Flight Crew Operating Manual

FCOM

A330

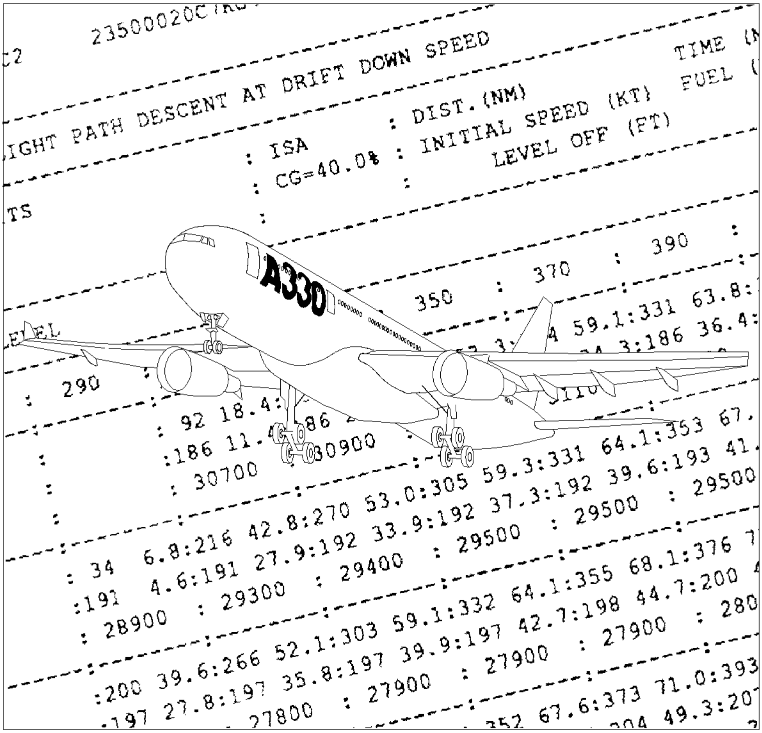
Volume 2

Customer Services

AIRBUS

A330

FLIGHT CREW OPERATING MANUAL



FLIGHT PREPARATION

2

AIRBUS®

Simu Std 2.2 For Training Only 3GM

00.00 CONTENTS

FOREWORD

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

COMMENTS — QUESTIONS — SUGGESTIONS

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

R

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

→ FOR TECHNICAL OR PROCEDURAL CONTENT

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

→ FOR PRINTING AND DISTRIBUTION

GFC5-02-0010-001-A001AA

CONTENT

R The Flight Crew Operating manual (FCOM), and the associated Quick Reference Handbook (QRH), are developed specifically for flight crews, in order to provide them with all of the necessary information about the operational, technical, procedural, and performance characteristics that are required for the safe and efficient aircraft operation. These manuals take into account all of the operational procedures to be applied during normal and abnormal/emergency situations that may occur on ground or in flight.

R The manuals are not designed to provide basic airmanship skills or piloting techniques. They are intended for flight crews that have already been trained to fly this type of aircraft, and are familiar with the aircraft's handling characteristics.

R In addition, the purpose of the FCOM is to :

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

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

USE

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

WARNINGS, CAUTIONS AND NOTES

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

COMPLEMENTARY INFORMATION

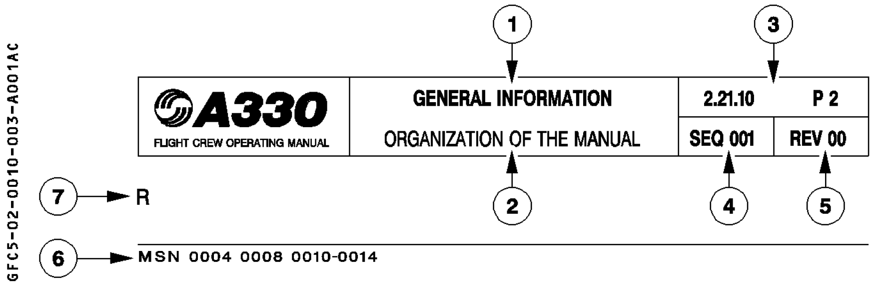
The manual includes technical information required for training as well as complementary information.
- Where a paragraph or schematic is preceded by the heading **FOR INFO** the details given are considered to be nice to know. Knowledge of these items is not required for the type rating qualification.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

PAGINATION

R



(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 :
R — 0004 0008 means that the page is applicable to aircraft MSN 0004 and MSN 0008
R — 0010-0014 means that the page is applicable from aircraft MSN 0010 to MSN 0014
— ALL means that the page is applicable to all aircraft covered by the manual.
Correspondance between MSN and registration may be found in the cross reference table

(7) An R in front of a line indicates that the line has been revised.

REVISIONS

NORMAL REVISIONS

These 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 modifications affecting the manual that gives a simple explanation of the technical content of each incorporated modification and its validity per aircraft.

R **INTERMEDIATE REVISIONS**

R They are issued between normal revisions to cover changes in the definition of the aircraft
R or changes in the composition of the fleet of an airline. They are numbered in ascending
R sequence e.g. 20A, 20B, 20C... for intermediate revisions issued between normal revisions
R 20 and 21.
R They are accompanied by filing instructions and an updated list of effective pages.

TEMPORARY REVISIONS

Printed on yellow paper, the Temporary Revisions (TR) are issued to provide information 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. It is to be filled by the FCOM's owner.

INCORPORATION OF SERVICE BULLETINS IN THE MANUAL

When a service bulletin 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 revision. If judged necessary by Airbus Industrie or requested by the
R operator, a temporary revision or an intermediate revision is issued between normal
R revisions.

OPERATIONS ENGINEERING BULLETINS

The Operations Engineering Bulletins (OEB) are issued as the need arises to give operators revised or new, but significant, technical and procedural information.
OEBs are provided with an OEB record sheet. It is to be filled by the FCOM's owner.
They are accompanied by filing instructions and an updated customized list of effective OEBs.

HOW TO INSERT A REVISION

FILING INSTRUCTIONS

Use the filing instructions as follows :

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

The column NOTE indicates EFFECTIVITY CHANGE ONLY if the page is revised due to an effectivity change and not due to a technical content.

LIST OF EFFECTIVE PAGES (LEP)

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

BEST WAY TO GET UPDATED DOCUMENTATION

As soon as any change has been completed on any airplane, the best way to get updated documentation is to advise:

AIRBUS INDUSTRIE
BP 33
31707 BLAGNAC CEDEX
FRANCE
Telex : TLSBP7X.. or 530526F
FAX 33.5.61.93.28.06
ATTN : Customer Service Directorate – Technical Documentation Services (AI/SE – D)

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

	CODE	DESIGNATION
	0001	Mod : 43359 = (43359+43620) = (44575+45481) = (43359+43620+44575) = (43620+44575+45481)
	0002	Mod : 44644 = (43359+43620+44575+44644) = (43359+43620+43756+44575+44644)
	0003	Mod : 44367 = (43620+44367) = (43308+43620+44367)
	0004	Mod : (46028+47930) = (43359+46028+47930) = (43359+43756+46028+47930)
	0005	Mod : 44905 = (43359+44905) = (43359+43756+44905)
	0006	Mod : (40624+40912) = (40912+SSV)
	0007	Mod : (40624+43037) = (40624+45055) = (40624+44629)
	0008	Mod : (43359+47930) = (43359+43620+47930) = (44575+45481+47930) = (43359+43620+44575+47930) = (43620+44575+45481+47930)
	0009	Mod : (43620+43756) = (43756+44575) = (43620+43756+44575)
	0010	Mod : (43359+43756) = (43359+43620+43756) = (43756+44575+45481) = (43359+43620+43756+44575) = (43620+43756+44575+45481)
	0011	Mod : (44644+47930) = (43359+43620+44575+44644+47930) = (43359+43620+43756+44575+44644+47930)
	0012	Mod : 46028 = (43359+46028) = (43359+43756+46028)
	0013	Mod : (43359+44905+47930) = (43359+43756+44905+47930)
R	0015	Mod : (40325+43359+43620+43756+44575)
	0016	Mod : (44905+49144+52776) = (44905+52776+QAF) = (44905+52776+QTR)
	0017	Mod : (44905+49144) = (44905+QAF) = (44905+QTR)
	0018	Mod : (40325+43359+44644) = (40325+43359+44644+43620+43756+44575)
	0019	Mod : (44367+47976) = (43630+44367+47976) = (43308+43620+44367+47976)
	0020	Mod : (40325+43359+44575+46028) = (40325+43359+43620+43756+44575+46028)
	0021	Mod : (43308+47976) = (43308+43260+47976)
	0022	STD = Mod : (43037+46266) = (45055+46266)
	0023	Mod : (43359+43620+43756+44575+57930)
	0024	Mod : (40325+43359+43620+43756+44575+47930)
	0025	Mod : (40325+43359+44644+47930) = (40325+43359+43620+43756+44575+44644+47930)
	0028	Mod : (43359+43620+44575+46028) = (43359+43620+44575+51805) = (43359+43620+43756+44575+46028) = (43359+43620+43756+44575+51805)
R R R	0029	Mod : (43359+43620+44575+46028+47930) = (43359+43620+44575+47930+51805) = (43359+43620+43756+44575+46028+47930) = (43359+43620+43756+44575+47930+51805)
	0030	Mod : 406028 = 51805 = (43359+56028) = (43359+51805) = (43359+43756+46028) = (43359+43756+51805)
	0031	Mod : (46028+47930) = (51805+47930) = (43359+46028+47930) = (43359+47930+51805) = (43359+43756+46028+47930) = (43359+43756+47930+51805)
	0032	Mod : 46028 = 51805 = (43756+46028) = (43756+51805)
	0033	Mod : 43756 = 46028 = 41805 = (43756+46028) = (43756+51805)
	0034	Mod : 46028 = 51805 = (40624+46028/CPA) = (40624+51805/CPA)
R	0035	Mod : 44905 = (44905+40624)
	0036	Mod : (43239+44905) = (40624+43239+44905)

CODE	DESIGNATION
0041	Mod : 40518 = 41957 = 47755 = 54122 = (47755+52183+52188) = (54122+47755+52183+52188) = (41957+47755+52183+52188) = (54122+41957+47755+52183+52188)
0042	Mod: (44905+43239) = (44905+40624+43239)
0043	Mod: (44905+43239+49144) = (44905+40624+43239+49144)
0044	Mod : (43239+44905) = (40624+43239+44905)
0045	Mod : (40325+43359+44575+46028+47930) = (40325+43359+43620+43756+44575+46028+47930) = (40325+43359+53620+43756+44575+47930+51805)
0046	STD = Mod : 54570 = (47755+52183+52188+53722) = (47755+52183+52188+54570)

R

N°	ISSUE DATE	
00	JAN 93	
01	JUN 93	
02	OCT 93	
03	NOV 93	
04	FEB 94	
05	MAY 95	
06	JUN 97	
07	JAN 98	
08	JUL 98	
09	JAN 99	
10	JUN 99	
11	DEC 99	
12	MAY 00	
13	OCT 00	
14	MAR 01	
15	SEP 01	
16	APR 02	
17	SEP 02	
18	MAR 03	
19	NOV 03	
20	JUL 04	
21	MAR 05	
22	DEC 05	
23	SEP 06	
24	MAY 07	

N°	TITLE	STATUS	LOCATION
R 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
0341	SIM2.2

V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA----- / ----REASONS OF CHANGE----
2	04	46	001	107	REV023	47457=47462=51138=51139
						- INCORPORATION OF MOD 51139

M V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
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2	00	00	001	001	REV006		ALL
2	00	10	001	001	REV023		ALL
2	00	10	002	001	REV023		
2	00	10	003	001	REV007		ALL
2	00	10	004	001	REV007		
2	00	10	005	001	REV006		ALL
2	00	20	001	001	REV024	LIST OF CODES	ALL
2	00	20	002	001	REV024	LIST OF CODES	
2	00	30	001	001	REV024	LIST OF NORMAL REVISIONS	ALL
2	00	35	001	001	REV007	RECORD OF TEMPORARY REVISION	ALL
2	00	36	001-LTR	001	REV024	LIST OF TEMPORARY REVISIONS	ALL
2	00	70	CRT	001	REV024	CROSS REFERENCE TABLE	ALL
2	00	75	HL	001	REV024	HIGHLIGHTS	ALL
2	00	80	LEP	001	REV024	LIST OF EFFECTIVE PAGES	ALL
2	00	85	LOM	001	REV024	LIST OF MOD/MP/SB	ALL
2	01	00	001	001	REV018		ALL
2	01	10	001	001	REV016		ALL
2	01	20	001	001	REV006		ALL
2	01	20	002	110	REV010	44905	
2	01	20	003	001	REV006		ALL
2	01	20	004	001	REV006		
2	01	20	005	001	REV006		ALL
2	01	20	006	001	REV006		
2	01	30	001	200	REV016	CODE:0009	ALL
2	01	30	002	108	REV015	47930=43620+44575+47930	
2	01	30	003	100	REV008	44644	ALL
2	01	30	004	212	REV023	CODE 0019	
2	01	30	005	200	REV015	43620+40513	ALL
2	01	30	006	100	REV022	40513	
2	01	30	007	100	REV006	43620	ALL
2	01	30	008	001	REV006		
2	01	30	009	100	REV023	47976	ALL
2	01	30	010	100	REV018	M:44644	
2	01	30	010A	100	REV018	M:44644	ALL
2	01	30	011	200	REV023	M:44644+47976	ALL
2	01	30	012	001	REV006		

M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
2 01 30	013	100	REV015	44644	ALL
2 01 30	014	001	REV006		
2 01 40	001	001	REV012		ALL
2 01 40	002	001	REV011		
2 01 40	003	001	REV011		ALL
2 01 40	004	001	REV005		
2 01 40	005	145	REV015	47930	ALL
2 01 40	006	145	REV015	47930	
2 01 40	007	130	REV012	44905=43756+44905	ALL
2 01 40	008	100	REV012	44905=46028=51805	
2 01 40	009	100	REV012	44905=46028=51805	ALL
2 01 40	010	200	REV012	43756+44905	
2 01 40	011	100	REV012	44905	ALL
2 02 00	001	001	REV010		ALL
2 02 00	002	100	REV017	43037=44629=45055	
2 02 05	001	001	REV007		ALL
2 02 10	001	001	REV007		ALL
2 02 10	002	001	REV010		
2 02 10	003	001	REV010		ALL
2 02 10	004	001	REV010		
2 02 10	005	001	REV010	STD=CPA+40624	ALL
2 02 10	006	001	REV011	BAS=CPA+40624	
2 02 10	007	001	REV010		ALL
2 02 12	001	001	REV010		ALL
2 02 12	002	115	REV010	44905/80E1A4/80E1A3	
2 02 12	003	001	REV010		ALL
2 02 12	004	115	REV010	44905/80E1A4/A3	
2 02 12	005	115	REV010	44905/80E1A4/A3	ALL
2 02 12	006	001	REV007		
2 02 14	001	010	REV012	GE80E1A2/A3/A4	ALL
2 02 14	002	001	REV024		
2 02 14	003	001	REV010		ALL
2 02 14	004	115	REV023	44905/80E1A4	
2 02 14	005	001	REV010		ALL
2 02 14	006	115	REV023	44905/80E1A4	
2 02 14	007	115	REV023	44905/80E1A4	ALL
2 02 14	008	001	REV018	STD	
2 02 16	001	001	REV007		ALL
2 02 16	002	001	REV007		

M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
2 02 16	003	001	REV010		ALL
2 02 16	004	001	REV010		
2 02 16	005	001	REV010	BAS=CPA+40624	ALL
2 02 16	006	001	REV010	STD=40624+CPA	
2 02 18	001	001	REV007		ALL
2 02 18	002	001	REV010		
2 02 18	003	115	REV010	44905/80E1A4/A3	ALL
2 02 18	004	001	REV010		
2 02 18	005	115	REV010	44905/80E1A4/A3	ALL
2 02 18	006	115	REV010	44905/80E1A4/A3	
2 02 18	007	001	REV007		ALL
2 02 20	001	010	REV012	GE80E1A2/A3/A4	ALL
2 02 20	002	001	REV024		
2 02 20	003	001	REV010		ALL
2 02 20	004	115	REV023	44905/80E1A4	
2 02 20	005	001	REV010		ALL
2 02 20	006	115	REV023	44905/80E1A4	
2 02 20	007	115	REV023	44905/80E1A4	ALL
2 02 20	008	001	REV019		
2 02 24	001	115	REV023	44905/GE80E1A4	ALL
2 02 25	001	225	REV020	44905+49144/GE80E1A4	ALL
2 02 25	002	225	REV020	CODE 0017/80E1A4	
2 02 25	003	225	REV020	CODE 0017/ GE80E1A4	ALL
2 02 25	004	225	REV020	CODE 0017 /GE80E1A4	
2 02 27	001	100	REV015	43037=44629=45055	ALL
2 02 27	002	100	REV015	43037=44629=45055	
2 02 27	003	100	REV007	43037=44629=45055=CPA	ALL
2 02 27	004	120	REV008	45055/80E1A4	
2 02 27	005	120	REV008	45055/GE80E1A4	ALL
2 02 27	006	120	REV008	45055/GE80E1A4	
2 02 27	007	120	REV008	45055/GE80E1A4	ALL
2 02 27	008	120	REV008	45055/GE80E1A4	
2 02 27	009	120	REV008	45055/GE80E1A4	ALL
2 02 30	001	001	REV015		ALL
2 02 30	002	001	REV006	STD=40624+CPA	
2 02 30	003	116	REV013	44905/GE80E1A4	ALL
2 02 30	004	115	REV016	44905/80E1A4	
2 02 30	005	115	REV013	44905/80E1A4	ALL
2 02 30	006	115	REV013	44905/GE80E1A4	

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
2	02	30	007	115	REV013	44905/GE80E1A4	ALL
2	02	30	008	115	REV013	44905/80E1A4	
2	02	30	009	115	REV013	44905/80E1A4	ALL
2	02	30	010	001	REV006		
2	02	30	011	115	REV013	44905/80E1A4	ALL
2	02	30	012	115	REV013	44905/80E1A4	
2	02	30	013	115	REV013	44905/80E1A4	ALL
2	02	40	001	001	REV010		ALL
2	02	40	002	115	REV009	44905/80E1A4	
2	02	40	003	115	REV009	44905/GE80E1A4	ALL
2	02	40	004	115	REV009	44905/GE80E1A4	
2	02	40	005	115	REV009	44905/GE80E1A4	ALL
2	02	40	006	115	REV009	44905/GE80E1A4	
2	02	40	007	115	REV009	44905/GE80E1A4	ALL
2	03	00	001	001	REV016		ALL
2	03	10	001	001	REV011		ALL
2	03	10	002	001	REV011		
2	03	10	003	120	REV016	44905/GE80E1A4/A3	ALL
2	03	10	004	120	REV016	44905/GE80E1A4/A3	
2	03	10	005	120	REV016	44905/GE80E1A3/A4	ALL
2	03	10	006	001	REV006		
2	03	20	001	001	REV018	STD	ALL
2	03	20	002	120	REV016	44905/GE80E1A4/A3	
2	04	00	001	001	REV024		ALL
2	04	00	002	001	REV023		
2	04	10	001	001	REV017	STD	ALL
2	04	10	002	001	REV022	STD	
2	04	10	003	001	REV022		ALL
2	04	10	004	115	REV023	44905/GE80E1A4	
2	04	10	005	115	REV023	44905/GE80E1A4	ALL
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2	04	10	007	225	REV020	CODE 0017/GE80E1A4	ALL
2	04	10	008	225	REV020	CODE 0017/GE80E1A4	
2	04	10	009	225	REV020	CODE 0017/GE80E1A4	ALL
2	04	10	010	225	REV020	CODE 0017/GE80E1A4	
2	04	10	011	001	REV006		ALL
2	04	10	012	001	REV006		
2	04	10	013	001	REV006		ALL
2	04	10	014	115	REV023	44905/GE80E1A4	

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
2	04 10	015	225	REV020	CODE 0017/GE80E1A4	ALL
2	04 10	016	225	REV020	CODE 0017/GE80E1A4	
2	04 20	001	001	REV006		ALL
2	04 20	002	001	REV012		
2	04 20	003	103	REV024	40257=(40257+40518+41957)	ALL
2	04 20	004	001	REV006		
2	04 20	005	001	REV014		ALL
2	04 20	006	001	REV006		
2	04 20	007	115	REV015	44905/GE80E1A2/A3/A4	ALL
2	04 20	008	001	REV011		
2	04 25	001	001	REV018	STD	ALL
2	04 25	002	115	REV018	44905/80E1A4/A3	
2	04 25	003	040	REV018	GE80E1A2/A3/A4	ALL
2	04 25	004	115	REV009	44905/80E1A4/A3/A2	
2	04 25	005	115	REV009	44905/80E1A4/A3/A2	ALL
2	04 25	006	115	REV009	44905/80E1A4/A3/A2	
2	04 25	007	115	REV015	44905/80E1A4/A3/A2	ALL
2	04 25	008	115	REV011	44905/80E1A4/A3	
2	04 25	009	115	REV016	44905/80E1A4/A3	ALL
2	04 30	001	001	REV006		ALL
2	04 35	001	001	REV006		ALL
2	04 35	002	001	REV006		
2	04 40	001	001	REV024		ALL
2	04 40	002	001	REV006		
2	04 40	003	001	REV006		ALL
2	04 40	004	001	REV006		
2	04 40	005	001	REV006		ALL
2	04 40	006	001	REV024		
2	04 40	007	001	REV024		ALL
2	04 40	008	001	REV024		
2	04 40	009	001	REV014		ALL
2	04 40	010	001	REV016		
2	04 40	010A	001	REV010		ALL
2	04 40	010B	001	REV023	STD	ALL
2	04 40	011	115	REV009	44905/80E1A4/A3	ALL
2	04 40	012	115	REV009	44905/80E1A4/A3	
2	04 40	013	115	REV009	44905/80E1A4/A3	ALL
2	04 40	014	115	REV009	44905/80E1A4/A3	

M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
2 04 45	001	100	REV023	45554	ALL
2 04 45	002	001	REV022		
2 04 45	003	001	REV023		ALL
2 04 46	001	107	REV023	47457=47462=51138=51139	ALL
2 04 46	002	001	REV023		
2 04 46	003	105	REV012	43724=44661=44662	ALL
2 04 46	004	001	REV022		
2 04 46	005	001	REV022		ALL
2 05 00	001	001	REV007		ALL
2 05 10	001	001	REV006		ALL
2 05 10	002	010	REV006	GE ALL/PW ALL	
2 05 10	003	001	REV006		ALL
2 05 10	004	001	REV006		
2 05 15	001	001	REV006		ALL
2 05 15	002	001	REV006		
2 05 15	003	001	REV020		ALL
2 05 15	004	001	REV006		
2 05 15	005	115	REV020	44905/80E1A4/A3/A2	ALL
2 05 15	006	115	REV014	44905/80E1A4/A3/A2	
2 05 15	007	115	REV020	44905/80E1A4/A3/A2	ALL
2 05 15	008	115	REV014	44905/80E1A4/A3/A2	
2 05 15	009	115	REV014	44905/80E1A4/A3/A2	ALL
2 05 20	001	010	REV014	GE80E1A2/A4/A3	ALL
2 05 20	002	010	REV023	GE80E1A2/A3/A4	
2 05 20	003	010	REV023	GE80E1A2/A3/A4	ALL
2 05 20	004	010	REV007	GE80E1A2/A4/A3	
2 05 30	001	001	REV006		ALL
2 05 30	002	115	REV009	44905/80E1A4/A3/A2	
2 05 30	003	115	REV009	44905/80E1A4/A3/A2	ALL
2 05 30	004	115	REV009	44905/80E1A4/A3/A2	
2 05 30	005	115	REV009	44905/80E1A4/A3/A2	ALL
2 05 30	006	115	REV009	44905/80E1A4/A3/A2	
2 05 30	007	115	REV009	44905/80E1A4/A3/A2	ALL
2 05 30	008	115	REV009	44905/80E1A4/A3/A2	
2 05 30	009	115	REV009	44905/80E1A4/A3/A2	ALL
2 05 30	010	115	REV009	44905/80E1A4/A3/A2	
2 05 30	011	115	REV009	44905/80E1A4/A3/A2	ALL
2 05 30	012	115	REV009	44905/80E1A4/A3/A2	

M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
	2	05	30	013	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	014	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	015	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	016	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	017	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	018	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	019	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	020	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	021	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	022	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	023	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	024	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	025	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	026	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	027	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	028	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	029	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	030	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	031	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	032	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	033	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	034	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	035	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	036	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	037	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	038	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	039	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	040	010	REV007	STD=44905/GE80E1A2/A3/A4	
	2	05	30	041	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	042	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	043	010	REV007	STD=44905/GE80E1A2/A3/A4	ALL
	2	05	30	044	115	REV009	44905/80E1A4/A3/A2	
	2	05	30	045	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	30	046	010	REV007	GE80E1A2/A4/A3	
	2	05	30	047	010	REV007	GE80E1A2/A4/A3	ALL
	2	05	30	048	010	REV014	GE80E1A2/A4/A3	
	2	05	40	001	001	REV006		ALL
	2	05	40	002	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	003	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	004	115	REV009	44905/80E1A4/A3/A2	

M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
	2	05	40	005	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	006	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	007	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	008	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	009	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	010	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	011	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	012	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	013	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	014	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	015	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	016	115	REV009	44905/80E1A4/A3/A2	
	2	05	40	017	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	40	018	115	REV009	44905/80E1A4/A3/A2	
	2	05	50	001	001	REV006		ALL
	2	05	50	002	115	REV009	44905/80E1A4/A3/A2	
	2	05	50	003	115	REV009	44905/80E1A4/A3/A2	ALL
	2	05	60	001	001	REV006		ALL
	2	05	60	002	001	REV011		
	2	05	60	003	001	REV011		ALL
	2	05	60	004	001	REV011		
	2	05	60	005	001	REV011		ALL
	2	05	60	006	001	REV011		
	2	05	70	001	010	REV006	GE80E1A2/A4/A3	ALL
	2	05	70	002	010	REV006	GE80E1A2/A4/A3	
	2	05	70	003	010	REV006	GE80E1A2/A3/A4	ALL
	2	05	70	004	010	REV006	GE80E1A2/A3/A4	
	2	05	70	005	010	REV006	GE80E1A2/A3/A4	ALL
	2	05	70	006	010	REV006	GE80E1A2/A3/A4	
	2	05	70	007	010	REV006	GE80E1A2/A3/A4	ALL
	2	05	70	008	010	REV006	GE80E1A2/A3/A4	

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

M V T	REV	MOD MP SB	TITLE	VALIDITY
.	024	40197	POWER PLANT-DEFINE CF6 80E1 POWER PLANT AND ASSOCIATED SYSTEMS	ALL
.	024	40257	OXYGEN-PASSENGER OXYGEN-INSTALL SYSTEM PROVISIONS FOR FIVE OXYGEN CYLINDERS GASEOUS SYSTEM	ALL
.	024	40513	FUEL-REFUEL/DEFUEL SYSTEM-INSTALL A FACILITY TO ENABLE REFUEL PRESELECTION AND INITIATION FROM THE COCKPIT	ALL
.	024	40518	OXYGEN-PASSENGER OXYGEN-EXTEND DURATION OF CHEMICAL O2 SUPPLY TO 20 MINUTES	ALL
.	024	41957	OXYGEN -PASSENGER OXYGEN-INSTALL ALTERNATIVE OXYGEN BOXES EXTENDED DURATION 22 MINUTES (VENDOR PURITAN)	ALL
.	024	43620	FUEL - FCMS - INSTALL STAGE 6.12 FCMC WITH CHANGES TO SOFTWARE FOR A330 AND A340 A/C	ALL
.	024	43724	AUTOFLIGHT - FMEGC - INSTALL IMPROVED AUTOPILOT FOR GE ENGINES	ALL
.	024	43756	FUEL - TANKS - INCREASE TRIM TANK CAPACITY BY 230 LITRES	ALL
.	024	44367	FUEL - REFUEL/DEFUEL SYSTEM - INSTALL PRESSURE SWITCH AT WING CENTRE SECTION REAR WALL (A330 ONLY)	ALL
.	024	44575	FUEL - FMCS - FIT FCMC (STAGE 7.1) WITH CHANGES TO SOFTWARE FOR A330 AND A340 AIRCRAFT	ALL

M V T	REV	MOD SB	MP	TITLE / VALIDITY
.	024	44644	......	FUEL - DISTRIBUTION - INSTALL STRUCTURE AND SYSTEM PROVISIONS FOR ACTIVATION OF CENTER TANK (A330-200) ALL
.	024	44905	......	FLIGHT CONTROLS - GENERAL - ADAPT FLIGHT CONTROLS FOR ST7 ALL
.	024	45006	......	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STANDARD S6D ALL
.	024	45055	......	ENGINE FUEL AND CONTROL - GENERAL - PROVIDE DERATED TAKE-OFF FACILITIES FOR G.E. ENGINES ALL
.	024	45554	......	AUTOFLIGHT-FCU-DEFINE LONG RANGE VERSION OF MODULAR F.C.U. ALL
.	024	45900	......	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STANDARD S7A ALL
.	024	47457	......	AUTO FLIGHT - FMGEC - INSTALL FMGEC P1-B7 FOR GE ENGINES ALL
.	024	47500	......	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STANDARD S8D ALL
.	024	47930	......	FUEL - FCMS - INSTALL FCMC STAGE 9.0 ALL
.	024	47976	......	COMMUNICATION-HF SYSTEM-ACTIVATE DATA LINK FUNCTION FOR HFDR1 ALL
.	024	49144	......	FLIGHT CONTROLS - ELECTRICAL FLIGHT CONTROL SYSTEM (EFCS) - INSTALL RUDDER FLY-BY WIRE ON A330/A340 ALL

M V T	REV	MOD	MP SB	TITLE VALIDITY
N	024	51139	....	AUTO FLIGHT - FMGEC - INSTALL STANDARD P1B7 (FROM LEGACY) FOR GE ENGINES ALL

01.00 CONTENTS

01.10 GENERAL

01.20 CARGO LOADING

01.30 FUEL

01.40 WEIGHT AND BALANCE

DEFINITIONS

R – **MANUFACTURER'S EMPTY WEIGHT (MEW)**
The weight of the structure, power plant, furnishings, systems and other items of equipment that are considered an integral part of the aircraft. It is essentially a "dry" weight, including only those fluids contained in closed systems (e.g. hydraulic fluid).

R – **OPERATIONAL EMPTY WEIGHT (OEW)**
The manufacturer's weight empty plus the operator's items i.e. the flight and cabin crew and their baggage, unusable fuel, engine oil, emergency equipment, toilet chemicals and fluids, galley structure, catering equipment, seats, documents etc.

R – **DRY OPERATING WEIGHT (DOW)**
R The total weight of an aircraft ready for a specific type of operation excluding all usable
R fuel and traffic load.
R Operational Empty Weight plus items specific to the type of flight i.e. catering,
R newspapers, pantry equipment etc.

– **TAKEOFF FUEL**
The weight of the fuel onboard at takeoff.

– **OPERATING WEIGHT**
R The weight obtained by addition of the operational empty weight and the takeoff fuel.

– **TOTAL TRAFFIC LOAD**
The weight of the payload including cargo loads, passengers and passengers bags.

– **ZERO FUEL WEIGHT (ZFW)**
R The weight obtained by addition of the total traffic load and the dry operating weight.

– **TAKEOFF WEIGHT (TOW)**
The weight at takeoff. It is equal to the addition of the zero fuel weight and takeoff fuel.

– **TRIP FUEL**
The weight of the fuel necessary to cover the normal leg without reserves.

– **LANDING WEIGHT**
The weight at landing. It is equal to takeoff weight minus trip fuel.

GENERAL

The aircraft has three lower deck cargo compartments :
- Forward cargo compartment subdivised into compartments 1 and 2.
- Aft cargo compartment subdivised into compartments 3 and 4.
- Bulk cargo compartment, compartment 5.

The main access doors to forward and aft compartments are hydraulically operated. The bulk cargo door gives access to the aft cargo compartment. It is manually operated.

DESCRIPTION

Each compartment is divided into sections, and is designed to be category C as defined by FAR.
A placard in each compartment indicates the maximum authorized gross weight. The compartments have separate lighting.

CARGO LOADING SYSTEM

A semi-automatic cargo loading system, which is installed in forward and aft compartments, loads pallets and containers.

CARGO CAPACITY

The maximum cumulative loads for each compartment and section are as follows :

R – forward compartment : 18 869 kg (40 200 lb)
– aft compartment : 15 241 kg (33 600 lb)
– bulk compartment : 3 468 kg (7 645 lb)

The following table lists the loading possibilities (including the maximum gross weight per container/pallet).

R

ULD	ATA	NAS 3610	IATA	Allowable MGW		Maximum number		
				lb	kg	forward	aft	bulk
Half-size	LD3	2K2	E/G	3500	1587	14	12	
Half-size	LD1	2K2	C/H	3500	1587	7	6	
60.4 × 61.5 in		2K3	X/G/E	3500	1587	14	12	
60.4 × 61.5 in		2K3	H	3500	1587	7	6	
Full-size	LD6	2L2	F	7000	3174	7	6	
60.4 × 125 in		2L3/2L4	F	7000	3174	7	6	
88 × 125 in		2A1/2A2	F	10200	4626	4	4	
		2A3/2A4/2A6	F					
96 × 125 in		2M1/2M2/2M3	F	11250	5103	4	4	

CARGO DOORS OPERATION

NORMAL OPERATION

OPENING

On door

– **ACCESS DOOR OPERATING HANDLE . . . . RELEASE**
Push handle flap inward.

– **DOOR . . . . UNLOCK**
Move door operating handle upward from LOCKED to UNLOCK position.
Indicator flags at the lower part of the door move out from the door contour. This gives a visual indication that the cargo door is unlocked.

– **DIFFERENTIAL PRESSURE . . . . CHECK**

> WARNING
> Do not operate the latching handle if the red indicator light flashes as an overpressure may exist in the cargo hold.

– **DOOR . . . . UNLATCH**
Press the pushbutton on the latching handle, then pull the handle down to the unlatched position.

On door service panel

– **SERVICE PANEL ACCESS DOOR . . . . OPEN**

– **LEVER OF MANUAL SELECTOR VALVE . . . . HOLD ON OPEN**
The yellow hydraulic system is pressurized (YELLOW ELEC PUMP energized). Operation of the flight controls is inhibited.

● **When the door is fully open (green light on the service panel is on) :**

– **LEVER OF MANUAL SELECTOR VALVE . . . . RELEASE**
When released, the lever returns to the neutral (STOP) position and shuts down the electric pump after a 10 seconds delay.

> CAUTION
> Check that the lever has reached the neutral position and the pump operation has stopped. Continuous operation leads to a pump overheat.

CLOSING

On door service panel

– **LEVER OF MANUAL SELECTOR VALVE . . . . HOLD ON CLOSE**
At first the lever locks in an intermediate position, maintaining a pre-set pressurization to prevent the door from dropping open. The operator can then move the lever to CLOSE and the door closes. When it is fully closed, the lever returns to the neutral position and shuts down the electric pump.
Ensure that green indicator light goes out.

● **When the door is fully closed :**

– **LEVER OF MANUAL SELECTOR VALVE . . . . RELEASE**
Release within 1 minute after door closure

On door

– **DOOR . . . . LATCH AND LOCK**
Push the latching handle back into its recess. Push the door locking handle downwards to the locked position. When the door is locked, the cargo door indication on ECAM extinguishes and the handle flap mechanism locks the operating handle.

On door service panel

– **ACCESS DOOR . . . . CLOSE**

AUXILIARY OPERATION

In case of an electrical failure or if the electric pump fails, the operator can open or close the doors by working the hand pump.

HAND PUMP OPENING

On door

– **DOOR . . . . UNLOCK**
Unlock the operating handle as if for normal operation.

On ground service panel

– **SERVICE PANEL ACCESS DOOR . . . . OPEN**

– **LEVER OF ELECTRICAL MANUAL SELECTOR VALVE . . . . CLOSE**

On door service panel

- **SERVICE PANEL ACCESS DOOR . . . . OPEN**

- **LEVER OF MANUAL SELECTOR VALVE . . . . HOLD ON OPEN**

On ground service panel

- **HAND PUMP . . . . OPERATE**
  The door opens.

● **When door fully opened (green light on the service panel is on or sudden increase of force to operate the hand pump) :**

On door service panel

- **LEVER OF MANUAL SELECTOR VALVE . . . . RELEASE**

On ground service panel

- **LEVER OF ELECTRICAL MANUAL SELECTOR VALVE . . . . OPEN**

HAND PUMP CLOSING

On ground service panel

- **LEVER OF ELECTRICAL MANUAL SELECTOR VALVE . . . . CLOSE**

On door service panel

- **LEVER OF MANUAL SELECTOR VALVE . . . . HOLD ON CLOSE**

On ground service panel

- **HAND PUMP . . . . OPERATE**
  The door closes.

On door service panel

- **LEVER OF MANUAL SELECTOR VALVE . . . . RELEASE**
  Release when door is fully closed.

On ground service panel

- **LEVER OF ELECTRICAL MANUAL SELECTOR VALVE . . . . OPEN**

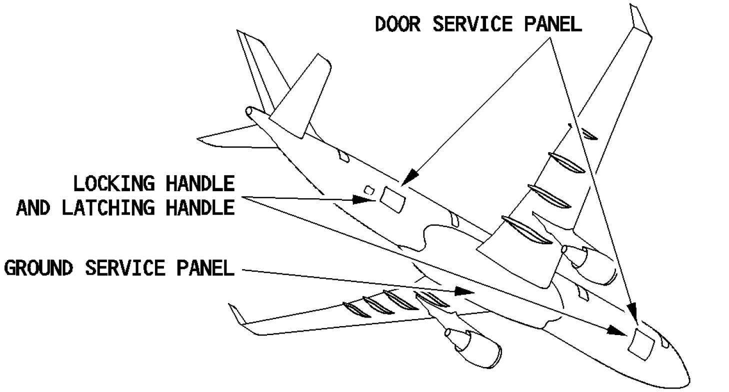
On door

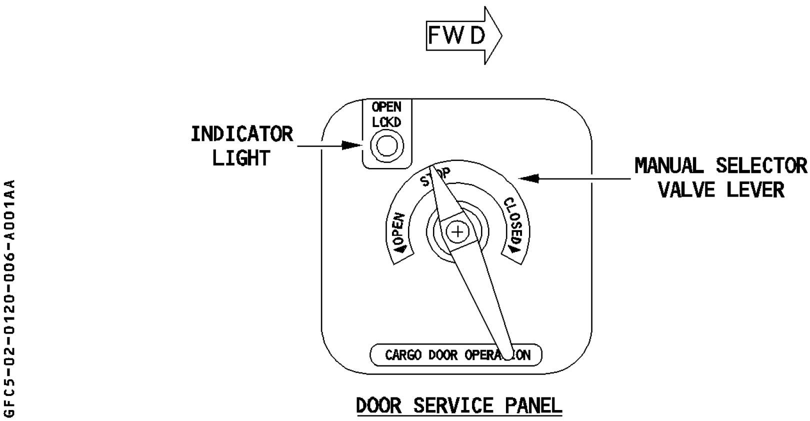
– **DOOR . . . . LATCH AND LOCK**
Lock the operating handle as for normal operation.

On door service panel and ground service panel

– **ACCESS DOORS . . . . CLOSE**

LOCATION OF SERVICE PANELS





DOOR SERVICE PANEL

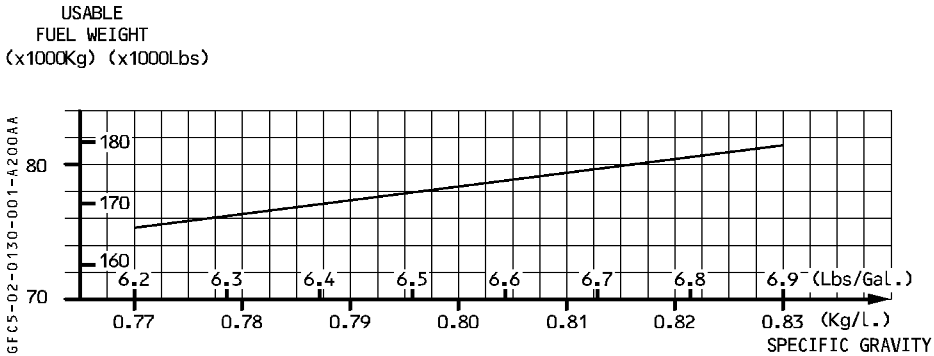
GENERAL INFORMATION

USABLE FUEL VOLUME

R

	OUTER TANK	INNER TANK	TRIM TANK	TOTAL
LITERS	3 624 × 2	41 904 × 2	6 230	97 286
US GAL	957 × 2	11 071 × 2	1 646	25 702

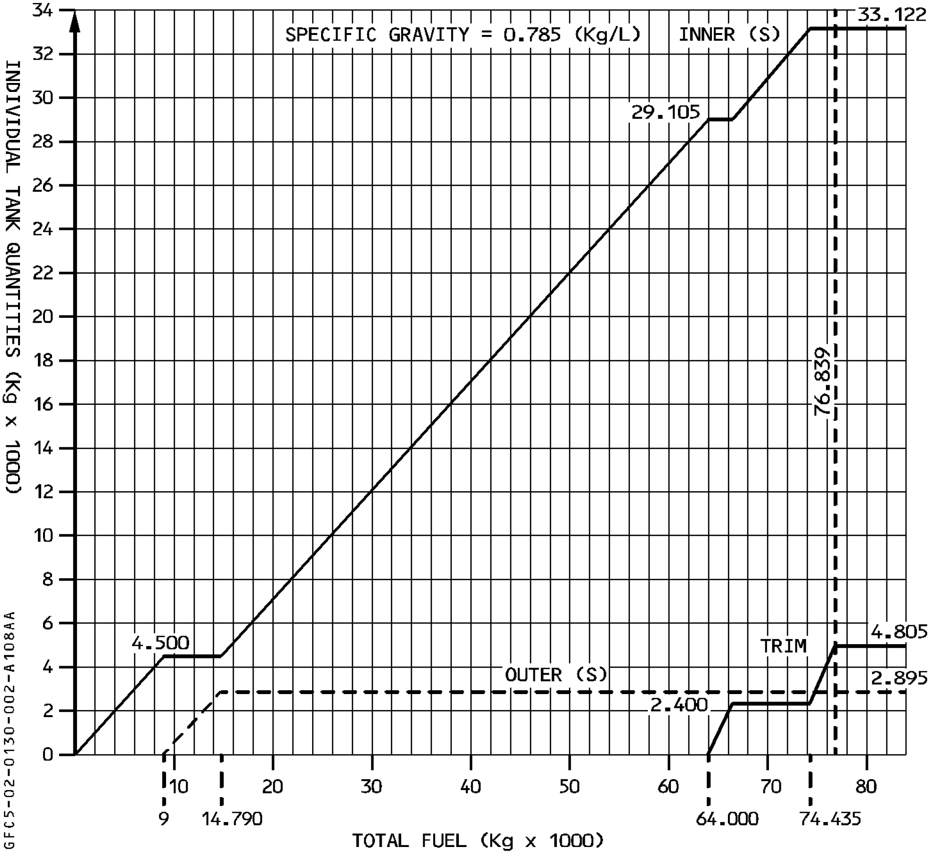
USABLE FUEL WEIGHT



REFUELING

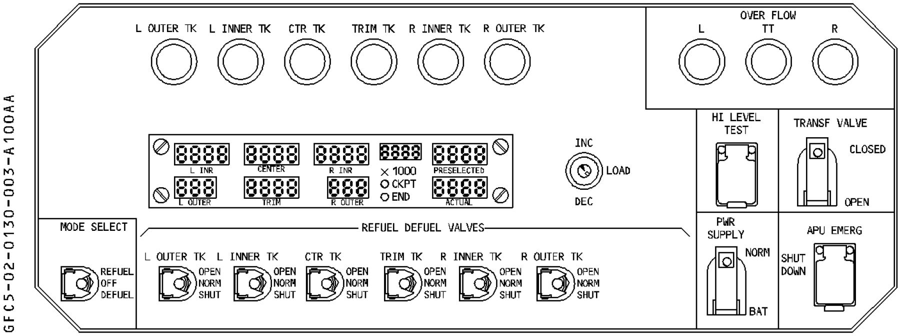
- During automatic refueling, the trim tank is filled when the preselected fuel quantity is greater than 64000 kg, whatever the density.
- With the tanks filled to maximum capacity, there is enough space in each tank to allow for a 2 % thermal expansion of the fuel without its spilling through the vent system.

REFUEL DISTRIBUTION



Example : Required FOB 70000 kg
Post refuel distribution :
OUTERS (each) 2895 kg
INNERS (each) 30905 kg
TRIM 2400 kg

REFUELING CONTROL PANEL



The correct panel configuration for flight is :
— the MODE SELECT switch at OFF (and guarded)
— all REFUEL/DEFUEL VALVES switches at NORM (and guarded).
— the TRANSF VALVE switch at CLOSED (and guarded)
— the PWR SUPPLY switch at NORM (and guarded)
— the refuel control panel access door closed.

If the above conditions are not fulfilled the following messages are displayed on the ECAM:
— REFUEL IN PROCESS (green) in flight phase 1,10.
R — REFUEL PNL (amber) in flight phases 2, 3, 4, 5.

APU START/SHUTDOWN DURING REFUELING/DEFUELING

APU starts or shutdowns are permitted during refuel/defuel procedures. If it is necessary to operate the APU, the limits that follow apply :

a) An APU start is not permitted during a refuel/defuel procedure if the APU has failed to start or an automatic shutdown has occurred.

b) A normal APU shutdown must be completed if a fuel spill has occurred during the refuel defuel procedure.

REFUELING

PREPARATION

– **ACCESS PLATFORM . . . . IN POSITION**

– **SAFETY PRECAUTIONS . . . . APPLY**

Ensure that no HF transmission (including HF transmission via the HF DATA LINK pushbutton) is performed during refueling, and that the tanker and the aircraft are properly grounded.

R Connect the tanker ground cable to the parking ground point before connecting it to a
R grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that
R the ACCU PRESS has sufficient pressure. Do not refuel, if a fire or engine overheat
R warning is displayed. During refueling, do not operate the external lighting.

Note : Refer to the above procedures for APU start/shutdown during refueling.

HI LEVEL TEST :

From refueling control panel :

– **HI LEVEL TEST . . . . PRESS**
During test high level lights and over flow lights come on if their circuits are serviceable. CKPT and END lights come on. The fuel quantity, PRESELECTED and ACTUAL displays show all 8's.
If there is a failure during the high level test the END light flashes and remains flashing after completion. In addition the affected HI LVL light remains on.

From cockpit :
The HI LEVEL TEST is performed automatically when cockpit FUEL REFUEL pushbutton is pressed. Positive test will initiate refueling. If test fails, "END" It will illuminate steady.

● **If HI LEVEL TEST is negative :**
A negative Hi LEVEL TEST prevents refueling. This situation is latched until FCMC RESET.

– **FCMC 1+ 2 RESET button (cockpit) . . . . PULL then PUSH**

Note : After FCMC reset re-enter ZFW/ZFCG in the MCDU INIT B page.

– **MANUAL REFUELING PROCEDURE . . . . APPLY**
Apply manual procedure with continuous monitoring of refueling.
FOR DISPATCH REFER TO MEL

AUTOMATIC REFUELING

From refueling control panel :

- **LOAD PRESELECTOR . . . . SET**
- **REFUEL VALVES . . . . CHECK NORM and GUARDED**
- **MODE SELECT . . . . REFUEL**

On completion of refueling :
END light comes on. It flashes if after refueling an imbalance greater than 3000 kg (6614 lb) exists.

- **ACTUAL QUANTITY . . . . CHECK**
- **MODE SELECT . . . . OFF and GUARDED**

From cockpit :

- **BLOCK FUEL on FMGS MCDU INIT B page . . . . CONFIRM/SET**
  The CKPT light on the refueling control panel comes on.

  Note : *Once BLOCK FUEL value has been entered on the MCDU the aircraft will refuel to the MCDU value. Refuel to this value can be started from either panel.*

- **FUEL REFUEL pushbutton . . . . ON**
  ON light comes on and a HI LEVEL TEST is initiated. If test is positive, the refueling will start. At the refuel couplings a green light comes on to signal that the aircraft is ready for refueling. This light remains on as long as the REFUEL pushbutton is switched ON.

On completion of refueling :
END light comes on. It flashes if after refueling an imbalance greater than 3000 kg (6614 lb) exists.

- **FUEL ON BOARD QUANTITY . . . . CHECK**
- **FUEL REFUEL pushbutton . . . . OFF**
  ON light and END light go out. At the refuel couplings the light goes out to indicate to the ground personnel that hoses can be disconnected.

MANUAL REFUELING

– **DETERMINE FUEL QUANTITY IN EACH TANK**
Respect distribution in accordance with REFUEL DISTRIBUTION graph

Note : To refuel the trim tank, one of these conditions must be fulfilled.
- *the two inner tank inlet valves are open,*
- *both inner tank quantities are each greater than 14 000 kg,*
- *one inner tank quantity is greater than 14 000 kg and the other inner tank inlet valve is open.*

– **REFUEL VALVES . . . . SHUT**

– **REFUEL VALVES (tank(s) to be filled) . . . . OPEN**

R *Note : Because the Fuel Control and Monitoring System (FCMS) does not have control*
R *of all the tanks, the END light will flash.*

– **MODE SELECT . . . . REFUEL**

– **FUEL QTY . . . . MONITOR**

● **When the tank contents reach the required level :**

– **Corresponding REFUEL VALVES . . . . SHUT**

– **MODE SELECT . . . . OFF and GUARDED**

– **REFUEL VALVES . . . . NORM and GUARDED**

GROUND FUEL TRANSFER

A ground transfer is possible from tank to tank except to the trim tank.

On cockpit overhead FUEL panel :

– **PUMPS (of the tanks not to be defueled) . . . . OFF**

– **PUMPS (of the tanks to be defueled) . . . . ON**

On refueling control panel :

– **REFUEL VALVES (of tanks not to filled) . . . . SHUT**

– **REFUEL VALVES (of tanks to be filled) . . . . OPEN**

– **MODE SELECT . . . . REFUEL**

– **TRANSF VALVE . . . . OPEN**

R *Note : The TRANSF VALVE opens the left hand aft transfer valve only if one ENG 1*
R *main pump is on, and opens the right hand aft transfer valve only if one ENG*
R *2 main pump is on.*

– **FUEL QTY . . . . MONITOR**

● **When the tank contents reach the required level :**

On the refueling control panel :

– **Corresponding REFUEL VALVES . . . . SHUT**

– **TRANSF VALVE . . . . CLOSED and GUARDED**

– **MODE SELECT . . . . OFF and GUARDED**

● **Upon completion of the ground fuel transfer :**

– **REFUEL VALVES . . . . NORM and GUARDED**

– **Cockpit FUEL panel . . . . SET NORMAL CONFIGURATION**

DEFUELING

– **ACCESS PLATFORM . . . . IN POSITION**

– **SAFETY PRECAUTIONS . . . . APPLY**
Ensure that no HF transmission (including HF transmission via the HF DATA LINK pushbutton) is performed during defueling, and that the tanker and the aircraft are properly grounded.
R Connect the tanker ground cable to the parking ground point before connecting it to a
R grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that
R the ACCU PRESS has sufficient pressure. Do not defuel, if a fire or engine overheat
R warning is displayed. During defueling, do not operate the external lighting.

Note : *1. For APU start/shutdown during defueling, refer to FCOM 2.01.30 p4.*
2. If only one hose is used for defueling, it must be connected to the coupling marked "USE THIS ADAPTOR TO DEFUEL".

On the cockpit's overhead FUEL panel :

– **PUMPS (all) . . . . OFF**

DEFUELING BY SUCTION

Note : · *Defueling all the tanks by suction is possible.*
· *If the trim tank contains fuel, then fuel-system interlocks prevent a suction defuel of inner tanks.*

On refueling control panel :

– **MODE SELECT . . . . DEFUEL**

– **REFUEL VALVES (of the tanks to be defueled) . . . . OPEN**

– **FUEL QTY . . . . MONITOR**

● **When the tank contents reach the required level :**

– **REFUEL VALVES . . . . NORM and GUARDED**

– **MODE SELECT . . . . OFF and GUARDED**

– **Cockpit FUEL panel . . . . SET NORMAL CONFIGURATION**

DEFUELING WITH FUEL PUMPS

Note : It is only possible to defuel the inner and center tanks. To defuel the other tanks, their fuel must be first transferred to the inner tank.

INNER TANK

On refueling control panel :

– **REFUEL VALVES . . . . CHECK NORM**

– **MODE SELECT . . . . DEFUEL**

– **TRANSF VALVE . . . . OPEN**
The LH (RH) aft transfer valves open provided all these conditions are met :
– one or more of the LH (RH) main fuel pumps is (are) on.
– the trim tank is empty
– the inner tank and outer tank inlet valves are closed.

On cockpit overhead FUEL panel :

– **PUMPS L1 and R1 (and L2 and R2 if greater flow needed) . . . . ON**

– **FUEL QTY . . . . MONITOR**

- **When the tank contents reach the required level :**

  – **Corresponding PUMPS . . . . OFF**

  Note : *When the fuel quantity in an inner tank decreases to 3 500 kg (7 716 lb) the intertank transfer valves automatically open. The fuel in the outer tanks moves to the inner tanks which can be subsequently defueled.*

On refueling control panel :

– **TRANSF VALVE . . . . CLOSED and GUARDED**

– **MODE SELECT . . . . OFF and GUARDED**

– **REFUEL VALVES . . . . NORM and GUARDED**

– **Cockpit FUEL panel . . . . SET NORMAL CONFIGURATION**

CENTER TANK

On refueling control panel :

– **REFUEL VALVES . . . . CHECK NORM**

– **MODE SELECT . . . . DEFUEL**

On cockpit overhead fuel panel :

– **PUMPS L and R . . . . ON**

- **If trim tank has to be defueled**

  – **T TANK MODE . . . . FWD**

  – **FUEL QTY . . . . MONITOR**

- **When the tank contents reach the required level :**

  – **Corresponding PUMPS . . . . OFF**

On refueling control panel :

– **MODE SELECT . . . . OFF and GUARDED**

– **REFUEL VALVES . . . . NORM and GUARDED**

– **Cockpit FUEL panel . . . . SET NORMAL CONFIGURATION**

OVERWING GRAVITY REFUELING

Overwing gravity refueling is done at the refuel point in the top of each wing.

– **SAFETY PRECAUTIONS . . . . APPLY**

R Disembark all passengers.
Ensure that no HF transmission (including HF transmission via the HF DATA LINK pushbutton) is performed during refueling, and that the tanker and the aircraft are grounded.
R Connect the tanker ground cable to the parking ground point before connecting it to a
R grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that
R the ACCU PRESS has sufficient pressure. Do not refuel, if a fire or engine overheat
R warning is displayed. During refueling, do not operate the external lighting.
Ensure that the slats are retracted, and the flight control safety-locks, with their warning notices, are in position.

Note : For APU start/shutdown during refueling, refer to FCOM 2.01.30 p4.

INNER TANK REFUELING PROCEDURE

– **OVERWING REFUEL CAP . . . . REMOVE**

– **REFUELING . . . . START**
The approximate flow rate per refueling fill is 200 liters/minute.

● **If the outer tank is to be refueled :**

– **GROUND FUEL TRANSFER PROCEDURE . . . . APPLY**

Note : This procedure is not applicable for trim tank refueling.

R **REFUELING WITH ONE ENGINE RUNNING**

R – Refuel with one engine running only at airports where no external ground pneumatic
R power is available and only when APU is unserviceable.
R – Only the right hand fuel couplings can be used.
R – Overwing gravity filling is not permitted.
R – Disembark all passengers.
R – Obtain airport authorization.
R The Airport Fire Department should standby at the aircraft during the entire refueling
R procedure.
R – Point the aircraft into the wind at a location where the slope is negligible.
R Set the parking brake and check its pressure.
R Run engine n° 1 at ground idle with its generator connected.
R – Do not start engine n° 2, shut down engine n° 1 or attempt to start the APU before all
R fueling operations have been completed.
R – Position the fuel truck under the extremity of the right wing. Its pressure should not
R exceed 50 psi.
R – Follow automatic or manual refueling procedure.

R *Note : The refuel system must be fully operational.*

R **OPERATION MONITORING**

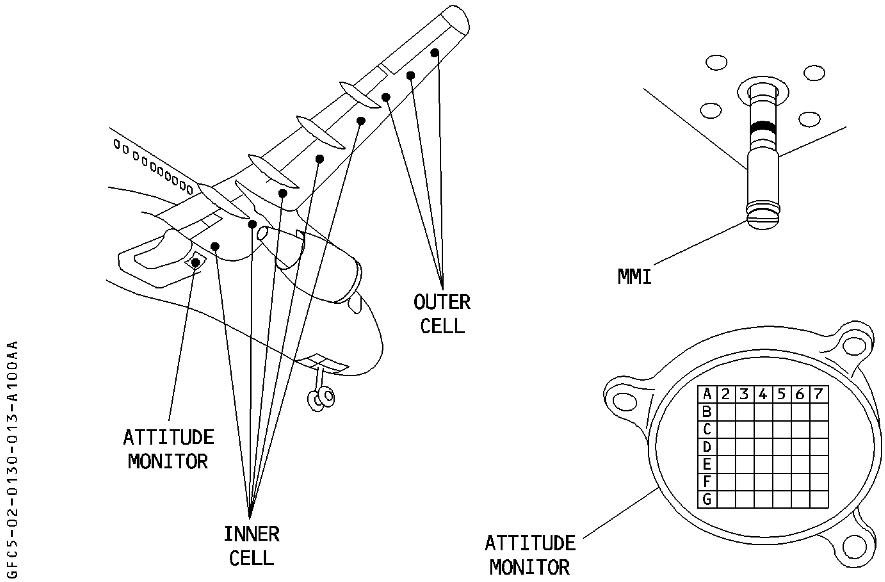
R **During the entire refueling procedure :**

R – Monitor the fuel truck shut off valve.
R – Be sure that the fueling company is keeping permanent control of the emergency fuel
R shut off device.
R – Have a flight crew member in the cockpit monitoring all systems and the running engine.
R – Have a qualified ground crew member at the fueling station to operate the refuel valve
R switches.

USE OF MANUAL MAGNETIC INDICATORS (MMI)

Indicators are installed in each wing tank and in the center tank.

R



– **AIRCRAFT ATTITUDE . . . . NOTE**
Note the grid square letter and grid square number shown by the bubble on the attitude monitor.

– **ACCESS PLATFORM . . . . IN POSITION**

– **MMI . . . . UNLOCK and WITHDRAW**
The crewman must withdraw the MMI slowly until he feels the magnetic attraction between the road and the float magnets.
Do not use force when withdrawing MMI as this will disengage float magnet from the rod magnet and bring the rod down on to the mechanical stop.

– **ROD GRADUATION (which aligns with wing bottom surface) . . . . READ**

– **MMI . . . . IN PLACE and LOCKED**

– **Use the table for the applicable aircraft attitude with the grid square letter and number and the applicable MMI stick number to find the volume of fuel in each tank (refer to AMM 12.11.28). Mutiply the result by the specific gravity to find the fuel weight.**

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LOAD AND TRIM SHEET

This chart allows the determination of the aircraft CG location function of dry operating weight, pantry adjustment, cargo loads, passengers and fuel on board.
The operational limits shown on the load and trim sheet are more restrictive than the certified limits because error margins have been taken into account.
The load and trim sheet needs to be updated when :

- a modification which changes the aircraft certified limits is included or
- a modification (cabin layout, cargo arrangment...) which influences the operational limits is made.

It is the airline's responsability to define a load and trim sheet and to keep it up to date.
Hereafter is a description of the load and trim sheet utilization in the standard Airbus Industrie format (see example p3) and for a typical passenger cabin arrangement. Refer to customized load and trim sheet for preparing a revenue flight.

R **DATA FOR GENERIC EXAMPLE**

Dry operating weight = 110 000 kg and CG = 31%
Deviation or adjustment = + 100 kg in zone F
Cargo = 11 500 kg as : cargo 1 = 2 500 kg ; cargo 2 = 3 000 kg ;
cargo 3 = 3 000 kg ; cargo 4 = 2 000 kg ; cargo 5 = 1 000 kg
Passengers (75 kg/PAX) = 240 PAX with the following distribution :
cabin OA = 20 ; cabin OB = 120 ; cabin OC = 100
Fuel = 72 000 kg

DESCRIPTION

a) Enter master data in (1).
b) Compute dry operating weight index using the formula indicated in (2) and report in (3). Dry operating index = 119.1.
c) Enter weight deviation in (4) and read corresponding index in (5) : – 0.51.
d) Calculate corrected index and report in (6) : CORRECTED INDEX = 118.6
e) Enter cargo weight and PAX number in (7).
f) Enter index scale (8) with corrected index and proceed through cargo and passengers scales as shown in (9). Then, from the final point (cabin OC), draw a vertical line down to the zero fuel line (10) : 139600 kg.
g) Check that the intersection with zero fuel line determined in table (11) is within the maximum zero fuel weight and zero fuel operational limits. If not rearrange cargo loading.
h) Read in table 2.01.40 p5 fuel index correction. Fuel on Board : 72 000 kg.
Fuel density : 0.780.
R Read in fuel index table. This example will be continued assuming FUEL INDEX = + 8
R was found.
Carry in scale (12). From this point draw a vertical line down to takeoff weight line (13) at 211 600 kg.
i) Check that intersection with takeoff line determined in table (11) is within maximum takeoff weight and takeoff operational limits. If not rearrange cargo loading.
R j) Read takeoff CG on CG scale (14) : CG = 29.8 %

CAUTION

If there is no customized trim sheet for your airline in this section 2.01.40
do not use the information enclosed herein for day to day operation as margins and load CG vary with cabin and cargo layout.

R

GFC5-02-0140-003-A001AB

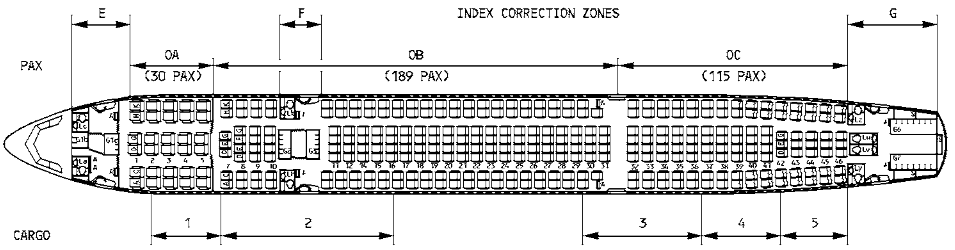
STANDARD	LOAD and TRIM SHEET	A330 - XXX VERSION : 30F/C 304Y/C

	DRY OPERATING WEIGHT CONDITIONS	
	WEIGHT (1000 Kg)	CG(%MAC)
(1)	110	31 %
(2)	I = [(CG-25) x W x 0.029] + 100	
(3)	DRY OPER WEIGHT INDEX	119.1

AIRCRAFT REGISTR :	
DATE :	PREPARED BY :
FLT Nbr :	
FROM :	TO :

DRY OPERATING WEIGHT		110000	
WEIGHT DEVIATION (PANTRY)	±	100	
CORRECTED DRY OPER WEIGHT	=	110100	
CARGO	+	11500	
PASSENGERS 2 4 0 x 7 5 =	+	18000	(11)
ZERO FUEL WEIGHT	=	139600	
TOTAL FUEL	+	72000	
TOTAL WEIGHT	=	211600	

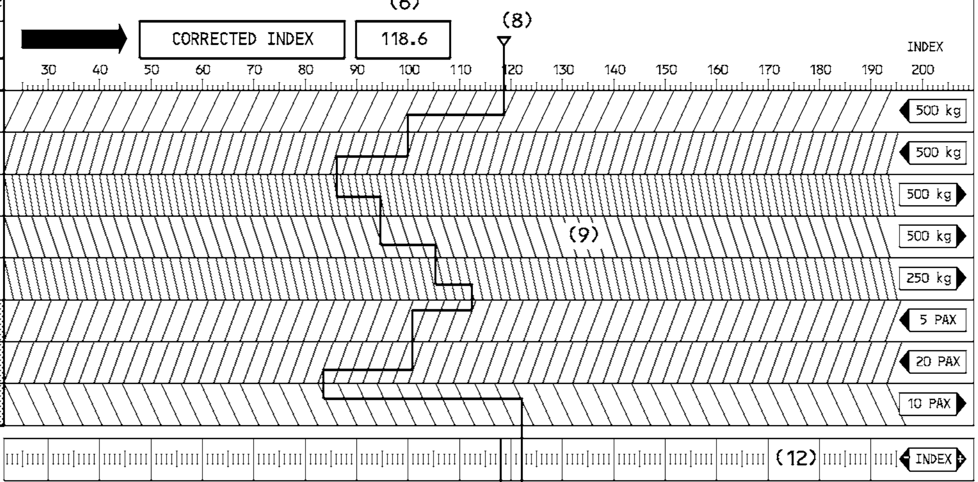
	ZONES	E	F	G
(4)	WEIGHT (kg) DEVIATION		+100	



	BASIC INDEX CORRECTION			
	DRY OPER WEIGHT DEVIATION	ZONES E	F	G
(5)	+ 100 kg	-0.99	-0.51	+0.92
	- 100 kg	+0.99	+0.51	-0.92
	INDEX CORRECTION	- 0.51		

(6) CORRECTED INDEX 118.6

	ZONES	Nbr	WEIGHT (kg)
	CARGO 1		2500
	CARGO 2		3000
	CARGO 3		3000
	CARGO 4		2000
(7)	CARGO 5		1000
	CABIN OA	20	
	CABIN OB	120	
	CABIN OC	100	



FUEL INDEX	- 3
SEE TABLE OVERLEAF	

NOTA

TAKE OFF
CG % MAC
2 7 . 8

ZFW CDU INPUT	
WEIGHT (1000 Kg)	CG % MAC
1 3 9 . 6	3 0 . 5

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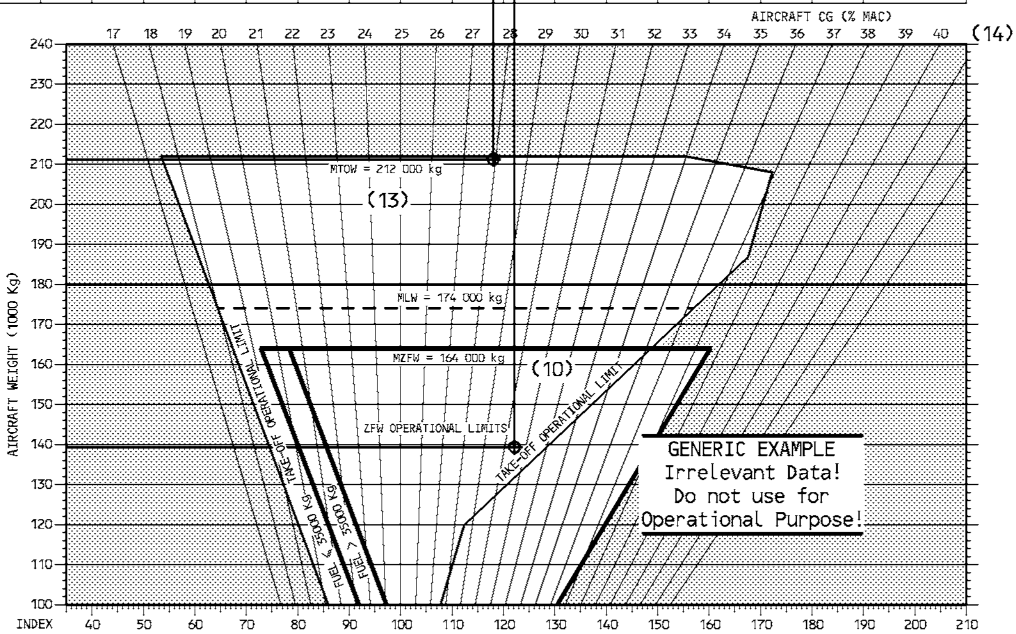

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FUEL INDEX TABLE

Note : This table is valid only when used with the following formulae for the index :
I = W × (Harm – 36.3495)/2500 + K or I = [(CG – 25) × W × 0.000029] + K
(Weight in kg, Harm in m).

WEIGHT	DENSITY (kg/l)														
(kg)	0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
2000	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2
4000	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4
6000	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6
8000	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8
9000	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9
10000	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8	–8
11000	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6	–6
12000	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4	–4
14000	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
16000	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3
18000	–1	+0	+0	+0	+0	+0	+0	+0	+0	+0	+1	+1	+1	+1	+1
20000	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–1	–1	–1	–1	–1
22000	–4	–4	–4	–4	–4	–4	–4	–4	–4	–3	–3	–3	–3	–3	–3
24000	–6	–6	–6	–6	–6	–6	–6	–5	–5	–5	–5	–5	–5	–5	–5
26000	–8	–8	–8	–8	–8	–7	–7	–7	–7	–7	–7	–7	–7	–7	–7
28000	–10	–10	–10	–9	–9	–9	–9	–9	–9	–9	–9	–9	–9	–8	–8
30000	–11	–11	–11	–11	–11	–11	–11	–11	–11	–11	–11	–10	–10	–10	–10
32000	–13	–13	–13	–13	–13	–13	–13	–13	–12	–12	–12	–12	–12	–12	–12
34000	–15	–15	–15	–15	–15	–14	–14	–14	–14	–14	–14	–14	–14	–14	–14
36000	–16	–16	–16	–16	–16	–16	–16	–16	–16	–16	–16	–16	–15	–15	–15
38000	–18	–18	–18	–18	–18	–18	–18	–18	–17	–17	–17	–17	–17	–17	–17
40000	–20	–20	–19	–19	–19	–19	–19	–19	–19	–19	–19	–19	–19	–19	–19
45000	–23	–23	–23	–23	–23	–23	–23	–23	–23	–23	–23	–23	–22	–22	–22
50000	–25	–25	–25	–25	–25	–25	–25	–25	–25	–26	–26	–26	–26	–26	–26
55000	–26	–26	–26	–26	–26	–26	–27	–27	–27	–27	–27	–27	–27	–27	–27
60000	–24	–25	–25	–25	–26	–26	–26	–26	–27	–27	–27	–27	–28	–28	–28
64000	–22	–23	–23	–23	–24	–24	–25	–25	–25	–26	–26	–26	–27	–27	–27
64500	–17	–17	–17	–18	–18	–19	–19	–19	–20	–20	–20	–21	–21	–21	–22
65000	–11	–11	–12	–12	–13	–13	–13	–14	–14	–15	–15	–15	–15	–16	–16
65500	–5	–6	–6	–7	–7	–7	–8	–8	–9	–9	–9	–10	–10	–10	–10
66000	+0	+0	–1	–1	–1	–2	–2	–3	–3	–3	–4	–4	–4	–5	–5
66500	+5	+4	+4	+4	+3	+3	+2	+2	+2	+1	+1	+1	+0	+0	+0
66750	+5	+5	+4	+4	+3	+3	+3	+2	+2	+1	+1	+1	+0	+0	+0
67000	+5	+5	+4	+4	+3	+3	+3	+2	+2	+2	+1	+1	+1	+0	+0
68000	+6	+6	+5	+5	+4	+4	+3	+3	+2	+2	+2	+1	+1	+1	+0
69000	+7	+6	+6	+5	+5	+4	+4	+4	+3	+3	+2	+2	+1	+1	+1
70000	+8	+7	+7	+6	+6	+5	+5	+4	+4	+3	+3	+2	+2	+2	+1
71000	+9	+9	+8	+7	+7	+6	+6	+5	+5	+4	+4	+3	+3	+2	+2
72000	+10	+10	+9	+8	+8	+7	+7	+6	+5	+5	+4	+4	+3	+3	+3
72250	+12	+10	+9	+9	+8	+7	+7	+6	+6	+5	+5	+4	+4	+3	+3
72500	+15	+10	+10	+9	+8	+8	+7	+7	+6	+5	+5	+4	+4	+3	+3
72750	+18	+12	+10	+9	+9	+8	+7	+7	+6	+6	+5	+5	+4	+4	+3
73000	+20	+15	+10	+10	+9	+8	+8	+7	+6	+6	+5	+5	+4	+4	+3
73250	+23	+18	+13	+10	+9	+9	+8	+7	+7	+6	+6	+5	+4	+4	+3
73500	+26	+21	+15	+10	+10	+9	+8	+8	+7	+6	+6	+5	+5	+4	+4
73750	+29	+24	+18	+13	+10	+9	+9	+8	+7	+7	+6	+6	+5	+4	+4
74000	+32	+27	+21	+16	+10	+9	+9	+8	+8	+7	+6	+6	+5	+5	+4
74250	+35	+30	+24	+19	+13	+10	+9	+8	+8	+7	+7	+6	+5	+5	+4
74500		+33	+27	+22	+16	+11	+9	+9	+8	+7	+7	+6	+6	+5	+5
74750		+36	+30	+25	+19	+14	+10	+9	+8	+8	+7	+7	+6	+5	+5

Continued on next page.

FUEL INDEX TABLE CONT'D

WEIGHT	DENSITY (kg/l)														
(kg)	0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
74750		+36	+30	+25	+19	+14	+10	+9	+8	+8	+7	+7	+6	+5	+5
75000			+33	+28	+22	+16	+11	+9	+9	+8	+7	+7	+6	+6	+5
75250			+36	+31	+25	+19	+14	+10	+9	+8	+8	+7	+6	+6	+5
75500				+34	+28	+22	+17	+11	+9	+9	+8	+7	+7	+6	+6
75750				+37	+31	+25	+20	+14	+10	+9	+8	+8	+7	+6	+6
76000					+34	+28	+23	+17	+12	+9	+9	+8	+7	+7	+6
76250					+37	+31	+26	+20	+15	+10	+9	+8	+8	+7	+6
76500						+34	+29	+23	+18	+12	+9	+8	+8	+7	+7
76750						+37	+32	+26	+20	+15	+10	+9	+8	+7	+7
77000							+35	+29	+23	+18	+13	+9	+8	+8	+7
77250							+38	+32	+26	+21	+15	+10	+9	+8	+7
77500								+35	+29	+24	+18	+13	+9	+8	+8
77750								+38	+32	+27	+21	+16	+10	+9	+8
78000									+35	+30	+24	+19	+13	+9	+8
78250									+38	+33	+27	+22	+16	+11	+9
78500										+36	+30	+25	+19	+14	+9
78750										+39	+33	+27	+22	+16	+11
79000											+36	+30	+25	+19	+14
79250											+39	+33	+28	+22	+17
79500												+37	+31	+25	+20
79750												+40	+34	+28	+23
80000													+37	+31	+26
80250													+40	+34	+29
80500														+37	+32
80750														+40	+35
81000															+38
FULL	+37	+37	+38	+38	+38	+38	+39	+39	+39	+39	+40	+40	+40	+40	+41

FUEL INDEX TABLE PER TANK

The fuel index table has been established assuming a fuel distribution in accordance with refuel distribution chart as given in section 2.01.30 of this volume (for a single specific gravity only).
If after refueling the actual distribution deviates from the chart values, the actual and the load sheed CG will show a discrepancy. The following tables allow to determine the fuel index taking into account the actual fuel quantity in each tank. To determine the actual takeoff CG enter the tables with the actual fuel quantites in each tank, read the fuel index for each tank and use their sum to enter the load sheet. Check that the actual CG is inside the operational limits. If CG is outside the limits transfer fuel to achieve a distribution in accordance with the chart or rearrange the load.

Note : *These tables are valid only when used with the following formulae for the index :*
I=Wx(Harm-33.1555) /2500+K or I=[(CG-25)xWx 0.00029]+K
(Weight in kg, Harm in m)

Example

DATA : Fuel density = 0.795 kg/l
Fuel in inner fuel tanks = 28250 kg
Fuel in outer fuel tanks = 2200 kg
Fuel in trim tank = 4400 kg
Fuel in center tank = 21000 kg

		Weight (kg)	Index	
Inner tank	Left	28250	–	19
	Right	28250	–	19
Outer tank	Left	2200	+	4
	Right	2200	+	4
Center tank		21000	–	27
Trim tank		4400	+	47
TOTAL		86300	–	10

Enter the load sheet with a fuel index of – 10.

FUEL INDEX TABLE FOR INNER TANK

WEIGHT	DENSITY (kg/l)														
(kg)	0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
1000	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
2000	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
3000	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
4000	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
5000	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
6000	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6
7000	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
8000	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
9000	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
10000	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
11000	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11
12000	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
13000	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
14000	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-14	-14
15000	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14
16000	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
17000	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
18000	-16	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17
19000	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-18	-18
20000	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18
21000	-18	-18	-18	-18	-18	-18	-19	-19	-19	-19	-19	-19	-19	-19	-19
22000	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
23000	-19	-19	-19	-19	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20
24000	-19	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20	-20	-20	-20
25000	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20	-20	-20	-20	-21
26000	-19	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20	-20	-21	-21
27000	-18	-19	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20	-20	-21
28000	-18	-18	-18	-19	-19	-19	-19	-19	-20	-20	-20	-20	-20	-20	-20
29000	-17	-18	-18	-18	-18	-18	-19	-19	-19	-19	-20	-20	-20	-20	-20
30000	-17	-17	-17	-17	-18	-18	-18	-18	-19	-19	-19	-19	-19	-20	-20
31000	-16	-16	-16	-16	-17	-17	-17	-18	-18	-18	-18	-19	-19	-19	-19
32000		-15	-15	-15	-16	-16	-16	-17	-17	-17	-18	-18	-18	-18	-19
33000						-15	-15	-16	-16	-16	-17	-17	-17	-18	-18
34000											-15	-16	-16	-17	-17
FULL	-14	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-16	-16	-16	-16

FUEL INDEX TABLE FOR OUTER TANK

WEIGHT	DENSITY (kg/l)														
(kg)	0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
100	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0
200	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0	+0
300	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
400	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
500	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
600	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
700	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
800	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
900	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
1000	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
1100	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
1200	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
1300	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
1400	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
1500	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
1600	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
1700	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
1800	+4	+4	+4	+4	+4	+4	+3	+3	+3	+3	+3	+3	+3	+3	+3
1900	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
2000	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
2100	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
2200	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
2300	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
2400	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
2500	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
2600	+6	+6	+6	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
2700	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6
2800			+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6
2900								+6	+6	+6	+6	+6	+6	+6	+6
3000														+7	+6
FULL	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+7	+7

FUEL INDEX TABLE FOR TRIM TANK

WEIGHT (kg)	DENSITY (kg/l) 0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
100	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
200	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
300	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
400	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
500	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
600	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6	+6
700	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7	+7
800	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8	+8
900	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9	+9
1000	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10	+10
1100	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11	+11
1200	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12	+12
1300	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13	+13
1400	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14	+14
1500	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15
1600	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17	+17
1700	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18
1800	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19	+19
1900	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20
2000	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21	+21
2100	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22	+22
2200	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23	+23
2300	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24	+24
2400	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25	+25
2500	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26	+26
2600	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27	+27
2700	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28	+28
2800	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29	+29
2900	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30
3000	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31	+31
3100	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32	+32
3200	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33	+33
3300	+35	+35	+35	+35	+35	+35	+35	+35	+34	+34	+34	+34	+34	+34	+34
3400	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36	+36
3500	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37	+37
3600	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38	+38
3700	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39	+39
3800	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40	+40
3900	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41	+41
4000	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42	+42
4100	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43	+43
4200	+45	+45	+45	+44	+44	+44	+44	+44	+44	+44	+44	+44	+44	+44	+44
4300	+46	+46	+46	+46	+46	+46	+46	+46	+46	+46	+45	+45	+45	+45	+45
4400	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47	+47
4500	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48	+48
4600	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49	+49
4700	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50
4800				+51	+51	+51	+51	+51	+51	+51	+51	+51	+51	+51	+51
4900							+52	+52	+52	+52	+52	+52	+52	+52	+52
5000										+53	+53	+53	+53	+53	+53
5100													+55	+55	+54
FULL	+51	+51	+51	+52	+52	+52	+53	+53	+53	+54	+54	+54	+55	+55	+55

FUEL INDEX TABLE FOR CENTER TANK

WEIGHT	DENSITY (kg/l)														
(kg)	0.760	0.765	0.770	0.775	0.780	0.785	0.790	0.795	0.800	0.805	0.810	0.815	0.820	0.825	0.830
1000	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
2000	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
3000	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
4000	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
5000	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
6000	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
7000	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
8000	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
9000	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11
10000	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
11000	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
12000	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
13000	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
14000	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17
15000	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
16000	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
17000	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21
18000	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23
19000	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24
20000	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
21000	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
22000	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
23000	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29
24000	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31
25000	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32
26000	-34	-34	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
27000	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35
28000	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36
29000	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-37
30000	-40	-40	-40	-40	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39
31000	-42	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-40
32000			-43	-43	-43	-43	-43	-43	-43	-43	-42	-42	-42	-42	-42
33000								-45	-44	-44	-44	-44	-44	-44	-44
34000													-46	-46	-46
FULL	-43	-43	-43	-44	-44	-44	-44	-45	-45	-45	-46	-46	-46	-46	-47

02.00 CONTENTS

02.05 INTRODUCTION

02.10 GENERAL (TEMPERATURE ENTRY)

02.12 MTOW CALCULATION (TEMPERATURE ENTRY)

02.14 FLEXIBLE TAKEOFF (TEMPERATURE ENTRY)

02.16 GENERAL (WEIGHT ENTRY)

02.18 MTOW CALCULATION (WEIGHT ENTRY)

TAKEOFF CHARTS

Takeoff charts are required to provide performance at takeoff. It is possible to present the charts in two different ways, one of which is selected by the airline. The different presentations are :

- temperature entry (temperature provided in the left column)
- weight entry (weight provided in the left column)

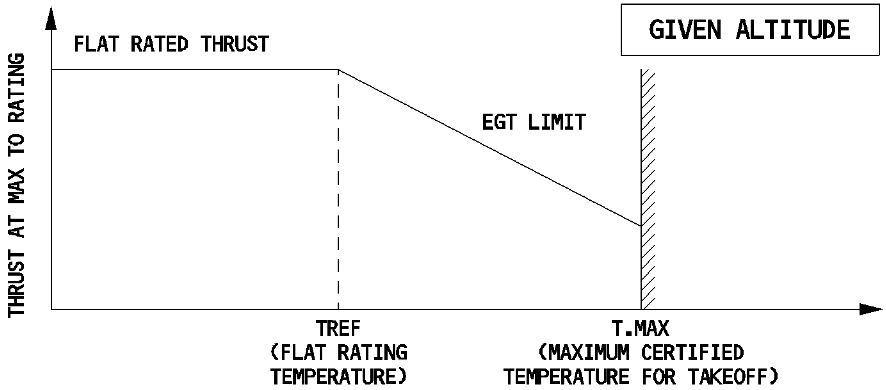
Both presentations are described hereafter. Sections 2.02.10, 2.02.12 and 2.02.14 are relative to temperature entry while 2.02.16, 2.02.18 and 2.02.20 are relative to weight entry.

R The airline may request Airbus to delete any one set of sections from the customized
R FCOM.

TAKEOFF PERFORMANCE

Takeoff optimization is calculated for a given runway and its obstacles and for given conditions of flap setting, temperature, wind and QNH. The calculation produces a maximum permissible takeoff weight (or a maximum takeoff temperature for an actual weight).

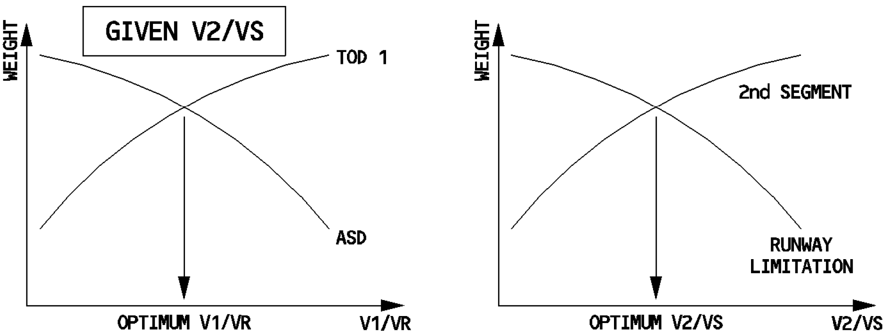
The takeoff thrust produced by the engine varies as follows :



GFC5-02-0210-001-A001AA

The optimization process calculates the speeds which will produce the maximum takeoff weight. To do so, it takes into account the different takeoff limitations, such as TOD, ASD, TOR, second segment..., as shown on the graphs below.

R



LEGEND : TOD1 = TAKEOFF DISTANCE 1 ENGINE OUT,
ASD = ACCELERATE STOP DISTANCE

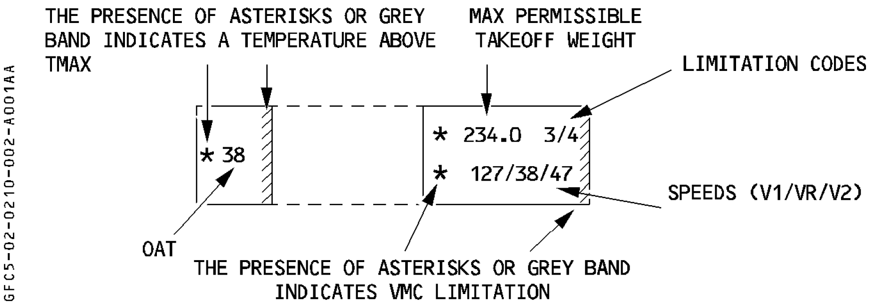
GFC5-02-0210-001-B001AA

On a typical runway, the performance of a twin engine aircraft is generally limited by the one engine out operation at takeoff. The optimum V2/VS and optimum V1/VR are consequently unique.

TAKEOFF CHART DESCRIPTION

The takeoff chart (RTOW : Regulatory Takeoff Weight) is calculated for a specific aircraft version and for a particular runway specified at the top of the chart. The top of the chart also gives some information about the runway and lists the calculation assumptions.
The chart is given for 2 different configurations and 5 wind values per configuration. This allows the crew to select the configuration that gives either :
– the highest permissible takeoff weight, or, for a given weight,
– the highest flexible temperature.
If different configurations give equivalent performance the crew should select the configuration associated with the lowest takeoff speeds.
For each temperature value (and for a given configuration and wind), the chart provides the following information :

R



The available limitation codes are :

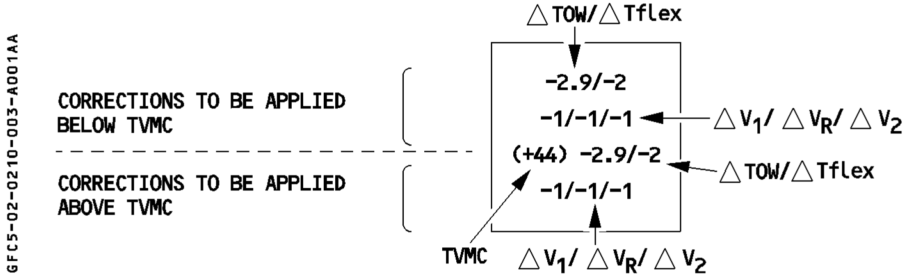
– First segment	: 1
– Second segment	: 2
– Runway length	: 3
– Obstacles	: 4
– Tire speed	: 5
– Brake energy	: 6
– Maximum computation weight	: 7
– Final takeoff	: 8
– VMU	: 9

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

Each takeoff chart is computed for a given set of conditions (air conditioning, QNH, anti ice...) specified at the top of the chart. If the actual takeoff conditions are different, the crew must apply corrections. Two types of corrections are available :
– Conservative corrections on 2.02.24 p 1 (to be used when not provided on the chart).
– Corrections (less restrictive) listed on the chart, to be applied as explained below.

DESCRIPTION OF THE CORRECTIONS ON TAKEOFF CHART

The corrections are presented on 4 lines :



TVMC is a temperature value given per column. This is a fictitious value that indicates the temperature above which the speeds are close to a VMC limitation or are VMC limited.

Note : The lower two lines may be shaded on certain chart formats.

R **MINIMUM SPEED**

R Minimum V1/VR/V2 due to VMC are provided on the bottom right side of the takeoff chart.
R They are only applicable in case of speed corrections.
R These speeds are conservative. They may be slightly higher than V1/VR/V2 displayed on
R the takeoff chart.

R **FLEX TEMPERATURE INDICATOR**

R On the temperature entry chart, the temperature column may display asterisks or have a
R grey band to indicate temperature values above TMAX and which are flex temperature.

ADDITIONAL INFORMATION

ONE ENGINE OUT CLIMB PROCEDURE

The performance given in the chart is consistent with the flight path specified for the aircraft with one engine out and takes into account significant obstacles.
When the procedure to be followed is not the standard instrument departure, the chart describes a specific procedure (EOSID).
When the specified procedure requires a turn, except if otherwise stated on the RTOW chart, the turn should be performed with a maximum bank of 15° until the aircraft reaches 1500 feet or green dot.
The acceleration height (or altitude) ensures that the net flight path clears the highest obstacle by at least 35 feet when accelerating in level flight to green dot speed after an engine failure, in the most adverse conditions.

TAKEOFF ON A WET RUNWAY

Takeoff charts computed for wet runway with a 15 feet screen height and/or use of reverse thrust may produce, in some conditions, a maximum takeoff weight (or flexible temperature) higher than that obtained for a dry runway. It is thus mandatory to compare both charts (dry and wet) and retain the lower of the two weights (or flexible temperature) and the associated speeds determined for a wet runway.

Note : *The crew need not compare the charts if the top of the WET runway chart specifies "DRY CHECK". (The comparison has already been inserted in the WET runway calculation).*

R

GFC5-02-0210-005-A001AA

AIRCRAFT MODEL — TAKEOFF CONFIGURATION — ENGINE TYPE — AIRPORT CHARACTERISTICS — WIND — AIRPORT IDENTIFICATION — RUNWAY CONDITION AND DERATE — RUNWAY IDENTIFICATION — OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE — TAKEOFF CONDITIONS

A330XXX	ENGINE	AIRPORT NAME				15L	Version ABXXXAXX*	Date V8
QNH Air conditioning Anti-icing	1013 HPA AC OFF AI OFF	Elevation Isa temp Rwy slope	489 FT 14 C .08%	TORA TODA ASDA	3000 M 3100 M 3000 M	4 obstacles	DRY	

OAT °C	CONF 1 + F					CONF 2				
	TAILWIND - 10.0 KT	TAILWIND - 5.0 KT	WIND 0 KT	HEADWIND + 10.0 KT	HEADWIND + 20.0 KT	TAILWIND - 10.0 KT	TAILWIND - 5.0 KT	WIND 0 KT	HEADWIND + 10.0 KT	HEADWIND + 20.0 KT
-20	212.6 4/9 147/47/54	219.8 4/3 156/57/62	224.5 3/9 161/62/67	227.5 4/3 164/65/70	230.8 4/9 161/62/67	216.0 4/4 151/52/57	221.2 3/4 156/56/60	226.6 3/4 160/60/65	228.8 4/3 163/63/67	230.9 4/3 165/67/70
-10	212.0 4/9 146/46/53	216.5 4/9 148/48/55	222.1 4/9 152/52/58	225.7 4/9 155/56/61	228.9 4/2 158/59/64	214.1 4/4 149/49/55	219.3 4/3 153/53/58	224.9 3/4 158/58/63	227.0 4/4 158/60/64	229.5 4/3 162/64/67
0	210.9 4/3 148/48/54	215.5 4/9 148/49/55	DO NOT USE FOR						226.7 3/4 159/59/63	227.9 4/3 159/61/65
10	209.0 3/4 146/46/52	214.3 4/3 149/49/55	OPERATIONAL PURPOSE						224.6 3/4 156/57/61	227.9 2/3 159/60/64
20	205.7 4/9 142/44/51	212.3 4/3 148/48/54	217.3 4/9 150/50/56	220.9 4/9 153/53/58	224.3 4/9 155/55/61	208.3 4/4 143/44/50	213.7 4/4 147/48/53	219.2 3/4 152/53/57	222.7 3/4 154/56/60	226.0 2/4 157/58/62
30	202.7 4/9 140/43/49	209.3 4/3 146/47/53	214.6 4/9 148/48/54	217.7 4/9 150/50/55	221.2 4/9 154/54/59	205.3 4/4 142/43/48	210.6 4/4 146/47/52	216.2 3/4 150/51/56	219.7 3/4 153/54/58	223.1 3/4 155/57/61
//	//	//	//	//	//	//	//	//	//	//
46	182.4 4/9 137/37/43	186.2 4/4 138/38/44	191.2 4/3 148/49/53	194.3 4/3 151/52/56	197.1 4/3 153/54/58	183.7 3/4 139/40/44	188.0 4/4 143/44/48	192.3 4/4 147/47/51	195.2 4/4 150/50/54	198.0 3/4 152/53/56
48	179.0 4/9 136/36/42	182.9 4/9 139/39/44	188.0 4/3 148/48/53	191.0 4/3 150/51/55	192.2 3/4 154/54/58	180.2 4/4 138/40/44	184.5 3/4 143/43/47	188.7 4/4 147/47/51	191.4 4/4 149/50/53	194.1 3/4 152/52/55
50	175.6 4/9 137/37/42	179.6 4/9 138/38/43	184.8 4/3 147/48/52	186.2 4/3 151/51/55	186.3 4/3 154/54/58	176.8 4/4 138/39/43	181.0 3/4 142/43/47	185.0 4/4 147/47/50	187.6 4/4 148/49/52	189.4 4/3 152/52/55
52	172.2 4/9 136/36/42	176.2 4/9 139/39/44	180.0 4/4 141/41/45	181.1 3/4 151/51/55	182.8 3/4 154/54/58	173.4 4/4 138/39/43	177.5 4/4 142/43/46	181.2 4/4 146/47/50	183.5 3/4 149/49/52	185.5 4/4 150/50/53
*54	168.8 4/9 136/36/41	173.1 4/4 137/37/42	176.1 4/4 139/39/44	177.8 4/3 151/51/55	179.9 4/3 153/53/56	169.9 4/4 137/38/42	173.8 4/4 142/43/46	177.5 4/4 146/46/49	179.2 4/4 147/48/51	181.7 4/4 150/50/53
	INFLUENCE OF RUNWAY CONDITION									
WET	+.0/+0 -4/ 0/ 0 (+54)-.2/-1 -4/+0/+0	+.0/+0 -3/+0/+0 (+54)-.2/-1 -3/+0/+0	+.0/+0 -2/+0/+0 (+54)-.6/-1 -2/+0/+0	+.0/+0 -2/+0/+0 (+54)-.6/-1 -2/+0/+0	+.0/+0 -3/+0/+0 (+54)-.6/-1 -3/+0/+0	+.0/+0 -4/+0/+0 (+54)-.6/-1 -4/+0/+0	+.0/+0 -3/+0/+0 (+54)-.6/-1 -3/+0/+0	+.0/+0 -3/+0/+0 (+54)-.6/-1 -3/+0/+0	+.0/+0 -3/+0/+0 (+54)-.6/-1 -3/+0/+0	+.0/+0 -2/+0/+0 (+54)-.6/-1 -2/+0/+0
D QNH HPA	INFLUENCE OF DELTA PRESSURE									
-10	-20/-2 +0/ 0/ 0 (+54)-2.0/-2 +0/+0/+0	-25/-2 0/ 0/ 0 (+54)-2.5/-2 0/+0/+0	-23/-2 0/ 0/ 0 (+54)-2.3/-2 0/+0/+0	-23/-2 0/ 0/ 0 (+54)-2.3/-2 0/+0/+0	-22/-2 0/ 0/ 0 (+54)-2.3/-2 0/+0/+0	-1.7/-2 0/ 0/ 0 (+54)-1.7/-2 0/+0/+0	-1.7/-2 0/ 0/ 0 (+54)-1.7/-2 0/+0/+0	-1.9/-2 0/-1/-1 (+54)-1.9/-2 0/+0/+0	-2.4/-2 0/-1/-1 (+54)-2.4/-2 0/+0/+0	-1.9/-2 0/-1/-1 (+54)-1.9/-2 0/+0/+0
+10	+1.4/+0 +0/+1/+1 (+54)+1.2/+0 +0/+1/+1	+1.5/+0 +0/+1/+1 (+54)+1.3/+0 +0/+1/+1	+1.5/+0 +1/+1/+1 (+54)+.9/+0 +1/+1/+1	+1.5/+0 +1/+1/+1 (+54)+.9/+0 +1/+1/+1	+1.5/+0 +1/+1/+1 (+54)+.9/+0 +1/+1/+1	+1.5/+1 +0/+1/+1 (+54)+.9/+0 +0/+1/+1	+1.5/+0 +0/+0/+0 (+54)+.9/+0 +0/+0/+0	+1.5/+0 +1/+1/+1 (+54)+.9/+0 +1/+1/+1	+1.7/+0 +1/+1/+1 (+54)+1.0/+0 +1/+1/+1	+1.5/+0 +1/+1/+1 (+54)+.9/+0 +1/+1/+1

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	MTOW(1000 KG) codes V1min/VR/V2(KT)	*VMC *LIMITATION	Tref (OAT) =29 C Tmax (OAT) =52 C	Min acc height 784Ft Max acc height 1965Ft	Min QNH alt 1280Ft Max QNH alt 2461Ft
	LIMITATION CODES: 1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final takeoff 9=VMU			MIN V1/VR/V2 = 120/22/28 CHECK VMU LIMITATION CORRECT. V1/VR/V2 = .1Kt/1000 Kg	

MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.

INFLUENCE CORRECTION
ΔWEIGHT ΔTFLEX
$\Delta V_1/\Delta V_R/\Delta V_2$
(TVMC) Δ WEIGHT ΔTFLEX
$\Delta V_1/\Delta V_R/\Delta V_2$

TAKEOFF PARAMETERS

MAX WEIGHT (1000 KG) (179.9) — LIMITATION CODE (4-3)

V_1 (KT IAS) - V_R (KT IAS) - V_2 (KT IAS)
(153) (153) (156)

MINIMUM VALUES OF $V_1/V_R/V_2$ TO WHICH TAKEOFF SPEEDS MUST BE LIMITED WHEN DECREMENTS ARE APPLIED

$V_1/V_R/V_2$ DECREMENTS FOR WEIGHTS BELOW THE LOWEST WEIGHT OF A COLUMN

R

A330XXX	ENGINE	AIRPORT NAME						15L	Version DATE
QNH	1013.00 HPA	Elevation	489	FT	TORA	3000	M		ABXXXXXX * V8
Air cond.	AC OFF	Isa temp	14	C	TODA	3000	M		
Anti-icing	AI OFF	rwy slope	.08	%	ASDA	3000	M	4 obstacles	DRY
All reversers operating									
No reversers on dry runway									

OAT C	CONF 1+F					CONF 2				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
-20	214.9 3/4 149/49/56	220.3 3/4 154/54/60	225.6 3/4 159/59/64	228.9 3/4 160/60/66	232.3 3/4 164/64/69	215.8 3/4 149/51/56	221.1 3/4 154/56/61	226.3 3/4 159/60/64	229.2 3/4 162/63/68	231.1 3/4 166/68/72
-10	213.3 3/4 147/47/54	218.7 3/4 152/52/58	224.1 3/4 156/56/62	227.5 3/4 160/60/65	230.8 3/4 162/62/67	214.0 3/4 147/49/55	219.4 3/4 152/54/59	224.6 3/4 156/58/63	227.9 3/4 160/61/65	230.0 3/4 163/65/69
0	211.6 3/4 145/45/52	217.1 3/4 150/50/56	**DO NOT USE FOR OPERATIONAL PURPOSE**						226.5 3/4 157/59/63	228.8 3/4 161/63/67
10	209.9 3/4 143/43/50	215.5 3/4 148/48/54							225.0 3/4 155/57/61	227.6 3/4 158/60/65
20	207.9 3/4 142/43/49	214.0 3/4 146/46/52	219.4 3/4 150/50/56	222.8 3/4 153/53/58	226.3 3/4 156/56/61	209.1 3/4 141/44/49	214.5 3/4 146/48/53	219.9 3/4 150/52/57	223.5 3/4 153/55/59	226.3 3/4 156/58/63
30	205.2 3/4 140/42/48	211.4 3/4 144/45/51	217.1 3/4 148/48/54	220.6 3/4 151/51/56	223.8 3/4 154/54/59	206.8 3/4 139/42/47	212.2 3/4 144/46/51	217.6 3/4 148/50/55	221.1 3/4 151/53/57	224.0 3/4 154/56/61
32	203.3 3/4 139/41/48	209.5 3/4 143/44/50	214.9 3/4 148/48/53	218.4 3/4 151/51/56	221.6 3/4 154/54/59	204.8 3/4 139/42/47	210.1 3/4 143/46/51	215.4 3/4 148/50/54	218.9 3/4 151/52/57	221.7 3/4 154/56/60
34	201.5 3/4 139/41/47	207.5 3/4 143/43/49	212.8 3/4 147/47/53	216.1 3/4 150/50/55	219.4 3/4 153/53/58	202.8 3/4 139/41/47	208.0 3/4 143/45/50	213.2 3/4 147/49/54	216.6 3/4 150/52/56	219.4 3/4 153/56/60
36	199.5 3/4 139/40/46	205.4 3/4 143/43/49	210.5 3/4 147/47/52	213.8 3/4 150/50/55	217.0 3/4 153/53/58	200.7 3/4 138/41/46	205.8 3/4 143/45/50	210.9 3/4 147/49/53	214.3 3/4 150/51/56	217.0 3/4 153/55/59
38	197.5 3/4 138/39/46	203.2 3/4 142/42/48	208.1 3/4 147/47/52	211.3 3/4 150/50/55	214.5 3/4 152/52/57	198.5 3/4 138/40/46	203.5 3/4 142/44/49	208.5 3/4 147/48/53	211.9 3/4 150/51/55	214.5 3/4 153/54/59
40	195.4 3/4 138/39/45	200.6 3/4 142/42/48	205.4 3/4 147/47/52	208.6 3/4 149/49/54	211.7 3/4 152/52/57	196.1 3/4 138/40/45	201.0 3/4 142/44/49	205.9 3/4 146/48/53	209.2 3/4 149/51/55	211.8 3/4 152/54/58
42	193.1 3/4 138/38/44	197.9 3/4 142/42/48	202.5 3/4 146/46/52	205.5 3/4 148/48/53	208.5 3/4 151/51/56	193.5 3/4 138/40/45	198.3 3/4 142/44/49	203.1 3/4 146/48/52	206.2 3/4 149/50/54	208.8 3/4 152/54/57
44	190.4 3/4 138/38/44	195.1 3/4 142/42/48	199.4 3/4 145/45/50	202.5 4/4 147/47/52	205.4 3/4 150/50/55	190.8 3/4 138/39/44	195.5 3/4 142/44/48	200.1 3/4 146/48/52	203.2 3/4 149/50/54	205.8 3/4 152/53/57
46	186.5 3/4 137/37/43	191.1 3/4 141/41/46	195.5 3/4 144/44/49	198.3 4/4 145/45/50	201.4 2/4 150/50/54	187.1 3/4 137/39/44	191.7 3/4 141/43/47	196.1 3/4 146/47/51	199.1 3/4 149/49/53	201.7 3/4 152/52/56
48	182.6 3/4 137/37/42	187.0 3/4 140/40/45	191.3 4/4 143/43/48	194.1 4/4 145/45/50	196.9 2/4 149/49/53	183.4 3/4 137/39/43	187.6 3/4 141/43/47	191.9 3/4 146/46/50	194.8 3/4 148/49/53	197.4 3/4 151/52/55
50	178.6 4/4 135/35/41	182.9 4/4 139/39/44	187.0 4/4 142/42/47	190.0 4/4 144/44/48	192.1 4/4 148/48/52	179.4 3/4 137/38/43	183.5 3/4 141/42/46	187.6 3/4 145/46/49	190.4 3/4 148/48/52	192.8 3/4 151/51/54
52	174.6 4/4 134/34/40	178.6 4/4 138/38/43	182.6 4/4 141/41/45	185.4 4/4 143/43/47	187.8 2/4 147/47/51	175.3 3/4 136/38/42	179.3 3/4 141/41/45	183.2 3/4 145/45/49	185.8 3/4 148/48/51	188.1 3/4 150/50/53
*54	170.3 4/4 133/33/39	174.3 4/4 137/37/42	178.1 4/4 140/40/44	180.7 4/4 142/42/46	183.0 2/4 146/46/50	171.2 3/4 136/37/41	174.9 3/4 140/41/45	178.6 3/4 144/44/48	180.9 3/4 146/46/50	183.0 2/4 149/49/52
	INFLUENCE OF RUNWAY CONDITION									
WET	+.0/ +0 -4/ 0/ 0 (+54) -.2/-1 -4/ +0/ +0	+.0/ +0 -3/ 0/ 0 (+54) -.2/-1 -3/ +0/ +0	+.0/ +0 -2/ +0/ +0 (+54) -.6/-1 -2/ +0/ +0	+.0/ +0 -2/ +0/ +0 (+54) -.6/-1 -2/ +0/ +0	+.0/ +0 -3/ +0/ +0 (+54) -.6/-1 -3/ +0/ +0	+.0/ +0 -4/ +0/ +0 (+54) -.6/-1 -4/ +0/ +0	+.0/ +0 -3/ +0/ +0 (+54) -.6/-1 -3/ +0/ +0	+.0/ +0 -3/ +0/ +0 (+54) -.6/-1 -3/ +0/ +0	+.0/ +0 -3/ +0/ +0 (+54) -.6/-1 -3/ +0/ +0	+.0/ +0 -2/ +0/ +0 (+54) -.6/-1 -2/ +0/ +0
D QNH HPA	**INFLUENCE OF DELTA PRESSURE**									
-10	-2.0/ -2 +0/ 0/ 0 (+54) -2.0/-2 +0/ +0/ +0	-2.5/ -2 0/ 0/ 0 (+54) -2.5/-2 0/ +0/ +0	-2.3/ -2 0/ 0/ 0 (+54) -2.3/-2 0/ +0/ +0	-2.3/ -2 0/ 0/ 0 (+54) -2.3/-2 0/ +0/ +0	-2.2/ -2 0/ 0/ 0 (+54) -2.3/-2 0/ +0/ +0	-1.7/ -2 0/ 0/ 0 (+54) -1.7/-2 0/ +0/ +0	-1.7/ -2 0/ 0/ 0 (+54) -1.7/-2 0/ +0/ +0	-1.9/ -2 0/ -1/ -1 (+54) -1.9/-2 0/ +0/ +0	-2.4/ -2 0/ -1/ -1 (+54) -2.4/-2 0/ +0/ +0	-1.9/ -2 0/ -1/ -1 (+54) -1.9/-2 0/ +0/ +0
+10	+1.4/ +0 +0/ +1/ +1 (+54) +1.2/+0 +0/ +1/ +1	+1.5/ +0 +0/ +1/ +1 (+54) +1.3/+0 +0/ +1/ +1	+1.5/ +0 +1/ +1/ +1 (+54) +.9/+0 +1/ +1/ +1	+1.5/ +0 +1/ +1/ +1 (+54) +.9/+0 +1/ +1/ +1	+1.5/ +0 +1/ +1/ +1 (+54) +.9/+0 +1/ +1/ +1	+1.5/ +1 +0/ +1/ +1 (+54) +.9/+0 +0/ +1/ +1	+1.5/ +0 +0/ +0/ +0 (+54) +.9/+0 +0/ +0/ +0	+1.5/ +0 +1/ +1/ +1 (+54) +.9/+0 +1/ +1/ +1	+1.7/ +0 +1/ +1/ +1 (+54) +1.0/+0 +1/ +1/ +1	+1.5/ +0 +1/ +1/ +1 (+54) +.9/+0 +1/ +1/ +1

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000KG) DTFLEX DV1-DVR-DV2 (KT)	MTOW(1000 KG) codes V1min/VR/V2 (kt)	* VMC *LIMITATION	Tref (OAT) = 29 C Tmax (OAT) = 52 C	Min acc height 784 FT Max acc height 1965 FT	Min QNH alt 1280 FT Max QNH alt 2461 FT
	LIMITATION CODES : 1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final takeoff 9=VMU				Min V1/VR/V2 = 120/22/28 CHECK VMU LIMITATION Correct. V1/VR/V2 = .1 KT/1000 KG

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DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS

DIRECT CHART READING

The takeoff chart is computed for a given runway under a set of conditions, which are :
- OAT
- Wind
- Configuration
- QNH, air conditioning, anti ice...

Two configurations are produced on the chart. This enables the crew to select that giving the highest permissible takeoff weight. In case of equivalent performance, retain the configuration giving the lower takeoff speeds.
For a given configuration, enter the chart with the OAT and wind value to determine the maximum permissible weight. For an OAT or wind value not presented on the chart, interpolate between two consecutive temperature rows and/or two consecutive wind columns. Conservative OAT or wind values can also be considered. No extrapolation is allowed.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

Retain the maximum takeoff weight, associated configuration and speeds from above.
For conditions different from those of the chart, apply relevant corrections.

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 p 1

Corrections are given for QNH ≠ 1013 hPa, air conditioning ON, anti ice ON.
1. For the given wind and temperature conditions, read the maximum takeoff weight (choose the configuration giving the highest weight).
2. Apply the published weight correction(s) to the maximum takeoff weight (for each correction) to determine the maximum permissible takeoff weight.
3. Read the speeds associated with the maximum permissible takeoff weight by entering the chart with the retained configuration and wind value.

Example 1
DATA : OAT = 25°C
Head Wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

R Use the chart from 2.02.10 p 6.
Enter the 10 kt head wind column and interpolate for 25°C, CONF 1+F,
Maximum takeoff weight (1000 kg) air conditioning OFF 221.7
Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
Maximum takeoff weight (1000 kg) air conditioning OFF 222.3

Retain CONF 2 as takeoff configuration.
Maximum TO weight (1000 kg) air conditioning OFF 222.3
Air conditioning correction (FCOM 2.02.24 p1) . . . . – 7.1
Maximum permissible TO weight (1000 kg) air conditioning ON 215.2
Determine takeoff speeds for 215.2 (1000 kg) in the 10 kt head wind column (CONF2)
R V1 = 150 kt, VR = 152 kt, V2 = 156 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

R **CORRECTIONS PRODUCED ON THE RTOW CHART (SEE EXAMPLE ON 2.02.10 P 6)**

A description of this correction is given on 2.02.10 p3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti ice. A maximum of three corrections can be produced on one chart.

To apply the corrections, proceed as follows :

1. Enter the chart with given OAT and wind to determine the maximum takeoff weight before correction.
2. Apply the first correction :
   If OAT is less than or equal to TVMC (line 3), apply △W correction from line 1 and △V1/△VR/△V2 corrections from line 2.
   Else, (for OAT greater than TVMC), apply △W correction from line 3 and △V1/△VR/△V2 corrections from line 4.
3. To combine a second (and third, as applicable) correction :
   If OAT is less than or equal to TVMC (line 3), apply △W correction from line 1 and △V1/△VR/△V2 corrections from line 2.
   Check that the resulting speeds are higher than the minimum speeds displayed on the RTOW chart and that V2 is higher than the VMU limited speed (FCOM 2.02.25).
   If OAT is higher than TVMC (line3) or if the above speed check is not fulfilled, apply △W correction from line 3 and △V1/△VR/△V2 corrections from line 4. No speed check is required.

<u>Note</u> :
- *QNH correction is given for ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.*
- *When using a takeoff chart with failure cases, it is not allowed to combine two failure cases.*
- *Corrections from the chart must be applied from top to bottom, i.e. in the RTOW*
R *on 2.02.10 p 6, apply the wet correction first.*
- *If asterisk or dotted lines appear in the correction boxes, refer to more conservative corrections provided in the FCOM.*
- *No speed check is required for the first correction. However, if the first influence correction follows a conservative FCOM correction, a speed check is required.*

Example 2

DATA : OAT = 25°C
Head wind = 10 kt
QNH = 1028 hPa
WET runway

R Use the chart from 2.02.10 p 6.

- Enter the 10 kt head wind column and interpolate for 25°C, CONF 1+F, max TO weight (1000 kg) 221.7
- Enter the 10 kt head wind column and interpolate for 25°C, CONF 2, max TO weight (1000 kg) 222.3
- Retain CONF 2 for takeoff.
- Read associated speeds as V1 = 152 kt, VR = 154 kt, V2 = 158 kt
- Apply WET correction
  For OAT < TVMC (54°), △W = ... 0.0
  Intermediate weight (1000 kg) 222.3
  Associated speeds,
  V1 = 152 kt – 3 = 149 kt
  VR = 154 kt – 0 = 154 kt
  V2 = 158 kt – 0 = 158 kt
  (No speed check required for first correction)
- Apply QNH correction
  For OAT < TVMC (54°), △W = 1.7 × 15/10 = ... + 2.5
  Maximum permissible takeoff weight (1000 kg) 224.9
  Associated speeds,
  V1 = 149 kt + 1 × 15/10 = 150 kt
  VR = 154 kt + 1 × 15/10 = 156 kt
  V2 = 158 kt + 1 × 15/10 = 160 kt
- Check that the speeds are higher than minimum speeds from the chart and from VMU table.

	Takeoff Configuration : 2			
	TOW	V1	VR	V2
TOW (RTOW)	222.3	152	154	158
FCOM correction(s)				
Intermediate value	222.3	152	154	158
WET Correction	0.0	– 3	0	0
Intermediate value	222.3	149	154	158
QNH Correction	+ 2.6	+ 1	+ 2	+ 2
Final value	224.9	150	156	160

COMBINING CORRECTIONS FROM FCOM AND CHART

Proceed as follows :
1. Enter the chart with selected configuration, OAT and wind to read the maximum takeoff weight.
2. Apply corrections from FCOM to determine an intermediate weight. Interpolate associated speeds for intermediate weight in the same column (same wind and configuration).
3. Apply corrections from RTOW chart as explained above.

Example 3

DATA : OAT = 25°C
Head wind = 10 kt
Air conditioning ON
QNH = 1028 hPa
WET runway

R 1. Use the chart from 2.02.10 p 6.
Enter the 10 kt head wind column and interpolate for 25°C, CONF 1+F,
Max TO weight (1000 kg) air conditioning OFF 221.7
Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
Max TO weight (1000 kg) air conditioning OFF 222.3
Retain CONF 2 for takeoff configuration.

2. First, apply the correction from FCOM page 2.02.24 p 1.
Max TO weight (1000 kg) air conditioning OFF 222.3
Air conditioning correction . . . . – 7.1
Intermediate weight 215.2
Interpolate takeoff speeds for 215.2 (1000 kg) in the 10 kt head wind column,
R V1 = 150 kt, VR = 152 kt, V2 = 156 kt

3. Apply WET correction
For OAT < TVMC (54°), ΔW = ... 0.0
Intermediate weight 215.2
Associated speeds,
V1 = 150 kt – 3 = 147 kt
R VR = 152 kt – 0 = 152 kt
V2 = 156 kt – 0 = 156 kt
Check that the speeds are higher than minimum speeds from the chart and from VMU table.
Apply QNH correction
For OAT < TVMC (54°), $\Delta W = 1.7 \times 15/10 =$ . . . .+ 2.6
Maximum permissible takeoff weight 217.8
Associated speed,
V1 = 147 kt + 1 × 15/10 = 148 kt
R VR = 152 kt + 1 × 15/10 = 154 kt
V2 = 156 kt + 1 × 15/10 = 158 kt

Check that the speeds are higher than minimum speeds from the chart and from VMU table. (It is reminded that if the speed checks are not fulfilled, the corrections must be recalculated using those provided on lines 3 and 4).
Since the speed check is fulfilled :
Maximum permissible takeoff weight = 217.8 (1000 kg)
R V1 = 148 kt, VR = 154 kt, V2 = 158 kt.

R

	Takeoff Configuration : 2			
	TOW	V1	VR	V2
TOW (RTOW)	222.3			
FCOM correction(s)	– 7.1			
Intermediate value	215.2	150	152	156
WET Correction	0.0	– 3	0	0
Intermediate value	215.2	147	152	156
QNH Correction	+ 2.6	+ 1	+ 2	+ 2
Final value	217.8	148	154	158

EXTRAPOLATION

For a takeoff weight lower than those displayed on the chart, associated speeds are calculated as follows :

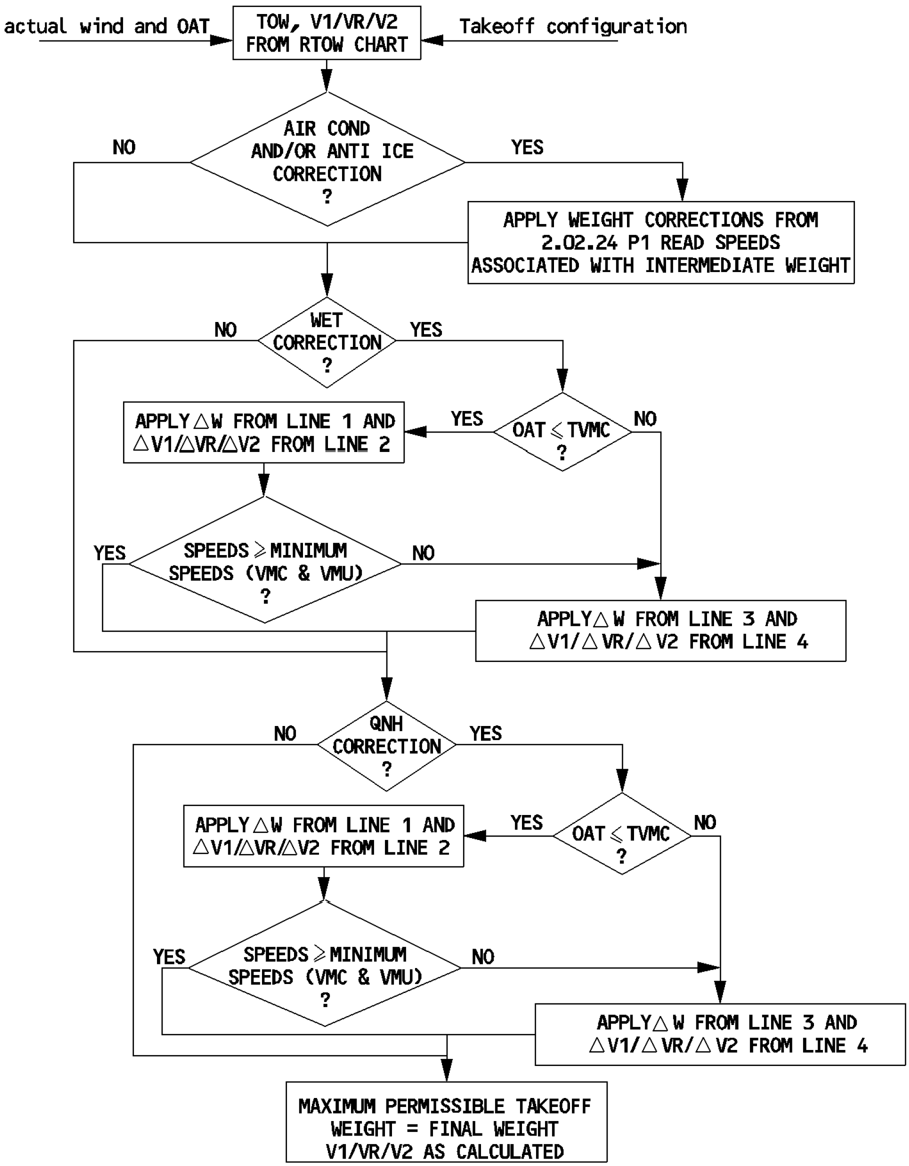
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

MAXIMUM STRUCTURAL TAKEOFF WEIGHT

The maximum structural takeoff weight is a weight limitation depending on the aircraft. This limitation is provided in the Flight Manual and in the chapter limitation of the FCOM3. Compare the maximum structural takeoff weight to the maximum permissible takeoff weight computed for given conditions and retain the lower of the two values.

SUMMARY

R The following flow diagram gives the different steps to follow.



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DEFINITION OF FLEXIBLE TAKEOFF

In many cases the aircraft takes off with a weight lower than the maximum permissible takeoff weight. When this happens, it can meet the required performance (runway, second segment, obstacle,...) with a decreased thrust that is adapted to the weight : this is called FLEXIBLE TAKEOFF and the thrust is called FLEXIBLE TAKEOFF THRUST.
The use of flexible takeoff thrust saves engine life.

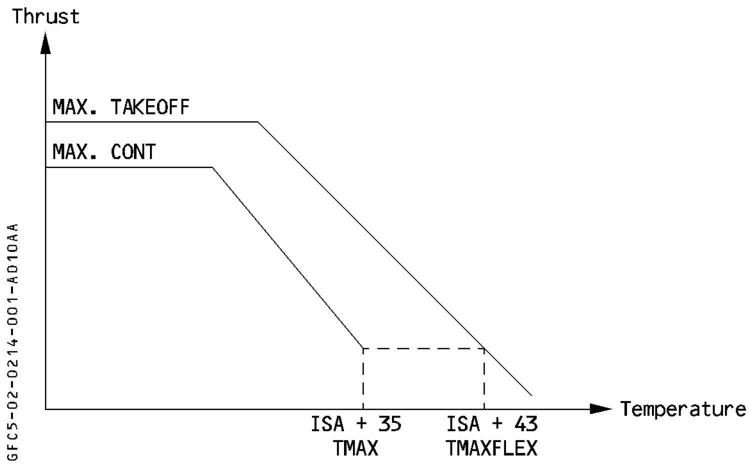
USE OF FLEXIBLE TAKEOFF

The pilot can use flexible takeoff when the actual takeoff weight is lower than the maximum permissible takeoff weight for the actual temperature. The maximum permissible takeoff weight decreases when temperature increases, so it is possible to assume a temperature at which the actual takeoff weight would be the limiting one. This temperature is called FLEXIBLE TEMPERATURE or assumed temperature and is entered in the FADEC via the MCDU PERF TO page in order to get the adapted thrust.

REQUIREMENTS

- Thrust must not be reduced by more than 25 % of the full rated takeoff thrust.
- The flexible takeoff N1 cannot be lower than the Max Climb N1 at the same flight conditions.
  The FADEC takes the above two constraints into account to determine the flexible N1.
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 35 at 16600 ft and above).
  This constraint limits the maximum flexible temperature at ISA + 43 (58° C at sea level).
- The flexible temperature cannot be lower than the flat rating temperature, TREF (ISA + 15), or the actual temperature (OAT).

R



- Flexible takeoff is not permitted on contaminated runways.
- The operator should check the maximum thrust (TOGA) at regular intervals in order to detect any engine deterioration, or maintain an adequate engine performance monitoring program to follow up the engine parameters.

RECOMMENDATION

R · In order to extend engine life and save maintenance costs, it is recommended to use
R flexible thrust reduction.

· However, to improve the takeoff performance the thrust can be increased by selecting a lower flex temperature.

Using the same takeoff chart, for a given weight, it is possible to :

- Select a temperature lower than the maximum determined one and keep the speeds defined at maximum temperature or,
- Move towards the left side (tailwind) of the takeoff chart while remaining within the same configuration and looking for the same actual takeoff weight at lower temperature. This produces a lower flexible temperature and, in general, lower takeoff speeds (V1/VR/V2).

Using one of the two above possibilities, check that the selected temperature is greater than the actual temperature (OAT) and greater than the flat rating temperature (TREF).

TAKEOFF PROCEDURE

Depending on environmental takeoff conditions, the following procedure is recommended.

R

CONDITIONS	PROCEDURE	REASON
Dry or wet, well paved runway	– Use the flap setting giving the highest flexible temperature. – When flexible temperature difference between two flap settings is low, use the highest flap setting.	Extend engine life and save maintenance costs.
High altitude takeoff	– Use CONF2/CONF3	Improve comfort.
Badly paved runway or Accelerate stop distance limited runway	– Use CONF2/CONF3 or – Move towards left side of the takeoff chart.	Improve comfort. Improve stopping distance.
Windshear expected along takeoff path	– Use maximum thrust.	Maintain acceleration capability.
Contaminated runway	– Use maximum thrust (flex forbidden).	Improve stopping distance. Decrease time on runway. Required by regulations.

DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS

Before determining the flexible temperature, calculate the maximum permissible takeoff weight (see previous section) and ensure that the actual takeoff weight is lower than the determined maximum takeoff weight.

- Enter the RTOW chart with the wind condition and selected configuration to interpolate for the actual takeoff weight. Read the flexible temperature in the temperature column corresponding to the actual weight.
- Repeat this process for the other configuration available. Select that configuration giving the highest flexible temperature.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

When the takeoff conditions are different from those provided on the chart, apply the associated corrections.

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 P 1

Corrections are given for QNH $\neq$ 1013 hPa, air conditioning ON, anti ice ON.

1. For a given takeoff weight, wind condition and selected configuration, determine the flexible temperature. Retain the takeoff speeds associated with the actual weight.
2. Apply the published temperature correction. To combine two or more corrections, add the different corrections and apply to temperature value.
   (No speed corrections required).

Example 4

DATA : Actual takeoff weight = 190 000 kg
Head wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

R Use the chart from 2.02.10 p 6. Determine the maximum permissible takeoff weight (see example1). The actual weight being lower than the maximum one, flexible takeoff is possible.
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 1+F,
Flexible temperature . . . . 50° C
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 2,
Flexible temperature . . . . 50° C

Equivalent performance is obtained from the two different configurations.
Retain CONF 1 + F as the speeds are lower.
Takeoff speeds are V1 = 144 kt, VR = 144 kt, V2 = 148 kt
Flexible temperature with air conditioning OFF . . . . 50° C
R Air conditioning correction (FCOM 2.02.24 p1) . . . . – 6° C
R Maximum flexible temperature . . . . 44° C

CORRECTIONS FOR WET RUNWAY FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

CORRECTIONS PRODUCED ON THE RTOW CHART (SEE EXAMPLE ON 2.02.10 P6)

A description of this correction is given on 2.02.10 p3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti ice. A maximum of three corrections can be produced on one chart.
To apply the correction, proceed as follows :

1. Enter the chart with wind and selected configuration. Interpolate for actual takeoff weight. Read flexible temperature associated with this weight.
2. Apply the first correction :
   If the flexible temperature is less than or equal to TVMC (line 3), apply △Tflex correction from line 1 and apply speed corrections (△V1/△VR/△V2) from line 2.
   Else, (flexible temperature greater than TVMC), apply △Tflex from line 3 and △V1/ △VR/ △V2 corrections from line 4.
   Check V2 against VMU limitation (FCOM 2.02.25). If V2 is lower than V2 limited by VMU, flexible takeoff is not possible. Set TOGA thrust and retain the speeds associated with maximum permissible takeoff weight or the speeds read in the chart for the actual weight if they are all lower.
   No speed correction is required for QNH and bleeds influence (Not applicable to maximum takeoff weight determination).
3. To combine a second and/or a third correction, proceed as per point 2.
4. Check that the final flexible temperature is :
   – higher than OAT and TREF
   – limited to TMAXFLEX
     If the check is fulfilled, retain final flexible temperature as the one to be inserted in the MCDU.
     If the check is not fulfilled, (final flexible temperature lower than OAT or TREF), no flexible takeoff is possible.
     Use TOGA thrust and retain speeds that have been calculated for the maximum permissible takeoff weight. (See 2.02.14 p7)

Note : – *QNH correction is given for ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.*
– *Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.10 p6, apply the wet influence first.*

Note : – *When the flexible temperature is higher than TVMC, it is allowed to limit the flexible temperature to TVMC and apply only corrections from lines 1 and 2.*
– *If asterisk or dotted lines appear in the correction boxes, refer to more conservative corrections provided in the FCOM.*

Example 5

DATA : Actual takeoff weight = 190 000 kg
Head wind = 10 kt
QNH = 1028 hPa
WET runway
Air conditioning OFF

R Use the chart from 2.02.10 p6. Determine the maximum permissible takeoff weight (see example 2). The actual weight being lower than the maximum one, flexible takeoff is possible.
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 1+F,
Flexible temperature . . . . .50° C
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 2,
Flexible temperature . . . . .50° C
Equivalent performance is obtained from the two different configurations.
Retain CONF 1 + F as the speeds are lower.
Takeoff speeds are V1 = 144 kt, VR = 144 kt, V2 = 148 kt
Apply WET correction
For flexible temperature < TVMC (54°), △Tflex = ... 0° C
Intermediate flex temperature . . . . .50° C
Associated speeds,
V1 = 144 kt – 2 = 142 kt
VR = 144 kt – 0 = 144 kt
V2 = 148 kt – 0 = 148 kt

R Since the correction on V2 is 0, no V2 check against VMU limitation is necessary.
Apply QNH correction
For flex temperature < TVMC (54°), △Tflex = ... 0° C
Maximum flexible temperature . . . . 50° C
Check that OAT/TREF < flex temperature ≤ TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 142 kt, VR = 144 kt, V2 = 148 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	50	144	144	148
FCOM correction(s)				
Intermediate value	50	144	144	148
WET Correction	0	– 2	0	0
Intermediate value	50	142	144	148
QNH Correction	0	0	0	0
Final value	50	142	144	148

COMBINING CORRECTIONS FROM FCOM AND CHART

1. Apply corrections from FCOM (see 2.02.24 p1).
2. Apply corrections from the RTOW chart.
   Apply speed corrections except for QNH and bleed influences.

Example 6

DATA : Actual takeoff weight = 190 000 kg
Head wind = 10 kt
Air conditioning ON
QNH = 1028 hPa
WET runway

Use the chart from 2.02.10 p6. Determine the maximum permissible takeoff weight (see example 3). The actual weight being lower than the maximum one, flexible takeoff is possible.

· Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 1+F,
Flexible temperature . . . . 50° C
· Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 2,
Flexible temperature . . . . 50° C
· Equivalent performance is obtained from the two different configurations.
Retain CONF 1 + F as the speeds are lower.
Takeoff speeds are V1 = 144 kt, VR = 144 kt, V2 = 148 kt
· First, apply the correction from FCOM page 2.02.24 p1.
Flexible temperature with air conditioning OFF . . . . 50° C
R Air conditioning correction . . . . – 6° C
R Intermediate flexible temperature . . . . 44° C
No speed correction.
· Apply WET correction
For flexible temperature < TVMC (54°), △Tflex = ...0° C
R Intermediate flex temperature . . . . 44° C
Associated speeds,
V1 = 144 kt – 2 = 142 kt
VR = 144 kt – 0 = 144 kt
V2 = 148 kt – 0 = 148 kt
Since the correction on V2 is 0, no V2 check against VMU limitation is necessary.
· Apply QNH correction
For flexible temperature < TVMC (54°), △Tflex = ... 0° C
R Maximum flexible temperature . . . . 44° C
Check that OAT/TREF < flex temperature ≤ TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 142 kt, VR = 144 kt, V2 = 148 kt

R

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	50	144	144	148
FCOM correction(s)	– 6	0	0	0
Intermediate value	44	144	144	148
WET Correction	0	– 2	0	0
Intermediate value	44	142	144	148
QNH Correction	0	0	0	0
Final value	44	142	144	148

FLEXIBLE TAKEOFF NOT POSSIBLE

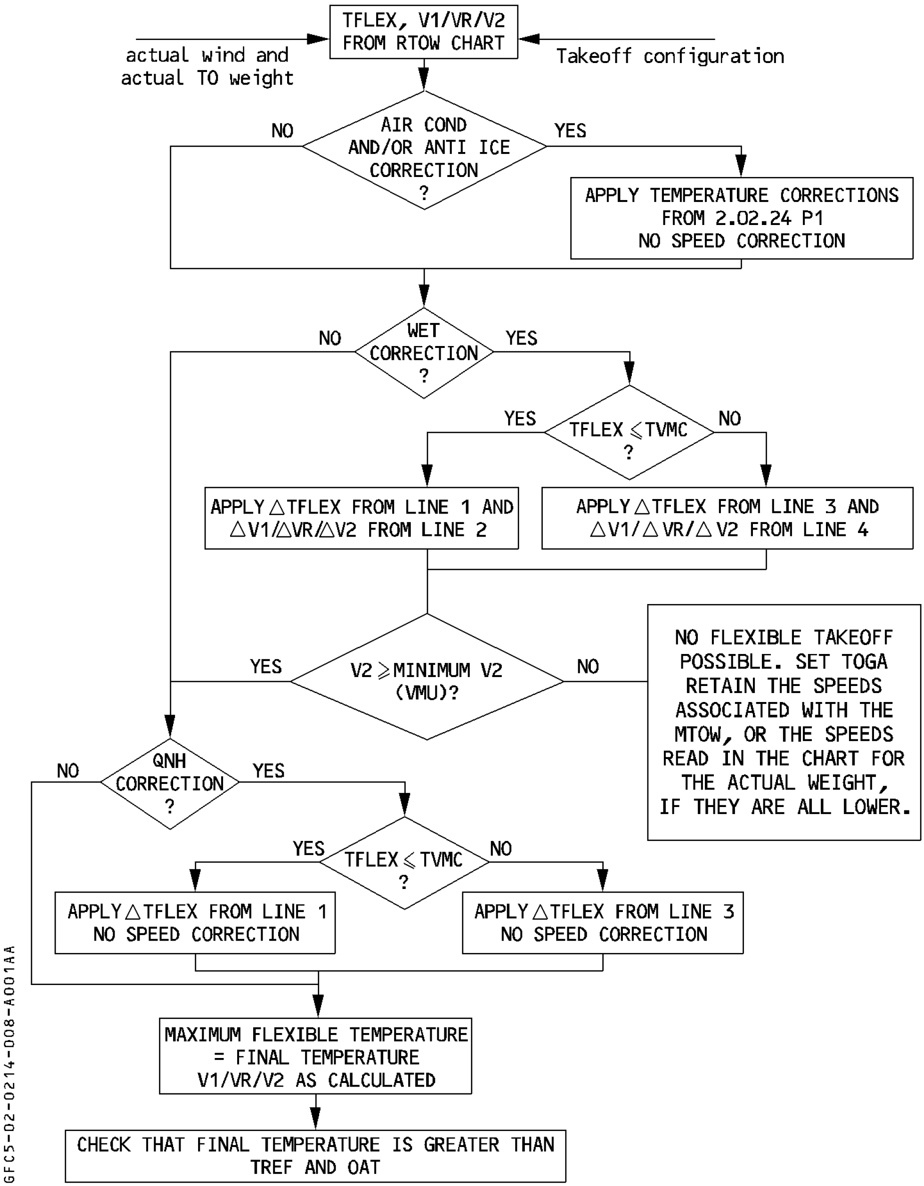
In some cases when the actual takeoff weight is lower than the maximum permissible one but no flexible takeoff possible (that is flexible temperature lower than TREF or OAT) :
- It is mandatory to use TOGA thrust
- You can retain the speeds that have been calculated for the maximum permissible takeoff weight;

OR
- You can retain the speeds associated with the actual takeoff weight provided they are all lower than the speeds calculated for the maximum permissible takeoff weight.

SUMMARY

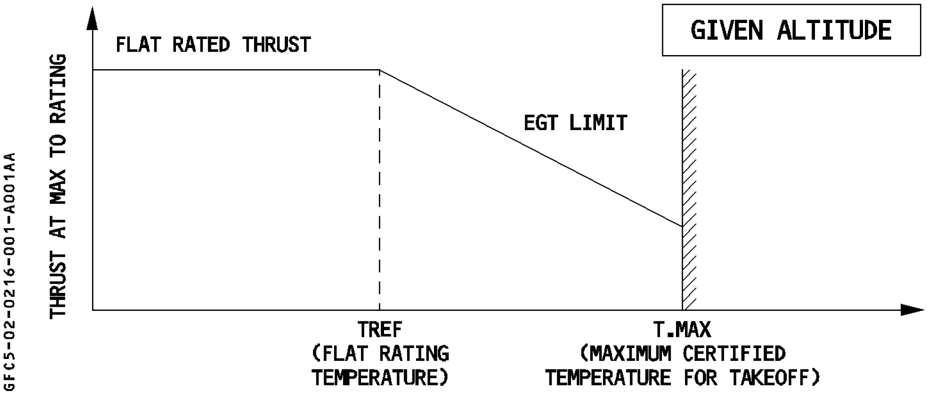
The flow diagram gives the different steps to follow.

R

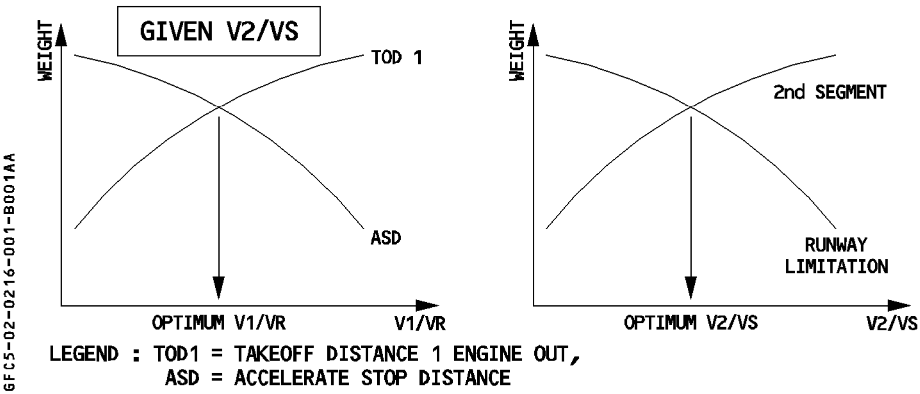


TAKEOFF PERFORMANCE

Takeoff optimization is calculated for a given runway and its obstacles and for given conditions of flap setting, temperature, wind and QNH. The calculation produces a maximum permissible takeoff weight (or a maximum takeoff temperature for an actual weight).
The takeoff thrust produced by the engine varies as follows :



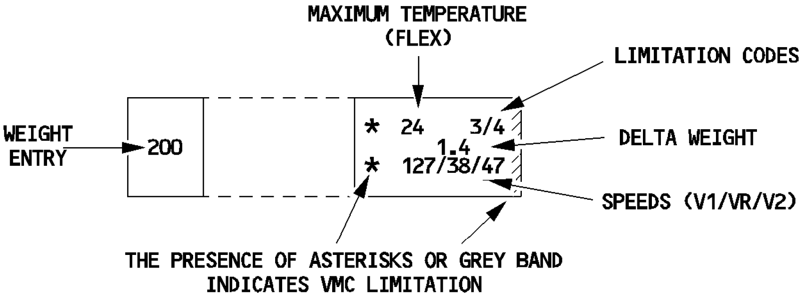
The optimization process calculates the speeds which will produce the maximum takeoff weight. To do so, it takes into account the different takeoff limitations, such as TOD, ASD, TOR, second segment..., as shown on the graphs below.



On a typical runway, the performance of a twin engine aircraft is generally limited by the one engine out operation at takeoff. The optimum V2/VS and optimum V1/VR are consequently unique.

TAKEOFF CHART DESCRIPTION

The takeoff chart (RTOW : Regulatory Takeoff Weight) is calculated for a specific aircraft version and for a particular runway specified at the top of the chart. The top of the chart also gives some information about the runway and lists the calculation assumptions.
The chart is given for 2 different configurations and 5 wind values per configuration. This allows the crew to select the configuration that gives either :
– the highest permissible takeoff weight, or, for a given weight,
– the highest flexible temperature.
If different configurations give equivalent performance the crew should select the configuration associated with the lowest takeoff speeds.
The left column of the chart contains weight entry : For each weight entry (and for a given configuration and wind), the chart provides the following information :



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Note : The takeoff weight is the sum of the weight entry and the delta weight.

The available limitation codes are :

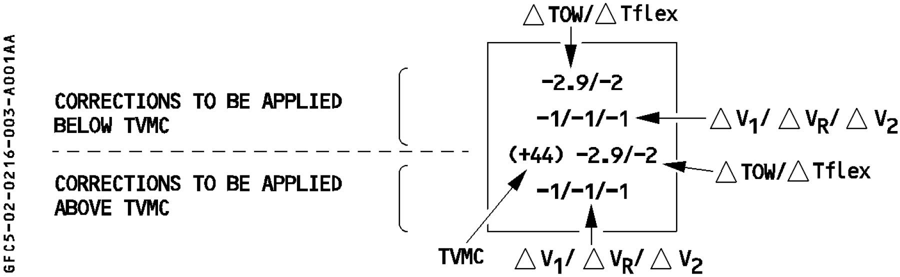
– First segment	:	1
– Second segment	:	2
– Runway length	:	3
– Obstacles	:	4
– Tire speed	:	5
– Brake energy	:	6
– Maximum computation weight	:	7
– Final takeoff	:	8
– VMU	:	9

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

Each takeoff chart is computed for a given set of conditions (air conditioning, QNH, anti ice...) specified at the top of the chart. If the actual takeoff conditions are different, the crew must apply corrections. Two types of corrections are available :
– Conservative corrections on 2.02.24 p 1 (to be used when not provided on the chart).
– Corrections (less restrictive) listed on the chart, to be applied as explained below.

DESCRIPTION OF THE CORRECTIONS ON TAKEOFF CHART

The corrections are presented on 4 lines :



TVMC is a temperature value given per column. This is a fictitious value that indicates the temperature above which the speeds are close to a VMC limitation or are VMC limited.

Note : The lower two lines may be shaded on certain chart formats.

R **MINIMUM SPEED**

R Minimum V1/VR/V2 due to VMC are provided on the bottom right side of the takeoff chart.
R They are only applicable in case of speed corrections.
R These speeds are conservative. They may be slightly higher than V1/VR/V2 displayed on
R the takeoff chart.

ADDITIONAL INFORMATION

ONE ENGINE OUT CLIMB PROCEDURE

The performance given in the chart is consistent with the flight path specified for the aircraft with one engine failure and takes into account significant obstacles.
When the procedure to be followed is not the standard instrument departure, the chart describes a specific procedure (EOSID).
When the specified procedure requires a turn, except if otherwise stated on the RTOW chart, the turn should be performed with a maximum bank of 15° until the aircraft reaches 1500 feet or green dot.
The acceleration height (or altitude) ensures that the net flight path clears the highest obstacle by at least 35 feet when accelerating in level flight to green dot speed after an engine failure, in the most adverse conditions.

TAKEOFF ON A WET RUNWAY

Takeoff charts computed for wet runway with a 15 feet screen height and/or use of reverse thrust may produce, in some conditions, a maximum takeoff weight (or flexible temperature) higher than that obtained for a dry runway. It is thus mandatory to compare both charts (dry and wet) and retain the lower of the two weights (or flexible temperature) and the associated speeds determined for a wet runway.

Note : The crew need not compare the charts if the top of the WET runway chart specifies "DRY CHECK". (The comparison has already been inserted in the WET runway calculation).

R

GFC5-02-0216-005-A001AB

AIRCRAFT MODEL — TAKEOFF CONFIGURATION — ENGINE TYPE — AIRPORT CHARACTERISTICS — WIND — AIRPORT IDENTIFICATION — RUNWAY CONDITION AND DERATE — RUNWAY IDENTIFICATION — OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE — TAKEOFF CONDITIONS

A330XXX	ENGINE	AIRPORT NAME				15L	Version ABXXXXXX	Date **V9
QNH	1013 HPA	Elevation	489 FT	TORA	3000 M	0 obstacle	DRY	
Air conditioning	AC OFF	Isa temp	14 C	TODA	3000 M			
Anti-icing	AI OFF	Rwy slope	.08%	ASDA	3000 M			
All reversers operating								
No reversers on dry runway								

WEIGHT 1000 KG	CONF 1 + F TAILWIND - 10 KT	CONF 1 + F TAILWIND - 5 KT	CONF 1 + F WIND 0 KT	CONF 1 + F HEADWIND 10 KT	CONF 2 TAILWIND - 10 KT	CONF 2 TAILWIND - 5 KT	CONF 2 WIND 0 KT	CONF 2 HEADWIND 10 KT
220	-15 3/3 .3 147/48/54	7 3/3 .1 148/48/55	28 3/3 .0 149/50/55	31 3/3 .2 151/52/57	-15 3/3 .2 147/49/54	6 3/3 .1 148/49/54	26 3/3 .0 149/51/55	30 3/3 .5 151/53/57
210	19 3/3 .1 142/44/50	33 3/3 .4 143/44/50	37 3/3 .0 147/48/53	38 3/3 1.3 150/51/55	30 3/3 .3 139/41/46	33 3/3 .8 143/45/49	36 3/3 .6 147/49/53	38 3/3 .1 150/51/55
200	36 3/3 .5 139/41/47	41 3/3 .8 142/42/48	44 3/3 .1 145/46/51	45 3/3 .7 148/49/53	38 3/3 .6 138/39/44	41 3/3 .3 141/43/47	43 3/3 .7 145/47/51	44 3/3 1.2 148/49/53
190	45 3/3 .4 137/37/43	47 3/3 1.6 140/41/46	49 3/3 1.6 145/45/49	51 3/3 .1 147/47/51	45 3/3 .8 136/37/42	47 3/3 1.0 140/41/45	49 3/3 .7 144/45/49	50 3/3 .6 147/48/51
180	51 3/3 1.5 135/35/41	53 3/3 1.5 139/39/44	56 2/3 .2 143/43/47	57 3/7 .0 144/44/48	51 3/3 1.3 135/36/40	53 3/3 1.2 139/40/43	55 3/3 .8 144/44/47	56 3/3 .7 147/47/50
170	57 3/7 .0 127/30/35	* 57 3/7 * .0 * 122/30/35	* 57 7/9 * .0 * 120/30/35	* 57 7/9 * .0 * 120/30/35	57 3/7 .0 128/31/34	57 3/7 .0 124/31/35	* 57 3/7 * .0 * 121/31/34	* 57 2/7 * .0 * 120/31/34
160	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28
150	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	DO NOT USE FOR				* 57 7/7 * .0 * 120/23/28	* 57 7/7 * .0 * 120/23/28
140	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	OPERATIONAL PURPOSE				* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29
130	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29
	GRAD1/GRAD2 (KG/C)							
	220/****	210/****	160/****	160/1010	150/****	150/****	150/****	140/1040
	INFLUENCE OF RUNWAY CONDITION							
WET	.0/ -1 -2/ 0/ 0 (+57).0/-1 -2/ 0/ 0	.0/ -1 -1/ 0/ 0 (+57)-.2/-1 -1/ 0/ 0	.0/ 0 -1/ 0/ 0 (+57)-.4/-1 -1/ 0/ 0	.0/ 0 0/ 0/ 0 (+57)-.4/-1 0/ 0/ 0	-.2/ -1 -3/ 0/ 0 (+57)-.4/-1 -3/ 0/ 0	-.1/ -1 -3/ 0/ 0 (+57)-.1/-1 -3/ 0/ 0	-.2/ -1 -2/ 0/ 0 (+57)-.2/-1 -2/ 0/ 0	-.2/ -1 -2/ 0/ 0 (+57)-.4/-1 -2/ 0/ 0
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-10	-2.2/ -2 0/ -1/ -1 (+54)-2.2/-2 0/ 0/ 0	-2.5/ -2 0/ -1/ -1 (+54)-2.5/-2 0/ 0/ 0	-2.6/ -2 0/ -1/ -1 (+54)-2.6/-2 0/ 0/ 0	-2.2/ -2 -1/ -1/ -1 (+54)-2.2/-2 -1/ 0/ 0	-1.8/ -2 0/ 0/ 0 (+54)-1.8/-2 0/ 0/ 0	-2.0/ -2 0/ -1/ -1 (+54)-2.0/-2 0/ 0/ 0	-2.1/ -2 0/ 0/ 0 (+54)-2.1/-2 0/ 0/ 0	-2.1/ -2 0/ -1/ -1 (+54)-2.1/-2 0/ 0/ 0
+10	+1.5/ +1 0/ +1/ +1 (+57)+1.5/+1 0/ +1/ +1	+1.6/ +1 +1/ +1/ +1 (+57)+1.4/0 +1/ +1/ +1	+1.5/ 0 +1/ +1/ +1 (+57)+1.1/0 +1/ +1/ +1	+1.5/ 0 +1/ +1/ +1 (+57)+1.1/0 +1/ +1/ +1	+1.5/ +1 0/ +1/ +1 (+57)+1.3/0 0/ +1/ +1	+.9/ 0 +1/ +1/ +1 (+57)+.9/0 +1/ +1/ +1	+1.0/ 0 +1/ +1/ +1 (+57)+1.0/0 +1/ +1/ +1	+1.4/ 0 +1/ +1/ +1 (+57)+1.2/0 +1/ +1/ +1

GRAD1/GRAD2

LABEL FOR INFLUENCE	OAT C DW CODES	* VMC	Tref (OAT) =29 C	Min acc height 535Ft	Min QNH alt 1031Ft
DW (1000 KG) DTFLEX	V1min/VR/V2 (KT)	* LIMITATION	Tmax (OAT) =54 C	Max acc height 1907Ft	Max QNH alt 2403Ft
DV1-DVR-DV2 (KT)	LIMITATION CODES:			MIN V1/VR/V2 = 120/22/28	
(TVMC OAT C)	1=1st segment 2=2nd segment 3=runway length 4=obstacles			CHECK VMU LIMITATION	
DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU			CORRECT. V1/VR/V2 = .3Kt/1000 Kg	

MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.

INFLUENCE CORRECTION
ΔWEIGHT ΔTFLEX
ΔV1/ΔV_R/ΔV2
(TVMC) ΔWEIGHT ΔTFLEX
ΔV1/ΔV_R/ΔV2

TAKEOFF PARAMETERS

MAX TEMPERATURE (57) — LIMITATION CODE (7-7)

DELTA WEIGHT (1000 KG) (.0)

V_1 (KT IAS) - V_R (KT IAS) - V_2 (KT IAS)
(123) (123) (130)

MINIMUM VALUES OF V1/VR/V2 TO WHICH TAKEOFF SPEEDS MUST BE LIMITED WHEN DECREMENTS ARE APPLIED

V1/VR/V2 DECREMENTS FOR WEIGHTS BELOW THE LOWEST WEIGHT OF A COLUMN

R

A330XXX	ENGINE	AIRPORT NAME						15L	Version Date ABXXXXXX**V9
QNH	1013.00 HPA	Elevation	489	FT	TORA	3000	M		
Air cond.	AC OFF	Isa temp	14	C	TODA	3000	M		
Anti-icing	AI OFF	rwy slope	.08	%	ASDA	3000	M	0 obstacle	DRY
All reversers operating No reversers on dry runway									

WEIGHT 1000 KG	CONF 1+F				CONF 2			
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT
220	-15 3/3 .3 147/48/54	7 3/3 .1 148/48/55	28 3/3 .0 149/50/55	31 3/3 .2 151/52/57	-15 3/3 .2 147/49/54	6 3/3 .1 148/49/54	26 3/3 .0 149/51/55	30 3/3 .5 151/53/57
210	19 3/3 .1 142/44/50	33 3/3 .4 143/44/50	37 3/3 .0 147/48/53	38 3/3 1.3 150/51/55	30 3/3 .3 139/41/46	33 3/3 .8 143/45/49	36 3/3 .6 147/49/53	38 3/3 .1 150/51/55
200	36 3/3 .5 139/41/47	41 3/3 .8 142/42/48	44 3/3 .1 145/46/51	45 3/3 .7 148/49/53	38 3/3 .6 138/39/44	41 3/3 .3 141/43/47	43 3/3 .7 145/47/51	44 3/3 1.2 148/49/53
190	45 3/3 .4 137/37/43	47 3/3 1.6 140/41/46	49 3/3 1.6 145/45/49	51 3/3 .1 147/47/51	45 3/3 .8 136/37/42	47 3/3 1.0 140/41/45	49 3/3 .7 144/45/49	50 3/3 .6 147/48/51
180	51 3/3 1.5 135/35/41	53 3/3 1.5 139/39/44	56 2/3 .2 143/43/47	57 3/7 .0 144/44/48	51 3/3 1.3 135/36/40	53 3/3 1.2 139/40/43	55 3/3 .8 144/44/47	56 3/3 .7 147/47/50
170	57 3/7 .0 127/30/35	* 57 3/7 * .0 * 122/30/35	* 57 7/9 * .0 * 120/30/35	* 57 7/9 * .0 * 120/30/35	57 3/7 .0 128/31/34	57 3/7 .0 124/31/35	* 57 3/7 * .0 * 121/31/34	* 57 2/7 * .0 * 120/31/34
160	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/9 * .0 * 120/25/31	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28	* 57 7/7 * .0 * 120/24/28
150	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	**DO NOT USE FOR OPERATIONAL PURPOSE**				* 57 7/7 * .0 * 120/23/28	* 57 7/7 * .0 * 120/23/28
140	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30					* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29
130	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 123/23/30	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29	* 57 7/7 * .0 * 120/23/29
	GRAD1/GRAD2 (KG/C)							
	220/****	210/****	160/****	160/1010	150/****	150/****	150/****	140/1040
	INFLUENCE OF RUNWAY CONDITION							
WET	.0/ -1 -2/ 0/ 0 (+57) .0/ -1 -2/ 0/ 0	.0/ -1 -1/ 0/ 0 (+57) -.2/ -1 -1/ 0/ 0	.0/ 0 -1/ 0/ 0 (+57) -.4/ -1 -1/ 0/ 0	.0/ 0 0/ 0/ 0 (+57) -.4/ -1 0/ 0/ 0	-.2/ -1 -3/ 0/ 0 (+57) -.4/ -1 -3/ 0/ 0	-.1/ -1 -3/ 0/ 0 (+57) -.1/ -1 -3/ 0/ 0	-.2/ -1 -2/ 0/ 0 (+57) -.2/ -1 -2/ 0/ 0	-.2/ -1 -2/ 0/ 0 (+57) -.4/ -1 -2/ 0/ 0
D QNH HPA	**INFLUENCE OF DELTA PRESSURE**							
-10	-2.2/ -2 0/ -1/ -1 (+54) -2.2/ -2 0/ 0/ 0	-2.5/ -2 0/ -1/ -1 (+54) -2.5/ -2 0/ 0/ 0	-2.6/ -2 0/ -1/ -1 (+54) -2.6/ -2 0/ 0/ 0	-2.2/ -2 -1/ -1/ -1 (+54) -2.2/ -2 -1/ 0/ 0	-1.8/ -2 0/ 0/ 0 (+54) -1.8/ -2 0/ 0/ 0	-2.0/ -2 0/ -1/ -1 (+54) -2.0/ -2 0/ 0/ 0	-2.1/ -2 0/ 0/ 0 (+54) -2.1/ -2 0/ 0/ 0	-2.1/ -2 0/ -1/ -1 (+54) -2.1/ -2 0/ 0/ 0
+10	+1.5/ +1 0/ +1/ +1 (+57) +1.5/ +1 0/ +1/ +1	+1.6/ +1 +1/ +1/ +1 (+57) +1.4/ 0 +1/ +1/ +1	+1.5/ 0 +1/ +1/ +1 (+57) +1.1/ 0 +1/ +1/ +1	+1.5/ 0 +1/ +1/ +1 (+57) +1.1/ 0 +1/ +1/ +1	+1.5/ +1 0/ +1/ +1 (+57) +1.3/ 0 0/ +1/ +1	+.9/ 0 +1/ +1/ +1 (+57) +.9/ 0 +1/ +1/ +1	+1.0/ 0 +1/ +1/ +1 (+57) +1.0/ 0 +1/ +1/ +1	+1.4/ 0 +1/ +1/ +1 (+57) +1.2/ 0 +1/ +1/ +1

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	OAT C DW CODES V1min/VR/V2 (kt)	* VMC *LIMITATION	Tref (OAT) = 29 C Tmax (OAT) = 54 C	Min acc height 535 FT Min QNH alt 1031 FT Max acc height 1907 FT Max QNH alt 2403 FT
	LIMITATION CODES : 1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU			Min V1/VR/V2 = 120/22/28 CHECK VMU LIMITATION Correct. V1/VR/V2 = .3 KT/1000 KG

DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS

GENERAL

The takeoff chart is computed for a given runway under a set of conditions, which are :
- OAT
- Wind
- Configuration
- QNH, air conditioning, anti ice...

Two configurations are produced on the chart. This enables the crew to select that giving the highest permissible takeoff weight. In case of equivalent performance, retain the configuration giving the lower takeoff speeds.

MTOW DETERMINATION

Enter the chart with the first configuration and actual wind column reading the temperature value. This temperature value stands for the OAT. Read the maximum takeoff weight corresponding to the actual OAT. Note that it is allowed to interpolate between two consecutive lines to obtain the maximum takeoff weight.
It is reminded that the takeoff weight is the sum of the weight entry and the delta weight.
Similarly determine the takeoff speeds associated with the maximum takeoff weight.
In somes cases, it may happen that the first temperature value (displayed for the highest weight entry) is higher than OAT. In this case, it is allowed to extrapolate the weight value to avoid unnecessary penalty. Use the Grad 1/Grad 2 gradients provided at the bottom of the corresponding column.

Correction to weight
Grad 1/Grad 2 are gradients provided for both sides of the flat rating temperature (TREF). Grad 1 applies to temperatures below TREF and Grad 2 applies above TREF.
Read the lowest temperature of the column (corresponding to the highest weight entry).

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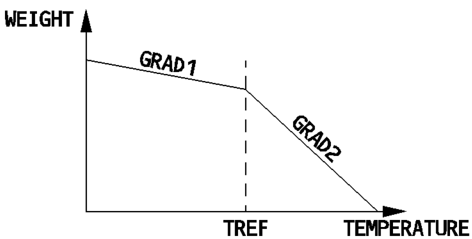


· If the lowest temperature and OAT are above TREF.
Obtain weight increment by multiplying Grad 2 by the difference in temperature between OAT and lowest temperature. Add this weight increment to the maximum takeoff weight calculated for the lowest temperature.

· If the lowest temperature and OAT are below TREF.
Obtain weight increment by multiplying Grad 1 by the difference in temperature between OAT and lowest temperature. Add this weight increment to the maximum takeoff weight calculated for the lowest temperature.

· If OAT is below TREF and lowest temperature is above TREF.
The weight increment is calculated in two steps. Step one is multiplying Grad 2 by temperature difference between lowest temperature and TREF. Step two is multiplying Grad 1 by temperature difference between TREF and OAT. Add results from step one and two to maximum takeoff weight calculated for lowest temperature.

Note : *Use the weight gradients only to extrapolate above the maximum weight shown in the RTOW chart. They are not valid for interpolation between two boxes, between filled boxes or between one filled and one blank box.*

— Repeat the above process for the other available configuration and retain the configuration giving the highest takeoff weight.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

Retain the maximum takeoff weight, associated configuration and speeds from above.
For conditions different from those of the chart, apply relevant corrections.

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 p 1

Corrections are given for QNH $\neq$ 1013 hPa, air conditioning ON, anti ice ON.

1. For the given wind and temperature conditions, determine the maximum takeoff weight (choose the configuration giving the highest weight).
2. Apply the published weight correction(s) to the maximum takeoff weight (for each correction) to determine the maximum permissible takeoff weight.
3. Read the speeds associated with the maximum permissible takeoff weight by entering the chart with the retained configuration and weight value.

Example A

DATA : OAT = 25°C
Head Wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

R Use the chart from 2.02.16 p 6.
Enter the 10 kt head wind column, CONF 1+F, to read for 25°C.
The lowest temperature of the column is 31°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.
Max TO weight (1000 kg) air conditioning OFF = 220.2+1.010×2+0.160×4=222.9
Enter the 10 kt head wind column, CONF 2, to read for 25°C.
The lowest temperature of the column is 30°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.
Max TO weight (1000 kg) air conditioning OFF=220.5+1.040×1+0.140×4=222.1

Retain CONF 1+F as takeoff configuration.
Maximum TO weight (1000 kg) air conditioning OFF 222.9
Air conditioning correction (FCOM 2.02.24 p1) . . . . – 7.1
Maximum permissible TO weight (1000 kg) air conditioning ON 215.8
Determine takeoff speeds for 215.8 (1000 kg) in the 10 kt head wind column (CONF1+F)
R V1 = 150 kt, VR = 152 kt, V2 = 156 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

R **CORRECTIONS PRODUCED ON THE RTOW CHART (SEE EXAMPLE ON 2.02.16 P 6)**

A description of this correction is given on 2.02.16 p3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti ice. A maximum of three corrections can be produced on one chart.
To apply the corrections, proceed as follows :

1. Determine the maximum takeoff weight before correction for the given OAT and wind condition.
2. Apply the first correction :
   If OAT is less than or equal to TVMC (line 3), apply △W correction from line 1 and △V1/△VR/△V2 corrections from line 2.
   Else, (for OAT greater than TVMC), apply △W correction from line 3 and △V1/ △VR/△V2 corrections from line 4.
3. To combine a second (and third, as applicable) correction :
   If OAT is less than or equal to TVMC (line 3), apply △W correction from line 1 and △V1/△VR/△V2 corrections from line 2.
   Check that the resulting speeds are higher than the minimum speeds displayed on the RTOW chart and that V2 is higher than the VMU limited speed (FCOM 2.02.25).
   If OAT is higher than TVMC (line3) or if the above speed check is not fulfilled, apply △W correction from line 3 and △V1/△VR/△V2 corrections from line 4. No speed check is required.

Note : – *QNH correction is given for ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.*
– *When using a takeoff chart with failure cases, it is not allowed to combine two failure cases.*
– *Corrections from the chart must be applied from top to bottom, i.e. in the RTOW*
R *on 2.02.16 p6, apply the wet correction first.*
– *If asterisk or dotted lines appear in the correction boxes, refer to more conservative corrections provided in the FCOM.*
– *No speed check is required for the first correction. However, if the first influence correction follows a conservative FCOM correction, a speed check is required.*

Example B

DATA : OAT = 35°C
Head wind = 10 kt
QNH = 998 hPa
WET runway

R Use the chart from 2.02.16 p 6.

· Enter the 10 kt head wind column, CONF 1+F, to read for 35°C
max TO weight (1000 kg) 215.1

· Enter the 10 kt head wind column, CONF 2, to read for 35°C
max TO weight (1000 kg) 214.0

· Retain CONF 1+F for takeoff.

· Read associated speeds as V1 = 150 kt, VR = 151 kt, V2 = 156 kt

· Apply WET correction
For OAT < TVMC (57°), △W = ... 0.0
Intermediate weight (1000 kg) 215.1
Associated speeds,
V1 = 150 kt – 0 = 150 kt
VR = 151 kt – 0 = 151 kt
V2 = 156 kt – 0 = 156 kt
(No speed check required for first correction)

· Apply QNH correction
For OAT < TVMC (54°), △W = – 2.2 × 15/10 =. . . . .– 3.3
Maximum permissible takeoff weight (1000 kg) 211.8
Associated speeds,
V1 = 150 kt – 1 × 15/10 = 148 kt
VR = 151 kt – 1 × 15/10 = 150 kt
V2 = 156 kt – 1 × 15/10 = 155 kt

· Check that the speeds are higher than minimum speeds from the chart and from VMU table.

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	215.1	150	151	156
FCOM correction(s)				
Intermediate value	215.1	150	151	156
WET Correction	0.0	0	0	0
Intermediate value	215.1	150	151	156
QNH Correction	– 3.3	– 2	– 1	– 1
Final value	211.8	148	150	155

COMBINING CORRECTIONS FROM FCOM AND CHART

Proceed as follows :

1. Determine the maximum takeoff weight by entering the chart with selected configuration, OAT and wind.
2. Apply corrections from FCOM to determine an intermediate weight. Interpolate associated speeds for intermediate weight in the same column (same wind and configuration).
3. Apply corrections from RTOW chart as explained above.

Example C

DATA : OAT = 25°C
Head wind = 10 kt
Air conditioning ON
QNH = 998 hPa
WET runway

R 1. Use the chart from 2.02.16 p 6.
Enter the 10 kt head wind column, CONF 1+F, to read for 25°C
Max TO weight (1000 kg) air conditioning OFF = 220.2 + 1.010 × 2 + 0.160 × 4 = 222.9
Enter the 10 kt head wind column, CONF 2, to read for 25°C
Max TO weight (1000 kg) air conditioning OFF= 220.5 + 1.040 × 1 + 0.140 × 4 = 222.1
Retain CONF 1+F for takeoff configuration.

2. First, apply the correction from FCOM page 2.02.24 p 1.
Max TO weight (1000 kg) air conditioning OFF 222.9
Air conditioning correction . . . . – 7.1
Intermediate weight 215.8
Interpolate takeoff speeds for 215.8 (1000 kg) in the 10 kt head wind column,
R V1 = 150 kt, VR = 152 kt, V2 = 156 kt

3. Apply WET correction
For OAT < TVMC (57°), △W = ... 0.0
Intermediate weight 215.8
Associated speeds,
R V1 = 150 kt – 0 = 150 kt
VR = 152 kt – 0 = 152 kt
V2 = 156 kt – 0 = 156 kt
Check that the speeds are higher than minimum speeds from the chart and from VMU table.
Apply QNH correction
For OAT < TVMC (54°), △W = – 2.2 × 15/10 = ... <u>– 3.3</u>
Maximum permissible takeoff weight 212.5
Associated speed,
R V1 = 150 kt – 1 × 15/10 = 148 kt
VR = 152 kt – 1 × 15/10 = 151 kt
V2 = 156 kt – 1 × 15/10 = 155 kt

Check that the speeds are higher than minimum speeds from the chart and from VMU table. (It is reminded that if the speed checks are not fulfilled, the corrections must be recalculated using those provided on lines 3 and 4).
Since the speed check is fulfilled :
Maximum permissible takeoff weight = 212.5 (1000 kg)
R V1 = 148 kt, VR = 151 kt, V2 = 155 kt.
R

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	222.9			
FCOM correction(s)	– 7.1			
Intermediate value	215.8	150	152	156
WET Correction	0.0	0	0	0
Intermediate value	215.8	150	152	156
QNH Correction	– 3.3	– 2	– 1	– 1
Final value	212.5	148	151	155

EXTRAPOLATION

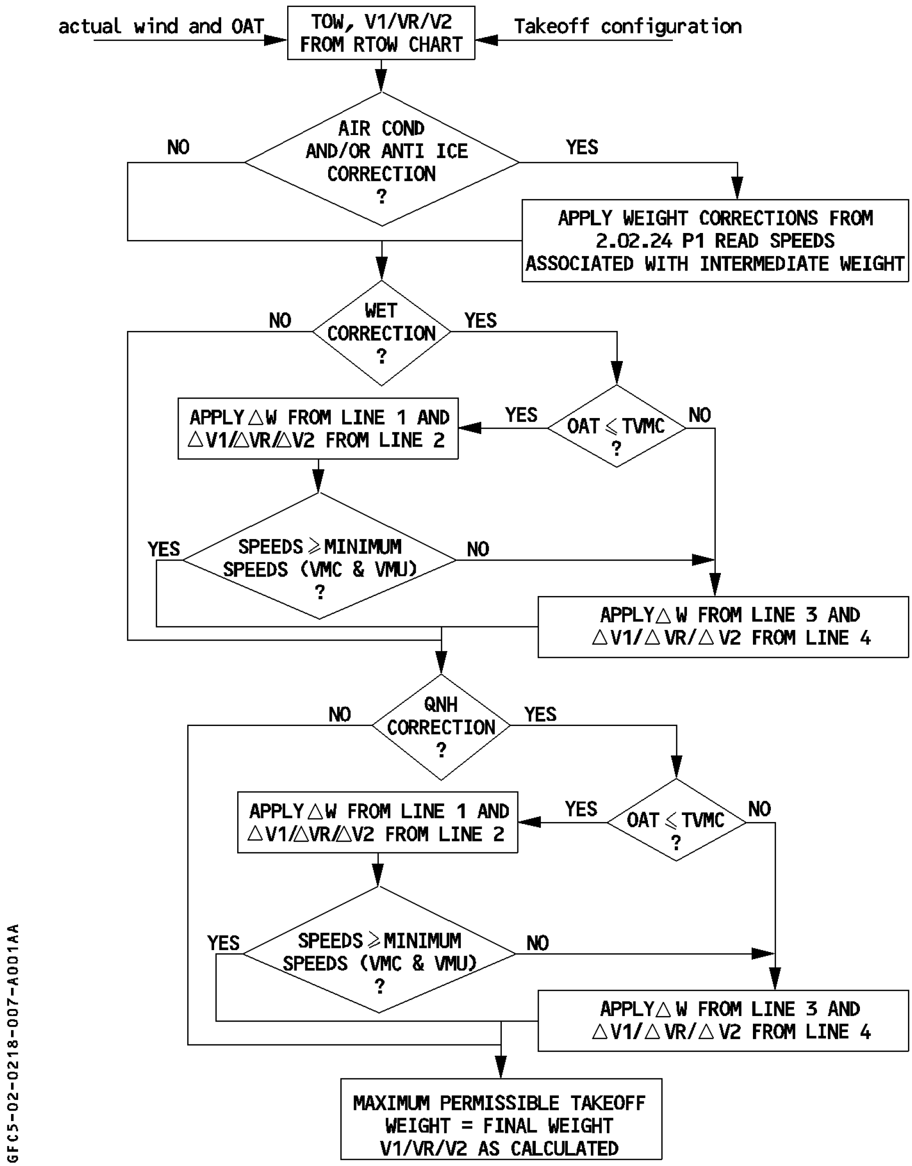
For OAT lower than the lowest temperature value at a wind column, it is possible to obtain a higher maximum permissible takeoff weight by using Grad 1/Grad 2 values. See page 1 for more details.

MAXIMUM STRUCTURAL TAKEOFF WEIGHT

The maximum structural takeoff weight is a weight limitation depending on the aircraft. This limitation is provided in the Flight Manual and in the chapter Limitation of the FCOM3. Compare the maximum structural takeoff weight to the maximum permissible takeoff weight computed for given conditions and retain the lower of the two values.

SUMMARY

The following flow diagram gives the different steps to follow.



DEFINITION OF FLEXIBLE TAKEOFF

In many cases the aircraft takes off with a weight lower than the maximum permissible takeoff weight. When this happens, it can meet the required performance (runway, second segment, obstacle,...) with a decreased thrust that is adapted to the weight : this is called FLEXIBLE TAKEOFF and the thrust is called FLEXIBLE TAKEOFF THRUST.
The use of flexible takeoff thrust saves engine life.

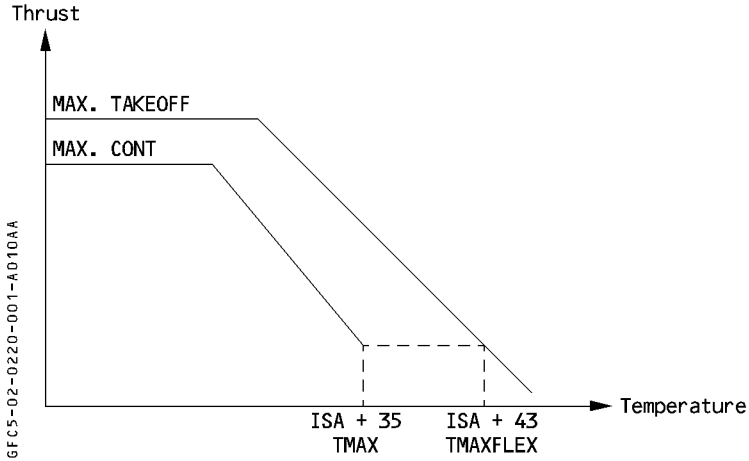
USE OF FLEXIBLE TAKEOFF

The pilot can use flexible takeoff when the actual takeoff weight is lower than the maximum permissible takeoff weight for the actual temperature. The maximum permissible takeoff weight decreases when temperature increases, so it is possible to assume a temperature at which the actual takeoff weight would be the limiting one. This temperature is called FLEXIBLE TEMPERATURE or assumed temperature and is entered in the FADEC via the MCDU PERF TO page in order to get the adapted thrust.

REQUIREMENTS

- Thrust must not be reduced by more than 25 % of the full rated takeoff thrust.
- The flexible takeoff N1 cannot be lower than the Max Climb N1 at the same flight conditions.
  The FADEC takes the above two constraints into account to determine the flexible N1.
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 35 at 16600 ft and above).
  This constraint limits the maximum flexible temperature at ISA + 43 (58° C at sea level)
- The flexible temperature cannot be lower than the flat rating temperature, TREF (ISA + 15), or the actual temperature (OAT).

R



– Flexible takeoff is not permitted on contaminated runways.
– The operator should check the maximum thrust (TOGA) at regular intervals in order to detect any engine deterioration, or maintain an adequate engine performance monitoring program to follow up the engine parameters.

RECOMMENDATION

R · In order to extend engine life and save maintenance costs, it is recommended to use
R flexible thrust reduction.
· However, to improve the takeoff performance the thrust can be increased by selecting a lower flex temperature.

Using the same takeoff chart, for a given weight, it is possible to :
– Select a temperature lower than the maximum determined one and keep the speeds defined at maximum temperature or,
– Move towards the left side of the takeoff chart (tailwind) while remaining with the same configuration and looking for the same actual takeoff weight.
This produces a lower flexible temperature and, in general, lower takeoff speeds (V1/VR/V2).

<u>Using one of the two above possibilities, check that the selected temperature is greater than the actual temperature (OAT) and greater than the flat rating temperature (TREF).</u>

TAKEOFF PROCEDURE

Depending on environmental takeoff conditions, the following procedure is recommended.

R

CONDITIONS	PROCEDURE	REASON
Dry or wet, well paved runway	– Use the flap setting giving the highest flexible temperature. – When flexible temperature difference between two flap settings is low, use the highest flap setting.	Extend engine life and save maintenance costs.
High altitude takeoff	– Use CONF2/CONF3	Improve comfort.
Badly paved runway or Accelerate stop distance limited runway	– Use CONF2/CONF3 or – Move towards left side of the takeoff chart.	Improve comfort. Improve stopping distance.
Windshear expected along takeoff path	– Use maximum thrust.	Maintain acceleration capability.
Contaminated runway	– Use maximum thrust. (flex forbidden).	Improve stopping distance Decrease time on runway. Required by regulations.

DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS

Before determining the flexible temperature, calculate the maximum permissible takeoff weight (see previous section) and ensure that the actual takeoff weight is lower than the determined maximum takeoff weight.

- For a given configuration and wind value, enter the RTOW chart with the actual takeoff weight to read the flexible temperature and associated speeds. It is reminded that the takeoff weight is the sum of the weight entry and the delta weight displayed in each box. It is allowed to interpolate between two consecutive rows and/or columns for weight and for wind values not displayed on the chart.
- Repeat this process for the other configuration available. Select that configuration giving the highest flexible temperature.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

When the takeoff conditions are different from those provided on the chart, apply the associated corrections.

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 P1

Corrections are given for QNH $\neq$ 1013 hPa, air conditioning ON, anti ice ON.

1. For a given takeoff weight, wind condition and selected configuration, read the flexible temperature. Retain the takeoff speeds associated with the actual weight.
2. Apply the published temperature correction. To combine two or more corrections, add the different corrections and apply to temperature value.
   (No speed corrections required).

Example D

DATA : Actual takeoff weight = 170 000 kg
Head wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

R Use the chart from 2.02.16 p6. Determine the maximum permissible takeoff weight (see example A). The actual weight being lower than the maximum one, flexible takeoff is possible.
Enter the 10 kt head wind column and interpolate for 170 000 kg, CONF 1+F,
Flexible temperature . . . . 57° C
Enter the 10 kt head wind column and interpolate for 170 000 kg, CONF 2,
Flexible temperature . . . . 57° C

Equivalent performance is obtained from the two different configurations.
Retain CONF 1 + F as the speeds are lower.
Takeoff speeds are V1 = 120 kt, VR = 130 kt, V2 = 135 kt
Flexible temperature with air conditioning OFF . . . . 57° C
R Air conditioning correction (FCOM 2.02.24 p1) . . . . – 6° C
R Maximum flexible temperature . . . . 51° C

CORRECTIONS FOR WET RUNWAY FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

CORRECTIONS PRODUCED ON THE RTOW CHART (SEE EXAMPLE ON 2.02.16 P6)

A description of this correction is given on 2.02.16 p3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti ice. A maximum of three corrections can be produced on one chart.
To apply the correction, proceed as follows :

1. Enter the chart with selected configuration, wind and actual takeoff weight to read the flexible temperature associated with this weight.
2. Apply the first correction :
   If the flexible temperature is less than or equal to TVMC (line 3), apply △Tflex correction from line 1 and apply speed corrections (△V1/△VR/△V2) from line 2.
   Else, (flexible temperature greater than TVMC), apply △Tflex from line 3 and △V1/△VR/△V2 corrections from line 4.
   Check V2 against VMU limitation (FCOM 2.02.25). If V2 is lower than V2 limited by VMU, flexible takeoff is not possible. Set TOGA thrust and retain the speeds associated with maximum permissible takeoff weight or the speeds read in the chart for the actual weight if they are all lower.
   <u>No speed correction is required for QNH and bleeds influence</u> (Not applicable to maximum takeoff weight determination).
3. To combine a second and/or a third correction, proceed as per point 2.
4. Check that the final flexible temperature is :
   – higher than OAT and TREF
   – limited to TMAXFLEX
     If the check is fulfilled, retain final flexible temperature as the one to be inserted in the MCDU.
     If the check is not fulfilled, (final flexible temperature lower than OAT or TREF), no flexible takeoff is possible.
     Use TOGA thrust and retain speeds that have been calculated for the maximum permissible takeoff weight. (See 2.02.20 p7)

<u>Note</u> : – QNH correction is given for ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.
– Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.16 p6, apply the wet influence first.

Note : – *When the flexible temperature is higher than TVMC, it is allowed to limit the flexible temperature to TVMC and apply only corrections from lines 1 and 2.*
– *If asterisk or dotted lines appear in the correction boxes, refer to more conservative corrections provided in the FCOM.*

Example E

DATA : Actual takeoff weight = 190 000 kg
Head wind = 10 kt
QNH = 1028 hPa
WET runway
Air conditioning OFF

R Use the chart from 2.02.16 p6. Determine the maximum permissible takeoff weight (see example B). The actual weight being lower than the maximum one, flexible takeoff is possible.
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 1+F,
Flexible temperature . . . . 51° C
Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 2,
Flexible temperature . . . . 50° C
Retain CONF 1 + F for take off as the flexible temperature is higher.
Takeoff speeds are V1 = 147 kt, VR = 147 kt, V2 = 151 kt
Apply WET correction
For flexible temperature < TVMC (57°), △Tflex = ... 0° C
Intermediate flex temperature . . . . 51° C
Associated speeds,
V1 = 147 kt – 0 = 147 kt
VR = 147 kt – 0 = 147 kt
V2 = 151 kt – 0 = 151 kt

R Since the correction on V2 is 0, no V2 check against VMU limitation is necessary.
Apply QNH correction
For flex temperature < TVMC (57°), △Tflex = ... + 0° C
Maximum flexible temperature . . . . 51° C
Check that OAT/TREF < flex temperature ≤ TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 147 kt, VR = 147 kt, V2 = 151 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	51	147	147	151
FCOM correction(s)				
Intermediate value	51	147	147	151
WET Correction	0	0	0	0
Intermediate value	51	147	147	151
QNH Correction	0	0	0	0
Final value	51	147	147	151

COMBINING CORRECTIONS FROM FCOM AND CHART

1. Apply corrections from FCOM (see 2.02.24 p1).
2. Apply corrections from the RTOW chart.
   Apply speed corrections except for QNH and bleed influences.

Example F

DATA : Actual takeoff weight = 190 000 kg
Head wind = 10 kt
Air conditioning ON
QNH = 1028 hPa
WET runway

Use the chart from 2.02.16 p6. Determine the maximum permissible takeoff weight (see example C). The actual weight being lower than the maximum one, flexible takeoff is possible.

· Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 1+F,
  Flexible temperature . . . . 51° C
· Enter the 10 kt head wind column and interpolate for 190 000 kg, CONF 2,
  Flexible temperature . . . . 50° C
· Retain CONF 1 + F for takeoff as the flexible temperature is higher.
  Takeoff speeds are V1 = 147 kt, VR = 147 kt, V2 = 151 kt
· First, apply the correction from FCOM page 2.02.24 p1.
  Flexible temperature with air conditioning OFF . . . . 51° C
R Air conditioning correction . . . . – 6° C
R Intermediate flexible temperature . . . . 45° C
  No speed correction.
· Apply WET correction
  For flexible temperature < TVMC (57°), △Tflex = ... 0° C
R Intermediate flex temperature . . . . 45° C
  Associated speeds,
  V1 = 147 kt – 0 = 147 kt
  VR = 147 kt – 0 = 147 kt
  V2 = 151 kt – 0 = 151 kt

Since the correction on V2 is 0, no V2 check against VMU limitation is necessary.

· Apply QNH correction
  For flexible temperature < TVMC (57°), △Tflex = ... 0° C
R Maximum flexible temperature . . . . 45° C
  Check that OAT/TREF < flex temperature ≤ TMAXFLEX
  No speed correction.
  Takeoff speeds are V1 = 147 kt, VR = 147 kt, V2 = 151 kt

R

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	51	147	147	151
FCOM correction(s)	– 6	0	0	0
Intermediate value	45	147	147	151
WET Correction	0	0	0	0
Intermediate value	45	147	147	151
QNH Correction	0	0	0	0
Final value	45	147	147	151

FLEXIBLE TAKEOFF NOT POSSIBLE

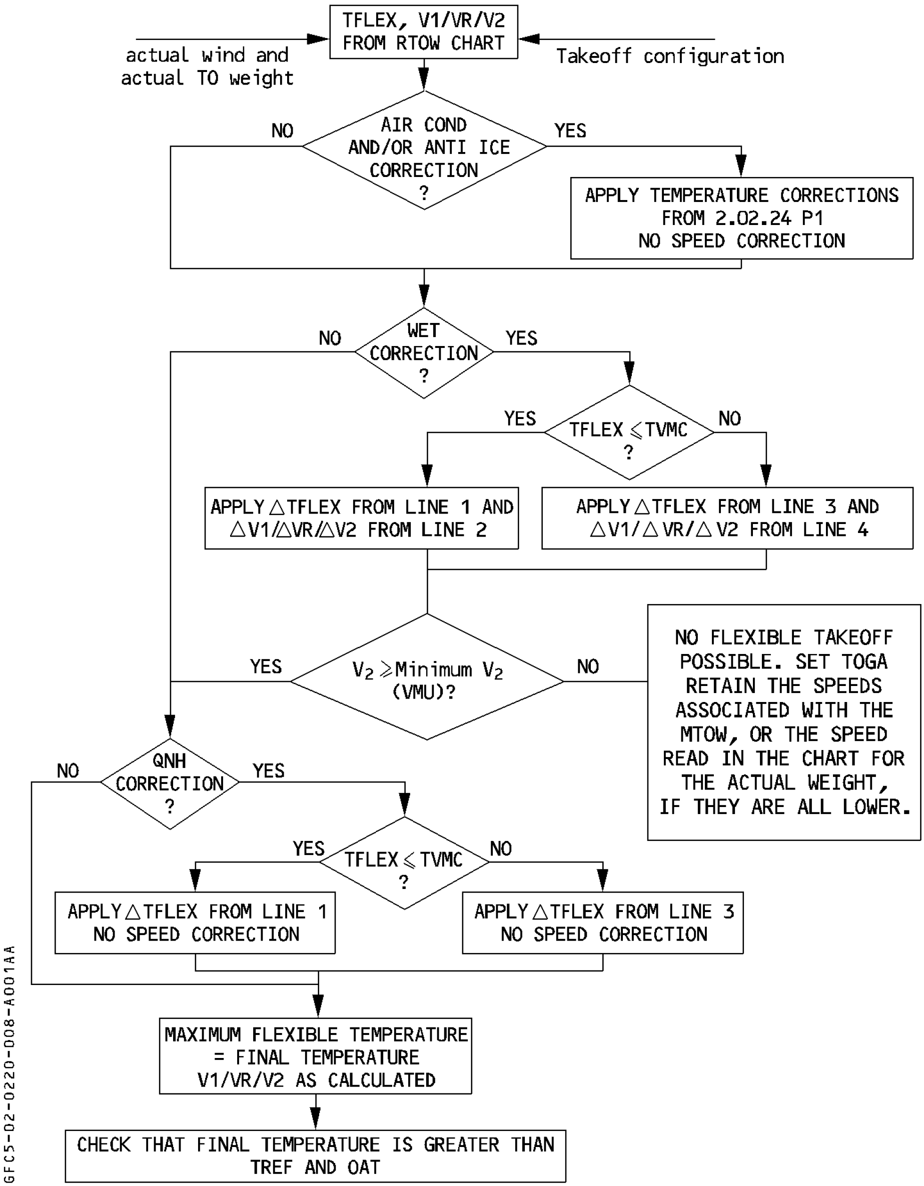
In some cases when the actual takeoff weight is lower than the maximum permissible one but no flexible takeoff possible (that is flexible temperature lower than TREF or OAT) :
- It is mandatory to use TOGA thrust
- You can retain the speeds that have been calculated for the maximum permissible takeoff weight;

OR
- You can retain the speeds associated with the actual takeoff weight provided they are all lower than the speeds calculated for the maximum permissible takeoff weight.

SUMMARY

The flow diagram gives the different steps to follow.

R



EFFECT OF QNH AND BLEEDS

R

To take into account QNH deviation and/or bleeds ON apply

CORRECTIONS ON TEMPERATURE IF FLEX T/O IS PERFORMED		CORRECTIONS ON WEIGHT IF T/O WITH FULL THRUST PERFORMED
Add 1°C/20 hPa until pressure altitude equals zero. No correction for pressure altitude below 0 ft.	QNH above 1013 hPa	Add 150 kg (350 lb)/hPa until pressure altitude equals zero. Add 30 kg (70 lb)/hPa for pressure altitude below 0 ft.
Subtract 1°C/2 hPa	QNH below 1013 hPa	Subtract 300 kg (700 lb)/hPa
Subtract 3°C	Engine A/ICE ON *	OAT ≤ ISA + 13°C Subtract 450 kg (1000 lb) OAT > ISA + 13°C Subtract 2200 kg (4900 lb)
For pressure altitude below 6000 ft : subtract 6°C For pressure altitude above 6000 ft : subtract 7°C	Total A/ICE ON *	OAT ≤ ISA + 11°C Subtract 2200 kg (4900 lb) OAT > ISA + 11°C Subtract 6500 kg (14300 lb)
Subtract 6°C	Air Conditioning ON	Subtract 7100 kg (15700 lb)

Compare corrected temp, (CT), flat rating temp (T REF) and OAT →

CT higher than OAT and CT higher than T REF	Take CT as flex. temp limited to ISA + 43°C
Either condition above not fullfilled	No flexible takeoff possible determine MAX TOW

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*Note : * Corrections valid only for OAT < 10°C*

Example : Airfield elevation = 450 ft
QNH = 1040 hPa
Pressure altitude = 450 – (1040 – 1013) × 28 = – 306 ft

R Correction = 150 kg (350 lb) × (450/28) + 30 kg (70 lb) × (306/28) =
R 2740 kg (6390 lb)

SPEEDS LIMITED BY VMC

Takeoff speeds all have a minimum value limited by control. These minimum control speeds are usually provided on each RTOW chart. If these are not available, use the following conservative values.

Pressure altitude (ft)	–2000	0	1000	2000	3000	4000	5000	6000	10000	14600	
CONF 1 + F	116	115	114	113	111	110	109	107	101	96	V1 min = VR min
CONF 2	116	115	114	113	112	110	109	107	101	96	
CONF 3	116	116	114	113	112	111	109	107	102	96	

Pressure altitude (ft)	–2000	0	1000	2000	3000	4000	5000	6000	10000	14600	
CONF 1 + F	119	118	116	115	114	112	111	109	102	96	V2 min
CONF 2	119	118	116	115	114	112	110	109	102	96	
CONF 3	119	118	117	116	114	113	111	109	102	96	

V2 LIMITED BY VMU/VMCA

The following tables, one per configuration, provide the V2 limited by minimum unstick speed and minimum control speed in the air.

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)												
CONFIGURATION 1+F												
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)											
	130	140	150	160	170	180	190	200	210	220	230	240
–2000	119	122	126	130	134	138	142	146	149	153	156	159
0	118	122	126	130	134	138	142	146	149	153	156	159
1000	118	122	126	130	134	138	142	146	149	153	156	159
2000	118	122	126	130	134	138	142	146	149	153	156	159
3000	118	122	126	130	134	138	142	146	149	153	156	159
4000	118	122	126	130	134	138	142	146	150	153	156	159
5000	118	122	126	130	134	138	142	146	150	153	156	159
6000	118	122	126	130	134	138	142	146	150	153	156	159
7000	118	122	126	130	134	138	142	146	150	153	156	160
8000	118	122	126	130	134	138	142	146	150	153	156	160
9000	118	122	126	130	134	138	142	146	150	153	156	160
10000	118	122	126	130	134	138	142	146	150	153	156	160
11000	118	122	126	130	134	138	142	146	150	153	157	160
12000	118	122	126	130	134	138	142	146	150	153	157	161
13000	118	122	126	130	134	138	142	146	150	154	157	161
14000	118	122	126	130	134	138	142	146	150	154	157	161
14600	118	122	126	130	134	138	142	147	151	154	158	161

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)												
CONFIGURATION 2												
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)											
	130	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**
–2000	119	119	120	123	127	130	134	137	141	144	147	150
0	118	118	120	123	127	130	134	137	141	144	147	150
1000	116	116	120	123	127	130	134	137	141	144	147	150
2000	115	116	120	123	127	130	134	138	141	144	147	150
3000	114	116	120	123	127	130	134	138	141	144	147	151
4000	112	116	119	123	127	130	134	138	141	144	147	151
5000	112	116	119	123	127	130	134	138	141	144	147	151
6000	112	116	119	123	127	130	134	138	141	144	147	151
7000	112	115	119	123	127	130	134	138	141	144	147	151
8000	112	115	119	123	127	130	134	138	141	144	147	151
9000	111	115	119	123	127	130	134	138	141	144	148	151
10000	111	115	119	123	127	130	134	138	141	145	148	151
11000	111	115	119	123	127	130	134	138	141	145	148	152
12000	111	115	119	123	127	130	134	138	142	145	149	152
13000	111	115	119	123	127	131	134	138	142	145	149	152
14000	111	116	119	123	127	131	134	138	142	146	149	153
14600	111	116	119	123	127	131	135	139	142	146	149	153

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

CONFIGURATION 3

PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)											
	130	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**
−2000	119	119	119	121	124	127	131	134	138	141	144	147
0	118	118	118	121	124	127	131	134	138	141	144	147
1000	117	117	117	121	124	127	131	134	138	141	144	147
2000	116	116	117	120	124	127	131	134	138	141	144	147
3000	114	114	117	120	123	127	131	134	138	141	144	147
4000	113	113	117	120	123	127	131	134	138	141	144	147
5000	111	113	117	120	123	127	131	134	138	141	144	147
6000	110	113	116	120	123	127	131	134	138	141	144	147
7000	109	113	116	120	123	127	131	134	138	141	144	147
8000	109	113	116	120	123	127	131	134	138	141	144	147
9000	109	112	116	120	123	127	131	135	138	141	144	147
10000	109	112	116	120	123	127	131	135	138	141	144	147
11000	108	112	116	120	123	127	131	135	138	141	144	147
12000	108	112	116	120	123	127	131	135	138	141	144	148
13000	108	112	116	120	124	127	131	135	138	142	145	148
14000	108	112	116	120	124	127	131	135	139	142	145	148
14600	108	112	116	120	124	127	131	135	139	142	145	149

DEFINITION OF DERATED TAKEOFF

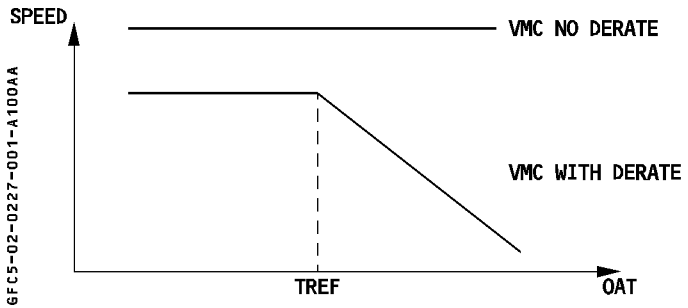
A derated takeoff is defined as a takeoff at a thrust setting less than the maximum takeoff thrust, where the AFM provides a set of takeoff limitations and performance data corresponding to a derated thrust setting which complies with all the takeoff requirements of JAR 25.
The N1/EPR values corresponding to each derated takeoff thrust setting are given in the AFM and are considered as a normal takeoff limit.
Six derate levels are defined :
D04, D08, D12, D16, D20 and D24, corresponding to 4, 8, 12, 16, 20 and 24 % decrease from the maximum takeoff thrust.

USE OF DERATED TAKEOFF

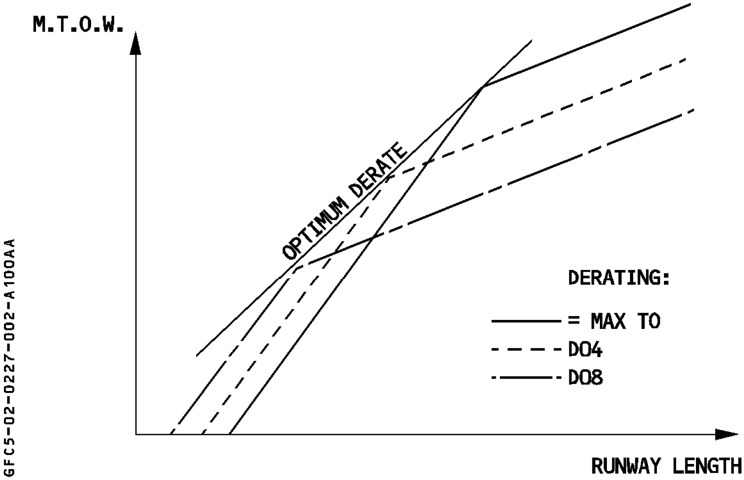
Derated takeoff may be used when the takeoff weight is limited by VMCG, enabling benefit to be taken from the reduction in VMCG associated with the new rating.
The use of flexible thrust is not permitted when derated thrust is used. Moreover the level of derate is entered on the MCDU PERF TO page in the DRT TO/FLX TO field.
R When a derated takeoff is performed, selection of full takeoff thrust by setting thrust levers
R at TOGA is not permitted below the speeds specified in engine failure procedure
R (FCOM 3.02.10 page 4).
The use of derated takeoff is allowed on dry, wet and contaminated runway.

TAKEOFF PERFORMANCE IMPROVEMENT BY DERATING THE ENGINES

The minimum control speeds VMCG and VMCA are reduced for two reasons :
- The derated thrust is lower than the maximum takeoff thrust
- The effect of temperature on VMCG and VMCA is taken into account (which is not the case for the takeoff without derate, due to the flexible takeoff concept)



The effect of the derate on the maximum takeoff weight is different depending on whether VMCG or VMCA is limiting. Indeed the effect on maximum takeoff weight is the result of a thrust decrease (downgrading the takeoff performance) and of a VMC decrease (improving the takeoff performance). As VMCG only concerns the accelerate stop distance, the VMCG decrease compensates amply the thrust loss, the VMCG limited weight is then improved by derating.
But as VMCA mainly concerns the airborne phase of the takeoff, the effect of the thrust loss is more important and not compensated by the effect of the VMCA decrease. Therefore derated takeoff would not improve TOW if VMCA limited.
When VMCG limited, an optimum derate can be determined as shown below.



DETERMINATION OF THE MAXIMUM TAKEOFF WEIGHT AND ASSOCIATED SPEEDS

A specific RTOW chart must be computed for each runway on which the derated takeoff is considered. MTOW and associated takeoff speeds will be determined in the RTOW chart.

DETERMINATION OF DERATED TAKEOFF N1/EPR

The following pages give the derated takeoff N1/EPR tables for each derate level.
For each concerned runway, it is recommended to determine the optimum derate(s) depending on ambient and runway conditions and to issue the corresponding RTOW chart (example below).
R In the following RTOW chart, at 30°C, using a derate of 4 % will give the best takeoff performance.

A330XXX	ENGINES	AIRPORT NAME			15L	Version Date ABXXXXXX
Wind QNH Air cond. Anti-icing All reversers operating	**0 KT** **1013.25 HPA** **AC OFF** **AI OFF**	Elevation **489** FT TORA **2300** M Isa temp **14** C TODA **2300** M rwy slope **.06** % ASDA **2300** M			0 obstacle	WATER 1/4" CONF 2
OAT C	**NO DERATE**	**D04**	**D08**	**D12**	**D16**	**D20**
0	205.3 3/9 126/37/42	201.9 3/9 126/36/41	199.0 3/9 126/36/40	195.1 3/9 126/35/39	191.0 3/9 125/33/37	186.8 3/9 124/32/35
10	* 201.7 3/9 * 125/36/41	198.4 3/9 124/35/40	194.9 3/9 124/34/39	191.8 3/9 124/33/37	187.9 3/9 123/32/36	183.6 3/9 123/31/34
20	* 198.1 3/9 * 123/35/40	* 195.0 3/9 * 123/34/39	191.6 3/9 122/33/38	187.9 3/9 122/32/36	184.7 3/9 122/31/35	180.6 3/9 121/30/33
30	* 182.7 3/9 * 123/29/35	* 191.1 3/9 * 121/32/37	* 187.8 3/9 * 120/31/36	184.2 3/9 120/30/35	180.7 3/9 120/29/33	177.2 3/9 120/28/32
32	* 178.4 3/9 * 123/27/33	* 189.3 3/9 * 120/32/37	* 185.9 3/9 * 120/31/35	182.3 3/9 120/30/34	179.0 3/9 119/29/33	175.4 3/9 119/27/31
34	* 173.9 3/9 * 123/26/32	* 187.3 3/9 * 120/31/36	* 183.9 3/9 * 119/30/35	180.4 3/9 119/29/33	177.2 3/9 119/28/32	173.5 3/9 119/27/31
36	* 170.9 3/3 * 123/26/32	* 185.3 3/9 * 119/30/35	* 181.9 3/9 * 119/29/34	178.4 3/9 119/28/33	175.3 3/9 119/27/31	171.5 3/9 118/26/30
38	* 167.3 3/3 * 123/26/32	* 183.3 3/9 * 119/30/35	* 179.9 3/9 * 119/29/33	176.6 3/9 118/28/32	173.4 3/9 118/27/31	169.6 3/9 118/26/29
40	* 163.6 3/3 * 123/26/32	* 181.3 3/9 * 118/29/34	* 178.0 3/9 * 118/28/32	174.8 3/9 118/27/31	171.5 3/9 118/26/30	167.7 3/9 117/25/28
42	* 160.0 3/3 * 123/26/32	* 179.4 3/9 * 118/28/33	* 176.0 3/9 * 118/27/32	173.2 3/9 118/27/31	169.7 3/9 117/25/29	165.8 3/9 117/24/28
44	* 156.5 3/3 * 123/26/32	**DO NOT USE FOR OPERATIONAL PURPOSE**				164.0 3/9 116/24/27
46	* 152.9 3/3 * 123/26/32					162.2 3/9 116/23/26
48	* 149.4 3/3 * 123/26/32	* 173.5 3/9 * 117/26/31	* 170.5 3/9 * 117/26/29	167.5 3/9 116/25/28	163.9 3/9 116/24/27	160.3 3/9 115/22/25
50	* 146.3 3/3 * 123/26/32	* 171.4 3/9 * 116/26/30	* 168.8 3/9 * 116/25/29	165.5 3/9 116/24/27	161.9 3/9 115/23/26	158.4 3/9 115/22/25
52	* 143.0 3/3 * 123/26/32	* 169.5 3/9 * 116/25/29	* 166.8 3/9 * 116/24/28	163.5 3/9 115/23/27	160.0 3/9 115/22/25	156.5 3/9 114/21/24
54	* 139.7 3/3 * 123/26/32	* 167.7 3/9 * 116/25/28	* 164.9 3/9 * 115/24/27	161.5 3/9 115/23/26	158.1 3/9 115/22/24	* 154.6 3/9 * 114/20/23
LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	MTOW(1000 KG) codes V1min/VR/V2 (kt)	* VMC *LIMITATION	Tref (OAT) = 29 C Tmax (OAT) = 54 C	Min acc height 425 FT Max acc height 1966 FT		Min QNH alt 914 FT Max QNH alt 2455 FT
	LIMITATION CODES 1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU			Min V1/VR/V2 = 123/26/31 CHECK VMU LIMITATION Correct. V1/VR/V2 = .1 KT/1000 KG		

OCTO FCOM-F0-02-02-27-003-140

CF6-80E1A4	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
D04 DERATED TO N1 NO AIR BLEED MACH=.000	AIR CONDITIONING ON	-.8	-.8
	ENGINE ANTI-ICE ON	0.0	-.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	90.0	91.6	93.2	94.0	94.7	95.5	96.3	97.1	98.0	98.5
-50.0	90.8	92.4	94.0	94.8	95.5	96.3	97.1	97.9	98.7	99.3
-46.0	91.6	93.2	94.8	95.6	96.3	97.1	97.9	98.7	99.5	100.1
-42.0	92.4	94.0	95.6	96.4	97.1	97.9	98.6	99.5	100.3	100.9
-38.0	93.1	94.8	96.4	97.1	97.8	98.6	99.4	100.2	101.0	101.6
-34.0	93.9	95.5	97.1	97.9	98.6	99.4	100.1	101.0	101.8	102.3
-30.0	94.6	96.3	97.9	98.6	99.4	100.1	100.9	101.7	102.5	103.1
-26.0	95.4	97.0	98.6	99.4	100.1	100.9	101.6	102.4	103.2	103.8
-22.0	96.1	97.8	99.4	100.1	100.8	101.6	102.3	103.1	103.9	104.5
-18.0	96.8	98.5	100.1	100.8	101.6	102.3	103.0	103.9	104.7	105.2
-14.0	97.5	99.2	100.9	101.6	102.3	103.0	103.8	104.6	105.4	105.9
-10.0	98.2	99.9	101.6	102.3	103.0	103.7	104.5	105.3	106.1	106.7
-6.0	99.0	100.6	102.3	103.0	103.7	104.4	105.2	106.0	106.8	107.4
-2.0	99.7	101.4	103.0	103.7	104.4	105.2	105.9	106.7	107.5	108.1
2.0	100.4	102.1	103.7	104.4	105.1	105.9	106.6	107.4	108.2	108.8
6.0	101.0	102.7	104.4	105.1	105.8	106.6	107.3	108.1	108.9	109.5
10.0	101.7	103.4	105.1	105.8	106.5	107.3	108.0	108.8	109.7	110.2
14.0	102.4	104.1	105.8	106.5	107.2	108.0	108.7	109.5	110.4	110.9
18.0	103.1	104.8	106.5	107.2	107.9	108.7	109.4	110.2	111.0	*110.8*
22.0	103.7	105.5	107.2	107.9	108.6	109.3	110.1	*110.0*	*109.8*	*109.8*
26.0	104.4	106.1	107.8	108.6	109.3	*109.1*	*108.9*	*108.9*	*108.9*	*108.9*
30.0	105.1	106.8	*108.5*	*108.4*	*108.2*	*108.1*	*108.1*	*108.1*	*107.9*	*107.8*
34.0	*105.7*	*107.0*	*107.7*	*107.5*	*107.3*	*107.3*	*107.2*	*107.1*	*106.9*	*106.6*
38.0	*105.9*	*106.7*	*106.9*	*106.7*	*106.5*	*106.4*	*106.2*	*106.1*	*105.8*	*105.5*
42.0	*106.1*	*106.4*	*106.0*	*105.8*	*105.6*	*105.4*	*105.3*	*105.3*	*105.0*	
46.0	*105.5*	*105.2*	*105.0*	*104.8*	*104.5*					
50.0	*104.3*	*104.1*	*103.9*	*103.7*	*103.4*					
54.0	*103.4*	*103.1*	*102.8*							

OAT < ISA + 15

OAT ≥ ISA + 15

CF6-80E1A4 / D08 DERATED TO N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
	AIR CONDITIONING ON	-.8	-.8
	ENGINE ANTI-ICE ON	0.0	-.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	88.7	90.3	91.9	92.6	93.3	94.1	94.9	95.7	96.6	97.1
-50.0	89.5	91.1	92.6	93.4	94.1	94.9	95.7	96.5	97.3	97.9
-46.0	90.2	91.9	93.4	94.2	94.9	95.7	96.5	97.3	98.1	98.7
-42.0	91.0	92.6	94.2	95.0	95.7	96.5	97.2	98.1	98.9	99.4
-38.0	91.8	93.4	95.0	95.7	96.4	97.2	98.0	98.8	99.6	100.2
-34.0	92.5	94.1	95.7	96.5	97.2	98.0	98.7	99.5	100.4	100.9
-30.0	93.2	94.9	96.5	97.2	97.9	98.7	99.5	100.3	101.1	101.7
-26.0	94.0	95.6	97.2	98.0	98.7	99.4	100.2	101.0	101.8	102.4
-22.0	94.7	96.4	98.0	98.7	99.4	100.2	100.9	101.7	102.5	103.1
-18.0	95.4	97.1	98.7	99.4	100.1	100.9	101.6	102.4	103.2	103.8
-14.0	96.1	97.8	99.4	100.2	100.9	101.6	102.3	103.1	103.9	104.5
-10.0	96.8	98.5	100.2	100.9	101.6	102.3	103.0	103.8	104.6	105.2
-6.0	97.5	99.2	100.9	101.6	102.3	103.0	103.7	104.6	105.4	105.9
-2.0	98.2	99.9	101.6	102.3	103.0	103.7	104.5	105.3	106.1	106.7
2.0	98.9	100.6	102.3	103.0	103.7	104.4	105.2	106.0	106.8	107.4
6.0	99.6	101.3	103.0	103.7	104.4	105.1	105.9	106.7	107.5	108.1
10.0	100.3	102.0	103.7	104.4	105.1	105.8	106.6	107.4	108.2	108.8
14.0	101.0	102.7	104.4	105.1	105.8	106.5	107.3	108.1	108.9	109.5
18.0	101.6	103.4	105.0	105.8	106.5	107.2	107.9	108.8	109.6	*109.4*
22.0	102.3	104.0	105.7	106.4	107.1	107.9	108.6	*108.5*	*108.4*	*108.4*
26.0	103.0	104.7	106.4	107.1	107.8	*107.7*	*107.5*	*107.4*	*107.4*	*107.4*
30.0	103.6	105.4	*107.0*	*107.0*	*106.7*	*106.6*	*106.6*	*106.7*	*106.5*	*106.3*
34.0	*104.3*	*105.5*	*106.2*	*106.0*	*105.8*	*105.8*	*105.7*	*105.6*	*105.4*	*105.1*
38.0	*104.4*	*105.2*	*105.4*	*105.2*	*105.0*	*104.9*	*104.7*	*104.6*	*104.3*	*104.0*
42.0	*104.6*	*104.9*	*104.6*	*104.3*	*104.1*	*103.9*	*103.8*	*103.9*	*103.5*	
46.0	*104.0*	*103.7*	*103.5*	*103.3*	*103.0*					
50.0	*102.8*	*102.6*	*102.4*	*102.2*	*101.9*					
54.0	*101.8*	*101.6*	*101.3*							

OAT < ISA + 15

OAT ≥ ISA + 15

CF6-80E1A4	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
D12 DERATED TO N1 NO AIR BLEED MACH=.000	AIR CONDITIONING ON	-.8	-.8
	ENGINE ANTI-ICE ON	0.0	-.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	87.3	88.9	90.5	91.2	92.0	92.8	93.5	94.4	95.2	95.7
-50.0	88.1	89.7	91.3	92.0	92.8	93.5	94.3	95.1	95.9	96.5
-46.0	88.9	90.5	92.1	92.8	93.5	94.3	95.1	95.9	96.7	97.3
-42.0	89.7	91.3	92.9	93.6	94.3	95.1	95.8	96.7	97.5	98.0
-38.0	90.4	92.0	93.6	94.3	95.1	95.8	96.6	97.4	98.2	98.8
-34.0	91.1	92.8	94.4	95.1	95.8	96.6	97.3	98.1	98.9	99.5
-30.0	91.9	93.5	95.1	95.8	96.6	97.3	98.1	98.9	99.7	100.2
-26.0	92.6	94.2	95.8	96.6	97.3	98.0	98.8	99.6	100.4	101.0
-22.0	93.3	95.0	96.6	97.3	98.0	98.8	99.5	100.3	101.1	101.7
-18.0	94.0	95.7	97.3	98.0	98.7	99.5	100.2	101.0	101.8	102.4
-14.0	94.7	96.4	98.0	98.7	99.4	100.2	100.9	101.7	102.5	103.1
-10.0	95.4	97.1	98.7	99.5	100.1	100.9	101.6	102.4	103.2	103.8
-6.0	96.1	97.8	99.4	100.2	100.8	101.6	102.3	103.1	103.9	104.5
-2.0	96.8	98.5	100.1	100.9	101.5	102.3	103.0	103.8	104.7	105.2
2.0	97.5	99.2	100.8	101.6	102.3	103.0	103.7	104.6	105.4	105.9
6.0	98.2	99.9	101.5	102.2	102.9	103.7	104.4	105.3	106.1	106.6
10.0	98.8	100.6	102.2	102.9	103.6	104.4	105.1	106.0	106.8	107.3
14.0	99.5	101.2	102.9	103.6	104.3	105.1	105.8	106.7	107.5	108.0
18.0	100.2	101.9	103.6	104.3	105.0	105.8	106.5	107.3	108.2	*107.9*
22.0	100.8	102.6	104.2	105.0	105.7	106.4	107.2	*107.1*	*106.9*	*106.9*
26.0	101.5	103.2	104.9	105.6	106.4	*106.2*	*106.0*	*106.0*	*106.0*	*106.0*
30.0	102.2	103.9	*105.6*	*105.5*	*105.3*	*105.2*	*105.2*	*105.2*	*105.0*	*104.8*
34.0	*102.8*	*104.0*	*104.7*	*104.6*	*104.3*	*104.4*	*104.3*	*104.1*	*103.9*	*103.6*
38.0	*103.0*	*103.7*	*104.0*	*103.8*	*103.5*	*103.5*	*103.3*	*103.2*	*102.8*	*102.6*
42.0	*103.1*	*103.4*	*103.1*	*102.9*	*102.7*	*102.4*	*102.3*	*102.4*	*102.1*	
46.0	*102.5*	*102.2*	*102.0*	*101.8*	*101.5*					
50.0	*101.3*	*101.1*	*100.9*	*100.7*	*100.4*					
54.0	*100.3*	*100.1*	*99.8*							

OAT < ISA + 15

OAT ≥ ISA + 15

CF6-80E1A4 D16 DERATED TO N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
	AIR CONDITIONING ON	-.8	-.8
	ENGINE ANTI-ICE ON	0.0	-.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	86.0	87.6	89.1	89.9	90.6	91.4	92.2	93.0	93.8	94.3
-50.0	86.8	88.4	89.9	90.7	91.4	92.2	92.9	93.7	94.5	95.1
-46.0	87.5	89.1	90.7	91.5	92.2	92.9	93.7	94.5	95.3	95.9
-42.0	88.3	89.9	91.5	92.2	92.9	93.7	94.5	95.3	96.1	96.6
-38.0	89.0	90.6	92.2	93.0	93.7	94.5	95.2	96.0	96.8	97.4
-34.0	89.8	91.4	93.0	93.7	94.4	95.2	95.9	96.7	97.5	98.1
-30.0	90.5	92.1	93.7	94.5	95.2	95.9	96.7	97.5	98.3	98.8
-26.0	91.2	92.8	94.5	95.2	95.9	96.6	97.4	98.2	99.0	99.5
-22.0	91.9	93.6	95.2	95.9	96.6	97.4	98.1	98.9	99.7	100.2
-18.0	92.6	94.3	95.9	96.6	97.3	98.1	98.8	99.6	100.4	100.9
-14.0	93.3	95.0	96.6	97.3	98.0	98.8	99.5	100.3	101.1	101.7
-10.0	94.0	95.7	97.3	98.0	98.7	99.5	100.2	101.0	101.8	102.4
-6.0	94.7	96.4	98.0	98.7	99.4	100.2	100.9	101.7	102.5	103.1
-2.0	95.4	97.1	98.7	99.4	100.1	100.9	101.6	102.4	103.2	103.8
2.0	96.1	97.8	99.4	100.1	100.8	101.6	102.3	103.1	103.9	104.5
6.0	96.7	98.4	100.1	100.8	101.5	102.3	103.0	103.8	104.6	105.2
10.0	97.4	99.1	100.8	101.5	102.2	102.9	103.7	104.5	105.3	105.9
14.0	98.1	99.8	101.5	102.2	102.9	103.6	104.4	105.2	106.0	106.6
18.0	98.7	100.5	102.1	102.9	103.6	104.3	105.0	105.9	106.7	*106.5*
22.0	99.4	101.1	102.8	103.5	104.2	105.0	105.7	*105.6*	*105.5*	*105.5*
26.0	100.0	101.8	103.5	104.2	104.9	*104.8*	*104.6*	*104.5*	*104.5*	*104.5*
30.0	100.7	102.4	*104.1*	*104.0*	*103.8*	*103.7*	*103.7*	*103.7*	*103.6*	*103.4*
34.0	*101.3*	*102.6*	*103.3*	*103.1*	*102.9*	*102.9*	*102.8*	*102.6*	*102.5*	*102.2*
38.0	*101.5*	*102.2*	*102.5*	*102.3*	*102.1*	*102.0*	*101.8*	*101.7*	*101.4*	*101.1*
42.0	*101.6*	*101.9*	*101.6*	*101.4*	*101.2*	*101.0*	*100.8*	*100.9*	*100.6*	
46.0	*101.0*	*100.7*	*100.5*	*100.3*	*100.0*					
50.0	*99.8*	*99.6*	*99.4*	*99.2*	*98.9*					
54.0	*98.8*	*98.6*	*98.3*							

OAT < ISA + 15
OAT ≥ ISA + 15

CF6-80E1A4	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
D20 DERATED TO N1	AIR CONDITIONING ON	-.8	-.8
NO AIR BLEED	ENGINE ANTI-ICE ON	0.0	-.6
MACH=.000	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	84.7	86.3	87.8	88.5	89.3	90.0	90.8	91.6	92.4	93.0
-50.0	85.4	87.0	88.6	89.3	90.0	90.8	91.6	92.4	93.2	93.7
-46.0	86.2	87.8	89.4	90.1	90.8	91.6	92.3	93.1	93.9	94.5
-42.0	86.9	88.5	90.1	90.9	91.6	92.3	93.1	93.9	94.7	95.3
-38.0	87.7	89.3	90.9	91.6	92.3	93.1	93.8	94.6	95.4	96.0
-34.0	88.4	90.0	91.6	92.3	93.0	93.8	94.5	95.4	96.1	96.7
-30.0	89.1	90.7	92.3	93.1	93.8	94.5	95.3	96.1	96.9	97.4
-26.0	89.8	91.5	93.1	93.8	94.5	95.2	96.0	96.8	97.6	98.1
-22.0	90.5	92.2	93.8	94.5	95.2	96.0	96.7	97.5	98.3	98.8
-18.0	91.2	92.9	94.5	95.2	95.9	96.7	97.4	98.2	99.0	99.5
-14.0	91.9	93.6	95.2	95.9	96.6	97.4	98.1	98.9	99.7	100.2
-10.0	92.6	94.3	95.9	96.6	97.3	98.1	98.8	99.6	100.4	100.9
-6.0	93.3	95.0	96.6	97.3	98.0	98.7	99.5	100.3	101.1	101.6
-2.0	94.0	95.7	97.3	98.0	98.7	99.4	100.2	101.0	101.8	102.4
2.0	94.6	96.3	98.0	98.7	99.4	100.1	100.9	101.7	102.5	103.1
6.0	95.3	97.0	98.7	99.4	100.1	100.8	101.6	102.4	103.2	103.7
10.0	96.0	97.7	99.3	100.1	100.8	101.5	102.2	103.1	103.9	104.4
14.0	96.6	98.4	100.0	100.7	101.4	102.2	102.9	103.8	104.6	105.1
18.0	97.3	99.0	100.7	101.4	102.1	102.9	103.6	104.4	105.3	*105.0*
22.0	97.9	99.7	101.3	102.1	102.8	103.5	104.3	*104.2*	*104.0*	*104.0*
26.0	98.6	100.3	102.0	102.7	103.4	*103.3*	*103.1*	*103.0*	*103.1*	*103.0*
30.0	99.2	101.0	*102.7*	*102.6*	*102.3*	*102.2*	*102.2*	*102.3*	*102.1*	*101.9*
34.0	*99.8*	*101.1*	*101.8*	*101.6*	*101.4*	*101.4*	*101.3*	*101.2*	*101.0*	*100.7*
38.0	*100.0*	*100.8*	*101.0*	*100.8*	*100.6*	*100.5*	*100.3*	*100.2*	*99.9*	*99.6*
42.0	*100.2*	*100.4*	*100.1*	*99.9*	*99.7*	*99.5*	*99.3*	*99.4*	*99.1*	
46.0	*99.5*	*99.2*	*99.0*	*98.8*	*98.5*					
50.0	*98.3*	*98.1*	*97.9*	*97.6*	*97.4*					
54.0	*97.3*	*97.1*	*96.8*							

OAT < ISA + 15

OAT ≥ ISA + 15

CF6-80E1A4 / D24 DERATED TO N1 / NO AIR BLEED / MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
	AIR CONDITIONING ON	-.8	-.8
	ENGINE ANTI-ICE ON	0.0	-.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	-1.0

OAT (°C)	PRESSURE ALTITUDE (FT) -2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
-54.0	83.4	84.9	86.5	87.2	87.9	88.7	89.4	90.3	91.0	91.6
-50.0	84.1	85.7	87.2	88.0	88.7	89.5	90.2	91.0	91.8	92.4
-46.0	84.9	86.4	88.0	88.7	89.5	90.2	91.0	91.8	92.6	93.1
-42.0	85.6	87.2	88.8	89.5	90.2	91.0	91.7	92.5	93.3	93.9
-38.0	86.3	87.9	89.5	90.2	90.9	91.7	92.4	93.2	94.0	94.6
-34.0	87.0	88.6	90.2	91.0	91.7	92.4	93.2	94.0	94.8	95.3
-30.0	87.7	89.4	91.0	91.7	92.4	93.1	93.9	94.7	95.5	96.0
-26.0	88.5	90.1	91.7	92.4	93.1	93.9	94.6	95.4	96.2	96.7
-22.0	89.1	90.8	92.4	93.1	93.8	94.6	95.3	96.1	96.9	97.4
-18.0	89.8	91.5	93.1	93.8	94.5	95.3	96.0	96.8	97.6	98.1
-14.0	90.5	92.2	93.8	94.5	95.2	96.0	96.7	97.5	98.3	98.8
-10.0	91.2	92.9	94.5	95.2	95.9	96.6	97.4	98.2	99.0	99.5
-6.0	91.9	93.6	95.2	95.9	96.6	97.3	98.0	98.9	99.7	100.2
-2.0	92.6	94.2	95.9	96.6	97.3	98.0	98.7	99.6	100.4	100.9
2.0	93.2	94.9	96.6	97.3	98.0	98.7	99.4	100.3	101.1	101.6
6.0	93.9	95.6	97.2	97.9	98.6	99.4	100.1	100.9	101.8	102.3
10.0	94.5	96.2	97.9	98.6	99.3	100.1	100.8	101.6	102.4	103.0
14.0	95.2	96.9	98.6	99.3	100.0	100.7	101.5	102.3	103.1	103.7
18.0	95.8	97.6	99.2	100.0	100.7	101.4	102.2	103.0	103.8	*103.6*
22.0	96.5	98.2	99.9	100.6	101.3	102.1	102.8	*102.7*	*102.6*	*102.6*
26.0	97.1	98.9	100.5	101.3	102.0	*101.9*	*101.6*	*101.6*	*101.6*	*101.6*
30.0	97.7	99.5	*101.2*	*101.1*	*100.9*	*100.8*	*100.8*	*100.8*	*100.6*	*100.4*
34.0	*98.4*	*99.6*	*100.3*	*100.2*	*99.9*	*99.9*	*99.9*	*99.7*	*99.5*	*99.2*
38.0	*98.5*	*99.3*	*99.5*	*99.3*	*99.1*	*99.0*	*98.8*	*98.7*	*98.4*	*98.1*
42.0	*98.7*	*98.9*	*98.6*	*98.4*	*98.2*	*98.0*	*97.8*	*97.9*	*97.6*	
46.0	*98.0*	*97.7*	*97.5*	*97.3*	*97.0*					
50.0	*96.7*	*96.6*	*96.4*	*96.1*	*95.9*					
54.0	*95.8*	*95.5*	*95.2*							

OAT < ISA + 15

OAT ≥ ISA + 15

INTRODUCTION

These tables enable the crew to quickly determine the takeoff performance at an airport for which no takeoff chart has been established. They are conservative.

USE OF TABLES

A first table gives the corrections to be applied to the runway length for wind and runway slope. Nine other tables give, for three different pressure altitudes (0, 1000 and 2000 feet) and three configurations, the maximum takeoff weight, limitation codes and associated speeds as a function of temperature and corrected runway length. TREF and TMAX are given at the top of each table. For pressure altitudes above 2000 feet, use a specific RTOW chart.

R *Note :* *1. Quick reference tables are established at V1 min (minimum V1 in the V1 range) with air conditioning OFF and anti ice OFF*
2. Do not use quick reference tables in case of tailwind.

HOW TO PROCEED

1. Enter the first table with runway length, slope and wind data. Determine the corrected runway length by applying the corrections due to slope and wind.
2. Select the configuration as a function of this corrected runway length
3. Enter the table(s) corresponding to the configuration and airport pressure altitude.
   As far as airport pressure altitude is concerned, two methods may be applied:
   – interpolate the takeoff performance by using the two tables enclosing the airport pressure altitude,
   – for a more conservative figure, use the table corresponding to the pressure altitude immediately above the airport pressure altitude.
4. Enter the appropriate column of the table(s) with the corrected runway length.
   Once again, two methods may be applied :
   – interpolate the takeoff performance between the two columns enclosing the corrected runway length,
   – for a more conservative figure, use the column corresponding to the shorter corrected runway length.
5. Determination of maximum takeoff weight.
   Enter the table(s) and column(s) as explained above with the actual OAT and read maximum takeoff weight, limitation codes, V1, VR and V2. If necessary interpolate weight and speeds.
6. Determination of flexible temperature.
   The determination of flexible temperature is possible only when there is no obstacle on the flight path. Enter the table(s) and column(s) with the actual takeoff weight and read the corresponding temperature as flexible temperature.
7. In case of obstacles, use the graphs from 2.02.40 to determine the corresponding weight penalty.

LIMITATION CODES

- 1 : first segment
- 2 : second segment
- 3 : runway
- 5 : tire speed
- 6 : brake energy
- 7 : maximum computation weight
R - 8 : final takeoff
- 9 : VMU

R *Note : 1. Limitation code 4 (obstacles) does not appear in quick reference tables.*
R *2. VMC limitation appears with a asterisk (*) in the chart.*

CORRECTIONS FOR WIND AND RUNWAY SLOPE

Runway length (m)		2000	2250	2500	2750	3000	3250	3500	3750	4000
Effect of wind	per knot of head wind add (meters)	9	10	11	12	12	13	13	14	14
Effect of runway slope	per percent uphill slope subtract (meters)	130	160	200	250	300	350	420	480	520
	per percent downhill slope add (meters)	50	58	66	75	83	92	100	108	120

EXAMPLE

Pressure altitude	:	1400 ft
Temperature	:	30°C
Runway length	:	3750 m
Wind	:	10 kt head
Slope	:	1 % up
Takeoff configuration	:	1 + F

– **Determination of corrected runway length**
(Refer to 2.02.30 p2.)
runway length . . . . .3750 m
correction for wind . . . . .10 × + 14 = + 140 m
correction for slope . . . . – 480 m
corrected runway length . . . . .3410 m

– **Determination of a conservative maximum takeoff weight :**
(Refer to 2.02.30 p6.)
– Pressure altitude: 1400 ft – Use the table for 2000 ft.
– Enter the column corresponding to 3250 m.
– Read the maximum takeoff weight on the line corresponding to the temperature of
R 30°C: 224 000 kg
R V1 = 143 kt, VR = 147 kt, V2 = 155 kt

– **Determination of a precise flexible temperature for the actual takeoff weight of 200 000 kg :**
(Refer to 2.02.30 p5 and 6.)
– Interpolate the temperature corresponding to 200 000 kg for the runway length of 3410 m at 1000 ft and 2000 ft pressure altitude.
Results:
R 1000 ft: 53°C, V1 = 149 kt, VR = 150 kt, V2 = 156 kt
R 2000 ft: 49°C, V1 = 147 kt, VR = 149 kt, V2 = 154 kt
– Interpolate between these two values to get the flexible temperature.
R 1400 ft: 51°C, V1 = 148 kt, VR = 150 kt, V2 = 155 kt

R

CONFIGURATION 1+F			PRESSURE ALTITUDE = 0 FT		
TREF = 30 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	3000	**3250**	**3500**	**3750**	**4000**
−20	248.6 3/6 154/58/66	251.2 3/6 153/61/69	253.4 3/6 152/63/71	255.5 3/6 152/66/73	257.5 3/6 151/68/75
−10	246.2 3/6 152/56/64	248.8 3/6 151/58/66	251.1 3/6 150/61/69	253.4 3/6 149/63/71	255.4 3/6 149/66/73
0	243.7 3/6 149/53/62	246.4 3/6 149/56/64	248.9 3/6 148/59/67	251.2 3/6 147/61/69	253.3 3/6 146/64/71
10	241.2 3/6 147/51/60	243.9 3/6 147/54/62	246.4 3/6 146/57/65	248.8 3/6 145/59/67	251.0 3/6 144/62/69
20	238.0 3/6 146/50/58	241.3 3/6 145/52/60	243.9 3/6 144/55/63	246.3 3/6 143/57/65	248.5 3/6 142/60/67
30	234.6 3/6 144/49/57	238.7 3/6 143/50/58	241.4 3/6 142/53/61	243.9 3/6 141/55/63	246.1 3/6 140/58/65
32	232.7 3/6 144/48/56	236.3 3/6 143/50/58	238.9 3/6 142/53/60	241.3 3/6 142/55/63	243.5 3/6 141/57/65
34	230.7 3/6 145/48/56	233.9 3/6 144/50/58	236.3 3/6 143/52/60	238.6 3/6 142/55/62	240.7 3/6 141/57/65
36	228.8 3/6 145/47/55	231.5 3/6 144/50/57	233.9 3/6 143/52/60	236.1 3/6 143/55/62	238.1 3/6 142/57/64
38	226.6 3/6 145/47/55	229.1 3/6 144/50/57	231.4 3/6 144/52/60	233.5 3/6 143/55/62	235.4 3/6 142/57/64
40	224.1 3/6 146/47/55	226.6 3/6 145/50/57	228.8 3/6 144/52/59	230.8 3/6 144/54/61	232.8 3/6 143/57/64
42	221.2 2/3 145/47/54	224.0 3/6 146/50/57	226.1 3/6 145/52/59	228.1 3/6 144/54/61	229.9 3/6 144/56/63
44	217.9 2/3 145/46/53	221.2 3/6 146/50/57	223.1 3/6 146/52/59	225.0 3/6 145/54/61	226.7 3/6 144/56/63
46	214.5 2/3 145/46/53	218.2 3/6 147/50/57	220.0 3/6 146/52/59	221.7 3/6 146/54/61	223.3 3/6 145/56/63
48	211.0 2/3 145/45/52	215.1 3/6 148/50/57	216.8 3/6 147/52/59	218.4 3/6 147/54/61	219.9 3/6 146/56/63
50	207.6 2/3 144/45/52	211.9 3/6 149/50/56	213.6 3/6 148/52/59	215.1 3/6 148/54/61	216.6 3/6 147/56/62
52	203.7 2/3 144/44/51	207.8 2/3 148/50/56	209.9 3/6 149/53/59	211.3 3/6 149/55/61	212.6 3/6 148/56/62
54	199.8 2/3 144/44/50	203.7 2/3 148/49/55	206.3 3/6 151/53/59	207.5 3/6 150/55/61	208.6 3/6 150/57/62
56	196.6 2/3 144/44/50	200.3 2/3 148/49/55	203.3 3/6 152/53/59	204.4 3/6 151/55/61	205.3 3/6 151/57/62
58	194.0 2/3 143/43/49	197.7 2/3 148/48/54	200.8 3/6 152/53/59	201.9 3/6 152/55/61	202.8 3/6 152/57/62

R

CONFIGURATION 1+F — **PRESSURE ALTITUDE = 1000 FT**

TREF = 28 °C
TMAX = 53 °C

DRY RUNWAY
SLOPE = 0 %

MAX TO WEIGHT(1000KG) CODES
IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	3000	**3250**	**3500**	**3750**	**4000**
−20	243.0 3/6 153/56/64	245.4 3/6 152/59/67	247.6 3/6 152/61/69	249.6 3/6 151/64/71	251.6 3/6 150/66/73
−10	240.5 3/6 151/54/62	243.1 3/6 150/57/65	245.4 3/6 149/59/67	247.5 3/6 148/62/69	249.5 3/6 148/64/71
0	238.1 3/6 149/52/60	240.7 3/6 148/54/62	243.1 3/6 147/57/65	245.3 3/6 146/59/67	247.4 3/6 146/62/69
10	235.6 3/6 146/50/58	238.2 3/6 146/52/60	240.7 3/6 145/55/63	243.0 3/6 144/57/65	245.1 3/6 143/60/67
20	232.4 3/6 145/48/56	235.6 3/6 144/50/58	238.2 3/6 143/53/61	240.5 3/6 142/55/63	242.7 3/6 141/58/65
28	229.7 3/6 143/47/55	233.7 3/6 142/49/57	236.3 3/6 141/51/59	238.6 3/6 141/54/61	240.9 3/6 140/56/64
30	227.9 3/6 144/47/55	231.4 3/6 143/49/56	233.9 3/6 142/51/59	236.2 3/6 141/54/61	238.4 3/6 140/56/63
32	226.0 3/6 144/47/54	229.0 3/6 143/49/56	231.4 3/6 142/51/58	233.6 3/6 142/53/61	235.7 3/6 141/56/63
34	224.0 3/6 144/46/54	226.5 3/6 143/49/56	228.8 3/6 143/51/58	231.0 3/6 142/53/60	232.9 3/6 141/56/63
36	221.5 3/6 144/46/53	224.1 3/6 144/49/56	226.3 3/6 143/51/58	228.3 3/6 143/53/60	230.3 3/6 142/55/62
38	218.6 2/3 144/45/53	221.6 3/6 145/49/56	223.7 3/6 144/51/58	225.6 3/6 143/53/60	227.5 3/6 143/55/62
40	216.0 2/3 144/45/52	219.3 3/6 145/48/55	221.3 3/6 144/51/58	223.2 3/6 144/53/60	225.0 3/6 143/55/62
42	213.3 2/3 144/45/51	216.9 3/6 146/48/55	218.8 3/6 145/51/57	220.7 3/6 144/53/59	222.3 3/6 144/55/61
44	210.1 2/3 143/44/51	214.1 3/6 146/49/55	215.9 3/6 146/51/57	217.7 3/6 145/53/59	219.2 3/6 144/55/61
46	206.7 2/3 143/44/50	211.0 3/6 147/49/55	212.8 3/6 147/51/57	214.3 3/6 146/53/59	215.8 3/6 145/55/61
48	203.3 2/3 143/43/50	207.5 2/3 147/48/54	209.6 3/6 147/51/57	211.0 3/6 147/53/59	212.4 3/6 146/55/61
50	199.5 2/3 143/43/49	203.6 2/3 147/48/54	206.1 3/6 149/51/57	207.4 3/6 148/53/59	208.6 3/6 148/55/61
52	195.8 2/3 142/42/48	199.7 2/3 147/47/53	202.6 3/6 150/52/57	203.8 3/6 149/53/59	204.9 3/6 149/55/61
54	192.6 2/3 142/42/48	196.5 2/3 146/47/53	199.6 3/6 150/52/57	200.9 3/6 150/54/59	201.8 3/6 150/55/61
56	190.2 2/3 141/41/47	194.0 2/3 146/47/52	197.1 2/3 150/51/57	198.5 3/6 151/54/59	199.4 3/6 150/55/61

R

CONFIGURATION 1+F			PRESSURE ALTITUDE = 2000 FT		
TREF = 26 °C TMAX = 51 °C			DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	3000	3250	3500	3750	4000
−20	237.3 3/6 152/55/63	239.7 3/6 151/57/65	241.8 3/6 151/60/67	243.8 3/6 150/62/69	245.6 3/6 150/64/71
−10	234.9 3/6 150/52/60	237.3 3/6 149/55/63	239.6 3/6 148/57/65	241.7 3/6 148/60/67	243.6 3/6 147/62/69
0	232.5 3/6 148/50/58	235.0 3/6 147/53/60	237.3 3/6 146/55/63	239.5 3/6 145/58/65	241.5 3/6 145/60/67
10	230.0 3/6 146/48/56	232.5 3/6 145/51/58	234.9 3/6 144/53/61	237.1 3/6 143/56/63	239.2 3/6 143/58/65
20	226.8 3/6 144/47/54	230.0 3/6 143/49/56	232.5 3/6 142/51/59	234.8 3/6 141/54/61	236.8 3/6 141/56/63
26	224.8 3/6 143/46/54	228.6 3/6 142/48/55	231.1 3/6 141/50/58	233.4 3/6 140/52/60	235.5 3/6 139/55/62
28	223.0 3/6 143/46/53	226.3 3/6 142/47/55	228.7 3/6 141/50/57	230.9 3/6 141/52/59	233.0 3/6 140/54/62
30	221.2 3/6 143/45/53	224.0 3/6 143/47/55	226.3 3/6 142/50/57	228.5 3/6 141/52/59	230.5 3/6 140/54/61
32	218.7 3/6 143/44/52	221.6 3/6 143/47/54	223.8 3/6 142/50/57	225.9 3/6 142/52/59	227.8 3/6 141/54/61
34	216.0 2/3 143/44/51	219.1 3/6 144/47/54	221.2 3/6 143/50/57	223.2 3/6 142/52/59	225.0 3/6 142/54/61
36	213.1 2/3 143/44/51	216.6 3/6 144/47/54	218.6 3/6 143/50/56	220.4 3/6 143/52/58	222.2 3/6 142/54/60
38	210.8 2/3 142/43/50	214.6 3/6 144/47/54	216.5 3/6 144/49/56	218.3 3/6 143/52/58	220.0 3/6 143/54/60
40	208.5 2/3 142/43/50	212.5 3/6 145/47/54	214.3 3/6 144/49/56	216.1 3/6 144/51/58	217.7 3/6 143/53/60
42	205.7 2/3 142/42/49	210.0 3/6 146/47/54	211.7 3/6 145/49/56	213.4 3/6 144/51/58	215.0 3/6 144/53/60
44	202.4 2/3 142/42/48	206.7 3/6 146/47/53	208.7 3/6 146/49/56	210.2 3/6 145/51/58	211.6 3/6 145/53/59
46	199.0 2/3 141/41/48	203.2 2/3 145/46/53	205.6 3/6 147/50/56	207.0 3/6 146/52/57	208.3 3/6 146/53/59
48	195.3 2/3 141/41/47	199.4 2/3 145/46/52	202.2 3/6 148/50/56	203.5 3/6 147/52/57	204.7 3/6 147/54/59
50	191.6 2/3 140/40/46	195.7 2/3 145/46/51	198.9 3/6 149/50/56	200.1 3/6 148/52/57	201.2 3/6 148/54/59
52	188.5 2/3 140/40/45	192.6 2/3 145/45/51	195.8 2/3 149/50/55	197.3 3/6 149/52/58	198.2 3/6 149/54/59
54	186.2 2/3 139/39/45	190.2 2/3 144/45/50	193.3 2/3 148/49/55	195.0 3/6 150/52/58	195.9 3/6 149/54/59

R

CONFIGURATION 2			PRESSURE ALTITUDE = 0 FT		
TREF = 30 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2500	2750	3000	3250	3500
−20	238.5 2/3 146/48/56	244.8 2/3 151/54/62	249.4 3/6 155/59/66	251.5 3/6 154/62/69	253.3 3/6 154/64/71
−10	236.1 2/3 144/46/54	242.5 2/3 149/52/59	247.2 3/6 153/57/64	249.3 3/6 152/59/66	251.3 3/6 151/62/69
0	233.6 2/3 142/44/52	240.1 2/3 147/50/57	245.0 3/6 150/55/62	247.1 3/6 150/57/64	249.1 3/6 149/60/66
10	231.0 2/3 141/42/50	237.7 2/3 145/48/56	242.5 3/6 148/53/60	244.9 3/6 147/55/62	246.9 3/6 147/58/64
20	228.3 2/3 139/40/48	235.1 2/3 143/46/54	239.9 3/6 146/51/58	242.3 3/6 145/53/60	244.5 3/6 145/55/62
30	225.7 2/3 137/38/46	232.5 2/3 142/44/52	237.4 3/6 144/49/56	239.9 3/6 143/51/58	242.2 3/6 143/54/60
32	223.2 2/3 137/38/46	229.9 2/3 141/44/51	235.0 3/6 145/49/56	237.4 3/6 144/51/58	239.6 3/6 143/53/60
34	220.6 2/3 137/37/45	227.3 2/3 141/43/51	232.5 3/6 145/49/56	234.8 3/6 144/51/58	237.0 3/6 144/53/60
36	218.0 2/3 137/37/45	224.6 2/3 141/43/50	230.1 3/6 145/49/55	232.4 3/6 145/51/58	234.4 3/6 144/53/60
38	215.5 2/3 136/37/44	222.0 2/3 141/43/50	227.3 2/3 145/48/55	229.9 3/6 145/51/58	231.8 3/6 145/53/60
40	212.8 2/3 136/36/44	219.2 2/3 141/42/49	224.5 2/3 145/48/54	227.3 3/6 146/51/57	229.1 3/6 145/53/59
42	210.1 2/3 136/36/43	216.3 2/3 140/42/49	221.6 2/3 145/47/54	224.6 3/6 147/51/57	226.3 3/6 146/53/59
44	207.1 2/3 136/36/42	213.1 2/3 140/41/48	218.2 2/3 144/47/53	221.6 3/6 147/51/57	223.2 3/6 147/53/59
46	203.8 2/3 135/35/42	209.8 2/3 140/41/48	214.7 2/3 144/46/53	218.5 3/6 148/51/57	220.0 3/6 148/53/59
48	200.5 2/3 135/35/41	206.5 2/3 140/41/47	211.1 2/3 144/46/52	214.9 3/6 148/51/57	216.6 3/6 149/54/59
50	197.2 2/3 134/34/40	203.2 2/3 139/40/46	207.5 2/3 144/46/52	211.2 2/3 148/51/56	213.1 3/6 150/54/59
52	193.5 2/3 133/33/39	199.4 2/3 139/40/46	203.5 2/3 144/45/51	207.0 2/3 148/50/56	209.1 3/6 151/54/60
54	189.9 2/3 133/33/39	195.7 2/3 139/39/45	199.6 2/3 143/45/50	202.6 2/3 148/50/55	204.9 3/6 152/55/60
56	186.9 2/3 132/32/38	192.5 2/3 139/39/45	196.3 2/3 143/44/50	199.1 2/3 148/50/55	201.3 2/3 152/54/59
58	184.6 2/3 132/32/37	190.1 2/3 138/39/44	193.8 2/3 143/44/49	196.4 2/3 147/49/54	198.3 2/3 152/54/59

R

CONFIGURATION 2			PRESSURE ALTITUDE = 1000 FT		
TREF = 28 °C TMAX = 53 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2500	2750	3000	3250	3500
−20	232.5 2/3 144/46/54	238.7 2/3 149/52/59	243.7 3/6 154/58/65	245.7 3/6 153/60/67	247.5 3/6 153/63/69
−10	230.1 2/3 143/44/52	236.4 2/3 147/50/57	241.5 3/6 152/55/62	243.6 3/6 151/58/65	245.5 3/6 150/60/67
0	227.6 2/3 141/42/50	234.1 2/3 145/48/55	239.3 3/6 149/53/60	241.4 3/6 149/56/62	243.4 3/6 148/58/65
10	225.1 2/3 139/40/48	231.7 2/3 143/46/53	236.9 3/6 147/51/58	239.1 3/6 146/53/60	241.1 3/6 146/56/63
20	222.4 2/3 137/38/46	229.2 2/3 142/44/52	234.3 3/6 145/49/56	236.7 3/6 144/51/58	238.8 3/6 144/54/61
28	220.5 2/3 136/37/44	227.2 2/3 140/43/50	232.4 3/6 144/48/55	234.8 3/6 143/50/57	237.0 3/6 142/52/59
30	218.0 2/3 136/36/44	224.7 2/3 140/42/49	230.1 3/6 144/47/54	232.5 3/6 143/50/57	234.6 3/6 143/52/59
32	215.5 2/3 135/36/43	222.1 2/3 140/42/49	227.5 3/6 144/47/54	229.9 3/6 144/50/56	232.0 3/6 143/52/59
34	212.8 2/3 135/35/43	219.4 2/3 140/41/48	224.7 2/3 144/47/54	227.4 3/6 144/50/56	229.3 3/6 144/52/58
36	210.2 2/3 135/35/42	216.7 2/3 139/41/48	221.9 2/3 144/46/53	224.9 3/6 145/50/56	226.7 3/6 144/52/58
38	207.6 2/3 135/35/42	213.8 2/3 139/41/47	219.0 2/3 143/46/53	222.2 3/6 145/50/56	223.9 3/6 145/52/58
40	205.1 2/3 134/34/41	211.2 2/3 139/40/47	216.4 2/3 143/46/52	219.8 3/6 146/50/56	221.5 3/6 145/52/58
42	202.5 2/3 134/34/41	208.7 2/3 139/40/46	213.6 2/3 143/45/52	217.4 3/6 147/50/56	218.9 3/6 146/52/58
44	199.4 2/3 133/33/40	205.6 2/3 138/39/46	210.4 2/3 143/45/51	214.2 3/6 147/50/56	215.9 3/6 147/52/58
46	196.1 2/3 133/33/39	202.3 2/3 138/39/45	206.8 2/3 142/44/50	210.5 2/3 147/49/55	212.6 3/6 148/52/58
48	192.8 2/3 132/32/38	198.9 2/3 138/38/45	203.3 2/3 142/44/50	206.9 2/3 146/49/54	209.1 3/6 149/52/58
50	189.3 2/3 131/31/37	195.3 2/3 138/38/44	199.4 2/3 142/43/49	202.9 2/3 146/48/54	205.2 3/6 150/53/58
52	185.8 2/3 131/31/37	191.7 2/3 137/38/43	195.6 2/3 142/43/48	198.8 2/3 146/48/53	201.1 2/3 150/53/58
54	183.0 2/3 130/30/36	188.8 2/3 137/37/43	192.5 2/3 141/43/48	195.4 2/3 146/48/53	197.6 2/3 150/52/57
56	180.8 2/3 130/30/35	186.4 2/3 137/37/42	190.1 2/3 141/42/47	192.9 2/3 146/47/52	194.9 2/3 150/52/57

R

CONFIGURATION 2		PRESSURE ALTITUDE = 2000 FT			
TREF = 26 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2500	2750	3000	3250	3500
−20	226.5 2/3 143/44/52	232.6 2/3 148/50/57	237.5 2/3 152/56/62	239.9 3/6 153/59/65	241.6 3/6 152/61/67
−10	224.1 2/3 141/42/49	230.3 2/3 146/48/55	235.5 3/6 150/54/60	237.8 3/6 150/56/63	239.7 3/6 150/58/65
0	221.6 2/3 139/40/47	228.0 2/3 144/46/53	233.4 3/6 148/51/58	235.7 3/6 148/54/61	237.6 3/6 147/56/63
10	219.1 2/3 137/38/45	225.7 2/3 142/44/51	231.1 3/6 146/49/56	233.4 3/6 146/52/59	235.3 3/6 145/54/61
20	216.6 2/3 136/36/44	223.2 2/3 140/42/49	228.7 3/6 144/47/54	231.0 3/6 144/50/57	233.1 3/6 143/52/59
26	215.2 2/3 135/35/43	221.8 2/3 139/41/48	227.3 3/6 143/46/53	229.6 3/6 142/49/56	231.8 3/6 142/51/58
28	212.7 2/3 134/35/42	219.2 2/3 139/41/48	224.8 3/6 143/46/53	227.3 3/6 143/49/55	229.4 3/6 142/51/57
30	210.2 2/3 134/34/41	216.7 2/3 138/40/47	222.1 2/3 143/46/52	224.9 3/6 143/49/55	226.9 3/6 143/51/57
32	207.6 2/3 134/34/41	214.0 2/3 138/40/47	219.3 2/3 142/45/52	222.4 3/6 144/48/55	224.2 3/6 143/51/57
34	204.9 3/3 134/34/41	211.2 2/3 138/39/46	216.4 2/3 142/45/51	219.8 3/6 144/49/55	221.5 3/6 144/51/57
36	202.1 3/3 133/33/40	208.4 2/3 138/39/45	213.5 2/3 142/44/51	217.2 3/6 145/49/55	218.8 3/6 144/51/57
38	199.9 2/3 132/32/39	206.2 2/3 137/39/45	211.2 2/3 142/44/50	215.1 3/6 145/49/55	216.6 3/6 145/51/56
40	197.7 2/3 132/32/39	204.0 2/3 137/38/44	208.8 2/3 141/43/50	212.7 3/6 146/48/54	214.4 3/6 145/51/56
42	195.0 3/3 132/32/38	201.3 2/3 137/38/44	206.0 2/3 141/43/49	209.7 2/3 145/48/54	211.7 3/6 146/51/56
44	191.7 2/3 131/31/37	198.0 2/3 137/37/43	202.6 2/3 141/43/48	206.2 2/3 145/47/53	208.5 3/6 147/51/56
46	188.5 2/3 130/30/36	194.7 2/3 136/37/43	199.1 2/3 141/42/48	202.6 2/3 145/47/52	205.2 3/6 148/51/56
48	185.1 2/3 130/30/35	191.2 2/3 136/36/42	195.4 2/3 140/42/47	198.8 2/3 145/47/52	201.3 3/6 149/51/56
50	181.7 2/3 129/29/35	187.8 2/3 136/36/41	191.7 2/3 140/41/47	194.9 2/3 144/46/51	197.2 2/3 149/51/56
52	179.0 2/3 128/28/34	184.9 2/3 136/36/41	188.7 2/3 140/41/46	191.7 2/3 144/46/51	193.9 2/3 148/51/55
54	176.8 2/3 128/28/33	182.7 2/3 135/35/40	186.4 2/3 140/41/45	189.2 2/3 144/46/50	191.3 2/3 148/50/55

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R

CONFIGURATION 3			PRESSURE ALTITUDE = 0 FT		
TREF = 30 °C TMAX = 55 °C			DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2000	2250	2500	2750	3000
−20	221.6 3/3 137/37/46	230.5 2/3 142/44/52	236.3 2/3 148/51/59	240.7 2/3 153/58/65	244.1 3/6 159/64/70
−10	218.8 3/3 135/35/44	228.3 2/3 140/42/50	234.4 2/3 145/49/56	239.1 2/3 151/55/62	242.7 3/6 156/61/68
0	216.1 3/3 133/33/42	226.1 2/3 138/39/48	232.5 2/3 143/47/54	237.4 2/3 149/53/60	241.2 3/6 154/59/66
10	213.2 3/3 132/32/41	223.6 2/3 136/37/46	230.3 2/3 141/45/52	235.3 2/3 147/51/58	239.4 3/6 151/57/64
20	210.3 3/3 130/30/39	221.1 2/3 135/35/44	227.9 2/3 140/43/50	233.2 2/3 145/49/56	237.3 3/6 149/55/61
30	207.6 3/3 129/29/38	218.6 2/3 133/33/42	225.6 2/3 138/41/48	231.1 2/3 143/47/54	235.2 3/6 147/52/59
32	205.3 3/3 128/28/37	216.2 2/3 133/33/41	223.1 2/3 138/40/48	228.4 2/3 143/47/54	232.6 3/6 147/52/59
34	202.9 3/3 128/28/37	213.5 2/3 133/33/41	220.3 2/3 138/40/48	225.4 2/3 142/46/53	229.7 3/6 147/52/59
36	200.6 3/3 128/28/37	211.1 2/3 132/32/41	217.7 2/3 137/40/47	222.7 2/3 142/46/53	226.8 2/3 147/52/58
38	198.2 3/3 126/26/35	208.5 2/3 132/32/40	215.0 2/3 137/39/47	219.9 2/3 142/46/52	223.8 2/3 147/51/58
40	195.8 3/3 126/26/35	206.0 2/3 132/32/40	212.2 2/3 137/39/46	217.0 2/3 142/45/52	220.8 2/3 147/51/57
42	193.3 3/3 126/26/34	203.4 2/3 132/32/39	209.4 2/3 137/39/46	214.0 2/3 142/45/52	217.6 2/3 146/51/57
44	190.4 3/3 125/25/33	200.3 2/3 131/31/39	206.3 2/3 136/38/45	210.6 2/3 141/44/51	214.1 2/3 146/50/56
46	187.5 3/3 124/24/32	197.2 2/3 131/31/38	203.0 2/3 136/38/45	207.2 2/3 141/44/50	210.3 2/3 146/50/56
48	184.6 3/3 124/24/32	194.0 2/3 130/30/38	199.7 2/3 136/37/44	203.7 2/3 141/44/50	206.7 2/3 146/49/55
50	181.6 3/3 123/23/31	190.9 2/3 130/30/37	196.3 2/3 136/37/44	200.2 2/3 141/43/49	203.0 2/3 146/49/55
52	178.4 3/3 123/23/30	187.4 2/3 130/30/37	192.5 2/3 135/37/43	196.1 2/3 141/43/49	198.7 2/3 145/48/54
54	175.3 3/3 122/22/29	183.9 2/3 129/29/36	188.7 2/3 135/37/43	192.0 2/3 140/43/48	194.3 2/3 145/48/54
56	172.7 3/3 121/21/28	180.9 2/3 129/29/35	185.7 2/3 135/36/42	188.7 2/3 140/42/48	190.8 2/3 145/48/53
58	170.6 3/3 120/20/27	178.7 2/3 129/29/35	183.3 2/3 135/36/42	186.2 2/3 140/42/48	188.1 2/3 145/48/53

R

CONFIGURATION 3			PRESSURE ALTITUDE = 1000 FT		
TREF = 28 °C TMAX = 53 °C			DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2000	**2250**	**2500**	**2750**	**3000**
−20	215.5 3/3 135/35/44	224.7 2/3 140/42/50	230.4 2/3 146/49/56	234.8 2/3 151/56/62	238.2 2/3 157/62/68
−10	212.8 3/3 133/33/42	222.5 2/3 138/40/48	228.6 2/3 144/47/54	233.2 2/3 149/53/60	236.8 2/3 154/59/66
0	210.1 3/3 131/31/41	220.3 2/3 136/37/46	226.6 2/3 142/45/52	231.4 2/3 147/51/58	235.2 2/3 152/57/64
10	207.4 3/3 130/30/39	217.8 2/3 135/35/44	224.4 2/3 140/43/50	229.5 2/3 145/49/56	233.5 3/6 150/55/61
20	204.7 3/3 129/29/38	215.4 2/3 133/33/42	222.1 2/3 138/41/48	227.4 2/3 143/47/54	231.6 3/6 148/53/59
28	202.6 3/3 127/27/36	213.3 2/3 132/32/40	220.4 2/3 137/39/47	225.8 2/3 141/45/53	230.1 3/6 146/51/58
30	200.4 3/3 127/27/36	211.0 2/3 132/32/40	217.9 2/3 136/39/46	223.2 2/3 141/45/52	227.4 2/3 146/51/57
32	198.0 3/3 126/26/35	208.5 3/3 131/31/40	215.2 2/3 136/38/46	220.4 2/3 141/44/52	224.5 2/3 146/50/57
34	195.6 3/3 126/26/34	205.9 3/3 131/31/39	212.4 2/3 136/38/45	217.4 2/3 141/44/51	221.4 2/3 146/50/56
36	193.2 3/3 125/25/34	203.4 3/3 131/31/39	209.8 2/3 136/38/45	214.6 2/3 141/44/51	218.5 2/3 145/49/56
38	190.7 3/3 125/25/33	200.8 3/3 131/31/38	207.0 2/3 135/37/45	211.6 2/3 140/43/50	215.3 2/3 145/49/55
40	188.5 3/3 124/24/32	198.4 3/3 130/30/38	204.6 2/3 135/37/44	209.0 2/3 140/43/50	212.6 2/3 145/49/55
42	186.1 3/3 124/24/32	195.9 2/3 129/29/37	202.0 2/3 135/37/44	206.3 2/3 140/43/49	209.7 2/3 145/48/54
44	183.4 3/3 123/23/31	192.9 3/3 129/29/37	199.0 2/3 135/36/43	203.1 2/3 140/42/49	206.3 2/3 144/48/54
46	180.5 3/3 122/22/30	189.8 2/3 129/29/36	195.7 2/3 134/36/43	199.6 2/3 139/42/48	202.7 2/3 144/47/53
48	177.5 3/3 122/22/29	186.6 2/3 128/28/35	192.3 2/3 134/35/42	196.1 2/3 139/42/48	199.0 2/3 144/47/53
50	174.4 3/3 121/21/28	183.3 2/3 128/28/34	188.6 2/3 134/35/42	192.2 2/3 139/41/47	194.9 2/3 144/47/52
52	171.4 3/3 120/20/27	179.9 2/3 127/27/34	185.0 2/3 134/35/41	188.3 2/3 139/41/47	190.7 2/3 144/46/52
54	168.9 3/3 120/20/26	177.2 2/3 127/27/33	182.0 2/3 133/35/41	185.2 2/3 138/41/46	187.3 2/3 143/46/51
56	166.9 3/3 119/19/25	175.0 2/3 127/27/33	179.8 2/3 133/34/40	182.8 2/3 138/40/46	184.8 2/3 143/46/51

R

CONFIGURATION 3			PRESSURE ALTITUDE = 2000 FT		
TREF = 26 °C TMAX = 51 °C			DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2000	2250	2500	2750	3000
−20	209.4 3/3 133/33/42	218.8 2/3 139/40/48	224.5 2/3 144/47/54	228.8 2/3 149/53/60	232.2 2/3 155/59/66
−10	206.9 3/3 131/31/40	216.7 2/3 137/38/46	222.7 2/3 142/45/52	227.3 2/3 147/51/58	230.8 2/3 152/57/63
0	204.3 3/3 130/30/39	214.4 2/3 135/35/44	220.7 2/3 140/43/50	225.5 2/3 145/49/56	229.3 2/3 150/55/61
10	201.7 3/3 128/28/37	212.0 2/3 133/33/42	218.6 2/3 138/41/48	223.5 2/3 143/47/54	227.5 2/3 148/53/59
20	199.1 3/3 127/27/36	209.5 2/3 131/31/40	216.4 2/3 136/38/46	221.6 2/3 141/45/52	225.7 2/3 146/51/57
26	197.5 3/3 126/26/35	208.1 3/3 131/31/39	215.0 2/3 135/37/45	220.4 2/3 140/44/51	224.6 2/3 145/49/56
28	195.3 3/3 125/25/34	205.7 3/3 130/30/38	212.6 2/3 135/37/45	217.8 2/3 140/43/50	221.9 2/3 145/49/56
30	193.0 3/3 125/25/33	203.3 3/3 130/30/38	210.0 2/3 135/37/44	215.1 2/3 140/43/50	219.1 2/3 144/48/55
32	190.6 3/3 124/24/33	200.7 3/3 130/30/38	207.3 2/3 134/36/44	212.2 2/3 139/42/49	216.1 2/3 144/48/54
34	188.1 3/3 124/24/32	198.1 3/3 129/29/37	204.7 2/3 134/36/43	209.3 2/3 139/42/49	213.1 2/3 144/48/54
36	185.6 3/3 123/23/31	195.5 3/3 129/29/37	201.9 2/3 134/36/43	206.4 2/3 139/42/48	209.9 2/3 144/47/54
38	183.7 3/3 123/23/31	193.4 3/3 128/28/36	199.7 2/3 134/35/42	204.1 2/3 139/41/48	207.6 2/3 143/47/53
40	181.6 3/3 122/22/30	191.2 3/3 128/28/35	197.5 2/3 133/35/42	201.8 2/3 138/41/47	205.1 2/3 143/47/53
42	179.2 3/3 122/22/29	188.6 3/3 128/28/35	194.8 2/3 133/34/41	199.0 2/3 138/41/47	202.2 2/3 143/46/52
44	176.3 3/3 121/21/28	185.5 3/3 127/27/34	191.6 2/3 133/34/41	195.5 2/3 138/40/46	198.6 2/3 143/46/51
46	173.4 3/3 120/20/27	182.4 2/3 126/26/33	188.2 2/3 133/34/40	192.1 2/3 137/40/46	194.9 2/3 142/45/51
48	170.4 3/3 119/19/26	179.1 2/3 126/26/32	184.8 2/3 132/33/40	188.4 2/3 137/39/45	191.0 2/3 142/45/50
50	167.5 3/3 119/19/26	175.9 2/3 125/25/32	181.3 2/3 132/33/39	184.6 2/3 137/39/45	187.1 2/3 142/44/50
52	165.1 3/3 118/18/25	173.3 2/3 125/25/31	178.4 2/3 132/33/39	181.6 2/3 137/39/44	183.9 2/3 142/44/49
54	163.2 3/3 117/17/24	171.2 2/3 125/25/31	176.2 2/3 132/32/38	179.3 2/3 137/38/44	181.4 2/3 141/44/49

INTRODUCTION

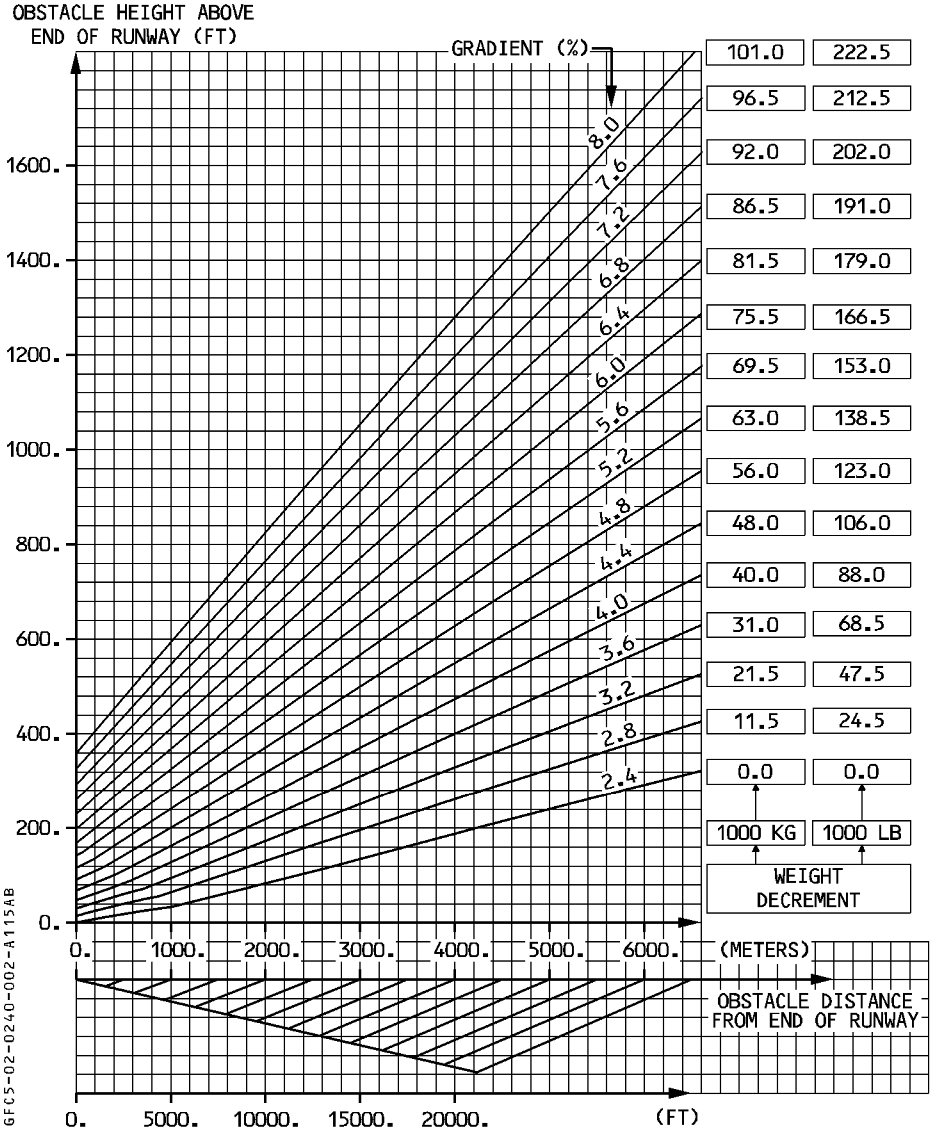
The following graphs enable the crew to quickly determine the takeoff performance out of an airport by positioning obstacles.
They must be used with the corresponding quick reference table so as to determine weight decrement and required gradient.
The net takeoff flight path and the associated weight decrement are conservative.

HOW TO PROCEED

1. Position the obstacle by entering its distance from end of runway and its height above the end of runway (No 35 feet margin is required as this is already included).
   In case of an ascending runway, increase the obstacle height by an additional value as indicated below each graph.
2. Read the associated weight correction. Interpolate if necessary. The second segment gradient is given for information only.
3. Decrease the takeoff speeds by 0.1 knot per 1000 kg (0.05 kt/1000 lb) weight decrement.
R Limit the final speeds to the minimum values as given on 2.02.25 p1.

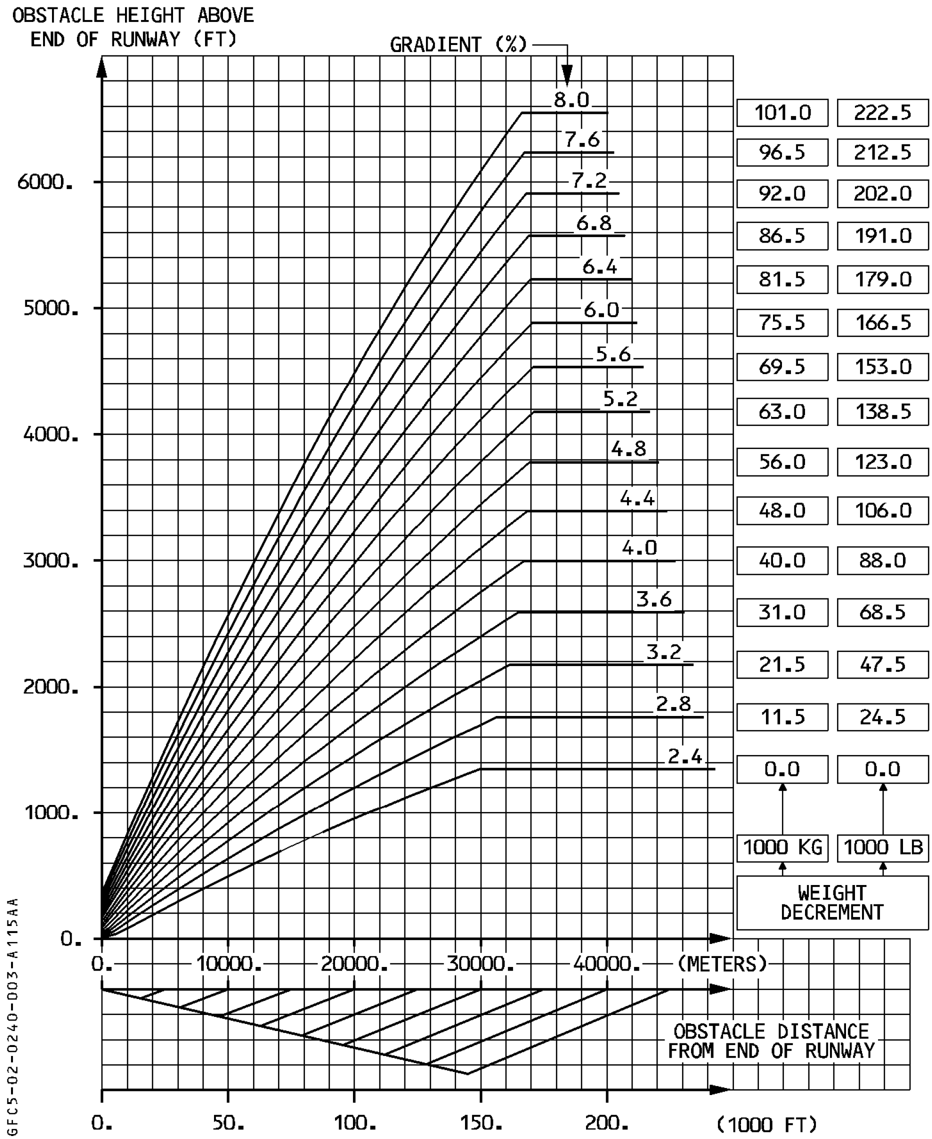
Note : In case of tailwind, do not use the obstacle clearance graphs.

CLOSE OBSTACLE CLEARANCE CONF 1 + F



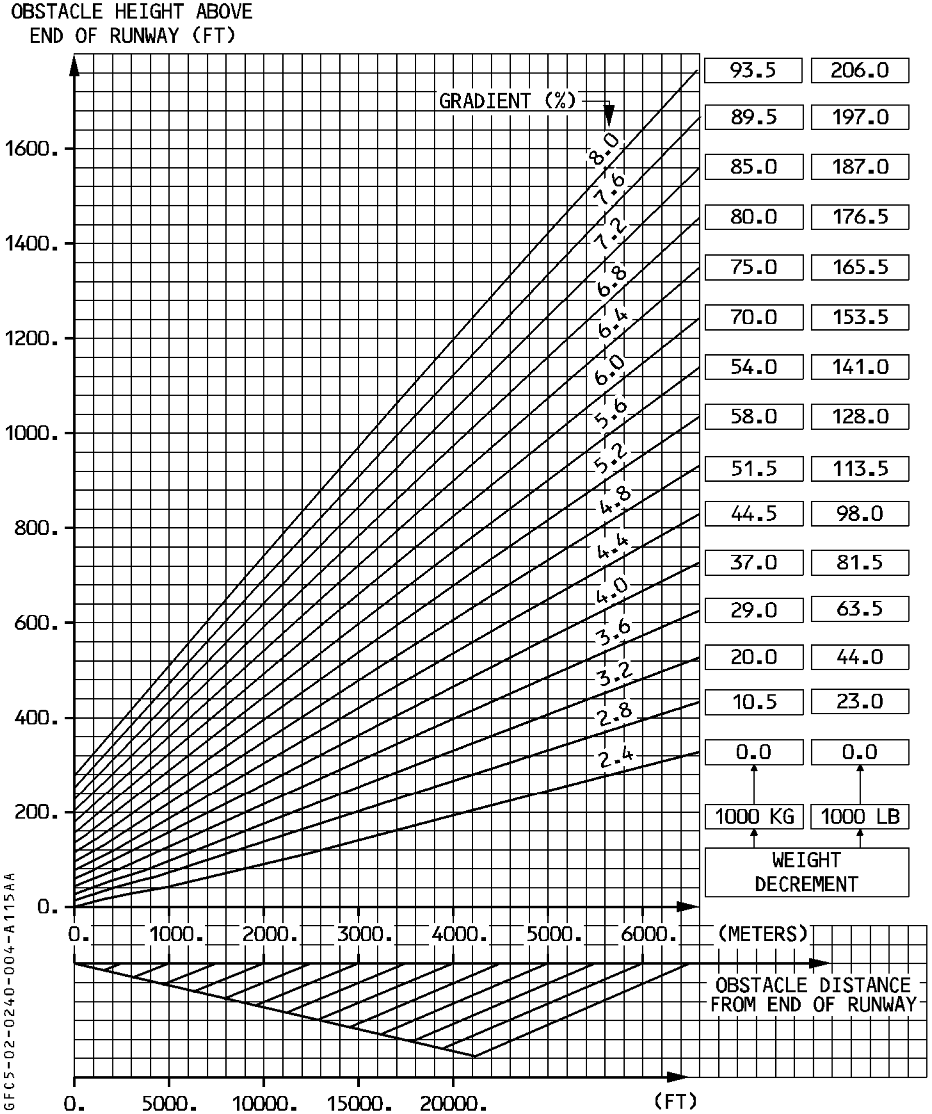
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



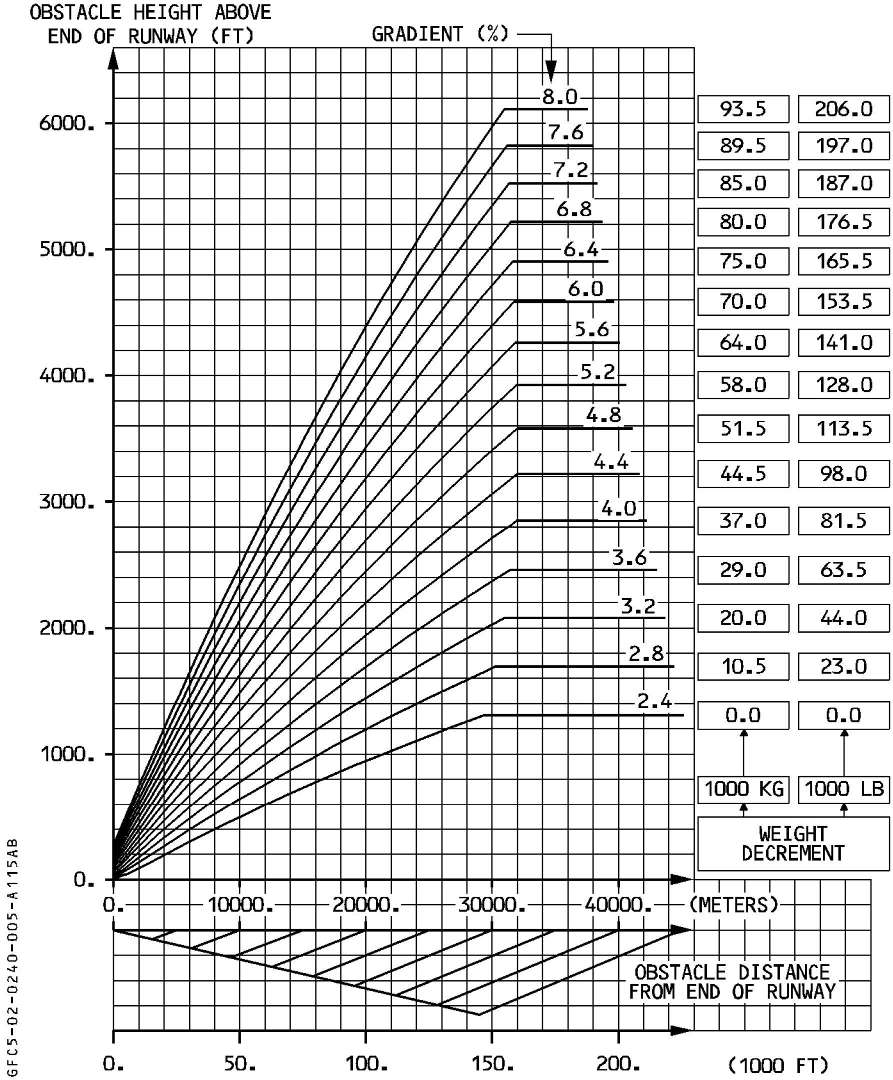
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



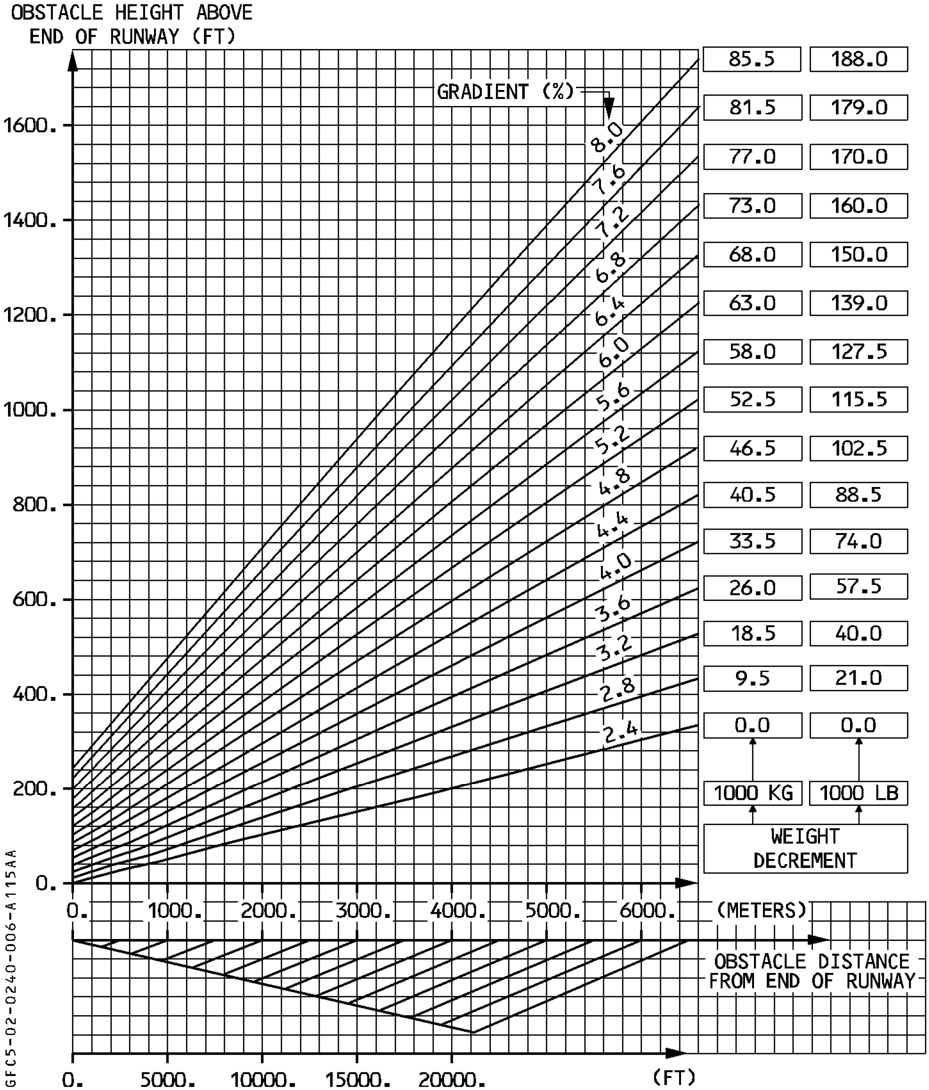
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 2



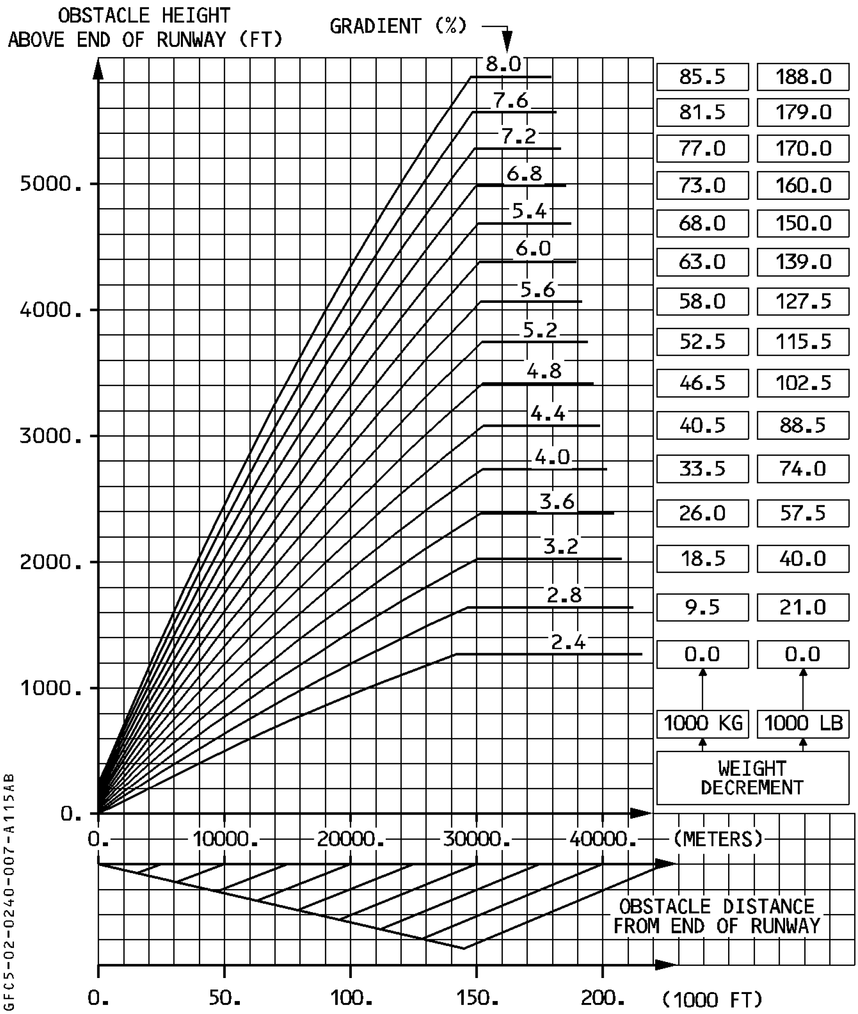
Note : *In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.*

CLOSE OBSTACLE CLEARANCE CONF 3



Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3



<u>Note</u> : *In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.*

03.00 CONTENTS

03.10 LANDING

03.20 USE OF THE AUTOBRAKE SYSTEM

GENERAL

ACTUAL LANDING DISTANCE

The actual landing distance is the distance measured between a point 50 feet above the runway threshold and the point where the complete stop of the aircraft is achieved.
It assumes that :
- the approach speed is :
  - VLS (1.23 VS of the configuration) for manual landing
  - VLS + 5 kt for CAT II/CAT III automatic landing.
- the pilot applies maximum braking and the antiskid system is operating.
- the ground spoilers are operating.

It does not consider the use of reverse thrust.

REQUIRED LANDING DISTANCE

MANUAL LANDING

Regulation defines the required landing distance as the actual landing distance divided by 0.6, assuming the surface is dry.
If the surface is wet, the required landing distance must be at least 115 % of that for a dry surface.

R For JAR-OPS operators, if the surface is contaminated, the required landing distance must
R be at least the greater of the required landing distance on wet runway (see previous
R paragraph) and 115 % of the landing distance determined in accordance with approved
R contaminated landing distance data.

R AUTOMATIC LANDING

R Regulation defines the required landing distance for automatic landing as the actual landing distance in automatic landing multiplied by 1.15. This distance must be retained for automatic landing whenever it is greater than the required landing distance in manual mode.

DISPATCH

The pilot must check before departure that the available runway length at destination is at least equal to the required landing distance for the forecasted landing weight.
In case of aircraft system failure affecting landing distance known before the dispatch, the available runway length must be at least equal to the required landing distance with failure, i.e. the required landing distance without failure multiplied by the coefficient given in the Flight Manual or the MMEL.

FAILURE IN FLIGHT

In case of an aircraft system failure occurring in flight and affecting the landing performance, the runway length to be considered for landing is the actual landing distance without failure multiplied by the landing distance coefficient associated with the failure. The coefficients are given in FCOM 3.02.80 and in the QRH.
The concept of required landing distance no longer applies.

RECOMMENDATIONS

For most cases of abnormal landing configuration, the increased actual landing distance
R does not exceed the required runway length for landing in normal configuration.
However, the addition of several of these factors can very quickly lead to an overrun. Special notice should be taken of the runway condition. A slippery runway is the most common reason for overrun at landing. The combination of a slippery runway and a factor such as tailwind or an increase in approach speed should be avoided.
As far as possible, avoid the combination of any failure affecting the braking capability of the aircraft (spoilers, reversers) with landing on a contaminated runway, or prepare for it carefully by checking the available runway length against the forecasted landing distance.
During a visual approach, use all means of monitoring the flight path ; use the ILS together with available visual aids such as VASI or PAPI. Monitor the approach speed along with the wind and ground speed, especially during final approach.

ACTUAL LANDING DISTANCES

CONFIGURATION FULL

R

ACTUAL LANDING DISTANCE (METERS)								
WEIGHT (1000 KG)			130	150	170	190	210	230
RUNWAY CONDITION	DRY		880	930	1010	1080	1220	1390
	WET		1070	1160	1290	1430	1580	1730
	COVERED WITH	6.3 MM (1/4 INCH) WATER	1420	1560	1780	1990	2230	2420
		12.7 MM (1/2 INCH) WATER	1350	1480	1670	1870	2060	2240
		6.3 MM (1/4 INCH) SLUSH	1390	1500	1670	1880	2080	2280
		12.7 MM (1/2 INCH) SLUSH	1330	1440	1600	1790	1970	2150
		COMPACTED SNOW	1340	1430	1570	1710	1840	1960
		ICE	2580	2770	3040	3320	3590	3840

CORRECTIONS

R

	CORRECTION ON ACTUAL LANDING DISTANCE							
	dry runway	wet runway	runway covered with					
			1/4 inch water	1/2 inch water	1/4 inch slush	1/2 inch slush	compacted snow	ice
per 1000 ft above SL	+ 3 %	+ 4 %	+ 4 %	+ 4 %	+ 5 %	+ 4 %	+ 3 %	+ 4 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 18 %	+ 22 %	+ 24 %	+ 22 %	+ 23 %	+ 21 %	+ 17 %	+ 29 %
2 reversers operative	– 1 %	– 4 %	– 7 %	– 7 %	– 7 %	– 6 %	– 6 %	– 19 %
Per 5 kt speed increment (and no failure) add 8 % (all runways)								

CONFIGURATION 3

R

ACTUAL LANDING DISTANCE (METERS)								
WEIGHT (1000 KG)			130	150	170	190	210	230
RUNWAY CONDITION	DRY		890	970	1050	1130	1290	1480
	WET		1090	1240	1390	1550	1710	1880
	COVERED WITH	6.3 MM (1/4 INCH) WATER	1450	1680	1920	2160	2410	2630
		12.7 MM (1/2 INCH) WATER	1380	1580	1790	1990	2220	2420
		6.3 MM (1/4 INCH) SLUSH	1420	1610	1810	2030	2260	2460
		12.7 MM (1/2 INCH) SLUSH	1350	1530	1710	1920	2130	2310
		COMPACTED SNOW	1370	1520	1660	1810	1950	2070
		ICE	2720	3020	3320	3610	3920	4180

CORRECTIONS

R

	CORRECTION ON ACTUAL LANDING DISTANCE							
	dry runway	wet runway	runway covered with					
			1/4 inch water	1/2 inch water	1/4 inch slush	1/2 inch slush	compacted snow	ice
per 1000 ft above SL	+ 3 %	+ 4 %	+ 4 %	+ 4 %	+ 5 %	+ 5 %	+ 3 %	+ 4 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 17 %	+ 22 %	+ 25 %	+ 22 %	+ 23 %	+ 21 %	+ 17 %	+ 29 %
2 reversers operative	– 1 %	– 4 %	– 8 %	– 7 %	– 8 %	– 7 %	– 7 %	– 21 %
Per 5 kt speed increment (and no failure) add 8 % (all runways)								

REQUIRED LANDING DISTANCE

MANUAL LANDING

R

REQUIRED LANDING DISTANCE (METERS)							
WEIGHT (1000 KG)	**130**	**140**	**150**	**160**	**170**	**180**	**190**
CONF 3	1490	1550	1610	1680	1750	1810	1880
CONF FULL	1470	1480	1550	1610	1670	1740	1800

Corrections on landing distances

R Wind : per 10 kt tailwind add 18 %
No correction for headwind due to wind correction on approach speed.

Airport elevation : per 1000 ft above sea level add 3 %.

AUTOMATIC LANDING

For automatic landing, use the same required landing distances and corrections as for manual landing.

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GENERAL

The autobrake system is designed to help the pilot in case of :
· aborted takeoff or
· landing on short runways or
· operation with low visibility weather conditions
Furthermore, it ensures a straight roll-out and optimizes the landing distance on contaminated runways provided the contamination is evenly distributed.
The following tables cover :
· dry runway
· wet runway
· runway covered with water, slush or compacted snow
· icy runway
At landing, select the braking mode according to :
· runway length
· configuration
· runway condition
A correction is necessary :
· if landing is not performed at sea level
· if reverse thrust is used
· in windy conditions

MANUAL LANDING WITH AUTOBRAKE

CONFIGURATION 3

R

ACTUAL LANDING DISTANCE (METERS)									CORRECTIONS (%) ON LANDING DISTANCE		
WEIGHT (1000 KG)			130	150	170	190	210	230	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION		MODE									
DRY		MED	1220	1350	1470	1590	1700	1820	+ 3	0	+16
		LOW	1670	1850	2040	2220	2400	2560	+ 3	0	+17
WET		MED	1260	1420	1570	1730	1890	2030	+ 4	–2	+20
		LOW	1670	1850	2040	2220	2400	2560	+ 3	0	+17
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1560	1750	1980	2220	2470	2710	+ 4	–9	+23
		LOW	1650	1840	2040	2290	2540	2780	+ 4	–2	+22
	12.7 MM (1/2 INCH) WATER	MED	1470	1640	1840	2050	2280	2480	+ 4	–7	+21
		LOW	1570	1750	1940	2130	2350	2560	+ 4	0	+19
	6.3 MM (1/4 INCH) SLUSH	MED	1530	1710	1900	2090	2330	2530	+ 5	–9	+22
		LOW	1620	1810	2000	2180	2390	2600	+ 5	–2	+21
	12.7 MM (1/2 INCH) SLUSH	MED	1450	1620	1800	1970	2170	2370	+ 5	–8	+20
		LOW	1550	1730	1910	2080	2260	2440	+ 5	0	+18
	COMPACTED SNOW	MED	1510	1670	1830	1980	2130	2260	+ 4	–8	+17
		LOW	1660	1850	2030	2200	2380	2540	+ 4	0	+17
	ICE	MED	2780	3080	3380	3690	3990	4250	+ 5	–20	+29
		LOW	2820	3130	3420	3730	4040	4310	+ 4	–21	+28

CONFIGURATION FULL

R

ACTUAL LANDING DISTANCE (METERS)									CORRECTIONS (%) ON LANDING DISTANCE		
WEIGHT (1000 KG)			130	150	170	190	210	230	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION		MODE									
DRY		MED	1200	1290	1400	1520	1630	1730	+ 3	0	+16
		LOW	1630	1760	1930	2100	2270	2430	+ 3	0	+17
WET		MED	1220	1320	1460	1600	1750	1880	+ 4	–1	+19
		LOW	1630	1760	1930	2100	2270	2430	+ 3	0	+17
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1500	1640	1830	2050	2280	2480	+ 4	–7	+22
		LOW	1600	1740	1920	2120	2350	2550	+ 4	0	+21
	12.7 MM (1/2 INCH) WATER	MED	1420	1550	1710	1910	2120	2300	+ 4	–6	+22
		LOW	1540	1670	1840	2010	2210	2390	+ 4	0	+18
	6.3 MM (1/4 INCH) SLUSH	MED	1470	1600	1770	1950	2150	2330	+ 5	–8	+22
		LOW	1570	1700	1880	2050	2230	2410	+ 5	0	+20
	12.7 MM (1/2 INCH) SLUSH	MED	1400	1530	1690	1850	2020	2200	+ 5	–7	+20
		LOW	1520	1650	1810	1980	2140	2290	+ 5	0	+18
	COMPACTED SNOW	MED	1460	1570	1720	1860	2000	2120	+ 4	–6	+17
		LOW	1630	1760	1930	2100	2270	2420	+ 4	0	+17
	ICE	MED	2600	2820	3100	3380	3660	3900	+ 4	–19	+29
		LOW	2650	2870	3150	3420	3700	3950	+ 4	–19	+29

Note : – *Max mode is not recommended at landing*
– *Per 5 knot speed increment (and no failure) add 6 % (all runways)*
– *No correction for headwind due to wind correction on approach speed*

04.00 CONTENTS

GENERAL

This section presents the recommendations of Airbus Industrie for operations from wet runways or from runways which are covered with contaminants such as standing water, slush or snow.
The following conservative penalties may be used instead of a specific RTOW.

CAUTION
Takeoff from icy runway is not recommended.

DEFINITIONS

DAMP : A runway is damp when the surface is not dry, but when the water on it does not give it a shiny appearance.
WET : A runway is considered as wet when the surface has a shiny appearance due to a thin layer of water. When this layer does not exceed 3 mm depth, there is no substantial risk of hydroplaning.
STANDING WATER : Is caused by heavy rainfall and/or insufficient runway drainage with a depth of more than 3 mm.
SLUSH : Is water saturated with snow which spatters when stepping firmly on it. It is encountered at temperatures around 5°C and its density is approximately 0.85 kg/liter (7.1 lb/US GAL).
WET SNOW : Is a condition where, if compacted by hand, snow will stick together and tend to form a snowball. Its density is approximately 0.4 kg/liter (3.35 lb/US GAL).
DRY SNOW : Is a condition where snow can be blown if loose, or if compacted by hand, will fall apart again upon release. Its density is approximately 0.2 kg/liter (1.7 lb/US GAL).
COMPACTED SNOW : Is a condition where snow has been compressed (a typical friction coefficient is 0.2).
ICY : Is a condition where the friction coefficient is 0.05 or below.

The performance given in this chapter has been divided into two categories which are determined by the depth of the contaminant. For each of these categories an equivalent depth of contaminant has been defined for which the performance deterioration is the same.

1. WET RUNWAY and EQUIVALENT
   Equivalent of a wet runway is a runway covered with or less than :
   - 2 mm (0.08 inch) slush
R - 3 mm (0.12 inch) water
   - 4 mm (0.16 inch) wet snow
   - 15 mm (0.59 inch) dry snow

2. CONTAMINATED RUNWAY

R An equivalence between depth of slush and snow has been defined :

- 12.7 mm (1/2 inch) wet snow is equivalent to 6.3 mm (1/4 inch) slush
- R 25.4 mm (1 inch) wet snow is equivalent to 12.7 mm (1/2 inch) slush
- 50.8 mm (2 inches) dry snow is equivalent to 6.3 mm (1/4 inch) slush
- R 101.6 mm (4 inches) dry snow is equivalent to 12.7 mm (1/2 inch) slush

Note : *1. On a damp runway no performance degradation should be considered.*
2. It is not recommended to take off from a runway covered with more than 4 inches of dry snow or 1 inch of wet snow.

OPERATIONAL CONDITIONS

Performance penalties for takeoff as published in this section are computed with the following assumptions :

- The contaminant is in a layer of uniform depth and density over the entire length of the runway
- Antiskid and spoilers are operative
- The friction coefficient is based on studies and checked by actual tests
- The screen height at the end of the takeoff segment is 15 feet, not 35 feet.

In addition, for contaminated runways only :

- There is drag due to rolling resistance of the wheels
- There is drag due to spray on the airframe and gears
- Reverse thrust is used for the deceleration phase
- Maximum thrust is used for takeoff.

Note : The net flight path clears obstacles by 15 feet instead of 35 feet.

TAKEOFF PERFORMANCE

CAUTION

The method is based on the use of the RTOW charts established at optimum V2/VS and optimum V1/VR. In addition, when applying corrections for a wet runway, the RTOW charts should also have been established with V1 min (minimum V1 of the V1 range). The method should not be used with takeoff charts computed for other conditions. All tables have been established for TOGA (and Flexible Takeoff for wet runways). Do not use them for Derated thrust.

Correct the determined maximum takeoff weight on dry runway to take into account QNH and bleed effects, then apply the corrections given on the following pages.

R *Note : 1. The results obtained with this method may be different from the influence given*
R *at the bottom of the RTOW chart.*
R *2. On contaminated runway, in some cases, no MTOW can be determined with this*
R *method (box dashed below a given weight). A specific RTOW chart must then*
R *be computed.*

TAKEOFF FROM A WET RUNWAY

1. Determine the maximum takeoff weight or flexible temperature and associated speeds on dry runway.
2. Two sets of tables are given depending on the use of thrust reversers and the presence of clearway. Select the table to use as applicable to your case.
   The runway length in the table corresponds to the available takeoff run (TORA).
3. Apply the corrections shown in the table to the maximum takeoff weight or flexible temperature and associated speeds determined on dry runway.
4. Check that takeoff speeds are above the minimum values shown on the RTOW chart.
   If one or more speeds are below these values apply the following procedure :
   Actual TOW = maximum TOW
   - if V1 is lower than the minimum V1 (V1 limited by VMCG), take this last value as V1 and further decrease weight by 4000 kg (8800 lb) per knot difference between both values.
     Check that VR and V2 are higher or equal to the minimum values.
   - if VR or/and V2 fall below the minimum value, takeoff is not possible.

   Actual TOW lower than maximum TOW
   - If V1 corresponding to the actual TOW is lower than the minimum V1 (V1 limited by VMCG) :
     · If maximum TOW has a V1 equal or above minimum V1, retain minimum V1 as V1 and decrease flexible temperature by 3°C per knot difference between them.
     · In the rare case when the V1 corresponding to the maximum TOW falls below the minimum V1, decrease maximum TOW by 4000 kg (8800 lb) per knot difference between them. Limit the actual TOW to the value found after this decrement. Take V1 equal to minimum V1 and decrease flexible temperature by 3°C per knot difference between this value and the V1 corresponding to the actual TOW.
   - If VR or V2 corresponding to actual TOW falls below minimum values, and if VR and V2 corresponding to maximum TOW are above the minimum values, retain the minimum speed value for VR and V2.
5. Check that V2 is above the minimum V2 value due to VMU (Refer to 2.02.25).
6. Check that the corrected flexible temperature is higher than OAT and Tref.

Note : · Do not extrapolate below the shortest runway length provided in the table.
· If no minimum speed value is available, use the conservative values provided on 2.02.25.

NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

R

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (M) (FT)	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above
FLEX TO TEMPERATURE DECREMENT (°C)	5	5	5	6	4	4	3	5	4
MAX TO WEIGHT DECREMENT (1000 KG) (1000 LB)	5.2 11.5	5.0 11.0	5.2 11.5	5.0 11.1	4.3 9.5	4.7 10.4	2.0 4.4	4.5 9.9	3.8 8.4
V1 DECREMENT (KT)	13	14	15	12	13	13	12	13	13
VR AND V2 DECREMENT (KT)	2	4	5	2	3	5	2	4	5

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

R

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (M) (FT)	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above
FLEX TO TEMPERATURE DECREMENT (°C)	2	3	5	1	2	3	0	3	2
MAX TO WEIGHT DECREMENT (1000 KG) (1000 LB)	1.3 2.9	2.3 5.1	5.0 11.1	0.4 0.9	2.1 4.7	2.9 6.4	0.0 0.0	2.3 5.1	2.0 4.5
V1 DECREMENT (KT)	8	9	10	6	8	8	8	8	8
VR AND V2 DECREMENT (KT)	1	2	3	0	2	3	1	2	3

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

R

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (M) (FT)	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above
FLEX TO TEMPERATURE DECREMENT (°C)	9	7	6	9	7	6	11	6	5
MAX TO WEIGHT DECREMENT (1000 KG) (1000 LB)	9.4 20.8	7.3 16.1	6.5 14.3	8.4 18.6	6.8 15.0	6.5 14.3	10.0 22.0	6.1 13.5	5.4 12.0
V1 DECREMENT (KT)	13	14	15	12	13	13	12	12	13
VR AND V2 DECREMENT (KT)	5	7	7	5	6	7	5	6	7

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

R

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (M) (FT)	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above
FLEX TO TEMPERATURE DECREMENT (°C)	6	5	7	5	4	4	9	4	4
MAX TO WEIGHT DECREMENT (1000 KG) (1000 LB)	6.3 13.9	5.2 11.5	7.6 16.8	4.8 10.6	4.0 8.9	4.5 10.0	7.5 16.6	3.6 8.0	3.7 8.2
V1 DECREMENT (KT)	8	9	9	7	8	8	6	7	8
VR AND V2 DECREMENT (KT)	4	5	6	4	4	5	2	4	5

TAKEOFF FROM A 6.3 MM (1/4 INCH) WATER COVERED RUNWAY

– Determine maximum takeoff weight on dry runway.
– Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
△WEIGHT (1000 kg) With clearway	33.4	31.1	26.1	20.3	30.6	21.9	22.2	20.1	18.4	21.8
△WEIGHT (1000 kg) Without clearway	28.6	28.5	24.5	19.3	27.1	20.3	21.7	18.5	17.8	21.8

– Enter the following tables with the corrected weight to determine MTOW. If the MTOW on dry runway is obstacle limited, check that MTOW is at least 24400 kg below the MTOW on dry runway. If not, the MTOW on contaminated runway is MTOW on dry runway minus 24400 kg. Then determine takeoff speeds associated with actual TOW.

CONF 1 + F

CORRECTED WEIGHT (1000 kg)	<159	159	160	170	172.5	172.5 to 240
MTOW (1000 kg)	–	137.5	140	166	172.5	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<137.5	137.5	140	150	160	170	172.5	180	190	200	210	220	230	240
V2 (kt IAS)	123	123	124	129	133	137	138	141	145	149	153	156	160	163
VR (kt IAS)	116	116	117	122	126	130	131	134	138	142	146	149	153	156
V1 (kt IAS)	116	116	116	116	116	116	116	119	123	127	131	134	138	141

CONF 2

CORRECTED WEIGHT (1000 kg)	<170	170	180	182.5	180 to 240
MTOW (1000 kg)	–	150	176	182.5	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<150	150	160	170	180	182.5	190	200	210	220	230	240
V2 (kt IAS)	122	122	126	129	133	134	137	141	144	148	151	154
VR (kt IAS)	116	116	120	123	127	128	131	135	138	142	145	148
V1 (kt IAS)	116	116	116	116	116	116	119	123	126	130	133	136

CONF 3

CORRECTED WEIGHT (1000 kg)	<178.5	178.5	180	190	190 to 240
MTOW (1000 kg)	–	160	164	190	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<160	160	170	180	190	200	210	220	230	240
V2 (kt IAS)	122	122	126	130	134	138	141	144	147	150
VR (kt IAS)	116	116	120	124	128	132	135	138	141	144
V1 (kt IAS)	116	116	116	116	116	120	123	126	129	132

TAKEOFF FROM A 12.7 MM (1/2 INCH) WATER COVERED RUNWAY

- Determine maximum takeoff weight on dry runway.
- Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
△WEIGHT (1000 kg) With clearway	49.6	50.7	51.7	48.3	42.6	42.0	42.8	34.1	28.3	26.6
Without clearway	44.8	48.1	50.1	47.3	39.1	40.4	42.3	32.5	27.7	26.6

- Enter the following tables with the corrected weight to determine MTOW. Then determine takeoff speeds associated with actual TOW.

CONF 1 + F

CORRECTED WEIGHT (1000 kg)	<145.5	145.5	150	152.5	152.5 to 240									
MTOW (1000 kg)	–	132.5	146	152.5	EQUAL TO CORRECTED WEIGHT									
ACTUAL WEIGHT (1000 kg)	**<132.5**	**132.5**	**140**	**150**	**152.5**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**
V2 (kt IAS)	121	121	124	129	130	133	137	141	145	149	153	156	160	163
VR (kt IAS)	116	116	119	124	125	128	132	136	140	144	148	151	155	158
V1 (kt IAS)	116	116	116	116	116	119	123	127	131	135	139	142	146	149

CONF 2

CORRECTED WEIGHT (1000 kg)	<154.2	154.2	160	160 to 240								
MTOW (1000 kg)	–	145	160	EQUAL TO CORRECTED WEIGHT								
ACTUAL WEIGHT (1000 kg)	**<145**	**145**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**
V2 (kt IAS)	120	120	122	126	129	133	137	141	144	148	151	154
VR (kt IAS)	116	116	118	122	125	129	133	137	140	144	147	150
V1 (kt IAS)	116	116	116	116	119	123	127	131	134	138	141	144

CONF 3

CORRECTED WEIGHT (1000 kg)	<164.2	164.2	170	170 to 240							
MTOW (1000 kg)	–	155	170	EQUAL TO CORRECTED WEIGHT							
ACTUAL WEIGHT (1000 kg)	**<155**	**155**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**
V2 (kt IAS)	120	120	122	126	130	134	138	141	144	147	150
VR (kt IAS)	116	116	118	122	126	130	134	137	140	143	146
V1 (kt IAS)	116	116	116	116	120	124	128	131	134	137	140

TAKEOFF FROM A 6.3 MM (1/4 INCH) SLUSH COVERED RUNWAY

- Determine maximum takeoff weight on dry runway.
- Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
△WEIGHT (1000 kg) With clearway	34.7	30.7	26.1	21.2	28.0	21.8	22.2	20.9	18.4	21.4
△WEIGHT (1000 kg) Without clearway	29.9	28.1	24.5	20.2	24.5	20.2	21.7	19.3	17.8	21.4

- Enter the following tables with the corrected weight to determine MTOW. If the MTOW on dry runway is obstacle limited, check that MTOW is at least 24400 kg below the MTOW on dry runway. If not, the MTOW on contaminated runway is MTOW on dry runway minus 24400 kg. Then determine takeoff speeds associated with actual TOW.

CONF 1 + F

CORRECTED WEIGHT (1000 kg)	<153.5	153.5	160	165	165 to 240
MTOW (1000 kg)	–	135	152	165	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<135	135	140	150	160	165	170	180	190	200	210	220	230	240
V2 (kt IAS)	122	122	124	129	133	135	137	141	145	149	153	156	160	163
VR (kt IAS)	116	116	118	123	127	129	131	135	139	143	147	150	154	157
V1 (kt IAS)	116	116	116	116	116	116	118	122	126	130	134	137	141	144

CONF 2

CORRECTED WEIGHT (1000 kg)	<165.2	165.2	170	177.5	177.5 to 240
MTOW (1000 kg)	–	147.5	158	177.5	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<147.5	147.5	150	160	170	177.5	180	190	200	210	220	230	240
V2 (kt IAS)	121	121	122	126	129	132	133	137	141	144	148	151	154
VR (kt IAS)	116	116	117	121	124	127	128	132	136	139	143	146	149
V1 (kt IAS)	116	116	116	116	116	116	117	121	125	128	132	135	138

CONF 3

CORRECTED WEIGHT (1000 kg)	<176.9	176.9	180	187.5	187.5 to 240
MTOW (1000 kg)	–	160	168	187.5	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<160	160	170	180	187.5	190	200	210	220	230	240
V2 (kt IAS)	122	122	126	130	133	134	138	141	144	147	150
VR (kt IAS)	116	116	120	124	127	128	132	135	138	141	144
V1 (kt IAS)	116	116	116	116	116	117	121	124	127	130	133

TAKEOFF FROM A 12.7 MM (1/2 INCH) SLUSH COVERED RUNWAY

- Determine maximum takeoff weight on dry runway.
- Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
△WEIGHT (1000 kg) With clearway	48.4	46.5	45.3	50.1	45.5	45.8	53.3	38.8	46.0	49.1
Without clearway	43.6	43.9	43.7	49.1	42.0	44.2	52.8	37.2	45.4	49.1

- Enter the following tables with the corrected weight to determine MTOW. Then determine takeoff speeds associated with actual TOW.

CONF 1 + F

CORRECTED WEIGHT (1000 kg)	<139.2	139.2	140	144	144 to 240
MTOW (1000 kg)	–	130	132	144	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<130	130	140	144	150	160	170	180	190	200	210	220	230	240
V2 (kt IAS)	120	120	124	126	129	133	137	141	145	149	153	156	160	163
VR (kt IAS)	116	116	120	122	125	129	133	137	141	145	149	152	156	159
V1 (kt IAS)	116	116	116	116	119	123	127	131	135	139	143	146	150	153

CONF 2

CORRECTED WEIGHT (1000 kg)	<153.3	153.3	160	160 to 240
MTOW (1000 kg)	–	142.5	160	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<142.5	142.5	150	160	170	180	190	200	210	220	230	240
V2 (kt IAS)	119	119	122	126	129	133	137	141	144	148	151	154
VR (kt IAS)	116	116	119	123	126	130	134	138	141	145	148	151
V1 (kt IAS)	116	116	116	116	119	123	127	131	134	138	141	144

CONF 3

CORRECTED WEIGHT (1000 kg)	<163.3	163.3	170	170 to 240
MTOW (1000 kg)	–	152.5	170	EQUAL TO CORRECTED WEIGHT

ACTUAL WEIGHT (1000 kg)	<152.5	152.5	160	170	180	190	200	210	220	230	240
V2 (kt IAS)	119	119	122	126	130	134	138	141	144	147	150
VR (kt IAS)	116	116	119	123	127	131	135	138	141	144	147
V1 (kt IAS)	116	116	116	116	120	124	128	131	134	137	140

TAKEOFF FROM A COMPACTED SNOW COVERED RUNWAY

- Determine maximum takeoff weight on dry runway.
- Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
△WEIGHT (1000 kg) With clearway	15.5	12.7	8.6	13.8	9.0	13.3	22.2	12.2	18.4	22.5
Without clearway	10.7	10.1	7.0	12.8	5.5	11.7	21.7	10.6	17.8	22.5

- Enter the following tables with the corrected weight to determine MTOW. If the MTOW on dry runway is obstacle limited, check that MTOW is at least 24400 kg below the MTOW on dry runway. If not, the MTOW on contaminated runway is MTOW on dry runway minus 24400 kg. Then determine takeoff speeds associated with actual TOW.

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<158.5	158.5	160	170	170 to 240							
	MTOW (1000 kg)	–	140	144	170	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	<140	140	150	160	170	180	190	200	210	220	230	240
	V2 (kt IAS)	124	124	129	133	137	141	145	149	153	156	160	163
	VR (kt IAS)	116	116	121	125	129	133	137	141	145	148	152	155
	V1 (kt IAS)	116	116	116	116	116	120	124	128	132	135	139	142

CONF 2	CORRECTED WEIGHT (1000 kg)	<173.5	173.5	180	185	185 to 240							
	MTOW (1000 kg)	–	155	172	185	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	<155	155	160	170	180	185	190	200	210	220	230	240
	V2 (kt IAS)	124	124	126	129	133	135	137	141	144	148	151	154
	VR (kt IAS)	116	116	118	121	125	127	129	133	136	140	143	146
	V1 (kt IAS)	116	116	116	116	116	116	118	122	125	129	132	135

CONF 3	CORRECTED WEIGHT (1000 kg)	<181.9	181.9	190	192.5	192.5 to 240						
	MTOW (1000 kg)	–	165	186	192.5	EQUAL TO CORRECTED WEIGHT						
	ACTUAL WEIGHT (1000 kg)	<165	165	170	180	190	192.5	200	210	220	230	240
	V2 (kt IAS)	124	124	126	130	134	135	138	141	144	147	150
	VR (kt IAS)	116	116	118	122	126	127	130	133	136	139	142
	V1 (kt IAS)	116	116	116	116	116	116	119	122	125	128	131

SPRAY PATTERN

R There is a little chance of the engines ingesting fluid, which in any case should not
R jeopardize safety. The risk of ingestion is independent of the depth of the contaminant.

CROSSWIND

R To optimize directional control during the low speed phase of the takeoff and landing roll
R and according to the reported braking action given by the control tower, it is not
R recommended to takeoff and to land with a crosswind component higher than :

Reported braking action	Reported runway friction coefficient	Maximum crosswind (kt)	Equivalent runway condition**
Good	≥ 0.4	32*	1
Good/medium	0.39 to 0.36	27	1
Medium	0.35 to 0.3	20	2/3
Medium/poor	0.29 to 0.26	20	2/3
Poor	≤ 0.25	15	3/4
Unreliable		Not defined	4/5

* This is the maximum crosswind demonstrated for dry and wet runway.
** Equivalent runway condition (only valid for maximum cross wind determination)
1. Dry, damp or wet runway (less than 3 mm water depth)
2. Runway covered with slush
3. Runway covered with dry snow
4. Runway covered with standing water with risk of hydroplaning or wet snow
5. Icy runway or high risk of hydroplaning

TAXIING

– **FOLLOWING TAXIING PROCEDURES .... CONSIDER**

R – Avoid high thrust settings.

R – When taxiing on slippery surfaces, stay well behind preceding aircraft.

– Taxi at low taxi speed. Note that antiskid does not operate at low speeds.

– On slippery taxiways during turns with large nose wheel steering angles, noise and vibration may result from the wheels slipping sideways. Keep speed as low as possible to make a smooth turn with minimum radius. Differential power may be needed.

– If taxiing in icing conditions with precipitation on runways and taxiways
R contaminated with slush or snow :

· Before takeoff keep flaps/slats retracted until reaching the holding point on the takeoff runway to avoid contaminating of the mechanism. Hold the BEFORE TO checklist at FLAP SETTING and finish it after extending flaps/slats.

· When taxiing in after landing, do not retract the flaps/slats to avoid damage of the structure.
After engine shutdown make a visual inspection to determine that the flap/slat mechanism is free of contamination.

R · When the mechanism is clean, use the following procedure to retract the flaps/slats before the aircraft electric network is de-energized :

– Select ON the GREEN and YELLOW ELEC PUMP.
– Retract the FLAPS, and monitor retraction on ECAM page.
– Select OFF the GREEN and YELLOW ELEC PUMP and resume with normal procedure.

TAKEOFF

– **FOLLOWING TAKEOFF RECOMMENDATIONS .... CONSIDER**

– For contaminated runways, select MAX TO.

– Do not abort takeoff for minor deficiencies even at low speeds.
R If you have to abort takeoff, maintain directional control with the rudder and small inputs to the nose wheel. If necessary, use differential braking to regain the center line when stopping distance permits.

– Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the aircraft because this produces additional aerodynamic drag.

– Rotate, lift off and retract gear and high lift devices in the normal manner.

LANDING

R – **FOLLOWING LANDING PROCEDURES .... CONSIDER**

- Avoid landing on contaminated runways if the antiskid is not functioning. The use of autobrake LOW or MED is recommended provided that the contamination is evenly distributed.
- Approach at the normal speed.
- R Make a positive touchdown after a brief flare.
- As soon as the aircraft has touched down, lower the nose wheel onto the runway and select maximum reverse thrust.
  Do not hold the nose wheel off the ground.
- If necessary, the maximum reverse thrust can be used until the aircraft is fully stopped.
- If the runway length is limiting, apply the brakes before lowering the nose gear onto the runway, but be prepared to apply back stick to counter the nose down pitch produced by the brakes application. (The strength of this pitching moment will depend on the brake torque attainable on the slippery runway).
- Maintain directional control with the rudder as long as possible, use nose wheel steering with care.
- R When the aircraft is at taxi speed, follow the recommendations for taxiing.

Note : If there is snow, visibility may be reduced by snow blowing forward at low speeds if reversers are not cancelled.

EXAMPLES

TAKEOFF PERFORMANCE ON DRY RUNWAY

Data

Runway length : 3000 m, OAT = 34°C, no wind, CONF 2

– Determine maximum takeoff weight on dry runway from RTOW chart (Refer to FCOM
R 2.02.10 p 6)

OAT °C	CONF 2				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
32.0	204.8 3/4 139/42/47	210.1 3/4 143/46/51	215.4 3/4 148/50/54	218.9 3/4 151/52/57	221.7 3/4 154/56/60
34.0	202.8 3/4 139/41/47	208.0 3/4 143/45/50	213.2 3/4 147/49/54	216.6 3/4 150/52/56	219.4 3/4 153/56/60
36.0	200.7 3/4 138/41/46	205.8 3/4 143/45/50	210.9 3/4 147/49/53	214.3 3/4 150/51/56	217.0 3/4 153/55/59

GFC5-02-0410-014-A115AA

Maximum TOW = 213200 kg, V1 = 147 kt, VR = 149 kt, V2 = 154 kt.

TAKEOFF PERFORMANCE ON WET RUNWAY

With thrust reversers operating and assuming that no clearway was used to compute the dry RTOW chart, use the lower table from 2.04.10 p 4.
R

TAKEOFF CONFIGURATION	1+F			2			3		
RUNWAY LENGTH (M) (FT)	3000 9842	3500 11483	4000 13123	2500 8202	3000 9842	3500 11483	2000 6562	2500 8202	3000 9842
FLEX TO TEMPERATURE DECREMENT (°C)	2	3	5	1	2	3	0	3	2
MAX TO WEIGHT DECREMENT (1000 KG) (1000 LB)	1.3 2.9	2.3 5.1	5.0 11.1	0.4 0.9	2.1 4.7	2.9 6.4	0.0 0.0	2.3 5.1	2.0 4.5
V1 DECREMENT (KT)	8	9	10	6	8	8	8	8	8
VR AND V2 DECREMENT (KT)	1	2	3	0	2	3	1	2	3

GFC5-02-0410-014-B115AA

· Maximum takeoff weight correction :
MTOW = 213200 – 2100 = 211100 kg, V1 = 147 – 8 = 139 kt,
VR = 149 – 2 = 147 kt, V2 = 154 – 2 = 151 kt.

· Flex temperature correction :
Assuming an actual takeoff weight of 200000 kg and an initial flex temperature of 44°C
TOW = 200000 kg ⇒ Flex temperature = 44 – 2 = 42°C
V1 = 146 – 8 = 136 kt, VR = 148 – 2 = 146 kt, V2 = 152 – 2 = 150 kt.

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH

Data

Runway length : 3000 m (no clearway), OAT = 5°C, no wind, CONF 2

– Determine maximum takeoff weight on dry runway (Refer to FCOM 2.02.10 p 6).

GFC5-02-0410-015-A225AA

OAT °C	CONF 2 TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
0.0	212.3 3/4 145/47/53	217.7 3/4 149/51/57	223.0 3/4 154/56/61	226.5 3/4 157/59/63	228.8 3/4 161/63/67
10.0	210.7 3/4 143/45/51	216.1 3/4 147/50/55	221.4 3/4 152/54/59	225.0 3/4 155/57/61	227.6 3/4 158/60/65

Maximum takeoff weight on dry runway = 222200 kg

– Determine a corrected weight (Refer to FCOM 2.04.10 p 9). As no clearway, use the correction displayed on the second line (without clearway).

GFC5-02-0410-015-B225AA

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
ΔWEIGHT (1000 kg) With clearway Without clearway	48.4 43.6	46.5 43.9	45.3 43.7	50.1 49.1	45.5 42.0	45.8 44.2	53.3 52.8	38.8 37.2	46.0 45.4	49.1 49.1

Corrected weight = 222200 – 44200 = 178000 kg

– Determine maximum takeoff weight and associated speeds :

GFC5-02-0410-015-C225AA

CONF 2													
CORRECTED WEIGHT (1000 kg)	<153.3	153.3	160	160 to 240									
MTOW (1000 kg)	-	142.5	160	EQUAL TO CORRECTED WEIGHT									
ACTUAL WEIGHT (1000 kg)	<142.5	142.5	150	160	170	180	190	200	210	220	230	240	
V2 (kt IAS)	119	119	122	126	129	133	137	141	144	148	151	154	
VR (kt IAS)	116	116	119	123	126	130	134	138	141	145	148	151	
V1 (kt IAS)	116	116	116	116	119	123	127	131	134	138	141	144	

MTOW = 178000 kg

V1 = 122 kt, VR = 130 kt, V2 = 133 kt

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/4 INCH WATER

Data

Runway length : 3000 m (no clearway), OAT = 50°C, 10 kt tailwind, CONF 2

— Determine maximum takeoff weight on dry runway (Refer to FCOM 2.02.10 p 6).

GFC5-02-0410-016-A225AA

OAT °C	CONF 2 TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
48.0	183.4 3/4 137/39/43	187.7 3/4 141/43/47	191.9 3/4 146/46/50	194.8 3/4 148/49/53	197.4 3/4 151/52/55
50.0	179.4 3/4 137/38/43	183.5 3/4 141/42/46	187.6 3/4 145/46/49	190.4 3/4 148/48/52	192.8 3/4 151/51/54
52.0	175.3 3/4 136/38/42	179.3 3/4 141/41/45	183.2 3/4 145/45/49	185.8 3/4 148/48/51	188.1 3/4 150/50/53

Maximum takeoff weight on dry runway = 179400 kg

— Determine a corrected weight (Refer to FCOM 2.04.10 p 6). As no clearway, use the correction displayed on the second line (without clearway).

GFC5-02-0410-016-B225AA

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2500 8000	3000 10000	3500 11500 and above	2500 8000	3000 10000	3500 11500 and above
ΔWEIGHT (1000 kg) With clearway Without clearway	33.4 28.6	31.1 28.5	26.1 24.5	20.3 19.3	30.6 27.1	21.9 20.3	22.2 21.7	20.1 18.5	18.4 17.8	21.8 21.8

Corrected weight = 179400 – 20300 = 159100 kg

— Determine maximum takeoff weight :

GFC5-02-0410-016-C225AA

CONF 2												
CORRECTED WEIGHT (1000 kg)	<170	170	180	182.5	182.5 to 240							
MTOW (1000 kg)	-	150	176	182.5	EQUAL TO CORRECTED WEIGHT							
ACTUAL WEIGHT (1000 kg)	<150	150	160	170	180	182.5	190	200	210	220	230	240
V2 (kt IAS)	122	122	126	129	133	134	137	141	144	148	151	154
VR (kt IAS)	116	116	120	123	127	128	131	135	138	142	145	148
V1 (kt IAS)	116	116	116	116	116	116	119	123	126	130	133	136

For corrected weight 159100 kg < 170000 kg no takeoff weight can be determined with this method.

GENERAL

R The aircraft may fly without cabin pressurization because of an aircraft system deficiency
R (see MEL) or after a decompression in flight. The pilot's choice of flight level and airspeed
R depends on the cause of the depressurization, the distance to fly, the topographic
R conditions and the meteorological conditions.

OXYGEN REQUIREMENTS

CREW MEMBERS

R See FAR 121.329 or JAR-OPS 1.770

PASSENGERS

R For flight at cabin pressure altitudes above 10000 feet, up to and including 14000 feet,
R there must be enough oxygen to supply 10 % of the passengers for the flight at those
R altitudes that lasts more than 30 minutes.
R For flight at cabin pressure altitudes above 14000 feet, up to and including 15000 feet,
R there must be enough oxygen for 30 % of the passengers.
R For flight at cabin pressure altitudes above 15000 feet, there must be enough oxygen for
R all passengers.

FLIGHT PLANNING AND EXECUTION

ALTITUDE

Flight route planning should consider the above-stated restriction in cabin altitude. If cabin altitude exceeds 9950 (± 350) feet, the EXCESS CAB ALT warning on the ECAM will be activated. When above 14000 feet, the passenger oxygen masks will be automatically provided. Therefore, the recommended maximum altitude for prolonged flight is FL100. The minimum altitude should be selected by respecting :
- The Minimum Safe Altitude (MSA),
- Turbulence, which is uncomfortable for passengers and,
- Low Outside Air Temperature (OAT), which can be uncomfortable for passengers when the cabin is ventilated by ram air only.

AIRSPEED

If decompression is due to structural damage, consider airspeed reduction. Use slats and flaps, as necessary, to establish low speed conditions. In addition, turbulent conditions are uncomfortable for passengers, and gust response should be minimized by reducing airspeed.

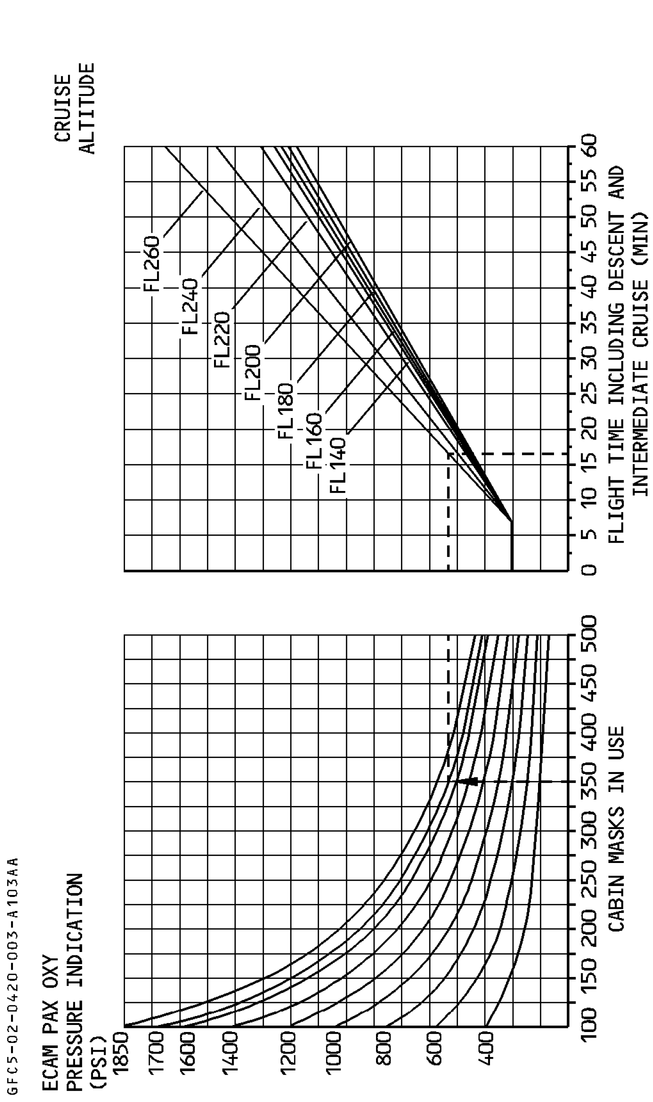
CLIMB AND DESCENT RATE

Takeoff must be performed normally, and the rate of climb must be limited to about 500 feet/minute, to ease the pressure change felt by passengers and crew.
R Likewise, the rate of descent must be limited to about 1000 feet/minute, except for the final approach which must be performed normally. Notify the ATC of any performance deficiency by a remark in the flight plan.

EMERGENCY DESCENT IN CASE OF RAPID DEPRESSURIZATION

In case of depressurization, the cabin's fixed oxygen system supplies oxygen, stored in interconnected cylinders. The flow rate is controlled by an altimetric flow regulation device within each mask container.
Depending on the number of masks used, and on the altitude flown during the descent, the following chart provides the oxygen supply time.

R



The oxygen is supplied for:
- 30 seconds at FL 400,
- Descent at 5500 ft/min from FL 400 to cruise altitude,
- Descent at 5500 ft/min cruise altitude to FL 100.
- Flight time at a selected cruise altitude read on the chart.

Note : - The pax oxygen system is designed such that, for a constant pressure and a given number of pax masks in use, the flight time increases for flight levels above 140 up to 200 and decreases for altitudes above.
- According to the JAR-OPS 1.770 regulation, when the oxygen supply is exhausted, the aircraft is authorized to fly for 30 minutes at FL 140 before descending to FL 100.

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SYSTEMS

FAILURE OCCURRING IN FLIGHT

Apply the abnormal and emergency procedures required by the ECAM.

FAILURE PRESENT AT DISPATCH

- **If flight, with both packs inoperative :**
  - **PACK 1 and 2 . . . . OFF**
  - **RAM AIR . . . . ON**
- **If both CAB PRESS systems are inoperative, or if there is structural damage :**
  - **PACK 1 and 2 . . . . ON**
  - **MODE SEL . . . . MAN**
  - **MAN VALVE SEL . . . . BOTH**
  - R **MAN V/S CTL . . . . AS RQRD**
    R Use MAN V/S CTL to set the outflow valve opening to 50 %.
  - **OUTFLOW VALVE HALF OPEN . . . . CHECK**
    The outflow valve opening is limited to 50 %, to avoid cabin air suction effect.
  - **MAX FL . . . . 100 or MSA**

TAKEOFF

Limit the aircraft's rate of climb to about 500 feet/minute.

CLIMB

Note : The EXCESS CAB ALT warning may occur.
Use the ECAM CLR pushbutton to clear the warning.

DESCENT

Limit the aircraft's rate of descent to about 1000 feet/minute. Perform the final approach normally.

PERFORMANCE DATA

The following table enables the fuel consumption and the time needed from takeoff to landing to be determined in case of flight without cabin pressurization.
The table is established for
- Takeoff
- Climb from 1500 ft at 250 kt
- Long range cruise speed at FL100
- Descent to 1500 ft at 250 kt
- Approach and landing : IMC procedure 240 kg or 530 lb (6 min)
- ISA temperature
- CG = 30 %
- Normal air conditioning
- Anti ice OFF

The table on page 8 gives the conversion from ground distance to air distance.

Note : For each degree Celsius above ISA temperature apply a correction of 0.010 kg/°C/NM or 0.022 lb/°C/NM.

R

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250 KT - CRUISE : LONG RANGE - DESCENT : 250KT
IMC PROCEDURE : 240 KG (6MIN)

FL 100

NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 30.0%	FUEL CONSUMED (KG) TIME (H.MIN)

AIR DIST. (NM)	INITIAL WEIGHT (1000KG) 140	160	180	200	220	240
300	5068 1.11	5377 1.09	5710 1.08	6058 1.07	6423 1.05	6786 1.04
400	6490 1.33	6889 1.29	7311 1.27	7749 1.25	8209 1.22	8656 1.21
500	7905 1.54	8393 1.49	8905 1.46	9433 1.44	9987 1.40	10518 1.38
600	9314 2.15	9890 2.10	10493 2.05	11109 2.02	11758 1.58	12373 1.54
700	10717 2.37	11381 2.30	12072 2.25	12776 2.21	13521 2.15	14221 2.11
800	12114 2.58	12864 2.50	13645 2.44	14437 2.40	15274 2.33	16061 2.28
900	13504 3.20	14341 3.11	15211 3.04	16090 2.58	17017 2.51	17894 2.45
1000	14889 3.41	15812 3.32	16770 3.23	17735 3.17	18751 3.09	19720 3.03
1100	16268 4.03	17274 3.53	18322 3.43	19373 3.36	20477 3.27	21539 3.20
1200	17642 4.25	18729 4.13	19868 4.02	21003 3.55	22195 3.46	23351 3.37
1300	19009 4.46	20177 4.35	21407 4.22	22624 4.14	23905 4.04	25153 3.54
1400	20371 5.08	21618 4.56	22940 4.42	24239 4.33	25606 4.23	26945 4.12
1500	21727 5.30	23053 5.17	24466 5.01	25846 4.52	27300 4.41	28730 4.29
1600	23073 5.53	24482 5.38	25986 5.21	27446 5.12	28986 5.00	30508 4.47
1700	24411 6.16	25904 6.00	27496 5.41	29038 5.31	30664 5.19	32278 5.04
1800	25743 6.39	27320 6.22	28999 6.01	30624 5.50	32335 5.38	34041 5.22
1900	27069 7.02	28729 6.43	30496 6.21	32203 6.10	33999 5.56	35797 5.40
2000	28389 7.25	30133 7.05	31987 6.41	33775 6.29	35655 6.15	37546 5.58
2100	29703 7.48	31530 7.27	33471 7.02	35340 6.49	37304 6.34	39287 6.16
2200	31012 8.12	32925 7.49	34949 7.22	36901 7.08	38946 6.53	41019 6.34
2300	32314 8.36	34315 8.10	36421 7.42	38455 7.28	40581 7.12	42744 6.52
2400	33611 9.00	35699 8.32	37887 8.03	40002 7.47	42209 7.31	44462 7.10
2500	34902 9.24	37078 8.53	39346 8.23	41543 8.07	43830 7.50	46173 7.28
2600	36188 9.48	38451 9.15	40800 8.44	43079 8.27	45443 8.10	47877 7.46
2700	37467 10.13	39819 9.37	42243 9.05	44608 8.46	47048 8.29	49574 8.04

AIR CONDITIONING OFF	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 2 %	△FUEL = + 3 %	△FUEL = + 4 %

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+ 90	+ 60	+ 30	0	-30	-60	-90
300	241	258	277	**300**	327	359	398
400	321	343	370	**400**	436	479	531
500	401	429	462	**500**	545	599	664
600	481	515	554	**600**	654	718	797
700	561	601	647	**700**	763	838	930
800	641	687	739	**800**	872	958	1063
900	722	773	831	**900**	981	1078	1195
1000	802	859	924	**1000**	1090	1197	1328
1100	882	944	1016	**1100**	1199	1317	1461
1200	962	1030	1109	**1200**	1308	1437	1594
1300	1042	1116	1201	**1300**	1417	1556	1727
1400	1123	1202	1293	**1400**	1526	1676	1860
1500	1203	1288	1386	**1500**	1635	1796	1992
1600	1283	1374	1478	**1600**	1744	1916	2125
1700	1363	1460	1571	**1700**	1853	2035	2258
1800	1443	1545	1663	**1800**	1962	2155	2391
1900	1523	1631	1755	**1900**	2071	2275	2524
2000	1604	1717	1848	**2000**	2180	2395	2657
2100	1684	1803	1940	**2100**	2289	2514	2789
2200	1764	1889	2033	**2200**	2398	2634	2922
2300	1844	1975	2125	**2300**	2507	2754	3055
2400	1924	2060	2217	**2400**	2615	2873	3188
2500	2005	2146	2310	**2500**	2724	2993	3321
2600	2085	2232	2402	**2600**	2833	3113	3454
2700	2165	2318	2494	**2700**	2942	3233	3586

GENERAL

R This Chapter applies to dispatch with landing gear down. However, the limitations and inflight performance also apply in case of an inflight L/G retraction failure . Revenue flight is permitted with the L/G down, and the gear doors closed in the conditions stated below.

LIMITATIONS

- The maximum altitude is 35,000 feet.
- Do not fly into expected icing conditions.
- Ditching with landing gear down has not been demonstrated.
- 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.

Note : Automatic fuel aft transfer is lost.

PROCEDURES

PREFLIGHT

VMO/MMO with landing gear down is 255 knots/M.60. In the avionics compartment, on 808VU, the VMO-MMO switch must be set to the “L/G DOWN” position.

PERFORMANCE

Consider the increase in drag to determine the takeoff weight and fuel consumption.
CONF 1 + F is the recommended takeoff configuration.

Note : Takeoff with tailwind is not recommended.

Penalties on takeoff performance affect second segment gradient, final takeoff, and enroute conditions. The takeoff weight to be retained is the most limiting of these three conditions.

SECOND SEGMENT GRADIENT CONDITION

The RTOW charts, or the quick reference tables, give the basic information for normal takeoff. To simplify, a constant weight reduction is applied, whatever the limitation. This weight reduction covers the most critical case presented, for flying over an obstacle.

R

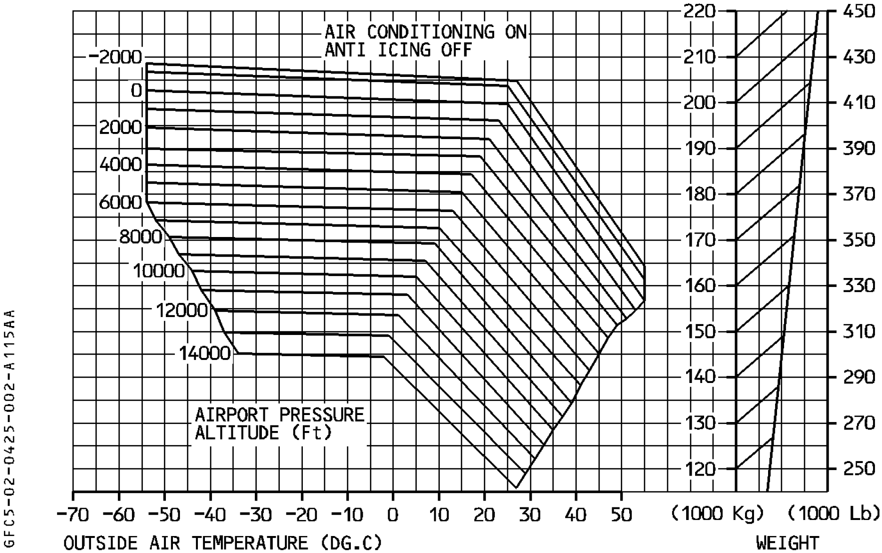
Takeoff configuration	1 + F	2	3
Weight reduction	21 %	16 %	15 %

METHOD

Use the RTOW chart or the quick reference tables to define the maximum takeoff weight for the conditions on the airport (temperature, pressure, wind, runway...), then apply the above weight reduction.

FINAL TAKEOFF CONDITION

The final takeoff speed is VLS + 11
Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition.



R **EN-ROUTE CONDITION**

R Retain the lowest weight according to the most limiting condition (second segment or final
R takeoff). Use the en-route net flight path on page 8 to check that, in case of engine failure,
R the aircraft can clear the terrain on the route by 1000 feet (climbing) or 2000 feet
R (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to
R this weight in the RTOW chart or in the quick reference tables.

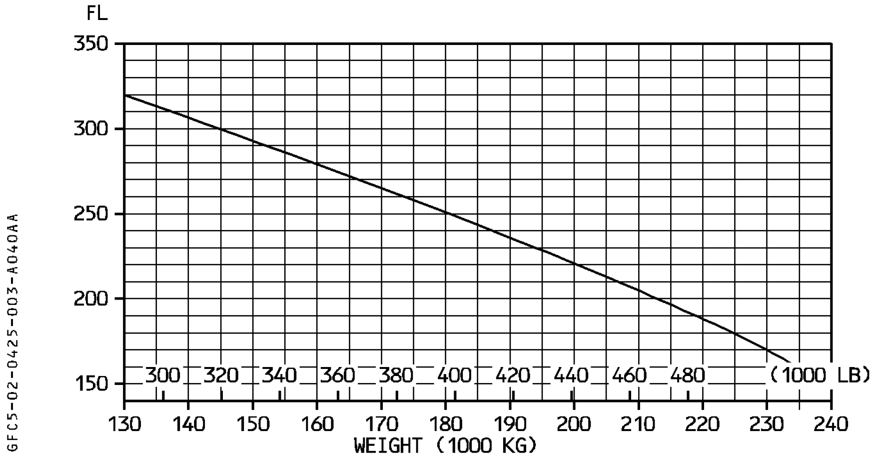
R **GO AROUND PERFORMANCE**

R See 3.05.35 for go around requirements.
R Further decrease the basic limiting weight by 12 %.

FLIGHT PLANNING

MAXIMUM ALTITUDE

In order to ensure that there is at any moment of the flight a minimum range of 20 kts between VLS and the maximum speed (limited by thrust or VMO/MMO), the aircraft must remain below the following profile.



CLIMB

Climb at 240 kt/M.52 with all engines at maximum climb thrust. The tables on page 4 give the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 240 kt/M.52.
The ceiling with an engine inoperative may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

In case of engine failure, the airplane will drift down to the ceiling shown on page 9.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to VLS + 5.

HOLDING

Page 7 gives the holding parameters with slats out, this configuration being the least penalizing for holding.

R

CLIMB - 240KT/M.52 - ALL ENGINES - L/G DOWN

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**	**200**	**210**	**220**
310	19 3881									
	94 288									
290	17 3557	19 3934								
	81 286	90 287								
270	15 3266	16 3596	18 3954	20 4349						
	70 283	78 283	86 284	95 285						
250	13 2995	15 3287	16 3601	18 3940	19 4315					
	61 279	68 280	75 280	82 281	90 282					
240	12 2863	14 3139	15 3434	16 3750	18 4096	20 4480				
	57 277	63 277	69 278	76 279	84 279	92 280				
220	11 2603	12 2849	13 3108	14 3385	16 3683	17 4009	19 4370	20 4774		
	50 272	55 272	60 273	65 273	71 274	78 275	85 276	94 277		
200	10 2345	11 2562	11 2790	12 3031	14 3289	15 3567	16 3871	17 4206	19 4579	
	43 265	47 266	51 266	56 267	60 267	66 268	72 269	78 270	86 271	
180	8 2061	9 2248	10 2443	11 2648	11 2866	12 3100	13 3351	15 3625	16 3925	17 4255
	35 256	39 257	42 257	46 258	50 258	54 259	58 260	63 260	69 261	75 262
160	7 1800	8 1960	8 2127	9 2302	10 2487	10 2684	11 2894	12 3120	13 3365	14 3632
	29 247	32 248	34 248	37 249	40 249	44 250	47 250	51 251	55 252	60 252
140	6 1563	6 1700	7 1842	8 1991	8 2148	9 2313	9 2489	10 2677	11 2879	12 3097
	24 238	26 239	28 239	30 240	33 240	35 240	38 241	41 242	44 242	48 243
120	5 1346	5 1462	6 1582	6 1708	7 1840	7 1979	8 2126	9 2282	9 2449	10 2628
	19 229	21 229	23 229	24 230	26 230	28 231	31 231	33 232	35 233	38 233
100	4 1142	5 1238	5 1339	5 1444	6 1554	6 1670	7 1791	7 1920	7 2057	8 2202
	15 218	16 218	18 219	19 219	21 220	22 220	24 221	26 221	28 222	30 223
50	2 669	3 723	3 779	3 838	3 899	3 964	4 1031	4 1101	4 1175	4 1253
	7 180	7 180	8 180	9 181	9 181	10 182	11 182	12 183	12 184	13 184
15	1 358	1 385	1 413	1 443	2 474	2 506	2 540	2 575	2 612	2 650
	2 113	2 113	3 113	3 113	3 113	3 113	3 114	4 115	4 116	4 117

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CRUISE - 240KT/M.52 - ALL ENGINES - L/G DOWN

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=30.0%	**N1 (%) KG/H/ENG NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL200**		**FL250**		**FL270**		**FL290**		**FL310**	
130	85.8	.434	90.0	.477	93.9	.520	93.2	.520	93.1	.520	93.2	.520	93.5	.520
	4274	240	4323	240	4307	237	3560	214	3312	205	3097	196	2911	188
	32.4	277	34.6	299	37.1	319	44.0	313	46.9	310	49.7	308	52.4	305
140	86.1	.434	90.2	.477	94.2	.520	93.7	.520	93.7	.520	94.0	.520	94.5	.520
	4316	240	4365	240	4354	237	3620	214	3386	205	3182	196	3008	188
	32.1	277	34.2	299	36.7	319	43.2	313	45.8	310	48.4	308	50.7	305
150	86.3	.434	90.5	.477	94.6	.520	94.3	.520	94.5	.520	94.9	.520	95.8	.520
	4360	240	4410	240	4402	237	3693	214	3470	205	3276	196	3123	188
	31.8	277	33.9	299	36.3	319	42.4	313	44.7	310	47.0	308	48.8	305
160	86.6	.434	90.8	.477	94.9	.520	94.9	.520	95.3	.520	96.0	.520		
	4407	240	4459	240	4457	237	3776	214	3563	205	3388	196		
	31.5	277	33.5	299	35.8	319	41.5	313	43.6	310	45.4	308		
170	87.0	.434	91.2	.477	95.3	.520	95.6	.520	96.2	.520	97.2	.520		
	4460	240	4513	240	4518	237	3866	214	3668	205	3511	196		
	31.1	277	33.1	299	35.4	319	40.5	313	42.3	310	43.8	308		
180	87.3	.434	91.6	.477	95.7	.520	96.4	.520	97.3	.520				
	4517	240	4573	240	4587	237	3965	214	3787	205				
	30.7	277	32.7	299	34.8	319	39.5	313	41.0	310				
190	87.7	.434	92.0	.477	96.2	.520	97.3	.520	98.5	.520				
	4580	240	4640	240	4668	237	4079	214	3924	205				
	30.3	277	32.2	299	34.2	319	38.4	313	39.5	310				
200	88.2	.434	92.4	.477	96.8	.520	98.3	.520						
	4648	240	4715	240	4755	237	4204	214						
	29.8	277	31.7	299	33.6	319	37.2	313						
210	88.6	.434	92.9	.477	97.4	.520								
	4723	240	4798	240	4849	237								
	29.4	277	31.2	299	32.9	319								
220	89.1	.434	93.4	.477	98.0	.520								
	4807	240	4886	240	4950	237								
	28.8	277	30.6	299	32.3	319								

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DESCENT - M.52/240KT - ALL ENGINES - L/G DOWN									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=30.0%		**MAXIMUM CABIN RATE OF DESCENT 350FT/MIN**				
WEIGHT (1000KG)	**150**				**200**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
310	9.6	174	46	IDLE	11.6	211	56	IDLE	188
290	8.8	162	42	IDLE	10.8	198	52	IDLE	196
270	8.1	151	39	IDLE	10.0	186	48	IDLE	205
250	7.4	140	35	IDLE	9.2	174	44	IDLE	214
240	7.1	135	34	IDLE	8.8	168	42	IDLE	218
220	6.5	125	31	IDLE	8.1	156	38	IDLE	228
200	6.0	116	28	IDLE	7.5	145	35	IDLE	237
180	5.4	106	25	IDLE	6.7	132	31	IDLE	240
160	4.8	95	22	IDLE	6.0	119	27	IDLE	240
140	4.2	84	18	IDLE	5.2	105	23	IDLE	240
120	3.5	72	15	IDLE	4.4	90	19	IDLE	240
100	2.9	60	12	IDLE	3.6	75	16	IDLE	240
50	1.2	26	5	IDLE	1.5	33	6	IDLE	240
15	.0	0	0	IDLE	.0	0	0	IDLE	240

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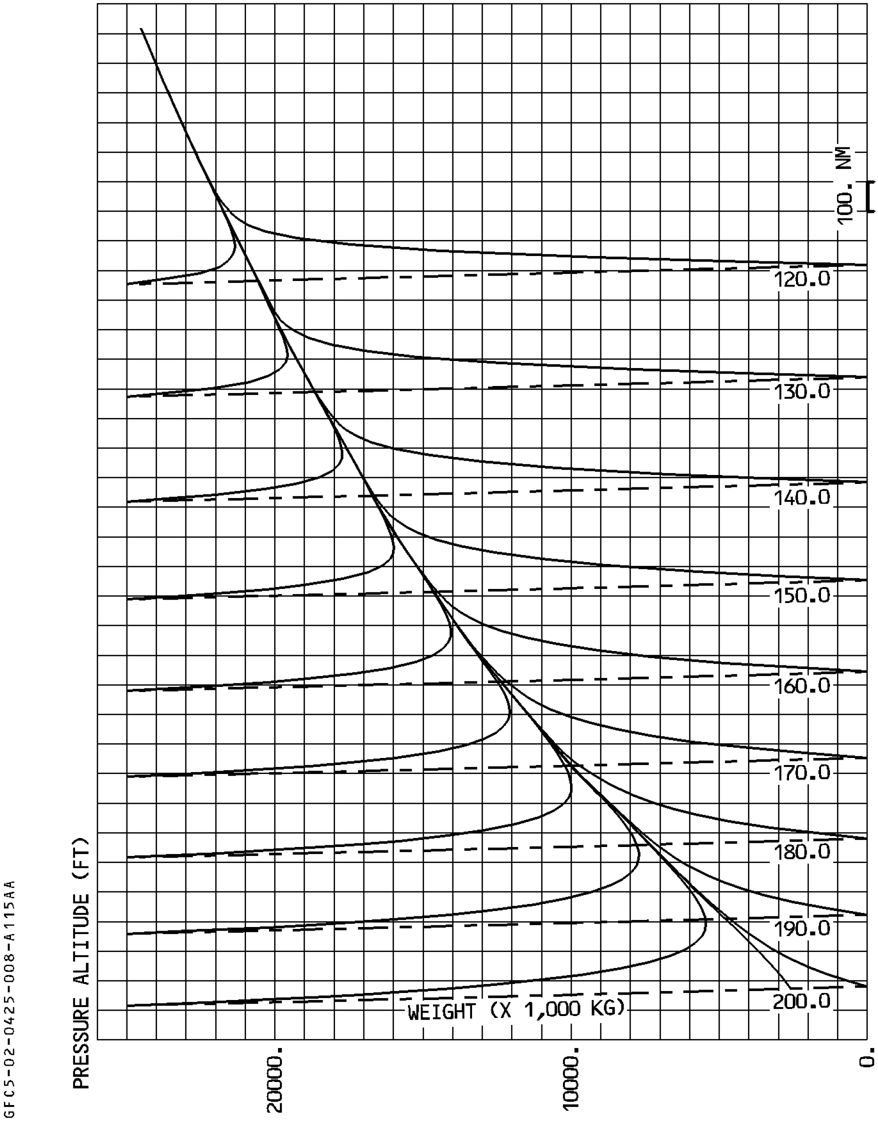
R

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN

MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=30.0%	**N1 (%)** **FF (KG/H/ENG)**

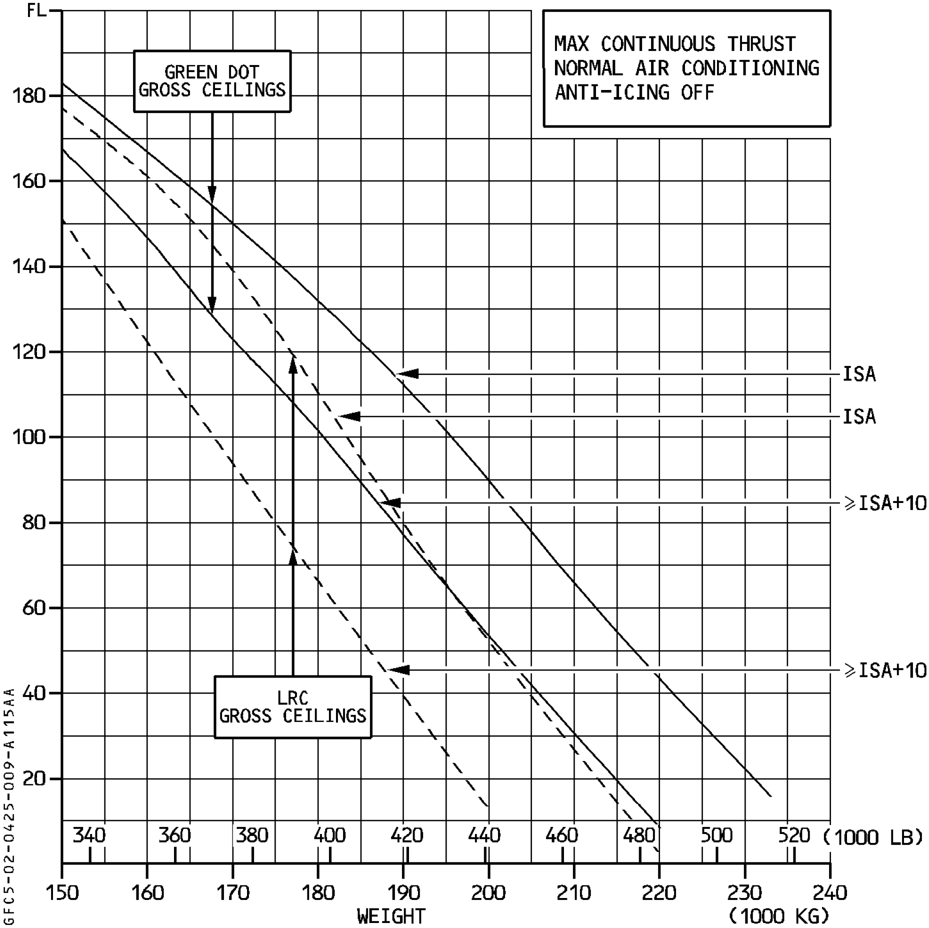
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL120**	**FL140**	**FL150**	**FL160**	**FL180**	**FL200**
130	65.1 2608	68.2 2604	72.4 2584	74.1 2588	75.8 2598	76.7 2600	77.6 2601	79.4 2602	81.3 2612
140	67.3 2819	70.3 2810	74.5 2800	76.3 2812	78.0 2815	78.9 2815	79.8 2816	81.6 2826	83.4 2835
150	69.4 3033	72.3 3015	76.6 3029	78.3 3033	80.1 3033	81.0 3038	81.9 3044	83.7 3050	85.4 3067
160	71.4 3245	74.3 3231	78.5 3253	80.3 3255	82.1 3264	83.0 3264	83.8 3268	85.6 3285	87.4 3303
170	73.2 3457	76.1 3460	80.4 3480	82.2 3487	83.9 3489	84.8 3495	85.6 3504	87.5 3522	89.3 3548
180	75.0 3680	77.9 3701	82.2 3713	83.9 3713	85.6 3726	86.5 3735	87.4 3744	89.2 3769	91.2 3796
190	76.7 3915	79.6 3937	83.9 3942	85.6 3950	87.3 3969	88.2 3979	89.1 3992	91.0 4020	93.0 4050
200	78.5 4180	81.4 4190	85.6 4193	87.3 4210	89.1 4233	90.0 4247	90.9 4262	92.8 4290	94.9 4330
210	80.2 4442	83.1 4438	87.2 4455	89.0 4477	90.7 4507	91.6 4523	92.6 4536	94.6 4574	96.8 4626
220	81.9 4724	84.7 4710	88.9 4747	90.7 4775	92.5 4806	93.4 4820	94.4 4839	96.5 4889	98.9 4956

EN ROUTE NET FLIGHT PATH - L/G DOWN - ONE ENGINE OUT		
MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA	Required gradient : 1.1 % Minimum engine



GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS – ONE ENGINE OUT

R



BLEED CORRECTIONS

R

		ISA	≥ ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	– 200	– 1100
	TOTAL ANTI ICE ON	– 600	– 2400
GREEN DOT	ENGINE ANTI ICE ON	– 100	– 700
	TOTAL ANTI ICE ON	– 500	– 2000

OPERATION ABOVE 8000 FEET

The STANDARD OPERATING PROCEDURES (Refer to FCOM 3.03) and ABNORMAL and EMERGENCY PROCEDURES (Refer to FCOM 3.02) remain applicable for operation at high altitude airfields.

SYSTEM OPERATION

– PRESS

In case the aircraft takes off from an airfield higher than 8000 feet the cabin altitude
R remains at takeoff altitude until the cruise conditions are fulfilled (i.e. aircraft altitude
R 5000 feet above takeoff altitude and aircraft climb rate lower than 50 SLFPM for more
R than 32 seconds). After level off the cabin altitude is controlled to the scheduled cruise cabin altitude. On the ECAM PRESS or CRUISE page it can be observed that the cabin altitude starts changing 32 seconds after level off.

R <u>Note</u> : *After a takeoff with packs off the Cabin Pressure Controller (CLB mode) will*
R *control the cabin altitude to takeoff altitude + 250 feet.*

– HYD

If on ground the «RSVR LO AIR PR» ECAM caution is triggered, switch OFF the
R associated hydraulic pumps (engines and electrical) before engine start to allow reservoir pressurization before hydraulic pump operation.

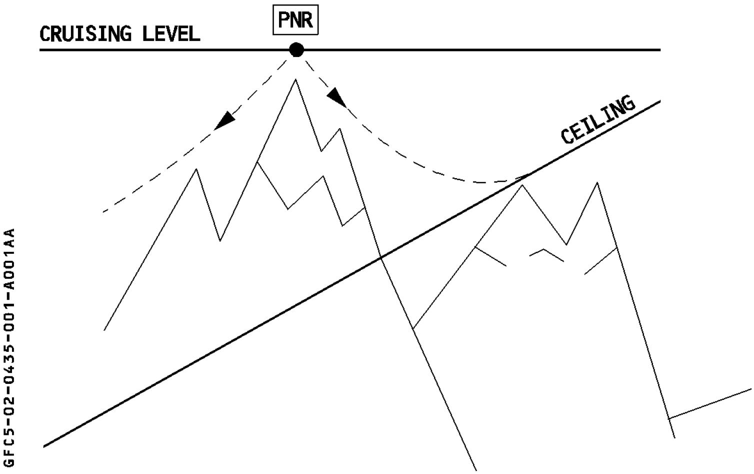
INTRODUCTION

Two failures must be taken into consideration for en route obstacle clearance over mountainous area :

R – Engine failure that forces a descent to a lower cruise level
– Depressurization which, due to the passenger oxygen system, requires a descent to 10000 feet before supplementary oxygen is exhausted.

ENGINE FAILURE

R If the standard strategy does not allow the aircraft to clear obstacles, the pilot must use
R a drift down procedure. If an engine failure occurs at any point on the route, the net flight path must clear the obstacles on the drift down part by 2000 feet and on the climb part by 1000 feet.
R If the aircraft cannot clear the en route obstacles, a point of no return (PNR) must be
R determined.



R If an engine failure occurs after the PNR, the aircraft must drift down on course. If the
R failure occurs before the PNR, the aircraft must turn back.
For en route net flight paths, refer to the Aircraft Flight Manual.

DEPRESSURIZATION

In case of depressurization, the passengers receive oxygen through individual modules. An emergency descent in accordance with a certain profile depending on passenger oxygen equipment installed has to be performed (Refer to 2.04.20) FLIGHT WITHOUT CABIN PRESSURIZATION.

CONCLUSION

R A detailed study of each route over mountainous area must show that single-engine net
R flight path and passenger oxygen system performance allow the obstacles to be cleared by
R 1000 feet in climb and 2000 feet in cruise or descent.
R If the aircraft in these circonstances cannot clear obstacles on the route, a PNR must be
R determined and diversion procedures must be established.

GENERAL

R The system design and the reliability of the engine installation of this airplane comply with the criteria for Extended Twin Operations (ETOPS) flights set forth in AMC 20–6 (EASA) or AC 120-42 A (FAA) when the aircraft is configured, maintained and operated in accordance with the provisions of the appropriate Airbus Industrie document "Standard for Extended Range Operations" in the latest approved revision which is the Airbus CMP (Configuration, Maintenance and Procedure) document.

This statement of ability does not constitute an approval to conduct Extended-Range Operations.

The section 6 of the Flight Manual refers to the approved Standard for Extended-Range Operations and the applicable limitations, procedures and performance references.

The operator is responsible for showing that he is complying with the regulation of his nation and for obtaining operational approval from his national authorities. The operator may amend this chapter, as needed.

The airplane must be configured in accordance with the Airbus Industrie Standard for Extended-Range Operations. However, the authorities may under certain conditions allow the operator to conduct ETOPS flights with limited maximum diversion time (for example, 75 minute diversion time in a benign area of operation) without showing full compliance with these standards.

OPERATIONAL LIMITATIONS

DEFINITIONS

R For the purpose of AC 120-42 A and AMC 20–6 Extended-Range Operations are those intended to be conducted over a route that contains a point more than 60 minutes from an adequate airport at the selected one-engine-inoperative speed in still air and ISA (or prevailing delta ISA) conditions.

An adequate airport is an airport which satisfies the aircraft performance requirements applicable at the expected landing weight, and sufficiently equipped to be safely used. In particular, at the anticipated time of use, it should be available and equipped with the necessary services, including ATC, weather information and at least one let down aid for an instrument approach.

A suitable airport is a confirmed adequate airport which satisfies the dispatch weather minima requirements for ceiling and visibility within the required validity period. Airport conditions should also ensure that a safe landing with one engine and/or airframe system inoperative is possible.

AREA OF OPERATION

The maximum distance from an adequate airport must be determined for ISA (or prevailing delta ISA) and no-wind conditions, taking into account aircraft performance with one engine inoperative and the remaining engine operating at not more than MCT.
To determine the maximum distance from an adequate airport, the operator must define a diversion speed strategy as well as an aircraft reference weight for performance computation.
The same diversion speed strategy (Refer to FCOM 3.06) must be considered for :
– establishing the area of operation ;
– calculating the single-engine fuel planning,
– conducting the diversion in case of engine failure (conditions permitting).
The operator establishes the ETOPS reference gross weight for each route or area of operation. This must be a representative but conservative value of the aircraft gross weight at the critical point of the route or at the various critical points of all the routes included in the area of operation.
The-one-engine-inoperative descent and cruise speed law must be chosen so that the associated net flight path clears the enroute obstacles with the regulatory margin.
FCOM section 3.06 gives data for two speed schedules. The associated approved net flight paths are published in the section 6 of the Flight Manual.
When the diversion strategy is chosen, the maximum distance from a diversion airport, can be directly determined for different maximum diversion times, with the help of the tables provided in this section. The area of possible ETOPS operation can then be drawn on plotting charts.
Another way to determine the maximum distance to a diversion airport is to read the one-engine-inoperative cruise TAS (for the reference gross weight and at the FL for best TAS) in the cruise tables in section 3.06 taking into consideration the appropriate speed strategy and the minimum altitude for clearing possible obstacles. The maximum distance the aircraft can travel to a diversion airport is this one-engine-inoperative-TAS multiplied by the maximum allowed diversion time granted to the operator.
Operators whose authorities require that an approved one-engine-inoperative speed be published in the Flight Manual must use this approved speed.

DISPATCH CONSIDERATION

MMEL

The MMEL has been approved taking into consideration the duration of the average ETOPS flight and the maximum diversion time granted to the airframe/engine combination.
The MMEL published by Airbus Industrie and approved by the French DGAC can be used to establish the airline MEL, which must be approved by the operator's national authorities.
This MEL will probably be adapted to the airline network, environment and organization.
Other determining parameters will be :
· The maximum and the average diversion times on the route.
· The equipment of the enroute alternates.
· The navigation and communication facilities.
· The average meteorological conditions.

COMMUNICATION AND NAVIGATION FACILITIES

The aircraft communication system has provision to install three VHF transceivers and two HF radios ensuring full compliance with ETOPS requirements on any kind of route.
The aircraft navigation system meets the ETOPS requirements for en route navigation.
The aircraft has three inertial reference systems which, in conjunction with 2 FMS comply with MNPS criteria and this combination of systems is approved as the sole means of navigation for flight up to the maximum aircraft range.
See the MEL for a definition of the authorized dispatch configuration.

<u>Note</u> : *For operation within the MNPS area, airlines must obtain approval from their national authorities.*

FUEL AND OIL SUPPLY

The aircraft fuel and oil supply must be adequate to allow the aircraft to reach its destination or a planned alternate after the combined failures of an engine and pressurization or the failure of pressurization alone at the critical point on the route.
Planners must consider forecast wind and temperature conditions, as well as forecast icing conditions.
The operator must etablish a routine for ETOPS critical fuel planning and compare it with the standard (non-ETOPS) fuel planning.

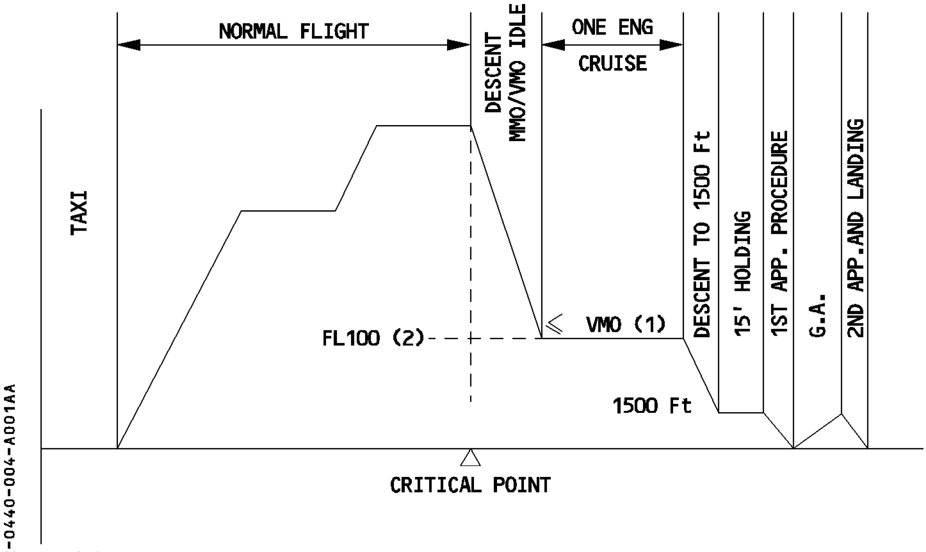
R ### ELECTRICAL GENERATORS

R Refer to MEL for a definition of the authorized dispatch configuration.

ETOPS FUEL SCENARIOS

For establishing the ETOPS critical fuel reserves, the planner must consider two diversion scenarios.

Pressurization failure + engine failure



(1) SELECTED SPEED IN DETERMINING ETOPS AREA OF OPERATION.
(2) OR ABOVE IF REQUIRED BY OBSTACLE CLEARANCE AND IF SUPPLEMENTARY OXYGEN IS AVAILABLE.

Pressurization failure
Same flight profile, but with 2 engines operating and diversion cruise set at LRC.

Fuel requirements
For each scenario, the required block fuel must be computed in accordance with the operator's ETOPS fuel policy and using the regulatory ETOPS critical fuel reserves described below.
Depending on the strategy and the one-engine-inoperative speed selected for the single-engine diversion scenario, either of these two scenarios may result in the higher fuel requirement.
The scenario resulting in the higher fuel requirement is the ETOPS critical fuel scenario, and the associated minimum block fuel requirement is the ETOPS critical fuel plan.

ETOPS CRITICAL FUEL RESERVES

For the computation of the ETOPS critical fuel reserves and of the complete ETOPS critical fuel planning, the diversion fuel must include the following fuel provisions :

- fuel burn-off from the critical point to the end of descent (for example 1500 feet) at the diversion airport,
- 5 % of the above fuel burn-off as contingency fuel,
- fuel for 15 minutes of holding at 1500 feet and green dot speed,
- fuel for first (IFR) approach, a go-around and second (VFR) approach,
- 5 % fuel mileage penalty or a demonstrated performance factor,
- effect of any Configuration Deviation List (CDL) or MEL item,
- if icing conditions are forecast :
  - effect of Nacelle Anti Icing (NAI) and Wing Anti Icing (WAI) systems,
  - effect of ice accretion on the unheated surfaces of the aircraft :

    The fuel provisions associated with the effects of NAI and WAI systems and of ice accretion on the unheated surfaces are adjusted to take into account the horizontal extent of the forecast icing areas (exposure time).

    The fuel provision factor for ice accretion on the unheated surfaces is a percentage equal to three times the forecast exposure time in hours. For example, assuming a one-hour exposure en route to and (e.g. the 15 minute holding) at the diversion airport, the fuel provision is 3 % of the fuel burned during the considered exposure time. If moderate icing is forecast, the above fuel provision is divided by two.
- for operations above 138 minutes diversion time, if the above effect of ice accretion is less than 5 %, this effect should be rounded–up to 5 % to provide a provision for weather avoidance.
- if the APU is needed as a power source (MEL), its fuel consumption must be considered:
R 130 kg/h or 286 lb/h (APU GEN ON, APU BLEED OFF).

In view of our experience, Airbus Industrie recommends that the operator considers the following non mandatory fuel practices :

- Include the effect of a demonstrated performance factor, in all standard and ETOPS fuel requirement computations,
- Include a contingency fuel provision from departure to the Critical Point (CP), when computing the ETOPS critical fuel planning.

The complete ETOPS critical fuel planning for the ETOPS critical fuel scenario (from the departure to the Critical Point and then from the Critical Point to the diversion airport) must be compared with the standard fuel planning (for example, from the departure to the destination and alternate) computed in accordance with the company fuel policy and applicable operational requirements. The higher of the two fuel requirements must be considered as the minimum required block fuel for the flight.

DISPATCH FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING

ETOPS diversion fuel requirements for dispatch are provided at the end of this section. Data for the engine failure case alone is not provided as this scenario is never critical.

WEATHER MINIMA

Weather forecasts for en route alternates must meet the operator's applicable weather
R minimun requirements. If this applicable requirement is AC 120-42A or AMC 20–6 following applies :
An airplane cannot be dispatched unless the meteorological forecasts at en route alternate airports meet the weather minimums listed here for a period starting one hour before the earliest expected time of landing and ending o04ne hour after the latest expected time of landing.
A. AC 120-42A dispatch weather minima (FAA)

AIRPORT EQUIPMENT	Ceiling (ft)	Visibility (m)
1 ILS/MLS	DH + 400	Greater of (3200, published minima + 1600)
2 ILS/MLS on separate runways *	DH + 200	Greater of (1600, published minima + 800)
Non precision approach	Greater of (800, MDH + 400)	Greater of (3200, published minima + 1600)
CAT II/CAT III capability with engine failure	Lower than above minima, approved on a case-by-case basis considering aircraft performance under failure conditions	

* separate runways are runways which do not touch each other.
DH : decision height
MDH : minimum descent height

R B. AMC 20–6 dispatch weather minima (EASA)

The operator must use either table 1 or table 2, but not a combination of both.

Table 1

Approach Facility Configuration	Alternate Airfield Ceiling	Weather Minima Visibility
For aerodromes with at least one operational navigation facility, providing a precision or non-precision runway approach procedure or a circling manoeuvre from an instrument approach procedure	A ceiling derived by adding 400 feet to the authorised DH, MDH (DA/MDA) or circling minima	A visibility derived by adding 1500 meters to the authorised landing minima
The weather minima below apply at airports which are equipped with precision or non-precision approaches on at least two separate runways (two separate landing surfaces)		
For airports with at least two operational navigation facilities providing a precision or non-precision runway approach procedure to separate suitable runways	A ceiling derived by adding 200 feet to the higher of the two authorised DH/MDH (DA/MDA) for the approaches	A visibility derived by adding 800 meters to the higher of the two authorised landing minima

Table 2

Type of Approach	Planning Minima (RVR visibility required and ceiling if applicable)			
	Aerodrome with			
	at least 2 separate approach procedures based on 2 separate aids serving 2 separate runways	at least 2 separate approach procedures based on 2 separate aids serving 1 runway	or	at least 1 approach procedure based on 1 aid serving 1 runway
Precision Approach Cat II, III (ILS, MLS)	Precision Approach Cat I Minima	Non-Precision Approach Minima		
Precision Approach Cat I (ILS, MLS)	Non-Precision Approach Minima	Circling minima or, if not available, non-precision approach minima plus 200 ft/1000 m		
Non-Precision Approach	The lower of non-precision approach minima plus 200 ft/1000 m or circling minima	The higher of circling minima or non-precision approach minima plus 200 ft/1000 m		
Circling Approach	Circling minima			

DIVERSION DURING EXTENDED RANGE OPERATIONS

DIVERSION DECISION MAKING

The technical criteria governing a re-routing or diversion decision can be classified into four categories, as follows :

- Loss of MNPS capability, before entering the MNPS area (as applicable).
- Weather minima at diversion airport(s) going below the company/crew en-route minima, before reaching the ETOPS Entry Point, or diversion airport(s) becoming unsuitable for any reason.
- Failure cases requiring a diversion to the nearest airport (cases leading to a LAND ASAP message on the ECAM and/or in the QRH).
- Failure cases resulting in increased fuel consumption, exceeding the available fuel reserves.

Comments and recommendations

· Electrical generation
Diversion is required in case of :
- only one generator (either one IDG, APU GEN or EMER GEN) remaining available following a multiple failure, or
R - only one main generator (either one IDG or APU GEN) remaining available, and low
R level, low pressure or overheat on the green hydraulic circuit.

· Fuel system
Some failure cases may lead to fuel gravity feeding which implies flight at lower altitude or to some fuel being unusable. The flight crew's evaluation of the actual situation and the fuel remaining may lead to the decision that a diversion is required.

DIVERSION PERFORMANCE DATA

FCOM section 3.06 gives three single engine descent and cruise procedures :
1. The standard strategy.
2. The obstacle strategy.
3. Fixed speed strategies (ETOPS).

For ETOPS operations, any one of the above diversion strategies can be used provided that the selected strategy and speed schedule are used in :
· establishing the area of operation (maximum diversion distance),
· calculating the diversion fuel requirements for the single-engine ETOPS fuel scenario.
· demonstrating the applicable obstacle clearance requirements (net flight path and net ceiling).

During the diversion, the flight crew is expected to use the planned speed schedule. However, based on the evaluation of the actual situation, the pilot in command has the authority to deviate from this planned one-engine-inoperative speed.

GUIDELINES FOR DIVERSION PROCEDURE

- Complete the related failure procedure.
- Inform ATC.
- Initiate the descent.
- Determine which en route alternate is the most suitable one (per company procedure).
- Divert to the chosen en route alternate.
- Comply with the pre-planned diversion strategy and speed schedule, or adjust the speed schedule, as dictated by the evaluation of the actual situation.

Note : For detailed guidelines and procedures for conducting the diversion (lateral and vertical navigation), see FCOM Vol 4, the FMGS Pilot's Guide.

PROCEDURES

The SOP (Refer to FCOM 3.03) and the ABNORMAL and EMERGENCY procedures (Refer to FCOM 3.02) apply. For ETOPS flights, the flight crew must complete them using the
R procedures given below :

ABNORMAL AND EMERGENCY PROCEDURES

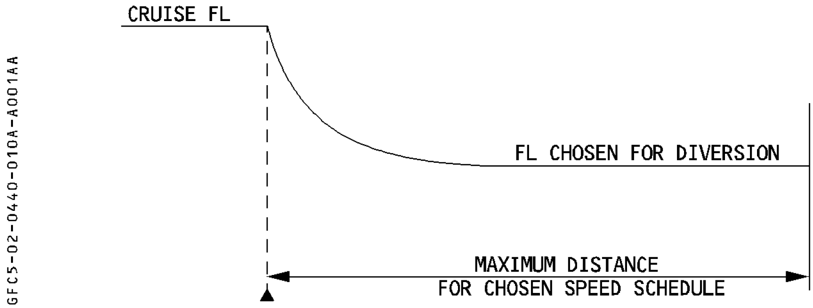
GEN 1 or 2 FAULT

- **When in ETOPS segment :**
  - **APU GEN (if available) . . . . USE**

PERFORMANCE

In electrical emergency configuration, the engine anti ice valves are permanently open, it results in a fuel consumption increase.

MAXIMUM DISTANCE (Still air) TO DIVERSION AIRPORT IN NAUTICAL MILES



Determination of 60 minutes maximum diversion distance (JAR-OPS 1.245)

Use the distance given within the table below to decide if a route is an ETOPS one according to JAR-OPS 1.245.
The following computation conditions have been used in accordance with the interpretation of the JAR-OPS 1.245 :

- Reference weight : the aircraft gross weight after one hour of flight having taken off at sea level at the maximum structural takeoff weight given by the flight manual
- ISA conditions
- No wind
- Diversion level after engine failure : FL170
- Single engine diversion speed schedule : VMO/MMO

Note : using the JAR-OPS 1.245 method, obstacles have not to be considered to determine if a route is or is not an ETOPS route.

R

Aircraft	MTOW		Distance (NM)
	(kg)	(lb)	
A330-201 (GE 80E1A2)	Up to 202 000	Up to 445333	423
A330-202/-203 (GE 80E1A4/A3)	Up to 233 000	Up to 513671	422
A330-301 (GE 80E1A2)	Up to 218 000	Up to 480603	415
A330-302/-303 (GE 80E1A3/A4)	Up to 233 000	Up to 513671	419
A330-223 (PW 4168A)	Up to 233 000	Up to 513671	430
A330-321 (PW 4164)	Up to 218 000	Up to 480603	423
A330-322 (PW 4168)	Up to 218 000	Up to 480603	433
A330-323 (PW 4168A)	Up to 233 000	Up to 513671	428
A330-243 (RR TRENT 772B)	Up to 233 000	Up to 513671	429
A330-243 (RR TRENT 772C)	Up to 233 000	Up to 513671	430
A330-341 (RR TRENT 768)	Up to 218 000	Up to 480603	418
A330-342 (RR TRENT 772)	Up to 218 000	Up to 480603	431
A330-343 (RR TRENT 772B)	Up to 233 000	Up to 513671	426

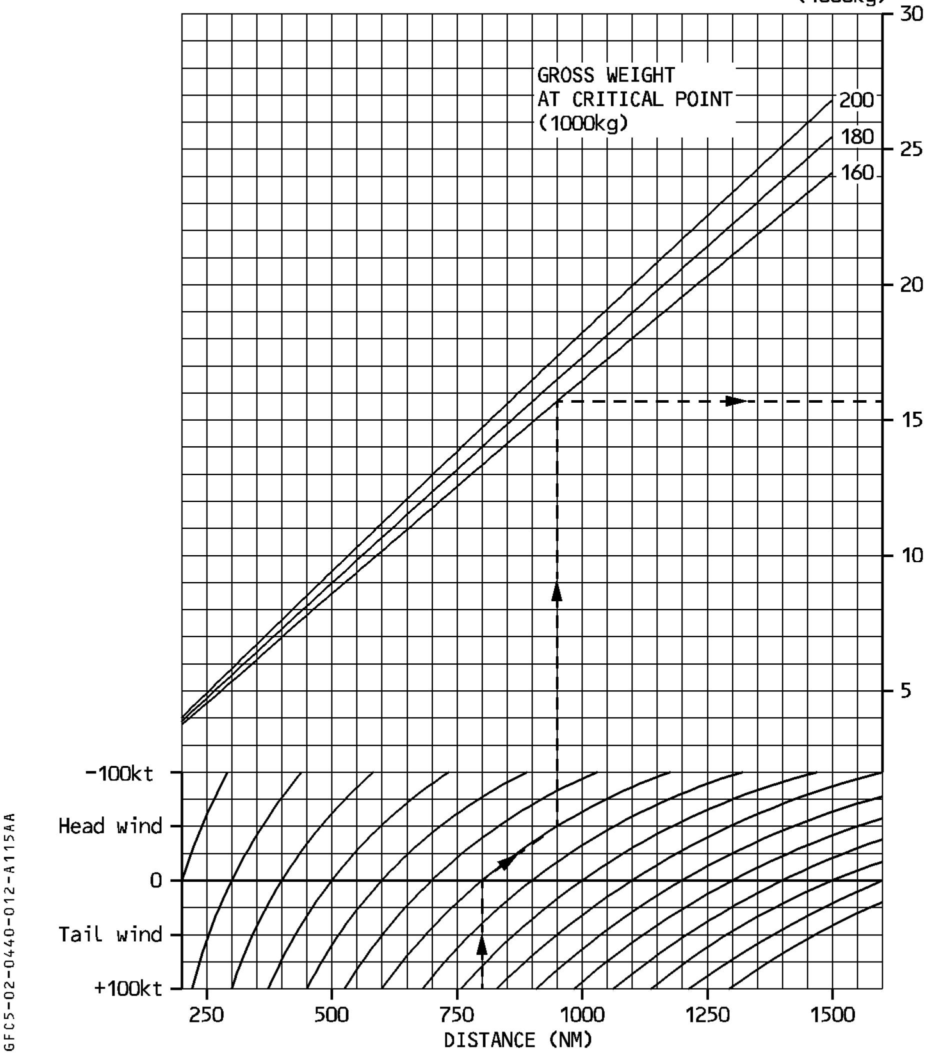
ISA							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/330KT	150000	190	440	653	867	1081	1296
	160000	190	438	650	863	1076	1289
	170000	180	438	650	862	1075	1287
	180000	170	436	646	857	1068	1280
	190000	170	436	645	855	1064	1274
	200000	170	433	641	850	1059	1269
	210000	170	433	637	844	1051	1259
	220000	160	430	636	842	1049	1255
	230000	150	428	632	836	1039	1243
MCT/310 KT	150000	220	434	645	857	1070	1282
	160000	210	432	641	851	1060	1270
	170000	210	430	638	847	1056	1266
	180000	200	428	634	840	1047	1253
	190000	200	428	630	835	1041	1248
	200000	190	424	627	831	1034	1237
	210000	190	421	622	825	1029	1232
	220000	180	420	620	820	1021	1221
	230000	170	416	614	811	1008	1206

Note : For temperatures higher than ISA + 10, use ISA values

ISA + 10							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/330KT	150000	180	449	666	883	1099	1316
	160000	180	448	665	882	1098	1315
	170000	180	446	662	878	1094	1311
	180000	180	445	659	873	1086	1300
	190000	170	444	657	871	1085	1298
	200000	170	442	653	866	1078	1292
	210000	170	442	649	859	1070	1282
	220000	160	439	648	857	1068	1279
	230000	150	437	644	852	1059	1267
MCT/310 KT	150000	220	442	657	873	1090	1307
	160000	210	440	654	868	1082	1295
	170000	210	438	650	863	1076	1290
	180000	200	436	646	857	1067	1278
	190000	200	433	641	851	1060	1271
	200000	200	432	635	842	1049	1258
	210000	180	429	633	838	1042	1246
	220000	180	428	632	836	1041	1245
	230000	170	425	626	827	1029	1230

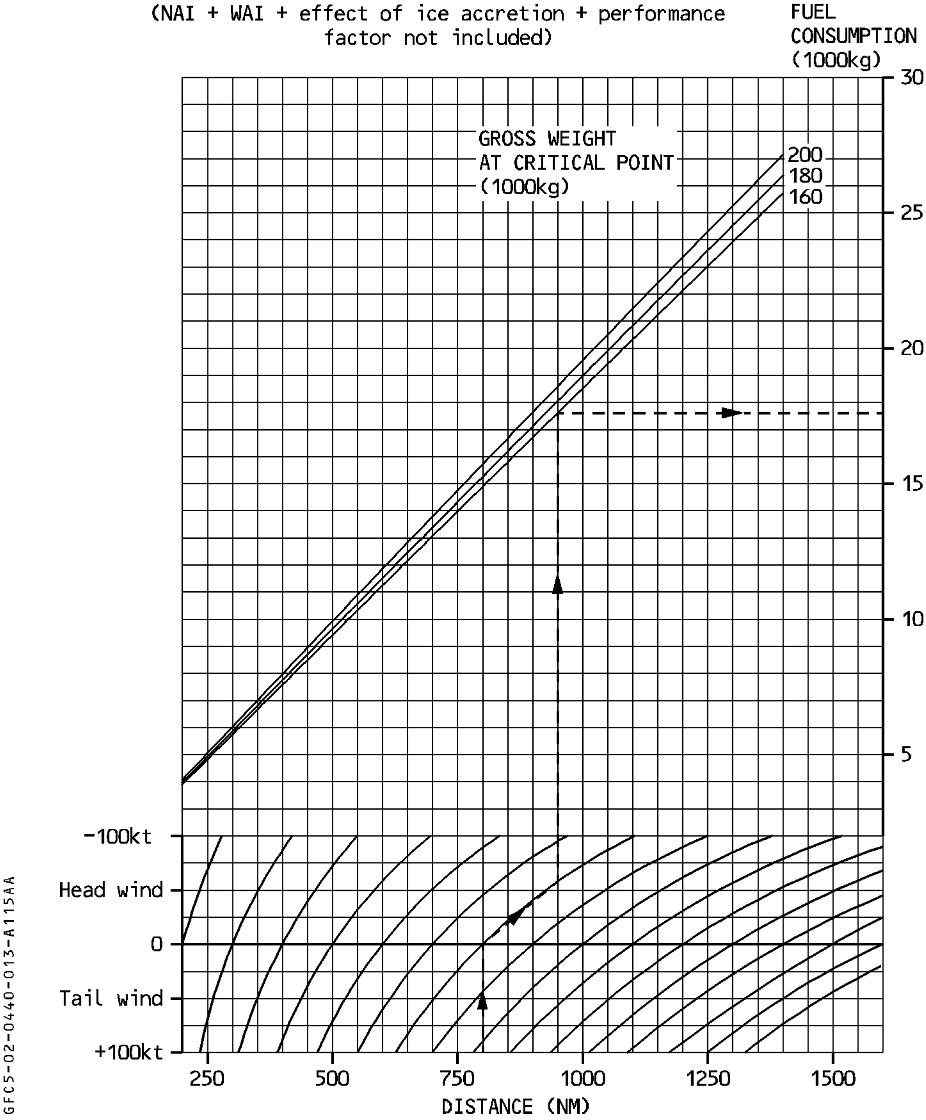
ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ALL ENGINES-LONG RANGE CRUISE

Including: emergency descent-long range cruise at FL100
final descent 250kt-holding 15 min at FL15
IFR procedure-Go Around-2nd VFR procedure
5% allowance for wind errors
(NAI + WAI + effect of ice accretion + performance factor not included)



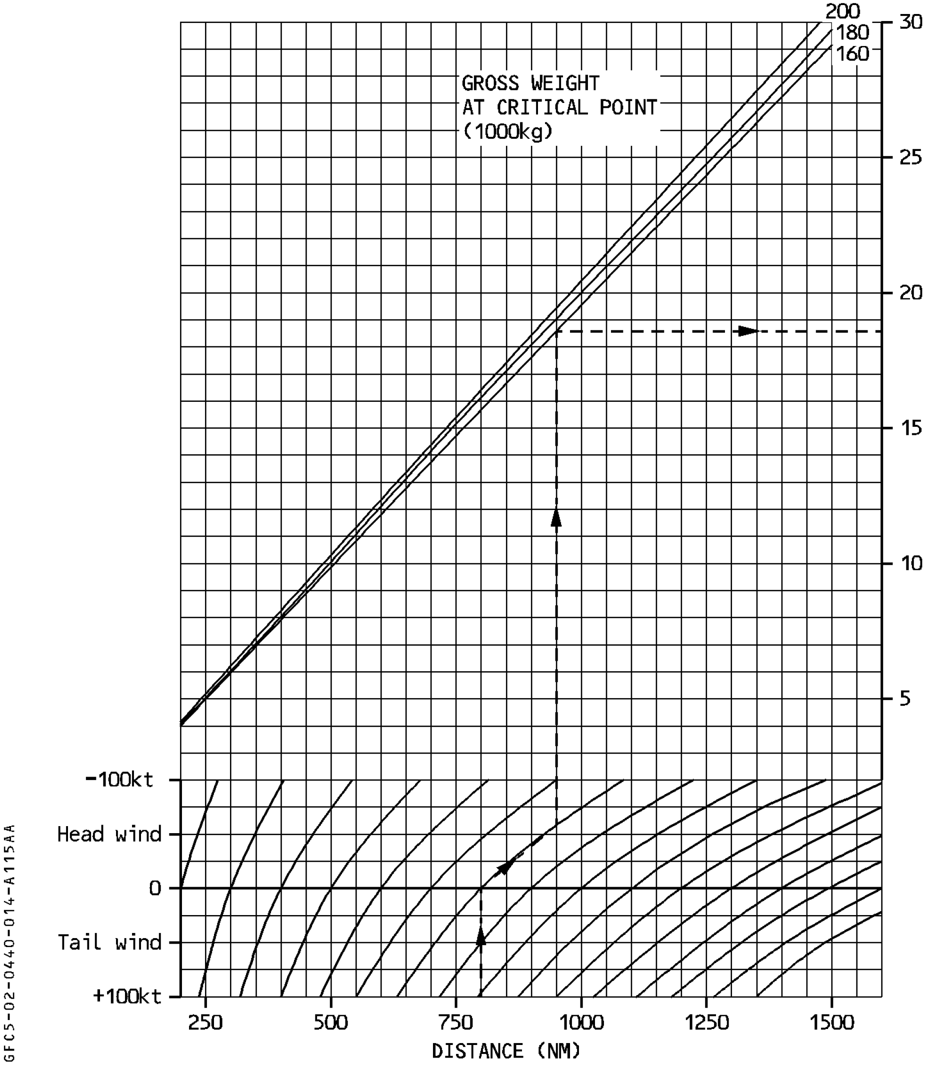
ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 310KT

Including: emergency descent-cruise 310kt at FL100
final descent 250kt-holding 15 min at FL15
IFR procedure-Go Around-2nd VFR procedure
5% allowance for wind errors-APU fuel burn
(NAI + WAI + effect of ice accretion + performance
factor not included)



ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 330KT

Including: emergency descent-cruise 330kt at FL100
final descent 250kt-holding 15 min at FL15
IFR procedure-Go Around-2nd VFR procedure
5% allowance for wind errors-APU fuel burn
(NAI + WAI + effect of ice accretion + performance factor not included)



GENERAL

Reduced Vertical Separation Minimum (RVSM) airspace is any airspace or route between FL290 and FL410 (inclusive), where aircraft are vertically separated by 1000 feet, instead of 2000 feet. The A330 system design complies with the design criteria of the JAA Information Leaflet N° 6, and the FAA 91-RVSM Interim Guidance Material for RVSM operations. The statement of RVSM capability is also indicated in the AFM.

OPERATIONAL APPROVAL

The above capability statement does not constitute an approval to fly RVSM. Operational approval is to be granted by the Operator's national authorities, after assessment of the airline's capability to meet RVSM requirements. The above-mentioned JAA and FAA documents also cover requirements to obtain operational approval.

REQUIRED EQUIPMENT/FUNCTIONS FOR RVSM

RVSM regulations require the following equipment/functions to be operative :

- 2 ADRs + 2 DMCs
- 1 transponder
- 1 Autopilot function
- R 2 PFD functions (for altitude indication)
- 1 FCU channel (for altitude target selection and OP CLB/OP DES mode engagement)
- 1 FWC (for altitude alert function)

PROCEDURES

The SOPs (FCOM 3.03) and the ABN and EMER (FCOM 3.02) procedures apply. In addition, flights in RVSM airspace must be completed by the following :

FLIGHT PREPARATION

The crew must pay particular attention to conditions that may affect operation in RVSM airspace. These include, but may not be limited to :

- Verifying that the airframe is approved for RVSM operations.
- Reported and forecast weather on the flight route.
- Review of maintenance logs and forms to determine the condition of equipment required for flight in RVSM airspace. Ensure that maintenance action has been taken to correct defects to required equipment.
- R Check that each PFD altitude indication (QNH reference) does not differ from the airport elevation by more than 75 feet.
- R Check, on ground, that the difference between the two primary altitude indications on the PFD is less than the tolerance specified in paragraph 3.04.34 “Maximum Differences Between Altitude Indications”.

IN FLIGHT PROCEDURES

PRIOR TO RVSM AIRSPACE ENTRY

The required equipment for RVSM listed above must be operating normally.
Should any of this equipment fail prior entering the RVSM airspace, the crew must request a new clearance so as to avoid flight in this airspace.
The two primary altitude indications (PFD indication from onside ADR or ADR 3) should be checked to be in accordance with the instrument tolerances (3.04.34).
If only two ADR are operative, the altimeter indications on PFD and standby altimeters should be recorded. This information may be useful in case of subsequent PFD altitude discrepancy or loss of both remaining ADR.

WITHIN RVSM AIRSPACE

- Autopilot should be engaged within RVSM airspace for cruise and flight level changes.
- During cleared transitions between flight levels, the aircraft should not overshoot or undershoot the cleared flight levels by more than 150 feet.
- At intervals of approximately one hour, check that PFD altimeter indications agree in accordance with the instruments tolerances (3.04.34). The usual scan of flight deck instruments should be sufficient.
- Use the transponder and the autopilot, associated with one of the ADRs which is within tolerance.

POST FLIGHT

The crew must report any malfunction in the height-keeping systems including :
– the malfunction or the loss of any required equipment
– altimeter readings outside the tolerances of 3.04.34,
and provide sufficient details to enable maintenance to troubleshoot and repair the system.

ABN AND EMER PROCEDURES

When in RVSM airspace, the following contingencies which affect the ability to maintain the cleared flight level will be notified to ATC.
– failure of both autopilots,
– loss of altimeter system redundancy (only one PFD indication remaining),
– failure of any other equipment affecting the ability to maintain the cleared flight level, or
– encountering greater than moderate turbulence.

R *Note : The flight crew can obtain the contingency procedures for flying in Minimum*
R *Navigation Performance Specification (MNPS) airspace by referring to specific*
R *manuals, such as, for example, the North Atlantic (NAT) MNPS Manual.*

If unable to notify ATC and obtain ATC clearance prior to deviating from the assigned cleared flight level, the crew should follow the established contingency procedure and obtain ATC clearance as soon as possible.

GENERAL

The aircraft navigation system, required by regulation to fly within a Required Navigation Performance (RNP) airspace, shall comply with RNAV functionality criteria and with navigation position accuracy and integrity criteria.
When referring to RNP-X, the value of X is the navigation accuracy expressed in NM, which has to be met with a probability of 95 %.
An RNP value can be associated with an airspace, a route, a SID, a STAR, a RNAV approach or an RNAV missed approach procedure.
Depending on the RNP value, and on the airspace environment (ground radio navaid), different navigation equipment may be necessary.
An operational approval from the airline's national authorities may be necessary.

NAVIGATION SYSTEM CAPABILITY (for reference only)

European BRNAV (RNP-5) and P-RNAV (RNP-1) capability meets the certification
R requirements of JAA TGL 2 and TGL 10. Terminal and en-route RNAV operations comply
R with the certification requirements of the FAA Advisory Circular 90-100.
RNP-10 capability in oceanic or remote areas complies with paragraph 12.b.(1) of FAA Notice 8400.12A, or with paragraph 12.a. or 12.b.(5), if GPS is installed and is operative.
Navigation system with the GPS PRIMARY function (if GPS installed) meets certification requirements of FAA AC 20–130A and TSO C 129A in class C1 (for navigation system with multiple sensor inputs including GPS).

RNP CAPABILITY

In order to match a given RNP value, the FMS-estimated position accuracy (also called Estimated Position Error) must be better than the RNP value. Obviously, this dependent on the FMS navigation-updating mode (GPS, DME/DME, VORDME, or IRS).
On the MCDU PROG page, the required and the estimated position accuracy are displayed, and determine the HIGH/LOW accuracy indication (refer to FCOM 1.22.20).
The required accuracy can be a default value, which is either a function of the flight phase, or a navigation database procedure value, or a value manually-entered by the crew.
When flying in an RNP environment, the crew can insert the appropriate RNP value in the REQUIRED ACCUR field of the PROG page.

- When HIGH is displayed, the RNP requirement is estimated to be fulfilled.
- When LOW is displayed, the RNP requirement is estimated not to fulfilled. In this case :
  - The crew crosschecks navigation with raw data, if available.
  - If the crosscheck is negative, or if raw data is unavailable, the crew informs the ATC.

When leaving the RNP environment, the crew will clear the manually-entered required accuracy.

Without GPS PRIMARY function

RNP accuracy criteria are met, provided radio navaid coverage supports it for :

- RNP-1 en route, and in terminal area, provided a required accuracy of 1 NM(1) is checked or manually entered in the MCDU.
- RNP-0.3 in approach, provided a required accuracy of 0.3 NM(1) is checked, or manually entered in the MCDU.

Note : *(1) It is possible to enter the radial equivalent to the specified Crosstrack (XTK) accuracy, that is the RNP multiplied by 1.2, the EPE being an estimated radial position error.*

With the GPS PRIMARY function

RNP requirements are met, provided GPS PRIMARY is available, for :

- RNP-1 en route
- RNP-0.5 in the terminal area, provided the AP or FD in NAV mode is used
- RNP-0.3 in approach, provided the AP or FD in NAV mode is used

BRNAV IN EUROPEAN AIRSPACE

In this airspace, radio navaid coverage is assumed to support RNP-5 accuracy.

The minimum required equipment to enter BRNAV airspace is :

- One RNAV system, which means :
  - · One FMGC
  - · One MCDU
  - R · One VOR or one GPS receiver for FM navigation update
  - R · One DME or one GPS receiver for FM navigation update
  - · One IRS
- Flight Plan Data on two NDs

PROCEDURES

When GPS PRIMARY is not available, periodically crosscheck the FM position with the navaid raw data.

Manual selection of a required accuracy on the MCDU is optional.

- If manual entry of a required accuracy is desired, enter 5 NM, or use the radial equivalent to 5NM XTK accuracy that is 6.1NM.

When leaving RNP-5 airspace, or when entering the terminal area, revert to the default required accuracy, or enter the appropriate value on the MCDU.

- If one of the following MCDU or ECAM messages is displayed, check the navigation accuracy with navaid raw data or GPS MONITOR page (if GPS installed) :
  - NAV ACCUR DOWNGRAD
  - FMS1/FMS2 POS DIFF
  - CHECK IRS 1(2)(3)/FM POSITION
  - ECAM : FM/GPS POS DISAGREE (if GPS installed)
  - ECAM : FM/IR POS DISAGREE
- If accuracy check confirms that RNP-5 capability is lost or if both FMGC are failed : inform ATC and revert to conventional navigation.
- If accuracy check confirms that only one FMGC position is incorrect, resume navigation with the other FMGC.

In inertial navigation, the BRNAV capability is kept during 2 hours independently of the estimated accuracy displayed on MCDU.

RNP-10 IN OCEANIC OR REMOTE AREAS

In this kind of airspace the aircraft is expected to fly for a long period of time outside radio navaid coverage.
For aircraft without GPS the flight time outside radio navaid coverage is limited. According to FAA Notice 8400.12A this limitation is :
- 6.2 hours since IRS ground alignment, or
- 5.7 hours since last FM radio update.

There is no limitation for aircraft fitted with GPS.
Minimum required equipment to enter a RNP-10 airspace is :
- Two long range navigation systems, which means :
  - Two FMGC (or 1 FMGC + 1 BACK UP NAV)
  - Two MCDU
R - One GPS if required by flight time outside radio navaid coverage
  - Two IRS

Refer also to Regional Supplementary Procedures of ICAO Doc 7030 for specific requirements in a particular airspace.

PROCEDURES

The manual selection of a required accuracy on MCDU is optional.

- **If manual entry of a required accuracy is desired, enter 10 NM or use the radial equivalent to 10NM XTK accuracy that is 12.2NM.**

When leaving RNP-10 airspace, revert to the default required accuracy or enter the appropriate value.

- If one of the following MCDU or ECAM messages is displayed, check navigation with POSITION MONITOR page, IRS MONITOR pages and GPS MONITOR page (if GPS installed) :
  - · FMS1/FMS2 POS DIFF
  - · CHECK IRS 1(2)(3)/FM POSITION
  - · ECAM : FM/GPS POS DISAGREE (if GPS installed)
  - · ECAM : FM/IR POS DISAGREE
- Use the AP, with the navigation system checked correct.
- If unable to determine which system is correct, inform the ATC, and look for navaid raw data confirmation as soon as possible.

In inertial navigation, the RNP-10 capability is maintained for 5.7 hours, since the last radio update (according to FAA Notice 8400.12A), independently of the estimated accuracy displayed on the MCDU.

R **P-RNAV/RNP-1 TERMINAL PROCEDURES**

R For terminal procedures requiring P-RNAV or RNP-1 capability, the flight crew can assume
R that the radio navaid coverage supports the RNP-1 accuracy. Otherwise, the procedure may
R specify that GPS equipment is required (refer to the published procedure chart). The
R minimum equipment required to fly a P-RNAV or RNP-1 procedure is :
R – One RNAV system, which includes :
R · One FMGC
R · One MCDU
R · One GPS receiver, or one VOR and one DME, for FM navigation update*
R · One IRS, and
R · One FD in NAV mode.
R – Flight Plan data displayed on both NDs.
R * GPS may be required for RNP-1 terminal procedures.
R For terminal procedures with legs below the MSA, or with legs that may not have sufficient
R radar coverage, two RNAV systems may be mandated by the procedure chart.

R **PROCEDURES**

R The terminal procedure (RNAV SID, RNAV STAR, RNAV TRANSITION, ...) must be loaded
R from the FM navigation database and checked for reasonableness, by comparing the
R waypoints, tracks, distances and altitude constraints (displayed on the F-PLN page), with
R the procedure chart.
R The flight crew must not modify the procedure, that is loaded from the navigation database,
R unless instructed to do so by the ATC (DIR TO, radar vectoring, insertion of waypoints
R loaded from the navigation database).

R ● **If GPS is required for the P-RNAV/RNP-1 procedure :**
R – Before starting the departure/approach procedure, check that GPS PRIMARY is
R available (GPS PRIMARY displayed on the MCDU PROG page).
R – If GPS PRIMARY is not available before starting the procedure, inform the ATC, and
R request another departure/arrival procedure that does not require GPS.
R – If GPS PRIMARY is lost while flying the procedure, inform the ATC of this loss, and
R follow ATC instructions.

R ● **If GPS is NOT required for the P-RNAV/RNP-1 procedure :**
R – Check that GPS PRIMARY is available (GPS PRIMARY displayed on the MCDU PROG
R page).
R If GPS PRIMARY is not available :
R – Crosscheck the FM position with the navaid raw data, before starting the procedure.
R – Check or enter RNP-1 in the REQUIRED field of the MCDU PROG page, and check that
R HIGH accuracy is available. When completing the terminal procedure, revert to the
R default value or enter the appropriate value on the MCDU PROG page.
R If one of the following messages appears, while flying the procedure :
R – "NAV ACCUR DOWNGRAD" (on MCDU and ND) on both sides, or
R – "FMS1/FMS2 POS DIFF" (on MCDU and ND), or
R – "NAV FM/GPS POS DISAGREE" (on ECAM)
R Then :
R – Inform the ATC of the loss of P-RNAV/RNP-1 capability, and follow ATC instructions.

R *Note : If the "NAV ACCUR DOWNGRAD" message is displayed on one side only,*
R *navigation may be continued using the other FMGC.*

05.00 CONTENTS

INTRODUCTION

Use this flight planning chapter when no precalculated flight plan is available.
It contains the following general graphs and tables :
- Maximum and optimum cruise altitudes for M.80, M.82, M.84 and long range speed
- Optimum altitude on short stage
- R — Ground distance to air distance conversion for M.80, M.82, M.84 and long range speed

The integrated range method includes the following tables :
- Integrated cruise tables for M.80, M.82, M.84, long range speed at optimum flight level
- Integrated cruise tables at long range speed for FL100 up to FL410
- Climb, step climb and descent correction tables

These tables allow the flight planning to be done segment by segment.
Chapter 2.05.15 contains calculation tables and a comprehensive example to show how to use them.
R The quick determination method is shown in chapter 2.05.40 for M.80, M.82, M.84 and
R long range speed.

MINIMUM RECOMMENDED FUEL REQUIREMENTS

The total fuel quantity required to fly a given sector is the sum of the following quantities:

TAXI FUEL

Quantity required for startup and taxi. Fuel calculation is based on a consumption of **25 kg/min** or **55 lb/min**
Average quantity (12 minutes) → **300 kg** or **660 lb**

TRIP FUEL

Fuel required from departure to destination includes the following quantities :
- Takeoff and climb at selected speed.
- Cruise at selected speed.
- Descent from cruising level to 1500 feet above destination airport.
- Approach and landing. Fuel calculation is based on a consumption of **40 kg/min** or **90 lb/min**.
  Average quantity (6 minute IFR) → **240 kg** or **540 lb**

RESERVE FUEL

This quantity includes :

"En Route" reserve fuel (contingency fuel)
· According to national regulations and company policy (generally based on a percentage of trip fuel).

Alternate fuel
· Fuel required to fly from destination to alternate airport.
It includes go-around **500 kg** or **1100 lb** , climb to cruising level, cruise at long range speed, descent and approach procedure.
160 kg or 360 lb for 4 minutes VFR

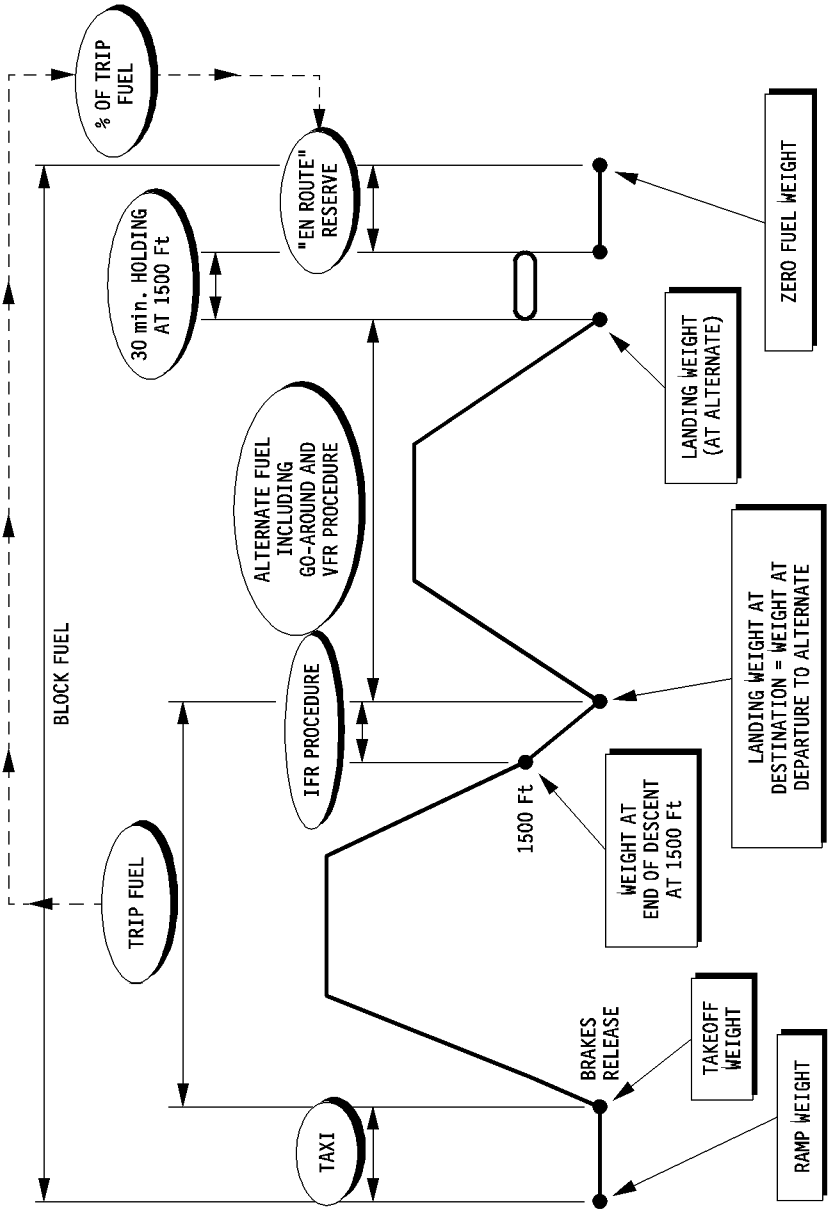
Holding Fuel
Calculation of holding fuel should take into account the altitude of the alternate and the landing weight at the alternate, using holding charts of chapter 3.05.25.
A conservative quantity corresponding to 30 minute holding at 1500 feet above alternate airport elevation at green dot speed in the clean configuration is
2400 kg or **5300 lb** .

APU FUEL

- During ground operation, the APU fuel consumption is about :
  200 kg/h (440 lb/h) Packs ON and APU GEN ON
  140 kg/h (310 lb/h) APU GEN only
- In flight APU fuel consumption is about :
  130 kg/h (290 lb/h) at FL200 Pack ON and APU GEN ON
  65 kg/h (140 lb/h) at FL300 APU GEN only
  55 kg/h (120 lb/h) at FL410 APU GEN only

R **FLIGHT PLAN**

R When no precalculated flight plan is available, flight planning can be determined by using
R the tables given in this chapter.
R Fuel policy will be the same as for precalculated flight plan.
R The graph on the following page defines the different terms used in this chapter.



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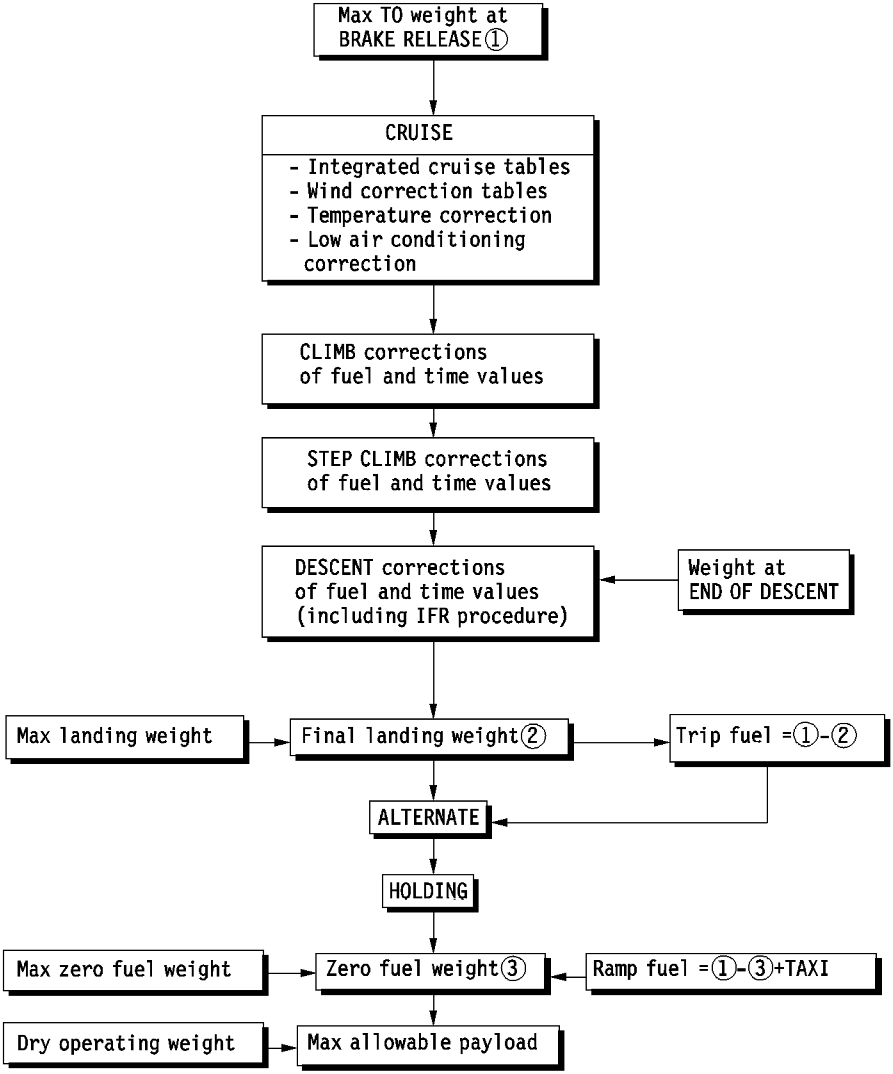
GENERAL

R



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The following tables can be used for the flight planning.
The first table allows the planner to calculate fuel and time during cruise, including up to two step climbs (see p3).
The second table shows the fuel and time planning for the whole flight plan (see p4).
At the end of the section an example shows how to use both tables for a given mission.

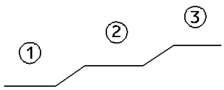
Note :
- *Differences in fuel consumption during step climb sections will be taken into account in the calculation table of page 4.*
- R *To find optimum aircraft weight to proceed to next flight level (4000 feet step)*
R *(Refer to 2.05.20 p 1).*
- *Integrated cruise tables are established for ISA conditions only. Corrections due to differences from ISA temperature are included in the calculation table of page 4.*
- *Overhead departure weight is assumed to be equal to weight at brake release.*
- *Overhead destination weight must be entered in the calculation table of page 4.*

R

CALCULATION TABLE

MACHNUMBER	
INITIAL FLIGHT LEVEL:	
GROUND DISTANCE:	
WIND ('-' HEAD/'+' TAIL):	
AIR DISTANCE:	

FLIGHT PROFILE



FL:

OVERHEAD DEPARTURE
WEIGHT:
DISTANCE:
TIME:

START OF FIRST STEP CLIMB
WEIGHT:
DISTANCE:
TIME:

1
FUEL:
DISTANCE:
TIME:
REMAINING DISTANCE:

FL:

START OF SECOND CRUISE SEGMENT
WEIGHT:
DISTANCE:
TIME:

START OF SECOND STEP CLIMB
WEIGHT:
DISTANCE:
TIME:

2
FUEL:
DISTANCE:
TIME:
REMAINING DISTANCE:

FL:

START OF FINAL CRUISE SEGMENT
WEIGHT:
DISTANCE:
TIME:

OVERHEAD DESTINATION
WEIGHT:
DISTANCE:
TIME:

3
FUEL:
DISTANCE:
TIME:
REMAINING DISTANCE : 0 NM

REMAINING DISTANCE:

TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	
WEIGHT OVERHEAD DESTINATION:	
FUEL:	
TIME:	

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1	(1) Max TO Weight at BRAKE RELEASE	▶				•	
2	WEIGHT Overhead Destination	▶				•	
3	– Temperature Correction for CRUISE	–				•	
4	+ Correction for Air Conditioning (+ for LO, – for HI)	+				•	
5	– CLIMB correction	–				•	
6	+ TO Altitude correction	+				•	
7	– STEP CLIMB correction	–				•	
8	= Corrected Weight Overhead Destination	=				•	
9	+ DESCENT correction (including 6 min IFR)	+				•	
10	(2) Landing Weight at Destination	=				•	
11	– ALTERNATE Fuel	–				•	
12	= ALTERNATE Landing Weight	=				•	
13	– HOLDING	–				•	
14	= Weight at END OF HOLDING	=				•	
15	TRIP FUEL (1) – (2) •	///////////////					
16	– "En Route" Reserve	–				•	
17	(3) ZERO FUEL WEIGHT	=				•	
18	– OPERATING WEIGHT EMPTY	–				•	
19	= Max Allowable Payload	=				•	

BLOCK FUEL CALCULATION							
20	Required Fuel (1) – (3)	▶				•	
21	+ Taxi	+				•	
22	= Block Fuel	=				•	

FLIGHT TIME CALCULATION (H. MIN)							
23	Time from integrated Cruise Tables	▶			•		
24	+ CLIMB Correction	+			•		
25	+ DESCENT Correction (including 6 min IFR)	+			•		
26	= Flight Time	=			•		

Note : Line 3 : temperature correction :
R *0.010 (kg/°C/NM) × △ISA (°C) × air distance (NM) or*
R *0.022 (lb/°C/NM) × △ISA (°C) × air distance (NM)*
R *Line 4 : in case of low air conditioning refer to cruise table correction box.*
R *Line 6 : TO altitude correction :*
R *0.9 (kg/1000 kg/1000 ft) × TOW (1000 kg) × airport elevation (1000*
R *ft) or*
R *0.9 (lb/1000 lb/1000 ft) × TOW (1000 lb) × airport elevation (1000 ft)*
Line 10 : Check that landing weight at destination is lower than maximum landing weight.
R *Line 17 : Check that the zero fuel weight is lower than maximum zero fuel weight.*
Line 22 : Check that the block fuel value is lower than maximum tank capacity.

Example

DATA
- T/O weight : 200 000 kg
- Ground distance to destination : 4000 NM
- Wind : – 40 kt (head wind)
- Selected initial FL : 330
- Long range speed
- Temperature : ISA + 10
- Airport elevation : 1500 ft
- Normal air conditioning

DETERMINATION OF CRUISE FUEL AND TIME

A : Enter the chosen flight Mach number, flight level, ground distance to be covered and forecast windspeed in the calculation table of page 7.
Calculate the air distance (see 2.05.60 p 6).
here : long range speed, 40 kt head wind, 4000 NM ground distance → air distance : 4380 NM

CRUISE TABLE FL330

B : Read from integrated cruise table (long range speed, FL330) the values for time and distance for the weight of 200 000 kg (see 2.05.30 p 33)
→ distance : 6896 NM → time : 961 min.

C : After 250 NM a step climb to FL370 is performed.
Calculate the new value of the distance in the integrated cruise table
→ 6896 – 250 = 6646 NM

D : Enter integrated cruise table and interpolate the values for the distance of
R 6646 NM (start of first step climb)
→ weight : 196905 kg → time : 930 min.

E : Calculate the values for the first cruise segment
Fuel : 200 000 – 196 905 = 3095 kg
Distance : 250 NM
Time : 961 – 930 = 31 min
Remaining distance : 4380 – 250 = 4130 NM

CRUISE TABLE FL370

F : Read from integrated cruise table (long range speed, FL370) the values for time and distance for the weight of 196 905 kg (see 2.05.30 p 39)
→ distance : 6992 NM → time : 932 min.

G : The optimum aircraft weight to proceed to FL410 is 175 000 kg. (see 2.05.20 p 1) Read from integrated cruise table the values for time and distance for the weight of 175 000 kg
→ distance : 5061 NM → time : 682 min.

H : Calculate the values for the second cruise segment
Fuel : 196 905 – 175 000 = 21 905 kg
Distance : 6992 – 5061 = 1931 NM
Time : 932 – 682 = 250 min
Remaining distance : 4130 – 1931 = 2199 NM

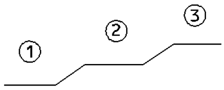
CRUISE TABLE FL410

I : Proceed to final table ; enter distance and time values corresponding to an
R aircraft weight of 175 000 kg at FL410 and long range speed. (see 2.05.30
R p 45)
R → distance : 5261 NM → time : 681 min
R J : Subtract remaining distance : 5261 – 2199 = 3062 NM
K : Interpolate in integrated cruise table weight and time values corresponding to a distance of 3062 NM (see 2.05.30 p 44)
→ weight : 152 885 kg → time : 399 min
L : Calculate values for last cruise seqment :
R Fuel : 175 000 – 152 885 = 22 115 kg
R Distance : 5261 – 3062 = 2199 NM
R Time : 681 – 399 = 282 min
Cross-check that remaining air distance equals zero
M : Fill in the final table with weight overhead departure (200 000 kg) and overhead destination (152 885 kg).
N : Calculate total values
Fuel : 200 000 – 152 885 = 47 115 kg
R Time : 31 + 250 + 282 = 563 min = 9 h 23 min

R

MACHNUMBER	LRC
INITIAL FLIGHT LEVEL:	FL330
GROUND DISTANCE:	4000 NM
WIND ('-' HEAD/'+' TAIL):	- 40 Kt
AIR DISTANCE:	4380 NM

FLIGHT PROFILE



FL: 330

OVERHEAD DEPARTURE	
WEIGHT:	200 000 kg
DISTANCE:	6896 NM
TIME:	961 min

→

START OF FIRST STEP CLIMB	
WEIGHT:	196 905 kg
DISTANCE:	6646 NM
TIME:	930 min

1	
FUEL:	3095 kg
DISTANCE:	250 NM
TIME:	31 min
REMAINING DISTANCE:	4130 NM

FL: 370

START OF SECOND CRUISE SEGMENT	
WEIGHT:	196 905 kg
DISTANCE:	6992 NM
TIME:	932 min

→

START OF SECOND STEP CLIMB	
WEIGHT:	175 000 kg
DISTANCE:	5061 NM
TIME:	682 min

2	
FUEL:	21 905 kg
DISTANCE:	1931 NM
TIME:	250 min
REMAINING DISTANCE:	2199 NM

FL: 410

START OF FINAL CRUISE SEGMENT	
WEIGHT:	175 000 kg
DISTANCE:	5261 NM
TIME:	681 min

→

OVERHEAD DESTINATION	
WEIGHT:	152 885 kg
DISTANCE:	3062 NM
TIME:	399 min

3	
FUEL:	22 115 kg
DISTANCE:	2199 NM
TIME:	282 min
REMAINING DISTANCE :	0 NM

REMAINING DISTANCE: 2199 NM

TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	200 000 kg
WEIGHT OVERHEAD DESTINATION:	152 885 kg
FUEL:	47 115 kg
TIME:	563 min

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DATA : – TO weight : 200 000 kg
– Ground distance to destination 4000 NM
– Wind : – 40 kt (headwind)
– Selected first flight level : FL330
– Long range speed
– Temperature : ISA + 10 along the whole flight profile
– Airport elevation : 1500 ft
– Normal air conditioning

STEPS

1 : Fill in Max TO weight → 200 000 kg
2 : Enter the integrated cruise table corresponding to chosen FL with TO weight at brake release point and calculate weight overhead destination (see 2.05.15 p7) Fill in → 152 885 kg
3 : Apply temperature correction for given air distance
4380 NM × 10°C × 0.010 kg/°C/NM = 438 kg
4 : Correction for air conditioning → here = 0
5 : Subtract climb correction for chosen FL (see 2.05.30 p47) → 2700 kg
6 : Add TO altitude correction 0.9 × 200 × 1.5 = 270 kg
7 : Subtract value for step climb correction (see 2.05.30 p47) 2 × 160 = 320 kg
R 8 : Calculate corrected weight overhead destination → 149 500 kg
9 : Enter weight overhead destination and find descent correction (including 6 min
R IFR) (see 2.05.30 p48) → 400 kg
R 10 : Calculate landing weight at destination → 149 900 kg
11 : Alternate fuel e.g. 200 NM at FL310
(see 2.05.50 p3) → 3484 kg
R Landing weight at alternate 149 900 – 3484 = 146 416 kg
Correction due to deviation from reference landing weight at alternate (see
R 2.05.50 p3) (146.5 – 140) × 11 = 72 kg
R Corrected alternate fuel 3484 + 72 = 3556 kg
R 12 : Calculate alternate landing weight → 146 300 kg
13 : Subtract holding fuel : (Refer to 2.05.10 p2) → 2400 kg
R 14 : Calculate weight at end of holding → 143 900 kg
R 15 : Calculate trip fuel → 50 100 kg
R 16 : Subtract "en route" reserve (standard amount is 5 % of trip fuel) → 2505 kg
R 17 : Calculate zero fuel weight → 141 400 kg
18–19 : Subtract dry operating weight to obtain maximum allowable payload
20–22 : Calculate block fuel
23–26 : Calculate flight time

R

1	(1) Max TO Weight at BRAKE RELEASE					▶	2	0	0	•	0
2	WEIGHT Overhead Destination					▶	1	5	2	•	9
3	– Temperature Correction for CRUISE					–			0	•	5
4	+ Correction for Air Conditioning (+ for LO, – for HI)					+			0	•	0
5	– CLIMB correction					–			2	•	7
6	+ TO Altitude correction					+			0	•	2
7	– STEP CLIMB correction					–			0	•	4
8	= Corrected Weight Overhead Destination					=	1	4	9	•	5
9	+ DESCENT correction (including 6 min IFR)					+			0	•	4
10	(2) Landing Weight at Destination					=	1	4	9	•	9
11	– ALTERNATE Fuel					–			3	•	6
12	= ALTERNATE Landing Weight					=	1	4	6	•	3
13	– HOLDING					–			2	•	4
14	= Weight at END OF HOLDING					=	1	4	3	•	9
15	TRIP FUEL (1) – (2)		5	0	• 1	///////////////					
16	– "En Route" Reserve					–			2	•	5
17	(3) ZERO FUEL WEIGHT					=	1	4	1	•	4
18	– OPERATING WEIGHT EMPTY					–	1	1	8	•	0
19	= Max Allowable Payload					=		2	3	•	4

BLOCK FUEL CALCULATION							
20	Required Fuel (1) – (3)	▶		5	8	•	6
21	+ Taxi	+			0	•	3
22	= Block Fuel	=		5	8	•	9

R

FLIGHT TIME CALCULATION (H. MIN)							
23	Time from integrated Cruise Tables	▶		9	•	2	3
24	+ CLIMB Correction	+		0	•	0	5
25	+ DESCENT Correction (including 6 min IFR)	+		0	•	1	1
26	= Flight Time	=		9	•	3	9

<u>Note</u> : Line 3 : temperature correction :
0.010 (kg/°C/NM) × △ISA (°C) × air distance (NM) or
0.022 (lb/°C/NM) × △ISA (°C) × air distance (NM)
Line 4 : in case of low air conditioning refer to cruise table correction box.
Line 6 : TO altitude correction :
0.9 (kg/1000 kg/1000 ft) × TOW (1000 kg) × airport elevation (1000 ft) or
0.9 (lb/1000 lb/1000 ft) × TOW (1000 lb) × airport elevation (1000 ft)
Line 10 : Check that landing weight at destination is lower than maximum landing weight.
Line 17 : Check that the zero fuel weight is lower than maximum zero fuel weight.
Line 22 : Check that the block fuel value is lower than maximum tank capacity.

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 deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 feet/minute vertical speed.

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 and M.80, M.82, M.84

Note : 1. Optimum and maximum altitude 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 (1.4 g) curve indicates the buffet margin.

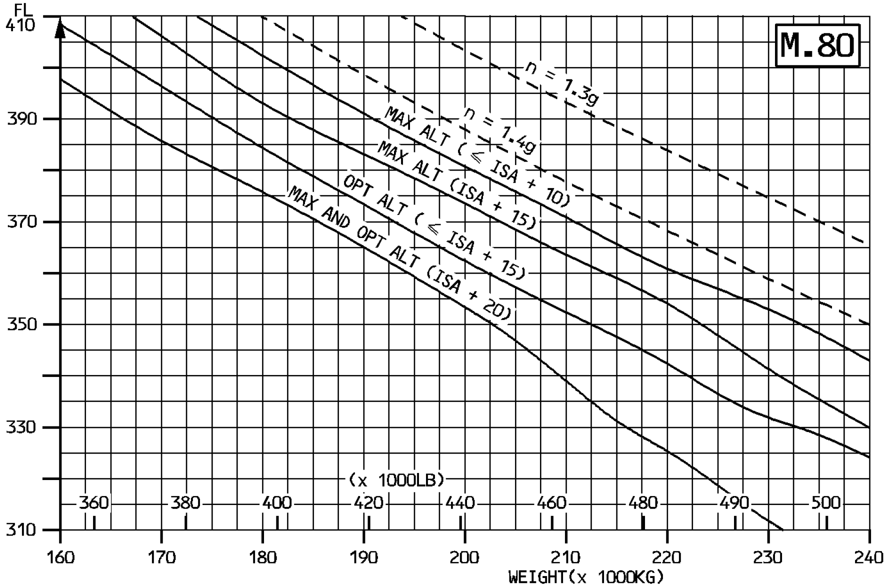
OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

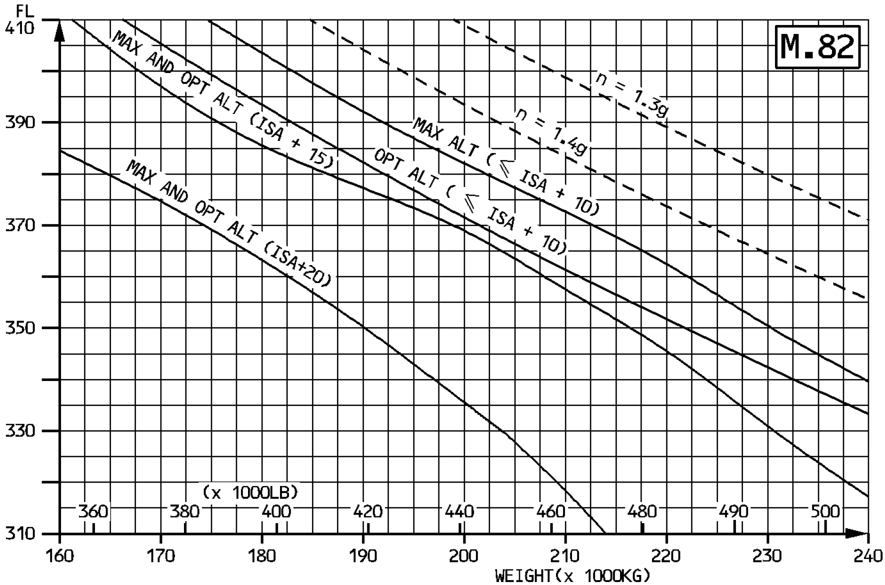
STEP CLIMB FROM/TO	WEIGHT (1000 kg)											
	≤ ISA + 10				ISA + 15				ISA + 20			
	LR	M.80	M.82	M.84	LR	M.80	M.82	M.84	LR	M.80	M.82	M.84
310/350	236	235	232	212	228	224	217	194	216	203	190	162
330/370	215	213	213	194	208	205	199	178	196	186	175	148
350/390	191	193	192	175	187	183	175	157	176	166	155	129
370/410	176	176	175	159	170	167	161	144	161	151	141	126

BLEED CORRECTIONS

	ENG ANTI ICE ON	TOTAL ANTI ICE ON	PACK FLOW HI AND/OR CARGO COOL ON
≤ ISA + 9	– 100 ft	– 300 ft	– 400 ft
ISA + 15	– 1100 ft	– 1300 ft	– 600 ft
ISA + 20	– 1300 ft	– 1700 ft	– 1200 ft

R





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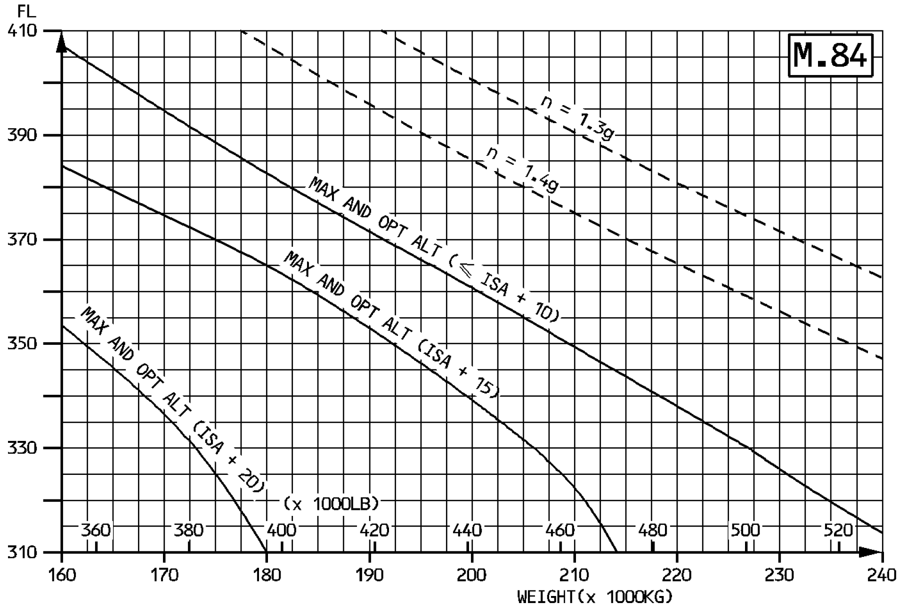

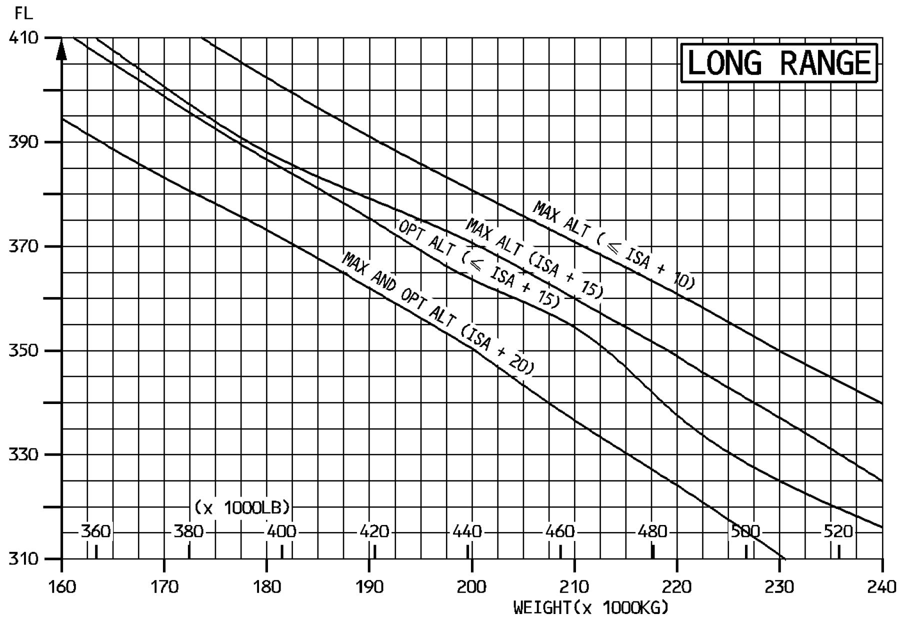

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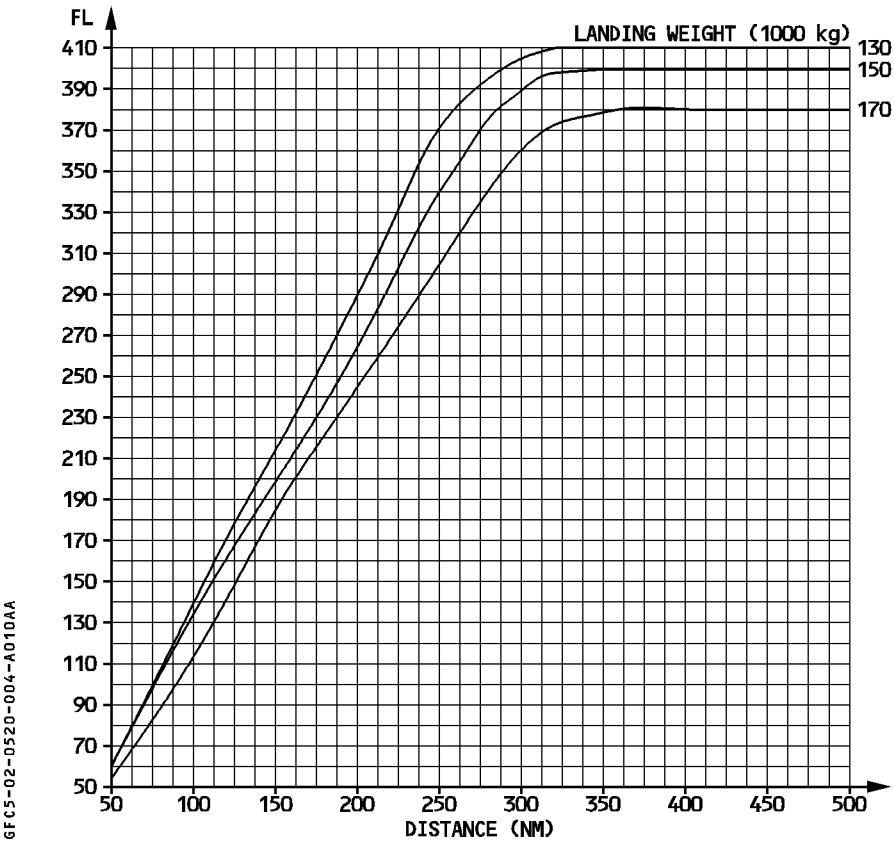
OPTIMUM ALTITUDE ON SHORT STAGE

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.
It includes the following profiles :
- Takeoff
- Climb : 250kt/300kt/M.80
- 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



GENERAL

Integrated cruise tables allow the planner to calculate the cruise fuel consumption and the cruise time required to cover a given air distance.
In the tables, the difference between two gross weights represents the fuel consumption. The difference between the corresponding distances and times respectively represents the cruise distance covered and the cruise time for this fuel consumption.
Integrated cruise tables are established for M.80, M.82, M.84 (and long range speed) at optimum level (with 4000 feet step climb) and for long range speed at fixed levels from FL100 to FL410 (with 4000 feet step climb).
Corrections are given on separate tables to allow for step climbs and to take into account the climb and the descent phases.

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**M.80 OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	24	48	72	96	120	144	168	192	216	459
	0	3	6	9	13	16	19	22	25	28	
128	240	264	288	312	336	360	384	408	431	455	459
	31	35	38	41	44	47	50	53	56	60	
130	479	503	526	550	574	598	621	645	669	692	459
	63	66	69	72	75	78	81	84	87	91	
132	716	739	763	786	810	833	857	880	904	927	459
	94	97	100	103	106	109	112	115	118	121	
134	951	974	997	1021	1044	1067	1090	1114	1137	1160	459
	124	127	130	133	136	140	143	146	149	152	
136	1183	1207	1230	1253	1276	1299	1322	1345	1368	1391	459
	155	158	161	164	167	170	173	176	179	182	
138	1414	1437	1460	1483	1506	1529	1552	1575	1597	1620	459
	185	188	191	194	197	200	203	206	209	212	
140	1643	1666	1688	1711	1734	1757	1779	1802	1825	1847	459
	215	218	221	224	227	230	233	236	239	242	
142	1870	1892	1915	1937	1960	1982	2005	2027	2050	2072	459
	244	247	250	253	256	259	262	265	268	271	
144	2095	2117	2139	2162	2184	2206	2228	2251	2273	2295	459
	274	277	280	283	286	288	291	294	297	300	
146	2317	2339	2362	2384	2406	2428	2450	2472	2494	2516	459
	303	306	309	312	315	317	320	323	326	329	
148	2538	2560	2582	2604	2626	2648	2669	2691	2713	2735	459
	332	335	338	340	343	346	349	352	355	358	
150	2757	2778	2800	2822	2844	2865	2887	2909	2930	2952	459
	360	363	366	369	372	375	377	380	383	386	
152	2973	2995	3016	3038	3059	3081	3102	3124	3145	3166	459
	389	392	394	397	400	403	406	408	411	414	
154	3188	3209	3230	3252	3273	3294	3315	3337	3358	3379	459
	417	420	422	425	428	431	434	436	439	442	
156	3400	3421	3442	3463	3484	3505	3526	3547	3568	3589	459
	445	447	450	453	456	458	461	464	467	469	
158	3610	3631	3652	3672	3693	3714	3735	3755	3776	3797	459
	472	475	477	480	483	486	488	491	494	496	
160	3818	3838	3859	3879	3900	3920	3941	3961	3982	4002	459
	499	502	505	507	510	513	515	518	521	523	
162	4023	4043	4063	4084	4104	4124	4144	4165	4185	4205	459
	526	529	531	534	537	539	542	545	547	550	
164	4225	4245	4265	4285	4306	4326	4346	4365	4385	4405	459
	552	555	558	560	563	566	568	571	573	576	
166	4425	4445	4465	4485	4504	4524	4544	4564	4583	4599	459
	579	581	584	586	589	592	594	597	599	601	
168	4615	4635	4654	4674	4693	4713	4732	4752	4771	4791	459
	603	606	609	611	614	616	619	621	624	626	
170	4810	4830	4849	4869	4888	4907	4927	4946	4965	4984	459
	629	632	634	637	639	642	644	647	649	652	
172	5004	5023	5042	5061	5080	5100	5119	5138	5157	5176	459
	654	657	659	662	664	667	669	672	674	677	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-G0-02-05-30-002-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**M.80 OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	5195 679	5214 682	5233 684	5252 687	5271 689	5290 692	5309 694	5328 697	5347 699	5365 702	459
176	5384 704	5403 707	5422 709	5441 711	5460 714	5478 716	5497 719	5516 721	5534 724	5553 726	459
178	5572 729	5590 731	5609 733	5627 736	5646 738	5665 741	5683 743	5702 746	5720 748	5738 750	459
180	5757 753	5775 755	5794 758	5812 760	5830 762	5849 765	5867 767	5885 770	5903 772	5922 774	459
182	5940 777	5958 779	5976 781	5994 784	6012 786	6030 789	6049 791	6067 793	6085 796	6103 798	459
184	6121 800	6134 802	6149 804	6167 806	6185 809	6203 811	6221 813	6239 816	6256 818	6274 820	459
186	6292 823	6310 825	6328 827	6345 830	6363 832	6381 834	6399 837	6416 839	6434 841	6452 844	459
188	6470 846	6487 848	6505 851	6522 853	6540 855	6558 857	6575 860	6593 862	6610 864	6628 867	459
190	6645 869	6663 871	6680 873	6698 876	6715 878	6732 880	6750 883	6767 885	6785 887	6802 889	459
192	6819 892	6836 894	6854 896	6871 898	6888 901	6906 903	6923 905	6940 907	6957 910	6974 912	459
194	6992 914	7009 916	7026 919	7043 921	7060 923	7077 925	7094 928	7111 930	7128 932	7145 934	459
196	7162 937	7179 939	7196 941	7213 943	7230 945	7247 948	7264 950	7280 952	7297 954	7314 956	459
198	7331 959	7348 961	7364 963	7381 965	7398 967	7415 970	7431 972	7448 974	7465 976	7481 978	459
200	7498 980	7515 983	7531 985	7548 987	7564 989	7581 991	7597 993	7614 996	7630 998	7647 1000	459
202	7663 1002	7679 1004	7696 1006	7712 1008	7729 1011	7744 1013	7757 1014	7771 1016	7787 1018	7803 1020	459
204	7819 1022	7836 1025	7852 1027	7868 1029	7884 1031	7901 1033	7917 1035	7933 1037	7949 1039	7965 1041	461
206	7981 1044	7998 1046	8014 1048	8030 1050	8046 1052	8062 1054	8078 1056	8094 1058	8110 1060	8126 1062	461
208	8142 1064	8158 1066	8174 1069	8190 1071	8206 1073	8222 1075	8238 1077	8254 1079	8269 1081	8285 1083	461
210	8301 1085	8317 1087	8333 1089	8349 1091	8364 1093	8380 1095	8396 1097	8412 1100	8427 1102	8443 1104	461
212	8459 1106	8475 1108	8490 1110	8506 1112	8522 1114	8537 1116	8553 1118	8568 1120	8584 1122	8600 1124	461
214	8615 1126	8631 1128	8646 1130	8662 1132	8677 1134	8693 1136	8708 1138	8724 1140	8739 1142	8755 1144	461
216	8770 1146	8786 1148	8801 1150	8816 1152	8832 1154	8847 1156	8862 1158	8878 1160	8893 1162	8908 1164	461
218	8924 1166	8939 1168	8954 1170	8969 1172	8984 1174	9000 1176	9015 1178	9030 1180	9045 1182	9060 1184	461

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-G0-02-05-30-003-115

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=37.0%		**DISTANCE (NM) TIME (MIN)**		**M.80 OPT FL**			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	9075 1186	9090 1188	9105 1190	9121 1192	9136 1194	9151 1196	9166 1198	9181 1200	9196 1202	9211 1203	461
222	9226 1205	9241 1207	9255 1209	9270 1211	9285 1213	9300 1215	9315 1217	9329 1219	9340 1220	9353 1222	461
224	9367 1224	9382 1226	9397 1228	9412 1230	9427 1231	9441 1233	9456 1235	9471 1237	9485 1239	9500 1241	465
226	9515 1243	9530 1245	9544 1247	9559 1249	9574 1250	9588 1252	9603 1254	9617 1256	9632 1258	9647 1260	465
228	9661 1262	9676 1264	9690 1265	9705 1267	9719 1269	9734 1271	9748 1273	9763 1275	9777 1277	9792 1279	465
230	9806 1280	9821 1282	9835 1284	9850 1286	9864 1288	9879 1290	9893 1292	9907 1293	9922 1295	9936 1297	465
232	9950 1299	9965 1301	9979 1303	9993 1305	10008 1306	10022 1308	10036 1310	10050 1312	10065 1314	10079 1316	465
234	10093 1317	10107 1319	10121 1321	10136 1323	10150 1325	10164 1327	10178 1328	10192 1330	10206 1332	10220 1334	465
236	10235 1336	10249 1337	10263 1339	10277 1341	10291 1343	10305 1345	10319 1347	10333 1348	10347 1350	10361 1352	465
238	10375 1354	10389 1356	10403 1357	10417 1359	10431 1361	10445 1363	10458 1364	10472 1366	10486 1368	10500 1370	465
PACK FLOW LO △FUEL = – 0.5 %			**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1 %			**ENGINE ANTI ICE ON** △FUEL = + 1.5 %			**TOTAL ANTI ICE ON** △FUEL = + 3 %		

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-G0-02-05-30-004-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**M.82 OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	23	47	70	94	117	141	164	188	211	470
	0	3	6	9	12	15	18	21	24	27	
128	234	258	281	304	328	351	374	398	421	444	470
	30	33	36	39	42	45	48	51	54	57	
130	467	490	513	537	560	583	606	629	652	675	470
	60	63	66	68	71	74	77	80	83	86	
132	698	721	744	767	790	813	836	859	881	904	470
	89	92	95	98	101	104	107	110	112	115	
134	927	950	973	995	1018	1041	1064	1086	1109	1132	470
	118	121	124	127	130	133	136	139	141	144	
136	1154	1177	1199	1222	1245	1267	1290	1312	1335	1357	470
	147	150	153	156	159	162	165	167	170	173	
138	1380	1402	1424	1447	1469	1492	1514	1536	1559	1581	470
	176	179	182	185	187	190	193	196	199	202	
140	1603	1625	1648	1670	1692	1714	1736	1758	1780	1803	470
	205	207	210	213	216	219	221	224	227	230	
142	1825	1847	1869	1891	1913	1935	1957	1979	2001	2022	470
	233	236	238	241	244	247	250	252	255	258	
144	2044	2066	2088	2110	2132	2154	2175	2197	2219	2240	470
	261	264	266	269	272	275	277	280	283	286	
146	2262	2284	2305	2327	2349	2370	2392	2413	2435	2457	470
	289	291	294	297	300	302	305	308	311	313	
148	2478	2500	2521	2542	2564	2585	2607	2628	2649	2671	470
	316	319	322	324	327	330	333	335	338	341	
150	2692	2713	2735	2756	2777	2798	2819	2841	2862	2883	470
	343	346	349	352	354	357	360	362	365	368	
152	2904	2925	2946	2967	2988	3009	3030	3051	3072	3093	470
	370	373	376	379	381	384	387	389	392	395	
154	3114	3135	3156	3176	3197	3218	3239	3259	3280	3301	470
	397	400	403	405	408	411	413	416	418	421	
156	3322	3342	3363	3383	3404	3425	3445	3466	3486	3507	470
	424	426	429	432	434	437	440	442	445	447	
158	3527	3548	3568	3589	3609	3629	3650	3670	3690	3711	470
	450	453	455	458	460	463	466	468	471	473	
160	3731	3751	3771	3792	3812	3832	3852	3872	3892	3912	470
	476	479	481	484	486	489	491	494	497	499	
162	3933	3953	3973	3993	4013	4033	4052	4072	4092	4112	470
	502	504	507	509	512	514	517	520	522	525	
164	4132	4152	4172	4191	4211	4231	4251	4270	4290	4310	470
	527	530	532	535	537	540	542	545	547	550	
166	4329	4349	4369	4388	4408	4427	4447	4466	4486	4505	470
	552	555	557	560	562	565	567	570	572	575	
168	4525	4544	4563	4583	4602	4621	4641	4660	4679	4698	470
	577	580	582	585	587	590	592	594	597	599	
170	4718	4737	4756	4775	4794	4813	4832	4851	4870	4889	470
	602	604	607	609	612	614	616	619	621	624	
172	4908	4927	4946	4965	4984	5003	5021	5040	5059	5078	470
	626	629	631	633	636	638	641	643	645	648	

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .820 .000 .000 0 FCOM-G0-02-05-30-005-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**M.82 OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	5097 650	5115 653	5134 655	5152 657	5171 660	5190 662	5208 664	5227 667	5245 669	5264 672	470
176	5280 674	5295 675	5312 678	5330 680	5349 682	5367 685	5386 687	5404 689	5422 692	5441 694	470
178	5459 696	5477 699	5495 701	5514 703	5532 706	5550 708	5568 710	5587 713	5605 715	5623 717	470
180	5641 720	5659 722	5677 724	5695 727	5713 729	5732 731	5750 733	5768 736	5786 738	5804 740	470
182	5822 743	5839 745	5857 747	5875 750	5893 752	5911 754	5929 756	5947 759	5964 761	5982 763	470
184	6000 765	6018 768	6036 770	6053 772	6071 774	6089 777	6106 779	6124 781	6142 783	6159 786	470
186	6177 788	6194 790	6212 792	6229 795	6247 797	6264 799	6282 801	6299 804	6317 806	6334 808	470
188	6352 810	6369 812	6386 815	6404 817	6421 819	6438 821	6455 824	6473 826	6490 828	6507 830	470
190	6524 832	6542 835	6559 837	6576 839	6593 841	6610 843	6627 845	6644 848	6661 850	6678 852	470
192	6695 854	6712 856	6729 858	6746 861	6763 863	6780 865	6797 867	6813 869	6827 871	6841 873	470
194	6857 875	6873 877	6890 879	6907 881	6924 883	6941 885	6957 888	6974 890	6991 892	7007 894	470
196	7024 896	7041 898	7057 900	7074 902	7091 905	7107 907	7124 909	7140 911	7157 913	7174 915	470
198	7190 917	7207 919	7223 921	7240 924	7256 926	7273 928	7289 930	7305 932	7322 934	7338 936	470
200	7355 938	7371 940	7387 942	7404 944	7420 947	7436 949	7453 951	7469 953	7485 955	7501 957	470
202	7518 959	7534 961	7550 963	7566 965	7582 967	7599 969	7615 971	7631 973	7647 976	7663 978	470
204	7679 980	7695 982	7711 984	7727 986	7743 988	7759 990	7775 992	7791 994	7807 996	7823 998	470
206	7839 1000	7855 1002	7871 1004	7886 1006	7902 1008	7918 1010	7934 1012	7950 1014	7965 1016	7981 1018	470
208	7997 1020	8013 1022	8028 1024	8044 1026	8060 1028	8075 1030	8091 1032	8107 1034	8122 1036	8138 1038	470
210	8154 1040	8169 1042	8185 1044	8200 1046	8216 1048	8231 1050	8247 1052	8262 1054	8277 1056	8293 1058	470
212	8308 1060	8323 1062	8336 1063	8349 1065	8363 1067	8378 1069	8393 1071	8409 1073	8424 1075	8439 1077	470
214	8455 1078	8470 1080	8485 1082	8500 1084	8515 1086	8531 1088	8546 1090	8561 1092	8576 1094	8591 1096	473
216	8607 1098	8622 1100	8637 1102	8652 1104	8667 1105	8682 1107	8697 1109	8712 1111	8727 1113	8742 1115	473
218	8757 1117	8772 1119	8787 1121	8802 1123	8817 1125	8832 1126	8847 1128	8862 1130	8877 1132	8892 1134	473

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-G0-02-05-30-006-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA CG=37.0%

DISTANCE (NM) TIME (MIN)

M.82 OPT FL

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	8907 1136	8922 1138	8936 1140	8951 1142	8966 1143	8981 1145	8996 1147	9010 1149	9025 1151	9040 1153	473
222	9055 1155	9069 1157	9084 1158	9099 1160	9114 1162	9128 1164	9143 1166	9158 1168	9172 1170	9187 1171	473
224	9202 1173	9216 1175	9231 1177	9245 1179	9260 1181	9274 1183	9289 1184	9303 1186	9318 1188	9333 1190	473
226	9347 1192	9361 1194	9376 1195	9390 1197	9405 1199	9419 1201	9434 1203	9448 1205	9462 1206	9477 1208	473
228	9491 1210	9505 1212	9520 1214	9534 1216	9548 1217	9563 1219	9577 1221	9591 1223	9605 1225	9620 1226	473
230	9634 1228	9648 1230	9662 1232	9676 1234	9691 1235	9705 1237	9719 1239	9733 1241	9747 1243	9761 1244	473
232	9775 1246	9789 1248	9803 1250	9817 1251	9831 1253	9845 1255	9859 1257	9873 1259	9885 1260	9897 1262	473
234	9909 1263	9922 1265	9936 1266	9950 1268	9964 1270	9978 1272	9992 1273	10005 1275	10019 1277	10033 1279	473
236	10047 1280	10061 1282	10074 1284	10088 1286	10102 1287	10116 1289	10130 1291	10143 1293	10157 1294	10171 1296	477
238	10184 1298	10198 1299	10212 1301	10226 1303	10239 1305	10253 1306	10267 1308	10280 1310	10294 1312	10307 1313	477

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .800 .000 .000 0 FCOM-G0-02-05-30-007-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=37.0%

DISTANCE (NM)
TIME (MIN)

M.84 OPT FL

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	22	44	66	88	110	132	154	176	198	482
	0	3	5	8	11	14	16	19	22	25	
128	220	242	264	286	308	330	352	374	396	418	482
	27	30	33	36	38	41	44	47	49	52	
130	440	461	483	505	527	549	570	592	614	635	482
	55	57	60	63	66	68	71	74	76	79	
132	657	679	701	722	744	766	787	809	830	852	482
	82	85	87	90	93	95	98	101	103	106	
134	873	895	916	938	959	981	1002	1024	1045	1067	482
	109	111	114	117	119	122	125	127	130	133	
136	1088	1109	1131	1152	1173	1195	1216	1237	1258	1280	482
	135	138	141	143	146	149	151	154	157	159	
138	1301	1322	1343	1364	1385	1407	1428	1449	1470	1491	482
	162	165	167	170	173	175	178	180	183	186	
140	1512	1533	1554	1575	1596	1617	1638	1658	1679	1700	482
	188	191	194	196	199	201	204	207	209	212	
142	1721	1742	1763	1783	1804	1825	1846	1866	1887	1908	482
	214	217	220	222	225	227	230	232	235	238	
144	1928	1949	1969	1990	2011	2031	2052	2072	2092	2113	482
	240	243	245	248	250	253	255	258	261	263	
146	2133	2154	2174	2195	2215	2235	2256	2276	2296	2316	482
	266	268	271	273	276	278	281	283	286	288	
148	2337	2357	2377	2397	2417	2437	2458	2478	2498	2518	482
	291	293	296	299	301	304	306	309	311	314	
150	2538	2558	2578	2598	2618	2638	2657	2677	2697	2717	482
	316	319	321	323	326	328	331	333	336	338	
152	2737	2757	2776	2796	2816	2836	2855	2875	2895	2914	482
	341	343	346	348	351	353	356	358	360	363	
154	2934	2953	2973	2992	3012	3031	3051	3070	3090	3109	482
	365	368	370	373	375	378	380	382	385	387	
156	3128	3148	3167	3186	3206	3225	3244	3263	3282	3302	482
	390	392	394	397	399	402	404	406	409	411	
158	3321	3340	3359	3378	3397	3416	3435	3454	3473	3491	482
	414	416	418	421	423	425	428	430	432	435	
160	3510	3528	3544	3560	3578	3597	3616	3634	3653	3671	482
	437	439	441	443	446	448	450	453	455	457	
162	3690	3708	3727	3745	3764	3782	3801	3819	3837	3856	482
	460	462	464	466	469	471	473	476	478	480	
164	3874	3893	3911	3929	3947	3966	3984	4002	4020	4039	482
	482	485	487	489	492	494	496	498	501	503	
166	4057	4075	4093	4111	4129	4148	4166	4184	4202	4220	482
	505	507	510	512	514	517	519	521	523	525	
168	4238	4256	4274	4292	4310	4328	4345	4363	4381	4399	482
	528	530	532	534	537	539	541	543	546	548	
170	4417	4435	4452	4470	4488	4506	4523	4541	4559	4576	482
	550	552	554	557	559	561	563	565	568	570	
172	4594	4611	4629	4647	4664	4682	4699	4717	4734	4752	482
	572	574	576	579	581	583	585	587	590	592	

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.5 %	ΔFUEL = + 1 %	ΔFUEL = + 1.5 %	ΔFUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .840 .000 .000 0 FCOM-G0-02-05-30-008-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**M.84 OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	4769 594	4786 596	4804 598	4821 600	4838 602	4855 605	4873 607	4890 609	4907 611	4924 613	482
176	4942 615	4956 617	4970 619	4986 621	5003 623	5020 625	5037 627	5054 629	5071 632	5088 634	482
178	5105 636	5122 638	5139 640	5156 642	5173 644	5189 646	5206 648	5223 650	5240 653	5257 655	482
180	5273 657	5290 659	5307 661	5324 663	5340 665	5357 667	5374 669	5391 671	5407 673	5424 675	482
182	5441 678	5457 680	5474 682	5490 684	5507 686	5524 688	5540 690	5557 692	5573 694	5590 696	482
184	5606 698	5623 700	5639 702	5655 704	5672 706	5688 708	5705 710	5721 712	5737 715	5754 717	482
186	5770 719	5786 721	5803 723	5819 725	5835 727	5852 729	5868 731	5884 733	5900 735	5916 737	482
188	5933 739	5949 741	5965 743	5981 745	5997 747	6013 749	6029 751	6045 753	6061 755	6077 757	482
190	6093 759	6109 761	6125 763	6141 765	6157 767	6173 769	6189 771	6205 773	6221 775	6236 777	482
192	6252 779	6268 781	6284 783	6300 785	6315 786	6331 788	6347 790	6362 792	6378 794	6393 796	482
194	6409 798	6425 800	6440 802	6456 804	6469 806	6482 807	6496 809	6511 811	6527 813	6542 815	482
196	6558 817	6573 819	6588 820	6604 822	6619 824	6634 826	6650 828	6665 830	6680 832	6696 834	484
198	6711 836	6726 837	6741 839	6757 841	6772 843	6787 845	6802 847	6818 849	6833 851	6848 853	484
200	6863 854	6878 856	6893 858	6908 860	6924 862	6939 864	6954 866	6969 868	6984 869	6999 871	484
202	7014 873	7029 875	7044 877	7059 879	7074 881	7089 882	7104 884	7119 886	7134 888	7149 890	484
204	7163 892	7178 894	7193 895	7208 897	7223 899	7238 901	7252 903	7267 905	7282 906	7297 908	484
206	7312 910	7326 912	7341 914	7356 915	7370 917	7385 919	7400 921	7414 923	7429 925	7444 926	484
208	7458 928	7473 930	7488 932	7502 934	7517 935	7531 937	7546 939	7560 941	7575 943	7589 944	484
210	7604 946	7618 948	7633 950	7647 952	7661 953	7676 955	7690 957	7705 959	7719 961	7733 962	484
212	7748 964	7762 966	7776 968	7790 969	7805 971	7819 973	7832 974	7843 976	7855 977	7869 979	484
214	7883 981	7897 983	7911 984	7925 986	7939 988	7954 989	7968 991	7982 993	7996 995	8010 996	489
216	8024 998	8037 1000	8051 1001	8065 1003	8079 1005	8093 1007	8107 1008	8121 1010	8135 1012	8149 1013	489
218	8163 1015	8176 1017	8190 1019	8204 1020	8218 1022	8232 1024	8246 1025	8259 1027	8273 1029	8287 1030	489

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .840 .000 .000 0 FCOM-G0-02-05-30-009-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=37.0%

DISTANCE (NM)
TIME (MIN)

M.84 OPT FL

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	8301 1032	8314 1034	8328 1035	8342 1037	8356 1039	8369 1041	8383 1042	8397 1044	8410 1046	8424 1047	489
222	8438 1049	8451 1051	8465 1052	8479 1054	8492 1056	8506 1057	8519 1059	8533 1061	8547 1062	8560 1064	489
224	8574 1066	8587 1067	8601 1069	8614 1071	8628 1072	8641 1074	8655 1076	8668 1077	8682 1079	8695 1081	489
226	8709 1082	8722 1084	8735 1085	8749 1087	8762 1089	8775 1090	8789 1092	8802 1094	8815 1095	8829 1097	489
228	8842 1099	8855 1100	8869 1102	8882 1103	8895 1105	8908 1107	8922 1108	8935 1110	8948 1112	8961 1113	489
230	8975 1115	8988 1116	9001 1118	9014 1120	9027 1121	9040 1123	9051 1124	9062 1126	9073 1127	9086 1129	489
232	9099 1130	9112 1132	9125 1133	9138 1135	9151 1136	9164 1138	9177 1140	9189 1141	9202 1143	9215 1144	493
234	9228 1146	9241 1147	9254 1149	9266 1150	9279 1152	9292 1154	9305 1155	9318 1157	9330 1158	9343 1160	493
236	9356 1161	9369 1163	9381 1164	9394 1166	9407 1168	9420 1169	9432 1171	9445 1172	9458 1174	9470 1175	493
238	9483 1177	9496 1178	9508 1180	9521 1181	9534 1183	9546 1185	9559 1186	9571 1188	9584 1189	9597 1191	493

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .840 .000 .000 0 FCOM-G0-02-05-30-010-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS — NORMAL AIR CONDITIONING — ANTI-ICING OFF | ISA CG=37.0% | **DISTANCE (NM) TIME (MIN)** | **LR OPT FL**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	24	49	73	97	121	146	170	194	218	468
	0	3	6	10	13	16	19	22	26	29	
128	242	266	290	314	338	362	386	410	434	458	468
	32	35	38	42	45	48	51	54	57	61	
130	482	506	530	553	577	601	625	648	672	696	468
	64	67	70	73	76	79	82	86	89	92	
132	719	743	766	790	814	837	861	884	908	931	468
	95	98	101	104	107	110	113	117	120	123	
134	954	978	1001	1024	1048	1071	1094	1118	1141	1164	468
	126	129	132	135	138	141	144	147	150	153	
136	1187	1210	1233	1257	1280	1303	1326	1349	1372	1395	468
	156	159	162	165	168	171	174	177	180	183	
138	1418	1441	1464	1486	1509	1532	1555	1578	1600	1623	468
	186	189	192	195	198	201	204	207	210	213	
140	1646	1669	1691	1714	1737	1759	1782	1804	1827	1849	468
	216	219	222	225	228	231	234	237	240	242	
142	1872	1894	1917	1939	1962	1984	2006	2029	2051	2073	468
	245	248	251	254	257	260	263	266	269	271	
144	2095	2118	2140	2162	2184	2206	2228	2251	2273	2295	468
	274	277	280	283	286	289	292	294	297	300	
146	2317	2339	2361	2383	2405	2427	2448	2470	2492	2514	468
	303	306	309	312	314	317	320	323	326	329	
148	2536	2558	2579	2601	2623	2645	2666	2688	2710	2731	468
	331	334	337	340	343	345	348	351	354	357	
150	2753	2774	2796	2817	2839	2860	2882	2903	2925	2946	468
	359	362	365	368	371	373	376	379	382	384	
152	2967	2989	3010	3031	3053	3074	3095	3116	3137	3159	468
	387	390	393	395	398	401	404	406	409	412	
154	3180	3201	3222	3243	3264	3285	3306	3327	3348	3369	468
	414	417	420	423	425	428	431	433	436	439	
156	3390	3410	3431	3452	3473	3494	3514	3535	3556	3576	468
	441	444	447	449	452	455	458	460	463	465	
158	3597	3618	3638	3659	3679	3700	3720	3741	3761	3782	468
	468	471	473	476	479	481	484	487	489	492	
160	3802	3823	3843	3863	3884	3904	3924	3944	3965	3985	468
	494	497	500	502	505	508	510	513	515	518	
162	4005	4025	4045	4065	4085	4105	4125	4145	4165	4185	468
	520	523	526	528	531	533	536	538	541	544	
164	4205	4225	4245	4265	4285	4304	4324	4344	4363	4383	468
	546	549	551	554	556	559	561	564	566	569	
166	4403	4422	4442	4461	4477	4493	4512	4531	4551	4570	468
	571	574	576	579	581	583	585	588	590	593	
168	4590	4609	4629	4648	4667	4687	4706	4725	4745	4764	468
	595	598	600	603	605	608	610	613	615	618	
170	4783	4802	4822	4841	4860	4879	4898	4917	4936	4955	468
	620	623	625	628	630	633	635	638	640	642	
172	4974	4993	5012	5031	5050	5069	5088	5107	5126	5145	468
	645	647	650	652	655	657	660	662	664	667	

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22800000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-02-05-30-011-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR OPT FL**

WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
174	5164 669	5182 672	5201 674	5220 676	5239 679	5257 681	5276 684	5295 686	5313 689	5332 691	468
176	5351 693	5369 696	5388 698	5406 700	5425 703	5444 705	5462 708	5480 710	5499 712	5517 715	468
178	5536 717	5554 719	5573 722	5591 724	5609 726	5628 729	5646 731	5664 733	5682 736	5701 738	468
180	5719 741	5737 743	5755 745	5773 747	5792 750	5810 752	5828 754	5846 757	5864 759	5882 761	468
182	5900 764	5918 766	5936 768	5954 771	5968 772	5982 774	5999 776	6017 779	6035 781	6053 783	468
184	6070 786	6088 788	6106 790	6124 792	6142 795	6159 797	6177 799	6195 802	6212 804	6230 806	468
186	6248 808	6265 811	6283 813	6300 815	6318 818	6336 820	6353 822	6371 824	6388 827	6406 829	468
188	6423 831	6441 833	6458 836	6475 838	6493 840	6510 842	6528 845	6545 847	6562 849	6580 851	468
190	6597 853	6614 856	6631 858	6649 860	6666 862	6683 865	6700 867	6717 869	6735 871	6752 873	468
192	6769 876	6786 878	6803 880	6820 882	6837 884	6854 887	6871 889	6888 891	6905 893	6922 895	468
194	6939 897	6956 900	6973 902	6990 904	7007 906	7024 908	7041 910	7057 913	7074 915	7091 917	468
196	7108 919	7125 921	7141 923	7158 926	7175 928	7192 930	7208 932	7225 934	7242 936	7258 938	468
198	7275 940	7291 943	7308 945	7325 947	7341 949	7358 951	7374 953	7391 955	7407 957	7423 960	468
200	7440 962	7456 964	7473 966	7489 968	7505 970	7522 972	7535 974	7548 975	7563 977	7579 979	468
202	7595 982	7612 984	7628 986	7644 988	7660 990	7677 992	7693 994	7709 996	7725 998	7741 1000	470
204	7757 1002	7773 1004	7789 1006	7805 1009	7822 1011	7838 1013	7854 1015	7870 1017	7886 1019	7902 1021	470
206	7918 1023	7934 1025	7950 1027	7965 1029	7981 1031	7997 1033	8013 1035	8029 1037	8045 1039	8061 1041	470
208	8077 1043	8092 1045	8108 1047	8124 1049	8140 1051	8156 1053	8171 1055	8187 1057	8203 1059	8218 1061	470
210	8234 1063	8250 1065	8265 1067	8281 1069	8297 1071	8312 1073	8328 1075	8343 1077	8359 1079	8374 1081	470
212	8390 1083	8406 1085	8421 1087	8437 1089	8452 1091	8467 1093	8483 1095	8498 1097	8514 1099	8529 1101	470
214	8545 1103	8560 1105	8575 1107	8591 1109	8606 1111	8621 1113	8637 1115	8652 1117	8667 1119	8682 1121	470
216	8698 1123	8713 1125	8728 1127	8743 1129	8758 1131	8774 1132	8789 1134	8804 1136	8819 1138	8834 1140	470
218	8849 1142	8864 1144	8879 1146	8894 1148	8909 1150	8925 1152	8939 1154	8954 1156	8969 1157	8984 1159	470

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22800000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-02-05-30-012-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=37.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR OPT FL**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS** (KT)
220	8999 1161	9014 1163	9029 1165	9044 1167	9059 1169	9071 1170	9082 1172	9096 1174	9111 1175	9125 1177	470
222	9140 1179	9155 1181	9170 1183	9185 1185	9199 1187	9214 1189	9229 1190	9244 1192	9258 1194	9273 1196	474
224	9288 1198	9302 1200	9317 1202	9332 1204	9346 1205	9361 1207	9375 1209	9390 1211	9405 1213	9419 1215	474
226	9434 1217	9448 1218	9463 1220	9477 1222	9492 1224	9506 1226	9521 1228	9535 1230	9550 1231	9564 1233	474
228	9579 1235	9593 1237	9608 1239	9622 1241	9636 1242	9651 1244	9665 1246	9679 1248	9694 1250	9708 1251	474
230	9722 1253	9737 1255	9751 1257	9765 1259	9779 1261	9794 1262	9808 1264	9822 1266	9836 1268	9851 1270	474
232	9865 1271	9879 1273	9893 1275	9907 1277	9921 1279	9935 1280	9950 1282	9964 1284	9978 1286	9992 1287	474
234	10006 1289	10020 1291	10034 1293	10048 1295	10062 1296	10076 1298	10090 1300	10104 1302	10118 1303	10132 1305	474
236	10146 1307	10160 1309	10174 1311	10187 1312	10201 1314	10215 1316	10229 1318	10243 1319	10257 1321	10271 1323	474
238	10284 1325	10298 1326	10312 1328	10326 1330	10340 1332	10353 1333	10367 1335	10381 1337	10394 1338	10408 1340	474
PACK FLOW LO △FUEL = – 0.5 %			**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1.5 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %			**TOTAL ANTI ICE ON** △FUEL = + 5 %	

11.1-08F0A330-200 CF6-80E1A4 22800000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-02-05-30-013-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=30.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR FL 100**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	14	29	43	58	72	87	101	115	130	278
	0	3	6	9	12	16	19	22	25	28	
128	144	158	173	187	201	216	230	244	259	273	280
	31	34	37	40	43	46	49	52	55	58	
130	287	301	316	330	344	358	373	387	401	415	282
	62	65	68	71	74	77	80	83	86	89	
132	429	443	458	472	486	500	514	528	542	557	283
	92	95	98	101	104	107	110	113	116	119	
134	571	585	599	613	627	641	655	669	683	697	284
	122	125	128	131	134	137	139	142	145	148	
136	711	725	739	753	767	781	795	809	823	837	285
	151	154	157	160	163	166	169	172	175	178	
138	851	865	879	892	906	920	934	948	962	976	286
	181	184	187	189	192	195	198	201	204	207	
140	990	1003	1017	1031	1045	1059	1072	1086	1100	1114	287
	210	213	216	218	221	224	227	230	233	236	
142	1128	1141	1155	1169	1183	1196	1210	1224	1237	1251	288
	239	242	244	247	250	253	256	259	261	264	
144	1265	1278	1292	1306	1319	1333	1347	1360	1374	1387	290
	267	270	273	276	278	281	284	287	290	293	
146	1401	1415	1428	1442	1455	1469	1482	1496	1509	1523	292
	295	298	301	304	306	309	312	315	318	320	
148	1536	1550	1563	1577	1590	1604	1617	1631	1644	1657	294
	323	326	329	331	334	337	339	342	345	348	
150	1671	1684	1698	1711	1724	1738	1751	1765	1778	1791	296
	350	353	356	358	361	364	367	369	372	375	
152	1805	1818	1831	1844	1858	1871	1884	1898	1911	1924	299
	377	380	383	385	388	391	393	396	399	401	
154	1937	1951	1964	1977	1990	2003	2017	2030	2043	2056	301
	404	407	409	412	414	417	420	422	425	428	
156	2069	2082	2096	2109	2122	2135	2148	2161	2174	2187	303
	430	433	435	438	441	443	446	448	451	453	
158	2200	2213	2227	2240	2253	2266	2279	2292	2305	2318	305
	456	459	461	464	466	469	471	474	477	479	
160	2331	2344	2357	2370	2383	2396	2409	2421	2434	2447	306
	482	484	487	489	492	494	497	499	502	504	
162	2460	2473	2486	2499	2512	2525	2538	2550	2563	2576	307
	507	509	512	515	517	520	522	525	527	530	
164	2589	2602	2615	2628	2640	2653	2666	2679	2692	2704	309
	532	535	537	540	542	544	547	549	552	554	
166	2717	2730	2743	2755	2768	2781	2794	2806	2819	2832	310
	557	559	562	564	567	569	572	574	577	579	
168	2844	2857	2870	2882	2895	2908	2920	2933	2946	2958	311
	581	584	586	589	591	594	596	599	601	603	
170	2971	2984	2996	3009	3021	3034	3047	3059	3072	3084	312
	606	608	611	613	615	618	620	623	625	628	
172	3097	3109	3122	3134	3147	3159	3172	3184	3197	3209	313
	630	632	635	637	640	642	644	647	649	651	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-G0-02-05-30-014-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=30.0%

DISTANCE (NM)
TIME (MIN)

LR FL 100

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	3222 654	3234 656	3247 659	3259 661	3272 663	3284 666	3297 668	3309 670	3322 673	3334 675	315
176	3346 678	3359 680	3371 682	3384 685	3396 687	3408 689	3421 692	3433 694	3445 696	3458 699	316
178	3470 701	3482 703	3495 706	3507 708	3519 710	3532 713	3544 715	3556 717	3569 720	3581 722	317
180	3593 724	3605 727	3618 729	3630 731	3642 733	3654 736	3667 738	3679 740	3691 743	3703 745	318
182	3715 747	3728 750	3740 752	3752 754	3764 756	3776 759	3789 761	3801 763	3813 766	3825 768	320
184	3837 770	3849 772	3861 775	3873 777	3886 779	3898 781	3910 784	3922 786	3934 788	3946 790	321
186	3958 793	3970 795	3982 797	3994 799	4006 802	4018 804	4030 806	4042 808	4054 811	4066 813	322
188	4078 815	4090 817	4102 819	4114 822	4126 824	4138 826	4150 828	4162 830	4174 833	4186 835	324
190	4198 837	4210 839	4222 841	4234 844	4245 846	4257 848	4269 850	4281 852	4293 855	4305 857	325
192	4317 859	4329 861	4340 863	4352 866	4364 868	4376 870	4388 872	4400 874	4411 876	4423 879	326
194	4435 881	4447 883	4459 885	4470 887	4482 889	4494 892	4506 894	4517 896	4529 898	4541 900	327
196	4553 902	4564 904	4576 907	4588 909	4599 911	4611 913	4623 915	4634 917	4646 919	4658 921	328
198	4670 924	4681 926	4693 928	4704 930	4716 932	4728 934	4739 936	4751 938	4763 940	4774 943	330
200	4786 945	4797 947	4809 949	4821 951	4832 953	4844 955	4855 957	4867 959	4878 961	4890 964	331
202	4901 966	4913 968	4924 970	4936 972	4948 974	4959 976	4971 978	4982 980	4994 982	5005 984	333
204	5016 986	5028 988	5039 990	5051 992	5062 994	5074 996	5085 999	5097 1001	5108 1003	5119 1005	335
206	5131 1007	5142 1009	5154 1011	5165 1013	5176 1015	5188 1017	5199 1019	5211 1021	5222 1023	5233 1025	337
208	5245 1027	5256 1029	5267 1031	5279 1033	5290 1035	5301 1037	5313 1039	5324 1041	5335 1043	5347 1045	339
210	5358 1047	5369 1049	5380 1051	5392 1053	5403 1055	5414 1057	5425 1059	5437 1061	5448 1063	5459 1065	341
212	5470 1067	5482 1069	5493 1070	5504 1072	5515 1074	5526 1076	5538 1078	5549 1080	5560 1082	5571 1084	343
214	5582 1086	5593 1088	5605 1090	5616 1092	5627 1094	5638 1096	5649 1098	5660 1100	5671 1102	5683 1103	345
216	5694 1105	5705 1107	5716 1109	5727 1111	5738 1113	5749 1115	5760 1117	5771 1119	5782 1121	5793 1123	347
218	5804 1125	5816 1126	5827 1128	5838 1130	5849 1132	5860 1134	5871 1136	5882 1138	5893 1140	5904 1142	348

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-G0-02-05-30-015-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=30.0%

DISTANCE (NM)
TIME (MIN)

LR FL 100

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	5915 1144	5926 1145	5937 1147	5948 1149	5959 1151	5970 1153	5981 1155	5992 1157	6003 1159	6014 1160	349
222	6025 1162	6035 1164	6046 1166	6057 1168	6068 1170	6079 1172	6090 1174	6101 1175	6112 1177	6123 1179	351
224	6134 1181	6145 1183	6156 1185	6166 1187	6177 1188	6188 1190	6199 1192	6210 1194	6221 1196	6232 1198	352
226	6242 1199	6253 1201	6264 1203	6275 1205	6286 1207	6297 1209	6307 1210	6318 1212	6329 1214	6340 1216	354
228	6351 1218	6362 1220	6372 1221	6383 1223	6394 1225	6405 1227	6415 1229	6426 1230	6437 1232	6448 1234	356
230	6458 1236	6469 1238	6480 1239	6491 1241	6501 1243	6512 1245	6523 1247	6534 1248	6544 1250	6555 1252	358
232	6566 1254	6576 1256	6587 1257	6598 1259	6608 1261	6619 1263	6630 1264	6640 1266	6651 1268	6662 1270	359
234	6672 1272	6683 1273	6694 1275	6704 1277	6715 1279	6726 1280	6736 1282	6747 1284	6757 1286	6768 1287	361
236	6779 1289	6789 1291	6800 1293	6810 1294	6821 1296	6831 1298	6842 1300	6853 1301	6863 1303	6874 1305	363
238	6884 1307	6895 1308	6905 1310	6916 1312	6926 1314	6937 1315	6947 1317	6958 1319	6969 1321	6979 1322	364

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-G0-02-05-30-016-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=30.0%	**DISTANCE (NM) TIME (MIN)**	**LR FL 150**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	16	32	48	64	80	95	111	127	143	294
	0	3	6	10	13	16	19	23	26	29	
128	159	175	190	206	222	238	254	269	285	301	297
	32	35	39	42	45	48	51	55	58	61	
130	317	332	348	364	379	395	411	426	442	457	298
	64	67	70	74	77	80	83	86	89	92	
132	473	489	504	520	535	551	566	582	597	613	300
	95	99	102	105	108	111	114	117	120	123	
134	628	644	659	675	690	706	721	736	752	767	302
	126	129	133	136	139	142	145	148	151	154	
136	783	798	813	829	844	859	875	890	905	920	303
	157	160	163	166	169	172	175	178	181	184	
138	936	951	966	981	997	1012	1027	1042	1057	1073	305
	187	190	193	196	199	202	205	208	211	214	
140	1088	1103	1118	1133	1148	1163	1179	1194	1209	1224	306
	217	220	223	226	229	232	235	238	241	244	
142	1239	1254	1269	1284	1299	1314	1329	1344	1359	1374	308
	247	250	252	255	258	261	264	267	270	273	
144	1389	1404	1419	1434	1449	1463	1478	1493	1508	1523	309
	276	279	282	284	287	290	293	296	299	302	
146	1538	1553	1567	1582	1597	1612	1627	1641	1656	1671	311
	305	307	310	313	316	319	322	325	327	330	
148	1686	1700	1715	1730	1745	1759	1774	1789	1803	1818	312
	333	336	339	342	344	347	350	353	356	359	
150	1833	1847	1862	1877	1891	1906	1920	1935	1949	1964	314
	361	364	367	370	372	375	378	381	384	386	
152	1979	1993	2008	2022	2037	2051	2066	2080	2095	2109	315
	389	392	395	397	400	403	406	408	411	414	
154	2123	2138	2152	2167	2181	2196	2210	2224	2239	2253	316
	417	419	422	425	428	430	433	436	439	441	
156	2267	2282	2296	2310	2325	2339	2353	2368	2382	2396	318
	444	447	449	452	455	457	460	463	465	468	
158	2410	2425	2439	2453	2467	2481	2496	2510	2524	2538	319
	471	474	476	479	482	484	487	490	492	495	
160	2552	2566	2581	2595	2609	2623	2637	2651	2665	2679	321
	497	500	503	505	508	511	513	516	519	521	
162	2693	2707	2721	2735	2750	2764	2778	2792	2805	2819	322
	524	526	529	532	534	537	539	542	545	547	
164	2833	2847	2861	2875	2889	2903	2917	2931	2945	2959	324
	550	552	555	557	560	563	565	568	570	573	
166	2973	2986	3000	3014	3028	3042	3056	3069	3083	3097	327
	575	578	580	583	586	588	591	593	596	598	
168	3111	3125	3138	3152	3166	3180	3193	3207	3221	3234	329
	601	603	606	608	611	613	616	618	621	623	
170	3248	3262	3276	3289	3303	3317	3330	3344	3357	3371	332
	626	628	631	633	635	638	640	643	645	648	
172	3385	3398	3412	3425	3439	3452	3466	3480	3493	3507	334
	650	653	655	657	660	662	665	667	670	672	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-G0-02-05-30-017-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=30.0%	**DISTANCE (NM) TIME (MIN)**		**LR FL 150**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
174	3520 674	3534 677	3547 679	3561 682	3574 684	3588 686	3601 689	3614 691	3628 694	3641 696	337
176	3655 698	3668 701	3682 703	3695 705	3708 708	3722 710	3735 713	3749 715	3762 717	3775 720	339
178	3789 722	3802 724	3815 727	3829 729	3842 731	3855 734	3869 736	3882 738	3895 741	3908 743	340
180	3922 745	3935 748	3948 750	3961 752	3975 755	3988 757	4001 759	4014 762	4028 764	4041 766	342
182	4054 769	4067 771	4080 773	4093 775	4107 778	4120 780	4133 782	4146 785	4159 787	4172 789	344
184	4185 791	4199 794	4212 796	4225 798	4238 801	4251 803	4264 805	4277 807	4290 810	4303 812	345
186	4316 814	4329 816	4342 819	4355 821	4368 823	4381 825	4394 828	4407 830	4420 832	4433 834	347
188	4446 837	4459 839	4472 841	4485 843	4498 845	4511 848	4524 850	4537 852	4550 854	4563 856	349
190	4576 859	4588 861	4601 863	4614 865	4627 867	4640 870	4653 872	4666 874	4679 876	4691 878	351
192	4704 881	4717 883	4730 885	4743 887	4755 889	4768 891	4781 894	4794 896	4807 898	4819 900	353
194	4832 902	4845 904	4858 907	4870 909	4883 911	4896 913	4908 915	4921 917	4934 919	4947 922	355
196	4959 924	4972 926	4985 928	4997 930	5010 932	5023 934	5035 936	5048 939	5060 941	5073 943	357
198	5086 945	5098 947	5111 949	5124 951	5136 953	5149 955	5161 958	5174 960	5186 962	5199 964	359
200	5211 966	5224 968	5237 970	5249 972	5262 974	5274 976	5287 978	5299 980	5312 983	5324 985	360
202	5337 987	5349 989	5362 991	5374 993	5386 995	5399 997	5411 999	5424 1001	5436 1003	5449 1005	361
204	5461 1007	5473 1009	5486 1011	5498 1013	5511 1016	5523 1018	5535 1020	5548 1022	5560 1024	5572 1026	363
206	5585 1028	5597 1030	5609 1032	5622 1034	5634 1036	5646 1038	5659 1040	5671 1042	5683 1044	5696 1046	364
208	5708 1048	5720 1050	5732 1052	5745 1054	5757 1056	5769 1058	5781 1060	5794 1062	5806 1064	5818 1066	366
210	5830 1068	5842 1070	5855 1072	5867 1074	5879 1076	5891 1078	5903 1080	5916 1082	5928 1084	5940 1086	367
212	5952 1088	5964 1090	5976 1092	5988 1094	6000 1096	6013 1098	6025 1100	6037 1102	6049 1104	6061 1106	369
214	6073 1108	6085 1109	6097 1111	6109 1113	6121 1115	6133 1117	6145 1119	6157 1121	6170 1123	6182 1125	370
216	6194 1127	6206 1129	6218 1131	6230 1133	6242 1135	6254 1137	6266 1139	6277 1140	6289 1142	6301 1144	372
218	6313 1146	6325 1148	6337 1150	6349 1152	6361 1154	6373 1156	6385 1158	6397 1160	6409 1161	6421 1163	374

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-G0-02-05-30-018-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA CG=30.0%

DISTANCE (NM) TIME (MIN)

LR FL 150

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	6432 1165	6444 1167	6456 1169	6468 1171	6480 1173	6492 1175	6504 1177	6516 1179	6527 1180	6539 1182	376
222	6551 1184	6563 1186	6575 1188	6586 1190	6598 1192	6610 1194	6622 1195	6634 1197	6645 1199	6657 1201	378
224	6669 1203	6681 1205	6692 1207	6704 1208	6716 1210	6728 1212	6739 1214	6751 1216	6763 1218	6774 1220	379
226	6786 1221	6798 1223	6810 1225	6821 1227	6833 1229	6845 1231	6856 1232	6868 1234	6880 1236	6891 1238	381
228	6903 1240	6914 1242	6926 1243	6938 1245	6949 1247	6961 1249	6973 1251	6984 1252	6996 1254	7007 1256	382
230	7019 1258	7030 1260	7042 1262	7054 1263	7065 1265	7077 1267	7088 1269	7100 1271	7111 1272	7123 1274	384
232	7134 1276	7146 1278	7157 1279	7169 1281	7180 1283	7192 1285	7203 1287	7215 1288	7226 1290	7238 1292	386
234	7249 1294	7261 1296	7272 1297	7284 1299	7295 1301	7307 1303	7318 1304	7329 1306	7341 1308	7352 1310	387
236	7364 1311	7375 1313	7386 1315	7398 1317	7409 1318	7421 1320	7432 1322	7443 1324	7455 1325	7466 1327	389
238	7477 1329	7489 1331	7500 1332	7511 1334	7523 1336	7534 1338	7545 1339	7557 1341	7568 1343	7579 1345	390

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-G0-02-05-30-019-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=30.0%

DISTANCE (NM)
TIME (MIN)

LR FL 200

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0 0	17 3	35 7	52 10	70 13	87 17	104 20	122 24	139 27	157 30	310
128	174 34	191 37	208 40	226 44	243 47	260 50	277 53	295 57	312 60	329 63	312
130	346 67	363 70	381 73	398 76	415 80	432 83	449 86	466 90	483 93	500 96	314
132	517 99	534 102	551 106	568 109	585 112	602 115	619 119	636 122	653 125	670 128	316
134	687 131	704 135	721 138	738 141	754 144	771 147	788 150	805 153	822 157	838 160	319
136	855 163	872 166	889 169	905 172	922 175	939 178	955 182	972 185	989 188	1005 191	322
138	1022 194	1039 197	1055 200	1072 203	1088 206	1105 209	1122 212	1138 215	1155 218	1171 221	325
140	1188 224	1204 227	1220 230	1237 233	1253 236	1270 239	1286 242	1303 245	1319 248	1335 251	328
142	1352 254	1368 257	1384 260	1401 263	1417 266	1433 269	1450 272	1466 275	1482 278	1499 281	330
144	1515 284	1531 287	1547 290	1563 293	1580 295	1596 298	1612 301	1628 304	1644 307	1660 310	332
146	1677 313	1693 316	1709 319	1725 322	1741 324	1757 327	1773 330	1789 333	1805 336	1821 339	334
148	1837 342	1853 345	1869 347	1885 350	1901 353	1917 356	1933 359	1949 362	1965 364	1981 367	336
150	1997 370	2013 373	2029 376	2044 378	2060 381	2076 384	2092 387	2108 390	2124 392	2139 395	338
152	2155 398	2171 401	2187 404	2203 406	2218 409	2234 412	2250 415	2265 417	2281 420	2297 423	341
154	2313 426	2328 428	2344 431	2360 434	2375 437	2391 439	2406 442	2422 445	2438 447	2453 450	343
156	2469 453	2484 456	2500 458	2515 461	2531 464	2547 466	2562 469	2578 472	2593 474	2609 477	345
158	2624 480	2639 482	2655 485	2670 488	2686 490	2701 493	2717 496	2732 498	2747 501	2763 504	348
160	2778 506	2794 509	2809 512	2824 514	2840 517	2855 519	2870 522	2885 525	2901 527	2916 530	350
162	2931 532	2947 535	2962 538	2977 540	2992 543	3007 545	3023 548	3038 551	3053 553	3068 556	351
164	3083 558	3099 561	3114 564	3129 566	3144 569	3159 571	3174 574	3189 576	3204 579	3219 581	353
166	3235 584	3250 587	3265 589	3280 592	3295 594	3310 597	3325 599	3340 602	3355 604	3370 607	355
168	3385 609	3400 612	3414 614	3429 617	3444 619	3459 622	3474 624	3489 627	3504 629	3519 632	356
170	3534 634	3549 637	3563 639	3578 642	3593 644	3608 647	3623 649	3638 652	3652 654	3667 657	358
172	3682 659	3697 662	3711 664	3726 667	3741 669	3756 671	3770 674	3785 676	3800 679	3814 681	360

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02001 .990 .000 .000 0 FCOM-G0-02-05-30-020-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=30.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR FL 200**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	3829 684	3844 686	3858 688	3873 691	3888 693	3902 696	3917 698	3932 701	3946 703	3961 705	362
176	3975 708	3990 710	4004 713	4019 715	4034 717	4048 720	4063 722	4077 725	4092 727	4106 729	364
178	4121 732	4135 734	4149 736	4164 739	4178 741	4193 743	4207 746	4222 748	4236 750	4250 753	367
180	4265 755	4279 758	4294 760	4308 762	4322 765	4337 767	4351 769	4365 771	4380 774	4394 776	368
182	4408 778	4422 781	4437 783	4451 785	4465 788	4480 790	4494 792	4508 795	4522 797	4536 799	371
184	4551 801	4565 804	4579 806	4593 808	4607 811	4622 813	4636 815	4650 817	4664 820	4678 822	373
186	4692 824	4706 826	4720 829	4734 831	4749 833	4763 835	4777 838	4791 840	4805 842	4819 844	375
188	4833 847	4847 849	4861 851	4875 853	4889 856	4903 858	4917 860	4931 862	4945 864	4959 867	377
190	4973 869	4987 871	5000 873	5014 875	5028 878	5042 880	5056 882	5070 884	5084 886	5098 889	378
192	5112 891	5125 893	5139 895	5153 897	5167 900	5181 902	5195 904	5208 906	5222 908	5236 910	380
194	5250 913	5263 915	5277 917	5291 919	5305 921	5318 923	5332 926	5346 928	5360 930	5373 932	382
196	5387 934	5401 936	5414 938	5428 940	5442 943	5455 945	5469 947	5483 949	5496 951	5510 953	384
198	5523 955	5537 957	5551 960	5564 962	5578 964	5591 966	5605 968	5618 970	5632 972	5646 974	386
200	5659 976	5673 979	5686 981	5700 983	5713 985	5727 987	5740 989	5754 991	5767 993	5780 995	387
202	5794 997	5807 999	5821 1001	5834 1003	5848 1006	5861 1008	5874 1010	5888 1012	5901 1014	5915 1016	389
204	5928 1018	5941 1020	5955 1022	5968 1024	5981 1026	5995 1028	6008 1030	6021 1032	6035 1034	6048 1036	391
206	6061 1038	6075 1040	6088 1042	6101 1044	6114 1046	6128 1048	6141 1050	6154 1053	6167 1055	6181 1057	392
208	6194 1059	6207 1061	6220 1063	6233 1065	6247 1067	6260 1069	6273 1071	6286 1073	6299 1075	6312 1077	394
210	6326 1079	6339 1081	6352 1083	6365 1085	6378 1087	6391 1089	6404 1091	6417 1092	6430 1094	6444 1096	396
212	6457 1098	6470 1100	6483 1102	6496 1104	6509 1106	6522 1108	6535 1110	6548 1112	6561 1114	6574 1116	397
214	6587 1118	6600 1120	6613 1122	6626 1124	6639 1126	6652 1128	6665 1130	6678 1132	6691 1134	6703 1135	399
216	6716 1137	6729 1139	6742 1141	6755 1143	6768 1145	6781 1147	6794 1149	6807 1151	6819 1153	6832 1155	403
218	6845 1157	6858 1158	6871 1160	6884 1162	6896 1164	6909 1166	6922 1168	6935 1170	6948 1172	6960 1174	405

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02001 .990 .000 .000 0 FCOM-G0-02-05-30-021-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=30.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR FL 200**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
220	6973 1175	6986 1177	6999 1179	7011 1181	7024 1183	7037 1185	7050 1187	7062 1189	7075 1190	7088 1192	408
222	7101 1194	7113 1196	7126 1198	7139 1200	7151 1201	7164 1203	7177 1205	7189 1207	7202 1209	7215 1211	411
224	7227 1213	7240 1214	7252 1216	7265 1218	7278 1220	7290 1222	7303 1223	7315 1225	7328 1227	7341 1229	413
226	7353 1231	7366 1233	7378 1234	7391 1236	7403 1238	7416 1240	7428 1242	7441 1243	7453 1245	7466 1247	416
228	7478 1249	7491 1251	7503 1252	7516 1254	7528 1256	7541 1258	7553 1260	7566 1261	7578 1263	7591 1265	418
230	7603 1267	7615 1268	7628 1270	7640 1272	7653 1274	7665 1275	7677 1277	7690 1279	7702 1281	7714 1283	420
232	7727 1284	7739 1286	7752 1288	7764 1290	7776 1291	7789 1293	7801 1295	7813 1297	7825 1298	7838 1300	422
234	7850 1302	7862 1303	7875 1305	7887 1307	7899 1309	7911 1310	7924 1312	7936 1314	7948 1316	7960 1317	424
236	7973 1319	7985 1321	7997 1323	8009 1324	8021 1326	8034 1328	8046 1329	8058 1331	8070 1333	8082 1334	426
238	8094 1336	8107 1338	8119 1340	8131 1341	8143 1343	8155 1345	8167 1346	8179 1348	8191 1350	8204 1351	427
PACK FLOW LO △FUEL = – 0.5 %			**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1.5 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %			**TOTAL ANTI ICE ON** △FUEL = + 5 %		

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02001 .990 .000 .000 0 FCOM-G0-02-05-30-022-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=30.0%

DISTANCE (NM)
TIME (MIN)

LR FL 250

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	19	38	57	76	95	114	133	152	171	337
	0	3	7	10	13	17	20	24	27	30	
128	190	208	227	246	265	284	303	321	340	359	340
	34	37	40	44	47	50	53	57	60	63	
130	378	396	415	434	452	471	490	508	527	546	342
	67	70	73	76	80	83	86	90	93	96	
132	564	583	601	620	638	657	675	694	712	731	344
	99	102	106	109	112	115	119	122	125	128	
134	749	768	786	804	823	841	859	878	896	914	346
	131	135	138	141	144	147	151	154	157	160	
136	933	951	969	987	1006	1024	1042	1060	1078	1097	348
	163	166	169	173	176	179	182	185	188	191	
138	1115	1133	1151	1169	1187	1205	1223	1241	1259	1277	350
	194	198	201	204	207	210	213	216	219	222	
140	1295	1313	1331	1349	1367	1385	1403	1421	1439	1456	353
	225	228	231	234	237	240	243	247	250	253	
142	1474	1492	1510	1528	1546	1563	1581	1599	1616	1634	356
	256	259	262	265	268	271	274	276	279	282	
144	1652	1670	1687	1705	1722	1740	1758	1775	1793	1810	359
	285	288	291	294	297	300	303	306	309	312	
146	1828	1846	1863	1881	1898	1916	1933	1950	1968	1985	361
	315	318	321	323	326	329	332	335	338	341	
148	2003	2020	2038	2055	2072	2090	2107	2124	2142	2159	363
	344	347	349	352	355	358	361	364	367	369	
150	2176	2193	2211	2228	2245	2262	2280	2297	2314	2331	366
	372	375	378	381	384	386	389	392	395	398	
152	2348	2365	2382	2400	2417	2434	2451	2468	2485	2502	368
	400	403	406	409	411	414	417	420	423	425	
154	2519	2536	2553	2570	2587	2604	2621	2638	2655	2672	371
	428	431	434	436	439	442	445	447	450	453	
156	2688	2705	2722	2739	2756	2773	2790	2806	2823	2840	373
	455	458	461	464	466	469	472	474	477	480	
158	2857	2873	2890	2907	2924	2940	2957	2974	2990	3007	375
	482	485	488	490	493	496	498	501	504	506	
160	3024	3040	3057	3074	3090	3107	3123	3140	3156	3173	377
	509	512	514	517	520	522	525	527	530	533	
162	3189	3206	3222	3239	3255	3272	3288	3305	3321	3338	380
	535	538	541	543	546	548	551	553	556	559	
164	3354	3370	3387	3403	3420	3436	3452	3469	3485	3501	382
	561	564	566	569	572	574	577	579	582	584	
166	3517	3534	3550	3566	3582	3599	3615	3631	3647	3664	384
	587	589	592	594	597	600	602	605	607	610	
168	3680	3696	3712	3728	3744	3760	3777	3793	3809	3825	386
	612	615	617	620	622	625	627	630	632	635	
170	3841	3857	3873	3889	3905	3921	3937	3953	3969	3985	388
	637	640	642	645	647	650	652	654	657	659	
172	4001	4017	4033	4049	4065	4080	4096	4112	4128	4144	390
	662	664	667	669	672	674	677	679	681	684	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-G0-02-05-30-023-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=30.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR FL 250**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
174	4160 686	4176 689	4191 691	4207 693	4223 696	4239 698	4255 701	4270 703	4286 705	4302 708	393
176	4318 710	4333 713	4349 715	4365 717	4380 720	4396 722	4412 724	4427 727	4443 729	4459 731	397
178	4474 734	4490 736	4505 738	4521 741	4537 743	4552 746	4568 748	4583 750	4599 752	4614 755	400
180	4630 757	4645 759	4661 762	4676 764	4692 766	4707 769	4723 771	4738 773	4754 775	4769 778	403
182	4784 780	4800 782	4815 785	4831 787	4846 789	4861 791	4877 794	4892 796	4907 798	4923 800	406
184	4938 803	4953 805	4969 807	4984 809	4999 812	5014 814	5030 816	5045 818	5060 821	5075 823	408
186	5091 825	5106 827	5121 829	5136 832	5151 834	5166 836	5182 838	5197 840	5212 843	5227 845	411
188	5242 847	5257 849	5272 851	5287 854	5302 856	5317 858	5332 860	5347 862	5363 865	5378 867	413
190	5393 869	5408 871	5423 873	5438 875	5452 878	5467 880	5482 882	5497 884	5512 886	5527 888	415
192	5542 890	5557 893	5572 895	5587 897	5602 899	5617 901	5631 903	5646 905	5661 908	5676 910	417
194	5691 912	5706 914	5720 916	5735 918	5750 920	5765 922	5779 924	5794 927	5809 929	5824 931	419
196	5838 933	5853 935	5868 937	5882 939	5897 941	5912 943	5926 945	5941 948	5956 950	5970 952	420
198	5985 954	6000 956	6014 958	6029 960	6044 962	6058 964	6073 966	6087 968	6102 970	6116 972	422
200	6131 975	6145 977	6160 979	6175 981	6189 983	6204 985	6218 987	6233 989	6247 991	6261 993	423
202	6276 995	6290 997	6305 999	6319 1001	6334 1003	6348 1005	6363 1007	6377 1009	6391 1011	6406 1014	423
204	6420 1016	6434 1018	6449 1020	6463 1022	6477 1024	6492 1026	6506 1028	6520 1030	6535 1032	6549 1034	424
206	6563 1036	6578 1038	6592 1040	6606 1042	6620 1044	6635 1046	6649 1048	6663 1050	6677 1052	6692 1054	426
208	6706 1056	6720 1058	6734 1060	6748 1062	6762 1064	6777 1066	6791 1068	6805 1070	6819 1072	6833 1074	428
210	6847 1076	6861 1078	6875 1080	6889 1081	6903 1083	6918 1085	6932 1087	6946 1089	6960 1091	6974 1093	430
212	6988 1095	7002 1097	7016 1099	7030 1101	7044 1103	7058 1105	7072 1107	7086 1109	7099 1111	7113 1113	432
214	7127 1115	7141 1116	7155 1118	7169 1120	7183 1122	7197 1124	7211 1126	7225 1128	7238 1130	7252 1132	434
216	7266 1134	7280 1136	7294 1137	7308 1139	7321 1141	7335 1143	7349 1145	7363 1147	7376 1149	7390 1151	436
218	7404 1153	7418 1154	7431 1156	7445 1158	7459 1160	7473 1162	7486 1164	7500 1166	7514 1168	7527 1169	439

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-G0-02-05-30-024-115

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=30.0%		DISTANCE (NM) TIME (MIN)		LR FL 250			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	7541 1171	7555 1173	7568 1175	7582 1177	7596 1179	7609 1181	7623 1182	7636 1184	7650 1186	7664 1188	441
222	7677 1190	7691 1192	7704 1193	7718 1195	7731 1197	7745 1199	7759 1201	7772 1203	7786 1204	7799 1206	443
224	7813 1208	7826 1210	7840 1212	7853 1214	7867 1215	7880 1217	7893 1219	7907 1221	7920 1223	7934 1224	445
226	7947 1226	7961 1228	7974 1230	7987 1232	8001 1233	8014 1235	8028 1237	8041 1239	8054 1241	8068 1242	447
228	8081 1244	8094 1246	8108 1248	8121 1250	8134 1251	8148 1253	8161 1255	8174 1257	8187 1258	8201 1260	448
230	8214 1262	8227 1264	8241 1265	8254 1267	8267 1269	8280 1271	8293 1273	8307 1274	8320 1276	8333 1278	450
232	8346 1280	8359 1281	8373 1283	8386 1285	8399 1286	8412 1288	8425 1290	8438 1292	8452 1293	8465 1295	453
234	8478 1297	8491 1299	8504 1300	8517 1302	8530 1304	8543 1306	8556 1307	8569 1309	8582 1311	8595 1312	454
236	8608 1314	8622 1316	8635 1318	8648 1319	8661 1321	8674 1323	8687 1324	8700 1326	8712 1328	8725 1329	456
238	8738 1331	8751 1333	8764 1335	8777 1336	8790 1338	8803 1340	8816 1341	8829 1343	8842 1345	8855 1346	458
PACK FLOW LO △FUEL = – 0.5 %			**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1.5 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %			**TOTAL ANTI ICE ON** △FUEL = + 5 %		

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-G0-02-05-30-025-115

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=37.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR** **FL 290**				
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
126	0	20	41	61	81	101	122	142	162	182	360
	0	3	7	10	13	17	20	24	27	30	
128	202	222	243	263	283	303	323	343	363	383	363
	34	37	40	43	47	50	53	57	60	63	
130	403	423	443	463	483	503	522	542	562	582	366
	67	70	73	76	80	83	86	89	93	96	
132	602	622	641	661	681	701	720	740	760	779	369
	99	102	105	109	112	115	118	121	125	128	
134	799	819	838	858	877	897	916	936	955	975	371
	131	134	137	141	144	147	150	153	156	159	
136	994	1014	1033	1053	1072	1092	1111	1130	1150	1169	373
	163	166	169	172	175	178	181	184	187	191	
138	1188	1207	1227	1246	1265	1285	1304	1323	1342	1361	376
	194	197	200	203	206	209	212	215	218	221	
140	1380	1400	1419	1438	1457	1476	1495	1514	1533	1552	378
	224	227	230	233	236	239	242	245	248	251	
142	1571	1590	1609	1628	1647	1666	1685	1703	1722	1741	380
	254	257	260	263	266	269	272	275	278	281	
144	1760	1779	1798	1816	1835	1854	1873	1891	1910	1929	383
	284	287	290	293	296	299	302	305	308	310	
146	1948	1966	1985	2003	2022	2041	2059	2078	2096	2115	386
	313	316	319	322	325	328	331	334	336	339	
148	2133	2152	2170	2189	2207	2226	2244	2263	2281	2300	390
	342	345	348	351	353	356	359	362	365	368	
150	2318	2336	2355	2373	2391	2410	2428	2446	2464	2483	394
	370	373	376	379	382	384	387	390	393	395	
152	2501	2519	2537	2556	2574	2592	2610	2628	2646	2664	397
	398	401	404	406	409	412	415	417	420	423	
154	2683	2701	2719	2737	2755	2773	2791	2809	2827	2845	400
	426	428	431	434	436	439	442	444	447	450	
156	2863	2881	2899	2916	2934	2952	2970	2988	3006	3024	403
	452	455	458	460	463	466	468	471	474	476	
158	3041	3059	3077	3095	3113	3130	3148	3166	3183	3201	406
	479	482	484	487	489	492	495	497	500	503	
160	3219	3236	3254	3272	3289	3307	3325	3342	3360	3377	408
	505	508	510	513	516	518	521	523	526	528	
162	3395	3412	3430	3447	3465	3482	3500	3517	3535	3552	410
	531	534	536	539	541	544	546	549	551	554	
164	3570	3587	3604	3622	3639	3656	3674	3691	3708	3726	412
	556	559	562	564	567	569	572	574	577	579	
166	3743	3760	3778	3795	3812	3829	3846	3864	3881	3898	413
	582	584	587	589	592	594	597	599	602	604	
168	3915	3932	3950	3967	3984	4001	4018	4035	4052	4069	415
	607	609	612	614	617	619	621	624	626	629	
170	4086	4103	4120	4137	4154	4171	4188	4205	4222	4239	416
	631	634	636	639	641	644	646	648	651	653	
172	4256	4273	4290	4307	4324	4340	4357	4374	4391	4408	417
	656	658	661	663	665	668	670	673	675	678	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG300 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-G0-02-05-30-026-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**LR FL 290**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	4425 680	4441 682	4458 685	4475 687	4492 690	4508 692	4525 694	4542 697	4559 699	4575 701	419
176	4592 704	4609 706	4625 709	4642 711	4658 713	4675 716	4692 718	4708 720	4725 723	4741 725	421
178	4758 727	4774 730	4791 732	4807 734	4824 737	4840 739	4857 741	4873 744	4890 746	4906 748	423
180	4923 751	4939 753	4955 755	4972 758	4988 760	5005 762	5021 765	5037 767	5054 769	5070 771	425
182	5086 774	5103 776	5119 778	5135 781	5151 783	5168 785	5184 787	5200 790	5216 792	5232 794	428
184	5249 796	5265 799	5281 801	5297 803	5313 805	5329 808	5346 810	5362 812	5378 814	5394 817	431
186	5410 819	5426 821	5442 823	5458 825	5474 828	5490 830	5506 832	5522 834	5538 836	5554 839	434
188	5570 841	5586 843	5602 845	5618 847	5634 850	5650 852	5665 854	5681 856	5697 858	5713 860	437
190	5729 863	5745 865	5760 867	5776 869	5792 871	5808 873	5824 875	5839 878	5855 880	5871 882	440
192	5887 884	5902 886	5918 888	5934 890	5949 892	5965 895	5981 897	5996 899	6012 901	6028 903	444
194	6043 905	6059 907	6074 909	6090 911	6106 913	6121 916	6137 918	6152 920	6168 922	6183 924	447
196	6199 926	6214 928	6230 930	6245 932	6261 934	6276 936	6292 938	6307 940	6323 942	6338 944	449
198	6353 947	6369 949	6384 951	6400 953	6415 955	6430 957	6446 959	6461 961	6476 963	6492 965	451
200	6507 967	6522 969	6538 971	6553 973	6568 975	6583 977	6599 979	6614 981	6629 983	6644 985	453
202	6659 987	6675 989	6690 991	6705 993	6720 995	6735 997	6750 999	6766 1001	6781 1003	6796 1005	455
204	6811 1007	6826 1009	6841 1011	6856 1013	6871 1015	6886 1017	6901 1019	6916 1021	6931 1023	6946 1025	456
206	6961 1027	6976 1029	6991 1031	7006 1033	7021 1035	7036 1037	7051 1039	7066 1040	7081 1042	7096 1044	458
208	7111 1046	7126 1048	7141 1050	7156 1052	7170 1054	7185 1056	7200 1058	7215 1060	7230 1062	7245 1064	459
210	7260 1066	7274 1068	7289 1070	7304 1072	7319 1073	7333 1075	7348 1077	7363 1079	7378 1081	7392 1083	460
212	7407 1085	7422 1087	7437 1089	7451 1091	7466 1093	7481 1095	7495 1096	7510 1098	7525 1100	7539 1102	460
214	7554 1104	7568 1106	7583 1108	7598 1110	7612 1112	7627 1114	7641 1115	7656 1117	7671 1119	7685 1121	461
216	7700 1123	7714 1125	7729 1127	7743 1129	7758 1131	7772 1132	7787 1134	7801 1136	7816 1138	7830 1140	462
218	7845 1142	7859 1144	7873 1146	7888 1147	7902 1149	7917 1151	7931 1153	7945 1155	7960 1157	7974 1159	463

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-G0-02-05-30-027-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=37.0%		DISTANCE (NM) TIME (MIN)		LR FL 290			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
220	7988 1160	8003 1162	8017 1164	8031 1166	8046 1168	8060 1170	8074 1172	8089 1173	8103 1175	8117 1177	464
222	8131 1179	8146 1181	8160 1183	8174 1184	8188 1186	8203 1188	8217 1190	8231 1192	8245 1194	8259 1195	464
224	8274 1197	8288 1199	8302 1201	8316 1203	8330 1205	8344 1206	8358 1208	8372 1210	8387 1212	8401 1214	465
226	8415 1216	8429 1217	8443 1219	8457 1221	8471 1223	8485 1225	8499 1226	8513 1228	8527 1230	8541 1232	466
228	8555 1234	8569 1235	8583 1237	8597 1239	8611 1241	8625 1243	8639 1244	8653 1246	8667 1248	8681 1250	466
230	8694 1252	8708 1253	8722 1255	8736 1257	8750 1259	8764 1260	8778 1262	8792 1264	8805 1266	8819 1268	467
232	8833 1269	8847 1271	8861 1273	8874 1275	8888 1276	8902 1278	8916 1280	8929 1282	8943 1283	8957 1285	468
234	8971 1287	8984 1289	8998 1290	9012 1292	9025 1294	9039 1296	9053 1297	9066 1299	9080 1301	9094 1303	468
236	9107 1304	9121 1306	9135 1308	9148 1310	9162 1311	9176 1313	9189 1315	9203 1317	9216 1318	9230 1320	469
238	9243 1322	9257 1324	9270 1325	9284 1327	9297 1329	9311 1330	9324 1332	9338 1334	9351 1336	9365 1337	470

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-G0-02-05-30-028-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	DISTANCE (NM) TIME (MIN)	LR FL 310

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	21	42	63	84	105	126	147	168	188	372
	0	3	7	10	14	17	20	24	27	30	
128	209	230	251	272	292	313	334	355	375	396	375
	34	37	40	44	47	50	54	57	60	63	
130	417	437	458	478	499	520	540	561	581	602	378
	67	70	73	76	80	83	86	90	93	96	
132	622	643	663	683	704	724	745	765	785	806	380
	99	102	106	109	112	115	118	122	125	128	
134	826	846	866	887	907	927	947	967	988	1008	384
	131	134	138	141	144	147	150	153	156	159	
136	1028	1048	1068	1088	1108	1128	1148	1168	1188	1208	389
	163	166	169	172	175	178	181	184	187	190	
138	1228	1248	1268	1288	1308	1327	1347	1367	1387	1407	393
	193	196	199	202	205	208	211	214	217	220	
140	1426	1446	1466	1486	1505	1525	1545	1564	1584	1604	396
	223	226	229	232	235	238	241	244	247	250	
142	1623	1643	1662	1682	1701	1721	1740	1760	1779	1799	399
	253	256	259	262	265	268	271	274	277	280	
144	1818	1838	1857	1876	1896	1915	1935	1954	1973	1992	401
	282	285	288	291	294	297	300	303	306	308	
146	2012	2031	2050	2069	2089	2108	2127	2146	2165	2185	404
	311	314	317	320	323	326	328	331	334	337	
148	2204	2223	2242	2261	2280	2299	2318	2337	2356	2375	406
	340	343	345	348	351	354	357	359	362	365	
150	2394	2413	2432	2451	2470	2489	2508	2526	2545	2564	408
	368	371	373	376	379	382	384	387	390	393	
152	2583	2602	2620	2639	2658	2677	2695	2714	2733	2752	409
	395	398	401	404	406	409	412	415	417	420	
154	2770	2789	2808	2826	2845	2864	2882	2901	2919	2938	411
	423	426	428	431	434	437	439	442	445	447	
156	2956	2975	2993	3012	3030	3049	3067	3086	3104	3122	412
	450	453	455	458	461	463	466	469	472	474	
158	3141	3159	3178	3196	3214	3233	3251	3269	3287	3306	414
	477	480	482	485	487	490	493	495	498	501	
160	3324	3342	3360	3378	3397	3415	3433	3451	3469	3487	416
	503	506	509	511	514	516	519	522	524	527	
162	3505	3523	3541	3559	3578	3596	3614	3632	3649	3667	419
	529	532	535	537	540	542	545	547	550	553	
164	3685	3703	3721	3739	3757	3775	3793	3811	3828	3846	421
	555	558	560	563	565	568	570	573	575	578	
166	3864	3882	3899	3917	3935	3953	3970	3988	4006	4023	423
	581	583	586	588	591	593	596	598	601	603	
168	4041	4059	4076	4094	4112	4129	4147	4164	4182	4199	426
	606	608	610	613	615	618	620	623	625	628	
170	4217	4234	4252	4269	4287	4304	4322	4339	4357	4374	429
	630	633	635	638	640	642	645	647	650	652	
172	4391	4409	4426	4443	4461	4478	4495	4513	4530	4547	432
	655	657	659	662	664	667	669	671	674	676	

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03101 .990 .000 .000 0 FCOM-G0-02-05-30-029-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR FL 310**

WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS** (KT)
174	4564 678	4582 681	4599 683	4616 686	4633 688	4650 690	4668 693	4685 695	4702 697	4719 700	436
176	4736 702	4753 704	4770 707	4787 709	4804 711	4821 714	4838 716	4855 718	4872 721	4889 723	439
178	4906 725	4923 728	4940 730	4957 732	4974 734	4991 737	5008 739	5025 741	5042 743	5059 746	443
180	5076 748	5092 750	5109 753	5126 755	5143 757	5160 759	5176 762	5193 764	5210 766	5227 768	446
182	5243 771	5260 773	5277 775	5293 777	5310 779	5327 782	5343 784	5360 786	5377 788	5393 791	449
184	5410 793	5427 795	5443 797	5460 799	5476 802	5493 804	5509 806	5526 808	5542 810	5559 812	451
186	5575 815	5592 817	5608 819	5625 821	5641 823	5658 826	5674 828	5690 830	5707 832	5723 834	453
188	5740 836	5756 839	5772 841	5789 843	5805 845	5821 847	5838 849	5854 851	5870 854	5886 856	454
190	5903 858	5919 860	5935 862	5951 864	5968 866	5984 869	6000 871	6016 873	6032 875	6048 877	456
192	6065 879	6081 881	6097 883	6113 886	6129 888	6145 890	6161 892	6177 894	6193 896	6209 898	457
194	6225 900	6241 902	6257 905	6273 907	6289 909	6305 911	6321 913	6337 915	6353 917	6369 919	458
196	6385 921	6401 923	6417 925	6433 927	6449 930	6465 932	6481 934	6496 936	6512 938	6528 940	458
198	6544 942	6560 944	6575 946	6591 948	6607 950	6623 952	6639 954	6654 956	6670 958	6686 961	459
200	6702 963	6717 965	6733 967	6749 969	6764 971	6780 973	6796 975	6811 977	6827 979	6842 981	460
202	6858 983	6874 985	6889 987	6905 989	6920 991	6936 993	6951 995	6967 997	6982 999	6998 1001	461
204	7014 1003	7029 1005	7044 1007	7060 1009	7075 1011	7091 1013	7106 1015	7122 1017	7137 1019	7152 1021	462
206	7168 1023	7183 1025	7199 1027	7214 1029	7229 1031	7245 1033	7260 1035	7275 1037	7291 1039	7306 1041	462
208	7321 1043	7337 1045	7352 1047	7367 1049	7382 1051	7398 1053	7413 1055	7428 1057	7443 1059	7458 1061	463
210	7474 1063	7489 1065	7504 1067	7519 1069	7534 1071	7549 1073	7564 1075	7580 1077	7595 1078	7610 1080	464
212	7625 1082	7640 1084	7655 1086	7670 1088	7685 1090	7700 1092	7715 1094	7730 1096	7745 1098	7760 1100	465
214	7775 1102	7790 1104	7805 1106	7820 1108	7835 1109	7850 1111	7865 1113	7880 1115	7895 1117	7909 1119	466
216	7924 1121	7939 1123	7954 1125	7969 1127	7984 1129	7999 1131	8013 1132	8028 1134	8043 1136	8058 1138	466
218	8073 1140	8087 1142	8102 1144	8117 1146	8132 1148	8146 1149	8161 1151	8176 1153	8190 1155	8205 1157	467

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03101 .990 .000 .000 0 FCOM-G0-02-05-30-030-115

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=37.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR FL 310**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS** (KT)
220	8220 1159	8234 1161	8249 1163	8264 1165	8278 1166	8293 1168	8308 1170	8322 1172	8337 1174	8351 1176	468
222	8366 1178	8381 1179	8395 1181	8410 1183	8424 1185	8439 1187	8453 1189	8468 1191	8482 1192	8497 1194	469
224	8511 1196	8526 1198	8540 1200	8554 1202	8569 1204	8583 1205	8598 1207	8612 1209	8626 1211	8641 1213	470
226	8655 1215	8670 1216	8684 1218	8698 1220	8713 1222	8727 1224	8741 1226	8756 1227	8770 1229	8784 1231	470
228	8798 1233	8813 1235	8827 1236	8841 1238	8855 1240	8870 1242	8884 1244	8898 1246	8912 1247	8926 1249	471
230	8940 1251	8955 1253	8969 1255	8983 1256	8997 1258	9011 1260	9025 1262	9039 1264	9053 1265	9067 1267	471
232	9081 1269	9096 1271	9110 1272	9124 1274	9138 1276	9152 1278	9166 1280	9180 1281	9194 1283	9208 1285	472
234	9222 1287	9236 1288	9249 1290	9263 1292	9277 1294	9291 1296	9305 1297	9319 1299	9333 1301	9347 1303	472
236	9361 1304	9374 1306	9388 1308	9402 1310	9416 1311	9430 1313	9444 1315	9457 1317	9471 1318	9485 1320	473
238	9499 1322	9513 1324	9526 1325	9540 1327	9554 1329	9567 1331	9581 1332	9595 1334	9609 1336	9622 1338	473
PACK FLOW LO △FUEL = – 0.5 %			**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1.5 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %			**TOTAL ANTI ICE ON** △FUEL = + 5 %		

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03101 .990 .000 .000 0 FCOM-G0-02-05-30-031-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=37.0%

DISTANCE (NM)
TIME (MIN)

LR FL 330

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0 0	22 3	43 7	65 10	87 13	108 17	130 20	152 23	173 27	195 30	388
128	216 33	238 37	259 40	281 43	302 46	324 50	345 53	366 56	388 59	409 63	392
130	431 66	452 69	473 72	494 76	516 79	537 82	558 85	579 88	601 92	622 95	395
132	643 98	664 101	685 104	706 107	727 111	748 114	769 117	790 120	811 123	832 126	399
134	853 130	874 133	895 136	916 139	937 142	958 145	979 148	1000 151	1020 154	1041 158	401
136	1062 161	1083 164	1103 167	1124 170	1145 173	1166 176	1186 179	1207 182	1227 185	1248 188	403
138	1269 191	1289 194	1310 197	1330 200	1351 204	1371 207	1392 210	1412 213	1433 216	1453 219	405
140	1474 222	1494 225	1514 228	1535 231	1555 234	1575 237	1596 240	1616 243	1636 246	1657 249	407
142	1677 252	1697 255	1717 257	1737 260	1758 263	1778 266	1798 269	1818 272	1838 275	1858 278	408
144	1878 281	1898 284	1918 287	1938 290	1958 293	1978 296	1998 299	2018 301	2038 304	2058 307	411
146	2078 310	2098 313	2118 316	2138 319	2157 322	2177 325	2197 327	2217 330	2237 333	2256 336	413
148	2276 339	2296 342	2315 344	2335 347	2355 350	2374 353	2394 356	2413 359	2433 361	2453 364	416
150	2472 367	2492 370	2511 373	2531 375	2550 378	2570 381	2589 384	2608 387	2628 389	2647 392	418
152	2667 395	2686 398	2705 400	2725 403	2744 406	2763 409	2783 411	2802 414	2821 417	2840 420	421
154	2859 422	2879 425	2898 428	2917 430	2936 433	2955 436	2974 438	2993 441	3013 444	3032 447	424
156	3051 449	3070 452	3089 455	3108 457	3127 460	3146 463	3165 465	3183 468	3202 470	3221 473	427
158	3240 476	3259 478	3278 481	3297 484	3316 486	3334 489	3353 492	3372 494	3391 497	3409 499	430
160	3428 502	3447 505	3466 507	3484 510	3503 512	3522 515	3540 517	3559 520	3577 523	3596 525	433
162	3615 528	3633 530	3652 533	3670 535	3689 538	3707 540	3726 543	3744 545	3763 548	3781 550	436
164	3800 553	3818 555	3836 558	3855 560	3873 563	3891 565	3910 568	3928 570	3946 573	3965 575	441
166	3983 578	4001 580	4019 583	4038 585	4056 588	4074 590	4092 593	4110 595	4128 597	4147 600	444
168	4165 602	4183 605	4201 607	4219 610	4237 612	4255 614	4273 617	4291 619	4309 622	4327 624	447
170	4345 627	4363 629	4381 631	4399 634	4417 636	4435 638	4453 641	4471 643	4488 646	4506 648	449
172	4524 650	4542 653	4560 655	4578 657	4595 660	4613 662	4631 665	4649 667	4666 669	4684 672	451

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.5 %	ΔFUEL = + 1.5 %	ΔFUEL = + 3 %	ΔFUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22700000C5KG370 0 018590 0 0 1 1.0 .0 .00 03301 .990 .000 .000 0 FCOM-G0-02-05-30-032-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=37.0%

DISTANCE (NM)
TIME (MIN)

LR FL 330

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	4702 674	4719 676	4737 679	4755 681	4772 683	4790 686	4808 688	4825 690	4843 693	4861 695	452
176	4878 697	4896 700	4913 702	4931 704	4948 707	4966 709	4983 711	5001 714	5018 716	5036 718	453
178	5053 720	5071 723	5088 725	5105 727	5123 730	5140 732	5158 734	5175 737	5192 739	5210 741	454
180	5227 743	5244 746	5262 748	5279 750	5296 753	5313 755	5331 757	5348 759	5365 762	5382 764	455
182	5399 766	5417 768	5434 771	5451 773	5468 775	5485 777	5502 780	5519 782	5536 784	5554 786	456
184	5571 789	5588 791	5605 793	5622 795	5639 798	5656 800	5673 802	5690 804	5707 806	5724 809	457
186	5741 811	5758 813	5774 815	5791 818	5808 820	5825 822	5842 824	5859 826	5876 829	5892 831	458
188	5909 833	5926 835	5943 837	5960 840	5976 842	5993 844	6010 846	6027 848	6043 850	6060 853	459
190	6077 855	6093 857	6110 859	6127 861	6143 864	6160 866	6177 868	6193 870	6210 872	6226 874	460
192	6243 877	6260 879	6276 881	6293 883	6309 885	6326 887	6342 889	6359 892	6375 894	6392 896	461
194	6408 898	6425 900	6441 902	6457 904	6474 907	6490 909	6507 911	6523 913	6539 915	6556 917	462
196	6572 919	6588 921	6605 923	6621 926	6637 928	6654 930	6670 932	6686 934	6702 936	6718 938	463
198	6735 940	6751 942	6767 945	6783 947	6799 949	6816 951	6832 953	6848 955	6864 957	6880 959	464
200	6896 961	6912 963	6928 965	6944 967	6960 970	6976 972	6992 974	7008 976	7024 978	7040 980	464
202	7056 982	7072 984	7088 986	7104 988	7120 990	7136 992	7152 994	7168 996	7184 998	7200 1000	465
204	7216 1002	7231 1004	7247 1006	7263 1009	7279 1011	7295 1013	7310 1015	7326 1017	7342 1019	7358 1021	466
206	7373 1023	7389 1025	7405 1027	7421 1029	7436 1031	7452 1033	7468 1035	7483 1037	7499 1039	7515 1041	467
208	7530 1043	7546 1045	7561 1047	7577 1049	7592 1051	7608 1053	7624 1055	7639 1057	7655 1059	7670 1061	467
210	7686 1063	7701 1065	7717 1067	7732 1069	7747 1071	7763 1073	7778 1075	7794 1077	7809 1079	7825 1081	468
212	7840 1083	7855 1085	7871 1087	7886 1089	7901 1090	7917 1092	7932 1094	7947 1096	7963 1098	7978 1100	468
214	7993 1102	8008 1104	8024 1106	8039 1108	8054 1110	8069 1112	8084 1114	8100 1116	8115 1118	8130 1120	469
216	8145 1122	8160 1124	8175 1126	8190 1127	8206 1129	8221 1131	8236 1133	8251 1135	8266 1137	8281 1139	469
218	8296 1141	8311 1143	8326 1145	8341 1147	8356 1149	8371 1151	8386 1152	8401 1154	8416 1156	8431 1158	470

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-02-05-30-033-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=37.0%		**DISTANCE (NM) TIME (MIN)**		**LR** **FL 330**	
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS** (KT)
220	8446 1160	8461 1162	8475 1164	8490 1166	8505 1168	8520 1170	8535 1171	8550 1173	8565 1175	8579 1177	470
222	8594 1179	8609 1181	8624 1183	8639 1185	8653 1187	8668 1188	8683 1190	8697 1192	8712 1194	8727 1196	471
224	8742 1198	8756 1200	8771 1202	8786 1203	8800 1205	8815 1207	8829 1209	8844 1211	8859 1213	8873 1215	471
226	8888 1216	8902 1218	8917 1220	8931 1222	8946 1224	8960 1226	8975 1228	8989 1229	9004 1231	9018 1233	471
228	9033 1235	9047 1237	9062 1239	9076 1240	9090 1242	9105 1244	9119 1246	9133 1248	9148 1249	9162 1251	472
230	9176 1253	9191 1255	9205 1257	9219 1259	9233 1260	9248 1262	9262 1264	9276 1266	9290 1268	9305 1269	472
232	9319 1271	9333 1273	9347 1275	9361 1277	9375 1278	9389 1280	9404 1282	9418 1284	9432 1286	9446 1287	473
234	9460 1289	9474 1291	9488 1293	9502 1294	9516 1296	9530 1298	9544 1300	9558 1302	9572 1303	9586 1305	473
236	9600 1307	9614 1309	9628 1310	9641 1312	9655 1314	9669 1316	9683 1317	9697 1319	9711 1321	9725 1323	474
238	9738 1324	9752 1326	9766 1328	9780 1330	9794 1331	9807 1333	9821 1335	9835 1337	9848 1338	9862 1340	474

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03301 .990 .000 .000 0 FCOM-G0-02-05-30-034-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR FL 350**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0 0	22 3	45 7	67 10	90 13	112 17	134 20	157 23	179 27	201 30	401
128	224 33	246 37	268 40	290 43	312 47	335 50	357 53	379 56	401 60	423 63	402
130	445 66	467 70	489 73	511 76	533 79	555 83	577 86	599 89	621 92	643 95	405
132	665 99	686 102	708 105	730 108	752 112	773 115	795 118	817 121	838 124	860 127	408
134	882 131	903 134	925 137	946 140	968 143	990 146	1011 149	1033 153	1054 156	1075 159	410
136	1097 162	1118 165	1140 168	1161 171	1182 174	1204 177	1225 180	1246 184	1267 187	1289 190	413
138	1310 193	1331 196	1352 199	1373 202	1395 205	1416 208	1437 211	1458 214	1479 217	1500 220	416
140	1521 223	1542 226	1563 229	1584 232	1605 235	1626 238	1647 241	1668 244	1688 247	1709 250	420
142	1730 253	1751 256	1772 259	1793 262	1813 265	1834 268	1855 270	1875 273	1896 276	1917 279	423
144	1937 282	1958 285	1979 288	1999 291	2020 294	2040 297	2061 299	2081 302	2102 305	2122 308	426
146	2143 311	2163 314	2183 317	2204 319	2224 322	2245 325	2265 328	2285 331	2306 334	2326 336	430
148	2346 339	2366 342	2387 345	2407 348	2427 350	2447 353	2467 356	2487 359	2508 361	2528 364	433
150	2548 367	2568 370	2588 372	2608 375	2628 378	2648 381	2668 383	2688 386	2708 389	2728 392	437
152	2748 394	2767 397	2787 400	2807 402	2827 405	2847 408	2867 410	2886 413	2906 416	2926 418	441
154	2946 421	2965 424	2985 426	3005 429	3024 432	3044 434	3064 437	3083 440	3103 442	3122 445	444
156	3142 448	3162 450	3181 453	3201 455	3220 458	3240 461	3259 463	3278 466	3298 468	3317 471	446
158	3337 474	3356 476	3375 479	3395 481	3414 484	3433 487	3453 489	3472 492	3491 494	3510 497	448
160	3530 499	3549 502	3568 505	3587 507	3606 510	3626 512	3645 515	3664 517	3683 520	3702 522	450
162	3721 525	3740 528	3759 530	3778 533	3797 535	3816 538	3835 540	3854 543	3873 545	3892 548	451
164	3911 550	3930 553	3949 555	3968 558	3987 560	4006 563	4024 565	4043 568	4062 570	4081 573	452
166	4100 575	4118 578	4137 580	4156 583	4175 585	4193 588	4212 590	4231 593	4249 595	4268 597	453
168	4287 600	4305 602	4324 605	4342 607	4361 610	4379 612	4398 615	4417 617	4435 620	4454 622	454
170	4472 624	4490 627	4509 629	4527 632	4546 634	4564 637	4583 639	4601 641	4619 644	4638 646	455
172	4656 649	4674 651	4693 653	4711 656	4729 658	4748 661	4766 663	4784 665	4802 668	4820 670	456

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
$\triangle$FUEL = – 0.5 %	$\triangle$FUEL = + 1.5 %	$\triangle$FUEL = + 3 %	$\triangle$FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-G0-02-05-30-035-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**LR FL 350**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
174	4839 673	4857 675	4875 677	4893 680	4911 682	4930 685	4948 687	4966 689	4984 692	5002 694	457
176	5020 696	5038 699	5056 701	5074 704	5092 706	5110 708	5128 711	5146 713	5164 715	5182 718	458
178	5200 720	5218 722	5236 725	5253 727	5271 729	5289 732	5307 734	5325 736	5343 739	5360 741	459
180	5378 743	5396 746	5414 748	5431 750	5449 753	5467 755	5485 757	5502 759	5520 762	5538 764	460
182	5555 766	5573 769	5590 771	5608 773	5626 776	5643 778	5661 780	5678 782	5696 785	5713 787	461
184	5731 789	5748 791	5766 794	5783 796	5801 798	5818 801	5836 803	5853 805	5870 807	5888 810	462
186	5905 812	5922 814	5940 816	5957 819	5974 821	5992 823	6009 825	6026 828	6043 830	6061 832	462
188	6078 834	6095 836	6112 839	6129 841	6147 843	6164 845	6181 848	6198 850	6215 852	6232 854	463
190	6249 856	6266 859	6283 861	6300 863	6317 865	6334 867	6351 870	6368 872	6385 874	6402 876	464
192	6419 878	6436 881	6453 883	6470 885	6487 887	6504 889	6521 892	6537 894	6554 896	6571 898	464
194	6588 900	6605 902	6621 905	6638 907	6655 909	6672 911	6688 913	6705 915	6722 918	6739 920	465
196	6755 922	6772 924	6789 926	6805 928	6822 930	6838 933	6855 935	6872 937	6888 939	6905 941	465
198	6921 943	6938 945	6954 947	6971 950	6987 952	7004 954	7020 956	7037 958	7053 960	7069 962	466
200	7086 964	7102 967	7118 969	7135 971	7151 973	7168 975	7184 977	7200 979	7216 981	7233 983	466
202	7249 985	7265 987	7281 990	7298 992	7314 994	7330 996	7346 998	7362 1000	7378 1002	7395 1004	467
204	7411 1006	7427 1008	7443 1010	7459 1012	7475 1014	7491 1017	7507 1019	7523 1021	7539 1023	7555 1025	467
206	7571 1027	7587 1029	7603 1031	7619 1033	7635 1035	7651 1037	7667 1039	7683 1041	7698 1043	7714 1045	467
208	7730 1047	7746 1049	7762 1051	7777 1053	7793 1055	7809 1057	7825 1059	7840 1061	7856 1063	7872 1065	468
210	7888 1067	7903 1069	7919 1071	7935 1073	7950 1075	7966 1077	7981 1079	7997 1081	8012 1083	8028 1085	469
212	8044 1087	8059 1089	8075 1091	8090 1093	8106 1095	8121 1097	8136 1099	8152 1101	8167 1103	8183 1105	469
214	8198 1107	8213 1109	8229 1111	8244 1113	8260 1115	8275 1117	8290 1119	8305 1121	8321 1123	8336 1125	470
216	8351 1127	8366 1129	8382 1130	8397 1132	8412 1134	8427 1136	8442 1138	8457 1140	8473 1142	8488 1144	470
218	8503 1146	8518 1148	8533 1150	8548 1152	8563 1154	8578 1156	8593 1157	8608 1159	8623 1161	8638 1163	470

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-G0-02-05-30-036-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=37.0%		**DISTANCE (NM) TIME (MIN)**		**LR FL 350**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
220	8653 1165	8668 1167	8683 1169	8698 1171	8713 1173	8727 1175	8742 1176	8757 1178	8772 1180	8787 1182	471
222	8802 1184	8816 1186	8831 1188	8846 1190	8861 1192	8875 1193	8890 1195	8905 1197	8919 1199	8934 1201	471
224	8949 1203	8963 1205	8978 1206	8992 1208	9007 1210	9022 1212	9036 1214	9051 1216	9065 1218	9080 1219	472
226	9094 1221	9109 1223	9123 1225	9137 1227	9152 1229	9166 1230	9181 1232	9195 1234	9209 1236	9224 1238	473
228	9238 1240	9252 1241	9267 1243	9281 1245	9295 1247	9310 1249	9324 1250	9338 1252	9352 1254	9366 1256	473
230	9381 1258	9395 1259	9409 1261	9423 1263	9437 1265	9451 1267	9465 1268	9479 1270	9493 1272	9508 1274	473
232	9522 1275	9536 1277	9550 1279	9564 1281	9578 1283	9591 1284	9605 1286				473
234											
236											
238											

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-G0-02-05-30-037-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA CG=37.0%

DISTANCE (NM) TIME (MIN)

LR FL 370

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0 0	23 3	46 7	69 10	92 13	115 17	138 20	161 23	184 27	207 30	414
128	230 33	253 36	276 40	299 43	321 46	344 50	367 53	390 56	412 59	435 62	418
130	458 66	480 69	503 72	526 75	548 79	571 82	593 85	616 88	638 91	661 94	422
132	683 98	706 101	728 104	750 107	773 110	795 113	817 117	840 120	862 123	884 126	425
134	907 129	929 132	951 135	973 138	995 141	1017 144	1039 148	1061 151	1083 154	1106 157	429
136	1128 160	1149 163	1171 166	1193 169	1215 172	1237 175	1259 178	1281 181	1303 184	1325 187	433
138	1346 190	1368 193	1390 196	1412 199	1433 202	1455 205	1477 208	1498 211	1520 214	1542 217	437
140	1563 220	1585 223	1606 225	1628 228	1649 231	1671 234	1692 237	1714 240	1735 243	1757 246	440
142	1778 249	1799 252	1821 255	1842 257	1863 260	1885 263	1906 266	1927 269	1948 272	1969 275	443
144	1991 277	2012 280	2033 283	2054 286	2075 289	2096 292	2117 294	2138 297	2159 300	2180 303	446
146	2201 306	2222 309	2243 311	2264 314	2285 317	2306 320	2327 323	2348 325	2369 328	2389 331	448
148	2410 334	2431 336	2452 339	2472 342	2493 345	2514 348	2535 350	2555 353	2576 356	2597 359	449
150	2617 361	2638 364	2658 367	2679 369	2699 372	2720 375	2740 378	2761 380	2781 383	2802 386	451
152	2822 389	2843 391	2863 394	2884 397	2904 399	2924 402	2945 405	2965 407	2985 410	3006 413	452
154	3026 416	3046 418	3066 421	3087 424	3107 426	3127 429	3147 432	3167 434	3187 437	3207 440	453
156	3228 442	3248 445	3268 448	3288 450	3308 453	3328 455	3348 458	3368 461	3388 463	3408 466	454
158	3428 469	3448 471	3467 474	3487 476	3507 479	3527 482	3547 484	3567 487	3586 490	3606 492	455
160	3626 495	3646 497	3666 500	3685 503	3705 505	3725 508	3744 510	3764 513	3784 515	3803 518	457
162	3823 521	3842 523	3862 526	3881 528	3901 531	3921 533	3940 536	3959 538	3979 541	3998 544	458
164	4018 546	4037 549	4057 551	4076 554	4095 556	4115 559	4134 561	4153 564	4173 566	4192 569	459
166	4211 571	4231 574	4250 576	4269 579	4288 581	4307 584	4327 586	4346 589	4365 591	4384 594	459
168	4403 596	4422 599	4441 601	4460 604	4479 606	4498 609	4517 611	4536 614	4555 616	4574 619	460
170	4593 621	4612 624	4631 626	4650 629	4669 631	4688 634	4707 636	4725 638	4744 641	4763 643	461
172	4782 646	4801 648	4819 651	4838 653	4857 655	4875 658	4894 660	4913 663	4931 665	4950 668	462

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.5 %	ΔFUEL = + 1.5 %	ΔFUEL = + 3 %	ΔFUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 0 FCOM-G0-02-05-30-038-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=37.0%		**DISTANCE (NM) TIME (MIN)**		**LR FL 370**		
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
174	4969 670	4987 672	5006 675	5024 677	5043 680	5061 682	5080 684	5098 687	5117 689	5135 692	462
176	5154 694	5172 696	5191 699	5209 701	5228 704	5246 706	5264 708	5283 711	5301 713	5319 715	463
178	5338 718	5356 720	5374 723	5392 725	5411 727	5429 730	5447 732	5465 734	5483 737	5501 739	463
180	5520 741	5538 744	5556 746	5574 748	5592 751	5610 753	5628 755	5646 758	5664 760	5682 762	464
182	5700 765	5718 767	5736 769	5754 772	5772 774	5790 776	5807 779	5825 781	5843 783	5861 785	465
184	5879 788	5897 790	5914 792	5932 795	5950 797	5968 799	5985 801	6003 804	6021 806	6038 808	465
186	6056 811	6074 813	6091 815	6109 817	6126 820	6144 822	6162 824	6179 826	6197 829	6214 831	465
188	6232 833	6249 835	6266 838	6284 840	6301 842	6319 844	6336 847	6353 849	6371 851	6388 853	466
190	6405 856	6423 858	6440 860	6457 862	6474 864	6492 867	6509 869	6526 871	6543 873	6560 876	466
192	6577 878	6594 880	6611 882	6629 884	6646 887	6663 889	6680 891	6697 893	6714 895	6731 897	467
194	6748 900	6765 902	6781 904	6798 906	6815 908	6832 910	6849 913	6866 915	6883 917	6899 919	467
196	6916 921	6933 923	6950 926	6967 928	6983 930	7000 932	7017 934	7033 936	7050 938	7067 941	468
198	7083 943	7100 945	7116 947	7133 949	7149 951	7166 953	7182 955	7199 957	7215 960	7232 962	468
200	7248 964	7265 966	7281 968	7297 970	7314 972	7330 974	7346 976	7363 978	7379 981	7395 983	469
202	7412 985	7428 987	7444 989	7460 991	7476 993	7493 995	7509 997	7525 999	7541 1001	7557 1003	469
204	7573 1005	7589 1007	7605 1009	7621 1011	7637 1013	7653 1016	7669 1018	7685 1020	7701 1022	7717 1024	470
206	7733 1026	7749 1028	7765 1030	7780 1032	7796 1034	7812 1036	7828 1038	7843 1040	7859 1042	7875 1044	471
208	7891 1046	7906 1048	7922 1050	7938 1052	7953 1054	7969 1056	7985 1058	8000 1060	8016 1062	8031 1064	471
210	8047 1066	8062 1068	8078 1070	8093 1072	8109 1074	8124 1076	8140 1078	8155 1079	8170 1081	8186 1083	471
212	8201 1085	8216 1087	8232 1089	8247 1091	8262 1093	8277 1095	8293 1097	8308 1099	8323 1101		471
214											
216											
218											

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 0 FCOM-G0-02-05-30-039-115

INTENTIONALLY LEFT BLANK

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM)** **TIME (MIN)**	**LR FL 390**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0	24	47	71	95	118	142	165	189	212	439
	0	3	6	10	13	16	19	23	26	29	
128	236	259	283	306	329	353	376	399	423	446	442
	32	35	38	42	45	48	51	54	57	61	
130	469	492	516	539	562	585	608	631	654	677	445
	64	67	70	73	76	79	82	86	89	92	
132	700	723	746	769	792	815	838	861	883	906	447
	95	98	101	104	107	110	113	116	119	122	
134	929	952	975	997	1020	1043	1065	1088	1111	1133	449
	125	128	131	135	138	141	144	147	150	153	
136	1156	1178	1201	1223	1246	1268	1291	1313	1335	1358	450
	156	159	162	165	168	171	174	177	180	183	
138	1380	1403	1425	1447	1469	1492	1514	1536	1558	1581	452
	186	188	191	194	197	200	203	206	209	212	
140	1603	1625	1647	1669	1691	1713	1735	1757	1779	1801	453
	215	218	221	224	227	230	233	235	238	241	
142	1823	1845	1867	1889	1911	1933	1954	1976	1998	2020	454
	244	247	250	253	256	259	261	264	267	270	
144	2042	2063	2085	2107	2128	2150	2172	2193	2215	2236	456
	273	276	279	282	284	287	290	293	296	299	
146	2258	2280	2301	2323	2344	2366	2387	2408	2430	2451	457
	301	304	307	310	313	316	318	321	324	327	
148	2473	2494	2515	2537	2558	2579	2600	2622	2643	2664	458
	330	332	335	338	341	344	346	349	352	355	
150	2685	2706	2727	2749	2770	2791	2812	2833	2854	2875	459
	357	360	363	366	368	371	374	377	379	382	
152	2896	2917	2938	2959	2979	3000	3021	3042	3063	3084	460
	385	388	390	393	396	399	401	404	407	409	
154	3104	3125	3146	3167	3187	3208	3229	3249	3270	3291	461
	412	415	417	420	423	426	428	431	434	436	
156	3311	3332	3352	3373	3393	3414	3434	3455	3475	3496	462
	439	442	444	447	450	452	455	458	460	463	
158	3516	3536	3557	3577	3597	3618	3638	3658	3678	3699	462
	466	468	471	473	476	479	481	484	487	489	
160	3719	3739	3759	3779	3799	3820	3840	3860	3880	3900	463
	492	494	497	500	502	505	508	510	513	515	
162	3920	3940	3960	3980	4000	4020	4039	4059	4079	4099	464
	518	520	523	526	528	531	533	536	539	541	
164	4119	4139	4158	4178	4198	4218	4237	4257	4277	4296	464
	544	546	549	551	554	556	559	561	564	567	
166	4316	4336	4355	4375	4394	4414	4433	4453	4472	4492	465
	569	572	574	577	579	582	584	587	589	592	
168	4511	4531	4550	4569	4589	4608	4627	4647	4666	4685	465
	594	597	599	602	604	607	609	612	614	617	
170	4704	4724	4743	4762	4781	4800	4819	4838	4858	4877	466
	619	622	624	627	629	632	634	636	639	641	
172	4896	4915	4934	4953	4972	4991	5009	5028	5047	5066	466
	644	646	649	651	654	656	658	661	663	666	

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-G0-02-05-30-041-115

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=37.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR** **FL 390**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS (KT)**
174	5085 668	5104 671	5122 673	5141 675	5160 678	5179 680	5197 683	5216 685	5235 687	5253 690	467
176	5272 692	5291 695	5309 697	5328 699	5346 702	5365 704	5383 706	5402 709	5420 711	5439 714	467
178	5457 716	5476 718	5494 721	5512 723	5531 725	5549 728	5567 730	5585 732	5604 735	5622 737	468
180	5640 739	5658 742	5677 744	5695 746	5713 749	5731 751	5749 753	5767 756	5785 758	5803 760	469
182	5821 763	5839 765	5857 767	5875 769	5893 772	5911 774	5929 776	5947 779	5964 781	5982 783	469
184	6000 785	6018 788	6035 790	6053 792	6071 794	6089 797	6106 799	6124 801	6142 803	6159 806	470
186	6177 808	6194 810	6212 812	6229 815	6247 817	6264 819	6282 821	6299 824	6316 826	6334 828	470
188	6351 830	6369 832	6386 835	6403 837	6420 839	6438 841	6455 843	6472 846	6489 848	6507 850	471
190	6524 852	6541 854	6558 857	6575 859	6592 861	6609 863	6626 865	6643 867	6660 870	6677 872	471
192	6694 874	6711 876	6728 878	6745 880	6761 883	6778 885					471
194											
196											
198											
200											

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-G0-02-05-30-042-115

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INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=37.0%	**DISTANCE (NM) TIME (MIN)**	**LR FL 410**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
126	0 0	24 3	49 6	73 10	97 13	121 16	146 19	170 22	194 26	218 29	452
128	242 32	266 35	290 38	314 42	338 45	362 48	386 51	410 54	434 57	458 61	454
130	482 64	506 67	530 70	553 73	577 76	601 79	625 82	648 86	672 89	696 92	455
132	719 95	743 98	766 101	790 104	814 107	837 110	861 113	884 117	908 120	931 123	457
134	954 126	978 129	1001 132	1024 135	1048 138	1071 141	1094 144	1118 147	1141 150	1164 153	458
136	1187 156	1210 159	1233 162	1257 165	1280 168	1303 171	1326 174	1349 177	1372 180	1395 183	459
138	1418 186	1441 189	1464 192	1486 195	1509 198	1532 201	1555 204	1578 207	1600 210	1623 213	460
140	1646 216	1669 219	1691 222	1714 225	1737 228	1759 231	1782 234	1804 237	1827 240	1849 242	461
142	1872 245	1894 248	1917 251	1939 254	1962 257	1984 260	2006 263	2029 266	2051 269	2073 271	462
144	2095 274	2118 277	2140 280	2162 283	2184 286	2206 289	2228 292	2251 294	2273 297	2295 300	463
146	2317 303	2339 306	2361 309	2383 312	2405 314	2427 317	2448 320	2470 323	2492 326	2514 329	464
148	2536 331	2558 334	2579 337	2601 340	2623 343	2645 345	2666 348	2688 351	2710 354	2731 357	464
150	2753 359	2774 362	2796 365	2817 368	2839 371	2860 373	2882 376	2903 379	2925 382	2946 384	465
152	2967 387	2989 390	3010 393	3031 395	3053 398	3074 401	3095 404	3116 406	3137 409	3159 412	465
154	3180 414	3201 417	3222 420	3243 423	3264 425	3285 428	3306 431	3327 433	3348 436	3369 439	466
156	3390 441	3410 444	3431 447	3452 449	3473 452	3494 455	3514 458	3535 460	3556 463	3576 465	466
158	3597 468	3618 471	3638 473	3659 476	3679 479	3700 481	3720 484	3741 487	3761 489	3782 492	467
160	3802 494	3823 497	3843 500	3863 502	3884 505	3904 508	3924 510	3944 513	3965 515	3985 518	468
162	4005 520	4025 523	4045 526	4065 528	4085 531	4105 533	4125 536	4145 538	4165 541	4185 544	468
164	4205 546	4225 549	4245 551	4265 554	4285 556	4304 559	4324 561	4344 564	4364 566	4383 569	469
166	4403 571	4423 574	4442 576	4462 579	4481 581	4501 584	4520 586	4540 589	4559 591	4579 594	470
168	4598 596	4618 599	4637 601	4656 604	4676 606	4695 609	4714 611	4733 614	4752 616	4772 618	470
170	4791 621	4810 623	4829 626	4848 628	4867 631	4886 633	4905 635	4924 638	4943 640	4962 643	471
172	4981 645	5000 648	5019 650	5038 652	5056 655	5075 657	5094 659	5113 662	5131 664	5150 667	471

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 04101 .990 .000 .000 0 FCOM-G0-02-05-30-044-115

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=37.0%		**DISTANCE (NM)** **TIME (MIN)**		**LR FL 410**			
WEIGHT (1000KG)	**0**	**.2**	**.4**	**.6**	**.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**TAS** (KT)
174	5169 669	5187 671	5206 674	5224 676	5243 678	5261 681	5280 683	5299 686			471
176											
178											
180											

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

11.1-08F0A330-200 CF6-80E1A4 22200000C5KG370 0 018590 0 0 1 1.0 .0 .00 04101 .990 .000 .000 0 FCOM-G0-02-05-30-045-115

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CLIMB CORRECTION

The planner must correct the values for the fuel and the time obtained from the integrated cruise tables with the numbers given in the following tables. The tables which are established for M.80, M.82, M.84 and long range speed take into account climbing from the brake release point at 250KT/300KT/M.80.

LONG RANGE SPEED

R

CORRECTION ON FUEL CONSUMPTION (1000 kg)												
FL	WEIGHT AT BRAKE RELEASE (1000 kg)											time correction
	140	150	160	170	180	190	200	210	220	230	240	
410	2.2	2.5	2.5	2.7	–	–	–	–	–	–	–	3 min
390	2.1	2.3	2.4	2.6	2.8	2.9	–	–	–	–	–	4 min
370	2.0	2.2	2.4	2.5	2.6	2.8	2.9	2.9	–	–	–	4 min
350	2.0	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	–	5 min
330	1.9	2.1	2.2	2.3	2.4	2.5	2.7	2.9	3.1	3.1	3.2	5 min
310	1.8	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	3.0	3.1	5 min
290	1.7	1.9	1.9	2.1	2.1	2.3	2.4	2.5	2.6	2.8	2.9	5 min
270	1.6	1.8	1.8	2.0	2.0	2.2	2.3	2.4	2.5	2.6	2.8	5 min
250	1.5	1.6	1.7	1.9	1.9	2.1	2.1	2.3	2.3	2.5	2.6	5 min
200	1.2	1.4	1.4	1.4	1.6	1.7	1.8	1.9	2.0	2.1	2.2	4 min
150	1.0	1.1	1.1	1.2	1.4	1.4	1.5	1.5	1.6	1.7	1.8	3 min
100	0.7	0.8	0.8	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.3	2 min

CLIMB TO OPTIMUM FL

R

CORRECTION ON FUEL CONSUMPTION (1000 kg)												
SPEED	WEIGHT AT BRAKE RELEASE (1000 kg)											time correction
	140	150	160	170	180	190	200	210	220	230	240	
LRC	2.4	2.5	2.5	2.6	2.6	2.8	2.8	2.9	3.0	3.1	3.1	5 min
M.80	2.2	2.3	2.3	2.6	2.6	2.8	2.8	3.0	3.2	3.1	3.1	5 min
M.82	2.2	2.4	2.5	2.6	2.7	2.8	2.9	2.9	3.0	3.0	3.2	6 min
M.84	2.2	2.3	2.3	2.5	2.5	2.7	2.7	2.8	2.8	2.9	3.1	6 min

STEP CLIMB CORRECTION

When the flight includes one or more step climbs (2000 feet below FL290, 4000 feet above), apply a correction of 160 kg per step climb to the fuel consumption.

DESCENT CORRECTION

Correct the fuel and the time values determined in the integrated cruise tables as follows to take into account the descent down to 1500 feet followed by 6 min IFR approach and landing.

R **LONG RANGE CRUISE SPEED**

R

CORRECTION ON FUEL CONSUMPTION (1000 kg)								
FL	WEIGHT OVERHEAD DESTINATION (1000 kg)							time correction
	130	140	150	160	170	180	190	
290 and above	0.3	0.3	0.4	0.5	0.5	0.6	0.7	11 min
270	0.2	0.3	0.4	0.4	0.5	0.6	0.6	10 min
250	0.2	0.3	0.3	0.4	0.5	0.5	0.6	10 min
200	0.2	0.2	0.3	0.3	0.4	0.4	0.5	9 min
150	0.1	0.1	0.2	0.2	0.2	0.3	0.3	8 min
100	0.0	0.0	0.0	0.0	0.0	0.1	0.1	8 min

LRC, M.80, M.82, M.84 FROM OPTIMUM FL

R

CORRECTION ON FUEL CONSUMPTION (1000 kg)							
WEIGHT OVERHEAD DESTINATION (1000 kg)							time correction
130	140	150	160	170	180	190	
0.4	0.4	0.5	0.6	0.7	0.8	0.8	11 min

INTRODUCTION

The following flight planning tables allow the planner to determine trip fuel consumption and trip time required to cover a given air distance.
These tables are established for :
- Takeoff
- Climb profile : 250kt/300kt/M.80
- Cruise mach number : M.80, M.82, M.84, LR
- Descent profile : Cruise Mach number/300kt/250kt
- Approach and landing : 240 kg – 6 minute IFR
- ISA
- CG = 37 %
- Normal air conditioning
- Anti ice OFF

Note : *1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding FL.*
2. To obtain a flight plan at optimum cruise level, the highest flight level desired within the flight has to be selected in the table.
3. For each degree Celsius above ISA temperature apply fuel correction 0.010 (kg/°C/NM) × △ISA(°C) × Air Distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE LANDING WEIGHT

The fuel consumption must be corrected when the actual landing weight is different from the reference landing weight.
If it is lower (or greater) than the reference landing weight, subtract (or add) the value given in the correction part of the table per 1000 kg below (or above) the reference landing weight.

EXAMPLE

The following is an example of a complete flight plan based on the assumptions :
- Zero fuel weight (OWE + PAYLOAD) : 160 000 kg = landing weight at alternate airport.
- Cruise M.82 at FL390
- Ground distance from departure to destination : 2500 NM
- Average wind during flight : – 50 kt (headwind)
- ISA conditions
- “Enroute” reserve : 5 %
- Ground distance from destination to alternate : 200 NM, no wind at FL200

To calculate the flight plan, a reverse calculation is needed, i.e. start with the landing weight at alternate (the schematic on 2.05.10 p 4 gives an overview of the calculation to be performed).

1. Alternate fuel and time
   – From 2.05.50 p2 ;
     Alternate time = 41 min
     Alternate fuel : 3489 + 10 × (160 – 140) = 3689 kg
2. Holding fuel and time
   – A 30 min holding is assumed at 1500 feet. Read from 2.05.10 p2, holding fuel = 2400 kg
3. At destination, the landing weight = 160 000 + 3689 + 2400 = 166 089 kg
4. Evaluation of the air distance between departure and destination.
   – The “Ground distance/Air distance” conversion tables from 2.05.60 p3, shows that the corresponding air distance is : 2796 NM (~ 2800 NM).
5. Trip fuel and time
   – Enter air distance and flight level 390 (see tables on 2.05.40 p8), interpolate to find the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
     Fuel = 29 496 kg
     Time = 6 h 11 min
   – Correction for landing weight
     △ fuel consumption = 135 × (166.1 – 140) = 3523 kg
   – Trip reserves (5 %) = 0.05 × (29 496 + 3523) = 1650 kg
6. Taxi fuel = 300 kg (2.05.10 p2)
7. Total fuel on board (Block fuel) :
   29496 + 3689 + 2400 + 3523 + 1650 + 300 = 41058 kg

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.80 - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
200	3500 0.38	3488 0.38	3486 0.39	3494 0.39			12	13	
300	4645 0.51	4567 0.51	4506 0.52	4465 0.52	4441 0.52	4432 0.52	14	16	18
400	5793 1.04	5649 1.04	5529 1.05	5438 1.05	5374 1.05	5334 1.05	16	19	22
500	6944 1.17	6733 1.17	6554 1.18	6414 1.18	6310 1.18	6240 1.18	18	22	26
600	8097 1.30	7820 1.30	7582 1.31	7394 1.31	7249 1.31	7149 1.31	21	25	30
700	9253 1.42	8910 1.43	8613 1.44	8377 1.44	8192 1.44	8062 1.44	23	28	34
800	10411 1.55	10002 1.56	9647 1.57	9362 1.57	9138 1.57	8979 1.57	25	31	38
900	11572 2.08	11096 2.09	10684 2.10	10350 2.10	10087 2.10	9900 2.10	28	34	42
1000	12735 2.21	12193 2.22	11723 2.23	11342 2.23	11040 2.23	10824 2.23	30	37	46
1100	13901 2.34	13292 2.35	12766 2.36	12336 2.36	11995 2.36	11752 2.36	33	41	50
1200	15070 2.47	14395 2.48	13811 2.49	13334 2.49	12954 2.49	12683 2.49	35	44	54
1300	16240 2.59	15500 3.01	14859 3.02	14334 3.03	13916 3.03	13618 3.03	37	47	59
1400	17413 3.12	16608 3.13	15911 3.15	15338 3.16	14882 3.16	14558 3.16	40	50	63
1500	18589 3.25	17718 3.26	16966 3.28	16346 3.29	15851 3.29	15502 3.29	42	54	67
1600	19766 3.38	18831 3.39	18023 3.41	17356 3.42	16825 3.42	16450 3.42	45	57	72
1700	20947 3.51	19947 3.52	19084 3.54	18370 3.55	17802 3.55	17402 3.55	48	61	77
1800	22131 4.03	21066 4.05	20148 4.07	19386 4.08	18783 4.08	18358 4.08	50	64	81
1900	23318 4.16	22188 4.18	21215 4.20	20407 4.21	19768 4.21	19318 4.21	53	68	86
2000	24507 4.29	23313 4.31	22286 4.33	21431 4.34	20756 4.34	20282 4.34	56	71	91
2100	25698 4.42	24441 4.44	23361 4.46	22458 4.47	21749 4.47	21251 4.47	59	75	97
2200	26892 4.55	25571 4.57	24438 4.59	23489 5.00	22746 5.00	22225 5.00	62	79	103
2300	28089 5.07	26704 5.10	25518 5.12	24524 5.14	23746 5.14	23224 5.14	65	82	108
2400	29289 5.20	27840 5.23	26601 5.25	25561 5.27	24751 5.27	24210 5.27	68	86	114
2500	30493 5.33	28980 5.36	27688 5.38	26602 5.40	25759 5.40	25201 5.40	71	90	121
2600	31700 5.46	30124 5.49	28779 5.51	27646 5.53	26770 5.53	26196 5.53	74	93	126
2700	32910 5.59	31271 6.01	29872 6.04	28695 6.06	27817 6.06	27196 6.06	77	97	132

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-003-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.80 - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
2800	34123 6.11	32422 6.14	30969 6.17	29746 6.19	28842 6.19	28202 6.19	80	101	138
2900	35338 6.24	33576 6.27	32070 6.30	30802 6.32	29870 6.32	29213 6.32	83	105	144
3000	36557 6.37	34734 6.40	33173 6.43	31860 6.45	30904 6.45	30232 6.45	87	111	149
3100	37778 6.50	35894 6.53	34281 6.56	32923 6.58	31942 6.58	31261 6.58	90	115	155
3200	39003 7.03	37058 7.06	35391 7.10	34033 7.11	32985 7.11	32296 7.11	94	119	161
3300	40230 7.16	38225 7.19	36505 7.23	35108 7.25	34032 7.25	33337 7.24	97	126	168
3400	41460 7.28	39395 7.32	37623 7.36	36187 7.38	35085 7.38	34385 7.38	100	129	175
3500	42693 7.41	40568 7.45	38744 7.49	37270 7.51	36142 7.51	35441 7.51	104	133	183
3600	43930 7.54	41745 7.58	39928 8.02	38357 8.04	37204 8.04	36502 8.04	107	138	190
3700	45171 8.07	42925 8.11	41063 8.15	39448 8.17	38271 8.17	37569 8.17	114	140	198
3800	46414 8.20	44110 8.24	42201 8.28	40543 8.30	39342 8.30	38643 8.30	118	144	205
3900	47661 8.32	45370 8.37	43343 8.41	41643 8.43	40418 8.43	39723 8.43	121	149	213
4000	48911 8.45	46569 8.49	44491 8.54	42748 8.56	41501 8.56	40811 8.56	129	154	220
4100	50164 8.58	47773 9.02	45642 9.07	43859 9.09	42589 9.09	41932 9.09*	130	159	227
4200	51420 9.11	48980 9.15	46797 9.20	44976 9.22	43681 9.22	43043 9.22*	134	164	234
4300	52760 9.24	50192 9.28	47957 9.33	46098 9.36	44779 9.36	44160 9.35*	138	169	241
4400	54029 9.36	51407 9.41	49122 9.46	47225 9.49	45883 9.49	45280 9.49*	138	174	248
4500	55302 9.49	52627 9.54	50291 9.59	48358 10.02	46991 10.02	46406 10.02*	142	179	256
4600	56579 10.02	53850 10.07	51464 10.12	49495 10.15	48107 10.15	47538 10.15*	146	184	263
4700	57862 10.15	55078 10.20	52641 10.25	50637 10.28	49228 10.28	48675 10.28*	150	189	268
4800	59150 10.28	56311 10.33	53822 10.38	51783 10.41	50355 10.41	49817 10.41*	154	195	276
4900	60440 10.41	57548 10.46	55009 10.51	52935 10.54	51487 10.54	50964 10.54*	159	200	283
5000	61736 10.53	58789 10.59	56200 11.04	54092 11.07	52624 11.07	52117 11.07*	163	206	290
5100	63035 11.06	60034 11.12	57396 11.17	55255 11.20	53768 11.20	53275 11.20*	168	211	300
5200	64338 11.19	61284 11.25	58596 11.30	56423 11.33	54919 11.33	54439 11.33*	172	217	309
5300	65645 11.32	62539 11.38	59801 11.43	57597 11.47	56076 11.47	55609 11.47*	177	222	318

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-004-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.80 - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
5400	66956 11.45	63799 11.50	61011 11.56	58777 12.00	57239 12.00	56785 12.00*	182	228	327
5500	68272 11.57	65062 12.03	62227 12.09	59963 12.13	58465 12.13	57966 12.13*	186	234	335
5600	69591 12.10	66330 12.16	63447 12.22	61155 12.26	59671 12.26*	59153 12.26*	191	240	344
5700	70920 12.23	67603 12.29	64671 12.36	62353 12.39	60888 12.39*	60345 12.39*	196	246	351
5800	72256 12.36	68881 12.42	65901 12.49	63556 12.52	62110 12.52*	61550 12.52*	201	252	360
5900	73596 12.49	70164 12.55	67135 13.02	64766 13.05	63336 13.05*	62763 13.05*	206	258	369
6000	74942 13.02	71453 13.08	68375 13.15	65980 13.18	64575 13.18*	63982 13.18*	211	268	378
6100	76293 13.14	72747 13.21	69621 13.28	67201 13.31	65814 13.31*	65207 13.31*	216	274	388
6200	77648 13.27	74046 13.34	70871 13.41	68487 13.45	67059 13.44*	66440 13.44*	221	281	396
6300	79008 13.40	75351 13.47	72131 13.54	69726 13.58	68311 13.57*	67681 13.58*	227	288	405
6400	80373 13.53	76661 14.00	73396 14.07	70972 14.11	69569 14.10*	68930 14.11*	232	295	413
6500	81743 14.06	77975 14.13	74667 14.20	72226 14.24	70833 14.23*	70186 14.24*	237	303	422
6600	83118 14.18	79295 14.26	75945 14.33	73486 14.37	72104 14.36*	71450 14.37*	242	315	430
6700	84498 14.31	80620 14.39	77228 14.46	74755 14.50	73380 14.49*	72721 14.50*	248	321	440
6800	85884 14.44	81951 14.51	78517 14.59	76031 15.03	74664 15.02*	74032 15.03*	253	330	449
6900	87275 14.57	83288 15.04	79811 15.12	77314 15.16	75954 15.15*	75330 15.16*	258	340	457
7000	88673 15.10	84629 15.17	81190 15.25	78604 15.29	77251 15.28*	76638 15.29*	263	349	467
7100	90075 15.23	85977 15.30	82503 15.38	79901 15.42	78554 15.41*	77955 15.42*	269	359	476
7200	91482 15.35	87330 15.43	83822 15.51	81255 15.55*	79864 15.55*	79281 15.56*	274	369	484
7300	92895 15.48	88690 15.56	85151 16.04	82601 16.08*	81181 16.08*	80622 16.09*	284	374	493
7400	94313 16.01	90056 16.09	86491 16.17	83954 16.21*	82506 16.21*	81966 16.22*	290	383	503
7500	95737 16.14	91516 16.22	87838 16.30	85312 16.34*	83840 16.34*	83315 16.34*	296	393	512
7600	97166 16.27	92899 16.35	89193 16.43	86677 16.47*	85185 16.47*	84671 16.47*	307	402	521
7700	98602 16.40	94288 16.48	90555 16.56	88049 17.00*	86537 17.00*	86033 17.00*	313	410	530
7800	100044 16.52	95684 17.01	91923 17.09	89427 17.13*	87899 17.13*	87401 17.13*	315	417	540
7900	101589 17.05	97086 17.14	93299 17.23	90814 17.26*	89295 17.26*	88777 17.26*	322	425	549

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-005-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.80 - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG
NORMAL AIR CONDITIONING
ANTI ICING OFF

ISA
CG = 37.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
8000	103050 17.18	98495 17.27	94684 17.36	92207 17.39*	90678 17.39*	90160 17.39*	328	434	558
8100	104517 17.31	99912 17.40	96078 17.49	93606 17.52*	92070 17.52*	91549 17.52*	335	442	568
8200	105989 17.44	101335 17.53	97478 18.02	95014 18.05*	93470 18.05*	92946 18.05*	342	454	578
8300	107468 17.57	102767 18.06	98887 18.15	96430 18.18*	94882 18.18*	94350 18.18*	345	464	588
8400	108955 18.09	104205 18.18	100304 18.28	97853 18.31*	96303 18.31*	95765 18.31*	352	474	597
8500	110448 18.22	105649 18.31	101731 18.41	99283 18.44*	97735 18.44*	97185 18.44*	359	485	607
8600	111949 18.35	107100 18.44	103167 18.54	100720 18.57*	99181 18.57*	98613 18.57*	367	496	618
8700	113458 18.48	108560 18.57	104695 19.07*	102166 19.09*	100637 19.10*	100048 19.10*	370	507	628
8800	114976 19.01	110028 19.10	106182 19.20*	103621 19.22*	102106 19.23*	101491 19.23*	378	517	638
8900		111502 19.23	107676 19.32*	105088 19.35*	103594 19.36*	102944 19.36*	412	528	648
9000		112991 19.36	109179 19.45*	106564 19.48*	105076 19.49*	104408 19.49*	401	539	659
9100		114493 19.49	110690 19.58*	108069 20.01*	106565 20.02*	105883 20.01*	411	551	668
9200		116006 20.02	112207 20.11*	109569 20.14*	108061 20.15*	107367 20.14*	421	557	679
9300			113732 20.24*	111077 20.27*	109566 20.28*	108862 20.27*		563	689
9400			115267 20.37*	112595 20.40*	111078 20.40*	110367 20.40*		565	699
9500				114123 20.53*	112598 20.53*	111881 20.53*		604	695
9600				115664 21.06*	114125 21.06*	113404 21.06*		612	705
9700					115662 21.19*	114940 21.19*			715
9800									
9900									
10000									
10100									
10200									
10300									
10400									
10500									

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-006-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.82 - DESCENT : M.82/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
200	3523 0.38	3507 0.38	3502 0.38				11	12	
300	4717 0.51	4631 0.51	4560 0.51	4507 0.51	4475 0.51	4461 0.51	13	15	18
400	5915 1.03	5757 1.04	5621 1.04	5511 1.04	5432 1.04	5384 1.04	15	18	22
500	7114 1.16	6885 1.16	6684 1.17	6517 1.17	6392 1.17	6311 1.17	18	21	25
600	8316 1.28	8016 1.29	7750 1.29	7527 1.30	7355 1.30	7241 1.30	20	23	29
700	9521 1.41	9150 1.41	8819 1.42	8539 1.42	8323 1.42	8176 1.42	22	26	33
800	10729 1.53	10285 1.54	9891 1.55	9554 1.55	9293 1.55	9114 1.55	24	29	37
900	11938 2.06	11424 2.07	10964 2.07	10571 2.08	10267 2.08	10055 2.08	27	32	41
1000	13150 2.18	12564 2.19	12041 2.20	11591 2.21	11243 2.21	11001 2.21	29	34	45
1100	14365 2.31	13708 2.32	13120 2.33	12614 2.33	12224 2.34	11949 2.34	31	37	50
1200	15583 2.43	14854 2.44	14202 2.46	13640 2.46	13207 2.46	12902 2.46	34	40	54
1300	16804 2.56	16003 2.57	15287 2.58	14669 2.59	14194 2.59	13859 2.59	36	43	58
1400	18027 3.08	17154 3.10	16374 3.11	15701 3.12	15185 3.12	14820 3.12	39	46	62
1500	19252 3.21	18309 3.22	17465 3.24	16736 3.25	16180 3.25	15784 3.25	41	49	67
1600	20480 3.33	19466 3.35	18558 3.36	17773 3.37	17178 3.37	16754 3.37	44	52	71
1700	21712 3.46	20626 3.47	19654 3.49	18814 3.50	18180 3.50	17728 3.50	46	55	76
1800	22947 3.58	21789 4.00	20753 4.02	19858 4.03	19186 4.03	18706 4.03	49	58	81
1900	24184 4.11	22955 4.13	21856 4.15	20905 4.16	20195 4.16	19689 4.16	51	62	85
2000	25424 4.23	24124 4.25	22961 4.27	21955 4.29	21209 4.29	20676 4.29	54	65	91
2100	26667 4.36	25296 4.38	24070 4.40	23009 4.41	22228 4.41	21684 4.41	57	68	96
2200	27912 4.48	26470 4.51	25181 4.53	24066 4.54	23249 4.54	22684 4.54	59	72	102
2300	29161 5.01	27647 5.03	26295 5.06	25126 5.07	24275 5.07	23689 5.07	62	76	107
2400	30412 5.13	28827 5.16	27412 5.18	26188 5.20	25304 5.20	24698 5.20	65	79	114
2500	31665 5.26	30011 5.28	28532 5.31	27254 5.32	26337 5.32	25712 5.33	67	83	118
2600	32921 5.38	31197 5.41	29655 5.44	28324 5.45	27374 5.45	26730 5.45	70	86	124
2700	34181 5.51	32387 5.54	30782 5.56	29396 5.58	28447 5.58	27756 5.58	73	90	129

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-007-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.82 - DESCENT : M.82/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL **310**	**330**	**350**	**370**	**390**	**410**	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) **FL310 FL330**	**FL350 FL370**	**FL390 FL410**
2800	35443 6.03	33579 6.06	31913 6.09	30475 6.11	29496 6.11	28786 6.11	76	93	135
2900	36708 6.16	34775 6.19	33046 6.22	31558 6.24	30551 6.24	29821 6.24	78	99	139
3000	37975 6.28	35974 6.31	34182 6.35	32645 6.36	31610 6.36	30863 6.36	81	103	145
3100	39246 6.41	37176 6.44	35322 6.47	33736 6.49	32673 6.49	31911 6.49	84	107	151
3200	40519 6.53	38380 6.57	36465 7.00	34873 7.02	33741 7.02	32964 7.02	87	112	157
3300	41796 7.06	39587 7.09	37611 7.13	35976 7.15	34815 7.15	34024 7.15	90	116	163
3400	43075 7.18	40798 7.22	38760 7.25	37083 7.27	35893 7.28	35090 7.28	93	121	169
3500	44359 7.31	42012 7.34	39912 7.38	38195 7.40	36975 7.40	36162 7.40	96	126	177
3600	45646 7.43	43229 7.47	41119 7.51	39310 7.53	38063 7.53	37240 7.53	100	131	185
3700	46936 7.56	44450 8.00	42283 8.04	40429 8.06	39155 8.06	38323 8.06	105	135	192
3800	48230 8.08	45674 8.12	43451 8.16	41554 8.19	40252 8.19	39413 8.19	109	137	200
3900	49527 8.21	46964 8.25	44624 8.29	42683 8.31	41355 8.31	40508 8.32	116	142	207
4000	50827 8.33	48200 8.38	45799 8.42	43818 8.44	42463 8.44	41639 8.44*	117	146	215
4100	52197 8.46	49441 8.50	46978 8.55	44961 8.57	43576 8.57	42774 8.57*	120	151	223
4200	53509 8.58	50685 9.03	48162 9.07	46108 9.10	44697 9.10	43914 9.10*	124	156	230
4300	54824 9.11	51932 9.15	49350 9.20	47260 9.23	45823 9.23	45059 9.23*	125	161	238
4400	56143 9.23	53183 9.28	50541 9.33	48418 9.35	46955 9.35	46209 9.35*	128	166	246
4500	57468 9.36	54438 9.41	51736 9.45	49581 9.48	48094 9.48	47364 9.48*	132	171	254
4600	58796 9.48	55696 9.53	52935 9.58	50749 10.01	49239 10.01	48526 10.01*	135	176	260
4700	60128 10.01	56960 10.06	54138 10.11	51921 10.14	50389 10.14	49693 10.14*	139	182	267
4800	61464 10.13	58228 10.18	55345 10.24	53099 10.27	51545 10.27	50866 10.26*	143	187	276
4900	62804 10.26	59501 10.31	56557 10.36	54282 10.39	52706 10.39	52044 10.39*	146	192	283
5000	64148 10.38	60777 10.44	57777 10.49	55471 10.52	53873 10.52	53228 10.52*	150	198	292
5100	65495 10.51	62058 10.56	59002 11.02	56665 11.05	55080 11.05	54418 11.05*	154	203	301
5200	66846 11.04	63343 11.09	60232 11.15	57865 11.18	56264 11.18	55615 11.18*	158	209	310
5300	68202 11.16	64632 11.22	61467 11.27	59070 11.30	57455 11.31	56818 11.30*	162	215	319

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-008-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.82 - DESCENT : M.82/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
5400	69561 11.29	65925 11.34	62707 11.40	60281 11.43	58662 11.43	58026 11.43*	166	221	328
5500	70926 11.41	67221 11.47	63951 11.53	61500 11.56	59906 11.56*	59240 11.56*	170	228	337
5600	72295 11.54	68523 11.59	65199 12.05	62723 12.09	61151 12.09*	60461 12.09*	174	234	344
5700	73668 12.06	69829 12.12	66452 12.18	63953 12.22	62403 12.21*	61689 12.22*	178	243	352
5800	75046 12.19	71141 12.25	67711 12.31	65188 12.34	63664 12.34*	62924 12.34*	183	250	361
5900	76429 12.31	72457 12.37	68974 12.44	66428 12.47	64928 12.47*	64165 12.47*	187	257	370
6000	77815 12.44	73777 12.50	70243 12.56	67725 13.00	66198 13.00*	65412 13.00*	191	264	378
6100	79205 12.56	75103 13.03	71524 13.09	68984 13.13	67473 13.12*	66665 13.13*	196	272	386
6200	80600 13.09	76434 13.15	72816 13.22	70248 13.26	68756 13.25*	67927 13.26*	200	279	394
6300	82000 13.21	77768 13.28	74115 13.35	71520 13.38	70044 13.38*	69196 13.38*	205	286	401
6400	83404 13.34	79108 13.40	75420 13.47	72798 13.51	71340 13.50*	70472 13.51*	210	297	409
6500	84814 13.46	80451 13.53	76732 14.00	74083 14.04	72642 14.03*	71755 14.04*	215	304	417
6600	86230 13.59	81801 14.06	78050 14.13	75378 14.17	73951 14.16*	73069 14.17*	219	314	426
6700	87652 14.11	83155 14.18	79374 14.26	76679 14.30	75268 14.29*	74370 14.30*	224	324	436
6800	89078 14.24	84514 14.31	80703 14.38	77987 14.42	76592 14.41*	75680 14.42*	229	335	445
6900	90510 14.36	85881 14.44	82114 14.51	79301 14.55	77923 14.54*	76998 14.55*	234	345	455
7000	91946 14.49	87254 14.56	83463 15.04	80663 15.08*	79260 15.07*	78324 15.08*	239	355	463
7100	93387 15.01	88633 15.09	84819 15.16	82039 15.20*	80604 15.20*	79657 15.21*	249	365	473
7200	94833 15.14	90017 15.21	86184 15.29	83421 15.33*	81957 15.32*	81027 15.33*	255	371	483
7300	96284 15.26	91406 15.34	87556 15.42	84809 15.46*	83317 15.45*	82405 15.46*	261	381	493
7400	97741 15.39	92800 15.47	88938 15.55	86203 15.58*	84684 15.58*	83788 15.58*	268	391	502
7500	99204 15.51	94271 15.59	90326 16.07	87605 16.11*	86057 16.11*	85178 16.11*	274	399	512
7600	100673 16.04	95682 16.12	91721 16.20	89013 16.24*	87437 16.23*	86574 16.24*	281	407	522
7700	102148 16.16	97098 16.25	93123 16.33	90430 16.36*	88848 16.36*	87978 16.36*	292	414	531
7800	103629 16.29	98526 16.37	94533 16.46	91854 16.49*	90248 16.49*	89388 16.49*	295	426	540
7900	105194 16.41	99971 16.50	95953 16.58	93285 17.01*	91656 17.02*	90807 17.02*	302	436	549

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-009-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.82 - DESCENT : M.82/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL **310**	**330**	**350**	**370**	**390**	**410**	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) **FL310 FL330**	**FL350 FL370**	**FL390 FL410**
8000	106689 16.54	101425 17.02	97380 17.11	94725 17.14*	93072 17.14*	92233 17.14*	309	447	559
8100	108192 17.07	102886 17.15	98815 17.24	96173 17.27*	94498 17.27*	93667 17.27*	313	457	569
8200	109701 17.19	104353 17.28	100258 17.37	97629 17.39*	95934 17.40*	95111 17.40*	321	468	579
8300	111215 17.32	105827 17.40	101793 17.49*	99092 17.52*	97377 17.53*	96562 17.52*	329	478	590
8400	112736 17.44	107308 17.53	103303 18.02*	100562 18.05*	98830 18.05*	98020 18.05*	337	489	600
8500	114263 17.57	108799 18.06	104820 18.14*	102043 18.17*	100292 18.18*	99487 18.17*	342	500	611
8600	115799 18.09	110296 18.18	106344 18.27*	103532 18.30*	101802 18.30*	100962 18.30*	350	511	622
8700		111801 18.31	107875 18.39*	105028 18.42*	103312 18.43*	102446 18.43*	401	522	632
8800		113323 18.44	109415 18.52*	106531 18.55*	104829 18.55*	103939 18.55*	388	528	643
8900		114862 18.56	110964 19.04*	108060 19.08*	106353 19.08*	105439 19.08*	399	537	654
9000			112520 19.17*	109585 19.20*	107885 19.20*	106947 19.21*		541	665
9100			114084 19.29*	111119 19.33*	109425 19.33*	108465 19.33*		550	674
9200			115659 19.42*	112661 19.46*	110973 19.46*	109993 19.46*		553	684
9300				114212 19.58*	112530 19.58*	111529 19.59*		586	682
9400				115776 20.11*	114095 20.11*	113074 20.11*		593	691
9500					115670 20.23*	114629 20.24*			701
9600									
9700									
9800									
9900									
10000									
10100									
10200									
10300									
10400									
10500									

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-010-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.84 - DESCENT : M.84/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
200	3560 0.38	3533 0.38	3520 0.38				10	12	
300	4849 0.50	4740 0.51	4651 0.51	4584 0.51	4539 0.51	4512 0.51	12	14	17
400	6140 1.03	5949 1.03	5785 1.03	5654 1.03	5555 1.03	5490 1.04	14	17	21
500	7434 1.15	7160 1.15	6921 1.16	6726 1.16	6575 1.16	6472 1.16	16	19	25
600	8730 1.27	8374 1.28	8060 1.28	7801 1.28	7598 1.28	7459 1.29	18	22	29
700	10029 1.39	9590 1.40	9201 1.40	8880 1.41	8624 1.41	8451 1.41	20	25	33
800	11330 1.51	10809 1.52	10345 1.53	9961 1.53	9654 1.53	9447 1.54	22	27	37
900	12633 2.04	12030 2.04	11492 2.05	11045 2.06	10687 2.06	10448 2.06	24	30	42
1000	13939 2.16	13253 2.17	12641 2.18	12132 2.18	11722 2.18	11453 2.18	26	33	46
1100	15248 2.28	14479 2.29	13792 2.30	13222 2.31	12761 2.31	12463 2.31	28	36	51
1200	16559 2.40	15708 2.41	14947 2.43	14315 2.43	13804 2.43	13478 2.43	31	39	55
1300	17873 2.52	16939 2.54	16105 2.55	15411 2.56	14850 2.56	14498 2.56	33	41	60
1400	19190 3.05	18173 3.06	17266 3.07	16511 3.08	15899 3.08	15523 3.08	35	45	65
1500	20509 3.17	19410 3.18	18431 3.20	17614 3.21	16955 3.21	16553 3.21	37	48	70
1600	21831 3.29	20649 3.31	19598 3.32	18719 3.33	18015 3.33	17589 3.33	40	51	75
1700	23156 3.41	21891 3.43	20769 3.45	19828 3.46	19078 3.46	18630 3.46	42	54	80
1800	24484 3.54	23137 3.55	21943 3.57	20941 3.58	20145 3.58	19676 3.58	44	57	89
1900	25814 4.06	24385 4.08	23121 4.10	22057 4.11	21217 4.11	20744 4.11	47	61	97
2000	27147 4.18	25635 4.20	24301 4.22	23177 4.23	22294 4.23	21806 4.23	49	64	105
2100	28483 4.30	26888 4.32	25484 4.34	24300 4.36	23374 4.36	22874 4.36	52	67	114
2200	29821 4.42	28144 4.45	26671 4.47	25426 4.48	24459 4.48	23947 4.48	54	71	121
2300	31163 4.55	29403 4.57	27861 4.59	26555 5.01	25547 5.01	25072 5.01*	57	74	130
2400	32507 5.07	30666 5.09	29054 5.12	27688 5.13	26639 5.13	26204 5.13*	59	78	139
2500	33853 5.19	31932 5.22	30251 5.24	28824 5.26	27762 5.26	27340 5.25*	62	81	147
2600	35203 5.31	33201 5.34	31451 5.37	29964 5.38	28867 5.38	28481 5.38*	64	84	155
2700	36556 5.43	34472 5.46	32655 5.49	31108 5.51	29980 5.51	29626 5.50*	67	88	163

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-011-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.84 - DESCENT : M.84/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
2800	37911 5.56	35747 5.58	33862 6.01	32256 6.03	31105 6.03	30776 6.03*	70	91	170
2900	39269 6.08	37025 6.11	35073 6.14	33407 6.15	32235 6.16	31929 6.15*	73	97	174
3000	40629 6.20	38305 6.23	36287 6.26	34596 6.28	33371 6.28	33087 6.28*	76	101	180
3100	41993 6.32	39589 6.35	37504 6.39	35760 6.40	34513 6.41	34249 6.40*	78	105	186
3200	43360 6.44	40875 6.48	38725 6.51	36926 6.53	35662 6.53	35416 6.53*	81	112	196
3300	44731 6.57	42165 7.00	39948 7.03	38097 7.05	36816 7.06	36592 7.05*	84	115	205
3400	46105 7.09	43457 7.12	41222 7.16	39272 7.18	37976 7.18	37772 7.18*	87	119	214
3500	47482 7.21	44757 7.25	42458 7.28	40450 7.30	39143 7.31	38959 7.30*	90	124	224
3600	48862 7.33	46060 7.37	43699 7.41	41634 7.43	40315 7.43	40150 7.43*	96	126	233
3700	50245 7.46	47366 7.49	44944 7.53	42821 7.55	41568 7.55*	41348 7.55*	100	131	242
3800	51631 7.58	48733 8.02	46193 8.06	44019 8.08	42810 8.08*	42552 8.08*	104	135	251
3900	53020 8.10	50052 8.14	47447 8.18	45224 8.20	44056 8.20*	43761 8.20*	110	140	260
4000	54469 8.22	51374 8.26	48704 8.30	46434 8.33	45306 8.33*	44976 8.33*	112	145	269
4100	55870 8.34	52700 8.39	49966 8.43	47650 8.45	46562 8.45*	46198 8.45*	116	151	278
4200	57276 8.47	54030 8.51	51232 8.55	48871 8.58	47823 8.57*	47425 8.58*	116	157	283
4300	58686 8.59	55365 9.03	52502 9.08	50097 9.10	49091 9.10*	48658 9.10*	120	163	289
4400	60100 9.11	56703 9.16	53776 9.20	51328 9.23	50363 9.22*	49899 9.23*	123	169	295
4500	61517 9.23	58050 9.28	55055 9.33	52564 9.35	51641 9.35*	51147 9.35*	127	176	302
4600	62939 9.36	59402 9.40	56338 9.45	53805 9.48	52924 9.47*	52401 9.48*	131	182	308
4700	64364 9.48	60757 9.53	57627 9.58	55052 10.00	54213 10.00*	53662 10.00*	135	195	318
4800	65793 10.00	62118 10.05	58922 10.10	56305 10.13	55507 10.12*	54931 10.13*	139	204	328
4900	67225 10.12	63483 10.17	60222 10.22	57568 10.25	56808 10.24*	56206 10.25*	143	214	338
5000	68661 10.24	64852 10.30	61527 10.35	58852 10.38	58114 10.37*	57489 10.38*	147	224	348
5100	70102 10.37	66225 10.42	62837 10.47	60142 10.50	59425 10.49*	58777 10.50*	152	234	358
5200	71550 10.49	67602 10.54	64152 11.00	61586 11.02*	60744 11.02*	60073 11.03*	156	244	367
5300	73001 11.01	68985 11.07	65471 11.12	62957 11.15*	62074 11.14*	61506 11.15*	160	254	377

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-012-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.84 - DESCENT : M.84/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
5400	74458 11.13	70373 11.19	66795 11.25	64333 11.27*	63410 11.27*	62876 11.27*	164	265	387
5500	75918 11.26	71767 11.31	68124 11.37	65714 11.39*	64752 11.39*	64252 11.39*	169	275	398
5600	77383 11.38	73165 11.43	69459 11.49	67101 11.52*	66102 11.51*	65633 11.52*	173	285	408
5700	78852 11.50	74569 11.56	70799 12.02	68495 12.04*	67458 12.04*	67019 12.04*	178	287	418
5800	80324 12.02	75978 12.08	72151 12.14	69896 12.16*	68823 12.16*	68412 12.16*	183	293	422
5900	81802 12.14	77392 12.20	73510 12.27	71303 12.29*	70194 12.29*	69813 12.29*	188	306	429
6000	83284 12.27	78811 12.33	74875 12.39	72717 12.41*	71573 12.41*	71220 12.41*	193	317	437
6100	84776 12.39	80234 12.45	76247 12.52	74137 12.53*	72958 12.54*	72633 12.53*	198	329	450
6200	86279 12.51	81664 12.57	77624 13.04	75565 13.06*	74352 13.06*	74054 13.06*	203	341	461
6300	87787 13.03	83098 13.10	79007 13.17	76999 13.18*	75755 13.19*	75482 13.18*	209	353	472
6400	89301 13.16	84537 13.22	80595 13.28*	78440 13.30*	77165 13.31*	76916 13.30*	214	365	483
6500	90819 13.28	85985 13.34	82096 13.41*	79887 13.43*	78617 13.43*	78357 13.43*	220	378	494
6600	92343 13.40	87438 13.47	83604 13.53*	81343 13.55*	80136 13.55*	79805 13.55*	225	390	505
6700	93872 13.52	88898 13.59	85117 14.05*	82807 14.07*	81635 14.08*	81260 14.07*	234	402	516
6800	95407 14.04	90364 14.11	86636 14.17*	84281 14.20*	83141 14.20*	82725 14.20*	240	407	527
6900	96947 14.17	91834 14.24	88163 14.30*	85762 14.32*	84652 14.32*	84199 14.32*	252	414	536
7000	98493 14.29	93310 14.36	89696 14.42*	87251 14.44*	86170 14.44*	85680 14.44*	263	421	547
7100	100049 14.41	94855 14.49	91238 14.54*	88749 14.57*	87694 14.57*	87170 14.57*	275	430	555
7200	101612 14.53	96348 15.01	92787 15.06*	90255 15.09*	89225 15.09*	88669 15.09*	290	441	563
7300	103180 15.06	97934 15.13*	94344 15.19*	91768 15.21*	90764 15.21*	90176 15.21*	303	452	575
7400	104755 15.18	99563 15.25*	95910 15.31*	93291 15.34*	92312 15.33*	91691 15.34*	312	463	587
7500	106404 15.30	101199 15.37*	97483 15.43*	94848 15.46*	93866 15.46*	93214 15.46*	324	475	599
7600	107995 15.42	102842 15.49*	99064 15.55*	96393 15.58*	95430 15.58*	94759 15.58*	336	486	611
7700	109593 15.55	104492 16.01*	100652 16.07*	98018 16.10*	97001 16.10*	96303 16.11*	353	497	622
7800	111197 16.07	106149 16.14*	102250 16.20*	99647 16.22*	98580 16.22*	97922 16.23*	353	509	634
7900	112809 16.19	107814 16.26*	103856 16.32*	101284 16.35*	100166 16.34*	99551 16.35*	360	520	646

PACK FLOW LO	PACK FLOW HI OR/ AND CARGO COOL ON	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-013-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - CRUISE : M.84 - DESCENT : M.84/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
8000	114428 16.31	109486 16.38*	105472 16.44*	102928 16.47*	101761 16.47*	101187 16.47*	358	530	658
8100		111166 16.50*	107097 16.56*	104578 16.59*	103365 16.59*	102831 16.59*	432	541	670
8200		112853 17.02*	108733 17.09*	106236 17.11*	104978 17.11*	104481 17.11*	430	551	682
8300		114551 17.14*	110377 17.21*	107900 17.23*	106601 17.23*	106138 17.24*	437	557	694
8400			112030 17.33*	109573 17.35*	108234 17.36*	107802 17.36*		563	702
8500			113692 17.45*	111253 17.47*	109876 17.48*	109475 17.48*		568	709
8600			115435 17.57*	112941 18.00*	111527 18.00*	111155 18.00*		578	716
8700				114640 18.12*	113188 18.12*	112842 18.12*		639	723
8800					114858 18.25*	114541 18.24*			732
8900									
9000									
9100									
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PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1 %	△FUEL = + 1.5 %	△FUEL = + 3 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8000 .00000 240 0300350140 0 260200 90164 18590 FCOM-G0-02-05-40-014-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - LONG RANGE CRUISE - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 310	330	350	370	390	410	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL310 FL330	FL350 FL370	FL390 FL410
200	3386 0.39	3397 0.39	3411 0.39	3426 0.38			13	14	
300	4419 0.54	4398 0.54	4383 0.53	4373 0.52	4366 0.52	4365 0.51	17	18	18
400	5456 1.09	5402 1.08	5360 1.07	5324 1.06	5293 1.05	5270 1.04	22	23	23
500	6498 1.24	6411 1.23	6341 1.21	6280 1.19	6223 1.18	6179 1.17	26	27	27
600	7544 1.39	7425 1.38	7326 1.35	7240 1.33	7158 1.31	7092 1.30	31	32	32
700	8595 1.54	8443 1.52	8316 1.49	8204 1.46	8096 1.44	8010 1.43	35	36	36
800	9650 2.09	9466 2.07	9310 2.03	9173 2.00	9039 1.58	8932 1.56	40	41	41
900	10710 2.24	10493 2.21	10308 2.17	10146 2.13	9985 2.11	9858 2.09	44	45	46
1000	11774 2.39	11524 2.36	11311 2.31	11124 2.26	10936 2.24	10788 2.22	49	50	50
1100	12843 2.53	12560 2.50	12318 2.45	12106 2.40	11890 2.37	11722 2.35	53	55	55
1200	13916 3.08	13601 3.04	13330 2.59	13092 2.53	12849 2.50	12660 2.48	58	59	60
1300	14995 3.23	14647 3.19	14347 3.13	14083 3.06	13811 3.03	13602 3.01	62	64	65
1400	16076 3.37	15696 3.33	15368 3.26	15079 3.19	14778 3.16	14550 3.14	67	68	70
1500	17161 3.52	16750 3.47	16394 3.40	16077 3.33	15750 3.29	15502 3.27	72	73	75
1600	18251 4.07	17808 4.01	17423 3.53	17078 3.46	16724 3.42	16458 3.40	77	78	80
1700	19345 4.21	18871 4.15	18458 4.07	18082 3.59	17704 3.55	17419 3.53	81	83	85
1800	20444 4.36	19939 4.30	19497 4.20	19090 4.12	18687 4.09	18384 4.06	86	88	91
1900	21548 4.50	21011 4.44	20541 4.33	20102 4.26	19674 4.22	19354 4.19	91	92	96
2000	22657 5.05	22089 4.58	21590 4.47	21119 4.39	20666 4.35	20329 4.32	96	97	102
2100	23770 5.19	23172 5.12	22644 5.00	22140 4.52	21663 4.48	21310 4.44	100	102	108
2200	24888 5.34	24260 5.25	23704 5.13	23166 5.05	22665 5.00	22295 4.57	105	106	114
2300	26011 5.48	25352 5.39	24768 5.26	24196 5.18	23671 5.13	23312 5.10	110	111	120
2400	27138 6.02	26450 5.53	25836 5.39	25229 5.32	24681 5.26	24311 5.23	115	116	126
2500	28271 6.17	27552 6.07	26910 5.52	26267 5.45	25696 5.39	25316 5.36	120	120	135
2600	29408 6.31	28660 6.21	27990 6.05	27310 5.58	26715 5.52	26326 5.49	125	125	139
2700	30549 6.45	29772 6.34	29074 6.18	28357 6.11	27782 6.05	27342 6.02	130	130	146

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

FLIP23D A330-200 CF6-80E1A4 3420 03701.000011 0250300 .8001 .00000 240 0300350140 0 260169 90179 18590 FCOM-G0-02-05-40-015-115

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - LONG RANGE CRUISE - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
2800	31695 6.59	30886 6.48	30161 6.31	29409 6.24	28817 6.18	28364 6.14	136	135	152
2900	32846 7.13	32005 7.01	31249 6.44	30465 6.37	29856 6.31	29392 6.27	141	143	157
3000	34001 7.28	33129 7.15	32342 6.57	31525 6.50	30898 6.44	30428 6.40	146	149	163
3100	35162 7.42	34258 7.28	33439 7.10	32652 7.03	31946 6.57	31472 6.53	151	157	170
3200	36328 7.56	35393 7.42	34627 7.22	33728 7.16	32999 7.10	32522 7.06	156	159	177
3300	37499 8.10	36532 7.55	35743 7.35	34809 7.29	34058 7.22	33579 7.18	166	164	184
3400	38674 8.24	37787 8.07	36865 7.48	35896 7.42	35122 7.35	34644 7.31	172	164	191
3500	39855 8.38	38948 8.20	37992 8.01	36988 7.55	36192 7.48	35716 7.44	185	168	198
3600	41042 8.52	40115 8.33	39125 8.14	38085 8.08	37267 8.01	36794 7.57	185	173	205
3700	42377 9.04	41288 8.46	40264 8.27	39187 8.21	38348 8.14	37879 8.09	191	177	213
3800	43587 9.18	42467 8.59	41409 8.40	40295 8.34	39434 8.27	38971 8.22	190	182	220
3900	44804 9.32	43647 9.12	42560 8.52	41408 8.46	40526 8.39	40070 8.35	196	187	227
4000	46026 9.45	44831 9.25	43705 9.05	42528 8.59	41625 8.52	41203 8.48*	202	192	234
4100	47255 9.58	46021 9.37	44853 9.19	43651 9.12	42729 9.05	42317 9.01*	207	197	241
4200	48491 10.12	47217 9.50	46004 9.32	44777 9.25	43839 9.18	43438 9.14*	212	202	248
4300	49733 10.25	48420 10.02	47161 9.45	45909 9.38	44953 9.31	44564 9.27*	217	207	255
4400	50982 10.38	49629 10.15	48324 9.58	47047 9.51	46072 9.44	45695 9.39*	223	213	262
4500	52237 10.52	50844 10.27	49492 10.11	48191 10.03	47198 9.56	46831 9.52*	228	218	267
4600	53499 11.05	52065 10.39	50665 10.24	49341 10.16	48332 10.09	47974 10.05*	233	223	275
4700	54769 11.18	53293 10.51	51843 10.37	50496 10.29	49471 10.22	49123 10.18*	239	228	283
4800	56046 11.31	54527 11.03	53027 10.50	51657 10.42	50617 10.35	50277 10.31*	244	234	290
4900	57321 11.44	55768 11.16	54216 11.03	52825 10.55	51769 10.47	51438 10.44*	250	239	301
5000	58601 11.57	57013 11.28	55412 11.16	53998 11.07	52927 11.00	52605 10.57*	256	245	309
5100	59888 12.09	58259 11.40	56613 11.29	55178 11.20	54093 11.13	53777 11.10*	262	252	317
5200	61181 12.22	59512 11.53	57824 11.42	56365 11.33	55311 11.26	54958 11.23*	267	259	326
5300	62481 12.35	60772 12.05	59042 11.55	57557 11.45	56495 11.38	56144 11.36*	272	265	334

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

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FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - LONG RANGE CRUISE - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
5400	63787 12.47	62037 12.18	60265 12.08	58753 11.58	57692 11.51	57336 11.49*	278	272	343
5500	65101 13.00	63310 12.30	61496 12.20	59956 12.11	58918 12.04*	58535 12.02*	283	279	352
5600	66422 13.12	64589 12.43	62734 12.33	61166 12.24	60137 12.17*	59741 12.14*	288	288	361
5700	67750 13.24	65874 12.55	63978 12.46	62383 12.37	61362 12.30*	60953 12.27*	293	295	367
5800	69086 13.37	67167 13.07	65228 12.59	63607 12.49	62592 12.43*	62175 12.40*	299	302	375
5900	70428 13.49	68467 13.20	66485 13.11	64837 13.02	63838 12.56*	63406 12.53*	305	310	384
6000	71769 14.01	69775 13.32	67749 13.24	66148 13.15	65083 13.09*	64644 13.06*	311	317	392
6100	73118 14.13	71086 13.44	69020 13.36	67397 13.28	66334 13.21*	65890 13.19*	317	324	400
6200	74473 14.24	72399 13.57	70299 13.49	68656 13.40	67592 13.34*	67143 13.31*	323	328	410
6300	75837 14.36	73719 14.09	71578 14.02	69922 13.53	68856 13.47*	68406 13.44*	329	339	419
6400	77207 14.47	75047 14.22	72859 14.14	71195 14.06	70128 14.00*	69677 13.57*	334	347	428
6500	78585 14.59	76383 14.34	74244 14.27	72474 14.18	71406 14.13*	70955 14.10*	344	357	437
6600	79969 15.10	77724 14.47	75545 14.39	73761 14.31	72691 14.26*	72276 14.23*	349	361	446
6700	81362 15.22	79202 14.59	76854 14.52	75058 14.44	73984 14.39*	73575 14.35*	362	369	455
6800	82914 15.31	80567 15.11	78170 15.05	76362 14.56	75285 14.52*	74885 14.48*	368	378	464
6900	84328 15.43	81941 15.23	79493 15.17	77675 15.09	76593 15.04*	76204 15.01*	367	386	473
7000	85746 15.55	83324 15.36	80823 15.30	79037 15.22*	77908 15.17*	77533 15.14*	373	395	480
7100	87171 16.07	84699 15.48	82163 15.42	80379 15.35*	79230 15.30*	78878 15.26*	370	403	489
7200	88606 16.18	86069 16.01	83510 15.55	81729 15.47*	80559 15.43*	80220 15.39*	375	412	498
7300	90049 16.30	87446 16.14	84868 16.08	83086 16.00*	81898 15.56*	81569 15.52*	380	422	509
7400	91500 16.42	88831 16.27	86238 16.20	84450 16.13*	83244 16.09*	82925 16.05*	385	431	518
7500	92961 16.53	90223 16.40	87618 16.32	85820 16.26*	84598 16.21*	84287 16.17*	390	438	527
7600	94430 17.05	91622 16.52	89007 16.45	87197 16.39*	85964 16.34*	85657 16.30*	395	446	537
7700	95909 17.16	93029 17.05	90406 16.57	88583 16.51*	87339 16.47*	87034 16.43*	401	454	546
7800	97398 17.28	94444 17.18	91813 17.10	89976 17.04*	88756 17.00*	88419 16.56*	406	463	556
7900	98869 17.40	95868 17.31	93228 17.22	91376 17.17*	90155 17.12*	89811 17.09*	412	471	566

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

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FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.80 - LONG RANGE CRUISE - DESCENT : M.80/300KT/250KT
IMC PROCEDURE : 240 KG (6MIN)

REF. LANDING WEIGHT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 37.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	310	**330**	**350**	**370**	**390**	**410**	**FL310 FL330**	**FL350 FL370**	**FL390 FL410**
8000	100343 17.53	97299 17.43	94655 17.34	92784 17.30*	91564 17.25*	91210 17.21*	420	480	576
8100	101825 18.05	98745 17.56	96092 17.47	94199 17.42*	92982 17.38*	92617 17.34*	428	492	586
8200	103316 18.18	100204 18.08	97539 17.59	95623 17.55*	94411 17.50*	94032 17.47*	437	502	597
8300	104815 18.30	101674 18.20	98991 18.11	97055 18.08*	95852 18.03*	95459 18.00*	445	511	606
8400	106323 18.43	103154 18.33	100442 18.24	98495 18.21*	97302 18.16*	96891 18.12*	453	520	615
8500	107839 18.55	104643 18.45	101904 18.37	99943 18.33*	98763 18.28*	98331 18.25*	462	531	625
8600	109366 19.07	106141 18.57	103463 18.49*	101399 18.46*	100237 18.41*	99780 18.38*	470	540	636
8700	110901 19.20	107649 19.10	104953 19.02*	102865 18.59*	101724 18.54*	101237 18.51*	480	550	646
8800	112458 19.32	109169 19.22	106450 19.15*	104339 19.12*	103218 19.06*	102704 19.03*	475	560	656
8900	114032 19.44	110698 19.34	107956 19.27*	105822 19.24*	104706 19.19*	104180 19.16*	487	570	667
9000	115622 19.56	112235 19.46	109471 19.40*	107348 19.37*	106202 19.32*	105667 19.29*	502	576	677
9100		113767 19.58	110993 19.53*	108865 19.50*	107706 19.45*	107170 19.42*	518	585	687
9200		115398 20.11	112524 20.06*	110392 20.02*	109220 19.57*	108686 19.54*	542	593	698
9300			114063 20.18*	111929 20.15*	110741 20.10*	110212 20.07*		595	708
9400			115612 20.31*	113477 20.28*	112271 20.23*	111749 20.19*		607	704
9500				115038 20.40*	113808 20.35*	113296 20.32*		645	715
9600					115356 20.48*	114856 20.45*			727
9700									
9800									
9900									
10000									
10100									
10200									
10300									
10400									
10500									

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

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GENERAL

The alternate planning tables allow the flight crew to determine the fuel consumption and time required to cover a given air distance from go-around at destination airport to landing at alternate airport.
These tables are established for :
- Go-around : 500 kg or 1100 lb
- Climb profile : 250kt/300kt/M.80
- Long Range Cruise
- Descent profile : M.80/300kt/250kt
- Approach and landing at alternate airport : 160 kg or 350 lb (4 min)
- ISA
- CG = 30%
- Normal air conditioning (Packs NORM/Cargo cooling OFF or Packs LO/cargo cooling NORM)
- Anti ice OFF

Note : *1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.01 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.022 (lb/°C/NM) ×△ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at alternate.
The fuel consumption must 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.

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 500 KG - CLIMB : 250KT/300KT/M.80 - CRUISE : LONG RANGE
DESCENT : M.80/300KT/250KT - VMC PROCEDURE : 160 KG (4MIN)

REF. LDG WT AT ALTERNATE = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF	ISA CG = 30.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	120	140	160	180	200	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL120	FL140 FL160	FL180 FL200
50	1527 0.14						3		
100	2253 0.25	2228 0.25	2227 0.24	2233 0.24	2245 0.23	2262 0.23	5	5	5
150	2981 0.35	2930 0.35	2905 0.34	2887 0.33	2877 0.33	2875 0.32	7	7	8
200	3710 0.45	3634 0.45	3585 0.44	3543 0.43	3511 0.42	3489 0.41	10	10	10
250	4440 0.56	4340 0.55	4266 0.54	4201 0.53	4147 0.52	4105 0.50	12	12	12
300	5173 1.06	5048 1.05	4949 1.03	4860 1.02	4784 1.01	4723 0.59	14	14	15
350	5907 1.17	5757 1.15	5634 1.13	5520 1.12	5423 1.10	5342 1.08	17	17	17
400	6643 1.27	6468 1.25	6319 1.23	6182 1.21	6063 1.20	5962 1.17	19	19	19
450	7382 1.37	7181 1.35	7007 1.33	6846 1.31	6705 1.29	6583 1.26	21	21	22
500	8122 1.48	7895 1.45	7695 1.42	7511 1.41	7348 1.39	7205 1.35	24	24	24
550	8863 1.58	8611 1.55	8386 1.52	8177 1.50	7993 1.48	7829 1.44	26	26	27
600	9607 2.08	9328 2.05	9077 2.02	8846 2.00	8639 1.57	8454 1.53	29	29	29
650	10353 2.18	10048 2.14	9771 2.12	9515 2.09	9287 2.06	9080 2.02	31	31	31
700	11100 2.28	10769 2.24	10466 2.21	10187 2.19	9937 2.16	9708 2.11	34	34	34
750	11849 2.38	11491 2.34	11162 2.31	10860 2.28	10588 2.25	10337 2.20	36	36	36
800	12601 2.48	12216 2.44	11860 2.41	11534 2.38	11241 2.34	10967 2.29	38	38	39
850	13354 2.58	12942 2.54	12559 2.50	12210 2.47	11895 2.43	11599 2.38	41	41	41
900	14109 3.08	13670 3.03	13260 3.00	12888 2.57	12551 2.52	12232 2.47	43	43	43
950	14865 3.18	14400 3.13	13963 3.10	13567 3.06	13209 3.02	12866 2.56	46	46	46
1000	15623 3.28	15131 3.23	14667 3.19	14248 3.16	13868 3.11	13502 3.05	48	48	48
1050	16382 3.38	15863 3.33	15373 3.29	14930 3.25	14529 3.20	14139 3.13	51	51	51
1100	17144 3.48	16597 3.42	16081 3.39	15614 3.34	15192 3.29	14777 3.22	53	53	53
1150	17907 3.58	17332 3.52	16790 3.48	16298 3.44	15855 3.38	15417 3.31	56	55	55
1200	18672 4.08	18070 4.02	17500 3.58	16984 3.53	16520 3.47	16058 3.40	58	58	58

PACK FLOW LO	**PACK FLOW HI OR/ AND CARGO COOL ON**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 1.5 %	△FUEL = + 3 %	△FUEL = + 5 %

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ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 500 KG - CLIMB : 250KT/300KT/M.80 - CRUISE : LONG RANGE
DESCENT : M.80/300KT/250KT - VMC PROCEDURE : 160 KG (4MIN)

REF. LDG WT AT ALT = 140000 KG NORMAL AIR CONDITIONING ANTI ICING OFF			ISA CG = 30.0 %		**FUEL CONSUMED (KG)** **TIME (H.MIN)**		
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	230	**270**	**310**	**350**	**390**	**FL230 FL270**	**FL310 FL350**	**FL390**
150	2880 0.31	2913 0.30				8		0
200	3463 0.40	3459 0.38	3484 0.36	3508 0.36		10	11	0
250	4048 0.48	4007 0.46	3998 0.44	3992 0.43	4000 0.42	12	13	14
300	4633 0.57	4555 0.54	4513 0.52	4478 0.50	4460 0.49	14	15	16
350	5220 1.06	5104 1.02	5029 0.59	4964 0.57	4921 0.55	17	18	18
400	5808 1.14	5655 1.11	5546 1.07	5451 1.04	5383 1.02	19	20	20
450	6398 1.23	6207 1.19	6064 1.14	5940 1.11	5847 1.09	21	22	23
500	6988 1.31	6760 1.27	6584 1.22	6429 1.18	6311 1.15	23	24	25
550	7580 1.40	7315 1.35	7104 1.29	6919 1.25	6776 1.22	26	26	27
600	8173 1.49	7870 1.43	7626 1.37	7411 1.32	7242 1.28	28	29	29
650	8768 1.57	8427 1.51	8149 1.44	7904 1.39	7709 1.35	30	31	31
700	9364 2.06	8985 1.59	8673 1.51	8398 1.46	8177 1.42	33	33	34
750	9961 2.14	9545 2.07	9198 1.59	8892 1.54	8646 1.48	35	35	36
800	10559 2.23	10105 2.15	9724 2.06	9388 2.00	9116 1.55	37	38	38
850	11159 2.31	10667 2.23	10251 2.14	9885 2.07	9587 2.01	39	40	40
900	11760 2.40	11230 2.31	10779 2.21	10383 2.14	10059 2.08	42	42	43
950	12363 2.48	11795 2.39	11309 2.28	10883 2.21	10532 2.15	44	44	45
1000	12966 2.57	12360 2.47	11839 2.36	11383 2.28	11006 2.21	46	47	47
1050	13571 3.05	12927 2.55	12371 2.43	11884 2.35	11481 2.28	49	49	49
1100	14178 3.14	13495 3.03	12904 2.50	12387 2.42	11957 2.34	51	51	52
1150	14786 3.22	14065 3.11	13439 2.58	12890 2.49	12435 2.41	53	54	54
1200	15395 3.31	14636 3.19	13974 3.05	13395 2.56	12913 2.47	56	56	56
PACK FLOW LO △FUEL = – 0.5		**PACK FLOW HI OR/ AND CARGO COOL ON** △FUEL = + 1.5 %		**ENGINE ANTI ICE ON** △FUEL = + 3 %		**TOTAL ANTI ICE ON** △FUEL = + 5 %		

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GENERAL

R The ground to air miles conversion tables show the air distance for a given ground distance due to influence of the wind.

R The tables are given for:

- M.80, M.82, M.84
- R — Long range cruise

M.80

GROUND DIST. (NM)	AIR DISTANCE (NM) TAIL WIND +150	WIND COMPONENT (KT) +100	+ 50	0	-50	-100	HEAD WIND -150
10	8	8	9	**10**	11	13	15
20	15	16	18	**20**	22	26	30
30	23	25	27	**30**	34	38	44
40	30	33	36	**40**	45	51	59
50	38	41	45	**50**	56	64	74
100	75	82	90	**100**	112	128	148
200	151	164	180	**200**	224	255	296
300	226	247	271	**300**	336	383	445
400	302	329	361	**400**	449	511	593
500	377	411	451	**500**	561	638	741
1000	755	822	902	**1000**	1122	1277	1482
1500	1132	1233	1353	**1500**	1682	1915	2223
2000	1509	1644	1804	**2000**	2243	2554	2964
2500	1886	2054	2255	**2500**	2804	3192	3705
3000	2264	2465	2707	**3000**	3365	3831	4446
3500	2641	2876	3158	**3500**	3926	4469	5187
4000	3018	3287	3609	**4000**	4486	5108	5928
4500	3395	3698	4060	**4500**	5047	5746	6669
5000	3773	4109	4511	**5000**	5608	6385	7411
5500	4150	4520	4962	**5500**	6169	7023	8152
6000	4527	4931	5413	**6000**	6730	7661	8893
6500	4905	5342	5864	**6500**	7290	8300	9634
7000	5282	5753	6315	**7000**	7851	8938	10375
7500	5659	6163	6766	**7500**	8412	9577	11116
8000	6036	6574	7217	**8000**	8973	10215	11857
8500	6414	6985	7669	**8500**	9534	10854	12598
9000	6791	7396	8120	**9000**	10095	11492	13339
9500	7168	7807	8571	**9500**	10655	12131	14080
10000	7546	8218	9022	**10000**	11216	12769	14821

M.82

GROUND DIST (NM)	AIR DISTANCE (NM) TAIL WIND		WIND COMPONENT (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 DIST (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENT (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 CRUISE BELOW FL250

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENT (KT)				HEAD WIND
	+150	+100	+ 50	0	-50	-100	-150
10	7	8	9	**10**	12	14	17
20	14	16	18	**20**	23	27	33
30	22	24	27	**30**	35	41	50
40	29	32	35	**40**	46	54	66
50	36	40	44	**50**	58	68	83
100	72	79	88	**100**	115	136	165
200	143	158	177	**200**	230	271	330
300	215	238	265	**300**	345	407	495
400	287	317	354	**400**	461	543	660
500	359	396	442	**500**	576	678	825
1000	717	792	884	**1000**	1151	1357	1651
1500	1076	1188	1326	**1500**	1727	2035	2476
2000	1434	1584	1768	**2000**	2303	2713	3302
2500	1793	1980	2210	**2500**	2878	3391	4127
3000	2152	2376	2652	**3000**	3454	4070	4953
3500	2510	2772	3093	**3500**	4030	4748	5778
4000	2869	3167	3535	**4000**	4605	5426	6604
4500	3227	3563	3977	**4500**	5181	6105	7429
5000	3586	3959	4419	**5000**	5757	6783	8254
5500	3945	4355	4861	**5500**	6332	7461	9080
6000	4303	4751	5303	**6000**	6908	8139	9905
6500	4662	5147	5745	**6500**	7484	8818	10731
7000	5021	5543	6187	**7000**	8059	9496	11556
7500	5379	5939	6629	**7500**	8635	10174	12382
8000	5738	6335	7071	**8000**	9210	10853	13207
8500	6096	6731	7513	**8500**	9786	11531	14033
9000	6455	7127	7955	**9000**	10362	12209	14858
9500	6814	7523	8397	**9500**	10937	12887	15684
10000	7172	7919	8838	**10000**	11513	13566	16509

LONG RANGE CRUISE ABOVE FL250

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENT (KT)				HEAD WIND
	+150	+100	+ 50	0	-50	-100	-150
10	8	8	9	10	11	13	15
20	15	16	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	64	74
100	76	82	90	100	112	127	147
200	151	165	181	200	224	254	295
300	227	247	271	300	336	382	442
400	303	330	361	400	448	509	589
500	379	412	452	500	560	636	736
1000	757	824	903	1000	1120	1272	1473
1500	1136	1236	1355	1500	1680	1908	2209
2000	1514	1648	1807	2000	2240	2544	2945
2500	1893	2059	2258	2500	2799	3180	3681
3000	2271	2471	2710	3000	3359	3817	4418
3500	2650	2883	3162	3500	3919	4453	5154
4000	3028	3295	3613	4000	4479	5089	5890
4500	3407	3707	4065	4500	5039	5725	6627
5000	3785	4119	4517	5000	5599	6361	7363
5500	4164	4531	4968	5500	6159	6997	8099
6000	4542	4943	5420	6000	6719	7633	8836
6500	4921	5354	5872	6500	7279	8269	9572
7000	5299	5766	6324	7000	7839	8905	10308
7500	5678	6178	6775	7500	8398	9541	11044
8000	6056	6590	7227	8000	8958	10177	11781
8500	6435	7002	7679	8500	9518	10814	12517
9000	6813	7414	8130	9000	10078	11450	13253
9500	7192	7826	8582	9500	10638	12086	13990
10000	7570	8238	9034	10000	11198	12722	14726

FUEL TANKERING

GENERAL

Fuel tankering graphs allow to determine the optimum fuel quantity to be tankered as a function of the fuel price ratio between departure and destination airports. The following pages present for one flight level per page the optimum aircraft takeoff weight depending on the fuel price ratio (departure fuel price divided by destination fuel price) and on the air distance to fly.

The computed optimum takeoff weight is based on the additional fuel consumption needed for the transport of the extra (tankered) fuel and it is the weight at which the maximum profit can be achieved. The quantity of extra fuel that can be loaded is calculated as the difference between the optimum takeoff weight (including extra fuel) and the planned takeoff weight (without fuel tankering).

The graphs are established for :
- FL 290, 310, 330, 350, 370, 390
- Air distances from 500 to 5000 NM
- Flight profile :
  Climb : 250kt/300kt/M.80
  Cruise : M.80
  Descent : M.80/300kt/250kt

Note : *1. If necessary, step climbs are performed to reach the indicated flight levels.*
2. The crew/operator has to verify that the found aircraft weight complies with basic aircraft limitations (e.g. max fuel capacity) as well as with mission dependent restrictions (e.g. MLW at destination).

EXAMPLES

1. Fuel price ratio = 0.934
Cruising Altitude = FL310
Planned TOW = 190 000 kg (mission weight without fuel tankering)
Air Distance = 2500 NM
Enter graph on page 2.05.70 p.4.
For the given air distance, the optimum fuel tankering weight is 180 000 kg, which is lower than the planned takeoff weight → no fuel tankering recommended.

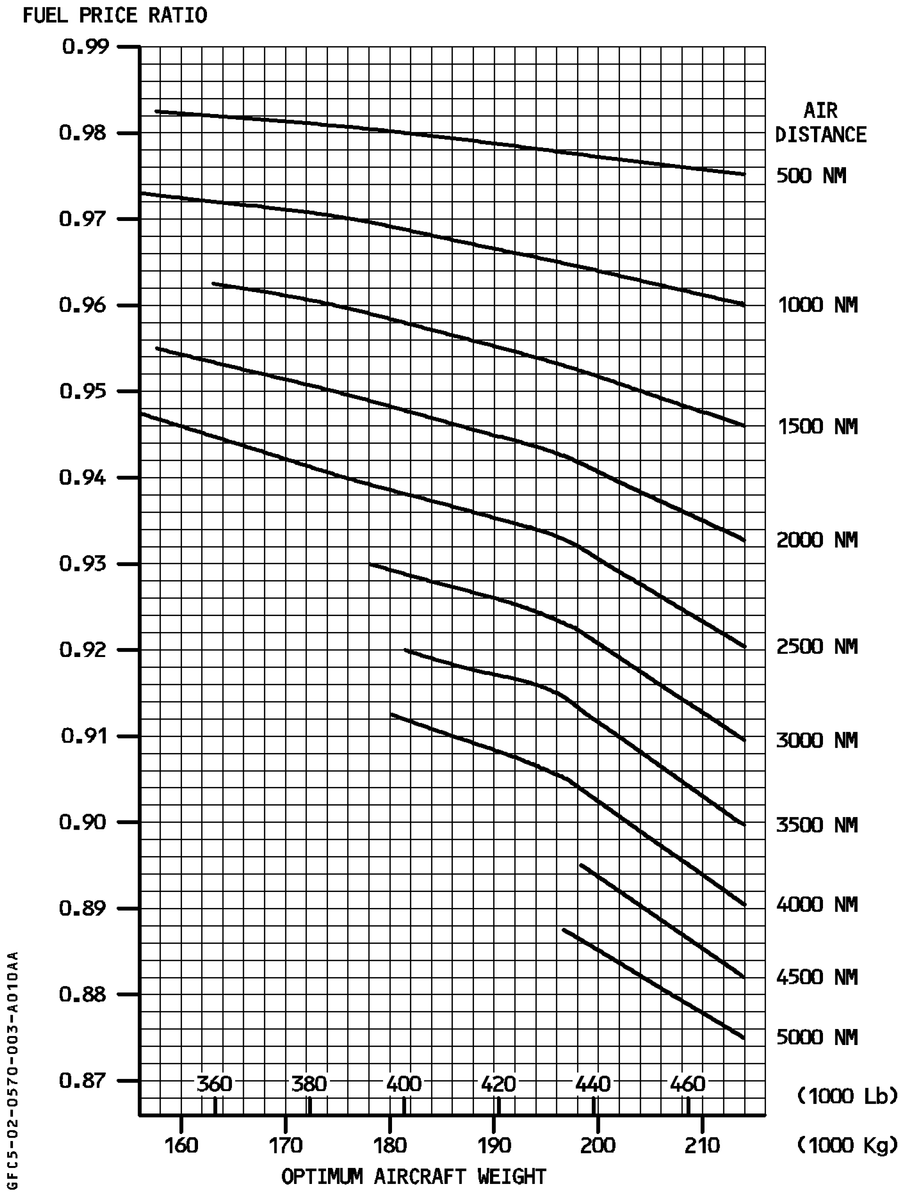
2. fuel price ratio = 0.908

Cruising Altitude = FL 350
Planned TOW = 190 000 kg (mission weight without fuel tankering)
Air Distance = 2250 NM
Enter graph on page 2.05.70 P.6.
For the given air distance, the optimum fuel tankering weight is 203 000 kg, which is 13 000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 13 000 kg.
Check :
a) new TOW less or equal MTOW from departure airport.
b) total fuel to be loaded less or equal maximum fuel capacity.
c) MLW at destination

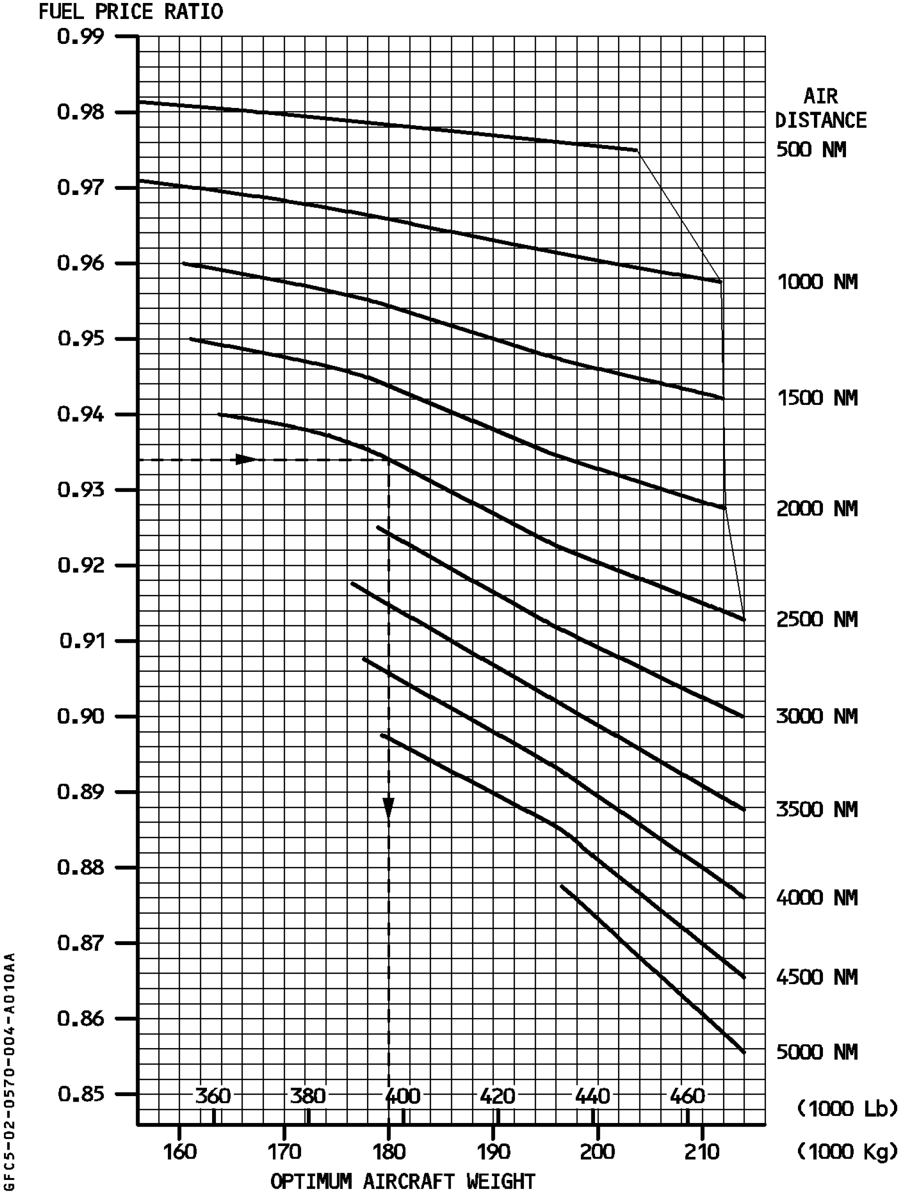
3. fuel price ratio = 0.874

Cruising Altitude = FL 390
Planned TOW = 190 000 kg (mission weight without fuel tankering)
Air Distance = 2250 NM
Enter graph on page 2.05.70 P. 8.
Interpolate for the air distance of 2250 NM between borderline and 2000 NM.
The optimum fuel tankering weight is 198 000 kg, which is 8 000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 8 000 kg.
Check :
a) new TOW less or equal MTOW from departure airport.
b) total fuel to be loaded less than or equal to maximum fuel capacity.
c) MLW at destination

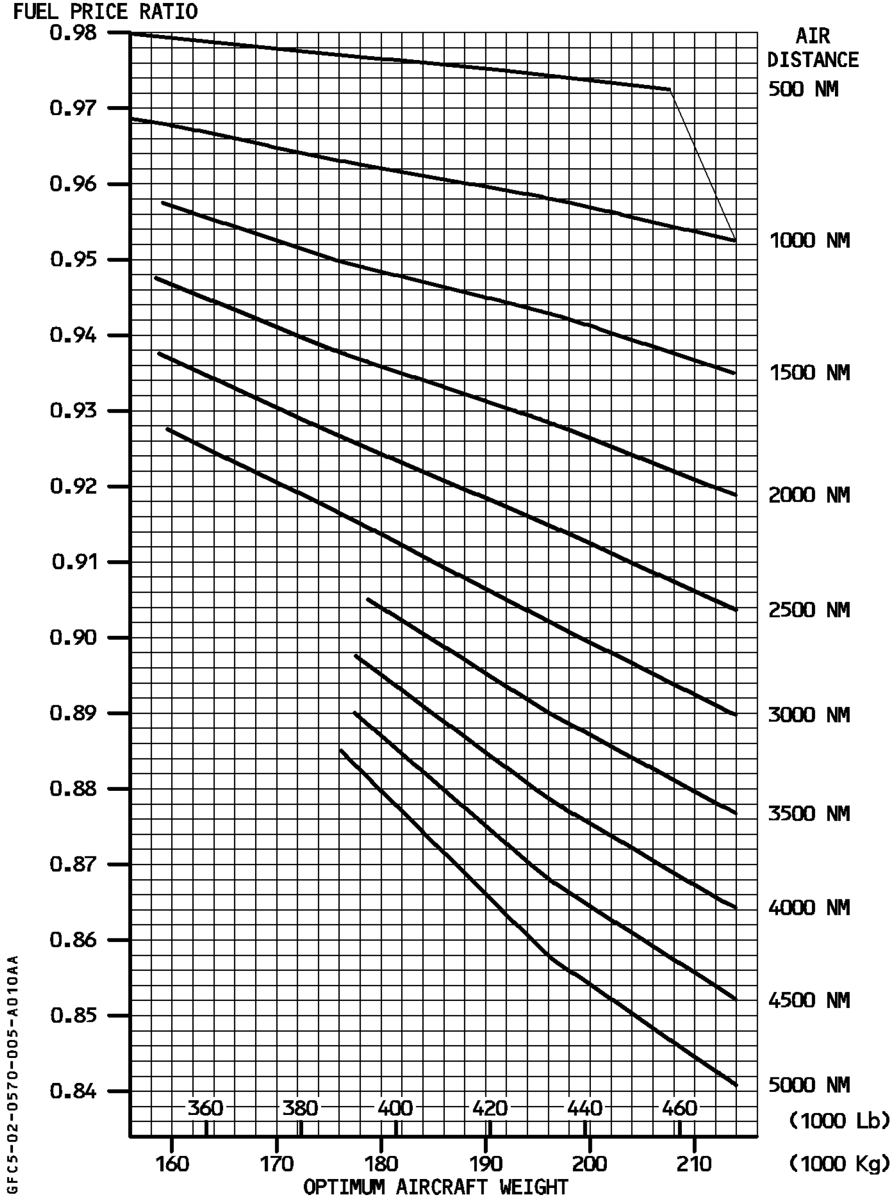
FL 290


FUEL PRICE RATIO
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-003-A010AA

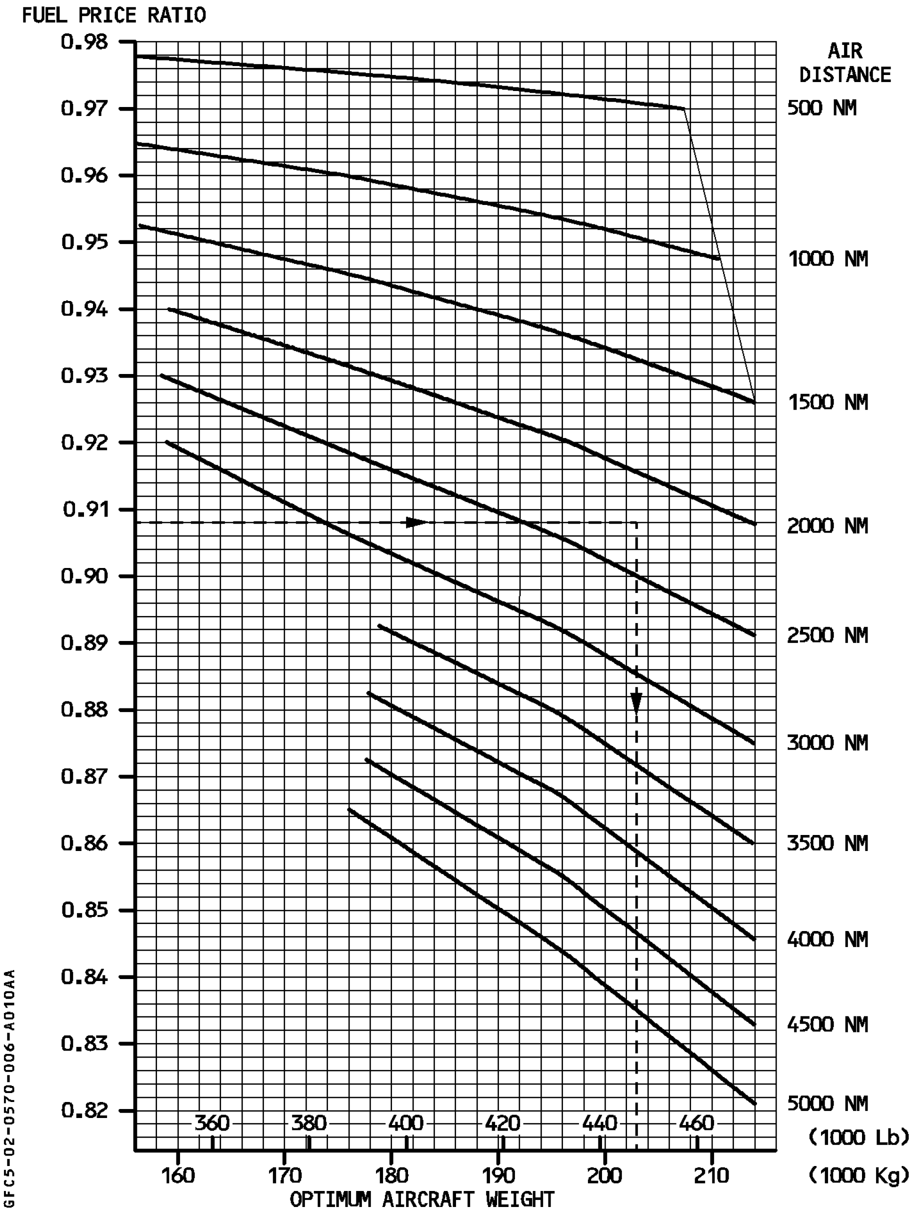
FL 310


FUEL PRICE RATIO
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
0.86
0.85
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-004-A010AA

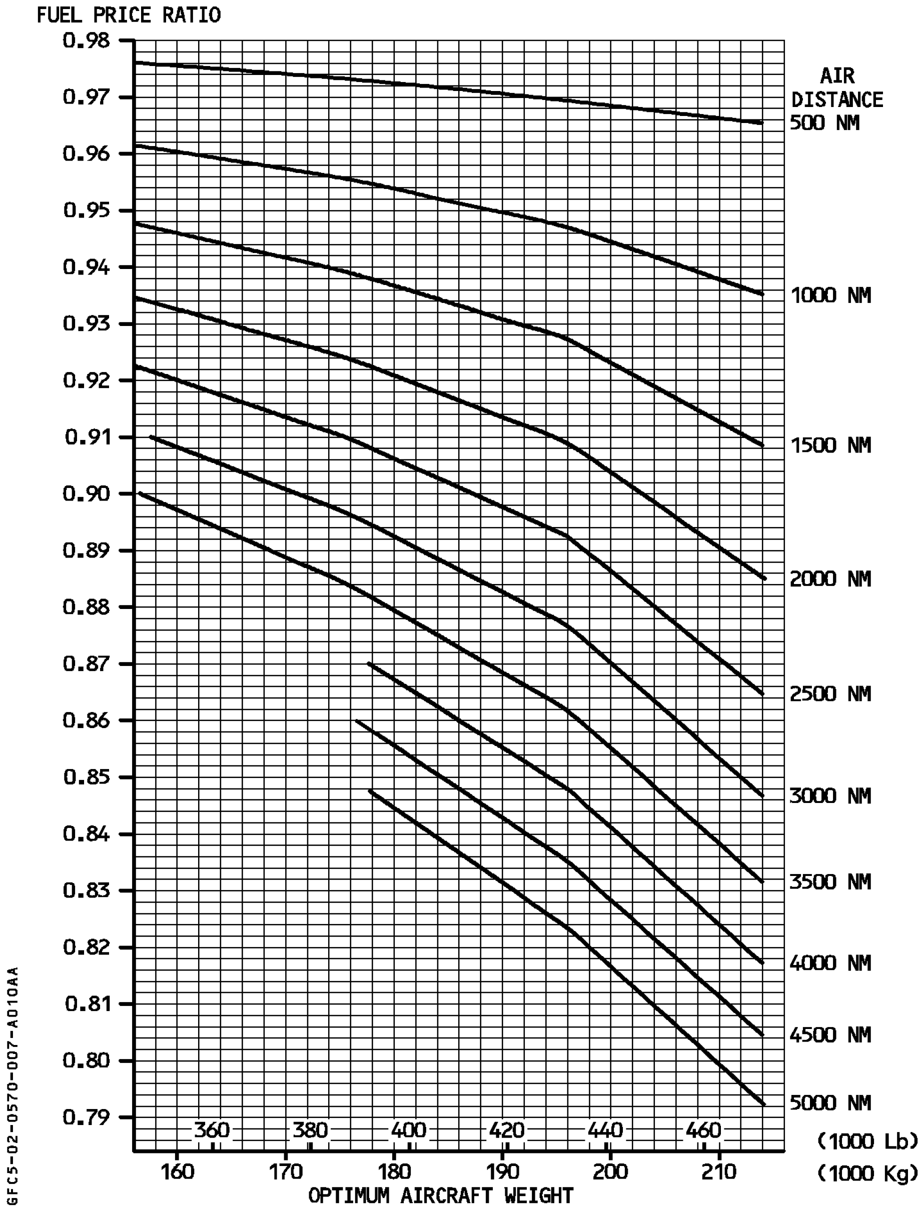
FL 330


FUEL PRICE RATIO
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
0.86
0.85
0.84
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-005-A010AA

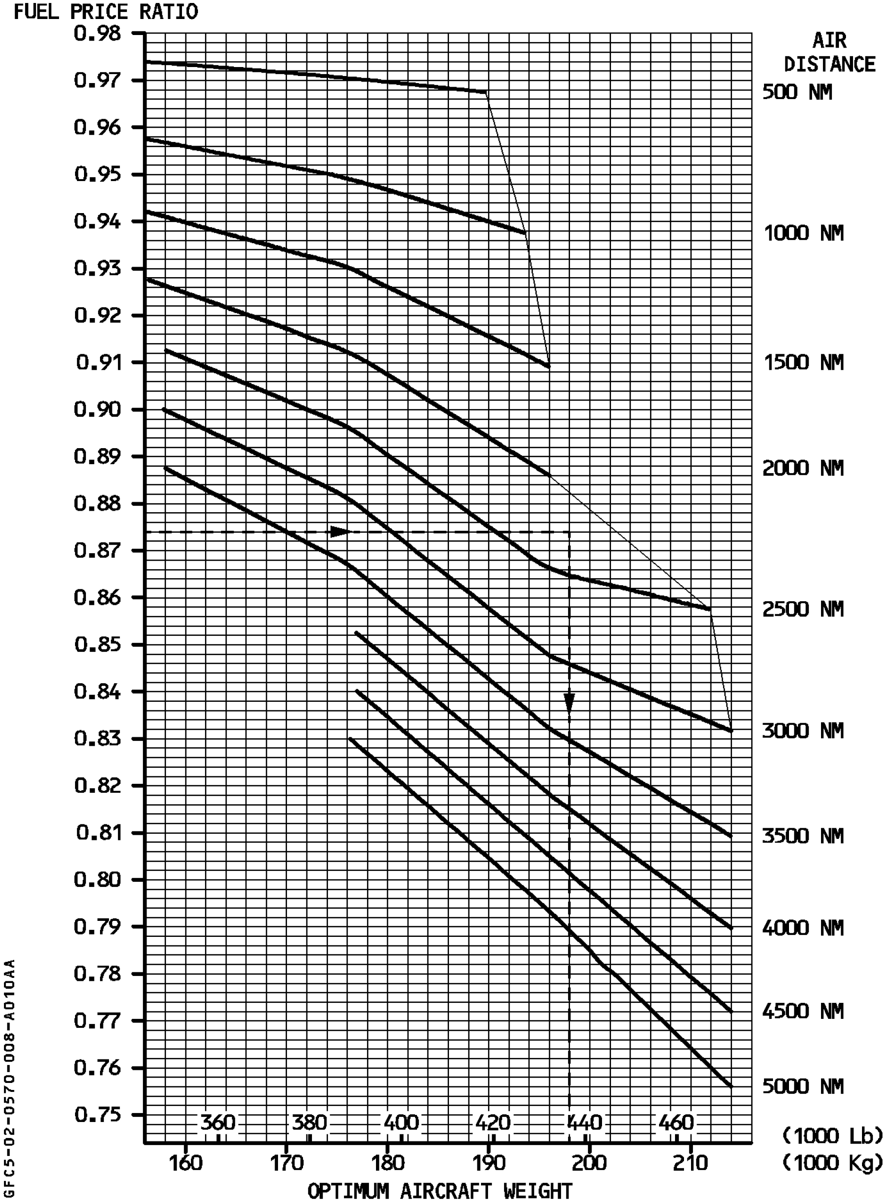
FL 350


FUEL PRICE RATIO
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
0.86
0.85
0.84
0.83
0.82
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-006-AD10AA

FL 370


FUEL PRICE RATIO
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0.80
0.79
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-007-A010AA

FL 390


FUEL PRICE RATIO
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0.89
0.88
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0.80
0.79
0.78
0.77
0.76
0.75
AIR DISTANCE
500 NM
1000 NM
1500 NM
2000 NM
2500 NM
3000 NM
3500 NM
4000 NM
4500 NM
5000 NM
360
380
400
420
440
460
(1000 Lb)
160
170
180
190
200
210
(1000 Kg)
OPTIMUM AIRCRAFT WEIGHT
GFC5-02-0570-008-A010AA