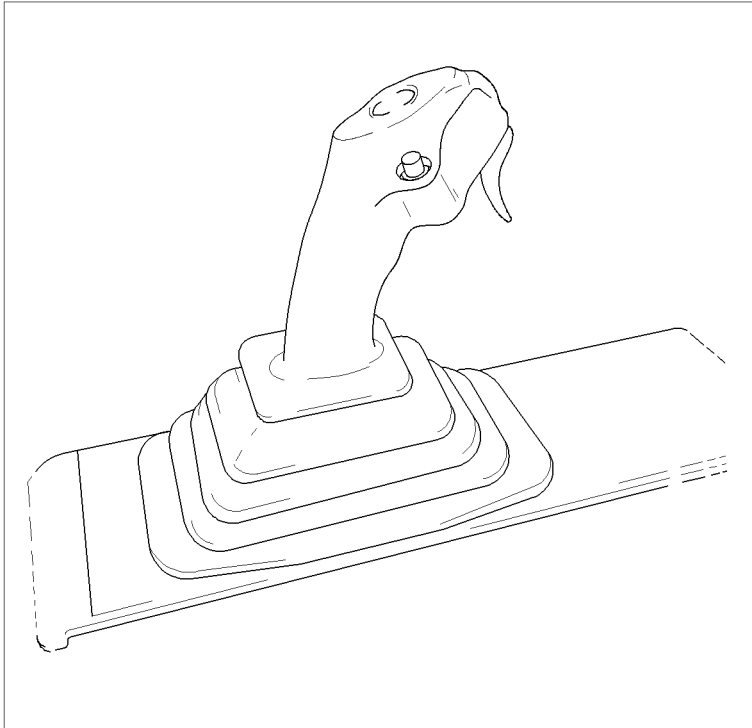


A340

FLIGHT CREW OPERATING MANUAL



FLIGHT OPERATIONS

3

 FLIGHT CREW OPERATING MANUAL	GENERAL INFORMATION CONTENTS	3.00.00	P 1
		SEQ 001	REV 13

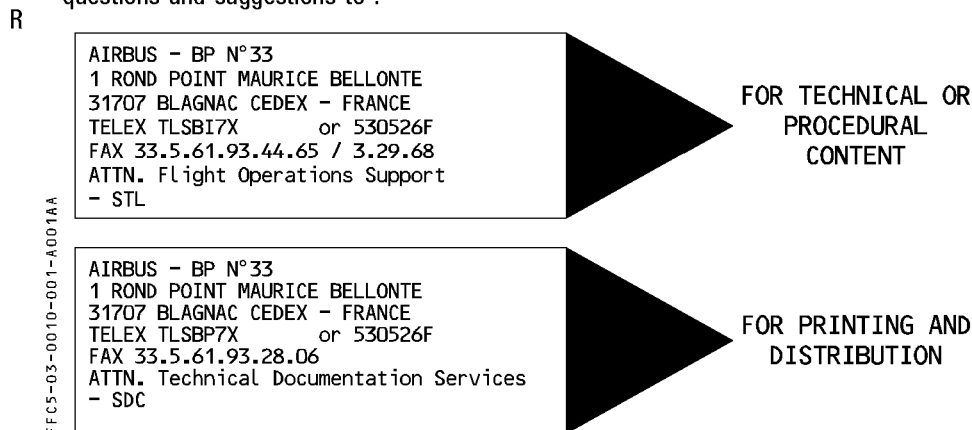
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FOREWORD

- R 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 :



CONTENT

- R The Flight Crew Operating Manual is the support documentation for flight crew operations.
- R The Flight Crew Operating Manual provides operating crews with the technical, procedural and performance characteristics of the A340 aircraft to ensure a safe and efficient operation during normal and/or abnormal/emergency situations on ground and in flight.
- R However, the Flight Crew Operating Manual is not intended to provide basic jet aircraft piloting techniques or information that are considered as basic airmanship for trained flight crews familiar with that type of aircraft and with its general handling characteristics.
- R The Flight Crew Operating Manual is intended :
- R — To be used directly as flight crew operating manual or to be the basis for elaboration of the relevant parts of the “crew manual” by the operations department of the operator in accordance with applicable requirements.
 - R — To be used as a flight crew training manual (initial and refresher).
- R However, the Flight Crew Operating Manual is not intended to be used for teaching basic piloting skills.

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	ORGANIZATION OF THE MANUAL		SEQ 001	REV 24

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 personnel 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.

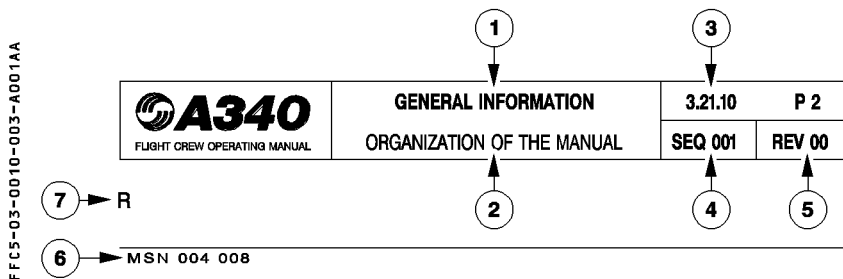
- Where a paragraph or schematic is preceded by the heading **FOR INFO** the details given are considered to be "nice to know". Knowledge of these items is not required for the type rating qualification.
- Warnings and cautions are summarized in a table at the end of each chapter. Numeric values are given for information only.

OPTIONAL EQUIPMENT

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

 A340 FLIGHT CREW OPERATING MANUAL	GENERAL INFORMATION		3.00.10	P 3
	ORGANIZATION OF THE MANUAL		SEQ 001	REV 13

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, or ALL (when a 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.

 A340 FLIGHT CREW OPERATING MANUAL	GENERAL INFORMATION		3.00.10	P 4
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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 filing instructions and an updated customized list of effective OEB.

HOW TO INSERT A REVISION

GENERAL

Two documents added to each revision facilitate its incorporation :

- the “Filing instructions” is a list of sheets to be removed or inserted.
- the “List of Effective Pages - LEP” is a list of all pages valid for the entire fleet of the airline.

ACTIONS TO BE TAKEN

AIRLINE ENVELOPE MANUAL			
CODE	MEANING	ACTION	OBSERVATIONS
N	NEW	Sheet to be inserted	The sheet is inserted for the first time
R	REVISED	Sheet to be inserted in place of the previous one	The sheet already exists but its contents is updated by the revision.
C	CANCELLED	Sheet to be removed	The sheet is cancelled.

AIRLINE PARTICULAR AIRPLANE MANUAL			
CODE	MEANING	ACTION	OBSERVATIONS
N	NEW	Sheet to be inserted in the airplane manuals indicated in the “validity zone”.	The sheet is inserted for first time.
R	REVISED	Sheet to be inserted in the airplane manuals indicated in the “validity zone”, in place of the previous one.	The sheet already exists but its contents is updated by the revision.
C	CANCELLED	Sheet to be removed from all airplane manuals.	The sheet is cancelled.

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.

 A340 FLIGHT CREW OPERATING MANUAL	GENERAL INFORMATION LIST OF CODES	3.00.20	P 1
		SEQ 001	REV 27

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

	CODE	DESIGNATION
	0001	Mod : 46179 = 47456 = (40023+46179) = (40023+47456)
R	0002	Mod : (49192+49633) = (49633+52306) = (47419+49633+52306) =
R		(47419+49192+49633)
	0003	Mod : 45332 = 46255 = (42143+45332) = (42143+46255) = (42223+45332) =
		(42143+42223+45332) = (42143+42223+46255) = (42143+42223+45332+46255)
	0004	Mod : (44385+44431) = (44358+44431+45509+46095)
R	0005	Mod : (47000+47654+52465) = (47001+47654+52465)
	0006	Mod : (40259+46441) = (40512+46441) = (40259+40512+46441)
R	0007	Mod : (46742+50076) = (46742+48227+50076)
R	0008	Mod : 51808 = 45738 = (44135+45738)
R	0009	Mod : 47244 = 52423 = (43537+47244) = (43537+52423)
R	0010	Mod : (47001+50791) = (47001+50791+51080)
R	0011	Mod : 47419 = (45025+46257+47419) = (40064+43057+45025+46257+47419)
R	0012	Mod : (47419+40064) = (40064+45025+46257+47419)
R	0013	STD = Mod : 51096 = (43395+46894+51096)
R	0014	Mod : 46742+47002+47921+52845+52874
R	0015	Mod : 46613 = 51809 = (43500+46613) = (44135+46613) = (45738+46613) =
R		(44135+45738+46613)
R	0016	Mod : (50967+51733) = (50967+51733+51885+52599)
R	0017	Mod : 47000 = (47000+51885+52599)
	0018	Mod : (40063+42915) = (40063+42630+42915)
	0019	Mod : (40023+44260) = (40023+44260+44495)
	0020	Mod : (44385+44431+45509) = (44385+44431+45509+46095+46589)
	0021	Mod : 40260 = 40512 = 49136 = 50107 = D45087 = d43970 = (40260+40512) =
		(40259+48551) = (40259+49502)
R	0022	Mod : (40086+40518) = (40086+41957) = (40086+40518+47261) =
R		(40086+41957+47261) = (40086+40518+45341+45748) =
R		(40086+40518+45341+45342+45748+47324) =
R		(40086+45341+45748+43724+47755) = (40086+40518+45341+45748+47324) =
R		(40086+45341+45748+47324+47755)
R	0023	Mod : (40467+40518) = (40467+41957) = (40518+45748) = (41957+45748) =
R		(45748+47755) = (40467+45341+45748) = (40518+45341+45748) =
R		(41957+45344+45748) = (40467+40518+45341+45748) =
R		(40086+40518+45341+45748)
	0024	Mod : 44260 = (44260+44495)
	0025	Mod : 40023 = (40023+44495)
	0026	Mod : (41126+44260) = (43238+44260)
	0027	Mod : 44625 = (43238+44625) = (43500+44625)
	0028	Mod : 44228 = (41302+44228) = (43238+44228)
R	0029	Mod : 41124 = 41125 = 43237 = 45390 = 45391 = 45392 = 45950 = 47002
	0030	Mod : 40086 = (40086+40630) = (40086+45341) = (40086+47261) =
		(40086+40518+45341+45784+47324)
	0031	Mod : 40467 = 45748 = (40467+40630) = (40467+45341) = (40467+45748) =
		(45341+45748)
R	0032	Mod : (47002+52845+52874) = (46742+47002+47921+52845+52874)

	CODE	DESIGNATION
R	0033	Mod : 40467 = 45748 = (40467+40630) = (40467+45341) = (40467+45748) = (45341+45748) = (40467+45341+45748) = (45341+45748+52183) = (40467+45748+47000+47002) = (45748+47000+47002+52183)
R	0034	Mod : 44968 = 44969 = (44968+44969)
R	0035	Mod : (42611+44004) = (42611+44004+46257)
	0036	Mod : (45509+46257) = (45509+46095+46257+46589)
	0037	Mod : 44228 = (43238+44228)
	0038	Mod : (40023+44229) = (40023+41302+44229)
R	0039	Mod : 44230 = (41302+44230) = (44135+44791)
	0040	Mod : (40023+44229) = (40023+41302+44229)
	0041	Mod : 44135 = (43500+44135)
	0042	Mod : 44228 = (41302+44228)
	0043	Mod : 44625 = (43500+44625)
	0044	Mod : (46257+46290) = (47419+46290) = (45509+46095+46257+46290)
	0045	Mod : (45509+46257+46290) = (45509+46095+46257+46290+46589)
	0046	Mod : (43442+47500) = (43442+50214) = (43442+46863+47500) = (43442+47500+50214)
	0047	Mod : (43500+44791) = (43500+44625+44791)
R	0048	Mod : 46613 = 51809 = (51808+51809) = (43500+46613) = (44135+46613) = (44135+45738+46613)
R		
R	0049	Mod : 40086 = (40086+40630) = (40086+45341) = (40086+47261) = (40086+45748+47324) = (40086+40518+45341+45748+47324) = (40086+45748+47002+47324) = (40086+45748+47000+47002+47324) = (40086+45748+47000+47002+47324+52183)
R		
R	0050	Mod : (49192+52108) = (49192+49633+52108)
R	0051	Mod : (41600+47002) = (41600+42855+47002)
R	0052	Mod : (40259+48551) = (40259+40260+40379) = (40259+40260+40379+40512)
	0053	Mod : 40518 = 41957 = 47755 = (40257+45748+47755)
R	0054	Mod : (46257+49192+49633) = (46257+52306+49633)
R	0055	Mod : (46257+49144+49192+49633) = (46257+49144+52306+49633)
R	0056	Mod : (40259+47549) = (40259+47967) = (40512+47549) = (40512+47967) = (40512+48558) = (40259+49423) = (40512+49423) = (47419+47967+49157) = (40259+40512+47549) = (40259+40512+47967) = (40512+47419+47967) = (40259+47419+47967) = (40259+40512+47419+47549) = (40259+40512+47419+47967) = (40259+40512+47419+47967+49157) = (40259+40512+47419+49157) + (40259+47419+48558)
R		
R	0057	Mod : (40259+46441+47549) = (40259+46441+47967) = (40512+46441+47549) = (40512+46441+47967) = (40512+46441+48558) = (40259+46441+49423) = (40512+46441+49423) = (40259+40512+46441+47549) = (40259+40512+46441+47967)
	0058	Mod : (40259+46441+47419+47549) = (40259+46441+47419+47967) = (40512+46441+47419+47549) = (40512+46441+47419+47967) = (40259+46441+47419+49423) = (40512+46441+47419+48558) = (40512+46441+47419+49423) = (40259+40512+46441+47419+47549) = (40259+40512+46441+47419+47967)
	0059	Mod : (40259+46441+47419) = (40512+46441+47419) = (40259+40512+46441+47419)
R	0060	Mod : (40259+40260+40379+47978) = (40259+40260+40379+47978/SAS)
R	0061	Mod : (49183+49192+49633) = (49183+49633+52306) = (49183+49192+49633+52306)
R		
	0062	Mod : 43500 = 44135 = 44625 = (43500+44135) = (43500+44625)
R	0063	Mod : (49144+49192+53368) = (49144+52306+53368)
R	0064	Mod : (45237+49192+53368) = (45237+52306+53368)

CODE		DESIGNATION
R R R R R R R	0065	Mod : (41126+44260+47297) = (43238+44260+47297)
	0066	Mod : 40086 = (40086+40630) = (40086+45341) = (40086+47261) = (40086+45748+47324) = (40086+40518+45341+45748+47324) = (40086+45748+47002+47324) = (40086+45748+47000+47002+47324)
	0067	Mod : 47000 = (47001+47654)
	0068	Mod : (49192+49633) = (52306+49633)
	0069	Mod : (49144+49192+49633) = (49144+52306+49633)
	0070	Mod : 49192 = 52306 = (47002+51973)
	0071	Mod : (45509+47419+47930) = (45509+46095+46589+47419+47930)
	0072	Mod : 47000 = (47001+47654) = (47000+47654)
	0073	Mod : (40097+49192) = (40097+52306) = (40097+49192+49633) = (40097+49633+52306)
	0074	Mod : 49192 = 52306 = (49192+49633) = (49633+52306)
R R R R R R R	0075	Mod : 49192 = (49192+51869) = (51844+51869+52306) = (49192+51844+51869+52306)
	0076	Mod : (45451+46257) = (45452+46257) = (48447+46256)
	0077	Mod : 47000 = (44385+44431+45509+47000)
	0078	Mod : (47419+47930) = (46257+47419+47930) = (45509+46095+46257+47419+47930)
	0079	Mod : (46257+46290+47419+47930) = (45509+46095+46257+47419+47930+46290)
	0080	Mod : (46509+46257+46290+47419+47930) = (45509+46095+46257+47419+47930+46290+46589)
	0082	Mod : (46257+46290+49192) = (46257+46290+52306)
	0083	Mod : (45509+46257+46290+47419+47930+49192+49633) = (45509+46257+46290+47419+47930+49633+52306)
	0084	Mod : (45509+47930+49192) = (45509+47930+52306)
	0085	Mod : (45509+44604) = (45509+46095+46589+44604)
R R R R R R R	0086	Mod : 49633 = (47419+49633) = (46257+47419+49633)
	0087	Mod : (44431+49633) = (44431+47419+49633) = (44431+46257+47419+49633)
	0088	Mod : (47460+49633) = (47419+47460+49633) = (46257+47419+47460+49633)
	0089	Mod : (44431+47460+49633) = (44431+47419+47460+49633) = (44431+46257+47419+47460+49633)
	0090	Mod : (46257+46290+47419+47930+49633) = (45509+46095+46257+46290+47419+47930+49633)
	0091	Mod : (45509+46257+46290+47419+47930+49633) = (45509+46095+46257+46290+46589+47419+47930+49633)
	0092	Mod : (45509+47419+47930+49633) = (45509+46095+46589+47419+47930+49633)
	0093	Mod : (47419+47930+49633) = (46257+47419+47930+49633) = (45509+46095+46257+47419+47930+49633)
	0094	Mod : 49192 = 52306 = (49192+49633) = (49633+52306) = (46257+49192+49633) = (46257+49633+52306)
	0095	Mod : (46441+49192) = (46441+52306) = (46441+49192+49633) = (46441+49633+52306)
R R R R R	0096	Mod : (48818+49192) = (48818+52306) = (48818+49192+50091) = (48818+50091+52306) = (48818+49192+49633+50091) = (48818+49633+50091+52306)
	0097	Mod : 47002 = 48818 = (48818+49192) = (48818+52306)
	0098	Mod : (40259+46441+49633) = (40512+46441+49633) = (40259+40512+46441+49633)

	CODE	DESIGNATION
R	0099	Mod : (40259+47967+46441+49633) = (40259+46441+47549+49633) = (40512+47967+46441+49633) = (40512+46441+47549+49633) = (40259+40512+46441+48558+49633)
R	0100	Mod : (40097+46482+49633) = (40097+46561+49633)
R	0101	Mod : 47001 = (44385+44431+45509+47001)
R	0102	Mod : (47002+48972) = (47002+49101) = (47002+49829) = (48818+50091) = (48818+49192+50091) = (48818+50091+52306)
R	0103	Mod : (49633+49844) = (46257+49633+49844)
R	0104	Mod : 49633 = (49633+46257) = (49633+46257+45025)
R	0105	Mod : 49192 = 52306 = (44063+49192) = (44063+52306)
R	0106	Mod : 47000 = (45509+46257+46596+47000)
R	0107	Mod : (46742+47419+48227) = (46742+47002+48227)
R	0108	Mod : (40467+40518) = (40467+41957) = (40518+45748) = (41957+45748) = (45748+47755) = (40467+45341+45748) = (40518+45341+45748) = (41957+45344+45748) = (45748+47002+47755) = (40467+40518+45341+45748) = (40086+40518+45341+45748) = (40518+45341+45342+45748) = (45748+47000+47002+47755) = (40467+40518+45341+45342+45748) = (45748+47002+47755+52183+52188) = (40467+45748+47000+47002+47755+52183+52188)
R	0109	Mod : (40257+40467) = (40257+45748) = (40257+40467+45341) = (40257+40467+45748) = (40257+45341+45748) = (45748+47002+48635) = (40257+40467+45341+45748) = (40257+40467+40518+40630+41957+45748)
R	0110	Mod : 47002 = (45191+46257+46532+47002)
R	0111	Mod : (40256+46257) = (41827+46257) = (42114+46257) = (42913+46257) = (44451+46257) = (44701+46257) = (45179+46257) = (45966+46257) = (46257+46728) = (40256+41827+46257) = (41827+45966+46257) = (45179+45966+46257)
R	0112	Mod : (D41829+S14956) = (D41987+S14956) = (D43999+S14956) = (D45206+S14956) = (D45260+S14956) = (D45356+S14956) = (D47227+S14956)
R	0113	Mod : STD = 44724 = (44308+44724) = (44724+44907)
R	0114	Mod : 44308 = 44339 = 46893 = (44308+44724+44907) = (44339+44724+44907)
R	0115	R[00e9]serv[00e9] STUDEC
R	0116	Mod : 44308 = 44339 = 46893 = (44308+44724+44907)
R	0117	Mod : 49144 = (49144+49192) = (49144+52306)
R	0118	Mod : 46324 = (44724+46324) = (44308+44724+46324) = (44724+44907+46324)
R	0119	Mod : (44308+46324) = (44339+46324) = (46324+46572) = (46324+46893) = (44308+44724+44907+46324)
R	0121	Mod : (49192+50718) = (49192+50982) = (50718+52306) = (50982+52306)
R	0122	Mod : 46893 = (42083+44339) = (42233+44339) = (42083+44339+46893) = (45100+46893+46990) = (42083+44339+44724+44907) = (46893+47589+52564+47552)
R	0123	Mod : (49144+49192+50718) = (49144+49192+50982) = (49144+50718+52306) = (49144+50982+52306)
R	0124	Mod : 49192 = 52306 = (46257+49192) = (46257+52306)
R	0125	Mod : (42611+44004+46192) = (42611+44004+52306)
R	0126	Mod : (S14942+47930+49192) = (S14942+47930+52306) = (47930+49192+49800) = (47930+49800+52306) = (S14942+47930+49192+49800) = (S14942+47930+49800+52306)
R	0127	Mod : 47001 = (45509+46257+46596+47001)
R	0128	Mod : (49192+53368) = (51973+53368) = (52306+53368)
R	0129	Mod : (43442+46863) = (43442+51393) = (43442+46863+47500+51393)
R	0130	Mod : 46863 = 51393 = (46863+47500+51393)

	CODE	DESIGNATION
R	0131	Mod : 46613 = 51809 = (43500+46613) = (44135+46613) = (45738+46613) = (51808+51809) = (44135+45738+46613)
R	0132	Mod : (42182+44063) = (42182+44063+44495)
R	0133	Mod : 47002 = (44495+47002) = (44063+47002) = (44063+44495+47002)
R	0134	Mod : 46893 = (42083+44339) = (42233+44339) = (42083+46893) = (42083+44339+46893) = (45100+46893+46990) = (42083+44339+44724+44907) = (46893+47589+52564+47552)
R	0135	Mod : (46572+51144) = (46572+46893+51144)
R	0136	Mod : (41240+44308+45100+46894+51096) = (45100+46893+46894+47552+47589) = (45100+46893+45894+47552+47589+51096) = (45100+46893+46894+47552+47589+51096+51144)
R	0137	Mod : (47002+51973+53368) = (40064+43057+47002+51973+53368)
R	0138	Mod : (47002+47244+48096) = (47002+47244+48096+48586)
	0153	STD = Mod : 42083 = 42233 = 45100 = (45100+46894) = (41240+44724) = (42083+44724+44907) = (42083+44724+44339) = (41240+44308+44724+45100+46894) = (41240+44724+44907+45100+46894)
	0155	Mod : 47002 = (44451+46257+47002) = (46257+46728+47002) = (45179+45966+46257+47002)
	0156	Mod : 40086+45748+47002+47324+50616
	0157	Mod : (46257+49103) = (46257+47990) = (46257+50982)
	0158	Mod : 50321 = 47990 = 50982 = (44308+47990) = (44308+50982) = (44339+47990) = (44339+50982) = (44724+47990) = (44724+50982) = (46893+50321) = (46893+47990) = (46893+50982) = (44308+44724+47990) = (44308+44724+50982) = (46572+46893+47990)
	0159	Mod : 47990 = 49103 = 50321 = 50982 = (40023+47990) = (46179+47990) = (46179+50982) = (40023+50982)
	0160	Mod : (40096+40098) = (40186+40190) = (40706+40707) = (40707+40709)
	0161	Mod : 47500 = 50214 = (46863+47500) = (46863+50214) = (47500+50214)
	0162	Mod : (40086+40518) = (40086+41957) = (40086+40518+47261) = (40086+41957+47261) = (40086+40518+45341+45748) = (40086+40518+45341+45342+45748+47324)
R	0163	Mod : 49192 = 52306 = (45237+49192) = (45237+52306)
R	0164	Mod : (45900+46257+49192) = (45900+46257+52306)
R	0165	Mod : (40256+46257+46728+49192) = (45179+45966+46257+49192) = (40256+46257+46728+52306) = (45179+45966+46257+52306)
R	0166	Mod : 46324 = (46324+47244+52166) = (46324+47244+52167)
	0167	Mod : (46893+45100) = (41240+44308+46894) = (45100+46893+46894) = (412140+44308+45100) = (41240+44308+45100+46894) = (41240+44308+44724+44907+46894) = (41240+44308+44724+44907+45100+46894)
R	0168	Mod : (46893+51144) = (45100+46893+46894+51144) = (46893+47589+52564+47552+51144)
R	0169	Mod : 45509 = (45509+47244+52166) = (45509+47244+52167)
	0170	STD = Mod : (47244+52166) = (47244+52167)
R	0171	Mod : (40257+40467) = (40257+45748) = (40257+40467+45341) = (40257+40467+45748) = (40257+45341+45748) = (45748+47002+48635) = (40257+40467+45341+45748)
R	0172	Mod : 40257 = (40257+40467) = (40257+45748) = (45748+48635)
R	0173	Mod : 49192 = (47419+49192) = (46257+47419+49192)
R	0174	Mod : 45509+46257+46290+47419+47930+49192+49633
R	0175	Mod : (49144+49192+50718) = (49144+49192+50982)

	CODE	DESIGNATION
	0176	Mod : (49192+46441) = (49633+49192+46441)
	0177	Mod : (49192+48818) = (49192+48818+50091)
	0178	Mod : (47002+48972) = (47002+49101) = (47002+49829) = (48818+50091) = (49192+48818+50091)
	0179	Mod : (49633+51502) = (40097+46482+49633+51502) = (40097+46561+49633+51502)
R	0180	Mod : (40097+49633+51502) = (40097+46482+49633+51502) = (40097+46561+49633+51502)
R	0181	Mod : (49633+51502) = (46482+49633+51502) = (46561+49633+51502)
R	0182	Mod : 42094 = 43584 = 45496 = 46063 = 47110 = 48050 = 49539 = (42094+45496)
	0183	Mod : 44308 = 44339 = 46893 = (44308+44724+44907)
	0184	Mod : (44308+46257+46324) = (44339+46257+46324) = (46257+46324+46893) = (44308+44724+46257+46324) = (44308+44724+44907+46257+46324)
	0185	STD = Mod : 44724 = (44308+44724) = (44724+44907) = (44308+44724+46257)
	0186	Mod : 44308 = 44339 = 46893 = (44308+44724+44907) = (44339+44724+44907)
	0187	Mod : (44308+46257) = (44339+46257) = (46257+46893) = (44308+44724+44907+46257) = (44339+44724+44907+46257)
R	0188	Mod : (49633+49192) = (49633+52306) = (46257+49192+49633) = (46257+49633+52306)
R	0189	Mod : 49192 = 52306 = (45025+46257+49192) = (45025+46257+52306)
R	0190	Mod : (49192+49633+49844) = (49633+49844+52306)
R	0191	Mod : (49144+49192+49633+49844) = (49144+49633+49844+52306)
R	0192	Mod : (49192+53368) = (52306+53368) = (40064+43057+49192+53368) = (40064+43057+52306+53368)
R	0193	Mod : 49192 = 52306 = (40064+43057+49192) = (40064+43057+52306)
R	0194	Mod : (40064+49192+53368) = (40064+52306+53368)
R	0196	Mod : (45237+49144+49192) = (45237+49144+52306) = (45237+47419+49144+49192) = (45237+47419+49144+52306)
R	0197	Mod : (43500+44791) = (44135+44791) = (43500+44625+44791)

R

N°	ISSUE DATE	
00	JUL 91	
01	NOV 91	
02	APR 92	
03	JUL 92	
04	OCT 92	
05	FEB 93	
06	MAR 93	
07	JUN 93	
08	OCT 93	
09	DEC 93	
10	MAR 94	
11	AUG 94	
12	SEP 95	
13	NOV 96	
14	JAN 98	
15	JUL 98	
16	DEC 98	
17	APR 99	
18	SEP 99	
19	MAR 00	
20	JUL 00	
21	DEC 00	
22	JUL 01	
23	DEC 01	
24	JUN 02	
25	MAR 03	
26	JAN 04	

[illegible]

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
0063	LV-ZP0
0074	LV-ZPJ
0080	LV-ZPX
0085	LV-ZRA

ARG

V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA-----
-----REASONS OF CHANGE-----

3 01 22 002 110 REV027 CODE:0114
- INCORPORATION OF MOD 44308
- INCORPORATION OF MOD 44339
- INCORPORATION OF MOD 46893

3 01 22 002A 100 REV026 CODE 0114
- INCORPORATION OF MOD 44308
- INCORPORATION OF MOD 44339
- INCORPORATION OF MOD 46893

3 01 34 001 100 REV026 CODE:0166
- INCORPORATION OF MOD 46324

3 02 22 001 100 REV027 46324
- INCORPORATION OF MOD 46324

3 02 22 005 100 REV027 46324
- INCORPORATION OF MOD 46324

3 02 24 006 205 REV025 44431+45509
- INCORPORATION OF MOD 44431
- INCORPORATION OF MOD 45509

3 02 24 008 100 REV024 45509={45509+46095+46589}
- INCORPORATION OF MOD 45509

3 02 24 011 303 REV026 CODE 0084
- INCORPORATION OF MOD 45509
- INCORPORATION OF MOD 49192
- INCORPORATION OF MOD 52306

3 02 24 014 100 REV025 CODE:0169
- INCORPORATION OF MOD 45509

3 02 24 016 405 REV026 M:45509+46257+46596+49633
- INCORPORATION OF MOD 45509

3 02 24 017 205 REV026 M:45509+49633
- INCORPORATION OF MOD 45509

3 02 24 018 205 REV025 M:45509+49633
- INCORPORATION OF MOD 45509

3 02 24 021 100 REV025 M: 45509={45509+46095+46589}
- INCORPORATION OF MOD 45509

3 02 34 001 100 REV017 M:46324
- INCORPORATION OF MOD 46324

V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA-----
-----REASONS OF CHANGE-----

3 02 34 002 100 REV024 46324
- INCORPORATION OF MOD 46324

3 02 34 004A 100 REV024 M:46324
- INCORPORATION OF MOD 46324

3 02 34 006 300 REV026 CODE 0184
- INCORPORATION OF MOD 46257
- INCORPORATION OF MOD 46324
- INCORPORATION OF MOD 46893

3 02 34 007 100 REV024 M:46324
- INCORPORATION OF MOD 46324

3 02 34 012 100 REV025 46324
- INCORPORATION OF MOD 46324

3 02 34 013 100 REV023 46324
- INCORPORATION OF MOD 46324

3 02 70 007 205 REV024 CODE:0036
- INCORPORATION OF MOD 45509

3 02 80 002 100 REV027 M:46324
- INCORPORATION OF MOD 46324

3 02 80 005 100 REV027 M:46324
- INCORPORATION OF MOD 46324

3 03 18 002 200 REV025 CODE 0119
- INCORPORATION OF MOD 46324
- INCORPORATION OF MOD 46893

3 03 19 001 100 REV026 CODE:0183
- INCORPORATION OF MOD 44308
- INCORPORATION OF MOD 44339
- INCORPORATION OF MOD 46893

3 03 19 003 202 REV026 CODE 0167
- INCORPORATION OF MOD 46893

3 03 19 006 210 REV025 CODE 0119
- INCORPORATION OF MOD 46324
- INCORPORATION OF MOD 46893

3 03 19 007 110 REV025 CODE:0183
- INCORPORATION OF MOD 44308
- INCORPORATION OF MOD 44339
- INCORPORATION OF MOD 46893

V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA-----
-----REASONS OF CHANGE-----

3 04 34 015 200 REV025 M:46324+49633

- INCORPORATION OF MOD 46324
- INCORPORATION OF MOD 49633

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

3	00	00	001	001	REV013		ALL
3	00	10	001	001	REV024		ALL
3	00	10	002	001	REV024		
3	00	10	003	001	REV013		ALL
3	00	10	004	001	REV013		
3	00	10	005	001	REV013		ALL
3	00	20	001	001	REV027	LIST OF CODES	ALL
3	00	20	002	001	REV027	LIST OF CODES	
3	00	20	003	001	REV027	LIST OF CODES	ALL
3	00	20	004	001	REV027	LIST OF CODES	
3	00	20	005	001	REV027	LIST OF CODES	ALL
3	00	20	006	001	REV027	LIST OF CODES	
3	00	30	001	001	REV026	LIST OF NORMAL REVISIONS	ALL
3	00	30	002	001	REV027	LIST OF NORMAL REVISION	
3	00	35	001	001	REV014	RECORD OF TEMPORARY REVISION	ALL
3	00	36	001-LTR	001	REV027	LIST OF TEMPORARY REVISIONS	ALL
R	3	00	70	CRT	001	REV027	CROSS REFERENCE TABLE
							ALL
	3	00	75	HL	001	REV027	HIGHLIGHTS
							ALL
R	3	00	80	LEP	001	REV027	LIST OF EFFECTIVE PAGES
							ALL
	3	00	85	L0M	001	REV027	LIST OF MOD/MP/SB
							ALL
	3	01	00	001	001	REV024	
	3	01	00	002	001	REV023	
							ALL
	3	01	10	001	001	REV012	
							ALL
	3	01	20	001	255	REV014	CODE 0038/CFM 56-5-C2
	3	01	20	002	220	REV021	CODE:0040
							ALL
	3	01	20	003	001	REV020	
	3	01	20	004	100	REV027	44585
							ALL
	3	01	20	004A	001	REV027	
							ALL
	3	01	20	005	200	REV026	CODE 0132
	3	01	20	006	150	REV014	CODE 0025/CFM 56-5-C2
							ALL
	3	01	20	007	100	REV014	MOD 40023
							ALL
	3	01	21	001	001	REV023	STD=42902
							ALL
N	3	01	22	001	001	REV025	
							ALL
N	3	01	22	002	110	REV027	CODE:0114
N	3	01	22	002A	100	REV026	CODE 0114
							ALL

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

		3	01	22	003	105	REV022		CODE:0159		ALL
		3	01	22	004	105	REV025		47990=49103=50982		
		3	01	25	001	200	REV027		CODE 0052		ALL
		3	01	28	001	001	REV020				0063
		3	01	28	002	001	REV022				
		3	01	28	001	100	REV020		M:41600		0074-0085
		3	01	28	002	001	REV022				
		3	01	29	001	001	REV015				ALL
		3	01	32	001	100	REV023		CODE 0161		ALL
		3	01	32	002	001	REV024				
N	3	01	34	001		100	REV026		CODE:0166		ALL
		3	01	35	001	205	REV014		CODE 0108		ALL
		3	01	35	002	001	REV012		STD=40086=40467=45748		
		3	01	49	001	001	REV027				ALL
		3	01	49	002	110	REV023		CODE:0003		
		3	01	70	001	020	REV027		ALL CFM		ALL
		3	01	70	002	020	REV018		CFM ALL		
		3	02	00	001	105	REV026		CODE 0074		ALL
		3	02	00	002	001	REV027				
		3	02	00	003	110	REV027		M:50014		ALL
		3	02	00	004	210	REV026		CODE 0103		
		3	02	00	005	200	REV026		M:46257+49192=46257+52306		ALL
		3	02	00	006	113	REV027		M:49192=52306		
		3	02	00	007	120	REV027		CODE 0193		ALL
		3	02	00	008	001	REV027				
		3	02	00	009	105	REV027		CODE 0104		ALL
		3	02	00	010	001	REV027				
		3	02	01	001	001	REV014				ALL
		3	02	01	002	001	REV019				
		3	02	01	003	001	REV027				ALL
		3	02	01	004	001	REV021				
		3	02	01	005	001	REV026				ALL
		3	02	01	006	001	REV026				
		3	02	10	001	001	REV014				ALL
		3	02	10	002	100	REV025		M:44063		
		3	02	10	003	001	REV025				ALL
		3	02	10	004	001	REV025				
		3	02	10	005	100	REV025		MOD 44495		ALL
		3	02	10	006	001	REV026				

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

3	02	10	007	001	REV026		ALL
3	02	10	008	001	REV026		
3	02	10	009	100	REV026	M:44063	ALL
3	02	10	010	001	REV026		
3	02	21	001	105	REV024	40097	ALL
3	02	21	002	105	REV024	40097	
3	02	21	003	202	REV024	40097+49633	0063 0080-0085
3	02	21	004	205	REV026	CODE 0073	
3	02	21	003	302	REV024	CODE:0100	0074
3	02	21	004	205	REV026	CODE 0073	
3	02	21	005	935	REV026	M:49192=52306	ALL
3	02	21	006	001	REV016		
3	02	21	007	103	REV027	CODE 0074	ALL
3	02	21	008	001	REV025		
3	02	21	009	001	REV022		ALL
3	02	21	010	103	REV026	CODE 0074	
3	02	21	011	103	REV026	M:49192=52306	ALL
3	02	21	012	102	REV024	47419	
3	02	21	013	103	REV026	49192=52306:(47002+51973)	ALL
N	3	02	22	001	100	REV027	46324
N	3	02	22	002	001	REV016	ALL
3	02	22	003	001	REV014		ALL
3	02	22	004	001	REV024		
N	3	02	22	005	100	REV027	46324
N	3	02	22	006	001	REV027	STD
3	02	23	001	100	REV025	M:46257	ALL
3	02	23	002	105	REV024	49633	
3	02	24	001	100	REV015	MOD 44431	ALL
3	02	24	002	001	REV014		
3	02	24	003	001	REV014		ALL
3	02	24	004	208	REV026	CODE:0087	
3	02	24	005	001	REV022		ALL
3	02	24	005A	001	REV022		ALL
N	3	02	24	006	205	REV025	44431+45509
N	3	02	24	007	001	REV015	ALL
N	3	02	24	008	100	REV024	45509:(45509+46095+46589)
3	02	24	009	001	REV020		ALL
3	02	24	010	340	REV024	CODE:0093	

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

N	3	02	24	011		303	REV026		CODE 0084			ALL
N	3	02	24	012		001	REV024					
N	3	02	24	013		001	REV017					ALL
N	3	02	24	014		100	REV025		CODE:0169			
N	3	02	24	015		001	REV027					ALL
N	3	02	24	016		405	REV026		M:45509+46257+46596+49633			
N	3	02	24	017		205	REV026		M:45509+49633			ALL
N	3	02	24	018		205	REV025		M:45509+49633			
		3	02	24	019		100	REV024	46257			ALL
		3	02	24	020		001	REV026				
N	3	02	24	021		100	REV025		M: 45509=(45509+46095+46589)			ALL
N	3	02	24	022		100	REV026		M:44710=45117			
		3	02	25	001		200	REV025	50014+50723=50014+51243			ALL
		3	02	26	001		001	REV022				ALL
		3	02	26	002		105	REV026	M:49192=52306			
		3	02	26	003		001	REV021				ALL
		3	02	26	004		001	REV027				
		3	02	26	005		001	REV027				ALL
		3	02	26	006		001	REV027				
		3	02	26	007		102	REV026	CODE 0094			ALL
		3	02	26	008		102	REV026	49633			
		3	02	26	009		001	REV027				ALL
		3	02	26	010		103	REV027	M:40096=40186=47107			
		3	02	26	011		001	REV027				ALL
		3	02	26	012		001	REV027				
		3	02	26	013		210	REV026	CODE:0056			ALL
		3	02	26	014		100	REV026	47002=49192=52306			
		3	02	27	001		001	REV014				ALL
		3	02	27	002		106	REV026	49192=52306			
		3	02	27	003		106	REV026	CODE 0105			ALL
		3	02	27	004		105	REV019	M:45237			
		3	02	27	005		100	REV016	M:46257			ALL
		3	02	27	006		200	REV026	CODE 0157			
		3	02	27	007		001	REV015				ALL
		3	02	27	008		001	REV015				
		3	02	27	009		001	REV024	STD:46257			ALL
		3	02	27	010		001	REV024				
		3	02	27	011		001	REV026				ALL
		3	02	27	012		100	REV026	46257			

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

3	02	27	013			001	REV027		STD=47002		ALL
3	02	27	014			001	REV014				
3	02	27	015			001	REV026				ALL
3	02	27	016			102	REV026		49192-52306		
3	02	27	017			001	REV026				ALL
3	02	27	018			100	REV027		47419		
3	02	27	019			001	REV020				ALL
3	02	27	020			100	REV026		47419		
3	02	28	001			200	REV024		49633+49844		ALL
3	02	28	002			100	REV027		47930		
3	02	28	003			001	REV024				ALL
3	02	28	004			105	REV016		M0D 44575		
3	02	28	005			105	REV026		CODE 0124		ALL
3	02	28	006			001	REV016				
3	02	28	007			100	REV016		M.46257		ALL
3	02	28	008			100	REV016		M.46257		
3	02	28	009			001	REV025				ALL
3	02	28	010			100	REV026		M:49192-52306		
3	02	28	011			001	REV027				ALL
3	02	28	012			001	REV027				
3	02	28	013			100	REV027		M:46257		ALL
3	02	28	014			100	REV026		M:40023		
3	02	28	015			001	REV025		STD		ALL
3	02	28	016			202	REV025		49633+49844		
3	02	28	017			305	REV026		CODE:0126		ALL
3	02	29	001			001	REV014				ALL
3	02	29	002			001	REV026				
3	02	29	003			100	REV024		M:47419		ALL
3	02	29	004			105	REV022		M:47419		
3	02	29	004A			001	REV021				ALL
3	02	29	005			100	REV024		M:47419		ALL
3	02	29	006			102	REV026		CODE 0163		
3	02	29	006A			102	REV023		47419		ALL
3	02	29	007			100	REV022		M:47419		ALL
3	02	29	008			102	REV026		M:49192-52306		
3	02	29	009			110	REV026		47419		ALL
3	02	29	010			001	REV026				
3	02	29	011			001	REV022				ALL
3	02	29	012			001	REV024				

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

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

N	3	02	34	001	100	REV017	M:46324	ALL
N	3	02	34	002	100	REV024	46324	
	3	02	34	003	001	REV027		ALL
	3	02	34	004	001	REV023		
N	3	02	34	004A	100	REV024	M:46324	ALL
N	3	02	34	005	001	REV025		ALL
N	3	02	34	006	300	REV026	CODE 0184	
N	3	02	34	007	100	REV024	M:46324	ALL
N	3	02	34	008	001	REV027	STD=40064+43057	
	3	02	34	009	100	REV025	47002+49192+52306	ALL
	3	02	34	010	200	REV027	CODE 0111	
N	3	02	34	011	001	REV014		ALL
N	3	02	34	012	100	REV025	46324	
N	3	02	34	013	100	REV023	46324	ALL
N	3	02	34	014	100	REV026	CODE:0022	
	3	02	34	015	105	REV026	M:49192+52306+(47002+51973)	ALL
	3	02	34	016	103	REV027	49192+52306+47002+51973	
	3	02	34	017	001	REV024		ALL
	3	02	34	018	001	REV024		
	3	02	34	019	001	REV024		ALL
	3	02	34	020	001	REV024		
	3	02	34	021	070	REV024	56-5-C2/C3	ALL
	3	02	34	022	070	REV024	56-5-C2/C3	
	3	02	34	023	070	REV024	56-5-C2/C3	ALL
	3	02	36	001	001	REV026		ALL
	3	02	36	002	102	REV024	46257	
	3	02	36	003	001	REV026		ALL
	3	02	36	004	001	REV026		
	3	02	36	005	001	REV025		ALL
	3	02	36	006	100	REV026	CODE 0189	
	3	02	36	007	102	REV026	46257	ALL
	3	02	36	008	001	REV024		
	3	02	49	001	100	REV016	M:46257	ALL
	3	02	52	001	001	REV025		ALL
	3	02	52	002	001	REV014		
	3	02	70	001	210	REV026	49192+49633+49633+52306/CFM	ALL
	3	02	70	002	210	REV027	CODE 0002/CFM	
	3	02	70	002A	100	REV018	M:46532	ALL

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

		3	02	70	003	001	REV018				ALL
		3	02	70	004	200	REV027	CODE 068			
		3	02	70	005	110	REV027	49633=47419+49633			ALL
		3	02	70	006	200	REV026	CODE 0188			
N	3	02	70	007	205	REV024	CODE:0036				ALL
N	3	02	70	008	120	REV024	CFM/49633				
		3	02	70	009	120	REV024	CFM/49633			ALL
		3	02	70	010	001	REV015				
		3	02	70	011	001	REV025				ALL
		3	02	70	012	001	REV014				
		3	02	70	013	050	REV014	CFM 56-5C2/5C3			ALL
		3	02	70	014	145	REV024	CFM/49633			
		3	02	70	015	001	REV014				ALL
		3	02	70	016	120	REV026	49633=(46257+49633)/CFM			
		3	02	70	017	310	REV026	CODE 0061/CFM			ALL
		3	02	70	018	130	REV027	49183/CFM			
		3	02	70	019	100	REV016	M:46257			ALL
		3	02	70	020	001	REV014				
		3	02	70	021	001	REV014				ALL
		3	02	70	022	001	REV013				
		3	02	70	023	105	REV014	MOD 45025			ALL
		3	02	70	024	001	REV019				
		3	02	70	025	001	REV026				ALL
		3	02	70	026	001	REV014				
N	3	02	80	001	001	REV027					ALL
N	3	02	80	002	100	REV027	M:46324				
		3	02	80	003	001	REV027				ALL
		3	02	80	004	001	REV027				
N	3	02	80	005	100	REV027	M:46324				ALL
N	3	02	80	006	001	REV027					
		3	02	80	007	001	REV023				ALL
		3	02	80	008	150	REV027	M:40023/CFM 56-5-C2			
		3	02	80	009	001	REV014				ALL
		3	02	80	010	001	REV023				
		3	02	80	010A	001	REV020				ALL
		3	02	80	011	001	REV024				ALL
		3	02	80	011A	001	REV023				ALL
		3	02	80	012	001	REV023				ALL

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

3	02	80	013	001	REV027		ALL
3	02	80	014	001	REV027		
3	02	80	015	001	REV014		ALL
3	02	80	016	200	REV027	45237+47419	
3	02	80	017	200	REV027	45237+47419	ALL
3	02	80	018	100	REV027	49633	
3	02	80	019	001	REV025		ALL
3	02	80	020	001	REV025		
3	02	80	021	100	REV025	M:43211=44100=44754	ALL
3	02	80	022	001	REV025		
3	02	90	001	001	REV014		ALL
3	02	90	002	001	REV026		
3	02	90	003	001	REV026		ALL
3	02	90	004	001	REV026		
3	02	90	005	001	REV026		ALL
3	02	90	006	001	REV026		
3	02	90	007	001	REV026		ALL
3	02	90	008	001	REV026		
3	03	00	001	001	REV016		ALL
3	03	01	001	001	REV024		ALL
3	03	01	002	001	REV024		
3	03	01	003	001	REV024		ALL
3	03	01	004	001	REV023		
3	03	01	005	001	REV014		ALL
3	03	02	001	001	REV023		ALL
3	03	02	002	001	REV014		
3	03	03	001	001	REV014		ALL
3	03	04	001	001	REV015		ALL
3	03	04	002	100	REV021	M:42630	
3	03	04	003	100	REV020	M:46255	0063 0080-0085
3	03	04	004	001	REV020	STD=M:45191+46257+46532	
3	03	04	003	102	REV022	47454÷(46255+47454)	0074
3	03	04	004	001	REV020	STD=M:45191+46257+46532	
3	03	04	005	001	REV025		ALL
3	03	04	006	001	REV027	STD OR (ACA/M:46257)	
3	03	04	007	001	REV017		ALL
3	03	05	001	001	REV024		ALL
3	03	05	002	001	REV024		

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

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3 03 05 003	001	REV012		ALL
3 03 05 004	001	REV024		
3 03 05 005	001	REV025		ALL
3 03 05 006	001	REV024		
3 03 05 007	001	REV014		ALL
3 03 06 001	001	REV014		ALL
3 03 06 002	001	REV027	STD	
3 03 06 003	001	REV021		ALL
3 03 06 004	001	REV022		
3 03 06 005	001	REV026		ALL
3 03 06 006	001	REV027		
3 03 06 007	001	REV016		ALL
3 03 06 008	001	REV022		
3 03 06 009	001	REV024		ALL
3 03 06 010	001	REV024		
3 03 06 011	001	REV023	CODE:0170	ALL
3 03 06 012	001	REV023		
3 03 06 013	001	REV027		ALL
3 03 06 014	001	REV023		
3 03 06 015	001	REV018		ALL
3 03 07 001	001	REV027		ALL
3 03 07 002	210	REV025	M: 47500+50014	
3 03 07 003	001	REV025		ALL
3 03 08 001	108	REV023	CFM/46532	ALL
3 03 08 002	020	REV019	CFM-SAS+50963	
3 03 09 001	020	REV025	CFM	ALL
3 03 09 002	100	REV020	M: 47297	
3 03 10 001	001	REV024	STD	ALL
3 03 10 002	100	REV023	CODE 0161	
3 03 10 003	001	REV026		ALL
3 03 10 004	001	REV026		
3 03 10 005	001	REV014		ALL
3 03 10 006	105	REV021	CODE 0161	
3 03 11 001	110	REV021	M: 47297	ALL
3 03 11 002	001	REV025		
3 03 12 001	001	REV027		ALL
3 03 12 002	001	REV027		
3 03 12 003	001	REV027		ALL
3 03 12 004	001	REV022		

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

		3	03	12	005	001	REV026				ALL
		3	03	13	001	108	REV025	CFM/RR/47297=47002			ALL
		3	03	14	001	001	REV016				ALL
		3	03	14	002	001	REV016				
		3	03	15	001	001	REV027				ALL
		3	03	15	002	001	REV025	STD			
		3	03	16	001	001	REV014				ALL
		3	03	16	002	001	REV026				
		3	03	16	003	100	REV026	47297=47002			ALL
		3	03	17	001	100	REV014	MOD 44495			ALL
		3	03	17	002	100	REV014	MOD 44495			
		3	03	17	003	001	REV025				ALL
		3	03	17	004	001	REV024				
N	3	03	18	001	100	REV016	M:44495				ALL
N	3	03	18	002	200	REV025	CODE 0119				
		3	03	18	003	001	REV020				ALL
		3	03	18	004	100	REV020	M:44495			
		3	03	18	005	001	REV025	STD			ALL
		3	03	18	006	110	REV026	M:49192=52306			
		3	03	18	007	001	REV027	STD			ALL
		3	03	18	008	001	REV025	STD			
N	3	03	19	001	100	REV026	CODE:0183				ALL
N	3	03	19	002	001	REV026					
N	3	03	19	003	202	REV026	CODE 0167				ALL
N	3	03	19	004	001	REV025					
N	3	03	19	005	105	REV025	M:44495				ALL
N	3	03	19	006	210	REV025	CODE 0119				
N	3	03	19	007	110	REV025	CODE:0183				ALL
N	3	03	19	008	110	REV026	M:4919=52306				
		3	03	19	009	001	REV026				ALL
		3	03	19	010	001	REV026				
		3	03	19	011	001	REV026				ALL
		3	03	19	012	001	REV025				
		3	03	19	013	001	REV025				ALL
		3	03	20	001	001	REV024				ALL
		3	03	20	002	001	REV014				
		3	03	20	003	001	REV014				ALL
		3	03	21	001	001	REV017				ALL

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

3	03	22	001			100	REV013		MOD	40023		ALL
3	03	22	002			100	REV023		MOD	40023		
3	03	22	003			100	REV026		M:	40023		ALL
3	03	22	004			105	REV027		MOD:	40023		
3	03	22	005			001	REV024					ALL
3	03	22	006			001	REV014					
3	03	23	001			001	REV025					ALL
3	03	23	002			001	REV027					
3	03	24	001			001	REV024					ALL
3	03	24	002			001	REV023					
3	03	25	001			001	REV027		STD			ALL
3	03	25	002			001	REV027					
3	03	25	003			100	REV027		49633=	47002		ALL
3	03	26	001			001	REV019					ALL
3	03	90	001			001	REV024					ALL
3	03	90	002			001	REV023					
3	03	90	003			001	REV016					ALL
3	03	90	004			001	REV016					
3	03	90	005			001	REV027					ALL
3	03	90	006			001	REV027					
3	03	90	007			001	REV022					ALL
3	04	00	001			100	REV025		M:	50014		ALL
3	04	00	002			001	REV027		STD			
3	04	00	003			001	REV027					ALL
3	04	10	001			001	REV014					ALL
3	04	10	002			100	REV026		MOD	44495		
3	04	10	003			001	REV026					ALL
3	04	10	004			001	REV014					
3	04	21	001			001	REV015					ALL
3	04	21	002			001	REV021					
3	04	23	001			001	REV025					ALL
3	04	23	001A			001	REV026					ALL
3	04	23	002			001	REV026					ALL
3	04	23	002A			001	REV026					ALL
3	04	24	001			001	REV017					ALL
3	04	24	002			100	REV026		40259=	40512		

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

3	04	24	003	001	REV016		ALL
3	04	24	004	001	REV022		
3	04	24	005	001	REV027		ALL
3	04	24	006	001	REV027	STD=46742	
3	04	24	007	001	REV023		ALL
3	04	25	001	100	REV025	50014	ALL
3	04	25	002	100	REV025	50014	
3	04	25	003	100	REV025	50014	ALL
3	04	27	001	001	REV014		ALL
3	04	27	002	001	REV025		
3	04	27	003	001	REV025		ALL
3	04	27	004	100	REV025	46292=46627	
3	04	27	005	100	REV025	M:46292=46627	ALL
3	04	27	006	001	REV025		
3	04	27	007	001	REV025		ALL
3	04	27	008	001	REV025		
3	04	27	009	001	REV027		ALL
3	04	27	010	001	REV020		
3	04	27	011	001	REV024		ALL
3	04	28	001	001	REV022		ALL
3	04	28	002	001	REV023		
3	04	28	003	001	REV023		ALL
3	04	30	001	001	REV027	STD	ALL
3	04	30	002	001	REV023		
3	04	31	001	001	REV014		ALL
3	04	31	002	001	REV014		
3	04	32	001	100	REV027	CODE 0029	ALL
3	04	32	002	001	REV026		
3	04	32	003	105	REV014	M0D 44228 = 44229 = 44230	ALL
3	04	32	004	103	REV026	M:50214=51393	
3	04	34	001	001	REV014		ALL
3	04	34	002	001	REV021		
3	04	34	003	001	REV020		ALL
3	04	34	004	100	REV015	CODE 0034	
3	04	34	005	001	REV015		ALL
3	04	34	006	001	REV014	STD=M0D 43537	
3	04	34	007	001	REV026		ALL
3	04	34	008	001	REV012		

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

3	04	34	009			100	REV018		CODE:0022		ALL
3	04	34	010			100	REV018		CODE:0022		
3	04	34	011			001	REV012				ALL
3	04	34	012			001	REV015				
3	04	34	013			001	REV015				ALL
3	04	34	014			001	REV017				
N	3	04	34		015	200	REV025		M:46324+49633		ALL
N	3	04	34		016	001	REV027		STD		
3	04	34	017			001	REV027		STD		ALL
3	04	34	018			001	REV027				
3	04	52	001			001	REV014				ALL
3	04	70	001			001	REV014				ALL
3	04	70	002			001	REV026				
3	04	70	003			020	REV026		CFM:RR		ALL
3	04	70	004			108	REV017		CFM/46532		
3	04	70	005			001	REV027				ALL
3	04	70	006			001	REV027				
3	04	70	007			001	REV027				ALL
3	04	70	008			001	REV019		STD:M:45237		
3	04	70	009			008	REV019		CFM ALL		ALL
3	04	70	010			001	REV019				
3	04	90	001			001	REV024		STD		ALL
3	04	90	002			001	REV026				
3	04	91	001			001	REV021				ALL
3	04	91	002			001	REV014				
3	04	91	003			120	REV017		M:40023/CFM 56-5-C2/C3		ALL
3	04	91	004			001	REV014				
3	04	91	005			001	REV014				ALL
3	04	91	006			001	REV014				
3	04	91	007			001	REV014				ALL
3	04	91	008			001	REV025				
3	04	91	009			101	REV025		42630		ALL
3	04	91	010			001	REV025				
3	04	91	010A			001	REV026				ALL
3	04	91	011			001	REV024		STD		ALL
3	04	91	012			001	REV017				
3	04	91	013			001	REV017				ALL
3	04	91	014			001	REV017				
3	04	91	015			001	REV026				ALL

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

3	04	91	015A			001	REV027				ALL
3	04	91	016			001	REV017				ALL
3	04	91	017			001	REV017				ALL
3	04	92	001			001	REV025				ALL
3	04	92	002			001	REV025				
3	04	92	003			001	REV025				ALL
3	04	92	004			001	REV025				
3	04	92	005			001	REV025				ALL
3	04	92	006			001	REV025				
3	05	00	001			001	REV022				ALL
3	05	00	002			001	REV013				
3	05	05	001			001	REV012				ALL
3	05	05	002			001	REV012				
3	05	05	003			001	REV013				ALL
3	05	05	004			001	REV012				
3	05	05	005			001	REV019				ALL
3	05	05	006			001	REV012				
3	05	06	001			001	REV013				0063
3	05	06	002			050	REV014	CFM 56-5C2			
3	05	06	001			100	REV013	MOD 41150			0074-0085
3	05	06	002			050	REV014	CFM 56-5C2			
3	05	06	003			050	REV013	CFM 56-5C2			ALL
3	05	06	004			050	REV013	CFM 56-5C2			
3	05	06	005			050	REV016	CFM 56-5C2			ALL
3	05	06	006			050	REV024	CFM 56-5C2			
3	05	06	007			050	REV024	CFM 56-5C2			ALL
3	05	10	001			150	REV014	CFM 56-5C2/5C3 MOD 40023			ALL
3	05	10	002			150	REV013	CFM 56-5C2/5C3 MOD 40023			
3	05	10	003			150	REV014	CFM 56-5C2 MOD 40023			ALL
3	05	10	004			150	REV014	CFM 56-5C2 MOD 40023			
3	05	10	005			150	REV014	CFM 56-5C2 MOD 40023			ALL
3	05	10	006			150	REV014	CFM 56-5C2 MOD 40023			
3	05	10	007			150	REV014	CFM 56-5C2 MOD 40023			ALL
3	05	10	008			150	REV014	CFM 56-5C2 MOD 40023			
3	05	10	009			150	REV014	CFM 56-5C2 MOD 40023			ALL
3	05	10	010			150	REV014	CFM 56-5C2 MOD 40023			
3	05	15	001			150	REV017	CFM 56-5C2/5C3 MOD 40023			ALL
3	05	15	002			150	REV017	CFM 56-5C2/5C3 MOD 40023			

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

3	05	15	003			150	REV017	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	004			150	REV026	M:	40023/56-5-C2/C3			
3	05	15	005			150	REV016	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	006			150	REV024	CFM	56-5C2/5C3	MOD 40023		
3	05	15	007			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	008			150	REV013	CFM	56-5C2/5C3	MOD 40023		
3	05	15	009			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	010			050	REV014	CFM	56-5C2/C3/40023			
3	05	15	011			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	012			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	013			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	014			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	015			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	016			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	017			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	018			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	019			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	020			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	021			150	REV012	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	022			150	REV012	CFM	56-5C2/5C3	MOD 40023		
3	05	15	023			150	REV014	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	024			150	REV014	CFM	56-5C2/5C3	MOD 40023		
3	05	15	025			150	REV014	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	026			150	REV014	CFM	56-5C2/5C3	MOD 40023		
3	05	15	027			150	REV014	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	028			150	REV014	CFM	56-5C2/5C3	MOD 40023		
3	05	15	029			150	REV014	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	15	030			150	REV014	CFM	56-5C2/5C3	MOD 40023		
3	05	20	001			001	REV013					ALL
3	05	20	002			150	REV013	CFM	56-5C2/5C3	MOD 40023		
3	05	20	003			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	20	004			150	REV013	CFM	56-5C2/5C3	MOD 40023		
3	05	20	005			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	20	006			150	REV027	CFM	56-5C2/5C3	MOD 40023		
3	05	20	007			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	20	008			150	REV013	CFM	56-5C2/5C3	MOD 40023		
3	05	20	009			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	20	010			150	REV013	CFM	56-5C2/5C3	MOD 40023		
3	05	20	011			150	REV013	CFM	56-5C2/5C3	MOD 40023		ALL
3	05	20	012			150	REV013	CFM	56-5C2/5C3	MOD 40023		

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

3	05	20	013	150	REV013	CFM 56-5C2/5C3 MOD 40023	ALL
3	05	20	014	001	REV013		
3	05	20	015	150	REV014	CFM 56-5C2/5C3 MOD 40023	ALL
3	05	20	016	150	REV014	CFM 56-5C2/5C3 MOD 40023	
3	05	20	017	150	REV026	M:40023/56-5-C2/C3	ALL
3	05	20	018	150	REV014	CFM 56-5C2/5C3 MOD 40023	
3	05	25	001	001	REV014		ALL
3	05	25	002	150	REV022	CFM 56-5C2/5C3 MOD 40023	
3	05	25	003	150	REV022	CFM 56-5C2/5C3 MOD 40023	ALL
3	05	25	004	150	REV022	M:40023 CFM 56-5-C2/C3	
3	05	25	005	150	REV022	M:40023 CFM 56-5-C2/C3	ALL
3	05	30	001	001	REV015		ALL
3	05	30	002	150	REV014	CFM 56-5C2/5C3 MOD 40023	
3	05	30	003	150	REV014	CFM 56-5C2/5C3 MOD 40023	ALL
3	05	35	001	001	REV027		ALL
3	05	35	002	150	REV013	CFM 56-5C2 MOD 40023	
3	05	35	003	150	REV013	CFM 56-5C2 MOD 40023	ALL
3	05	40	001	001	REV014		ALL
3	05	40	002	150	REV019	M:40023/56-5-C2/C3	
3	05	40	003	150	REV019	M:40023/56-5-C2/C3	ALL
3	05	50	001	001	REV013		ALL
3	05	50	002	001	REV018		
3	05	50	003	001	REV018		ALL
3	05	50	004	001	REV018		
3	05	50	005	001	REV018		ALL
3	05	50	006	001	REV018		
3	06	00	001	001	REV013		ALL
3	06	10	001	001	REV015		ALL
3	06	20	001	150	REV014	CFM 56-5C2 MOD 40023	ALL
3	06	30	001	001	REV014		ALL
3	06	30	002	150	REV013	CFM 56-5C2/5C3 MOD 40023	
3	06	30	003	150	REV013	CFM 56-5C2/5C3 MOD 40023	ALL
3	06	30	004	150	REV014	CFM 56-5C2/5C3 MOD 40023	
3	06	30	005	150	REV014	CFM 56-5C2/5C3 MOD 40023	ALL
3	06	30	006	150	REV014	CFM 56-5C2/5C3 MOD 40023	
3	06	30	007	150	REV014	CFM 56-5C2/5C3 MOD 40023	ALL
3	06	30	008	150	REV014	CFM 56-5C2/5C3 MOD 40023	

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

3	06	30	009			150	REV014		CFM 56-5C2/5C3 MOD	40023		ALL
3	06	30	010			150	REV014		CFM 56-5C2/5C3 MOD	40023		
3	06	30	011			150	REV014		CFM 56-5C2/5C3 MOD	40023		ALL
3	06	30	012			001	REV014					
3	06	30	013			150	REV019		M:40023/56-5-C2/C3			ALL
3	06	30	014			150	REV019		M:40023/56-5-C2/C3			
3	06	30	015			150	REV019		M:40023/56-5-C2/C3			ALL
3	06	40	001			001	REV022					ALL
3	06	40	002			150	REV013		CFM 56-5C2 MOD	40023		
3	06	40	003			150	REV013		CFM 56-5C2 MOD	40023		ALL
3	06	40	004			150	REV013		CFM 56-5C2 MOD	40023		
3	06	40	005			150	REV013		CFM 56-5C2 MOD	40023		ALL
3	06	40	006			150	REV013		CFM 56-5C2 MOD	40023		
3	06	40	007			001	REV013					ALL
3	06	45	001			150	REV022		CFM 56-5C2/5C3 MOD	40023		ALL
3	06	48	001			150	REV018		M:40023/CFM 56-5-C2/C3			ALL
3	06	50	001			001	REV014					ALL
3	06	50	002			150	REV019		M:40023 CFM 56-5-C2/C3			
3	06	60	001			001	REV013					ALL
3	06	60	002			001	REV018					
3	06	60	003			001	REV018					ALL
3	07	00	001			001	REV013					ALL
3	07	10	001			001	REV013					ALL
3	07	10	002			150	REV013		CFM 56-5C2 MOD	40023		
3	07	20	001			150	REV014		CFM 56-5C2 MOD	40023		ALL
3	07	30	001			150	REV013		CFM 56-5C2 MOD	40023		ALL
3	07	30	002			150	REV013		CFM 56-5C2 MOD	40023		
3	07	30	003			150	REV013		CFM 56-5C2 MOD	40023		ALL
3	07	30	004			150	REV013		CFM 56-5C2 MOD	40023		
3	07	40	001			150	REV014		CFM 56-5C2 MOD	40023		ALL
3	07	40	002			150	REV014		CFM 56-5C2 MOD	40023		
3	07	40	003			150	REV014		CFM 56-5C2 MOD	40023		ALL
3	07	40	004			150	REV014		CFM 56-5C2 MOD	40023		
3	07	50	001			150	REV014		CFM 56-5C2 MOD	40023		ALL
3	07	60	001			150	REV022		CFM 56-5C2/5C3 MOD	40023		ALL
3	07	70	001			150	REV013		CFM 56-5C2/5C3 MOD	40023		ALL

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

3	07	80	001			001	REV013				ALL
3	07	80	002			001	REV018				
3	08	20	001-LEBBU	001			REV026	LIST OF OEB & FCOM BULLETINS			ALL
3	08	30	001			001	REV014	STATUS OF OEB			ALL

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	017A	40021		ELECTRICS-GENERATION-DISTRIBUTION-VU'S AND AVIONICS-DEFINE BASIC A/C ALL	
.	017A	40023		GENERAL- ADAPT BASIC DEFINITION FOR ST2 (A340-200) ALL	
.	017A	40033		POWER PLANT-DEFINE CFM56 POWER PLANT AND ASSOCIATED SYSTEMS ALL	
.	026	40096		AIR CONDITIONING-DEFINE VENTILATION OF FORWARD CARGO COMPARTMENT ALL	
		21-4068	01		
.	024	40097		AIR CONDITIONING-DEFINE TEMPERATURE CONTROL OF FORWARD CARGO COMPARTMENT ALL	
		21-4068	01		
.	026	40186		AIR CONDITIONING-ADAPT VENTILATION OF FORWARD CARGO COMPARTMENT FOR ST2 VERSION ALL	
		21-4068	01		
.	017A	40259		EQUIPMENT/FURNISHINGS-CREW REST COMPARTMENT-INSTALL STRUCTURAL PROVISIONS ALL	
.	017A	40260		EQUIPMENT/FURNISHINGS-CREW REST COMPARTMENT-INSTALL SYSTEM PROVISIONS ALL	
.	017A	40350		NAVIGATION-ADIRS-INSTALL A LITTON LTN 101 FLAGSHIP (GPADIRS) SYSTEM ALL	
.	017A	40379		EQUIPMENT/FURNISHINGS-INSTALL PROVISIONS FOR AN UNDERFLOOR CREW REST CONTAINER (BFE) ALL	
.	017A	40467		OXYGEN-CREW OXYGEN-INSTALL A 115 CU FEET STEEL CYLINDER ALL	

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		
.	017A	40512			EQUIPMENT/FURNISHINGS-CREW REST ROOM - UNCLIP BFE U.C.R.C. CIRCUIT BREAKERS ALL	
.	017A	40721			NAVIGATION -VOR-MARKER - REPLACE ALLIED SIGNAL BY COLLINS RECEIVERS (BFE) ALL	
.	017A	41124			LANDING GEAR-WHEELS AND BRAKES-FIT GOODRICH BRAKES ALL	
.	017A	41125			LANDING GEAR - WHEELS AND BRAKES FIT GOODRICH BRAKES (186T MLW) ALL	
.	017A	41150			ENGINE FUEL AND CONTROL - GENERAL - PROVIDE DERATED TAKE OFF FACILITY FOR CFMI ENGINES LV-ZPJ LV-ZPX LV-ZRA	
.	017A	41302			GENERAL - INTRODUCE INCREASED DESIGN WEIGHTS FOR A340-300(257 T,186 T,174 T) FOR A340-200(257 T,181 T,169 T) (WV001) ALL	
.	017A	41600			FUEL-TRIM TRANSFER SYSTEM-FIT FORWARD TRANSFER PUMP IN THE TRIM HORIZONTAL STABILIZER LV-ZPJ LV-ZPX LV-ZRA	
.	025	41827			NAVIGATION -TCAS II-INSTALL AND CERTIFY A HONEYWELL - SYSTEM WITH ATC MODES COLLINS ALL	
.	017A	41957			OXYGEN -PASSENGER OXYGEN-INSTALL ALTERNATIVE OXYGEN BOXES EXTENDED DURATION 22 MINUTES (VENDOR PURITAN) ALL	
.	017A	42143			APU-CONTROL AND MONITORING- INTRODUCE STANDARD-7 ECB ALL	

M V T	REV	MOD	MP	SB	TITLE	VALIDITY
.	017A	42182			DOORS-CENTERLINE GEAR DOORS-INSTALL SPOILER ALL	
.	017A	42223			APU - CONTROL AND MONITORING - INTRODUCE IMPROVED ECB -8 LV-ZRA	
.	017A	42311			AIR CONDITIONING-LOWER DECK CARGO COMPARTMENT-IMPROVE TEMPERATURE LEVEL BULK CARGO COMPARTMENT LV-ZPO LV-ZPJ	
.	017A	42478			COMMUNICATIONS-CIDS-INTRODUCE CIDS VERSION 113 ALL	
.	017A	42630			AIR CONDITIONING-AVIONICS EQUIPMENT VENTILATION-INCREASE HORN TIME DELAY WARNINGIN CASE OF VENT EXTRA FAULT ALL	
.	017A	42902			AIR CONDITIONING-PRESSURE CONTROL AND MONITORING- FIT CPC-4STD ALL	
.	018	42933			FUEL - FCMS - PREVENT ERRONEOUS FAULT OUTPUTS FROM FCMC IN THE BATTERY GROUND SERVICE CONFIGURATION ALL	
.	017A	43143			AIR CONDITIONING - TEMPERATURE CONTROL - MODIFY CABIN TEMPERATURE SENSOR VENTILATION ALL	
.	024	43171			AIR CONDITIONING - LOWER DECK CARGO COMPARTMENT - IMPROVE TEMPERATURE LEVEL BULK CARGO COMPARTMENT (ST2 ONLY) ALL	
.	017A	43188			AIR CONDITIONING - CABIN TEMPERATURE CONTROL - MODIFY ZONE CONTROLLER INTO -06 STANDARD ALL	

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	017A	43411		NAVIGATION - VOR - INSTALL COLLINS FM				
		34-4061	03	IMMUNE				
				ALL				
.	017A	43469		PNEUMATIC - ENGINE BLEED AIR SYSTEM				
		36-4009		REPLACE BLEED MONITORING COMPUTER				
				ALL				
.	018	43537		NAVIGATION - ADIRS - FIT REDUCED				
		34-4034	13	VERTICAL SEPARATION MINIMUM (RVSM)				
				ALL				
.	017A	43620		FUEL - FCMS - INSTALL STAGE 6.12 FCMC				
		28-4037	02	WITH CHANGES TO SOFTWARE FOR A330 AND				
				A340 A/C				
				ALL				
.	017A	44015		FIRE PROTECTION - SMOKE DETECTION -				
		26-4013	01	INTRODUCE UPDATED SDCU				
				ALL				
.	017A	44063		INDICATING/RECORDING SYSTEMS - CENTRAL				
		31-4021	02	WARNING SYSTEM - INSTALL NEW FWC				
				STANDARD L5.0				
				ALL				
.	017A	44100		NAVIGATION - WEATHER RADAR SYSTEM -				
		34-4050	04	ACTIVATE DUAL PREDICTIVE WINDSHEAR				
				RADAR SYSTEM, COLLINS				
				ALL				
.	017A	44229		GENERAL - INTRODUCE A340/200 INCREASED				
		00-4024	03	DESIGN WEIGHT MTOW 260T, MLW 181T,				
				MZFW 169T (WV002)				
				ALL				
.	017A	44431		ELECTRICAL POWER-ELECTRICAL CONTRACTOR				
		24-4019	05	MANAGEMENT SYSTEM - INSTALL NEW ECMU				
				STANDARD 5				
				ALL				
.	017A	44495		AUTO FLIGHT - FMGEC - INTRODUCE L6				
		22-4011		STD FOR CFMI				
				ALL				

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	017A	44575	 28-4046 01	FUEL - FMCS - FIT FCMC (STAGE 7.1) WITH CHANGES TO SOFTWARE FOR A330 AND A340 AIRCRAFT ALL	
.	027	44585	 22-4011	AUTO FLIGHT - FLIGHT ENVELOPE - INSTALL PLACARD SPEED VFE CONF. 1 ALL	
.	017A	44968	 31-4031	INDICATING/RECORDING SYSTEM-ELECTRONIC INSTRUMENT SYSTEM (E.I.S.) - INSTALL DMC SOFTWARE V109X WITH DMC B HARDWARE ALL	
.	017A	44969	 31-4031	INDICATING/RECORDING SYSTEM-ELECTRONIC INSTRUMENT SYSTEM (E.I.S.) - INSTALL DMC SOFTWARE V109X WITH DMC A HARDWARE ALL	
.	017A	45025	 31-4034	INDITING/RECORDING SYSTEM - F.W.C. - INSTALL NEW F.W.C. STANDARD L5-1 ALL	
.	017A	45030	 23-4051	COMMUNICATIONS - RMP - INSTALL RMP SEXTANT P/N 899-0850-004 ALL	
.	019	45033	 34-4052	NAVIGATION - ADIRS - INSTALL LITTON ADIRU 4 MCU STD WITH IMPROVED LATITUDE TEST FUNCTION LV-2RA	
.	017A	45100	 34-4055	NAVIGATION - ADIRS - INSTALL LITTON ADIRU 4 MCU STD WITH IMPROVED PRIMARY GPS (AIME) FUNCTION ALL	
.	019A	45117	 24-4024 05	ELECT. POWER-AC MAIN DISTRIB.-ACTIVATE NEW GALLEY SHEDDING BY CTL OF 115XP AND 208XP SUB BUS BARS BY ECMU1, ECMU2 ALL	
.	017A	45191	 29-4032 02	HYDRAULIC POWER - MAIN HYDRAULIC POWER- INTRODUCE PUSH BUTTON SWITCHES AND SWITCHGUARDS ON HYDRAULIC CONTROL PANEL ALL	

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	018	45237		22-4016	02		AUTO FLIGHT - FMGEC - INSTALL STD L7 - A7 FOR A340 WITH CFMI ENGINES ALL	
.	017A	45381		29-4035	02		HYDRAULIC POWER - AUXILIARY HYDRAULIC POWER - INSTALL A320 VICKERS ELECTRICAL MOTOR PUMP ON YELLOW SYSTEM ALL	
.	017A	45384		29-4037	02		HYDRAULIC POWER - AUXILIARY HYDRAULIC POWER - INSTALL A320 VICKERS ELECTRICAL MOTOR PUMP ON BLUE SYSTEM ALL	
.	017A	45387		29-4036	02		HYDRAULIC POWER - AUXILIARY HYDRAULIC POWER - INSTALL A320 VICKERS ELECTRICAL MOTOR PUMP ON GREEN SYSTEM ALL	
N	027B	45509					NAVIGATION - MMR - INSTALL COLLINS MULTI-MODE RECEIVERS PROVIDING ILS (FM IMMUNE) AND GPS PRIMARY FUNCTION ALL	
.	023	45900		32-4109	01		LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STANDARD S7A ALL	
.	025	45966		34-4094			NAVIGATION-TCAS-INSTALL TCAS 2000 HONEYWELL P/N 751-7900-10002 ALL	
.	018	46255		49-4023			AIRBORNE AUXILIARY POWER - CONTROL AND MONITORING - INTRODUCE ECB-10 ALL	
.	018	46257		31-4042			INDICATING/RECORDING SYSTEMS - FWC - INSTALL NEW FWC STANDARD L7-0 ALL	
.	019	46292		27-4067			FLIGHT CONTROLS-FCPC-INTRODUCE NEW L15 SOFTWARE STD ON FCPC HARDWARE LA 2K1 ALL	

M V T	REV	MOD	MP	SB	TITLE	VALIDITY
N	027B	46324			NAVIGATION - GPWS - ACTIVATE ENHANCED GPWS	ALL
.	017A	46356		73-4014	ENGINE FUEL AND CONTROL - FUNCTIONAL INTERFACES (FADEC) A340 - IMPROVE AIR CONDITIONING PACK CLOSURE CONTROL	ALL
.	027A	46482		21-4083	AIR CONDITIONING - PACK CONTROL AND INDICATING - INTRODUCE PACK CONTROLLER -06	LV-ZPJ
.	018	46532		31-4041 02	INDICATING/RECORDING SYSTEMS - EIS - DISPLAY MANAGEMENT COMPUTER - INSTALL NEW DMC SOFTWARE V110X	ALL
.	018	46596		22-4019 01	AUTO FLIGHT - FCU - INTRODUCE FCU P/N -608	ALL
.	019	46627		27-4070	FLIGHT CONTROLS-FCPC-INTRODUCE NEW L15 SOFTWARE STD ON FCPC HARDWARE LA 2K0	ALL
.	020	46755		26-4023 02	FIRE PROTECTION - DETECTION - MODIFY SMOKE DETECTION CONTROL UNIT (SDCU)	ALL
.	018	46863		32-4131 02	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STANDARD S8C	ALL
N	027B	46893			NAVIGATION - MMR - INSTALL COLLINS MULTI-MODE RECEIVERS P/N 822-1152-121	ALL
.	019	46894		34-4051 01	NAVIGATION - AIR DATA/INITIAL REFERENCE SYSTEM-INSTALL LITTON ADIRU 4MCU (-312) COMPATIBLE WITH MMR	ALL

M	V	REV	MOD	MP	T	TITLE	VALIDITY
.	019A	47293				FUEL -TRIM TANK TRANSFER - INSTALL	
		28-4079	01			TWO ADDITIONAL PRESSURE RELIEF VALVES	
						IN THE TRIM TANK	
						ALL	
.	020	47297				ENGINE FUEL AND CONTROL -	
		73-4015				CONTROLLING - INSTALL FADEC SOFTWARE	
						STD C3G	
						ALL	
.	021A	47392				NAVIGATION-TCAS-INSTALL TCAS II	
		34-4099	01			HONEYWELL 2000 (CHANGE 7) P/N	
						7517900-10003	
						ALL	
.	023A	47419				INDICATING/RECORDING SYSTEMS - FLIGHT	
		31-4054				WARNING COMPUTER (FWC) - INSTALL NEW	
						FWC STANDARD L8-0	
						ALL	
.	024B	47454				APU - CONTROL AND MONITORING -	
		49-4025				INTRODUCE VECB-210101	
						LV-ZPJ	
.	024A	47500				LANDING GEAR - NORMAL BRAKING - INSTALL	
		32-4154	02			BSCU SOFTWARE STANDARD S8D	
						ALL	
.	024A	47930				FUEL - FCMS - INSTALL FCMC STAGE 9.0	
		28-4085	01			ALL	
.	021A	47967				EQUIPMENT/FURNISHINGS - CREW REST ROOM	
		25-4153	03			(UNDERFLOOR) - DELETE AUTOMATIC FIRE	
						EXTINGUISHING SYSTEM	
						ALL	
.	024A	49103				AUTO FLIGHT - FMGEC - INSTALL STANDARD	
		22-4029	01			L10A10 FOR CFM ENGINES	
						ALL	
.	023	49157				EQUIPMENT/FURNISHINGS-CREW REST	
		25-4153	03			ROOM (UNDERFLOOR)-DELETE AUTOMATIC	
						FIRE EXTINGUISHING SYSTEM	
						ALL	

M V T	REV	MOD	MP	SB	TITLE	VALIDITY
.	026C	49183			ENGINE FUEL AND CONTROL - FADEC - INTRODUCE NEW ECU STANDARD C3J FOR CFM56-5C AND -5C/P ENGINES ALL	
.	026B	49633			INDICATING/RECORDING SYSTEMS - FWC - REPLACE THE EXISTING STANDARD FWC BY A NEW STD L9 FOR A340 - FAR 121-344 ALL	
.	026A	49800			FUEL - FCMS - ACTIVATE CREW ALERT 'FUEL FU/FOB DISCREPANCY' ALL	
.	024B	49844			FUEL - FCMS - INSTALL FCMC STAGE 10.0 ALL	
.	024B	50014			EQUIPMENT/FURNISHINGS - COCKPIT - INSTALL AN ARMoured COCKPIT DOOR ALL	
.	027	50214			LANDING GEAR - NORMAL BRAKING - INTRODUCE STAGE 9 STANDARD BSCU ALL	
N	027B	50301			NAVIGATION-ATC-INSTALL COLLINS ATC MODE S TPR901 INCORPOR. EUROPEAN REGUL. FOR ELEMENTARY ENHANCED SURVEILLANCE (EHS) ALL	
.	024B	50723			DOORS - COCKPIT DOOR RELEASE SYSTEM - OVERRIDE ELECTRICAL SYSTEM ALL	
.	027	52230			EQUIPMENT/FURNISHINGS - CURTAINS AND PARTITIONS -MODIFY CDLS STRIKE TOLERANCE ALL	
.	027A	52306			INDICATING/RECORDING SYSTEM-FWS-INSTALL FWC L10 (A340) WITH 386 CPU BOARD ALL	

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 A340 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS		3.01.10	P 1
	FOREWORD		SEQ 001	REV 12

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.

- R All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

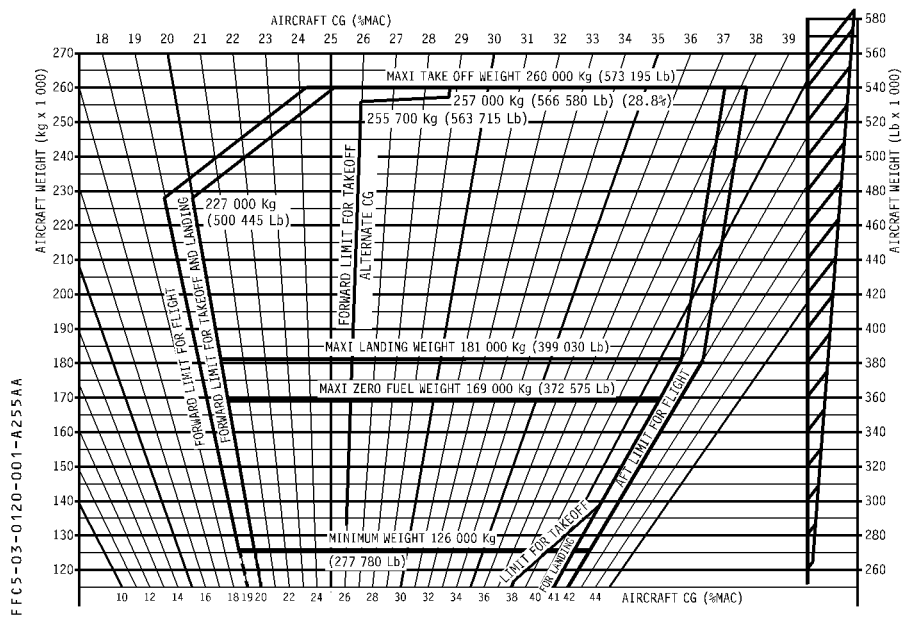
This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 375

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 7.27 m (23.85 feet). It is 26.02 m (85.36 feet) aft of the aircraft nose.
- The CG must always be within these limits regardless of fuel load.

WEIGHT LIMITATIONS

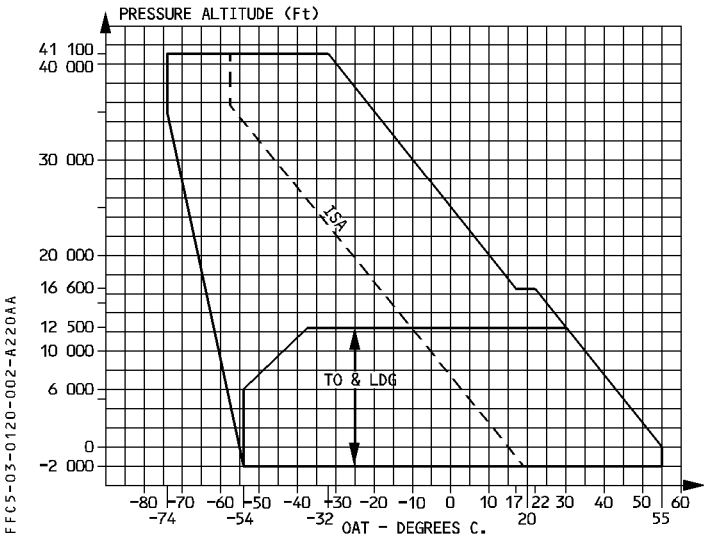
Maximum taxi weight 260 900 kg (575 180 lb)
 Maximum takeoff weight (brake release) 260 000 kg* (573 195 lb)
 Maximum landing weight 181 000 kg (399 030 lb)
 Maximum zero fuel weight 169 000 kg (372 575 lb)
 Minimum weight 126 000 kg (277 800 lb)
 * Weight varies with CG (refer to graph p 1).

In exceptional conditions (in flight turn back 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
 Other configurations 0 g to + 2 g

ENVIRONMENTAL ENVELOPE

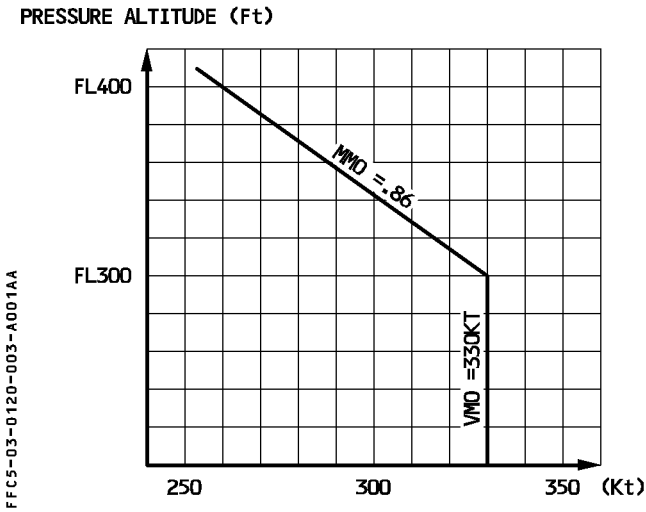


AIRPORT OPERATIONS

- Runway slope (mean) ± 2 %
- Runway altitude 12 500 ft
- Wind for takeoff and landing :
 - Maximum crosswind demonstrated 27 kt gusting up to 33 kt
 - Maximum tailwind 10 kt
- R · Maximum crosswind values have been demonstrated with flight controls in normal
- R law, as well as in direct law, with and without yaw damper.
- Wind for passenger/cargo door operation :
 - Maximum wind for passenger door operation is 40 knots (or 50 knots, if the aircraft nose is orientated into the wind).
 - Maximum wind for cargo door operation is 40 knots (or 60 knots, if the aircraft nose is orientated into the wind, or door is on the leeward side).
 - The passenger/cargo door must be closed before the wind speed exceeds 60 knots.

SPEED LIMITATIONS

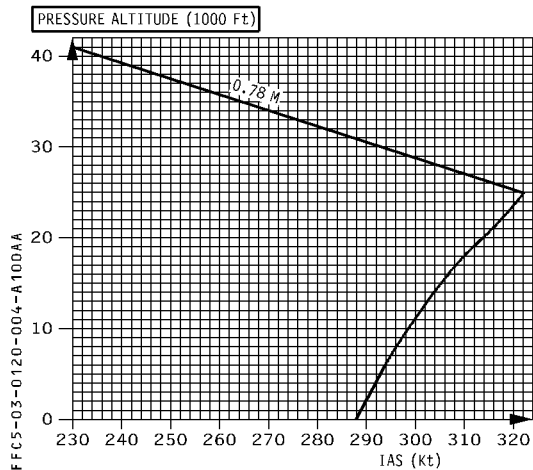
MAXIMUM OPERATING SPEED VMO/MMO



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

MAXIMUM DESIGN MANEUVERING SPEED VA

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



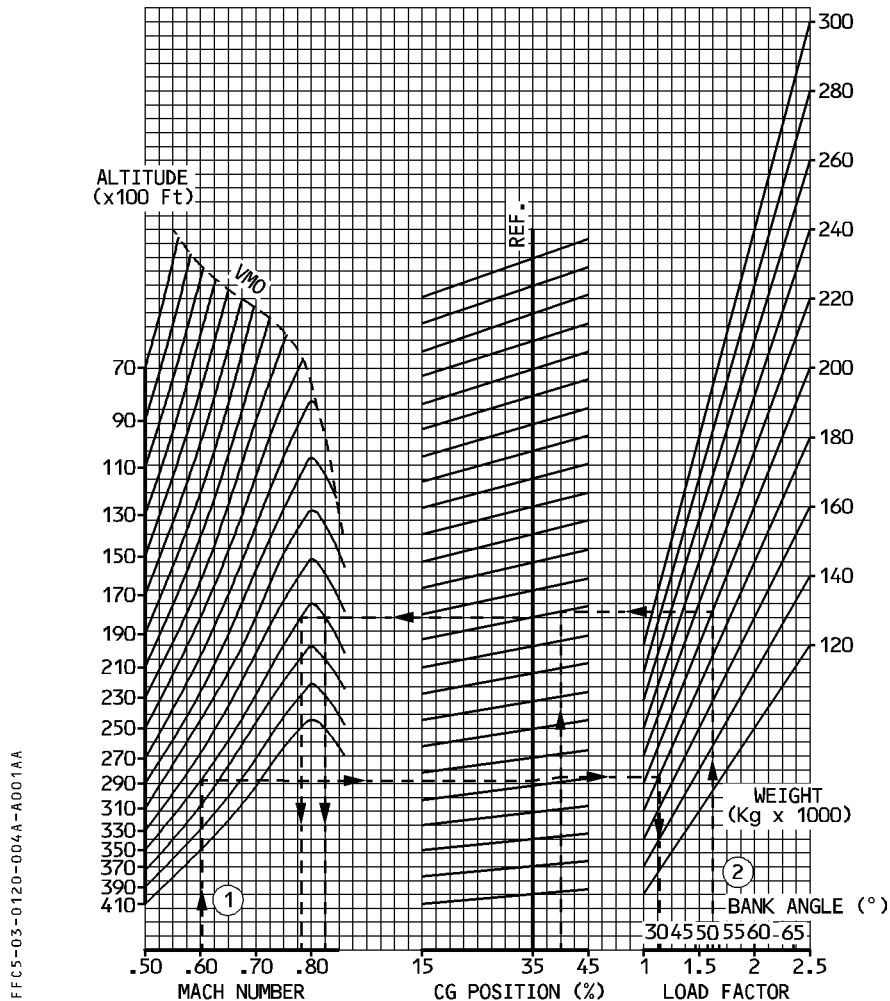
If alternate or direct law is active, full ailerons and rudder should only be applied at speeds below VA.

If alternate or direct law is active, manoeuvres involving an angle-of-attack near stall should only be performed at 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.

BUFFET ONSET



Examples :

1. Determine Maximum Bank Angle limited by buffet :

DATA : M = 0.6, FL = 350, CG = 40 %, WEIGHT = 180000 kg

RESULT : load factor = 1.15 g or 30° bank

2. Determine low and high speed limited by buffet :

DATA : 52° bank or 1.63 g, WEIGHT = 200000 kg, CG = 40%, FL = 350

RESULT : M = 0.775 (low speed buffet) and M = 0.825 (high speed buffet).

MAXIMUM FLAPS/SLATS SPEEDS

Lever Position	SLATS	FLAPS	AILERONS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	20	0	0	1	255	HOLDING
		17	10	1 + F	215	TAKEOFF
2	24	17	10	2(a)	205	APPROACH
	24	22	10	2	196	TAKEOFF/APPROACH
3	24	26	10	3	186	TAKEOFF/APPR/LDG
FULL	24	32	10	FULL	180	LANDING

(a) This slats/flaps position corresponds to CONF 1*

- Maximum altitude with flaps/slats extended : 20000 feet.

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 250 knots/.55
- Maximum speed at which the landing gear may be operated (extension and retraction) (VLO) 250 knots/.55
- Maximum speed for gravity extension (VLE/VLO) 200 knots
- Maximum altitude at which the landing gear may be extended 21000 feet

MAXIMUM TIRE SPEED

- R · Ground speed 204 knots

WINDSHIELD WIPERS IN USE

- Maximum speed 230 knots

COCKPIT WINDOW OPEN

- Maximum speed 230 knots

Note : It is not possible to open the cockpit windows, with the packs ON.

SPEEDBRAKES

- No limitation.

R MINIMUM CONTROL SPEEDS

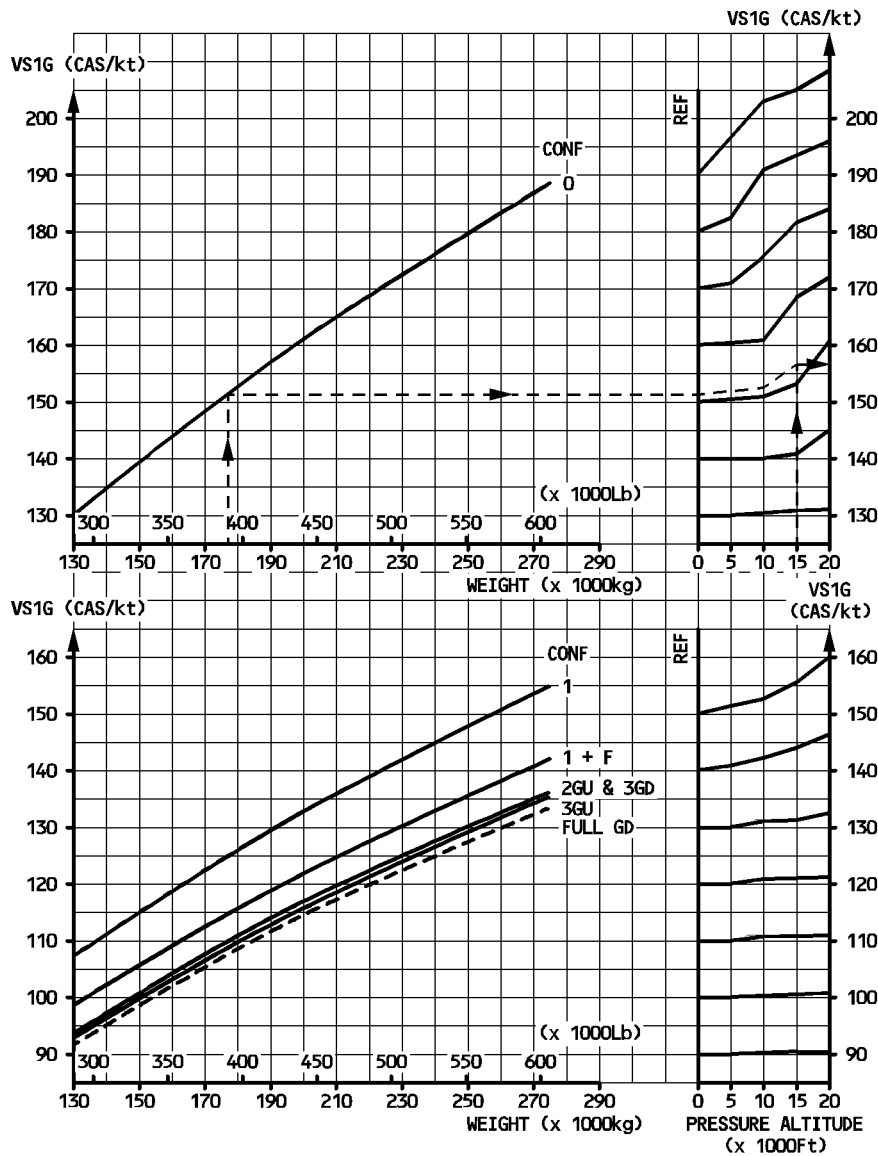
VMCL = 124 kt ; VMCL-2 = 157 kt.

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
0	122.5	125	125	125.5
2000	119.5	122	122	123
4000	116.5	119	119	120
6000	113.5	116	116	117
8000	110.5	113.5	113.5	114

STALLING SPEEDS

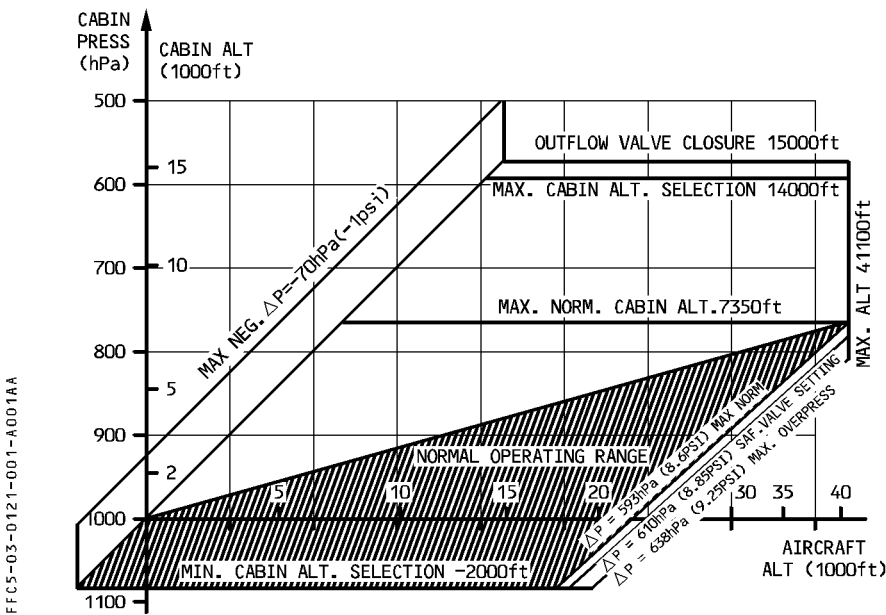
R



R EXAMPLE : DATA : 178 000 kg (392419 lb), PRESSURE ALTITUDE 15000 ft, CLEAN
R CONFIGURATION
RESULT : VS1G CAS = 158 kt

CABIN PRESSURE

- Maximum positive differential pressure 9.25 psi
- Maximum negative differential pressure – 1 psi
- Safety relief valve setting 8.85 psi/– 1 psi



Note : Maximum differential pressure and safety valve setting tolerance = ± 7 hPa (0.1 psi).

RAM AIR INLET

Opens only if differential pressure is lower than 1 psi.

AIR CONDITIONING WITH LP GROUND UNIT

- Do not use conditioned air simultaneously from packs and low pressure ground units (to avoid chattering of the non return valves).
- Air flow supplied by two ground carts should not exceed 2 × 1.6 kg/sec (2 × 3.53 lb/sec).

R AIR CONDITIONING WITH HP GROUND UNIT

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

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.

R RNP accuracy with GPS PRIMARY, 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	2 NM	2 NM	2 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.31 NM	Not authorized

R Without GPS PRIMARY (or GPS deselected or inoperative), the 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.

R FMGS approval is based on the assumption that the navigation database has been validated for intended use. The Precision RNAV Airworthiness approval does not account

R for database accuracy or compatibility.

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, a map shift may occur after takeoff.

GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

 A340 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS		3.01.22	P 2a
	AUTO FLIGHT		SEQ 100	REV 26

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.

For instrument approach procedures not coded in WGS 84 (or equivalent) coordinate system, the GPS must be deselected.

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

R – Navaid raw data is monitored.

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 3 DUAL must be displayed on the FMA.
If the crew performs an automatic approach without autoland, the autopilot must be disengaged no later than at 80 feet.

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 the FMA.

CATEGORY III FAIL OPERATIONAL

A/THR must be used in selected or managed speed.
Alert height : 200 feet
– CAT III With DH :
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

R ENGINE OUT

R CAT II and CAT III autoland are only approved in configuration 3 if engine-out procedures
R are completed before reaching 1000 feet in approach. CAT III fail passive autoland is
R approved in single inner engine out, CAT III fail operational autoland in single outer engine
R out.

 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS		3.01.22	P 4
	AUTO FLIGHT		SEQ 105	REV 25

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

Headwind : 35 kt
Tailwind : 10 kt
Crosswind : 20 kt

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

AUTOMATIC LANDING

CAT II and CAT III autoland is approved in CONF3 and CONF FULL.

Automatic landing has been demonstrated :

- On CAT II and CAT III ILS beam,
- With ILS slope angle inside a range of (– 2.5°, – 3.15°),
- For airfield elevation lower than 9200 feet.
- For weights below maximum landing weight.
- R – at approach speed (VAPP) = VLS + wind correction
- R minimum wind correction = 5 kt
- R maximum wind correction = 15 kt

Automatic roll out performance has been approved on dry and wet runways, but performance on snow covered or icy runway has not been demonstrated.

Automatic landing system performance has been demonstrated on CAT II and CAT III ILS beams. However, automatic landing in CAT I, or better, weather conditions is possible on CAT I ground installation 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 the terrain profile before the runway have no adverse effect on autopilot guidance. In particular the effect of terrain discontinuities within 300m before the runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft system, may occur and the PF is prepared to immediately disconnect the autopilot and to take the appropriate action should unsatisfactory guidance occur.
- At least CAT 2 capability is displayed on the FMA and CAT II/III procedures are used.
- Visual references are obtained, at a DH appropriate for the CAT I approach being flown, or a go-around is performed.
- When the crew does not intend to perform an autoland, they should disconnect the AP at or above 80 feet. This altitude is considered as a minimum to take over and feel comfortable.

Nevertheless, for safety purposes, the AP can be disconnected at anytime.

 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS CREW REST COMPARTMENTS	3.01.25	P 1
		SEQ 200	REV 27

LOWER DECK MOBILE CREW REST COMPARTMENT

Do not occupy the mobile crew rest compartment during taxi, takeoff, and landing.

FLIGHT CREW REST COMPARTMENT

The flight crew rest compartment seats can be used during taxi, takeoff, and landing, according to local regulation.

GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

- See CFM specification.
- The fuel system has been certified with JET A, JET A1, JP 8, JET B, JP4 and JP 5.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Maximum allowed wing fuel imbalance in either inner or outer tanks at takeoff, landing and in flight.

R

INNER TANKS		OUTER TANKS	
Tank content (heavier tank)	Maximum allowed imbalance	Tank content (heavier tank)	Maximum allowed imbalance
FULL 34 500 kg (76 100 lb)	2 900 kg (6 400 lb)	FULL 3 000 kg (6 600 lb)	1 500 kg (3 300 lb)
HALF 17 000 kg (37 500 lb)	4 800 kg (10 500 lb)	2 400 kg (5 300 lb)	1 600 kg (3 500 lb)
7 500 kg (16 500 lb)	7 500 kg (16 500 lb)	1 700 kg (3 750 lb)	1 700 kg (3 750 lb)

- R The variation is linear between these values. (No limitation below 7500 kg (16500 lb) for inner tanks and 1700 kg (3750 lb) for outer tanks).

Note : Inner and outer authorized asymmetries should not be added.

FUEL TEMPERATURE

Maximum fuel temperature : JET A, JET A1, JP 8 and JP 5 : + 60°C
JP 4, JET B : + 49°C

Minimum fuel temperature : Freezing point + 5°C in inner tank.
Freezing point in outer or trim tank.

If the actual fuel freezing point of the fuel being used for the flight is unknown, the fuel specification freezing point provided hereafter must be used :

JET A1	JET A	JET B	JP 4	JP 8	JP 5
– 47° C	– 40° C	– 50° C	– 58° C	– 47° C	– 46° C

FUEL MANAGEMENT

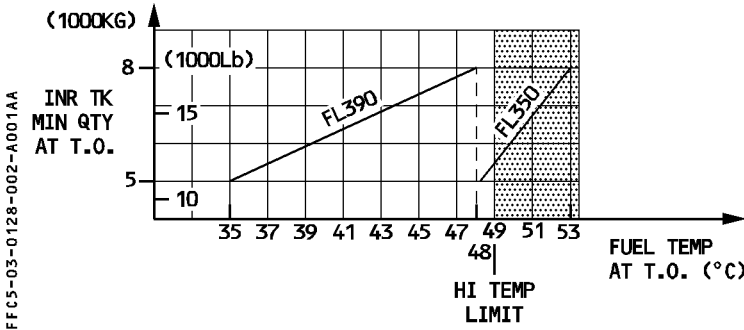
- Tanks must be emptied in the following order : center tank then wing tanks.
- Do not select the trim tank forward when pitch attitude is above 3 degrees to avoid inadvertent fuel aft transfer.
- Transfer from center to inner when using JP4 is possible up to 20 000 feet.

R **MINIMUM FUEL QUANTITY FOR TAKEOFF : 5 400 kg (11 460 lb)**

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

TEMPERATURE LIMIT USING JP 4 TO ENSURE ADEQUATE JET PUMP PERFORMANCE

If JP 4 fuel is used, the inner tank minimum quantity at takeoff (depending on the first CRUISE flight level) is as follows :



GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

- See CFM specification.
- The fuel system has been certified with JET A, JET A1, JP 8, JET B, JP4 and JP 5.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Maximum allowed wing fuel imbalance in either inner or outer tanks at takeoff, landing and in flight.

R

INNER TANKS		OUTER TANKS	
Tank content (heavier tank)	Maximum allowed imbalance	Tank content (heavier tank)	Maximum allowed imbalance
FULL 34 500 kg (76 100 lb)	2 900 kg (6 400 lb)	FULL 3 000 kg (6 600 lb)	1 500 kg (3 300 lb)
HALF 17 000 kg (37 500 lb)	4 800 kg (10 500 lb)	2 400 kg (5 300 lb)	1 600 kg (3 500 lb)
7 500 kg (16 500 lb)	7 500 kg (16 500 lb)	1 700 kg (3 750 lb)	1 700 kg (3 750 lb)

- R The variation is linear between these values. (No limitation below 7500 kg (16500 lb) for
R inner tanks and 1700 kg (3750 lb) for outer tanks).

Note : Inner and outer authorized asymmetries should not be added.

FUEL TEMPERATURE

Maximum fuel temperature : JET A, JET A1, JP 8 and JP 5 : + 60°C
JP 4, JET B : 49°C

Minimum fuel temperature : Freezing point + 5°C in inner tank.
Freezing point in outer or trim tank.

If the actual fuel freezing point of the fuel being used for the flight is unknown, the fuel specification freezing point provided hereafter must be used :

JET A1	JET A	JET B	JP 4	JP 8	JP 5
– 47° C	– 40° C	– 50° C	– 58° C	– 47° C	– 46° C

FUEL MANAGEMENT

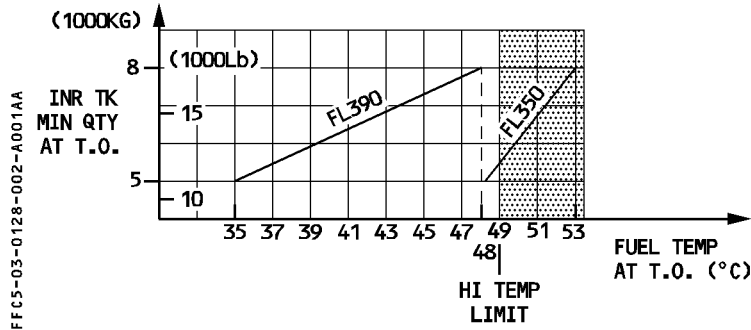
- Tanks must be emptied in the following order : center tank then wing tanks.
- In case of trim tank forward transfer pump failure do not select the trim tank forward when pitch attitude is above 3 degrees to avoid inadvertent fuel aft transfer.
- Transfer from center to inner when using JP4 is possible up to 20 000 feet.

R **MINIMUM FUEL QUANTITY FOR TAKEOFF : 5 400 kg (11 460 lb)**

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

TEMPERATURE LIMIT USING JP 4 TO ENSURE ADEQUATE JET PUMP PERFORMANCE

If JP 4 fuel is used, the inner tank minimum quantity at takeoff (depending on the first CRUISE flight level) is as follows :



AEROLINEAS ARGENTINAS A340 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS HYDRAULIC	3.01.29	P 1
		SEQ 001	REV 15

HYDRAULIC

Normal operating pressure is 3000 psi ± 200.

 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS LANDING GEAR	3.01.32	P 1
		SEQ 100	REV 23

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 the 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 all engines with the parking brake ON.

LANDING GEAR

The center gear may be inhibited by ground maintenance action.
For weight limitations, see the MEL.

NOSEWHEEL STEERING (NWS)

The nosewheel steering angle is limited to 72°.

R No braked pivot turn is allowed (ie. differential braking cannot be used to fully stop one
R main gear).

R Asymmetric thrust should be used during the turn, to maintain a continuous speed
R (between 5 and 10 knots). Some anticipation is required to ensure that asymmetric thrust
R is available at the beginning of the turn.

For towing and pushback, the nosewheel steering angle is limited to 65°. The ground crew should make use of the 65° markings on the nose landing gear door, to ensure that this limitation is not exceeded.

Towbarless operation on the nose landing gear (towing and pushback) is approved, when using the accepted towbarless towing vehicles listed in the Airbus SIL 09-002.

 A340 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS		3.01.32	P 2
	LANDING GEAR		SEQ 001	REV 24

TAXI WITH DEFLATED TIRES

- R If tire damage is suspected after landing, or after a rejected takeoff, 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 four tires), the speed should be limited to 7 knots when turning.
 - R 2. If two tires are deflated on the same main gear (the other main gear tires not being deflated), or on the center gear, the speed should be limited to 3 knots, and the nosewheel steering angle should be limited to 30 degrees.

 A340 FLIGHT CREW OPERATING MANUAL	OPERATING LIMITATIONS		3.01.34	P 1
	NAVIGATION		SEQ 100	REV 26

R **INERTIAL REFERENCE SYSTEM**

R Refer to the Polar Navigation section in the FCOM 4.04.40.

ISIS

NOT APPLICABLE

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 *		°C	– 10	0	10	20	30	40	50
		°F	14	32	50	68	86	104	122
MIN ** BOTTLE PRESSURE (PSI)	2 CREW MEMBERS		540	560	580	600	620	640	660
	2 CREW MEMBERS	+1 OBS	660	690	710	740	760	790	810
	2 CREW MEMBERS	+2 OBS	810	850	880	910	940	970	1 000

* REF TEMPERATURE :

· on ground : (OAT + CAB TEMP) / 2

· in flight : CAB TEMP (°C) – 10°C

or

CAB TEMP (°F) – 18° F

** MINIMUM BOTTLE PRESSURE TO COVER :

– Preflight checks

– Usage of oxygen when only one pilot is in the cockpit

R – Unusable quantity (to ensure regulator functioning with minimum pressure)

– Normal system leakage

– and :

R · Protection after loss of cabin pressure with mask regulator on NORMAL (diluted oxygen):

– During emergency descent for all cockpit members for 22 minutes (refer to cabin fixed oxygen system)

– During cruise at FL 100 for 2 crew members for 98 minutes

or

R · Protection against smoke with 100 % oxygen for all cockpit members during 15 minutes at 8000 feet cabin altitude.

R Note : The above times which are based on the use of a sealed mask, may be shorter for
R bearded crew (in terms of performance, pressure or duration).

LEFT INTENTIONALLY BLANK

GENERAL

OIL QUANTITY

R Minimum before start LOW OIL LEVEL ECAM advisory not displayed

R *Refer to 3.02.80.*

APU STARTER

After three consecutive start attempts without cooling down, a 60–minute cooling interval must be observed before the next start.

ROTOR SPEED

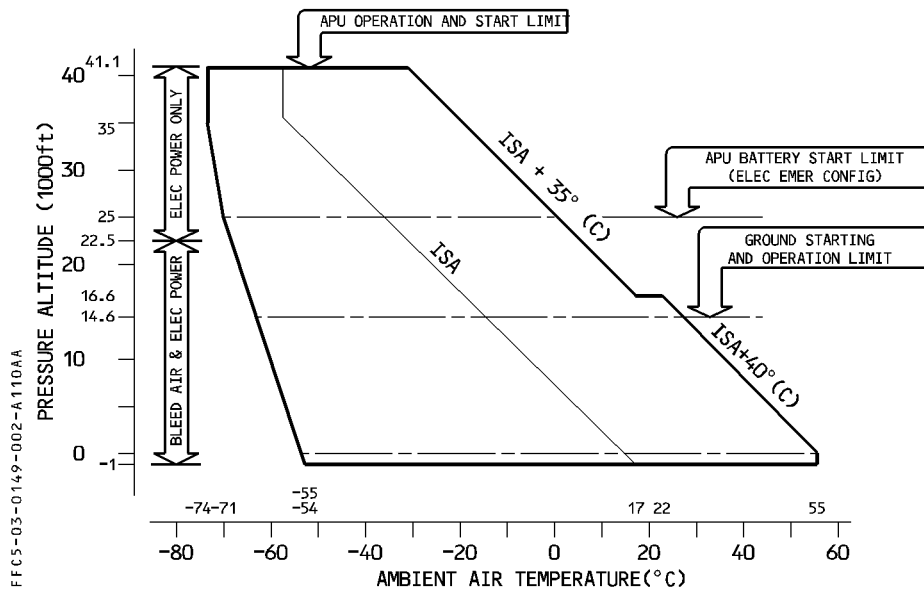
· Maximum N 107 %

EGT

· Maximum EGT 650 degrees C

· Maximum for start 1250 degrees C

ENVELOPE



R Note : In the APU start envelope, APU start is guaranteed within 3 consecutive start attempts.

R When JET B or JP4 is used APU operation is limited to 25000 feet.

- ELEC power extraction only in flight or on ground : 115 KVA (100 %).
- Air bleed extraction with generator load in flight :

BLEED AIR AND GEN LOAD IN FLIGHT				
TEMP ►		ISA	ISA + 20	ISA + 35
MAX ALT (feet) ▼				
22500 feet	ONE PACK	100 % (115 KVA)	63 % (72 KVA)	35 % (40 KVA)
20000 feet	ENG START	100 % (115 KVA)	83 % (95 KVA)	55 % (63 KVA)
17500 feet	TWO PACKS	100 % (115 KVA)	100 % (115 KVA)	74 % (85 KVA)

- APU air bleed extraction for wing anti-ice is not permitted.

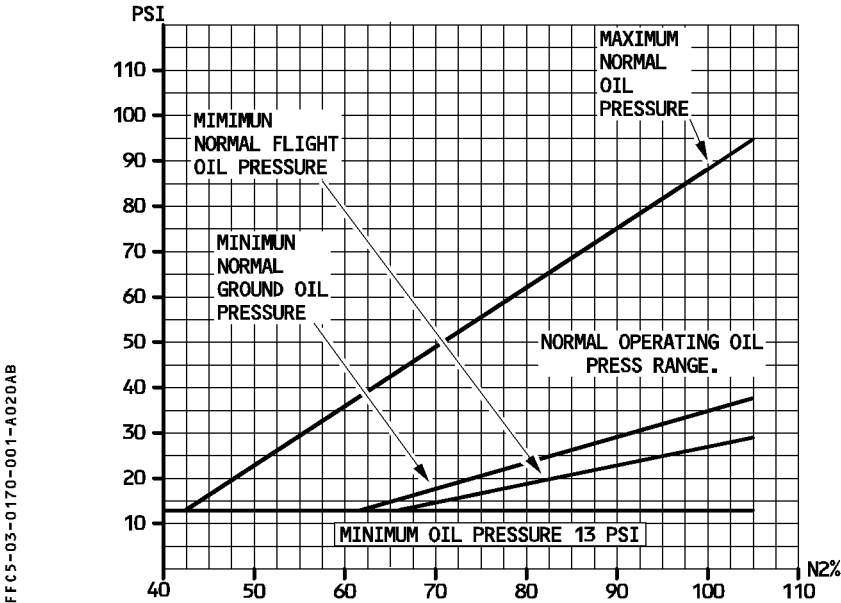
THRUST SETTING / EGT LIMITS

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

OIL

- Maximum continuous temperature 140°C
- Maximum transient temperature (15 minutes) 155°C
- Minimum starting temperature :
- CLASS A (TYPE 1) - 54°C
- CLASS B (TYPE 2) - 40°C
- R Minimum prior to takeoff - 10°C
- Minimum oil quantity (Refer to 3.03.04)

MIN/MAX OIL PRESSURE (ECAM indication)



RPM

N1 max 100.3 %

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

N2 max 105 %

STARTER

- 4 consecutive cycles, each of 2 minutes duration, maximum
- 20 seconds between cycles to allow for starter relubrication
- After 4 cycles,15 minutes to allow starter to cool before attempting a new start or motoring.
- No running engagement of the starter when the N2 is above 20 %.

Note : High tailwinds (> 25 kt) may have an adverse effect on start. It may be necessary to reposition the airplane into the wind.

REVERSE THRUST

- Selection of reverse thrust in flight is prohibited
- Backing the aircraft with reverse thrust is not permitted.
- Maximum reverse should not be used below 60 knots (or when indication starts to fluctuate). Idle reverse is allowed down to aircraft stop.

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is permissible only 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 + 40°C (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature or the actual OAT.
- Takeoff reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is allowed 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.

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02.01 INTRODUCTION

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- ENG FAILURE AFTER V1 – CONTINUED TAKEOFF 4
- LDG WITH SLATS OR FLAPS JAMMED 8
- NO FLAPS NO SLATS LANDING 10
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02.21 AIR COND / PRESS / VENT

- BLOWING FAULT 8
- BULK (FWD)(AFT) CRG ISOL FAULT OR VENT FAULT ◁ 10
- BULK (FWD) CRG HEAT FAULT ◁ 11
- BULK CRG DUCT OVHT ◁ 12
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- FWD (AFT) OFV NOT OPEN 13
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	– ACARS 1(2) (1+2) FAULT◀	1
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	– CIDS 1+2/PA FAULT	1
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02.24 ELECTRICAL

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	– CONFIG SPD BRK NOT RETRACTED	13
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	– RUD SERVO G(Y) (B) JAM	17
	– RUDDER JAM/RUDDER PEDAL JAM	20
	– RUD TRIM 1(2) FAULT	17
	– RUD TRIM FAULT	17
	– RUD TRV LIM (1) (2) FAULT	17
	– RUD TRV LIM FAULT	18
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	– SEC 1 (2) FAULT	7
	– SENSOR FAULT	17
	– SLATS FAULT/LOCKED	2
	– SLAT or FLAP SYS 1(2) FAULT	1
	– SLAT or FLAP TIP BRK FAULT	1
	– SPD BRK FAULT or DISAGREE	12
	– SPD BRK STILL OUT	12
	– SPLR FAULT	12
	– STAB CTL FAULT	11
R	– TURB DAMP FAULT	19
	– YAW DAMPER 1(2) FAULT	16
	– YAW DAMPER FAULT	16

02.28 FUEL

	– ABNORM MAN FWD XFR	13
	– ACT LINE FAULT/ACT XFR FAULT ◀	16
	– ACT PUMP LO PR◀	16
	– APU AFT PUMP FAULT	13
	– CELL NOT FULL	1
	– CTR TO INNER FAULT	6
	– FU/FOB DISCREPANCY ◀	17
	– ENG 1 (2) (3) (4) or APU LP VALVE FAULT	3
	– EXCESS AFT CG	7
	– FCMC 1 (2) FAULT	10
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02.28	FUEL (Cont'd)	
	– GRVTY FUEL FEEDING	3
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	– L(R) CTR PUMP LO PR	1
	– L(R) INNER TK HI TEMP	10
	– L(R) WING/L+R CTR PUMPS LO PR	2
	– L(R) (L+R) WING TK LO LVL	5
	– MAN XFR COMPLETED	6
	– NO WEIGHT/CG DATA	13
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	– X FEED 1 (2) (3) (4) FAULT	3
	– ZFW ZFCG DISAGREE	13
02.29	HYDRAULIC	
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	– B ENG 2 PUMP LO PR	13
	– B+Y SYS LO PR	9
	– G(B) (Y) ELEC PUMP FAULT	11
	– G ENG 1(4) PUMP LO PR	11
	– G ENG 1+4 PUMP LO PR	12
	– G RSVR LO AIR PR/OVHT/LO LVL	1
	– G RSVR UNDERFILLED/SYS LEAK	16
	– G+B SYS LO PR	5
	– G+Y SYS LO PR	7
	– MONITORING FAULT	15
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	– Y RSVR LO AIR PR/OVHT/LO LVL	4a
02.30	ICE AND RAIN PROTECTION	
	– ALL PITOT HEAT	13
	– CAPT (F/O) (STBY) PITOT (L STAT) (R STAT) (AOA) HEAT	2
	– CAPT (F/O) (STBY) PROBES HEAT	3
	– CAPT (F/O) TAT HEAT	3
	– CAPT + F/O PITOT HEAT	10
	– CAPT + STBY PITOT HEAT	11
	– DOUBLE STAT or AOA HEAT FAILURE	3
	– ENG 1(2) (3) (4) VALVE CLOSED or OPEN	4
	– F/O + STBY PITOT HEAT	12
	– ICE DETECT FAULT	8

	02.30	ICE AND RAIN PROTECTION (Cont'd)	
		– ICE or SEVERE ICE DETECTED	8
		– L(R) INR (OUTR) WING HI PR	4
		– L(R) INR (OUTR) WING LO PR	5
		– L(R) INR (OUTR) WING OPEN	6
		– L(R) (L+R) WINDOW HEAT/WSHLD HEAD	1
		– WAI SYS FAULT	7
		– WING OPEN ON GND	4
		– WING VLVE NOT OPEN	5
	02.31	INDICATING / RECORDING	
		– DFDR or FDIU FAULT	1
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		– DISPLAY UNIT FAILURE	5
		– ECAM DMC 1(2) FAULT	4
		– ECAM DMC 3 FAULT	3
		– ECAM SINGLE DISPLAY	6
		– ECP FAULT	1
		– EFIS DMC 1(2) (3) FAULT	3
		– FWC 1(2) FAULT	1
		– FWC 1+2 FAULT	2
		– OEB/FWC DISCREPANCY ◀	6
		– SDAC 1(2) (1+2) FAULT	2
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		– BSCU CH 1(2) FAULT	12
		– CONFIG PARK BRK ON	11
		– HOT	11
		– LOSS OF BRAKING	13
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		– RELEASED	10
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	<u>L/G</u>	– DOORS NOT CLOSED	4
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		– GEAR NOT UPLOCKED	1
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		– LGCIU 1(2) (1+2) FAULT	5
		– L(R) LENGTHENING FAULT	4
		– RETRACTION FAULT	3
R		– SYS DISAGREE	4

02.32	LANDING GEAR (Cont'd)	
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	– ADR 1+2 (1+3) (2+3) FAULT	2
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	– ADR CHECK PROC	17
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	– APU BLEED LEAK	8
	– APU LEAK DET FAULT	6
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	– BMC 1(2)(3)(4) FAULT	6
	– ENG 1 (2) (3) (4) BLEED FAULT/NOT CLSD	1
	– ENG 1 (2) (3) (4) HPV NOT OPEN	4
	– L (R) WING or ENG 1 (2) (3) (4) LEAK	4
	– L (R) WING LEAK DET FAULT	5
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02.46	INFORMATION SYSTEM ◀	
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	– ATC FAULT	1
	– COMPANY FAULT	1
02.49	APU	
	– APU FAULT	1
02.52	DOORS	
	– FWD or AFT or BULK CARGO	1
	– L (R) FWD or MID or AFT CABIN	1
	– L (R) EMER EXIT or AVIONIC	1
	– POS DET 1 (2) (1+2)	2
	– UPPER DECK CARGO◀	1

02.70	POWER PLANT	
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- CTL SYS FAULT		8
- EIU FAULT		11
- ENG 1(2)(3)(4) START VALVE FAULT		20
- ENG 1(2)(3)(4) START FAULT		21
- ENG START FAULT		22
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- FADEC SYS FAULT		9
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GENERAL

Abnormal and emergency procedures are the actions the crew must take after a failure. These actions retain adequate safety and make the further conduct of the flight easier. The crew uses the READ and DO principle (oral reading) in performing them.

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.

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 :

FFC5-03-0201-001-A001AA

ANTI ICE CAPT (F/O) (STBY) PROBES

■ CAPT PROBES

■ F / O PROBES

■ STBY PROBES

a procedure to be applied

b a or b or c

c

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

FFC5-03-0201-001-B001AA

BRAKES HOT

— BRK FAN (if installed) ON

■ ON GROUND

■ IN FLIGHT

a procedure to be applied

b (a + b) or (a + c)

c

The ECAM does not display black squares.

- 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 :

FFCS-03-0201-002-A001AA

F / CTL FLAPS FAULT	
— FLAPS LEVER	RECYCLE
• If unsuccessful :	
— GPWS FLAP MODE	OFF

"If unsuccessful" does not appear on ECAM

- Titles of the procedures appear in the following ways :

FFCS-03-0201-002-B001AA

TITLE	for abnormal procedure displayed on ECAM
TITLE	for abnormal procedure not displayed on ECAM
TITLE	for emergency procedure displayed on ECAM
TITLE	for emergency procedure not displayed on ECAM

TASK SHARING

The general task sharing shown below applies to all procedures.

The pilot flying remains pilot flying throughout the procedure.

PF, the pilot flying, is responsible for :

- thrust levers,
- control of flight path and airspeed,
- aircraft configuration (request configuration change),
- navigation,
- communications.

PNF, the pilot not flying, is responsible for :

- reading aloud the ECAM and checklists,
- executing required actions or actions requested by the PF, if applicable,
- operating the engine master switch and ENG FIRE pushbutton (monitored by the PF).

R MEMORY ITEMS

R The following procedures are to be applied without referring to paper : Windshear ◁ ,

R windshear ahead, TCAS ◁ , EGPWS ◁ , loss of braking, beginning of EMER DESCENT,

R beginning of UNRELIABLE SPEED INDICATION.

USE OF AUTOPILOT

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

- R — In case of engine failure, including CAT II/CAT III ILS approaches and fail-passive
 - R automatic landings (or fail-operational automatic landings, in case of an outer engine
 - R failure).
 - 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 the appropriate flight path is established, the Pilot Flying may initiate actions before this height.

If an emergency causes LAND ASAP to appear in red on the ECAM, the Pilot Flying should land at the nearest suitable airport.

If an abnormal procedure causes LAND ASAP to appear in amber on the ECAM, the crew should consider the seriousness of the situation, and select a 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 ENG 2 PUMP.....OFF	READ FAILURE TAKE ATC RADIO CTL – REQUEST ECAM ACTION (1)	READ FAILURE – PERFORM ECAM ACTION OR REQUEST EXECUTION BY THE PF
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 IF BLUE OVHT OUT : BLUE ENG 2 PUMP ON CAT 2 ONLY SLATS SLOW INOP SYS CAT 3 BLUE HYD PART SPLRS ALTN BRK REV 2	– 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, supplemented by a PFD/ND check suffice for
 R handling the fault. However, before applying the ECAM procedures, the fault
 R should be confirmed on the system display.
 R When ECAM actions have been performed, and ECAM STATUS has been
 R reviewed, the crew may refer to FCOM procedure (3.02) for supplementary
 R information, if time permits.

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 EMER ELEC CONFIG 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 with failure, 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.

It is assuming that the pilot knows the computation method, and uses the VREF given on the MCDU (the destination having been 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.

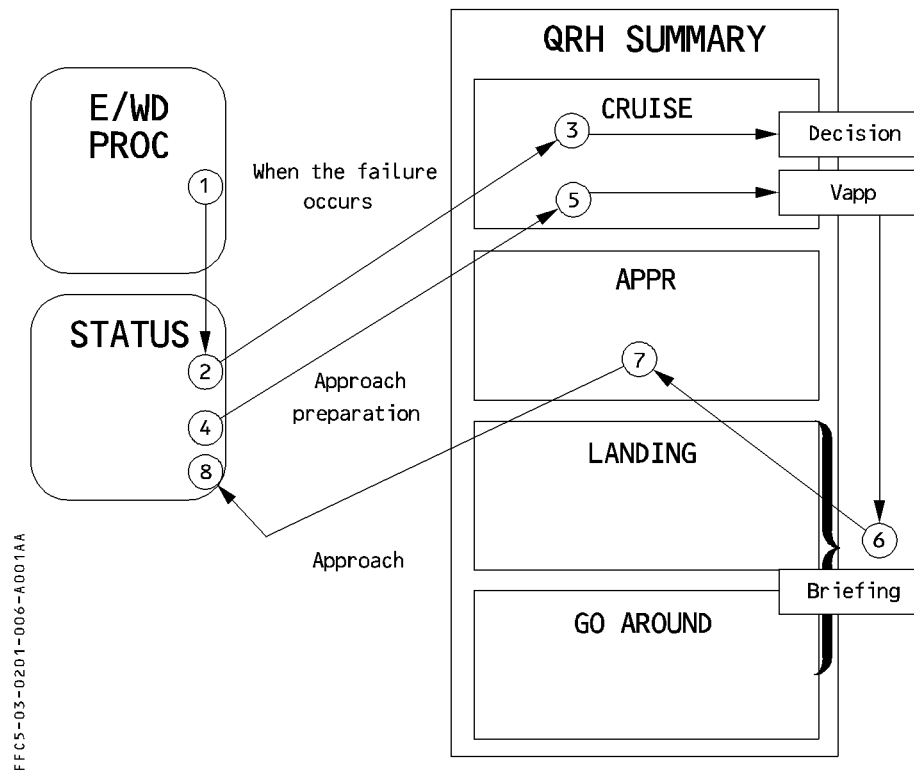
APPROACH

The APPR PROC actions should be performed by reading the APPROACH portion of the summary. This portion has been added mainly because of the flap extension procedure, which is not properly covered on the ECAM.

It is assumed that the recommendations given in this part of the summary are sufficient, and avoid to go to the "LANDING WITH FLAPS (SLATS) JAMMED" paper procedure.

The PNF should then review the ECAM STATUS, and check that all the 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.

Therefore the captain should keep his hand on the thrust levers until V1 is reached whether he is pilot flying or pilot not flying. As soon as he decides to abort, he calls "stop", takes over, and performs the stop actions.

It is impossible to list all the factors that could lead to the decision to abort the takeoff, but in order to help in the decision process, the ECAM inhibits the warnings that are not paramount from 80 knots to 1 500 feet (or 2 minutes after lift-off, whichever occurs first).

Rejected takeoffs have sometimes been hazardous even though the performance was correctly calculated, based on flight tests.

This may be due to the following :

- delay in initiating the stopping procedure,
- tires damaged,
- brakes worn or not working correctly, initial temperature higher than normal,
- brakes not fully applied,
- runway friction coefficient lower than expected,
- error in gross weight determination,
- runway line up not considered.

The aircraft is certificated according to FAR amendment 25-42, which allows 2 seconds between decision and action, thus improving the safety margin.

Above 100 knots, rejecting the takeoff becomes a serious action that may lead to a hazardous situation. Therefore, as speed approaches V1, the pilot should be "go-minded" if none of the main failure cited below ("Above 100 knots and below V1") has occurred.



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 of the causes, the Captain should seriously consider discontinuing the takeoff, if any ECAM warning is activated.

Note : The speed of 100 knots is not critical, and was chosen in order to help the Captain make his decision and 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. Very few situations should lead to the decision to reject the takeoff. The main ones are:

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, such as :
 - . ENG or APU FIRE
 - . ENG FAIL
 - . CONFIG
 - . ENG OIL LO PR
 - . 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

R

CAPT	F/O
Phase 1 – CALL "STOP" Simultaneously : – THRUST LEVERS IDLE – REVERSE THRUST MAX AVAIL.	– BRAKE RESPONSE MONITOR – REVERSE CONFIRM – ANY AUDIO CANCEL – ATC INFORM – ON GROUND EMER/EVACUATION Checklist LOCATE
Phase 2 Consider positioning the aircraft to keep any possible fire away from the fuselage. – PARKING BRAKE APPLY Set parking brake ON after aircraft stops. – PA call . "ATTENTION CREW! AT STATIONS" – CALL "ECAM ACTIONS" The aircraft should remain stationary while the crew evaluates the situation.	
Evacuation phase If required, refer to the ON GROUND EMER/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.

- Note : 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 & NOSEWHEEL switch OFF and modulate brake pressure, as required, at or below 1 000 psi.*
If the brake pedals were fully pressed when switching the A/SKID & NOSEWHEEL 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

- R
- R
- 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, initiate the rotation with a positive sidestick input to achieve a continuous rotation rate, towards a pitch attitude of 12.5 degrees. After lift-off follow the speed reference system (SRS).
 - When airborne with a positive rate of climb and when the radio altitude has increased, 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. Accelerate if β target cannot be zeroed with full rudder.
 - Consider the use of TOGA thrust.
On derated takeoff (derated takeoff option installed), do not use asymmetric TOGA thrust if speed is below F in CONF 2 and 3.
 - 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 sideslip 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 ALLOWED FOR 10 MINUTES ONLY.

FOR ENG FAIL 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.

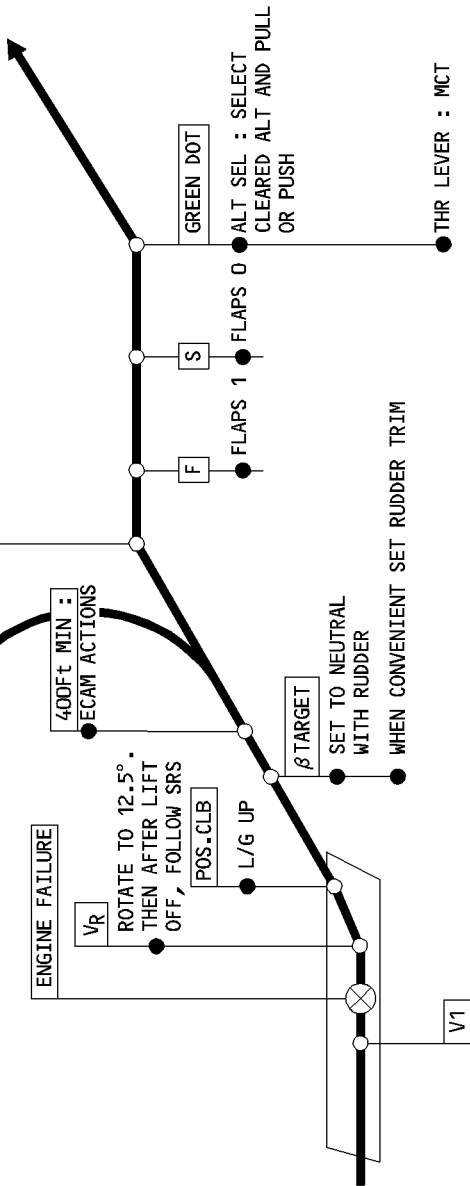


ENG FAILURE AFTER V1 – CONTINUED TAKEOFF (CONT'D)

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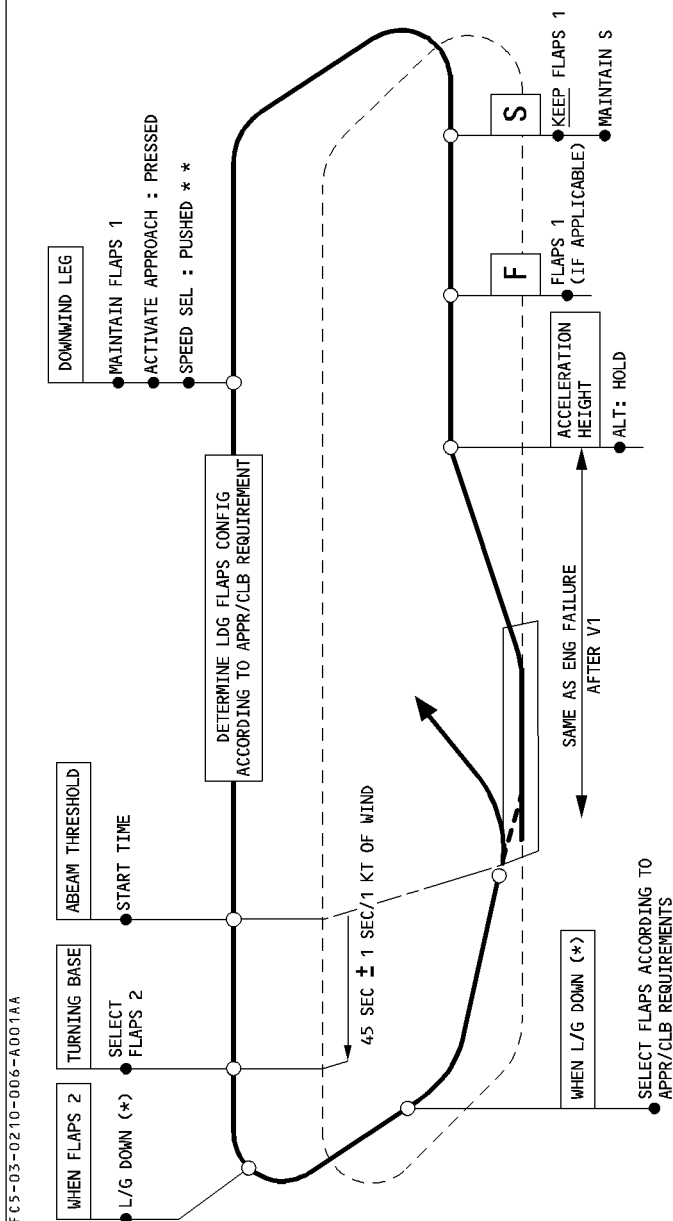
INTURN :

FOLLOW FD OR AP ORDER*. WITH NO AP/FD, THE PILOT SHALL LIMIT THE BANK ANGLE TO 15° UP TO F/S, GREEN DOT.



NOTE : FOR APPROACH AND LANDING, APPLY STANDARD APPROACH PROCEDURE.

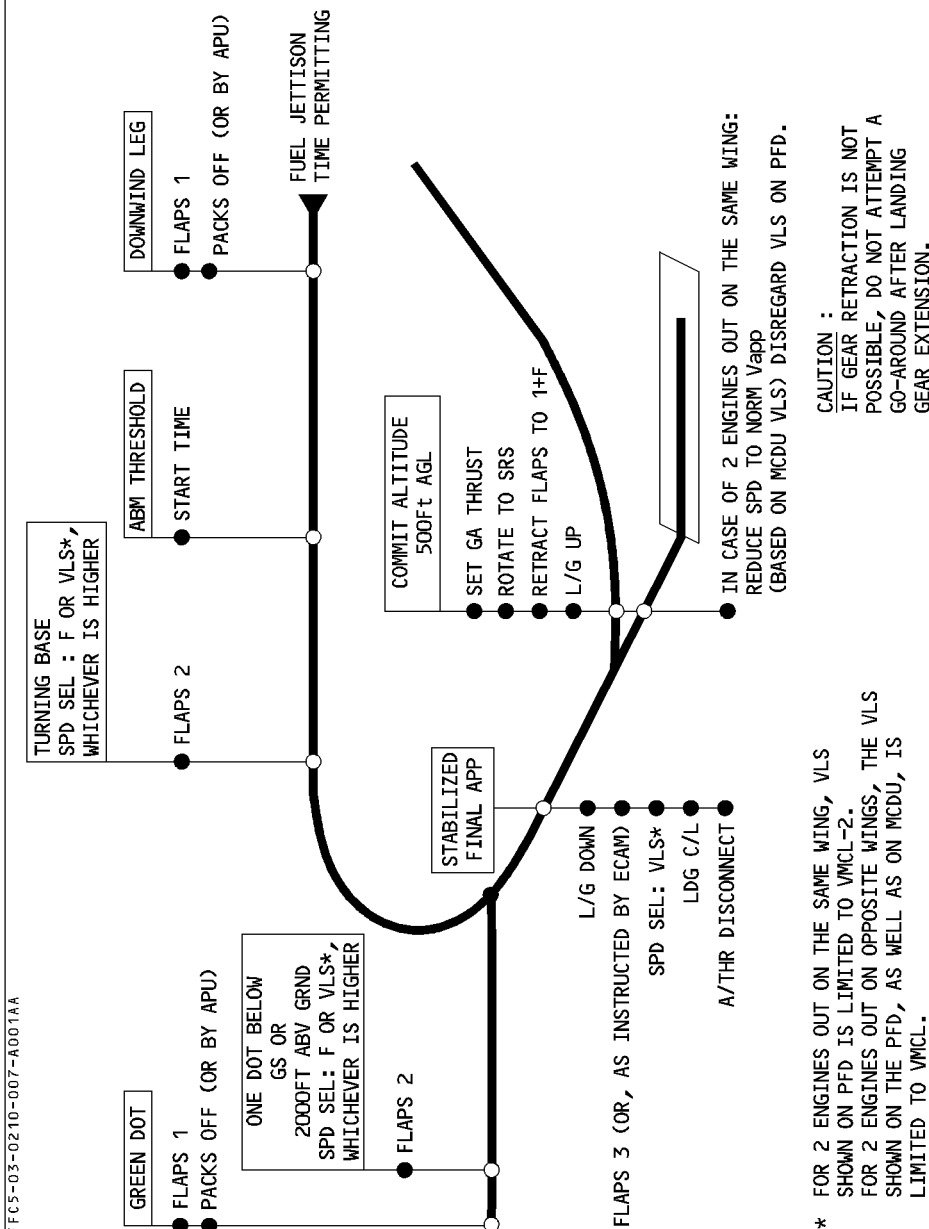
* BANK ANGLE IS LIMITED TO
 -15° UP TO (MANEUVERING SPEEDS - 10KTS)
 -THEN, LINEAR INCREASE TO 25° UP TO (MANEUVERING SPEEDS - 3KTS)
 -25° ABOVE (MANEUVERING SPEEDS - 3KTS)

VMC LDG FOLLOWING ENG FAILURE ON TO

* AT HIGH ALTITUDE AIRPORT AND HIGH LANDING WEIGHT, DELAY
SELECTION OF GEAR DOWN AND LANDING FLAPS/SLATS
CONFIGURATION UNTIL FINAL APPROACH.

** THIS PATTERN ASSUMES THE USE OF MANAGED SPEED (INCLUDING MINIMUM GROUND SPEED FUNCTION)
IF NOT, SELECT SPEEDS MANUALLY: F AFTER FLAPS 2 SELECTION,
VAPP AFTER LANDING FLAPS SELECTION.
SELECTED SPEED MUST BE USED IF THE FLIGHT PLAN
HAS NOT BEEN UPDATED WITH THE NEW RUNWAY
(MINIMUM GRND SPD NOT CORRECT).

TWO ENGINE INOP LANDING



LANDING WITH SLATS OR FLAPS JAMMED

Determine landing configuration, according to the table 3.02.80.

■ Repeat the following, until landing configuration is reached

- SPEED SEL VFE NEXT – 5 KT
Decelerate towards VFE NEXT – 5 knots, 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 A/THR and selected speed is recommended.
- OVERSPEED warning and VLS, displayed on the PFD, are computed according to the actual flap/slats position.
- VFE and VFE NEXT are displayed on 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 reengaged 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 abnormal configurations.

■ IF SLATS FAULT :**● FOR CIRCUIT :**

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

● FOR DIVERSION :

- SELECT CLEAN CONFIGURATION

● If SLATS jammed at 0

- Normal operating speeds

● If SLATS jammed > 0

- Recommended speed for diversion : 205 KTS.
- Increased fuel consumption.



LANDING WITH SLATS OR FLAPS JAMMED (CONT'D)

■ IF FLAPS FAULT :

● FOR CIRCUIT :

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

● FOR DIVERSION :

● If FLAPS jammed at 0

- SELECT CLEAN CONFIGURATION
- Normal operating speeds

● If FLAPS jammed > 0

- MAINTAIN SLATS/FLAPS CONFIGURATION
- Recommended speed for diversion :

MAX SPEED –10 KT

- Increased fuel consumption

Note : · In case the SPD LIM flag is displayed on the PFD, use the MAX SPEED displayed on the ECAM status page.

· In case of a go-around with CONF FULL selected, the L/G NOT DOWN warning is triggered at landing gear retraction.

· In some cases, MAX SPEED –10 KTS may be a few knots higher than the VFE. In this situation, pilots may follow the VFE.

MAX SPEED					
Flaps Slats	F = 0	0 < F ≤ 1	1 < F ≤ 2	2 < F ≤ 3	F > 3
S = 0	NO LIMITATION	215 knots	196 knots	186 knots	180 knots
0 < S ≤ 1	255 knots				
1 < S	215 knots	205 knots	196 knots	186 knots	180 knots

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 the ALTERNATE FLIGHT PLANNING tables, refer to 2.05.50), and multiply this result by 1.4 (SLATS EXTENDED), or 2 (FLAPS EXTENDED), or 2.3 (SLATS and FLAPS EXTENDED), to obtain the fuel consumption required to reach the destination in the current configuration.

NO FLAPS NO SLATS LANDING

– SPEED SEL GREEN DOT
Initial approach, with autothrust in selected mode, is recommended.
Autopilot is permitted down to 500 feet AGL.

– GPWS FLAP MODE OFF

– FLAPS LEVER CONF 1
Disregard the CONF 2 requirement on the ECAM status page.
Set FLAP handle to CONF1, to benefit from SRS guidance, in case of a go-around.
The VFE displayed on the PFD depends on the flap lever position. So, a false VFE will be given.
Plan a long stabilized approach.

● **For the final approach :**

– A/THR OFF

– SPD SEL VAPP
Select VLS on the PFD (or VREF + 50 knots, if VLS is not available).
At 500 feet, reduce speed to obtain VLS – 5 knots (or VREF + 45 knots, if VLS is not available) at touchdown.

– LDG DIST PROC APPLY
Refer to the QRH part 2, or to the FCOM 3.02.80.

AIR PACK 1(2) OVHT

– PACK (affected) OFF

High flow is automatically selected on the remaining pack.

The fault light goes off when the overheat disappears.

– FWD CRG COOLING (a) OFF

● WHEN PACK OVHT OUT :

– PACK (affected) ON

– FWD CRG COOLING (a) ON

STATUS

● WHEN PACK OVHT OUT :

– PACK (affected) ON

– FWD CRG COOLING (a) ON

INOP SYS

PACK 1(2)

FWD CRG TEMP

(a) These lines are only displayed, if the forward cargo cooling is installed and if the automatic closure of the cargo cooling cold air valve is not operative.

AIR PACK VALVE 1(2) FAULT

■ If only one PACK VALVE closed (on ground at engine start) :

PACK (affected) INHIB BY DOORS

In case of prevention of pressurization due to one door not closed, only one pack valve is closed. The valve of the other pack stays abnormally in the OPEN position.

– FWD CRG COOLING (a) OFF

■ Other cases :

– PACK (affected) OFF

– FWD CRG COOLING (a) OFF

STATUS

INOP SYS

PACK 1(2)

FWD CRG TEMP

(a) These lines are only displayed, if the forward cargo cooling is installed and if the automatic closure of the cargo cooling cold air valve is not operative.

ARG ALL

AIR PACK 1(2) OFF	
Crew awareness. <i>One pack is abnormally selected OFF.</i>	
STATUS INOP SYS PACK 1(2) FWD CRG TEMP	

AIR PACK 1 + 2 FAULT	
■ If one door not locked closed on ground : PACKS INHIB BY DOORS <i>Check doors locked closed. If confirmed closed, maintenance action is due.</i> ■ In all other cases : – PACK (affected) OFF <i>The fault light goes off when the failure disappears.</i> DESCENT TO FL 100/MEA <i>Note : The rate at which the cabin altitude increases may be minimized by closing the CARGO ISOL VALVES, if the cargo freight permits.</i> ● WHEN PACK OVHT OUT : <i>If the FAULT was due to an overheat :</i> – PACK (affected) ON ● WHEN DIFF PR < 1 PSI AND FL BELOW 100 : – RAM AIR ON MAX FL 100/MEA	
STATUS INOP SYS PACK 1 + 2 FWD CRG TEMP	
MAX FL 100/MEA ● WHEN PACK OVHT OUT : <i>If the FAULT was due to an overheat :</i> – PACK (affected) ON	

AIR PACK 1(2) REGUL FAULT

■ If pack controller fault :
 Crew awareness.

PACK 1(2) AT FIXED TEMP

The pack delivers a fixed temperature of 5°C ± 4°C.
The flow control valve pneumatically regulates the flow to the NORM value.

■ If pack in bypass mode :
Failure of the Air Cycle Machine.
 PACK 1 (2) IN BY PASS MODE
 – PACK (affected on ground) OFF
To avoid overheating on ground.
 PACK (affected) AVAIL IN FLT (only displayed on ground)

PACK PERF AFFECTED

PACK (affected) AVAIL IN FLT (only displayed on ground)

STATUS

INOP SYS

PACK 1(2)

(on ground only)

AIR HOT AIR SYS 1(2) FAULT

One hot air valve and the hot air X valve failed closed.
 Crew awareness.

CAB TEMP REGUL DEGRADED (on ground)

INOP SYS

CKPT TEMP

(only if sys 2 failed)

FWD CRG TEMP

(only if sys 1 failed)

ARG MSN 0063 0080-0085

COND ZONE CTLR 1(2) FAULT	
Crew awareness.	
STATUS INOP SYS ZONE CTLR (1) (2)	

COND ZONE REGUL FAULT	
<i>Zone controller fault, or loss of trim air system.</i> ALL ENG HI IDLE (if all engines at high idle) ENG 1(2)(3)(4) HI IDLE (if not all engines at high idle)	
STATUS INOP SYS ZONE REGUL FWD CRG TEMP	
ALL ENG HI IDLE (if all engines at high idle) ENG 1(2)(3)(4) HI IDLE (if not all engines at high idle) CAB TEMP REGUL DEGRADED (on ground) PACKS AT FIXED TEMP <i>The packs are controlled to deliver a fixed temperature of 20°C (68°F). Pack flow and zone temperature selections are lost.</i>	

COND DUCT OVHT	
FWD CRG DUCT OVHT, or COCKPIT DUCT OVHT, or CABIN DUCT OVHT – HOT AIR (affected) OFF <i>If not closed automatically.</i>	
● IF HOT AIR STUCK OPEN : – PACK (affected) OFF	
● WHEN DUCT TEMP < 70 DEG C : – HOT AIR (affected) OFF THEN ON <i>Hot air pressure regulating valve will reopen.</i> – PACK (affected) ON	
STATUS INOP SYS FWD CRG TEMP CKPT TEMP (only if sys 2 failed)	
● WHEN DUCT TEMP < 70 DEG C : – HOT AIR (affected) . . . OFF THEN ON – PACK (affected) ON CAB TEMP REGUL DEGRADED (on ground)	

AIR PACK 1(2) REGUL FAULT

■ If ram air door failed closed :

PACK 1(2) RAM DOOR CLOSED

STATUS

PACK PERF AFFECTED

I

■ If pack controller fault :

Crew awareness.

STATUS

PACK 1(2) AT FIXED TEMP

The pack delivers a fixed temperature of 5° C ± 4° C.
The flow control valve pneumatically regulates the flow to the NORM value.

|

■ If pack in bypass mode :

Failure of the Air Cycle Machine.

PACK 1 (2) IN BY PASS MODE

– PACK (affected on ground) OFF

To avoid overheating on ground.

PACK (affected) AVAIL IN FLT (only displayed on ground)

STATUS

PACK PERF AFFECTED

PACK (affected) AVAIL IN FLT (only
displayed on ground)

INOP SYS
PACK 1(2)
(on ground only)

AIR HOT AIR SYS 1(2) FAULT

One hot air valve and the hot air X valve failed closed.

Crew awareness.

STATUS

CAB TEMP REGUL DEGRADED (on ground)

INOP SYS
CKPT TEMP
(only if sys 2
failed)
FWD CRG TEMP
(only if sys 1
failed)

COND ZONE CTLR 1(2) FAULT	
Crew awareness.	STATUS INOP SYS ZONE CTLR (1) (2)

COND ZONE REGUL FAULT	
<i>Zone controller fault, or loss of trim air system.</i> ALL ENG HI IDLE (if all engines at high idle) ENG 1(2)(3)(4) HI IDLE (if not all engines at high idle)	
STATUS INOP SYS ZONE REGUL FWD CRG TEMP	ALL ENG HI IDLE (if all engines at high idle) ENG 1(2)(3)(4) HI IDLE (if not all engines at high idle) CAB TEMP REGUL DEGRADED (on ground) PACKS AT FIXED TEMP <i>The packs are controlled to deliver a fixed temperature of 20°C (68°F). Pack flow and zone temperature selections are lost.</i>

COND DUCT OVHT	
FWD CRG DUCT OVHT, or COCKPIT DUCT OVHT, or CABIN DUCT OVHT – HOT AIR (affected) OFF <i>If not closed automatically.</i>	
● IF HOT AIR STUCK OPEN : – PACK (affected) OFF	
● WHEN DUCT TEMP < 70 DEG C : – HOT AIR (affected) OFF THEN ON <i>Hot air pressure regulating valve will reopen.</i> – PACK (affected) ON	
STATUS INOP SYS FWD CRG TEMP CKPT TEMP (only if sys 2 failed)	● WHEN DUCT TEMP < 70 DEG C : – HOT AIR (affected) . . . OFF THEN ON – PACK (affected) ON CAB TEMP REGUL DEGRADED (on ground)

CAB PR EXCESS CAB ALT

– CREW OXY MASKS (if above FL 100) ON

It is recommended to descend with the autopilot engaged :

- Turn ALT selector knob and pull.
- Turn HDG selector knob and pull.
- Set target SPD/MACH.

● If above FL 100, and under FL 160 :

– DESCENT INITIATE

Check on ECAM CAB PRESS page if any pressurization system fault. If abnormal, apply appropriate procedure.

● If above FL 160 :

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

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

– SPD BRK FULL

– 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 21000 feet ; Reduce speed to VLO/VLE.

– SIGNS ON

– ENG START SEL 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 : (VHF) 121.5 MHz or (HF) 2182 KHz or 8364 KHz.

To save oxygen, set oxygen diluter selector to N position.

With oxygen diluter selector 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 to minimize the interference from oxygen mask breathing noise.

● IF CAB ALT > 14 000 FT :

– PAX OXY MASKS MAN ON

- Confirm PAX OXY MASKS released.
- In case of CABIN ALTITUDE advisory or EXCESS CAB ALT warning, check that the OUTFLOW VALVES are closed on the CAB PRESS ECAM page. If they are not closed and ΔP is positive, select manual control and the V/S CTL toggle switch to full down.
- Mobile crew rest compartment supply relies on chemical generators and additional portable oxygen bottles. The portable equipment can be used when cabin altitude is below 30000 feet. At first level off, advise the mobile crew rest compartment occupants to change oxygen supply from chemical generators to portable bottles.
- Notify cabin crew when 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 :

- if one door not locked closed on ground :

CAB PR INHIB BY DOORS

- In all other cases :

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

- MODE SEL MAN
- MAN VALVE SEL BOTH
- MAN V/S CTL AS RQRD

· Monitor cabin V/S and cabin altitude frequently and adjust as necessary.

Maintain aircraft altitude at or above cabin altitude. It may take 10 seconds in manual mode before the crew notices a change of the outflow valve position.

• The two safety valves limit ΔP to 8.85 psi.

STATUS

INOP SYS
CAB PR 1 + 2

MAN CAB PR CTL :

TGT V/S : CLIMB 500 FT/MN
: DES 300 FT/MN

A/C FL	CAB ALT TGT
410	8 000
350	6 500
300	5 000
250	2 500
< 200	0

- **DURING FINAL APPR :**

- MAN V/S CTL FULL UP

When on intermediate approach (below 2500 feet),
adjust $\Delta P = 0$.

When ΔP is zero, select FULL UP to fully open both outflow valves.

CAUTION

Check that ΔP is zero before opening doors.

CAB PR LO DIFF PR (in flight)

EXPECT HI CAB RATE

- A/C V/S REDUCE
This line is not displayed in case of an Emergency Descent, due to Excessive Cabin Altitude.

CAB PR SAFETY VALVE OPEN

The failure is probably due to an overpressure.

- **IF DIFF PR ABV 8.7 PSI :**
 - MODE SEL MAN
 - MAN VALVE SEL BOTH
 - MAN V/S CTL AS RQRD

If overpressure is confirmed, reduce cabin ΔP .
For manual control, refer to the CAB PR SYS 1 + 2 FAULT status.
It may take 10 seconds in manual mode, before the crew notices a change in the outflow valve position.
- **IF UNSUCCESSFUL :**
 - A/C FL REDUCE

CAB PR LDG ELEV FAULT

- LDG ELEV MAN ADJUST
Landing field elevation is not available from the FMGS. Landing elevation must be manually-selected, with the LDG ELEV selector.
Refer to the LDG ELEV indication on the CRUISE page, or on the CAB PRESS page, to adjust the required landing elevation.
Note : If the landing is performed using QFE, set "0" feet on the LDG ELEV selector.
- **If LDG ELEV selector is inoperative :**
LDG ELEV SET AT ZERO

COND L (R) (L + R) CAB VENT FAULT

Failure of the cabin fan(s) or recirculation valve(s).

– PACK FLOW HI

STATUS

INOP SYS

L CAB VENT

(R) (L + R)

VENT BLOWING FAULT

– PACK FLOW HI

To increase air flow.

– CAB FANS ON

– COCKPIT TEMP DECREASE

– CABIN TEMP DECREASE

To decrease the temperature of the recirculated air.

● IF WARNING AFTER 5 MIN :

MAX FLT TIME 5 HOURS

Note : This flight time limitation intends to prevent premature failures of some minor equipments (IFE, cabin communication ...) that may occur after 5 hours with a BLOWING FAULT caution. This 5 hours limitation is not applicable to other equipments.

STATUS

MAX FLT TIME 5 HOURS

INOP SYS

VENT BLOWING

VENT EXTRACT FAULT

Note : Resetting the AEVC computer may clear the EXTRACT FAULT caution, if it is triggered on ground at engine start.

– EXTRACT OVRD

Air is blown through the overboard extract valve, which is partially open.

The underfloor extract valve is closed.

STATUS

INOP SYS

VENT EXTRACT

R
R

VENT OVBD VALVE FAULT

Note : Resetting the AEVC computer may clear the OVBD VALVE FAULT caution, if it is triggered on ground, at engine start.

– EXTRACT OVRD

● IF OVBD STILL FULL OPEN :

MAX FL 100/MEA

– CAB PR MODE SEL MAN

– CAB PR VALVE SEL BOTH

– MAN V/S CTL FULL UP

Pressurization is inhibited to avoid damage to the ducts.

It may take 10 seconds in manual mode before the crew notices a change in the outflow valve position.

STATUS

MAX FL 100/MEA

INOP SYS

OVBD VALVE

VENT PACK BAY VENT FAULT (on ground)

– ONE PACK OFF

● On the ground :

BOTH PACKS AVAIL IN FLT

INOP SYS

PACK 1 or 2

PACKBAY VENT

FWD CRG TEMP◀

STATUS

INOP SYS

PACK 1 or 2

PACKBAY VENT

FWD CRG TEMP◀

VENT GND COOL FAULT ◀

– GND COOL OFF

● IF SKIN VALVE STILL OPEN :

MAX FL 100/MEA

– CAB PR MODE SEL MAN

– CAB PR VALVE SEL BOTH

– MAN V/S CTL FULL UP

Pressurization is inhibited to avoid damage to the ducts.

It may take 10 seconds in manual mode before the crew notices a change in the outflow valve position.

STATUS

MAX FL 100/MEA

INOP SYS

GND COOL

ARG ALL

COND LAV + GAL VENT FAULT

Crew awareness.

On ground, cabin zone temperature sensors are normally ventilated by air extracted by the fan. Therefore, when the fan is faulty, no cabin temperature indication is available on the ECAM.

– PAX SYS OFF(a)

PAX SYS AVAIL IN FLT (a)(b)

STATUS

● On ground :

CAB TEMP REGUL DEGRADED

· Cabin zone inlet duct temperature is constant.

· No cabin temperature on the ECAM.

· Cockpit temperature regulation is normal.

PAX SYS AVAIL IN FLT (a)(b)

INOP SYS

LAV + GAL VENT

(a) Displayed, only when the passenger entertainment system is installed in the cabin (VCC).

(b) Displayed, if no smoke is detected, and no IFE bay ventilation is lost.

COND BULK (FWD) (AFT) CRG ISOL FAULT ◀

Crew awareness.

STATUS

●

INOP SYS

BULK VENT

FWD (AFT) CRG◀

FWD CRG TEMP◀

COND BULK (FWD) CRG VENT FAULT

Crew awareness.

Failure of ventilation fan.

STATUS

● If FWD (AFT) affected :

FWD (AFT) CARGO VENT REDUCED

INOP SYS

BULK VENT

FWD (AFT) CRG◀

FWD CRG TEMP◀

ARG ALL

COND BULK (FWD) CRG HEAT FAULT ◀

Crew awareness.

STATUS

INOP SYS

BULK HEAT

(FWD CRG TEMP)

COND VENT SYS FAULT

Failure of the ventilation controller, leading to the loss of galley and cargo ventilation.

– AIR FLOW AUTO HI

– PAX SYS OFF (a)

PAX SYS AVAIL IN FLT (b)(d)

STATUS

INOP SYS

CRG VENT

CRG COND

ALL CAB FANS

LAV + GAL VENT

IFE BAY VENT (c)

● On ground :

CAB TEMP REGUL DEGRADED

Cabin temperature sensors are not ventilated.

PAX SYS AVAIL IN FLT (b)(d)

(a) When the passenger entertainment system is installed in the cabin (VCC), or in the avionic bay (IFEC)

(b) When the passenger entertainment system is installed in the cabin (VCC), but not in the avionic bay.

(c) When the passenger entertainment system is only installed in the avionic bay (IFEC).

(d) If no smoke is detected.

COND FWD CRG COOL FAULT ◀

– FWD CRG COOLING OFF

STATUS

INOP SYS

FWD CRG TEMP

COND BULK CRG DUCT OVHT

– BULK HOT AIR (If not closed automatically) OFF

● WHEN BULK CRG DUCT TEMP<70 DEG C :

– BULK HOT AIR OFF/ON

STATUS

● WHEN BULK CRG DUCT TEMP<70 DEG C: | INOP SYS

– BULK HOT AIR OFF/ON | BULK HEAT

COND CAB REST ISOL FAULT

Crew awareness.

Position disagree of the cargo rest isolation valve.

COND LWR LAV (STOWAGE) VENT FAULT

Crew awareness.

STATUS

| INOP SYS

LWR LAV (STW)

VENT

COND LWR STOWAGE ISOL FAULT

Crew awareness.

CAB PR FWD (AFT) OFV NOT OPEN (on ground)

– MODE SEL MAN

– MAN VALVE SEL FWD (AFT)

– MAN V/S CTL FULL UP

It may take 10 seconds in manual mode, before the crew notices a change in the outflow valve’s position.

● IF UNSUCCESSFUL :

– PACK 1 OFF

– PACK 2 OFF

FWD OFV CTL : MAN ONLY (AFT)

STATUS

I

CAB PR EXCESS RESIDUAL PR

– PACK 1 OFF

– PACK 2 OFF

– CABIN CREW ALERT

ARG ALL

AUTO FLT FM 1 (2) FAULT

This warning is associated with MAP NOT AVAIL message, that is displayed on the corresponding ND.

- FM SOURCE BOTH ON 2 (1)
Both NDs use the same FM information.

CAT 3 SINGLE ONLY

STATUS

INOP SYS

AP 1 (2)
FM 1 (2)
GPWS TERR(a)
CAT 3 DUAL

(a) Only if FM 1 is lost.

AUTO FLT FM 1 + 2 FAULT

- FM SOURCE NORM
The FM source selector must be at NORM, to allow the NAV B/UP prompt to be displayed on the MCDU MENU page
- NAVAID TUNING USE RMP
Set both RMPs to NAV
- LDG ELEV MAN ADJUST
CPCs normally use the landing elevation from the FM.

MCDU BACK UP NAV AVAIL
CAT 1 ONLY (a)

STATUS

INOP SYS

FM 1 + 2
AP 1 + 2 (a)
GPWS TERR
REAC W/S DET (b)

Note : Therefore, DH indication is lost, ILS approach may only be a CAT 1 approach.

- (a) AP 1 + 2 are lost, if the FG parts of the FMGES are lost.
- (b) The Reactive Windshear Detection function is lost, if the FE part of the FMGES is lost.

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

CAT 1 ONLY
(if both AP lost)

STATUS
| INOP SYS
AP (affected)

AUTO FLT A/THR OFF

This warning is displayed only for involuntary disconnection. For voluntary disconnection an amber A/THR OFF message is displayed in the right lower part of ECAM upper DU.
– THR LEVERS MOVE
Thrust is frozen after autothrust disconnection.
Note : *If the thrust levers are not moved the ENG THRUST LOCKED warning is then triggered every 5 seconds (Refer to 3.02.70).*

CAT 2 ONLY

STATUS
| INOP SYS
A/THR
CAT 3

R

AUTO FLT REAC W/S DET FAULT

Reactive windshear function is lost.
Crew awareness.

STATUS

INOP SYS

REAC W/S DET

AUTO FLT A/THR ENG 1(2)(3)(4) OFF

– THR LEVER (affected) MAN ADJUST

STATUS

INOP SYS

ENG 1 A/THR
(2, 3, 4)

AUTO FLT A/THR LIMITED

This warning is displayed when autothrust is active and the thrust levers are not in the CLB detent (or MCT detent in case of engine out). The caution is repeated every 5 seconds as long as the thrust levers are not moved.

■ If all engine operative

– THR LEVER CLB

■ In case of engine out :

– THR LEVERS (remaining engines) MCT

ARG ALL

AUTO FLT FCU FAULT

R

■ Partial loss of the FCU

- **BARO REF** **CHECK**
Barometer reference setting on FCU and PFDs must be crosschecked.

● If necessary (a) :

- **AFS TARGET** **RESELECT**
Although AP/FD and A/THR are lost, the target selection and displays are available.

STATUS

R

CAT 1 ONLY (a)

INOP SYS

PART FCU

AP 1 + 2 (a)

A/THR (a)

R

(a) AP 1+2 and A/THR are only lost in a specific FCU failure mode (channel B+C failure in a 3-channel FCU architecture).

R

■ **Total loss of the FCU**

PFD BARO REF : STD ONLY

With all FCU channels failed, the barometer reference goes to 1013 hPa.

Use standby altimeter to change this to the actual barometer setting.

In addition :

- All FCU controls are inoperative.
- A/THR, AP 1+2 and FD 1+2 not available.
(except in LAND TRACK or GO AROUND mode where only A/THR is lost)

— On PFD :

- Altitude alert is inoperative.
- ILS deviation scales are displayed.
- TRK/FPA selection is lost.
- MACH selection is lost.

— On ND :

- *ROSE NAV mode with map (80 NM range) is displayed.*
- *Weather radar display is lost.*
- *VOR/ADF needles :*

Needle 1 is related to VOR1 only.

Needle 2 is related to ADF2 only.

— On DDRMI

VOR/ADF selection is not affected.



AUTO FLT FCU FAULT (CONT'D)

STATUS

PFD BARO REF : STD ONLY
CAT 1 ONLY

INOP SYS
AP 1+2
A/THR
FCU
GPWS TERR

AUTOLAND

- The red AUTOLAND lights will flash on the glareshield, if :*
- The AP is OFF below 200 feet AGL
 - The LOC deviates excessively, between 15 feet and 200 feet AGL
 - The GLIDE deviates excessively, between 100 feet and 200 feet AGL
 - The ILS failure below 200 feet AGL
 - There is any radio altimeter discrepancy of more than plus or minus 15 feet below 200 feet AGL.
- Note : If the autopilot is disengaged below 200 feet AGL using the instinctive disconnect pushbutton, the AUTOLAND lights will flash for 3 seconds. If visual references are insufficient, initiate a go-around.*
- GO-AROUND PERFORM

MCDU 1(2)(3) FAILURE

- BRT KNOB (on affected MCDU) OFF
The MCDU 3 automatically replaces MCDU 1 or 2.

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 FMGES 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.
- The “REENTER WEIGHT/CG” MCDU message is displayed.

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 cycle.
- 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 and CG values read on the ECAM fuel page.
- Activate the APPROACH phase.

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

R
R
R
R

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.

2. If unsuccessful, deselect the identified failed VHF/HF transmission keys on the associated Audio Control Panel (ACP) to remove the caution. This ACP should only be used in 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 VHF/FH channel.

COM CIDS 1 + 2 FAULT

Crew awareness

Passenger address, cabin and service interphone, passenger signs, and communication with the lower deck and flight crew rest compartment (if installed) are inoperative.

STATUS

I

INOP SYS

CIDS 1+2

COM CIDS PA FAULT

Crew awareness

Passenger address is inoperative.

STATUS

I

INOP SYS

CIDS PA

COM ACARS 1(2) (1+2) FAULT ⚠

Crew awareness.

STATUS

I

INOP SYS

ACARS 1(2) (1+2)

COM SATCOM (DATA) FAULT

Crew awareness.
ACARS and telephone communications are inoperative.

VHF 3 ONLY FOR DATALINK (a)

(a) Only displayed, if the ATC option is installed.

STATUS

INOP SYS

SATCOM (DATA)

COM SATCOM VOICE FAULT

Crew awareness.
Telephone communications are inoperative. ACARS is still transmitted by the SATCOM.

COM VHF 3 DATA FAULT

Crew awareness.

SATCOM ONLY FOR DATALINK(a)

(a) Only displayed, if the ATC option is installed.

STATUS

INOP SYS

VHF3 DATA

COM HF DATA FAULT

Crew awareness.
Triggered to indicate the loss of the HFDRs' DATA mode.

ELEC GEN 1(2)(3)(4) FAULT

– GEN (affected) OFF THEN ON

● **IF UNSUCCESSFUL :**

– GEN (affected) OFF

Note : In case of failure of an additional generator, or for recovery of some galleys, the APU, if available, may be started.

STATUS

Note : · Medical outlets ◀

In case of two GENs loss on the same side, in order not to overload the remaining generators, window or ceiling cabin light must be switched off through the Forward Attendants Panel if Medical Outlets are used.

· LDMCR ◀

If the GEN 4 is inoperative, the heating of the lower deck cabin crew rest compartment is lost.

INOP SYS

GEN 1(2)(3)(4)
PART GALLEY
(only if APU GEN
not in line)

ELEC GEN 1(2)(3)(4) OFF

Crew awareness

Switch affected GEN on.

ELEC APU GEN FAULT

– APU GEN OFF THEN ON

● **IF UNSUCCESSFUL :**

– APU GEN OFF

In flight : restrict use of APU to emergencies.

STATUS

INOP SYS

APU GEN

ELEC IDG 1(2)(3)(4) DISCONNECTED (on ground)

A maintenance action is due to reconnect the IDG.

STATUS

Note : If the IDG 4 is inoperative the heating of the LDMCR is lost.

INOP SYS
GEN 1(2)(3)(4)
PART GALLEY
(only if APU GEN
not in line)

ELEC IDG 1(2)(3)(4) OIL LO PR/OVHT

– IDG (affected) OFF

When the engine is stopped, or below idle, the IDG disconnection is inhibited.
Press IDG pushbutton switch until GEN FAULT light comes on but not more than 3 seconds
to avoid damage to the disengage solenoid.

IDG FAULT light stays on as long as overheat is present.

STATUS

Note : If the IDG 4 is inoperative the heating of the LDMCR is lost.

INOP SYS
GEN 1(2)(3)(4)
PART GALLEY

ELEC GEN 1(2)(3)(4)/APU GEN/EXT PWR OVERLOAD

– GALLEY OFF

This warning is only displayed if galley automatic shedding has failed.

STATUS

INOP SYS
GALLEY

ELEC STATIC INV FAULT

Crew awareness

ELEC ECMU 1(2) FAULT

– GEN 1+ 2 (3 + 4)

KEEP ON

The closure control of associated generator line contactors is lost, but these contactors remain closed provided the GEN pushbutton switch is at on.

The associated AC BUS TIE contactors open. The APU line contactor opens if ECMU 1 is affected.

STATUS

– GEN 1 + 2 (3 + 4)

KEEP ON

INOP SYS

ECMU 1(2)

APU GEN (a)

PART GALLEY

EXT PWR A (b)

EXT PWR B (a)

(a) IF ECMU 1 FAULT

(b) IF ECMU 2 FAULT

ELEC BAT 1(2) or APU BAT FAULT

● In case of thermal runaway or short circuit :

– BAT (affected)

OFF

Battery contactor is automatically opened by Battery Charge Limiter, but the automatic opening must be manually confirmed open.

STATUS

● IF APU BAT and APU TR fault :

APU START NOT AVAIL

INOP SYS

BAT 1(2) or

APU BAT

ELEC BAT 1(2) or APU BAT OFF

Crew awareness

Battery is abnormally selected off.

STATUS

● If APU BAT off and APU TR fault :

● FOR APU START :

– APU BAT

ON

ARG ALL

R

ELEC BAT 1(2) or APU BAT SYS FAULT

Crew awareness.

STATUS

● If APU BAT SYS FAULT and APU TR fault

INOP SYS

APU START NOT AVAIL

BAT 1(2) or APU BAT SYS

ELEC TR 1(2) or APU TR or ESS TR FAULT

Crew awareness.

● In case of an APU TR fault :

● IF APU NOT REQUIRED

– APU BAT

OFF

STATUS

● If APU TR fault, and APU BAT off :

● FOR APU START :

– APU BAT

ON

CAT 3 SINGLE ONLY (if TR 1 or 2 is failed)

INOP SYS

TR 1(2) or APU TR or ESS TR

CAT 3 DUAL (if TR 1 or 2 is failed)

ELEC C/B MONITOR FAULT

Crew awareness.

STATUS

INOP SYS

C/B MONITOR

ELEC C/B TRIPPED

Crew awareness.

Press the C/B pushbutton on the ECP to identify the affected circuit breakers on the ECAM SD.

ELEC IDG 1(2)(3)(4) OIL SYS FAULT (on ground)

Crew awareness.

ARG ALL

ELEC AC BUS 1–1 FAULT

- AIR DATA SWTG (If ADR 3 avail) CAPT ON 3
- KEEP ENG 4 LAST (only in phase 9)
Engine 4 must be the last engine to be shut down, to keep power supply to the HP fuel valves.

STATUS

CAB TEMP REGUL DEGRADED (on ground) | INOP SYS
| See below

INOP SYS DISPLAYED ON ECAM

REV 1 + 4	CAPT AOA	ACARS 1 + 2 ◀
GALLEY FAN	CAPT TAT	PART GALLEY
GND COOL ◀	G ELEC PUMP	TCAS ◀
L WNDOW HEAT	L WSHLD HEAT	

OTHER INOP SYS

PARTIAL CKPT LIGHTS	L VACUUM GEN	DME 1
WATER HEATER	PVI	

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 AC BUS 1–2 FAULT

- VENT EXTRACT OVRD
Air is blown through the overboard valve which is partially open.
- PACK FLOW HI

STATUS

CAT 2 ONLY

INOP SYS
See below

INOP SYS DISPLAYED ON ECAM

EFIS DMC 3	AFT CRG VENT ◀	L CTR PUMP
ECAM DMC 1	TR 1	Y ELEC PUMP
GPWS	REV 2	STBY AOA
L CAB VENT	ENG 2 IGNB	STBY PITOT
PART GALLEY	ENG 4 IGNB	HF 1
FUEL PUMP 2	RA 1	VENT EXTRACT
ADR 3	F STBY PUMP 3	CAT 3

OTHER INOP SYS

BRK FAN ◀	ECAM SD	L LDG LTS
(WHEELS 5,6,7,8)	RADAR 1	PARTIAL CKPT LIGHTS
CAPT ND	MDDU	

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 AC BUS 2–3 FAULT

- F/O EFIS DMC 3
- AIR DATA SWTG F/O ON 3
If not already used on opposite side.
- PACK FLOW HI

STATUS

CAT 1 ONLY

INOP SYS
See below

INOP SYS DISPLAYED ON ECAM

EFIS DMC 2	B ELEC PUMP	ATC 2
FDIU	REV 3	F/O AOA
R CAB VENT	F/O PITOT	PART GALLEY
ENG 1 IGN B	F/O TAT	F. STBY PUMP 1
ENG 3 IGN B	HF 2	FUEL PUMP 3
RA 2	ADR 2	R CTR PUMP
SDAC 2	ILS 2	F T.TK PUMP ◀
CAT 2	TR 2	GPS 2

OTHER INOP SYS

BRK	FAN	(WHEELS	RADAR 2	F/O PFD
1,2,3,4)◀				
DME 2		VOR 2		ADF 2

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

ELEC AC BUS 2-4 FAULT

- KEEP ENG 1 LAST (only in phase 9)
Engine 1 must be the last engine to be shut down, to keep power supply to the HP fuel valves.

STATUS

CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS DISPLAYED ON ECAM

R	ECAM DMC 2	PART GALLEY	APU TR
	REV 1 + 4	FWD CRG VENT ◀	F. STBY PUMP 2
	R WINDOW HEAT	CAT 3 DUAL	BULK VENT
	FUEL PUMP 4	FWC 2	R WSHLD HEAT
OTHER INOP SYS			
	MCDU 2	R LDG LTS	PRESSURIZED WATER SYS
	F/O ND	AFT CRG LOAD	WATER HEATER
	CMC 2	DRAIN HEAT	PARTIAL CKPT LIGHTS
	STROBE LT	R VACUUM GEN	

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 AC ESS BUS FAULT

- AC ESS FEED ALTN
- IF UNSUCCESSFUL :
 - CAPT EFIS DMC 3
 - ECAM SWTG DMC 1
 - AIR DATA SWTG CAPT ON 3

If not already used on the opposite side.

STATUS

CAT 1 ONLY

INOP SYS

CAT 2

See below

INOP SYS DISPLAYED ON ECAM

EFIS DMC 1	I/L S 1	ENG 1,2,3,4 IGN A
ECAM DMC 3	F. PUMP 1	SDAC 1
CAPT PITOT	F. STBY PUMP 4	FWC 1
ADR 1	GPWS G/S	ATC 1
GPS 1		

OTHER INOP SYS

MCDU 3	L/G IND. PNL	VOR 1
CMC 1	PAX OXY MASK	ADF 1
	ACTUATION	
FWD APU PUMP	DDRMI	E/WD
CAPT PFD		
CVR		

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

Crew awareness.

STATUS

INOP SYS

ATC 1

See below

OTHER INOP SYS

MCDU 1	CVR

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
- EMER ELEC PWR MAN ON
Display only if EMER GEN not automatically coupled.
 - ALL GEN OFF THEN ON
 - IF UNSUCCESSFUL :
 - BUS TIE OFF
Setting BUS TIE pushbutton switch to OFF segregates all generator channel.
 - ALL GEN OFF THEN ON
If the emergency generator is automatically or manually coupled and if at least one generator is recovered, the DC and AC ESS buses are still supplied by EMER GEN.
 - VHF 1/ATC 1 USE
Only VHF 1 and ATC 1 are supplied in electrical emergency configuration. SELCAL is inoperative.
 - VENT EXTRACT OVRD
Switch EXTRACT OVRD since extract fan and cabin fans are lost.

CAUTION

In case of discrepancies between airspeed indications on captain PFD and on standby indicator, disregard standby indicator (probe not deiced).

- LGD ELEV MAN ADJUST
Landing elevation has to be manually set since both FMGCs are lost.
- AVOID ICING CONDITIONS
Wing anti ice, windshields, windows heat are lost.
Note : · Engine anti ice is on regardless of pushbutton position. Fuel consumption increases by approximately 1.5 %.
· Aircraft is out of trim due to the right aileron up float.
The rudder trim control remains operative despite no indication on control panel (pedestal).

CTR TK XFR BY GRVTY
CTR TK UNUSABLE IF < 15 T

Note : · As fuel is fed from one side only, fuel balance must be monitored. To maintain fuel balance, fuel PUMP 1 can be selected off, then STBY PUMP 4 will automatically start (although it is indicated FAULT when fuel PUMP 1 is ON).
· The T TANK MODE FWD light is not powered. Check ECAM fuel page for valve position.



ELEC EMER CONFIG (CONT'D)

- FM SOURCE NORM
- MCDU B/UP NAV SELECT
- NAVAID TUNING USE RMP 1
*Only VOR 1 or ADF 1 (as selected on the DDRMI) is available. No DME is available.
 If the ND is displayed (using the PFD/ND pushbutton), the ADF/VOR selector position on the FCU must be in accordance with the VOR/ADF selector on the DDRMI.*
- ELEV REDUND PROC APPLY
- **FOR SLATS EXTENSION :**
 - LAND RECOVERY ON
ILS 1, SFCC 1, LGCIU 1, are recovered. The remaining fuel pump is lost.
- **FOR L/G GRVTY EXTN :**
 - MAX SPEED 200 KT
 - L/G GRVTY EXTN DOWN
- **WHEN L/G DOWNLOCKED :**
 - L/G lever DOWN

F/CTL ALTN LAW (PROT LOST)

SPD BRK DO NOT USE
 MAX SPEED 305/.82
Speed limited due to loss of flight control normal laws.
Note : Because ailerons are preset upward, the flight domain limitations, as given in ELEV REDUND LOST PROC (QRH 2. 04), have to be observed.

STATUS

SPD BRK DO NOT USE
 MAX SPEED 305/.82
Note : Because ailerons are preset upward, the flight domain limitations, as given in ELEV REDUND LOST PROC (QRH 2. 04), have to be observed.

AVOID ICING CONDITIONS

MAX BRK PR 1000 PSI



ELEC EMER CONFIG (CONT'D)
STATUS

APPR PROC

- **FOR SLATS EXTENSION :**
 - LAND RECOVERY ON
 - FOR LDG USE FLAP 3
- **FOR L/G GRVTY EXTN :**
 - MAX SPEED 200 KT
 - L/G GRVTY EXTN DOWN
- **WHEN L/G DOWNLOCKED :**
 - L/G LEVER DOWN
- **IF ICE ACCRETION**
 - APPR SPD VLS + 10 KT
- **WHEN L/G DOWN :**
 - MAN PITCH TRIM USE
As Direct law becomes active at landing gear extension, the Automatic Trim is inoperative.
- **AT SLAT EXTENSION :**
 - T TANK MODE AUTO
 - LDG DIST PROC APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST
INCREASED FUEL CONSUMP
CTR TK UNUSABLE IF < 15 T
CTR TO INR : MAN ONLY
ENG HI IDLE
MCDU BACK UP NAV AVAIL
CAT 1 ONLY

INOP SYS

F/CTL PROT
PRIM 2+3
ADR 2+3
RA 1+2
ANTI SKID
WING A.ICE
VHF 2+3
MOST SPOILERS
REVERSERS
SEC 2
N/W STRG
MOST F PUMPS
(a)
F CTR PUMPS
GPS 2

- (a) After LAND RECOVERY ON selection:
- LGCIU 1, SLATS/FLAPS channel 1 are recovered.
 - Remaining fuel pump will stop (pump 1 or stby 4).
 - SLATS/FLAPS SLOW is displayed as information in the STS.

Note : Disregard the “-T TANK MODE...FWD” procedure, displayed when SPD>270 knots and NOT IN CLIMB and, LAND RECOVERY is not selected ON. The TRIM TANK transfer process is automatic.
STATUS is simplified in ELEC EMER CONFIG. Only the most significant STATUS items are displayed.

R

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING		BAT ONLY	
		SUPPLIED BY ENG HYD PUMPS	SUPPLIED BY RAT	IN FLT	ON GND (IAS < 50 kt)
AIR COND PRESS VENT	PRESS AUTO SYS 1	Norm	Norm	Norm	Norm
	MAN PRESS CTL	inop	inop	inop	Norm
	RAM AIR	Norm	Norm	Norm	Norm
	PACK VALVE	Norm	Norm	Norm	Norm
	AVIONIC VENT	OVBD only	OVBD only	OVBD only	OVBD only
	CARGO VENT	ISOL valve only	inop	inop	inop
AUTO FLT	MCDU	1 only	inop	inop	3 only
	FCU	1 only	1 only	1 only	1 only
COM	VHF 1	Norm	Norm	Norm	Norm
	RMP 1	Norm	Norm	Norm	Norm
	ACP (CAPT., F/O)	Norm	Norm	Norm	Norm
	CIDS	Norm	Norm	Norm	Norm
	INTERPHONE	Norm	Norm	Norm	Norm
	CVR	Norm	inop	inop	inop
	LOUDSPEAKER 1+2	Norm	Norm	Norm	Norm
EIS	PFD 1	Norm	Norm	Norm	Norm
	ECAM upper DU	Norm	Norm	Norm	Norm
	DMC 1 or 3	Norm	Norm	Norm	Norm
	SDAC 1, FWC 1	Norm	Norm	Norm	Norm
	ECP	Norm	Norm	Norm	Norm
EMER EQPT	SLIDES ARM/WARN	Norm	Norm	Norm	Norm
FLT INS	CLOCK	Norm	Norm	Norm	Norm

R

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING		BAT ONLY	
		SUPPLIED BY ENG HYD PUMPS	SUPPLIED BY RAT	IN FLT	ON GND (IAS < 50 kt)
FIRE	ENG LOOPS	A only	A only	A only	A only
	APU LOOP	A only	A only	A only	Norm
	CARGO SMOKE DET	1 only	inop	inop	inop
	ENG FIRE EXT.	Squib A	Squib A	Squib A	Squib A
	APU FIRE EXT.	Squib A	Squib A	Squib A	Squib A
	CARGO FIRE EXT.	Squib A	Squib A	Squib A	Squib A
	APU AUTO EXT.				Norm
FLT CTL	PRIM 1	Norm	Norm	Norm	Norm
	SEC 1	Norm	Norm	Norm	Norm
	FCDC 1	Norm	inop	inop	inop
	SFCC SLATS	1 only *	1 only *	1 only *	1 only *
	SFCC FLAPS	1 only *	inop	inop	inop
	PITCH TRIM	1 only	inop	inop	inop
	RUDD TRIM	1 only *****	inop	inop	inop
	RUDD TRAVEL	1 only	1 only	1 only	1 only
FUEL	FCMC	1 only	inop	inop	2 only
	PUMPS	PUMP 1 only *****	PUMP 1 only *****	inop	inop
	X FEED	1 Mot only	1 Mot only	1 Mot only	1 Mot only
	LP VALVES	Mot 1 only	Mot 1 only	Mot 1 only	Mot 1 only
	XFR, ISOL VALVES	Norm	Norm	Norm	Norm
	APU PUMPS	Norm	Norm	Norm	Norm
	APU LP VALVE	Norm	Norm	Norm	Norm
	JETTISON	Inop	inop	inop	inop

* operative when LAND RECOVERY pushbutton ON

- All cross Feed valves automatically open
- If the pump 1 is inoperative, the pump 4 STBY takes over.
- Remaining pump is lost when LAND RECOVERY pushbutton is at ON.

When supplied by RAT only, the remaining pump is lost when speed is below 260 knots.

RUDDER TRIM is operative, but position indication is lost on center pedestal.

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING		BAT ONLY	
		SUPPLIED BY ENG HYD PUMPS	SUPPLIED BY RAT	IN FLT	ON GND (IAS < 50 kt)
HYD	FIRE SOV	Norm	Norm	Norm	Norm
	RAT CTL	Norm	Norm	Norm	Norm
ICE & RAIN	ENG A. ICE	Open	Open	Open	Open
	CAPT PITOT	Norm	Norm	Norm	Norm
	RAIN REPEL ◀	Capt	Capt	Capt	Capt
L/G	LGCIU	1 only *	1 only *	1 only *	1 only *
	GRVTY EXT	Norm	Norm	Norm	Norm
	IND. PANEL	Norm	Norm	Norm	Norm
	AUTO BRK/ANTI SKID	inop	inop	inop	inop
	PARK BRK	Norm	Norm	Norm	Norm
NAV	IR 1 and 3	Norm	Norm	Norm	Norm
	IR 2	5 min	5 min	5 min	5 min
	ADR 1 or ADR 3	Norm	Norm	Norm	Norm
	VOR or ADF **	1 only	1 only	1 only	1 only
	MMR	1 only	1 only	1 only	1 only
	DDRMI	Norm	Norm	Norm	Norm
	ATC	1 only	Inop	Inop	Inop
	STBY HOR/COMPASS	Norm	Norm	Norm	Norm
	STBY ASI (not deiced)	Norm	Norm	Norm	Norm
OXYGEN	STBY ALTI (VIB)	Norm	inop	inop	inop
	Crew Oxy valve ctl	Norm	Inop	Inop	Inop
	PAX OXY	Norm	Norm	Norm	Norm
PNEU	ENG BLEED	BMC 1+4 inop	BMC 1+4 inop	BMC 1+4 inop	BMC 1+4 inop
	X BLEED	man only	man only	man only	man only

* Operative, when the LAND RECOVERY pushbutton is ON.

** Only VOR 1 or ADF 1 (as selected on the DDRMI) is available at a time.

R If the DDRMI is deactivated, only VOR 1 is available on the ND (ADF

R 1 will not be available independently of the selection performed on

R the DDRMI).

R

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING		BAT ONLY	
		SUPPLIED BY ENG HYD PUMPS	SUPPLIED BY RAT	IN FLT	ON GND (IAS < 50 kt)
APU		Norm	Norm	Norm	Norm
DOORS	SLIDES ARM/WARN	Norm	Norm	Norm	Norm
PWR PLT	FADECs	A only	A only	A only	A only
	IGNITION	A only	A only	A only	A only
	REV	Inop	Inop	Inop	Inop
	HP VALVE closure	Norm	Norm	Norm	Norm

ELEC DC BUS 1 FAULT

– FM SOURCE BOTH ON 2

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

BOTH PFD ON SAME FMGC

PACK 1 AT FIXED TEMP

CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS DISPLAYED ON ECAM

WING A. ICE	TR 1	BRAKES SYS 1
AP 1 (FMGC 1)	G ELEC PUMP	L CTR PUMP
	VHF 3	B ELEC PUMP
L WNDW HEAT	JETTISON	
CAPT TAT	FUEL AFT XFR	L WSHLD HEAT
ZONE CTLR 1	MAN CAB	L+R CAPT STAT HEAT
PART GALLEY	GND COOL	L+R STBY STAT HEAT
FUEL PUMP 2	PACKBAY VENT	ACP 3
F. STBY PUMP 3	C/B MONITOR	FM 1
F. STBY PUMP 4	REV 1 + 4 (if CH A in control on ENG 1 or 4)	APU LOOP B
	CAT 3 DUAL	
REV 2 (if CH A in control on ENG 2)		REV 3 (if CH A in control on ENG 3)

OTHER INOP SYS

TPIS <	SELCAL	Brake Temp ind.
RMP 3	CAPT WIPER	DATA LOADER
PACK 1 REGUL	BLOW DET	PART COCKPIT LTS
LDG LTS		

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 2 FAULT

- AIR DATA SWTG (if ADR 3 available) F/O ON 3
- FM SOURCE BOTH ON 1
- PRIM 2 KEEP ON

Note : PRIM 2 is normally supplied by DC BUS 2. In case of DC BUS 2 failure, DC BUS 1 supplies the PRIM 2.
However, in this case, the PRIM 2 FAULT light on the overhead panel comes on.
Do not attempt a reset : The OFF selection would result in a loss of the PRIM 2 backup power supply.

Secondary Failure
* F/CTL

STATUS

- LDG DIST PROC APPLY INOP SYS
Refer to the QRH Part 2, or to the FCOM 3.02.80.
See below
- INCREASED FUEL CONSUMPTION
- BOTH PFD ON SAME FMGC
- SLATS/FLAPS SLOW
- CAT 3 SINGLE ONLY

INOP SYS DISPLAYED ON ECAM

AP 2 (FMGC 2)	TURB DAMP	LGCIU 2
R WNDW HEAT	VHF 2	CAB PR 2
HALF SPLRS	GALLEY	FCDC 2
FUEL AFT XR	F/O TAT	L+R F/O STAT HEAT
F. STBY PUMP 1	RUD TRIM 2	FM 2
F. STBY PUMP 2	RUD TRV LIM 2	CAT 3 DUAL
R OUTF AIL	TR 2	BRAKES SYS 2
YAW DAMPER	Y ELEC PUMP	FUEL PUMP 3
FCMC 2	R WSHLD HEAT	BMC 1+4
PRIM 3	FUEL PUMP 4 ◀	ENG 1+2+3+4 LOOP B
SEC 2	R CTR PUMP	REV 1 + 4 (if CH B in control on ENG 1 or 4)
REV 2 (if CH B in control on ENG 2)	F T.TK PUMP ◀	REV 3 (if CH B in control on ENG 3)

OTHER INOP SYS

CARGO SQUIB B	F/O WIPER	PACK 2 REGUL
SFCC 2	F/O RAIN REP. ◀	RMP 2
SDCU 2	ENG 1+2+3+4 SQUIB B	PART COCKPIT LTS
CDLS ◀		

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

AC ESS SHED, DC ESS SHED and AC LAND RCVRY buses are also lost.
For AC ESS SHED and DC ESS SHED bus faults, refer to the corresponding cautions for additional procedures.

- ECAM SWTG DMC 3
Allows the STATUS page to be recovered.
- PFD BARO REF : STD ONLY
This line is only displayed, if the DC2 BUS is also lost.
In this case, the BARO REF CHECK line is not displayed.
- AUDIO SWTG SELECT
- VHF 2 OR 3/ATC 2 USE
- BARO REF CHECK
- GPWS OFF
- T TK UNUSBL PROC APPLY

Note : 1. In case of a DC ESS BUS FAULT, PRIM 1 and SEC 1 are supplied by the Hot Bus (backup). However, in this case, the corresponding FAULT lights come on on the overhead panel come on. Do not attempt a reset. The OFF selection would result in the loss of the PRIM 1/SEC 1 backup power supply.

2. The trim tank fuel is trapped, if the center tank is not empty at the time of the failure. Refer to the TRIM TANK FUEL UNUSABLE procedure.

3. To shut down the engines on ground, the fire pushbutton must be used.

STATUS

APPR PROC

- GPWS FLAP MODE OFF
- SLATS/FLAPS SLOW
- CAT 1 ONLY

INOP SYS

See below

INOP SYS DISPLAYED ON ECAM

ESS TR	PART FCU	FCDC 1
VHF 1	LGCIU 1	RUD TRIM 1
JETTISION	CAB PR 1	FCMC 1
ACP 1+2	FUEL PUMP 1	APU LOOP A
CAT 3 DUAL	F STBY PUMP 4	ENG 1 LOOP A
BMC 2	GPWS	ENG 2 LOOP A
BMC 3	ATC 1	ENG 3 LOOP A
ENG 4 LOOP A		

OTHER INOP SYS

FLT INTERPHONE	SFCC 1	L/G IND. PANEL
RMP 1	CAPT RAIN REP ⏏	CREW OXY CTL
ECP	SDCU 1	
STBY ALTI	STBY HORIZON	APU
MCDU 1	CVR	

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 SHED

AC ESS SHED BUS is lost. Refer to the AC ESS BUS SHED procedure for inoperative systems.

Crew awareness.

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

STATUS

INOP SYS

JETTISON

CAT 3 DUAL

ATC 1

RUD TRIM 1

FCMC 1

See below

OTHER INOP SYS

PAX OXY AUTO CTL

STBY ALTI

SDCU 1

CREW OXY CTL

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

– X FEED (all)

Only Fuel PUMP 1 is supplied.

– FM SOURCE

– NAVAID TUNING

– LDG ELEV

– FUEL IMBALANCE

To stop the imbalance, consider descent to gravity feed ceiling (refer to FCOM 3.02.28 p 3), in order to use gravity feeding on the right side. In this case, close the XFEED 3 + 4.

SPD BRK

Since PRIM 2 + 3 are lost.

ON

NORM

USE RMP 1

MAN ADJUST

MONITOR

DO NOT USE

ARG ALL

ELEC DC BUS 1 + 2 FAULT (CONT'D)

● IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB:

– T TANK MODE FWD

Fuel consumption increases by approximately 1 %.

AVOID ICING CONDITIONS

CTR TK XFR BY GRVTY

CTR TK UNUSABLE IF < 15 T

MAX BRK PR 1 000 PSI

F/CTL ELEV REDUND LOST

Refer to the FCOM 3.02.27 for this procedure's description.

Secondary Failure
* F/CTL

STATUS

SPD BRK DO NOT USE

AVOID ICING CONDITIONS

MAX BRK PR 1 000 PSI

APPR PROC

● FOR L/G GRVTY EXTN :

MAX SPEED 200 KT

– L/G GRVTY EXTN DOWN

● WHEN L/G DOWNLOCKED :

– L/G DOWN

● IF ICE ACCRETION

– APPR SPD VLS + 10 KT

● IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :

– T TANK MODE FWD

– LDG DIST PROC APPLY

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

R FUEL GRVTY FEED ONLY

ENG (All) AUTO START ONLY

INCREASED FUEL CONSUMP

CTR TO INR : MAN ONLY

PACK AT FIXED TEMP

FUEL CELL 2 BY GRVTY ONLY



ELEC DC BUS 1 + 2 FAULT (CONT'D)

STATUS

ENG HI IDLE
CTR TK UNUSABLE < 15 T
MCDU BACK UP NAV AVAIL
SLATS/FLAPS SLOW
CAT 1 ONLY

INOP SYS
See below

INOP SYS DISPLAYED ON ECAM

PRIM 2+3	BSCU CH 1+2	F. STBY PUMP 1
ANTI SKID	G ELEC PUMP	F. CTL PUMPS
WING A. ICE	B ELEC PUMP	F. TK PUMP
FM 1+2	Y ELEC PUMP	AP 1+2
BMC 1+4	WINDOW HEAT	TR 1+2
SEC 2	GND COOL	VHF 2+3
TURB DAMP	CB DISPLAY	MOST SPLRS
LGCIU 2	REAC W/S DET	REVERSERS
CAB PR 2	FCDC 2	WSHLD HEAT
MAN CAB PR	RUD TRIM 2	FUEL AFT XFR
N. W. STRG	RUD TRV LIM 2	CAPT STAT HEAT
GALLEYS	YAW DAMPER 2	F/O STAT HEAT
AUTO BRK	FCMC 2	STBY STAT HEAT
FUEL PUMP 2+STBY	APU LOOP B	ACP 3
FUEL PUMP 3+STBY	ENG 1 LOOP B	ZONE REGUL
FUEL PUMP 4+STBY	ENG 2 LOOP B	R OUTR AIL
ENG 4 LOOP B	CAT 2	ENG 3 LOOP B

OTHER INOP SYS

SFCC 2	F/O RAIN REP ◀	TPIS ◀
RMP 2+3	Lower ECAM DU	PACK 1+2 REGUL
SDCU 2	SELCAL	WIPER
BLOW DET	DATA LOADER	L/G SAFETY VALVE
BRAKE TEMP IND	CARGO SQUIB B	LDG LTS
ENG SQUIB B	CDLS ◀	PART COCKPIT LTS

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

ELEC DC BAT BUS FAULT

ENG 1 AUTO START ONLY
ENG 2 AUTO START ONLY
ENG 3 AUTO START ONLY
ENG 4 AUTO START ONLY
ENG HI IDLE
Due to the loss of the EIVMUs.

STATUS

INOP SYS

A/THR
REVERSERS
MAN CAB PR
APU LOOP B
See below

OTHER INOP SYS

APU SQUIB B | |

ELEC BUS TIE OFF

The BUS TIE pushbutton is abnormally selected OFF.
Crew awareness

ELEC AC ESS BUS ALTN (on ground)

The AC ESS BUS is supplied from the AC BUS 2-4, even if the AC ESS FEED pushbutton is set to normal.
Crew awareness

ELEC PART GALLEY SHED

● FOR GALLEY RECOVERY :
– GALLEY OFF THEN ON

ARG ALL

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 CKPT DOOR panel comes on.

In case of a DC BUS 2 loss, the cockpit door also fails, but there is no FAULT indication.

– **CKPT DOOR CONT NORMAL PANEL CHECK**

This panel is located on the left-hand side of the overhead panel. It is used to identify the faulty CDLS item, and to verify the status of the normal panel's pressure sensors and the status of the three electrical latches (referred to as strikes).

● **If two or more electrical latches (strikes) are faulty :**

The cockpit door is not intrusion-proof.

● **If no LED on the CKPT DOOR CONT panel is on, or if two pressure sensors are faulty :**

– **LKG SYS switch BACKUP**

When the CDLS is switched to the Backup Control Unit, the FAULT light goes off and the Backup Control Unit controls the CDLS. Therefore :

● **If entry is requested :**

Identify the person that is requesting entry.

● **If entry is authorized :**

– **CKPT DOOR BKUP CTL pb PRESS and MAINTAIN**

This unlocks the cockpit door, which can be pushed open from the cabin side.

Note : *As emergency access to the cockpit is unavailable when the Backup Control Unit controls the CDLS, it is recommended that at least two crewmembers remain in the cockpit during that time.*

	ENG 1(2)(3)(4) 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 (adjacent) OFF – ENG MASTERS (opposite side) OFF – 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	
R		

ENG 1(2)(3)(4) FIRE in flight

- LAND ASAP
- THR LEVER (affected) IDLE
 - ENG MASTER (affected) OFF
 - Associated low pressure and high pressure valves close.*
 - ENG FIRE P/B (affected) PUSH
 - Aural warning stops.*
 - ENG FIRE pushbutton remains on, as long as a fire is detected.*
 - ENG BLEED (affected side, if not automatically closed) . . OFF
 - APU BLEED (only if left side is affected) OFF
 - X BLEED (if not automatically closed) CLOSE
 - The affected side is isolated from any source of air.*
 - 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.*
 - **If hydraulic fire shut-off valve still open :**
 - IF FIRE PERSISTS :
 - **If engine 1 or 4 affected :**
 - GREEN ENG 1 PUMP OFF
 - GREEN ENG 4 PUMP OFF
 - GREEN ELEC PUMP OFF
 - **If engine 2 affected :**
 - BLUE ENG 2 PUMP OFF
 - BLUE ELEC PUMP OFF
 - **If engine 3 affected :**
 - YELLOW ENG 3 PUMP OFF
 - YELLOW ELEC PUMP OFF

ENG 1(2)(3)(4)

SHUT DOWN

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 lit, as long as 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.

– APU MASTER SW OFF

Do not attempt to restart the APU.

STATUS

INOP SYS

APU

ENG/APU FIRE LOOP A(B) FAULT

Crew awareness.

STATUS

INOP SYS

ENG 1(2)(3)(4)

LOOP A (B) or

APU LOOP A (B)

ENG/APU FIRE DET FAULT

Crew awareness.

Loss of both fire detection loops.

STATUS

INOP SYS

FIRE DET 1(2)(3)(4)

or

APU FIRE DET

SMOKE LAVATORY SMOKE

Crew awareness.

Maintain contact with the cabin crew to follow the status of the fire, and consider the emergency descent and smoke removal procedures.

ARG ALL

SMOKE/FUMES REMOVAL	
R	· Use the smoke removal procedure, if there is dense smoke, toxic fumes (smell), or if smoke generation cannot be stopped. · If a scent similar to orange peel pervades the cockpit, suspect a toxic leak of rain repellent fluid. If the scent is similar to pine needles, suspect a non-toxic leak (≠). · If there is smoke in the cabin, it may be necessary to make a PA announcement to minimize apprehension.
R	– 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 10 000 FT/MEA – DESCENT (FL 100 or MEA or minimum obstacle clearance altitude) INITIATE - Descent is initiated to FL100, or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10000 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 regulations. – ATC NOTIFY – SMOKE PROC CONTINUE - While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.
R	
R	
R	



R

SMOKE/FUMES REMOVAL (CONT'D)

● **At FL 100, or MEA :**

- PACK 1+2 OFF
It is not possible to open the cockpit window, when the packs are ON.
- MODE SEL MAN
- MAN VALVE SEL BOTH
- MAN V/S CTL FULL UP
The outflow valves must be fully open to prevent repressurization when the RAM AIR valve is open.
- RAM AIR ON
At FL100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve, when ΔP is 1 psi or below. RAM AIR does not assist smoke removal, but allows flying with both packs OFF (after window opening).

R
R
R
R
R
R
R
R
R
R
R

● **If smoke persists, cockpit window opening :**

Unless smoke pervades the cockpit, do not open the cockpit window to evacuate the smoke.

- MAX SPEED 230 KT
- COCKPIT DOOR OPEN
- HEADSETS ON
- COCKPIT WINDOW (PNF) 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 PROC CONTINUE
Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE FWD CRG SMOKE

Note : If the warning has been displayed temporarily in flight, and no crew action has been taken, normal cargo ventilation may be recovered, when ventilation is required for livestock transportation, by resetting both ventilation controller channels.

LAND ASAP

- FWD ISOL VALVE (if not automatically closed) OFF ◀
- FWD AGENT DISCH
- FWD CRG COOLING OFF ◀

Note : · Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.

Once the isolation valves are closed, the cargo is not ventilated. Therefore, the cargo temperature is unreliable.

Order the ground crew to not open the door of the affected cargo compartment, unless the passengers have disembarked and the fire services are present.

· If the SMOKE warning is displayed on ground, with the cargo compartment door open, do not initiate AGENT DISCHARGE. Request the ground crew to investigate and eliminate the smoke source.

· On ground, the warning may be triggered due to a high level of humidity or insecticide spraying. Provided that the smoke is not visually confirmed :

- Deactivate the smoke detection system, by pulling the SDCU 1 and 2 reset pushbuttons.
- Reset the cargo ventilation system, using the VENT CONT 1 and 2 reset pushbuttons.
- At cargo doors closure, reactivate SDCU 1 and 2.

STATUS

- INOP SYS
- FWD CRG VENT◀
- FWD CRG HEAT◀
- FWD CRG TEMP◀
- FWD CRG COOL◀

SMOKE FWD (AFT) CRG BTL 1(2) FAULT

Crew awareness.

If bottle 1 is lost, fire-extinguishing capability is lost in the affected compartment.

If bottle 2 is lost, agent concentration will not be ensured after fire extinguishing.

SMOKE AFT/BULK CRG SMOKE

LAND ASAP

– AFT ISOL VALVE OFF ▢

– BULK ISOL VALVE (if not automatically closed) OFF

– CAB REST EVACUATE ▢

– CAB REST DOORS CLOSE ▢

– BULK REST EVACUATE ▢

– AFT AGENT DISCH ▢

Note : Refer to the notes in the FWD CRG SMOKE procedure. They are applicable to the AFT/BULK CRG SMOKE procedure.

STATUS

INOP SYS

AFT CRG VENT▢

BULK VENT

BULK HEAT▢

SMOKE LAVATORY DET FAULT

Crew awareness.
Toilet smoke detection is lost.

STATUS

INOP SYS

LAV DET

SMOKE FWD (AFT/BULK) CRG DET FAULT

● IF NO LIVESTOCK :
– ISOL VALVE (affected compartment) OFF
– FWD CRG COOLING OFF ▢

STATUS

INOP SYS

FWD CRG DET
(AFT) (BULK)

FWD CRG TEMP▢

AFT CRG HEAT▢
(BULK)

FWD CRG VENT▢
(AFT)(BULK)

ARG ALL

R

SMOKE DET FAULT

Both SDCU channels fail. Avionics, cargo, and toilet smoke detection are lost.

● IF NO LIVESTOCK :

- FWD and AFT ISOL VALVE OFF◀
- BULK ISOL VALVE OFF
- FWD CRG COOLING OFF ◀
- BULK AVNCS OFF ◀

STATUS

INOP SYS

SMOKE DET

CRG VENT ◀

FWD CRG TEMP◀

SMOKE AVIONICS DET FAULT

Avionics compartment smoke detection is lost.

Crew awareness.

STATUS

INOP SYS

AVNCS DET

SMOKE AVNCS VENT SMOKE

The description of this procedure is included in the SMOKE/AVNCS SMOKE procedures (Refer to the FCOM 3.02.26 p. 9).

ARG ALL

SMOKE/FUMES/AVNCS SMOKE

Apply this procedure, in case of suspected smoke from the avionics compartment, air conditioning or cabin equipment. Apply this paper procedure, if smoke is detected, with or without "AVNCS VENT SMOKE" ECAM activation.

This paper procedure includes all the steps of the AVNCS VENT SMOKE ECAM procedure. The ECAM procedure, when displayed, may be applied, if smoke from avionics is suspected. However, if non-avionics smoke is suspected, refer to the paper procedure.

The procedure layout is organized as follows :

- The first lines (before the text box) correspond to immediate actions, that must be performed as soon as smoke is detected (with or without ECAM activation, whatever the smoke source). These immediate actions enable quick reference to the most common steps taken in cases of smoke. This section has two parts. The first actions before the line are those displayed on the ECAM, if the "AVIONICS VENT SMOKE" ECAM warning triggers.
- The text box indicates the immediate applicable procedure, if at any time of the procedure, the smoke is so dense that smoke source can no longer be determined, and smoke removal is required.
- The last part of the procedure corresponds to specific actions to be applied, once the smoke source has been identified.

In case of a CARGO, LAVATORY (or other area with smoke detectors <1) SMOKE ECAM warning, without any smoke detected in the cockpit/cabin, directly apply the ECAM/QRH procedure. Note that these warnings may be caused by some other source, that should, ordinarily, first be detected by the flight crew/cabin crew avionics smoke detectors.

LAND ASAP

APPLY IMMEDIATELY :

- **VENT EXTRACT** OVRD
Avionics ventilation air is extracted overboard.
- **CAB FANS** OFF
To prevent smoke from entering the cockpit and cabin.
- **GALLEYS** OFF

● IF REQUIRED :

- **CREW OXY MASKS 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.
- **SEAT BELTS / NO SMOKING ON**



R
R
R
R
R

- 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.
 - FAULTY EQPT (if identified) ISOLATE

- IF DENSE SMOKE, at any time of the procedure :
 - EMER EXIT LT.....ON
 - SMOKE FUMES REMOVAL..... APPLY
 - ELEC EMER CONFIG..... CONSIDER
 Refer to the end of the procedure to set ELEC EMER CONFIG

- Guidelines to determine smoke source :*
- If smoke initially comes out of the cockpit’s ventilation outlets, or if smoke is detected in the cabin, the crew may suspect an AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must therefore be applied.
 - Following an identified ENG or APU failure, smoke may emanate from the faulty item through the bleed system and be perceptible in the cockpit or the cabin. In that case, it will be re-circulated 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 AVIONICS SMOKE warning is triggered, while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.

- IF AIR COND SMOKE SUSPECTED :**
- APU BLEED OFF
 - VENT EXTRACT AUTO
Note : When VENT EXTRACT is in the OVRD position, a single pack may not be able to maintain cabin pressure.
 - PACK 1 OFF
 - If smoke persists :
 - PACK 1 ON
 - PACK 2 OFF
 - CRG FWD ISOL VALVE OFF
To prevent a cargo smoke warning from being triggered due to cabin smoke.
 - If smoke still persists :
 - PACK 2 ON
If the crew suspects that the smoke does not come from Pack 2, normal pack configuration can be restored.
 - VENT EXTRACT OVRD



SMOKE/FUMES/AVNCS SMOKE (CONT'D)

- SMOKE/FUMES REMOVAL CONSIDER

■ IF CAB EQUIPMENT SMOKE SUSPECTED :

- EMER EXIT LT ON

To recover minimum cabin lighting when the COMMERCIAL is switched OFF.

- COMMERCIAL OFF

- SMOKE DISSIPATION CHECK

● If FAULTY EQUIPMENT IDENTIFIED

- FAULTY EQPT ISOLATE

Cabin lights, reading lights, passenger system, and galleys have dedicated control or C/B in the cabin or cockpit.

● **When faulty equipment confirmed isolated :**

- COMMERCIAL NORM

- SMOKE/FUMES REMOVAL CONSIDER

● IF THE SMOKE SOURCE CANNOT BE DETERMINED AND STILL PERSISTS OR AVIONICS/COCKPIT 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.

● AC BUS 1-1 + 1-2 can be shed as follows :

- ECAM/ND SEL F/O

The ECAM SD will be lost during the sequence. Switching is necessary to allow ELEC page monitoring.

- ELEC/AC page SELECT

- BUS TIE OFF

The BUS TIE OFF caution is triggered after 5 seconds.

- GEN 3+4 CHECK ON

- ACCESS FEED ALTN

Avoids autopilot and autothrust disconnection during electrical transients.

- GEN 1+2 OFF

The ECAM SD is lost.

Note: If this electrical configuration is maintained, the Captain's Total Air Temperature and angle-of-attack, standby angle-of-attack, and pitot are not deiced. PFD1 and STBY instruments may display erroneous data in icing conditions. Use PFD2.

- SMOKE DISSIPATION CHECK



R

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

- AC BUS 2-3 + 2-4 can be shed as follows :
 - BUS TIE CHECK OFF
 - GEN 1+2 ON
 - AC ESS FEED NORM
 - ECAM/ND SEL NORM
 - GEN 3+4 OFF
 - PFD2 and ND2 are lost.*
 - SMOKE DISSIPATION CHECK

R

TO SET ELEC EMER CONFIG :

- EMER ELEC PWR MAN ON
- WHEN EMER GEN AVAIL :
 - GEN 1+4 OFF
 - GEN 2+3 OFF
 - APU GEN OFF

ELEC

EMER CONFIG

APPLY ECAM PROCEDURE WITHOUT PERFORMING THE GEN RESET.

SMOKE CAB REST SMOKE◀

- If **SMOKE** is in the **LDMCR** compartment :
 - CAB REST DOORS CLOSE
If it is not possible to fight the smoke source, evacuate and close the hatch. Ensure that the cabin crew have manually discharged the internal fire extinguisher, because the automatic fire extinguishing system is deactivated.
Maintain contact with the cabin crew to follow up on the status of the fire, and consider emergency descent and smoke removal procedures.
Note : If, in flight, the warning has been temporarily displayed and identified as a false warning, crew rest compartment ventilation may be recovered by resetting both VENT controller channels.

SMOKE FLT REST SMOKE◀

Crew awareness.
Maintain contact with the cabin crew to follow up on the status of the fire, and consider the emergency descent and smoke removal procedures.

SMOKE FLT (CAB) REST DET FAULT◀

Crew awareness.
Smoke detection is lost in the upper (lower) deck crew rest compartment.

STATUS

INOP SYS
FLT REST DET
(CAB)

SMOKE LWR STOWAGE SMOKE

Crew awareness.

SMOKE LWR STOWAGE DET FAULT

Crew awareness.
Lower stowage smoke detection is lost.

STATUS

|

INOP SYS

LWR STWG DET

SMOKE BULK REST SMOKE

Crew awareness.
Maintain contact with the cabin crew to follow the status of the fire, and consider the emergency descent and smoke removal procedures.

LAND ASAP

SMOKE BULK DET FAULT

BULK REST
Crew awareness that Bulk rest detection is faulty.
Bulk rest smoke detection is lost.

STATUS

|

INOP SYS

BLK REST DET

SMOKE BULK REST BTL 1(2)

Crew awareness that Bulk Rest Bottle 1(2) is faulty.

F/CTL SLAT SYS 1(2) FAULT	
Crew awareness	STATUS I
SLATS SLOW	

F/CTL FLAP SYS 1(2) FAULT	
Crew awareness	STATUS
● In case of FLAP SYS 1 FAULT	
APPR PROC :	
– GPWS FLAP MODE OFF	
FLAPS SLOW	
<i>Flap position signal to GPWS is lost.</i>	

F/CTL SLAT (FLAP) TIP BRK FAULT	
Failure of one slat or flap wing tip brake.	STATUS I
Crew awareness	
<u>Note</u> : The SLAT (FLAP) TIP BRK FAULT warning is also triggered when the automatic test has not been performed during the last 10 days.	
This warning being classified as a NO GO item in the MMEL it will have to be cleared before the next flight. This can be done on the ground by manually launching the WTB engagement test accessing the CMS through the MCDU.	
SLATS (FLAPS) SLOW	

F/CTL L (R) SIDESTICK FAULT
Crew awareness

CONFIG L (R) SIDESTICK FAULT (BY TAKE OVER)
The warning is triggered on ground if either stick is inoperative (take over pushbutton pressed more than 30 seconds). – L (R) TAKE OVER DEPRESS The affected stick becomes operative.

F/CTL SLATS FAULT/LOCKED
For landing with slats jammed, see OPERATING TECHNIQUES (Refer to 3.02.10). 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. MAX SPEED See page 4 Speed is limited to the VFE corresponding to the next slat position. ● WHEN SPEED BELOW VFE : – FLAPS LEVER (if slats not locked) RECYCLE Return to the previous selection, then back to the desired position. <u>Note</u> : If there is a SLATS FAULT after a dual SFCC failure, alternate law becomes active (see associated procedure). Speed limits are lost on PFD.
STATUS MAX SPEED See page 4 APPR PROC : – GPWS FLAP MODE (if slats < 1) . OFF – S/F JAMMED PROC APPLY ■ If SLATS < 1 : – FOR LDG USE FLAP 2 ■ If SLATS ≥ 1 – FOR LDG USE FLAP 3 – APPR SPD VLS + 5 KTS – LDG DIST PROC (see page 4) . . . APPLY Landing distance increases due to increase of approach speed. INOP SYS SLATS

F/CTL FLAPS FAULT/LOCKED

For landing with flaps jammed, see OPERATING TECHNIQUES (Refer to 3.02.10).
The autopilot may be used down to 500 feet AGL. As it is not tuned for the abnormal configuration, its behaviour can be less than optimum and must be monitored.

MAX SPEED See page 4
Speed is limited to the VFE corresponding to the next flaps position.

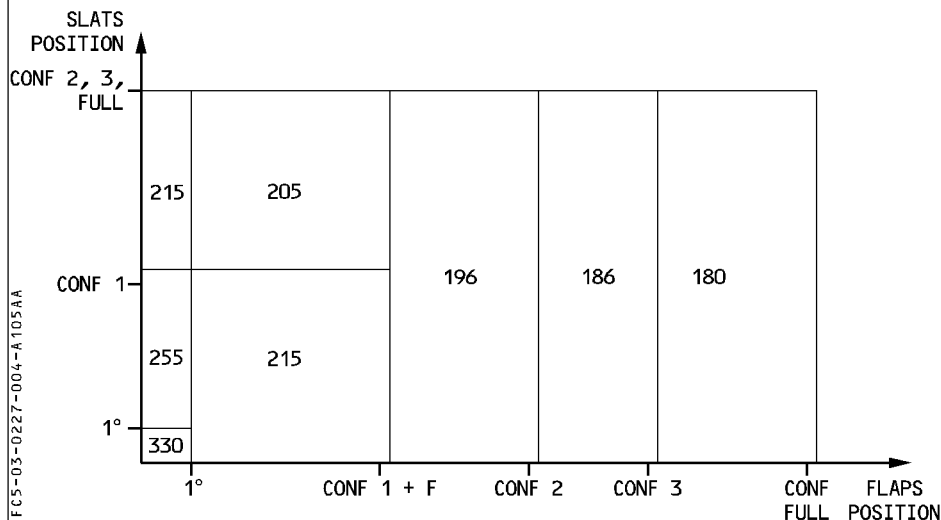
- WHEN SPEED BELOW VFE :
 - FLAPS LEVER (if flaps not locked) RECYCLE
Return to the previous selection, then back to the desired position.
- Note : In case of FLAPS FAULT, when idle is selected, approach idle is set on all engines. If there is a FLAPS FAULT after a dual SFCC failure, alternative law becomes active (see associated procedure). Speed limits are lost on PFD.

STATUS

MAX SPEED See page 4	INOP SYS
APPR PROC :	FLAPS
– GPWS FLAP MODE (if flaps ≤ 2) . OFF	
– S/F/ JAMMED PROC APPLY	
Refer to 3.02.10.	
● If FLAPS ≤ 2 :	
– FOR LDG USE FLAP 2	
Selecting FLAP 2 instead of FLAP 3 permits VMAX display on PFD to be increased.	
● If 2 < FLAPS ≤ 3 :	
– FOR LDG USE FLAP 3	
● If FLAPS > 3 :	
– FOR LDG USE FLAP FULL	
– LDG DIST PROC (See page 4) . . APPLY	
Landing distance increases due to increase of approach speed.	

FLAPS/SLATS FAULT/LOCKED

This figure gives the MAX SPEED value displayed on ECAM in case of failure for all Slats/Flaps positions.

**VLS/LDG DIST**

	$0 \leq \text{Flaps} < 1+F$	$1+F \leq \text{Flaps} < 2$	$2 \leq \text{Flaps} < 3$	$\text{Flaps} \geq 3$
$0 \leq \text{Slats} < 1$	VREF + 50 DIST. $\times 1.7$	VREF + 35 DIST. $\times 1.5$	VREF + 35 DIST. $\times 1.5$	VREF + 30 DIST. $\times 1.4$
$1 \leq \text{Slats} < 2$	VREF + 25 DIST. $\times 1.4$	VREF + 10 DIST. $\times 1.2$	VREF + 10 DIST. $\times 1.2$	VREF + 5 DIST. $\times 1.1$
Slats = 2	VREF + 25 DIST. $\times 1.4$	VREF + 10 DIST. $\times 1.2$	VREF + 5 DIST. $\times 1.1$	VREF

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to fuel flow indication.

As a guideline, determine the fuel consumption in clean configuration at same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables) and multiply this result by 1.4 (SLATS EXTENDED) or 2 (FLAPS EXTENDED) or 2.3 (SLATS and FLAPS EXTENDED) to give the fuel consumption required to reach the destination in the current configuration.

CONFIG SLATS (FLAPS) NOT IN T.O CONFIG

Crew awareness

F/CTL LVR OUT OF DETENT

The flaps lever is between two detents.

Crew awareness

F/CTL FLAP/MCDU DISAGREE

This caution is triggered when pressing the T.O CONFIG TEST pushbutton in phase 2 or at takeoff initiation if the flap lever position and the FLAPS position as entered on the PERF T.O MCDU page are different.

Crew awareness

R

F/CTL FLAP LVR NOT ZERO

The flap lever is not at zero when altitude is above 22000 ft.

F/CTL PRIM 1(2)(3) FAULT

- PRIM (affected) OFF THEN ON
- IF UNSUCCESSFUL:
 - PRIM (affected) OFF
- In case of a dual PRIM failure :
 - SPD BRK DO NOT USE

In case of a third PRIM failure : If the speedbrakes are out, they immediately retract, inducing a strong pitch down effect.
- If CG AFT 32 % :
 - T TANK MODE FWD

Fuel consumption is increased by approximately 1%.

Note : If the trim tank pump is failed, or not installed, this part of the procedure is replaced by :

 - IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :
 - T TANK MODE FWD

STATUS

- In case of a dual PRIM failure :
 - SPD BRK DO NOT USE
- If CG AFT 32 % :
 - T TANK MODE FWD

Fuel consumption is increased by approximately 1%.

Note : If the trim tank pump is failed, or not installed, this part of the procedure is replaced by :

 - IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :
 - T TANK MODE FWD
- LDG DIST PROC APPLY

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

CAT 3 SINGLE ONLY

INOP SYS

PRIM 1(2)(3)
PART (HALF,
MOST) SPLRS
CAT 3 DUAL
(PRIM 1 or PRIM 2
failure)
REV 1+4 (if PRIM
1+2 failure)
REV 2+3 (if PRIM
1+3 failure)
SPD BRK (all PRIM
failure)
GND SPLRS (all
PRIM failure)
AP 1+2 (all PRIM
failure)

F/CTL SEC 1(2) FAULT

– SEC (affected) OFF THEN ON

● IF UNSUCCESSFUL :

– SEC (affected) OFF

● In case of dual SEC failure :

RUD WITH CARE ABV 160 KT

RUD WITH CARE ABV 160 KT (a)
CAT 1 ONLY (a)
CAT 3 SINGLE ONLY

STATUS

INOP SYS
PART SPLRS
SEC 1 (2)
CAT 3 DUAL
AP 1+2 (a)
RUD TRIM (a)
RUD TRV LIM (a)

(a) In case of dual SEC failure

LOW ENERGY WARNING

The “SPEED SPEED SPEED” synthetic voice is triggered every 5 seconds each time the aircraft energy becomes lower than a threshold under which thrust shall be increased to recover a positive flight path angle.

– THR LEVERS PUSH
Increase the thrust until the warning disappears.

F/CTL ALTN LAW (PROT LOST)

Maneuver protections (pitch, bank) are lost, high speed and high angle-of-attack protections are degraded, the load factor protection is kept.

SPD BRK (in case of EMER ELEC CONFIG) DO NOT USE
MAX SPEED 305/.82
Speed is limited due to degraded high speed protection.

R
R

Note : In case of GPWS (EGPWS ⚠) alerts, since protection are lost respect stall warning when applying the GPWS (EGPWS ⚠) procedure.

MAX SPEED 305/.82
APPR PROC :

– FOR LDG USE FLAP 3

ALTN LAW : PROT LOST

STATUS

INOP SYS
F/CTL PROT

F/CTL DIRECT LAW (PROT LOST)

PFD displays «USE MAN PITCH TRIM» in amber.

SPD BRK DO NOT USE

MAX SPEED 305/.80

Note : In case of GPWS (EGPWS <Δ>) alerts, since protections are lost respect stall warning when applying the GPWS (EGPWS <Δ>) procedure.

Speed is limited due to the loss of high speed protection.

Do not exceed M.80 so as not to degrade handling qualities.

– MAN PITCH TRIM (except if B + Y HYD 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.

● **If CG AFT 32 % :**

– T TANK MODE FWD

Fuel consumption is increased by approximately 1%.

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by:

· If CG AFT 32% AND WHEN > 270 KT AND NOT IN CLIMB :

- T TANK MODE FWD

STATUS

SPD BRK DO NOT USE

MAX SPEED 305/.80

MANEUVER WITH CARE

APPR PROC :

– FOR LDG USE FLAP 3

– MAN PITCH TRIM USE

(except if B + Y HYD LO PR)

● **If CG AFT 32 % :**

– T TANK MODE FWD

Fuel consumption is increased by approximately 1 %.

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by:

· If CG AFT 32% AND WHEN > 270 KT AND NOT IN CLIMB :

- T TANK MODE FWD

DIRECT LAW : PROT LOST

CAT 1 ONLY

INOP SYS

F/CTL PROT

AP 1 + 2

F/CTL ELEV REDUND LOST

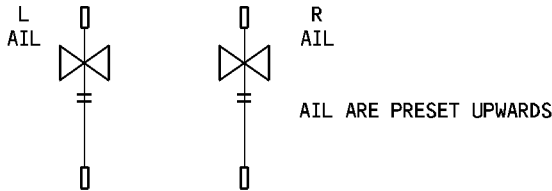
This caution is triggered, in case of dual failure, when a subsequent third failure affecting the F/CTL system may lead to degraded pitch control or pitch mechanical backup. Certain failure combinations lead to an aileron preset to limit the pitch up effect in case of this third failure. If this third failure occurs, the ELEV REDUND LOST PROC and associated FL and speed limitations no longer apply. In this case, if the MAN PITCH TRIM ONLY message is displayed, it is recommended that the autothrust be disconnected to improve longitudinal control of the aircraft.

- REDUND LOST PROC APPLY
Refer to the paper procedure below.

ELEV REDUND LOST PROC (paper proc)

- CHECK the AIL positions on the F/CTL page.

■ IFAILERONS ARE PRESET UPWARDS



The autopilot is not available.

- SPD BRK DO NOT USE
- MAX FL 350
- MAX SPEED M0.80
- DISREGARD AFT CG WARNING

Use the ECAM CG indication to monitor the center of gravity.



F/CTL ELEV REDUND LOST (CONT'D)

- Fuel consumption is increased by approximately 16 %
- T TANK MODE FWD

Note : If the trim tank pump is failed, or not installed :

- Check that pitch attitude is below 3 degrees before initiating the forward transfer.
- Interrupt manual forward transfer (MODE pushbutton at AUTO), when aircraft attitude is above 3 degrees, to avoid inadvertent aft transfer.

Note : In case of an engine-out, the aileron preset is cancelled, and the autopilot may be recovered.

Apply normal engine-out procedures.

Below 2000 feet RA, or when in CONF ≥ 2, the aileron preset is cancelled. The autopilot is available (provided it is not lost due to another failure, such as an elevator failure).

■ AILERONS ARE NOT PRESET

The autopilot is available.

- SPD BRK DO NOT USE
- MAX FL 300
- MAX SPEED M0.75
- T TANK MODE FWD

Fuel consumption is increased by approximately 1 %.

Note : If the trim tank pump is failed, or not installed :

- Check that pitch attitude is below 3 degrees, before initiating the forward transfer.
- Interrupt manual forward transfer (MODE pushbutton at AUTO), when aircraft attitude is above 3 degrees, to avoid inadvertent aft transfer.

F/CTL STAB CTL FAULT

- MAN PITCH TRIM CHECK
The force needed on the pitch trim wheel may be higher than usual (pre-takeoff manual setting).
- IF MAN TRIM AVAIL :
 - TRIM FOR NEUTRAL ELEV
If man pitch trim is available, trim to maintain elevator at zero position (indications on ECAM F/CTL page).
To improve the longitudinal control of the aircraft, it is recommended to disconnect the autothrust.
- IF TRIM LOCKED > 8 UP :
MAX SPEED 180 KT
If trim is locked above 8 degrees up, pitch down authority may not be sufficient for speed above 180 knots.
Select configuration as appropriate - Fuel consumption is increased.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED 305/.82

STATUS

MAX SPEED 305/.82	INOP SYS
● IF TRIM LOCKED > 8 UP : MAX SPEED 180 KT	F/CTL PROT
APPR PROC : – FOR LDG USE FLAP 3	AP 1 + 2
● IF MAN TRIM NOT AVAIL : – PITCH AUTHORITY REDUCED <i>Start the flare slightly earlier. More stick deflection may be needed to achieve the flare.</i> – GPWS FLAP MODE OFF – FOR LDG USE FLAP 2 <i>Do not select CONF FULL or CONF 3 so as not to degrade handling qualities.</i> – APPR SPD VLS + 10 KT	
– LDG DIST PROC APPLY <i>Refer to the QRH part 2, or to the FCOM 3.02.80.</i>	
ALTN LAW : PROT LOST	
CAT 1 ONLY	

R

CONFIG PITCH TRIM NOT IN T.O RANGE

Crew awareness

F/CTL SPLR FAULT

Loss of one or more spoilers.

Crew awareness

R

– LDG DIST PROC

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

APPLY

STATUS

INOP SYS

PART SPLRS

(HALF) (MOST)

(ALL)

F/CTL GND SPLR FAULT

Crew awareness

R

– LDG DIST PROC

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

APPLY

STATUS

INOP SYS

GND SPLRS

F/CTL SPD BRK FAULT

Loss of speedbrake surfaces, due to failure of speedbrake lever transducer. In addition, associated ground spoilers are only available through reverse selection.

Crew awareness

STATUS

INOP SYS

SPD BRK

F/CTL SPD BRK DISAGREE

Disagree between the spoiler position and the speedbrake lever order.

– SPD BRK LEVER

SPD BRK

RETRACT

DO NOT USE

STATUS

SPD BRK

DO NOT USE

F/CTL SPD BRK STILL OUT

The speedbrakes are commanded to extension and the engines are not at idle.

ARG ALL

CONFIG SPD BRK NOT RETRACTED

Crew awareness

F/CTL L (R) ELEV FAULT

SPD BRK DO NOT USE

F/CTL ALTN LAW (PROT LOST)

MAX SPEED 305/.82

STATUS

SPD BRK DO NOT USE

MAX SPEED 305/.82

APPR PROC :

- GPWS FLAP MODE OFF
- FOR LDG USE FLAP 2
- APPR SPD VLS + 10 KT
- LDG DIST PROC APPLY

INOP SYS

F/CTL PROT

AP 1 + 2

L (R) ELEV

R

ALTN LAW : PROT LOST

CAT 1 ONLY

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

F/CTL ELEV SERVO FAULT

Crew awareness

The remaining servojack controls the elevator

STATUS

CAT 3 SINGLE ONLY

INOP SYS

CAT 3 DUAL

F/CTL L + R ELEV FAULT

PITCH MECH BACK UP

SPD BRK DO NOT USE

R

Do not use speedbrakes, because it is difficult to control the induced pitch moment with manual pitch trim only.

MAX SPEED 305/.80

Due to loss of high speed protections.

– MAN PITCH TRIM USE

R

Only manual trim is available for pitch control. To improve the longitudinal control of the aircraft it is recommended to disconnect the autothrust.

MANEUVER WITH CARE

● IF CG AFT 32 % :

– T. TANK MODE FWD

Fuel consumption is increased by approximately 1%.

R

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by :

· IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :

- T TANK MODE FWD

STATUS

SPD BRK DO NOT USE

MAX SPEED 305/.80

MANEUVER WITH CARE

APPR PROC :

– FOR LDG USE FLAP 2

Do not select CONF FULL so as not to degrade handling qualities.

– GPWS FLAP MODE OFF

– APPR SPD VLS + 10 KT

– MAN PITCH TRIM USE

● IF CG AFT 32% :

– T TANK MODE FWD

Fuel consumption is increased by approximately 1%.

R

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by :

· IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :

- T TANK MODE FWD



F/CTL L + R ELEV FAULT (CONT'D)

STATUS

R	– LDG DIST PROC APPLY	<u>INOP SYS</u>
	<i>Refer to the QRH part 2, or to the FCOM 3.02.80.</i>	L + R ELEV
	PITCH MECH BACK UP	F/CTL PROT
	ROLL DIRECT LAW	AP 1 + 2
	CAT 1 ONLY	

F/CTL FCDC 1(2) FAULT

Crew awareness

STATUS

	<u>INOP SYS</u>
	FCDC 1(2)

F/CTL FCDC 1 + 2 FAULT

- **ABOVE FL 200 :**
SPD BRK DO NOT USE
Audio stall warning is available. It is not corrected for speedbrakes extension and may come early with speedbrakes out.
RUD WITH CARE ABV 160 KT (if DC 2 or DC ESS bus failed)
- **MONITOR F/CTL OVHD PNL**
Note : – *Control law remains normal.*
 - *All information is flagged on the F/CTL system page.*
 - *F/CTL warnings are not available on ECAM.*
 - *Stall warning is available.*
 - *Bank and pitch limits become amber on the PFD.*
 - *V₀.max, V₀.PROT and V_{sw} indications are lost on the PFD.*

STATUS

● ABOVE FL 200 : SPD BRK DO NOT USE RUD WITH CARE ABV 160 KT <i>This line is displayed if DC 2 or DC ESS bus is failed.</i> F/CTL INDICATIONS LOST		<u>INOP SYS</u> FCDC 1 + 2

F/CTL AIL SERVO FAULT

Crew awareness

F/CTL L (R) INR (OUTR) AIL FAULT	
Crew awareness	
INCREASED FUEL CONSUMP <i>Note : For one aileron (INR or OUTR) fault, fuel consumption is increased by approximately + 6 %.</i> <i>For two or more ailerons fault, fuel consumption is increased by approximately + 16%.</i>	STATUS INOP SYS L(R) OUTR (INR) AIL

F/CTL YAW DAMPER 1(2)	
Crew awareness	
CAT 3 SINGLE ONLY	STATUS INOP SYS YAW DAMPER 1(2) CAT 3 DUAL

F/CTL YAW DAMPER FAULT	
<i>Loss of yaw damper 1 + 2.</i> USE RUD FOR TURN COORD	
F/CTL ALTN LAW (PROT LOST)	
MAX SPEED 305/.82	
STATUS MAX SPEED 305/.82 APPR PROC : – FOR LDG USE FLAP 3 – USE RUD FOR TURN COORD ALTN LAW : PROT LOST CAT 1 ONLY	INOP SYS F/CTL PROT YAW DAMPER AP 1 + 2

F/CTL PITCH TRIM/MCDU/CG DISAGREE	
Crew awareness. <i>The system detects a disagreement between : The real pitch trim value and the pitch trim value calculated by the FCMC, based on the CG.</i>	

	CONFIG RUD TRIM NOT IN T.O RANGE	
Crew awareness		

F/CTL RUD TRIM 1(2) FAULT	
Crew awareness	
CAT 3 SINGLE ONLY	STATUS INOP SYS RUD TRIM 1(2) CAT 3 DUAL

F/CTL RUD TRIM FAULT	
Crew awareness	
CAT 1 ONLY	STATUS INOP SYS RUD TRIM AP 1 + 2

F/CTL RUD TRV LIM 1(2) FAULT	
Crew awareness	
	STATUS INOP SYS RUD TRV LIM 1(2)

F/CTL RUD G (Y)(B) SERVO JAM	
Crew awareness	
<u>Note</u> : If the F/CTL RUD G(Y)(B) SERVO JAM warning occurs at engine start : – Reset FCDC 1 and 2. – Select the non affected LEAK MEASUREMENT valves OFF. – Perform a rapid and full deflection of the rudder. If no new warning is triggered, disregard the previous one, and reselect the LEAK MEASUREMENT valves ON. <u>Note</u> : If the G and Y LEAK MEASUREMENT valves have been selected OFF, at the end of the above test the rudder will be deflected 1.5 degrees to the right.	

F/CTL SENSOR FAULT	
A failure affecting a sensor in the F/CTL system is detected.	
Crew awareness	

F/CTL RUD TRV LIM FAULT	
R R	RUD WITH CARE ABV 160 KT <i>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 above 160 knots.</i> <i>At slats' extension, the low speed TLU authority may be recovered.</i> ● If TLU (rudder or pedals) remains locked at high speed after slat extension : - MAX X WIND FOR LDG 15 KT ● AT LDG ROLL – DIFF BRAKING AS RQRD
	STATUS INOP SYS RUD TRV LIM RUD WITH CARE ABV 160 KT ● If TLU (rudder or pedals) remains locked at high speed after slat extension : – MAX X WIND FOR LDG 15 KT ● AT LDG ROLL – DIFF BRAKING AS RQRD APPR PROC : – GPWS FLAP MODE OFF – FOR LDG USE FLAP 2 – APPR SPD VLS + 10 KT – LDG DIST PROC APPLY <i>Refer to the QRH part 2, or to the FCOM 3.02.80.</i> APPR PROC (ONE ENGINE INOPERATIVE) – GPWS FLAP MODE OFF – FOR LDG USE FLAP 2 – APPR SPD 160 KT ■ IN CASE OF GO AROUND – SPD SELECT 160 KT – LDG DIST PROC APPLY <i>Refer to the QRH part 2, or to the FCOM 3.02.80.</i>

F/CTL RUDDER TRIM RUNAWAY

- LATERAL CONTROL USE TO LEVEL WINGS
- RUDDER CENTRALIZE

Check the rudder position on the ECAM F/CTL page.

Note : This failure is seen mainly as uncommanded roll (induced by yaw). In most conditions, the aircraft stabilizes in a steady heading sideslip.

For continued flight, either maintain rudder central or leave the aircraft in a steady stabilized heading sideslip, but ensure that all changes between rudder centralized and steady heading sideslip are made smoothly. As speed is reduced, the TLU may gradually open to allow more rudder to be applied by the trim runaway.

DURING APPROACH

● **BEFORE SLATS EXTENSION :**

- LOWEST SAFE SPEED SELECT
*In the case of TLU failure, the TLU fully opens when slats are extended, and allow more rudder to be applied than is safe for the structure.
Full rudder is not permitted above 160 knots.*
- RUDDER MAINTAIN CENTRAL
Care must be taken to keep rudder steady and approximately centralized during slats extension, until the TLU has released.
- SEC 1 OFF THEN ON
- SEC 2 OFF THEN ON
- FOR LDG USE NORMAL CONF

F/CTL PRIM 1(2)(3)(SEC 1)(2) PITCH FAULT

Failure of pitch channel in the associated computer.

Crew awareness

F/CTL TURB DAMP FAULT

The turbulence damper function is inoperative.

Crew awareness

STATUS

I INOP SYS
TURB DAMPER

Note : When no alarm is given, but abnormal vibrations are present in non-turbulent conditions, this function may be disconnected through the TURB DAMP pushbutton.
Note the effect and report.

F/CTL RUDDER JAM/RUDDER PEDAL JAM

Rudder jamming may be detected by undue (and adverse) pedal movement during rolling maneuvers.

This is because yaw damper orders can no longer be sent to the rudder, but are fed back to the pedals.

Use the ECAM F/CTL page for a visual check of the rudder position.

This procedure also applies to RUDDER PEDAL JAM cases.

FOR APPROACH

- R

- AVOID LANDING WITH CROSSWIND from the side where the rudder is deflected.
 - FOR LANDING USE FLAP 2
 - GPWS FLAP MODE OFF
 - If all engines are operative :
 - APPR SPD VLS + 10
 - SPEED and TRAJECTORY STABILIZE ASAP
 - LDG DIST PROC APPLY
- Refer to the QRH part 2, or to the FCOM 3.02.80
- R

- In case of an Engine-Out :
 - APPR SPEED 160 knots
 - SPEED and TRAJECTORY STABILIZE ASAP
 - In case of a Go-Around :
 - SPD SELECT 160 knots
 - LDG DIST PROC APPLY
- Refer to the QRH part 2, or to the FCOM 3.02.80.

ON GROUND

- R

- DIFFERENTIAL BRAKING USE ASAP
- Do not use asymmetrical thrust reverse.
- R

Use the nosewheel steering handle below 100 knots knots only in case of RUDDER PEDAL JAM.

FUEL PUMP 1(2)(3)(4) LO PR

The corresponding standby pump automatically replaces the faulty main pump.

– PUMP (affected)

OFF

STATUS

INOP SYS

FUEL PUMP

(affected)

FUEL PUMPS 1 (2)(3)(4) + STBY LO PR

– X FEED (affected side)

ON

– PUMP (affected)

OFF

– PUMP (affected) STBY

OFF

STATUS

INOP SYS

FUEL AFT XFR

(Only if CTR TK

empty)

F. PUMP 1+STBY

(2)(3)(4)

FUEL CELL 1 BY GRVTY ONLY

(2)(3)(4)

FUEL L(R) CTR PUMP LO PR

– CTR PUMP (affected)

OFF

STATUS

INOP SYS

L(R) CTR PUMP

FUEL CELL NOT FULL

– JETTISON (if in operation)

OFF

– FUEL X-FEED (to operating engines)

ON

Do not open the fuel crossfeed valve of the failed engine, if any. Opening the X-FEED valves to the operating engine avoids an Engine 2 and/or 3 flameout.

FUEL L(R) WING PUMPS LO PR

- X FEED 1+2+3 (4+2+3) ON
- PUMPS (affected) OFF
- **WHEN L(R) TK FUEL RQRD :**
 - L(R) FUEL GRVTY FEED ONLY
 - GRVTY FEED PROC APPLY

STATUS

L(R) FUEL GRVTY FEED ONLY

(Not displayed, when the Xfeed valves are opened).

INOP SYS

FUEL AFT XFR

(only if CTR TK

empty)

F PUMP 1 + STBY

F PUMP 2 + STBY

F PUMP 3 + STBY

F PUMP 4 + STBY

FUEL L + R CTR PUMPS LO PR

- L + R CTR PUMPS OFF
- **WHEN EITHER INR < 17 T :**
 - CTR TANK XFR MAN

CTR TK XFR BY GRVTY

CTR TK UNUSABLE IF < 15 T

Note : The trim tank fuel is directly transferred to the inner tanks.

STATUS

CTR TK UNUSABLE IF < 15 T

INOP SYS

FUEL AFT XFR

(only if CTR TK

not empty)

F CTR PUMPS

GRVTY FUEL FEEDING

– ENG START SEL IGN

AVOID NEGATIVE G FACTOR

● DETERMINE GRVTY FEED CEILING

Depending when the fuel pumps have failed, the flight altitude must be limited to the following values :

Flight conditions at the time of gravity feeding	Gravity feed ceiling
Flight time from takeoff greater than 30 minutes (Fuel deaerated)	20 000 feet *
Flight time from takeoff less than 30 minutes (Fuel non deaerated)	15 000 feet *

R

R

R

* In case JP4 or JET B fuel is used, the gravity feed ceiling is the highest altitude between 4000 feet above sea level and 2 000 feet above the takeoff airport altitude.

DESCEND TO GRVTY FEED CEILING (if applicable)

● WHEN REACHING GRVTY FEED CEILING :

– X FEED (all) AUTO

Crossfeed valves close, except in EMER ELEC configuration.

FUEL ENG 1(2)(3)(4) LP VALVE FAULT

Crew awareness.

Valve position disagree.

FUEL APU LP VALVE FAULT

Crew awareness.

Valve position disagree.

FUEL X FEED 1(2)(3)(4) FAULT

Crew awareness.

Valve position disagree.

STATUS

INOP SYS

F. X FEED1(2)(3)(4)

FUEL AFT XFR

(Only if F.X FEED

2 or 3 is failed)

FUEL JETTISON NOT CLOSED

– JETTISON OFF

● IF JETTISON CONFIRMED :

– L + R CTR PUMPS OFF

● WHEN EITHER INR < 17 T :

– CTR TANK XFR MAN

CTR TK XFR BY GRVTY

CTR TK UNUSABLE IF < 15 T

CTR TK UNUSABLE IF < 15 T

STATUS

INOP SYS

FUEL CTR PUMPS

FUEL AFT XFR

FUEL WING TK OVERFLOW

– L + R CTR PUMPS OFF

To stop the center to inner transfer.

– T TANK MODE (only if CTR TANK empty) FWD

To force transfer into the center tank and prevent forward transfer into the inner tanks.

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by :

· *WHEN SPD > 270 KT AND NOT IN CLIMB :*

– T TANK MODE FWD

● WHEN EITHER INR < 17 T :

– L + R CTR PUMPS ON

STATUS

● WHEN SPD > 270 KT AND NOT IN CLIMB:

– T TANK MODE FWD

Displayed if the trim tank pumps is failed or not installed.

FUEL JETTISON FAULT

Jettison system is inhibited

JETTISON NOT AVAIL

ARG ALL

FUEL L(R) WING TK LO LVL

- CTR TANK XFR MAN
- OUTR TK XFR ON
- T TANK MODE FWD

If the trim tank pump is failed or not installed, check the pitch attitude is below 3 degrees before the forward transfer selection. After forward transfer, fuel consumption is increased by approximately 1 %.

● IF NO FUEL LEAK :

- X FEED 1+2 (3+4) ON

Inner and outer engine collector cells are not located at the same level inside the wing.

Note : The crossfeed valves of the non affected side can also be opened provided it is confirmed that there is no leak.

STATUS

- LVL OFF FOR MAN FWD XFR

Displayed if the trim tank pump is failed or not installed.



FUEL L + R WING TK LO LVL

LAND ASAP appears 20 minutes after the caution.

LAND ASAP

- CTR TANK XFR MAN
- OUTR TK XFR ON
- T TANK MODE FWD

If the trim tank pump is failed or not installed, check the pitch attitude is below 3 degrees before the forward transfer selection. After forward transfer, fuel consumption is increased by approximately 1 %.

- WING PUMPS ON
- X FEED 1+2+3+4 ON

STATUS

- LVL OFF FOR MAN FWD XFR

Displayed if the trim tank pump is failed or not installed.



FUEL CTR TO INNER FAULT

This caution is triggered if one of the following conditions is present :

- an anomaly is detected during the center to inner transfer or,
- the left (right) outer inlet valve is failed open or,
- the left (right) inner inlet valve is failed open.

– L + R CTR PUMPS OFF

● **WHEN EITHER INR < 17 T :**

- OUTR TK XFR (if OUTR inlet valve open) ON
- CTR TANK XFR (if low level sensor failed) MAN
- L + R CTR PUMPS ON

Note : This caution is recalled when the center tank becomes empty.

STATUS

I

– CTR TO INR : MAN ONLY

FUEL OUTR TO INR FAULT

- L + R CTR PUMPS (if center tank not empty) OFF
- OUTR TK XFR ON

● **WHEN BOTH OUTR EMPTY :**

- OUTR TK XFR AUTO
- L + R CTR PUMPS (if center tank not empty) ON

Note : This caution is recalled when the center tanks become empty.

FUEL MAN XFR COMPLETED

Center tank or outer tanks are empty, the manual XFR pushbuttons are ON.

- CTR TANK XFR AUTO
- OUTR TK XFR AUTO

FUEL TRIM TK PUMP LO PR ◀

– FWD XFR BY GRVTY ONLY

STATUS

I

– LVL OFF FOR MAN FWD XFR

INOP SYS

F T. TK PUMP

FUEL EXCESS AFT CG

– PITCH ATT

BELOW 3 DEG

This line is only displayed if the trim tank pump is failed or not installed : in this case, decrease the pitch attitude below 3 degrees to allow manual forward transfer.

– T TANK MODE

FWD

Fuel consumption is increased by approximately 1 %.

STATUS

– LVL OFF FOR MAN FWD XFR

Displayed if the trim tank pump is failed or not installed.

|

FUEL T TANK XFR FAULT

– T TANK MODE (b)

FWD

– T TANK FEED (a)

OPEN

Fuel consumption is increased by approximately 1 %.
Either line (a) or (b) will be displayed.
(a) Displayed if the trim tank isolation valve is failed closed or if the trim tank low level sensor is failed.
(b) Displayed in all other cases.
Note : 1. If the trim tank pump is failed or not installed, the above procedure is preceded by :

WHEN SPD > 270 KT AND NOT IN CLIMB :

2. If forward transfer is initiated by T TANK FEED switch, do not completely empty the trim tank (below around 200 kg). This avoids drainage of the trim line and so ensures APU supply.

● If either aft transfer valve is failed open :

– FUEL IMBALANCE

MONITOR

● IF TRIM TK QUANTITY NOT DECREASING :

– T TANK MODE

AUTO

– T TANK FEED

ISOL

T TK FUEL UNUSABLE

These steps prevent uncommanded aft transfer via a failed aft transfer valve.

● If is CG forward of 32 % :

Trim tank transfer has to be done in two steps.

● WHEN T TANK < 2.4 T :

– T TANK MODE (b)

AUTO

– T TANK FEED (a)

AUTO

This stops the tranfer after the first step.

ARG ALL

FUEL T TANK XFR FAULT (CONT'D)

- WHEN CTR TANK EMPTY :
 - T TANK MODE (b) FWD
 - T TANK FEED (a) OPEN*If the trim tank pump is failed or not installed, the above step is preceded by :
When CTR TANK EMPTY AND WHEN SPD > 270 KT AND NOT IN CLIMB :*
- WHEN T TANK EMPTY :
 - T TANK MODE (b) AUTO
 - T TANK FEED (a) AUTO
- If either aft transfer valve failed open :
 - T TANK FEED ISOL
- IF T TK FUEL UNUSABLE :
 - T TK UNUSABLE PROC APPLY

STATUS

- WHEN SPD > 270 KT AND NOT IN CLIMB
 - T TANK MODE FWD
 - T TANK FEED OPEN*Displayed if trim tank pump is failed or not installed.*

FUEL TRIM LINE FAULT

This caution is triggered in case of damage on the trim line or in case of trim tank isolation failure (failure of valves on the trim line).

- If damage on the TRIM LINE

TRIM LINE ISOLATED

 - APU MASTER sw OFF
- If T TK isolation fault
 - T TANK FEED ISOL
 - APU MASTER sw OFF
- IF T TK ISOL AFTER TO :
 - T TANK FEED AUTO*Trim tank may be recovered after takeoff, if manual isolation was selected on ground.*

STATUS

APPR PROC

- IF T TANK NOT EMPTY :
 - T TANK FEED ISOL

INOP SYS

FUEL AFT XFR
APU (when T TK
isol)



R

FUEL TRIM LINE FAULT (CONT'D)

■ If trim line isolation valve failed open and CTR TK not empty

- JETTISON OFF
- L + R CTR PUMPS OFF
- T TANK MODE FWD

Note : If the trim tank pump is failed, or not installed, this part of the procedure is replaced by :

- *WHEN SPD > 270 KT AND NOT IN CLIMB :*
- T TANK MODE FWD

● If CG forward 32 % :

Trim tank transfer has to be initiated in two steps.

● WHEN T TANK < 2.4 T :

- T TANK FEED ISOL
- L + R CTR PUMPS ON

● WHEN CTR TK EMPTY :

- L + R CTR PUMPS OFF
- T TANK FEED AUTO

● WHEN T TANK EMPTY :

- T TANK MODE AUTO
- L + R CTR PUMPS ON
- JETTISON AS RQRD

Note : 1. The caution is recalled at each step of the procedure, or when the tank becomes empty.

2. If unsuccessful, and if fuel is trapped in the trim tank, refer to the TRIM TANK FUEL UNUSABLE procedure.

STATUS

APPR PROC

● IF T TANK NOT EMPTY :

- T TANK FEED ISOL

INOP SYS

FUEL AFT XFR
APU (when T.TK
isol)

FUEL L(R) INNER TK HI TEMP

on ground before takeoff :

- GALLEY OFF
Reducing electrical loads will reduce heat rejected by IDG.

IF FUEL temp reaches 45° C

- LIMITED TAXI TIME

IF JET B FUEL :

- DELAY T.O.
- THR LEVER (affected side) IDLE
- ENG MASTER (affected side) OFF
- APU AS RQRD

Note : The ECAM caution is triggered at 45°C (without procedure) and automatically recalled at 49°C (with procedure for JET B) and 60°C (with procedure for all Fuels).

in flight :

IF JET A fuel temp reaches 60°C or JET B fuel temp reaches 49°C :

- GALLEY OFF
Reducing electrical loads will reduce heat rejected by IDG.
- ENG F. FLOW (affected side) INCREASE
Disconnect autothrust. Adjust thrust lever to increase fuel flow through IDG oil heat exchanger and decrease temperature of fuel returning to inner tank.

Note : The ECAM caution is triggered at 49°C and automatically recalled at 60°C.

FUEL FCMC 1(2) FAULT

Crew awareness

STATUS

INOP SYS
FCMC 1(2)

	FUEL FUEL LO TEMP
R	This caution appears, as soon as the inner tank temperature is less than −35°C, or outer or trim tank temperature is less than −40°C. However, at this threshold : Crew action is required for JET A FUEL only, and no crew action is required for other fuel types. For all other fuel types : This caution will automatically be recalled, if the temperature reaches −42°C (inner tank temp), or −47°C (outer or trim tank temp). However, regardless of the fuel type, the crew may consider delaying application of the procedure, until reaching the minimum fuel temperature specific to their fuel type (Refer to 3.01.28, page 1). ■ On ground, before takeoff : ● IF JET A : – DELAY T.O. Do not takeoff, until the temperature is within limits.
R	■ In flight : ● If inner tank temp is less than −35°C (auto recall at −42°C) ● IF JET A (not displayed at −42°C) : – CTR TANK XFR MAN ● If outer tank temp is less than −40°C (auto recall at −47°C) ● IF JET A (not displayed at −47°C) : – OUTR TK XFR ON If the center tank is not empty, the center tank pumps must be selected OFF to avoid inadvertent fuel transfer from center to outer tanks. ● If trim tank temp is less than −40°C (auto recall at −47°C) ● IF JET A (not displayed at −47°C) : – T TANK MODE FWD – If trim tank pump fails, or is not installed, this part of the procedure is replaced by : . WHEN SPD > 270 KT AND NOT IN CLIMB : – T TANK MODE FWD – If the CG is forward 26 % MAC, the CG should be monitored during the forward transfer, to ensure that forward CG limits are not exceeded. – Fuel consumption increases by approximately 1 %. ● IF NECESSARY : – TAT INCREASE Consider descending to a lower altitude and/or increasing Mach to increase TAT.
	STATUS
R	● WHEN SPD > 270 KT AND NOT IN CLIMB – T TANK MODE FWD Only appears, if trim tank pump fails, or is not installed.
R	

R
R
R
R
R
R
R

FUEL FCMC 1 + 2 FAULT

Transfers are controlled using the T TANK MODE, and the OUTR XFR pushbutton switches.

- FCMC 1 + 2 RESET
- WEIGHT/CG INITIALIZE

In flight, after a dual FCMC reset, the weight (GW) and CG displayed on the FUEL PRED page are those computed by the FE. However, the GW computed by the FE may be less accurate, therefore :

- If the FCMC reset is successful, the FCMC 1+2 FAULT ECAM caution will be replaced by the NO WEIGHT/CG DATA ECAM caution. Refer to this caution for the GW and CG re-initialization procedure.
- If the FCMC reset is not successful, determine the Fuel on Board (FOB) from the engine start fuel quantity minus the Fuel Used quantity indication.

FUEL TK XFR : MAN ONLY

● IF CG AFT 32 %

Read the CG on the MCDU FUEL PRED page.

- T TANK MODE FWD

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by :

- IF CG AFT 32 % AND WHEN SPD > 270 KT AND NOT IN CLIMB :
 - T TANK MODE FWD

Fuel consumption is increased by approximately 1 %.

● WHEN FOB BELOW 60 T :

- CTR TANK XFR MAN
- OUTR TK XFR ON

● WHEN < FL250 IN DESCENT

- T TANK MODE FWD

Note : If the trim tank pump is failed or not installed, this part of the procedure is replaced by :

- WHEN FL < 250 IN DESCENT AND SPD > 270 KT :
 - T TANK MODE FWD

STATUS

● WHEN SPD > 270 KT AND NOT IN CLIMB

- T TANK MODE FWD

Displayed if the trim tank pump is failed or not installed.

FUEL TK XFR : MAN ONLY

INOP SYS
FCMC 1 + 2

FUEL ZFW ZFCG DISAGREE

This caution is triggered in case of disagree between ZFW or ZFCG values from FMGC 1 and 2.

- FMGC VALUES CONFIRM
Confirm that the ZFW and ZFCG values from each FMGC are the same as the loadsheet values.

FUEL APU AFT PUMP FAULT

- IF APU RQRD
MAX FL 250
These lines are displayed on the ECAM, if the trim tank is not empty.

STATUS

- IF T TANK NOT EMPTY :
APU AVAIL BELOW FL 250

|

FUEL ABNORM MAN FWD XFR

This warning is triggered when the T TANK MODE pushbutton is selected FWD, or when the TRIM TANK FEED selector is set to OPEN, if :

- The trim tank pump is failed or not installed
- The aircraft pitch attitude is above 3.4 degrees for longer than 30 seconds.

This warning is not triggered, in case of inner tank low level, or in case of AFT CG warning.

- FOR SPD < 270 KT OR IN CLIMB :
 - T TANK MODE AUTO
 - T TANK FEED AUTO
- WHEN SPD > 270 KT AND NOT IN CLIMB :
 - T TANK MODE FWD
 - T TANK FEED OPEN

FUEL NO WEIGHT/CG DATA

This caution is triggered at engine start, if no WEIGHT/CG has been entered by the crew, or following a successful reset of both FCMCs.

- WEIGHT/CG INITIALIZE
In flight, after a dual FCMC reset, the weight (GW) and CG displayed on the FUEL PRED page are those computed by the flight envelope part of the FMGEC (FE). However, the FE based GW may be less accurate. Therefore, if time permits, the GW should be computed by using the loadsheet ZFW and the ECAM FOB, and re-entered on the MCDU FUEL PRED page.

TRIM TANK FUEL UNUSABLE

T TANK MODE FWD

T TANK FEED OPEN

● If TRIM TANK FUEL is still unusable :

- OUTR TK XFR ON

The CG moves forward.

– CTR TK PUMPS OFF

If the center tank is not yet empty, maintain fuel in the aircraft's center tank by switching off the pumps. This will reduce the effect of unusable trim tank fuel on the aircraft's center of gravity.

MAXIMUM FLIGHT TIME 4 HOURS

After 4 hours, depending on the fuel distribution, the aft CG limit may be reached.

FOR LANDING

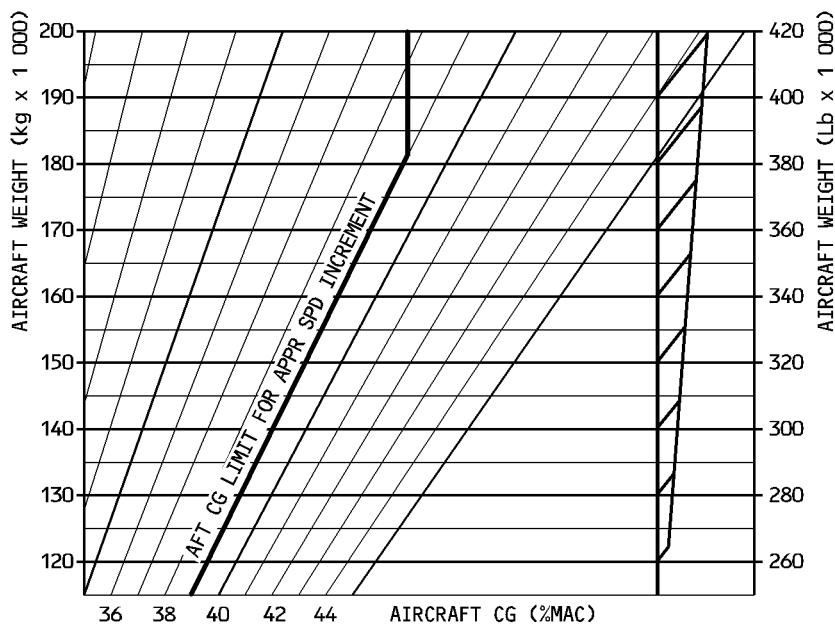
● If CG > aft CG limit shown below :

- APPR SPD VLS + 10 KT

- LDG DIST PROC APPLY

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

To keep the nosewheel on the runway and to avoid the aircraft sitting on its tail, apply continuous braking throughout the landing roll out.



FUEL LEAK

A fuel leak may either be detected by :

- The sum of FOB and F. USED significantly less than FOB at departure or decreases, or
- Passenger observation (fuel spray from the engine or the wing tip), or
- The total fuel quantity decreasing at an abnormal rate, or
- A fuel imbalance, or
- A tank emptying too fast (leak from an engine, or hole in a tank), or
- A tank overflowing (due to a pipe rupture in a tank), or
- An excessive fuel flow (leak from engine), or
- A fuel smell in the cabin.

If visibility permits, a visual check from the cabin may permit to identify the source of leak.

WHEN A LEAK IS CONFIRMED

LAND ASAP

■ **LEAK FROM ENGINE**

This procedure must be applied, if positively identified that leak comes from engine.

- THR LEVER (of affected engine) IDLE
- ENG MASTER (of affected engine) OFF
- FUEL X FEED 1+2+3+4 USE AS RQRD

The crossfeed valves can be opened for re-balancing, or to allow use of the fuel from both wings. Do not restart the engine.

■ **LEAK AFTER ENG FAIL**

This procedure must be applied, if the leak occurs after an engine failure. The leak could be caused by a engine rotor burst, having damaged the fuel tanks and/or fuel pipes.

- FUEL X FEED 1+2+3+4 AUTO
- The crossfeed valves must remain closed to prevent the leak from affecting both sides. Selecting AUTO maintains the crossfeed valves closed.*
- L+ R INR TK SPLIT ON

L+R INR TK SPLIT ON splits the inner tank into two parts to minimize fuel loss in case of an engine rotor burst.

● **If Center Tank or Trim Tank not empty :**

- CTR TANK XFR MAN
- T TANK MODE (if not empty) FWD

A manual trim tank transfer (via the center tank), and/or a manual center tank transfer must be done, to symetrically transfer fuel to both inner tanks, and avoid automatic transfer to only the least full inner tank.

● **When Trim Tank empty :**

- T TANK MODE AUTO
- T TANK FEED ISOL



FUEL LEAK (CONT'D)

- **When Center Tank empty :**
 - CTR TANK XFR AUTO

- **If the collector cell(s) deplete below 500 kg :**
 FUEL CELL NOT FULL

For prolonged flights, with split valves closed, the forward part of the inner tanks may empty sooner than the aft part. Consequently, collector cell(s) may deplete.

- JETTISON (if in operation) OFF
 - FUEL X-FEED (to operating engines) ON
- Do not open the fuel crossfeed valve of the failed engine. Opening the fuel X-FEED valves to the operating engines avoids an Engine 2 and/or 3 flameout.*

CAUTION

Do not apply the FUEL IMBALANCE procedure : Approach and landing can be done even with one inner tank full/one inner tank empty.

OTHER CASES

This procedure must be applied for any other leak source, whether or not the leak is located.

- FUEL X FEED 1+2+3+4 AUTO
- The crossfeed valves must remain closed to prevent the leak from affecting both sides. Selecting AUTO maintains the crossfeed valves closed.*

- **If Center Tank or Trim Tank not empty :**
 - CTR TANK XFR MAN
 - T TANK MODE (if not empty) FWD

A manual trim tank transfer (via the center tank) and/or a manual center tank transfer must be done, to symetrically transfer fuel to both inner tanks, and avoid automatic transfer to only the least full inner tank.

- **When Trim Tank empty :**
 - T TANK MODE AUTO
 - T TANK FEED ISOL

- **When Center Tank empty :**
 - CTR TANK XFR AUTO

- DESCEND TO GRVTY FUEL FEEDING CEILING
- Refer to the gravity fuel feeding procedure.*
- ENG START SEL IGN
 - ALL TK PUMPS (when gravity ceiling is reached) OFF
- In almost all cases, switching the pumps off will prevent any further loss of fuel.*



FUEL LEAK (CONT'D)

– AVOID NEGATIVE G FACTOR

CAUTION

Do not apply the FUEL IMBALANCE procedure : Approach and landing can be done even with one inner tank full/one inner tank empty.

● **If one engine flames out when fuel is still in the feeding tank :**

- ALL TK PUMPS ON
- LEAK FROM ENGINE proc APPLY

Note : The flameout is due to air suction from an engine leak.

FOR LANDING

CAUTION

Notify the ATC, and do not use reverse.

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 FUEL LEAK procedure.

– X FEED (all) ON

Select X FEED ON even if already automatically open.

● **On the lighter side :**

– (ALL) FUEL PUMPS (STBY then NORM) OFF

● **When fuel balanced :**

– PUMPS (NORM then STBY) ON

– X FEED (all) AUTO

FUEL FU/FOB DISCREPANCY

Difference between initial FOB and current FOB plus fuel used data is more than 3500 kg.

– FUEL LEAK PROC APPLY

HYD G RSVR LO AIR PR/OVHT/LO LVL

■ RSVR OVHT or LO LVL :

Note : False fluid temperature signal leads to undue related FAULT light illumination without ECAM warning.

– GREEN PUMPS (ENG 1 + 4 + ELEC) OFF

■ RSVR LO AIR PR :

● IF PRESS FLUCTUATES :

– GREEN PUMPS (ENG 1 + 4 + ELEC) OFF

G SYS LO PR

Secondary Failure

* WHEEL

* F/CTL

Note : · As a general rule, do not manually select an HYD ELEC PUMP ON, except temporarily, to retract the spoilers if they remain out after an hydraulic failure.

· On ground, avoid to retract the flaps when the aircraft is moving, to prevent a loss of alternate braking efficiency.



HYD G RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

APPR PROC

- **system 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.

– GREEN ENG 1 + 4 PUMPS . . . ON

● **IF HYD NOT RECOVERED :**

Same as RSVR LO LVL

■ **system lost by RSVR OVHT :**

● **IF GREEN OVHT OUT :**

– GREEN ENG 1 + 4 PUMPS .. ON

● **IF HYD NOT RECOVERED :**

Same as RSVR LO LVL

■ **system lost by RSVR LO LVL :**

● **FOR L/G GRVTY EXTN :**

MAX SPEED 200 KT

– LDG GRVTY EXTN DOWN

● **WHEN L/G DOWNLOCKED :**

– L/G DOWN

– LDG DIST PROC APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.
- INOP SYS
- GREEN HYD
L/G RETRACT
PART SPLRS
REV 1 + 4
CAT 3 DUAL
N/W STRG
AUTO BRK
NORM BRK
YAW DAMPER 1
- SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY
- R
R
- ARG ALL

HYD B RSVR LO AIR PR/OVHT/LO LVL

R LAND ASAP
R "LAND ASAP" is only triggered, if the green hydraulic system is
R supplied by the RAT.

■ RSVR OVHT or LO LVL :

Note : A false fluid temperature signal leads to undue related FAULT light illumination without ECAM warning.

– BLUE PUMPS (ENG 2 + ELEC) OFF

■ RSVR LO AIR PR :

● IF PRESS FLUCTUATES :

– BLUE PUMPS (ENG 2 + ELEC) OFF

B SYS LO PR

● If G HYD SYS is supplied by RAT :

– A/SKID NWS OFF
MAX BRK PR 1000 PSI
BRK B ACCU PR ONLY

Secondary Failure
* F/CTL

Note : As a general rule, do not manually select a HYD ELEC PUMP ON, except temporarily, to retract the spoilers if they remain out after a hydraulic failure.



ARG ALL

HYD Y RSVR LO AIR PR/OVHT/LO LVL

■ RSVR OVHT or LO LVL :

Note : False fluid temperature signal leads to undue related FAULT light illumination without ECAM warning.

– YELLOW PUMPS (ENG 3 + ELEC) OFF

■ RSVR LO AIR PR :

● IF PRESS FLUCTUATES :

– YELLOW PUMPS (ENG 3 + ELEC) OFF

Y SYS LO PR

Secondary Failure

* F/CTL

Note : As a general rule, do not manually select a HYD ELEC PUMP ON, except temporarily to retract the spoilers if they remain out after a hydraulic failure.

STATUS

APPR PROC

■ System lost by RSVR LO AIR PR :

*The possibility of cavitation increases with altitude.
So, it may be possible to restore the system after descending to a lower altitude.*

– YELLOW ENG 3 PUMP ON

● IF HYD NOT RECOVERED :

Same as RSVR LO LVL

■ System lost by RSVR OVHT :

● IF YELLOW OVHT OUT :

– YELLOW ENG 3 PUMP ON

● IF HYD NOT RECOVERED :

Same as RSVR LO LVL

■ System lost by RSVR LO LVL :

– LDG DIST PROC APPLY

FLAPS SLOW

CAT 3 SINGLE ONLY

INOP SYS

YELLOW HYD

PART SPLRS

REV 3

CAT 3 DUAL

CRG DOOR

(if Y LO LVL)

YAW DAMPER 2

HYD G + B SYS LO PR

LAND ASAP

MAN ON

– RAT

“RAT MAN ON” is only triggered in case of a G + B low level.

– CONSIDER RAT MAN USE

“CONSIDER RAT MAN USE” is neither triggered in case of a green reservoir overheat, nor in case of a G + B hydraulic system low level.

Note

: With the RAT extended, the green system is recovered. This permits slat extension recovery.

However, green pressure will be lost when the speed drops below 140 knots.

At that time, the red “G + B SYS LO PR” warning will be triggered again, and antiskid will be lost. To anticipate antiskid loss, the ECAM “HYD B RSVR LO AIR PR/OVHT/LO LVL” procedure requests to select it OFF.

With the RAT extended, fuel consumption increases by approximately 0.6 %.

R MIN RAT SPEED (not displayed if G RSVR OVHT)

140 KT

– Affected PUMPS

OFF

SPD BRK

DO NOT USE

Due to the loss of one elevator.

– MANEUVER WITH CARE

To avoid high hydraulic demand on the remaining system.

Note

: As a general rule, do not manually select a HYD ELEC PUMP ON, except temporarily, to retract the spoilers if they remain out after a hydraulic failure.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED

305/.82

Secondary Failure

* WHEEL

* F/CTL

STATUS

SPD BRK

DO NOT USE

MAX SPEED

305/.82

MAX BRK PR

1000 PSI

MANEUVER WITH CARE

MIN RAT SPEED (if RAT extended)

140 KT



HYD G + B SYS LO PR (CONT'D)

STATUS

APPR PROC

■ If system lost by RSVR LO AIR PR :

- Affected ENG PUMP ON

■ If system lost by RSVR OVHT :

● IF GREEN OVHT OUT :

- GREEN ENG 1 + 4 PUMP . . ON

● IF BLUE OVHT OUT :

- BLUE ENG 2 PUMP ON

■ IF HYD NOT RECOVERED :

- GPWS FLAP MODE (if $S < 1$) . OFF
- S/F JAMMED PROC APPLY
(Refer to 3.02.10. LANDING WITH SLATS OR FLAPS JAMMED).

- FOR LDG (if $S < 1$) . . USE FLAP 2

- FOR LDG (if $S \geq 1$) . . . USE FLAP 3

● FOR L/G GRVTY EXTN :

MAX SPEED 200 KT

- LDG GRVTY EXTN DOWN

● WHEN L/G DOWNLOCKED :

- L/G lever DOWN

- APPR SPD (if $S \geq 1$) . . VLS+10 KT

Approach speed must be increased, due to the loss of one elevator.

- LDG DIST PROC APPLY

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

Landing distance increases due to the increase in approach speed, loss of antiskid, and partial loss of ground spoilers.



HYD G + B SYS LO PR (CONT'D)
STATUS

ALTN LAW : PROT LOST
CONSIDER RAT MAN USE

“CONSIDER RAT MAN USE” is not triggered, in case of a green reservoir overheat, or in case of a G + B or G + Y hydraulic system low level.

BRK B ACCU PR ONLY

7 full brake applications are available.

INCREASED FUEL CONSUMP

Fuel consumption increases by approximately 16 % due to the inner ailerons in the upfloat position.

FLAPS SLOW

CAT 1 ONLY

Note : *Following a blue hydraulic system failure, the parking brake may be inoperative due to blue accumulator low pressure.*

INOP SYS

F/CTL PROT

G + B HYD

ANTI SKID

L/G RETRACT

AP 1 + 2

SLATS

L ELEV

MOST SPLRS

REV 1 + 2 + 4

L + R INR AIL

N/W STRG

NORM BRK

AUTO BRK

ALTN BRK

YAW DAMPER 1

HYD G + Y SYS LO PR

R

LAND ASAP

– CONSIDER RAT MAN USE

“CONSIDER RAT MAN USE” is not triggered in case of a green reservoir overheat.

Note : With the RAT extended, the green system is recovered. This permits flap extension recovery. However, green pressure will be lost when the speed drops below 140 knots.

At that time, the red “G + Y SYS LO PR” warning will be triggered again.

With the RAT extended, fuel consumption increases by approximately 0.6 %.

MIN RAT SPD (if RAT extended) 140 KT

– Affected PUMPS OFF

– USE RUD FOR TURN COORD

Due to the loss of yaw dampers 1 + 2.

SPD BRK DO NOT USE

Due to the loss of one elevator.

– MANEUVER WITH CARE

To avoid high hydraulic demand on the remaining system.

Note : As a general rule, do not manually select a HYD ELEC PUMP ON, except temporarily, to retract the spoilers if they remain out after a hydraulic failure.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED 305/.82

Secondary Failure

* WHEEL

* F/CTL

STATUS

SPD BRK DO NOT USE

MAX SPEED 305/.82

MANEUVER WITH CARE

MIN RAT SPD (if RAT extended) 140 KT



HYD G + Y SYS LO PR (CONT'D)

STATUS

APPR PROC

- **If system lost by RSVR LO AIR PR :**
 - Affected ENG PUMP ON
- **If system lost by RSVR OVHT :**
 - **IF GREEN OVHT OUT :**
 - GREEN ENG 1 + 4 PUMP . . ON
 - **IF YELLOW OVHT OUT :**
 - YELLOW ENG 3 PUMP ON
- **IF HYD NOT RECOVERED :**
 - **BEFORE S/F EXTENSION and if ENG 3 S/D :**
 - YELLOW ELEC PUMP OFF
 - Switch OFF the yellow electrical pump to avoid flight control jerk, in case Engine 3 is lost.*
 - **If FLAPS ≤ 2 :**
 - GPWS FLAP MODE OFF
 - FOR LDG USE FLAP 2
 - Selecting FLAP 2, instead of FLAP 3, permits VMAX display on PFD to increase.*
 - **If $2 < \text{FLAPS} \leq 3$:**
 - FOR LDG USE FLAP 3
 - **If FLAPS > 3 :**
 - FOR LDG USE FLAP FULL
 - S/F JAMMED PROC APPLY
 - Refer to 3.02.10*
 - LANDING WITH SLATS OR FLAPS JAMMED.*
 - **FOR LDG GRVTY EXTN**
 - MAX SPEED 200 KT
 - LDG GRVTY EXTN DOWN
 - **WHEN L/G DOWNLOCKED :**
 - L/G lever DOWN
 - APPR SPD (if $F \geq 2$) . . VLS + 10 KT
 - Approach speed increases, due to the loss of one elevator.*
 - USE RUD FOR TURN COORD



HYD G + Y SYS LO PR (CONT'D)	
STATUS	
R	– LDG DIST PROC APPLY <i>Refer to the QRH Part 2, or to the FCOM 3.02.80.</i> Landing distance increases due to the increase in approach speed and the partial loss of ground spoilers. ALTN LAW : PROT LOST CONSIDER RAT MAN USE <i>“CONSIDER RAT MAN USE” is not triggered in case of green reservoir overheat or in case of G + B or G + Y hydraulic system low level.</i> INCREASED FUEL CONSUMP <i>Fuel consumption increases by approximately 16 %, due to the outer ailerons in the upfloat position.</i> SLATS SLOW CAT 1 ONLY INOP SYS F/CTL PROT G + Y HYD YAW DAMPER L/G RETRACT AP 1 + 2 FLAPS L + R OUTR AIL R ELEV MOST SPLRS REV 1 + 3 + 4 N/W STRG AUTO BRK NORM BRK CRG DOORS (if Y LO LVL) L/G DOORS

HYD B + Y SYS LO PR	
	LAND ASAP
– Affected PUMPS OFF	
– MANEUVER WITH CARE	
<i>To avoid high hydraulic demand on the remaining system.</i>	
<i>Note : As a general rule, do not manually select a HYD ELEC PUMP ON, except temporarily, to retract the spoilers if they remain out after a hydraulic failure.</i>	
● IF TRIM LOCKED > 8 UP	
MAX SPEED 180 KT	
<i>Select the configuration, as appropriate. Fuel consumption is increased.</i>	
<i>Use manual thrust.</i>	
F/CTL ALTN LAW (PROT LOST)	
MAX SPEED 305/.82	
	Secondary Failure
	* F/CTL



HYD B + Y SYS LO PR (CONT'D)

STATUS

- MAX SPEED 305/.82
 MANEUVER WITH CARE
 ● **IF TRIM LOCKED > 8 UP :**
 MAX SPEED 180 KT
 APPR PROC
 ■ **If system lost by RSVR LO AIR PR :**
 – affected ENG PUMP ON
 ■ **If system lost by RSVR OVHT :**
 ● **IF BLUE OVHT OUT :**
 – BLUE ENG 2 PUMP ON
 ● **IF YELLOW OVHT OUT :**
 – YELLOW ENG 3 PUMP ON
 ■ **IF HYD NOT RECOVERED :**
 – PITCH AUTHORITY REDUCED
Start the flare earlier. More stick deflection may be needed to achieve the flare.
 – GPWS FLAP MODE OFF
 – FOR LDG USE FLAP 2
Due to loss of the stabilizer, do not select CONF FULL or 3, so as not to degrade handling qualities.
 ● **FOR L/G GRVTY EXTN :**
 MAX SPEED 200 KT
 – LDG GRVTY EXTN DOWN
The ldg. gear is extended by gravity to preserve green system integrity for flight controls.
 ● **WHEN L/G DOWNLOCKED :**
 – L/G lever DOWN
 – APPR SPD VLS + 10 KT
Approach speed is increased, due to partial loss of spoilers and stabilizer.
 – LDG DIST PROC APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
 ALTN LAW : PROT LOST
 SLATS/FLAPS SLOW
 CAT 1 ONLY
Note : Following a blue hyd. sys. failure, the parking brake may be inop. due to blue accumulator low pressure.

INOP SYS
 F/CTL PROT
 STABILIZER
 B + Y HYD
 AP 1 + 2
 MOST SPLRS
 REV 2 + 3
 ALTN BRK
 CRG DOORS
 (if Y LO LVL)
 YAW DAMPER 2
 N/W STRG
 L/G DOORS

R

HYD G (B) (Y) ELEC PUMP FAULT

In case of an electrical pump overheat, or if an electrical pump fails while in use :

– Affected ELEC PUMP OFF

STATUS

Note : *In case of an electrical pump overheat, and until the system is reset on ground, the electrical pump pushbutton FAULT light (on the overhead panel) stays on, and the OVHT indication (on the ECAM) stays displayed, even if the overheat has stopped.*

INOP SYS
G ELEC PUMP
(B)(Y)

HYD G ENG 1 (4) PUMP LO PR

– GREEN ENG PUMP (affected) OFF

STATUS

Note : *On ground, avoid retracting the flaps when the aircraft is moving, to prevent a loss of normal braking.*

INOP SYS
G ENG 1(4)
PUMP

HYD G ENG 1 + 4 PUMP LO PR

– GREEN ENG 1 + 4 PUMP OFF

G SYS LO PR

Secondary Failure

* F/CTL

* WHEEL

STATUS

APPR PROC

● FOR L/G GRVTY EXTN :
MAX SPEED 200 KT
– L/G GRVTY EXTN DOWN

● WHEN L/G DOWNLOCKED :
– L/G DOWN
– LDG DIST PROC APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
L/G RETRACT
PART SPLRS
REV 1 + 4
CAT 3 DUAL
N/W STRG
NORM BRK
AUTO BRK
YAW DAMPER 1
G ENG 1 PUMP
G ENG 4 PUMP

R
R

ARG ALL

HYD B ENG 2 PUMP LO PR

– BLUE ENG 2 PUMP OFF

B SYS LO PR

● If G HYD SYS is supplied by the RAT :

- A/SKID NWS OFF
- MAX BRK PR 1000 PSI
- BRK B ACCU PR ONLY

Secondary Failure
* F/CTL

STATUS

MAX BRK PR 1000 PSI (a)
– LDG DIST PROC APPLY
BRK B ACCU PR ONLY (a)
SLATS SLOW
CAT 3 SINGLE ONLY

INOP SYS
BLUE HYD
PART SPLRS
REV 2
CAT 3 DUAL
ALT BRK
AUTO BRK (a)
ANTI SKID (a)
NORM BRK (a)
N/W STRG (a)
B ENG 2 PUMP

(a) If G HYD SYS is supplied by the RAT

Note : Following a blue hydraulic system failure, the parking brake may be inoperative due to a blue accumulator low pressure.

R

HYD Y ENG 3 PUMP LO PR

– YELLOW ENG 3 PUMP OFF

Y SYS LO PR

STATUS

– LDG DIST PROC APPLY

FLAPS SLOW

CAT 3 SINGLE ONLY

Secondary Failure

* F/CTL

INOP SYS

YELLOW HYD

PART SPLRS

REV 3

CAT 3 DUAL

YAW DAMPER 2

Y ENG 3 PUMP

R

HYD RAT FAULT (on ground)

Crew awareness.

STATUS

I

INOP SYS

RAT

HYD MONITORING FAULT

Crew awareness.

HSMU not racked.

Note

: The following functions are lost :

– Automatic control of the electrical pumps,

– Automatic RAT extension,

– Automatic closure of the fire shutoff valves,

– OVHT warning on the hydraulic circuit,

– Reservoir fluid level on the ECAM.

STATUS

I

INOP SYS

HYD MONG

HYD G RSVR UNDERFILLED (on ground)

This caution is triggered on the ground if the reservoir quantity is below a quantity function of the temperature. Maintenance action is due.

HYD G SYS LEAK

This caution is triggered in flight, with the same logic as the G RSVR UNDERFILLED caution.

– LEAK RATE MONITOR

● IF LEVEL DECREASES :

– GREEN ENG 1 + 4 PUMP OFF

– GREEN ELEC PUMP OFF

R

A. ICE L(R) WSHLD HEAT

● If due to a WHC command failure :

L(R) WINDOW HEAT

– PROBE WINDOW HEAT ON

STATUS

INOP SYS

L (R) WSHLD HEAT

A. ICE L + R WSHLD HEAT

● If due to a WHC command failure :

L + R WINDOW HEAT

– PROBE WINDOW HEAT ON

STATUS

INOP SYS

WSHLD HEAT

WINDOW HEAT

(If WHC command failed)

A. ICE L (R) (L + R) WINDOW HEAT

Crew awareness.

STATUS

INOP SYS

L(R) WNDOW HEAT

(WINDOW HEAT)

A. ICE CAPT PITOT or L (R) STAT or AOA HEAT

- AIR DATA SWTG (if ADR 3 avail and not used) . . CAPT ON 3
ADR 3 supplies data to PFD 1 and ND 1.

- **IF ICING EXPECTED :**

Only for PITOT HEAT FAULT, and if ADR 2 and 3 are FAULT or OFF.

- UNREL SPD PROC APPLY

STATUS

	INOP SYS
	CAPT PITOT
	(CAPT L STAT)
	(CAPT R STAT)
	(CAPT AOA)

A. ICE F/O PITOT or L (R) STAT or AOA HEAT

- AIR DATA SWTG (if ADR 3 avail, and not used) . . . F/O ON 3
ADR 3 supplies data to PFD 2 and ND 2.

- **IF ICING EXPECTED :**

Only for PITOT HEAT FAULT, and if ADR 1 and 3 are FAULT or OFF.

- UNREL SPD PROC APPLY

STATUS

	INOP SYS
	F/O PITOT
	(F/O L STAT)
	(F/O R STAT)
	(F/O AOA)

A. ICE STBY PITOT or L (R) STAT or AOA HEAT

- AIR DATA SWTG AS RQRD
If standby instruments are used, monitor air data information.

STATUS

	INOP SYS
	STBY PITOT
	(STBY L(R) STAT)
	(STBY AOA)

A. ICE CAPT (F/O) TAT HEAT

- If TAT abnormally heated on ground :
TAT HEATED ON GND

A. ICE CAPT (F/O) (STBY) PROBES HEAT

- PROBE WINDOW HEAT ON
 - IF UNSUCCESSFUL :
 - AIR DATA SWTG CAPT ON 3 (F/O ON 3) (AS RQRD)
- STATUS

INOP SYS

CAPT PROBES

(F/O) (STBY)

DOUBLE STAT (AOA) HEAT FAILURE

In case of double failure of the static probe or 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.*

R

A. ICE ENG 1 (2) (3) (4) VALVE CLOSED	
AVOID ICING CONDITIONS	STATUS INOP SYS ENG 1 A. ICE (2) (3) (4)

A. ICE ENG 1 (2) (3) (4) VALVE OPEN
<i>This warning is triggered, if one ENG ANTI ICE pushbutton is selected OFF, and the corresponding ENG ANTI ICE valve is detected OPEN.</i> <i>If the fault is present before takeoff, there will be an EGT increase, which can lead to an EGT overlimit, for engines with a low EGT margin when the OAT is high (above the cornerpoint value).</i> <i>Refer to the MMEL for dispatch.</i> Crew awareness.

A. ICE WING OPEN ON GND	
<i>Following ground test, the valves are still open after 40 seconds.</i> This caution is automatically recalled in phase 9. – WING ANTI ICE OFF WAI AVAIL IN FLT	
WAI AVAIL IN FLT	STATUS I

A. ICE L (R) INR (OUTR) WING HI PR
Crew awareness.

A. ICE L(R) INR (OUTR) WING LO PR

In flight, low pressure is detected when wing anti-ice is selected on.

– THRUST INCREASE

● IF UNSUCCESSFUL :

– WING ANTI ICE OFF

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

APPR PROC

● IF ICE ACCRETION :

– APPR SPD VLS + 10 KT

– LDG DIST PROC APPLY

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

Note : In case of severe ice accretion, with wing anti ice failed, the angle-of-attack protections are still efficient. However, if full back stick is maintained while at maximum angle-of-attack, a divergent roll oscillation may appear. Releasing slightly the stick will stop this oscillation.

INOP SYS

WING A. ICE

R

A. ICE WING VLVE NOT OPEN

In flight, one wing valve remains closed, when WAI is selected on.

- WING ANTI ICE OFF

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

APPR PROC

● IF ICE ACCRETION :

- APPR SPD VLS + 10 KT
- LDG DIST PROC APPLY

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

Note : *In case of severe ice accretion, with wing anti-ice failed, the angle-of-attack protections are still efficient. However, if full backstick is maintained, while at the maximum angle-of-attack, a divergent roll oscillation may appear. Slightly releasing the stick will stop this oscillation.*

INOP SYS

WING A. ICE

A. ICE L (R) INR (OUTR) WING OPEN

One wing anti-ice valve is abnormally not closed.

■ Failure detected on ground :

- WING ANTI ICE OFF
- X BLEED (if not closed) CLOSE
- ENG BLEED (affected side) OFF
- APU BLEED (if left wing affected) OFF

WAI AVAIL IN FLT

● After takeoff, when above 1500 feet (automatic recall) :

- ENG BLEED (affected side) ON
- X BLEED AUTO
- WING ANTI ICE AS RQRD

On the failed side, wing anti-ice is continually ON, and is therefore available, if needed.

WAI AVAIL IN FLT.

● After landing (automatic recall) :

- WING ANTI ICE OFF
- X BLEED (if not closed) CLOSE
- ENG BLEED (affected side) OFF
- APU BLEED (if left wing affected) OFF

STATUS

WAI AVAIL IN FLT

INOP SYS
ENG BLEED
PACK

■ Failure detected in flight :

- WING ANTI ICE AS RQRD

WAI AVAIL IN FLT

On the failed side, wing anti-ice is continually ON, and is therefore available, if needed.

● Depending on bleed configuration :

- X BLEED OPEN or AUTO

● After landing (automatic recall) :

Refer to the failure detected on ground.

STATUS

WAI AVAIL IN FLT

I

A. ICE WAI SYS FAULT

The wing anti-ice command relay is failed.

■ **WING ANTI ICE pushbutton ON – All WAI valves CLOSED**

The wing anti-ice valves stay closed.

– WING ANTI ICE OFF
AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS
APPR PROC

INOP SYS
WING A. ICE

● IF ICE ACCRETION

- APPR SPD VLS + 10 KT
- LDG DIST PROC APPLY

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

Note : In case of severe ice accretion, with wing anti-ice failed, the angle-of-attack protections are still efficient. However, if full backstick is maintained, while at the maximum angle-of-attack, a divergent roll oscillation may appear. Slightly releasing the stick will stop this oscillation.

■ **WING ANTI ICE pushbutton OFF – All WAI valves OPEN**

The wing anti-ice valves are abnormally open.

WING ANTI ICE ON

- If on ground :

- X BLEED (if not closed) CLOSE
- ENG BLEED (all) OFF
- APU BLEED OFF

WAI AVAIL IN FLT



A. ICE WAI SYS FAULT (CONT'D)

STATUS

WAI AVAIL IN FLT

INOP SYS
ENG BLEED
PACK

- If, in flight, or after T.O, when above 1500 feet (automatic recall) :
 - ENG BLEED (all) ON
 - X BLEED (depending on Bleed Config) OPEN or AUTO
- After landing (automatic recall) :
 - X BLEED (if not closed) CLOSE
 - ENG BLEED (all) OFF
 - APU BLEED OFF

ANTI ICE CAPT + F/O PITOT HEAT

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 all probes heating is lost on the CAPT and/or F/O side :**
 - PROBE/WINDOW HEAT ON
In some failure conditions, probe heating may be recovered.

- **IF UNSUCCESSFUL :**

- **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 APPLY
Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the unreliable speed 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 F/O + STBY PITOT HEAT

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 all probes heating is lost on the F/O and/or STBY side :
 – PROBE/WINDOW HEAT ON
In some failure conditions, probe heating may be recovered.

- IF UNSUCCESSFUL :

- 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 APPLY
Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the unreliable speed procedure.

NAV ADR FAULT

STATUS

- **If ADR 1 failed or OFF**

- IF ICING EXPECTED :

- ```

- ADR 2 (3) OFF
- UNREL SPD PROC APPLY

```

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 HEAT

*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.*

● **If all probes heating is lost on the CAPT and/or F/O and/or STBY side :**

- PROBE/WINDOW HEAT ..... ON

● **IF UNSUCCESSFUL :**

- 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 ..... APPLY

*Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the unreliable speed procedure.*

## NAV ADR FAULT

*Single ADR FAULT or double ADR FAULT ECAM cautions may be triggered, depending on the number of ADR 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 ALL PITOT HEAT (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 FDIU FAULT

Crew awareness

STATUS

INOP SYS

FDIU

FWS ECP FAULT

ECP KEYS AVAIL :  
CLR, RCL, STS, ALL  
EMER CANCEL.  
*CLR, STS, RECALL, EMERGENCY CANCEL, ALL keys are directly wired to the EIS computers.*

FWS FWC 1(2) FAULT

Crew awareness

CAT 3 SINGLE ONLY

STATUS

INOP SYS

FWC 1(2)

CAT 3 DUAL

**FWS FWC 1 + 2 FAULT**

- MONITOR SYS
- MONITOR OVERHEAD PANEL

**STATUS**

| 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 check regularly (more often than usual)  
cockpit panels for local warnings and ECAM system pages for system checks.  
Check the general status of the systems for the DES/APPR preparation.*

**FWS SDAC 1(2) FAULT**

Crew awareness

**STATUS**

| INOP SYS  
SDAC 1(2)

**FWS SDAC 1 + 2 FAULT**

- MONITOR OVERHEAD PANEL

*Part of amber cautions is lost.*

*All red warnings, engine and fuel parameters are available on ECAM upper DU.*

ECAM SYS PAGES AVAIL :

ENG, F/CTL, FUEL, WHEEL,  
PRESS, C/B

**STATUS**

| INOP SYS  
SDAC 1 + 2

**EIS EFIS DMC 1(2) FAULT**

- CAPT (F/O) EFIS DMC (if EFIS DMC3 avail) . . . . . 3
- CAPT (F/O) EFIS DMC (if EFIS DMC2 or 1 avail) . . . . . 2(1)

**STATUS**

| INOP SYS  
EFIS DMC 1(2)

**EIS EFIS DMC 3 FAULT**

Crew awareness

- **if EFIS DMC 1 failed :**
  - CAPT EFIS DMC . . . . . 2

*The message EFIS SINGLE SOURCE 2 is displayed on both PFDs.*
- **if EFIS DMC 2 failed :**
  - F/O EFIS DMC . . . . . 1

*The message EFIS SINGLE SOURCE 1 is displayed on both PFDs.*

**STATUS**

| INOP SYS  
EFIS DMC 3

**EIS ECAM DMC 3 FAULT**

- ECAM SWTG DMC . . . . . 1
- ECAM DMC 1 replaces automatically ECAM DMC 3. However manual confirmation is required.*
- **if ECAM DMC 1 failed :**
    - ECAM SWTG DMC . . . . . 2

*These two lines are not displayed on ECAM as ECAM DMC 1 + 3 are lost.*

**STATUS**

| INOP SYS  
ECAM DMC 3

EIS ECAM DMC 1(2) FAULT

● if ECAM DMC 3 failed :

– ECAM SWTG DMC . . . . . 2

In case of ECAM DMC 1 failure these two lines are not displayed on ECAM as ECAM DMC 1+3 are lost.

STATUS

INOP SYS

ECAM DMC 1(2)

EIS DISPLAY DISCREPANCY

CHECK EWD

CHECK SD

CHECK PFD

CHECK ND

The DMC detects a discrepancy between acquisition and display on a DU.

This warning is associated with an amber message displayed on the affected DU. In case of EWD display discrepancy, the amber message is displayed on the EWDU and on both NDUs.

– DMC/DU SWTG . . . . . AS RQRD

Note : The failure may be due to a DMC or a DU problem.

The following part of the procedure is not displayed on ECAM :

■ In case of CHECK EWD or CHECK SD :

– ECAM SWTG DMC . . . . . 1 or 2

DMC 1 or 2 may be selected if not failed

● If unsuccessful

return to normal DMC configuration

in case of CHECK EWD :

R – ECAM UPPER DISPLAY . . . . . OFF

EWD is automatically transferred on SDU

R – ECAM/ND . . . . . CAPT or F/O

SD display may be recovered on CAPT or on F/O NDU.

R in case of CHECK SD

R – ECAM/ND . . . . . AS RQRD

R – ECAM LOWER DISPLAY . . . . . AS RQRD

R The DU may by switched off.



### EIS DISPLAY DISCREPANCY (CONT'D)

- **In case of CHECK PFD or CHECK ND :**
  - Crosscheck with standby instrument.
  - EFIS DMC (affected side) ..... 3
- **If unsuccessful :**
  - Return to normal DMC configuration
  - PFD/ND XFR (affected side) ..... AS RQRD
  - DU (affected) ..... AS RQRD

*The DU can be switched off.*

### DISPLAY UNIT FAILURE

- **AFFECTED DU IS BLANK or DISPLAY IS DISTORTED :**
  - DU (affected) ..... AS RQRD
  - The DU can be switched off.*
  - ECAM/ND SEL (if ECAM DUs affected) ..... USE
  - Transfer SD to F/O or CAPT ND.*
  - PFD/ND XFR (if EFIS DUs affected) ..... USE
- **DIAGONAL LINE ON THE AFFECTED DU :**

*This failure may be due to a DMC FAULT, or a communication interruption between the DMC and DU.*

  - DMC SWITCHING (EFIS OR ECAM) ..... AS RQRD
- **If unsuccessful :**
  - DU (affected) ..... OFF THEN ON

*Note : ND display may disappear, in case 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.*
- **DIAGONAL LINE ON ECAM DUs (EWD and SD) :**
  - ECAM DMC SWITCHING ..... 2
  - This action permits the recovery of both ECAM DUs.*
- **INVERSION OF EWD AND SD :**
  - ECAM UPPER DISPLAY ..... OFF THEN ON
  - The action on the ECAM DMC SWITCHING selector produces the same effect.*

**ECAM SINGLE DISPLAY**

*EWD only is available, no SD on the other DUs.*

■ **To call a SYS page :**

- PRESS AND MAINTAIN SYS page key on ECP.

■ **OVERFLOW ON THE STATUS page :**

- PRESS AND MAINTAIN STS KEY ON ECP

*First page of STATUS is displayed.*

- RELEASE IT THEN PRESS AGAIN WITHIN 2 SECONDS

*Second page of STATUS is displayed.*

- CONTINUE UNTIL DISAPPEARANCE OF THE OVERFLOW ARROW

*When the STS key is released more than 2 seconds, EWD is displayed again.*

TAIL STRIKE

When a tail strike is experienced, apply the following procedure

LAND ASAP

– MAX FL . . . . . 100 or MSA

500 feet/minute should be targeted for the climb, to minimize pressure changes, 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

ARG ALL

L/G GEAR NOT UNLOCKED

This warning appears, if the landing gear sequence is not completed after 30 seconds.

■ L/G doors closed :

AVOID EXCESS G FACTOR

Since the gear rests on the doors, avoid excessive load factors in order not to damage the door structure.

STATUS

I

AVOID EXCESS G FACTOR

■ L/G doors not closed :

MAX SPEED ..... 250/.55

● WHEN SPD < 250/.55 :

– L/G lever ..... RECYCLE

Recycling the landing gear, switches landing gear control to the other LGCIU.

● IF UNSUCCESSFUL :

– L/G lever ..... DOWN

MAX SPEED ..... 250/.55

STATUS

MAX SPEED ..... 250/.55 | 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 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 UPLOCK FAULT

MAX SPEED ..... 250/.55  
– L/G lever ..... KEEP DOWN  
*Landing gear must be left down to avoid structural damage, as the uplock device will stay in the locked position.*

STATUS

MAX SPEED ..... 250/.55  
– L/G lever ..... 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 3.*

L/G GEAR NOT DOWNLOCKED

*This warning appears, if the landing gear sequence (main, CTR, or nose gears) is not completed after 30 seconds.*  
– L/G lever ..... RECYCLE  
*Recycling the landing gear switches landing gear control to the other LGCIU.*

● IF UNSUCCESSFUL :

● FOR L/G GRVTY EXTN :

MAX SPEED ..... 200 KT  
– L/G GRVTY EXTN ..... DOWN  
*Refer to L/G GRAVITY EXT procedure.*

● WHEN L/G DOWNLOCKED :

– L/G lever ..... DOWN

● IF WARNING AFTER 40 S :

*If still unsuccessful, the center gear must be retracted.*  
*For this reason, the ECAM displays the following procedure :*  
– L/G GRVTY EXTN ..... RESET  
– L/G lever ..... UP

● FOR L/G GRVTY EXTN :

MAX SPEED ..... 200 KT  
– L/G GRVTY EXTN ..... DOWN

● WHEN L/G DOWNLOCKED :

– L/G lever ..... DOWN

ARG ALL

R

R

R

R

R

R

APPR PROC

FOR L/G GRVTY EXTN :

MAX SPEED ..... 200 KT

– L/G GRVTY EXTN ..... DOWN

● **WHEN L/G DOWNLOCKED**

– L/G lever ..... DOWN

CAT 3 SINGLE ONLY

*If the second gravity extension is unsuccessful refer to “LDG WITH ABNORMAL L/G” procedure*

STATUS

INOP SYS

CTR L/G

CAT 3 DUAL

N/W STRG (a)

(a) As nose gear doors remain open, N.W. steering hydraulic power is lost.

L/G GEAR NOT DOWN

*This warning appears in approach at 750 feet RA if the landing gear is not selected DOWN although the system is not failed.*

*This warning is associated with the illumination of the red arrow on the instrument panel.*

Crew awareness

L/G RETRACTION FAULT

R

MAX SPEED ..... 250/.55

– L/G lever ..... RECYCLE

● **IF UNSUCCESSFUL :**

– L/G ..... KEEP DOWN

STATUS

INOP SYS

L/G RETRACT

MAX SPEED ..... 250/.55

– L/G lever ..... KEEP DOWN

INCREASED FUEL CONSUMP

L/G L (R) LENGTHENING FAULT

MAX SPEED ..... 250/.55  
– L/G lever ..... KEEP DOWN  
*Note : The shock absorber performance of the affected gear is degraded. Touch down as smoothly as possible.*

STATUS

MAX SPEED ..... 250/.55  
– L/G lever ..... KEEP DOWN  
INCREASED FUEL CONSUMP

INOP SYS  
L/G RETRACT

L/G SYS DISAGREE

*Disagreement between the landing gear positions detected by LGCIU 1 and by LGCIU 2. Provided there is no other landing gear ECAM warning, the landing gear position is in agreement with the landing gear lever position.*  
Crew awareness

L/G DOORS NOT CLOSED

*This warning appears, if the landing gear sequence is not completed after 30 seconds.*  
MAX SPEED ..... 250/.55  
● **WHEN SPD < 250/.55 :**  
– L/G lever ..... RECYCLE  
*Recycling the landing gear switches landing gear control to the other LGCIU.*

STATUS

MAX SPEED ..... 250/.55  
INCREASED FUEL CONSUMP

INOP SYS  
L/G DOOR

L/G LGCIU 1 (2) (1 + 2) FAULT

■ One LGCIU FAULT

- GPWS (if LGCIU 1 affected) . . . . . OFF  
*As LGCIU 1 is lost, GPWS receives “landing gear in up position” information even if landing gear is down. Setting GPWS SYS pushbutton to OFF, will prevent untimely warnings in approach.*

STATUS

INOP SYS  
LGCIU 1(2)  
GPWS (if LGCIU 1 failed)

■ Both LGCIU FAULT :

- GPWS . . . . . OFF  
*As LGCIU 1 is lost, GPWS receives “landing gear in up position” information even if landing gear is down. Setting GPWS SYS pushbutton to OFF, will prevent untimely warnings in approach.*
- FOR L/G EXTN :
  - L/G NORMAL EXTN . . . . . TRY
- IF UNSUCCESSFUL :
  - L/G GRVTY EXTN ONLY  
*Refer to L/G GRAVITY EXTENSION procedure.*
- FOR L/G GRVTY EXTN :
  - MAX SPEED . . . . . 200 KT

STATUS

APPR PROC :

- FOR L/G EXTN :
  - L/G NORMAL EXTN . . . . . TRY
- IF UNSUCCESSFUL :
  - L/G GRVTY EXTN ONLY
- FOR L/G GRVTY EXTN :
  - MAX SPEED . . . . . 200 KT

INOP SYS  
LGCIU 1 + 2  
CTR L/G  
REVERSERS  
N/W STRG  
GPWS  
CAT 3 DUAL

ENG HI IDLE

*When idle is selected on the ground, only the approach idle is available*

CAT 3 SINGLE ONLY

Note : *The partial spoiler extension at landing when only one main landing gear is compressed is not available. The spoilers extend normally on the ground when wheel speed is greater than 72 knots.*

L/G GRAVITY EXTENSION

MAX SPEED ..... 200 KT  
*Speed with main landing gear doors open (and center landing gear doors closed) is limited to 200 knots to avoid vibrations transmitted through the cabin floor.*

– L/G GRVTY EXTN ..... DOWN

CAUTION

Both selector guards have to be open before selecting DOWN.

– 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 landing gear indications panel.*
- *To prevent the L/G CTL message on ECAM WHEEL page and the L/G NOT DOWN warning on ECAM.*
- *To minimize the risk of landing gear retraction on the ground, due to unknow system fault, when the free fall system is reset.*

– GEAR DOWN indications ..... CHECK

Center gear remains retracted in case of gravity extension.

CAUTION

Nose wheel steering is lost.

■ **If successful :**

The free fall system should not be reset to avoid undesirable effect such as further fluid loss in the event of a leak or possible landing gear unlocking in the event of a gear selector valve jammed in UP position.

*Note : The free fall system may be reset in flight after use for training. Provided the green hydraulic system is available, resetting the free fall system may permit to restore landing gear doors closure and nose wheel steering operation.*

■ **If the failure has disappeared the following status is displayed:**

STATUS

● **WHEN L/G DOWNLOCKED**

– L/G lever ..... DOWN |

■ **If unsuccessful :**

Refer to “LDG WITH ABNORMAL L/G” procedure.

*Note : 1. One gravity extension reset is allowed in case of “L/G GEAR NOT DOWNLOCKED” warning display.*

*2. In all cases the free fall system should not be reset by flight crew on the ground following free fall extension.*

**LDG WITH ABNORMAL L/G**

*The procedure is intended for use when nose or main landing gear fail to extend or/and lockdown following the application of L/G GRVTY EXTN procedure.*

*It is preferable to use any available landing gear (except center landing gear) rather than carry out a belly landing (the center landing gear cannot be extended by gravity).*

*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 emergency encountered and state intention. Specify the amount of time available for preparation.*
- ATC ..... NOTIFY  
*Notify ATC of the nature of emergency and state intentions.*
- JETTISON ..... CONSIDER  
*Consider fuel reduction to safe minimum. This reduces VREF and as a consequence the load factor at impact and the energy to be dissipated.*
- **If NOSE L/G abnormal**
  - CG location (if possible) ..... AFT  
*· 10 passengers from front to rear about + 2 %*
- **If one MAIN L/G abnormal**
  - FUEL IMBALANCE ..... CONSIDER  
*Open all fuel crossfeed valves and switch off the pumps on the side with landing gear normally extended.*
  - OXYGEN CREW SUPPLY ..... OFF
  - SEAT BELTS/NO SMOKING ..... ON
  - CABIN and COCKPIT ..... PREPARE
    - Loose equipment secured.
    - Survival equipment prepared.
    - Belts and shoulder harnesses locked.

**APPROACH**

- GPWS SYS ..... OFF
- L/G GRVTY EXTN ..... CHECK DOWN  
*It is not permitted to land with a main landing gear in the abnormal position and the center gear extended. Do not reset the free-fall system, with the landing gear lever selected down and one main gear not downlocked, to avoid extension of the center gear.*



R  
R  
R

R  
R  
R

R

R  
R

## LDG WITH ABNORMAL L/G (CONT'D)

- L/G LEVER ..... CHECK DOWN
- AUTOBRAKE ..... DO NOT ARM  
*Manual braking will enable better pitch and roll control. Moreover, with at least one main landing gear in the abnormal position the autobrake cannot be activated (ground spoilers not armed).*
- EMER EXIT LT ..... ON
- COMMERCIAL ..... OFF
- CABIN REPORT ..... OBTAIN
- JETTISON ..... OFF
- T TANK FEED ..... ISOL

### ● If one or both MAIN L/G abnormal

- A/SKID & N/S STRG ..... OFF  
*With one main landing gear not extended, the reference speed used by the anti-skid to detect a wheel blockage is not correctly initialized. Consequently, the anti-skid must be switched off the prevent permanent brake release.*
- MAX BRAKE PR ..... 1000PSI  
*Modulate the brale pressure to 1000 psi because the anti-skid is off.*
- GROUND SPOILERS ..... DO NOT ARM  
*To keep as much roll authority as possible for maintaining the wings level. 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. Hydraulic pressure for flight controls remains available for 30 seconds after shut down of engine 1 and 4.*
- REVERSE ..... DO NOT USE  
*Do not use reverse to prevent ground spoiler extension, and because the engine will touch the ground during roll-out.*



**LDG WITH ABNORMAL L/G (CONT'D)**

● **If NOSE L/G abnormal**

- NOSE ..... MAINTAIN UP  
*After touchdown, keep the nose off the runway by using the elevator. Then, lower the nose onto the runway before elevator control is lost.*
- BRAKES (compatible with elevator efficiency) . . . APPLY
- ENG MASTERS ..... OFF  
*Shut down the engines before nose impact.*

● **If one MAIN L/G abnormal**

- ENG MASTERS (in sequence) ..... OFF  
*After main gear touchdown, shut down the outboard engines first, then the inboard engines (failure side first) before nacelle touchdown.*
- FAILURE SIDE WING ..... MAINTAIN UP  
*Use roll control, as needed, to keep 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**

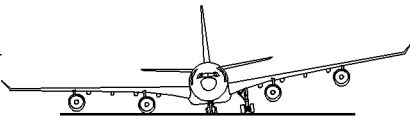
- ENG MASTERS ..... OFF  
*Shut down the engines in the flare, before touchdown.*
- PITCH ATTITUDE (at touchdown) . . NOT LESS THAN 6°

**WHEN A/C STOPPED**

- ENG (all) and APU FIRE pushbutton ..... PUSH  
*Pressing the ENG FIRE pb shuts off the related hydraulic pressure within a short time.*
- ALL ENG and APU AGENT ..... DISCH
- 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.
  - If one or both main landing gear is (are) not extended, the aircraft will rest on the nose gear and the outer engine(s).



NOSE L/G ABNORMAL



ONE MAIN L/G ABNORMAL



BOTH MAIN L/G ABNORMAL

R

FFCS-03-0232-009-4001A4



**BRAKES A/SKID FAULT or A/SKID NWS OFF**

Antiskid is failed, or the A/SKID & N/W STRG switch is OFF.

Braking is in alternate mode. For any pedal deflection, the braking effect is higher in alternate mode than in normal mode.

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 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.*  
CAT 3 SINGLE ONLY  
*Note : As specified in the QRH 5.04, automatic rollout is not authorized.*

INOP SYS  
ANTI SKID  
CAT 3 DUAL  
N/W STRG  
(only if sw at OFF)  
AUTO BRK

**BRAKES RELEASED**

A tachometer is failed or a servovalve is jammed closed on one or two wheels.

BRAKE 1 (2, 3, 4 , 5, 6, 7, 8) RELEASED

STATUS

– LDG DIST PROC ..... APPLY  
*Refer to the QRH part 2, or to the FCOM 3.02.80.*  
CAT 3 SINGLE ONLY

INOP SYS  
AUTO BRK  
CAT 3 DUAL

**BRAKES PARK BRK LO PR**

– BRK B ACCU PR ..... CHECK

The blue electrical pump can be used to pressurize the accumulators. If the accu pressure is still low, chocks are required before Engine 1 and 4 shutdown.

- On ground :
- BEFORE ENG S/D :
  - CHOCKS ..... CONSIDER

CONFIG PARK BRK ON

Crew awareness.  
Check that the parking brake handle is in the OFF position. If the warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

R

BRAKES HOT

- On the ground :
- BRK FAN (if installed) . . . . . ON

Note : 1. If the caution is displayed during taxi in, brake fan selection should be delayed for a minimum of about 5 minutes, or done just before stopping at the gate (whichever occurs first), to allow thermal equalization and stabilization, and thus avoid oxidation of brake surface hot spots.

2. The brake temperature sensor is located close to the carbon, but not inside. Consequently, when the brake fan is ON, the indicated temperatures decrease rapidly.
- 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.
- DELAY T.O. FOR COOLG

· Delay takeoff until the brake temperature is below 300°C (or 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 COOLG

MAX SPEED . . . . . 250/.55

· If performance permits, landing gear retraction should be delayed to improve brake cooling.

· Reduce the speed to 250 knots for landing gear operation.

STATUS

MAX SPEED . . . . . 250/.55 I

WHEEL HYD SEL VALVE

Failure of the 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 green hydraulic system pressurized : Nosewheel steering remains pressurized, and so towing may either break the towbar’s shear pin, or the nose gear (if towbarless towing).
- Setting A/SKID & N/W STRG to OFF, or resetting the BSCU, will cause the nosewheel to go to maximum deflection.
- A/SKID N/WS ..... KEEP ON  
As long as antiskid is operative, brake pressure is regulated by normal servovalves.

STATUS

– A/SKID N/WS ..... KEEP ON I

BRAKES SYS 1 (2) FAULT

One BSCU system is failed.  
Crew awareness.

STATUS

I INOP SYS  
BRAKES SYS 1 (2)

WHEEL N/W STRG FAULT

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

I INOP SYS  
CAT 3 DUAL  
N/W STRG

*Note : As specified in the QRH 5.04, automatic rollout is not authorized.*

WHEEL TIRE LO PR 

Crew awareness.

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

*The braking system reverts to alternate mode.*

– BRAKE PEDALS ..... PRESS

*Apply brakes 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 on the 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 use of the parking brake until low speed to reduce the risk of tire burst and lateral control difficulties.*

BRAKE AUTO BRK FAULT

Crew awareness.

*A tachometer is failed or a servovalve is jammed closed on one or two wheels.*

CAT 3 SINGLE ONLY

STATUS

INOP SYS

AUTO BRK

CAT 3 DUAL

ARG ALL

**BRAKES RESIDUAL BRAKING**

ON BRAKE 1 (2, 3, 4, 5, 6, 7, 8)

*Residual brake pressure is detected with the pedals released :*

- On at least one wheel, if on the normal braking system, or
- On the left or right main gear side (affecting the four wheels).

*Maintenance action is due.*

■ **ON GROUND :**

*On ground, a BSCU reset may be attempted, since the “BRAKES RESIDUAL BRAKING” ECAM caution may be spurious due to :*

- Drifted pressure transducer, after aircraft electrical power-up.
- BSCU detection of residual pressure decay after brake release.

*The aircraft must be stopped, and the parking brake applied, before switching the A/SKID & N/W STRG selector OFF then ON.*

■ **IN FLIGHT :**

*For simplification purposes, the following procedure must be applied in all residual braking cases (of the normal or alternate system), even if some actions are not really necessary in the case of actual residual pressure on the normal braking system.*

- A/SKID NWS ..... KEEP ON
- BRK PEDAL ..... SEVERAL USE

*Press the brakes pedals several times. This could zero a residual pressure on the alternate system.*

● **IF STILL RESIDUAL BRKG :**

- AUTO BRK ..... MED

*Using MED mode gives immediate priority to normal braking upon landing gear touchdown, which cancels alternate pressure.*

● **IF PEDAL BRAKING ONLY :**

JUST AFTER TOUCHDOWN :

- BRK PEDAL ..... USE

*If the autobrake is not available, 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 pocedure (FCOM 3.01.32, page 2).*

NAV ADR 1 (2) (3) 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 ON 3  
*Select ADR 3 to captain side.*
- ADR 1 ..... OFF
- GPWS ..... OFF  
*The GPWS TERR amber FAULT light comes on as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton switch should be switched OFF.*

■ ADR 2 FAULT :

- AIR DATA SWTG ..... F/O ON 3  
*Select ADR 3 to first officer side.*
- ADR 2 ..... OFF

■ ADR 3 FAULT :

- AIR DATA SWTG (if ADR 3 in use) ..... NORM
- ADR 3 ..... OFF

STATUS

CAT 3 SINGLE ONLY

INOP SYS  
CAT 3 DUAL  
ADR 1 (2)(3)  
GPWS (in case of  
ADR 1 failure)

R  
R  
R

### NAV ADR 1 + 2 (1 + 3) (2 + 3) FAULT

*Note : In case of a simultaneous ADR and IR (same ADIRU) failure, apply ADR FAULT procedure before IR FAULT procedure.*

- AIR DATA SWTG ..... CAPT ON 3 (NORM) (NORM)
- ADRs (affected) ..... OFF

*Note : The crewmember on the affected side may recover air data information by using the EFIS DMC selector.*

- **If ADR 1 + 2 failed :**
  - GPWS ..... 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.*
- **If ADR 1 + 3 failed :**
  - ATC ..... SYS 2
  - GPWS ..... 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.*
- **If ADR 2 + 3 failed :**
  - ATC ..... SYS 1

### F/CTL ALTN LAW (PROT LOST)

MAX SPEED ..... 305/.82

#### STATUS

MAX SPEED ..... 305/.82

APPR PROC

- FOR LDG ..... USE FLAP 3

ALTN LAW : PROT LOST

BOTH PFDs ON SAME FMGC

CAT 1 ONLY

INOP SYS

F/CTL PROT

ADR 1+2 (1+3)

(ADR 2+3)

AP 1+2

A/THR

GPWS (if ADR 1 failed)





ADR 1+2+3 FAULT (CONT'D)

STATUS

CAT 1 ONLY

Note : Check speed is below VFE of CONF 1+F (215 knots) before selecting Flaps 1; since ADR parameters are lost, the SFCCs will set CONF 1+F instead of CONF1.

CAUTION

Check that ΔP is at zero before opening doors.

INOP SYS

See below

INOP SYS DISPLAYED ON ECAM

F/CTL PROT

YAW DAMPER

A/THR

ADR 1+2+3

AP 1+2

WINDSHEAR DET

L/G RETRACT

RUD TRV LIM

GPWS

CAB PR 1+2

OTHER INOP SYS

FLAPS AUTO RETRACT

ALPHA LOCK

ATC ALTI MODE

FLAPS LOAD RELIEF

TCAS

Note : Both FCMCs use default reference values for ADR parameters, resulting in an automatic one or two step forward transfer.

ARG ALL

NAV IR 1(2) (3) FAULT

Note : In case of a simultaneous ADR and IR (same ADIRU) failure, apply the ADR FAULT procedure prior to the IR FAULT procedure.

- ATT HDG SWTG . . . . . CAPT ON 3 (F/O ON 3) (NORM)  
Select IR 3 to the affected side.

In case of a NAV IR 1 FAULT, 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.

● If IR available in ATT mode :

- IR MODE SEL . . . . . ATT  
For IR alignment in ATT mode, refer to the associated procedure.

● If IR totally faulty :

- IR . . . . . OFF  
Set the IR pushbutton OFF.

Note : If desired, one attempt may be made to realign a faulty IRS (light steady) in ATT mode, by passing IR MODE SEL to OFF, then to ATT. But, in this case, the ATT HDG SWTG must be in the same position as the AIR DATA SWTG selector during the reset to avoid the flight controls from temporarily reverting to alternate law, and to avoid autopilot/autothrust disconnection.

STATUS

CAT 3 SINGLE ONLY

INOP SYS  
IR 1 (2) (3)  
CAT 3 DUAL  
GPWS TERR (If  
IR1 FAULT)  
TCAS (\*)

Note : (\*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer).

R  
R  
R  
R  
R

**IR ALIGNMENT IN ATT MODE**

If IR alignment is lost in flight, the navigation mode is inoperative (red ATT flag on the PFD, and red HDG flag on the ND).

Aircraft attitude and heading may be recovered by applying the following procedure : The aircraft must stay level, with a constant speed for 30 seconds.

- MODE SELECTOR ..... ATT
- LEVEL A/C ATTITUDE ..... HOLD
- CONSTANT A/C SPEED ..... MAINTAIN

■ **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).*

Due to IR drift, the magnetic heading must be periodically crosschecked with the standby compass and updated, if required.

**NAV IR NOT ALIGNED**

*This caution is available in Phase 2 (one engine running).*

■ **POSITION MISMATCH**

■ **POSITION MISSING**

- PRESENT POSITION ..... INSERT

■ **EXCESS MOTION**

■ **IR 1 (2) (3) (1+2) (2+3) (1+2+3) IN ALIGN**

NAV FM/IR POS DISAGREE

*This message is generated by the FWC, when it detects a significant drift between any of the FMS positions and any of the IRS positions. For flight continuation, consider periodic NAV ACCURACY check.*

– A/C POS ..... CHECK

*Use the MCDU's POSITION and IRS MONITOR pages.*

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 45°
  - 0.7 minutes for latitudes at or above 45° and below 60°
  - 1 minute for latitudes at or above 60°, and below 70°
- *A latitude threshold of 0.5 minutes, regardless of the latitude.*

– A/C POS ..... CHECK

*The following procedure is not displayed on the ECAM :*

- **If the message occurs at takeoff initiation, or in ILS/LOC approach (LOC green) :**
  - Disregard it.
- **If the message occurs in 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.

|                                                                                                                                                                                                           |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>NAV IR 1 + 2 (1 + 3) (2 + 3) FAULT</b>                                                                                                                                                                 |                  |
| – ATT HDG SWTG ..... CAPT ON 3 (NORM) (NORM)                                                                                                                                                              |                  |
| ● <b>If IR (affected) available in ATT mode :</b>                                                                                                                                                         |                  |
| – IR (affected) MODE SEL ..... ATT                                                                                                                                                                        |                  |
| ● <b>If IR (affected) totally faulty :</b>                                                                                                                                                                |                  |
| – IR (affected) ..... OFF                                                                                                                                                                                 |                  |
| <i>Note : The crewmember on the affected side can recover IR information by using the EFIS DMC selector (copy of the opposite side).</i>                                                                  |                  |
| SPD BRK ..... DO NOT USE                                                                                                                                                                                  |                  |
| <i>In case of an IR 1 + 2 or IR 1 + 3 FAULT, 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.</i> |                  |
| ● <b>IF CG AFT 32 % :</b>                                                                                                                                                                                 |                  |
| – T TANK MODE ..... FWD                                                                                                                                                                                   |                  |
| <i>Fuel consumption is increased by approximately 1 %.</i>                                                                                                                                                |                  |
| <i>Note : If the trim tank pump is failed, or not installed, this part of the procedure is replaced by:</i>                                                                                               |                  |
| · <i>IF CG AFT 32 % AND WHEN SPD &gt; 270 KT AND NOT IN CLIMB :</i>                                                                                                                                       |                  |
| – T TANK MODE ..... FWD                                                                                                                                                                                   |                  |
| <b>F/CTL ALTN LAW (PROT LOST)</b>                                                                                                                                                                         |                  |
| MAX SPEED ..... 305/.82                                                                                                                                                                                   |                  |
| <b>STATUS</b>                                                                                                                                                                                             |                  |
| SPD BRK ..... DO NOT USE                                                                                                                                                                                  | INOP SYS         |
| MAX SPEED ..... 305/.82                                                                                                                                                                                   | F/CTL PROT       |
| APPR PROC :                                                                                                                                                                                               | IR 1+2(1+3)(2+3) |
| – FOR LDG ..... USE FLAP 3                                                                                                                                                                                | AP 1+2           |
| ● <b>IF CG AFT 32 % :</b>                                                                                                                                                                                 | A/THR            |
| – T TANK MODE ..... FWD                                                                                                                                                                                   | GPWS TERR (If    |
| <i>Fuel consumption is increased by approximately 1 %.</i>                                                                                                                                                | IR1 FAULT)       |
| <i>Note : If the trim tank pump is failed, or not installed,</i>                                                                                                                                          | TCAS (*)         |
| <i>this part of the procedure is replaced by:</i>                                                                                                                                                         |                  |
| · <i>IF CG AFT 32 % AND WHEN SPD &gt; 270 KT</i>                                                                                                                                                          |                  |
| <i>AND NOT IN CLIMB :</i>                                                                                                                                                                                 |                  |
| – T TANK MODE ..... FWD                                                                                                                                                                                   |                  |
| ALTN LAW : PROT LOST                                                                                                                                                                                      |                  |
| CAT 1 ONLY                                                                                                                                                                                                |                  |
| <i>Note : (*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer).</i>                                                                                             |                  |

NAV EXTREME LATITUDE

– NORTH REF SEL . . . . . TRUE

The magnetic heading is replaced by the true heading on EFIS and DDRMI.

OVERSPEED

VMO/MMO . . . . . 330/.86

255/.60 in case of dispatch with landing gear down

VLE . . . . . 250/.55

VFE . . . . . see below

|       |     |
|-------|-----|
| CONF  | VFE |
| FULL  | 180 |
| 3     | 186 |
| 2     | 196 |
| 1*    | 205 |
| 1 + F | 215 |
| 1     | 255 |

NAV HDG DISCREPANCY

– HDG . . . . . X CHECK

Compare the 3 IR headings on the MCDU page, or crosscheck with the standby compass.

– ATT HDG SWTG . . . . . AS RQRD

Select IR 3 to the faulty side.

NAV ATT DISCREPANCY

– ATT . . . . . X CHECK

Crosscheck with the standby horizon.

– ATT HDG SWTG . . . . . AS RQRD

Select IR 3 to the faulty side.

NAV ALTI DISCREPANCY

– ALT . . . . . X CHECK

Crosscheck with the standby altimeter.

– AIR DATA SWTG . . . . . AS RQRD

Select ADR 3 to the faulty side.

**NAV IAS DISCREPANCY**

- AIR SPD . . . . . X CHECK
- AIR DATA SWTG . . . . . AS RQRD

**STATUS**

CAT 3 SINGLE ONLY

| INOP SYS  
CAT 3 DUAL

**NAV RA 1 (2) (1+2) FAULT**

- GPWS (only in case of an RA 1 or RA 1 + 2 FAULT) . . . . OFF

**STATUS**

- One RA FAULT :  
CAT 2 ONLY

| INOP SYS  
CAT 3  
GPWS (if RA 1  
fault)  
RA 1 (2)

- Both RA FAULT :  
*On the ECAM, only one of the following two statements are displayed, depending on the autopilot status.  
Use manual pitch trim when flare law is active.*

- WHEN L/G DN :
  - MAN PITCH TRIM . . . . . USE  
*Provided the autopilot is off, switching to flare law occurs at landing gear extension.*
- WHEN L/G DN AND AP OFF :
  - MAN PITCH TRIM . . . . . USE  
*When the autopilot is engaged, and the landing gear is extended, switching to flare law occurs at autopilot disengagement.*

CAT 1 ONLY  
*ILS APPR mode cannot be engaged, LOC mode is available via the FCU LOC pushbutton.*

| INOP SYS  
RA 1 + 2  
A/CALLOUT  
AP 1 + 2 (in  
APPR)  
CAT 2  
GPWS

### NAV ILS 1 (2) (1 + 2) FAULT

Crew awareness.

■ **One ILS FAULT :**  
CAT 1 ONLY

**STATUS**

INOP SYS

ILS 1 (2)

CAT 2

GPWS G/S (if ILS 1 fault)

■ **Both ILS FAULT :**  
CAT 1 ONLY

**STATUS**

INOP SYS

ILS 1 + 2

CAT 2

GPWS G/S

AP 1 + 2 (in APPR)

### NAV GPWS FAULT

– GPWS ..... OFF

*This line remains displayed on the ECAM, after action.*

**STATUS**

INOP SYS

GPWS

### NAV TCAS FAULT

– TCAS MODE ..... STBY

*Set the TCAS to standby mode. This is achieved by setting the selector to XPNDR, STBY, ON or OFF, depending on which TCAS control panel is installed (refer to 1.34.80). The TCAS is electrically-supplied, but it is inoperating.*

**STATUS**

INOP SYS

TCAS



STALL WARNING

*When the threshold is reached, a permanent aural warning “STALL” + cricket is triggered until a correct angle-of-attack is recovered. (Refer to 3.04.27).*

NAV GPS 1 (2) FAULT

Crew awareness

STATUS

INOP SYS

GPS 1(2)

NAV PRED W/S DET FAULT

*The predictive windshear function is lost.*

Crew awareness

STATUS

INOP SYS

PRED W/S DET

R

## 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 ceases, or a safe trajectory is ensured.

- **"PULL UP" - "TERRAIN TERRAIN PULL UP" - "TERRAIN AHEAD PULL UP"**  
 Simultaneously :
  - AP ..... OFF
  - PITCH ..... PULL UP  
*Pull up to full backstick, and maintain.*
  - THRUST LEVERS ..... TOGA
  - SPEEDBRAKE lever ..... CHECK RETRACTED
  - BANK ..... WINGS LEVEL or adjust  
*For "TERRAIN AHEAD PULL UP" only, in addition to climbing, and if the crew concludes that turning is the safest way of action, a turning maneuver can be initiated.*
- **When the flight path is safe and GPWS warning ceases :**  
 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" :**  
 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" :**  
 Correct the configuration, or perform a go-around.
- **"GLIDE SLOPE" :**  
 Establish the airplane on the glideslope, or switch OFF the G/S mode pushbutton, if flight below the glideslope is intentional (non precision approach).

**NAV GPWS TERR DET FAULT**

*The enhanced Terrain Clearance Floor and Terrain Awareness Display modes of the EGPWS are inoperative.*

- GPWS TERR ..... OFF  
*The basic GPWS Modes 1 to 5 are still operative, if the SYS pushbutton FAULT or OFF lights are not on.*

**STATUS**

| INOP SYS  
GPWS TERR

R  
R

## TCAS WARNINGS

■ Traffic advisory : “TRAFFIC” messages.

Do not maneuver based on a TA alone.  
Attempt to see the reported traffic.

■ Preventive resolution advisory : “MONITOR VERTICAL SPEED” message

Maintain or adjust vertical speed, as required, to avoid the red area of the vertical speed scale.

Notify the ATC.

When "CLEAR OF CONFLICT" is announced :

Resume normal navigation, in accordance with ATC clearance.

■ Corrective resolution advisory : All “CLIMB” and “DESCEND” or “MAINTAIN VERTICAL SPEED MAINTAIN” or “ADJUST VERTICAL SPEED ADJUST” type messages.

Respond promptly and smoothly to a RA.

– AP (if engaged) ..... OFF  
*TCAS orders may require an incremental load factor, which is greater than that achieved by the autopilot.*

- BOTH FDs ..... OFF

Adjust vertical speed, as required, to that indicated on the green 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  $V_{0max}$  and  $V_{max}$ .

Respect stall, GPWS, or windshear warning.

Notify the ATC.

When "CLEAR OF CONFLICT" is announced :

- Resume normal navigation, in accordance with ATC clearance.

The AP/FD can be re-engaged, as desired.

- The GO AROUND procedure must be performed, when an RA "CLIMB" or "INCREASE CLIMB" is triggered on final approach.

*Note: Resolution Advisories (RA) are inhibited below 900 feet.*

NAV IR DISAGREE

Two IRs disagree. The third IR is failed, or rejected by the PRIMs.

DIRECT LAW

Direct law becomes active. All pitch and roll protections are lost.

- ATT ..... X CHECK  
Use the standby horizon to determine the faulty IR.

● IF DISAGREE CONFIRMED :

- FAULTY IR ..... OFF
- PRIM 3 ..... OFF THEN ON
- PRIM 2 ..... OFF THEN ON
- PRIM 1 ..... OFF THEN ON

After corrective action (the faulty IR is switched OFF, and the PRIMs, are reset), pitch alternate law is recovered with reduced protections.

F/CTL ALTN LAW

Refer to the associated procedure.

● If disagree is not confirmed (both IRs remain on) :

F/CTL DIRECT LAW

Refer to the associated procedure.

### NAV ADR DISAGREE

*This caution is triggered by the PRIMs, when they use only 2 ADRs, and when these 2 ADRs disagree. This may occur, when :*

- *One ADR has already been selected OFF by the pilot, or*
- *One ADR has been eliminated by the PRIM, without any caution, because it deviated from the others.*
- AIR SPD ..... XCHECK  
*Check airspeed information on both PFDs, and on the standby airspeed indicator.*

■ **IF NO SPD DISAGREE :**

AOA DISCREPANCY

■ **IF SPD DISAGREE :**

- ADR CHECK PROC ..... APPLY  
*Refer to the associated procedure.*

### F/CTL ALTN LAW (PROT LOST)

*Note : Following an ADR DISAGREE, detected by the PRIMs, alternate law is latched. Resetting the PRIMs, by using the pushbutton, does not allow normal law recovery. Refer to the associated procedure.*

- MAX SPEED ..... 305/.82

### STATUS

- MAX SPEED ..... 305/.82

CAT 3 SINGLE ONLY

RISK OF UNDUE STALL WARN

*Undue stall warnings may mainly occur, in case of an AOA discrepancy.*

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.*

INOP SYS  
RUD TRV LIM  
CAT 3 DUAL

**ADR CHECK PROC**

**Use this procedure :**

- Following an ADR DISAGREE, if there is a speed disagree (16 knots minimum) between the remaining ADRs ;
- In case of an erroneous speed/altitude, which can either be suspected by :
  - Speed discrepancies (between ADR 1, 2, 3, and standby instruments).
  - Fluctuating or unexpected increase/decrease/permanent 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, or a Flap RELIEF ECAM message, 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.

**To determine the correct ADR, refer to the :**

- UNRELIABLE SPEED INDICATION procedure to fly the target pitch and thrust setting (Refer to the FCOM 3.02.34), or
- SEVERE TURBULENCE procedure, if in cruise, to set a thrust and deduce the correct speed indication (Refer to the FCOM 3.04.91).
- FAULTY ADR ..... OFF

**UNRELIABLE SPEED INDICATION**

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. 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/permanent 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, or a Flap RELIEF ECAM message, 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.





## **UNRELIABLE SPEED INDICATION (CONT'D)**

How to apply the procedure :

- If the wrong speed or altitude information does not affect the safe conduct of the flight, first apply the ADR CHECK procedure to identify the faulty ADR(s) and switch it (them) OFF. If necessary, enter the unreliable speed procedure, or severe turbulence table (if in cruise), to set the pitch and thrust corresponding to the current flight phase. Check the resulting speed indicated on the table with all the indicated speeds/altitudes (from ADR 1, 2, 3 and standby instruments) to positively identify the faulty ADR(s).
- If the safe conduct of the flight is affected (all the speed indications are unreliable, or the wrong speed indication cannot not be positively identified) :
  - Immediately apply the memory items : AP/FD/ATHR OFF, and fly the memory pitch – thrust settings.
  - Then, once stabilized, refer to the QRH in order to determine the pitch and thrust settings required by the current flight phase.
  - Determine the faulty ADR(s) once the aircraft is stabilized, by comparing all of the indicated speeds/altitudes (from ADR 1, 2, 3 and standby instruments) with the expected speed, as per the table ; use ground speed and GPS speed/altitude variations for reasonableness considerations.
  - In the extreme case where the faulty ADR(s) cannot be identified and all speed indications remain unreliable, apply the proper pitch-thrust settings for each flight phase until landing and refer to ground speed and GPS speed/altitude variations for assistance.



# UNRELIABLE SPEED INDICATION (CONT'D)

**CAUTION**

If the failure is due to radome destruction, the drag will increase and N1 must, therefore, be increased by 3 % (CRZ) or by 1.5 % (APP). Fuel flow will increase by about 10 %.

## IMMEDIATE ACTIONS

- AP/FD ..... OFF
  - A/THR ..... OFF
  - FLAPS ..... MAINTAIN CURRENT CONFIG
  - SPEEDBRAKES ..... CHECK RETRACTED
- Note : If a failure is detected while in CONF FULL and go-around is initiated, select CONF3.*
- L/G ..... UP WHEN AIRBORNE

## IMMEDIATE PITCH ATTITUDE AND THRUST GUIDANCE

- **If the failure occurs before thrust reduction :**
  - THRUST LEVER ..... TOGA
  - PITCH ATTITUDE ..... 12.5°
- **If the failure occurs after thrust reduction :**
  - THRUST LEVER ..... CLB
  - PITCH ATTITUDE below FL 100 ..... 10°
  - PITCH ATTITUDE above FL 100 ..... 5°



UNRELIABLE SPEED INDICATION (CONT'D)

Respect the Stall warning.  
Ground speed variations and radio altimeter indications can provide valuable short-term information at low altitude.  
If the altitude information is affected, the FPV is unreliable. In that case, GPS (◀) altitude variations may be a valuable aid for flying in level flight. ATC altitude will also be unreliable.  
In other cases, if the altitude information is not affected, the FPV is a valuable aid in establishing a safe flight path.

WHEN FLIGHT PATH IS STABILIZED

- PROBE WINDOW HEAT ..... ON
- ATTITUDE/THRUST ..... ADJUST

| Takeoff phase           | Pitch | Thrust | Remark                                                                                                                                                                            |
|-------------------------|-------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Before thrust reduction | 12.5° | TOGA   | Keep at least till thrust reduction altitude                                                                                                                                      |
| Above thrust reduction  | 10°   | CL     | Up to MSA or Circuit Altitude                                                                                                                                                     |
| Acceleration            | 7.5°  | CL     | At MSA or Circuit Altitude, <u>TO RETRACT SURFACE</u> :<br><br>From CONF 3 (2) to CONF 1    *IMMEDIATE<br>From CONF 1 to CONF 0 :    Above 180 T : *60 s.<br>Below 180 T : *30 s. |

\* Time from pitch 7.5° / thrust CL setting.  
In case of an immediate return to departure airport, keep the flaps in the takeoff configuration and climb to the circuit altitude or MSA. Level off at maneuvering speed : See the approach table.  
In case the flight continues, climb to MSA or Circuit Altitude. Retract the surfaces, as explained in the above table. Then, establish initial climb, as per climb table.

| Phase | Weight     | Flight Level   | Speed             | Pitch Attitude | N1 |
|-------|------------|----------------|-------------------|----------------|----|
| CLIMB | ANY WEIGHT | Below FL50     | 250 knots         | 11.0°          | CL |
|       |            | FL50 to FL100  |                   | 10.0°          |    |
|       |            | FL100 to FL150 |                   | 9.0°           |    |
|       |            | FL150 to FL200 |                   | 8.0°           |    |
|       |            | FL200 to FL250 | 270 knots / M0.78 | 6.0°           |    |
|       |            | FL250 to FL300 |                   | 5.0°           |    |
|       |            | Above FL300    |                   | 4.0°           |    |
|       |            |                |                   |                |    |

The speeds indicated in the above table correspond to the turbulence speeds.



| UNRELIABLE SPEED INDICATION (CONT'D) |                |                |           |                |                                                                                                                                                                                        |
|--------------------------------------|----------------|----------------|-----------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase                                | Weight         | Flight Level   | Speed     | Pitch Attitude | N1                                                                                                                                                                                     |
| CRUISE                               | Above 220 T    | Below FL200    | 250 knots | 5.0°           | 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 |
|                                      | 220 T to 170 T |                |           | 4.0°           |                                                                                                                                                                                        |
|                                      | Below 170 T    |                |           | 2.5°           |                                                                                                                                                                                        |
|                                      | Above 220 T    | FL200 to FL340 | 270 knots | 4.0°           |                                                                                                                                                                                        |
|                                      | 220 T to 170 T |                |           | 3.0°           |                                                                                                                                                                                        |
|                                      | Below 170 T    |                |           | 2.0°           |                                                                                                                                                                                        |
| DESCENT                              | Above 190 T    | Above FL340    | M0.78     | 3.5°           |                                                                                                                                                                                        |
|                                      | 190 T to 160 T |                |           | 3.0°           |                                                                                                                                                                                        |
|                                      | Below 160 T    |                |           | 2.5°           |                                                                                                                                                                                        |
|                                      | Above 160 T    | Above FL360    | M0.78     | 0°             |                                                                                                                                                                                        |
|                                      |                | FL360 to FL340 | M0.78     | – 0.5°         |                                                                                                                                                                                        |
|                                      |                | FL340 to FL200 | 270 knots | 0°             |                                                                                                                                                                                        |
|                                      |                | FL200 to FL100 | 250 knots | 1.0°           |                                                                                                                                                                                        |
|                                      |                | Below FL100    | 250 knots | 0.5°           |                                                                                                                                                                                        |
|                                      | Below 160 T    | Above FL360    | M0.78     | – 1.0°         |                                                                                                                                                                                        |
|                                      |                | FL360 to FL340 | M0.78     | – 2.0°         |                                                                                                                                                                                        |
|                                      |                | FL340 to FL200 | 270 knots | – 1.0°         |                                                                                                                                                                                        |
|                                      |                | FL200 to FL100 | 250 knots | – 0.5°         |                                                                                                                                                                                        |
|                                      |                | Below FL100    | 250 knots | – 1.0°         |                                                                                                                                                                                        |

The speeds indicated in the above table correspond to the turbulence speeds.



## UNRELIABLE SPEED INDICATION (CONT'D)

The approach phase between Green Dot speed (clean configuration) and the landing configuration (CONF 3 or CONF FULL), is flown in level flight.

| INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT |                   |                   |                |                |           |      |
|---------------------------------------------------|-------------------|-------------------|----------------|----------------|-----------|------|
| A/C CONF                                          |                   | Speed             | FPA            | Weight         | Pitch     | N1   |
| Gear Up                                           | 0                 | Green Dot Speed   | 0              | Above 210 T    | 7.0°      | 65 % |
|                                                   |                   |                   |                | 210 T to 160 T | 5.0°      | 57 % |
|                                                   |                   |                   |                | below 160 T    | 5.0°      | 52 % |
|                                                   | 1                 | S Speed           | 0              | Above 210 T    | 11.0°     | 69 % |
|                                                   |                   |                   |                | 210 T to 160 T | 9.0°      | 60 % |
|                                                   |                   |                   |                | below 160 T    | 8.0°      | 54 % |
| 2                                                 | F Speed<br>CONF 2 | 0                 | Above 210 T    | 6.0°           | 72 %      |      |
|                                                   |                   |                   | 210 T to 160 T | 5.0°           | 63 %      |      |
|                                                   |                   |                   | below 160 T    | 5.0°           | 57 %      |      |
| Gear Down                                         | 3                 | F Speed<br>CONF 3 | 0              | Above 210 T    | 6.0°      | 78 % |
|                                                   |                   |                   |                | 210 T to 160 T | 6.0°      | 69 % |
|                                                   |                   |                   |                | below 160 T    | 5.0°      | 63 % |
|                                                   | FULL              | VREF + 10         | 0              | Above 210 T    | 6.0°      | 80 % |
|                                                   |                   |                   |                | 210 T to 160 T | 6.0°      | 71 % |
|                                                   |                   |                   |                | below 160 T    | 4.0°      | 65 % |
| FINAL APPROACH AT STANDARD – 3° DESCENT PATH      |                   |                   |                |                |           |      |
| A/C CONF                                          |                   | Speed             | FPA            | Weight         | Pitch/AOA | N1   |
| Gear Down                                         | 3                 | VLS + 10          | – 3°           | Above 210 T    | 4.0°/7.0° | 59 % |
|                                                   |                   |                   |                | 210 T to 160 T | 4.0°/7.0° | 51 % |
|                                                   |                   |                   |                | below 160 T    | 2.5°/5.5° | 45 % |
|                                                   | FULL              | VREF + 10         | – 3°           | Above 210 T    | 3.0°/6.0° | 62 % |
|                                                   |                   |                   |                | 210 T to 160 T | 3.0°/6.0° | 54 % |
| below 160 T                                       |                   |                   |                | 1.0°/4.0°      | 49 %      |      |

Flying technique :

- Adjust pitch, in order to fly the required path.
- When target pitch is reached, flying the intended flight path, adjust thrust to target.
  - If the aircraft pitch tends to increase, to fly the intended FPA, increase thrust ;
  - If the aircraft pitch tends to decrease, to fly the intended FPA, decrease thrust.

**AIR ENG 1(2)(3)(4) BLEED FAULT**

R

*This caution appears in case of overheat, overpressure, low pressure, or loss of the backflow protection function.*

- **In case of backflow protection loss :**  
BACK FLOW PROT LOST
- ENG BLEED affected (if not automatically closed) . . . . . OFF  
*ENG BLEED is not automatically closed, in case of low pressure or loss of the backflow protection function.*  
*The FAULT light goes off, when the failure disappears (overheat or overpressure).*  
*Pack flow is limited to 112 %.*

**STATUS**

INOP SYS  
ENG 1 BLEED  
(2)(3)(4)

**AIR ABNORM BLEED CONFIG**

Refer to the associated procedure.

**AIR ENG 1(2)(3)(4) BLEED NOT CLSD**

*Engine bleed valve is unduly open during engine start, or when APU BLEED is selected on.*

- ENG BLEED (affected) . . . . . OFF
- **When engine start is completed, or APU BLEED is deselected (automatic recall) :**
  - ENG BLEED (affected) . . . . . ON

AIR ABNORM BLEED CONFIG

One or more bleed system is faulty, off, or not supplied.

- **If ENG BLEED is abnormally selected OFF :**  
ENG 1(2)(3)(4) BLEED OFF
- **IF BLEED NOT RECOVERED**
  - X BLEED ..... CLOSE or OPEN

CLOSE, if :

- ENG BLEED LEAK, or WING LEAK, or
- ENG FIRE (detected, or FIRE pushbutton pressed), or
- Engine start valve failed open, or
- Pressure-regulating valve not closed after an overpressure.

OPEN in all other cases.

- **X BLEED OPEN**
  - **One BLEED inoperative :**  
Pack flow is automatically limited to 112 %.
  - **If engine shut down :**  
Reduce the bleed demand on the remaining engines (aircraft performance).
    - PACK FLOW ..... LO
    - FWD CRG COOLING ..... OFF ◀
  - **Two BLEEDS inoperative :**
    - **If corresponding engines running :**  
Reduce the load on the remaining bleed systems (precooler performance).
      - PACK FLOW ..... LO
      - FWD CRG COOLING ..... OFF ◀
    - **If at least one corresponding engine not running :**  
Reduce the bleed demand on the remaining engines (aircraft performance).
      - PACK (affected side, or PACK 1 if both sides affected) ..... OFF
    - **If WING ANTI ICE ON :**
      - PACK (affected side, or PACK 1 if both sides affected) ..... OFF
      - FWD CRG COOLING ..... OFF ◀



**AIR ABNORM BLEED CONFIG (CONT'D)**

■ **X BLEED CLOSE**

■ **One BLEED inoperative :**

- PACK (affected side) if WING ANTI ICE ON . . . . . OFF

■ **TWO BLEEDS inoperative :**

- PACK 1 (if both sides affected) . . . . . OFF

● **If two BLEEDS inoperative on the same side :**

- FWD CRG COOL . . . . . OFF ◀
  - WING A ICE . . . . . OFF
- AVOID ICING CONDITIONS

■ **THREE BLEEDS inoperative**

- PACK (on remaining side only) . . . . . ON
  - WING A. ICE . . . . . OFF
- AVOID ICING CONDITIONS

**STATUS**

- **Depending on the failure cases :**  
AVOID ICING CONDITIONS  
PACK 1(2) ONLY IF WAI ON

● **IF ICE ACCRETION :**

- APPR SPD . . . . . VLS + 10 KT
- LDG DIST PROC . . . . . APPLY

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

INOP SYS  
WING A. ICE  
PACK 1 or 2  
FWD CRG TEMP◀

R  
R



**AIR L(R) WING or ENG 1(2)(3)(4) BLEED LEAK**

- ENG BLEED’s affected side, (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 overheat disappears.
- APU BLEED (if not closed, only for L WING LEAK) . . . . . OFF

**AIR ABNORM BLEED CONFIG**

- X BLEED (if not closed) . . . . . CLOSE
  - FWD CRG COOLING . . . . . OFF ◀
  - WING ANTI ICE . . . . . OFF
- AVOID ICING CONDITIONS

**STATUS**

AVOID ICING CONDITIONS  
APPR PROC

● **IF ICE ACCRETION**

- APPR SPD . . . . . VLS + 10 KT
  - LDG DIST PROC . . . . . APPLY
- Refer to the QRH Part 2, or to the FCOM 3.02.80.*

INOP SYS  
WING A. ICE  
ENG 1 (3) BLEED  
ENG 2 (4) BLEED  
PACK 1 (2)  
FWD CRG TEMP◀

R

**AIR ENG 1(2)(3)(4) HPV NOT OPEN**

Crew awareness.

**STATUS**

NO BLEED 1 (2)(3)(4) AT LO PWR

I

**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 L(R) WNG LEAK DET FAULT**

Crew awareness.

**STATUS**

| INOP SYS  
L(R) LEAK DET

**AIR X BLEED FAULT**

– X BLEED ..... MAN CTL  
*Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING ANTI ICE is ON with one or two bleeds inoperative.*

● If manual opening is inoperative, and one BLEED is off :

**AIR ABNORM BLEED CONFIG**

Refer to the associated procedure.

**STATUS**

AIR X BLEED : MAN CTL

| INOP SYS  
AIR X BLEED  
(if closed)

AIR BMC 1 (2)(3)(4) FAULT

● If APU bleed is selected ON :

– ENG (affected) BLEED

OFF

● If APU bleed is selected OFF :

– ENG (affected) BLEED

ON

STATUS

| INOP SYS

BMC 1(2)(3)(4)

AIR APU LEAK DET FAULT

Crew awareness.

STATUS

| INOP SYS

APU LEAK DET

ARG ALL

R  
R  
R

**AIR BLEED LO TEMP**

ON BLEED 1(2)(3)(4)

*In flight, engine bleed temperature is too low for correct wing deicing.*

– ENG PWR ..... INCREASE

*The thrust lever of the affected engine must be advanced with the autothrust OFF.*

*Low bleed temperature may be due to low outside air temperature. Therefore, increasing engine thrust may increase bleed temperature and clear the ECAM caution.*

■ **If one BLEED LO TEMP :**

● **IF UNSUCCESSFUL :**

– ENG BLEED (affected) ..... OFF

■ **If more than one BLEED LO TEMP :**

– WING ANTI ICE ..... OFF

AVOID ICING CONDITIONS

**AIR ABNORM BLEED CONFIG**

Refer to the associated procedure.

**STATUS**

● **If more than one BLEED LO TEMP :**

AVOID ICING CONDITIONS

APPR PROC

● **IF ICE ACCRETION**

– APPR SPD ..... VLS + 10 KT

– LDG DIST PROC ..... APPLY

*Refer to the QRH part 2, or to the FCOM 3.02.80.*

INOP SYS

WING A. ICE

ENG 1 BLEED

(2)(3)(4)

R

**AIR APU BLEED LEAK**

- APU BLEED (if not automatically 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

APU FAULT

■ EMER SHUT DOWN

- EMER SHUT DOWN is triggered if :
- the ground crew presses the APU SHUT OFF pushbutton on the nose gear interphone panel, or
  - the flight crew presses the APU FIRE pushbutton in the cockpit, or
  - the ground crew presses the APU EMER SHUT DOWN pushbutton on the Refuel/Defuel panel.
- MASTER SW ..... OFF

■ AUTO SHUT DOWN

- MASTER SW ..... OFF

■ Non automatic APU shut down

A failure has been detected by the ECB, but the APU remains available.  
Shut down the APU manually, except if it is required in flight for electrical or pneumatic purposes.

● IF USE NOT ESSENTIAL :

- MASTER SW ..... OFF

STATUS

| INOP SYS  
APU

R

DOOR

R

DOOR L(R) FWD CABIN, or  
DOOR L(R) MID CABIN, or  
DOOR L(R) AFT CABIN, or  
DOOR L(R) EMER EXIT, or  
DOOR FWD (AFT) (BULK) CARGO, or  
DOOR AVIONIC.

R

*The crew may confirm a cabin door warning by checking the visual indicator on the door.*

R

*Prior to taxi-out, the FWD (AFT) CARGO warning can be confirmed by checking the visual indicator flags on the base of the cargo doors.*

■ On ground :

PACKS + CAB PR NOT AVAIL

STATUS

INOP SYS

CAB PR 1+2

PACK 1+2

■ In flight :

No crew action is required, as long as cabin pressure is normal.

● IF ABN CAB V/S :

Limit maximum flight level to FL 100, or MEA, or minimum obstacle clearance altitude.

MAX FL ..... 100/MEA

*If the door warning is accompanied by an abnormal increase in cabin altitude, the flight crew must reduce cabin ΔP and altitude by descending.*

*Cabin and Avionic doors are of the plug type. Therefore, full depressurization is not recommended.*

STATUS

MAX FL ..... 100/MEA |

ARG ALL

DOOR POS DET 1(2) (1+2)

R

● On the ground before takeoff :

PACKS + CAB PR NOT AVAIL

Failure of PSCU channel 1(2) (1+2).

STATUS

INOP SYS

CAB PR 1+2

PACK 1+2

DOOR DET 1(2)

(DOORS DET)

ARG ALL



**ENG 1 (2)(3)(4) 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 :*

- Explosion,*
- Significant increase in aircraft vibrations and/or buffeting,*
- Repeated, or uncontrollable, engine stalls,*
- Associated abnormal indications such as hydraulic fluid loss, no N2 indication.*

**■ Before takeoff, or after landing :**

- THR LEVER (affected engine) . . . . . IDLE**
- ENG MASTER (affected engine) . . . . . OFF**

**● IF DAMAGE :**

- ENG FIRE P/B (affected engine) . . . . . PUSH**
- AGENT 1 . . . . . DISCH**
- L + R INR TK SPLIT . . . . . ON**

**● IF NO DAMAGE :**

- ENG (affected) RELIGHT . . . . . CONSIDER**

*Refer to 3.02.70, p 3.*

**ENG 1 (2)(3)(4)**

**SHUT DOWN**

*Apply the ENG SHUT DOWN procedure, if damage, or if engine relight is unsuccessful.*



# ENG 1 (2)(3)(4) FAIL (CONT'D)

## In flight

### If engine fire pushbutton not pressed :

- ENG START SEL ..... IGN  
*Selection of continuous ignition confirms the FADEC's immediate relight attempt.*
- THR LEVER (affected engine) ..... IDLE  
*Note : In case of GPWS (EGPWS <math>\triangleleft</math>) alerts, reduce speed with care below VLS with the flaps extended (at light weights VMC may be reached before  $\alpha$  max), when applying the GPWS (EGPWS <math>\triangleleft</math>) procedure.*

### IF NO RELIGHT AFTER 30 S :

- ENG MASTER (affected engine) ..... OFF

### IF DAMAGE :

- ENG FIRE P/B (affected engine) ..... PUSH
- AGENT 1 AFTER 10 S ..... DISCH
- L + R INR TK SPLIT ..... ON

### IF NO DAMAGE :

- ENG (affected) RELIGHT ..... CONSIDER  
*Apply the ENG RELIGHT (in flight) procedure.*

ENG 1 (2)(3)(4)

SHUT DOWN

Apply the ENG SHUT DOWN procedure, if damage, or if engine relight is not successful.  
 If high engine vibrations occur and continue after engine shutdown, reduce airspeed and descend to a safe altitude.  
 Attempt to define, and use, a practical airspeed and altitude for minimum vibrations.  
 For performance reasons, landing is in CONF 3.  
 CONF 3 should be selected as the landing configuration on the MCDU.

ENG RELIGHT (in flight)

- MAX GUARANTEED ALTITUDE ..... 28 000 FT
- ENG MASTER (affected engine) ..... OFF
  - THR LEVER (affected engine) ..... check IDLE
  - MAN START pushbutton (affected engine) ..... OFF

Note : Auto start 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 abnormal start.*

- ENG START SEL ..... IGN

Note : During engine relight in flight, PACK 1 + 2 FAULT is temporarily triggered.

- X BLEED (if necessary) ..... OPEN

*The FADEC selects an assisted start (start valve automatically opens) when N2 is below 16%. Airspeed at or above 300 knots ensure a windmilling start.*

- WING ANTI ICE (for starter assisted start) ..... OFF
- ENG MASTER ..... ON

Note : Engine light up must be achieved within 30 seconds after fuel flow increases.

*Monitor N2*

■ **When idle reached (AVAIL indication pulses in green) :**

- ENG START SEL ..... NORM

- TCAS MODE SEL ◀ ..... Check TA/RA

*If the ENG SHUT DOWN procedure has been applied the TCAS mode selector is at TA position.*

- Affected SYS ..... RESTORE

*Restore affected systems and set XBLEED selector at AUTO.*



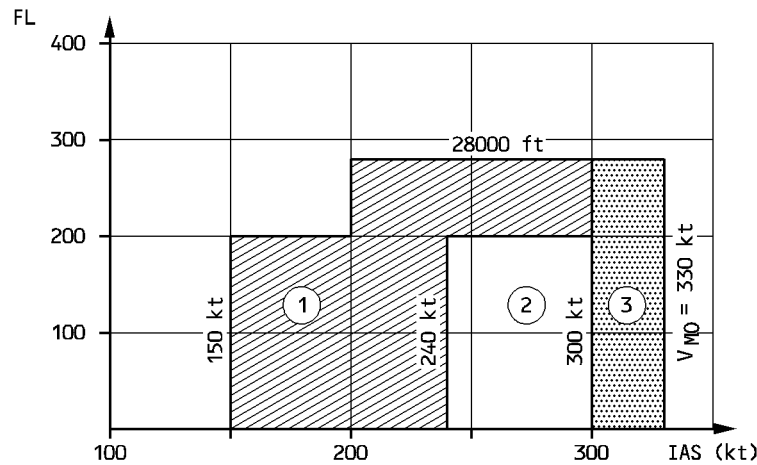
R  
R  
R

**ENG RELIGHT (in flight) (CONT'D)**

■ **If no relight :**

- ENG MASTER (affected engine) ..... OFF  
*Wait 30 seconds before new start attempt (to drain the engine).*

**IN FLIGHT ENGINE RELIGHT ENVELOPE**



- ① : STARTER ASSISTED RELIGHT  
NOTE:- APU EXTRACTION AVAILABLE BELOW FL 200.
- ② : STARTER ASSISTED RELIGHT OR WINDMILLING QUICK RELIGHT IF  $N_2 \geq 12\%$
- ③ STABILIZED WINDMILLING START

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# After ENG 1 (2)(3)(4) SHUT DOWN

- LAND ASAP(b)  
 – ENG START SEL ..... IGN  
*Select continuous ignition, to protect the remaining engines.*  
Note : If the Y ELEC PUMP is running after an ENG 3 failure (engine failure before flaps' retraction), switch OFF the pump, when in clean configuration.

– L/G (displayed during the takeoff phase) ..... UP  
 – FUEL IMBALANCE ..... MONITOR  
 – TCAS MODE SEL ◀ ..... TA

Secondary Failure

\* HYD  
 \* ELEC

Note : · In case a second engine fails, the \*HYD and \* ELEC secondary failures are not automatically recalled, if they were, after the first engine failure.  
 · In some conditions with full asymmetric power, the aircraft may be control-limited before reaching the limit of the protection system. 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.

## AIR ABNORM BLEED CONFIG

Refer to 3.02.36.

## STATUS

- FUEL IMBALANCE ..... MONITOR  
 ● IF NO FUEL LEAK  
 – L + R INR TK SPLIT ..... OFF  
 APPR PROC  
 ● BEFORE S/F EXTENSION  
 ● If ENG 3 S/D and green hyd lost  
 – YELLOW ELEC PUMP ..... OFF  
*This avoids Y hydraulic pressure fluctuations, that could cause flight control jerks.*  
 – FOR LDG ..... USE FLAP 3  
 – LDG DIST PROC (if ENG 2 or 3 shutdown)  
 ..... APPLY  
*Refer to the QRH Part 2, or to the FCOM 3.02.80.*  
 SLATS SLOW (if ENG 2 shutdown)  
 FLAPS SLOW (if ENG 3 shutdown)  
 CAT 3 SINGLE ONLY (a)  
 a) CAT 3 DUAL is lost, if ENG 2 or 3 shuts down.  
 b) Displayed, if more than one engine shuts down.

INOP SYS  
 (BLUE HYD)  
 (YELLOW HYD)  
 PART SPLRS  
 (if ENG 2 or 3 shutdown)  
 REV 1+4 (2)(3)  
 CAT 3 DUAL(a)  
 ENG 1(2)(3)(4)  
 BLEED  
 G ENG 1 PUMP  
 (G ENG 4 PUMP)  
 GEN 1(2)(3)(4)  
 ALTN BRK  
 (if ENG 2 shutdown)  
 PART GALLEY  
 YAW DAMPER 2  
 (if ENG 3 shutdown)

ENG ALL ENG FLAME OUT

R This warning inhibits the EMER ELEC CONFIG warning. The FCOM Volume 3 provides the ALL  
R ENG FLAME OUT steps displayed on the ECAM. However, to ease the handling of all the  
R different ECAM procedures resulting from this all engine flame out situation, it is  
R recommended using the ALL ENG FLAME OUT QRH paper procedure, and if time permits,  
R clearing the ECAM warnings. This QRH paper procedure also includes the ditching and the  
R forced landing procedures, to be more straightforward.

LAND ASAP

- R – RAT ..... MAN ON
- R – ENG START SEL ..... IGN  
*This confirms immediate relight attempt.*
- R – THR LEVERS ..... IDLE
- R – OPTIMUM RELIGHT SPD ..... 300/.82  
*300/.82 knots is the optimum airspeed for a windmilling start. One fuel pump remains supplied down to 260 knots. Increase speed during descent towards 300 knots. Do not exceed Mmo. At 300/.82 with all engines stopped, it takes about 15 minutes to descend from FL 400 to the ground. Distance is about 100 NM. In case of a speed indication failure (volcanic ash), the pitch attitude for optimum relight speed is – 2 degrees (for weights above 150 tons add 0.5 degree for each additional 20 tons).*
- R – EMER ELEC PWR (if not automatically coupled) .... MAN ON
- R – VHF1 ..... USE  
*Only VHF1 is always supplied. Notify the ATC of the nature of emergency and state intentions. If there is no contact with air traffic control, transmit a distress message on VHF frequency 121.5 MHz.*

● IF NO RELIGHT AFTER 30 SEC :

- ENG MASTERS ..... OFF 30S/ON  
*ENG MASTERS must be left OFF for 30 seconds, to allow ventilation of combustion chamber. Unassisted start attempts can be repeated until successful, or until APU BLEED is available.*

● IF UNSUCCESSFUL :

- CREW OXY MASKS (above FL100) ..... ON

● WHEN BELOW FL 250 :

- APU (if operative) ..... START

● WHEN BELOW FL 200 :

- WING ANTI ICE ..... OFF
- APU BLEED ..... ON

● IN SEQUENCE

- ENG MASTERS (one at a time) ..... OFF 30S/ON  
*Only one engine must be started at a time. The other non-running engine masters must be set to OFF.*



- ENG ALL ENG FLAME OUT (CONT'D)

  - OPTIMUM SPEED (when APU BLEED avail) . . . . . 250 KT  
*Green dot speed is not displayed on the Captain's PFD.  
Initially use 250 knots before checking the QRH.*
  - USE RUD WITH CARE  
*If forced landing or ditching is expected, use the QRH's Forced Landing or Ditching procedure.*
  - **EARLY IN APPROACH :**
    - CAB SECURE . . . . . ORDER
  - **FOR SLATS EXTENSION :**
    - LAND RECOVERY . . . . . ON  
*LGCIU 1, ILS1, Slat channel 1 are recovered.*
    - FOR LDG . . . . . USE FLAP 1  
*At FLAP 1 selection, the emergency generator stops.*
    - MIN RAT SPEED . . . . . 140 KT  
*Flight controls are supplied by the RAT, down to 130 knots.*
  - **FOR L/G GRVTY EXTN :**
    - MAX SPEED . . . . . 200 KT
    - L/G GRVTY EXTN (if no ditching predicted) . . . . . DOWN  
*Disregard "USE MAN PITCH TRIM" on the PFD, since stabilizer control is lost.*
  - **WHEN L/G DOWNLOCKED :**
    - L/G . . . . . DOWN
    - TARGET SPD . . . . . 170 KT
  - **AT TOUCHDOWN**
    - ENG MASTERS . . . . . OFF
    - APU MASTER SW . . . . . OFF
    - EVACUATION . . . . . INITIATE

HYD

B + Y SYS LO PR

- AFFECTED PUMPS . . . . . OFF
- MANEUVER WITH CARE

F/CTL ALTN LAW (PROT LOST)

- SPD BRK . . . . . DO NOT USE
- MAX SPEED . . . . . 305/.82



**ENG ALL ENG FLAME OUT (CONT'D)**

**STATUS**

|                                                                         |                 |
|-------------------------------------------------------------------------|-----------------|
| SPD BRK ..... DO NOT USE                                                | <u>INOP SYS</u> |
| MAX SPEED ..... 305/.82                                                 | F/CTL PROT      |
| MIN RAT SPEED ..... 140 KT                                              | STABILIZER      |
| MANEUVER WITH CARE                                                      | B+Y HYD         |
| AVOID ICING CONDITIONS                                                  | PACK 1+2        |
| MAX BRK PR ..... 1000 PSI                                               | PRIM 2+3        |
| APPR PROC                                                               | ADR 2+3         |
| ● <b>FOR SLATS EXTENSION :</b>                                          | RA 1+2          |
| – LAND RECOVERY ..... ON                                                | A/CALL OUT      |
| – FOR LDG ..... USE FLAP 1                                              | ANTI SKID       |
| ● <b>AT SLATS EXTENSION (if a FUEL MAN FWD XFR has been selected) :</b> | RUD TRIM        |
| – T TK MODE ..... AUTO                                                  | WING A.ICE      |
| – T TK FEED ..... AUTO                                                  | MOST SPLRS      |
| ● <b>FOR L/G GRVTY EXTN</b>                                             | REVERSERS       |
| MAX SPEED ..... 200 KT                                                  | HF 1+2          |
| – L/G GRVTY EXTN ..... DOWN                                             | SEC 2           |
| ● <b>WHEN L/G DOWNLOCKED :</b>                                          | N/W STRG        |
| – L/G ..... DOWN                                                        | AUTO BRK        |
| – PITCH AUTHORITY REDUCED                                               | ALTN BRK        |
| – TARGET SPD ..... 170 KT                                               | MOST F. PUMPS   |
| ALTN LAW : PROT LOST                                                    | F. CTR PUMPS    |
| CAT 1 ONLY                                                              | F. ACT PUMPS ◀  |
|                                                                         | GPS 2           |

R  
R  
R  
R  
R

*Note : MCDU BACK UP NAV AVAIL may be displayed in the STATUS. It should be disregarded, as the MCDU BACK UP NAV is not available when the CSM/G is powered by the RAT.*

*AFTER LAND RECOVERY : LGCIU 1, SLATS CHANNEL 1 are recovered. SLATS SLOW is displayed in the STATUS. Remaining fuel pump stops. ALL F. PUMPS is displayed in the INOP SYS list.*

*Note : STATUS is simplified in ALL ENG FLAME OUT configuration, only the most important STATUS items are kept.*



ENG 1(2)(3)(4) CTL SYS FAULT

■ On ground :

– THR LEVER 1(2)(3)(4) ..... IDLE

– ENG MASTER 1(2)(3)(4) ..... OFF

■ In flight :

Depending on the type of failure, one of the following three messages is displayed :

■ AVOID RAPID THR CHANGES, or

■ ENG (affected) SLOW RESPONSE, or

■ MAX N2 : 95 %

STATUS

■ In flight :

■ AVOID RAPID THR CHANGES, or

■ ENG (affected) SLOW RESPONSE, or

■ MAX ENG 1 (2)(3)(4) N2 : 95 %

ENG 1(2)(3)(4) BLEED STATUS FAULT

Bleed valve, pack valve, wing and engine anti-ice valve, crossbleed valve position status is not received by the FADEC's active channel.

HI IDLE

The FADEC increases minimum idle on the related engine as if bleed, pack, wing and engine anti-ice valves were opened.

● BEFORE T.O :

– PACK 1+2 ..... OFF

– WING ANTI ICE (if ENG ANTI ICE ON) ..... ON

BOTH PACKS AVAIL IN FLT (displayed on ground)

STATUS

BOTH PACKS AVAIL IN FLT (on ground)

ENG (affected) HI IDLE

**ENG 1(2)(3)(4) FADEC FAULT or OVHT**

CONFIRM ENG STATUS  
ON DISPLAYS

*Since engine indications are lost ; other system pages such as HYD, ELEC AC, or BLEED must be used to confirm engine status.*

● **IF ABN ENG OPERATION :**

- THR LEVER (affected engine) ..... IDLE
- ENG MASTER (affected engine) ..... OFF

**ENG 1(2)(3)(4)      SHUT DOWN**

*Apply the after ENG SHUT DOWN procedure.*

**ENG 1(2)(3)(4) FADEC SYS FAULT**

*This warning is triggered only on ground, if one NO DISPATCH failure affects one or both channels.*

■ **On ground**

- THR LEVER 1 (2)(3)(4) ..... IDLE
- ENG MASTER 1(2)(3)(4) ..... OFF

**ENG 1(2)(3)(4) MINOR FAULT**

Crew awareness.

ENG THR LEVERS NOT SET

*This caution is triggered when one thrust lever is set between CLB and FLEX MCT at takeoff or in case of disagree between the thrust lever position and the takeoff thrust mode selected by the FADECs.*

■ **Aircraft without derated takeoff option :**

- If FLX to temp not set and thrust levers at FLX MCT :
  - THR LEVERS ..... TO GA

■ **Aircraft with derated takeoff option :**

- If no FLX temp neither derate level set and thrust levers at FLX-MCT :
  - THR LEVERS ..... IDLE
- If derate level is set and thrust levers at TO GA :
  - THR LEVERS ..... MCT/DRTO

ENG T.O THRUST DISAGREE

*Two or more FADECs select different thrust takeoff mode (DRT, FLX, MAX) on the ground.*

Crew awareness.

ENG 1(2)(3)(4) FUEL FILTER CLOG

Crew awareness.

*Maintenance action is due.*

ENG 1(2)(3)(4) IGN A(B) FAULT

Crew awareness.

STATUS

INOP SYS

ENG 1 (2)(3)(4)

IGN A (B)

ENG 1(2)(3)(4) IGN A+B FAULT

AVOID ADVERSE WEATHER

STATUS

INOP SYS

ENG 1 (2)(3)(4)

IGN

AVOID ADVERSE WEATHER

ENG 1(2)(3)(4) EIU FAULT

- As the databus between the EIU and the ECU fails :
- Autothrust control is lost on the affected engine.
  - Thrust reverser is lost on the affected engine, and on the opposite in case of engine 1 or 4.
  - When idle is selected, only high ground idle is available.
  - Bleed corrections on N1 limit are lost.
  - Manual start is lost.
  - Flex takeoff and derated takeoff are lost.
  - On ground, the affected engine's anti-ice fault light may be ON, if the affected engine does not run.
  - On ground, when the crossbleed valve is open, the 2 packs may be controlled closed.

■ ON GROUND

T.O THR : TOGA ONLY  
HI IDLE

FADEC increases minimum idle on the related engine, as if the bleed, pack, wing, and anti-ice, valves were opened.

● BEFORE T.O :

- PACK 1+2 ..... OFF
- WING ANTI ICE (if ENG ANTI ICE on) ..... ON

As the FADEC directly receives the ENG ANTI-ICE pushbutton position, it assumes that the WING ANTI ICE is selected ON, when the engine anti-ice is selected ON.  
Wing anti-ice must be selected ON to have the selection in accordance with the FADEC bleed status.

BOTH PACKS AVAIL IN FLT

STATUS

|   |                               |                  |
|---|-------------------------------|------------------|
| R | T.O THR : TOGA ONLY           | INOP SYS         |
| R | ENG (affected) AUTOSTART ONLY | PACK 1 + 2       |
| R | BOTH PACKS AVAIL IN FLT       | A/THR            |
| R | ENG (affected) HI IDLE        | REV 1 + 4 (2)(3) |
| R | CAT 2 ONLY                    | CAT 3            |

■ IN FLIGHT

- THR LEVER (affected engine) ..... MAN ADJUST

Note : It is recommended that the autothrust be disconnected when in descent, and to manually adjust the thrust levers.

STATUS

|   |                               |                 |
|---|-------------------------------|-----------------|
| R | ENG (affected) AUTOSTART ONLY | INOP SYS        |
| R | ENG (affected) HI IDLE        | ENG 1 (2)(3)(4) |
| R | CAT 2 ONLY                    | A/THR           |
|   |                               | REV 1 +4 (2)(3) |
|   |                               | CAT 3           |

|   |                                                                                             |
|---|---------------------------------------------------------------------------------------------|
|   | <b>ENG 1(2)(3)(4) STALL</b>                                                                 |
| R | A stall may be indicated by varying degrees of abnormal engine noises, accompanied by       |
| R | flame from the engine exhaust (and possibly from engine inlet in severe cases), 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.  |
|   | – THR LEVER (affected engine) . . . . . IDLE                                                |
|   | – ENG MASTER (affected engine) . . . . . OFF                                                |
|   | <b>ENG 1(2)(3)(4) SHUT DOWN</b>                                                             |
|   | Apply ENG SHUT DOWN procedure.                                                              |
|   | Engine restart at crew discretion.                                                          |
|   | ■ <b>If the crew detects a stall before the ECAM caution activation</b>                     |
|   | The following procedure may be applied :                                                    |
|   | – THR LEVER (affecting engine) . . . . . IDLE                                               |
|   | – ENG PARAMETERS (affected engine) . . . . . CHECK                                          |
| R | ● <b>If abnormal parameters :</b>                                                           |
|   | – ENG MASTER (affected engine) . . . . . OFF                                                |
|   | <b>ENG 1(2)(3)(4) SHUT DOWN</b>                                                             |
|   | Apply ENG SHUT DOWN procedure.                                                              |
|   | Engine restart at crew discretion.                                                          |
| R | ● <b>If normal parameters :</b>                                                             |
|   | – ENG A ICE (affected engine) . . . . . ON                                                  |
|   | – WING A ICE . . . . . ON                                                                   |
| R | Operation of engine and wing anti ice increase the stall margin but EGT increases           |
|   | accordingly.                                                                                |
| R | – THR LEVER (affected engine) . . . . . SLOWLY ADVANCE                                      |
| R | ● <b>If stall recurs :</b>                                                                  |
| R | – THR LEVER (affected engine) . . . . . REDUCE                                              |
|   | Reduce thrust and operate below the stall threshold.                                        |
| R | ● <b>If stall does not recur :</b>                                                          |
| R | – Continue engine operation.                                                                |

**ENG 1(2)(3)(4) N1/N2 OVERLIMIT**

R

**Maximum pointer indications :**

*N1 between 100.3 % and 101.4 % or*  
*N2 between 105 % and 105.8 %.*  
 – THR LEVER (affected engine) ..... **BELOW LIMIT**  
*Normal operation may be resumed to next landing.*  
*Report in maintenance logbook.*

R

**Maximum pointer indications:**

*N1 above 101.4 % or*  
*N2 above 105.8 %.*  
 – THR LEVER (affected engine) ..... **IDLE**  
 – ENG MASTER (affected engine) ..... **OFF**  
*If conditions do not permit engine shut down, land as soon as possible using the minimum thrust required to sustain safe flight.*

R

**ENG 1(2)(3)(4)**

**SHUT DOWN**

*Apply after ENG SHUT DOWN procedure*

**ENG 1(2)(3)(4) EGT OVERLIMIT**

R

**Maximum pointer indications :**

EGT above 915 °C (or 950 °C at takeoff power) and below 990°C :  
 – THR LEVER (affected engine) ..... **BELOW LIMIT**  
*Normal operation may be resumed to next landing.*  
*Report in maintenance logbook.*

R

**Maximum pointer indications :**

EGT above 990°C :  
 – THR LEVER (affected engine) ..... **IDLE**  
 – ENG MASTER (affected engine) ..... **OFF**  
*If conditions do not permit engine shut down, land as soon as possible using the minimum thrust required to sustain safe flight.*

R

**ENG 1(2)(3)(4)**

**SHUT DOWN**

*Apply after ENG SHUT DOWN procedure*

ARG ALL

|                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ENG TYPE DISAGREE</b>                                                                                                                                    |
| Crew awareness.<br><i>The engine ratings seen by the FWC are not identical for all engines, or they are different from the rating memorized by the FWC.</i> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ENG 1 (2)(3)(4) REV PRESSURIZED</b>                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>The reverse thrust system is pressurized, without reverse deployment order.</i><br>● <b>If IDLE is not automatically selected by the FADEC :</b><br>– THR LEVER (affected engine) ..... IDLE<br>● <b>If IDLE is automatically selected by the FADEC :</b><br>ENG (affected) AT IDLE<br>– THR LEVER (affected engine) ..... IDLE<br><i>Select thrust lever at idle, even if idle is automatically selected by the FADEC.</i> |

|                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------|
| <b>ENG 1(2)(3)(4) REV INHIBITED</b>                                                                                          |
| <i>Reverse is inhibited by maintenance action.</i><br>Crew awareness.<br><div>STATUS<br/>  INOP SYS<br/>REV 1+4 (2)(3)</div> |

|                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|
| <b>ENG 1(2)(3)(4) REV FAULT</b>                                                                                         |
| <i>A failure affects the reverser system.</i><br>Crew awareness.<br><div>STATUS<br/>  INOP SYS<br/>REV 1+4 (2)(3)</div> |

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| <b>ENG 1(2)(3)(4) REV SET</b>                                                                     |
| <i>Reverse thrust has been selected in flight.</i><br>– THR LEVER (affected engine) ..... FWD THR |

ENG 1(2)(3)(4) REV UNLOCKED

■ On the ground :

*Note : This ECAM warning may be triggered after an aircraft bounce at landing. Any aircraft bounce should be reported to the maintenance.*

● If IDLE not automatically selected by FADEC :

– THR LEVER (affected engine) . . . . . IDLE

● If IDLE automatically selected by FADEC :

ENG (affected) AT IDLE

– THR LEVER (affected engine) . . . . . IDLE

*Select thrust lever at idle, even if idle is automatically selected by the FADEC.*

■ In flight :

MAX SPEED . . . . . 300/.82

● If IDLE not automatically selected by FADEC :

– THR LEVER (affected engine) . . . . . IDLE

● If IDLE automatically selected by FADEC

ENG (affected) AT IDLE

– THR LEVER (affected engine) . . . . . IDLE

*Select thrust lever at idle, even if idle automatically selected by the FADEC.*

● IF BUFFET :

*The warning alone without buffet or vibration may be a false warning.*

MAX SPEED . . . . . 250/.70

– THR LEVER (affected engine) . . . . . IDLE

– ENG MASTER (affected engine) . . . . . OFF

ENG 1(2)(3)(4)

SHUT DOWN

*Apply ENG SHUT DOWN procedure.*

*Note : 1. Lateral control (up to the equivalent of 1/2 stick) is applied by the normal lateral law and thus spoilers are extended and large aileron deflection are used. However adequate roll control remains.*

*2. – Do not follow beta and beta target.*

*– Apply full rudder and rudder trim towards the running engines.*





| ENG 1(2)(3)(4) REV UNLOCKED (CONT'D)                      |                 |
|-----------------------------------------------------------|-----------------|
| STATUS                                                    |                 |
| MAX SPEED ..... 300/.82                                   | INOP SYS        |
| ● IF BUFFET :                                             | (BLUE HYD or    |
| MAX SPEED ..... 250/.70                                   | YELLOW HYD      |
| APPR PROC                                                 | PART SPLRS)     |
| – FOR LDG ..... USE FLAP 3                                | (if ENG 2 or 3  |
| ● IF BUFFET :                                             | shutdown)       |
| – GPWS FLAP MODE ..... OFF                                | REV 1+4         |
| – FOR LDG ..... USE FLAP 2                                | (2)(3)(1+4)     |
| – LDG DIST PROC ..... APPLY                               | CAT 3 DUAL      |
| Refer to the QRH Part 2, or to the FCOM 3.02.80.          | ENG 1 (2)(3)(4) |
| – APPR SPD ..... VLS + 15 KT                              | BLEED           |
| The approach speed of VLS + 15 knots is                   | G ENG 1 PUMP    |
| recommended, both to increase lateral control and         | (G ENG 4 PUMP)  |
| to maintain the approach angle-of-attack at a             | GEN 1 (2)(3)(4) |
| reasonable value.                                         | ALTN BRK        |
| – FUEL IMBALANCE ..... MONITOR                            | (if ENG 2       |
| ENG (affected) AT IDLE (if selected by FADEC)             | shutdown)       |
| SLATS SLOW (if ENG 2 shutdown)                            | PART GALLEY     |
| FLAPS SLOW (if ENG 3 shutdown)                            | YAW DAMPER 2    |
| CAT 3 SINGLE ONLY                                         | (if ENG 3       |
| <u>Note</u> : The approach speed of VLS + 15 knots is     | shutdown)       |
| recommended, both to increase lateral control and to      |                 |
| maintain the approach angle-of-attack at a reasonable     |                 |
| value. Note that a reduction in lift may result from this |                 |
| failure and therefore, a higher angle-of-attack than      |                 |
| normal may be advised at a given speed.                   |                 |

| ENG 1(2)(3)(4) REV ISOL FAULT (on ground)                                                   |
|---------------------------------------------------------------------------------------------|
| The hydraulic shut-off valve for the reverser system is abnormally open.<br>Crew awareness. |

**ENG 1(2)(3)(4) THR LEVER DISAGREE**

Both thrust lever angle (TLA) sensors are not in agreement on one engine.  
If the failure occurs during takeoff (with thrust lever in TOGA or FLX/MCT gate), FADEC maintains TO., FLX TO., or DRT TO  $\triangleleft$  thrust until thrust reduction, after which the maximum available thrust is CLB. If the failure occurs while the thrust lever is between idle and MCT, the FADEC selects the higher TLA, limited at CLB in flight, or the FADEC selects idle thrust on ground.

■ **On ground :**

ENG (affected) AT IDLE (if TLA not at TOGA/FLX/MCT)  
*The FADEC automatically selects idle power.*

■ **In flight :**

MAX AVAIL PWR : CLB (if TLA at or below MCT and L/G up)  
ENG (affected) AT IDLE (if TLA not at TOGA/FLX/MCT and L/G DN)  
*At landing gear extension, (or when Mn < 0.46, if the associated EIU is failed) the FADEC automatically selects idle thrust.*

- A/THR (if ON) ..... KEEP ON
  - A/THR (if not ON) ..... ON
- With the autothrust engaged, thrust is automatically managed between idle and the higher TLA position, as long as the landing gear is up.*

**STATUS**

■ **On ground :**

ENG (affected) AT IDLE (if TLA not at TOGA or FLX/MCT)

■ **In flight :**

APPR PROC

- FOR LDG ..... USE FLAP 3

● **If TLA at, or below, MCT**

ENG (affected) MAX AVAIL PWR : CLB

● **WHEN L/G DOWN, or**

● **WHEN MN < 0.46**

(Displayed, if the affected EIU is failed)

ENG (affected) AT IDLE

INOP SYS

ENG 1 (2)(3)(4)  
THR  
REV 1+4 (2)(3)

### ENG 1(2)(3)(4) THR LEVER FAULT

*No validated thrust lever angle for one engine thrust lever.*

■ **On ground :**

ENG (affected) AT IDLE

*FADEC selects idle power automatically.*

*If associated thrust reverser is already deployed, FADEC commands restow.*

■ **In flight :**

*If selected thrust lever position at the time of fault detection is :*

*TOGA or FLX : FADEC freezes takeoff or flex takeoff thrust until slat retraction. At slat retraction it will select CLB thrust.*

*between IDLE and MCT : In manual thrust setting mode, engine thrust increases and freezes at CLB thrust. At slats' or landing gear extension, FADEC selects idle power automatically.*

*It is possible to activate autothrust. If selected, autothrust mode will manage thrust between idle and CLB, as long as the landing gear is up and the slats are in.*

● **During takeoff or when slats and landing gear are retracted :**

ENG (affected) HI PWR IN MAN THR

● **If A/THR on :**

– A/THR ..... KEEP ON

● **If A/THR not on :**

● **BEFORE SLATS IN :**

– A/THR ..... ON

● **If EIU not avail and FLX/MCT/TOGA selected :**

ENG (affected) HI PWR ONLY

*Engine thrust is frozen at takeoff power.*

### STATUS

APPR PROC

– FOR LDG ..... USE FLAP 3

● **WHEN L/G DOWN OR SLATS OUT :**

ENG (affected) AT IDLE

*Note : As the engine is automatically set to idle when the landing gear is downlocked or at slat extension, it is recommended to land in CONF3.*

● **If EIU (affected) not available :**

● **WHEN MN < 0.46 :**

ENG (affected) AT IDLE

INOP SYS

ENG 1 (2)(3)(4)

THR

REV 1+4 (2)(3)

ARG ALL

ENG THRUST LOCKED

The thrust is frozen on one or more engines after a failure or an involuntary autothrust disconnection. This caution is automatically repeated every 5 seconds until thrust levers are moved.

– THR LEVERS ..... MOVE

ENG 1(2)(3)(4) OIL LO TEMP

The engine oil temperature is less than - 10°C.

– THR LEVER (affected engine) ..... IDLE

– DELAY T.O. FOR WARM UP

ENG 1(2)(3)(4) OIL HI TEMP

Engine oil temperature between 140°C and 155°C for more than 15 minutes or oil temperature above 155°C.

– THR LEVER (affected engine) ..... IDLE

– ENG MASTER (affected engine) ..... OFF

ENG 1(2)(3)(4)SHUT DOWN

Apply ENG SHUT DOWN procedure

R

ENG 1(2)(3)(4) OIL LO PR

– THR LEVER (affected engine) ..... IDLE

– ENG MASTER (affected engine) ..... OFF

ENG 1(2)(3)(4)SHUT DOWN

Apply ENG SHUT DOWN procedure

ENG 1(2)(3)(4) OIL FILTER CLOG

Crew awareness

ENG 1(2)(3)(4) START VALVE FAULT

■ VALVE STUCK CLOSED

The valve is mechanically stuck closed.

On the ground, consider application of "START VALVE MANUAL OPERATION" procedure.

– MAN START (affected engine, if manual start performed)

..... OFF

– ENG MASTER (affected engine) .....

OFF

■ START VALVE NOT OPEN

Air pressure is not sufficient to open the valve.

WINDMILL START AVAIL (in flight only)

– X BLEED (if opposite engine is running or APU available for right side) .....

OPEN

– APU BLEED (if APU available below FL 200) .....

ON

● IF UNSUCCESSFUL :

– MAN START (affected engine, if MAN START performed)

..... OFF

– ENG MASTER (affected engine) .....

OFF

■ START VALVE NOT CLOSED

Remove all bleed sources supplying the faulty starter valve.

– APU BLEED (only for left side) .....

OFF

– X BLEED (if an opposite engine is running or APU available from left side) .....

CLOSE

– ENG BLEED (adjacent on the ground, affected side in flight)

..... OFF

● On the ground :

– MAN START (affected engine) .....

OFF

– ENG MASTER (affected engine) .....

OFF

Consider application of "START VALVE MANUAL OPERATION" procedure.

● In flight :

– WING ANTI ICE .....

OFF

AIR

ABNORM BLEED CONFIG

Refer to chapter 3.02.36 for associated procedure.

ARG ALL

## ENG 1(2)(3)(4) START FAULT

■ **LOW N1 (on the ground)**

*No N1 rotation during start.*

- THR LEVER (affected engine) . . . . . IDLE
- ENG MASTER (affected engine) . . . . . OFF

## ■ HUNG START

- MAN START ..... OFF
- ENG MASTER (affected engine) ..... OFF

■ STALL or EGT OVERLIMIT or HIGH TAIL WIND START or NO LIGHT UP

- **In flight :**

- ENG MASTER (affected engine) ..... OFF

*Wait 30 seconds before a new start attempt (to drain the engine).*

- On the ground (auto start) :

*In case of hot start, start stall or overtemperature, the FADEC reduces the start fuel schedule in steps of 7 % down to 21 % until start is successful .*

Following message is displayed on ECAM.

## NEW START IN PROGRESS

*If start is unsuccessful, the fuel valve is closed.*

- If start still unsuccessful :

- ENG MASTER (affected engine) ..... OFF

*Fuel valve and start valve are automatically closed. Both igniters are turned off.*

*In case of stall consider X BLEED start if pressure is low.*

- **On the ground (manual start) :**

- MAN START (affected engine) . . . . . OFF
- ENG MASTER (affected engine) . . . . . OFF
- ENG START SEL . . . . . CRANK
- MAN START . . . . . ON

*Note : These last two lines are not displayed on ECAM.*

*Dry crank the engine for 30 seconds. The start valve reopens automatically when N2 below 20 %.*

*The pilot must decide whether to attempt a new start, or report the no start condition for appropriate maintenance condition.*

■ **STARTER FAULT** or **STARTER TIME EXCEEDED**

- MAN START (affected engine) . . . . . OFF
- ENG MASTER (affected engine) . . . . . OFF

| ENG START FAULT                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------|
| <i>All thrust levers are not at idle during engine start.</i><br>THR LEVERS NOT AT IDLE<br>– THR LEVERS ..... IDLE |

**ENG 1(2)(3)(4) HP FUEL VALVE**

- associated engine below idle

HP FUEL VALVE NOT OPEN

Failure of HP fuel valve.

– MAN START (affected engine)

OFF

– ENG MASTER (affected engine)

OFF
- associated engine at or above idle

HP FUEL VALVE NOT CLSD

Failure of HP fuel valve.

Engine will shut down by closure of the LP fuel valve.

– MAN START (affected engine)

OFF

– ENG MASTER (affected engine)

OFF

**ENG 1(2)(3)(4) FUEL RETURN VALVE**

- VALVE NOT OPEN

The valve is failed closed

Crew awareness.
- VALVE NOT CLOSED

The valve is failed open

Crew awareness.

**ENG THRUST LOSS**

- Actual bleed configuration is not in accordance with the bleed configuration requested by the crew
- if abnormal engine anti ice :

ABNORM ENG A. ICE
- if abnormal wing anti ice :

ABNORM WING A. ICE
- if abnormal bleed or pack:

ABNORM BLEED OR PACK

– THR LEVERS

IDLE



LEFT INTENTIONALLY BLANK

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 :

- 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 ENG BLEED, to motor the engine.
  - If APU BLEED is not available, and the other engine is shut down, connect external pneumatic power (if readily available).
- BEACON . . . . . ON
- When N2 < 20 %
  - ENG START SEL . . . . . CRANK
  - MAN START . . . . . ON  
*The start valve automatically reopens, when N2 is below 20 %.*
- When burning has stopped :
  - MAN START . . . . . OFF
  - ENG START SEL . . . . . NORM  
*Maintenance action is due.*

## HIGH ENGINE VIBRATION

The vibration advisory on ECAM (N1 greater than 5.7 units, N2 greater than 5.6 units) is mainly a guideline to induce the crew to monitor engine parameters more closely.

*Vibration 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 EXIST :

– **ENG PARAMETERS** ..... **CHECK**  
*Check engine parameters and especially EGT, crosscheck with other engine.*  
*Report in maintenance logbook.*

- 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 EXIST :

*An increase of N1 vibration in icing conditions with or without engine anti ice may be due to fan blades and/or spinner icing.*

- A/THR ..... OFF

- ENG 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 with power setting compatible with the flight phase. Vibration level will come back to normal after ice shedding 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.

ON GROUND EMER/EVACUATION

Carefully analyze the situation before deciding to evacuate passengers. However, do not waste valuable time.

- AIRCRAFT/PARKING BRK . . . . . STOP/ON
- ATC (VHF 1) . . . . . NOTIFY

Notify ATC of the nature of the emergency, and state intentions.

Only VHF 1 is available on batteries.

- ΔP (Only if MAN CAB PR has been used) . . . . . CHECK ZERO
- If ΔP is not a zero, select manual mode and V/S CTL FULL UP, to fully open the outflow valves.

- ENG MASTER (all) . . . . . OFF
- Associated LP and HP valves close.

- CABIN CREW (PA) . . . . . NOTIFY
- Notify the cabin crew of the nature of the emergency, and state intentions.

- ENG (all) and APU FIRE pushbutton . . . . . PUSH

- AGENT (ENG and APU) . . . . . AS RQRD

- EVACUATION . . . . . INITIATE

Using the passenger address system, announce an appropriate command such as "PASSENGER EVACUATION - EVACUATE THROUGH LH or RH DOORS", and press the EVAC COMMAND pushbutton.

**DITCHING**

- R

*This procedure applies when engines are running. If engines are not running, refer to the QRH*
- R

*"ALL ENG FLAME OUT" (with or without fuel remaining) procedure, which has been amended*
- R

*to include the ditching procedure in case the engines are not running.*
- R

**PREPARATION**

- R

– ATC/TRANSPONDER (if available) . . . . . NOTIFY/AS RQRD

R

*Notify ATC of the nature of emergency encountered and state intentions.*

R

*If not in contact with ATC, select transponder code A7700 or transmit the distress*

R

*message on : (VHF) 121.5 MHZ or (HF) 2182 KHZ or 8364 KHZ.*

  - R

– CABIN and COCKPIT . . . . . PREPARE

R

*Notify the cabin crew of the nature of the emergency and state intentions.*

R

*Specify the available time.*

R

*· Loose equipment secured*

R

*· Survival equipment prepared*

R

*· Belts and shoulder harnesses locked*

  - R

– JETTISON . . . . . ON

  - R

– GPWS SYS . . . . . OFF

  - R

– GPWS TERR . . . . . OFF

R

*Pressing the SYS and TERR pushbuttons OFF avoids nuisance warnings.*

  - R

– SEAT BELTS/NO SMOKING . . . . . ON

  - R

– EMER EXIT LT . . . . . ON

  - R

– COMMERCIAL . . . . . OFF

  - R

– LDG ELEV . . . . . SELECT 00

  - R

– BARO . . . . . SET

R

*Omit normal approach and landing check list.*

  - R

– CREW MASKS/OXY SUPPLY (below FL 100) . . . . . OFF



## DITCHING (CONT'D)

## APPROACH

- L/G lever ..... UP
- SLATS and FLAPS ..... MAX AVAIL
- JETTISON ..... OFF

### AT 2000 FEET AGL

- CAB PRESS MODE SEL ..... CHECK AUTO
- BLEED (ENGs and APU) ..... OFF
- CABIN ..... NOTIFY FOR DITCHING
- DITCHING pushbutton ..... ON



### DITCHING (CONT'D)

The direction of ditching depends mainly on wind direction and sea state and these factors may be considered as follows:

1. Wind direction :  
 This may be determined by observation of the waves, which move and break downwind. Spray from 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 Kt  
 Many white crests ..... 17-26 Kt  
 Streaks of foam along water ..... 23-35 Kt  
 Spray from waves ..... 35-43 Kt
3. Sea state :  
 This is best determined from a height of 500 to 1000 feet. At lower height, the direction of the swell may be less obvious than the direction of the waves, even though the waves are much smaller.  
 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 the wind as possible. If drift exceeds 10 degrees, ditch into wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.  
 Touchdown with approximately 11 degrees of pitch and minimum aircraft vertical speed.

R

AT 500 FEET AGL

- R

– BRACE FOR IMPACT ..... ORDER

– ENG MASTERS ..... OFF

– APU MASTER SW ..... OFF

R

AFTER DITCHING

- ATC (VHF 1) ..... NOTIFY

*With engines and APU shutdown, only VHF 1 is supplied.*

– FIRE pusbutton (ENG and APU) ..... PUSH

– AGENTS (ENG and APU) ..... DISCH

– EVACUATION ..... INITIATE

FORCED LANDING

This procedure applies when engines are running. If engines are not running, refer to the QRH “ALL ENG FLAME OUT” (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 (if available) . . . . . 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 the 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
- JETTISON . . . . . ON
- GPWS SYS . . . . . OFF
- GPWS TERR . . . . . OFF  
Pressing the SYS and TERR pushbuttons OFF avoids nuisance warnings.
- SEAT BELTS/NO SMOKING . . . . . ON
- EMER EXIT LT . . . . . ON
- COMMERCIAL . . . . . OFF
- LDG ELEV . . . . . SET
  - If not known, select an approximate value.
- BARO . . . . . SET  
Omit normal approach and landing check list.
- CREW MASKS/OXY SUPPLY (below FL 100) . . . . . OFF

APPROACH

- RAM AIR . . . . . ON  
Switch ON the RAM AIR to ensure complete depressurization on the ground.
- L/G lever . . . . . DOWN
- SLATS and FLAPS . . . . . MAX AVAIL





|   |   |                                                               |
|---|---|---------------------------------------------------------------|
|   |   | <b>FORCED LANDING (CONT'D)</b>                                |
| R | – | GND SPLR ..... ARM                                            |
| R | – | JETTISON ..... OFF                                            |
| R | – | MAX BRK PR ..... 1000 PSI                                     |
| R |   | <b>AT 2000 FEET AGL</b>                                       |
| R | – | CABIN ..... NOTIFY FOR LANDING                                |
| R |   | <b>AT 500 FEET AGL</b>                                        |
| R | – | BRACE FOR IMPACT ..... ORDER                                  |
| R |   | <b>AT TOUCHDOWN</b>                                           |
| R | – | ENG MASTERS ..... OFF                                         |
| R | – | APU MASTER SW ..... OFF                                       |
| R | – | BRAKES ON ACCU ONLY                                           |
| R |   | <b>AFTER LANDING</b>                                          |
| R | ● | <b>When the aircraft has stopped :</b>                        |
| R | – | PARKING BRK ..... ON                                          |
| R | – | ATC (VHF 1) ..... NOTIFY                                      |
| R |   | <i>With engines and APU shutdown, only VHF 1 is supplied.</i> |
| R | – | FIRE pushbutton (ENG and APU) ..... PUSH                      |
| R | – | AGENTS (ENG and APU) ..... DISCH                              |
| R | – | EVACUATION ..... INITIATE                                     |

EMER DESCENT

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.
- THR LEVER (if A/THR not engaged) ..... IDLE
  - If autothrust is engaged, check IDLE on the UPPER ECAM.
  - If not engaged, retard the thrust levers.
- SPD BRK ..... FULL

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 21,000 feet. Speed must be reduced to VLO.*

- SIGNS ..... ON
- ENG START 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 one of the following frequencies : (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 > 14000 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**

R Automatic landing is certified up to MLW, but flight tests have been performed successfully  
R up to MTOW. In case of emergency, and under crew responsibility, an automatic landing may  
R be performed up to MTOW provided that the runway is approved for automatic landing.

- JETTISON ..... **CONSIDER**
- 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.

- 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 speed 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 (feet) |      |      |      |      |       |       |       |
|----------|--------------------------|------|------|------|------|-------|-------|-------|
|          | 0                        | 2000 | 4000 | 6000 | 8000 | 10000 | 12000 | 14000 |
| 10       | 276                      | 264  | 252  | 239  | 227  | 212   | 190   | 174   |
| 15       | 275                      | 263  | 251  | 239  | 224  | 204   | 183   | 167   |
| 20       | 275                      | 263  | 251  | 234  | 216  | 196   | 173   | 159   |
| 25       | 274                      | 263  | 243  | 224  | 207  | 186   | 164   | 151   |
| 30       | 272                      | 252  | 233  | 215  | 195  | 172   | 156   |       |
| 35       | 259                      | 241  | 223  | 202  | 179  |       |       |       |
| 40       | 247                      | 231  | 208  | 186  |      |       |       |       |
| 45       | 232                      | 214  | 192  |      |      |       |       |       |
| 50       | 218                      | 198  |      |      |      |       |       |       |
| 55       |                          |      |      |      |      |       |       |       |

### CREW INCAPACITATION

- R If a cockpit crew member becomes incapacitated, the remaining  
R crew member must call a cabin attendant as soon as practicable.  
R The best way to request assistance from the cabin crew, is by means  
R of the passenger address system :  
“ATTENTION, PURSER TO COCKPIT PLEASE”. The purser or any  
other cabin attendant must proceed to the cockpit immediately.  
R 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  
R from a seat without endangering any controls and switches.  
R If it is not possible to remove the body, one cabin attendant must stay  
in the cockpit to take care of and observe the incapacitated 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**

R IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.  
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.

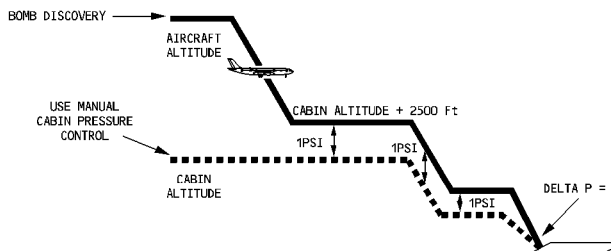
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2500 feet difference between the aircraft and the cabin altitude. These conditions are achieved 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).



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**BOMB ON BOARD (CONT'D)**

- AIRCRAFT (if climbing) . . . . . LEVEL OFF
- CABIN PRESS MODE SEL . . . . . MAN  
*The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid the activation of an altitude-sensitive bomb.*
- CAB ALT . . . . . MAINTAIN  
*Use MAN V/S CTL to maintain the cabin altitude at the value it had when the bomb was discovered.*
- CABIN CREW . . . . . NOTIFY
- ATC/COMPANY OPERATIONS . . . . . NOTIFY  
*To obtain expert advice from explosive specialists.*
- FUEL RESERVES . . . . . DETERMINE  
*Keep in mind that when flying at cabin altitude +2500ft, fuel consumption in CONF 1, with landing gear down, will be about 2.1 times that consumed in clean configuration.*
- NEXT SUITABLE AIRPORT . . . . . DETERMINE
- FCU SPEED SELECTION KNOB . . . . . PULL AND TURN  
*Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequences of possible structural damage, if the bomb explodes.*
- DESCENT TO CAB ALT + 2500 FT or MEA or minimum obstacle clearance altitude . . . . . INITIATE  
*Descending to 2500ft above the cabin altitude gives a cabin differential pressure of approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb explodes.*
- AVOID SHARP MANEUVERS  
*which might result in the bomb moving.*
- CAB ALT . . . . . MAINTAIN  
*Use MAN V/S CTL to maintain the cabin altitude. Initially brief UP input should be required; but, be careful not to increase the cabin altitude.*
- **When at CAB ALT + 2500 FT :**
  - 1 PSI DELTA P . . . . . MAINTAIN  
*Use MAN V/S CTL to adjust delta P to 1 PSI. Brief DN input should be initially required to set 0 ft/min cabin vertical speed.*
  - GALLEY/COMMERCIAL . . . . . OFF
  - FLAPS (fuel permitting) . . . . . AT LEAST CONF 1  
*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 aircraft 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**

**CAUTION**

The least risk bomb location for the aircraft's structure and systems is the 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 ..... 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. If the other seats are full, these passengers should sit on the floor in protected areas.  
Passengers near the bomb should protect their heads with pillows, blankets, etc, and sit in the brace position.*

*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.*



BOMB ON BOARD (CONT'D)

– 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 indicated that an anti-lift device is present, it may be possible to move the bomb together with the surface on which the bomb is located, such as a shelf or seat cushion.*

*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.*

● If the bomb can be moved :

*PLACE THE BOMB AS CLOSE TO THE CENTER OF THE RH AFT CABIN DOOR AS POSSIBLE.*

– PASSENGERS ..... MOVE/ADVISE

*Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). If the other seats are full, these passengers should sit on the floor in protected areas towards the front of the aircraft.*

*Passengers near the bomb should protect their heads with pillows, blankets, etc, and sit in the brace position.*

*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.*

– RH AFT CABIN DOOR SLIDE ..... DISARM

– LEAST RISK BOMB LOCATION (LRBL) ..... PREPARE

*Build up a platform of solid baggage against the door up to about 25cm (10 in) below the middle of the door.*

*On top of this, build up at least 25cm (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.*





**BOMB ON BOARD (CONT'D)**

- 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.*

- LEAST RISK BOMB LOCATION ..... COMPLETE

*Place an additional single thin sheet of plastic over the bomb.*

*Build up at least 25cm (10in) 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.*

- 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.*

COCKPIT WINDSHIELD/WINDOW CRACKED

*In case of a one-ply failure, whichever the one may be, the windshield is still able to sustain the maximum differential pressure. Nevertheless, because the pilot is unable to accurately determine how many plies have failed, 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  $\Delta P$  5 PSI, without resulting in an excessive cabin altitude and corresponding EXCESS CAB ALT warning. The following procedure allows maintaining  $\Delta P$  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 :*

|                          |                |     |      |      |      |
|--------------------------|----------------|-----|------|------|------|
| $\Delta P$<br>=<br>5 PSI | FL             | 100 | 150  | 200  | 230  |
|                          | CABIN ALTITUDE | 0   | 3000 | 6000 | 8000 |

- **When starting the final descent :**
  - CAB PRESS MODE SEL ..... AUTO

R

R

R

R

R

R

COCKPIT WINDSHIELD/WINDOW ARCING

- Affected WINDSHIELD/WINDOW WHC reset button . . . . PULL

*In case of electrical arcing, pull the Window Heat Computer reset button that is located on the affected side.*

- . WINDSHIELD/WINDOW LEFT SIDE - WHC 1 (261 VU)
- . WINDSHIELD/WINDOW RIGHT SIDE - WHC 2 (262 VU).

## R ECAM ADVISORY CONDITIONS

| SYST             | CONDITIONS                                                                            | RECOMMENDED ACTION                                                                                                                                                                                    |
|------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CAB PRESS</b> | CAB VERT SPD<br>V/S > 1800 ft/min or<br>V/S < - 1800 ft/min                           | CPC changeover is recommended:<br>MODE SEL ..... MAN<br>● AFTER 3 seconds :<br>MODE SEL ..... AUTO                                                                                                    |
|                  | CAB ALT<br>alt ≥ 8800 ft                                                              | MODE SEL ..... MAN<br>Manual pressure control                                                                                                                                                         |
|                  | CAB DIFF PRESS<br>ΔP ≥ 1,5 PSI in phase 7                                             | LDG ELEV ..... MAN ADJUST<br>● If unsuccessful :<br>MODE SEL ..... MAN<br>Manual pressure control                                                                                                     |
| <b>COND</b>      | PACK LO FLOW<br>Pack flow not sufficient to satisfy temperature demand                | PACK FLOW ..... INCREASE                                                                                                                                                                              |
| <b>ELEC</b>      | IDG OIL TEMP<br>T > 142° C                                                            | Reduce IDG load, if possible (GALLEY or GEN OFF).<br>If required, restore when the temperature has dropped.<br>Restrict use of the generator to a short time, if temperature rises again excessively. |
| <b>FUEL</b>      | The difference between L and R wing fuel quantities is greater than 3000 kg (6614 lb) | FUEL MANAGEMENT ..... CHECK<br>If a fuel leak is suspected, refer to the FUEL LEAK procedure.<br>For limitations, see 3.01.28.                                                                        |
| <b>APU</b>       | LOW OIL LEVEL<br>The oil level is below 4.1 liters.                                   |                                                                                                                                                                                                       |
|                  | EGT high<br>(inhibited during APU start)                                              |                                                                                                                                                                                                       |
| <b>OXY/ DOOR</b> | PAX OXY ◁<br>200 < pressure < 1200 PSI                                                |                                                                                                                                                                                                       |

R

| SYST | CONDITIONS                                       | RECOMMENDED ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENG  | OIL PRESS > 90 PSI                               | <ul style="list-style-type: none"> <li>Under cold oil condition it is permissible to exceed 90 psi at high power before engine warm up.</li> <li>An oil pressure &gt; 90 psi during steady-state engine operation indicates an engine malfunction, unless all other engine parameters are normal.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|      | OIL TEMP<br>140°C < T < 155° C<br>for 15 minutes | <p>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.</p> <p><i>Note : If OIL TEMP rise follows thrust reduction, increasing thrust may reduce oil temperature.</i></p> <p>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 :</p> <ol style="list-style-type: none"> <li>1. <u>Low Speed</u> - Increase engine speed to increase fuel flow and thereby cool IDG oil.</li> <li>2. <u>High Speed</u> - Reduce generator load or turn off generator. If oil temperature continues to rise, mechanically disconnect IDG.</li> </ol> |
|      | OIL QTY < 1.8 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<br>N1 ≥ 5.7 units<br>N2 ≥ 5.6 units    | Refer to HIGH ENGINE VIBRATION procedure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

R LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

| A340  | FAILURE                                |                   | FLAPS<br>LEVER<br>POSITION<br>FOR LDG | △ VREF<br>APPR SPD<br>INCREMENT | MULTIPLY<br>LDG DIST<br>(CONF FULL)<br>BY |
|-------|----------------------------------------|-------------------|---------------------------------------|---------------------------------|-------------------------------------------|
| ELEC  | EMER CONFIG                            |                   |                                       |                                 |                                           |
|       | Without ice accretion                  |                   | 3                                     | –                               | 1.5                                       |
|       | With ice accretion                     |                   | 3                                     | 10                              | 1.75                                      |
|       | DC BUS 1+2 FAULT                       |                   |                                       |                                 |                                           |
|       | Without ice accretion                  |                   | NORM (1)                              | –                               | 1.5                                       |
|       | With ice accretion                     |                   | NORM (1)                              | 10                              | 1.75                                      |
| S/F   | DC BUS 2 FAULT                         |                   | NORM (1)                              | –                               | 1.1                                       |
|       | FLAPS<br>FAULT                         | 0 ≤ FLAPS < 1 + F | 2                                     | 25                              | 1.4*                                      |
|       |                                        | 1 + F ≤ FLAPS < 2 | 2                                     | 10                              | 1.2*                                      |
|       |                                        | FLAPS = 2         | 2                                     | 5                               | 1.1*                                      |
|       |                                        | 2 < FLAPS ≤ 3     | 3                                     | 5                               | 1.1*                                      |
|       |                                        | FLAPS > 3         | FULL                                  | –                               | –                                         |
|       | SLATS<br>FAULT                         | 0 ≤ SLATS < 1     | 2                                     | 35                              | 1.5*                                      |
|       |                                        | 1 ≤ SLATS < 2     | 3                                     | 10                              | 1.2*                                      |
|       |                                        | SLATS = 2         | 3                                     | 5                               | 1.1*                                      |
|       | NO FLAPS NO SLATS                      |                   | 1                                     | 50                              | 1.7*                                      |
| F/CTL | STAB CTL FAULT<br>(MAN TRIM NOT AVAIL) |                   | 2                                     | 15                              | 1.2*                                      |
|       | L/R/L + R ELEV FAULT                   |                   | 2                                     | 15                              | 1.2*                                      |
|       | RUD TRV LIM FAULT (2)                  |                   | 2 (2)                                 | 15 (2)                          | 1.2* (2)                                  |
|       | RUD TRV LIM FAULT<br>(engine-out) (2)  |                   | 2 (2)                                 | APPR SPD :<br>160 KT (2)        | 1.75* (2)                                 |
|       | RUDDER JAM                             |                   | 2                                     | 15                              | 1.2*                                      |
|       | RUDDER JAM (engine-out)                |                   | 2                                     | APPR SPD :<br>160 KT            | 1.75*                                     |
|       | ALTN/DIRECT LAW                        |                   | 3                                     | –                               | –                                         |
|       | PRIM 1+3, 2+3 FAULT                    |                   | NORM (1)                              | –                               | 1.1                                       |
|       | PRIM 1+2+3 FAULT                       |                   | 3                                     | –                               | 1.2                                       |
| SPLR  | ONE/TWO SPLRS per wing                 |                   | NORM (1)                              | –                               | NEGLECTIBLE                               |
|       | THREE/FOUR SPLRS<br>per wing           |                   | NORM (1)                              | –                               | 1.1                                       |
|       | FIVE/ALL SPLRS per wing                |                   | NORM (1)                              | –                               | 1.2                                       |

- (1) If CONF 3 is used when “NORM” is indicated in the table, multiply the resulting landing distance by an additional factor of 1.1.
- (2) This landing configuration and associated parameters only have to be applied if the Travel Limiter Unit (TLU) remains locked in the high-speed position after slats’ extension.

R

| A340          | FAILURE                                                                                      |                 | FLAPS<br>LEVER<br>POSITION<br>FOR LDG | △ VREF<br>APPR SPD<br>INCREMENT | MULTIPLY<br>LDG DIST<br>(CONF<br>FULL) BY |
|---------------|----------------------------------------------------------------------------------------------|-----------------|---------------------------------------|---------------------------------|-------------------------------------------|
| <b>FUEL</b>   | T TANK UNUSABLE<br>If CG > CG limit shown on<br>3.02.28 p 14                                 |                 | NORM (1)                              | 10                              | 1.2                                       |
| <b>HYD</b>    | G SYS LO PR                                                                                  |                 | NORM (1)                              | –                               | 1.1                                       |
|               | B SYS LO PR                                                                                  |                 | NORM (1)                              | –                               | NEGLIGIBLE<br>(2)                         |
|               | Y SYS LO PR                                                                                  |                 | NORM (1)                              | –                               | NEGLIGIBLE                                |
|               | G+B                                                                                          | SLATS < 1       | 2                                     | 35                              | 2.4                                       |
|               |                                                                                              | 1 ≤ SLATS < 2   | 3                                     | 20                              | 1.9                                       |
|               |                                                                                              | SLATS = 2       | 3                                     | 15                              | 1.8                                       |
|               | G +Y                                                                                         | 0 ≤ FLAPS < 1+F | 2                                     | 25                              | 1.5                                       |
|               |                                                                                              | 1+F ≤ FLAPS < 2 | 2                                     | 10                              | 1.2                                       |
|               |                                                                                              | FLAPS = 2       | 2                                     | 15                              | 1.3                                       |
|               |                                                                                              | 2 < FLAPS ≤ 3   | 3                                     | 15                              | 1.3                                       |
|               |                                                                                              | FLAPS > 3       | FULL                                  | 10                              | 1.2                                       |
|               | B +Y                                                                                         |                 | 2                                     | 15                              | 1.3                                       |
| <b>A. ICE</b> | If ice accretion :<br>WING LO PR/WING VALVE<br>NOT OPEN/WAI SYS FAULT                        |                 | NORM (1)                              | 10                              | 1.2                                       |
| <b>BRK</b>    | ANTI SKID                                                                                    |                 | NORM (1)                              | –                               | 1.4                                       |
|               | NORM BRK<br>(ALTN with ANTI SKID)                                                            |                 | NORM (1)                              | –                               | 1.1                                       |
|               | RELEASED                                                                                     |                 | NORM (1)                              | –                               | 1.5                                       |
| <b>NAV</b>    | TRIPLE ADR FAULT                                                                             |                 | 3                                     | 10                              | 1.2*                                      |
|               | DOUBLE ADR FAULT/<br>IR FAULT                                                                |                 | 3                                     | –                               | –                                         |
| <b>BLEED</b>  | If ice accretion :<br>WING LEAK / ENG BLEED<br>LEAK / ABNORM BLEED<br>CONFIG / BLEED LO TEMP |                 | NORM (1)                              | 10                              | 1.2                                       |

- (1) If CONF 3 is used when “NORM” is indicated in the table, multiply the resulting landing distance by an additional factor of 1.1.
- (2) If the green hydraulic system is supplied by the RAT, the landing distance coefficient to be applied is 1.4 on dry runway (A/SKID lost).

R

| A340 | FAILURE                          | FLAPS<br>LEVER<br>POSITION<br>FOR LDG | △ VREF<br>APPR SPD<br>INCREMENT | MULTIPLY<br>LDG DIST<br>(CONF FULL)<br>BY |
|------|----------------------------------|---------------------------------------|---------------------------------|-------------------------------------------|
| ENG  | SHUTDOWN                         | 3                                     | –                               | 1.1 (Eng 2 or 3)                          |
|      | THR LEVER FAULT                  | 3                                     | –                               | –                                         |
|      | REV UNLOCKED<br>(WITH BUFFET)    | 2                                     | 20                              | 1.3*                                      |
|      | REV UNLOCKED<br>(WITHOUT BUFFET) | 3                                     | –                               | –                                         |

### USE OF THE TABLE

- APPR SPD INCREMENT accounts for corrections due to the failure, and to the required landing configuration. These values are rounded off to cover the entire weight range. LDG DIST factors have to be applied to the actual LANDING DISTANCE WITHOUT AUTOBRAKE-CONFIGURATION FULL (4.03)
- For a single failure :
- Determine the required LDG CONF to be selected.
  - Determine the APPR SPD INCREMENT.
- R •  $VAPP = VREF + APPR SPD INCREMENT + WIND CORRECTION$  (refer to QRH page 2.40).
- Determine the LDG DIST factor.
- For multiple failures :
- Only SINGLE or PRIMARY failures should be combined. In case of a PRIMARY failure, the effect of the related SECONDARY failures are already taken into account in APPR SPD INCREMENT and LDG DIST factor computation.
  - Use the lowest LDG CONF.
  - Use the highest APPR SPD INCREMENT to compute VAPP.
  - LDG DIST factors : Multiply the landing distance factors together, except when all failures are indicated by an asterisk (\*). In this case, the highest factor has to be taken.
  - Examples :

|                              |            |                |                 |
|------------------------------|------------|----------------|-----------------|
| FLAPS FAULT<br>1 + F ≤ F < 2 | LDG CONF 2 | Δ VREF = 10 KT | LDG DIST × 1.2* |
| NORM BRK FAULT               | NORM CONF  | Δ VREF = 0     | LDG DIST × 1.1  |
| TOTAL                        | LDG CONF 2 | Δ VREF = 10 KT | LDG DIST × 1.32 |

$$VREF = 131 \text{ KT} \rightarrow VAPP = 131 + 10 + WIND (10 \text{ KT MAX})$$

$$141 \text{ KT} + WIND (10 \text{ KT MAX})$$

|                              |            |                |                 |
|------------------------------|------------|----------------|-----------------|
| L ELEV FAULT                 | LDG CONF 2 | Δ VREF = 15 KT | LDG DIST × 1.2* |
| FLAPS FAULT<br>1 + F ≤ F < 2 | LDG CONF 2 | Δ VREF = 10 KT | LDG DIST × 1.2* |
| TOTAL                        | LDG CONF 2 | Δ VREF = 15 KT | LDG DIST × 1.2  |

$$VREF = 139 \text{ KT} \rightarrow VAPP = 139 + 15 + WIND (5 \text{ kt MAX})$$



**WINDSHEAR**

A red flag "WINDSHEAR" message is displayed on each PFD, associated with an aural "WINDSHEAR" message, 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 only be rejected 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 use of full backstick, if demanded.*

*Note : If engaged, the autopilot will disengage, when  $\alpha$  greater than  $\alpha$  prot.*

- **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 a synthetic aural voice : "WINDSHEAR AHEAD, WINDSHEAR AHEAD".

##### ● **Before takeoff :**

- Delay takeoff, or select the most favorable runway.

##### ● **During takeoff run :**

- Reject takeoff.

*Note : The 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  $\alpha$  is greater than  $\alpha$  prot.*

#### ■ Landing :

Associated with a synthetic aural 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 use of full backstick, if demanded.

*Note : If engaged, the autopilot disengages, when  $\alpha$  is greater than  $\alpha$  prot.*

### W/S AHEAD amber

Apply precautionary measures, as indicated in the SUPPLEMENTARY TECHNIQUES (3.04.91).

VOLCANIC ASH ENCOUNTER

- Accomplish the following, while making a 180 degree turn :
- ATC ..... NOTIFY
  - A/THR ..... OFF
- This prevents autothrust from generating thrust variations.*
- THRUST (conditions permitting) ..... DECREASE
- To reduce ash ingestion.*
- If altitude permits, reduce thrust to idle : This maximizes the 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 (3.01.49).*
- APU bleed for engine relight is only available below FL 200.*
- ENGINE PARAMETERS ..... MONITOR
- Monitor EGT, in particular. If the EGT exceeds limits, it may become necessary to consider a precautionary engine shutdown and engine restart in flight.*
- AIRSPEED INDICATIONS ..... MONITOR
- If airspeed is unreliable or lost, use the UNRELIABLE SPEED INDICATION procedure.*
- Note : *If all engines flame out and speed indications are lost, use the ALL ENGINE FLAME OUT procedure to obtain the required pitch attitude for the optimum relight speed.*
- In case of an engine failure, switch off the wing anti-ice before engine restart.*

|                                                                                                                 |                                                                   |         |        |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>ABNORMAL AND EMERGENCY</b><br>DETAILED CABIN/COCKPIT EVAC PROC | 3.02.90 | P 1    |
|                                                                                                                 |                                                                   | SEQ 001 | REV 14 |

**GENERAL**

- R A successful outcome of an emergency situation depends, first of all, upon each crew member's perfect knowledge and execution of the duties assigned to him.
- R The captain should frequently check 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.
- R Since it is not possible to cover all the situations which 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.
- R 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 :

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C<br>A<br>P<br>T | <ul style="list-style-type: none"><li>– Is the last person to leave the cockpit : Proceeds to the cabin and helps with passenger evacuation, as necessary.</li><li>– Is the last person to leave the aircraft : Checks that all persons have evacuated the aircraft.</li><li>– Evacuates the aircraft, via the rear door, or any other available exit, if he/she cannot reach the rear door.</li><li>– On ground, he/she takes command of operations until rescue units arrive.</li></ul> |
| F<br>/<br>O      | <ul style="list-style-type: none"><li>– Proceeds to the cabin, and takes the emergency equipment.</li><li>– Evacuates the aircraft, using any available exit.</li><li>– Helps passengers on ground, and directs them away from the aircraft.</li></ul>                                                                                                                                                                                                                                    |

**CABIN CREW-ASSIGNED AREAS FOR EVACUATION**

R

| CABIN CREW<br>DESIGNATION | ASSIGNED JUMPSEAT<br>AND DOOR | ASSIGNED AREA   |
|---------------------------|-------------------------------|-----------------|
| 1 PURSER                  | DOOR 1 LH                     | FWD - ALL CABIN |
| 1 CABIN CREW              | DOOR 1 RH                     | FWD             |
| 2 CABIN CREWS             | DOOR 2 RH/LH                  | MID/FWD         |
| 2 CABIN CREWS             | DOOR 3 RH/LH                  | MID/AFT         |
| 2 CABIN CREWS             | DOOR 4 RH/LH                  | AFT/MID         |

R Note : These procedures are established for the minimum required number of 8 cabin  
R crews.

## COMMUNICATIONS

R

| 1. EMERGENCY CALL |         |                                                                                                                       |                                                                         |
|-------------------|---------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| FROM              | TO      | COMMUNICATION METHOD(5)                                                                                               | REMARKS                                                                 |
| <b>COCKPIT</b>    | CABIN   | – Press “EMER” CALL pushbutton on the CALL panel, or<br>– Passenger Address (PA) System : “PURSER TO COCKPIT PLEASE!” | The Purser must immediately go to the cockpit.                          |
| <b>CABIN</b>      | COCKPIT | – Interphone : “PRIO CAPT”                                                                                            | Any cabin crewmember can make such a call. The cockpit crew must reply. |

R

| 2. EMERGENCY ALERT |       |                                              |                                                                                                                                                                                                      |
|--------------------|-------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FROM               | TO    | COMMUNICATION METHOD(S)                      | REMARKS                                                                                                                                                                                              |
| <b>COCKPIT</b>     | 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                                                                                                                                                            |
| <b>COCKPIT</b>                | CABIN | – “NO SMOKING/SEATBELT” signs ON.<br>– PA system | For psychological reasons, the cockpit crew should be the first to inform of an intended emergency landing.                                                        |
| <b>PURSER</b>                 | CABIN | – CABIN LIGHTS 100 %<br>– PA System              | Purser informs passengers that they have to pay special attention to these warnings :<br>– “FINISH PREPARATION”<br>– “BRACE FOR IMPACT”<br>– “PASSENGERS EVACUATE” |

R

| 4. FINISH PREPARATION |       |                                                         |                                                                             |
|-----------------------|-------|---------------------------------------------------------|-----------------------------------------------------------------------------|
| FROM                  | TO    | COMMUNICATION METHOD(S)                                 | REMARKS                                                                     |
| <b>COCKPIT</b>        | 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                                                                 |
| <b>COCKPIT</b>      | 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                                                                                                                                       |
| <b>COCKPIT</b>                            | CABIN             | – PA System : “PASSENGERS EVACUATE !”<br>– Activate EVAC signals.          | The cockpit crew orders an immediate evacuation, and the cabin crew directs passengers to all available exits.                                |
| <b>CABIN</b>                              | COCKPIT AND CABIN | – EVAC SIGNAL SYSTEM on FWD ATTND panel (FAP)<br>– 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. |
| <b>CABIN</b>                              | CABIN             | – Verbal                                                                   | The cabin crew stands up and shouts :<br>– “SEATBELTS OFF!”<br>– “LEAVE EVERYTHING!”<br>– “GET OUT!”<br>– “COME THIS WAY!”                    |

R

| 7. EVACUATION NOT REQUIRED |       |                                                          |                                                                                                                               |
|----------------------------|-------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| FROM                       | TO    | COMMUNICATION METHOD(S)                                  | REMARKS                                                                                                                       |
| <b>COCKPIT</b>             | 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. |

R

ON GROUND EVACUATION

R

COCKPIT CREW PROCEDURES

- R>

—

The cockpit crew notifies the cabin crew of the nature of the emergency, and states intentions.
- R>

—

The cockpit crew uses the Passenger Address system, to make an appropriate announcement, such as : “PASSENGERS EVACUATE”, and presses the EVAC COMMAND pushbutton.

R

CABIN CREW PROCEDURES

- R>

When the cabin receives the order to evacuate, each cabin crewmember must proceed as follows :
- R>

—

STAND UP AND SHOUT . . . . . “UNFASTEN SEATBELTS”
- R>

—

OUTSIDE CONDITIONS . . . . . CHECK

R>

●

If outside conditions are safe :

R>

—

DOOR IN ARMED POSITION . . . . . OPEN FIRMLY

R>

—

SHOUT . . . . . “COME THIS WAY”

R>

●

If the door does not open automatically :

R>

—

DOOR . . . . . PUSH AND OPEN MANUALLY

R>

—

SLIDE (or SLIDERAFT) DEPLOYMENT . . . . . CHECK FULL DEPLOYMENT

It takes approximately four seconds for the slide (or slideraft) to deploy.

R>

●

If the slide (or slideraft) does not automatically inflate :

R>

—

RED, MANUAL INFLATION HANDLE . . . . . PULL

The red, manual inflation handle is located on the right-hand side of the slide (or slideraft) girt extension.

R>

—

ORDER . . . . . “PASSENGERS EVACUATE”

R>

—

PASSENGER EVACUATION . . . . . EXPEDITE

ARG ALL



- R● If the slide (or slideraft) becomes unserviceable :
- R— PASSENGER EVACUATION . . . . . STOP
- R— PASSENGERS TO ANOTHER USABLE EXIT . . . . . REDIRECT
- R— TOTAL ZONE EVACUATION . . . . . CHECK
- R— CABIN CREW . . . . . EVACUATE
- R— PASSENGERS AWAY FROM THE AIRCRAFT . . . . . DIRECT
- R● If outside conditions are unsafe :
- R— EXIT DOOR . . . . . BLOCK
- R— PASSENGERS TO NEAREST USABLE EXIT . . . . . REDIRECT

EVACUATION ON WATER

CABIN CREW RESPONSIBLE FOR TYPE “A” 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.
- ORDER . . . . . “REMOVE SHOES”

● If the Type A door is usable :

- DOOR IN ARMED POSITION . . . . . OPEN
- SLIDERAFT . . . . . DEPLOY
- RED, MANUAL INFLATION HANDLE . . . . . PULL  
Do not wait for automatic inflation of the slideraft.

■ If the water level is close to the door sill :

The slideraft inflates on the water.

- SLIDERAFT . . . . . LEAVE ATTACHED TO CABIN FLOOR
- PASSENGER LIFEVESTS . . . . . INFLATE WHEN BOARDING SLIDERAFT
- PASSENGERS . . . . . BOARD SLIDERAFT
- TOTAL ZONE EVACUATION . . . . . CHECK
- LAST CREWMEMBER . . . . . BOARD SLIDERAFT
- SLIDERAFT . . . . . SEPARATE FROM DOOR SILL  
The last crewmember must separate the slideraft from the door sill, and board with all the necessary safety equipment.
- MOORING LINE . . . . . CUT

— **SURVIVAL KIT** . . . . . **RETRIEVE**  
The survival kit is attached to the slideraft via a lanyard.

■ **If the water level is too far away from the door sill :**

— **SLIDERAFT** . . . . . **DISCONNECT FROM DOOR SILL**  
The slideraft remains tied to the aircraft by a 6-meter (20 feet) mooring line.

— **MOORING LINE** . . . . . **HOLD**  
To keep the slideraft close to the exit, hold the mooring line.

— **PASSENGER LIFEVESTS** . . . . . **INFLATE WHEN BOARDING SLIDERAFT**

— **PASSENGERS** . . . . . **BOARD SLIDERAFT**

— **TOTAL ZONE EVACUATION** . . . . . **CHECK**

— **LAST CREWMEMBER** . . . . . **BOARD SLIDERAFT**  
The last crewmember must board with all the necessary safety equipment.

— **MOORING LINE** . . . . . **CUT**

— **SURVIVAL KIT** . . . . . **RETRIEVE**  
The survival kit is attached to the slideraft via a lanyard.

**CABIN CREW RESPONSIBLE FOR EMERGENCY EXIT 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”**

— **ORDER** . . . . . **“REMOVE SHOES”**

Note : *Evacuation is usually done through the passenger doors. However, if one of the passenger doors is not usable, Exit 3 door (Type 1) may be used for evacuation, and the slide may be used as a flotation device.*

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## FOREWORD

- R 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.

## PRELIMINARY

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 TECHNIQUES Chapter (3.04) and in the SPECIAL OPERATIONS Chapter (2.04).

## NORMAL CHECKLIST

- After completing a given procedure, the flight crew uses the related normal checklist to ascertain that they have checked the safety points.
- The crewmember that reads the checklist should announce completion of the checklist (Example : "LANDING CHECKLIST COMPLETED").
- R The normal checklist developed by Airbus, takes advantage of the ECAM system and only includes the items that may directly impact safety and efficiency if done incorrectly.
- All normal checklists are requested by the PF, and read by the PNF. They are of the challenge/response type. The responding crewmember only responds to the challenge after having checked the configuration. If the configuration does not agree with the checklist response, he must take corrective action before answering.

If corrective action is not possible, the pilot modifies the response to reflect the actual situation (specific answer). Whenever necessary, the other crewmember crosschecks the validity of the response. The challenger waits for the response, before proceeding any further.

For the checklist items identified “AS RQRD”, the response states the actual condition or configuration of the system (for example “ANTI ICE”.....“ON”).

*Note : Normal checklists are not “TO DO” lists. The flight crew should have performed the actions, or checks, prior to going through the checklist.*

*Obviously, the flight crew must take corrective action on any item that is not in the proper condition, when it reads the list.*

COMMUNICATION

- R · Cross-cockpit communications :
- Cross-cockpit communication is VITAL for any two-pilot crew. Anytime a crewmember makes any adjustments or changes to any information or equipment on the flight deck, he must advise the other crewmember and obtain an acknowledgement. This includes such items as : FMGS alterations, changes in speed or Mach, the tuning of navigation aids, flight plan modifications, and the selection of such systems as anti-ice and pack low flow.
- The flight crew must use headsets from engine start up to top of climb, and from top of descent until the aircraft is parked.
- R · Sterile cockpit rule :
- R Below 10 000 ft, any non-essential conversation within the cockpit and between the
- R cabin and cockpit crews should be avoided. Adherence to this policy facilitates effective
- R crew communication as well as communication of emergency or safety related
- R information by cabin crew.

USE OF THE FLIGHT MANAGEMENT AND GUIDANCE SYSTEM

- The FMGC has 3 functions :
- The two FG (Flight Guidance) functions :
    - Autopilot (AP) and Flight Director (FD)
    - Autothrust (A/THR)
  - The FM (Flight Management) function.

AUTOPILOT AND FLIGHT DIRECTOR

The design objective of the autopilot and flight director is to provide assistance to the crew throughout the flight :

- By freeing up the Pilot Flying from routine handling tasks, and thus providing the time and resources to assess the overall operational situation.
- By providing the Pilot Flying with adequate attitude or flight path orders, with the flight director symbol on the Primary Flight Display, so as to facilitate the accurate handling of the aircraft.

The AP/FD guides the aircraft along the intended flight path, or at the intended speed, according to the guidance modes engaged by the pilot on the Flight Control Unit (FCU) (Example : NAV-HDG-V/S...).

The FCU is the short-term interface between the pilot and the FMGC, used to select guidance targets and arm/engage guidance modes.

There are 2 types of modes and associated targets :

- Managed modes and targets : The aircraft is guided along the FMS lateral and vertical flight plan and speed profile. These modes and targets are armed or engaged by pressing the FCU knobs.
- Selected modes and targets : The aircraft is guided by selected targets according to the modes selected on the FCU. These modes and targets are armed or engaged by the pilot by turning and pulling the FCU knobs.

The PF’s task is to set the desired modes and targets to fly the aircraft where he wants to go.

- If the autopilot is used, the PF may select the modes on the FCU, himself.
- If the autopilot is not used, the PF asks the PNF to select the intended modes and targets on the FCU.

The armed and engaged modes are indicated on the Flight Mode Annunciator (FMA) on top of the PFD ; the targets (SPD, ALT, HDG...) are indicated on the associated scales on the PFD.

- The crew must check the FCU-selected targets on the PFD.
- The crew must monitor the engaged/armed modes on the FMA.

If the autopilot and/or flight director do not guide the aircraft where the crew is expecting:

- The PF should disengage the autopilot using the instinctive disconnect pushbutton on the side-stick, or both pilots should delete the flight director symbols from the PFDs with the flight director pushbuttons located on the EFIS control panel, and fly the aircraft manually.
- The PF should not disengage the autopilot by sidestick override, except if instinctive reaction.

The autopilot may be used from after takeoff down to a late stage of the approach (including autoland when permitted).

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

- R – In case of engine failure, including CATII/CATIII ILS approaches and fail-passive  
R automatic landings (or fail-operational automatic landings, in case of an outer engine  
R failure).
- In case of abnormal configuration, down to 500 feet AGL in all modes.

When the autopilot is engaged, there is no backdriven feedback system to the sidestick, since this is no longer necessary with fly-by-wire controls.

When the PF handflies the aircraft using the flight director, he must obey the flight director orders ; in other words, the crossbars must be centered, or the flight path vector must be on the flight path director symbol so as to fly according to the selected modes and targets.

- If the PF does not wish to fly the flight director orders, both pilots must delete the flight director symbols from the PFDs.
- When flying a visual approach, the flight directors should be deselected.

|                                                                                                                                               |                                      |  |         |        |
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## **AUTOTHRUST (A/THR)**

The A/THR'S design objective is to provide assistance to the crew for thrust management throughout the flight.

The A/THR may be engaged in one of the following modes, which automatically depend on the AP/FD vertical modes :

- THRUST mode : The A/THR maintains a fixed thrust level (e.g. THR CLB or THR IDLE) when the AP/FD guides the aircraft in climb or descent at a constant speed (e.g. CLB or DES modes)
- SPEED/MACH mode : The A/THR varies the thrust, so as to maintain a target speed, when the AP/FD guides the aircraft on a given trajectory (e.g. V/S, ALT, G/S modes).

When the A/THR is active, the thrust levers are set to detents (e.g. MCT, CLB) ; they remain in this fixed position, while the A/THR varies or sets the thrust according to the active mode.

When the A/THR is active, the thrust lever position defines the maximum thrust available for the A/THR.

The crew must monitor the A/THR to ensure correct operation :

- On the PFD, by checking the active mode on the FMA, the current speed versus the target speed and, most importantly, the speed trend vector on the speed scale.
- On the ECAM, by checking the thrust command symbols on the engine thrust indication (N1 or EPR).

In case the PF is not satisfied with the A/THR's operation, he must disengage it using one of the instinctive disconnect pushbuttons located on the thrust levers.

He can then command the thrust manually, which is totally conventional.

R The A/THR may be used from thrust reduction, after takeoff, down to flare, at landing.

The A/THR may be used in most failure cases, when available, in case of :

- One engine failure, without any restrictions.
- Abnormal configuration, with selected target speed for the approach.

## **FLIGHT MANAGEMENT SYSTEM (FMS)**

The FMS is designed to provide assistance to the crew for :

- Navigation,
- Flight planning,
- Aircraft performance (optimum speeds/altitudes),
- Predictions.

The FMS is an important long-term planning and management tool, linked to the AP/FD.

When the AP/FD is engaged in managed modes, the aircraft is guided along the FMS flight plan, using the FMS target speeds.

The Multipurpose Control and Display Unit (MCDU) is used to insert and retrieve data to/from the FMS.

The FMS MCDU is a major interface between the pilots and the FMS. However, the various FMS entries required at successive flight phases should not distract the crew from general flight conduct and duties.



|                                                                                                                                            |                                                                 |         |        |
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The prime concern for the flight crew should be :

- is the aircraft flying as expected NOW ?
- what is the aircraft expected to fly NEXT ?

If any doubt is raised about the aircraft current trajectory, or proposed target speed..., the PF must immediately select the appropriate modes and targets on the FCU (which automatically disengages the managed modes).

Subsequently and if time permits, the PNF will analyze and correct whatever might have gone wrong on the MCDU.

#### GENERAL RULES FOR GOOD USE OF THE FMGS

- Monitor the AP/FD/ATHR modes and engagement status on the FMA
- Any FMA modification must be announced.
- Monitor the result of any target selection performed on the FCU, on the related scales of the PFD (e.g. SPD target, on SPD scale)
- Monitor the AP/FD/ATHR resulting guidance, on the basic flight instrument scales of the PFD (HDG, SPD, ALT, attitude...)
- If the PF is not satisfied with the guidance he must :
  - REVERT TO BASICS
  - FLY THE AIRCRAFT where he wants to go.

The FMGS description and procedures are provided in the FCOM VOL 4 called FMGS PILOT'S GUIDE.

#### TAKING OVER THE FLIGHT CONTROLS

Because of the nature of “fly by wire” and “sidestick” systems, the PNF should not make control inputs to correct the PF's handling of the aircraft.

If a take-over becomes necessary during flight, the PNF must call clearly “I have control”, and press the sidestick priority pushbutton, keeping it pressed until the transfer of control is clearly established.

### 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 nav aids, availability of runways and approach aids etc, all of which may affect the final fuel requirement.

### 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 :
  - Is filled in and filed, in accordance with the prescribed procedures,
  - 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.

R

**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 2.05.20)

- R 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 %). If flight above optimum (up to ceiling) is intended the increase in consumption may reach 4 %.

**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 2.05.40. Although the aircraft will fly at ECON MACH that is based on the cost index, the 0.82 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.

\* — **APU AREA** . . . . . **CHECK**  
Observe that the APU inlet and outlet are clear.

**PRELIMINARY COCKPIT PREPARATION**

Items marked by (\*) are the only steps to be completed during a transit stop.  
The following procedure, performed by the PNF, ensures that all required safety 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**

- **ENG MASTER 1, 2, 3 and 4 . . . . . OFF**
- **ENG START 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 and APU BAT . . . . . CHECK OFF**
- **BAT 1 and 2 and APU BAT VOLTAGE . . . . . CHECK ABOVE 25.5 V**  
Battery voltage above 25.5 V ensures a charge above 50 %. After the check, the selector should remain on APU position to avoid discharge of BAT 1 or 2.

● **If battery voltage is below 25.5 V :**  
a charging cycle of about 20 minutes is required.

- **BAT 1 and 2 and APU BAT . . . . . AUTO**
- **EXT PWR . . . . . ON**  
Check on ECAM ELEC DC page, battery contactors closed and batteries charging.

● **after 20 minutes :**

- **BAT 1 + 2 and APU BAT . . . . . OFF**
- **BAT 1 and 2 and APU BAT VOLTAGE . . . . . CHECK ABOVE 25.5 V**  
After the check, the selector should remain on APU position.

● **If battery voltage is above 25.5 V :**

— **BAT 1 and 2 and APU BAT . . . . . AUTO**

*Note :* The ground horn will be triggered, associated with the ventilation **EXTRACT FAULT** illumination and **ECAM** warning after 5 minutes when the aircraft is supplied with batteries only.

■ **If the aircraft has been electrically supplied during the 6 last hours**

— **BAT 1 and 2 and APU BAT . . . . . AUTO**

*Note :* In case of APU start on battery only, perform the following check :

- BAT 1 and 2 and APU BAT. . . . . **AUTO**
- BAT 1 and 2 and APU BAT. . . . . **CHECK ABOVE 23.5 V**

*If one battery voltage is lower than 23,5 V, there is a risk of aborted APU start. A charging cycle of the battery is required.*

— **EXT PWR (if AVAIL light is on) . . . . . ON**  
AVAIL light goes out.

*Note :* 1. When only one electrical power is available it is recommended to connect **EXT PWR A** since :

- **EXT PWR B** does not permit **GND/FLT** buses to be supplied directly without energizing the total aircraft network.
- **EXT PWR B** cannot be used simultaneously with **APU GEN**.

2. If **AVAIL** light does not come on (**EXT PWR** connected) or **ON/AVAIL** lights go out during **EXT PWR** operation, the **GPCU** protection has tripped. Reset using the **EXT PWR** pushbutton.

**HYD**

**WARNING**

Do not pressurize hydraulic systems without clearance from ground crew.

**APU FIRE**

— **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.
  - APU FIRE pushbutton lighted red.
  - SQUIB and DISCH lights on.

**APU START**

- **APU MASTER switch . . . . . ON**  
 ON light comes on.  
 APU page appears on ECAM.

*Note : If only batteries are supplying, press the APU pushbutton on the ECAM control panel during the start sequence (to permit the ECAM upper display to display the APU page).*

● **When N and EGT amber crosses have disappeared :**

- **APU START . . . . . ON**  
 FLAP OPEN indication appears on the ECAM APU page.  
 On the 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/OXY pages replaces the ECAM APU page.

R *Note : Bleed pressure up to 12 psi, with possible fluctuations, can be observed on the*  
 R *ECAM APU and BLEED pages in cold weather conditions (below approx. 10°C).*

**ELEC**

- \*— **EXT PWR (if ON) . . . . . AS RQRD**  
 External power may be kept on to reduce APU load, especially in hot conditions.

**COCKPIT LIGHTS**

- \*— **COCKPIT LIGHTS . . . . . AS RQRD**
  - Set STBY COMPASS, DOME, ANN LT switches, as required.
  - Set FLOOD LT and INTEG LT, as required.

**PARKING BRAKE**

- \* — **PARKING BRAKE** . . . . . **ON**  
The parking brake must be on during the exterior inspection to allow the flight crew to check brake wear indicators.
- \* — **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 blue hydraulic system to recharge the brake accumulators.

— **WARNING** —

Blue hydraulic system is pressurized from blue 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").
- **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 pressure must be between 2400 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 FIRE TEST pushbutton** . . . . . **PRESS**

**Check :**

- APU FIRE warning on ECAM + CRC + MASTER WARN light.
- APU FIRE pushbutton lighted red.
- SQUIB and DISCH lights on.

## APU START

- **APU MASTER switch** . . . . . **ON**

ON light comes on. APU page appears on ECAM.

Note : If only batteries are supplying, press the APU pushbutton on the ECAM control panel during the start sequence (to permit the ECAM upper display to display the APU page).

- When N and EGT amber crosses have disappeared :

- **APU START** . . . . . **ON**

FLAP OPEN indication appears on the ECAM APU page. On the 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/OXY pages replaces the ECAM APU page.

R Note: A bleed pressure up to 12 psi can be observed on the ECAM APU and  
R BLEED pages in cold weather conditions (below approx. 10°C) when the  
R APU bleed valve is indicated closed.

**ELEC**

- \* — **EXT PWR (if ON)** . . . . . **AS RQRD**

External power may be kept on to reduce APU load, especially in hot conditions.

## COCKPIT LIGHTS

- \*— **COCKPIT LIGHTS** . . . . . **AS RQRD**

- Set STBY COMPASS, DOME, ANN LT switches, as required.
- Set FLOOD LT and INTEG LT, as required.

### PARKING BRAKE

- \* — **PARKING BRAKE** . . . . . **ON**  
 The parking brake must be on during the exterior inspection to allow the flight crew to check brake wear indicators.
  
- \* — **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 blue hydraulic system to recharge the brake accumulators.

— **WARNING** —
 

Blue hydraulic system is pressurized from blue 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").*
- **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 pressure must be between 2400 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.

**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**

- **Cockpit and cabin temperature selectors . . . . . AS RQRD**  
Full range temperature 24 ± 6°C (75 ± 11°F).  
The temperature selection recommended for the cabin is 21.5° C (about 10 o'clock).

**CARGO AIR COND ◀**

- **SELECTORS . . . . . AS RQRD**  
Set temperature selectors as required.  
Set forward cargo cooling selector to OFF, unless livestock, plants, food, or dry ice are carried.

**ELEC**

- **Scan and check that there are no amber lights, except GEN FAULT lights.**

**VENT**

- Check all lights off.

**\* 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.
- R \* — **DOOR** . . . . . **PRESS**  
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 engine oil quantity is at, or above, 10 qt + estimated consumption (maximum average estimated consumption = 0.6 qt/h) limited to 19.6 qt (corresponding to the tank overflow level).

**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 (if installed and operative)**

- **Pressure and quantity indicators . . . . . CHECK**

— CAUTION —  
Never use rain repellent to wash the windshield and never use it on a dry windshield.

# **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 crewmember before each originating flight.

Items marked by (\*) must be performed again by a flight crewmember before each flight.

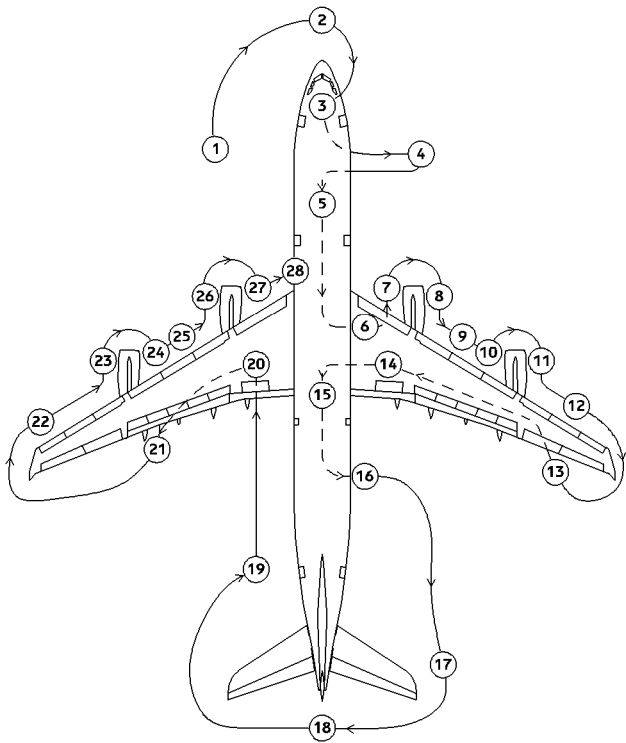
The parking brake must be ON during the exterior inspection, to allow the flight crew to check brake wear indicators.

- Check structure for no impact damage.
- Check that there is no evident fuel, oil, or hydraulic leaks.
- Check that all ground access doors are closed.

## **WARNING**

If a landing gear door is open, contact the maintenance crew before applying hydraulic power.

# **EXTERIOR WALKAROUND**



### ① LH FWD FUSELAGE

- Outflow valve . . . . . CONDITION
- Static ports . . . . . CLEAR
- \* — AOA probe . . . . . CONDITION
- R — Wing and engine scan lights . . . . . CONDITION

### ② NOSE SECTION

- \* — Pitot probes . . . . . CONDITION
- \* — TAT probes . . . . . CONDITION
- \* — Radome and latches . . . . . CONDITION/LATCHED
- Avionics compartment door ◁ . . . . . CLOSED
- Ice detection probes . . . . . CONDITION
- Crew oxygen discharge indicator . . . . . GREEN

### ③ NOSE L/G

- Taxi and turn off lights . . . . . CONDITION
- \* — Nose wheel chocks . . . . . IN PLACE
- \* — Wheels and tires . . . . . CONDITION
- Nose gear structure . . . . . CONDITION
- Hydraulic lines and electrical wires . . . . . CONDITION
- Wheel well . . . . . CHECK
- Safety pin . . . . . REMOVED
- Ground electrical power door (if not required) . . . . . CLOSED
- Avionic ventilation overboard valve . . . . . CONDITION

### ④ RH FWD FUSELAGE

- \* — AOA probes . . . . . CONDITION
- PAX oxygen dispatch indicator ◁ . . . . . GREEN
- Cargo loading operation access door . . . . . CLOSED
- Cargo door operation access door . . . . . CLOSED
- Cargo door . . . . . CLOSED
- Static ports . . . . . CLEAR
- Antennas . . . . . CONDITION
- \* — Drain mast . . . . . CONDITION
- R — Wing and engine scan lights . . . . . CONDITION

5 LOWER CENTER FUSELAGE

- RAM air inlet flap . . . . . CONDITION
- LP ground connection door . . . . . CLOSED
- Anticollision light . . . . . CHECK
- Pack air intakes and outlets . . . . . CLEAR
- HP ground connection door . . . . . CLOSED
- CTR TK magnetic fuel level . . . . . FLUSH
- Ground hydraulic connection blue . . . . . CLOSED
- Left L/G ground opening handle access door . . . . . CLOSED
- Center L/G ground opening handle access door . . . . . CLOSED
- Right L/G ground opening handle access door . . . . . CLOSED
- Ground hydraulic connection yellow . . . . . CLOSED

6 RH CENTER WING

- Inner tank magnetic fuel levels R1 and R2 . . . . . FLUSH
- Fuel water drain valves (inner tank) . . . . . NO LEAK
- Water drain valve door . . . . . CLOSED
- Landing light . . . . . CONDITION
- \*— Slat 1 . . . . . CONDITION

7 ENG 3 LH SIDE

- Oil fill access door . . . . . CLOSED
- \*— Fan cowl door . . . . . CLOSED/LATCHED
- \*— Drain mast . . . . . CONDITION/NO LEAK
- \*— Engine inlet and fan blades . . . . . CHECK

8 ENG 3 RH SIDE

- ECU cooling air inlet . . . . . CLEAR
- Start Valve handle access and pressure relief door . . . . . CLOSED
- Turbine exhaust . . . . . CLEAR



⑨ RH WING LEADING EDGE

- R
- Refuel coupling door . . . . . CLOSED
  - Refuel control panel ◁ . . . . . CLOSED
  - Magnetic fuel levels R3, R4, R5, and R6 . . . . . FLUSH
  - Fuel water drain valve (outer tank) . . . . . NO LEAK
  - RAT doors . . . . . CLOSED
  - \* — Slats 2, 3, 4 . . . . . CONDITION

⑩ ENG 4 LH SIDE

Identical to ENG 3

⑪ ENG 4 RH SIDE

Identical to ENG 3

⑫ RH WING TIP

- R
- R
- \* — Fuel ventilation overpressure disc . . . . . INTACT
  - Wing fence . . . . . CONDITION
  - Magnetic fuel levels R7 and R8 . . . . . FLUSH
  - Fuel water drain valve (surge tank) . . . . . NO LEAK
  - Surge tank air inlet . . . . . CLEAR
  - \* — Slats 5, 6, 7 . . . . . CONDITION
  - Navigation light . . . . . CONDITION
  - Antennas on top of fuselage . . . . . CONDITION

⑬ RH WING TRAILING EDGE

- Static dischargers . . . . . CHECK
- \* — Control surfaces . . . . . CONDITION
- \* — Flaps and fairings . . . . . CONDITION
- Jettison outlet . . . . . NO LEAK

⑭ RH LANDING GEAR

- \* — Chocks . . . . . REMOVED
- \* — Wheels and tires . . . . . CONDITION
- Brakes and brake wear indicators . . . . . CONDITION
- Hydraulic lines . . . . . CHECK
- Landing gear structure . . . . . CHECK
- Downlock springs . . . . . CHECK
- Safety pin . . . . . REMOVED

15 CENTER L/G AND FUSELAGE

- R
- \*— Wheels and tires . . . . . CONDITION
  - Hydraulic lines . . . . . CHECK
  - Landing gear structure . . . . . CHECK
  - Safety pin . . . . . REMOVED
  - Refuel electric control panel . . . . . CLOSED
  - APU FUEL Drain . . . . . CONDITION/NO LEAK
  - Ground hydraulic connection green and reservoir filling . . . . . CLOSED

16 RH AFT FUSELAGE

- Antennas . . . . . CONDITION
- Drain mast . . . . . CONDITION
- Potable water aft drain panel . . . . . CLOSED
- Cargo loading operation access door . . . . . CLOSED
- Cargo door operation access door . . . . . CLOSED
- Cargo door . . . . . CLOSED
- Bulk door . . . . . CLOSED
- \*— Potable water service panel . . . . . CLOSED
- \*— Waste service panel . . . . . CLOSED

17 \* TAIL

- \*— Stabilizer, elevator, fin and rudder . . . . . CONDITION
- Surge tank air inlet . . . . . CLEAR
- Fuel water drain valves (3) . . . . . NO LEAK
- Static dischargers (elevator rudder) . . . . . CHECK
- \*— Lower fuselage structure (tail impact on runway) . . . . . CONDITION
- Flight records access door . . . . . CLOSED
- \*— Fuel ventilation overpressure disc . . . . . INTACT

18 APU

- Access door . . . . . CLOSED
- Air intake . . . . . CONDITION
- Exhaust . . . . . CLEAR
- Navigation light . . . . . CONDITION
- Fire extinguishing overpressure indication (red disc) . . . . . IN PLACE

19 LH AFT FUSELAGE

- \*— Stabilizer, elevator, fin and rudder . . . . . CONDITION
- Outflow valve . . . . . CONDITION

**20** LH LANDING GEAR AND FUSELAGE

- \* — Chocks . . . . . REMOVED
- \* — Wheels and tires . . . . . CONDITION
- Brakes and brake wear indicator . . . . . CONDITION
- Hydraulic lines . . . . . CHECK
- Landing gear structure . . . . . CHECK
- Downlock spring . . . . . CHECK
- Safety pin . . . . . REMOVED

**21** LH WING TRAILING EDGE

- Jettison outlet . . . . . NO LEAK
- \* — Flaps and fairings . . . . . CONDITION
- \* — Control surfaces . . . . . CONDITION
- Static dischargers . . . . . CHECK

**22** LH WING TIP

- Navigation light . . . . . CONDITION
- \* — Slats 7, 6, 5 . . . . . CONDITION
- Surge tank air inlet . . . . . CLEAR
- Fuel water drain valve (surge tank) . . . . . NO LEAK
- Magnetic fuel levels L8 and L7 . . . . . FLUSH
- R — Wing fence . . . . . CONDITION
- R \* — Fuel ventilation overpressure disc . . . . . INTACT

**23** ENG 1 LH SIDE

Identical to ENG 3

**24** ENG 1 RH SIDE

Identical to ENG 3

**25** LH WING LEADING EDGE

- Magnetic fuel levels L6, L5, L4 and L3 . . . . . FLUSH
- R — Fuel water drain valve (outer tank) . . . . . NO LEAK
- \* — Slats 4, 3, 2 . . . . . CONDITION
- Refuel coupling door . . . . . CLOSED
- Refuel control panel ◀ . . . . . CLOSED

26 ENG 2 LH SIDE

Identical to ENG 3

27 ENG 2 RH SIDE

Identical to ENG 3

28 LH CENTER WING

- Inner tank magnetic fuel levels L2 and L1 . . . . . FLUSH
- Fuel water drain valves (inner tank) . . . . . NO LEAK
- Water drain valve panel . . . . . CLOSED
- Landing light . . . . . CONDITION
- \* – Slat 1 . . . . . CONDITION

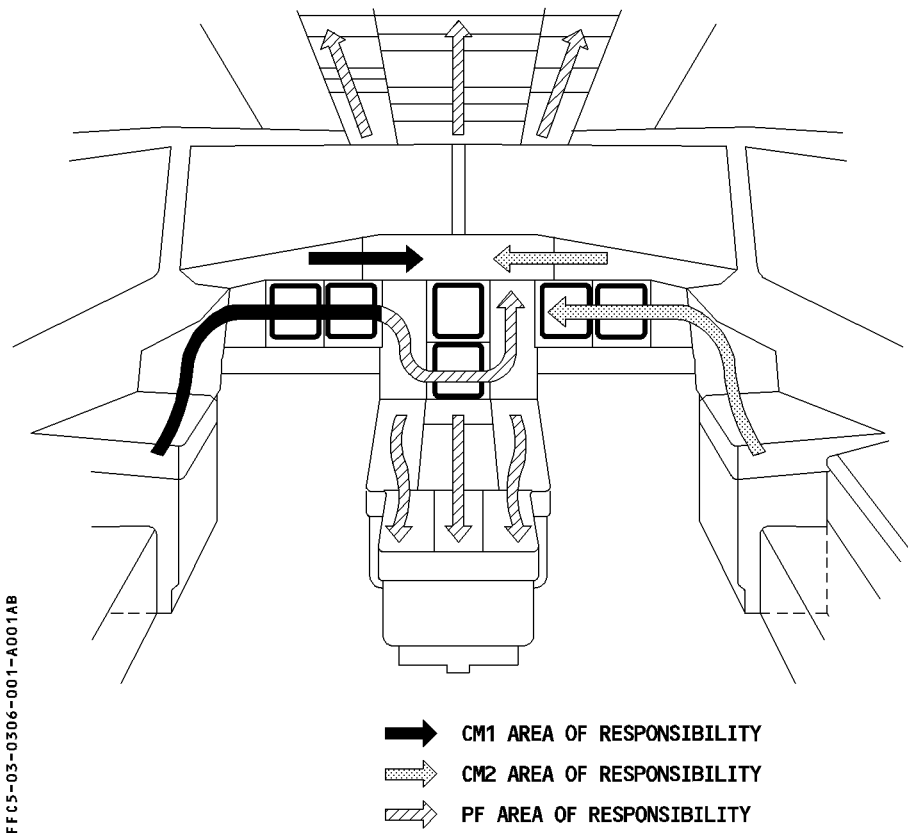
## INTRODUCTION

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



- \* — **GEAR PINS and COVERS** . . . . . **CHECK**  
Check that four 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

**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 flight crew changes
      - \* 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.
    - For more information on ADIRS OPERATION, refer to SUPPLEMENTARY TECHNIQUES, 3.04.34.

**EXT LT**

- **EXTERIOR LIGHTS** . . . . . **AS RQRD**  
Set STROBE switch to AUTO, the BEACON switch to OFF, and the remaining switches as required.

**\* SIGNS**

\* — SEAT BELTS . . . . . ON/AUTO

\* — NO SMOKING . . . . . AUTO

*Note : Leaving the NO SMOKING selector ON prevents the emergency batteries from charging.*

\* — EMER EXIT LT . . . . . ARM

**CABIN PRESS**

— LDG ELEV . . . . . AUTO

— VALVE SEL . . . . . BOTH

**\* AIR COND**

\* — PACK FLOW . . . . . AS RQRD

Select :

LO : if less than 60 % of the seats in the economy class are occupied, but not more than 200 passengers in all classes

HI : for abnormally hot and humid conditions

NORM : for all other normal operating cases.

If APU is supplying, pack controllers select HI flow automatically, independently of selector position.

**ELEC**

— ECAM ELEC DC PAGE . . . . . CALL

— BAT 1 and 2 and APU BAT . . . . . OFF then ON

R 10 seconds after selecting ON, check on the ECAM ELEC page that the three battery  
R charge currents are below 60 A and decreasing.

**FUEL**

— T. TANK . . . . . AUTO

**ENG 1 – ENG 2 – ENG 3 – ENG 4 FIRE**

- **ENG 1, 2, 3 and 4 FIRE pushbuttons . . . . . CHECK IN and GUARDED**
- **AGENT 1 and AGENT 2 lights . . . . . CHECK OUT**
- **TEST pushbutton . . . . . PRESS**
  - Check :
    - ENG 1 FIRE warning on the ECAM + CRC + MASTER WARN light
    - ENG 2, 3 and 4 FIRE indication on the ECAM MEMO
    - ENG FIRE pushbutton is red.
    - SQUIB and DISCH lights on.
    - FIRE light (on ENG panel) on.

**DATA LOADER**

- **DATA LOADER . . . . . CHECK OFF**

**MAINTENANCE PANEL**

- **Check that all lights are out. If not, select associated pushbutton to turn off.**

**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 the volume at or above medium range.

**CVR**

- **CVR TEST . . . . . PRESS**
  - Check that at least one green LED is illuminated on the test result indicator.

**RMP**

- **RMP . . . . . ON**
- **Green NAV light . . . . . CHECK OFF**
- **SEL light . . . . . CHECK OFF**
- **COM FREQUENCIES . . . . . TUNE**
  - Use VHF 1 for ATC (only VHF 1 is available in emergency electrical configuration), VHF 2 for ATIS and company frequencies. VHF 3 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** ◀

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 the 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 to SEL NAVAID page, and deselect the related navaid.

\* — **FLIGHT PLAN INITIALIZATION** . . . . . **COMPLETE**

- Press INIT key.
- Insert CO RTE or city pair, and check FROM/TO.
- Check/modify ALTN/CO RTE.
- 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 flight number.
- Enter (and/or check) cost index.
- Enter intended initial CRZ FL, or check it 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  
R

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 gate coordinates to initialize the ADIRS : To insert these coordinates, slew them on

R 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 enroute waypoints. However, some databases will only include

departure and arrival airport idents and enroute waypoints.

The 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 the

scroll keys.

· Lateral revision at WPT for ROUTE modification, if needed. (Refer to 4.04.10).

· 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 (INIT B page), or forecast wind, for CLB or CRZ

phases. (Refer to 4.04.20).

\*— **F-PLN . . . . . CHECK**

· Check the F-PLN, either by using the ROUTE SELECTION page versus ATC F-PLN or

F-PLN page, or the 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 :

· 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.

· If weather is below landing minimums at the departure airfield, the secondary flight

plan should be that required for a diversion immediately after takeoff.

· If there is a chance of a runway or SID change 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**

Block fuel may be automatically computed by the FMGC using the FLIGHT PLANNING function.

CAUTION

Part of characteristic speeds displayed on PFD (green dot, F, S, VLS) are computed from the ZFW and ZFCG entered by the crew on the MCDU. Therefore these data must be carefully checked (captain 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 not available 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.

**TAKE OFF DATA INSERTION (PERF TAKE OFF page)**

- \* — **V1, VR, V2** ..... **INSERT**
- \* — **FLEX TO TEMP/DERATE** ◁ ..... **INSERT**
- \* — **THR RED/ACC altitude** ..... **SET or CHECK**

For noise abatement procedure “A”, the crew must set the acceleration altitude at or above 3000 ft.
- \* — **ENG OUT ACC altitude** ..... **SET or CHECK**
- \* — **FLAPS/THS reminder** ..... **INSERT**
- \* — **TO SHIFT** ..... **AS RQRD**

Enter takeoff SHIFT distance if takeoff is to be from an intersection. This is essential for position updating at takeoff and consequently for navigation accuracy.

**R 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 as a selected speed (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 10 000 feet in the managed speed profile. This may either be cleared, or modified, on the VERT REV page at the origin (or a climb waypoint).

\* **GLARESHIELD**

- **Glareshield and FCU integral light** . . . . . **AS RQRD**
- \* — **LOUDSPEAKER** . . . . . **SET**
- Approximately at the 1 o'clock position.
- \* — **BARO REF** . . . . . **SET**
- Set QNH 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**

*Note : Do not engage the autothrust on ground, as it may generate the AUTO FLT A/THR OFF warning at engine start.*

**\* EFIS CONTROL PANEL**

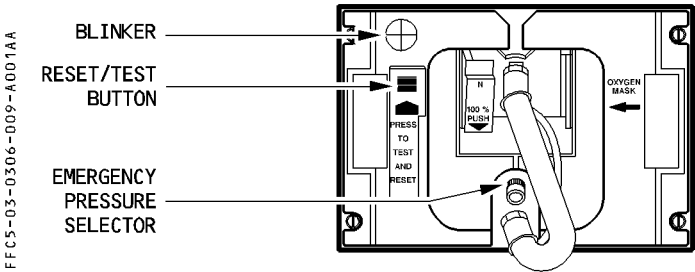
- \*— **ND mode and range** ..... **AS RQRD**  
 MODE : Display the ARC mode on the ND, if the takeoff direction is approximately the departure direction, or the ROSE NAV mode if the direction change will be more than 70° after takeoff (to allow the ND to display the area behind the aircraft).  
 RANGE : 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**



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.
- 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 mask, an LP valve failed closed may not be detected during the oxygen mask test).

**CM 1/2 INSTRUMENT PANELS**

— **EFIS DMC selector** . . . . . **CHECK NORM**

— **PFD and ND brightness knob** . . . . . **AS RQRD**  
Check the ND outer ring to maximum range (radar display).

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 \*— **NORTH REF** . . . . . **CHECK**  
Check TRUE blue light off.

R \* **ECAM SWITCHING panel**

— **Check DMC at AUTO and ECAM/ND at NORM.**

R \* **CLOCK**

— **Check time, adjust if necessary ; elapsed time at zero, chrono at zero.**

*Note : If the clock is readjusted for a value above 10 days, the maintenance must perform the wing tip brake engagement test.*

**LANDING GEAR**

- **LDG GEAR GRVTY EXTN** . . . . . **OFF**
- 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** . . . . . **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**

**\* PARKING BRK**

- \*— **PARKING BRK** . . . . . **ON then OFF**
  - Check pressure on BRAKE PRESS indicator.
  - If chocks are in place, release the parking brake to improve brake cooling.



\* **SWITCHING panel**

- \* — **SWITCHING panel** . . . . . **CHECK**  
Check all selectors at NORM.

\* **ECAM control panel**

- \* — **PRESS** . . . . . **PRESS**  
Check that the CAB PRESS page displays LDG ELEV AUTO to confirm correct position of the LDG ELEV selector.

\* **THRUST LEVERS**

- \* — **THRUST LEVERS** . . . . . **CHECK IDLE**  
Check reverse levers stowed.

**ENG**

- **ENG MASTER switches** . . . . . **CHECK OFF**
- **ENG START selector** . . . . . **CHECK NORM**

**ATC**

- **ATC** . . . . . **SET FOR OPERATION**
- **SYS 1** . . . . . **SELECT**  
Only system 1 is available in the emergency electrical configuration.

\* **FMGS DATA CONFIRMATION**

- \* — **AIRFIELD DATA** . . . . . **CONFIRM**
- \* — **ATC CLEARANCE** . . . . . **OBTAIN**

- R \* — **IRS ALIGN** . . . . . **CHECK**  
R Check that the ADIRS are in NAV mode on the POSITION MONITOR page. Select ND  
R in ROSE NAV or ARC mode. Confirm that the aircraft position relative to the airport, SID  
R and surrounding nav aids is consistent.

- \* — **GROSS WEIGHT INSERTION** . . . . . **CHECK**  
The PNF checks FMGS data.

- \* — **TO DATA** . . . . . **CALCULATE/CHECK**  
The PNF calculates and checks takeoff data.

- \* — **F-PLN A and B pages . . . . . CHECK**
  - Select EFIS CSTR pushbutton switch on.
  - The PNF ensures 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 than 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.
  - Check that ECAM CG is within operational limits.

**\* TAKEOFF BRIEFING**

- **TAKEOFF BRIEFING . . . . . PERFORM**

The purpose of the takeoff briefing is for the PF to inform the PNF of the planned course of action for both normal and abnormal situations during takeoff.

Whenever practical, it is recommended that as much of the takeoff briefing as possible be completed at the gate.

Prior to the first flight of a trip series the PF should conduct a complete departure briefing. It should include, but not necessarily be limited to, a review of the following areas :

  - Adverse weather and runway conditions.
  - Crew coordination in the event of a rejected takeoff.
  - A discussion of any unusual, non-standard, or abnormal conditions which might affect the safety of the flight.
  - SID with 1 engine out, making extensive use of FMGS

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  - For airlines having different models of A340, mention if the aircraft is an A340–200, an A340–300, an A340–500 or an A340–600. Awareness of the aircraft model may prevent tailstrike.

The PF will brief for all subsequent flights, however, the briefing may be substantially reduced when continuing with the same crew.

However, any change or items peculiar to the specific departure should be thoroughly covered.

|                                                                                                                 |                                                      |          |        |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | STANDARD OPERATING PROCEDURES<br>COCKPIT PREPARATION | 3.03.06  | P 15   |
|                                                                                                                 |                                                      | SEQ. 001 | REV 18 |

**\* PC DEDICATED TO MAINTENANCE ◀**

- Check that the Personal Computer (PC) dedicated to maintenance use and located in front of the 4th occupant console is stowed.
- Check that the light of its manual switch is off. If not, switch it off.
- Check that its associated printer located in the LH rear corner 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.

- Check the loadsheet CG, against the ECAM CG.

In case there is a discrepancy of more than 2 %, check that the ZFW and the ZFCG have been correctly inserted in the MCDU, then rely on the ECAM CG.

If the difference is less than 2%, no further action is required. Rely on the ECAM CG.

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- 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 calculates the takeoff speeds and the flexible temperature, using the RTOW charts.

- The PF independently recalculates the takeoff speeds and the 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, HARNESSSES, 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.  
 Make sure that ground crew is aware of the 65° limitation, and that they ensure that this value is not exceeded, making use of markings on the nose landing gear doors.  
 Obtain ground crew clearance.
  
- **NW STRG DISC** ..... **CHECK AS RORD**  
 In case of pushback (conventional or towbarless), the nosewheel steering selector bypass pin must be in the tow position. The ECAM NW STRG DISC memo indicates 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.

- **WINDOWS and DOORS** ..... **CHECK CLOSED**
  - Check that the cockpit windows are closed and locked (flush, no red).
  - Check, on the ECAM lower display, that all the aircraft doors are closed.
  - When required by local airworthiness 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.

*Note : Starting one engine with a door not closed will result in pack valve closure.*

— **BEACON** . . . . . **ON**

— **THR LEVERS** . . . . . **IDLE**

— **CAUTION** —  
The engines will start, regardless of the thrust lever position. If the thrust levers are not at IDLE, then the thrust will rapidly increase to the corresponding thrust lever position, causing a hazardous situation.

— **PARKING BRAKE ACCU PRESS** . . . . . **CHECK**  
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 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.

— 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 BRK to ON, and inform the ground crew to allow the towbar to be disconnected.

— **BEFORE START CHECKLIST below the line** . . . . . **COMPLETE**

**AUTOMATIC ENGINE START**

If, during the start of a cold soak engine (at around – 20°C) the ground crew reports a fuel leak from engine drain mast, run the engine at idle for 5 minutes. If the leak disappears during the 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 next flight.

- **ENG START selector** . . . . . **IGN START**  
 ENG page is displayed on ECAM lower display.
- **ANNOUNCE** . . . . . **“STARTING ENGINE 1 and 2”**  
 Engines 1 and 2 are usually started first (Engine 2 powers blue hydraulic system, which pressurizes the parking brake).
- **MASTER switch 1 then 2** . . . . . **ON**
  - Wait until the ENG 1 N2 is at about 10 % before switching the ENG 2 MASTER switch at ON (to permit correct operation of the No Break Power Transfer).
  - Do not turn MASTER switch ON before all amber crosses and messages have disappeared on engine parameters (upper ECAM display).

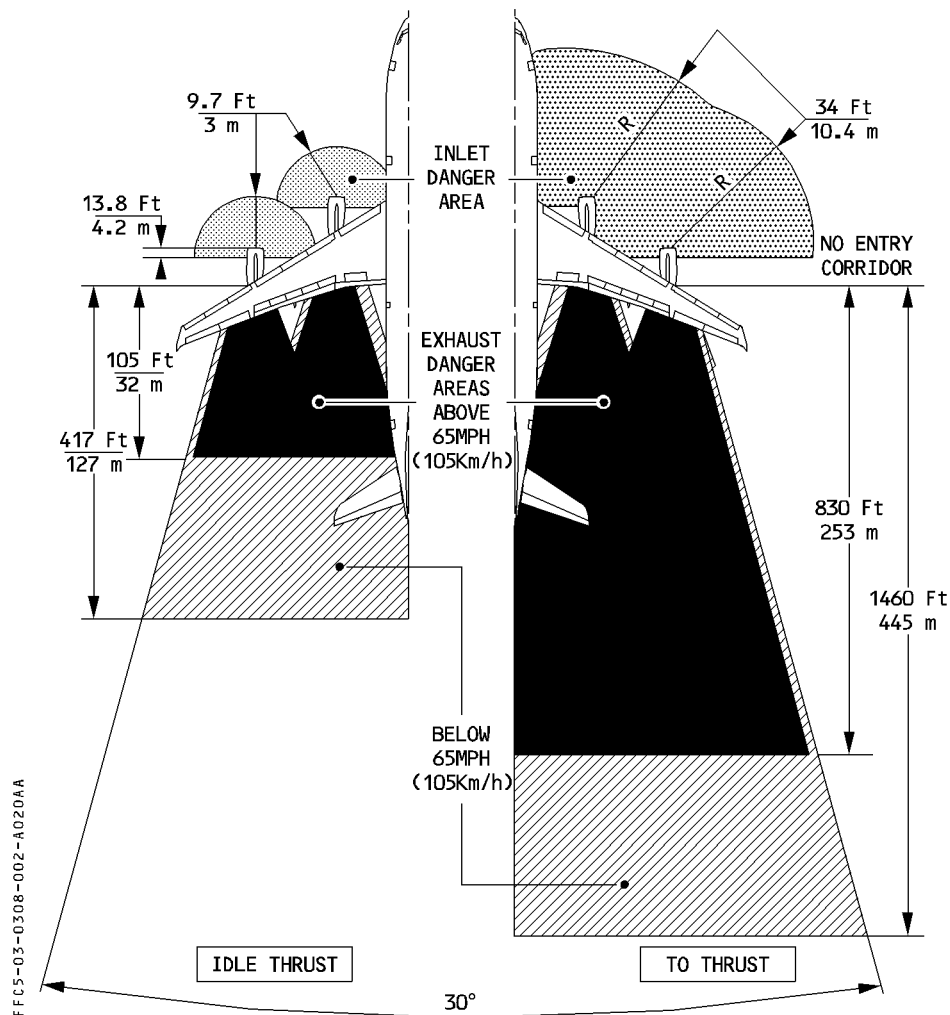
| ON ECAM UPPER DISPLAY                                                                                        | ON ECAM LOWER DISPLAY                                                                             |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| N2 increases.                                                                                                | Corresponding start valve in line.<br>Bleed pressure indication green.<br>Oil pressure increases. |
| At 16 % N2 :                                                                                                 | Indication of the active igniter (A or B)                                                         |
| At 22 % N2 :<br>– FF increases<br>10 seconds (maximum) after fuel is on<br>– EGT increases<br>– N1 increases |                                                                                                   |
| At 50 % N2 :                                                                                                 | Start valve cross line.<br>Igniter indication off.                                                |

- Parameter call outs are not mandatory.
- **When idle is reached (AVAIL indication is displayed) :**
- **MAIN AND SECONDARY ENG. IDLE PARAMETERS** . . . . . **CHECK NORMAL**  
 At ISA sea level : N1 about 20 %  
                           N2 about 60 %  
                           EGT about 400°C  
                           FF about 300 kg/h (660 lb/h)
- **ANNOUNCE** . . . . . **“STARTING ENGINE 3 and 4”**

- MASTER switch 3 then 4 (ENG 4 when ENG 3 N2 is at about 10 %) . . . . . ON  
Same procedure as for Engines 1 and 2.

**GROUND RUN UP – DANGER AREAS**

R





AFTER START

— **ENG START selector . . . . . NORM**

- Turning the ENG START selector to NORM indicates the end of the start sequence. AFTER START actions may be performed.
- ON the ECAM's lower display, the WHEEL page replaces the ENG page.

*Note : If the ENG START selector is not switched to NORM, the WHEEL page automatically replaces the ENG page, 15 seconds after the last engine start.*

- Leaving the ENG START selector at the START/IGN position would prevent continuous relight selection on ground (would be supplied at lift-off). The selector must be cycled to recover normal control of ignition.
- 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 at idle may be included in the warm-up period. A longer warm-up time (up to about 10 minutes) may result in a lower peak EGT value during takeoff.

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— **APU BLEED . . . . . OFF**

- Turn APU BLEED off, just after engine start, to avoid ingestion of engine exhaust gases.
- APU BLEED valve closes, ENG BLEED valves open.

— **GROUND SPOILERS . . . . . ARM**

— **RUD TRIM . . . . . ZERO**

If the RUD TRIM position indication is not at zero, press the RESET pushbutton.

— **FLAP lever . . . . . SET**

- Set FLAPS for takeoff.
- Check their position on the ECAM's upper display.
- If taxiing in slush, keep the flaps retracted until reaching the holding point before takeoff.

— **PITCH TRIM . . . . . SET**

Set takeoff CG on the pitch trim wheel. For this purpose, use the ECAM's CG indication.

— **ECAM STATUS . . . . . CHECK**

- Check that there is no status reminder (STS) on the ECAM's upper display.
- If a 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 at least 70 % N1 for approximately 15 seconds before operating at higher thrust. (See also the parking brake limitation 3.01.32).

*Note : Icing conditions may be expected when the OAT (on the ground and for takeoff), or the TAT (in flight) is 10° C or below, if there is visible moisture in the air or if standing water, slush, ice or snow is present on the taxiways or runway.*

- **WING ANTI ICE** . . . . . **AS RQRD**  
 · When the 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.

- **NWS TOWING FAULT light** ◀ **extinguished** . . . . . **CHECK**

- **ECAM DOOR page** . . . . . **CHECK**  
 · Check that all slides are armed.  
 · Deselect DOOR page after verifying the slides.

- **ANNOUNCE** . . . . . **“CLEAR TO DISCONNECT”**  
 Request : Chocks removed.  
               Nosewheel steering bypass pin removed.  
               Nosewheel steering towing light ◀ on the nose landing gear checked off.  
               Interphone disconnect.  
               Hand signal on the left/right side.

- **AFTER START CHECKLIST** . . . . . **COMPLETE**

TAXI

- **TAXI clearance** . . . . . **OBTAINED**
  
- **NOSE light** . . . . . **TAXI**  
Turn on the nosewheel light to TAXI day and night.  
RWY TURN OFF lights may be switched ON, as required.
  
- **PARKING BRAKE** . . . . . **OFF**  
Check that the 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 (maximum 40 % N1) to get the aircraft moving. 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 positionning 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).
  - In case additional thrust is required in order to maintain aircraft speed, use of the inner engines is recommended to minimize FOD on the outer engines, unless a sharp turn requiring asymmetrical thrust is necessary.
  - “Square wheel effect” may be noticed, if the aircraft was parked for a long time (more than 6 hours), with high tire temperature conditions and with a high weight.

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- **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.

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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 blue pressure : The blue pressure on the brake pressure triple indicator must be at 0 when pressing the brake pedals. Although green hydraulic power supplies the braking system, if pedals are quickly pressed a brief brake pressure indication appears on the BRAKE PRESS indicator.
- Thereafter, the normal maximum taxi speed should be 30 knots in a straight line on long taxiways, and 10 knots for a sharp turn. The ground speed is difficult to assess, so monitor ground speed on the ND. Do not “ride” the brakes. As 30 knots are exceeded with idle thrust, apply brakes smoothly and decelerate to 10 knots; release the brakes and allow the aircraft to accelerate again.
- 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, select brake fans on (if installed).

- **NOSEWHEEL STEERING** ..... **AS RQRD**
- Use smooth and progressive handwheel inputs. Avoid the use of large rapid inputs that introduce big variations in demand, which cannot be satisfied by the steering mechanism (maximum rate for nosewheel deflection of about 12°/sec). Be aware that it will take approximately 7 seconds for the nosewheel to return to zero deflection from its full travel. Therefore, some anticipation is needed to reduce the nosewheel steering deflection when exiting a turn.

When exiting a tight turn, roll straight a short distance to take the stress out of the main gears.

  - The nosewheel steering angle is limited to 72°.
  - No braked pivot turn is allowed (ie differential braking cannot be used to fully stop one main gear).
  - Asymmetric thrust may be used during turns at high NWS angles, in order to initiate the turn and to keep the aircraft moving during the turn. But, it should not be used to tighten the turn.

— **FLIGHT CONTROLS . . . . . CHECK**

- R 1. At a convenient stage, prior to or during taxi, and before arming the autobrake, the  
R PF silently applies full longitudinal and lateral sidestick deflection.  
R On the F/CTL page, the PNF checks full travel of all elevators and all ailerons, and the  
R correct deflection and retraction of all spoilers.  
R The PNF calls out “full up”, “full down”, “neutral”, “full left”, “full right”, “neutral”, as  
R each full travel/neutral position is reached.  
R The PF silently checks that the PNF calls are in accordance with the sidestick order.

R *Note : In order to reach full travel, full sidestick must be held for a sufficient period*  
R *of time.*

- R 2. The PF presses the PEDAL DISC pushbutton on the nosewheel tiller, and silently  
R applies full left rudder, full right rudder, and neutral. The PNF calls out “full left”, “full  
R right”, “neutral”, as each full travel/neutral position is reached.  
R 3. The PNF applies full longitudinal and lateral sidestick deflection, and silently checks  
R full travel and the correct sense of all elevators and all ailerons, and the correct  
R deflection and retraction of all spoilers, on the ECAM F/CTL page.

R *Note : The F/CTL page is automatically displayed for 20 seconds.*

— **AUTO BRK . . . . . MAX**

- The ON light comes on.
  - AUTO BRK may be armed, with the parking brake on.
  - The selection of MAX mode prior to takeoff improves safety, in the event of an aborted takeoff.
- If the takeoff must be aborted, the autobrake system applies maximum braking (if the ground speed is above 72 knots), as soon as the thrust levers are set to idle.

— **ATC clearance . . . . . CONFIRM**

**TAKEOFF DATA/CONDITIONS**

If the takeoff data has changed, or in the case of a runway change, prepare updated takeoff data and, as appropriate :

— **F-PLN (Runway) . . . . . REVISED**

— **FLAP LEVER . . . . . AS APPROPRIATE**  
Select takeoff position.

— **V1, VR, V2 . . . . . REINSERT**

— **FLEX 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 an heading is required by 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.

FD ..... CHECK SELECTED ON

— **FMA** ..... **CHECK**

— **FLIGHT INSTRUMENTS** ..... **CHECK**

— **RADAR** (if required) ..... **ON**

If the radar is required for the flight, use the following test procedure :

Adjust the tilt downward until ground returns appear, and then slowly adjust it in 1 to 2 degree steps, up to 15 degrees UP for weather returns.

Select tilt at 4 degrees UP for takeoff.

- PREDICTIVE WINDSHEAR SYSTEM  (if required) . . . . . AUTO

— **ATC code** ..... **CONFIRM/SET**

— **TAKEOFF BRIEFING** . . . . . **CONFIRM**

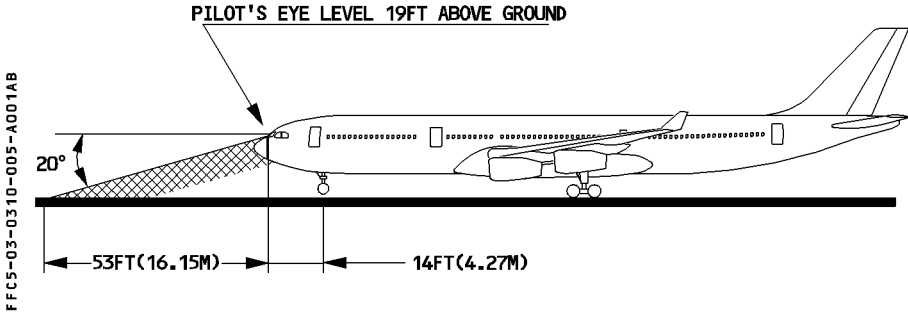
This briefing should normally be only a brief confirmation of the thorough takeoff briefing made at the gate. Any changes in the clearance are to be addressed at this time.

Make as extensive use of the displays as possible. For example :

Takeoff from RWY 07 (Perf page), weight 240 000 kg (lower ECAM) configuration 2, 8500 kg of fuel, FLEX 50°, 93% N1 (upper ECAM) LMG 2D departure (FPLN page) V1 155, V2 158 (PFD), initial clearance 12 000 feet blue (FMA)".

- **CABIN REPORT** . . . . . **RECEIVED**  
Check CABIN READY message on ECAM MEMO or 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 CHECK LIST down to the line** . . . . . **COMPLETE**

**VISUAL GROUND GEOMETRY**



**180 ° TURN ON RUNWAY**

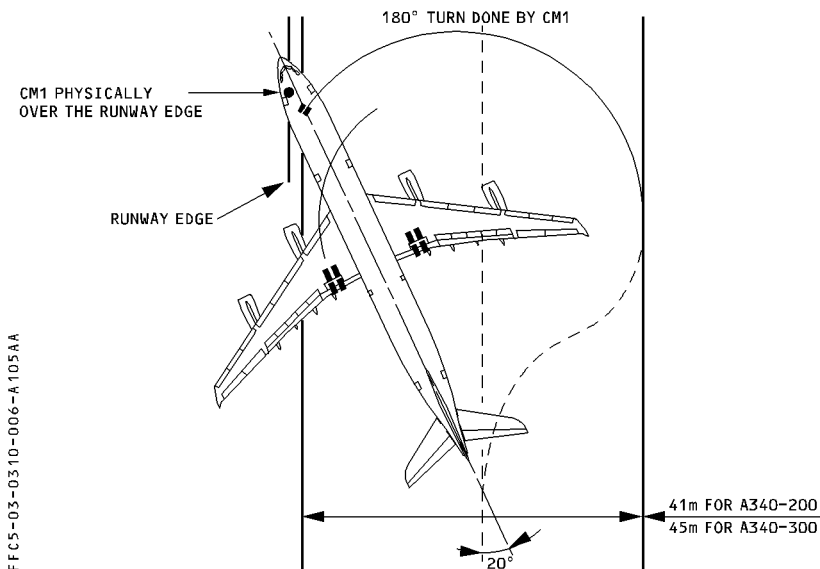
A standard runway is 45 meters wide. With the maximum nosewheel steering angle ( $72^\circ$ ), the actual turn width (without margin) is 41 meters for an A340-200 and 45 meters for an A340-300. These distances are based on the following procedure :

**● FOR THE CM1**

- Taxi on the right hand side of the runway and turn left, maintaining  $20^\circ$  (check on the PFD) divergence from the runway axis.
- Asymmetric thrust should be used during the turn, to maintain a continuous speed (between 5 and 10 knots). Some anticipation is required to ensure that asymmetric thrust is available at the beginning of the turn.
- When the CM1 is physically over the runway edge, he turns and maintains the nosewheel  $72^\circ$  right.
- No braked pivot turn is allowed (ie. differential braking cannot be used to fully stop one main gear).

**● FOR THE CM2**

The procedure is symmetrical. (Taxi on the left hand side of the runway).





**BEFORE TAKEOFF**

- If the brake fans are running ◁
  - BRAKE TEMP . . . . . CHECK
- If BRAKE TEMP above 150°C
  - Delay takeoff
- If BRAKE TEMP below 150°C
  - BRAKE FANS . . . . . OFF
- TAKEOFF OR LINE UP CLEARANCE . . . . . OBTAIN
- APPROACH PATH CLEAR OF TRAFFIC . . . . . CHECK
- CABIN CREW . . . . . ADVISE
- ENG START selector . . . . . AS RQRD  
Select IGN/START 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  
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 or converging runways...).

Read the checklist below the line, when line up or takeoff clearance is received.

# TAKEOFF

R Rolling takeoff is permitted.

— **ANNOUNCE** . . . . . **"TAKEOFF"**

R — **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.
- For crosswind takeoffs, routine use of into-wind aileron is not recommended. In strong crosswind conditions, small amounts of lateral control may be used to maintain wings level, but the pilot should avoid using excessive amounts. This causes excessive spoiler deployment, which increases the aircraft tendency to turn into wind.
- PF progressively adjusts engine thrust in two steps :
  - From idle to about 50 % N1.
  - From engines at similar N1 to takeoff thrust.
- Once the thrust is set, the Captain maintains 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 on all engines** . . . . . **FLX or TOGA**

- The PF applies full forward stick.
- For crosswind takeoffs, routine use of into-wind aileron is not recommended. In strong crosswind conditions, small amounts of lateral control may be used to maintain wings level, but the pilot should avoid using excessive amounts. This causes excessive spoiler deployment, which increases the aircraft tendency to turn into wind.
- PF sets 50 % N1 on all engines, then rapidly increases thrust to about 70 % N1, then progressively to reach takeoff thrust at 40 knots ground speed, while maintaining stick full forward up to 80 knots. Release the stick gradually to reach neutral at 100 knots.
- Once the thrust is set, the Captain maintains his hand on the thrust levers, until the aircraft reaches V1.

Note : The ENG page replaces the WHEEL page on the lower ECAM display.

- **DIRECTIONAL CONTROL** ..... **USE RUDDER**
  - **CHRONO** ..... **START**
  - **PFD/ND** ..... **SCAN**
    - Check the Flight Mode Annunciator on the PFD :  
MAN TOGA (MAN FLX xx), SRS, RWY (or blank), 1FD2.
    - 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.*

  - **ANNOUNCE** ..... **“POWER 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**
    - At VR, initiate the rotation with a positive sidestick input to achieve a continuous rotation rate of about 3 degrees/second, towards a pitch attitude of 12.5 degrees.
    - Minimize lateral inputs on ground and during the rotation, to avoid spoiler extension.
    - 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”**  
Announce positive climb, when the vertical speed indication is positive and radio altitude has increased.
- **ORDER** . . . . . **“GEAR UP”**
- **LDG GEAR** . . . . . **SELECT UP**
- **GRND SPLRS** . . . . . **DISARM**
- **EXTERIOR LIGHTS** . . . . . **SET**
  - Set the NOSE and RWY TURN OFF lights to OFF.
  - The LAND lights may be left on, depending on 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 to the CL detent, when the flashing LVR CLB prompt appears on the FMA. Autothrust is now active.  
In manual flight, the pilot must anticipate the 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.

R

R

R

R

*Note : 1. Selecting the packs on, before reducing the takeoff thrust, will result in an EGT increase.*  
*2. PACK 2 may be selected earlier, but not sooner than 10 seconds after PACK 1 is selected on, for passenger comfort.*  
*3. If packs are not switched on after the takeoff phase, an ECAM caution will 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).

*Note :* 1. For most normal operations, thrust reduction and acceleration altitudes will be the same. So the FMA will change from MAN FLX/SRS/RWY to THR CLB/CLB/NAV (or THR CLB/OP CLB/NAV).

2. If the 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 CLB phase) :**

The following procedure ensures that the aircraft is effectively accelerating toward climb speed.

• **At F speed**

*Note :* For takeoff in CONF 1+F, the “F” speed is not displayed.

- **ORDER . . . . . “FLAPS 1”**
- **FLAPS 1 . . . . . SELECT**
- R – **CONFIRM/ANNOUNCE . . . . . “FLAPS 1”**

• **At S speed**

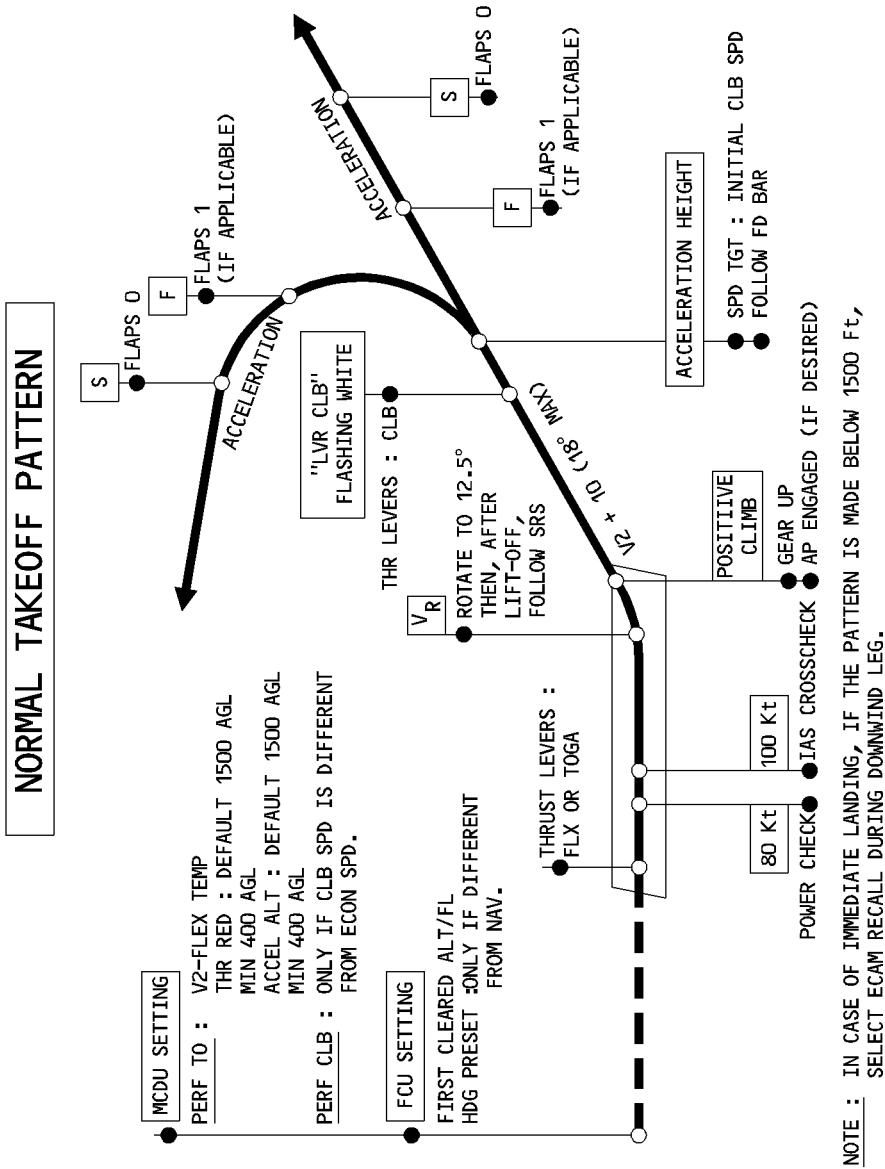
- **ORDER . . . . . “FLAPS ZERO”**
- **FLAPS ZERO . . . . . SELECT**
- R – **CONFIRM/ANNOUNCE . . . . . “FLAPS ZERO”**

*Note :* 1. For high weight, when in CONF 1 + F, the slat retraction speed S may be above the VFE of CONF 1 + F (215 knots). When accelerating above 200 knots, the flaps will automatically retract and the VFE will increase to VFE CONF 1 (240 knots).

2. The CRUISE page replaces the ECAM ENG page, when reaching 1500 feet.

R

FFCS-03-0312-005-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 START selector** . . . . . **AS RQRD**  
Select IGN/START, 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

- R — **Normal vertical mode is CLB or OP CLB with managed speed active.**
- **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 (CI).
    - 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 profile push FCU SPD selection knob. Speed target is now managed.
- Note :*
1. At heavy weights, green dot is above 250 knots. If requested by ATC, since adequate margins are retained down to VLS, flying at 250 knots is acceptable.
  2. The best speed (and rate of climb) for long-term situations lies between green dot and ECON speed. At high altitude, acceleration from green dot to ECON speed can take a long time.
  3. At high altitude, if the rate of climb is not satisfactory using managed speed, return to selected speed (300 knots/.78).
  4. At high altitude, depending on Mach (selected or computed by FMGS), the indicated speed may be below green dot.

- **BARO REF** . . . . . **SET**  
 · At transition altitude (baro setting flashing on PFD) set STD on the EFIS control panels and on standby altimeter.  
 · Crosscheck 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 inserted 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 : consequently the managed speed targets and Mach are not modified and SOFT N1 mode is not available.  
 In that case FMA will display ALT instead of ALT CRZ in the second column.
- **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**  
 The tilt angle depends on aircraft altitude and on the selected range on ND. The radar must have a slightly negative tilt in order to avoid overscanning and to show some ground return at the top edge of the ND.
- **At 10 000 ft :**
- R — **LAND light** . . . . . **OFF**
- R — **SEAT BELTS** . . . . . **AS RQRD**
- R — **EFIS option** . . . . . **ARPT**
- R — **ECAM MEMO** . . . . . **REVIEW**
- **RAD NAV** . . . . . **CHECK**  
 Clear manually tuned VORs from MCDU RAD/NAV page.
- **SEC F-PLN** . . . . . **AS RQRD**  
 Recopy the active flight plan in the secondary if an immediate return flight plan has previously been constructed.
- **OPT/MAX ALT** . . . . . **CHECK**  
 Check optimum and maximum altitude capability. (Refer to 3.05.15)

**CRUISE**

— **ECAM MEMO . . . . . REVIEW**

— **ECAM SYS PAGES . . . . . REVIEW**  
Periodically review the system display pages, and monitor ENG oil pressure and temperature, in particular.

*Note : During cruise, oil quantity variation is not linear. A rapid decrease can be noted, especially at the beginning of the flight.  
This is due to an oil temperature decrease that leads to a longer oil transit time in the sumps (more oil retained in the sumps).*

- R  
R
- BLEED : BLEED parameters
  - ELEC : Parameters, GEN loads
  - HYD : Fluid quantity. After landing gear retraction, the indicated fluid quantity of the green system is higher than on ground.
  - COND : Duct temperature, compared with zone temperature.  
Avoid large differences for passenger comfort.
  - FLT CTL : Note any unusual control surface position.
  - FUEL : Fuel distribution, trim tank quantity, and CG.

— **FLIGHT PROGRESS . . . . . CHECK**

*Note : VLS, shown on the PFD, ensures a 0.3 g buffet margin. Therefore, no additional margin is necessary in cruise.*

Monitor flight progress in the conventional way.  
When overflying a waypoint :  
· Check track and distance to the next waypoint.  
When overflying a 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 either unusually smaller than the Fuel On Board at departure, or 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 :

- Manually tune VOR (VOR/DME or ADF) to a station that is within range on the RAD NAV page and select associated needles on the ND.  
Check that the needle (raw data) overlies the corresponding blue navaid symbol (FM computed) and that the DME distance is equal to the distance showing between the aircraft symbol and the navaid symbol on the ND.
- Or insert a VOR/DME ident in BRG/DIST TO field on the PROG page and compare the computed BRG (DIST) with the raw data on the ND. This method allows the FM error to be quantified.

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 TILT . . . . . ADJUST**

- Below 20000 feet : Start with tilt near zero, then adjust. If using different ranges on the two NDs, set the tilt down for the shorter ND range (in order to monitor and detect weather activity) and near zero for the longer ND range (in order to monitor course changes).

- Above 20000 feet : A slight downward tilt is recommended.

— **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 if any should include runway in use for arrival.

FMGS

- **ARRIVAL page . . . . . COMPLETE/CHECK**  
Insert APPR, STAR, TRANS and APPR VIA if applicable. (Access by lateral revision at destination).
- **PERF DES SPEED page . . . . . CHECK**  
Prior to descent, access PERF DES page and check MANAGED MACH/SPD.  
If a speed other than ECON is required, insert that MACH or SPD into the ECON field. This new MACH and/or SPD is now the one for the descent path and TOD computation, and will be used for the managed speed descent profile (instead of ECON).  
A speed limit of 250 knots below 10 000 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 gusts).

- Insert the MDA (MDH if QFE used) or DH, whichever applies.

R *Note :* To avoid undershooting the MDA (MDH) during go-around, due to the aircraft  
R inertia during pull-up, the flight crew should add an additional number of feet  
R (defined by the operator) to the published MDA (MDH).

**CAUTION**  
If QNH altimeter setting is used with an aircraft with 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 :
  - The pilot may choose FLAP 3, rather than FLAP FULL for landing, depending on the available runway length and go-around performance, or if windshear/severe turbulence is considered possible on the approach.
  - The ECAM may require a specific landing configuration, in case of a system failure:
    - \* First read the VLS CONF FULL value on the PERF APP page to determine the VAPP (or use QRH 2.40). Then, keep CONF FULL on the PERF APP page, for landing in CONF 2 or FULL.
    - \* Select CONF 3 on the PERF APP page, for landing in CONF 3.

As a general rule, managed speed can be used if the landing configuration and the configuration selected on the PERF APP page are the same. (If they are not the same, the managed speed will not drop down to the approach speed).
- Check VAPP according to the FLAPS FULL or FLAP 3 selection on the MCDU.

When using selected speed to compute VAPP, it is recommended that the same method be used to compute VAPP, as when in managed speed.

The pilot can modify VAPP. The new value will be taken into account for the ground speed mini-function.

- **PERF GO-AROUND page** . . . . . **CHECK/MODIFY**

Check THR RED ALT and ACC ALT, and modify if necessary.



**DESCENT INITIATION**

- **DESCENT . . . . . INITIATE**  
The normal method of initiating the descent is to select DES mode at the FMGS calculated top of descent (TOD).
- **If ATC requires an early descent :**  
Use DES mode which will guide the aircraft down at a lower vertical speed in order to converge with the required descent path. (The pilot may use a V/S of 1000 feet/min).
- **If the descent is delayed by ATC :**  
Beyond TOD, a DECELERATE message comes up on PFD and MCDU. This suggests to the crew that it starts reducing the speed towards green dot speed (with ATC permission).  
When cleared to descent, 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 information
  - PERF DES in order to get predictions down to any inserted altitude in DES/OP DES modes.
- **PNF MCDU . . . . . F-PLN**  
With the AP engaged, the PF usually makes any required F-PLN revisions.

*Note : The NDs show a level off symbol ↘ along the flight path. Its position is based on the current active AP/FD and A/THR modes.*



- **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).  
The flight crew can use the level ↘ symbols as well as Energy Circle, on the ND 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.

$$FPA (^{\circ}) = \Delta FL/DIST (NM)$$

**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.

– **SPEEDBRAKES** . . . . . **AS RQRD**

In OPEN DES : Use speedbrakes to increase the rate of descent. The pilot may use up to half speedbrake 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.

– **RADAR TILT** . . . . . **ADJUST**

Every 10 000 feet of the planned descent, down to about 15 000 feet, adjust the tilt upwards to eliminate ground clutter on the upper part of the ND.

Every 5000 feet below 15 000 feet, adjust the tilt angle one degree upwards, in order to keep the ND relatively free of ground clutter.

– **BARO REF** . . . . . **SET**

- Set QNH (or QFE  $\leq$ ) 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.*

● **If EGPWS is available :**

R – **TERR ON ND** . . . . . **ON**

R If use of radar is required, consider selecting the radard display on the PF side, and

R TERR ON ND on the PNF side only.

– **ECAM STATUS** . . . . . **CHECK**

- 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.
- The ECAM STATUS page automatically appears, if not empty, when the BARO setting is selected.

● **At 10000 feet :**

– **LAND LIGHTS** . . . . . **ON**

LAND lights may be switched ON, depending on the airline policy or regulatory recommendation.

– **SEATBELTS** . . . . . **AS RQRD**

– **EFIS option** . . . . . **CSTR**

- **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.
- **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.

**INITIAL APPROACH**

- **ENG START 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 area.
- **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 in HDG/TRK mode, approximately 15 NM from touchdown activate and confirm APPROACH phase on the MCDU. (PERF DES page).
- **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, use selected speed. When the ATC speed constraint (“maintain 170 knots to the outer marker” for example) no longer applies, return to managed speed.
- **SPEED BRAKES** . . . . . **AS RQRD**

- NAV ACCURACY . . . . . MONITOR
- When GPS PRIMARY is available, no NAV ACCURACY monitoring is required.

· When GPS PRIMARY is lost check on PROG page that the required navigation accuracy is appropriate to the phase of flight. Monitor NAV accuracy and be prepared to change approach strategy. If NAV ACCUR DOWNGRAD occurs, use raw data to check navigation accuracy.
- The navigation accuracy determines which autopilot modes the flight crew should use, and the type of displays to be shown on the ND, as well as the use of EGPWS.

R

| NAVIGATION ACCURACY                                                            | ND                                      |                                                           | AP/FD mode | TERR<br>pushbutton |
|--------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|------------|--------------------|
|                                                                                | PF                                      | PNF                                                       |            |                    |
| GPS PRIMARY                                                                    | ARC or ROSE NAV<br>with navaid raw data |                                                           | NAV        | ON                 |
| NAV ACCUR HIGH                                                                 |                                         |                                                           |            |                    |
| NAV ACCUR LOW and<br>NAV ACCURACY check ≤ 1 NM                                 |                                         |                                                           |            |                    |
| GPS PRIMARY LOST and<br>NAV ACCUR LOW and<br>NAV ACCURACY check > 1NM          | ROSE ILS                                | ARC or ROSE<br>NAV or ROSE<br>ILS with navaid<br>raw data | HDG or TRK | OFF                |
| GPS PRIMARY LOST and<br>Aircraft flying within unreliable<br>radio navaid area |                                         |                                                           |            |                    |

- RADAR TILT . . . . . ADJUST
- Increase tilt, as required (+ 3° to + 4°).
- APPROACH CHECKLIST . . . . . PERFORMED

INTERMEDIATE/FINAL APPROACH (ILS approach entered in the flight plan)

The objective is to be stabilized on the final descent path at VAPP, thrust above idle, in the landing configuration at 1000 feet, after continuous deceleration on the glideslope.

- R To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching
- R this stabilization height :
- R — The aircraft is on the correct lateral flight plan,
- R — The aircraft is in the desired landing configuration,
- R — The thrust is stabilized above idle, to maintain the target speed on the desired glide path,
- R — No excessive flight parameter deviation.

The advantages are :

- Lower fuel consumption
- Lower noise levels
- Time saving
- Flexibility and ability to vary speed to suit ATC.

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

- R policy/regulations, a go-around must be initiated.

R *Note : ICAO defines the envelope where the quality of the G/S signal ensures a normal*  
R *capture, this envelope is within 10 NM, +/- 8 degrees of the centerline of the ILS*  
R *glide path and up to 1.75 teta and down to 0.3 teta (teta being the nominal glide*  
R *path angle).*  
R *When arming the approach well outside of the normal G/S capture envelope, a*  
R *spurious G/S\* engagement may occur due to a wrong G/S deviation signal. This*  
R *spurious G/S capture will order a pitch up, if the aircraft is below the glide beam,*  
R *and a pitch down attitude, if the aircraft is above the glide beam.*  
R *Whenever the pilot notices the pitch movement, or the spurious G/S\*, or the*  
R *trajectory deviation, he will immediately disconnect the AP, if engaged, to*  
R *re-establish a normal attitude and will disengage APPR mode. It is then*  
R *recommended to arm/rearm APP (ILS) mode within the normal capture zone.*

- **APPR pushbutton on FCU . . . . . PRESS**
  - Press the APPR pushbutton only when ATC clears 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**
- R — **CONFIRM/ANNOUNCE . . . . . « FLAPS 1 »**
  - FLAPS 1 should be selected not less than 3 NM from FAF (final approach fix).
  - Check deceleration toward “S” speed.
  - The aircraft must reach or be established on the glide slope with FLAPS 1 and S speed at or above 2000 feet AGL.
  - If the aircraft speed is significantly higher than S on the glide slope , or if the aircraft does not decelerate on the glide slope, extend the landing gear in order to slow it down.

The use of speedbrakes is not recommended because it causes an unwanted increase in VLS.
- **TCAS Mode selector ◀ . . . . . TA or TA/RA**

FAA recommends to select 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
- ANNOUNCE . . . . . « LOC \* »
- G/S CAPTURE . . . . . MONITOR

*Note : The glide slope may be captured independently of LOC capture according to FMGC pin program.*

● If above the glideslope :

- V/S mode . . . . . SELECT
- FCU ALTITUDE . . . . . SET ABOVE A/C ALTITUDE
- ANNOUNCE . . . . . “G/S\*”
- GO AROUND ALTITUDE . . . . . SET

*Note : 1. This procedure prevents an undesired level off at G/S intercept altitude.  
2. If the aircraft intercepts the ILS above radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on FMA. Check that the FMA displays the correct capability for the intended approach when the aircraft is below 5000 feet.*

**AT 2000 FT AGL MINIMUM**

- ORDER . . . . . « FLAPS 2 »
- FLAPS 2 . . . . . SELECT
- CONFIRM/ANNOUNCE . . . . . « FLAPS 2 »
  - Check deceleration toward F speed
  - If the aircraft intercepts the ILS glideslope below 2 000 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 FLAPS ARE AT 2**

- ORDER ..... “GEAR DOWN”
  - L/G DOWN ..... SELECT
  - GROUND SPOILERS ..... ARM
  - AUTO BRK ..... AS RQRD  
Use of the autobrake is recommended.  
Use of MAX mode is not recommended at landing.  
On short or contaminated runways, use MED mode.  
On long and dry runways, LO mode is recommended.
- Note : If, on very long runways, the pilot anticipates that braking will not be needed, use of the autobrake is unnecessary.*
- Press the appropriate pushbutton, according to runway length and condition, and check that the related ON light comes on.
- CONFIRM/ANNOUNCE ..... “GEAR DOWN”



**WHEN LANDING GEAR IS DOWN**

- **ORDER** ..... **“FLAPS 3”**
- **FLAPS 3** ..... **SELECT**
  - Select FLAPS 3 below VFE.
  - It is recommended that the speedbrakes be retracted before selecting FLAPS 3.
- **CONFIRM/ANNOUNCE** ..... **“FLAPS 3”**
- **ECAM WHEEL page** ..... **CHECK**
  - ECAM WHEEL page appears below 800 feet, or at landing gear extension.
  - Check for four landing gear green indications.
- **ORDER** ..... **“FLAPS FULL”**
- **FLAPS FULL** ..... **SELECT**
  - 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**  
Switch the WING ANTI ICE ON, only in severe icing conditions.
- **EXTERIOR LIGHTS** . . . . . **SET**  
Set NOSE switch to TAXI, RWY TURN OFF switch to ON, and LAND switch to ON.
- **SLIDING TABLE** ◀ . . . . . **STOWED**
- **LDG MEMO** . . . . . **CHECK NO BLUE LINE**
- **CABIN REPORT** . . . . . **OBTAIN**
- **CABIN CREW** . . . . . **ADVISE**
- **LANDING CHECKLIST** . . . . . **COMPLETE**
- **FLIGHT PARAMETERS** . . . . . **CHECK**  
PF announces any FMA modification (LAND green at 350 feet, and any other change).  
The PNF calls out, if :
  - The speed goes lower than the speed target – 5 knots, or greater than the speed target + 10 knots.
  - The pitch attitude goes lower than 0°, 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 500 ft AGL : 1 dot LOC/GS
    - R 300 ft AGL : 0.5 dot LOC ; 1 dot GS

**AT DH + 100 FT (or MDA/MDH + 100 FT) :**

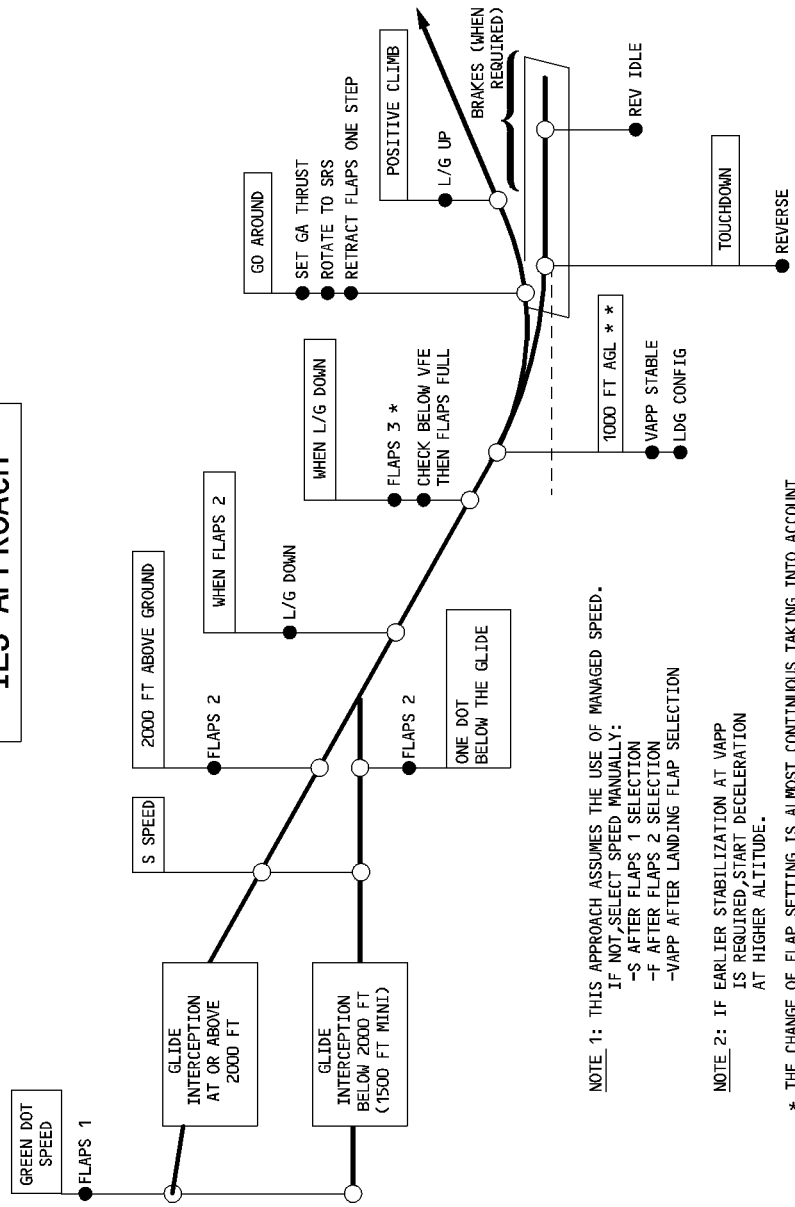
- **MONITOR or ANNOUNCE** . . . . . **“ONE HUNDRED ABOVE”**

**AT DH (or MDA/MDH) :**

- **MONITOR or ANNOUNCE** . . . . . **“MINIMUM”**
- **ANNOUNCE** . . . . . **“LANDING” or “GO AROUND/FLAPS”**  
Maintain a stabilized flight path down to flare.  
At 50 feet, one dot below the glideslope is 14 feet below the glideslope.  
Do not duck under the glideslope.

# ILS APPROACH

FFCS-03-0318-008-A001AA



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 FLAP 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 (HEAVY AIRCRAFT).

\*\* 1000 FT AGL MINIMUM IMC, 500 FT 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.

In all cases, 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 :
  - The approach stored in the navigation database has been validated, and is approved by the operator for use of FINAL APP mode.

This validation includes evaluation of the OAT effect on obstacle clearance : It is necessary to define a minimum OAT, below which selected vertical guidance must be used.

- 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.
- The final approach is laterally and vertically monitored, using the appropriate raw data (navaids, distance to the runway or MAP, altitude, FPV).

*Note : For additional information on recommended flight crew procedures, and on navigation database flight path validation, refer to the FCOM Bulletin N° 12 and the FMGS Pilot's Guide (4.02.20 and 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 data indicates the correct navigation.

|                                                                                                                             |                                      |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--|---------|--------|
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|                                                                                                                             | NON PRECISION APPROACH               |  | SEQ 001 | REV 26 |

## **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.

In all cases, the recommended flying reference is FPV, which should be selected during the initial approach.

RNAV approach can be performed, provided :

- The approach procedure does not include a PI-CF leg (PROC T indicated on the MCDU F-PLN).
- The approach stored in the navigation database has been validated, and is approved by the operator.
- This validation includes evaluation of the OAT effect on obstacle clearance : It is necessary to define a minimum OAT, below which selected vertical guidance must be used.
- 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.
- Before starting the approach, two navigation systems must be operative : 2 FMGS and 2 sensors (2 GPS, 2 DME, 2 VOR as appropriate).
- 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 appropriate raw data (distance to the runway, altitude, FPV).

*Note : For additional information on recommended flight crew procedures, and on navigation database flight path validation, refer to the FCOM Bulletin N° 12 and the FMGS Pilot's Guide (4.02.20 and 4.05.70).*

### 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 en route alternate), the GPS PRIMARY availability must be verified prior to flight.

AIME is available worldwide, if 23 GPS satellites or more are operative.

If the number of GPS satellites is 22 or less, check AIME availability using the approved version of the Litton ground-based AIME prediction software. Before starting the approach, check that GPS PRIMARY is available on both MCDUs.

- R If the GPS PRIMARY LOST indication appears on the ND during the approach, discontinue
- R the approach, unless :
- R — For RNAV approach not requiring GPS, HIGH accuracy is displayed on the MCDU with
- R the appropriate RNP value.
- R — If GPS PRIMARY is lost on only one, FMGC, the approach can be continued, using the
- R AP/FD associated to the other FMGC.
- R If the FM/GPS POS DISAGREE ECAM caution is triggered during the approach, discontinue
- R the approach.

### 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 is displayed 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.

R The objective is to be stabilized on the final descent path thrust above idle, in the landing

R configuration at 1000 feet.

R To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching

R this stabilization height :

R – The aircraft is on the correct lateral flight plan,

R – The aircraft is in the desired landing configuration,

R – The thrust is stabilized above idle, to maintain the target speed on the desired descent

R path,

R – No excessive flight parameter deviation.

R If the aircraft is not stabilized on the approach and in landing configuration, at 1000 feet in

R instrument conditions, or at 500 feet in visual conditions, or as restricted by airline

R policy/regulations, a go-around must be initiated.

**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 the 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 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 :

R

| NAVIGATION ACCURACY                                                            | Approach guidance | ND                                        |                                                                    | AP/FD mode                          | TERR pushbutton |
|--------------------------------------------------------------------------------|-------------------|-------------------------------------------|--------------------------------------------------------------------|-------------------------------------|-----------------|
|                                                                                |                   | PF                                        | PNF                                                                |                                     |                 |
| GPS PRIMARY                                                                    | Managed***        | ARC or ROSE NAV *<br>With navaid raw data |                                                                    | NAV-FPA<br>or APP-NAV/<br>FINAL *** | ON              |
| NAV ACCUR HIGH                                                                 |                   |                                           |                                                                    |                                     |                 |
| NAV ACCUR LOW and<br>NAV ACCURACY check ≤ 1NM                                  |                   |                                           |                                                                    |                                     |                 |
| GPS PRIMARY LOST and<br>NAV ACCUR LOW and<br>NAV ACCURACY check<br>> 1 NM      | Selected          | ROSE VOR<br>**                            | ARC or<br>ROSE NAV<br>or ROSE<br>VOR **<br>With navaid<br>raw data | TRK-PFA                             | OFF             |
| GPS PRIMARY LOST and<br>aircraft flying within unreliable<br>radio navaid area |                   |                                           |                                                                    |                                     |                 |

- (\*) 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.

R *Note : 1. During approach in overlay to a conventional radio navaid procedure, monitor raw*  
 R *data. If raw data indicates unsatisfactory managed guidance, revert to selected*  
 R *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 TILT . . . . . ADJUST**

Increase tilt, as required (+ 3° to + 4°).

– **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**
- **AUTO BRK** ..... **AS RQRD**
  - Use of the autobrake is recommended.
  - The use of MAX mode is not recommended at landing.
  - On short or contaminated runways, use MED mode.
  - On long and dry runways, LO mode is recommended.

*Note : If, on very long runways, the pilot anticipates that braking will not be needed, autobrake use is unnecessary.*

Firmly press the appropriate pushbutton, according to the runway length and condition, and check that the related ON light comes on.

- **CONFIRM/ANNOUNCE** ..... **“GEAR DOWN”**

**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 automatically retract.
- **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.

— **ORDER** . . . . . **“FLAPS FULL”**

— **FLAPS FULL** . . . . . **SELECT**

R · Select FLAPS FULL below VFE. VFE – 15 knots is recommended to minimize flap wear.

— **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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>· <b>After the FAF :</b></p> <p>— <b>FINAL APP</b> . . . . . <b>CHECK</b></p> <p>Check FINAL APP green on the FMA.</p> <p>— <b>GO AROUND ALTITUDE</b> . . . . . <b>SET</b></p> <p>Set, when below the go-around altitude.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>· <b>At FAF :</b></p> <p>— <b>FPA for final approach</b> . . . . . <b>SET</b></p> <p>· <b>After the FAF :</b></p> <p>— <b>GO AROUND ALTITUDE</b> . . . . . <b>SET</b></p> <p>Set, when below the go-around altitude.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>— <b>POSITION/FLIGHT PATH</b> . . . . <b>MONITOR</b></p> <p>· <b>For approach in overlay to a conventional radio navaid procedure :</b></p> <p>Use radio navaid raw data and altitude to monitor the lateral and vertical navigation. If the navigation is unsatisfactory, revert to selected guidance.</p> <p>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.</p> <p>· <b>For RNAV approach :</b></p> <p>Monitor VDEV and FPV (on the PFD) and XTK error (on the ND).</p> <p>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.</p> | <p>— <b>POSITION/FLIGHT PATH</b> . . <b>MONITOR/ADJUST</b></p> <p>· <b>For approach in overlay to a conventional radio navaid procedure :</b></p> <p>Use radio navaid raw data to monitor the lateral navigation.</p> <p>Using altitude indication versus radio navaid position, adjust the FPA, as necessary, to follow the published descent profile, taking into account the minimum altitudes.</p> <p>Do not use the FMGC VDEV on the PFD. If the lateral navigation is unsatisfactory, revert to TRK/FPA.</p> <p>· <b>For RNAV approach :</b></p> <p>Monitor XTK error on ND.</p> <p>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.</p> <p>If the lateral guidance is unsatisfactory, perform a go-around.</p> |

- **A/THR** . . . . . **CHECK IN SPEED MODE OR OFF**
- **WING ANTI ICE** . . . . . **OFF**  
Switch WING ANTI ICE ON, only in severe icing conditions.
- **EXTERIORS LIGHTS** . . . . . **SET**  
Set NOSE switch to TAXI, RWY TURN OFF switch to ON, and 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 :
  - R – “SPEED”, when the speed goes below Vapp – 5 knots, or goes above the speed target
  - R + 10 knots.
  - R – “SINK RATE”, when V/S is greater than – 1000 feet/minute.
  - R – “BANK”, when the bank angle goes above 7 degrees.
  - R – “PITCH”, when the pitch attitude goes below 0 degrees, or goes above + 10 degrees.
  - R – “COURSE”, when greater than 1/2 dot (VOR) or 5 degrees (ADF).
  - R – “\_ FT HIGH (LOW)” at altitude checkpoints.

- R ● **AT ENTERED MDA/MDH + 100 FT :**
- **MONITOR or ANNOUNCE** ..... **“ONE HUNDRED ABOVE”**
- R ● **AT ENTERED MDA/MDH**
- **MONITOR or ANNOUNCE** ..... **“MINIMUM”**
  - **If ground references are visible :**
    - **ANNOUNCE** ..... **“LANDING”**
    - **AP** ..... **OFF**  
Continue, as with a visual approach (Refer to 3.03.20).
  - **If ground references are not visible :**
    - **ANNOUNCE** ..... **“GO AROUND/FLAPS”**  
Initiate a go-around.

*Note : 1. In managed guidance (FINAL APP mode engaged), when the aircraft reaches MDA (MDH) – 50 feet or MAP (whichever occurs first), 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/MDH :

– Push the ALT pushbutton.

– Search for visual references.

● **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**

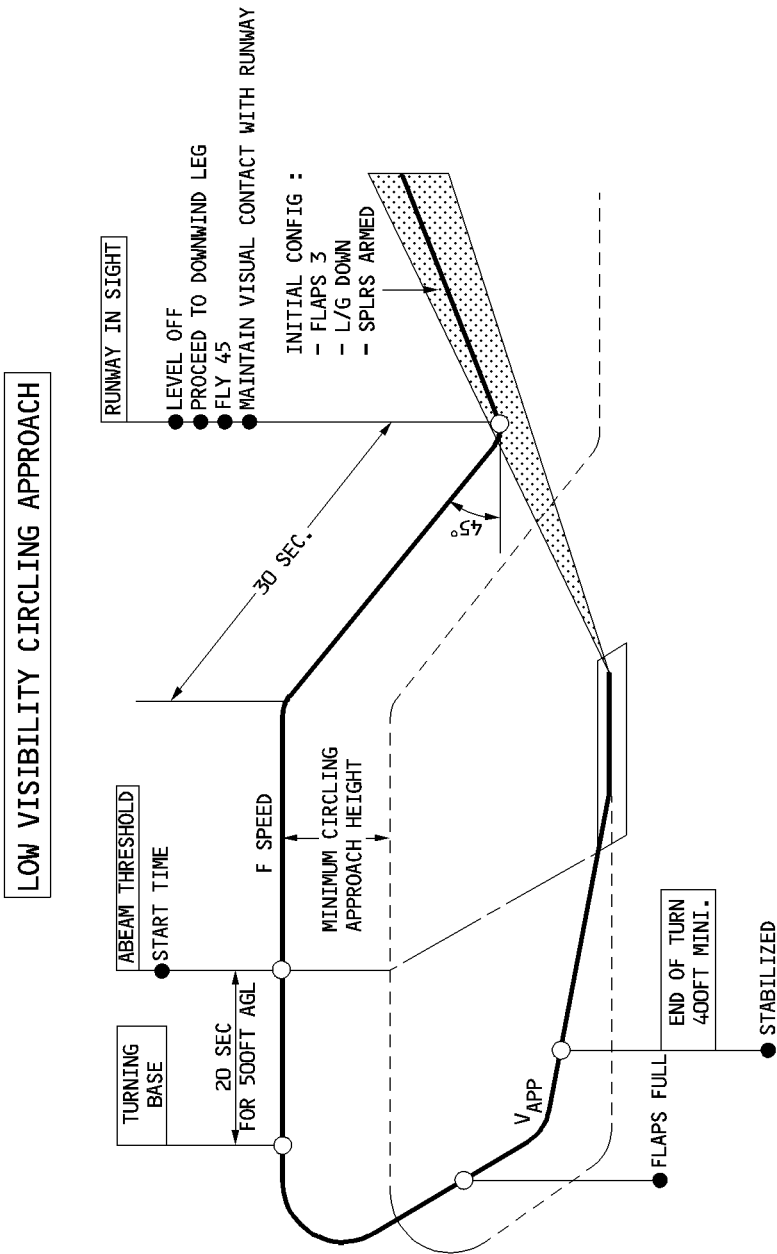
The PNF should activate the SEC F-PLN.

The PF should maintain visual contact during all the circling.

– **Disengage autopilot before reaching the base leg.**

R

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|                                                                                                                             |                               |         |        |
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## 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 nightvision.

## 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 produce 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 ( $\pm$  wind correction).  
 Turn into base leg with a maximum of 30° of bank.  
 Descend with appropriate FPA. Set FLAPS 2, F speed.

|                                                                                                                                               |                                      |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--|---------|--------|
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|                                                                                                                                               | VISUAL APPROACH                      |  | SEQ 001 | REV 14 |

## **FINAL APPROACH**

- The speed trend arrow and FPV help the flight crew to make timely and correct thrust settings (if in manual thrust) and approach path corrections. Avoid descent 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 considerer making a go around.
- Avoid any tendency to “duck under” in the latte stages of the approach.
- Avoid destabilizing the approach in the last 100 feet to have the best chance of making a good touchdown at the desired position.

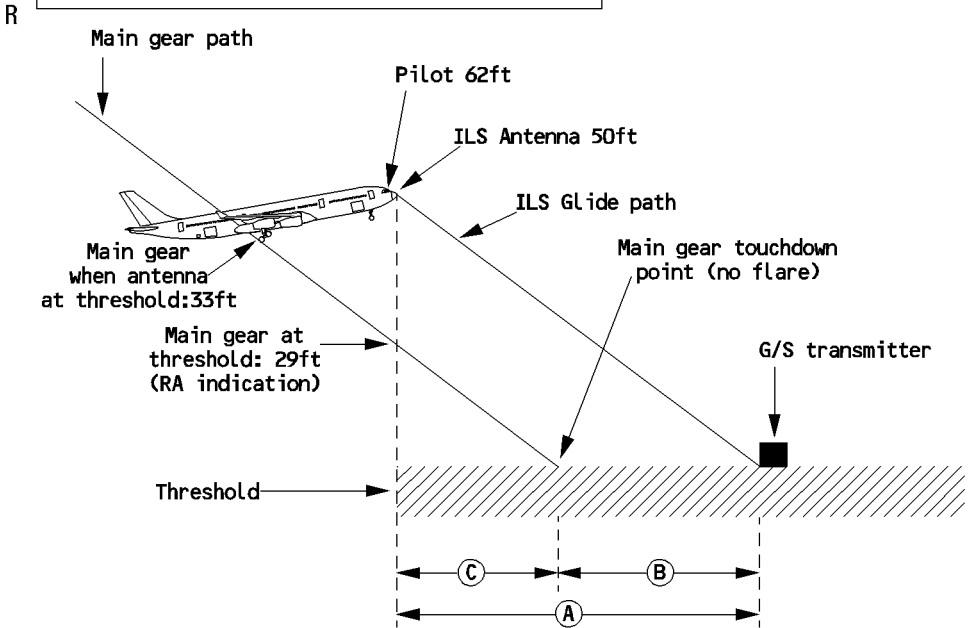


|                                                                                                                         |                               |             |        |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------|--------|
| <div><div><div><div>AEROLINEAS ARGENTINAS</div><div>A340</div></div><div>FLIGHT CREW OPERATING MANUAL</div></div></div> | STANDARD OPERATING PROCEDURES | 3.03.21 P 1 |        |
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PRECISION APPROACH

(Refer to 4.05.70)

ILS FINAL APPROACH AND LANDING GEOMETRY

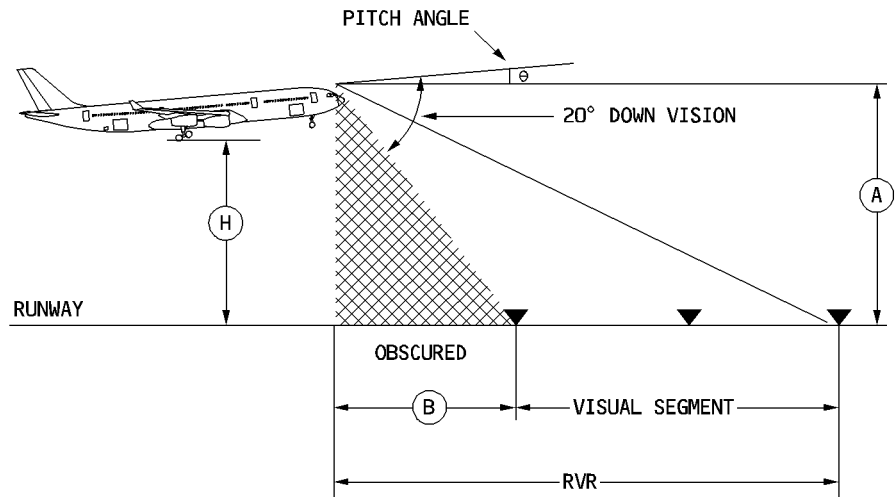


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| CONDITIONS : | GLIDE PATH (°) | G / S TRANS<br>(A) | (B)             | TOUCHDOWN POINT<br>(C) |
|--------------|----------------|--------------------|-----------------|------------------------|
|              | 2°5            | 348 m<br>1142 ft   | 147 m<br>482 ft | 201 m<br>660 ft        |
|              | 3°             | 291 m<br>955 ft    | 127 m<br>417 ft | 164 m<br>538 ft        |

R
 

MINIMUM VISUAL GROUND SEGMENTS (Flare phase)



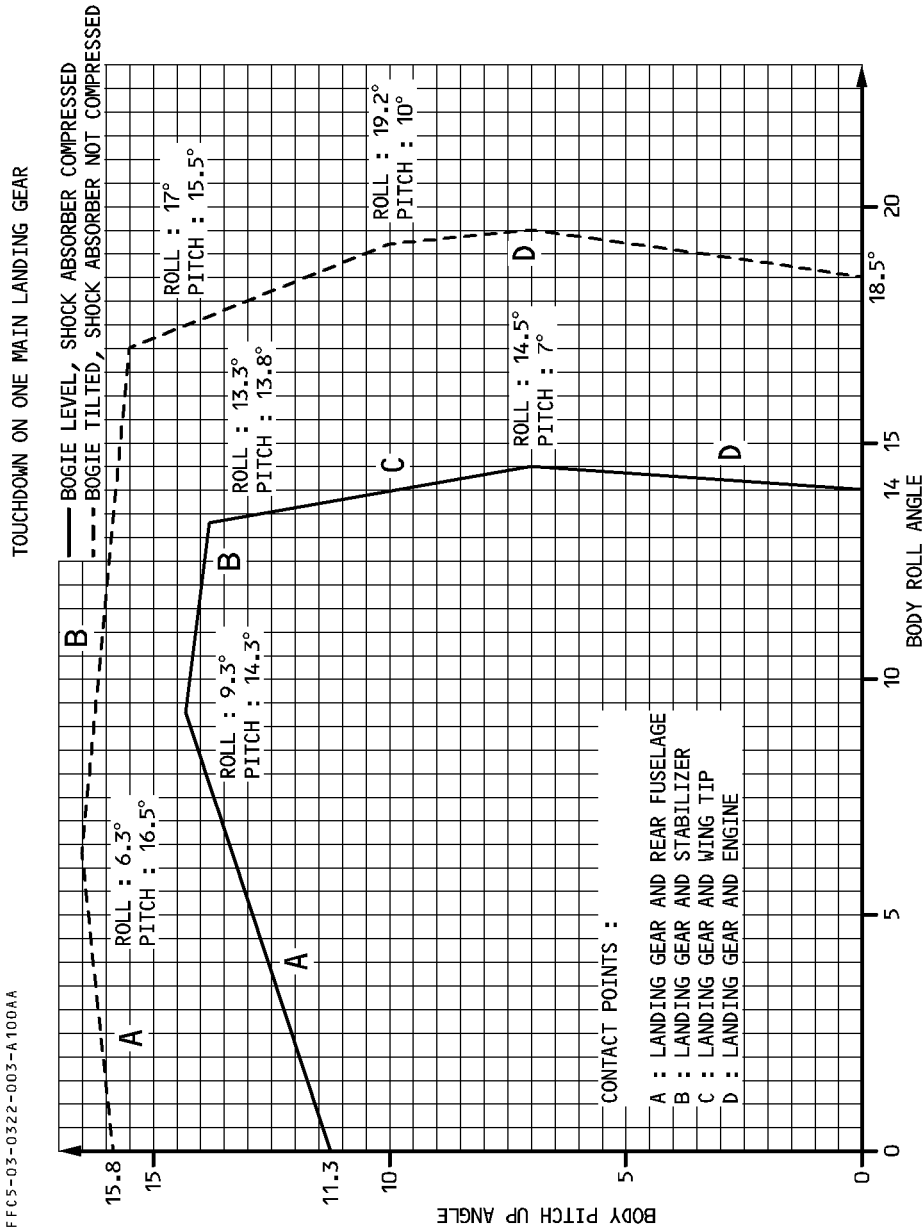
|                 | CAT III                            |                                    | CAT II                              |
|-----------------|------------------------------------|------------------------------------|-------------------------------------|
| (H)             | 15 ft<br>( $\theta = 4^\circ 3'$ ) | 50 ft<br>( $\theta = 3^\circ 7'$ ) | 100 ft<br>( $\theta = 3^\circ 7'$ ) |
| VISUAL SEGMENT  | 60 m (197 ft)                      |                                    | 120 m (394 ft)                      |
| (A)             | 46 ft                              | 80 ft                              | 130 ft                              |
| OBSCURED<br>(B) | 50 m (164 ft)                      | 83 m (274 ft)                      | 135 m (445 ft)                      |
| MINIMUM RVR     | 110 m (361 ft)                     | 143 m (471 ft)                     | 255 m (839 ft)                      |

Note : This drawing shows that for a CAT III landing (60 meters minimum visual segment) the minimum RVR is 110 meters at 15 feet.

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GROUND CLEARANCE DIAGRAM

R



LANDING

The cockpit cut-off angle is 20 degrees.

- R
- **From stabilized approach, the flare height is about 40 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 reminder. Begin a gentle progressive flare, and allow the aircraft to touch down without prolonged float.

**Crosswind landings**

- The preferred technique is to use the rudder to align the aircraft with the runway heading during the flare, while using lateral control to maintain the aircraft on the runway center line.
- Routine use of into wind aileron is not recommended, because sidestick deflection commands the roll rate until touchdown.
- In strong crosswind conditions, small amounts of lateral control may be used to maintain the wings level. This lateral stick input must be reduced to zero at first main landing gear touchdown.

**Ground clearance**

- Avoid flaring high.
- A tailstrike occurs, if the pitch attitude exceeds 12 degrees (landing gear compressed), 16 degrees (landing gear extended).
- A wingtip or engine scrape occurs, if the roll angle exceeds 14 degrees.

**Derotation**

- Begin derotation, as soon as the main wheels touch down. In flare law, the aircraft tends to nose down naturally, as the aft stick applied for flare is relaxed towards neutral.
- To achieve a comfortable nosewheel touchdown, maintain the stick just aft of neutral during derotation. If brakes are applied with the nose high, be prepared to use up to full backstick to restrain the nose down pitching moment.



— **REV . . . . . PULL**

- Pull to reverse idle at main landing gear contact (not before).
- When REV green indicated on ECAM select MAX REV.
- An interlock system on reversers 1 and 4 prevents the two corresponding thrust levers from being increased above idle reverse until both 1 and 4 reverser doors are fully open.  
Select immediatly reversers 2 and 3.
- In case of engine 2 or 3 failure, pilot should use the remaining reversers.
- If the airport regulations restrict the use of reversers, select and maintain reverse idle until taxi speed is reached.
- Lower the nose wheel without undue delay if MED is selected.
- Braking may be commenced before nosewheel is down if required for performance reasons, but when comfort is the priority it should be delayed until the nose wheel 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 made.

— **GROUND SPOILERS . . . . . CHECK**

R Check that the ECAM WHEEL page shows the ground spoilers deployed after touchdown. Announce “Ground Spoilers” then “reverse green”.

— **DIRECTIONAL CONTROL . . . . . ENSURE**

- Use rudder pedals for directional control
- Do not use nose wheel steering control handle before reaching taxi speed.

— **BRAKES . . . . . AS RQRD**

Monitor the autobrake if it is on. When required, brake with the pedals.

● **At 70 knots :**

— **REVERSE levers** . . . . . **IDLE**

It is recommended to select idle reverse thrust at 70 knots (minimum is 60 knots or beginning of speed indication fluctuation).

— **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 :**

— **REVERSE levers** . . . . . **STOW**

· Deselect the REV position upon reaching taxi speed and before leaving the runway.

— **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 the engines and 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 command.
  - Check and announce FMA : TOGA, SRS, GA TRK.

*Note : The MCDU PERF page automatically switches to the GO AROUND phase.*

- **FLAPS** ..... **RETRACT ONE STEP**  
Announce “FLAPS...” when indicated
- **ANNOUNCE** ..... **“POSITIVE CLIMB”**
- **ORDER** ..... **“GEAR UP”**
- **L/G UP** ..... **SELECT**
- **CONFIRM/ANNOUNCE** ..... **“GEAR UP-FLAPS”**

*Note : Consider retarding to CL detent, if TOGA thrust is not required.*

- **NAV or HDG mode** ..... **SELECT**

*Note : 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.*

**R GO-AROUND FROM AN INTERMEDIATE APPROACH ALTITUDE**

- R To interrupt the approach, or to perform a go-around, from an intermediate altitude in the

R approach, and if TOGA thrust is not required, proceed as follows :

R – **SET the thrust levers to TOGA detent, then retard the thrust levers as required.**

R This enables to engage the GO AROUND phase, with associated AP/FD modes.

R – **SELECT the applicable AP/FD and A/THR modes on the FCU.**

R *Note : If the thrust levers are not set briefly to TOGA detent, the FMS does not engage*

R *the GO AROUND phase, and flying over, or close to the airport (less than 7 NM)*

R *will sequence the Destination waypoint in the F-PLN.*

AFTER LANDING

- R

— LAND LIGHTS . . . . .

OFF

Retract landing lights, unless they are needed.

Set the STROBE lights to AUTO when leaving the runway.
- GROUND SPOILERS . . . . .

DISARM
- 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 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.
- ENG START selector . . . . .

NORM
- ATC . . . . .

STBY/OFF

This is not applicable to transponder panels equipped with an AUTO position, if AUTO is selected.
- TCAS Mode selector ◀ . . . . .

STBY

This is only applicable to transponder panels equipped with an AUTO position, if AUTO is selected.
- ANTI ICE . . . . .

AS REQD

If engine anti-ice is used, take care to control taxi speed, especially on wet or slippery surfaces (ground idle is increased).
- APU . . . . .

START

APU START may be delayed until just prior to engine shutdown.
- RADAR . . . . .

OFF/STBY
- PREDICTIVE WINDSHEAR SYSTEM ◀ . . . . .

OFF

Switching the radar and predictive windshear system OFF after landing avoids risk of radiating persons at the gate area.

— **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

— **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 and 4 shutdown.

R — **PARKING BRK . . . . . ON**  
 R · When one brake temperature is above 500°C (or above 350°C with the brake fans  
 R ON  $\triangleleft$ ), avoid applying the parking brake, unless operationally necessary.  
 R · Check the brake pressure on the Triple Indicator for the left and right brakes.

R — **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 switches 1, 2, 3 and 4 . . . . . 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 operational 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 the ENG MASTER to OFF.  
 · Check that engine parameters decrease.  
 · The DOOR/OXY page is displayed on the lower ECAM display.

— **GROUND CONTACT . . . . . ESTABLISH**  
 · Establish ground communication  
 · Check chocks are in place.

— **SLIDE DISARMED . . . . . CHECK**  
 Check slides disarmed on the ECAM DOOR/OXY 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.





— **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.  
· 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.

R — **PARKING BRAKE** . . . . . **AS RQRD**  
· If one brake temperature is above 300°C (or above 150°C with brake fan ON ▶), the parking brake should be released after the chocks are in place.  
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.

— **DUs** . . . . . **DIM**  
Dim EFIS, ECAM and MCDU display units.

— **PARKING 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 70°N in order to avoid 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**
- **GND SELECT CTL switch** . . . . . **AS RQRD**  
Should electrical power be required for crew or servicing personel, consider selecting the GND SELECT CTL switch in the forward cabin to the ON position prior to selecting aircraft power off.
- **APU BLEED** . . . . . **OFF**
- **EXT PWR** . . . . . **AS RQRD**
- **APU MASTER switch** . . . . . **OFF**  
Switch off the APU after the passengers have disembarked.
- **EMER EXIT LT** . . . . . **OFF**
- **NO SMOKING** . . . . . **OFF**  
Switching off the NO SMOKING signs permits the emergency batteries to be charged (provided external power is supplying the aircraft network).
- **BAT 1 and 2 and APU BAT** . . . . . **OFF**  
Wait until the APU flap is fully closed (about 2 minutes after APU AVAIL light goes out) before switching off the APU battery. Switching the batteries off before the APU flap is closed may cause smoke in the cabin during the next flight.
- **SECURING THE AIRCRAFT CHECKLIST** . . . . . **COMPLETE**

R  
R

## COMMUNICATIONS AND STANDARD TERMS

Standard phraseology is essential to ensure effective crew communication. The phraseology should be concise and exact. The following Chapter lists the calls 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.

### R CHECKLIST CALLOUTS

- “CHECK” : A command for the other pilot to check an item.
- “CHECKED” : A response that an item has been checked.
- “CROSSCHECKED” : A call verifying information from both pilots stations.

R If a checklist needs to be interrupted, announce : “HOLD CHECKLIST AT \_\_\_\_” and “RESUME

R 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.

All actions performed on the FCU must be verified 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 mode or target.

The “PULL” command means pulling an FCU knob to engage, or arm, a selected mode or target. Example :

- |                      |                                       |
|----------------------|---------------------------------------|
| – “HDG 090 PULL”     | (Heading knob is turned and pulled).  |
| – MANAGE NAV         | (Heading knob is pushed).             |
| – “FL 190 PULL”      | (Altitude knob is turned and pulled). |
| – “FL 190 MANAGE”    | (Altitude knob is turned and pushed). |
| – SPEED 250 KTS PULL | (Speed knob is turned and pulled).    |
| – MANAGE SPEED       | (Speed knob is pushed).               |

|                                                                                                                             |                                      |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>STANDARD OPERATING PROCEDURES</b> |  | 3.03.90 | P 2    |
|                                                                                                                             | STANDARD CALLS                       |  | SEQ 001 | REV 23 |

Note : 1. If the value was previously set, there is no requirement to repeat the figure.  
Simply call e.g. HDG PULL : SPEED PULL : FL PULL  
2. It is sometimes preferable to first pull the FCU knob before setting the value (e.g. a long turn).

The VS/FPA selector knob has no managed function. The standard calls 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).

e.g. : BIRD ON (The HDG-V/S/TRK-FPA pushbutton is pushed).

Note : All actions on the FCU and MCDU must be verified on the PFD and ND, as follows :

- First, ensure that the correct FCU knob is used, then verify indications on the PFD/ND.
- Mode changes should be confirmed by calling the color when appropriate (e.g. BLUE, MAGENTA).

## **FMA**

Unless listed otherwise (eg CAT II & III task sharing), all FMA changes will be normally called by the PF.

## **ALTITUDE**

The PNF calls when passing 1000 feet before the cleared altitude or FL, and is acknowledged by the PF calling “CHECKED”.

R e.g. : 1000 below 4000

R e.g. : 1000 above 290

## FLAP OR GEAR CONFIGURATION

### FLAPS CALLS

| FLAPS CONFIGURATION | CALL |
|---------------------|------|
| 1                   | One  |
| 1 + F               | One  |
| 0                   | Zero |

The reply will be given when selecting the new flap position.

e.g. :

|     | CALL                            | REMARK                                                                                                                                              |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| PF  | "FLAPS FULL"                    | PF commands Flaps Full                                                                                                                              |
| PNF | "SPEED CHECKED"<br>"FLAPS FULL" | PNF replies when selecting the Flap position, and checks the blue number on the ECAM flap indicator to confirm the correct selection has been made. |

### GEAR CALL

|     | CALL             | REMARK                                                                                                                             |
|-----|------------------|------------------------------------------------------------------------------------------------------------------------------------|
| PF  | "GEAR UP (DOWN)" | PF commands Gear Up (Down)                                                                                                         |
| PNF | "GEAR UP (DOWN)" | PNF replies when selecting the Gear position, and checks the lights on the landing gear indicator panel to confirm gear operation. |

## FLIGHT PARAMETERS

PNF will make call-outs for the following conditions during final approach. Attitude callouts also to be made through to landing.

- "SPEED" when speed becomes less than  $V_{app} - 5$  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 0° or higher than + 10°.
- "LOC" or "GLIDE" when either localizer or glide slope deviation is one dot.
- "COURSE" when greater than 1/2 dot (VOR) or 5 degrees (ADF).
- "\_\_\_ FT HIGH (LOW)" at altitude checks points.

**PF/PNF DUTIES TRANSFER**

Transfer of control is initiated by a command and followed by an acknowledgement.

- “I HAVE CONTROL” is either the command that the other pilot is to pass control and assume PNF duties ; or the acknowledgement by the other pilot that he has assumed PF duties.
- “YOU HAVE CONTROL” is either the command that the other pilot is to take control and assume PF duties ; or the acknowledgement by the other pilot that he has assumed 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. “CLEAR \_\_\_ (title of the system)” is the command by the PF that the action and review is confirmed.
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.

**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   |

| BEFORE ENGINE START/PUSH BACK      |                              |                                       |
|------------------------------------|------------------------------|---------------------------------------|
| EVENT                              | PF                           | PNF                                   |
| Before start up clearance received | BEFORE START C/L TO THE LINE | BEFORE START C/L TO THE LINE COMPLETE |
| After start up clearance received  | 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<br>CLEAR TO PUSH                 |                                            |
| When ready to start engines                                                    | CLEAR TO START ?<br>STARTING ENG(S)              | CLEAR TO START                             |
| When pushback completed                                                        | 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 |

R

| 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 *                                                                   |                                        | FULL LEFT, FULL RIGHT, NEUTRAL           |
| During taxi                                                                   | BEFORE TAKE-OFF CHECK LIST TO THE LINE | BEFORE TAKE-OFF C/L TO THE LINE COMPLETE |
| Lining up on the runway                                                       | BELOW THE LINE                         | BEFORE TAKE-OFF C/L COMPLETE             |

Note : \* The PNF should follow pedal movement with his/her feet

R

| TAKE-OFF                                                                       |                       |                                           |
|--------------------------------------------------------------------------------|-----------------------|-------------------------------------------|
| EVENT                                                                          | PF                    | PNF                                       |
| Setting thrust levers to initial stabilisation value                           | TAKE-OFF              |                                           |
| When thrust levers set to FLEX/TOGA                                            | ANNOUNCE FMA          | CHECKED                                   |
| Before passing 80 kts                                                          |                       | POWER SET                                 |
| At 100 kts                                                                     | CHECKED               | ONE HUNDRED KNOTS                         |
| At V1                                                                          |                       | V1                                        |
| At VR                                                                          |                       | ROTATE                                    |
| When climbing clear of the ground (positive increase of V/S, BARO and RAD ALT) | GEAR UP               | POSITIVE CLIMB<br>GEAR UP                 |
| If AP is engaged by PNF<br>If AP is engaged by PF                              | AP 1(2) ON<br>AP 1(2) | CHECKED                                   |
| When F Speed and accelerating                                                  | FLAPS ONE             | SPEED CHECKED<br>FLAPS ONE                |
| When S Speed and accelerating                                                  | FLAPS ZERO            | SPEED CHECKED<br>FLAPS ZERO               |
| After T/O check (not normally requested before flap retraction completed)      | AFTER TAKE-OFF C/L    | AFTER TAKE-OFF C/L COMPLETED TO THE LINE. |

| ALTIMETER SETTING CHANGES TO/FROM QNH/QFE-STD                  |                                             |                                                                  |
|----------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------|
| EVENT                                                          | PF                                          | PNF                                                              |
| Barometric setting change and subsequent altimeter cross-check | PULL STANDARD (PUSH QNH/QFE)<br><br>CHECKED | STANDARD (QNH/QFE)<br>CROSS-CHECKED<br>PASSING FL__ ( __ FT) NOW |



R

| APPROACH AND LANDING                                                                                                                                                                                                                                                            |                         |                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| EVENT                                                                                                                                                                                                                                                                           | PF                      | PNF                                                   |
| When cleared below transition level or when appropriate                                                                                                                                                                                                                         | APPROACH C/L            | APPROACH C/L COMPLETE                                 |
| Activation of approach Phase (approx 15mn from touchdown ; automatic, if in managed nav)                                                                                                                                                                                        | ACTIVATE APPROACH PHASE | APPROACH PHASE ACTIVATED                              |
| Beginning of radio altimeter indication (could be auto callout of 2500 ft)                                                                                                                                                                                                      | CROSS CHECKED           | RAD ALT ALIVE (see Note 1 below)                      |
| At green dot speed or < VFE                                                                                                                                                                                                                                                     | FLAPS ONE               | SPEED CHECKED<br>FLAPS ONE                            |
| "GS*", "FINAL APP", or "FAF"                                                                                                                                                                                                                                                    | SET GA ALTITUDE __ FT   | GA ALTITUDE SET,                                      |
| 2000 ft AGL min (ILS) ; or S speed (non-precision)                                                                                                                                                                                                                              | FLAPS TWO               | SPEED CHECKED<br>FLAPS TWO                            |
| When at flaps at two                                                                                                                                                                                                                                                            | GEAR DOWN               | GEAR DOWN                                             |
| When gear is down                                                                                                                                                                                                                                                               | FLAPS THREE             | SPEED CHECKED<br>FLAPS THREE                          |
| When flaps at three (unless landing with Flap 3)                                                                                                                                                                                                                                | FLAPS FULL              | SPEED CHECKED<br>FLAPS FULL                           |
| FAF                                                                                                                                                                                                                                                                             | CHECKED                 | PASSING __ (Fix Name), __ FT,                         |
| When landing flaps set, and landing memo is displayed on ECAM                                                                                                                                                                                                                   | LANDING C/L             | LANDING C/L COMPLETE                                  |
| 1000 ft above TDZE (may be auto callout)                                                                                                                                                                                                                                        | CHECKED                 | ONE THOUSAND                                          |
| FMA "LAND GREEN" (ILS approach)                                                                                                                                                                                                                                                 | LAND GREEN              | CHECKED                                               |
| 100 ft above MDA/DH                                                                                                                                                                                                                                                             | CHECKED                 | ONE HUNDRED ABOVE (if no Auto Call out)               |
| MDA/DH visual reference                                                                                                                                                                                                                                                         | LANDING                 | MINIMUM                                               |
| MDA/DH no visual reference                                                                                                                                                                                                                                                      | GO AROUND-FLAPS         | MINIMUM                                               |
| PNF monitors pin-programmed auto callout, or announces if inoperative                                                                                                                                                                                                           |                         | ONE HUNDRED<br>FIFTY                                  |
| After touchdown                                                                                                                                                                                                                                                                 |                         | GROUND SPOILERS, REVERSE GREEN (See the note 2 below) |
| If autobrake armed                                                                                                                                                                                                                                                              |                         | DECEL (See note 3 below)                              |
| At 70 kts                                                                                                                                                                                                                                                                       | CHECK                   | SEVENTY KNOTS                                         |
| Note 1 : Crew awareness : Crew should now keep RA in scan to landing.<br>Note 2 : If reverse deployment is not as expected, call NO REVERSE ENGINE __ or NO REVERSE, as appropriate.<br>Note 3 : If autobrake is armed and no positive deceleration is observed, call NO DECEL. |                         |                                                       |

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**GENERAL**

This section 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 FE (Flight Envelope). 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, GO AROUND pages. These values are computed by the FMGC.

Computations made by FE and FMGC are based on the gross weight information transmitted by the FCMC (Fuel Control and Monitoring Computer).

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 the A340 has a low-speed protection feature (alpha limit) that the flight crew cannot override, the airworthiness authorities have reconsidered the definition of stall speed for this 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 A340 and VSmin for conventional aircraft types. As a result the authorities allow the A340 to use the following factors :

$V2 = 1.2 \times 0.94 VS1g = 1.13 VS1g$

$VREF = 1.3 \times 0.94 VS1g = 1.23 VS1g$

These speeds are identical to those that the conventional 94 % rule would have defined for this aircraft. The A340 has 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.  
 It is equal to :  
 – 1.13 VS, at takeoff  
 – 1.18 VS, when the flaps are retracted.  
 – 1.23 VS, when in clean configuration. (It remains at this value until landing).  
 VLS is corrected for Mach effect to maintain a 0.3g buffet margin.  
 In addition, VLS is increased when the speedbrakes are extended.  
 The VMC is taken into account for VLS computation as follows :  
 – At takeoff, until retraction of one step of flaps, VLS is equal to or greater than the lowest of :  
   · V<sub>2</sub>/1.05 or  
   · 1.05 VMCA maximum certified.  
 – In all the other phases, it is equal to or greater than VMCL.  
 – When two engines fail on the same wing, as soon as the slats are extended, VLS is equal to or greater than VMCL-2. (This limitation does not apply to the VLS displayed on the MCDU).
- 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.  
 At takeoff, it is equal to about 1.18 VS of CONF 1 + F, and is limited to a minimum of VMCL + 5 knots.  
 In approach, when the aircraft is in CONF 2, the takeoff value is increased by 18 %. It is limited to a minimum of VMCL + 15 knots and to a maximum of VFE CONF 3 – 2 knots.  
 Then, when the aircraft is in CONF 3, the takeoff value is increased by 7 %. It is limited to a minimum of VMCL + 10 knots and to a maximum of VFE CONF FULL – 2 knots.
- 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 1.21 VS of clean configuration.  
 In approach, S is limited to a maximum of VFE CONF 1\* – 2 knots.
- 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.
- R** : With all engines running :  
**R** – Below 20000 feet equal to  $0.6 \times \text{weight (tons)} + 115$  knots.  
 – Above 20000 feet, add 1 knot per 1000 feet  
**R** : With at least one engine-out, subtract 10 knots, in the above situations.

**PROTECTION SPEEDS**

- $V_{\alpha}$  PROT,  $V_{\alpha}$  MAX and VSW are computed by the PRIM, based on aerodynamic data.  
 $V_{\alpha}$  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.  
 $V_{\alpha}$  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 FE according to the aircraft configuration.  
 It is equal to VMO (or speed corresponding to MMO), VLE or VFE.

**LIMIT SPEEDS**

- VMCG : Minimum speed, on the ground during takeoff, at which the aircraft can be controlled by the use of primary flight controls only, after a sudden failure of the critical engine, the other engines remaining at takeoff power.  
 VMCA : Minimum control speed in flight at which the aircraft can be controlled with a maximum bank of 5 degrees, if one engine fails, the other engines 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 degrees, if one engine fails, the other engines remaining at takeoff power (approach flap setting).  
 VMCL-2 : Minimum control speed in flight at which the aircraft can be controlled with a maximum bank of 5 degrees, if two engines fail on the same side, the other engines remaining at takeoff power (approach flap setting).  
 VFE : Maximum speed for each flap configuration.  
 VLE : Maximum speed with landing gear extended.  
 R 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 :  $VAPP = VLS + \text{wind correction}$ .  
 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.
- R

:
 

VAPP TARGET

: Represented by a magenta triangle.  
 Calculated by the FMGCs  
 Gives efficient speed guidance in approach during various windy conditions.  
 Represents :  
 $VAPP\ TARGET = GS\ mini + \text{actual headwind (measured by ADIRS)}$   
 $GS\ mini = VAPP - \text{TOWER WIND (headwind component along runway axis calculated by FMGC from tower wind entered on MCDU)}$



## CABIN TEMPERATURE CONTROL

### SYSTEM OPERATION

The cabin is divided into 3 temperature control zones : FWD, MID and AFT. The length of the three zones is, as far as practicable, adapted to the individual cabin class arrangement by respective programming of the CIDS.

The cockpit cabin temperature selector is used to select prior to flight a common cabin master temperature for all zones.

The common master temperature can be individually adapted for the three cabin zones at any time via the cabin temperature page of the Programming and Indication Modul (PIM) on the forward attendant panel. An individual zone correction up to  $\pm 2.5^{\circ}\text{C}$  ( $4.5^{\circ}\text{F}$ ) can be selected for the FWD, MID or AFT cabin zones in steps of  $0.5^{\circ}\text{C}$  ( $0.9^{\circ}\text{F}$ ).

### CABIN TEMPERATURE SELECTION

The system is designed to minimize flight crew workload. The cockpit and cabin selections should be set only once prior to flight. Throughout the flight the system takes care of cabin temperature regulation and under normal operating conditions there is no need to change the selection during flight.

It is recommended to follow these guidelines :

*Note : Any change of selection makes the system blow either colder or hotter air into the cabin which may result in a temporary discomfort for the passengers. To reach a stabilized cabin temperature again the system needs about 20 minutes : 10 minutes cabin temperature adjustment plus 10 minutes to compensated for furniture and lining heat dissipation. After selecting a temperature, allow the cabin temperature to stabilize again before selecting a new temperature.*

#### On the ground, prior to flight :

1. The cabin temperature selector in the cockpit (AIR panel) should be set to about the 10 o'clock position ( $21.5^{\circ}\text{C}/70.7^{\circ}\text{F}$ ) for ground and flight operation.
  2. The zone correction should be set to zero by pressing the <<RESET TO COCKPIT SELECTED TEMP>> soft key on the cabin temperature page of the PIM.
- The above settings provide a good cabin temperature comfort for most operating conditions.

**In flight :**

- 1. The master temperature preselection on the cockpit panel should normally not be changed during flight.  
If a cockpit preselection change is required, the cabin crew should be informed since, in the cabin, there is no automatic indication associated.

Note : *The PIM cabin temperature page will show the newly selected cabin temperature (+ zone correction + altitude correction) in each of the cabin zones.*

- 2. If required, the cabin crew should normally adjust the zone temperature on the forward attendant panel by no more than 0.5°C (0.9°F).

Note : *1. Generally, the lowest comfortable temperature should be selected.  
2. It is recommended that the cabin crew judge the required zone temperature, based on the temperature that is felt, rather than on the indicated value.*

|                         |
|-------------------------|
| <b>AIR CONDITIONING</b> |
|-------------------------|

With passengers on board, it is not recommended to exceed 20 minutes without air conditioning supply. The lack of fresh air supply will significantly reduce the quality of cabin air.

- R An external HP source may be used for air conditioning, provided the air supply is
- R confirmed to be free from oil contamination.

VHF, HF UTILIZATION

R

R

R

R

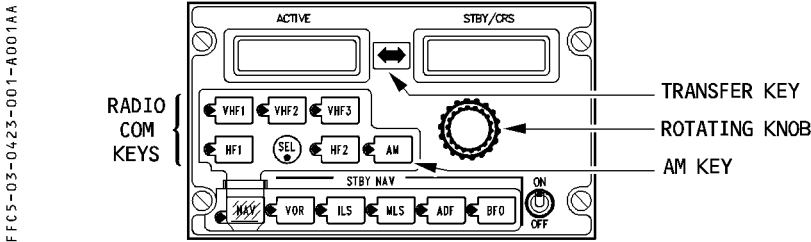
R

*Note :* 1. Reception of some frequencies could be noisy, on one or more VHF's. In such cases, try selecting a non-affected 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 desired radios. If tuning the radio results in the SEL lights coming on, he should put them out 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 one RMP tunes a transceiver normally associated with another RMP, the SEL lights on both RMPs come on.

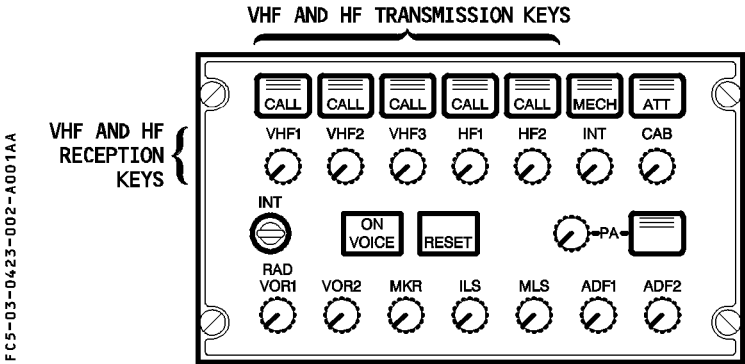
To change the frequency :

- **Rotating knob** . . . . . **TURN**  
Make the STBY/CRS window display the new frequency.  
Outer and inner rotating knobs are used for units and decimals, respectively.
  - **Transfer key** . . . . . **PRESS**  
This interchanges the ACTIVE and STBY frequency. The receiver is now tuned to the new ACTIVE frequency.
  - **AM key (if necessary)** . . . . . **PRESS**  
The green light comes on.
- R — **SEL light** . . . . . **CHECK OFF**  
R If SEL light is on, select the appropriate radio systems dedicated to the onside RMP.

R **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 off.
- **Affected RMP . . . . . SWITCH OFF**
- One RMP can control all receivers.
- If RMP 1 is affected, tune VHF1 through RMP3.
  - If RMP 2 is affected, tune VHF2 through RMP3.
  - If RMP 3 is affected, tune VHF3, HF1, HF2 through RMP1 or RMP2.
  - If two RMPs fail, tune all receivers through the remaining RMP.

**TRANSMISSION AND RECEPTION**



- **VHF or HF transmission key . . . . . PRESS**  
The green bars on the selected system key light up.  
The 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.
- R To adjust the volume, turn the key.

**FROZEN RMP**

An RMP is frozen, if it is impossible to interchange the ACTIVE and STBY radio navigation or communication frequencies.  
To recover normal operation of the RMP, all RMPs must be reset, because a problem on one RMP may be due to another RMP.

**PROCEDURE**

All RMP’s must be reset, one after the other.

**On the RMP control panel :**

- **ON/OFF switch . . . . . OFF**  
Wait 5 seconds, then
- **ON/OFF switch . . . . . ON**

**COMPUTER RESET**

In most cases, computers may be recovered following an abnormal behaviour or a detected fault by either :

- a software reset (reset of the microprocessor) or
- interrupting the power supply of its processing part for a short time.

This may be achieved with the normal cockpit controls (engagement levers, pushbuttons) or by action on the corresponding reset button.

For this purpose :

- R — Select the related normal cockpit control OFF, or pull the corresponding reset button,
- R — Wait 3 seconds if a normal cockpit control is used (unless a different time is indicated),
- R or 1 second if a reset button is used,
- R — Select the related normal cockpit control ON, or push the corresponding reset button,
- R — Wait 3 seconds for the end of the reset.

**WARNING**

- R Do not reset more than one computer at the same time, unless instructed to do so.

The following table, lists the various computers for which manual reset capability is provided :

- On the overhead RESET panels
- On the system control panel.

For each computer, effects and/or precaution in case of reset (if any) are also listed.

- A computer reset has to be attempted when :
  - recommended by an ECAM procedure or
  - recommended by a paper procedure.
- In all other circumstances, where a failure is suspected or detected, there is no specific recommendations as to whether a reset should be performed or not, except those where a reset is specifically forbidden.
- Before doing any reset that is not asked for by ECAM, or paper checklist, consult the QRH to ensure that it is not forbidden.

Manual reset on ground triggers complete power up test.

The number of reset attempt is not limited.

R

| ATA | EQUIPMENT    | MANUAL RESET     |                      | REMARKS                                                                                                                                                                                                                                                                                                           |
|-----|--------------|------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |              | OVHD RESET panel | System control panel |                                                                                                                                                                                                                                                                                                                   |
| 21  | PACK CONT    | 2                |                      | NIL                                                                                                                                                                                                                                                                                                               |
|     | ZONE CONT    | 1                |                      |                                                                                                                                                                                                                                                                                                                   |
|     | AEVC         | 1                |                      |                                                                                                                                                                                                                                                                                                                   |
|     | VENT CONT    | 2                |                      | If, in flight, the CAB REST SMOKE warning has been temporarily displayed and identified as a false warning, crew rest compartment ventilation may be recovered by resetting both VENT controller channels (simultaneously pull both ventilation controller RESET buttons for at least 5 seconds, then push them). |
|     | CPC          | 2                |                      | To force a CPC changeover :<br>– MODE SEL . . . . . MAN<br>• AFTER 3 seconds :<br>– MODE SEL . . . . . AUTO<br>The inactive CPC may then be reset (check the CAB PRESS ECAM page).                                                                                                                                |
| 22  | FCU          | 2                |                      | – On ground : The FCU has to be reconfigured after reset.<br>– In flight : Check FCU targets after reset.<br>Following a total FCU loss, targets are selected targets.                                                                                                                                            |
|     | FMGEC and FM | 4                |                      | · FMGEC or FM resets results in inside AP disconnection (if engaged).<br>· Resynchronization of both FM's will occur after a reset sequence, with associated messages on the MCDU and ND :<br>– PLEASE WAIT<br>– MAP NOT AVAIL<br>· It is recommended to use FMGEC R/B, rather than FM R/B.                       |
|     | MCDU         |                  | BRT OFF CTL          | In case the MCDU is blank or locked, refer to 4.06.20.                                                                                                                                                                                                                                                            |
|     |              |                  |                      |                                                                                                                                                                                                                                                                                                                   |



R

| ATA | EQUIPMENT | MANUAL RESET     |                      | REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----|-----------|------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |           | OVHD RESET panel | System control panel |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 23  | CIDS      | 2                |                      | <ul style="list-style-type: none"> <li>· In the event of reset of this active CIDS (usually CIDS 1 when both are operative) a complete power up test is performed.               <ul style="list-style-type: none"> <li>– In flight, test lasts about 20seconds:                   <ul style="list-style-type: none"> <li>· the cabin light comes on at full intensity.</li> <li>If selected, dimming is lost and must be reselected after test.</li> <li>· PA, CALL and INTERPHONE functions are interrupted and have to be reselected after test.</li> <li>· FAP cabin temperature corrections are lost and have to be reselected after test.</li> </ul> </li> <li>– On ground, test lasts about 80 seconds and includes additionally :                   <ul style="list-style-type: none"> <li>· a sequential cabin loudspeakers test (triggers a tone for about 10 seconds)</li> <li>· the cabin light might flash shortly. Dimming selection is lost (as in flight)</li> </ul> </li> </ul> </li> </ul> |
|     | ACP/AMU   | 2                |                      | NIL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|     | RMP       |                  | ON/OFF CTL           | <p>In case of freezing of one RMP (impossibility to interchange the ACTIVE and STBY radio navigation or communication frequencies,...), all the RMP's have to be reset, one after the other, to recover a normal operation.</p> <p>In order to be reset, RMP's must be switched off at least 5 seconds by using the ON/OFF selector on the RMP control panels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 24  | GPCU      |                  | 2 pb on ELEC panel   | <p>GPCU reset may be attempted if AVAIL and ON lights do not light up.</p> <ol style="list-style-type: none"> <li>1. Press once the affected EXT A(B) pb sw to reset the functions of GPCU.</li> <li>2. Switch ON the external power unit to reset the GPU.</li> <li>3. Check AVAIL light is ON and press the EXT A(B) pb sw to connect the GPU.</li> </ol> <ul style="list-style-type: none"> <li>· If unsuccessful, check GPU voltage and frequency (bite is available on batteries only)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

R

| ATA | EQUIPMENT    | MANUAL RESET     |                        | REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----|--------------|------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |              | OVHD RESET panel | System control panel   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 24  | BCL          |                  | 3 BAT pb on ELEC panel | Use the BAT pushbutton to reset the BCL. Do not reset the BCL when the BAT FAULT caution has been triggered and the BAT OFF selection has been requested by the ECAM.                                                                                                                                                                                                                                                                                                                                                                                       |
| 26  | SDCU         | 2                |                        | NIL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 27  | PRIM and SEC |                  | FLT/CTL panel          | <ul style="list-style-type: none"> <li>PRIMs or SECs may be reset, unless the DC ESS BUS FAULT or DC BUS 2 FAULT cautions are present, as this would result in a loss of the related PRIM or SEC.</li> <li>If a reset is performed on ground, it must be followed by a flight controls' test (SOP 3–03–10).</li> </ul> <b>WARNING :</b> <ul style="list-style-type: none"> <li>Do not reset more than one computer at a time.</li> </ul> <p><i><u>Note</u> : When a PRIM reset is performed on ground, the crew must check the pitch trim position.</i></p> |
|     | FCDC         | 2                |                        | NIL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

R

| ATA | EQUIPMENT         | MANUAL RESET     |                      | REMARKS                                                                                                                                                                                                                                                     |
|-----|-------------------|------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                   | OVHD RESET panel | System control panel |                                                                                                                                                                                                                                                             |
| 28  | FCMC              | 2                |                      | <div><div>– If the reset is done before engine start, the ZFW and ZFCG must be re-entered on the MCDU (init B page).</div><div>– If the reset is done after engine start, the actual GW and CG must be re-entered on the MCDU (FUEL PRED page).</div></div> |
| 30  | PHC<br>WHC        | 3<br>2           |                      | Associated heating is interrupted, when the reset button is pulled.                                                                                                                                                                                         |
| 31  | DU (ECAM, PFD,ND) |                  | OFF/BRT CTL          | IF DU reset is unsuccessful, a DMC (driving the affected DU) reset may be attempted.                                                                                                                                                                        |
|     | DMC               | 3                |                      | EFIS/ECAM displays are lost for 40 seconds on ground, after a reset or power up.                                                                                                                                                                            |
|     | FWC               | 2                |                      | NIL                                                                                                                                                                                                                                                         |
|     | SDAC              | 2                |                      | NIL                                                                                                                                                                                                                                                         |
| 32  | LGCIU             | 2                |                      | An LGCIU reset must neither be made during landing gear maneuvers nor just prior to touchdown.                                                                                                                                                              |

R

| ATA | EQUIPMENT | MANUAL RESET     |                                            | REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----|-----------|------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |           | OVHD RESET panel | System control panel                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 38  | VSC       |                  | Cabin aft C/B panel (VACUUM TOILET SYSTEM) | <p>In case all toilets of one or both sides are shutdown (on the cabin aft C/B panel) :</p> <ul style="list-style-type: none"> <li>– VACUUM TOILET SYSTEM (blue button) . . . . . RESET</li> </ul> <p><i>The repeated use of the blue reset button is not recommended.</i></p> <p><i>If this does not fix the problem, apply the following procedure for both system sides on the cabin aft C/B panel (VACUUM TOILET SYSTEM).</i></p> <p><i>Do not apply the following procedure in case of a waste tank overfill.</i></p> <p>On the cabin aft C/B panel :</p> <ul style="list-style-type: none"> <li>– C/B SYSTEM (both) and VACUUM GEN (both) (4 C/B) . . . . . PULL</li> <li>– C/B LAVATORY POWER (LH and RH) (8 C/B) . . . . . PULL</li> <li>– C/B LAVATORY POWER (LH and RH) (8 C/B) . . . . . PUSH</li> </ul> <p><i>LH and RH SYSTEM and both VACUUM GEN C/Bs remain pulled. In this configuration :</i></p> <ul style="list-style-type: none"> <li>· <i>The waste quantity indication is lost,</i></li> <li>· <i>The protection against waste tank overfill is lost,</i></li> <li>· <i>Do not use toilets below 16000 feet,</i></li> <li>· <i>On ground, during servicing, do not use toilets.</i></li> </ul> |
| 49  | ECB       |                  | APU MASTER sw                              | Reset must be attempted only when APU speed is below 7%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 52  | PSCU      | 2                |                                            | NIL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

R

| ATA | EQUIPMENT | MANUAL RESET           |                            | REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----|-----------|------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |           | OVHD<br>RESET<br>panel | System<br>control<br>panel |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 70  | EIVMU     | 4                      |                            | During the reset, and the subsequent 5 seconds, the following occurs : <ul style="list-style-type: none"> <li>– On the corresponding engine :               <ul style="list-style-type: none"> <li>· Loss of thrust reverser (T/R 1 and 4 are lost if EIVMU 1 or 4 affected).</li> <li>· Loss of vibration indication.</li> <li>· If idle is selected, only high idle is available.</li> <li>· Loss of man start and wet crank.</li> <li>· Loss of bleed corrections on thrust limit.</li> </ul> </li> <li>– On all engines :               <ul style="list-style-type: none"> <li>· Loss of autothrust</li> </ul> </li> <li>– Loss of Flex/Derated T.O.</li> </ul> |

**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**

- **COCKPIT DOOR . . . . . CLOSE**  
With the cockpit door selector at NORM, the cockpit door is closed and locked.

**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 :**
  - **DOOR LOCK switch . . . . . LOCK**  
Emergency access, the buzzer, and the keypad are inhibited for a preselected time between 5 and 20 minutes.
- **If entry is authorized by the flight crew :**
  - **DOOR LOCK switch . . . . . UNLOCK**  
The flight crew should pull the switch and maintain it in the UNLOCK position, until the cabin crew pushes the door open.

*Note : 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.

*Note : If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 seconds.*

- **DOOR LOCK switch . . . . . LOCK**  
Emergency access, the buzzer, and the keypad are inhibited for a preselected time between 5 and 20 minutes.  
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 :**
  - **DOOR LOCK switch . . . . . UNLOCK**  
The flight crew should pull the switch and maintain it in the UNLOCK position, until the cabin crew pushes the door open.

**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 seven digits.
- **CABIN CREW . . . . . STAND IN COCKPIT DOOR AXIS**  
The cabin crew should stand in the axis of the cockpit door.  
A buzzer sounds in the cockpit.
- **If entry is NOT authorized by the flight crew :**
  - The flight crew locks the door via the DOOR LOCK switch.
  - The keypad’s red light comes on steady, and indicates that the door is locked.  
Emergency access, the buzzer, and the keypad are inhibited for a preselected time between 5 and 20 minutes.
- **If entry is authorized by the flight crew :**
  - The flight crew unlocks the door via the DOOR LOCK switch.
  - The keypad’s green light comes on steady, and indicates that the door is unlocked.
- **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 seven 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).  
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 :

- excessive maneuvering
- loss of control leading to excursions outside the safe flight envelope.

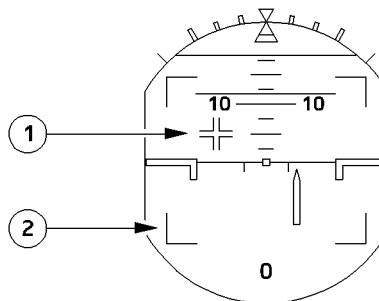
**AIRCRAFT ON THE GROUND**

On the ground the sidesticks have full authority over the controls in pitch and roll.  
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 unnecessary 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.

FFC5-03-0427-002-A001AA



R 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 during takeoff roll.

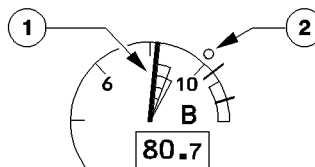
Small limit marks (2) indicate the limits of stick travel ( $\pm 16^\circ$  in pitch,  $\pm 20^\circ$  in roll). They are displayed only with aircraft on ground. Flight crew must not use this display for control checks, because it does not necessarily indicate control position in failure cases. Flight crew must use the ECAM flight controls page for making that check.

## IN FLIGHT

### **TAKEOFF MODE**

R

FFC5-03-0427-002-B001AA



Thrust management is very easy. The pilot selects a FLX thrust by stopping the thrust levers in the FLX/MCT detent and checking that the resulting N1 (1) is compatible with N1 target (2). For maximum takeoff thrust, the pilot moves the thrust levers fully forward and makes the same thrust check (N1).

R 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 gradually to reach neutral at 100 knots (Refer to SOP 3.03.12 for additional information).

- R Rotation is conventional. As the A340 has a large inertia, it is important to initiate the rotation with a positive backward stick input (typically 2/3 backstick).
- R The rotation rate produced by a given sidestick input takes time to build up ; once it has developed, it remains relatively constant for a given sidestick position. Rapid variations in stick position cause discomfort.
- R The pilot continues the rotation to a typical all-engine attitude of about 12.5°. 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 crosswind conditions, some lateral control may be used, but care should be taken to avoid using large deflections, resulting in excessive spoiler deployment which increases the tendency to turn into wind, reduces lift, and increases drag. Spoiler deflection starts to become significant with more than half sidestick deflection. As the aircraft lifts off, any lateral control applied will result in a roll rate demand.

## FLIGHT MODE

The sidestick is normally 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 best flown 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 trim changes, due to 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.

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 the 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 100 feet, the normal flight law is changed to the flare law which is a full authority pitch direct law compensated for CG and for certain pitching effects so 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. 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 the aircraft with the runway heading, during the flare, while using lateral control to maintain 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.

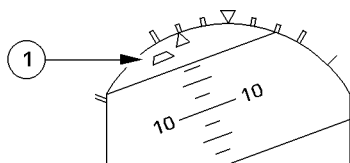
Derotation is conventional.

Pitch trim then resets to 5° UP after the transition to ground law, which happens 5 seconds after the ground condition is confirmed and if the ground spoilers are retracted.

## ABNORMAL OPERATIONS

### ENGINE FAILURE AT TAKEOFF

FFCS-03-0427-004-A100A



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 FLT CTL page on ECAM 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 %. To make the landing run easier, it is recommended that, in the later stages of the approach, the rudder be reset to zero. With trim at zero, the neutral rudder pedal position corresponds to zero rudder and zero nosewheel deflection.

## **GO-AROUND WITH ONE OR TWO ENGINE FAILURE**

The piloting technique, in this case, is similar to that for an engine failure at takeoff :

- Zero beta target value for optimum performance, with appropriate rudder application.
- At certain weights and CG positions, it will not be possible to satisfy beta target demands at VLS. When obstacle clearance is assured, accelerate to a speed at which beta target can be satisfied.

## **R BOUNCE AT LANDING**

- R In case of a light bounce, maintain the current pitch attitude and complete the landing,  
 R while maintaining the thrust at idle. In case of a strong bounce, initiate a go-around, initially  
 R maintaining the pitch attitude. Retract the flaps one step, and then the landing gear, once  
 R the aircraft is properly established on the go-around segment. In all cases, do not attempt  
 R 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 5° UP : This normally occurs 5 seconds after the pitch attitude is less than 2.5°, and if the ground spoilers are retracted. 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 retracts at 50 feet, provided the aircraft has transitioned to flight law.

## **ABNORMAL CONTROL LAWS – GENERAL**

### **ALTERNATE LAW**

Pitch alternate and roll normal is the first level of degraded control law.

Further failures result in pitch alternate and roll direct.

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 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 normal control law. However, alternate law does not maintain any of the protections, except maneuver protection. As a result, the pilot must fly the aircraft more attentively to avoid inadvertently exceeding the normal limits.

- R
- Alternate law reduces MMO to 0.82, and VMO to 305 knots.
- An aural “STALL, STALL, STALL” warning sounds at low speeds. Upon hearing it, the pilot must return to the normal operating speed by taking conventional actions with the controls:
- THRUST LEVERS . . . . .TOGA

At the same time :

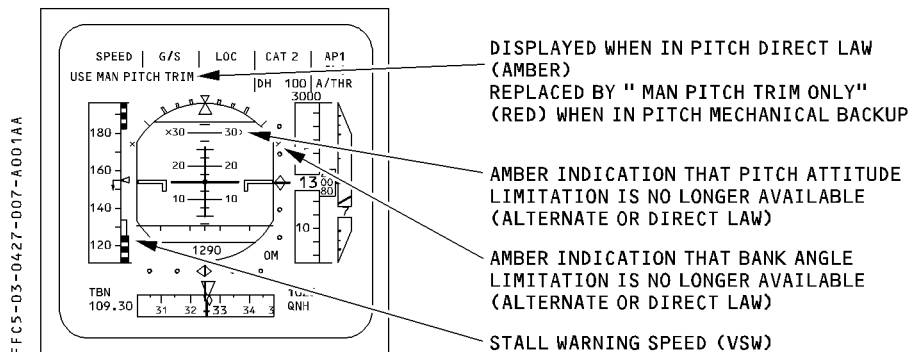
- PITCH ATTITUDE . . . . .REDUCE
- BANK ANGLE . . . . .ROLL WINGS LEVEL
- SPEEDBRAKES . . . . .CHECK RETRACTED

- If a danger of ground contact exists, reduce pitch attitude no more than necessary to allow airspeed to increase. After initial recovery, maintain speed close to VSW until it is safe to accelerate.
- If below 20000 feet, and if in clean, select FLAP 1.
- Out of stall, when there is no threat of ground contact :

LANDING GEAR . . . . .UP

  - Recover to normal speeds and select flaps as required.
  - In case one engine is 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.



At low speed, the change in the speed scale is very noticeable. VLS remains, but  $V_{\alpha}$  PROT and  $V_{\alpha}$  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 FLARE law for landing at 100 feet.

## Roll

Roll control is direct. The roll rate is generally higher than with normal law and, at first, the aircraft appears to be very sensitive.

Bank stability and limits are no longer active, and the flight crew should be careful to remain 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, the PRIMs can be reset 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 five seconds, then remains 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 gently retract the speedbrakes, 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 the center. With some failure conditions, the asymmetric rolling tendency may be increased. It will always be possible to trim the aircraft to flight straight, hands off. There may then be an asymmetry in roll response, but the achieved roll rate 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 (30 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 the yaw damper and provides a minimal turn coordination.

**THE PROTECTION SYSTEMS**

**GENERAL**

The aircraft has a comprehensive flight envelope protection system. This system increases safety if the pilot has to perform an extreme maneuver, or if the aircraft enters very violent meteorological conditions. 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.*

**ATTITUDE LIMITS**

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.

**MANEUVER LIMIT**

The aircraft is structurally designed to the same limits as any other large aircraft. The 2.5g limit (2g if not in clean configuration) 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 normally not be able to safely perform at any altitude, low or high.



## **EXCEEDING VMO/MMO**

- R 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.
- R Using the following procedure prevents such an exceedance :
- R 1. In case of turbulence, adapt speed or Mach target. If severe turbulence is known, or
- R forecasted, consider the use of turbulence speed.
- R 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.
- R 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 in order to recover proper speed.

In all events :

- 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 side-stick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.

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.

**STALL 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, alpha floor 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 ALPHA MAX, THE PILOT CAN MAKE GENTLE TURNS, IF NECESSARY. As the aircraft enters protection at the amber and black strip, 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 alpha protection except for brief periods when maximum maneuvering is required. If the pilot enters alpha protection 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 alpha floor 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 alpha protection if the stick is released with the angle of attack still greater than the value set for alpha protection. Thus to exit alpha protection properly, the pilot should reduce angle attack to a value less than the value set for alpha protection.

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.

Alpha floor will usually be triggered just after alpha protection 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, alpha protection should be exited by easing forward on the sidestick, as described above, and the alpha floor 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 alpha protection at a high level, where it protects the aircraft from the buffet boundary. The PFD shows that alpha protection is active in the same way it does so at low speed or low level : the amber and black strip rises to the actual speed of the aircraft. As at low speed or low level, if the stick is merely released to neutral the aircraft maintains the alpha for alpha protection. (This value of alpha is not however the same as the values used at low speed : alpha for alpha protection is reduced as a function of Mach so that a typical cruise value is in the order of 5°). Thus the aircraft may climb, stick free, when leaving a turn after entering alpha protection. If the pilot has flown into alpha protection, he should leave it as soon as other considerations allow by easing forward on the stick to reduce alpha below the value of alpha protection while simultaneously increasing thrust or speed as appropriate.

## **WINDSHEAR**

Most of the recommended techniques for flight in windshear apply. But, for this 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. It can sustain this energy level in three ways :

- Carry extra speed. In some cases, the aircraft does this automatically.
- 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), 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 close to the beginning of the red strip. But, in turbulence, it could be below it temporarily, 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**

With the horizontal stabilizer jammed, control is much easier than it is on a conventional aircraft because the system holds the elevator, required to maintain the 1g flight path.

Pitch control law reverts to alternate, and lateral control law remains normal to touchdown.

### **AIRCRAFT TRIMMING**

When the aircraft is :

- In normal cruise range,
  - 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 2.9 degrees right and 1.6 degrees left.

R *Note : This indication corresponds to a true rudder deflection within  $\pm 1$  degrees, taking into account the permanent offset of rudder trim indication when the aircraft is in cruise conditions (1.9 degrees right, 0.6 degrees left).*

**FUEL JETTISON**

**WARNING**

R If the jettison procedure is applied following the “FUEL LEAK” or “ENG FAIL” with tank  
R damage procedure, the flight crew must comply with the following requirements :  
R — If a fuel leak is present, and weight reduction is essential for landing, once close to  
R the landing airfield, adopt the following procedure for fuel jettison.

Fuel jettison is provided for quick reduction of aircraft weight in order to :

- Comply with the approach and landing climb requirements (not required, if the configuration is FLAP 3 for landing),
- Obtain the normal maximum landing weight (if time permits),
- Obtain the planned flight profile in case of engine failure enroute.

It is possible to jettison in any convenient configuration and at any speed. When practicable, the height should be sufficient to avoid contamination on the ground (5 000 feet AGL is considered as adequate).

Do not jettison in a thunderstorm.

When jettison is performed, avoid flying into the jettisoned flow (which is descending at about 500 feet/min).

Average weight reduction (by jettison only) is 1000 kg/min (2200 lbs/min).

**AUTOMATIC MODE**

**On MCDU :**

- **FUEL PRED key . . . . . SELECT**
- **JET GW . . . . . ENTER THE FINAL GW**

**On OVERHEAD panel :**

- **L+R INR TK SPLIT . . . . . OFF**  
Re-open the split valves, if previously shut (FUEL LEAK or ENG FAIL with fuel leak procedure).
- **T TANK MODE . . . . . CHECK AUTO**
- **JETTISON ARM . . . . . ON**
- **JETTISON ACTIVE . . . . . ON**

*Note : If T TANK XFR FAULT ECAM warning is triggered, disregard the ECAM procedure.*

R

CAUTION

During jettison operation, monitor the CG.  
If either the forward or aft takeoff and landing limit is reached, stop jettison.

• **When JETTISON is completed, or to manually stop JETTISON operation :**

- **JETTISON ACTIVE . . . . . OFF**
- **JETTISON ARM . . . . . OFF**

*Note : 1. Jettison operation is automatically stopped when actual GW reaches the value inserted in the MCDU.  
2. Automatic jettison can be restarted by re-entering JET GW.*

**MANUAL MODE**

**On MCDU if necessary :**

- **FUEL PRED key** . . . . . **SELECT**
- **JET GW** . . . . . **CLEAR**

**On OVERHEAD panel :**

- **L+R INR TK SPLIT** . . . . . **OFF**  
 Re-open the split valves, if previously shut (FUEL LEAK or ENG FAIL with fuel leak procedure).
- **T TANK MODE** . . . . . **CHECK AUTO**
- **JETTISON ARM** . . . . . **ON**
- **JETTISON ACTIVE** . . . . . **ON**

*Note : If T TANK XFR FAULT ECAM warning is triggered, disregard the ECAM procedure.*

**CAUTION**

During jettison operation, monitor the CG.  
 If either the forward or aft takeoff and landing limit is reached, stop jettison.

**To stop JETTISON operation :**

- **JETTISON ACTIVE** . . . . . **OFF**
- **JETTISON ARM** . . . . . **OFF**

**CAUTION**

The fuel will be jettisoned until a low level sensor becomes dry or until the flight crew turns off the jettison pushbuttons.

**ICING CONDITIONS**

Icing conditions may be expected when the OAT (on ground and for takeoff), or the TAT (in flight) is 10°C or below, 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 when 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**

The flight crew may use WING ANTI ICE to either prevent ice formation, or to remove an ice accumulation from the wing leading edges.

The flight crew should turn WING ANTI ICE ON, whenever there is an indication that the airframe is icing up. The indication may be an accumulation of the ice on the visual ice detector (between the two cockpit windshields), or on the windshield wipers.

**CAUTION**

R  
R

1. The pilot should avoid extended flight in icing conditions with the slats extended.
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 clean configuration, VLS + 15 knots.
- In CONF 1, 2, 3, FULL, VLS + 5 knots, and multiply the landing distance by 1.1.

R  
R

3. If there is evidence of significant ice accretion on de-iced parts (WING ANTI ICE inoperative) of the airframe, the minimum speeds should be :
  - In clean configuration, VLS + 15 knots ;
  - In CONF 1, 2, 3, FULL, VLS + 10 knots, and multiply the landing distance by 1.2.

**Ground operation in icing conditions**

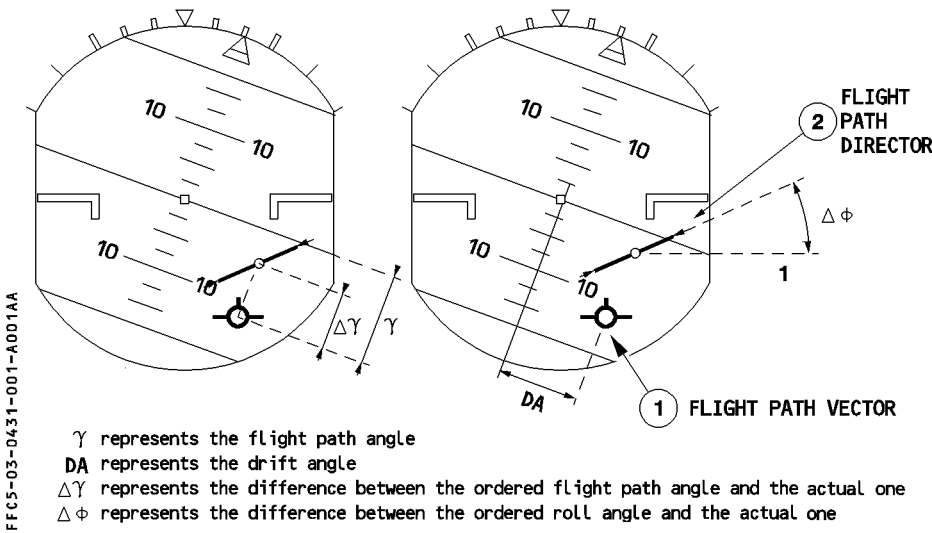
See the Contaminated Runways section in the FCOM Volume 2 (Refer to FCOM 2.04.10).  
See the Adverse Weather section for aircraft preparation in cold weather (Refer to 3.04.91).  
See the Standard Operating Procedures for engine operations (Refer to 3.03.09).

**RAIN REPELLENT** ◀

- R If the rain repellent is operative, the flight crew should only use the rain repellent in moderate to heavy rain.



# USE OF FLIGHT PATH VECTOR



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  $-3^\circ$ .

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.

|                                                                                                                                            |                                 |  |         |        |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--|---------|--------|
|  <b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>SUPPLEMENTARY TECHNIQUES</b> |  | 3.04.32 | P 1    |
|                                                                                                                                            | LANDING GEAR                    |  | SEQ 100 | REV 27 |

## R **BRAKING IN ALTERNATE MODE**

Apply brakes with care, since initial pedal force or displacement produces more braking action in alternate mode than in normal mode. If antiskid is lost, modulate brake pressure as required at or below 1000 psi. If nosewheel steering is lost, steer the aircraft with differential braking.

### **BRAKE TEMPERATURE LIMITATIONS REQUIRING MAINTENANCE ACTIONS**

Maintenance action is due in the following cases :

- Temperature difference between 2 brakes on a same gear is greater than 150°C, and either temperature of one brake is higher or equal to 600°C, or
- Temperature difference between 2 brakes on a same gear is greater than 150°C, and the temperature of one brake is lower or equal to 60°C, or
- The difference between the LH and RH brake average temperature is higher or equal to 200° C, or
- A fuse plug has melt, or
- The brake temperature exceeds 900° C.

TIRE PRESSURE

These charts present the different nominal tire pressures, depending on maximum takeoff weight and landing gear loading.

R

| A340–200                | NOSE      |           | MAIN      |           | CENTER    |           |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                         | Unloaded  | Loaded    | Unloaded  | Loaded    | Unloaded  | Loaded    |
|                         | bar   psi | bar   psi | bar   psi | bar   psi | bar   psi | bar   psi |
| MAXIMUM TAKEOFF WEIGHT  |           |           |           |           |           |           |
| 253 500 KG / 558 866 LB | 11.0 160  | 11.4 165  | 12.5 181  | 13.0 189  | 9.9 144   | 10.3 149  |
| 257 000 KG / 566 582 LB |           |           |           |           |           |           |
| 260 000 KG / 573 196 LB | 11.1 161  | 11.6 168  | 12.7 184  | 13.2 191  | 10.5 152  | 10.9 158  |

| A340–300                | NOSE      |           | MAIN      |           | CENTER    |           |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                         | Unloaded  | Loaded    | Unloaded  | Loaded    | Unloaded  | Loaded    |
|                         | bar   psi | bar   psi | bar   psi | bar   psi | bar   psi | bar   psi |
| MAXIMUM TAKEOFF WEIGHT  |           |           |           |           |           |           |
| 253 500 KG / 558 866 LB | 10.9 158  | 11.4 165  | 12.6 183  | 13.1 190  | 10.0 145  | 10.4 151  |
| 257 000 KG / 566 582 LB |           |           |           |           |           |           |
| 260 000 KG / 573 196 LB | 11.1 161  | 11.6 168  | 12.7 184  | 13.2 191  | 10.5 152  | 10.9 158  |
| 262 000 KG / 577 605 LB |           |           |           |           |           |           |
| 271 000 KG / 597 447 LB | 11.6 168  | 12.1 175  | 13.6 198  | 14.2 206  | 10.5 152  | 10.9 158  |
| 275 000 KG / 606 265 LB |           |           |           |           |           |           |

|                                                                                                                 |                                                     |         |        |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>SUPPLEMENTARY TECHNIQUES</b><br><br>LANDING GEAR | 3.04.32 | P 3    |
|                                                                                                                 |                                                     | SEQ 105 | REV 14 |

**TIRES, WHEELS AND BRAKES INTERMIX**

Tire, wheel and brake types basically installed on the aircraft are specific for 260 T MTOW version. Some cases of intermix are authorized as per SIL 32–083 for return to the main base (not exceeding 5 flights).  
However, in case of tire 32 PR installed on the main or center landing gear, the MTOW is limited to 257 T.

**OPERATION WITH NOSEWHEEL STEERING OFFSET**

**GENERAL**

During taxi, the crew may notice an aircraft veering tendency. It 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 repetitive flight crew 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**

| NWS offset                   | Offset ≤ 0.8°             | 0.8° < offset ≤ 2°                                                                                                                                                                       | Offset > 2°                         |
|------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Rudder trim to taxi straight | Trim ≤ 6°                 | 6° < trim ≤ 12°                                                                                                                                                                          | Trim > 12°                          |
| Dispatch                     | YES                       | YES                                                                                                                                                                                      | NO                                  |
| Procedures                   | No operational limitation | <u>Apply the following procedure</u><br>At landing :<br>– DIFF BRK . . . . . AS REQUIRED<br>Manual landing :<br>– MAX X WIND . . . . . 25KT<br>Autoland :<br>– MAX X WIND . . . . . 14KT | Immediate maintenance action is due |

**CAUTION**

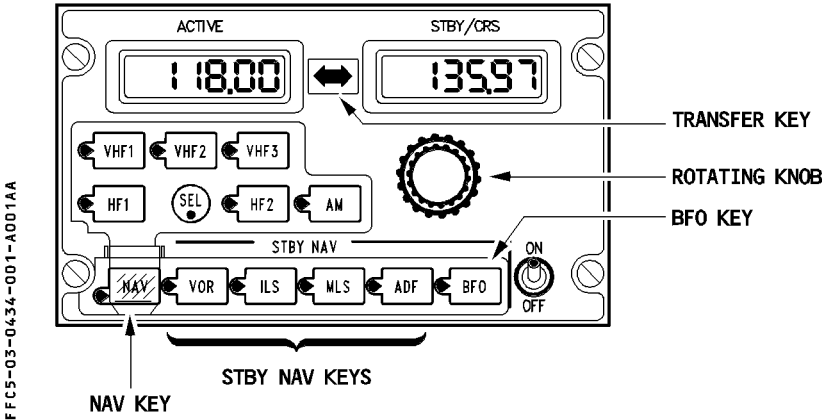
The tolerance required by maintenance (± 0.5° NWS offset, corresponding to the ± 5° rudder trim necessary to taxi straight) remains valid. Operating the aircraft outside the maintenance tolerance is possible by using the applicable procedure. However, in such cases, the flight crew must accurately and 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.

PROCEDURES FOR TUNING STANDBY NAVIGATION RADIOS

CAUTION

Pilots should use these procedures only when both FMGCs or all MCDUs are inoperative.  
 In this case they must press both RMP NAV keys (lighting the green lights).



ON BOTH RMP

- 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 on 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 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 automatically tuned, or manually tuned by a crewmember that enters the associated ident on the MCDU RAD NAV page ; and the decoded ident appearing on the ND is the wrong one.
- A crewmember manually tunes the station on an RMP, or enters 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 to AUTO). The sensitivity of the receiver may vary from one type of radar system to another.

#### **COLOR CODE**

A color code distinguishes areas by the intensity of the precipitation in them :

- 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 – GROUND CLUTTER SUPPRESSION ◀**

- 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 code is : 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 use this mode only at shallow tilt angles (0 to 5°) and for short intervals, since it may identify stationary weather targets incorrectly. 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 centerline.

**TILT AND RANGE**

(Refer to 3.03)

**DETECTION AND INTERPRETATION**

**General**

1. The flight crew should monitor the weather at long range, as well as that at shorter ranges, in order to be able to plan efficient 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 :  
 $D(NM) = 1,25 \sqrt{\text{(aircraft altitude (feet))}}$

**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 :

$$\Delta h \text{ (feet)} \sim d(\text{NM}) \times \text{Tilt (degrees)} \times 100.$$

Example :

Cell at 40 NM disappearing at less than 3 degrees downtilt

$$\Delta h \sim 40 \times 3 \times 100 = 12000 \text{ feet.}$$

- 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 given below apply to an aircraft in symmetrical flight (no sideslip), in the clean configuration, in a straight and level flight.

**ALTITUDE TOLERANCES :**

- PFD 1 or PFD 2 at ground check :  $\pm 25$  feet
- STBY ALTI at ground check :  $\pm 300$  feet

*Note : On the ground, the vibrator of the standby altimeter is off. That is why the standby altimeter tolerance value is high. In flight, the vibrator is on and the value is lower.*

**MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS :**

|           | ALTITUDE (ft) COMPARISON BETWEEN |                             |                                                      |                                      |
|-----------|----------------------------------|-----------------------------|------------------------------------------------------|--------------------------------------|
|           | SPEED                            | ADR 1 and ADR 2<br>(on PFD) | ADR 3 and ADR 1<br>or<br>ADR 3 and ADR 2<br>(on PFD) | STBY ALTI and<br>any ADR 1 or 2 or 3 |
| GND CHECK | -                                | 20                          | 20                                                   | *                                    |
| FL 50     | 250                              | 55                          | 55                                                   | 90                                   |
| FL 100    | 250                              | 60                          | 60                                                   | 130                                  |
| FL 200    | 300                              | 95                          | 100                                                  | 220                                  |
| FL 300    | .82                              | 120                         | 130                                                  | 320                                  |
| FL 410    | .82                              | 145                         | 150                                                  | 380                                  |

\* on the ground, the check is meaningless as the standby altimeter vibrator is off

**MAXIMUM DIFFERENCES BETWEEN SPEED/MACH INDICATIONS :**

|           | SPEED (kt) MACH COMPARISON BETWEEN |                             |       |                                                   |       |                                     |      |
|-----------|------------------------------------|-----------------------------|-------|---------------------------------------------------|-------|-------------------------------------|------|
|           | SPEED                              | ADR 1 and ADR 2<br>(on PFD) |       | ADR 3 and ADR 1 or<br>ADR 3 and ADR 2<br>(on PDF) |       | STBY ASI and<br>any ADR 1 or 2 or 3 |      |
|           |                                    |                             |       |                                                   |       |                                     |      |
|           |                                    | SPEED                       | MACH  | SPEED                                             | MACH  | SPEED                               | MACH |
| GND CHECK | —                                  | 6                           | 0.008 | 6                                                 | 0.008 | 6                                   | —    |
| FL 50     | 250                                | 4                           | 0.010 | 4                                                 | 0.010 | 7                                   | —    |
| FL 100    | 250                                | 4                           | 0.009 | 4                                                 | 0.009 | 7                                   | —    |
| FL 200    | 300                                | 3                           | 0.008 | 3                                                 | 0.009 | 8                                   | —    |
| FL 300    | .82                                | 3                           | 0.009 | 3                                                 | 0.009 | 8                                   | —    |
| FL 410    | .82                                | 4                           | 0.009 | 4                                                 | 0.009 | 7                                   | —    |

**MAXIMUM DIFFERENCE BETWEEN ND MAGNETIC HEADING INDICATIONS**

Maximum difference between magnetic heading indications on the NDs : 4 degrees.

## TCAS

For System Description, refer to the FCOM 1.34.  
 For Operational Procedures, refer to the FCOM 3.02.

### CONFLICT RESOLUTION PRINCIPLES

#### – **Traffic Advisory (TA)**

If an intruder represents a potential collision threat, a visual and aural Traffic Advisory (TA) is given. This advisory helps the crew to visually situate the intruder. It also prepares the crew for a possible Resolution Advisory (RA). 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 (RA) 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 the already displayed RA (i.e. if the intruder changes their vertical speed).

### 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 equipped and may be maneuvering toward his aircraft in response to a coordinated RA. This could compromise safe separation.

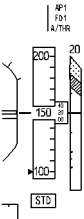
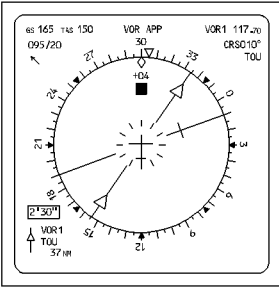
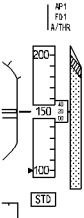
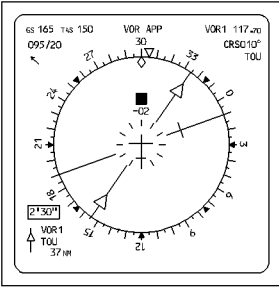
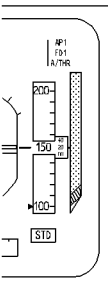
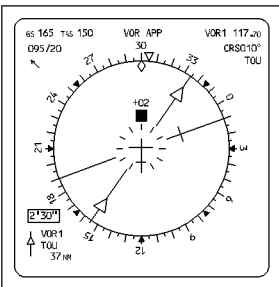
- R Pilots should comply with the vertical speed limitations during the last 2000 feet of a climb or descent. In particular, pilots should limit vertical speeds to 1500 feet/min during the last 2000 feet of a climb or descent, especially when they are aware of traffic that is converging in altitude and 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 |                                               | CREW RESPONSE                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                            | PFD                               | ND                                            |                                                                                                                                                                                                                    |
| <div>TRAFFIC ADVISORY</div> <ul style="list-style-type: none"><li>- one intruder is ahead at 12 o'clock beyond 6 NM, 200 ft below your altitude</li></ul>                                                                                                                  |                                   | <div>"TRAFFIC, TRAFFIC"</div>                 | <ul style="list-style-type: none"><li>- Do not maneuver on the traffic advisory symbol.</li><li>- Attempt to visually acquire the intruder.</li><li>- Be prepared to maneuver if the TA changes to an RA</li></ul> |
| <div>RESOLUTION ADVISORY (PREVENTIVE)</div> <ul style="list-style-type: none"><li>- One intruder is ahead at 12 o'clock, 600 ft below your altitude</li></ul>                                                                                                              |                                   | <div>"MONITOR VERTICAL SPEED"</div>           | <ul style="list-style-type: none"><li>- Do not descend</li></ul>                                                                                                                                                   |
| <div>RESOLUTION ADVISORY (CORRECTIVE)</div> <ul style="list-style-type: none"><li>- Two intruders are ahead at 12 o'clock<ul style="list-style-type: none"><li>• one, at 500 ft above your altitude</li><li>• the other, at 500 ft below your altitude</li></ul></li></ul> |                                   | <div>"MAINTAIN VERTICAL SPEED MAINTAIN"</div> | <ul style="list-style-type: none"><li>- Remain in level flight</li><li>- Do not climb or descend</li></ul>                                                                                                         |

FFC5-03-0434-009-A100AB

V/S scale color legend: : green : red

| SCENARIO                                                                                                                                                                                                                       | AURAL WARNING and TYPICAL DISPLAY                                                   |                                                                                      | CREW RESPONSE                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                | PFD                                                                                 | ND                                                                                   |                                                                                    |
| <div> <div>RESOLUTION ADVISORY (CORRECTIVE)</div> <ul style="list-style-type: none"> <li>- The intruder is ahead at 12 o'clock, 400 ft above your altitude</li> <li>- You are already climbing at 2000 ft/mn</li> </ul> </div> |    |    | - Reduce climb                                                                     |
|                                                                                                                                                                                                                                |    |   | - Promptly (within 5 seconds) and smoothly establish a climb rate of 1 500 ft/mn   |
|                                                                                                                                                                                                                                |  |  | - Promptly (within 5 seconds) and smoothly establish a descent rate of 1 500 ft/mn |

FFCS-03-0434-010-A.100AB

V/S scale color legend:  : green  : red





## APPROACH ON PAPI

Eye to wheel height on approach is 34 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 54 feet.

## R QNH USE FOR TO/APPR/LDG ON QFE/QNH PIN PROGRAMMED AIRCRAFT

- R The QNH option is the basic reference on the aircraft.
- R For airlines using QFE reference, the switching from “QNH only” to “QNH/QFE can be done by activating a specific pin program on the three following computers : FMGC, GPWC, FCU.
- R For various reasons, some airlines may use QNH reference for approach and landing on QNH/QFE pin programmed aircraft. The crew should be aware of the following consequences and should use the following procedures.

## R CONSEQUENCES

- R · 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 crew.
- R · On some airports in mountainous areas, GPWS warnings may be delayed by a maximum of five seconds.

## R PROCEDURES

- R No specific procedures are necessary for takeoff, climb, cruise, descent and go around phases.
- R Procedure for precision approaches (CAT2 and CAT3) :
  - R · Insert the DH into the DH field of the PERF APPR pages as usual.
- R Procedure for ILS approach (CAT1) :
  - R · Insert the DA into the MDH field of the PERF APPR page.
- R Procedure for non precision approach :
  - R · Insert the MDA value into the MDH field of the PERF APPR page.

R Note : *If the MDA is greater than 5000 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 calls outs.*

- R · Do not use APPR NAV FINAL
- R · Use selected mode TRK/FPA until visual references are met.
- R · The change of color from green to amber in the PFD altitude scale and the auto callout “MINIMUM” will occur at the correct altitude.

|                                                                                                                             |                                                   |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>SUPPLEMENTARY TECHNIQUES</b><br><br>NAVIGATION | 3.04.34 | P 13   |
|                                                                                                                             |                                                   | SEQ 001 | REV 15 |

**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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|                                                                                                                                            |                                 |  |         |        |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--|---------|--------|
|  <b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>SUPPLEMENTARY TECHNIQUES</b> |  | 3.04.34 | P 15   |
|                                                                                                                                            | NAVIGATION                      |  | SEQ 200 | REV 25 |

## ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

The Flight Management System (FMS) provides aircraft position inputs to the EGPWS for enhanced function processing purposes.

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 navigation accuracy check performed by the pilots (as described in Volumes 3.03 and 4.05) is positive, the enhanced functions should be switched ON.

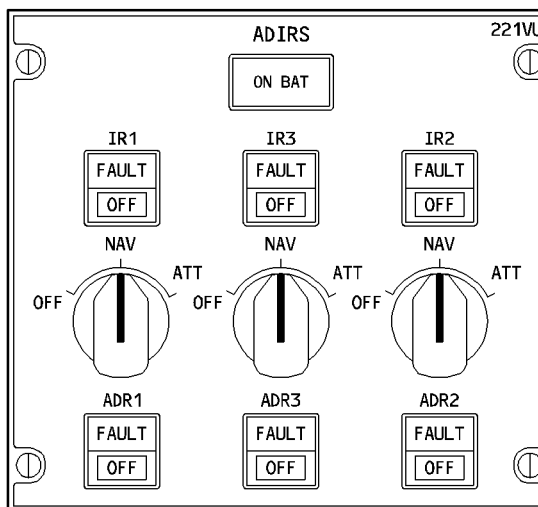
During climb, descent, approach, and go-around phases, when GPS PRIMARY is not available (or not installed) and the FMS navigation accuracy check prevents the crew from using the NAV mode in a phase of flight, the TERR pushbutton must be switched OFF. When the TERR pushbutton is switched OFF, the ECAM "TERR OFF" memo 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.

## ADIRS OPERATION

FFCS-03-0434-016-A001AA



The ADIRS must be aligned : This allows them to operate in NAV mode, to continuously provide the aircraft's position. To complete the alignment, the ADIRS must be initialized to a navigation starting point, from which the ADIRS determine subsequent aircraft positions during flight.

The pilot may check the ADIRS status, and the ADIRS drift, at any moment on the MCDU POSITION MONITOR page.

## 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 accurate initial speed. The ADIRS does not estimate the
- R latitude.

R The procedure for ADIRS complete or fast alignment is the following :

R — **All 3 ADIRS Control Panel mode selectors . . . . . 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 alignment.

R Otherwise, the ON BAT light comes ON for five seconds, and the ADIRS then start a complete alignment.

R **POSITION INITIALIZATION**

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 occurs.

R — **MCDU coordinates . . . . . CHECK/MODIFY**

R When the pilot enters or modifies the origin airport (FROM) or the CO RTE, the MCDU INIT coordinates are reset to the airport reference point (extracted from the FMS database). The pilot may also manually modify these coordinates.

R If the MCDU INIT coordinates change, when the ADIRS are already in NAV mode, the RESET IRS TO NAV message is triggered on the MCDU : Crosscheck the MCDU INIT 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, initialize the ADIRS to the airport reference point extracted from the FMS database. This reduces the risk of entering incorrect values.

R If the GPS is not available, and long segments in poor radio navaid coverage airspace are expected, initialize the ADIRS to the gate coordinates. This increases the accuracy of the ADIRS position computation.

R If the airport reference point is not stored in the FMS database, and the gate coordinates 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 point is set.

R ALIGNMENT/INITIALIZATION ERROR

- R The ADIRS keeps a record of the last position it had the last time it was in NAV mode. It  
R is also able to estimate the present latitude after a complete alignment. The ADIRS may use  
R this information to detect coarse initialization errors.  
R If any of the 3 ADIRS indicates an alignment error, the prompt REALIGN IRS reappears on  
R the INIT page (instead of ALIGN IRS).
- R ● If the IR FAULT light flashes, the affected ADIRS can only be used in ATT  
R mode.

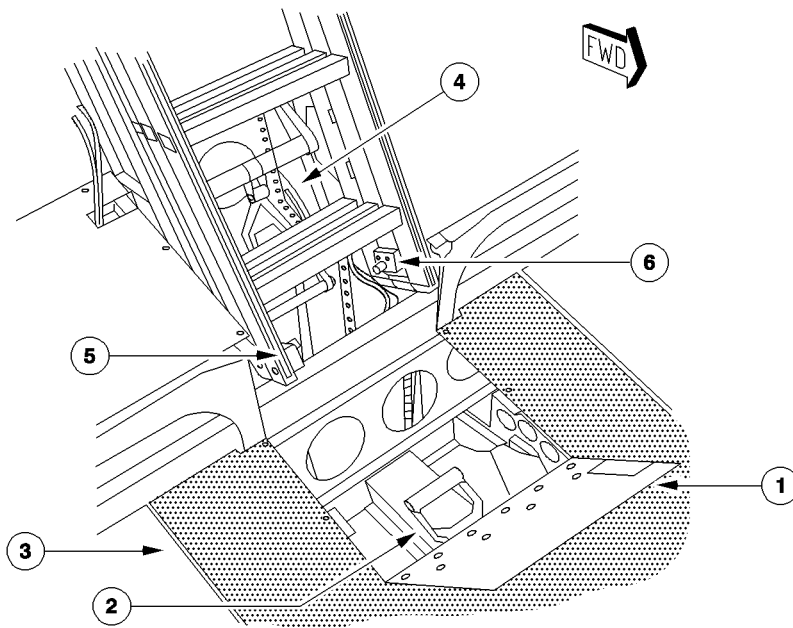


# **LEAVING THE AIRCRAFT VIA AVIONIC BAY ACCESS DOOR**

- Move forward the captain seat completely and open the floor hatch to get access to the avionics bay.
- Descend into the avionics bay and take a position right side of the avionics bay access door

*Note : Do not try to open the access door while standing on it.*

- Open the floor panel (1) which covers the avionics bay access door handle (2), located at the aft, center part of the access door (coin may be needed to open the lock).
- To open the access door (3) lift the handle (2) and pull the door completely into the bay until it is latched in its upper stop (LH).
- Remove the strap which fixes the ladder assembly against motion.
- Lift the lever (4), located on the right side aft of the lower rung of the aft ladder element, to unlock the ladder assembly and swing it simultaneously towards the opening.
- Release the lower locking device on the right inner side of the first ladder element (5) by pulling the orange handle forward (indicated on a placard next to the locking device). Lower the element until it latches.
- Repeat with the second ladder element (locking device (6) is at the left inner side).
- If the ladder does not touch the ground yet the last element is lowered by pulling forward its orange handle at the lower end on the left outer side.
- If the ladder touches the ground leave the aircraft via the extended ladder.



**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 two 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 controlll between idle 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 more thrust levers are above CL, it shows MCT/FLEX. If one or more 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.

**AUTO THRUST**

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(s) 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. LVR CLB flashes on the FMA.

R If the thrust levers are not aligned, an asymmetric message (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 FCUs A/THR is pressed, or
- The thrust levers' instinctive disconnect pushbutton is pressed, or
- All thrust levers are set to IDLE.
- When the radio altitude is below 100 feet, and :
  - Both thrust levers are above CL detent, or
  - One thrust lever is above MCT detent.

1. Disconnection, due to a failure or to the use of the FCU A/THR pushbutton.

If the thrust levers are set in the CL detent (all engines operative), or one thrust lever in the MCT (one engine inoperative), the thrust is locked at its actual value. The FMA displays "THR LK".

Single chime, ECAM message and caution light are triggered every 5 seconds, as long as thrust lock is active. (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 the instinctive disconnect pushbutton.

When a pilot presses the instinctive disconnect pushbutton, the thrust corresponding to the thrust levers' position is immediately recovered, whatever the thrust levers' position.

### **Instinctive Disconnection Procedure**

- 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 pushbutton to disconnect the A/THR
- Check that "AUTO FLT A/THR OFF" is displayed on the ECAM, and that there is no annunciator in the first column of the FMA.
- Set the correct manual thrust.

### **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 A/THR 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, A/THR 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 has 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.

R *Note : When below 100 feet, moving thrust levers above the CL detent, will result in*  
R *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 FMGEC, is reasonable.

R For more information concerning aircraft handling during final approach, refer to the FCOM  
R Bulletin 14.

### **Engine failure**

The pilot can continue to use autothrust after an engine failure, but some pilots feel that directional control is more difficult, when A/THR changes the thrust instead of the pilot making the thrust changes manually. The choice between using, or not using, A/THR after engine failure is a personal one. As far as speed control is concerned, A/THR 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 thrust will accelerate rapidly to generate the thrust demanded by the TLA, causing a hazardous situation if the thrust levers are not at idle.

– **ENG START selector** ..... **NORM THEN IGN START**  
Lower ECAM displays the engine page.

– **ENG MAN START** ..... **ON**

- Do not set MAN START pushbutton to ON before all amber crosses have disappeared on engine parameters (upper ECAM display).
- On ECAM lower display check that the START VALVE is in line
- On ECAM displays check that the OIL PRESS increases, N2 increases.

● **When N2 reaches maximum motoring speed (minimum 20 %) :**  
Maximum motoring speed is defined as that at which N2 acceleration is less than 1% in approximately 5 seconds.

– **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 increases.  
EGT and N1 increase within 30 seconds in flight or 15 seconds on ground (maximum) after fuel is on.

● **When idle is reached (AVAIL indication is displayed) :**

– **MAIN AND SECONDARY ENG. IDLE PARAMETERS** . . . . **CHECK NORMAL**

– **ECAM displays** ..... **CHECK**  
Check : START VALVE cross line.  
Igniter indication off.

– **MAN START** ..... **OFF**

– **ENG START 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** . . . . . **CHECK OFF**
  - **ENG BLEED (All engines)** . . . . . **OFF**
  - **X BLEED** . . . . . **OPEN**

R      *Note : The ABN BLEED CONF ECAM caution is triggered after the first engine start.*

- **Cleared to start :**
  - **Start Engine 2 first.**
  - **Apply the normal engine start procedure**  
The recommended starter air supply pressure is 25 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 the other engines :**
- R      – **Start the other engines (apply the normal engine start procedure)**
- R      Start engines one by one, if ground pneumatic units are not sufficient.
- R      – **Request the removal of external pneumatic power unit(s)**
- R      – **ENG BLEED (running engines)** . . . . . **ON**
- R      – **PACKS 1 and 2** . . . . . **ON**

- R
- If the crossbleed engine start procedure is used :**

Request the removal of external pneumatic power unit(s)

**PACKS 1 and 2 . . . . . ON**

**CROSSBLEED ENGINE START for REMAINING ENG . . . . . APPLY**
- R
- Once all engines started :**

**X BLEED . . . . . AUTO**

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 X BLEED valve closes.

**ENG BLEED (running engine) . . . . . ON**

**ENG BLEED (other engines) . . . . . OFF**

The bleed valves of engines to be started are closed to stop reverse flow.

**X BLEED . . . . . OPEN**

Open the X-BLEED if the engine to be started is on the opposite side from the supplying engine. The ABNORMAL BLEED CONFIG ECAM caution will be triggered, after the engine start.
- R
- R
- Cleared to start :**

**Apply the normal engine start procedure**

**Confirm the area is clear of obstacles.**

Increase the N1 of the supplying engine up to 30 %, to obtain starter air supply pressure at about 25 psi.

• After start :

- X BLEED ..... **AUTO**
- ENG BLEED (all) ..... **ON**
- PACKS ..... **check ON**

|                                                    |
|----------------------------------------------------|
| <b>ENGINE START WITH ELECTRICAL EXTERNAL POWER</b> |
|----------------------------------------------------|

Start two engines, before disconnecting external electrical power, to have the entire network supplied.

Note : *In this configuration, the NBPT function will not be operative, if the external power is disconnected, or if the third engine is connected and two engines of the same side have been started first.*



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|                                                                                                                             |                                 |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>SUPPLEMENTARY TECHNIQUES</b> |  | 3.04.70 | P 9    |
|                                                                                                                             | POWER PLANT                     |  | SEQ 008 | REV 19 |

## ENGINE START ON BATTERIES

*Note : This procedure can be followed when the aircraft electrical network is only supplied with batteries.*

*Make sure that pneumatic power is available for starting the engines.*

- Perform an autostart on engine 2.

The secondary engine parameters are unavailable as long as the aircraft electrical network is supplied by the batteries.

*Note : It is required to first start a LH engine since the Xbleed valve does not open automatically on batteries. Moreover, the parking brake is pressurized by engine 2.*

- When all the parameters are stabilized, check that the aircraft electrical network is normal.
- Start the other engines following the autostart procedure.

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 or 3 or 4”
- ENG START 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.

GENERAL

When the aircraft is not in such unusual operational environments, such as uphill slopes, slippery taxiways, or high gross weight, it may be advisable to taxi on two engines. The pilot must exercise caution when taxiing on two engines to avoid generating excessive jet blast.

Use the outer engines for taxiing, because it pressurizes the green hydraulic system (normal braking + nose wheel steering).

R Consider using the inner engines, if the outer engines are exposed to an ingestion risk

R (FOD).

CAUTION

If, for operational reasons, taxi with the inner engines only is required, check the availability of the GREEN ELEC PUMP and never move slats/flaps during taxi (nosewheel steering would be lost).

AT DEPARTURE

The pilot should use the following procedure to taxi out, if company policy and regulations permit.

Note : Before starting the engines, check that the pressure is normal on the BRAKE & ACCU PRESS indicator.

- **ENGINE 4, then ENGINE 1 . . . . . START**
- **PROBE/WINDOW HEAT . . . . . ON**  
Switch on probe and window heating, since automatic control from the Engine 2 or 3 running signal is not available.
- **Apply normal “AFTER START” procedures, except :**
  - Keep the APU running to avoid additional electrical transients, and to allow the galley to operate.
  - Delay WING A. ICE, ENG A. ICE checks.
  - Switch off APU BLEED in order to prevent the air conditioning system from ingesting engine exhaust gases.
- **Use normal “TAXI” procedures.**
- **Before ENG 2 start :**
  - **APU BLEED . . . . . ON**

- No less than 2 minutes before takeoff :

- ENGINE 2 then 3 . . . . . START
  - PROBE/WINDOW HEAT . . . . . AUTO
  - APU . . . . . AS RQRD
- Proceed with the “AFTER START” checklist (wing anti-ice, engine anti ice).

AT ARRIVAL

The flight crew may use the following procedure for taxiing in.

- APU . . . . . START

R • No less than 3 minutes after high thrust operations, and when taxiing straight :

- ENG 2 and 3 . . . . . SHUT DOWN

|                                                                                                                             |                                 |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>SUPPLEMENTARY TECHNIQUES</b> |  | 3.04.91 | P 1    |
|                                                                                                                             | ADVERSE WEATHER                 |  | SEQ 001 | REV 21 |

## SEVERE TURBULENCE

### GENERAL

Whenever possible, the pilot should plan to fly above or around areas of 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 aircraft structure, whilst maintaining an adequate margin above VLS.

Consider requesting a lower flight level to increase margin to buffet onset.

- R Sufficient buffet margin exists at optimum altitude.

### SIGNS

Before entering an area of known turbulence the flight crew and the cabin crew must secure all loose equipment and turn on the "SEAT BELTS" and "NO SMOKING" signs.

### AUTOPILOT/AUTOTHURST

- **Keep the autopilot on.**
- **When thrust changes become excessive : Disconnect autothrust.**
- **For approach : Use autothrust for managed speed.**

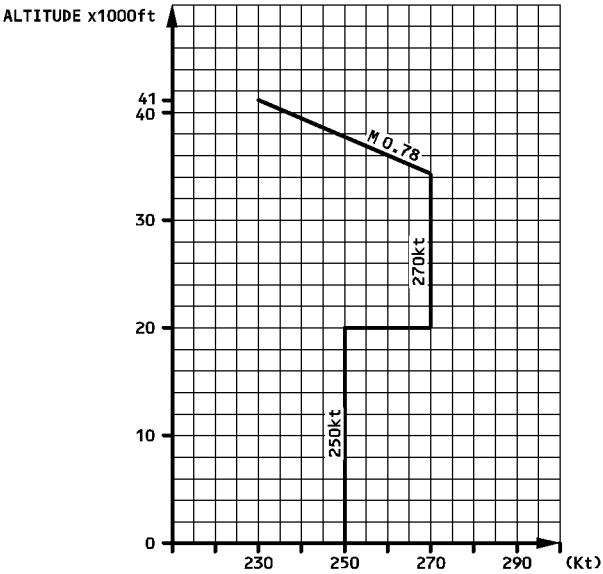
**THRUST AND AIRSPEED**

Set the thrust to give the recommended speed (see table on next page). This thrust setting aims to obtain, in stabilized conditions, the speed for turbulence penetration given in the graph below.

Change thrust only 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.

FFCS-03-0491-002-A001AB



**THRUST SETTING (N1) FOR RECOMMENDED SPEED**

R

| FL  | SPD<br>or<br>Mach | WEIGHT (1000 kg) |      |      |      |      |      |      |      |      |      |      |
|-----|-------------------|------------------|------|------|------|------|------|------|------|------|------|------|
|     |                   | 150              | 160  | 170  | 180  | 190  | 200  | 210  | 220  | 230  | 240  | 250  |
| 410 | .78               | 84.4             | 85.8 | 87.6 | 90.3 | —    | —    | —    | —    | —    | —    | —    |
| 390 | .78               | 82.6             | 83.7 | 84.9 | 86.3 | 88.2 | 90.7 | —    | —    | —    | —    | —    |
| 370 | .78               | 81.2             | 82.1 | 83.0 | 84.1 | 85.2 | 86.6 | 88.4 | 90.7 | —    | —    | —    |
| 350 | .78               | 80.5             | 81.2 | 81.9 | 82.7 | 83.6 | 84.6 | 85.7 | 87.0 | 88.6 | 90.7 | —    |
| 330 | 270               | 79.7             | 80.3 | 81.0 | 81.7 | 82.4 | 83.2 | 84.1 | 85.1 | 86.1 | 87.3 | 89.0 |
| 310 | 270               | 78.5             | 79.1 | 79.8 | 80.4 | 81.1 | 81.8 | 82.6 | 83.3 | 84.2 | 85.2 | 86.4 |
| 290 | 270               | 77.3             | 77.8 | 78.5 | 79.2 | 79.9 | 80.5 | 81.2 | 82.0 | 82.7 | 83.6 | 84.6 |
| 270 | 270               | 76.1             | 76.6 | 77.1 | 77.8 | 78.4 | 79.1 | 79.9 | 80.6 | 81.3 | 82.1 | 83.0 |
| 250 | 270               | 74.8             | 75.3 | 75.9 | 76.5 | 77.1 | 77.7 | 78.4 | 79.1 | 79.8 | 80.7 | 81.5 |
| 200 | 260               | 70.0             | 70.6 | 71.2 | 71.9 | 72.7 | 73.4 | 74.3 | 75.1 | 76.1 | 77.0 | 77.9 |
| 150 | 250               | 65.2             | 65.8 | 66.4 | 67.1 | 67.9 | 68.7 | 69.5 | 70.3 | 71.3 | 72.3 | 73.3 |
| 100 | 250               | 61.6             | 62.2 | 62.9 | 63.6 | 64.3 | 65.0 | 65.7 | 66.5 | 67.3 | 68.3 | 69.2 |
| 50  | 250               | 57.9             | 58.5 | 59.1 | 59.8 | 60.5 | 61.2 | 62.0 | 62.7 | 63.6 | 64.5 | 65.4 |

**ALTITUDE**

- If the crew flies manually the aircraft :
- 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.).



**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 runway approach aid.
- Select **FLAPS 3**
- Use managed speed in approach phase.
- Check both FDs engaged in ILS, FPA or V/S

- Engage autopilot, for a more accurate approach and earlier recognition of deviation from the beam when ILS is available.

*Note:* – It is using the GS mini function associated with managed speed, the system will carry extra speed in strong wind conditions.

- If downburst is expected, increase VAPP displayed on the MCDU up to a maximum of VLS + 15 knots.

## **RECOVERY TECHNIQUE AT TAKEOFF**

### **• 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.

### **• After V1**

- Set thrust levers : 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 back stick if demanded)

*Note:* If SRS is not available, initially use pitch attitude up to 12.5° but this pitch attitude can be increased by using up to full back stick if necessary to minimize loss of height.

- 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 : TOGA**
- **If the autopilot is engaged, use it, but be aware that automatic disengagement may occur if  $\alpha > \alpha_{prot}$ .**
- **Follow SRS orders**

*Note : If FD is not available, initially use pitch attitude up to 12.5° but this pitch attitude can be increased by using up to full back stick if necessary to minimize loss of height.*

- **Do not change configuration**
- **Monitor closely the flight path and speed**
- **Recover smoothly normal climb when out of shear**

## **COLD WEATHER**

For flight operations in icing conditions, see ice and rain protection chapter (Refer to 3.04.30).

For ground operations on contaminated runways (Refer to 2.04.10).

The preparation and ground operation of the aircraft following cold soak 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/32°F) 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 overflight air temperatures.

*Note : At low outside air temperatures avoid keeping the doors unnecessarily open since this causes problems of temperature regulation in the flight deck and in cabin areas close to the doors.*

## EXTERIOR INSPECTION

Before each flight, a thorough check of the following items should be carried out :

- **Check that the APU intake, packs inlet and outlet doors, outflow valves and pressure relief valve are free from snow and ice. De-ice as necessary. Remove all protective covers.**

- **PRELIMINARY COCKPIT PREPARATION (normal procedures) . . . . COMPLETED**  
APU is started and air conditioning is on.

*Note :* 1. Ground power should be used for the APU start if the OAT is – 15°C (5°F) or lower.  
2. For temperatures below – 15°C (5°F) in the cockpit the display units may not be available.

- **If avionic bay is cold soaked (aircraft parked without electrical ground supply or without air conditioning) :**

- **IRS . . . . . INITIATE ALIGNMENT**  
For temperatures below – 15°C (5°F) in the avionic bay the IRS alignment needs 15 minutes.

- **PROBE/WINDOW HEAT . . . . . ON**

- **SURFACES . . . . . CHECK 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 cristalline deposit which usually develops uniformly on exposed surfaces on cold and cloudless nights ; it is 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 . . . . . CHECK FREE OF FROST, ICE AND SNOW**
  - Landing gear assemblies (lever locks) and tires, landing gear doors.
  - Engine inlets, inlet lips, fans (check free 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).
- **After start of either inner engine :**
  - **PROBE/WINDOW HEAT . . . . . AUTO**  
Heating will continue to operate under automatic control.

**PROCEDURE FOR GROUND DE-ICING/ANTI-ICING**

In all circumstances, it is the Captain’s responsibility to decide whether or not to de-ice/anti-ice the aircraft, or to order a repeated treatment.

CAUTION
 

R

R

- Check that no external air is supplied to the aircraft, via the low or high pressure ground connectors.
- If repeated anti-icing is necessary, ground crew must de-ice the surfaces with a hot fluid mixture before applying a new layer of anti-icing fluid.

Ensure that the ground crew is using de-/anti-icing fluids, in accordance with applicable company requirements and Aircraft Maintenance Manual instructions.

The flight crew must establish good communication with the ground personnel, responsible for de-icing or anti-icing, before the procedure begins.

R

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The aircraft may be de-iced or anti-iced with its engines and APU stopped, or with the APU running, and/or with the engines running. However, the flight crew should not start the engines or APU while the fluid is being sprayed on the aircraft.

CAUTION
 

- Avoid indiscriminate use of de-icing fluid or its ingestion by the engine or APU.
- Do not move flaps or slats, flight control surfaces or trim surfaces if they are not free of ice
- Always have the aircraft treated symmetrically : the left and right hand sides must receive the same and complete treatment.

**BEFORE FLUID SPRAYING :**

- **CAB PRESS MODE SEL** ..... **CHECK AUTO**
- **ENG BLEED 1, 2, 3, 4** ..... **OFF**
- **APU BLEED** ..... **OFF**

- **DITCHING pushbutton** ..... **ON**  
Outflow valves, pack flow control valves, avionic ventilation overboard valve close.  
The cabin fans are stopped. This will prevent de-icing fluid from entering the aircraft.  
Avionic ventilation is provided, since air blows to the inboard valve. Considering the low OAT, there is no time limitation associated with this configuration.  
The “CAB PRESS FWD OFV NOT OPEN” and “CAB PRESS AFT OFV NOT OPEN” ECAM cautions will be triggered. In addition, the “VENT BLOWING FAULT” caution will be triggered, and if both inner engines are not running, the ground horn will sound.  
Disregard the associated procedure.  
The ground horn will sound after a 5-minute delay and can only be cancelled from outside by pressing the HORN RESET pushbutton on the external power panel at the nosewheel bay.

*Note : On the ground with passengers on board, it is recommended to avoid packs inoperative for longer than 20 minutes because comfort may be affected.*

- **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.

CAUTION

If spraying is performed with the engines not running, a small negative cabin delta P may appear for a short time, just after selecting the ditching pushbutton to OFF. During this time, do not open any doors or windows.

- ENG BLEED . . . . . ON
- At least 60 seconds after APU start, or on completion of spraying operation.

— APU BLEED . . . . . ON

— 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.
- Result of post application check : Aircraft critical parts are clean.

— 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.*

SECURING THE AIRCRAFT FOR COLD SOAK

*Note : At beginning of a cold soak, due to a transient temperature difference between fluid in the reservoir and the system piping, the G RSVR UNDERFILLED caution may be triggered on the ECAM. Check the reservoir quantity in the upper half part of the norm filling range. The caution may disappear with the operation of the green electrical pump.*

- 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.



- **CAPT SEAT . . . . . MOST FORWARD POSITION**  
 To facilitate access to the avionics bay, since seat operation becomes difficult once the mechanism is cold-soaked.
  
- **PROTECTIVE COVERS . . . . . INSTALL**  
 Install protective covers and plugs to protect the aircraft and engines from snow and ice.
  
- **If no electrical ground supply or air conditioning is available :**
  - **APU BATTERY . . . . . REMOVE**  
 If the APU battery is subject to cold soak for 12 hours or more, and the ambient temperature is below – 15°C (5°F), its remaining capacity may not allow the cold-soaked APU to start. Remove the battery and store it in a warm place.

**WATER SYSTEM DRAINING**

Drain the water system, if the OAT requires it, as shown below :

R

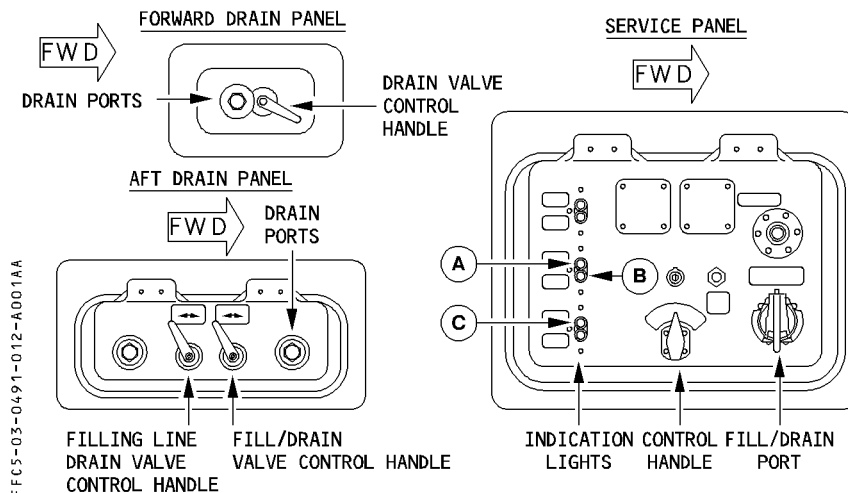
| Configuration    |                   |                                       | Exposure time | Water tank drain |
|------------------|-------------------|---------------------------------------|---------------|------------------|
| Air Conditioning | Cabin temperature | Outside Air Temperature               |               |                  |
| ON               | Above 10°C (50°F) | Between 0 and – 15°C (32° and 5°F)    | Any           | Not required     |
|                  |                   | Below – 15°C (5°F)                    | 1 h 15 min    |                  |
| OFF              |                   | Between 0 and – 7°C (32 and 19.4°F)   | 1 h 30 min    | Required         |
|                  |                   | Between – 7 and – 15°C (19.4 and 5°F) | 0 h 30 min    |                  |
|                  |                   | Below – 15°C (5°F)                    | Any           |                  |

**FOR WATER DRAINING PROCEDURE**

Apply the following procedure when the water system has to be drained and the aircraft is exposed to temperatures below the freezing point.

Draining is usually performed with electrical power supply on.

Potable-water Panels :



- **ACCESS PLATFORM(S)** . . . . . **PUT IN POSITION**
- **SHUTOFF VALVES IN GALLEYS/TOILETS** . . . . . **CHECK OPEN**
- **WATER FAUCETS IN GALLEYS/TOILETS** . . . **CHECK MIDDLE (WARM) POSITION**
- **FWD/AFT DRAIN, SERVICE PANELS ACCESS DOORS** . . . . . **OPEN**
- **DRAIN PORT CAPS** . . . . . **REMOVE**  
Remove drain port cap on portable water service panel.
- **DRAIN HOSES** . . . . . **CONNECT**  
Connect drain hoses to :
  - the drain port on forward and aft drain panel
  - the drain port on potable-water service panel
- **CONTROL HANDLE (SERVICE PANEL)** . . . . . **TURN TO "DRAIN" AND PULL**  
To drain, turn the handle to "DRAIN" position and then pull out until its mechanical stop. The indicator lights ((A), (B), (C)) come on. Water flows out of the drain ports of the forward drain and potable-water service panel.

- **When the water system is drained :**
  - **CONTROL HANDLE (SERVICE PANEL) . . . . . PUSH AND TURN TO “NORMAL”**  
The indication lights ((A), (B), (C)) go out.
- **In freezing conditions,**  
The drain valves must stay open after draining to prevent damage to the system :
  - **CONTROL HANDLE (SERVICE PANEL) . . . . . TURN TO “DRAIN” AND PULL**  
Turn the handle to “DRAIN” position and then pull out until its mechanical stop. The indicator lights ((A), (B), (C)) come on.
- **After de-energizing the aircraft electrical network :**
  - **DRAIN CONTROL HANDLE (AFT DRAIN PANEL) . . . . . TURN TO “OPEN”**  
The most aft (filling line drain valve control) handle on the aft drain panel is set to the “OPEN” position. It is not possible to close the aft drain panel access door any more.
  - **DRAIN HOSES . . . . . DISCONNECT**
  - **PANELS . . . . . CLEAN AND DRY**
  - Note : In freezing conditions when the drain valves must stay open, do not put the caps on service panel drain port.*
  - **ACCESS DOORS (FWD, AFT) . . . . . CLOSE**  
Water drainage is assured even with access doors closed.
  - Note : When the drain valve is open manually it is not possible to close the portable water service panel access door.*
  - **ACCESS PLATFORM(S) . . . . . REMOVE**

**OPERATIONS IN VOLCANIC ASHES**

The following procedures are recommended for operators who fly routes that could take their aircraft through the material emerging from active volcanoes.  
Because volcanic ash is composed of very abrasive particles, it can do serious damage to aircraft parts and impair the operation of aircraft systems significantly.  
Operators should avoid airports with volcanic ash deposits if possible.  
If operations at such airports are unavoidable, operators should heed the following recommendations.

**GROUND OPERATIONS ON AIRPORT COVERED WITH ASH OR DUST**

**Preparation of the cockpit**

- **APU . . . . . DO NOT USE**  
Use the APU only to start the engines and then only if ground power is not available.  
Request ground supply for air conditioning and for electricity.
- **WINDSHIELD WIPERS . . . . . DO NOT USE**  
Do not use windshield wipers to remove ash or for anything else.

**Exterior inspection**

- **SURFACES AND EQUIPMENT . . . . . CHECK FREE OF ASH DEPOSITS**  
Ground maintenance should remove ash that has settled on exposed lubricated surfaces and could penetrate seals or enter the engine gas path, air conditioning system, air data probes and other orifices on the aircraft.
- **ENGINE INLETS . . . . . CHECK FREE OF ASH DEPOSITS**  
Inspect the inlets and order them cleaned of any volcanic ash. Have the area within 25 feet of the engine inlet cleaned of volcanic ash (as much as practical).

**Engine start**

Use external pneumatic power to start the engines, if available. (Refer to 3.04.70).

- **ENGINE . . . . . CRANK**  
Before engine start, ventilate them by dry cranking at maximum motoring speed for two minutes. This will blow out any ash that may have entered the booster area.

**Taxi**

After releasing the brakes :

- **THRUST LEVERS .. ADVANCE SMOOTHLY THEN MOVE TO IDLE WHEN ROLLING**  
Smoothly advance the levers to the minimum required for breakaway.  
Avoid making sharp or high-speed turns.
- **ENG 1, 2, 3, 4 BLEED . . . . . OFF**  
Keep the bleed valves closed for taxiing.

**Takeoff**

- **Allow ash and dust (if present) to settle on the runway before starting the takeoff roll.**
- **Use the rolling takeoff technique, if possible.**
- **Progressively adjust engine power, as is done for normal takeoff procedures.**

**Landing**

- **REVERSERS . . . . . AS RQRD**  
If it appears that maximum reverse thrust will be needed, apply reverse thrust when the main landing gear touches down. Limit the use of reverse thrust as much as possible, because reverse flow may throw up ash and impair visibility.

*Note : The abrasive effect of volcanic ash on windshields and on landing lights may significantly reduce the pilot's visibility for approach and landing. Consider diverting to an airfield where it is possible to use AUTOLAND.*

- **BRAKE PERFORMANCE . . . . . CONSIDER PENALTY**  
A layer of ash on the runway may degrade braking efficiency. Treat landing performance as if it were similar to that on a wet runway (dry ash), or on slush (wet ash).

R

SECURING THE AIRCRAFT IN VOLCANIC ASH

- After switching off all bleeds, and before switching off AC power :
  - DITCHING pushbutton . . . . . ON  
This closes the outflow valve, the pack valves, the avionic ventilation inlet and the extract valves.
- After switching off the batteries :
  - DITCHING pushbutton . . . . . OFF
  - PROTECTIVE COVERS . . . . . INSTALL  
Install protective covers and plugs, to protect the aircraft and engines from volcanic ash.

R  
R

**FLIGHT OPERATIONS**

Avoid flight into areas of known volcanic activity.

If a volcanic eruption is reported while the aircraft is in flight, reroute the flight to remain well clear of the affected area (volcanic dust may be spread over several hundred miles). If possible, stay on the upwind side of the volcano (at least 20 NM upwind of it if it is erupting).

In hours of darkness or in meteorological conditions that obscure volcanic dust, one or several of the following phenomena indicate that the aircraft may be flying into ash cloud:

- smoke or dust in the cockpit,
- acrid odor similar to electric smoke,
- at night, the appearance of St. Elmo fire and static discharges around the windshield,
- bright white or orange glow appearing in the engine inlets,
- sharp, distinct beams from the landing lights,
- multiple engine malfunctions, such as rising EGT decreasing, power, stall or flame out.

- **If the aircraft enters a volcanic ash cloud :**
  - **ESCAPE MANEUVER (terrain permitting) . . . . . INITIATE**  
Because the lateral dimensions of ash cloud are not known, the pilot should if possible turn 180°.
  - **ATC . . . . . NOTIFY**
  - **A/THR . . . . . OFF**  
This will prevent thrust variations.
  - **THRUST (terrain permitting) . . . . . DECREASE**  
This helps to maintain the engine stall margin by reducing the amount of ash ingestion and limiting the EGT. It also holds the accumulation of molten volcanic ash on turbine vanes to a minimum. Do not climb, since this increases EGT.
  - **CREW OXYGEN . . . . . ON/100 %**
  - **CABIN CREW . . . . . NOTIFY**
  - **PAX 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 CARGO VENTILATION system is installed, it is recommended to switch off the CARGO ISOL VALVES, to prevent a cargo smoke warning being triggered.*

- **APU (if available)** ..... **START**  
This prepares the aircraft for a starter-assisted engine relight.

- **ENGINES 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 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.

- **AIRSPED INDICATIONS** ..... **MONITOR**  
Volcanic ash may clog the pitot probes. If the airspeed indication is lost or becomes unreliable, see the abnormal procedure “UNRELIABLE SPEED INDICATION” (Refer to 3.02.80).

*Note : Electrostatic conditions may cause communication problems.*

**Reporting**

- Whenever operating in areas affected by volcanic activity, flight crews should be aware of volcanic reporting procedures and be familiar with the use of the ICAO Special Air Report of Volcanic Activity (Model VAR).
- If the aircraft encounters a volcanic ash cloud, the flight crew should report the location altitude, and direction of drift for the ash cloud to ATC, flight conditions and crew duties permitting.



## INTRODUCTION

The Less Paper Cockpit (LPC) concept consists of a complete set of software tools, designed to :

- Improve access to pilots' 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

- R 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

PCs should be 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 the 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**

- R
- **When refuelling is completed, if the Weight and Balance module is used :**
    - **Check the fuel distribution on the ECAM FUEL page.**
    - **If necessary, correct the fuel distribution on the pilot PC’s loading module.**  
 This will ensure consistency between the ECAM CG, and the CG computed by the loading module.

*Note : The takeoff CG, computed by the Weight and Balance module, is used by the takeoff performance module for the selection between alternate CG or basic performance.*

**FMGS DATA CONFIRMATION**

- **GROSS WEIGHT INSERTION . . . . . CHECK**  
 The PNF checks FMGS data.
  - If the Aircraft Loading module is used :
    - 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 checks, on the pilot’s PC, that the entered data is correct.  
 The PNF checks that the computed data has been correctly introduced in the MCDU.

**BEFORE PUSHBACK or START**

- R

– **LOADING** . . . . . **CHECK**

– Check the ECAM CG versus the loadsheet CG or, if the W & B module is used, check the ECAM CG versus the CG computed on the pilot’s PC.

– In case of a discrepancy, check that the ZFW and ZFCG have been correctly inserted in the MCDU, then rely on the ECAM CG.
- **TAKEOFF DATA** . . . . . **PREPARE and CHECK/REVISE**

Once the loading is checked :

– Check or re-enter the data entered in the takeoff performance module.

– 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**

- **PILOT PC** . . . . . **STOWED**

**ILS (or NON PRECISION) APPROACH**

- **When the landing gear is down :**

– **PILOT PC** . . . . . **STOWED**

R

LPC WEIGHT AND BALANCE MODULE

R

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.

R

The following procedure applies to operators using only 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**

R

The tasksharing policy for data computation and introduction in the MCDU is consistent with the currently applicable policy, as per the SOP :

R

One pilot performs the computation, then introduces the resulting data in the MCDU.

R

The other pilot checks the :

R

– Computation by using the PC to verify that the entered data is correct.

R

– Data entered in the MCDU.

R

Data entry and computation are generally done by the PF, and checked by the PNF.

R

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 the 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
- When refuelling is completed :
  - Check the fuel distribution on the ECAM FUEL page.
  - If necessary, correct the fuel distribution on the pilot PC’s W & B module.  
This will ensure consistency between the ECAM CG and the CG computed by the W & B module.

**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**  
 – Check the ECAM CG versus the CG computed on the pilot’s PC.  
 – In case of a discrepancy, check that the ZFW and ZFCG have been correctly inserted in the MCDU, then rely on the ECAM CG.
  
- **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**

- **PILOT PC . . . . . STOWED**

**ILS (or NON PRECISION) APPROACH**

- **When the landing gear is down :**
  - **PILOT PC . . . . . STOWED**

**LPC MEL MODULE**

TBD

**05.00    CONTENTS**

**05.05    OPERATING DATA**

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- CONVERSIONS QNH – QFE – PRESSURE ALTITUDE . . . . . 3
- CONVERSIONS QFE – hPa – in.Hg – ft . . . . . 4
- WIND COMPONENTS (FOR TAKEOFF AND LANDING) . . . . . 5
- ALTITUDE TEMPERATURE CORRECTION . . . . . 6

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|       |                                         |   |
|-------|-----------------------------------------|---|
| 05.25 | HOLDING                                 |   |
|       | – GENERAL                               | 1 |
|       | – CLEAN CONFIGURATION – GREEN DOT SPEED | 2 |
|       | – CLEAN CONFIGURATION – 240 KT          | 3 |
|       | – CONFIGURATION 1 – S SPEED             | 4 |
|       | – CONFIGURATION 1 – 210 KT              | 5 |

|       |                             |   |
|-------|-----------------------------|---|
| 05.30 | DESCENT                     |   |
|       | – GENERAL                   | 1 |
| R     | – DESCENT M.82/300KT/250KT  | 2 |
|       | – EMERGENCY DESCENT MMO/VMO | 3 |

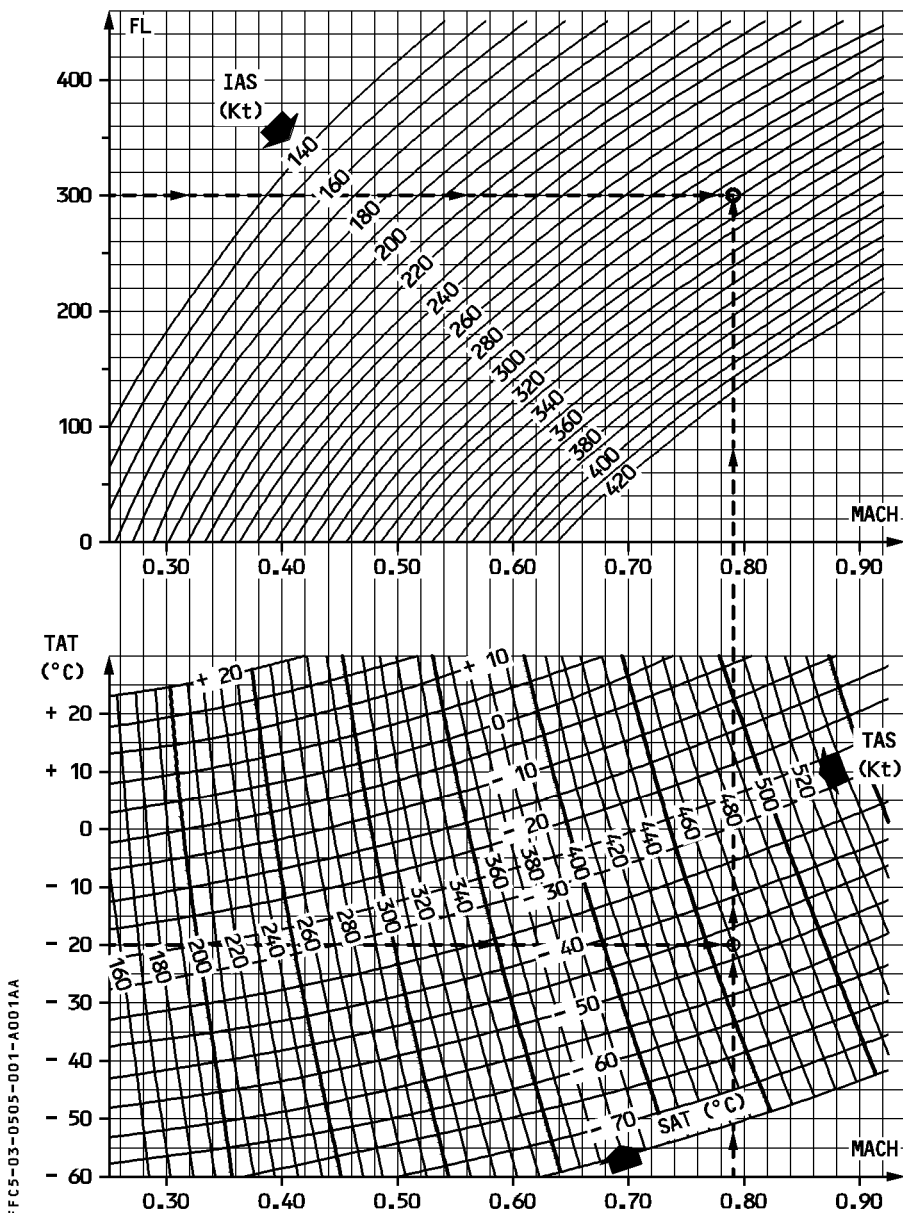
05.35 GO AROUND

05.40 ALTERNATE

|   |       |                                         |
|---|-------|-----------------------------------------|
| R | 05.50 | GROUND DISTANCE/AIR DISTANCE CONVERSION |
|---|-------|-----------------------------------------|



**CONVERSIONS – IAS. MACH – TAS. MACH – SAT. TAT**



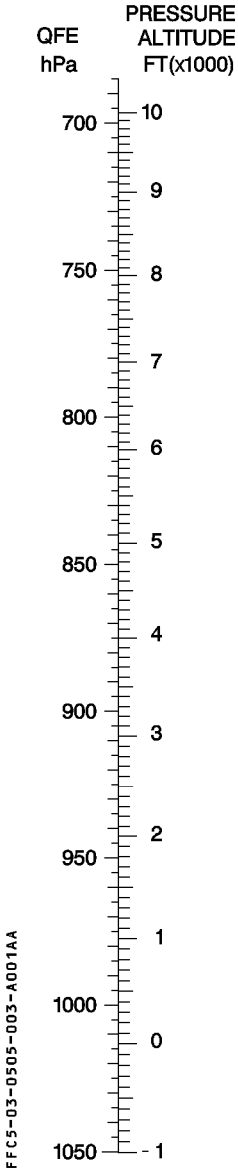
FFC5-03-0505-001-A001AA

**INTERNATIONAL STANDARD ATMOSPHERE (ISA)**

| ALTITUDE<br>(Feet) | TEMP.<br>(°C) | PRESSURE |        |        | PRESSURE<br>RATIO<br>$\delta = P / P_0$ | DENSITY<br>$\sigma = \rho / \rho_0$ | SPEED of<br>SOUND (a)<br>kt | ALTITUDE<br>(meters) |
|--------------------|---------------|----------|--------|--------|-----------------------------------------|-------------------------------------|-----------------------------|----------------------|
|                    |               | hPa      | P.S.I. | In Hg. |                                         |                                     |                             |                      |
| 41,000             | -56.5         | 179      | 2.59   | 5.28   | 0.1764                                  | 0.2346                              | 573                         | 12.496               |
| 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                                  | 0.2891                              | 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

R



| 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 |

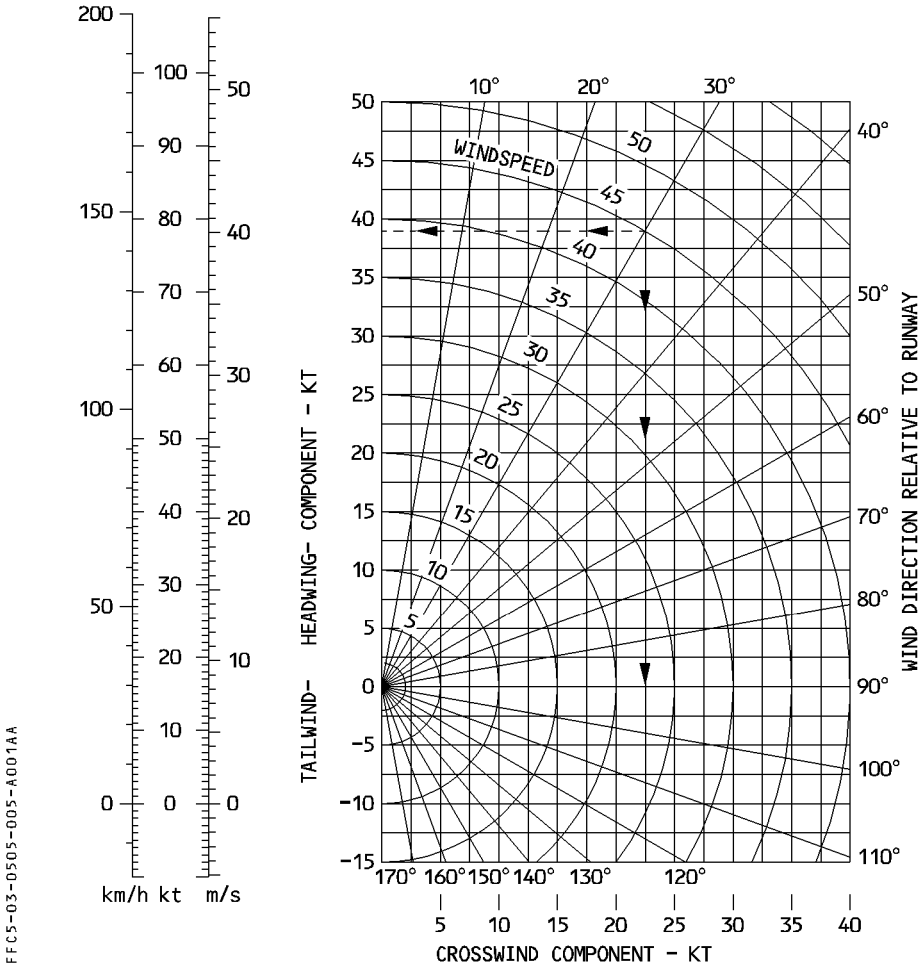
Examples : 1) Elevation: 2500 ft QNH = 1020 hPa  
Find : correction: -200 ft  
Pressure altitude = 2300 ft QFE = 933 hPa  
2) Elevation: 1500 ft QFE = 980 hPa  
Find : Pressure altitude: 920 ft  
Correction = - 580 ft QNH = 1032 hPa

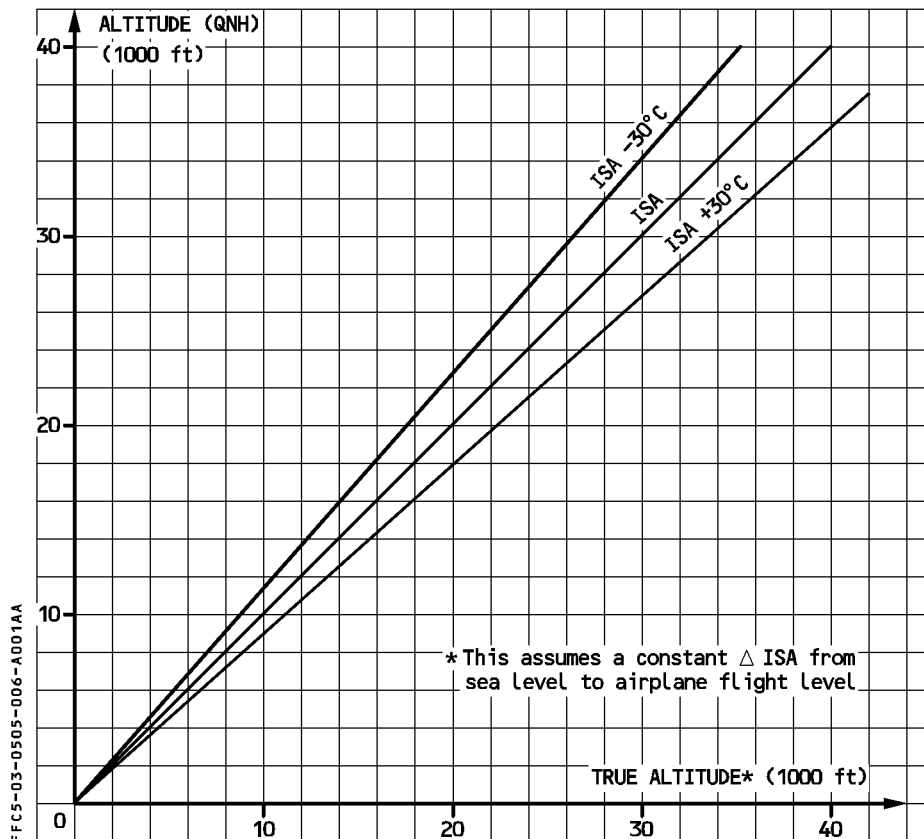
**CONVERSIONS QFE hPa – in. Hg – ft**

| QFE<br>hPa | in. HG | PRESS.<br>ALT.<br>ft | QFE<br>hPa | in. HG | PRESS.<br>ALT.<br>ft | QFE<br>hPa | in. HG | PRESS.<br>ALT.<br>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                 |

R WIND COMPONENTS (FOR TAKEOFF AND LANDING)

| MULTIPLY | BY     | TO GET |                                                                            |                                                             |
|----------|--------|--------|----------------------------------------------------------------------------|-------------------------------------------------------------|
| kt       | 1.852  | km/h   | GIVEN                                                                      | FIND                                                        |
| kt       | 0.5144 | m/s    |                                                                            |                                                             |
| m/s      | 3.6    | km/h   | WIND DIRECTION<br>RELATIVE TO<br>RUNWAY HEADING=30 DEG<br>WIND SPEED=45 kt | CROSS WIND COMPONENT=22.5 kt<br>HEAD WIND COMPONENT=39.0 kt |
| m/s      | 1.9438 | kt     |                                                                            |                                                             |
| km/h     | 0.5396 | kt     |                                                                            |                                                             |
| km/h     | 0.2778 | m/s    |                                                                            |                                                             |



**ALTITUDE TEMPERATURE CORRECTION****FOR HIGH ALTITUDE USE****FOR LOW ALTITUDE USE**

| QNH ALTITUDE MINUS TERRAIN ELEVATION (ft)                                      |         | $\Delta$ Z CORRECTION (ft) |       |       |       |       |       |
|--------------------------------------------------------------------------------|---------|----------------------------|-------|-------|-------|-------|-------|
|                                                                                | →       | 500                        | 1000  | 1500  | 2000  | 2500  | 3000  |
| $\Delta$ ISA                                                                   | - 10 °C | - 17                       | - 34  | - 51  | - 68  | - 85  | - 102 |
|                                                                                | - 20 °C | - 35                       | - 70  | - 105 | - 140 | - 175 | - 210 |
|                                                                                | - 30 °C | - 52                       | - 104 | - 156 | - 208 | - 260 | - 312 |
|                                                                                | - 40 °C | - 70                       | - 140 | - 210 | - 280 | - 350 | - 420 |
| TRUE ALTITUDE = QNH ALTITUDE + $\Delta$ Z                                      |         |                            |       |       |       |       |       |
| Note : A constant $\Delta$ ISA from ground to airplane level has been assumed. |         |                            |       |       |       |       |       |

## THRUST RATINGS

The thrust rating charts have been established for :

R — **Maximum Takeoff**

R 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.

R — **Flexible Takeoff**

R 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**

R It is the maximum thrust approved for normal climb.

— **Maximum Cruise**

R 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.

R The FMGS uses the maximum cruise N1 to compute the aircraft maximum speed.

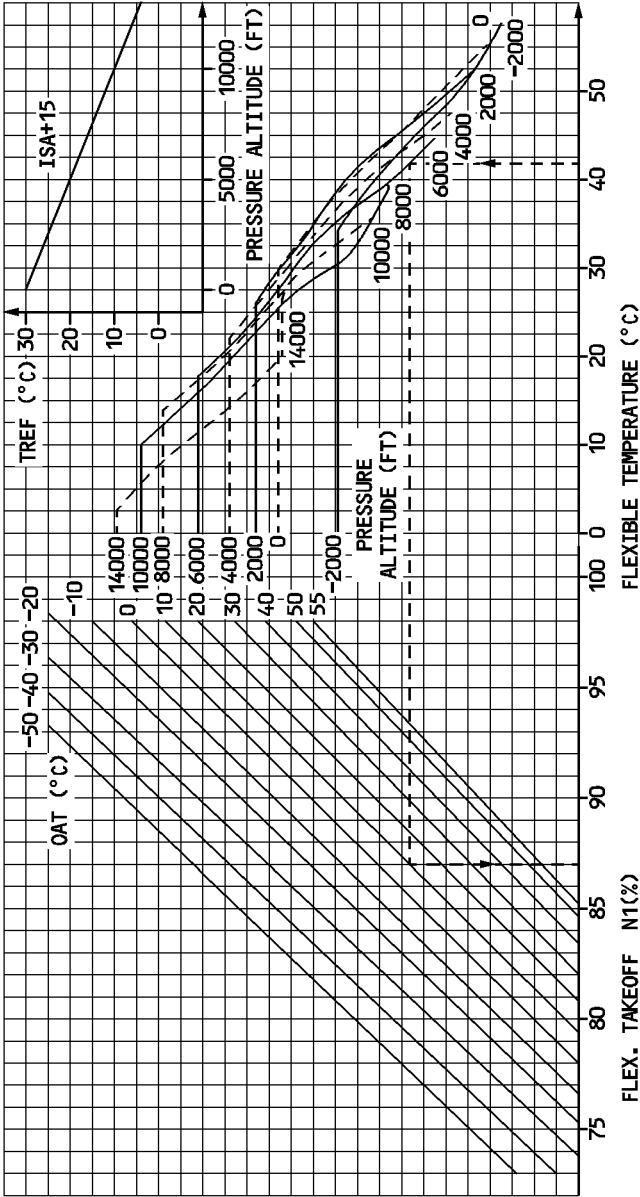
R In manual thrust setting, in cruise, the pilot should limit N1 to the maximum cruise N1

R that is equal to the displayed maximum climb N1 minus 2.5 %.

### FLEXIBLE TAKEOFF N1

R

EXAMPLE : PRESS.ALT.:6000ft. OAT=+10°C. FLX T=42°C.  
 - FLX TEMP 42°C > FLAT RATING TEMP(ISA+15=18°C)  
 ALT:6000 ft → N1 FLEX = 87%  
 OAT:+10°C



| CFM56-5C2       | N1 CORRECTIONS FOR AIR BLEED | OAT < ISA+15 | OAT ≥ ISA+15 |
|-----------------|------------------------------|--------------|--------------|
| FLEX TAKEOFF N1 | AIR CONDITIONING ON          | - 2.6        | - 2.6        |
| MACH = .000     | ENGINE ANTI-ICE ON           | 0.0          | - 1.3        |
|                 | ENGINE AND WING ANTI-ICE ON  | 0.0          | - 3.0        |



## 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.

– **Derated takeoff**

It is a reduced maximum thrust certified for takeoff. (Refer to FCOM 2.02.27)

– **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 that is equal to the displayed maximum climb N1 minus 2.5 %.



|                                                                                                                             |                       |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | IN FLIGHT PERFORMANCE |  | 3.05.06 | P 3    |
|                                                                                                                             | THRUST RATINGS        |  | SEQ 050 | REV 13 |

R TAKEOFF

| CFM56-5C2                                  |                        | N1 CORRECTIONS FOR AIR BLEED         |      |       |       |       |       | OAT <<br>ISA + 15   |       | OAT ≥<br>ISA + 15 |  |
|--------------------------------------------|------------------------|--------------------------------------|------|-------|-------|-------|-------|---------------------|-------|-------------------|--|
| TAKEOFF<br>N1<br>NO AIR BLEED<br>MACH=.000 |                        |                                      |      |       |       |       |       | AIR CONDITIONING ON |       |                   |  |
|                                            |                        | ENGINE ANTI-ICE ON                   |      |       |       |       |       | 0.0                 |       | -1.3              |  |
|                                            |                        | ENGINE ANTI-ICE AND WING ANTI-ICE ON |      |       |       |       |       | 0.0                 |       | -3.0              |  |
| OAT<br>(°C)                                | PRESSURE ALTITUDE (FT) |                                      |      |       |       |       |       |                     |       |                   |  |
|                                            | -2000.                 | -1000.                               | 0.   | 1000. | 2000. | 3000. | 4000. | 5000.               | 6000. | 7000.             |  |
| -54.0                                      | 79.9                   | 81.2                                 | 82.4 | 82.9  | 83.3  | 83.9  | 84.4  | 85.0                | 85.8  | 86.6              |  |
| -50.0                                      | 80.6                   | 81.9                                 | 83.1 | 83.6  | 84.0  | 84.6  | 85.2  | 85.7                | 86.5  | 87.3              |  |
| -46.0                                      | 81.3                   | 82.6                                 | 83.9 | 84.3  | 84.7  | 85.3  | 85.9  | 86.4                | 87.2  | 88.0              |  |
| -42.0                                      | 82.0                   | 83.3                                 | 84.6 | 85.0  | 85.4  | 86.0  | 86.6  | 87.1                | 88.0  | 88.7              |  |
| -38.0                                      | 82.6                   | 83.9                                 | 85.2 | 85.7  | 86.1  | 86.7  | 87.3  | 87.8                | 88.6  | 89.4              |  |
| -34.0                                      | 83.3                   | 84.6                                 | 85.9 | 86.3  | 86.8  | 87.3  | 87.9  | 88.5                | 89.3  | 90.1              |  |
| -30.0                                      | 83.9                   | 85.2                                 | 86.5 | 87.0  | 87.4  | 88.0  | 88.6  | 89.2                | 90.0  | 90.8              |  |
| -26.0                                      | 84.6                   | 85.9                                 | 87.2 | 87.6  | 88.1  | 88.7  | 89.3  | 89.8                | 90.7  | 91.4              |  |
| -22.0                                      | 85.2                   | 86.6                                 | 87.8 | 88.3  | 88.7  | 89.3  | 89.9  | 90.5                | 91.3  | 92.1              |  |
| -18.0                                      | 85.9                   | 87.2                                 | 88.5 | 89.0  | 89.4  | 90.0  | 90.6  | 91.2                | 92.0  | 92.8              |  |
| -14.0                                      | 86.5                   | 87.9                                 | 89.2 | 89.6  | 90.1  | 90.7  | 91.3  | 91.9                | 92.7  | 93.5              |  |
| -10.0                                      | 87.1                   | 88.5                                 | 89.8 | 90.2  | 90.7  | 91.3  | 91.9  | 92.5                | 93.3  | 94.1              |  |
| -6.0                                       | 87.7                   | 89.1                                 | 90.4 | 90.9  | 91.3  | 91.9  | 92.5  | 93.1                | 93.9  | 94.7              |  |
| -2.0                                       | 88.3                   | 89.7                                 | 91.0 | 91.5  | 91.9  | 92.6  | 93.2  | 93.8                | 94.6  | 95.4              |  |
| 2.0                                        | 88.9                   | 90.3                                 | 91.6 | 92.1  | 92.6  | 93.2  | 93.8  | 94.4                | 95.2  | 96.0              |  |
| 6.0                                        | 89.5                   | 90.9                                 | 92.3 | 92.7  | 93.2  | 93.8  | 94.4  | 95.0                | 95.8  | 96.6              |  |
| 10.0                                       | 90.1                   | 91.5                                 | 92.9 | 93.4  | 93.8  | 94.5  | 95.1  | 95.7                | 96.5  | 97.3              |  |
| 14.0                                       | 90.8                   | 92.2                                 | 93.5 | 94.0  | 94.5  | 95.1  | 95.7  | 96.3                | 97.1  | 97.9              |  |
| 18.0                                       | 91.3                   | 92.7                                 | 94.1 | 94.6  | 95.1  | 95.7  | 96.3  | 96.9                | 97.7  | 97.7              |  |
| 22.0                                       | 91.9                   | 93.3                                 | 94.7 | 95.2  | 95.6  | 96.3  | 96.9  | 96.8                | 96.7  | 96.6              |  |
| 26.0                                       | 92.5                   | 93.9                                 | 95.3 | 95.8  | 96.2  | 96.2  | 96.1  | 95.8                | 95.9  | 95.8              |  |
| 30.0                                       | 93.1                   | 94.5                                 | 95.9 | 95.7  | 95.5  | 95.4  | 95.3  | 95.1                | 95.1  | 95.0              |  |
| 34.0                                       | 93.6                   | 94.4                                 | 95.0 | 94.9  | 94.9  | 94.8  | 94.6  | 94.5                | 94.2  | 93.5              |  |
| 38.0                                       | 93.0                   | 93.6                                 | 94.2 | 94.2  | 94.3  | 94.1  | 93.8  | 93.1                | 92.5  | 91.8              |  |
| 42.0                                       | 92.2                   | 92.8                                 | 93.2 | 93.3  | 93.4  | 92.8  | 92.2  | 91.5                | 90.8  |                   |  |
| 46.0                                       | 91.2                   | 91.7                                 | 92.0 | 92.1  | 91.9  | 91.3  | 90.6  |                     |       |                   |  |
| 50.0                                       | 90.1                   | 90.5                                 | 90.9 | 90.8  | 90.4  |       |       |                     |       |                   |  |
| 54.0                                       | 89.0                   | 89.4                                 | 89.8 |       |       |       |       |                     |       |                   |  |

**GO AROUND**

| CFM56-5C2                          |                        | N1 CORRECTIONS FOR AIR BLEED         |      |       |       |       |       | OAT <              |       | OAT ≥             |  |
|------------------------------------|------------------------|--------------------------------------|------|-------|-------|-------|-------|--------------------|-------|-------------------|--|
| GO AROUND N1                       |                        |                                      |      |       |       |       |       | ISA + 15<br>( C )  |       | ISA + 15<br>( C ) |  |
| AIR CONDITIONING ON<br>MACH = .225 |                        | AIR CONDITIONING OFF                 |      |       |       |       |       | 1.000              |       | 1.000             |  |
|                                    |                        | ENGINE ANTI-ICE ON                   |      |       |       |       |       | 0.000              |       | -1.800            |  |
|                                    |                        | ENGINE ANTI-ICE AND WING ANTI-ICE ON |      |       |       |       |       | 0.000              |       | -2.500            |  |
| TAT<br>(°C)                        | PRESSURE ALTITUDE (FT) |                                      |      |       |       |       |       |                    |       |                   |  |
|                                    | -2000.                 | -1000.                               | 0.   | 1000. | 2000. | 3000. | 4000. | 5000.              | 6000. | 7000.             |  |
| -54.0                              | 78.7                   | 79.7                                 | 80.7 | 81.2  | 81.7  | 82.2  | 82.7  | 83.2               | 83.7  | 84.3              |  |
| -50.0                              | 79.4                   | 80.4                                 | 81.4 | 81.9  | 82.4  | 82.9  | 83.4  | 83.9               | 84.5  | 85.0              |  |
| -46.0                              | 80.1                   | 81.1                                 | 82.1 | 82.6  | 83.1  | 83.6  | 84.1  | 84.6               | 85.2  | 85.8              |  |
| -42.0                              | 80.8                   | 81.8                                 | 82.8 | 83.3  | 83.8  | 84.3  | 84.8  | 85.3               | 85.9  | 86.5              |  |
| -38.0                              | 81.4                   | 82.4                                 | 83.4 | 83.9  | 84.4  | 84.9  | 85.4  | 85.9               | 86.5  | 87.1              |  |
| -34.0                              | 82.0                   | 83.1                                 | 84.1 | 84.6  | 85.1  | 85.6  | 86.1  | 86.6               | 87.2  | 87.8              |  |
| -30.0                              | 82.7                   | 83.7                                 | 84.7 | 85.2  | 85.7  | 86.3  | 86.8  | 87.3               | 87.9  | 88.5              |  |
| -26.0                              | 83.3                   | 84.4                                 | 85.4 | 85.9  | 86.4  | 86.9  | 87.4  | 87.9               | 88.5  | 89.1              |  |
| -22.0                              | 83.9                   | 85.0                                 | 86.0 | 86.5  | 87.0  | 87.6  | 88.1  | 88.6               | 89.2  | 89.8              |  |
| -18.0                              | 84.6                   | 85.6                                 | 86.7 | 87.2  | 87.7  | 88.2  | 88.7  | 89.2               | 89.9  | 90.5              |  |
| -14.0                              | 85.2                   | 86.3                                 | 87.3 | 87.8  | 88.3  | 88.9  | 89.4  | 89.9               | 90.5  | 91.1              |  |
| -10.0                              | 85.8                   | 86.9                                 | 87.9 | 88.5  | 89.0  | 89.5  | 90.0  | 90.5               | 91.2  | 91.8              |  |
| -6.0                               | 86.4                   | 87.5                                 | 88.6 | 89.1  | 89.6  | 90.1  | 90.7  | 91.2               | 91.8  | 92.4              |  |
| -2.0                               | 87.0                   | 88.1                                 | 89.2 | 89.7  | 90.2  | 90.7  | 91.3  | 91.8               | 92.4  | 93.0              |  |
| 2.0                                | 87.6                   | 88.7                                 | 89.8 | 90.3  | 90.8  | 91.4  | 91.9  | 92.4               | 93.1  | 93.7              |  |
| 6.0                                | 88.2                   | 89.3                                 | 90.4 | 90.9  | 91.4  | 92.0  | 92.5  | 93.0               | 93.7  | 94.3              |  |
| 10.0                               | 88.8                   | 89.9                                 | 91.0 | 91.5  | 92.0  | 92.6  | 93.1  | 93.7               | 94.3  | 94.9              |  |
| 14.0                               | 89.4                   | 90.5                                 | 91.6 | 92.1  | 92.7  | 93.2  | 93.8  | 94.3               | 94.9  | 95.6              |  |
| 18.0                               | 90.0                   | 91.1                                 | 92.2 | 92.7  | 93.3  | 93.8  | 94.4  | 94.9               | 95.5  | 96.2              |  |
| 22.0                               | 90.6                   | 91.7                                 | 92.8 | 93.3  | 93.8  | 94.4  | 95.0  | 95.5               | 95.8  | 95.7              |  |
| 26.0                               | 91.1                   | 92.3                                 | 93.4 | 93.9  | 94.4  | 95.0  | 95.3  | 95.2               | 95.1  | 95.0              |  |
| 30.0                               | 91.7                   | 92.8                                 | 93.9 | 94.5  | 94.7  | 94.7  | 94.6  | 94.5               | 94.5  | 94.4              |  |
| 34.0                               | 92.3                   | 93.4                                 | 94.2 | 94.1  | 94.1  | 94.0  | 94.0  | 93.8               | 93.8  | 93.7              |  |
| 38.0                               | 92.5                   | 93.0                                 | 93.4 | 93.4  | 93.5  | 93.4  | 93.3  | 93.2               | 92.7  | 92.0              |  |
| 42.0                               | 91.8                   | 92.2                                 | 92.6 | 92.6  | 92.8  | 92.8  | 92.3  | 91.7               | 91.0  | 90.3              |  |
| 46.0                               | 91.0                   | 91.3                                 | 91.5 | 91.8  | 91.9  | 91.4  | 90.8  | 90.1               | 89.4  |                   |  |
| 50.0                               | 90.0                   | 90.2                                 | 90.5 | 90.6  | 90.5  | 89.9  | 89.2  |                    |       |                   |  |
| 54.0                               | 89.0                   | 89.3                                 | 89.5 | 89.4  | 89.0  |       |       |                    |       |                   |  |
| 58.0                               | 88.0                   | 88.3                                 | 88.6 |       |       |       |       |                    |       |                   |  |
| 62.0                               | 87.1                   |                                      |      |       |       |       |       |                    |       |                   |  |
|                                    |                        |                                      |      |       |       |       |       | OAT < ISA+15(C)    |       |                   |  |
|                                    |                        |                                      |      |       |       |       |       | OAT ≥ ISA + 15 (C) |       |                   |  |

**MAXIMUM CONTINUOUS**

R

| CFM56-5C2                           |                        | N1 CORRECTIONS FOR AIR BLEED         |       |        |        |        |        | OAT <<br>ISA + 10    |        | OAT ≥<br>ISA + 10 |        |
|-------------------------------------|------------------------|--------------------------------------|-------|--------|--------|--------|--------|----------------------|--------|-------------------|--------|
| MAXIMUM CONTINUOUS N1               |                        |                                      |       |        |        |        |        | AIR CONDITIONING OFF |        | 1.1               |        |
| AIR CONDITIONING ON *<br>IAS=230 KT |                        | ENGINE ANTI-ICE ON                   |       |        |        |        |        | 0.0                  |        | -1.5              |        |
|                                     |                        | ENGINE ANTI-ICE AND WING ANTI-ICE ON |       |        |        |        |        | 0.0                  |        | -2.3              |        |
| TAT<br>(°C)                         | PRESSURE ALTITUDE (FT) |                                      |       |        |        |        |        |                      |        |                   |        |
|                                     | -2000.                 | 3000.                                | 7000. | 11000. | 15000. | 19000. | 23000. | 27000.               | 31000. | 35000.            | 39000. |
| -54.0                               | 74.6                   | 77.8                                 | 79.7  | 81.9   | 84.0   | 86.9   | 88.1   | 89.3                 | 90.1   | 90.4              | 90.3   |
| -50.0                               | 75.3                   | 78.5                                 | 80.4  | 82.6   | 84.7   | 87.6   | 88.8   | 90.1                 | 90.8   | 91.1              | 91.0   |
| -46.0                               | 75.9                   | 79.2                                 | 81.1  | 83.3   | 85.4   | 88.3   | 89.6   | 90.8                 | 91.5   | 91.8              | 91.7   |
| -42.0                               | 76.6                   | 79.8                                 | 81.8  | 84.0   | 86.1   | 89.0   | 90.3   | 91.5                 | 92.2   | 92.5              | 92.4   |
| -38.0                               | 77.2                   | 80.5                                 | 82.4  | 84.6   | 86.8   | 89.7   | 91.0   | 92.2                 | 92.9   | 93.2              | 93.1   |
| -34.0                               | 77.8                   | 81.1                                 | 83.1  | 85.3   | 87.4   | 90.4   | 91.6   | 92.9                 | 93.6   | 93.9              | 93.8   |
| -30.0                               | 78.4                   | 81.7                                 | 83.7  | 85.9   | 88.1   | 91.1   | 92.3   | 93.5                 | 94.2   | 94.5              | 94.5   |
| -26.0                               | 79.0                   | 82.4                                 | 84.4  | 86.6   | 88.8   | 91.8   | 93.0   | 94.2                 | 94.9   | 95.2              | 95.1   |
| -22.0                               | 79.7                   | 83.0                                 | 85.0  | 87.2   | 89.4   | 92.4   | 93.7   | 94.9                 | 95.6   | 95.7              | 95.8   |
| -18.0                               | 80.3                   | 83.6                                 | 85.6  | 87.9   | 90.1   | 93.1   | 94.3   | 95.6                 | 96.3   | 95.3              | 95.4   |
| -14.0                               | 80.9                   | 84.3                                 | 86.3  | 88.5   | 90.8   | 93.8   | 95.0   | 96.2                 | 95.8   | 94.9              | 94.7   |
| -10.0                               | 81.5                   | 84.9                                 | 86.9  | 89.2   | 91.4   | 94.4   | 95.7   | 96.2                 | 95.2   | 94.4              | 94.0   |
| -6.0                                | 82.0                   | 85.4                                 | 87.5  | 89.8   | 92.0   | 95.1   | 96.3   | 95.6                 | 94.6   | 93.6              | 93.2   |
| -2.0                                | 82.6                   | 86.0                                 | 88.1  | 90.4   | 92.7   | 95.7   | 95.7   | 94.9                 | 93.8   | 92.8              | 92.4   |
| 2.0                                 | 83.2                   | 86.6                                 | 88.7  | 91.0   | 93.3   | 95.7   | 95.1   | 94.1                 | 92.9   | 92.1              | 91.7   |
| 6.0                                 | 83.8                   | 87.2                                 | 89.3  | 91.6   | 93.9   | 95.0   | 94.5   | 93.3                 | 92.2   | 91.5              | 91.1   |
| 10.0                                | 84.3                   | 87.8                                 | 89.9  | 92.3   | 93.5   | 94.4   | 93.8   | 92.6                 | 91.6   | 90.8              | 90.5   |
| 14.0                                | 84.9                   | 88.4                                 | 90.5  | 92.6   | 92.8   | 93.7   | 93.1   | 91.9                 | 91.0   |                   |        |
| 18.0                                | 85.5                   | 89.0                                 | 91.1  | 92.0   | 92.2   | 93.0   | 92.4   | 91.3                 |        |                   |        |
| 22.0                                | 86.0                   | 89.6                                 | 91.1  | 91.4   | 91.7   | 92.4   | 91.8   |                      |        |                   |        |
| 26.0                                | 86.6                   | 90.1                                 | 90.6  | 90.9   | 91.1   | 91.9   |        |                      |        |                   |        |
| 30.0                                | 87.1                   | 89.9                                 | 90.0  | 90.4   | 90.6   | 91.4   |        |                      |        |                   |        |
| 34.0                                | 87.7                   | 89.4                                 | 89.5  | 89.8   | 90.1   |        |        |                      |        |                   |        |
| 38.0                                | 87.6                   | 88.9                                 | 89.0  | 89.4   |        |        |        |                      |        |                   |        |
| 42.0                                | 87.2                   | 88.4                                 | 88.5  | 89.0   |        |        |        |                      |        |                   |        |
| 46.0                                | 86.6                   | 87.9                                 | 88.1  |        |        |        |        |                      |        |                   |        |
| 50.0                                | 85.9                   | 87.4                                 | 87.7  |        |        |        |        |                      |        |                   |        |
| 54.0                                | 85.2                   | 86.9                                 |       |        |        |        |        |                      |        |                   |        |
|                                     |                        |                                      |       |        |        |        |        | OAT<ISA + 10         |        |                   |        |
|                                     |                        |                                      |       |        |        |        |        | OAT≥ISA + 10         |        |                   |        |

\* One engine inoperative  
 2 packs operative on remaining engines

MAXIMUM CLIMB

R

| CFM56-5C2                                                 |        |       | N1 CORRECTIONS FOR AIR BLEED         |                        |        |        |        |        |        | OAT <                |        | OAT >  |  |
|-----------------------------------------------------------|--------|-------|--------------------------------------|------------------------|--------|--------|--------|--------|--------|----------------------|--------|--------|--|
| MAXIMUM<br>CLIMB N1<br>AIR CONDITIONING ON<br>250/300/.78 |        |       |                                      |                        |        |        |        |        |        | AIR CONDITIONING OFF |        |        |  |
|                                                           |        |       | ENGINE ANTI-ICE ON                   |                        |        |        |        |        |        | 0.000                |        | -1.600 |  |
|                                                           |        |       | ENGINE ANTI-ICE AND WING ANTI-ICE ON |                        |        |        |        |        |        | 0.000                |        | -2.500 |  |
|                                                           |        |       | TAT<br>(C)                           | PRESSURE ALTITUDE (FT) |        |        |        |        |        |                      |        |        |  |
|                                                           | -2000. | 3000. | 7000.                                | 11000.                 | 15000. | 19000. | 23000. | 27000. | 31000. | 35000.               | 39000. | 41000. |  |
| -54.                                                      | 74.6   | 77.7  | 79.5                                 | 80.5                   | 82.1   | 84.3   | 85.4   | 86.5   | 88.1   | 90.3                 | 90.4   | 90.2   |  |
| -50.                                                      | 75.2   | 78.4  | 80.2                                 | 81.2                   | 82.8   | 85.0   | 86.1   | 87.2   | 88.8   | 91.0                 | 91.1   | 90.9   |  |
| -46.                                                      | 75.9   | 79.0  | 80.9                                 | 81.9                   | 83.5   | 85.7   | 86.8   | 87.9   | 89.5   | 91.7                 | 91.9   | 91.7   |  |
| -42.                                                      | 76.5   | 79.7  | 81.5                                 | 82.5                   | 84.2   | 86.4   | 87.5   | 88.6   | 90.2   | 92.4                 | 92.6   | 92.4   |  |
| -38.                                                      | 77.1   | 80.3  | 82.2                                 | 83.2                   | 84.9   | 87.1   | 88.2   | 89.3   | 90.9   | 93.1                 | 93.2   | 93.1   |  |
| -34.                                                      | 77.7   | 81.0  | 82.8                                 | 83.8                   | 85.5   | 87.8   | 88.9   | 90.0   | 91.6   | 93.8                 | 93.9   | 93.7   |  |
| -30.                                                      | 78.3   | 81.6  | 83.5                                 | 84.5                   | 86.2   | 88.4   | 89.5   | 90.6   | 92.3   | 94.4                 | 94.6   | 94.4   |  |
| -26.                                                      | 79.0   | 82.2  | 84.1                                 | 85.1                   | 86.8   | 89.1   | 90.2   | 91.3   | 92.9   | 95.1                 | 95.3   | 95.1   |  |
| -22.                                                      | 79.6   | 82.8  | 84.7                                 | 85.8                   | 87.5   | 89.8   | 90.9   | 92.0   | 93.6   | 95.8                 | 95.9   | 95.8   |  |
| -18.                                                      | 80.2   | 83.5  | 85.4                                 | 86.4                   | 88.1   | 90.5   | 91.6   | 92.7   | 94.3   | 96.5                 | 96.2   | 96.1   |  |
| -14.                                                      | 80.8   | 84.1  | 86.0                                 | 87.1                   | 88.8   | 91.1   | 92.2   | 93.3   | 95.0   | 96.2                 | 95.4   | 95.2   |  |
| -10.                                                      | 81.4   | 84.7  | 86.6                                 | 87.7                   | 89.4   | 91.8   | 92.9   | 94.0   | 95.6   | 95.4                 | 94.6   | 94.3   |  |
| -6.                                                       | 81.9   | 85.3  | 87.2                                 | 88.3                   | 90.0   | 92.4   | 93.5   | 94.6   | 95.7   | 94.6                 | 93.7   | 93.5   |  |
| -2.                                                       | 82.5   | 85.9  | 87.8                                 | 88.9                   | 90.7   | 93.0   | 94.1   | 95.3   | 94.9   | 93.9                 | 93.0   | 92.7   |  |
| 2.                                                        | 83.1   | 86.5  | 88.4                                 | 89.5                   | 91.3   | 93.6   | 94.8   | 94.7   | 94.1   | 93.1                 | 92.2   | 92.0   |  |
| 6.                                                        | 83.7   | 87.1  | 89.1                                 | 90.1                   | 91.9   | 94.3   | 94.5   | 93.9   | 93.3   | 92.3                 | 91.5   | 91.3   |  |
| 10.                                                       | 84.2   | 87.7  | 89.7                                 | 90.7                   | 92.5   | 94.5   | 93.7   | 93.1   | 92.6   | 91.7                 | 90.9   | 90.7   |  |
| 14.                                                       | 84.8   | 88.3  | 90.3                                 | 91.3                   | 93.1   | 93.8   | 92.9   | 92.4   | 91.8   | 91.2                 | 90.3   | 90.1   |  |
| 18.                                                       | 85.4   | 88.8  | 90.8                                 | 91.9                   | 92.7   | 93.1   | 92.3   | 91.7   | 91.2   |                      |        |        |  |
| 22.                                                       | 85.9   | 89.4  | 91.3                                 | 92.0                   | 92.2   | 92.6   | 91.7   | 91.1   | 90.6   |                      |        |        |  |
| 26.                                                       | 86.5   | 90.0  | 90.8                                 | 91.5                   | 91.7   | 92.1   | 91.2   | 90.6   | 90.1   |                      |        |        |  |
| 30.                                                       | 87.0   | 90.1  | 90.3                                 | 91.0                   | 91.2   | 91.6   | 90.8   | 90.1   |        |                      |        |        |  |
| 34.                                                       | 87.6   | 89.6  | 89.8                                 | 90.6                   | 90.8   | 91.3   | 90.4   |        |        |                      |        |        |  |
| 38.                                                       | 87.9   | 89.1  | 89.3                                 | 90.2                   | 90.4   | 90.9   |        |        |        |                      |        |        |  |
| 42.                                                       | 87.4   | 88.7  | 88.8                                 | 89.8                   | 90.0   |        |        |        |        |                      |        |        |  |
| 46.                                                       | 86.9   | 88.2  | 88.4                                 | 89.5                   | 89.6   |        |        |        |        |                      |        |        |  |
| 50.                                                       | 86.2   | 87.7  | 88.0                                 | 89.1                   |        |        |        |        |        |                      |        |        |  |
| 54.                                                       | 85.5   | 87.2  |                                      |                        |        |        |        |        |        |                      |        |        |  |
| OAT < ISA + 10                                            |        |       |                                      |                        |        |        |        |        |        |                      |        |        |  |
| OAT > ISA + 10                                            |        |       |                                      |                        |        |        |        |        |        |                      |        |        |  |

MAXIMUM CRUISE

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| CFM56-5C2                                               |                        | N1 CORRECTIONS FOR AIR BLEED         |       |        |        |        |        |        |        | OAT < ISA + 10 |        | OAT > ISA + 10 |  |
|---------------------------------------------------------|------------------------|--------------------------------------|-------|--------|--------|--------|--------|--------|--------|----------------|--------|----------------|--|
| MAXIMUM CRUISE N1<br>AIR CONDITIONING ON<br>250/300/.78 |                        | AIR CONDITIONING OFF                 |       |        |        |        |        |        |        | 1.400          |        | 1.400          |  |
|                                                         |                        | ENGINE ANTI-ICE ON                   |       |        |        |        |        |        |        | 0.000          |        | -1.600         |  |
|                                                         |                        | ENGINE ANTI-ICE AND WING ANTI-ICE ON |       |        |        |        |        |        |        | 0.000          |        | -2.500         |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
| TAT<br>(C)                                              | PRESSURE ALTITUDE (FT) |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         | -2000.                 | 3000.                                | 7000. | 11000. | 15000. | 19000. | 23000. | 27000. | 31000. | 35000.         | 39000. | 43000.         |  |
| -54.                                                    | 70.8                   | 73.9                                 | 75.7  | 76.7   | 78.3   | 80.5   | 81.6   | 82.7   | 84.9   | 87.8           | 87.9   | 87.7           |  |
| -50.                                                    | 71.4                   | 74.6                                 | 76.4  | 77.4   | 79.0   | 81.2   | 82.3   | 83.4   | 85.6   | 88.5           | 88.6   | 88.4           |  |
| -46.                                                    | 72.1                   | 75.2                                 | 77.1  | 78.1   | 79.7   | 81.9   | 83.0   | 84.1   | 86.3   | 89.2           | 89.4   | 89.2           |  |
| -42.                                                    | 72.7                   | 75.9                                 | 77.7  | 78.7   | 80.4   | 82.6   | 83.7   | 84.8   | 87.0   | 89.9           | 90.1   | 89.9           |  |
| -38.                                                    | 73.3                   | 76.5                                 | 78.4  | 79.4   | 81.1   | 83.3   | 84.4   | 85.5   | 87.7   | 90.6           | 90.7   | 90.6           |  |
| -34.                                                    | 73.9                   | 77.2                                 | 79.0  | 80.0   | 81.7   | 84.0   | 85.1   | 86.2   | 88.4   | 91.3           | 91.4   | 91.2           |  |
| -30.                                                    | 74.5                   | 77.8                                 | 79.7  | 80.7   | 82.4   | 84.6   | 85.7   | 86.8   | 89.1   | 91.9           | 92.1   | 91.9           |  |
| -26.                                                    | 75.2                   | 78.4                                 | 80.3  | 81.3   | 83.0   | 85.3   | 86.4   | 87.5   | 89.7   | 92.6           | 92.8   | 92.6           |  |
| -22.                                                    | 75.8                   | 79.0                                 | 80.9  | 82.0   | 83.7   | 86.0   | 87.1   | 88.2   | 90.4   | 93.3           | 93.4   | 93.3           |  |
| -18.                                                    | 76.4                   | 79.7                                 | 81.6  | 82.6   | 84.3   | 86.7   | 87.8   | 88.9   | 91.1   | 94.0           | 93.7   | 93.6           |  |
| -14.                                                    | 77.0                   | 80.3                                 | 82.2  | 83.3   | 85.0   | 87.3   | 88.4   | 89.5   | 91.8   | 93.7           | 92.9   | 92.7           |  |
| -10.                                                    | 77.6                   | 80.9                                 | 82.8  | 83.9   | 85.6   | 88.0   | 89.1   | 90.2   | 92.4   | 92.9           | 92.1   | 91.8           |  |
| -6.                                                     | 78.1                   | 81.5                                 | 83.4  | 84.5   | 86.2   | 88.6   | 89.7   | 90.8   | 92.5   | 92.1           | 91.2   | 91.0           |  |
| -2.                                                     | 78.7                   | 82.1                                 | 84.0  | 85.1   | 86.9   | 89.2   | 90.3   | 91.5   | 91.7   | 91.4           | 90.5   | 90.2           |  |
| 2.                                                      | 79.3                   | 82.7                                 | 84.6  | 85.7   | 87.5   | 89.8   | 91.0   | 90.9   | 90.9   | 90.6           | 89.7   | 89.5           |  |
| 6.                                                      | 79.9                   | 83.3                                 | 85.3  | 86.3   | 88.1   | 90.5   | 90.7   | 90.1   | 90.1   | 89.8           | 89.0   | 88.8           |  |
| 10.                                                     | 80.4                   | 83.9                                 | 85.9  | 86.9   | 88.7   | 90.7   | 89.9   | 89.3   | 89.4   | 89.2           | 88.4   | 88.2           |  |
| 14.                                                     | 81.0                   | 84.5                                 | 86.5  | 87.5   | 89.3   | 90.0   | 89.1   | 88.6   | 88.6   | 88.7           | 87.8   | 87.6           |  |
| 18.                                                     | 81.6                   | 85.0                                 | 87.0  | 88.1   | 88.9   | 89.3   | 88.5   | 87.9   | 88.0   |                |        |                |  |
| 22.                                                     | 82.1                   | 85.6                                 | 87.5  | 88.2   | 88.4   | 88.8   | 87.9   | 87.3   | 87.4   |                |        |                |  |
| 26.                                                     | 82.7                   | 86.2                                 | 87.0  | 87.7   | 87.9   | 88.3   | 87.4   | 86.8   | 86.9   |                |        |                |  |
| 30.                                                     | 83.2                   | 86.3                                 | 86.5  | 87.2   | 87.4   | 87.8   | 87.0   | 86.3   |        |                |        |                |  |
| 34.                                                     | 83.8                   | 85.8                                 | 86.0  | 86.8   | 87.0   | 87.5   | 86.6   |        |        |                |        |                |  |
| 38.                                                     | 84.1                   | 85.3                                 | 85.5  | 86.4   | 86.6   | 87.1   |        |        |        |                |        |                |  |
| 42.                                                     | 83.6                   | 84.9                                 | 85.0  | 86.0   | 86.2   |        |        |        |        |                |        |                |  |
| 46.                                                     | 83.1                   | 84.4                                 | 84.6  | 85.7   | 85.8   |        |        |        |        |                |        |                |  |
| 50.                                                     | 82.4                   | 83.9                                 | 84.2  | 85.3   |        |        |        |        |        |                |        |                |  |
| 54.                                                     | 81.7                   | 83.4                                 |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |
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|                                                         |                        |                                      |       |        |        |        |        |        |        |                |        |                |  |

**GENERAL**

Climb tables are established at MAX CLIMB THRUST with air conditioning in normal mode, and anti ice OFF.

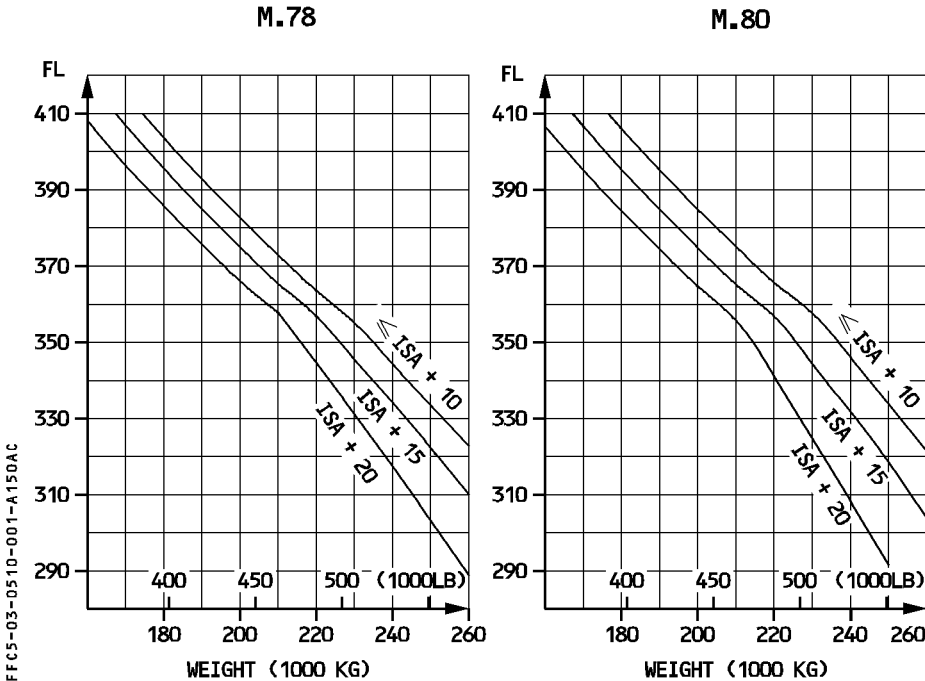
The climb speed profile is :

- 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.

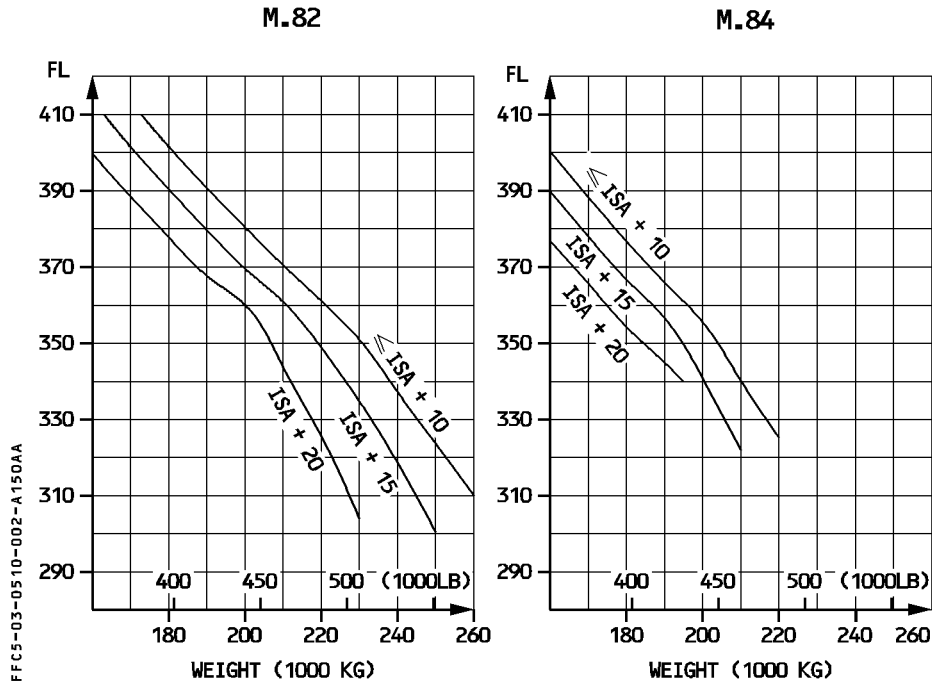
All charts are established with a center of gravity of 30%.

**CLIMB CEILING**

The following graphs show for M.78, M.80, M.82, M.84 the flight levels that can be reached with a minimum rate of climb of 300 feet/minute.







**BLEED CORRECTIONS**

R

|           | ENGINE ANTI ICE ON | TOTAL ANTI ICE ON | PACK FLOW HI AND/OR CARGO COOL ON |
|-----------|--------------------|-------------------|-----------------------------------|
| ≤ ISA + 4 | – 100 FT           | – 250 FT          | – 300 FT                          |
| ISA + 20  | – 2000 FT          | – 2500 FT         | – 900 FT                          |

|                                                                                 |                              |  |         |        |
|---------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.10 | P 3    |
|                                                                                 | CLIMB                        |  | SEQ 150 | REV 14 |

FLIGHT CREW OPERATING MANUAL

| CLIMB - 250KT/300KT/M.78 |                                  |                                       |                    |                    |                    |                    |                    |  |  |
|--------------------------|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|--|
| MAX. CLIMB THRUST        |                                  |                                       | ISA                |                    | FROM BRAKE RELEASE |                    |                    |  |  |
| NORMAL AIR CONDITIONING  |                                  |                                       | CG=30.0%           |                    | TIME (MIN)         |                    | FUEL (KG)          |  |  |
| ANTI-ICING OFF           |                                  |                                       |                    |                    | DISTANCE (NM)      |                    | TAS (KT)           |  |  |
| FL                       | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |                    |                    |                    |                    |                    |  |  |
|                          | 130                              | 140                                   | 150                | 160                | 170                | 180                | 190                |  |  |
| 410                      | 16 3029<br>103 380               | 18 3318<br>114 382                    | 20 3634<br>127 384 | 22 3986<br>141 386 | 25 4393<br>159 389 | 28 4895<br>183 393 | 34 5663<br>226 399 |  |  |
| 390                      | 15 2873<br>91 373                | 16 3135<br>101 374                    | 18 3416<br>111 376 | 19 3721<br>122 378 | 21 4056<br>135 380 | 23 4432<br>150 382 | 26 4868<br>168 385 |  |  |
| 370                      | 13 2732<br>82 366                | 15 2974<br>90 367                     | 16 3231<br>99 369  | 17 3505<br>108 370 | 19 3800<br>118 372 | 21 4123<br>129 373 | 23 4479<br>142 375 |  |  |
| 350                      | 12 2607<br>75 359                | 14 2833<br>82 361                     | 15 3071<br>89 362  | 16 3323<br>97 363  | 17 3593<br>105 365 | 19 3884<br>115 366 | 20 4199<br>125 367 |  |  |
| 330                      | 12 2489<br>68 352                | 13 2701<br>74 354                     | 14 2925<br>81 355  | 15 3160<br>88 356  | 16 3410<br>95 357  | 17 3677<br>103 358 | 19 3965<br>112 360 |  |  |
| 310                      | 11 2371<br>62 345                | 12 2572<br>68 346                     | 13 2782<br>73 347  | 14 3002<br>80 348  | 15 3235<br>86 349  | 16 3483<br>93 350  | 17 3747<br>101 351 |  |  |
| 290                      | 10 2247<br>56 336                | 11 2435<br>61 337                     | 12 2632<br>66 338  | 13 2838<br>71 339  | 14 3054<br>77 340  | 15 3284<br>83 341  | 16 3528<br>90 342  |  |  |
| 270                      | 9 2090<br>49 323                 | 10 2263<br>53 325                     | 11 2444<br>58 326  | 11 2633<br>62 327  | 12 2831<br>67 328  | 13 3040<br>72 328  | 14 3261<br>78 329  |  |  |
| 250                      | 8 1942<br>43 312                 | 9 2101<br>46 313                      | 10 2267<br>50 314  | 10 2441<br>54 315  | 11 2623<br>58 316  | 12 2814<br>63 316  | 13 3015<br>67 317  |  |  |
| 240                      | 8 1871<br>40 306                 | 8 2023<br>43 307                      | 9 2183<br>47 308   | 10 2349<br>51 309  | 11 2523<br>54 310  | 11 2706<br>59 311  | 12 2898<br>63 311  |  |  |
| 220                      | 7 1734<br>35 294                 | 8 1873<br>38 296                      | 8 2020<br>41 297   | 9 2172<br>44 298   | 10 2332<br>47 298  | 10 2499<br>51 299  | 11 2676<br>55 300  |  |  |
| 200                      | 6 1602<br>30 283                 | 7 1729<br>33 284                      | 7 1863<br>35 285   | 8 2003<br>38 286   | 9 2149<br>41 287   | 9 2303<br>44 287   | 10 2464<br>47 288  |  |  |
| 180                      | 6 1474<br>26 271                 | 6 1590<br>28 272                      | 7 1712<br>31 273   | 7 1840<br>33 274   | 8 1974<br>36 275   | 8 2114<br>38 276   | 9 2262<br>41 276   |  |  |
| 160                      | 5 1349<br>23 259                 | 6 1455<br>24 260                      | 6 1565<br>26 261   | 6 1681<br>28 262   | 7 1803<br>31 263   | 7 1930<br>33 264   | 8 2065<br>35 264   |  |  |
| 140                      | 5 1225<br>19 246                 | 5 1320<br>21 247                      | 5 1419<br>22 248   | 6 1524<br>24 249   | 6 1634<br>26 250   | 7 1749<br>28 251   | 7 1871<br>30 251   |  |  |
| 120                      | 4 1103<br>16 231                 | 4 1187<br>17 233                      | 5 1276<br>19 234   | 5 1369<br>20 235   | 5 1467<br>22 236   | 6 1571<br>23 236   | 6 1680<br>25 237   |  |  |
| 100                      | 3 900<br>11 204                  | 4 967<br>12 206                       | 4 1037<br>13 207   | 4 1112<br>14 208   | 4 1191<br>15 209   | 5 1274<br>16 210   | 5 1363<br>17 211   |  |  |
| 50                       | 2 616<br>6 167                   | 2 657<br>6 168                        | 2 702<br>7 169     | 3 750<br>7 170     | 3 801<br>8 171     | 3 856<br>9 172     | 3 914<br>9 173     |  |  |
| 15                       | 1 415<br>3 119                   | 1 439<br>3 119                        | 2 466<br>3 119     | 2 495<br>3 120     | 2 528<br>4 121     | 2 562<br>4 122     | 2 600<br>4 123     |  |  |
| PACK FLOW LO             |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |                    | ENGINE ANTI ICE ON |                    | TOTAL ANTI ICE ON  |                    |  |  |
| △ FUEL = - 1 %           |                                  | △FUEL = + 1 %                         |                    | △ FUEL = + 1.5 %   |                    | △ FUEL = + 3 %     |                    |  |  |

10B -08FOA340-211/212 CFM56-5C2 2110000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 0 FCOM-F0-03-05-10-003-150

**CLIMB - 250KT/300KT/M.78**

MAX. CLIMB THRUST

NORMAL AIR CONDITIONING

ANTI-ICING OFF

ISA

CG=30.0%

FROM BRAKE RELEASE

TIME (MIN)

FUEL (KG)

DISTANCE (NM)

TAS (KT)

| FL             | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |                    |                    |                    |                    |                    |                   |     |  |     |  |     |  |
|----------------|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|-----|--|-----|--|-----|--|
|                | 200                              |                                       | 210                |                    | 220                |                    | 230                |                   | 240 |  | 250 |  | 260 |  |
| 410            |                                  |                                       |                    |                    |                    |                    |                    |                   |     |  |     |  |     |  |
| 390            | 30 5410<br>192 389               | 35 6228<br>234 395                    |                    |                    |                    |                    |                    |                   |     |  |     |  |     |  |
| 370            | 25 4881<br>157 378               | 28 5346<br>175 380                    | 31 5916<br>198 384 | 36 6707<br>234 390 |                    |                    |                    |                   |     |  |     |  |     |  |
| 350            | 22 4546<br>137 369               | 24 4933<br>150 371                    | 27 5368<br>165 373 | 29 5872<br>184 376 | 33 6486<br>207 380 | 38 7316<br>242 385 |                    |                   |     |  |     |  |     |  |
| 330            | 20 4277<br>121 361               | 22 4618<br>132 362                    | 24 4995<br>144 364 | 26 5415<br>158 366 | 28 5890<br>174 369 | 31 6440<br>193 371 | 35 7107<br>218 375 |                   |     |  |     |  |     |  |
| 310            | 19 4033<br>109 352               | 20 4342<br>118 354                    | 22 4678<br>128 355 | 23 5048<br>139 357 | 25 5456<br>151 358 | 28 5910<br>166 360 | 30 6425<br>182 363 |                   |     |  |     |  |     |  |
| 290            | 17 3790<br>97 343                | 18 4072<br>105 344                    | 20 4377<br>113 345 | 21 4707<br>122 346 | 23 5067<br>132 347 | 25 5462<br>144 349 | 27 5898<br>157 350 |                   |     |  |     |  |     |  |
| 270            | 15 3497<br>84 330                | 16 3750<br>90 331                     | 18 4021<br>97 332  | 19 4313<br>104 333 | 20 4628<br>112 334 | 22 4968<br>121 335 | 23 5339<br>131 336 |                   |     |  |     |  |     |  |
| 250            | 14 3228<br>72 318                | 15 3457<br>78 318                     | 16 3700<br>83 319  | 17 3962<br>90 320  | 18 4242<br>96 321  | 19 4542<br>103 322 | 21 4867<br>111 322 |                   |     |  |     |  |     |  |
| 240            | 13 3102<br>67 312                | 14 3319<br>72 312                     | 15 3551<br>78 313  | 16 3799<br>83 314  | 17 4064<br>89 315  | 18 4348<br>96 315  | 20 4654<br>103 316 |                   |     |  |     |  |     |  |
| 220            | 12 2861<br>58 300                | 12 3059<br>63 301                     | 13 3269<br>67 301  | 14 3493<br>72 302  | 15 3732<br>77 303  | 16 3987<br>82 303  | 17 4261<br>88 304  |                   |     |  |     |  |     |  |
| 200            | 11 2634<br>51 289                | 11 2814<br>54 289                     | 12 3005<br>58 290  | 13 3208<br>62 290  | 14 3425<br>66 291  | 15 3656<br>71 291  | 16 3903<br>76 292  |                   |     |  |     |  |     |  |
| 180            | 9 2417<br>44 277                 | 10 2581<br>47 278                     | 11 2755<br>50 278  | 12 2940<br>54 279  | 12 3137<br>57 279  | 13 3346<br>61 280  | 14 3570<br>66 280  |                   |     |  |     |  |     |  |
| 160            | 9 2206<br>38 265                 | 9 2356<br>40 266                      | 10 2514<br>43 266  | 10 2682<br>46 267  | 11 2861<br>49 267  | 12 3050<br>53 268  | 13 3254<br>56 269  |                   |     |  |     |  |     |  |
| 140            | 8 1999<br>32 252                 | 8 2134<br>34 253                      | 9 2277<br>37 253   | 9 2429<br>39 254   | 10 2590<br>42 255  | 10 2761<br>45 255  | 11 2944<br>48 256  |                   |     |  |     |  |     |  |
| 120            | 7 1795<br>27 238                 | 7 1917<br>29 239                      | 8 2045<br>30 239   | 8 2181<br>33 240   | 9 2326<br>35 241   | 9 2480<br>37 241   | 10 2644<br>40 242  |                   |     |  |     |  |     |  |
| 100            | 5 1456<br>19 212                 | 6 1555<br>20 213                      | 6 1660<br>22 213   | 6 1771<br>23 214   | 7 1889<br>25 215   | 7 2014<br>26 216   | 8 2149<br>28 217   |                   |     |  |     |  |     |  |
| 50             | 3 976<br>10 174                  | 4 1041<br>11 176                      | 4 1110<br>11 177   | 4 1183<br>12 178   | 4 1260<br>13 179   | 5 1342<br>14 181   | 5 1428<br>15 182   |                   |     |  |     |  |     |  |
| 15             | 2 640<br>4 125                   | 2 682<br>5 127                        | 2 727<br>5 128     | 3 775<br>6 130     | 3 825<br>6 132     | 3 878<br>7 134     | 3 934<br>7 136     |                   |     |  |     |  |     |  |
| PACK FLOW LO   |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |                    |                    | ENGINE ANTI ICE ON |                    |                    | TOTAL ANTI ICE ON |     |  |     |  |     |  |
| △ FUEL = - 1 % |                                  | △FUEL = + 1 %                         |                    |                    | △ FUEL = + 1.5 %   |                    |                    | △ FUEL = + 3 %    |     |  |     |  |     |  |

|                                                                                 |                              |  |         |        |
|---------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.10 | P 5    |
|                                                                                 | <b>CLIMB</b>                 |  | SEQ 150 | REV 14 |

| CLIMB - 250KT/300KT/M.78 |                                  |      |                                       |      |     |                    |     |           |                   |      |     |      |     |      |
|--------------------------|----------------------------------|------|---------------------------------------|------|-----|--------------------|-----|-----------|-------------------|------|-----|------|-----|------|
| MAX. CLIMB THRUST        |                                  |      | ISA +10                               |      |     | FROM BRAKE RELEASE |     |           |                   |      |     |      |     |      |
| NORMAL AIR CONDITIONING  |                                  |      | CG=30.0%                              |      |     | TIME (MIN)         |     | FUEL (KG) |                   |      |     |      |     |      |
| ANTI-ICING OFF           |                                  |      |                                       |      |     | DISTANCE (NM)      |     | TAS (KT)  |                   |      |     |      |     |      |
|                          | WEIGHT AT BRAKE RELEASE (1000KG) |      |                                       |      |     |                    |     |           |                   |      |     |      |     |      |
| FL                       | 130                              |      | 140                                   |      | 150 |                    | 160 |           | 170               |      | 180 |      | 190 |      |
| 410                      | 17                               | 3194 | 18                                    | 3496 | 20  | 3827               | 23  | 4197      | 25                | 4625 | 29  | 5154 | 35  | 5964 |
|                          | 108                              | 388  | 120                                   | 390  | 133 | 392                | 148 | 395       | 167               | 398  | 192 | 401  | 237 | 408  |
| 390                      | 15                               | 3029 | 17                                    | 3301 | 18  | 3595               | 20  | 3914      | 22                | 4266 | 24  | 4662 | 27  | 5123 |
|                          | 96                               | 381  | 106                                   | 383  | 116 | 384                | 128 | 386       | 141               | 388  | 157 | 390  | 176 | 393  |
| 370                      | 14                               | 2879 | 15                                    | 3130 | 16  | 3398               | 18  | 3684      | 19                | 3995 | 21  | 4334 | 23  | 4710 |
|                          | 86                               | 374  | 94                                    | 375  | 103 | 377                | 113 | 378       | 123               | 380  | 135 | 382  | 149 | 384  |
| 350                      | 13                               | 2745 | 14                                    | 2979 | 15  | 3228               | 16  | 3491      | 18                | 3774 | 19  | 4079 | 21  | 4412 |
|                          | 78                               | 367  | 85                                    | 368  | 93  | 370                | 101 | 371       | 110               | 372  | 120 | 374  | 131 | 375  |
| 330                      | 12                               | 2619 | 13                                    | 2840 | 14  | 3072               | 15  | 3317      | 16                | 3579 | 18  | 3859 | 19  | 4162 |
|                          | 71                               | 360  | 78                                    | 361  | 85  | 363                | 92  | 364       | 100               | 365  | 108 | 366  | 117 | 367  |
| 310                      | 11                               | 2494 | 12                                    | 2702 | 13  | 2920               | 14  | 3149      | 15                | 3393 | 16  | 3652 | 18  | 3931 |
|                          | 65                               | 352  | 71                                    | 353  | 77  | 355                | 83  | 356       | 90                | 357  | 97  | 358  | 105 | 359  |
| 290                      | 10                               | 2362 | 11                                    | 2556 | 12  | 2760               | 13  | 2974      | 14                | 3201 | 15  | 3441 | 16  | 3698 |
|                          | 58                               | 343  | 64                                    | 344  | 69  | 345                | 75  | 346       | 81                | 347  | 87  | 348  | 94  | 349  |
| 270                      | 9                                | 2196 | 10                                    | 2374 | 11  | 2561               | 12  | 2757      | 13                | 2964 | 14  | 3182 | 15  | 3414 |
|                          | 51                               | 330  | 55                                    | 332  | 60  | 333                | 65  | 334       | 70                | 334  | 75  | 335  | 81  | 336  |
| 250                      | 8                                | 2039 | 9                                     | 2203 | 10  | 2374               | 11  | 2554      | 11                | 2743 | 12  | 2943 | 13  | 3154 |
|                          | 44                               | 318  | 48                                    | 319  | 52  | 320                | 57  | 321       | 61                | 322  | 65  | 323  | 70  | 323  |
| 240                      | 8                                | 1964 | 9                                     | 2121 | 9   | 2285               | 10  | 2457      | 11                | 2638 | 12  | 2829 | 12  | 3031 |
|                          | 42                               | 312  | 45                                    | 313  | 49  | 314                | 53  | 315       | 57                | 316  | 61  | 317  | 66  | 317  |
| 220                      | 7                                | 1819 | 8                                     | 1962 | 8   | 2113               | 9   | 2270      | 10                | 2436 | 10  | 2611 | 11  | 2796 |
|                          | 36                               | 300  | 39                                    | 302  | 43  | 303                | 46  | 304       | 49                | 304  | 53  | 305  | 57  | 305  |
| 200                      | 7                                | 1680 | 7                                     | 1811 | 8   | 1948               | 8   | 2092      | 9                 | 2244 | 9   | 2404 | 10  | 2573 |
|                          | 31                               | 289  | 34                                    | 290  | 37  | 291                | 40  | 292       | 43                | 292  | 46  | 293  | 49  | 294  |
| 180                      | 6                                | 1546 | 6                                     | 1664 | 7   | 1789               | 7   | 1921      | 8                 | 2059 | 8   | 2205 | 9   | 2360 |
|                          | 27                               | 277  | 30                                    | 278  | 32  | 279                | 34  | 280       | 37                | 281  | 40  | 281  | 43  | 282  |
| 160                      | 5                                | 1415 | 6                                     | 1522 | 6   | 1635               | 7   | 1754      | 7                 | 1880 | 8   | 2012 | 8   | 2153 |
|                          | 23                               | 264  | 25                                    | 266  | 27  | 267                | 30  | 267       | 32                | 268  | 34  | 269  | 37  | 270  |
| 140                      | 5                                | 1285 | 5                                     | 1380 | 6   | 1482               | 6   | 1589      | 6                 | 1702 | 7   | 1822 | 7   | 1949 |
|                          | 20                               | 251  | 22                                    | 252  | 23  | 253                | 25  | 254       | 27                | 255  | 29  | 256  | 31  | 256  |
| 120                      | 4                                | 1157 | 5                                     | 1241 | 5   | 1331               | 5   | 1426      | 6                 | 1527 | 6   | 1634 | 6   | 1749 |
|                          | 17                               | 236  | 18                                    | 237  | 19  | 238                | 21  | 239       | 22                | 240  | 24  | 241  | 26  | 242  |
| 100                      | 3                                | 944  | 4                                     | 1010 | 4   | 1081               | 4   | 1157      | 4                 | 1238 | 5   | 1324 | 5   | 1417 |
|                          | 12                               | 209  | 13                                    | 210  | 14  | 211                | 15  | 212       | 16                | 213  | 17  | 214  | 18  | 215  |
| 50                       | 2                                | 647  | 2                                     | 687  | 2   | 730                | 3   | 778       | 3                 | 830  | 3   | 887  | 3   | 947  |
|                          | 6                                | 171  | 7                                     | 172  | 7   | 173                | 8   | 173       | 8                 | 174  | 9   | 175  | 10  | 177  |
| 15                       | 1                                | 436  | 2                                     | 458  | 2   | 484                | 2   | 512       | 2                 | 544  | 2   | 580  | 2   | 618  |
|                          | 3                                | 124  | 3                                     | 122  | 3   | 122                | 3   | 122       | 4                 | 123  | 4   | 124  | 4   | 125  |
| PACK FLOW LO             |                                  |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |     | ENGINE ANTI ICE ON |     |           | TOTAL ANTI ICE ON |      |     |      |     |      |
| △ FUEL = - 1 %           |                                  |      | △FUEL = + 1 %                         |      |     | △ FUEL = + 4 %     |     |           | △ FUEL = + 7 %    |      |     |      |     |      |

10B-08FQA340-211/212 CFM56-5C2 2110000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 10 FCOM-F0-03-05-10-005-150

**CLIMB - 250KT/300KT/M.78**

MAX. CLIMB THRUST

NORMAL AIR CONDITIONING

ANTI-ICING OFF

ISA+10

CG=30.0%

FROM BRAKE RELEASE

TIME (MIN)

FUEL (KG)

DISTANCE (NM)

TAS (KT)

| FL             | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |                    |                    |                    |                    |                    |  |
|----------------|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
|                | 200                              | 210                                   | 220                | 230                | 240                | 250                | 260                |  |
| <b>410</b>     |                                  |                                       |                    |                    |                    |                    |                    |  |
| <b>390</b>     | 30 5696<br>201 397               | 36 6558<br>244 404                    |                    |                    |                    |                    |                    |  |
| <b>370</b>     | 26 5135<br>164 386               | 28 5627<br>183 389                    | 32 6231<br>208 392 | 37 7068<br>245 398 |                    |                    |                    |  |
| <b>350</b>     | 23 4779<br>143 377               | 25 5187<br>157 379                    | 27 5649<br>173 381 | 30 6184<br>192 384 | 34 6834<br>217 388 | 39 7712<br>254 393 |                    |  |
| <b>330</b>     | 21 4491<br>127 369               | 22 4853<br>138 370                    | 24 5252<br>151 372 | 27 5697<br>166 374 | 29 6202<br>182 376 | 32 6787<br>203 379 | 36 7496<br>229 383 |  |
| <b>310</b>     | 19 4232<br>114 360               | 20 4558<br>123 361                    | 22 4915<br>134 362 | 24 5306<br>145 364 | 26 5739<br>159 366 | 28 6223<br>174 368 | 31 6771<br>191 370 |  |
| <b>290</b>     | 17 3974<br>101 350               | 19 4271<br>109 351                    | 20 4593<br>118 352 | 22 4944<br>128 353 | 23 5326<br>139 355 | 25 5745<br>151 356 | 27 6209<br>164 358 |  |
| <b>270</b>     | 16 3662<br>87 337                | 17 3929<br>94 338                     | 18 4215<br>101 338 | 19 4525<br>109 339 | 21 4859<br>118 340 | 22 5220<br>127 342 | 24 5615<br>137 343 |  |
| <b>250</b>     | 14 3378<br>76 324                | 15 3619<br>81 325                     | 16 3876<br>87 326  | 17 4153<br>94 326  | 18 4450<br>101 327 | 20 4769<br>108 328 | 21 5115<br>116 329 |  |
| <b>240</b>     | 13 3244<br>70 318                | 14 3473<br>75 319                     | 15 3718<br>81 319  | 16 3981<br>87 320  | 17 4262<br>93 321  | 19 4564<br>100 322 | 20 4889<br>107 322 |  |
| <b>220</b>     | 12 2990<br>61 306                | 13 3199<br>65 307                     | 14 3420<br>70 307  | 15 3658<br>75 308  | 16 3912<br>80 308  | 17 4183<br>86 309  | 18 4474<br>92 310  |  |
| <b>200</b>     | 11 2751<br>53 294                | 12 2941<br>57 295                     | 12 3142<br>61 295  | 13 3358<br>65 296  | 14 3589<br>69 296  | 15 3834<br>74 297  | 16 4097<br>79 298  |  |
| <b>180</b>     | 10 2522<br>46 282                | 10 2696<br>49 283                     | 11 2879<br>52 283  | 12 3076<br>56 284  | 13 3285<br>60 285  | 13 3508<br>64 285  | 14 3747<br>68 286  |  |
| <b>160</b>     | 9 2301<br>39 270                 | 9 2459<br>42 271                      | 10 2626<br>45 271  | 11 2804<br>48 272  | 11 2995<br>51 272  | 12 3197<br>55 273  | 13 3414<br>59 274  |  |
| <b>140</b>     | 8 2083<br>33 257                 | 8 2226<br>36 258                      | 9 2377<br>38 258   | 9 2538<br>41 259   | 10 2710<br>43 259  | 11 2893<br>46 260  | 11 3089<br>50 261  |  |
| <b>120</b>     | 7 1869<br>28 242                 | 7 1998<br>30 243                      | 8 2134<br>32 244   | 8 2278<br>34 245   | 9 2433<br>36 245   | 9 2598<br>39 246   | 10 2774<br>42 247  |  |
| <b>100</b>     | 5 1515<br>19 216                 | 6 1619<br>21 217                      | 6 1730<br>22 218   | 7 1848<br>24 218   | 7 1976<br>26 219   | 8 2110<br>28 220   | 8 2255<br>30 221   |  |
| <b>50</b>      | 3 1012<br>10 178                 | 4 1081<br>11 179                      | 4 1155<br>12 180   | 4 1233<br>13 181   | 4 1317<br>14 183   | 5 1406<br>15 184   | 5 1501<br>16 186   |  |
| <b>15</b>      | 2 660<br>5 127                   | 2 706<br>5 129                        | 2 755<br>5 131     | 3 807<br>6 133     | 3 863<br>6 135     | 3 922<br>7 137     | 3 984<br>7 139     |  |
| PACK FLOW LO   |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |                    | ENGINE ANTI ICE ON |                    | TOTAL ANTI ICE ON  |                    |  |
| △ FUEL = - 1 % |                                  | △ FUEL = + 1 %                        |                    | △ FUEL = + 5 %     |                    | △ FUEL = + 8 %     |                    |  |

10B -08FOA340-211/-212 CFM56-5C2 21100000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 10 FCOM-FO-03-05-10-006-150

|                                                                                 |                              |  |         |        |
|---------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.10 | P 7    |
|                                                                                 | <b>CLIMB</b>                 |  | SEQ 150 | REV 14 |

| CLIMB - 250KT/300KT/M.78 |                                  |                                       |          |                    |         |                    |                   |           |  |
|--------------------------|----------------------------------|---------------------------------------|----------|--------------------|---------|--------------------|-------------------|-----------|--|
| MAX. CLIMB THRUST        |                                  |                                       | ISA +15  |                    |         | FROM BRAKE RELEASE |                   |           |  |
| NORMAL AIR CONDITIONING  |                                  |                                       | CG=30.0% |                    |         | TIME (MIN)         |                   | FUEL (KG) |  |
| ANTI-ICING OFF           |                                  |                                       |          |                    |         | DISTANCE (NM)      |                   | TAS (KT)  |  |
|                          | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |          |                    |         |                    |                   |           |  |
| FL                       | 130                              | 140                                   | 150      | 160                | 170     | 180                | 190               |           |  |
| 410                      | 19 3408                          | 21 3738                               | 23 4107  | 26 4529            | 29 5036 | 34 5718            |                   |           |  |
|                          | 123 396                          | 137 398                               | 153 400  | 172 403            | 197 406 | 234 411            |                   |           |  |
| 390                      | 17 3222                          | 18 3517                               | 20 3838  | 22 4192            | 25 4588 | 27 5046            | 31 5597           |           |  |
|                          | 109 388                          | 120 390                               | 132 392  | 146 394            | 163 396 | 182 399            | 207 402           |           |  |
| 370                      | 15 3057                          | 17 3327                               | 18 3616  | 20 3929            | 22 4272 | 24 4652            | 26 5080           |           |  |
|                          | 97 381                           | 107 383                               | 117 384  | 128 386            | 141 387 | 155 389            | 172 392           |           |  |
| 350                      | 14 2911                          | 15 3161                               | 17 3428  | 18 3714            | 20 4023 | 22 4361            | 23 4733           |           |  |
|                          | 88 374                           | 96 376                                | 105 377  | 115 378            | 125 380 | 137 381            | 150 383           |           |  |
| 330                      | 13 2773                          | 14 3008                               | 15 3257  | 17 3521            | 18 3806 | 20 4113            | 21 4448           |           |  |
|                          | 80 367                           | 88 368                                | 95 370   | 104 371            | 113 372 | 123 373            | 133 375           |           |  |
| 310                      | 12 2637                          | 13 2857                               | 14 3090  | 15 3336            | 17 3599 | 18 3881            | 20 4187           |           |  |
|                          | 73 359                           | 79 360                                | 86 362   | 94 363             | 102 364 | 110 365            | 119 366           |           |  |
| 290                      | 11 2491                          | 12 2697                               | 13 2913  | 14 3142            | 15 3384 | 17 3644            | 18 3924           |           |  |
|                          | 65 349                           | 71 351                                | 77 352   | 84 353             | 91 354  | 98 355             | 106 356           |           |  |
| 270                      | 10 2310                          | 11 2497                               | 12 2694  | 13 2902            | 14 3123 | 15 3357            | 16 3607           |           |  |
|                          | 57 337                           | 62 338                                | 67 339   | 72 340             | 78 341  | 84 341             | 91 342            |           |  |
| 250                      | 9 2141                           | 10 2311                               | 11 2492  | 11 2681            | 12 2882 | 13 3095            | 14 3321           |           |  |
|                          | 49 324                           | 54 325                                | 58 326   | 63 327             | 68 328  | 73 329             | 78 329            |           |  |
| 240                      | 9 2060                           | 9 2223                                | 10 2395  | 11 2577            | 12 2768 | 13 2971            | 14 3187           |           |  |
|                          | 46 318                           | 50 319                                | 54 320   | 58 321             | 63 322  | 68 323             | 73 323            |           |  |
| 220                      | 8 1906                           | 8 2055                                | 9 2212   | 10 2377            | 11 2552 | 11 2737            | 12 2934           |           |  |
|                          | 40 306                           | 43 307                                | 47 308   | 51 309             | 55 310  | 59 310             | 63 311            |           |  |
| 200                      | 7 1759                           | 8 1894                                | 8 2037   | 9 2188             | 10 2348 | 10 2517            | 11 2696           |           |  |
|                          | 35 294                           | 38 296                                | 41 296   | 44 297             | 47 298  | 51 299             | 55 299            |           |  |
| 180                      | 6 1617                           | 7 1739                                | 7 1869   | 8 2006             | 9 2152  | 9 2306             | 10 2470           |           |  |
|                          | 30 283                           | 33 284                                | 35 285   | 38 285             | 41 286  | 44 287             | 47 287            |           |  |
| 160                      | 6 1478                           | 6 1588                                | 7 1705   | 7 1829             | 8 1961  | 8 2100             | 9 2249            |           |  |
|                          | 26 270                           | 28 271                                | 30 272   | 33 273             | 35 274  | 38 274             | 40 275            |           |  |
| 140                      | 5 1341                           | 6 1438                                | 6 1543   | 6 1654             | 7 1772  | 7 1898             | 8 2032            |           |  |
|                          | 22 257                           | 24 258                                | 26 259   | 27 259             | 30 260  | 32 261             | 34 261            |           |  |
| 120                      | 5 1205                           | 5 1291                                | 5 1383   | 6 1481             | 6 1586  | 6 1699             | 7 1819            |           |  |
|                          | 18 242                           | 20 243                                | 21 244   | 23 244             | 25 245  | 26 246             | 28 247            |           |  |
| 100                      | 4 981                            | 4 1047                                | 4 1119   | 4 1197             | 5 1280  | 5 1370             | 5 1467            |           |  |
|                          | 13 215                           | 14 215                                | 15 216   | 16 217             | 17 218  | 18 219             | 20 219            |           |  |
| 50                       | 2 671                            | 2 710                                 | 3 754    | 3 802              | 3 855   | 3 912              | 3 975             |           |  |
|                          | 7 178                            | 7 178                                 | 8 178    | 8 178              | 9 179   | 10 180             | 10 181            |           |  |
| 15                       | 2 453                            | 2 473                                 | 2 497    | 2 525              | 2 557   | 2 593              | 2 633             |           |  |
|                          | 3 131                            | 3 129                                 | 4 128    | 4 127              | 4 127   | 4 128              | 5 129             |           |  |
| PACK FLOW LO             |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |          | ENGINE ANTI ICE ON |         |                    | TOTAL ANTI ICE ON |           |  |
| △ FUEL = - 1 %           |                                  | △FUEL = + 1 %                         |          | △ FUEL = + 5 %     |         |                    | △ FUEL = + 8 %    |           |  |

10B-08FQA340-211/212 CFM56-5C2 2110000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 15 FCOM-F0-03-05-10-007-150

**CLIMB - 250KT/300KT/M.78**

MAX. CLIMB THRUST

NORMAL AIR CONDITIONING

ANTI-ICING OFF

ISA+15

CG=30.0%

FROM BRAKE RELEASE

TIME (MIN)

FUEL (KG)

DISTANCE (NM)

TAS (KT)

| FL             | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |                    |                    |                    |                    |                    |  |
|----------------|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
|                | 200                              | 210                                   | 220                | 230                | 240                | 250                | 260                |  |
| <b>410</b>     |                                  |                                       |                    |                    |                    |                    |                    |  |
| <b>390</b>     | 36 6343<br>245 407               |                                       |                    |                    |                    |                    |                    |  |
| <b>370</b>     | 29 5575<br>192 394               | 33 6169<br>217 398                    | 38 6951<br>252 403 |                    |                    |                    |                    |  |
| <b>350</b>     | 26 5149<br>165 385               | 28 5621<br>182 387                    | 31 6169<br>203 390 | 35 6826<br>230 394 | 40 7682<br>266 399 |                    |                    |  |
| <b>330</b>     | 23 4816<br>146 376               | 25 5226<br>159 378                    | 28 5686<br>175 380 | 30 6210<br>194 383 | 34 6820<br>216 386 | 38 7556<br>244 390 | 43 8515<br>284 395 |  |
| <b>310</b>     | 21 4520<br>130 367               | 23 4886<br>141 369                    | 25 5290<br>154 370 | 27 5741<br>168 372 | 30 6248<br>185 375 | 33 6828<br>205 377 | 36 7505<br>229 380 |  |
| <b>290</b>     | 19 4226<br>115 357               | 21 4556<br>124 358                    | 22 4916<br>135 359 | 24 5312<br>146 361 | 26 5749<br>160 362 | 29 6236<br>175 364 | 31 6784<br>192 366 |  |
| <b>270</b>     | 17 3876<br>98 343                | 18 4169<br>106 344                    | 20 4485<br>114 345 | 21 4828<br>123 346 | 23 5203<br>134 347 | 25 5612<br>145 349 | 27 6064<br>158 350 |  |
| <b>250</b>     | 15 3563<br>84 330                | 16 3824<br>91 331                     | 18 4106<br>98 332  | 19 4410<br>105 333 | 20 4739<br>113 333 | 22 5095<br>122 334 | 24 5484<br>132 335 |  |
| <b>240</b>     | 14 3417<br>78 324                | 16 3665<br>84 324                     | 17 3932<br>90 325  | 18 4219<br>97 326  | 19 4530<br>105 327 | 21 4864<br>113 328 | 22 5228<br>122 329 |  |
| <b>220</b>     | 13 3143<br>68 312                | 14 3368<br>72 312                     | 15 3608<br>78 313  | 16 3867<br>84 314  | 17 4146<br>90 314  | 18 4444<br>96 315  | 20 4768<br>104 316 |  |
| <b>200</b>     | 12 2887<br>58 300                | 13 3091<br>63 300                     | 13 3309<br>67 301  | 14 3544<br>72 301  | 15 3795<br>77 302  | 16 4065<br>83 303  | 18 4356<br>89 303  |  |
| <b>180</b>     | 11 2643<br>50 288                | 11 2829<br>54 288                     | 12 3027<br>58 289  | 13 3240<br>62 290  | 14 3469<br>67 290  | 15 3713<br>71 291  | 16 3977<br>77 291  |  |
| <b>160</b>     | 9 2407<br>43 275                 | 10 2576<br>46 276                     | 11 2756<br>50 277  | 12 2949<br>53 277  | 12 3156<br>57 278  | 13 3377<br>61 279  | 14 3616<br>66 279  |  |
| <b>140</b>     | 8 2175<br>37 262                 | 9 2327<br>39 263                      | 10 2490<br>42 263  | 10 2663<br>45 264  | 11 2850<br>48 265  | 12 3049<br>52 265  | 12 3265<br>55 266  |  |
| <b>120</b>     | 7 1947<br>30 247                 | 8 2084<br>33 248                      | 8 2229<br>35 249   | 9 2385<br>37 250   | 10 2553<br>40 250  | 10 2731<br>43 251  | 11 2925<br>46 252  |  |
| <b>100</b>     | 6 1571<br>21 220                 | 6 1682<br>23 221                      | 7 1800<br>24 222   | 7 1927<br>26 223   | 8 2064<br>28 224   | 8 2210<br>30 225   | 9 2368<br>33 226   |  |
| <b>50</b>      | 4 1043<br>11 182                 | 4 1116<br>12 184                      | 4 1194<br>13 185   | 4 1278<br>14 186   | 5 1369<br>15 188   | 5 1464<br>16 189   | 5 1567<br>17 191   |  |
| <b>15</b>      | 2 677<br>5 131                   | 2 724<br>5 133                        | 3 776<br>6 135     | 3 832<br>6 137     | 3 892<br>7 140     | 3 955<br>7 142     | 3 1023<br>8 144    |  |
| PACK FLOW LO   |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |                    | ENGINE ANTI ICE ON |                    | TOTAL ANTI ICE ON  |                    |  |
| △ FUEL = - 1 % |                                  | △ FUEL = + 1 %                        |                    | △ FUEL = + 6 %     |                    | △ FUEL = + 9 %     |                    |  |

10B -08FOA340-211/-212 CFM56-5C2 21100000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 15 FCOM-FO-03-05-10-008-150

|                                                                                 |                              |  |         |        |
|---------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.10 | P 9    |
|                                                                                 | <b>CLIMB</b>                 |  | SEQ 150 | REV 14 |

FLIGHT CREW OPERATING MANUAL

| CLIMB - 250KT/300KT/M.78 |                                  |                                       |         |          |         |                    |         |                    |     |                   |           |  |     |
|--------------------------|----------------------------------|---------------------------------------|---------|----------|---------|--------------------|---------|--------------------|-----|-------------------|-----------|--|-----|
| MAX. CLIMB THRUST        |                                  |                                       |         | ISA +20  |         |                    |         | FROM BRAKE RELEASE |     |                   |           |  |     |
| NORMAL AIR CONDITIONING  |                                  |                                       |         | CG=30.0% |         |                    |         | TIME (MIN)         |     |                   | FUEL (KG) |  |     |
| ANTI-ICING OFF           |                                  |                                       |         |          |         |                    |         | DISTANCE (NM)      |     |                   | TAS (KT)  |  |     |
|                          | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |         |          |         |                    |         |                    |     |                   |           |  |     |
| FL                       | 130                              |                                       | 140     |          | 150     |                    | 160     |                    | 170 |                   | 180       |  | 190 |
| 410                      | 21 3686                          | 24 4058                               | 26 4482 | 30 4985  | 35 5629 |                    |         |                    |     |                   |           |  |     |
|                          | 142 403                          | 160 405                               | 180 408 | 206 411  | 241 416 |                    |         |                    |     |                   |           |  |     |
| 390                      | 19 3473                          | 21 3799                               | 23 4158 | 26 4560  | 29 5023 | 32 5575            | 37 6284 |                    |     |                   |           |  |     |
|                          | 125 395                          | 139 397                               | 154 399 | 171 401  | 192 404 | 218 407            | 255 412 |                    |     |                   |           |  |     |
| 370                      | 17 3288                          | 19 3583                               | 21 3903 | 23 4253  | 25 4641 | 28 5080            | 31 5587 |                    |     |                   |           |  |     |
|                          | 112 388                          | 123 390                               | 135 391 | 149 393  | 165 395 | 182 397            | 204 400 |                    |     |                   |           |  |     |
| 350                      | 16 3126                          | 17 3399                               | 19 3692 | 21 4009  | 23 4356 | 25 4740            | 27 5170 |                    |     |                   |           |  |     |
|                          | 101 381                          | 111 383                               | 122 384 | 133 386  | 146 387 | 160 389            | 177 391 |                    |     |                   |           |  |     |
| 330                      | 15 2974                          | 16 3228                               | 17 3500 | 19 3791  | 21 4107 | 22 4453            | 24 4836 |                    |     |                   |           |  |     |
|                          | 92 374                           | 101 375                               | 110 377 | 120 378  | 131 380 | 143 381            | 156 383 |                    |     |                   |           |  |     |
| 310                      | 14 2822                          | 15 3059                               | 16 3312 | 17 3581  | 19 3871 | 21 4186            | 22 4531 |                    |     |                   |           |  |     |
|                          | 83 366                           | 91 367                                | 99 368  | 108 370  | 117 371 | 127 372            | 139 374 |                    |     |                   |           |  |     |
| 290                      | 13 2658                          | 14 2878                               | 15 3112 | 16 3360  | 17 3626 | 19 3912            | 20 4224 |                    |     |                   |           |  |     |
|                          | 74 356                           | 81 357                                | 88 358  | 96 359   | 104 361 | 113 362            | 122 363 |                    |     |                   |           |  |     |
| 270                      | 11 2456                          | 12 2655                               | 13 2866 | 14 3091  | 15 3330 | 17 3586            | 18 3862 |                    |     |                   |           |  |     |
|                          | 64 342                           | 70 344                                | 76 345  | 82 346   | 89 347  | 96 348             | 104 349 |                    |     |                   |           |  |     |
| 250                      | 10 2270                          | 11 2451                               | 12 2642 | 13 2845  | 14 3062 | 15 3292            | 16 3540 |                    |     |                   |           |  |     |
|                          | 56 330                           | 60 331                                | 66 332  | 71 333   | 77 334  | 83 335             | 89 335  |                    |     |                   |           |  |     |
| 240                      | 10 2182                          | 10 2354                               | 11 2536 | 12 2730  | 13 2935 | 14 3155            | 15 3390 |                    |     |                   |           |  |     |
|                          | 52 323                           | 56 325                                | 61 326  | 66 327   | 71 328  | 77 328             | 82 329  |                    |     |                   |           |  |     |
| 220                      | 9 2014                           | 9 2169                                | 10 2335 | 11 2511  | 12 2698 | 13 2896            | 13 3109 |                    |     |                   |           |  |     |
|                          | 45 311                           | 49 312                                | 53 313  | 57 314   | 61 315  | 66 316             | 71 316  |                    |     |                   |           |  |     |
| 200                      | 8 1854                           | 8 1995                                | 9 2145  | 10 2304  | 10 2474 | 11 2654            | 12 2848 |                    |     |                   |           |  |     |
|                          | 39 299                           | 42 300                                | 46 301  | 49 302   | 53 303  | 57 304             | 61 304  |                    |     |                   |           |  |     |
| 180                      | 7 1701                           | 8 1827                                | 8 1963  | 9 2107   | 9 2261  | 10 2425            | 11 2600 |                    |     |                   |           |  |     |
|                          | 34 287                           | 36 288                                | 39 289  | 42 290   | 45 291  | 49 291             | 53 292  |                    |     |                   |           |  |     |
| 160                      | 6 1552                           | 7 1665                                | 7 1786  | 8 1916   | 8 2055  | 9 2203             | 10 2362 |                    |     |                   |           |  |     |
|                          | 29 274                           | 31 275                                | 34 276  | 36 277   | 39 278  | 42 279             | 45 279  |                    |     |                   |           |  |     |
| 140                      | 6 1405                           | 6 1505                                | 6 1613  | 7 1728   | 7 1853  | 8 1985             | 9 2128  |                    |     |                   |           |  |     |
|                          | 24 261                           | 26 262                                | 28 263  | 30 263   | 33 264  | 35 265             | 38 265  |                    |     |                   |           |  |     |
| 120                      | 5 1261                           | 5 1348                                | 6 1443  | 6 1544   | 7 1654  | 7 1772             | 7 1900  |                    |     |                   |           |  |     |
|                          | 20 246                           | 22 247                                | 23 247  | 25 248   | 27 249  | 29 250             | 31 250  |                    |     |                   |           |  |     |
| 100                      | 4 1024                           | 4 1090                                | 4 1163  | 5 1242   | 5 1329  | 5 1422             | 6 1525  |                    |     |                   |           |  |     |
|                          | 14 218                           | 15 219                                | 16 220  | 17 220   | 19 221  | 20 222             | 22 222  |                    |     |                   |           |  |     |
| 50                       | 3 701                            | 3 738                                 | 3 781   | 3 829    | 3 883   | 3 943              | 4 1008  |                    |     |                   |           |  |     |
|                          | 8 182                            | 8 182                                 | 9 182   | 9 182    | 10 182  | 10 183             | 11 184  |                    |     |                   |           |  |     |
| 15                       | 2 474                            | 2 492                                 | 2 514   | 2 541    | 2 573   | 2 610              | 2 651   |                    |     |                   |           |  |     |
|                          | 4 138                            | 4 134                                 | 4 132   | 4 131    | 4 130   | 5 131              | 5 132   |                    |     |                   |           |  |     |
| PACK FLOW LO             |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |         |          |         | ENGINE ANTI ICE ON |         |                    |     | TOTAL ANTI ICE ON |           |  |     |
| △ FUEL = - 1 %           |                                  | △FUEL = + 1 %                         |         |          |         | △ FUEL = + 6 %     |         |                    |     | △ FUEL = + 9 %    |           |  |     |

10B-08FQA340-211/212 CFM56-5C2 2110000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 20 FCOM-F0-03-05-10-009-150



## CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST

NORMAL AIR CONDITIONING

ANTI-ICING OFF

ISA+20

CG=30.0%

FROM BRAKE RELEASE

TIME (MIN)

FUEL (KG)

DISTANCE (NM)

TAS (KT)

| FL             | WEIGHT AT BRAKE RELEASE (1000KG) |                                       |                    |                    |                    |                    |                    |  |
|----------------|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
|                | 200                              | 210                                   | 220                | 230                | 240                | 250                | 260                |  |
| <b>410</b>     |                                  |                                       |                    |                    |                    |                    |                    |  |
| <b>390</b>     |                                  |                                       |                    |                    |                    |                    |                    |  |
| <b>370</b>     | 34 6193<br>231 403               | 39 6962<br>267 408                    |                    |                    |                    |                    |                    |  |
| <b>350</b>     | 30 5663<br>196 394               | 33 6237<br>219 397                    | 37 6930<br>249 400 | 43 7818<br>289 405 | 52 9157<br>355 412 |                    |                    |  |
| <b>330</b>     | 27 5263<br>172 385               | 29 5749<br>190 387                    | 32 6307<br>211 390 | 36 6966<br>237 393 | 41 7772<br>270 397 | 47 8828<br>316 402 |                    |  |
| <b>310</b>     | 24 4912<br>151 375               | 26 5337<br>166 377                    | 29 5814<br>182 379 | 32 6359<br>202 381 | 35 6990<br>225 384 | 39 7742<br>254 388 | 44 8674<br>291 392 |  |
| <b>290</b>     | 22 4565<br>133 364               | 24 4941<br>145 365                    | 26 5358<br>158 367 | 28 5823<br>173 369 | 31 6346<br>190 371 | 34 6943<br>210 373 | 37 7635<br>235 376 |  |
| <b>270</b>     | 19 4161<br>112 350               | 21 4489<br>122 351                    | 23 4848<br>132 352 | 24 5243<br>144 353 | 27 5678<br>157 355 | 29 6161<br>171 356 | 31 6703<br>188 358 |  |
| <b>250</b>     | 17 3806<br>96 336                | 18 4096<br>104 337                    | 20 4411<br>112 338 | 21 4755<br>121 339 | 23 5131<br>131 340 | 25 5541<br>142 341 | 27 5996<br>155 342 |  |
| <b>240</b>     | 16 3641<br>89 330                | 17 3915<br>96 330                     | 19 4212<br>103 331 | 20 4535<br>112 332 | 22 4887<br>121 333 | 23 5269<br>130 334 | 25 5690<br>141 335 |  |
| <b>220</b>     | 14 3336<br>76 317                | 15 3582<br>82 317                     | 17 3848<br>88 318  | 18 4136<br>95 319  | 19 4448<br>103 320 | 21 4786<br>111 320 | 22 5154<br>119 321 |  |
| <b>200</b>     | 13 3054<br>66 305                | 14 3276<br>71 305                     | 15 3516<br>76 306  | 16 3775<br>82 306  | 17 4055<br>88 307  | 18 4356<br>94 308  | 20 4685<br>102 308 |  |
| <b>180</b>     | 12 2787<br>56 292                | 12 2989<br>61 293                     | 13 3205<br>65 293  | 14 3439<br>70 294  | 15 3692<br>75 295  | 16 3963<br>81 295  | 18 4259<br>87 296  |  |
| <b>160</b>     | 10 2531<br>48 280                | 11 2714<br>52 280                     | 12 2909<br>55 281  | 13 3120<br>60 281  | 14 3348<br>64 282  | 15 3592<br>69 283  | 16 3859<br>74 283  |  |
| <b>140</b>     | 9 2281<br>40 266                 | 10 2445<br>43 267                     | 10 2621<br>47 267  | 11 2810<br>50 268  | 12 3015<br>54 268  | 13 3234<br>58 269  | 14 3473<br>62 270  |  |
| <b>120</b>     | 8 2036<br>34 251                 | 9 2183<br>36 252                      | 9 2340<br>39 252   | 10 2509<br>42 253  | 11 2693<br>45 254  | 11 2889<br>48 255  | 12 3103<br>52 255  |  |
| <b>100</b>     | 6 1634<br>23 223                 | 7 1753<br>25 224                      | 7 1880<br>27 225   | 8 2017<br>29 226   | 8 2166<br>31 227   | 9 2326<br>34 228   | 10 2500<br>36 229  |  |
| <b>50</b>      | 4 1080<br>12 185                 | 4 1157<br>13 186                      | 4 1241<br>14 187   | 5 1331<br>15 189   | 5 1429<br>16 190   | 6 1533<br>18 192   | 6 1646<br>19 194   |  |
| <b>15</b>      | 2 697<br>5 133                   | 3 747<br>6 135                        | 3 803<br>6 137     | 3 863<br>7 140     | 3 928<br>8 142     | 3 997<br>8 145     | 4 1072<br>9 148    |  |
| PACK FLOW LO   |                                  | PACK FLOW HI OR/<br>AND CARGO COOL ON |                    | ENGINE ANTI ICE ON |                    | TOTAL ANTI ICE ON  |                    |  |
| △ FUEL = - 1 % |                                  | △ FUEL = + 1 %                        |                    | △ FUEL = + 7 %     |                    | △ FUEL = + 10 %    |                    |  |

10B -08FOA340-211/-212 CFM56-5C2 21100000C5KG300 0 018590 0 0 2 1.0 500.0 100.00 1 03250.000300.000 .780 15 FCOM-FO-03-05-10-010-150

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 FL410 at M.80, M.82 and M.84
  - from FL100 to FL410 at long range speed
- R · with a 30 % center of gravity below 25 000 feet and a 37 % center of gravity at higher altitudes.

OPTIMUM MACH NUMBER

Six tables give the optimum Mach number versus cost index, altitude and wind as calculated by the FMGC.

R

R

| COST INDEX = 0 (MAXIMUM RANGE) |       |              |      |      |      |      |      | COST INDEX = 100 kg/min |       |              |      |      |      |      |      |
|--------------------------------|-------|--------------|------|------|------|------|------|-------------------------|-------|--------------|------|------|------|------|------|
|                                |       | FLIGHT LEVEL |      |      |      |      |      |                         |       | FLIGHT LEVEL |      |      |      |      |      |
| WEIGHT/WIND                    |       |              |      |      |      |      |      | WEIGHT/WIND             |       |              |      |      |      |      |      |
| 1000kg                         | kt    | 310          | 330  | 350  | 370  | 390  | 410  | 1000kg                  | kt    | 310          | 330  | 350  | 370  | 390  | 410  |
| 150                            | 100.  | .633         | .661 | .687 | .707 | .730 | .768 | 150                     | 100.  | .776         | .792 | .799 | .807 | .814 | .819 |
|                                | 50.   | .648         | .678 | .696 | .713 | .742 | .773 |                         | 50.   | .789         | .797 | .805 | .813 | .819 | .822 |
|                                | 0.    | .667         | .699 | .707 | .720 | .759 | .785 |                         | 0.    | .795         | .803 | .812 | .819 | .823 | .824 |
|                                | -50.  | .689         | .710 | .729 | .752 | .778 | .792 |                         | -50.  | .803         | .811 | .818 | .824 | .826 | .826 |
|                                | -100. | .717         | .727 | .757 | .784 | .794 | .800 |                         | -100. | .812         | .820 | .826 | .829 | .830 | .828 |
| 170                            | 100.  | .670         | .696 | .713 | .738 | .772 | .804 | 170                     | 100.  | .791         | .798 | .805 | .812 | .817 | .819 |
|                                | 50.   | .684         | .702 | .721 | .751 | .779 | .804 |                         | 50.   | .796         | .803 | .810 | .817 | .821 | .821 |
|                                | 0.    | .702         | .710 | .732 | .767 | .788 | .804 |                         | 0.    | .801         | .810 | .817 | .821 | .823 | .822 |
|                                | -50.  | .716         | .736 | .760 | .782 | .794 | .804 |                         | -50.  | .809         | .817 | .822 | .825 | .825 | .824 |
|                                | -100. | .737         | .766 | .787 | .796 | .801 | .804 |                         | -100. | .817         | .824 | .827 | .828 | .827 | .825 |
| 190                            | 100.  | .699         | .717 | .744 | .776 | .800 |      | 190                     | 100.  | .797         | .803 | .809 | .815 | .817 |      |
|                                | 50.   | .705         | .727 | .756 | .782 | .800 |      |                         | 50.   | .801         | .808 | .815 | .819 | .820 |      |
|                                | 0.    | .713         | .738 | .771 | .790 | .800 |      |                         | 0.    | .807         | .814 | .820 | .822 | .821 |      |
|                                | -50.  | .740         | .764 | .785 | .796 | .800 |      |                         | -50.  | .815         | .820 | .823 | .824 | .823 |      |
|                                | -100. | .771         | .789 | .797 | .802 | .804 |      |                         | -100. | .821         | .825 | .826 | .826 | .824 |      |
| 210                            | 100.  | .719         | .747 | .777 | .795 |      |      | 210                     | 100.  | .801         | .807 | .812 | .815 |      |      |
|                                | 50.   | .729         | .758 | .783 | .795 |      |      |                         | 50.   | .805         | .812 | .817 | .818 |      |      |
|                                | 0.    | .741         | .772 | .790 | .795 |      |      |                         | 0.    | .812         | .817 | .821 | .821 |      |      |
|                                | -50.  | .766         | .785 | .796 | .799 |      |      |                         | -50.  | .818         | .822 | .823 | .822 |      |      |
|                                | -100. | .789         | .797 | .802 | .805 |      |      |                         | -100. | .823         | .825 | .825 | .824 |      |      |
| 230                            | 100.  | .746         | .776 | .790 |      |      |      | 230                     | 100.  | .804         | .810 | .813 |      |      |      |
|                                | 50.   | .758         | .782 | .790 |      |      |      |                         | 50.   | .809         | .814 | .817 |      |      |      |
|                                | 0.    | .772         | .790 | .794 |      |      |      |                         | 0.    | .815         | .819 | .820 |      |      |      |
|                                | -50.  | .785         | .796 | .799 |      |      |      |                         | -50.  | .820         | .822 | .821 |      |      |      |
|                                | -100. | .797         | .802 | .804 |      |      |      |                         | -100. | .824         | .824 | .823 |      |      |      |
| 250                            | 100.  | .774         | .786 |      |      |      |      | 250                     | 100.  | .807         | .811 |      |      |      |      |
|                                | 50.   | .780         | .790 |      |      |      |      |                         | 50.   | .812         | .815 |      |      |      |      |
|                                | 0.    | .789         | .794 |      |      |      |      |                         | 0.    | .817         | .819 |      |      |      |      |
|                                | -50.  | .795         | .798 |      |      |      |      |                         | -50.  | .821         | .820 |      |      |      |      |
|                                | -100. | .801         | .804 |      |      |      |      |                         | -100. | .824         | .820 |      |      |      |      |



R

| COST INDEX = 400 kg/min |       |              |      |      |      |      |      | COST INDEX = 500 kg/min |       |              |      |      |      |      |      |
|-------------------------|-------|--------------|------|------|------|------|------|-------------------------|-------|--------------|------|------|------|------|------|
|                         |       | FLIGHT LEVEL |      |      |      |      |      |                         |       | FLIGHT LEVEL |      |      |      |      |      |
| WEIGHT/WIND             |       |              |      |      |      |      |      | WEIGHT/WIND             |       |              |      |      |      |      |      |
| 1000kg                  | kt    | 310          | 330  | 350  | 370  | 390  | 410  | 1000kg                  | kt    | 310          | 330  | 350  | 370  | 390  | 410  |
| 150                     | 100.  | .838         | .840 | .840 | .840 | .838 | .834 | 150                     | 100.  | .840         | .840 | .840 | .840 | .840 | .837 |
|                         | 50.   | .840         | .840 | .840 | .840 | .839 | .835 |                         | 50.   | .840         | .840 | .840 | .840 | .840 | .839 |
|                         | 0.    | .840         | .840 | .840 | .840 | .840 | .837 |                         | 0.    | .840         | .840 | .840 | .840 | .840 | .840 |
|                         | -50.  | .840         | .840 | .840 | .840 | .840 | .839 |                         | -50.  | .840         | .840 | .840 | .840 | .840 | .840 |
|                         | -100. | .840         | .840 | .840 | .840 | .840 | .840 |                         | -100. | .840         | .840 | .840 | .840 | .840 | .840 |
| 170                     | 100.  | .839         | .840 | .838 | .835 | .832 | .828 | 170                     | 100.  | .840         | .840 | .840 | .838 | .834 | .830 |
|                         | 50.   | .840         | .840 | .840 | .837 | .833 | .829 |                         | 50.   | .840         | .840 | .840 | .839 | .835 | .830 |
|                         | 0.    | .840         | .840 | .840 | .838 | .834 | .830 |                         | 0.    | .840         | .840 | .840 | .840 | .837 | .831 |
|                         | -50.  | .840         | .840 | .840 | .840 | .836 | .831 |                         | -50.  | .840         | .840 | .840 | .840 | .838 | .831 |
|                         | -100. | .840         | .840 | .840 | .840 | .838 | .831 |                         | -100. | .840         | .840 | .840 | .840 | .840 | .831 |
| 190                     | 100.  | .838         | .836 | .834 | .830 | .827 |      | 190                     | 100.  | .840         | .839 | .836 | .832 | .827 |      |
|                         | 50.   | .839         | .838 | .835 | .831 | .827 |      |                         | 50.   | .840         | .840 | .837 | .833 | .827 |      |
|                         | 0.    | .840         | .839 | .836 | .832 | .827 |      |                         | 0.    | .840         | .840 | .839 | .835 | .827 |      |
|                         | -50.  | .840         | .840 | .838 | .834 | .827 |      |                         | -50.  | .840         | .840 | .840 | .836 | .827 |      |
|                         | -100. | .840         | .840 | .840 | .836 | .827 |      |                         | -100. | .840         | .840 | .840 | .838 | .827 |      |
| 210                     | 100.  | .835         | .832 | .829 | .827 |      |      | 210                     | 100.  | .838         | .835 | .831 | .828 |      |      |
|                         | 50.   | .836         | .834 | .830 | .827 |      |      |                         | 50.   | .839         | .836 | .832 | .828 |      |      |
|                         | 0.    | .838         | .835 | .831 | .828 |      |      |                         | 0.    | .840         | .837 | .833 | .829 |      |      |
|                         | -50.  | .839         | .836 | .832 | .828 |      |      |                         | -50.  | .840         | .839 | .835 | .829 |      |      |
|                         | -100. | .840         | .838 | .834 | .829 |      |      |                         | -100. | .840         | .840 | .836 | .829 |      |      |
| 230                     | 100.  | .831         | .829 | .826 |      |      |      | 230                     | 100.  | .834         | .830 | .827 |      |      |      |
|                         | 50.   | .833         | .829 | .827 |      |      |      |                         | 50.   | .835         | .831 | .827 |      |      |      |
|                         | 0.    | .834         | .830 | .827 |      |      |      |                         | 0.    | .836         | .832 | .827 |      |      |      |
|                         | -50.  | .835         | .832 | .827 |      |      |      |                         | -50.  | .838         | .834 | .827 |      |      |      |
|                         | -100. | .837         | .833 | .827 |      |      |      |                         | -100. | .839         | .836 | .827 |      |      |      |
| 250                     | 100.  | .828         | .820 |      |      |      |      | 250                     | 100.  | .830         | .820 |      |      |      |      |
|                         | 50.   | .829         | .820 |      |      |      |      |                         | 50.   | .830         | .820 |      |      |      |      |
|                         | 0.    | .830         | .820 |      |      |      |      |                         | 0.    | .830         | .820 |      |      |      |      |
|                         | -50.  | .830         | .820 |      |      |      |      |                         | -50.  | .830         | .820 |      |      |      |      |
|                         | -100. | .830         | .820 |      |      |      |      |                         | -100. | .830         | .820 |      |      |      |      |

**OPTIMUM AND MAXIMUM ALTITUDES**

**DEFINITIONS**

- Optimum altitude : the altitude at which the airplane covers the maximum distance per kilogram of fuel (best specific range). It depends on the actual weight and the deviation from ISA.
- Maximum altitude : Maximum altitude which can be flown in level flight without acceleration at maximum cruise thrust.

*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 37 % MAC.  
Maximum and optimum altitudes are given for different temperatures at long range speed, M.80, M.82 and M.84.

- Note :*
1. Optimum and maximum altitudes curves do not cover for M.80, M.82 and M.84 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**

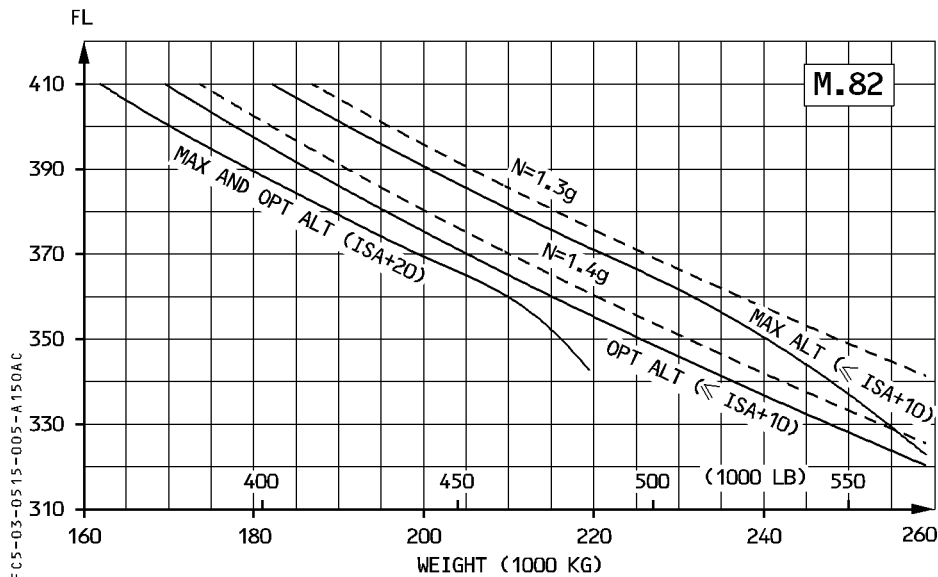
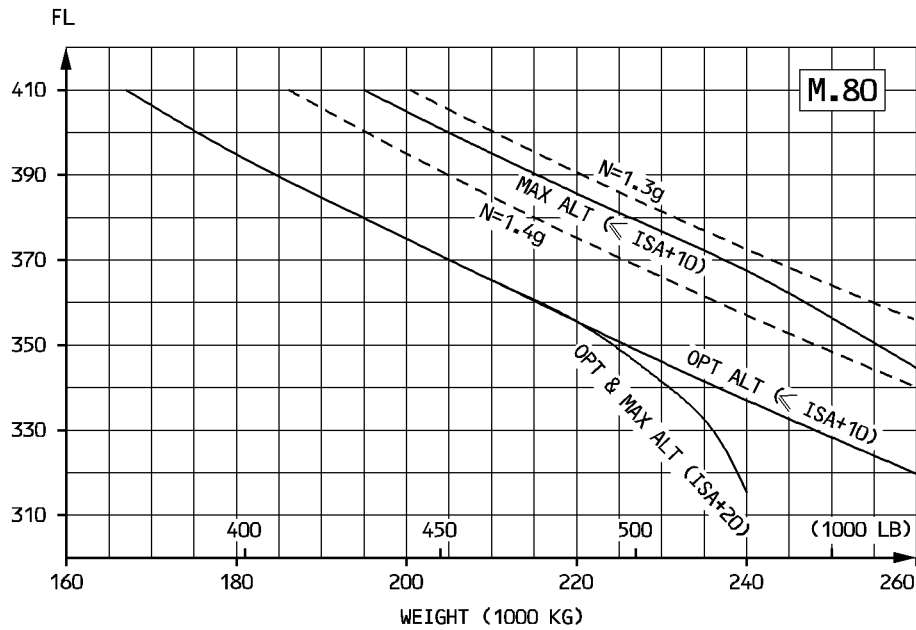
R

| STEP<br><br>CLIMB<br>FROM/TO | WEIGHT (1000 kg) |      |      |      |          |      |      |      |          |      |      |      |
|------------------------------|------------------|------|------|------|----------|------|------|------|----------|------|------|------|
|                              | ISA              |      |      |      | ISA + 10 |      |      |      | ISA + 20 |      |      |      |
|                              | LR               | M.80 | M.82 | M.84 | LR       | M.80 | M.82 | M.84 | LR       | M.80 | M.82 | M.84 |
| 310/350                      | 236              | 239  | 233  | 206  | 232      | 238  | 232  | 206  | 215      | 215  | 207  | 184  |
| 330/370                      | 216              | 218  | 213  | 189  | 214      | 217  | 212  | 188  | 195      | 195  | 189  | 168  |
| 350/390                      | 197              | 197  | 193  | 171  | 194      | 196  | 192  | 170  | 175      | 175  | 169  | 150  |
| 370/410                      | 178              | 178  | 175  | 155  | 177      | 177  | 174  | 154  | 158      | 158  | 153  | 135  |

**BLEED CORRECTIONS**

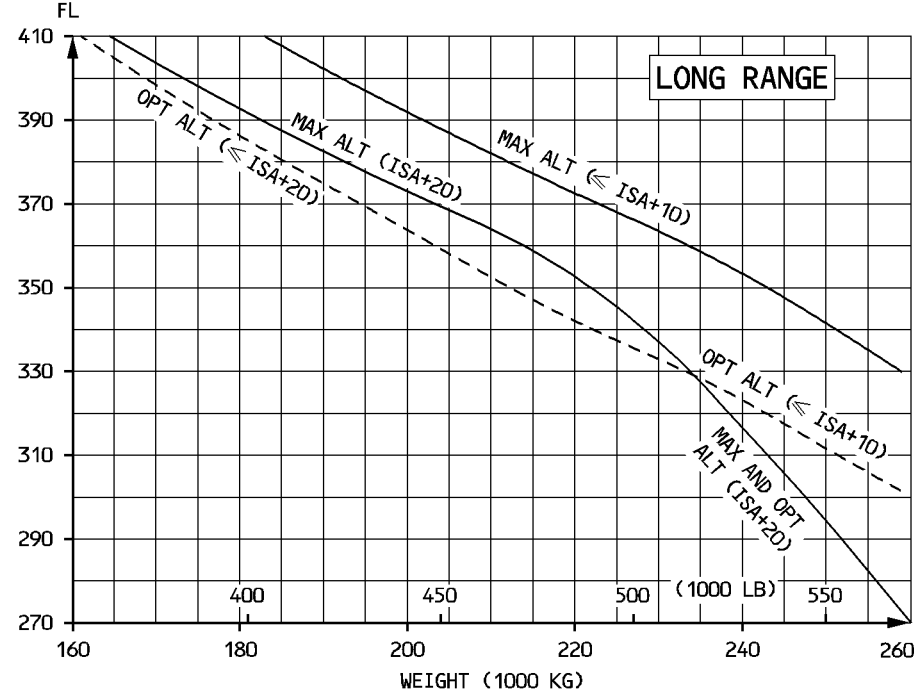
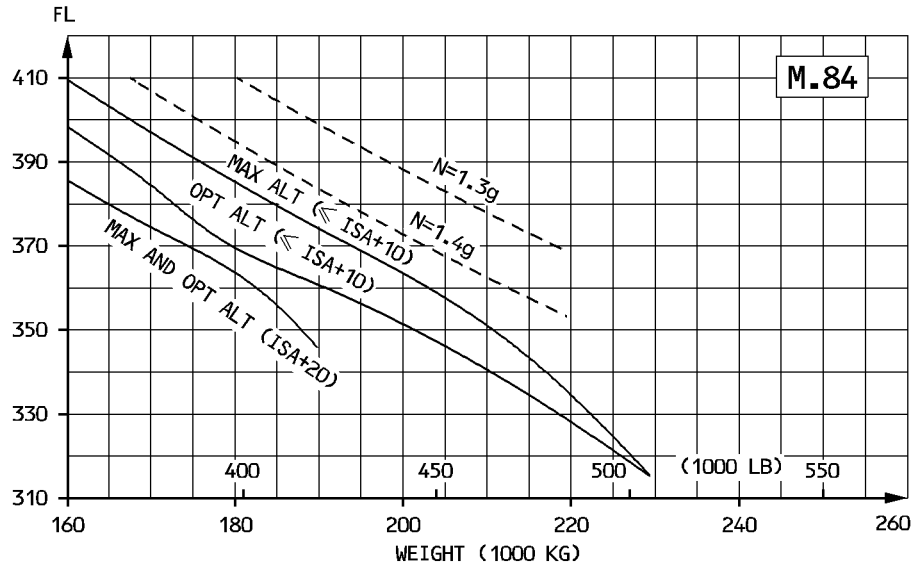
|           | ENGINE ANTI ICE ON | TOTAL ANTI ICE ON | PACK FLOW HI AND/OR<br>CARGO COOL ON |
|-----------|--------------------|-------------------|--------------------------------------|
| ≤ ISA + 4 | –                  | – 100 FT          | – 200 FT                             |
| ISA + 20  | – 1400 FT          | – 1600 FT         | – 300 FT                             |

R



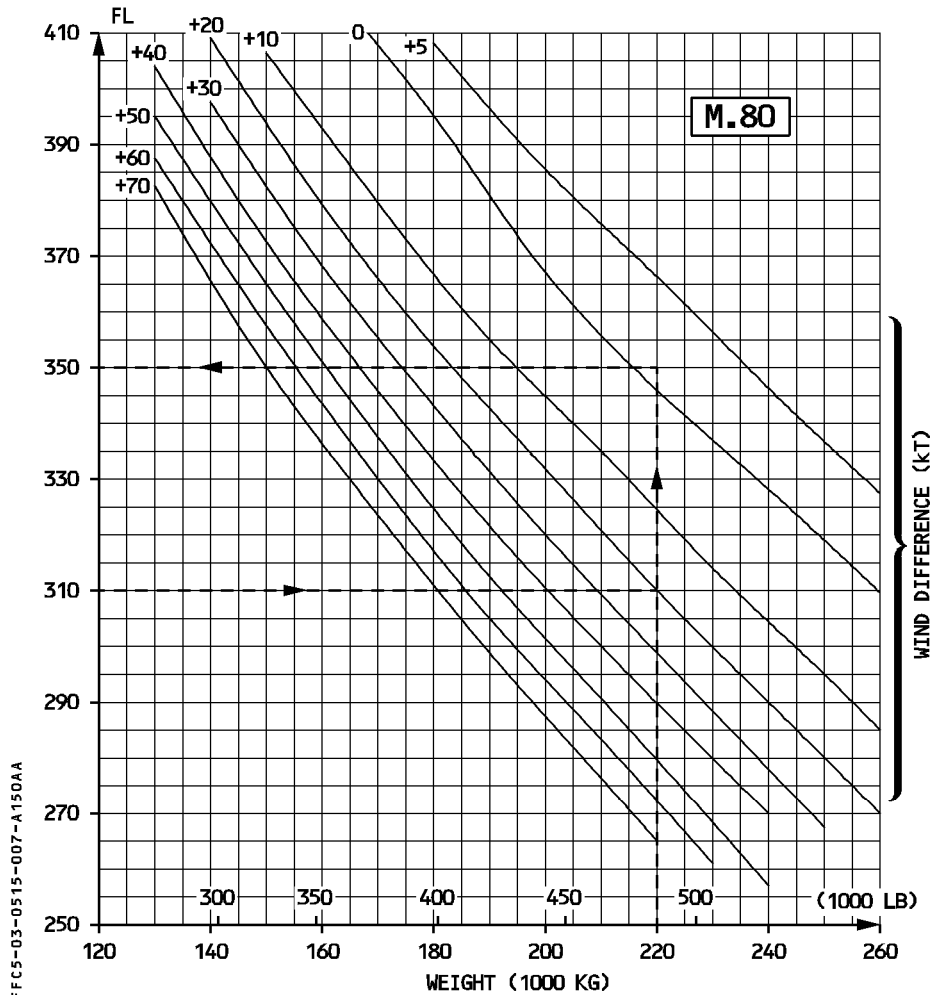
FFCS-03-0515-005-A150AC

R



FFCS-03-0515-006-A150AA

**WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE**

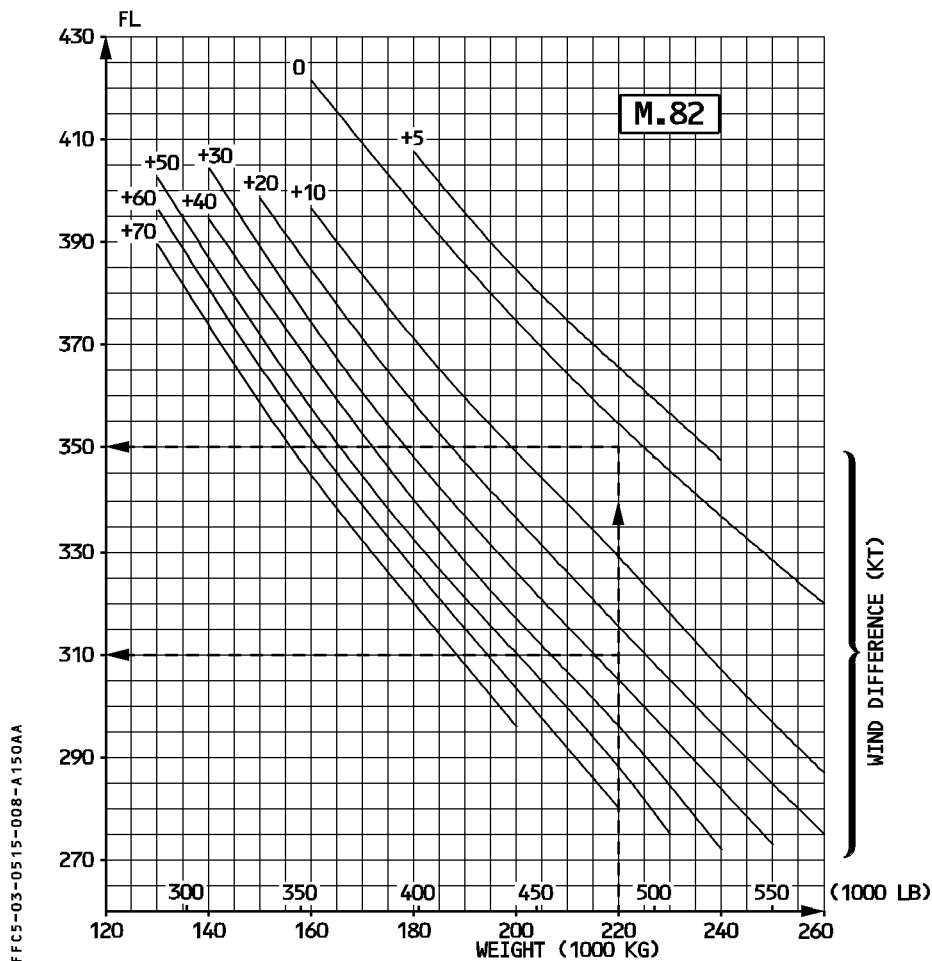


**GIVEN** : Weight : 220 000 kg (485 000 lb)  
Wind at FL350 : 10 kt head

**FIND** : Minimum wind difference to descend to FL310 :  $(20 - 1) = 19$  kt

**RESULTS** : Descent to FL310 may be considered provided the tail wind at this altitude is more than  $(19 - 10) = 9$  kt.



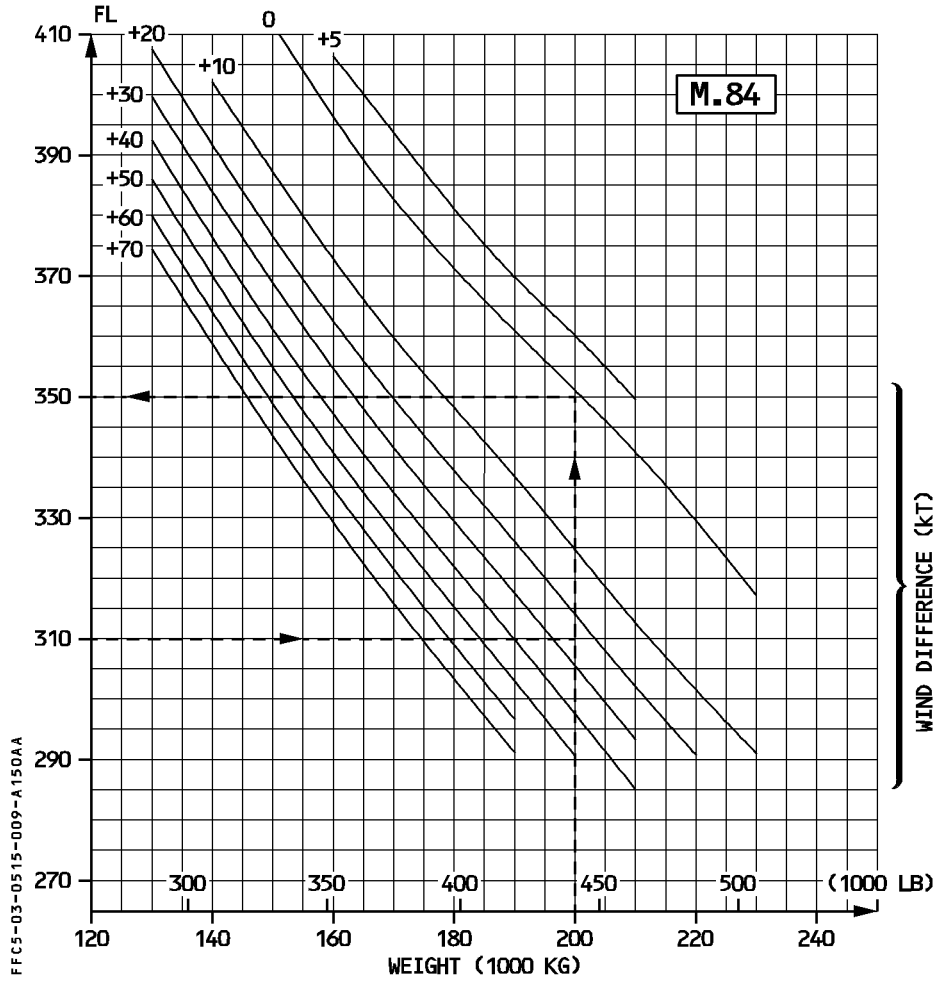


GIVEN : Weight : 220 000 kg (485 000 lb)

Wind at FL350 : 10 kt head

FIND : Minimum wind difference to descend to FL310 :  $(24 - 2) = 22$  kt

RESULTS : Descent to FL310 may be considered provided the tail wind at this altitude is more than  $(22 - 10) = 12$  kt.



GIVEN : Weight : 200 000 kg (441 000 lb)  
 Wind at FL350 : 10 kt head

FIND : Minimum wind difference to descend to FL310 :  $(25 - 0) = 25$  kt

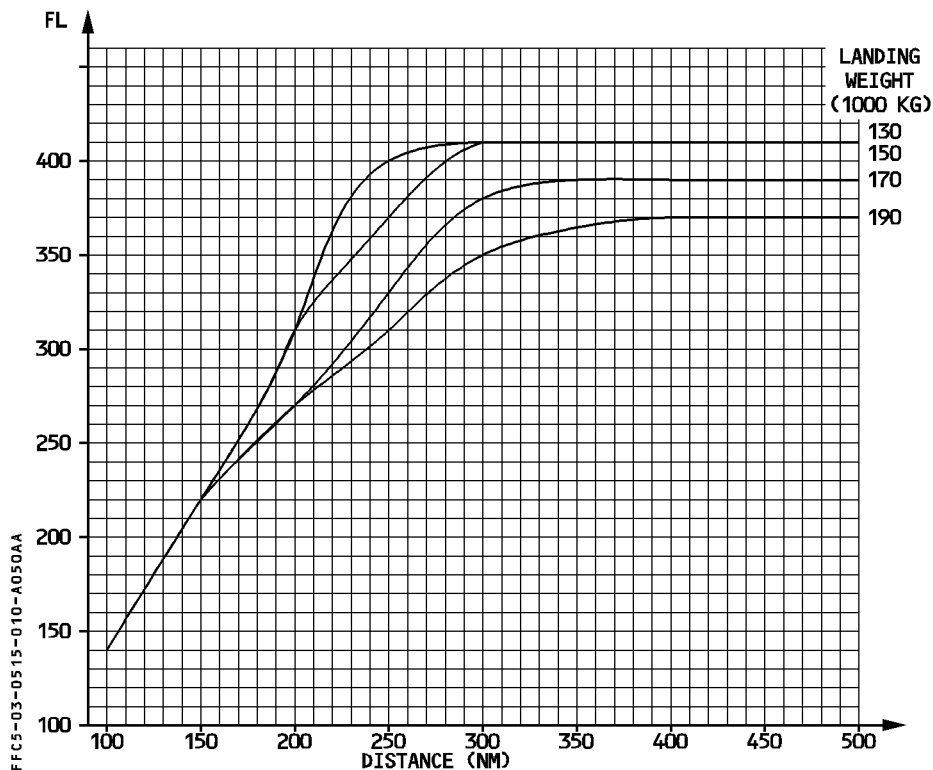
RESULTS : Descent to FL310 may be considered provided the tail wind at this altitude is more than  $(25 - 10) = 15$  kt.

**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
  - R — Climb : 250kt/300kt/M.78
  - Long range cruise (during at least 5 minutes)
  - Descent : M.80/300kt/250kt
  - Approach and landing
- and it is established for
- ISA
  - CG = 37 %
  - Normal air conditioning
  - Anti ice OFF



|                                                                                                |                              |  |         |        |
|------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.15 | P 11   |
|                                                                                                | CRUISE                       |  | SEQ 150 | REV 12 |

| CRUISE - M.80                                                          |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|--------------------|-------|---------------------------------|-------------------|------------------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA<br>CG=37.0%    |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                    | FL350 |                                 | FL370             |                              | FL390 |      | FL410 |      |
| 130                                                                    | 81.2  | .800 | 80.9                                  | .800 | 80.7  | .800               | 80.5  | .800                            | 80.8              | .800                         | 81.6  | .800 | 82.7  | .800 |
|                                                                        | 1554  | 311  | 1435                                  | 297  | 1328  | 284                | 1228  | 272                             | 1145              | 260                          | 1079  | 248  | 1029  | 237  |
|                                                                        | 76.2  | 473  | 81.8                                  | 469  | 87.6  | 465                | 93.9  | 461                             | 100.2             | 459                          | 106.3 | 459  | 111.5 | 459  |
| 140                                                                    | 81.4  | .800 | 81.2                                  | .800 | 81.0  | .800               | 80.9  | .800                            | 81.4              | .800                         | 82.4  | .800 | 83.7  | .800 |
|                                                                        | 1570  | 311  | 1453                                  | 297  | 1346  | 284                | 1250  | 272                             | 1171              | 260                          | 1114  | 248  | 1070  | 237  |
|                                                                        | 75.4  | 473  | 80.7                                  | 469  | 86.4  | 465                | 92.2  | 461                             | 98.0              | 459                          | 103.0 | 459  | 107.2 | 459  |
| 150                                                                    | 81.7  | .800 | 81.5                                  | .800 | 81.4  | .800               | 81.4  | .800                            | 82.0              | .800                         | 83.2  | .800 | 84.9  | .800 |
|                                                                        | 1588  | 311  | 1472                                  | 297  | 1368  | 284                | 1276  | 272                             | 1204              | 260                          | 1155  | 248  | 1118  | 237  |
|                                                                        | 74.5  | 473  | 79.7                                  | 469  | 85.0  | 465                | 90.4  | 461                             | 95.3              | 459                          | 99.4  | 459  | 102.6 | 459  |
| 160                                                                    | 81.9  | .800 | 81.8                                  | .800 | 81.8  | .800               | 82.0  | .800                            | 82.7              | .800                         | 84.3  | .800 | 86.2  | .800 |
|                                                                        | 1608  | 311  | 1494                                  | 297  | 1394  | 284                | 1306  | 272                             | 1243              | 260                          | 1200  | 248  | 1173  | 237  |
|                                                                        | 73.6  | 473  | 78.6                                  | 469  | 83.5  | 465                | 88.3  | 461                             | 92.3              | 459                          | 95.6  | 459  | 97.8  | 459  |
| 170                                                                    | 82.2  | .800 | 82.2                                  | .800 | 82.3  | .800               | 82.6  | .800                            | 83.6              | .800                         | 85.4  | .800 | 88.0  | .800 |
|                                                                        | 1629  | 311  | 1519                                  | 297  | 1422  | 284                | 1343  | 272                             | 1287              | 260                          | 1252  | 248  | 1242  | 237  |
|                                                                        | 72.7  | 473  | 77.3                                  | 469  | 81.8  | 465                | 85.8  | 461                             | 89.1              | 459                          | 91.6  | 459  | 92.3  | 459  |
| 180                                                                    | 82.6  | .800 | 82.7                                  | .800 | 82.9  | .800               | 83.4  | .800                            | 84.6              | .800                         | 86.7  | .800 | 90.2  | .800 |
|                                                                        | 1653  | 311  | 1547                                  | 297  | 1457  | 284                | 1386  | 272                             | 1336              | 260                          | 1313  | 248  | 1330  | 237  |
|                                                                        | 71.6  | 473  | 75.9                                  | 469  | 79.8  | 465                | 83.2  | 461                             | 85.9              | 459                          | 87.4  | 459  | 86.2  | 459  |
| 190                                                                    | 83.0  | .800 | 83.2                                  | .800 | 83.5  | .800               | 84.2  | .800                            | 85.7              | .800                         | 88.5  | .800 |       |      |
|                                                                        | 1681  | 311  | 1578                                  | 297  | 1498  | 284                | 1433  | 272                             | 1391              | 260                          | 1389  | 248  |       |      |
|                                                                        | 70.4  | 473  | 74.4                                  | 469  | 77.7  | 465                | 80.5  | 461                             | 82.5              | 459                          | 82.6  | 459  |       |      |
| 200                                                                    | 83.4  | .800 | 83.7                                  | .800 | 84.2  | .800               | 85.2  | .800                            | 86.9              | .800                         | 90.7  | .800 |       |      |
|                                                                        | 1711  | 311  | 1616                                  | 297  | 1543  | 284                | 1484  | 272                             | 1455              | 260                          | 1483  | 248  |       |      |
|                                                                        | 69.2  | 473  | 72.6                                  | 469  | 75.4  | 465                | 77.7  | 461                             | 78.8              | 459                          | 77.3  | 459  |       |      |
| 210                                                                    | 83.9  | .800 | 84.3                                  | .800 | 85.0  | .800               | 86.2  | .800                            | 88.7              | .800                         |       |      |       |      |
|                                                                        | 1745  | 311  | 1660                                  | 297  | 1592  | 284                | 1542  | 272                             | 1534              | 260                          |       |      |       |      |
|                                                                        | 67.9  | 473  | 70.7                                  | 469  | 73.1  | 465                | 74.8  | 461                             | 74.8              | 459                          |       |      |       |      |
| 220                                                                    | 84.4  | .800 | 85.0                                  | .800 | 85.9  | .800               | 87.4  | .800                            | 90.7              | .800                         |       |      |       |      |
|                                                                        | 1785  | 311  | 1707                                  | 297  | 1646  | 284                | 1608  | 272                             | 1630              | 260                          |       |      |       |      |
|                                                                        | 66.3  | 473  | 68.7                                  | 469  | 70.7  | 465                | 71.7  | 461                             | 70.4              | 459                          |       |      |       |      |
| 230                                                                    | 85.0  | .800 | 85.7                                  | .800 | 86.9  | .800               | 89.0  | .800                            |                   |                              |       |      |       |      |
|                                                                        | 1831  | 311  | 1759                                  | 297  | 1705  | 284                | 1690  | 272                             |                   |                              |       |      |       |      |
|                                                                        | 64.7  | 473  | 66.7                                  | 469  | 68.2  | 465                | 68.2  | 461                             |                   |                              |       |      |       |      |
| 240                                                                    | 85.6  | .800 | 86.6                                  | .800 | 87.9  | .800               | 90.7  | .800                            |                   |                              |       |      |       |      |
|                                                                        | 1880  | 311  | 1814                                  | 297  | 1773  | 284                | 1784  | 272                             |                   |                              |       |      |       |      |
|                                                                        | 63.0  | 473  | 64.7                                  | 469  | 65.6  | 465                | 64.6  | 461                             |                   |                              |       |      |       |      |
| 250                                                                    | 86.3  | .800 | 87.5                                  | .800 | 89.4  | .800               |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 1933  | 311  | 1875                                  | 297  | 1858  | 284                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 61.2  | 473  | 62.6                                  | 469  | 62.6  | 465                |       |                                 |                   |                              |       |      |       |      |
| 260                                                                    | 87.1  | .800 | 88.4                                  | .800 | 91.0  | .800               |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 1990  | 311  | 1943                                  | 297  | 1952  | 284                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 59.5  | 473  | 60.4                                  | 469  | 59.6  | 465                |       |                                 |                   |                              |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON |       |                                 | TOTAL ANTI-ICE ON |                              |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %    |       |                                 | △ FUEL = +4.0 %   |                              |       |      |       |      |

H09C -08B1A340-211 CFM56-5C2 12100000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-F0-03-05-15-008-150

| CRUISE - M.80                                                          |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|---------------------|-------|---------------------------------|-------------------|------------------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA +10<br>CG=37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                     | FL350 |                                 | FL370             |                              | FL390 |      | FL410 |      |
| 130                                                                    | 82.9  | .800 | 82.7                                  | .800 | 82.5  | .800                | 82.3  | .800                            | 82.6              | .800                         | 83.5  | .800 | 84.6  | .800 |
|                                                                        | 1593  | 311  | 1471                                  | 297  | 1360  | 284                 | 1257  | 272                             | 1173              | 260                          | 1106  | 248  | 1055  | 237  |
|                                                                        | 75.9  | 484  | 81.5                                  | 480  | 87.4  | 476                 | 93.8  | 472                             | 100.1             | 469                          | 106.1 | 469  | 111.2 | 469  |
| 140                                                                    | 83.1  | .800 | 82.9                                  | .800 | 82.8  | .800                | 82.8  | .800                            | 83.2              | .800                         | 84.2  | .800 | 85.6  | .800 |
|                                                                        | 1610  | 311  | 1490                                  | 297  | 1379  | 284                 | 1281  | 272                             | 1200              | 260                          | 1142  | 248  | 1099  | 237  |
|                                                                        | 75.1  | 484  | 80.5                                  | 480  | 86.2  | 476                 | 92.1  | 472                             | 97.8              | 469                          | 102.7 | 469  | 106.7 | 469  |
| 150                                                                    | 83.4  | .800 | 83.3                                  | .800 | 83.2  | .800                | 83.3  | .800                            | 83.8              | .800                         | 85.1  | .800 | 86.8  | .800 |
|                                                                        | 1629  | 311  | 1510                                  | 297  | 1402  | 284                 | 1307  | 272                             | 1234              | 260                          | 1185  | 248  | 1149  | 237  |
|                                                                        | 74.2  | 484  | 79.4                                  | 480  | 84.8  | 476                 | 90.2  | 472                             | 95.1              | 469                          | 99.0  | 469  | 102.1 | 469  |
| 160                                                                    | 83.7  | .800 | 83.6                                  | .800 | 83.6  | .800                | 83.8  | .800                            | 84.6              | .800                         | 86.1  | .800 | 88.1  | .800 |
|                                                                        | 1650  | 311  | 1532                                  | 297  | 1429  | 284                 | 1339  | 272                             | 1275              | 260                          | 1233  | 248  | 1208  | 237  |
|                                                                        | 73.3  | 484  | 78.3                                  | 480  | 83.2  | 476                 | 88.0  | 472                             | 92.0              | 469                          | 95.2  | 469  | 97.2  | 469  |
| 170                                                                    | 84.0  | .800 | 84.0                                  | .800 | 84.2  | .800                | 84.5  | .800                            | 85.5              | .800                         | 87.3  | .800 | 89.9  | .800 |
|                                                                        | 1671  | 311  | 1558                                  | 297  | 1459  | 284                 | 1378  | 272                             | 1321              | 260                          | 1287  | 248  | 1286  | 237  |
|                                                                        | 72.4  | 484  | 76.9                                  | 480  | 81.5  | 476                 | 85.5  | 472                             | 88.8              | 469                          | 91.2  | 469  | 91.2  | 469  |
| 180                                                                    | 84.3  | .800 | 84.5                                  | .800 | 84.7  | .800                | 85.2  | .800                            | 86.5              | .800                         | 88.6  | .800 | 92.2  | .800 |
|                                                                        | 1696  | 311  | 1588                                  | 297  | 1495  | 284                 | 1423  | 272                             | 1372              | 260                          | 1353  | 248  | 1377  | 237  |
|                                                                        | 71.3  | 484  | 75.5                                  | 480  | 79.5  | 476                 | 82.9  | 472                             | 85.5              | 469                          | 86.7  | 469  | 85.2  | 469  |
| 190                                                                    | 84.7  | .800 | 85.0                                  | .800 | 85.4  | .800                | 86.1  | .800                            | 87.6              | .800                         | 90.5  | .800 |       |      |
|                                                                        | 1725  | 311  | 1621                                  | 297  | 1538  | 284                 | 1471  | 272                             | 1430              | 260                          | 1437  | 248  |       |      |
|                                                                        | 70.1  | 484  | 74.0                                  | 480  | 77.3  | 476                 | 80.1  | 472                             | 82.0              | 469                          | 81.7  | 469  |       |      |
| 200                                                                    | 85.2  | .800 | 85.5                                  | .800 | 86.1  | .800                | 87.1  | .800                            | 88.9              | .800                         | 92.7  | .800 |       |      |
|                                                                        | 1757  | 311  | 1660                                  | 297  | 1585  | 284                 | 1525  | 272                             | 1501              | 260                          | 1534  | 248  |       |      |
|                                                                        | 68.8  | 484  | 72.2                                  | 480  | 75.0  | 476                 | 77.3  | 472                             | 78.2              | 469                          | 76.5  | 469  |       |      |
| 210                                                                    | 85.7  | .800 | 86.1                                  | .800 | 86.9  | .800                | 88.1  | .800                            | 90.7              | .800                         |       |      |       |      |
|                                                                        | 1792  | 311  | 1706                                  | 297  | 1636  | 284                 | 1586  | 272                             | 1588              | 260                          |       |      |       |      |
|                                                                        | 67.5  | 484  | 70.3                                  | 480  | 72.7  | 476                 | 74.3  | 472                             | 73.9              | 469                          |       |      |       |      |
| 220                                                                    | 86.2  | .800 | 86.8                                  | .800 | 87.8  | .800                | 89.3  | .800                            | 92.7              | .800                         |       |      |       |      |
|                                                                        | 1835  | 311  | 1755                                  | 297  | 1693  | 284                 | 1660  | 272                             | 1687              | 260                          |       |      |       |      |
|                                                                        | 65.9  | 484  | 68.3                                  | 480  | 70.2  | 476                 | 71.0  | 472                             | 69.6              | 469                          |       |      |       |      |
| 230                                                                    | 86.8  | .800 | 87.6                                  | .800 | 88.8  | .800                | 91.0  | .800                            |                   |                              |       |      |       |      |
|                                                                        | 1882  | 311  | 1809                                  | 297  | 1758  | 284                 | 1748  | 272                             |                   |                              |       |      |       |      |
|                                                                        | 64.2  | 484  | 66.3                                  | 480  | 67.6  | 476                 | 67.4  | 472                             |                   |                              |       |      |       |      |
| 240                                                                    | 87.4  | .800 | 88.4                                  | .800 | 89.8  | .800                | 92.7  | .800                            |                   |                              |       |      |       |      |
|                                                                        | 1934  | 311  | 1869                                  | 297  | 1833  | 284                 | 1845  | 272                             |                   |                              |       |      |       |      |
|                                                                        | 62.5  | 484  | 64.2                                  | 480  | 64.9  | 476                 | 63.9  | 472                             |                   |                              |       |      |       |      |
| 250                                                                    | 88.2  | .800 | 89.3                                  | .800 | 91.4  | .800                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 1990  | 311  | 1936                                  | 297  | 1921  | 284                 |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 60.8  | 484  | 62.0                                  | 480  | 61.9  | 476                 |       |                                 |                   |                              |       |      |       |      |
| 260                                                                    | 88.9  | .800 | 90.3                                  | .800 | 93.0  | .800                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2051  | 311  | 2008                                  | 297  | 2017  | 284                 |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 58.9  | 484  | 59.7                                  | 480  | 58.9  | 476                 |       |                                 |                   |                              |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON  |       |                                 | TOTAL ANTI-ICE ON |                              |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %     |       |                                 | △ FUEL = +4.0 %   |                              |       |      |       |      |

H09C -08B1A340-211 CFM56-5C2 12100000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 10 FCOM-F0-03-05-15-009-150

|                                                                                                                 |                              |                 |        |
|-----------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> | 3.05.15    P 13 |        |
|                                                                                                                 |                              | SEQ 150         | REV 12 |

| CRUISE - M.80                                                          |       |      |                                       |      |                     |                    |                                 |      |                              |      |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|---------------------|--------------------|---------------------------------|------|------------------------------|------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      | ISA +15<br>CG=37.0% |                    | N1 (%)<br>KG/H/ENG<br>NM/1000KG |      | MACH<br>IAS (KT)<br>TAS (KT) |      |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330               |                    | FL350                           |      | FL370                        |      | FL390 |      | FL410 |      |
| 130                                                                    | 83.8  | .800 | 83.5                                  | .800 | 83.4                | .800               | 83.2                            | .800 | 83.5                         | .800 | 84.4  | .800 | 85.5  | .800 |
|                                                                        | 1614  | 311  | 1490                                  | 297  | 1378                | 284                | 1273                            | 272  | 1188                         | 260  | 1121  | 248  | 1070  | 237  |
|                                                                        | 75.7  | 489  | 81.3                                  | 485  | 87.2                | 481                | 93.6                            | 477  | 99.9                         | 474  | 105.8 | 474  | 110.9 | 474  |
| 140                                                                    | 84.0  | .800 | 83.8                                  | .800 | 83.7                | .800               | 83.7                            | .800 | 84.1                         | .800 | 85.1  | .800 | 86.5  | .800 |
|                                                                        | 1632  | 311  | 1510                                  | 297  | 1397                | 284                | 1297                            | 272  | 1216                         | 260  | 1158  | 248  | 1115  | 237  |
|                                                                        | 74.9  | 489  | 80.3                                  | 485  | 86.0                | 481                | 91.9                            | 477  | 97.6                         | 474  | 102.5 | 474  | 106.4 | 474  |
| 150                                                                    | 84.3  | .800 | 84.1                                  | .800 | 84.1                | .800               | 84.2                            | .800 | 84.8                         | .800 | 86.0  | .800 | 87.7  | .800 |
|                                                                        | 1651  | 311  | 1530                                  | 297  | 1420                | 284                | 1325                            | 272  | 1251                         | 260  | 1201  | 248  | 1166  | 237  |
|                                                                        | 74.0  | 489  | 79.2                                  | 485  | 84.6                | 481                | 90.0                            | 477  | 94.8                         | 474  | 98.7  | 474  | 101.7 | 474  |
| 160                                                                    | 84.6  | .800 | 84.5                                  | .800 | 84.5                | .800               | 84.7                            | .800 | 85.5                         | .800 | 87.1  | .800 | 89.1  | .800 |
|                                                                        | 1672  | 311  | 1553                                  | 297  | 1448                | 284                | 1357                            | 272  | 1293                         | 260  | 1251  | 248  | 1228  | 237  |
|                                                                        | 73.1  | 489  | 78.0                                  | 485  | 83.0                | 481                | 87.8                            | 477  | 91.8                         | 474  | 94.9  | 474  | 96.6  | 474  |
| 170                                                                    | 84.9  | .800 | 84.9                                  | .800 | 85.0                | .800               | 85.4                            | .800 | 86.4                         | .800 | 88.3  | .800 | 90.9  | .800 |
|                                                                        | 1694  | 311  | 1580                                  | 297  | 1478                | 284                | 1397                            | 272  | 1340                         | 260  | 1307  | 248  | 1308  | 237  |
|                                                                        | 72.1  | 489  | 76.7                                  | 485  | 81.3                | 481                | 85.3                            | 477  | 88.5                         | 474  | 90.8  | 474  | 90.7  | 474  |
| 180                                                                    | 85.2  | .800 | 85.3                                  | .800 | 85.6                | .800               | 86.2                            | .800 | 87.4                         | .800 | 89.6  | .800 |       |      |
|                                                                        | 1720  | 311  | 1609                                  | 297  | 1516                | 284                | 1442                            | 272  | 1392                         | 260  | 1376  | 248  |       |      |
|                                                                        | 71.0  | 489  | 75.3                                  | 485  | 79.3                | 481                | 82.6                            | 477  | 85.2                         | 474  | 86.2  | 474  |       |      |
| 190                                                                    | 85.6  | .800 | 85.8                                  | .800 | 86.3                | .800               | 87.0                            | .800 | 88.5                         | .800 | 91.5  | .800 |       |      |
|                                                                        | 1749  | 311  | 1643                                  | 297  | 1559                | 284                | 1492                            | 272  | 1453                         | 260  | 1461  | 248  |       |      |
|                                                                        | 69.8  | 489  | 73.7                                  | 485  | 77.1                | 481                | 79.8                            | 477  | 81.6                         | 474  | 81.2  | 474  |       |      |
| 200                                                                    | 86.1  | .800 | 86.4                                  | .800 | 87.0                | .800               | 88.0                            | .800 | 89.8                         | .800 |       |      |       |      |
|                                                                        | 1782  | 311  | 1684                                  | 297  | 1607                | 284                | 1548                            | 272  | 1526                         | 260  |       |      |       |      |
|                                                                        | 68.6  | 489  | 72.0                                  | 485  | 74.8                | 481                | 77.0                            | 477  | 77.7                         | 474  |       |      |       |      |
| 210                                                                    | 86.5  | .800 | 87.0                                  | .800 | 87.8                | .800               | 89.0                            | .800 | 91.7                         | .800 |       |      |       |      |
|                                                                        | 1818  | 311  | 1730                                  | 297  | 1660                | 284                | 1613                            | 272  | 1614                         | 260  |       |      |       |      |
|                                                                        | 67.2  | 489  | 70.0                                  | 485  | 72.4                | 481                | 73.9                            | 477  | 73.5                         | 474  |       |      |       |      |
| 220                                                                    | 87.1  | .800 | 87.7                                  | .800 | 88.7                | .800               | 90.2                            | .800 |                              |      |       |      |       |      |
|                                                                        | 1861  | 311  | 1781                                  | 297  | 1720                | 284                | 1688                            | 272  |                              |      |       |      |       |      |
|                                                                        | 65.6  | 489  | 68.0                                  | 485  | 69.9                | 481                | 70.6                            | 477  |                              |      |       |      |       |      |
| 230                                                                    | 87.7  | .800 | 88.5                                  | .800 | 89.7                | .800               | 91.9                            | .800 |                              |      |       |      |       |      |
|                                                                        | 1910  | 311  | 1837                                  | 297  | 1787                | 284                | 1777                            | 272  |                              |      |       |      |       |      |
|                                                                        | 64.0  | 489  | 66.0                                  | 485  | 67.3                | 481                | 67.0                            | 477  |                              |      |       |      |       |      |
| 240                                                                    | 88.3  | .800 | 89.3                                  | .800 | 90.8                | .800               |                                 |      |                              |      |       |      |       |      |
|                                                                        | 1963  | 311  | 1899                                  | 297  | 1863                | 284                |                                 |      |                              |      |       |      |       |      |
|                                                                        | 62.2  | 489  | 63.8                                  | 485  | 64.5                | 481                |                                 |      |                              |      |       |      |       |      |
| 250                                                                    | 89.1  | .800 | 90.2                                  | .800 | 92.3                | .800               |                                 |      |                              |      |       |      |       |      |
|                                                                        | 2021  | 311  | 1967                                  | 297  | 1952                | 284                |                                 |      |                              |      |       |      |       |      |
|                                                                        | 60.4  | 489  | 61.6                                  | 485  | 61.6                | 481                |                                 |      |                              |      |       |      |       |      |
| 260                                                                    | 89.8  | .800 | 91.2                                  | .800 |                     |                    |                                 |      |                              |      |       |      |       |      |
|                                                                        | 2084  | 311  | 2040                                  | 297  |                     |                    |                                 |      |                              |      |       |      |       |      |
|                                                                        | 58.6  | 489  | 59.4                                  | 485  |                     |                    |                                 |      |                              |      |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |                     | ENGINE ANTI-ICE ON |                                 |      | TOTAL ANTI-ICE ON            |      |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |                     | △ FUEL = +2.0 %    |                                 |      | △ FUEL = +4.0 %              |      |       |      |       |      |

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| CRUISE - M.80                                                          |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|---------------------|-------|---------------------------------|-------------------|------------------------------|-----------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA +20<br>CG=37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |           |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                     | FL350 |                                 | FL370             |                              | FL410     |
| 130                                                                    | 84.6  | .800 | 84.4                                  | .800 | 84.2  | .800                | 84.1  | .800                            | 84.4              | .800                         | 86.4 .800 |
|                                                                        | 1637  | 311  | 1510                                  | 297  | 1396  | 284                 | 1290  | 272                             | 1203              | 260                          | 1085 237  |
|                                                                        | 75.4  | 494  | 81.1                                  | 490  | 87.0  | 486                 | 93.3  | 482                             | 99.6              | 480                          | 110.5 480 |
| 140                                                                    | 84.9  | .800 | 84.7                                  | .800 | 84.5  | .800                | 84.5  | .800                            | 85.0              | .800                         | 87.5 .800 |
|                                                                        | 1654  | 311  | 1530                                  | 297  | 1415  | 284                 | 1315  | 272                             | 1232              | 260                          | 1131 237  |
|                                                                        | 74.6  | 494  | 80.0                                  | 490  | 85.8  | 486                 | 91.6  | 482                             | 97.3              | 480                          | 106.0 480 |
| 150                                                                    | 85.1  | .800 | 85.0                                  | .800 | 84.9  | .800                | 85.1  | .800                            | 85.7              | .800                         | 88.7 .800 |
|                                                                        | 1674  | 311  | 1551                                  | 297  | 1440  | 284                 | 1343  | 272                             | 1268              | 260                          | 1184 237  |
|                                                                        | 73.7  | 494  | 78.9                                  | 490  | 84.4  | 486                 | 89.7  | 482                             | 94.5              | 480                          | 101.2 480 |
| 160                                                                    | 85.4  | .800 | 85.3                                  | .800 | 85.4  | .800                | 85.6  | .800                            | 86.4              | .800                         | 90.0 .800 |
|                                                                        | 1695  | 311  | 1574                                  | 297  | 1467  | 284                 | 1376  | 272                             | 1311              | 260                          | 1249 237  |
|                                                                        | 72.8  | 494  | 77.8                                  | 490  | 82.8  | 486                 | 87.5  | 482                             | 91.5              | 480                          | 96.0 480  |
| 170                                                                    | 85.7  | .800 | 85.8                                  | .800 | 85.9  | .800                | 86.3  | .800                            | 87.3              | .800                         |           |
|                                                                        | 1718  | 311  | 1602                                  | 297  | 1499  | 284                 | 1417  | 272                             | 1359              | 260                          |           |
|                                                                        | 71.8  | 494  | 76.4                                  | 490  | 81.0  | 486                 | 85.0  | 482                             | 88.2              | 480                          |           |
| 180                                                                    | 86.1  | .800 | 86.2                                  | .800 | 86.5  | .800                | 87.1  | .800                            | 88.4              | .800                         |           |
|                                                                        | 1744  | 311  | 1632                                  | 297  | 1537  | 284                 | 1463  | 272                             | 1413              | 260                          |           |
|                                                                        | 70.7  | 494  | 75.0                                  | 490  | 79.0  | 486                 | 82.3  | 482                             | 84.8              | 480                          |           |
| 190                                                                    | 86.5  | .800 | 86.7                                  | .800 | 87.1  | .800                | 87.9  | .800                            | 89.5              | .800                         |           |
|                                                                        | 1775  | 311  | 1667                                  | 297  | 1581  | 284                 | 1514  | 272                             | 1477              | 260                          |           |
|                                                                        | 69.5  | 494  | 73.4                                  | 490  | 76.8  | 486                 | 79.5  | 482                             | 81.2              | 480                          |           |
| 200                                                                    | 86.9  | .800 | 87.3                                  | .800 | 87.9  | .800                | 88.9  | .800                            | 90.8              | .800                         |           |
|                                                                        | 1807  | 311  | 1709                                  | 297  | 1631  | 284                 | 1573  | 272                             | 1551              | 260                          |           |
|                                                                        | 68.3  | 494  | 71.7                                  | 490  | 74.5  | 486                 | 76.6  | 482                             | 77.3              | 480                          |           |
| 210                                                                    | 87.4  | .800 | 87.9                                  | .800 | 88.7  | .800                | 90.0  | .800                            |                   |                              |           |
|                                                                        | 1845  | 311  | 1756                                  | 297  | 1686  | 284                 | 1639  | 272                             |                   |                              |           |
|                                                                        | 66.9  | 494  | 69.7                                  | 490  | 72.0  | 486                 | 73.5  | 482                             |                   |                              |           |
| 220                                                                    | 87.9  | .800 | 88.6                                  | .800 | 89.6  | .800                | 91.2  | .800                            |                   |                              |           |
|                                                                        | 1889  | 311  | 1809                                  | 297  | 1747  | 284                 | 1716  | 272                             |                   |                              |           |
|                                                                        | 65.3  | 494  | 67.7                                  | 490  | 69.5  | 486                 | 70.2  | 482                             |                   |                              |           |
| 230                                                                    | 88.6  | .800 | 89.4                                  | .800 | 90.6  | .800                |       |                                 |                   |                              |           |
|                                                                        | 1939  | 311  | 1866                                  | 297  | 1815  | 284                 |       |                                 |                   |                              |           |
|                                                                        | 63.6  | 494  | 65.6                                  | 490  | 66.9  | 486                 |       |                                 |                   |                              |           |
| 240                                                                    | 89.2  | .800 | 90.2                                  | .800 |       |                     |       |                                 |                   |                              |           |
|                                                                        | 1994  | 311  | 1929                                  | 297  |       |                     |       |                                 |                   |                              |           |
|                                                                        | 61.9  | 494  | 63.5                                  | 490  |       |                     |       |                                 |                   |                              |           |
| 250                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 260                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON  |       |                                 | TOTAL ANTI-ICE ON |                              |           |
| Δ FUEL = -0.5 %                                                        |       |      | ΔFUEL = +1.0 %                        |      |       | Δ FUEL = +2.0 %     |       |                                 | Δ FUEL = +4.0 %   |                              |           |

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|                                                                                                                 |                              |                 |        |
|-----------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> | 3.05.15    P 15 |        |
|                                                                                                                 |                              | SEQ 150         | REV 12 |

| CRUISE - M.82                                                          |       |      |                                       |      |                 |                                 |       |                              |                   |       |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-----------------|---------------------------------|-------|------------------------------|-------------------|-------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      | ISA<br>CG=37.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG |       | MACH<br>IAS (KT)<br>TAS (KT) |                   |       |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330           | FL350                           | FL370 | FL390                        |                   | FL410 |       |      |
| 130                                                                    | 82.8  | .820 | 82.4                                  | .820 | 82.1            | .820                            | 81.8  | .820                         | 82.0              | .820  | 83.6  | .820 |
|                                                                        | 1684  | 319  | 1547                                  | 306  | 1424            | 292                             | 1310  | 279                          | 1215              | 267   | 1141  | 255  |
|                                                                        | 72.1  | 485  | 77.7                                  | 481  | 83.8            | 477                             | 90.2  | 473                          | 96.7              | 470   | 103.0 | 470  |
| 140                                                                    | 82.9  | .820 | 82.6                                  | .820 | 82.4            | .820                            | 82.2  | .820                         | 82.5              | .820  | 84.6  | .820 |
|                                                                        | 1696  | 319  | 1561                                  | 306  | 1439            | 292                             | 1329  | 279                          | 1240              | 267   | 1172  | 255  |
|                                                                        | 71.6  | 485  | 77.1                                  | 481  | 82.9            | 477                             | 88.9  | 473                          | 94.8              | 470   | 100.4 | 470  |
| 150                                                                    | 83.1  | .820 | 82.9                                  | .820 | 82.7            | .820                            | 82.6  | .820                         | 83.0              | .820  | 84.1  | .820 |
|                                                                        | 1709  | 319  | 1577                                  | 306  | 1457            | 292                             | 1353  | 279                          | 1270              | 267   | 1210  | 255  |
|                                                                        | 71.0  | 485  | 76.3                                  | 481  | 81.9            | 477                             | 87.3  | 473                          | 92.6              | 470   | 97.2  | 470  |
| 160                                                                    | 83.3  | .820 | 83.1                                  | .820 | 83.0            | .820                            | 83.1  | .820                         | 83.7              | .820  | 85.1  | .820 |
|                                                                        | 1724  | 319  | 1594                                  | 306  | 1480            | 292                             | 1382  | 279                          | 1305              | 267   | 1254  | 255  |
|                                                                        | 70.4  | 485  | 75.5                                  | 481  | 80.6            | 477                             | 85.5  | 473                          | 90.1              | 470   | 93.7  | 470  |
| 170                                                                    | 83.6  | .820 | 83.5                                  | .820 | 83.5            | .820                            | 83.7  | .820                         | 84.5              | .820  | 86.2  | .820 |
|                                                                        | 1741  | 319  | 1616                                  | 306  | 1509            | 292                             | 1416  | 279                          | 1347              | 267   | 1307  | 255  |
|                                                                        | 69.7  | 485  | 74.4                                  | 481  | 79.0            | 477                             | 83.5  | 473                          | 87.3              | 470   | 90.0  | 470  |
| 180                                                                    | 83.9  | .820 | 83.8                                  | .820 | 84.0            | .820                            | 84.3  | .820                         | 85.4              | .820  | 87.5  | .820 |
|                                                                        | 1762  | 319  | 1644                                  | 306  | 1541            | 292                             | 1456  | 279                          | 1396              | 267   | 1368  | 255  |
|                                                                        | 68.9  | 485  | 73.2                                  | 481  | 77.4            | 477                             | 81.2  | 473                          | 84.2              | 470   | 86.0  | 470  |
| 190                                                                    | 84.2  | .820 | 84.3                                  | .820 | 84.5            | .820                            | 85.1  | .820                         | 86.5              | .820  | 89.3  | .820 |
|                                                                        | 1788  | 319  | 1675                                  | 306  | 1578            | 292                             | 1502  | 279                          | 1453              | 267   | 1442  | 255  |
|                                                                        | 67.9  | 485  | 71.8                                  | 481  | 75.6            | 477                             | 78.7  | 473                          | 80.9              | 470   | 81.6  | 470  |
| 200                                                                    | 84.6  | .820 | 84.8                                  | .820 | 85.2            | .820                            | 86.0  | .820                         | 87.8              | .820  | 91.7  | .820 |
|                                                                        | 1819  | 319  | 1711                                  | 306  | 1622            | 292                             | 1554  | 279                          | 1516              | 267   | 1544  | 255  |
|                                                                        | 66.7  | 485  | 70.3                                  | 481  | 73.5            | 477                             | 76.0  | 473                          | 77.6              | 470   | 76.2  | 470  |
| 210                                                                    | 85.0  | .820 | 85.3                                  | .820 | 86.0            | .820                            | 87.1  | .820                         | 89.5              | .820  |       |      |
|                                                                        | 1853  | 319  | 1751                                  | 306  | 1671            | 292                             | 1614  | 279                          | 1595              | 267   |       |      |
|                                                                        | 65.5  | 485  | 68.7                                  | 481  | 71.4            | 477                             | 73.2  | 473                          | 73.7              | 470   |       |      |
| 220                                                                    | 85.5  | .820 | 86.0                                  | .820 | 86.8            | .820                            | 88.3  | .820                         | 91.7              | .820  |       |      |
|                                                                        | 1891  | 319  | 1797                                  | 306  | 1726            | 292                             | 1681  | 279                          | 1700              | 267   |       |      |
|                                                                        | 64.1  | 485  | 66.9                                  | 481  | 69.1            | 477                             | 70.3  | 473                          | 69.2              | 470   |       |      |
| 230                                                                    | 86.1  | .820 | 86.7                                  | .820 | 87.8            | .820                            | 89.9  | .820                         |                   |       |       |      |
|                                                                        | 1934  | 319  | 1849                                  | 306  | 1789            | 292                             | 1762  | 279                          |                   |       |       |      |
|                                                                        | 62.7  | 485  | 65.0                                  | 481  | 66.7            | 477                             | 67.1  | 473                          |                   |       |       |      |
| 240                                                                    | 86.7  | .820 | 87.5                                  | .820 | 89.0            | .820                            | 91.9  | .820                         |                   |       |       |      |
|                                                                        | 1983  | 319  | 1907                                  | 306  | 1861            | 292                             | 1866  | 279                          |                   |       |       |      |
|                                                                        | 61.2  | 485  | 63.1                                  | 481  | 64.1            | 477                             | 63.3  | 473                          |                   |       |       |      |
| 250                                                                    | 87.4  | .820 | 88.4                                  | .820 | 90.4            | .820                            |       |                              |                   |       |       |      |
|                                                                        | 2037  | 319  | 1973                                  | 306  | 1941            | 292                             |       |                              |                   |       |       |      |
|                                                                        | 59.6  | 485  | 61.0                                  | 481  | 61.4            | 477                             |       |                              |                   |       |       |      |
| 260                                                                    | 88.1  | .820 | 89.5                                  | .820 |                 |                                 |       |                              |                   |       |       |      |
|                                                                        | 2096  | 319  | 2047                                  | 306  |                 |                                 |       |                              |                   |       |       |      |
|                                                                        | 57.9  | 485  | 58.7                                  | 481  |                 |                                 |       |                              |                   |       |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |                 | ENGINE ANTI-ICE ON              |       |                              | TOTAL ANTI-ICE ON |       |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |                 | △ FUEL = +2.0 %                 |       |                              | △ FUEL = +4.0 %   |       |       |      |

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| CRUISE - M.82                                                          |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|---------------------|-------|---------------------------------|-------------------|------------------------------|-----------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA +10<br>CG=37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |           |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                     | FL350 |                                 | FL370             |                              | FL410     |
| 130                                                                    | 84.5  | .820 | 84.2                                  | .820 | 83.9  | .820                | 83.7  | .820                            | 83.9              | .820                         | 85.5 .820 |
|                                                                        | 1729  | 319  | 1588                                  | 306  | 1461  | 292                 | 1344  | 279                             | 1247              | 267                          | 1109 243  |
|                                                                        | 71.7  | 496  | 77.4                                  | 492  | 83.4  | 488                 | 89.9  | 483                             | 96.4              | 481                          | 108.4 481 |
| 140                                                                    | 84.7  | .820 | 84.4                                  | .820 | 84.2  | .820                | 84.0  | .820                            | 84.3              | .820                         | 86.5 .820 |
|                                                                        | 1742  | 319  | 1603                                  | 306  | 1477  | 292                 | 1363  | 279                             | 1273              | 267                          | 1151 243  |
|                                                                        | 71.2  | 496  | 76.7                                  | 492  | 82.5  | 488                 | 88.6  | 483                             | 94.5              | 481                          | 104.5 481 |
| 150                                                                    | 84.9  | .820 | 84.7                                  | .820 | 84.5  | .820                | 84.4  | .820                            | 84.9              | .820                         | 87.6 .820 |
|                                                                        | 1756  | 319  | 1619                                  | 306  | 1495  | 292                 | 1389  | 279                             | 1304              | 267                          | 1200 243  |
|                                                                        | 70.6  | 496  | 75.9                                  | 492  | 81.5  | 488                 | 87.0  | 483                             | 92.3              | 481                          | 100.2 481 |
| 160                                                                    | 85.1  | .820 | 84.9                                  | .820 | 84.9  | .820                | 84.9  | .820                            | 85.6              | .820                         | 88.9 .820 |
|                                                                        | 1772  | 319  | 1637                                  | 306  | 1520  | 292                 | 1419  | 279                             | 1341              | 267                          | 1262 243  |
|                                                                        | 70.0  | 496  | 75.1                                  | 492  | 80.2  | 488                 | 85.2  | 483                             | 89.7              | 481                          | 95.3 481  |
| 170                                                                    | 85.4  | .820 | 85.3                                  | .820 | 85.3  | .820                | 85.5  | .820                            | 86.4              | .820                         | 90.7 .820 |
|                                                                        | 1789  | 319  | 1660                                  | 306  | 1550  | 292                 | 1454  | 279                             | 1385              | 267                          | 1334 243  |
|                                                                        | 69.3  | 496  | 74.0                                  | 492  | 78.6  | 488                 | 83.1  | 483                             | 86.8              | 481                          | 90.2 481  |
| 180                                                                    | 85.7  | .820 | 85.7                                  | .820 | 85.8  | .820                | 86.2  | .820                            | 87.3              | .820                         | 93.1 .820 |
|                                                                        | 1811  | 319  | 1689                                  | 306  | 1584  | 292                 | 1496  | 279                             | 1436              | 267                          | 1431 243  |
|                                                                        | 68.4  | 496  | 72.8                                  | 492  | 77.0  | 488                 | 80.8  | 483                             | 83.7              | 481                          | 84.0 481  |
| 190                                                                    | 86.0  | .820 | 86.1                                  | .820 | 86.4  | .820                | 87.0  | .820                            | 88.4              | .820                         |           |
|                                                                        | 1838  | 319  | 1722                                  | 306  | 1622  | 292                 | 1544  | 279                             | 1497              | 267                          | 1492 255  |
|                                                                        | 67.4  | 496  | 71.4                                  | 492  | 75.1  | 488                 | 78.3  | 483                             | 80.3              | 481                          | 80.6 481  |
| 200                                                                    | 86.4  | .820 | 86.6                                  | .820 | 87.1  | .820                | 87.9  | .820                            | 89.8              | .820                         |           |
|                                                                        | 1870  | 319  | 1759                                  | 306  | 1668  | 292                 | 1599  | 279                             | 1569              | 267                          | 1598 255  |
|                                                                        | 66.3  | 496  | 69.9                                  | 492  | 73.1  | 488                 | 75.6  | 483                             | 76.7              | 481                          | 75.3 481  |
| 210                                                                    | 86.8  | .820 | 87.2                                  | .820 | 87.9  | .820                | 89.0  | .820                            | 91.5              | .820                         |           |
|                                                                        | 1906  | 319  | 1801                                  | 306  | 1720  | 292                 | 1665  | 279                             | 1651              | 267                          |           |
|                                                                        | 65.0  | 496  | 68.2                                  | 492  | 70.9  | 488                 | 72.6  | 483                             | 72.8              | 481                          |           |
| 220                                                                    | 87.3  | .820 | 87.8                                  | .820 | 88.7  | .820                | 90.3  | .820                            | 93.8              | .820                         |           |
|                                                                        | 1946  | 319  | 1850                                  | 306  | 1780  | 292                 | 1738  | 279                             | 1760              | 267                          |           |
|                                                                        | 63.7  | 496  | 66.4                                  | 492  | 68.5  | 488                 | 69.5  | 483                             | 68.3              | 481                          |           |
| 230                                                                    | 87.9  | .820 | 88.6                                  | .820 | 89.7  | .820                | 91.8  | .820                            |                   |                              |           |
|                                                                        | 1991  | 319  | 1906                                  | 306  | 1849  | 292                 | 1822  | 279                             |                   |                              |           |
|                                                                        | 62.3  | 496  | 64.5                                  | 492  | 65.9  | 488                 | 66.3  | 483                             |                   |                              |           |
| 240                                                                    | 88.5  | .820 | 89.4                                  | .820 | 90.9  | .820                | 93.9  | .820                            |                   |                              |           |
|                                                                        | 2043  | 319  | 1969                                  | 306  | 1924  | 292                 | 1930  | 279                             |                   |                              |           |
|                                                                        | 60.7  | 496  | 62.4                                  | 492  | 63.3  | 488                 | 62.6  | 483                             |                   |                              |           |
| 250                                                                    | 89.2  | .820 | 90.3                                  | .820 | 92.3  | .820                |       |                                 |                   |                              |           |
|                                                                        | 2101  | 319  | 2039                                  | 306  | 2007  | 292                 |       |                                 |                   |                              |           |
|                                                                        | 59.0  | 496  | 60.3                                  | 492  | 60.7  | 488                 |       |                                 |                   |                              |           |
| 260                                                                    | 90.0  | .820 | 91.4                                  | .820 |       |                     |       |                                 |                   |                              |           |
|                                                                        | 2166  | 319  | 2116                                  | 306  |       |                     |       |                                 |                   |                              |           |
|                                                                        | 57.2  | 496  | 58.1                                  | 492  |       |                     |       |                                 |                   |                              |           |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON  |       |                                 | TOTAL ANTI-ICE ON |                              |           |
| Δ FUEL = -0.5 %                                                        |       |      | ΔFUEL = +1.0 %                        |      |       | Δ FUEL = +2.0 %     |       |                                 | Δ FUEL = +4.0 %   |                              |           |

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|                                                                                 |                       |  |  |  |         |        |
|---------------------------------------------------------------------------------|-----------------------|--|--|--|---------|--------|
|  | IN FLIGHT PERFORMANCE |  |  |  | 3.05.15 | P 17   |
|                                                                                 | CRUISE                |  |  |  | SEQ 150 | REV 12 |

| CRUISE - M.82                                                          |       |                                       |       |      |                     |                    |                                 |      |                              |      |           |
|------------------------------------------------------------------------|-------|---------------------------------------|-------|------|---------------------|--------------------|---------------------------------|------|------------------------------|------|-----------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |                                       |       |      | ISA +15<br>CG=37.0% |                    | N1 (%)<br>KG/H/ENG<br>NM/1000KG |      | MACH<br>IAS (KT)<br>TAS (KT) |      |           |
| WEIGHT<br>(1000KG)                                                     | FL290 |                                       | FL310 |      | FL330               |                    | FL350                           |      | FL370                        |      | FL410     |
| 130                                                                    | 85.4  | .820                                  | 85.1  | .820 | 84.8                | .820               | 84.6                            | .820 | 84.8                         | .820 | 86.5 .820 |
|                                                                        | 1754  | 319                                   | 1610  | 306  | 1481                | 292                | 1362                            | 279  | 1264                         | 267  | 1125 243  |
|                                                                        | 71.4  | 501                                   | 77.1  | 497  | 83.2                | 493                | 89.7                            | 489  | 96.2                         | 486  | 108.1 486 |
| 140                                                                    | 85.6  | .820                                  | 85.3  | .820 | 85.1                | .820               | 84.9                            | .820 | 85.2                         | .820 | 87.4 .820 |
|                                                                        | 1766  | 319                                   | 1625  | 306  | 1497                | 292                | 1382                            | 279  | 1290                         | 267  | 1167 243  |
|                                                                        | 70.9  | 501                                   | 76.4  | 497  | 82.3                | 493                | 88.4                            | 489  | 94.2                         | 486  | 104.1 486 |
| 150                                                                    | 85.8  | .820                                  | 85.5  | .820 | 85.4                | .820               | 85.3                            | .820 | 85.8                         | .820 | 88.5 .820 |
|                                                                        | 1781  | 319                                   | 1642  | 306  | 1516                | 292                | 1408                            | 279  | 1322                         | 267  | 1219 243  |
|                                                                        | 70.3  | 501                                   | 75.7  | 497  | 81.3                | 493                | 86.8                            | 489  | 92.0                         | 486  | 99.7 486  |
| 160                                                                    | 86.0  | .820                                  | 85.8  | .820 | 85.8                | .820               | 85.8                            | .820 | 86.5                         | .820 | 89.9 .820 |
|                                                                        | 1797  | 319                                   | 1660  | 306  | 1541                | 292                | 1439                            | 279  | 1360                         | 267  | 1283 243  |
|                                                                        | 69.7  | 501                                   | 74.8  | 497  | 79.9                | 493                | 84.9                            | 489  | 89.4                         | 486  | 94.7 486  |
| 170                                                                    | 86.2  | .820                                  | 86.2  | .820 | 86.2                | .820               | 86.4                            | .820 | 87.3                         | .820 | 91.6 .820 |
|                                                                        | 1815  | 319                                   | 1684  | 306  | 1572                | 292                | 1474                            | 279  | 1405                         | 267  | 1356 243  |
|                                                                        | 69.0  | 501                                   | 73.8  | 497  | 78.4                | 493                | 82.9                            | 489  | 86.5                         | 486  | 89.6 486  |
| 180                                                                    | 86.5  | .820                                  | 86.6  | .820 | 86.7                | .820               | 87.1                            | .820 | 88.3                         | .820 |           |
|                                                                        | 1837  | 319                                   | 1713  | 306  | 1606                | 292                | 1517                            | 279  | 1459                         | 267  |           |
|                                                                        | 68.2  | 501                                   | 72.5  | 497  | 76.7                | 493                | 80.5                            | 489  | 83.4                         | 486  |           |
| 190                                                                    | 86.9  | .820                                  | 87.0  | .820 | 87.3                | .820               | 88.0                            | .820 | 89.4                         | .820 |           |
|                                                                        | 1865  | 319                                   | 1747  | 306  | 1646                | 292                | 1567                            | 279  | 1523                         | 267  |           |
|                                                                        | 67.1  | 501                                   | 71.1  | 497  | 74.8                | 493                | 78.0                            | 489  | 79.8                         | 486  |           |
| 200                                                                    | 87.3  | .820                                  | 87.5  | .820 | 88.0                | .820               | 88.9                            | .820 | 90.8                         | .820 |           |
|                                                                        | 1898  | 319                                   | 1785  | 306  | 1693                | 292                | 1625                            | 279  | 1595                         | 267  |           |
|                                                                        | 66.0  | 501                                   | 69.6  | 497  | 72.8                | 493                | 75.2                            | 489  | 76.2                         | 486  |           |
| 210                                                                    | 87.7  | .820                                  | 88.1  | .820 | 88.8                | .820               | 89.9                            | .820 | 92.5                         | .820 |           |
|                                                                        | 1935  | 319                                   | 1828  | 306  | 1747                | 292                | 1693                            | 279  | 1679                         | 267  |           |
|                                                                        | 64.7  | 501                                   | 67.9  | 497  | 70.5                | 493                | 72.2                            | 489  | 72.4                         | 486  |           |
| 220                                                                    | 88.2  | .820                                  | 88.8  | .820 | 89.7                | .820               | 91.2                            | .820 |                              |      |           |
|                                                                        | 1976  | 319                                   | 1880  | 306  | 1809                | 292                | 1767                            | 279  |                              |      |           |
|                                                                        | 63.4  | 501                                   | 66.1  | 497  | 68.1                | 493                | 69.1                            | 489  |                              |      |           |
| 230                                                                    | 88.8  | .820                                  | 89.5  | .820 | 90.7                | .820               | 92.8                            | .820 |                              |      |           |
|                                                                        | 2023  | 319                                   | 1937  | 306  | 1879                | 292                | 1853                            | 279  |                              |      |           |
|                                                                        | 61.9  | 501                                   | 64.1  | 497  | 65.6                | 493                | 65.9                            | 489  |                              |      |           |
| 240                                                                    | 89.4  | .820                                  | 90.3  | .820 | 91.9                | .820               |                                 |      |                              |      |           |
|                                                                        | 2076  | 319                                   | 2001  | 306  | 1955                | 292                |                                 |      |                              |      |           |
|                                                                        | 60.3  | 501                                   | 62.1  | 497  | 63.0                | 493                |                                 |      |                              |      |           |
| 250                                                                    | 90.1  | .820                                  |       |      |                     |                    |                                 |      |                              |      |           |
|                                                                        | 2135  | 319                                   |       |      |                     |                    |                                 |      |                              |      |           |
|                                                                        | 58.7  | 501                                   |       |      |                     |                    |                                 |      |                              |      |           |
| 260                                                                    |       |                                       |       |      |                     |                    |                                 |      |                              |      |           |
|                                                                        |       |                                       |       |      |                     |                    |                                 |      |                              |      |           |
|                                                                        |       |                                       |       |      |                     |                    |                                 |      |                              |      |           |
| PACK FLOW LO                                                           |       | PACK FLOW HI OR/<br>AND CARGO COOL ON |       |      |                     | ENGINE ANTI-ICE ON |                                 |      | TOTAL ANTI-ICE ON            |      |           |
| △ FUEL = -0.5 %                                                        |       | △FUEL = +1.0 %                        |       |      |                     | △ FUEL = +2.0 %    |                                 |      | △ FUEL = +4.0 %              |      |           |

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| CRUISE - M.82                                                          |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|---------------------|-------|---------------------------------|-------------------|------------------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA +20<br>CG=37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                     | FL350 |                                 | FL370             |                              | FL390 |      | FL410 |      |
| 130                                                                    | 86.3  | .820 | 86.0                                  | .820 | 85.7  | .820                | 85.5  | .820                            | 85.7              | .820                         | 86.4  | .820 | 87.4  | .820 |
|                                                                        | 1779  | 319  | 1634                                  | 306  | 1501  | 292                 | 1381  | 279                             | 1282              | 267                          | 1205  | 255  | 1142  | 243  |
|                                                                        | 71.1  | 506  | 76.8                                  | 502  | 82.9  | 498                 | 89.4  | 494                             | 95.9              | 492                          | 102.0 | 492  | 107.6 | 492  |
| 140                                                                    | 86.5  | .820 | 86.2                                  | .820 | 86.0  | .820                | 85.8  | .820                            | 86.2              | .820                         | 87.1  | .820 | 88.3  | .820 |
|                                                                        | 1792  | 319  | 1649                                  | 306  | 1518  | 292                 | 1402  | 279                             | 1309              | 267                          | 1238  | 255  | 1186  | 243  |
|                                                                        | 70.6  | 506  | 76.1                                  | 502  | 82.0  | 498                 | 88.1  | 494                             | 93.9              | 492                          | 99.3  | 492  | 103.6 | 492  |
| 150                                                                    | 86.6  | .820 | 86.4                                  | .820 | 86.3  | .820                | 86.2  | .820                            | 86.7              | .820                         | 87.9  | .820 | 89.5  | .820 |
|                                                                        | 1807  | 319  | 1665                                  | 306  | 1538  | 292                 | 1428  | 279                             | 1341              | 267                          | 1280  | 255  | 1240  | 243  |
|                                                                        | 70.0  | 506  | 75.3                                  | 502  | 81.0  | 498                 | 86.4  | 494                             | 91.7              | 492                          | 96.0  | 492  | 99.1  | 492  |
| 160                                                                    | 86.9  | .820 | 86.7                                  | .820 | 86.6  | .820                | 86.8  | .820                            | 87.4              | .820                         | 88.9  | .820 | 90.8  | .820 |
|                                                                        | 1823  | 319  | 1684                                  | 306  | 1563  | 292                 | 1460  | 279                             | 1380              | 267                          | 1330  | 255  | 1305  | 243  |
|                                                                        | 69.4  | 506  | 74.5                                  | 502  | 79.6  | 498                 | 84.6  | 494                             | 89.1              | 492                          | 92.4  | 492  | 94.2  | 492  |
| 170                                                                    | 87.1  | .820 | 87.0                                  | .820 | 87.1  | .820                | 87.3  | .820                            | 88.3              | .820                         | 90.0  | .820 |       |      |
|                                                                        | 1842  | 319  | 1709                                  | 306  | 1594  | 292                 | 1496  | 279                             | 1427              | 267                          | 1391  | 255  |       |      |
|                                                                        | 68.7  | 506  | 73.4                                  | 502  | 78.1  | 498                 | 82.5  | 494                             | 86.1              | 492                          | 88.3  | 492  |       |      |
| 180                                                                    | 87.4  | .820 | 87.4                                  | .820 | 87.6  | .820                | 88.1  | .820                            | 89.2              | .820                         |       |      |       |      |
|                                                                        | 1864  | 319  | 1739                                  | 306  | 1630  | 292                 | 1540  | 279                             | 1483              | 267                          |       |      |       |      |
|                                                                        | 67.8  | 506  | 72.2                                  | 502  | 76.4  | 498                 | 80.1  | 494                             | 82.9              | 492                          |       |      |       |      |
| 190                                                                    | 87.8  | .820 | 87.9                                  | .820 | 88.2  | .820                | 88.9  | .820                            | 90.3              | .820                         |       |      |       |      |
|                                                                        | 1893  | 319  | 1774                                  | 306  | 1671  | 292                 | 1592  | 279                             | 1548              | 267                          |       |      |       |      |
|                                                                        | 66.8  | 506  | 70.8                                  | 502  | 74.5  | 498                 | 77.5  | 494                             | 79.4              | 492                          |       |      |       |      |
| 200                                                                    | 88.2  | .820 | 88.4                                  | .820 | 88.9  | .820                | 89.8  | .820                            |                   |                              |       |      |       |      |
|                                                                        | 1927  | 319  | 1813                                  | 306  | 1720  | 292                 | 1652  | 279                             |                   |                              |       |      |       |      |
|                                                                        | 65.6  | 506  | 69.2                                  | 502  | 72.4  | 498                 | 74.7  | 494                             |                   |                              |       |      |       |      |
| 210                                                                    | 88.6  | .820 | 89.0                                  | .820 | 89.7  | .820                | 90.9  | .820                            |                   |                              |       |      |       |      |
|                                                                        | 1965  | 319  | 1858                                  | 306  | 1775  | 292                 | 1721  | 279                             |                   |                              |       |      |       |      |
|                                                                        | 64.4  | 506  | 67.5                                  | 502  | 70.1  | 498                 | 71.8  | 494                             |                   |                              |       |      |       |      |
| 220                                                                    | 89.1  | .820 | 89.7                                  | .820 | 90.6  | .820                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2007  | 319  | 1910                                  | 306  | 1838  | 292                 |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 63.0  | 506  | 65.7                                  | 502  | 67.7  | 498                 |       |                                 |                   |                              |       |      |       |      |
| 230                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
| 240                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
| 250                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
| 260                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON  |       |                                 | TOTAL ANTI-ICE ON |                              |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %     |       |                                 | △ FUEL = +4.0 %   |                              |       |      |       |      |

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|                                                                                                                             |                       |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | IN FLIGHT PERFORMANCE |  | 3.05.15 | P 19   |
|                                                                                                                             | CRUISE                |  | SEQ 150 | REV 12 |

| CRUISE - M.84                                                          |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|--------------------|-------|---------------------------------|-------------------|------------------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA<br>CG=37.0%    |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                    | FL350 |                                 | FL370             |                              | FL390 |      | FL410 |      |
| 130                                                                    | 85.0  | .840 | 84.5                                  | .840 | 84.1  | .840               | 83.7  | .840                            | 83.8              | .840                         | 84.6  | .840 | 85.7  | .840 |
|                                                                        | 1879  | 328  | 1716                                  | 314  | 1569  | 300                | 1438  | 287                             | 1326              | 274                          | 1243  | 262  | 1180  | 250  |
|                                                                        | 66.2  | 497  | 71.8                                  | 493  | 77.9  | 489                | 84.2  | 484                             | 90.9              | 482                          | 96.9  | 482  | 102.1 | 482  |
| 140                                                                    | 85.1  | .840 | 84.6                                  | .840 | 84.3  | .840               | 84.0  | .840                            | 84.3              | .840                         | 85.4  | .840 | 87.0  | .840 |
|                                                                        | 1884  | 328  | 1724                                  | 314  | 1581  | 300                | 1452  | 287                             | 1351              | 274                          | 1281  | 262  | 1237  | 250  |
|                                                                        | 66.0  | 497  | 71.5                                  | 493  | 77.3  | 489                | 83.3  | 484                             | 89.2              | 482                          | 94.1  | 482  | 97.4  | 482  |
| 150                                                                    | 85.2  | .840 | 84.8                                  | .840 | 84.5  | .840               | 84.4  | .840                            | 85.0              | .840                         | 86.4  | .840 | 88.9  | .840 |
|                                                                        | 1892  | 328  | 1735                                  | 314  | 1596  | 300                | 1475  | 287                             | 1387              | 274                          | 1332  | 262  | 1311  | 250  |
|                                                                        | 65.7  | 497  | 71.0                                  | 493  | 76.5  | 489                | 82.1  | 484                             | 86.9              | 482                          | 90.4  | 482  | 91.9  | 482  |
| 160                                                                    | 85.3  | .840 | 85.0                                  | .840 | 84.8  | .840               | 85.0  | .840                            | 85.8              | .840                         | 87.9  | .840 |       |      |
|                                                                        | 1903  | 328  | 1750                                  | 314  | 1616  | 300                | 1509  | 287                             | 1432              | 274                          | 1399  | 262  |       |      |
|                                                                        | 65.3  | 497  | 70.4                                  | 493  | 75.6  | 489                | 80.2  | 484                             | 84.1              | 482                          | 86.1  | 482  |       |      |
| 170                                                                    | 85.5  | .840 | 85.3                                  | .840 | 85.3  | .840               | 85.7  | .840                            | 87.0              | .840                         | 90.0  | .840 |       |      |
|                                                                        | 1917  | 328  | 1769                                  | 314  | 1647  | 300                | 1551  | 287                             | 1494              | 274                          | 1492  | 262  |       |      |
|                                                                        | 64.8  | 497  | 69.7                                  | 493  | 74.2  | 489                | 78.0  | 484                             | 80.6              | 482                          | 80.8  | 482  |       |      |
| 180                                                                    | 85.7  | .840 | 85.7                                  | .840 | 86.0  | .840               | 86.7  | .840                            | 88.6              | .840                         |       |      |       |      |
|                                                                        | 1935  | 328  | 1795                                  | 314  | 1687  | 300                | 1606  | 287                             | 1570              | 274                          |       |      |       |      |
|                                                                        | 64.2  | 497  | 68.6                                  | 493  | 72.4  | 489                | 75.4  | 484                             | 76.7              | 482                          |       |      |       |      |
| 190                                                                    | 86.1  | .840 | 86.2                                  | .840 | 86.7  | .840               | 87.8  | .840                            | 90.8              | .840                         |       |      |       |      |
|                                                                        | 1958  | 328  | 1832                                  | 314  | 1735  | 300                | 1674  | 287                             | 1676              | 274                          |       |      |       |      |
|                                                                        | 63.5  | 497  | 67.3                                  | 493  | 70.4  | 489                | 72.3  | 484                             | 71.9              | 482                          |       |      |       |      |
| 200                                                                    | 86.5  | .840 | 86.8                                  | .840 | 87.6  | .840               | 89.4  | .840                            |                   |                              |       |      |       |      |
|                                                                        | 1989  | 328  | 1877                                  | 314  | 1796  | 300                | 1759  | 287                             |                   |                              |       |      |       |      |
|                                                                        | 62.5  | 497  | 65.6                                  | 493  | 68.0  | 489                | 68.8  | 484                             |                   |                              |       |      |       |      |
| 210                                                                    | 87.0  | .840 | 87.6                                  | .840 | 88.8  | .840               | 91.6  | .840                            |                   |                              |       |      |       |      |
|                                                                        | 2031  | 328  | 1931                                  | 314  | 1874  | 300                | 1872  | 287                             |                   |                              |       |      |       |      |
|                                                                        | 61.2  | 497  | 63.8                                  | 493  | 65.2  | 489                | 64.7  | 484                             |                   |                              |       |      |       |      |
| 220                                                                    | 87.6  | .840 | 88.5                                  | .840 | 90.4  | .840               |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2080  | 328  | 2000                                  | 314  | 1963  | 300                |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 59.8  | 497  | 61.6                                  | 493  | 62.2  | 489                |       |                                 |                   |                              |       |      |       |      |
| 230                                                                    | 88.4  | .840 | 89.6                                  | .840 |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2139  | 328  | 2082                                  | 314  |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 58.1  | 497  | 59.2                                  | 493  |       |                    |       |                                 |                   |                              |       |      |       |      |
| 240                                                                    |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
| 250                                                                    |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                    |       |                                 |                   |                              |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON |       |                                 | TOTAL ANTI-ICE ON |                              |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %    |       |                                 | △ FUEL = +4.0 %   |                              |       |      |       |      |

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| CRUISE - M.84                                                          |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|------------------------|-------|---------------------------------|-------------------|------------------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA + 10<br>CG = 37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                        | FL350 |                                 | FL370             |                              | FL390 |      | FL410 |      |
| 130                                                                    | 86.8  | .840 | 86.3                                  | .840 | 85.9  | .840                   | 85.6  | .840                            | 85.7              | .840                         | 86.5  | .840 | 87.7  | .840 |
|                                                                        | 1933  | 328  | 1765                                  | 314  | 1613  | 300                    | 1477  | 287                             | 1362              | 274                          | 1278  | 262  | 1215  | 250  |
|                                                                        | 65.7  | 508  | 71.4                                  | 504  | 77.4  | 499                    | 83.8  | 495                             | 90.4              | 493                          | 96.4  | 493  | 101.4 | 493  |
| 140                                                                    | 86.9  | .840 | 86.5                                  | .840 | 86.1  | .840                   | 85.8  | .840                            | 86.2              | .840                         | 87.3  | .840 | 88.9  | .840 |
|                                                                        | 1939  | 328  | 1773                                  | 314  | 1625  | 300                    | 1492  | 287                             | 1389              | 274                          | 1317  | 262  | 1278  | 250  |
|                                                                        | 65.5  | 508  | 71.0                                  | 504  | 76.8  | 499                    | 83.0  | 495                             | 88.7              | 493                          | 93.5  | 493  | 96.4  | 493  |
| 150                                                                    | 87.0  | .840 | 86.6                                  | .840 | 86.4  | .840                   | 86.3  | .840                            | 86.9              | .840                         | 88.4  | .840 | 90.9  | .840 |
|                                                                        | 1947  | 328  | 1785                                  | 314  | 1641  | 300                    | 1516  | 287                             | 1426              | 274                          | 1373  | 262  | 1357  | 250  |
|                                                                        | 65.2  | 508  | 70.6                                  | 504  | 76.1  | 499                    | 81.6  | 495                             | 86.4              | 493                          | 89.7  | 493  | 90.8  | 493  |
| 160                                                                    | 87.1  | .840 | 86.8                                  | .840 | 86.7  | .840                   | 86.9  | .840                            | 87.8              | .840                         | 89.8  | .840 |       |      |
|                                                                        | 1958  | 328  | 1800                                  | 314  | 1662  | 300                    | 1551  | 287                             | 1475              | 274                          | 1447  | 262  |       |      |
|                                                                        | 64.8  | 508  | 69.9                                  | 504  | 75.1  | 499                    | 79.8  | 495                             | 83.6              | 493                          | 85.1  | 493  |       |      |
| 170                                                                    | 87.3  | .840 | 87.1                                  | .840 | 87.2  | .840                   | 87.6  | .840                            | 88.9              | .840                         | 92.1  | .840 |       |      |
|                                                                        | 1973  | 328  | 1820                                  | 314  | 1695  | 300                    | 1596  | 287                             | 1543              | 274                          | 1544  | 262  |       |      |
|                                                                        | 64.4  | 508  | 69.2                                  | 504  | 73.7  | 499                    | 77.6  | 495                             | 79.9              | 493                          | 79.8  | 493  |       |      |
| 180                                                                    | 87.6  | .840 | 87.5                                  | .840 | 87.8  | .840                   | 88.6  | .840                            | 90.6              | .840                         |       |      |       |      |
|                                                                        | 1991  | 328  | 1848                                  | 314  | 1736  | 300                    | 1656  | 287                             | 1625              | 274                          |       |      |       |      |
|                                                                        | 63.8  | 508  | 68.1                                  | 504  | 71.9  | 499                    | 74.8  | 495                             | 75.8              | 493                          |       |      |       |      |
| 190                                                                    | 87.9  | .840 | 88.1                                  | .840 | 88.6  | .840                   | 89.7  | .840                            | 92.8              | .840                         |       |      |       |      |
|                                                                        | 2016  | 328  | 1887                                  | 314  | 1789  | 300                    | 1732  | 287                             | 1735              | 274                          |       |      |       |      |
|                                                                        | 63.0  | 508  | 66.7                                  | 504  | 69.8  | 499                    | 71.5  | 495                             | 71.0              | 493                          |       |      |       |      |
| 200                                                                    | 88.3  | .840 | 88.7                                  | .840 | 89.6  | .840                   | 91.4  | .840                            |                   |                              |       |      |       |      |
|                                                                        | 2050  | 328  | 1936                                  | 314  | 1857  | 300                    | 1819  | 287                             |                   |                              |       |      |       |      |
|                                                                        | 61.9  | 508  | 65.0                                  | 504  | 67.2  | 499                    | 68.1  | 495                             |                   |                              |       |      |       |      |
| 210                                                                    | 88.8  | .840 | 89.5                                  | .840 | 90.7  | .840                   | 93.6  | .840                            |                   |                              |       |      |       |      |
|                                                                        | 2095  | 328  | 1994                                  | 314  | 1938  | 300                    | 1937  | 287                             |                   |                              |       |      |       |      |
|                                                                        | 60.6  | 508  | 63.1                                  | 504  | 64.4  | 499                    | 63.9  | 495                             |                   |                              |       |      |       |      |
| 220                                                                    | 89.5  | .840 | 90.4                                  | .840 | 92.3  | .840                   |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2147  | 328  | 2067                                  | 314  | 2029  | 300                    |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 59.1  | 508  | 60.9                                  | 504  | 61.5  | 499                    |       |                                 |                   |                              |       |      |       |      |
| 230                                                                    | 90.2  | .840 | 91.5                                  | .840 |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 2211  | 328  | 2151                                  | 314  |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        | 57.4  | 508  | 58.5                                  | 504  |       |                        |       |                                 |                   |                              |       |      |       |      |
| 240                                                                    |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
| 250                                                                    |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
|                                                                        |       |      |                                       |      |       |                        |       |                                 |                   |                              |       |      |       |      |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON     |       |                                 | TOTAL ANTI-ICE ON |                              |       |      |       |      |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %        |       |                                 | △ FUEL = +4.0 %   |                              |       |      |       |      |

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|                                                                                 |                       |  |  |         |        |
|---------------------------------------------------------------------------------|-----------------------|--|--|---------|--------|
|  | IN FLIGHT PERFORMANCE |  |  | 3.05.15 | P 21   |
|                                                                                 | CRUISE                |  |  | SEQ 150 | REV 12 |

FLIGHT CREW OPERATING MANUAL

| CRUISE - M.84                                                          |           |                                       |           |                    |                     |                                 |                              |  |  |
|------------------------------------------------------------------------|-----------|---------------------------------------|-----------|--------------------|---------------------|---------------------------------|------------------------------|--|--|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |           |                                       |           |                    | ISA +15<br>CG=37.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG | MACH<br>IAS (KT)<br>TAS (KT) |  |  |
| WEIGHT<br>(1000KG)                                                     | FL290     | FL310                                 | FL330     | FL350              | FL370               | FL390                           | FL410                        |  |  |
| <b>130</b>                                                             | 87.7 .840 | 87.2 .840                             | 86.8 .840 | 86.5 .840          | 86.6 .840           | 87.4 .840                       | 88.6 .840                    |  |  |
|                                                                        | 1962 328  | 1791 314                              | 1636 300  | 1498 287           | 1382 274            | 1296 262                        | 1236 250                     |  |  |
|                                                                        | 65.4 513  | 71.1 509                              | 77.1 505  | 83.5 501           | 90.1 498            | 96.1 498                        | 100.8 498                    |  |  |
| <b>140</b>                                                             | 87.8 .840 | 87.4 .840                             | 87.0 .840 | 86.8 .840          | 87.1 .840           | 88.2 .840                       | 89.9 .840                    |  |  |
|                                                                        | 1968 328  | 1799 314                              | 1649 300  | 1513 287           | 1409 274            | 1337 262                        | 1300 250                     |  |  |
|                                                                        | 65.2 513  | 70.7 509                              | 76.5 505  | 82.7 501           | 88.4 498            | 93.1 498                        | 95.8 498                     |  |  |
| <b>150</b>                                                             | 87.9 .840 | 87.5 .840                             | 87.3 .840 | 87.2 .840          | 87.8 .840           | 89.3 .840                       | 91.9 .840                    |  |  |
|                                                                        | 1977 328  | 1811 314                              | 1665 300  | 1538 287           | 1447 274            | 1396 262                        | 1380 250                     |  |  |
|                                                                        | 64.9 513  | 70.2 509                              | 75.8 505  | 81.4 501           | 86.1 498            | 89.2 498                        | 90.2 498                     |  |  |
| <b>160</b>                                                             | 88.0 .840 | 87.8 .840                             | 87.6 .840 | 87.8 .840          | 88.7 .840           | 90.8 .840                       |                              |  |  |
|                                                                        | 1988 328  | 1827 314                              | 1687 300  | 1574 287           | 1499 274            | 1471 262                        |                              |  |  |
|                                                                        | 64.5 513  | 69.6 509                              | 74.8 505  | 79.5 501           | 83.1 498            | 84.6 498                        |                              |  |  |
| <b>170</b>                                                             | 88.2 .840 | 88.0 .840                             | 88.1 .840 | 88.6 .840          | 89.9 .840           |                                 |                              |  |  |
|                                                                        | 2003 328  | 1847 314                              | 1720 300  | 1621 287           | 1569 274            |                                 |                              |  |  |
|                                                                        | 64.0 513  | 68.9 509                              | 73.3 505  | 77.2 501           | 79.4 498            |                                 |                              |  |  |
| <b>180</b>                                                             | 88.5 .840 | 88.4 .840                             | 88.8 .840 | 89.5 .840          | 91.6 .840           |                                 |                              |  |  |
|                                                                        | 2022 328  | 1877 314                              | 1765 300  | 1683 287           | 1653 274            |                                 |                              |  |  |
|                                                                        | 63.4 513  | 67.8 509                              | 71.5 505  | 74.3 501           | 75.4 498            |                                 |                              |  |  |
| <b>190</b>                                                             | 88.8 .840 | 89.0 .840                             | 89.6 .840 | 90.7 .840          |                     |                                 |                              |  |  |
|                                                                        | 2048 328  | 1917 314                              | 1819 300  | 1761 287           |                     |                                 |                              |  |  |
|                                                                        | 62.6 513  | 66.4 509                              | 69.4 505  | 71.1 501           |                     |                                 |                              |  |  |
| <b>200</b>                                                             | 89.2 .840 | 89.6 .840                             | 90.5 .840 | 92.4 .840          |                     |                                 |                              |  |  |
|                                                                        | 2083 328  | 1967 314                              | 1888 300  | 1849 287           |                     |                                 |                              |  |  |
|                                                                        | 61.6 513  | 64.7 509                              | 66.8 505  | 67.7 501           |                     |                                 |                              |  |  |
| <b>210</b>                                                             | 89.8 .840 | 90.4 .840                             | 91.7 .840 |                    |                     |                                 |                              |  |  |
|                                                                        | 2128 328  | 2027 314                              | 1970 300  |                    |                     |                                 |                              |  |  |
|                                                                        | 60.3 513  | 62.8 509                              | 64.1 505  |                    |                     |                                 |                              |  |  |
| <b>220</b>                                                             |           |                                       |           |                    |                     |                                 |                              |  |  |
| <b>230</b>                                                             |           |                                       |           |                    |                     |                                 |                              |  |  |
| <b>240</b>                                                             |           |                                       |           |                    |                     |                                 |                              |  |  |
| <b>250</b>                                                             |           |                                       |           |                    |                     |                                 |                              |  |  |
| PACK FLOW LO                                                           |           | PACK FLOW HI OR/<br>AND CARGO COOL ON |           | ENGINE ANTI-ICE ON |                     | TOTAL ANTI-ICE ON               |                              |  |  |
| △ FUEL = -0.5 %                                                        |           | △FUEL = +1.0 %                        |           | △ FUEL = +2.0 %    |                     | △ FUEL = +4.0 %                 |                              |  |  |

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| CRUISE - M.84                                                          |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-------|---------------------|-------|---------------------------------|-------------------|------------------------------|-----------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      |       | ISA +20<br>CG=37.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                   | MACH<br>IAS (KT)<br>TAS (KT) |           |
| WEIGHT<br>(1000KG)                                                     | FL290 |      | FL310                                 |      | FL330 |                     | FL350 |                                 | FL370             |                              | FL410     |
| 130                                                                    | 88.6  | .840 | 88.1                                  | .840 | 87.7  | .840                | 87.4  | .840                            | 87.5              | .840                         | 89.6 .840 |
|                                                                        | 1992  | 328  | 1818                                  | 314  | 1660  | 300                 | 1520  | 287                             | 1403              | 274                          | 1256 250  |
|                                                                        | 65.0  | 518  | 70.7                                  | 514  | 76.8  | 510                 | 83.2  | 506                             | 89.7              | 504                          | 100.2 504 |
| 140                                                                    | 88.7  | .840 | 88.3                                  | .840 | 87.9  | .840                | 87.7  | .840                            | 88.0              | .840                         | 90.9 .840 |
|                                                                        | 1998  | 328  | 1827                                  | 314  | 1673  | 300                 | 1536  | 287                             | 1431              | 274                          | 1321 250  |
|                                                                        | 64.8  | 518  | 70.3                                  | 514  | 76.2  | 510                 | 82.3  | 506                             | 88.0              | 504                          | 95.3 504  |
| 150                                                                    | 88.8  | .840 | 88.4                                  | .840 | 88.2  | .840                | 88.1  | .840                            | 88.8              | .840                         |           |
|                                                                        | 2007  | 328  | 1840                                  | 314  | 1690  | 300                 | 1562  | 287                             | 1471              | 274                          |           |
|                                                                        | 64.5  | 518  | 69.9                                  | 514  | 75.4  | 510                 | 81.0  | 506                             | 85.6              | 504                          |           |
| 160                                                                    |       |      | 88.6                                  | .840 | 88.5  | .840                | 88.7  | .840                            | 89.7              | .840                         |           |
|                                                                        |       |      | 1856                                  | 314  | 1714  | 300                 | 1600  | 287                             | 1524              | 274                          |           |
|                                                                        |       |      | 69.3                                  | 514  | 74.4  | 510                 | 79.0  | 506                             | 82.6              | 504                          |           |
| 170                                                                    |       |      | 88.9                                  | .840 | 89.0  | .840                | 89.5  | .840                            | 90.9              | .840                         |           |
|                                                                        |       |      | 1877                                  | 314  | 1748  | 300                 | 1648  | 287                             | 1595              | 274                          |           |
|                                                                        |       |      | 68.5                                  | 514  | 72.9  | 510                 | 76.7  | 506                             | 78.9              | 504                          |           |
| 180                                                                    |       |      | 89.3                                  | .840 | 89.7  | .840                | 90.5  | .840                            |                   |                              |           |
|                                                                        |       |      | 1907                                  | 314  | 1793  | 300                 | 1711  | 287                             |                   |                              |           |
|                                                                        |       |      | 67.4                                  | 514  | 71.1  | 510                 | 73.9  | 506                             |                   |                              |           |
| 190                                                                    |       |      |                                       |      | 90.5  | .840                |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      | 1848  | 300                 |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      | 69.0  | 510                 |       |                                 |                   |                              |           |
| 200                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 210                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 220                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 230                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 240                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| 250                                                                    |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
|                                                                        |       |      |                                       |      |       |                     |       |                                 |                   |                              |           |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |       | ENGINE ANTI-ICE ON  |       |                                 | TOTAL ANTI-ICE ON |                              |           |
| △ FUEL = -0.5 %                                                        |       |      | △FUEL = +1.0 %                        |      |       | △ FUEL = +2.0 %     |       |                                 | △ FUEL = +4.0 %   |                              |           |

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|                                                                                                                                               |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.15 | P 23   |
|                                                                                                                                               | <b>CRUISE</b>                |  | SEQ 150 | REV 14 |

| LONG RANGE CRUISE                                                      |       |      |                                       |      |                 |                                 |       |                              |                    |      |       |                   |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|-----------------|---------------------------------|-------|------------------------------|--------------------|------|-------|-------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      | ISA<br>CG=30.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG |       | MACH<br>IAS (KT)<br>TAS (KT) |                    |      |       |                   |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL100 |      | FL120                                 |      | FL140           |                                 | FL160 |                              | FL180              |      | FL200 |                   | FL220 |      | FL240 |      |
| 130                                                                    | 58.6  | .427 | 59.7                                  | .440 | 61.3            | .457                            | 63.4  | .484                         | 64.8               | .505 | 65.6  | .513              | 66.6  | .523 | 67.6  | .536 |
|                                                                        | 1076  | 236  | 1055                                  | 234  | 1047            | 234                             | 1059  | 239                          | 1052               | 240  | 1015  | 234               | 986   | 229  | 966   | 225  |
|                                                                        | 63.4  | 273  | 66.0                                  | 279  | 68.6            | 287                             | 71.3  | 302                          | 74.2               | 312  | 77.6  | 315               | 80.9  | 319  | 83.8  | 324  |
| 140                                                                    | 60.0  | .439 | 61.5                                  | .455 | 63.6            | .481                            | 65.1  | .503                         | 65.9               | .513 | 67.0  | .524              | 67.9  | .534 | 71.0  | .590 |
|                                                                        | 1141  | 243  | 1131                                  | 242  | 1142            | 247                             | 1140  | 249                          | 1102               | 243  | 1075  | 239               | 1047  | 234  | 1113  | 249  |
|                                                                        | 61.4  | 280  | 63.8                                  | 289  | 66.2            | 303                             | 68.9  | 314                          | 72.0               | 317  | 74.9  | 322               | 77.7  | 326  | 80.0  | 356  |
| 150                                                                    | 61.6  | .453 | 63.7                                  | .477 | 65.4            | .502                            | 66.2  | .512                         | 67.3               | .525 | 68.2  | .534              | 71.0  | .582 | 72.5  | .608 |
|                                                                        | 1215  | 250  | 1224                                  | 254  | 1229            | 258                             | 1193  | 253                          | 1166               | 249  | 1134  | 244               | 1190  | 256  | 1190  | 257  |
|                                                                        | 59.5  | 289  | 61.7                                  | 302  | 64.2            | 315                             | 66.9  | 319                          | 69.7               | 325  | 72.3  | 328               | 74.5  | 355  | 77.2  | 367  |
| 160                                                                    | 63.6  | .473 | 65.5                                  | .499 | 66.5            | .511                            | 67.5  | .523                         | 68.5               | .534 | 70.7  | .572              | 72.7  | .606 | 73.9  | .621 |
|                                                                        | 1308  | 262  | 1320                                  | 266  | 1287            | 262                             | 1257  | 259                          | 1225               | 254  | 1261  | 262               | 1282  | 267  | 1258  | 268  |
|                                                                        | 57.7  | 302  | 59.9                                  | 316  | 62.4            | 321                             | 65.0  | 327                          | 67.5               | 331  | 69.6  | 351               | 72.0  | 369  | 74.6  | 375  |
| 170                                                                    | 65.5  | .494 | 66.6                                  | .509 | 67.7            | .522                            | 68.6  | .533                         | 70.3               | .558 | 72.7  | .602              | 73.8  | .615 | 75.1  | .634 |
|                                                                        | 1406  | 273  | 1383                                  | 272  | 1351            | 268                             | 1316  | 263                          | 1323               | 266  | 1371  | 276               | 1342  | 271  | 1324  | 269  |
|                                                                        | 56.1  | 315  | 58.3                                  | 323  | 60.7            | 328                             | 63.1  | 332                          | 65.3               | 345  | 67.4  | 370               | 69.8  | 375  | 72.4  | 383  |
| 180                                                                    | 66.8  | .508 | 67.8                                  | .519 | 68.8            | .532                            | 70.0  | .547                         | 72.6               | .594 | 73.7  | .610              | 74.9  | .626 | 76.9  | .668 |
|                                                                        | 1483  | 281  | 1446                                  | 277  | 1413            | 273                             | 1391  | 270                          | 1454               | 284  | 1430  | 280               | 1407  | 276  | 1439  | 284  |
|                                                                        | 54.6  | 324  | 56.9                                  | 329  | 59.2            | 334                             | 61.3  | 341                          | 63.3               | 368  | 65.5  | 375               | 67.8  | 382  | 70.2  | 404  |
| 190                                                                    | 67.8  | .517 | 69.0                                  | .530 | 69.9            | .541                            | 72.1  | .579                         | 73.8               | .607 | 74.9  | .621              | 76.2  | .644 | 78.4  | .695 |
|                                                                        | 1546  | 287  | 1513                                  | 283  | 1476            | 278                             | 1517  | 287                          | 1528               | 290  | 1498  | 285               | 1487  | 285  | 1542  | 296  |
|                                                                        | 53.4  | 330  | 55.5                                  | 336  | 57.6            | 340                             | 59.5  | 361                          | 61.5               | 376  | 63.7  | 381               | 65.9  | 392  | 68.1  | 420  |
| 200                                                                    | 68.9  | .527 | 69.9                                  | .538 | 71.4            | .561                            | 73.7  | .602                         | 74.7               | .614 | 75.8  | .630              | 78.2  | .683 | 79.4  | .710 |
|                                                                        | 1610  | 292  | 1571                                  | 287  | 1573            | 289                             | 1623  | 299                          | 1585               | 293  | 1560  | 290               | 1623  | 303  | 1623  | 303  |
|                                                                        | 52.2  | 336  | 54.3                                  | 341  | 56.1            | 353                             | 57.9  | 376                          | 59.9               | 380  | 62.1  | 387               | 64.1  | 416  | 66.1  | 429  |
| 210                                                                    | 69.9  | .535 | 70.8                                  | .547 | 73.3            | .592                            | 74.6  | .609                         | 75.7               | .623 | 77.8  | .666              | 79.3  | .701 | 80.2  | .717 |
|                                                                        | 1669  | 296  | 1634                                  | 292  | 1702            | 305                             | 1682  | 303                          | 1651               | 298  | 1691  | 307               | 1710  | 311  | 1683  | 307  |
|                                                                        | 51.1  | 341  | 53.0                                  | 346  | 54.6            | 372                             | 56.5  | 380                          | 58.4               | 386  | 60.5  | 409               | 62.4  | 427  | 64.4  | 434  |
| 220                                                                    | 70.7  | .541 | 72.6                                  | .572 | 74.5            | .605                            | 75.5  | .617                         | 76.7               | .636 | 79.0  | .688              | 80.1  | .712 | 80.8  | .721 |
|                                                                        | 1726  | 300  | 1754                                  | 306  | 1786            | 312                             | 1745  | 307                          | 1724               | 304  | 1792  | 318               | 1785  | 317  | 1734  | 308  |
|                                                                        | 50.0  | 346  | 51.7                                  | 362  | 53.3            | 381                             | 55.2  | 385                          | 57.1               | 394  | 58.9  | 422               | 60.8  | 434  | 62.8  | 436  |
| 230                                                                    | 71.7  | .551 | 74.3                                  | .599 | 75.2            | .610                            | 76.3  | .625                         | 78.6               | .671 | 79.9  | .702              | 80.8  | .718 | 81.4  | .724 |
|                                                                        | 1797  | 306  | 1881                                  | 321  | 1839            | 315                             | 1809  | 311                          | 1864               | 322  | 1872  | 324               | 1843  | 319  | 1783  | 309  |
|                                                                        | 48.9  | 352  | 50.4                                  | 380  | 52.2            | 384                             | 53.9  | 390                          | 55.7               | 415  | 57.6  | 431               | 59.3  | 437  | 61.3  | 437  |
| 240                                                                    | 73.4  | .579 | 75.2                                  | .607 | 76.1            | .618                            | 77.4  | .638                         | 79.6               | .687 | 80.7  | .712              | 81.4  | .721 | 82.0  | .727 |
|                                                                        | 1932  | 322  | 1949                                  | 325  | 1905            | 319                             | 1886  | 317                          | 1952               | 330  | 1948  | 329               | 1895  | 321  | 1834  | 311  |
|                                                                        | 47.8  | 370  | 49.3                                  | 385  | 51.0            | 389                             | 52.8  | 398                          | 54.5               | 425  | 56.1  | 437               | 58.0  | 439  | 59.9  | 439  |
| 250                                                                    | 74.6  | .594 | 75.8                                  | .611 | 76.9            | .626                            | 78.8  | .662                         | 79.9               | .687 | 81.2  | .713              | 81.9  | .723 | 82.7  | .732 |
|                                                                        | 2020  | 330  | 2002                                  | 328  | 1969            | 324                             | 1996  | 330                          | 1988               | 330  | 1991  | 330               | 1944  | 322  | 1894  | 313  |
|                                                                        | 46.9  | 379  | 48.4                                  | 387  | 50.0            | 394                             | 51.8  | 413                          | 53.5               | 425  | 55.0  | 438               | 56.7  | 441  | 58.4  | 442  |
| 260                                                                    | 75.0  | .594 | 76.5                                  | .616 | 77.8            | .637                            | 79.2  | .662                         | 80.4               | .687 | 81.6  | .713              | 82.5  | .726 | 83.4  | .738 |
|                                                                        | 2050  | 330  | 2054                                  | 330  | 2043            | 329                             | 2032  | 330                          | 2026               | 330  | 2031  | 330               | 1996  | 323  | 1961  | 316  |
|                                                                        | 46.2  | 379  | 47.5                                  | 390  | 49.0            | 400                             | 50.8  | 413                          | 52.5               | 425  | 53.9  | 438               | 55.4  | 442  | 56.9  | 446  |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |                 |                                 |       |                              | ENGINE ANTI-ICE ON |      |       | TOTAL ANTI-ICE ON |       |      |       |      |
| △ FUEL = - 0.5 %                                                       |       |      | △FUEL = + 1 %                         |      |                 |                                 |       |                              | △ FUEL = + 3.5 %   |      |       | △ FUEL = + 5 %    |       |      |       |      |

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## LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS  
NORMAL AIR CONDITIONING  
ANTI-ICING OFFISA  
CG=37.0%N1 (%)  
KG/H/ENG  
NM/1000KGMACH  
IAS (KT)  
TAS (KT)

| WEIGHT<br>(1000KG) | FL270                             | FL290                                 | FL310                             | FL330                             | FL350                              | FL370                              | FL390                              | FL410                              |
|--------------------|-----------------------------------|---------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 130                | 71.6 .606<br>1032 240<br>87.5 362 | 72.9 .624<br>1017 238<br>90.8 369     | 74.3 .651<br>1013 238<br>94.3 382 | 76.2 .696<br>1038 244<br>97.4 405 | 77.4 .722<br>1034 243<br>100.6 416 | 78.4 .729<br>998 234<br>104.8 418  | 80.1 .751<br>993 231<br>108.4 430  | 82.7 .801<br>1030 237<br>111.5 459 |
| 140                | 73.1 .621<br>1101 247<br>84.2 371 | 74.5 .646<br>1093 246<br>87.5 382     | 76.3 .687<br>1114 252<br>90.4 403 | 77.7 .720<br>1123 254<br>93.3 419 | 78.4 .727<br>1080 245<br>97.0 419  | 79.6 .743<br>1060 239<br>100.5 426 | 82.1 .794<br>1100 246<br>103.5 455 | 83.9 .804<br>1080 238<br>106.8 461 |
| 150                | 74.5 .637<br>1168 253<br>81.4 380 | 76.2 .674<br>1184 258<br>84.2 399     | 78.0 .717<br>1212 264<br>86.8 421 | 78.6 .725<br>1168 255<br>90.2 422 | 79.4 .737<br>1137 248<br>93.4 425  | 81.5 .787<br>1172 255<br>96.3 451  | 83.3 .802<br>1159 249<br>99.2 460  | 85.2 .809<br>1140 240<br>101.8 464 |
| 160                | 76.3 .670<br>1272 267<br>78.6 400 | 78.1 .711<br>1299 273<br>81.0 421     | 78.8 .723<br>1261 266<br>84.0 424 | 79.5 .731<br>1219 258<br>87.2 425 | 80.5 .754<br>1209 255<br>89.8 434  | 82.8 .801<br>1245 260<br>92.2 459  | 84.5 .806<br>1216 250<br>95.0 462  | 86.7 .813<br>1205 241<br>96.7 466  |
| 170                | 78.1 .704<br>1385 282<br>75.9 420 | 79.0 .720<br>1358 277<br>78.5 426     | 79.6 .727<br>1308 268<br>81.5 426 | 80.5 .741<br>1281 262<br>84.1 431 | 82.3 .791<br>1319 268<br>86.4 456  | 83.7 .803<br>1296 261<br>88.9 461  | 85.7 .808<br>1275 251<br>90.9 464  | 88.6 .820<br>1288 243<br>91.3 470  |
| 180                | 79.1 .716<br>1454 287<br>73.5 428 | 79.7 .724<br>1405 279<br>76.3 429     | 80.4 .734<br>1365 271<br>78.9 431 | 81.6 .757<br>1357 268<br>81.1 440 | 83.4 .800<br>1387 272<br>83.2 461  | 84.9 .806<br>1354 262<br>85.4 462  | 87.2 .814<br>1352 253<br>86.4 467  | 90.9 .817<br>1375 242<br>85.2 469  |
| 190                | 79.8 .721<br>1505 290<br>71.5 430 | 80.5 .728<br>1455 280<br>74.1 431     | 81.4 .744<br>1431 275<br>76.3 437 | 83.1 .790<br>1467 280<br>78.3 459 | 84.4 .803<br>1442 273<br>80.2 463  | 86.0 .808<br>1416 263<br>81.8 464  | 89.1 .816<br>1429 253<br>81.8 468  |                                    |
| 200                | 80.5 .724<br>1553 291<br>69.6 432 | 81.2 .735<br>1514 283<br>71.9 435     | 82.4 .759<br>1508 281<br>73.8 445 | 84.2 .799<br>1539 284<br>75.5 465 | 85.4 .805<br>1501 274<br>77.3 464  | 87.5 .813<br>1495 264<br>78.0 466  | 91.4 .816<br>1530 253<br>76.5 468  |                                    |
| 210                | 81.2 .728<br>1605 293<br>67.8 435 | 82.1 .745<br>1583 287<br>69.7 441     | 83.8 .787<br>1618 292<br>71.4 462 | 85.1 .802<br>1600 285<br>72.9 466 | 86.5 .806<br>1565 274<br>74.3 465  | 89.2 .813<br>1573 265<br>74.1 467  |                                    |                                    |
| 220                | 81.9 .735<br>1665 295<br>65.9 439 | 83.0 .757<br>1658 292<br>67.5 448     | 84.8 .795<br>1691 295<br>69.0 467 | 86.1 .803<br>1659 286<br>70.4 467 | 87.8 .810<br>1644 276<br>71.0 467  | 91.4 .814<br>1678 265<br>69.6 467  |                                    |                                    |
| 230                | 82.7 .743<br>1733 299<br>64.0 444 | 84.4 .783<br>1769 303<br>65.5 464     | 85.7 .799<br>1754 297<br>66.8 469 | 87.1 .804<br>1724 286<br>67.9 468 | 89.4 .810<br>1723 276<br>67.7 467  |                                    |                                    |                                    |
| 240                | 83.5 .753<br>1806 303<br>62.2 449 | 85.3 .790<br>1843 306<br>63.4 468     | 86.7 .802<br>1821 298<br>64.6 470 | 88.2 .807<br>1802 287<br>65.1 469 | 91.4 .812<br>1832 277<br>63.9 468  |                                    |                                    |                                    |
| 250                | 84.7 .775<br>1915 313<br>60.4 463 | 86.1 .793<br>1906 308<br>61.6 469     | 87.6 .802<br>1885 298<br>62.4 471 | 89.6 .805<br>1879 287<br>62.3 468 |                                    |                                    |                                    |                                    |
| 260                | 85.6 .785<br>1997 317<br>58.7 468 | 87.0 .796<br>1976 309<br>59.6 471     | 88.6 .803<br>1962 299<br>60.1 471 | 91.5 .810<br>1996 289<br>59.0 471 |                                    |                                    |                                    |                                    |
| PACK FLOW LO       |                                   | PACK FLOW HI OR/<br>AND CARGO COOL ON |                                   |                                   | ENGINE ANTI-ICE ON                 |                                    | TOTAL ANTI-ICE ON                  |                                    |
| △ FUEL = - 0.5 %   |                                   | △FUEL = + 1 %                         |                                   |                                   | △ FUEL = + 2.5 %                   |                                    | △ FUEL = + 3.5 %                   |                                    |

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|                                                                                                                                               |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.15 | P 25   |
|                                                                                                                                               | CRUISE                       |  | SEQ 150 | REV 14 |

| LONG RANGE CRUISE                                                      |                                   |                                       |                                   |                                   |                                   |                                   |                                   |                                   |  |  |
|------------------------------------------------------------------------|-----------------------------------|---------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|--|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |                                   |                                       |                                   | ISA+10<br>CG=30.0%                | N1 (%)<br>KG/H/ENG<br>NM/1000KG   | MACH<br>IAS (KT)<br>TAS (KT)      |                                   |                                   |  |  |
| WEIGHT<br>(1000KG)                                                     | FL100                             | FL120                                 | FL140                             | FL160                             | FL180                             | FL200                             | FL220                             | FL240                             |  |  |
| <b>130</b>                                                             | 59.7 .427<br>1099 236<br>63.2 278 | 60.9 .439<br>1078 234<br>65.7 283     | 62.4 .456<br>1070 234<br>68.3 292 | 64.5 .482<br>1079 238<br>71.0 306 | 66.1 .503<br>1074 239<br>73.9 318 | 67.1 .516<br>1047 235<br>77.1 323 | 68.2 .527<br>1019 231<br>80.4 328 | 69.6 .545<br>1010 230<br>83.3 336 |  |  |
| <b>140</b>                                                             | 61.2 .439<br>1166 242<br>61.1 285 | 62.7 .456<br>1157 243<br>63.5 294     | 64.8 .480<br>1165 246<br>66.0 307 | 66.5 .504<br>1168 249<br>68.6 320 | 67.5 .516<br>1138 245<br>71.5 326 | 68.6 .528<br>1109 241<br>74.6 331 | 69.9 .544<br>1093 239<br>77.3 338 | 72.6 .591<br>1140 250<br>79.9 365 |  |  |
| <b>150</b>                                                             | 62.8 .453<br>1241 250<br>59.3 294 | 64.9 .476<br>1251 254<br>61.5 308     | 66.8 .503<br>1262 258<br>63.9 322 | 67.8 .516<br>1232 255<br>66.6 328 | 69.0 .529<br>1203 251<br>69.4 334 | 70.0 .541<br>1177 247<br>72.0 339 | 72.4 .582<br>1214 256<br>74.5 362 | 74.0 .607<br>1214 257<br>77.1 374 |  |  |
| <b>160</b>                                                             | 64.9 .473<br>1338 262<br>57.5 308 | 67.0 .502<br>1358 268<br>59.6 324     | 68.0 .515<br>1327 264<br>62.1 330 | 69.2 .528<br>1298 261<br>64.7 336 | 70.1 .538<br>1262 256<br>67.3 340 | 72.2 .572<br>1287 262<br>69.6 358 | 74.2 .605<br>1308 267<br>71.9 376 | 75.4 .621<br>1285 263<br>74.5 383 |  |  |
| <b>170</b>                                                             | 67.1 .499<br>1452 276<br>55.8 324 | 68.2 .514<br>1426 274<br>58.1 332     | 69.3 .526<br>1392 270<br>60.6 337 | 70.2 .536<br>1353 265<br>63.0 341 | 71.8 .559<br>1352 266<br>65.2 353 | 74.2 .602<br>1399 276<br>67.4 377 | 75.4 .615<br>1371 271<br>69.8 383 | 76.7 .636<br>1357 270<br>72.3 392 |  |  |
| <b>180</b>                                                             | 68.4 .512<br>1528 284<br>54.5 333 | 69.4 .523<br>1488 279<br>56.7 338     | 70.3 .534<br>1447 274<br>59.1 342 | 71.4 .547<br>1420 271<br>61.2 348 | 74.1 .594<br>1482 283<br>63.2 375 | 75.2 .609<br>1458 280<br>65.5 382 | 76.6 .628<br>1439 277<br>67.8 390 | 78.6 .669<br>1471 285<br>70.1 413 |  |  |
| <b>190</b>                                                             | 69.4 .520<br>1587 288<br>53.3 338 | 70.4 .531<br>1545 284<br>55.5 343     | 71.3 .541<br>1504 278<br>57.6 347 | 73.5 .578<br>1545 287<br>59.5 368 | 75.3 .607<br>1558 290<br>61.5 383 | 76.4 .621<br>1529 285<br>63.6 389 | 78.0 .647<br>1527 286<br>65.9 403 | 79.7 .686<br>1552 292<br>68.2 423 |  |  |
| <b>200</b>                                                             | 70.4 .528<br>1645 293<br>52.2 343 | 71.2 .537<br>1599 287<br>54.2 347     | 72.8 .560<br>1600 288<br>56.1 359 | 75.2 .602<br>1654 299<br>57.9 383 | 76.2 .614<br>1618 294<br>59.9 388 | 77.5 .633<br>1599 291<br>62.0 397 | 79.5 .676<br>1638 300<br>64.1 420 | 81.0 .706<br>1647 301<br>66.1 436 |  |  |
| <b>210</b>                                                             | 71.2 .534<br>1699 296<br>51.1 347 | 72.2 .546<br>1663 292<br>53.0 352     | 74.8 .591<br>1733 305<br>54.6 379 | 76.0 .609<br>1714 302<br>56.5 387 | 77.2 .624<br>1687 299<br>58.4 394 | 79.1 .660<br>1709 304<br>60.5 413 | 80.6 .692<br>1722 307<br>62.5 430 | 81.8 .715<br>1715 306<br>64.3 441 |  |  |
| <b>220</b>                                                             | 72.0 .541<br>1756 300<br>50.0 351 | 74.0 .571<br>1785 306<br>51.7 369     | 76.0 .605<br>1819 312<br>53.3 388 | 77.0 .617<br>1780 307<br>55.1 392 | 78.2 .635<br>1756 304<br>57.1 401 | 80.3 .679<br>1804 313<br>58.9 425 | 81.6 .708<br>1811 315<br>60.7 440 | 82.4 .719<br>1770 307<br>62.7 444 |  |  |
| <b>230</b>                                                             | 73.0 .550<br>1827 305<br>48.9 358 | 75.7 .599<br>1916 321<br>50.4 386     | 76.7 .610<br>1874 315<br>52.2 391 | 77.9 .625<br>1843 311<br>53.9 398 | 79.8 .662<br>1874 317<br>55.7 418 | 81.3 .694<br>1890 321<br>57.5 435 | 82.3 .715<br>1879 318<br>59.2 445 | 83.1 .722<br>1822 309<br>61.1 446 |  |  |
| <b>240</b>                                                             | 74.8 .578<br>1965 321<br>47.8 376 | 76.6 .606<br>1985 325<br>49.3 391     | 77.6 .618<br>1941 319<br>51.0 396 | 78.8 .635<br>1915 316<br>52.7 404 | 80.8 .679<br>1970 326<br>54.4 429 | 82.2 .708<br>1978 327<br>56.0 443 | 83.0 .719<br>1935 320<br>57.8 447 | 83.7 .725<br>1876 310<br>59.6 447 |  |  |
| <b>250</b>                                                             | 76.0 .594<br>2058 330<br>46.9 386 | 77.2 .610<br>2036 327<br>48.4 394     | 78.3 .624<br>2002 323<br>50.0 400 | 80.3 .661<br>2039 330<br>51.6 421 | 81.5 .687<br>2035 330<br>53.3 434 | 82.8 .713<br>2040 330<br>54.7 447 | 83.6 .722<br>1987 321<br>56.4 449 | 84.3 .730<br>1936 312<br>58.1 450 |  |  |
| <b>260</b>                                                             | 76.4 .594<br>2090 330<br>46.2 386 | 77.9 .616<br>2096 330<br>47.4 397     | 79.2 .633<br>2071 327<br>49.0 406 | 80.7 .662<br>2079 330<br>50.6 421 | 82.0 .687<br>2074 330<br>52.3 434 | 83.3 .713<br>2082 330<br>53.6 447 | 84.2 .724<br>2041 322<br>55.2 450 | 85.0 .736<br>2003 315<br>56.7 454 |  |  |
| PACK FLOW LO                                                           |                                   | PACK FLOW HI OR/<br>AND CARGO COOL ON |                                   |                                   | ENGINE ANTI-ICE ON                |                                   | TOTAL ANTI-ICE ON                 |                                   |  |  |
| △ FUEL = - 0.5 %                                                       |                                   | △FUEL = + 1 %                         |                                   |                                   | △ FUEL = + 3.5 %                  |                                   | △ FUEL = + 5 %                    |                                   |  |  |

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## LONG RANGE CRUISE

| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |           |                                       |           | ISA + 10<br>CG=37.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG | MACH<br>IAS (KT)<br>TAS (KT) |                   |           |  |
|------------------------------------------------------------------------|-----------|---------------------------------------|-----------|----------------------|---------------------------------|------------------------------|-------------------|-----------|--|
| WEIGHT<br>(1000KG)                                                     | FL270     | FL290                                 | FL310     | FL330                | FL350                           | FL370                        | FL390             | FL410     |  |
| 130                                                                    | 73.2 .606 | 74.5 .624                             | 75.9 .649 | 78.2 .703            | 79.1 .720                       | 80.2 .728                    | 81.8 .745         | 84.5 .796 |  |
|                                                                        | 1055 240  | 1040 238                              | 1032 237  | 1073 247             | 1051 242                        | 1017 234                     | 1007 229          | 1048 235  |  |
|                                                                        | 87.5 369  | 90.7 377                              | 94.2 389  | 97.4 418             | 101.0 424                       | 105.0 427                    | 108.5 437         | 111.5 467 |  |
| 140                                                                    | 74.7 .621 | 76.3 .649                             | 78.4 .697 | 79.4 .718            | 80.1 .725                       | 81.3 .740                    | 83.9 .790         | 85.7 .803 |  |
|                                                                        | 1125 247  | 1121 248                              | 1157 256  | 1141 253             | 1099 244                        | 1078 238                     | 1119 244          | 1107 238  |  |
|                                                                        | 84.2 379  | 87.4 392                              | 90.4 418  | 93.5 427             | 97.3 427                        | 100.6 434                    | 103.5 463         | 106.4 471 |  |
| 150                                                                    | 76.1 .638 | 78.2 .684                             | 79.6 .715 | 80.3 .723            | 81.1 .734                       | 83.2 .782                    | 85.1 .801         | 87.1 .808 |  |
|                                                                        | 1195 254  | 1228 262                              | 1233 263  | 1190 255             | 1156 247                        | 1191 253                     | 1187 248          | 1168 239  |  |
|                                                                        | 81.3 389  | 84.2 413                              | 86.9 429  | 90.3 430             | 93.6 433                        | 96.4 459                     | 99.0 470          | 101.4 474 |  |
| 160                                                                    | 78.2 .674 | 79.7 .709                             | 80.5 .721 | 81.2 .729            | 82.2 .749                       | 84.5 .797                    | 86.4 .805         | 88.5 .811 |  |
|                                                                        | 1309 269  | 1321 272                              | 1284 265  | 1243 257             | 1227 253                        | 1267 259                     | 1247 250          | 1237 240  |  |
|                                                                        | 78.5 411  | 81.1 429                              | 84.1 432  | 87.2 434             | 89.9 441                        | 92.2 467                     | 94.7 473          | 96.1 476  |  |
| 170                                                                    | 79.7 .701 | 80.6 .718                             | 81.3 .725 | 82.2 .739            | 84.0 .787                       | 85.6 .802                    | 87.6 .807         | 90.5 .817 |  |
|                                                                        | 1406 281  | 1381 276                              | 1333 267  | 1306 261             | 1341 267                        | 1327 260                     | 1308 250          | 1327 242  |  |
|                                                                        | 76.0 427  | 78.5 434                              | 81.5 435  | 84.1 439             | 86.4 464                        | 88.6 470                     | 90.5 474          | 90.3 479  |  |
| 180                                                                    | 80.7 .714 | 81.4 .722                             | 82.1 .731 | 83.3 .754            | 85.2 .798                       | 86.7 .805                    | 89.0 .811         | 92.9 .817 |  |
|                                                                        | 1480 287  | 1432 278                              | 1390 270  | 1382 266             | 1418 271                        | 1387 261                     | 1386 252          | 1423 242  |  |
|                                                                        | 73.5 435  | 76.2 437                              | 78.9 438  | 81.1 448             | 83.0 471                        | 85.1 472                     | 85.8 476          | 84.2 479  |  |
| 190                                                                    | 81.4 .720 | 82.2 .726                             | 83.0 .741 | 84.8 .786            | 86.2 .802                       | 87.9 .807                    | 91.1 .816         |           |  |
|                                                                        | 1535 289  | 1484 280                              | 1456 273  | 1495 279             | 1479 273                        | 1453 262                     | 1479 253          |           |  |
|                                                                        | 71.4 439  | 74.0 439                              | 76.2 444  | 78.2 467             | 79.9 473                        | 81.4 473                     | 80.9 478          |           |  |
| 200                                                                    | 82.2 .723 | 82.9 .733                             | 84.1 .754 | 85.9 .796            | 87.2 .804                       | 89.3 .810                    | 93.4 .815         |           |  |
|                                                                        | 1586 290  | 1543 282                              | 1534 279  | 1571 283             | 1540 274                        | 1533 263                     | 1582 253          |           |  |
|                                                                        | 69.5 441  | 71.8 443                              | 73.7 452  | 75.3 473             | 77.0 474                        | 77.5 475                     | 75.6 478          |           |  |
| 210                                                                    | 82.9 .727 | 83.8 .742                             | 85.5 .783 | 86.9 .800            | 88.3 .805                       | 91.2 .813                    |                   |           |  |
|                                                                        | 1639 292  | 1612 286                              | 1649 290  | 1637 285             | 1606 274                        | 1627 264                     |                   |           |  |
|                                                                        | 67.6 443  | 69.5 448                              | 71.2 470  | 72.7 476             | 73.9 475                        | 73.3 477                     |                   |           |  |
| 220                                                                    | 83.6 .733 | 84.7 .753                             | 86.5 .792 | 87.9 .802            | 89.6 .808                       | 93.4 .814                    |                   |           |  |
|                                                                        | 1701 295  | 1690 291                              | 1727 294  | 1703 285             | 1690 275                        | 1736 265                     |                   |           |  |
|                                                                        | 65.7 447  | 67.4 455                              | 68.7 475  | 70.0 477             | 70.5 476                        | 68.8 477                     |                   |           |  |
| 230                                                                    | 84.4 .741 | 86.0 .779                             | 87.4 .795 | 88.9 .803            | 91.4 .810                       |                              |                   |           |  |
|                                                                        | 1769 298  | 1805 302                              | 1792 295  | 1770 285             | 1783 276                        |                              |                   |           |  |
|                                                                        | 63.8 452  | 65.3 471                              | 66.5 477  | 67.4 477             | 67.0 478                        |                              |                   |           |  |
| 240                                                                    | 85.2 .750 | 87.0 .788                             | 88.4 .799 | 90.1 .806            | 93.4 .812                       |                              |                   |           |  |
|                                                                        | 1844 302  | 1885 305                              | 1867 297  | 1857 287             | 1895 277                        |                              |                   |           |  |
|                                                                        | 62.0 457  | 63.2 476                              | 64.2 479  | 64.5 479             | 63.2 479                        |                              |                   |           |  |
| 250                                                                    | 86.0 .759 | 87.8 .790                             | 89.3 .800 | 91.6 .805            |                                 |                              |                   |           |  |
|                                                                        | 1922 306  | 1951 306                              | 1938 298  | 1941 286             |                                 |                              |                   |           |  |
|                                                                        | 60.2 463  | 61.2 478                              | 61.9 480  | 61.6 479             |                                 |                              |                   |           |  |
| 260                                                                    | 87.3 .782 | 88.7 .793                             | 90.4 .803 | 93.4 .809            |                                 |                              |                   |           |  |
|                                                                        | 2042 316  | 2022 307                              | 2026 299  | 2058 288             |                                 |                              |                   |           |  |
|                                                                        | 58.4 477  | 59.2 479                              | 59.4 482  | 58.4 481             |                                 |                              |                   |           |  |
| PACK FLOW LO                                                           |           | PACK FLOW HI OR/<br>AND CARGO COOL ON |           |                      | ENGINE ANTI-ICE ON              |                              | TOTAL ANTI-ICE ON |           |  |
| △ FUEL = - 0.5 %                                                       |           | △FUEL = + 1 %                         |           |                      | △ FUEL = + 2.5 %                |                              | △ FUEL = + 3.5 %  |           |  |

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|                                                                                                                 |                                                   |                     |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b><br><br><b>CRUISE</b> | 3.05.15      P 27   |
|                                                                                                                 |                                                   | SEQ 150      REV 14 |

| LONG RANGE CRUISE                                                      |       |                                       |       |      |                    |      |                                 |                    |       |      |                              |                   |       |      |       |      |
|------------------------------------------------------------------------|-------|---------------------------------------|-------|------|--------------------|------|---------------------------------|--------------------|-------|------|------------------------------|-------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |                                       |       |      | ISA+15<br>CG=30.0% |      | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                    |       |      | MACH<br>IAS (KT)<br>TAS (KT) |                   |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL100 |                                       | FL120 |      | FL140              |      | FL160                           |                    | FL180 |      | FL200                        |                   | FL220 |      | FL240 |      |
| 130                                                                    | 60.2  | .427                                  | 61.5  | .439 | 63.0               | .456 | 65.1                            | .481               | 66.8  | .505 | 68.0                         | .518              | 69.1  | .530 | 70.5  | .548 |
|                                                                        | 1110  | 236                                   | 1089  | 233  | 1081               | 234  | 1090                            | 237                | 1090  | 239  | 1064                         | 236               | 1037  | 232  | 1027  | 231  |
|                                                                        | 63.0  | 280                                   | 65.6  | 286  | 68.2               | 295  | 70.8                            | 309                | 73.7  | 322  | 76.9                         | 327               | 80.2  | 333  | 83.1  | 341  |
| 140                                                                    | 61.8  | .439                                  | 63.3  | .455 | 65.5               | .481 | 67.3                            | .506               | 68.3  | .518 | 69.4                         | .530              | 70.7  | .545 | 73.3  | .591 |
|                                                                        | 1179  | 242                                   | 1169  | 242  | 1181               | 247  | 1186                            | 250                | 1155  | 246  | 1126                         | 242               | 1108  | 239  | 1151  | 250  |
|                                                                        | 61.0  | 288                                   | 63.4  | 296  | 65.8               | 311  | 68.4                            | 325                | 71.4  | 330  | 74.5                         | 335               | 77.3  | 342  | 79.9  | 368  |
| 150                                                                    | 63.4  | .453                                  | 65.6  | .478 | 67.6               | .506 | 68.6                            | .518               | 69.7  | .530 | 70.7                         | .541              | 73.2  | .582 | 74.8  | .607 |
|                                                                        | 1255  | 250                                   | 1269  | 255  | 1283               | 260  | 1250                            | 256                | 1219  | 252  | 1188                         | 247               | 1226  | 256  | 1226  | 257  |
|                                                                        | 59.1  | 297                                   | 61.4  | 311  | 63.7               | 327  | 66.5                            | 333                | 69.3  | 338  | 72.0                         | 342               | 74.5  | 365  | 77.1  | 378  |
| 160                                                                    | 65.7  | .475                                  | 67.8  | .504 | 68.8               | .517 | 70.0                            | .529               | 70.8  | .538 | 72.9                         | .571              | 74.9  | .605 | 76.2  | .621 |
|                                                                        | 1358  | 263                                   | 1380  | 269  | 1346               | 265  | 1313                            | 262                | 1273  | 256  | 1297                         | 261               | 1320  | 267  | 1299  | 263  |
|                                                                        | 57.4  | 312                                   | 59.5  | 328  | 62.1               | 334  | 64.7                            | 340                | 67.3  | 343  | 69.6                         | 361               | 71.9  | 380  | 74.5  | 387  |
| 170                                                                    | 68.0  | .502                                  | 69.0  | .515 | 70.0               | .527 | 70.9                            | .536               | 72.5  | .558 | 75.0                         | .601              | 76.1  | .615 | 77.6  | .637 |
|                                                                        | 1478  | 278                                   | 1444  | 275  | 1407               | 271  | 1365                            | 265                | 1365  | 266  | 1412                         | 276               | 1385  | 271  | 1372  | 270  |
|                                                                        | 55.7  | 330                                   | 58.1  | 335  | 60.5               | 341  | 63.0                            | 344                | 65.2  | 356  | 67.3                         | 380               | 69.7  | 386  | 72.3  | 397  |
| 180                                                                    | 69.1  | .513                                  | 70.1  | .524 | 71.0               | .533 | 72.1                            | .547               | 74.8  | .594 | 76.0                         | .609              | 77.4  | .628 | 79.2  | .663 |
|                                                                        | 1545  | 284                                   | 1503  | 279  | 1459               | 274  | 1433                            | 271                | 1496  | 283  | 1472                         | 280               | 1455  | 277  | 1473  | 282  |
|                                                                        | 54.4  | 336                                   | 56.7  | 341  | 59.1               | 345  | 61.2                            | 351                | 63.2  | 378  | 65.5                         | 386               | 67.7  | 394  | 70.2  | 413  |
| 190                                                                    | 70.0  | .520                                  | 71.0  | .531 | 71.9               | .540 | 74.2                            | .577               | 76.0  | .606 | 77.2                         | .622              | 78.7  | .645 | 80.3  | .681 |
|                                                                        | 1600  | 288                                   | 1559  | 284  | 1516               | 278  | 1558                            | 286                | 1572  | 290  | 1546                         | 286               | 1536  | 285  | 1555  | 290  |
|                                                                        | 53.3  | 341                                   | 55.5  | 346  | 57.6               | 349  | 59.5                            | 371                | 61.4  | 386  | 63.6                         | 393               | 65.9  | 405  | 68.2  | 424  |
| 200                                                                    | 71.0  | .528                                  | 71.9  | .537 | 73.5               | .560 | 75.9                            | .602               | 77.0  | .614 | 78.2                         | .632              | 80.1  | .670 | 81.7  | .705 |
|                                                                        | 1659  | 293                                   | 1613  | 287  | 1616               | 288  | 1669                            | 299                | 1634  | 293  | 1611                         | 291               | 1641  | 297  | 1660  | 301  |
|                                                                        | 52.2  | 346                                   | 54.2  | 350  | 56.1               | 362  | 57.9                            | 386                | 59.9  | 391  | 62.0                         | 400               | 64.1  | 421  | 66.1  | 439  |
| 210                                                                    | 71.8  | .534                                  | 72.9  | .546 | 75.5               | .590 | 76.8                            | .608               | 78.0  | .624 | 79.7                         | .654              | 81.2  | .688 | 82.5  | .714 |
|                                                                        | 1713  | 296                                   | 1678  | 292  | 1747               | 304  | 1729                            | 302                | 1701  | 298  | 1711                         | 301               | 1729  | 305  | 1732  | 305  |
|                                                                        | 51.1  | 350                                   | 53.0  | 355  | 54.6               | 382  | 56.5                            | 391                | 58.4  | 397  | 60.4                         | 414               | 62.4  | 432  | 64.2  | 445  |
| 220                                                                    | 72.7  | .540                                  | 74.6  | .571 | 76.7               | .604 | 77.7                            | .616               | 78.9  | .633 | 80.9                         | .673              | 82.4  | .706 | 83.2  | .718 |
|                                                                        | 1770  | 299                                   | 1799  | 305  | 1834               | 312  | 1795                            | 306                | 1769  | 303  | 1808                         | 311               | 1826  | 314  | 1788  | 307  |
|                                                                        | 50.0  | 354                                   | 51.7  | 372  | 53.3               | 391  | 55.1                            | 396                | 57.0  | 404  | 58.9                         | 426               | 60.7  | 443  | 62.6  | 448  |
| 230                                                                    | 73.7  | .550                                  | 76.4  | .597 | 77.4               | .609 | 78.6                            | .624               | 80.4  | .657 | 81.9                         | .690              | 83.1  | .714 | 83.9  | .722 |
|                                                                        | 1844  | 305                                   | 1929  | 320  | 1889               | 314  | 1859                            | 310                | 1878  | 315  | 1898                         | 319               | 1899  | 318  | 1843  | 308  |
|                                                                        | 48.9  | 361                                   | 50.4  | 389  | 52.1               | 394  | 53.9                            | 401                | 55.7  | 418  | 57.4                         | 436               | 59.0  | 448  | 61.0  | 450  |
| 240                                                                    | 75.5  | .578                                  | 77.3  | .606 | 78.3               | .617 | 79.5                            | .633               | 81.4  | .674 | 82.9                         | .705              | 83.8  | .718 | 84.5  | .725 |
|                                                                        | 1982  | 321                                   | 2001  | 324  | 1957               | 319  | 1929                            | 315                | 1974  | 323  | 1995                         | 326               | 1956  | 320  | 1898  | 310  |
|                                                                        | 47.8  | 379                                   | 49.3  | 394  | 51.0               | 399  | 52.7                            | 407                | 54.4  | 429  | 55.9                         | 446               | 57.6  | 451  | 59.5  | 451  |
| 250                                                                    | 76.7  | .594                                  | 77.9  | .609 | 79.1               | .624 | 80.8                            | .655               | 82.3  | .687 | 83.6                         | .713              | 84.4  | .721 | 85.1  | .729 |
|                                                                        | 2079  | 330                                   | 2052  | 326  | 2021               | 322  | 2039                            | 326                | 2060  | 330  | 2067                         | 330               | 2011  | 321  | 1959  | 312  |
|                                                                        | 46.9  | 390                                   | 48.3  | 397  | 49.9               | 403  | 51.5                            | 420                | 53.1  | 438  | 54.5                         | 451               | 56.3  | 453  | 58.0  | 454  |
| 260                                                                    | 77.1  | .594                                  | 78.7  | .616 | 79.9               | .632 | 81.5                            | .662               | 82.8  | .687 | 84.1                         | .713              | 85.0  | .723 | 85.8  | .734 |
|                                                                        | 2112  | 330                                   | 2118  | 330  | 2089               | 326  | 2104                            | 330                | 2100  | 330  | 2109                         | 330               | 2065  | 322  | 2025  | 314  |
|                                                                        | 46.1  | 390                                   | 47.3  | 401  | 48.9               | 408  | 50.5                            | 425                | 52.1  | 438  | 53.5                         | 451               | 55.0  | 454  | 56.5  | 458  |
| PACK FLOW LO                                                           |       | PACK FLOW HI OR/<br>AND CARGO COOL ON |       |      |                    |      |                                 | ENGINE ANTI-ICE ON |       |      |                              | TOTAL ANTI-ICE ON |       |      |       |      |
| △ FUEL = - 0.5 %                                                       |       | △FUEL = + 1 %                         |       |      |                    |      |                                 | △ FUEL = + 3.5 %   |       |      |                              | △ FUEL = + 5 %    |       |      |       |      |

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## LONG RANGE CRUISE

| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |           |                                       |           |           | ISA + 15<br>CG = 37.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG | MACH<br>IAS (KT)<br>TAS (KT) |                   |  |
|------------------------------------------------------------------------|-----------|---------------------------------------|-----------|-----------|------------------------|---------------------------------|------------------------------|-------------------|--|
| WEIGHT<br>(1000KG)                                                     | FL270     | FL290                                 | FL310     | FL330     | FL350                  | FL370                           | FL390                        | FL410             |  |
| 130                                                                    | 73.9 .605 | 75.3 .624                             | 76.8 .652 | 79.0 .703 | 80.0 .719              | 81.0 .727                       | 82.7 .743                    | 85.3 .795         |  |
|                                                                        | 1065 240  | 1051 238                              | 1049 238  | 1084 247  | 1060 242               | 1027 234                        | 1016 229                     | 1059 235          |  |
|                                                                        | 87.5 373  | 90.7 381                              | 94.2 395  | 97.4 422  | 101.0 428              | 105.0 431                       | 108.5 441                    | 111.3 471         |  |
| 140                                                                    | 75.5 .622 | 77.1 .651                             | 79.1 .694 | 80.2 .717 | 80.9 .724              | 82.1 .738                       | 84.7 .787                    | 86.6 .803         |  |
|                                                                        | 1138 247  | 1137 248                              | 1162 255  | 1150 252  | 1109 244               | 1088 238                        | 1129 244                     | 1121 237          |  |
|                                                                        | 84.1 383  | 87.4 397                              | 90.4 420  | 93.6 431  | 97.3 432               | 100.6 438                       | 103.4 467                    | 106.1 476         |  |
| 150                                                                    | 77.1 .642 | 78.9 .680                             | 80.4 .714 | 81.2 .722 | 81.9 .733              | 84.0 .781                       | 86.1 .800                    | 88.0 .807         |  |
|                                                                        | 1215 256  | 1232 260                              | 1244 263  | 1202 254  | 1166 247               | 1202 253                        | 1202 248                     | 1184 239          |  |
|                                                                        | 81.3 395  | 84.3 415                              | 86.9 433  | 90.3 434  | 93.6 437               | 96.3 463                        | 98.7 475                     | 101.1 479         |  |
| 160                                                                    | 78.8 .671 | 80.5 .707                             | 81.3 .720 | 82.0 .728 | 83.1 .746              | 85.4 .795                       | 87.3 .805                    | 89.5 .810         |  |
|                                                                        | 1315 268  | 1331 272                              | 1298 265  | 1255 257  | 1236 252               | 1281 258                        | 1264 250                     | 1256 240          |  |
|                                                                        | 78.6 413  | 81.1 432                              | 84.1 436  | 87.2 438  | 89.9 445               | 92.1 472                        | 94.4 477                     | 95.6 480          |  |
| 170                                                                    | 80.4 .697 | 81.4 .717                             | 82.2 .725 | 83.0 .737 | 84.8 .784              | 86.5 .801                       | 88.5 .806                    | 91.5 .817         |  |
|                                                                        | 1412 279  | 1394 275                              | 1348 267  | 1318 260  | 1353 266               | 1344 260                        | 1325 250                     | 1349 242          |  |
|                                                                        | 76.0 429  | 78.5 438                              | 81.4 439  | 84.0 443  | 86.3 467               | 88.4 475                        | 90.2 478                     | 89.8 485          |  |
| 180                                                                    | 81.5 .713 | 82.2 .721                             | 83.0 .731 | 84.1 .752 | 86.0 .797              | 87.6 .804                       | 90.0 .811                    |                   |  |
|                                                                        | 1493 286  | 1447 278                              | 1406 269  | 1394 266  | 1433 271               | 1406 261                        | 1409 252                     |                   |  |
|                                                                        | 73.5 439  | 76.1 441                              | 78.7 443  | 81.0 452  | 82.8 475               | 84.8 477                        | 85.3 481                     |                   |  |
| 190                                                                    | 82.2 .719 | 83.0 .726                             | 83.9 .740 | 85.7 .784 | 87.1 .802              | 88.8 .805                       | 92.1 .816                    |                   |  |
|                                                                        | 1550 288  | 1500 279                              | 1472 273  | 1511 278  | 1499 273               | 1471 261                        | 1504 253                     |                   |  |
|                                                                        | 71.4 442  | 73.9 443                              | 76.1 448  | 78.0 471  | 79.7 478               | 81.2 477                        | 80.4 484                     |                   |  |
| 200                                                                    | 83.0 .722 | 83.8 .732                             | 84.9 .752 | 86.8 .795 | 88.1 .804              | 90.2 .810                       |                              |                   |  |
|                                                                        | 1603 290  | 1560 282                              | 1550 278  | 1590 282  | 1561 273               | 1558 263                        |                              |                   |  |
|                                                                        | 69.4 445  | 71.6 447                              | 73.5 456  | 75.1 477  | 76.7 479               | 77.1 480                        |                              |                   |  |
| 210                                                                    | 83.7 .726 | 84.6 .740                             | 86.3 .782 | 87.8 .799 | 89.2 .804              | 92.2 .813                       |                              |                   |  |
|                                                                        | 1657 292  | 1629 285                              | 1667 290  | 1657 284  | 1630 274               | 1654 264                        |                              |                   |  |
|                                                                        | 67.5 447  | 69.4 452                              | 71.0 474  | 72.4 480  | 73.5 479               | 72.9 482                        |                              |                   |  |
| 220                                                                    | 84.4 .732 | 85.5 .751                             | 87.4 .790 | 88.8 .801 | 90.6 .808              |                                 |                              |                   |  |
|                                                                        | 1719 294  | 1706 290                              | 1747 293  | 1724 285  | 1718 275               |                                 |                              |                   |  |
|                                                                        | 65.5 451  | 67.2 459                              | 68.5 479  | 69.8 481  | 70.1 481               |                                 |                              |                   |  |
| 230                                                                    | 85.2 .739 | 86.7 .772                             | 88.2 .793 | 89.8 .802 | 92.3 .810              |                                 |                              |                   |  |
|                                                                        | 1788 297  | 1811 299                              | 1812 294  | 1798 285  | 1812 276               |                                 |                              |                   |  |
|                                                                        | 63.7 455  | 65.1 472                              | 66.3 480  | 67.0 482  | 66.6 483               |                                 |                              |                   |  |
| 240                                                                    | 86.0 .748 | 87.8 .786                             | 89.3 .797 | 91.0 .805 |                        |                                 |                              |                   |  |
|                                                                        | 1864 301  | 1907 305                              | 1889 296  | 1886 287  |                        |                                 |                              |                   |  |
|                                                                        | 61.8 461  | 62.9 480                              | 63.9 483  | 64.1 484  |                        |                                 |                              |                   |  |
| 250                                                                    | 86.9 .757 | 88.6 .788                             | 90.3 .800 | 92.4 .801 |                        |                                 |                              |                   |  |
|                                                                        | 1943 305  | 1973 305                              | 1969 297  | 1958 285  |                        |                                 |                              |                   |  |
|                                                                        | 60.0 466  | 61.0 481                              | 61.6 485  | 61.5 481  |                        |                                 |                              |                   |  |
| 260                                                                    | 88.1 .781 | 89.6 .792                             | 91.4 .803 |           |                        |                                 |                              |                   |  |
|                                                                        | 2067 315  | 2051 307                              | 2058 299  |           |                        |                                 |                              |                   |  |
|                                                                        | 58.1 481  | 59.0 484                              | 59.1 487  |           |                        |                                 |                              |                   |  |
| PACK FLOW LO                                                           |           | PACK FLOW HI OR/<br>AND CARGO COOL ON |           |           |                        | ENGINE ANTI-ICE ON              |                              | TOTAL ANTI-ICE ON |  |
| △ FUEL = - 0.5 %                                                       |           | △ FUEL = + 1 %                        |           |           |                        | △ FUEL = + 2.5 %                |                              | △ FUEL = + 3.5 %  |  |

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|                                                                                                                                               |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.15 | P 29   |
|                                                                                                                                               | CRUISE                       |  | SEQ 150 | REV 14 |

| LONG RANGE CRUISE                                                      |       |      |                                       |      |                      |                                 |       |                              |                    |      |       |                   |       |      |       |      |
|------------------------------------------------------------------------|-------|------|---------------------------------------|------|----------------------|---------------------------------|-------|------------------------------|--------------------|------|-------|-------------------|-------|------|-------|------|
| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |       |      |                                       |      | ISA + 20<br>CG=30.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG |       | MACH<br>IAS (KT)<br>TAS (KT) |                    |      |       |                   |       |      |       |      |
| WEIGHT<br>(1000KG)                                                     | FL100 |      | FL120                                 |      | FL140                |                                 | FL160 |                              | FL180              |      | FL200 |                   | FL220 |      | FL240 |      |
| 130                                                                    | 60.8  | .426 | 62.0                                  | .438 | 63.6                 | .456                            | 65.9  | .483                         | 67.6               | .507 | 68.8  | .521              | 69.8  | .531 | 71.2  | .548 |
|                                                                        | 1121  | 235  | 1100                                  | 233  | 1092                 | 233                             | 1108  | 238                          | 1108               | 241  | 1082  | 238               | 1051  | 233  | 1036  | 231  |
|                                                                        | 62.9  | 282  | 65.5                                  | 288  | 68.1                 | 297                             | 70.7  | 313                          | 73.6               | 326  | 76.8  | 332               | 80.1  | 337  | 83.1  | 345  |
| 140                                                                    | 62.3  | .439 | 63.9                                  | .455 | 66.3                 | .483                            | 68.0  | .507                         | 69.1               | .520 | 70.1  | .531              | 71.4  | .546 | 74.0  | .590 |
|                                                                        | 1191  | 242  | 1181                                  | 242  | 1200                 | 248                             | 1203  | 251                          | 1171               | 247  | 1138  | 242               | 1119  | 239  | 1162  | 245  |
|                                                                        | 60.9  | 290  | 63.3                                  | 299  | 65.7                 | 315                             | 68.3  | 329                          | 71.3               | 334  | 74.4  | 339               | 77.2  | 346  | 79.9  | 371  |
| 150                                                                    | 64.0  | .453 | 66.5                                  | .483 | 68.4                 | .508                            | 69.4  | .519                         | 70.4               | .530 | 71.4  | .541              | 73.9  | .582 | 75.5  | .607 |
|                                                                        | 1269  | 250  | 1295                                  | 257  | 1302                 | 261                             | 1265  | 256                          | 1229               | 252  | 1199  | 247               | 1238  | 256  | 1238  | 257  |
|                                                                        | 59.0  | 300  | 61.2                                  | 317  | 63.6                 | 331                             | 66.4  | 336                          | 69.3               | 341  | 72.0  | 345               | 74.5  | 369  | 77.1  | 382  |
| 160                                                                    | 66.7  | .480 | 68.6                                  | .506 | 69.5                 | .517                            | 70.6  | .529                         | 71.5               | .537 | 73.6  | .570              | 75.7  | .605 | 77.0  | .622 |
|                                                                        | 1387  | 266  | 1398                                  | 270  | 1361                 | 266                             | 1324  | 261                          | 1284               | 256  | 1307  | 261               | 1332  | 267  | 1313  | 263  |
|                                                                        | 57.2  | 318  | 59.5                                  | 333  | 62.0                 | 338                             | 64.7  | 343                          | 67.3               | 346  | 69.6  | 364               | 71.9  | 383  | 74.5  | 391  |
| 170                                                                    | 68.7  | .503 | 69.6                                  | .515 | 70.7                 | .527                            | 71.6  | .536                         | 73.2               | .558 | 75.7  | .601              | 76.9  | .616 | 78.3  | .635 |
|                                                                        | 1495  | 279  | 1458                                  | 275  | 1419                 | 271                             | 1377  | 265                          | 1376               | 266  | 1425  | 276               | 1400  | 272  | 1381  | 269  |
|                                                                        | 55.7  | 333  | 58.1                                  | 339  | 60.5                 | 344                             | 63.0  | 347                          | 65.2               | 359  | 67.3  | 384               | 69.7  | 390  | 72.3  | 400  |
| 180                                                                    | 69.7  | .513 | 70.7                                  | .523 | 71.6                 | .533                            | 72.8  | .547                         | 75.5               | .593 | 76.7  | .609              | 78.1  | .627 | 79.7  | .658 |
|                                                                        | 1558  | 284  | 1515                                  | 279  | 1472                 | 274                             | 1447  | 271                          | 1509               | 283  | 1486  | 280               | 1467  | 277  | 1474  | 275  |
|                                                                        | 54.4  | 339  | 56.7                                  | 344  | 59.1                 | 348                             | 61.2  | 354                          | 63.2               | 382  | 65.4  | 389               | 67.7  | 397  | 70.2  | 414  |
| 190                                                                    | 70.6  | .520 | 71.7                                  | .531 | 72.6                 | .540                            | 74.9  | .577                         | 76.7               | .606 | 77.9  | .621              | 79.4  | .643 | 81.0  | .676 |
|                                                                        | 1613  | 288  | 1572                                  | 284  | 1529                 | 278                             | 1571  | 286                          | 1586               | 289  | 1559  | 285               | 1547  | 284  | 1560  | 288  |
|                                                                        | 53.3  | 344  | 55.5                                  | 349  | 57.6                 | 352                             | 59.5  | 374                          | 61.4               | 390  | 63.6  | 396               | 65.9  | 408  | 68.1  | 425  |
| 200                                                                    | 71.7  | .528 | 72.5                                  | .537 | 74.2                 | .560                            | 76.6  | .601                         | 77.7               | .613 | 78.9  | .630              | 80.7  | .665 | 82.4  | .702 |
|                                                                        | 1673  | 293  | 1627                                  | 287  | 1629                 | 288                             | 1683  | 299                          | 1648               | 293  | 1624  | 290               | 1646  | 295  | 1673  | 300  |
|                                                                        | 52.2  | 349  | 54.2                                  | 353  | 56.1                 | 365                             | 57.9  | 390                          | 59.9               | 395  | 62.0  | 403               | 64.1  | 422  | 66.0  | 442  |
| 210                                                                    | 72.5  | .533 | 73.6                                  | .546 | 76.2                 | .590                            | 77.5  | .608                         | 78.7               | .623 | 80.2  | .647              | 81.9  | .683 | 83.3  | .713 |
|                                                                        | 1726  | 296  | 1693                                  | 292  | 1762                 | 304                             | 1743  | 302                          | 1716               | 298  | 1711  | 298               | 1737  | 303  | 1750  | 304  |
|                                                                        | 51.1  | 353  | 53.0                                  | 359  | 54.6                 | 385                             | 56.5  | 394                          | 58.4               | 401  | 60.4  | 413               | 62.3  | 433  | 64.1  | 448  |
| 220                                                                    | 73.3  | .540 | 75.3                                  | .570 | 77.3                 | .603                            | 78.4  | .615                         | 79.6               | .632 | 81.4  | .668              | 83.1  | .704 | 84.0  | .717 |
|                                                                        | 1784  | 299  | 1814                                  | 305  | 1848                 | 311                             | 1809  | 306                          | 1784               | 302  | 1814  | 308               | 1841  | 313  | 1809  | 307  |
|                                                                        | 50.0  | 357  | 51.6                                  | 375  | 53.3                 | 394                             | 55.1  | 399                          | 57.0               | 407  | 58.8  | 427               | 60.6  | 446  | 62.4  | 451  |
| 230                                                                    | 74.4  | .550 | 77.0                                  | .595 | 78.0                 | .608                            | 79.3  | .623                         | 80.8               | .649 | 82.5  | .685              | 83.9  | .713 | 84.7  | .721 |
|                                                                        | 1859  | 305  | 1937                                  | 318  | 1902                 | 314                             | 1875  | 310                          | 1876               | 311  | 1907  | 316               | 1918  | 317  | 1865  | 308  |
|                                                                        | 48.9  | 364  | 50.4                                  | 391  | 52.1                 | 397                             | 53.8  | 404                          | 55.6               | 417  | 57.3  | 438               | 58.9  | 452  | 60.8  | 453  |
| 240                                                                    | 76.2  | .577 | 77.9                                  | .604 | 78.9                 | .616                            | 80.2  | .632                         | 82.0               | .669 | 83.6  | .703              | 84.5  | .717 | 85.3  | .724 |
|                                                                        | 1996  | 320  | 2015                                  | 324  | 1972                 | 318                             | 1944  | 314                          | 1981               | 321  | 2012  | 325               | 1978  | 319  | 1920  | 309  |
|                                                                        | 47.8  | 382  | 49.3                                  | 397  | 50.9                 | 402                             | 52.6  | 409                          | 54.3               | 430  | 55.8  | 449               | 57.5  | 455  | 59.3  | 455  |
| 250                                                                    | 77.4  | .594 | 78.6                                  | .608 | 79.8                 | .623                            | 81.3  | .647                         | 83.0               | .683 | 84.4  | .712              | 85.2  | .720 | 85.9  | .728 |
|                                                                        | 2100  | 330  | 2068                                  | 326  | 2039                 | 322                             | 2037  | 322                          | 2074               | 328  | 2090  | 330               | 2036  | 321  | 1982  | 311  |
|                                                                        | 46.8  | 393  | 48.3                                  | 400  | 49.8                 | 406                             | 51.5  | 419                          | 53.0               | 440  | 54.4  | 455               | 56.1  | 457  | 57.8  | 458  |
| 260                                                                    | 77.8  | .594 | 79.4                                  | .615 | 80.6                 | .631                            | 82.2  | .662                         | 83.5               | .687 | 84.9  | .713              | 85.8  | .723 | 86.6  | .733 |
|                                                                        | 2134  | 330  | 2138                                  | 330  | 2108                 | 326                             | 2130  | 330                          | 2127               | 330  | 2137  | 330               | 2091  | 322  | 2049  | 314  |
|                                                                        | 46.0  | 393  | 47.2                                  | 404  | 48.8                 | 411                             | 50.3  | 429                          | 51.9               | 442  | 53.3  | 455               | 54.8  | 458  | 56.3  | 461  |
| PACK FLOW LO                                                           |       |      | PACK FLOW HI OR/<br>AND CARGO COOL ON |      |                      |                                 |       |                              | ENGINE ANTI-ICE ON |      |       | TOTAL ANTI-ICE ON |       |      |       |      |
| △ FUEL = - 0.5 %                                                       |       |      | △FUEL = + 1 %                         |      |                      |                                 |       |                              | △ FUEL = + 3.5 %   |      |       | △ FUEL = + 5 %    |       |      |       |      |

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## LONG RANGE CRUISE

| MAX. CRUISE THRUST LIMITS<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |           |                                       |           |           | ISA +20<br>CG=37.0% | N1 (%)<br>KG/H/ENG<br>NM/1000KG | MACH<br>IAS (KT)<br>TAS (KT) |           |       |      |
|------------------------------------------------------------------------|-----------|---------------------------------------|-----------|-----------|---------------------|---------------------------------|------------------------------|-----------|-------|------|
| WEIGHT<br>(1000KG)                                                     | FL270     | FL290                                 | FL310     | FL330     | FL350               | FL370                           | FL390                        | FL410     |       |      |
| 130                                                                    | 74.6 .605 | 76.1 .624                             | 77.8 .656 | 79.8 .701 | 80.8 .718           | 81.8 .726                       | 83.5 .741                    | 86.2 .793 | 86.2  | .793 |
|                                                                        | 1075 240  | 1062 238                              | 1065 240  | 1092 246  | 1071 242            | 1037 233                        | 1025 228                     | 1070 234  | 1070  | 234  |
|                                                                        | 87.5 376  | 90.7 385                              | 94.2 401  | 97.5 426  | 101.0 433           | 104.9 435                       | 108.4 444                    | 111.1 475 | 111.1 | 475  |
| 140                                                                    | 76.3 .622 | 77.9 .650                             | 79.7 .689 | 81.0 .715 | 81.8 .724           | 83.0 .737                       | 85.5 .785                    | 87.5 .802 | 87.5  | .802 |
|                                                                        | 1150 247  | 1148 248                              | 1165 253  | 1161 252  | 1122 244            | 1099 237                        | 1140 243                     | 1136 237  | 1136  | 237  |
|                                                                        | 84.1 387  | 87.4 401                              | 90.5 422  | 93.5 434  | 97.2 436            | 100.5 442                       | 103.3 471                    | 105.8 481 | 105.8 | 481  |
| 150                                                                    | 77.9 .643 | 79.5 .676                             | 81.2 .712 | 82.0 .722 | 82.8 .732           | 84.3 .756                       | 86.9 .799                    | 88.9 .805 | 88.9  | .805 |
|                                                                        | 1229 256  | 1237 259                              | 1253 262  | 1214 254  | 1179 247            | 1178 244                        | 1217 248                     | 1199 238  | 1199  | 238  |
|                                                                        | 81.3 400  | 84.3 417                              | 86.9 436  | 90.2 438  | 93.5 441            | 96.2 453                        | 98.4 479                     | 100.7 483 | 100.7 | 483  |
| 160                                                                    | 79.5 .668 | 81.2 .705                             | 82.1 .719 | 82.9 .727 | 83.9 .745           | 86.2 .794                       | 88.2 .804                    | 90.4 .810 | 90.4  | .810 |
|                                                                        | 1322 267  | 1341 271                              | 1311 265  | 1268 256  | 1249 251            | 1295 257                        | 1280 249                     | 1276 240  | 1276  | 240  |
|                                                                        | 78.6 415  | 81.1 435                              | 84.0 440  | 87.0 442  | 89.8 448            | 91.9 476                        | 94.1 482                     | 95.1 485  | 95.1  | 485  |
| 170                                                                    | 81.0 .694 | 82.2 .716                             | 83.0 .724 | 83.8 .736 | 85.6 .782           | 87.4 .801                       | 89.4 .805                    |           |       |      |
|                                                                        | 1419 278  | 1408 275                              | 1363 267  | 1332 260  | 1366 265            | 1362 260                        | 1345 250                     |           |       |      |
|                                                                        | 76.0 431  | 78.4 442                              | 81.2 443  | 83.9 447  | 86.2 471            | 88.1 480                        | 89.7 483                     |           |       |      |
| 180                                                                    | 82.2 .711 | 83.0 .720                             | 83.8 .730 | 84.9 .750 | 86.9 .795           | 88.5 .803                       | 91.0 .811                    |           |       |      |
|                                                                        | 1505 285  | 1462 277                              | 1422 269  | 1408 265  | 1448 270            | 1424 261                        | 1432 252                     |           |       |      |
|                                                                        | 73.4 442  | 76.0 445                              | 78.6 447  | 80.8 455  | 82.6 479            | 84.5 481                        | 84.8 486                     |           |       |      |
| 190                                                                    | 83.0 .717 | 83.8 .725                             | 84.7 .739 | 86.5 .783 | 88.0 .801           | 89.7 .805                       |                              |           |       |      |
|                                                                        | 1566 288  | 1516 279                              | 1489 273  | 1527 278  | 1518 272            | 1494 261                        |                              |           |       |      |
|                                                                        | 71.2 446  | 73.7 447                              | 75.9 452  | 77.8 475  | 79.4 482            | 80.7 482                        |                              |           |       |      |
| 200                                                                    | 83.8 .722 | 84.6 .731                             | 85.7 .751 | 87.6 .793 | 89.0 .802           | 91.2 .810                       |                              |           |       |      |
|                                                                        | 1621 290  | 1577 281                              | 1567 277  | 1608 282  | 1582 273            | 1583 263                        |                              |           |       |      |
|                                                                        | 69.2 449  | 71.5 451                              | 73.3 460  | 74.9 482  | 76.4 483            | 76.6 485                        |                              |           |       |      |
| 210                                                                    | 84.5 .725 | 85.4 .738                             | 87.2 .780 | 88.6 .797 | 90.2 .804           |                                 |                              |           |       |      |
|                                                                        | 1676 291  | 1645 285                              | 1687 289  | 1675 283  | 1656 273            |                                 |                              |           |       |      |
|                                                                        | 67.3 451  | 69.2 456                              | 70.8 478  | 72.2 484  | 73.1 484            |                                 |                              |           |       |      |
| 220                                                                    | 85.2 .731 | 86.3 .749                             | 88.2 .789 | 89.7 .801 | 91.5 .808           |                                 |                              |           |       |      |
|                                                                        | 1739 294  | 1723 289                              | 1767 293  | 1752 285  | 1745 275            |                                 |                              |           |       |      |
|                                                                        | 65.4 455  | 67.0 462                              | 68.3 483  | 69.4 486  | 69.7 486            |                                 |                              |           |       |      |
| 230                                                                    | 86.0 .738 | 87.3 .759                             | 89.1 .790 | 90.8 .802 |                     |                                 |                              |           |       |      |
|                                                                        | 1808 297  | 1805 293                              | 1831 293  | 1827 285  |                     |                                 |                              |           |       |      |
|                                                                        | 63.5 459  | 64.9 468                              | 66.1 484  | 66.7 487  |                     |                                 |                              |           |       |      |
| 240                                                                    | 86.8 .746 | 88.6 .784                             | 90.1 .797 |           |                     |                                 |                              |           |       |      |
|                                                                        | 1884 300  | 1929 304                              | 1917 296  |           |                     |                                 |                              |           |       |      |
|                                                                        | 61.6 464  | 62.7 484                              | 63.6 488  |           |                     |                                 |                              |           |       |      |
| 250                                                                    | 87.7 .755 | 89.4 .787                             | 90.6 .780 |           |                     |                                 |                              |           |       |      |
|                                                                        | 1964 304  | 1998 305                              | 1927 289  |           |                     |                                 |                              |           |       |      |
|                                                                        | 59.8 470  | 60.7 485                              | 61.9 477  |           |                     |                                 |                              |           |       |      |
| 260                                                                    | 88.9 .778 | 89.9 .774                             |           |           |                     |                                 |                              |           |       |      |
|                                                                        | 2090 314  | 2020 300                              |           |           |                     |                                 |                              |           |       |      |
|                                                                        | 57.9 484  | 59.1 478                              |           |           |                     |                                 |                              |           |       |      |
| PACK FLOW LO                                                           |           | PACK FLOW HI OR/<br>AND CARGO COOL ON |           |           | ENGINE ANTI-ICE ON  |                                 | TOTAL ANTI-ICE ON            |           |       |      |
| △ FUEL = - 0.5 %                                                       |           | △FUEL = + 1 %                         |           |           | △ FUEL = + 2.5 %    |                                 | △ FUEL = + 3.5 %             |           |       |      |

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EXAMPLE

- R In-cruise quick check with cruise at M.82
- R FL390
- R Actual cruise weight : 200 000 kg
- R Remaining ground distance : 2500 NM
- ISA + 10
- Average wind during flight : – 50 kt (head wind)
- Evaluation of air distance to be covered
- Using the “Ground Distance/Air Distance” conversion table (see 3.05.50 p3), the corresponding air distance is : 2796 NM ~ 2800 NM
- Determination of fuel consumption and time for the reference initial weight in cruise.
- R · Enter table on 3.05.20 p8 with an air distance of 2800 NM and a FL390 for ISA.
- Fuel consumption : 34 335 kg
- Time needed : 6 h 07 min
- Correction due to real in cruise weight of 200 000 kg
- △ fuel consumption : – 163 kg per 1000 kg below reference weight
- △ fuel : – 163 × (210 – 200) = – 1630 kg
- Temperature Correction
- △ fuel consumption : + 0.015 (kg/°C/NM) × 10°C × 2800 NM
- △ fuel : + 420 kg

RESULTS

Fuel : 34 335 – 1630 + 420 = 33 125 kg

Time : 6 h 07 min

| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |               |                                       |               |                    |               |                    |                                                  |                |                |
|------------------------------------------------------------|---------------|---------------------------------------|---------------|--------------------|---------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : M.80 - DESCENT : M.80/300KT/250KT                 |               |                                       |               |                    |               |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |               |                                       |               |                    |               |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 180000 KG                            |               |                                       |               | ISA                |               | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |               |                                       |               | CG = 37.0 %        |               |                    |                                                  |                |                |
| ANTI-ICING OFF                                             |               |                                       |               | TIME (H.MIN)       |               |                    |                                                  |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL  |                                       |               |                    |               |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                            | (NM)          | 310                                   | 330           | 350                | 370           | 390                | 410                                              | FL310<br>FL330 | FL350<br>FL370 |
| 200                                                        | 1982<br>0.36  | 1863<br>0.36                          | 1762<br>0.36  | 1671<br>0.36       | 1593<br>0.36  | 1540<br>0.36       | 0                                                | 0              | 2              |
| 300                                                        | 3300<br>0.49  | 3115<br>0.49                          | 2963<br>0.49  | 2833<br>0.49       | 2733<br>0.49  | 2693<br>0.49       | 2                                                | 4              | 8              |
| 400                                                        | 4615<br>1.01  | 4362<br>1.02                          | 4158<br>1.02  | 3990<br>1.02       | 3866<br>1.02  | 3837<br>1.02       | 5                                                | 8              | 15             |
| 500                                                        | 5927<br>1.14  | 5605<br>1.15                          | 5349<br>1.15  | 5142<br>1.15       | 4992<br>1.15  | 4970<br>1.15       | 8                                                | 12             | 21             |
| 600                                                        | 7235<br>1.27  | 6845<br>1.28                          | 6536<br>1.28  | 6288<br>1.28       | 6113<br>1.28  | 6096<br>1.28       | 10                                               | 16             | 27             |
| 700                                                        | 8541<br>1.40  | 8080<br>1.40                          | 7718<br>1.41  | 7430<br>1.42       | 7229<br>1.42  | 7213<br>1.42       | 13                                               | 20             | 33             |
| 800                                                        | 9844<br>1.53  | 9313<br>1.53                          | 8896<br>1.54  | 8567<br>1.55       | 8339<br>1.55  | 8321<br>1.55       | 15                                               | 24             | 38             |
| 900                                                        | 11143<br>2.05 | 10541<br>2.06                         | 10070<br>2.07 | 9699<br>2.08       | 9444<br>2.08  | 9422<br>2.08       | 18                                               | 28             | 44             |
| 1000                                                       | 12440<br>2.18 | 11766<br>2.19                         | 11240<br>2.20 | 10827<br>2.21      | 10543<br>2.21 | 10515<br>2.21      | 20                                               | 31             | 49             |
| 1100                                                       | 13734<br>2.31 | 12988<br>2.32                         | 12406<br>2.33 | 11950<br>2.34      | 11637<br>2.34 | 11600<br>2.34      | 22                                               | 35             | 54             |
| 1200                                                       | 15024<br>2.44 | 14208<br>2.45                         | 13567<br>2.46 | 13069<br>2.47      | 12726<br>2.47 | 12677<br>2.47      | 25                                               | 38             | 59             |
| 1300                                                       | 16312<br>2.56 | 15423<br>2.58                         | 14725<br>2.59 | 14183<br>3.00      | 13809<br>3.00 | 13746<br>3.00      | 27                                               | 42             | 69             |
| 1400                                                       | 17597<br>3.09 | 16636<br>3.11                         | 15878<br>3.12 | 15293<br>3.13      | 14887<br>3.13 | 14808<br>3.13      | 29                                               | 45             | 74             |
| 1500                                                       | 18879<br>3.22 | 17846<br>3.23                         | 17028<br>3.25 | 16399<br>3.26      | 15959<br>3.26 | 15862<br>3.26      | 31                                               | 49             | 79             |
| 1600                                                       | 20159<br>3.35 | 19052<br>3.36                         | 18173<br>3.38 | 17500<br>3.39      | 17027<br>3.39 | 16910<br>3.39      | 34                                               | 52             | 84             |
| 1700                                                       | 21436<br>3.47 | 20257<br>3.49                         | 19315<br>3.51 | 18597<br>3.52      | 18090<br>3.52 | 17951<br>3.52      | 36                                               | 55             | 89             |
| 1800                                                       | 22711<br>4.00 | 21458<br>4.02                         | 20454<br>4.04 | 19691<br>4.05      | 19148<br>4.05 | 18985<br>4.05      | 38                                               | 58             | 93             |
| 1900                                                       | 23982<br>4.13 | 22656<br>4.15                         | 21588<br>4.17 | 20779<br>4.18      | 20201<br>4.18 | 20016<br>4.18      | 40                                               | 62             | 97             |
| 2000                                                       | 25251<br>4.26 | 23852<br>4.28                         | 22719<br>4.30 | 21864<br>4.31      | 21250<br>4.31 | 21042<br>4.31      | 42                                               | 65             | 102            |
| 2100                                                       | 26517<br>4.38 | 25044<br>4.41                         | 23846<br>4.43 | 22945<br>4.44      | 22294<br>4.44 | 22061<br>4.44      | 43                                               | 68             | 106            |
| 2200                                                       | 27781<br>4.51 | 26233<br>4.54                         | 24969<br>4.56 | 24022<br>4.57      | 23333<br>4.57 | 23075<br>4.57      | 45                                               | 71             | 110            |
| 2300                                                       | 29042<br>5.04 | 27421<br>5.07                         | 26088<br>5.09 | 25094<br>5.11      | 24368<br>5.11 | 24082<br>5.11      | 47                                               | 74             | 114            |
| 2400                                                       | 30301<br>5.17 | 28607<br>5.19                         | 27208<br>5.22 | 26163<br>5.24      | 25398<br>5.24 | 25084<br>5.24      | 49                                               | 76             | 118            |
| 2500                                                       | 31557<br>5.30 | 29789<br>5.32                         | 28324<br>5.35 | 27229<br>5.37      | 26425<br>5.37 | 26080<br>5.37      | 51                                               | 79             | 122            |
| 2600                                                       | 32810<br>5.42 | 30969<br>5.45                         | 29436<br>5.48 | 28291<br>5.50      | 27449<br>5.50 | 27073<br>5.50      | 52                                               | 82             | 126            |
| 2700                                                       | 34062<br>5.55 | 32146<br>5.58                         | 30546<br>6.01 | 29350<br>6.03      | 28470<br>6.03 | 28062<br>6.03      | 54                                               | 84             | 129            |
| PACK FLOW LO                                               |               | PACK FLOW HI OR/<br>AND CARGO COOL ON |               | ENGINE ANTI-ICE ON |               |                    | TOTAL ANTI-ICE ON                                |                |                |
| Δ FUEL = -0.5 %                                            |               | Δ FUEL = +1.0 %                       |               | Δ FUEL = +2.0 %    |               |                    | Δ FUEL = +4.0 %                                  |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
|------------------------------------------------------------|----------------|---------------------------------------|----------------|--------------------|-----------------|--------------------|--------------------------------------------------|----------------|----------------|----------------|
| CRUISE : M.80 - DESCENT : M.80/300KT/250KT                 |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
| REF. INITIAL WEIGHT = 210000 KG                            |                |                                       |                | ISA                |                 | FUEL CONSUMED (KG) |                                                  |                |                |                |
| NORMAL AIR CONDITIONING                                    |                |                                       |                | CG = 37.0 %        |                 |                    |                                                  |                |                |                |
| ANTI-ICING OFF                                             |                |                                       |                | TIME (H.MIN)       |                 |                    |                                                  |                |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL   |                                       |                |                    |                 |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |                |
|                                                            | (NM)           | 310                                   | 330            | 350                | 370             | 390                | 410                                              | FL310<br>FL330 | FL350<br>FL370 | FL390<br>FL410 |
| 2700                                                       | 35847<br>5.55  | 34411<br>5.58                         | 33300<br>6.01  | 32583<br>6.03      | 32725<br>6.03*  |                    |                                                  | 82             | 118            | 160            |
| 2800                                                       | 37148<br>6.08  | 35651<br>6.11                         | 34493<br>6.14  | 33738<br>6.16      | 33854<br>6.16*  | 33755<br>6.16*     |                                                  | 85             | 122            | 155            |
| 2900                                                       | 38447<br>6.21  | 36887<br>6.24                         | 35680<br>6.27  | 34888<br>6.29      | 34981<br>6.29*  | 34891<br>6.29*     |                                                  | 87             | 125            | 161            |
| 3000                                                       | 39747<br>6.34  | 38118<br>6.37                         | 36863<br>6.40  | 36033<br>6.42      | 36101<br>6.42*  | 36017<br>6.42*     |                                                  | 90             | 128            | 166            |
| 3100                                                       | 41044<br>6.47  | 39346<br>6.50                         | 38042<br>6.53  | 37172<br>6.55      | 37215<br>6.55*  | 37135<br>6.55*     |                                                  | 92             | 131            | 171            |
| 3200                                                       | 42337<br>6.59  | 40571<br>7.03                         | 39218<br>7.06  | 38307<br>7.08      | 38322<br>7.08*  | 38244<br>7.09*     |                                                  | 94             | 135            | 176            |
| 3300                                                       | 43627<br>7.12  | 41791<br>7.16                         | 40389<br>7.19  | 39436<br>7.21      | 39423<br>7.21*  | 39345<br>7.22*     |                                                  | 96             | 138            | 181            |
| 3400                                                       | 44914<br>7.25  | 43007<br>7.29                         | 41557<br>7.32  | 40561<br>7.35      | 40518<br>7.34*  | 40438<br>7.35*     |                                                  | 99             | 141            | 186            |
| 3500                                                       | 46198<br>7.38  | 44218<br>7.41                         | 42719<br>7.45  | 41680<br>7.48      | 41608<br>7.47*  | 41523<br>7.48*     | 101                                              | 144            | 191            |                |
| 3600                                                       | 47478<br>7.50  | 45427<br>7.54                         | 43878<br>7.58  | 42795<br>8.01      | 42691<br>8.00*  | 42600<br>8.01*     | 103                                              | 147            | 196            |                |
| 3700                                                       | 48756<br>8.03  | 46631<br>8.07                         | 45033<br>8.11  | 43905<br>8.14      | 43768<br>8.13*  | 43670<br>8.14*     | 105                                              | 149            | 200            |                |
| 3800                                                       | 50033<br>8.16  | 47832<br>8.20                         | 46183<br>8.24  | 45010<br>8.27      | 44842<br>8.26*  | 44732<br>8.27*     | 107                                              | 152            | 205            |                |
| 3900                                                       | 51306<br>8.29  | 49031<br>8.33                         | 47330<br>8.37  | 46111<br>8.40      | 45910<br>8.39*  | 45788<br>8.40*     | 109                                              | 155            | 209            |                |
| 4000                                                       | 52576<br>8.41  | 50228<br>8.46                         | 48473<br>8.50  | 47208<br>8.53      | 46974<br>8.52*  | 46839<br>8.53*     | 110                                              | 158            | 214            |                |
| 4100                                                       | 53843<br>8.54  | 51420<br>8.59                         | 49612<br>9.03  | 48300<br>9.06      | 48032<br>9.05*  | 47885<br>9.06*     | 112                                              | 161            | 218            |                |
| 4200                                                       | 55107<br>9.07  | 52610<br>9.12                         | 50747<br>9.16  | 49392<br>9.19      | 49085<br>9.18*  | 48924<br>9.19*     | 114                                              | 164            | 222            |                |
| 4300                                                       | 56368<br>9.20  | 53795<br>9.24                         | 51878<br>9.29  | 50481<br>9.32      | 50133<br>9.32*  | 49957<br>9.32*     | 115                                              | 167            | 226            |                |
| 4400                                                       | 57626<br>9.32  | 54977<br>9.37                         | 53005<br>9.42  | 51565<br>9.45      | 51175<br>9.45*  | 50984<br>9.45*     | 117                                              | 169            | 230            |                |
| 4500                                                       | 58882<br>9.45  | 56156<br>9.50                         | 54129<br>9.55  | 52644<br>9.58      | 52213<br>9.58*  | 52005<br>9.58*     | 119                                              | 172            | 234            |                |
| 4600                                                       | 60138<br>9.58  | 57331<br>10.03                        | 55248<br>10.08 | 53720<br>10.11     | 53245<br>10.11* | 53019<br>10.11*    | 120                                              | 174            | 238            |                |
| 4700                                                       | 61391<br>10.11 | 58503<br>10.16                        | 56364<br>10.21 | 54792<br>10.24     | 54273<br>10.24* | 54028<br>10.24*    | 122                                              | 177            | 241            |                |
| 4800                                                       | 62642<br>10.23 | 59675<br>10.29                        | 57476<br>10.34 | 55859<br>10.37     | 55303<br>10.37* | 55032<br>10.38*    | 124                                              | 180            | 245            |                |
| 4900                                                       | 63889<br>10.36 | 60844<br>10.42                        | 58585<br>10.47 | 56922<br>10.50     | 56329<br>10.50* | 56029<br>10.51*    | 125                                              | 182            | 249            |                |
| 5000                                                       | 65134<br>10.49 | 62010<br>10.55                        | 59691<br>11.00 | 57982<br>11.04     | 57351<br>11.03* | 57023<br>11.04*    | 127                                              | 185            | 252            |                |
| 5100                                                       | 66376<br>11.02 | 63172<br>11.07                        | 60793<br>11.13 | 59038<br>11.17     | 58368<br>11.16* | 58012<br>11.17*    | 128                                              | 187            | 255            |                |
| 5200                                                       | 67615<br>11.15 | 64331<br>11.20                        | 61892<br>11.26 | 60091<br>11.30     | 59381<br>11.29* | 58996<br>11.30*    | 129                                              | 190            | 259            |                |
| PACK FLOW LO                                               |                | PACK FLOW HI OR/<br>AND CARGO COOL ON |                | ENGINE ANTI-ICE ON |                 |                    | TOTAL ANTI-ICE ON                                |                |                |                |
| Δ FUEL = -0.5 %                                            |                | Δ FUEL = +1.0 %                       |                | Δ FUEL = +2.0 %    |                 |                    | Δ FUEL = +4.0 %                                  |                |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                 |                |                |                 |                 |                    |                                                  |                |                |
|------------------------------------------------------------|-----------------|----------------|----------------|-----------------|-----------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : M.80 - DESCENT : M.80/300KT/250KT                 |                 |                |                |                 |                 |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                 |                |                |                 |                 |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 240000 KG                            |                 |                |                | ISA             |                 | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |                 |                |                | CG = 37.0 %     |                 |                    |                                                  |                |                |
| ANTI-ICING OFF                                             |                 |                |                | TIME (H.MIN)    |                 |                    |                                                  |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL    |                |                |                 |                 |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
| (NM)                                                       | 310             | 330            | 350            | 370             | 390             | 410                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 5200                                                       | 71780<br>11.15  | 69489<br>11.21 | 67835<br>11.27 | 67378<br>11.27* | 67143<br>11.28* | 67346<br>11.27*    | 180                                              | 247            | 278            |
| 5300                                                       | 73059<br>11.28  | 70709<br>11.34 | 69003<br>11.40 | 68508<br>11.40* | 68251<br>11.41* | 68454<br>11.40*    | 183                                              | 250            | 283            |
| 5400                                                       | 74334<br>11.40  | 71926<br>11.46 | 70167<br>11.53 | 69633<br>11.53* | 69352<br>11.54* | 69554<br>11.53*    | 185                                              | 253            | 287            |
| 5500                                                       | 75605<br>11.53  | 73139<br>11.59 | 71331<br>12.06 | 70753<br>12.06* | 70447<br>12.07* | 70645<br>12.06*    | 187                                              | 256            | 291            |
| 5600                                                       | 76872<br>12.06  | 74347<br>12.12 | 72492<br>12.19 | 71867<br>12.19* | 71536<br>12.20* | 71729<br>12.20*    | 189                                              | 258            | 294            |
| 5700                                                       | 78136<br>12.19  | 75552<br>12.25 | 73649<br>12.32 | 72977<br>12.32* | 72620<br>12.33* | 72805<br>12.33*    | 191                                              | 261            | 298            |
| 5800                                                       | 79396<br>12.32  | 76752<br>12.38 | 74801<br>12.45 | 74086<br>12.46* | 73697<br>12.46* | 73874<br>12.46*    | 193                                              | 264            | 302            |
| 5900                                                       | 80652<br>12.44  | 77949<br>12.51 | 75949<br>12.58 | 75190<br>12.59* | 74768<br>12.59* | 74936<br>12.59*    | 195                                              | 266            | 306            |
| 6000                                                       | 81905<br>12.57  | 79142<br>13.04 | 77093<br>13.11 | 76291<br>13.12* | 75834<br>13.13* | 75993<br>13.12*    | 197                                              | 269            | 310            |
| 6100                                                       | 83155<br>13.10  | 80331<br>13.17 | 78233<br>13.24 | 77385<br>13.25* | 76895<br>13.26* | 77044<br>13.25*    | 199                                              | 272            | 313            |
| 6200                                                       | 84404<br>13.23  | 81516<br>13.30 | 79368<br>13.37 | 78476<br>13.38* | 77950<br>13.39* | 78087<br>13.38*    | 200                                              | 275            | 317            |
| 6300                                                       | 85652<br>13.35  | 82698<br>13.42 | 80500<br>13.50 | 79563<br>13.51* | 78999<br>13.52* | 79125<br>13.51*    | 202                                              | 277            | 320            |
| 6400                                                       | 86897<br>13.48  | 83876<br>13.55 | 81628<br>14.03 | 80645<br>14.04* | 80049<br>14.05* | 80156<br>14.04*    | 203                                              | 280            | 324            |
| 6500                                                       | 88139<br>14.01  | 85052<br>14.08 | 82752<br>14.16 | 81723<br>14.17* | 81098<br>14.18* | 81182<br>14.17*    | 205                                              | 282            | 327            |
| 6600                                                       | 89377<br>14.14  | 86224<br>14.21 | 83872<br>14.29 | 82797<br>14.30* | 82142<br>14.31* | 82201<br>14.30*    | 207                                              | 284            | 330            |
| 6700                                                       | 90611<br>14.26  | 87392<br>14.34 | 84989<br>14.42 | 83866<br>14.43* | 83181<br>14.44* | 83215<br>14.43*    | 208                                              | 287            | 333            |
| 6800                                                       | 91843<br>14.39  | 88557<br>14.47 | 86102<br>14.55 | 84931<br>14.56* | 84216<br>14.57* | 84222<br>14.56*    | 210                                              | 289            | 336            |
| 6900                                                       | 93071<br>14.52  | 89718<br>15.00 | 87210<br>15.08 | 85992<br>15.09* | 85246<br>15.10* | 85224<br>15.09*    | 211                                              | 291            | 339            |
| 7000                                                       | 94296<br>15.05  | 90875<br>15.13 | 88316<br>15.21 | 87052<br>15.22* | 86272<br>15.23* | 86220<br>15.22*    | 213                                              | 293            | 342            |
| 7100                                                       | 95517<br>15.17  | 92029<br>15.25 | 89417<br>15.34 | 88113<br>15.35* | 87293<br>15.36* | 87211<br>15.35*    | 214                                              | 296            | 345            |
| 7200                                                       | 96736<br>15.30  | 93180<br>15.38 | 90514<br>15.47 | 89169<br>15.48* | 88310<br>15.49* | 88199<br>15.49*    | 215                                              | 298            | 348            |
| 7300                                                       | 97962<br>15.43  | 94327<br>15.51 | 91608<br>16.00 | 90221<br>16.01* | 89322<br>16.02* | 89185<br>16.02*    | 216                                              | 300            | 351            |
| 7400                                                       | 99190<br>15.56  | 95471<br>16.04 | 92699<br>16.13 | 91270<br>16.15* | 90330<br>16.15* | 90165<br>16.15*    | 217                                              | 302            | 354            |
| 7500                                                       | 100415<br>16.08 | 96611<br>16.17 | 93785<br>16.26 | 92315<br>16.28* | 91333<br>16.28* | 91140<br>16.28*    | 218                                              | 304            | 357            |
| 7600                                                       | 101637<br>16.21 | 97749<br>16.30 | 94868<br>16.39 | 93356<br>16.41* | 92333<br>16.41* | 92111<br>16.41*    | 219                                              | 306            | 359            |
| 7700                                                       | 102856<br>16.34 | 98886<br>16.43 | 95948<br>16.52 | 94393<br>16.54* | 93330<br>16.55* | 93077<br>16.54*    | 221                                              | 308            | 362            |

PACK FLOW LO

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| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
|------------------------------------------------------------|-----------------|---------------------------------------|------------------|--------------------|------------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : M.80 - DESCENT : M.80/300KT/250KT                 |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 250000 KG                            |                 |                                       |                  | ISA                |                  | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |                 |                                       |                  | CG = 37.0 %        |                  | TIME (H.MIN)       |                                                  |                |                |
| ANTI-ICING OFF                                             |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                   | FLIGHT LEVEL    |                                       |                  |                    |                  |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                            | 310             | 330                                   | 350              | 370                | 390              | 410                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 7700                                                       | 104952<br>16.34 | 101445<br>16.43                       | 99185<br>16.50*  | 97662<br>16.53*    | 97050<br>16.53*  | 96773<br>16.53*    | 232                                              | 325            | 371            |
| 7800                                                       | 106171<br>16.47 | 102597<br>16.56                       | 100285<br>17.03* | 98718<br>17.06*    | 98064<br>17.06*  | 97764<br>17.06*    | 234                                              | 327            | 374            |
| 7900                                                       | 107387<br>17.00 | 103746<br>17.09                       | 101382<br>17.16* | 99770<br>17.19*    | 99073<br>17.19*  | 98750<br>17.19*    | 235                                              | 329            | 376            |
| 8000                                                       | 108600<br>17.12 | 104890<br>17.21                       | 102475<br>17.29* | 100817<br>17.32*   | 100084<br>17.32* | 99731<br>17.32*    | 236                                              | 331            | 379            |
| 8100                                                       |                 | 106032<br>17.34                       | 103564<br>17.42* | 101862<br>17.45*   | 101090<br>17.45* | 100707<br>17.45*   | 263                                              | 333            | 382            |
| 8200                                                       |                 | 107170<br>17.47                       | 104650<br>17.55* | 102902<br>17.58*   | 102092<br>17.58* | 101678<br>17.58*   | 265                                              | 335            | 385            |
| 8300                                                       |                 | 108305<br>18.00                       | 105732<br>18.08* | 103938<br>18.11*   | 103091<br>18.11* | 102644<br>18.11*   | 267                                              | 337            | 387            |
| 8400                                                       |                 |                                       | 106810<br>18.21* | 104971<br>18.24*   | 104084<br>18.24* | 103606<br>18.24*   |                                                  | 339            | 389            |
| 8500                                                       |                 |                                       | 107886<br>18.34* | 106001<br>18.37*   | 105074<br>18.37* | 104562<br>18.37*   |                                                  | 341            | 392            |
| 8600                                                       |                 |                                       |                  | 107029<br>18.50*   | 106060<br>18.50* | 105514<br>18.50*   |                                                  | 346            | 394            |
| 8700                                                       |                 |                                       |                  | 108053<br>19.03*   | 107043<br>19.03* | 106462<br>19.03*   |                                                  | 348            | 396            |
| 8800                                                       |                 |                                       |                  |                    | 108021<br>19.16* | 107405<br>19.16*   |                                                  |                | 398            |
| 8900                                                       |                 |                                       |                  |                    |                  | 108345<br>19.29*   |                                                  |                | 400            |
| 9000                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9100                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9200                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9300                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9400                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9500                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9600                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9700                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9800                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9900                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10000                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10100                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10200                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| PACK FLOW LO                                               |                 | PACK FLOW HI OR/<br>AND CARGO COOL ON |                  | ENGINE ANTI-ICE ON |                  |                    | TOTAL ANTI-ICE ON                                |                |                |
| Δ FUEL = -0.5 %                                            |                 | ΔFUEL = +1.0 %                        |                  | Δ FUEL = +2.0 %    |                  |                    | Δ FUEL = +4.0 %                                  |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
|------------------------------------------------------------|----------------|---------------------------------------|----------------|--------------------|-----------------|--------------------|--------------------------------------------------|----------------|----------------|----------------|
| CRUISE : M.82 - DESCENT : M.82/300KT/250KT                 |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                |                                       |                |                    |                 |                    |                                                  |                |                |                |
| REF. INITIAL WEIGHT = 210000 KG                            |                |                                       |                | ISA                |                 | FUEL CONSUMED (KG) |                                                  |                |                |                |
| NORMAL AIR CONDITIONING                                    |                |                                       |                | CG = 37.0 %        |                 |                    |                                                  |                |                |                |
| ANTI-ICING OFF                                             |                |                                       |                | TIME (H.MIN)       |                 |                    |                                                  |                |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL   |                                       |                |                    |                 |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |                |
|                                                            | (NM)           | 310                                   | 330            | 350                | 370             | 390                | 410                                              | FL310<br>FL330 | FL350<br>FL370 | FL390<br>FL410 |
| 2700                                                       | 37021<br>5.47  | 35271<br>5.50                         | 33972<br>5.53  | 33147<br>5.55      | 33189<br>5.54*  |                    |                                                  | 76             | 115            | 167            |
| 2800                                                       | 38372<br>6.00  | 36547<br>6.03                         | 35192<br>6.06  | 34324<br>6.08      | 34335<br>6.07*  | 34305<br>6.08*     |                                                  | 78             | 118            | 163            |
| 2900                                                       | 39721<br>6.12  | 37818<br>6.15                         | 36406<br>6.19  | 35496<br>6.20      | 35479<br>6.20*  | 35448<br>6.21*     |                                                  | 80             | 121            | 168            |
| 3000                                                       | 41067<br>6.25  | 39090<br>6.28                         | 37616<br>6.31  | 36662<br>6.33      | 36616<br>6.33*  | 36582<br>6.33*     |                                                  | 83             | 125            | 173            |
| 3100                                                       | 42409<br>6.37  | 40359<br>6.40                         | 38822<br>6.44  | 37822<br>6.46      | 37747<br>6.45*  | 37708<br>6.46*     |                                                  | 85             | 128            | 178            |
| 3200                                                       | 43748<br>6.50  | 41625<br>6.53                         | 40025<br>6.57  | 38978<br>6.59      | 38872<br>6.58*  | 38826<br>6.59*     |                                                  | 87             | 131            | 183            |
| 3300                                                       | 45084<br>7.02  | 42886<br>7.06                         | 41224<br>7.09  | 40130<br>7.11      | 39991<br>7.11*  | 39936<br>7.12*     |                                                  | 89             | 134            | 187            |
| 3400                                                       | 46416<br>7.14  | 44144<br>7.18                         | 42418<br>7.22  | 41276<br>7.24      | 41104<br>7.24*  | 41037<br>7.24*     |                                                  | 91             | 137            | 192            |
| 3500                                                       | 47746<br>7.27  | 45398<br>7.31                         | 43608<br>7.35  | 42417<br>7.37      | 42211<br>7.36*  | 42131<br>7.37*     |                                                  | 93             | 140            | 195            |
| 3600                                                       | 49073<br>7.39  | 46649<br>7.43                         | 44794<br>7.47  | 43553<br>7.50      | 43313<br>7.49*  | 43217<br>7.50*     |                                                  | 94             | 143            | 200            |
| 3700                                                       | 50397<br>7.52  | 47897<br>7.56                         | 45976<br>8.00  | 44685<br>8.02      | 44411<br>8.02*  | 44295<br>8.03*     |                                                  | 96             | 146            | 204            |
| 3800                                                       | 51718<br>8.04  | 49142<br>8.08                         | 47153<br>8.13  | 45812<br>8.15      | 45506<br>8.15*  | 45367<br>8.15*     |                                                  | 98             | 149            | 209            |
| 3900                                                       | 53037<br>8.17  | 50385<br>8.21                         | 48327<br>8.25  | 46934<br>8.28      | 46597<br>8.27*  | 46434<br>8.28*     |                                                  | 100            | 152            | 213            |
| 4000                                                       | 54352<br>8.29  | 51625<br>8.34                         | 49499<br>8.38  | 48052<br>8.40      | 47683<br>8.40*  | 47496<br>8.41*     |                                                  | 101            | 155            | 217            |
| 4100                                                       | 55663<br>8.42  | 52861<br>8.46                         | 50667<br>8.51  | 49165<br>8.53      | 48763<br>8.53*  | 48552<br>8.53*     |                                                  | 103            | 158            | 221            |
| 4200                                                       | 56972<br>8.54  | 54094<br>8.59                         | 51831<br>9.03  | 50275<br>9.06      | 49838<br>9.06*  | 49602<br>9.06*     |                                                  | 104            | 160            | 225            |
| 4300                                                       | 58278<br>9.07  | 55323<br>9.11                         | 52991<br>9.16  | 51380<br>9.19      | 50909<br>9.18*  | 50646<br>9.19*     |                                                  | 106            | 163            | 228            |
| 4400                                                       | 59585<br>9.19  | 56549<br>9.24                         | 54147<br>9.29  | 52481<br>9.31      | 51974<br>9.31*  | 51683<br>9.32*     |                                                  | 108            | 165            | 232            |
| 4500                                                       | 60889<br>9.31  | 57772<br>9.36                         | 55299<br>9.41  | 53577<br>9.44      | 53035<br>9.44*  | 52715<br>9.44*     |                                                  | 109            | 167            | 235            |
| 4600                                                       | 62191<br>9.44  | 58994<br>9.49                         | 56448<br>9.54  | 54669<br>9.57      | 54091<br>9.57*  | 53741<br>9.57*     |                                                  | 110            | 169            | 239            |
| 4700                                                       | 63490<br>9.56  | 60214<br>10.01                        | 57593<br>10.07 | 55756<br>10.10     | 55143<br>10.09* | 54761<br>10.10*    |                                                  | 112            | 172            | 242            |
| 4800                                                       | 64785<br>10.09 | 61431<br>10.14                        | 58735<br>10.19 | 56840<br>10.22     | 56190<br>10.22* | 55776<br>10.23*    |                                                  | 113            | 174            | 246            |
| 4900                                                       | 66078<br>10.21 | 62645<br>10.27                        | 59875<br>10.32 | 57919<br>10.35     | 57232<br>10.35* | 56791<br>10.35*    |                                                  | 115            | 176            | 249            |
| 5000                                                       | 67369<br>10.34 | 63856<br>10.39                        | 61011<br>10.45 | 58997<br>10.48     | 58270<br>10.47* | 57802<br>10.48*    |                                                  | 116            | 178            | 253            |
| 5100                                                       | 68656<br>10.46 | 65064<br>10.52                        | 62144<br>10.57 | 60074<br>11.01     | 59304<br>11.00* | 58809<br>11.01*    |                                                  | 117            | 180            | 256            |
| 5200                                                       | 69944<br>10.59 | 66268<br>11.04                        | 63274<br>11.10 | 61148<br>11.13     | 60333<br>11.13* | 59811<br>11.14*    |                                                  | 118            | 182            | 259            |
| PACK FLOW LO                                               |                | PACK FLOW HI OR/<br>AND CARGO COOL ON |                | ENGINE ANTI-ICE ON |                 |                    | TOTAL ANTI-ICE ON                                |                |                |                |
| Δ FUEL = -0.5 %                                            |                | Δ FUEL = +1.0 %                       |                | Δ FUEL = +2.0 %    |                 |                    | Δ FUEL = +4.0 %                                  |                |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                 |                                       |                |                    |                 |                    |                                                  |                |                |                |
|------------------------------------------------------------|-----------------|---------------------------------------|----------------|--------------------|-----------------|--------------------|--------------------------------------------------|----------------|----------------|----------------|
| CRUISE : M.82 - DESCENT : M.82/300KT/250KT                 |                 |                                       |                |                    |                 |                    |                                                  |                |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                 |                                       |                |                    |                 |                    |                                                  |                |                |                |
| REF. INITIAL WEIGHT = 240000 KG                            |                 |                                       |                | ISA                |                 | FUEL CONSUMED (KG) |                                                  |                |                |                |
| NORMAL AIR CONDITIONING                                    |                 |                                       |                | CG = 37.0 %        |                 |                    |                                                  |                |                |                |
| ANTI-ICING OFF                                             |                 |                                       |                | TIME (H.MIN)       |                 |                    |                                                  |                |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL    |                                       |                |                    |                 |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |                |
|                                                            | (NM)            | 310                                   | 330            | 350                | 370             | 390                | 410                                              | FL310<br>FL330 | FL350<br>FL370 | FL390<br>FL410 |
| 5200                                                       | 73814<br>10.59  | 71009<br>11.05                        | 69122<br>11.10 | 68507<br>11.11*    | 68119<br>11.12* | 68374<br>11.11*    |                                                  | 169            | 250            | 286            |
| 5300                                                       | 75142<br>11.11  | 72262<br>11.17                        | 70313<br>11.23 | 69660<br>11.24*    | 69244<br>11.25* | 69487<br>11.24*    |                                                  | 171            | 253            | 290            |
| 5400                                                       | 76466<br>11.24  | 73511<br>11.30                        | 71501<br>11.36 | 70808<br>11.37*    | 70363<br>11.37* | 70591<br>11.37*    |                                                  | 173            | 256            | 294            |
| 5500                                                       | 77787<br>11.36  | 74756<br>11.42                        | 72685<br>11.48 | 71951<br>11.49*    | 71476<br>11.50* | 71687<br>11.50*    |                                                  | 174            | 259            | 297            |
| 5600                                                       | 79104<br>11.49  | 75997<br>11.55                        | 73864<br>12.01 | 73089<br>12.02*    | 72584<br>12.03* | 72775<br>12.02*    |                                                  | 176            | 261            | 301            |
| 5700                                                       | 80418<br>12.01  | 77233<br>12.07                        | 75038<br>12.14 | 74222<br>12.15*    | 73686<br>12.16* | 73855<br>12.15*    |                                                  | 178            | 264            | 305            |
| 5800                                                       | 81729<br>12.14  | 78466<br>12.20                        | 76208<br>12.27 | 75351<br>12.28*    | 74783<br>12.28* | 74931<br>12.28*    |                                                  | 180            | 267            | 309            |
| 5900                                                       | 83036<br>12.26  | 79695<br>12.33                        | 77373<br>12.39 | 76475<br>12.40*    | 75875<br>12.41* | 76003<br>12.41*    |                                                  | 182            | 269            | 312            |
| 6000                                                       | 84343<br>12.39  | 80920<br>12.45                        | 78534<br>12.52 | 77593<br>12.53*    | 76961<br>12.54* | 77068<br>12.53*    |                                                  | 183            | 272            | 316            |
| 6100                                                       | 85648<br>12.51  | 82142<br>12.58                        | 79691<br>13.05 | 78708<br>13.06*    | 78042<br>13.07* | 78126<br>13.06*    |                                                  | 184            | 275            | 320            |
| 6200                                                       | 86950<br>13.03  | 83359<br>13.10                        | 80844<br>13.17 | 79818<br>13.19*    | 79117<br>13.19* | 79178<br>13.19*    |                                                  | 186            | 277            | 323            |
| 6300                                                       | 88248<br>13.16  | 84577<br>13.23                        | 81992<br>13.30 | 80923<br>13.31*    | 80191<br>13.32* | 80225<br>13.32*    |                                                  | 187            | 279            | 326            |
| 6400                                                       | 89544<br>13.28  | 85791<br>13.35                        | 83137<br>13.43 | 82025<br>13.44*    | 81260<br>13.45* | 81266<br>13.44*    |                                                  | 189            | 282            | 330            |
| 6500                                                       | 90836<br>13.41  | 87003<br>13.48                        | 84281<br>13.55 | 83122<br>13.57*    | 82324<br>13.58* | 82301<br>13.57*    |                                                  | 190            | 284            | 333            |
| 6600                                                       | 92125<br>13.53  | 88210<br>14.01                        | 85425<br>14.08 | 84214<br>14.10*    | 83383<br>14.10* | 83330<br>14.10*    |                                                  | 191            | 286            | 336            |
| 6700                                                       | 93410<br>14.06  | 89414<br>14.13                        | 86566<br>14.21 | 85302<br>14.22*    | 84437<br>14.23* | 84353<br>14.23*    |                                                  | 193            | 288            | 339            |
| 6800                                                       | 94693<br>14.18  | 90615<br>14.26                        | 87702<br>14.33 | 86386<br>14.35*    | 85487<br>14.36* | 85370<br>14.35*    |                                                  | 194            | 290            | 342            |
| 6900                                                       | 95972<br>14.31  | 91812<br>14.38                        | 88835<br>14.46 | 87469<br>14.48*    | 86533<br>14.49* | 86383<br>14.48*    |                                                  | 195            | 293            | 345            |
| 7000                                                       | 97249<br>14.43  | 93005<br>14.51                        | 89963<br>14.59 | 88549<br>15.01*    | 87573<br>15.01* | 87389<br>15.01*    |                                                  | 197            | 295            | 348            |
| 7100                                                       | 98529<br>14.56  | 94195<br>15.03                        | 91088<br>15.11 | 89624<br>15.13*    | 88610<br>15.14* | 88397<br>15.14*    |                                                  | 198            | 297            | 350            |
| 7200                                                       | 99806<br>15.08  | 95381<br>15.16                        | 92209<br>15.24 | 90695<br>15.26*    | 89641<br>15.27* | 89401<br>15.26*    |                                                  | 199            | 299            | 353            |
| 7300                                                       | 101080<br>15.20 | 96564<br>15.28                        | 93327<br>15.37 | 91762<br>15.39*    | 90668<br>15.40* | 90399<br>15.39*    |                                                  | 199            | 302            | 356            |
| 7400                                                       | 102351<br>15.33 | 97751<br>15.41                        | 94441<br>15.49 | 92825<br>15.51*    | 91692<br>15.52* | 91393<br>15.52*    |                                                  | 200            | 304            | 358            |
| 7500                                                       | 103620<br>15.45 | 98940<br>15.54                        | 95551<br>16.02 | 93885<br>16.04*    | 92711<br>16.05* | 92383<br>16.05*    |                                                  | 201            | 305            | 361            |
| 7600                                                       | 104885<br>15.58 | 100126<br>16.06                       | 96657<br>16.15 | 94940<br>16.17*    | 93728<br>16.18* | 93368<br>16.17*    |                                                  | 207            | 307            | 364            |
| 7700                                                       | 106147<br>16.10 | 101308<br>16.19                       | 97764<br>16.27 | 95992<br>16.30*    | 94740<br>16.31* | 94348<br>16.30*    |                                                  | 208            | 309            | 366            |
| PACK FLOW LO                                               |                 | PACK FLOW HI OR/<br>AND CARGO COOL ON |                | ENGINE ANTI-ICE ON |                 |                    | TOTAL ANTI-ICE ON                                |                |                |                |
| Δ FUEL = -0.5 %                                            |                 | Δ FUEL = +1.0 %                       |                | Δ FUEL = +2.0 %    |                 |                    | Δ FUEL = +4.0 %                                  |                |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
|------------------------------------------------------------|-----------------|---------------------------------------|------------------|--------------------|------------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : M.82 - DESCENT : M.82/300KT/250KT                 |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 250000 KG                            |                 |                                       |                  | ISA                |                  | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |                 |                                       |                  | CG = 37.0 %        |                  |                    |                                                  |                |                |
| ANTI-ICING OFF                                             |                 |                                       |                  |                    |                  | TIME (H.MIN)       |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                   | FLIGHT LEVEL    |                                       |                  |                    |                  |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                            | 310             | 330                                   | 350              | 370                | 390              | 410                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 7700                                                       | 108070<br>16.10 | 103690<br>16.19                       | 101017<br>16.26* | 99319<br>16.29*    | 98531<br>16.29*  | 98121<br>16.29*    | 215                                              | 329            | 377            |
| 7800                                                       |                 | 104875<br>16.31                       | 102142<br>16.39* | 100389<br>16.41*   | 99564<br>16.42*  | 99125<br>16.42*    | 238                                              | 331            | 380            |
| 7900                                                       |                 | 106057<br>16.44                       | 103264<br>16.51* | 101455<br>16.54*   | 100593<br>16.54* | 100125<br>16.54*   | 239                                              | 333            | 382            |
| 8000                                                       |                 | 107235<br>16.57                       | 104383<br>17.04* | 102517<br>17.07*   | 101618<br>17.07* | 101120<br>17.07*   | 240                                              | 334            | 385            |
| 8100                                                       |                 | 108411<br>17.09                       | 105497<br>17.17* | 103575<br>17.20*   | 102639<br>17.20* | 102111<br>17.20*   | 241                                              | 336            | 388            |
| 8200                                                       |                 |                                       | 106608<br>17.30* | 104629<br>17.32*   | 103655<br>17.33* | 103097<br>17.33*   |                                                  | 338            | 390            |
| 8300                                                       |                 |                                       | 107716<br>17.42* | 105681<br>17.45*   | 104667<br>17.45* | 104078<br>17.45*   |                                                  | 340            | 393            |
| 8400                                                       |                 |                                       | 108821<br>17.55* | 106736<br>17.58*   | 105676<br>17.58* | 105055<br>17.58*   |                                                  | 342            | 395            |
| 8500                                                       |                 |                                       |                  | 107787<br>18.11*   | 106680<br>18.11* | 106028<br>18.11*   |                                                  | 348            | 397            |
| 8600                                                       |                 |                                       |                  |                    | 107681<br>18.24* | 106996<br>18.24*   |                                                  |                | 399            |
| 8700                                                       |                 |                                       |                  |                    | 108678<br>18.36* | 107961<br>18.36*   |                                                  |                | 402            |
| 8800                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 8900                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9000                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9100                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9200                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9300                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9400                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9500                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9600                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9700                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9800                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 9900                                                       |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10000                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10100                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| 10200                                                      |                 |                                       |                  |                    |                  |                    |                                                  |                |                |
| PACK FLOW LO                                               |                 | PACK FLOW HI OR/<br>AND CARGO COOL ON |                  | ENGINE ANTI-ICE ON |                  |                    | TOTAL ANTI-ICE ON                                |                |                |
| Δ FUEL = -0.5 %                                            |                 | Δ FUEL = +1.0 %                       |                  | Δ FUEL = +2.0 %    |                  |                    | Δ FUEL = +4.0 %                                  |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |               |                                       |               |                    |               |                    |                                                  |                |                |                |
|------------------------------------------------------------|---------------|---------------------------------------|---------------|--------------------|---------------|--------------------|--------------------------------------------------|----------------|----------------|----------------|
| CRUISE : M.84 - DESCENT : M.84/300KT/250KT                 |               |                                       |               |                    |               |                    |                                                  |                |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |               |                                       |               |                    |               |                    |                                                  |                |                |                |
| REF. INITIAL WEIGHT = 170000 KG                            |               |                                       |               | ISA                |               | FUEL CONSUMED (KG) |                                                  |                |                |                |
| NORMAL AIR CONDITIONING                                    |               |                                       |               | CG = 37.0 %        |               |                    |                                                  |                |                |                |
| ANTI-ICING OFF                                             |               |                                       |               | TIME (H.MIN)       |               |                    |                                                  |                |                |                |
| AIR<br>DIST.                                               | FLIGHT LEVEL  |                                       |               |                    |               |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |                |
|                                                            | (NM)          | 310                                   | 330           | 350                | 370           | 390                | 410                                              | FL310<br>FL330 | FL350<br>FL370 | FL390<br>FL410 |
| 200                                                        | 2103<br>0.35  | 1965<br>0.35                          | 1853<br>0.35  | 1762<br>0.36       | 1701<br>0.36  |                    |                                                  | 0              | 0              | 2              |
| 300                                                        | 3541<br>0.47  | 3314<br>0.48                          | 3133<br>0.48  | 2999<br>0.48       | 2930<br>0.48  |                    |                                                  | 0              | 5              | 9              |
| 400                                                        | 4977<br>1.00  | 4658<br>1.00                          | 4408<br>1.00  | 4228<br>1.00       | 4148<br>1.00  |                    |                                                  | 2              | 9              | 16             |
| 500                                                        | 6411<br>1.12  | 6000<br>1.12                          | 5678<br>1.13  | 5451<br>1.13       | 5354<br>1.13  |                    |                                                  | 4              | 14             | 30             |
| 600                                                        | 7843<br>1.24  | 7337<br>1.24                          | 6944<br>1.25  | 6667<br>1.25       | 6550<br>1.25  |                    |                                                  | 6              | 18             | 37             |
| 700                                                        | 9273<br>1.36  | 8672<br>1.37                          | 8207<br>1.37  | 7878<br>1.38       | 7741<br>1.38  |                    |                                                  | 8              | 22             | 44             |
| 800                                                        | 10701<br>1.48 | 10002<br>1.49                         | 9465<br>1.50  | 9083<br>1.50       | 8924<br>1.50  |                    |                                                  | 10             | 26             | 51             |
| 900                                                        | 12127<br>2.00 | 11329<br>2.01                         | 10718<br>2.02 | 10282<br>2.03      | 10098<br>2.03 |                    |                                                  | 11             | 29             | 57             |
| 1000                                                       | 13551<br>2.12 | 12653<br>2.13                         | 11968<br>2.14 | 11476<br>2.15      | 11264<br>2.15 | 11412<br>2.15*     |                                                  | 13             | 33             | 65             |
| 1100                                                       | 14973<br>2.25 | 13976<br>2.26                         | 13213<br>2.27 | 12663<br>2.27      | 12423<br>2.27 | 12584<br>2.28*     |                                                  | 14             | 37             | 73             |
| 1200                                                       | 16393<br>2.37 | 15298<br>2.38                         | 14455<br>2.39 | 13846<br>2.40      | 13573<br>2.40 | 13744<br>2.40*     |                                                  | 16             | 40             | 80             |
| 1300                                                       | 17811<br>2.49 | 16616<br>2.50                         | 15693<br>2.52 | 15022<br>2.52      | 14717<br>2.52 | 14892<br>2.53*     |                                                  | 17             | 43             | 86             |
| 1400                                                       | 19228<br>3.01 | 17931<br>3.02                         | 16927<br>3.04 | 16194<br>3.05      | 15853<br>3.05 | 16030<br>3.05*     |                                                  | 19             | 47             | 93             |
| 1500                                                       | 20643<br>3.13 | 19245<br>3.15                         | 18157<br>3.16 | 17360<br>3.17      | 16981<br>3.17 | 17158<br>3.17*     |                                                  | 20             | 50             | 99             |
| 1600                                                       | 22057<br>3.25 | 20556<br>3.27                         | 19383<br>3.29 | 18520<br>3.30      | 18103<br>3.30 | 18275<br>3.30*     |                                                  | 21             | 53             | 105            |
| 1700                                                       | 23470<br>3.37 | 21866<br>3.39                         | 20605<br>3.41 | 19677<br>3.42      | 19220<br>3.42 | 19383<br>3.42*     |                                                  | 22             | 55             | 111            |
| 1800                                                       | 24880<br>3.50 | 23173<br>3.51                         | 21824<br>3.53 | 20829<br>3.54      | 20336<br>3.54 | 20481<br>3.55*     |                                                  | 23             | 58             | 111            |
| 1900                                                       | 26290<br>4.02 | 24477<br>4.04                         | 23039<br>4.06 | 21977<br>4.07      | 21446<br>4.07 | 21569<br>4.07*     |                                                  | 24             | 61             | 116            |
| 2000                                                       | 27698<br>4.14 | 25780<br>4.16                         | 24251<br>4.18 | 23120<br>4.19      | 22551<br>4.19 | 22647<br>4.20*     |                                                  | 25             | 63             | 121            |
| 2100                                                       | 29104<br>4.26 | 27081<br>4.28                         | 25462<br>4.30 | 24258<br>4.32      | 23649<br>4.32 | 23717<br>4.32*     |                                                  | 26             | 65             | 127            |
| 2200                                                       | 30509<br>4.38 | 28379<br>4.40                         | 26671<br>4.43 | 25396<br>4.44      | 24742<br>4.44 | 24777<br>4.44*     |                                                  | 26             | 67             | 132            |
| 2300                                                       | 31912<br>4.50 | 29676<br>4.53                         | 27878<br>4.55 | 26533<br>4.57      | 25827<br>4.57 | 25829<br>4.57*     |                                                  | 27             | 70             | 137            |
| 2400                                                       | 33314<br>5.02 | 30971<br>5.05                         | 29081<br>5.08 | 27666<br>5.09      | 26907<br>5.09 | 26874<br>5.09*     |                                                  | 29             | 72             | 142            |
| 2500                                                       | 34714<br>5.15 | 32268<br>5.17                         | 30281<br>5.20 | 28794<br>5.21      | 27981<br>5.21 | 27921<br>5.22*     |                                                  | 30             | 74             | 146            |
| 2600                                                       | 36112<br>5.27 | 33563<br>5.30                         | 31479<br>5.32 | 29919<br>5.34      | 29050<br>5.34 | 28962<br>5.34*     |                                                  | 34             | 76             | 151            |
| 2700                                                       | 37509<br>5.39 | 34856<br>5.42                         | 32673<br>5.45 | 31041<br>5.46      | 30113<br>5.46 | 29995<br>5.47*     |                                                  | 35             | 77             | 155            |
| PACK FLOW LO                                               |               | PACK FLOW HI OR/<br>AND CARGO COOL ON |               | ENGINE ANTI-ICE ON |               |                    | TOTAL ANTI-ICE ON                                |                |                |                |
| Δ FUEL = -0.5 %                                            |               | Δ FUEL = +1.0 %                       |               | Δ FUEL = +2.0 %    |               |                    | Δ FUEL = +4.0 %                                  |                |                |                |

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| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                |                                       |                |                    |                 |                    |                                                  |                |                |
|------------------------------------------------------------|----------------|---------------------------------------|----------------|--------------------|-----------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : M.84 - DESCENT : M.84/300KT/250KT                 |                |                                       |                |                    |                 |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                |                                       |                |                    |                 |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 200000 KG                            |                |                                       |                | ISA                |                 | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |                |                                       |                | CG = 37.0 %        |                 |                    |                                                  |                |                |
| ANTI-ICING OFF                                             |                |                                       |                |                    |                 | TIME (H.MIN)       |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                   | FLIGHT LEVEL   |                                       |                |                    |                 |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                            | 310            | 330                                   | 350            | 370                | 390             | 410                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 2700                                                       | 38659<br>5.39  | 36742<br>5.42                         | 35440<br>5.45  | 35068<br>5.46*     | 35129<br>5.46*  |                    | 76                                               | 149            | 168            |
| 2800                                                       | 40070<br>5.52  | 38070<br>5.55                         | 36698<br>5.58  | 36278<br>5.59*     | 36328<br>5.58*  |                    | 77                                               | 153            | 175            |
| 2900                                                       | 41484<br>6.04  | 39394<br>6.07                         | 37950<br>6.10  | 37483<br>6.11*     | 37517<br>6.11*  |                    | 79                                               | 156            | 182            |
| 3000                                                       | 42900<br>6.16  | 40713<br>6.19                         | 39197<br>6.22  | 38680<br>6.24*     | 38696<br>6.23*  |                    | 80                                               | 160            | 188            |
| 3100                                                       | 44313<br>6.28  | 42031<br>6.31                         | 40438<br>6.35  | 39871<br>6.36*     | 39866<br>6.36*  |                    | 81                                               | 163            | 193            |
| 3200                                                       | 45723<br>6.40  | 43344<br>6.44                         | 41674<br>6.47  | 41055<br>6.49*     | 41026<br>6.48*  | 41003<br>6.49*     | 83                                               | 166            | 202            |
| 3300                                                       | 47130<br>6.52  | 44653<br>6.56                         | 42904<br>6.59  | 42232<br>7.01*     | 42177<br>7.01*  | 42181<br>7.01*     | 84                                               | 169            | 208            |
| 3400                                                       | 48534<br>7.04  | 45959<br>7.08                         | 44130<br>7.12  | 43402<br>7.13*     | 43319<br>7.13*  | 43346<br>7.14*     | 85                                               | 172            | 214            |
| 3500                                                       | 49935<br>7.17  | 47260<br>7.20                         | 45350<br>7.24  | 44567<br>7.26*     | 44452<br>7.26*  | 44499<br>7.26*     | 86                                               | 175            | 220            |
| 3600                                                       | 51340<br>7.29  | 48557<br>7.33                         | 46565<br>7.37  | 45737<br>7.38*     | 45588<br>7.38*  | 45640<br>7.39*     | 87                                               | 177            | 226            |
| 3700                                                       | 52742<br>7.41  | 49850<br>7.45                         | 47774<br>7.49  | 46900<br>7.51*     | 46718<br>7.50*  | 46769<br>7.51*     | 88                                               | 180            | 232            |
| 3800                                                       | 54142<br>7.53  | 51145<br>7.57                         | 48979<br>8.01  | 48058<br>8.03*     | 47842<br>8.03*  | 47890<br>8.04*     | 89                                               | 183            | 237            |
| 3900                                                       | 55539<br>8.05  | 52438<br>8.09                         | 50181<br>8.14  | 49210<br>8.16*     | 48958<br>8.15*  | 49000<br>8.16*     | 90                                               | 185            | 239            |
| 4000                                                       | 56933<br>8.17  | 53727<br>8.22                         | 51391<br>8.26  | 50357<br>8.28*     | 50067<br>8.28*  | 50100<br>8.28*     | 90                                               | 188            | 244            |
| 4100                                                       | 58325<br>8.30  | 55012<br>8.34                         | 52598<br>8.38  | 51498<br>8.41*     | 51169<br>8.40*  | 51191<br>8.41*     | 91                                               | 190            | 248            |
| 4200                                                       | 59718<br>8.42  | 56294<br>8.46                         | 53799<br>8.51  | 52634<br>8.53*     | 52266<br>8.53*  | 52273<br>8.53*     | 91                                               | 192            | 253            |
| 4300                                                       | 61112<br>8.54  | 57572<br>8.58                         | 54997<br>9.03  | 53765<br>9.05*     | 53355<br>9.05*  | 53346<br>9.06*     | 92                                               | 195            | 257            |
| 4400                                                       | 62504<br>9.06  | 58847<br>9.11                         | 56191<br>9.15  | 54890<br>9.18*     | 54445<br>9.17*  | 54409<br>9.18*     | 92                                               | 197            | 262            |
| 4500                                                       | 63894<br>9.18  | 60123<br>9.23                         | 57380<br>9.28  | 56009<br>9.30*     | 55532<br>9.30*  | 55464<br>9.31*     | 98                                               | 199            | 266            |
| 4600                                                       | 65282<br>9.30  | 61397<br>9.35                         | 58565<br>9.40  | 57123<br>9.43*     | 56613<br>9.42*  | 56518<br>9.43*     | 98                                               | 201            | 270            |
| 4700                                                       | 66668<br>9.42  | 62669<br>9.47                         | 59749<br>9.53  | 58232<br>9.55*     | 57689<br>9.55*  | 57567<br>9.55*     | 98                                               | 203            | 275            |
| 4800                                                       | 68051<br>9.55  | 63937<br>10.00                        | 60932<br>10.05 | 59337<br>10.08*    | 58759<br>10.07* | 58609<br>10.08*    | 98                                               | 205            | 278            |
| 4900                                                       | 69438<br>10.07 | 65202<br>10.12                        | 62111<br>10.17 | 60436<br>10.20*    | 59824<br>10.20* | 59645<br>10.20*    | 106                                              | 207            | 282            |
| 5000                                                       | 70824<br>10.19 | 66465<br>10.24                        | 63287<br>10.30 | 61530<br>10.32*    | 60883<br>10.32* | 60673<br>10.33*    | 107                                              | 209            | 285            |
| 5100                                                       | 72208<br>10.31 | 67724<br>10.36                        | 64459<br>10.42 | 62620<br>10.45*    | 61937<br>10.44* | 61695<br>10.45*    | 107                                              | 210            | 289            |
| 5200                                                       |                | 68986<br>10.49                        | 65627<br>10.54 | 63714<br>10.57*    | 62986<br>10.57* | 62711<br>10.58*    | 136                                              | 220            | 292            |
| PACK FLOW LO                                               |                | PACK FLOW HI OR/<br>AND CARGO COOL ON |                | ENGINE ANTI-ICE ON |                 |                    | TOTAL ANTI-ICE ON                                |                |                |
| △ FUEL = -0.5 %                                            |                | △ FUEL = +1.0 %                       |                | △ FUEL = +2.0 %    |                 |                    | △ FUEL = +4.0 %                                  |                |                |

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|                                                                                                                             |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.20 | P 13   |
|                                                                                                                             | <b>IN-CRUISE QUICK CHECK</b> |  | SEQ 150 | REV 13 |

| IN-CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING<br>CRUISE : M.84 - DESCENT : M.84/300KT/250KT<br>IMC PROCEDURE : 330 KG (6MIN) |                |                                       |                 |                    |                 |                                        |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------|-----------------|--------------------|-----------------|----------------------------------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 220000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF TIME (H.MIN)                                                 |                |                                       |                 | ISA<br>CG = 37.0 % |                 | FUEL CONSUMED (KG)<br><br>TIME (H.MIN) |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                                                                                                  | FLIGHT LEVEL   |                                       |                 |                    |                 |                                        | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                                                                                                           | 310            | 330                                   | 350             | 370                | 390             | 410                                    | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 5200                                                                                                                                      | 75479<br>10.43 | 71995<br>10.49                        | 70059<br>10.54* | 69160<br>10.55*    | 68957<br>10.56* | 68955<br>10.56*                        | 161                                              | 278            | 317            |
| 5300                                                                                                                                      | 76846<br>10.56 | 73270<br>11.01                        | 71254<br>11.08* | 70307<br>11.08*    | 70070<br>11.08* | 70056<br>11.08*                        | 162                                              | 281            | 322            |
| 5400                                                                                                                                      | 78211<br>11.08 | 74542<br>11.14                        | 72444<br>11.19* | 71448<br>11.20*    | 71176<br>11.20* | 71147<br>11.20*                        | 162                                              | 284            | 326            |
| 5500                                                                                                                                      | 79588<br>11.20 | 75809<br>11.26                        | 73629<br>11.31* | 72583<br>11.33*    | 72276<br>11.33* | 72229<br>11.33*                        | 163                                              | 286            | 330            |
| 5600                                                                                                                                      | 80962<br>11.32 | 77071<br>11.38                        | 74809<br>11.43* | 73714<br>11.45*    | 73370<br>11.45* | 73301<br>11.45*                        | 164                                              | 288            | 334            |
| 5700                                                                                                                                      | 82333<br>11.44 | 78332<br>11.50                        | 75984<br>11.56* | 74839<br>11.57*    | 74457<br>11.58* | 74364<br>11.58*                        | 164                                              | 290            | 338            |
| 5800                                                                                                                                      | 83701<br>11.56 | 79595<br>12.03                        | 77155<br>12.08* | 75961<br>12.10*    | 75538<br>12.10* | 75428<br>12.10*                        | 164                                              | 293            | 342            |
| 5900                                                                                                                                      | 85067<br>12.08 | 80855<br>12.15                        | 78321<br>12.21* | 77079<br>12.22*    | 76613<br>12.23* | 76484<br>12.23*                        | 174                                              | 295            | 346            |
| 6000                                                                                                                                      | 86429<br>12.21 | 82112<br>12.27                        | 79482<br>12.33* | 78192<br>12.35*    | 77683<br>12.35* | 77533<br>12.35*                        | 175                                              | 297            | 349            |
| 6100                                                                                                                                      | 87789<br>12.33 | 83364<br>12.39                        | 80639<br>12.45* | 79300<br>12.47*    | 78746<br>12.47* | 78575<br>12.48*                        | 175                                              | 299            | 353            |
| 6200                                                                                                                                      | 89146<br>12.45 | 84613<br>12.52                        | 81809<br>12.58* | 80403<br>13.00*    | 79806<br>13.00* | 79610<br>13.00*                        | 193                                              | 301            | 356            |
| 6300                                                                                                                                      | 90514<br>12.57 | 85859<br>13.04                        | 82979<br>13.10* | 81502<br>13.12*    | 80866<br>13.12* | 80637<br>13.12*                        | 193                                              | 303            | 359            |
| 6400                                                                                                                                      | 91882<br>13.09 | 87101<br>13.16                        | 84145<br>13.22* | 82596<br>13.25*    | 81921<br>13.25* | 81659<br>13.25*                        | 193                                              | 305            | 363            |
| 6500                                                                                                                                      |                | 88339<br>13.28                        | 85308<br>13.35* | 83685<br>13.37*    | 82971<br>13.37* | 82674<br>13.37*                        | 245                                              | 312            | 366            |
| 6600                                                                                                                                      |                | 89576<br>13.41                        | 86467<br>13.47* | 84770<br>13.49*    | 84016<br>13.50* | 83682<br>13.50*                        | 246                                              | 314            | 369            |
| 6700                                                                                                                                      |                | 90820<br>13.53                        | 87621<br>13.59* | 85850<br>14.02*    | 85056<br>14.02* | 84684<br>14.02*                        | 247                                              | 315            | 371            |
| 6800                                                                                                                                      |                |                                       | 88772<br>14.12* | 86931<br>14.14*    | 86091<br>14.14* | 85680<br>14.15*                        |                                                  | 325            | 374            |
| 6900                                                                                                                                      |                |                                       | 89920<br>14.24* | 88010<br>14.27*    | 87121<br>14.27* | 86681<br>14.27*                        |                                                  | 328            | 379            |
| 7000                                                                                                                                      |                |                                       | 91063<br>14.37* | 89085<br>14.39*    | 88146<br>14.39* | 87677<br>14.39*                        |                                                  | 330            | 388            |
| 7100                                                                                                                                      |                |                                       | 92204<br>14.49* | 90157<br>14.52*    | 89166<br>14.52* | 88668<br>14.52*                        |                                                  | 332            | 391            |
| 7200                                                                                                                                      |                |                                       |                 | 91224<br>15.04*    | 90182<br>15.04* | 89653<br>15.04*                        |                                                  | 360            | 393            |
| 7300                                                                                                                                      |                |                                       |                 | 92287<br>15.16*    | 91198<br>15.17* | 90633<br>15.17*                        |                                                  | 362            | 396            |
| 7400                                                                                                                                      |                |                                       |                 |                    | 92213<br>15.29* | 91608<br>15.29*                        |                                                  |                | 398            |
| 7500                                                                                                                                      |                |                                       |                 |                    |                 | 92578<br>15.42*                        |                                                  |                | 415            |
| 7600                                                                                                                                      |                |                                       |                 |                    |                 |                                        |                                                  |                |                |
| 7700                                                                                                                                      |                |                                       |                 |                    |                 |                                        |                                                  |                |                |
| PACK FLOW LO                                                                                                                              |                | PACK FLOW HI OR/<br>AND CARGO COOL ON |                 | ENGINE ANTI-ICE ON |                 |                                        | TOTAL ANTI-ICE ON                                |                |                |
| Δ FUEL = -0.5 %                                                                                                                           |                | Δ FUEL = +1.0 %                       |                 | Δ FUEL = +2.0 %    |                 |                                        | Δ FUEL = +4.0 %                                  |                |                |

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|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.20 | P 15   |
|                                                                                                                             | <b>IN-CRUISE QUICK CHECK</b> |  | SEQ 150 | REV 14 |

| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING<br>CRUISE : LONG RANGE - DESCENT : M.80/300KT/250KT<br>IMC PROCEDURE : 330 KG (6MIN) |               |                                       |               |                    |                    |                                    |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------|---------------|--------------------|--------------------|------------------------------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 180000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                    |               |                                       |               | ISA<br>CG = 37.0 % |                    | FUEL CONSUMED (KG)<br>TIME (H.MIN) |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                                                                                                        | FLIGHT LEVEL  |                                       |               |                    |                    |                                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                                                                                                                 | 310           | 330                                   | 350           | 370                | 390                | 410                                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 200                                                                                                                                             | 1933<br>0.37  | 1845<br>0.37                          | 1763<br>0.36  | 1677<br>0.36       | 1603<br>0.36       | 1549<br>0.36                       | 1                                                | 1              | 2              |
| 300                                                                                                                                             | 3197<br>0.51  | 3074<br>0.50                          | 2962<br>0.49  | 2845<br>0.49       | 2756<br>0.49       | 2715<br>0.49                       | 5                                                | 5              | 8              |
| 400                                                                                                                                             | 4456<br>1.05  | 4298<br>1.04                          | 4158<br>1.02  | 4008<br>1.02       | 3903<br>1.02       | 3871<br>1.02                       | 9                                                | 10             | 15             |
| 500                                                                                                                                             | 5709<br>1.19  | 5516<br>1.18                          | 5349<br>1.15  | 5165<br>1.15       | 5042<br>1.15       | 5017<br>1.14                       | 14                                               | 14             | 23             |
| 600                                                                                                                                             | 6958<br>1.33  | 6730<br>1.32                          | 6536<br>1.28  | 6317<br>1.28       | 6175<br>1.28       | 6153<br>1.27                       | 18                                               | 19             | 29             |
| 700                                                                                                                                             | 8201<br>1.47  | 7938<br>1.45                          | 7713<br>1.41  | 7464<br>1.41       | 7301<br>1.40       | 7281<br>1.40                       | 22                                               | 23             | 36             |
| 800                                                                                                                                             | 9439<br>2.01  | 9142<br>1.59                          | 8884<br>1.54  | 8605<br>1.54       | 8421<br>1.53       | 8401<br>1.53                       | 26                                               | 27             | 42             |
| 900                                                                                                                                             | 10672<br>2.15 | 10341<br>2.13                         | 10049<br>2.08 | 9742<br>2.07       | 9535<br>2.06       | 9512<br>2.05                       | 30                                               | 32             | 48             |
| 1000                                                                                                                                            | 11901<br>2.29 | 11534<br>2.27                         | 11209<br>2.21 | 10873<br>2.20      | 10642<br>2.19      | 10615<br>2.18                      | 34                                               | 36             | 54             |
| 1100                                                                                                                                            | 13124<br>2.44 | 12723<br>2.41                         | 12362<br>2.34 | 11999<br>2.33      | 11743<br>2.32      | 11710<br>2.31                      | 38                                               | 40             | 60             |
| 1200                                                                                                                                            | 14343<br>2.58 | 13908<br>2.55                         | 13511<br>2.47 | 13120<br>2.46      | 12838<br>2.45      | 12796<br>2.44                      | 41                                               | 44             | 65             |
| 1300                                                                                                                                            | 15557<br>3.12 | 15087<br>3.09                         | 14653<br>3.01 | 14236<br>2.59      | 13927<br>2.58      | 13875<br>2.57                      | 45                                               | 48             | 71             |
| 1400                                                                                                                                            | 16767<br>3.26 | 16262<br>3.22                         | 15790<br>3.14 | 15348<br>3.12      | 15010<br>3.11      | 14947<br>3.09                      | 49                                               | 52             | 76             |
| 1500                                                                                                                                            | 17974<br>3.40 | 17429<br>3.37                         | 16926<br>3.27 | 16455<br>3.25      | 16088<br>3.24      | 16011<br>3.22                      | 53                                               | 56             | 81             |
| 1600                                                                                                                                            | 19177<br>3.54 | 18591<br>3.51                         | 18059<br>3.40 | 17555<br>3.38      | 17162<br>3.37      | 17071<br>3.35                      | 57                                               | 61             | 86             |
| 1700                                                                                                                                            | 20375<br>4.08 | 19748<br>4.05                         | 19187<br>3.54 | 18651<br>3.51      | 18232<br>3.50      | 18126<br>3.48                      | 60                                               | 65             | 91             |
| 1800                                                                                                                                            | 21570<br>4.22 | 20900<br>4.19                         | 20311<br>4.07 | 19742<br>4.04      | 19296<br>4.03      | 19175<br>4.00                      | 64                                               | 69             | 96             |
| 1900                                                                                                                                            | 22760<br>4.37 | 22047<br>4.33                         | 21431<br>4.20 | 20829<br>4.18      | 20355<br>4.16      | 20217<br>4.13                      | 67                                               | 73             | 100            |
| 2000                                                                                                                                            | 23945<br>4.51 | 23190<br>4.47                         | 22546<br>4.34 | 21910<br>4.31      | 21409<br>4.29      | 21253<br>4.26                      | 71                                               | 77             | 105            |
| 2100                                                                                                                                            | 25127<br>5.05 | 24328<br>5.02                         | 23657<br>4.47 | 22987<br>4.44      | 22458<br>4.42      | 22282<br>4.39                      | 74                                               | 81             | 109            |
| 2200                                                                                                                                            | 26304<br>5.19 | 25461<br>5.16                         | 24763<br>5.00 | 24060<br>4.57      | 23502<br>4.55      | 23306<br>4.51                      | 78                                               | 85             | 113            |
| 2300                                                                                                                                            | 27476<br>5.33 | 26589<br>5.30                         | 25865<br>5.14 | 25128<br>5.10      | 24541<br>5.08      | 24323<br>5.04                      | 81                                               | 89             | 118            |
| 2400                                                                                                                                            | 28643<br>5.47 | 27713<br>5.45                         | 26960<br>5.27 | 26192<br>5.23      | 25576<br>5.21      | 25335<br>5.17                      | 85                                               | 93             | 122            |
| 2500                                                                                                                                            | 29806<br>6.02 | 28832<br>5.59                         | 28049<br>5.42 | 27257<br>5.36      | 26606<br>5.33      | 26342<br>5.30                      | 88                                               | 97             | 126            |
| 2600                                                                                                                                            | 30966<br>6.16 | 29948<br>6.13                         | 29134<br>5.56 | 28319<br>5.49      | 27633<br>5.46      | 27346<br>5.43                      | 92                                               | 100            | 130            |
| 2700                                                                                                                                            | 32121<br>6.30 | 31059<br>6.28                         | 30215<br>6.10 | 29377<br>6.02      | 28656<br>5.59      | 28345<br>5.56                      | 95                                               | 104            | 134            |
| PACK FLOW LO                                                                                                                                    |               | PACK FLOW HI OR/<br>AND CARGO COOL ON |               |                    | ENGINE ANTI-ICE ON |                                    | TOTAL ANTI-ICE ON                                |                |                |
| △ FUEL = - 0.5 %                                                                                                                                |               | △FUEL = + 1 %                         |               |                    | △ FUEL = + 2.5 %   |                                    | △ FUEL = + 3.5 %                                 |                |                |

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| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING<br>CRUISE : LONG RANGE - DESCENT : M.80/300KT/250KT<br>IMC PROCEDURE : 330 KG (6MIN) |                |                                                        |                |                    |                                        |                                    |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------|----------------|--------------------|----------------------------------------|------------------------------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 210000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                    |                |                                                        |                | ISA<br>CG = 37.0 % |                                        | FUEL CONSUMED (KG)<br>TIME (H.MIN) |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                                                                                                        | FLIGHT LEVEL   |                                                        |                |                    |                                        |                                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                                                                                                                 | 310            | 330                                                    | 350            | 370                | 390                                    | 410                                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 2700                                                                                                                                            | 35094<br>6.18  | 34232<br>6.02                                          | 33406<br>6.00  | 32887<br>5.59      | 32982<br>5.58*                         | 32966<br>5.58*                     | 107                                              | 125            | 152            |
| 2800                                                                                                                                            | 36350<br>6.32  | 35453<br>6.15                                          | 34597<br>6.13  | 34044<br>6.12      | 34114<br>6.11*                         | 34121<br>6.10*                     | 111                                              | 128            | 155            |
| 2900                                                                                                                                            | 37602<br>6.46  | 36668<br>6.28                                          | 35784<br>6.26  | 35195<br>6.25      | 35238<br>6.23*                         | 35265<br>6.23*                     | 115                                              | 132            | 160            |
| 3000                                                                                                                                            | 38849<br>7.00  | 37879<br>6.41                                          | 36966<br>6.39  | 36340<br>6.38      | 36355<br>6.36*                         | 36399<br>6.36*                     | 119                                              | 136            | 166            |
| 3100                                                                                                                                            | 40091<br>7.14  | 39084<br>6.55                                          | 38142<br>6.52  | 37479<br>6.51      | 37466<br>6.49*                         | 37524<br>6.49*                     | 123                                              | 140            | 171            |
| 3200                                                                                                                                            | 41329<br>7.28  | 40285<br>7.08                                          | 39314<br>7.05  | 38612<br>7.04      | 38586<br>7.02*                         | 38640<br>7.01*                     | 127                                              | 143            | 177            |
| 3300                                                                                                                                            | 42558<br>7.42  | 41481<br>7.21                                          | 40482<br>7.18  | 39740<br>7.17      | 39701<br>7.15*                         | 39747<br>7.14*                     | 130                                              | 147            | 182            |
| 3400                                                                                                                                            | 43779<br>7.56  | 42672<br>7.35                                          | 41644<br>7.31  | 40863<br>7.30      | 40809<br>7.27*                         | 40845<br>7.27*                     | 134                                              | 150            | 187            |
| 3500                                                                                                                                            | 44995<br>8.11  | 43857<br>7.48                                          | 42801<br>7.44  | 41980<br>7.43      | 41911<br>7.40*                         | 41934<br>7.40*                     | 138                                              | 154            | 192            |
| 3600                                                                                                                                            | 46206<br>8.25  | 45037<br>8.01                                          | 43953<br>7.57  | 43100<br>7.56      | 43008<br>7.53*                         | 43016<br>7.52*                     | 141                                              | 157            | 197            |
| 3700                                                                                                                                            | 47412<br>8.39  | 46213<br>8.15                                          | 45101<br>8.11  | 44215<br>8.09      | 44099<br>8.06*                         | 44089<br>8.05*                     | 145                                              | 160            | 202            |
| 3800                                                                                                                                            | 48613<br>8.54  | 47385<br>8.28                                          | 46243<br>8.24  | 45325<br>8.22      | 45185<br>8.18*                         | 45159<br>8.18*                     | 149                                              | 164            | 206            |
| 3900                                                                                                                                            | 49810<br>9.08  | 48551<br>8.42                                          | 47382<br>8.37  | 46430<br>8.35      | 46265<br>8.31*                         | 46223<br>8.31*                     | 152                                              | 167            | 211            |
| 4000                                                                                                                                            | 51002<br>9.22  | 49713<br>8.55                                          | 48515<br>8.50  | 47530<br>8.48      | 47340<br>8.44*                         | 47280<br>8.43*                     | 156                                              | 170            | 215            |
| 4100                                                                                                                                            | 52190<br>9.37  | 50871<br>9.09                                          | 49645<br>9.03  | 48626<br>9.01      | 48409<br>8.56*                         | 48329<br>8.56*                     | 159                                              | 173            | 220            |
| 4200                                                                                                                                            | 53374<br>9.51  | 52024<br>9.22                                          | 50770<br>9.16  | 49717<br>9.14      | 49473<br>9.09*                         | 49372<br>9.09*                     | 163                                              | 176            | 224            |
| 4300                                                                                                                                            | 54552<br>10.06 | 53173<br>9.36                                          | 51891<br>9.29  | 50803<br>9.27      | 50531<br>9.22*                         | 50408<br>9.22*                     | 166                                              | 179            | 229            |
| 4400                                                                                                                                            | 55727<br>10.20 | 54318<br>9.49                                          | 53007<br>9.42  | 51885<br>9.40      | 51580<br>9.35*                         | 51437<br>9.35*                     | 170                                              | 183            | 233            |
| 4500                                                                                                                                            | 56898<br>10.35 | 55457<br>10.04                                         | 54119<br>9.56  | 52963<br>9.53      | 52624<br>9.48*                         | 52460<br>9.47*                     | 173                                              | 186            | 237            |
| 4600                                                                                                                                            | 58065<br>10.49 | 56590<br>10.19                                         | 55229<br>10.09 | 54035<br>10.06     | 53663<br>10.01*                        | 53476<br>10.00*                    | 176                                              | 189            | 241            |
| 4700                                                                                                                                            | 59227<br>11.04 | 57719<br>10.34                                         | 56343<br>10.22 | 55104<br>10.19     | 54697<br>10.14*                        | 54485<br>10.13*                    | 180                                              | 193            | 244            |
| 4800                                                                                                                                            | 60386<br>11.18 | 58844<br>10.50                                         | 57453<br>10.35 | 56171<br>10.32     | 55725<br>10.27*                        | 55489<br>10.26*                    | 183                                              | 196            | 248            |
| 4900                                                                                                                                            | 61541<br>11.32 | 59965<br>11.05                                         | 58559<br>10.48 | 57234<br>10.45     | 56749<br>10.40*                        | 56487<br>10.39*                    | 186                                              | 199            | 252            |
| 5000                                                                                                                                            | 62691<br>11.47 | 61081<br>11.21                                         | 59662<br>11.01 | 58293<br>10.58     | 57768<br>10.53*                        | 57480<br>10.51*                    | 189                                              | 202            | 255            |
| 5100                                                                                                                                            | 63838<br>12.01 | 62194<br>11.37                                         | 60761<br>11.14 | 59347<br>11.11     | 58782<br>11.06*                        | 58478<br>11.04*                    | 192                                              | 205            | 259            |
| 5200                                                                                                                                            | 64980<br>12.16 | 63303<br>11.53                                         | 61857<br>11.27 | 60398<br>11.24     | 59791<br>11.19*                        | 59472<br>11.17*                    | 194                                              | 208            | 262            |
| PACK FLOW LO<br>△ FUEL = - 0.5 %                                                                                                                |                | PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 % |                |                    | ENGINE ANTI-ICE ON<br>△ FUEL = + 2.5 % |                                    | TOTAL ANTI-ICE ON<br>△ FUEL = + 3.5 %            |                |                |

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|                                                                                                                             |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.20 | P 17   |
|                                                                                                                             | <b>IN-CRUISE QUICK CHECK</b> |  | SEQ 150 | REV 26 |

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| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING<br>CRUISE : LONG RANGE - DESCENT : M.80/300KT/250KT<br>IMC PROCEDURE : 330 KG (6MIN) |                 |                                                        |                |                    |                                          |                    |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------|----------------|--------------------|------------------------------------------|--------------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 240000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                    |                 |                                                        |                | ISA<br>CG = 37.0 % |                                          | FUEL CONSUMED (KG) |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                                                                                                        |                 | FLIGHT LEVEL                                           |                |                    |                                          |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                                                                                                                 |                 |                                                        |                |                    |                                          |                    | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 5200                                                                                                                                            | 70948<br>11.29  | 69512<br>11.21                                         | 68219<br>11.22 | 67876<br>11.20*    | 67736<br>11.19*                          | 67883<br>11.20*    | 210                                              | 253            | 277            |
| 5300                                                                                                                                            | 72188<br>11.42  | 70720<br>11.34                                         | 69385<br>11.35 | 69009<br>11.33*    | 68854<br>11.31*                          | 68998<br>11.33*    | 213                                              | 257            | 281            |
| 5400                                                                                                                                            | 73423<br>11.56  | 71923<br>11.47                                         | 70547<br>11.48 | 70136<br>11.46*    | 69966<br>11.44*                          | 70104<br>11.45*    | 216                                              | 260            | 285            |
| 5500                                                                                                                                            | 74649<br>12.10  | 73122<br>12.00                                         | 71704<br>12.01 | 71258<br>11.59*    | 71071<br>11.57*                          | 71202<br>11.58*    | 219                                              | 263            | 289            |
| 5600                                                                                                                                            | 75867<br>12.25  | 74315<br>12.13                                         | 72855<br>12.14 | 72375<br>12.12*    | 72171<br>12.10*                          | 72292<br>12.11*    | 222                                              | 266            | 293            |
| 5700                                                                                                                                            | 77081<br>12.41  | 75499<br>12.26                                         | 74003<br>12.27 | 73486<br>12.26*    | 73264<br>12.23*                          | 73374<br>12.24*    | 226                                              | 269            | 298            |
| 5800                                                                                                                                            | 78291<br>12.56  | 76679<br>12.39                                         | 75152<br>12.40 | 74592<br>12.39*    | 74352<br>12.36*                          | 74453<br>12.36*    | 229                                              | 272            | 302            |
| 5900                                                                                                                                            | 79496<br>13.12  | 77856<br>12.53                                         | 76296<br>12.53 | 75693<br>12.52*    | 75434<br>12.49*                          | 75524<br>12.49*    | 232                                              | 274            | 306            |
| 6000                                                                                                                                            | 80698<br>13.27  | 79028<br>13.06                                         | 77437<br>13.06 | 76788<br>13.05*    | 76510<br>13.02*                          | 76590<br>13.02*    | 236                                              | 277            | 310            |
| 6100                                                                                                                                            | 81894<br>13.43  | 80196<br>13.19                                         | 78574<br>13.19 | 77880<br>13.18*    | 77580<br>13.15*                          | 77649<br>13.15*    | 239                                              | 280            | 314            |
| 6200                                                                                                                                            | 83087<br>13.59  | 81359<br>13.33                                         | 79706<br>13.32 | 78966<br>13.31*    | 78644<br>13.28*                          | 78703<br>13.28*    | 242                                              | 283            | 318            |
| 6300                                                                                                                                            | 84276<br>14.15  | 82519<br>13.46                                         | 80834<br>13.45 | 80048<br>13.44*    | 79704<br>13.41*                          | 79750<br>13.41*    | 245                                              | 285            | 321            |
| 6400                                                                                                                                            | 85460<br>14.30  | 83674<br>13.59                                         | 81958<br>13.58 | 81131<br>13.57*    | 80757<br>13.54*                          | 80791<br>13.53*    | 248                                              | 288            | 325            |
| 6500                                                                                                                                            | 86640<br>14.46  | 84825<br>14.13                                         | 83078<br>14.11 | 82214<br>14.10*    | 81806<br>14.07*                          | 81826<br>14.06*    | 251                                              | 290            | 329            |
| 6600                                                                                                                                            | 87817<br>15.03  | 85972<br>14.26                                         | 84194<br>14.24 | 83292<br>14.23*    | 82849<br>14.20*                          | 82856<br>14.19*    | 254                                              | 293            | 332            |
| 6700                                                                                                                                            | 88989<br>15.19  | 87115<br>14.39                                         | 85305<br>14.37 | 84367<br>14.36*    | 83887<br>14.33*                          | 83879<br>14.32*    | 258                                              | 296            | 336            |
| 6800                                                                                                                                            | 90157<br>15.35  | 88254<br>14.53                                         | 86413<br>14.50 | 85436<br>14.49*    | 84919<br>14.46*                          | 84897<br>14.45*    | 261                                              | 298            | 339            |
| 6900                                                                                                                                            | 91322<br>15.50  | 89389<br>15.06                                         | 87516<br>15.03 | 86502<br>15.02*    | 85947<br>14.59*                          | 85909<br>14.58*    | 264                                              | 300            | 343            |
| 7000                                                                                                                                            | 92482<br>16.04  | 90519<br>15.20                                         | 88615<br>15.16 | 87563<br>15.15*    | 86970<br>15.12*                          | 86916<br>15.10*    | 267                                              | 303            | 346            |
| 7100                                                                                                                                            | 93639<br>16.18  | 91640<br>15.33                                         | 89711<br>15.29 | 88621<br>15.28*    | 87988<br>15.25*                          | 87917<br>15.23*    | 270                                              | 306            | 349            |
| 7200                                                                                                                                            | 94792<br>16.33  | 92758<br>15.47                                         | 90802<br>15.42 | 89674<br>15.41*    | 89001<br>15.38*                          | 88913<br>15.36*    | 273                                              | 308            | 352            |
| 7300                                                                                                                                            | 95942<br>16.47  | 93871<br>16.00                                         | 91887<br>15.55 | 90723<br>15.54*    | 90009<br>15.51*                          | 89904<br>15.49*    | 276                                              | 311            | 355            |
| 7400                                                                                                                                            | 97087<br>17.02  | 94981<br>16.14                                         | 92969<br>16.09 | 91768<br>16.07*    | 91013<br>16.04*                          | 90890<br>16.02*    | 279                                              | 313            | 358            |
| 7500                                                                                                                                            | 98229<br>17.16  | 96087<br>16.27                                         | 94047<br>16.22 | 92809<br>16.20*    | 92012<br>16.17*                          | 91870<br>16.15*    | 282                                              | 315            | 360            |
| 7600                                                                                                                                            | 99367<br>17.31  | 97189<br>16.41                                         | 95121<br>16.35 | 93846<br>16.33*    | 93012<br>16.30*                          | 92846<br>16.28*    | 284                                              | 318            | 363            |
| 7700                                                                                                                                            | 100503<br>17.45 | 98287<br>16.54                                         | 96191<br>16.48 | 94879<br>16.46*    | 94012<br>16.43*                          | 93817<br>16.41*    | 287                                              | 320            | 366            |
| PACK FLOW LO<br>ΔFUEL = - 0.5 %                                                                                                                 |                 | PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFUEL = + 1 % |                |                    | ENGINE<br>ANTI ICE ON<br>ΔFUEL = + 2.5 % |                    | TOTAL<br>ANTI ICE ON<br>ΔFUEL = + 3.5 %          |                |                |



| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
|------------------------------------------------------------|-----------------|---------------------------------------|------------------|------------------|--------------------|--------------------|--------------------------------------------------|----------------|----------------|
| CRUISE : LONG RANGE - DESCENT : M.80/300KT/250KT           |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| IMC PROCEDURE : 330 KG (6MIN)                              |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| REF. INITIAL WEIGHT = 250000 KG                            |                 |                                       |                  | ISA              |                    | FUEL CONSUMED (KG) |                                                  |                |                |
| NORMAL AIR CONDITIONING                                    |                 |                                       |                  | CG = 37.0 %      |                    | TIME (H.MIN)       |                                                  |                |                |
| ANTI-ICING OFF                                             |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                   | FLIGHT LEVEL    |                                       |                  |                  |                    |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                            | 310             | 330                                   | 350              | 370              | 390                | 410                | FL310<br>FL330                                   | FL350<br>FL370 | FL390<br>FL410 |
| 7700                                                       | 103368<br>17.21 | 101327<br>16.45                       | 99378<br>16.46*  | 98148<br>16.44*  | 97711<br>16.41*    | 97506<br>16.37*    | 299                                              | 328            | 377            |
| 7800                                                       | 104519<br>17.37 | 102441<br>16.59                       | 100469<br>16.59* | 99197<br>16.57*  | 98726<br>16.54*    | 98498<br>16.50*    | 301                                              | 330            | 380            |
| 7900                                                       | 105665<br>17.52 | 103551<br>17.12                       | 101557<br>17.12* | 100243<br>17.10* | 99735<br>17.07*    | 99484<br>17.03*    | 303                                              | 333            | 382            |
| 8000                                                       | 106808<br>18.07 | 104656<br>17.26                       | 102641<br>17.25* | 101284<br>17.23* | 100740<br>17.20*   | 100465<br>17.16*   | 305                                              | 335            | 385            |
| 8100                                                       | 107948<br>18.23 | 105758<br>17.40                       | 103721<br>17.38* | 102321<br>17.37* | 101741<br>17.33*   | 101441<br>17.29*   | 307                                              | 337            | 387            |
| 8200                                                       |                 | 106857<br>17.53                       | 104797<br>17.51* | 103355<br>17.50* | 102737<br>17.46*   | 102411<br>17.41*   | 318                                              | 339            | 389            |
| 8300                                                       |                 | 107952<br>18.07                       | 105870<br>18.04* | 104384<br>18.03* | 103728<br>17.59*   | 103376<br>17.54*   | 319                                              | 341            | 391            |
| 8400                                                       |                 |                                       | 106939<br>18.17* | 105409<br>18.16* | 104715<br>18.12*   | 104335<br>18.07*   |                                                  | 343            | 393            |
| 8500                                                       |                 |                                       | 108005<br>18.31* | 106430<br>18.29* | 105698<br>18.26*   | 105296<br>18.20*   |                                                  | 345            | 396            |
| 8600                                                       |                 |                                       |                  | 107448<br>18.42* | 106676<br>18.39*   | 106253<br>18.33*   |                                                  | 357            | 398            |
| 8700                                                       |                 |                                       |                  | 108462<br>18.55* | 107657<br>18.52*   | 107206<br>18.46*   |                                                  | 359            | 401            |
| 8800                                                       |                 |                                       |                  |                  | 108634<br>19.05*   | 108155<br>18.59*   |                                                  |                | 403            |
| 8900                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9000                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9100                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9200                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9300                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9400                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9500                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9600                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9700                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9800                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 9900                                                       |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 10000                                                      |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 10100                                                      |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| 10200                                                      |                 |                                       |                  |                  |                    |                    |                                                  |                |                |
| PACK FLOW LO                                               |                 | PACK FLOW HI OR/<br>AND CARGO COOL ON |                  |                  | ENGINE ANTI-ICE ON |                    | TOTAL ANTI-ICE ON                                |                |                |
| △ FUEL = - 0.5 %                                           |                 | △ FUEL = + 1 %                        |                  |                  | △ FUEL = + 2.5 %   |                    | △ FUEL = + 3.5 %                                 |                |                |

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|                                                                                                                                            |                                             |         |        |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|--------|
|  <b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b><br><br>HOLDING | 3.05.25 | P 1    |
|                                                                                                                                            |                                             | SEQ 001 | REV 14 |

## GENERAL

- R Holding tables contain information about the engine 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 240 knots and green dot speed
  - configuration 1 at 210 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.
- R These charts are established with air conditioning in normal mode (Packs NORM/Cargo cooling OFF or Packs LO/Cargo cooling NORM) and the center of gravity at 30 %.

R

| RACE TRACK HOLDING PATTERN - GREEN DOT SPEED                                                  |                                                          |              |              |                                          |                 |                                           |                         |                                        |              |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------|--------------|------------------------------------------|-----------------|-------------------------------------------|-------------------------|----------------------------------------|--------------|
| MAX. CRUISE THRUST LIMITS<br>CLEAN CONFIGURATION<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |                                                          |              |              |                                          | ISA<br>CG=30.0% |                                           | N1 (%)<br>FF (KG/H/ENG) |                                        |              |
| WEIGHT<br>(1000KG)                                                                            | FL 15                                                    | FL 50        | FL100        | FL120                                    | FL140           | FL160                                     | FL180                   | FL200                                  | FL250        |
| <b>130</b>                                                                                    | 47.7<br>962                                              | 50.5<br>949  | 54.8<br>938  | 56.3<br>928                              | 57.8<br>921     | 59.4<br>916                               | 61.0<br>911             | 62.7<br>904                            | 67.0<br>904  |
| <b>140</b>                                                                                    | 49.5<br>1026                                             | 52.5<br>1021 | 56.5<br>1002 | 58.0<br>994                              | 59.6<br>988     | 61.2<br>984                               | 62.8<br>977             | 64.4<br>971                            | 68.8<br>973  |
| <b>150</b>                                                                                    | 51.3<br>1098                                             | 54.3<br>1091 | 58.1<br>1069 | 59.7<br>1062                             | 61.3<br>1058    | 62.9<br>1051                              | 64.5<br>1044            | 66.1<br>1040                           | 70.6<br>1049 |
| <b>160</b>                                                                                    | 53.1<br>1171                                             | 56.0<br>1159 | 59.7<br>1137 | 61.3<br>1132                             | 62.9<br>1125    | 64.5<br>1119                              | 66.1<br>1113            | 67.7<br>1108                           | 72.3<br>1126 |
| <b>170</b>                                                                                    | 54.7<br>1242                                             | 57.4<br>1226 | 61.2<br>1206 | 62.8<br>1201                             | 64.4<br>1194    | 66.0<br>1187                              | 67.6<br>1181            | 69.2<br>1177                           | 73.9<br>1204 |
| <b>180</b>                                                                                    | 56.2<br>1312                                             | 58.8<br>1293 | 62.7<br>1277 | 64.3<br>1270                             | 65.9<br>1262    | 67.4<br>1256                              | 69.0<br>1250            | 70.7<br>1252                           | 75.4<br>1279 |
| <b>190</b>                                                                                    | 57.6<br>1380                                             | 60.2<br>1363 | 64.1<br>1346 | 65.7<br>1338                             | 67.2<br>1331    | 68.8<br>1324                              | 70.5<br>1321            | 72.2<br>1329                           | 76.8<br>1355 |
| <b>200</b>                                                                                    | 58.9<br>1448                                             | 61.5<br>1433 | 65.4<br>1416 | 67.0<br>1407                             | 68.5<br>1399    | 70.1<br>1393                              | 71.9<br>1398            | 73.7<br>1408                           | 78.1<br>1433 |
| <b>210</b>                                                                                    | 60.1<br>1518                                             | 62.8<br>1507 | 66.7<br>1484 | 68.2<br>1476                             | 69.8<br>1468    | 71.4<br>1467                              | 73.2<br>1476            | 75.0<br>1487                           | 79.3<br>1512 |
| <b>220</b>                                                                                    | 61.4<br>1590                                             | 64.0<br>1578 | 67.9<br>1553 | 69.4<br>1544                             | 71.0<br>1538    | 72.8<br>1545                              | 74.6<br>1556            | 76.2<br>1563                           | 80.5<br>1592 |
| <b>230</b>                                                                                    | 62.6<br>1663                                             | 65.2<br>1648 | 69.0<br>1622 | 70.6<br>1613                             | 72.3<br>1614    | 74.0<br>1624                              | 75.8<br>1634            | 77.5<br>1640                           | 81.5<br>1673 |
| <b>240</b>                                                                                    | 63.7<br>1737                                             | 66.4<br>1718 | 70.1<br>1691 | 71.8<br>1684                             | 73.5<br>1694    | 75.3<br>1704                              | 76.9<br>1712            | 78.7<br>1720                           | 82.6<br>1757 |
| <b>250</b>                                                                                    | 64.8<br>1808                                             | 67.5<br>1787 | 71.3<br>1761 | 72.9<br>1763                             | 74.6<br>1773    | 76.4<br>1784                              | 78.0<br>1791            | 79.7<br>1801                           | 83.6<br>1842 |
| PACK FLOW LO<br><br>ΔFF = − 0.5 %                                                             | PACK FLOW HI OR/<br>AND CARGO COOL ON<br><br>ΔFF = + 1 % |              |              | ENGINE<br>ANTI ICE ON<br><br>ΔFF = + 4 % |                 | TOTAL<br>ANTI ICE ON<br><br>ΔFF = + 5.5 % |                         | per 1° above ISA<br><br>ΔFF = + 0.25 % |              |

Note : Correction for straight line holding : − 5 %

|                                                                                                                             |                              |  |  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|--|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  |  |  | 3.05.25 | P 3    |
|                                                                                                                             | <b>HOLDING</b>               |  |  |  | SEQ 150 | REV 22 |

R

| <b>RACE TRACK HOLDING PATTERN - 240KT</b>                                                     |              |                                                                  |              |                                                  |                 |                                                   |                         |                                               |              |
|-----------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------|--------------|--------------------------------------------------|-----------------|---------------------------------------------------|-------------------------|-----------------------------------------------|--------------|
| MAX. CRUISE THRUST LIMITS<br>CLEAN CONFIGURATION<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |              |                                                                  |              |                                                  | ISA<br>CG=30.0% |                                                   | N1 (%)<br>FF (KG/H/ENG) |                                               |              |
| WEIGHT<br>(1000KG)                                                                            | FL 15        | FL 50                                                            | FL100        | FL120                                            | FL140           | FL160                                             | FL180                   | FL200                                         | FL250        |
| <b>130</b>                                                                                    | 53.2<br>1170 | 56.0<br>1155                                                     | 59.7<br>1127 | 61.2<br>1119                                     | 62.7<br>1107    | 64.1<br>1094                                      | 65.5<br>1084            | 67.1<br>1081                                  | 70.8<br>1068 |
| <b>140</b>                                                                                    | 54.0<br>1203 | 56.7<br>1186                                                     | 60.4<br>1160 | 61.9<br>1151                                     | 63.4<br>1139    | 64.8<br>1126                                      | 66.3<br>1118            | 67.8<br>1116                                  | 71.7<br>1106 |
| <b>150</b>                                                                                    | 54.8<br>1240 | 57.4<br>1221                                                     | 61.2<br>1196 | 62.7<br>1187                                     | 64.2<br>1175    | 65.6<br>1163                                      | 67.1<br>1156            | 68.7<br>1154                                  | 72.6<br>1148 |
| <b>160</b>                                                                                    | 55.6<br>1277 | 58.2<br>1258                                                     | 62.0<br>1235 | 63.5<br>1226                                     | 65.0<br>1213    | 66.4<br>1203                                      | 67.9<br>1197            | 69.6<br>1196                                  | 73.7<br>1195 |
| <b>170</b>                                                                                    | 56.5<br>1319 | 59.0<br>1299                                                     | 62.9<br>1278 | 64.4<br>1268                                     | 65.8<br>1256    | 67.3<br>1247                                      | 68.9<br>1241            | 70.5<br>1241                                  | 74.7<br>1247 |
| <b>180</b>                                                                                    | 57.3<br>1362 | 59.9<br>1344                                                     | 63.7<br>1323 | 65.2<br>1313                                     | 66.7<br>1302    | 68.2<br>1294                                      | 69.9<br>1290            | 71.6<br>1295                                  | 75.8<br>1304 |
| <b>190</b>                                                                                    | 58.2<br>1410 | 60.8<br>1394                                                     | 64.7<br>1373 | 66.2<br>1363                                     | 67.7<br>1353    | 69.2<br>1346                                      | 70.9<br>1344            | 72.7<br>1352                                  | 77.0<br>1365 |
| <b>200</b>                                                                                    | 59.2<br>1459 | 61.8<br>1445                                                     | 65.6<br>1424 | 67.1<br>1415                                     | 68.7<br>1406    | 70.3<br>1401                                      | 72.0<br>1407            | 73.8<br>1416                                  | 78.1<br>1433 |
| <b>210</b>                                                                                    | 60.1<br>1516 | 62.8<br>1504                                                     | 66.6<br>1483 | 68.2<br>1474                                     | 69.8<br>1466    | 71.4<br>1465                                      | 73.2<br>1475            | 75.0<br>1485                                  | 79.3<br>1505 |
| <b>220</b>                                                                                    | 61.1<br>1576 | 63.8<br>1565                                                     | 67.7<br>1543 | 69.2<br>1536                                     | 70.9<br>1529    | 72.6<br>1535                                      | 74.5<br>1548            | 76.1<br>1555                                  | 80.5<br>1580 |
| <b>230</b>                                                                                    | 62.2<br>1638 | 64.8<br>1629                                                     | 68.7<br>1607 | 70.4<br>1601                                     | 72.0<br>1601    | 73.8<br>1611                                      | 75.6<br>1625            | 77.4<br>1632                                  | 81.8<br>1660 |
| <b>240</b>                                                                                    | 63.3<br>1708 | 66.0<br>1699                                                     | 69.9<br>1678 | 71.6<br>1674                                     | 73.3<br>1681    | 75.2<br>1692                                      | 76.9<br>1706            | 78.6<br>1710                                  | 83.1<br>1744 |
| <b>250</b>                                                                                    | 64.3<br>1779 | 67.1<br>1771                                                     | 71.1<br>1751 | 72.8<br>1755                                     | 74.6<br>1763    | 76.3<br>1776                                      | 78.1<br>1790            | 79.8<br>1791                                  | 84.5<br>1834 |
| <b>PACK FLOW LO</b><br><br>ΔFF = - 0.5 %                                                      |              | <b>PACK FLOW HI OR/<br/>AND CARGO COOL ON</b><br><br>ΔFF = + 1 % |              | <b>ENGINE<br/>ANTI ICE ON</b><br><br>ΔFF = + 4 % |                 | <b>TOTAL<br/>ANTI ICE ON</b><br><br>ΔFF = + 5.5 % |                         | <b>per 1° above ISA</b><br><br>ΔFF = + 0.25 % |              |

Note : Correction for straight line holding : - 2 %

|                                                                                                                                               |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.25 | P 4    |
|                                                                                                                                               | <b>HOLDING</b>               |  | SEQ 150 | REV 22 |

R

| <b>RACE TRACK HOLDING PATTERN - S SPEED</b>                                               |              |                                                          |              |                                          |                   |                                           |                         |                                        |              |
|-------------------------------------------------------------------------------------------|--------------|----------------------------------------------------------|--------------|------------------------------------------|-------------------|-------------------------------------------|-------------------------|----------------------------------------|--------------|
| MAX. CRUISE THRUST LIMITS<br>CONFIGURATION 1<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |              |                                                          |              |                                          | ISA<br>CG = 30.0% |                                           | N1 (%)<br>FF (KG/H/ENG) |                                        |              |
| WEIGHT<br>(1000KG)                                                                        | FL 15        | FL 50                                                    | FL100        | FL120                                    | FL140             | FL150                                     | FL160                   | FL180                                  | FL200        |
| <b>130</b>                                                                                | 50.6<br>1076 | 53.6<br>1070                                             | 57.7<br>1056 | 59.4<br>1052                             | 61.0<br>1048      | 61.8<br>1047                              | 62.7<br>1047            | 64.5<br>1049                           | 66.2<br>1049 |
| <b>140</b>                                                                                | 52.7<br>1162 | 55.7<br>1156                                             | 59.7<br>1141 | 61.4<br>1137                             | 63.0<br>1136      | 64.0<br>1136                              | 64.9<br>1138            | 66.5<br>1136                           | 68.3<br>1135 |
| <b>150</b>                                                                                | 54.7<br>1250 | 57.5<br>1239                                             | 61.6<br>1227 | 63.3<br>1225                             | 65.1<br>1226      | 65.9<br>1225                              | 66.7<br>1224            | 68.5<br>1223                           | 70.2<br>1225 |
| <b>160</b>                                                                                | 56.5<br>1337 | 59.3<br>1324                                             | 63.4<br>1315 | 65.1<br>1315                             | 66.8<br>1312      | 67.6<br>1311                              | 68.5<br>1310            | 70.2<br>1311                           | 72.1<br>1313 |
| <b>170</b>                                                                                | 58.2<br>1420 | 61.0<br>1410                                             | 65.2<br>1405 | 66.8<br>1401                             | 68.4<br>1399      | 69.3<br>1398                              | 70.2<br>1398            | 72.0<br>1399                           | 74.0<br>1403 |
| <b>180</b>                                                                                | 59.8<br>1506 | 62.6<br>1497                                             | 66.7<br>1491 | 68.3<br>1487                             | 70.1<br>1485      | 70.9<br>1486                              | 71.8<br>1486            | 73.8<br>1488                           | 75.6<br>1495 |
| <b>190</b>                                                                                | 61.3<br>1591 | 64.1<br>1585                                             | 68.2<br>1577 | 69.9<br>1574                             | 71.6<br>1573      | 72.5<br>1574                              | 73.5<br>1575            | 75.3<br>1580                           | 77.2<br>1588 |
| <b>200</b>                                                                                | 62.7<br>1678 | 65.5<br>1674                                             | 69.6<br>1663 | 71.3<br>1661                             | 73.1<br>1662      | 74.1<br>1663                              | 75.0<br>1665            | 76.9<br>1674                           | 78.8<br>1683 |
| <b>210</b>                                                                                | 64.1<br>1770 | 67.0<br>1760                                             | 71.0<br>1749 | 72.8<br>1750                             | 74.7<br>1751      | 75.6<br>1754                              | 76.4<br>1759            | 78.4<br>1768                           | 80.1<br>1777 |
| <b>220</b>                                                                                | 65.5<br>1859 | 68.2<br>1847                                             | 72.4<br>1838 | 74.2<br>1840                             | 76.0<br>1844      | 76.9<br>1849                              | 77.8<br>1855            | 79.7<br>1864                           | 81.4<br>1870 |
| <b>230</b>                                                                                | 66.7<br>1944 | 69.5<br>1933                                             | 73.7<br>1928 | 75.6<br>1929                             | 77.3<br>1939      | 78.2<br>1945                              | 79.2<br>1949            | 80.9<br>1959                           | 82.7<br>1962 |
| <b>240</b>                                                                                | 67.9<br>2029 | 70.7<br>2019                                             | 75.0<br>2017 | 76.8<br>2023                             | 78.6<br>2034      | 79.6<br>2040                              | 80.4<br>2045            | 82.2<br>2052                           | 83.9<br>2055 |
| <b>250</b>                                                                                | 69.1<br>2115 | 71.9<br>2105                                             | 76.3<br>2107 | 78.0<br>2119                             | 79.9<br>2130      | 80.7<br>2136                              | 81.6<br>2141            | 83.3<br>2145                           | 85.1<br>2150 |
| <b>260</b>                                                                                | 70.2<br>2201 | 73.0<br>2193                                             | 77.4<br>2203 | 79.2<br>2215                             | 81.0<br>2227      | 81.9<br>2233                              | 82.7<br>2236            | 84.4<br>2240                           | 86.3<br>2250 |
| <b>270</b>                                                                                | 71.2<br>2288 | 74.1<br>2283                                             | 78.5<br>2300 | 80.4<br>2312                             | 82.1<br>2325      | 82.9<br>2328                              | 83.8<br>2331            | 85.6<br>2337                           | 87.5<br>2352 |
| PACK FLOW LO<br><br>ΔFF = - 0.5 %                                                         |              | PACK FLOW HI OR/<br>AND CARGO COOL ON<br><br>ΔFF = + 1 % |              | ENGINE<br>ANTI ICE ON<br><br>ΔFF = + 4 % |                   | TOTAL<br>ANTI ICE ON<br><br>ΔFF = + 5.5 % |                         | per 1° above ISA<br><br>ΔFF = + 0.25 % |              |

Note : Correction for straight line holding : - 5 %

|                                                                                                                             |                              |  |  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|--|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  |  |  | 3.05.25 | P 5    |
|                                                                                                                             | <b>HOLDING</b>               |  |  |  | SEQ 150 | REV 22 |

R

| <b>RACE TRACK HOLDING PATTERN - 210KT</b>                                                 |              |                                                          |              |                                          |                   |                                           |                         |                                        |              |
|-------------------------------------------------------------------------------------------|--------------|----------------------------------------------------------|--------------|------------------------------------------|-------------------|-------------------------------------------|-------------------------|----------------------------------------|--------------|
| MAX. CRUISE THRUST LIMITS<br>CONFIGURATION 1<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |              |                                                          |              |                                          | ISA<br>CG = 30.0% |                                           | N1 (%)<br>FF (KG/H/ENG) |                                        |              |
| WEIGHT<br>(1000KG)                                                                        | FL 15        | FL 50                                                    | FL100        | FL120                                    | FL140             | FL150                                     | FL160                   | FL180                                  | FL200        |
| <b>130</b>                                                                                | 57.3<br>1369 | 59.9<br>1344                                             | 63.6<br>1321 | 65.1<br>1315                             | 66.7<br>1307      | 67.5<br>1302                              | 68.3<br>1298            | 69.8<br>1290                           | 71.6<br>1286 |
| <b>140</b>                                                                                | 57.9<br>1402 | 60.5<br>1378                                             | 64.3<br>1357 | 65.9<br>1352                             | 67.5<br>1345      | 68.2<br>1340                              | 69.0<br>1336            | 70.7<br>1328                           | 72.4<br>1329 |
| <b>150</b>                                                                                | 58.7<br>1439 | 61.2<br>1417                                             | 65.1<br>1398 | 66.7<br>1393                             | 68.2<br>1385      | 69.0<br>1381                              | 69.8<br>1376            | 71.5<br>1371                           | 73.3<br>1377 |
| <b>160</b>                                                                                | 59.5<br>1480 | 62.0<br>1460                                             | 65.8<br>1441 | 67.5<br>1437                             | 69.0<br>1429      | 69.8<br>1424                              | 70.7<br>1420            | 72.4<br>1420                           | 74.3<br>1430 |
| <b>170</b>                                                                                | 60.3<br>1529 | 62.9<br>1510                                             | 66.8<br>1493 | 68.4<br>1489                             | 70.0<br>1481      | 70.8<br>1476                              | 71.7<br>1475            | 73.5<br>1479                           | 75.3<br>1490 |
| <b>180</b>                                                                                | 61.2<br>1582 | 63.8<br>1564                                             | 67.7<br>1549 | 69.4<br>1545                             | 71.0<br>1536      | 71.8<br>1535                              | 72.7<br>1535            | 74.6<br>1543                           | 76.4<br>1552 |
| <b>190</b>                                                                                | 62.2<br>1641 | 64.8<br>1625                                             | 68.8<br>1611 | 70.5<br>1607                             | 72.1<br>1603      | 73.0<br>1603                              | 74.0<br>1605            | 75.8<br>1615                           | 77.6<br>1625 |
| <b>200</b>                                                                                | 63.2<br>1710 | 65.9<br>1695                                             | 70.0<br>1682 | 71.6<br>1679                             | 73.4<br>1679      | 74.3<br>1680                              | 75.3<br>1684            | 77.1<br>1695                           | 78.9<br>1701 |
| <b>210</b>                                                                                | 64.3<br>1783 | 67.1<br>1769                                             | 71.2<br>1757 | 72.9<br>1757                             | 74.7<br>1757      | 75.6<br>1761                              | 76.5<br>1766            | 78.4<br>1777                           | 80.1<br>1782 |
| <b>220</b>                                                                                | 65.5<br>1860 | 68.3<br>1847                                             | 72.4<br>1839 | 74.2<br>1840                             | 76.0<br>1845      | 76.9<br>1850                              | 77.8<br>1855            | 79.7<br>1865                           | 81.4<br>1870 |
| <b>230</b>                                                                                | 66.7<br>1943 | 69.4<br>1932                                             | 73.7<br>1927 | 75.6<br>1928                             | 77.3<br>1938      | 78.3<br>1943                              | 79.2<br>1948            | 81.0<br>1958                           | 82.8<br>1962 |
| <b>240</b>                                                                                | 68.0<br>2032 | 70.7<br>2023                                             | 75.1<br>2022 | 76.9<br>2029                             | 78.7<br>2040      | 79.7<br>2044                              | 80.6<br>2051            | 82.4<br>2060                           | 84.2<br>2065 |
| <b>250</b>                                                                                | 69.2<br>2129 | 72.1<br>2120                                             | 76.5<br>2125 | 78.3<br>2136                             | 80.2<br>2146      | 81.1<br>2153                              | 82.0<br>2158            | 83.8<br>2167                           | 85.7<br>2177 |
| <b>260</b>                                                                                | 70.5<br>2229 | 73.4<br>2225                                             | 77.8<br>2238 | 79.7<br>2248                             | 81.6<br>2262      | 82.5<br>2268                              | 83.4<br>2273            | 85.3<br>2282                           | 87.4<br>2304 |
| <b>270</b>                                                                                | 71.8<br>2339 | 74.8<br>2340                                             | 79.3<br>2358 | 81.2<br>2371                             | 83.0<br>2386      | 83.9<br>2391                              | 84.9<br>2396            | 86.9<br>2418                           | 89.3<br>2447 |
| PACK FLOW LO<br><br>ΔFF = - 0.5 %                                                         |              | PACK FLOW HI OR/<br>AND CARGO COOL ON<br><br>ΔFF = + 1 % |              | ENGINE<br>ANTI ICE ON<br><br>ΔFF = + 4 % |                   | TOTAL<br>ANTI ICE ON<br><br>ΔFF = + 5.5 % |                         | per 1° above ISA<br><br>ΔFF = + 0.25 % |              |

Note : Correction for straight line holding : - 2 %

|                                                                                                                 |                                             |         |        |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b><br><br>DESCENT | 3.05.30 | P 1    |
|                                                                                                                 |                                             | SEQ 001 | REV 15 |

**GENERAL**

Descent tables are established for normal descent speed M.82/300kt/250kt and emergency descent at MMO/VMO with airbrakes extended down to 1 500 feet with :

- R
- Normal air conditioning (Packs NORM/Cargo cooling OFF or Packs LO/Cargo cooling NORM)
  - CG = 30 %
  - Anti ice OFF

For normal descent, cabin vertical speed is limited to 350 feet/minute.

| DESCENT - M.82/300KT/250KT                               |               |              |                                       |                 |                       |                                         |               |                  |             |
|----------------------------------------------------------|---------------|--------------|---------------------------------------|-----------------|-----------------------|-----------------------------------------|---------------|------------------|-------------|
| IDLE THRUST<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |               |              |                                       | ISA<br>CG=30.0% |                       | MAXIMUM CABIN RATE OF DESCENT 350FT/MIN |               |                  |             |
| WEIGHT<br>(1000KG)                                       | 150           |              |                                       |                 | 200                   |                                         |               |                  | IAS<br>(KT) |
| FL                                                       | TIME<br>(MIN) | FUEL<br>(KG) | DIST.<br>(NM)                         | N1              | TIME<br>(MIN)         | FUEL<br>(KG)                            | DIST.<br>(NM) | N1               |             |
| 410                                                      | 19.5          | 412          | 120                                   | IDLE            |                       |                                         |               |                  | 243         |
| 390                                                      | 18.7          | 400          | 114                                   | IDLE            | 21.9                  | 470                                     | 135           | IDLE             | 255         |
| 370                                                      | 17.9          | 389          | 109                                   | IDLE            | 21.1                  | 458                                     | 129           | IDLE             | 267         |
| 350                                                      | 17.3          | 380          | 103                                   | IDLE            | 20.4                  | 447                                     | 123           | IDLE             | 279         |
| 330                                                      | 16.7          | 371          | 99                                    | IDLE            | 19.7                  | 437                                     | 117           | IDLE             | 292         |
| 310                                                      | 16.0          | 361          | 94                                    | IDLE            | 18.9                  | 425                                     | 111           | IDLE             | 300         |
| 290                                                      | 15.2          | 348          | 87                                    | IDLE            | 18.0                  | 410                                     | 104           | IDLE             | 300         |
| 270                                                      | 14.4          | 335          | 81                                    | IDLE            | 17.0                  | 394                                     | 96            | IDLE             | 300         |
| 250                                                      | 13.5          | 321          | 75                                    | IDLE            | 15.9                  | 378                                     | 89            | IDLE             | 300         |
| 240                                                      | 13.1          | 314          | 72                                    | IDLE            | 15.4                  | 370                                     | 85            | IDLE             | 300         |
| 220                                                      | 12.2          | 301          | 66                                    | IDLE            | 14.4                  | 353                                     | 78            | IDLE             | 300         |
| 200                                                      | 11.4          | 287          | 60                                    | IDLE            | 13.3                  | 336                                     | 70            | IDLE             | 300         |
| 180                                                      | 10.5          | 270          | 54                                    | IDLE            | 12.2                  | 316                                     | 63            | IDLE             | 300         |
| 160                                                      | 9.6           | 250          | 48                                    | IDLE            | 11.1                  | 291                                     | 56            | IDLE             | 300         |
| 140                                                      | 8.6           | 224          | 42                                    | IDLE            | 9.9                   | 258                                     | 49            | IDLE             | 300         |
| 120                                                      | 7.6           | 196          | 36                                    | IDLE            | 8.7                   | 224                                     | 42            | IDLE             | 300         |
| 100                                                      | 6.7           | 169          | 31                                    | IDLE            | 7.6                   | 191                                     | 35            | IDLE             | 300         |
| 50                                                       | 2.3           | 53           | 10                                    | IDLE            | 2.6                   | 60                                      | 11            | IDLE             | 250         |
| 15                                                       | .0            | 0            | 0                                     | IDLE            | .0                    | 0                                       | 0             | IDLE             | 250         |
| CORRECTIONS                                              | PACK FLOW LO  |              | PACK FLOW HI OR/<br>AND CARGO COOL ON |                 | ENGINE<br>ANTI-ICE ON | TOTAL<br>ANTI-ICE ON                    |               | PER 1° ABOVE ISA |             |
| TIME                                                     | -             |              | -                                     |                 | + 2 %                 | + 8 %                                   |               | -                |             |
| FUEL                                                     | + 2 %         |              | + 3 %                                 |                 | + 15 %                | + 50 %                                  |               | + 0.25 %         |             |
| DISTANCE                                                 | -             |              | -                                     |                 | + 2 %                 | + 7 %                                   |               | + 0.3 %          |             |

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| EMERGENCY DESCENT M.86/330KT                             |               |              |                 |      |                    |              |               |      |             |
|----------------------------------------------------------|---------------|--------------|-----------------|------|--------------------|--------------|---------------|------|-------------|
| IDLE THRUST<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF |               |              | ISA<br>CG=30.0% |      | AIRBRAKES EXTENDED |              |               |      |             |
| WEIGHT<br>(1000KG)                                       | 150           |              |                 |      | 200                |              |               |      | IAS<br>(KT) |
| FL                                                       | TIME<br>(MIN) | FUEL<br>(KG) | DIST.<br>(NM)   | N1   | TIME<br>(MIN)      | FUEL<br>(KG) | DIST.<br>(NM) | N1   |             |
| 410                                                      | 5.5           | 118          | 38              | IDLE |                    |              |               |      | 257         |
| 390                                                      | 5.2           | 115          | 36              | IDLE | 6.8                | 150          | 48            | IDLE | 269         |
| 370                                                      | 5.0           | 111          | 35              | IDLE | 6.5                | 145          | 45            | IDLE | 282         |
| 350                                                      | 4.8           | 109          | 33              | IDLE | 6.3                | 142          | 43            | IDLE | 295         |
| 330                                                      | 4.7           | 106          | 32              | IDLE | 6.1                | 138          | 42            | IDLE | 308         |
| 310                                                      | 4.5           | 104          | 31              | IDLE | 5.9                | 136          | 40            | IDLE | 322         |
| 290                                                      | 4.3           | 101          | 29              | IDLE | 5.6                | 132          | 38            | IDLE | 330         |
| 270                                                      | 4.1           | 97           | 27              | IDLE | 5.3                | 127          | 35            | IDLE | 330         |
| 250                                                      | 3.8           | 93           | 25              | IDLE | 4.9                | 121          | 32            | IDLE | 330         |
| 240                                                      | 3.6           | 90           | 24              | IDLE | 4.8                | 118          | 31            | IDLE | 330         |
| 220                                                      | 3.3           | 85           | 21              | IDLE | 4.4                | 112          | 28            | IDLE | 330         |
| 200                                                      | 3.1           | 80           | 19              | IDLE | 4.0                | 105          | 25            | IDLE | 330         |
| 180                                                      | 2.8           | 75           | 17              | IDLE | 3.6                | 98           | 23            | IDLE | 330         |
| 160                                                      | 2.4           | 67           | 15              | IDLE | 3.2                | 88           | 20            | IDLE | 330         |
| 140                                                      | 2.1           | 58           | 13              | IDLE | 2.8                | 76           | 17            | IDLE | 330         |
| 120                                                      | 1.8           | 48           | 11              | IDLE | 2.3                | 62           | 14            | IDLE | 330         |
| 100                                                      | 1.5           | 38           | 9               | IDLE | 1.9                | 49           | 11            | IDLE | 330         |
| 50                                                       | .6            | 14           | 3               | IDLE | .8                 | 18           | 5             | IDLE | 330         |
| 15                                                       | .0            | 0            | 0               | IDLE | .0                 | 0            | 0             | IDLE | 330         |

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|                                                                                                                             |                       |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | IN FLIGHT PERFORMANCE |  | 3.05.35 | P 1    |
|                                                                                                                             | GO AROUND             |  | SEQ 001 | REV 27 |

## GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.7 %, at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.

The following tables 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 2.7 % 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 (4 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 2.7 %.

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.

*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 evidence of significant ice accretion, to take into account ice formation on the non heated structure :*

- *decrease the approach climb limiting weight by 5 %*
- *increase the approach and landing speeds by 5 knots and multiply landing distance by 1.1.*

R 3. *In the following tables corrections for anti ice are only valid for OAT of 10°C, or below.*

|                                                                                                                                               |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
| <br><b>A340</b><br><small>FLIGHT CREW OPERATING MANUAL</small> | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.35 | P 2    |
|                                                                                                                                               | <b>GO AROUND</b>             |  | SEQ 150 | REV 13 |

|                                                 |                                             |               |
|-------------------------------------------------|---------------------------------------------|---------------|
| <b>APPROACH CLIMB LIMITING WEIGHT (1000 KG)</b> | <b>Gradient : 2.7%</b>                      | <b>CONF 2</b> |
| <b>ONE ENGINE OUT</b>                           | <b>Normal Air Conditioning</b>              |               |
| <b>THREE ENGINES AT GO AROUND THRUST</b>        | <b>Anti Icing OFF</b><br><b>V = 1.23 Vs</b> |               |

R

| PRESSURE ALTITUDE (ft)                                 |                                                                                                    |       |       |                                                                                                    |       |       |                                                           |       |       |       |       |       |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------|-------|----------------------------------------------------------------------------------------------------|-------|-------|-----------------------------------------------------------|-------|-------|-------|-------|-------|
| OAT<br>(°C)                                            | -2000                                                                                              | 0     | 200   | 400                                                                                                | 600   | 800   | 1000                                                      | 1500  | 2000  | 5000  | 10000 | 14600 |
| ≤10                                                    | 282.4                                                                                              | 279.2 | 278.0 | 276.8                                                                                              | 275.6 | 274.3 | 273.1                                                     | 270.0 | 266.9 | 248.1 | 216.8 | 172.7 |
| 20                                                     | 281.4                                                                                              | 278.3 | 277.1 | 275.9                                                                                              | 274.7 | 273.5 | 272.3                                                     | 269.3 | 266.2 | 247.6 | 199.8 | 156.0 |
| 22                                                     | 281.2                                                                                              | 278.2 | 277.0 | 275.8                                                                                              | 274.6 | 273.4 | 272.2                                                     | 269.2 | 266.1 | 243.7 | 196.6 | 152.8 |
| 24                                                     | 281.0                                                                                              | 278.0 | 276.8 | 275.6                                                                                              | 274.4 | 273.2 | 272.0                                                     | 269.0 | 266.0 | 239.5 | 193.4 | 150.0 |
| 26                                                     | 280.9                                                                                              | 277.9 | 276.7 | 275.5                                                                                              | 274.3 | 273.1 | 271.9                                                     | 268.9 | 265.9 | 235.5 | 188.9 |       |
| 28                                                     | 280.7                                                                                              | 277.7 | 276.6 | 275.4                                                                                              | 274.2 | 273.0 | 271.8                                                     | 266.6 | 261.6 | 231.4 | 182.4 |       |
| 30                                                     | 280.6                                                                                              | 277.6 | 275.4 | 273.3                                                                                              | 271.2 | 269.1 | 267.0                                                     | 262.1 | 257.3 | 227.3 | 176.0 |       |
| 32                                                     | 280.4                                                                                              | 272.3 | 270.2 | 268.2                                                                                              | 266.2 | 264.2 | 262.3                                                     | 257.6 | 252.4 | 223.5 | 169.7 |       |
| 34                                                     | 280.2                                                                                              | 267.0 | 265.0 | 263.1                                                                                              | 261.2 | 259.4 | 257.5                                                     | 252.4 | 248.0 | 219.6 | 163.3 |       |
| 36                                                     | 274.8                                                                                              | 261.8 | 260.0 | 258.2                                                                                              | 256.2 | 254.0 | 252.2                                                     | 247.8 | 243.6 | 214.4 |       |       |
| 38                                                     | 269.5                                                                                              | 256.7 | 254.4 | 252.6                                                                                              | 250.9 | 249.2 | 247.5                                                     | 243.2 | 239.4 | 207.9 |       |       |
| 40                                                     | 264.2                                                                                              | 251.1 | 249.2 | 247.3                                                                                              | 245.6 | 243.9 | 242.3                                                     | 238.5 | 235.1 | 201.5 |       |       |
| 42                                                     | 259.0                                                                                              | 244.8 | 243.1 | 241.5                                                                                              | 239.9 | 238.4 | 236.9                                                     | 233.6 | 229.4 | 194.9 |       |       |
| 44                                                     | 253.1                                                                                              | 238.3 | 236.8 | 235.4                                                                                              | 234.0 | 232.5 | 231.0                                                     | 226.9 | 222.6 | 188.7 |       |       |
| 46                                                     | 246.9                                                                                              | 232.1 | 230.7 | 229.3                                                                                              | 227.8 | 226.3 | 224.7                                                     | 220.4 | 215.8 |       |       |       |
| 48                                                     | 240.8                                                                                              | 226.8 | 225.3 | 223.8                                                                                              | 222.2 | 220.6 | 218.9                                                     | 214.4 | 209.6 |       |       |       |
| 50                                                     | 234.9                                                                                              | 221.7 | 220.1 | 218.4                                                                                              | 216.7 | 215.0 | 213.2                                                     | 208.4 | 203.3 |       |       |       |
| 52                                                     | 229.3                                                                                              | 216.6 | 214.8 | 213.1                                                                                              | 211.3 | 209.4 | 207.5                                                     | 202.4 |       |       |       |       |
| 54                                                     | 223.8                                                                                              | 211.5 | 209.6 | 207.7                                                                                              |       |       |                                                           |       |       |       |       |       |
| 55                                                     | 221.2                                                                                              | 208.9 |       |                                                                                                    |       |       |                                                           |       |       |       |       |       |
| <b>AIR CONDITIONING OFF :</b><br><b>ADD</b><br>5600 kg | <b>ENGINE ANTI ICE ON :</b><br><b>SUBTRACT :</b><br>400 kg up to 7500 ft<br>10000 kg above 7500 ft |       |       | <b>TOTAL ANTI ICE ON :</b><br><b>SUBTRACT :</b><br>1400 kg up to 7500 ft<br>14000 kg above 7500 ft |       |       | <b>SPEED INCREASE</b><br><b>PER 0.01 Vs ADD</b><br>300 kg |       |       |       |       |       |

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|                                                                                                                             |                              |  |  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|--|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  |  |  | 3.05.35 | P 3    |
|                                                                                                                             | <b>GO AROUND</b>             |  |  |  | SEQ 150 | REV 13 |

|                                                 |                                             |               |
|-------------------------------------------------|---------------------------------------------|---------------|
| <b>APPROACH CLIMB LIMITING WEIGHT (1000 KG)</b> | <b>Gradient : 2.7%</b>                      | <b>CONF 3</b> |
| <b>ONE ENGINE OUT</b>                           | <b>Normal Air Conditioning</b>              |               |
| <b>THREE ENGINES AT GO AROUND THRUST</b>        | <b>Anti Icing OFF</b><br><b>V = 1.23 Vs</b> |               |

R

| PRESSURE ALTITUDE (ft)                            |                                                                                                |       |       |       |                                                                                                |       |       |       |                                                      |       |       |       |
|---------------------------------------------------|------------------------------------------------------------------------------------------------|-------|-------|-------|------------------------------------------------------------------------------------------------|-------|-------|-------|------------------------------------------------------|-------|-------|-------|
| OAT<br>(°C)                                       | -2000                                                                                          | 0     | 200   | 400   | 600                                                                                            | 800   | 1000  | 1500  | 2000                                                 | 5000  | 10000 | 14600 |
| ≤10                                               | 276.0                                                                                          | 272.8 | 271.6 | 270.5 | 269.3                                                                                          | 268.1 | 266.9 | 263.8 | 260.8                                                | 241.9 | 211.3 | 168.4 |
| 20                                                | 275.1                                                                                          | 272.0 | 270.8 | 269.7 | 268.5                                                                                          | 267.3 | 266.1 | 263.1 | 260.1                                                | 241.3 | 194.9 | 152.5 |
| 22                                                | 274.9                                                                                          | 271.9 | 270.7 | 269.5 | 268.3                                                                                          | 267.2 | 266.0 | 263.0 | 260.0                                                | 237.5 | 191.8 | 149.9 |
| 24                                                | 274.7                                                                                          | 271.7 | 270.5 | 269.4 | 268.2                                                                                          | 267.0 | 265.8 | 262.9 | 259.9                                                | 233.4 | 188.7 | 147.2 |
| 26                                                | 274.6                                                                                          | 271.6 | 270.4 | 269.2 | 268.1                                                                                          | 266.9 | 265.7 | 262.7 | 259.8                                                | 229.5 | 184.3 |       |
| 28                                                | 274.4                                                                                          | 271.4 | 270.3 | 269.1 | 267.9                                                                                          | 266.8 | 265.6 | 260.5 | 254.8                                                | 225.5 | 178.0 |       |
| 30                                                | 274.3                                                                                          | 271.3 | 269.2 | 267.1 | 265.0                                                                                          | 263.0 | 261.0 | 255.6 | 250.5                                                | 221.7 | 171.8 |       |
| 32                                                | 274.1                                                                                          | 266.2 | 264.1 | 262.1 | 260.2                                                                                          | 258.3 | 256.0 | 250.8 | 246.2                                                | 218.0 | 165.6 |       |
| 34                                                | 273.9                                                                                          | 261.0 | 259.1 | 257.2 | 254.3                                                                                          | 252.7 | 250.8 | 246.3 | 241.9                                                | 214.3 | 159.4 |       |
| 36                                                | 268.6                                                                                          | 255.3 | 253.3 | 251.4 | 249.6                                                                                          | 247.8 | 246.1 | 241.8 | 237.6                                                | 209.3 |       |       |
| 38                                                | 263.4                                                                                          | 250.0 | 248.2 | 246.5 | 244.8                                                                                          | 243.1 | 241.4 | 237.2 | 233.4                                                | 202.9 |       |       |
| 40                                                | 258.3                                                                                          | 245.0 | 243.1 | 241.3 | 239.6                                                                                          | 237.9 | 236.3 | 232.6 | 229.2                                                | 196.6 |       |       |
| 42                                                | 252.3                                                                                          | 238.8 | 237.1 | 235.5 | 234.0                                                                                          | 232.5 | 231.1 | 227.8 | 223.8                                                | 190.2 |       |       |
| 44                                                | 247.0                                                                                          | 232.4 | 230.9 | 229.5 | 228.2                                                                                          | 226.8 | 225.3 | 221.5 | 217.3                                                | 184.1 |       |       |
| 46                                                | 240.8                                                                                          | 226.4 | 225.1 | 223.7 | 222.3                                                                                          | 220.8 | 219.3 | 215.1 | 210.7                                                |       |       |       |
| 48                                                | 234.8                                                                                          | 221.3 | 219.9 | 218.4 | 216.9                                                                                          | 215.3 | 213.6 | 209.2 | 204.5                                                |       |       |       |
| 50                                                | 229.0                                                                                          | 216.3 | 214.8 | 213.2 | 211.5                                                                                          | 209.8 | 208.0 | 203.4 | 198.5                                                |       |       |       |
| 52                                                | 223.6                                                                                          | 211.3 | 209.7 | 208.0 | 206.2                                                                                          | 204.3 | 202.5 | 197.6 |                                                      |       |       |       |
| 54                                                | 218.4                                                                                          | 206.4 | 204.6 | 202.7 |                                                                                                |       |       |       |                                                      |       |       |       |
| 55                                                | 215.9                                                                                          | 203.9 |       |       |                                                                                                |       |       |       |                                                      |       |       |       |
| <b>AIR CONDITIONING OFF :<br/>ADD<br/>4900 kg</b> | <b>ENGINE ANTI ICE ON :<br/>SUBTRACT :<br/>400 kg up to 7500 ft<br/>10000 kg above 7500 ft</b> |       |       |       | <b>TOTAL ANTI ICE ON :<br/>SUBTRACT :<br/>1400 kg up to 7500 ft<br/>14000 kg above 7500 ft</b> |       |       |       | <b>SPEED INCREASE<br/>PER 0.01 Vs ADD<br/>200 kg</b> |       |       |       |

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|                                                                                                                             |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.40 | P 1    |
|                                                                                                                             | ALTERNATE                    |  | SEQ 001 | REV 14 |

## GENERAL

The alternate planning tables enable the flight crew to dertermine 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 :

- R — Go-around : 600 kg or 1320 lb
- Climb profile : 250kt/300kt/M.78
- Long range cruise
- Descent profile : M.80/300kt/250kt
- Approach and landing at alternate airport : 220 kg or 490 lb (4 min)
- ISA
- CG = 30 %
- 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  
 $0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$   
 or  $0.033 \text{ (lb/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$

## 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**

| <b>ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT</b><br><b>GO-AROUND : 600 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE</b><br><b>DESCENT : M.80/300KT/250KT - VMC PROCEDURE : 220 KG (4MIN)</b> |               |               |               |                    |               |                                    |                                                  |                |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|--------------------|---------------|------------------------------------|--------------------------------------------------|----------------|----------------|
| REF. LDG WT AT DEST. = 150000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                                                                                      |               |               |               | ISA<br>CG = 30.0 % |               | FUEL CONSUMED (KG)<br>TIME (H.MIN) |                                                  |                |                |
| AIR<br>DIST.                                                                                                                                                                                                       | FLIGHT LEVEL  |               |               |                    |               |                                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
| (N/M)                                                                                                                                                                                                              | 100           | 120           | 140           | 160                | 180           | 200                                | FL100<br>FL120                                   | FL140<br>FL160 | FL180<br>FL200 |
| 50                                                                                                                                                                                                                 | 1804<br>0.14  |               |               |                    |               |                                    | 3                                                |                |                |
| 100                                                                                                                                                                                                                | 2650<br>0.24  | 2614<br>0.24  | 2608<br>0.24  | 2608<br>0.23       | 2615<br>0.23  | 2628<br>0.23                       | 5                                                | 5              | 5              |
| 150                                                                                                                                                                                                                | 3497<br>0.35  | 3431<br>0.34  | 3394<br>0.33  | 3363<br>0.33       | 3340<br>0.32  | 3328<br>0.32                       | 8                                                | 7              | 8              |
| 200                                                                                                                                                                                                                | 4347<br>0.45  | 4251<br>0.44  | 4183<br>0.43  | 4119<br>0.42       | 4067<br>0.42  | 4030<br>0.41                       | 10                                               | 10             | 10             |
| 250                                                                                                                                                                                                                | 5199<br>0.55  | 5073<br>0.54  | 4972<br>0.52  | 4877<br>0.52       | 4796<br>0.51  | 4733<br>0.50                       | 13                                               | 12             | 13             |
| 300                                                                                                                                                                                                                | 6053<br>1.06  | 5897<br>1.04  | 5764<br>1.02  | 5636<br>1.01       | 5526<br>1.00  | 5438<br>0.99                       | 16                                               | 14             | 15             |
| 350                                                                                                                                                                                                                | 6910<br>1.16  | 6723<br>1.13  | 6558<br>1.11  | 6398<br>1.10       | 6258<br>1.09  | 6145<br>1.08                       | 18                                               | 16             | 18             |
| 400                                                                                                                                                                                                                | 7769<br>1.26  | 7550<br>1.23  | 7352<br>1.21  | 7161<br>1.20       | 6991<br>1.18  | 6854<br>1.17                       | 21                                               | 19             | 20             |
| 450                                                                                                                                                                                                                | 8630<br>1.36  | 8380<br>1.33  | 8149<br>1.30  | 7925<br>1.29       | 7727<br>1.28  | 7565<br>1.26                       | 23                                               | 21             | 23             |
| 500                                                                                                                                                                                                                | 9493<br>1.46  | 9212<br>1.42  | 8948<br>1.40  | 8691<br>1.38       | 8464<br>1.37  | 8277<br>1.35                       | 26                                               | 23             | 25             |
| 550                                                                                                                                                                                                                | 10359<br>1.56 | 10046<br>1.52 | 9748<br>1.49  | 9459<br>1.47       | 9202<br>1.46  | 8992<br>1.43                       | 28                                               | 25             | 28             |
| 600                                                                                                                                                                                                                | 11227<br>2.06 | 10882<br>2.02 | 10549<br>1.98 | 10229<br>1.95      | 9942<br>1.92  | 9708<br>1.89                       | 31                                               | 27             | 30             |
| 650                                                                                                                                                                                                                | 12097<br>2.16 | 11720<br>2.11 | 11353<br>2.08 | 11000<br>2.06      | 10684<br>2.04 | 10426<br>2.01                      | 33                                               | 30             | 33             |
| 700                                                                                                                                                                                                                | 12970<br>2.26 | 12560<br>2.21 | 12159<br>2.17 | 11773<br>2.15      | 11428<br>2.13 | 11146<br>2.10                      | 36                                               | 32             | 35             |
| 750                                                                                                                                                                                                                | 13845<br>2.36 | 13402<br>2.30 | 12966<br>2.26 | 12548<br>2.24      | 12174<br>2.22 | 11868<br>2.18                      | 39                                               | 34             | 38             |
| 800                                                                                                                                                                                                                | 14722<br>2.46 | 14246<br>2.40 | 13775<br>2.36 | 13324<br>2.34      | 12921<br>2.32 | 12592<br>2.27                      | 41                                               | 37             | 40             |
| 850                                                                                                                                                                                                                | 15602<br>2.56 | 15092<br>2.49 | 14586<br>2.45 | 14102<br>2.43      | 13670<br>2.41 | 13318<br>2.35                      | 44                                               | 39             | 43             |
| 900                                                                                                                                                                                                                | 16484<br>3.05 | 15941<br>2.58 | 15398<br>2.54 | 14882<br>2.52      | 14421<br>2.50 | 14046<br>2.44                      | 46                                               | 41             | 46             |
| 950                                                                                                                                                                                                                | 17368<br>3.15 | 16791<br>3.08 | 16212<br>3.04 | 15663<br>3.01      | 15173<br>2.99 | 14776<br>2.92                      | 49                                               | 43             | 48             |
| 1000                                                                                                                                                                                                               | 18255<br>3.25 | 17644<br>3.17 | 17028<br>3.13 | 16447<br>3.10      | 15928<br>3.08 | 15507<br>3.01                      | 51                                               | 46             | 51             |
| 1050                                                                                                                                                                                                               | 19144<br>3.34 | 18499<br>3.26 | 17846<br>3.22 | 17232<br>3.19      | 16684<br>3.17 | 16241<br>3.09                      | 54                                               | 48             | 53             |
| 1100                                                                                                                                                                                                               | 20036<br>3.44 | 19356<br>3.36 | 18666<br>3.32 | 18018<br>3.28      | 17441<br>3.26 | 16976<br>3.17                      | 56                                               | 50             | 56             |
| 1150                                                                                                                                                                                                               | 20930<br>3.54 | 20215<br>3.45 | 19488<br>3.41 | 18807<br>3.38      | 18201<br>3.35 | 17714<br>3.26                      | 59                                               | 53             | 58             |
| 1200                                                                                                                                                                                                               | 21824<br>4.03 | 21076<br>3.54 | 20311<br>3.50 | 19597<br>3.47      | 18962<br>3.44 | 18454<br>3.34                      | 61                                               | 55             | 61             |

PACK FLOW LO

PACK FLOW HI OR/  
AND CARGO COOL ON

ENGINE  
ANTI ICE ON

TOTAL ANTI ICE ON

ΔFUEL = - 0.7 %

ΔFUEL = + 1 %

ΔFUEL = + 3 %

ΔFUEL = + 6 %

|                                                                                                                             |                              |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.40 | P 3    |
|                                                                                                                             | <b>ALTERNATE</b>             |  | SEQ 150 | REV 19 |

R

| ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT<br>GO-AROUND :600 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE<br>DESCENT : M.80/300KT/250KT - VMC PROCEDURE : 220 KG (4MIN) |               |                                                        |               |                                        |               |                                                  |                |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------|---------------|----------------------------------------|---------------|--------------------------------------------------|----------------|-------|
| REF. LDG WT AT DEST. = 150000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                                                                |               |                                                        |               | ISA<br>CG = 30.0 %                     |               | FUEL CONSUMED (KG)<br>TIME (H.MIN)               |                |       |
| AIR<br>DIST.<br><br>(NM)                                                                                                                                                                     | FLIGHT LEVEL  |                                                        |               |                                        |               | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |       |
|                                                                                                                                                                                              | 230           | 270                                                    | 310           | 350                                    | 390           | FL230<br>FL270                                   | FL310<br>FL350 | FL390 |
| 150                                                                                                                                                                                          | 3326<br>0.30  | 3343<br>0.30                                           |               |                                        |               | 8                                                |                | 0     |
| 200                                                                                                                                                                                          | 3996<br>0.39  | 3966<br>0.38                                           | 3963<br>0.36  | 3978<br>0.36                           |               | 10                                               | 11             | 0     |
| 250                                                                                                                                                                                          | 4667<br>0.47  | 4590<br>0.45                                           | 4548<br>0.43  | 4524<br>0.43                           | 4524<br>0.42  | 12                                               | 13             | 14    |
| 300                                                                                                                                                                                          | 5340<br>0.55  | 5216<br>0.53                                           | 5135<br>0.51  | 5070<br>0.50                           | 5040<br>0.49  | 15                                               | 15             | 16    |
| 350                                                                                                                                                                                          | 6014<br>1.03  | 5843<br>1.01                                           | 5723<br>0.58  | 5618<br>0.57                           | 5558<br>0.56  | 17                                               | 17             | 19    |
| 400                                                                                                                                                                                          | 6690<br>1.11  | 6471<br>1.09                                           | 6313<br>1.05  | 6167<br>1.04                           | 6076<br>1.02  | 19                                               | 19             | 21    |
| 450                                                                                                                                                                                          | 7367<br>1.19  | 7100<br>1.17                                           | 6904<br>1.12  | 6717<br>1.11                           | 6595<br>1.09  | 21                                               | 21             | 23    |
| 500                                                                                                                                                                                          | 8045<br>1.28  | 7731<br>1.25                                           | 7496<br>1.19  | 7268<br>1.18                           | 7116<br>1.15  | 24                                               | 23             | 25    |
| 550                                                                                                                                                                                          | 8724<br>1.36  | 8363<br>1.32                                           | 8088<br>1.26  | 7820<br>1.25                           | 7638<br>1.22  | 26                                               | 25             | 28    |
| 600                                                                                                                                                                                          | 9405<br>1.44  | 8997<br>1.40                                           | 8681<br>1.33  | 8373<br>1.32                           | 8160<br>1.28  | 28                                               | 28             | 30    |
| 650                                                                                                                                                                                          | 10087<br>1.52 | 9632<br>1.48                                           | 9276<br>1.41  | 8928<br>1.40                           | 8684<br>1.35  | 30                                               | 30             | 32    |
| 700                                                                                                                                                                                          | 10771<br>2.00 | 10269<br>1.56                                          | 9871<br>1.48  | 9483<br>1.47                           | 9209<br>1.41  | 33                                               | 32             | 35    |
| 750                                                                                                                                                                                          | 11457<br>2.08 | 10907<br>2.03                                          | 10468<br>1.55 | 10040<br>1.54                          | 9735<br>1.48  | 35                                               | 34             | 37    |
| 800                                                                                                                                                                                          | 12143<br>2.16 | 11547<br>2.11                                          | 11066<br>2.02 | 10598<br>2.01                          | 10262<br>1.54 | 37                                               | 36             | 39    |
| 850                                                                                                                                                                                          | 12831<br>2.25 | 12188<br>2.18                                          | 11665<br>2.09 | 11157<br>2.08                          | 10791<br>2.01 | 39                                               | 38             | 42    |
| 900                                                                                                                                                                                          | 13521<br>2.33 | 12830<br>2.26                                          | 12265<br>2.16 | 11717<br>2.15                          | 11321<br>2.07 | 42                                               | 40             | 44    |
| 950                                                                                                                                                                                          | 14212<br>2.41 | 13474<br>2.34                                          | 12866<br>2.23 | 12279<br>2.22                          | 11852<br>2.14 | 44                                               | 42             | 46    |
| 1000                                                                                                                                                                                         | 14905<br>2.49 | 14119<br>2.41                                          | 13468<br>2.30 | 12842<br>2.29                          | 12385<br>2.21 | 46                                               | 45             | 49    |
| 1050                                                                                                                                                                                         | 15598<br>2.57 | 14766<br>2.49                                          | 14071<br>2.37 | 13406<br>2.36                          | 12918<br>2.27 | 49                                               | 47             | 51    |
| 1100                                                                                                                                                                                         | 16294<br>3.05 | 15414<br>2.56                                          | 14675<br>2.45 | 13971<br>2.42                          | 13453<br>2.34 | 51                                               | 49             | 53    |
| 1150                                                                                                                                                                                         | 16991<br>3.13 | 16064<br>3.04                                          | 15281<br>2.52 | 14537<br>2.49                          | 13989<br>2.40 | 53                                               | 51             | 56    |
| 1200                                                                                                                                                                                         | 17689<br>3.21 | 16715<br>3.11                                          | 15887<br>2.59 | 15104<br>2.56                          | 14526<br>2.47 | 55                                               | 53             | 58    |
| PACK FLOW LO<br>ΔFUEL = - 0.7 %                                                                                                                                                              |               | PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFUEL = + 1 % |               | ENGINE<br>ANTI ICE ON<br>ΔFUEL = + 3 % |               | TOTAL ANTI ICE ON<br>ΔFUEL = + 5 %               |                |       |

|                                                                                                                             |                              |  |          |        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|--|----------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>IN FLIGHT PERFORMANCE</b> |  | 3.05.50  | P 1    |
|                                                                                                                             | GROUND DISTANCE/AIR DISTANCE |  | SEQ. 001 | REV 13 |

**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 :

- R — M.80
- R — M.82
- M.84
- Long range speed
  - up to FL250
  - above FL250



**M. 80**

| GROUND<br>DIST.<br>(NM) | AIR DISTANCE (NM) |      |                      |              |       |           |       |
|-------------------------|-------------------|------|----------------------|--------------|-------|-----------|-------|
|                         | TAIL WIND         |      | WIND COMPONENTS (KT) |              |       | HEAD WIND |       |
|                         | +150              | +100 | + 50                 | 0            | -50   | -100      | -150  |
| <b>10</b>               | 8                 | 8    | 9                    | <b>10</b>    | 11    | 13        | 15    |
| <b>20</b>               | 15                | 16   | 18                   | <b>20</b>    | 22    | 26        | 30    |
| <b>30</b>               | 23                | 25   | 27                   | <b>30</b>    | 34    | 38        | 44    |
| <b>40</b>               | 30                | 33   | 36                   | <b>40</b>    | 45    | 51        | 59    |
| <b>50</b>               | 38                | 41   | 45                   | <b>50</b>    | 56    | 64        | 74    |
| <b>100</b>              | 75                | 82   | 90                   | <b>100</b>   | 112   | 128       | 148   |
| <b>200</b>              | 151               | 164  | 180                  | <b>200</b>   | 224   | 255       | 296   |
| <b>300</b>              | 226               | 247  | 271                  | <b>300</b>   | 336   | 383       | 445   |
| <b>400</b>              | 302               | 329  | 361                  | <b>400</b>   | 449   | 511       | 593   |
| <b>500</b>              | 377               | 411  | 451                  | <b>500</b>   | 561   | 638       | 741   |
| <b>1000</b>             | 755               | 822  | 902                  | <b>1000</b>  | 1122  | 1277      | 1482  |
| <b>1500</b>             | 1132              | 1233 | 1353                 | <b>1500</b>  | 1682  | 1915      | 2223  |
| <b>2000</b>             | 1509              | 1644 | 1804                 | <b>2000</b>  | 2243  | 2554      | 2964  |
| <b>2500</b>             | 1886              | 2054 | 2255                 | <b>2500</b>  | 2804  | 3192      | 3705  |
| <b>3000</b>             | 2264              | 2465 | 2707                 | <b>3000</b>  | 3365  | 3831      | 4446  |
| <b>3500</b>             | 2641              | 2876 | 3158                 | <b>3500</b>  | 3926  | 4469      | 5187  |
| <b>4000</b>             | 3018              | 3287 | 3609                 | <b>4000</b>  | 4486  | 5108      | 5928  |
| <b>4500</b>             | 3395              | 3698 | 4060                 | <b>4500</b>  | 5047  | 5746      | 6669  |
| <b>5000</b>             | 3773              | 4109 | 4511                 | <b>5000</b>  | 5608  | 6385      | 7411  |
| <b>5500</b>             | 4150              | 4520 | 4962                 | <b>5500</b>  | 6169  | 7023      | 8152  |
| <b>6000</b>             | 4527              | 4931 | 5413                 | <b>6000</b>  | 6730  | 7661      | 8893  |
| <b>6500</b>             | 4905              | 5342 | 5864                 | <b>6500</b>  | 7290  | 8300      | 9634  |
| <b>7000</b>             | 5282              | 5753 | 6315                 | <b>7000</b>  | 7851  | 8938      | 10375 |
| <b>7500</b>             | 5659              | 6163 | 6766                 | <b>7500</b>  | 8412  | 9577      | 11116 |
| <b>8000</b>             | 6036              | 6574 | 7217                 | <b>8000</b>  | 8973  | 10215     | 11857 |
| <b>8500</b>             | 6414              | 6985 | 7669                 | <b>8500</b>  | 9534  | 10854     | 12598 |
| <b>9000</b>             | 6791              | 7396 | 8120                 | <b>9000</b>  | 10095 | 11492     | 13339 |
| <b>9500</b>             | 7168              | 7807 | 8571                 | <b>9500</b>  | 10655 | 12131     | 14080 |
| <b>10000</b>            | 7546              | 8218 | 9022                 | <b>10000</b> | 11216 | 12769     | 14821 |

M. 82

| GROUND<br>DIST.<br>(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                | 17   | 18                   | 20    | 22    | 25        | 29    |
| 30                      | 23                | 25   | 27                   | 30    | 34    | 38        | 44    |
| 40                      | 30                | 33   | 36                   | 40    | 45    | 51        | 59    |
| 50                      | 38                | 41   | 45                   | 50    | 56    | 63        | 73    |
| 100                     | 76                | 83   | 90                   | 100   | 112   | 127       | 146   |
| 200                     | 152               | 165  | 181                  | 200   | 224   | 254       | 293   |
| 300                     | 228               | 248  | 271                  | 300   | 335   | 381       | 439   |
| 400                     | 304               | 330  | 362                  | 400   | 447   | 507       | 586   |
| 500                     | 380               | 413  | 452                  | 500   | 559   | 634       | 732   |
| 1000                    | 759               | 825  | 904                  | 1000  | 1118  | 1268      | 1465  |
| 1500                    | 1139              | 1238 | 1357                 | 1500  | 1677  | 1903      | 2197  |
| 2000                    | 1518              | 1651 | 1809                 | 2000  | 2237  | 2537      | 2930  |
| 2500                    | 1898              | 2063 | 2261                 | 2500  | 2796  | 3171      | 3662  |
| 3000                    | 2277              | 2476 | 2713                 | 3000  | 3355  | 3805      | 4395  |
| 3500                    | 2657              | 2889 | 3165                 | 3500  | 3914  | 4439      | 5127  |
| 4000                    | 3036              | 3302 | 3617                 | 4000  | 4473  | 5073      | 5860  |
| 4500                    | 3416              | 3714 | 4070                 | 4500  | 5032  | 5708      | 6592  |
| 5000                    | 3795              | 4127 | 4522                 | 5000  | 5591  | 6342      | 7324  |
| 5500                    | 4175              | 4540 | 4974                 | 5500  | 6151  | 6976      | 8057  |
| 6000                    | 4555              | 4952 | 5426                 | 6000  | 6710  | 7610      | 8789  |
| 6500                    | 4934              | 5365 | 5878                 | 6500  | 7269  | 8244      | 9522  |
| 7000                    | 5314              | 5778 | 6330                 | 7000  | 7828  | 8878      | 10254 |
| 7500                    | 5693              | 6190 | 6783                 | 7500  | 8387  | 9513      | 10987 |
| 8000                    | 6073              | 6603 | 7235                 | 8000  | 8946  | 10147     | 11719 |
| 8500                    | 6452              | 7016 | 7687                 | 8500  | 9506  | 10781     | 12451 |
| 9000                    | 6832              | 7428 | 8139                 | 9000  | 10065 | 11415     | 13184 |
| 9500                    | 7211              | 7841 | 8591                 | 9500  | 10624 | 12049     | 13916 |
| 10000                   | 7591              | 8254 | 9043                 | 10000 | 11183 | 12683     | 14649 |

M. 84

| GROUND<br>DIST.<br>(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        | 14    |
| 20                      | 15                | 17   | 18                   | 20    | 22    | 25        | 29    |
| 30                      | 23                | 25   | 27                   | 30    | 33    | 38        | 43    |
| 40                      | 31                | 33   | 36                   | 40    | 45    | 50        | 58    |
| 50                      | 38                | 41   | 45                   | 50    | 56    | 63        | 72    |
| 100                     | 76                | 83   | 91                   | 100   | 112   | 126       | 145   |
| 200                     | 153               | 166  | 181                  | 200   | 223   | 252       | 290   |
| 300                     | 229               | 249  | 272                  | 300   | 335   | 378       | 435   |
| 400                     | 305               | 332  | 363                  | 400   | 446   | 504       | 580   |
| 500                     | 382               | 414  | 453                  | 500   | 558   | 630       | 724   |
| 1000                    | 763               | 829  | 906                  | 1000  | 1115  | 1260      | 1449  |
| 1500                    | 1145              | 1243 | 1360                 | 1500  | 1673  | 1890      | 2173  |
| 2000                    | 1527              | 1658 | 1813                 | 2000  | 2230  | 2521      | 2898  |
| 2500                    | 1909              | 2072 | 2266                 | 2500  | 2788  | 3151      | 3622  |
| 3000                    | 2290              | 2486 | 2719                 | 3000  | 3345  | 3781      | 4347  |
| 3500                    | 2672              | 2901 | 3172                 | 3500  | 3903  | 4411      | 5071  |
| 4000                    | 3054              | 3315 | 3626                 | 4000  | 4461  | 5041      | 5795  |
| 4500                    | 3436              | 3730 | 4079                 | 4500  | 5018  | 5671      | 6520  |
| 5000                    | 3817              | 4144 | 4532                 | 5000  | 5576  | 6301      | 7244  |
| 5500                    | 4199              | 4559 | 4985                 | 5500  | 6133  | 6932      | 7969  |
| 6000                    | 4581              | 4973 | 5438                 | 6000  | 6691  | 7562      | 8693  |
| 6500                    | 4963              | 5387 | 5892                 | 6500  | 7249  | 8192      | 9417  |
| 7000                    | 5344              | 5802 | 6345                 | 7000  | 7806  | 8822      | 10142 |
| 7500                    | 5726              | 6216 | 6798                 | 7500  | 8364  | 9452      | 10866 |
| 8000                    | 6108              | 6631 | 7251                 | 8000  | 8921  | 10082     | 11591 |
| 8500                    | 6490              | 7045 | 7704                 | 8500  | 9479  | 10712     | 12315 |
| 9000                    | 6871              | 7459 | 8158                 | 9000  | 10036 | 11343     | 13040 |
| 9500                    | 7253              | 7874 | 8611                 | 9500  | 10594 | 11973     | 13764 |
| 10000                   | 7635              | 8288 | 9064                 | 10000 | 11152 | 12603     | 14488 |

LONG RANGE SPEED UP TO FL250

| GROUND<br>DIST.<br>(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                      | 14                | 16   | 18                   | 20    | 23    | 27        | 32    |
| 30                      | 22                | 24   | 27                   | 30    | 34    | 40        | 49    |
| 40                      | 29                | 32   | 35                   | 40    | 46    | 54        | 65    |
| 50                      | 36                | 40   | 44                   | 50    | 57    | 67        | 81    |
| 100                     | 72                | 80   | 89                   | 100   | 115   | 134       | 162   |
| 200                     | 144               | 159  | 177                  | 200   | 229   | 269       | 325   |
| 300                     | 217               | 239  | 266                  | 300   | 344   | 403       | 487   |
| 400                     | 289               | 318  | 355                  | 400   | 459   | 538       | 650   |
| 500                     | 361               | 398  | 443                  | 500   | 573   | 672       | 812   |
| 1000                    | 722               | 796  | 886                  | 1000  | 1147  | 1344      | 1624  |
| 1500                    | 1084              | 1194 | 1330                 | 1500  | 1720  | 2017      | 2436  |
| 2000                    | 1445              | 1592 | 1773                 | 2000  | 2294  | 2689      | 3248  |
| 2500                    | 1806              | 1990 | 2216                 | 2500  | 2867  | 3361      | 4060  |
| 3000                    | 2167              | 2388 | 2659                 | 3000  | 3441  | 4033      | 4873  |
| 3500                    | 2528              | 2786 | 3103                 | 3500  | 4014  | 4706      | 5685  |
| 4000                    | 2890              | 3184 | 3546                 | 4000  | 4588  | 5378      | 6497  |
| 4500                    | 3251              | 3582 | 3989                 | 4500  | 5161  | 6050      | 7309  |
| 5000                    | 3612              | 3980 | 4432                 | 5000  | 5735  | 6722      | 8121  |
| 5500                    | 3973              | 4378 | 4875                 | 5500  | 6308  | 7395      | 8933  |
| 6000                    | 4334              | 4776 | 5319                 | 6000  | 6882  | 8067      | 9745  |
| 6500                    | 4695              | 5174 | 5762                 | 6500  | 7455  | 8739      | 10557 |
| 7000                    | 5057              | 5572 | 6205                 | 7000  | 8028  | 9411      | 11369 |
| 7500                    | 5418              | 5970 | 6648                 | 7500  | 8602  | 10083     | 12181 |
| 8000                    | 5779              | 6368 | 7092                 | 8000  | 9175  | 10756     | 12994 |
| 8500                    | 6140              | 6766 | 7535                 | 8500  | 9749  | 11428     | 13806 |
| 9000                    | 6501              | 7164 | 7978                 | 9000  | 10322 | 12100     | 14618 |
| 9500                    | 6863              | 7562 | 8421                 | 9500  | 10896 | 12772     | 15430 |
| 10000                   | 7224              | 7960 | 8864                 | 10000 | 11469 | 13445     | 16242 |

### LONG RANGE SPEED ABOVE FL250

| GROUND<br>DIST.<br>(NM) | AIR DISTANCE (NM) |      |                      |              |       |           |       |
|-------------------------|-------------------|------|----------------------|--------------|-------|-----------|-------|
|                         | TAIL WIND         |      | WIND COMPONENTS (KT) |              |       | HEAD WIND |       |
|                         | +150              | +100 | + 50                 | 0            | -50   | -100      | -150  |
| <b>10</b>               | 8                 | 8    | 9                    | <b>10</b>    | 11    | 13        | 15    |
| <b>20</b>               | 15                | 16   | 18                   | <b>20</b>    | 22    | 26        | 30    |
| <b>30</b>               | 23                | 25   | 27                   | <b>30</b>    | 34    | 38        | 44    |
| <b>40</b>               | 30                | 33   | 36                   | <b>40</b>    | 45    | 51        | 59    |
| <b>50</b>               | 38                | 41   | 45                   | <b>50</b>    | 56    | 64        | 74    |
| <b>100</b>              | 76                | 82   | 90                   | <b>100</b>   | 112   | 128       | 148   |
| <b>200</b>              | 151               | 164  | 181                  | <b>200</b>   | 224   | 255       | 296   |
| <b>300</b>              | 227               | 247  | 271                  | <b>300</b>   | 336   | 383       | 444   |
| <b>400</b>              | 302               | 329  | 361                  | <b>400</b>   | 448   | 510       | 592   |
| <b>500</b>              | 378               | 411  | 451                  | <b>500</b>   | 560   | 638       | 739   |
| <b>1000</b>             | 755               | 822  | 903                  | <b>1000</b>  | 1121  | 1275      | 1479  |
| <b>1500</b>             | 1133              | 1234 | 1354                 | <b>1500</b>  | 1681  | 1913      | 2218  |
| <b>2000</b>             | 1511              | 1645 | 1805                 | <b>2000</b>  | 2242  | 2551      | 2958  |
| <b>2500</b>             | 1888              | 2056 | 2256                 | <b>2500</b>  | 2802  | 3188      | 3697  |
| <b>3000</b>             | 2266              | 2467 | 2708                 | <b>3000</b>  | 3363  | 3826      | 4437  |
| <b>3500</b>             | 2644              | 2879 | 3159                 | <b>3500</b>  | 3923  | 4464      | 5176  |
| <b>4000</b>             | 3022              | 3290 | 3610                 | <b>4000</b>  | 4484  | 5101      | 5915  |
| <b>4500</b>             | 3399              | 3701 | 4062                 | <b>4500</b>  | 5044  | 5739      | 6655  |
| <b>5000</b>             | 3777              | 4112 | 4513                 | <b>5000</b>  | 5605  | 6376      | 7394  |
| <b>5500</b>             | 4155              | 4524 | 4964                 | <b>5500</b>  | 6165  | 7014      | 8134  |
| <b>6000</b>             | 4532              | 4935 | 5415                 | <b>6000</b>  | 6726  | 7652      | 8873  |
| <b>6500</b>             | 4910              | 5346 | 5867                 | <b>6500</b>  | 7286  | 8289      | 9613  |
| <b>7000</b>             | 5288              | 5757 | 6318                 | <b>7000</b>  | 7847  | 8927      | 10352 |
| <b>7500</b>             | 5665              | 6168 | 6769                 | <b>7500</b>  | 8407  | 9565      | 11091 |
| <b>8000</b>             | 6043              | 6580 | 7221                 | <b>8000</b>  | 8968  | 10202     | 11831 |
| <b>8500</b>             | 6421              | 6991 | 7672                 | <b>8500</b>  | 9528  | 10840     | 12570 |
| <b>9000</b>             | 6799              | 7402 | 8123                 | <b>9000</b>  | 10089 | 11478     | 13310 |
| <b>9500</b>             | 7176              | 7813 | 8575                 | <b>9500</b>  | 10649 | 12115     | 14049 |
| <b>10000</b>            | 7554              | 8225 | 9026                 | <b>10000</b> | 11210 | 12753     | 14789 |

|   |       |                                                          |    |
|---|-------|----------------------------------------------------------|----|
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**INTRODUCTION**

This chapter provides the one engine out 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).

**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.

**STRATEGY**

In most cases, no constraining obstacle will be found on the route and the standard strategy will be adopted :

- descent at M.82/300kt, maximum continuous thrust.
- cruise close to LRC ceiling (optimum altitude).
- descent to destination at 300kt/250kt, idle thrust.

If constraining obstacles are on the route, the obstacle strategy will be adopted :

- descent then cruise at green dot speed, maximum continuous thrust.
- as soon as obstacles are cleared, reversion to standard strategy.

The in cruise check tables show the fuel and the time required to cover a given air distance from any moment in cruise to landing.

The tables are established for :

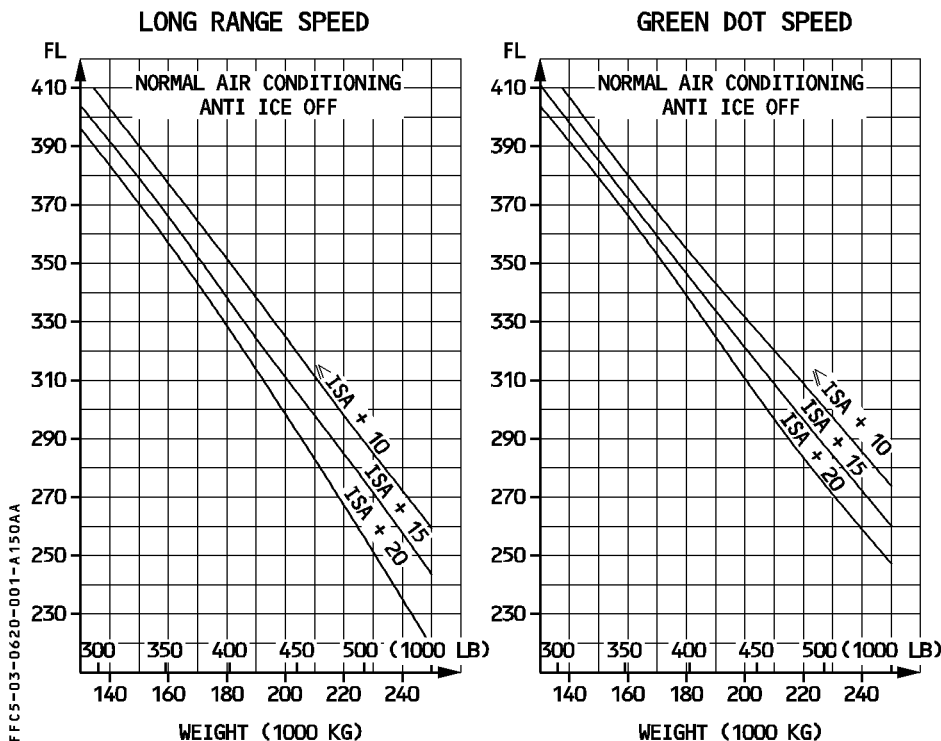
- Long range speed
- Descent at M.82/300kt/250kt
- Approach and Landing (330 kg or 720 lb - 6 minute IFR)
- ISA conditions
- A CG of 30 %
- Pack flow LO
- Anti ice OFF

R Note : Approximate increase in fuel consumption compared to all engine operative.

R

|     | ≤ M. 82 or LRC | M.83   | M.84 |
|-----|----------------|--------|------|
| Add | + 15 %         | + 10 % | –    |

**GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS**



*Note : If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 5000 feet.*

|            | PACK FLOW HI AND/OR<br>CARGO COOLING ON | ENGINE<br>ANTI ICE ON | TOTAL<br>ANTI ICE ON |
|------------|-----------------------------------------|-----------------------|----------------------|
| LONG RANGE | - 1 000 FT                              | - 2 000 FT            | - 3 000 FT           |
| GREEN DOT  | - 700 FT                                | - 1 300 FT            | - 2 500 FT           |

**NET CEILING AT GREEN DOT SPEED**

- R To obtain the net ceiling at green dot speed, apply the following corrections to the gross  
R ceilings at green dot speed :

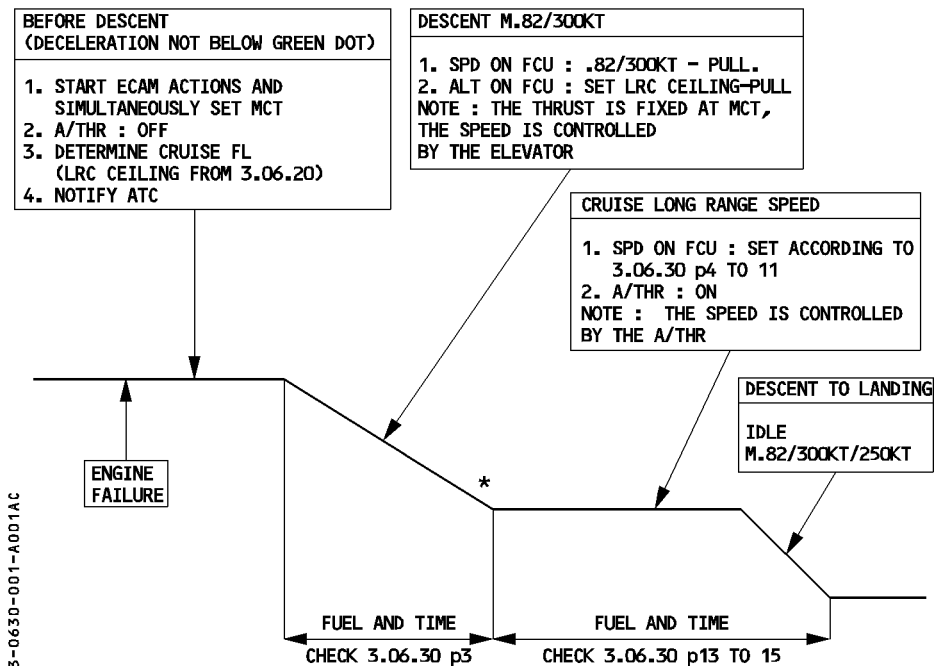
|            | WEIGHT (1000 kg) |            |            |            |            |            |
|------------|------------------|------------|------------|------------|------------|------------|
|            | 240              | 220        | 200        | 180        | 160        | 140        |
| ≤ ISA + 10 | - 9 700 FT       | - 9 300 FT | - 8 800 FT | - 8 500 FT | - 8 200 FT | - 8 000 FT |
| ISA + 20   | - 11 200 FT      | - 9 300 FT | - 8 900 FT | - 8 700 FT | - 8 500 FT | - 7 900 FT |



## PROCEDURE

Unless a specific procedure has been established before dispatch (obstacles, mountainous areas) the recommended procedure is as follows :

## R



\* IF V/S BECOMES < 500 feet/minute SELECT V/S MODE

EXAMPLE

**Given :**  
 GW at engine failure = 200 000 kg  
 FL at engine failure = 350  
 Temperature = ISA  
 Distance to destination airport = 2500 NM  
 No wind

**Find :**  
 R LRC ceiling : (see 3.06.20 p1) FL320  
 R Descent to cruise level : (FL310) Distance = 223 – 160 = 63 NM  
 (see 3.06.30 p 3) Fuel = 2702 – 1930 = 772 kg  
 Time = 30 – 22 = 8 min

Cruise at long range speed (FL310) to landing.  
 (Weight = 200 000 – 772 = 199 228 kg : Distance = 2500 – 63 = 2437 NM)  
 R Determine on (3.06.30 p 13) time and fuel consumption at ISA conditions for a reference  
 R weight of 160 000 kg. Interpolate the remaining air distance of 2437 NM at FL310.  
 Fuel : 27 926 kg  
 Time : 6 h 18 min  
 Correction due to actual in-cruise weight  
 $\Delta\text{Fuel} = + 96.5 \text{ kg per } 1000 \text{ kg above reference weight}$   
 $\Delta\text{Fuel} = + 96.5 \times (199 - 160) = 3764 \text{ kg}$

**Result :**  
 R Total Fuel = 27 926 – 3764 + 772 = 32 462 kg  
 Time = 6 h 18 min + 8 min = 6 h 26 min

| DESCENT - M.82/300KT - 1 ENGINE OUT |               |                       |               |                      |                                   |                                       |               |                            |             |
|-------------------------------------|---------------|-----------------------|---------------|----------------------|-----------------------------------|---------------------------------------|---------------|----------------------------|-------------|
| MAX. CONTINUOUS THRUST LIMITS       |               |                       | ISA           |                      | MINIMUM RATE OF DESCENT 500FT/MIN |                                       |               |                            |             |
| PACK FLOW LO                        |               |                       | CG=30.0%      |                      |                                   |                                       |               |                            |             |
| ANTI-ICING OFF                      |               |                       |               |                      |                                   |                                       |               |                            |             |
| WEIGHT<br>(1000KG)                  | 150           |                       |               |                      | 200                               |                                       |               |                            | IAS<br>(KT) |
| FL                                  | TIME<br>(MIN) | FUEL<br>(KG)          | DIST.<br>(NM) | MODE                 | TIME<br>(MIN)                     | FUEL<br>(KG)                          | DIST.<br>(NM) | MODE                       |             |
| 410                                 | 42.0          | 3473                  | 317           | MCT                  |                                   |                                       |               |                            | 243         |
| 390                                 | 38.0          | 3192                  | 286           | MCT                  | 37.6                              | 3380                                  | 282           | MCT                        | 255         |
| 370                                 | 34.0          | 2897                  | 255           | MCT                  | 34.0                              | 3069                                  | 255           | MCT                        | 267         |
| 350                                 | 30.0          | 2579                  | 223           | MCT                  | 30.0                              | 2702                                  | 223           | MCT                        | 279         |
| 330                                 | 26.0          | 2230                  | 191           | MCT                  | 26.0                              | 2317                                  | 191           | MCT                        | 292         |
| 310                                 | 22.0          | 1865                  | 160           | V/S                  | 22.0                              | 1930                                  | 160           | V/S                        | 300         |
| 290                                 | 18.0          | 1518                  | 129           | V/S                  | 18.0                              | 1567                                  | 129           | V/S                        | 300         |
| 270                                 | 14.0          | 1179                  | 98            | V/S                  | 14.0                              | 1213                                  | 98            | V/S                        | 300         |
| 250                                 | 10.0          | 840                   | 69            | V/S                  | 10.0                              | 862                                   | 69            | V/S                        | 300         |
| 240                                 | 8.0           | 672                   | 55            | V/S                  | 8.0                               | 689                                   | 55            | V/S                        | 300         |
| 220                                 | 4.0           | 337                   | 27            | V/S                  | 4.0                               | 345                                   | 27            | V/S                        | 300         |
| 200                                 | .0            | 0                     | 0             | V/S                  | .0                                | 0                                     | 0             | V/S                        | 300         |
| CORRECTIONS                         |               | ENGINE<br>ANTI-ICE ON |               | TOTAL<br>ANTI-ICE ON |                                   | PACK FLOW HI OR/<br>AND CARGO COOL ON |               | ΔISA<br>(per 1° above ISA) |             |
| TIME                                |               | -                     |               | -                    |                                   | -                                     |               | -                          |             |
| FUEL                                |               | + 2 %                 |               | + 4 %                |                                   | + 1 %                                 |               | + 0.25 %                   |             |
| DISTANCE                            |               | -                     |               | -                    |                                   | -                                     |               | + 0.2 %                    |             |

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## LONG RANGE CRUISE - 1 ENGINE OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           | ISA<br>CG=30.0%                      | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                                     | MACH<br>IAS (KT)<br>TAS (KT) |           |
|-----------------------------------------------------------------|-----------|-----------|-----------|--------------------------------------|---------------------------------|-------------------------------------|------------------------------|-----------|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160                                | FL180                           | FL200                               | FL220                        | FL240     |
| 130                                                             | 64.2 .422 | 66.0 .443 | 67.4 .459 | 68.8 .474                            | 70.2 .488                       | 71.2 .494                           | 71.8 .494                    | 73.0 .498 |
|                                                                 | 1350 233  | 1359 236  | 1344 235  | 1326 234                             | 1311 232                        | 1271 225                            | 1221 216                     | 1199 209  |
|                                                                 | 66.5 270  | 68.9 281  | 71.6 289  | 74.3 296                             | 76.9 302                        | 79.7 304                            | 82.3 301                     | 83.7 301  |
| 140                                                             | 66.4 .444 | 67.9 .460 | 69.3 .475 | 70.5 .488                            | 71.5 .494                       | 72.2 .495                           | 73.2 .497                    | 74.7 .503 |
|                                                                 | 1472 245  | 1459 245  | 1443 244  | 1418 241                             | 1376 234                        | 1323 225                            | 1295 218                     | 1282 211  |
|                                                                 | 64.1 283  | 66.6 291  | 69.1 299  | 71.5 304                             | 74.1 306                        | 76.5 304                            | 78.0 303                     | 79.1 304  |
| 150                                                             | 68.3 .461 | 69.6 .476 | 70.8 .486 | 71.8 .493                            | 72.5 .495                       | 73.4 .496                           | 74.8 .502                    | 80.5 .613 |
|                                                                 | 1579 255  | 1560 253  | 1526 249  | 1484 243                             | 1432 235                        | 1392 226                            | 1378 220                     | 1649 260  |
|                                                                 | 62.1 294  | 64.4 301  | 66.8 306  | 69.1 308                             | 71.4 307                        | 73.0 305                            | 74.0 306                     | 74.9 371  |
| 160                                                             | 69.9 .475 | 70.9 .485 | 72.0 .492 | 72.8 .496                            | 73.5 .496                       | 74.8 .501                           | 80.3 .602                    | 81.5 .623 |
|                                                                 | 1677 263  | 1638 258  | 1596 253  | 1544 245                             | 1493 235                        | 1475 228                            | 1742 265                     | 1730 264  |
|                                                                 | 60.2 303  | 62.5 307  | 64.7 310  | 66.8 309                             | 68.5 307                        | 69.5 308                            | 70.2 367                     | 72.6 377  |
| 170                                                             | 71.0 .483 | 72.1 .491 | 73.1 .496 | 73.6 .495                            | 74.8 .499                       | 78.1 .544                           | 81.7 .618                    | 82.6 .634 |
|                                                                 | 1751 267  | 1711 262  | 1660 255  | 1597 244                             | 1574 237                        | 1681 249                            | 1850 273                     | 1816 269  |
|                                                                 | 58.6 308  | 60.7 311  | 62.7 312  | 64.5 309                             | 65.5 309                        | 66.3 334                            | 67.9 377                     | 70.4 384  |
| 180                                                             | 72.2 .490 | 73.1 .495 | 73.8 .496 | 74.8 .498                            | 76.2 .504                       | 81.7 .614                           | 82.6 .628                    | 83.7 .647 |
|                                                                 | 1829 271  | 1774 264  | 1711 254  | 1674 246                             | 1662 239                        | 1976 282                            | 1933 277                     | 1911 275  |
|                                                                 | 57.0 313  | 58.9 314  | 60.7 312  | 61.9 311                             | 62.6 312                        | 63.6 377                            | 66.0 383                     | 68.2 391  |
| 190                                                             | 73.2 .493 | 74.0 .496 | 74.7 .496 | 76.0 .502                            | 81.5 .604                       | 82.6 .622                           | 83.5 .638                    | 84.9 .663 |
|                                                                 | 1892 273  | 1832 265  | 1776 255  | 1758 248                             | 2082 289                        | 2059 286                            | 2023 282                     | 2018 282  |
|                                                                 | 55.5 315  | 57.2 315  | 58.6 312  | 59.3 313                             | 59.9 374                        | 61.9 382                            | 64.1 389                     | 66.2 401  |
| 200                                                             | 74.1 .497 | 74.6 .495 | 75.8 .500 | 78.4 .528                            | 82.6 .617                       | 83.5 .631                           | 84.7 .653                    | 86.0 .675 |
|                                                                 | 1956 275  | 1884 264  | 1859 256  | 1926 261                             | 2186 295                        | 2145 290                            | 2129 289                     | 2116 287  |
|                                                                 | 54.0 317  | 55.5 314  | 56.3 314  | 57.0 329                             | 58.2 382                        | 60.3 388                            | 62.3 398                     | 64.2 408  |
| 210                                                             | 74.7 .496 | 75.6 .498 | 77.1 .505 | 82.6 .611                            | 83.4 .625                       | 84.4 .641                           | 85.7 .666                    | 87.0 .685 |
|                                                                 | 2009 275  | 1961 265  | 1952 259  | 2318 304                             | 2270 299                        | 2235 295                            | 2234 295                     | 2211 292  |
|                                                                 | 52.6 317  | 53.6 315  | 54.2 317  | 54.8 381                             | 56.8 387                        | 58.7 394                            | 60.5 406                     | 62.4 414  |
| 220                                                             | 75.4 .496 | 76.7 .501 | 80.7 .565 | 83.4 .618                            | 84.2 .633                       | 85.4 .654                           | 86.7 .676                    | 87.9 .694 |
|                                                                 | 2068 275  | 2047 267  | 2266 291  | 2402 307                             | 2358 303                        | 2345 302                            | 2332 300                     | 2308 296  |
|                                                                 | 51.1 317  | 51.7 318  | 52.3 356  | 53.6 386                             | 55.4 392                        | 57.1 402                            | 58.9 412                     | 60.6 420  |
| 230                                                             | 76.4 .499 | 77.9 .505 | 83.2 .612 | 84.1 .626                            | 85.1 .642                       | 86.4 .666                           | 87.6 .685                    | 88.9 .702 |
|                                                                 | 2151 276  | 2137 270  | 2536 316  | 2489 311                             | 2452 307                        | 2451 307                            | 2428 304                     | 2403 300  |
|                                                                 | 49.4 319  | 50.0 320  | 50.6 385  | 52.3 390                             | 54.0 397                        | 55.7 409                            | 57.3 417                     | 58.9 424  |
| 240                                                             | 77.4 .502 | 82.0 .580 | 84.0 .618 | 84.8 .633                            | 86.1 .655                       | 87.3 .676                           | 88.5 .691                    | 89.9 .712 |
|                                                                 | 2237 278  | 2537 310  | 2621 319  | 2577 315                             | 2567 314                        | 2551 312                            | 2518 307                     | 2509 304  |
|                                                                 | 47.8 321  | 48.3 367  | 49.5 389  | 51.1 395                             | 52.7 406                        | 54.3 415                            | 55.8 421                     | 57.2 430  |
| 250                                                             | 78.5 .505 | 83.8 .612 | 84.7 .625 | 85.6 .641                            | 87.0 .666                       | 88.1 .684                           | 89.3 .699                    | 90.9 .716 |
|                                                                 | 2324 280  | 2760 328  | 2709 323  | 2671 319                             | 2674 319                        | 2647 316                            | 2615 310                     | 2598 306  |
|                                                                 | 46.3 323  | 46.8 388  | 48.4 393  | 49.9 400                             | 51.4 412                        | 52.9 420                            | 54.3 426                     | 55.5 433  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 3 % |                                 | TOTAL ANTI-ICE ON<br>△ FUEL = + 5 % |                              |           |

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| LONG RANGE CRUISE - 1 ENGINE OUT                                |           |           |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|--------------------------------------|-----------------|-----------|---------------------------------|---------------------------------------|------------------------------|--|--|--|
| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           |                                      | ISA<br>CG=30.0% |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                                       | MACH<br>IAS (KT)<br>TAS (KT) |  |  |  |
| WEIGHT<br>(1000KG)                                              | FL250     | FL270     | FL290     | FL310                                | FL330           | FL350     | FL370                           |                                       |                              |  |  |  |
| 130                                                             | 73.7 .501 | 79.3 .608 | 80.4 .627 | 81.5 .648                            | 82.9 .673       | 84.2 .692 | 86.3 .719                       |                                       |                              |  |  |  |
|                                                                 | 1191 206  | 1419 241  | 1399 239  | 1381 237                             | 1370 236        | 1349 232  | 1350 231                        |                                       |                              |  |  |  |
|                                                                 | 84.3 301  | 85.2 363  | 88.4 371  | 91.8 380                             | 95.2 391        | 98.5 399  | 101.8 412                       |                                       |                              |  |  |  |
| 140                                                             | 79.2 .595 | 80.7 .623 | 81.7 .642 | 83.1 .668                            | 84.4 .687       | 86.1 .714 | 88.2 .726                       |                                       |                              |  |  |  |
|                                                                 | 1502 246  | 1511 248  | 1487 245  | 1481 245                             | 1460 241        | 1456 240  | 1428 233                        |                                       |                              |  |  |  |
|                                                                 | 79.5 358  | 82.1 372  | 85.2 380  | 88.2 392                             | 91.3 400        | 94.3 412  | 97.1 416                        |                                       |                              |  |  |  |
| 150                                                             | 80.9 .620 | 81.9 .637 | 83.2 .661 | 84.5 .682                            | 86.0 .706       | 87.6 .720 | 90.6 .745                       |                                       |                              |  |  |  |
|                                                                 | 1630 257  | 1598 253  | 1589 253  | 1572 250                             | 1563 248        | 1528 242  | 1551 240                        |                                       |                              |  |  |  |
|                                                                 | 76.4 373  | 79.3 380  | 82.1 391  | 84.9 400                             | 87.6 411        | 90.5 415  | 91.8 427                        |                                       |                              |  |  |  |
| 160                                                             | 82.0 .631 | 83.2 .653 | 84.5 .675 | 85.8 .695                            | 87.5 .720       | 89.5 .728 | 93.3 .773                       |                                       |                              |  |  |  |
|                                                                 | 1713 262  | 1696 260  | 1683 259  | 1663 255                             | 1657 254        | 1623 245  | 1705 250                        |                                       |                              |  |  |  |
|                                                                 | 73.9 380  | 76.6 390  | 79.2 400  | 81.7 408                             | 84.3 419        | 86.2 420  | 86.7 443                        |                                       |                              |  |  |  |
| 170                                                             | 83.1 .644 | 84.5 .669 | 85.7 .687 | 87.3 .713                            | 88.9 .719       | 92.2 .761 |                                 |                                       |                              |  |  |  |
|                                                                 | 1806 268  | 1799 267  | 1774 263  | 1771 262                             | 1722 253        | 1792 257  |                                 |                                       |                              |  |  |  |
|                                                                 | 71.6 388  | 74.0 399  | 76.4 407  | 78.8 418                             | 81.0 418        | 81.6 439  |                                 |                                       |                              |  |  |  |
| 180                                                             | 84.4 .661 | 85.7 .681 | 87.0 .702 | 88.5 .717                            | 91.0 .739       | 94.3 .774 |                                 |                                       |                              |  |  |  |
|                                                                 | 1912 275  | 1893 272  | 1877 270  | 1844 264                             | 1859 261        | 1915 262  |                                 |                                       |                              |  |  |  |
|                                                                 | 69.4 398  | 71.6 407  | 73.8 416  | 76.0 421                             | 77.0 430        | 77.7 446  |                                 |                                       |                              |  |  |  |
| 190                                                             | 85.5 .674 | 86.8 .692 | 88.3 .715 | 90.0 .722                            | 93.4 .763       |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2010 281  | 1987 277  | 1978 275  | 1936 266                             | 2016 270        |           |                                 |                                       |                              |  |  |  |
|                                                                 | 67.2 406  | 69.3 413  | 71.3 423  | 72.9 424                             | 73.4 444        |           |                                 |                                       |                              |  |  |  |
| 200                                                             | 86.6 .684 | 88.0 .706 | 89.3 .713 | 92.2 .744                            | 94.4 .745       |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2104 285  | 2092 283  | 2038 274  | 2093 275                             | 2039 263        |           |                                 |                                       |                              |  |  |  |
|                                                                 | 65.2 412  | 67.1 421  | 69.0 422  | 69.6 437                             | 70.9 433        |           |                                 |                                       |                              |  |  |  |
| 210                                                             | 87.6 .694 | 89.1 .714 | 91.0 .725 | 94.2 .762                            |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2199 290  | 2183 286  | 2162 279  | 2239 282                             |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 63.3 418  | 65.0 426  | 66.2 429  | 66.6 447                             |                 |           |                                 |                                       |                              |  |  |  |
| 220                                                             | 88.6 .703 | 90.1 .714 | 92.9 .746 | 94.5 .724                            |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2297 294  | 2255 286  | 2321 288  | 2194 267                             |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 61.4 423  | 63.0 426  | 63.4 442  | 64.5 425                             |                 |           |                                 |                                       |                              |  |  |  |
| 230                                                             | 89.7 .712 | 91.6 .726 | 94.1 .743 |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2398 298  | 2382 291  | 2391 287  |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 59.6 429  | 60.6 433  | 61.3 440  |                                      |                 |           |                                 |                                       |                              |  |  |  |
| 240                                                             | 90.7 .716 | 93.4 .743 |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2483 299  | 2536 299  |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 57.8 431  | 58.3 443  |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
| 250                                                             | 92.1 .724 | 93.9 .723 |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 2600 303  | 2536 290  |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
|                                                                 | 55.9 436  | 56.7 431  |           |                                      |                 |           |                                 |                                       |                              |  |  |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 2 % |                 |           |                                 | TOTAL ANTI-ICE ON<br>△ FUEL = + 3.5 % |                              |  |  |  |

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## LONG RANGE CRUISE - 1 ENGINE OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           | ISA + 10<br>CG=30.0%                 |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG     |           | MACH<br>IAS (KT)<br>TAS (KT) |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|--------------------------------------|-----------|-------------------------------------|-----------|------------------------------|--|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160                                | FL180     | FL200                               | FL220     | FL240                        |  |
| 130                                                             | 65.5 .423 | 67.6 .447 | 69.3 .465 | 70.4 .478                            | 71.6 .488 | 72.7 .494                           | 73.3 .494 | 74.5 .498                    |  |
|                                                                 | 1383 233  | 1403 238  | 1394 238  | 1367 235                             | 1335 231  | 1297 225                            | 1246 216  | 1224 209                     |  |
|                                                                 | 66.3 275  | 68.6 289  | 71.3 298  | 74.1 304                             | 76.9 308  | 79.6 310                            | 82.2 307  | 83.7 307                     |  |
| 140                                                             | 68.1 .449 | 69.7 .466 | 70.8 .477 | 71.9 .487                            | 73.0 .494 | 73.7 .494                           | 74.8 .497 | 76.3 .503                    |  |
|                                                                 | 1524 248  | 1511 248  | 1479 245  | 1445 240                             | 1403 234  | 1349 225                            | 1322 218  | 1309 211                     |  |
|                                                                 | 63.8 292  | 66.3 301  | 68.9 306  | 71.5 310                             | 74.1 312  | 76.5 310                            | 78.0 309  | 79.0 310                     |  |
| 150                                                             | 70.0 .465 | 71.1 .476 | 72.2 .486 | 73.2 .493                            | 74.0 .495 | 74.9 .496                           | 76.4 .503 | 82.0 .610                    |  |
|                                                                 | 1627 257  | 1593 254  | 1556 249  | 1513 243                             | 1459 235  | 1420 226                            | 1409 220  | 1674 258                     |  |
|                                                                 | 61.9 302  | 64.3 308  | 66.8 312  | 69.1 314                             | 71.4 312  | 73.0 311                            | 73.9 313  | 74.9 376                     |  |
| 160                                                             | 71.3 .475 | 72.3 .484 | 73.4 .492 | 74.3 .496                            | 75.0 .495 | 76.4 .501                           | 81.6 .594 | 83.1 .620                    |  |
|                                                                 | 1711 263  | 1668 258  | 1626 253  | 1573 245                             | 1523 235  | 1506 228                            | 1752 262  | 1758 262                     |  |
|                                                                 | 60.2 309  | 62.5 313  | 64.6 315  | 66.8 315                             | 68.5 313  | 69.5 314                            | 70.3 369  | 72.5 382                     |  |
| 170                                                             | 72.4 .482 | 73.5 .491 | 74.5 .496 | 75.1 .495                            | 76.3 .499 | 79.0 .529                           | 83.2 .616 | 84.1 .631                    |  |
|                                                                 | 1784 267  | 1743 262  | 1690 254  | 1629 244                             | 1605 237  | 1667 242                            | 1883 272  | 1848 267                     |  |
|                                                                 | 58.6 314  | 60.6 317  | 62.7 318  | 64.4 315                             | 65.4 315  | 66.3 332                            | 67.8 383  | 70.2 389                     |  |
| 180                                                             | 73.6 .490 | 74.6 .495 | 75.2 .495 | 76.3 .498                            | 77.8 .505 | 83.2 .611                           | 84.1 .625 | 85.2 .643                    |  |
|                                                                 | 1863 271  | 1808 264  | 1743 254  | 1708 246                             | 1697 240  | 2008 280                            | 1971 276  | 1944 273                     |  |
|                                                                 | 57.0 319  | 58.9 319  | 60.7 317  | 61.8 317                             | 62.6 319  | 63.5 383                            | 65.8 389  | 68.0 397                     |  |
| 190                                                             | 74.6 .493 | 75.4 .496 | 76.1 .496 | 77.6 .502                            | 82.7 .593 | 84.1 .619                           | 85.1 .635 | 86.4 .657                    |  |
|                                                                 | 1927 273  | 1866 264  | 1810 255  | 1796 248                             | 2083 283  | 2095 285                            | 2062 281  | 2051 279                     |  |
|                                                                 | 55.5 321  | 57.2 320  | 58.5 318  | 59.3 319                             | 59.9 375  | 61.7 388                            | 63.8 395  | 65.9 406                     |  |
| 200                                                             | 75.5 .496 | 76.1 .495 | 77.3 .500 | 78.9 .506                            | 84.1 .614 | 85.0 .628                           | 86.2 .647 | 87.5 .670                    |  |
|                                                                 | 1992 275  | 1921 264  | 1896 257  | 1883 250                             | 2226 293  | 2185 289                            | 2164 286  | 2155 285                     |  |
|                                                                 | 54.0 323  | 55.5 320  | 56.3 320  | 57.0 322                             | 58.0 387  | 60.0 394                            | 62.0 402  | 63.9 413                     |  |
| 210                                                             | 76.2 .496 | 77.1 .498 | 78.5 .503 | 84.0 .608                            | 84.9 .622 | 85.9 .638                           | 87.2 .660 | 88.5 .678                    |  |
|                                                                 | 2046 275  | 1999 265  | 1983 258  | 2357 302                             | 2315 297  | 2280 293                            | 2271 292  | 2248 289                     |  |
|                                                                 | 52.5 323  | 53.6 321  | 54.2 323  | 54.7 387                             | 56.5 393  | 58.4 399                            | 60.2 410  | 62.0 418                     |  |
| 220                                                             | 76.9 .496 | 78.2 .501 | 81.0 .536 | 84.9 .615                            | 85.7 .629 | 86.9 .649                           | 88.2 .671 | 89.4 .685                    |  |
|                                                                 | 2106 274  | 2085 267  | 2192 276  | 2445 306                             | 2405 301  | 2386 299                            | 2374 297  | 2341 292                     |  |
|                                                                 | 51.0 322  | 51.7 323  | 52.3 344  | 53.3 391                             | 55.1 397  | 56.8 407                            | 58.5 417  | 60.2 423                     |  |
| 230                                                             | 77.8 .498 | 79.3 .504 | 84.7 .609 | 85.6 .622                            | 86.6 .638 | 87.9 .661                           | 89.1 .677 | 90.6 .699                    |  |
|                                                                 | 2189 276  | 2173 269  | 2583 314  | 2536 309                             | 2500 305  | 2495 305                            | 2466 300  | 2462 298                     |  |
|                                                                 | 49.3 324  | 49.9 325  | 50.4 390  | 52.0 396                             | 53.7 403  | 55.3 414                            | 56.9 421  | 58.3 431                     |  |
| 240                                                             | 78.8 .501 | 82.2 .548 | 85.5 .616 | 86.4 .630                            | 87.5 .649 | 88.8 .670                           | 90.0 .686 | 91.7 .712                    |  |
|                                                                 | 2275 277  | 2447 293  | 2673 318  | 2631 313                             | 2609 311  | 2597 309                            | 2570 304  | 2585 304                     |  |
|                                                                 | 47.7 326  | 48.2 354  | 49.2 395  | 50.8 401                             | 52.3 410  | 53.9 420                            | 55.3 426  | 56.6 439                     |  |
| 250                                                             | 79.8 .504 | 85.3 .609 | 86.2 .622 | 87.1 .638                            | 88.4 .660 | 89.7 .677                           | 91.1 .698 | 92.7 .715                    |  |
|                                                                 | 2364 279  | 2812 326  | 2764 321  | 2727 317                             | 2720 316  | 2696 313                            | 2692 310  | 2673 305                     |  |
|                                                                 | 46.2 327  | 46.6 393  | 48.1 399  | 49.6 406                             | 51.0 416  | 52.5 424                            | 53.8 434  | 55.0 441                     |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 3 % |           | TOTAL ANTI-ICE ON<br>△ FUEL = + 5 % |           |                              |  |

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| LONG RANGE CRUISE - 1 ENGINE OUT                                |       |      |       |      |                                      |                      |       |                                 |       |                                       |       |      |       |      |
|-----------------------------------------------------------------|-------|------|-------|------|--------------------------------------|----------------------|-------|---------------------------------|-------|---------------------------------------|-------|------|-------|------|
| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |       |      |       |      |                                      | ISA +10<br>CG =30.0% |       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |       | MACH<br>IAS (KT)<br>TAS (KT)          |       |      |       |      |
| WEIGHT<br>(1000KG)                                              | FL250 |      | FL270 |      | FL290                                |                      | FL310 |                                 | FL330 |                                       | FL350 |      | FL370 |      |
| 130                                                             | 75.2  | .500 | 81.1  | .609 | 82.0                                 | .624                 | 83.1  | .643                            | 84.5  | .666                                  | 85.9  | .687 | 88.1  | .714 |
|                                                                 | 1216  | 205  | 1455  | 242  | 1421                                 | 238                  | 1399  | 235                             | 1387  | 233                                   | 1373  | 230  | 1376  | 229  |
|                                                                 | 84.3  | 307  | 85.1  | 371  | 88.5                                 | 377                  | 91.8  | 385                             | 95.1  | 396                                   | 98.4  | 405  | 101.5 | 419  |
| 140                                                             | 80.8  | .594 | 82.3  | .621 | 83.3                                 | .639                 | 84.7  | .661                            | 86.0  | .680                                  | 87.8  | .709 | 89.8  | .714 |
|                                                                 | 1532  | 246  | 1537  | 247  | 1513                                 | 244                  | 1499  | 242                             | 1478  | 238                                   | 1482  | 238  | 1448  | 229  |
|                                                                 | 79.4  | 365  | 82.0  | 378  | 85.1                                 | 386                  | 88.1  | 396                             | 91.2  | 404                                   | 94.0  | 418  | 96.4  | 419  |
| 150                                                             | 82.5  | .617 | 83.5  | .633 | 84.8                                 | .656                 | 86.1  | .676                            | 87.7  | .700                                  | 89.1  | .708 | 92.6  | .745 |
|                                                                 | 1654  | 256  | 1626  | 252  | 1613                                 | 250                  | 1596  | 248                             | 1588  | 246                                   | 1543  | 238  | 1609  | 240  |
|                                                                 | 76.3  | 379  | 79.2  | 386  | 81.9                                 | 396                  | 84.7  | 405                             | 87.4  | 416                                   | 90.1  | 417  | 90.6  | 437  |
| 160                                                             | 83.6  | .628 | 84.7  | .647 | 86.1                                 | .671                 | 87.5  | .690                            | 89.1  | .712                                  | 91.4  | .727 | 95.3  | .770 |
|                                                                 | 1742  | 261  | 1722  | 258  | 1712                                 | 257                  | 1694  | 253                             | 1681  | 250                                   | 1676  | 245  | 1758  | 249  |
|                                                                 | 73.8  | 386  | 76.4  | 395  | 78.9                                 | 406                  | 81.4  | 414                             | 83.9  | 423                                   | 85.2  | 429  | 85.7  | 452  |
| 170                                                             | 84.7  | .640 | 86.0  | .662 | 87.3                                 | .682                 | 88.9  | .705                            | 90.7  | .716                                  | 94.2  | .760 |       |      |
|                                                                 | 1835  | 266  | 1823  | 264  | 1805                                 | 261                  | 1799  | 259                             | 1770  | 252                                   | 1851  | 257  |       |      |
|                                                                 | 71.4  | 393  | 73.8  | 404  | 76.2                                 | 412                  | 78.4  | 423                             | 80.1  | 426                                   | 80.6  | 448  |       |      |
| 180                                                             | 85.9  | .655 | 87.2  | .675 | 88.6                                 | .693                 | 90.2  | .711                            | 93.0  | .739                                  | 96.1  | .766 |       |      |
|                                                                 | 1940  | 272  | 1923  | 270  | 1903                                 | 266                  | 1886  | 262                             | 1925  | 261                                   | 1959  | 259  |       |      |
|                                                                 | 69.1  | 402  | 71.3  | 411  | 73.4                                 | 419                  | 75.4  | 427                             | 76.1  | 440                                   | 76.8  | 451  |       |      |
| 190                                                             | 87.1  | .668 | 88.3  | .685 | 89.9                                 | .707                 | 92.0  | .722                            | 95.3  | .762                                  |       |      |       |      |
|                                                                 | 2045  | 278  | 2018  | 274  | 2012                                 | 272                  | 2002  | 266                             | 2083  | 270                                   |       |      |       |      |
|                                                                 | 66.9  | 411  | 69.0  | 417  | 70.8                                 | 428                  | 72.1  | 433                             | 72.5  | 453                                   |       |      |       |      |
| 200                                                             | 88.1  | .678 | 89.4  | .695 | 91.1                                 | .711                 | 94.1  | .744                            | 96.3  | .743                                  |       |      |       |      |
|                                                                 | 2141  | 283  | 2116  | 278  | 2098                                 | 273                  | 2161  | 274                             | 2107  | 262                                   |       |      |       |      |
|                                                                 | 64.9  | 417  | 66.7  | 423  | 68.3                                 | 430                  | 68.8  | 446                             | 69.9  | 442                                   |       |      |       |      |
| 210                                                             | 89.1  | .685 | 90.8  | .711 | 92.9                                 | .724                 | 96.0  | .757                            |       |                                       |       |      |       |      |
|                                                                 | 2233  | 286  | 2243  | 285  | 2229                                 | 279                  | 2299  | 280                             |       |                                       |       |      |       |      |
|                                                                 | 62.9  | 421  | 64.4  | 433  | 65.5                                 | 438                  | 65.8  | 454                             |       |                                       |       |      |       |      |
| 220                                                             | 90.3  | .698 | 91.9  | .713 | 94.9                                 | .745                 |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 2348  | 292  | 2322  | 286  | 2395                                 | 287                  |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 60.9  | 429  | 62.3  | 434  | 62.7                                 | 450                  |       |                                 |       |                                       |       |      |       |      |
| 230                                                             | 91.5  | .712 | 93.5  | .725 | 96.0                                 | .740                 |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 2471  | 298  | 2458  | 291  | 2462                                 | 285                  |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 59.0  | 437  | 59.9  | 442  | 60.6                                 | 447                  |       |                                 |       |                                       |       |      |       |      |
| 240                                                             | 92.5  | .714 | 95.3  | .742 |                                      |                      |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 2554  | 299  | 2617  | 299  |                                      |                      |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 57.2  | 439  | 57.6  | 452  |                                      |                      |       |                                 |       |                                       |       |      |       |      |
| 250                                                             | 93.9  | .723 | 95.7  | .718 |                                      |                      |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 2681  | 303  | 2605  | 288  |                                      |                      |       |                                 |       |                                       |       |      |       |      |
|                                                                 | 55.3  | 444  | 56.0  | 438  |                                      |                      |       |                                 |       |                                       |       |      |       |      |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFUEL = + 1 %          |       |      |       |      | ENGINE ANTI-ICE ON<br>Δ FUEL = + 2 % |                      |       |                                 |       | TOTAL ANTI-ICE ON<br>Δ FUEL = + 3.5 % |       |      |       |      |

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## LONG RANGE CRUISE - 1 ENGINE OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           | ISA + 15<br>CG=30.0%                 |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG     |           | MACH<br>IAS (KT)<br>TAS (KT) |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|--------------------------------------|-----------|-------------------------------------|-----------|------------------------------|--|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160                                | FL180     | FL200                               | FL220     | FL240                        |  |
| <b>130</b>                                                      | 66.3 .425 | 68.4 .450 | 70.0 .466 | 71.1 .477                            | 72.3 .488 | 73.5 .494                           | 74.1 .494 | 75.3 .498                    |  |
|                                                                 | 1405 235  | 1426 239  | 1411 239  | 1378 235                             | 1349 231  | 1310 225                            | 1258 216  | 1236 209                     |  |
|                                                                 | 66.1 279  | 68.5 293  | 71.2 302  | 74.1 306                             | 76.9 311  | 79.6 313                            | 82.1 310  | 83.6 310                     |  |
| <b>140</b>                                                      | 68.9 .451 | 70.4 .467 | 71.5 .477 | 72.6 .487                            | 73.7 .494 | 74.4 .494                           | 75.5 .497 | 77.2 .505                    |  |
|                                                                 | 1545 249  | 1528 249  | 1491 245  | 1458 240                             | 1417 234  | 1363 225                            | 1335 217  | 1327 212                     |  |
|                                                                 | 63.8 296  | 66.3 304  | 68.9 308  | 71.5 313                             | 74.0 315  | 76.5 313                            | 77.9 312  | 79.0 314                     |  |
| <b>150</b>                                                      | 70.6 .465 | 71.7 .476 | 72.9 .486 | 73.9 .493                            | 74.7 .495 | 75.7 .496                           | 77.2 .503 | 82.8 .608                    |  |
|                                                                 | 1642 257  | 1608 254  | 1570 249  | 1527 243                             | 1472 235  | 1435 226                            | 1425 220  | 1687 257                     |  |
|                                                                 | 61.9 305  | 64.3 310  | 66.7 314  | 69.1 317                             | 71.4 315  | 72.9 314                            | 73.9 316  | 74.8 379                     |  |
| <b>160</b>                                                      | 71.9 .475 | 73.0 .484 | 74.1 .492 | 75.0 .495                            | 75.7 .495 | 77.2 .502                           | 82.1 .586 | 83.8 .618                    |  |
|                                                                 | 1725 263  | 1683 258  | 1642 253  | 1587 244                             | 1537 235  | 1523 229                            | 1744 258  | 1773 262                     |  |
|                                                                 | 60.2 311  | 62.5 315  | 64.6 318  | 66.8 318                             | 68.5 316  | 69.4 317                            | 70.3 368  | 72.4 385                     |  |
| <b>170</b>                                                      | 73.1 .482 | 74.2 .491 | 75.2 .496 | 75.8 .495                            | 77.1 .499 | 78.8 .509                           | 83.9 .614 | 84.9 .629                    |  |
|                                                                 | 1800 267  | 1759 262  | 1706 254  | 1645 244                             | 1622 237  | 1618 232                            | 1899 271  | 1865 267                     |  |
|                                                                 | 58.6 316  | 60.6 320  | 62.6 321  | 64.4 318                             | 65.4 318  | 66.3 322                            | 67.6 385  | 70.1 392                     |  |
| <b>180</b>                                                      | 74.3 .490 | 75.3 .495 | 75.9 .495 | 77.0 .498                            | 78.5 .504 | 84.0 .609                           | 84.9 .624 | 86.0 .641                    |  |
|                                                                 | 1880 271  | 1824 264  | 1758 254  | 1725 246                             | 1709 239  | 2027 280                            | 1989 275  | 1962 272                     |  |
|                                                                 | 57.0 321  | 58.9 322  | 60.7 320  | 61.8 320                             | 62.6 321  | 63.4 385                            | 65.6 392  | 67.8 399                     |  |
| <b>190</b>                                                      | 75.3 .493 | 76.1 .496 | 76.9 .496 | 78.3 .502                            | 83.1 .585 | 84.9 .618                           | 85.9 .634 | 87.1 .654                    |  |
|                                                                 | 1945 273  | 1882 264  | 1827 255  | 1810 248                             | 2074 279  | 2116 284                            | 2084 280  | 2067 278                     |  |
|                                                                 | 55.5 324  | 57.2 323  | 58.5 321  | 59.3 322                             | 59.9 373  | 61.6 391                            | 63.7 398  | 65.7 407                     |  |
| <b>200</b>                                                      | 76.2 .496 | 76.8 .495 | 78.0 .499 | 79.6 .505                            | 84.9 .612 | 85.8 .627                           | 86.9 .646 | 88.3 .667                    |  |
|                                                                 | 2010 275  | 1938 264  | 1912 256  | 1898 249                             | 2246 292  | 2208 288                            | 2186 285  | 2174 283                     |  |
|                                                                 | 54.0 325  | 55.5 323  | 56.3 323  | 57.0 324                             | 57.9 390  | 59.9 396                            | 61.8 405  | 63.7 415                     |  |
| <b>210</b>                                                      | 76.8 .496 | 77.8 .497 | 79.2 .503 | 84.7 .606                            | 85.7 .620 | 86.7 .636                           | 88.0 .657 | 89.2 .675                    |  |
|                                                                 | 2063 274  | 2017 265  | 2000 258  | 2376 301                             | 2337 296  | 2303 293                            | 2293 291  | 2269 287                     |  |
|                                                                 | 52.5 325  | 53.5 324  | 54.2 325  | 54.5 389                             | 56.4 395  | 58.2 402                            | 60.0 413  | 61.8 420                     |  |
| <b>220</b>                                                      | 77.6 .495 | 78.9 .500 | 81.3 .526 | 85.6 .613                            | 86.5 .628 | 87.7 .647                           | 89.0 .668 | 90.3 .685                    |  |
|                                                                 | 2125 274  | 2104 267  | 2174 271  | 2470 305                             | 2431 301  | 2409 298                            | 2396 296  | 2375 292                     |  |
|                                                                 | 51.0 325  | 51.6 326  | 52.2 340  | 53.2 394                             | 54.9 400  | 56.6 409                            | 58.3 419  | 59.9 427                     |  |
| <b>230</b>                                                      | 78.5 .498 | 80.0 .503 | 85.4 .607 | 86.3 .621                            | 87.4 .637 | 88.6 .658                           | 89.9 .676 | 91.5 .699                    |  |
|                                                                 | 2209 276  | 2192 268  | 2609 314  | 2562 309                             | 2528 305  | 2518 303                            | 2497 300  | 2499 298                     |  |
|                                                                 | 49.3 327  | 49.8 328  | 50.2 393  | 51.9 399                             | 53.5 406  | 55.1 416                            | 56.7 424  | 58.0 435                     |  |
| <b>240</b>                                                      | 79.5 .501 | 82.6 .541 | 86.2 .614 | 87.1 .628                            | 88.3 .647 | 89.6 .668                           | 90.9 .685 | 92.6 .711                    |  |
|                                                                 | 2297 277  | 2442 289  | 2701 317  | 2658 313                             | 2638 310  | 2628 308                            | 2606 304  | 2623 304                     |  |
|                                                                 | 47.6 328  | 48.1 352  | 49.0 397  | 50.6 404                             | 52.1 413  | 53.6 423                            | 55.0 430  | 56.3 443                     |  |
| <b>250</b>                                                      | 80.5 .503 | 86.0 .607 | 86.9 .621 | 87.9 .636                            | 89.2 .658 | 90.5 .677                           | 92.0 .698 | 93.6 .714                    |  |
|                                                                 | 2385 278  | 2841 325  | 2796 321  | 2756 317                             | 2750 315  | 2734 313                            | 2731 310  | 2709 305                     |  |
|                                                                 | 46.1 330  | 46.4 396  | 47.9 402  | 49.4 408                             | 50.8 419  | 52.2 428                            | 53.5 438  | 54.7 445                     |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 3 % |           | TOTAL ANTI-ICE ON<br>△ FUEL = + 5 % |           |                              |  |

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|                                                                                 |                                  |  |         |        |
|---------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  | <b>ONE ENGINE OUT OPERATIONS</b> |  | 3.06.30 | P 9    |
|                                                                                 | <b>STANDARD STRATEGY</b>         |  | SEQ 150 | REV 14 |

| LONG RANGE CRUISE - 1 ENGINE OUT                                |           |           |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|-----------------------------------------------------------------|-----------|-----------|--------------------------------------|-----------|-----------|---------------------|---------------------------------------|---------------------------------|--|------------------------------|--|--|
| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |                                      |           |           | ISA +15<br>CG=30.0% |                                       | N1 (%)<br>KG/H/ENG<br>NM/1000KG |  | MACH<br>IAS (KT)<br>TAS (KT) |  |  |
| WEIGHT<br>(1000KG)                                              | FL250     | FL270     | FL290                                | FL310     | FL330     | FL350               | FL370                                 |                                 |  |                              |  |  |
| <b>130</b>                                                      | 76.0 .500 | 81.7 .604 | 82.8 .622                            | 83.9 .640 | 85.3 .664 | 86.7 .685           | 88.8 .709                             |                                 |  |                              |  |  |
|                                                                 | 1229 205  | 1454 240  | 1432 237                             | 1410 234  | 1399 232  | 1384 229            | 1384 227                              |                                 |  |                              |  |  |
|                                                                 | 84.2 311  | 85.3 372  | 88.4 380                             | 91.8 388  | 95.0 399  | 98.2 408            | 101.3 420                             |                                 |  |                              |  |  |
| <b>140</b>                                                      | 81.2 .586 | 83.0 .619 | 84.1 .637                            | 85.4 .657 | 86.8 .678 | 88.5 .704           | 90.7 .713                             |                                 |  |                              |  |  |
|                                                                 | 1524 242  | 1550 246  | 1525 243                             | 1509 240  | 1492 237  | 1491 236            | 1471 229                              |                                 |  |                              |  |  |
|                                                                 | 79.5 364  | 82.0 381  | 85.0 389                             | 88.0 398  | 91.0 407  | 93.8 420            | 95.9 423                              |                                 |  |                              |  |  |
| <b>150</b>                                                      | 83.2 .615 | 84.3 .632 | 85.5 .652                            | 86.9 .673 | 88.4 .695 | 90.0 .707           | 93.6 .745                             |                                 |  |                              |  |  |
|                                                                 | 1669 255  | 1642 252  | 1623 249                             | 1608 246  | 1597 244  | 1566 237            | 1636 240                              |                                 |  |                              |  |  |
|                                                                 | 76.2 382  | 79.0 389  | 81.8 398                             | 84.5 408  | 87.2 417  | 89.7 421            | 90.1 442                              |                                 |  |                              |  |  |
| <b>160</b>                                                      | 84.3 .626 | 85.5 .646 | 86.9 .668                            | 88.3 .686 | 89.9 .709 | 92.4 .727           | 95.2 .737                             |                                 |  |                              |  |  |
|                                                                 | 1758 260  | 1739 257  | 1728 256                             | 1706 252  | 1701 249  | 1704 245            | 1694 237                              |                                 |  |                              |  |  |
|                                                                 | 73.7 389  | 76.2 398  | 78.8 408                             | 81.2 416  | 83.5 426  | 84.7 433            | 86.0 437                              |                                 |  |                              |  |  |
| <b>170</b>                                                      | 85.4 .638 | 86.8 .660 | 88.1 .679                            | 89.7 .702 | 91.7 .715 | 95.1 .758           |                                       |                                 |  |                              |  |  |
|                                                                 | 1852 265  | 1840 263  | 1822 260                             | 1815 258  | 1797 252  | 1879 256            |                                       |                                 |  |                              |  |  |
|                                                                 | 71.3 396  | 73.6 406  | 75.9 415                             | 78.1 425  | 79.7 430  | 80.1 452            |                                       |                                 |  |                              |  |  |
| <b>180</b>                                                      | 86.6 .651 | 88.0 .672 | 89.3 .689                            | 91.1 .710 | 94.0 .739 |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 1955 271  | 1941 269  | 1917 264                             | 1913 261  | 1955 261  |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 68.9 404  | 71.1 414  | 73.2 421                             | 75.0 430  | 75.7 444  |                     |                                       |                                 |  |                              |  |  |
| <b>190</b>                                                      | 87.8 .665 | 89.1 .680 | 90.8 .707                            | 93.0 .722 | 95.3 .733 |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2062 277  | 2031 272  | 2044 272                             | 2035 266  | 2020 258  |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 66.7 413  | 68.7 419  | 70.5 432                             | 71.7 438  | 72.7 440  |                     |                                       |                                 |  |                              |  |  |
| <b>200</b>                                                      | 88.9 .674 | 90.3 .694 | 92.0 .710                            | 95.1 .744 |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2157 281  | 2147 278  | 2128 273                             | 2196 275  |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 64.6 418  | 66.4 427  | 68.0 434                             | 68.4 451  |           |                     |                                       |                                 |  |                              |  |  |
| <b>210</b>                                                      | 89.9 .683 | 91.7 .711 | 93.8 .724                            | 95.5 .707 |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2258 285  | 2276 285  | 2264 279                             | 2163 260  |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 62.6 424  | 64.1 438  | 65.1 442                             | 66.0 428  |           |                     |                                       |                                 |  |                              |  |  |
| <b>220</b>                                                      | 91.1 .698 | 92.8 .712 | 95.1 .724                            |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2384 292  | 2355 285  | 2347 278                             |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 60.6 433  | 62.0 438  | 62.8 442                             |           |           |                     |                                       |                                 |  |                              |  |  |
| <b>230</b>                                                      | 92.4 .712 | 94.5 .725 |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2508 298  | 2497 291  |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 58.7 442  | 59.6 446  |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
| <b>240</b>                                                      | 93.4 .713 | 95.0 .702 |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2589 298  | 2488 281  |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 57.0 442  | 57.9 432  |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
| <b>250</b>                                                      | 94.4 .710 |           |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 2657 297  |           |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
|                                                                 | 55.3 440  |           |                                      |           |           |                     |                                       |                                 |  |                              |  |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 2 % |           |           |                     | TOTAL ANTI-ICE ON<br>△ FUEL = + 3.5 % |                                 |  |                              |  |  |

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## LONG RANGE CRUISE - 1 ENGINE OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           | ISA +20<br>CG=30.0%                         | N1 (%)<br>KG/H/ENG<br>NM/1000KG | MACH<br>IAS (KT)<br>TAS (KT)               |           |           |
|-----------------------------------------------------------------|-----------|-----------|-----------|---------------------------------------------|---------------------------------|--------------------------------------------|-----------|-----------|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160                                       | FL180                           | FL200                                      | FL220     | FL240     |
| 130                                                             | 67.2 .429 | 69.2 .451 | 70.7 .466 | 71.8 .477                                   | 73.1 .488                       | 74.2 .494                                  | 74.8 .494 | 76.0 .498 |
|                                                                 | 1433 237  | 1443 240  | 1424 239  | 1390 235                                    | 1362 231                        | 1322 225                                   | 1270 216  | 1249 209  |
|                                                                 | 66.0 284  | 68.4 296  | 71.2 304  | 74.1 309                                    | 76.8 314                        | 79.6 316                                   | 82.1 313  | 83.6 313  |
| 140                                                             | 69.6 .451 | 71.1 .466 | 72.1 .477 | 73.3 .487                                   | 74.4 .494                       | 75.1 .494                                  | 76.3 .497 | 77.9 .504 |
|                                                                 | 1561 249  | 1540 248  | 1504 244  | 1471 240                                    | 1430 234                        | 1375 225                                   | 1349 217  | 1338 212  |
|                                                                 | 63.8 299  | 66.3 306  | 68.9 311  | 71.5 316                                    | 74.0 318                        | 76.5 315                                   | 77.9 315  | 79.0 317  |
| 150                                                             | 71.3 .465 | 72.4 .476 | 73.5 .486 | 74.7 .493                                   | 75.4 .494                       | 76.4 .496                                  | 77.9 .503 | 83.5 .606 |
|                                                                 | 1656 257  | 1622 254  | 1584 249  | 1541 243                                    | 1486 235                        | 1450 226                                   | 1437 220  | 1701 256  |
|                                                                 | 61.9 308  | 64.3 313  | 66.7 317  | 69.1 319                                    | 71.4 318                        | 72.9 317                                   | 73.9 319  | 74.7 381  |
| 160                                                             | 72.6 .475 | 73.7 .484 | 74.8 .492 | 75.7 .495                                   | 76.5 .495                       | 77.9 .501                                  | 82.4 .576 | 84.6 .617 |
|                                                                 | 1739 263  | 1698 258  | 1657 253  | 1601 244                                    | 1552 235                        | 1535 228                                   | 1731 253  | 1790 261  |
|                                                                 | 60.2 314  | 62.5 318  | 64.6 321  | 66.8 321                                    | 68.4 319                        | 69.4 320                                   | 70.3 365  | 72.2 388  |
| 170                                                             | 73.8 .482 | 74.9 .491 | 75.9 .495 | 76.5 .495                                   | 77.8 .499                       | 79.5 .508                                  | 84.7 .612 | 85.6 .627 |
|                                                                 | 1815 267  | 1775 262  | 1721 254  | 1660 244                                    | 1636 237                        | 1632 232                                   | 1916 270  | 1883 266  |
|                                                                 | 58.6 319  | 60.6 323  | 62.6 323  | 64.4 321                                    | 65.4 321                        | 66.2 324                                   | 67.5 388  | 69.9 395  |
| 180                                                             | 75.0 .490 | 76.0 .495 | 76.6 .495 | 77.7 .498                                   | 79.2 .503                       | 84.7 .608                                  | 85.6 .622 | 86.8 .639 |
|                                                                 | 1896 271  | 1840 264  | 1773 254  | 1740 246                                    | 1723 239                        | 2046 279                                   | 2008 274  | 1981 271  |
|                                                                 | 57.0 324  | 58.9 325  | 60.7 323  | 61.8 322                                    | 62.6 323                        | 63.2 388                                   | 65.4 394  | 67.6 402  |
| 190                                                             | 76.0 .493 | 76.8 .495 | 77.6 .496 | 79.0 .501                                   | 83.4 .575                       | 85.6 .617                                  | 86.7 .632 | 87.9 .651 |
|                                                                 | 1962 273  | 1897 264  | 1844 254  | 1825 247                                    | 2060 274                        | 2138 283                                   | 2106 279  | 2086 277  |
|                                                                 | 55.4 326  | 57.2 325  | 58.5 324  | 59.3 324                                    | 59.9 370                        | 61.4 394                                   | 63.4 401  | 65.5 410  |
| 200                                                             | 76.9 .496 | 77.5 .495 | 78.7 .499 | 80.3 .504                                   | 85.6 .610                       | 86.5 .625                                  | 87.7 .643 | 89.0 .663 |
|                                                                 | 2025 274  | 1954 264  | 1930 256  | 1914 249                                    | 2267 292                        | 2232 288                                   | 2208 285  | 2193 282  |
|                                                                 | 54.0 328  | 55.4 325  | 56.2 326  | 56.9 327                                    | 57.7 393                        | 59.6 399                                   | 61.6 408  | 63.4 417  |
| 210                                                             | 77.5 .495 | 78.5 .497 | 79.9 .502 | 85.3 .600                                   | 86.4 .619                       | 87.5 .634                                  | 88.7 .655 | 90.1 .674 |
|                                                                 | 2079 274  | 2035 265  | 2018 258  | 2379 298                                    | 2362 296                        | 2329 292                                   | 2316 290  | 2297 287  |
|                                                                 | 52.5 328  | 53.5 326  | 54.1 328  | 54.5 389                                    | 56.2 398                        | 58.0 405                                   | 59.7 415  | 61.5 424  |
| 220                                                             | 78.3 .495 | 79.5 .499 | 81.2 .507 | 86.3 .612                                   | 87.3 .627                       | 88.4 .645                                  | 89.8 .666 | 91.1 .684 |
|                                                                 | 2145 274  | 2122 266  | 2119 261  | 2497 304                                    | 2458 300                        | 2437 297                                   | 2426 295  | 2408 291  |
|                                                                 | 50.9 328  | 51.6 328  | 52.1 331  | 53.0 397                                    | 54.7 403                        | 56.4 412                                   | 58.0 422  | 59.6 430  |
| 230                                                             | 79.2 .498 | 80.6 .502 | 86.1 .605 | 87.1 .620                                   | 88.1 .636                       | 89.4 .656                                  | 90.8 .675 | 92.3 .699 |
|                                                                 | 2231 275  | 2211 268  | 2630 312  | 2591 308                                    | 2558 304                        | 2547 302                                   | 2531 299  | 2537 298  |
|                                                                 | 49.2 329  | 49.7 330  | 50.0 395  | 51.6 401                                    | 53.3 409                        | 54.8 419                                   | 56.4 428  | 57.8 440  |
| 240                                                             | 80.2 .500 | 83.0 .533 | 86.9 .613 | 87.9 .627                                   | 89.1 .647                       | 90.4 .668                                  | 91.8 .685 | 93.5 .709 |
|                                                                 | 2318 277  | 2432 285  | 2728 316  | 2689 312                                    | 2672 310                        | 2662 308                                   | 2643 304  | 2653 303  |
|                                                                 | 47.6 331  | 48.0 350  | 48.8 400  | 50.4 406                                    | 51.9 416                        | 53.4 426                                   | 54.8 434  | 56.1 446  |
| 250                                                             | 81.2 .502 | 86.7 .606 | 87.7 .620 | 88.7 .636                                   | 90.0 .658                       | 91.3 .676                                  | 92.8 .698 | 93.6 .691 |
|                                                                 | 2409 278  | 2868 324  | 2825 320  | 2792 316                                    | 2788 315                        | 2770 312                                   | 2769 310  | 2637 295  |
|                                                                 | 46.0 332  | 46.3 398  | 47.7 404  | 49.2 412                                    | 50.6 423                        | 52.0 432                                   | 53.2 442  | 55.0 435  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>$\Delta$ FUEL = + 1 %  |           |           |           | ENGINE ANTI-ICE ON<br>$\Delta$ FUEL = + 3 % |                                 | TOTAL ANTI-ICE ON<br>$\Delta$ FUEL = + 5 % |           |           |

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|                                                                                                                 |                                                              |              |        |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b><br><b>STANDARD STRATEGY</b> | 3.06.30 P 11 |        |
|                                                                                                                 |                                                              | SEQ 150      | REV 14 |

| LONG RANGE CRUISE - 1 ENGINE OUT                                |           |           |           |                                      |           |                     |           |                                       |  |                              |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|--------------------------------------|-----------|---------------------|-----------|---------------------------------------|--|------------------------------|--|
| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW LO<br>ANTI-ICING OFF |           |           |           |                                      |           | ISA +20<br>CG=30.0% |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG       |  | MACH<br>IAS (KT)<br>TAS (KT) |  |
| WEIGHT<br>(1000KG)                                              | FL250     | FL270     | FL290     | FL310                                | FL330     | FL350               | FL370     |                                       |  |                              |  |
| 130                                                             | 76.9 .502 | 82.3 .599 | 83.5 .620 | 84.7 .639                            | 86.1 .661 | 87.6 .682           | 89.6 .705 |                                       |  |                              |  |
|                                                                 | 1244 206  | 1456 238  | 1444 236  | 1424 233                             | 1412 231  | 1396 228            | 1395 226  |                                       |  |                              |  |
|                                                                 | 84.2 314  | 85.3 373  | 88.3 383  | 91.6 391                             | 94.8 402  | 98.0 410            | 100.9 422 |                                       |  |                              |  |
| 140                                                             | 81.6 .575 | 83.8 .617 | 84.9 .635 | 86.2 .655                            | 87.6 .676 | 89.3 .700           | 91.7 .713 |                                       |  |                              |  |
|                                                                 | 1510 238  | 1564 245  | 1538 242  | 1521 239                             | 1508 237  | 1502 235            | 1494 229  |                                       |  |                              |  |
|                                                                 | 79.5 360  | 81.8 384  | 84.9 392  | 87.8 401                             | 90.8 410  | 93.5 421            | 95.3 427  |                                       |  |                              |  |
| 150                                                             | 84.0 .614 | 85.0 .631 | 86.2 .649 | 87.6 .670                            | 89.1 .690 | 90.9 .707           | 94.4 .738 |                                       |  |                              |  |
|                                                                 | 1686 255  | 1658 251  | 1636 248  | 1621 245                             | 1607 242  | 1591 237            | 1642 237  |                                       |  |                              |  |
|                                                                 | 76.1 385  | 78.8 392  | 81.6 401  | 84.3 410                             | 86.9 419  | 89.1 426            | 89.8 442  |                                       |  |                              |  |
| 160                                                             | 85.1 .625 | 86.3 .644 | 87.7 .665 | 89.0 .681                            | 90.9 .708 | 93.4 .727           |           |                                       |  |                              |  |
|                                                                 | 1777 259  | 1756 257  | 1743 254  | 1716 250                             | 1726 249  | 1733 245            |           |                                       |  |                              |  |
|                                                                 | 73.5 392  | 76.0 401  | 78.5 411  | 80.9 417                             | 83.1 430  | 84.2 438            |           |                                       |  |                              |  |
| 170                                                             | 86.2 .636 | 87.6 .658 | 88.9 .675 | 90.6 .701                            | 92.6 .714 |                     |           |                                       |  |                              |  |
|                                                                 | 1871 264  | 1859 262  | 1835 258  | 1842 258                             | 1824 251  |                     |           |                                       |  |                              |  |
|                                                                 | 71.1 399  | 73.4 409  | 75.7 416  | 77.7 429                             | 79.3 434  |                     |           |                                       |  |                              |  |
| 180                                                             | 87.4 .649 | 88.7 .669 | 90.2 .689 | 92.0 .710                            | 94.4 .724 |                     |           |                                       |  |                              |  |
|                                                                 | 1972 270  | 1957 267  | 1946 264  | 1942 261                             | 1937 255  |                     |           |                                       |  |                              |  |
|                                                                 | 68.7 406  | 70.8 416  | 72.8 425  | 74.6 434                             | 75.6 440  |                     |           |                                       |  |                              |  |
| 190                                                             | 88.6 .662 | 89.9 .679 | 91.7 .708 | 93.9 .722                            |           |                     |           |                                       |  |                              |  |
|                                                                 | 2079 275  | 2057 271  | 2077 272  | 2066 266                             |           |                     |           |                                       |  |                              |  |
|                                                                 | 66.5 415  | 68.4 422  | 70.1 437  | 71.3 442                             |           |                     |           |                                       |  |                              |  |
| 200                                                             | 89.6 .671 | 91.2 .694 | 92.9 .710 |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2179 280  | 2178 278  | 2159 273  |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 64.4 421  | 66.0 431  | 67.6 438  |                                      |           |                     |           |                                       |  |                              |  |
| 210                                                             | 90.8 .683 | 92.6 .710 | 94.2 .708 |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2289 285  | 2309 285  | 2237 272  |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 62.3 428  | 63.8 442  | 65.1 437  |                                      |           |                     |           |                                       |  |                              |  |
| 220                                                             | 92.0 .698 | 93.7 .711 |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2418 291  | 2388 285  |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 60.3 437  | 61.7 442  |           |                                      |           |                     |           |                                       |  |                              |  |
| 230                                                             | 93.3 .712 | 94.1 .686 |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2546 298  | 2372 274  |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 58.4 446  | 60.0 427  |           |                                      |           |                     |           |                                       |  |                              |  |
| 240                                                             | 93.6 .697 |           |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2547 291  |           |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 57.1 436  |           |           |                                      |           |                     |           |                                       |  |                              |  |
| 250                                                             | 94.1 .659 |           |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 2509 274  |           |           |                                      |           |                     |           |                                       |  |                              |  |
|                                                                 | 54.8 413  |           |           |                                      |           |                     |           |                                       |  |                              |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>△FUEL = + 1 %          |           |           |           | ENGINE ANTI-ICE ON<br>△ FUEL = + 2 % |           |                     |           | TOTAL ANTI-ICE ON<br>△ FUEL = + 3.5 % |  |                              |  |

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**IN CRUISE QUICK CHECK AT LONG RANGE SPEED**

- R The following in cruise quick check tables allow the flight crew to determine the fuel  
R consumption and time required to cover a given air distance from any moment in cruise to  
R landing with one engine inoperative.  
R These tables are established for :  
R – Cruise Mach number : long range  
R – Descent profile : M.82/300kt/250kt  
R – Approach and landing : 330 kg or 720 lb – 6 minute IMC  
R – ISA  
R – C.G = 30 %  
R – Pack flow LO  
R – Anti ice OFF
- R *Note : 1. In the tables, the asterisk (\*) means that a step climb of 4000 feet must be flown*  
R *to reach the corresponding flight level.*  
R *2. The flight level shown on top of each column is the final flight level.*  
R *3. For each degree Celcius above ISA temperature apply a fuel correction of 0.015*  
R *(kg/°C/NM) × Δ ISA(°C) × air distance (NM) or 0.033 (lb/°C/NM) × Δ ISA (°C)*  
R *× air distance (NM).*

**CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT**

- The in cruise quick check tables are based on a reference initial weight that may vary from  
page to page.  
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 initial  
R weight (see example 3.06.30).

|                                                                                                                             |                                  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b> |  | 3.06.30 | P 13   |
|                                                                                                                             | <b>STANDARD STRATEGY</b>         |  | SEQ 150 | REV 19 |

R

| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE<br>CRUISE: LONG RANGE - DESCENT: M.82/300KT/250KT<br>IMC PROCEDURE: 330 KG (6MIN) |               |               |                                      |               |                    |               |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|--------------------------------------|---------------|--------------------|---------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 160000 KG<br>PACK FLOW LO<br>ANTI-ICING OFF                                                                                                 |               |               | ISA<br>CG = 30.0 %                   |               | FUEL CONSUMED (KG) |               |                                                  |                |                |
|                                                                                                                                                                   |               |               |                                      |               |                    |               | TIME (H.MIN)                                     |                |                |
| AIR<br>DIST.                                                                                                                                                      | FLIGHT LEVEL  |               |                                      |               |                    |               | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
| (NM)                                                                                                                                                              | 250           | 270           | 290                                  | 310           | 330                | 370           | FL250<br>FL270                                   | FL290<br>FL310 | FL330<br>FL370 |
| 200                                                                                                                                                               | 2281<br>0.39  | 2157<br>0.39  | 2042<br>0.38                         | 1935<br>0.38  | 1846<br>0.37       | 1717<br>0.36  | 2                                                | 1              | 1              |
| 300                                                                                                                                                               | 3626<br>0.55  | 3455<br>0.55  | 3299<br>0.53                         | 3152<br>0.53  | 3027<br>0.52       | 2863<br>0.50  | 6                                                | 6              | 7              |
| 400                                                                                                                                                               | 4965<br>1.11  | 4748<br>1.10  | 4549<br>1.09                         | 4363<br>1.08  | 4203<br>1.06       | 4003<br>1.04  | 11                                               | 10             | 12             |
| 500                                                                                                                                                               | 6298<br>1.27  | 6034<br>1.26  | 5794<br>1.24                         | 5568<br>1.23  | 5373<br>1.21       | 5135<br>1.18  | 15                                               | 15             | 18             |
| 600                                                                                                                                                               | 7625<br>1.43  | 7315<br>1.42  | 7033<br>1.39                         | 6768<br>1.38  | 6539<br>1.35       | 6261<br>1.31  | 19                                               | 19             | 23             |
| 700                                                                                                                                                               | 8947<br>1.59  | 8589<br>1.58  | 8266<br>1.55                         | 7962<br>1.53  | 7700<br>1.50       | 7380<br>1.45  | 24                                               | 24             | 29             |
| 800                                                                                                                                                               | 10263<br>2.16 | 9859<br>2.13  | 9493<br>2.10                         | 9151<br>2.08  | 8855<br>2.04       | 8493<br>1.59  | 28                                               | 28             | 34             |
| 900                                                                                                                                                               | 11574<br>2.32 | 11123<br>2.29 | 10715<br>2.26                        | 10334<br>2.23 | 10006<br>2.19      | 9600<br>2.13  | 32                                               | 33             | 40             |
| 1000                                                                                                                                                              | 12880<br>2.48 | 12381<br>2.45 | 11931<br>2.41                        | 11512<br>2.38 | 11152<br>2.33      | 10700<br>2.27 | 36                                               | 37             | 45             |
| 1100                                                                                                                                                              | 14179<br>3.04 | 13635<br>3.01 | 13144<br>2.57                        | 12686<br>2.53 | 12293<br>2.48      | 11794<br>2.40 | 41                                               | 41             | 51             |
| 1200                                                                                                                                                              | 15474<br>3.20 | 14885<br>3.17 | 14351<br>3.12                        | 13856<br>3.08 | 13426<br>3.03      | 12877<br>2.55 | 45                                               | 46             | 56             |
| 1300                                                                                                                                                              | 16763<br>3.37 | 16129<br>3.33 | 15554<br>3.28                        | 15021<br>3.23 | 14554<br>3.18      | 13953<br>3.09 | 49                                               | 50             | 61             |
| 1400                                                                                                                                                              | 18046<br>3.53 | 17368<br>3.49 | 16752<br>3.44                        | 16182<br>3.39 | 15677<br>3.32      | 15021<br>3.23 | 53                                               | 54             | 65             |
| 1500                                                                                                                                                              | 19325<br>4.09 | 18602<br>4.05 | 17944<br>3.59                        | 17337<br>3.54 | 16795<br>3.47      | 16083<br>3.38 | 57                                               | 58             | 70             |
| 1600                                                                                                                                                              | 20599<br>4.26 | 19831<br>4.21 | 19132<br>4.15                        | 18489<br>4.09 | 17908<br>4.02      | 17138<br>3.52 | 62                                               | 62             | 75             |
| 1700                                                                                                                                                              | 21866<br>4.42 | 21055<br>4.38 | 20316<br>4.31                        | 19635<br>4.24 | 19016<br>4.18      | 18187<br>4.07 | 67                                               | 66             | 79             |
| 1800                                                                                                                                                              | 23127<br>4.59 | 22271<br>4.54 | 21492<br>4.47                        | 20777<br>4.39 | 20119<br>4.33      | 19229<br>4.22 | 72                                               | 71             | 84             |
| 1900                                                                                                                                                              | 24384<br>5.15 | 23483<br>5.10 | 22662<br>5.03                        | 21911<br>4.55 | 21217<br>4.48      | 20266<br>4.37 | 78                                               | 75             | 88             |
| 2000                                                                                                                                                              | 25636<br>5.32 | 24689<br>5.26 | 23827<br>5.19                        | 23040<br>5.10 | 22311<br>5.03      | 21294<br>4.51 | 83                                               | 79             | 92             |
| 2100                                                                                                                                                              | 26883<br>5.48 | 25891<br>5.43 | 24987<br>5.35                        | 24164<br>5.25 | 23400<br>5.18      | 22315<br>5.06 | 88                                               | 82             | 97             |
| 2200                                                                                                                                                              | 28125<br>6.05 | 27088<br>5.59 | 26142<br>5.51                        | 25284<br>5.41 | 24485<br>5.34      | 23329<br>5.21 | 94                                               | 86             | 101            |
| 2300                                                                                                                                                              | 29362<br>6.22 | 28280<br>6.16 | 27293<br>6.07                        | 26399<br>5.56 | 25565<br>5.49      | 24338<br>5.36 | 99                                               | 90             | 105            |
| 2400                                                                                                                                                              | 30593<br>6.38 | 29468<br>6.32 | 28439<br>6.23                        | 27510<br>6.12 | 26641<br>6.04      | 25341<br>5.51 | 104                                              | 94             | 109            |
| 2500                                                                                                                                                              | 31819<br>6.55 | 30651<br>6.49 | 29580<br>6.40                        | 28616<br>6.28 | 27712<br>6.20      | 26338<br>6.06 | 110                                              | 98             | 113            |
| 2600                                                                                                                                                              | 33040<br>7.12 | 31829<br>7.05 | 30715<br>6.56                        | 29717<br>6.43 | 28779<br>6.35      | 27329<br>6.21 | 115                                              | 102            | 148            |
| 2700                                                                                                                                                              | 34256<br>7.29 | 33003<br>7.22 | 31846<br>7.12                        | 30813<br>6.59 | 29842<br>6.51      | 28314<br>6.37 | 120                                              | 106            | 152            |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFUEL = + 1 %                                                                                                            |               |               | ENGINE ANTI ICE ON<br>ΔFUEL = +2.5 % |               |                    |               | TOTAL ANTI ICE ON<br>ΔFUEL = + 4 %               |                |                |



|                                                                                                                             |                                  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b> |  | 3.06.30 | P 15   |
|                                                                                                                             | <b>STANDARD STRATEGY</b>         |  | SEQ 150 | REV 19 |

R

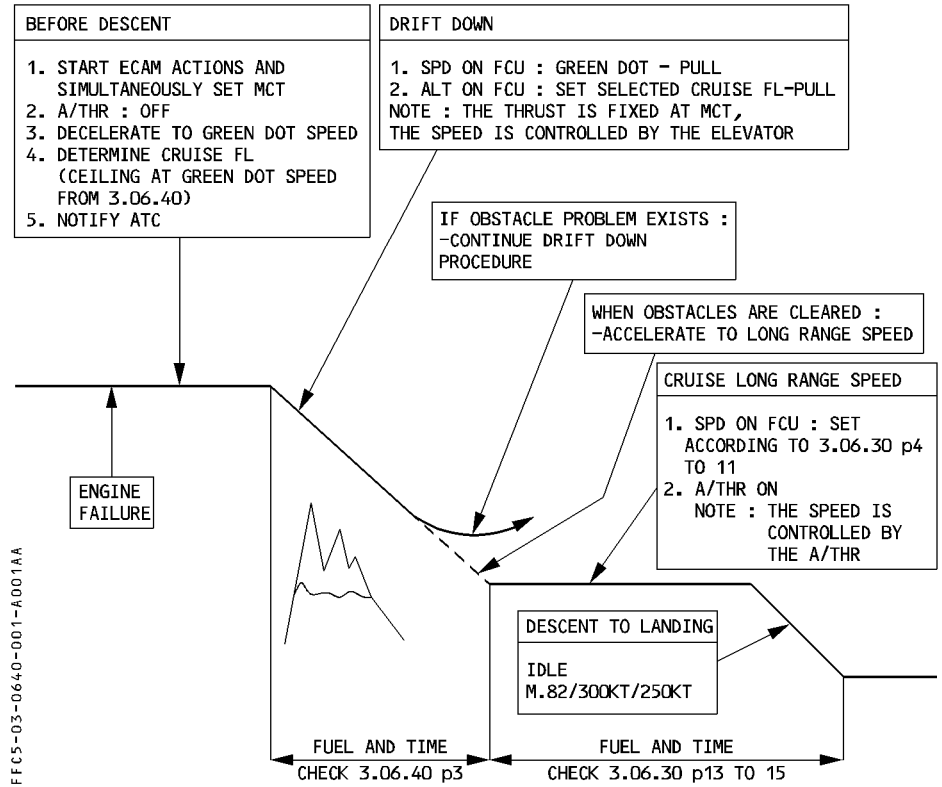
| IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE<br>CRUISE: LONG RANGE - DESCENT: M.82/300KT/250KT<br>IMC PROCEDURE: 330 KG (6MIN) |                |                |                                      |                    |                |                    |                                                  |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|--------------------------------------|--------------------|----------------|--------------------|--------------------------------------------------|----------------|----------------|
| REF. INITIAL WEIGHT = 190000 KG<br>PACK FLOW LO<br>ANTI-ICING OFF                                                                                                 |                |                |                                      | ISA<br>CG = 30.0 % |                | FUEL CONSUMED (KG) |                                                  |                |                |
| AIR<br>DIST.<br><br>(NM)                                                                                                                                          |                | FLIGHT LEVEL   |                                      |                    |                |                    | CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                |                |
|                                                                                                                                                                   |                | 250            | 270                                  | 290                | 310            | 330                | 370                                              | FL250<br>FL270 | FL290<br>FL310 |
| 5200                                                                                                                                                              | 69007<br>13.59 | 66756<br>13.42 | 64737<br>13.18                       | 62867<br>13.00     | 61156<br>12.36 | 60243<br>12.42*    | 198                                              | 203            | 237            |
| 5300                                                                                                                                                              | 70210<br>14.16 | 67913<br>13.59 | 65857<br>13.34                       | 63958<br>13.16     | 62219<br>12.51 | 61228<br>12.56*    | 202                                              | 207            | 240            |
| 5400                                                                                                                                                              | 71409<br>14.33 | 69066<br>14.16 | 66974<br>13.51                       | 65045<br>13.31     | 63278<br>13.06 | 62209<br>13.11*    | 205                                              | 210            | 242            |
| 5500                                                                                                                                                              | 72604<br>14.49 | 70215<br>14.33 | 68086<br>14.07                       | 66128<br>13.47     | 64333<br>13.21 | 63187<br>13.25*    | 208                                              | 214            | 245            |
| 5600                                                                                                                                                              | 73791<br>15.06 | 71360<br>14.50 | 69194<br>14.24                       | 67207<br>14.02     | 65385<br>13.36 | 64161<br>13.40*    | 212                                              | 217            | 248            |
| 5700                                                                                                                                                              | 74974<br>15.23 | 72502<br>15.07 | 70298<br>14.41                       | 68283<br>14.18     | 66433<br>13.51 | 65131<br>13.54*    | 215                                              | 221            | 250            |
| 5800                                                                                                                                                              | 76152<br>15.40 | 73641<br>15.24 | 71399<br>14.57                       | 69354<br>14.34     | 67476<br>14.06 | 66097<br>14.09*    | 219                                              | 225            | 254            |
| 5900                                                                                                                                                              | 77326<br>15.57 | 74777<br>15.41 | 72495<br>15.14                       | 70422<br>14.49     | 68517<br>14.21 | 67060<br>14.23*    | 222                                              | 228            | 257            |
| 6000                                                                                                                                                              | 78497<br>16.14 | 75909<br>15.57 | 73591<br>15.31                       | 71487<br>15.05     | 69553<br>14.37 | 68018<br>14.38*    | 225                                              | 232            | 261            |
| 6100                                                                                                                                                              | 79663<br>16.31 | 77037<br>16.14 | 74682<br>15.47                       | 72547<br>15.21     | 70587<br>14.52 | 68973<br>14.52*    | 230                                              | 235            | 265            |
| 6200                                                                                                                                                              | 80826<br>16.49 | 78162<br>16.31 | 75771<br>16.04                       | 73599<br>15.36     | 71616<br>15.07 | 69925<br>15.07*    | 236                                              | 239            | 268            |
| 6300                                                                                                                                                              | 81984<br>17.06 | 79282<br>16.48 | 76855<br>16.20                       | 74647<br>15.52     | 72642<br>15.22 | 70873<br>15.21*    | 242                                              | 243            | 272            |
| 6400                                                                                                                                                              | 83139<br>17.23 | 80399<br>17.05 | 77936<br>16.37                       | 75692<br>16.08     | 73652<br>15.38 | 71818<br>15.36*    | 247                                              | 246            | 276            |
| 6500                                                                                                                                                              | 84290<br>17.40 | 81512<br>17.21 | 79013<br>16.53                       | 76733<br>16.24     | 74658<br>15.54 | 72755<br>15.50*    | 253                                              | 249            | 280            |
| 6600                                                                                                                                                              | 85432<br>17.57 | 82622<br>17.38 | 80086<br>17.10                       | 77770<br>16.40     | 75661<br>16.11 | 73683<br>16.06*    | 259                                              | 252            | 283            |
| 6700                                                                                                                                                              | 86570<br>18.15 | 83728<br>17.55 | 81156<br>17.27                       | 78804<br>16.56     | 76660<br>16.27 | 74607<br>16.21*    | 265                                              | 255            | 287            |
| 6800                                                                                                                                                              | 87703<br>18.32 | 84828<br>18.12 | 82223<br>17.44                       | 79834<br>17.12     | 77655<br>16.43 | 75528<br>16.36*    | 271                                              | 258            | 291            |
| 6900                                                                                                                                                              | 88833<br>18.50 | 85919<br>18.29 | 83285<br>18.00                       | 80860<br>17.28     | 78647<br>16.59 | 76444<br>16.51*    | 277                                              | 262            | 294            |
| 7000                                                                                                                                                              | 89960<br>19.07 | 87007<br>18.47 | 84345<br>18.17                       | 81883<br>17.44     | 79635<br>17.16 | 77357<br>17.07*    | 283                                              | 265            | 298            |
| 7100                                                                                                                                                              | 91082<br>19.25 | 88091<br>19.04 | 85390<br>18.34                       | 82903<br>18.00     | 80620<br>17.32 | 78266<br>17.22*    | 289                                              | 268            | 301            |
| 7200                                                                                                                                                              | 92201<br>19.42 | 89171<br>19.21 | 86428<br>18.52                       | 83919<br>18.16     | 81601<br>17.48 | 79171<br>17.37*    | 263                                              | 271            | 304            |
| 7300                                                                                                                                                              | 93317<br>20.00 | 90248<br>19.38 | 87462<br>19.09                       | 84931<br>18.32     | 82579<br>18.05 | 80072<br>17.53*    | 266                                              | 274            | 307            |
| 7400                                                                                                                                                              | 94429<br>20.17 | 91322<br>19.56 | 88494<br>19.26                       | 85935<br>18.49     | 83554<br>18.21 | 80970<br>18.08*    | 269                                              | 277            | 310            |
| 7500                                                                                                                                                              | 95538<br>20.35 | 92391<br>20.13 | 89521<br>19.44                       | 86936<br>19.05     | 84526<br>18.38 | 81864<br>18.24*    | 272                                              | 280            | 313            |
| 7600                                                                                                                                                              | 96644<br>20.53 | 93458<br>20.30 | 90545<br>20.01                       | 87933<br>19.22     | 85487<br>18.55 | 82754<br>18.40*    | 275                                              | 283            | 316            |
| 7700                                                                                                                                                              | 97593<br>21.30 | 94521<br>20.48 | 91566<br>20.18                       | 88928<br>19.38     | 86445<br>19.11 | 83641<br>18.55*    | 286                                              | 286            | 319            |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFUEL = + 1 %                                                                                                            |                |                | ENGINE ANTI ICE ON<br>ΔFUEL = +2.5 % |                    |                |                    | TOTAL ANTI ICE ON<br>ΔFUEL = + 4 %               |                |                |

**PROCEDURE**

In order to maintain the highest possible level, the drift down procedure must be adopted. This requires maximum continuous thrust on the remaining engines at green dot speed.

- If, having reached green dot 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.*





**EXAMPLE****Given :**

GW at engine failure = 200 000 kg  
FL at engine failure = 350  
Temperature = ISA  
Distance to destination airport = 2500 NM  
No wind

**Find :**

Level off (drift down ceiling) : 33500 ft  
(see 3.06.40 p3)  
Distance : 260 NM  
Fuel : 3600 kg  
Time : 39 min  
LRC ceiling : (see 3.06.20 p1) FL320  
Cruise at long range speed (FL310) to landing  
(weight = 200 000 – 3600 = 196 400 kg : Distance = 2500 – 260 = 2240 NM)  
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions for a reference weight of 160 000 kg. Interpolate the remaining air distance of 2240 NM at FL310.  
Fuel : 25765 kg  
Time : 5 h 47 min  
Correction due to actual in-cruise weight  
 $\Delta\text{Fuel} = + 89 \text{ kg per } 1000 \text{ kg above reference weight}$   
 $\Delta\text{Fuel} = + 89 \text{ kg} \times (196 - 160) \sim 3204 \text{ kg}$

**Result :**

Total Fuel = 25765 + 3204 + 3600 = 32569 kg  
Time = 5 h 47 min + 39 min = 6 h 26 min

| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT                                        |                            |                                                                           |                            |                            |                                                                               |                            |                            |
|----------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------|----------------------------|----------------------------|-------------------------------------------------------------------------------|----------------------------|----------------------------|
| MAX. CONTINUOUS THRUST                                                                             |                            | ISA                                                                       |                            | DISTANCE (NM)              |                                                                               | TIME (MIN)                 |                            |
| PACK FLOW LO                                                                                       |                            | CG=30.0%                                                                  |                            | INITIAL SPEED(KT)          |                                                                               | FUEL(1000KG)               |                            |
| ANTI-ICING OFF                                                                                     |                            |                                                                           |                            | LEVEL OFF (FT)             |                                                                               |                            |                            |
| INIT. GW<br>(1000KG)                                                                               | INITIAL FLIGHT LEVEL       |                                                                           |                            |                            |                                                                               |                            |                            |
|                                                                                                    | 290                        | 310                                                                       | 330                        | 350                        | 370                                                                           | 390                        | 410                        |
| 130                                                                                                |                            |                                                                           |                            |                            |                                                                               |                            |                            |
| 140                                                                                                |                            |                                                                           |                            |                            |                                                                               |                            | 110 16<br>210 1.1<br>40700 |
| 150                                                                                                |                            |                                                                           |                            |                            |                                                                               |                            | 246 36<br>216 2.6<br>39600 |
| 160                                                                                                |                            |                                                                           |                            |                            |                                                                               | 201 30<br>220 2.3<br>38200 | 299 44<br>222 3.3<br>38400 |
| 170                                                                                                |                            |                                                                           |                            |                            | 86 13<br>224 1.0<br>36800                                                     | 272 40<br>226 3.2<br>37100 | 334 49<br>228 3.8<br>37200 |
| 180                                                                                                |                            |                                                                           |                            |                            | 232 35<br>230 2.9<br>35900                                                    | 309 46<br>232 3.8<br>36000 | 359 52<br>234 4.3<br>36100 |
| 190                                                                                                |                            |                                                                           |                            | 171 26<br>234 2.3<br>34500 | 297 44<br>236 3.9<br>34700                                                    | 354 52<br>238 4.5<br>34800 | 390 57<br>240 4.9<br>34900 |
| 200                                                                                                |                            |                                                                           |                            | 260 39<br>240 3.6<br>33500 | 330 49<br>242 4.5<br>33600                                                    | 378 55<br>244 5.0<br>33700 |                            |
| 210                                                                                                |                            |                                                                           | 202 30<br>244 3.0<br>32300 | 305 45<br>246 4.4<br>32400 | 358 53<br>248 5.1<br>32500                                                    | 395 58<br>250 5.5<br>32500 |                            |
| 220                                                                                                |                            | 51 8<br>248 .8<br>30900                                                   | 268 40<br>250 4.1<br>31300 | 335 50<br>252 5.0<br>31400 | 376 55<br>254 5.5<br>31400                                                    |                            |                            |
| 230                                                                                                |                            | 212 32<br>254 3.5<br>30100                                                | 306 45<br>256 4.9<br>30300 | 358 53<br>258 5.6<br>30400 | 393 57<br>260 6.0<br>30400                                                    |                            |                            |
| 240                                                                                                | 125 19<br>258 2.2<br>28800 | 291 44<br>260 4.9<br>29100                                                | 353 52<br>262 5.8<br>29200 | 395 58<br>264 6.4<br>29300 |                                                                               |                            |                            |
| 250                                                                                                | 243 37<br>264 4.3<br>27800 | 334 50<br>266 5.8<br>28000                                                | 381 56<br>268 6.5<br>28100 | 419 61<br>270 7.0<br>28100 |                                                                               |                            |                            |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔTIME = + 15 %<br>ΔFUEL = + 20 %<br>ΔLEVEL OFF = - 700 FT |                            | ENGINE ANTI-ICE ON<br>ΔTIME = 0<br>ΔFUEL = + 4 %<br>ΔLEVEL OFF = - 100 FT |                            |                            | TOTAL ANTI-ICE ON<br>ΔTIME = + 6 %<br>ΔFUEL = + 20 %<br>ΔLEVEL OFF = - 300 FT |                            |                            |

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| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT |                            |                                                           |                            |                                                      |                                                            |                            |                            |
|-------------------------------------------------------------|----------------------------|-----------------------------------------------------------|----------------------------|------------------------------------------------------|------------------------------------------------------------|----------------------------|----------------------------|
| MAX. CONTINUOUS THRUST<br>PACK FLOW LO<br>ANTI-ICING OFF    |                            | ISA +10<br>CG=30.0%                                       |                            | DISTANCE (NM)<br>INITIAL SPEED(KT)<br>LEVEL OFF (FT) |                                                            | TIME (MIN)<br>FUEL(1000KG) |                            |
| INIT. GW<br>(1000KG)                                        | INITIAL FLIGHT LEVEL       |                                                           |                            |                                                      |                                                            |                            |                            |
|                                                             | 290                        | 310                                                       | 330                        | 350                                                  | 370                                                        | 390                        | 410                        |
| 130                                                         |                            |                                                           |                            |                                                      |                                                            |                            |                            |
| 140                                                         |                            |                                                           |                            |                                                      |                                                            |                            | 139 20<br>210 1.4<br>40700 |
| 150                                                         |                            |                                                           |                            |                                                      |                                                            |                            | 256 37<br>216 2.7<br>39600 |
| 160                                                         |                            |                                                           |                            |                                                      |                                                            | 209 30<br>220 2.4<br>38200 | 310 44<br>222 3.4<br>38300 |
| 170                                                         |                            |                                                           |                            |                                                      | 109 16<br>224 1.3<br>36800                                 | 282 41<br>226 3.3<br>37100 | 345 49<br>228 4.0<br>37200 |
| 180                                                         |                            |                                                           |                            |                                                      | 226 33<br>230 2.9<br>35800                                 | 316 46<br>232 3.9<br>36000 | 369 53<br>234 4.5<br>36000 |
| 190                                                         |                            |                                                           |                            | 177 26<br>234 2.4<br>34500                           | 303 44<br>236 4.0<br>34700                                 | 365 53<br>238 4.7<br>34800 | 402 57<br>240 5.1<br>34800 |
| 200                                                         |                            |                                                           |                            | 265 39<br>240 3.8<br>33500                           | 343 50<br>242 4.7<br>33600                                 | 389 56<br>244 5.3<br>33600 |                            |
| 210                                                         |                            |                                                           | 209 31<br>244 3.2<br>32200 | 314 46<br>246 4.6<br>32400                           | 368 53<br>248 5.3<br>32500                                 | 407 58<br>250 5.7<br>32500 |                            |
| 220                                                         |                            | 63 9<br>248 1.0<br>30900                                  | 276 40<br>250 4.3<br>31300 | 344 50<br>252 5.2<br>31400                           | 389 56<br>254 5.8<br>31400                                 |                            |                            |
| 230                                                         |                            | 217 32<br>254 3.6<br>30100                                | 315 46<br>256 5.1<br>30300 | 368 53<br>258 5.8<br>30300                           | 404 58<br>260 6.2<br>30400                                 |                            |                            |
| 240                                                         | 122 18<br>258 2.1<br>28700 | 301 44<br>260 5.1<br>29100                                | 365 53<br>262 6.1<br>29200 | 405 58<br>264 6.6<br>29300                           |                                                            |                            |                            |
| 250                                                         | 252 37<br>264 4.5<br>27800 | 343 50<br>266 6.0<br>28000                                | 395 57<br>268 6.8<br>28100 | 431 62<br>270 7.2<br>28100                           |                                                            |                            |                            |
| PACK FLOW HI OR/<br>AND CARGO COOL ON                       |                            | ENGINE ANTI-ICE ON                                        |                            |                                                      | TOTAL ANTI-ICE ON                                          |                            |                            |
| △TIME = + 15 %<br>△FUEL = + 20 %<br>△LEVEL OFF = - 700 FT   |                            | △TIME = + 9 %<br>△FUEL = + 12 %<br>△LEVEL OFF = - 1200 FT |                            |                                                      | △TIME = + 30 %<br>△FUEL = + 30 %<br>△LEVEL OFF = - 2200 FT |                            |                            |

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| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT |                            |                            |                            |                            |                            |                            |                            |
|-------------------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| MAX. CONTINUOUS THRUST                                      |                            |                            | ISA+15                     |                            | DISTANCE (NM)              |                            | TIME (MIN)                 |
| PACK FLOW LO                                                |                            |                            | CG=30.0%                   |                            | INITIAL SPEED(KT)          |                            | FUEL(1000KG)               |
| ANTI-ICING OFF                                              |                            |                            | LEVEL OFF (FT)             |                            |                            |                            |                            |
| INIT. GW<br>(1000KG)                                        | INITIAL FLIGHT LEVEL       |                            |                            |                            |                            |                            |                            |
|                                                             | 290                        | 310                        | 330                        | 350                        | 370                        | 390                        | 410                        |
| 130                                                         |                            |                            |                            |                            |                            |                            |                            |
| 140                                                         |                            |                            |                            |                            |                            |                            | 227 33<br>210 2.3<br>40000 |
| 150                                                         |                            |                            |                            |                            |                            | 152 22<br>214 1.6<br>38600 | 282 41<br>216 3.0<br>38800 |
| 160                                                         |                            |                            |                            |                            |                            | 248 36<br>220 2.8<br>37500 | 320 46<br>222 3.5<br>37600 |
| 170                                                         |                            |                            |                            |                            | 197 29<br>224 2.4<br>36300 | 294 43<br>226 3.5<br>36400 | 347 50<br>228 4.0<br>36400 |
| 180                                                         |                            |                            |                            | 109 16<br>228 1.4<br>34800 | 281 41<br>230 3.6<br>35100 | 341 49<br>232 4.2<br>35200 | 382 55<br>234 4.6<br>35300 |
| 190                                                         |                            |                            |                            | 244 36<br>234 3.3<br>33800 | 328 48<br>236 4.3<br>33900 | 376 54<br>238 4.9<br>34000 |                            |
| 200                                                         |                            |                            | 189 28<br>238 2.8<br>32400 | 305 45<br>240 4.3<br>32600 | 363 53<br>242 5.0<br>32700 | 404 58<br>244 5.4<br>32700 |                            |
| 210                                                         |                            | 56 8<br>242 .9<br>30900    | 274 41<br>244 4.1<br>31300 | 345 51<br>246 5.1<br>31400 | 391 57<br>248 5.6<br>31500 |                            |                            |
| 220                                                         |                            | 226 34<br>248 3.6<br>30000 | 324 48<br>250 5.0<br>30200 | 376 55<br>252 5.7<br>30300 | 415 60<br>254 6.2<br>30300 |                            |                            |
| 230                                                         | 150 23<br>252 2.5<br>28700 | 297 44<br>254 4.9<br>28900 | 365 54<br>256 5.8<br>29100 | 406 59<br>258 6.4<br>29100 |                            |                            |                            |
| 240                                                         | 256 38<br>258 4.4<br>27700 | 342 51<br>260 5.8<br>27800 | 394 58<br>262 6.5<br>27900 | 430 62<br>264 7.0<br>28000 |                            |                            |                            |
| 250                                                         | 308 46<br>264 5.5<br>26600 | 372 55<br>266 6.5<br>26700 | 414 60<br>268 7.0<br>26800 |                            |                            |                            |                            |
| PACK FLOW HI OR/<br>AND CARGO COOL ON                       |                            | ENGINE ANTI-ICE ON         |                            |                            | TOTAL ANTI-ICE ON          |                            |                            |
| ΔTIME = + 15 %                                              |                            | ΔTIME = + 20 %             |                            |                            | ΔTIME = + 35 %             |                            |                            |
| ΔFUEL = + 20 %                                              |                            | ΔFUEL = + 20 %             |                            |                            | ΔFUEL = + 35 %             |                            |                            |
| ΔLEVEL OFF = - 700 FT                                       |                            | ΔLEVEL OFF = - 1300 FT     |                            |                            | ΔLEVEL OFF = - 2400 FT     |                            |                            |

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| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT                                        |                            |                                                                                      |                            |                            |                                                                                     |                            |                                              |  |
|----------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------|----------------------------|----------------------------|-------------------------------------------------------------------------------------|----------------------------|----------------------------------------------|--|
| MAX. CONTINUOUS THRUST<br>PACK FLOW LO<br>ANTI-ICING OFF                                           |                            |                                                                                      | ISA +20<br>CG=30.0%        |                            | DISTANCE (NM)<br>INITIAL SPEED(KT)                                                  |                            | TIME (MIN)<br>FUEL(1000KG)<br>LEVEL OFF (FT) |  |
| INIT. GW<br>(1000KG)                                                                               | INITIAL FLIGHT LEVEL       |                                                                                      |                            |                            |                                                                                     |                            |                                              |  |
|                                                                                                    | 290                        | 310                                                                                  | 330                        | 350                        | 370                                                                                 | 390                        | 410                                          |  |
| 130                                                                                                |                            |                                                                                      |                            |                            |                                                                                     |                            | 124 18<br>204 1.2<br>40500                   |  |
| 140                                                                                                |                            |                                                                                      |                            |                            |                                                                                     |                            | 247 36<br>210 2.5<br>39300                   |  |
| 150                                                                                                |                            |                                                                                      |                            |                            |                                                                                     | 204 30<br>214 2.2<br>38100 | 286 41<br>216 3.0<br>38200                   |  |
| 160                                                                                                |                            |                                                                                      |                            |                            | 103 15<br>218 1.2<br>36700                                                          | 261 38<br>220 2.9<br>36900 | 318 46<br>222 3.5<br>37000                   |  |
| 170                                                                                                |                            |                                                                                      |                            |                            | 235 35<br>224 2.9<br>35700                                                          | 303 44<br>226 3.6<br>35800 | 327 47<br>228 3.7<br>35800                   |  |
| 180                                                                                                |                            |                                                                                      |                            | 203 30<br>228 2.7<br>34200 | 304 45<br>230 3.9<br>34400                                                          | 354 51<br>232 4.4<br>34500 |                                              |  |
| 190                                                                                                |                            |                                                                                      | 139 21<br>232 1.9<br>32700 | 288 43<br>234 3.9<br>33000 | 351 51<br>236 4.6<br>33100                                                          | 392 57<br>238 5.0<br>33100 |                                              |  |
| 200                                                                                                |                            |                                                                                      | 261 39<br>238 3.8<br>31500 | 340 50<br>240 4.8<br>31700 | 389 57<br>242 5.3<br>31800                                                          |                            |                                              |  |
| 210                                                                                                |                            | 234 35<br>242 3.6<br>30100                                                           | 333 50<br>244 5.0<br>30300 | 387 57<br>246 5.7<br>30400 | 427 63<br>248 6.1<br>30400                                                          |                            |                                              |  |
| 220                                                                                                | 159 24<br>246 2.6<br>28600 | 305 46<br>248 4.8<br>28900                                                           | 370 55<br>250 5.7<br>29000 | 415 61<br>252 6.3<br>29100 |                                                                                     |                            |                                              |  |
| 230                                                                                                | 261 39<br>252 4.4<br>27600 | 346 52<br>254 5.6<br>27700                                                           | 398 59<br>256 6.4<br>27800 | 436 64<br>258 6.8<br>27900 |                                                                                     |                            |                                              |  |
| 240                                                                                                | 313 47<br>258 5.4<br>26500 | 375 56<br>260 6.3<br>26600                                                           | 417 62<br>262 6.9<br>26700 |                            |                                                                                     |                            |                                              |  |
| 250                                                                                                | 348 52<br>264 6.1<br>25400 | 397 59<br>266 6.9<br>25500                                                           | 434 64<br>268 7.3<br>25500 |                            |                                                                                     |                            |                                              |  |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔTIME = + 15 %<br>ΔFUEL = + 20 %<br>ΔLEVEL OFF = - 700 FT |                            | ENGINE ANTI-ICE ON<br><br>ΔTIME = + 30 %<br>ΔFUEL = + 30 %<br>ΔLEVEL OFF = - 1400 FT |                            |                            | TOTAL ANTI-ICE ON<br><br>ΔTIME = + 40 %<br>ΔFUEL = + 40 %<br>ΔLEVEL OFF = - 2500 FT |                            |                                              |  |

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|                                                                                                                 |                                                           |          |        |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b><br><br>OBSTACLE STRATEGY | 3.06.40  | P 7    |
|                                                                                                                 |                                                           | SEQ. 001 | REV 13 |

- For LONG RANGE CRUISE table (Refer to 3.06.30 page 4 to 11)
- For IN CRUISE QUICK CHECK (Refer to 3.06.30 page 13 to 15)

|                                                                                                                 |                                  |  |  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------|----------------------------------|--|--|--|---------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b> |  |  |  | 3.06.45 | P 1    |
|                                                                                                                 | HOLDING                          |  |  |  | SEQ 150 | REV 22 |

## HOLDING

R

| RACE TRACK HOLDING PATTERN - GREEN DOT SPEED - 1 ENGINE OUT |              |              |                                        |              |                                     |              |               |                                    |              |
|-------------------------------------------------------------|--------------|--------------|----------------------------------------|--------------|-------------------------------------|--------------|---------------|------------------------------------|--------------|
| MAX. CONTINUOUS THRUST LIMITS                               |              |              |                                        |              | ISA                                 |              | N1 (%)        |                                    |              |
| CLEAN CONFIGURATION                                         |              |              |                                        |              | CG = 30.0%                          |              | FF (KG/H/ENG) |                                    |              |
| PACK FLOW NORM                                              |              |              |                                        |              |                                     |              |               |                                    |              |
| ANTI-ICING OFF                                              |              |              |                                        |              |                                     |              |               |                                    |              |
| WEIGHT<br>(1000KG)                                          | FL 15        | FL 50        | FL100                                  | FL120        | FL140                               | FL160        | FL180         | FL200                              | FL250        |
| <b>130</b>                                                  | 53.5<br>1198 | 56.4<br>1192 | 60.4<br>1175                           | 62.0<br>1169 | 63.6<br>1165                        | 65.3<br>1162 | 67.0<br>1161  | 68.8<br>1160                       | 73.6<br>1181 |
| <b>140</b>                                                  | 55.5<br>1291 | 58.3<br>1280 | 62.3<br>1263                           | 63.9<br>1258 | 65.6<br>1256                        | 67.2<br>1254 | 69.0<br>1253  | 70.8<br>1253                       | 75.7<br>1283 |
| <b>150</b>                                                  | 57.4<br>1384 | 60.2<br>1371 | 64.1<br>1353                           | 65.7<br>1350 | 67.4<br>1347                        | 69.1<br>1346 | 70.8<br>1345  | 72.7<br>1348                       | 77.6<br>1384 |
| <b>160</b>                                                  | 59.1<br>1473 | 61.8<br>1458 | 65.8<br>1444                           | 67.4<br>1441 | 69.1<br>1439                        | 70.8<br>1437 | 72.7<br>1440  | 74.6<br>1449                       | 79.5<br>1493 |
| <b>170</b>                                                  | 60.7<br>1564 | 63.4<br>1548 | 67.4<br>1536                           | 69.1<br>1533 | 70.8<br>1530                        | 72.6<br>1532 | 74.5<br>1539  | 76.3<br>1551                       | 81.3<br>1598 |
| <b>180</b>                                                  | 62.2<br>1652 | 64.9<br>1638 | 69.0<br>1628                           | 70.7<br>1625 | 72.4<br>1624                        | 74.3<br>1628 | 76.1<br>1641  | 78.0<br>1655                       | 82.9<br>1701 |
| <b>190</b>                                                  | 63.7<br>1742 | 66.4<br>1730 | 70.5<br>1720                           | 72.1<br>1717 | 74.0<br>1720                        | 75.8<br>1730 | 77.7<br>1745  | 79.5<br>1755                       | 84.4<br>1805 |
| <b>200</b>                                                  | 65.0<br>1832 | 67.8<br>1821 | 71.9<br>1810                           | 73.6<br>1812 | 75.5<br>1819                        | 77.3<br>1834 | 79.2<br>1847  | 81.0<br>1864                       | 86.0<br>1918 |
| <b>210</b>                                                  | 66.3<br>1923 | 69.1<br>1913 | 73.3<br>1905                           | 75.1<br>1909 | 76.9<br>1924                        | 78.7<br>1939 | 80.5<br>1952  | 82.6<br>1980                       | 87.8<br>2043 |
| <b>220</b>                                                  | 67.7<br>2015 | 70.4<br>2006 | 74.6<br>2001                           | 76.5<br>2012 | 78.3<br>2029                        | 80.1<br>2042 | 82.0<br>2069  | 83.9<br>2089                       | 89.6<br>2176 |
| <b>230</b>                                                  | 68.9<br>2107 | 71.7<br>2098 | 76.0<br>2100                           | 77.8<br>2118 | 79.6<br>2136                        | 81.4<br>2154 | 83.4<br>2185  | 85.2<br>2198                       | 91.4<br>2313 |
| <b>240</b>                                                  | 70.1<br>2200 | 72.9<br>2188 | 77.3<br>2207                           | 79.0<br>2225 | 80.8<br>2242                        | 82.8<br>2276 | 84.6<br>2294  | 86.4<br>2309                       | 93.1<br>2458 |
| <b>250</b>                                                  | 71.2<br>2293 | 74.0<br>2283 | 78.5<br>2314                           | 80.3<br>2334 | 82.1<br>2362                        | 84.0<br>2390 | 85.8<br>2405  | 87.7<br>2433                       | 95.0<br>2614 |
| PACK FLOW HI OR/<br>AND CARGO COOL ON<br>ΔFF = + 1 %        |              |              | ENGINE<br>ANTI ICE ON<br>ΔFF = + 2.5 % |              | TOTAL<br>ANTI ICE ON<br>ΔFF = + 4 % |              |               | per 1° above ISA<br>ΔFF = + 0.25 % |              |

Note : Correction for straight line holding : – 5 %

DESCENT TO LANDING

| DESCENT - M.82/300KT/250KT - 1 ENGINE OUT    |               |                       |                 |                      |               |                                       |               |                            |             |
|----------------------------------------------|---------------|-----------------------|-----------------|----------------------|---------------|---------------------------------------|---------------|----------------------------|-------------|
| IDLE THRUST<br>PACK FLOW LO<br>ANTHICING OFF |               |                       | ISA<br>CG=30.0% |                      |               |                                       |               |                            |             |
| WEIGHT<br>(1000KG)                           | 150           |                       |                 |                      | 200           |                                       |               |                            | IAS<br>(KT) |
| FL                                           | TIME<br>(MIN) | FUEL<br>(KG)          | DIST.<br>(NM)   | N1                   | TIME<br>(MIN) | FUEL<br>(KG)                          | DIST.<br>(NM) | N1                         |             |
| 410                                          | 19.0          | 368                   | 117             | IDLE                 |               |                                       |               |                            | 243         |
| 390                                          | 18.3          | 354                   | 111             | IDLE                 | 21.4          | 415                                   | 131           | IDLE                       | 255         |
| 370                                          | 17.5          | 342                   | 105             | IDLE                 | 20.6          | 402                                   | 125           | IDLE                       | 267         |
| 350                                          | 16.9          | 330                   | 100             | IDLE                 | 19.9          | 389                                   | 119           | IDLE                       | 279         |
| 330                                          | 16.3          | 321                   | 96              | IDLE                 | 19.2          | 378                                   | 114           | IDLE                       | 292         |
| 310                                          | 15.7          | 310                   | 91              | IDLE                 | 18.5          | 365                                   | 108           | IDLE                       | 300         |
| 290                                          | 14.9          | 297                   | 85              | IDLE                 | 17.6          | 349                                   | 101           | IDLE                       | 300         |
| 270                                          | 14.1          | 283                   | 79              | IDLE                 | 16.6          | 332                                   | 93            | IDLE                       | 300         |
| 250                                          | 13.3          | 268                   | 73              | IDLE                 | 15.6          | 315                                   | 86            | IDLE                       | 300         |
| 240                                          | 12.9          | 261                   | 70              | IDLE                 | 15.1          | 306                                   | 83            | IDLE                       | 300         |
| 220                                          | 12.0          | 247                   | 64              | IDLE                 | 14.1          | 289                                   | 76            | IDLE                       | 300         |
| 200                                          | 11.2          | 232                   | 59              | IDLE                 | 13.1          | 271                                   | 69            | IDLE                       | 300         |
| 180                                          | 10.4          | 217                   | 53              | IDLE                 | 12.1          | 252                                   | 62            | IDLE                       | 300         |
| 160                                          | 9.5           | 202                   | 48              | IDLE                 | 11.0          | 233                                   | 55            | IDLE                       | 300         |
| 140                                          | 8.6           | 183                   | 42              | IDLE                 | 9.9           | 211                                   | 49            | IDLE                       | 300         |
| 120                                          | 7.8           | 164                   | 37              | IDLE                 | 8.8           | 187                                   | 42            | IDLE                       | 300         |
| 100                                          | 6.9           | 145                   | 32              | IDLE                 | 7.8           | 163                                   | 36            | IDLE                       | 300         |
| 50                                           | 2.5           | 54                    | 11              | IDLE                 | 2.9           | 61                                    | 12            | IDLE                       | 250         |
| 15                                           | .0            | 0                     | 0               | IDLE                 | .0            | 0                                     | 0             | IDLE                       | 250         |
| CORRECTIONS                                  |               | ENGINE<br>ANTI-ICE ON |                 | TOTAL<br>ANTI-ICE ON |               | PACK FLOW HI OR/<br>AND CARGO COOL ON |               | ΔISA<br>(per 1° above ISA) |             |
| TIME                                         |               | —                     |                 | + 4 %                |               | —                                     |               | + 0.2 %                    |             |
| FUEL                                         |               | + 7 %                 |                 | + 35 %               |               | + 6 %                                 |               | + 0.4 %                    |             |
| DISTANCE                                     |               | —                     |                 | + 4 %                |               | —                                     |               | + 0.4 %                    |             |



|                                                                                                                             |                                  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b> |  | 3.06.50 | P 1    |
|                                                                                                                             | ALTERNATE                        |  | SEQ 001 | REV 14 |

## GENERAL

The alternate planning tables enable fuel consumption and time required to cover a given air distance from go-around at destination airport to landing at alternate airport to be determined.

These tables are established for :

- R — Go around : 600 kg or 1320 lb
- Climb profile : 250kt/300kt/M.78
- Long range speed
- Descent profile : M.80/300kt/250kt
- Approach and landing at alternate airport : 220 kg or 490 lb (4 minutes)
- ISA
- CG = 30 %
- Pack flow LO
- 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  
 $0.015 \text{ (kg/°C/NM)} \times \Delta \text{ISA (°C)} \times \text{Air Distance (NM)}$   
 or  $0.033 \text{ (lb/°C/NM)} \times \Delta \text{ISA (°C)} \times \text{Air distance (NM)}$

## CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The tables are based on a reference landing weight at destination.

The fuel consumption has to be corrected when the actual weight is different from the reference 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<br>GO-AROUND : 600 KG - CLIMB : 250KT/300KT - CRUISE : LONG RANGE<br>DESCENT : 300KT/250KT - VMC PROCEDURE : 220 KG (4MIN) |               |               |               |                                       |               |               |                    |                                                                  |                    |                |                |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|---------------------------------------|---------------|---------------|--------------------|------------------------------------------------------------------|--------------------|----------------|----------------|-------|
| REF. LDG WT AT DESTINATION = 150000 KG<br>NORMAL AIR CONDITIONING<br>ANTI-ICING OFF                                                                                                 |               |               |               |                                       |               |               | ISA<br>CG = 30.0 % |                                                                  | FUEL CONSUMED (KG) |                |                |       |
| AIR<br>DIST.                                                                                                                                                                        | FLIGHT LEVEL  |               |               |                                       |               |               |                    | TIME (H.MIN)<br>CORRECTION ON<br>FUEL CONSUMPTION<br>(KG/1000KG) |                    |                |                |       |
|                                                                                                                                                                                     | (NM)          | 100           | 120           | 140                                   | 160           | 180           | 200                | 220                                                              | FL100<br>FL120     | FL140<br>FL160 | FL180<br>FL200 | FL220 |
| 50                                                                                                                                                                                  | 1788<br>0.14  |               |               |                                       |               |               |                    |                                                                  | 3                  |                |                |       |
| 100                                                                                                                                                                                 | 2599<br>0.24  | 2547<br>0.25  | 2544<br>0.24  | 2548<br>0.24                          | 2558<br>0.24  |               |                    |                                                                  | 5                  | 5              | 6              |       |
| 150                                                                                                                                                                                 | 3411<br>0.34  | 3331<br>0.35  | 3301<br>0.34  | 3279<br>0.34                          | 3267<br>0.34  | 3269<br>0.33  | 3278<br>0.33       |                                                                  | 8                  | 8              | 9              | 13    |
| 200                                                                                                                                                                                 | 4226<br>0.45  | 4116<br>0.45  | 4060<br>0.44  | 4012<br>0.44                          | 3978<br>0.43  | 3966<br>0.43  | 3965<br>0.43       |                                                                  | 10                 | 10             | 12             | 16    |
| 250                                                                                                                                                                                 | 5043<br>0.55  | 4903<br>0.55  | 4820<br>0.54  | 4747<br>0.53                          | 4690<br>0.53  | 4665<br>0.53  | 4656<br>0.53       |                                                                  | 13                 | 13             | 15             | 20    |
| 300                                                                                                                                                                                 | 5862<br>1.05  | 5691<br>1.04  | 5581<br>1.03  | 5483<br>1.03                          | 5405<br>1.03  | 5366<br>1.03  | 5348<br>1.03       |                                                                  | 15                 | 15             | 18             | 24    |
| 350                                                                                                                                                                                 | 6682<br>1.15  | 6482<br>1.14  | 6345<br>1.13  | 6221<br>1.13                          | 6122<br>1.13  | 6070<br>1.13  | 6043<br>1.12       |                                                                  | 18                 | 18             | 22             | 27    |
| 400                                                                                                                                                                                 | 7505<br>1.25  | 7274<br>1.24  | 7110<br>1.23  | 6961<br>1.23                          | 6841<br>1.23  | 6776<br>1.23  | 6741<br>1.22       |                                                                  | 20                 | 21             | 25             | 31    |
| 450                                                                                                                                                                                 | 8330<br>1.35  | 8068<br>1.34  | 7877<br>1.33  | 7703<br>1.32                          | 7562<br>1.32  | 7485<br>1.32  | 7450<br>1.32       |                                                                  | 23                 | 23             | 28             | 34    |
| 500                                                                                                                                                                                 | 9157<br>1.45  | 8864<br>1.44  | 8646<br>1.42  | 8446<br>1.42                          | 8285<br>1.42  | 8196<br>1.42  | 8161<br>1.41       |                                                                  | 25                 | 26             | 31             | 38    |
| 550                                                                                                                                                                                 | 9986<br>1.55  | 9661<br>1.54  | 9417<br>1.52  | 9192<br>1.52                          | 9010<br>1.52  | 8909<br>1.52  | 8876<br>1.51       |                                                                  | 27                 | 28             | 35             | 41    |
| 600                                                                                                                                                                                 | 10817<br>2.05 | 10461<br>2.04 | 10190<br>2.02 | 9939<br>2.01                          | 9738<br>2.02  | 9625<br>2.02  | 9592<br>2.01       |                                                                  | 30                 | 31             | 38             | 44    |
| 650                                                                                                                                                                                 | 11650<br>2.15 | 11262<br>2.14 | 10964<br>2.12 | 10688<br>2.11                         | 10467<br>2.12 | 10343<br>2.12 | 10311<br>2.10      |                                                                  | 32                 | 33             | 42             | 48    |
| 700                                                                                                                                                                                 | 12485<br>2.25 | 12065<br>2.23 | 11740<br>2.21 | 11438<br>2.21                         | 11199<br>2.21 | 11063<br>2.21 | 11033<br>2.20      |                                                                  | 35                 | 36             | 46             | 51    |
| 750                                                                                                                                                                                 | 13322<br>2.34 | 12870<br>2.33 | 12517<br>2.31 | 12191<br>2.30                         | 11932<br>2.31 | 11786<br>2.31 | 11756<br>2.29      |                                                                  | 37                 | 39             | 50             | 54    |
| 800                                                                                                                                                                                 | 14161<br>2.44 | 13677<br>2.43 | 13297<br>2.41 | 12945<br>2.40                         | 12668<br>2.41 | 12512<br>2.41 | 12483<br>2.39      |                                                                  | 40                 | 41             | 53             | 58    |
| 850                                                                                                                                                                                 | 15001<br>2.54 | 14486<br>2.53 | 14078<br>2.50 | 13701<br>2.50                         | 13406<br>2.51 | 13240<br>2.51 | 13205<br>2.48      |                                                                  | 42                 | 44             | 57             | 61    |
| 900                                                                                                                                                                                 | 15843<br>3.04 | 15298<br>3.02 | 14862<br>3.00 | 14460<br>3.00                         | 14147<br>3.01 | 13970<br>3.01 | 13929<br>2.58      |                                                                  | 45                 | 46             | 61             | 64    |
| 950                                                                                                                                                                                 | 16687<br>3.14 | 16111<br>3.12 | 15648<br>3.10 | 15221<br>3.09                         | 14890<br>3.10 | 14703<br>3.10 | 14655<br>3.08      |                                                                  | 47                 | 49             | 64             | 67    |
| 1000                                                                                                                                                                                | 17534<br>3.24 | 16926<br>3.22 | 16436<br>3.20 | 15983<br>3.19                         | 15636<br>3.20 | 15439<br>3.20 | 15382<br>3.17      |                                                                  | 50                 | 52             | 68             | 70    |
| 1050                                                                                                                                                                                | 18382<br>3.33 | 17743<br>3.32 | 17226<br>3.29 | 16748<br>3.29                         | 16384<br>3.30 | 16177<br>3.30 | 16111<br>3.24      |                                                                  | 52                 | 54             | 72             | 73    |
| 1100                                                                                                                                                                                | 19232<br>3.43 | 18563<br>3.41 | 18018<br>3.39 | 17514<br>3.38                         | 17134<br>3.40 | 16917<br>3.40 | 16842<br>3.32      |                                                                  | 55                 | 57             | 75             | 76    |
| 1150                                                                                                                                                                                | 20085<br>3.53 | 19384<br>3.51 | 18811<br>3.49 | 18282<br>3.48                         | 17886<br>3.49 | 17660<br>3.49 | 17575<br>3.39      |                                                                  | 57                 | 59             | 79             | 79    |
| 1200                                                                                                                                                                                | 20939<br>4.03 | 20207<br>4.01 | 19607<br>3.58 | 19053<br>3.58                         | 18641<br>3.59 | 18406<br>3.59 | 18311<br>3.46      |                                                                  | 60                 | 62             | 83             | 81    |
| PACK FLOW HI AND/OR<br>CARGO COOL ON<br>ΔFUEL = + 1 %                                                                                                                               |               |               |               | ENGINE ANTI ICE ON<br>ΔFUEL = + 2.5 % |               |               |                    | TOTAL ANTI ICE ON<br>ΔFUEL = + 4.5 %                             |                    |                |                |       |

|                                                                                                                 |                                                                      |                  |        |
|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------|--------|
| <br>FLIGHT CREW OPERATING MANUAL | <b>ONE ENGINE OUT OPERATIONS</b><br><br>GROUND DISTANCE/AIR DISTANCE | 3.06.60      P 1 |        |
|                                                                                                                 |                                                                      | SEQ 001          | REV 13 |

**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 at

R    — Flight Level up to FL250

R    — Flight Level above FL250

**LONG RANGE CRUISE UP TO FL250**

| GROUND<br>DIST.<br>(NM) | AIR DISTANCE (NM) |      |                      |              |       |           |       |
|-------------------------|-------------------|------|----------------------|--------------|-------|-----------|-------|
|                         | TAIL WIND         |      | WIND COMPONENTS (KT) |              |       | HEAD WIND |       |
|                         | +150              | +100 | + 50                 | 0            | -50   | -100      | -150  |
| <b>10</b>               | 7                 | 8    | 9                    | <b>10</b>    | 11    | 13        | 16    |
| <b>20</b>               | 14                | 16   | 18                   | <b>20</b>    | 23    | 27        | 33    |
| <b>30</b>               | 22                | 24   | 27                   | <b>30</b>    | 34    | 40        | 49    |
| <b>40</b>               | 29                | 32   | 35                   | <b>40</b>    | 46    | 54        | 65    |
| <b>50</b>               | 36                | 40   | 44                   | <b>50</b>    | 57    | 67        | 82    |
| <b>100</b>              | 72                | 79   | 89                   | <b>100</b>   | 115   | 135       | 163   |
| <b>200</b>              | 144               | 159  | 177                  | <b>200</b>   | 230   | 270       | 327   |
| <b>300</b>              | 216               | 238  | 266                  | <b>300</b>   | 345   | 405       | 490   |
| <b>400</b>              | 288               | 318  | 354                  | <b>400</b>   | 459   | 539       | 653   |
| <b>500</b>              | 360               | 397  | 443                  | <b>500</b>   | 574   | 674       | 817   |
| <b>1000</b>             | 721               | 795  | 886                  | <b>1000</b>  | 1148  | 1349      | 1633  |
| <b>1500</b>             | 1081              | 1192 | 1328                 | <b>1500</b>  | 1723  | 2023      | 2450  |
| <b>2000</b>             | 1441              | 1589 | 1771                 | <b>2000</b>  | 2297  | 2697      | 3266  |
| <b>2500</b>             | 1802              | 1987 | 2214                 | <b>2500</b>  | 2871  | 3371      | 4083  |
| <b>3000</b>             | 2162              | 2384 | 2657                 | <b>3000</b>  | 3445  | 4046      | 4900  |
| <b>3500</b>             | 2522              | 2781 | 3099                 | <b>3500</b>  | 4019  | 4720      | 5716  |
| <b>4000</b>             | 2882              | 3178 | 3542                 | <b>4000</b>  | 4594  | 5394      | 6533  |
| <b>4500</b>             | 3243              | 3576 | 3985                 | <b>4500</b>  | 5168  | 6069      | 7349  |
| <b>5000</b>             | 3603              | 3973 | 4428                 | <b>5000</b>  | 5742  | 6743      | 8166  |
| <b>5500</b>             | 3963              | 4370 | 4871                 | <b>5500</b>  | 6316  | 7417      | 8983  |
| <b>6000</b>             | 4324              | 4768 | 5313                 | <b>6000</b>  | 6891  | 8091      | 9799  |
| <b>6500</b>             | 4684              | 5165 | 5756                 | <b>6500</b>  | 7465  | 8766      | 10616 |
| <b>7000</b>             | 5044              | 5562 | 6199                 | <b>7000</b>  | 8039  | 9440      | 11433 |
| <b>7500</b>             | 5405              | 5960 | 6642                 | <b>7500</b>  | 8613  | 10114     | 12249 |
| <b>8000</b>             | 5765              | 6357 | 7084                 | <b>8000</b>  | 9187  | 10789     | 13066 |
| <b>8500</b>             | 6125              | 6754 | 7527                 | <b>8500</b>  | 9762  | 11463     | 13882 |
| <b>9000</b>             | 6486              | 7152 | 7970                 | <b>9000</b>  | 10336 | 12137     | 14699 |
| <b>9500</b>             | 6846              | 7549 | 8413                 | <b>9500</b>  | 10910 | 12811     | 15516 |
| <b>10000</b>            | 7206              | 7946 | 8856                 | <b>10000</b> | 11484 | 13486     | 16332 |

LONG RANGE CRUISE ABOVE FL250

| GROUND<br>DIST.<br>(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    |
| 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   |
| 1000                    | 740               | 810  | 895                  | 1000  | 1133  | 1306      | 1542  |
| 1500                    | 1110              | 1215 | 1343                 | 1500  | 1699  | 1959      | 2314  |
| 2000                    | 1480              | 1620 | 1790                 | 2000  | 2266  | 2612      | 3085  |
| 2500                    | 1850              | 2025 | 2238                 | 2500  | 2832  | 3266      | 3856  |
| 3000                    | 2220              | 2430 | 2685                 | 3000  | 3398  | 3919      | 4627  |
| 3500                    | 2589              | 2835 | 3133                 | 3500  | 3965  | 4572      | 5398  |
| 4000                    | 2959              | 3240 | 3580                 | 4000  | 4531  | 5225      | 6169  |
| 4500                    | 3329              | 3645 | 4028                 | 4500  | 5098  | 5878      | 6941  |
| 5000                    | 3699              | 4050 | 4475                 | 5000  | 5664  | 6531      | 7712  |
| 5500                    | 4069              | 4455 | 4923                 | 5500  | 6230  | 7184      | 8483  |
| 6000                    | 4439              | 4861 | 5370                 | 6000  | 6797  | 7837      | 9254  |
| 6500                    | 4809              | 5266 | 5818                 | 6500  | 7363  | 8490      | 10025 |
| 7000                    | 5179              | 5671 | 6266                 | 7000  | 7929  | 9144      | 10797 |
| 7500                    | 5549              | 6076 | 6713                 | 7500  | 8496  | 9797      | 11568 |
| 8000                    | 5919              | 6481 | 7161                 | 8000  | 9062  | 10450     | 12339 |
| 8500                    | 6289              | 6886 | 7608                 | 8500  | 9629  | 11103     | 13110 |
| 9000                    | 6659              | 7291 | 8056                 | 9000  | 10195 | 11756     | 13881 |
| 9500                    | 7028              | 7696 | 8503                 | 9500  | 10761 | 12409     | 14652 |
| 10000                   | 7398              | 8101 | 8951                 | 10000 | 11328 | 13062     | 15424 |

|                                                                                                              |                                       |         |        |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------|---------|--------|
| <div><div><div>AEROLINEAS ARGENTINAS</div><div>A340</div></div><div>FLIGHT CREW OPERATING MANUAL</div></div> | TWO ENGINE OUT OPERATIONS<br>CONTENTS | 3.07.00 | P 1    |
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|                                                                                                                 |                                                           |         |        |
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**GENERAL**

R After failure of a second engine, descent will be performed at green dot speed, with maximum continuous thrust. After level-off, the altitude will be maintained, and the aircraft will accelerate up to long range speed. Descent to destination will be performed at 300kt/250kt, idle thrust.

**EXAMPLE****Given**

GW at engine failure = 200 000 kg  
FL at engine failure = 350  
Temperature = ISA + 10  
Distance to diversion airport = 2000 NM  
No wind – No obstacle

**Find**

Descent to drift down ceiling :

From 3.07.30 p2 : Distance = 410 NM  
Fuel = 6100 kg  
Time = 72 min  
Ceiling = 22 200 ft

Cruise and descent to 1500 ft :

Weight = 200 000 – 6100 = 193 900 kg

Distance = 2000 – 410 = 1590 NM

Interpolate fuel and time for 193 900 kg and 1590 NM

From 3.07.50 p1 : Fuel = 24 449 kg  
Time = 5 h 11 min

Temperature correction

Add for each °C above ISA temperature 0.015 kg per NM cruise air distance

Fuel :  $24\,449 + (0.015 \times 10 \times 1590) = 24\,688$  kg

Approach and Landing

IMC procedure : 330 kg/6 min

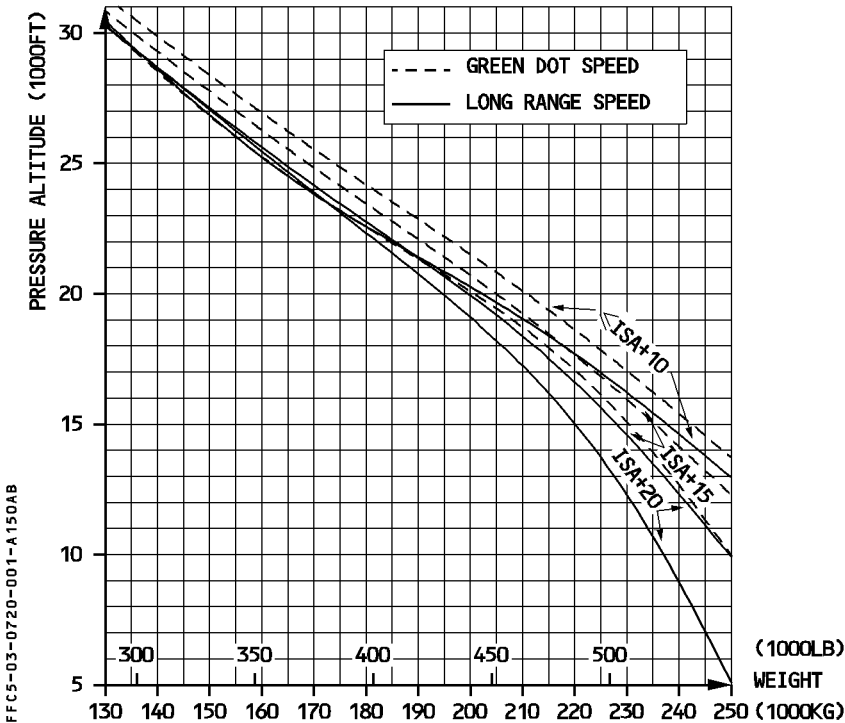
**Results**

Total fuel = 31 118 kg  
time = 6 h 29 min



GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS

Pack flow HI — Anti ice OFF



Note : If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 7000 feet.

|            | ENGINE ANTI ICE ON | TOTAL ANTI ICE ON |
|------------|--------------------|-------------------|
| LONG RANGE | – 3 000 FT         | – 5 000 FT        |
| GREEN DOT  | – 2 000 FT         | – 3 000 FT        |

NET CEILING AT GREEN DOT SPEED

- R To obtain the net ceiling at green dot speed, apply the following corrections to the gross
- R ceilings at green dot speed :

| WEIGHT (1 000 kg) |            |            |            |            |            |            |
|-------------------|------------|------------|------------|------------|------------|------------|
|                   | 240        | 220        | 200        | 180        | 160        | 140        |
| ≤ ISA + 10        | – 5 900 FT | – 5 700 FT | – 3 400 FT | – 2 900 FT | – 2 700 FT | – 2 700 FT |
| ISA + 20          | – 7 900 FT | – 7 900 FT | – 6 300 FT | – 3 800 FT | – 3 100 FT | – 2 600 FT |

|                                                                                                                             |                                  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>TWO ENGINE OUT OPERATIONS</b> |  | 3.07.30 | P 1    |
|                                                                                                                             | DESCENT AT GREEN DOT SPEED       |  | SEQ 150 | REV 13 |

DESCENT AT GREEN DOT SPEED

| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 2 ENGINES OUT         |                            |                            |                            |                                                                        |                            |                            |                            |
|----------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|
| MAX. CONTINUOUS THRUST                                               |                            | ISA                        |                            | DISTANCE (NM)                                                          |                            | TIME (MIN)                 |                            |
| PACK FLOW HI                                                         |                            | CG=30.0%                   |                            | INITIAL SPEED(KT)                                                      |                            | FUEL(1000KG)               |                            |
| ANTI-ICING OFF                                                       |                            |                            |                            | LEVEL OFF (FT)                                                         |                            |                            |                            |
| INIT. GW<br>(1000KG)                                                 | INITIAL FLIGHT LEVEL       |                            |                            |                                                                        |                            |                            |                            |
|                                                                      | 290                        | 310                        | 330                        | 350                                                                    | 370                        | 390                        | 410                        |
| 140                                                                  |                            | 165 31<br>200 2.0<br>30200 | 247 46<br>202 2.9<br>30300 | 291 53<br>204 3.3<br>30400                                             | 323 59<br>206 3.5<br>30400 | 350 63<br>208 3.8<br>30500 | 372 66<br>210 3.9<br>30500 |
| 150                                                                  | 126 24<br>204 1.6<br>28600 | 239 45<br>206 3.0<br>28800 | 287 53<br>208 3.5<br>28900 | 322 59<br>210 3.8<br>29000                                             | 348 63<br>212 4.0<br>29000 | 372 67<br>214 4.2<br>29000 | 391 70<br>216 4.3<br>29000 |
| 160                                                                  | 216 41<br>210 2.9<br>27300 | 274 51<br>212 3.6<br>27400 | 312 58<br>214 4.0<br>27500 | 341 62<br>216 4.3<br>27500                                             | 365 66<br>218 4.5<br>27600 | 386 69<br>220 4.6<br>27600 | 405 72<br>222 4.7<br>27600 |
| 170                                                                  | 255 48<br>216 3.6<br>26000 | 298 55<br>218 4.1<br>26100 | 327 60<br>220 4.4<br>26100 | 353 64<br>222 4.6<br>26200                                             | 374 67<br>224 4.8<br>26200 | 394 70<br>226 4.9<br>26200 | 411 73<br>228 5.0<br>26200 |
| 180                                                                  | 285 53<br>222 4.2<br>24700 | 318 59<br>224 4.5<br>24800 | 344 63<br>226 4.8<br>24800 | 365 66<br>228 5.0<br>24900                                             | 386 69<br>230 5.2<br>24900 | 403 72<br>232 5.3<br>24900 | 420 74<br>234 5.4<br>24900 |
| 190                                                                  | 311 58<br>228 4.7<br>23400 | 340 62<br>230 5.0<br>23500 | 364 66<br>232 5.3<br>23500 | 384 69<br>234 5.5<br>23500                                             | 403 72<br>236 5.6<br>23500 | 420 74<br>238 5.7<br>23600 | 436 76<br>240 5.8<br>23600 |
| 200                                                                  | 330 61<br>234 5.2<br>22100 | 356 65<br>236 5.5<br>22200 | 378 69<br>238 5.7<br>22200 | 397 71<br>240 5.9<br>22200                                             | 412 73<br>242 6.0<br>22200 | 432 76<br>244 6.2<br>22200 |                            |
| 210                                                                  | 348 64<br>240 5.7<br>20800 | 371 68<br>242 5.9<br>20900 | 390 70<br>244 6.1<br>20900 | 409 73<br>246 6.3<br>20900                                             | 426 76<br>248 6.4<br>20900 | 441 77<br>250 6.5<br>21000 |                            |
| 220                                                                  | 352 64<br>246 5.9<br>19600 | 375 68<br>248 6.2<br>19600 | 393 71<br>250 6.4<br>19600 | 410 73<br>252 6.5<br>19700                                             | 426 75<br>254 6.6<br>19700 |                            |                            |
| 230                                                                  | 368 67<br>252 6.4<br>18200 | 389 70<br>254 6.6<br>18200 | 406 73<br>256 6.8<br>18300 | 422 75<br>258 6.9<br>18300                                             | 438 77<br>260 7.0<br>18300 |                            |                            |
| 240                                                                  | 408 74<br>258 7.3<br>16600 | 427 77<br>260 7.5<br>16600 | 443 79<br>262 7.7<br>16700 | 459 81<br>264 7.8<br>16700                                             |                            |                            |                            |
| 250                                                                  | 429 77<br>264 7.9<br>14900 | 448 80<br>266 8.1<br>14900 | 466 83<br>268 8.3<br>14900 | 481 85<br>270 8.4<br>14900                                             |                            |                            |                            |
| ENGINE ANTI-ICE ON<br>ΔTIME = 0<br>ΔFUEL = 0<br>ΔLEVEL OFF = -100 FT |                            |                            |                            | TOTAL ANTI-ICE ON<br>ΔTIME = 0<br>ΔFUEL = +6 %<br>ΔLEVEL OFF = -600 FT |                            |                            |                            |

09H -08D0A340-211 CFM56-5C2 23500020C7KG300 0 018590 0 0 3 .0 .00 0 02 1.000 1.000 .000 0 FCOM-F0-03-07-30-001-150

## GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 2 ENGINES OUT

|                                                                             |                            |                            |                            |                                                                              |                            |                            |                            |  |
|-----------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|------------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|--|
| MAX. CONTINUOUS THRUST                                                      |                            |                            | ISA +10                    |                                                                              | DISTANCE (NM)              |                            | TIME (MIN)                 |  |
| PACK FLOW HI                                                                |                            |                            | CG=30.0%                   |                                                                              | INITIAL SPEED(KT)          |                            | FUEL(1000KG)               |  |
| ANTI-ICING OFF                                                              |                            |                            |                            |                                                                              |                            |                            | LEVEL OFF (FT)             |  |
| INIT. GW<br>(1000KG)                                                        | INITIAL FLIGHT LEVEL       |                            |                            |                                                                              |                            |                            |                            |  |
|                                                                             | 290                        | 310                        | 330                        | 350                                                                          | 370                        | 390                        | 410                        |  |
| 140                                                                         |                            | 173 32<br>200 2.1<br>30200 | 255 46<br>202 3.0<br>30300 | 301 54<br>204 3.4<br>30400                                                   | 333 59<br>206 3.7<br>30400 | 361 64<br>208 3.9<br>30400 | 384 67<br>210 4.1<br>30500 |  |
| 150                                                                         | 133 25<br>204 1.7<br>28600 | 245 45<br>206 3.1<br>28800 | 296 54<br>208 3.7<br>28900 | 332 60<br>210 4.0<br>28900                                                   | 358 64<br>212 4.2<br>29000 | 382 67<br>214 4.4<br>29000 | 404 70<br>216 4.5<br>29000 |  |
| 160                                                                         | 221 41<br>210 3.0<br>27300 | 282 51<br>212 3.7<br>27400 | 321 58<br>214 4.1<br>27500 | 350 63<br>216 4.4<br>27500                                                   | 373 66<br>218 4.6<br>27600 | 397 70<br>220 4.8<br>27600 | 417 72<br>222 4.9<br>27600 |  |
| 170                                                                         | 262 48<br>216 3.7<br>26000 | 305 55<br>218 4.2<br>26100 | 337 61<br>220 4.6<br>26100 | 363 65<br>222 4.8<br>26200                                                   | 385 68<br>224 5.0<br>26200 | 406 71<br>226 5.1<br>26200 | 425 73<br>228 5.3<br>26200 |  |
| 180                                                                         | 293 53<br>222 4.3<br>24700 | 328 59<br>224 4.7<br>24800 | 355 64<br>226 5.0<br>24800 | 379 67<br>228 5.2<br>24800                                                   | 398 70<br>230 5.4<br>24900 | 418 73<br>232 5.5<br>24900 | 434 75<br>234 5.6<br>24900 |  |
| 190                                                                         | 320 58<br>228 4.9<br>23400 | 351 63<br>230 5.3<br>23400 | 375 67<br>232 5.5<br>23500 | 397 70<br>234 5.7<br>23500                                                   | 416 73<br>236 5.9<br>23500 | 433 75<br>238 6.0<br>23500 | 450 77<br>240 6.1<br>23600 |  |
| 200                                                                         | 342 62<br>234 5.4<br>22100 | 368 66<br>236 5.7<br>22100 | 390 69<br>238 6.0<br>22200 | 410 72<br>240 6.1<br>22200                                                   | 429 75<br>242 6.3<br>22200 | 444 77<br>244 6.4<br>22200 |                            |  |
| 210                                                                         | 355 64<br>240 5.8<br>20800 | 380 68<br>242 6.1<br>20800 | 401 71<br>244 6.3<br>20900 | 420 74<br>246 6.5<br>20900                                                   | 438 76<br>248 6.7<br>20900 | 455 78<br>250 6.8<br>20900 |                            |  |
| 220                                                                         | 362 65<br>246 6.1<br>19500 | 384 68<br>248 6.4<br>19600 | 403 71<br>250 6.6<br>19600 | 421 73<br>252 6.7<br>19600                                                   | 437 76<br>254 6.9<br>19600 |                            |                            |  |
| 230                                                                         | 378 67<br>252 6.6<br>18200 | 398 70<br>254 6.8<br>18200 | 416 73<br>256 7.0<br>18200 | 434 75<br>258 7.2<br>18300                                                   | 450 77<br>260 7.3<br>18300 |                            |                            |  |
| 240                                                                         | 419 75<br>258 7.6<br>16600 | 438 77<br>260 7.8<br>16600 | 455 80<br>262 7.9<br>16600 | 471 82<br>264 8.1<br>16700                                                   |                            |                            |                            |  |
| 250                                                                         | 439 78<br>264 8.1<br>14900 | 459 81<br>266 8.3<br>14900 | 477 83<br>268 8.5<br>14900 | 493 85<br>270 8.7<br>14900                                                   |                            |                            |                            |  |
| ENGINE ANTI-ICE ON<br>ΔTIME = +4 %<br>ΔFUEL = +3 %<br>ΔLEVEL OFF = -1100 FT |                            |                            |                            | TOTAL ANTI-ICE ON<br>ΔTIME = +10 %<br>ΔFUEL = +10 %<br>ΔLEVEL OFF = -2300 FT |                            |                            |                            |  |

09H -08DOA340-211 CFM56-5C2 23500020C7KG300 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 10 FCOM-F0-03-07-30-002-150

|                                                                                                                             |                                  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>TWO ENGINE OUT OPERATIONS</b> |  | 3.07.30 | P 3    |
|                                                                                                                             | DESCENT AT GREEN DOT SPEED       |  | SEQ 150 | REV 13 |

| GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 2 ENGINES OUT                |                            |                            |                            |                                                                              |                            |                            |                            |  |
|-----------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|------------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|--|
| MAX. CONTINUOUS THRUST                                                      |                            |                            | ISA+15                     |                                                                              | DISTANCE (NM)              |                            | TIME (MIN)                 |  |
| PACK FLOW HI                                                                |                            |                            | CG=30.0%                   |                                                                              | INITIAL SPEED(KT)          |                            | FUEL(1000KG)               |  |
| ANTI-ICING OFF                                                              |                            |                            |                            |                                                                              | LEVEL OFF (FT)             |                            |                            |  |
| INIT. GW<br>(1000KG)                                                        | INITIAL FLIGHT LEVEL       |                            |                            |                                                                              |                            |                            |                            |  |
|                                                                             | 290                        | 310                        | 330                        | 350                                                                          | 370                        | 390                        | 410                        |  |
| 140                                                                         |                            | 209 38<br>200 2.5<br>29600 | 276 50<br>202 3.2<br>29700 | 317 57<br>204 3.6<br>29800                                                   | 349 62<br>206 3.9<br>29800 | 375 66<br>208 4.1<br>29800 | 397 69<br>210 4.2<br>29900 |  |
| 150                                                                         | 178 33<br>204 2.3<br>28000 | 255 47<br>206 3.2<br>28200 | 299 54<br>208 3.7<br>28200 | 333 60<br>210 4.0<br>28300                                                   | 360 64<br>212 4.2<br>28300 | 383 67<br>214 4.4<br>28400 | 404 70<br>216 4.5<br>28400 |  |
| 160                                                                         | 238 44<br>210 3.2<br>26700 | 287 52<br>212 3.8<br>26800 | 322 58<br>214 4.1<br>26800 | 349 62<br>216 4.4<br>26900                                                   | 374 66<br>218 4.6<br>26900 | 395 69<br>220 4.7<br>26900 | 414 72<br>222 4.9<br>26900 |  |
| 170                                                                         | 274 50<br>216 3.9<br>25400 | 311 56<br>218 4.3<br>25400 | 340 61<br>220 4.6<br>25500 | 365 65<br>222 4.8<br>25500                                                   | 387 68<br>224 5.0<br>25500 | 407 71<br>226 5.1<br>25500 | 425 74<br>228 5.2<br>25500 |  |
| 180                                                                         | 308 56<br>222 4.5<br>24000 | 337 61<br>224 4.8<br>24000 | 364 65<br>226 5.1<br>24100 | 386 69<br>228 5.3<br>24100                                                   | 405 71<br>230 5.5<br>24100 | 425 74<br>232 5.6<br>24100 | 442 76<br>234 5.7<br>24200 |  |
| 190                                                                         | 315 57<br>228 4.8<br>22600 | 342 62<br>230 5.1<br>22700 | 365 65<br>232 5.3<br>22700 | 386 68<br>234 5.5<br>22700                                                   | 406 71<br>236 5.7<br>22800 | 423 73<br>238 5.8<br>22800 |                            |  |
| 200                                                                         | 326 59<br>234 5.1<br>21300 | 351 63<br>236 5.4<br>21400 | 373 66<br>238 5.6<br>21400 | 392 69<br>240 5.8<br>21400                                                   | 410 72<br>242 5.9<br>21400 | 426 73<br>244 6.0<br>21400 |                            |  |
| 210                                                                         | 341 61<br>240 5.5<br>20000 | 364 65<br>242 5.8<br>20000 | 383 68<br>244 6.0<br>20100 | 401 70<br>246 6.1<br>20100                                                   | 419 73<br>248 6.3<br>20100 |                            |                            |  |
| 220                                                                         | 360 65<br>246 6.0<br>18600 | 381 68<br>248 6.2<br>18700 | 400 70<br>250 6.4<br>18700 | 417 73<br>252 6.6<br>18700                                                   | 433 75<br>254 6.7<br>18700 |                            |                            |  |
| 230                                                                         | 392 70<br>252 6.8<br>17100 | 412 73<br>254 7.0<br>17200 | 429 75<br>256 7.1<br>17200 | 445 78<br>258 7.3<br>17200                                                   |                            |                            |                            |  |
| 240                                                                         | 431 77<br>258 7.7<br>15400 | 449 80<br>260 7.8<br>15500 | 465 82<br>262 8.0<br>15500 | 480 84<br>264 8.1<br>15500                                                   |                            |                            |                            |  |
| 250                                                                         | 462 82<br>264 8.5<br>13700 | 479 85<br>266 8.6<br>13800 | 495 87<br>268 8.8<br>13800 |                                                                              |                            |                            |                            |  |
| ENGINE ANTI-ICE ON<br>ΔTIME = +4 %<br>ΔFUEL = +3 %<br>ΔLEVEL OFF = -1300 FT |                            |                            |                            | TOTAL ANTI-ICE ON<br>ΔTIME = +10 %<br>ΔFUEL = +10 %<br>ΔLEVEL OFF = -2300 FT |                            |                            |                            |  |

09H -08D0A340-211 CFM56-5C2 23500020C7KG300 0 018590 0 0 3 .0 .00 0 02 1.000 1.000 .000 15 FCOM-F0-03-07-30-003-150

### GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 2 ENGINES OUT

| MAX. CONTINUOUS THRUST                                                      |                            |                             | ISA +20                      |                                                                              | DISTANCE (NM)              |                            | TIME (MIN)                 |  |
|-----------------------------------------------------------------------------|----------------------------|-----------------------------|------------------------------|------------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|--|
| PACK FLOW HI                                                                |                            |                             | CG=30.0%                     |                                                                              | INITIAL SPEED(KT)          |                            | FUEL(1000KG)               |  |
| ANTI-ICING OFF                                                              |                            |                             | LEVEL OFF (FT)               |                                                                              |                            |                            |                            |  |
| INIT. GW<br>(1000KG)                                                        | INITIAL FLIGHT LEVEL       |                             |                              |                                                                              |                            |                            |                            |  |
|                                                                             | 290                        | 310                         | 330                          | 350                                                                          | 370                        | 390                        | 410                        |  |
| 140                                                                         | 91 17<br>198 1.1<br>28800  | 224 41<br>200 2.7<br>29000  | 281 51<br>202 3.3<br>29100   | 319 57<br>204 3.6<br>29200                                                   | 351 62<br>206 3.9<br>29200 | 376 66<br>208 4.1<br>29300 | 397 69<br>210 4.2<br>29300 |  |
| 150                                                                         | 206 38<br>204 2.7<br>27500 | 266 49<br>206 3.3<br>27600  | 305 55<br>208 3.7<br>27600   | 337 61<br>210 4.0<br>27700                                                   | 364 65<br>212 4.2<br>27700 | 386 68<br>214 4.4<br>27700 | 405 70<br>216 4.5<br>27800 |  |
| 160                                                                         | 255 47<br>210 3.4<br>26100 | 296 54<br>212 3.9<br>26100  | 329 59<br>214 4.2<br>26200   | 355 64<br>216 4.4<br>26200                                                   | 378 67<br>218 4.6<br>26200 | 399 70<br>220 4.8<br>26300 | 417 73<br>222 4.9<br>26300 |  |
| 170                                                                         | 272 50<br>216 3.8<br>24700 | 305 56<br>218 4.2<br>24700  | 333 60<br>220 4.4<br>24800   | 357 64<br>222 4.7<br>24800                                                   | 378 67<br>224 4.8<br>24800 | 397 69<br>226 4.9<br>24900 | 413 71<br>228 5.0<br>24900 |  |
| 180                                                                         | 293 54<br>222 4.3<br>23300 | 322 58<br>224 4.6<br>23300  | 346 62<br>226 4.8<br>23400   | 368 65<br>228 5.0<br>23400                                                   | 387 68<br>230 5.1<br>23400 | 405 71<br>232 5.3<br>23400 |                            |  |
| 190                                                                         | 313 57<br>228 4.7<br>21900 | 337 61<br>230 4.9<br>21900  | 360 64<br>232 5.2<br>22000   | 380 67<br>234 5.3<br>22000                                                   | 398 70<br>236 5.5<br>22000 | 415 72<br>238 5.6<br>22000 |                            |  |
| 200                                                                         | 331 60<br>234 5.1<br>20500 | 354 64<br>236 5.4<br>20600  | 373 66<br>238 5.5<br>20600   | 392 69<br>240 5.7<br>20600                                                   | 410 72<br>242 5.8<br>20600 |                            |                            |  |
| 210                                                                         | 348 63<br>240 5.6<br>19100 | 369 66<br>242 5.8<br>19200  | 389 69<br>244 6.0<br>19200   | 406 71<br>246 6.1<br>19200                                                   | 423 74<br>248 6.2<br>19200 |                            |                            |  |
| 220                                                                         | 374 67<br>246 6.2<br>17700 | 391 70<br>248 6.3<br>17800  | 408 72<br>250 6.5<br>17800   | 424 74<br>252 6.6<br>17800                                                   |                            |                            |                            |  |
| 230                                                                         | 469 85<br>252 8.1<br>15800 | 485 87<br>254 8.3<br>15800  | 500 89<br>256 8.4<br>15900   | 516 91<br>258 8.5<br>15900                                                   |                            |                            |                            |  |
| 240                                                                         | 505 92<br>258 9.0<br>13800 | 523 94<br>260 9.2<br>13800  | 541 97<br>262 9.4<br>13800   |                                                                              |                            |                            |                            |  |
| 250                                                                         | 536 97<br>264 9.9<br>12000 | 550 99<br>266 10.0<br>12000 | 568 102<br>268 10.2<br>12000 |                                                                              |                            |                            |                            |  |
| ENGINE ANTI-ICE ON<br>ΔTIME = +4 %<br>ΔFUEL = +3 %<br>ΔLEVEL OFF = -1500 FT |                            |                             |                              | TOTAL ANTI-ICE ON<br>ΔTIME = +10 %<br>ΔFUEL = +10 %<br>ΔLEVEL OFF = -2500 FT |                            |                            |                            |  |

09H -08D0A340-211 CFM56-5C2 23500020C7KG300 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 20 FCOM-F0-03-07-30-004-150

LONG RANGE CRUISE

| LONG RANGE CRUISE - 2 ENGINES OUT                               |       |      |       |      |                 |      |                                 |                                    |       |      |                              |      |       |      |       |      |
|-----------------------------------------------------------------|-------|------|-------|------|-----------------|------|---------------------------------|------------------------------------|-------|------|------------------------------|------|-------|------|-------|------|
| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW HI<br>ANTI-ICING OFF |       |      |       |      | ISA<br>CG=30.0% |      | N1 (%)<br>KG/H/ENG<br>NM/1000KG |                                    |       |      | MACH<br>IAS (KT)<br>TAS (KT) |      |       |      |       |      |
| WEIGHT<br>(1000KG)                                              | FL100 |      | FL120 |      | FL140           |      | FL160                           |                                    | FL180 |      | FL200                        |      | FL220 |      | FL240 |      |
| 130                                                             | 74.0  | .425 | 74.8  | .430 | 76.3            | .442 | 78.0                            | .457                               | 79.7  | .474 | 81.2                         | .487 | 82.3  | .492 | 83.4  | .495 |
|                                                                 | 1956  | 235  | 1899  | 229  | 1881            | 226  | 1885                            | 225                                | 1890  | 225  | 1876                         | 222  | 1830  | 215  | 1779  | 208  |
|                                                                 | 69.4  | 272  | 71.8  | 273  | 73.8            | 278  | 75.7                            | 285                                | 77.7  | 293  | 79.8                         | 299  | 82.0  | 300  | 84.1  | 299  |
| 140                                                             | 75.3  | .431 | 76.7  | .442 | 78.4            | .456 | 79.9                            | .472                               | 81.5  | .486 | 82.6                         | .492 | 83.7  | .495 | 85.0  | .498 |
|                                                                 | 2053  | 238  | 2033  | 235  | 2032            | 233  | 2036                            | 233                                | 2026  | 230  | 1980                         | 224  | 1926  | 216  | 1882  | 209  |
|                                                                 | 67.0  | 275  | 68.8  | 280  | 70.5            | 287  | 72.3                            | 295                                | 74.3  | 301  | 76.3                         | 302  | 78.3  | 301  | 79.9  | 301  |
| 150                                                             | 76.9  | .440 | 78.6  | .453 | 80.1            | .469 | 81.7                            | .484                               | 82.9  | .491 | 84.0                         | .494 | 85.2  | .497 | 86.8  | .501 |
|                                                                 | 2184  | 243  | 2176  | 241  | 2180            | 240  | 2176                            | 239                                | 2134  | 233  | 2076                         | 225  | 2030  | 217  | 1997  | 210  |
|                                                                 | 64.4  | 281  | 66.0  | 287  | 67.6            | 295  | 69.4                            | 302                                | 71.2  | 304  | 73.1                         | 303  | 74.6  | 303  | 75.9  | 303  |
| 160                                                             | 78.7  | .451 | 80.2  | .465 | 81.8            | .481 | 83.1                            | .491                               | 84.1  | .493 | 85.3                         | .496 | 86.7  | .499 | 88.7  | .503 |
|                                                                 | 2323  | 249  | 2324  | 248  | 2327            | 247  | 2295                            | 242                                | 2232  | 234  | 2181                         | 226  | 2137  | 218  | 2123  | 211  |
|                                                                 | 61.9  | 288  | 63.4  | 295  | 65.0            | 303  | 66.7                            | 306                                | 68.4  | 305  | 69.9                         | 305  | 71.2  | 304  | 71.6  | 304  |
| 170                                                             | 80.2  | .461 | 81.8  | .478 | 83.2            | .489 | 84.2                            | .492                               | 85.3  | .495 | 86.6                         | .498 | 88.4  | .502 | 92.9  | .540 |
|                                                                 | 2468  | 255  | 2478  | 255  | 2455            | 251  | 2394                            | 243                                | 2337  | 235  | 2286                         | 227  | 2266  | 220  | 2441  | 227  |
|                                                                 | 59.6  | 294  | 61.1  | 303  | 62.6            | 307  | 64.2                            | 307                                | 65.6  | 307  | 66.9                         | 306  | 67.5  | 306  | 66.9  | 327  |
| 180                                                             | 81.7  | .473 | 83.2  | .486 | 84.3            | .492 | 85.4                            | .494                               | 86.6  | .497 | 88.2                         | .502 | 90.4  | .503 | 94.3  | .526 |
|                                                                 | 2623  | 262  | 2613  | 259  | 2560            | 252  | 2497                            | 244                                | 2444  | 236  | 2414                         | 229  | 2404  | 220  | 2511  | 221  |
|                                                                 | 57.5  | 302  | 58.9  | 308  | 60.4            | 309  | 61.8                            | 308                                | 63.0  | 308  | 63.8                         | 308  | 63.8  | 307  | 63.4  | 318  |
| 190                                                             | 83.1  | .482 | 84.3  | .491 | 85.3            | .493 | 86.5                            | .496                               | 87.9  | .499 | 89.8                         | .502 | 94.3  | .540 |       |      |
|                                                                 | 2768  | 267  | 2730  | 262  | 2660            | 253  | 2604                            | 245                                | 2559  | 237  | 2546                         | 229  | 2730  | 237  |       |      |
|                                                                 | 55.6  | 308  | 56.9  | 311  | 58.3            | 310  | 59.5                            | 310                                | 60.4  | 309  | 60.6                         | 309  | 60.3  | 329  |       |      |
| 200                                                             | 84.3  | .489 | 85.3  | .492 | 86.4            | .495 | 87.7                            | .498                               | 89.3  | .501 | 93.2                         | .529 | 94.3  | .496 |       |      |
|                                                                 | 2900  | 270  | 2832  | 262  | 2768            | 254  | 2712                            | 246                                | 2688  | 238  | 2841                         | 242  | 2673  | 217  |       |      |
|                                                                 | 53.8  | 312  | 55.1  | 312  | 56.2            | 311  | 57.2                            | 310                                | 57.7  | 310  | 57.2                         | 325  | 56.6  | 303  |       |      |
| 210                                                             | 85.2  | .491 | 86.3  | .494 | 87.5            | .497 | 89.0                            | .500                               | 91.0  | .503 | 94.2                         | .513 |       |      |       |      |
|                                                                 | 3007  | 272  | 2937  | 263  | 2878            | 255  | 2840                            | 247                                | 2833  | 239  | 2902                         | 234  |       |      |       |      |
|                                                                 | 52.1  | 314  | 53.3  | 313  | 54.2            | 312  | 55.0                            | 312                                | 54.9  | 311  | 54.3                         | 315  |       |      |       |      |
| 220                                                             | 86.2  | .493 | 87.3  | .495 | 88.5            | .497 | 90.3                            | .502                               | 93.7  | .521 |                              |      |       |      |       |      |
|                                                                 | 3111  | 273  | 3047  | 264  | 2986            | 255  | 2976                            | 248                                | 3092  | 247  |                              |      |       |      |       |      |
|                                                                 | 50.5  | 314  | 51.5  | 314  | 52.4            | 313  | 52.6                            | 313                                | 52.1  | 322  |                              |      |       |      |       |      |
| 230                                                             | 87.1  | .494 | 88.3  | .497 | 89.9            | .501 | 91.9                            | .503                               | 93.9  | .493 |                              |      |       |      |       |      |
|                                                                 | 3221  | 274  | 3158  | 265  | 3132            | 257  | 3125                            | 248                                | 3070  | 234  |                              |      |       |      |       |      |
|                                                                 | 49.0  | 315  | 49.8  | 315  | 50.3            | 315  | 50.2                            | 314                                | 49.7  | 305  |                              |      |       |      |       |      |
| 240                                                             | 88.0  | .496 | 89.3  | .498 | 91.1            | .502 | 92.7                            | .489                               |       |      |                              |      |       |      |       |      |
|                                                                 | 3333  | 274  | 3275  | 265  | 3269            | 258  | 3165                            | 241                                |       |      |                              |      |       |      |       |      |
|                                                                 | 47.5  | 316  | 48.2  | 315  | 48.3            | 316  | 48.2                            | 305                                |       |      |                              |      |       |      |       |      |
| 250                                                             | 88.9  | .497 | 90.5  | .502 | 91.7            | .493 |                                 |                                    |       |      |                              |      |       |      |       |      |
|                                                                 | 3445  | 275  | 3425  | 268  | 3314            | 253  |                                 |                                    |       |      |                              |      |       |      |       |      |
|                                                                 | 46.0  | 317  | 46.4  | 318  | 46.7            | 310  |                                 |                                    |       |      |                              |      |       |      |       |      |
| ENGINE ANTI-ICE ON<br>ΔFUEL = + 2.5 %                           |       |      |       |      |                 |      |                                 | TOTAL ANTI-ICE ON<br>ΔFUEL = + 5 % |       |      |                              |      |       |      |       |      |

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## LONG RANGE CRUISE - 2 ENGINES OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW HI<br>ANTI-ICING OFF |           |           |           | ISA + 10<br>CG = 30.0% |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG    |           | MACH<br>IAS (KT)<br>TAS (KT) |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|------------------------|-----------|------------------------------------|-----------|------------------------------|--|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160                  | FL180     | FL200                              | FL220     | FL240                        |  |
| <b>130</b>                                                      | 75.4 .425 | 76.3 .430 | 77.8 .442 | 79.4 .455              | 81.1 .472 | 82.8 .486                          | 83.9 .492 | 85.1 .495                    |  |
|                                                                 | 1990 235  | 1932 229  | 1919 224  | 1911 224               | 1919 224  | 1911 221                           | 1868 215  | 1818 207                     |  |
|                                                                 | 69.4 276  | 71.8 277  | 73.7 283  | 75.7 289               | 77.6 298  | 79.7 305                           | 81.8 306  | 83.9 305                     |  |
| <b>140</b>                                                      | 76.7 .430 | 78.2 .441 | 79.7 .453 | 81.3 .469              | 83.0 .484 | 84.2 .491                          | 85.4 .494 | 86.7 .497                    |  |
|                                                                 | 2090 238  | 2070 235  | 2059 232  | 2066 231               | 2062 230  | 2023 224                           | 1970 216  | 1924 208                     |  |
|                                                                 | 66.9 280  | 68.8 285  | 70.5 290  | 72.3 299               | 74.2 306  | 76.1 308                           | 78.0 307  | 79.7 307                     |  |
| <b>150</b>                                                      | 78.3 .439 | 80.0 .451 | 81.5 .467 | 83.2 .482              | 84.4 .491 | 85.6 .493                          | 86.8 .496 | 88.4 .500                    |  |
|                                                                 | 2219 243  | 2209 240  | 2216 239  | 2215 238               | 2180 233  | 2124 225                           | 2076 217  | 2044 210                     |  |
|                                                                 | 64.3 285  | 65.9 291  | 67.5 299  | 69.2 307               | 71.0 310  | 72.8 309                           | 74.3 309  | 75.5 308                     |  |
| <b>160</b>                                                      | 80.1 .449 | 81.6 .463 | 83.3 .480 | 84.6 .490              | 85.7 .493 | 86.9 .496                          | 88.3 .499 | 90.4 .502                    |  |
|                                                                 | 2358 248  | 2362 247  | 2372 246  | 2343 242               | 2285 234  | 2233 226                           | 2190 218  | 2182 211                     |  |
|                                                                 | 61.8 292  | 63.3 299  | 64.8 308  | 66.5 311               | 68.1 311  | 69.5 311                           | 70.8 310  | 70.9 310                     |  |
| <b>170</b>                                                      | 81.5 .459 | 83.2 .476 | 84.7 .487 | 85.8 .492              | 87.0 .495 | 88.3 .497                          | 90.1 .501 | 94.7 .539                    |  |
|                                                                 | 2508 254  | 2521 253  | 2504 250  | 2450 243               | 2393 235  | 2341 226                           | 2328 219  | 2512 227                     |  |
|                                                                 | 59.5 298  | 60.9 307  | 62.4 312  | 63.9 313               | 65.3 312  | 66.5 311                           | 66.9 312  | 66.2 333                     |  |
| <b>180</b>                                                      | 83.1 .471 | 84.7 .484 | 85.9 .491 | 87.0 .494              | 88.2 .496 | 89.8 .500                          | 92.2 .503 | 96.0 .524                    |  |
|                                                                 | 2669 260  | 2664 258  | 2619 252  | 2558 244               | 2503 235  | 2477 228                           | 2478 220  | 2583 220                     |  |
|                                                                 | 57.3 306  | 58.7 313  | 60.1 315  | 61.4 314               | 62.6 313  | 63.3 314                           | 63.1 313  | 62.5 323                     |  |
| <b>190</b>                                                      | 84.5 .481 | 85.9 .490 | 86.9 .493 | 88.1 .496              | 89.5 .499 | 91.6 .502                          | 96.0 .538 |                              |  |
|                                                                 | 2825 266  | 2792 261  | 2725 253  | 2669 245               | 2626 237  | 2621 229                           | 2804 236  |                              |  |
|                                                                 | 55.4 313  | 56.6 316  | 57.9 316  | 59.1 315               | 59.9 315  | 60.0 315                           | 59.6 334  |                              |  |
| <b>200</b>                                                      | 85.8 .487 | 86.9 .492 | 88.0 .495 | 89.3 .497              | 91.1 .501 | 93.9 .508                          | 96.0 .494 |                              |  |
|                                                                 | 2960 270  | 2902 262  | 2838 254  | 2783 245               | 2768 238  | 2807 231                           | 2746 216  |                              |  |
|                                                                 | 53.5 317  | 54.7 317  | 55.8 317  | 56.8 316               | 57.1 316  | 56.7 318                           | 55.9 307  |                              |  |
| <b>210</b>                                                      | 86.8 .491 | 87.9 .493 | 89.1 .496 | 90.7 .500              | 92.8 .502 | 95.9 .510                          |           |                              |  |
|                                                                 | 3080 272  | 3012 263  | 2951 254  | 2923 247               | 2917 238  | 2979 233                           |           |                              |  |
|                                                                 | 51.8 319  | 52.9 318  | 53.8 318  | 54.4 318               | 54.4 317  | 53.6 320                           |           |                              |  |
| <b>220</b>                                                      | 87.7 .492 | 88.9 .495 | 90.2 .497 | 92.1 .502              | 95.4 .518 |                                    |           |                              |  |
|                                                                 | 3190 272  | 3127 264  | 3071 255  | 3064 248               | 3173 246  |                                    |           |                              |  |
|                                                                 | 50.1 320  | 51.1 320  | 51.9 319  | 52.1 319               | 51.5 327  |                                    |           |                              |  |
| <b>230</b>                                                      | 88.7 .494 | 89.9 .496 | 91.5 .501 | 93.7 .503              | 95.6 .491 |                                    |           |                              |  |
|                                                                 | 3306 273  | 3243 265  | 3220 257  | 3217 248               | 3150 233  |                                    |           |                              |  |
|                                                                 | 48.6 321  | 49.4 320  | 49.8 321  | 49.7 320               | 49.2 310  |                                    |           |                              |  |
| <b>240</b>                                                      | 89.6 .495 | 91.0 .498 | 92.8 .502 | 94.3 .483              |           |                                    |           |                              |  |
|                                                                 | 3421 274  | 3369 266  | 3362 258  | 3240 238               |           |                                    |           |                              |  |
|                                                                 | 47.0 322  | 47.7 321  | 47.8 322  | 47.4 307               |           |                                    |           |                              |  |
| <b>250</b>                                                      | 90.6 .496 | 92.2 .501 | 93.3 .491 |                        |           |                                    |           |                              |  |
|                                                                 | 3541 275  | 3521 267  | 3398 252  |                        |           |                                    |           |                              |  |
|                                                                 | 45.6 323  | 46.0 324  | 46.3 315  |                        |           |                                    |           |                              |  |
| ENGINE ANTI-ICE ON<br>ΔFUEL = + 2.5 %                           |           |           |           |                        |           | TOTAL ANTI-ICE ON<br>ΔFUEL = + 5 % |           |                              |  |

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| LONG RANGE CRUISE - 2 ENGINES OUT |       |      |       |      |                    |      |                                 |      |                   |      |                              |      |       |      |       |      |
|-----------------------------------|-------|------|-------|------|--------------------|------|---------------------------------|------|-------------------|------|------------------------------|------|-------|------|-------|------|
| MAX. CONTINUOUS THRUST LIMITS     |       |      |       |      | ISA+15<br>CG=30.0% |      | N1 (%)<br>KG/H/ENG<br>NM/1000KG |      |                   |      | MACH<br>IAS (KT)<br>TAS (KT) |      |       |      |       |      |
| WEIGHT<br>(1000KG)                | FL100 |      | FL120 |      | FL140              |      | FL160                           |      | FL180             |      | FL200                        |      | FL220 |      | FL240 |      |
| 130                               | 76.1  | .424 | 76.9  | .429 | 78.5               | .440 | 80.1                            | .454 | 81.8              | .471 | 83.5                         | .485 | 84.7  | .492 | 85.9  | .494 |
|                                   | 2006  | 234  | 1947  | 228  | 1932               | 225  | 1926                            | 224  | 1936              | 223  | 1928                         | 221  | 1889  | 215  | 1839  | 207  |
|                                   | 69.4  | 278  | 71.8  | 279  | 73.7               | 285  | 75.7                            | 291  | 77.5              | 300  | 79.6                         | 307  | 81.7  | 309  | 83.7  | 308  |
| 140                               | 77.3  | .429 | 78.8  | .440 | 80.4               | .452 | 82.0                            | .469 | 83.8              | .484 | 85.0                         | .491 | 86.2  | .494 | 87.5  | .497 |
|                                   | 2104  | 237  | 2084  | 234  | 2075               | 232  | 2084                            | 231  | 2081              | 229  | 2045                         | 224  | 1993  | 216  | 1947  | 208  |
|                                   | 66.9  | 282  | 68.7  | 286  | 70.5               | 292  | 72.2                            | 301  | 74.0              | 308  | 75.9                         | 311  | 77.8  | 310  | 79.4  | 309  |
| 150                               | 79.0  | .438 | 80.6  | .450 | 82.2               | .466 | 83.9                            | .481 | 85.2              | .490 | 86.4                         | .493 | 87.6  | .496 | 89.2  | .500 |
|                                   | 2236  | 242  | 2227  | 240  | 2233               | 239  | 2236                            | 237  | 2205              | 233  | 2150                         | 225  | 2102  | 217  | 2071  | 210  |
|                                   | 64.3  | 287  | 65.9  | 293  | 67.4               | 301  | 69.1                            | 309  | 70.9              | 312  | 72.6                         | 312  | 74.1  | 311  | 75.2  | 311  |
| 160                               | 80.7  | .448 | 82.3  | .462 | 84.0               | .479 | 85.4                            | .489 | 86.5              | .492 | 87.7                         | .496 | 89.2  | .498 | 91.3  | .502 |
|                                   | 2377  | 247  | 2383  | 246  | 2394               | 246  | 2367                            | 241  | 2312              | 234  | 2262                         | 226  | 2219  | 218  | 2214  | 210  |
|                                   | 61.7  | 294  | 63.2  | 301  | 64.7               | 310  | 66.3                            | 314  | 67.9              | 314  | 69.3                         | 314  | 70.5  | 313  | 70.6  | 313  |
| 170                               | 82.2  | .458 | 83.9  | .475 | 85.4               | .487 | 86.6                            | .492 | 87.8              | .495 | 89.1                         | .497 | 91.0  | .501 | 94.4  | .517 |
|                                   | 2530  | 253  | 2544  | 253  | 2530               | 250  | 2480                            | 243  | 2422              | 235  | 2373                         | 226  | 2363  | 219  | 2442  | 217  |
|                                   | 59.4  | 301  | 60.7  | 309  | 62.2               | 315  | 63.6                            | 316  | 65.1              | 315  | 66.2                         | 314  | 66.6  | 315  | 65.9  | 322  |
| 180                               | 83.8  | .470 | 85.4  | .484 | 86.6               | .491 | 87.8                            | .494 | 89.0              | .496 | 90.7                         | .501 | 93.1  | .503 | 95.4  | .495 |
|                                   | 2694  | 260  | 2692  | 258  | 2651               | 252  | 2590                            | 244  | 2533              | 235  | 2513                         | 228  | 2514  | 220  | 2483  | 207  |
|                                   | 57.2  | 308  | 58.5  | 315  | 59.9               | 317  | 61.2                            | 317  | 62.4              | 316  | 63.0                         | 317  | 62.8  | 316  | 62.1  | 308  |
| 190                               | 85.3  | .480 | 86.6  | .489 | 87.7               | .493 | 88.9                            | .495 | 90.4              | .498 | 92.4                         | .502 | 95.2  | .506 |       |      |
|                                   | 2854  | 266  | 2824  | 261  | 2761               | 253  | 2703                            | 244  | 2663              | 237  | 2658                         | 229  | 2683  | 221  |       |      |
|                                   | 55.2  | 315  | 56.4  | 319  | 57.7               | 319  | 58.8                            | 318  | 59.6              | 318  | 59.7                         | 318  | 59.2  | 317  |       |      |
| 200                               | 86.5  | .487 | 87.7  | .492 | 88.8               | .494 | 90.1                            | .497 | 91.9              | .501 | 94.8                         | .508 |       |      |       |      |
|                                   | 2993  | 269  | 2938  | 262  | 2876               | 254  | 2822                            | 245  | 2807              | 238  | 2848                         | 231  |       |      |       |      |
|                                   | 53.3  | 319  | 54.5  | 320  | 55.6               | 320  | 56.5                            | 319  | 56.9              | 319  | 56.4                         | 321  |       |      |       |      |
| 210                               | 87.6  | .490 | 88.7  | .493 | 89.9               | .496 | 91.5                            | .500 | 93.6              | .502 |                              |      |       |      |       |      |
|                                   | 3119  | 271  | 3053  | 263  | 2991               | 254  | 2964                            | 247  | 2958              | 238  |                              |      |       |      |       |      |
|                                   | 51.6  | 322  | 52.6  | 321  | 53.6               | 321  | 54.2                            | 321  | 54.1              | 320  |                              |      |       |      |       |      |
| 220                               | 88.5  | .492 | 89.7  | .495 | 91.0               | .497 | 92.9                            | .502 | 94.7              | .493 |                              |      |       |      |       |      |
|                                   | 3234  | 272  | 3169  | 264  | 3114               | 255  | 3108                            | 248  | 3032              | 234  |                              |      |       |      |       |      |
|                                   | 49.9  | 323  | 50.9  | 322  | 51.6               | 322  | 51.8                            | 322  | 51.8              | 314  |                              |      |       |      |       |      |
| 230                               | 89.5  | .494 | 90.7  | .496 | 92.4               | .501 | 93.5                            | .491 |                   |      |                              |      |       |      |       |      |
|                                   | 3352  | 273  | 3287  | 265  | 3265               | 257  | 3151                            | 242  |                   |      |                              |      |       |      |       |      |
|                                   | 48.3  | 324  | 49.2  | 323  | 49.6               | 324  | 50.0                            | 315  |                   |      |                              |      |       |      |       |      |
| 240                               | 90.4  | .495 | 91.8  | .498 | 92.6               | .486 |                                 |      |                   |      |                              |      |       |      |       |      |
|                                   | 3468  | 274  | 3415  | 265  | 3268               | 249  |                                 |      |                   |      |                              |      |       |      |       |      |
|                                   | 46.8  | 325  | 47.5  | 324  | 48.0               | 314  |                                 |      |                   |      |                              |      |       |      |       |      |
| 250                               | 91.2  | .495 | 92.0  | .484 |                    |      |                                 |      |                   |      |                              |      |       |      |       |      |
|                                   | 3570  | 274  | 3419  | 258  |                    |      |                                 |      |                   |      |                              |      |       |      |       |      |
|                                   | 45.5  | 325  | 46.1  | 316  |                    |      |                                 |      |                   |      |                              |      |       |      |       |      |
| ENGINE ANTI-ICE ON                |       |      |       |      |                    |      |                                 |      | TOTAL ANTI-ICE ON |      |                              |      |       |      |       |      |
| ΔFUEL = + 2.5 %                   |       |      |       |      |                    |      |                                 |      | ΔFUEL = + 5 %     |      |                              |      |       |      |       |      |

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## LONG RANGE CRUISE - 2 ENGINES OUT

| MAX. CONTINUOUS THRUST LIMITS<br>PACK FLOW HI<br>ANTI-ICING OFF |           |           |           | ISA +20<br>CG=30.0% |           | N1 (%)<br>KG/H/ENG<br>NM/1000KG    |           | MACH<br>IAS (KT)<br>TAS (KT) |  |
|-----------------------------------------------------------------|-----------|-----------|-----------|---------------------|-----------|------------------------------------|-----------|------------------------------|--|
| WEIGHT<br>(1000KG)                                              | FL100     | FL120     | FL140     | FL160               | FL180     | FL200                              | FL220     | FL240                        |  |
| 130                                                             | 76.7 .423 | 77.6 .428 | 79.2 .440 | 80.8 .453           | 82.5 .470 | 84.2 .484                          | 85.5 .491 | 86.7 .494                    |  |
|                                                                 | 2020 234  | 1961 228  | 1947 225  | 1943 223            | 1952 223  | 1946 220                           | 1910 215  | 1862 207                     |  |
|                                                                 | 69.3 280  | 71.7 281  | 73.7 287  | 75.6 294            | 77.4 302  | 79.4 309                           | 81.5 311  | 83.5 311                     |  |
| 140                                                             | 77.9 .428 | 79.4 .438 | 81.1 .451 | 82.8 .468           | 84.5 .483 | 85.8 .491                          | 87.0 .494 | 88.3 .496                    |  |
|                                                                 | 2117 236  | 2098 233  | 2091 231  | 2103 230            | 2103 229  | 2070 224                           | 2017 216  | 1971 208                     |  |
|                                                                 | 66.9 283  | 68.7 288  | 70.4 294  | 72.0 303            | 73.9 311  | 75.7 313                           | 77.5 313  | 79.2 312                     |  |
| 150                                                             | 79.6 .437 | 81.3 .449 | 82.9 .465 | 84.6 .481           | 86.0 .490 | 87.2 .493                          | 88.4 .496 | 90.1 .499                    |  |
|                                                                 | 2252 241  | 2243 239  | 2252 238  | 2259 237            | 2231 232  | 2177 225                           | 2128 217  | 2101 210                     |  |
|                                                                 | 64.2 289  | 65.8 295  | 67.3 303  | 68.9 311            | 70.6 315  | 72.3 315                           | 73.8 314  | 74.8 314                     |  |
| 160                                                             | 81.4 .446 | 82.9 .461 | 84.7 .478 | 86.1 .488           | 87.3 .492 | 88.5 .495                          | 90.0 .498 | 92.1 .502                    |  |
|                                                                 | 2396 247  | 2404 246  | 2415 245  | 2392 241            | 2341 233  | 2290 226                           | 2251 218  | 2246 210                     |  |
|                                                                 | 61.6 295  | 63.0 303  | 64.5 312  | 66.1 316            | 67.6 317  | 69.0 316                           | 70.1 316  | 70.2 316                     |  |
| 170                                                             | 82.9 .457 | 84.6 .474 | 86.2 .486 | 87.4 .491           | 88.6 .494 | 89.9 .497                          | 91.8 .501 | 94.8 .507                    |  |
|                                                                 | 2554 253  | 2570 252  | 2556 249  | 2511 243            | 2454 234  | 2407 226                           | 2397 219  | 2428 213                     |  |
|                                                                 | 59.2 303  | 60.6 311  | 62.0 317  | 63.4 318            | 64.8 318  | 65.9 317                           | 66.3 318  | 65.7 319                     |  |
| 180                                                             | 84.5 .469 | 86.1 .483 | 87.4 .491 | 88.6 .493           | 89.8 .496 | 91.5 .500                          | 94.0 .503 |                              |  |
|                                                                 | 2720 259  | 2721 257  | 2684 252  | 2624 244            | 2569 235  | 2548 228                           | 2551 220  |                              |  |
|                                                                 | 57.0 310  | 58.3 317  | 59.6 320  | 60.9 320            | 62.1 319  | 62.7 319                           | 62.5 319  |                              |  |
| 190                                                             | 86.0 .479 | 87.3 .489 | 88.5 .492 | 89.7 .495           | 91.2 .498 | 93.3 .502                          |           |                              |  |
|                                                                 | 2884 265  | 2856 260  | 2798 253  | 2740 244            | 2701 237  | 2698 229                           |           |                              |  |
|                                                                 | 55.0 317  | 56.2 321  | 57.4 321  | 58.5 321            | 59.4 321  | 59.4 321                           |           |                              |  |
| 200                                                             | 87.2 .486 | 88.4 .491 | 89.6 .494 | 90.9 .497           | 92.8 .501 | 94.2 .484                          |           |                              |  |
|                                                                 | 3026 269  | 2978 262  | 2916 254  | 2861 245            | 2846 238  | 2740 220                           |           |                              |  |
|                                                                 | 53.1 321  | 54.2 323  | 55.3 323  | 56.2 322            | 56.6 322  | 56.3 309                           |           |                              |  |
| 210                                                             | 88.3 .490 | 89.5 .493 | 90.7 .496 | 92.3 .500           | 93.8 .495 |                                    |           |                              |  |
|                                                                 | 3160 271  | 3094 263  | 3032 254  | 3005 247            | 2936 235  |                                    |           |                              |  |
|                                                                 | 51.3 324  | 52.4 324  | 53.3 323  | 53.9 324            | 54.3 319  |                                    |           |                              |  |
| 220                                                             | 89.3 .492 | 90.5 .495 | 91.8 .497 | 92.7 .486           |           |                                    |           |                              |  |
|                                                                 | 3279 272  | 3212 264  | 3149 255  | 3023 240            |           |                                    |           |                              |  |
|                                                                 | 49.7 326  | 50.6 325  | 51.5 324  | 52.1 315            |           |                                    |           |                              |  |
| 230                                                             | 90.3 .494 | 91.2 .493 | 91.9 .471 |                     |           |                                    |           |                              |  |
|                                                                 | 3396 273  | 3294 263  | 3123 241  |                     |           |                                    |           |                              |  |
|                                                                 | 48.1 327  | 49.2 324  | 49.2 307  |                     |           |                                    |           |                              |  |
| 240                                                             | 90.6 .487 | 91.3 .467 |           |                     |           |                                    |           |                              |  |
|                                                                 | 3421 269  | 3267 249  |           |                     |           |                                    |           |                              |  |
|                                                                 | 47.1 322  | 47.0 307  |           |                     |           |                                    |           |                              |  |
| 250                                                             | 90.6 .455 |           |           |                     |           |                                    |           |                              |  |
|                                                                 | 3387 252  |           |           |                     |           |                                    |           |                              |  |
|                                                                 | 44.5 301  |           |           |                     |           |                                    |           |                              |  |
| ENGINE ANTI-ICE ON<br>ΔFUEL = + 2.5 %                           |           |           |           |                     |           | TOTAL ANTI-ICE ON<br>ΔFUEL = + 5 % |           |                              |  |

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**FUEL AND TIME FROM LEVEL OFF TO END OF DESCENT AT 1500 FT**

| ACCELERATION FROM GREEN DOT TO LONG RANGE SPEED<br>CRUISE AT LONG RANGE - DESCENT = 250KT |                  |       |       |       |       | KG<br>H.MIN |
|-------------------------------------------------------------------------------------------|------------------|-------|-------|-------|-------|-------------|
| AIR DIST.<br>(NM)                                                                         | WEIGHT (1000 KG) |       |       |       |       |             |
|                                                                                           | 140              | 160   | 180   | 200   | 220   | 240         |
| 200                                                                                       | 1659             | 1916  | 2149  | 2495  | 2854  | 3253        |
|                                                                                           | 0.37             | 0.38  | 0.38  | 0.38  | 0.39  | 0.39        |
| 400                                                                                       | 4109             | 4685  | 5272  | 5932  | 6617  | 7322        |
|                                                                                           | 1.13             | 1.14  | 1.14  | 1.16  | 1.17  | 1.18        |
| 600                                                                                       | 6502             | 7416  | 8324  | 9311  | 10304 | 11318       |
|                                                                                           | 1.52             | 1.53  | 1.52  | 1.53  | 1.56  | 1.56        |
| 800                                                                                       | 8846             | 10078 | 11330 | 12638 | 13919 | 15247       |
|                                                                                           | 2.33             | 2.33  | 2.28  | 2.31  | 2.35  | 2.34        |
| 1000                                                                                      | 11139            | 12685 | 14290 | 15908 | 17468 | 19111       |
|                                                                                           | 3.16             | 3.15  | 3.06  | 3.09  | 3.13  | 3.12        |
| 1200                                                                                      | 13390            | 15251 | 17204 | 19088 | 20956 | 22916       |
|                                                                                           | 4.00             | 3.58  | 3.45  | 3.49  | 3.52  | 3.50        |
| 1400                                                                                      | 15624            | 17775 | 20027 | 22207 | 24393 | 26659       |
|                                                                                           | 4.40             | 4.38  | 4.25  | 4.29  | 4.31  | 4.29        |
| 1600                                                                                      | 17824            | 20255 | 22811 | 25267 | 27776 | 30346       |
|                                                                                           | 5.20             | 5.18  | 5.05  | 5.11  | 5.10  | 5.07        |
| 1800                                                                                      | 20002            | 22705 | 25346 | 28285 | 31106 | 33978       |
|                                                                                           | 6.00             | 5.58  | 5.45  | 5.52  | 5.48  | 5.45        |
| 2000                                                                                      | 22151            | 25132 | 28226 | 31271 | 34386 | 37557       |
|                                                                                           | 6.40             | 6.38  | 6.31  | 6.31  | 6.27  | 6.24        |
| 2200                                                                                      | 24259            | 27525 | 30857 | 34210 | 37611 | 41090       |
|                                                                                           | 7.20             | 7.17  | 7.15  | 7.10  | 7.06  | 7.02        |
| 2400                                                                                      | 26334            | 29884 | 33470 | 37107 | 40792 | 44578       |
|                                                                                           | 8.01             | 7.57  | 7.54  | 7.50  | 7.45  | 7.41        |
| 2600                                                                                      | 28379            | 32210 | 36046 | 39961 | 43928 | 48020       |
|                                                                                           | 8.42             | 8.37  | 8.34  | 8.29  | 8.24  | 8.20        |
| 2800                                                                                      | 30396            | 34506 | 38585 | 42776 | 47022 | 51418       |
|                                                                                           | 9.23             | 9.16  | 9.14  | 9.08  | 9.03  | 8.59        |
| 3000                                                                                      | 32386            | 36765 | 41096 | 45554 | 50092 | 54776       |
|                                                                                           | 10.04            | 9.57  | 9.53  | 9.47  | 9.42  | 9.38        |

|                                                                                                                             |                                  |  |  |  |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|--|--|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>TWO ENGINE OUT OPERATIONS</b> |  |  |  | 3.07.60 | P 1    |
|                                                                                                                             | <b>HOLDING</b>                   |  |  |  | SEQ 150 | REV 22 |

HOLDING

R

| RACE TRACK HOLDING PATTERN - GREEN DOT SPEED - 2 ENGINES OUT |              |              |              |                                  |              |              |                                    |              |              |
|--------------------------------------------------------------|--------------|--------------|--------------|----------------------------------|--------------|--------------|------------------------------------|--------------|--------------|
| MAX. CONTINUOUS THRUST LIMITS                                |              |              |              |                                  | ISA          |              | N1 (%)                             |              |              |
| CLEAN CONFIGURATION                                          |              |              |              |                                  | CG=30.0%     |              | FF (KG/H/ENG)                      |              |              |
| PACK FLOW HI                                                 |              |              |              |                                  |              |              |                                    |              |              |
| ANTI-ICING OFF                                               |              |              |              |                                  |              |              |                                    |              |              |
| WEIGHT<br>(1000KG)                                           | FL 15        | FL 50        | FL100        | FL120                            | FL140        | FL160        | FL180                              | FL200        | FL250        |
| <b>130</b>                                                   | 62.9<br>1706 | 65.8<br>1704 | 70.2<br>1709 | 71.9<br>1708                     | 73.8<br>1710 | 75.7<br>1714 | 77.6<br>1720                       | 79.4<br>1728 | 84.4<br>1752 |
| <b>140</b>                                                   | 64.9<br>1840 | 67.9<br>1841 | 72.2<br>1843 | 74.1<br>1844                     | 76.0<br>1848 | 77.8<br>1855 | 79.7<br>1863                       | 81.6<br>1871 | 86.9<br>1906 |
| <b>150</b>                                                   | 66.9<br>1977 | 69.9<br>1982 | 74.3<br>1979 | 76.2<br>1982                     | 78.0<br>1990 | 79.9<br>1998 | 81.7<br>2008                       | 83.6<br>2015 | 89.5<br>2081 |
| <b>160</b>                                                   | 68.8<br>2116 | 71.8<br>2114 | 76.3<br>2117 | 78.0<br>2126                     | 79.9<br>2133 | 81.7<br>2145 | 83.6<br>2154                       | 85.6<br>2162 | 93.1<br>2315 |
| <b>170</b>                                                   | 70.6<br>2255 | 73.5<br>2250 | 78.0<br>2261 | 79.9<br>2269                     | 81.7<br>2282 | 83.6<br>2293 | 85.5<br>2301                       | 87.6<br>2323 | 97.0<br>2576 |
| <b>180</b>                                                   | 72.3<br>2388 | 75.2<br>2387 | 79.8<br>2405 | 81.6<br>2418                     | 83.4<br>2432 | 85.3<br>2442 | 87.3<br>2460                       | 89.7<br>2492 |              |
| <b>190</b>                                                   | 73.8<br>2522 | 76.9<br>2526 | 81.4<br>2553 | 83.2<br>2570                     | 85.0<br>2582 | 87.0<br>2597 | 89.2<br>2626                       | 91.9<br>2672 |              |
| <b>200</b>                                                   | 75.3<br>2661 | 78.4<br>2672 | 82.9<br>2707 | 84.7<br>2721                     | 86.6<br>2735 | 88.6<br>2761 | 91.1<br>2801                       | 94.5<br>2904 |              |
| <b>210</b>                                                   | 76.8<br>2801 | 79.9<br>2820 | 84.4<br>2861 | 86.2<br>2875                     | 88.1<br>2896 | 90.4<br>2932 | 93.2<br>2999                       | 97.9<br>3187 |              |
| <b>220</b>                                                   | 78.3<br>2944 | 81.4<br>2970 | 85.8<br>3015 | 87.6<br>3032                     | 89.7<br>3065 | 92.2<br>3115 | 96.0<br>3261                       |              |              |
| <b>230</b>                                                   | 79.7<br>3095 | 82.8<br>3124 | 87.1<br>3174 | 89.1<br>3200                     | 91.4<br>3242 | 94.3<br>3337 |                                    |              |              |
| <b>240</b>                                                   | 81.0<br>3247 | 84.0<br>3284 | 88.5<br>3333 | 90.6<br>3372                     | 93.1<br>3438 |              |                                    |              |              |
| <b>250</b>                                                   | 82.3<br>3402 | 85.3<br>3445 | 89.8<br>3506 | 92.1<br>3553                     | 95.3<br>3686 |              |                                    |              |              |
| ENGINE ANTI ICE ON<br>ΔFF = + 2 %                            |              |              |              | TOTAL ANTI ICE ON<br>ΔFF = + 4 % |              |              | per 1° above ISA<br>ΔFF = + 0.25 % |              |              |

DESCENT TO LANDING

| DESCENT - 300KT/250KT - 2 ENGINES OUT         |               |              |                    |      |                   |              |                         |      |             |
|-----------------------------------------------|---------------|--------------|--------------------|------|-------------------|--------------|-------------------------|------|-------------|
| IDLE THRUST<br>PACK FLOW HI<br>ANTI-ICING OFF |               |              | ISA<br>CG=30.0%    |      |                   |              |                         |      |             |
| WEIGHT<br>(1000KG)                            | 150           |              |                    |      | 200               |              |                         |      | IAS<br>(KT) |
| FL                                            | TIME<br>(MIN) | FUEL<br>(KG) | DIST.<br>(NM)      | N1   | TIME<br>(MIN)     | FUEL<br>(KG) | DIST.<br>(NM)           | N1   |             |
| 290                                           | 14.1          | 194          | 80                 | IDLE | 16.7              | 230          | 95                      | IDLE | 300         |
| 270                                           | 13.4          | 186          | 74                 | IDLE | 15.8              | 219          | 88                      | IDLE | 300         |
| 250                                           | 12.6          | 177          | 69                 | IDLE | 14.9              | 208          | 82                      | IDLE | 300         |
| 230                                           | 11.9          | 167          | 63                 | IDLE | 14.0              | 197          | 75                      | IDLE | 300         |
| 220                                           | 11.5          | 163          | 61                 | IDLE | 13.5              | 191          | 72                      | IDLE | 300         |
| 210                                           | 11.1          | 158          | 58                 | IDLE | 13.0              | 185          | 69                      | IDLE | 300         |
| 200                                           | 10.7          | 153          | 56                 | IDLE | 12.5              | 179          | 66                      | IDLE | 300         |
| 190                                           | 10.3          | 149          | 53                 | IDLE | 12.1              | 174          | 62                      | IDLE | 300         |
| 180                                           | 9.9           | 144          | 51                 | IDLE | 11.6              | 168          | 59                      | IDLE | 300         |
| 170                                           | 9.5           | 139          | 48                 | IDLE | 11.1              | 162          | 56                      | IDLE | 300         |
| 160                                           | 9.2           | 134          | 46                 | IDLE | 10.6              | 155          | 53                      | IDLE | 300         |
| 150                                           | 8.7           | 128          | 43                 | IDLE | 10.1              | 149          | 50                      | IDLE | 300         |
| 140                                           | 8.3           | 122          | 41                 | IDLE | 9.6               | 141          | 47                      | IDLE | 300         |
| 100                                           | 6.7           | 97           | 31                 | IDLE | 7.6               | 110          | 35                      | IDLE | 300         |
| 50                                            | 2.5           | 37           | 11                 | IDLE | 2.8               | 42           | 12                      | IDLE | 250         |
| 15                                            | .0            | 0            | 0                  | IDLE | .0                | 0            | 0                       | IDLE | 250         |
| CORRECTIONS                                   |               |              | ENGINE ANTI-ICE ON |      | TOTAL ANTI-ICE ON |              | △ ISA (per 1°above ISA) |      |             |
| TIME                                          |               |              | +1.5 %             |      | +5 %              |              | +0.2 %                  |      |             |
| FUEL                                          |               |              | +15 %              |      | +45 %             |              | +0.4 %                  |      |             |
| DISTANCE                                      |               |              | 0 %                |      | +3 %              |              | +0.4 %                  |      |             |

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|                                                                                                                             |                                                                      |         |        |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------|--------|
|  <b>A340</b><br>FLIGHT CREW OPERATING MANUAL | <b>TWO ENGINE OUT OPERATIONS</b><br><br>GROUND DISTANCE/AIR DISTANCE | 3.07.80 | P 1    |
|                                                                                                                             |                                                                      | SEQ 001 | REV 13 |

**GENERAL**

The ground distance/air distance conversion table is used to calculate the air distance for a given ground distance due to the influence of the wind.  
The table is given for long range speed.

LONG RANGE CRUISE

| GROUND<br>DIST.<br>(NM) | AIR DISTANCE (NM) |      |                      |       |       |           |       |
|-------------------------|-------------------|------|----------------------|-------|-------|-----------|-------|
|                         | TAIL WIND         |      | WIND COMPONENTS (KT) |       |       | HEAD WIND |       |
|                         | +150              | +100 | + 50                 | 0     | -50   | -100      | -150  |
| 10                      | 7                 | 8    | 9                    | 10    | 12    | 15        | 19    |
| 20                      | 13                | 15   | 17                   | 20    | 24    | 30        | 39    |
| 30                      | 20                | 23   | 26                   | 30    | 36    | 44        | 58    |
| 40                      | 27                | 30   | 34                   | 40    | 48    | 59        | 77    |
| 50                      | 34                | 38   | 43                   | 50    | 60    | 74        | 97    |
| 100                     | 67                | 76   | 86                   | 100   | 119   | 148       | 194   |
| 200                     | 135               | 151  | 172                  | 200   | 238   | 295       | 387   |
| 300                     | 202               | 227  | 258                  | 300   | 358   | 443       | 581   |
| 400                     | 270               | 303  | 344                  | 400   | 477   | 590       | 774   |
| 500                     | 337               | 378  | 431                  | 500   | 596   | 738       | 968   |
| 1000                    | 674               | 756  | 861                  | 1000  | 1192  | 1475      | 1936  |
| 1500                    | 1011              | 1134 | 1292                 | 1500  | 1788  | 2213      | 2903  |
| 2000                    | 1348              | 1513 | 1722                 | 2000  | 2384  | 2951      | 3871  |
| 2500                    | 1685              | 1891 | 2153                 | 2500  | 2980  | 3689      | 4839  |
| 3000                    | 2022              | 2269 | 2584                 | 3000  | 3576  | 4426      | 5807  |
| 3500                    | 2359              | 2647 | 3014                 | 3500  | 4172  | 5164      | 6775  |
| 4000                    | 2697              | 3025 | 3445                 | 4000  | 4768  | 5902      | 7742  |
| 4500                    | 3034              | 3403 | 3876                 | 4500  | 5364  | 6640      | 8710  |
| 5000                    | 3371              | 3781 | 4306                 | 5000  | 5960  | 7377      | 9678  |
| 5500                    | 3708              | 4160 | 4737                 | 5500  | 6556  | 8115      | 10646 |
| 6000                    | 4045              | 4538 | 5167                 | 6000  | 7152  | 8853      | 11614 |
| 6500                    | 4382              | 4916 | 5598                 | 6500  | 7748  | 9590      | 12581 |
| 7000                    | 4719              | 5294 | 6029                 | 7000  | 8344  | 10328     | 13549 |
| 7500                    | 5056              | 5672 | 6459                 | 7500  | 8941  | 11066     | 14517 |
| 8000                    | 5393              | 6050 | 6890                 | 8000  | 9537  | 11804     | 15485 |
| 8500                    | 5730              | 6428 | 7321                 | 8500  | 10133 | 12541     | 16453 |
| 9000                    | 6067              | 6807 | 7751                 | 9000  | 10729 | 13279     | 17420 |
| 9500                    | 6404              | 7185 | 8182                 | 9500  | 11325 | 14017     | 18388 |
| 10000                   | 6741              | 7563 | 8612                 | 10000 | 11921 | 14755     | 19356 |

| N°                                        | TITLE |
|-------------------------------------------|-------|
| "To be filled by the operator, if needed" |       |
|                                           |       |