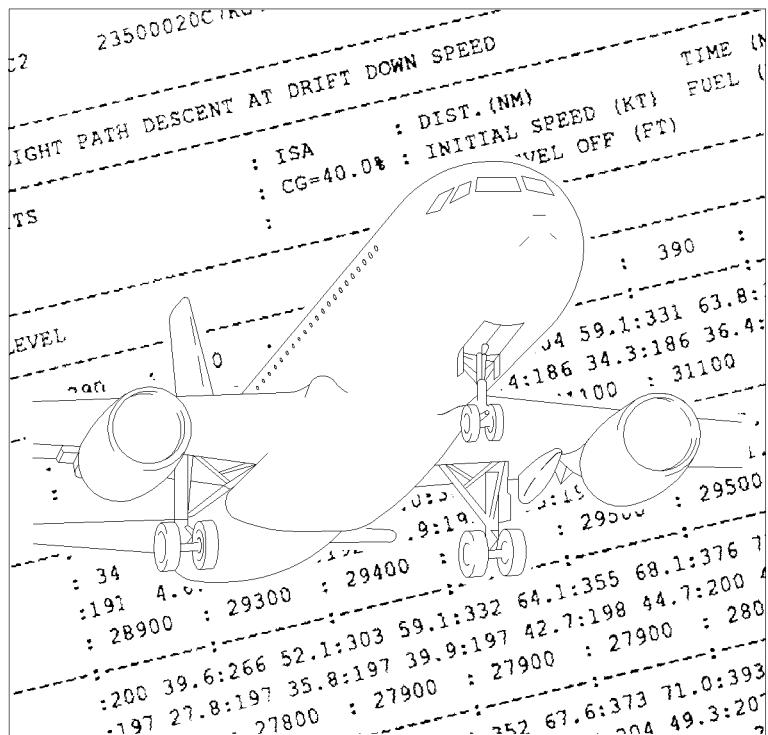


A318/A319/A320/A321

FLIGHT CREW OPERATING MANUAL



FLIGHT PREPARATION

2

AIRBUS®

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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

NFC5-02-0010-001-A001AA

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 : flttops.fbwstd@airbus.com

FOR TECHNICAL OR
PROCEDURAL
CONTENT

AIRBUS - BP N°33
1 ROND POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX - FRANCE
TELEX TLSBP7X or 530526F
FAX 33.5.61.93.28.06
ATTN. Technical Documentation Services - SDC
EMAIL : sb.reporting@airbus.com

FOR PRINTING AND
DISTRIBUTION

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.
- R 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 :
- R — 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).
 - R — Provide Airbus operators with a basis for their development of a customized airline operations manual, in accordance with applicable requirements.

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- 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 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 personnel injury or loss of life if not carefully followed.

CAUTION : an operating procedure, technique, etc, which may result in damage to equipment if not carefully followed.

NOTE : an operating procedure, technique, etc, considered essential to emphasize.

COMPLEMENTARY INFORMATION

The manual includes technical information required for training as well as complementary information.

- Where a paragraph or schematic is preceded by the heading **FOR INFO** the details given are considered to be nice to know. Knowledge of these items is not required for the type rating qualification.
- 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

NFC5-02-0010-003-A001AC

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7 → R

6 → MSN 0004 0008 0010 - 0014

- 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
 - 0004 0008 means that the page is applicable to aircraft MSN 0004 and MSN 0008
 - 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.

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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 sequence e.g. 20A, 20B, 20C... for intermediate revisions issued between normal revisions 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 cover urgent matters arising between normal revisions. They are accompanied by filing instructions and an updated customized list of effective TR.

A yellow temporary revision record sheet is at the front of each volume. 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 operator, a temporary revision or an intermediate revision is issued between normal 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 come with an OEB record sheet. This record sheet 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 the reason for change. It states EFFECTIVITY CHANGE ONLY if the page is only revised due to effectivity change and not due to technical content.

LIST OF EFFECTIVE PAGES (LEP)

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

BEST WAY TO GET UPDATED DOCUMENTATION

- R 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
0002	STD = Mod : 22013 = 24373 = 30961 = (24373+30961)
0003	Mod : 20268 = (20139+20268+22129)
0004	Mod : 20268 = (20268+L) = (20139+20268+22129) = (20139+20268+22129+L)
0005	Mod : (20268+25647) = (20268+25647+ACA)
0008	Mod : 24404 = 24405 = (24404+25800) = (24405+25800) = (25800+27727) = (24404+25800+27727) = (24405+25800+27727)
0009	STD = Mod : 25800 = (24405+25501) = (24405+25501+25800)
0010	Mod : 24405 = (24405+25800) = (25800+27727) = (24405+25800+27727)
0013	IAE V2522 = V2524 = V2527M = V2530 = V2533 = (Mod : 28160+IAE V2500 = V2527 = V2527E)
0014	CFM 56-5-A4 = A5 = (Mod : 28160+CFM 56-5-A1 = A3)
0015	CFM 56-5-B1 = B2 = B3 = B5 = B6 = B7 = B8 = (Mod : 28160+CFM 56-5-B4)
0017	Mod : 24404 = (24404+25800) = (25800+27727) = (24404+25800+27727)
0018	Mod : 25530 = (25530+25800) = (25800+27727) = (25530+25800+27727)
0019	STD = Mod : 25800 = (24404+25502) = (24404+25502+25800)
0020	Mod : (22013+36310) = (22013+25800+36310)
0021	Mod : (20024+20167) = (20024+20167+21120+23869) = (20024+20167+21120+22802+23869)
R 0022	Mod : (20040+20065+20106+20107+21103+22013+25453)
R 0023	Mod : (20268+25530) = (20268+25530+25800) = (20268+25800+27727) = (20268+25530+25800+27727)
R 0024	Mod : (20024+20167) = (20024+20167+22802) = (20024+20167+21120+23869) = (20024+20167+21120+22802+23869)
R 0025	Mod : (20024+20167+22013) = (20024+20167+22013+22802) = (20024+20167+20586+22013+22802)
R 0026	Mod : (20024+20167+21120) = (20024+20167+21120+22802)
R 0028	Mod : (20040+20065+20106+20107+21103+22013+30422) = (20040+20065+20106+20107+21103+22013+25453+30422)
R 0029	STD = Mod : 22802 = (20586+22802)
R 0030	Mod : 22013 = (22013+22802) = (20586+22013+22802)
R 0031	Mod : 20024 = (20024+22802) = (20024+20586+22802)
R 0033	Mod : (20164+24373) = (20164+22013+24373)
R 0034	Mod : (21103+28378) = (21103+25714+26131)
R 0035	Mod : (20268+32121) = (21103+25714+26131) = (20268+32121+36885) = (20268+32121+36311) = (20268+32121+36297)
R 0041	Mod : 22461 = 23408 = (22461+23408)
R 0042	Mod : (20268+22013) = (20268+22013+25141)
R 0043	Mod : (20268+25714) = (20268+25714+26131)
R 0044	Mod : 22461 = 23108 = 23871 = (22461+26018) = (22461+26645) = (23108+26018) = (23871+26018) = (23871+26645) = (22461+23108+23109) = (22461+26018+26645) = (23871+26018+26645) = (22461+23108+23109+26018)
R 0045	Mod : (20268+22461) = (20268+23408) = (20268+22461+23408) = (20139+20268+22129+22461+23408)
R 0046	Mod : (25615+26018+26645) = (23108+25615+26018+26645)

CODE	DESIGNATION
0047	Mod : $(25615+26018) = (23108+25615+26018)$
0048	Mod : $20268 = (20268+25800) = (20268+24405+25501) = (20268+24405+25501+25800)$
0049	Mod : $(20268+24405) = (20268+24405+25800) = (20268+25800+27727) = (20268+24405+25800+27727)$
0050	Mod : $(20268+24404) = (20268+24404+25800) = (20268+25800+27727) = (20268+24404+25800+27727)$
0051	Mod : $20268 = (20268+25800) = (20268+24404+25502) = (20268+24404+25502+25800)$
0052	Mod : $20268 = (20268+25800)$
0053	Mod : $(20268+28238) = (20268+25800+28238)$
0055	STD = Mod : $(20139+22129) = (20139+22129+28160+28917)$
0056	Mod : $20139 = (20139+28160+28917)$
0058	Mod : $22461 = 23408 = (22461+23408)$
0067	Mod : $(20268+24044+28721+31607) = (20268+24044+28960+31607)$
0068	Mod : $(20268+25647) = (20268+ACA)$
0069	Mod : $26723 = 27410 = 27639 = 27763 = 30277 = 30835 = 30836$
0070	Mod : $20268 = (20268+25800) = (20268+24404+35404) = (20268+27727+35404) = (20268+24404+25800+35404) = (20268+24404+27727+35404) = (20268+25800+27727+35404) = (20268+24404+25800+27727+35404)$
0071	Mod : $20268 = (20268+25800) = (20268+24404+25502) = (20268+24404+35404) = (20268+27727+35404) = (20268+24404+25502+25800) = (20268+24404+25800+35404) = (20268+24404+27727+35404) = (20268+25800+27727+35404) = (20268+24404+25800+27727+35404)$
0072	STD = Mod : $25800 = (24404+35404) = (27727+35404) = (24404+27727+35404) = (24404+25800+35404) = (25800+27727+35404) = (24404+25800+27727+35404)$
0073	STD = Mod : $24404 = 24405 = (24404+25502) = (24405+25501) = (24404+35404) = (27727+35404) = (24404+25502+25800) = (24405+25501+25800) = (24404+27727+35404) = (24404+25800+35404) = (25800+27727+35404) = (24404+25800+27727+35404)$
0075	Mod : $(20268+24044+25647) = (20268+24044+ACA) = (20268+24044+25647+ACA)$
0076	Mod : $(20268+28721) = (20268+28960)$
0077	Mod : $(20268+24044+28721) = (20268+24044+28960)$
0078	Mod : $(20268+28238) = (20268+25800+28238)$
0079	Mod : $20268 = (20268+25647)$
0080	Mod : $(20268+25647) = (ACA = CMM) = (20268+25647+ACA = CMM)$
0081	STD = Mod : $24105 = 27773 = (24105+27773) = (24105+27773+28471)$
0082	Mod : $(20268+24044+25647) = (20268+24044+ACA) = (20268+24044+25647+ACA) = (20268+24044+25647+28960+ACA)$
0083	Mod : $(20024+20167+22013+30422) = (20024+20167+22013+25453+30422)$
0084	Mod : $(20024+25453) = (20024+20164+25453) = (20024+20586+25453)$
0086	Mod : $(20024+22013+25453) = (20024+22013+30422) = (20024+22013+25453+30422)$
0087	Mod : $(20024+22013+25453+31286) = (20024+22013+30422+31286) = (20024+22013+25453+30422+31286)$
0090	Mod : $(20268+24946+26965) = (20268+24946+27773) = (20268+25951+26965) = (20268+25951+27773) = (20268+26760+26965) = (20268+26760+27773) = (20268+26965+32150) = (20268+26965+32238) = (20268+26965+32239) = (20268+26965+32311) = (20268+27773+32150) = (20268+27773+32238) = (20268+27773+32239) = (20268+27773+32311) = (20268+26965+35040) = (20268+27773+35040)$

CODE	DESIGNATION
R 0091	Mod : $22013 = (22013+32656) = (22013+34221) = (22013+34221+32656)$
0092	Mod : $(24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311) = (26965+35040) = (27773+35040)$
0093	Mod : $25530 = (25530+25800) = (25800+27727) = (25530+25800+27727)$
0094	Mod : $(24946+25615+26965) = (24946+25615+27773) = (25615+25951+26965) = (25615+25951+27773) = (25615+26760+26965) = (25615+26760+27773) = (25615+26965+32150) = (25615+26965+32238) = (25615+26965+32239) = (25615+26965+32311) = (25615+27773+32150) = (25615+27773+32238) = (25615+27773+32239) = (25615+27773+32311) = (25615+26965+35040) = (25615+27773+35040)$
0095	Mod : $(20268+24946+26965) = (20268+24946+27773) = (20268+25951+26965) = (20268+25951+27773) = (20268+26760+26965) = (20268+26760+27773) = (20268+26965+32150) = (20268+26965+32238) = (20268+26965+32239) = (20268+26965+32311) = (20268+27773+32150) = (20268+27773+32238) = (20268+27773+32239) = (20268+27773+32311) = (20268+26965+35040) = (20268+27773+35040) = (20268+24946+26965+US) = (20268+24946+27773+US) = (20268+25951+26965+US) = (20268+25951+27773+US) = (20268+26760+26965+US) = (20268+26760+27773+US) = (20268+26965+32150+US) = (20268+26965+32238+US) = (20268+26965+32239+US) = (20268+26965+32311+US) = (20268+27773+32150+US) = (20268+27773+32238+US) = (20268+27773+32239+US) = (20268+27773+32311+US)$
R 0096	Mod : $(20024+20164+20586) = (20024+20164+37565)$
0097	Mod : $(20268+26965)$ or $(20268+31106)$
0098	Mod : $(20268+25647+26965) = (20268+25647+31106) = (20268+26965+ACA = MXA) = (20268+31106+ACA = MXA)$
R 0099	Mod : $(20268+25647+26965) = (20268+25647+31106)$
R 0100	Mod : $(20024+20167+22013) = (20024+20167+20586+22013) = (20024+20167+22013+37565)$
R 0101	Mod : $(20024+20586+28238) = (20024+28238+37565)$
0102	Mod : $(22461+27773+32311) = (22461+27773+32150) = (22461+27773+24946) = (22461+27773+26760) = (22461+27773+32238) = (22461+27773+25951) = (22461+27773+32239) = (22461+26965+32311) = (22461+26965+32150) = (22461+26965+24946) = (22461+26965+26760) = (22461+26965+32238) = (22461+26965+25951) = (22461+26965+32239) = (22461+26965+35040) = (22461+27773+35040) = (23408+27773+32311) = (23408+27773+32150) = (23408+27773+24946) = (23408+27773+26760) = (23408+27773+32238) = (23408+27773+25951) = (23408+27773+32239) = (23408+26965+32311) = (23408+26965+32150) = (23408+26965+24946) = (23408+26965+26760) = (23408+26965+32238) = (23408+26965+25951) = (23408+26965+32239) = (23408+26965+35040) = (23408+27773+35040) = (22461+23408+27773+32311) = (22461+23408+27773+32150) = (22461+23408+27773+24946) = (22461+23408+27773+26760) = (22461+23408+27773+32238) = (22461+23408+27773+25951) = (22461+23408+27773+32239) = (22461+23408+26965+32311) = (22461+23408+26965+32150) = (22461+23408+26965+24946) = (22461+23408+26965+26760) = (22461+23408+26965+32238) = (22461+23408+26965+25951) = (22461+23408+26965+32239) = (22461+23408+27773+35040)$
R 0103	Mod : $(20268+25647+CFM 56-5-B6) = (ACA = MXA+CFM 56-5-B6)$
0104	Mod : $(20024+20167+21120+22013) = (20024+20167+20586+21120+22013)$

CODE	DESIGNATION
0105	$\begin{aligned} \text{Mod : } & (20268+24946+25647+27773) = (20268+25647+27773+32311) = \\ & (20268+25647+27773+32150) = (20268+25647+26760+27773) = \\ & (20268+25647+27773+32238) = (20268+25647+27773+32239) = \\ & (20268+25647+25951+27773) = (20268+24946+25647+26965) = \\ & (20268+25647+26965+32311) = (20268+25647+26965+32150) = \\ & (20268+25647+26760+26965) = (20268+25647+26965+32238) = \\ & (20268+25647+26965+32239) = (20268+25647+25951+26965) = \\ & (20268+25647+26965+35040) = (20268+25647+27773+35040) = \\ & (20268+24946+27773+ACA) = (20268+27773+32311+ACA) = \\ & (20268+27773+32150+ACA) = (20268+26760+27773+ACA) = \\ & (20268+27773+32238+ACA) = (20268+27773+32239+ACA) = \\ & (20268+25951+27773+ACA) = (20268+24946+26965+ACA) = \\ & (20268+26965+32311+ACA) = (20268+26965+32150+ACA) = \\ & (20268+26760+26965+ACA) = (20268+26965+32238+ACA) = \\ & (20268+26965+32239+ACA) = (20268+25951+26965+ACA) = \\ & (20268+26965+35040+ACA) = (20268+27773+35040+ACA) \end{aligned}$
0106	$\begin{aligned} \text{Mod : } & (20268+22461+27773+32311) = (20268+22461+27773+32150) = \\ & (20268+22461+27773+24946) = (20268+22461+27773+26760) = \\ & (20268+22461+27773+32238) = (20268+22461+27773+25951) = \\ & (20268+22461+27773+32239) = (20268+22461+26965+32311) = \\ & (20268+22461+26965+32150) = (20268+22461+26965+24946) = \\ & (20268+22461+26965+26760) = (20268+22461+26965+32238) = \\ & (20268+22461+26965+25951) = (20268+22461+26965+32239) = \\ & (20268+22461+26965+35040) = (20268+22461+27773+35040) = \\ & (20268+23408+27773+32311) = (20268+23408+27773+32150) = \\ & (20268+23408+27773+24946) = (20268+23408+27773+26760) = \\ & (20268+23408+27773+32238) = (20268+23408+27773+25951) = \\ & (20268+23408+27773+32239) = (20268+23408+26965+32311) = \\ & (20268+23408+26965+32150) = (20268+23408+26965+24946) = \\ & (20268+23408+26965+26760) = (20268+23408+26965+32238) = \\ & (20268+23408+26965+25951) = (20268+23408+26965+32239) = \\ & (20268+23408+26965+35040) = (20268+23408+27773+35040) = \\ & (20268+22461+23408+27773+32311) = (20268+22461+23408+27773+32150) = \\ & (20268+22461+23408+27773+24946) = (20268+22461+23408+27773+26760) = \\ & (20268+22461+23408+27773+32238) = (20268+22461+23408+27773+25951) = \\ & (20268+22461+23408+26965+32311) = (20268+22461+23408+26965+32150) = \\ & (20268+22461+23408+26965+24946) = (20268+22461+23408+26965+26760) = \\ & (20268+22461+23408+26965+32238) = (20268+22461+23408+26965+25951) = \\ & (20268+22461+23408+26965+32239) = (20268+22461+23408+26965+35040) = \\ & (20268+22461+23408+27773+35040) \end{aligned}$
0107	$\begin{aligned} \text{Mod : } & (24946+25647+27773) = (25647+27773+32311) = (25647+27773+32150) = \\ & (25647+26760+27773) = (25647+27773+32238) = (25647+27773+32239) = \\ & (25647+25951+27773) = (24946+25647+26965) = (25647+26965+32311) = \\ & (25647+26965+32150) = (25647+26760+26965) = (25647+26965+32238) = \\ & (25647+26965+32239) = (25647+25951+26965) = (25647+26965+35040) = \\ & (25647+27773+35040) = (24946+27773+ACA) = (27773+32311+ACA) = \\ & (27773+32150+ACA) = (26760+27773+ACA) = (27773+32238+ACA) = \\ & (27773+32239+ACA) = (25951+27773+ACA) = (24946+26965+ACA) = \\ & (26965+32311+ACA) = (26965+32150+ACA) = (26760+26965+ACA) = \\ & (26965+32238+ACA) = (26965+32239+ACA) = (25951+26965+ACA) = \\ & (26965+35040+ACA) = (27773+35040+ACA) \end{aligned}$

CODE	DESIGNATION
0108	Mod : (24946+25647+26965) = (24946+25647+27773) = (25647+25951+26965) = (25647+26760+26965) = (25647+25951+27773) = (25647+26760+27773) = (25647+26965+32150) = (25647+26965+32238) = (25647+26965+32239) = (25647+26965+32311) = (25647+27773+32150) = (25647+27773+32238) = (25647+27773+32239) = (25647+27773+32311) = (25647+26965+35040) = (25647+27773+35040) = (24946+26965+ACA) = (24946+27773+ACA) = (25951+26965+ACA) = (26760+26965+ACA) = (25951+27773+ACA) = (26760+27773+ACA) = (26965+32150+ACA) = (26965+32238+ACA) = (26965+32239+ACA) = (26965+32311+ACA) = (27773+32150+ACA) = (27773+32238+ACA) = (27773+32239+ACA) = (27773+32311+ACA) = (26965+35040+ACA) = (27773+35040+ACA)
0109	Mod : (20268+25647) = ACA = (20268+25647+ACA)
0110	Mod : (20268+25647) = ACA = MXA = (20268+ACA = MXA) = (20268+25647+ACA = MXA)
R R R	0111 Mod : (20024+20167+28238) = (20024+20167+28238+32635+35649) 0112 Mod : 34456 = (20024+34456) = (20024+37226) = (20024+20164+34456) = (20024+20586+34456) 0113 Mod : 20268 = (20268+25800) = (20268+25530+26505) = (20268+25530+25800+26505) 0114 STD = Mod : 25800 = (25530+26505) = (25530+25800+26505) 0115 Mod : (20268+31106+33323) = (20268+26965+33323) 0116 Mod : (20268+25647+31106) = (20268+25647+26965) 0117 Mod : (20024+20167+28378) = (20024+20167+33973) 0118 Mod : (20268+32619) = (20268+33239) = (20268+32619+33239) 0119 Mod : (20268+28342+32619) = (20268+28342+33239) = (20268+28342+32619+33239) 0120 "Mod: (24946+26965+20268+32619) = (24946+27773+20268+32619) = (25951+26965+20268+32619) = (25951+27773+20268+32619) = (26760+26965+20268+32619) = (26760+27773+20268+32619) = (26965+32150+20268+32619) = (26965+32238+20268+32619) = (26965+32239+20268+32619) = (26965+32311+20268+32619) = (26965+35040+20268+32619) = (27773+35040+20268+32619) = (27773+32150+20268+32619) = (27773+32238+20268+32619) = (27773+32239+20268+32619) = (27773+32311+20268+32619) = (24946+26965+20268+33239) = (24946+27773+20268+33239) = (25951+27773+20268+33239) = (26760+27773+20268+33239) = (26965+32150+20268+33239) = (26965+32238+20268+33239) = (26965+32239+20268+33239) = (26965+32311+20268+33239) = (27773+32150+20268+33239) = (27773+32238+20268+33239) = (27773+32239+20268+33239) = (27773+32311+20268+33239) = (24946+26965+20268+32619+33239) = (24946+27773+20268+32619+33239) = (25951+26965+20268+32619+33239) = (26760+26965+20268+32619+33239) = (26965+32150+20268+32619+33239) = (26965+32238+20268+32619+33239) = (26965+32239+20268+32619+33239) = (26965+32311+20268+32619+33239) = (27773+32150+20268+32619+33239) = (27773+32238+20268+32619+33239) = (27773+32239+20268+32619+33239) = (27773+32311+20268+32619+33239) = (24946+26965+20268+32619+33239) = (24946+27773+20268+32619+33239) = (25951+27773+20268+32619+33239) = (26760+27773+20268+32619+33239) = (26965+32150+20268+32619+33239) = (26965+32238+20268+32619+33239) = (26965+32239+20268+32619+33239) = (26965+32311+20268+32619+33239) = (27773+32150+20268+32619+33239) = (27773+32238+20268+32619+33239) = (27773+32239+20268+32619+33239) = (27773+32311+20268+32619+33239) = (ACA + 20268+25647+27773+32311) = (ACA + 20268+25647+27773+32150) = (ACA + 20268+25647+27773+24946) = (ACA + 20268+25647+27773+26760) = (ACA + 20268+25647+27773+32238) = (ACA + 20268+25647+27773+25951) = (ACA + 20268+25647+26965+32311) = (ACA + 20268+25647+26965+32150) = (ACA + 20268+25647+26965+24946) = (ACA + 20268+25647+26965+26760) = (ACA + 20268+25647+26965+32238) = (ACA + 20268+25647+26965+32311) = (ACA + 20268+25647+26965+35040) = (ACA + 20268+25647+27773+35040)
R R	0121 Mod : (20024+28378) = (20024+33973) = (20024+20164+33973) = (20024+20164+20586+28378)

CODE	DESIGNATION
R 0122	Mod : $25453 = 28378 = 30422 = 33973 = 34456 = 37226$
R 0123	Mod : $(20024+28378) = (20024+33973) = (20024+34456) = (20024+37226)$
0124	Mod : $(20268+26965) = (20268+31106)$
0125	Mod : $(20268+28342+31106) = (20268+28342+26965)$
0126	Mod : $(20024+22013) = (22013+24024+32115+32622)$
0127	Mod : $(20024+30422) = (20024+20164+30422) = (20024+20586+30422) = (20024+25453+30422) = (20024+20164+25453+30422) = (20024+20586+25453+30422) = (20024+25453+30422+32255)$
0128	Mod : $20164 = (20164+22013) = (20164+30961) = (20164+24373+30961) = (22013+32255)$
0129	Mod: $(20268+24946+26965+33323) = (20268+24946+27773+33323) = (20268+25951+26965+33323) = (20268+25951+27773+33323) = (20268+26760+26965+33323) = (20268+26760+27773+33323) = (20268+26965+32150+33323) = (20268+26965+32238+33323) = (20268+26965+32239+33323) = (20268+26965+32311+33323) = (20268+27773+32150+33323) = (20268+27773+32238+33323) = (20268+27773+32239+33323) = (20268+27773+32311+33323) = (20268+26965+35040+33323) = (20268+27773+35040+33323)$
0130	Mod: $(24946+26965+33323) = (24946+27773+33323) = (25951+26965+33323) = (25951+27773+33323) = (26760+26965+33323) = (26760+27773+33323) = (26965+32150+33323) = (26965+32238+33323) = (26965+32239+33323) = (26965+32311+33323) = (27773+32150+33323) = (27773+32238+33323) = (27773+32239+33323) = (27773+32311+33323) = (26965+35040+33323) = (27773+35040+33323)$
0131	Mod: $(20268+28342+31106) = (202268+26965+28342)$
0132	Mod: $(20268+31106) = (20268+26965)$
0133	Mod: $(20268+24946+26965+25647) = (20268+24946+27773+25647) = (20268+25951+26965+25647) = (20268+25951+27773+25647) = (20268+26760+26965+25647) = (20268+26760+27773+25647) = (20268+26965+32150+25647) = (20268+26965+32238+25647) = (20268+26965+32239+25647) = (20268+26965+32311+25647) = (20268+27773+32150+25647) = (20268+27773+32238+25647) = (20268+27773+32239+25647) = (20268+27773+32311+25647) = (20268+26965+35040+25647) = (20268+27773+35040+25647)$
0134	Mod : $22013 = 24105 = (24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (26965+35040) = (27773+35040) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311)$
0135	Mod : $(32401+33323+31426) = (32402+33323+31426) = (32475+33323+31426) = (32929+33323+31426)$
0136	Mod : $(24946+26965+20268+32656) = (24946+27773+20268+32656) = (25951+26965+20268+32656) = (25951+27773+20268+32656) = (26760+26965+20268+32656) = (26760+27773+20268+32656) = (26965+32150+20268+32656) = (26965+32238+20268+32656) = (26965+32239+20268+32656) = (26965+32311+20268+32656) = (26965+35040+20268+32656) = (27773+35040+20268+32656) = (27773+32150+20268+32656) = (27773+32238+20268+32656) = (27773+32239+20268+32656) = (27773+32311+20268+32656)$
0137	Mod : $(21103+21897+21898+22013) = (21103+21897+22013)$
0138	Mod : $(21103+22013+25453+30422) = (21103+22013+30422)$
0139	Mod : $(20040+20065+20106+20107) = (20040+20065+20106)$
0141	Mod : $(20040+20065+20106+21103) = (20040+20065+20106+20107+21105)$
0142	Mod : $(21103+30243) = (21103+30243+33223)$
0143	Mod : $21103 = (20107+21103)$
0144	Mod : $(21103+24105+28238) = (21103+24105+28238+32635)$

CODE	DESIGNATION
0145	Mod : $(20040+20065+21103+24105+24821+26372) = (20040+20065+21103+24105+24821+25940)$
0146	Mod : $(21103+22013+25453) = (21103+21897+22013+25453) = (20040+20065+21103+21897+21898+22013+25453)$
R 0147	Mod : $25453 = 28378 = 28378 = 30422 = 33973 = 34456 = 37226$
R 0148	Mod : $(22013+36310) = (22013+36310+25800)$
R 0149	Mod : $(20268+36310) = (20268+25800+36310)$
R 0150	Mod : $(21103+22013+25453+25940) = (21103+21897+21898+22013+25453+25940)$
R 0151	Mod : $(20040+20065+21103+22013+25453+25940) = (21103+21897+21898+22013+25453+25940)$
R 0152	Mod : $31896 = 31897 = 32401 = 32402 = 32475 = 32929 = 35119 = (31896+32401) = (31896+32402) = (31897+32401) = (31897+32929) = (32333+32929) = (31896+32332+32475) = (31897+32333+32929) = (31896+32332+35119)$
R 0153	Mod : $(21103+24105+28238+32457) = (21103+24105+28238+32457+32635)$
R 0154	Mod : $(20040+20065+21103+24105+24821) = (21897+21898+21103+24105+24821) = (21103+21897+21898+24105+24821+26638+26639)$
R 0158	Mod : $(20268+31106) = (20268+26965)$
R 0159	Mod : $22013 = 24105 = (27773+32311) = (27773+32150) = (27773+24946) = (27773+26760) = (27773+32238) = (27773+32239) = (26965+32311) = (26965+32150) = (26965+24946) = (26965+26760) = (26965+32238) = (26965+32239) = (26965+35040) = (27773+35040)$
R 0160	Mod : $(20268+24044+31701) = (20268+24044+34818)$
R 0161	Mod : $(20268+24946+26965+33171) = (20268+24946+27773+33171) = (20268+25951+26965+33171) = (20268+25951+27773+33171) = (20268+26760+26965+33171) = (20268+26760+27773+33171) = (20268+26965+32150+33171) = (20268+26965+32238+33171) = (20268+26965+32239+33171) = (20268+26965+32311+33171) = (20268+27773+32150+33171) = (20268+27773+32238+33171) = (20268+27773+32239+33171) = (20268+27773+32311+33171) = (20268+26965+35040+33171) = (20268+27773+35040+33171)$
R 0162	Mod : $(20268+32656) = (20268+26342+34221)$
R 0163	Mod : $20268 = (20268+28342+34221)$
R 0164	Mod : $31896 = 31897 = 32401 = 32402 = 32475 = 32929 = 35119 = (31896+32332+32475) = (31897+32333+32929) = (31896+32332+35119)$
R 0165	Mod : $(20024+20167+21120) = (20024+20167+21120+22802)$
R 0166	Mod : $(30397+27714) = (30397+25910) = (30397+31039) = (30397+31528) = (28685+30397+34506) = (27714+28685+30397+31528+34506)$
R 0168	Mod : $(20040+20065+21103+24105) = (21103+21897+21898+24105) = (21103+24105+26638+26639) = (21103+24105+28319+28322) = (21103+21897+21898+24105+26638+26639)$
R 0169	Mod : $(21897+22013+25453) = (22013+25453+25905) = (22013+25453+25907) = (22013+25453+21898)$
R 0170	Mod : $(22013+25453+25905+30422) = (22013+25453+25907+30422) = (22013+25905+30422) = (22013+25907+30422)$
R 0171	Mod : $(20268+26965+28342) = (20268+28342+31106) = (20268+28342)$
R 0173	Mod : $STD = 26925 = (30397+33865)$
R 0175	Mod : $20268 = (20268+25800) = (20268+24404) = (20268+24404+25502) = (20268+24404+25800) = (20268+25800+27727) = (20268+24404+25502+25800) = (20268+24404+25800+27727)$

CODE	DESIGNATION
0176	Mod : (20268+24946+26965+34041) = (20268+24946+27773+34041) = (20268+25951+26965+34041) = (20268+25951+27773+34041) = (20268+26760+26965+34041) = (20268+26760+27773+34041) = (20268+26965+32150+34041) = (20268+26965+32238+34041) = (20268+26965+32239+34041) = (20268+26965+32311+34041) = (20268+27773+32150+34041) = (20268+27773+32238+34041) = (20268+27773+32239+34041) = (20268+27773+32311+34041) = (20268+26965+35040+34041) = (20268+27773+35040+34041)
0177	Mod : (21103+34456) = (20040+20065+21103+34456)
0178	Mod : (21103+24105+28319+28322+31687) = (21103+24105+31687)
0179	Mod : (21103+21897+21898) = (20106+20107+21103+21897+21898) = (21103+28330)
0180	Mod : (20040+20065+21103+28378) = (20040+20065+21103+28378+34456)
0182	Mod : (20024+20167+34456) = (20024+20167+28378+34456)
0183	Mod : (24105+30020) = (20268+24105+30020)
0184	Mod : (23871+24946+26965) = (23871+24946+27773) = (23871+25951+26965) = (23871+25951+27773) = (23871+26760+26965) = (23871+26760+27773) = (23871+26965+32150) = (23871+26965+32238) = (23871+26965+32239) = (23871+26965+32311) = (23871+27773+32150) = (23871+27773+32238) = (23871+27773+32239) = (23871+27773+32311) = (23871+26965+35040) = (23871+27773+35040)
0185	Mod : 22013 = 24105 = (MXA+24105) = (((24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311) = (26965+35040) = (27773+35040)) + 56-5-1)
0186	Mod : 20268 = (20268+26346+N:US)
0187	Mod : 20268 = (20268+26346+22129) = (20268+26346+N:US)
0188	Mod : 22013 = 24105 = (20268+22013) = (20268+24105) = (24946+26965+Eng:56-5A1) = (24946+27773+Eng:56-5A1) = (25951+26965+Eng:56-5A1) = (25951+27773+Eng:56-5A1) = (26760+26965+Eng:56-5A1) = (26760+27773+Eng:56-5A1) = (26965+32150+Eng:56-5A1) = (26965+32238+Eng:56-5A1) = (26965+32239+Eng:56-5A1) = (26965+32311+Eng:56-5A1) = (27773+32150+Eng:56-5A1) = (27773+32238+Eng:56-5A1) = (27773+32239+Eng:56-5A1) = (27773+32311+Eng:56-5A1) = (26965+35040+Eng:56-5A1) = (27773+35040+Eng:56-5A1)
0189	Mod : 22013 = 24105 = (24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311) = (26965+35040) = (27773+35040)
0190	Mod : 22013 = 24105 = (24946+26965+Eng:56-5A1) = (24946+27773+Eng:56-5A1) = (25951+26965+Eng:56-5A1) = (25951+27773+Eng:56-5A1) = (26760+26965+Eng:56-5A1) = (26760+27773+Eng:56-5A1) = (26965+32150+Eng:56-5A1) = (26965+32238+Eng:56-5A1) = (26965+32239+Eng:56-5A1) = (26965+32311+Eng:56-5A1) = (27773+32150+Eng:56-5A1) = (27773+32238+Eng:56-5A1) = (27773+32239+Eng:56-5A1) = (27773+32311+Eng:56-5A1) = (26965+35040+Eng:56-5A1) = (27773+35040+Eng:56-5A1)

CODE	DESIGNATION
0191	Mod : $(22013+25647) = (24105+25647) = (24946+25647+26965) = (24946+25647+27773) = (25647+25951+26965) = (25647+26760+26965) = (25647+25951+27773) = (25647+26760+27773) = (25647+26965+32150) = (25647+26965+32238) = (25647+26965+32239) = (25647+26965+32311) = (25647+27773+32150) = (25647+27773+32238) = (25647+27773+32239) = (25647+27773+32311) = (25647+27773+35040) = (25647+26965+35040) = (24946+26965+ACA) = (24946+27773+ACA) = (25951+26965+ACA) = (26760+26965+ACA) = (25951+27773+ACA) = (26760+27773+ACA) = (26965+32150+ACA) = (26965+32238+ACA) = (26965+32239+ACA) = (26965+32311+ACA) = (27773+32150+ACA) = (27773+32238+ACA) = (27773+32239+ACA) = (27773+32311+ACA) = (27773+35040+ACA) = (26965+35040+ACA)$
0192	Mod : $22013 = 24105 = (24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311) = (27773+35040) = (26965+35040)$
0193	Mod : $28685 = 28686 = (27714+28685+31528) = (27714+28685) = (27714+28686) = (27714+28686+31039)$
0194	Mod : $31528 = 31039 = 25910 = 27714 = (28685+34506) = (28686+34506) = (27714+28685+31528+34506)$
0197	Mod : $(27714+30397+35165) = (30397+35165+31039) = (30397+35165+31528)$
0198	Mod : $(23779+25910) = (23779+27714) = (23779+25910+28685+34506) = (23779+27714+28685+34506) = (23779+27714+31528) = (23779+27714+28685+31528+34506)$
0199	Mod : $(23779+31039) = (23779+31528) = (23779+27714+31039) = (23779+27714+31528) = (23779+27714+28685+31528+34506)$
0200	Mod : $25910 = 27714 = (25910+28685+34506) = (27714+28685+34506) = (27714+28686+34506)$
0201	Mod : $31039 = 31528 = (27714+31039) = (27714+31528) = (27714+28685+31528+34506)$
0202	Mod : $25453 = 28238 = 28378 = 30422 = 33973 = 34456$
0203	STD = Mod : $(31896+32332) = (31897+32333)$
0205	Mod : $(25615+23124) = (25615+28009)$
0206	Mod : $(21103+28378+33223) = (21103+25714+26131+33223)$
0208	Mod : $(25615+32619) = (25615+33239)$
0213	Mod : $(20268+34221) = (20268+34221+32656)$
0214	Mod : $(24105+34221) = (24105+34221+32656)$
0215	Mod : $(20268+36310) = (20268+25800+36310) = (20268+24404+25502+36310) = (20268+24404+25502+25800+36310)$
0216	"Mod : $(20268+36297) = (20268+24946+26965+36297) = (20268+24946+27773+36297) = (20268+25951+26965+36297) = (20268+26760+27773+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297)"$
0219	Mod : $(20268+36311) = (20268+36297)$

CODE	DESIGNATION
0223	Mod : $36750 = (24946+25615+26965+36750) = (24946+25615+27773+36750) = (25615+25951+26965+36750) = (25615+25951+27773+36750) = (25615+26760+26965+36750) = (25615+26760+27773+36750) = (25615+26965+32150+36750) = (25615+26965+32238+36750) = (25615+26965+32239+36750) = (25615+26965+32311+36750) = (25615+27773+32150+36750) = (25615+27773+32238+36750) = (25615+27773+32239+36750) = (25615+27773+32311+36750) = (25615+26965+35040+36750) = (25615+27773+35040+36750)$
0224	Mod : $26750 = (24946+26965+36750) = (24946+27773+36750) = (25951+26965+36750) = (25951+27773+36750) = (26760+26965+36750) = (26760+27773+36750) = (26965+32150+36750) = (26965+32238+36750) = (26965+32239+36750) = (26965+32311+36750) = (27773+32238+36750) = (27773+32239+36750) = (27773+32311+36750) = (26965+35040+36750) = (27773+35040+36750)$
0225	Mod : $(20268+36311) = (20268+36297) = (20268+25800+36311) = (20268+25800+36297) = (20268+25530+26505+36311) = (20268+25530+26505+36297) = (20268+25800+25530+26505+36311) = (20268+25800+25530+26505+36297)$
0227	Mod : $33323 = (33323+31896+32332) = (33323+31897+32333)$
0228	Mod : $(32401+33323) = (32402+33323) = (32475+33323) = (32929+33323) = (31896+32332+32475+33323) = (31897+32333+32929+33323)$
0229	Mod : $(20268+34818) = (20268+31701)$
0230	Mod : $(20268+36311) = (20268+36297) = (20268+36885) = (20268+24946+26965+36311) = (20268+24946+27773+36311) = (20268+25951+26965+36311) = (20268+25951+27773+36311) = (20268+26760+26965+36311) = (20268+26760+27773+36311) = (20268+26965+32150+36311) = (20268+26965+32238+36311) = (20268+26965+32239+36311) = (20268+26965+32311+36311) = (20268+27773+32150+36311) = (20268+27773+32238+36311) = (20268+27773+32239+36311) = (20268+27773+32311+36311) = (20268+26965+35040+36311) = (20268+27773+35040+36311) = (20268+24946+26965+36297) = (20268+25951+26965+36297) = (20268+25951+27773+36297) = (20268+26760+26965+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297) = (20268+24946+26965+36885) = (20268+24946+27773+36885) = (20268+25951+26965+36885) = (20268+25951+27773+36885) = (20268+26760+26965+36885) = (20268+26760+27773+36885) = (20268+26965+32150+36885) = (20268+26965+32238+36885) = (20268+26965+32239+36885) = (20268+26965+32311+36885) = (20268+27773+32150+36885) = (20268+27773+32238+36885) = (20268+27773+32239+36885) = (20268+27773+32311+36885) = (20268+26965+35040+36885) = (20268+27773+35040+36885)$

CODE	DESIGNATION
0231	$\text{Mod : } (20268+36311) = (20268+36885) = (20268+24946+26965+36311) =$ $(20268+24946+27773+36311) = (20268+25951+26965+36311) =$ $(20268+25951+27773+36311) = (20268+26760+26965+36311) =$ $(20268+26760+27773+36311) = (20268+26965+32150+36311) =$ $(20268+26965+32238+36311) = (20268+26965+32239+36311) =$ $(20268+26965+32311+36311) = (20268+27773+32150+36311) =$ $(20268+27773+32238+36311) = (20268+27773+32239+36311) =$ $(20268+27773+32311+36311) = (20268+26965+35040+36311) =$ $(20268+27773+35040+36311) = (20268+24946+26965+36885) =$ $(20268+24946+27773+36885) = (20268+25951+26965+36885) =$ $(20268+25951+27773+36885) = (20268+26760+26965+36885) =$ $(20268+26760+27773+36885) = (20268+26965+32150+36885) =$ $(20268+26965+32238+36885) = (20268+26965+32239+36885) =$ $(20268+26965+32311+36885) = (20268+27773+32150+36885) =$ $(20268+27773+32238+36885) = (20268+27773+32239+36885) =$ $(20268+27773+32311+36885) = (20268+26965+35040+36885) =$ $(20268+27773+35040+36885)$
0232	Mod : (20268+36297) = (20268+36311) = (20268+36885)
0233	Mod : 30397 = (27714+28685+30397+31528)
R 0234	$\text{"Mod : } (20268+36311) = (20268+36297) = (20268+36885) = (20268+25800+36311)$ $= (20268+25800+36297) = (20268+25800+36885) = (20268+25530+26505+36311)$ $= (20268+25530+26505+36297) = (20268+25530+26505+36885) =$ $(20268+25800+25530+26505+36297) = (20268+25800+25530+26505+36311) =$ $(20268+25800+25530+26505+36885) "$
R 0235	Mod : (20268+36311) = (20268+36885) = (20268+36311/US) = (20268+36885/US)
R 0236	Mod : (27620+30020+33323) = (27620+30020+33323+37285)
R 0237	Mod : (27620+33323) = (27620+33323+37285)
R 0238	$\text{Mod : } (24946+26965+36311) = (24946+27773+36311) = (25951+26965+36311) =$ $(25951+27773+36311) = (26760+26965+36311) = (26760+27773+36311) =$ $(26965+32150+36311) = (26965+32238+36311) = (26965+32239+36311) =$ $(26965+32311+36311) = (27773+32150+36311) = (27773+32238+36311) =$ $(27773+32239+36311) = (27773+32311+36311) = (26965+35040+36311) =$ $(27773+35040+36311) = (24946+26965+36885) = (24946+27773+36885) =$ $(25951+26965+36885) = (25951+27773+36885) = (26760+26965+36885) =$ $(26760+27773+36885) = (26965+32150+36885) = (26965+32238+36885) =$ $(26965+32239+36885) = (26965+32311+36885) = (27773+32150+36885) =$ $(27773+32238+36885) = (27773+32239+36885) = (27773+32311+36885) =$ $(26965+35040+36885) = (27773+35040+36885)$
R 0239	Mod : 32009 = 36664 = 36666 = 36667
R 0240	Mod : 32009 = 36664 = 36666 = 36667 = (25800+32009) = (25800+36664) =
R 0241	$\text{Mod : } 32009 = 36664 = 36666 = 36667 = (25800+32009) = (25800+36664) =$ $(25800+36666) = (25800+36667) = (24404+25502+32009) = (24404+25502+36664)$ $= (24404+25502+36666) = (24404+25502+36667) = (24404+25502+25800+32009)$ $= (24404+25502+25800+36664) = (24404+25502+25800+36666) =$ $(24404+25502+25800+36667)$
R 0242	$\text{Mod : } 32009 = 36664 = 36666 = 36667 = (25800+32009) = (25800+36664) =$ $(25800+36666) = (25800+36667) = (24405+25501+32009) = (24405+25501+36664)$ $= (24405+25501+36666) = (24405+25501+36667) = (24405+25501+25800+32009)$ $= (24405+25501+25800+36664) = (24405+25501+25800+36666) =$ $(24405+25501+25800+36667)$
R 0243	$\text{Mod : } 32009 = 36664 = 36666 = 36667 = (25800+32009) = (25800+36664) =$ $(25800+36666) = (25800+36667) = (25530+26505+32009) = (25530+26505+36664)$ $= (25530+26505+36666) = (25530+26505+36667) = (25530+25800+26505+32009)$ $= (25530+25800+26505+36664) = (25530+25800+26505+36666) =$ $(25530+25800+26505+36667)$

CODE	DESIGNATION
0244	Mod : $32009 = 36664 = 36666 = 36667 = (25800+32009) = (25800+36664) = (25800+36666) = (25800+36667) = (24404+32009+35404) = (24404+35404+36664) = (24404+35404+36666) = (24404+35404+36667) = (27727+32009+35404) = (27727+35404+36664) = (27727+35404+36667) = (27727+35404+36666) = (24404+27727+32009+35404) = (24404+27727+35404+36664) = (24404+27727+35404+36667) = (24404+25800+32009+35404) = (24404+25800+35404+36664) = (24404+25800+35404+36666) = (24404+25800+35404+36667) = (25800+27727+32009+35404) = (25800+27727+35404+36664) = (25800+27727+35404+36666) = (25800+27727+35404+36667) = (24404+25800+27727+32009+35404) = (24404+25800+27727+35404+36664) = (24404+25800+27727+35404+36667)$
0245	Mod : $(24404+32009) = (24404+36664) = (24404+36666) = (24404+36667) = (24404+25800+32009) = (24404+25800+36664) = (24404+25800+36666) = (24404+25800+36667) = (25800+27727+32009) = (25800+27727+36664) = (25800+27727+36666) = (25800+27727+36667) = (24404+25800+27727+32009) = (24404+25800+27727+36664) = (24404+25800+27727+36667)$
0246	Mod : $(24405+32009) = (24405+36664) = (24405+36666) = (24405+36667) = (24405+25800+32009) = (24405+25800+36664) = (24405+25800+36666) = (24405+25800+36667) = (25800+27727+32009) = (25800+27727+36664) = (25800+27727+36666) = (25800+27727+36667) = (24405+25800+27727+32009) = (24405+25800+27727+36664) = (24405+25800+27727+36667)$
0247	Mod : $(25530+32009) = (25530+36664) = (25530+36666) = (25530+36667) = (25530+25800+32009) = (25530+25800+36664) = (25530+25800+36666) = (25530+25800+36667) = (25800+27727+32009) = (25800+27727+36664) = (25800+27727+36666) = (25800+27727+36667) = (25530+25800+27727+32009) = (25530+25800+27727+36664) = (25530+25800+27727+36667)$
0248	Mod : $(20268+36310+32009) = (20268+36310+36664) = (20268+36310+36666) = (20268+36310+36667) = (20268+25800+36310+32009) = (20268+25800+36310+36664) = (20268+25800+36310+36666) = (20268+25800+36310+36667) = (20268+24404+25502+36310+32009) = (20268+24404+25502+36310+36664) = (20268+24404+25502+36310+36666) = (20268+24404+25502+36310+36667) = (20268+24404+25502+25800+36310+32009) = (20268+24404+25502+25800+36310+36664) = (20268+24404+25502+25800+36310+36666) = (20268+24404+25502+25800+36310+36667)$
0249	Mod : $(20268+36311+32009) = (20268+36311+36664) = (20268+36311+36666) = (20268+36311+36667) = (20268+36297+32009) = (20268+36297+36664) = (20268+36297+36666) = (20268+36885+32009) = (20268+36885+36664) = (20268+36885+36666) = (20268+36885+36667) = (20268+25800+36311+32009) = (20268+25800+36311+36664) = (20268+25800+36311+36666) = (20268+25800+36311+36667) = (20268+25800+36297+32009) = (20268+25800+36297+36664) = (20268+25800+36297+36666) = (20268+25800+36885+32009) = (20268+25800+36885+36664) = (20268+25800+36885+36666) = (20268+25800+36885+36667) = (20268+25800+36311+32009) = (20268+25530+26505+36311+32009) = (20268+25530+26505+36311+36664) = (20268+25530+26505+36311+36666) = (20268+25530+26505+36311+36667) = (20268+25530+26505+36297+32009) = (20268+25530+26505+36297+36664) = (20268+25530+26505+36297+36666) = (20268+25530+26505+36885+32009) = (20268+25530+26505+36885+36664) = (20268+25530+26505+36885+36666) = (20268+25530+26505+36885+36667) = (20268+25800+25530+26505+36297+32009) = (20268+25800+25530+26505+36297+36664) = (20268+25800+25530+26505+36297+36666) = (20268+25800+25530+26505+36297+36667) = (20268+25800+25530+26505+36311+32009) = (20268+25800+25530+26505+36311+36664) = (20268+25800+25530+26505+36311+36666) = (20268+25800+25530+26505+36311+36667)$
0250	Mod : $20164 = 32255 = (20164+30961) = (20164+24373+30961)$

CODE	DESIGNATION
0381	Mod : $(20268+36297) = (20268+24946+26965+36297) =$ $(20268+24946+27773+36297) = (20268+25951+26965+36297) =$ $(20268+25951+27773+36297) = (20268+26760+26965+36297) =$ $(20268+26760+27773+36297) = (20268+26965+32150+36297) =$ $(20268+26965+32238+36297) = (20268+26965+32239+36297) =$ $(20268+26965+32311+36297) = (20268+27773+32150+36297) =$ $(20268+27773+32238+36297) = (20268+27773+32239+36297) =$ $(20268+27773+32311+36297) = (20268+26965+35040+36297) =$ $(20268+27773+35040+36297)$

R

N°	ISSUE DATE	
01	SEP 1987	
02	MAR 1988	
03	MAY 1988	
04	JUL 1988	
05	AUG 1988	
06	OCT 1988	
07	JAN 1989	
08	MAR 1989	
09	APR 1989	
10	AUG 1989	
11	DEC 1989	
12	SEP 1990	
13	JUL 1991	
14	MAY 1992	
15	DEC 1992	
16	JUN 1993	
17	NOV 1993	
18	MAY 1994	
19	MAY 1995	
20	SEP 1996	
21	JUN 97	
22	JAN 98	
23	AUG 98	
24	JAN 99	
25	JUN 99	
26	DEC 99	
27	MAY 00	
28	OCT 00	

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N°	ISSUE DATE	
29	MAR 01	
30	SEP 01	
31	APR 02	
32	SEP 02	
33	MAR 03	
34	NOV 03	
35	JUL 04	
36	MAR 05	
37	DEC 05	
38	SEP 06	
39	MAY 07	

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

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

- THE MANUFACTURING SERIAL NUMBER (MSN) WHICH APPEARS IN THE LIST OF EFFECTIVE PAGES
- THE REGISTRATION NUMBER OF THE AIRCRAFT AS KNOWN BY AIRBUS INDUSTRIE.

MSN	REGISTRATION
0990	CC-CZB
1304	CC-COC
1332	CC-COD
1351	CC-COE
1355	CC-COF
1491	CC-COG
1512	LV-BGU
1526	CC-COI
1548	CC-COK
1568	CC-COL
1626	CC-COM
1854	LV-BET
1858	LV-BFY
1877	LV-BFO
1903	CC-COT
2089	CC-COU
2096	CC-COX
2295	CC-COY
2304	CC-COZ
2321	CC-CPE
2572	CC-CPF
2585	CC-CPI
2845	CC-CPJ
2858	CC-CPL
2864	CC-CPM
2872	CC-CPO
2886	CC-CPQ
2887	CC-CPX
2892	CC-CQK
2894	CC-CQL
3001	CC-CVA
3030	CC-CVB
3062	CC-CVF
3214	
3216	
3280	
3319	

LAN

01 MAY 2007

2.00.70
PAGE : CRT001

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

2 01 00 001 001 REV039
- TECHNICAL AMENDMENT
1)The table of contents has been updated
to reflect FCOM revisions.

2 02 12 002 078 REV039 PW:6122A
- TECHNICAL AMENDMENT
1)Update of example.

2 02 14 006 078 REV039 PW:6122A
- TECHNICAL AMENDMENT
1)Update of maximum Tflex value.

2 02 14 007 078 REV039 PW:6122A
- TECHNICAL AMENDMENT
1)Update of maximum Tflex value.

2 04 00 001 001 REV039
- TECHNICAL AMENDMENT
1)The table of contents has been updated
to reflect FCOM revisions.

2 04 10 011 100 REV039 30020
- INCORPORATION OF MOD 30020
- TECHNICAL AMENDMENT
1)Page created for A318 aircraft. The
maximum demonstrated crosswind for
takeoff and landing is provided with
a single value including the gusts.

2 04 20 006 252 REV038 24105+30020/PW 6122A/24A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

2 04 25 003 050 REV039 PW
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
- TECHNICAL AMENDMENT
1)Page created in order to incorporate
new PW 6000 engine for A318 aircraft.

2 04 25 004 063 REV038 PW 6122A/6124A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

2 04 25 005 178 REV039 20268/6122A/T OR L
- TECHNICAL AMENDMENT
1)Update of A318-121 data.
Incorporation of TR 648-1.

2 04 25 006 063 REV038 PW:6122A/6124A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

2 04 25 009 158 REV038 20268/6122A/24A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

V CH SEC	---PAGE---	SEQ-	REV-	VALIDATION CRITERIA	-----REASONS OF CHANGE-----
2 04 25 010		158	REV038	20268/6122A/24A	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
2 04 30 001		310	REV039	CODE 0046	- TECHNICAL AMENDMENT 1)Page revised to indicate that the altitude measurement tolerance for the release of PAX oxygen masks is +250, -750 feet, instead of +0, -500 feet.
2 04 30 002		210	REV029	CODE 0205/IAE-PW ALL	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
2 04 40 001		001	REV039		- TECHNICAL AMENDMENT 1)Page revised to update the ETOPS EASA regulation reference.
2 04 40 006		001	REV039		- TECHNICAL AMENDMENT 1)Page revised to update the ETOPS EASA regulation reference.
2 04 40 007		001	REV039		- TECHNICAL AMENDMENT 1)Page revised to update the ETOPS EASA regulation reference.
2 04 40 010		212	REV038	26017+33374/CFM/PW	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
2 04 40 010A		010	REV031	CFM/PW	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
2 04 40 011		161	REV038	20268/6122A/6124A	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
2 04 40 012		054	REV039	PW:6122A/6124A	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE - TECHNICAL AMENDMENT 1)Introduction of A318-122 performance data and update of A318-121 data.
2 04 40 013		054	REV039	PW 6122A/6124A	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE - TECHNICAL AMENDMENT 1)Introduction of A318-122 performance data and update of A318-121 data.
2 04 40 014		054	REV039	6122/6124	- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE - TECHNICAL AMENDMENT 1)Introduction of A318-122 performance

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

data and update of A318-121 data.

2 04 70 004 050 REV039 6122A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
- TECHNICAL AMENDMENT
1)Page created for A318 aircraft
powered by the PW 6000 engines to
introduce a procedure that improves
the go-around climb performance in
high and/or hot airports.

2 04 70 005 050 REV039 6122A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
- TECHNICAL AMENDMENT
1)Page created for A318 aircraft
powered by the PW 6000 engines to
introduce a procedure that improves
the go-around climb performance in
high and/or hot airports.

2 05 15 008 161 REV039 20268/6122A
- TECHNICAL AMENDMENT
1)Update of the example.

2 05 15 009 161 REV039 20268/6122A
- TECHNICAL AMENDMENT
1)Update of the example.

2 05 20 003 260 REV039 24105+30020/6122A/6124A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

2 05 30 023 161 REV039 20268/6122A
- TECHNICAL AMENDMENT
1)Update of table values.

2 05 30 024 161 REV039 20268/6122A/6124A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE
- TECHNICAL AMENDMENT
1)Update of the table values and
introduction of A318-122 data.

2 05 40 001 252 REV038 24105+30020/6122A/6124A
- VERSION AND/OR ENGINE INCORPORATION, DELETION OR CHANGE

2 05 40 002 153 REV039 20268/6122A
- TECHNICAL AMENDMENT
1)Update of example.

2 05 40 006 153 REV039 20268/PW 6122A
- TECHNICAL AMENDMENT
1)Update of the chart.

2 05 40 007 153 REV039 20268/PW 6122A
- TECHNICAL AMENDMENT
1)Update of the chart.

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2 00 00 001	001	REVO21	CONTENTS	ALL
2 00 10 001	001	REVO38	ORGANIZATION OF THE MANUAL	ALL
2 00 10 002	001	REVO38	ORGANIZATION OF THE MANUAL	ALL
2 00 10 003	001	REVO22	ORGANIZATION OF THE MANUAL	ALL
2 00 10 004	001	REVO22	ORGANIZATION OF THE MANUAL	ALL
2 00 10 005	001	REVO21	ORGANIZATION OF THE MANUAL	ALL
R 2 00 20 001	001	REVO39	LIST OF CODES	ALL
R 2 00 20 002	001	REVO39	LIST OF CODES	ALL
R 2 00 20 003	001	REVO39	LIST OF CODES	ALL
R 2 00 20 004	001	REVO39	LIST OF CODES	ALL
R 2 00 20 005	001	REVO39	LIST OF CODES	ALL
R 2 00 20 006	001	REVO39	LIST OF CODES	ALL
R 2 00 20 007	001	REVO39	LIST OF CODES	ALL
R 2 00 20 008	001	REVO39	LIST OF CODES	ALL
R 2 00 20 009	001	REVO39	LIST OF CODES	ALL
R 2 00 20 010	001	REVO39	LIST OF CODES	ALL
N 2 00 20 011	001	REVO39	LIST OF CODES	ALL
N 2 00 20 012	001	REVO39	LIST OF CODES	ALL
N 2 00 20 013	001	REVO39	LIST OF CODES	ALL
R 2 00 30 001	001	REVO28	LIST OF NORMAL REVISIONS	ALL
R 2 00 30 002	001	REVO39	LIST OF NORMAL REVISIONS	ALL
2 00 35 001	001	REVO22	RECORD OF TEMPORARY REVISION	ALL
R 2 00 36 001	001	REVO39	LIST OF EFFECTIVE TR	ALL
R 2 00 70 001	001	REVO39	CROSS REFERENCE TABLE	ALL
R 2 00 75 001	001	REVO39	HIGHLIGHTS	ALL
R 2 00 80 001	001	REVO39	LIST OF EFFECTIVE PAGES	ALL
R 2 00 85 001	001	REVO39	LIST OF MODIFICATIONS	ALL
R 2 01 00 001	001	REVO39		ALL
2 01 10 001	001	REVO31		ALL
2 01 20 001	100	REVO21	21103	0990-1903 3280-3319
2 01 20 002	110	REVO35	CODE 0143	
2 01 20 001	100	REVO21	21103	2089-2894
2 01 20 002	210	REVO35	M:21103+24105	
2 01 20 001	110	REVO34	M: 30020	3001-3216
2 01 20 002	100	REVO34	M:30020=(21103+24105+30020)	

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2	01	20	005		100	REV026	M:23320	ALL
2	01	20	006		100	REV026	M:23320	
2	01	30	001		200	REV038	M: 20024+20167	ALL
2	01	30	002		100	REV020	MOD:20024	
2	01	30	003		001	REV038	CODE 0002	ALL
2	01	30	004		001	REV020		
2	01	30	005		100	REV020	MOD:20024	ALL
2	01	30	006		001	REV021		
2	01	30	007		100	REV038	M:20024	ALL
2	01	30	007A		001	REV038		ALL
2	01	30	008		100	REV038	20024	ALL
2	01	30	009		100	REV037	MOD:20024	ALL
2	01	30	010		200	REV024	CODE 0024	
2	01	30	010A		001	REV033		ALL
2	01	30	011		100	REV033	M:20024+20024+32115+32622	0990-1903
2	01	30	011		210	REV033	20024+32115	2089-3319
2	01	30	011A		001	REV033	STD=32115+32622	0990-1903
2	01	30	011A		100	REV033	32115	2089-3319
2	01	30	012		100	REV033	20024	ALL
2	01	30	013		001	REV033	CODE 0029	ALL
2	01	30	014		001	REV033	CODE 0029	
2	01	30	015		001	REV033	CODE 0029	ALL
2	01	30	016		001	REV033	CODE 0029	
2	01	30	017		001	REV033	CODE 0029	ALL
2	01	30	018		001	REV033	CODE 0029	
2	01	30	019		001	REV033	CODE 0029	ALL
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2	01	30	021		100	REV033	CODE 0031	ALL
2	01	40	001		001	REV028		0990-1903 3280-3319
2	01	40	002		110	REV028	M:20268	
2	01	40	001		001	REV028		2089-2894
2	01	40	002		230	REV028	M:20268+24105	
2	01	40	001		001	REV028		3001-3216
2	01	40	002		305	REV038	M:20268+24105+30020	

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2	01	40	003	210	REVO28	MOD:20268+24105	2089-2894	
2	01	40	004	230	REVO35	MOD 20268+24105		
2	01	40	003	305	REVO38	M:20268+24105+30020	3001-3216	
2	01	40	004	305	REVO38	M:20268+24105+30020		
2	01	40	005	110	REVO35	MOD 20268	0990-1903 3280-3319	
2	01	40	006	001	REVO30			
2	01	40	005	230	REVO35	MOD 20268+24105	2089-2894	
2	01	40	006	001	REVO30			
2	01	40	005	305	REVO38	M:20268+24105+30020	3001-3216	
2	01	40	006	001	REVO30			
2	02	00	001	100	REVO25	CODE 0189	0990-1903	
2	02	00	002	001	REVO35			
2	02	00	001	100	REVO25	CODE 0189	2089-3319	
2	02	00	002	100	REVO36	M:33309		
2	02	05	001	001	REVO22		ALL	
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2	02	10	002	100	REVO25	CODE 0189		
2	02	10	003	100	REVO25	CODE 0188	2089-3216	
2	02	10	004	100	REVO25	CODE 0189		
2	02	10	003	370	REVO34	C0D90/2500/2527/27E/B4/A1/A3	0990-1903 3280-3319	
2	02	10	004	100	REVO25	CODE 0189		
2	02	10	005	100	REVO25	CODE 0189	2089-2894	
2	02	10	006	110	REVO26	M:24105		
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2	02	10	006	201	REVO36	M:24105+30020		
2	02	10	005	100	REVO25	CODE 0189	0990-1903 3280-3319	
2	02	10	006	270	REVO34	C0D92/2527/2500/27E/A1/A3/B4		
2	02	12	001	110	REVO25	M:24105	2089-2894	
2	02	12	002	055	REVO30	IAE V2524		
R	2	02	12	001	200	REVO34	M:24105+30020	3001-3216
R	2	02	12	002	078	REVO39	PW:6122A	
2	02	12	001	270	REVO37	C0092/V2500/27/27E/A1/A3/B4	0990-1903 3280-3319	
2	02	12	002	270	REVO37	CODE 0092/IAE V2527/2527EA5		
2	02	12	003	110	REVO25	M:24105	2089-2894	
2	02	12	004	055	REVO30	IAE V2524		
2	02	12	003	200	REVO34	M:24105+30020	3001-3216	
2	02	12	004	078	REVO38	PW:6122A		

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2	02	12	005	055	REV030	IAE V2524	2089-2894		
2	02	12	006	100	REV022	CODE 0189			
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2	02	14	003	110	REV025	M:24105=(20268+24105)	2089-2894		
2	02	14	004	060	REV030	IAE V2524			
2	02	14	003	200	REV034	CODE 0183	3001-3216		
2	02	14	004	078	REV038	6122A			
2	02	14	003	370	REV037	CODE0090/V25/27/27E/B4/A1/A3	0990		
2	02	14	004	270	REV035	CODE 0092/IAE V2527			
2	02	14	003	370	REV037	CODE0090/V25/27/27E/B4/A1/A3	1304-1903 3280-3319		
2	02	14	004	275	REV034	CODE 0092/IAE V2527E			
2	02	14	005	110	REV025	M:24105	2089-2894		
2	02	14	006	060	REV030	IAE V2524			
R	2	02	14	005	200	REV034	M:24105+30020	3001-3216	
R	2	02	14	006	078	REV039	PW:6122A		
2	02	14	005	270	REV035	CODE0092/V25/27/27E/B4/A1/A3	0990		
2	02	14	006	270	REV034	CODE 0092/IAE V2527			
2	02	14	005	270	REV035	CODE0092/V25/27/27E/B4/A1/A3	1304-1903 3280-3319		
2	02	14	006	275	REV034	CODE 0092/IAE V2527E			
2	02	14	007	060	REV031	IAE V2524	2089-2894		
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2	02	16	002	100	REV023	CODE 0189			

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2	02	16	005	100	REVO37	CODE 0189	2089-2894	
2	02	16	006	105	REVO25	M:24105		
2	02	16	005	100	REVO37	CODE 0189	3001-3216	
2	02	16	006	201	REVO36	M:24105+30020		
2	02	16	005	100	REVO37	CODE 0189	0990-1903 3280-3319	
2	02	16	006	270	REVO34	0092 V2527/27E/2500/A1/A3/B4		
2	02	18	001	100	REVO25	CODE 0189	2089-2894	
2	02	18	002	100	REVO25	M:24105		
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2	02	18	002	200	REVO34	M:24105+30020		
2	02	18	001	100	REVO25	CODE 0189	0990-1903 3280-3319	
2	02	18	002	270	REVO34	0092 V2527/27E/2500/A1/A3/B4		
2	02	18	003	050	REVO30	IAE V2524	2089-2894	
2	02	18	004	100	REVO35	M:24105		
2	02	18	003	078	REVO38	PW: 6122A	3001-3216	
2	02	18	004	200	REVO34	M:24105+30020		
2	02	18	003	250	REVO34	CODE 0092/V2527E	1304-1903 3280-3319	
2	02	18	004	270	REVO37	0092 V2527/27E/2500/A1/A3/B4		
2	02	18	003	270	REVO33	CODE 0092 V2527A5	0990	
2	02	18	004	270	REVO37	0092 V2527/27E/2500/A1/A3/B4		
2	02	18	005	050	REVO30	IAE V2524	2089-2894	
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2	02	18	005	250	REVO37	CODE 0092/V2527E/V2527	0990	
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2	02	18	007	100	REVO22	CODE 0189	ALL	
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2	02	20	002	100	REVO38	CODE 0192		
2	02	20	001	070	REVO22	IAE V2524	2089-2894	
2	02	20	002	100	REVO38	CODE 0192		
2	02	20	001	078	REVO38	PW: 6122A	3001-3216	
2	02	20	002	100	REVO38	CODE 0192		

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2	02	20	003	200	REV034	CODE 0183 EQUI 305	3001-3216
2	02	20	004	078	REV038	PW:6122A	
2	02	20	003	270	REV034	C:0092/V2500/27/27E/A1/A3/B4	1304-1903 3280-3319
2	02	20	004	250	REV034	CODE 0092/V2527E	
2	02	20	003	270	REV034	C:0092/V2500/27/27E/A1/A3/B4	0990
2	02	20	004	270	REV033	CODE 0092 V2527A5	
2	02	20	005	100	REV025	M:24105	2089-2894
2	02	20	006	065	REV030	IAE V2524	
2	02	20	005	200	REV034	M:24105+30020	3001-3216
2	02	20	006	078	REV038	PW:6122A	
2	02	20	005	270	REV036	C:0092/V2500/27/27E/A1/A3/B4	0990-1903 3280-3319
2	02	20	006	250	REV037	CODE 0092/V2527E/2527A5	
2	02	20	007	065	REV031	IAE V2524	2089-2894
2	02	20	008	100	REV033	CODE 0189	
2	02	20	007	078	REV038	PW:6122A	3001-3216
2	02	20	008	100	REV033	CODE 0189	
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2	02	20	008	100	REV033	CODE 0189	
2	02	20	007	270	REV033	CODE 0092 V2527A5	0990
2	02	20	008	100	REV033	CODE 0189	
2	02	24	001	065	REV029	IAE V2524	2089-2894
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2	02	24	001	270	REV033	CODE:0092/V2527	0990
2	02	24	002	270	REV033	CODE:0092/V2527	
2	02	24	003	165	REV029	M:25615/IAE V2524	2089-2894
2	02	24	004	165	REV029	M:25615/IAE V2524	
2	02	24	003	350	REV034	CODE 0094/V2527E	1304-1903 3280-3319
2	02	24	004	185	REV029	M:25615/IAE V2527-V2527E	
2	02	25	001	140	REV031	20268/IAE V2524	2089-2894
2	02	25	002	195	REV022	M:20268 IAE V2524	
2	02	25	001	178	REV038	M:20268/PW:6122A	3001-3216
2	02	25	002	178	REV038	M:20268/PW:6122A	
2	02	25	001	360	REV034	CODE 0090/V2527E	1304-1903 3280-3319
2	02	25	002	187	REV038	M:20268 IAE V2527E	

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2	02	25	004	140	REVO22	M:20268 IAE V2527		
2	02	25	003	178	REVO38	M:20268/PW:6122A	3001-3216	
2	02	25	004	178	REVO38	M:20268/PW:6122A		
2	02	25	003	182	REVO38	M:20268 IAE V2527E	1304-1903 3280-3319	
2	02	25	004	182	REVO38	M:20268 IAE V2527E		
2	02	25	003	195	REVO22	M:20268 IAE V2524	2089-2894	
2	02	25	004	195	REVO22	M:20268 IAE V2524		
2	02	27	001	020	REVO38	PW6122A/6124A	3001-3216	
2	02	27	002	020	REVO38	PW6122A/6124A		
2	02	27	003	020	REVO38	PW6122A/6124A	3001-3216	
2	02	27	004	020	REVO38	PW 6122A		
2	02	27	005	020	REVO38	PW 6122A	3001-3216	
2	02	27	006	020	REVO38	PW 6122A		
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2	02	27	012	020	REVO38	PW 6122A		
2	02	27	013	020	REVO38	PW 6122A	3001-3216	
2	02	27	014	020	REVO38	PW 6122A		
2	02	27	015	020	REVO38	PW 6122A	3001-3216	
2	02	27	016	020	REVO38	PW 6122A		
2	02	27	017	020	REVO38	PW 6122A	3001-3216	
2	02	40	001	100	REVO37	CODE 0185	2089-2894	
2	02	40	002	110	REVO21	M:24105		
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2	02	40	002	201	REVO34	MOD:24105 + 30020		
2	02	40	001	360	REVO37	CODE 0090 (IAE/CFM)	0990-1903 3280-3319	
2	02	40	002	260	REVO37	CODE 0092 (IAE/CFM)		
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2	02	40	004	138	REVO38	20268/PW 6122		
2	02	40	003	203	REVO34	CODE 0124 IAE ENG: V2524	2089-2894	
2	02	40	004	203	REVO34	CODE 0124 IAE ENG: V2524		
2	02	40	003	312	REVO34	CODE:0090/V2527E	1304-1903 3280-3319	
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2	02	40	007		138	REV038	20268/PW 6122	3001-3216
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2	02	40	014		001	REV020		
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2	02	40	014		001	REV020		
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2	02	50	001	001	REVO32		3001-3216
2	02	50	002	125	REVO37	M:20268/PW6122	
2	02	50	001	001	REVO32		1304-1903 3280-3319
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2	02	50	001	001	REVO32		0990
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2	02	50	004	125	REVO22	MOD 20268 IAE V2524	
2	02	50	003	125	REVO38	M:20268/PW6122	3001-3216
2	02	50	004	115	REVO38	M:20268/PW6122	
2	02	50	003	312	REVO34	CODE:0090/V2527E	1304-1903 3280-3319
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2	02	50	005	115	REVO38	M:20268/PW6122	3001-3216
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2	02	50	007	125	REVO22	MOD 20268 IAE V2524	2089-2894
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2	03	10	003	160	REVO38	20268/6122A/6124A	3001-3216
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2	03	10	004	300	REVO34	CODE 0090 V2527A5/V2527E		
2	03	10	005	160	REVO38	20268/6122A/6124A	3001-3216	
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2	03	20	002	300	REVO35	CODE 0090 V2527A5/V2527E		
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2	04	00	003	300	REVO34	CODE 0236	3001-3216	
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2	04	10	002A	340	REVO37	C:90/V2527/27E/2500/B4/A1/A3	0990-1903 3280-3319	
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2	04	10	013	001	REVO38		0990	
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2	04	10	015	342	REVO34	CODE:0090/V2527E	1304-1903 3280-3319	
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2	04	20	007		153	REV038	20268/PW 6122A	3001-3216
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2	04	25	003		075	REV037	STD=28160+28917/V2527/V2527E	0990
2	04	25	004		370	REV033	CODE 0090/V2527	
2	04	25	003		080	REV037	CODE 0013	2089-2894
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2	04	25	003		080	REV037	CODE 0013	1304-1903 3280-3319
2	04	25	004		215	REV034	CODE 0092/IAE V2527E	
R	2	04	25	005	178	REV039	20268/6122A/T OR L	3001-3216
R	2	04	25	006	063	REV038	PW:6122A/6124A	
2	04	25	005		180	REV023	M:20268 IAE V2522/V2524 OR L	2089-2894
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2	04	51	004	103	REV038	CODE 0164		
2	04	51	005	001	REV038	STD		ALL
2	04	60	001	110	REV038	MOD 30397		0990-2321
2	04	60	002	110	REV038	30397		
2	04	60	001	200	REV038	M:30397+26925		2572-3319
2	04	60	002	110	REV038	30397		

M	V	CH	SEC	---PAGE---	SEQ-	--REV--	----VALIDATION CRITERIA----	-----EFFECTIVITY-----
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2	04	62	001	100	REV037	MOD.	28177	1304-3319
N	2	04	65	001	200	REV037	CODE 0237	3001-3216
N	2	04	65	002	200	REV037	M:33323+31426	
	2	04	65	003	200	REV037	CODE 0237	3001-3216
	2	04	70	001	100	REV034	M:30020	3001-3216
	2	04	70	002	100	REV034	M:30020	
N	2	04	70	003	100	REV036	M:30020	3001-3216
N	2	04	70	004	050	REV039	6122A	
N	2	04	70	005	050	REV039	6122A	3001-3216
	2	05	00	001	001	REV021		ALL
	2	05	10	001	001	REV021		0990-1903 3280-3319
	2	05	10	002	001	REV021		
	2	05	10	001	001	REV021		2089-2894
	2	05	10	002	103	REV021	M:24105	
	2	05	10	001	001	REV021		3001-3216
	2	05	10	002	200	REV038	M:24105+30020	
	2	05	10	003	001	REV020		ALL
	2	05	10	004	001	REV021		
	2	05	15	001	001	REV020		ALL
	2	05	15	002	001	REV021		
	2	05	15	003	001	REV020		ALL
	2	05	15	004	001	REV022		
	2	05	15	005	130	REV031	20268/IAE V2522/V2524	2089-2894
	2	05	15	006	130	REV031	20268/IAE V2522/V2524	
	2	05	15	005	140	REV031	20268/IAE V2527/V2527E	0990-1903 3280-3319
	2	05	15	006	140	REV031	20268/IAE V2527/V2527E	
	2	05	15	005	161	REV038	20268/6122A	3001-3216
	2	05	15	006	161	REV038	20268/6122A	
	2	05	15	007	130	REV031	20268 IAE V2522/V2524	2089-2894
	2	05	15	008	180	REV031	20268 IAE V2522/V2524	
	2	05	15	007	140	REV031	20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	15	008	160	REV031	20268 IAE V2527/V2527E	
R	2	05	15	007	161	REV038	20268/6122A	3001-3216
R	2	05	15	008	161	REV039	20268/6122A	
	2	05	15	009	160	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
R	2	05	15	009	161	REV039	20268/6122A	3001-3216
	2	05	15	009	180	REV031	20268/V2522/V2524	2089-2894

M	V	CH	SEC	--PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
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2	05	20	001	160	REV031	20268 IAE V2527/V2527E	0990-1903 3280-3319	
2	05	20	002	140	REV031	20268 IAE V2527/V2527E T=L		
2	05	20	001	162	REV038	20268/6122A	3001-3216	
2	05	20	002	161	REV038	20268/6122A		
2	05	20	001	180	REV031	20268 IAE V2522/V2524	2089-2894	
2	05	20	002	130	REV031	20268/IAE V2522/V2524/T/L		
2	05	20	003	001	REV022		0990-1903 3280-3319	
2	05	20	003	120	REV021	MOD 24105	2089-2894	
R	2	05	20	003	260	REV039	24105+30020/6122A/6124A	3001-3216
2	05	30	001	001	REV021		2089-2894	
2	05	30	002	130	REV022	MOD 20268 IAE V2522/V2524		
2	05	30	001	001	REV021		0990-1903 3280-3319	
2	05	30	002	140	REV023	M:20268 IAE V2527/V2527E		
2	05	30	001	001	REV021		3001-3216	
2	05	30	002	161	REV038	20268/6122A		
2	05	30	003	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894	
2	05	30	004	130	REV022	MOD 20268 IAE V2522/V2524		
2	05	30	003	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319	
2	05	30	004	140	REV023	M:20268 IAE V2527/V2527E		
2	05	30	003	161	REV038	20268/6122A	3001-3216	
2	05	30	004	161	REV038	20268/6122A		
2	05	30	005	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894	
2	05	30	006	130	REV022	MOD 20268 IAE V2522/V2524		
2	05	30	005	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319	
2	05	30	006	140	REV023	M:20268 IAE V2527/V2527E		
2	05	30	005	161	REV038	20268/6122A	3001-3216	
2	05	30	006	161	REV038	20268/6122A		
2	05	30	007	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894	
2	05	30	008	130	REV022	MOD 20268 IAE V2522/V2524		
2	05	30	007	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319	
2	05	30	008	140	REV023	M:20268 IAE V2527/V2527E		
2	05	30	007	161	REV038	20268/6122A	3001-3216	
2	05	30	008	161	REV038	20268/6122A		
2	05	30	009	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894	
2	05	30	010	130	REV022	MOD 20268 IAE V2522/V2524		
2	05	30	009	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319	
2	05	30	010	140	REV023	M:20268 IAE V2527/V2527E		
2	05	30	009	161	REV038	20268/6122A	3001-3216	
2	05	30	010	161	REV038	20268/6122A		

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2	05	30	012	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	011	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	012	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	011	161	REVO38	20268/6122A		3001-3216
2	05	30	012	161	REVO38	20268/6122A		
2	05	30	013	130	REVO22	MOD 20268	IAE V2522/V2524	2089-2894
2	05	30	014	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	013	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	014	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	013	161	REVO38	20268/6122A		3001-3216
2	05	30	014	161	REVO38	20268/6122A		
2	05	30	015	130	REVO22	MOD 20268	IAE V2522/V2524	2089-2894
2	05	30	016	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	015	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	016	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	015	161	REVO38	20268/6122A		3001-3216
2	05	30	016	161	REVO38	20268/6122A		
2	05	30	017	130	REVO22	MOD 20268	IAE V2522/V2524	2089-2894
2	05	30	018	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	017	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	018	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	017	161	REVO38	20268/6122A		3001-3216
2	05	30	018	161	REVO38	20268/6122A		
2	05	30	019	130	REVO22	MOD 20268	IAE V2522/V2524	2089-2894
2	05	30	020	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	019	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	020	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	019	161	REVO38	20268/6122A		3001-3216
2	05	30	020	161	REVO38	20268/6122A		
2	05	30	021	130	REVO22	MOD 20268	IAE V2522/V2524	2089-2894
2	05	30	022	130	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	021	140	REVO23	M:20268	IAE V2527/V2527E	0990-1903 3280-3319
2	05	30	022	140	REVO23	M:20268	IAE V2527/V2527E	
2	05	30	021	161	REVO38	20268/6122A		3001-3216
2	05	30	022	161	REVO38	20268/6122A		
2	05	30	023	133	REVO22	20268/V2522/V2524		2089-2894
2	05	30	024	133	REVO22	MOD 20268	IAE V2522/V2524	
2	05	30	023	140	REVO23	20268/V2527/V2527E		0990-1903 3280-3319
2	05	30	024	140	REVO23	M:20268	IAE V2527/V2527E	

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R	2	05	30	023	161	REV039	20268/6122A	3001-3216
R	2	05	30	024	161	REV039	20268/6122A/6124A	
	2	05	40	001	001	REV021		0990-1903 3280-3319
	2	05	40	002	140	REV023	20268/V2527/V2527E	
	2	05	40	001	103	REV021	MOD 24105	2089-2894
	2	05	40	002	160	REV022	20268/V2522/V2524	
R	2	05	40	001	252	REV038	24105+30020/6122A/6124A	3001-3216
R	2	05	40	002	153	REV039	20268/6122A	
	2	05	40	003	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894
	2	05	40	004	130	REV022	MOD 20268 IAE V2522/V2524	
	2	05	40	003	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	40	004	140	REV023	M:20268 IAE V2527/V2527E	
	2	05	40	003	153	REV038	20268/PW 6122A	3001-3216
	2	05	40	004	153	REV038	20268/PW 6122A	
	2	05	40	005	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894
	2	05	40	006	130	REV022	MOD 20268 IAE V2522/V2524	
	2	05	40	005	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	40	006	140	REV023	M:20268 IAE V2527/V2527E	
R	2	05	40	005	153	REV038	20268/PW 6122A	3001-3216
R	2	05	40	006	153	REV039	20268/PW 6122A	
	2	05	40	007	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894
	2	05	40	008	130	REV022	MOD 20268 IAE V2522/V2524	
	2	05	40	007	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	40	008	140	REV023	M:20268 IAE V2527/V2527E	
R	2	05	40	007	153	REV039	20268/PW 6122A	3001-3216
R	2	05	40	008	153	REV038	20268/PW 6122A	
	2	05	40	009	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894
	2	05	40	010	130	REV022	MOD 20268 IAE V2522/V2524	
	2	05	40	009	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	40	010	140	REV023	M:20268 IAE V2527/V2527E	
	2	05	40	009	153	REV038	20268/PW 6122A	3001-3216
	2	05	40	010	153	REV038	20268/PW 6122A	
	2	05	40	011	130	REV022	MOD 20268 IAE V2522/V2524	2089-2894
	2	05	40	012	130	REV022	MOD 20268 IAE V2522/V2524	
	2	05	40	011	140	REV023	M:20268 IAE V2527/V2527E	0990-1903 3280-3319
	2	05	40	012	140	REV023	M:20268 IAE V2527/V2527E	
	2	05	40	011	153	REV038	20268/PW 6122A	3001-3216
	2	05	40	012	153	REV038	20268/PW 6122A	
	2	05	50	001	001	REV021		0990-1903 3280-3319
	2	05	50	002	140	REV023	M:20268 IAE V2527/V2527E	

M	V	CH	SEC	---PAGE---	SEQ-	--REV--	----VALIDATION CRITERIA----	-----EFFECTIVITY-----
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	05	50	002	130	REVO22	MOD 20268 IAE V2522/V2524		
N	2	05	50	001	110	REVO21	MOD 24105	3001-3216
N	2	05	50	002	161	REVO38	20268/6122A	
2	05	50	003	130	REVO22	MOD 20268 IAE V2522/V2524		2089-2894
2	05	50	003	140	REVO23	M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	50	003	161	REVO38	20268/6122A		3001-3216
2	05	60	001	001	REVO21			ALL
2	05	60	002	001	REVO23			
2	05	60	003	001	REVO22			0990-1903 3280-3319
2	05	60	004	001	REVO21			
2	05	60	003	150	REVO21	MOD:24105		2089-2894
2	05	60	004	150	REVO21	MOD:24105		
2	05	60	003	252	REVO38	24105+30020/PW 6122A		3001-3216
2	05	60	004	252	REVO38	24105+30020/PW 6122A		
2	05	70	001	035	REVO21	IAE V2500/V2527/V2527E		0990-1903 3280-3319
2	05	70	002	035	REVO22	IAE V2500/V2527/V2527E		
2	05	70	001	045	REVO33	IAE V2522/V2524		2089-2894
2	05	70	002	045	REVO33	IAE V2522/V2524		
2	05	70	001	054	REVO38	PW 6122A		3001-3216
2	05	70	002	054	REVO38	PW 6122A		
2	05	70	003	035	REVO21	IAE V2500/V2527/V2527E		0990-1903 3280-3319
2	05	70	004	035	REVO21	IAE V2500/V2527/V2527E		
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2	05	70	004	045	REVO33	IAE V2522/V2524		
2	05	70	003	054	REVO38	PW 6122A		3001-3216
2	05	70	004	054	REVO38	PW 6122A		
2	05	70	005	035	REVO21	IAE V2500/V2527/V2527E		0990-1903 3280-3319
2	05	70	006	035	REVO21	IAE V2500/V2527/V2527E		
2	05	70	005	045	REVO33	IAE V2522/V2524		2089-2894
2	05	70	006	045	REVO33	IAE V2522/V2524		
2	05	70	005	054	REVO38	PW 6122A		3001-3216
2	05	70	006	054	REVO38	PW 6122A		
2	05	70	007	035	REVO21	IAE V2500/V2527/V2527E		0990-1903 3280-3319
2	05	70	008	035	REVO21	IAE V2500/V2527/V2527E		
2	05	70	007	045	REVO33	IAE V2522/V2524		2089-2894
2	05	70	008	045	REVO33	IAE V2522/V2524		
2	05	70	007	054	REVO38	PW 6122A		3001-3216
2	05	70	008	054	REVO38	PW 6122A		

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

- . 026A 20024 FUEL- INSTALL A CENTRE TANK SYSTEM-
..... ALL
- . 026A 20167 STRUCTURE - REINFORCE STRUCTURE TO
..... ALLOW MTOW 72T-MLW 63T-MZFW 59T DESIGN
WEIGHTS
..... ALL
- . 026A 20268 WINGS-WING TIP FENCES-INTRODUCE WING
..... TIPS INCLUDING FENCES-
..... ALL
- . 033 20856 LANDING GEAR - INSTALL CARBON BRAKES
..... AND ASSOCIATED WHEELS BF-GOODRICH -
..... CC-CZB CC-COC CC-COD
..... CC-COE CC-COF CC-COG
..... LV-BGU CC-COI CC-COK
..... CC-COL CC-COM LV-BET
..... LV-BFY LV-BFO CC-COT
..... CC-COU CC-COX CC-COV
..... CC-COZ CC-CPE CC-CPF
..... CC-CPI
- . 026A 21103 EQUIPMENT/FURNISHINGS - CARGO
..... COMPARTMENT - REARRANGE COMPARTMENT 4
..... INTO TWO ZONES -
..... ALL
- . 026A 21329 DOORS-CARGO COMPT DOORS-MODIFY LOCKING
..... INDICATION
..... ALL
- . 036B 23008 POWER PLANT - IAE - INSTALL DERATED
..... V2500-A5 ON A320 A/C
..... CC-CZB
- . 026A 23108 ENGINES - EXTEND FLIGHT ENVELOPPE
(9200 FT) FOR IAE V2500 ENGINES
(WITHOUT THRUST BUMP)
..... CC-COC CC-COD CC-COE
..... CC-COF CC-COG LV-BGU
..... CC-COI CC-COK CC-COL
..... CC-COM LV-BET LV-BFY
..... LV-BFO CC-COT MSN 3280
..... MSN 3319

M	V	REV	MOD	MP	TITLE	VALIDITY
				SB		
.	026A	23124		AIR CONDITIONING - PRESSURIZATION CONTROL - IMPROVE CONTROLLER TO ENABLE USE OF EXTERNAL MODE ALL	
.	026A	23320		DOORS-CARGO COMPARTMENT DOOR HYDRAULIC SYSTEM-INTRODUCE MODIFIED DOOR SELECTOR VALVE ALL	
.	033	23597		LANDING GEAR - MLG - BF GOODRICH BRAKES - INTRODUCE IMPROVED CARBON MATERIAL	
					CC-CZB CC-COC CC-COD	
					CC-COE CC-COF CC-COG	
					LV-BGU CC-COI CC-COK	
					CC-COL CC-COM LV-BET	
					LV-BFY LV-BFO CC-COT	
					CC-COU CC-COX CC-COY	
					CC-COZ CC-CPE CC-CPF	
					CC-CPI	
.	030	23779		MINOR IMPROVEMENTS INTRODUCED FROM A/C 508 (ST2) TO A/C 521 (ST2) ALL	
.	033	24007		LANDING GEAR-MLG-WHEELS AND BRAKES- INTRODUCE NEW REAR BRAKE PLATE	
					CC-CZB CC-COC CC-COD	
					CC-COE CC-COF CC-COG	
					LV-BGU CC-COI CC-COK	
					CC-COL CC-COM LV-BET	
					LV-BFY LV-BFO CC-COT	
					CC-COU CC-COX CC-COY	
					CC-COZ CC-CPE CC-CPF	
					CC-CPI	

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

. 033A 24105 FUSELAGE - REAR FUSELAGE - ADAPT
SECTION 17/19 STRUCTURE TO
A319 DEFINITION
CC-COU CC-COX CC-COY
CC-COZ CC-CPE CC-CPF
CC-CPI CC-CPJ CC-CPL
CC-CPM CC-CPO CC-CPQ
CC-CPX CC-CQK CC-CQL
CC-CVA CC-CVB CC-CVF
MSN 3214 MSN 3216

. 028 24373 FUEL - TANK LEVEL SENSING - INTRODUCE
MODIFIED LOW FUEL PRESSURE WARNING
CONTROL
ALL

. 037A 24946 LANDING GEAR - MLG - MESSIER -
INTRODUCE BRAKES P/N C202253
CC-CPJ CC-CPL CC-CPM
CC-CPO CC-CPQ CC-CPX
CC-CQK CC-CQL CC-CVA
CC-CVB CC-CVF MSN 3214
MSN 3216 MSN 3280 MSN 3319

. 026A 25068 POWER PLANT - INSTALL IAE V2527E A5
ENGINES (INCREASED TAKE-OFF THRUST AT
HIGH ALTITUDES)
CC-COC CC-COD CC-COE
CC-COF CC-COG LV-BGU
CC-COI CC-COK CC-COL
CC-COM LV-BET LV-BFY
LV-BFO CC-COT MSN 3280
MSN 3319

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

. 028 25141 NACELLES/PYLONS-PYLON STRUCTURE-
ADAPT PRIMARY STRUCTURE TO A321-200
VERSION

CC-CZB	CC-COC	CC-COD
CC-COE	CC-COF	CC-COG
LV-BGU	CC-COI	CC-COK
CC-COL	CC-COM	LV-BET
LV-BFY	LV-BFO	CC-COT
CC-COU	CC-COX	CC-COV
CC-COZ	CC-CPE	CC-CPF
CC-CPI	CC-CPJ	CC-CPL
CC-CPM	CC-CP0	CC-CPQ
CC-CPX	CC-CQK	CC-CQL
MSN 3280	MSN 3319	

. 037 25404 EXHAUST-THRUST REVERSER CONTROL AND
INDICATING-ACTIVATE ADDITIONAL THRUST
REVERSER LOCK CONTROL
ALL

. 026A 25615 CERTIFICATION - GENERAL - CERTIFICATION
FOR HIGH ALTITUDE AIRPORT OPERATION

CC-COC	CC-COD	CC-COE
CC-COF	CC-COG	LV-BGU
CC-COI	CC-COK	CC-COL
CC-COM	LV-BET	LV-BFY
LV-BFO	CC-COT	CC-COU
CC-COX	CC-COV	CC-COZ
CC-CPE	CC-CPF	CC-CPI
CC-CPJ	CC-CPL	CC-CPM
CC-CP0	CC-CPQ	CC-CPX
CC-CQK	CC-CQL	CC-CVA
CC-CVB	CC-CVF	MSN 3214
MSN 3216	MSN 3280	MSN 3319

. 031 25810 LANDING GEAR - WHEELS AND BRAKES -
INSTALL BF GOODRICH CARBON BRAKES
(SEPCARB III) P/N 2-1600

CC-COC	CC-COD	CC-COE
CC-COF	CC-COG	LV-BGU
CC-COI	CC-COK	CC-COL
CC-COM	LV-BET	LV-BFY
LV-BFO	CC-COT	CC-COU
CC-COX	CC-COV	CC-COZ
CC-CPE	CC-CPF	CC-CPI

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

. 036B 25951	LANDING GEAR - INSTALL ABS A321 WHEELS AND BRAKES ON A320 CC-CZB				
. 026A 26017	INDICATING/RECORDING SYSTEMS-FLIGHT WARNING COMPUTER (FWC)-INTRODUCE FWC ST2 E2 ALL				
. 026A 26018	INDICATING/RECORDING SYSTEMS-DISPLAY MANAGEMENT COMPUTER (DMC)-INTRODUCE DMC V32 STD ALL				
. 030 26249	AIR CONDITIONING-FLOW CONTROL AND INDICATING INTRODUCE MODIFIED AIR CONDITIONING FLOW CONTROL ALL				
. 033A 26298	POWER PLANT-GENERAL-INTRODUCE IAE V2524-A5 ON A319-132 A/C CC-COU CC-COX CC-COY CC-COZ CC-CPE CC-CPF CC-CPI CC-CPJ CC-CPL CC-CPM CC-CP0 CC-CPQ CC-CPX CC-CQK CC-CQL				
. 026A 26645	AUTO-FLIGHT-FAC INTRODUCE FAC STD BAM 0513 ALL				
. 030 26910	FLIGHT CONTROL -ELAC SYSTEM- INTRODUCE E.L.A.C. WITH ENHANCED RELAYS CC-COC CC-COD CC-COE CC-COF CC-COG LV-BGU CC-COI CC-COK CC-COL CC-COM LV-BET LV-BFY LV-BFO CC-COT CC-COU CC-COX CC-COY CC-COZ CC-CPE CC-CPF CC-CPI CC-CPJ CC-CPL CC-CPM CC-CP0 CC-CPQ CC-CPX CC-CQK CC-CQL CC-CVA CC-CVB CC-CVF MSN 3214 MSN 3216 MSN 3280 MSN 3319				

M				
V	REV	MOD	MP	TITLE
T			SB	VALIDITY

. 036A 26925 LANDING GEAR-ALTERNATE BRAKING-
..... INTRODUCE MODIFIED ALTERNATE
BRAKING SYSTEM
CC-CPF CC-CPI CC-CPJ
CC-CPL CC-CPM CC-CP0
CC-CPQ CC-CPX CC-CQK
CC-CQL CC-CVA CC-CVB
CC-CVF MSN 3214 MSN 3216
MSN 3280 MSN 3319

. 033A 26965 LANDING GEAR-WHEELS AND BRAKES-
..... INTRODUCE BSCU COMMON STD
CC-COU CC-COX CC-COY
CC-COZ CC-CPE CC-CPF
CC-CPI CC-CPJ CC-CPL
CC-CPM CC-CP0 CC-CPQ
CC-CPX CC-CQK CC-CQL
CC-CVA CC-CVB CC-CVF
MSN 3214 MSN 3216 MSN 3280
MSN 3319

. 030 27276 FLIGHT CONTROLS-ELAC SYSTEM-INTRODUCE
..... ELAC SOFTWARE "L80"
ALL

. 036A 27620 NAVIGATION-STANDBY DATA : ALTITUDE AND
..... HEADING - INSTALL INTEGRATED STANDBY
INSTRUMENT SYSTEM (ISIS)
CC-CPF CC-CPI CC-CPJ
CC-CPL CC-CPM CC-CP0
CC-CPQ CC-CPX CC-CQK
CC-CQL CC-CVA CC-CVB
CC-CVF MSN 3214 MSN 3216
MSN 3280 MSN 3319

M	V	REV	MOD	MP	TITLE	VALIDITY
				SB		

. 037 27714 NAVIGATION - ADIRS - REDUCE VERTICAL
34-1172 01 SEPARATION MINIMUM USING ADR1 AND 2
ONLY

CC-CZB	CC-COC	CC-COD
CC-COE	CC-COF	CC-COG
LV-BGU	CC-COI	CC-COK
CC-COL	CC-COM	LV-BET
LV-BFY	LV-BFO	CC-COT
CC-COU	CC-COX	CC-COY
CC-COZ	CC-CPE	CC-CPF
CC-CPI	CC-CPJ	CC-CPL
CC-CPM	CC-CP0	CC-CPQ
CC-CPX	CC-CQK	CC-CQL
MSN 3280	MSN 3319	

. 030 27773 LANDING GEAR-NORMAL BRAKING-
32-1232 01 INTRODUCE STD 8 BSCU (TWIN
VERSION)
ALL

. 030 27845 FLIGHT CONTROLS-ELAC-INTRODUCE
ELAC WITH ADVANCED ELAC POWER SUPPLY
BOARD

CC-COC	CC-COD	CC-COE
CC-COF	CC-COG	LV-BGU
CC-COI	CC-COK	CC-COL
CC-COM	LV-BET	LV-BFY
LV-BFO	CC-COT	CC-COU
CC-COX	CC-COY	CC-COZ
CC-CPE	CC-CPF	CC-CPI
CC-CPJ	CC-CPL	CC-CPM
CC-CP0	CC-CPQ	CC-CPX
CC-CQK	CC-CQL	CC-CVA
CC-CVB	CC-CVF	MSN 3214
MSN 3280	MSN 3280	MSN 3319

M				
V	REV	MOD	MP	TITLE
T			SB	VALIDITY

. 037 28009 AIR CONDITIONING-PRESSURE CONTROL AND
21-1116 04 MONITORING-INTRODUCE PRESSURE
CONTROLLER P/N 9022-15702-10

CC-CZB	CC-COC	CC-COD
CC-COE	CC-COF	CC-COG
LV-BGU	CC-COI	CC-COK
CC-COL	CC-COM	LV-BET
LV-BFY	LV-BFO	CC-COT
CC-COU	CC-COX	CC-COV
CC-COZ	CC-CPE	CC-CPF
CC-CPI	CC-CPJ	CC-CPL
CC-CPM	CC-CP0	CC-CPQ
CC-CPX	CC-CQK	CC-CQL
MSN 3280	MSN 3319	

. 026A 28160 ELEC PWR-AC EMERGENCY GENERATION-
..... ACTIVATE A319/A321 ELECTRICAL
EMERGENCY CONFIGURATION ON A320 A/C
CC-COC CC-COD CC-COE
CC-COF CC-COG LV-BGU
CC-COI CC-COK CC-COL
CC-COM LV-BET LV-BFY
LV-BFO CC-COT MSN 3280
MSN 3319

. 037A 28164 LANDING GEAR - WHEELS AND BRAKES -
..... INSTALL CARBON BRAKES TYPE SEPCARB III
PLUS - MESSIER BUGATTI
CC-CPJ CC-CPL CC-CPM
CC-CP0 CC-CPQ CC-CPX
CC-CQK CC-CQL CC-CVA
CC-CVB CC-CVF MSN 3214
MSN 3216 MSN 3280 MSN 3319

M V T	REV MOD SB	TITLE	VALIDITY
. 036A 28177			
CERTIFICATION - GENERAL - CERTIFY OPERATION AT EL SALVADOR (CHILE) RUNWAY WITH SLOPE GREATER THAN +/- 3%			
		CC-COC	CC-COD
		CC-COF	CC-COG
		CC-COI	CC-COK
		CC-COM	LV-BET
		LV-BFO	CC-COT
		CC-COX	CC-COY
		CC-CPE	CC-CPF
		CC-CPJ	CC-CPL
		CC-CPQ	CC-CPX
		CC-CQK	CC-CQL
		CC-CVB	CC-CVF
		MSN 3216	MSN 3280
			MSN 3319
. 038 30020			
FUSELAGE - CENTER FUSELAGE - ADAPT INTERFACES AND ASSEMBLING OF SECTION 15/21 TO 17/19 TO A318 DEFINITION			
		CC-CVA	CC-CVB
		MSN 3214	MSN 3216
. 038 30034			
ENGINE - GENERAL - INSTALL PW 6100 ENGINE RATED AT 22.100 IBF ON A318			
		CC-CVA	CC-CVB
		MSN 3214	MSN 3216
. 031 30075			
LANDING GEAR - WHEELS AND BRAKES - REDUCE LENGTH OF WEAR INDICATOR ON BF GOODRICH BRAKES			
		CC-COC	CC-COD
		CC-COF	CC-COG
		CC-COI	CC-COK
		CC-COM	LV-BET
		LV-BFO	CC-COT
		CC-COX	CC-COY
		CC-CPE	CC-CPF

M	V	REV	MOD	MP	TITLE	VALIDITY
				SB		

. 029	30277			OXYGEN - PASSENGER OXYGEN - INTRODUCE MODIFIED OPTIONAL CHEMICAL OXYGEN CONTAINER SERIES 22 MIN (DRAEGER)		
					CC-COC	CC-COD	CC-COE
					CC-COF	CC-COG	LV-BGU
					CC-COI	CC-COK	CC-COL
					CC-COM	LV-BET	LV-BFY
					LV-BFO	CC-COT	CC-COU
					CC-COX	CC-COV	CC-COZ
					CC-CPE	CC-CPF	CC-CPI
					CC-CPJ	CC-CPL	CC-CPM
					CC-CP0	CC-CPQ	CC-CPX
					CC-CQK	CC-CQL	CC-CVA
					CC-CVB	CC-CVF	MSN 3214
					MSN 3216	MSN 3280	MSN 3319
. 029	30397	00-1058 49		CERTIFICATION DOCUMENTS - GENERAL - CERTIFY AIRCRAFT FOR OPERATION ON RUNWAYS LESS THAN 45M WIDTH ALL		
. 029	30961			FUEL - MAIN FUEL PUMP SYSTEM - ADAPT PUMP CONTROL LATCH FOR FLIGHT DECK REFUEL CAPABILITY		
					LV-BGU	CC-COI	CC-COK
					CC-COL	CC-COM	LV-BET
					LV-BFY	LV-BFO	CC-COT
					CC-COU	CC-COX	CC-COY
					CC-COZ	CC-CPE	CC-CPF
					CC-CPI	CC-CPJ	CC-CPL
					CC-CPM	CC-CP0	CC-CPQ
					CC-CPX	CC-CQK	CC-CQL
					CC-CVA	CC-CVB	CC-CVF
					MSN 3214	MSN 3216	MSN 3280
					MSN 3319		
. 033A	31106	32-1232 01		LANDING GEAR - NORMAL BRAKING - INTRODUCE STD 9 BSCU (TWIN VERSION) ALL		

M V T	REV MOD SB	TITLE	VALIDITY
. 031 31146	32-1228 04	LANDING GEAR - WHEELS AND BRAKES - INTRODUCE OXIDATION RESISTANT BFG CARBON BRAKE	CC-COC CC-COD CC-COE CC-COF CC-COG LV-BGU CC-COI CC-COK CC-COL CC-COM LV-BET LV-BFY LV-BFO CC-COT CC-COU CC-COX CC-COY CC-COZ CC-CPE CC-CPF CC-CPI
. 030 31395	27-1135 02	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC STD L81 ALL	
. 036 31426		NAVIGATIONS-EGPWS-ACTIVATE GEOMETRIC ALTITUDE FUNCTION IN THE EGPWS	CC-CPF CC-CPI CC-CPJ CC-CPL CC-CPM CC-CP0 CC-CPQ CC-CPX CC-CQK CC-CQL CC-CVA CC-CVB CC-CVF MSN 3214 MSN 3216 MSN 3280 MSN 3319
. 031 31528	34-1252	NAVIGATION-ADIRU-RESTORE RVSM 3 CIRCUIT CAPABILITIES (SERIAL SOLUTION)	CC-COG LV-BGU CC-COI CC-COK CC-COL CC-COM LV-BET LV-BFY LV-BFO CC-COT CC-COU CC-COX CC-COY CC-COZ CC-CPE CC-CPF CC-CPI CC-CPJ CC-CPL CC-CPM CC-CP0 CC-CPQ CC-CPX CC-CQK CC-CQL CC-CVA CC-CVB CC-CVF MSN 3214 MSN 3216 MSN 3280 MSN 3319

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

. 031	31803	LANDING GEAR-WHEELS AND BRAKES-INTRODU			
	32-1238	06	CE GOODRICH CARBON BRAKE (SEPCARB III)			
			P/N 2-1600-3 WITH ANTI-OXIDANT "M1"			
			CC-COC	CC-COD	CC-COE	
			CC-COF	CC-COG	LV-BGU	
			CC-COI	CC-COK	CC-COL	
			CC-COM	LV-BET	LV-BFY	
			LV-BFO	CC-COT	CC-COU	
			CC-COX	CC-COV	CC-COZ	
			CC-CPE	CC-CPF	CC-CPI	
. 031	31897	AUTOFLIGHT-FMGC-INSTALL FMGC IAE			
	22-1090	11	C13042BA01 (EQUIPPED WITH FMS2			
			HONEYWELL)			
			CC-COC	CC-COD	CC-COE	
			CC-COF	CC-COG	LV-BGU	
			CC-COI	CC-COK	CC-COL	
			CC-COM	LV-BET	LV-BFY	
			LV-BFO	CC-COT	CC-COU	
			CC-COX	CC-COV	CC-COZ	
			CC-CPE	CC-CPF	CC-CPI	
			CC-CPJ	CC-CPL	CC-CPM	
			CC-CP0	CC-CPQ	CC-CPX	
			CC-CQK	CC-CQL	CC-CVA	
			CC-CVB	CC-CVF	MSN 3214	
			MSN 3216	MSN 3280	MSN 3319	
. 033A	32115	FUEL-MANUAL (MAGNETIC) INDICATORS-			
			DELETE ATTITUDE MONITOR			
			CC-COU	CC-COX	CC-COV	
			CC-COZ	CC-CPE	CC-CPF	
			CC-CPI	CC-CPJ	CC-CPL	
			CC-CPM	CC-CP0	CC-CPQ	
			CC-CPX	CC-CQK	CC-CQL	
			CC-CVA	CC-CVB	CC-CVF	
			MSN 3214	MSN 3216	MSN 3280	
			MSN 3319			

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		

. 0378 32238	LANDING GEAR-WHEELS AND BRAKES- INSTALL 32-1244 28 MESSIER WHEELS&SEPCARB III PLUS BRAKES IN PLACE OF GOODRICH WHEELS AND BRAKES	CC-COC CC-COF CC-COI CC-COM LV-BFO CC-COX CC-CPE	CC-COD CC-COG CC-COK LV-BET CC-COT CC-COY CC-CPF	CC-COE LV-BGU CC-COL LV-BFY CC-COU CC-COZ CC-CPI
. 0368 32239	LANDING GEAR-WHEELS AND BRAKES- INSTALL 32-1242 06 MESSIER WHEELS &SUBCARB III PLUS BRAKES IN PLACE OF ABS(A321TYPE) WHEELS&BRAKES	CC-CZB		
. 035 32311	LANDING GEAR-WHEELS AND BRAKES-CANCEL 32-1247 02 MIXABILITY BETWEEN GOODRICH BRAKES 2-1600-2 AND -3 AUTHOR. WITH MOD 31803	CC-COC CC-COF CC-COI CC-COM CC-COU CC-CPE	CC-COD CC-COG CC-COK CC-COT CC-COY CC-CPF	CC-COE LV-BGU CC-COU CC-COZ CC-CPI
. 035 32656	ENGINE FUEL AND CONTROL - CONTROLLING - 73-1075 01 INTRODUCE EEC SOFTWARE STANDARD "SCN17" ON V2500-AS ENGINES	CC-CZB CC-COE LV-BGU CC-COL LV-BFY CC-COU CC-COZ CC-CPI CC-CPM CC-CPX MSN 3280	CC-COC CC-COF CC-COI CC-COM LV-BFO CC-COX CC-CPE CC-CPJ CC-CPQ CC-CQK MSN 3319	CC-COD CC-COG CC-COK LV-BET CC-COT CC-COY CC-CPF CC-CPL CC-CPQ CC-CQL

M	V	REV	MOD	MP	TITLE	VALIDITY
	T			SB		

. 036 33309				FLIGHT CONTROLS - SLATS/FLAPS - TRANSFER THE RESPONSIBILITY FROM A-UK TO A-D (ADMINISTRATION MOD)		
					CC-COU	CC-COK	CC-COY
					CC-COZ	CC-CPE	CC-CPF
					CC-CPI	CC-CPJ	CC-CPL
					CC-CPM	CC-CP0	CC-CPQ
					CC-CPX	CC-CQK	CC-CQL
					CC-CVA	CC-CVB	CC-CVF
					MSN 3214	MSN 3216	MSN 3280
					MSN 3319		
. 038A 33323				CERTIFICATION DOCUMENTS - GENERAL - EXTEND OPERATING FLIGHT ENVELOPE TO MINUS 2000FT PRESSURE ALTITUDE		
					CC-CVA	CC-CVB	CC-CVF
					MSN 3214	MSN 3216	
. 038 33374				INDICATING RECORDING SYSTEM - FLIGHT WARNING COMPUTER (FWC) - INSTALL FWC STANDARD H2F2		
		31-1197			LV-BET	LV-BFY	LV-BFO
		31-1257			CC-COT	CC-CPF	CC-CPI
					CC-CPJ	CC-CPL	CC-CPM
					CC-CP0	CC-CPQ	CC-CPX
					CC-CQK	CC-CQL	CC-CVA
					CC-CVB	CC-CVF	MSN 3214
					MSN 3216	MSN 3280	MSN 3319
. 036 34221				ENGINE FUEL AND CONTROL - CONTROLLING - INSTALL EEC SOFTWARE "SCN18" ON IAE V2500-A5 ENGINES		
		73-1082 01			CC-CZB	CC-COC	CC-COD
					CC-COE	CC-COF	CC-COG
					LV-BGU	CC-COI	CC-COK
					CC-COL	CC-COM	LV-BET
					LV-BFO	CC-COK	CC-COY
					CC-COZ	CC-CPE	CC-CPF
					CC-CPI	CC-CPJ	CC-CPL
					CC-CPM	CC-CP0	CC-CPQ
					CC-CPX	CC-CQK	CC-CQL
					MSN 3280	MSN 3319	

M	V	REV	MOD	MP	TITLE	VALIDITY
				SB		

. 037 35040 LANDING GEAR - WHEELS AND BRAKES
..... INTRODUCE GOODRICH DURACARB CARBON
..... BRAKES WITH ANTI - OXYDAN "M1"
..... CC-CPF CC-CPI

. 038 35800 FUSELAGE - BELLY FAIRING -
..... TRANSFER OF DEFINITION FROM
..... AIRBUS FRANCE TO AIRBUS SPAIN
..... CC-CPJ CC-CPL CC-CPM
..... CC-CPQ CC-CPQ CC-CPX
..... CC-CQK CC-CQL CC-CVA
..... CC-CVB CC-CVF MSN 3214
..... MSN 3216 MSN 3280 MSN 3319

. 038A 35944 ENGINE FUEL AND CONTROL-FADEC SYSTEM-
..... INTRODUCE EEC SOFTWARE STANDARD "SCN19"
..... ON IAE V2500-A5 ENGINES
..... MSN 3280 MSN 3319

01.00 CONTENTS**01.10 GENERAL****01.20 CARGO LOADING**

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R	– LOAD and TRIM SHEET	1
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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.
- **DRY OPERATING WEIGHT (DOW)**
The total weight of an aircraft ready for a specific type of operation excluding all usable fuel and traffic load.
Operational Empty Weight plus items specific to the type of flight i.e. catering, newspapers, pantry equipment etc.
- **TAKEOFF FUEL**
The weight of the fuel onboard at takeoff.
- **OPERATING WEIGHT**
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)**
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 two lower deck cargo compartments :

- Forward cargo compartment, compartment 1.
- Aft cargo compartment, subdivided into compartments 3, 4 and 5.

The main access doors to forward and aft compartments are hydraulically operated.

A bulk cargo door ◄ gives additional access to the aft cargo compartment. It is manually operated.

DESCRIPTION

Each compartment is divided into sections, and is designed to be category D (for A320 and A319) or category C (A321, A319 ◄ and A320 ◄) as defined by FAR.

A placard in each compartment indicates the maximum authorized gross weight.

The compartments have separate lighting.

RESTRAINT SYSTEM

Divider nets subdivide the compartments to allow them to be partially loaded and to retain the bulk.

Door nets which protect the doors from shifting cargo, must be used whenever the compartment contain cargo.

CARGO LOADING SYSTEM ◄

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING CARGO LOADING	2.01.20	P 2
		SEQ 110	REV 35

CARGO CAPACITY

FULL BULK

The maximum load for each compartment is as follows :

– **Forward**

Compartment 1 : 3 402 kg (7 500 lb)

– **Aft**

Compartment 3 : 2 426 kg (5 349 lb)

Compartment 4 : 2 110 kg (4 652 lb)

Compartment 5 : 1 497 kg (3 300 lb)

GENERAL

The aircraft has two lower deck cargo compartments :

- Forward cargo compartment, compartment 1.
- Aft cargo compartment, subdivided into compartments 3, 4 and 5.

The main access doors to forward and aft compartments are hydraulically operated.

A bulk cargo door ◄ gives additional access to the aft cargo compartment. It is manually operated.

DESCRIPTION

Each compartment is divided into sections, and is designed to be category D (for A320 and A319) or category C (A321, A319 ◄ and A320 ◄) as defined by FAR.

A placard in each compartment indicates the maximum authorized gross weight.

The compartments have separate lighting.

RESTRAINT SYSTEM

Divider nets subdivide the compartments to allow them to be partially loaded and to retain the bulk.

Door nets which protect the doors from shifting cargo, must be used whenever the compartment contain cargo.

CARGO LOADING SYSTEM ◄

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING CARGO LOADING	2.01.20	P 2
		SEQ 210	REV 35

CARGO CAPACITY

FULL BULK

The maximum load for each compartment and section is as follows :

— **Forward**

Compartment 1 : 2 268 kg (5 000 lb)

— **Aft**

Section 41 : 1 326 kg (2 924 lb)

Section 42 : 1 695 kg (3 736 lb)

Compartment 5 : 1 497 kg (3 300 lb)

GENERAL

The aircraft has two lower deck cargo compartments :

- Forward cargo compartment, compartment 1.
- Aft cargo compartment, subdivided into compartments 4 (aft cargo hold) and 5 (bulk cargo hold).

The main access doors to forward and aft compartments are hydraulically 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.

RESTRAINT SYSTEM

Divider nets subdivide the compartments to allow them to be partially loaded and to retain the bulk.

Door nets which protect the doors from shifting cargo, must be used whenever the compartment contain cargo.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING CARGO LOADING	2.01.20	P 2
		SEQ 100	REV 34

CARGO CAPACITY

The aircraft is in full bulk configuration.

The maximum load for each compartment is as follows :

– **Forward cargo compartment**

Compartment 1 : 1 614 kg (3 558 lb)

– **Aft cargo compartment**

Compartment 4 : 2 131 kg (4 698 lb)

Compartment 5 : 1 372 kg (3 025 lb)

CARGO DOOR OPERATION**NORMAL OPERATION****OPENING****On door****– ACCESS DOOR OPERATING HANDLE RELEASE**

Push handle flap inward.

– DOOR UNLOCK

Move door operating handle downward (105°) from LOCKED to UNLOCK 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 and PTU 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 position and shuts down the electric pump.

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 off.

On door**– DOOR LOCK**

Immediately push the door operating handle upwards to the locked position. When the door is locked, the cargo doors view ports appear green, the CARGO door indication on ECAM extinguishes, and the handle flap mechanism locks the operating handle.

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	CARGO LOADING	SEQ 100	REV 26

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

On door service panel

– **LEVER OF MANUAL SELECTOR VALVE** **RELEASE**

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.

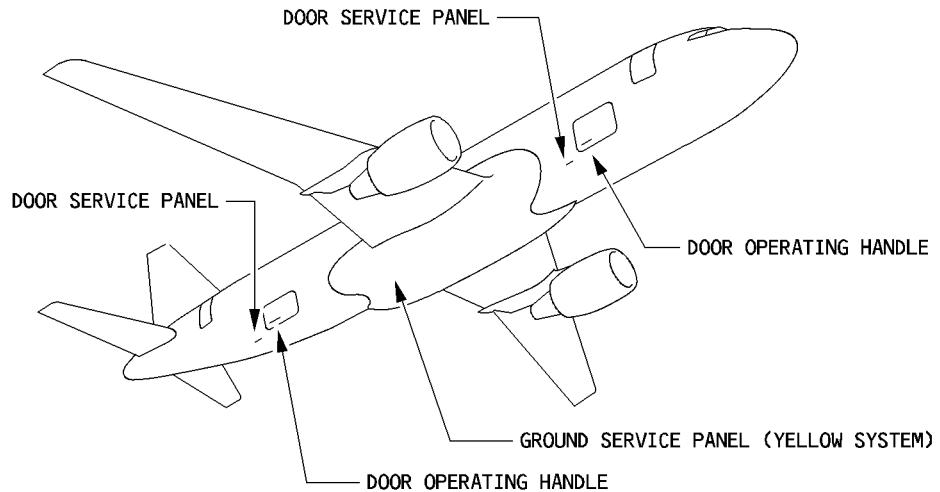
On door

- **DOOR** **LOCK**
Lock the operating handle as for normal operation.

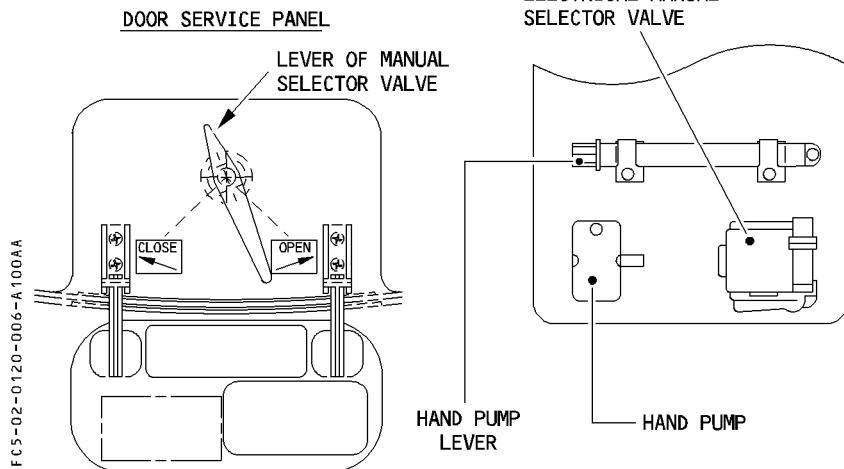
On door service panel and ground service panel

- **ACCESS DOORS** **CLOSE**

LOCATION OF SERVICE PANELS

GROUND SERVICE PANEL

YELLOW SYSTEM

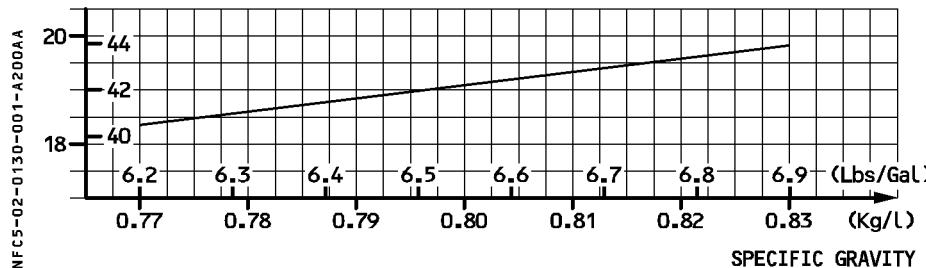
ELECTRICAL MANUAL
SELECTOR VALVE

GENERAL INFORMATION**USABLE FUEL VOLUME**

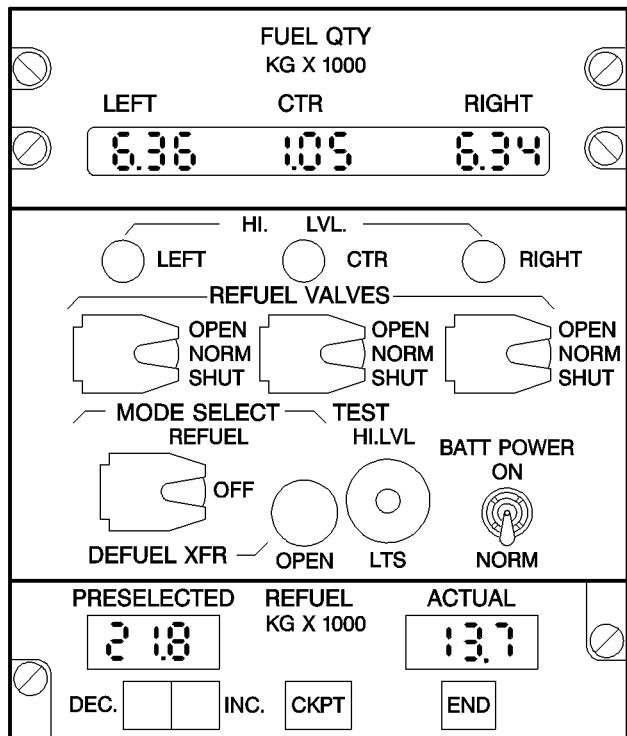
	WING TANKS		CENTER TANK	TOTAL
	OUTER CELL	INNER CELL		
LITERS	1760	13849	8250	23859
US GALLONS	464	3659	2180	6303

USABLE FUEL WEIGHT

USABLE
FUEL WEIGHT
(x1000Kg) (x1000Lb)

**REFUELING**

- R – During automatic refueling, fuel goes into the center tank and outer cell of wing tanks simultaneously. When the outer cell of wing tank is full, fuel overflows into the inner cell.
- R – During manual refueling, fill the wing tanks first, then the center tank.
- R – With the tanks filled to the 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.
- R – Electrical transients (caused by switching among the APU, the external and the engine electrical supply) during automatic refueling may stop the process. If the automatic refueling process is stopped, it is necessary to re-enter the Preselected Fuel Quantity.

REFUELING CONTROL PANEL

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REFUELING**PREPARATION**

– **ACCESS PLATFORM** **IN POSITION**

– **SAFETY PRECAUTIONS** **APPLY**

Make certain that no HF transmission 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 grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that the ACCU PRESS has sufficient pressure. Do not refuel, if a fire or engine overheat warning is displayed. During refueling, do not operate the external lighting.

Note : For APU start/shutdown during refueling, refer to FCOM 2.01.30 p 10a.

– **MAX REFUELING PRESSURE** **50 PSI (3.5 bars)**

On refueling control panel :

– **TEST** **LTS**

Lights on the panel come on. FUEL QTY and the PRESELECTED and ACTUAL displays show 8's.

– **TEST** **HI.LVL**

HI LVL lights change state if the high level sensors and their circuits are serviceable.

AUTOMATIC REFUELING

– **REFUEL VALVES** **CHECK NORM and GUARDED**

– **PRESELECTOR** **SET**

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		SEQ 001	REV 20

- **MODE SELECT** **REFUEL**
- **START REFUELING**
When the refueling is finished the END light comes on.
- **ACTUAL QUANTITY** **CHECK**
The actual quantity must be within 100 kg (220 lb) of the preselected quantity.
- **MODE SELECT** **OFF and GUARDED**

MANUAL REFUELING

- **REFUEL VALVES** **SHUT**
- **MODE SELECT** **REFUEL**
- **REFUEL VALVES (tanks to be filled)** **OPEN**
- **START REFUELING**
- **FUEL QTY** **MONITOR**
- When the contents of the tanks reach the required level :
 - Corresponding **REFUEL VALVES** **SHUT**
 - **MODE SELECT** **OFF and GUARDED**
 - **REFUEL VALVES** **NORM and GUARDED**

GROUND FUEL TRANSFER**On cockpit overhead FUEL panel**

- PUMPS (of the tanks not to be defueled) OFF
- MODE SEL MAN
- PUMPS (of the tanks to be defueled) ON
- if left wing and/or center tanks is (are) to be defueled :
 - X FEED ON
OPEN light comes on.

On refueling control panel :

- REFUEL VALVES (of tanks not to be filled) SHUT
- REFUEL VALVES (of tanks to be filled) OPEN
- MODE SELECT DEFUEL/XFR
OPEN light comes on.
- FUEL QTY MONITOR
- When the tank contents reach the required level :
 - Corresponding REFUEL VALVES SHUT
 - MODE SELECT OFF and GUARDED
OPEN light goes out.
 - REFUEL VALVES NORM and GUARDED
 - Set cockpit FUEL panel to normal configuration.

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		SEQ 001	REV 21

INTENTIONALLY LEFT BLANK

DEFUELING

Note : Defueling by suction is not possible.

– ACCESS PLATFORM IN POSITION

– SAFETY PRECAUTIONS APPLY

Make certain that no HF transmission 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 grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that the ACCU PRESS has sufficient pressure. Do not defuel, if a fire or engine overheat warning is displayed. During defueling, do not operate the external lighting.

Note : For APU start/shutdown during defueling, refer to FCOM 2.01.30 p 10a.

– MAX DEFUELING PRESSURE 11 PSI (0.75 bar)

On cockpit overhead FUEL panel :

– PUMPS OFF

On refueling control panel :

R – REFUEL VALVES NORM

– MODE SELECT (OPEN light comes on) DEFUEL/XFR

On cockpit overhead FUEL panel :

– MODE SEL MAN

– PUMPS (of the tank(s) to be defueled) ON

– X FEED (OPEN light comes on) ON

– FUEL QTY MONITOR

● When the tank contents reach the required level

– Corresponding PUMPS OFF

- **On refueling control panel :**

- **MODE SELECT (OPEN light goes out) OFF and GUARDED**
 - **REFUEL VALVES NORM and GUARDED**
 - **Set cockpit FUEL panel to normal configuration.**

OVERWING GRAVITY REFUELING

Overwing gravity refueling is done at the refuel point in the top of each wing. Fuel is delivered directly into the outer cell from which the inner cell is filled by opening the intercell transfer valves. Fill center tank by transfer from the right wing tank (open the X FEED valve in case of transfer from the left wing tank).

– SAFETY PRECAUTIONS APPLY

R Disembark all passengers.

Make certain that no HF transmission is performed during refueling and that the tanker and the aircraft are properly grounded. Connect a tanker grounding cable to the aircraft's grounding point on the main landing gear. Refer to Aircraft Maintenance Manual (AMM) 12-11-28 PB 301 for detailed safety procedures.

Note : For APU start/shutdown during refueling, refer to FCOM 2.01.30 p 10a.

– TRANSFER VALVES (on ECAM FUEL page) CHECK POSITION**● If transfer valves closed :**

– MODE SELECT (on the refuel control panel) Check OFF

– FUEL/XFR VALVE 1/WING/L C/B (A10 on 49VU) and FUEL/XFR VALVE 2/WING/L C/B (M22 on 121VU) PULL for a minimum of 5 sec then PUSH
The refuel control panel door must be closed when the C/B's are being pulled.

– FUEL/XFR VALVE 1/WING/R C/B (A11 on 49VU) and FUEL/XFR VALVE 2/WING/R C/B (M23 on 121VU) PULL for a minimum of 5 sec then PUSH
Intercell transfer valves will stay open until the next refuel selection.

– FUEL/XFR VALVE 1/WING/L and R C/B's (A10 and A11 on 49VU), and FUEL/XFR VALVE 2/WING/L and R C/B's (M22 and M23 on 121 VU) PULL
The refuel control panel door must be closed when the C/B's are being pulled. Then it could be opened for subsequent procedures.

RH WING REFUELING PROCEDURE

*– OVERWING REFUEL CAP REMOVE

*– REFUELING START

● If the center tank is to be refueled :

– GROUND FUEL TRANSFER PROCEDURE APPLY

● When the wing tank reaches the required level :*** – REFUELING STOP***** – OVERWING REFUEL CAP INSTALL****LH WING REFUELING PROCEDURE**

Perform the steps for RH wing refueling procedure marked * then :

- R – FUEL/XFR VALVE 1/WING/L and R C/B's (A10 and A11 on 49VU) and FUEL/XFR VALVE 2/WING/L and R C/B's (M22 and M23 on 121VU) PUSH
- R – MODE SELECT REFUEL then OFF
Check on FUEL page that the intercell transfer valves close.

Note : The overwing refuel point is not at the highest point of the wing and therefore the wing tanks cannot be filled to full.

REFUELING WITH ONE ENGINE RUNNING

- Refuel with one engine running only at airports where no external ground pneumatic power is available and only when APU is unserviceable.
- Only the RH fuel couplings can be used.
- Overwing gravity filling is not permitted.
- Disembark all passengers.
- Obtain airport authorization.
The Airport Fire Department should standby at the aircraft during the entire refueling procedure.
- Point the aircraft into the wind at a location where the slope is negligible.
Set the parking brake and check its pressure.
Run engine n° 1 at ground idle with its generator connected.
- Do not start engine n° 2, shut down engine n° 1 or attempt to start the APU before all fueling operations have been completed.
- Position the fuel truck under the extremity of the right wing. Its pressure should not exceed 30 psi.
- Follow manual refueling procedure.

OPERATION MONITORING**During the entire refueling procedure :**

- Monitor the fuel truck shut off valve.
- Be sure that the fueling company is keeping permanent control of the emergency fuel shut off device.
- Have a flight crew member in the cockpit monitoring all systems and the running engine.
- Have a qualified ground crew member at the fueling station to operate the refuel valve switches.
- Monitor the refueling closely and be prepared to close the refuel valves in order not to exceed the following fuel quantities :

DENSITY (kg/l)	0.77	0.78	0.79	0.8	0.81	0.82	0.83
L(R) WING (kg)	5710	5780	5860	5930	6005	6080	6160
CENTER (kg)	6030	6110	6190	6270	6350	6430	6500

After second engine start :**● Reset the 3DMCs in order to reinitialize the fuel used values :**

- DMC 1 SPLY C/B (E11 on 49VU) PULL
- DMC 2 SPLY C/B (Q8 on 121 VU) PULL
- DMC 3 SPLY C/B (Q9 on 121 VU) PULL
- DMC 3 SPLY STBY (E10 on 49 VU) PULL

● After 5 seconds :

- All C/B's PUSH

Note : The T.O MEMO does not appear automatically since one engine is kept running.

R APU START/SHUTDOWN DURING REFUELING/DEFUELING

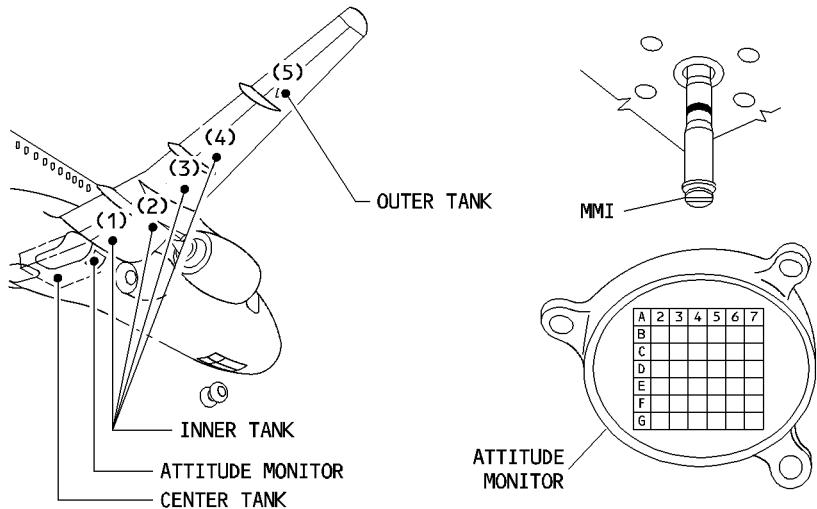
- R APU starts or shutdowns are permitted during refuel/defuel procedures. If it is necessary
R to operate the APU, the limits that follow apply :
- R a) An APU start is not permitted during a refuel/defuel procedure if the APU has failed to
R start or an automatic shutdown has occurred
- R b) A normal APU shutdown must be completed if a fuel spill has occurred during the refuel
R defuel procedure.

USE OF MANUAL MAGNETIC INDICATORS (MMI)

Indicators are disposed as follows :

- five in each wing tank, four in inner tank and one in outer tank
- one in the center tank

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– A/C ATTITUDE NOTE

Note the grid square letter and grid square number shown by the bubble on the attitude monitor.

– ACCESS PLATFORM IN POSITION

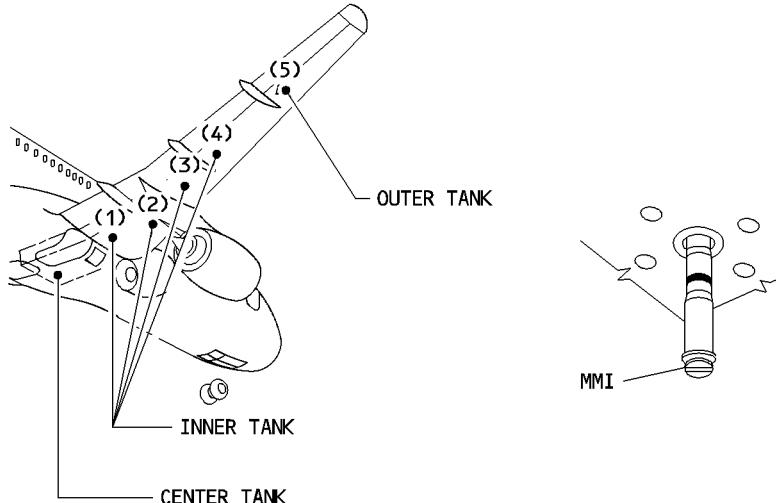
USE OF MANUAL MAGNETIC INDICATORS (MMI)

Indicators are installed as follows :

- Five in each wing tank : Four in the inner tank and one in the outer tank
- One in the center tank

R

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R TO DETERMINE AIRCRAFT ATTITUDE

- R — Set ADIRS 1, 2, 3 to the NAV position.
- R — On the LH or RH MCDU, press MCDU MENU pushbutton.
- R — Select CFDS line key (LSK 4L).
- R — Select SYSTEM REPORT/TEST line key (LSK 5L).
- R — Select the line key adjacent to the FUEL indication.
- R — On the MCDU control panel, push the NEXT PAGE key to display the FUEL Main Menu second page.
- R — Select the line key adjacent to the INPUT PARAMETERS VALUES indication.
- R — Use the Table given on the next page to determine the equivalent number and letter from PITCH and ROLL data.
- R — Select RETURN line key (LSK 6L) until CFDS main menu appears.
- R — Press MCDU MENU pushbutton.

TO DETERMINE FUEL QUANTITY IN THE OUTER TANK

- **MMI number 5** **UNLOCK and WITHDRAW**
The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.
Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.
- **ROD GRADUATION (which aligns with bottom wing surface)** **READ**
- **MMI** **IN PLACE and LOCKED**
- Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the MMI stick number 5, to find the volume of fuel in the outer tank (See the following pages).
- Multiply the result by the specific gravity to find the fuel weight.

PITCH	REF	ROLL	REF
Minus 1.5	1	Minus 1.5	A
Minus 1.0	2	Minus 1.0	B
Minus 0.5	3	Minus 0.5	C
0.0	4	0.0	D
Plus 0.5	5	Plus 0.5	E
Plus 1.0	6	Plus 1.0	F
Plus 1.5	7	Plus 1.5	G

Note : 1. This procedure can only be used if :

- The PITCH and ROLL data is taken from the ADIRS (identified by an "A" after the PITCH and ROLL title).
 - The PITCH data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.
 - The ROLL data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.
2. The FQIS input parameters are not automatically updated. Use the NEXT PAGE control on the MCDU to cycle the pages to update the screen.

– ACCESS PLATFORM IN POSITION

TO DETERMINE FUEL QUANTITY IN THE OUTER TANK

- **MMI number 5** **UNLOCK and WITHDRAW**
The crewmember must slowly withdraw the MMI, until magnetic attraction is felt between the rod and float magnets.
Do not use force when withdrawing the MMI, as this will disengage the float magnet from the rod magnet, and bring the rod down on to the mechanical stop.
- **ROD GRADUATION (which aligns with bottom wing surface)** **READ**
- **MMI** **IN PLACE and LOCKED**
- Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number) and the MMI stick number 5, to find the volume of fuel in the outer tank (See the following pages).
- Multiply the result by the specific gravity to find the fuel weight.

TO DETERMINE FUEL QUANTITY IN THE INNER TANK

- **MMI (from number 4 to number 1) UNLOCK and WITHDRAW**
The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.
Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.
- **ROD GRADUATION (which aligns with bottom wing surface) READ**
- **MMI IN PLACE and LOCKED**
MMIs shall be withdrawn from number 4 to number 1 until one MMI measures fuel.
- **Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the applicable MMI stick number to find the volume of fuel in the inner tank (See the following pages).**
- **Multiply the result by the specific gravity to find the fuel weight.**

TO DETERMINE FUEL QUANTITY IN THE CENTER TANK

- **CENTER TANK MMI UNLOCK and WITHDRAW**
The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.
Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.
- **ROD GRADUATION (which aligns with bottom wing surface) READ**
- **MMI IN PLACE and LOCKED**
- **Use the table for the center tank, and for the applicable aircraft attitude (grid square letter and number) to find the volume of fuel in the center tank (See the following pages).**
- **Multiply the result by the specific gravity to find the fuel weight.**

WING TANKS (LITERS)

M M I N°	R E M M I N G	LITERS ATTITUDE MONITOR READING							R E M M I N G	LITERS ATTITUDE MONITOR READING							R E M M I N G								
		A* LEFT WING			G RIGHT WING					A RIGHT WING			G LEFT WING												
		1	2	3	4	5	6	7										1	2	3	4	5	6	7**	
1	2	50	50	50	50	50	50	50	1	50	50	50	50	50	50	50	2	50	50	50	50	50	50	50	
	4	100	100	100	100	100	100	100		50	50	50	50	50	50	50		4	50	50	50	50	50	50	50
	6	100	100	100	100	100	100	100		100	100	100	100	100	100	100		6	100	100	100	100	100	100	100
	8	150	150	150	150	150	150	150		150	150	150	150	150	150	150		8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200		200	200	200	200	200	200	200		10	200	200	200	200	200	200	200
	12	250	250	250	250	250	250	250		250	250	250	250	250	250	250		12	250	250	250	250	250	250	250
	14	300	300	300	300	300	300	300		300	300	300	300	300	300	300		14	300	300	300	300	300	300	300
	16	350	350	350	350	350	350	350		350	350	350	350	350	350	350		16	350	350	350	350	350	350	350
	18	450	450	450	450	450	450	450		400	400	400	400	400	400	400		18	400	400	400	400	400	400	400
	20	500	500	500	500	500	500	500		500	500	500	500	500	500	500		20	450	450	450	450	450	450	450
	22	550	550	550	550	550	550	550		550	550	550	550	550	550	550		22	500	500	500	500	500	500	500
	24	650	650	650	650	650	650	650		650	650	650	650	650	650	650		24	550	550	550	550	550	550	550
	26	750	750	750	750	750	750	750		700	700	700	700	700	700	700		26	650	650	650	650	650	650	600
	28	800	800	800	800	800	800	800		800	800	800	800	800	800	800		28	700	700	700	700	700	700	700
	30	900	900	900	900	900	900	900		900	900	900	900	900	900	900		30	800	800	800	800	800	800	750
	32	1050	1050	1050	1050	1050	1050	1050		1000	1000	1000	1000	1000	1000	1000		32	900	900	900	900	900	850	850
	34	1150	1150	1150	1150	1150	1150	1150		1150	1150	1150	1150	1150	1150	1150		34	950	950	950	950	950	950	950
	36	1250	1250	1250	1250	1250	1250	1250		1250	1250	1250	1250	1250	1250	1250		36	1050	1050	1050	1050	1050	1050	1050
	38	1350	1350	1350	1350	1350	1350	1350		1350	1350	1350	1350	1350	1350	1350		38	1150	1150	1150	1150	1150	1150	1150
	40	1500	1500	1500	1500	1500	1500	1500		1500	1500	1500	1500	1500	1500	1500		40	1250	1250	1250	1250	1250	1250	1250
	42	1600	1600	1600	1600	1600	1600	1600		1600	1600	1600	1600	1600	1600	1600		42	1350	1350	1350	1350	1350	1350	1350
	44	1750	1750	1750	1750	1750	1750	1750		1750	1750	1750	1750	1750	1750	1750		44	1450	1450	1450	1450	1450	1450	1450
	46	1900	1900	1900	1900	1900	1900	1900		1900	1900	1900	1900	1900	1900	1900		46	1550	1550	1550	1550	1550	1550	1550
	48	2000	2000	2000	2000	2000	2000	2000		2050	2050	2050	2050	2050	2050	2050		48	1700	1700	1700	1700	1700	1700	1700
	50	2200	2200	2200	2200	2200	2200	2200		2200	2200	2200	2200	2200	2200	2200		50	1800	1800	1800	1800	1800	1800	1800
	52	2350	2350	2350	2350	2350	2350	2350		2400	2400	2400	2400	2400	2400	2400		52	1950	1950	1950	1950	1950	1950	1950
	54	2500	2500	2500	2500	2500	2500	2500		2550	2550	2550	2550	2550	2550	2550		54	2000	2000	2050	2050	2050	2050	2050
	56	2650	2650	2700	2700	2700	2700	2700		2650	2700	2700	2700	2700	2700	2700		56	2200	2200	2200	2200	2200	2200	2200
	58	2800	2800	2800	2800	2850	2850	2850		2850	2850	2850	2850	2850	2850	2850		58	2300	2300	2300	2300	2300	2350	2350
	60	2950	2950	2950	3000	3000	3050	3050		3050	3050	3050	3050	3050	3050	3050		60	2450	2500	2500	2500	2500	2500	2500
	62	3100	3100	3150	3150	3150	3200	3250		3250	3250	3250	3250	3250	3250	3250		62	2600	2600	2650	2650	2650	2650	2650
	63	3150	3150	3200	3200	3250	3300	3350		3350	3350	3350	3350	3350	3350	3350		63	2650	2650	2700	2700	2700	2700	2700
	MAX	3450	3450	3450	3500	3500	3600	3600		3600	3600	3600	3600	3600	3600	3600		MAX	2950	2950	2950	2950	2950	3000	3000

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MM N°	RE M A M D I N G	LITERS ATTITUDE READING							RE M A M D I N G	LITERS ATTITUDE READING							
		A LEFT WING			G RIGHT WING					A RIGHT WING			G LEFT WING				
		1	2	3	4	5	6	7		1	2	3	4	5	6	7	
2	2	2300	2250	2200	2200	2200	2200	2200	2	2850	2850	2850	2850	2850	2850	2850	
	4	2500	2450	2400	2400	2350	2350	2350		3050	3050	3050	3050	3050	3000	3000	
	6	2650	2600	2600	2600	2550	2500	2500		3200	3200	3200	3200	3200	3200	3150	
	8	2750	2750	2750	2700	2700	2650	2650		3300	3300	3300	3300	3300	3300	3250	
	10	2900	2900	2900	2900	2850	2850	2850		3500	3500	3500	3500	3450	3450	3400	
	12	3100	3100	3100	3100	3050	3050	3000		3650	3650	3600	3600	3600	3600	3600	
	14	3250	3250	3250	3250	3250	3250	3200		3800	3800	3750	3750	3750	3750	3750	
	16	3450	3450	3450	3450	3450	3400	3400		3950	3900	3900	3900	3900	3900	3900	
	18	3700	3650	3650	3650	3650	3600	3600		4050	4050	4050	4050	4050	4050	4050	
	20	3900	3900	3900	3900	3850	3850	3850		4200	4200	4200	4200	4200	4200	4200	
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	MAX									MAX							
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	6	4950	4950	4900	4850	4800	4700	4550		5250	5250	5300	5300	5300	5300	5300	
	8	5150	5100	5100	5050	5000	4950	4800		5350	5350	5400	5400	5400	5400	5400	
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	18	5900	5900	5850	5850	5850	5850	5800		5800	5800	5850	5850	5900	5900	5950	
	20	6000	6000	6000	6000	6000	6000	6000		5900	5900	5950	5950	6000	6000	6050	
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	4	5850	5750	5700	5650	5600	5550	5500		6100	6100	6150	6150	6150	6200	6200	
	6	6000	5900	5850	5800	5750	5700	5650		6200	6200	6200	6250	6250	6300	6300	
	8	6150	6100	6050	6000	5950	5900	5850		6250	6300	6300	6350	6350	6400	6400	
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	16	6600	6600	6600	6600	6600	6600	6550		6600	6600	6650	6650	6700	6700	6750	
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	MAX									MAX							
5	2	650	600	550	550	550	500	500	2	700	700	700	700	700	700	700	
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M M I N°	R E M A M D I N G	LITERS ATTITUDE MONITOR READING							R E M A M D I N G	LITERS ATTITUDE MONITOR READING							
		B* LEFT WING				F RIGHT WING				B RIGHT WING				F LEFT WING			
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	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	250	
	16	350	350	350	350	360	350	350	16	350	350	350	350	350	350	300	
	18	400	400	400	400	400	400	400	18	400	400	400	400	400	400	350	
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	22	550	550	550	550	550	550	550	22	500	500	500	500	500	500	500	
	24	600	600	600	600	600	600	600	24	550	550	550	550	550	550	550	
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	34	1100	1100	1100	1100	1100	1100	1100	34	1000	1000	1000	1000	950	950	950	
	36	1200	1200	1200	1200	1200	1200	1200	36	1100	1100	1100	1100	1050	1050	1050	
	38	1300	1300	1300	1300	1300	1300	1300	38	1200	1200	1200	1200	1150	1150	1150	
	40	1450	1450	1450	1450	1450	1450	1450	40	1300	1300	1300	1300	1300	1300	1300	
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	44	1700	1700	1700	1700	1700	1700	1700	44	1500	1500	1500	1500	1500	1500	1500	
	46	1800	1800	1800	1800	1800	1800	1800	46	1600	1600	1600	1600	1600	1600	1600	
	48	1950	1950	1950	1950	1950	1950	1950	48	1700	1700	1700	1700	1700	1700	1700	
	50	2100	2100	2100	2100	2100	2100	2100	50	1850	1850	1850	1850	1850	1850	1850	
	52	2250	2250	2250	2250	2250	2250	2250	52	1950	1950	1950	1950	1950	1950	1950	
	54	2400	2400	2400	2400	2400	2400	2450	54	2100	2100	2100	2100	2100	2100	2100	
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	58	2750	2750	2750	2750	2750	2750	2750	58	2400	2400	2400	2400	2400	2400	2400	
	60	2850	2850	2850	2850	2900	2900	2950	60	2550	2550	2550	2550	2550	2550	2550	
	62	3000	3000	3000	3050	3050	3050	3100	62	2700	2700	2700	2700	2700	2700	2700	
	63	3050	3050	3050	3100	3150	3150	3200	63	2750	2750	2750	2750	2750	2750	2750	
	MAX	3350	3350	3350	3350	3400	3450	3500	MAX	3000	3000	3000	3000	3000	3000	3000	

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	RE M A M D I N G	LITERS ATTITUDE MONITOR READING							RE M A M D I N G	LITERS ATTITUDE MONITOR READING							
		B LEFT WING			F RIGHT WING					B RIGHT WING			F LEFT WING				
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	6	2750	2700	2700	2650	2650	2600	2600		3100	3100	3100	3100	3100	3050	3050	
	8	2850	2850	2800	2800	2800	2750	2750		3200	3200	3200	3200	3200	3200	3150	
	10	3000	3000	3000	3000	2950	2900	2900		3400	3400	3350	3350	3350	3350	3300	
	12	3150	3150	3200	3150	3150	3150	3100		3550	3550	3550	3550	3500	3500	3450	
	14	3350	3350	3350	3350	3350	3300	3300		3750	3700	3700	3700	3650	3650	3650	
	16	3550	3550	3550	3550	3500	3500	3450		3900	3850	3850	3850	3800	3800	3800	
	18	3750	3750	3750	3750	3700	3700	3650		4050	4000	4000	4000	4000	4000	3950	
	20	4000	3950	3950	3950	3950	3900	3900		4200	4150	4150	4150	4150	4150	4150	
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	26	4500	4500	4500	4500	4500	4500	4500		4500	4500	4500	4550	4550	4550	4550	
	28	4700	4700	4700	4700	4700	4750	4750		4650	4650	4650	4650	4700	4700	4750	
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3	MAX																
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	4	4800	4800	4800	4750	4650	4600	4500		5100	5100	5100	5100	5100	5100	5100	
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	8	5150	5150	5150	5150	5100	5000	5000		5300	5300	5350	5350	5350	5350	5350	
	10	5300	5300	5300	5300	5250	5200	5150		5400	5400	5450	5450	5450	5450	5450	
	12	5450	5450	5450	5450	5400	5400	5350		5500	5500	5550	5550	5550	5550	5550	
	14	5600	5600	5600	5550	5550	5550	5500		5600	5600	5650	5650	5650	5650	5700	
	16	5700	5700	5700	5700	5700	5700	5700		5700	5700	5700	5750	5750	5750	5800	
	18	5850	5850	5850	5850	5850	5850	5850		5800	5800	5800	5850	5850	5850	5900	
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	4	5850	5750	5700	5650	5600	5600	5600		6050	6050	6100	6100	6100	6150	6150	
	6	6000	6000	5950	5900	5850	5800	5800		6150	6150	6200	6200	6200	6200	6200	
	8	6150	6150	6100	6100	6050	6000	6000		6250	6250	6250	6300	6300	6300	6300	
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	12	6400	6400	6400	6400	6350	6350	6300		6400	6450	6450	6450	6500	6500	6500	
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	MAX																
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	6	750	750	750	700	700	650	650		800	800	800	800	750	750	750	
	8	800	800	750	750	750	750	700		800	800	800	800	800	800	800	
	10	800	800	800	800	800	750	750		850	850	850	850	800	800	800	
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	14	850	850	850	850	850	850	850		850	850	850	850	850	850	850	
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M M I N°	R E M A M D I N G	LITERS ATTITUDE MONITOR READING							R E M A M D I N G	LITERS ATTITUDE MONITOR READING							
		C* LEFT WING				E RIGHT WING				C RIGHT WING				E LEFT WING			
		1	2	3	4	5	6	7		1	2	3	4	5	6	7**	
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	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	250	
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	22	550	550	550	550	500	500	500	22	500	500	500	500	500	500	500	
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	28	750	750	750	750	750	750	750	28	750	750	750	750	700	700	700	
	30	850	850	850	850	850	850	850	30	800	800	800	800	800	800	800	
	32	950	950	950	950	950	950	950	32	900	900	900	900	900	900	900	
	34	1050	1050	1050	1050	1050	1050	1050	34	1000	1000	1000	1000	1000	1000	1000	
	36	1200	1150	1150	1150	1150	1150	1150	36	1100	1100	1100	1100	1100	1100	1100	
	38	1300	1300	1300	1250	1250	1250	1250	38	1200	1200	1200	1200	1200	1200	1200	
	40	1400	1400	1400	1400	1400	1400	1400	40	1300	1300	1300	1300	1300	1300	1300	
	42	1500	1500	1500	1500	1500	1500	1500	42	1400	1400	1400	1400	1400	1400	1400	
	44	1600	1600	1600	1600	1600	1600	1600	44	1550	1550	1500	1500	1500	1500	1500	
	46	1750	1750	1750	1750	1750	1750	1750	46	1650	1650	1650	1650	1650	1650	1650	
	48	1850	1850	1850	1900	1900	1900	1900	48	1800	1750	1750	1750	1750	1750	1800	
	50	2000	2000	2000	2000	2000	2000	2050	50	1900	1900	1900	1900	1900	1900	1900	
	52	2150	2150	2150	2150	2150	2150	2200	52	2000	2000	2000	2000	2000	2000	2050	
	54	2300	2300	2300	2300	2300	2300	2350	54	2150	2150	2150	2150	2150	2150	2200	
	56	2450	2500	2500	2500	2500	2500	2500	56	2300	2300	2300	2300	2300	2350	2350	
	58	2600	2650	2650	2650	2650	2650	2700	58	2450	2450	2450	2450	2500	2500	2500	
	60	2800	2800	2800	2800	2850	2850	2850	60	2600	2600	2600	2600	2650	2650	2650	
	62	2900	2950	2950	2950	2950	2950	3000	62	2750	2750	2750	2750	2800	2800	2800	
	63	2950	3000	3000	3000	3050	3050	3100	63	2800	2800	2800	2800	2850	2850	2850	
	MAX	3250	3250	3300	3350	3350	3350	3400	MAX	3100	3100	3100	3100	3100	3100	3100	

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

M M I N°	R E A M D I N G	LITERS ATTITUDE READING							R E A M D I N G	LITERS ATTITUDE MONITOR READING							
		C LEFT WING			E RIGHT WING					C RIGHT WING			E LEFT WING				
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	8	2900	2900	2900	2900	2850	2850	2850		3100	3100	3100	3100	3100	3050	3050	
	10	3100	3100	3100	3100	3050	3050	3000		3300	3300	3300	3250	3250	3200	3200	
	12	3250	3250	3250	3250	3250	3250	3200		3450	3450	3450	3450	3450	3400	3350	
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	16	3650	3650	3650	3600	3600	3550	3550		3800	3800	3800	3750	3750	3750	3700	
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	20	4050	4050	4000	4000	4000	3950	3950		4150	4100	4100	4100	4100	4100	4100	
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	26	4500	4500	4500	4500	4500	4500	4500		4500	4500	4500	4500	4500	4500	4550	
	28	4650	4650	4650	4700	4700	4700	4700		4650	4650	4650	4700	4700	4700	4700	
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	MAX																
3	2								2								
	4	4650	4650	4650	4600	4600	4500	4500		4900	4900	4900	4900	4900	4850	4800	
	6	4900	4900	4900	4900	4800	4750	4650		5050	5100	5100	5100	5050	5000	5000	
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	10	5200	5200	5200	5200	5150	5150	5100		5250	5300	5300	5300	5300	5300	5300	
	12	5300	5350	5350	5350	5300	5300	5250		5350	5400	5400	5400	5400	5400	5400	
	14	5450	5450	5450	5450	5450	5450	5400		5500	5500	5500	5500	5550	5550	5550	
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	MAX									5900	5950	5950	6000	6000	6000	6000	
4	2								2								
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	6	5950	5900	5900	5850	5850	5800	5800		6000	6000	6000	6050	6050	6050	6050	
	8	6050	6050	6000	6000	6000	5950	5950		6100	6100	6150	6150	6150	6150	6150	
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	12	6300	6300	6300	6300	6300	6250	6250		6300	6350	6350	6350	6350	6350	6350	
	14	6400	6400	6400	6400	6400	6400	6400		6400	6400	6450	6450	6450	6450	6450	
	16	6500	6500	6500	6500	6500	6500	6500		6500	6600	6600	6600	6600	6600	6600	
	18	6600	6600	6600	6600	6600	6600	6600		6750	6750	6770	6790	6800	6810	6820	
	MAX																
5	2								2								
	4	700	700	650	650	600	600	600		750	700	700	700	700	650	650	
	6	750	750	700	700	650	650	650		800	800	750	750	750	750	750	
	8	800	800	800	750	750	750	750		800	800	800	800	800	800	800	
	10	800	800	800	800	800	800	800		850	850	850	800	800	800	800	
	12	850	850	850	800	800	800	800		850	850	850	850	850	850	850	
	14	850	850	850	850	850	850	850		900	900	850	850	850	850	850	
	MAX																

M M I N°	R E M A D I N G	LITERS ATTITUDE MONITOR READING							R E M A D I N G	LITERS ATTITUDE MONITOR READING							M M I N°		
		D* BOTH WINGS								D BOTH WINGS									
		1	2	3	4	5	6	7		1	2	3	4	5	6	7**			
1	2	50	50	50	50	50	50	50	18	3950	3900	3900	3850	3850	3850	3800	2		
	4	100	100	100	100	100	100	100	20	4100	4100	4050	4050	4050	4000	4000			
	6	100	100	100	100	100	100	100	22	4200	4200	4150	4150	4150	4150	4150			
	8	150	150	150	150	150	150	150	24	4350	4350	4350	4300	4300	4300	4300	3		
	10	200	200	200	200	200	200	200	26	4500	4500	4500	4500	4500	4500	4500			
	12	250	250	250	250	250	250	250	28	4650	4650	4650	4650	4650	4700	4700			
	14	300	300	300	300	300	300	300	30	4800	4800	4800	4850	4850	4850	4900			
	16	350	350	350	360	350	350	350	32	4950	4950	5000	5000	5050	5100				
	18	400	400	400	400	400	400	400	MAX										
	20	450	450	450	450	450	450	450	2	4800	4800	4800	4800	4750	4750	4600			
	22	500	500	500	500	500	500	500	4	5000	5000	5000	5000	4950	4900	4850			
	24	600	600	600	600	600	600	600	6	5100	5150	5150	5100	5100	5100	5050			
	26	650	650	650	650	650	650	650	8	5250	5250	5250	5250	5250	5200	5200			
	28	750	750	750	750	750	750	750	10	5350	5350	5350	5400	5400	5350	5350			
	30	850	850	850	850	850	850	850	12	5450	5500	5500	5500	5500	5500	5500			
	32	950	950	950	950	950	950	950	14	5600	5600	5600	5600	5600	5600	5600			
	34	1050	1050	1050	1050	1050	1000	1000	16	5700	5700	5700	5750	5750	5750	5750			
	36	1150	1150	1150	1150	1150	1100	1100	18	5800	5800	5850	5850	5850	5900	5900			
	38	1250	1250	1250	1250	1250	1250	1250	20	5900	5900	5950	5950	5950	6000	6000			
	40	1350	1350	1350	1350	1350	1350	1350	MAX								4		
	42	1450	1450	1450	1450	1450	1450	1450	2	5900	5850	5800	5800	5800	5800	5800			
	44	1550	1550	1550	1550	1550	1550	1550	4	6000	5950	5950	5950	5950	5950	5950			
	46	1700	1700	1700	1700	1700	1700	1700	6	6100	6100	6050	6050	6050	6050	6050			
	48	1800	1800	1800	1800	1800	1800	1800	8	6200	6200	6200	6200	6200	6200	6200			
	50	1950	1950	1950	1950	1950	1950	1950	10	6300	6300	6300	6300	6300	6300	6300			
	52	2100	2100	2100	2100	2100	2100	2100	12	6400	6400	6400	6400	6400	6400	6400			
	54	2250	2250	2250	2250	2250	2250	2250	14	6500	6500	6500	6500	6500	6500	6500			
	56	2400	2400	2400	2400	2400	2400	2400	16	6600	6600	6600	6600	6600	6600	6600			
	58	2550	2550	2550	2550	2550	2600	2600	18	6750	6750	6770	6800	6800	6810	6820			
	60	2700	2700	2700	2700	2700	2750	2750	MAX								5		
	62	2850	2850	2850	2850	2850	2900	2900	2	700	700	700	650	650	650	600			
	63	2900	2900	2900	2900	2900	2950	2950	4	750	750	750	700	700	700	650			
	MAX	3050	3050	3100	3100	3100	3150	3150	6	800	800	800	800	800	750	750			
	2	2550	2550	2500	2500	2450	2450	2450	8	800	800	800	800	800	750	750			
	4	2750	2700	2700	2700	2650	2650	2600	10	850	800	800	800	800	800	800			
	6	2900	2900	2850	2850	2850	2800	2800	12	850	850	850	850	850	850	850			
	8	3000	3000	2950	2950	2950	2950	2900	14	850	850	850	850	850	850	850			
	10	3200	3150	3150	3150	3150	3100	3050	16	850	850	850	850	850	850	850			

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

CENTER TANK (LITERS)

R E A M M I N G	LITERS ATTITUDE MONITOR READING LINES A AND G*							R E A M M I N G	LITERS ATTITUDE MONITOR READING LINES B AND F						
	1	2	3	4	5	6	7		1	2	3	4	5	6	7**
2	300	300	350	350	350	350	350	2	300	300	300	300	300	300	350
4	400	450	450	500	500	500	500	4	400	450	450	450	500	500	500
6	600	600	650	650	650	650	650	6	600	600	650	650	650	650	600
8	750	750	750	750	750	750	750	8	750	750	750	750	750	750	750
10	900	850	850	850	850	850	900	10	900	850	850	850	850	850	900
12	1050	1000	1000	1000	1000	1000	1050	12	1050	1000	1000	1000	1000	1000	1050
14	1250	1250	1200	1200	1200	1200	1200	14	1250	1200	1200	1200	1200	1200	1200
16	1450	1450	1400	1400	1400	1400	1400	16	1450	1450	1450	1450	1400	1400	1400
18	1650	1650	1600	1600	1600	1600	1600	18	1700	1700	1650	1650	1600	1600	1600
20	1900	1850	1850	1850	1850	1800	1800	20	1900	1900	1900	1850	1850	1850	1800
22	2100	2050	2050	2050	2050	2000	2000	22	2100	2100	2100	2050	2050	2000	2000
24	2300	2250	2250	2250	2200	2200	2150	24	2300	2300	2250	2250	2200	2200	2150
26	2450	2450	2450	2450	2450	2400	2350	26	2500	2500	2450	2450	2400	2350	2350
28	2700	2650	2650	2650	2600	2550	2550	28	2700	2700	2650	2650	2600	2550	2500
30	2900	2850	2850	2850	2800	2800	2750	30	2900	2900	2900	2850	2800	2800	2750
32	3050	3050	3050	3050	3000	3000	2950	32	3100	3100	3100	3050	3050	3000	2950
34	3250	3250	3250	3250	3200	3200	3150	34	3300	3300	3300	3250	3250	3200	3150
36	3500	3500	3450	3450	3450	3400	3400	36	3500	3500	3500	3450	3450	3400	3400
38	3700	3700	3700	3700	3650	3650	3600	38	3700	3700	3700	3700	3650	3650	3600
40	3900	3900	3900	3900	3900	3850	3800	40	3950	3950	3950	3900	3900	3850	3800
42	4100	4100	4100	4100	4100	4050	4050	42	4150	4150	4150	4100	4100	4050	4000
44	4350	4350	4350	4300	4300	4250	4250	44	4350	4350	4350	4300	4300	4250	4200
46	4550	4550	4550	4550	4500	4500	4450	46	4550	4550	4550	4550	4500	4500	4450
48	4750	4750	4750	4700	4700	4650	4650	48	4750	4750	4750	4750	4700	4700	4650
50	4950	4950	4950	4950	4900	4900	4850	50	4950	4950	4950	4950	4900	4900	4850
52	5150	5150	5150	5150	5100	5100	5050	52	5150	5150	5150	5150	5150	5100	5050
54	5400	5400	5400	5400	5350	5300	5250	54	5400	5400	5400	5400	5350	5300	5250
56	5600	5600	5600	5600	5550	5500	5450	56	5600	5600	5600	5600	5550	5500	5450
58	5800	5800	5800	5750	5750	5700	5650	58	5800	5800	5800	5800	5750	5700	5700
60	6000	6000	6000	5950	5950	5900	5900	60	6000	6000	6000	6000	5950	5950	5900
62	6200	6200	6200	6150	6150	6100	6100	62	6200	6200	6200	6200	6150	6100	6100
64	6400	6400	6400	6400	6350	6300	6300	64	6400	6400	6400	6400	6350	6300	6300
66	6600	6600	6600	6600	6550	6550	6500	66	6600	6600	6600	6600	6550	6500	6500
68	6800	6800	6750	6750	6750	6700	6700	68	6800	6800	6800	6800	6750	6700	6700
70	7000	6950	6950	6950	6900	6900	6900	70	7000	7000	7000	6950	6950	6900	6900
72	7200	7200	7150	7150	7100	7100	7050	72	7200	7200	7150	7150	7100	7100	7100
74	7400	7400	7350	7350	7300	7300	7300	74	7400	7400	7350	7350	7300	7300	7300
76	7600	7600	7600	7550	7550	7500	7500	76	7600	7600	7600	7550	7550	7500	7500
78	7850	7800	7800	7800	7750	7700	7700	78	7800	7800	7800	7750	7750	7700	7700
MAX	7950	7900	7900	7900	7850	7800	7800	MAX	7900	7900	7850	7850	7800	7800	7800

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

M A M I N G	R E A M I N G	LITERS ATTITUDE MONITOR READING LINES C AND E							LITERS ATTITUDE MONITOR READING LINES D						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
2	2	250	300	300	300	300	300	300	2	300	300	300	300	300	300
4	4	400	450	450	500	500	500	450	4	450	450	500	500	500	500
6	6	600	600	650	650	650	600	600	6	600	600	650	650	650	600
8	8	750	750	750	750	750	750	750	8	750	750	750	750	750	750
10	10	850	850	850	850	850	850	850	10	900	900	900	900	900	900
12	12	1050	1000	1000	1000	1000	1000	1000	12	1050	1000	1000	1000	1000	1050
14	14	1250	1200	1200	1200	1200	1200	1200	14	1250	1250	1200	1200	1200	1200
16	16	1450	1450	1450	1400	1400	1400	1400	16	1500	1450	1450	1450	1400	1400
18	18	1650	1650	1650	1600	1600	1600	1600	18	1700	1700	1700	1650	1650	1600
20	20	1900	1900	1900	1900	1850	1800		20	1900	1900	1900	1900	1850	1850
22	22	2100	2100	2100	2100	2050	2050	2000	22	2100	2100	2100	2100	2050	2050
24	24	2300	2300	2250	2250	2250	2200	2200	24	2300	2300	2300	2250	2250	2200
26	26	2500	2500	2450	2450	2400	2400	2350	26	2500	2500	2450	2450	2400	2350
28	28	2700	2650	2650	2600	2600	2550		28	2700	2700	2650	2600	2600	2550
30	30	2900	2900	2850	2850	2800	2800	2750	30	2900	2900	2900	2850	2800	2750
32	32	3100	3100	3100	3100	3050	3050	3000	32	3100	3100	3100	3100	3050	3000
34	34	3300	3300	3300	3250	3250	3200	3200	34	3300	3300	3300	3300	3250	3200
36	36	3500	3500	3500	3500	3450	3450	3400	36	3500	3500	3500	3500	3450	3400
38	38	3700	3700	3700	3700	3650	3650	3600	38	3700	3750	3750	3700	3650	3650
40	40	3950	3950	3950	3950	3900	3900	3850	40	3950	3950	3950	3950	3900	3850
42	42	4150	4150	4150	4150	4100	4100	4050	42	4150	4150	4150	4150	4100	4050
44	44	4350	4350	4350	4350	4300	4300	4250	44	4350	4350	4350	4350	4300	4250
46	46	4550	4550	4550	4550	4500	4500	4450	46	4550	4550	4550	4550	4500	4450
48	48	4750	4750	4750	4750	4700	4700	4650	48	4750	4750	4750	4750	4700	4650
50	50	4950	4950	4950	4950	4900	4900	4850	50	4950	4950	4950	4950	4900	4850
52	52	5150	5150	5150	5150	5100	5100	5050	52	5200	5200	5200	5150	5100	5050
54	54	5400	5400	5400	5400	5350	5300	5250	54	5400	5400	5400	5350	5300	5250
56	56	5600	5600	5600	5600	5550	5500	5450	56	5600	5600	5600	5550	5500	5450
58	58	5800	5800	5800	5800	5750	5700	5650	58	5800	5800	5800	5750	5700	5650
60	60	6000	6000	6000	6000	5950	5950	5900	60	6000	6000	6000	5950	5950	5900
62	62	6200	6200	6200	6200	6150	6100	6100	62	6200	6200	6200	6150	6150	6100
64	64	6400	6400	6400	6400	6350	6300	6300	64	6400	6400	6400	6350	6350	6300
66	66	6600	6600	6600	6600	6550	6550	6500	66	6600	6600	6600	6550	6550	6500
68	68	6800	6800	6800	6750	6750	6700	6700	68	6800	6800	6800	6750	6750	6700
70	70	7000	7000	7000	6950	6950	6900	6900	70	7000	7000	7000	6950	6950	6900
72	72	7200	7200	7150	7150	7150	7150	7100	72	7200	7200	7200	7150	7150	7100
74	74	7400	7400	7400	7350	7350	7300	7300	74	7400	7400	7400	7350	7350	7300
76	76	7600	7600	7600	7550	7550	7500	7500	76	7600	7600	7600	7550	7550	7500
78	78	7800	7800	7800	7750	7750	7700	7700	78	7800	7800	7800	7750	7750	7700
MAX	MAX	7900	7900	7850	7850	7850	7800	7800	MAX	7900	7900	7900	7900	7850	7800

LOAD and TRIM SHEET

This chart allows the determination of Aircraft CG location (MAC) 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 arrangement ...) which influences the operational limits is made.

It is the airline responsibility to define a load and trim sheet and to keep it up to date.

R On page 2 is a description of the Load and Trim Sheet utilization (see example p. 3), for a typical passenger arrangement.

Refer to customized load and trim sheet for preparing a revenue flight.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING WEIGHT and BALANCE	2.01.40	P 2
		SEQ 110	REV 28

R DATA

- R Dry Operating Weight = 42500 kg and CG = 27 % (H-arm = 18.93 m)
- R Deviation or adjustment = + 100 kg in zone F
- R Cargo = 5500 kg with the following distribution :
- R cargo 1 = 2000 kg ; cargo 3 = 1500 kg ; cargo 4 = 1500 kg ; cargo 5 = 500 kg
- R Passengers = 145 pax with the following distribution :
- R cabin OA = 50 ; cabin OB = 55 ; cabin OC = 40
- R Fuel = 13000 kg

DESCRIPTION

- R a) Enter Master data in (1).
- R b) Compute Dry Operating Weight Index using the formula indicated in (2) and report in (3).
- R c) Dry Operating Index = 53.4.
- R d) Enter weight deviation or adjustment in (4) and read corresponding index variation in (5) : + 1.43.
- R e) Calculate corrected index and report in (6) : 54.83.
- R f) Enter master data in table (7) and determine Zero Fuel Weight : 60280 kg and Takeoff Weight : 73280 kg.
- R g) Enter cargo weight and passenger number per compartment in (8).
- R h) Enter index scale (9) with corrected index and proceed through cargo and passenger scales (10).
- R i) From the final point draw a vertical line which intersects (12) the zero fuel weight horizontal line (11).
- R j) Check if the intersection point is within the Zero Fuel Weight operational limits, if not rearrange cargo loading.
- R k) Read in table (13) the fuel index correction : - 2 and carry forward in fuel scale (14).
- R l) From this point draw a vertical line which intersects (16) the takeoff weight horizontal line (15).
- R m) Check if the intersection point is within the Takeoff Weight operational limits.
- R n) Read zero fuel weight and CG position : 32.7 % and fill in table (17).
- R o) Read takeoff CG position : 30.5 % and fill in table (18).

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 C.G. vary with cabin and cargo layout.

Note : When referring to CG lower than 27 %, an operational margin is taken into account. It is the reason why performance at forward CG (lower than 25 %) must be used for operational CG lower than 27 %.

LOAD and TRIM SHEET

This chart allows the determination of Aircraft CG location (MAC) 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 arrangement ...) which influences the operational limits is made.

It is the airline responsibility to define a load and trim sheet and to keep it up to date.

R On page 2 is a description of the Load and Trim Sheet utilization (see example p. 3), for a typical passenger arrangement.

Refer to customized load and trim sheet for preparing a revenue flight.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING WEIGHT and BALANCE	2.01.40 P 2	
		SEQ 230	REV 28

R DATA

- R Dry Operating Weight = 40500 kg and CG = 25.5 % (H-arm = 17.27 m)
- R Deviation or adjustment = + 100 kg in zone F
- R Cargo = 4000 kg with the following distribution :
- R cargo 1 = 1500 kg ; cargo 4 = 2000 kg ; cargo 5 = 500 kg
- R Passengers = 120 pax with the following distribution :
- R cabin OA = 50 ; cabin OB = 70
- R Fuel = 14000 kg

DESCRIPTION

- R a) Enter Master data in (1).
- R b) Compute Dry Operating Weight Index using the formula indicated in (2) and report in (3).
- R c) Dry Operating Index = 50.85.
- R d) Enter weight deviation or adjustment in (4) and read corresponding index variation in (5) : + 1.21.
- R e) Calculate corrected index and report in (6) : 51.06.
- R f) Enter master data in table (7) and determine Zero Fuel Weight : 54680 kg and Takeoff Weight : 68680 kg.
- R g) Enter cargo weight and passenger number per compartment in (8).
- R h) Enter index scale (9) with corrected index and proceed through cargo and passenger scales (10).
- R i) From the final point draw a vertical line which intersects (12) the zero fuel weight horizontal line (11).
- R j) Check if the intersection point is within the Zero Fuel Weight operational limits, if not rearrange cargo loading.
- R k) Read in table (13) the fuel index correction : - 4 and carry forward in fuel scale (14).
- R l) From this point draw a vertical line which intersects (16) the takeoff weight horizontal line (15).
- R m) Check if the intersection point is within the Takeoff Weight operational limits.
- R n) Read zero fuel weight and CG position : 31 % and fill in table (17).
- R o) Read takeoff CG position : 28.4 % and fill in table (18).

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 C.G. vary with cabin and cargo layout.

LOAD and TRIM SHEET

This chart allows the determination of Aircraft CG location (MAC) 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 arrangement ...) which influences the operational limits is made.

It is the airline responsibility to define a load and trim sheet and to keep it up to date.

R On page 2 is a description of the Load and Trim Sheet utilization (see example p. 3), for a typical passenger arrangement.

Refer to customized load and trim sheet for preparing a revenue flight.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING WEIGHT and BALANCE	2.01.40 P 2	
		SEQ 305	REV 38

DATA

Dry Operating Weight = 38000 kg and CG = 25.5 % (H-arm = 16.4 m)

Deviation or adjustment = - 50 kg in zone F, + 50 kg in zone E

Cargo = 2800 kg with the following distribution :

cargo 1 = 1000 kg; cargo 4 = 1300 kg ; cargo 5 = 500 kg

Passengers = 95 pax with the following distribution :

cabin OA = 38 ; cabin OB = 57

Fuel = 15500 kg

DESCRIPTION

- a) Enter Master data in (1).
- b) Compute Dry Operating Weight Index using the formula indicated in (2) and report in (3).
- c) Dry Operating Index = 45.
- d) Enter weight deviation or adjustment in (4) and read corresponding index variation in (5) : - 2.
- e) Calculate corrected index and report in (6) : 43.
- f) Enter master data in table (7) and determine Zero Fuel Weight : 48 480 kg and Takeoff Weight : 64 280 kg.
- g) Enter cargo weight and passenger number per compartment in (8).
- h) Enter index scale (9) with corrected index and proceed through cargo and passenger scales (10).
- i) From the final point draw a vertical line which intersects (12) the zero fuel weight horizontal line (11).
- j) Check if the intersection point is within the Zero Fuel Weight operational limits, if not rearrange cargo loading.
- k) Read in table (13) the fuel index correction : - 12 and carry forward in fuel scale (14).
- l) From this point draw a vertical line which intersects (16) the takeoff weight horizontal line (15).
- m) Check if the intersection point is within the Takeoff Weight operational limits.
- n) Read zero fuel weight and CG position : 25.9 % and fill in table (17).
- o) Read takeoff CG position : 23.4 % and fill in table (18).

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 C.G. vary with cabin and cargo layout.

LOAD and TRIM SHEET

AIRBUS



A320-200
VERSION : 180 YC

NEC5-02-0140-003-A100AD -R

LAN MSN 0990-1903 3280-3319

FUEL INDEX TABLE PER TANK

The fuel index table has been established assuming a fuel distribution in accordance with refuel distribution given in section 2.01.30 of this volume.

If after refueling the actual distribution deviates from the chart values, the actual and the trim sheet 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 quantities in each tank, read the fuel index for each tank and use their sum to enter the trim sheet. Check that the actual CG is inside the operational limits. If the 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 :

R $I = W \times (H\text{-arm} - 18.85) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$
 R (Weight in kg, H-arm in m)

Example

DATA : Fuel in left inner fuel tank = 4500 kg
 Fuel in right inner fuel tank = 4500 kg
 Fuel in left outer fuel tank = 200 kg
 Fuel in right outer fuel tank = FULL
 Fuel in center tank = 0 kg

		Weight	Index	
Inner tank	Left	4500	–	3
	Right	4500	–	3
Outer tank	Left	200		0
	Right	691	+	2
Center tank		0		0
TOTAL		9891	–	4

Enter the trim sheet with a fuel index of – 4

FUEL INDEX TABLE PER TANK

The fuel index table has been established assuming a fuel distribution in accordance with refuel distribution given in section 2.01.30 of this volume.

If after refueling the actual distribution deviates from the chart values, the actual and the trim sheet 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 quantities in each tank, read the fuel index for each tank and use their sum to enter the trim sheet. Check that the actual CG is inside the operational limits. If the 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 :

R $I = W \times (H\text{-arm} - 17.25) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$
 R (Weight in kg, H-arm in m)

Example

DATA : Fuel in left inner fuel tank = 4500 kg
 Fuel in right inner fuel tank = 4500 kg
 Fuel in left outer fuel tank = 200 kg
 Fuel in right outer fuel tank = FULL
 Fuel in center tank = 0 kg

		Weight	Index	
Inner tank	Left	4500	–	3
	Right	4500	–	3
Outer tank	Left	200		0
	Right	691	+	2
Center tank		0		0
TOTAL		9891	–	4

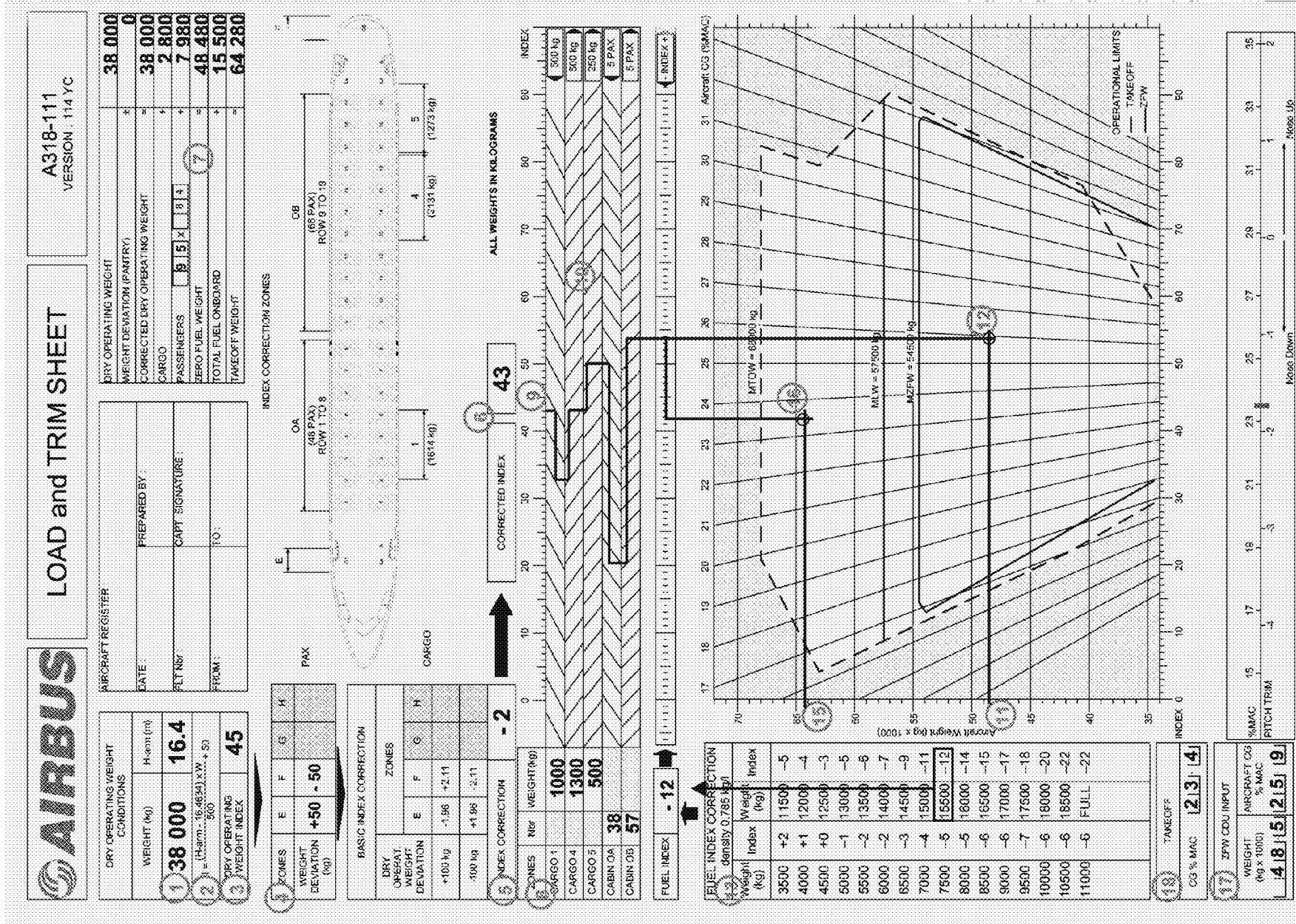
Enter the trim sheet with a fuel index of – 4

LOAD and TRIM SHEET

LOAD and TRIM SHEET

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LAN MSN 3001-3216



FUEL INDEX TABLE PER TANK

The fuel index table has been established assuming a fuel distribution in accordance with refuel distribution given in section 2.01.30 of this volume.

If after refueling the actual distribution deviates from the chart values, the actual and the trim sheet 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 quantities in each tank, read the fuel index for each tank and use their sum to enter the trim sheet. Check that the actual CG is inside the operational limits. If the 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 :

R $I = W \times (H\text{-arm} - 16.46) / 500 + K$ or $I = [(CG - 25) \times W \times 0.000084] + K$
 R (Weight in kg, H-arm in m)

Example

DATA : Fuel in left inner fuel tank = 4500 kg
 Fuel in right inner fuel tank = 4500 kg
 Fuel in left outer fuel tank = 200 kg
 Fuel in right outer fuel tank = FULL
 Fuel in center tank = 0 kg

		Weight	Index	
Inner tank	Left	4500	–	3
	Right	4500	–	3
Outer tank	Left	200	+	0
	Right	691	+	1
Center tank		0	0	
TOTAL		9891	–	5

Enter the trim sheet with a fuel index of – 4

FUEL INDEX TABLES PER TANK

Note : These tables are valid only when used with the following formulae for the index :

R $I = W \times (H\text{-arm} - 18.85) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$
 R (Weight in kg, H-arm in m)

Inner Tanks		Outer Tanks		Center Tank	
Weight	Index	Weight	Index	Weight	Index
500	- 1	250	1	500	- 1
1000	- 1	500	1	1000	- 1
1500	- 2	FULL	2	1500	- 2
2000	- 2			2000	- 3
2500	- 2			2500	- 3
3000	- 3			3000	- 4
3500	- 3			3500	- 5
4000	- 3			4000	- 6
4500	- 3			4500	- 7
5000	- 3			5000	- 7
FULL	- 2			5500	- 8
				6000	- 9
				FULL	- 10

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FUEL INDEX TABLES PER TANK

Note : These tables are valid only when used with the following formulae for the index :

R $I = W \times (H\text{-arm} - 17.25) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$
 R (Weight in kg, H-arm in m)

Inner Tank		Outer Tank		Center Tank	
Weight	Index	Weight	Index	Weight	Index
400	0	200	0	400	0
800	-1	400	1	800	-1
1200	-1	600	1	1200	-1
1600	-2	FULL	2	1600	-2
2000	-2			2000	-3
2400	-2			2400	-3
2800	-3			2800	-4
3200	-3			3200	-5
3600	-3			3600	-5
4000	-3			4000	-6
4400	-3			4400	-6
4800	-3			4800	-7
5200	-3			5200	-8
FULL	-2			5600	-8
				6000	-9
				6400	-10
				FULL	-10

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FUEL INDEX TABLES PER TANK

Note : These tables are valid only when used with the following formulae for the index :

R $I = W \times (H\text{-arm} - 16.46) / 500 + K$ or $I = [(CG - 25) \times W \times 0.000084] + K$
 R (Weight in kg, H-arm in m)

Inner Tank		Outer Tank		Center Tank	
Weight	Index	Weight	Index	Weight	Index
400	- 1	200	1	400	- 1
800	- 2	400	2	800	- 2
1200	- 3	600	3	1200	- 3
1600	- 3	FULL	3	1600	- 4
2000	- 4			2000	- 5
2400	- 5			2400	- 7
2800	- 5			2800	- 8
3200	- 6			3200	- 9
3600	- 6			3600	- 10
4000	- 7			4000	- 12
4400	- 7			4400	- 13
4800	- 6			4800	- 14
5200	- 5			5200	- 15
FULL	- 5			5600	- 16
				6000	- 18
				6400	- 19
				FULL	- 19

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		SEQ 001	REV 30

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- TAKEOFF PERFORMANCE 1
- TAKEOFF CHART DESCRIPTION 2
- ADDITIONAL INFORMATION 4

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02.12 MTOW CALCULATION (TEMPERATURE ENTRY)

- DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS 1
- EXTRAPOLATION 5
- MAXIMUM STRUCTURAL TAKEOFF WEIGHT 5
- SUMMARY 6

02.14 FLEXIBLE TAKEOFF (TEMPERATURE ENTRY)

- DEFINITION OF FLEXIBLE TAKEOFF 1
- USE OF FLEXIBLE TAKEOFF 1
- REQUIREMENTS 1
- RECOMMENDATION 2
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- FLEXIBLE TAKEOFF NOT POSSIBLE 7
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02.16 GENERAL (WEIGHT ENTRY)

- TAKEOFF PERFORMANCE 1
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02.18 MTOW CALCULATION (WEIGHT ENTRY)

- DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS 1
- EXTRAPOLATION 6
- MAXIMUM STRUCTURAL TAKEOFF WEIGHT 6
- SUMMARY 7

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- DEFINITION OF FLEXIBLE TAKEOFF 1
- USE OF FLEXIBLE TAKEOFF 1
- REQUIREMENTS 1
- RECOMMENDATION 2
- DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS 3
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02.24 QNH/BLEEDS CORRECTION

02.25 MINIMUM SPEEDS

- MINIMUM V1/VR/V2 LIMITED BY VMC 1
- MINIMUM V2 LIMITED BY VMU/VMCA 2

02.40 QUICK REFERENCE TABLES

- INTRODUCTION 1
- USE OF TABLES 1
- HOW TO PROCEED 1
- CONF 1 + F 4
- CONF 2 7
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02.50 NET TAKEOFF FLIGHT PATH

- INTRODUCTION 1
- HOW TO PROCEED 1
- CLOSE OBSTACLE CLEARANCE CONF 1 + F 2
- REMOTE OBSTACLE CLEARANCE CONF 1 + F 3
- CLOSE OBSTACLE CLEARANCE CONF 2 4
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- CLOSE OBSTACLE CLEARANCE CONF 3 6
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	– DEFINITION OF FLEXIBLE TAKEOFF 1 – USE OF FLEXIBLE TAKEOFF 1 – REQUIREMENTS 1 – RECOMMENDATION 2 – DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS 3 – FLEXIBLE TAKEOFF NOT POSSIBLE 7 – SUMMARY 8
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	– DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS 1 – EXTRAPOLATION 6 – MAXIMUM STRUCTURAL TAKEOFF WEIGHT 6 – SUMMARY 7
02.20	FLEXIBLE TAKEOFF (WEIGHT ENTRY)
	– DEFINITION OF FLEXIBLE TAKEOFF 1 – USE OF FLEXIBLE TAKEOFF 1 – REQUIREMENTS 1 – RECOMMENDATION 2 – DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS 3 – FLEXIBLE TAKEOFF NOT POSSIBLE 7 – SUMMARY 8

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02.24 QNH/BLEEDS CORRECTION

02.25 MINIMUM SPEEDS

- MINIMUM V1/VR/V2 LIMITED BY VMC 1
- MINIMUM V2 LIMITED BY VMU/VMCA 2

R 02.27 DERATED TAKEOFF ◄

- R – DEFINITION OF DERATED TAKEOFF 1
- R – USE OF DERATED TAKEOFF 1
- R – TAKEOFF PERFORMANCE IMPROVEMENT BY DERATING
THE ENGINES 1
- R – DETERMINATION OF THE MAXIMUM TAKEOFF WEIGHT AND
ASSOCIATED SPEEDS 2
- R – DETERMINATION OF DERATED TAKEOFF EPR 2

02.40 QUICK REFERENCE TABLES

- INTRODUCTION 1
- USE OF TABLES 1
- HOW TO PROCEED 1
- CONF 1 + F 4
- CONF 2 7
- CONF 3 11

02.50 NET TAKEOFF FLIGHT PATH

- INTRODUCTION 1
- HOW TO PROCEED 1
- CLOSE OBSTACLE CLEARANCE CONF 1 + F 2
- REMOTE OBSTACLE CLEARANCE CONF 1 + F 3
- CLOSE OBSTACLE CLEARANCE CONF 2 4
- REMOTE OBSTACLE CLEARANCE CONF 2 5
- CLOSE OBSTACLE CLEARANCE CONF 3 6
- REMOTE OBSTACLE CLEARANCE CONF 3 7

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 here after. 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.

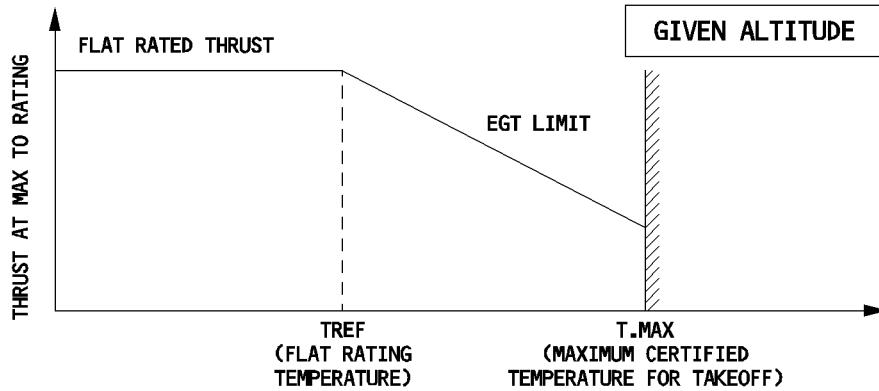
The airline may request Airbus to delete anyone set of sections from the customized FCOM.

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).

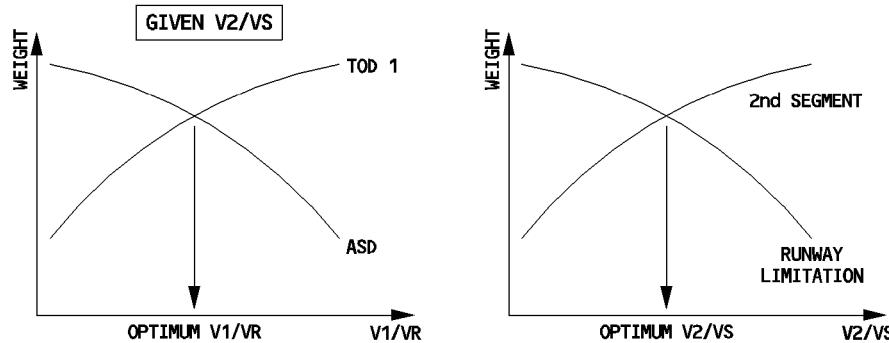
The takeoff thrust produced by the engine varies as follows :

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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 figure charts below.

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

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

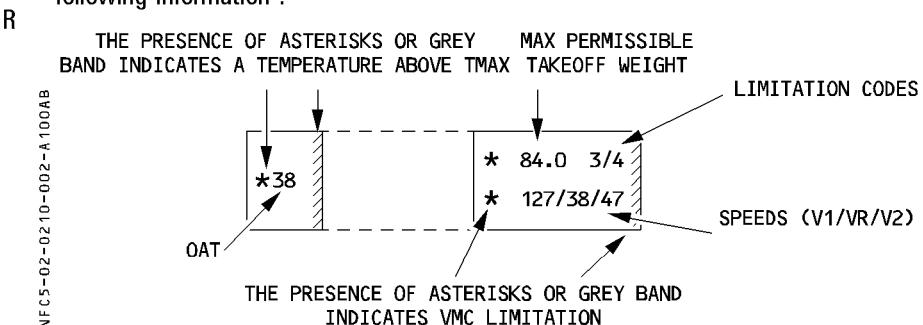
The takeoff chart (RTOW : Regulatory Takeoff Weight) is calculated for a specific aircraft version and for a particular runway specified at the top of the chart. The top of the chart also gives some information about the runway and lists the calculation assumptions.

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 :



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

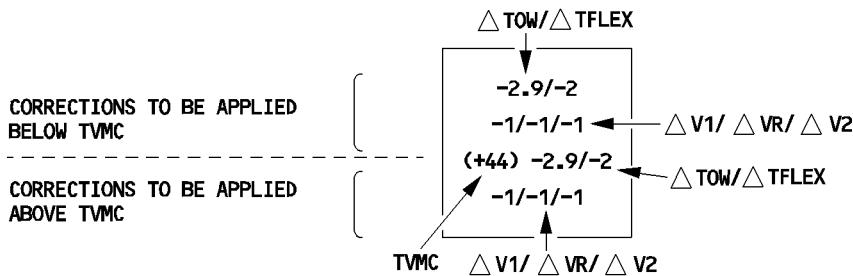
Each takeoff chart is computed for a given set of conditions (air conditioning, QNH, anti ice...) specified at the top of the chart. If the actual takeoff conditions are different, the crew must apply corrections. Two types of corrections are available :

- 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 :

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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 the takeoff chart.

R FLEX TEMPERATURE INDICATOR

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

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		SEQ 100	REV 25

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.

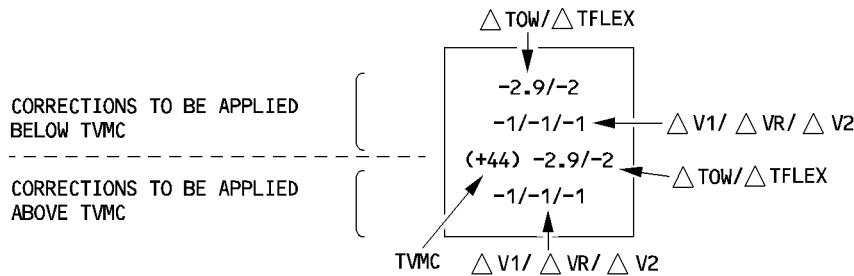
Note : The crew need not compare the charts if the top of the wet runway chart specifies "DRY CHECK". (The comparison has already been inserted in the WET runway calculation).

Note : If the RTOW chart is based on the CG being at 25 %, the crew can find the takeoff performance at a more forward CG by decreasing the takeoff weight by 1000 kg (2200 lb) and increasing V_1 , VR and V_2 by 1 knot.

DESCRIPTION OF THE CORRECTIONS ON TAKEOFF CHART

The corrections are presented on 4 lines :

NFC5-02-0210-003-A370AA



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.

MINIMUM SPEED

Minimum $V_1/VR/V_2$ due to VMC are provided on the bottom right side of the takeoff chart. They are only applicable in case of speed corrections. These speeds are conservative. They may be slightly higher than $V_1/VR/V_2$ displayed on the takeoff chart.

FLEX TEMPERATURE INDICATOR

On the temperature entry chart, the temperature column may display asterisks or have a gray band to indicate temperature values above T_{MAX} and which are flex temperature.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF GENERAL (TEMPERATURE ENTRY)	2.02.10 P 4	
		SEQ 100	REV 25

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.

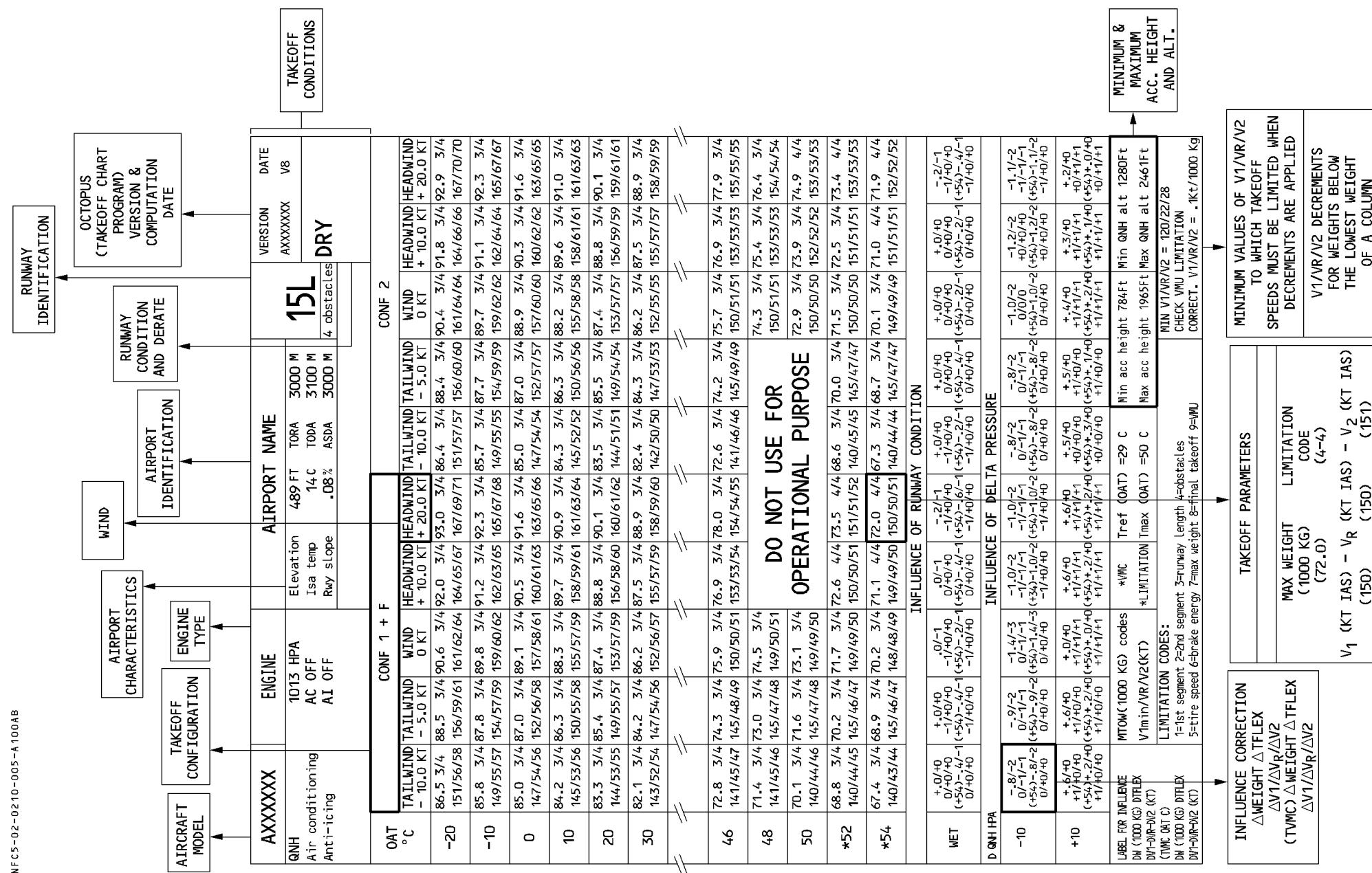
The acceleration height (or altitude) ensures that the net flight path clears the highest obstacle by at least 35 feet when accelerating in level flight to green dot speed after an engine failure, in the most adverse conditions.

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.

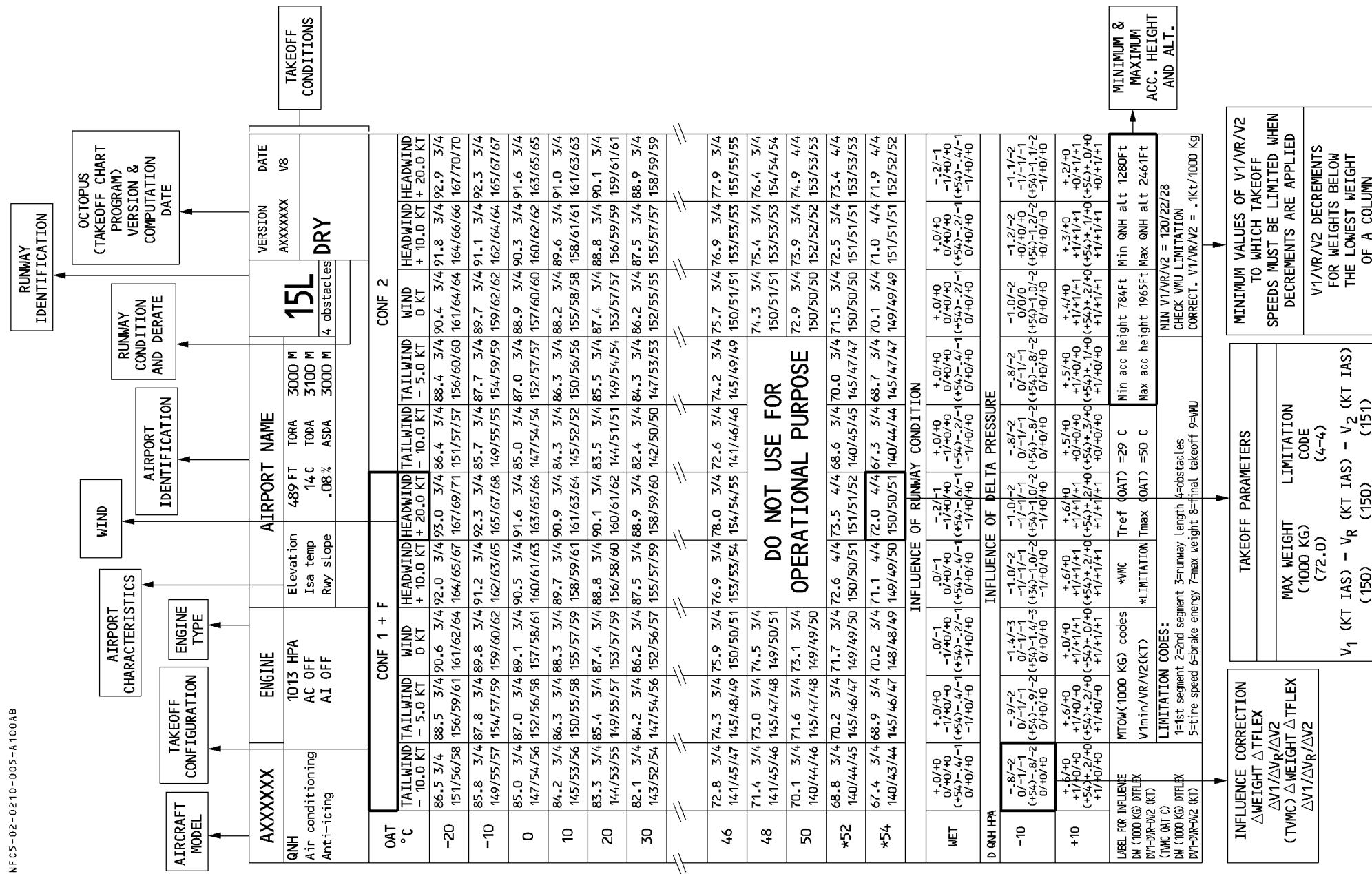
Note : The crew need not compare the charts if the top of the wet runway chart specifies "DRY CHECK". (The comparison has already been inserted in the WET runway calculation).

RTOW CHARTS – COMPLEMENTARY INFORMATION



A319XXX		ENGINES		AIRPORT NAME				15L	VERSION	DATE	
QNH		1013.00 HPA		Elevation	489 FT	TORA	3000 M		AXXXXXXX ***V10		
Air cond.		AC OFF		Isla temp	14 C	TODA	3000 M				
Anti-icing		AI OFF		rwy slope	.08 %	ASDA	3000 M				
All reversers operating								4 obstacles			
No reversers on dry runway									DRY		
OAT		CONF 1+F				CONF 2					
C		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	70.4 4/4 153/53/56	71.4 4/4 155/55/58								72.7 4/4 156/56/58	73.5 2/4 157/57/60
-10	70.1 4/4 153/53/56	71.1 4/4 154/54/57								72.5 4/4 155/55/57	73.2 2/4 156/56/58
0	69.7 3/4 152/52/55	70.7 4/4 153/53/56	71.7 4/4 154/54/56	72.6 4/4 155/55/58	73.4 4/4 155/55/58	69.2 4/4 148/48/51	70.2 4/4 150/50/52	71.3 4/4 151/51/54	72.1 4/4 153/53/55	72.9 2/4 155/55/57	72.8 2/4 155/55/57
10	69.3 3/4 152/52/55	70.3 4/4 153/53/56	71.3 4/4 154/54/57	72.1 4/4 155/55/58	72.9 4/4 148/48/50	68.8 4/4 149/49/51	69.7 4/4 150/50/53	70.8 4/4 151/51/53	71.6 4/4 152/52/55	72.4 2/4 153/53/55	72.4 2/4 153/53/55
20	68.8 3/4 150/50/53	69.8 4/4 151/51/54	70.8 4/4 153/53/55	71.5 4/4 154/54/57	72.4 4/4 147/47/49	68.3 4/4 148/48/50	69.2 4/4 149/49/51	70.3 4/4 149/49/51	71.1 4/4 149/49/51	71.8 2/4 151/51/53	71.8 2/4 151/51/53
30	68.3 3/4 148/48/51	69.3 3/4 150/50/53	70.4 4/4 151/51/54	71.0 4/4 152/52/55	71.8 4/4 153/53/55	67.8 3/4 147/47/49	68.8 4/4 147/47/49	69.7 4/4 148/48/50	70.5 4/4 148/48/50	71.3 2/4 150/50/52	71.3 2/4 150/50/52
32	68.2 3/4 148/48/50	69.2 3/4 150/50/53	70.3 4/4 151/51/54	70.9 4/4 153/53/56	71.7 4/4 153/53/55	67.7 3/4 147/47/49	68.7 4/4 147/47/49	69.6 4/4 148/48/50	70.4 4/4 148/48/50	71.2 2/4 149/49/51	71.2 2/4 149/49/51
34	68.1 3/4 147/47/50	69.1 3/4 150/50/53	70.2 4/4 151/51/54	70.8 4/4 152/52/55	71.6 4/4 152/52/55	67.7 4/4 145/45/47	68.6 4/4 146/46/48	69.5 4/4 148/48/50	70.3 4/4 148/48/50	71.1 2/4 149/49/51	71.1 2/4 149/49/51
36	68.0 3/4 147/47/50	69.0 3/4 150/50/52	70.1 4/4 151/51/54	70.7 4/4 152/52/55	71.5 4/4 152/52/55	67.6 3/4 145/45/47	68.5 4/4 147/47/49	69.5 4/4 148/48/50	70.2 4/4 148/48/50	71.0 2/4 149/49/51	71.0 2/4 149/49/51
38	67.9 3/4 147/47/49	69.0 3/4 150/50/53	70.0 4/4 151/51/53	70.7 4/4 152/52/55	71.4 4/4 152/52/55	67.6 3/4 146/46/48	68.5 4/4 147/47/49	69.4 4/4 148/48/50	70.1 4/4 148/48/50	70.9 2/4 148/48/50	70.9 2/4 148/48/50
40	67.9 3/4 146/46/49	68.9 3/4 150/50/53	70.0 4/4 151/51/54	70.6 4/4 152/52/55	71.3 4/4 152/52/55	67.4 3/4 145/45/47	68.4 4/4 147/47/49	69.3 4/4 148/48/50	70.0 4/4 148/48/49	70.8 2/4 148/48/50	70.8 2/4 148/48/50
42	67.8 3/4 146/46/49	68.8 3/4 150/50/52	69.9 4/4 151/51/54	70.5 4/4 152/52/55	71.3 4/4 152/52/55	67.4 3/4 145/45/47	68.3 4/4 147/47/49	69.3 4/4 148/48/50	70.7 4/4 148/48/50	70.7 4/4 148/48/50	70.7 4/4 148/48/50
44	67.6 3/4 146/46/48	68.7 3/4 150/50/52	69.8 4/4 151/51/54	70.4 4/4 152/52/55	71.1 4/4 152/52/55	67.2 3/4 146/46/48	68.2 4/4 147/47/49	69.1 4/4 148/48/50	69.7 4/4 148/48/50	70.4 4/4 148/48/50	70.4 4/4 148/48/50
46	66.5 3/4 145/45/48	67.4 3/4 148/48/51	68.5 4/4 149/49/52	69.1 4/4 151/51/53	69.9 4/4 150/50/53	66.0 3/4 145/45/47	66.9 4/4 145/45/47	67.8 4/4 146/46/48	68.5 4/4 146/46/48	69.3 4/4 147/47/48	69.3 4/4 147/47/48
48	65.2 3/4 145/45/48	66.2 4/4 146/46/49	67.2 4/4 148/48/50	67.8 4/4 149/49/52	68.6 4/4 149/49/52	64.7 4/4 143/43/45	65.7 4/4 143/43/45	66.5 4/4 145/45/47	67.2 4/4 144/44/46	68.1 2/4 145/45/47	68.1 2/4 145/45/47
* 50	64.0 3/4 144/44/47	64.9 4/4 145/45/47	65.9 4/4 147/47/49	66.5 4/4 147/47/49	67.3 4/4 147/47/50	63.5 4/4 147/47/50	64.4 4/4 141/41/43	65.2 4/4 142/42/44	66.0 4/4 143/43/45	66.8 2/4 143/43/45	66.8 2/4 144/44/46
* 52	62.7 4/4 142/42/45	63.7 4/4 144/44/46	64.6 4/4 146/46/48	65.2 4/4 146/46/48	66.1 4/4 146/46/48	62.3 4/4 139/39/41	63.1 4/4 141/41/43	64.0 4/4 142/42/43	64.7 4/4 142/42/44	65.5 2/4 143/43/45	65.5 2/4 143/43/45
* 54	61.5 4/4 141/41/43	62.4 4/4 143/43/45	63.3 4/4 144/44/46	64.0 4/4 144/44/46	64.8 4/4 145/46/48	61.0 4/4 138/38/40	61.8 4/4 140/40/42	62.7 4/4 140/40/42	63.5 4/4 141/41/42	64.3 2/4 142/42/44	64.3 2/4 142/42/44
INFLUENCE OF RUNWAY CONDITION											
WET	-.4/-1 -10/-3/-3 (+54)-8/-2 -10/0/0	-.7/-2 -8/-1/-1 (+54)-7/-2 -8/0/0	.0/-1 -4/-1/-1 (+54)-0/1 -4/0/0	.0/0 -1/0/0 (+54)-0/0 -4/0/0	.9/-2 -1/0/0 (+54)-0/0 -1/0/0	-2/-1 -4/0/0 (+54)-9/-2 -9/0/0	.0/0 -2/0/0 (+54)-2/-1 -4/0/0	.0/-1 0/0/0 (+54)-0/-1 0/0/0	.0/-1 0/0/0 (+54)-2/-1 0/0/0	.0/-1 0/0/0 (+54)-2/-1 0/0/0	
D QNH HPA	INFLUENCE OF DELTA PRESSURE										
-10	-.6/-1 0/0/0 (+54)-6/-1 0/0/0	-.7/-2 -1/0/0 (+54)-7/-2 0/0/0	-.7/-2 -1/0/0 (+54)-9/-2 0/0/0	-.9/-2 -1/0/0 (+54)-8/-2 0/0/0	-.7/-2 -1/0/0 (+54)-7/-2 0/0/0	-.8/-2 -2/0/0 (+54)-8/-2 0/0/0	-.8/-2 -2/0/0 (+54)-9/-2 0/0/0	-.9/-2 -2/0/0 (+54)-9/-2 0/0/0	-.8/-2 -2/0/0 (+54)-8/-2 0/0/0	-.8/-2 -2/0/0 (+54)-8/-2 0/0/0	
+10	+.3/0 0/+1/+1 (+54)+1/0 0/+1/+1	+.1/0 +1/+1/+1 (+54)+1/0 +1/+1/+1	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	+.1/0 0/0/0 (+54)+1/0 0/0/0	
LABEL FOR INFLUENCE		MTOW(1000 KG) codes			* VMC	Tref (OAT) = 44 C	Min acc height 810 FT		Min QNH alt 1306 FT		
DW (1000 KG) DTRLEX		V1minVR/V2 (kt)			* LIMITATION	Tmax (OAT) = 50 C	Max acc height 1992 FT		Max QNH alt 2488 FT		
DV1-DVR-DV2 (KT)		LIMITATION CODES					Min V1/VR/2 = 107/3/17		CHECK VRU LIMITATION		
(TVMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles					Correct. V1/VR/2 = .2 KT/1000 KG				
DW (1000 KG) DTRLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU									
DV1-DVR-DV2 (KT)											

RTOW CHARTS – COMPLEMENTARY INFORMATION



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A318XXX		ENGINES		AIRPORT NAME				15L	VERSION AXXXXXXX **V22	DATE 15/56/60		
QNH 1013.25 HPA		Air cond. AC OFF		Elevation 489 FT TORA Isa temp 14 C TODA runway slope .08 % ASDA		3000 M 3000 M 3000 M 4 obstacles						
Anti-icing AI OFF								DRY				
All reversers operating												
No reversers on dry runway												
OAT		CONF 1+F					CONF 2					
C		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	151/51/55	69.6 4/4 152/52/57	70.7 4/4 154/54/59	72.0 4/4 156/56/60	72.9 3/4 157/57/61	73.6 3/4 145/45/50	69.0 4/4 148/48/53	70.1 4/4 148/48/53	71.3 4/4 150/50/54	72.2 2/4 153/53/57	72.6 2/3 156/56/60	
-10	150/50/55	69.2 4/4 151/51/55	70.3 4/4 154/54/58	71.6 4/4 155/55/60	72.5 3/4 157/57/61	73.3 3/4 145/45/50	68.7 4/4 146/46/50	69.8 4/4 148/48/53	70.9 4/4 148/48/53	71.9 2/4 151/51/56	72.4 3/4 155/55/59	
0	149/49/54	68.8 3/4 152/52/56	69.9 4/4 153/53/57	71.2 4/4 154/54/58	72.1 4/4 155/55/59	72.8 3/4 145/45/49	68.3 4/4 146/46/51	69.4 4/4 148/48/52	70.6 4/4 150/50/54	71.5 2/4 154/54/58	72.1 2/4 152/52/57	
10	148/48/52	68.4 3/4 150/50/54	69.5 4/4 152/52/57	70.7 4/4 153/53/58	71.6 4/4 154/54/58	72.4 3/4 143/43/48	67.9 4/4 145/45/50	69.0 4/4 147/47/51	70.2 4/4 149/49/53	71.1 2/4 152/52/57	71.8 2/4 154/49/54	
20	146/46/50	67.9 3/4 148/48/53	69.0 4/4 150/50/54	70.2 4/4 152/52/56	71.1 4/4 154/54/58	71.9 3/4 143/43/48	67.5 4/4 144/44/49	68.6 4/4 146/46/51	69.8 4/4 148/48/52	70.7 2/4 151/51/55	71.4 2/4 155/55/59	
30	144/44/49	67.3 3/4 148/48/52	68.5 3/4 149/49/52	69.7 4/4 151/51/55	70.6 4/4 151/51/56	71.3 4/4 142/42/46	67.1 4/4 144/44/48	68.1 4/4 145/45/49	70.2 4/4 146/46/51	71.1 2/4 149/49/54	70.9 2/4 154/49/54	
40	143/43/47	66.9 3/4 146/46/51	68.0 3/4 148/48/52	69.2 4/4 150/50/54	70.1 4/4 152/52/56	70.9 3/4 141/41/46	66.6 4/4 143/43/47	67.7 4/4 145/45/49	68.8 4/4 146/46/50	69.7 4/4 148/48/52	70.5 2/4 152/52/57	
44	142/42/46	66.6 3/4 146/46/50	67.8 3/4 148/48/53	69.0 3/4 149/49/54	69.9 4/4 152/52/56	70.7 3/4 141/41/46	66.4 3/4 142/42/47	67.5 4/4 144/44/49	68.7 4/4 145/45/49	69.6 4/4 147/47/52	70.3 2/4 147/47/52	
46	142/42/46	65.6 3/4 145/45/50	66.8 3/4 148/48/52	68.0 4/4 149/49/53	68.8 4/4 150/50/54	69.6 3/4 140/40/44	65.4 4/4 141/41/46	66.5 4/4 141/41/46	67.6 4/4 144/44/48	68.5 4/4 144/44/48	69.2 2/4 147/47/51	
48	141/41/46	64.6 3/4 144/44/48	65.7 3/4 147/47/51	66.8 4/4 148/48/51	67.7 4/4 148/48/52	68.5 4/4 138/38/43	64.3 4/4 140/40/45	65.4 4/4 143/43/47	66.4 4/4 143/43/47	67.3 4/4 146/46/50	68.0 2/4 146/46/50	
50	141/41/46	63.5 3/4 143/43/47	64.6 4/4 146/46/49	65.7 4/4 147/47/51	66.6 4/4 147/47/51	67.4 4/4 138/38/42	63.2 4/4 139/39/44	64.2 4/4 140/40/45	65.3 4/4 140/40/45	66.2 2/4 142/42/46	66.9 2/4 145/45/49	
52	141/41/45	62.5 3/4 142/42/46	63.5 4/4 142/42/47	64.9 4/4 143/43/47	65.9 4/4 144/44/48	67.4 4/4 135/35/40	61.0 4/4 136/36/41	62.0 4/4 138/38/42	62.8 2/4 139/39/44	63.1 2/4 141/41/45	65.7 2/4 144/44/48	
54	140/40/44	61.4 3/4 142/42/46	62.4 4/4 143/43/46	64.1 4/4 144/44/47	65.2 4/4 144/44/48	66.2 3/4 133/33/37	59.0 4/4 133/33/37	60.9 4/4 135/35/39	61.7 2/4 136/36/40	62.3 2/4 138/38/43	64.5 2/4 142/42/46	
* 56	139/39/43	60.4 4/4 141/41/45	61.4 4/4 143/43/46	62.4 4/4 144/44/47	63.3 4/4 144/44/48	64.0 4/4 135/35/40	60.0 4/4 136/36/41	61.0 4/4 138/38/42	62.0 4/4 139/39/44	63.4 2/4 143/43/47		
* 58	138/38/42	59.3 4/4 140/40/44	60.3 4/4 141/41/45	61.4 4/4 143/43/46	62.2 4/4 143/43/47	62.9 3/4 133/33/37	59.0 4/4 133/33/37	59.9 4/4 135/35/39	60.9 4/4 136/36/40	61.7 2/4 138/38/43	62.3 2/4 142/42/46	
* 60	137/37/40	58.2 4/4 139/39/42	59.2 4/4 140/40/43	60.2 4/4 141/41/45	61.1 4/4 142/42/46	61.7 3/4 132/32/37	57.9 4/4 133/33/37	58.8 4/4 135/35/39	59.8 4/4 138/38/42	60.6 2/4 141/41/45	61.1 2/4 141/41/45	
* 62	136/36/39	57.3 4/4 138/38/41	58.3 4/4 139/39/43	60.1 4/4 140/40/43	60.7 2/4 141/41/45	60.7 2/4 131/31/36	57.0 4/4 132/32/36	57.8 4/4 134/34/39	58.8 4/4 137/37/41	59.6 2/4 140/40/44	60.1 2/4 140/40/44	
* 64	135/35/38	56.4 4/4 137/37/40	57.3 4/4 138/38/42	58.3 4/4 139/39/42	59.1 4/4 141/41/44	58.7 2/4 130/30/35	56.1 4/4 131/31/35	56.9 4/4 134/34/38	57.8 4/4 136/36/40	58.6 2/4 140/40/43	59.1 3/4 140/40/43	
INFLUENCE OF RUNWAY CONDITION												
WET	-2.2/-5 -15/-3/-3 (+74)-2.9/-6 -15'/0/0	-2.2/-5 -13/-2/-2 (+74)-2.2/-5 -13'/0/0	-1.7/-4 -10/-2/-2 (+74)-1.7/-4 -10'/0/0	-1.4/-3 -8'/0/0 (+74)-1.4/-3 -8'/0/0	-0.5/-1 -6/-2/-2 (+74)-0.8/-2 -6'/0/0	-2.5/-6 -14/-1/-1 (+74)-2.8/-6 -14'/0/0	-1.9/-4 -10'/0/0 (+74)-2.1/-5 -10'/0/0	-1.2/-3 -8'/-1/-1 (+74)-1.2/-3 -8'/0/0	-0.5/-1 -5'/-1/-1 (+74)-0.5/-1 -5'/0/0	-0.8/-2 -4'/-1/-1 (+74)-0.8/-2 -4'/0/0		
D QNH HPA	INFLUENCE OF DELTA PRESSURE											
-10.0	-0.5/-2 -1/-1/-2 (+72)-0.5/-2 -1/0/0	-0.5/-2 -1/-1/-1 (+72)-0.5/-2 -1/0/0	-0.5/-1 0'/0/-1 (+72)-0.5/-1 0'/0/0	-0.5/-2 0'/0/-1 (+72)-0.8/-2 0'/0/0	-0.5/-1 0'/0/-1 (+72)-0.8/-2 0'/0/0	-0.5/-1 0'/0/-1 (+72)-0.7/-2 0'/0/0	-0.5/-1 0'/0/-1 (+72)-0.5/-1 0'/0/0	-0.6/-2 0'/0/0 (+72)-0.6/-2 0'/0/0	-0.6/-2 0'/0/0 (+72)-0.6/-2 0'/0/0			
+10.0	+0.5/0 0'/0/0 (+74)+0.5/0 0'/0/0	+0.4/0 0'/0/0 (+74)+0.4/0 0'/0/0	+0.7/+1 +1/+1/0 (+74)+0.4/0 +1/+1/0	+0.4/0 0'/0/0 (+74)+0.5/0 +1/+1/0	+0.5/0 0'/0/0 (+74)+0.5/+1 +1/+1/0	+0.5/0 0'/0/0 (+74)+0.5/+1 +1/+1/0	+0.5/0 0'/0/0 (+74)+0.5/+1 +1/+1/0	+0.4/0 0'/0/0 (+74)+0.4/0 +1/+1/+1	+0.4/0 0'/0/0 (+74)+0.4/0 +1/+1/+1			
LABEL FOR INFLUENCE MTOW(1000 KG) codes * VMU Tref (OAT) = 44 C Min acc height 464 FT Min QNH alt 953 FT												
DW1-DVR-V2 (KT) *LIMITATION Tmax (OAT) = 54 C Max acc height 1796 FT Max QNH alt 2285 FT Min V1/R/V2 = 105/09/12												
DV1-DVR-V2 (KT) LIMITATION CODES 1=1st segment 2=2nd segment 3=runway length 4=obstacles												
DV1-DVR-V2 (KT) 5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU												
CHECK VMU LIMITATION Correct. V1/R/V2 = 1.0 KT/1000 KG												

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A320XXX		ENGINES		AIRPORT NAME				15L	VERSION AXXXXXXX **V20	DATE 169/69/74	
QNH 1013.25 HPA		Air cond. AC OFF		Elevation 489 FT TORA Isa temp 14 C TODA runway slope .08 % ASDA		3000 M 3000 M 3000 M					
Anti-icing AI OFF											
All reversers operating											
No reversers on dry runway											
OAT	CONF 1+F						CONF 2				
	C	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	80.2 4/6 156/56/58	82.0 4/6 162/62/64	83.6 3/4 167/67/69	84.8 3/4 170/70/72	85.8 3/4 173/73/74	80.4 4/6 154/54/59	81.9 3/4 159/59/64	83.4 3/4 164/64/69	84.4 3/4 167/67/72	85.2 2/4 167/67/72	85.2 2/4 167/67/72
-10	79.5 4/6 153/56/58	81.3 4/6 159/59/62	83.1 4/6 164/64/66	84.3 3/4 167/67/69	85.3 3/4 171/71/72	79.7 4/6 151/52/57	81.4 4/6 156/56/62	82.9 3/4 161/61/66	84.0 3/4 164/64/69	84.9 3/4 167/67/72	84.9 3/4 167/67/72
0	78.8 4/6 151/54/57	80.6 4/6 156/57/59	82.5 4/6 162/62/64	83.7 3/4 165/65/67	84.7 3/4 168/68/70	79.0 4/6 149/51/56	80.8 4/6 154/54/60	82.4 3/4 159/59/64	83.5 3/4 162/62/67	84.5 3/4 165/65/70	84.5 3/4 165/65/70
10	78.2 4/6 148/53/55	80.0 4/6 154/57/59	81.8 4/6 159/60/62	83.1 4/6 163/63/65	84.2 3/4 166/66/67	78.4 4/6 147/50/54	80.2 4/6 152/52/58	81.9 3/4 156/56/62	83.0 3/4 159/59/65	83.9 3/4 162/63/68	83.9 3/4 162/63/68
20	77.6 4/6 146/51/53	79.3 4/6 151/55/57	81.1 4/6 157/57/60	82.5 4/6 160/60/62	83.6 4/6 163/63/65	77.7 4/6 145/48/52	79.5 4/6 150/51/56	81.3 4/6 154/54/60	82.4 3/4 157/57/63	83.4 3/4 160/61/66	83.4 3/4 160/61/66
30	76.9 4/6 144/50/52	78.7 4/6 149/54/56	80.5 4/6 154/57/60	81.8 4/6 158/58/60	83.0 4/6 161/61/63	77.1 4/6 143/46/50	78.9 4/6 148/50/55	80.7 4/6 153/53/58	81.9 3/4 155/56/61	82.9 3/4 158/59/64	82.9 3/4 158/59/64
32	76.8 4/6 144/50/52	78.6 4/6 149/53/55	80.4 4/6 154/56/58	81.7 4/6 157/58/60	82.9 4/6 161/61/63	77.0 4/6 142/45/50	78.7 4/6 147/50/55	80.6 4/6 152/53/58	81.8 4/6 155/55/60	82.8 3/4 157/59/64	82.8 3/4 157/59/64
34	76.7 4/6 143/50/52	78.4 4/6 148/53/55	80.2 4/6 154/56/58	81.5 4/6 157/57/60	82.8 4/6 160/60/62	76.9 4/6 142/45/50	78.6 4/6 147/50/55	80.5 4/6 152/52/57	81.7 4/6 154/55/60	82.7 3/4 157/58/64	82.7 3/4 157/58/64
36	76.6 4/6 143/49/52	78.4 4/6 148/52/54	80.1 4/6 153/56/58	81.4 4/6 156/57/59	82.7 4/6 160/60/62	76.8 4/6 141/45/50	78.5 4/6 146/50/55	80.3 4/6 151/52/57	81.6 4/6 154/55/60	82.6 3/4 157/58/63	82.6 3/4 157/58/63
38	76.5 4/6 142/49/52	78.3 4/6 147/52/54	80.0 4/6 153/56/58	81.3 4/6 156/58/60	82.6 4/6 159/60/62	76.7 4/6 141/45/50	78.4 4/6 146/48/53	80.2 4/6 151/52/57	81.5 4/6 154/54/59	82.5 3/4 156/58/63	82.5 3/4 156/58/63
40	76.4 4/6 142/49/52	78.2 4/6 147/52/54	79.9 4/6 152/56/58	81.2 4/6 156/58/60	82.5 4/6 159/59/61	76.6 4/6 141/45/50	78.3 4/6 146/48/53	80.1 4/6 150/51/56	81.4 4/6 153/54/59	82.4 3/4 156/57/63	82.4 3/4 156/57/63
42	76.3 4/6 142/49/51	78.0 4/6 147/52/54							81.3 4/6 153/54/59	82.3 3/4 156/57/62	
44	76.1 4/6 142/49/51	77.9 4/6 146/51/53							81.1 4/6 153/53/58	82.1 3/4 155/57/62	
46	75.5 4/6 142/48/51	77.2 4/6 147/51/53	78.9 4/6 152/55/57	80.2 4/6 155/55/58	80.7 2/4 154/55/58	75.7 4/6 141/45/52	77.3 4/6 145/45/52	79.1 4/6 150/50/55	80.3 3/4 152/53/58	80.7 2/4 152/55/60	80.7 2/4 152/55/60
48	74.5 4/6 143/48/50	76.2 4/6 148/50/52	77.9 4/6 153/53/55	79.1 4/6 155/55/57	79.3 2/4 153/55/57	74.7 4/6 141/44/48	76.4 4/6 146/47/51	78.0 3/4 150/50/55	79.1 3/4 152/53/57	79.5 4/8 155/58/63	79.5 4/8 155/58/63
50	73.6 4/6 143/47/49	75.3 4/6 148/49/51	76.9 4/6 153/53/55	77.9 4/6 154/54/56	77.9 2/4 151/54/55	73.8 4/6 142/42/46	75.4 4/6 146/47/51	76.9 3/4 150/50/54	78.0 3/4 152/52/57	78.0 2/4 149/52/57	78.0 2/4 149/52/57
52	72.7 4/6 144/46/48	74.4 4/6 149/49/51	75.8 3/4 153/53/54	76.3 2/4 152/52/53	76.3 2/4 147/52/53	72.9 4/6 142/44/48	74.3 3/4 146/46/50	75.8 3/4 150/50/54	76.4 2/4 150/50/55	76.4 2/4 146/50/55	76.4 2/4 146/50/55
54	71.8 4/6 145/46/47	73.3 3/4 149/49/51	74.8 3/4 152/52/54	75.0 2/4 150/50/52	75.0 2/4 145/50/52	71.9 3/4 142/43/47	73.3 3/4 146/46/50	74.7 3/4 149/49/54	75.1 2/4 148/49/54	75.1 2/4 144/49/54	75.1 2/4 144/49/54
INFLUENCE OF RUNWAY CONDITION											
WET	-2.0/-5 -169/-1/1 (+54)-2.0/-5 (+54)-1.5/-4 -16/0/0	-1.5/-4 -15/-2/2 (+54)-1.5/-4 (+54)-1.5/-3 -15/0/0	-1.2/-3 -13/-4/4 (+54)-1.3/-3 (+54)-1.1/-2 -11/0/0	-1.1/-2 -11/-3/3 (+54)-1.1/-2 (+54)-0.9/-2 -10/0/0	-1.8/-2 -10/-2/2 (+54)-0.8/-2 (+54)-0.9/-4 -10/0/0	-0.9/-4 -14/0/ (+54)-0.9/-4 (+54)-1.5/-4 -14/0/0	-1.5/-4 -13/0/ (+54)-1.5/-4 (+54)-1.3/-3 -13/0/0	-1.2/-3 -12/-2/2 (+54)-1.2/-3 (+54)-1.2/-2 -11/0/0	-1.2/-2 -10/-1/1 (+54)-1.2/-2 (+54)-1.2/-2 -10/0/0	-1.5/-3 -4/-2/2 (+54)-1.5/-3 (+54)-1.5/-2 -4/0/0	
D QNH HPA	INFLUENCE OF DELTA PRESSURE										
-10.0	-0.8/-2 0/0/ (+54)-0.8/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.7/-2 0/0/ (+54)-0.7/-2 (+54)-0.7/-2 0/0/0	-0.8/-2 0/0/ (+54)-0.8/-2 (+54)-0.8/-2 0/0/0	
+10.0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.0/0 0/0/ (+54)+0.0/0 (+54)+0.0/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	+0.2/0 0/0/ (+54)+0.2/0 (+54)+0.2/0 0/0/0	
LABEL FOR INFLUENCE	MTOW(1000 KG) codes										
DW1 (1000 KG) DTFLX	* VMU * LIMITATION										
DV1-DVR-V2 (KT)	Tref (OAT) = 44 C Tmax (OAT) = 54 C										
(TVMC OAT C)	Min acc height 464 FT Max acc height 1917 FT										
DW1 (1000 KG) DTFLX	Min V1/V2 = 108/114/117										
DV1-DVR-DV2 (KT)	CHECK VMU LIMITATION Correct. V1/V/R/V2 = 1.0 KT/1000 KG										
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											

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 \neq 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 71.2
 Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
 Maximum takeoff weight (1000 kg) air conditioning OFF 70.9

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- Retain CONF 1+F as takeoff configuration.
- Maximum TO weight (1000 kg) air conditioning OFF 71.2
- R Air conditioning correction (FCOM 2.02.24 p1) -2.0
- R Maximum permissible TO weight (1000 kg) air conditioning ON 69.2
- R Determine takeoff speeds for 69.2 (1000kg) in the 10kt head wind column (CONF1+F)
V1 = 151 kt, VR = 151 kt, V2 = 153 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 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.

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 \neq 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

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 70.8

Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,

Maximum takeoff weight (1000 kg) air conditioning OFF 70.4

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		SEQ 078	REV 39

Retain CONF 1+F as takeoff configuration.

Maximum TO weight (1000 kg) air conditioning OFF 70.8

Air conditioning correction (FCOM 2.02.24 p1) -4.7

Maximum permissible TO weight (1000 kg) air conditioning ON 66.1

- R Determine takeoff speeds for 66.1 (1000kg) in the 10kt head wind column (CONF1+F)
V1 = 147 kt, VR = 147 kt, V2 = 151 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 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.

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 \neq 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

Use the chart from 2.02.10 p 6.

Enter the 10 kt head wind column and interpolate for 25°C, CONF 1+F,

- R Maximum takeoff weight (1000 kg) air conditioning OFF 82.1
 Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
 R Maximum takeoff weight (1000 kg) air conditioning OFF 82.1

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		SEQ 270	REV 37

- Retain CONF 2 as takeoff configuration as the speeds are lower.
- R Maximum TO weight (1000 kg) air conditioning OFF 82.1
Air conditioning correction (FCOM 2.02.24 p1) -1.8
- R Maximum permissible TO weight (1000 kg) air conditioning ON 80.3
Determine takeoff speeds for 80.3 (1000 kg) in the 10 kt head wind column (CONF 2)
V1 = 152 kt, VR = 153kt, V2 = 158 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 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) 71.2
- Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
 max TO weight (1000 kg) 70.9
- Retain CONF 1+F for takeoff

Read associated speeds as V1 = 152 kt, VR = 152 kt, V2 = 155 kt

Apply WET correction

For OAT < TVMC (54°), ΔW = 0.0
 Intermediate weight (1000 kg) 71.2

Associated speeds,

$$V1 = 152 \text{ kt} - 4 = 148 \text{ kt}$$

$$VR = 152 \text{ kt} - 1 = 151 \text{ kt}$$

$$V2 = 155 \text{ kt} - 1 = 154 \text{ kt}$$

(No speed check required for first correction)

Apply QNH correction

For OAT < TVMC (54°), $\Delta W = 0.1 \times 15/10 = + 0.1$

Maximum permissible takeoff weight (1000 kg) 71.3

Associated speeds,

$$V1 = 148 \text{ kt} + 0 \times 15/10 = 148 \text{ kt}$$

$$VR = 151 \text{ kt} + 0 \times 15/10 = 151 \text{ kt}$$

$$V2 = 154 \text{ kt} + 0 \times 15/10 = 154 \text{ kt}$$

- 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)	71.2	152	152	155
FCOM correction(s)				
Intermediate value	71.2	152	152	155
WET Correction	0.0	- 4	- 1	- 1
Intermediate value	71.2	148	151	154
QNH Correction	+ 0.1	0	0	0
Final value	71.3	148	151	154

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

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 71.2

Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,

Max TO weight (1000 kg) air conditioning OFF 70.9

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 71.2

R Air conditioning correction - 2.0

R Intermediate weight 69.2

R Interpolate takeoff speeds for 69.2 (1000 kg) in the 10 kt head wind column,

V1 = 151 kt, VR = 151 kt, V2 = 153 kt

3. Apply WET correction

R For OAT < TVMC (54°C), $\Delta W =$ 0.0

R Intermediate weight 69.2

R Associated speeds,

V1 = 151 kt - 4 = 147 kt

VR = 151 kt - 1 = 150 kt

V2 = 153 kt - 1 = 152 kt

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

Apply QNH correction

R For OAT < TVMC (54°C), $\Delta W = 0.1 \times 15/10 =$ + 0.1

R Maximum permissible takeoff weight 69.3

R Associated speed,

V1 = 147 kt + 0 × 15/10 = 147 kt

VR = 150 kt + 0 × 15/10 = 150 kt

V2 = 152 kt + 0 × 15/10 = 152 kt

Example 2

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

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) 70.8
- Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,
 max TO weight (1000 kg) 70.4
- Retain CONF 1+F for takeoff
- Read associated speeds as V1 = 151 kt, VR = 152 kt, V2 = 156 kt
- Apply WET correction

For OAT < TVMC (74°C), $\Delta W = - 1.4$
 Intermediate weight (1000 kg) 69.4

Associated speeds,

$$V1 = 151 \text{ kt} - 8 = 143 \text{ kt}$$

$$VR = 152 \text{ kt} - 0 = 152 \text{ kt}$$

$$V2 = 156 \text{ kt} - 0 = 156 \text{ kt}$$

(No speed check required for first correction)

- Apply QNH correction
- For OAT < TVMC (74°C), $\Delta W = 0.4 \times 15/10 = + 0.6$
 Maximum permissible takeoff weight (1000 kg) 70.0

Associated speeds,

$$V1 = 143 \text{ kt} + 0 \times 15/10 = 143 \text{ kt}$$

$$VR = 152 \text{ kt} + 0 \times 15/10 = 152 \text{ kt}$$

$$V2 = 156 \text{ kt} + 0 \times 15/10 = 156 \text{ kt}$$

- 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)	70.8	151	152	156
FCOM correction(s)				
Intermediate value	70.8	151	152	156
WET Correction	- 1.4	- 8	0	0
Intermediate value	69.4	143	152	156
QNH Correction	+ 0.6	0	0	0
Final value	70.0	143	152	156

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

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 70.8

Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,

Max TO weight (1000 kg) air conditioning OFF 70.4

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 70.8

Air conditioning correction - 4.7

Intermediate weight 66.1

Interpolate takeoff speeds for 66.1 (1000 kg) in the 10 kt head wind column,

V1 = 147 kt, VR = 147 kt, V2 = 151 kt

3. Apply WET correction

For OAT < TVMC (74°C), $\Delta W =$ - 1.4

Intermediate weight 64.7

Associated speeds,

V1 = 147 kt - 8 = 139 kt

VR = 147 kt - 0 = 147 kt

V2 = 151 kt - 0 = 151 kt

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

Apply QNH correction

For OAT < TVMC (74°C), $\Delta W = 0.4 \times 15/10 =$ + 0.6

Maximum permissible takeoff weight 65.3

Associated speed,

V1 = 139 kt + 0 × 15/10 = 139 kt

VR = 147 kt + 0 × 15/10 = 147 kt

V2 = 151 kt + 0 × 15/10 = 151 kt

Example 2

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

Use the chart from 2.02.10 p 6.

· Enter the 10 kt head wind column and interpolate for 25°C, CONF 1+F,

R max TO weight (1000 kg) 82.1

· Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,

R max TO weight (1000 kg) 82.1

· Retain CONF 2 for takeoff as the speeds are lower.

· Read associated speeds as V1 = 156 kt, VR = 157 kt, V2 = 162 kt

· Apply WET correction

R For OAT < TVMC (54°C), $\Delta W =$ - 1.2

R Intermediate weight (1000 kg) 80.9

Associated speeds,

R V1 = 156 kt - 10 = 146 kt

R VR = 157 kt - 1 = 156 kt

R V2 = 162 kt - 1 = 161 kt

(No speed check required for first correction)

· Apply QNH correction

For OAT < TVMC (54°C), $\Delta W = 0.2 \times 15/10 =$ + 0.3

R Maximum permissible takeoff weight (1000 kg) 81.2

Associated speeds,

R V1 = 146 kt + 1 × 15/10 = 147 kt

R VR = 156 kt + 1 × 15/10 = 158 kt

R V2 = 161 kt + 1 × 15/10 = 163 kt

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

R

	Takeoff Configuration : 2			
	TOW	V1	VR	V2
TOW (RTOW)	82.1	156	157	162
FCOM correction(s)				
Intermediate value	82.1	156	157	162
WET Correction	- 1.2	- 10	- 1	- 1
Intermediate value	80.9	146	156	161
QNH Correction	+ 0.3	+ 1	+ 2	+ 2
Final value	81.2	147	158	163

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

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,

R Max TO weight (1000 kg) air conditioning OFF 82.1

Enter the 10 kt head wind column and interpolate for 25°C, CONF 2,

R Max TO weight (1000 kg) air conditioning OFF 82.1

Retain CONF 2 for takeoff configuration as the speeds are lower.

2. First, apply the correction from FCOM page 2.02.24 p 1.

R Max TO weight (1000 kg) air conditioning OFF 82.1

Air conditioning correction - 1.8

R Intermediate weight 80.3

R Interpolate takeoff speeds for 80.3 (1000 kg) in the 10 kt head wind column,

V1 = 152 kt, VR = 153 kt, V2 = 158 kt

3. Apply WET correction

R For OAT < TVMC (54°C), $\Delta W =$ - 1.2

R Intermediate weight 79.1

Associated speeds,

R V1 = 152 kt - 10 = 142 kt

R VR = 153 kt - 1 = 152 kt

R V2 = 158 kt - 1 = 157 kt

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

Apply QNH correction

R For OAT < TVMC (54°C), $\Delta W = 0.2 \times 15/10 =$ + 0.3

R Maximum permissible takeoff weight 79.4

Associated speed,

R V1 = 142 kt + 1 \times 15/10 = 143 kt

R VR = 152 kt + 1 \times 15/10 = 154 kt

R V2 = 157 kt + 1 \times 15/10 = 159 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 :

- R Max permissible takeoff weight = 69.3 (1000 kg)
V1 = 147 kt, VR = 150 kt, V2 = 152 kt.

R

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	71.2			
FCOM correction(s)	- 2.0			
Intermediate value	69.2	151	151	153
WET Correction	0.0	- 4	- 1	- 1
Intermediate value	69.2	147	150	152
QNH Correction	+ 0.1	0	0	0
Final value	69.3	147	150	152

EXTRAPOLATION

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

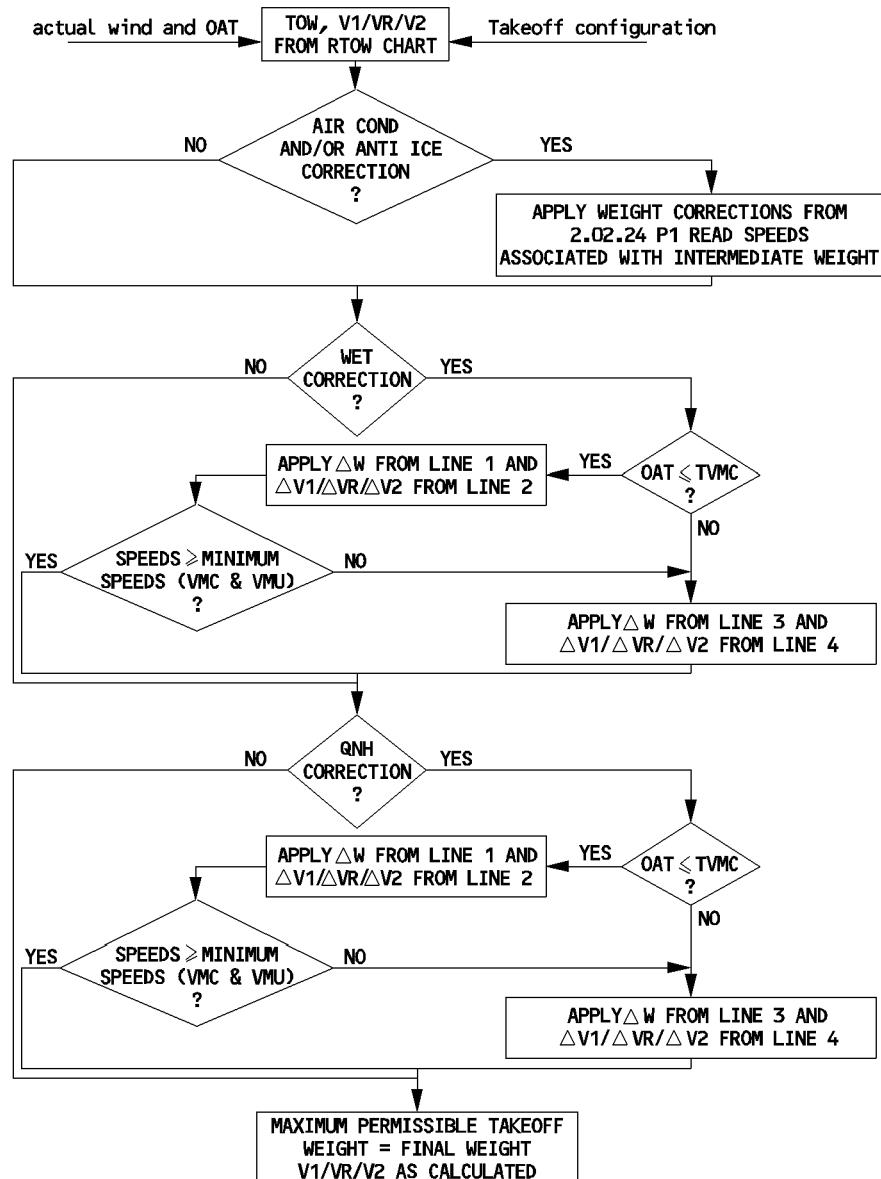
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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

The following flow diagram gives the different steps to follow.



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 :

Max permissible takeoff weight = 65.3 (1000 kg)

V1 = 139 kt, VR = 147 kt, V2 = 151 kt.

	Takeoff Configuration : 1 + F			
	TOW	V1	VR	V2
TOW (RTOW)	70.8			
FCOM correction(s)	– 4.7			
Intermediate value	66.1	147	147	151
WET Correction	– 1.4	– 8	0	0
Intermediate value	64.7	139	147	151
QNH Correction	+ 0.6	0	0	0
Final value	65.3	139	147	151

EXTRAPOLATION

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

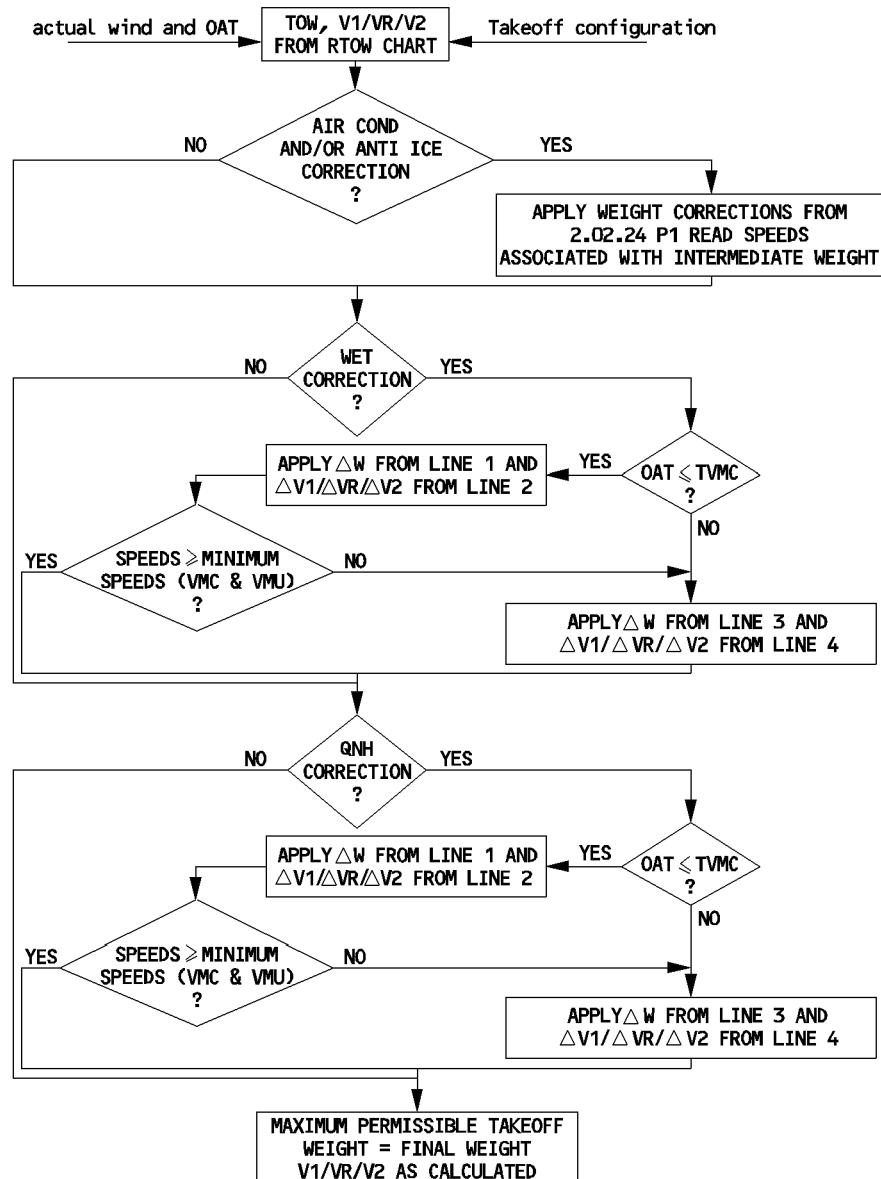
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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

The following flow diagram gives the different steps to follow.



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 :

- R Max permissible takeoff weight = 79.4 (1000 kg)
R V1 = 143 kt, VR = 154 kt, V2 = 159 kt.

R

	Takeoff Configuration : 2			
	TOW	V1	VR	V2
TOW (RTOW)	82.1			
FCOM correction(s)	- 1.8			
Intermediate value	80.3	152	153	158
WET Correction	- 1.2	- 10	- 1	- 1
Intermediate value	79.1	142	152	157
QNH Correction	+ 0.3	+ 1	+ 2	+ 2
Final value	79.4	143	154	159

EXTRAPOLATION

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

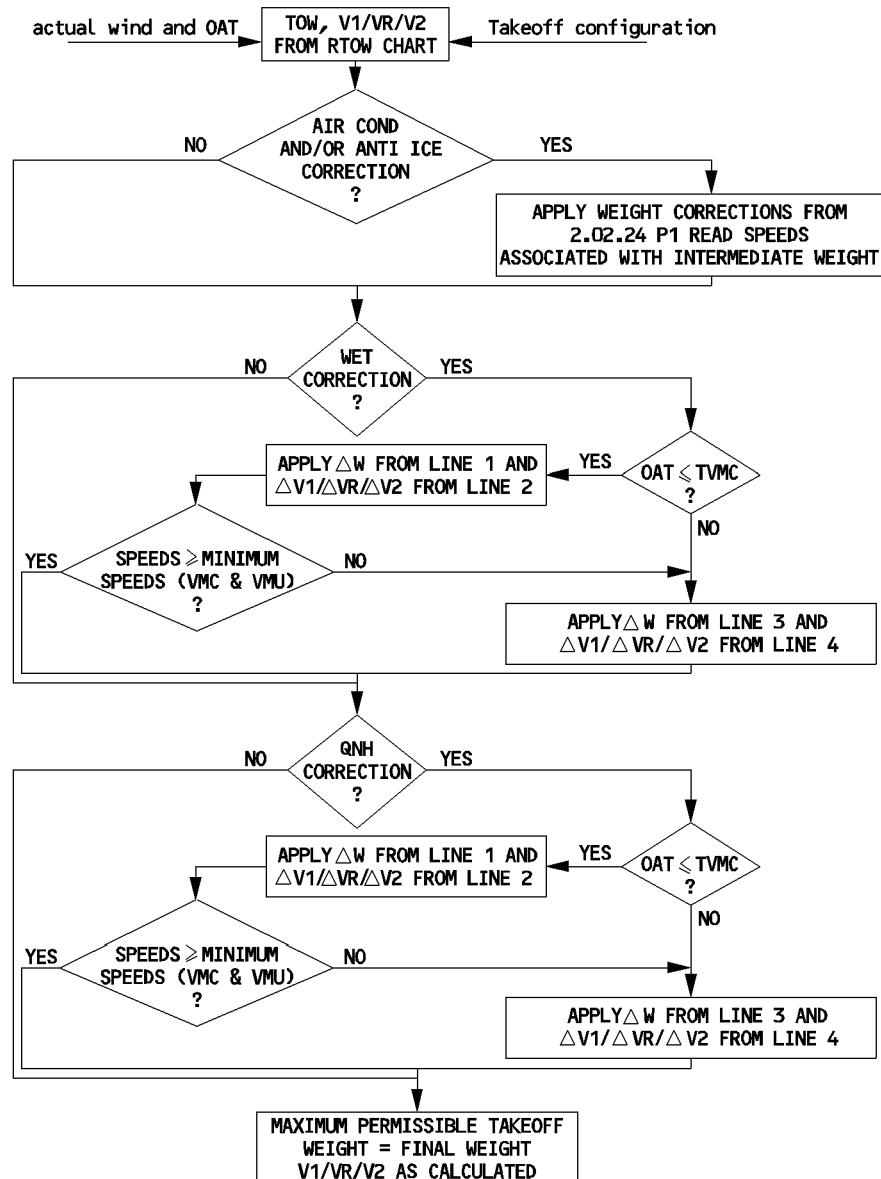
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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

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.

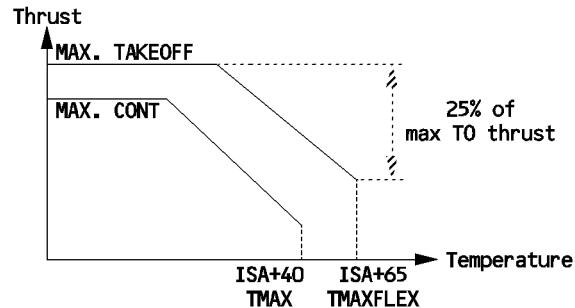
USE OF FLEXIBLE TAKEOFF

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 EPR cannot be lower than the Max climb EPR at the same flight conditions.

- R The FADEC takes the above two constraints into account to determine flexible EPR. The above two constraints also limit the maximum flexible temperature at ISA + 65 (80° C at sea level).
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
 - The flexible temperature cannot be lower than the flat rating temperature, TREF *, or the actual temperature (OAT).



NFC5-02-0214-001-A055AA

Note : * Tref being a function of the pressure-altitude, read it on the takeoff chart.

- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — 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.

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.

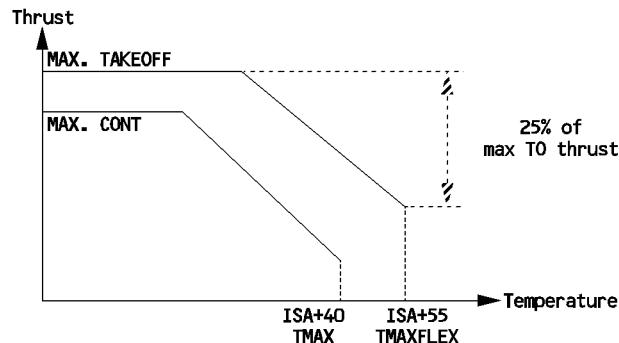
USE OF FLEXIBLE TAKEOFF

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 EPR cannot be lower than the Max Climb EPR at the same flight conditions.
- R The FADEC takes the above two constraints into account to determine flexible EPR. The above two constraints also limit the maximum flexible temperature at ISA + 55 (70°C at Sea Level).
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
 - The flexible temperature cannot be lower than the flat rating temperature, TREF*, or the actual temperature (OAT).

NFC5-02-02-14-001-A075AA



Note : * Tref being a function of the pressure altitude read it on the takeoff chart.

- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — Use CONF2/CONF3 	Improve comfort
	Badly paved runway or Accelerate stop distance limited runway	<ul style="list-style-type: none"> — Use CONF2/CONF3 or — Move towards left side of the takeoff chart 	Improve comfort Improve stopping distance
	Windshear expected along takeoff path	<ul style="list-style-type: none"> — Use maximum thrust 	Maintain acceleration capability
	Contaminated runway	<ul style="list-style-type: none"> — Use maximum thrust (flex forbidden) 	Improve stopping distance Decrease time on runway. Required by regulations.

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.

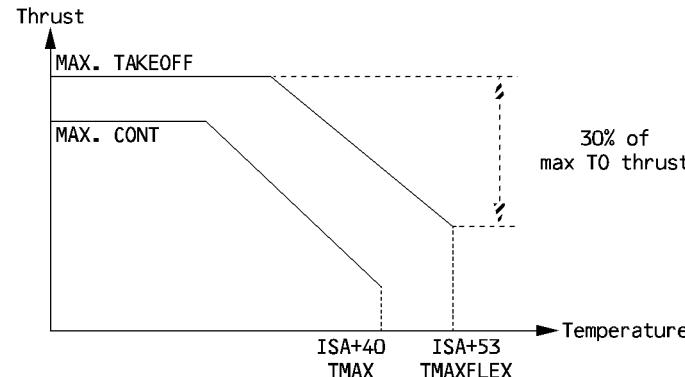
The use of flexible takeoff thrust saves engine life.

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 30 % 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 flexible N1. The above two constraints also limit the maximum flexible temperature at ISA + 53 (68° C at sea level).
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
 - The flexible temperature cannot be lower than the flat rating temperature, TREF (ISA + 15), or the actual temperature (OAT).



- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — 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 = 65 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF	2.02.14	P 4
	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ 060	REV 30

- Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are $V1 = 146 \text{ kt}$, $VR = 146 \text{ kt}$, $V2 = 148 \text{ kt}$
 Flexible temperature with air conditioning OFF 52° C
 R Air conditioning correction (FCOM 2.02.24 p 1) -3° C
 R Maximum flexible temperature 49° 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 P 6)

A description of this correction is given on 2.02.10 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 of 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 p 7)

- Note :
- QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, apply the wet influence first.

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 = 65 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

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 65 000 kg, CONF 1+F, 53° C
Flexible temperature
Enter the 10 kt head wind column and interpolate for 65 000 kg, CONF 2, 52° C
Flexible temperature

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF	2.02.14	P 4
	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ 078	REV 38

Retain CONF 1+F for takeoff configuration.

Takeoff speeds are $V1 = 145 \text{ kt}$, $VR = 146 \text{ kt}$, $V2 = 150 \text{ kt}$

Flexible temperature with air conditioning OFF 53° C

Air conditioning correction (FCOM 2.02.24 p 1) -10° C

Maximum flexible temperature 43° 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 P 6)

A description of this correction is given on 2.02.10 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 of 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 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, apply the wet influence first.*

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.

Note : If the RTOW chart is based on the CG being at 25 %, the crew can determine the flexible temperature at a more forward CG by decreasing the flexible temperature by 2°C. V1, VR and V2 must be increased by 1 knot.

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 2

DATA : Actual takeoff weight = 76 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

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 76 000 kg, CONF 1 + F, Flexible temperature52°C
 Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2, Flexible temperature52°C

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14 P 4	
		SEQ 270	REV 35

Retain CONF 2 for takeoff configuration as the speeds are lower.
 Takeoff speeds are $V1 = 150$ kt, $VR = 150$ kt, $V2 = 155$ kt
 Flexible temperature with air conditioning OFF 52° C
 Air conditioning correction (FCOM 2.02.24 p 1) -3° C
 Maximum flexible temperature 49° 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 P 6)

A description of this correction is given on 2.02.10 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 of 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 p 7)

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 p 6, apply the wet influence first.*

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.

Note : If the RTOW chart is based on the CG being at 25 %, the crew can determine the flexible temperature at a more forward CG by decreasing the flexible temperature by 2°C. V1, VR and V2 must be increased by 1 knot.

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 2

DATA : Actual takeoff weight = 76 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

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 76 000 kg, CONF 1 + F, Flexible temperature52°C
 Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2, Flexible temperature52°C

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	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ 275	REV 34

Retain CONF 2 for takeoff configuration.

Takeoff speeds are $V1 = 150 \text{ kt}$, $VR = 150 \text{ kt}$, $V2 = 155 \text{ kt}$

Flexible temperature with air conditioning OFF 52° C

Air conditioning correction (FCOM 2.02.24 p 1) -3° C

Maximum flexible temperature 49° 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 P 6)

A description of this correction is given on 2.02.10 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 of 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 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, 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 = 65 000 kg

Head wind = 10 kt

QNH = 1028 hPa

WET runway

Air conditioning OFF

- R Use the chart from 2.02.10 p 6. 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 65 000 kg, CONF 1+F,

Flexible temperature 52° C

Enter the 10 kt head wind column and interpolate for 65 000 kg, CONF 2,

Flexible temperature 51° C

Retain CONF 1+F as the flexible temperature is higher.

Takeoff speeds are V1 = 146 kt, VR = 146 kt, V2 = 148 kt

Apply WET correction

For flexible temperature < TVMC (54° C), ΔT_{flex} = – 0° C

Intermediate flex temperature 52° C

Associated speeds,

V1 = 146 kt – 4 = 142 kt

VR = 146 kt – 1 = 145 kt

V2 = 148 kt – 1 = 147 kt

- R Check V2 against VMU limitation on FCOM 2.02.25.

Apply QNH correction

For flex temperature < TVMC (54° C), ΔT_{flex} = 0° C

Maximum flexible temperature 52° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

Takeoff speeds are V1 = 142 kt, VR = 145 kt, V2 = 147 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	52	146	146	148
FCOM correction(s)				
Intermediate value	52	146	146	148
WET Correction	0	– 4	– 1	– 1
Intermediate value	52	142	145	147
QNH Correction	0	0	0	0
Final value	52	142	145	147

A318/A319/A320/A321 <small>FLIGHT CREW OPERATING MANUAL</small>	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 6
		SEQ 060	REV 30

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example 6

DATA : Actual takeoff weight = 65 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1028 hPa
 WET runway

Use the chart from 2.02.10 p 6. 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 65 000 kg, CONF 1+F, Flexible temperature 52° C
- Enter the 10 kt head wind column and interpolate for 65 000 kg, CONF 2, Flexible temperature 51° C
- Retain CONF 1+F for takeoff configuration.
Takeoff speeds are V1 = 146 kt, VR = 146 kt, V2 = 148 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 52° C
- R Air conditioning correction -3° C
- R Intermediate flexible temperature 49° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = 0° C
- R Intermediate flex temperature 49° C
Associated speeds,
V1 = 146 kt - 4 = 142 kt
VR = 146 kt - 1 = 145 kt
V2 = 148 kt - 1 = 147 kt
Check V2 against VMU limitation on FCOM 2.02.25.
- Apply QNH correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = 0° C
- R Maximum flexible temperature 49° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 142 kt, VR = 145 kt, V2 = 147 kt

- 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 = 65 000 kg

Head wind = 10 kt

QNH = 1028 hPa

WET runway

Air conditioning OFF

Use the chart from 2.02.10 p 6. 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 65 000 kg, CONF 1+F,

Flexible temperature 53° C

Enter the 10 kt head wind column and interpolate for 65 000 kg, CONF 2,

Flexible temperature 52° C

Retain CONF 1+F as the flexible temperature is higher.

Takeoff speeds are V1 = 145 kt, VR = 146 kt, V2 = 150 kt

Apply WET correction

For flexible temperature < TVMC (74° C), ΔT_{flex} = – 3° C

Intermediate flex temperature 50° C

Associated speeds,

V1 = 145 kt – 8 = 137 kt

VR = 146 kt – 0 = 146 kt

V2 = 150 kt – 0 = 150 kt

Check V2 against VMU limitation on FCOM 2.02.25.

Apply QNH correction

For flex temperature < TVMC (74° C), ΔT_{flex} = 0° C

Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

Takeoff speeds are V1 = 137 kt, VR = 146 kt, V2 = 150 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	53	145	146	150
FCOM correction(s)				
Intermediate value	53	145	146	150
WET Correction	– 3	– 8	0	0
Intermediate value	50	137	146	150
QNH Correction	0	0	0	0
Final value	50	137	146	150

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 6
		SEQ 078	REV 39

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example 6

DATA : Actual takeoff weight = 65 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1028 hPa
 WET runway

Use the chart from 2.02.10 p 6. 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 65 000 kg, CONF 1+F, Flexible temperature 53° C
- Enter the 10 kt head wind column and interpolate for 65 000 kg, CONF 2, Flexible temperature 52° C
- Retain CONF 1 + F for takeoff configuration.
Takeoff speeds are V1 = 145 kt, VR = 146 kt, V2 = 150 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 53° C
Air conditioning correction -10° C
Intermediate flexible temperature 43° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (74° C), ΔT_{flex} = -3° C
Intermediate flex temperature 40° C
Associated speeds,
V1 = 145 kt - 8 = 137 kt
VR = 146 kt - 0 = 146 kt
V2 = 150 kt - 0 = 150 kt
Check V2 against VMU limitation on FCOM 2.02.25.
- Apply QNH correction
For flexible temperature < TVMC (74° C), ΔT_{flex} = 0° C
Maximum flexible temperature 40° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 137 kt, VR = 146 kt, V2 = 150 kt

R

- 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 = 76 000 kg

Head wind = 10 kt

QNH = 1028 hPa

WET runway

Air conditioning OFF

Use the chart from 2.02.10 p 6. 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 76 000 kg, CONF 1+F,

Flexible temperature 52° C

Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2,

Flexible temperature 52° C

Equivalent performance is obtained from the two different configurations.

Retain CONF 2 as the speeds are lower.

Takeoff speeds are V1 = 150 kt, VR = 150 kt, V2 = 155 kt

Apply WET correction

R For flexible temperature < TVMC (54° C), ΔT_{flex} = – 2° C

R Intermediate flex temperature 50° C

Associated speeds,

R V1 = 150 kt – 10 = 140 kt

VR = 150 kt – 1 = 149 kt

V2 = 155 kt – 1 = 154 kt

R Check V2 against VMU limitation on FCOM 2.02.25.

Apply QNH correction

For flex temperature < TVMC (54° C), ΔT_{flex} = 0° C

R Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

R Takeoff speeds are V1 = 140 kt, VR = 149 kt, V2 = 154 kt

R

	Takeoff Configuration : 2			
	Tflex	V1	VR	V2
Chart temperature	52	150	150	155
FCOM correction(s)				
Intermediate value	52	150	150	155
WET Correction	– 2	– 10	– 1	– 1
Intermediate value	50	140	149	154
QNH Correction	0	0	0	0
Final value	50	150	149	154

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 6
		SEQ 270	REV 34

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example 6

DATA : Actual takeoff weight = 76 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1028 hPa
 WET runway

Use the chart from 2.02.10 p 6. 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 76 000 kg, CONF 1+F, Flexible temperature 52° C
- Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2, Flexible temperature 52° C
- Retain CONF 2 for takeoff configuration as the speeds are lower.
Takeoff speeds are V1 = 150 kt, VR = 150 kt, V2 = 155 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 52° C
Air conditioning correction -3° C
Intermediate flexible temperature 49° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = -1° C
Intermediate flex temperature 48° C
Associated speeds,
V1 = 150 kt - 5 = 145 kt
VR = 150 kt - 1 = 149 kt
V2 = 155 kt - 1 = 154 kt
Check V2 against VMU limitation on FCOM 2.02.25.
- Apply QNH correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = 0° C
Maximum flexible temperature 48° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 145 kt, VR = 149 kt, V2 = 154 kt

- 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 = 76 000 kg

Head wind = 10 kt

QNH = 1028 hPa

WET runway

Air conditioning OFF

Use the chart from 2.02.10 p 6. 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 76 000 kg, CONF 1+F,

Flexible temperature 52° C

Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2,

Flexible temperature 52° C

Equivalent performance is obtained from the two different configurations.

Retain CONF 2 as the speeds are lower.

Takeoff speeds are V1 = 150 kt, VR = 150 kt, V2 = 155 kt

Apply WET correction

R For flexible temperature < TVMC (54° C), ΔT_{flex} = – 2° C

R Intermediate flex temperature 50° C

Associated speeds,

R V1 = 150 kt – 10 = 140 kt

VR = 150 kt – 1 = 149 kt

V2 = 155 kt – 1 = 154 kt

R Check V2 against VMU limitation on FCOM 2.02.25.

Apply QNH correction

For flex temperature < TVMC (54° C), ΔT_{flex} = 0° C

R Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

R Takeoff speeds are V1 = 140 kt, VR = 149 kt, V2 = 154 kt

R

	Takeoff Configuration : 2			
	Tflex	V1	VR	V2
Chart temperature	52	150	150	155
FCOM correction(s)				
Intermediate value	52	150	150	155
WET Correction	– 2	– 10	– 1	– 1
Intermediate value	50	140	149	154
QNH Correction	0	0	0	0
Final value	50	150	149	154

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF	2.02.14	P 6
	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ 275	REV 34

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example 6

DATA : Actual takeoff weight = 76 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1028 hPa
 WET runway

Use the chart from 2.02.10 p 6. 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 76 000 kg, CONF 1+F, Flexible temperature 52° C
- Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2, Flexible temperature 52° C
- Retain CONF 2 for takeoff configuration.
Takeoff speeds are V1 = 150 kt, VR = 150 kt, V2 = 155 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 52° C
Air conditioning correction -3° C
Intermediate flexible temperature 49° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = -1
Intermediate flex temperature 48° C
Associated speeds,
V1 = 150 kt - 5 = 145 kt
VR = 150 kt - 1 = 149 kt
V2 = 155 kt - 1 = 154 kt
Check V2 against VMU limitation on FCOM 2.02.25.
- Apply QNH correction
For flexible temperature < TVMC (54° C), ΔT_{flex} = 0° C
Maximum flexible temperature 48° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 145 kt, VR = 149 kt, V2 = 154 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	52	146	146	148
FCOM correction(s)	- 3	0	0	0
Intermediate value	49	146	146	148
WET Correction	0	- 4	- 1	- 1
Intermediate value	49	142	145	147
QNH Correction	0	0	0	0
Final value	49	142	145	147

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;

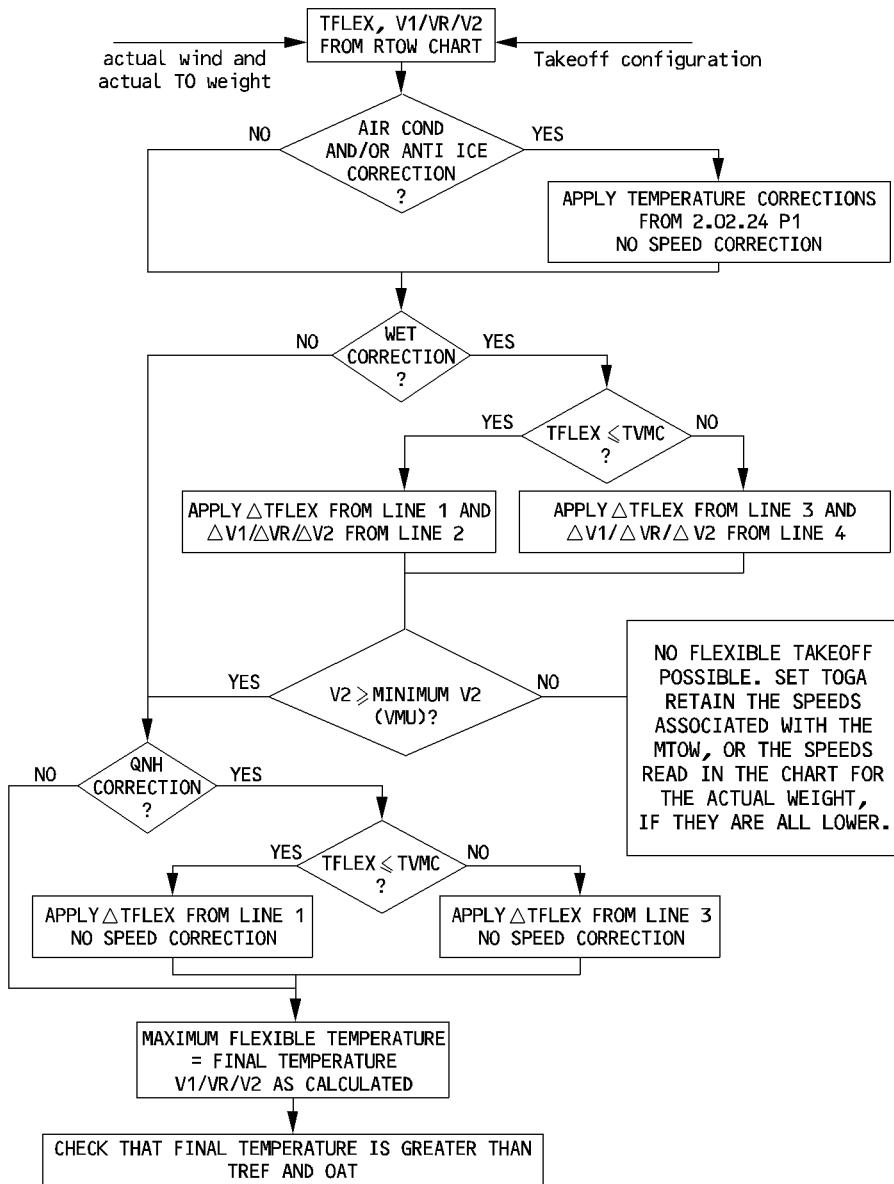
R OR

- R – 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



R

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	53	145	146	150
FCOM correction(s)	- 10	0	0	0
Intermediate value	43	145	146	150
WET Correction	- 3	- 8	0	0
Intermediate value	40	137	146	150
QNH Correction	0	0	0	0
Final value	40	137	146	150

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;

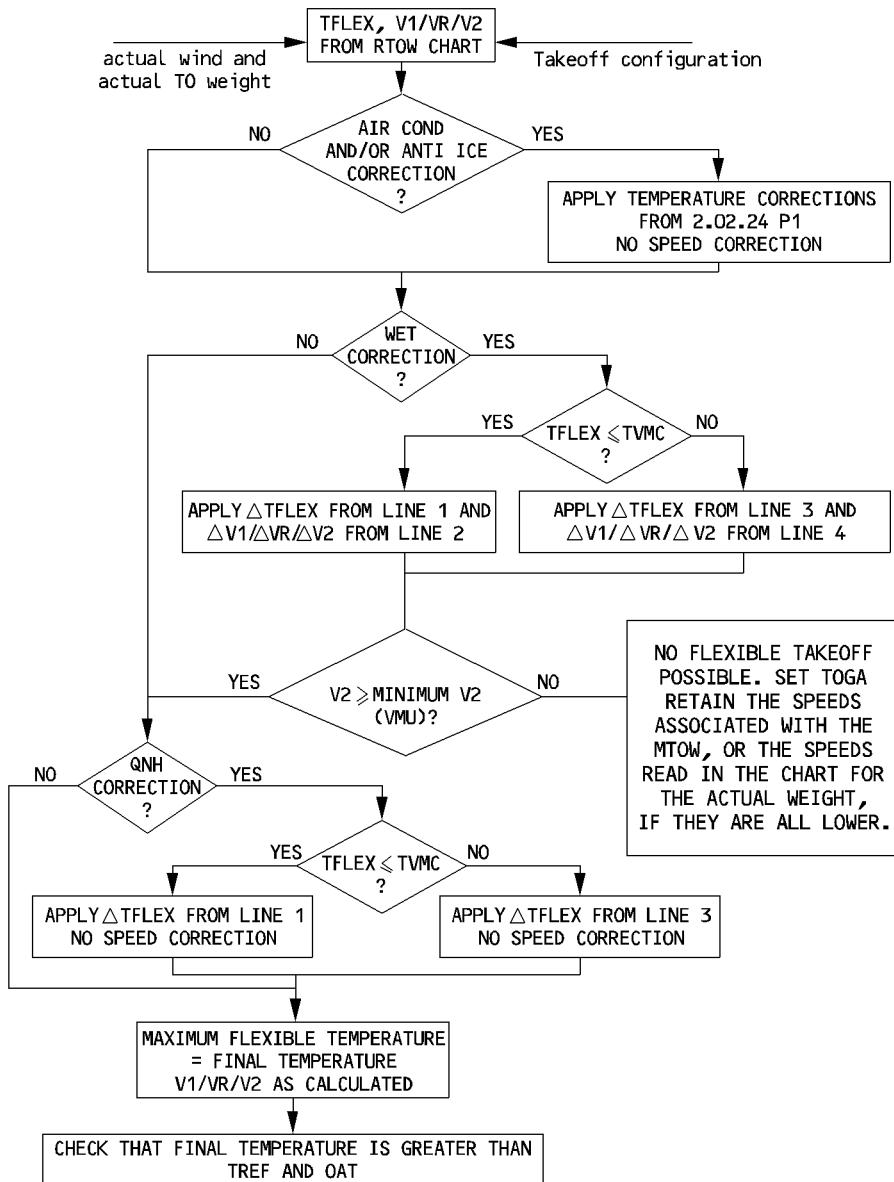
OR

- 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 Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	52	150	150	155
FCOM correction(s)	- 3	0	0	0
Intermediate value	49	150	150	155
WET Correction	0	- 5	- 1	- 1
Intermediate value	49	145	149	154
QNH Correction	0	0	0	0
Final value	49	145	149	154

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;

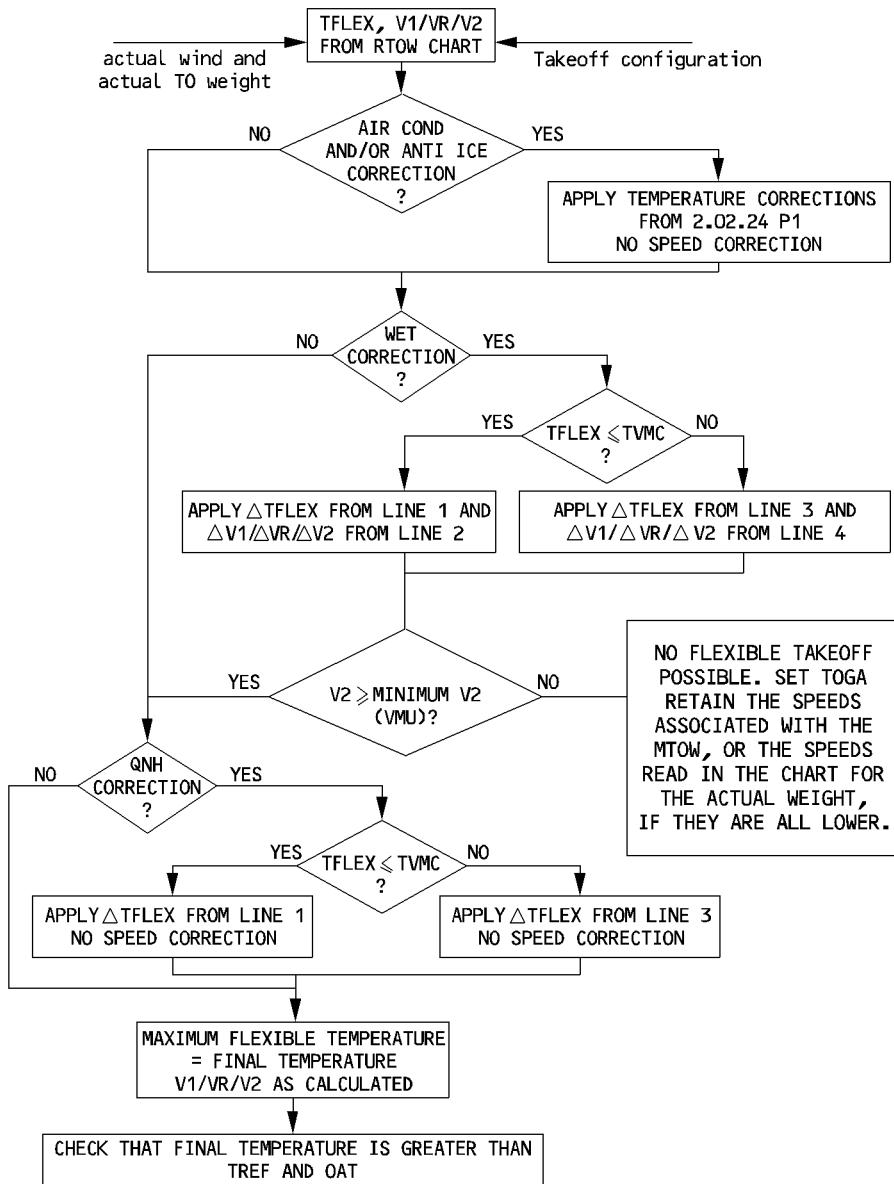
OR

- 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 Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	52	150	150	155
FCOM correction(s)	- 3	0	0	0
Intermediate value	49	150	150	155
WET Correction	0	- 5	- 1	- 1
Intermediate value	49	145	149	154
QNH Correction	0	0	0	0
Final value	49	145	149	154

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;

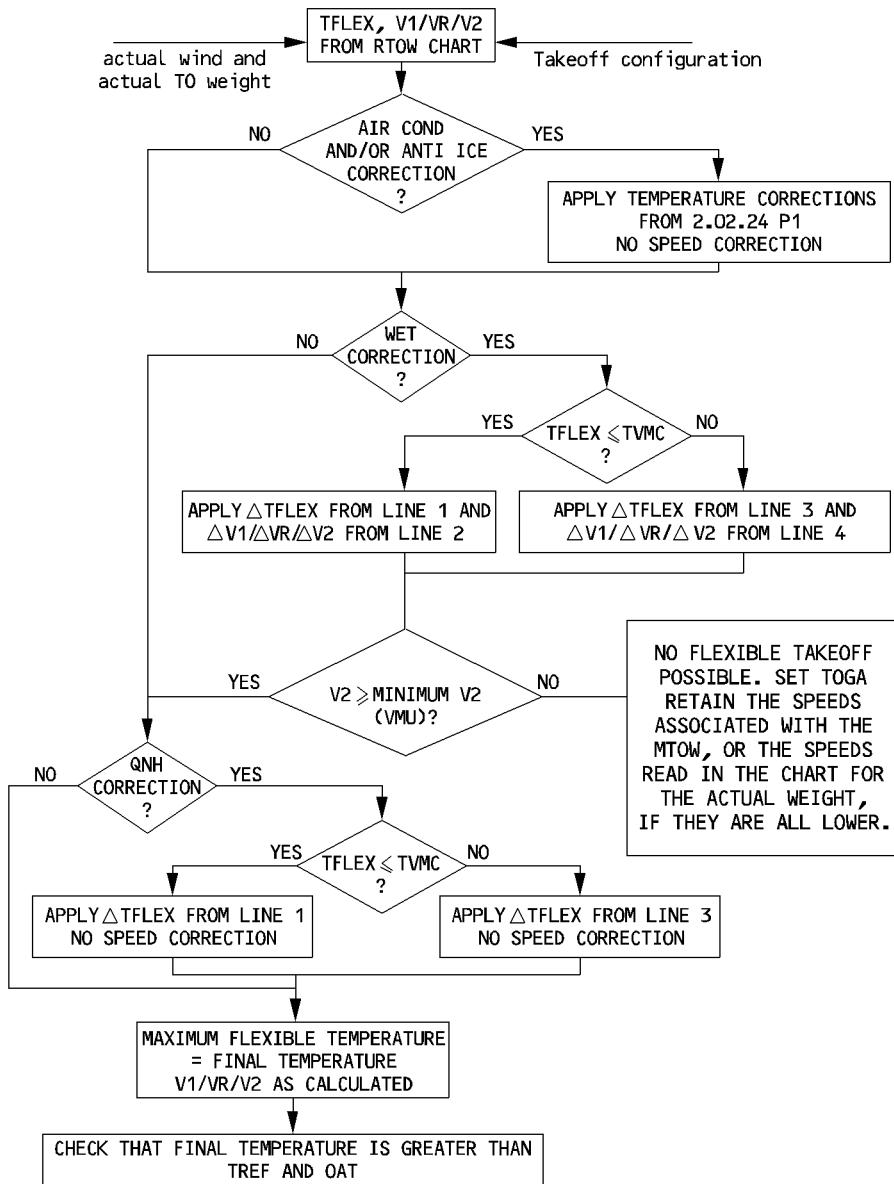
OR

- 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

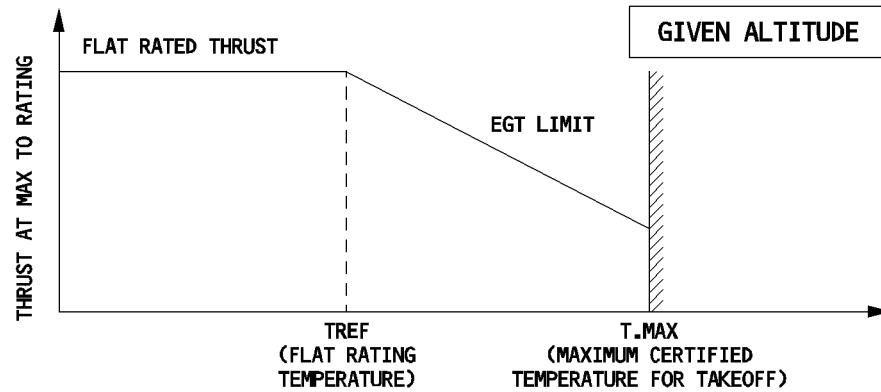


TAKEOFF PERFORMANCE

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).

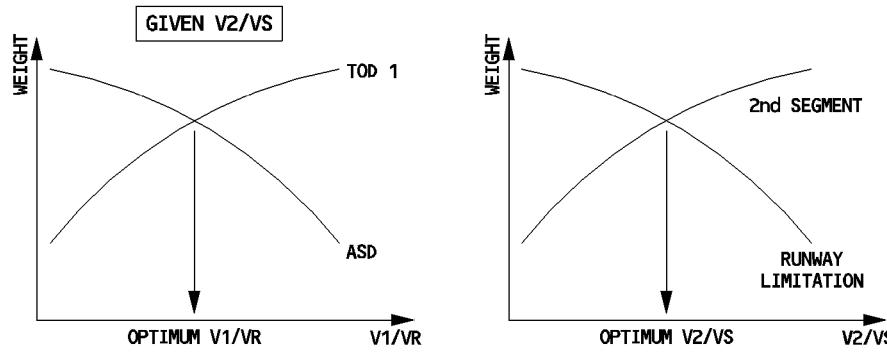
The takeoff thrust produced by the engine varies as follows :

NFC5-02-0216-001-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 charts below.

NFC5-02-0216-001-B001AA



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

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.

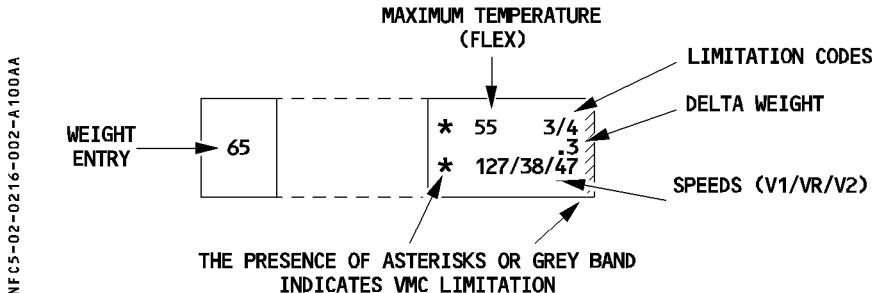
TAKEOFF CHART DESCRIPTION

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.

- R The chart is given for 2 different configurations and 4 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 :



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

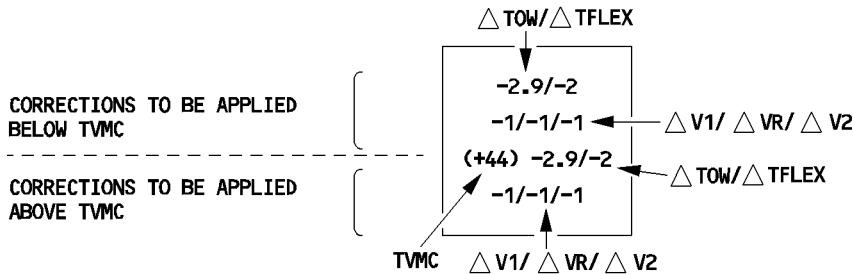
Each takeoff chart is computed for a given set of conditions (air conditioning, QNH, anti ice...) specified at the top of the chart. If the actual takeoff conditions are different, the crew must apply corrections. Two types of corrections are available :

- 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 :

NFC5-02-0216-003-A100AA



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 the takeoff chart.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF GENERAL (WEIGHT ENTRY)	2.02.16	P 4
		SEQ 100	REV 25

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).

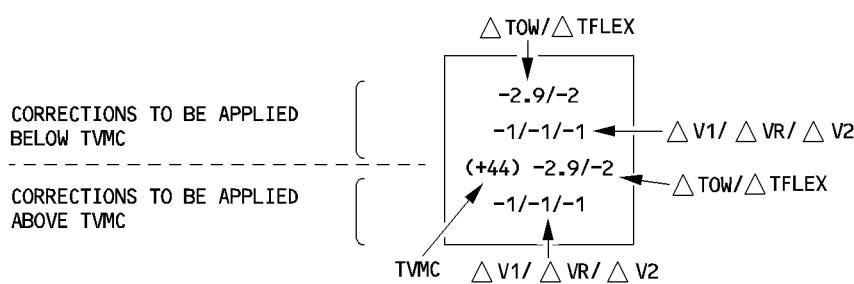
Note : If the RTOW chart is based on the CG being at 25 %, the crew can find the takeoff performance at a more forward CG by decreasing the takeoff weight by 1000 kg (2200 lb) and increasing V_1 , VR and V_2 by 1 knot.

R DESCRIPTION OF THE CORRECTIONS ON TAKEOFF CHART

R The corrections are presented on 4 lines :

R

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R 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.

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

R MINIMUM SPEED

R Minimum $V_1/VR/V_2$ 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 $V_1/VR/V_2$ displayed on

R the takeoff chart.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF GENERAL (WEIGHT ENTRY)	2.02.16	P 4
		SEQ 100	REV 25

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.

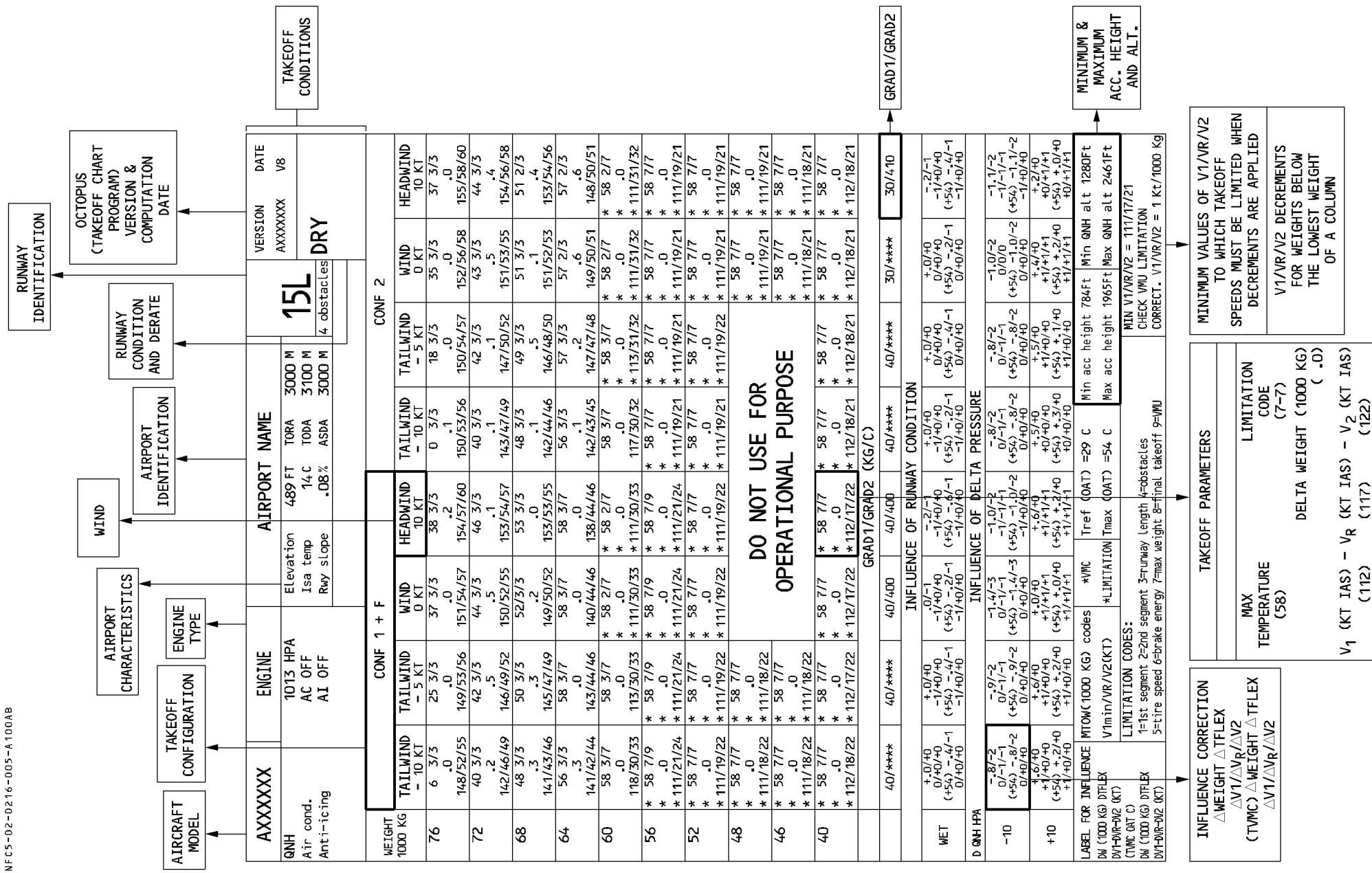
TAKEOFF ON A WET RUNWAY

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.

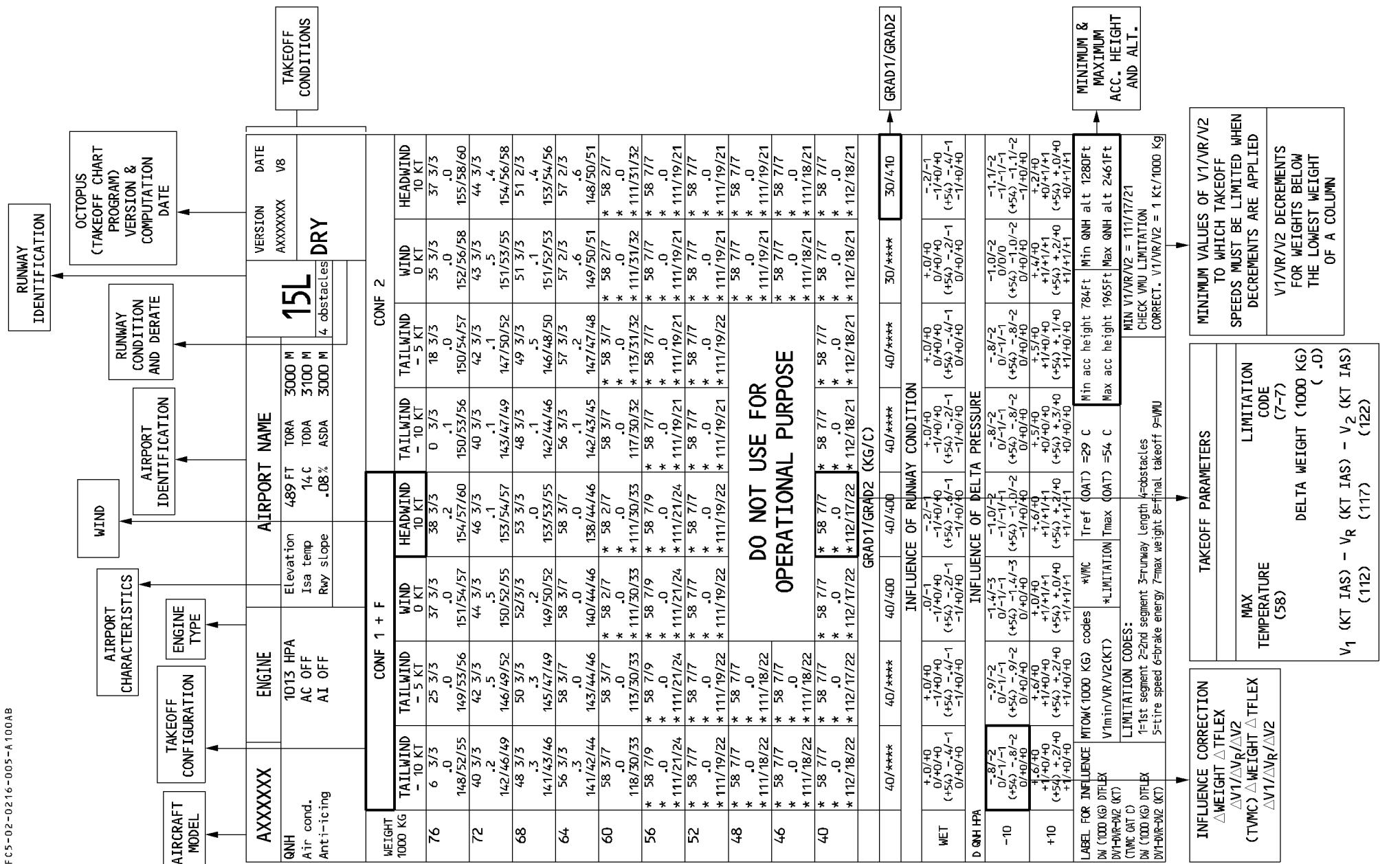
Note : The crew need not compare the charts if the top of the wet runway chart specifies "DRY CHECK". (The comparison has already been inserted in the WET runway calculation).

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	GENERAL (WEIGHT ENTRY)	SEQ 105	REV 25



A318/A319/A320/A321	TAKEOFF	2.02.16	P 6
	GENERAL (WEIGHT ENTRY)	SEQ 201	REV 36

FLIGHT CREW OPERATING MANUAL

GENERAL (WEIGHT ENTRY)

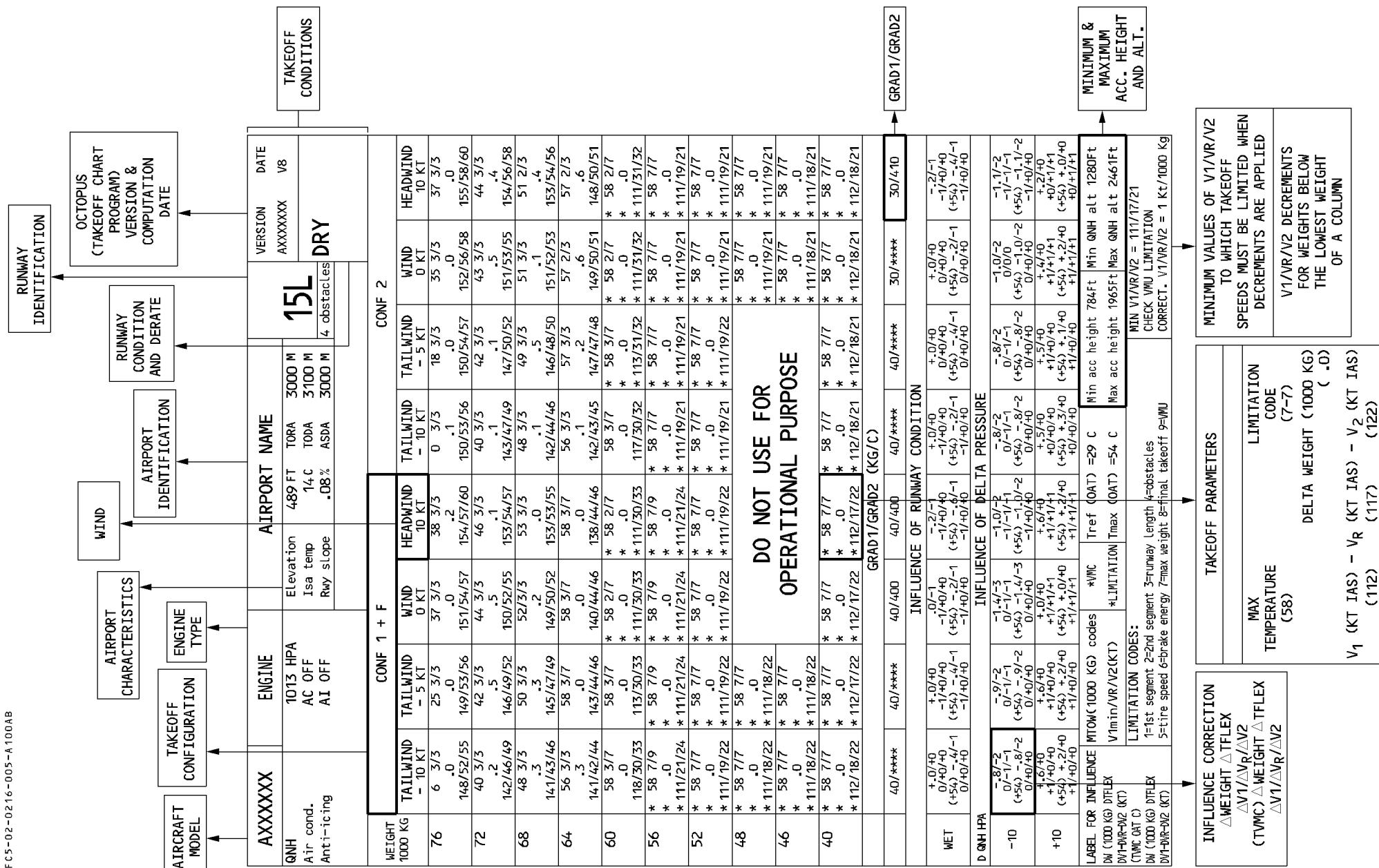
2.02.16 P 6

P 6

SEQ 201 REV 36

REV 36

R



R

A320XXX				ENGINES		AIRPORT NAME				15L	VERSION DATE AXXXXXXX **V20
QNH	1013.25 HPA			Elevation	489 FT	TO/R	3000 M				
Air cond.	AC OFF			lسا temp	14 C	TODA	3100 M				
Anti-icing	AI OFF			rwy slope	.08 %	ASDA	3000 M			4 obstacles	
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			
80	-18 4/6 0.0 155/56/58	9 4/6 0.0 154/57/59	37 4/6 0.0 153/55/57	45 4/6 0.6 155/56/58	-15 4/6 0.0 153/53/58	12 4/6 0.0 151/52/57	40 4/6 0.1 150/51/56	46 3/4 0.3 152/53/58			
76	44 4/6 0.1 141/49/51	48 4/6 0.2 148/50/52	51 3/4 0.4 153/53/55	52 2/4 0.3 152/52/53	44 4/6 0.3 140/45/49	48 4/6 0.4 146/47/51	51 3/4 0.4 150/50/54	52 2/4 0.4 150/50/55			
72	53 4/6 0.3 145/46/48	56 3/4 0.2 148/48/50	59 3/4 0.0 152/52/53	60 3/4 0.4 154/54/55	53 3/4 0.4 142/43/47	56 3/4 0.2 146/46/50	58 3/4 0.5 149/49/53	60 3/4 0.3 151/51/55			
68	61 3/4 0.3 144/44/45	63 3/4 0.5 148/48/49	65 3/4 0.6 151/51/52	67 3/4 0.3 153/53/54	61 3/4 0.3 142/42/45	63 3/4 0.5 145/45/48	65 3/4 0.4 148/48/52	66 4/4 0.6 149/49/53			
64	68 3/4 0.5 143/43/44	69 3/4 1.1 147/47/48	69 3/4 2.2 151/51/52	69 3/4 3.0 153/53/54	68 3/4 0.6 141/41/44	69 3/4 1.0 144/44/47	69 4/4 2.0 147/47/50	69 4/4 2.7 147/47/50			
60	69 3/4 4.0 143/43/44	* 69 7/9 * 0.0 * 114/32/33	* 69 7/9 * 0.0 * 114/32/33	* 69 7/9 * 0.0 * 114/32/33	* 69 7/9 * 0.0 * 114/32/33	* 69 7/9 * 0.0 * 114/32/33	* 69 7/9 * 0.0 * 112/26/29				
56	* 69 7/9 * 0.0 * 114/27/29	* 69 7/9 * 0.0 * 114/27/29	DO NOT USE FOR OPERATIONAL PURPOSE				* 69 7/9 * 0.0 * 112/21/24	* 69 7/9 * 0.0 * 112/21/24	* 69 7/9 * 0.0 * 112/19/22	* 69 7/9 * 0.0 * 112/19/22	
52	* 69 7/9 * 0.0 * 114/22/24	* 69 7/9 * 0.0 * 114/22/24	DO NOT USE FOR OPERATIONAL PURPOSE				* 69 7/7 * 0.0 * 112/19/22				
48	* 69 7/7 * 0.0 * 115/20/22	* 69 7/7 * 0.0 * 115/20/22	* 69 7/7 * 0.0 * 115/20/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	* 69 7/7 * 0.0 * 113/18/22	
GRAD1/GRAD2 (KG/C)											
50/****	50/****	60/****	60/ 460	50/****	50/****	60/****	50/ 470				
INFLUENCE OF RUNWAY CONDITION											
WET	-1.4/-3 -11/-1/-1 (+69)-1.4/-3 -11/ 0/ 0	-1.1/-3 -10/-1/-1 (+69)-1.1/-3 -10/ 0/ 0	-0.7/-2 -9/-2/-2 (+69)-0.7/-2 -9/ 0/ 0	-0.7/-2 -8/-2/-2 (+69)-0.7/-2 -8/ 0/ 0	-1.3/-3 -10/ 0/ 0 (+69)-1.3/-3 -10/ 0/ 0	-1.3/-3 -9/-4/-4 (+69)-1.3/-3 -9/ 0/ 0	-0.4/-1 -7/-2/-2 (+69)-0.4/-1 -7/ 0/ 0	-0.2/-1 -5/ 0/ 0 (+69)-0.2/-1 -5/ 0/ 0			
D QNH HPA	INFLUENCE OF DELTA PRESSURE										
-10.0	-0.8/-2 0/ 0/-1 (+61)-0.8/-2 0/ 0/ 0	-1.2/-3 0/ 0/-1 (+61)-1.2/-3 0/ 0/ 0	-0.7/-2 -1/-1/-1 (+61)-0.7/-2 -1/ 0/ 0	-0.7/-2 -1/-1/-1 (+61)-0.7/-2 -1/ 0/ 0	-0.7/-2 -10/ 0/ 0 (+69)-1.3/-3 -10/ 0/ 0	-0.7/-2 -9/-4/-4 (+69)-1.3/-3 -9/ 0/ 0	-0.7/-2 -7/-2/-2 (+61)-0.7/-2 -7/ 0/ 0	-0.7/-2 -5/ 0/ 0 (+69)-0.2/-1 -5/ 0/ 0	-0.7/-2 -0/ 0/-1 (+61)-0.7/-2 -0/ 0/ 0	-0.7/-2 -0/ 0/-1 (+61)-0.7/-2 -0/ 0/ 0	
+10.0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	0.0/ 0 0/ 0/ 0 (+69) 0.0/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+69)+0.2/ 0 0/ 0/ 0
LABEL FOR INFLUENCE		OAT C DW CODES			* VM	Tref (OAT) = 44 C	Min acc height 515 FT			Min QNH alt 1004 FT	
DW (1000 KG) DTFLEX		V1min/VR/V2 (kt)			* LIMITATION	Tmax (OAT) = 54 C	Max acc height 1934 FT			Max QNH alt 2423 FT	
DV1-DVR-DV2 (KT)		LIMITATION CODES					Min V1/VR/V2 = 115/20/22			CHECK VMU LIMITATION	
(VMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles					Correct. V1/VR/V2 = 1.0 KT/1000 KG				
DW (1000 KG) DTFLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU									
DV1-DVR-DV2 (KT)											

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.

- R In some 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.

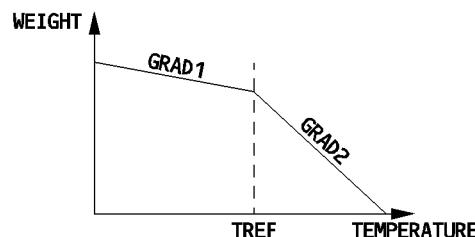
Correction to weight

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 2
		SEQ 100	REV 25

- 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 38°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.
 Max TO weight (1000 kg) air conditioning OFF = $76.2 + 0.4 \times 2 + 0.04 \times 11 = 77.4$
 Enter the 10 kt head wind column CONF 2, to read for 25°C
 The lowest temperature of the column is 37°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.

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.

- R In some 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.

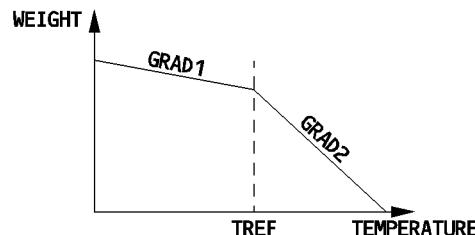
Correction to weight

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF	2.02.18	P 2
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 200	REV 34

- 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

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 41°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.

Max TO weight (1000 kg) air conditioning OFF = $70.1 + 0.04 \times 16 = 70.7$

Enter the 10 kt head wind column CONF 2, to read for 25°C

The lowest temperature of the column is 33°C, use Grad 1/Grad 2 to extrapolate the maximum takeoff weight.

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.

- R In some 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.

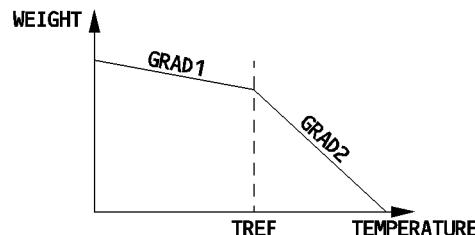
Correction to weight

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF	2.02.18	P 2
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 270	REV 34

- 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.

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

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

- R 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.

- R 1. For the given wind and temperature conditions, determine the maximum takeoff weight (choose the configuration giving the highest weight).
- R 2. Apply the published weight correction(s) to the maximum takeoff weight (for each correction) to determine the maximum permissible takeoff weight.
- R 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

Use the chart from 2.02.16 p 6.

- R Enter the 10 kt head wind column CONF 1+F, to read for 25°C
- R The lowest temperature of the column is 45°C, use Grad 1/Grad 2 to extrapolate the R maximum takeoff weight.
- R Max TO weight (1000 kg) air conditioning OFF = $80.6 + 0.46 \times 1 + 0.06 \times 19 = 82.2$
- R Enter the 10 kt head wind column CONF 2, to read for 25°C
- R The lowest temperature of the column is 46°C, use Grad 1/Grad 2 to extrapolate the R maximum takeoff weight.

Max TO weight (1000 kg) air conditioning OFF = $76.0 + 0.41 \times 1 + 0.03 \times 11 = 76.7$
 Retain CONF 1+F as takeoff configuration.

- Maximum TO weight (1000 kg) air conditioning OFF 77.4
- R Air conditioning correction (FCOM 2.02.24 p1) -2.0
- R Maximum permissible TO weight (1000 kg) air conditioning ON 75.4
- R Determine takeoff speeds for 75.4 (1000kg) in the 10 kt head wind column (CONF1+F)
 V1 = 154 kt, VR = 157 kt, V2 = 160 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 on 2.02.16 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 B

DATA : OAT = 40°C
 Head wind = 10 kt
 QNH = 998 hPa
 WET runway

Use the chart from 2.02.16 p 6.

- Enter the 10 kt head wind column CONF 1+F, to read for 40°C
 max TO weight (1000 kg) 75.2
- Enter the 10 kt head wind column CONF 2, to read for 40°C
 max TO weight (1000 kg) 74.4
- Retain CONF 1+F for takeoff
- Read associated speeds as V1 = 154 kt, VR = 157 kt, V2 = 160 kt
- Apply WET correction

R For OAT < TVMC (58°C), $\Delta W = -0.3$
 Intermediate weight (1000 kg) 74.9

Associated speeds,

V1 = 154 kt - 6 = 148 kt

VR = 157 kt - 0 = 157 kt

V2 = 160 kt - 0 = 160 kt

(No speed check required for first correction)

- Apply QNH correction

R For OAT < TVMC (54°C), $\Delta W = -0.5 \times 15/10 = -0.8$
 Maximum permissible takeoff weight (1000 kg) 74.1

Associated speeds,

V1 = 148 kt - 1 × 15/10 = 146 kt

VR = 157 kt - 1 × 15/10 = 156 kt

V2 = 160 kt - 1 × 15/10 = 159 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)	75.2	154	157	160
FCOM correction(s)				
Intermediate value	75.2	154	157	160
WET Correction	- 0.3	- 6	0	0
Intermediate value	74.9	148	157	160
QNH Correction	- 0.8	- 2	- 1	- 1
Final value	74.1	146	156	159

Max TO weight (1000 kg) air conditioning OFF = $70.0 + 0.03 \times 16 = 70.4$

Retain CONF 1+F as takeoff configuration.

Maximum TO weight (1000 kg) air conditioning OFF 70.7

Air conditioning correction (FCOM 2.02.24 p1) - 4.7

Maximum permissible TO weight (1000 kg) air conditioning ON 66.0

Determine takeoff speeds for 66.0 (1000kg) in the 10 kt head wind column (CONF1+F)

V1 = 146 kt, VR = 147 kt, V2 = 151 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 on 2.02.16 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.

A318/A319/A320/A321	TAKEOFF	2.02.18	P 4
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 200	REV 34

Example B

DATA : OAT = 45°C
Head wind = 10 kt
QNH = 998 hPa
WET runway

Use the chart from 2.

Enter the 10 kt head wind cell.

- Enter the 10 kt head wind column CONF 1+F, to read for 45°C
max TO weight (1000 kg) 68.9
 - Enter the 10 kt head wind column CONF 2, to read for 45°C
max TO weight (1000 kg) 68.6
 - Retain CONF 1+F for takeoff
 - Read associated speeds as $V1 = 148$ kt, $VR = 149$ kt, $V2 = 153$ kt
 - Apply WET correction
For OAT < TVMC (74°C), $\Delta W =$ - 1.1
Intermediate weight (1000 kg) 67.8
Associated speeds,
 $V1 = 148$ kt - 6 = 142 kt
 $VR = 149$ kt - 0 = 149 kt
 $V2 = 153$ kt - 0 = 153 kt
(No speed check required for first correction)
 - Apply QNH correction
For OAT < TVMC (59°C), $\Delta W = - 0.6 \times 15/10 =$ - 0.9
Maximum permissible takeoff weight (1000 kg) 66.9
Associated speeds,
 $V1 = 142$ kt - $1 \times 15/10 = 140$ kt
 $VR = 149$ kt - $1 \times 15/10 = 148$ kt
 $V2 = 153$ kt - $1 \times 15/10 = 152$ 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)	68.9	148	149	153
FCOM correction(s)				
Intermediate value	68.9	148	149	153
WET Correction	- 1.1	- 6	0	0
Intermediate value	67.8	142	149	153
QNH Correction	- 0.9	- 2	- 1	- 1
Final value	66.9	140	148	152

Max TO weight (1000 kg) air conditioning OFF = $80.3 + 0.47 \times 2 + 0.05 \times 19 = 82.2$
 Retain CONF 1+F as takeoff configuration.

Maximum TO weight (1000 kg) air conditioning OFF 82.2

Air conditioning correction (FCOM 2.02.24 p1) -1.8

Maximum permissible TO weight (1000 kg) air conditioning ON 80.4

Determine takeoff speeds for 80.4 (1000kg) in the 10 kt head wind column (CONF1+F)

V1 = 155 kt, VR = 156 kt, V2 = 158 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 on 2.02.16 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.

A318/A319/A320/A321	TAKEOFF	2.02.18	P 4
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 270	REV 37

Example B

DATA : OAT = 45°C
Head wind = 10 kt
QNH = 998 hPa
WET runway

Use the chart from 2.

Enter the 10 kt head wind cell.

- Enter the 10 kt head wind column CONF 1+F, to read for 45°C
max TO weight (1000 kg) 80.6
 - Enter the 10 kt head wind column CONF 2, to read for 45°C
max TO weight (1000 kg) 80.3
 - Retain CONF 1+F for takeoff
 - Read associated speeds as $V1 = 155$ kt, $VR = 156$ kt, $V2 = 158$ kt
 - Apply WET correction
For OAT < TVMC (69°C), $\Delta W =$ -0.7
 - Intermediate weight (1000 kg) 79.9
 - Associated speeds,
 $V1 = 155$ kt - 8 = 147 kt
 $VR = 156$ kt - 2 = 154 kt
 $V2 = 158$ kt - 2 = 156 kt
(No speed check required for first correction)
 - Apply QNH correction
For OAT < TVMC (61°C), $\Delta W = -0.7 \times 15/10 =$ -1
 - Maximum permissible takeoff weight (1000 kg) 78.9
 - Associated speeds,
 $V1 = 147$ kt - $1 \times 15/10 = 145$ kt
 $VR = 154$ kt - $1 \times 15/10 = 153$ kt
 $V2 = 156$ kt - $1 \times 15/10 = 155$ 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)	80.6	155	156	158
FCOM correction(s)				
Intermediate value	80.6	155	156	158
WET Correction	- 0.7	- 8	- 2	- 2
Intermediate value	79.9	147	154	156
QNH Correction	- 1	- 2	- 1	- 1
Final value	78.9	145	153	155

Max TO weight (1000 kg) air conditioning OFF = $80.3 + 0.47 \times 2 + 0.05 \times 19 = 82.2$
 Retain CONF 1+F as takeoff configuration.

Maximum TO weight (1000 kg) air conditioning OFF 82.2

Air conditioning correction (FCOM 2.02.24 p1) -1.8

Maximum permissible TO weight (1000 kg) air conditioning ON 80.4

Determine takeoff speeds for 80.4 (1000kg) in the 10 kt head wind column (CONF1+F)

V1 = 155 kt, VR = 156 kt, V2 = 158 kt

CORRECTIONS FOR WET OR CONTAMINATED RUNWAYS FROM FCOM 2.04.10

(Refer to FCOM 2.04.10)

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 p 3. 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ corrections from line 2.

Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 ΔW correction from line 1 and $\Delta V1/\Delta VR/\Delta V2$ 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 (line 3) or if the above speed check is not fulfilled, apply ΔW correction from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 on 2.02.16 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.

A318/A319/A320/A321	TAKEOFF	2.02.18	P 4
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 270	REV 37

Example B

DATA : OAT = 45°C
Head wind = 10 kt
QNH = 998 hPa
WET runway

Use the chart from 2

Enter the 10 kt head wind column.

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	80.6	155	156	158
FCOM correction(s)				
Intermediate value	80.6	155	156	158
WET Correction	- 0.7	- 8	- 2	- 2
Intermediate value	79.9	147	154	156
QNH Correction	- 1	- 2	- 1	- 1
Final value	78.9	145	153	155

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 :

- R Max permissible takeoff weight = 74.3 (1000 kg)
V1 = 146 kt, VR = 156 kt, V2 = 159 kt.

R

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	77.4			
FCOM correction(s)	- 2.0			
Intermediate value	75.4	154	157	160
WET Correction	- 0.3	- 6	0	0
Intermediate value	75.1	148	157	160
QNH Correction	- 0.8	- 2	- 1	- 1
Final value	74.3	146	156	159

EXTRAPOLATION

For OAT lower than the lowest temperature value of 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.

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

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 = $70.1 + 0.04 \times 16 = 70.7$

Enter the 10 kt head wind column CONF 2, to read for 25°C

Max TO weight (1000 kg) air conditioning OFF = $70.0 + 0.03 \times 16 = 70.4$

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 70.7

Air conditioning correction - 4.7

Intermediate weight 66.0

Interpolate takeoff speeds for 66.0 (1000 kg) in the 10 kt head wind column,

V1 = 146 kt, VR = 147 kt, V2 = 151 kt

3. Apply WET correction

For OAT < TVMC (74°C), $\Delta W = - 1.1$

Intermediate weight 64.9

Associated speeds,

V1 = 146 kt - 6 = 140 kt

VR = 147 kt - 0 = 147 kt

V2 = 151 kt - 0 = 151 kt

Apply QNH correction

For OAT < TVMC (59°C), $\Delta W = - 0.6 \times 15/10 = - 0.9$

Maximum permissible takeoff weight 64.0

Associated speed,

V1 = 140 kt - 1 \times 15/10 = 138 kt

VR = 147 kt - 1 \times 15/10 = 146 kt

V2 = 151 kt - 1 \times 15/10 = 150 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 :

Max permissible takeoff weight = 64.0 (1000 kg)

V1 = 138 kt, VR = 146 kt, V2 = 150 kt.

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	70.7			
FCOM correction(s)	- 4.7			
Intermediate value	66.0	146	147	151
WET Correction	- 1.1	- 6	0	0
Intermediate value	64.9	140	147	151
QNH Correction	- 0.9	- 2	- 1	- 1
Final value	64.0	138	146	150

EXTRAPOLATION

For OAT lower than the lowest temperature value of 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.

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 :

Max permissible takeoff weight = 78.7 (1000 kg)

V1 = 145 kt, VR = 153 kt, V2 = 155 kt.

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	82.2			
FCOM correction(s)	- 1.8			
Intermediate value	80.4	155	156	158
WET Correction	- 0.7	- 9	- 2	- 2
Intermediate value	79.7	147	154	156
QNH Correction	- 1	- 2	- 1	- 1
Final value	78.7	145	153	155

EXTRAPOLATION

For OAT lower than the lowest temperature value of 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.

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 :

Max permissible takeoff weight = 78.7 (1000 kg)

V1 = 145 kt, VR = 153 kt, V2 = 155 kt.

	Takeoff Configuration : 1+F			
	TOW	V1	VR	V2
TOW (RTOW)	82.2			
FCOM correction(s)	- 1.8			
Intermediate value	80.4	155	156	158
WET Correction	- 0.7	- 8	- 2	- 2
Intermediate value	79.7	147	154	156
QNH Correction	- 1	- 2	- 1	- 1
Final value	78.7	145	153	155

EXTRAPOLATION

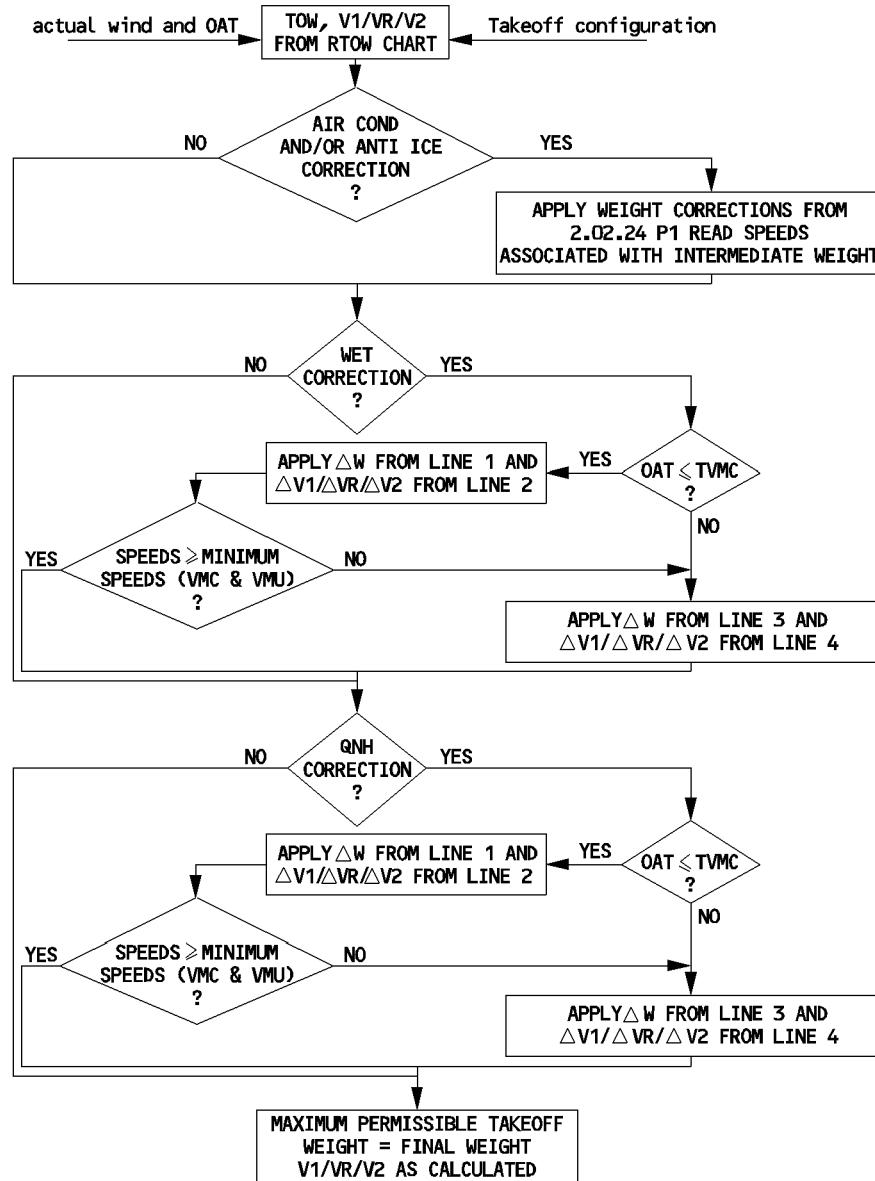
For OAT lower than the lowest temperature value of a wind column, it is possible to obtain a higher maximum permissible takeoff weight by using Grad 1/Grad 2 values. See page 1 for more details.

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

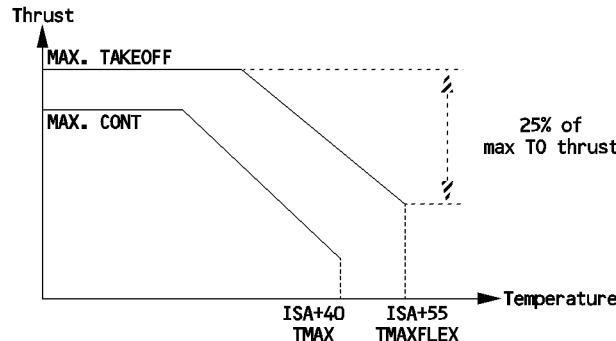
- Thrust must not be reduced by more than 25 % of the full rated takeoff thrust.
- The flexible takeoff EPR cannot be lower than the Max Climb EPR at the same flight conditions.

The FADEC takes the above two constraints into account to determine flexible EPR.

The above two constraints also limit the maximum flexible temperature at ISA + 55 (70°C at sea level).

- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
- The flexible temperature cannot be lower than the flat rating temperature, TREF*, or the actual temperature (OAT).

NFC5-02-0220-001-A060AA



Note : * Tref being a function of the pressure-altitude, read it on the takeoff chart.

- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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).
- 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — Use CONF2/CONF3 	Improve comfort	
Badly paved runway or Accelerate stop distance limited runway	<ul style="list-style-type: none"> — Use CONF2/CONF3 or — Move towards left side of the takeoff chart 	Improve comfort Improve stopping distance	
Windshear expected along takeoff path	<ul style="list-style-type: none"> — Use maximum thrust 	Maintain acceleration capability	
Contaminated runway	<ul style="list-style-type: none"> — Use maximum thrust (flex forbidden) 	Improve stopping distance Decrease time on runway. Required by regulations.	

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.

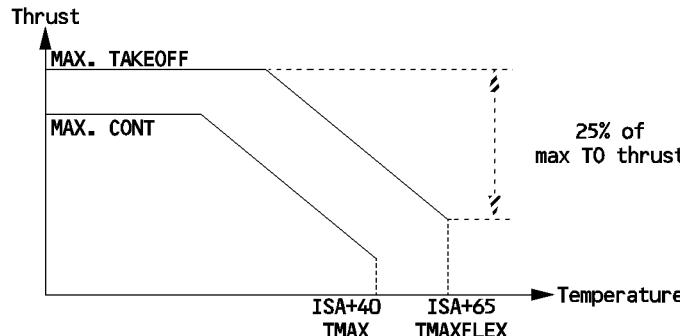
USE OF FLEXIBLE TAKEOFF

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 EPR cannot be lower than the Max climb EPR at the same flight conditions.
- The FADEC takes the above two constraints into account to determine flexible EPR.
- The above two constraints also limit the maximum flexible temperature at ISA + 65 (80° C at sea level).
 - The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
 - The flexible temperature cannot be lower than the flat rating temperature, TREF*, or the actual temperature (OAT).

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Note : * Tref being a function of the pressure-altitude, read it on the takeoff chart.

- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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).
- 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — Use CONF2/CONF3 	Improve comfort	
Badly paved runway or Accelerate stop distance limited runway	<ul style="list-style-type: none"> — Use CONF2/CONF3 or — Move towards left side of the takeoff chart 	Improve comfort Improve stopping distance	
Windshear expected along takeoff path	<ul style="list-style-type: none"> — Use maximum thrust 	Maintain acceleration capability	
Contaminated runway	<ul style="list-style-type: none"> — Use maximum thrust (flex forbidden) 	Improve stopping distance Decrease time on runway. Required by regulations.	

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.

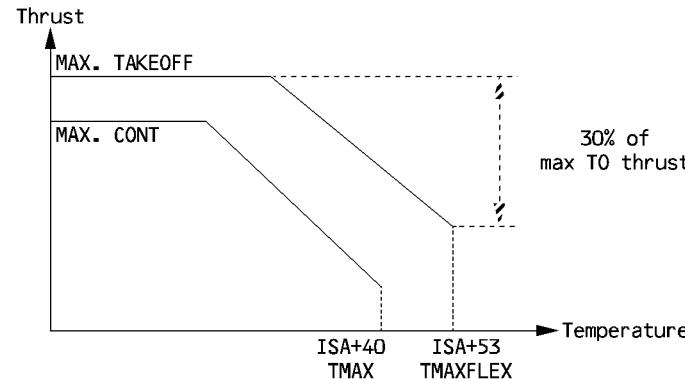
The use of flexible takeoff thrust saves engine life.

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 30 % 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 flexible N1. The above two constraints also limit the maximum flexible temperature at ISA + 53 (68° C at sea level).
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA + 40).
 - The flexible temperature cannot be lower than the flat rating temperature, TREF (ISA + 15), or the actual temperature (OAT).



- 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 flexible thrust reduction.
- R · However, to improve the takeoff performance, the thrust can be increased by selecting a lower flexible 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).
- 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — 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 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, 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 = 68 000 kg

Head wind = 10 kt

Air conditioning ON

QNH = 1013 hPa

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F.

Flexible temperature 53° C

Enter the 10 kt head wind column and interpolate for 68 000 kg. CONF 2.

Flexible temperature range from 10 °C to 51 °C

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- Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are $V1 = 153 \text{ kt}$, $VR = 153 \text{ kt}$, $V2 = 155 \text{ kt}$
 Flexible temperature with air conditioning OFF 53° C
 R Air conditioning correction (FCOM 2.02.24 p 1) -3° C
 R Maximum flexible temperature 50° 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 P 6)

A description of this correction is given on 2.02.16 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 2.02.20 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, apply the wet influence first.*

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 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, 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 = 68 000 kg

Head wind = 10 kt

Air conditioning ON

QNH = 1013 hPa

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F, Flexible temperature 47° C
Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2, Flexible temperature 46° C

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Retain CONF 1+F for takeoff configuration.

Takeoff speeds are $V1 = 148 \text{ kt}$, $VR = 148 \text{ kt}$, $V2 = 152 \text{ kt}$

Flexible temperature with air conditioning OFF 47° C

Air conditioning correction (FCOM 2.02.24 p 1) -10° C

Maximum flexible temperature 37° 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 P 6)

A description of this correction is given on 2.02.16 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 2.02.20 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, apply the wet influence first.*

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.

- R** Note : If the RTOW chart is based on the CG being at 25 %, the crew can determine the flexible temperature at a more forward CG by decreasing the flexible temperature by 2°C. V1, VR and V2 must be increased by 1 knot.

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, 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 = 68 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

Use the chart from 2.02.16 p 6. 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 68 000 kg. CONF 1+F

Flexible temperature 67°C

Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2

Flexible temperature 66° C

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		SEQ 250	REV 34

Retain CONF 1+F for takeoff configuration.

Takeoff speeds are $V1 = 153 \text{ kt}$, $VR = 153 \text{ kt}$, $V2 = 154 \text{ kt}$

Flexible temperature with air conditioning OFF 67° C

Air conditioning correction (FCOM 2.02.24 p 1) -3° C

Maximum flexible temperature 64° 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 P 6)

A description of this correction is given on 2.02.16 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 2.02.20 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, apply the wet influence first.*

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.

- R** Note : If the RTOW chart is based on the CG being at 25 %, the crew can determine the flexible temperature at a more forward CG by decreasing the flexible temperature by 2°C. V1, VR and V2 must be increased by 1 knot.

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, 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 = 68 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 1013 hPa

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F.

Flexible temperature 67°C

Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2

Flexible temperature 66°C

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		SEQ 270	REV 33

Retain CONF 1+F for takeoff configuration.

Takeoff speeds are $V1 = 153 \text{ kt}$, $VR = 153 \text{ kt}$, $V2 = 154 \text{ kt}$

Flexible temperature with air conditioning OFF 67° C

Air conditioning correction (FCOM 2.02.24 p 1) -3° C

Maximum flexible temperature 64° 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 P 6)

A description of this correction is given on 2.02.16 p 3. The list of corrections is not exhaustive, however the most commonly used corrections are wet runway, QNH, air conditioning and/or anti-icing. 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 ΔT_{flex} correction from line 1 and apply speed corrections ($\Delta V1/\Delta VR/\Delta V2$) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔT_{flex} from line 3 and $\Delta V1/\Delta VR/\Delta V2$ 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 2.02.20 p 7)

Note : – *QNH correction is given for $\pm 10 \text{ hPa}$. 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 p 6, 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 = 68 000 kg

Head wind = 10 kt

QNH = 998 hPa

WET runway

Air conditioning OFF

- R Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F,

Flexible temperature 53° C

Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2,

Flexible temperature 51° C

Retain CONF 1+F as the flexible temperature is higher.

Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 155 kt

Apply WET correction

For flexible temperature < TVMC (58° C), $\Delta T_{flex} = \dots - 1° C$

Intermediate flex temperature 52° C

Associated speeds,

V1 = 153 kt - 6 = 147 kt

VR = 153 kt - 0 = 153 kt

V2 = 155 kt - 0 = 155 kt

- R Since speed correction on V2 is 0, no V2 check against VMU limitation is necessary.

Apply QNH correction

For flex temperature < TVMC (54° C), $\Delta T_{flex} = \dots - 2° C$

Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature $\leq T_{MAXFLEX}$

No speed correction.

Takeoff speeds are V1 = 147 kt, VR = 153 kt, V2 = 153 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	53	153	153	155
FCOM correction(s)				
Intermediate value	53	153	153	155
WET Correction	- 1	- 6	0	0
Intermediate value	52	147	153	153
QNH Correction	- 2	0	0	0
Final value	50	147	153	153

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		SEQ 065	REV 30

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example F

DATA : Actual takeoff weight = 68 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 998 hPa
 WET runway

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F, Flexible temperature 53° C
- Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2, Flexible temperature 51° C
- Retain CONF 1+F for takeoff configuration.
- Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 155 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
- Flexible temperature with air conditioning OFF 53° C
- R Air conditioning correction -3° C
- R Intermediate flexible temperature 50° C
- No speed correction.
- Apply WET correction
- For flexible temperature < TVMC (58° C), ΔT_{flex} = -1° C
- R Intermediate flex temperature 49° C
- Associated speeds,
 $V1 = 153 \text{ kt} - 6 = 147 \text{ kt}$
 $VR = 153 \text{ kt} - 0 = 153 \text{ kt}$
 $V2 = 155 \text{ kt} - 0 = 155 \text{ kt}$
- Since speed correction on V2 is 0, no V2 check against VMU limitation is necessary.
- Apply QNH correction
- For flexible temperature \leq TVMC (54° C), ΔT_{flex} = -2° C
- R Maximum flexible temperature 47° C
- Check that OAT/TREF < flex temperature \leq TMAXFLEX
- No speed correction.
- Takeoff speeds are V1 = 147 kt, VR = 153 kt, V2 = 155 kt

- 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 = 68 000 kg

Head wind = 10 kt

QNH = 998 hPa

WET runway

Air conditioning OFF

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F,

Flexible temperature 47° C

Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2,

Flexible temperature 46° C

Retain CONF 1+F as the flexible temperature is higher.

Takeoff speeds are V1 = 147 kt, VR = 148 kt, V2 = 152 kt

Apply WET correction

For flexible temperature < TVMC (74° C), ΔT_{flex} = – 3° C

Intermediate flex temperature 44° C

Associated speeds,

V1 = 147 kt – 6 = 141 kt

VR = 148 kt – 0 = 148 kt

V2 = 152 kt – 0 = 152 kt

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

Apply QNH correction

For flex temperature < TVMC (59° C), ΔT_{flex} = – 3° C

Maximum flexible temperature 41° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

Takeoff speeds are V1 = 141 kt, VR = 148 kt, V2 = 152 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	47	147	148	152
FCOM correction(s)				
Intermediate value	47	147	148	152
WET Correction	– 3	– 6	0	0
Intermediate value	44	141	148	152
QNH Correction	– 3	0	0	0
Final value	41	141	148	152

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 6
		SEQ 078	REV 38

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example F

DATA : Actual takeoff weight = 68 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 998 hPa
 WET runway

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F, Flexible temperature 47° C
- Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2, Flexible temperature 46° C
- Retain CONF 1+F for takeoff configuration.
Takeoff speeds are V1 = 147 kt, VR = 148 kt, V2 = 152 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 47° C
Air conditioning correction -10° C
Intermediate flexible temperature 37° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (74° C), ΔT_{flex} = -3° C
Intermediate flex temperature 34° C
Associated speeds,
V1 = 147 kt - 6 = 141 kt
VR = 148 kt - 0 = 148 kt
V2 = 152 kt - 0 = 152 kt
Since speed correction on V2 is 0, no V2 check against VMU limitation is necessary.
- Apply QNH correction
For flexible temperature \leq TVMC (59° C), ΔT_{flex} = -3° C
Maximum flexible temperature 31° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 141 kt, VR = 148 kt, V2 = 152 kt

- 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 = 68 000 kg

Head wind = 10 kt

QNH = 998 hPa

WET runway

Air conditioning OFF

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F,

Flexible temperature67° C

Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2,

Flexible temperature66° C

Retain CONF 1+F as the flexible temperature is higher.

Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 154 kt

Apply WET correction

For flexible temperature < TVMC (69° C), $\Delta T_{flex} = \dots \dots \dots -2° C$

Intermediate flex temperature 65° C

Associated speeds,

V1 = 153 kt - 8 = 145 kt

VR = 153 kt - 2 = 151 kt

V2 = 154 kt - 2 = 152 kt

Check V2 against VMU limitation in FCOM 2.02.25.

Apply QNH correction

R For flex temperature \geq TVMC (61° C), $\Delta T_{flex} = \dots \dots \dots -3° C$

Maximum flexible temperature 62° C

Check that OAT/TREF < flex temperature \leq TMAXFLEX

No speed correction.

Takeoff speeds are V1 = 145 kt, VR = 151 kt, V2 = 152 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	67	153	153	154
FCOM correction(s)				
Intermediate value	67	153	153	154
WET Correction	- 2	- 8	- 2	- 2
Intermediate value	65	145	151	152
QNH Correction	- 3	0	0	0
Final value	62	145	151	152

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		SEQ 250	REV 37

COMBINING CORRECTIONS FROM FCOM AND CHART

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

Example F

DATA : Actual takeoff weight = 68 000 kg
 Head wind = 10 kt
 Air conditioning ON
 QNH = 998 hPa
 WET runway

Use the chart from 2.02.16 p 6. 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 68 000 kg, CONF 1+F, Flexible temperature 67° C
- Enter the 10 kt head wind column and interpolate for 68 000 kg, CONF 2, Flexible temperature 66° C
- Retain CONF 1+F for takeoff configuration.
Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 154 kt
- First, apply the correction from FCOM page 2.02.24 p 1.
Flexible temperature with air conditioning OFF 67° C
Air conditioning correction -3° C
Intermediate flexible temperature 64° C
No speed correction.
- Apply WET correction
For flexible temperature < TVMC (69° C), ΔT_{flex} = -2° C
Intermediate flex temperature 62° C
Associated speeds,
V1 = 153 kt - 8 = 145 kt
VR = 153 kt - 2 = 151 kt
V2 = 154 kt - 2 = 152 kt
- R Check V2 against VMU limitation in FCOM 2.02.25.
- Apply QNH correction
- R For flexible temperature \geq TVMC (61° C), ΔT_{flex} = -3° C
Maximum flexible temperature 59° C
Check that OAT/TREF < flex temperature \leq TMAXFLEX
No speed correction.
Takeoff speeds are V1 = 145 kt, VR = 151 kt, V2 = 152 kt

	Takeoff Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	53	153	153	155
FCOM correction(s)	- 3	0	0	0
Intermediate value	50	153	153	155
WET Correction	- 1	- 6	0	0
Intermediate value	49	147	153	155
QNH Correction	- 2	0	0	0
Final value	47	147	153	155

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;

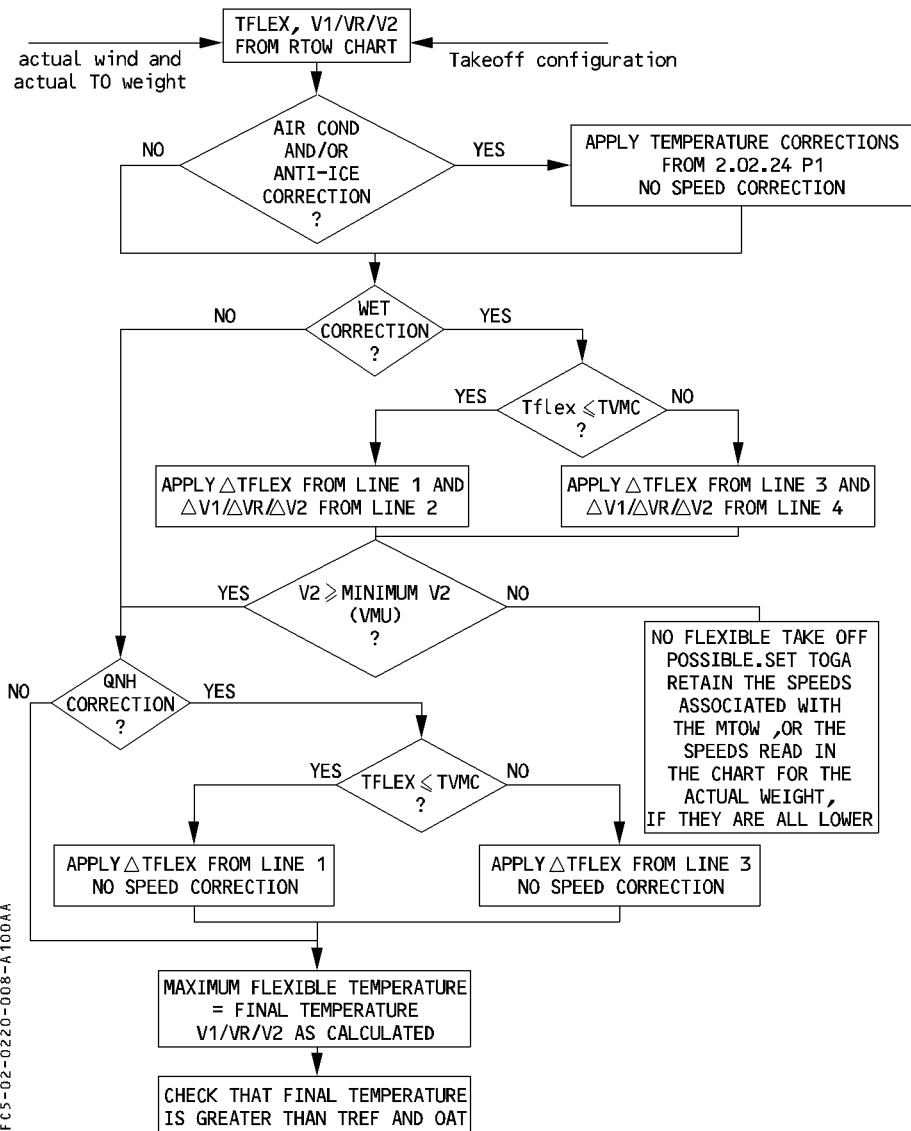
R OR

- R** – 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 Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	47	147	148	152
FCOM correction(s)	- 10	0	0	0
Intermediate value	37	147	148	152
WET Correction	- 3	- 6	0	0
Intermediate value	34	141	148	152
QNH Correction	- 3	0	0	0
Final value	31	141	148	152

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;

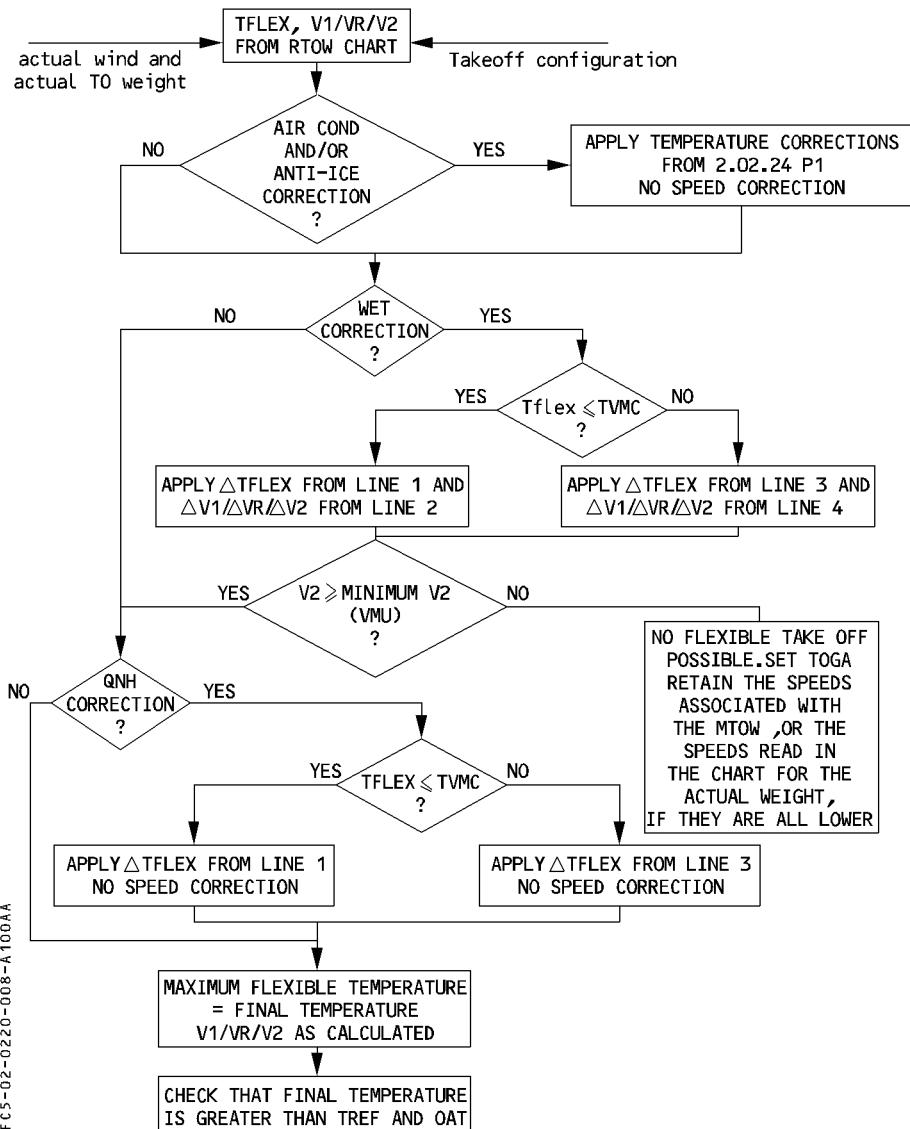
OR

- 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 Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	67	153	153	154
FCOM correction(s)	- 3	0	0	0
Intermediate value	64	153	153	154
WET Correction	- 2	- 8	- 2	- 2
Intermediate value	62	145	151	152
QNH Correction	- 3	0	0	0
Final value	59	145	151	152

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 ;

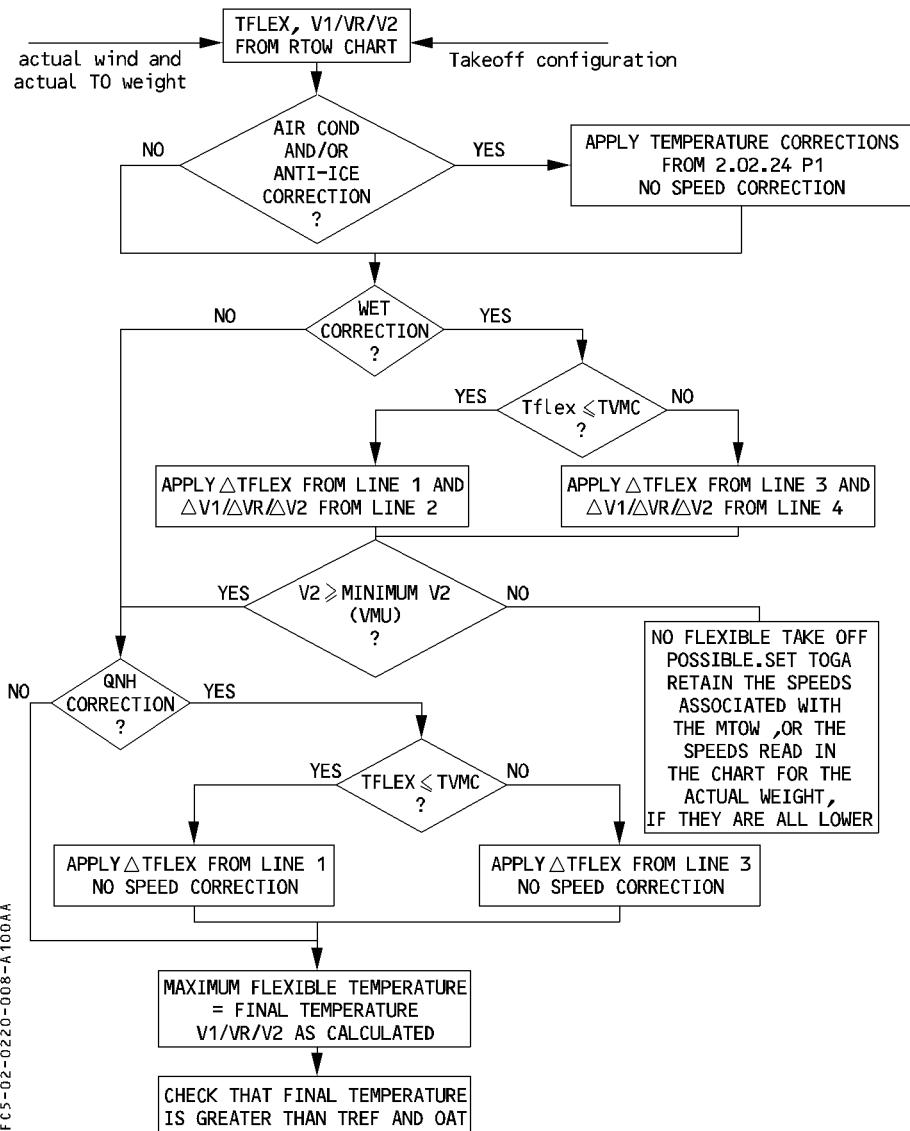
OR

- 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 Configuration : 1 + F			
	Tflex	V1	VR	V2
Chart temperature	67	153	153	154
FCOM correction(s)	- 3	0	0	0
Intermediate value	64	153	153	154
WET Correction	- 2	- 8	- 2	- 2
Intermediate value	62	145	151	152
QNH Correction	- 3	0	0	0
Final value	59	145	151	152

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 ;

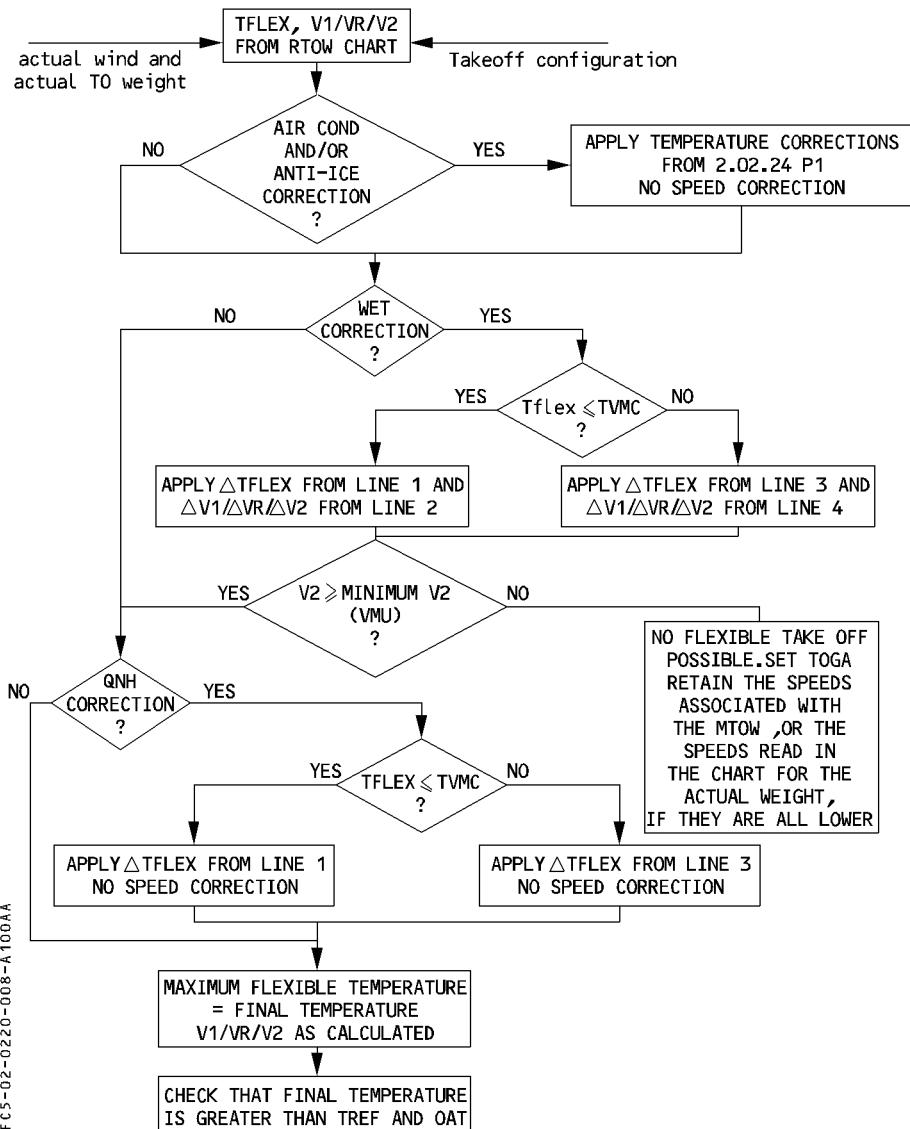
OR

- 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 (up to 9200 feet)

R

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

CORRECTIONS ON TEMPERATURE IF FLEX TAKEOFF PERFORMED		CORRECTIONS ON WEIGHT IF TAKEOFF WITH FULL THRUST IS PERFORMED
Add 1°C/40hPa until pressure altitude equals zero. No correction for pressure altitude below 0 ft.	QNH above 1013 hPa	Add 20 kg/hPa until pressure altitude equals zero. No correction for pressure altitude below 0 ft.
Subtract 1°C/3hPa	QNH below 1013 hPa	Subtract 100 kg/hPa
Subtract 5°C	* Engine A/ICE ON	No correction
Subtract 8°C	* Total A/ICE ON	Subtract 2150 kg
Subtract 3°C	Air Conditioning ON	Subtract 2000 kg

NFC5-02-0224-001-A065AA

Compare corrected temp (CT), flat rating temp (T REF) and OAT	→	CT higher than OAT and CT higher than TREF } Take CT as flex temp limited to ISA + 65
		Either conditions above not fulfilled } No flexible takeoff possible determine MAX TOW

Note : – * Corrections valid only for OAT < 10°C
 – For high altitude operation, refer to 2.02.24 p3 (if applicable)

EXAMPLES

Airport geometric elevation = 450 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

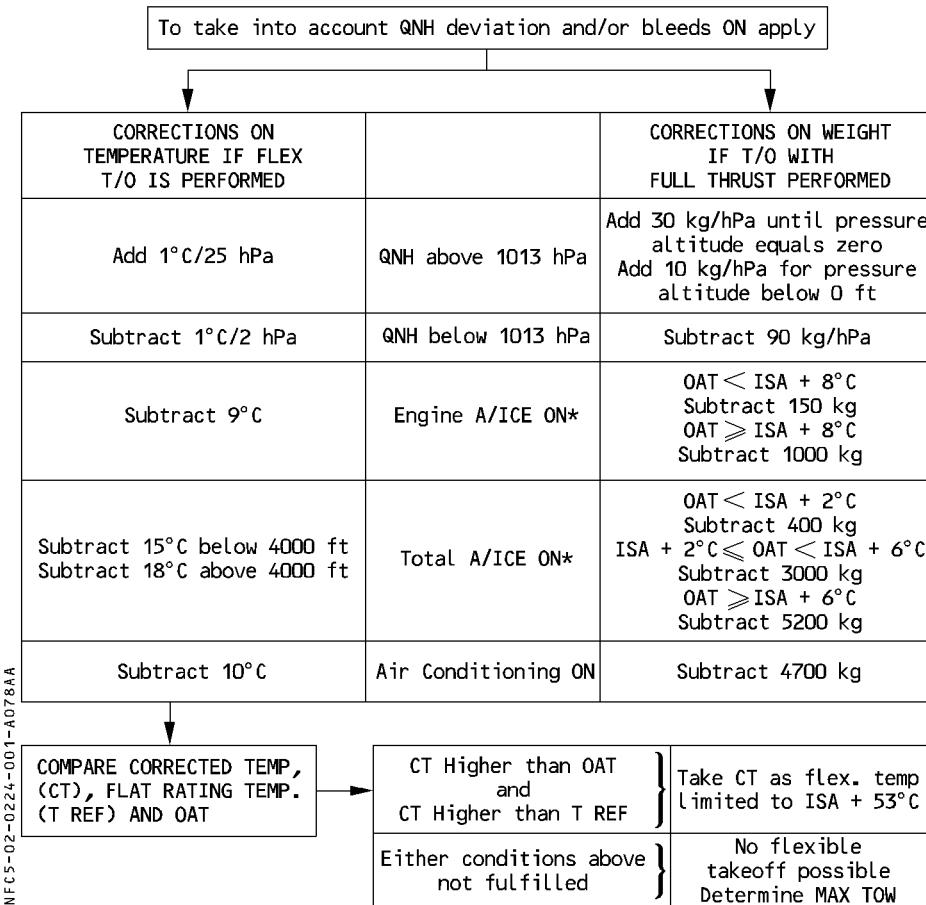
A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QNH/BLEEDS CORRECTION	2.02.24 P 2	
		SEQ 065	REV 29

Example 1 - Full thrust takeoff

- R Actual data : OAT = 5°C
 QNH = 1040 hPa
 Engine anti ice ON
 Air conditioning OFF
- R Weight read on the takeoff chart : 70 000 kg
 Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).
 Pressure altitude = $450 - (1040 - 1013) \times 28 = -306$ feet
 Read in the above table the corrections for high QNH and engine anti ice ON.
 QNH correction = $20 \text{ kg} \times (450/28) + 0 \text{ kg} \times (306/28) = +320 \text{ kg}$
 Engine anti ice correction : none
 The maximum permissible takeoff weight is $70000 + 320 = 70320 \text{ kg}$

Example 2 - Flexible thrust takeoff

- R Actual data : OAT = 5°C
 QNH = 1040 hPa
 Anti ice OFF
 Air conditioning ON
 TOW = 65000 kg
- R Flexible temperature read on the takeoff chart : TFLEX = 55°C
 Read TREF on the takeoff chart or on the quick reference table.
 Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).
 Pressure altitude = $450 - (1040 - 1013) \times 28 = -306$ feet
 Read in the above table the correction for QNH and air conditioning ON :
 QNH correction = $-1^\circ\text{C}/40 \text{ hPa} \times (450/28) + 0 = 0^\circ\text{C}$
- R Air conditioning ON correction : -3°C
- R New flexible temperature = $55 + 0 - 3 = 52^\circ\text{C}$
 Check that the flexible temperature is above TREF and actual OAT.
 Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

EFFECT OF QNH AND BLEEDS (up to 9200 feet)

NFC5-02-0224-001-A078AA

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

EXAMPLES

Airport geometric elevation = 450 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QNH/BLEEDS CORRECTION	2.02.24 P 2	
		SEQ 078	REV 38

Example 1 - Full thrust takeoff

Actual data : OAT = 5°C
 QNH = 1040 hPa
 Engine anti ice ON
 Air conditioning OFF

Weight read on the takeoff chart : 65 000 kg

Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).

Pressure altitude = $450 - (1040 - 1013) \times 28 = -306$ feet

Read in the above table the corrections for high QNH and engine anti ice ON.

QNH correction = $30 \text{ kg} \times (450/28) + 10 \text{ kg} \times (306/28) = +591 \text{ kg}$

Engine anti ice correction : -150 kg

The maximum permissible takeoff weight is $65000 + 592 - 150 = 65442 \text{ kg}$

Example 2 - Flexible thrust takeoff

Actual data : OAT = 5°C
 QNH = 1040 hPa
 Anti ice OFF
 Air conditioning ON
 TOW = 60000 kg

Flexible temperature read on the takeoff chart : TFLEX = 60°C

Read TREF on the takeoff chart or on the quick reference table.

Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).

Pressure altitude = $450 - (1040 - 1013) \times 28 = -306$ feet

Read in the above table the correction for QNH and air conditioning ON :

QNH correction = $1^\circ\text{C}/25 \text{ hPa} \times (1040 - 1013) = 1^\circ\text{C}$

Air conditioning ON correction : -10°C

New flexible temperature = $60 + 1 - 10 = 51^\circ\text{C}$

Check that the flexible temperature is above TREF and actual OAT.

Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

EFFECT OF QNH AND BLEEDS (up to 9200 feet)

To take into account QNH deviation and bleeds ON apply

CORRECTIONS ON TEMPERATURE IF FLEX. TAKEOFF PERFORMED		CORRECTIONS ON WEIGHT IF TAKEOFF WITH FULL THRUST PERFORMED
No correction	QNH above 1013 hPa	No correction
Subtract 1°C/3 hPa	QNH below 1013 hPa	Subtract 120 kg/hPa
Subtract 5°C	Engine A/ICE ON*	No correction
Subtract 7°C	Total A/ICE ON*	Subtract 2150 kg
Subtract 3°C	Air Conditioning ON	Subtract 1800 kg

NFC5-02-0224-001-A240AA

COMPARE CORRECTED TEMP,
(CT), FLAT RATING TEMP.
(T REF) AND OAT

CT Higher than OAT and CT Higher than TREF	}	Take CT as flex. temp limited to ISA + 55
Both conditions above not fulfilled		

}	No flexible takeoff possible Determine MAX TOW
---	--

*Note : – * Corrections valid only for OAT < 10°C
– For high altitude operation, refer to 2.02.24 p 3 (if applicable)*

EXAMPLES

Airport geometric elevation = 450 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

A318/A319/A320/A321	TAKEOFF	2.02.24	P 2
FLIGHT CREW OPERATING MANUAL	QNH/BLEEDS CORRECTION	SEQ 240	REV 34

Example 1 - Full thrust takeoff

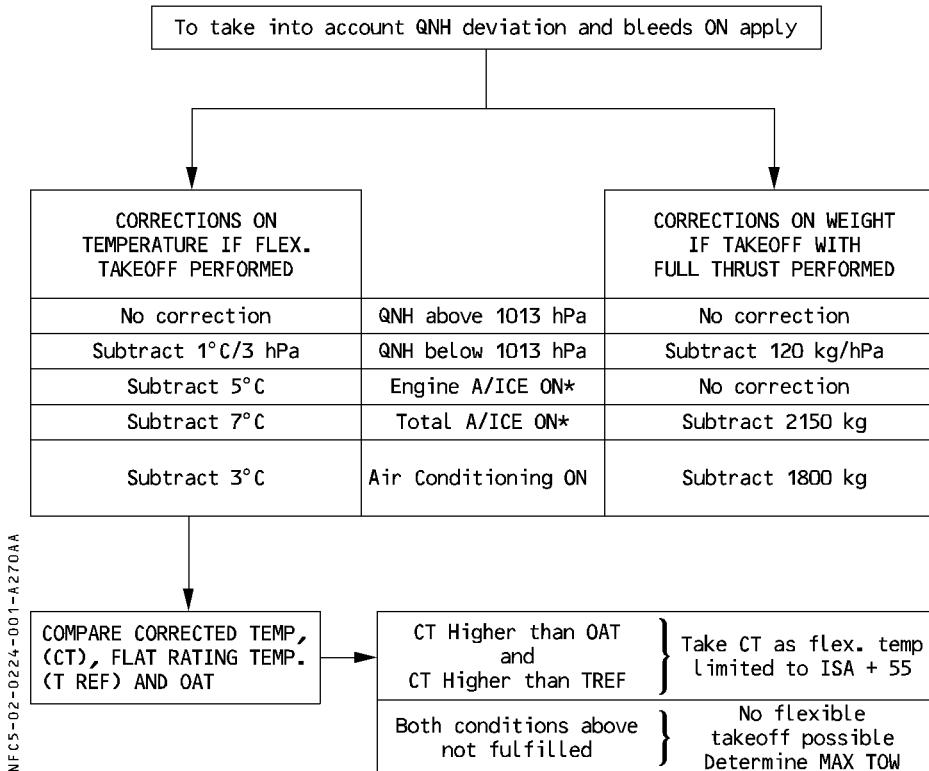
Actual data : OAT = 5°C
 QNH = 1040 hPa
 Engine anti ice ON
 Air conditioning OFF

Weight read on the takeoff chart : 73 000 kg
 Read in the above table the corrections for high QNH and engine anti ice ON.
 QNH correction : none
 Engine anti ice correction : none
 The maximum permissible takeoff weight is $73000 + 0 - 0 = 73000$ kg

Example 2 - Flexible thrust takeoff

Actual data : OAT = 5°C
 QNH = 1040 hPa
 Anti ice OFF
 Air conditioning ON
 TOW = 65000 kg

Flexible temperature read on the takeoff chart : TFLEX = 55°C
 Read TREF on the takeoff chart or on the quick reference table.
 Read in the above table the correction for QNH and air conditioning ON :
 QNH correction = none
 Air conditioning ON correction : - 3°C
 New flexible temperature = $55 - 3 = 52$ °C
 Check that the flexible temperature is above TREF and actual OAT.
 Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

EFFECT OF QNH AND BLEEDS (up to 9200 feet)

NFC5-02-0224-001-A270AA

Note : – * Corrections valid only for OAT < 10°C
 – For high altitude operation, refer to 2.02.24 p3 (if applicable)

EXAMPLES

Airport geometric elevation = 450 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

A318/A319/A320/A321	TAKEOFF	2.02.24	P 2
FLIGHT CREW OPERATING MANUAL	QNH/BLEEDS CORRECTION	SEQ 270	REV 33

Example 1 - Full thrust takeoff

Actual data : OAT = 5°C
 QNH = 1040 hPa
 Engine anti ice ON
 Air conditioning OFF

Weight read on the takeoff chart : 73 000 kg
 Read in the above table the corrections for high QNH and engine anti ice ON.
 QNH correction : none
 Engine anti ice correction : none
 The maximum permissible takeoff weight is $73000 + 0 - 0 = 73000$ kg

Example 2 - Flexible thrust takeoff

Actual data : OAT = 5°C
 QNH = 1040 hPa
 Anti ice OFF
 Air conditioning ON
 TOW = 65000 kg

Flexible temperature read on the takeoff chart : TFLEX = 55°C
 Read TREF on the takeoff chart or on the quick reference table.
 Read in the above table the correction for QNH and air conditioning ON :
 QNH correction = none
 Air conditioning ON correction : - 3°C
 New flexible temperature = $55 - 3 = 52$ °C
 Check that the flexible temperature is above TREF and actual OAT.
 Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

EFFECT OF QNH AND BLEEDS FOR HIGH ALTITUDE OPERATIONS (above 9200 feet)

R

To take into account QNH deviation and bleeds ON apply

CORRECTIONS ON TEMPERATURE IF FLEX. TAKEOFF PERFORMED		CORRECTIONS ON WEIGHT IF TAKEOFF WITH FULL THRUST PERFORMED
Add 1°C/20 hPa	QNH above 1013 hPa	Add 40 Kg/hPa
Subtract 1°C/3 hPa	QNH below 1013 hPa	Subtract 90 Kg/hPa
Subtract 5°C	Engine A/ICE ON*	No correction
Subtract 8°C	Total A/ICE ON*	Subtract 2000 Kg
Subtract 3°C	Air Conditioning ON	Subtract 2100 Kg

NFC5-02-0224-003-A165AA

COMPARE CORRECTED TEMP, (CT), FLAT RATING TEMP. (T REF) AND OAT	CT Higher than OAT and CT Higher than TREF	Take CT as flex. temp limited to ISA + 65
	Both conditions above not fulfilled	No flexible takeoff possible Determine MAX TOW

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

EXAMPLES

Airport geometric elevation = 11500 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QNH/BLEEDS CORRECTION	2.02.24 P 4	
		SEQ 165	REV 29

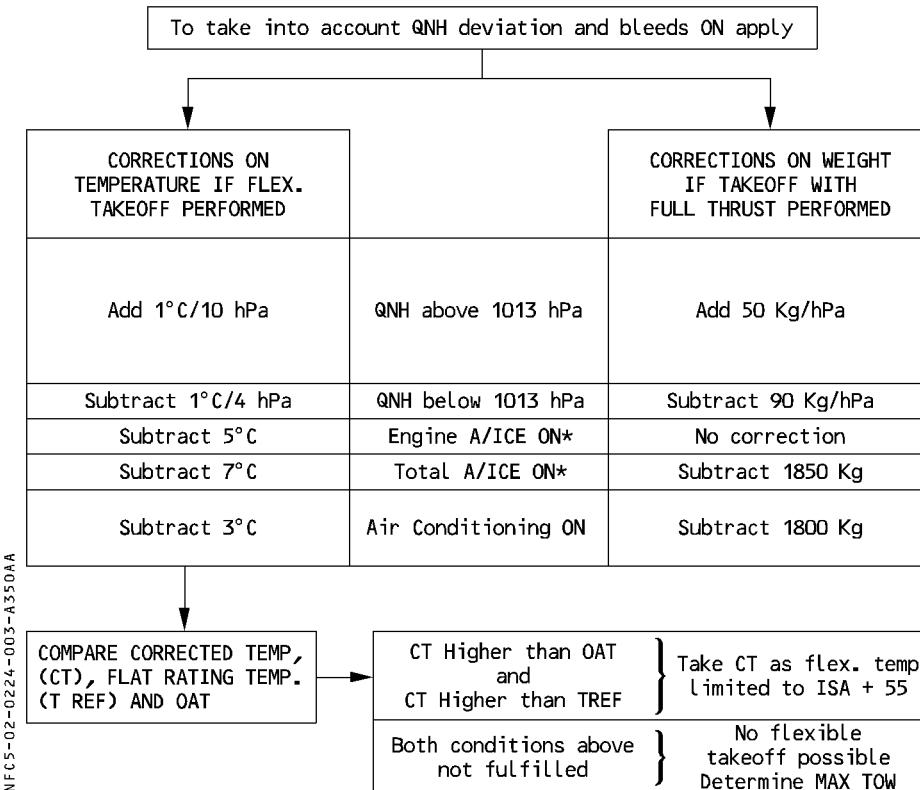
Example 1 - Full thrust takeoff

- R Actual data : OAT = 0°C
 QNH = 1040 hPa
 Engine anti ice ON
 Air conditioning OFF
- R Weight read on the takeoff chart : 65 000 kg
 Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).
 Pressure altitude = $11500 - (1040 - 1013) \times 28 = 10744$ feet
 Read in the above table the corrections for high QNH and engine anti ice ON.
 QNH correction = $40 \text{ kg} \times (11500 - 10744)/28 = + 1080 \text{ kg}$
 Engine anti ice correction : none
 The maximum permissible takeoff weight is $65000 + 1080 = 66080 \text{ kg}$

Example 2 - Flexible thrust takeoff

- R Actual data : OAT = 0°C
 QNH = 1040 hPa
 Anti ice OFF
 Air conditioning ON
 TOW = 60000 kg
- R Flexible temperature read on the takeoff chart : TFLEX = 40°C
 Read TREF on the takeoff chart or on the quick reference table.
 Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).
 Pressure altitude = $11500 - (1040 - 1013) \times 28 = 10744$ feet
 Read in the above table the correction for QNH and air conditioning ON :
 QNH correction = $1^\circ\text{C}/20 \text{ hPa} \times (11500 - 10744)/28 \text{ hPa} = + 1^\circ\text{C}$
- R Air conditioning ON correction = $- 3^\circ\text{C}$
- R New flexible temperature = $40 + 1 - 3 = 38^\circ\text{C}$
 Check that the flexible temperature is above TREF and actual OAT.
 Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

EFFECT OF QNH AND BLEEDS FOR HIGH ALTITUDE OPERATIONS (above 9200 feet)



NFC5-02-0224-003-A350AA

Note : – * Corrections valid only for OAT < 10°C
 – Corrections valid up to 14100 feet. Section 2.04.30 deals with high altitude operations.

EXAMPLES

Airport geometric elevation = 11500 feet

Takeoff chart data

QNH = 1013 hPa

Anti ice OFF

Air conditioning OFF

OAT = 0°C

MTOW = 73000 kg

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QNH/BLEEDS CORRECTION	2.02.24	P 4
		SEQ 185	REV 29

EXAMPLE 1 - Full thrust takeoff

Actual data : QNH = 1040 hPa

Engine anti ice ON

Air conditioning OFF

Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).

Pressure altitude = $11500 - (1040 - 1013) \times 28 = 10744$ feet

Read in the above table the corrections for high QNH and engine anti ice ON.

QNH correction = $50 \text{ kg} \times (11500 - 10744)/28 \text{ hPa} = + 1350 \text{ kg}$

Engine anti ice correction : 0 kg

The maximum permissible takeoff weight is $73000 + 1350 - 0 = 74350 \text{ kg}$

EXAMPLE 2 - Flexible thrust takeoff

Actual data : QNH = 1040 hPa

Anti ice OFF

Air conditioning ON

TOW = 65000 kg

TFLEX = 55°C

Read TREF on the takeoff chart or on the quick reference table.

Determine the actual airport pressure altitude (1 hPa is equivalent to 28 feet according to the ISA model).

Pressure altitude = $11500 - (1040 - 1013) \times 28 = 10744$ feet

Read in the above table the correction for QNH and air conditioning ON :

QNH correction = $1^\circ\text{C}/10 \text{ hPa} \times (11500 - 10744)/28 \text{ hPa} = + 3^\circ\text{C}$

Air conditioning ON correction = $- 3^\circ\text{C}$

New flexible temperature = $55 + 3 - 3 = 55^\circ\text{C}$

Check that the flexible temperature is above TREF and actual OAT.

Check that the flexible temperature is less than the maximum flexible temperature and retain the lower of the two.

SPEEDS LIMITED BY VMC

R Takeoff speeds all have a minimum value limited by control. These minimum values are given in the tables down below.

R

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V1 min
CONF 1 + F	111	111	111	110	109	108	107	105	104	99	
CONF 2	111	111	111	110	109	108	107	105	104	99	
CONF 3	111	111	111	110	109	108	107	105	104	99	

R

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	VR min
CONF 1 + F	114	114	113	112	111	111	109	107	105	99	
CONF 2	114	114	113	112	111	111	109	107	105	99	
CONF 3	114	114	113	112	111	111	109	107	105	99	

R

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V2 min
CONF 1 + F	121	121	120	119	118	117	116	113	111	105	
CONF 2	121	121	120	119	118	117	115	112	111	105	
CONF 3	121	121	120	119	118	117	116	113	111	105	

V2 LIMITED BY VMU/VMCA

R 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)									
	35	40	45	50	55	60	65	70	75	80
-1000	121	121	121	121	122	127	132	137	142	147
0	121	121	121	121	122	127	132	137	142	147
1000	120	120	120	120	122	127	132	137	142	148
2000	119	119	119	119	122	127	132	137	143	148
3000	118	118	118	118	122	127	132	138	143	148
4000	117	117	117	117	122	127	132	138	143	149
5000	117	117	117	117	122	127	133	138	144	149
6000	116	116	116	116	122	128	133	139	144	149
7000	114	114	114	116	122	128	133	139	144	150
8000	113	113	113	116	122	128	134	139	145	150
9000	112	112	112	116	123	128	134	140	145	151
10000	111	111	111	117	123	129	134	140	146	151
11000	109	109	110	117	123	129	135	140	146	152
12000	108	108	110	117	124	129	135	141	147	152
13000	107	107	111	117	124	130	136	141	147	153
14000	105	105	111	118	124	130	136	142	148	154

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SPEEDS LIMITED BY VMC

Takeoff speeds all have a minimum value limited by control. These minimum values are given in the tables down below.

MINIMUM V1										
CONF	PRESSURE ALTITUDE (FT)									
	-1000	0	1000	2000	3000	4000	5000	6000	8000	9200
1+F	111	110	109	108	107	106	105	104	102	102
2	110	110	109	107	106	105	104	103	102	101
3	110	110	109	108	106	105	104	103	102	101

MINIMUM VR										
CONF	PRESSURE ALTITUDE (FT)									
	-1000	0	1000	2000	3000	4000	5000	6000	8000	9200
1+F	111	110	109	108	107	106	105	104	102	102
2	110	110	109	107	106	105	104	103	102	101
3	110	110	109	108	106	105	104	103	102	101

MINIMUM V2										
CONF	PRESSURE ALTITUDE (FT)									
	-1000	0	1000	2000	3000	4000	5000	6000	8000	9200
1+F	115	114	113	112	110	109	108	107	105	104
2	115	115	113	112	111	109	108	107	105	104
3	116	116	114	113	111	110	109	108	106	105

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)	TAKE OFF WEIGHT (1000 KG)						
	40	45	50	55	60	65	70
-1000	115	115	115	121	127	132	136
0	114	114	115	121	127	132	137
1000	113	113	115	121	127	132	137
2000	112	112	115	121	127	132	137
3000	110	110	115	121	127	132	137
4000	109	109	115	121	127	133	138
5000	108	109	115	121	127	133	138
6000	107	109	115	121	127	133	138
8000	105	109	115	122	128	134	139
9200	104	109	116	122	128	134	139

SPEEDS LIMITED BY VMC

Takeoff speeds all have a minimum value limited by control. These minimum values are given in the tables down below.

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V1 min
CONF 1 + F	116	116	115	115	115	115	114	111	108	100	
CONF 2	114	114	113	113	113	113	112	109	106	98	
CONF 3	113	113	113	113	113	113	111	108	106	97	

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	VR min
CONF 1 + F	120	120	120	120	120	120	118	115	112	103	
CONF 2	118	118	118	118	118	118	116	113	111	101	
CONF 3	118	118	118	118	117	117	116	113	110	101	

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V2 min
CONF 1 + F	123	123	123	123	123	122	121	117	115	104	
CONF 2	123	123	123	123	123	122	121	118	115	105	
CONF 3	123	123	123	123	123	123	121	118	115	105	

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.

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 1+F								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-2000	123	124	129	135	140	145	150	155
-1000	123	124	129	135	140	145	150	155
0	123	124	129	135	140	145	151	155
1000	123	124	129	135	140	146	151	155
2000	123	124	129	135	140	146	151	156
3000	123	124	129	135	140	146	151	156
4000	122	124	129	135	141	146	151	156
5000	121	124	130	135	141	146	152	156
6000	121	124	130	135	141	146	152	156
7000	119	124	130	135	141	147	152	157
8000	118	124	130	135	141	147	152	157
9000	118	124	130	135	141	147	152	157
9200	118	124	130	136	141	147	152	157
10000	117	124	130	136	141	147	153	157
11000	117	124	130	136	142	147	153	157
12000	117	124	130	136	142	147	153	158
13000	117	124	130	136	142	148	153	158
14000	117	124	130	136	142	148	153	158
14100	117	124	130	136	142	148	153	158

SPEEDS LIMITED BY VMC

Takeoff speeds all have a minimum value limited by control. These minimum values are given in the tables down below.

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V1 min
CONF 1 + F	116	116	115	115	113	112	109	107	105	99	
CONF 2	114	114	113	113	111	110	107	105	103	97	
CONF 3	114	113	113	112	111	110	107	104	103	97	

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	VR min
CONF 1 + F	121	120	120	119	118	116	113	111	109	101	
CONF 2	119	118	118	117	116	115	111	109	107	99	
CONF 3	119	118	117	117	115	114	111	108	107	99	

Pressure altitude (ft)	-1000	0	1000	2000	3000	4000	6000	8000	9200	14100	V2 min
CONF 1 + F	124	123	122	122	120	119	116	113	111	103	
CONF 2	124	123	122	122	121	119	116	113	111	103	
CONF 3	124	123	122	122	121	119	116	113	111	103	

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)							
	45	50	55	60	65	70	75	80
-1000	124	124	129	135	140	146	151	156
0	123	123	129	135	140	146	151	156
1000	122	123	129	135	140	146	151	156
2000	122	123	129	135	140	146	151	156
3000	121	123	129	135	140	146	151	156
4000	119	123	129	135	140	146	151	156
5000	118	123	129	135	140	146	151	156
6000	118	123	129	135	140	146	151	156
7000	118	123	129	135	140	146	151	156
8000	118	123	129	135	140	146	151	156
9000	118	123	129	135	140	146	151	156

TAB M MD20QC69C A320-232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 2								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-1000	124	124	124	130	135	141	146	150
0	123	123	124	130	135	141	146	150
1000	122	122	124	130	135	141	146	150
2000	122	122	124	130	135	141	146	150
3000	121	121	124	130	135	141	146	150
4000	119	119	124	130	135	141	146	150
5000	118	118	124	130	135	141	146	150
6000	116	118	124	130	135	141	146	150
7000	115	118	124	130	135	141	146	150
8000	113	118	124	130	135	141	146	150
9000	112	118	124	130	135	141	146	150

TAB M MD2QC69C A320-232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

CONFIGURATION 3

PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-1000	124	124	124	124	129	135	139	144
0	123	123	123	124	129	135	139	144
1000	122	122	122	124	129	135	139	144
2000	122	122	122	124	129	135	139	144
3000	121	121	121	124	129	135	139	144
4000	119	119	119	124	129	135	139	144
5000	118	118	119	124	129	135	139	144
6000	116	116	119	124	129	135	139	144
7000	115	115	119	124	129	135	139	144
8000	113	114	119	124	129	135	139	144
9000	112	114	119	124	129	135	139	144

TAB M MD20QC69C A320-232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)							
CONFIGURATION 2							
PRESSURE ALTITUDE (FT)	TAKE OFF WEIGHT (1000 KG)						
	40	45	50	55	60	65	70
-1000	115	115	115	118	124	130	135
0	115	115	115	118	124	130	135
1000	113	113	113	118	124	130	135
2000	112	112	112	118	124	130	136
3000	111	111	112	118	125	131	136
4000	109	109	112	119	125	131	137
5000	108	108	112	119	125	131	137
6000	107	107	112	119	126	132	137
8000	105	106	113	120	126	132	138
9200	104	106	113	120	127	133	138

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)							
CONFIGURATION 3							
PRESSURE ALTITUDE (FT)	TAKE OFF WEIGHT (1000 KG)						
	40	45	50	55	60	65	70
-1000	116	116	116	118	124	130	136
0	116	116	116	118	124	130	136
1000	114	114	114	118	125	131	136
2000	113	113	113	118	125	131	137
3000	111	111	112	119	125	131	137
4000	110	110	112	119	126	132	137
5000	109	109	112	119	126	132	138
6000	108	108	113	120	126	132	138
8000	106	106	113	120	127	133	138
9200	105	106	114	121	127	133	139

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 2								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-2000	123	123	124	129	135	140	145	149
-1000	123	123	124	129	135	140	145	149
0	123	123	124	129	135	140	145	150
1000	123	123	124	129	135	140	145	150
2000	123	123	124	129	135	140	145	150
3000	123	123	124	130	135	140	146	150
4000	123	123	124	130	135	141	146	150
5000	122	122	124	130	135	141	146	150
6000	121	121	124	130	135	141	146	151
7000	119	119	124	130	136	141	146	151
8000	118	119	124	130	136	141	146	151
9000	115	119	125	130	136	141	147	151
9200	115	119	125	130	136	141	147	151
10000	113	119	125	130	136	142	147	151
11000	113	119	125	131	136	142	147	152
12000	113	119	125	131	136	142	147	152
13000	113	119	125	131	137	142	147	152
14000	113	119	125	131	137	142	148	152
14100	113	119	125	131	137	142	148	152

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 3								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-2000	123	123	123	124	129	134	139	143
-1000	123	123	123	124	129	134	139	143
0	123	123	123	124	129	134	139	143
1000	123	123	123	124	129	134	139	143
2000	123	123	123	124	129	134	139	143
3000	123	123	123	124	129	134	139	144
4000	123	123	123	125	130	135	139	144
5000	122	122	122	125	130	135	140	144
6000	121	121	121	125	130	135	140	144
7000	119	119	120	125	130	135	140	144
8000	118	118	120	125	130	135	140	144
9000	115	115	120	125	130	135	140	145
9200	115	115	120	125	130	135	140	145
10000	113	114	120	125	130	135	140	145
11000	111	114	120	125	130	136	141	145
12000	109	114	120	125	131	136	141	145
13000	108	114	120	125	131	136	141	145
14000	108	114	120	125	131	136	141	145
14100	108	114	120	126	131	136	141	146

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

CONFIGURATION 2

PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)									
	35	40	45	50	55	60	65	70	75	80
-1000	121	121	121	121	121	121	126	131	136	140
0	121	121	121	121	121	121	126	131	136	141
1000	120	120	120	120	120	121	126	131	136	141
2000	119	119	119	119	119	121	126	131	136	141
3000	118	118	118	118	118	121	126	131	136	141
4000	117	117	117	117	117	122	127	132	137	141
5000	116	116	116	116	117	122	127	132	137	142
6000	115	115	115	115	117	122	127	132	137	142
7000	114	114	114	114	117	122	127	132	137	142
8000	112	112	112	112	117	122	127	132	137	142
9000	111	111	111	111	117	123	128	133	138	143
10000	110	110	110	112	117	123	128	133	138	143
11000	109	109	109	112	118	123	128	133	138	143
12000	108	108	108	112	118	123	128	133	138	144
13000	106	106	106	112	118	123	128	134	139	144
14000	105	105	106	112	118	124	129	134	139	144

OCTO 12.0.3 AD132A02 FCOM-NO-02-02-25-003-075

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)**CONFIGURATION 3**

PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)									
	35	40	45	50	55	60	65	70	75	80
-1000	121	121	121	121	121	121	124	129	134	138
0	121	121	121	121	121	121	124	129	134	138
1000	120	120	120	120	120	120	124	129	134	138
2000	119	119	119	119	119	120	125	129	134	139
3000	118	118	118	118	118	120	125	129	134	139
4000	117	117	117	117	117	120	125	130	134	139
5000	117	117	117	117	117	120	125	130	134	139
6000	116	116	116	116	116	120	125	130	135	139
7000	114	114	114	114	116	121	125	130	135	140
8000	113	113	113	113	116	121	125	130	135	140
9000	112	112	112	112	116	121	126	130	135	140
10000	111	111	111	111	116	121	126	131	135	140
11000	109	109	109	111	116	121	126	131	136	140
12000	108	108	108	111	116	121	126	131	136	141
13000	107	107	107	111	117	121	126	131	136	141
14000	105	105	105	111	117	122	126	131	136	141

OCTO 12.0.3 AD132A02 FCOM-NO-02-02-25-004-095

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.

The AFM provides the N1 or EPR values that correspond to each certified takeoff thrust setting.

These N1 or EPR values are considered as a normal takeoff limit.

Seven derate levels are defined : D04, D08, D12, D16, D20, D24 and D40.

The derate levels approximately correspond to 4 %, 8 %, 12 %, 20 %, 24 % and 40 % 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.

It is not allowed to cumulate a Derated Takeoff and a Flexible Takeoff. The Derate level is selected on the MFD PERF TO page, which prevents the simultaneous selection of both a derate level and a FLEX temperature.

When a derated takeoff is performed, selection of full takeoff thrust by setting thrust levers at TOGA is not permitted below the speeds specified in engine failure procedure (FCOM 3.02.10 page 4) with the only exception of the Recovery Technique at Takeoff after penetrating unforeseen windshear.

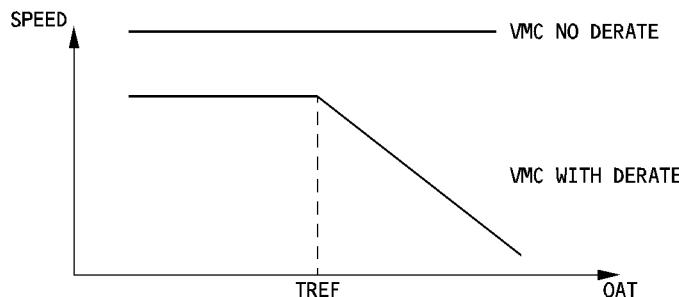
The use of derated takeoff is allowed on dry, wet and contaminated runway.

Derate procedures do not permit the selection of TOGA in an emergency, therefore FLEX takeoff is expected to provide the best performance margin in most cases, with Derated Takeoff only to be used on limiting runways.

TAKEOFF PERFORMANCE IMPROVEMENT BY DERATING THE ENGINES

The minimum control speeds VMCG and VMCA are reduced for two reasons :

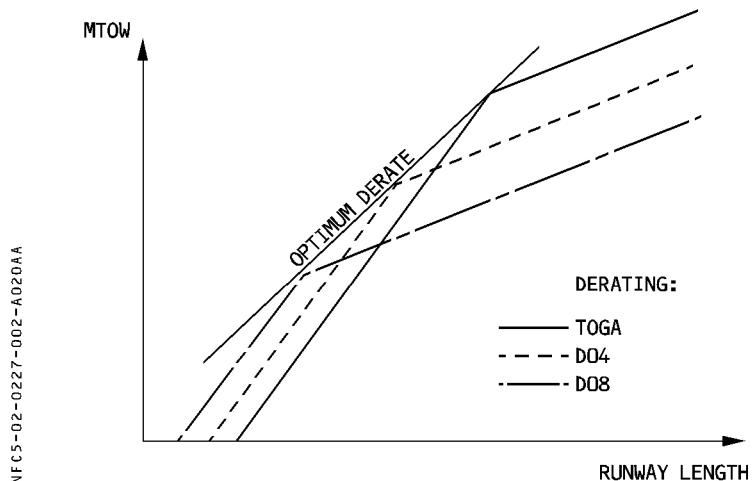
- The derated thrust is lower than the maximum takeoff thrust
- The effect of temperature on VMCG and VMCA is taken into account (which is not the case for takeoff without derate, due to the flexible takeoff concept)



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 by far compensates 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 decrease is more important and not compensated by the effect of a lower VMCA. 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

Specific takeoff performance (RTOW chart or equivalent) must be prepared for each runway on which derated takeoff is considered. MTOW and associated takeoff speeds will be determined for the exact derate level in use at takeoff.

DETERMINATION OF DERATED TAKEOFF EPR

The following pages give the derated takeoff N1 and 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 takeoff performance data (see RTOW chart example below).

In the following RTOW chart, at 0°C, using a derate of 4 % will give the best takeoff performance.

A318/A319/A320/A321**TAKEOFF**

2.02.27 P 3

DERATED TAKEOFF

SEQ 020 REV 38

FLIGHT CREW OPERATING MANUAL

A3XXXX		ENGINES		AIRPORT NAME				15L	VERSION	DATE								
Wind	0 KT	Elevation	0 FT	TORA	1800	M			AXXXXXXX	**20								
QNH	1013.25 HPA	Isa temp	15 C	TODA	1800	M												
Air cond.	Off	rwly slope	0.00 %	ASDA	1800	M			0 obstacle									
Anti-icing	Off	WATER 1/4" CONF 2																
All reversers operating																		
OAT	C	TOGA		D04	D08	D12	D16	D20	D24	D40								
0		* 68.8	3/9	* 69.3	3/9	67.8	3/9	66.0	3/9	63.9	2/3	61.6	2/3	59.5	2/3	52.2	2/3	
		* 114/25/30		* 113/26/30		113/24/29		113/23/28		113/23/27		113/22/26		113/21/25		112/18/21		
10		* 63.5	3/9	* 67.5	3/9	* 66.8	3/9	65.2	3/9	63.3	3/9	61.0	2/3	59.0	2/3	51.7	2/3	
		* 115/19/25		* 112/24/29		* 111/23/28		111/22/26		111/21/25		111/20/24		111/19/23		111/17/20		
20		* 58.2	3/3	* 62.4	3/9	* 65.6	3/9	* 64.1	3/9	62.6	3/9	60.4	3/9	58.4	2/3	51.2	2/3	
		* 115/18/25		* 112/18/24		* 110/22/27		* 109/21/25		109/19/24		109/19/23		109/18/22		109/15/18		
30		* 53.3	3/3	* 57.3	3/3	* 60.7	3/9	* 63.2	3/9	* 61.6	3/9	59.8	3/9	57.8	3/9	50.7	2/3	
		* 115/18/25		* 112/16/22		* 110/17/22		* 108/20/24		* 108/18/23		107/17/21		107/16/20		107/14/17		
32		* 52.5	3/3	* 56.3	3/3	* 59.9	3/9	* 63.0	3/9	* 61.4	3/9	59.6	3/9	57.7	3/9	50.6	2/3	
		* 115/18/25		* 112/16/22		* 110/16/21		* 108/20/24		* 107/18/23		107/17/21		107/16/20		107/13/16		
34		* 51.5	3/3	* 55.5	3/3	* 58.8	3/9	* 62.2	3/9	* 61.2	3/9	59.5	3/9	57.6	3/9	50.5	2/3	
		* 115/18/25		* 112/16/22		* 110/15/20		* 108/19/23		* 107/18/22		107/17/21		107/16/20		106/13/16		
36		* 50.7	3/3	* 54.2	3/3	* 57.8	3/9	* 61.1	3/9	* 61.0	3/9	* 59.3	3/9	57.5	3/9	50.4	2/3	
		* 115/17/25		* 113/16/22		* 110/14/19		* 108/18/22		* 107/18/22		* 106/17/21		106/15/19		106/13/16		
38		* 49.9	3/3	* 53.2	3/3	* 56.6	3/3	* 60.2	3/9	* 60.8	3/9	* 59.1	3/9	57.4	3/9	50.3	2/3	
		* 115/17/25		* 113/15/22		* 110/14/19		* 108/17/22		* 106/18/22		* 106/16/20		106/15/19		106/13/15		
40		* 49.0	3/3	* 52.2	3/3	* 55.6	3/3	* 59.0	3/9	* 60.6	3/9	* 58.9	3/9	57.2	3/9	50.2	2/3	
		* 116/17/25		* 113/15/22		* 110/14/19		* 108/15/20		* 106/18/22		* 106/16/20		105/15/19		105/12/15		
42		* 48.2	3/3	* 51.3	3/3	* 54.4	3/3	* 57.7	3/9	* 60.4	3/9	* 58.7	3/9	57.1	3/9	50.1	2/3	
		* 116/17/25		* 113/15/22		* 110/14/19		* 108/14/19		* 106/17/22		* 105/16/20		105/15/19		105/12/15		
44		* 47.3	3/3	* 50.4	3/3	DO NOT USE FOR OPERATIONAL PURPOSE					56.9	3/9	50.0	2/3				
		* 116/17/25		* 113/15/22							105/14/18		105/12/15					
46		* 46.4	3/3	* 49.5	3/3						56.7	3/9	49.9	2/3				
		* 116/17/25		* 113/15/22							105/14/18		104/11/14					
48		* 45.4	3/3	* 49.8	3/3	* 52.7	3/3	* 56.1	3/9	* 59.2	3/9	* 57.6	3/9	56.0	3/9	49.5	2/3	
		* 116/17/25		* 112/14/21		* 109/13/19		* 107/13/18		* 105/16/21		* 104/15/19		104/14/17		104/11/14		
50		* 44.5	3/3	* 50.1	3/3	* 53.0	3/3	* 56.2	3/9	* 58.5	3/9	* 56.8	3/9	55.3	3/9	49.1	2/3	
		* 116/17/25		* 111/14/20		* 109/12/18		* 106/13/18		* 104/16/20		* 104/14/18		104/13/17		104/11/13		
52		* 43.5	3/3	* 50.3	3/3	* 53.2	3/3	* 56.6	3/9	* 57.7	3/9	* 56.1	3/9	54.6	3/9	48.7	2/3	
		* 116/17/25		* 110/13/19		* 108/11/17		* 105/13/18		* 104/15/19		* 104/14/18		103/13/16		103/10/13		
54		* 42.6	3/3	* 50.8	3/3	* 53.7	3/9	* 56.8	3/9	* 56.9	3/9	* 55.4	3/9	53.8	3/9	48.5	2/3	
		* 116/17/25		* 109/12/18		* 107/10/15		* 104/14/18		* 103/14/18		* 103/13/17		103/12/15		103/10/13		
LABEL FOR INFLUENCE		MTOW(1000 KG) codes				* VMC	Tref (OAT)=46C	Min acc height 422 FT		Min QNH alt 422 FT								
DW (1000 KG) DTFLX		V1min/VR/V2 (kt)				* LIMITATION	Max (OAT)=55C	Max acc height 1586 FT		Max QNH alt 1586 FT								
DV1-DVR-DV2 (KT)		LIMITATION CODES																
(VMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles																
DW (1000 KG) DTFLX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU																
DV1-DVR-DV2 (KT)																		

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 4
		SEQ 020	REV 38

PW6122A		D04 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15			OAT > ISA + 15				
AIR CONDITIONING ON				-1.60			-1.60				
NACELLE ANTI-ICE ON				0.00			-2.80				
NACELLE AND WING ANTI-ICE ON				0.00			-3.70				
OAT (C)	PRESSURE ALTITUDE (FT)										
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.
-54.0	73.9	74.9	76.0	76.5	77.0	77.7	78.5	79.4	80.4	81.2	82.4
-50.0	74.5	75.6	76.6	77.1	77.6	78.4	79.1	80.0	81.0	81.8	83.0
-46.0	75.1	76.2	77.2	77.7	78.3	79.0	79.8	80.6	81.6	82.4	83.6
-42.0	75.7	76.8	77.9	78.4	78.9	79.6	80.4	81.2	82.2	83.0	84.2
-38.0	76.4	77.4	78.5	79.0	79.5	80.2	81.0	81.8	82.8	83.6	84.8
-34.0	77.0	78.0	79.0	79.6	80.1	80.8	81.6	82.4	83.4	84.2	85.4
-30.0	77.6	78.6	79.7	80.2	80.7	81.4	82.2	83.0	84.0	84.8	86.0
-26.0	78.1	79.2	80.3	80.8	81.3	82.0	82.8	83.6	84.5	85.4	86.6
-22.0	78.7	79.8	80.8	81.4	81.9	82.6	83.3	84.2	85.1	85.9	87.2
-18.0	79.3	80.4	81.4	81.9	82.4	83.2	83.9	84.7	85.7	86.5	87.7
-14.0	79.9	80.9	82.0	82.5	83.0	83.8	84.5	85.3	86.2	87.1	88.3
-10.0	80.5	81.5	82.6	83.1	83.6	84.3	85.1	85.8	86.8	87.6	88.9
-6.0	81.0	82.1	83.1	83.6	84.2	84.9	85.6	86.4	87.3	88.2	89.4
-2.0	81.6	82.7	83.7	84.2	84.7	85.5	86.2	87.0	87.9	88.7	90.0
2.0	82.1	83.2	84.3	84.8	85.3	86.0	86.7	87.5	88.4	89.3	90.5
6.0	82.7	83.8	84.8	85.3	85.8	86.6	87.3	88.0	88.9	89.8	91.1
10.0	83.3	84.3	85.4	85.9	86.4	87.1	87.8	88.6	89.5	90.3	91.6
14.0	83.8	84.9	85.9	86.4	86.9	87.7	88.4	89.1	90.0	90.9	92.1
18.0	84.3	85.4	86.5	87.0	87.5	88.2	88.9	89.6	90.5	90.7	91.4
22.0	84.9	85.9	87.0	87.5	88.0	88.7	89.4	89.6	89.5	89.3	90.5
26.0	85.4	86.5	87.5	88.0	88.5	88.8	88.7	88.4	88.4	88.2	89.6
30.0	85.9	87.0	88.1	88.2	88.1	88.0	87.9	87.8	87.7	87.6	88.6
34.0	86.5	87.2	87.7	87.6	87.5	87.4	87.3	87.2	87.2	87.1	88.0
38.0	86.1	86.6	87.1	87.1	87.0	86.9	86.8	86.8	86.8	86.7	87.5
42.0	85.5	86.0	86.6	86.5	86.5	86.4	86.4	86.4	86.3		
46.0	84.8	85.4	86.1	86.0	86.0	85.9	85.9				
50.0	84.2	84.8	85.5	85.5							
54.0	83.8	84.4	85.0								
58.0	83.5										
OAT < ISA +15(C)											
OAT > ISA +15(C)											

PW6122A		D04 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15				
AIR CONDITIONING ON								-1.60			
NACELLE ANTI-ICE ON								0.00			
NACELLE AND WING ANTI-ICE ON								0.00			
OAT (C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
-54.0	79.4	80.4	81.2	82.4	83.5	84.7	84.9	85.2	85.4	85.7	85.8
-50.0	80.0	81.0	81.8	83.0	84.2	85.3	85.6	85.8	86.1	86.3	86.5
-46.0	80.6	81.6	82.4	83.6	84.8	85.9	86.2	86.5	86.7	87.0	87.1
-42.0	81.2	82.2	83.0	84.2	85.4	86.6	86.8	87.1	87.3	87.6	87.7
-38.0	81.8	82.8	83.6	84.8	86.0	87.2	87.4	87.7	88.0	88.2	88.4
-34.0	82.4	83.4	84.2	85.4	86.6	87.8	88.1	88.3	88.6	88.9	89.0
-30.0	83.0	84.0	84.8	86.0	87.2	88.4	88.7	88.9	89.2	89.5	89.6
-26.0	83.6	84.5	85.4	86.6	87.8	89.0	89.3	89.5	89.8	90.1	90.2
-22.0	84.2	85.1	85.9	87.2	88.4	89.6	89.9	90.1	90.4	90.7	90.8
-18.0	84.7	85.7	86.5	87.7	89.0	90.2	90.5	90.7	91.0	91.3	91.4
-14.0	85.3	86.2	87.1	88.3	89.5	90.8	91.0	91.3	91.6	91.9	92.0
-10.0	85.8	86.8	87.6	88.9	90.1	91.4	91.6	91.9	92.2	92.4	92.6
-6.0	86.4	87.3	88.2	89.4	90.7	91.9	92.2	92.5	92.7	93.0	93.2
-2.0	87.0	87.9	88.7	90.0	91.2	92.5	92.8	93.0	93.3	93.6	93.7
2.0	87.5	88.4	89.3	90.5	91.8	93.1	93.3	93.6	93.9	94.2	94.3
6.0	88.0	88.9	89.8	91.1	92.3	93.6	93.9	94.2	94.3	94.3	94.3
10.0	88.6	89.5	90.3	91.6	92.9	94.2	94.3	94.3	94.3	94.2	94.2
14.0	89.1	90.0	90.9	92.1	93.1	94.3	94.3	94.1	94.1	93.9	93.7
18.0	89.6	90.5	90.7	91.4	92.6	94.0	93.9	93.5	93.0	92.8	92.8
22.0	89.6	89.5	89.3	90.5	91.9	93.1	92.4	91.9	91.9	91.9	92.0
26.0	88.4	88.4	88.2	89.6	90.6	91.2	91.0	91.0	91.1	91.2	91.2
30.0	87.8	87.7	87.6	88.6	89.5	90.1	90.2	90.3			
34.0	87.2	87.2	87.1	88.0	88.7	89.4					
38.0	86.8	86.8	86.7	87.5							
42.0	86.4	86.3									
46.0											
50.0											
54.0											
OAT <ISA+15(C) 											
OAT>ISA+15(C) 											

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		SEQ 020	REV 38

PW6122A		D08 DERATED TO N1		NO AIR BLEED				MACH=.000				
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15		OAT > ISA + 15						
AIR CONDITIONING ON				-1.60		-1.60						
NACELLE ANTI-ICE ON				0.00		-2.80						
NACELLE AND WING ANTI-ICE ON				0.00		-3.70						
OAT (C)	PRESSURE ALTITUDE (FT)											
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	
-54.0	72.8	73.8	74.7	75.1	75.6	76.2	76.9	77.5	78.3	79.2	80.4	
-50.0	73.4	74.4	75.3	75.8	76.2	76.8	77.5	78.1	78.9	79.8	81.0	
-46.0	74.0	75.0	76.0	76.4	76.8	77.5	78.1	78.7	79.5	80.4	81.6	
-42.0	74.6	75.6	76.6	77.0	77.4	78.1	78.7	79.4	80.1	81.0	82.2	
-38.0	75.2	76.2	77.2	77.6	78.1	78.7	79.3	80.0	80.8	81.6	82.8	
-34.0	75.8	76.8	77.8	78.2	78.6	79.3	79.9	80.6	81.4	82.2	83.4	
-30.0	76.4	77.4	78.4	78.8	79.2	79.9	80.5	81.2	82.0	82.8	83.9	
-26.0	77.0	78.0	79.0	79.4	79.9	80.5	81.1	81.8	82.5	83.4	84.5	
-22.0	77.6	78.6	79.6	80.0	80.4	81.1	81.7	82.3	83.1	84.0	85.1	
-18.0	78.2	79.2	80.1	80.6	81.0	81.6	82.3	82.9	83.7	84.5	85.6	
-14.0	78.7	79.8	80.7	81.2	81.6	82.2	82.9	83.5	84.3	85.1	86.2	
-10.0	79.3	80.3	81.3	81.7	82.2	82.8	83.4	84.1	84.9	85.7	86.7	
-6.0	79.9	80.9	81.9	82.3	82.7	83.4	84.0	84.6	85.4	86.2	87.3	
-2.0	80.4	81.5	82.4	82.9	83.3	83.9	84.6	85.2	86.0	86.8	87.8	
2.0	81.0	82.0	83.0	83.4	83.9	84.5	85.1	85.8	86.5	87.3	88.4	
6.0	81.5	82.6	83.5	84.0	84.4	85.0	85.7	86.3	87.1	87.9	88.9	
10.0	82.1	83.1	84.1	84.5	85.0	85.6	86.2	86.9	87.6	88.4	89.4	
14.0	82.6	83.7	84.6	85.1	85.5	86.1	86.8	87.4	88.2	88.9	89.9	
18.0	83.2	84.2	85.2	85.6	86.1	86.7	87.3	87.9	88.7	88.9	89.5	
22.0	83.7	84.8	85.7	86.2	86.6	87.2	87.8	88.0	87.9	87.7	88.8	
26.0	84.3	85.3	86.2	86.7	87.1	87.3	87.3	87.0	87.0	86.8	88.0	
30.0	84.8	85.8	86.8		86.9	86.8	86.7	86.6	86.5	86.4	87.3	
34.0	85.3	86.0	86.5		86.4	86.3	86.2	86.1	86.1	86.0	86.8	
38.0	84.9	85.4	86.0		85.9	85.8	85.8	85.7	85.6	85.6	85.5	
42.0	84.2	84.8	85.4		85.3	85.3	85.2	85.2	85.2	85.1		
46.0	83.5	84.1	84.8		84.8	84.8	84.7	84.7				
50.0	83.1	83.7	84.2		84.2	84.2						
54.0	82.7	83.3	83.9									
58.0	82.5											

OAT < ISA +15(C)

OAT > ISA +15(C)

PW6122A		D08 DERATED TO N1		NO AIR BLEED				MACH=.000					
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15						
AIR CONDITIONING ON					-1.60		-1.60						
NACELLE ANTI-ICE ON					0.00		-2.80						
NACELLE AND WING ANTI-ICE ON					0.00		-3.70						
OAT (C)	PRESSURE ALTITUDE (FT)												
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.		
-54.0	77.5	78.3	79.2	80.4	81.3	82.2	82.4	82.7	82.9	83.2	83.3		
-50.0	78.1	78.9	79.8	81.0	81.9	82.8	83.0	83.3	83.5	83.8	83.9		
-46.0	78.7	79.5	80.4	81.6	82.5	83.4	83.6	83.9	84.2	84.4	84.6		
-42.0	79.4	80.1	81.0	82.2	83.1	84.0	84.3	84.5	84.8	85.0	85.2		
-38.0	80.0	80.8	81.6	82.8	83.7	84.6	84.9	85.1	85.4	85.6	85.8		
-34.0	80.6	81.4	82.2	83.4	84.3	85.2	85.5	85.7	86.0	86.2	86.4		
-30.0	81.2	82.0	82.8	83.9	84.9	85.8	86.0	86.3	86.6	86.8	87.0		
-26.0	81.8	82.5	83.4	84.5	85.5	86.4	86.6	86.9	87.2	87.4	87.6		
-22.0	82.3	83.1	84.0	85.1	86.0	87.0	87.2	87.5	87.7	88.0	88.2		
-18.0	82.9	83.7	84.5	85.6	86.6	87.6	87.8	88.1	88.3	88.6	88.7		
-14.0	83.5	84.3	85.1	86.2	87.2	88.1	88.3	88.6	88.9	89.2	89.3		
-10.0	84.1	84.9	85.7	86.7	87.7	88.7	88.9	89.2	89.5	89.7	89.9		
-6.0	84.6	85.4	86.2	87.3	88.3	89.2	89.5	89.7	90.0	90.3	90.4		
-2.0	85.2	86.0	86.8	87.8	88.8	89.8	90.0	90.3	90.6	90.9	91.0		
2.0	85.8	86.5	87.3	88.4	89.4	90.3	90.6	90.9	91.1	91.4	91.5		
6.0	86.3	87.1	87.9	88.9	89.9	90.9	91.1	91.4	91.5	91.5	91.5		
10.0	86.9	87.6	88.4	89.4	90.4	91.4	91.5	91.5	91.5	91.4	91.5		
14.0	87.4	88.2	88.9	89.9	90.7	91.6	91.6	91.5	91.5	91.3	91.2		
18.0	87.9	88.7	88.9	89.5	90.4	91.5	91.4	91.1	90.7	90.5	90.5		
22.0	88.0	87.9	87.7	88.8	90.0	90.9	90.4	90.0	90.0	90.0	90.0		
26.0	87.0	87.0	86.8	88.0	88.9	89.5	89.3	89.3	89.4	89.5	89.5		
30.0	86.5	86.4	86.4	87.3	88.0	88.6	88.6	88.7					
34.0	86.1	86.0	85.9	86.8	87.4	88.0							
38.0	85.6	85.6	85.5	86.3									
42.0	85.2	85.1											
46.0													
50.0													
54.0													
										OAT < ISA+15(C)			
										OAT > ISA+15(C)			

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 8
		SEQ 020	REV 38

PW6122A		D12 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15			OAT > ISA + 15				
AIR CONDITIONING ON				-1.60			-1.60				
NACELLE ANTI-ICE ON				0.00			-2.80				
NACELLE AND WING ANTI-ICE ON				0.00			-3.70				
OAT (C)	PRESSURE ALTITUDE (FT)										
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.
-54.0	71.5	72.6	73.5	73.9	74.3	74.8	75.4	75.9	76.6	77.3	78.2
-50.0	72.2	73.2	74.1	74.5	74.9	75.5	76.0	76.6	77.2	77.9	78.9
-46.0	72.8	73.8	74.7	75.2	75.5	76.1	76.6	77.2	77.9	78.5	79.5
-42.0	73.4	74.4	75.4	75.8	76.2	76.7	77.3	77.8	78.5	79.1	80.1
-38.0	74.0	75.0	76.0	76.4	76.8	77.3	77.9	78.4	79.1	79.8	80.7
-34.0	74.6	75.6	76.6	77.0	77.4	77.9	78.4	79.0	79.7	80.4	81.3
-30.0	75.2	76.2	77.2	77.6	78.0	78.5	79.1	79.6	80.3	81.0	81.9
-26.0	75.8	76.8	77.8	78.2	78.6	79.1	79.7	80.2	80.9	81.5	82.5
-22.0	76.3	77.4	78.3	78.8	79.1	79.7	80.2	80.8	81.5	82.1	83.1
-18.0	76.9	78.0	78.9	79.3	79.7	80.3	80.8	81.4	82.0	82.7	83.7
-14.0	77.5	78.6	79.5	79.9	80.3	80.9	81.4	82.0	82.6	83.3	84.2
-10.0	78.1	79.1	80.1	80.5	80.9	81.4	82.0	82.5	83.2	83.9	84.8
-6.0	78.6	79.7	80.6	81.0	81.4	82.0	82.5	83.1	83.8	84.4	85.4
-2.0	79.2	80.3	81.2	81.6	82.0	82.6	83.1	83.7	84.3	85.0	85.9
2.0	79.8	80.8	81.8	82.2	82.6	83.1	83.7	84.2	84.9	85.5	86.5
6.0	80.3	81.4	82.3	82.7	83.1	83.7	84.2	84.8	85.4	86.1	87.0
10.0	80.9	81.9	82.9	83.3	83.7	84.2	84.8	85.3	86.0	86.6	87.6
14.0	81.4	82.5	83.4	83.8	84.2	84.8	85.3	85.9	86.5	87.2	88.1
18.0	81.9	83.0	83.9	84.4	84.8	85.3	85.9	86.4	87.1	87.2	87.7
22.0	82.5	83.6	84.5	84.9	85.3	85.8	86.4	86.5	86.4	86.3	87.2
26.0	83.0	84.1	85.0	85.4	85.8	86.0	85.9	85.8	85.7	85.6	86.6
30.0	83.5	84.6	85.5		85.6	85.5	85.4	85.3	85.2	85.2	86.0
34.0	84.1	84.8	85.3		85.2	85.1	85.0	84.9	84.8	84.8	85.6
38.0	83.6	84.2	84.7		84.6	84.6	84.5	84.4	84.4	84.3	85.1
42.0	83.0	83.5	84.1		84.0	84.0	83.9	83.9	83.9	83.8	
46.0	82.4	83.0	83.6		83.5	83.5	83.5	83.4			
50.0	82.0	82.6	83.1		83.1	83.0					
54.0	81.6	82.3	82.8								
58.0	81.3										

OAT < ISA +15(C)

OAT > ISA +15(C)

PW6122A		D12 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15				
AIR CONDITIONING ON								-1.60			
NACELLE ANTI-ICE ON								0.00			
NACELLE AND WING ANTI-ICE ON								0.00			
OAT (C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
-54.0	75.9	76.6	77.3	78.2	79.4	80.5	80.7	80.9	81.2	81.4	81.6
-50.0	76.6	77.2	77.9	78.9	80.0	81.1	81.3	81.5	81.8	82.1	82.2
-46.0	77.2	77.9	78.5	79.5	80.6	81.7	81.9	82.1	82.4	82.7	82.8
-42.0	77.8	78.5	79.1	80.1	81.2	82.3	82.5	82.7	83.0	83.3	83.4
-38.0	78.4	79.1	79.8	80.7	81.8	82.8	83.1	83.3	83.6	83.9	84.0
-34.0	79.0	79.7	80.4	81.3	82.4	83.4	83.6	83.9	84.2	84.4	84.6
-30.0	79.6	80.3	81.0	81.9	83.0	84.0	84.2	84.5	84.8	85.0	85.2
-26.0	80.2	80.9	81.5	82.5	83.5	84.6	84.8	85.1	85.3	85.6	85.7
-22.0	80.8	81.5	82.1	83.1	84.1	85.1	85.4	85.6	85.9	86.2	86.3
-18.0	81.4	82.0	82.7	83.7	84.7	85.7	85.9	86.2	86.5	86.7	86.9
-14.0	82.0	82.6	83.3	84.2	85.3	86.3	86.5	86.8	87.0	87.3	87.4
-10.0	82.5	83.2	83.9	84.8	85.8	86.8	87.0	87.3	87.6	87.9	88.0
-6.0	83.1	83.8	84.4	85.4	86.4	87.4	87.6	87.9	88.1	88.4	88.6
-2.0	83.7	84.3	85.0	85.9	86.9	87.9	88.1	88.4	88.7	89.0	89.1
2.0	84.2	84.9	85.5	86.5	87.5	88.4	88.7	88.9	89.2	89.5	89.6
6.0	84.8	85.4	86.1	87.0	88.0	89.0	89.2	89.5	89.6	89.6	89.6
10.0	85.3	86.0	86.6	87.6	88.5	89.5	89.6	89.6	89.5	89.5	89.5
14.0	85.9	86.5	87.2	88.1	88.8	89.7	89.7	89.6	89.5	89.4	89.3
18.0	86.4	87.1	87.2	87.7	88.6	89.6	89.5	89.2	88.9	88.7	88.7
22.0	86.5	86.4	86.3	87.2	88.2	89.1	88.6	88.3	88.3	88.3	88.3
26.0	85.8	85.7	85.6	86.6	87.4	87.9	87.8	87.7	87.8	87.9	87.9
30.0	85.3	85.2	85.2	86.0	86.7	87.2	87.2	87.3			
34.0	84.8	84.8	84.7	85.6	86.2	86.7					
38.0	84.4	84.3	84.3	85.1							
42.0	83.9	83.8									
46.0											
50.0											
54.0											

OAT < ISA+15(C)

OAT > ISA+15(C)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 10
		SEQ 020	REV 38

PW6122A		D16 DERATED TO N1								NO AIR BLEED		MACH=.000									
N1 CORRECTIONS FOR AIR BLEED										OAT < ISA + 15	OAT > ISA + 15										
AIR CONDITIONING ON										-1.60	-1.60										
NACELLE ANTI-ICE ON										0.00	-2.80										
NACELLE AND WING ANTI-ICE ON										0.00	-3.70										
OAT (C)		PRESSURE ALTITUDE (FT)																			
-54.0	70.2	71.3	72.3	72.7	73.1	73.6	74.1	74.6	75.1	75.7	76.4										
-50.0	70.8	71.9	72.9	73.3	73.7	74.2	74.7	75.2	75.8	76.3	77.1										
-46.0	71.5	72.5	73.5	73.9	74.3	74.8	75.3	75.8	76.4	77.0	77.7										
-42.0	72.1	73.2	74.1	74.6	74.9	75.5	75.9	76.4	77.0	77.6	78.3										
-38.0	72.7	73.8	74.7	75.2	75.5	76.1	76.6	77.0	77.6	78.2	78.9										
-34.0	73.3	74.4	75.3	75.8	76.1	76.7	77.1	77.6	78.2	78.8	79.5										
-30.0	73.9	75.0	75.9	76.4	76.7	77.3	77.7	78.2	78.8	79.4	80.1										
-26.0	74.4	75.5	76.5	76.9	77.3	77.8	78.3	78.8	79.4	80.0	80.7										
-22.0	75.0	76.1	77.1	77.5	77.9	78.4	78.9	79.4	80.0	80.6	81.3										
-18.0	75.6	76.7	77.7	78.1	78.5	79.0	79.5	80.0	80.6	81.2	81.9										
-14.0	76.2	77.3	78.2	78.7	79.1	79.6	80.1	80.6	81.2	81.7	82.4										
-10.0	76.7	77.8	78.8	79.3	79.6	80.2	80.7	81.1	81.7	82.3	83.0										
-6.0	77.3	78.4	79.4	79.8	80.2	80.7	81.2	81.7	82.3	82.9	83.6										
-2.0	77.9	79.0	79.9	80.4	80.8	81.3	81.8	82.3	82.9	83.4	84.2										
2.0	78.4	79.5	80.5	80.9	81.3	81.9	82.4	82.8	83.4	84.0	84.7										
6.0	79.0	80.1	81.1	81.5	81.9	82.4	82.9	83.4	84.0	84.6	85.3										
10.0	79.5	80.6	81.6	82.0	82.4	83.0	83.5	83.9	84.5	85.1	85.8										
14.0	80.1	81.2	82.1	82.6	83.0	83.5	84.0	84.5	85.1	85.6	86.4										
18.0	80.6	81.7	82.7	83.1	83.5	84.0	84.5	85.0	85.6	85.8	86.2										
22.0	81.1	82.2	83.2	83.7	84.1	84.6	85.1	85.2	85.1	84.9	85.8										
26.0	81.7	82.8	83.8	84.2	84.6	84.8	84.7	84.5	84.5	84.4	85.3										
30.0	82.2	83.3	84.3		84.4	84.3	84.2	84.1	84.0	83.9	83.9	84.8									
34.0	82.7	83.4	84.0		83.9	83.8	83.7	83.6	83.5	83.4	83.4	84.3									
38.0	82.3	82.9	83.4		83.3	83.2	83.2	83.1	83.0	83.0	83.0	83.8									
42.0	81.8	82.3	82.8		82.8	82.7	82.7	82.6	82.6	82.6	82.6										
46.0	81.3	81.8	82.4		82.4	82.3															
50.0	80.9	81.4	82.0		82.0	81.9															
54.0	80.5	81.1	81.7																		
58.0	80.2																				
												OAT < ISA +15(C)									
												OAT > ISA +15(C)									

PW6122A		D16 DERATED TO N1		NO AIR BLEED				MACH=.000					
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15						
AIR CONDITIONING ON					-1.60		-1.60						
NACELLE ANTI-ICE ON					0.00		-2.80						
NACELLE AND WING ANTI-ICE ON					0.00		-3.70						
OAT (C)	PRESSURE ALTITUDE (FT)												
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.		
-54.0	74.6	75.1	75.7	76.4	77.2	77.9	78.1	78.4	78.7	79.1	79.3		
-50.0	75.2	75.8	76.3	77.1	77.8	78.5	78.7	79.0	79.4	79.7	79.9		
-46.0	75.8	76.4	77.0	77.7	78.4	79.1	79.3	79.6	80.0	80.3	80.5		
-42.0	76.4	77.0	77.6	78.3	79.0	79.7	80.0	80.3	80.6	80.9	81.1		
-38.0	77.0	77.6	78.2	78.9	79.6	80.4	80.6	80.9	81.2	81.5	81.7		
-34.0	77.6	78.2	78.8	79.5	80.2	81.0	81.2	81.5	81.8	82.1	82.3		
-30.0	78.2	78.8	79.4	80.1	80.8	81.5	81.8	82.1	82.4	82.7	82.9		
-26.0	78.8	79.4	80.0	80.7	81.4	82.1	82.4	82.6	83.0	83.3	83.5		
-22.0	79.4	80.0	80.6	81.3	82.0	82.7	82.9	83.2	83.6	83.9	84.0		
-18.0	80.0	80.6	81.2	81.9	82.6	83.3	83.5	83.8	84.1	84.5	84.6		
-14.0	80.6	81.2	81.7	82.4	83.2	83.9	84.1	84.4	84.7	85.0	85.2		
-10.0	81.1	81.7	82.3	83.0	83.7	84.5	84.7	85.0	85.3	85.6	85.7		
-6.0	81.7	82.3	82.9	83.6	84.3	85.0	85.2	85.5	85.8	86.1	86.3		
-2.0	82.3	82.9	83.4	84.2	84.9	85.6	85.8	86.1	86.4	86.7	86.8		
2.0	82.8	83.4	84.0	84.7	85.4	86.1	86.3	86.6	86.9	87.2	87.4		
6.0	83.4	84.0	84.6	85.3	86.0	86.7	86.9	87.2	87.3	87.3	87.3		
10.0	83.9	84.5	85.1	85.8	86.5	87.2	87.3	87.3	87.3	87.3	87.3		
14.0	84.5	85.1	85.6	86.4	86.9	87.6	87.5	87.5	87.4	87.3	87.2		
18.0	85.0	85.6	85.8	86.2	86.9	87.6	87.6	87.3	87.1	86.9	86.9		
22.0	85.2	85.1	84.9	85.8	86.7	87.4	87.0	86.8	86.7	86.7	86.8		
26.0	84.5	84.5	84.4	85.3	86.0	86.4	86.4	86.3	86.4	86.4	86.5		
30.0	84.0	83.9	83.9	84.8	85.4	85.9	85.9	86.0					
34.0	83.5	83.4	83.4	84.3	84.9	85.5							
38.0	83.0	83.0	83.0	83.8									
42.0	82.6	82.6											
46.0													
50.0													
54.0													
										OAT < ISA+15(C)			
										OAT > ISA+15(C)			

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 12
		SEQ 020	REV 38

PW6122A		D20 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15			OAT > ISA + 15				
AIR CONDITIONING ON				-1.60			-1.60				
NACELLE ANTI-ICE ON				0.00			-2.80				
NACELLE AND WING ANTI-ICE ON				0.00			-3.70				
OAT (C)	PRESSURE ALTITUDE (FT)										
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.
-54.0	69.0	70.0	70.9	71.4	71.8	72.3	72.8	73.3	73.8	74.3	75.0
-50.0	69.6	70.6	71.5	72.0	72.4	73.0	73.4	73.9	74.4	74.9	75.6
-46.0	70.2	71.2	72.2	72.6	73.0	73.6	74.1	74.5	75.0	75.6	76.3
-42.0	70.8	71.8	72.8	73.2	73.6	74.2	74.7	75.1	75.6	76.2	76.9
-38.0	71.4	72.4	73.4	73.8	74.2	74.8	75.3	75.7	76.3	76.8	77.5
-34.0	72.0	73.0	74.0	74.4	74.8	75.4	75.9	76.3	76.9	77.4	78.1
-30.0	72.6	73.6	74.6	75.0	75.4	76.0	76.5	76.9	77.5	78.0	78.7
-26.0	73.2	74.2	75.1	75.6	76.0	76.6	77.1	77.5	78.0	78.6	79.3
-22.0	73.7	74.8	75.7	76.2	76.6	77.2	77.7	78.1	78.6	79.2	79.9
-18.0	74.3	75.3	76.3	76.8	77.2	77.7	78.2	78.7	79.2	79.7	80.5
-14.0	74.9	75.9	76.9	77.3	77.8	78.3	78.8	79.3	79.8	80.3	81.0
-10.0	75.5	76.5	77.4	77.9	78.3	78.9	79.4	79.8	80.4	80.9	81.6
-6.0	76.0	77.0	78.0	78.5	78.9	79.5	79.9	80.4	80.9	81.5	82.2
-2.0	76.6	77.6	78.6	79.0	79.4	80.0	80.5	81.0	81.5	82.0	82.7
2.0	77.1	78.2	79.1	79.6	80.0	80.6	81.1	81.5	82.0	82.6	83.3
6.0	77.7	78.7	79.7	80.1	80.6	81.1	81.6	82.1	82.6	83.1	83.9
10.0	78.2	79.2	80.2	80.7	81.1	81.7	82.2	82.6	83.2	83.7	84.4
14.0	78.8	79.8	80.8	81.2	81.6	82.2	82.7	83.2	83.7	84.2	84.9
18.0	79.3	80.3	81.3	81.8	82.2	82.8	83.3	83.7	84.2	84.4	84.8
22.0	79.8	80.9	81.8	82.3	82.7	83.3	83.8	83.9	83.8	83.7	84.4
26.0	80.4	81.4	82.4	82.8	83.3	83.5	83.4	83.2	83.2	83.0	84.1
30.0	80.9	81.9	82.9	83.0	82.9	82.8	82.7	82.6	82.5	82.5	83.4
34.0	81.4	82.1	82.6	82.5	82.4	82.3	82.2	82.2	82.1	82.0	82.9
38.0	81.1	81.6	82.1	82.0	81.9	81.9	81.8	81.8	81.7	81.7	82.4
42.0	80.6	81.1	81.6	81.6	81.5	81.5	81.5	81.4	81.4		
46.0	80.1	80.6	81.2	81.2	81.1	81.1	81.1				
50.0	79.7	80.2	80.8	80.8	80.7						
54.0	79.4	79.9	80.5								
58.0	79.1										

OAT < ISA+15(C)

OAT > ISA+15(C)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 14
		SEQ 020	REV 38

PW6122A		D24 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15			OAT > ISA + 15				
AIR CONDITIONING ON				-1.60			-1.60				
NACELLE ANTI-ICE ON				0.00			-2.80				
NACELLE AND WING ANTI-ICE ON				0.00			-3.70				
OAT (C)	PRESSURE ALTITUDE (FT)										
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.
-54.0	67.8	68.7	69.6	70.0	70.4	70.9	71.4	71.9	72.4	73.0	73.5
-50.0	68.4	69.3	70.2	70.6	71.0	71.6	72.1	72.5	73.1	73.6	74.2
-46.0	69.1	69.9	70.8	71.2	71.6	72.2	72.7	73.1	73.7	74.2	74.8
-42.0	69.7	70.5	71.4	71.8	72.2	72.8	73.3	73.7	74.3	74.8	75.4
-38.0	70.2	71.1	72.0	72.4	72.8	73.4	73.9	74.3	74.9	75.4	76.0
-34.0	70.8	71.7	72.6	73.0	73.4	74.0	74.5	74.9	75.5	76.0	76.6
-30.0	71.4	72.3	73.2	73.6	74.0	74.6	75.1	75.5	76.1	76.6	77.2
-26.0	72.0	72.9	73.8	74.2	74.6	75.2	75.7	76.1	76.7	77.2	77.8
-22.0	72.6	73.5	74.3	74.8	75.2	75.7	76.2	76.7	77.3	77.8	78.4
-18.0	73.1	74.0	74.9	75.3	75.7	76.3	76.8	77.3	77.9	78.4	79.0
-14.0	73.7	74.6	75.5	75.9	76.3	76.9	77.4	77.9	78.4	79.0	79.5
-10.0	74.3	75.2	76.1	76.5	76.9	77.5	78.0	78.4	79.0	79.5	80.1
-6.0	74.8	75.7	76.6	77.0	77.4	78.0	78.5	79.0	79.6	80.1	80.7
-2.0	75.4	76.3	77.2	77.6	78.0	78.6	79.1	79.6	80.1	80.7	81.2
2.0	75.9	76.8	77.7	78.2	78.6	79.1	79.6	80.1	80.7	81.2	81.8
6.0	76.5	77.4	78.3	78.7	79.1	79.7	80.2	80.7	81.2	81.8	82.3
10.0	77.0	77.9	78.8	79.2	79.7	80.2	80.7	81.2	81.8	82.3	82.9
14.0	77.5	78.5	79.4	79.8	80.2	80.8	81.3	81.8	82.3	82.9	83.4
18.0	78.1	79.0	79.9	80.3	80.7	81.3	81.8	82.3	82.9	83.0	83.4
22.0	78.6	79.5	80.4	80.9	81.3	81.9	82.4	82.5	82.4	82.2	83.0
26.0	79.1	80.1	81.0	81.4	81.8	82.0	81.9	81.7	81.7	81.5	82.6
30.0	79.7	80.6	81.5	81.6	81.5	81.4	81.3	81.2	81.2	81.1	82.0
34.0	80.2	80.8	81.2	81.1	81.1	81.0	80.9	80.9	80.8	80.7	81.5
38.0	79.9	80.4	80.8	80.7	80.7	80.6	80.6	80.5	80.5	80.4	81.2
42.0	79.4	79.9	80.4	80.3	80.3	80.2	80.2	80.2	80.1		
46.0	78.9	79.4	80.0	79.9	79.9	79.9	79.8				
50.0	78.5	79.0	79.6	79.5	79.5						
54.0	78.1	78.7	79.2								
58.0	77.8										

OAT < ISA +15(C)

OAT > ISA +15(C)

PW6122A		D24 DERATED TO N1		NO AIR BLEED				MACH=.000					
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15						
AIR CONDITIONING ON					-1.60		-1.60						
NACELLE ANTI-ICE ON					0.00		-2.80						
NACELLE AND WING ANTI-ICE ON					0.00		-3.70						
OAT (C)	PRESSURE ALTITUDE (FT)												
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.		
-54.0	71.9	72.4	73.0	73.5	74.1	74.7	74.8	75.1	75.4	75.7	75.9		
-50.0	72.5	73.1	73.6	74.2	74.7	75.3	75.5	75.8	76.0	76.3	76.5		
-46.0	73.1	73.7	74.2	74.8	75.3	75.9	76.1	76.4	76.7	77.0	77.1		
-42.0	73.7	74.3	74.8	75.4	76.0	76.5	76.7	77.0	77.3	77.6	77.7		
-38.0	74.3	74.9	75.4	76.0	76.6	77.1	77.3	77.6	77.9	78.2	78.3		
-34.0	74.9	75.5	76.0	76.6	77.2	77.7	77.9	78.2	78.5	78.7	78.9		
-30.0	75.5	76.1	76.6	77.2	77.8	78.3	78.5	78.8	79.1	79.4	79.5		
-26.0	76.1	76.7	77.2	77.8	78.4	78.9	79.1	79.4	79.7	80.0	80.1		
-22.0	76.7	77.3	77.8	78.4	78.9	79.5	79.7	80.0	80.3	80.6	80.7		
-18.0	77.3	77.9	78.4	79.0	79.5	80.1	80.3	80.6	80.9	81.1	81.3		
-14.0	77.9	78.4	79.0	79.5	80.1	80.7	80.9	81.1	81.4	81.7	81.9		
-10.0	78.4	79.0	79.5	80.1	80.7	81.2	81.4	81.7	82.0	82.3	82.4		
-6.0	79.0	79.6	80.1	80.7	81.2	81.8	82.0	82.3	82.6	82.9	83.0		
-2.0	79.6	80.1	80.7	81.2	81.8	82.4	82.6	82.8	83.1	83.4	83.6		
2.0	80.1	80.7	81.2	81.8	82.4	82.9	83.1	83.4	83.7	84.0	84.1		
6.0	80.7	81.2	81.8	82.3	82.9	83.5	83.7	84.0	84.1	84.1	84.1		
10.0	81.2	81.8	82.3	82.9	83.5	84.0	84.1	84.1	84.1	84.0	84.1		
14.0	81.8	82.3	82.9	83.4	83.9	84.4	84.4	84.3	84.3	84.2	84.1		
18.0	82.3	82.9	83.0	83.4	83.9	84.6	84.5	84.3	84.1	84.0	84.0		
22.0	82.5	82.4	82.2	83.0	83.9	84.5	84.2	84.0	83.9	84.0	84.0		
26.0	81.7	81.7	81.5	82.6	83.3	83.7	83.6	83.6	83.6	83.7	83.7		
30.0	81.2	81.2	81.1	82.0	82.7	83.2	83.2	83.3					
34.0	80.9	80.8	80.7	81.5	82.1	82.7							
38.0	80.5	80.5	80.4	81.2									
42.0	80.2	80.1											
46.0													
50.0													
54.0													

OAT < ISA+15(C)

OAT > ISA+15(C)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF DERATED TAKEOFF	2.02.27	P 16
		SEQ 020	REV 38

PW6122A		D40 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED				OAT < ISA + 15			OAT > ISA + 15				
AIR CONDITIONING ON				-1.60			-1.60				
NACELLE ANTI-ICE ON				0.00			-2.80				
NACELLE AND WING ANTI-ICE ON				0.00			-3.70				
OAT (C)	PRESSURE ALTITUDE (FT)										
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.
-54.0	66.2	67.0	67.7	68.0	68.3	68.8	69.3	69.7	70.3	70.8	71.4
-50.0	66.8	67.6	68.3	68.6	69.0	69.4	69.9	70.3	70.9	71.4	72.0
-46.0	67.4	68.2	68.9	69.2	69.6	70.0	70.5	71.0	71.5	72.0	72.7
-42.0	68.0	68.8	69.5	69.8	70.2	70.6	71.1	71.6	72.1	72.7	73.3
-38.0	68.6	69.4	70.1	70.4	70.8	71.2	71.7	72.2	72.7	73.3	73.9
-34.0	69.1	69.9	70.7	71.0	71.4	71.8	72.3	72.8	73.3	73.9	74.5
-30.0	69.7	70.5	71.3	71.6	71.9	72.4	72.9	73.3	73.9	74.4	75.1
-26.0	70.3	71.1	71.8	72.2	72.5	73.0	73.5	73.9	74.5	75.0	75.7
-22.0	70.8	71.7	72.4	72.8	73.1	73.6	74.0	74.5	75.1	75.6	76.2
-18.0	71.4	72.2	73.0	73.3	73.7	74.1	74.6	75.1	75.7	76.2	76.8
-14.0	71.9	72.8	73.5	73.9	74.2	74.7	75.2	75.7	76.2	76.8	77.4
-10.0	72.5	73.3	74.1	74.5	74.8	75.3	75.8	76.2	76.8	77.3	78.0
-6.0	73.0	73.9	74.7	75.0	75.4	75.8	76.3	76.8	77.4	77.9	78.5
-2.0	73.6	74.4	75.2	75.6	75.9	76.4	76.9	77.3	77.9	78.5	79.1
2.0	74.1	75.0	75.8	76.1	76.5	77.0	77.4	77.9	78.5	79.0	79.6
6.0	74.6	75.5	76.3	76.7	77.0	77.5	78.0	78.4	79.0	79.6	80.2
10.0	75.2	76.0	76.8	77.2	77.6	78.0	78.5	79.0	79.6	80.1	80.7
14.0	75.7	76.6	77.4	77.8	78.1	78.6	79.1	79.5	80.1	80.7	81.3
18.0	76.2	77.1	77.9	78.3	78.6	79.1	79.6	80.1	80.6	80.8	81.2
22.0	76.7	77.6	78.4	78.8	79.2	79.7	80.1	80.2	80.2	80.0	80.8
26.0	77.2	78.1	79.0	79.3	79.7	79.9	79.8	79.6	79.6	79.5	80.4
30.0	77.7	78.6	79.5	79.6	79.5	79.4	79.4	79.2	79.2	79.1	79.9
34.0	78.2	78.8	79.3	79.2	79.1	79.0	79.0	78.9	78.8	78.8	79.5
38.0	77.9	78.4	78.9	78.8	78.7	78.7	78.6	78.6	78.5	78.5	79.2
42.0	77.5	77.9	78.4	78.4	78.3	78.3	78.3	78.2	78.2		
46.0	77.0	77.5	78.0	78.0	78.0	77.9	77.9				
50.0	76.5	77.1	77.6	77.6	77.6	77.6					
54.0	76.1	76.7	77.3								
58.0	75.7										

OAT < ISA +15(C)

OAT > ISA +15(C)

PW6122A		D40 DERATED TO N1		NO AIR BLEED				MACH=.000			
N1 CORRECTIONS FOR AIR BLEED						OAT < ISA + 15	OAT > ISA + 15				
AIR CONDITIONING ON								-1.60			
NACELLE ANTI-ICE ON								0.00			
NACELLE AND WING ANTI-ICE ON								0.00			
OAT (C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
-54.0	69.7	70.3	70.8	71.4	72.0	72.7	72.9	73.1	73.4	73.7	73.8
-50.0	70.3	70.9	71.4	72.0	72.7	73.3	73.5	73.8	74.0	74.3	74.5
-46.0	71.0	71.5	72.0	72.7	73.3	73.9	74.1	74.4	74.7	74.9	75.1
-42.0	71.6	72.1	72.7	73.3	73.9	74.5	74.7	75.0	75.3	75.6	75.7
-38.0	72.2	72.7	73.3	73.9	74.5	75.1	75.3	75.6	75.9	76.2	76.3
-34.0	72.8	73.3	73.9	74.5	75.1	75.7	75.9	76.2	76.5	76.8	76.9
-30.0	73.3	73.9	74.4	75.1	75.7	76.3	76.5	76.8	77.1	77.4	77.5
-26.0	73.9	74.5	75.0	75.7	76.3	76.9	77.1	77.4	77.7	78.0	78.1
-22.0	74.5	75.1	75.6	76.2	76.9	77.5	77.7	78.0	78.3	78.5	78.7
-18.0	75.1	75.7	76.2	76.8	77.4	78.1	78.3	78.5	78.8	79.1	79.3
-14.0	75.7	76.2	76.8	77.4	78.0	78.6	78.8	79.1	79.4	79.7	79.8
-10.0	76.2	76.8	77.3	78.0	78.6	79.2	79.4	79.7	80.0	80.3	80.4
-6.0	76.8	77.4	77.9	78.5	79.2	79.8	80.0	80.3	80.5	80.8	81.0
-2.0	77.3	77.9	78.5	79.1	79.7	80.3	80.5	80.8	81.1	81.4	81.5
2.0	77.9	78.5	79.0	79.6	80.3	80.9	81.1	81.4	81.7	82.0	82.1
6.0	78.4	79.0	79.6	80.2	80.8	81.5	81.6	81.9	82.0	82.0	82.0
10.0	79.0	79.6	80.1	80.7	81.4	82.0	82.0	82.0	82.0	82.0	82.0
14.0	79.5	80.1	80.7	81.3	81.8	82.3					
18.0	80.1	80.6	80.8	81.2	81.8	82.5	82.4	82.2	82.0	81.9	81.9
22.0	80.2	80.2	80.0	80.8	81.7	82.3	82.0	81.8	81.7	81.7	81.8
26.0	79.6	79.6	79.5	80.4	81.1	81.5	81.4	81.4	81.4	81.5	81.5
30.0	79.2	79.2	79.1	79.9	80.5	80.9	81.0	81.0			
34.0	78.9	78.8	78.8	79.5	80.1	80.6					
38.0	78.6	78.5	78.5	79.2							
42.0	78.2	78.2									
46.0											
50.0											
54.0											
										OAT < ISA+15(C)	
										OAT > ISA+15(C)	

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 on 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 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 2.02.50 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
- 8 : final takeoff
- 9 : VMU

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

CORRECTIONS FOR WIND AND RUNWAY SLOPE

Runway length (m)		1500	1750	2000	2250	2500	2750	3000	3250	3500
Effect of wind	per knot of head wind add (meters)	6.5	7	8	8.5	9.5	10	11	11.5	12.5
	per percent uphill slope subtract (meters)	160	215	270	325	380	435	490	545	600
Effect of runway slope	per percent downhill slope add (meters)	17	23	29	36	42	48	55	61	67

INTRODUCTION

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Effect of wind	per knot of head wind add (meters)	6.5	7	8	8.5	9.5	10	11	11.5	12.5
Effect of runway slope	per percent uphill slope subtract (meters)	260	520	625	730	860	890	970	1060	1200
	per percent downhill slope add (meters)	31	41	50	59	69	78	87	97	106

INTRODUCTION

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Note : 1. Quick reference tables are established for the forward CG envelope (less than 25%) at V1 min 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.
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LIMITATION CODES

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Effect of runway slope	per percent uphill slope subtract (meters)	160	215	270	325	380	435	490	545	600
	per percent downhill slope add (meters)	17	23	29	36	42	48	55	61	67

EXAMPLE

Pressure altitude : 1400 ft
 Temperature : 30°C
 Runway length : 3250 m
 Wind : 10 kt head
 Slope : 1 % up
 Takeoff configuration : 1 + F

– Determination of corrected runway length

(Refer to 2.02.40 p2)

runway length	3250
correction for wind	$10 \times 11.5 = + 115$
correction for slope	<u>– 1060</u>
corrected runway length	2305

– Determination of a conservative maximum takeoff weight :

(Refer to 2.02.40 p6)

- Pressure altitude : 1400 ft – Use the table for 2000 ft.
 - Enter the column for 2250 m
 - Read the maximum takeoff weight on the line corresponding to the temperature of 30°C : 62400 kg
- V1 = 132 kt, VR = 132 kt, V2 = 136 kt

– Determination of a precise flexible temperature for the actual takeoff weight of 64000 kg :

(Refer to 2.02.40 p5 and p6)

- Interpolate the temperature corresponding to 64000 kg for the runway length of 2305 m at 1000 ft and 2000 ft pressure altitude.
- Results :
- 1000 ft : 33°C, V1 = 134 kt, VR = 135 kt, V2 = 139 kt
- 2000 ft : 27°C, V1 = 134 kt, VR = 135 kt, V2 = 139 kt
- Interpolate between these two values to get the flexible temperature
- 1400 ft : 30°C, V1 = 134 kt, VR = 135 kt, V2 = 139 kt

QUICK REFERENCE TABLE - CONFIGURATION 1+F - PRESSURE ALTITUDE = 0 FT		TAKEOFF		2.02.40 P 4	
TREF=30°C TMAX=55°C		DRY RUNWAY SLOPE=0%		QUICK REFERENCE TABLES	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
-20	70.4 3/3 143/43/47	72.2 2/3 147/47/52	73.5 2/3 153/53/57	74.5 2/3 157/57/61	75.3 2/3 160/60/64
-10	69.9 3/3 142/42/46	71.8 2/3 146/46/50	73.2 2/3 151/51/55	74.2 2/3 156/56/59	75.0 3/6 159/59/63
0	69.4 3/3 141/41/45	71.4 2/3 145/45/49	72.8 2/3 150/50/54	73.9 2/3 155/55/58	74.5 3/6 156/57/61
10	68.8 3/3 140/40/44	70.8 3/3 144/44/48	72.4 2/3 149/49/53	73.5 3/6 153/53/57	73.9 3/6 153/55/59
20	68.1 3/3 138/38/42	70.2 3/3 143/43/47	71.9 2/3 147/47/51	72.9 3/6 151/51/55	73.3 3/6 151/53/57
30	67.5 3/3 136/36/40	69.6 3/3 141/41/45	71.3 2/3 146/46/50	72.3 3/6 149/50/54	72.7 3/6 148/51/55
32	66.6 3/3 136/36/40	68.7 3/3 141/41/45	70.4 2/3 145/45/49	71.5 3/6 149/50/53	71.9 3/6 149/51/55
34	65.6 3/3 136/36/40	67.7 3/3 140/40/44	69.3 2/3 144/44/48	70.5 2/3 149/49/53	71.0 3/6 150/51/55
36	64.6 3/3 135/35/39	66.6 3/3 139/39/43	68.2 2/3 144/44/47	69.3 2/3 148/48/52	70.0 3/6 151/51/55
38	63.6 3/3 134/34/38	65.6 3/3 138/38/42	67.1 2/3 143/43/46	68.2 2/3 147/47/51	69.1 3/6 151/51/54
40	62.6 3/3 133/33/37	64.6 3/3 138/38/41	66.0 2/3 142/42/45	67.1 2/3 146/46/50	68.0 2/3 150/50/53
42	61.7 3/3 133/33/36	63.6 3/3 137/37/40	65.0 2/3 141/41/45	66.1 2/3 146/46/49	66.9 2/3 149/49/52
44	60.8 3/3 132/32/36	62.6 3/3 136/36/39	64.0 2/3 140/40/44	65.0 2/3 145/45/48	65.7 2/3 148/48/51
46	59.8 3/3 131/31/35	61.6 3/3 135/35/38	62.8 2/3 140/40/43	63.8 2/3 144/44/47	64.6 2/3 147/47/50
48	58.8 3/3 130/30/34	60.5 3/3 134/34/38	61.8 2/3 139/39/42	62.7 2/3 143/43/46	63.4 2/3 146/46/49
50	57.8 3/3 129/29/33	59.4 3/3 133/33/36	60.7 2/3 138/38/41	61.5 2/3 142/42/45	62.2 2/3 145/45/48
52	56.9 3/3 128/28/32	58.5 3/3 132/32/35	59.6 2/3 137/37/40	60.5 2/3 141/41/43	61.1 2/3 144/44/47
54	56.0 3/3 127/27/30	57.4 2/3 131/31/34	58.6 2/3 136/36/39	59.3 2/3 140/40/42	60.0 2/3 143/43/46
56	55.0 3/3 126/26/29	56.4 2/3 130/30/33	57.5 2/3 135/35/38	58.3 2/3 139/39/41	58.9 2/3 142/42/44
58	54.1 3/3 126/26/29	55.5 2/3 129/29/32	56.6 2/3 134/34/37	57.2 2/3 138/38/40	57.9 2/3 141/41/43
60	53.3 3/3 125/25/28	54.6 2/3 129/29/31	55.6 2/3 133/33/36	56.3 2/3 137/37/39	56.9 2/3 140/40/42
62	52.4 3/3 124/24/27	53.7 2/3 128/28/30	54.6 2/3 132/32/35	55.3 2/3 136/36/38	55.8 2/3 139/39/41
64	51.5 3/3 124/24/26	52.8 2/3 127/27/30	53.7 2/3 131/31/34	54.3 2/3 135/35/37	54.8 2/3 138/38/40
66	50.6 3/3 123/23/25	51.8 2/3 126/26/29	52.7 2/3 130/30/33	53.3 2/3 134/34/36	53.8 2/3 137/37/39
68	49.7 3/3 121/21/24	50.9 2/3 125/25/28	51.7 2/3 129/29/32	52.3 2/3 133/33/35	52.8 2/3 136/36/37

EXAMPLE

Pressure altitude : 1400 ft
 Temperature : 30°C
 Runway length : 2750 m
 Wind : 10 kt head
 Slope : 1 % up
 Takeoff configuration : 1 + F

– Determination of corrected runway length

(Refer to 2.02.40 p2)

runway length2750
correction for wind10 × 10 = + 100
correction for slope	– 435
corrected runway length2415

– Determination of a conservative maximum takeoff weight :

(Refer to 2.02.40 p6)

- Pressure altitude : 1400 ft – Use the table for 2000 ft.
 - Enter the column for 2250 m
 - Read the maximum takeoff weight on the line corresponding to the temperature of 30°C : 70800 kg
- V1 = 134 kt, VR = 135 kt, V2 = 140 kt

– Determination of a precise flexible temperature for the actual takeoff weight of 65000 kg :

(Refer to 2.02.40 p5 and p6)

- Interpolate the temperature corresponding to 65000 kg for the runway length of 2415m at 1000 ft and 2000 ft pressure altitude.
- Results :
- 1000 ft : 67°C, V1 = 133 kt, VR = 134 kt, V2 = 139 kt
- 2000 ft : 61°C, V1 = 132 kt, VR = 133 kt, V2 = 138 kt
- Interpolate between these two values to get the flexible temperature
- 1400 ft : 64°C, V1 = 132 kt, VR = 134 kt, V2 = 139 kt

CONFIGURATION 1+F				PRESSURE ALTITUDE = 0 FT			
TREF = 55 °C				DRY RUNWAY		MAX TO WEIGHT(1000KG) CODES	
TMAX = 55 °C				SLOPE = 0 %		IAS(KT) : V1 / VR / V2	
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)					
		2250	2500	2750	3000	CODES	
-20		76.6 147/48/53	78.4 153/54/59	79.7 158/60/65	80.3 159/62/67	80.7 159/64/69	
-10		76.0 145/46/51	77.8 150/52/57	79.3 156/58/63	79.8 156/60/65	80.1 156/62/67	
0		75.3 143/44/49	77.3 148/50/55	78.8 154/56/61	79.2 153/58/63	79.7 153/59/64	
10		74.7 141/42/47	76.8 146/48/53	78.2 151/53/59	78.7 151/55/61	79.2 150/57/62	
20		74.1 139/40/45	76.2 144/46/51	77.7 149/51/56	78.2 148/53/58	78.7 147/55/60	
30		73.4 137/39/44	75.6 142/45/50	77.1 146/49/54	77.7 146/51/56	78.2 145/53/58	
40		72.8 135/37/42	75.1 141/43/48	76.6 144/47/53	77.2 143/50/55	77.7 143/52/57	
50		72.2 134/35/41	74.5 139/41/47	75.8 141/46/51	75.8 136/45/50	75.8 131/45/50	
55		71.9 133/35/40	72.3 129/36/41	72.3 122/36/41	72.3 114/36/41	72.3 114/36/41	
57		71.0 133/34/39	72.3 134/38/43	72.3 128/38/43	72.3 121/38/43	72.3 116/38/43	
59		70.0 133/34/39	72.2 138/40/45	72.3 133/40/45	72.3 127/40/45	72.3 121/40/45	
61		69.0 132/33/38	71.2 137/39/44	72.3 139/42/47	72.3 134/42/47	72.3 128/42/47	
63		68.0 132/33/38	70.1 137/39/43	71.8 142/44/49	72.3 141/46/50	72.3 137/46/50	
65		67.0 132/32/37	69.1 137/38/43	70.6 142/44/48	71.6 144/47/52	72.0 144/49/53	
67		66.0 132/32/37	68.0 136/38/42	69.4 141/43/47	70.5 145/47/52	70.9 145/49/53	
69		64.9 131/31/36	66.8 136/37/42	68.3 141/42/47	69.5 146/47/52	69.8 146/49/53	
71		63.8 131/31/36	65.7 136/37/41	67.0 141/42/46	68.2 146/47/51	68.7 147/49/54	
73		62.7 131/31/35	64.5 136/36/40	65.9 141/41/45	66.9 145/46/50	67.6 148/49/54	
75		61.5 130/30/35	63.3 135/35/40	64.6 140/41/45	65.6 145/46/50	66.4 149/50/54	
77		60.2 129/29/34	62.0 135/35/39	63.3 140/40/44	64.3 145/45/49	65.0 149/49/53	
79		58.9 129/29/33	60.7 134/34/38	61.9 139/39/43	62.9 144/44/48	63.5 148/48/52	
80		58.3 128/28/33	60.0 133/33/37	61.2 139/39/43	62.1 143/43/47	62.8 147/47/51	

EXAMPLE

Pressure altitude : 1400 ft
 Temperature : 30°C
 Runway length : 2750 m
 Wind : 10 kt head
 Slope : 1 % up
 Takeoff configuration : 1 + F

– Determination of corrected runway length

(Refer to 2.02.40 p2)

runway length	2750
correction for wind	$10 \times 10 = + 100$
correction for slope	– 435
corrected runway length	2415

– Determination of a conservative maximum takeoff weight :

(Refer to 2.02.40 p6)

- Pressure altitude : 1400 ft – Use the table for 2000 ft.
 - Enter the column corresponding to 2250 m
 - Read the maximum takeoff weight on the line corresponding to the temperature of 30°C : 71500 kg
- V1 = 140 kt, VR = 174 kt, V2 = 149 kt

– Determination of a precise flexible temperature for the actual takeoff weight of 64000 kg :

(Refer to 2.02.40 p5 and p6)

- Interpolate the temperature corresponding to 64000 kg for the runway length of 2415m at 1000 ft and 2000 ft pressure altitude.

Results :

1000 ft : 64°C, V1 = 138 kt, VR = 140 kt, V2 = 141 kt

2000 ft : 62°C, V1 = 137 kt, VR = 139 kt, V2 = 140 kt

- Interpolate between these two values to get the flexible temperature

1400 ft : 63°C, V1 = 138 kt, VR = 140 kt, V2 = 141 kt

CONFIGURATION 1+F		PRESSURE ALTITUDE = 0 FT			FWD CG	
TREF = 46 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG)		CODES
TMAX = 55 °C		SLOPE = 0 %		IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	2250	2500	2750	3000	3250	
-20	79.2 151/52/55	81.9 156/56/59	83.8 162/62/64	85.4 167/67/69	86.0 168/70/72	
-10	78.3 149/51/54	81.2 154/55/57	83.2 159/60/62	84.8 165/66/68	85.4 165/68/70	
0	77.3 147/50/53	80.4 152/54/56	82.6 157/58/60	84.2 162/64/66	84.8 162/66/68	
10	76.3 146/50/52	79.5 150/53/55	82.0 155/56/59	83.6 160/61/64	84.2 159/64/66	
20	75.2 144/49/52	78.7 149/52/54	81.3 153/55/57	82.9 157/59/62	83.6 156/62/64	
30	74.1 143/48/51	77.8 147/51/53	80.6 152/54/56	82.3 155/58/60	83.0 154/60/62	
40	73.0 142/48/50	76.9 146/50/53	79.8 150/53/56	81.7 152/56/58	82.4 152/58/60	
46	72.5 141/47/50	76.3 145/50/52	79.3 149/53/55	81.3 151/55/57	81.8 149/56/58	
48	71.7 140/46/49	75.4 145/49/52	78.4 149/52/54	80.3 152/55/57	80.3 146/54/56	
50	70.9 140/46/48	74.4 144/49/51	77.5 148/51/53	78.9 150/53/55	78.9 145/53/55	
52	70.1 140/45/47	73.5 144/48/50	76.4 148/50/52	77.3 147/51/53	77.4 142/52/53	
54	69.4 139/44/46	72.5 144/48/50	75.4 148/50/52	76.0 146/50/52	76.0 140/50/52	
55	69.0 139/44/46	72.1 144/47/49	74.9 148/49/51	75.3 145/50/52	75.3 139/50/52	
56	68.6 139/43/45	71.7 143/47/49	74.4 148/49/51	75.3 147/51/53	75.2 142/51/52	
58	67.8 139/43/44	70.8 143/46/48	73.3 147/49/50	75.0 152/53/54	75.3 150/54/56	
60	67.0 138/42/43	70.0 143/45/47	72.3 147/48/49	73.9 152/52/54	75.0 156/57/58	
62	66.2 138/41/43	69.1 142/44/46	71.3 147/47/48	72.8 151/52/53	74.0 156/56/58	
64	65.4 138/40/42	68.1 142/43/45	70.2 147/47/48	71.6 151/51/53	72.6 156/56/57	
66	64.6 137/39/41	67.2 142/42/44	69.0 146/46/48	70.4 151/51/52	71.3 156/56/57	
68	63.7 137/38/40	66.2 141/41/43	67.8 146/46/47	69.0 151/51/52	70.0 154/54/55	
70	62.9 136/37/39	65.1 141/41/42	66.6 146/46/47	67.7 150/50/51	68.6 153/53/54	

EXAMPLE

Pressure altitude : 1400 ft
 Temperature : 30°C
 Runway length : 2750 m
 Wind : 10 kt head
 Slope : 1 % up
 Takeoff configuration : 1 + F

– Determination of corrected runway length

(Refer to 2.02.40 p2)

runway length	2750
correction for wind	$10 \times 10 = + 100$
correction for slope	– 435
corrected runway length	2415

– Determination of a conservative maximum takeoff weight :

(Refer to 2.02.40 p6)

- Pressure altitude : 1400 ft – Use the table for 2000 ft.
- Enter the column corresponding to 2250 m
- Read the maximum takeoff weight on the line corresponding to the temperature of 30°C : 71300 kg
- R V1 = 140 kt, VR = 146 kt, V2 = 148 kt

– Determination of a precise flexible temperature for the actual takeoff weight of 64000 kg :

(Refer to 2.02.40 p5 and p6)

- Interpolate the temperature corresponding to 64000 kg for the runway length of 2415m at 1000 ft and 2000 ft pressure altitude.

Results :

R 1000 ft : 66°C, V1 = 138 kt, VR = 139 kt, V2 = 140 kt

R 2000 ft : 61°C, V1 = 137 kt, VR = 139 kt, V2 = 140 kt

- Interpolate between these two values to get the flexible temperature

R 1400 ft : 64°C, V1 = 137 kt, VR = 139 kt, V2 = 140 kt

R

CONFIGURATION 1+F		PRESSURE ALTITUDE = 0 FT			FWD CG	
TREF = 46 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG)		CODES
TMAX = 55 °C		SLOPE = 0 %		IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	2250	2500	2750	3000	3250	
-20	79.4 151/52/54	81.9 156/56/59	83.0 157/60/62	83.8 157/62/64	84.5 156/64/67	
-10	78.5 149/51/53	81.2 154/54/57	82.3 155/58/60	83.1 154/60/62	83.9 153/62/65	
0	77.5 147/50/52	80.5 152/53/55	81.6 152/55/58	82.5 151/58/60	83.2 150/60/63	
10	76.6 145/49/51	79.7 150/52/54	80.9 150/53/56	81.8 149/56/58	82.6 148/58/61	
20	75.5 144/48/51	78.8 148/51/54	80.1 148/53/55	81.1 146/54/56	82.0 146/57/59	
30	74.4 142/48/50	77.9 146/50/53	79.3 146/52/54	80.5 144/53/55	81.4 144/55/57	
40	73.3 141/47/50	77.1 145/49/52	78.4 144/51/53	79.7 143/52/54	80.8 142/53/56	
46	72.7 140/46/49	76.4 144/49/51	77.9 143/50/53	79.2 142/52/54	80.3 141/53/55	
48	71.9 140/46/48	75.7 144/49/51	77.2 143/50/52	78.4 142/51/53	79.5 141/52/54	
50	71.2 140/45/47	74.7 144/48/50	76.4 144/49/51	77.6 143/50/52	78.5 142/52/54	
52	70.4 140/44/47	73.7 144/48/50	75.6 144/49/51	76.7 143/50/51	77.5 143/52/54	
54	69.6 139/44/46	72.8 144/47/49	74.8 145/49/50	75.8 144/49/51	76.5 143/52/53	
55	69.2 139/43/45	72.3 143/47/49	74.4 145/48/50	75.3 144/49/51	76.0 144/52/53	
56	68.8 139/43/45	71.9 143/46/48	74.0 146/48/50	74.9 145/49/51	75.6 144/52/53	
58	68.0 139/42/44	71.0 143/45/47	73.2 146/48/49	74.0 145/49/51	74.6 145/51/53	
60	67.2 138/41/43	70.1 143/45/46	72.4 147/47/49	73.0 146/49/51	73.7 145/51/53	
62	66.4 138/40/42	69.2 142/44/45	71.3 147/47/48	72.1 147/49/51	72.7 146/51/53	
64	65.6 137/40/41	68.3 142/43/44	70.2 147/47/48	71.1 148/49/51	71.6 147/51/53	
66	64.7 137/39/40	67.3 142/42/43	69.0 146/46/48	70.1 149/49/51	70.6 148/51/52	
68	63.9 137/38/39	66.2 141/41/43	67.8 146/46/47	69.1 150/50/51	69.5 149/51/52	
70	63.0 136/37/38	65.1 141/41/42	66.6 146/46/47	67.8 150/50/51	68.4 150/51/52	

QUICK REFERENCE TABLE - 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)				
	2250	2500	2750	3000	3250
-20	68.6 3/3 141/41/45	70.4 2/3 145/45/49	71.7 2/3 150/50/54	72.7 2/3 155/55/58	73.5 2/3 158/58/62
-10	68.1 3/3 140/40/44	70.0 2/3 144/44/48	71.4 2/3 149/49/53	72.4 2/3 153/53/57	73.3 3/6 157/57/61
0	67.6 3/3 139/39/43	69.5 3/3 143/43/47	71.0 2/3 148/48/52	72.1 2/3 152/52/56	72.8 3/6 155/55/59
10	66.9 3/3 137/37/41	69.0 3/3 141/41/45	70.6 2/3 147/47/50	71.7 2/3 151/51/55	72.2 3/6 152/53/57
20	66.3 3/3 136/36/40	68.4 3/3 140/40/44	70.1 2/3 145/45/49	71.3 3/6 150/50/54	71.6 3/6 150/52/55
28	65.8 3/3 135/35/39	68.0 3/3 140/40/44	69.6 2/3 144/44/48	70.8 3/6 148/49/52	71.1 3/6 148/50/54
30	64.9 3/3 134/34/39	67.1 3/3 139/39/43	68.7 2/3 143/43/47	69.9 3/6 148/48/52	70.4 3/6 149/50/54
32	64.0 3/3 134/34/38	66.1 3/3 138/38/42	67.7 2/3 143/43/46	68.9 2/3 147/47/51	69.6 3/6 149/50/54
34	63.1 3/3 134/34/38	65.1 3/3 137/37/41	66.7 2/3 142/42/46	67.9 2/3 147/47/50	68.7 3/6 150/50/53
36	62.2 3/3 133/33/37	64.1 3/3 137/37/41	65.6 2/3 141/41/45	66.8 2/3 146/46/49	67.6 2/3 149/49/53
38	61.2 3/3 132/32/36	63.1 3/3 136/36/39	64.6 2/3 140/40/44	65.6 2/3 145/45/48	66.5 2/3 148/48/52
40	60.4 3/3 131/31/35	62.2 3/3 135/35/38	63.6 2/3 140/40/43	64.6 2/3 144/44/47	65.4 2/3 147/47/51
42	59.5 3/3 130/30/34	61.2 3/3 134/34/37	62.6 2/3 139/39/42	63.5 2/3 143/43/46	64.3 2/3 146/46/49
44	58.5 3/3 129/29/33	60.2 2/3 133/33/36	61.5 2/3 138/38/41	62.5 2/3 142/42/45	63.2 2/3 146/46/48
46	57.6 3/3 128/28/32	59.3 3/3 133/33/36	60.5 2/3 137/37/40	61.4 2/3 141/41/44	62.1 2/3 144/45/47
48	56.7 3/3 128/28/31	58.3 2/3 131/31/34	59.5 2/3 136/36/39	60.3 2/3 140/40/43	61.0 2/3 144/44/46
50	55.8 3/3 127/27/30	57.3 3/3 131/31/34	58.4 2/3 135/35/38	59.3 2/3 139/39/42	60.0 2/3 143/43/45
52	54.9 3/3 126/26/29	56.3 2/3 130/30/33	57.4 2/3 134/34/37	58.2 2/3 138/38/41	58.8 2/3 141/41/44
54	53.9 3/3 125/25/28	55.4 2/3 129/29/32	56.4 2/3 133/33/36	57.2 2/3 137/37/40	57.8 2/3 140/40/43
56	53.0 3/3 124/24/27	54.4 2/3 128/28/31	55.4 2/3 133/33/35	56.1 2/3 136/36/39	56.7 2/3 139/39/42
58	52.1 3/3 123/23/26	53.5 2/3 127/27/30	54.4 2/3 132/32/34	55.1 2/3 135/35/38	55.7 2/3 138/38/41
60	51.3 3/3 122/22/25	52.6 2/3 126/26/29	53.5 2/3 131/31/33	54.2 2/3 134/34/37	54.7 2/3 137/37/39
62	50.4 3/3 122/22/24	51.6 2/3 125/25/28	52.5 2/3 130/30/32	53.2 2/3 133/33/36	53.7 2/3 136/36/38
64	49.5 3/3 121/21/23	50.7 2/3 125/25/27	51.6 2/3 129/29/31	52.2 2/3 132/32/34	52.7 2/3 135/35/37
66	48.6 3/3 120/20/22	49.8 2/3 124/24/26	50.6 2/3 128/28/30	51.2 2/3 131/31/33	51.6 2/3 134/34/36

QUICK REFERENCE TABLE - CONFIGURATION 1+F - PRESSURE ALTITUDE = 2000 FT		TAKEOFF		2.02.40 P 6	
TREF=26°C TMAX=51°C		DRY RUNWAY SLOPE=0%		QUICK REFERENCE TABLES	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
-20	66.8 3/3 139/39/43	68.6 2/3 143/43/47	70.0 2/3 148/48/52	70.9 2/3 152/52/56	71.7 2/3 156/56/59
-10	66.3 3/3 138/38/42	68.2 2/3 142/42/46	69.6 2/3 147/47/51	70.7 2/3 151/51/55	71.5 2/3 155/55/58
0	65.7 3/3 136/36/40	67.8 3/3 141/41/45	69.2 2/3 146/46/50	70.3 2/3 150/50/54	71.2 3/6 154/54/57
10	65.1 3/3 136/36/40	67.2 3/3 140/40/44	68.8 2/3 144/44/48	70.0 2/3 149/49/53	70.6 3/6 151/52/55
20	64.5 3/3 134/34/38	66.6 3/3 139/39/42	68.3 2/3 143/43/47	69.5 2/3 148/48/51	70.1 3/6 149/50/54
26	64.2 3/3 134/34/38	66.3 3/3 138/38/42	68.0 2/3 142/42/46	69.3 3/6 147/47/51	69.7 3/6 147/49/53
28	63.3 3/3 133/33/37	65.4 3/3 137/37/41	67.0 2/3 142/42/45	68.3 2/3 146/46/50	68.9 3/6 148/49/52
30	62.4 3/3 132/32/36	64.5 3/3 136/36/40	66.1 2/3 141/41/44	67.3 2/3 146/46/49	68.1 3/6 149/49/52
32	61.6 3/3 132/32/36	63.6 3/3 136/36/40	65.1 2/3 140/40/44	66.3 2/3 145/45/48	67.2 3/6 149/49/52
34	60.8 3/3 131/31/35	62.6 3/3 135/35/39	64.1 2/3 139/39/43	65.3 2/3 144/44/47	66.1 2/3 148/48/51
36	59.8 3/3 130/30/34	61.6 3/3 134/34/38	63.1 2/3 139/39/42	64.2 2/3 143/43/46	65.0 2/3 147/47/50
38	59.0 3/3 130/30/33	60.7 3/3 133/33/36	62.2 2/3 138/38/41	63.2 2/3 142/42/45	63.9 2/3 146/46/49
40	58.1 3/3 129/29/32	59.8 3/3 132/32/35	61.2 2/3 131/31/40	62.1 2/3 141/41/44	62.9 2/3 145/45/48
42	57.2 3/3 128/28/31	58.9 3/3 131/31/35	60.2 2/3 136/36/39	61.1 2/3 140/40/43	61.8 2/3 144/44/47
44	56.4 3/3 127/27/31	58.0 3/3 131/31/34	59.2 2/3 136/36/38	60.2 2/3 140/40/42	60.9 2/3 143/43/46
46	55.5 3/3 126/26/30	57.1 3/3 130/30/33	58.3 2/3 135/35/37	59.2 2/3 139/39/41	59.8 2/3 142/42/45
48	54.6 3/3 126/26/29	56.1 3/3 129/29/32	57.3 2/3 134/34/36	58.1 2/3 138/38/40	58.8 2/3 141/41/43
50	53.7 3/3 125/25/28	55.2 3/3 128/28/31	56.3 2/3 133/33/35	57.1 2/3 137/37/39	57.7 2/3 140/40/42
52	52.8 3/3 123/23/26	54.2 2/3 127/27/30	55.3 2/3 132/32/35	56.1 2/3 136/36/38	56.6 2/3 139/39/41
54	51.9 3/3 123/23/26	53.3 2/3 126/26/29	54.3 2/3 131/31/34	55.0 2/3 135/35/37	55.6 2/3 138/38/40
56	51.0 3/3 122/22/25	52.3 2/3 125/25/28	53.3 2/3 130/30/32	54.0 2/3 134/34/36	54.5 2/3 137/37/39
58	50.1 3/3 121/21/23	51.4 2/3 125/25/27	52.3 2/3 129/29/31	53.0 2/3 133/33/35	53.6 2/3 136/36/38
60	49.3 3/3 120/20/22	50.5 2/3 124/24/26	51.4 2/3 128/28/30	52.1 2/3 132/32/34	52.6 2/3 135/35/37
62	48.4 3/3 119/19/21	49.6 2/3 123/23/25	50.5 2/3 127/27/29	51.1 2/3 131/31/33	51.6 2/3 134/34/35
64	47.6 3/3 118/18/21	48.7 2/3 122/22/24	49.6 2/3 126/26/28	50.2 2/3 130/30/32	50.6 2/3 132/33/34

CONFIGURATION 1+F		PRESSURE ALTITUDE = 1000 FT				
TREF = 51 °C TMAX = 53 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG)			CODES IAS(KT) : V1 / VR / V2
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	2250	2500	2750	3000	3250	
-20	75.3 145/46/51	2/3 151/52/57	77.0 156/58/63	2/3 157/60/65	78.4 157/62/67	79.1 157/62/67
-10	74.6 143/44/49	2/3 148/50/55	76.5 154/56/61	2/3 154/58/63	77.9 154/60/65	78.5 154/60/65
0	74.0 141/42/47	2/3 146/48/53	75.9 152/54/59	2/3 151/56/61	77.4 151/57/63	78.0 151/57/63
10	73.3 139/40/45	2/3 144/46/51	75.4 149/52/57	2/3 149/54/59	76.9 148/55/61	77.4 148/55/61
20	72.7 137/38/43	2/3 142/44/49	74.8 147/50/55	2/3 146/52/57	76.4 146/53/58	77.4 146/53/58
30	72.0 135/37/42	2/3 141/43/48	74.3 145/48/53	2/3 144/50/55	75.8 143/52/57	76.9 143/52/57
40	71.4 134/35/40	2/3 139/41/46	73.7 142/46/51	2/3 142/48/53	75.3 141/50/55	75.9 141/50/55
50	70.8 132/34/39	2/3 137/40/45	73.1 138/43/48	2/3 133/43/48	74.3 127/43/48	74.2 127/43/48
51	70.8 132/33/39	2/3 137/39/44	73.0 135/41/46	2/3 129/41/46	73.5 122/41/46	73.5 122/41/46
53	70.2 132/33/38	2/3 136/39/44	72.1 129/38/43	2/3 123/38/43	72.0 116/38/43	72.0 116/38/43
55	69.3 131/33/38	2/3 136/39/43	71.4 135/40/45	2/3 130/40/45	72.1 123/40/45	72.1 123/40/45
57	68.4 131/32/37	2/3 136/38/43	70.5 140/43/47	2/3 135/43/47	72.0 130/43/47	72.1 130/43/47
59	67.4 131/32/37	2/3 136/38/42	69.5 141/43/48	2/3 142/46/50	71.2 138/46/51	72.0 138/46/51
61	66.5 131/31/36	2/3 136/37/42	68.5 140/42/47	2/3 143/46/50	70.2 142/48/52	71.0 142/48/52
63	65.5 130/31/36	2/3 135/37/41	67.6 140/42/46	2/3 143/46/50	69.1 143/48/52	70.1 143/48/52
65	64.6 130/30/35	2/3 135/36/41	66.5 140/41/46	2/3 144/46/50	68.0 144/48/52	69.1 144/48/52
67	63.6 130/30/35	2/3 135/35/40	65.4 139/41/45	2/3 144/46/50	66.9 145/48/52	67.6 145/48/52
69	62.5 129/29/34	2/3 134/35/39	64.3 139/40/44	2/3 144/45/49	65.8 144/45/49	66.9 146/48/52
71	61.4 129/29/34	2/3 134/34/39	63.3 139/40/44	2/3 144/45/49	64.6 147/48/52	65.7 147/48/52
73	60.3 129/29/34	2/3 134/34/38	62.2 139/39/43	2/3 143/44/48	63.4 148/48/52	64.5 148/48/52
75	59.1 128/28/33	2/3 133/33/37	60.9 138/38/42	2/3 143/43/47	62.2 148/48/52	63.2 148/48/52
78	57.3 127/27/31	2/3 132/32/36	59.0 137/37/41	2/3 142/42/46	60.3 146/46/50	61.2 146/46/50

A318/A319/A320/A321	TAKEOFF	2.02.40	P 6
FLIGHT CREW OPERATING MANUAL	QUICK REFERENCE TABLES	SEQ 203	REV 34

CONFIGURATION 1+F				PRESSURE ALTITUDE = 2000 FT			
TREF = 47 °C		DRY RUNWAY SLOPE = 0 %		MAX TO WEIGHT(1000KG)		CODES IAS(kt) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	2250	2500	2750	3000	3250		
-20	74.0 143/44/49	75.8 148/50/55	77.2 154/55/61	77.9 155/58/63	78.3 155/60/65		
-10	73.3 141/42/47	75.3 146/48/53	76.7 152/53/59	77.3 152/56/61	77.8 152/58/63		
0	72.7 139/40/45	74.7 144/46/51	76.2 150/52/57	76.8 150/54/59	77.2 149/56/61		
10	72.0 137/38/43	74.1 142/44/49	75.7 147/50/55	76.2 147/52/57	76.7 146/54/59		
20	71.4 135/36/42	73.5 140/42/47	75.2 145/48/53	75.7 144/50/55	76.2 144/52/57		
30	70.8 134/35/40	73.0 139/41/46	74.6 143/46/51	75.2 142/48/53	75.7 142/50/55		
40	70.2 132/33/39	72.4 137/39/44	74.0 141/44/49	74.7 140/46/51	75.2 139/48/53		
47	69.7 131/32/38	72.0 136/38/43	73.6 139/43/48	74.3 139/45/50	74.9 138/47/52		
49	69.1 131/32/37	71.3 136/38/43	73.0 140/43/47	73.5 138/44/49	73.5 134/44/49		
51	68.4 130/31/37	70.6 135/37/42	72.1 139/42/47	72.1 134/42/47	72.1 129/42/47		
53	67.6 130/31/36	69.7 135/37/42	71.5 140/42/47	72.1 139/44/49	72.1 135/44/49		
55	66.7 130/31/36	68.8 135/36/41	70.5 140/42/46	71.3 141/45/49	71.8 140/46/51		
57	65.9 130/30/35	67.9 135/36/41	69.5 139/41/46	70.4 141/45/49	70.9 141/46/51		
59	65.0 129/30/35	67.0 134/35/40	68.5 139/41/45	69.6 142/45/49	70.0 142/46/51		
61	64.0 129/29/34	66.0 134/35/40	67.5 139/40/45	68.7 143/45/49	69.1 142/46/51		
63	63.1 129/29/34	65.0 134/34/39	66.5 138/40/44	67.7 143/45/49	68.1 143/46/51		
65	62.2 128/28/33	64.1 133/34/38	65.5 138/39/43	66.6 143/44/48	67.2 144/47/51		
67	61.2 128/28/33	63.0 133/33/38	64.4 138/39/43	65.5 142/43/48	66.2 145/47/51		
69	60.1 128/28/32	62.0 133/33/37	63.3 137/38/42	64.4 142/43/47	65.2 146/47/51		
71	59.1 127/27/32	60.9 132/32/37	62.2 137/38/42	63.2 142/42/46	64.0 146/47/51		
76	56.3 125/25/30	58.0 130/30/35	59.3 136/36/40	60.2 140/40/44	60.9 145/45/48		

CONFIGURATION 1+F		PRESSURE ALTITUDE = 1000 FT		FWD CG			
TREF = 42 °C TMAX = 53 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	2250	2500	2750	3000	3250		
-20	78.2 149/52/54	81.1 154/55/57	83.1 160/60/62	84.7 165/66/68	85.3 165/68/70		
-10	77.2 147/51/53	80.2 152/54/56	82.4 157/58/61	84.1 163/64/66	84.7 162/66/68		
0	76.1 146/50/52	79.4 150/53/55	81.8 155/56/59	83.4 160/61/64	84.0 159/64/66		
10	75.0 144/49/52	78.5 149/52/54	81.1 153/55/57	82.8 157/59/62	83.4 156/62/64		
20	73.8 143/48/51	77.6 147/51/53	80.4 151/54/56	82.1 155/57/60	82.8 154/60/62		
30	72.8 141/48/50	76.6 145/50/53	79.5 150/53/56	81.5 152/56/58	82.2 152/58/60		
40	71.8 140/47/49	75.6 144/50/52	78.7 148/52/55	80.8 150/54/56	81.6 149/56/58		
42	71.5 140/46/49	75.3 144/49/52	78.5 148/52/54	80.6 150/53/56	81.4 149/56/58		
44	71.0 140/46/48	74.6 144/49/51	77.8 148/52/54	79.9 150/53/55	80.6 149/56/57		
46	70.2 139/45/47	73.6 143/49/51	76.9 147/51/53	79.0 151/53/55	79.6 150/55/57		
48	69.4 139/44/46	72.7 143/48/50	75.8 147/50/52	77.9 151/53/55	78.6 151/55/57		
50	68.7 138/43/46	71.8 143/47/49	74.8 147/50/51	76.8 151/53/54	77.5 151/55/57		
52	67.9 138/43/45	71.0 142/46/48	73.8 147/49/51	75.8 151/52/54	76.1 149/53/55		
53	67.5 138/42/44	70.6 142/46/48	73.3 146/49/50	75.2 151/52/54	75.4 148/53/54		
56	66.4 137/41/43	69.4 142/45/46	71.9 146/48/49	73.7 150/51/53	74.8 154/55/57		
58	65.7 137/40/42	68.6 141/44/45	70.9 146/47/48	72.6 150/51/52	73.8 155/55/57		
60	64.9 137/40/41	67.7 141/43/44	70.0 145/46/47	71.5 150/50/51	72.7 154/55/56		
62	64.1 136/39/40	66.8 141/42/43	68.9 145/45/46	70.4 150/50/51	71.4 154/54/55		
64	63.3 136/38/39	65.9 140/41/42	67.8 145/45/46	69.2 150/50/51	70.1 154/54/55		
66	62.5 136/37/38	65.0 140/40/41	66.7 145/45/46	67.9 149/49/50	68.8 153/53/54		
68	61.7 135/36/37	64.0 140/40/41	65.5 144/44/45	66.7 148/48/49	67.5 151/51/52		

CONFIGURATION 1+F		PRESSURE ALTITUDE = 2000 FT			FWD CG	
TREF = 37 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG)		CODES
TMAX = 51 °C		SLOPE = 0 %		IAS(KT) : V1 / VR / V2		
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)				
		2250	2500	2750	3000	3250
-20		77.1 147/51/53	80.2 152/54/56	82.3 158/58/61	84.0 163/64/66	84.5 162/66/68
-10		76.0 146/50/52	79.3 150/53/55	81.7 155/57/59	83.3 160/62/64	83.9 159/64/66
0		74.8 144/49/52	78.4 149/52/54	81.0 153/55/57	82.6 157/59/62	83.3 156/62/64
10		73.6 143/48/51	77.4 147/51/53	80.2 151/54/56	81.9 154/57/59	82.6 154/60/62
20		72.5 141/48/50	76.4 145/50/53	79.3 150/53/56	81.3 152/55/57	82.0 151/58/60
30		71.5 140/47/49	75.2 144/50/52	78.5 148/52/55	80.4 150/55/57	81.4 149/56/58
37		70.9 139/46/48	74.5 143/49/52	77.9 147/52/54	79.8 149/54/56	80.9 148/55/57
40		70.1 139/45/47	73.6 143/49/51	77.0 147/51/53	79.0 149/53/55	80.0 148/54/56
42		69.5 138/44/47	72.9 143/48/50	76.2 146/50/52	78.4 149/53/54	79.2 148/54/56
44		68.7 138/44/46	72.0 142/47/49	75.1 146/50/52	77.5 150/52/54	78.2 149/54/56
46		67.9 138/43/45	71.1 142/47/49	74.0 146/49/51	76.4 150/52/53	77.1 150/54/56
48		67.2 137/42/44	70.3 141/46/48	73.1 146/49/50	75.3 150/51/53	76.2 151/54/56
50		66.5 137/41/43	69.5 141/45/47	72.2 145/48/50	74.3 149/51/52	75.3 151/54/56
51		66.1 137/41/43	69.1 141/45/46	71.7 145/48/49	73.8 149/50/52	74.8 152/54/55
54		65.0 136/40/42	67.9 140/43/45	70.4 145/46/48	72.2 149/50/51	73.4 153/54/55
56		64.3 136/39/41	67.2 140/43/44	69.5 144/45/47	71.2 149/49/50	72.4 153/54/55
58		63.6 135/38/40	66.3 140/42/43	68.6 144/44/46	70.2 148/49/50	71.3 153/53/54
60		62.8 135/38/39	65.5 139/41/42	67.7 144/44/45	69.1 148/48/49	70.1 153/53/54
62		62.0 135/37/38	64.7 139/40/41	66.6 143/43/44	67.9 148/48/49	68.9 152/52/53
64		61.3 134/36/37	63.8 139/39/40	65.5 143/43/44	66.7 148/48/49	67.6 151/51/52
66		60.5 134/35/36	62.8 138/38/39	64.3 143/43/44	65.5 146/46/47	66.3 150/50/51

R

CONFIGURATION 1+F		PRESSURE ALTITUDE = 1000 FT		FWD CG			
TREF = 43 °C TMAX = 53 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	2250	2500	2750	3000	3250		
-20	78.1 149/51/53	80.8 154/54/57	82.0 155/58/60	82.7 154/60/62	83.4 154/63/65		
-10	77.2 147/50/52	80.1 152/53/55	81.2 152/56/58	82.1 152/58/60	82.8 151/60/63		
0	76.1 145/49/51	79.3 150/52/54	80.5 150/54/56	81.4 149/56/58	82.2 148/58/61		
10	75.0 144/48/51	78.4 148/51/53	79.7 148/52/55	80.7 147/54/56	81.5 146/57/59		
20	73.9 142/48/50	77.6 147/50/52	78.9 146/52/54	80.0 145/53/55	80.9 144/55/57		
30	72.8 141/47/49	76.6 145/49/52	77.9 143/51/53	79.2 143/52/54	80.3 142/53/55		
40	71.8 140/46/48	75.6 144/49/51	77.1 142/50/52	78.4 141/51/53	79.5 140/52/54		
43	71.5 139/46/48	75.2 143/49/51	76.7 142/50/52	78.1 141/51/53	79.3 139/52/54		
45	70.8 139/45/47	74.3 143/48/50	76.0 142/49/51	77.3 141/50/52	78.4 140/51/53		
47	70.0 139/44/46	73.4 143/48/50	75.2 143/49/51	76.5 142/50/52	77.5 141/51/53		
49	69.2 138/43/45	72.5 143/47/49	74.4 143/48/50	75.6 142/49/51	76.5 141/51/52		
51	68.5 138/43/45	71.6 142/46/48	73.7 144/48/50	74.8 143/49/51	75.6 142/50/52		
53	67.7 138/42/44	70.7 142/45/47	72.9 145/48/49	73.9 143/48/50	74.6 143/50/52		
55	66.9 137/41/43	69.9 142/44/46	72.2 145/47/49	73.1 144/48/50	73.7 143/50/52		
57	66.2 137/40/42	69.1 141/44/45	71.4 146/46/48	72.2 145/48/49	72.8 144/50/52		
59	65.4 137/39/41	68.3 141/43/44	70.5 145/45/47	71.3 145/48/49	71.8 145/50/51		
61	64.6 136/39/40	67.4 141/42/43	69.4 145/45/46	70.3 146/48/49	70.9 146/50/51		
63	63.8 136/38/39	66.5 140/41/42	68.3 145/45/46	69.4 147/48/49	69.9 147/50/51		
65	63.0 136/37/38	65.5 140/40/41	67.2 145/45/46	68.4 148/48/49	68.8 148/50/51		
67	62.2 135/36/37	64.4 140/40/41	66.0 145/45/46	67.2 149/49/50	67.8 149/50/51		
68	61.7 135/36/37	63.9 140/40/41	65.4 144/44/45	66.6 148/48/49	67.3 149/50/51		

R

CONFIGURATION 1+F		PRESSURE ALTITUDE = 2000 FT				FWD CG
		TREF = 40 °C		DRY RUNWAY	MAX TO WEIGHT(1000KG)	CODES
TMAX = 51 °C				SLOPE = 0 %	IAS(KT) : V1 / VR / V2	
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)				
		2250	2500	2750	3000	3250
-20	76.8 147/50/52	79.6 152/52/55	80.8 153/56/58	81.6 152/58/61	82.4 152/61/63	
-10	75.7 145/49/51	78.8 150/52/54	80.1 151/54/56	80.9 150/56/58	81.7 149/59/61	
0	74.5 144/48/51	78.0 148/51/53	79.3 148/52/54	80.2 147/54/56	81.1 147/57/59	
10	73.4 142/47/50	77.1 147/50/52	78.5 146/51/54	79.6 145/53/55	80.4 144/55/57	
20	72.3 141/47/49	76.1 145/49/52	77.6 144/51/53	78.8 143/52/54	79.8 142/53/55	
30	71.3 140/46/48	75.0 144/49/51	76.6 142/50/52	77.9 141/51/53	79.0 140/52/54	
40	70.3 138/44/47	73.8 142/48/50	75.5 141/49/51	76.9 139/50/52	78.1 138/51/53	
42	69.6 138/44/46	73.0 142/47/50	74.7 141/49/51	76.1 140/50/52	77.3 139/50/52	
44	68.8 138/43/45	72.1 142/47/49	74.0 142/48/50	75.3 141/49/51	76.4 140/50/52	
46	68.0 137/42/44	71.2 142/46/48	73.2 143/48/50	74.4 141/49/50	75.5 140/49/51	
48	67.3 137/42/43	70.4 141/45/47	72.5 143/47/49	73.6 142/48/50	74.6 141/49/51	
50	66.6 137/41/43	69.6 141/44/46	71.8 143/47/48	72.8 142/48/49	73.7 142/49/51	
51	66.2 136/40/42	69.2 141/44/46	71.5 144/46/48	72.4 143/47/49	73.2 142/49/50	
52	65.8 136/40/42	68.8 141/43/45	71.1 144/46/48	72.0 143/47/49	72.8 142/49/50	
54	65.1 136/39/41	68.0 140/43/44	70.4 144/45/47	71.2 144/47/48	71.9 143/49/50	
56	64.4 135/38/40	67.2 140/42/43	69.5 144/45/46	70.4 144/47/48	71.0 144/49/50	
58	63.6 135/38/39	66.4 139/41/42	68.5 144/44/45	69.5 145/47/48	70.0 144/49/50	
60	62.9 135/37/38	65.5 139/40/41	67.5 144/44/45	68.6 146/47/48	69.1 145/49/50	
62	62.1 134/36/37	64.7 139/39/40	66.4 143/43/44	67.7 147/47/48	68.1 146/49/50	
64	61.3 134/35/36	63.7 138/38/39	65.3 143/43/44	66.5 148/48/49	67.1 147/48/49	
66	60.5 134/34/35	62.7 138/38/39	64.1 143/43/44	65.3 147/47/48	66.1 148/48/49	

QUICK REFERENCE TABLE - 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)				
	1750	2000	2250	2500	2750
-20	65.6 3/3 129/29/35	68.4 3/3 133/33/39	70.4 2/3 140/40/45	71.9 2/3 146/46/51	72.9 2/3 150/50/55
-10	65.0 3/3 127/27/33	67.9 3/3 133/33/38	70.0 2/3 138/38/43	71.6 2/3 144/44/49	72.6 2/3 149/49/54
0	64.3 3/3 126/26/32	67.3 3/3 132/32/37	69.6 2/3 137/37/42	71.2 2/3 143/43/48	72.3 2/3 148/48/53
10	63.7 3/3 125/25/31	66.7 3/3 130/30/35	69.1 2/3 135/35/40	70.8 2/3 142/42/47	72.0 2/3 147/47/52
20	62.9 3/3 124/24/30	66.1 3/3 129/29/34	68.5 3/3 134/34/39	70.3 2/3 140/40/45	71.5 2/3 146/46/50
30	62.2 3/3 123/23/29	65.4 3/3 128/28/34	67.9 3/3 133/33/38	69.8 2/3 139/39/44	71.1 2/3 144/44/49
32	61.5 3/3 122/22/28	64.5 3/3 128/28/33	67.0 3/3 132/32/37	68.8 2/3 138/38/43	70.1 2/3 144/44/48
34	60.7 3/3 122/22/27	63.6 3/3 127/27/32	66.0 3/3 132/32/37	67.8 2/3 138/38/42	69.0 2/3 143/43/47
36	59.8 3/3 121/21/27	62.6 3/3 126/26/31	64.9 3/3 131/31/36	66.7 2/3 137/37/41	67.9 2/3 142/42/46
38	58.9 3/3 121/21/26	61.7 3/3 125/25/30	63.9 3/3 130/30/35	65.6 2/3 136/36/41	66.8 2/3 141/41/45
40	58.1 3/3 120/20/25	60.8 3/3 124/24/29	62.9 3/3 129/29/34	64.5 2/3 135/35/40	65.7 2/3 140/40/45
42	57.3 3/3 119/19/25	59.9 3/3 124/24/29	62.0 3/3 129/29/33	63.5 2/3 135/35/39	64.6 2/3 140/40/44
44	56.5 3/3 119/19/24	59.0 3/3 123/23/28	61.0 2/3 128/28/32	62.5 2/3 134/34/38	63.5 2/3 139/39/43
46	55.6 3/3 118/18/23	58.0 3/3 122/22/27	60.0 2/3 127/27/31	61.4 2/3 133/33/37	62.4 2/3 138/38/42
48	54.7 3/3 117/17/21	57.1 3/3 121/21/26	59.0 3/3 127/27/31	60.4 2/3 132/32/36	61.3 2/3 137/37/41
50	53.9 3/3 116/16/21	56.2 3/3 121/21/25	58.0 2/3 125/25/30	59.3 2/3 131/31/35	60.2 2/3 136/36/40
52	53.0 3/3 116/16/20	55.2 3/3 120/20/24	57.0 2/3 125/25/29	58.3 2/3 130/30/34	59.1 2/3 135/35/39
54	52.2 3/3 115/15/19	54.3 3/3 119/19/23	56.1 2/3 124/24/28	57.2 2/3 130/30/33	58.1 2/3 134/34/38
56	51.3 3/3 114/14/18	53.4 3/3 118/18/22	55.1 2/3 123/23/27	56.3 2/3 129/29/32	57.0 2/3 133/33/37
58	50.5 3/3 113/13/18	52.6 3/3 118/18/22	54.2 2/3 122/22/26	55.3 2/3 128/28/31	56.0 2/3 132/32/36
60	49.7 3/3 113/13/17	51.7 3/3 117/17/21	53.3 2/3 122/22/25	54.4 2/3 127/27/31	55.0 2/3 131/31/35
62	48.9 3/3 112/12/16	50.9 3/3 117/17/20	52.4 2/3 121/21/25	53.4 2/3 126/26/30	54.1 2/3 130/31/34
64	48.1 3/3 111/11/15	50.0 3/3 116/16/20	51.5 2/3 120/20/24	52.5 2/3 125/25/29	53.1 2/3 130/30/33
66	47.3 3/3 111/11/14	49.2 3/3 115/15/19	50.5 2/3 120/20/23	51.5 2/3 125/25/28	52.1 2/3 129/29/32
68	46.5 3/3 111/11/14	48.3 3/3 114/14/18	49.6 2/3 119/19/22	50.6 2/3 124/24/27	51.2 2/3 128/28/31

		QUICK REFERENCE TABLE - CONFIGURATION 2 - PRESSURE ALTITUDE = 1000 FT			MAX TO WEIGHT (1000KG) CODES IAS (KT) : V1/VR/V2
		TREF=28°C TMAX=53°C	DRY RUNWAY SLOPE=0%	CORRECTED RUNWAY LENGTH (M)	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
-20	63.8 3/3 127/27/33	66.6 3/3 132/32/37	68.7 2/3 137/37/43	70.2 2/3 144/44/48	71.1 2/3 148/48/53
-10	63.2 3/3 126/26/32	66.1 3/3 131/31/36	68.3 2/3 136/36/41	69.8 2/3 142/42/47	70.9 2/3 147/47/52
0	62.6 3/3 125/25/30	65.5 3/3 129/29/34	67.8 2/3 135/35/40	69.4 2/3 141/41/46	70.6 2/3 146/46/51
10	61.9 3/3 124/24/29	64.9 3/3 128/28/34	67.2 2/3 133/33/38	69.0 2/3 139/40/44	70.2 2/3 145/45/50
20	61.3 3/3 123/23/28	64.3 3/3 127/27/33	66.7 3/3 132/32/37	68.5 2/3 138/38/43	69.8 2/3 144/44/48
28	60.7 3/3 121/21/27	63.8 3/3 126/26/32	66.2 3/3 131/31/36	68.1 2/3 137/37/42	69.5 2/3 143/43/47
30	60.0 3/3 121/21/26	62.9 3/3 126/26/31	65.3 3/3 130/30/35	67.2 2/3 137/37/41	68.5 2/3 142/42/46
32	59.2 3/3 120/20/26	62.1 3/3 125/25/30	64.4 3/3 130/30/35	66.2 2/3 136/36/40	67.5 2/3 141/41/45
34	58.4 3/3 120/20/25	61.2 3/3 124/24/29	63.4 3/3 129/29/34	65.2 2/3 135/35/40	66.4 2/3 140/40/45
36	57.6 3/3 119/19/25	60.3 3/3 124/24/29	62.4 3/3 128/28/33	64.1 2/3 134/34/39	65.3 2/3 140/40/44
38	56.8 3/3 118/18/23	59.4 3/3 123/23/28	61.5 3/3 128/28/32	63.1 2/3 134/34/38	64.2 2/3 139/39/43
40	56.0 3/3 118/18/23	58.6 3/3 123/23/27	60.6 2/3 127/27/31	62.1 2/3 133/33/37	63.2 2/3 138/38/42
42	55.2 3/3 117/17/22	57.7 3/3 122/22/26	59.7 2/3 126/26/30	61.1 2/3 132/32/36	62.2 2/3 131/31/41
44	54.4 3/3 117/17/21	56.8 3/3 121/21/26	58.7 3/3 126/26/30	60.1 2/3 131/31/35	61.1 2/3 136/36/40
46	53.5 3/3 116/16/21	55.9 3/3 120/20/25	57.8 2/3 125/25/29	59.1 2/3 131/31/34	60.1 2/3 135/35/39
48	52.7 3/3 115/15/20	55.0 3/3 120/20/24	56.8 2/3 124/24/28	58.2 2/3 130/30/34	59.1 2/3 134/34/38
50	51.9 3/3 114/14/19	54.1 3/3 119/19/23	55.9 2/3 123/23/27	57.2 2/3 129/29/33	58.0 2/3 134/34/37
52	51.1 3/3 114/14/18	53.3 3/3 118/18/22	54.9 2/3 122/22/26	56.2 2/3 128/28/32	57.0 2/3 133/33/36
54	50.3 3/3 113/13/17	52.4 3/3 117/17/21	54.0 2/3 122/22/26	55.2 2/3 127/27/31	55.9 2/3 132/32/35
56	49.4 3/3 112/12/16	51.5 3/3 117/17/21	53.0 2/3 121/21/25	54.2 2/3 126/26/30	54.9 2/3 131/31/34
58	48.6 3/3 111/11/15	50.6 3/3 116/16/19	52.1 2/3 120/20/24	53.2 2/3 126/26/29	53.9 2/3 130/30/33
60	47.9 3/3 111/11/15	49.8 3/3 115/15/19	51.3 2/3 120/20/23	52.3 2/3 125/25/28	53.0 2/3 129/29/32
62	47.1 3/3 110/10/14	48.9 3/3 114/14/18	50.4 2/3 119/19/22	51.4 2/3 124/24/27	52.0 2/3 128/28/31
64	46.3 3/3 110/10/13	48.1 3/3 113/13/17	49.5 2/3 118/18/21	50.4 2/3 123/23/26	51.1 2/3 127/27/30
66	45.5 3/3 109/09/13	47.2 3/3 112/13/16	48.6 2/3 117/17/20	49.5 2/3 122/22/25	50.1 2/3 126/26/29

CONFIGURATION 2		PRESSURE ALTITUDE = 0 FT				
TREF = 55 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2			
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	1750	2000	2250	2500	2750	
-20	71.7 134/34/39	74.7 140/41/46	77.0 146/48/53	78.5 153/54/59	79.5 159/60/65	
-10	71.0 132/32/37	74.0 138/39/44	76.4 144/46/51	78.1 150/52/57	79.2 156/58/63	
0	70.4 130/30/35	73.3 136/37/42	75.8 142/44/49	77.6 148/50/55	78.8 154/56/61	
10	69.8 129/29/34	72.6 135/36/40	75.2 140/42/47	77.1 146/48/53	78.5 152/54/59	
20	69.1 127/27/32	72.0 133/34/39	74.5 139/41/45	76.6 144/47/51	78.1 149/52/57	
30	68.5 125/25/31	71.4 131/32/37	73.9 137/39/44	76.1 142/45/49	77.6 147/50/55	
40	67.9 124/24/29	70.8 130/31/36	73.3 135/38/42	75.5 140/43/48	77.1 145/48/53	
50	67.2 123/23/28	70.3 128/29/34	72.7 134/36/40	74.9 139/42/46	75.8 138/44/49	
55	66.9 122/23/28	70.0 127/29/33	72.3 132/35/39	72.3 126/35/40	72.3 119/35/40	
57	66.0 122/22/27	69.1 127/28/33	71.5 133/35/39	72.3 131/37/42	72.3 125/37/42	
59	65.2 121/21/27	68.1 127/28/32	70.5 132/34/39	72.3 136/40/44	72.3 131/40/44	
61	64.2 121/21/26	67.1 127/27/32	69.5 132/34/38	71.5 137/40/44	72.3 138/43/47	
63	63.3 121/21/26	66.1 126/27/31	68.5 132/33/38	70.5 137/39/43	72.0 142/44/48	
65	62.3 121/21/25	65.1 126/27/31	67.5 131/33/37	69.4 137/39/43	70.8 142/44/48	
67	61.2 120/20/25	64.1 126/26/30	66.4 131/32/36	68.3 136/38/42	69.6 141/43/47	
69	60.1 120/20/24	63.0 126/26/30	65.3 131/32/36	67.2 136/37/41	68.4 141/43/47	
71	59.0 119/19/24	61.9 125/25/30	64.2 131/31/35	66.0 136/37/41	67.2 141/42/46	
73	57.9 119/19/23	60.8 125/25/29	63.1 130/31/35	64.8 135/36/40	65.9 140/42/45	
75	56.8 118/18/22	59.6 124/24/28	62.0 130/30/34	63.6 135/36/39	64.6 140/41/45	
77	* 55.6 * 117/17/22	58.4 123/23/28	60.8 129/30/33	62.3 135/35/39	63.3 140/40/44	
79	* 54.4 * 117/17/21	57.1 123/23/27	59.5 129/29/32	60.9 134/35/38	61.9 140/40/43	
80	* 53.8 * 116/16/21	56.6 123/23/27	58.8 128/28/32	60.3 134/34/38	61.2 139/39/43	

CONFIGURATION 2		PRESSURE ALTITUDE = 1000 FT				
TREF = 51 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG) CODES		
TMAX = 53 °C		SLOPE = 0 %		IAS(KT) : V1 / VR / V2		
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)				
		1750	2000	2250	2500	2750
-20		70.3 132/32/37	73.3 138/39/44	75.7 145/46/51	77.2 150/52/57	78.3 156/58/63
-10		69.6 131/31/35	72.6 137/37/42	75.0 142/44/49	76.8 148/50/55	77.9 154/56/60
0		69.0 129/29/34	71.9 135/36/40	74.4 140/42/47	76.3 146/48/53	77.6 152/54/58
10		68.4 127/27/32	71.2 133/34/38	73.7 139/40/45	75.8 144/46/51	77.2 149/52/56
20		67.8 125/25/30	70.6 131/32/37	73.1 137/39/43	75.2 142/45/49	76.7 147/50/55
30		67.1 124/24/29	70.0 130/31/35	72.5 135/37/42	74.6 140/43/48	76.3 145/48/53
40		66.5 122/22/28	69.5 128/29/34	71.9 133/36/40	74.1 139/42/46	75.7 143/46/51
50		65.8 121/22/27	68.9 126/28/32	71.3 132/34/39	73.5 137/40/44	74.2 136/42/46
51		65.8 121/22/27	68.9 126/27/32	71.2 132/34/38	73.5 137/40/44	73.5 132/40/44
53		65.2 121/21/26	68.3 126/27/32	70.6 132/34/38	72.1 133/37/42	72.0 127/37/41
55		64.5 120/20/26	67.4 126/27/31	69.8 131/33/38	71.9 136/39/43	72.1 133/40/44
57		63.6 120/20/25	66.5 126/26/31	68.8 131/33/37	70.9 136/38/43	72.0 138/42/46
59		62.7 120/20/25	65.6 125/26/30	67.9 131/32/36	69.9 136/38/42	71.5 141/43/47
61		61.7 119/19/24	64.6 125/25/30	66.9 130/32/36	68.9 135/37/41	70.4 140/43/47
63		60.8 119/19/24	63.7 125/25/29	66.0 130/31/35	67.9 135/37/41	69.3 140/42/46
65		59.8 119/19/23	62.7 124/25/29	65.0 130/31/35	66.9 135/36/40	68.2 140/42/45
67		58.8 118/18/23	61.7 124/24/29	64.0 129/30/34	65.8 134/36/40	67.1 139/41/45
69		57.7 117/17/22	60.6 124/24/28	62.9 129/30/34	64.7 134/35/39	65.9 139/40/44
71		56.7 117/17/21	59.6 123/23/28	61.9 129/29/33	63.5 134/35/38	64.7 139/40/43
73		* 55.6 * 116/16/21	58.5 123/23/27	60.8 128/29/32	62.4 133/34/38	63.5 139/39/43
75		* 54.6 * 116/16/20	57.4 122/22/26	59.7 128/28/32	61.2 133/34/37	62.2 138/39/42
78		* 52.6 * 115/16/20	55.6 121/21/25	57.9 127/27/30	59.3 133/33/36	60.2 138/38/41

CONFIGURATION 2		PRESSURE ALTITUDE = 0 FT		FWD CG	
TREF = 46 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
-20	73.6 3/9 136/39/44	77.8 3/9 142/43/48	80.4 2/3 147/50/55	82.4 2/3 153/56/61	84.0 2/3 158/61/67
-10	72.4 3/9 135/38/43	77.0 3/9 140/41/46	79.6 2/3 145/48/53	81.8 2/3 151/54/59	83.5 2/3 156/59/65
0	71.3 3/9 133/37/42	75.9 3/9 138/41/45	78.9 2/3 143/46/51	81.2 2/3 149/52/57	82.9 2/3 154/57/63
10	70.3 3/9 132/36/41	74.8 3/9 137/40/45	78.2 2/3 142/44/49	80.5 2/3 147/50/55	82.3 2/3 152/56/61
20	69.3 3/9 130/35/40	73.7 3/9 135/40/44	77.6 3/9 140/43/47	79.9 2/3 145/49/54	81.8 2/3 150/54/59
30	68.3 3/9 129/34/39	72.7 3/9 134/39/43	76.8 3/9 138/42/46	79.3 2/3 143/47/52	81.2 2/3 148/52/57
40	67.3 3/9 128/33/38	71.7 3/9 133/38/43	75.8 3/9 137/41/45	78.6 2/3 142/46/50	80.7 2/3 147/51/56
46	66.8 3/9 127/33/37	71.1 3/9 132/37/42	75.2 3/9 136/41/45	78.3 2/3 141/45/49	80.3 2/3 146/50/55
48	66.2 3/9 127/32/37	70.4 3/9 132/37/41	74.3 3/9 136/40/45	77.3 2/3 141/44/49	79.3 2/3 145/49/54
50	65.5 3/9 127/31/36	69.7 3/9 132/36/40	73.4 3/9 136/40/44	76.2 2/3 141/44/48	78.1 2/3 145/49/54
52	64.8 3/9 126/31/35	68.9 3/9 131/35/40	72.5 3/9 136/39/43	75.2 2/3 140/44/48	77.0 2/3 145/49/53
54	64.1 3/9 126/30/34	68.1 3/9 131/35/39	71.6 3/9 135/39/42	74.2 2/3 140/43/47	75.9 2/3 145/48/52
55	63.8 3/9 126/30/34	67.7 3/9 131/34/38	71.2 3/9 135/38/42	73.7 2/3 140/43/47	75.3 3/8 145/48/52
56	63.4 3/9 126/29/34	67.3 3/9 131/34/38	70.8 3/9 135/38/42	73.2 2/3 140/43/47	74.9 2/3 145/48/52
58	62.7 3/9 125/29/33	66.6 3/9 130/33/37	70.0 3/9 135/37/41	72.2 2/3 140/42/46	73.8 2/3 144/47/51
60	62.0 3/9 125/28/32	65.9 3/9 130/33/36	69.1 3/9 134/36/40	71.2 2/3 139/42/45	72.8 2/3 144/47/51
62	61.3 3/9 125/28/31	65.1 3/9 130/32/35	68.2 3/9 134/36/39	70.1 2/3 139/41/45	71.6 2/3 144/46/50
64	60.5 3/9 124/27/31	64.3 3/9 129/31/35	67.2 3/9 134/35/39	69.1 2/3 139/41/44	70.5 2/3 144/46/50
66	59.8 3/9 124/26/30	63.4 3/9 129/30/34	66.2 2/3 134/35/38	68.0 2/3 139/40/44	69.3 2/3 143/45/49
68	59.0 3/9 124/26/29	62.6 3/9 129/30/33	65.2 2/3 133/34/38	66.9 2/3 139/40/43	68.2 2/3 143/45/48
70	58.2 3/9 123/25/28	61.7 3/9 128/29/32	64.2 2/3 133/34/37	65.8 2/3 138/39/43	67.0 2/3 143/44/48

CONFIGURATION 2		PRESSURE ALTITUDE = 1000 FT			FWD CG
TREF = 42 °C		DRY RUNWAY SLOPE = 0 %		MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)			
		1750	2000	2250	2500
		2750			
-20	72.4 135/39/43	76.9 140/42/46	79.5 145/48/53	81.6 151/54/59	83.3 156/59/65
-10	71.2 133/37/42	75.8 138/41/46	78.8 144/46/51	81.0 149/52/57	82.7 154/57/63
0	70.2 132/36/41	74.6 137/40/45	78.1 142/44/49	80.4 147/50/55	82.1 152/56/61
10	69.1 130/35/40	73.5 135/40/44	77.4 140/43/47	79.7 145/49/53	81.6 150/54/59
20	68.1 129/34/39	72.4 134/39/43	76.6 138/42/46	79.1 143/47/52	81.0 148/52/57
30	67.1 128/33/38	71.5 133/38/42	75.6 137/41/45	78.4 142/45/50	80.4 146/51/55
40	66.3 127/32/37	70.5 132/37/41	74.5 136/41/45	77.8 140/44/48	79.8 145/49/54
42	66.0 126/32/37	70.3 131/37/41	74.2 136/40/45	77.6 140/44/48	79.6 144/49/54
44	65.5 126/31/36	69.7 131/36/41	73.5 135/40/44	76.9 140/43/48	78.8 144/48/53
46	64.8 126/31/35	69.0 131/36/40	72.6 135/40/44	75.8 140/43/47	77.7 144/48/52
48	64.1 125/30/35	68.2 130/35/39	71.8 135/39/43	74.8 139/42/47	76.6 144/48/52
50	63.4 125/29/34	67.5 130/34/38	71.0 135/38/42	73.8 139/42/46	75.6 144/47/51
52	62.8 125/29/33	66.7 130/33/37	70.2 134/37/41	72.8 139/42/45	74.5 143/47/51
53	62.4 125/29/33	66.3 130/33/37	69.8 134/37/41	72.3 139/41/45	74.0 143/46/50
56	61.4 124/28/32	65.2 129/32/36	68.5 134/36/40	70.9 138/41/44	72.5 143/46/50
58	60.7 124/27/31	64.5 129/31/35	67.7 133/35/39	69.9 138/40/44	71.4 143/45/49
60	60.0 124/26/30	63.8 128/31/34	66.9 133/34/38	68.9 138/40/43	70.3 142/45/49
62	59.3 123/26/29	63.0 128/30/33	66.0 133/34/37	67.8 138/39/43	69.3 142/44/48
64	58.6 123/25/29	62.2 128/29/33	65.0 132/33/37	66.8 137/39/42	68.1 142/44/47
66	57.8 122/24/28	61.4 127/28/32	64.1 132/33/36	65.7 137/39/42	67.0 142/43/47
68	57.1 122/24/27	60.6 127/28/31	63.1 132/32/36	64.7 137/38/41	65.9 142/43/46

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CONFIGURATION 2		PRESSURE ALTITUDE = 0 FT		FWD CG	
TREF = 46 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
-20	73.6 136/39/44	77.8 142/43/48	80.3 147/50/55	82.4 153/56/61	83.5 155/60/65
-10	72.4 135/38/43	77.0 140/41/46	79.6 145/48/53	81.8 151/54/59	82.9 152/57/63
0	71.3 133/37/42	75.9 138/41/45	78.9 143/46/51	81.1 149/52/57	82.2 150/55/61
10	70.3 132/36/41	74.8 137/40/45	78.2 142/44/49	80.5 147/50/55	81.6 148/53/58
20	69.3 130/35/40	73.7 135/40/44	77.6 140/43/47	79.9 145/49/54	80.9 145/51/56
30	68.3 129/34/39	72.6 134/39/43	76.8 139/42/46	79.3 143/47/52	80.3 143/50/55
40	67.4 128/33/38	71.7 133/38/43	75.8 137/41/45	78.6 142/46/50	79.6 141/48/53
46	66.9 127/33/37	71.1 132/37/42	75.2 136/41/45	78.3 141/45/49	79.3 140/47/52
48	66.2 127/32/37	70.4 132/37/41	74.3 136/40/45	77.3 141/44/49	78.4 141/47/52
50	65.5 127/31/36	69.6 132/36/40	73.4 136/40/44	76.2 141/44/48	77.4 142/47/52
52	64.8 126/31/35	68.9 131/35/40	72.5 136/39/43	75.2 140/44/48	76.5 142/47/51
54	64.1 126/30/34	68.1 131/35/39	71.7 135/39/42	74.2 140/43/47	75.6 143/47/51
55	63.8 126/30/34	67.7 131/34/38	71.2 135/38/42	73.7 140/43/47	75.1 143/47/51
56	63.4 126/29/34	67.4 131/34/38	70.8 135/38/42	73.2 140/43/47	74.7 144/47/51
58	62.7 125/29/33	66.6 130/33/37	70.0 135/37/41	72.2 140/42/46	73.8 144/47/51
60	62.0 125/28/32	65.8 130/33/36	69.2 134/36/40	71.2 139/42/46	72.7 144/47/51
62	61.3 125/28/31	65.0 130/32/35	68.2 134/36/39	70.1 139/41/45	71.6 144/46/50
64	60.5 124/27/31	64.2 129/31/35	67.2 134/35/39	69.1 139/41/44	70.5 144/46/50
66	59.8 124/26/30	63.4 129/30/34	66.2 134/35/38	68.0 139/40/44	69.3 143/45/49
68	59.0 124/26/29	62.6 128/30/33	65.2 133/34/38	66.9 139/40/43	68.2 143/45/48
70	58.2 123/25/28	61.8 128/29/32	64.2 133/34/37	65.8 138/40/43	67.0 143/44/48

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CONFIGURATION 2		PRESSURE ALTITUDE = 1000 FT				FWD CG
		TREF = 43 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG)	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	1750	2000	2250	2500	2750	
-20	72.1 135/38/43	76.6 140/41/46	79.2 145/48/53	81.3 151/54/59	82.5 153/58/63	
-10	71.0 133/37/42	75.5 138/41/45	78.5 144/46/51	80.7 149/52/57	81.8 150/55/61	
0	70.0 132/36/41	74.4 137/40/45	77.8 142/44/49	80.0 147/50/55	81.1 148/53/59	
10	68.9 130/35/40	73.2 135/40/44	77.1 140/43/47	79.4 145/49/53	80.5 146/52/57	
20	67.9 129/34/39	72.2 134/39/43	76.3 138/41/46	78.7 143/47/52	79.8 144/50/55	
30	67.0 128/33/38	71.2 133/38/42	75.3 137/41/45	78.1 142/45/50	79.2 142/48/53	
40	66.1 127/32/37	70.3 131/37/41	74.3 136/40/45	77.5 140/44/48	78.5 140/46/51	
43	65.8 126/32/36	70.0 131/36/41	73.9 135/40/44	77.2 140/43/48	78.3 139/46/50	
45	65.1 126/31/36	69.2 131/36/40	73.0 135/40/44	76.2 140/43/47	77.3 140/46/50	
47	64.4 126/30/35	68.5 130/35/39	72.1 135/39/43	75.2 139/43/47	76.4 140/46/50	
49	63.7 125/30/34	67.8 130/34/39	71.3 135/38/42	74.2 139/42/46	75.5 141/46/50	
51	63.0 125/29/33	67.0 130/34/38	70.5 134/38/41	73.2 139/42/46	74.7 142/46/50	
53	62.3 125/28/33	66.3 130/33/37	69.7 134/37/41	72.2 139/41/45	73.8 142/46/50	
55	61.7 124/28/32	65.5 129/32/36	68.9 134/36/40	71.3 138/41/45	72.9 143/46/50	
57	61.0 124/27/31	64.8 129/32/35	68.1 133/35/39	70.3 138/41/44	71.9 143/45/49	
59	60.3 124/27/30	64.1 128/31/35	67.3 133/35/38	69.3 138/40/44	70.8 143/45/49	
61	59.6 123/26/30	63.3 128/30/34	66.4 133/34/37	68.3 138/40/43	69.7 142/45/48	
63	58.9 123/25/29	62.5 128/29/33	65.4 132/34/37	67.2 137/39/42	68.6 142/44/48	
65	58.1 123/25/28	61.7 127/29/32	64.4 132/33/36	66.2 137/39/42	67.5 142/44/47	
67	57.4 122/24/27	60.9 127/28/31	63.4 132/33/36	65.1 137/38/41	66.4 142/43/46	
68	57.0 122/24/27	60.5 127/28/31	62.9 132/32/35	64.5 137/38/41	65.8 142/43/46	

QUICK REFERENCE TABLE - 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)				
	1750	2000	2250	2500	2750
-20	62.1 3/3 125/25/31	64.7 3/3 130/30/35	66.8 2/3 135/35/40	68.4 2/3 142/42/46	69.4 2/3 146/46/51
-10	61.5 3/3 124/24/30	64.3 3/3 129/29/34	66.5 2/3 134/34/39	68.1 2/3 140/40/45	69.1 2/3 145/45/50
0	60.9 3/3 123/23/28	63.7 3/3 128/28/33	66.0 2/3 133/33/38	67.7 2/3 139/39/44	68.9 2/3 144/44/48
10	60.3 3/3 122/22/27	63.1 3/3 127/27/32	65.5 3/3 131/31/36	67.2 2/3 138/38/42	68.5 2/3 143/43/47
20	59.6 3/3 121/21/26	62.5 3/3 126/26/31	64.9 3/3 130/30/35	66.8 2/3 136/36/41	68.1 2/3 142/42/46
26	59.2 3/3 120/20/26	62.2 3/3 125/25/30	64.5 3/3 129/29/34	66.4 2/3 135/35/40	67.8 2/3 141/41/45
28	58.5 3/3 119/19/25	61.4 3/3 124/24/30	63.7 3/3 129/29/34	65.5 2/3 135/35/39	66.8 2/3 140/40/44
30	57.7 3/3 119/19/24	60.5 3/3 124/24/29	62.8 3/3 129/29/33	64.6 2/3 134/34/38	65.8 2/3 139/39/44
32	57.0 3/3 118/18/23	59.8 3/3 123/23/28	61.9 3/3 127/27/32	63.6 2/3 133/33/38	64.9 2/3 139/39/43
34	56.2 3/3 117/17/23	58.9 3/3 122/22/27	61.1 3/3 127/27/32	62.7 2/3 133/33/37	63.9 2/3 138/38/42
36	55.4 3/3 117/17/22	58.0 3/3 122/22/26	60.1 3/3 126/26/31	61.7 2/3 132/32/36	62.8 2/3 137/37/41
38	54.7 3/3 116/16/21	57.2 3/3 121/21/26	59.2 3/3 125/25/30	60.8 2/3 131/31/35	61.8 2/3 136/36/40
40	53.9 3/3 116/16/20	56.4 3/3 120/20/25	58.3 2/3 124/24/29	59.8 2/3 130/30/34	60.8 2/3 135/35/39
42	53.1 3/3 115/15/20	55.6 3/3 120/20/24	57.5 3/3 124/24/28	58.9 2/3 130/30/34	59.9 2/3 135/35/38
44	52.4 3/3 114/14/19	54.7 3/3 119/19/23	56.6 2/3 123/23/27	57.9 2/3 129/29/33	58.9 2/3 134/34/37
46	51.6 3/3 114/14/18	53.9 3/3 117/17/22	55.7 3/3 123/23/27	57.0 2/3 128/28/32	57.9 2/3 133/33/37
48	50.8 3/3 113/13/17	53.0 3/3 118/18/22	54.7 3/3 122/22/26	56.0 2/3 128/28/31	56.9 2/3 132/32/36
50	50.0 3/3 112/12/16	52.2 3/3 117/17/21	53.8 2/3 121/21/25	55.0 2/3 127/27/30	55.9 2/3 131/31/35
52	49.2 3/3 111/11/15	51.3 3/3 116/16/20	52.9 2/3 120/20/24	54.1 2/3 126/26/29	54.9 2/3 130/30/33
54	48.4 3/3 111/11/15	50.4 3/3 115/15/19	52.0 2/3 120/20/23	53.1 2/3 125/25/28	53.8 2/3 129/29/32
56	47.6 3/3 110/10/14	49.5 3/3 114/14/18	51.0 2/3 119/19/22	52.1 2/3 124/24/27	52.8 2/3 128/28/31
58	46.8 3/3 109/09/13	48.7 3/3 113/13/17	50.1 2/3 118/18/21	51.2 2/3 123/23/26	51.9 2/3 127/27/30
60	46.0 3/3 109/09/13	47.9 3/3 113/13/17	49.3 2/3 117/17/21	50.3 2/3 122/22/26	50.9 2/3 127/27/29
62	45.2 3/3 108/08/12	47.0 3/3 112/12/15	48.4 2/3 117/17/20	49.4 2/3 122/22/25	50.0 2/3 126/26/28
64	44.5 3/3 108/08/11	46.2 3/3 111/11/15	47.5 2/3 116/16/19	48.4 2/3 121/21/24	49.1 2/3 125/25/27

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CONFIGURATION 2		PRESSURE ALTITUDE = 2000 FT				
TREF = 47 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2			
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	1750	2000	2250	2500	2750	
-20	69.0 3/3 131/31/36	72.0 2/3 137/37/42	74.4 2/3 143/44/49	76.1 2/3 148/50/55	77.2 2/3 154/56/60	
-10	68.4 3/3 129/29/34	71.3 2/3 135/35/40	73.7 2/3 140/42/47	75.6 2/3 146/48/53	76.8 2/3 152/54/58	
0	67.8 3/3 127/27/32	70.6 2/3 133/34/38	73.1 2/3 139/40/45	75.0 2/3 144/46/51	76.4 2/3 149/52/56	
10	67.1 3/3 125/25/30	70.0 2/3 131/32/37	72.4 2/3 137/39/43	74.5 2/3 142/44/49	76.0 3/6 147/50/54	
20	66.5 3/9 124/24/29	69.4 2/3 129/30/35	71.8 2/3 135/37/41	73.9 2/3 140/43/47	75.6 3/6 145/48/53	
30	65.9 3/9 122/22/27	68.8 2/3 128/29/33	71.2 2/3 133/35/40	73.3 2/3 138/41/46	75.1 3/6 143/47/51	
40	65.2 3/9 121/21/27	68.2 2/3 126/27/32	70.6 2/3 132/34/38	72.8 2/3 137/40/44	74.5 3/6 141/45/49	
47	64.7 3/9 120/21/26	67.8 2/3 125/26/31	70.2 2/3 131/33/37	72.4 2/3 136/39/43	74.1 3/6 140/43/48	
49	64.2 3/9 120/20/25	67.2 2/3 125/26/31	69.5 2/3 130/32/37	71.7 2/3 135/38/42	73.4 3/6 140/43/48	
51	63.6 3/9 119/20/25	66.6 2/3 125/26/30	68.9 2/3 130/32/36	71.0 2/3 135/38/42	72.1 2/3 137/41/45	
53	62.8 3/9 119/19/24	65.7 2/3 124/25/30	68.0 2/3 130/32/36	70.1 2/3 135/37/41	71.8 2/3 140/42/47	
55	62.0 3/9 119/19/24	64.9 2/3 124/25/29	67.1 2/3 129/31/35	69.2 2/3 135/37/41	70.8 2/3 139/42/46	
57	61.1 3/9 118/18/23	64.0 2/3 124/24/29	66.3 2/3 129/31/35	68.2 2/3 134/36/40	69.8 2/3 139/42/45	
59	60.2 3/3 118/18/23	63.1 2/3 124/24/28	65.4 2/3 129/30/34	67.3 2/3 134/36/40	68.8 2/3 139/41/45	
61	59.3 3/3 117/17/22	62.2 2/3 123/24/28	64.4 2/3 128/30/34	66.3 2/3 134/35/39	67.8 2/3 138/40/44	
63	58.3 3/3 117/17/22	61.3 2/3 123/23/27	63.6 2/3 128/29/33	65.4 2/3 133/35/38	66.7 2/3 138/40/44	
65	57.4 3/3 116/16/21	60.3 3/3 123/23/27	62.6 2/3 128/29/33	64.4 2/3 133/34/38	65.6 2/3 138/39/43	
67	56.4 3/3 116/16/20	59.3 3/3 122/22/27	61.6 2/3 128/28/32	63.3 2/3 133/34/37	64.5 2/3 138/39/42	
69	* 55.4 3/3 * 115/15/20	58.3 3/3 122/22/26	60.6 2/3 127/28/31	62.3 2/3 132/33/37	63.4 2/3 137/38/42	
71	* 54.4 3/3 * 115/15/19	57.2 3/3 121/21/25	59.6 2/3 127/27/31	61.2 2/3 132/33/36	62.3 2/3 137/38/41	
76	* 51.4 3/3 * 114/15/19	54.6 3/3 120/20/24	56.8 2/3 125/25/29	58.3 2/3 131/31/35	59.2 2/3 136/36/40	

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CONFIGURATION 2		PRESSURE ALTITUDE = 2000 FT		FWD CG	
TREF = 37 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
-20	71.2 3/9 134/38/42	75.7 3/9 138/41/46	78.7 2/3 144/46/51	80.9 2/3 149/52/57	82.6 2/3 154/58/63
-10	70.1 3/9 132/36/41	74.6 3/9 137/40/45	78.0 2/3 142/44/49	80.3 2/3 147/50/55	82.0 2/3 152/56/61
0	69.0 3/9 130/35/40	73.3 3/9 136/40/44	77.3 3/9 140/43/47	79.6 2/3 145/49/53	81.4 2/3 150/54/59
10	68.0 3/9 129/34/39	72.3 3/9 134/39/43	76.4 3/9 138/42/46	78.9 2/3 143/47/52	80.8 2/3 148/52/57
20	67.0 3/9 128/33/38	71.3 3/9 133/38/42	75.4 3/9 137/41/45	78.3 2/3 142/45/50	80.2 2/3 146/50/55
30	66.1 3/9 126/32/37	70.3 3/9 131/37/41	74.2 3/9 136/41/45	77.6 2/3 140/44/48	79.6 2/3 145/49/54
37	65.4 3/9 126/31/36	69.7 3/9 131/36/41	73.5 3/9 135/40/44	77.2 3/9 139/43/47	79.2 2/3 143/48/53
40	64.7 3/9 125/31/35	68.8 3/9 130/35/40	72.6 3/9 135/40/44	76.2 3/9 139/42/46	78.2 2/3 143/47/52
42	64.2 3/9 125/30/35	68.2 3/9 130/35/39	71.9 3/9 134/39/43	75.4 3/9 138/42/46	77.3 2/3 143/47/51
44	63.5 3/9 125/30/34	67.5 3/9 129/34/38	71.1 3/9 134/38/42	74.4 3/9 138/41/45	76.2 2/3 143/46/51
46	62.8 3/9 124/29/33	66.7 3/9 129/34/38	70.3 3/9 134/37/41	73.3 3/9 138/41/45	75.1 2/3 142/46/50
48	62.0 3/9 124/28/32	66.0 3/9 129/33/37	69.5 3/9 133/37/41	72.4 3/9 138/41/44	74.1 2/3 142/45/50
50	61.4 3/9 124/28/32	65.3 3/9 128/32/36	68.6 3/9 133/36/40	71.4 2/3 137/40/44	73.1 2/3 142/45/49
51	61.0 3/9 124/27/31	64.9 3/9 128/32/36	68.2 3/9 133/36/39	70.9 2/3 137/40/44	72.6 2/3 142/45/49
54	60.1 3/9 123/26/30	63.9 3/9 128/31/34	67.1 3/9 132/35/38	69.5 2/3 137/39/43	71.1 2/3 142/44/48
56	59.4 3/9 123/26/30	63.2 3/9 127/30/34	66.4 3/9 132/34/37	68.5 2/3 137/39/42	70.0 2/3 141/44/47
58	58.7 3/9 122/25/29	62.4 3/9 127/29/33	65.6 3/9 132/33/36	67.6 2/3 136/38/42	69.0 2/3 141/43/47
60	58.1 3/9 122/24/28	61.7 3/9 127/29/32	64.8 3/9 131/32/35	66.6 2/3 136/38/41	68.0 2/3 141/43/46
62	57.4 3/9 122/24/27	60.9 3/9 126/28/31	63.8 3/9 131/32/35	65.6 2/3 136/37/41	66.9 2/3 141/42/46
64	56.6 3/9 121/23/26	60.2 3/9 126/27/30	62.9 2/3 131/31/34	64.6 2/3 136/37/40	65.8 2/3 140/42/45
66	55.9 3/9 121/22/26	59.4 3/9 126/26/30	61.9 2/3 130/31/34	63.5 2/3 135/37/40	64.7 2/3 140/42/45

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CONFIGURATION 2		PRESSURE ALTITUDE = 2000 FT		FWD CG			
TREF = 40 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1750	2000	2250	2500	2750		
-20 133/37/42	70.7 3/9 138/41/45	75.1 3/9 138/41/45	78.0 2/3 144/46/51	80.1 2/3 149/52/57	81.4 3/6 151/56/61		
-10 132/36/41	69.6 3/9 137/40/45	73.9 3/9 137/40/45	77.3 2/3 142/44/49	79.5 2/3 147/50/55	80.6 3/6 148/53/59		
0 130/35/40	68.6 3/9 135/39/44	72.8 3/9 135/39/44	76.6 3/9 140/43/47	78.9 2/3 145/48/53	80.0 3/6 146/52/57		
10 129/34/38	67.5 3/9 134/38/43	71.8 3/9 134/38/43	75.8 3/9 138/41/46	78.2 2/3 143/47/51	79.4 3/6 144/50/55		
20 128/33/37	66.6 3/9 133/37/42	70.8 3/9 133/37/42	74.7 3/9 137/41/45	77.6 2/3 142/45/50	78.7 3/6 142/48/53		
30 126/32/36	65.6 3/9 131/36/41	69.8 3/9 131/36/41	73.7 3/9 136/40/44	76.9 3/6 140/44/48	78.0 3/6 140/46/51		
40 125/31/35	64.6 3/9 130/35/40	68.8 3/9 130/35/40	72.6 3/9 134/39/44	76.2 3/6 138/42/46	77.2 3/6 138/45/49		
42 125/30/35	64.0 3/9 130/35/39	68.1 3/9 134/39/43	71.8 3/9 134/39/43	75.2 3/9 138/42/46	76.4 3/6 139/45/49		
44 125/29/34	63.3 3/9 129/34/38	67.3 3/9 129/34/38	70.9 3/9 134/38/42	74.2 3/9 138/41/45	75.4 3/6 139/45/49		
46 124/29/33	62.6 3/9 129/33/37	66.6 3/9 133/37/41	70.1 3/9 133/37/41	73.2 3/9 138/41/45	74.5 3/6 140/45/49		
48 124/28/32	61.9 3/9 129/33/37	65.9 3/9 133/37/40	69.4 3/9 133/37/40	72.2 3/9 138/40/44	73.7 3/6 141/45/49		
50 124/27/32	61.3 3/9 128/32/36	65.2 3/9 133/36/40	68.6 3/9 133/36/40	71.2 2/3 137/40/44	72.8 3/6 141/45/49		
51 123/27/31	60.9 3/9 128/32/35	64.8 3/9 133/35/39	68.2 3/9 133/35/39	70.7 2/3 137/40/43	72.4 3/6 142/45/49		
52 123/27/31	60.6 3/9 128/31/35	64.4 3/9 132/35/39	67.8 3/9 132/35/39	70.3 2/3 137/40/43	71.9 3/6 142/45/48		
54 123/26/30	59.9 3/9 128/31/34	63.7 3/9 132/34/38	67.0 3/9 132/34/38	69.3 2/3 137/39/43	70.9 2/3 141/44/48		
56 123/26/29	59.3 3/9 127/30/33	63.0 3/9 132/34/37	66.2 3/9 132/34/37	68.4 2/3 137/39/42	69.9 2/3 141/44/47		
58 122/25/29	58.6 3/9 127/29/33	62.3 3/9 131/33/36	65.4 3/9 131/33/36	67.4 2/3 136/38/42	68.9 2/3 141/43/47		
60 122/24/28	57.9 3/9 127/29/32	61.6 3/9 131/32/35	64.6 3/9 131/32/35	66.4 2/3 136/38/41	67.8 2/3 141/43/46		
62 121/24/27	57.2 3/9 126/28/31	60.8 3/9 131/32/35	63.7 3/9 131/32/35	65.4 2/3 136/37/40	66.7 2/3 141/42/46		
64 121/23/26	56.5 3/9 126/27/30	60.0 3/9 131/31/34	62.7 2/3 131/31/34	64.4 2/3 136/37/40	65.7 2/3 140/42/45		
66 121/22/26	55.7 3/9 126/26/29	59.2 3/9 130/31/34	61.7 2/3 130/31/34	63.3 2/3 135/36/39	64.6 2/3 140/41/44		

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QUICK REFERENCE TABLE - 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)				
	1500	1750	2000	2250	
-20	62.5 3/3 122/22/29	66.1 3/3 128/28/35	68.7 2/3 135/35/41	70.2 2/3 143/43/49	71.0 2/3 149/49/54
-10	61.9 3/3 121/21/28	65.5 3/3 127/27/34	68.3 2/3 134/34/40	69.9 2/3 141/41/47	70.8 2/3 147/47/53
0	61.2 3/9 120/20/26	64.9 3/3 126/26/33	67.8 2/3 132/32/38	69.6 2/3 140/40/46	70.6 2/3 146/46/52
10	60.5 3/9 119/19/25	64.3 3/3 125/25/31	67.2 2/3 131/31/37	69.2 2/3 138/38/44	70.3 2/3 144/45/50
20	59.8 3/9 117/17/24	63.6 3/3 124/24/30	66.6 3/3 129/29/35	68.7 2/3 137/37/42	69.9 2/3 142/43/48
30	59.1 3/9 116/16/23	62.9 3/3 123/23/29	65.9 3/3 128/28/34	68.1 2/3 135/35/41	69.4 2/3 141/41/47
32	58.4 3/9 116/16/23	62.1 3/3 122/22/29	65.0 3/3 128/28/34	67.2 2/3 135/35/40	68.5 2/3 140/41/46
34	57.6 3/9 115/15/21	61.3 3/3 121/21/28	64.1 3/3 127/27/33	66.2 2/3 134/34/40	67.4 2/3 140/40/46
36	56.8 3/9 114/14/21	60.4 3/3 121/21/27	63.0 3/3 126/26/32	65.1 2/3 133/33/39	66.3 2/3 140/40/45
38	56.0 3/9 114/14/20	59.5 3/3 120/20/26	62.1 3/3 125/25/31	64.1 2/3 133/33/38	65.2 2/3 139/39/44
40	55.2 3/9 113/13/19	58.6 3/3 120/20/25	61.2 2/3 125/25/30	63.0 2/3 132/32/37	64.1 2/3 138/38/43
42	54.5 3/3 113/13/19	57.8 3/3 119/19/25	60.3 2/3 124/24/30	62.0 2/3 131/31/37	63.1 2/3 137/37/42
44	53.7 3/3 112/12/18	57.0 3/3 118/18/24	59.4 2/3 123/23/29	61.0 2/3 131/31/36	62.0 2/3 137/37/42
46	52.9 3/3 112/12/18	56.1 3/3 118/18/23	58.4 2/3 123/23/28	60.0 2/3 130/30/35	60.9 2/3 136/36/41
48	52.1 3/3 111/11/16	55.2 3/3 117/17/22	57.5 2/3 122/22/27	59.0 2/3 129/29/34	59.8 2/3 135/35/40
50	51.3 3/3 110/10/16	54.3 3/3 116/16/21	56.5 2/3 122/22/27	57.9 2/3 129/29/33	58.7 2/3 134/34/39
52	50.5 3/3 110/10/15	53.4 3/3 116/16/21	55.6 2/3 121/21/26	56.9 2/3 128/28/32	57.7 2/3 133/33/38
54	49.7 3/3 110/10/15	52.5 3/3 115/15/20	54.6 2/3 120/20/25	55.9 2/3 127/27/32	56.6 2/3 133/33/37
56	48.9 3/3 110/10/15	51.7 3/3 114/14/19	53.7 2/3 120/20/24	55.0 2/3 126/26/31	55.5 2/3 132/32/36
58	48.0 3/3 110/10/15	50.9 3/3 113/13/18	52.8 2/3 119/19/24	54.0 2/3 126/26/30	54.5 2/3 131/31/35
60	47.2 3/3 110/10/15	50.1 3/3 112/12/17	51.9 2/3 119/19/23	53.1 2/3 125/25/29	53.6 2/3 130/30/34
62	46.1 3/3 110/10/15	49.3 3/3 112/12/16	51.1 2/3 118/18/22	52.2 2/3 124/24/28	52.6 2/3 129/29/33
64	45.0 3/3 110/11/15	48.5 3/3 111/11/16	50.2 2/3 117/17/21	51.2 2/3 123/23/27	51.7 2/3 128/28/32
66	43.9 3/3 110/11/15	47.6 3/3 111/11/15	49.3 2/3 116/16/20	50.3 2/3 123/23/27	50.7 2/3 127/27/31
68	42.8 3/3 110/11/15	46.8 3/3 111/11/15	48.5 2/3 116/16/20	49.4 2/3 122/22/26	49.7 2/3 127/27/30

		QUICK REFERENCE TABLE - CONFIGURATION 3 - PRESSURE ALTITUDE = 1000 FT			MAX TO WEIGHT (1000KG) CODES IAS (KT) : V1/VR/V2	
		TREF=28°C TMAX=53°C	DRY RUNWAY SLOPE=0%	CORRECTED RUNWAY LENGTH (M)		
TEMP (°C)		1500	1750	2000	2250	2500
-20		60.8 3/3 120/20/27	64.3 3/3 121/27/33	66.9 2/3 133/33/39	68.5 2/3 141/41/46	69.3 2/3 147/47/52
-10		60.2 3/3 119/19/26	63.7 3/3 125/25/32	66.5 2/3 132/32/38	68.2 2/3 139/39/45	69.1 2/3 145/45/51
0		59.6 3/9 117/17/24	63.1 3/3 124/24/31	65.9 2/3 130/30/36	67.9 2/3 138/38/43	68.9 2/3 144/44/49
10		58.9 3/9 116/16/23	62.5 3/3 123/23/29	65.4 2/3 129/29/35	67.4 2/3 136/36/42	68.6 2/3 143/43/48
20		58.2 3/9 116/16/22	61.9 3/3 122/22/28	64.8 2/3 127/27/33	66.9 2/3 135/35/40	68.2 2/3 141/41/46
28		57.6 3/9 115/15/21	61.4 3/3 121/21/27	64.3 3/3 127/27/32	66.5 2/3 133/34/39	67.8 2/3 139/39/45
30		56.9 3/9 114/14/21	60.6 3/3 120/20/26	63.4 3/3 126/26/32	65.6 2/3 133/33/38	66.9 2/3 139/39/44
32		56.2 3/9 114/14/20	59.8 3/3 120/20/26	62.5 3/3 125/25/31	64.6 2/3 132/32/38	65.9 2/3 139/39/44
34		55.5 3/9 113/13/19	59.0 3/3 119/19/25	61.7 3/3 125/25/30	63.6 2/3 132/32/37	64.9 2/3 138/38/43
36		54.7 3/9 113/13/19	58.2 3/3 119/19/24	60.8 2/3 124/24/29	62.6 2/3 131/31/36	63.8 2/3 137/37/42
38		53.9 3/9 112/12/18	57.3 3/3 118/18/24	59.8 2/3 123/23/28	61.6 2/3 130/30/35	62.7 2/3 137/37/42
40		53.2 3/9 110/10/16	56.5 3/3 118/18/23	59.0 2/3 122/22/28	60.7 2/3 130/30/35	61.7 2/3 136/36/41
42		52.5 3/3 111/11/17	55.7 3/3 111/11/22	58.1 2/3 122/22/27	59.8 2/3 129/29/34	60.7 2/3 135/35/40
44		51.7 3/3 110/10/16	54.9 3/3 116/16/21	57.2 2/3 121/21/26	58.8 2/3 128/28/33	59.7 2/3 134/34/39
46		51.0 3/3 110/10/15	54.0 3/3 115/15/20	56.3 2/3 121/21/25	57.8 2/3 128/28/32	58.7 2/3 133/33/38
48		50.2 3/3 109/09/14	53.1 3/3 114/14/19	55.4 2/3 120/20/25	56.8 2/3 127/27/32	57.6 2/3 133/33/37
50		49.4 3/3 109/09/14	52.3 3/3 114/14/19	54.5 2/3 119/19/24	55.9 2/3 126/26/31	56.6 2/3 132/32/36
52		48.7 3/3 109/09/14	51.5 3/3 113/13/18	53.6 2/3 119/19/23	54.9 2/3 126/26/30	55.6 2/3 131/31/35
54		47.8 3/3 109/09/14	50.6 3/3 112/12/17	52.6 2/3 118/18/23	53.9 2/3 125/25/29	54.5 2/3 130/30/34
56		47.0 3/3 109/09/14	49.8 3/3 111/11/16	51.7 2/3 117/17/22	52.9 2/3 124/24/28	53.5 2/3 129/29/33
58		46.0 3/3 109/09/14	49.0 3/3 111/11/15	50.8 2/3 117/17/21	52.0 2/3 123/23/27	52.5 2/3 129/29/33
60		44.9 3/3 109/09/14	48.2 3/3 110/10/15	50.0 2/3 116/16/20	51.1 2/3 123/23/27	51.5 2/3 128/28/32
62		43.9 3/3 108/09/14	47.4 3/3 110/10/14	49.1 2/3 116/16/20	50.1 2/3 122/22/26	50.6 2/3 127/27/31
64		42.8 3/3 108/09/14	46.6 3/3 110/10/14	48.3 2/3 115/15/19	49.3 2/3 121/21/25	49.6 2/3 126/26/30
66		41.6 3/3 108/09/14	45.7 3/3 110/10/14	47.4 2/3 114/14/18	48.3 2/3 120/20/24	48.7 2/3 125/25/29

CONFIGURATION 3		PRESSURE ALTITUDE = 0 FT				
TREF = 55 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2			
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	1500	1750	2000	2250	2500	
-20	68.2 124/24/29	71.8 134/34/38	74.4 141/42/46	76.4 147/49/53	77.3 154/55/59	
-10	67.7 123/23/28	71.2 132/32/37	73.7 139/40/44	75.8 145/47/51	77.1 151/53/57	
0	67.1 123/23/28	70.6 130/30/35	73.1 137/38/42	75.3 143/45/49	76.8 149/51/55	
10	66.5 122/22/27	70.1 128/29/33	72.5 135/36/40	74.7 141/43/47	76.4 147/49/53	
20	65.9 120/20/26	69.5 127/27/32	71.9 133/35/39	74.2 139/41/45	76.0 145/47/51	
30	65.2 119/19/25	68.9 125/26/30	71.4 131/33/37	73.6 137/40/44	75.5 143/45/49	
40	64.4 117/18/24	68.3 123/24/29	70.9 130/31/36	73.1 135/38/42	75.0 141/44/48	
50	63.6 116/18/23	67.8 122/23/27	70.4 128/30/34	72.5 134/37/40	74.5 139/42/46	
55	63.3 115/17/23	67.5 121/22/27	70.2 127/29/33	72.2 133/36/40	72.3 127/36/40	
57	62.5 115/16/22	66.7 121/22/26	69.2 127/29/33	71.3 133/35/39	72.3 133/38/42	
59	* 61.6 * 114/16/21	65.7 121/21/26	68.2 127/28/32	70.3 133/35/39	72.2 138/41/44	
61	* 60.6 * 114/15/21	64.8 121/21/25	67.2 127/28/32	69.3 132/34/38	71.0 137/40/44	
63	* 59.3 * 114/15/21	63.8 120/20/25	66.2 126/28/31	68.3 132/34/38	70.0 137/40/43	
65	* 58.0 * 113/16/21	62.7 120/20/25	65.1 126/27/31	67.2 132/33/37	68.9 137/39/43	
67	* 56.6 * 113/16/21	61.6 120/20/24	64.0 126/26/30	66.1 131/33/36	67.7 137/39/42	
69	* 55.2 * 112/16/21	60.5 119/19/23	63.0 126/26/30	65.0 131/32/36	66.6 136/38/41	
71	* 53.7 * 112/16/21	59.4 118/18/23	61.9 125/26/29	63.9 131/32/35	65.3 136/37/41	
73	* 52.2 * 112/16/21	58.2 118/18/22	60.8 125/25/29	62.8 130/31/35	64.1 136/37/40	
75	* 50.7 * 112/16/21	57.1 118/18/22	59.6 124/24/28	61.6 130/31/34	62.8 136/36/40	
77	* 49.1 * 112/16/21	* 55.8 * 117/17/21	58.4 124/24/27	60.4 130/30/33	61.5 135/35/38	
79	* 47.5 * 111/16/21	* 54.5 * 116/17/21	57.1 123/23/26	59.1 129/29/33	60.1 135/35/38	
80	* 46.7 * 111/16/21	* 53.7 * 116/17/21	56.5 122/22/26	58.4 129/29/32	59.4 135/35/38	

CONFIGURATION 3		PRESSURE ALTITUDE = 1000 FT				
TREF = 51 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG) CODES		
TMAX = 53 °C		SLOPE = 0 %		IAS(KT) : V1 / VR / V2		
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)				
		1500	1750	2000	2250	2500
-20		67.0 126/26/31	70.5 132/32/37	73.0 139/40/44	75.0 145/47/51	76.2 151/53/57
-10		66.3 122/22/27	69.9 130/30/35	72.4 137/38/42	74.5 143/45/49	75.8 148/51/54
0		65.8 121/21/26	69.3 128/29/33	71.8 135/36/40	73.9 141/43/47	75.5 147/49/53
10		65.2 120/20/25	68.8 127/27/31	71.1 133/34/39	73.3 139/41/45	75.1 144/47/51
20		64.6 119/19/24	68.2 125/25/30	70.6 131/33/37	72.8 137/39/43	74.6 143/45/49
30		63.8 117/18/23	67.6 123/24/29	70.1 130/31/35	72.3 135/38/42	74.1 141/44/47
40		63.0 116/17/23	67.1 122/22/27	69.6 128/30/34	71.7 134/36/40	73.6 139/42/46
50		62.1 114/16/22	66.5 121/21/26	69.1 126/28/32	71.2 132/35/39	73.1 137/40/44
51		62.0 114/16/22	66.4 120/21/26	69.0 126/28/32	71.1 132/35/38	73.1 137/40/44
53		61.5 114/16/21	65.9 120/20/25	68.4 126/28/32	70.5 132/34/38	72.1 135/39/43
55	*	60.7 113/15/21	65.1 120/20/25	67.5 126/27/31	69.6 131/34/37	71.4 137/39/43
57	*	59.8 113/15/20	64.2 120/20/24	66.6 125/27/31	68.7 131/33/37	70.5 136/39/43
59	*	58.6 112/15/20	63.2 119/19/24	65.7 125/26/30	67.7 131/33/36	69.5 136/38/42
61	*	57.4 112/15/20	62.3 119/19/24	64.7 125/26/30	66.7 131/32/36	68.4 136/38/41
63	*	56.1 112/15/20	61.3 119/19/23	63.7 125/26/29	65.7 130/32/35	67.4 135/37/41
65	*	54.8 111/15/20	60.2 118/18/23	62.7 124/25/29	64.7 130/31/35	66.3 135/37/40
67	*	53.4 111/15/20	59.2 118/18/22	61.7 124/25/28	63.7 130/31/34	65.2 135/36/40
69	*	52.0 111/15/20	58.1 117/17/21	60.6 124/24/28	62.6 129/30/34	64.0 134/36/39
71	*	50.6 111/15/20	57.0 116/16/20	59.5 123/23/27	61.5 129/30/33	62.9 134/35/38
73	*	49.2 110/15/20	55.9 116/16/20	58.4 123/23/27	60.4 129/29/32	61.7 134/35/38
75	*	47.7 110/15/20	54.7 115/16/20	57.3 122/22/26	59.3 128/29/32	60.4 133/34/37
78	*	45.4 110/15/20	52.5 115/16/20	55.5 121/21/25	57.4 127/27/31	58.5 133/33/36

CONFIGURATION 3		PRESSURE ALTITUDE = 0 FT			FWD CG
TREF = 46 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2		
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
-20	70.7 129/30/36	75.4 135/36/40	78.5 141/44/48	80.9 148/51/55	82.7 154/57/61
-10	69.7 127/29/35	74.7 133/34/39	77.7 139/42/46	80.3 145/49/53	82.1 151/55/59
0	68.6 126/28/34	73.5 131/33/38	77.0 137/40/44	79.6 143/47/51	81.6 149/53/57
10	67.6 124/27/33	72.5 130/32/37	76.3 135/38/43	78.9 141/45/49	81.0 147/51/55
20	66.7 123/26/32	71.5 128/31/36	75.6 134/36/41	78.3 139/43/48	80.5 145/50/53
30	65.8 122/25/31	70.6 127/31/35	75.0 132/34/39	77.6 138/42/46	79.9 143/48/52
40	64.8 121/25/30	69.7 126/30/35	74.1 131/34/38	77.0 136/40/44	79.3 141/46/50
46	64.3 120/24/29	69.1 125/29/34	73.4 130/33/38	76.6 135/39/43	78.9 140/45/49
48	63.7 120/23/29	68.4 125/28/33	72.6 130/33/37	75.5 135/39/43	77.9 140/45/49
50	63.0 119/23/28	67.7 125/28/32	71.7 130/32/37	74.4 135/38/43	76.8 140/44/48
52	62.4 119/22/27	67.0 124/27/32	70.9 129/31/36	73.4 135/38/42	75.7 140/44/48
54	61.7 119/22/26	66.2 124/27/31	70.0 129/31/35	72.3 135/38/42	74.6 140/44/47
55	61.3 118/21/26	65.8 124/26/31	69.5 129/31/35	71.8 134/37/42	74.0 140/43/47
56	61.0 118/21/26	65.5 124/26/30	69.1 129/30/35	71.3 134/37/41	73.4 139/43/47
58	60.3 118/20/25	64.7 123/25/29	68.1 129/30/34	70.4 134/37/41	72.3 139/43/46
60	59.6 118/20/24	64.0 123/24/29	67.2 128/30/34	69.4 134/36/40	71.3 139/42/46
62	* 58.9 * 117/19/23	63.2 123/24/28	66.2 128/29/33	68.4 134/36/40	70.2 139/42/45
64	* 58.1 * 117/18/23	62.4 123/23/27	65.2 128/29/33	67.4 133/35/39	69.1 139/41/45
66	* 56.9 * 117/18/23	61.6 122/22/26	64.2 128/29/32	66.3 133/35/39	68.0 138/41/44
68	* 55.6 * 116/19/23	60.6 122/22/26	63.3 127/28/32	65.3 133/35/38	66.9 138/40/43
70	* 54.3 * 116/19/23	59.6 122/22/25	62.3 127/28/31	64.3 133/34/37	65.7 138/40/43

CONFIGURATION 3		PRESSURE ALTITUDE = 1000 FT			FWD CG	
TREF = 42 °C		DRY RUNWAY		MAX TO WEIGHT(1000KG)		CODES
TMAX = 53 °C		SLOPE = 0 %		IAS(KT)		IAS(KT) : V1 / VR / V2
TEMP. (°C)		CORRECTED RUNWAY LENGTH (M)				
		1500	1750	2000	2250	2500
-20		69.6 127/29/35	74.6 133/34/39	77.6 139/42/46	80.1 145/49/53	82.0 152/56/59
-10		68.6 126/28/34	73.4 131/33/38	76.9 137/40/45	79.4 143/47/51	81.4 149/53/57
0		67.5 124/27/33	72.3 130/32/37	76.1 135/38/43	78.8 141/45/49	80.9 147/51/55
10		66.6 123/26/32	71.3 128/31/36	75.4 134/36/41	78.1 139/43/48	80.3 145/50/53
20		65.6 122/25/31	70.4 127/30/35	74.8 132/34/39	77.4 137/42/46	79.7 143/48/52
30		64.7 120/24/30	69.4 126/30/34	73.8 131/34/38	76.7 136/40/44	79.0 141/46/50
40		63.7 119/23/29	68.5 125/29/33	72.8 129/33/38	76.1 134/38/43	78.4 139/44/48
42		63.5 119/23/29	68.3 124/28/33	72.6 129/33/37	75.9 134/38/42	78.2 139/44/48
44		63.0 119/23/28	67.8 124/28/33	71.9 129/32/37	75.1 134/38/42	77.5 139/44/48
46		62.4 118/22/27	67.0 124/27/32	71.1 129/32/36	74.0 134/37/42	76.4 139/43/47
48		61.7 118/22/27	66.3 123/27/31	70.3 128/31/35	72.9 134/37/41	75.2 139/43/47
50		61.0 118/21/26	65.6 123/26/30	69.5 128/30/34	71.9 133/37/41	74.1 138/42/46
52		* 60.3 * 117/20/25	64.8 123/25/30	68.6 128/29/34	70.9 133/36/40	73.0 138/42/46
53		* 60.0 * 117/20/25	64.5 123/25/29	68.2 128/29/33	70.4 133/36/40	72.4 138/42/46
56		* 59.0 * 117/19/24	63.4 122/24/28	66.8 127/29/33	69.0 133/35/39	70.9 138/41/45
58		* 58.3 * 116/18/23	62.7 122/23/27	65.9 127/28/32	68.1 132/35/39	70.0 138/41/44
60		* 57.3 * 116/18/23	61.9 122/23/27	65.0 127/28/32	67.1 132/34/38	68.9 137/40/44
62		* 56.1 * 116/18/23	61.2 121/22/26	64.0 127/28/31	66.2 132/34/38	67.9 137/40/43
64		* 54.9 * 116/18/23	60.4 121/21/25	63.1 126/27/31	65.2 132/34/37	66.8 137/39/42
66		* 53.6 * 115/19/23	59.5 120/20/24	62.1 126/27/30	64.2 131/33/37	65.7 137/39/42
68		* 52.3 * 115/19/23	58.5 120/20/24	61.2 126/27/30	63.2 131/33/36	64.6 136/38/41

R

CONFIGURATION 3		PRESSURE ALTITUDE = 0 FT		FWD CG			
TREF = 46 °C TMAX = 55 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1500	1750	2000	2250	2500		
-20	70.7 129/30/36	75.4 135/36/40	78.5 141/44/48	80.9 148/51/55	82.7 154/58/61		
-10	69.7 127/29/35	74.7 133/34/39	77.7 139/42/46	80.2 145/49/53	82.1 152/55/59		
0	68.6 126/28/34	73.5 131/33/38	77.0 137/40/44	79.6 143/47/51	81.6 149/53/57		
10	67.6 124/27/33	72.5 130/32/37	76.2 135/38/43	78.9 141/45/49	81.0 147/51/55		
20	66.7 123/26/32	71.5 128/31/36	75.6 134/36/41	78.3 139/43/48	80.5 145/50/53		
30	65.7 122/25/31	70.6 127/31/35	74.9 132/34/39	77.6 138/42/46	79.9 143/48/52		
40	64.8 121/25/30	69.7 126/30/35	74.1 131/34/38	76.9 136/40/44	79.3 141/46/50		
46	64.3 120/24/29	69.1 125/29/34	73.5 130/33/38	76.5 135/39/43	78.9 140/45/49		
48	63.6 120/23/29	68.4 125/29/33	72.6 130/33/37	75.5 135/39/43	77.9 140/45/49		
50	63.0 119/23/28	67.7 125/28/33	71.7 130/32/36	74.4 135/38/43	76.8 140/44/48		
52	62.3 119/22/27	67.0 124/27/32	70.9 129/31/36	73.4 135/38/42	75.7 140/44/48		
54	61.6 119/22/26	66.2 124/27/31	70.0 129/31/35	72.3 135/38/42	74.5 140/44/47		
55	61.3 118/21/26	65.8 124/26/31	69.5 129/31/35	71.8 134/37/42	74.0 140/43/47		
56	60.9 118/21/26	65.5 124/26/30	69.0 129/30/35	71.3 134/37/41	73.4 139/43/47		
58	60.3 118/20/25	64.8 123/25/29	68.1 129/30/34	70.4 134/37/41	72.3 139/43/46		
60	59.6 118/20/24	64.0 123/25/29	67.2 128/30/34	69.4 134/36/40	71.3 139/42/46		
62	* 58.9 * 117/19/23	63.2 123/24/28	66.2 128/29/33	68.4 134/36/40	70.2 139/42/45		
64	* 58.0 * 117/18/23	62.4 123/23/27	65.2 128/29/33	67.4 133/36/39	69.1 139/41/45		
66	* 56.8 * 117/19/23	61.6 122/22/26	64.2 128/29/32	66.3 133/35/39	68.0 138/41/44		
68	* 55.6 * 116/19/23	60.6 122/22/26	63.2 127/28/32	65.3 133/35/38	66.9 138/40/44		
70	* 54.3 * 116/19/23	59.6 122/22/25	62.3 127/28/31	64.2 133/34/37	65.7 138/40/43		

R

CONFIGURATION 3		PRESSURE ALTITUDE = 1000 FT				FWD CG	
		TREF = 43 °C		DRY RUNWAY SLOPE = 0 %		MAX TO WEIGHT(1000KG)	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1500	1750	2000	2250	2500		
-20	69.4 127/29/34	74.3 133/34/39	77.3 139/42/46	79.8 145/49/53	81.6 152/55/59		
-10	68.3 126/28/33	73.2 131/33/38	76.6 137/40/44	79.1 143/47/51	81.1 149/53/57		
0	67.3 124/27/32	72.1 130/32/37	75.8 135/38/43	78.4 141/45/49	80.5 147/51/55		
10	66.3 123/26/31	71.1 128/31/36	75.1 134/36/41	77.8 139/43/47	80.0 145/49/53		
20	65.4 122/25/30	70.2 127/30/35	74.4 132/34/39	77.1 137/41/46	79.3 143/48/51		
30	64.4 120/24/29	69.2 126/29/34	73.5 131/33/38	76.4 136/40/44	78.7 141/46/50		
40	63.5 119/23/29	68.3 124/28/33	72.6 129/33/37	75.7 134/38/43	78.1 139/44/48		
43	63.2 119/23/28	68.0 124/28/33	72.2 129/33/37	75.5 134/38/42	77.9 139/44/48		
45	62.6 119/22/28	67.3 124/28/32	71.4 129/32/36	74.4 134/37/42	76.8 139/43/47		
47	61.9 118/22/27	66.6 124/27/32	70.6 128/31/35	73.3 134/37/41	75.7 139/43/47		
49	61.2 118/21/26	65.9 123/26/31	69.8 128/30/35	72.3 134/37/41	74.6 138/43/46		
51	60.6 118/21/25	65.1 123/26/30	69.0 128/30/34	71.3 133/36/40	73.4 138/42/46		
53	59.9 117/20/25	64.4 123/25/29	68.1 128/29/33	70.3 133/36/40	72.3 138/42/46		
55	59.2 117/19/24	63.7 122/24/28	67.2 127/29/33	69.4 133/36/39	71.3 138/41/45		
57	* 58.5 * 116/19/23	63.0 122/24/28	66.3 127/28/32	68.5 133/35/39	70.4 138/41/44		
59	* 57.9 * 116/18/22	62.3 122/23/27	65.3 127/28/32	67.5 132/35/38	69.4 137/40/44		
61	* 56.9 * 116/18/22	61.5 121/22/26	64.4 127/28/31	66.5 132/34/38	68.3 137/40/43		
63	* 55.7 * 115/18/22	60.7 121/22/25	63.5 127/27/31	65.6 132/34/37	67.3 137/39/43		
65	* 54.4 * 115/18/22	59.9 121/21/24	62.5 126/27/31	64.6 132/33/37	66.2 137/39/42		
67	* 53.2 * 115/18/22	58.9 120/20/24	61.5 126/27/30	63.5 131/33/36	65.1 136/38/42		
68	* 52.6 * 115/18/22	58.4 120/20/24	61.1 126/26/30	63.0 131/33/36	64.5 136/38/41		

QUICK REFERENCE TABLE - 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)				
	1500	1750	2000	2250	
-20	59.2 3/3 118/18/25	62.5 3/3 125/25/31	65.1 2/3 131/31/37	66.8 2/3 139/39/44	67.5 2/3 144/44/50
-10	58.6 3/3 117/17/24	62.0 3/3 124/24/30	64.7 2/3 130/30/35	66.4 2/3 137/37/42	67.4 2/3 143/43/48
0	57.9 3/9 116/16/22	61.4 3/3 122/22/28	64.2 2/3 128/28/34	66.1 2/3 136/36/41	67.2 2/3 142/42/47
10	57.3 3/9 115/15/21	60.8 3/3 121/21/27	63.6 2/3 127/27/32	65.6 2/3 134/34/40	66.8 2/3 140/40/46
20	56.6 3/9 114/14/20	60.2 3/9 120/20/26	63.0 3/3 125/25/31	65.1 2/3 133/33/38	66.5 2/3 139/39/44
26	56.1 3/9 113/13/20	59.9 3/3 120/20/26	62.7 3/3 125/25/31	64.8 2/3 132/32/37	66.2 2/3 138/38/43
28	55.5 3/9 112/12/19	59.1 3/9 118/18/24	61.9 3/3 124/24/30	63.9 2/3 131/31/37	65.3 2/3 137/37/43
30	54.8 3/9 112/12/18	58.3 3/3 118/18/24	61.0 3/3 124/24/29	63.0 2/3 131/31/36	64.3 2/3 137/37/42
32	54.1 3/9 111/11/18	57.6 3/3 118/18/23	60.2 3/3 123/23/29	62.1 2/3 130/30/35	63.3 2/3 136/36/41
34	53.4 3/9 111/11/17	56.8 3/3 117/17/23	59.4 3/3 122/22/28	61.2 2/3 129/29/34	62.4 2/3 136/36/41
36	52.7 3/9 110/10/16	55.9 3/3 117/17/22	58.5 2/3 121/21/27	60.3 2/3 129/29/34	61.3 2/3 135/35/40
38	52.0 3/9 110/10/16	55.2 3/3 116/16/21	57.6 2/3 121/21/26	59.4 2/3 128/28/33	60.4 2/3 134/34/39
40	51.3 3/9 109/09/15	54.4 3/3 115/15/21	56.8 2/3 120/20/25	58.5 2/3 127/27/32	59.4 2/3 133/33/38
42	50.5 3/9 109/09/14	53.6 3/3 115/15/20	55.9 2/3 120/20/25	57.5 2/3 127/27/31	58.5 2/3 133/33/37
44	49.8 3/3 108/08/14	52.8 3/3 114/14/19	55.1 2/3 119/19/24	56.6 2/3 126/26/31	57.5 2/3 132/32/36
46	49.1 3/3 108/08/13	52.0 3/3 113/13/18	54.2 2/3 118/18/23	55.7 2/3 125/25/30	56.5 2/3 131/31/36
48	48.4 3/3 107/07/13	51.2 3/3 112/12/17	53.3 2/3 118/18/22	54.7 2/3 125/25/29	55.5 2/3 130/30/35
50	47.6 3/3 107/07/12	50.4 3/3 111/11/16	52.4 2/3 117/17/22	53.8 2/3 124/24/28	54.5 2/3 130/30/34
52	46.8 3/3 107/07/12	49.6 3/3 111/11/16	51.6 2/3 117/17/21	52.8 2/3 123/23/27	53.5 2/3 129/29/33
54	45.9 3/3 108/08/12	48.7 3/3 110/10/15	50.6 2/3 116/16/20	51.9 2/3 123/23/27	52.4 2/3 128/28/32
56	44.9 3/3 107/08/12	47.9 3/3 110/10/14	49.7 2/3 115/15/19	50.9 2/3 122/22/26	51.4 2/3 127/27/31
58	43.8 3/3 107/08/12	47.1 3/3 109/09/13	48.9 2/3 115/15/19	50.0 2/3 121/21/25	50.5 2/3 126/26/30
60	42.8 3/3 107/08/12	46.3 3/3 108/08/12	48.1 2/3 114/14/18	49.1 2/3 120/20/24	49.6 2/3 125/25/29
62	41.7 3/3 107/08/12	45.6 3/3 108/08/12	47.2 2/3 113/13/17	48.2 2/3 120/20/23	48.6 2/3 124/24/28
64	40.6 3/3 107/08/12	44.7 3/3 108/08/12	46.4 2/3 113/13/16	47.3 2/3 119/19/22	47.7 2/3 124/24/27

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CONFIGURATION 3		PRESSURE ALTITUDE = 2000 FT				
TREF = 47 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES			
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)					
	1500	1750	2000	2250	2500	
-20 121/21/27	65.7 3/3 131/31/35	69.3 2/3 137/38/42	71.8 2/3 143/45/49	73.8 2/3 149/51/55	75.0 2/3	
-10 121/21/26	65.2 3/3 129/29/33	68.7 2/3 135/36/40	71.1 2/3 141/43/47	73.2 2/3 147/49/53	74.7 2/3	
0 120/20/25	64.6 3/3 127/27/31	68.1 2/3 133/34/38	70.5 2/3 139/41/45	72.7 2/3 145/47/51	74.2 2/3	
10 118/18/24	64.0 3/3 125/25/30	67.5 2/3 131/33/37	69.9 2/3 137/39/43	72.1 2/3 143/45/49	73.8 2/3	
20 117/17/23	63.2 3/3 123/24/28	67.0 2/3 129/31/35	69.4 2/3 135/37/41	71.5 2/3 141/43/47	73.4 2/3	
30 115/17/22	62.3 3/3 122/22/27	66.4 2/3 128/29/33	68.9 2/3 133/36/40	71.0 2/3 139/42/46	72.9 2/3	
40 114/16/21	61.5 3/3 120/21/25	65.9 2/3 126/28/32	68.4 2/3 132/34/38	70.5 2/3 137/40/44	72.4 2/3	
47 113/15/21	60.9 3/3 119/20/25	65.4 3/3 125/27/31	68.0 2/3 131/33/37	70.1 2/3 136/39/43	72.0 2/3	
49 112/15/20	* 60.3 3/3 * 119/20/24	64.8 3/3 125/26/31	67.4 2/3 130/33/37	69.4 2/3 136/39/42	71.3 2/3	
51 112/14/20	* 59.7 3/3 * 119/19/24	64.2 2/3 125/26/30	66.7 2/3 130/33/36	68.7 2/3 135/38/42	70.6 2/3	
53 112/14/19	* 58.9 3/3 * 119/19/23	63.4 2/3 124/26/30	65.9 2/3 130/32/36	67.9 2/3 135/38/41	69.7 2/3	
55 111/14/19	* 57.8 3/3 * 118/18/23	62.6 2/3 124/25/29	65.0 2/3 130/32/35	67.0 2/3 135/37/41	68.8 2/3	
57 111/14/19	* 56.6 3/3 * 118/18/23	61.7 3/3 124/25/29	64.1 2/3 129/31/35	66.1 2/3 135/37/40	67.8 2/3	
59 111/14/19	* 55.4 3/3 * 117/17/22	60.7 3/3 124/25/28	63.2 2/3 129/31/34	65.2 2/3 134/36/40	66.8 2/3	
61 110/14/19	* 54.2 3/3 * 117/17/22	59.8 3/3 123/24/28	62.2 2/3 129/30/34	64.2 2/3 134/36/39	65.9 2/3	
63 110/14/19	* 52.9 3/3 * 116/16/21	58.8 3/3 123/24/27	61.3 2/3 128/30/33	63.3 2/3 134/35/39	64.9 2/3	
65 110/14/19	* 51.6 3/3 * 116/16/20	57.8 3/3 123/23/27	60.3 2/3 128/29/33	62.3 2/3 133/35/38	63.8 2/3	
67 110/14/19	* 50.3 3/3 * 115/15/20	* 56.8 3/3 * 122/22/26	59.3 2/3 128/29/32	61.3 2/3 133/34/37	62.8 2/3	
69 109/14/19	* 48.9 3/3 * 115/15/19	* 55.8 3/3 * 122/22/26	58.2 2/3 127/28/31	60.2 2/3 133/34/37	61.6 2/3	
71 109/14/19	* 47.6 3/3 * 114/15/19	* 54.6 3/3 * 121/21/25	57.2 2/3 127/28/31	59.2 2/3 132/33/36	60.5 2/3	
76 109/15/19	* 44.0 3/3 * 113/15/19	* 51.3 3/3 * 119/20/23	54.5 2/3 125/26/29	56.4 2/3 131/32/34	57.5 2/3	

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CONFIGURATION 3		PRESSURE ALTITUDE = 2000 FT		FWD CG			
TREF = 40 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1500	1750	2000	2250	2500		
-20	68.2 126/29/34	72.7 132/34/38	76.5 137/37/41	79.0 143/44/48	80.8 149/51/54		
-10	67.1 124/28/33	71.7 130/33/37	75.8 135/36/40	78.3 141/42/46	80.2 147/49/52		
0	66.1 123/27/32	70.7 128/32/36	74.8 134/35/40	77.6 139/40/44	79.6 145/47/50		
10	65.1 122/25/31	69.7 127/31/35	73.8 132/35/39	76.9 137/38/43	78.9 143/45/49		
20	64.1 120/24/29	68.6 126/30/34	72.7 131/34/38	76.1 135/37/41	78.2 141/44/47		
30	63.1 119/23/28	67.6 124/29/33	71.6 129/33/37	75.3 134/36/40	77.5 139/42/45		
40	62.1 118/22/27	66.7 123/28/32	70.7 128/32/36	74.4 132/35/39	76.8 137/40/44		
42	61.3 117/22/26	65.8 123/27/31	69.7 128/31/35	73.1 132/34/39	75.4 137/40/43		
44	60.5 117/21/26	64.9 122/26/30	68.7 127/30/34	71.8 132/34/38	73.9 137/39/43		
46	59.7 117/20/25	64.1 122/25/29	67.7 127/29/33	70.7 132/33/37	72.5 137/39/43		
48	58.9 116/20/24	63.2 122/24/28	66.7 127/28/32	69.4 132/32/36	71.2 137/39/42		
50	58.0 116/19/23	62.3 122/24/28	65.7 127/28/31	68.2 132/32/36	69.8 137/38/42		
51	57.6 116/18/22	61.8 121/23/27	65.2 126/27/31	67.5 132/32/35	69.2 137/38/41		
52	57.2 115/18/22	61.4 121/23/27	64.7 126/27/30	66.9 132/32/35	68.5 137/38/41		
54	56.4 115/17/21	60.5 121/22/26	63.5 126/26/30	65.6 132/32/35	67.2 137/37/41		
56	* 55.5 * 114/16/20	59.5 121/21/25	62.2 126/26/29	64.3 131/31/35	65.8 137/37/40		
58	* 54.6 * 114/15/19	58.5 120/20/23	60.9 126/26/29	63.0 131/31/34	64.4 136/36/39		
60	* 53.6 * 113/15/18	57.3 119/19/22	59.7 125/25/28	61.6 130/30/33	63.1 135/35/38		
62	* 52.3 * 113/15/18	56.3 118/18/21	58.6 124/24/27	60.4 129/29/32	61.8 134/34/37		
64	* 51.1 * 113/15/18	55.2 117/17/20	57.4 123/23/26	59.2 128/28/31	60.5 134/34/36		

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CONFIGURATION 3		PRESSURE ALTITUDE = 2000 FT		FWD CG			
TREF = 37 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1500	1750	2000	2250	2500		
-20	68.6 126/28/34	73.4 132/33/38	76.8 137/40/45	79.4 143/47/51	81.3 150/54/57		
-10	67.5 124/27/33	72.3 130/32/37	76.0 135/38/43	78.7 141/45/49	80.7 147/52/55		
0	66.5 123/26/32	71.2 128/31/36	75.3 134/36/41	78.0 139/43/48	80.2 145/50/53		
10	65.5 122/25/31	70.2 127/30/35	74.6 132/34/39	77.3 137/42/46	79.5 143/48/52		
20	64.5 120/24/30	69.3 126/30/34	73.6 131/34/38	76.6 136/40/44	78.9 141/46/50		
30	63.6 119/23/29	68.3 124/29/33	72.6 129/33/38	75.9 134/38/42	78.3 139/44/48		
37	62.9 118/23/28	67.7 124/28/33	71.9 128/32/37	75.5 133/37/41	77.8 138/43/47		
40	62.3 118/22/27	67.0 123/27/32	71.1 128/32/36	74.4 133/36/41	76.8 138/43/47		
42	61.7 118/22/27	66.4 123/27/31	70.5 128/31/36	73.5 133/36/40	75.9 138/42/46		
44	61.0 117/21/26	65.6 123/26/31	69.6 127/30/35	72.4 133/36/40	74.8 137/42/46		
46	60.3 117/20/25	64.9 122/25/30	68.8 127/30/34	71.4 132/35/40	73.6 137/41/45		
48	59.6 117/20/24	64.2 122/25/29	68.0 127/29/33	70.4 132/35/39	72.5 137/41/45		
50	* 59.0 * 116/19/24	63.5 122/24/28	67.2 127/28/32	69.5 132/35/39	71.5 137/40/44		
51	* 58.6 * 116/19/23	63.1 122/24/28	66.8 126/28/32	69.0 132/34/38	71.0 137/40/44		
54	* 57.4 * 115/18/23	62.1 121/23/27	65.5 126/27/31	67.6 131/34/38	69.6 136/39/43		
56	* 56.3 * 115/18/23	61.4 121/22/26	64.6 126/27/31	66.7 131/33/37	68.6 136/39/43		
58	* 55.2 * 115/18/23	60.6 120/22/25	63.7 126/26/30	65.8 131/33/37	67.6 136/38/42		
60	* 54.0 * 115/18/23	59.9 120/21/25	62.9 125/26/30	64.9 131/33/36	66.7 136/38/41		
62	* 52.8 * 115/18/23	59.2 120/20/24	61.9 125/26/29	64.0 130/32/36	65.6 135/37/41		
64	* 51.5 * 114/19/23	* 58.4 * 119/19/23	61.0 125/26/29	63.0 130/32/35	64.6 135/37/40		
66	* 50.2 * 114/19/23	* 57.4 * 119/19/23	60.1 125/25/28	62.0 130/31/34	63.5 135/37/40		

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CONFIGURATION 3		PRESSURE ALTITUDE = 2000 FT		FWD CG			
TREF = 40 °C TMAX = 51 °C		DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2				
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)						
	1500	1750	2000	2250	2500		
-20	68.0 126/28/33	72.8 132/33/38	76.1 137/40/44	78.7 143/47/51	80.6 150/53/57		
-10	67.0 124/27/32	71.7 130/32/37	75.3 135/38/43	78.0 141/45/49	80.0 147/51/55		
0	66.0 123/26/31	70.7 128/31/36	74.6 134/36/41	77.3 139/43/47	79.4 145/49/53		
10	65.0 122/25/30	69.7 127/30/35	73.9 132/34/39	76.6 137/41/46	78.8 143/47/51		
20	64.0 120/24/29	68.8 126/29/34	73.0 130/33/38	75.9 136/40/44	78.2 141/46/50		
30	63.1 119/23/28	67.8 124/28/33	72.0 129/32/37	75.1 134/38/42	77.6 139/44/48		
40	62.1 118/22/27	66.9 123/27/32	71.0 128/32/36	74.4 133/36/41	76.8 138/42/46		
42	61.5 117/22/27	66.2 123/27/31	70.3 128/31/35	73.3 133/36/40	75.7 137/42/46		
44	60.8 117/21/26	65.5 123/26/30	69.5 127/30/34	72.2 132/36/40	74.6 137/42/46		
46	60.1 117/20/25	64.7 122/25/30	68.6 127/29/34	71.2 132/35/39	73.4 137/41/45		
48	59.5 116/20/24	64.0 122/25/29	67.9 127/29/33	70.3 132/35/39	72.4 137/41/45		
50	58.8 116/19/24	63.3 122/24/28	67.1 126/28/32	69.3 132/35/38	71.3 137/40/44		
51	58.5 116/19/23	63.0 122/24/28	66.7 126/28/32	68.8 132/34/38	70.8 137/40/44		
52	58.1 116/18/23	62.6 121/23/27	66.2 126/27/31	68.4 132/34/38	70.3 137/40/44		
54	* 57.5 * 115/18/22	* 61.9 * 121/23/27	* 65.3 * 126/27/31	* 67.5 * 131/34/38	* 69.4 * 136/39/43		
56	* 56.7 * 115/17/22	* 61.2 * 121/22/26	* 64.4 * 126/27/30	* 66.6 * 131/33/37	* 68.4 * 136/39/42		
58	* 55.6 * 115/17/22	* 60.5 * 120/21/25	* 63.6 * 126/26/30	* 65.7 * 131/33/37	* 67.5 * 136/38/42		
60	* 54.4 * 114/17/22	* 59.8 * 120/21/24	* 62.7 * 125/26/30	* 64.7 * 130/32/36	* 66.5 * 136/38/41		
62	* 53.2 * 114/17/22	* 59.0 * 120/20/24	* 61.7 * 125/26/29	* 63.7 * 130/32/35	* 65.4 * 135/37/41		
64	* 52.0 * 114/18/22	* 58.2 * 119/19/23	* 60.8 * 125/25/29	* 62.8 * 130/31/35	* 64.4 * 135/37/40		
66	* 50.8 * 114/18/22	* 57.3 * 119/19/22	* 59.9 * 124/25/28	* 61.8 * 130/31/34	* 63.3 * 135/36/40		

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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.

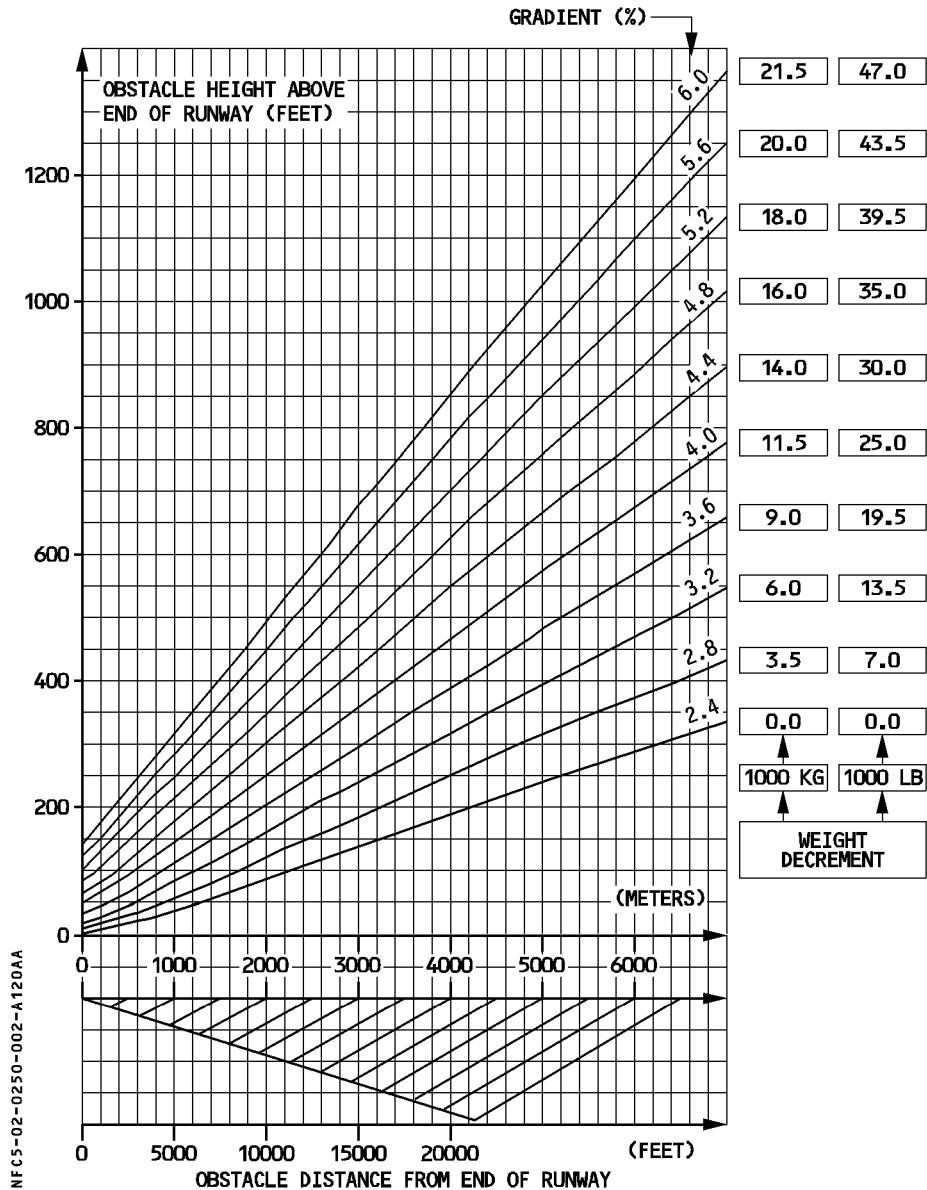
The net takeoff flight path and the associated weight decrement are conservative.

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.
- R 3. Decrease the takeoff speeds by 1 knot per 1000 kg (0.5 kt per 1000 lb) weight decrement. 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 30 feet per percent runway slope.

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.

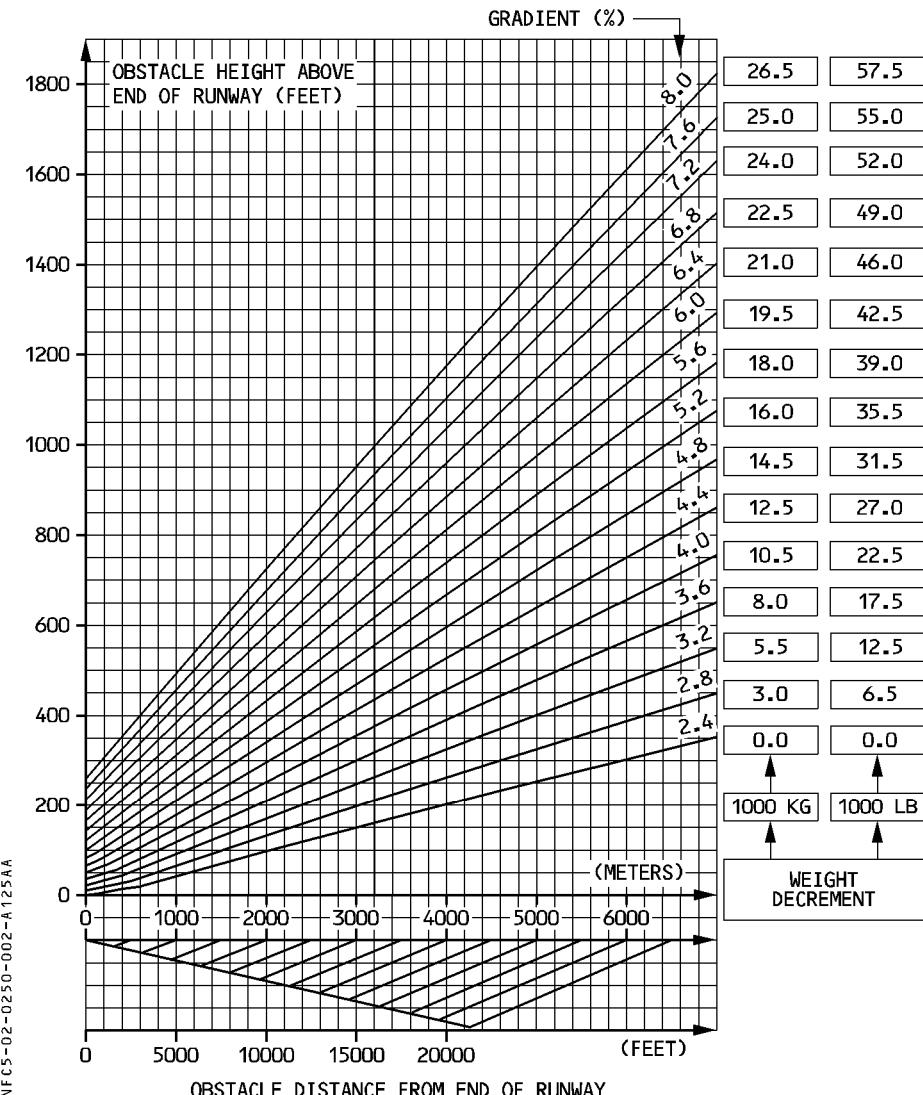
The net takeoff flight path and the associated weight decrement are conservative.

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.
- R 3. Decrease the takeoff speeds by 1 knot per 1000 kg (0.5 kt per 1000 lb) weight decrement. Limit the final speeds to the minimum values as given on 2.02.25 p1.

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CLOSE OBSTACLE CLEARANCE CONF 1 + F



Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

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.

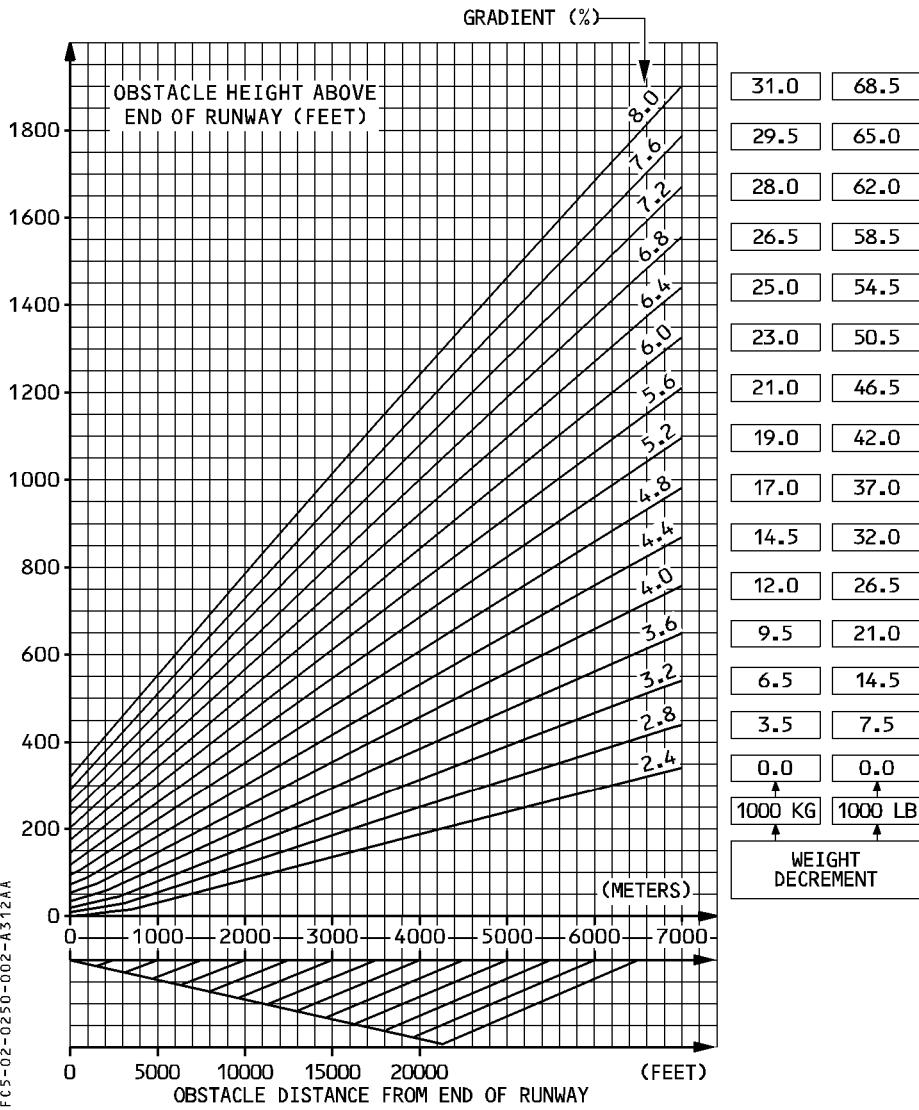
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CLOSE OBSTACLE CLEARANCE CONF 1 + F



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

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.

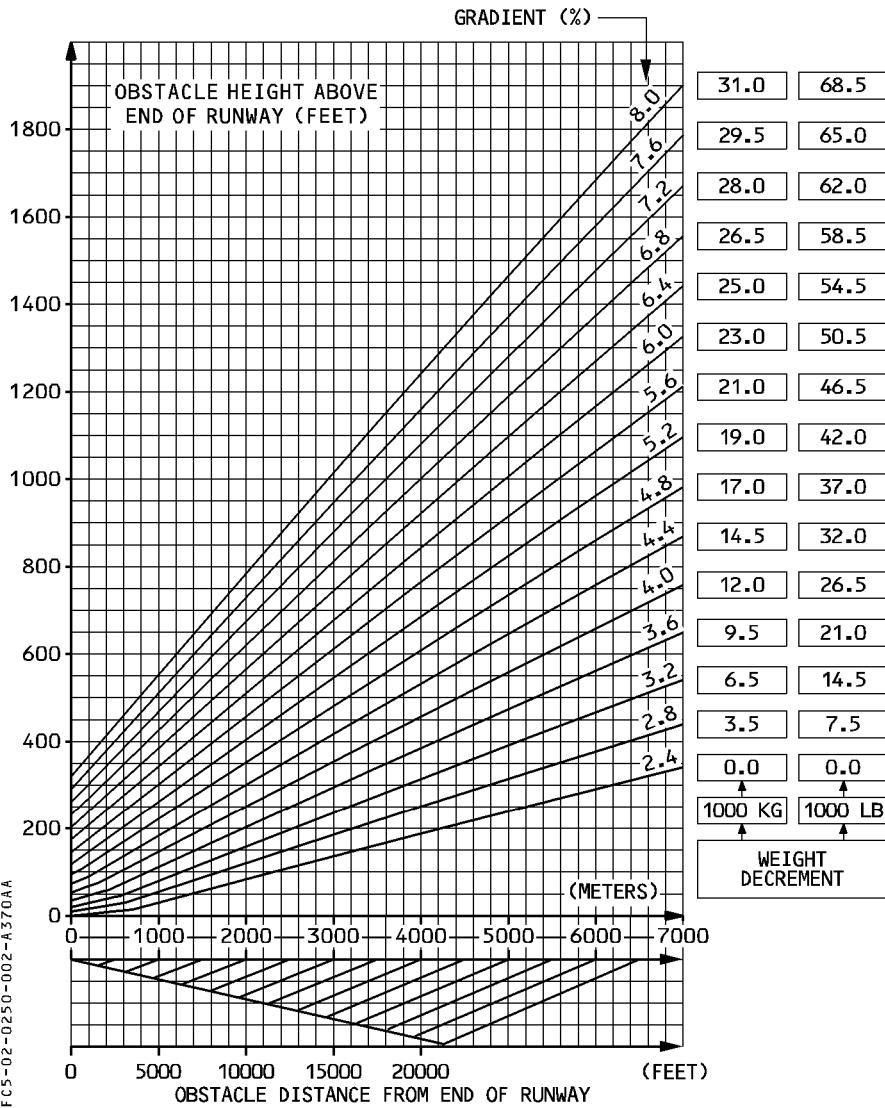
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HOW TO PROCEED

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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.
- R 3. Decrease the takeoff speeds by 1 knot per 1000 kg (0.5 kt per 1000 lb) weight decrement. Limit the final speeds to the minimum values as given on 2.02.25 p1.

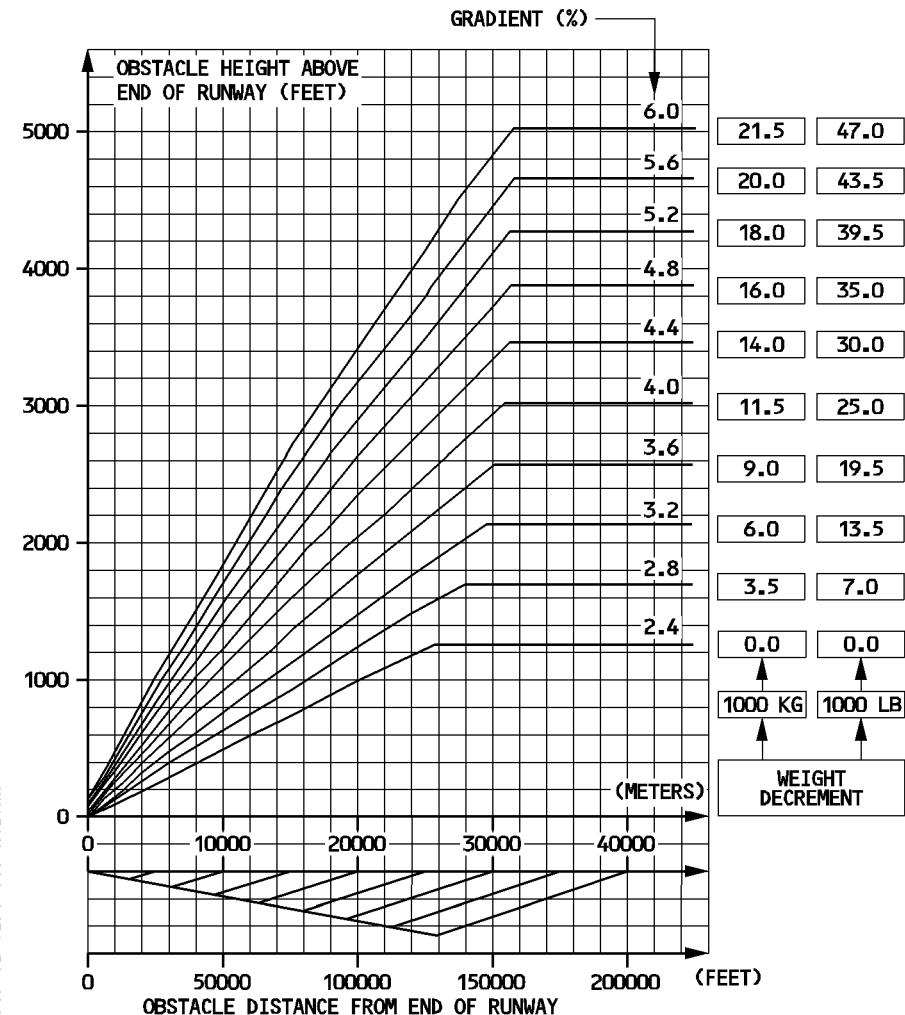
Note : In case of tailwind, do not use the obstacle clearance graphs.

CLOSE OBSTACLE CLEARANCE CONF 1 + F



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

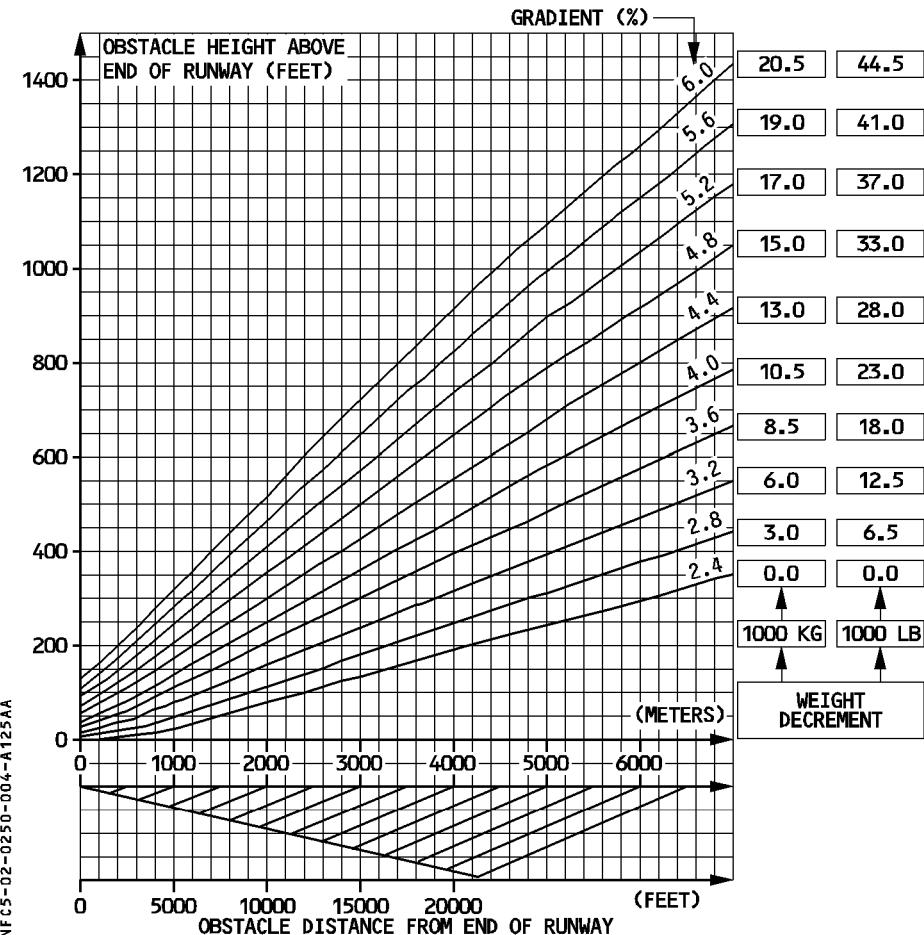
REMOTE OBSTACLE CLEARANCE CONF 1 + F



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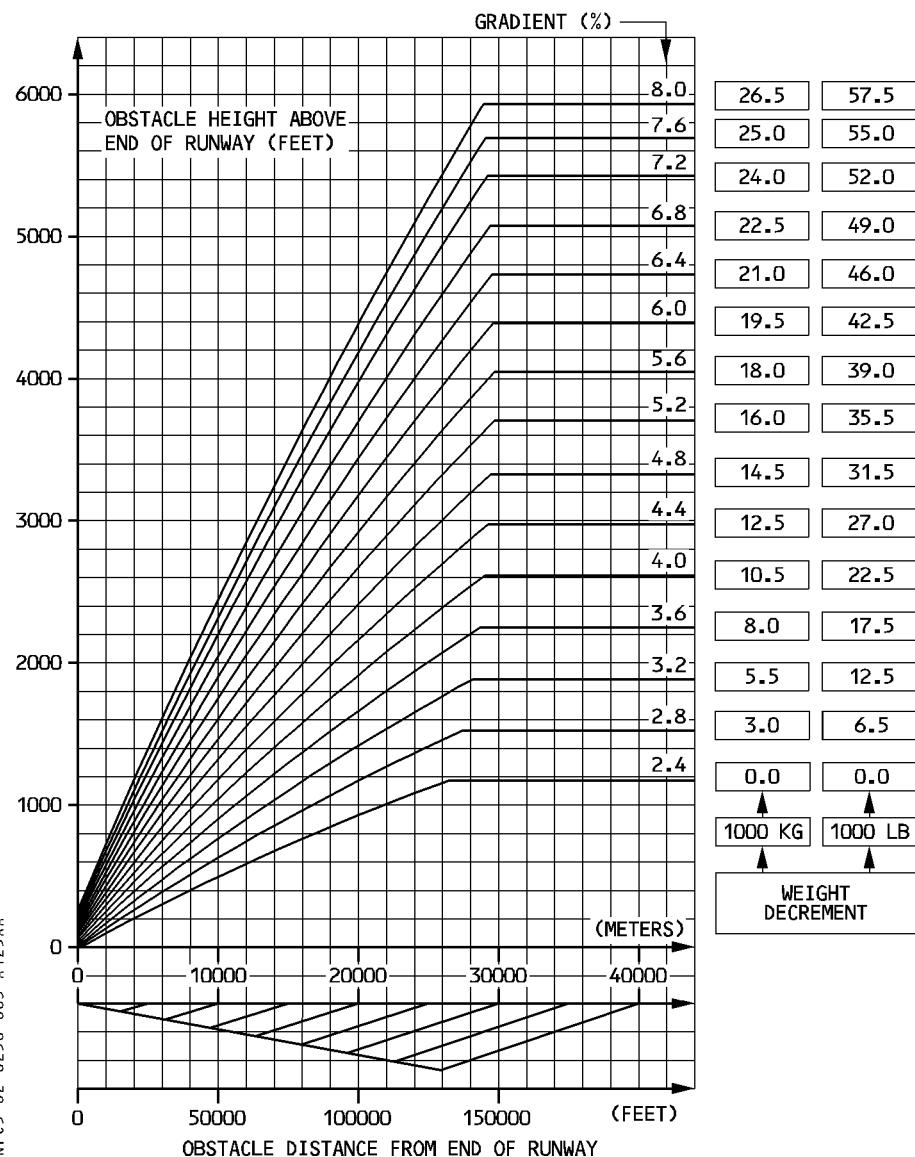
Note: In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



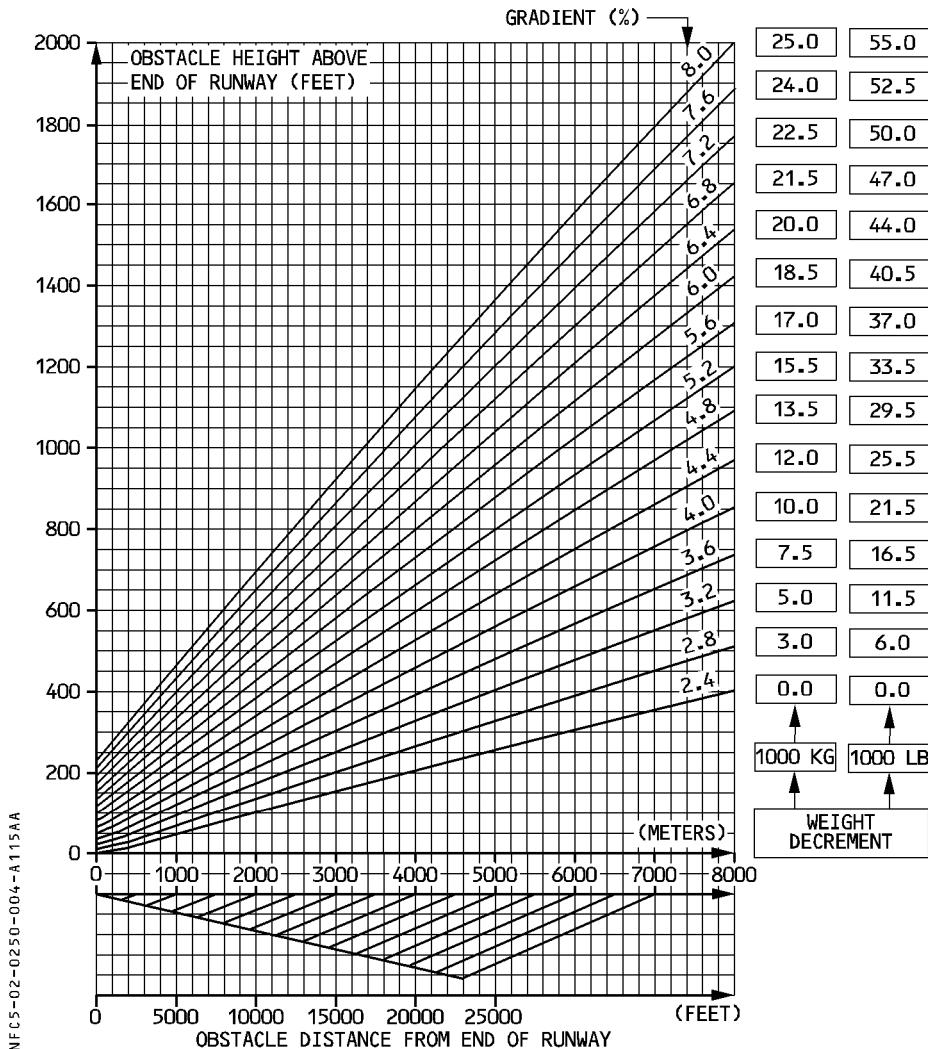
Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



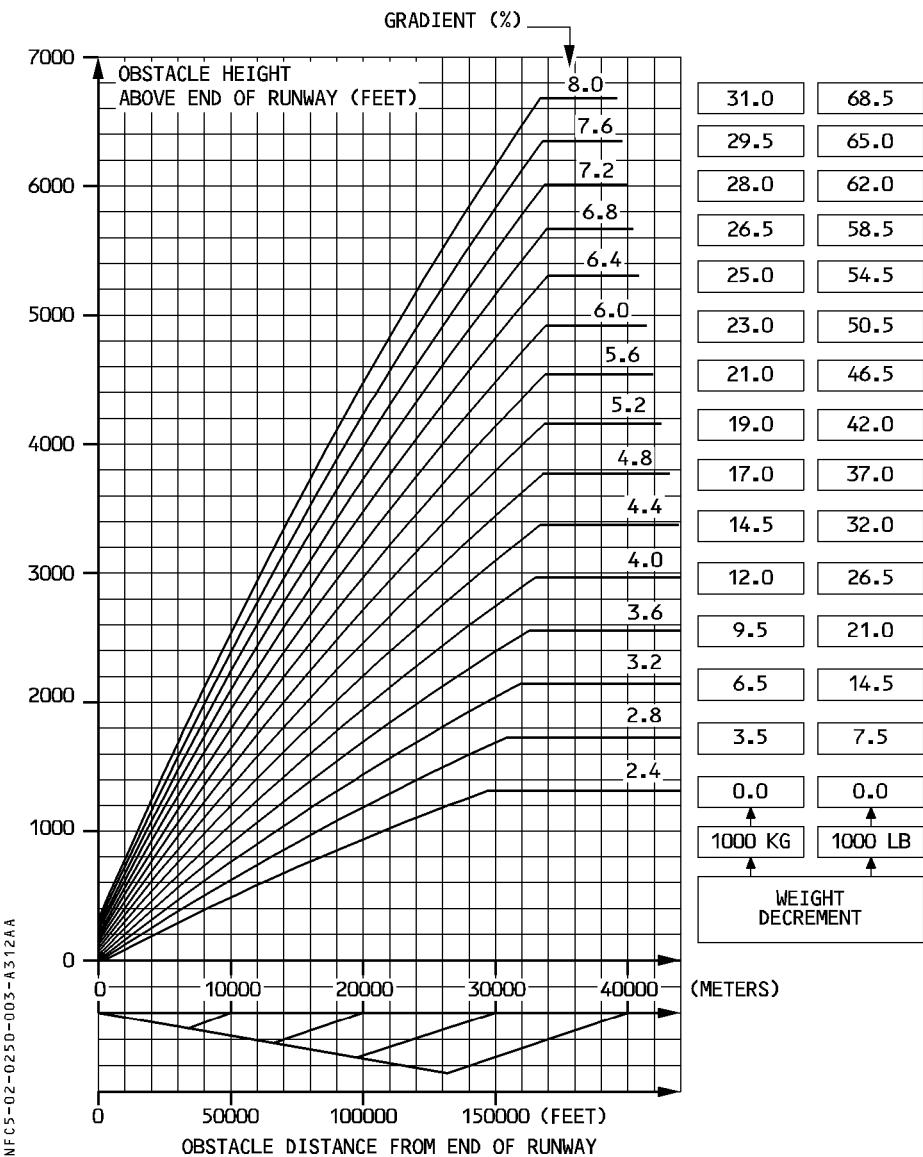
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



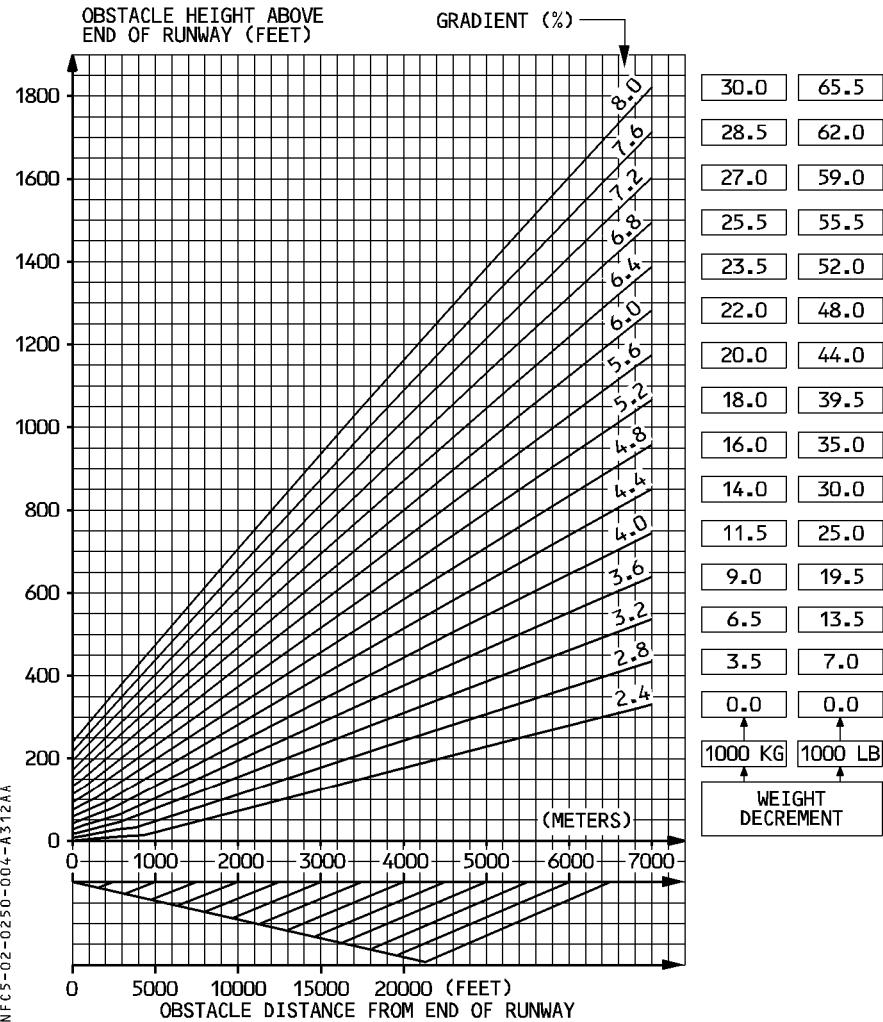
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



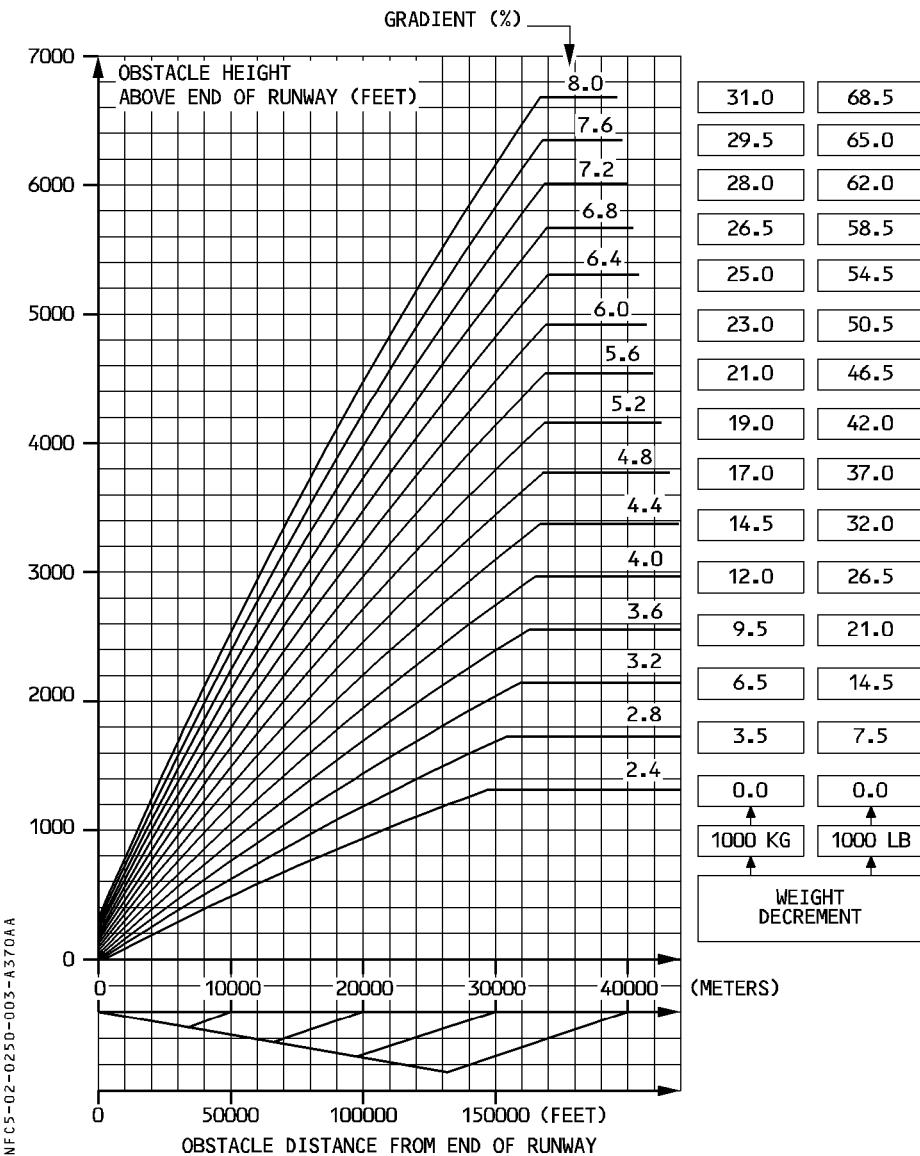
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



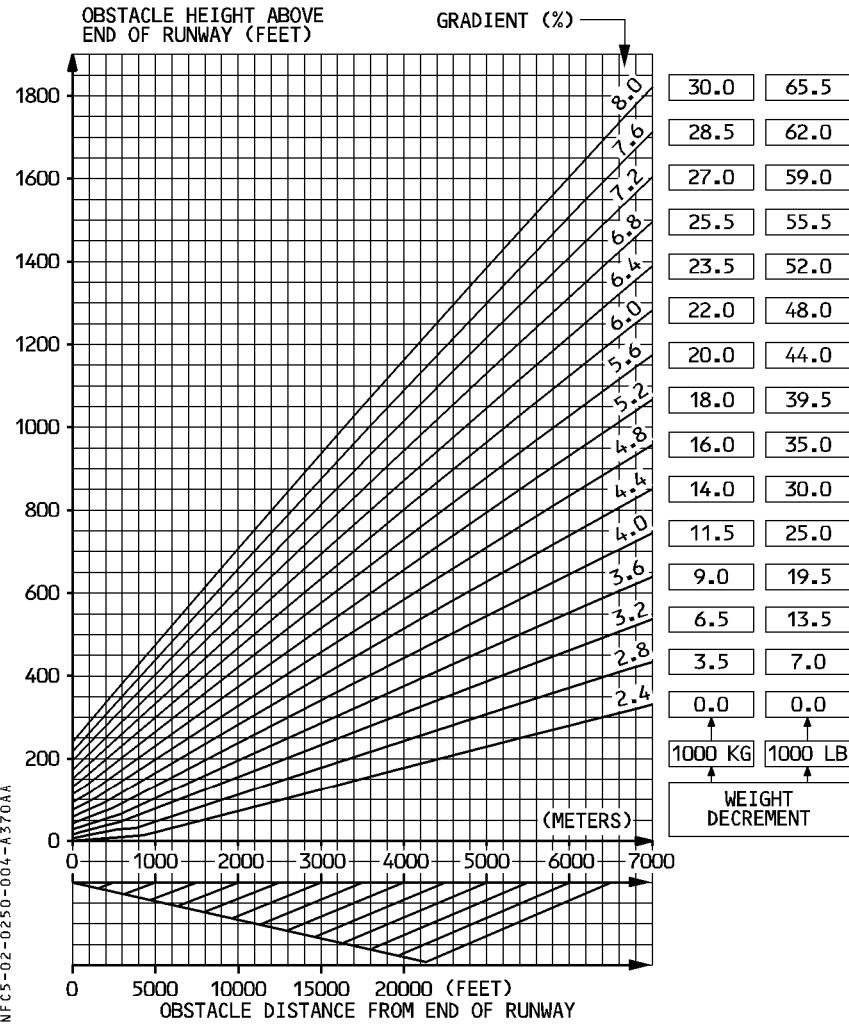
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



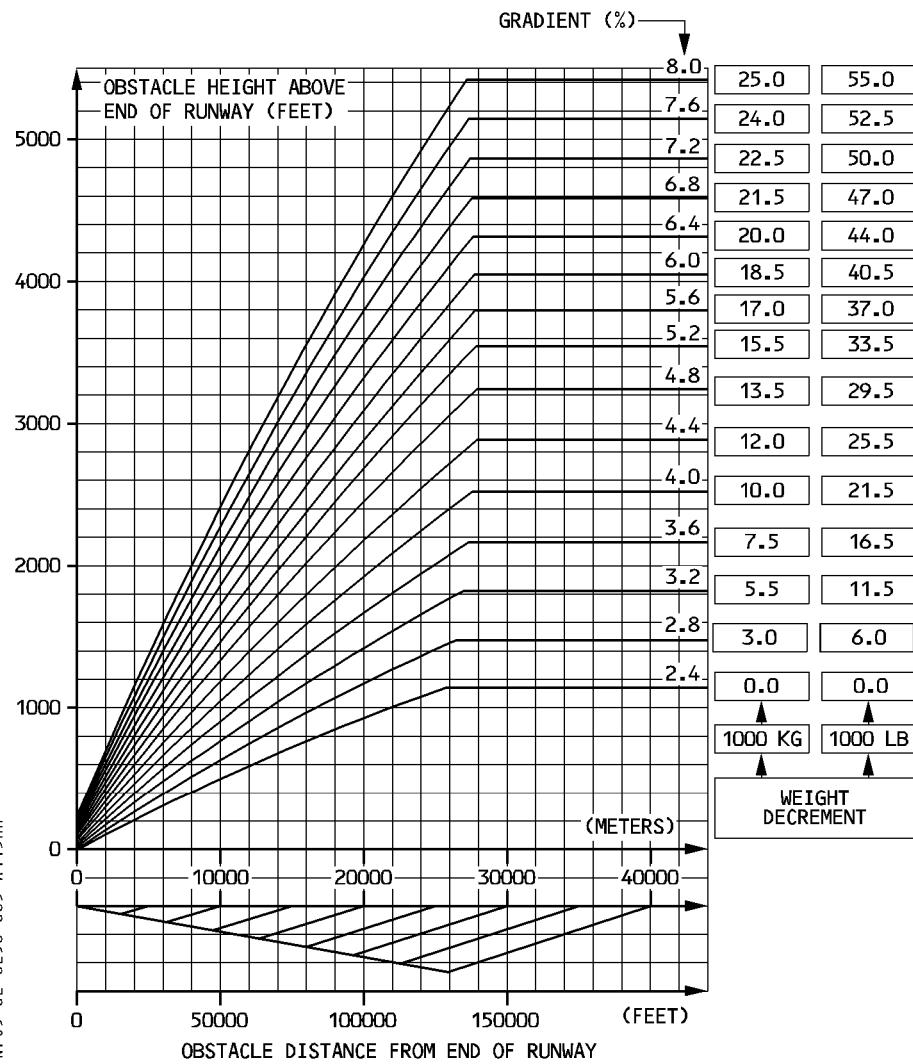
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



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

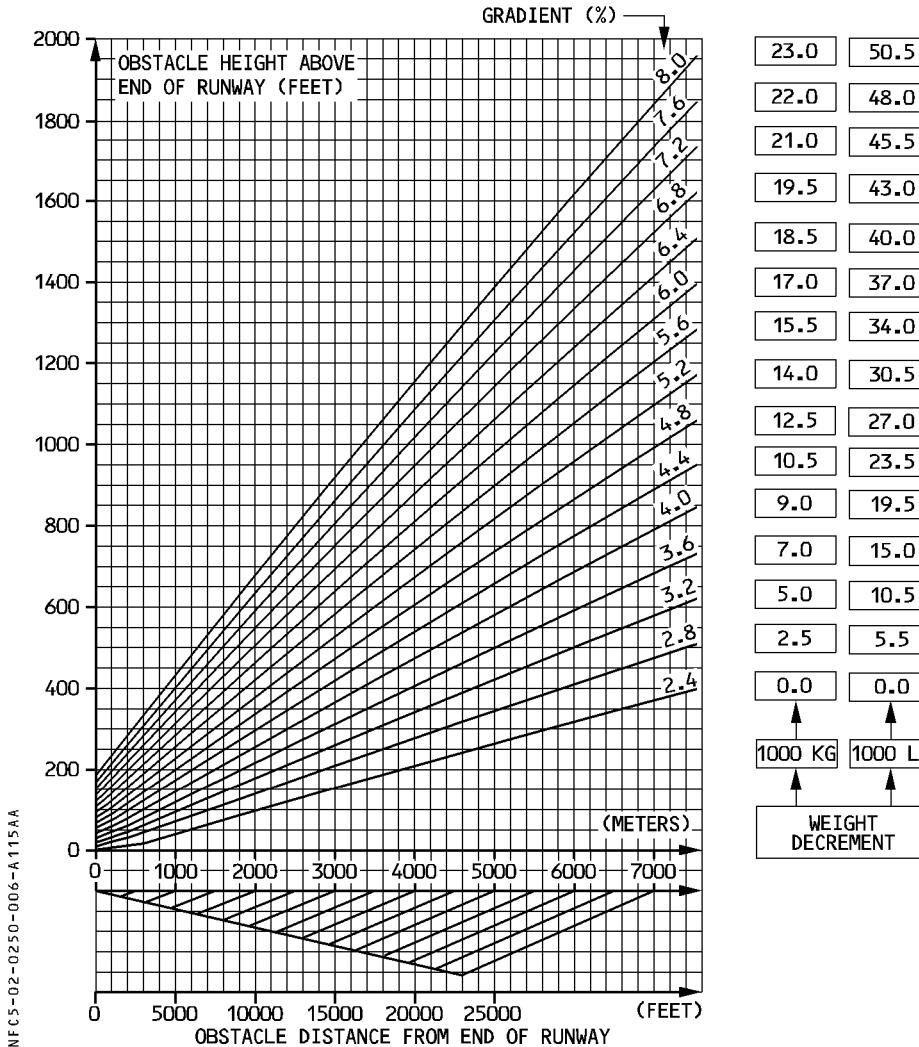
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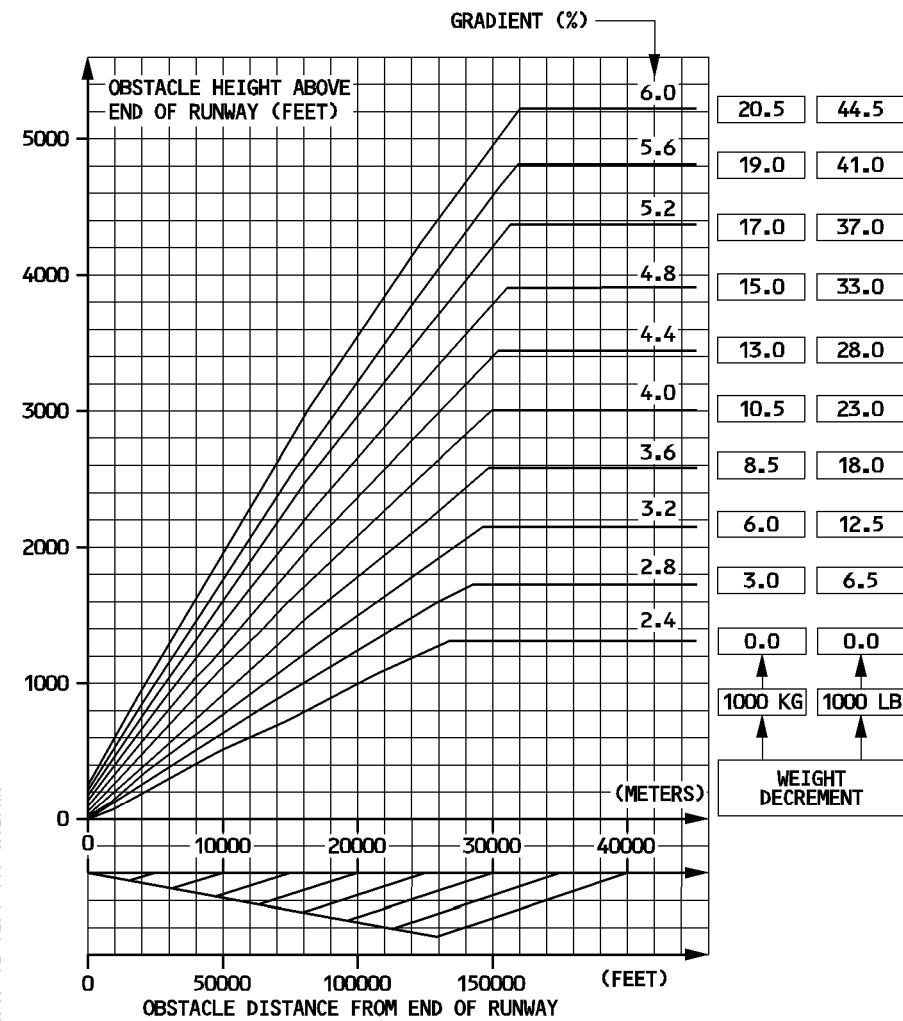
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

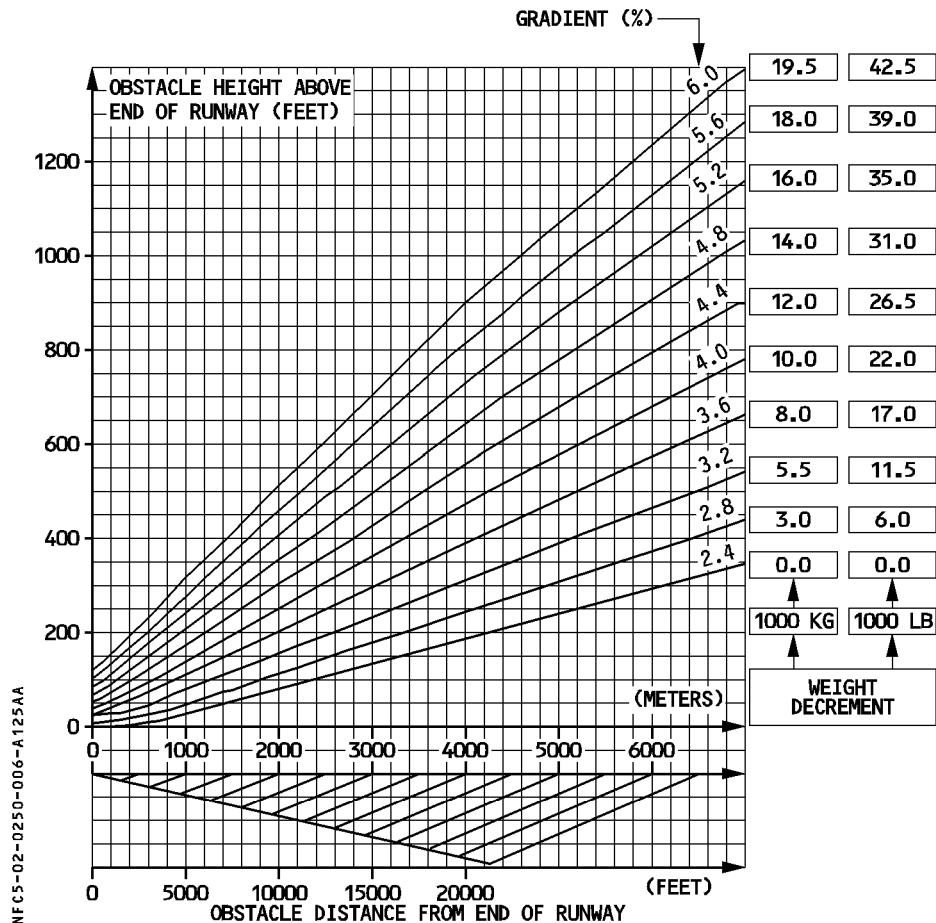
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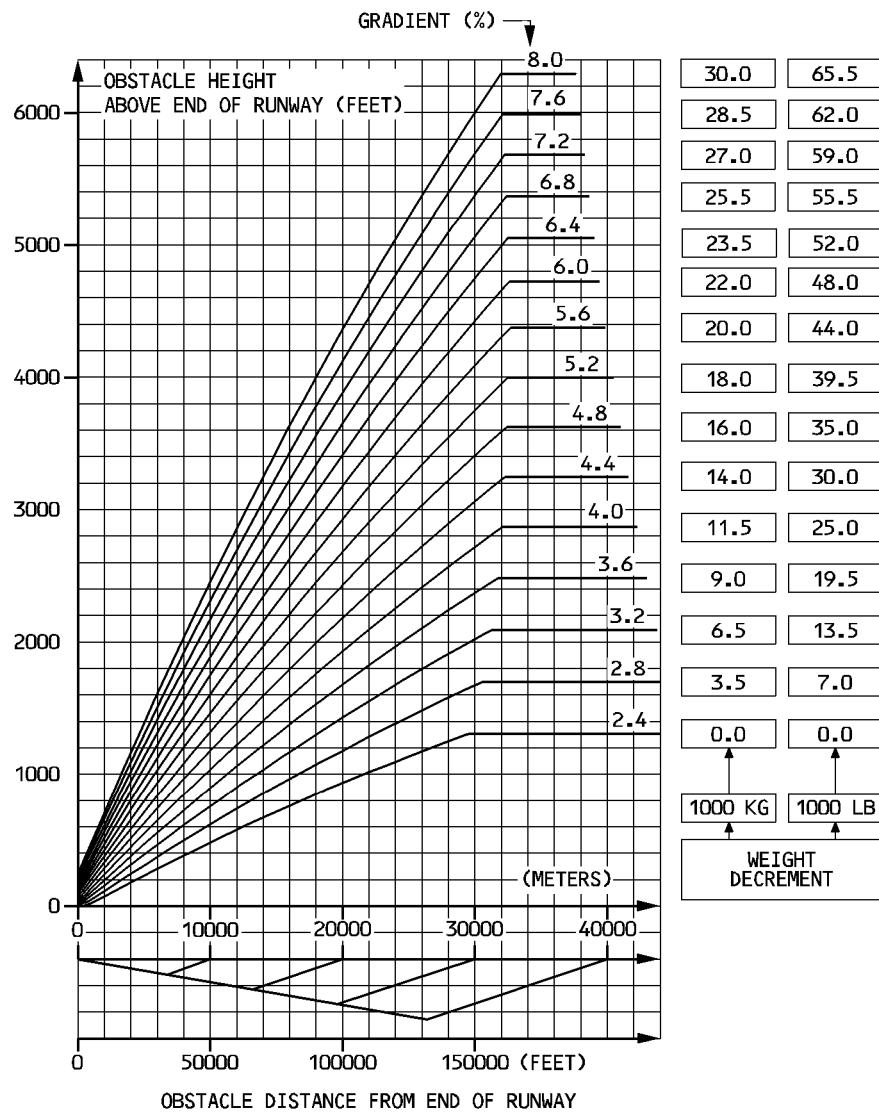
Note: In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

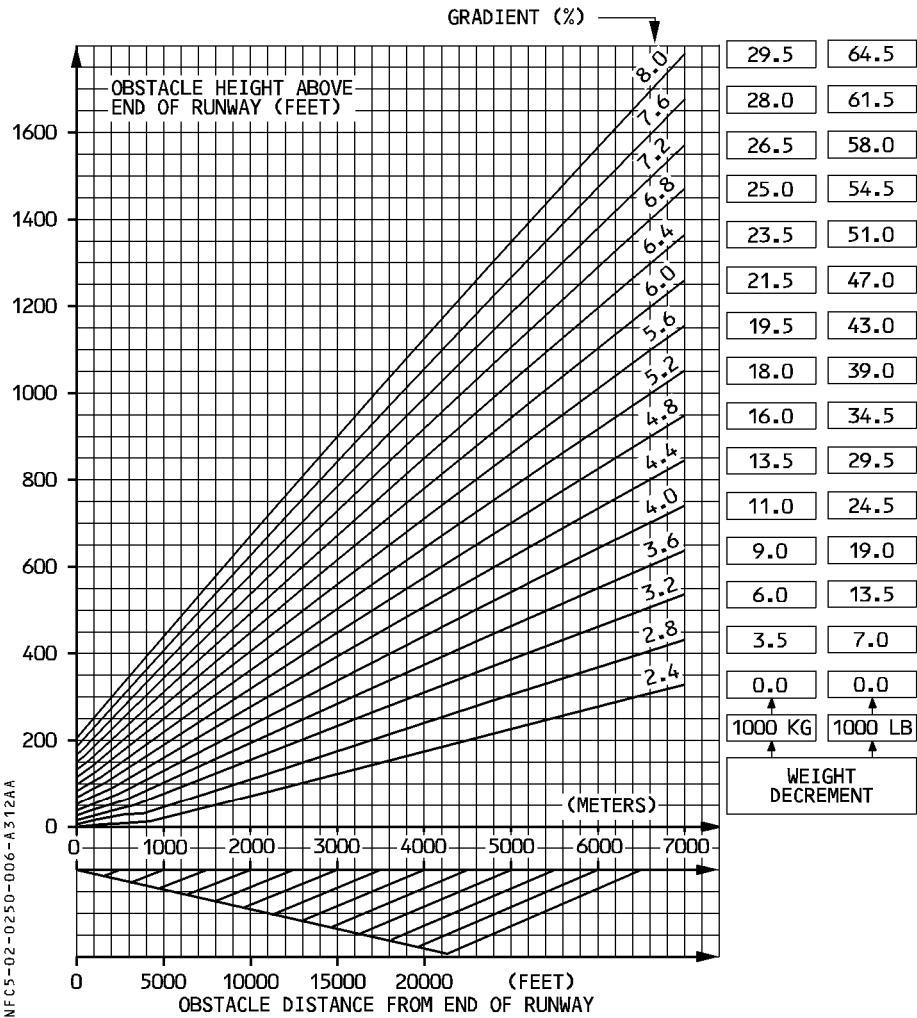
REMOTE OBSTACLE CLEARANCE CONF 2



NFC5-02-0250-005-A312AA

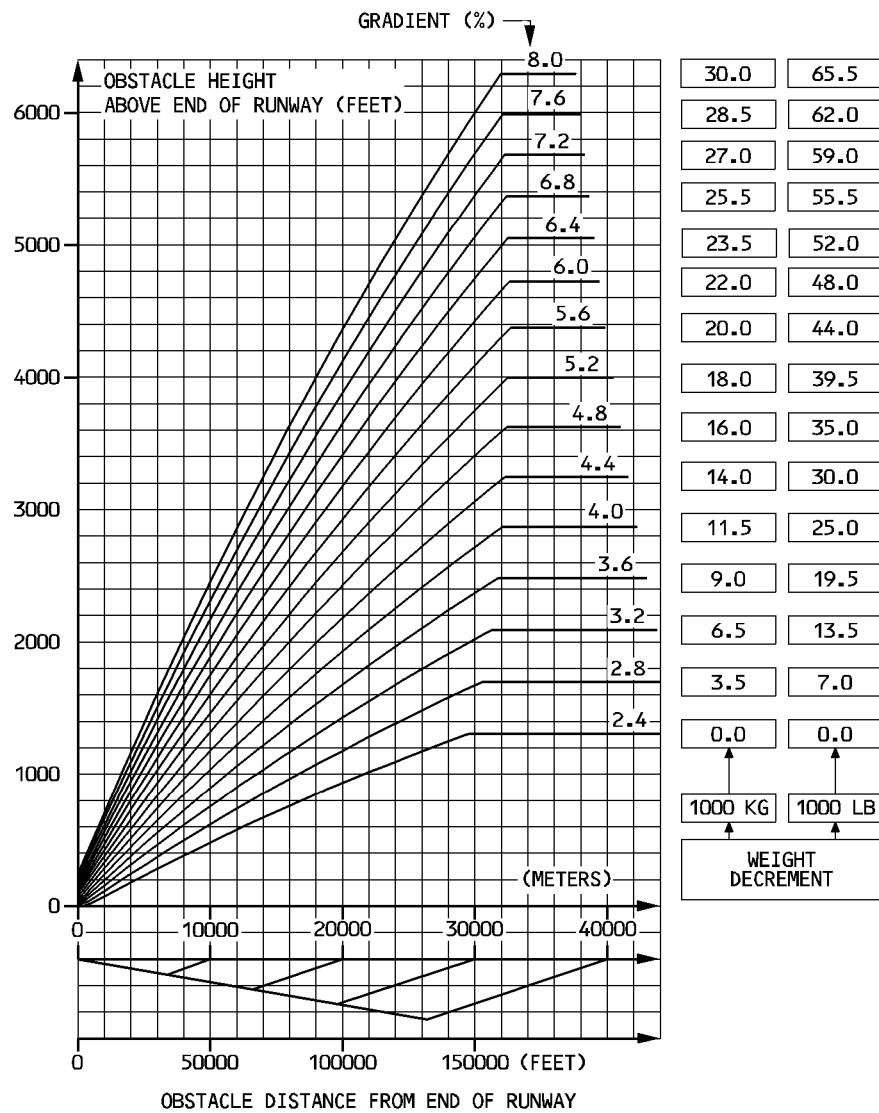
Note: In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



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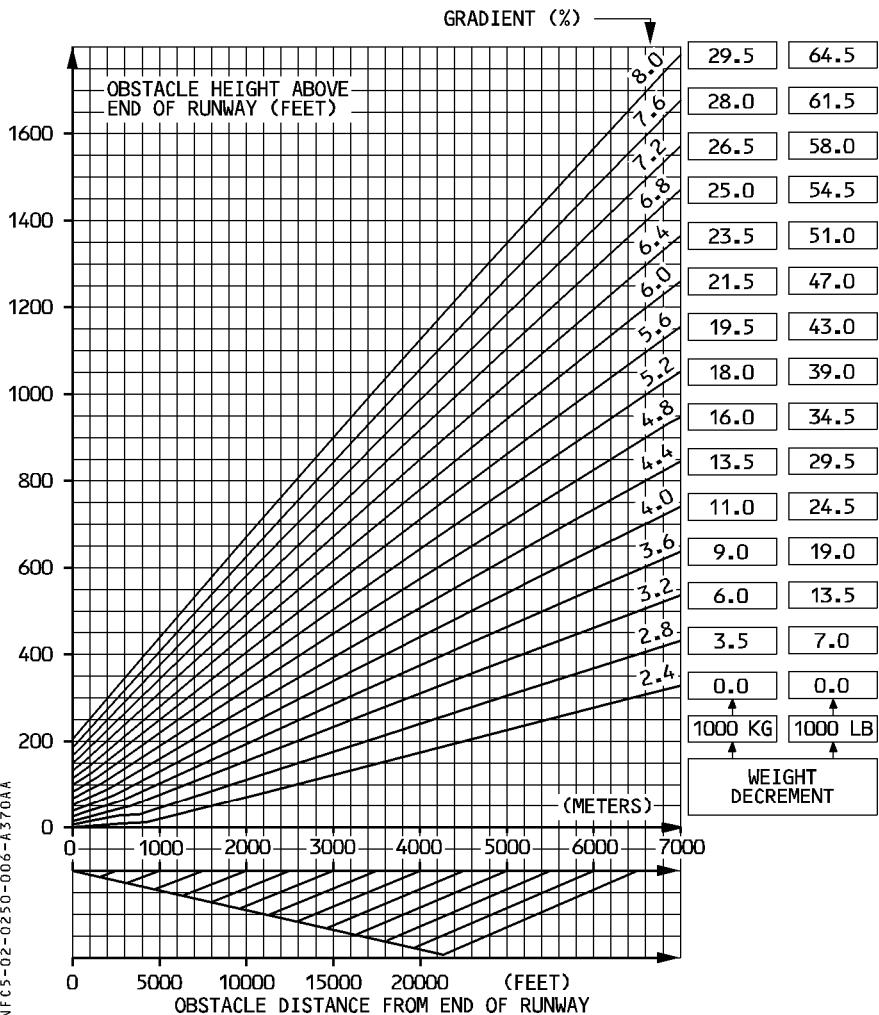
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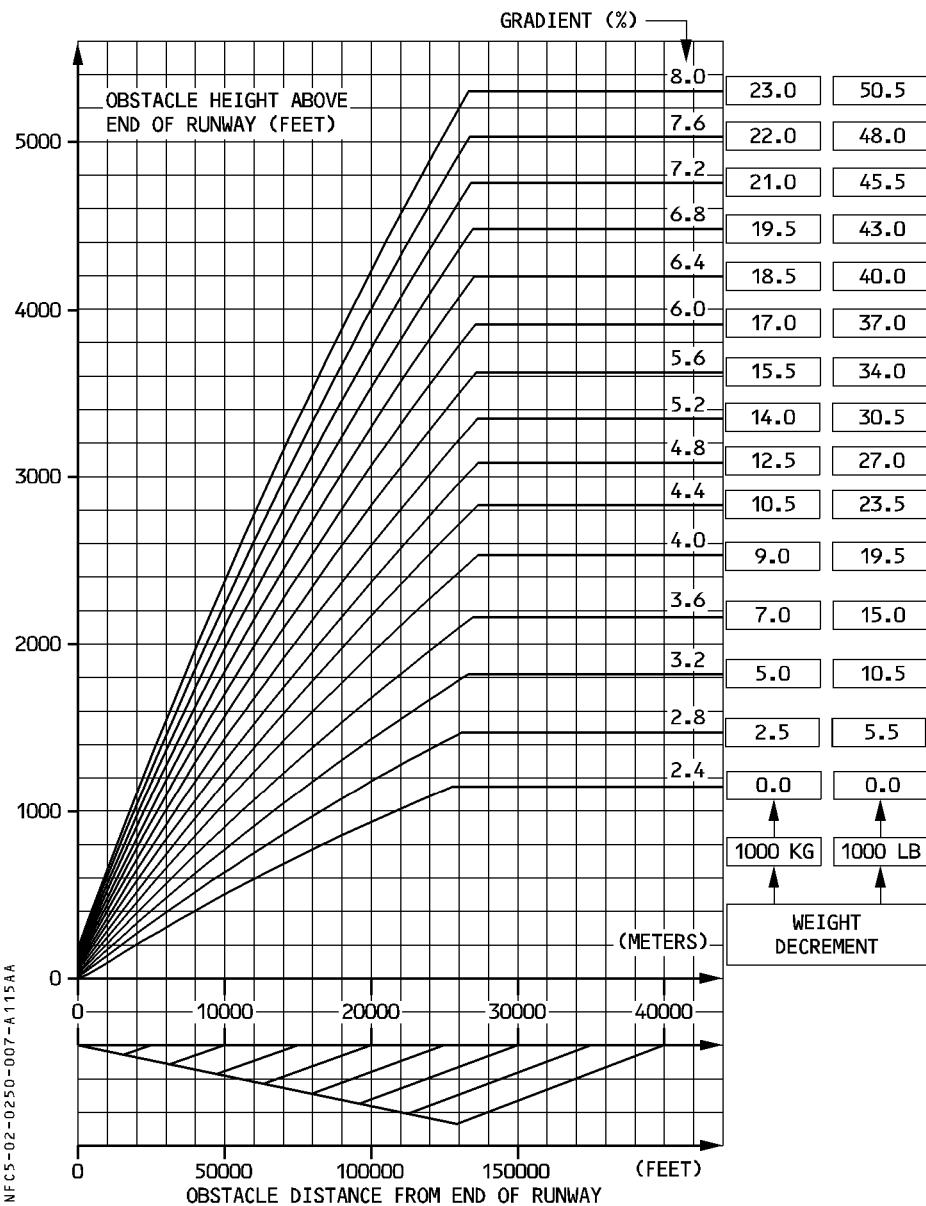
Note: In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



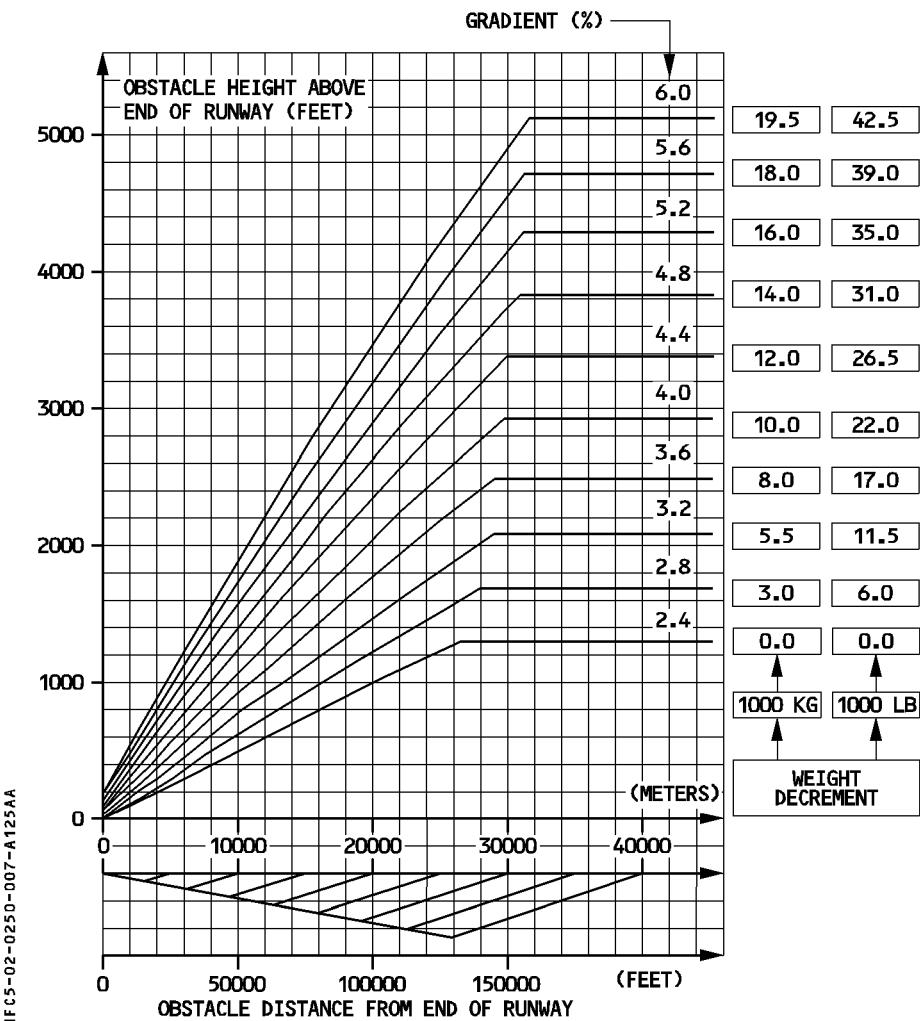
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3

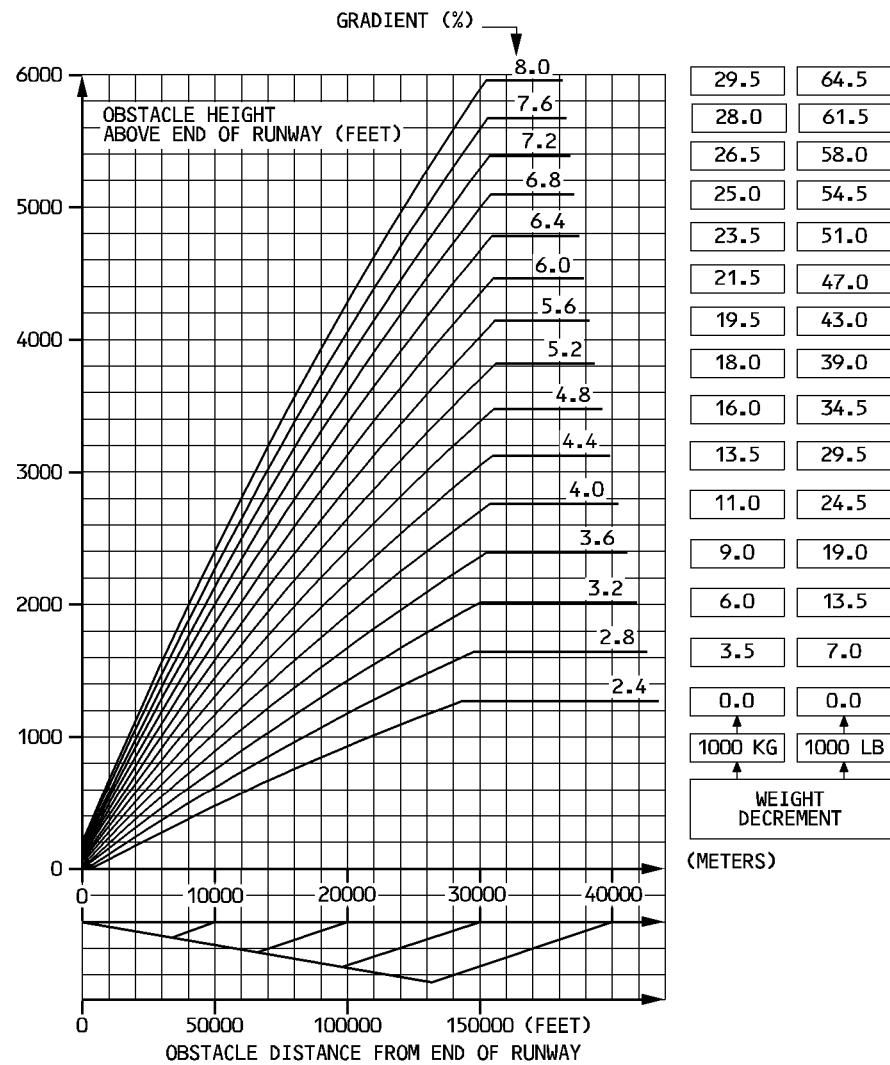


Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3

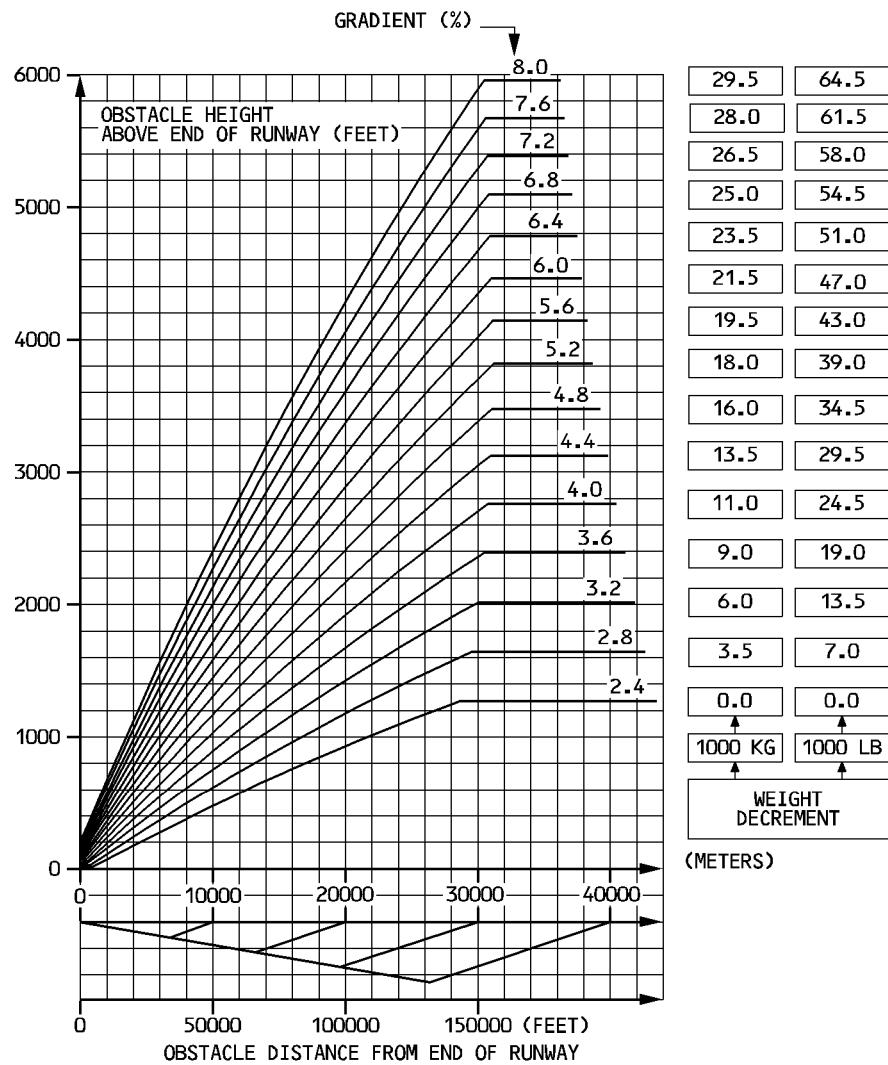


REMOTE OBSTACLE CLEARANCE CONF 3



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

REMOTE OBSTACLE CLEARANCE CONF 3



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

03.00 CONTENTS**03.10 LANDING**

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03.20 USE OF THE AUTOBRAKE SYSTEM

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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 be at least the greater of the required landing distance on wet runway (see previous paragraph) and 115 % of the landing distance determined in accordance with approved contaminated landing distance data.

R AUTOMATIC LANDING

- R Regulation (JAR.AWO 142) 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.

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		SEQ 001	REV 26

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

- R For most cases of abnormal landing configuration, the increased actual landing distance 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

ACTUAL LANDING DISTANCE (METERS)									
WEIGHT (1000 KG)		40	44	48	52	56	60	64	68
RUNWAY CONDITION	DRY	660	660	670	700	740	770	810	860
	WET	850	860	890	950	1010	1070	1140	1210
	6.3 MM (1/4 INCH) WATER	1170	1190	1240	1330	1440	1540	1640	1750
	12.7 MM (1/2 INCH) WATER	1130	1150	1200	1280	1380	1470	1570	1670
	6.3 MM (1/4 INCH) SLUSH	1140	1160	1210	1300	1380	1460	1550	1650
	12.7 MM (1/2 INCH) SLUSH	1110	1130	1170	1250	1340	1410	1500	1590
	COMPACTED SNOW	1130	1140	1180	1250	1320	1390	1460	1530
	ICE	2310	2340	2410	2530	2650	2770	2900	3030

CORRECTIONS

	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 %	+ 3 %	+ 4 %	+ 3 %	+ 5 %	+ 4 %	+ 3 %	+ 4 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 19 %	+ 22 %	+ 25 %	+ 23 %	+ 23 %	+ 21 %	+ 19 %	+ 37 %
2 reversers operative	-1 %	-6 %	-9 %	-8 %	-9 %	-8 %	-8 %	-23 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

CONFIGURATION 3

ACTUAL LANDING DISTANCE (METERS)									
WEIGHT (1000 KG)		40	44	48	52	56	60	64	68
RUNWAY CONDITION	DRY	660	690	720	760	800	850	920	1010
	WET	880	940	1010	1090	1160	1230	1310	1400
	6.3 MM (1/4 INCH) WATER	1220	1310	1430	1560	1680	1810	1940	2080
	12.7 MM (1/2 INCH) WATER	1170	1260	1370	1480	1590	1700	1830	1950
	6.3 MM (1/4 INCH) SLUSH	1190	1280	1380	1480	1580	1700	1830	1950
	12.7 MM (1/2 INCH) SLUSH	1150	1230	1330	1420	1520	1630	1740	1860
	COMPACTED SNOW	1160	1240	1320	1400	1480	1550	1630	1720
ICE		2610	2720	2860	3000	3150	3290	3450	3610

CORRECTIONS

	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 %	+ 4 %	+ 4 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 16 %	+ 22 %	+ 26 %	+ 23 %	+ 24 %	+ 22 %	+ 19 %	+ 36 %
2 reversers operative	-1 %	-7 %	-11 %	-9 %	-11 %	-10 %	-9 %	-26 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

ACTUAL LANDING DISTANCES

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (METERS)													
WEIGHT (1000 KG)			40	44	48	52	56	60	64	68	72	76	
RUNWAY CONDITION	DRY		670	670	690	720	750	780	810	860	940	1010	
	WET		860	870	910	970	1020	1070	1130	1200	1260	1300	
	COVERED WITH	6.3 MM (1/4 INCH) WATER		1160	1180	1240	1320	1410	1500	1590	1690	1790	1860
		12.7 MM (1/2 INCH) WATER		1110	1130	1190	1270	1350	1440	1520	1610	1710	1770
		6.3 MM (1/4 INCH) SLUSH		1130	1150	1210	1290	1360	1430	1500	1600	1700	1760
		12.7 MM (1/2 INCH) SLUSH		1090	1110	1170	1250	1320	1380	1450	1540	1630	1690
		COMPACTED SNOW		1120	1130	1180	1250	1300	1360	1420	1480	1550	1590
		ICE		2150	2200	2290	2420	2520	2630	2740	2870	2990	3070

CORRECTIONS

	CORRECTION ON ACTUAL LANDING DISTANCE							
	dry	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 %	+ 4 %	+ 5 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 18 %	+ 22 %	+ 25 %	+ 22 %	+ 22 %	+ 21 %	+ 18 %	+ 35 %
2 reversers operative	-3 %	-8 %	-13 %	-12 %	-13 %	-12 %	-10 %	-25 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

CONFIGURATION 3

		ACTUAL LANDING DISTANCE (METERS)									
WEIGHT (1000 KG)		40	44	48	52	56	60	64	68	72	76
RUNWAY CONDITION	DRY	670	710	740	780	820	850	900	990	1080	1160
	WET	890	960	1030	1100	1170	1230	1300	1390	1470	1520
	6.3 MM (1/4 INCH) WATER	1220	1310	1420	1550	1640	1750	1860	2000	2120	2210
	12.7 MM (1/2 INCH) WATER	1170	1260	1360	1470	1570	1670	1760	1880	2000	2080
	6.3 MM (1/4 INCH) SLUSH	1190	1280	1380	1470	1560	1660	1760	1880	2000	2090
	12.7 MM (1/2 INCH) SLUSH	1140	1240	1320	1420	1490	1590	1690	1790	1900	1970
	COMPACTED SNOW	1160	1240	1320	1400	1470	1530	1600	1670	1750	1800
ICE		2380	2520	2660	2810	2940	3060	3190	3340	3500	3600

CORRECTIONS

	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 %	+ 4 %	+ 5 %
per 10 kt headwind								
No correction for headwind due to wind correction on approach speed								
per 10 kt tailwind	+ 17 %	+ 22 %	+ 25 %	+ 22 %	+ 23 %	+ 22 %	+ 19 %	+ 33 %
2 reversers operative	-4 %	-9 %	-15 %	-14 %	-14 %	-13 %	-11 %	-27 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

ACTUAL LANDING DISTANCES

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (METERS)												
WEIGHT (1000 KG)			46	50	54	58	62	66	70	74	78	
RUNWAY CONDITION	DRY		690	730	760	790	830	890	980	1070	1150	
	WET		890	950	1010	1080	1150	1220	1290	1360	1420	
	COVERED WITH	6.3 MM (1/4INCH) WATER		1170	1250	1330	1420	1530	1630	1740	1850	1950
		12.7 MM (1/2INCH) WATER		1140	1220	1290	1380	1470	1580	1680	1780	1860
	COVERED WITH	6.3 MM (1/4INCH) SLUSH		1130	1210	1290	1370	1450	1530	1620	1720	1800
		12.7 MM (1/2INCH) SLUSH		1100	1180	1250	1330	1400	1480	1560	1660	1730
	COMPACTED SNOW		1140	1220	1290	1360	1430	1500	1570	1650	1700	
ICE		2030	2170	2310	2450	2600	2740	2880	3030	3150		

CORRECTIONS

	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 %	+ 4 %	+ 5 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 18 %	+ 21 %	+ 22 %	+ 20 %	+ 20 %	+ 19 %	+ 17 %	+ 25 %
forward C.G.	+ 2 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 2 %
2 reversers operative	-5 %	-11 %	-14 %	-13 %	-13 %	-12 %	-11 %	-24 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

CONFIGURATION 3

ACTUAL LANDING DISTANCE (METERS)											
WEIGHT (1000 KG)		46	50	54	58	62	66	70	74	78	
RUNWAY CONDITION	DRY		730	760	800	840	890	970	1060	1160	1250
	WET		970	1040	1110	1180	1260	1340	1420	1500	1580
	COVERED WITH	6.3 MM (1/4 INCH) WATER	1270	1360	1440	1560	1690	1810	1940	2070	2180
		12.7 MM (1/2 INCH) WATER	1230	1310	1400	1510	1620	1730	1840	1970	2060
		6.3 MM (1/4 INCH) SLUSH	1230	1310	1400	1480	1570	1660	1780	1900	2000
		12.7 MM (1/2 INCH) SLUSH	1190	1270	1350	1430	1520	1600	1710	1810	1900
		COMPACTED SNOW	1230	1310	1380	1460	1540	1620	1690	1770	1830
		ICE	2320	2480	2650	2810	2970	3140	3300	3470	3600

CORRECTIONS

	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 %	+ 4 %	+ 5 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 17 %	+ 21 %	+ 24 %	+ 20 %	+ 22 %	+ 20 %	+ 16 %	+ 24 %
forward C.G.	+ 2 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 2 %	+ 3 %	+ 3 %
2 reversers operative	-5 %	-12 %	-15 %	-15 %	-14 %	-13 %	-12 %	-27 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

REQUIRED LANDING DISTANCE**MANUAL LANDING**

REQUIRED LANDING DISTANCE (METERS)								
WEIGHT (1000 KG)	40	44	48	52	56	60	64	68
CONF 3	1100	1150	1200	1260	1330	1410	1530	1670
CONF FULL	1100	1100	1120	1170	1220	1280	1340	1430

Corrections on landing distances

Wind : per 10 kt tailwind add 20 %

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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REQUIRED LANDING DISTANCE**MANUAL LANDING**

WEIGHT (1000 KG)	REQUIRED LANDING DISTANCE (METERS)									
	42	46	50	54	58	62	66	70	74	78
CONF 3	1150	1210	1270	1330	1390	1450	1560	1720	1880	2010
CONF FULL	1110	1120	1170	1220	1260	1310	1380	1490	1630	1750

Corrections on landing distances

Wind : per 10 kt tailwind add 19%

No correction for headwind due to wind correction on approach speed.

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

AUTOMATIC LANDING

Determine the corrected required landing distance for manual landing from the data above.

The required landing distance for automatic landing is equal to the corrected required landing distance for manual landing except in the following case :

- In case of landing in Conf 3 with landing weight equal to or less than 45 000 kg and with headwind above 20 knots, it is equal to the corrected required landing distance for manual landing increased by 70 meters.

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REQUIRED LANDING DISTANCE**MANUAL LANDING**

REQUIRED LANDING DISTANCE (METERS)									
WEIGHT (1000 KG)	46	50	54	58	62	66	70	74	78
CONF 3	1210	1270	1330	1390	1470	1610	1770	1930	2070
CONF FULL	1150	1210	1260	1320	1380	1480	1630	1780	1910

Corrections on landing distances

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 %.

R Forward CG : add 2 %.

AUTOMATIC LANDING

Determine the corrected required landing distance for manual landing from the data above.
The required landing distance for automatic landing is equal to the corrected required landing distance for manual landing except in the following case :

- In case of landing in Conf 3 with landing weight equal to or less than 65000 kg with headwind, it is equal to the corrected required landing distance for manual landing increased by 95 meters.

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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
- for forward CG (A320-200 only)

MANUAL LANDING WITH AUTOBRAKE

CONFIGURATION 3

ACTUAL LANDING DISTANCE (FEET)							CORRECTIONS (%) ON LANDING DISTANCE			
WEIGHT (1000 LB)		40	45	50	55	60	65	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION		MODE								
DRY		MED	940	1000	1080	1150	1220	1300	+ 3	0
DRY		LOW	1360	1460	1580	1700	1830	1950	+ 3	0
WET		MED	950	1030	1110	1210	1300	1400	+ 4	-1
WET		LOW	1360	1460	1580	1700	1830	1950	+ 3	0
C O V E R E D	6.3 MM (1/4 INCH) WATER		MED	1270	1380	1520	1670	1830	2000	+ 4
	6.3 MM (1/4 INCH) WATER		LOW	1360	1470	1600	1740	1890	2050	+ 4
	12.7 MM (1/2 INCH) WATER		MED	1210	1320	1440	1580	1720	1870	+ 4
	12.7 MM (1/2 INCH) WATER		LOW	1330	1440	1560	1690	1820	1960	+ 4
W I T H	6.3 MM (1/4 INCH) SLUSH		MED	1240	1350	1470	1590	1720	1880	+ 5
	6.3 MM (1/4 INCH) SLUSH		LOW	1320	1440	1560	1690	1820	1950	+ 5
	12.7 MM (1/2 INCH) SLUSH		MED	1190	1300	1410	1530	1650	1790	+ 5
	12.7 MM (1/2 INCH) SLUSH		LOW	1300	1410	1530	1650	1770	1900	+ 4
COMPACTED SNOW		MED	1230	1310	1420	1520	1610	1720	+ 4	- 10
COMPACTED SNOW		LOW	1370	1480	1600	1720	1840	1970	+ 4	- 2
ICE		MED	2630	2780	2950	3140	3320	3520	+ 4	- 27
ICE		LOW	2660	2810	2990	3170	3360	3550	+ 4	- 26

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (FEET)							CORRECTIONS (%) ON LANDING DISTANCE			
WEIGHT (1000 LB)		40	45	50	55	60	65	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION		MODE								
		DRY	920	920	970	1030	1090	1160	+ 3	0
		DRY	1310	1310	1390	1500	1600	1710	+ 3	0
WET		MED	920	930	990	1060	1140	1220	+ 4	0
WET		LOW	1310	1310	1390	1500	1600	1710	+ 3	0
C O V E R E D	6.3 MM (1/4 INCH) WATER		MED	1210	1240	1320	1430	1550	1690	+ 4
	6.3 MM (1/4 INCH) WATER		LOW	1310	1330	1420	1530	1640	1760	+ 4
	12.7 MM (1/2 INCH) WATER		MED	1160	1190	1270	1380	1490	1610	+ 4
	12.7 MM (1/2 INCH) WATER		LOW	1290	1310	1390	1500	1610	1720	+ 3
W I T H	6.3 MM (1/4 INCH) SLUSH		MED	1180	1210	1290	1400	1500	1610	+ 5
	6.3 MM (1/4 INCH) SLUSH		LOW	1280	1300	1380	1490	1600	1710	+ 4
	12.7 MM (1/2 INCH) SLUSH		MED	1140	1170	1250	1350	1450	1550	+ 5
	12.7 MM (1/2 INCH) SLUSH		LOW	1260	1280	1360	1470	1570	1680	+ 4
COMPACTED SNOW		MED	1180	1200	1270	1360	1440	1530	+ 4	- 9
COMPACTED SNOW		LOW	1330	1340	1420	1530	1630	1740	+ 4	- 2
ICE		MED	2330	2370	2490	2640	2790	2960	+ 4	- 24
ICE		LOW	2350	2390	2510	2670	2820	2980	+ 4	- 23

Note : – Max mode is not recommended at landing

– Per 5 kt speed increment (and no failure) add 8 % (all runways)

– No correction for headwind due to wind correction on approach speed

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
- for forward CG (A320-200 only)

MANUAL LANDING WITH AUTOBRAKE

CONFIGURATION 3

		ACTUAL LANDING DISTANCE (METERS)					CORRECTIONS (%) ON LANDING DISTANCE		
WEIGHT (1000 KG)		40	50	60	70	80	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION	MODE								
DRY	MED	860	1000	1140	1280	1410	+ 3	0	+16
	LOW	1310	1550	1770	2010	2240	+ 3	0	+18
WET	MED	900	1080	1250	1440	1620	+ 4	0	+22
	LOW	1310	1550	1770	2010	2240	+ 3	0	+18
C O V E R E D	6.3 MM (1/4 INCH) WATER	MED	1220	1490	1750	2050	2340	+ 5	-15
		LOW	1310	1570	1820	2110	2390	+ 5	0
	12.7 MM (1/2 INCH) WATER	MED	1170	1410	1670	1930	2200	+ 5	-13
		LOW	1290	1540	1770	2030	2290	+ 4	0
W I T H	6.3 MM (1/4 INCH) SLUSH	MED	1190	1420	1660	1940	2200	+ 6	-14
		LOW	1280	1530	1750	2020	2260	+ 6	0
	12.7 MM (1/2 INCH) SLUSH	MED	1140	1370	1590	1860	2090	+ 5	-13
		LOW	1260	1500	1720	1960	2190	+ 5	0
COMPACTED SNOW	MED	1160	1360	1530	1710	1870	+ 4	-10	+19
	LOW	1310	1540	1760	2000	2220	+ 4	0	+18
ICE	MED	2380	2740	3060	3420	3750	+ 6	-26	+33
	LOW	2400	2760	3090	3450	3780	+ 6	-26	+33

CONFIGURATION FULL

		ACTUAL LANDING DISTANCE (METERS)					CORRECTIONS (%) ON LANDING DISTANCE		
WEIGHT (1000 KG)		40	50	60	70	80	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION	MODE								
DRY	MED	860	910	1030	1150	1260	+ 3	0	+16
	LOW	1290	1390	1580	1790	1970	+ 3	0	+18
WET	MED	870	950	1090	1250	1390	+ 4	0	+22
	LOW	1290	1390	1580	1790	1970	+ 3	0	+18
C O V E R E D	6.3 MM (1/4 INCH) WATER	MED	1160	1280	1500	1740	1960	+ 5	-13
		LOW	1280	1390	1600	1820	2040	+ 4	0
	12.7 MM (1/2 INCH) WATER	MED	1110	1230	1440	1660	1870	+ 4	-11
		LOW	1260	1380	1570	1790	1990	+ 4	0
W I T H	6.3 MM (1/4 INCH) SLUSH	MED	1130	1250	1430	1650	1850	+ 5	-12
		LOW	1240	1360	1550	1760	1950	+ 5	0
	12.7 MM (1/2 INCH) SLUSH	MED	1090	1210	1380	1590	1780	+ 5	-11
		LOW	1230	1340	1540	1740	1920	+ 4	0
COMPACTED SNOW	MED	1120	1210	1360	1520	1650	+ 4	-9	+19
	LOW	1280	1380	1570	1770	1960	+ 4	0	+18
ICE	MED	2150	2360	2630	2930	3200	+ 6	-24	+35
	LOW	2180	2380	2650	2960	3230	+ 6	-24	+34

Note : – Max mode is not recommended at landing

– Per 5 kt speed increment (and no failure) add 8 % (all runways)

– No correction for headwind due to wind correction on approach speed

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
- for forward CG (A320-200 only)

MANUAL LANDING WITH AUTOBRAKE

CONFIGURATION 3

ACTUAL LANDING DISTANCE (METERS)							CORRECTIONS (%) ON LANDING DISTANCE				
WEIGHT (1000 KG)		40	50	60	70	80	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND	FWD CG	
RUNWAY CONDITION		MODE									
DRY	MED	920	1060	1210	1360	1510	+ 3	0	+ 16	+ 2	
	LOW	1340	1570	1810	2060	2300	+ 4	0	+ 18	+ 2	
WET	MED	930	1100	1280	1480	1680	+ 4	-2	+ 20	+ 3	
	LOW	1340	1570	1810	2060	2300	+ 4	-1	+ 18	+ 2	
C O V E R E D	6.3 MM (1/4 INCH) WATER	MED	1170	1390	1640	1960	2260	+ 5	-15	+ 23	+ 3
		LOW	1330	1580	1830	2120	2430	+ 4	-2	+ 18	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1140	1340	1580	1860	2140	+ 5	-13	+ 20	+ 3
		LOW	1310	1550	1800	2060	2330	+ 4	-2	+ 16	+ 2
W I T H	6.3 MM (1/4 INCH) SLUSH	MED	1140	1340	1560	1800	2070	+ 6	-14	+ 21	+ 3
		LOW	1290	1530	1770	2020	2270	+ 5	-2	+ 17	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1100	1300	1500	1720	1970	+ 5	-13	+ 19	+ 3
		LOW	1270	1510	1750	1990	2220	+ 5	-1	+ 17	+ 2
C O V E R E D	COMPACTED SNOW	MED	1160	1350	1540	1740	1920	+ 4	-12	+ 17	+ 3
		LOW	1320	1550	1800	2050	2280	+ 4	-1	+ 16	+ 2
W I T H	ICE	MED	2100	2500	2910	3320	3710	+ 6	-27	+ 26	+ 3
		LOW	2130	2530	2940	3360	3740	+ 6	-26	+ 25	+ 3

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (METERS)							CORRECTIONS (%) ON LANDING DISTANCE				
WEIGHT (1000 KG)		40	50	60	70	80	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND	FWD CG	
RUNWAY CONDITION		MODE									
DRY	MED	900	1010	1150	1290	1430	+ 3	0	+ 16	+ 2	
	LOW	1300	1470	1700	1930	2160	+ 4	0	+ 18	+ 2	
WET	MED	900	1010	1170	1350	1520	+ 4	0	+ 20	+ 3	
	LOW	1300	1470	1700	1930	2160	+ 4	-1	+ 18	+ 2	
C O V E R E D	6.3 MM (1/4 INCH) WATER	MED	1120	1280	1490	1760	2020	+ 5	-12	+ 22	+ 3
		LOW	1300	1480	1720	1970	2210	+ 4	-2	+ 17	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1090	1240	1440	1690	1930	+ 4	-11	+ 20	+ 3
		LOW	1280	1460	1690	1930	2160	+ 4	-1	+ 16	+ 2
W I T H	6.3 MM (1/4 INCH) SLUSH	MED	1090	1240	1440	1640	1870	+ 6	-12	+ 20	+ 3
		LOW	1260	1440	1670	1900	2120	+ 5	-1	+ 17	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1060	1200	1390	1590	1790	+ 5	-11	+ 19	+ 3
		LOW	1240	1410	1640	1870	2090	+ 4	-1	+ 16	+ 2
C O V E R E D	COMPACTED SNOW	MED	1110	1250	1440	1620	1780	+ 4	-10	+ 17	+ 3
		LOW	1280	1460	1700	1930	2150	+ 4	-1	+ 18	+ 2
W I T H	ICE	MED	1880	2180	2540	2900	3240	+ 6	-24	+ 26	+ 3
		LOW	1900	2210	2570	2930	3270	+ 6	-22	+ 26	+ 2

Note : – Max mode is not recommended at landing

- R – Per 5 knot speed increment (and no failure) add 8 % (all runways)
 – No correction for headwind due to wind correction on approach speed

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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.

CAUTION

Take off from an 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
- 3 mm (0.12 inch) water
- 4 mm (0.16 inch) wet snow
- 15 mm (0.59 inch) dry snow

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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
 - 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
 - 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 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.

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

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.

- Note :
1. The results obtained with this method may be different from the influence given at the bottom of the RTOW chart.
 2. On contaminated runway, in some cases, no MTOW can be determined with this method (box dashed below a given weight). A specific RTOW chart must then be computed.
 3. The published corrections are valid for charts calculated with forward CG and basic CG.

R
R

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 greater than the minimum values shown on the RTOW chart.
If one or more speeds are lower than these minimum values, apply the following procedure :
 - Actual TOW = maximum TOW
 - If V1 is lower than minimum V1 (V1 limited by VMCG), take this last value as V1 and further decrease weight by 3000 kg (6600 lb) per kt difference between both values. Check that VR and V2 are higher or equal to minimum values.
 - If VR or/and V2 falls below the minimum values, takeoff is not possible.
 - Actual TOW lower than maximum TOW
 - If V1 corresponding to actual TOW is lower than the minimum V1 (V1 limited by VMCG) :
 - * If maximum TOW has a V1 equal to or above minimum V1, retain minimum V1 as V1 and decrease the flexible temperature by 4°C per knot difference between them.
 - * In the rare case when the V1 corresponding to maximum TOW falls below the minimum V1, decrease maximum TOW by 3000 kg (6600 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 the flexible temperature by 4°C per knot difference between this last value and the V1 corresponding to the actual TOW. Check that VR and V2 are higher than or equal to the minimum values.
 - If VR or V2 corresponding to actual TOW falls below the 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)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5000	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	6	3	2	3	5	4	16	9	4
MAX TO Weight decrement (1000 kg) (1000 lb)	2.3 5.1	1.2 2.8	0.5 1.2	1.0 2.3	1.7 3.9	1.7 3.8	5.1 11.3	3.0 6.7	1.5 3.4
V1 decrement (kt)	13	13	10	14	12	12	13	13	15
VR and V2 decrement (kt)	5	4	1	4	6	6	2	7	5

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5000	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	4	1	1	2	1	1	3	3	2
MAX TO Weight decrement (1000 kg) (1000 lb)	1.4 3.1	0.4 0.9	0.4 0.9	0.4 0.9	0.1 0.3	0.1 0.3	0.9 1.9	0.9 1.9	0.5 1.2
V1 decrement (kt)	8	8	6	8	7	7	8	7	9
VR and V2 decrement (kt)	4	1	1	3	2	2	0	2	2

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 (m) 8000 (ft)	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5000	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	6	5	4	6	5	5	15	8	5
MAX TO Weight decrement (1000 kg) (1000 lb)	2.3 5.1	1.9 4.2	1.5 3.4	2.3 5.0	2.0 4.5	1.9 4.2	5.0 11.1	2.8 6.1	1.9 4.2
V1 decrement (kt)	14	14	14	14	14	14	14	14	15
VR and V2 decrement (kt)	7	7	6	7	7	8	5	6	8

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 (m) 8000 (ft)	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5000	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	4	4	2	5	4	3	8	5	3
MAX TO Weight decrement (1000 kg) (1000 lb)	1.4 3.1	1.4 3.1	0.8 1.7	1.9 4.2	1.4 3.1	1.3 2.9	2.6 5.8	1.6 3.6	1.1 2.5
V1 decrement (kt)	8	9	8	9	9	9	8	9	9
VR and V2 decrement (kt)	4	5	3	5	5	4	3	5	5

NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	4	4	3	3	4	8	1	3	8
MAX TO Weight decrement (1000 kg) (1000 lb)	1.5 3.4	1.3 2.9	1.3 2.9	1.0 2.3	1.4 3.1	3.1 6.9	0.3 0.7	0.9 2.0	3.3 7.3
V1 decrement (kt)	15	15	15	15	15	14	14	14	14
VR and V2 decrement (kt)	4	5	6	3	4	10	2	2	11

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	2	2	2	1	2	10	0	1	5
MAX TO Weight decrement (1000 kg) (1000 lb)	0.7 1.6	0.7 1.6	0.7 1.6	0.2 0.5	0.6 1.4	3.8 8.4	0.0 0.0	0.3 0.7	1.8 4.0
V1 decrement (kt)	10	10	10	10	10	11	8	9	10
VR and V2 decrement (kt)	2	3	3	1	2	11	1	1	7

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	7	5	4	11	10	5	5	7	10
MAX TO Weight decrement (1000 kg) (1000 lb)	2.6 5.8	2.0 4.5	1.7 3.8	4.0 8.9	4.0 8.9	2.2 4.9	2.2 4.9	2.4 5.3	3.8 8.4
V1 decrement (kt)	14	15	15	14	14	15	13	14	14
VR and V2 decrement (kt)	7	7	8	6	11	9	6	7	12

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	5	3	3	5	7	6	4	5	7
MAX TO Weight decrement (1000 kg) (1000 lb)	1.8 4.0	1.3 2.9	1.0 2.3	1.5 3.4	2.5 5.6	2.5 5.6	1.4 3.1	1.6 3.6	2.9 6.4
V1 decrement (kt)	9	10	10	9	9	10	8	9	8
VR and V2 decrement (kt)	5	5	5	4	7	9	4	5	11

NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	11	3	3	9	8	8	7	5	5
MAX TO Weight decrement (1000 kg) (1000 lb)	3.2 7.1	0.8 1.8	0.8 1.8	2.4 5.3	2.6 5.8	2.6 5.8	2.3 5.1	1.5 3.4	1.5 3.4
V1 decrement (kt)	16	16	16	15	15	13	14	13	15
VR and V2 decrement (kt)	3	3	3	2	4	8	1	1	4

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	5	2	2	5	3	3	4	3	3
MAX TO Weight decrement (1000 kg) (1000 lb)	1.4 3.1	0.4 0.9	0.4 0.9	1.2 2.7	0.8 1.8	0.8 1.8	1.2 2.7	0.8 1.8	0.8 1.8
V1 decrement (kt)	10	10	10	10	9	8	9	8	9
VR and V2 decrement (kt)	1	0	2	1	1	3	0	1	2

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 (m) 8000 (ft)	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	14	5	4	18	10	9	15	9	8
MAX TO Weight decrement (1000 kg) (1000 lb)	4.3 9.5	4.2 4.2	1.4 3.1	4.8 10.6	3.2 7.1	3.2 7.1	4.7 10.4	2.6 5.8	2.6 5.8
V1 decrement (kt)	14	15	15	14	14	13	12	12	14
VR and V2 decrement (kt)	4	7	5	4	6	11	4	5	7

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 (m) 8000 (ft)	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	10	3	2	11	5	5	9	5	5
MAX TO Weight decrement (1000 kg) (1000 lb)	2.9 6.4	0.8 1.8	0.6 1.4	2.9 6.4	1.7 3.8	1.7 3.8	2.9 6.4	1.5 3.4	1.5 3.4
V1 decrement (kt)	8	9	9	9	9	8	8	8	8
VR and V2 decrement (kt)	2	3	2	3	4	6	3	4	4

NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	8	3	2	10	7	6	9	5	5
MAX TO Weight decrement (1000 kg) (1000 lb)	2.4 5.3	0.9 2.0	0.8 1.8	2.8 6.2	2.2 4.9	2.2 4.9	2.5 5.6	1.5 3.4	1.5 3.4
V1 decrement (kt)	16	16	14	16	15	15	15	15	15
VR and V2 decrement (kt)	3	3	2	3	4	7	1	3	4

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	5	2	2	5	3	2	4	3	2
MAX TO Weight decrement (1000 kg) (1000 lb)	1.4 3.1	0.6 1.4	0.6 1.4	1.3 2.9	0.8 1.8	0.5 1.2	0.9 2.0	0.7 1.6	0.7 1.6
V1 decrement (kt)	10	11	8	10	10	10	9	9	9
VR and V2 decrement (kt)	1	1	2	1	2	2	1	1	2

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	13	5	5	17	8	8	14	8	7
MAX TO Weight decrement (1000 kg) (1000 lb)	4.0 8.9	1.8 4.0	1.8 4.0	4.8 10.6	3.0 6.7	3.0 6.7	4.2 10.4	2.4 5.3	2.4 5.3
V1 decrement (kt)	15	16	16	15	15	14	13	14	14
VR and V2 decrement (kt)	5	6	6	5	7	11	4	6	7

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	9	3	3	12	4	4	9	5	5
MAX TO Weight decrement (1000 kg) (1000 lb)	2.7 6.0	1.1 2.5	1.0 2.3	3.3 7.3	1.6 3.6	1.5 3.4	2.7 6.0	1.6 3.6	1.6 3.6
V1 decrement (kt)	9	11	10	9	10	9	8	9	9
VR and V2 decrement (kt)	3	4	3	3	5	5	3	4	5

TAKEOFF FROM 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 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)											
With clearway	11.0	8.3		6.6		10.7	7.7	6.4	13.8	11.2	7.4
Without clearway	9.9	7.8		6.2		9.1	6.8	5.9	12.3	10.3	7.3

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<46.5	46.5	48	48 to 68											
	MTOW (1000 kg)	–	42	48	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<42	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	V2 (kt IAS)	115	115	118	121	124	126	129	132	134	137	139	141	144	145	147
	VR (kt IAS)	112	112	115	118	121	123	126	129	131	134	136	138	141	142	144
	V1 (kt IAS)	111	111	111	111	111	113	116	119	121	124	126	128	131	132	134

C O N F 2	CORRECTED WEIGHT (1000 kg)	<51.5	51.5	52	54	54 to 68											
	MTOW (1000 kg)	–	46	48	54	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	54	56	58	60	62	64	66	68			
	V2 (kt IAS)	115	115	118	120	123	125	127	130	132	134	136	138	140			
	VR (kt IAS)	111	111	114	116	119	121	123	126	128	130	132	134	136			
	V1 (kt IAS)	110	110	110	110	110	112	115	117	119	121	123	125	127			

C O N F 3	CORRECTED WEIGHT (1000 kg)	<50.8	50.8	52	52 to 68											
	MTOW (1000 kg)	–	47.3	52	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<47.3	47.3	48	50	52	54	56	58	60	62	64	66	68		
	V2 (kt IAS)	116	116	117	119	122	124	126	129	131	133	135	137	139		
	VR (kt IAS)	112	112	113	115	118	120	122	125	127	129	131	133	135		
	V1 (kt IAS)	110	110	110	110	110	112	114	117	119	121	123	125	127		

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 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)									
With clearway	14.6	15.8	17.7	14.2	11.9	11.6	14.8	12.1	11.0
Without clearway	13.5	15.3	17.3	12.6	11.0	11.1	13.3	11.2	10.9

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<43	43	43.3	43.3 to 68												
	MTOW (1000 kg)	—	42	43.3	EQUAL TO CORRECTED WEIGHT												
N	ACTUAL WEIGHT (1000 kg)	<42	42	43.3	44	46	48	50	52	54	56	58	60	62	64	66	68
F	V2 (kt IAS)	115	115	117	118	121	124	126	129	132	134	137	139	141	144	145	147
1	VR (kt IAS)	113	113	115	116	119	122	124	127	130	132	135	137	139	142	143	145
+ F	V1 (kt IAS)	111	111	111	112	115	118	120	123	126	128	131	133	135	138	139	141

C O N F 2	CORRECTED WEIGHT (1000 kg)	<47	47	47.3	47.3 to 68										
	MTOW (1000 kg)	—	46	47.3	EQUAL TO CORRECTED WEIGHT										
N	ACTUAL WEIGHT (1000 kg)	<46	46	47.3	48	50	52	54	56	58	60	62	64	66	68
F	V2 (kt IAS)	115	115	117	118	120	123	125	127	130	132	134	136	138	140
2	VR (kt IAS)	112	112	114	115	117	120	122	124	127	129	131	133	135	137
+ F	V1 (kt IAS)	110	110	110	111	113	116	118	120	123	125	127	129	131	133

C O N F 3	CORRECTED WEIGHT (1000 kg)	<49.1	49.1	50	50 to 68									
	MTOW (1000 kg)	—	47.3	50	EQUAL TO CORRECTED WEIGHT									
N	ACTUAL WEIGHT (1000 kg)	<47.3	47.3	48	50	52	54	56	58	60	62	64	66	68
F	V2 (kt IAS)	116	116	117	119	122	124	126	129	131	133	135	137	139
3	VR (kt IAS)	112	112	113	115	118	120	122	125	127	129	131	133	135
+ F	V1 (kt IAS)	110	110	110	110	113	115	117	120	122	124	126	128	130

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	13.1	10.1	7.4		6.3		15.9	12.9		11.2	14.9	14.9
Without clearway	13.1	10.1	7.4		6.3		14.6	12.9		11.2	13.9	12.0

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<50.2	50.2	52	52 to 76													
	MTOW (1000 kg)	–	44.7	52	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
V2 (kt IAS)	121	121	123	126	129	131	134	136	138	140	142	144	147	149	151	154	156	157
VR (kt IAS)	116	116	118	121	124	126	129	131	133	135	137	139	142	144	146	149	151	152
V1 (kt IAS)	111	111	111	111	111	111	114	116	118	120	122	124	127	129	131	134	136	137

C O N F 2	CORRECTED WEIGHT (1000 kg)	<51.2	51.2	52	53	53 to 76													
	MTOW (1000 kg)	–	44.7	49	53	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	50	52	53	54	56	58	60	62	54	66	68	70	72	74
V2 (kt IAS)	121	121	123	126	128	131	132	133	135	137	139	141	144	146	148	151	153	155	157
VR (kt IAS)	117	117	119	122	124	127	128	129	131	133	135	137	140	142	144	147	149	151	153
V1 (kt IAS)	111	111	111	111	111	111	112	114	116	118	120	123	125	127	130	132	134	136	

C O N F 3	CORRECTED WEIGHT (1000 kg)	<52	52	54	54 to 76												
	MTOW (1000 kg)	–	46	54	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
V2 (kt IAS)	121	121	124	126	129	131	133	135	137	139	142	144	146	148	151	153	154
VR (kt IAS)	117	117	120	122	125	127	129	131	133	135	138	140	142	144	147	149	150
V1 (kt IAS)	111	111	111	111	111	111	113	115	117	119	122	124	126	128	131	133	134

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

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

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)											
With clearway	16.9	14.8	12.6	10.5	19.3	17.3	15.2	19.2	18.5	16.0	
Without clearway	15.5	14.0	12.0	10.0	17.5	16.0	14.5	17.0	17.0	15.0	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	< 44		44	44 to 76													
		MTOW (1000 kg)		—	44	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	≤44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	123	126	129	131	134	136	138	140	142	144	147	149	151	154	156	159
	VR (kt IAS)	118	120	123	126	128	131	133	135	137	139	141	144	146	148	151	153	156
	V1 (kt IAS)	112	114	117	120	122	125	127	129	131	133	135	138	140	142	145	147	150

C O N F 2	CORRECTED WEIGHT (1000 kg)	< 44		44	44 to 76													
		MTOW (1000 kg)		—	44	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	≤44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	123	126	128	131	133	135	137	139	142	144	146	148	151	153	156	158
	VR (kt IAS)	118	120	123	125	128	130	132	134	136	139	141	143	145	148	150	153	155
	V1 (kt IAS)	112	114	117	119	122	124	126	128	130	133	135	137	139	142	144	147	149

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 47.1		47.1	47.3	47.3 to 76												
		MTOW (1000 kg)		—	46	47.3	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	≤46	47.3	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	123	124	126	129	131	133	135	137	139	142	144	146	148	151	153	155
	VR (kt IAS)	118	120	121	123	126	128	130	132	134	136	139	141	143	145	148	150	152
	V1 (kt IAS)	112	112	113	115	118	120	122	124	126	128	131	133	135	138	140	142	144

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	12.2	11.6	8.9	6.4	13.6	12.8	11.0	14.9	14.3	13.1		
Without clearway	10.0	10.0	7.9	5.5	11.1	11.1	10.1	12.1	12.1	12.0		

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	< 53.6	53.6	54	56	56 to 78							
	MTOW (1000 kg)	–	46	48	56	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 46	46	48	50	52	54	56	58	60	62	64	66
	V2 (kt IAS)	123	123	126	129	131	134	136	139	141	143	146	148
	VR (kt IAS)	121	121	124	127	129	132	134	137	139	141	144	146
	V1 (kt IAS)	116	116	116	116	116	116	119	121	123	126	128	130
		133	135	137	139	141	143	145	147	150	152	154	156

C O N F 2	CORRECTED WEIGHT (1000 kg)	< 55.3	55.3	56	58	58 to 78							
	MTOW (1000 kg)	–	47	50	58	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 47	47	48	50	52	54	56	58	60	62	64	66
	V2 (kt IAS)	123	123	124	127	129	132	134	136	139	141	143	146
	VR (kt IAS)	118	118	119	122	124	127	129	131	134	136	138	141
	V1 (kt IAS)	114	114	114	114	114	114	114	117	119	121	124	126
		128	130	133	135	137	139	141	143	145	147	150	152

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 55.3	55.3	56	57.3	57.3 to 78							
	MTOW (1000 kg)	–	47.3	50	57.3	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 47.3	47.3	48	50	52	54	56	57.3	58	60	62	64
	V2 (kt IAS)	123	123	124	126	129	131	133	135	136	138	141	143
	VR (kt IAS)	118	118	119	121	124	126	128	130	131	133	136	138
	V1 (kt IAS)	113	113	113	113	113	113	113	114	114	116	119	121
		123	125	128	130	132	134	136	138	140	142	145	147

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)											
With clearway	15.5	14.9	12.2	9.6	16.4	15.6	14.3	17.3	17.3	16.4	
Without clearway	13.3	13.3	11.2	8.7	13.9	13.9	13.4	14.1	15.1	15.3	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<49.8	49.8	50	51	51 to 78													
	MTOW (1000 kg)	–	46	47	51	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	< 46	46	48	50	51	52	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	126	129	130	131	134	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	122	122	125	128	129	130	133	135	138	140	142	145	147	149	152	154	156	158	160
V1 (kt IAS)	116	116	116	116	116	117	120	122	125	127	129	132	134	136	139	141	143	145	147

C O N F 2	CORRECTED WEIGHT (1000 kg)	<51.5	51.5	52	52.7	52.7 to 78													
	MTOW (1000 kg)	–	47	49	52.7	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	< 47	47	48	50	52	52.7	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	124	127	129	130	132	134	136	139	141	143	146	148	150	152	155	157	158
VR (kt IAS)	119	119	120	123	125	126	128	130	132	135	137	139	142	144	146	148	151	153	154
V1 (kt IAS)	114	114	114	114	114	116	118	120	123	125	127	130	132	134	136	139	141	142	

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 51.7	51.7	52	53	53 to 78													
	MTOW (1000 kg)	–	47.3	49	53	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	< 47.3	47.3	48	50	52	53	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	124	126	129	130	131	133	136	138	141	143	145	147	150	152	154	156	158
VR (kt IAS)	119	119	120	122	125	126	127	129	132	134	137	139	141	143	146	148	150	152	154
V1 (kt IAS)	113	113	113	113	113	114	116	118	120	123	125	127	130	132	134	136	139	141	

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

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

R

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2				CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)	With clearway	11.8	10.9	8.7	6.4	12.9	11.8	10.2	14.6	13.7	12.1	
	Without clearway	9.7	9.7	7.7	5.5	10.6	10.6	9.4	11.9	11.9	11.0	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<53.2	53.2	54	55	55 to 78													
	MTOW (1000 kg)	–	46.7	51	55	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	52	54	55	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	126	129	131	134	135	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	122	122	124	127	129	132	133	134	137	139	141	144	146	148	151	153	155	157	159
V1 (kt IAS)	116	116	116	116	116	116	116	117	120	122	124	127	129	131	134	136	138	140	142

C O N F 2	CORRECTED WEIGHT (1000 kg)	<54.8	54.8	56	57	57 to 78												
	MTOW (1000 kg)	–	48	53	57	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	57	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	127	129	132	134	135	136	139	141	143	146	148	150	152	155	157	158
VR (kt IAS)	119	119	122	124	127	129	130	131	134	136	138	141	143	145	147	150	152	153
V1 (kt IAS)	114	114	114	114	114	114	114	115	118	120	122	125	127	129	131	134	136	137

C O N F 3	CORRECTED WEIGHT (1000 kg)	<55.5	55.5	56	57.3	57.3 to 78												
	MTOW (1000 kg)	–	48	50	57.3	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	57.3	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	126	129	131	133	135	136	138	141	143	145	147	150	152	154	156	158
VR (kt IAS)	119	119	121	124	126	128	130	131	133	136	138	140	142	145	147	149	151	153
V1 (kt IAS)	114	114	114	114	114	114	114	115	117	120	122	124	126	129	131	133	135	137

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

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

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500
△WEIGHT (1000 kg)											
With clearway	15.2	14.3	11.9	9.2	16.0	14.9	13.9	18.9	16.4	15.7	
Without cleaway	13.1	13.1	10.9	8.3	13.7	13.7	13.1	15.0	14.6	14.6	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<49.4	49.4	50	50 to 78								
	MTOW (1000 kg)	—	46.7	50	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	52	54	56	58	60	62	64	66
V2 (kt IAS)	124	124	126	129	131	134	136	139	141	143	146	148	150
VR (kt IAS)	123	123	125	128	130	133	135	138	140	142	145	147	149
V1 (kt IAS)	116	116	116	116	118	121	123	126	128	130	133	135	137

C O N F 2	CORRECTED WEIGHT (1000 kg)	<51	51	52	52 to 78								
	MTOW (1000 kg)	—	48	52	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	58	60	62	64	66	68
V2 (kt IAS)	124	124	127	129	132	134	136	139	141	143	146	148	150
VR (kt IAS)	120	120	123	125	128	130	132	135	137	139	142	144	146
V1 (kt IAS)	114	114	114	114	117	119	121	124	126	128	131	133	137

C O N F 3	CORRECTED WEIGHT (1000 kg)	<51.8	51.8	52	53	53 to 78								
	MTOW (1000 kg)	—	48	49	53	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	53	54	56	58	60	62	64	66	68
V2 (kt IAS)	124	124	126	129	130	131	133	136	138	141	143	145	147	150
VR (kt IAS)	120	120	122	125	126	127	129	132	134	137	139	141	143	146
V1 (kt IAS)	114	114	114	114	114	115	117	120	122	125	127	129	131	134

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 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above	
△WEIGHT (1000 kg)												
With clearway	11.1	8.3		6.6		10.9	8.1	6.0	10.6	8.5	6.2	
Without clearway	10.0	7.8		6.2		9.3	7.2	5.5	9.1	7.6	6.1	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<45.5	45.5	46	46.7	46.7 to 68											
	MTOW (1000 kg)	–	42	44	46.7	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<42	42	44	46	46.7	48	50	52	54	56	58	60	62	64	66	68
	V2 (kt IAS)	115	115	118	121	122	124	126	129	132	134	137	139	141	144	145	147
	VR (kt IAS)	112	112	115	118	119	121	123	126	129	131	134	136	138	141	142	144
	V1 (kt IAS)	111	111	111	111	111	113	115	118	121	123	126	128	130	133	134	136

C O N F 2	CORRECTED WEIGHT (1000 kg)	<51	51	52	53	53 to 68											
	MTOW (1000 kg)	–	46	50	53	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	53	54	56	58	60	62	64	66	68		
	V2 (kt IAS)	115	115	118	120	123	124	125	127	130	132	134	136	138	140		
	VR (kt IAS)	111	111	114	116	119	120	121	123	126	128	130	132	134	136		
	V1 (kt IAS)	110	110	110	110	110	110	111	113	116	118	120	122	124	126		

C O N F 3	CORRECTED WEIGHT (1000 kg)	<53.1	53.1	54	56	56 to 68											
	MTOW (1000 kg)	–	47.3	50	56	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<47.3	47.3	48	50	52	54	56	58	60	62	64	66	68			
	V2 (kt IAS)	116	116	117	119	122	124	126	129	131	133	135	137	139			
	VR (kt IAS)	111	111	112	114	117	119	121	124	126	128	130	132	134			
	V1 (kt IAS)	110	110	110	110	110	110	110	113	115	117	119	121	123			

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 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)									
With clearway	14.6	16.8	18.7	14.4	11.2	12.8	14.6	11.9	10.7
Without clearway	13.5	16.3	18.3	12.8	10.3	12.3	13.1	11.0	10.6

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<42	42	42 to 68											
	MTOW (1000 kg)	–	42	EQUAL TO CORRECTED WEIGHT											
	ACTUAL WEIGHT (1000 kg)	<42	42	44	46	48	50	52	54	56	58	60	62	64	66
V2 (kt IAS)	115	115	118	121	124	126	129	132	134	137	139	141	144	145	147
VR (kt IAS)	113	113	116	119	122	124	127	130	132	135	137	139	142	143	145
V1 (kt IAS)	111	111	114	117	120	122	125	128	130	133	135	137	140	141	143

C O N F 2	CORRECTED WEIGHT (1000 kg)	<46.5	46.5	46.7	46.7 to 68									
	MTOW (1000 kg)	–	46	46.7	EQUAL TO CORRECTED WEIGHT									
	ACTUAL WEIGHT (1000 kg)	<46	46	46.7	48	50	52	54	56	58	60	62	64	66
V2 (kt IAS)	115	115	116	118	120	123	125	127	130	132	134	136	138	140
VR (kt IAS)	112	112	113	115	117	120	122	124	127	129	131	133	135	137
V1 (kt IAS)	110	110	110	112	114	117	119	121	124	126	128	130	132	134

C O N F 3	CORRECTED WEIGHT (1000 kg)	<49.1	49.1	50	50 to 68								
	MTOW (1000 kg)	–	47.3	50	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<47.3	47.3	48	50	52	54	56	58	60	62	64	66
V2 (kt IAS)	116	116	117	119	122	124	126	129	131	133	135	137	139
VR (kt IAS)	112	112	113	115	118	120	122	125	127	129	131	133	135
V1 (kt IAS)	110	110	110	112	114	117	119	121	124	126	128	130	132

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	13.3	9.2	6.9		6.3		15.7	12.7	10.2	15.6	13.5	11.8
Without clearway	13.3	9.2	6.9		6.3		14.4	12.7	10.2	14.6	12.5	11.8

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<48.5	48.5	49.3	49.3 to 76															
		MTOW (1000 kg)	–	44.7	49.3	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	49.3	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	121	123	126	128	129	131	134	136	138	140	142	144	147	149	151	154	156	157
	VR (kt IAS)	117	117	119	122	124	125	127	130	132	134	136	138	140	143	145	147	150	152	153
	V1 (kt IAS)	111	111	111	111	111	112	114	117	119	121	123	125	127	130	132	134	137	139	140

C O N F 2	CORRECTED WEIGHT (1000 kg)	<49.4	49.4	50	50.7	50.7 to 76														
		MTOW (1000 kg)	–	44.7	47	50.7	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	50	50.7	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	121	123	126	128	129	131	133	135	137	139	141	144	146	148	151	153	155	157
	VR (kt IAS)	117	117	119	122	124	125	127	129	131	133	135	137	140	142	144	147	149	151	153
	V1 (kt IAS)	111	111	111	111	111	113	115	117	119	121	123	126	128	130	133	135	137	139	

C O N F 3	CORRECTED WEIGHT (1000 kg)	<50.9	50.9	52	52 to 76													
		MTOW (1000 kg)	–	46	52	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	V2 (kt IAS)	121	121	124	126	129	131	133	135	137	139	142	144	146	148	151	153	154
	VR (kt IAS)	118	118	121	123	126	128	130	132	134	136	139	141	143	145	148	150	151
	V1 (kt IAS)	111	111	111	111	111	113	115	117	119	121	124	126	128	130	133	135	136

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)											
With clearway	16.1	15.6	14.4	12.3	18.6	17.0	15.6	18.6	17.2	16.7	16.7
Without clearway	16.1	15.6	14.4	12.3	17.3	17.0	15.6	17.6	16.7	16.7	16.7

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

C O N F 1	CORRECTED WEIGHT (1000 kg)	<45.2	45.2	45.3	45.3 to 76														
	MTOW (1000 kg)	–	44.7	45.3	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	45.3	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
V2 (kt IAS)	121	121	122	123	126	129	131	134	136	138	140	142	144	147	149	151	154	156	157
VR (kt IAS)	117	117	118	119	122	125	127	130	132	134	136	138	140	143	145	147	150	152	153
V1 (kt IAS)	111	111	111	112	115	118	120	123	125	127	129	131	133	136	138	140	143	145	146

C O N F 2	CORRECTED WEIGHT (1000 kg)	<45.2	45.2	45.3	45.3 to 76														
	MTOW (1000 kg)	–	44.7	45.3	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	45.3	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
V2 (kt IAS)	121	121	122	123	126	128	131	133	135	137	139	141	144	146	148	151	153	155	157
VR (kt IAS)	118	118	119	120	123	125	128	130	132	134	136	138	141	143	145	148	150	152	154
V1 (kt IAS)	111	111	111	112	115	117	120	122	124	126	128	130	133	135	137	140	142	144	146

C O N F 3	CORRECTED WEIGHT (1000 kg)	<47.1	47.1	47.3	47.3 to 76													
	MTOW (1000 kg)	–	46	47.3	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<46	46	47.3	48	50	52	54	56	58	60	62	64	66	68	70	72	74
V2 (kt IAS)	121	121	123	124	126	129	131	133	135	137	139	142	144	146	148	151	153	154
VR (kt IAS)	118	118	120	121	123	126	128	130	132	134	136	139	141	143	145	148	150	151
V1 (kt IAS)	111	111	111	112	114	117	119	121	123	125	127	130	132	134	136	139	141	142

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	12.9	12.3	9.6		7.1		14.1	13.3	12.0	15.6	15.0	14.2
Without clearway	10.7	10.7	8.6		6.2		11.6	11.6	11.1	12.8	12.8	13.1

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	< 52	52	53.3	53.3 to 78														
	MTOW (1000 kg)	–	46	53.3	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	< 46	46	48	50	52	53.3	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	126	129	130	133	134	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	121	121	124	127	129	131	132	134	137	139	141	144	146	148	151	153	155	157	159
V1 (kt IAS)	116	116	116	116	116	116	117	119	122	124	126	129	131	133	136	138	140	142	144

C O N F 2	CORRECTED WEIGHT (1000 kg)	< 53.3	53.3	54	55	55 to 78												
	MTOW (1000 kg)	–	47	51	55	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	< 47	47	48	50	54	55	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	124	127	132	133	134	136	139	141	143	146	148	150	152	155	157	158
VR (kt IAS)	119	119	120	123	128	129	130	132	135	137	139	142	144	146	148	151	153	154
V1 (kt IAS)	114	114	114	114	114	114	115	117	120	122	124	127	129	131	133	136	138	139

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 53.8	53.8	54	56	56 to 78												
	MTOW (1000 kg)	–	47.3	48	56	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	< 47.3	47.3	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	124	126	129	131	133	136	138	141	143	145	147	150	152	154	156	158
VR (kt IAS)	119	119	120	122	125	127	129	132	134	137	139	141	143	146	148	150	152	154
V1 (kt IAS)	113	113	113	113	113	113	113	116	118	121	123	125	127	130	132	134	136	138

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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)											
With clearway	18.8	18.2	16.3	14.7	17.6	17.6	17.2	19.0	18.4	18.2	
Without clearway	16.6	16.6	15.3	13.8	14.5	15.9	16.3	16.2	16.2	17.1	

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

C O N F 1	CORRECTED WEIGHT (1000 kg)	<47.1	47.1	47.3	47.3 to 78							
	MTOW (1000 kg)	–	46	47.3	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 46	46	47.3	48	50	52	54	56	58	60	62
V2 (kt IAS)	123	123	125	126	129	131	135	136	139	141	143	146
VR (kt IAS)	122	122	124	125	128	130	133	135	138	140	142	145
V1 (kt IAS)	116	116	116	117	120	122	125	127	130	132	134	137

C O N F 2	CORRECTED WEIGHT (1000 kg)	<48.4	48.4	48.7	48.7 to 78							
	MTOW (1000 kg)	–	47	48.7	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 47	47	48	50	52	54	56	58	60	62	64
V2 (kt IAS)	123	123	124	127	129	132	134	136	139	141	143	146
VR (kt IAS)	120	120	121	124	126	129	131	133	136	138	140	143
V1 (kt IAS)	114	114	114	116	118	121	123	125	128	130	132	135

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 48.6	48.6	49	49 to 78							
	MTOW (1000 kg)	–	47.3	49	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	< 47.3	47.3	48	49	50	52	54	56	58	60	62
V2 (kt IAS)	123	123	124	125	126	129	131	133	136	138	141	143
VR (kt IAS)	120	120	121	122	123	126	128	130	133	135	138	140
V1 (kt IAS)	113	113	113	113	114	117	119	121	124	126	129	131

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

- Determine maximum takeoff weight on dry runway.

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

R

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2				CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	12.2	10.7	8.5	6.4	13.4	12.3	10.7	14.0	14.0	12.2	13.0	
Without clearway	10.1	9.5	7.5	5.5	11.1	11.1	9.9	12.2	12.2	11.9		

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<49.9	49.9	50	51	51 to 78													
	MTOW (1000 kg)	–	46.7	47	51	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	51	52	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	126	129	130	131	134	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	122	122	124	127	128	129	132	134	137	139	141	144	146	148	151	153	155	157	159
V1 (kt IAS)	116	116	116	116	116	117	120	122	125	127	129	132	134	136	139	141	143	145	147

C O N F 2	CORRECTED WEIGHT (1000 kg)	<52.4	52.4	53.3	53.3 to 78													
	MTOW (1000 kg)	–	48	53.3	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	53.3	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	127	129	131	132	134	136	139	141	143	146	148	150	152	155	157	158
VR (kt IAS)	119	119	122	124	126	127	129	131	134	136	138	141	143	145	147	150	152	153
V1 (kt IAS)	114	114	114	114	114	115	117	119	122	124	126	129	131	133	135	138	140	141

C O N F 3	CORRECTED WEIGHT (1000 kg)	<53.3	53.3	54	55	55 to 78												
	MTOW (1000 kg)	–	48	51	55	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	55	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	126	129	131	132	133	136	138	141	143	145	147	150	152	154	156	158
VR (kt IAS)	120	120	122	125	127	128	129	132	134	137	139	141	143	146	148	150	152	154
V1 (kt IAS)	114	114	114	114	114	115	117	118	120	123	125	127	129	132	134	136	138	140

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

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

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500
△WEIGHT (1000 kg)											
With clearway	16.8	15.9	14.5	13.0	17.4	16.3	15.9	19.0	17.3	17.3	
Without clearway	14.7	14.7	13.5	12.1	15.1	15.1	15.1	16.6	16.2	16.2	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<47	47	47 to 78															
		MTOW (1000 kg)	—	47	EQUAL TO CORRECTED WEIGHT														
C O N F 1 +	ACTUAL WEIGHT (1000 kg)	<47	47	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	V2 (kt IAS)	124	124	126	129	131	134	136	139	141	143	146	148	150	153	155	157	159	161
	VR (kt IAS)	123	123	125	128	130	133	135	138	140	142	145	147	149	152	154	156	158	160
	V1 (kt IAS)	118	118	120	123	125	128	130	133	135	137	140	142	144	147	149	151	153	155

C O N F 2	CORRECTED WEIGHT (1000 kg)	<48	48	48 to 78														
		MTOW (1000 kg)	—	48	EQUAL TO CORRECTED WEIGHT													
C O N F 2	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	V2 (kt IAS)	124	124	127	129	132	134	136	139	141	143	146	148	150	152	155	157	158
	VR (kt IAS)	121	121	124	126	129	131	133	136	138	140	143	145	147	149	152	154	155
	V1 (kt IAS)	115	115	118	120	123	125	127	130	132	134	137	139	141	143	146	148	149

C O N F 3	CORRECTED WEIGHT (1000 kg)	<48	48	48 to 78														
		MTOW (1000 kg)	—	48	EQUAL TO CORRECTED WEIGHT													
C O N F 3	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	V2 (kt IAS)	124	124	126	129	131	133	136	138	141	143	145	147	150	152	154	156	158
	VR (kt IAS)	121	121	123	126	128	130	133	135	138	140	142	144	147	149	151	153	155
	V1 (kt IAS)	114	114	116	119	121	123	126	128	131	133	135	137	140	142	144	146	148

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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 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above	
△WEIGHT (1000 kg)												
With clearway	5.6	5.6	5.6	5.6	4.9	4.9	4.9	6.4	6.1	2.9		
Without clearway	5.6	5.6	5.6	4.9	4.9	4.9	4.9	4.9	3.2	2.8		

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<47.5	47.5	48	50	50 to 68										
	MTOW (1000 kg)	–	42	44	50	EQUAL TO CORRECTED WEIGHT										
	ACTUAL WEIGHT (1000 kg)	<42	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	V2 (kt IAS)	115	115	118	121	124	126	129	132	134	137	139	141	144	145	147
	VR (kt IAS)	111	111	114	117	120	122	125	128	130	133	135	137	140	141	143
	V1 (kt IAS)	111	111	111	111	111	111	114	117	119	122	124	126	129	130	132

C O N F 2	CORRECTED WEIGHT (1000 kg)	<52	52	52	54	55	55 to 68								
	MTOW (1000 kg)	–	46	46	52	55	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	54	55	56	58	60	62	64	66	68
	V2 (kt IAS)	115	115	118	120	123	125	126	127	130	132	134	136	138	140
	VR (kt IAS)	110	110	113	115	118	120	121	122	125	127	129	131	133	135
	V1 (kt IAS)	110	110	110	110	110	110	111	114	116	118	120	122	124	

C O N F 3	CORRECTED WEIGHT (1000 kg)	<54.4	54.4	56	57.3	57.3 to 68									
	MTOW (1000 kg)	–	47.3	52	57.3	EQUAL TO CORRECTED WEIGHT									
	ACTUAL WEIGHT (1000 kg)	<47.3	47.3	48	50	52	54	56	57.3	58	60	62	64	66	68
	V2 (kt IAS)	116	116	117	119	122	124	126	128	129	131	133	135	137	139
	VR (kt IAS)	110	110	111	113	116	118	120	122	123	125	127	129	131	133
	V1 (kt IAS)	110	110	110	110	110	110	110	111	114	116	117	119	121	

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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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	7.2	6.3	6.3	6.3	6.3	11.7	6.9	4.7	12.7	10.3	6.4	
Without clearway	7.2	6.3	6.3	6.3	6.3	10.4	6.9	4.7	11.7	9.3	6.4	

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<49	49	50	50 to 76								
		–	44.7	50	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	50	52	54	56	58	60	62	64
	V2 (kt IAS)	121	121	123	126	129	131	134	136	138	140	142	144
	VR (kt IAS)	116	116	118	121	124	126	129	131	133	135	137	139
	V1 (kt IAS)	111	111	111	111	111	113	116	118	120	122	124	126

C O N F 2	CORRECTED WEIGHT (1000 kg)	<50.1	50.1	51.3	51.3 to 76								
		–	44.7	51.3	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	46	48	50	51.3	52	54	56	58	60	62
	V2 (kt IAS)	121	121	123	126	128	130	131	133	135	137	139	141
	VR (kt IAS)	117	117	119	122	124	126	127	129	131	133	135	137
	V1 (kt IAS)	111	111	111	111	111	111	112	114	116	118	120	122

C O N F 3	CORRECTED WEIGHT (1000 kg)	<51.5	51.5	52	53	53 to 76								
		–	46	49	53	EQUAL TO CORRECTED WEIGHT								
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	53	54	56	58	60	62	64	66
	V2 (kt IAS)	121	121	124	126	129	130	131	133	135	137	139	142	144
	VR (kt IAS)	117	117	120	122	125	126	127	129	131	133	135	138	140
	V1 (kt IAS)	111	111	111	111	111	111	112	114	116	118	120	123	125

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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	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	7.7	7.1	6.5	6.4	9.5	8.1	5.8	11.9	10.9	8.9	8.7	8.9
Without clearway	5.5	5.5	5.5	5.5	7.0	6.4	4.9	9.1	8.7	7.8		

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

C O N F 1	CORRECTED WEIGHT (1000 kg)	< 52	52	53.3	53.3 to 78														
	MTOW (1000 kg)	–	46	53.3	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	< 46	46	48	50	52	53.3	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	126	129	131	133	134	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	121	121	124	127	129	131	132	134	137	139	141	144	146	148	151	153	155	157	159
V1 (kt IAS)	116	116	116	116	116	116	117	119	122	124	126	129	131	133	136	138	140	142	144

C O N F 2	CORRECTED WEIGHT (1000 kg)	< 54	54	56	56 to 78												
	MTOW (1000 kg)	–	48	56	EQUAL TO CORRECTED WEIGHT												
	ACTUAL WEIGHT (1000 kg)	< 48	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	124	124	127	129	132	134	136	139	141	143	146	148	150	152	155	157	158
VR (kt IAS)	118	118	121	123	126	128	130	133	135	137	140	142	144	146	149	151	152
V1 (kt IAS)	114	114	114	114	114	114	116	119	121	123	126	128	130	132	135	137	138

C O N F 3	CORRECTED WEIGHT (1000 kg)	< 55.3	55.3	56	57.3	57.3 to 78													
	MTOW (1000 kg)	–	47.3	50	57.3	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	< 47.3	47.3	48	50	52	54	56	57.3	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	123	123	124	126	129	131	133	135	136	138	141	143	145	147	150	152	154	156	158
VR (kt IAS)	119	119	120	122	125	127	129	131	132	134	137	139	141	143	146	148	150	152	154
V1 (kt IAS)	113	113	113	113	113	113	113	113	114	116	119	121	123	125	128	130	132	134	136

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TAKEOFF FROM A COMPACTED SNOW COVERED RUNWAY

- Determine maximum takeoff weight on dry runway.

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

R

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2				CONF 3			
	RUNWAY LENGTH (m) (ft)		2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)												
With clearway	7.6	7.4	7.4	6.4	9.1	8.7	4.9	11.9	8.5	7.7		
Without clearway	5.5	5.5	5.5	5.5	6.8	5.7	4.1	9.5	7.9	6.6		

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

C O N F 1 +	CORRECTED WEIGHT (1000 kg)	<51.4	51.4	52	52.7	52.7 to 78							
	MTOW (1000 kg)	–	46.7	49	52.7	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	52	52.7	54	56	58	60	62	64
V2 (kt IAS)	124	124	126	129	131	132	134	136	139	141	143	146	148
VR (kt IAS)	122	122	124	127	129	130	132	134	137	139	141	144	146
V1 (kt IAS)	116	116	116	116	116	116	118	120	123	125	127	130	132
	68	70	72	74	76	78							

C O N F 2	CORRECTED WEIGHT (1000 kg)	<53.5	53.5	54	55	55 to 78							
	MTOW (1000 kg)	–	48	51	55	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	55	56	58	60	62	64	66
V2 (kt IAS)	124	124	127	129	132	133	134	136	139	141	143	146	148
VR (kt IAS)	119	119	122	124	127	128	129	131	134	136	138	141	143
V1 (kt IAS)	114	114	114	114	114	114	115	117	120	122	124	127	129
	68	70	72	74	76	78							

C O N F 3	CORRECTED WEIGHT (1000 kg)	<54.8	54.8	56	56.7	56.7 to 78							
	MTOW (1000 kg)	–	48	53	56.7	EQUAL TO CORRECTED WEIGHT							
	ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	56.7	58	60	62	64	66
V2 (kt IAS)	124	124	126	129	131	133	134	136	138	141	143	145	147
VR (kt IAS)	120	120	122	125	127	129	130	132	134	137	139	141	143
V1 (kt IAS)	114	114	114	114	114	114	114	116	118	121	123	125	127
	68	70	72	74	76	78							

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SPRAY PATTERN

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

CROSSWIND

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

R

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

* This is the maximum crosswind demonstrated for dry and wet runway.

** Equivalent runway condition (only valid for maximum crosswind 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

R

TAXIING

— FOLLOWING TAXIING PROCEDURES CONSIDER

- Avoid high thrust settings.
- When taxiing on slippery surfaces, stay well behind preceding aircraft.
- Taxi at low speed. Note that antiskid does not operate at low taxi 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 contaminated with slush or snow :
 - Before takeoff keep flaps/slats retracted until reaching the holding point on the takeoff runway to avoid contaminating 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.
- When the mechanism is clean, use the following procedure to retract the flaps/slats before the aircraft electric network is de-energized :
 - * Set the YELLOW ELEC PUMP to ON
 - * Check that the BLUE ELEC PUMP is in the AUTO position
 - * Set the BLUE PUMP OVRD to ON
 - * Retract the FLAPS and monitor retraction on ECAM page.
 - * Select off the YELLOW ELEC PUMP and BLUE PUMP OVRD and resume with normal procedure.

Note : — On contaminated runways and taxiways, the radio altitude indications may fluctuate and auto call outs or GPWS warnings may be activated. Disregard them.

— During taxi on snowy runways, the radio altimeters may not compute any data and the ECAM warnings 'DUAL ENG FAILURE', 'ANTI ICE CAPT TAT FAULT', 'ANTI ICE F/O TAT FAULT', 'L/G SHOCK ABSORBER FAULT' may be triggered. Disregard these warnings.

SPRAY PATTERN

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

CROSSWIND

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

Reported braking action	Reported runway friction coefficient	Maximum crosswind (kt)		Equivalent runway condition **
		Takeoff	Landing	
Good	≥ 0.4	39 *	38.5 *	1
Good/medium	0.39 to 0.36	29	29	1
Medium	0.35 to 0.3	25		2/3
Medium/poor	0.29 to 0.26	20		2/3
Poor	≤ 0.25	15		3/4
Unreliable		5		4/5

* This is the maximum crosswind demonstrated (gusts included) for dry and wet runway.

** Equivalent runway condition (only valid for maximum crosswind 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

- Avoid high thrust settings.
- When taxiing on slippery surfaces, stay well behind preceding aircraft.
- Taxi at low speed. Note that antiskid does not operate at low taxi 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 contaminated with slush or snow :
 - Before takeoff keep flaps/slats retracted until reaching the holding point on the takeoff runway to avoid contaminating 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.
- When the mechanism is clean, use the following procedure to retract the flaps/slats before the aircraft electric network is de-energized :
 - * Set the YELLOW ELEC PUMP to ON
 - * Check that the BLUE ELEC PUMP is in the AUTO position
 - * Set the BLUE PUMP OVRD to ON
 - * Retract the FLAPS and monitor retraction on ECAM page.
 - * Select off the YELLOW ELEC PUMP and BLUE PUMP OVRD and resume with normal procedure.

- Note : — *On contaminated runways and taxiways, the radio altitude indications may fluctuate and auto call outs or GPWS warnings may be activated. Disregard them.*
- *During taxi on snowy runways, the radio altimeters may not compute any data and the ECAM warnings 'DUAL ENG FAILURE', 'ANTI ICE CAPT TAT FAULT', 'ANTI ICE F/O TAT FAULT', 'L/G SHOCK ABSORBER FAULT' may be triggered. Disregard these warnings.*

R **TAKEOFF**

- R – **FOLLOWING TAKEOFF PROCEDURES CONSIDER**
- For contaminated runways, select MAX TO.
 - Do not abort takeoff for minor deficiencies even at low speeds.
 - 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

- **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.
 - 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.
 - 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 = 30°C, no wind, CONF 1+F

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

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
30.0	67.3 3/4 144/44/49	68.5 3/4 148/48/52	69.7 4/4 149/49/54	70.6 4/4 151/51/55	71.3 4/4 151/51/56
40.0	66.9 3/4 143/43/47	68.0 3/4 146/46/51	69.2 4/4 148/48/52	70.1 4/4 150/50/54	70.9 3/4 152/52/56

Maximum TOW = 69700 kg, V1 = 149 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 3.

TAKEOFF CONFIGURATION	CONF 1+F			CONF 2			CONF 3		
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 AND ABOVE	2000 6500	2500 8000	3000 10000 AND ABOVE	1750 5000	2000 6500
FLEX TO TEMPERATURE DECREMENT (°C)	4	1	1	2	1	1	3	3	2
MAX TO WEIGHT DECREMENT (1000 kg) (1000 lb)	1.4 3.1	0.4 0.9	0.4 0.9	0.4 0.9	0.1 0.3	0.1 0.3	0.9 1.9	0.9 1.9	0.5 1.2
V1 DECREMENT (kt)	8	8	6	8	7	7	8	7	9
VR AND V2 DECREMENT (kt)	4	1	1	3	2	2	0	2	2

- Maximum takeoff weight correction :

MTOW = 69700 – 400 = 69300 kg, V1 = 149 – 8 = 141 kt, VR = 149 – 1 = 148 kt, V2 = 154 – 1 = 153 kt.

- Flex temperature correction :

Assuming an actual takeoff weight of 65700 kg and an initial flex temperature of 50°C
TOW = 65700 kg ⇒ Flex temperature = 50 – 1 = 49°C

V1 = 146 – 8 = 138 kt, VR = 146 – 1 = 145 kt, V2 = 149 – 1 = 148 kt.

Check the resulting speeds against the minimum speeds as per procedure 2.04.10 p2a.

R **TAKEOFF**

- R – **FOLLOWING TAKEOFF PROCEDURES CONSIDER**
- For contaminated runways, select MAX TO.
 - Do not abort takeoff for minor deficiencies even at low speeds.
 - 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

- **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.
 - 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.
 - 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 = 36°C, no wind, CONF 1+F

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

NFC5-02-0410-014-A203AA

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
34.0	68.1 3/4 147/47/50	69.1 3/4 150/50/53	70.2 4/4 151/51/54	70.8 4/4 152/52/55	71.6 4/4 152/52/55
36.0	68.0 3/4 147/47/50	69.0 3/4 150/50/52	70.1 4/4 151/51/54	70.7 4/4 152/52/55	71.5 4/4 152/52/55

Maximum TOW = 70100 kg, V1 = 151 kt, VR = 151 kt, V2 = 154 kt.

TAKEOFF PERFORMANCE ON WET RUNWAY

With no thrust reversers operating and assuming that no clearway was used to compute the dry RTOW chart, use the table from 2.04.10 p 3.

NFC5-02-0410-014-B203AA

TAKEOFF CONFIGURATION	1+F			2			3		
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 AND ABOVE	2000 6500	2500 8000	3000 10000 AND ABOVE	1750 5750	2000 6500
FLEX TO TEMPERATURE DECREMENT (°C)	4	4	3	3	4	8	1	3	8
MAX TO WEIGHT DECREMENT (1000 kg) (1000 lb)	1.5 3.4	1.3 2.9	1.3 2.9	1.0 2.3	1.4 3.1	3.1 6.9	0.3 0.7	0.9 2.0	3.3 7.3
V1 DECREMENT (kt)	15	15	15	15	15	14	14	14	14
VR AND V2 DECREMENT (kt)	4	5	6	3	4	10	2	2	11

- Maximum takeoff weight correction :

MTOW = 70100 – 1300 = 68800 kg, V1 = 151 – 15 = 136 kt, VR = 151 – 5 = 146 kt, V2 = 154 – 5 = 149 kt.

- Flex temperature correction :

Assuming an actual takeoff weight of 69000 kg and an initial flex temperature of 45°C.

TOW = 69000 kg ⇒ Flex temperature = 45 – 4 = 41°C

V1 = 149 – 15 = 134 kt, VR = 150 – 4 = 146 kt, V2 = 153 – 4 = 149 kt.

Check the resulting speeds against the minimum speeds as per procedure 2.04.10 p 2a.

R **TAKEOFF**

- R – **FOLLOWING TAKEOFF PROCEDURES CONSIDER**
- For contaminated runways, select MAX TO.
 - Do not abort takeoff for minor deficiencies even at low speeds.
 - 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

- **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.
 - 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.
 - 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 = 36°C, no wind, CONF 1+F

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

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
34.0	76.7 4/6 143/50/52	78.4 4/6 148/53/55	80.2 4/6 154/56/58	81.5 4/6 157/57/60	82.8 4/6 160/60/62
36.0	76.6 4/6 143/49/52	78.4 4/6 148/52/54	80.1 4/6 153/56/58	81.4 4/6 156/57/59	82.7 4/6 160/60/62

Maximum TOW = 80100 kg, V1 = 153 kt, VR = 156 kt, V2 = 158 kt.

TAKEOFF PERFORMANCE ON WET RUNWAY

With no thrust reversers operating and assuming that no clearway was used to compute the dry RTOW chart, use the table from 2.04.10 p 3.

TAKEOFF CONFIGURATION	CONF 1+F			CONF 2			CONF 3		
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
FLEX TO TEMPERATURE DECREMENT (°C)	11	3	3	9	8	8	7	5	5
MAX TO WEIGHT DECREMENT (1000 kg) (1000 lb)	3.2 7.1	0.8 1.8	0.8 1.8	2.4 5.3	2.6 5.8	2.6 5.8	2.3 5.1	1.5 3.4	1.5 3.4
V1 DECREMENT (kt)	16	16	16	15	15	13	14	13	15
VR AND V2 DECREMENT (kt)	3	3	3	2	4	8	1	1	4

- Maximum takeoff weight correction :

MTOW = 80100 – 800 = 79300 kg, V1 = 153 – 16 = 137 kt, VR = 156 – 3 = 153 kt, V2 = 158 – 3 = 155 kt.

- Flex temperature correction :

Assuming an actual takeoff weight of 78400 kg and an initial flex temperature of 47°C
TOW = 78400 kg ⇒ Flex temperature = 47 – 3 = 44°C

V1 = 152 – 16 = 136 kt, VR = 154 – 3 = 151 kt, V2 = 156 – 3 = 153 kt.

Check the resulting speeds against the minimum speeds as per procedure 2.04.10 p 2a.

R **TAKEOFF**

R – FOLLOWING TAKEOFF PROCEDURES CONSIDER

- For contaminated runways, select MAX TO.
- Do not abort takeoff for minor deficiencies even at low speeds.
- 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

– 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.
- 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.
- 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 = 36°C, no wind, CONF 1+F

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

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
34.0	76.7 4/6 143/50/52	78.4 4/6 148/53/55	80.2 4/6 154/56/58	81.5 4/6 157/57/60	82.8 4/6 160/60/62
36.0	76.6 4/6 143/49/52	78.4 4/6 148/52/54	80.1 4/6 153/56/58	81.4 4/6 156/57/59	82.7 4/6 160/60/62

Maximum TOW = 80100 kg, V1 = 153 kt, VR = 156 kt, V2 = 158 kt.

TAKEOFF PERFORMANCE ON WET RUNWAY

With no thrust reversers operating and assuming that no clearway was used to compute the dry RTOW chart, use the table from 2.04.10 p 3.

TAKEOFF CONFIGURATION	1+F			2			3		
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 AND ABOVE	2000 6500	2500 8000	3000 10000 AND ABOVE	1750 5750	2000 6500
FLEX TO TEMPERATURE DECREMENT (°C)	8	3	2	10	7	6	9	5	5
MAX TO WEIGHT DECREMENT (1000 kg) (1000 lb)	2.4 5.3	0.9 2.0	0.8 1.8	2.8 6.2	2.2 4.9	2.2 4.9	2.5 5.6	1.5 3.4	1.5 3.4
V1 DECREMENT (kt)	16	16	14	16	15	15	15	15	15
VR AND V2 DECREMENT (kt)	3	3	2	3	4	7	1	3	4

- Maximum takeoff weight correction :

MTOW = 80100 – 900 = 79200 kg, V1 = 153 – 16 = 137 kt, VR = 156 – 3 = 153 kt, V2 = 158 – 3 = 155 kt.

- Flex temperature correction :

R Assuming an actual takeoff weight of 75000 kg and an initial flex temperature of 53°C

R TOW = 75000 kg ⇒ Flex temperature = 53 – 3 = 50°C

R V1 = 152 – 16 = 136 kt, VR = 153 – 3 = 150 kt, V2 = 154 – 3 = 151 kt.

R Check the resulting speeds against the minimum speeds as per procedure 2.04.10 p 2b.

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH**Data**

Runway length : 3000 m (no clearway), OAT = 5°C, no wind, CONF 1 + F

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

NFC5-02-0410-015-A161AA

OAT °C	CONF 1 + F				
	TAILWIND - 10 kt	TAILWIND - 5 kt	WIND 0 kt	HEADWIND 10 kt	HEADWIND 20 kt
0.0	68.8 3/4 149/49/54	69.9 4/4 152/52/56	71.2 4/4 153/53/57	72.1 4/4 154/54/58	72.8 3/4 155/55/59
10.0	68.4 3/4 148/48/52	69.5 4/4 150/50/54	70.7 4/4 152/52/57	71.6 4/4 153/53/58	72.4 3/4 154/54/58

Maximum takeoff weight on dry runway = 70900 kg

- Determine a corrected weight (Refer to FCOM 2.04.10 p 8). As no clearway, use the correction displayed on the second line (without clearway).

NFC5-02-0410-015-B161AA

TAKEOFF CONFIGURATION	CONF 1 + F			CONF 2			CONF 3		
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500
△WEIGHT (1000 kg)									
With clearway	14.6	16.8	18.7	14.4	11.2	12.8	14.6	11.9	10.7
Without clearway	13.5	16.3	18.3	12.8	10.3	12.3	13.1	11.0	10.6

Corrected weight = 70900 – 16300 = 54600 kg

- Determine maximum takeoff weight and associated speeds :

NFC5-02-0410-015-C161AA

C O N F	CORRECTED WEIGHT (1000 kg)	< 42		42 to 68												
		—	42	EQUAL TO CORRECTED WEIGHT												
1 +	ACTUAL WEIGHT (1000 kg)	<42	42	44	46	48	50	52	54	56	58	60	62	64	66	68
V2 (kt IAS)	115	115	118	121	124	126	129	132	134	137	139	141	144	145	147	
VR (kt IAS)	113	113	116	119	122	124	127	130	132	135	137	139	142	143	145	
V1 (kt IAS)	111	111	114	117	120	122	125	128	130	133	135	137	140	141	143	

MTOW = 54600 kg

V1 = 129 kt, VR = 131 kt, V2 = 132 kt

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH**Data**

Runway length : 3000 m (no clearway), OAT = 5°C, no wind, CONF 1 + F

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

NFC5-02-0410-015-A203AA

OAT °C	CONF 1 + F				
	TAILWIND - 10 kt	TAILWIND - 5 kt	WIND 0 kt	HEADWIND 10 kt	HEADWIND 20 kt
0	69.7 152/52/55	3/4 153/53/56	70.7 154/54/56	4/4 155/55/58	71.7 155/55/58
10	69.3 152/52/55	3/4 152/52/55	70.3 153/53/56	4/4 154/54/57	71.3 155/55/58

Maximum takeoff weight on dry runway = 71500 kg

- Determine a corrected weight (Refer to FCOM 2.04.10 p 8). As no clearway use the correction displayed on the second line (without clearway).

NFC5-02-0410-015-B203AA

TAKEOFF CONFIGURATION	1 + F				2			3			
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)											
With clearway	16.1	15.6	14.4	12.3	18.6	17.0	15.6	18.6	17.2	16.7	
Without clearway	16.1	15.6	14.4	12.3	17.3	17.0	15.6	17.6	16.7	16.7	

Corrected weight = 71500 - 15600 = 55900 kg

- Determine maximum takeoff weight and associated speeds :

NFC5-02-0410-015-C203AA

C	CORRECTED WEIGHT (1000 kg)	<45.2	45.2	45.3	45.3 to 76															
O	MTOW (1000 kg)	—	44.7	45.3	EQUAL TO CORRECTED WEIGHT															
F	ACTUAL WEIGHT (1000 kg)	<44.7	44.7	45.3	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
V2 (kt IAS)	121	121	122	123	126	129	131	134	136	138	140	142	144	147	149	151	154	156	157	
VR (kt IAS)	117	117	118	119	122	125	127	130	132	134	136	138	140	143	145	147	150	152	153	
V1 (kt IAS)	111	111	111	112	115	118	120	123	125	127	129	131	133	136	138	140	143	145	146	

MTOW = 55900 kg

V1 = 124 kt, VR = 132 kt, V2 = 136 kt

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH**Data**

Runway length 3000 m (no clearway), OAT = 5°C, no wind, CONF 1 + F

- Determine maximum takeoff weight on dry runway (refer to FCOM 2.02.10 p 6)

NFC5-02-0410-015-A342AA

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
0.0	78.8 4/6 151/54/57	80.6 4/6 156/57/59	82.5 4/6 162/62/64	83.7 3/4 165/65/67	84.7 3/4 168/68/70
10.0	78.2 4/6 148/53/55	80.0 4/6 154/57/59	81.8 4/6 159/60/62	83.1 4/6 163/63/65	84.2 3/4 166/66/67

Maximum takeoff weight on dry runway = 80300 kg

- Determine a corrected weight (refer to FCOM 2.04.10 p 8). As no clearway, use the correction displayed on the second line (without clearway).

NFC5-02-0410-015-B342AA

TAKEOFF CONFIGURATION	CONF 1+F				CONF 2			CONF 3			
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△ WEIGHT (1000 kg)											
With clearway	18.8	18.2	16.3	14.7	17.6	17.6	17.2	19.0	18.4	18.2	
Without clearway	16.6	16.6	15.3	13.8	14.5	15.9	16.3	16.2	16.2	17.1	

Corrected weight = 80300 – 16600 = 63700 kg

- Determine maximum takeoff weight and associated speeds :

NFC5-02-0410-015-C342AA

C O N F	CORRECTED WEIGHT (1000 kg)	47.3 to 78																		
		EQUAL TO CORRECTED WEIGHT																		
1	ACTUAL WEIGHT (1000 kg)	<46	46	47.3	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	V2 (kt IAS)	123	123	125	126	129	131	134	136	139	141	143	146	148	150	153	155	157	159	161
	VR (kt IAS)	122	122	124	125	128	130	133	135	138	140	142	145	147	149	152	154	156	158	160
	V1 (kt IAS)	116	116	116	117	120	122	125	127	130	132	134	137	139	141	144	146	148	150	152

MTOW = 63700 kg

V1 = 136 kt, VR = 145 kt, V2 = 146 kt

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH**Data**

- R Runway length 3000 m (no clearway) , OAT = 5°C, 5 kt tailwind, CONF 1 + F
 – Determine maximum takeoff weight on dry runway (refer to FCOM 2.02.10 p 6)

NFC5-02-0410-015-A370AA

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
0.0	78.8 4/6 151/54/57	80.6 4/6 156/57/59	82.5 4/6 162/62/64	83.7 3/4 165/65/67	84.7 3/4 168/68/70
10.0	78.2 4/6 148/53/55	80.0 4/6 154/57/59	81.8 4/6 159/60/62	83.1 4/6 163/63/65	84.2 3/4 166/66/67

Maximum takeoff weight on dry runway = 80300 kg

- R – Determine a corrected weight (refer to FCOM 2.04.10 p 8). As no clearway, use the correction displayed on the second line (without clearway).

NFC5-02-0410-015-B370AA

TAKEOFF CONFIGURATION	CONF 1 + F			CONF 2			CONF 3				
	RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5700	2000 6500	2500 8000 and above
△WEIGHT (1000 kg)											
With clearway	16.8	15.9	14.5	13.0	17.4	16.3	15.9	19.0	17.3	17.3	
Without clearway	14.7	14.7	13.5	12.1	15.1	15.1	15.1	16.6	16.2	16.2	

Corrected weight = 80300 – 14700 = 65600 kg

- Determine maximum takeoff weight and associated speeds :

NFC5-02-0410-015-C370AA

CORRECTED WEIGHT (1000 kg)	<47		47 to 78															
	MTOW (1000 kg)	-	EQUAL TO CORRECTED WEIGHT															
ACTUAL WEIGHT (1000 kg)	<47	47	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	124	124	126	129	131	134	136	139	141	143	146	148	150	153	155	157	159	161
VR (kt IAS)	123	123	125	128	130	133	135	138	140	142	145	147	149	152	154	156	158	160
V1 (kt IAS)	118	118	120	123	125	128	130	133	135	137	140	142	144	147	149	151	153	155

MTOW = 65600 kg

V1 = 141 kt, VR = 147 kt, V2 = 148 kt

FERRY FLIGHT WITH NO SLATS

TO BE ISSUED LATER

GENERAL

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

OXYGEN REQUIREMENTS**CREW MEMBERS**

See FAR 121.329 or JAR-OPS 1.770

PASSENGERS

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

For flight at cabin pressure altitudes above 14000 feet, up to and including 15000 feet, there must be enough oxygen for 30 % of the passengers.

For flight at cabin pressure altitudes above 15000 feet, there must be enough oxygen for all passengers.

A318/A319/A320/A321 <small>FLIGHT CREW OPERATING MANUAL</small>	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 2
		SEQ 001	REV 20

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FLIGHT PLANNING AND EXECUTION**ALTITUDE**

Flight route planning should consider the above-stated restriction in cabin altitude. If cabin altitude exceeds 9550 ± 350 feet, the EXCESS CAB ALT warning on the ECAM will be activated. When above 14000 feet, the passenger oxygen masks will drop automatically. 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.

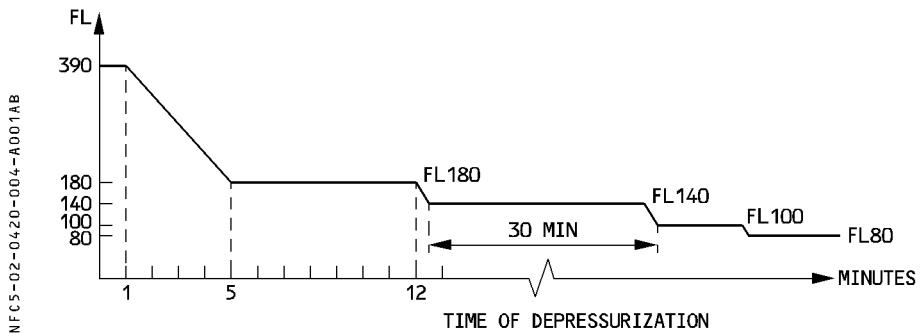
CLIMB AND DESCENT RATE

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 the event of depressurization, oxygen is supplied to passengers through an individual mask. The capacity of the units is such that the aircraft must descend and remain below the following profile.



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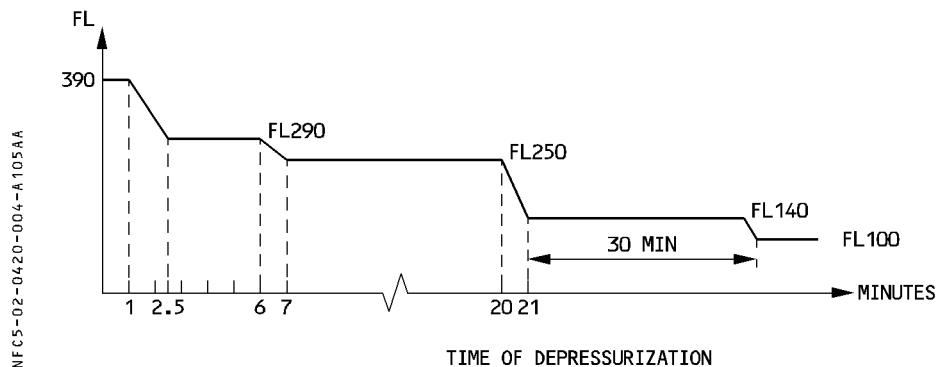
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SYSTEMS**FAILURE OCCURRING IN FLIGHT**

Apply the abnormal and emergency procedures required by ECAM.

FAILURE PRESENT AT DISPATCH

- If flight with both packs inoperative

- PACK 1 and 2 OFF
- RAM AIR ON

Note : If the «AVIONICS SMOKE» procedure has to be applied, the following flight time limitations have to be considered to protect the avionic equipment :
 At ISA + 40 : 0.5 hour
 At ISA + 30 : 1.5 hour
 At ISA + 20 : 4 hours
 At ISA + 10 and below : No limitation.

- (*) Between FL 80 and FL 150, oxygen must be provided for 2 % of the passengers. This is provided by the portable oxygen system. When it is no longer available, descend to FL 80. For performance at FL 80/250 knots : Use data for FL 100/LRC given in 3.05.15, and increase fuel consumption by 6 %.

- If both CAB PRESS systems are inoperative, or if there is structural damage :

- PACK 1 and 2 ON
- MODE SEL MAN
- V/S CTL AS RQRD
 Use 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 prevent the 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 120 kg or 260 lb (6 min)
- ISA temperature
- CG = 25 %
- Normal air conditioning
- Anti ice OFF

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

Note : For each degree Celcius above ISA temperature apply a correction of 0.01 (kg/°C/NM) or 0.022 (lb/°C/NM).

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R

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250 KT - CRUISE : LONG RANGE - DESCENT : 250KT
IMC PROCEDURE : 120 KG (6MIN)

FL 100

NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 25.0%		FUEL CONSUMED (KG) TIME (H.MIN)			
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)						
	50	55	60	65	70	75	80
220 0.55	1883 0.54	1955 0.54	2033 0.53	2119 0.53	2211 0.52	2306 0.50	2392 0.50
240 0.59	2025 0.58	2103 0.57	2187 0.57	2279 0.57	2378 0.55	2480 0.54	2571 0.53
260 1.04	2166 1.02	2251 1.01	2341 1.01	2440 1.00	2545 0.59	2653 0.57	2750 0.56
280 1.08	2307 1.07	2399 1.05	2495 1.05	2600 1.04	2711 1.03	2827 1.01	2928 0.59
300 1.13	2448 1.11	2546 1.11	2649 1.09	2760 1.08	2878 1.07	3000 1.04	3106 1.02
320 1.17	2589 1.15	2693 1.13	2802 1.13	2919 1.12	3044 1.10	3173 1.07	3284 1.06
340 1.21	2729 1.19	2840 1.17	2956 1.17	3079 1.16	3210 1.14	3345 1.11	3462 1.09
360 1.26	2870 1.24	2987 1.21	3109 1.21	3238 1.20	3376 1.18	3518 1.14	3640 1.12
380 1.30	3010 1.28	3133 1.26	3262 1.24	3397 1.22	3542 1.22	3690 1.18	3818 1.15
400 1.35	3150 1.32	3279 1.30	3414 1.30	3556 1.28	3707 1.25	3862 1.21	3995 1.19
420 1.39	3290 1.36	3426 1.34	3567 1.32	3714 1.32	3872 1.29	4034 1.25	4173 1.22
440 1.44	3429 1.40	3572 1.38	3719 1.36	3872 1.36	4037 1.33	4205 1.28	4350 1.25
460 1.48	3569 1.45	3717 1.42	3871 1.42	4031 1.39	4202 1.37	4376 1.32	4527 1.29
480 1.53	3708 1.49	3863 1.46	4023 1.46	4188 1.43	4367 1.41	4547 1.35	4704 1.32
500 1.57	3847 1.53	4008 1.50	4175 1.47	4346 1.47	4531 1.44	4718 1.39	4880 1.35
520 2.01	3986 1.57	4153 1.54	4326 1.51	4503 1.48	4695 1.48	4889 1.42	5057 1.38
540 2.06	4125 2.02	4298 1.58	4478 1.55	4661 1.52	4859 1.46	5059 1.42	5233 1.42
560 2.10	4264 2.06	4443 2.02	4629 1.59	4818 1.56	5023 1.49	5229 1.45	5410 1.45
580 2.15	4402 2.10	4588 2.06	4780 2.03	4974 1.59	5187 1.59	5399 1.53	5586 1.48
600 2.19	4541 2.15	4733 2.10	4931 2.10	5131 2.07	5350 2.03	5568 1.57	5762 1.52
620 2.24	4679 2.19	4877 2.14	5081 2.14	5288 2.11	5513 2.07	5738 2.00	5938 1.55
640 2.28	4817 2.23	5021 2.19	5232 2.19	5444 2.15	5676 2.11	5907 2.04	6113 1.58
660 2.33	4955 2.27	5165 2.27	5382 2.23	5600 2.19	5839 2.15	6076 2.07	6289 2.02
680 2.37	5092 2.32	5309 2.27	5532 2.23	5756 2.19	6001 2.19	6245 2.11	6464 2.05
700 2.42	5230 2.36	5452 2.31	5682 2.31	5912 2.27	6164 2.22	6413 2.15	6639 2.08
AIR CONDITIONING OFF Δ FUEL = - 1.5 %		ENGINE ANTI ICE ON Δ FUEL = + 3 %		TOTAL ANTI ICE ON Δ FUEL = + 6 %			

GROUND DISTANCE/AIR DISTANCE CONVERSION

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
40	27	30	35	40	48	59	76
60	41	46	52	60	71	88	115
80	54	61	69	80	95	117	153
100	68	76	86	100	119	146	191
120	81	91	104	120	143	176	229
140	95	106	121	140	166	205	267
160	108	121	138	160	190	234	305
180	122	137	155	180	214	264	344
200	135	152	173	200	238	293	382
220	149	167	190	220	261	322	420
240	163	182	207	240	285	352	458
260	176	197	224	260	309	381	496
280	190	213	242	280	333	410	534
300	203	228	259	300	357	439	573
320	217	243	276	320	380	469	611
340	230	258	293	340	404	498	649
360	244	273	311	360	428	527	687
380	257	288	328	380	452	557	725
400	271	304	345	400	475	586	763
420	285	319	362	420	499	615	802
440	298	334	380	440	523	645	840
460	312	349	397	460	547	674	878
480	325	364	414	480	571	703	916
500	339	380	432	500	594	732	954
520	352	395	449	520	618	762	992
540	366	410	466	540	642	791	1031
560	379	425	483	560	666	820	1069
580	393	440	501	580	689	850	1107
600	406	455	518	600	713	879	1145

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES

CLIMB : 250KT - CRUISE : LONG RANGE AT FL100 - DESCENT : 250KT

IMC PROCEDURE : 110 KG (6 MIN)

NORMAL AIR CONDITIONING		ISA		FUEL CONSUMED (KG)					
ANTI ICE OFF		CG=25.0%		TIME (H.MIN)					
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)								
	42	46	48	52	56	60	64	68	
220	1775 0.56	1820 0.56	1844 0.53	1885 0.53	1933 0.53	1989 0.53	2060 0.50	2119 0.50	
240	1910 1.01	1960 1.00	1986 0.57	2029 0.57	2081 0.57	2140 0.57	2218 0.54	2279 0.54	
260	2046 1.06	2099 1.05	2127 1.01	2174 1.02	2229 1.01	2291 1.01	2375 0.57	2439 0.57	
280	2181 1.10	2238 1.10	2269 1.06	2318 1.06	2376 1.05	2442 1.05	2533 1.00	2598 1.00	
300	2316 1.15	2377 1.14	2410 1.10	2462 1.10	2524 1.09	2593 1.09	2690 1.04	2758 1.04	
320	2451 1.19	2516 1.19	2551 1.14	2605 1.14	2671 1.13	2744 1.13	2847 1.07	2917 1.07	
340	2585 1.24	2654 1.23	2692 1.19	2749 1.18	2818 1.17	2895 1.17	3004 1.10	3077 1.10	
360	2720 1.29	2793 1.28	2832 1.23	2893 1.22	2965 1.21	3045 1.21	3161 1.14	3236 1.14	
380	2855 1.33	2931 1.33	2973 1.27	3036 1.26	3112 1.25	3196 1.25	3318 1.17	3395 1.17	
400	2989 1.38	3069 1.37	3113 1.32	3180 1.30	3259 1.29	3346 1.29	3475 1.20	3554 1.20	
420	3123 1.43	3207 1.42	3254 1.36	3323 1.34	3405 1.33	3496 1.33	3632 1.24	3713 1.24	
440	3258 1.47	3345 1.46	3394 1.41	3466 1.38	3552 1.37	3646 1.37	3789 1.27	3872 1.27	
460	3392 1.52	3483 1.51	3534 1.45	3610 1.42	3698 1.42	3796 1.41	3945 1.31	4031 1.31	
480	3526 1.57	3620 1.56	3673 1.50	3753 1.46	3844 1.46	3946 1.45	4102 1.34	4190 1.34	
500	3659 2.01	3758 2.00	3813 1.55	3896 1.50	3990 1.50	4095 1.49	4258 1.37	4348 1.37	
520	3793 2.06	3895 2.05	3952 1.59	4039 1.54	4136 1.54	4245 1.53	4415 1.41	4507 1.41	
540	3927 2.10	4032 2.10	4092 2.04	4181 1.58	4282 1.58	4394 1.57	4571 1.44	4665 1.44	
560	4060 2.15	4169 2.14	4231 2.09	4324 2.02	4428 2.02	4543 2.01	4727 1.47	4824 1.47	
580	4194 2.20	4306 2.19	4370 2.14	4467 2.06	4574 2.06	4692 2.05	4883 1.51	4982 1.51	
600	4327 2.24	4442 2.23	4509 2.19	4609 2.10	4719 2.10	4841 2.09	5039 1.54	5140 1.54	
620	4460 2.29	4579 2.28	4648 2.23	4752 2.14	4865 2.14	4989 2.13	5195 1.57	5298 1.57	
640	4593 2.34	4715 2.33	4786 2.28	4894 2.18	5010 2.18	5138 2.17	5351 2.01	5456 2.01	
660	4726 2.38	4851 2.37	4925 2.33	5036 2.23	5155 2.22	5286 2.21	5505 2.04	5615 2.04	
680	4859 2.43	4987 2.42	5063 2.39	5178 2.27	5300 2.26	5435 2.25	5656 2.08	5772 2.07	
CORRECTIONS		AIR CONDITIONNING OFF		ENGINE ANTI ICE ON		TOTAL ANTI ICE ON			
FUEL		- 2.5 %		+ 2.5 %		+ 6 %			

GROUND DISTANCE/AIR DISTANCE CONVERSION

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
40	23	27	32	40	52	75	134
60	35	41	49	60	78	113	202
80	47	54	65	80	104	150	269
100	59	68	81	100	131	188	336
120	70	82	97	120	157	226	403
140	82	95	113	140	183	263	470
160	94	109	130	160	209	301	538
180	106	123	146	180	235	339	605
200	117	136	162	200	261	376	672
220	129	150	178	220	287	414	739
240	141	163	194	240	313	451	806
260	153	177	211	260	339	489	874
280	164	191	227	280	366	527	941
300	176	204	243	300	392	564	1008
320	188	218	259	320	418	602	1075
340	200	232	275	340	444	639	1142
360	211	245	292	360	470	677	1210
380	223	259	308	380	496	715	1277
400	235	272	324	400	522	752	1344
420	247	286	340	420	548	790	1411
440	258	300	357	440	575	827	1479
460	270	313	373	460	601	865	1546
480	282	327	389	480	627	903	1613
500	294	341	405	500	653	940	1680
520	305	354	421	520	679	978	1747
540	317	368	438	540	705	1016	1815
560	329	381	454	560	731	1053	1882
580	341	395	470	580	757	1091	1949
600	352	409	486	600	783	1128	2016

R

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250 KT - CRUISE : LONG RANGE - DESCENT : 250KT
IMC PROCEDURE : 110 KG (6MIN)

FL 100

NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 25.0%		FUEL CONSUMED (KG) TIME (H.MIN)			
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)						
	45	50	55	60	65	70	75
220	1882 0.54	1936 0.54	1998 0.53	2058 0.53	2130 0.52	2203 0.51	2278 0.50
240	2028 0.58	2086 0.58	2152 0.57	2216 0.57	2293 0.56	2371 0.54	2451 0.53
260	2173 1.03	2235 1.02	2306 1.01	2374 1.01	2456 1.00	2539 0.58	2624 0.57
280	2318 1.07	2385 1.06	2459 1.05	2532 1.05	2619 1.04	2707 1.01	2796 1.00
300	2463 1.11	2534 1.10	2613 1.09	2690 1.09	2782 1.07	2875 1.05	2969 1.03
320	2608 1.15	2684 1.14	2766 1.13	2848 1.13	2945 1.11	3043 1.09	3141 1.07
340	2753 1.20	2833 1.18	2919 1.17	3005 1.17	3108 1.15	3211 1.12	3314 1.10
360	2898 1.24	2982 1.22	3073 1.21	3163 1.21	3270 1.19	3378 1.16	3486 1.13
380	3042 1.28	3131 1.27	3226 1.26	3320 1.25	3432 1.23	3545 1.19	3658 1.17
400	3187 1.33	3280 1.31	3379 1.30	3477 1.29	3594 1.27	3712 1.23	3830 1.20
420	3331 1.37	3429 1.35	3531 1.34	3634 1.33	3756 1.30	3879 1.26	4002 1.24
440	3475 1.41	3578 1.39	3684 1.38	3791 1.37	3918 1.34	4046 1.30	4174 1.27
460	3619 1.46	3726 1.43	3837 1.42	3947 1.40	4079 1.38	4212 1.34	4345 1.30
480	3763 1.50	3875 1.47	3989 1.46	4104 1.44	4241 1.42	4379 1.37	4516 1.34
500	3907 1.54	4023 1.51	4141 1.50	4260 1.48	4402 1.46	4545 1.41	4688 1.37
520	4050 1.59	4171 1.55	4294 1.54	4417 1.52	4563 1.50	4711 1.44	4859 1.40
540	4194 2.03	4319 2.00	4446 1.58	4573 1.56	4724 1.54	4877 1.48	5030 1.44
560	4337 2.07	4467 2.04	4598 2.02	4729 2.00	4884 1.57	5043 1.52	5201 1.47
580	4480 2.12	4615 2.08	4750 2.06	4885 2.04	5045 2.01	5208 1.55	5371 1.51
600	4623 2.16	4763 2.12	4901 2.10	5040 2.08	5205 2.05	5374 1.59	5542 1.54
620	4766 2.20	4910 2.16	5053 2.14	5196 2.12	5365 2.09	5539 2.03	5712 1.58
640	4909 2.25	5058 2.20	5204 2.18	5351 2.16	5525 2.13	5704 2.06	5882 2.01
660	5052 2.29	5205 2.25	5356 2.22	5507 2.20	5685 2.17	5869 2.10	6052 2.04
680	5194 2.33	5352 2.29	5507 2.26	5662 2.24	5845 2.21	6034 2.14	6222 2.08
700	5337 2.38	5500 2.33	5658 2.30	5817 2.28	6004 2.25	6199 2.17	6392 2.11
AIR CONDITIONING OFF Δ FUEL = - 1.5 %		ENGINE ANTI ICE ON Δ FUEL = + 3 %		TOTAL ANTI ICE ON Δ FUEL = + 6 %			

GROUND DISTANCE/AIR DISTANCE CONVERSION

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
40	27	30	34	40	48	59	77
60	41	45	52	60	71	88	115
80	54	61	69	80	95	117	153
100	68	76	86	100	119	147	192
120	81	91	103	120	143	176	230
140	95	106	121	140	167	206	268
160	108	121	138	160	190	235	307
180	122	136	155	180	214	264	345
200	135	152	172	200	238	294	384
220	149	167	190	220	262	323	422
240	162	182	207	240	286	352	460
260	176	197	224	260	309	382	499
280	189	212	241	280	333	411	537
300	203	227	259	300	357	441	575
320	216	243	276	320	381	470	614
340	230	258	293	340	405	499	652
360	243	273	310	360	428	529	690
380	257	288	328	380	452	558	729
400	271	303	345	400	476	587	767
420	284	318	362	420	500	617	805
440	298	334	379	440	524	646	844
460	311	349	397	460	547	675	882
480	325	364	414	480	571	705	920
500	338	379	431	500	595	734	959
520	352	394	448	520	619	764	997
540	365	409	466	540	642	793	1036
560	379	425	483	560	666	822	1074
580	392	440	500	580	690	852	1112
600	406	455	517	600	714	881	1151

GENERAL

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

LIMITATIONS

- Do not fly into expected icing conditions.
- Ditching with the landing gear down has not been demonstrated.
- R — Disregard FM fuel predictions. Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
- R — Do not use managed speed (except in approach) and CLB and DES autopilot modes.
- ALTITUDE ALERT is not available.
- The APU must run during the whole flight. APU GEN must be available.

PROCEDURES**PREFLIGHT**

- VMO/MMO with the landing gear down is 235 knots/M.60. In the avionics compartment, on 188 VU, the VMO-MMO switch must be set to the «L/G DOWN» position.
- The check of ELAC 2 standby power supply availability, in case of BLUE hydraulic pressure loss must be performed during cockpit preparation, if not already done by maintenance. This ensures that, if the crew forgets to reset the LGCIU 1C/B during approach in EMER ELEC configuration, ELAC 2 will be supplied by Battery 2, should the RAT stall during flare.

- **YELLOW ELEC PUMP** **ON**
- **PTU** **Check AUTO**
- **BLUE PUMP OVRD** **ON**
- **LGCIU 1 C/B (C09)** **PULL**
- **LGCIU/SYS 1/GND SPLY (Q34 if installed)** **PULL**
This simulates the L/G in retracted position.
 - Check that the "ELAC 2" indication is green on the ECAM F/CTL page.
- **ELAC 2/NORM/SPLY (R20 on rear panel)** **PULL**
 - Check that the ELAC 2 indication changes to amber.

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- R – **THS ACTR/MOT 1 (Q16 on rear panel)** **PULL**
 R This simulates the EMER ELEC configuration.
 R · Check that the ELAC 2 indication is again green for about 30 seconds, and that it then changes to amber.
- **BLUE ELEC PUMP OVRD** **OFF**
 This simulates a RAT stall in EMER ELEC configuration.
 · BLUE hydraulic system is depressurized.
 · Check ELAC 2 indication changes to green.
- **C/Bs** **RESET**
- Reset LGCIU 1 C/B : C09,
 Q34 (if installed)
 ELAC 2 C/B : R20
 THS ACTR/MOT 1 C/B : Q16
- **YELLOW ELEC PUMP** **OFF**

NORMAL PROCEDURES

● **After engine start :**

- **APU** **KEEP ON**
 Keep the APU running for the duration of the flight.

ABN AND EMER PROCEDURES

FLIGHT CONTROLS

Failures that would normally lead to ALTN law will, with the landing gear extended, degrade flight control laws down to DIRECT law.

ALL GENERATOR FAILURE

- **The aircraft is supplied by batteries only.**
 To recover the emergency generator

- **LGCIU 1 C/B (C09)** **PULL**
 – **EMER ELEC PWR** **MAN ON**

— **CAUTION** —
 Minimum speed is 180 knots instead of 140 knots given by ECAM.

GENERAL

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

LIMITATIONS

- Do not fly into expected icing conditions.
- Ditching with the landing gear down has not been demonstrated.
- R — Disregard FM fuel predictions. Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
- R — Do not use managed speed (except in approach) and CLB and DES autopilot modes.
- ALTITUDE ALERT is not available.

PROCEDURES**PREFLIGHT**

VMO/MMO with the landing gear down is 235 knots/M.60. In the avionics compartment, on 188 VU, the VMO-MMO switch must be set to the «L/G DOWN» position.

A318/A319/A320/A321 <small>FLIGHT CREW OPERATING MANUAL</small>	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 2
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ABN AND EMER PROCEDURES**FLIGHT CONTROLS**

Failure cases, which would normally lead to ALTN law, will degrade F/CTL laws down to DIRECT law, if the landing gear is extended.

FAILURE OF BOTH ENGINES

When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.

Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :

- If the APU is not available :
 - Attempt an APU start
 - If APU start is unsuccessful, a windmilling relight can be performed, as long as the speed is above 260 knots (corresponding N2 above 8.5 %).
In this case, increase the aircraft speed and disregard the VMO warning.
- If the APU is available : Perform an assisted relight, when below FL 200.
- Flight controls are in direct law. Use manual pitch trim, as necessary (not indicated on PFD, if APU GEN not available).
- In approach, set CONF 1 at or above 200 knots.
Do not select flaps/slats below 200 knots.

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FLIGHT CREW OPERATING MANUAL	FLIGHT WITH GEAR DOWN	SEQ 063	REV 38

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 tail wind is not recommended.

Penalties on takeoff performance affect second segment gradient condition, final takeoff condition and en-route 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.

Takeoff configuration	1 + F	2	3
Weight reduction	22 %	19 %	16 %

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.

● During deceleration (before reaching 200 kt) :

- LGCIU 1 C/B (C09) PUSH
Emergency generator will be deactivated.
Minimum speed is 140 knots.

ABN AND EMER PROCEDURES (CONT'D)

● In case of go-around, when above 200 knots :

- LGCIU 1 C/B (C09) PULL
- EMER ELEC PWR MAN ON

FAILURE OF BOTH ENGINES

- R When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.
- R Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :
- If APU is available : Perform an assisted relight when below FL 200.
 - If APU is not available
 - Do not attempt an APU start (APU start inhibited in this configuration).
 - Windmilling relight can be performed, as long as the speed is above 260 knots (corresponding N2 above 18%). In this case, increase aircraft speed and disregard VMO warning.
 - Flight controls are in direct laws.
Use manual pitch trim as necessary (not indicated on PFD, if APU GEN not available).
 - Do not use LGCIU 1 C/B.
 - In approach, set CONF 1 at or above 200 knots.
Do not select flaps/slats below 200 knots.

AVIONICS SMOKE

If smoke persists for more than 5 minutes, the LGCIU 1 C/B (C09 on 49 VU) must be pulled before RAT extension. Minimum speed is 180 knots (instead of 140 knots given by ECAM). During approach :

- GEN 2 ON
- EMER ELEC GEN 1 LINE ON
- LGCIU 1 C/B (C09 on 49 VU) PUSH

A318/A319/A320/A321	SPECIAL OPERATIONS	2.04.25	P 4
FLIGHT CREW OPERATING MANUAL	FLIGHT WITH GEAR DOWN	SEQ 370	REV 33

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 tail wind is not recommended.

Penalties on takeoff performance affect second segment gradient condition, final takeoff condition and en-route 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.

Takeoff configuration	1 + F	2	3
Weight reduction	22 %	18 %	18 %

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.

ABN AND EMER PROCEDURES**FLIGHT CONTROLS**

Failure cases, which would normally lead to ALTN law, will degrade F/CTL laws down to DIRECT law, if the landing gear is extended.

FAILURE OF BOTH ENGINES

- R When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.
- R Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :
 - If the APU is not available :
 - Attempt an APU start
 - If APU start is unsuccessful, a windmilling relight can be performed, as long as the speed is above 260 knots (corresponding N2 above 18%).
 - In this case, increase the aircraft speed and disregard the VMO warning.
 - If the APU is available : Perform an assisted relight, when below FL 200.
 - Flight controls are in direct law.
 - Use manual pitch trim, as necessary (not indicated on PFD, if APU GEN unavailable).
 - In approach, set CONF 1 at or above 200 knots.
 - Do not select flaps/slats below 200 knots.

A318/A319/A320/A321	SPECIAL OPERATIONS	2.04.25	P 4
FLIGHT CREW OPERATING MANUAL	FLIGHT WITH GEAR DOWN	SEQ 080	REV 22

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 tail wind is not recommended.

Penalties on takeoff performance affect second segment gradient condition, final takeoff condition and en-route 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.

Takeoff configuration	1 + F	2	3
Weight reduction	20 %	18 %	18 %

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.

ABN AND EMER PROCEDURES**FLIGHT CONTROLS**

Failure cases, which would normally lead to ALTN law, will degrade F/CTL laws down to DIRECT law, if the landing gear is extended.

FAILURE OF BOTH ENGINES

- R When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.
- R Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :
 - If the APU is not available :
 - Attempt an APU start
 - If APU start is unsuccessful, a windmilling relight can be performed, as long as the speed is above 260 knots (corresponding N2 above 18%).
In this case, increase the aircraft speed and disregard the VMO warning.
 - If the APU is available : Perform an assisted relight, when below FL 200.
 - Flight controls are in direct law.
Use manual pitch trim, as necessary (not indicated on PFD, if APU GEN unavailable).
 - In approach, set CONF 1 at or above 200 knots.
Do not select flaps/slats below 200 knots.

A318/A319/A320/A321	SPECIAL OPERATIONS	2.04.25	P 4
FLIGHT CREW OPERATING MANUAL	FLIGHT WITH GEAR DOWN	SEQ 215	REV 34

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 tail wind is not recommended.

Penalties on takeoff performance affect second segment gradient condition, final takeoff condition and en-route 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.

Takeoff configuration	1 + F	2	3
Weight reduction	22 %	18 %	18 %

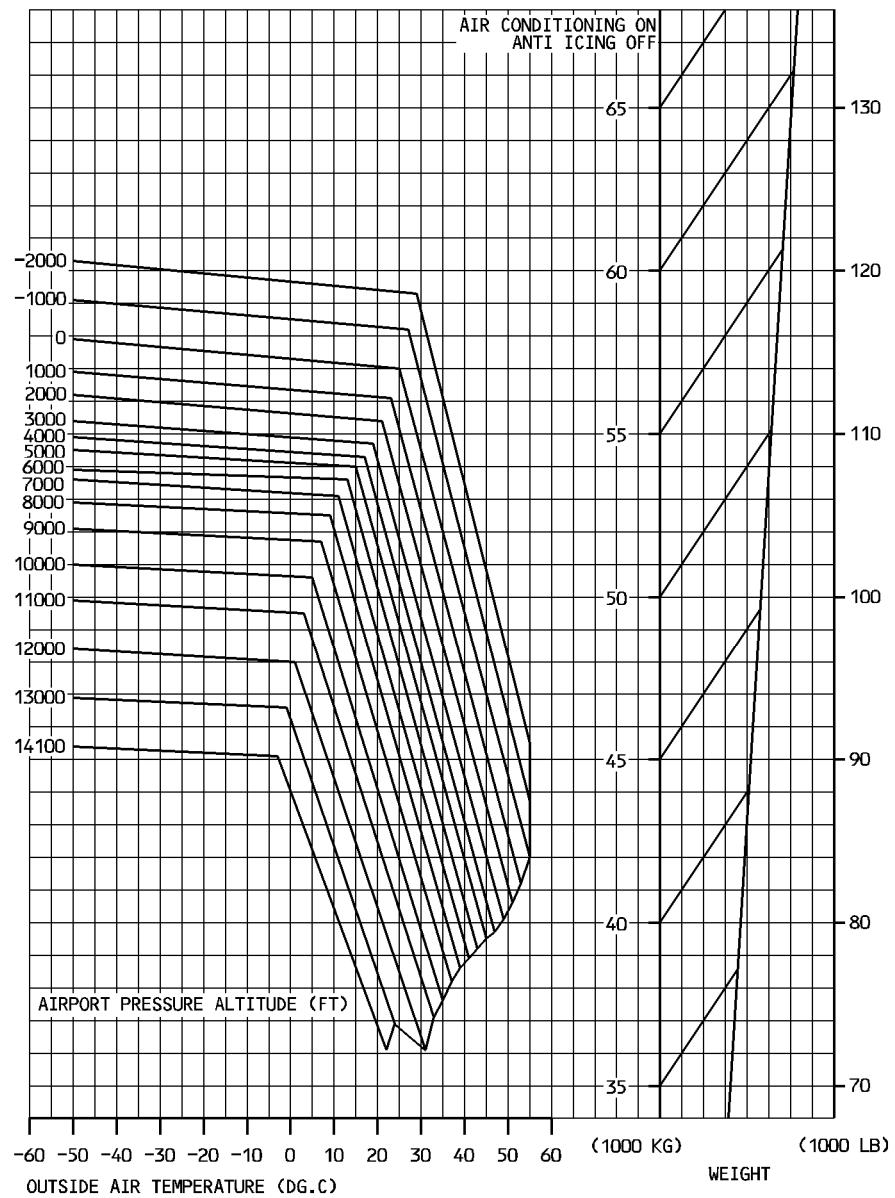
METHOD

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.

Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition.



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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 6
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EN ROUTE CONDITION

Retain the lowest weight according to the most limiting condition (second segment or final takeoff). Use the en route net flight path on page 11 to check that in case of engine failure the aircraft can clear the terrain on the route by 1000 feet (climbing) or 2000 feet (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to this weight in the RTOW chart or in the quick reference tables.

GO AROUND PERFORMANCE

See 3.05.35 for go-around requirements.
Further decrease the basic limiting weight by 15 %.

FLIGHT PLANNING

CLIMB

Climb at 230 kt/M.50 with both engines at maximum climb thrust. The table on page 7 gives the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 230 kt/M.50.
The ceiling on one engine may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

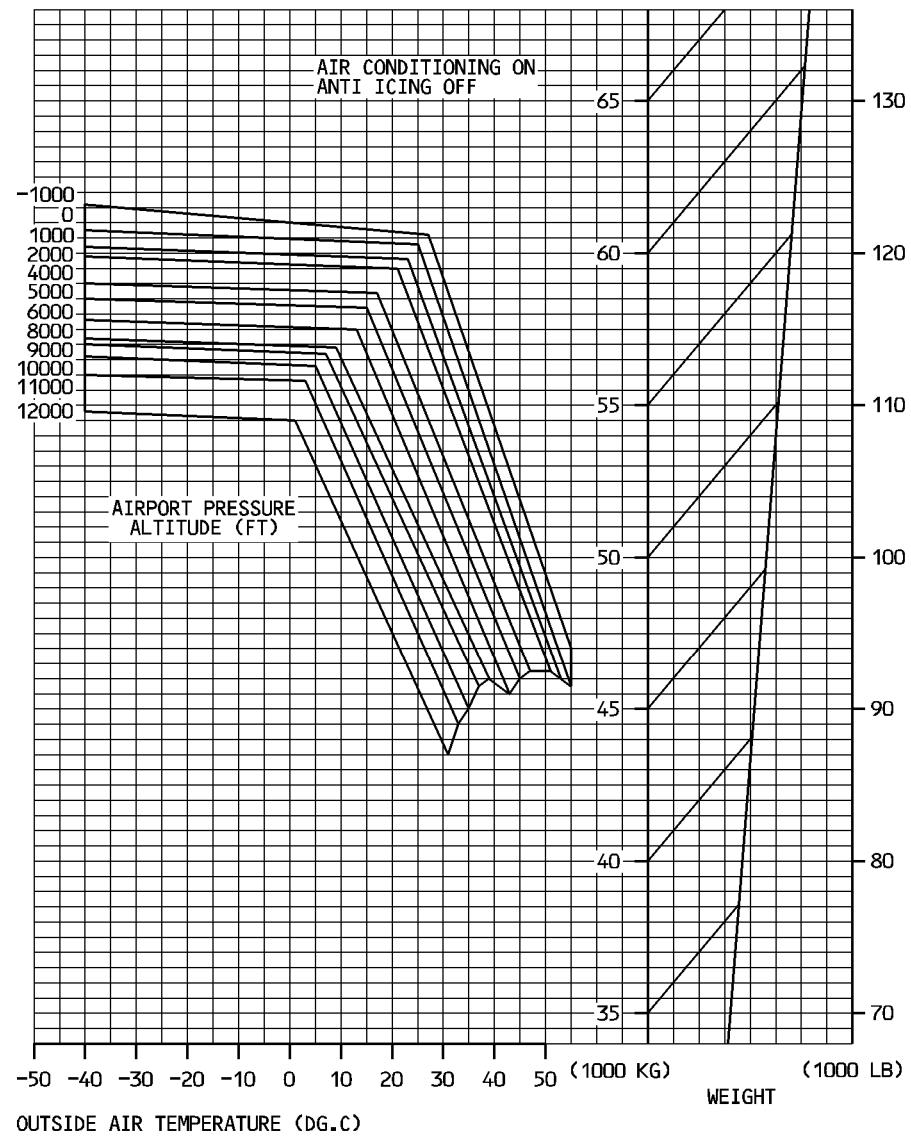
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

HOLDING

Page 10 gives the holding parameters with slats out, this configuration being the least penalizing for holding.

Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition.

R



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 6
		SEQ 080	REV 22

EN ROUTE CONDITION

Retain the lowest weight according to the most limiting condition (second segment or final takeoff). Use the en route net flight path on page 11 to check that in case of engine failure the aircraft can clear the terrain on the route by 1000 feet (climbing) or 2000 feet (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to this weight in the RTOW chart or in the quick reference tables.

GO AROUND PERFORMANCE

See 3.05.35 for go-around requirements.
Further decrease the basic limiting weight by 14 %.

FLIGHT PLANNING

CLIMB

Climb at 230 kt/M.50 with both engines at maximum climb thrust. The table on page 7 gives the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 230 kt/M.50.
The ceiling on one engine may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

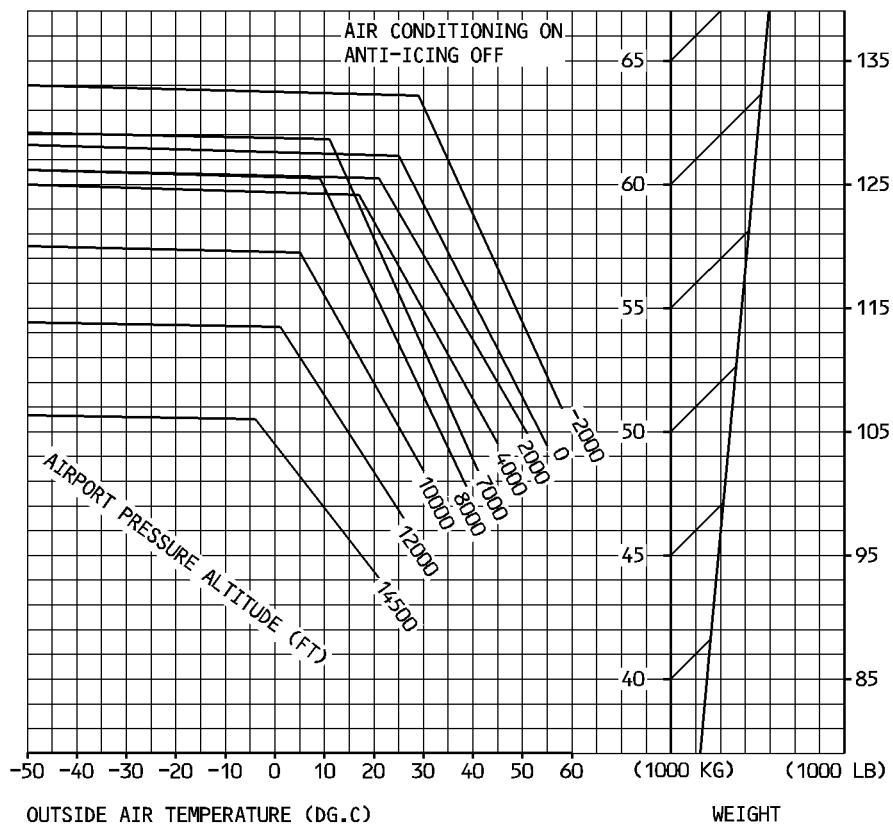
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

HOLDING

Page 10 gives the holding parameters with slats out, this configuration being the least penalizing for holding.

Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition. This graph is established for 25 % CG location.

In case of forward CG the weight must be decreased by 600 kg (1350 lb).



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 6
		SEQ 200	REV 34

EN ROUTE CONDITION

Retain the lowest weight according to the most limiting condition (second segment or final takeoff). Use the en route net flight path on page 11 to check that in case of engine failure the aircraft can clear the terrain on the route by 1000 feet (climbing) or 2000 feet (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to this weight in the RTOW chart or in the quick reference tables.

GO AROUND PERFORMANCE

See 3.05.35 for go-around requirements.
Further decrease the basic limiting weight by 15 %.

FLIGHT PLANNING

CLIMB

Climb at 230 kt/M.50 with both engines at maximum climb thrust. The table on page 7 gives the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 230 kt/M.50.
The ceiling on one engine may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

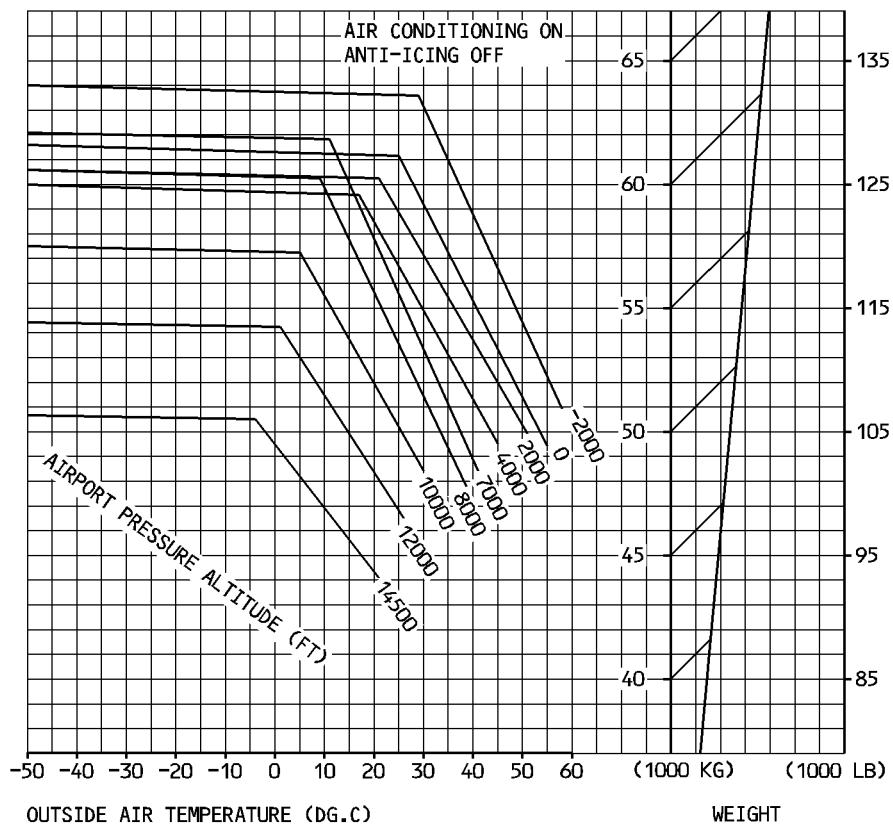
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

HOLDING

Page 10 gives the holding parameters with slats out, this configuration being the least penalizing for holding.

Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition. This graph is established for 25 % CG location.

In case of forward CG the weight must be decreased by 600 kg (1350 lb).



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 6
		SEQ 270	REV 33

EN ROUTE CONDITION

Retain the lowest weight according to the most limiting condition (second segment or final takeoff). Use the en route net flight path on page 11 to check that in case of engine failure the aircraft can clear the terrain on the route by 1000 feet (climbing) or 2000 feet (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to this weight in the RTOW chart or in the quick reference tables.

GO AROUND PERFORMANCE

See 3.05.35 for go-around requirements.
Further decrease the basic limiting weight by 15 %.

FLIGHT PLANNING

CLIMB

Climb at 230 kt/M.50 with both engines at maximum climb thrust. The table on page 7 gives the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 230 kt/M.50.
The ceiling on one engine 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 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

HOLDING

Page 10 gives the holding parameters with slats out, this configuration being the least penalizing for holding.

CLIMB - 230KT/M.50 - ALL ENGINES - L/G DOWN								
MAX. CLIMB THRUST			ISA		FROM BRAKE RELEASE			
NORMAL AIR CONDITIONING			CG=25.0%		TIME(MIN)	FUEL(KG)		
ANTI-ICING OFF					DISTANCE(NM)	TAS(KT)		
FL	WEIGHT AT BRAKE RELEASE (1000KG)							
	42	46	50	54	58	62	66	68
290	26 2021 123 282	31 2387 146 283	38 2867 178 285	47 3556 226 287				
270	23 1864 110 280	28 2183 130 282	33 2586 155 283	40 3133 191 285				
250	22 1735 100 279	25 2028 118 280	30 2393 141 282	36 2886 172 284				
240	21 1675 96 278	24 1958 113 279	29 2310 135 281	35 2785 166 283				
220	19 1557 89 276	23 1822 105 277	27 2152 125 279	33 2599 154 282				
200	17 1388 77 272	20 1620 91 274	24 1909 109 276	29 2299 133 278				
180	13 1076 55 260	14 1228 63 262	17 1403 73 263	19 1612 84 265	22 1882 100 266	27 2274 123 269		
160	10 864 41 250	11 976 46 251	13 1102 53 252	14 1244 60 254	16 1417 69 255	19 1641 81 257	22 1944 97 259	25 2137 107 260
140	8 703 31 240	9 789 35 241	10 883 39 242	11 989 44 244	12 1111 50 245	14 1262 57 246	16 1448 66 248	17 1557 71 249
120	6 575 24 230	7 643 26 231	8 717 30 233	9 797 33 234	9 890 37 235	11 1000 42 236	12 1131 48 238	13 1205 51 238
100	5 467 18 220	5 520 20 221	6 577 22 223	7 640 25 224	7 711 28 225	8 793 31 226	9 889 35 228	10 942 37 228
50	2 240 7 182	3 265 8 184	3 292 9 186	3 321 10 188	3 353 11 189	4 389 12 191	4 429 14 193	4 451 14 194
15	1 104 2 104	1 113 2 106	1 123 2 108	1 133 2 110	1 145 3 111	1 157 3 113	2 170 3 114	2 176 3 115

CRUISE - 230KT/M.50 - ALL ENGINES - L/G DOWN									
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI ICE OFF					ISA CG=25%	N1 (%) KG/H/ENG NM/1000KG		MACH IAS (KT) TAS (KT)	
WEIGHT (1000KG)	FL100	FL210	FL230	FL250		FL270		FL290	
42	74.1 1837 72.4	.417 230 266	82.6 1862 82.2	.500 223 306	82.6 1729 87.8	.500 214 303	82.6 1610 93.5	.500 205 301	83.1 1507 99.0
	1837 230 266		1862 1876 81.5		1729 1745 87.0		1610 1631 92.3		1507 197 298
	72.4 266		223 223 306		214 214 303		205 205 301		197 197 298
44	74.2 1848 71.9	.417 230 266	82.9 1876 81.5	.500 223 306	82.9 1745 87.0	.500 214 303	83.1 1631 92.3	.500 205 301	83.7 1535 97.2
	1848 230 266		1876 1892 80.9		1745 1764 86.0		1631 1655 91.0		1535 197 298
	71.9 266		223 223 306		214 214 303		205 1565 301		197 1490 95.4
46	74.4 1860 71.5	.417 230 266	83.2 1892 80.9	.500 223 306	83.2 1764 86.0	.500 214 303	83.6 1655 91.0	.500 205 301	84.3 1565 95.4
	1860 230 266		1892 1908 80.9		1764 1785 85.0		1655 1682 90.0		1565 197 298
	71.5 266		223 223 306		214 214 303		205 1597 301		197 1490 95.4
48	74.6 1872 71.0	.417 230 266	83.4 1908 80.2	.500 223 306	83.6 1785 85.0	.500 214 303	84.2 1682 89.5	.500 205 301	85.0 1597 93.4
	1872 230 266		1908 1927 80.2		1785 1809 85.0		1682 1712 90.0		1597 197 298
	71.0 266		223 223 306		214 214 303		205 1631 301		197 1568 94.4
50	74.7 1885 70.5	.417 230 266	83.7 1927 79.4	.500 223 306	84.1 1809 83.9	.500 214 303	84.7 1712 87.9	.500 205 301	85.7 1631 91.5
	1885 230 266		1927 1927 79.4		1809 1836 83.9		1712 1744 86.3		1631 197 298
	70.5 266		223 223 306		214 214 303		205 1666 301		197 1666 89.6
52	74.9 1899 70.0	.417 230 266	84.1 1948 78.5	.500 223 306	84.6 1836 82.6	.500 214 303	85.4 1744 86.3	.500 205 301	86.4 1666 91.7
	1899 230 266		1948 1948 78.5		1836 1836 82.6		1744 1750 86.3		1666 197 298
	70.0 266		223 223 306		214 214 303		205 1750 301		197 1613 91.7
54	75.1 1915 69.4	.417 230 266	84.5 1971 77.6	.500 223 306	85.1 1866 81.3	.500 214 303	86.0 1778 84.7	.500 205 301	87.2 1707 87.4
	1915 230 266		1971 1971 77.6		1866 1866 81.3		1778 1778 84.7		1707 197 298
	69.4 266		223 223 306		214 214 303		205 1707 301		197 1568 87.4
56	75.3 1931 68.8	.417 230 266	84.9 1997 76.6	.500 223 306	85.7 1898 80.0	.500 214 303	86.7 1812 83.1	.500 205 301	88.1 1750 85.3
	1931 230 266		1997 1997 76.6		1898 1898 80.0		1812 1812 83.1		1750 197 298
	68.8 266		223 223 306		214 214 303		205 1797 301		197 1797 83.0
58	75.5 1950 68.2	.417 230 266	85.5 2027 75.5	.500 223 306	86.3 1930 78.6	.500 214 303	87.4 1851 81.3	.500 205 301	89.1 1797 81.3
	1950 230 266		2027 2027 75.5		1930 1930 78.6		1851 1851 81.3		1797 197 298
	68.2 266		223 223 306		214 214 303		205 1844 301		197 1844 80.9
60	75.8 1971 67.5	.417 230 266	85.9 2058 74.3	.500 223 306	86.9 1965 77.2	.500 214 303	88.2 1893 79.5	.500 205 301	90.0 1844 80.9
	1971 230 266		2058 2058 74.3		1965 1965 77.2		1893 1893 79.5		1844 197 298
	67.5 266		223 223 306		214 214 303		205 1844 301		197 1844 80.9
62	76.1 1994 66.7	.417 230 266	86.5 2091 73.2	.500 223 306	87.5 2000 75.9	.500 214 303	89.0 1938 77.7	.500 205 301	
	1994 230 266		2091 2091 73.2		2000 2000 75.9		1938 1938 77.7		
	66.7 266		223 223 306		214 214 303		205 1984 301		
64	76.4 2017 65.9	.417 230 266	87.0 2124 72.0	.500 223 306	88.2 2041 74.3	.500 214 303	89.9 1984 75.8	.500 205 301	
	2017 230 266		2124 2124 72.0		2041 2041 74.3		1984 1984 75.8		
	65.9 266		223 223 306		214 214 303		205 1984 301		
66	76.7 2042 65.1	.417 230 266	87.6 2158 70.9	.500 223 306	88.9 2083 72.8	.500 214 303	90.8 2032 74.1	.500 205 301	
	2042 230 266		2158 2158 70.9		2083 2083 72.8		2032 2032 74.1		
	65.1 266		223 223 306		214 214 303		205 1984 301		
68	77.0 2068 64.3	.417 230 266	88.2 2195 69.7	.500 223 306	89.7 2129 71.3	.500 214 303	91.7 2084 72.2	.500 205 301	
	2068 230 266		2195 2195 69.7		2129 2129 71.3		2084 2084 72.2		
	64.3 266		223 223 306		214 214 303		205 1984 301		

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CLIMB 230KT/M.50 - ALL ENGINES - L/G DOWN									
MAX. CLIMB THRUST LIMITS			ISA		FROM BRAKE RELEASE				
NORMAL AIR CONDITIONING			CG=25.0%		TIME (MIN)		FUEL (KG)		
ANTI-ICING OFF					DISTANCE (NM)		TAS (KT)		
WEIGHT AT BRAKE RELEASE (1000KG)									
FL	50	52	54	56	58	60	62	64	66
290	22 1759 104 280	24 1889 113 281	26 2037 123 281	29 2206 135 282	31 2404 148 283				
270	20 1604 91 277	21 1713 98 278	23 1835 105 279	24 1972 114 280	27 2129 124 281	29 2314 137 282	32 2532 151 283		
250	17 1456 79 274	18 1550 84 275	20 1651 90 276	21 1763 97 277	23 1890 105 277	25 2036 114 278	27 2206 125 279	29 2404 137 280	
240	16 1384 73 272	17 1469 78 273	18 1562 83 274	20 1664 89 275	21 1778 96 275	23 1909 104 276	24 2058 113 277	27 2231 124 278	29 2433 136 280
220	14 1234 62 268	15 1306 66 268	16 1383 70 269	17 1466 74 269	18 1557 79 270	19 1661 85 271	20 1776 92 272	22 1906 99 273	24 2052 107 274
200	12 1082 51 261	12 1142 54 261	13 1205 57 262	14 1272 60 262	15 1345 64 263	16 1426 68 264	17 1515 73 264	18 1612 78 265	19 1719 84 266
180	10 921 40 251	10 969 42 251	11 1020 45 252	11 1073 47 252	12 1130 50 253	13 1193 53 253	13 1260 56 254	14 1332 59 255	15 1410 63 255
160	8 785 32 241	8 825 34 242	9 866 35 242	9 910 37 243	10 956 39 243	10 1006 41 244	11 1059 44 244	11 1115 46 245	12 1175 49 245
140	7 668 25 232	7 702 27 232	7 736 28 233	8 772 29 233	8 810 31 234	8 850 33 234	9 893 34 235	9 938 36 235	10 985 38 236
120	5 565 20 222	6 593 21 223	6 621 22 223	6 651 23 224	7 682 24 224	7 715 26 225	7 750 27 225	8 787 28 226	8 824 30 226
100	4 472 16 212	5 494 16 213	5 518 17 213	5 542 18 214	5 567 19 214	6 594 20 215	6 622 21 215	6 652 22 216	6 682 23 216
50	2 261 7 175	3 273 7 176	3 285 8 177	3 298 8 178	3 311 9 178	3 325 9 179	3 340 9 180	3 355 10 180	3 370 10 181
15	1 123 2 108	1 128 2 109	1 133 2 110	1 139 2 110	1 145 3 111	1 151 3 112	1 157 3 113	2 163 3 113	2 170 3 114

11.0-08FOA320-232 IAE V2527-A5 21101000C5KG250 0 018590 0 0 2 1.0 500.0 300.00 1 02230.000 .500 .000 0 FCOM-NO-02-04-25-007-160

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CRUISE - 230KT/M.50 - ALL ENGINES - L/G DOWN							
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=25.0%	EPR KG/H/ENG NM/1000KG	MACH IAS (KT) TAS (KT)	
WEIGHT (1000KG)	FL100	FL200	FL220	FL240	FL270	FL290	
48	1.162 .417	1.320 .500	1.329 .500	1.340 .500	1.366 .500	1.390 .500	
	1864 230	1849 228	1717 219	1599 210	1453 197	1370 188	
	71.3 266	83.1 307	88.7 305	94.5 302	102.7 298	108.0 296	
50	1.164 .417	1.323 .500	1.333 .500	1.347 .500	1.376 .500	1.402 .500	
	1880 230	1861 228	1731 219	1618 210	1475 197	1396 188	
	70.7 266	82.5 307	88.0 305	93.4 302	101.2 298	106.0 296	
52	1.166 .417	1.327 .500	1.338 .500	1.354 .500	1.386 .500	1.414 .500	
	1897 230	1874 228	1747 219	1639 210	1499 197	1422 188	
	70.1 266	81.9 307	87.2 305	92.2 302	99.5 298	104.0 296	
54	1.168 .417	1.331 .500	1.344 .500	1.362 .500	1.397 .500	1.427 .500	
	1914 230	1888 228	1766 219	1660 210	1525 197	1449 188	
	69.5 266	81.3 307	86.3 305	91.0 302	97.8 298	102.1 296	
56	1.171 .417	1.336 .500	1.351 .500	1.370 .500	1.408 .500	1.440 .500	
	1934 230	1904 228	1786 219	1682 210	1551 197	1478 188	
	68.8 266	80.7 307	85.3 305	89.8 302	96.2 298	100.1 296	
58	1.174 .417	1.341 .500	1.358 .500	1.378 .500	1.419 .500		
	1957 230	1922 228	1808 219	1706 210	1578 197		
	67.9 266	79.9 307	84.3 305	88.6 302	94.6 298		
60	1.177 .417	1.347 .500	1.365 .500	1.388 .500			
	1982 230	1942 228	1830 219	1731 210			
	67.1 266	79.1 307	83.3 305	87.3 302			
62	1.180 .417	1.353 .500	1.373 .500				
	2009 230	1963 228	1852 219				
	66.2 266	78.2 307	82.2 305				
64	1.184 .417	1.360 .500					
	2036 230	1985 228					
	65.3 266	77.4 307					
66	1.187 .417						
	2064 230						
	64.4 266						
68	1.191 .417						
	2084 230						
	63.8 266						

11.0-08FOA320-232 IAE V2527-A5 12101000C5KG250 0 018590 0 0 1 1.0 .0 .00 0 02230.000 .500 .000 0 FCOM-N0-02-04-25-008-160

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CLIMB - 230KT/M.50 - ALL ENGINES - L/G DOWN									
MAX. CLIMB THRUST LIMITS			ISA		FROM BRAKE RELEASE				
NORMAL AIR CONDITIONING			CG=25.0%		TIME (MIN)		FUEL (KG)		
ANTI-ICING OFF					DISTANCE (NM)		TAS (KT)		
FL	WEIGHT AT BRAKE RELEASE (1000KG)								
	44	48	52	56	60	64	68	72	76
290	17 1347 79 277	19 1530 90 279	22 1755 105 280	27 2049 125 282					
270	15 1240 69 275	17 1399 79 276	20 1588 90 278	23 1820 105 279	27 2129 125 281				
250	13 1134 61 272	15 1273 68 273	17 1434 78 274	19 1624 89 276	22 1864 104 277	27 2184 124 279			
240	13 1081 56 270	14 1210 64 271	16 1359 72 272	18 1532 82 274	21 1746 94 275	24 2022 111 277			
220	11 969 48 265	12 1081 54 266	14 1207 60 267	15 1350 68 268	17 1520 77 270	20 1728 89 271	23 1999 105 274		
200	9 853 40 257	10 948 44 259	11 1054 49 260	13 1172 55 261	14 1307 62 262	16 1465 70 263	18 1659 80 265	21 1906 94 268	
180	8 729 31 247	8 807 35 249	9 894 39 250	10 988 43 251	11 1094 48 252	13 1215 54 253	14 1354 60 254	16 1520 68 256	18 1725 78 258
160	6 623 25 237	7 690 28 239	8 761 31 240	8 839 34 241	9 925 38 242	10 1021 42 243	11 1128 46 244	13 1251 52 246	14 1395 58 247
140	5 533 20 227	6 589 22 229	6 649 24 230	7 714 27 231	8 785 30 232	8 863 33 233	9 949 36 234	10 1044 40 236	11 1152 45 237
120	4 454 16 217	5 501 18 219	5 551 19 220	6 605 21 221	6 664 24 222	7 728 26 223	8 797 28 224	8 873 31 226	9 956 34 228
100	4 381 12 206	4 420 14 208	4 462 15 210	5 506 17 211	5 555 18 212	6 607 20 213	6 662 22 214	7 722 24 216	7 788 27 217
50	2 217 6 169	2 238 6 171	2 260 7 173	3 285 8 175	3 311 8 176	3 338 9 177	3 367 10 179	4 398 11 181	4 431 12 183
15	1 108 2 105	1 118 2 107	1 128 2 109	1 139 2 110	1 151 3 112	2 163 3 113	2 176 3 115	2 189 3 118	2 203 4 120

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CRUISE - 230KT/M.50 - ALL ENGINES - L/G DOWN									
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=25.0%	EPR KG/H/ENG NM/1000KG	MACH IAS (KT) TAS (KT)		
WEIGHT (1000KG)	FL100	FL200	FL220	FL240		FL270	FL290		
44	1.155 .417	1.306 .500	1.312 .500	1.321 .500	1.339 .500	1.357 .500			
	1798 230	1803 228	1666 219	1544 210	1386 197	1299 188			
	73.9 266	85.2 307	91.4 305	97.8 302	107.7 298	113.9 296			
48	1.159 .417	1.312 .500	1.320 .500	1.331 .500	1.355 .500	1.380 .500			
	1818 230	1821 228	1690 219	1573 210	1426 197	1350 188			
	73.1 266	84.3 307	90.1 305	96.1 302	104.6 298	109.6 296			
52	1.163 .417	1.319 .500	1.329 .500	1.344 .500	1.376 .500	1.409 .500			
	1843 230	1845 228	1718 219	1609 210	1476 197	1411 188			
	72.1 266	83.2 307	88.7 305	93.9 302	101.1 298	104.9 296			
56	1.168 .417	1.327 .500	1.341 .500	1.359 .500	1.402 .500	1.441 .500			
	1872 230	1873 228	1754 219	1652 210	1536 197	1481 188			
	71.0 266	82.0 307	86.9 305	91.5 302	97.1 298	99.9 296			
60	1.174 .417	1.337 .500	1.354 .500	1.379 .500					
	1905 230	1907 228	1796 219	1705 210					
	69.8 266	80.5 307	84.8 305	88.6 302					
64	1.180 .417	1.349 .500	1.371 .500						
	1942 230	1948 228	1847 219						
	68.5 266	78.8 307	82.5 305						
68	1.187 .417	1.363 .500							
	1982 230	1996 228							
	67.1 266	76.9 307							
72	1.194 .417								
	2027 230								
	65.6 266								
76	1.201 .417								
	2076 230								
	64.0 266								

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DESCENT - M.50/230KT - ALL ENGINES - L/G DOWN									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG=25.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN					
WEIGHT (1000KG)	45				65				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
290	7.5	81	35	IDLE	9.7	104	45	IDLE	
270	6.9	75	32	IDLE	9.0	97	41	IDLE	197
250	6.4	70	29	IDLE	8.3	91	38	IDLE	205
240	6.1	67	28	IDLE	8.0	88	36	IDLE	210
220	5.6	62	25	IDLE	7.4	82	33	IDLE	219
200	5.2	58	23	IDLE	6.8	76	30	IDLE	228
180	4.7	53	21	IDLE	6.2	70	27	IDLE	230
160	4.2	48	18	IDLE	5.5	63	24	IDLE	230
140	3.7	42	16	IDLE	4.8	56	20	IDLE	230
120	3.1	37	13	IDLE	4.1	48	17	IDLE	230
100	2.6	30	11	IDLE	3.3	40	14	IDLE	230
50	1.1	13	4	IDLE	1.4	18	6	IDLE	230
15	.0	0	0	IDLE	.0	0	0	IDLE	230

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RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA					EPR		
	CG=25.0%					FF (KG/H/ENG)		
	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
	WEIGHT (1000KG)							
44	1.063 1238	1.075 1216	1.099 1188	1.110 1181	1.123 1173	1.137 1165	1.154 1159	1.173 1152
46	1.067 1290	1.080 1268	1.105 1242	1.117 1234	1.130 1226	1.146 1219	1.164 1212	1.183 1205
48	1.071 1342	1.085 1319	1.111 1296	1.124 1287	1.138 1279	1.155 1271	1.174 1264	1.193 1259
50	1.075 1395	1.091 1372	1.118 1349	1.131 1341	1.147 1333	1.164 1325	1.183 1318	1.203 1313
52	1.080 1447	1.096 1425	1.125 1403	1.139 1394	1.155 1385	1.173 1378	1.193 1372	1.213 1367
54	1.084 1501	1.101 1480	1.131 1457	1.146 1448	1.163 1439	1.182 1432	1.202 1427	1.222 1418
56	1.089 1554	1.106 1536	1.138 1511	1.154 1501	1.172 1493	1.191 1486	1.211 1482	1.232 1470
58	1.093 1607	1.112 1590	1.145 1565	1.162 1555	1.180 1547	1.200 1541	1.219 1534	1.244 1519
60	1.098 1662	1.117 1644	1.152 1618	1.170 1609	1.188 1602	1.208 1597	1.228 1586	1.257 1572
62	1.103 1717	1.123 1698	1.159 1671	1.178 1663	1.196 1656	1.216 1650	1.238 1635	1.271 1626
64	1.107 1773	1.128 1753	1.167 1725	1.185 1717	1.204 1712	1.224 1702	1.250 1686	1.286 1683
66	1.112 1828	1.134 1807	1.174 1780	1.192 1773	1.211 1767	1.232 1754	1.263 1740	1.302 1742
68	1.117 1883	1.139 1861	1.181 1835	1.200 1828	1.219 1820	1.242 1802	1.275 1795	1.318 1801
70	1.122 1938	1.145 1915	1.188 1890	1.207 1885	1.226 1873	1.253 1857	1.290 1854	1.334 1859
72	1.126 1993	1.151 1969	1.195 1946	1.213 1939	1.234 1924	1.265 1911	1.304 1914	1.351 1917
74	1.131 2047	1.157 2023	1.201 2002	1.220 1992	1.244 1974	1.277 1966	1.319 1973	1.368 1976
76	1.136 2101	1.163 2078	1.208 2058	1.227 2045	1.254 2028	1.291 2026	1.334 2032	1.385 2036

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DESCENT - M.50/230KT - ALL ENGINES - L/G DOWN								
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG=25.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN				
WEIGHT (1000KG)	45				55			
	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR
290	7.6	83	35	IDLE	8.9	97	41	IDLE
270	7.0	77	32	IDLE	8.2	91	38	IDLE
250	6.4	72	29	IDLE	7.6	84	34	IDLE
240	6.2	69	28	IDLE	7.3	81	33	IDLE
220	5.7	64	25	IDLE	6.7	76	30	IDLE
200	5.2	59	23	IDLE	6.2	70	27	IDLE
180	4.7	55	21	IDLE	5.6	64	25	IDLE
160	4.2	49	18	IDLE	5.0	58	22	IDLE
140	3.7	43	16	IDLE	4.3	51	19	IDLE
120	3.1	37	13	IDLE	3.7	44	16	IDLE
100	2.6	31	11	IDLE	3.0	36	13	IDLE
50	1.1	14	4	IDLE	1.3	16	5	IDLE
15	.0	0	0	IDLE	.0	0	0	IDLE
								230

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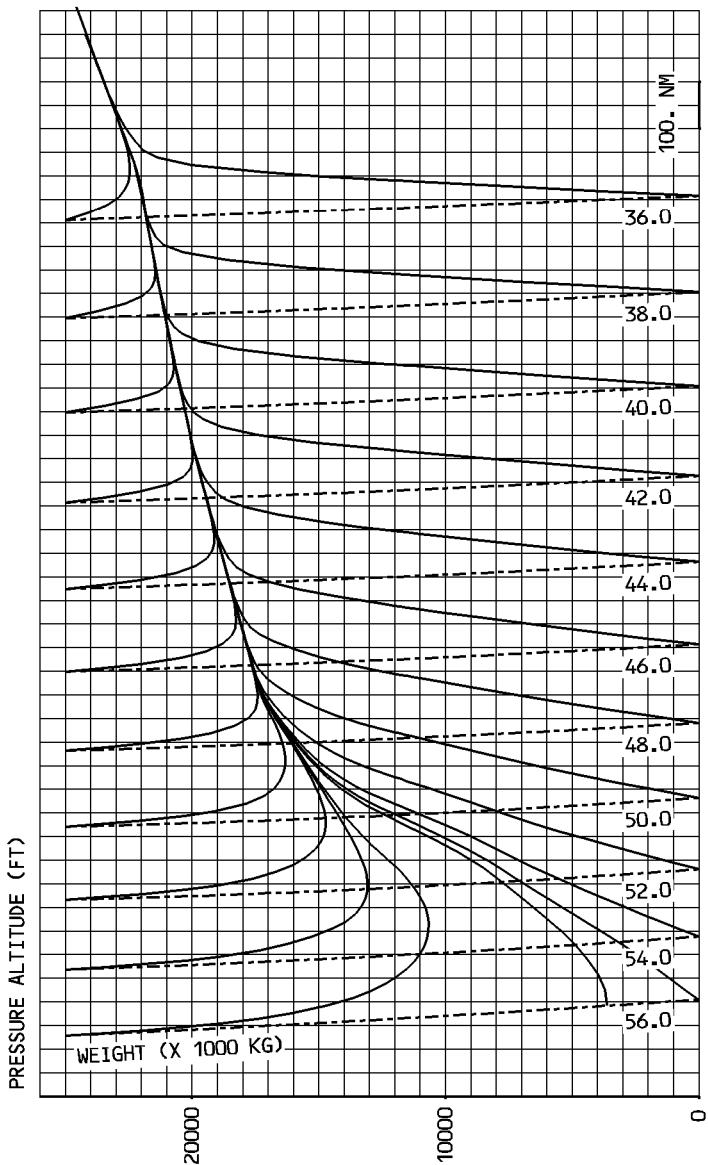
RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA						EPR	
	CG=25.0%						FF (KG/H/ENG)	
	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
	WEIGHT (1000KG)							
46	1,060 1239	1,074 1245	1,100 1252	1,113 1249	1,129 1240	1,147 1237	1,166 1242	1,188 1249
48	1,064 1299	1,079 1306	1,107 1312	1,122 1303	1,138 1296	1,157 1295	1,177 1304	1,200 1310
50	1,069 1360	1,084 1367	1,115 1367	1,130 1357	1,148 1354	1,167 1358	1,188 1365	1,212 1370
52	1,073 1421	1,090 1429	1,122 1420	1,139 1413	1,157 1411	1,177 1421	1,199 1427	1,225 1424
54	1,078 1482	1,095 1489	1,130 1474	1,147 1471	1,166 1474	1,187 1482	1,211 1489	1,238 1478
56	1,082 1544	1,101 1549	1,138 1531	1,156 1528	1,175 1538	1,197 1544	1,222 1543	1,251 1533
58	1,087 1606	1,107 1609	1,146 1589	1,164 1590	1,184 1599	1,207 1608	1,234 1598	1,264 1590
60	1,092 1668	1,113 1665	1,154 1646	1,173 1656	1,194 1662	1,218 1664	1,246 1652	1,278 1643
62	1,097 1728	1,120 1720	1,161 1705	1,181 1717	1,203 1724	1,229 1718	1,258 1710	1,292 1696
64	1,102 1789	1,126 1774	1,169 1771	1,190 1779	1,213 1785	1,240 1772	1,271 1763	1,307 1749
66	1,107 1850	1,133 1829	1,177 1834	1,198 1842	1,223 1840	1,251 1829	1,283 1818	1,321 1801
68	1,113 1906	1,139 1887	1,185 1897	1,207 1906	1,233 1896	1,262 1886	1,296 1871	1,336 1853
70	1,119 1963	1,146 1944	1,193 1960	1,216 1963	1,243 1949	1,274 1940	1,310 1924	1,351 1907
72	1,124 2018	1,152 2001	1,201 2023	1,225 2019	1,254 2008	1,286 1994	1,323 1976	1,366 1961
74	1,130 2072	1,158 2059	1,209 2087	1,235 2075	1,264 2064	1,298 2048	1,337 2029	
76	1,136 2128	1,165 2124	1,218 2143	1,244 2128	1,275 2118	1,310 2101	1,351 2083	
78	1,141 2184	1,171 2191	1,226 2199	1,254 2187	1,286 2172	1,322 2153		

DESCENT - M.50/230KT - ALL ENGINES - L/G DOWN												
IDLE THRUST NORMAL AIR CONDITIONING ANTI ICE OFF				ISA CG=25.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN						
FL	WEIGHT (1000KG)											
	45					65						
	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1 (%)	IAS (KT)	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1 (%)	IAS (KT)		
290	9.0	139	42	70.6	188	9.7	92	45	IDLE	188		
270	7.6	99	35	71.4	197	9.0	87	41	IDLE	197		
250	6.4	64	29	IDLE	205	8.3	82	38	IDLE	205		
240	6.2	62	28	IDLE	210	8.0	80	36	IDLE	210		
220	5.7	58	25	IDLE	219	7.4	75	33	IDLE	219		
200	5.3	54	23	IDLE	228	6.9	71	30	IDLE	228		
180	4.8	50	21	IDLE	230	6.2	66	27	IDLE	230		
160	4.3	46	18	IDLE	230	5.6	60	24	IDLE	230		
140	3.7	41	16	IDLE	230	4.9	54	21	IDLE	230		
120	3.2	36	13	IDLE	230	4.2	47	17	IDLE	230		
100	2.6	31	11	IDLE	230	3.4	40	14	IDLE	230		
50	1.1	14	5	IDLE	230	1.5	19	6	IDLE	230		
15	0.0	0	0	IDLE	230	0.0	0	0	IDLE	230		

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI ICE OFF				ISA CG=25.0%		N1 (%) FF (KG/H/ENG)		
WEIGHT (1000KG)	FL15	FL50	FL100	FL120	FL140	FL160	FL180	FL200
42	55.1 1149	57.5 1137	61.2 1116	62.8 1110	64.4 1105	65.9 1103	67.6 1101	69.3 1099
44	56.2 1202	58.7 1187	62.4 1167	64.0 1161	65.6 1160	67.2 1158	68.9 1156	70.4 1152
46	57.3 1255	59.8 1237	63.6 1219	65.2 1216	66.8 1215	68.4 1212	70.0 1210	71.6 1204
48	58.4 1306	60.9 1288	64.8 1272	66.3 1271	67.9 1270	69.6 1269	71.1 1264	72.7 1259
50	59.4 1356	61.9 1340	65.8 1328	67.4 1327	69.0 1326	70.6 1323	72.2 1318	73.7 1316
52	60.4 1406	63.0 1392	66.9 1384	68.5 1383	70.1 1382	71.6 1377	73.2 1372	74.7 1374
54	61.4 1457	64.0 1445	67.9 1440	69.5 1441	71.1 1436	72.6 1432	74.1 1429	75.7 1433
56	62.3 1509	65.0 1499	68.9 1498	70.5 1496	72.0 1492	73.6 1487	75.1 1488	76.7 1494
58	63.3 1562	66.0 1554	69.9 1556	71.4 1551	72.9 1547	74.4 1543	76.0 1546	77.6 1558
60	64.2 1616	66.9 1612	70.8 1611	72.3 1607	73.8 1602	75.3 1602	76.9 1607	78.6 1621
62	65.1 1671	67.8 1670	71.7 1666	73.1 1663	74.7 1658	76.2 1661	77.8 1671	79.6 1686
64	66.0 1727	68.7 1728	72.5 1723	74.0 1718	75.5 1716	77.0 1720	78.7 1734	80.6 1752
66	66.9 1784	69.5 1788	73.3 1779	74.8 1774	76.3 1775	77.9 1783	79.5 1797	81.6 1818
68	67.7 1843	70.3 1846	74.1 1835	75.6 1831	77.1 1834	78.7 1847	80.4 1864	82.6 1888

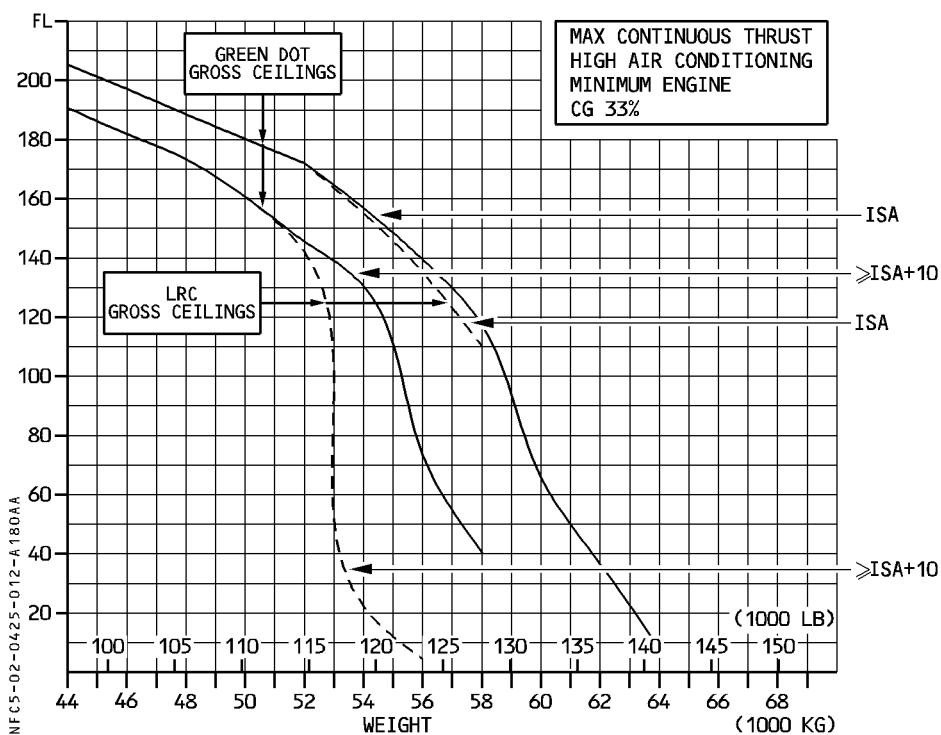
EN ROUTE NET FLIGHT PATH - L/G DOWN - ONE ENGINE OUT

MAX. CONTINUOUS THRUST	ISA	
HIGH AIR CONDITIONING		MINIMUM ENGINE
ANTI ICE OFF	CG = 25 %	



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

R



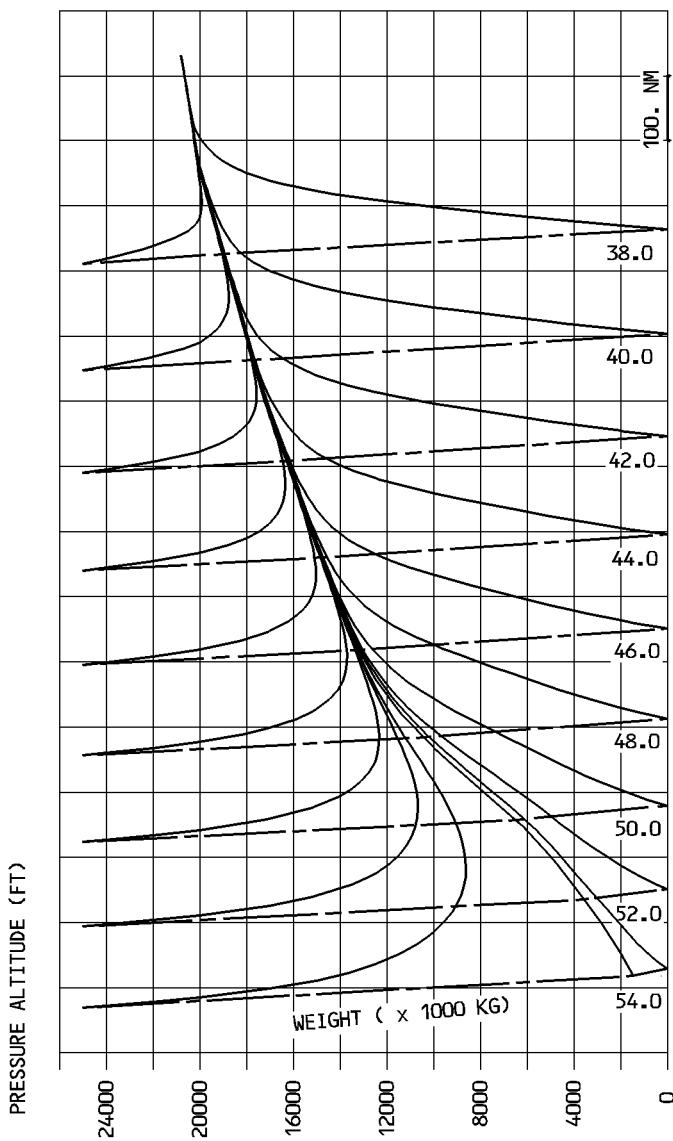
BLEED CORRECTIONS

R

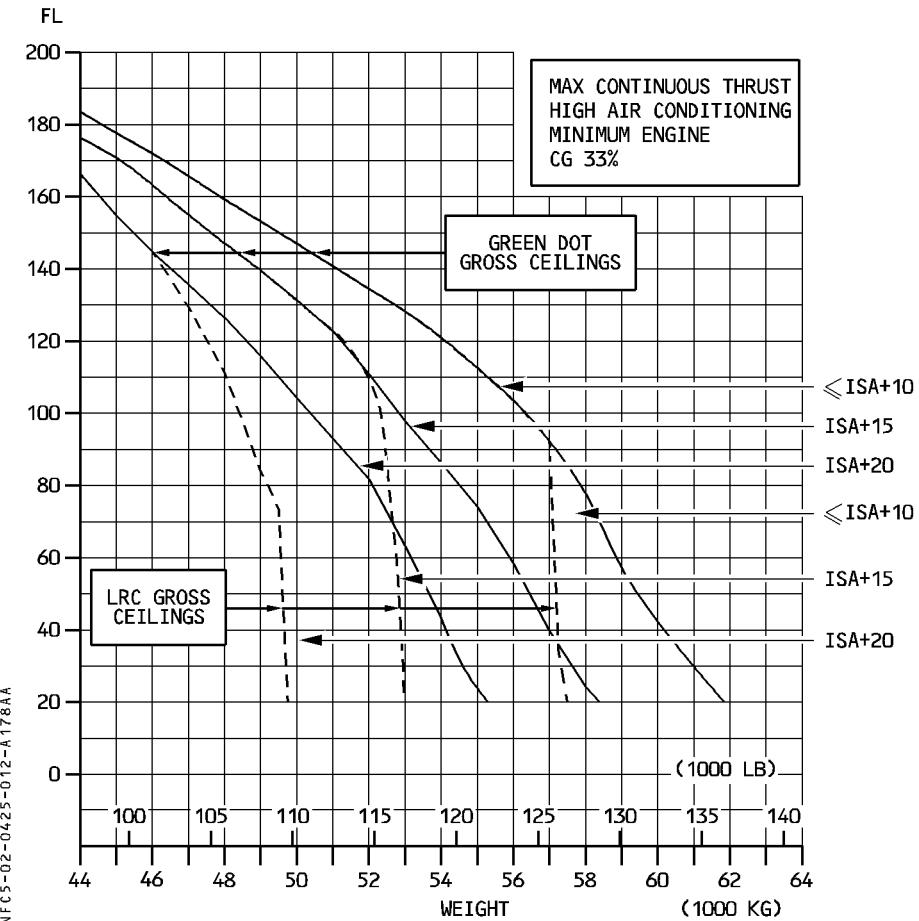
		ISA	\geq ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	- 1500 FT	- 2000 FT
	TOTAL ANTI ICE ON	- 3000 FT	- 3500 FT
GREEN DOT	ENGINE ANTI ICE ON	- 2500 FT	- 2500 FT
	TOTAL ANTI ICE ON	- 3000 FT	- 6000 FT

EN ROUTE NET FLIGHT PATH - L/G DOWN - ONE ENGINE OUT

MAX. CONTINUOUS THRUST	ISA	MINIMUM ENGINE
HIGH AIR CONDITIONING		
ANTI ICE OFF	CG = 25 %	



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

BLEED CORRECTIONS

		ISA	ISA + 10	> ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	- 200 FT	- 13500 FT	- 13500 FT
	TOTAL ANTI ICE ON	- 4500 FT	- 16000 FT	- 16000 FT
GREEN DOT	ENGINE ANTI ICE ON	- 150 FT	- 7000 FT	- 7000 FT
	TOTAL ANTI ICE ON	- 4500 FT	- 11000 FT	- 11000 FT

EN ROUTE NET FLIGHT PATH - L/G DOWN - ONE ENGINE OUT

MAX. CONTINUOUS THRUST

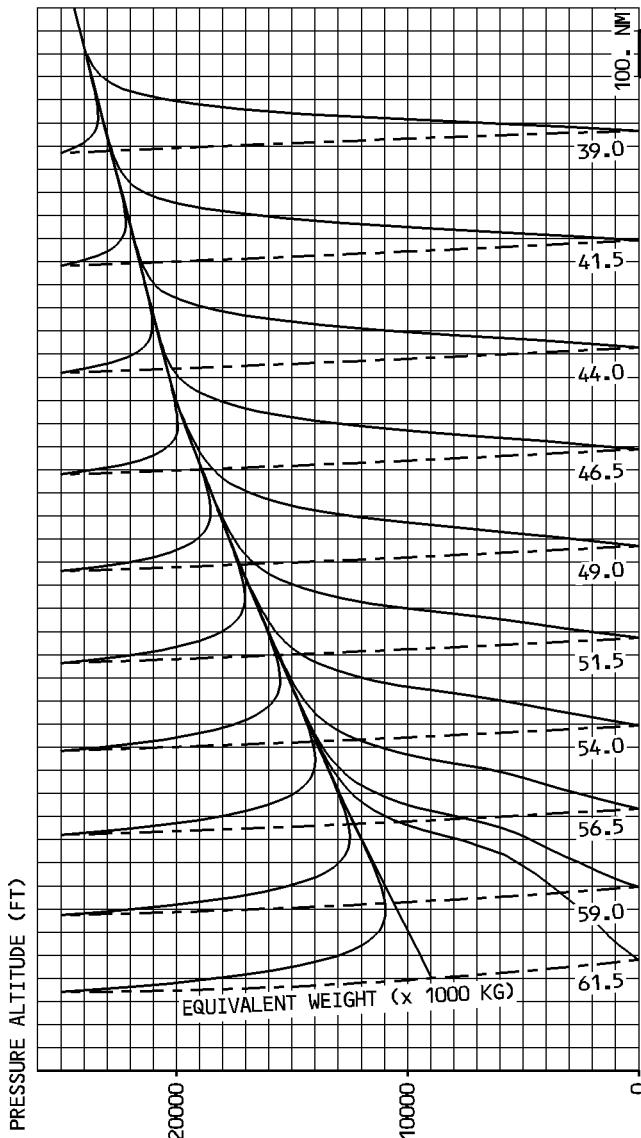
ISA

HIGH AIR CONDITIONING

MINIMUM ENGINE

ANTI ICE OFF

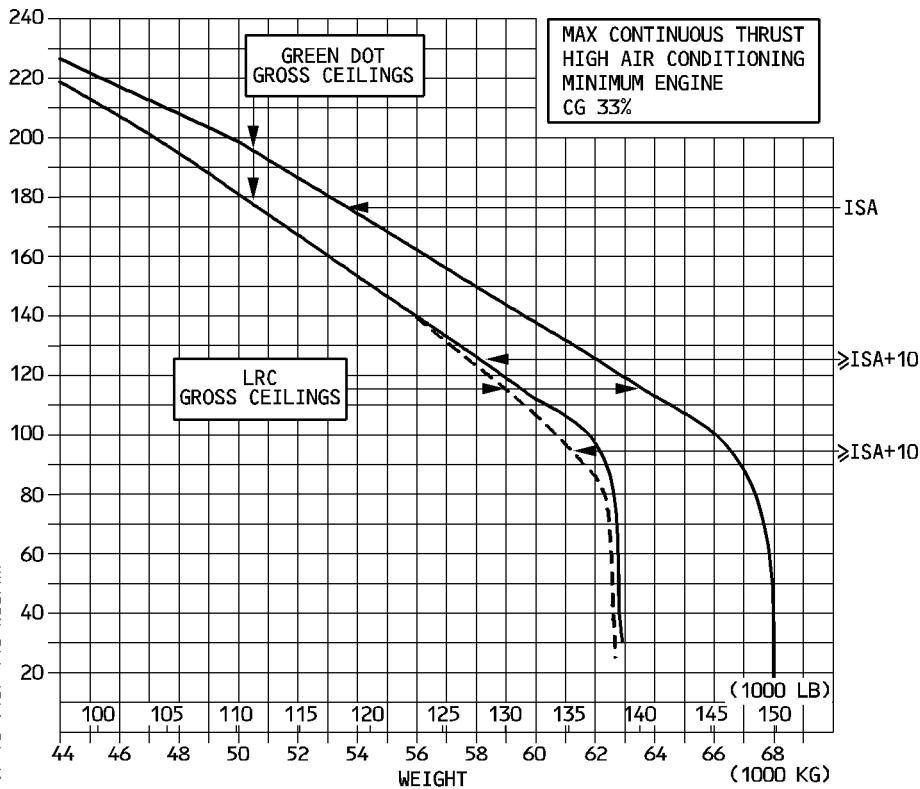
CG = 23 %



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

R

FL



BLEED CORRECTIONS

R

		ISA	\geq ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	- 9200 FT	- 9200 FT
	TOTAL ANTI ICE ON	- 10500 FT	- 10500 FT
GREEN DOT	ENGINE ANTI ICE ON	- 1200 FT	- 1600 FT
	TOTAL ANTI ICE ON	- 9100 FT	- 9700 FT

OPERATION FROM AIRPORT AT OR ABOVE 9200 ft**CRUISE TOWARD AIRPORT AT OR ABOVE 9200 ft**

- If CAB ALT unduly increases beyond 8000 ft :

– LDG ELEV MAN ADJUST AT 8000 FT

Note : A step descent or turbulence conditions may trigger an early CPC descent mode detection, leading the CPC to start controlling to the landing field elevation pressure. Manually selecting a landing field elevation overrides the FMGS landing field elevation for the remaining time of cruise.

AT TOP OF DESCENT

Note : For A/C operating under FAA requirements, at least one pilot must use the oxygen mask continuously until landing.

– HIGH ALT LDG switch ON

R *Note : Passengers oxygen masks would drop when cabin altitude is above 14000 ft +250/-750ft if HIGH ALT LDG is OFF. They drop above 16000 ft +250/-750ft cabin altitude if HIGH ALT LDG is ON.*

– LDG ELEV AUTO

Note : CPC starts controlling the pressure to the landing field elevation at beginning of descent.

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ON GROUND OPERATION

– HIGH ALT LDG switch **Keep ON for all on ground operation**

TAKE OFF

- R *Note : For A/C operating under FAA requirements, as long as the cabin altitude is above 12000 ft in flight, at least one pilot must use the oxygen mask continuously.*
- R · Packs may be supplied for takeoff by the engine bleed, or by the APU up to 17000ft depending on the takeoff performance requirement.

TOP OF CLIMB

– LDG ELEV **CHECK**
Check on the ECAM CRUISE page that LDG ELEV AUTO is displayed.

● **When cabin altitude is below 12000 ft and decreasing :**

– HIGH ALT LDG switch **OFF**
Check that the cabin altitude decreases below 9550+/-350 ft (this will allow the EXCESS CAB ALT warning to be triggered again if necessary despite the clear action).

INTRODUCTION

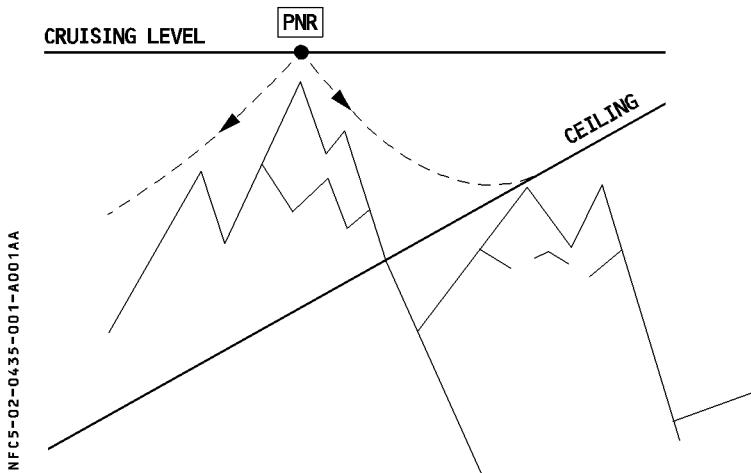
Two failures must be taken into consideration for en route obstacle clearance over mountainous area :

- 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

If the standard strategy does not allow the aircraft to clear obstacles, the pilot must use 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.

If the aircraft cannot clear the en route obstacles, a point of no return (PNR) must be determined.



If an engine failure occurs after the PNR, the aircraft must drift down on course. If the failure occurs before the PNR, the aircraft must turn back.

For en route net flight paths, refer to the Aircraft Flight Manual.

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DEPRESSURIZATION

In case of depressurization, the passengers receive oxygen through individual modules. An emergency descent in accordance with a certain profile 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 flight path and passenger oxygen system performance allow the aircraft to clear the obstacles by 1000 feet in climb and by 2000 feet in cruise or descent.
- R If the aircraft in these circumstances cannot clear the obstacles on the route, a PNR must be 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 120-42A 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.

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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 three 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.

Note : 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 establish a routine for ETOPS critical fuel planning and compare it with the standard (non-ETOPS) fuel planning.

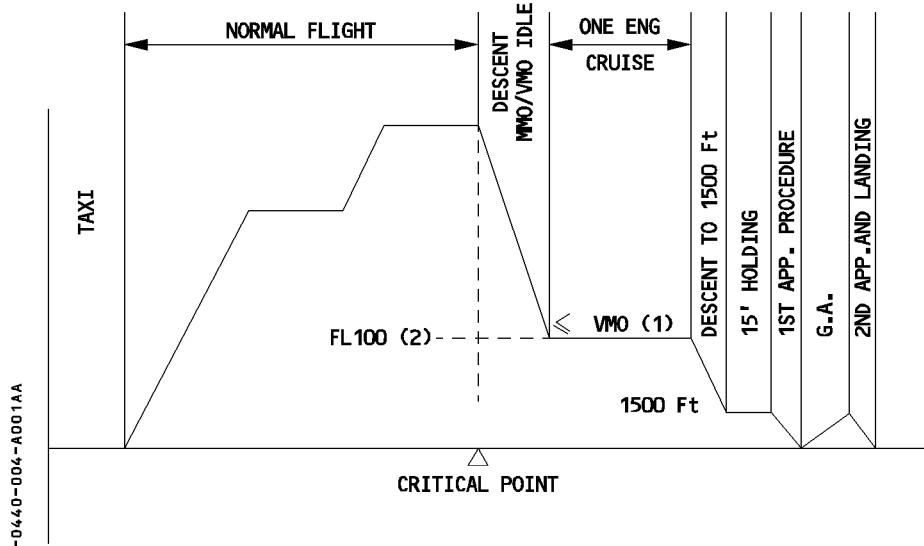
ELECTRICAL GENERATORS

Three generators are required for dispatch.

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 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 a 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 five 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 5 % of the fuel burned during the considered exposure time. If moderate icing is forecast, the above fuel provision is divided by two.

- If the APU is needed as a power source (MEL), its fuel consumption must be considered: 80 kg/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 are not provided as this scenario is never critical.

WEATHER MINIMA

- R Weather forecasts for en route alternates must meet the operator's applicable weather minimum requirements. If the applicable requirement is AC 120-42A or AMC 20-6 the 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 one 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 that 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		

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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
 - If one IDG fails, a diversion is required in case of :
 - Blue hydraulic circuit low level, low air pressure or overheat, or
 - APU no start, or
 - APU or APU generator inoperative, or
 - Second IDG failure.
- 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.
- Hydraulic system :

If low level, low air pressure or overheat on blue hydraulic circuit, a diversion is required in case of :

 - One IDG failure, or
 - APU no start, or
 - APU/APU GEN failure.
- APU :

If APU/APU GEN fails, a diversion is required in case of :

 - Blue hydraulic circuit low level, low air pressure or overheat, or
 - One IDG failure.

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 enroute alternate is the most suitable (per company procedure).
- Divert to the chosen enroute 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 in conducting the diversion (lateral and vertical navigation), see the FMGS Pilot's Guide (FCOM Volume 4).

PROCEDURES

The SOP (FCOM 3.03) and ABN and EMER procedures (FCOM 3.02) apply. For ETOPS flights, the flight crew must complete them using the procedures given below :

COCKPIT PREPARATION

Fuel

Before each flight, the flight crew must check that the fuel crossfeed valve is operating correctly :

- **FUEL X FEED ON**
On the ECAM FUEL page check that the fuel crossfeed valve is open (indication is inline green).
- **FUEL X FEED OFF**
Check that the fuel crossfeed valve is closed.

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		SEQ 120	REV 30

ABN AND EMER PROCEDURES

ELECTRICAL EMERGENCY CONFIGURATION :

In case of electrical emergency configuration, it may be better to study the STATUS on the paper checklist, after having applied ECAM actions.

The flight crew must complete the ECAM procedure using the following :

Air conditioning :

As cockpit and cabin temperature control is lost, it is recommended to open the cockpit door.

Fuel :

As all fuel pumps are lost, the engines are fed by gravity. Refer to 3.02.28 (Fuel gravity feed procedure).

Engine anti-ice :

Engine anti-ice valves are permanently open, although the ECAM memo ENG A. ICE is not displayed on the ECAM (except if the ENG A. ICE pushbutton is at ON).

Wing anti-ice :

If only one ENG BLEED is available, PACK 1 must be switched OFF, to avoid having both packs and wing anti-ice supplied by a single bleed source.

Engine :

As the engines are in N1 unrated mode, the power setting has to be done using tables given in FCOM 3.05.06 page 11 and following.

AVIONIC VENTILATION

Disregard the message : "MAX FLT TIME 2 HOURS", which is displayed on the ECAM in some failure cases.

BLUE HYDRAULIC LOW LEVEL

Start the APU to ensure availability of the APU generator.

For ETOPS operations, any one of the above diversion strategies can be used provided that the selected strategy and speed schedule are used in :

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	EXTENDED RANGE OPERATIONS	SEQ 212	REV 38

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Fuel :

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Before each flight, the flight crew must check that the fuel crossfeed valve is operating correctly :

- **FUEL X FEED ON**
On the ECAM FUEL page check that the fuel crossfeed valve is open (indication is inline green).
- **FUEL X FEED OFF**
Check that the fuel crossfeed valve is closed.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS	2.04.40	P 10
	EXTENDED RANGE OPERATIONS	SEQ 222	REV 38

ABN AND EMER PROCEDURES

ELECTRICAL EMERGENCY CONFIGURATION :

In case of electrical emergency configuration, it may be better to study the STATUS on the paper checklist, after having applied ECAM actions.

The flight crew must complete the ECAM procedure using the following :

Air conditioning :

As cockpit and cabin temperature control is lost, it is recommended to open the cockpit door.

Fuel :

As all fuel pumps are lost, the engines are fed by gravity. Refer to 3.02.28 (Fuel gravity feed procedure).

Engine anti-ice :

Engine anti-ice valves are permanently open, although the ECAM memo ENG A. ICE is not displayed on the ECAM (except if the ENG A. ICE pushbutton is at ON).

Wing anti-ice :

If only one ENG BLEED is available, PACK 1 must be switched OFF, to avoid having both packs and wing anti-ice supplied by a single bleed source.

Engine :

As the engines are in N1 unrated mode, the power setting has to be done using tables given in FCOM 3.05.06 page 11 and following.

BLUE HYDRAULIC LOW LEVEL

Start the APU to ensure availability of the APU generator.

ENGINE OR IDG FAILURE

Start the APU and use the APU electrical channel.

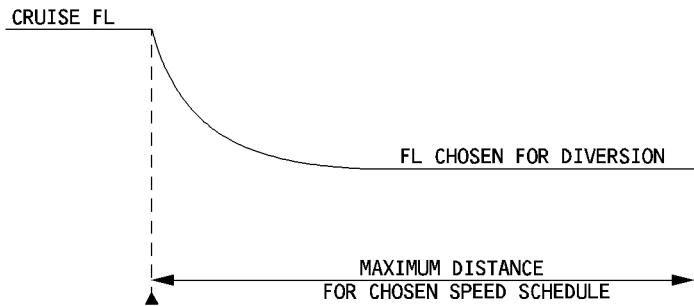
PERFORMANCE

The two following cases result in a fuel consumption increase :

- RAT extended (Refer to ELEC EMER proc. 3.02.24).
- in electrical emergency configuration, the engine anti-ice valves are permanently open.

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

NFC5-02-0440-010AA010AA



ENGINE OR IDG FAILURE

Start the APU and use the APU electrical channel.

PERFORMANCE**ONE ENGINE NET CEILINGS**

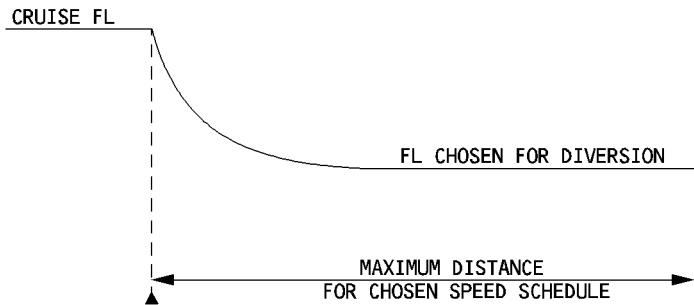
In case of electrical emergency configuration, the remaining engine reverts to N1 unrated mode. Consequently the penalties on net ceilings given in FCOM 3.05.06 page 11 must be taken into account for ETOPS part of the flight.

The two following cases result in a fuel consumption increase :

- RAT extended (Refer to ELEC EMER proc. 3.02.24).
- in electrical emergency configuration, the engine anti-ice valves are permanently open.

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

NFC5-02-0440-010AA050AA



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.

Aircraft	MTOW		Distance (NM)
	(kg)	(lb)	
A319-111/112 CFM56-5B5/B6	64000 to 70000	141094 to 154322	394
	73500	162038	389
	75500	166448	387
A319-113/114 CFM56-5A4/A5	64000	141094	402
	68000	149913	397
	70000	154322	394
	75500	166447	386
A319-115 CFM56-5B7	64000 to 70000	141094 to 154322	410
	75500	166447	407
A319-131/-132 IAE V2524-A5 / IAE V2527M-A5	64000 to 70000	141094 to 149913	394
	73500	154322	389
	75500	166448	405
A319-133 IAE V2527M-A5	64000 to 70000	141094 to 154322	410
	75500	166447	407

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.

Aircraft	MTOW		Distance (NM)
	(kg)	(lb)	
A320-111 CFM56-5A1	66000	145504	393
	68000	149913	390
A320-211/212 CFM56-5A1/A3	66000 to 67000	145504 to 147708	391
	68000 to 70000	149913 to 154322	388
	71500	157629	385
	73500	162038	382
	75500	166447	379
	77000	169754	376
A320-214 CFM56-5B4	70000	154322	406
	71500	157629	406
	73500 to 77000	162038 to 169754	397
A320-231 IAE V2500-A1	66000 to 68000	149913 to 154322	414
	70000 to 71500	154322 to 157629	411
	73500	162038	408
	75500	166447	405
	77000	169754	403
A320-232/233 IAE V2527-A5/ IAE V2527E-A5	70000	154322	417
	71500	157629	416
	73500	162038	415
	75500 to 78000	166447 to 171959	412

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.

Aircraft	MTOW		Distance (NM)
	(kg)	(lb)	
A320-111 CFM56-5A1	66000	145504	393
	68000	149913	390
A320-211/212 CFM56-5A1/A3	66000 to 67000	145504 to 147708	391
	68000 to 70000	149913 to 154322	388
	71500	157629	385
	73500	162038	382
	75500	166447	379
	77000	169754	376
A320-214 CFM56-5B4	70000	154322	406
	71500	157629	406
	73500 to 77000	162038 to 169754	397
A320-231 IAE V2500-A1	66000 to 68000	149913 to 154322	414
	70000 to 71500	154322 to 157629	411
	73500	162038	408
	75500	166447	405
	77000	169754	403
A320-232/233 IAE V2527-A5/ IAE V2527E-A5	70000	154322	427
	71500	157629	426
	73500	162038	426
	75500 to 78000	166447 to 171959	423

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)	
A318-111 CFM56-5B8/P	56000	123458	397
	59000	130072	395
	61000 to 64000	134481 to 141095	391
	64500 to 67000	142198 to 147709	388
	68000	149914	386
A318-112 CFM56-5B9/P	56000	123458	403
	59000	130072	401
	61000 to 64000	134481 to 141095	398
	64500 to 67000	142198 to 147709	395
	68000	149914	393
A318-121 PW6122A	56000	123458	399
	59000	130072	396
	61000 to 64000	134481 to 141095	391
	64500 to 68000	142198 to 149914	387
A318-122 PW6124A	56000	123458	400
	59000	130072	397
	61000 to 64000	134481 to 141095	393
	64500 to 68000	142198 to 149914	388

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.

Aircraft	MTOW		Distance (NM)
	(kg)	(lb)	
A319-111/112 CFM56-5B5/B6	64000 to 70000	141094 to 154322	394
	73500	162038	389
	75500	166448	387
A319-113/114 CFM56-5A4/A5	64000	141094	402
	68000	149913	397
	70000	154322	394
	75500	166447	386
A319-115 CFM56-5B7	64000 to 70000	141094 to 154322	410
	75500	166447	407
A319-131/-132 IAE V2524-A5 / IAE V2522-A5	64000 to 70000	141094 to 149913	394
	73500	154322	389
	75500	166448	405
A319-133 IAE V2527M-A5	64000 to 70000	141094 to 154322	425
	75500	166447	421

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

ISA						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VMO	45000	170	402	598	795	—
	50000	170	400	594	789	985 1181
	55000	170	397	589	782	975 1170
	60000	170	392	582	773	964 1156
	65000	170	388	574	761	949 1139
MCT/320 KT	45000	170	402	599	795	—
	50000	170	400	595	790	985 1181
	55000	170	397	589	782	976 1170
	60000	170	393	583	773	964 1156
	65000	170	388	575	762	950 1139

ISA + 10						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VMO	45000	170	409	609	809	—
	50000	170	407	605	803	1002 1202
	55000	170	404	599	796	993 1190
	60000	170	400	593	786	981 1176
	65000	170	395	584	775	966 1159
MCT/320KT	45000	170	410	609	809	—
	50000	170	407	605	804	1002 1202
	55000	170	404	600	796	993 1191
	60000	170	400	593	787	981 1177
	65000	170	396	585	776	967 1160

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)

FUEL
 CONSUMPTION
 (1000KG)

15

GROSS WEIGHT
 AT CRITICAL POINT
 (1000KG)

65

55

45

35

25

15

10

7.5

5

2.5

-100kt

Head wind

0

Tail wind

+100kt

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250 500 750 1000 1250 1500
 DISTANCE (NM)

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

ISA						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VMO	45000	170	414	616	819	-
	50000	170	413	615	817	1019
	55000	160	413	614	814	1015
	60000	160	413	612	812	1012
	65000	150	412	610	809	1008
	70000	140	412	609	806	1004
MCT/320 KT	45000	170	414	616	819	-
	50000	170	413	615	817	1019
	55000	160	413	614	814	1015
	60000	160	413	612	812	1012
	65000	150	412	610	807	1005
	70000	150	411	608	805	1002

ISA + 10						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VMO	45000	170	422	628	-	-
	50000	170	422	627	832	1038
	55000	170	421	625	830	1035
	60000	170	420	623	827	1031
	65000	170	418	620	823	1025
	70000	150	419	619	820	1021
MCT/320KT	45000	170	422	628	-	-
	50000	170	422	627	832	1038
	55000	170	421	625	830	1035
	60000	170	420	623	827	1031
	65000	170	418	620	823	1026
	70000	150	417	617	818	1019

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)

FUEL
 CONSUMPTION
 (1000KG)

15

GROSS WEIGHT
 AT CRITICAL POINT
 (1000KG)

12.5

10

7.5

5

2.5

-100kt

Head wind

0

Tail wind

+100kt

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250 500 750 1000 1250 1500

DISTANCE (NM)

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

ISA						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VM0	50000	210	427	637	847	1057
	55000	200	428	636	845	1054
	60000	200	426	634	841	1049
	65000	180	427	633	840	1046
	70000	170	427	631	836	1042
	75000	150	427	630	833	1037
	80000	130	426	628	830	1032
MCT/320KT	50000	210	427	637	847	1057
	55000	200	426	635	843	1053
	60000	200	425	632	840	1048
	65000	190	423	629	835	1042
	70000	180	421	626	831	1036
	75000	170	419	622	825	1029
	80000	160	416	617	817	1018

ISA + 10						
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)			
			60	90	120	150
MCT/VM0	50000	220	434	648	861	1075
	55000	200	436	648	860	1073
	60000	200	434	645	857	1069
	65000	180	436	645	855	1065
	70000	170	435	643	852	1061
	75000	160	434	640	847	1055
	80000	130	434	639	845	1051
MCT/320KT	50000	220	435	648	862	1076
	55000	210	434	646	859	1072
	60000	200	433	644	855	1067
	65000	190	431	641	851	1061
	70000	180	429	637	846	1055
	75000	170	427	633	840	1048
	80000	160	424	629	833	1037

R

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)

FUEL
 CONSUMPTION
 (1000KG)

15

GROSS WEIGHT
 AT CRITICAL POINT
 (1000KG)

75

65

55

45

35

25

15

5

5

5

5

5

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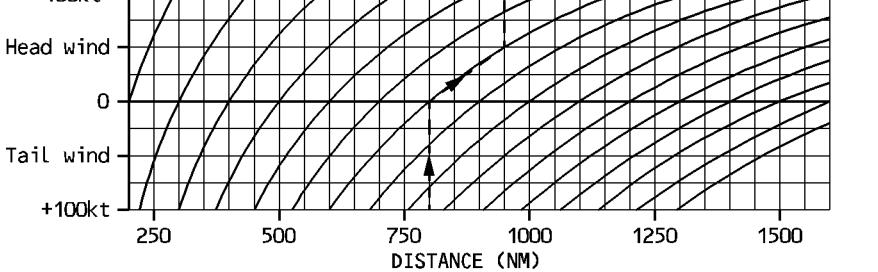
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MAXIMUM DISTANCE (Still air) TO DIVERSION AIRPORT IN NAUTICAL MILES (cont'd)

SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	ISA				
			60	90	120	150	180
MCT/VMO	50000	200	419	623	828	1033	1237
	55000	200	418	621	825	1028	1232
	60000	190	418	620	822	1024	1227
	65000	170	419	619	820	1021	1223
	70000	160	419	618	817	1017	1217
	75000	130	420	618	816	1014	1212
	80000	120	419	615	812	1009	1206
MCT/320KT	50000	200	420	624	828	1033	1238
	55000	200	419	622	825	1029	1233
	60000	190	417	619	821	1024	1227
	65000	170	417	617	818	1019	1220
	70000	160	415	614	813	1013	1213
	75000	150	413	610	808	1005	1203
	80000	140	410	605	800	995	1190

SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	ISA + 10				
			60	90	120	150	180
MCT/VMO	50000	200	427	635	843	1052	1260
	55000	200	426	633	840	1047	1255
	60000	200	424	630	836	1042	1248
	65000	170	427	631	835	1040	1245
	70000	160	427	629	832	1035	1239
	75000	130	428	629	830	1032	1234
	80000	120	427	627	827	1027	1228
MCT/320KT	50000	210	427	635	843	1052	1260
	55000	200	427	633	840	1048	1256
	60000	190	425	631	837	1043	1249
	65000	170	424	628	833	1037	1242
	70000	160	423	625	828	1031	1235
	75000	150	421	621	823	1024	1226
	80000	140	418	617	815	1014	1212

R

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)

FUEL
 CONSUMPTION
 (1000KG)

15

GROSS WEIGHT
 AT CRITICAL POINT
 (1000KG)

75

65

55

45

35

25

15

5

5

5

5

5

5

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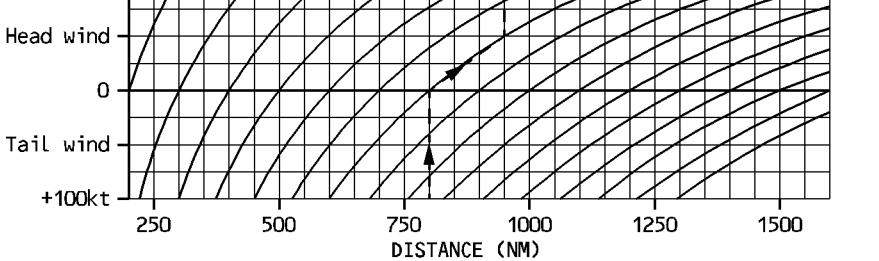
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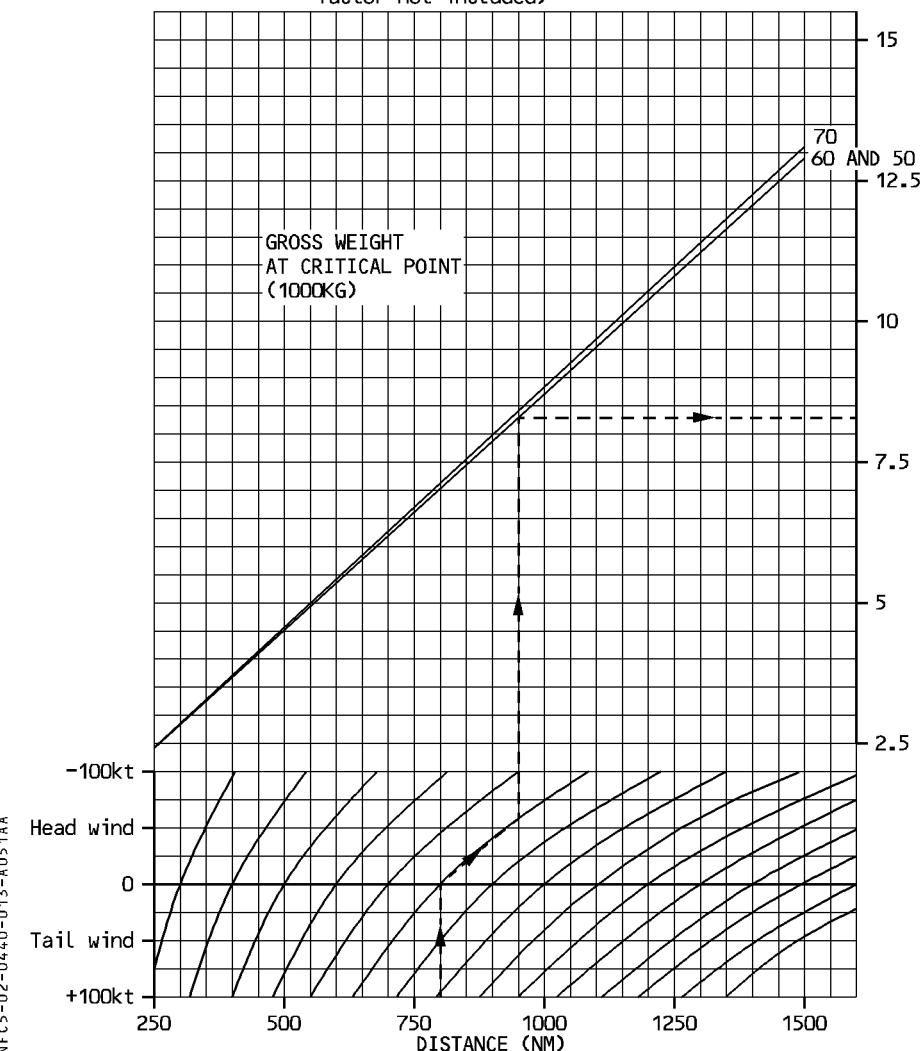
NFC5-02-044-012-A055AA



ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 350KT

Including: emergency descent-cruise 350kt 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)

FUEL
CONSUMPTION
(1000KG)

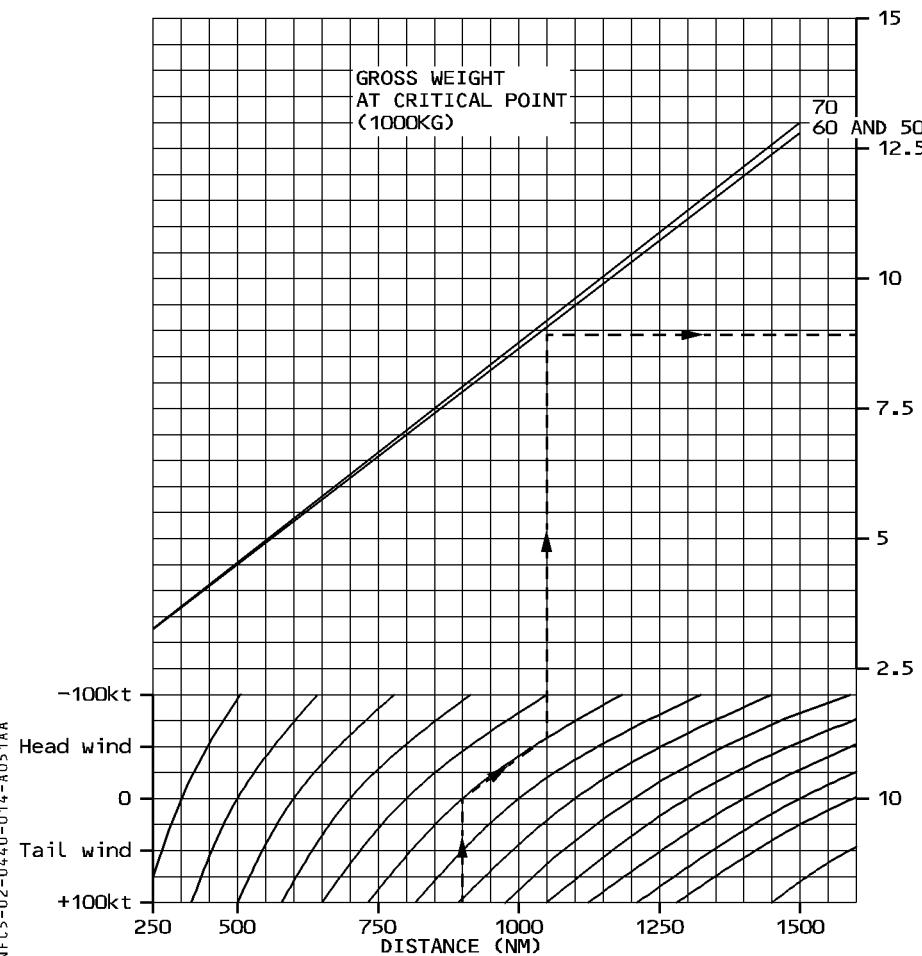


**ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 320KT**

Including: emergency descent-cruise 320kt at FL100
final descent 250kt-holding 15 min at FL15

IFR procedure-Go Around-2nd VFR procedure

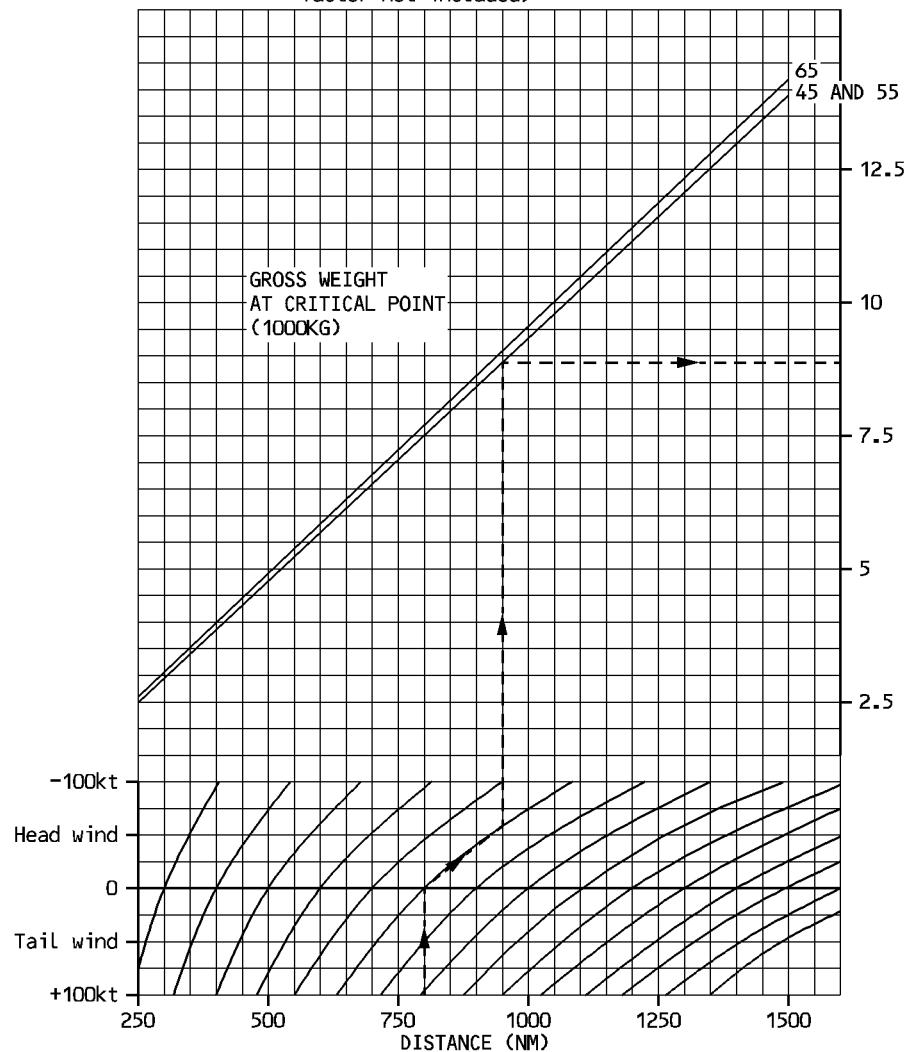
5% allowance for wind errors-APU fuel burn
(NAI + WAI + effect of ice accretion + performance FUEL
factor not included) CONSUMPTION
(1000KG)



ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 350KT

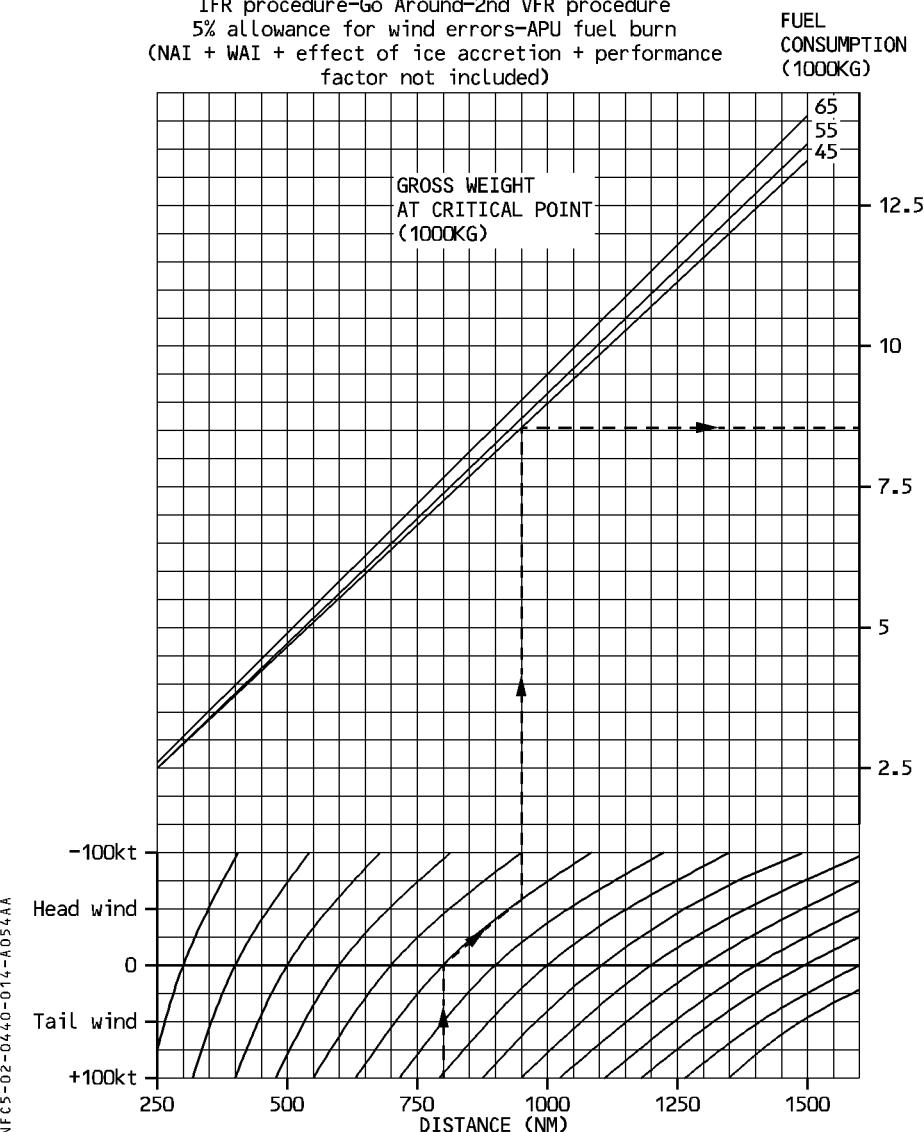
Including: emergency descent-cruise 350kt at FL100
final descent 250kt-holding 15 min at FL15
IFR procedure-Go Around-2nd VFR procedure
5% allowance for wind errors-APU fuel burn
(NAI + WAI + effect of ice accretion + performance
factor not included)

FUEL
CONSUMPTION
(1000KG)



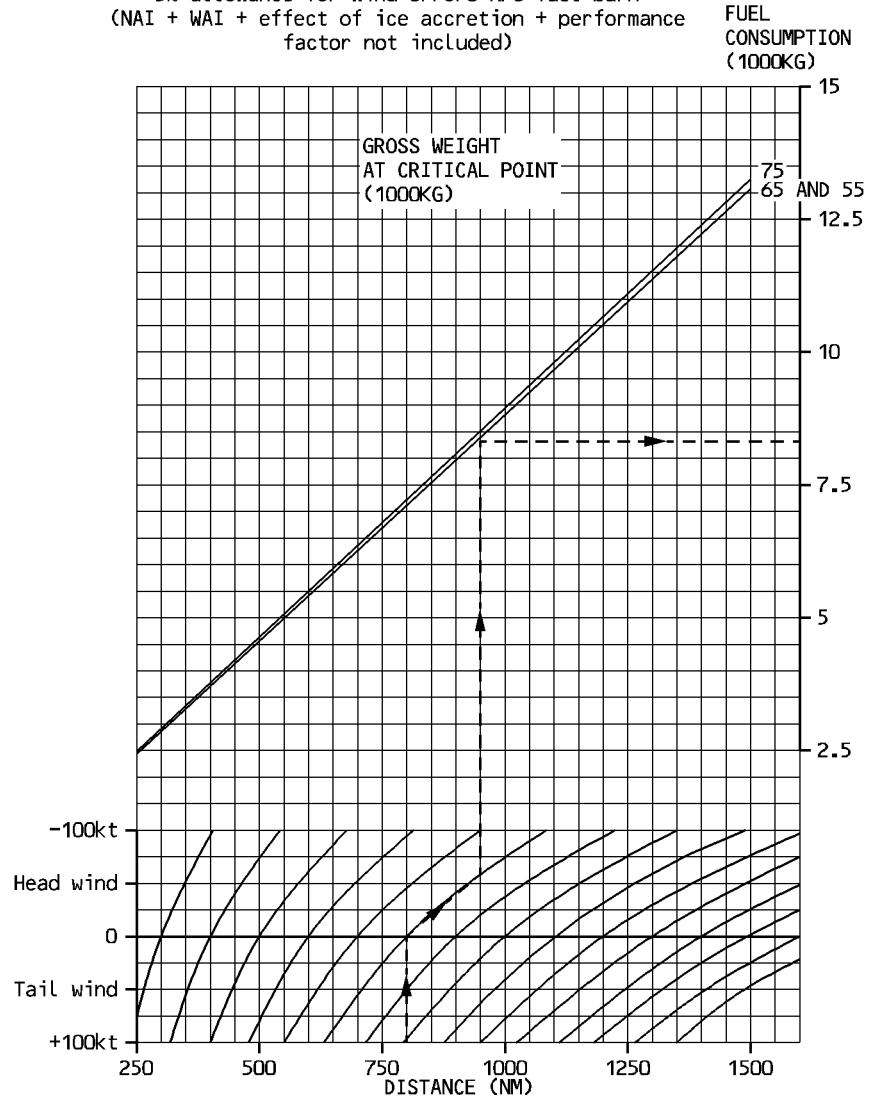
**ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 320KT**

Including: emergency descent-cruise 320kt 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)



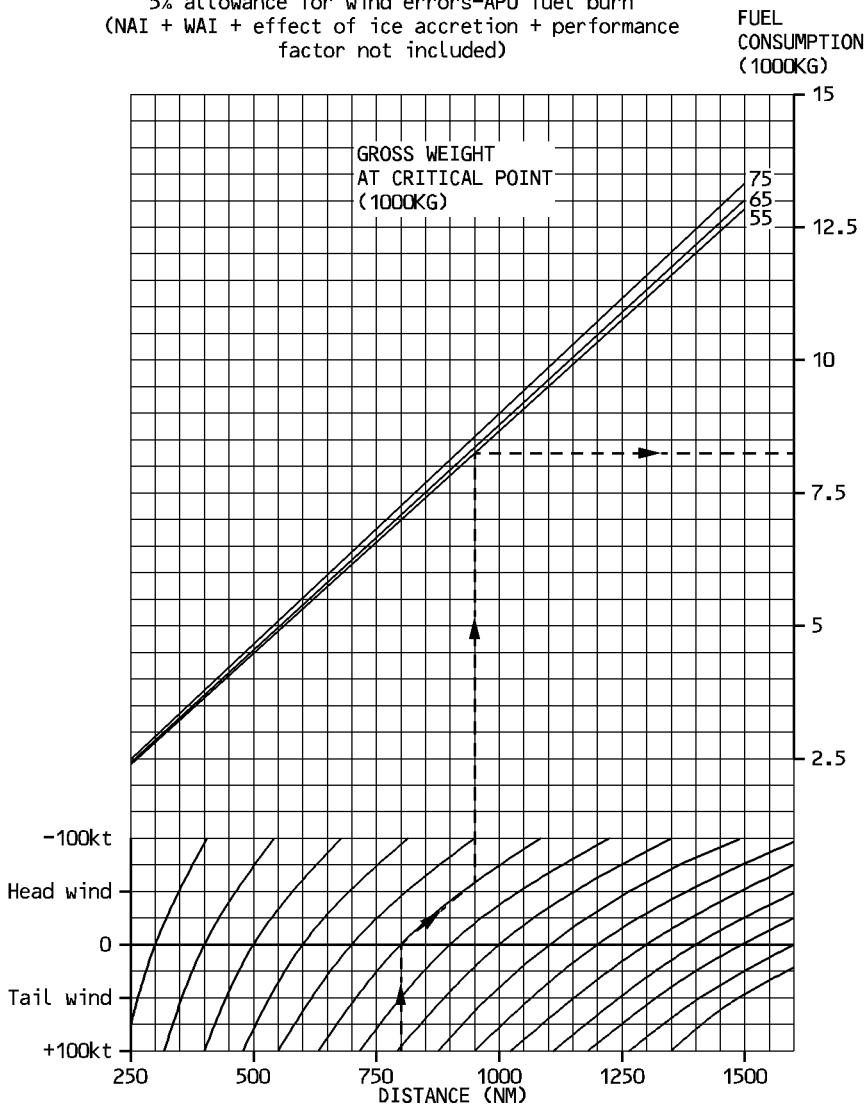
ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING
ONE ENGINE OUT-CRUISE AT 350KT

Including: emergency descent-cruise 350kt 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 320KT**

Including: emergency descent-cruise 320kt 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 aircraft 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 for obtaining operational approval.

REQUIRED EQUIPMENT/FUNCTIONS FOR RVSM

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

- ADR1 + ADR2 + 2 DMC
- 1 transponder
- 1 Autopilot function
- 1 FCU channel (for altitude target selection and OP CLB/OP DES mode engagement)
- R – 2 PFD functions (for altitude indication)
- 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 any defects of required equipment.
- Check that the PFD altitude indication (QNH reference) of ADR1, and also of ADR2, does not differ from the airport elevation by more than 75 feet.
- Check, on ground, that the difference between the altitude indications from ADR1 and ADR2 is less than the tolerance specified in paragraph 3.04.34 "Maximum Differences Between Altitude Indications".

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IN FLIGHT PROCEDURES

PRIOR TO RVSM AIRSPACE ENTRY

The above-listed equipment, required for RVSM, must be operating normally. Should any of this equipment fail prior entering the RVSM airspace, the crew must request new clearance, to avoid flight in this airspace. The two primary altitude indications (PFD indications from ADR1 and ADR2) should be in accordance with the instrument tolerance (3.04.34). If only two ADRs are operative, the altimeter indications on the PFD and standby altimeters should be recorded. This information may be useful in case of subsequent PFD altitude discrepancies, or the loss of both remaining ADRs.

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 instrument tolerance (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 of the height-keeping systems, including the :

- Malfunction, or loss of any required equipment,
 - Altimeter readings outside tolerances specified in 3.04.34,
- and must provide sufficient details to enable maintenance to troubleshoot and repair the system.

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 aircraft 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 for obtaining operational approval.

REQUIRED EQUIPMENT/FUNCTIONS FOR RVSM

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

- 2 ADR + 2 DMC
- 1 transponder
- 1 Autopilot function
- 1 FCU channel (for altitude target selection and OP CLB/OP DES mode engagement)
- R – 2 PFD functions (for altitude indication)
- 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 any defects of required equipment.
- Check that the PFD altitude indication (QNH reference) of ADR1, and also of ADR2, does not differ from the airport elevation by more than 75 feet.
- Check, on ground, that the difference between the two primary altitude indications is less than the tolerance specified in paragraph 3.04.34 "Maximum Differences Between Altitude Indications".

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FLIGHT CREW OPERATING MANUAL	RVSM	SEQ 210	REV 37

IN FLIGHT PROCEDURES

PRIOR TO RVSM AIRSPACE ENTRY

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

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 instrument tolerance (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 loss of any required equipment,
 - Altimeter readings outside tolerances specified in 3.04.34,
- and must provide sufficient details to enable maintenance to troubleshoot and repair the system.

ABN AND EMER PROCEDURES

When in RVSM airspace, the ATC will be notified of any of the following contingencies which affect the ability to maintain the cleared flight level.

- Failure of both autopilots,
- Loss of altimeter system redundancy (only one PFD indication remaining), or excessive altimeter discrepancy (200 ft).
- Failure of any other equipment affecting the ability to maintain the cleared flight level, or
- Encountering greater than moderate turbulence.
- Loss of ADR1 or ADR2. If ADR1 fails, use the AP2, if ADR2 fails, use AP1.
If the AP is unable to maintain the assigned altitude, select the other AP.

R *Note : The flight crew can obtain the contingency procedures for flying in Minimum Navigation Performance Specification (MNPS) airspace by referring to specific 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.

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), or excessive altimeter discrepancy (200 ft).
- 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 Navigation Performance Specification (MNPS) airspace by referring to specific 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)

- R European BRNAV (RNP-5) and P-RNAV (RNP-1) capability meets the certification requirements of JAA TGL 2 and TGL 10. Terminal and en-route RNAV operations comply 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 the 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 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 be 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.

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Without GPS PRIMARY function

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

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

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

- If manual entry of a required accuracy is desired, enter 5NM 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.

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 a 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)

- R European BRNAV (RNP-5) and P-RNAV (RNP-1) capability meets the certification requirements of JAA TGL 2 and TGL 10. Terminal and en-route RNAV operations comply 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 the 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 is 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 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.

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Without GPS PRIMARY function

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

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

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

- If manual entry of a required accuracy is desired, enter 5NM 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 navigation accuracy with navaid raw data, or with the GPS MONITOR page (if GPS installed) :
 - NAV ACCUR DOWNGRAD
 - FMS1/FMS2 POS DIFF
 - CHECK A/C POSITION
 - ECAM : FM/GPS POS DISAGREE (if GPS installed)
- If the accuracy check confirms that RNP-5 capability is lost, or if both FMGCs have failed : Inform the ATC, and revert to conventional navigation.
- If the accuracy check confirms that only one FMGC position is incorrect, resume navigation with the other FMGC.

In inertial navigation, BRNAV capability is maintained for 2 hours, independently of the estimated accuracy displayed on the 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 the GPS.

Minimum required equipment to enter RNP-10 airspace is :

- Two long range navigation systems, which means :
 - Two FMGCs
 - Two MCDUs
 - One GPS, required by flight time outside radio navaid coverage
 - Two IRS

Also refer to the Regional Supplementary Procedures (ICAO Doc 7030) for specific requirements in a particular airspace.

PROCEDURES

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

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

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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, ISDU and GPS MONITOR page (if GPS installed) :
 - FMS1/FMS2 POS DIFF
 - CHECK A/C POSITION
 - ECAM : FM/GPS POS DISAGREE (if GPS installed)
- 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 that the radio navaid coverage supports the RNP-1 accuracy. Otherwise, the procedure may specify that GPS equipment is required (refer to the published procedure chart). The minimum equipment required to fly a P-RNAV or RNP-1 procedure is :
 - One RNAV system, which includes :
 - One FMGC
 - One MCDU
 - One GPS receiver, or one VOR and one DME, for FM navigation update*
 - One IRS, and
 - One FD in NAV mode.
 - 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 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 from the FM navigation database and checked for reasonableness, by comparing the waypoints, tracks, distances and altitude constraints (displayed on the F-PLN page), with the procedure chart.
- R The flight crew must not modify the procedure, that is loaded from the navigation database, unless instructed to do so by the ATC (DIR TO, radar vectoring, insertion of waypoints loaded from the navigation database).

- If one of the following MCDU or ECAM messages is displayed, check navigation accuracy with the navaid raw data, or with the 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)
- If the accuracy check confirms that RNP-5 capability is lost, or if both FMGCs have failed : Inform the ATC, and revert to conventional navigation.
- If the accuracy check confirms that only one FMGC position is incorrect, resume navigation with the other FMGC.

In inertial navigation, BRNAV capability is maintained for 2 hours, independently of the estimated accuracy displayed on the 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, 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 the last the FM radio update.

There is no limitation for aircraft fitted with the GPS.

Minimum required equipment to enter RNP-10 airspace is :

- Two long range navigation systems, which means :
 - Two FMGC
 - Two MCDU
 - One GPS required by flight time outside radio navaid coverage
 - Two IRS

Also refer to the Regional Supplementary Procedures (ICAO Doc 7030) for specific requirements in a particular airspace.

PROCEDURES

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

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

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

- R — If one of the following MCDU or ECAM messages is displayed, check navigation with POSITION MONITOR page, ISDU or IRS 1(2)(3) 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)
- 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 that the radio navaid coverage supports the RNP-1 accuracy. Otherwise, the procedure may specify that GPS equipment is required (refer to the published procedure chart). The minimum equipment required to fly a P-RNAV or RNP-1 procedure is :
 - One RNAV system, which includes :
 - One FMGC
 - One MCDU
 - One GPS receiver, or one VOR and one DME, for FM navigation update*
 - One IRS, and
 - One FD in NAV mode.
 - 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 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 from the FM navigation database and checked for reasonableness, by comparing the waypoints, tracks, distances and altitude constraints (displayed on the F-PLN page), with the procedure chart.
- R The flight crew must not modify the procedure, that is loaded from the navigation database, unless instructed to do so by the ATC (DIR TO, radar vectoring, insertion of waypoints 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 available (GPS PRIMARY displayed on the MCDU PROG page).
- R – If GPS PRIMARY is not available before starting the procedure, inform the ATC, and 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 of capability, and 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 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 HIGH accuracy is available. When completing the terminal procedure, revert to the 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, navigation may be continued using the other FMGC.

GENERAL

This chapter gives the limitations, procedures and performance for operations from/to runways with a width below 45 m.

This chapter does not constitute an operational approval to operate on narrow runways. Such authorization must be obtained by the operator from the appropriate authorities.

LIMITATIONS

– **Minimum runway width** 30 m

The dispatch from/to narrow runways is not allowed in case of :

- Nose wheel steering inoperative
- One brake or more inoperative

Autoland is not allowed.

PROCEDURES

Diversion to a 45 m wide runway is recommended in case of :

- Rudder jam
- Rudder pedal jam
- Yaw damper fault
- All failures leading to the loss of the nose wheel steering (HYD Green system loss, double hydraulic failure, double BSCU fault, double LGCIU fault)

Maximum demonstrated crosswind for takeoff and landing :

- R – **Dry runway** 38 kt (gust included) for takeoff and landing
- R – **Wet runway** 33 kt (gust included) for takeoff and landing
- R – **Contaminated runway** 10 kt (gust included) for takeoff and landing

Note : These maximum demonstrated crosswind values are based on the assumption that the crew have been trained accordingly.

Operations on icy runways have not been demonstrated.

PERFORMANCE

For runways with a width above or equal to 40 m., the basic takeoff performance remains unchanged.

R For runways with a width below 40 meters, the VMCG must be increased by the values indicated in the following table :

R

Runway Width	30 meters	35 meters	40 meters
△ VMCG (kt)	+ 2.5	+ 1.5	+ 0

No correction is required, when takeoff performance is determined by using the applicable approved data.

The minimum V1 values, published in the FCOM 2.02.25, must be increased by 3 kt.

When using the takeoff performance for contaminated runways (FCOM 2.04.10), or the quick reference tables (FCOM 2.02.40), the resulting V1 must be crosschecked with the corrected minimum V1.

Further decrease the takeoff weight by 3 tons per knot increase in V1.

GENERAL

This chapter gives the limitations, procedures and performance for operations from/to runways with a width below 45 m.

This chapter does not constitute an operational approval to operate on narrow runways. Such authorization must be obtained by the operator from the appropriate authorities.

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- Nose wheel steering inoperative
- One brake or more inoperative

Autoland is not allowed.

PROCEDURES

Diversion to a 45 m wide runway is recommended in case of :

- Rudder jam
- Rudder pedal jam
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- All failures leading to the loss of the nose wheel steering (HYD Yellow system loss, double hydraulic failure, double BSCU fault, double LGCIU fault)

Maximum demonstrated crosswind for takeoff and landing :

- R – **Dry runway** 38 kt (gust included) for takeoff and landing
- R – **Wet runway** 33 kt (gust included) for takeoff and landing
- R – **Contaminated runway** 10 kt (gust included) for takeoff and landing

Note : These maximum demonstrated crosswind values are based on the assumption that the crew have been trained accordingly.

Operations on icy runways have not been demonstrated.

PERFORMANCE

For runways with a width above or equal to 40 m., the basic takeoff performance remains unchanged.

R For runways with a width below 40 meters, the VMCG must be increased by the values indicated in the following table :

R

Runway Width	30 meters	35 meters	40 meters
△ VMCG (kt)	+ 2.5	+ 1.5	+ 0

No correction is required, when takeoff performance is determined by using the applicable approved data.

The minimum V1 values, published in the FCOM 2.02.25, must be increased by 3 kt.

When using the takeoff performance for contaminated runways (FCOM 2.04.10), or the quick reference tables (FCOM 2.02.40), the resulting V1 must be crosschecked with the corrected minimum V1.

Further decrease the takeoff weight by 3 tons per knot increase in V1.

GENERAL

At El Salvador (SCES), the mean runway slope is 3.15 %. This chapter gives the limitations, procedures and performance for operation from/to this runway.

This chapter does not constitute an operational approval to operate on this runway. Such authorization must be obtained by the operator from the appropriate authorities.

LIMITATIONS

At El Salvador, the mean runway slope is 3.15 %.

Takeoff must be performed downhill.

Landing must be performed uphill.

Autoland is not allowed.

PROCEDURES

Minimum approach speed is VLS + 5 kt.

PERFORMANCE

The Performance Engineering Program/AFM_OCTO Flight Manual modules at the approved revision given in AFM 5.02.00 have to be used for takeoff and landing.

Takeoff performance must be computed by entering the mean runway slope.

Landing distance determination does not require any speed increment.

GENERAL

Some airlines may occasionally experience high barometric correction settings above 1050 hPa, or 31.0 inHg on some airfields, due to polar anticyclonic air mass conditions occurring near the polar area during winter.

The FCU, PFD, ISIS and CPCS are capable of operating at QNH/QFE up to 1100 hPa, or 32.48 inHg.

- R The FMGS is currently limited to 1050 hPa for DEST QNH entry on the MCDU PERF APPR page (i.e. as long as the aircraft altitude remains above -1000 feet standard pressure altitude).
- R When the Standard Pressure altitude becomes less than -1000 feet STD, the FMS is no longer capable to compute the aircraft position.

In addition, the ATC/TCAS operates only up to 1050 hPa (that is as long as the aircraft altitude remains above -1000 feet standard pressure altitude).

Therefore, when using QNH, or QFE for QFE pin-programmed aircraft, for departure and arrival, the crew should be aware of the following consequences, and should apply the following procedures.

It is necessary for the airline to obtain operational approval from its national airworthiness authority.

CONSEQUENCES**On the ATC-TCAS :**

For takeoff, approach and landing, the ATC altitude reporting and the TCAS TA/RA function may generate erroneous altitude information and nuisance TCAS alerts for other aircraft, if the aircraft standard altitude is below -1000 feet standard pressure altitude.

To avoid this, it is recommended to set the ALT RPTG to OFF when the QNH exceeds 1050 hPa, and to inform the ATC. As a consequence the TCAS reverts to STBY mode.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS OPERATIONS AT QNH ABOVE 1050 hPa	2.04.65 P 2	
		SEQ 200	REV 37

On cabin pressurization :

The CPCS normally uses the MCDU DEST QNH value to regulate cabin pressure during descent. However, since DEST QNH entries on the MCDU are limited to 1050 hPa, no DEST QNH value should be entered during descent preparation, in order to avoid incorrect cabin pressure regulation. As a backup, the CPCS will use the actual FCU barometric setting (when switching from STD to Baro reference).

In case of QFE use at arrival, the CPCS will erroneously use the FCU-selected QFE as a QNH setting. To ensure correct re-pressurization of the cabin when QFE is used, the Landing Field Elevation must be manually set to 0.

Note : *As no DEST QNH is entered, the FMS initially assumes that Standard barometric reference will be kept down to destination for descent flight path calculations. When QNH is set on the FCU, the aircraft and cabin altitude will be higher than expected (the aircraft altitude can be up to 2000 feet higher than expected). This will lead to a higher descent rate, with a possible "CAB PR LO DIFF PR" ECAM caution, and possible opening of the cabin pressure safety valve.*

On the FMS :

· Descent profile :

In the descent phase, when the crew switches from Standard to Barometric reference, the FMS tries to catch up with an altitude increase induced by the baro reference change. This altitude difference may be up to + 2000 feet, depending on the QNH value. However, the FMS predictions and the VDEV remain unchanged. Consequently, an altitude constraint, just below the Descent Transition Level, may still be predicted as "satisfied", and actually flown with a positive error. This altitude difference will gradually be zeroed, as the aircraft catches up with the descent profile.

Note : *As no DEST QNH value is entered on the MCDU PERF APPR page, the FMS is unable to compute the Descent Transition Level. So, the "STD" baro reference on the PFD will not flash when descending through the Transition Level.*

- R · Approach :
- R When the Standard Pressure altitude becomes less than -1000 feet STD, the FMS is no longer capable to compute the aircraft position. The associated ND display (in ARC or NAV mode) will subsequently be invalidated.
- R Therefore, non-precision approaches must not be performed using managed guidance.
- R The flight crew must perform non-precision approaches using selected lateral and vertical guidance, and raw data reference.

PROCEDURES

For departure :

- Before takeoff :
 - SET the ATC "ALT RPTG" to OFF (the TCAS reverts to STBY mode).
 - INFORM the ATC
- After takeoff :
 - SET the ATC "ALT RPTG" to ON above 1000 feet QNH, when time permits.

For Approach/Landing :

- During descent preparation :
 - DO NOT INSERT a DEST QNH value on the MCDU PERF APPR page.
 - For QFE use only, SET the LDG ELEV selector to 0.
- Before the final approach :
 - SET the ATC "ALT RPTG" to OFF (the TCAS reverts to STBY mode).
 - INFORM the ATC.

R **For non-precision approaches :**

- R – Perform non-precision approaches using selected lateral and vertical guidance, and raw data reference.

GENERAL

The purpose of this section is to give an additional procedure to improve the go-around climb performance (also called approach climb performance in the regulations). This procedure allows not to penalise the landing weight when operating in high and/or hot airport conditions.

This procedure provides the possibility of accelerating up to a target speed of 1.41 Vs1g when performing a go-around.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS HIGH/HOT AIRPORT OPERATION	2.04.70	P 2
		SEQ 100	REV 34

PROCEDURES

APPROACH

During the approach briefing, calculate the increase in the go-around target speed for the landing weight (see table in the paragraph speed determination). Verify also that the landing weight is not higher than the maximum allowed (corresponding to 1.41 Vs1g).

Note : Approach and landing is systematically performed in CONF3.

GO-AROUND

Apply the following three actions simultaneously :

- **THRUST LEVERS** **TOGA**
- **ANNOUNCE** **"GOAROUND-FLAPS 1"**
- **ROTATION** **PERFORM**
 - Rotate the aircraft to get a positive rate of climb, and establish the required pitch attitude, as directed by the SRS pitch command bar.
 - Check and announce the FMA : TOGA (or MAN TOGA), SRS, GA TRK.
- **FLAPS 1** **SELECT**
 - Retract two steps. Announce "FLAPS 1." when indicated.
- **ANNOUNCE** **"POSITIVE CLIMB"**
- **ORDER** **"GEAR UP"**
- **L/G UP** **SELECT**
- **CONFIRM/ANNOUNCE** **"GEAR UP-FLAPS 1"**
- **Immediately after positive climb is confirmed :**
 - **TARGET SPEED** **ADJUST AND PULL**
 - Select and pull the predetermined target speed on the FCU.

Note : The speed selection on the FCU must be made when above 150 ft RA.

- This action disengages the SRS mode and reverts to OPEN CLB.
- Accelerate to the new target speed following FD bars.
- When the target speed is reached resume climb to the GA altitude following the FD bars.

- NAV or HDG mode SELECT
 - Reselect NAV or HDG, as required.

■ **At go-around thrust reduction altitude (CLB or LVR CLB flashing on FMA)**

- THRUST LEVERS CL

■ **At go-around thrust acceleration altitude :**

- FCU SPEED PUSH or SELECT

- Push to select managed speed or select appropriate speed to accelerate.
- Retract flaps on schedule.

Note : Consider the next step :

- Engage NAV mode, to follow the published missed approach procedure, or
- Prepare for a second approach by selecting the ACTIVATE APP PHASE, and CONFIRM on the PERF page.

SPEED DETERMINATION

Use the table of the following page to determine the increase in the go-around speed as a function of the landing weight, the altitude and the OAT.

The values provided in the table are, for each cell :

MFC5-02-0470-003-A100AA

M1
V
M2

M1 = Maximum go-around weight for 1.23 Vs1g

V = Go-around speed for 1.23 Vs1g

M2 = Maximum go around weight for 1.41 Vs1g

Method to use the table :

- Determine the corrected maximum go-around weight for 1.23 Vs1g (corrected M1) using corrections at the bottom of following charts.
- If landing weight is lower than the corrected maximum go-around weight for 1.23 Vs1g (corrected M1), no target speed increment is necessary.
- If landing weight is higher than the corrected maximum go-around weight for 1.23 Vs1g (corrected M1), calculate the increase in the go-around target speed for the landing weight (see box placed at the bottom right of the following tables). Verify that the landing weight is not higher than the maximum allowed corresponding to 1.41 Vs1g (corrected M2), otherwise, the pilot should find a suitable diversion airport.

R Example : ((Actual landing weight-corrected M1)/160*1)) + V = G/A selected speed.

APPROACH CLIMB LIMITING WEIGHT (1000 KG)**ONE ENGINE OUT : CG=33.0%****ONE ENGINE AT GO AROUND THRUST****High Air Conditioning
Anti ice OFF****CONF
1+F**

PRESSURE ALTITUDE (FT)										
OAT (°C)	- 2000	0	2000	4000	6000	8000	9200	10000	12000	14100
< 10	71.2	71.3	68.0	64.4	61.9	61.0	60.5	60.0	55.9	51.4
	151	152	148	144	142	141	141	140	136	130
	77.3	77.2	73.8	69.7	66.9	66.2	66.0	65.6	61.0	56.0
20	70.9	71.1	67.8	64.3	60.6	58.2	58.0	57.8	51.9	47.0
	151	151	148	144	140	137	137	137	130	124
	77.0	77.0	73.6	69.6	65.5	63.2	63.1	62.7	56.2	50.9
22	70.9	71.0	67.8	64.2	59.2	57.3	57.0	56.0	50.5	46.1
	151	151	148	144	138	136	136	135	128	122
	77.0	76.9	73.6	69.5	64.1	62.2	61.9	60.7	54.6	49.8
24	70.8	71.0	67.7	63.0	58.0	56.3	55.4	54.0	49.4	45.2
	151	151	148	143	137	135	134	132	126	121
	76.9	76.9	73.5	68.3	62.9	61.1	60.0	58.4	53.4	48.8
26	70.8	70.9	67.7	61.7	56.9	55.1	53.7	52.3	48.2	44.1
	151	151	148	141	135	133	132	130	125	119
	76.9	76.8	73.5	66.8	61.6	59.7	58.0	56.4	52.1	47.7
28	70.8	70.9	66.6	60.3	55.6	53.8	52.2	50.8	47.2	
	151	151	147	139	134	132	130	128	123	
	76.8	76.8	72.2	65.4	60.3	58.3	56.5	55.0	51.1	
30	70.7	70.8	65.3	59.1	54.6	52.4	50.9	49.4	46.2	
	151	151	145	138	132	130	128	126	122	
	76.7	76.7	70.7	64.1	59.2	56.7	55.1	53.5	50.1	
32	70.7	69.5	64.0	58.0	53.6	51.2	49.5	48.3		
	150	150	143	136	131	128	126	124		
	76.7	75.3	69.4	62.9	58.1	55.5	53.6	52.3		
34	70.6	68.1	62.8	57.0	52.6	50.0	48.5	47.3		
	150	148	142	135	130	126	124	123		
	76.6	73.9	68.2	61.8	57.1	54.2	52.5	51.2		
36	69.3	66.8	61.6	55.9	51.7	49.1	47.4			
	149	146	140	134	128	125	123			
	75.2	72.5	66.9	60.7	56.1	53.2	51.4			
AIR CONDITIONING OFF ADD 1600 kg			ENGINE ANTI ICE ON SUBTRACT 80 kg up to 6000 ft 2500 kg above 6000 ft			TOTAL ANTI ICE ON SUBTRACT 1800 kg up to 4000 ft 6700 kg above 4000 ft			SPEED INCREASE PER 170 kg ADD 1 KT	

APPROACH CLIMB LIMITING WEIGHT (1000 KG)			
ONE ENGINE OUT : CG=33.0%		High Air Conditioning Anti ice OFF	
ONE ENGINE AT GO AROUND THRUST		CONF 1+F	

PRESSURE ALTITUDE (FT)										
OAT (°C)	- 2000	0	2000	4000	6000	8000	9200	10000	12000	14100
38	68.1	65.6	60.6	54.9	50.8	48.1				
	148	145	139	132	127	124				
	73.8	71.2	65.8	59.6	55.1	52.2				
40	66.8	64.5	59.5	54.0	50.0					
	146	144	138	131	126					
	72.4	69.9	64.6	58.5	54.1					
42	65.5	63.4	58.5	53.0	49.1					
	145	142	137	130	125					
	70.9	68.7	63.4	57.4	53.1					
44	64.2	62.3	57.5	52.1						
	143	141	135	129						
	69.4	67.4	62.2	56.3						
46	62.9	61.1	56.4	51.1						
	142	140	134	128						
	68.0	66.1	61.0	55.2						
48	61.6	59.9	55.3							
	140	138	133							
	66.6	64.8	59.8							
50	60.4	58.7	54.2							
	139	137	132							
	65.4	63.5	58.6							
52	59.3	57.6								
	138	135								
	64.2	62.3								
54	58.2	56.5								
	136	134								
	63.0	61.2								
55	57.7	56.0								
	136	134								
	62.5	60.6								
AIR CONDITIONING OFF ADD 1600 kg			ENGINE ANTI ICE ON SUBTRACT 80 kg up to 6000 ft 2500 kg above 6000 ft			TOTAL ANTI ICE ON SUBTRACT 1800 kg up to 4000 ft 6700 kg above 4000 ft		SPEED INCREASE PER 170 KG ADD 1 KT		

05.00 CONTENTS**05.10 GENERAL**

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– FLIGHT PLAN	3

05.15 CALCULATION TABLES**05.20 CRUISE LEVEL**

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05.30 INTEGRATED CRUISE

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05.60 GROUND DISTANCE/AIR DISTANCE CONVERSION**05.70 FUEL TANKERING**

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.78 and long range speed
- Optimum altitude on short stage
- Ground mile to air mile conversion for M.78 and long range speed

The integrated range method includes the following tables :

- Integrated cruise tables for M.78 for flight levels from FL290 to FL390,
- Integrated cruise tables for long range speed for flight levels from FL100 to FL390,
- 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.

The quick determination method is shown in chapter 2.05.40 for M.78 and 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

11.5 kg/min or **25 lb/min**

Average quantity (12 minutes) → **140 kg** or **300 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

20 kg/min or **45 lb/min**

Average quantity (6 minute IFR) → **120 kg** or **270 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 **100 kg** or **220 lb**, climb to cruising level, cruise at long range speed, descent and approach procedure.

80 kg or 180 lb for 4 minute 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 a 30 minute holding at 1500 feet above alternate airport elevation at "green dot" speed in the clean configuration is

1200 kg or **2700 lb**.

APU FUEL

During ground operations, APU fuel consumption is about **130 kg/h** or **290 lb/h** (Packs ON, 90 kVA load on APU GEN).

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.78 and long range speed
- Optimum altitude on short stage
- Ground mile to air mile conversion for M.78 and long range speed

The integrated range method includes the following tables :

- Integrated cruise tables for M.78 for flight levels from FL290 to FL390,
- Integrated cruise tables for long range speed for flight levels from FL100 to FL390,
- 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.

The quick determination method is shown in chapter 2.05.40 for M.78 and 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

10 kg/min or **22 lb/min**

Average quantity (12 minutes) → **120 kg** or **265 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
17 kg/min or **40 lb/min**.
- Average quantity (6 minute IFR) → **110 kg** or **240 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 **80 kg** or **180 lb**, climb to cruising level, cruise at long range speed, descent and approach procedure.

60 kg or 140 lb for 4 minute 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 a 30 minute holding at 1500 feet above alternate airport elevation and "green dot" speed in the clean configuration is

1150 kg or **2600 lb**.

APU FUEL

During ground operations, APU fuel consumption is about **130 Kg/h** or **290 lb/h** (Packs on, 90 KVA load on APU GEN).

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.78 and long range speed
- Optimum altitude on short stage
- Ground mile to air mile conversion for M.78 and long range speed

The integrated range method includes the following tables :

- Integrated cruise tables for M.78 for flight levels from FL290 to FL390,
- Integrated cruise tables for long range speed for flight levels from FL100 to FL390,
- 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.

The quick determination method is shown in chapter 2.05.40 for M.78 and 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

10 kg/min or **22 lb/min**

Average quantity (12 minutes) → **120 kg** or **265 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
18 kg/min or **40 lb/min**.
- Average quantity (6 minute IFR) → **110 kg** or **240 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 **80 kg** or **180 lb**, climb to cruising level, cruise at long range speed, descent and approach procedure.

60 kg or 140 lb for 4 minute 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 a 30 minute holding at 1500 feet above alternate airport elevation and "green dot" speed in the clean configuration is

R **1300 kg** or **2800 lb**.

APU FUEL

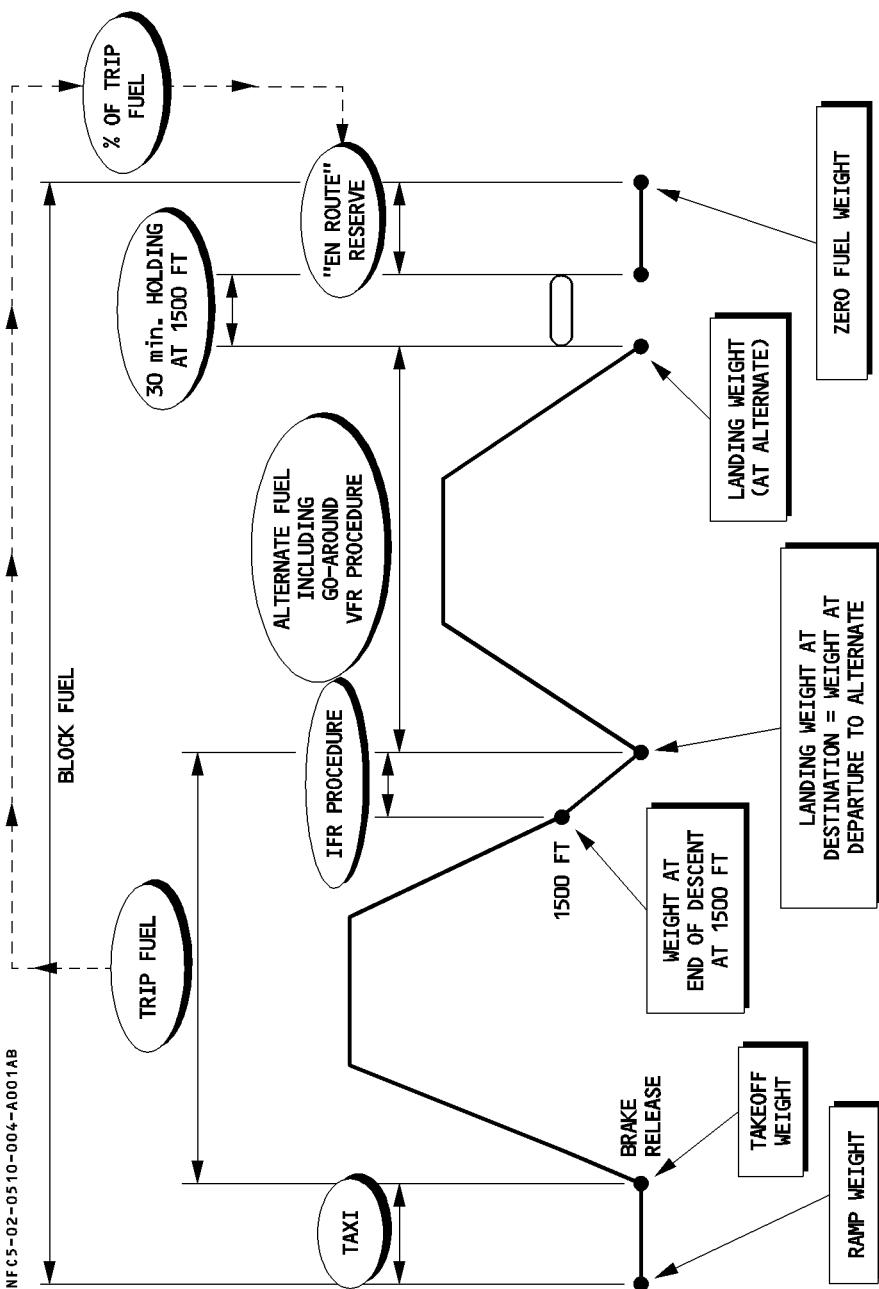
During ground operations, APU fuel consumption is about **130 Kg/h** or **290 lb/h** (Packs on, 90 KVA load on APU GEN).

FLIGHT PLAN

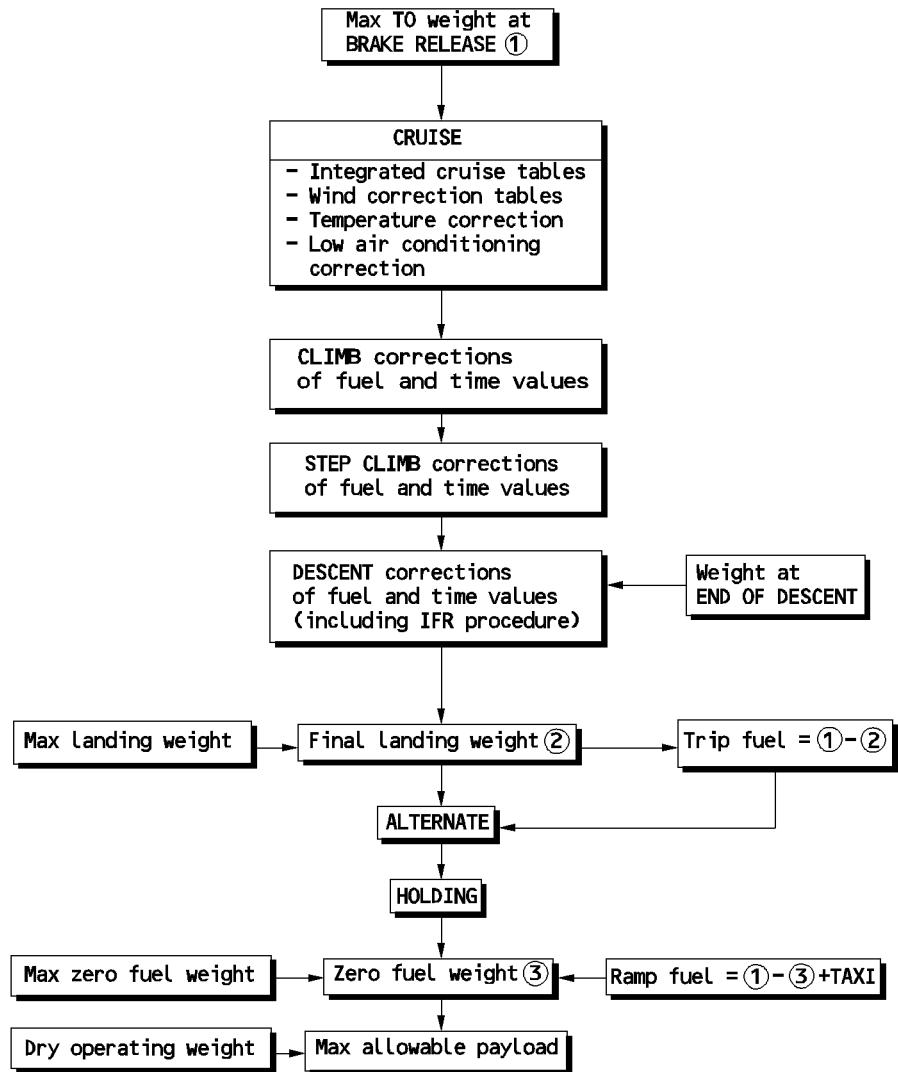
When no precalculated flight plan is available, flight planning can be determined by using the tables given in this chapter.

Fuel policy will be the same as for precalculated flight plan.

The graph on the following page defines the different terms used in this chapter.



GENERAL



NFC5-02-0515-001-A001AA

A318/A319/A320/A321	FLIGHT PLANNING	2.05.15	P 2
FLIGHT CREW OPERATING MANUAL	CALCULATION TABLES	SEQ 001	REV 21

The following tables can be used for the flight planning.

The first table allows the planner to calculate fuel and time during cruise, with a possible step climb (see p 3).

The second table shows the fuel and time planning for the whole flight plan (see p 4).

At the end of the section an example shows how to use both tables for a given mission.

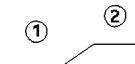
Note : – *Differences in fuel consumption during step climb sections will be taken into account in the calculation table of page 4.*

- *To find optimum aircraft weight to proceed to next flight level (4000 feet step) (Refer to 2.05.20 p 2).*
- *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.*

CALCULATION TABLE

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

FLIGHT PROFILE



FL:

OVERHEAD DEPARTURE	START OF STEP CLIMB
WEIGHT:	WEIGHT:
DISTANCE:	DISTANCE:
TIME:	TIME:

1	FUEL:
	DISTANCE:
	TIME:
	REMAINING DISTANCE:

FL:

BEGIN OF FINAL CRUISE SEGMENT	OVERHEAD DESTINATION
WEIGHT:	WEIGHT:
DISTANCE:	DISTANCE:
TIME:	TIME:

2	FUEL:
	DISTANCE:
	TIME:
	REMAINING DISTANCE:

REMAINING DISTANCE:

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

1	(1) Max TO Weight at BRAKE RELEASE	▼	►			•
2	WEIGHT Overhead Destination	►				•
3	- Temperature Correction for CRUISE	-				•
4	+ Correction for Low Air Conditioning	+				•
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 :*

$$0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta \text{ISA (}^{\circ}\text{C)} \times \text{air distance (NM)} \text{ or}$$

$$0.033 \text{ (lb/}^{\circ}\text{C/NM)} \times \Delta \text{ISA (}^{\circ}\text{C)} \times \text{air distance (NM)}$$

Line 6 : *TO altitude correction :*

$$0.5 \text{ (kg/1000 kg/1000 ft)} \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft)} \text{ or}$$

$$0.5 \text{ (lb/1000 lb/1000 ft)} \times \text{TOW (1000 lb)} \times \text{airport elevation (1000 ft)}$$

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.*

Example**DATA**

- TO weight : 66000 kg
- Ground distance to destination : 2000 NM
- Wind : – 50 kt (head wind)
- Selected initial FL : 350
- Mach number : M.78
- Temperature : ISA + 10

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 2)
 here : M.78, 50 kt head wind, 2000 NM ground distance
 → air distance : 2248 NM

CRUISE TABLE FL350

- B : Read from integrated cruise table (M.78, FL350) the values for time and distance for a weight of 66000 kg (see 2.05.30 P 5) :
 → distance : 5599 NM → time : 747 min

- R C : Read from 2.05.20 P 1 the value for the optimum aircraft weight to proceed to FL 390 → 62000 kg
- R D : Enter integrated cruise table (M.78, FL 350) and read the values for a weight of 62000 kg (begin of first step climb)
 → distance : 4813 NM → time : 642 min
- R E : Calculate the values for the first cruise segment :
- R Fuel : $66000 - 62000 = 4000$ kg
- R Distance : $5599 - 4813 = 786$ NM
- R Time : $747 - 642 = 105$ min
- R Remaining distance : $2248 - 786 = 1462$ NM

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.15	P 6
	CALCULATION TABLES	SEQ 130	REV 31

CRUISE TABLE FL390

- F : Read from integrated cruise table (M.78, FL390) the values for time and distance for the weight of 62000 kg (2.05.30 P 7)
- R → distance : 5203 NM → time : 698 min
- R G : Subtract remaining distance : $5203 - 1462 = 3741$ NM
- R H : Interpolate in integrated cruise table (M.78, FL390) the weight and time values corresponding to the distance of 3741 NM
- R → weight : 55100 kg → time : 502 min
- I : Calculate values for the second cruise segment :
- R Fuel : $62000 - 55100 = 6900$ kg
- R Distance : $5203 - 3741 = 1462$ NM
- R Time : $698 - 502 = 196$ min
- Crosscheck that remaining air distance equals zero.
- J : Fill in the final table with weight overhead departure 66000 kg and weight overhead destination (55100 kg).
- K : Calculate total values :
- R Fuel : $66000 - 55100 = 10900$ kg
- R Time : $105 + 196 = 301$ min = 5 h 01 min

Example**DATA**

- TO weight : 72000 kg
- Ground distance to destination : 2000 NM
- Wind : – 50 kt (head wind)
- Selected initial FL : 350
- Mach number : M.78
- Temperature : ISA + 10

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 2)
 here : M.78, 50 kt head wind, 2000 NM ground distance
 → air distance : 2248 NM

CRUISE TABLE FL350

- B : Read from integrated cruise table (M.78, FL350) the values for time and distance for a weight of 72000 kg (see 2.05.30 P 5) :
 → distance : 6589 NM → time : 879 min

- R C : Read from 2.05.20 P 1 the value for the optimum aircraft weight to proceed to FL390 → 62000 kg
- R D : Enter integrated cruise table (M.78, FL350) and read the values for a weight of 62000 kg (begin of first step climb)
 → distance : 4703 NM → time : 628 min
- R E : Calculate the values for the first cruise segment :
- R Fuel : $72000 - 62000 = 10000$ kg
- R Distance : $6589 - 4703 = 1886$ NM
- R Time : $879 - 628 = 251$ min
- R Remaining distance : $2248 - 1886 = 362$ NM

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.15	P 6
	CALCULATION TABLES	SEQ 140	REV 31

CRUISE TABLE FL390

- F : Read from integrated cruise table (M.78, FL390) the values for time and distance for the weight of 62000 kg (2.05.30 P 7)
- R → distance : 5084 NM → time : 682 min
- R G : Subtract remaining distance : $5084 - 362 = 4722$ NM
- R H : Interpolate in integrated cruise table (M.78, FL390) the weight and time values corresponding to the distance of 4722 NM
- R → weight : 60200 kg → time : 633 min
- I : Calculate values for the second cruise segment :
- R Fuel : $62000 - 60200 = 1800$ kg
- R Distance : $5084 - 4722 = 362$ NM
- R Time : $682 - 633 = 49$ min
- Crosscheck that remaining air distance equals zero.
- J : Fill in the final table with weight overhead departure (72000 kg) and weight overhead destination (60200 kg).
- K : Calculate total values :
- R Fuel : $72000 - 60200 = 11800$ kg
- R Time : $251 + 49 = 300$ min = 5 h 00 min

Example**DATA**

- TO weight : 66000 kg
- Ground distance to destination : 1500 NM
- Wind : – 50 kt (head wind)
- Selected initial FL : 350
- Mach number : M.78
- Temperature : ISA + 10

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 2)
 here : M.78, 50 kt head wind, 1500 NM ground distance.
 → air distance : 1688 NM

CRUISE TABLE FL350

- B : Read from integrated cruise table (M.78, FL350) the values for time and distance for a weight of 66000 kg (see 2.05.30 P 5) :
 → distance : 5346 NM → time : 713 min
- C : Read from 2.05.20 P 1 the value for the optimum aircraft weight to proceed to FL390 → 58000 kg
- D : Enter integrated cruise table (M.78, FL350) and read the values for a weight of 58000 kg (start of first step climb)
 → distance : 3840 NM → time : 512 min.
- E : Calculate the values for the first cruise segment :
 Fuel : $66000 - 58000 = 8000$ kg
 Distance : $5346 - 3840 = 1506$ NM
 Time : $713 - 512 = 201$ min
 Remaining distance : $1688 - 1506 = 182$ NM

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.15	P 6
	CALCULATION TABLES	SEQ 161	REV 38

CRUISE TABLE FL390

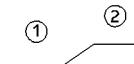
- F : Read from integrated cruise table (M.78, FL390) the values for time and distance for the weight of 58000 kg (2.05.30 P 7)
 → distance : 4132 NM → time : 554 min
- G : Subtract remaining distance : $4132 - 182 = 3950$ NM
- H : Interpolate in integrated cruise table (M.78, FL390) the weight and time values corresponding to the distance of 3950 NM
 → weight : 57100 kg → time : 530 min
- I : Calculate values for the second cruise segment :
 Fuel : $58000 - 57100 = 900$ kg
 Distance : $4132 - 3950 = 182$ NM
 Time : $554 - 530 = 24$ min
 Crosscheck that remaining air distance equals zero.
- J : Fill in the final table with weight overhead departure (66000 kg) and weight overhead destination (57100 kg).
- K : Calculate total values :
 Fuel : $66000 - 57100 = 8900$ kg
 Time : $201 + 24 = 225$ min = 3 h 45 min

R

CALCULATION TABLE

MACHNUMBER	0.78
INITIAL FLIGHT LEVEL:	350
GROUND DISTANCE:	2000 NM
WIND ('-' HEAD/'+' TAIL):	-50 KT
AIR DISTANCE:	2248 NM

FLIGHT PROFILE



FL: 350

OVERHEAD DEPARTURE	
WEIGHT:	66000 Kg
DISTANCE:	5599 NM
TIME:	747 Min

START OF STEP CLIMB	
WEIGHT:	62000 Kg
DISTANCE:	4813 NM
TIME:	642 Min

1	
FUEL:	4000 Kg
DISTANCE:	786 NM
TIME:	105 Min
REMAINING DISTANCE:	1462 NM

FL: 390

BEGIN OF FINAL CRUISE SEGMENT	
WEIGHT:	62000 Kg
DISTANCE:	5203 NM
TIME:	698 Min

OVERHEAD DESTINATION	
WEIGHT:	55100 Kg
DISTANCE:	3741 NM
TIME:	502 Min

2	
FUEL:	6900 Kg
DISTANCE:	1462 NM
TIME:	196 Min
REMAINING DISTANCE:	0 NM

REMAINING DISTANCE: 1462 NM

TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	66000 Kg
WEIGHT OVERHEAD DESTINATION:	55100 Kg
FUEL:	10900 Kg
TIME:	301 Min

A318/A319/A320/A321	FLIGHT PLANNING	2.05.15	P 8
FLIGHT CREW OPERATING MANUAL	CALCULATION TABLES	SEQ 180	REV 31

DATA

- TO weight : 66000 kg
- Ground distance to destination : 2000 NM
- Wind : – 50 kt (headwind)
- Selected first flight level : FL350
- M.78
- Temperature : ISA + 10 along the whole flight profile
- Airport elevation : 1500 ft
- Normal air conditioning

STEPS :

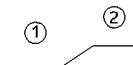
- 1 : Fill in Max TO weight → 66000 kg
- 2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See 2.05.15 P 7). Fill in → 55100 kg
- R 3 : Apply temperature correction for given air distance :
 $2248 \text{ NM} \times 10^\circ\text{C} \times 0.015 \text{ kg}/^\circ\text{C/NM} = 337 \text{ kg}$ (enter 400 kg into table)
- 4 : Correction for low air conditioning → here = 0
- 5 : Subtract climb correction for chosen FL (see 2.05.30 P 23) → 1000 kg
- 6 : Add TO altitude correction $0.5 \times 66 \times 1.5 = 49.5 \text{ kg}$ (enter 100 kg into table)
- 7 : Subtract value for step climb correction : 50 kg (enter 100 kg into table)
- R 8 : Calculate corrected weight overhead destination → 53700 kg
- R 9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (see 2.05.30 P 24) → 200 kg
- R 10 : Calculate landing weight at destination → 53900 kg
- R 11 : Subtract alternate fuel, e.g. : 100 NM at FL100
 (see 2.05.50 P 2) → 941 kg
- R 12 : Landing weight at alternate → $53900 - 941 = 52959 \text{ kg}$
- R 13 : Correction due to deviation from reference landing weight at alternate (see 2.05.50 p 2) → $4 \times (52.9 - 50) = 11.6 \text{ kg}$
- R 14 : Corrected alternate fuel → 953 kg
- R 15 : Calculate alternate landing weight → 52900 kg
- R 16 : Subtract holding fuel (Refer to 3.05.25) → 1072 kg
- R 17 : Calculate weight at end of holding → 51800 kg
- R 18-19 : Calculate trip fuel → 12100 kg
- R 20-22 : Subtract "En Route" reserve (standard amount is 5 % of trip fuel) → 600 kg
- R 23-26 : Calculate zero fuel weight → 51200 kg
- 18-19 : Subtract dry operating weight to obtain maximum allowable payload.
- R 20-22 : Calculate ramp fuel (see 2.05.10 P 2 for taxi fuel).
- R 23-26 : Calculate flight time (see 2.05.15 P 7, 2.05.30 P 23, 2.05.30 P 24).

R

CALCULATION TABLE

MACHNUMBER	0.78
INITIAL FLIGHT LEVEL:	350
GROUND DISTANCE:	2000 NM
WIND ('-' HEAD/'+' TAIL):	- 50 KT
AIR DISTANCE:	2248 NM

FLIGHT PROFILE



FL: 350

OVERHEAD DEPARTURE	
WEIGHT:	72000 Kg
DISTANCE:	6589 NM
TIME:	879 Min

START OF STEP CLIMB	
WEIGHT:	62000 Kg
DISTANCE:	4703 NM
TIME:	628 Min

1	
FUEL:	10000 Kg
DISTANCE:	1886 NM
TIME:	251 Min
REMAINING DISTANCE:	362 NM

FL: 390

BEGIN OF FINAL CRUISE SEGMENT	
WEIGHT:	62000 Kg
DISTANCE:	5084 NM
TIME:	682 Min

OVERHEAD DESTINATION	
WEIGHT:	60200 Kg
DISTANCE:	4722 NM
TIME:	633 Min

2	
FUEL:	1800 Kg
DISTANCE:	362 NM
TIME:	49 Min
REMAINING DISTANCE:	0 NM

REMAINING DISTANCE: 362 NM

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TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	72000 Kg
WEIGHT OVERHEAD DESTINATION:	60200 Kg
FUEL:	11800 Kg
TIME:	300 Min

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING CALCULATION TABLES	2.05.15 P 8	
		SEQ 160	REV 31

DATA

- TO weight : 72000 kg
- Ground distance to destination : 2000 NM
- Wind : – 50 kt (headwind)
- Selected first flight level : FL350
- M.78
- Temperature : ISA + 10 along the whole flight profile
- Airport elevation : 1500 ft
- Normal air conditioning

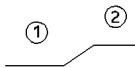
STEPS :

- 1 : Fill in Max TO weight → 72000 kg
- 2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See 2.05.15 P 7). Fill in → 60200 kg
- 3 : Apply temperature correction for given air distance :
 $2248 \text{ NM} \times 10^\circ\text{C} \times 0.015 \text{ kg}/^\circ\text{C/NM} = 337 \text{ kg}$ (enter 400 kg into table)
- 4 : Correction for low air conditioning → here = 0
- 5 : Subtract climb correction for chosen FL (see 2.05.30 P 23) → 1050 kg
- 6 : Add TO altitude correction $0.5 \times 72 \times 1.5 = 54 \text{ kg}$ (enter 100 kg into table)
- 7 : Subtract value for step climb correction : 50 kg (enter 100 kg into table)
- 8 : Calculate corrected weight overhead destination → 58700 kg
- 9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (see 2.05.30 P 24) → 300 kg
- 10 : Calculate landing weight at destination → 59000 kg
- R 11 : Subtract alternate fuel, e.g. : 100 NM at FL100
 (see 2.05.50 P 2) → 984 kg
- R 12 : Landing weight at alternate → $59000 - 984 = 58016 \text{ kg}$
- R 13 : Correction due to deviation from reference landing weight at alternate (see 2.05.50 p 2) → $6 \times (58.0 - 55) = 18 \text{ kg}$
- R 14 : Corrected alternate fuel → 1002 kg
- R 15 : Calculate alternate landing weight → 58000 kg
- R 16 : Subtract holding fuel (Refer to 3.05.25) → 1098 kg
- R 17 : Calculate weight at end of holding → 56200 kg
- R 18-19 : Calculate trip fuel → 13000 kg
- R 20-22 : Subtract "En Route" reserve (standard amount is 5 % of trip fuel) → 650 kg
- R 23-26 : Calculate zero fuel weight → 56200 kg
- R 20-22 : Calculate dry operating weight to obtain maximum allowable payload.
- R 20-22 : Calculate ramp fuel (see 2.05.10 P 2 for taxi fuel).
- R 23-26 : Calculate flight time (see 2.05.15 P 7, 2.05.30 P 23, 2.05.30 P 24).

CALCULATION TABLE

MACHNUMBER	0.78
INITIAL FLIGHT LEVEL:	350
GROUND DISTANCE:	1500 NM
WIND ('-' HEAD/'+' TAIL):	-50 KT
AIR DISTANCE:	1688 NM

FLIGHT PROFILE



FL: 350

OVERHEAD DEPARTURE	
WEIGHT:	66000 Kg
DISTANCE:	5346 NM
TIME:	713 Min

START OF STEP CLIMB	
WEIGHT:	58000 Kg
DISTANCE:	3840 NM
TIME:	512 Min

1	
FUEL:	8000 Kg
DISTANCE:	1506 NM
TIME:	201 Min
REMAINING DISTANCE:	182 NM

FL: 390

START OF FINAL CRUISE SEGMENT	
WEIGHT:	58000 Kg
DISTANCE:	4132 NM
TIME:	554 Min

OVERHEAD DESTINATION	
WEIGHT:	57100 Kg
DISTANCE:	3950 NM
TIME:	530 Min

2	
FUEL:	900 Kg
DISTANCE:	182 NM
TIME:	24 Min
REMAINING DISTANCE :	0 NM

REMAINING DISTANCE: 182 NM

NFC5-02-0515-007-A161AA

TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	66000 Kg
WEIGHT OVERHEAD DESTINATION:	57100 Kg
FUEL:	8900 Kg
TIME:	225 Min

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.15	P 8
	CALCULATION TABLES	SEQ 161	REV 39

DATA

- TO weight 66000 kg
- Ground distance to destination : 1500 NM
- Wind : – 50 kt (headwind)
- Selected first flight level : FL350
- M.78
- Temperature : ISA + 10 along the whole flight profile
- Airport elevation : 1500 ft
- Normal air conditioning

STEPS :

- 1 : Fill in Max TO weight → 66000 kg
- 2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See 2.05.15 P 7). Fill in → 57100 kg
- 3 : Apply temperature correction for given air distance :
 $1688 \text{ NM} \times 10^\circ\text{C} \times 0.015 \text{ kg/}^\circ\text{C/NM} = 254 \text{ kg}$
- 4 : Correction for low air conditioning → here = 0
- 5 : Subtract climb correction for chosen FL (see 2.05.30 P 23) → 1100 kg
- 6 : Add TO altitude correction $0.5 \times 66 \times 1.5 = 49.5 \text{ kg}$ (enter 100 kg into table)
- 7 : Subtract value for step climb correction : 80 kg (enter 100 kg into table)
- 8 : Calculate corrected weight overhead destination → 55700 kg
- 9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (see 2.05.30 P 24) → 100 kg
- 10 : Calculate landing weight at destination → 55800 kg
- 11 : Subtract alternate fuel, e.g. : 100 NM at FL100
(see 2.05.50 P 2) → 909 kg
Landing weight at alternate → $55800 - 909 = 54891 \text{ kg}$
Correction due to deviation from reference landing weight at alternate (see 2.05.50 p 2) → $5 \times (55 - 50) = 25 \text{ kg}$
Corrected alternate fuel → 934 kg
- 12 : Calculate alternate landing weight → 54800 kg
- 13 : Subtract holding fuel (Refer to 3.05.25) → 1058 kg
- 14 : Calculate weight at end of holding → 53700 kg
- 15 : Calculate trip fuel → 10200 kg
- 16 : Subtract "En Route" reserve (standard amount is 5 % of trip fuel) → 510 kg
- 17 : Calculate zero fuel weight → 53100 kg
- 18-19 : Subtract dry operating weight to obtain maximum allowable payload.
- 20-22 : Calculate ramp fuel (see 2.05.10 P 2 for taxi fuel).
- 23-26 : Calculate flight time (see 2.05.15 P 7, 2.05.30 P 23, 2.05.30 P 24).

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

BLOCK FUEL CALCULATION

20	Required Fuel (1) - (3)	►	1	5	•	8
21	+ Taxi	+		0	•	2
22	= Block Fuel	=	1	6	•	0

FLIGHT TIME CALCULATION (H. MIN)

23	Time from integrated Cruise Tables	►	5	•	0	0
24	+ CLIMB Correction	+	0	•	0	5
25	+ DESCENT Correction (including 6 min IFR)	+	0	•	1	0
26	= Flight Time	=	5	•	1	5

Note : Line 3 : *temperature correction :*

$$0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta \text{ISA (}^{\circ}\text{C)} \times \text{air distance (NM)}$$

Line 6 : *TO altitude correction :*

$$0.5 \text{ (kg/1000 kg/1000 ft)} \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft.)}$$

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.*

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

BLOCK FUEL CALCULATION

20	Required Fuel (1) – (3)	►	1	2	•	9
21	+ Taxi	+		0	•	2
22	= Block Fuel	=	1	3	•	1

FLIGHT TIME CALCULATION (H. MIN)

23	Time from integrated Cruise Tables	►	3	•	4	5
24	+ CLIMB Correction	+	0	•	0	4
25	+ DESCENT Correction (including 6 min IFR)	+	0	•	1	0
26	= Flight Time	=	3	•	5	9

Note : Line 3 : *temperature correction :*

$$0.015(\text{kg}/^{\circ}\text{C}/\text{NM}) \times \Delta\text{ISA } (^{\circ}\text{C}) \times \text{air distance (NM)}$$

Line 6 : *TO altitude correction :*

$$0.5 \text{ (kg/1000 kg/1000 ft)} \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft).}$$

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.*

R

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

BLOCK FUEL CALCULATION

20	Required Fuel (1) - (3)	►	1	4	•	7
21	+ Taxi	+			0	• 2
22	= Block Fuel	=	1	4	•	9

FLIGHT TIME CALCULATION (H. MIN)

23	Time from integrated Cruise Tables	►	5	•	0	0
24	+ CLIMB Correction	+	0	•	0	4
25	+ DESCENT Correction (including 6 min IFR)	+	0	•	1	0
26	= Flight Time	=	5	•	1	4

Note : Line 3 : *temperature correction :*

$$0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta \text{ISA (}^{\circ}\text{C)} \times \text{air distance (NM)}$$

Line 6 : *TO altitude correction :*

$$0.5 \text{ (kg/1000 kg/1000 ft)} \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft).}$$

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 (pound) 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).VT

CRUISE LEVEL CHARTS

These charts have been established for a center of gravity at 33 % MAC.

Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

Note : The $n = 1.3$ g (1.4 g) curve indicates the buffet margin.

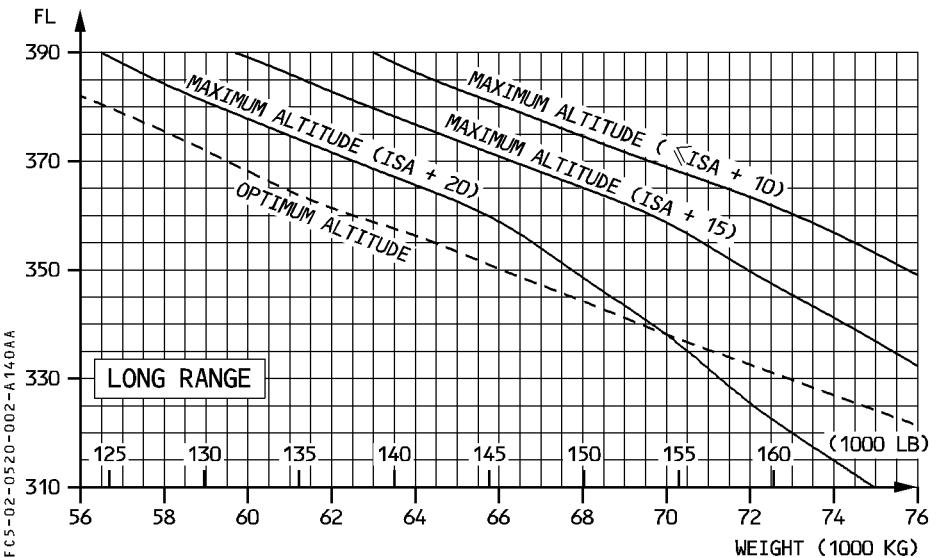
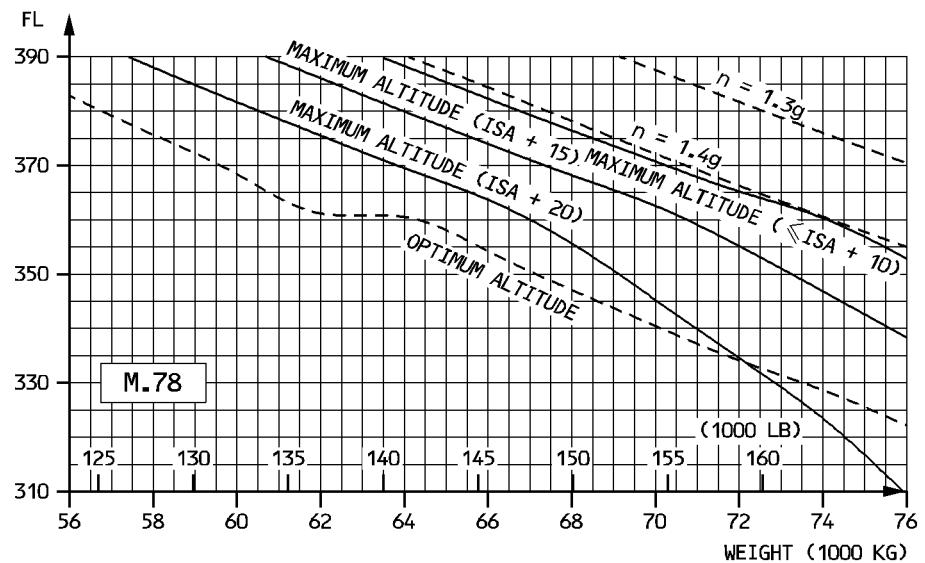
R OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

R

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	\leq ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	75/165	75/165	74/163	73/160	70/154	69/152
330/370	68/149	69/152	68/149	67/147	64/141	64/141
350/390	61/134	62/136	61/134	61/134	58/127	57/125

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
\leq ISA + 10	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : - 1700 ft Opt Alt. : No corr.
ISA + 15	Max Alt. : -1400 ft Opt Alt. : No corr.	Max Alt. : - 2800 ft Opt Alt. : -1400 ft
ISA + 20	Max Alt. : - 1700 ft Opt Alt. : - 1500 ft	Max Alt. : - 2800 ft Opt Alt. : - 2000 ft



NFC5-02-0520-002-A140AA

OPTIMUM AND MAXIMUM ALTITUDES**DEFINITIONS**

- Optimum altitude : The altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and 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 33 % MAC.

Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

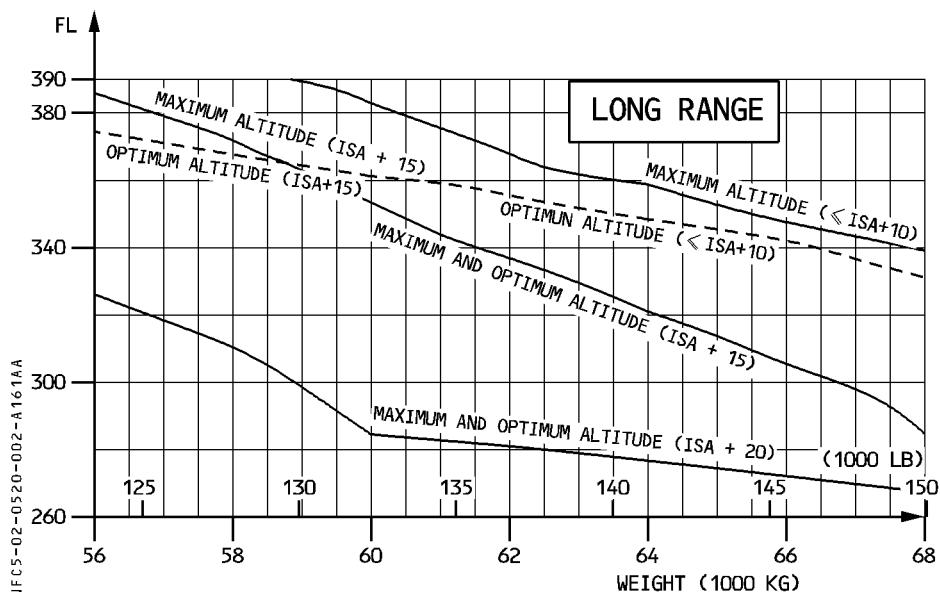
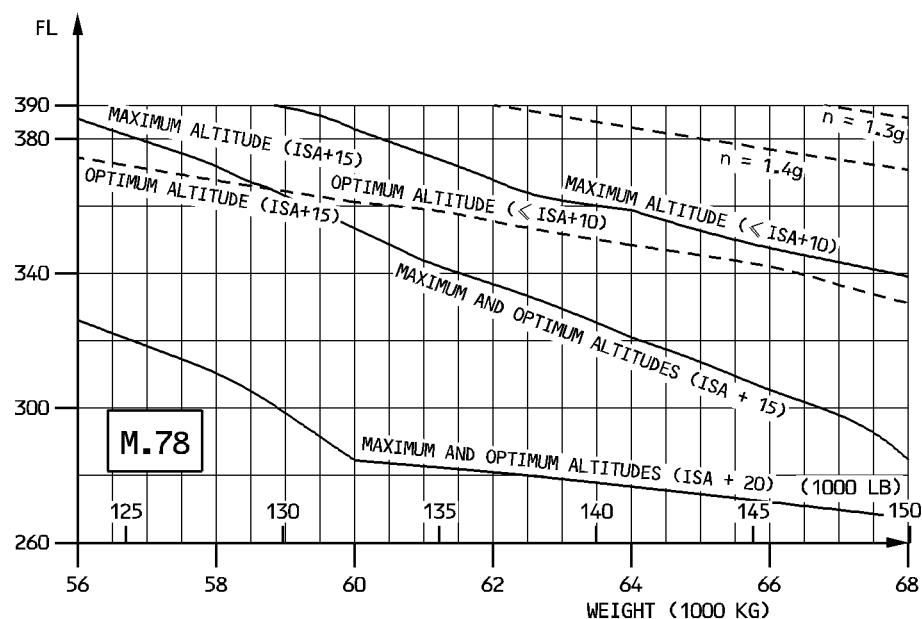
Note : The $n = 1.3$ g (1.4 g) curve indicates the buffet margin.

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	\leq ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	65/144	65/144	60/133	60/133	55/121	53/116
330/370	61/135	62/136	58/128	58/128	54/119	53/117
350/390	57/126	58/129	55/121	55/122	52/114	52/115

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
ISA	Max Alt. : - 100 ft Opt Alt. : - 100 ft	Max Alt. : - 400 ft Opt Alt. : - 100 ft
ISA + 10	Max Alt. : - 3500 ft Opt Alt. : - 300 ft	Max Alt. : - 9200 ft Opt Alt. : - 3900 ft
ISA + 15	Max Alt. : - 6200 ft Opt Alt. : - 4300 ft	Max Alt. : - 7800 ft Opt Alt. : - 9100 ft
ISA + 20	Max Alt. : - 3100 ft Opt Alt. : - 4800 ft	Max Alt. : - 4700 ft Opt Alt. : - 4600 ft



OPTIMUM AND MAXIMUM ALTITUDES**DEFINITIONS**

- Optimum altitude : The altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and 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 33 % MAC.

Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

Note : The $n = 1.3$ g (1.4 g) curve indicates the buffet margin.

R OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

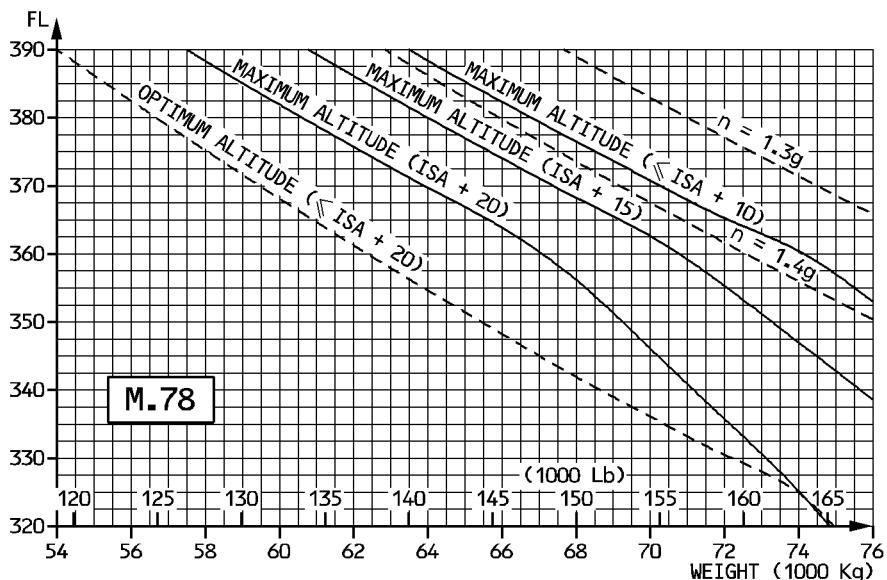
R

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	\leq ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	75/165	75/165	74/163	73/160	72/158	69/152
330/370	68/149	68/149	68/149	67/147	66/145	64/141
350/390	61/134	62/136	61/134	61/134	60/132	58/127

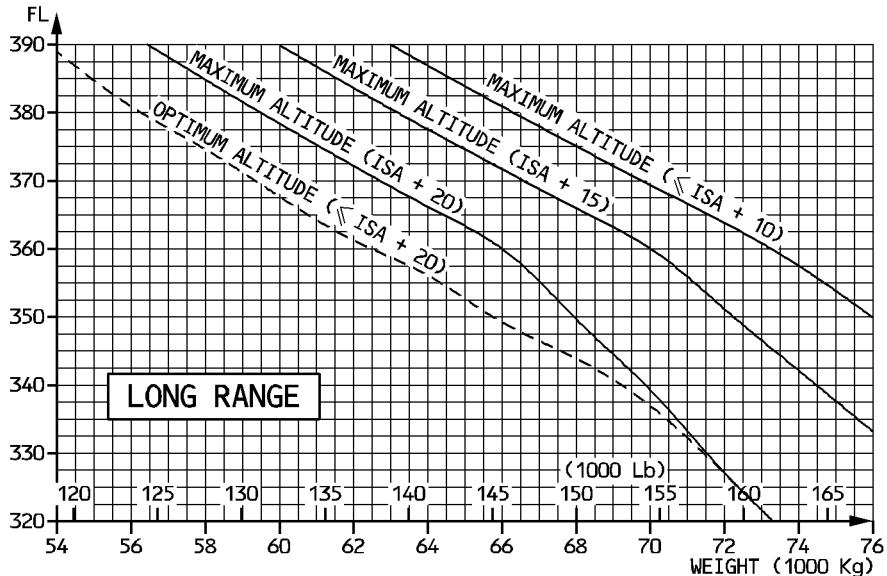
BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
ISA	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : - 1500 ft Opt Alt. : No corr.
ISA + 10	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : - 1600 ft Opt Alt. : No corr.
ISA + 15	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : - 1700 ft Opt Alt. : No corr.
ISA + 20	Max Alt. : - 1700 ft Opt Alt. : - 1500 ft	Max Alt. : - 2900 ft Opt Alt. : - 2900 ft

R



NFC5-02-0520-002-A130AA



OPTIMUM ALTITUDE ON SHORT STAGE

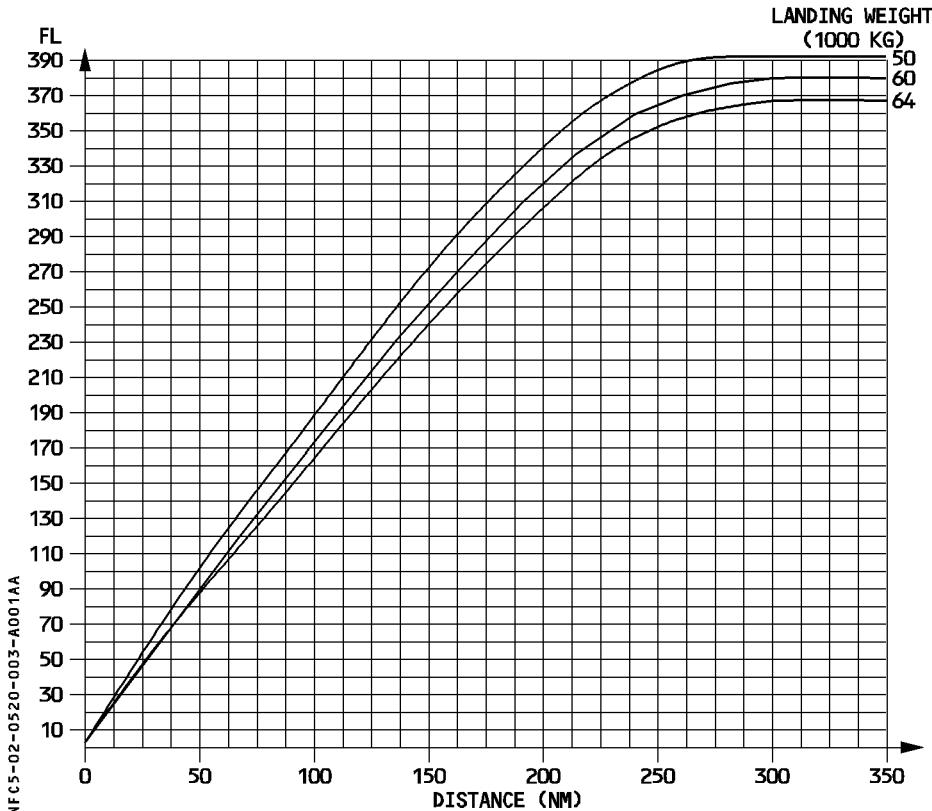
According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:

- Takeoff
- Climb: 250kt/300kt/M.78
- Long range cruise (during at least 5 minutes)
- Descent: M.78/300kt/250kt
- Approach and landing

and it is established for:

- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF



OPTIMUM ALTITUDE ON SHORT STAGE

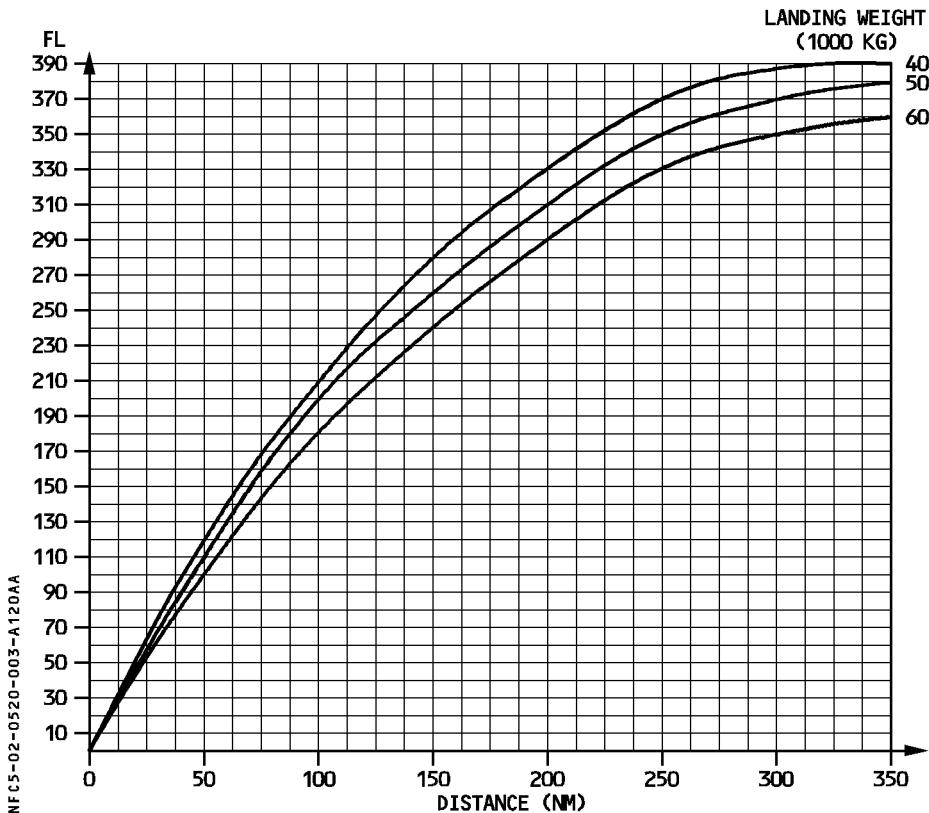
According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:

- Takeoff
- Climb: 250KT/300KT/M.78
- Long range cruise (during at least 5 minutes)
- Descent: M.78/300KT/250kt
- Approach and landing

and it is established for:

- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

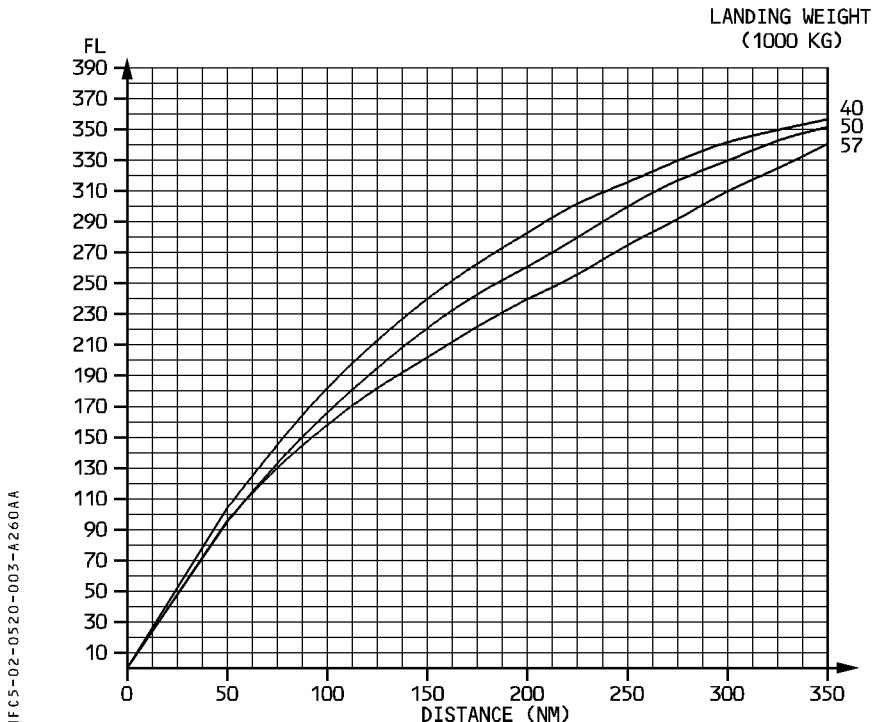


OPTIMUM ALTITUDE ON SHORT STAGE

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:

- Takeoff
 - Climb: 250KT/300KT/M.78
 - Long range cruise (during at least 5 minutes)
 - Descent: M.78/300KT/250KT
 - Approach and landing
- and it is established for:
- ISA
 - CG = 33 %
 - Normal air conditioning
 - Anti ice OFF



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.78 at fixed levels from FL290 to FL390 and for long range speed at fixed levels from FL100 to FL390.

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=33.0% TAS = 462KT		DISTANCE (NM)		TIME (MIN)		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	37 5	73 10	110 14	147 19	184 24	220 29	257 33	294 38	330 43
42	367 48	403 52	440 57	477 62	513 67	550 71	587 76	623 81	660 86	696 90
44	733 95	769 100	806 105	842 109	879 114	915 119	952 124	988 128	1025 133	1061 138
46	1098 143	1134 147	1170 152	1207 157	1243 162	1280 166	1316 171	1352 176	1389 180	1425 185
48	1461 190	1498 195	1534 199	1570 204	1607 209	1643 214	1679 218	1715 223	1752 228	1788 232
50	1824 237	1860 242	1897 246	1933 251	1969 256	2005 261	2041 265	2077 270	2113 275	2150 279
52	2186 284	2222 289	2258 293	2294 298	2330 303	2366 307	2402 312	2438 317	2474 322	2510 326
54	2546 331	2582 336	2618 340	2654 345	2689 350	2725 354	2761 359	2797 364	2833 368	2869 373
56	2904 377	2940 382	2976 387	3012 391	3047 396	3083 401	3119 405	3154 410	3190 415	3225 419
58	3261 424	3297 428	3332 433	3368 438	3403 442	3439 447	3474 452	3510 456	3545 461	3580 465
60	3616 470	3651 475	3686 479	3722 484	3757 488	3792 493	3827 497	3863 502	3898 507	3933 511
62	3968 516	4003 520	4038 525	4073 529	4108 534	4143 538	4178 543	4213 547	4247 552	4282 557
64	4317 561	4352 566	4386 570	4421 575	4455 579	4490 584	4524 588	4559 592	4593 597	4628 601
66	4662 606	4696 610	4730 615	4765 619	4799 624	4833 628	4867 633	4901 637	4935 641	4969 646
68	5003 650	5037 655	5070 659	5104 663	5138 668	5172 672	5205 677	5239 681	5272 685	5306 690
70	5340 694	5373 698	5406 703	5440 707	5473 711	5506 716	5539 720	5572 724	5606 729	5639 733
LOW AIR CONDITIONING △FUEL = - 0.4 %				ENGINE ANTI ICE ON △FUEL = + 3 %				TOTAL ANTI ICE ON △FUEL = + 5.5 %		

10E -08FOA319-131 1AEV2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 0.0 0.02901 780 .000 .000 0 FCOM-NO-02-05-30-002-130

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.78 at fixed levels from FL290 to FL390 and for long range speed at fixed levels from FL100 to FL390.

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=33.0% TAS = 462KT		DISTANCE (NM) TIME (MIN)		M.78 FL290		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2	38	75	111	148	184	221	257
			0	5	10	14	19	24	29	33
42	294	330	367	403	440	476	513	549	586	622
	38	43	48	52	57	62	67	71	76	81
44	658	695	731	767	804	840	876	913	949	985
	86	90	95	100	104	109	114	119	123	128
46	1022	1058	1094	1130	1167	1203	1239	1275	1312	1348
	133	137	142	147	152	156	161	166	170	175
48	1384	1420	1456	1492	1529	1565	1601	1637	1673	1709
	180	185	189	194	199	203	208	213	217	222
50	1745	1781	1817	1853	1889	1925	1961	1997	2033	2069
	227	231	236	241	246	250	255	260	264	269
52	2105	2141	2177	2213	2249	2285	2321	2356	2392	2428
	274	278	283	288	292	297	302	306	311	316
54	2464	2500	2535	2571	2607	2643	2678	2714	2750	2785
	320	325	330	334	339	343	348	353	357	362
56	2821	2856	2892	2928	2963	2999	3034	3070	3105	3141
	367	371	376	380	385	390	394	399	404	408
58	3176	3212	3247	3282	3318	3353	3388	3424	3459	3494
	413	417	422	427	431	436	440	445	450	454
60	3530	3565	3600	3635	3670	3705	3740	3775	3810	3845
	459	463	468	472	477	482	486	491	495	500
62	3880	3915	3950	3985	4020	4055	4089	4124	4159	4193
	504	509	513	518	522	527	531	536	540	545
64	4228	4262	4297	4331	4366	4400	4434	4469	4503	4537
	549	554	558	563	567	572	576	581	585	590
66	4571	4605	4640	4674	4708	4742	4775	4809	4843	4877
	594	599	603	607	612	616	621	625	629	634
68	4911	4944	4978	5012	5045	5079	5112	5146	5179	5213
	638	643	647	651	656	660	664	669	673	677
70	5246	5279	5312	5346	5379	5412	5445	5478	5511	5544
	682	686	690	695	699	703	708	712	716	721
72	5577	5610	5642	5675	5708	5741	5773	5806	5838	5871
	725	729	733	738	742	746	750	755	759	763
74	5903	5936	5968	6000	6033	6065	6097	6129	6161	6193
	767	771	776	780	784	788	792	797	801	805
76	6226	6257	6289	6321	6353	6385	6417	6448	6480	6512
	809	813	817	822	826	830	834	838	842	846
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
$\Delta FUEL = -0.4\%$				$\Delta FUEL = +3\%$				$\Delta FUEL = +5.5\%$		

10F-08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .780 .000 .000 0 FCOM-NO-02-05-30-002-140

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.78 at fixed levels from FL290 to FL390 and for long range speed at fixed levels from FL100 to FL390.

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=33.0% TAS = 462KT		DISTANCE (NM)		TIME (MIN)		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	37	73	110	147	183	220	256	293	330
	0	5	10	14	19	24	29	33	38	43
42	366	402	439	475	512	548	585	621	657	694
	48	52	57	62	67	71	76	81	85	90
44	730	766	802	839	875	911	947	983	1019	1055
	95	100	104	109	114	118	123	128	132	137
46	1091	1127	1163	1199	1235	1271	1307	1343	1379	1415
	142	147	151	156	161	165	170	175	179	184
48	1451	1486	1522	1558	1593	1629	1665	1700	1736	1771
	189	193	198	202	207	212	216	221	226	230
50	1807	1842	1878	1913	1949	1984	2020	2055	2090	2125
	235	239	244	249	253	258	262	267	272	276
52	2161	2196	2231	2266	2301	2336	2371	2406	2441	2476
	281	285	290	295	299	304	308	313	317	322
54	2511	2546	2581	2616	2651	2686	2720	2755	2790	2825
	326	331	335	340	345	349	354	358	363	367
56	2859	2894	2928	2963	2997	3032	3066	3101	3135	3169
	372	376	381	385	390	394	399	403	407	412
58	3204	3238	3272	3306	3340	3375	3409	3443	3477	3511
	416	421	425	430	434	439	443	447	452	456
60	3545	3578	3612	3646	3680	3714	3747	3781	3815	3848
	461	465	469	474	478	483	487	491	496	500
62	3882	3915	3949	3982	4016	4049	4082	4116	4149	4182
	505	509	513	518	522	526	531	535	539	544
64	4216	4249	4282	4315	4348	4381	4414	4447	4479	4512
	548	552	556	561	565	569	574	578	582	586
66	4545	4578	4611	4643	4676	4709	4741	4774	4806	4838
	591	595	599	603	608	612	616	620	625	629
68	4871	4903	4935	4968	5000	5032	5064	5096	5128	5161
	633	637	641	646	650	654	658	662	667	671
ENGINE ANTI ICE ON △FUEL = + 3 %							TOTAL ANTI ICE ON △FUEL = + 6.5 %			

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS				ISA		DISTANCE (NM)				
NORMAL AIR CONDITIONING				CG=33.0%		TIME (MIN)		M.78 FL310		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	40	79	119	159	199	238	278	318	357
	0	5	10	16	21	26	31	36	42	47
42	397	437	476	516	556	595	635	674	714	753
	52	57	62	68	73	78	83	88	94	99
44	793	832	872	911	951	990	1030	1069	1109	1148
	104	109	114	119	125	130	135	140	145	150
46	1187	1227	1266	1305	1345	1384	1423	1463	1502	1541
	156	161	166	171	176	181	187	192	197	202
48	1580	1620	1659	1698	1737	1776	1815	1854	1894	1933
	207	212	217	223	228	233	238	243	248	253
50	1972	2011	2050	2089	2128	2167	2205	2244	2283	2322
	258	264	269	274	279	284	289	294	299	304
52	2361	2400	2439	2477	2516	2555	2594	2632	2671	2709
	310	315	320	325	330	335	340	345	350	355
54	2748	2787	2825	2864	2902	2941	2979	3017	3056	3094
	360	365	370	375	380	386	391	396	401	406
56	3132	3171	3209	3247	3285	3323	3361	3399	3437	3475
	411	416	421	426	431	436	441	446	451	456
58	3513	3551	3589	3626	3664	3702	3739	3777	3814	3852
	461	466	470	475	480	485	490	495	500	505
60	3889	3926	3964	4001	4038	4075	4112	4149	4186	4223
	510	515	520	525	529	534	539	544	549	554
62	4260	4297	4334	4371	4407	4444	4481	4517	4553	4590
	559	563	568	573	578	583	587	592	597	602
64	4626	4663	4699	4735	4771	4808	4844	4879	4915	4951
	607	611	616	621	626	630	635	640	644	649
66	4987	5023	5059	5094	5130	5166	5201	5237	5272	5308
	654	659	663	668	673	677	682	687	691	696
68	5343	5378	5413	5448	5484	5519	5554	5589	5624	5658
	700	705	710	714	719	724	728	733	737	742
70	5693	5728	5763	5797	5832	5867	5901	5935	5970	6004
	746	751	755	760	765	769	774	778	783	787
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$		

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 0.00 03101 .780 .000 .000 0 FCOM-N0-02-05-30-003-132

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 454KT		DISTANCE (NM) TIME (MIN)		M.78 FL330		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	43	86	129	172	215	258	301	344	387
	0	6	11	17	23	28	34	40	45	51
42	430	473	515	558	601	644	687	730	772	815
	57	63	68	74	80	85	91	96	102	108
44	858	901	943	986	1028	1071	1114	1156	1199	1241
	113	119	125	130	136	142	147	153	159	164
46	1284	1326	1369	1411	1453	1496	1538	1580	1623	1665
	170	175	181	187	192	198	203	209	215	220
48	1707	1749	1792	1834	1876	1918	1960	2002	2044	2086
	226	231	237	243	248	254	259	265	270	276
50	2128	2170	2212	2254	2295	2337	2379	2420	2462	2503
	281	287	293	298	304	309	315	320	326	331
52	2545	2586	2628	2669	2710	2752	2793	2834	2875	2916
	337	342	348	353	358	364	369	375	380	386
54	2957	2997	3038	3079	3120	3160	3201	3241	3282	3322
	391	396	402	407	413	418	423	429	434	439
56	3363	3403	3443	3483	3523	3563	3603	3643	3683	3723
	445	450	455	461	466	471	477	482	487	492
58	3762	3802	3841	3881	3921	3960	3999	4039	4078	4117
	498	503	508	513	519	524	529	534	539	545
60	4156	4195	4234	4273	4312	4351	4389	4428	4467	4505
	550	555	560	565	570	575	581	586	591	596
62	4544	4582	4620	4659	4697	4735	4773	4811	4849	4887
	601	606	611	616	621	626	631	636	641	646
64	4925	4963	5000	5038	5076	5114	5151	5188	5226	5263
	651	656	661	666	671	676	681	686	691	696
66	5301	5338	5375	5412	5449	5486	5523	5560	5597	5634
	701	706	711	716	721	726	730	735	740	745
68	5670	5707	5744	5780	5817	5853	5889	5926	5962	5998
	750	755	760	764	769	774	779	784	789	793
70	6034	6070	6106	6142	6178	6214	6250	6285	6321	6356
	798	803	808	812	817	822	827	831	836	841
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
Δ FUEL = - 0.4 %				Δ FUEL = + 3 %				Δ FUEL = + 5.5 %		

10E -09FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0301 .780 .000 .000 0 FCOM-N0-02-05-30-004-130

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS			ISA		DISTANCE (NM)					
NORMAL AIR CONDITIONING			CG=33.0%		TIME (MIN)		M.78 FL310			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2	42	81	121	160	200	239	279
			0	5	11	16	21	26	31	37
42	318	358	397	437	476	515	555	594	634	673
	42	47	52	57	62	68	73	78	83	88
44	712	752	791	830	870	909	948	987	1027	1066
	93	99	104	109	114	119	124	129	135	140
46	1105	1144	1184	1223	1262	1301	1340	1379	1418	1458
	145	150	155	160	165	171	176	181	186	191
48	1497	1536	1575	1614	1653	1692	1731	1770	1808	1847
	196	201	206	212	217	222	227	232	237	242
50	1886	1925	1964	2003	2042	2080	2119	2158	2197	2235
	247	252	257	263	268	273	278	283	288	293
52	2274	2313	2351	2390	2429	2467	2506	2544	2583	2621
	298	303	308	313	318	323	328	334	339	344
54	2660	2698	2736	2775	2813	2852	2890	2928	2966	3004
	349	354	359	364	369	374	379	384	389	394
56	3043	3081	3119	3157	3195	3233	3270	3308	3346	3384
	399	404	409	414	419	424	429	434	439	444
58	3422	3459	3497	3534	3572	3609	3647	3684	3721	3759
	449	453	458	463	468	473	478	483	488	493
60	3796	3833	3870	3907	3944	3981	4018	4055	4092	4129
	498	503	507	512	517	522	527	532	536	541
62	4166	4202	4239	4275	4312	4348	4385	4421	4457	4494
	546	551	556	560	565	570	575	580	584	589
64	4530	4566	4602	4638	4674	4711	4746	4782	4818	4854
	594	599	603	608	613	618	622	627	632	636
66	4890	4925	4961	4996	5032	5067	5103	5138	5173	5208
	641	646	650	655	660	664	669	674	678	683
68	5244	5279	5314	5349	5384	5419	5454	5488	5523	5558
	687	692	697	701	706	710	715	720	724	729
70	5593	5627	5662	5696	5731	5765	5800	5834	5868	5903
	733	738	742	747	751	756	760	765	769	774
72	5937	5971	6005	6039	6073	6107	6141	6175	6209	6242
	778	783	787	792	796	801	805	809	814	818
74	6276	6310	6343	6377	6411	6444	6477	6511	6544	6577
	823	827	832	836	840	845	849	854	858	862
76	6611	6644	6677	6710	6743	6776	6809	6842	6875	6907
	867	871	875	880	884	888	893	897	901	906
LOW AIR CONDITIONING			ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$			$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10F-08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .780 .000 .000 0 FCOM-N0-02-05-30-003-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 454KT		DISTANCE (NM) TIME (MIN)		M.78 FL330		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2	45	88	131	173	216	259	302
			0	6	12	17	23	29	34	40
42	344	387	430	472	515	558	600	643	686	728
	46	51	57	62	68	74	79	85	91	96
44	771	813	856	898	941	983	1025	1068	1110	1153
	102	108	113	119	124	130	136	141	147	152
46	1195	1237	1279	1322	1364	1406	1448	1490	1533	1575
	158	164	169	175	180	186	192	197	203	208
48	1617	1659	1701	1743	1785	1827	1869	1910	1952	1994
	214	219	225	230	236	242	247	253	258	264
50	2036	2078	2119	2161	2202	2244	2285	2327	2368	2410
	269	275	280	286	291	297	302	308	313	319
52	2451	2492	2533	2574	2616	2657	2698	2738	2779	2820
	324	330	335	340	346	351	357	362	368	373
54	2861	2901	2942	2983	3023	3064	3104	3144	3184	3225
	378	384	389	394	400	405	411	416	421	426
56	3265	3305	3345	3385	3425	3465	3505	3544	3584	3624
	432	437	442	448	453	458	464	469	474	479
58	3663	3703	3742	3781	3821	3860	3899	3938	3977	4016
	484	490	495	500	505	511	516	521	526	531
60	4055	4094	4133	4172	4210	4249	4288	4326	4365	4403
	536	541	547	552	557	562	567	572	577	582
62	4441	4480	4518	4556	4594	4632	4670	4708	4746	4784
	587	592	598	603	608	613	618	623	628	633
64	4821	4859	4896	4934	4972	5009	5046	5084	5121	5158
	638	643	648	653	658	663	667	672	677	682
66	5196	5233	5270	5307	5344	5381	5417	5454	5491	5527
	687	692	697	702	707	712	716	721	726	731
68	5564	5601	5637	5673	5710	5746	5782	5819	5855	5891
	736	741	746	750	755	760	765	770	774	779
70	5927	5963	5999	6034	6070	6106	6142	6177	6213	6248
	784	789	793	798	803	808	812	817	822	826
72	6283	6319	6354	6389	6424	6459	6494	6528	6563	6598
	831	836	840	845	850	854	859	863	868	873
74	6633	6667	6701	6735	6770	6804	6838	6871	6905	6939
	877	882	886	891	895	900	904	909	913	918
76	6973	7006	7040	7073	7106	7140	7173	7206	7239	7272
	922	927	931	935	940	944	949	953	957	962
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$		

10F -08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0.00 03301 .780 .000 .000 0 FCOM-N0-02-05-30-004-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 458KT		DISTANCE (NM) TIME (MIN)		M.78 FL310		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	39	79	118	158	197	236	276	315	354
	0	5	10	16	21	26	31	36	41	46
42	393	433	472	511	550	589	628	667	706	745
	52	57	62	67	72	77	82	87	93	98
44	784	823	862	900	939	978	1017	1055	1094	1133
	103	108	113	118	123	128	133	138	143	148
46	1171	1210	1248	1287	1325	1364	1402	1440	1479	1517
	154	159	164	169	174	179	184	189	194	199
48	1555	1593	1632	1670	1708	1746	1784	1822	1860	1898
	204	209	214	219	224	229	234	239	244	249
50	1936	1974	2011	2049	2087	2125	2162	2200	2238	2275
	254	259	264	269	274	279	283	288	293	298
52	2313	2350	2388	2425	2462	2500	2537	2574	2611	2648
	303	308	313	318	323	328	333	337	342	347
54	2686	2722	2759	2796	2833	2870	2907	2944	2981	3017
	352	357	362	367	371	376	381	386	391	396
56	3054	3091	3127	3164	3200	3237	3273	3309	3346	3382
	400	405	410	415	420	424	429	434	439	443
58	3418	3454	3490	3526	3563	3599	3634	3670	3706	3742
	448	453	458	462	467	472	476	481	486	491
60	3778	3813	3849	3885	3920	3956	3991	4027	4062	4097
	495	500	505	509	514	519	523	528	533	537
62	4133	4168	4203	4238	4273	4308	4343	4378	4413	4448
	542	546	551	556	560	565	569	574	579	583
64	4483	4517	4552	4587	4621	4656	4690	4725	4759	4793
	588	592	597	601	606	610	615	619	624	628
66	4828	4862	4896	4930	4964	4998	5032	5066	5100	5134
	633	637	642	646	651	655	660	664	669	673
68	5168	5201	5235	5268	5302	5336	5369	5402	5435	5469
	677	682	686	691	695	699	704	708	713	717
ENGINE ANTI ICE ON						TOTAL ANTI ICE ON				
Δ FUEL = + 3 %						Δ FUEL = + 6.5 %				

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 454KT		DISTANCE (NM) TIME (MIN)		M.78 FL330		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	42 6	85 11	127 17	169 22	211 28	254 34	296 39	338 45	380 50
42	422 56	464 61	506 67	548 72	590 78	631 84	673 89	715 95	757 100	798 106
44	840 111	881 117	923 122	964 128	1006 133	1047 139	1089 144	1130 149	1171 155	1213 160
46	1254 166	1295 171	1336 177	1377 182	1418 188	1459 193	1500 198	1541 204	1582 209	1622 215
48	1663 220	1704 225	1744 231	1785 236	1825 241	1866 247	1906 252	1947 257	1987 263	2027 268
50	2068 273	2108 279	2148 284	2188 289	2228 295	2268 300	2308 305	2347 310	2387 316	2427 321
52	2467 326	2506 331	2546 337	2585 342	2625 347	2665 352	2704 358	2743 363	2782 368	2822 373
54	2861 378	2900 384	2939 389	2978 394	3017 399	3056 404	3094 409	3133 414	3172 420	3211 425
56	3249 430	3288 435	3326 440	3364 445	3403 450	3441 455	3479 460	3518 465	3556 470	3594 475
58	3632 480	3670 485	3708 490	3745 495	3783 500	3821 505	3859 510	3896 515	3934 520	3971 525
60	4009 530	4046 535	4083 540	4120 545	4158 550	4195 555	4232 560	4269 565	4306 569	4342 574
62	4379 579	4416 584	4452 589	4489 594	4526 599	4562 603	4598 608	4635 613	4671 618	4707 623
64	4743 627	4779 632	4815 637	4851 642	4887 646	4923 651	4958 656	4994 660	5029 665	5065 670
66	5100 675	5135 679	5171 684	5206 689	5241 693	5276 698	5311 702	5346 707	5380 712	5415 716
68	5450 721	5484 725	5519 730	5553 734	5587 739	5622 744	5656 748	5690 753	5724 757	5758 761
ENGINE ANTI ICE ON △FUEL = + 3 %							TOTAL ANTI ICE ON △FUEL = + 6.5 %			

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 450KT		DISTANCE (NM) TIME (MIN)		M.78 FL350		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	47	93	140	186	233	279	326	372	418
	0	6	12	19	25	31	37	43	50	56
42	465	511	557	604	650	696	742	788	835	881
	62	68	74	81	87	93	99	105	111	118
44	927	973	1019	1065	1111	1157	1202	1248	1294	1340
	124	130	136	142	148	154	160	167	173	179
46	1385	1431	1476	1522	1567	1613	1658	1703	1748	1793
	185	191	197	203	209	215	221	227	233	239
48	1838	1883	1928	1973	2018	2062	2107	2151	2196	2240
	245	251	257	263	269	275	281	287	293	299
50	2285	2329	2373	2417	2461	2505	2549	2593	2637	2680
	305	311	317	323	328	334	340	346	352	358
52	2724	2768	2811	2854	2898	2941	2984	3027	3070	3113
	364	369	375	381	387	392	398	404	410	415
54	3156	3199	3242	3284	3327	3370	3412	3454	3497	3539
	421	427	433	438	444	450	455	461	467	472
56	3581	3623	3665	3707	3749	3791	3832	3874	3915	3957
	478	483	489	495	500	506	511	517	523	528
58	3999	4040	4081	4122	4163	4205	4246	4286	4327	4368
	534	539	545	550	556	561	567	572	577	583
60	4409	4450	4490	4531	4571	4612	4652	4692	4732	4773
	588	594	599	605	610	615	621	626	632	637
62	4813	4853	4893	4932	4972	5012	5052	5091	5131	5170
	642	648	653	658	664	669	674	679	685	690
64	5210	5249	5288	5327	5366	5405	5444	5483	5521	5560
	695	700	706	711	716	721	726	732	737	742
66	5599	5637	5675	5713	5751	5790	5827	5865	5903	5940
	747	752	757	762	768	773	778	783	788	793
68	5978	6015	6052	6089	6126	6163	6200	6237	6273	6310
	798	803	808	813	818	823	827	832	837	842
70	6346	6382	6418	6454	6490	6526	6562	6597	6633	6668
	847	852	857	861	866	871	876	880	885	890
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
$\Delta FUEL = -0.4\%$				$\Delta FUEL = +3\%$				$\Delta FUEL = +5.5\%$		

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 .00 03501 .780 .000 .000 0 FCOM-N0-02-05-30-005-130

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 447KT		DISTANCE (NM)		TIME (MIN)		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	50 7	100 13	150 20	201 27	251 34	300 40	350 47	400 54	450 60
42	500 67	549 74	599 80	648 87	698 94	747 100	796 107	845 113	894 120	944 127
44	993 133	1041 140	1090 146	1139 153	1187 159	1236 166	1284 172	1333 179	1381 185	1429 192
46	1478 198	1525 205	1573 211	1621 217	1669 224	1717 230	1764 237	1812 243	1859 249	1907 256
48	1954 262	2001 268	2048 275	2095 281	2142 287	2189 294	2235 300	2282 306	2329 312	2375 319
50	2422 325	2468 331	2514 337	2560 343	2606 350	2652 356	2698 362	2744 368	2789 374	2835 380
52	2881 386	2926 392	2971 398	3016 405	3062 411	3107 417	3152 423	3197 429	3242 435	3286 441
54	3331 447	3376 453	3420 459	3465 465	3509 471	3554 477	3598 482	3642 488	3686 494	3730 500
56	3774 506	3818 512	3861 518	3905 524	3949 530	3992 535	4035 541	4079 547	4122 553	4165 559
58	4208 564	4251 570	4294 576	4337 582	4379 587	4422 593	4464 599	4507 604	4549 610	4591 616
60	4633 621	4675 627	4717 633	4758 638	4800 644	4842 649	4883 655	4924 660	4965 666	5005 671
62	5046 677	5087 682	5127 688	5167 693	5208 698	5248 704	5288 709	5328 714	5367 720	5407 725
64	5447 730	5486 736	5525 741	5564 746	5603 751	5642 757	5680 762	5719 767	5757 772	5795 777
66	5834 782	5871 787	5909 793	5947 798	5985 803	6023 808	6060 813	6097 818	6134 823	6171 828
68	6208 833	6245 837	6281 842	6318 847	6354 852	6390 857	6426 862	6462 867	6497 871	6533 876
70	6569 881	6604 886	6640 890	6675 895						
LOW AIR CONDITIONING △FUEL = - 0.4 %				ENGINE ANTI ICE ON △FUEL = + 3 %				TOTAL ANTI ICE ON △FUEL = + 5.5 %		

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0. 0. 00 03701 .780 .000 .000 0 FCOM-N0-02-05-30-006-130

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS				ISA		DISTANCE (NM)		TIME (MIN)		
NORMAL AIR CONDITIONING				CG=33.0%				M.78 FL350		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40				2	49	95	141	188	234	280
				0	6	13	19	25	31	37
42	372	419	465	511	557	603	649	695	741	787
	50	56	62	68	74	80	87	93	99	105
44	833	878	924	970	1016	1062	1107	1153	1198	1244
	111	117	123	129	136	142	148	154	160	166
46	1289	1334	1380	1425	1470	1515	1560	1605	1650	1695
	172	178	184	190	196	202	208	214	220	226
48	1740	1785	1829	1874	1919	1963	2008	2052	2096	2140
	232	238	244	250	256	262	268	274	280	286
50	2185	2229	2273	2316	2360	2404	2448	2491	2535	2579
	292	297	303	309	315	321	327	332	338	344
52	2622	2665	2709	2752	2795	2838	2881	2924	2967	3010
	350	356	361	367	373	379	385	390	396	402
54	3053	3095	3138	3180	3223	3265	3307	3349	3392	3434
	407	413	419	424	430	436	441	447	453	458
56	3476	3518	3559	3601	3643	3685	3726	3767	3809	3850
	464	469	475	481	486	492	497	503	508	514
58	3892	3933	3974	4015	4056	4097	4138	4179	4219	4260
	519	525	530	536	541	547	552	558	563	569
60	4301	4341	4382	4422	4462	4503	4543	4583	4623	4663
	574	579	585	590	596	601	606	612	617	622
62	4703	4743	4783	4822	4862	4902	4941	4981	5020	5059
	628	633	638	644	649	654	659	665	670	675
64	5099	5138	5177	5216	5255	5294	5332	5371	5409	5448
	680	686	691	696	701	706	712	717	722	727
66	5487	5525	5563	5601	5639	5677	5714	5752	5790	5827
	732	737	742	747	752	758	763	768	773	778
68	5865	5902	5939	5976	6013	6050	6086	6123	6159	6196
	783	788	793	797	802	807	812	817	822	827
70	6232	6268	6304	6340	6376	6412	6448	6483	6519	6554
	832	837	841	846	851	856	860	865	870	875
72	6589	6624	6659	6694	6729	6764	6798	6833	6867	6902
	879	884	889	893	898	903	907	912	916	921
74	6936	6970	7004	7037	7071	7105	7138	7171	7204	7237
	926	930	935	939	944	948	953	957	961	966
76	7270	7303	7336	7370	7403					
	970	975	979	983	988					
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON		
$\Delta FUEL = -0.4\%$				$\Delta FUEL = +3\%$				$\Delta FUEL = +5.5\%$		

10F-08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .780 .000 .000 0 FCOM-N0-02-05-30-005-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 447KT		DISTANCE (NM) TIME (MIN)		M.78 FL370		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2	52	102	152	202	251	301	350
			0	7	14	20	27	34	40	47
42	400	449	499	548	597	646	695	744	793	842
	54	60	67	73	80	87	93	100	106	113
44	891	939	988	1036	1085	1133	1181	1229	1277	1325
	119	126	132	139	145	152	158	165	171	178
46	1374	1421	1469	1517	1564	1612	1659	1706	1754	1801
	184	191	197	203	210	216	223	229	235	242
48	1848	1895	1942	1988	2035	2082	2128	2175	2221	2268
	248	254	260	267	273	279	285	292	298	304
50	2314	2360	2406	2452	2498	2544	2589	2635	2680	2726
	310	316	323	329	335	341	347	353	359	366
52	2771	2816	2861	2906	2952	2997	3041	3086	3131	3176
	372	378	384	390	396	402	408	414	420	426
54	3220	3265	3309	3353	3398	3442	3486	3530	3574	3618
	432	438	444	450	456	462	467	473	479	485
56	3662	3705	3749	3792	3836	3879	3922	3965	4008	4051
	491	497	503	509	514	520	526	532	538	543
58	4095	4137	4180	4222	4265	4308	4350	4392	4434	4476
	549	555	561	566	572	578	583	589	595	600
60	4518	4560	4601	4643	4684	4726	4767	4807	4848	4889
	606	612	617	623	628	634	639	645	650	656
62	4930	4970	5011	5051	5091	5131	5171	5211	5250	5290
	661	667	672	677	683	688	694	699	704	709
64	5330	5369	5408	5447	5486	5525	5563	5601	5640	5678
	715	720	725	730	736	741	746	751	756	761
66	5716	5754	5792	5830	5867	5905	5942	5979	6016	6053
	767	772	777	782	787	792	797	802	807	812
68	6091	6127	6163	6200	6236	6273	6308	6344	6380	6415
	817	822	827	831	836	841	846	851	856	860
70	6451	6487	6522	6558						
	865	870	875	879						
72										
74										
76										

LOW AIR CONDITIONING

 Δ FUEL = - 0.4 %

ENGINE ANTI ICE ON

 Δ FUEL = + 3 %

TOTAL ANTI ICE ON

 Δ FUEL = + 5.5 %

10F -08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0.00 03701 .780 .000 .000 0 FCOM-N0-02-05-30-006-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 450KT		DISTANCE (NM) TIME (MIN)		M.78 FL350		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	45 6	91 12	136 18	181 24	226 30	271 36	317 42	362 48	407 54
42	452 60	496 66	541 72	586 78	631 84	675 90	720 96	764 102	809 108	853 114
44	898 120	942 126	986 132	1030 137	1074 143	1119 149	1163 155	1206 161	1250 167	1294 173
46	1338 179	1382 184	1425 190	1469 196	1512 202	1556 208	1599 213	1642 219	1686 225	1729 231
48	1772 236	1815 242	1858 248	1901 254	1944 259	1987 265	2029 271	2072 277	2115 282	2157 288
50	2200 294	2242 299	2284 305	2327 310	2369 316	2411 322	2453 327	2495 333	2537 339	2579 344
52	2621 350	2662 355	2704 361	2745 366	2787 372	2829 377	2870 383	2911 388	2952 394	2993 399
54	3035 405	3075 410	3116 416	3157 421	3198 427	3239 432	3279 438	3320 443	3360 448	3401 454
56	3441 459	3481 465	3521 470	3561 475	3602 481	3642 486	3681 491	3721 497	3761 502	3800 507
58	3840 512	3879 518	3919 523	3958 528	3997 533	4036 539	4075 544	4114 549	4153 554	4192 559
60	4230 565	4269 570	4307 575	4346 580	4384 585	4422 590	4460 595	4498 600	4536 605	4574 610
62	4612 615	4649 620	4687 625	4724 630	4762 635	4799 640	4836 645	4873 650	4910 655	4947 660
64	4984 665	5021 670	5057 675	5094 680	5130 685	5166 689	5202 694	5238 699	5274 704	5310 709
66	5346 713	5381 718	5417 723	5452 728	5487 732	5523 737	5558 742	5592 746	5627 751	5662 756
68	5697 760	5731 765	5765 769	5800 774	5834 779	5868 783	5902 788	5936 792	5969 797	6003 801
ENGINE ANTI ICE ON Δ FUEL = + 3 %						TOTAL ANTI ICE ON Δ FUEL = + 6.5 %				

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 447KT		DISTANCE (NM) TIME (MIN)		M.78 FL370		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	48	96	145	193	241	289	336	384	432
	0	6	13	19	26	32	39	45	52	58
42	480	527	575	622	670	717	764	811	858	905
	64	71	77	83	90	96	102	109	115	121
44	952	999	1046	1093	1139	1186	1232	1278	1325	1371
	128	134	140	147	153	159	165	171	178	184
46	1417	1463	1509	1555	1601	1647	1692	1737	1783	1828
	190	196	202	209	215	221	227	233	239	245
48	1874	1919	1964	2009	2054	2099	2144	2188	2233	2277
	251	257	263	269	275	281	287	293	299	305
50	2322	2366	2410	2454	2498	2543	2586	2630	2674	2717
	311	317	323	329	335	341	347	353	359	364
52	2761	2804	2847	2890	2934	2977	3019	3062	3105	3147
	370	376	382	388	393	399	405	411	416	422
54	3190	3232	3274	3317	3359	3401	3442	3484	3526	3567
	428	433	439	445	450	456	462	467	473	478
56	3609	3650	3691	3732	3773	3814	3855	3895	3936	3976
	484	490	495	501	506	512	517	522	528	533
58	4017	4056	4096	4136	4176	4216	4255	4294	4333	4372
	539	544	549	555	560	565	571	576	581	586
60	4412	4450	4489	4527	4566	4604	4642	4680	4718	4756
	592	597	602	607	612	618	623	628	633	638
62	4794	4831	4868	4905	4943	4980	5016	5053	5090	5126
	643	648	653	658	663	668	673	678	683	687
64	5163	5199	5234	5270	5306	5342	5377	5413	5448	5483
	692	697	702	707	712	716	721	726	731	735
66	5518	5553	5588	5622	5657	5691				
	740	745	749	754	759	763				
68										
ENGINE ANTI ICE ON △FUEL = + 3 %							TOTAL ANTI ICE ON △FUEL = + 6.5 %			

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 447KT		DISTANCE (NM) TIME (MIN)		M.78 FL390			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	53	106	159	212	265	317	370	422	475
	0	7	14	21	28	36	43	50	57	64
42	527	579	631	683	735	787	839	890	942	993
	71	78	85	92	99	106	113	119	126	133
44	1045	1096	1147	1198	1249	1300	1350	1401	1451	1501
	140	147	154	161	167	174	181	188	195	201
46	1552	1602	1652	1702	1752	1802	1851	1900	1950	1999
	208	215	222	228	235	242	248	255	262	268
48	2049	2098	2147	2196	2245	2294	2342	2391	2439	2488
	275	281	288	294	301	308	314	321	327	334
50	2536	2584	2632	2680	2728	2777	2824	2872	2919	2967
	340	347	353	359	366	372	379	385	391	398
52	3014	3061	3108	3155	3202	3249	3296	3342	3389	3435
	404	411	417	423	429	436	442	448	454	461
54	3481	3527	3573	3619	3664	3710	3755	3800	3845	3890
	467	473	479	485	491	498	504	510	516	522
56	3935	3979	4023	4067	4112	4156	4199	4243	4286	4329
	528	534	540	545	551	557	563	569	575	581
58	4373	4415	4458	4501	4543	4586	4628	4670	4712	4754
	586	592	598	604	609	615	621	626	632	638
60	4795	4837	4878	4919	4960	5001	5041	5082	5122	5162
	643	649	654	660	665	671	676	682	687	692
62	5203	5242	5281	5321	5360	5399	5438	5478	5517	5556
	698	703	708	714	719	724	729	735	740	745
64										
66										
68										
70										
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
Δ FUEL = - 0.4 %			Δ FUEL = + 3 %			Δ FUEL = + 5.5 %				

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .780 .000 .000 0 FCOM-N0-02-05-30-007-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL100			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	28	56	84	111	139	167	195	222	250	275
	0	6	12	18	24	30	36	42	48	54	
42	278	305	333	360	388	415	442	470	497	524	281
	60	66	72	78	83	89	95	101	107	112	
44	552	579	606	633	660	687	714	741	768	795	286
	118	124	129	135	141	146	152	158	163	169	
46	822	849	876	903	929	956	983	1009	1036	1063	290
	174	180	185	191	197	202	208	213	218	224	
48	1089	1116	1142	1169	1195	1222	1248	1274	1301	1327	293
	229	235	240	246	251	256	262	267	273	278	
50	1353	1380	1406	1432	1458	1484	1510	1536	1563	1589	296
	283	289	294	299	304	310	315	320	325	331	
52	1615	1641	1666	1692	1718	1744	1770	1796	1821	1847	298
	336	341	346	352	357	362	367	372	377	383	
54	1873	1898	1924	1950	1975	2001	2026	2052	2077	2103	301
	388	393	398	403	408	413	418	423	428	433	
56	2128	2154	2179	2204	2229	2255	2280	2305	2330	2355	304
	438	443	448	453	458	463	468	473	478	483	
58	2381	2406	2431	2456	2481	2506	2530	2555	2580	2605	307
	488	493	498	503	507	512	517	522	527	532	
60	2630	2655	2679	2704	2729	2753	2778	2802	2827	2852	311
	536	541	546	551	555	560	565	569	574	579	
62	2876	2900	2925	2949	2974	2998	3022	3046	3071	3095	316
	583	588	593	597	602	606	611	615	620	625	
64	3119	3143	3167	3191	3215	3239	3263	3287	3311	3335	324
	629	633	638	642	647	651	655	660	664	668	
66	3359	3383	3407	3430	3454	3478	3502	3525	3549	3572	335
	673	677	681	685	690	694	698	702	706	710	
68	3596	3619	3643	3666	3690	3713	3737	3760	3783	3807	345
	714	719	723	727	731	735	739	743	747	751	
70	3830	3853	3877	3900	3923	3946	3969	3992	4015	4039	353
	755	759	763	767	770	774	778	782	786	790	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0. 0.00 01001 .990 .000 .000 0 FCOM-N0-02-05-30-008-130

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS			ISA		DISTANCE (NM)					
NORMAL AIR CONDITIONING			CG=33.0%		TIME (MIN)		M.78 FL390			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			3	55	108	161	213	265	317	370
			0	7	14	22	29	36	43	50
42	422	474	526	577	629	681	732	784	835	886
	57	64	70	77	84	91	98	105	112	119
44	937	988	1039	1090	1140	1191	1241	1292	1342	1392
	126	133	139	146	153	160	166	173	180	187
46	1442	1492	1542	1592	1642	1691	1741	1790	1839	1888
	193	200	207	213	220	227	233	240	247	253
48	1938	1987	2035	2084	2133	2182	2230	2279	2327	2375
	260	266	273	280	286	293	299	306	312	319
50	2424	2472	2519	2567	2615	2663	2710	2758	2805	2853
	325	331	338	344	351	357	363	370	376	383
52	2900	2947	2994	3040	3087	3134	3180	3227	3273	3319
	389	395	401	408	414	420	427	433	439	445
54	3366	3411	3457	3502	3548	3593	3638	3683	3728	3773
	451	457	464	470	476	482	488	494	500	506
56	3818	3862	3906	3950	3994	4038	4081	4125	4168	4211
	512	518	524	530	536	542	547	553	559	565
58	4255	4297	4340	4383	4425	4468	4510	4551	4593	4635
	571	576	582	588	593	599	605	610	616	622
60	4677	4718	4759	4800	4841	4883	4923	4963	5004	5044
	627	633	638	644	649	655	660	666	671	676
62	5084	5123	5163	5202	5241	5280	5320	5359	5398	
	682	687	692	698	703	708	713	719	724	
64										
66										
68										
70										
72										
74										
76										
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
Δ FUEL = - 0.4 %			Δ FUEL = + 3 %			Δ FUEL = + 5.5 %				

10F-08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .00 03901 .780 .000 .000 0 FCOM-N0-02-05-30-007-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL100			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	327	6214	9221	12128	15134	18141	21148	262
42	241 55	270 61	300 68	329 75	359 81	389 88	418 95	447 101	477 108	506 115	265
44	535 121	564 128	593 134	623 141	652 147	681 154	710 160	739 166	767 173	796 179	268
46	825 186	854 192	882 198	911 205	940 211	968 217	997 223	1025 230	1053 236	1082 242	271
48	1110 248	1138 254	1166 261	1195 267	1223 273	1251 279	1279 285	1307 291	1334 297	1362 303	275
50	1390 309	1418 315	1445 321	1473 327	1501 332	1528 338	1556 344	1583 350	1610 356	1638 361	280
52	1665 367	1692 373	1719 379	1746 384	1773 390	1801 396	1827 401	1854 407	1881 412	1908 418	286
54	1935 423	1962 429	1988 434	2015 440	2041 445	2068 451	2094 456	2121 462	2147 467	2174 472	291
56	2200 478	2226 483	2253 488	2279 494	2305 499	2331 504	2357 509	2383 515	2409 520	2435 525	296
58	2461 530	2487 535	2512 540	2538 546	2564 551	2590 556	2615 561	2641 566	2666 571	2692 576	300
60	2717 581	2743 586	2768 591	2793 596	2819 601	2844 606	2869 611	2894 616	2919 620	2944 625	305
62	2969 630	2994 635	3019 640	3044 645	3069 649	3094 654	3119 659	3143 664	3168 668	3193 673	309
64	3217 678	3242 683	3266 687	3291 692	3315 697	3340 701	3364 706	3388 710	3413 715	3437 720	314
66	3461 724	3485 729	3509 733	3533 738	3557 742	3581 747	3605 751	3629 755	3653 760	3677 764	319
68	3701 769	3725 773	3748 777	3772 781	3796 786	3819 790	3843 794	3866 798	3890 803	3913 807	328
70	3937 811	3960 815	3983 819	4007 823	4030 827	4053 831	4077 835	4100 840	4123 844	4146 848	339
72	4169 852	4192 855	4215 859	4238 863	4261 867	4284 871	4307 875	4329 879	4352 883	4375 886	349
74	4398 890	4420 894	4443 898	4466 901	4488 905	4511 909	4533 913	4556 916	4578 920	4601 924	360
76	4624 927	4646 931	4668 935	4691 938	4713 942	4735 945	4758 949	4780 953	4802 956	4825 960	369
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 2220000005KG330 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-N0-02-05-30-008-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 447KT		DISTANCE (NM) TIME (MIN)		M.78 FL390		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	51 7	102 14	152 20	203 27	254 34	304 41	355 48	405 54	455 61
42	506 68	555 74	605 81	655 88	705 95	755 101	804 108	854 114	903 121	952 128
44	1002 134	1050 141	1099 147	1148 154	1197 161	1246 167	1294 174	1342 180	1391 186	1439 193
46	1487 199	1535 206	1583 212	1630 219	1678 225	1726 231	1773 238	1820 244	1867 250	1915 257
48	1962 263	2008 269	2101 276	2148 282	2194 288	2240 294	2286 300	2332 307	2378 313	2378 319
50	2424 325	2469 331	2515 337	2560 343	2605 349	2650 355	2695 361	2740 367	2784 373	2829 379
52	2874 385	2917 391	2961 397	3005 403	3049 409	3093 415	3136 421	3179 426	3222 432	3266 438
54	3309 444	3351 449	3393 455	3436 461	3478 466	3520 472	3562 478	3604 483	3645 489	3687 494
56	3728 500	3769 505	3810 511	3851 516	3891 522	3932 527	3972 533	4012 538	4052 543	4092 549
58	4132 554	4171 559	4210 565	4250 570	4289 575	4328 580	4366 586	4405 591	4443 596	4482 601
60	4520 606	4558 611	4595 616	4633 621	4670 626	4708 631	4745 636	4782 641	4819 646	4856 651
62	4892 656	4929 661	4965 666	5001 671						
64										
66										
68										
ENGINE ANTI ICE ON Δ FUEL = + 3 %						TOTAL ANTI ICE ON Δ FUEL = + 6.5 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 259KT		DISTANCE (NM) TIME (MIN)		LR			FL100
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	29	59	88	118	147	177	206	235	264	
	0	7	14	20	27	34	41	48	54	61	
42	294	323	352	381	410	439	468	496	525	554	
	68	75	81	88	95	101	108	115	121	128	
44	583	612	640	669	697	726	754	783	811	839	
	134	141	148	154	161	167	173	180	186	193	
46	868	896	924	952	980	1008	1036	1064	1093	1121	
	199	205	211	217	223	229	234	240	246	251	
48	1149	1176	1204	1232	1260	1288	1316	1344	1371	1399	
	257	263	268	274	280	285	291	296	302	308	
50	1427	1454	1482	1510	1537	1565	1592	1620	1647	1674	
	313	319	324	330	336	341	347	352	358	363	
52	1702	1729	1756	1784	1811	1838	1865	1892	1919	1946	
	369	374	380	385	391	396	402	407	412	418	
54	1973	2000	2027	2054	2081	2108	2135	2162	2188	2215	
	423	429	434	439	445	450	456	461	466	472	
56	2242	2268	2295	2322	2348	2375	2401	2428	2454	2481	
	477	482	488	493	498	503	509	514	519	524	
58	2507	2533	2559	2586	2612	2638	2664	2690	2716	2743	
	530	535	540	545	551	556	561	566	571	576	
60	2769	2794	2820	2846	2872	2898	2924	2949	2975	3001	
	582	587	592	597	602	607	612	617	622	627	
62	3027	3052	3078	3103	3129	3154	3180	3205	3230	3256	
	632	637	642	646	651	656	660	664	669	673	
64	3281	3306	3331	3356	3382	3407	3432	3457	3482	3507	
	677	682	686	690	694	699	703	707	711	715	
66	3532	3557	3581	3606	3631	3656	3681	3706	3730	3755	
	720	724	728	732	736	740	745	749	753	757	
68	3780	3805	3829	3854	3879	3903	3928	3952	3977	4001	
	761	765	769	774	778	782	786	790	794	798	
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL120			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	29	59	88	117	147	176	205	234	263	282
	0	6	12	19	25	31	37	43	49	56	
42	292	321	350	379	408	437	466	494	523	552	286
	62	68	74	80	86	92	98	104	110	116	
44	581	609	638	666	695	723	752	780	808	837	290
	122	128	134	139	145	151	157	163	169	174	
46	865	893	922	950	978	1006	1034	1062	1090	1118	293
	180	186	192	198	203	209	215	221	226	232	
48	1146	1174	1202	1230	1258	1286	1313	1341	1369	1396	296
	238	243	249	255	260	266	271	277	283	288	
50	1424	1452	1479	1507	1534	1562	1589	1617	1644	1671	299
	294	299	305	310	316	321	327	332	338	343	
52	1699	1726	1753	1780	1807	1835	1862	1889	1916	1943	302
	348	354	359	365	370	375	381	386	391	397	
54	1970	1996	2023	2050	2077	2104	2130	2157	2184	2210	306
	402	407	412	418	423	428	433	439	444	449	
56	2237	2263	2290	2316	2343	2369	2396	2422	2448	2474	310
	454	459	464	469	475	480	485	490	495	500	
58	2501	2527	2553	2579	2605	2631	2657	2683	2709	2735	315
	505	510	515	520	524	529	534	539	544	549	
60	2761	2787	2812	2838	2864	2890	2915	2941	2966	2992	326
	553	558	563	567	572	577	581	586	591	595	
62	3017	3043	3068	3094	3119	3144	3170	3195	3220	3245	337
	600	604	609	613	618	622	627	631	635	640	
64	3271	3296	3321	3346	3371	3396	3421	3446	3471	3496	347
	644	649	653	657	661	666	670	674	679	683	
66	3521	3545	3570	3595	3620	3645	3669	3694	3719	3743	355
	687	691	695	700	704	708	712	716	720	724	
68	3768	3792	3817	3842	3866	3891	3915	3939	3964	3988	360
	729	733	737	741	745	749	753	757	761	765	
70	4013	4037	4061	4086	4110	4134	4159	4183	4207	4231	365
	769	773	777	781	785	789	793	797	801	805	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01201 .990 .000 .000 0 FCOM-N0-02-05-30-009-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL150			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	32	63	95	127	158	190	221	253	284	288
	0	7	13	20	26	33	39	46	52	59	
42	316	347	378	410	441	472	503	534	565	596	292
	65	72	78	85	91	97	104	110	116	123	
44	627	658	689	720	751	782	812	843	874	904	295
	129	135	142	148	154	160	167	173	179	185	
46	935	965	996	1026	1056	1087	1117	1147	1177	1208	298
	191	197	204	210	216	222	228	234	240	246	
48	1238	1268	1298	1328	1358	1388	1417	1447	1477	1507	302
	252	258	264	270	276	282	287	293	299	305	
50	1536	1566	1595	1625	1654	1684	1713	1743	1772	1801	307
	311	317	322	328	334	340	345	351	356	362	
52	1830	1859	1888	1918	1947	1976	2004	2033	2062	2091	312
	368	373	379	384	390	395	401	406	411	417	
54	2120	2148	2177	2206	2234	2263	2291	2320	2348	2376	327
	422	427	432	438	443	448	453	458	463	468	
56	2405	2433	2461	2489	2518	2546	2574	2602	2630	2658	338
	473	478	483	488	493	498	503	508	513	518	
58	2686	2713	2741	2769	2797	2825	2852	2880	2908	2935	348
	523	527	532	537	542	546	551	556	561	565	
60	2963	2990	3018	3045	3073	3100	3128	3155	3182	3210	354
	570	575	579	584	589	593	598	602	607	611	
62	3237	3264	3291	3318	3346	3373	3400	3427	3454	3481	360
	616	621	625	630	634	639	643	648	652	657	
64	3508	3535	3562	3589	3616	3643	3669	3696	3723	3750	365
	661	665	670	674	679	683	687	692	696	700	
66	3776	3803	3830	3856	3883	3909	3936	3962	3989	4015	374
	705	709	713	717	722	726	730	734	738	743	
68	4042	4068	4095	4121	4147	4174	4200	4226	4253	4279	379
	747	751	755	759	763	768	772	776	780	784	
70	4305	4331	4358	4384	4410	4436	4462	4488	4514	4540	381
	788	792	797	801	805	809	813	817	821	825	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0. 0.00 01501 .990 .000 .000 0 FCOM-N0-02-05-30-010-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		TIME (MIN)			
NORMAL AIR CONDITIONING										LR	FL120
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	337	6415	9622	12729	15836	18943	22150	265
42	25257	28364	31470	34577	37684	40791	43798	468105	498112	529118	268
44	560125	590132	620138	651145	681152	712158	742165	772172	802178	832185	272
46	862191	892198	921204	951210	981217	1011223	1040229	1069236	1099242	1128248	277
48	1158255	1187261	1216267	1245273	1275279	1304285	1333291	1361298	1390304	1419310	283
50	1448316	1477322	1505328	1534333	1563339	1591345	1620351	1648357	1676363	1705369	
52	1733374	1761380	1789386	1817392	1845397	1874403	1901409	1929414	1957420	1985426	293
54	2013431	2040437	2068442	2096448	2123453	2151459	2178464	2205470	2233475	2260480	
56	2287486	2314491	2342496	2369502	2396507	2423512	2450518	2477523	2503528	2530533	304
58	2557539	2584544	2610549	2637554	2663559	2690564	2716569	2743574	2769580	2795585	309
60	2822590	2848595	2874600	2900605	2926610	2952615	2978619	3004624	3030629	3056634	314
62	3082639	3107644	3133649	3159653	3184658	3210663	3235667	3261672	3286677	3312681	320
64	3337686	3362690	3388695	3413700	3438704	3463709	3488713	3513717	3538722	3563726	332
66	3588731	3613735	3638739	3663743	3687748	3712752	3737756	3761760	3786765	3810769	343
68	3835773	3859777	3884781	3908785	3933789	3957793	3981797	4005801	4030805	4054809	356
70	4078813	4102817	4126821	4151825	4175829	4199833	4223837	4247841	4271845	4295849	365
72	4319852	4342856	4366860	4390864	4414868	4438871	4461875	4485879	4509882	4533886	377
74	4556890	4580894	4604897	4627901	4651905	4674908	4698912	4722916	4745919	4769923	384
76	4792927	4816930	4839934	4862938	4886941	4909945	4933948	4956952	4979956	5003959	387
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1 0 .0 .00 01201 .990 .000 .000 0 FCOM-NO-02-05-30-009-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL150			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	358	6915	10222	13530	16837	20244	23551	271
42	268 59	301 66	333 73	366 80	399 87	432 94	464 101	497 108	529 115	562 121	277
44	594 128	626 135	658 142	690 149	722 155	755 162	786 169	818 175	850 182	882 189	283
46	913 195	945 202	976 208	1008 215	1039 221	1070 228	1102 234	1133 240	1164 247	1195 253	289
48	1226 259	1257 266	1287 272	1318 278	1349 284	1380 291	1410 297	1441 303	1471 309	1502 315	295
50	1532 321	1562 327	1592 333	1623 339	1653 345	1683 351	1713 357	1743 363	1772 369	1802 375	300
52	1832 380	1862 386	1891 392	1921 398	1950 404	1980 409	2009 415	2038 421	2067 426	2097 432	306
54	2126 438	2155 443	2184 449	2213 454	2241 460	2270 465	2299 471	2328 476	2356 481	2385 487	312
56	2414 492	2442 497	2470 503	2499 508	2527 513	2555 518	2584 523	2612 528	2640 534	2668 539	322
58	2696 544	2724 549	2751 554	2779 558	2807 563	2835 568	2862 573	2890 578	2918 583	2945 587	336
60	2973 592	3000 597	3027 601	3055 606	3082 611	3109 615	3136 620	3163 625	3191 629	3218 634	350
62	3245 638	3272 643	3299 647	3326 651	3353 656	3379 660	3406 665	3433 669	3460 673	3486 678	360
64	3513 682	3540 686	3566 690	3593 695	3620 699	3646 703	3673 707	3699 711	3726 716	3752 720	376
66	3779 724	3805 728	3831 732	3858 736	3884 741	3910 745	3937 749	3963 753	3989 757	4015 761	380
68	4042 765	4068 769	4094 774	4120 778	4146 782	4172 786	4199 790	4225 794	4251 798	4277 802	383
70	4303 806	4329 810	4355 814	4381 818	4407 822	4433 826	4459 830	4485 834	4511 838	4536 843	385
72	4562 847	4588 851	4614 855	4640 859	4666 863	4692 867	4717 871	4743 875	4769 879	4795 883	386
74	4821 887	4846 891	4872 895	4898 899	4923 903	4949 907	4975 911	5000 915	5026 919	5052 923	386
76	5077 926	5103 930	5128 934	5154 938	5179 942	5205 946	5230 950	5256 954	5281 958	5307 962	388
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 IAE V2527-A5 2220000005KG330 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-N0-02-05-30-010-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 259KT		DISTANCE (NM) TIME (MIN)		LR			FL120
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	31	62	93	124	154	185	216	246	277
	0	7	14	21	29	36	43	50	57	64
42	308	338	368	399	429	459	489	520	550	580
	71	77	84	90	97	103	110	116	122	128
44	610	640	670	700	730	760	790	820	850	879
	134	140	146	153	159	165	171	177	183	189
46	909	939	968	998	1028	1057	1087	1116	1146	1175
	195	201	207	213	220	226	232	238	244	250
48	1205	1234	1263	1292	1322	1351	1380	1409	1438	1467
	255	261	267	273	279	285	291	297	303	309
50	1496	1525	1554	1583	1612	1640	1669	1698	1726	1755
	315	320	326	332	338	344	349	355	361	367
52	1784	1812	1841	1869	1898	1926	1954	1983	2011	2039
	373	378	384	390	395	401	407	412	418	424
54	2067	2095	2123	2152	2180	2208	2236	2263	2291	2319
	429	435	441	446	452	457	463	468	474	479
56	2347	2375	2402	2430	2458	2485	2513	2540	2568	2595
	485	490	496	501	507	512	518	523	529	534
58	2623	2650	2677	2704	2731	2759	2786	2813	2840	2867
	539	544	549	554	559	564	569	573	578	583
60	2894	2921	2947	2974	3001	3028	3055	3081	3108	3135
	587	592	596	601	605	610	614	619	623	628
62	3162	3188	3215	3241	3268	3295	3321	3348	3374	3401
	632	637	641	646	650	655	659	664	668	673
64	3427	3453	3480	3506	3533	3559	3585	3611	3638	3664
	677	682	686	691	695	700	704	709	713	717
66	3690	3716	3743	3769	3795	3821	3847	3873	3899	3925
	722	726	731	735	740	744	748	753	757	762
68	3951	3977	4003	4029	4055	4081	4107	4132	4158	4184
	766	770	775	779	783	788	792	797	801	805
ENGINE ANTI ICE ON					TOTAL ANTI ICE ON					
Δ FUEL = + 2 %					Δ FUEL = + 6 %					

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 289KT		DISTANCE (NM) TIME (MIN)		LR FL150		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	33	66	100	133	166	199	232	265	298
	0	7	14	21	28	34	41	48	55	62
42	331	364	396	429	462	495	527	559	592	624
	68	75	82	89	95	102	109	116	122	129
44	657	689	721	754	786	818	850	882	914	946
	136	142	149	155	162	169	175	182	188	195
46	978	1010	1041	1073	1105	1137	1168	1199	1231	1262
	201	208	214	221	227	234	240	247	253	259
48	1294	1325	1356	1387	1419	1450	1481	1512	1543	1574
	266	272	278	285	291	297	303	309	316	322
50	1604	1635	1666	1696	1727	1758	1788	1819	1849	1880
	328	334	340	346	353	359	365	371	377	383
52	1910	1940	1970	2000	2031	2061	2091	2121	2151	2181
	389	395	401	407	413	419	424	430	435	441
54	2210	2240	2270	2300	2330	2359	2389	2419	2448	2478
	446	451	456	461	467	472	477	482	487	492
56	2508	2537	2567	2596	2626	2655	2685	2714	2744	2773
	497	502	507	512	517	522	527	532	537	542
58	2802	2832	2861	2890	2919	2949	2978	3007	3036	3065
	547	552	557	562	567	572	577	582	587	592
60	3094	3123	3152	3181	3210	3239	3268	3297	3326	3354
	597	602	607	612	617	622	627	632	637	642
62	3383	3412	3441	3469	3498	3527	3555	3584	3612	3641
	646	651	656	661	666	671	676	681	685	690
64	3669	3698	3726	3754	3783	3811	3839	3868	3896	3924
	695	700	705	710	715	719	724	729	734	739
66	3952	3981	4009	4037	4065	4093	4121	4149	4177	4205
	744	748	753	758	763	768	772	777	782	787
68	4233	4260	4288	4316	4344	4372	4399	4427	4454	4482
	791	796	801	806	811	815	820	825	829	834
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %			

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL170			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	33	67	100	134	167	200	233	266	300	291
	0	7	14	21	27	34	41	48	55	61	
42	333	366	399	432	464	497	530	563	595	628	295
	68	75	81	88	95	102	108	115	121	128	
44	661	693	725	758	790	823	855	887	919	951	299
	134	141	147	154	160	167	173	179	186	192	
46	983	1015	1047	1079	1111	1142	1174	1206	1237	1269	304
	199	205	211	217	224	230	236	242	248	254	
48	1300	1332	1363	1394	1426	1457	1488	1519	1550	1581	310
	261	267	273	278	284	290	296	302	308	314	
50	1612	1643	1674	1705	1735	1766	1797	1827	1858	1888	325
	319	325	331	336	342	348	353	359	364	370	
52	1919	1949	1980	2010	2040	2071	2101	2131	2161	2191	337
	375	380	386	391	396	402	407	412	418	423	
54	2221	2251	2281	2311	2340	2370	2400	2430	2459	2489	347
	428	433	438	443	449	454	459	464	469	474	
56	2519	2548	2578	2607	2637	2666	2696	2725	2754	2784	354
	479	484	489	494	499	504	509	514	519	524	
58	2813	2842	2871	2901	2930	2959	2988	3017	3046	3075	359
	529	533	538	543	548	553	558	562	567	572	
60	3104	3133	3162	3190	3219	3248	3277	3306	3334	3363	368
	577	581	586	591	595	600	605	609	614	618	
62	3392	3420	3449	3477	3506	3534	3563	3591	3620	3648	375
	623	628	632	637	641	646	650	655	659	664	
64	3677	3705	3733	3762	3790	3818	3846	3875	3903	3931	378
	669	673	678	682	686	691	695	700	704	709	
66	3959	3987	4015	4043	4071	4100	4128	4156	4184	4211	380
	713	718	722	727	731	735	740	744	749	753	
68	4239	4267	4295	4323	4351	4379	4407	4434	4462	4490	382
	757	762	766	770	775	779	784	788	792	797	
70	4518	4545	4573	4601	4628	4656	4683	4711	4739	4766	384
	801	805	810	814	818	822	827	831	835	840	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01701 .990 .000 .000 0 FCOM-N0-02-05-30-011-130

INTEGRATED CRUISE													
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		TIME (MIN)				LR	FL190
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)		
40	0 0	35 7	70 14	105 21	141 28	176 36	211 43	245 50	280 57	315 64	295		
42	350 71	384 77	419 84	453 91	488 98	522 105	557 112	591 118	625 125	659 132	300		
44	693 139	727 145	761 152	795 158	829 165	863 171	896 178	930 184	964 190	997 197	307		
46	1031 203	1064 209	1097 215	1131 221	1164 228	1197 234	1230 240	1263 246	1296 252	1329 258	322		
48	1362 264	1395 269	1427 275	1460 281	1493 287	1525 293	1558 298	1590 304	1623 310	1655 315	334		
50	1688 321	1720 327	1752 332	1784 338	1816 343	1849 349	1881 354	1912 360	1944 365	1976 371	345		
52	2008 376	2040 382	2072 387	2104 393	2136 398	2167 403	2199 409	2230 414	2262 419	2294 425	351		
54	2325 430	2357 435	2388 440	2419 446	2451 451	2482 456	2513 461	2544 466	2576 471	2607 476	359		
56	2638 482	2669 487	2700 492	2731 497	2762 502	2793 507	2824 512	2855 517	2886 522	2916 526	370		
58	2947 531	2978 536	3009 541	3039 546	3070 551	3101 556	3131 561	3162 566	3193 571	3223 576	373		
60	3254 581	3284 585	3315 590	3345 595	3376 600	3406 605	3436 610	3467 614	3497 619	3527 624	376		
62	3558 629	3588 634	3618 638	3648 643	3678 648	3709 653	3739 657	3769 662	3799 667	3829 672	379		
64	3859 676	3889 681	3919 686	3949 691	3979 695	4008 700	4038 705	4068 709	4098 714	4128 719	381		
66	4158 723	4187 728	4217 733	4247 737	4276 742	4306 747	4336 751	4365 756	4395 760	4424 765	383		
68	4454 770	4483 774	4513 779	4542 783	4572 788	4601 793	4630 797	4660 802	4689 806	4718 811	385		
70	4748 815	4777 820	4806 824	4835 829	4864 834	4893 838	4923 843	4952 847	4981 852	5010 856	386		
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON					
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$					

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0. 0.00 01901 .990 .000 .000 0 FCOM-N0-02-05-30-012-130

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL170			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	368	7115	10623	14030	17537	20945	24452	279
42	27859	31266	34673	38080	41488	44895	482102	516109	549116	583123	285
44	617130	650136	683143	716150	750157	783164	816170	849177	882184	915190	292
46	948197	980203	1013210	1045217	1078223	1110230	1142236	1174242	1207249	1239255	297
48	1271262	1303268	1335274	1366280	1398286	1430293	1461299	1493305	1524311	1556317	304
50	1587323	1618329	1649335	1680341	1711347	1743353	1773359	1804365	1835371	1866376	310
52	1896382	1927388	1957393	1988399	2018405	2049410	2079416	2109421	2139427	2169432	323
54	2199437	2229443	2259448	2289453	2319458	2348464	2378469	2407474	2437479	2466484	336
56	2496489	2525494	2554499	2584504	2613509	2642514	2671519	2700524	2729528	2758533	352
58	2788538	2816543	2845547	2874552	2903557	2932561	2960566	2989571	3018575	3047580	366
60	3075584	3104589	3132593	3161598	3189603	3218607	3246612	3275616	3303621	3332625	376
62	3360630	3388634	3417639	3445643	3473647	3501652	3530656	3558661	3586665	3614670	380
64	3642674	3670678	3699683	3727687	3755692	3783696	3811701	3839705	3867709	3895714	382
66	3923718	3951722	3979727	4007731	4035736	4062740	4090744	4118749	4146753	4174757	383
68	4202762	4229766	4257770	4285775	4313779	4340783	4368788	4396792	4424796	4451801	383
70	4479805	4506809	4534814	4562818	4589822	4617827	4644831	4672835	4699839	4727844	385
72	4754848	4781852	4809856	4836861	4863865	4891869	4918873	4945878	4973882	5000886	386
74	5027890	5054894	5081899	5109903	5136907	5163911	5190915	5217920	5244924	5271928	388
76	5298932	5325936	5352940	5379945	5406949	5433953	5460957	5486961	5513965	5540969	389
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1 0 .0 .00 01701 .990 .000 .000 0 FCOM-NO-02-05-30-011-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL190			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	388	7415	11023	14630	18137	21745	25352	287
42	28960	32467	35974	39481	43088	46595	500102	534109	569116	604123	293
44	639130	673137	708144	742151	776158	811165	845171	879178	913185	947191	300
46	981198	1014205	1048211	1081218	1115224	1148231	1182237	1215243	1248250	1281256	306
48	1314262	1347268	1380274	1413280	1446286	1478292	1511298	1543304	1576310	1608316	321
50	1640322	1672327	1705333	1737339	1769344	1801350	1832355	1864361	1896366	1928372	336
52	1959377	1991383	2022388	2054393	2085399	2117404	2148409	2179414	2210419	2242424	352
54	2273429	2304434	2335439	2366444	2397449	2428454	2459459	2490464	2520469	2551474	371
56	2582479	2613484	2644489	2674494	2705499	2736504	2766509	2797513	2827518	2858523	375
58	2888528	2919533	2949538	2980542	3010547	3041552	3071557	3101562	3132567	3162571	378
60	3192576	3223581	3253586	3283590	3313595	3344600	3374605	3404610	3434614	3464619	379
62	3494624	3524629	3554633	3585638	3615643	3645648	3675652	3705657	3734662	3764666	380
64	3794671	3824676	3854681	3884685	3914690	3944695	3973699	4003704	4033709	4062713	381
66	4092718	4122723	4151727	4181732	4211736	4240741	4270746	4299750	4329755	4358759	383
68	4387764	4417769	4446773	4476778	4505782	4534787	4563791	4593796	4622801	4651805	385
70	4680810	4710814	4739819	4768823	4797828	4826832	4855837	4884841	4913846	4942851	385
72	4971855	5000860	5029864	5057869	5086873	5115878	5144882	5172887	5201891	5230895	384
74	5258900	5287904	5315909	5344913	5372918	5401922	5429926	5457931	5486935	5514940	385
76	5542944	5571948	5599953	5627957	5655961	5683966	5711970	5739974	5767979	5795983	388
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 IAE V2527-A5 2220000005KG330 0 018590 0 0 1 1.0 .0 .00 01901 .990 .000 .000 0 FCOM-N0-02-05-30-012-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS = 289KT		DISTANCE (NM) TIME (MIN)		LR FL170		
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0 0	35 7	70 14	105 22	139 29	174 36	209 43	243 50	278 58	312 65
42	347 72	381 79	416 86	450 93	484 100	518 107	552 114	586 121	620 128	654 135
44	688 142	722 149	755 156	789 163	823 170	856 177	890 183	923 190	956 197	990 204
46	1023 210	1056 217	1089 224	1122 230	1155 237	1188 244	1221 250	1253 257	1286 263	1319 270
48	1351 276	1384 282	1416 288	1449 294	1481 300	1513 306	1546 312	1578 317	1610 323	1642 329
50	1674 334	1707 340	1739 345	1771 351	1803 356	1835 362	1867 367	1898 373	1930 378	1962 384
52	1994 389	2026 395	2058 400	2089 405	2121 411	2153 416	2184 422	2216 427	2248 433	2279 438
54	2311 444	2342 449	2374 454	2405 460	2436 465	2468 471	2499 476	2530 481	2562 487	2593 492
56	2624 497	2655 503	2686 508	2717 513	2748 519	2780 524	2810 529	2841 535	2872 540	2903 545
58	2934 551	2965 556	2996 561	3026 567	3057 572	3088 577	3118 582	3149 588	3180 593	3210 598
60	3241 603	3271 609	3302 614	3332 619	3362 624	3393 630	3423 635	3453 640	3484 645	3514 650
62	3544 656	3574 661	3604 666	3634 671	3664 676	3694 682	3724 687	3754 692	3784 697	3814 702
64	3844 707	3873 712	3903 718	3933 723	3962 728	3992 733	4021 738	4051 743	4080 748	4109 753
66	4139 758	4168 763	4197 768	4226 773	4255 778	4285 783	4314 788	4342 793	4371 798	4400 803
68	4429 808	4458 813	4487 818	4515 823	4544 827	4573 832	4601 837	4630 842	4658 847	4687 852
ENGINE ANTI ICE ON Δ FUEL = + 2 %					TOTAL ANTI ICE ON Δ FUEL = + 6 %					

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 288KT		DISTANCE (NM) TIME (MIN)		LR			FL190
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	36	73	109	146	182	218	254	290	327	
	0	8	15	23	30	38	45	53	60	68	
42	363	398	434	470	505	541	576	612	647	682	
	75	82	89	96	103	110	116	122	128	135	
44	717	752	787	822	857	892	927	962	996	1031	
	141	147	153	159	165	171	177	183	189	195	
46	1066	1100	1135	1169	1204	1239	1273	1307	1342	1376	
	202	208	213	219	225	231	237	243	249	255	
48	1410	1445	1479	1513	1547	1581	1615	1649	1683	1717	
	261	267	273	279	285	291	297	303	309	314	
50	1751	1785	1819	1853	1887	1920	1954	1988	2021	2055	
	320	326	332	338	344	350	356	361	367	373	
52	2088	2122	2155	2189	2222	2256	2289	2322	2355	2388	
	379	385	390	396	402	408	414	419	425	431	
54	2422	2455	2488	2521	2554	2587	2620	2653	2685	2718	
	437	442	448	454	459	465	471	477	482	488	
56	2751	2784	2816	2849	2882	2914	2947	2979	3012	3044	
	494	499	505	511	516	522	528	533	539	545	
58	3076	3109	3141	3173	3205	3237	3269	3301	3333	3365	
	550	556	561	567	573	578	584	589	595	600	
60	3397	3429	3460	3492	3524	3555	3587	3618	3649	3681	
	606	611	617	622	628	633	639	644	650	655	
62	3712	3743	3774	3805	3837	3868	3899	3929	3960	3991	
	660	666	671	676	682	687	692	698	703	708	
64	4022	4053	4083	4114	4144	4175	4205	4235	4266	4296	
	714	719	724	729	735	740	745	750	755	760	
66	4326	4356	4386	4416	4446	4476	4506	4536	4565	4595	
	766	771	776	781	786	791	796	801	806	811	
68	4625	4654	4684	4713	4742	4772	4801	4830	4859	4888	
	816	821	826	831	836	841	846	850	855	860	
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL210			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	37 7	74 15	110 22	147 29	184 36	220 43	257 50	293 57	330 64	303
42	366 71	402 78	438 85	474 92	510 99	547 105	582 112	618 118	654 125	689 132	316
44	725 138	761 145	796 151	831 157	867 164	902 170	937 176	972 182	1007 189	1043 195	330
46	1078 201	1112 207	1147 213	1182 219	1217 225	1252 231	1286 237	1321 243	1355 249	1390 255	342
48	1424 261	1459 267	1493 273	1527 279	1562 285	1596 291	1630 296	1664 302	1698 308	1732 314	349
50	1766 319	1800 325	1834 331	1868 336	1902 342	1935 347	1969 353	2003 358	2036 364	2070 369	359
52	2104 375	2137 380	2170 386	2204 391	2237 397	2271 402	2304 408	2337 413	2371 418	2404 424	368
54	2437 429	2470 434	2503 440	2537 445	2570 450	2603 456	2636 461	2669 466	2702 472	2735 477	371
56	2768 482	2800 488	2833 493	2866 498	2899 503	2932 509	2964 514	2997 519	3029 524	3062 529	374
58	3095 535	3127 540	3160 545	3192 550	3225 555	3257 560	3290 566	3322 571	3354 576	3387 581	377
60	3419 586	3451 591	3483 596	3516 601	3548 606	3580 611	3612 617	3644 622	3676 627	3708 632	379
62	3740 637	3772 642	3804 647	3836 652	3868 657	3900 662	3932 667	3963 672	3995 677	4027 682	381
64	4059 687	4090 692	4122 697	4154 702	4185 707	4217 712	4248 717	4280 721	4311 726	4343 731	383
66	4374 736	4406 741	4437 746	4468 751	4500 756	4531 761	4562 766	4593 771	4624 776	4656 781	381
68	4687 786	4718 790	4749 795	4780 800	4810 805	4841 810	4872 815	4903 820	4934 824	4964 829	381
70	4995 834	5026 839	5056 844	5087 848	5117 853	5148 858	5178 863	5209 867	5239 872	5269 877	383
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02101 .990 .000 .000 0 FCOM-N0-02-05-30-013-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL230			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	38 7	77 14	115 21	154 28	192 35	230 42	269 49	307 56	345 63	324
42	383 69	421 76	458 83	496 89	534 96	572 103	609 109	646 116	684 122	721 129	337
44	759 135	796 142	833 148	870 155	907 161	944 168	981 174	1018 180	1055 186	1092 193	346
46	1129 199	1165 205	1202 211	1239 217	1275 223	1312 229	1348 235	1385 241	1421 247	1457 253	357
48	1494 259	1530 265	1566 271	1602 277	1638 283	1675 289	1711 295	1747 301	1783 306	1818 312	366
50	1854 318	1890 324	1926 330	1962 336	1998 341	2033 347	2069 353	2105 359	2140 364	2176 370	369
52	2211 376	2247 382	2282 387	2318 393	2353 399	2388 405	2424 410	2459 416	2494 421	2529 427	372
54	2565 433	2600 438	2635 444	2670 450	2705 455	2740 461	2775 466	2810 472	2845 478	2880 483	375
56	2915 489	2949 494	2984 500	3019 505	3053 511	3088 516	3123 522	3157 527	3192 533	3226 538	377
58	3261 544	3295 549	3330 555	3364 560	3399 565	3433 571	3467 576	3501 582	3536 587	3570 593	379
60	3604 598	3638 603	3672 609	3706 614	3740 620	3774 625	3808 630	3842 636	3876 641	3910 647	377
62	3943 652	3977 657	4011 663	4044 668	4078 673	4111 679	4145 684	4178 689	4212 695	4245 700	377
64	4278 705	4311 710	4345 716	4378 721	4411 726	4444 731	4477 736	4510 742	4543 747	4575 752	379
66	4608 757	4641 762	4674 767	4706 773	4739 778	4772 783	4804 788	4836 793	4869 798	4901 803	382
68	4933 808	4966 813	4998 818	5030 823	5062 828	5094 833	5126 838	5158 843	5189 848	5221 853	386
70	5253 857	5285 862	5316 867	5348 872	5379 877	5411 882	5442 886	5474 891	5505 896	5536 901	390
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
Δ FUEL = - 0.4 %				Δ FUEL = + 3 %				Δ FUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0. 0.00 02301 .990 .000 .000 0 FCOM-N0-02-05-30-014-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		TIME (MIN)			
NORMAL AIR CONDITIONING										LR	FL210
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	398	7615	11423	15130	18738	22445	26152	296
42	298	334	371	407	44488	48096	516102	552109	588116	624123	303
44	60	67	74	81							
46	660	695	731	766	802	837	872	907	942	977	314
48	130	137	144	150	157	164	170	176	183	189	
50	1012	1047	1082	1116	1151	1186	1220	1254	1288	1322	333
52	196	202	208	214	220	226	232	238	244	250	
54	256	261	267	273	279	284	290	295	301	306	
56	1695	1728	1762	1795	1829	1862	1895	1929	1962	1995	369
58	312	317	323	328	334	339	344	350	355	360	
60	326	371	376	382	387	392	398	403	408	413	
62	2028	2061	2095	2128	2161	2194	2227	2260	2293	2326	373
64	419	424	429	434	440	445	450	455	461	466	
66	2687	2719	2752	2784	2817	2850	2882	2915	2947	2980	377
68	471	476	481	487	492	497	502	507	512	518	
70	3012	3045	3077	3109	3142	3174	3206	3239	3271	3303	378
72	523	528	533	538	543	548	554	559	564	569	
74	3335	3367	3400	3432	3464	3496	3528	3560	3592	3624	379
76	574	579	584	589	594	599	604	609	614	619	
78	3656	3688	3719	3751	3783	3815	3846	3878	3910	3942	381
80	625	630	635	640	645	650	654	659	664	669	
82	3973	4005	4036	4068	4099	4131	4162	4194	4225	4256	382
84	674	679	684	689	694	699	704	709	714	719	
86	4288	4319	4350	4381	4413	4444	4475	4506	4537	4568	380
88	724	729	734	739	744	749	753	758	763	768	
90	4599	4630	4661	4691	4722	4753	4784	4814	4845	4875	382
92	773	778	783	787	792	797	802	807	811	816	
94	4906	4936	4967	4997	5028	5058	5088	5118	5148	5179	385
96	821	826	830	835	840	845	849	854	859	863	
98	5209	5239	5269	5299	5328	5358	5388	5418	5448	5477	388
100	868	873	877	882	887	891	896	900	905	909	
102	5507	5537	5566	5596	5625	5655	5684	5713	5742	5772	391
104	914	918	923	928	932	937	941	945	950	954	
106	5801	5830	5859	5888	5917	5946	5975	6004	6033	6062	395
108	959	963	968	972	976	981	985	989	994	998	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1 0 .0 .00 02101 .990 .000 .000 0 FCOM-NO-02-05-30-013-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL230			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	408	7915	11722	15529	19436	23243	27050	308
42	30858	34564	38371	42078	45885	49591	53398	570104	607111	644117	328
44	681124	718130	754136	791142	828149	865155	901161	938167	974173	1010179	349
46	1047185	1083191	1119196	1155202	1192208	1228214	1264220	1300226	1336232	1372237	367
48	1408243	1443249	1479255	1515261	1551266	1587272	1622278	1658284	1694289	1729295	371
50	1765301	1800307	1836312	1871318	1907324	1942329	1978335	2013341	2049346	2084352	373
52	2119358	2155363	2190369	2225375	2260380	2296386	2331392	2366397	2401403	2436409	374
54	2471414	2506420	2541425	2576431	2611437	2646442	2681448	2715453	2750459	2785464	375
56	2820470	2854475	2889481	2924486	2958492	2993497	3027503	3062508	3096514	3131519	377
58	3165525	3200530	3234536	3268541	3302546	3337552	3371557	3405563	3439568	3473574	378
60	3507579	3541584	3575590	3609595	3643601	3677606	3711611	3744617	3778622	3812627	377
62	3845633	3879638	3912643	3946649	3979654	4013659	4046665	4079670	4112675	4146680	378
64	4179686	4212691	4245696	4278701	4311706	4344711	4376717	4409722	4442727	4474732	381
66	4507737	4539742	4572747	4604752	4637757	4669762	4701767	4734772	4766777	4798782	384
68	4830787	4862792	4894797	4926802	4958807	4990812	5021817	5053822	5085827	5116831	388
70	5148836	5180841	5211846	5242851	5274855	5305860	5336865	5367870	5399874	5430879	392
72	5461884	5492889	5523893	5554898	5585902	5615907	5646912	5677916	5707921	5738925	397
74	5769930	5799934	5829939	5860943	5890948	5921952	5951956	5981961	6011965	6041970	407
76	6072974	6101978	6131983	6161987	6191991	6221996	62511000	62811004	63111008	63401013	414
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 IAE V2527-A5 2220000005KG330 0 018590 0 0 1 1.0 .0 .00 02301 .990 .000 .000 0 FCOM-N0-02-05-30-014-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 338KT		DISTANCE (NM) TIME (MIN)		LR		FL210	
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	38	76	114	151	189	227	264	302	339
	0	7	13	20	27	33	40	46	53	60
42	377	414	452	489	526	564	601	638	675	712
	66	73	79	86	92	99	105	112	118	125
44	749	786	823	860	897	934	970	1007	1044	1081
	131	138	144	151	157	163	170	176	183	189
46	1117	1154	1190	1227	1263	1300	1336	1372	1408	1445
	196	202	208	215	221	227	234	240	246	253
48	1481	1517	1553	1589	1625	1661	1697	1733	1768	1804
	259	265	272	278	284	290	297	303	309	316
50	1840	1876	1911	1947	1982	2018	2053	2089	2124	2159
	322	328	334	340	347	353	359	365	371	378
52	2195	2230	2265	2300	2335	2370	2405	2440	2475	2510
	384	390	396	402	409	415	421	427	433	439
54	2544	2579	2613	2648	2682	2717	2751	2785	2820	2854
	445	451	457	463	469	475	481	487	493	499
56	2888	2922	2956	2990	3024	3057	3091	3125	3158	3192
	505	511	517	523	529	535	540	546	552	558
58	3225	3259	3292	3325	3358	3392	3425	3458	3491	3524
	564	570	575	581	587	593	598	604	610	615
60	3556	3589	3622	3654	3687	3720	3752	3784	3816	3849
	621	627	632	638	643	649	654	660	665	671
62	3881	3913	3945	3977	4009	4041	4072	4104	4135	4167
	676	682	687	692	698	703	709	714	719	724
64	4199	4230	4261	4292	4324	4355	4386	4417	4448	4479
	730	735	740	745	751	756	761	766	771	776
66	4510	4540	4571	4602	4632	4663	4693	4723	4754	4784
	781	786	791	796	801	806	811	816	821	826
68	4814	4844	4874	4904	4934	4964	4994	5023	5053	5083
	831	835	840	845	850	854	859	864	868	873
ENGINE ANTI ICE ON Δ FUEL = + 2 %					TOTAL ANTI ICE ON Δ FUEL = + 6 %					

INTEGRATED CRUISE												
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 341KT		DISTANCE (NM)		TIME (MIN)			LR	FL230
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8		
40	0	40	80	120	160	200	239	279	319	359		
	0	7	14	21	28	35	42	49	56	63		
42	398	438	477	517	556	596	635	674	713	752		
	70	77	84	91	98	105	112	119	126	133		
44	792	830	869	908	947	986	1025	1064	1102	1141		
	139	146	153	160	167	174	181	187	194	201		
46	1180	1218	1257	1295	1333	1372	1410	1448	1486	1524		
	208	215	221	228	235	242	249	255	262	269		
48	1563	1600	1638	1676	1714	1752	1789	1827	1864	1902		
	276	282	289	296	302	309	316	322	329	336		
50	1939	1976	2013	2051	2088	2125	2162	2198	2235	2272		
	342	349	355	362	368	375	381	388	394	401		
52	2309	2345	2381	2418	2454	2491	2527	2563	2599	2635		
	407	413	420	426	433	439	445	451	458	464		
54	2671	2706	2742	2778	2813	2849	2884	2920	2955	2990		
	470	476	483	489	495	501	507	513	519	526		
56	3025	3060	3095	3130	3165	3200	3234	3269	3303	3338		
	532	538	544	550	556	561	567	573	579	585		
58	3372	3406	3441	3475	3509	3543	3577	3610	3644	3678		
	591	596	602	608	614	619	625	631	636	642		
60	3711	3745	3778	3812	3845	3878	3911	3944	3977	4010		
	647	653	659	664	670	675	681	686	691	697		
62	4043	4076	4109	4141	4174	4206	4239	4271	4303	4335		
	702	707	713	718	723	728	734	744	749	749		
64	4368	4400	4432	4463	4495	4527	4559	4590	4622	4654		
	754	759	764	769	774	779	784	789	794	799		
66	4685	4716	4748	4779	4810	4842	4873	4904	4935	4966		
	803	808	813	818	823	827	832	837	842	846		
68	4997	5027	5058	5089	5119	5150	5181	5211	5241	5272		
	851	856	860	865	870	874	879	883	888	892		
ENGINE ANTI ICE ON △FUEL = + 2 %								TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL250			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	40	81	121	162	202	242	282	322	362	341
	0	7	14	21	28	35	42	49	56	63	
42	402	442	482	521	561	601	640	680	719	759	353
	70	76	83	90	96	103	110	116	123	129	
44	798	837	877	916	955	994	1033	1072	1111	1150	362
	136	142	149	155	162	168	175	181	188	194	
46	1189	1228	1267	1306	1344	1383	1422	1460	1499	1537	366
	200	207	213	219	226	232	238	245	251	257	
48	1576	1614	1653	1691	1729	1768	1806	1844	1882	1920	369
	263	270	276	282	288	295	301	307	313	319	
50	1958	1996	2034	2072	2110	2148	2186	2224	2261	2299	372
	325	331	338	344	350	356	362	368	374	380	
52	2337	2374	2412	2449	2487	2524	2562	2599	2636	2674	375
	386	392	398	404	410	416	422	428	434	440	
54	2711	2748	2785	2822	2859	2897	2934	2970	3007	3044	375
	446	452	458	464	470	476	482	488	493	499	
56	3081	3118	3154	3191	3228	3264	3301	3337	3373	3410	374
	505	511	517	523	529	535	541	546	552	558	
58	3446	3482	3518	3555	3591	3627	3663	3698	3734	3770	375
	564	570	575	581	587	593	598	604	610	615	
60	3806	3841	3877	3912	3948	3983	4019	4054	4089	4124	378
	621	627	632	638	644	649	655	660	666	672	
62	4160	4194	4229	4264	4299	4334	4369	4403	4438	4472	382
	677	683	688	693	699	704	710	715	721	726	
64	4507	4541	4576	4610	4644	4678	4712	4746	4780	4814	386
	731	737	742	747	753	758	763	768	774	779	
66	4848	4882	4916	4949	4983	5017	5050	5083	5117	5150	391
	784	789	794	799	805	810	815	820	825	830	
68	5183	5216	5250	5283	5316	5349	5382	5414	5447	5480	402
	835	840	845	850	854	859	864	869	874	879	
70	5513	5545	5578	5610	5643	5675	5708	5740	5772	5805	410
	883	888	893	898	902	907	912	917	921	926	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-N0-02-05-30-015-132

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL 270			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	43	85	128	171	213	256	298	341	383	359
	0	7	14	21	28	36	43	50	57	64	
42	425	468	510	552	594	636	678	720	762	804	363
	71	78	85	92	99	106	112	119	126	133	
44	846	887	929	970	1012	1054	1095	1137	1178	1219	366
	140	147	154	160	167	174	181	187	194	201	
46	1261	1302	1343	1384	1425	1466	1507	1548	1589	1630	369
	208	214	221	228	234	241	248	254	261	267	
48	1671	1712	1752	1793	1834	1874	1915	1955	1996	2036	372
	274	281	287	294	300	307	313	320	327	333	
50	2076	2117	2157	2197	2237	2277	2317	2357	2397	2437	370
	340	346	353	359	366	372	379	385	392	398	
52	2477	2516	2556	2595	2635	2674	2713	2753	2792	2831	371
	405	411	417	424	430	436	443	449	455	462	
54	2870	2909	2948	2987	3026	3065	3103	3142	3180	3219	373
	468	474	481	487	493	499	505	512	518	524	
56	3257	3296	3334	3372	3410	3448	3486	3524	3562	3600	376
	530	536	542	548	554	561	566	572	578	584	
58	3637	3675	3712	3750	3787	3824	3862	3899	3936	3973	381
	590	596	602	608	614	620	626	631	637	643	
60	4010	4046	4083	4120	4157	4193	4230	4266	4302	4339	386
	649	654	660	666	671	677	683	688	694	699	
62	4375	4411	4447	4483	4519	4555	4590	4626	4662	4697	397
	705	710	715	721	726	732	737	742	748	753	
64	4733	4768	4804	4839	4875	4910	4945	4980	5015	5050	406
	758	763	769	774	779	784	789	794	800	805	
66	5085	5120	5155	5189	5224	5259	5293	5328	5362	5397	412
	810	815	820	825	830	835	840	845	850	855	
68	5431	5466	5500	5534	5568	5603	5636	5670	5704	5738	417
	860	865	870	875	880	884	889	894	899	904	
70	5772	5806	5840	5873	5907	5941	5974	6008	6041	6074	420
	909	914	918	923	928	933	937	942	947	952	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
Δ FUEL = - 0.4 %				Δ FUEL = + 3 %				Δ FUEL = + 5.5 %			

10E -A319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0.0.00 02701 .990 .000 .000 0 FCOM-N0-02-05-30-016-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL250			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	427	8214	12221	16127	20134	24040	28047	342
42	31954	35960	39867	43773	47679	51686	55592	59499	633105	672111	364
44	711118	750124	788130	827137	866143	905149	943156	982162	1021168	1059174	368
46	1098181	1136187	1175193	1213199	1252206	1290212	1329218	1367224	1405230	1444237	370
48	1482243	1520249	1558255	1597261	1635268	1673274	1711280	1749286	1787292	1825298	371
50	1863304	1901310	1939316	1976323	2014329	2052335	2090341	2127347	2165353	2202359	373
52	2240365	2277371	2315377	2352383	2390389	2427395	2464401	2502407	2539413	2576419	375
54	2613425	2650431	2687437	2724442	2761448	2798454	2835460	2872466	2909472	2945478	374
56	2982484	3019490	3055496	3092501	3128507	3165513	3201519	3237525	3273531	3310536	374
58	3346542	3382548	3418554	3453559	3489565	3525571	3561576	3597582	3632588	3668593	376
60	3703599	3739604	3774610	3809616	3845621	3880627	3915632	3950638	3985643	4020649	380
62	4055654	4090660	4125665	4159670	4194676	4229681	4263687	4298692	4332697	4366703	384
64	4401708	4435713	4469718	4503724	4537729	4571734	4605739	4639745	4673750	4706755	388
66	4740760	4774765	4807770	4841775	4874780	4908785	4941790	4974795	5007800	5040805	394
68	5074810	5107815	5139820	5172825	5205830	5238835	5271839	5304844	5336849	5369854	404
70	5402858	5434863	5466868	5499873	5531877	5564882	5596887	5628891	5660896	5692901	411
72	5724905	5756910	5788914	5820919	5852924	5884928	5916933	5947937	5979942	6011946	417
74	6043951	6074955	6105960	6137964	6168969	6200973	6231978	6262982	6294987	6325991	421
76	6356995	63871000	64181004	64491009	64801013	65111017	65421022	65731026	66041030	66351035	424
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1 0 .0 .00 02501 .990 .000 .000 0 FCOM-NO-02-05-30-015-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL270			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	447	8614	12921	17128	21335	25542	29749	365
42	33955	38062	42269	46476	50683	54890	58996	631103	673110	714117	367
44	756124	797130	839137	880144	922151	963157	1004164	1046171	1087177	1128184	368
46	1169191	1210197	1251204	1292211	1333217	1374224	1415231	1456237	1497244	1537250	370
48	1578257	1619264	1659270	1700277	1740283	1781290	1821296	1862303	1902309	1942316	371
50	1982323	2022329	2063336	2103342	2143349	2183355	2222361	2262368	2302374	2341381	370
52	2381387	2420393	2460400	2499406	2539413	2578419	2617425	2656431	2695438	2734444	371
54	2773450	2812456	2850463	2889469	2928475	2966481	3005487	3043493	3081499	3120506	374
56	3158512	3196518	3234524	3272530	3310536	3348542	3385548	3423553	3461559	3498565	378
58	3536571	3573577	3610583	3647589	3685594	3722600	3759606	3796612	3832617	3869623	383
60	3906629	3943634	3979640	4016646	4052651	4089657	4125662	4161668	4197673	4233679	388
62	4270684	4305690	4341695	4377700	4413706	4449711	4484716	4520722	4555727	4591732	399
64	4626737	4661742	4697748	4732753	4767758	4802763	4837768	4872773	4907778	4942783	407
66	4977789	5011794	5046799	5081804	5115809	5150814	5184819	5219824	5253829	5287833	413
68	5322838	5356843	5390848	5424853	5458858	5492863	5526868	5560873	5594877	5628882	418
70	5662887	5695892	5729897	5762901	5796906	5829911	5863916	5896920	5929925	5962930	419
72	5996935	6029939	6062944	6095948	6128953	6160958	6193962	6226967	6258971	6291976	426
74	6324980	6356985	6388989	6421994	6453998	64851003	65171007	65491011	65821016	66141020	433
76	66461025	66771029	67091033	67411038	67731042	68051046	68361051	68681055	68991059	69311063	440
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 A/E V2527-A5 222000000C5KG330 0 018590 0 0 1 1.0.0.00 002701 .990 .000 .000 0 FCOM-N0-02-05-30-016-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 338KT		DISTANCE (NM) TIME (MIN)		LR		FL250	
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	42	84	127	169	211	253	295	337	379
	0	7	15	22	30	37	45	52	60	67
42	421	462	504	545	587	629	670	711	753	794
	75	82	90	97	104	112	119	127	134	141
44	835	876	917	958	999	1040	1080	1121	1161	1202
	149	156	163	171	178	185	192	200	207	214
46	1242	1282	1322	1362	1403	1443	1482	1522	1562	1601
	221	228	235	243	250	257	264	271	278	285
48	1641	1680	1719	1759	1798	1837	1876	1915	1953	1992
	292	299	306	313	319	326	333	340	347	354
50	2031	2069	2108	2146	2185	2223	2261	2299	2337	2375
	360	367	374	381	387	394	400	407	414	420
52	2412	2450	2487	2525	2562	2600	2637	2674	2711	2748
	427	433	439	446	452	459	465	471	477	484
54	2785	2821	2858	2894	2931	2967	3004	3040	3076	3112
	490	496	502	508	514	521	527	533	539	545
56	3148	3184	3220	3255	3291	3327	3362	3397	3433	3468
	551	557	562	568	574	580	586	592	597	603
58	3503	3538	3573	3608	3643	3678	3712	3747	3781	3816
	609	614	620	625	631	637	642	647	653	658
60	3850	3884	3918	3952	3986	4021	4054	4088	4122	4156
	664	669	674	679	685	690	695	700	706	711
62	4189	4223	4256	4290	4323	4356	4390	4423	4456	4489
	716	721	726	731	736	742	747	752	757	762
64	4522	4555	4588	4620	4653	4686	4718	4751	4783	4816
	767	772	777	782	787	791	796	801	806	811
66	4848	4881	4913	4945	4977	5009	5041	5073	5105	5137
	816	821	825	830	835	840	845	849	854	859
68	5169	5200	5232	5264	5295	5327	5358	5389	5421	5452
	864	868	873	878	882	887	891	896	901	905
ENGINE ANTI ICE ON ΔFUEL = + 2 %					TOTAL ANTI ICE ON ΔFUEL = + 6 %					

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 333KT		DISTANCE (NM) TIME (MIN)		LR			FL270
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	44	89	133	178	222	266	310	354	398	
	0	8	16	24	32	40	48	56	64	71	
42	442	485	528	572	615	659	701	744	787	830	
	79	87	95	103	110	118	126	133	141	149	
44	873	916	958	1000	1043	1085	1127	1169	1211	1253	
	156	164	171	179	186	194	201	209	216	223	
46	1295	1336	1378	1419	1461	1502	1543	1584	1625	1666	
	231	238	245	253	260	267	274	281	288	295	
48	1706	1747	1787	1827	1868	1908	1948	1988	2028	2067	
	303	309	316	323	330	337	344	350	357	364	
50	2107	2147	2186	2225	2265	2304	2343	2382	2421	2459	
	371	377	384	390	397	404	410	416	423	429	
52	2498	2537	2575	2614	2652	2690	2728	2766	2804	2842	
	436	442	448	455	461	467	473	479	485	492	
54	2880	2918	2955	2992	3030	3067	3104	3141	3178	3215	
	498	504	510	516	521	527	533	539	545	551	
56	3252	3289	3326	3362	3399	3435	3472	3508	3544	3580	
	556	562	568	573	579	585	590	596	601	607	
58	3616	3652	3688	3724	3760	3796	3831	3867	3902	3938	
	613	618	624	629	635	640	645	651	656	662	
60	3973	4008	4043	4078	4113	4149	4183	4218	4253	4288	
	667	672	678	683	688	694	699	704	709	714	
62	4322	4357	4391	4425	4460	4494	4528	4562	4596	4630	
	720	725	730	735	740	745	750	755	760	765	
64	4665	4698	4732	4766	4799	4833	4867	4900	4933	4967	
	770	775	780	785	790	795	800	805	810	815	
66	5000	5033	5066	5099	5132	5165	5198	5231	5264	5296	
	820	825	829	834	839	844	849	853	858	863	
68	5329	5362	5394	5426	5459	5491	5523	5555	5587	5620	
	868	872	877	882	886	891	895	900	905	909	
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL290			
NORMAL AIR CONDITIONING				TIME (MIN)							
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	45 7	91 15	136 22	181 30	227 37	272 45	317 52	362 60	407 67	363
42	452 74	497 82	541 89	586 96	631 104	676 111	720 118	765 125	809 133	854 140	366
44	898 147	942 154	987 162	1031 169	1075 176	1119 183	1163 190	1207 198	1251 205	1295 212	368
46	1339 219	1382 226	1426 233	1469 241	1513 248	1556 255	1599 262	1643 269	1686 276	1729 283	367
48	1772 290	1815 297	1858 304	1901 311	1943 318	1986 325	2029 332	2071 339	2113 346	2156 352	368
50	2198 359	2240 366	2282 373	2324 380	2366 386	2408 393	2450 400	2491 407	2533 413	2575 420	371
52	2616 427	2657 433	2698 440	2740 446	2781 453	2822 459	2863 466	2903 472	2944 479	2985 485	375
54	3025 492	3066 498	3106 504	3146 511	3186 517	3227 523	3266 530	3306 536	3346 542	3386 548	380
56	3426 554	3465 560	3505 566	3544 572	3583 578	3623 584	3662 590	3701 596	3740 602	3779 608	389
58	3818 614	3856 620	3895 625	3934 631	3972 637	4011 643	4049 648	4087 654	4126 660	4164 665	399
60	4202 671	4240 677	4278 682	4316 688	4354 693	4392 699	4429 704	4467 710	4505 715	4542 721	407
62	4580 726	4617 732	4654 737	4691 743	4729 748	4766 753	4803 759	4840 764	4877 769	4914 775	413
64	4951 780	4987 785	5024 791	5061 796	5097 801	5134 806	5170 812	5206 817	5243 822	5279 827	415
66	5315 832	5351 837	5387 842	5423 847	5458 853	5494 858	5530 863	5565 868	5601 873	5636 877	423
68	5672 882	5707 887	5742 892	5777 897	5812 902	5848 907	5882 912	5917 916	5952 921	5987 926	431
70	6022 931	6056 935	6091 940	6125 945	6160 950	6194 954	6228 959	6262 964	6297 968	6331 973	438
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-N0-02-05-30-017-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL310			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	48	96	145	193	241	289	337	384	432	364
	0	8	16	24	32	40	48	56	63	71	
42	480	527	575	622	670	717	764	811	858	905	363
	79	87	95	103	111	118	126	134	142	149	
44	952	998	1045	1091	1138	1184	1230	1276	1322	1368	365
	157	165	172	180	188	195	203	210	218	225	
46	1414	1460	1505	1551	1596	1642	1687	1732	1777	1822	368
	233	240	248	255	263	270	277	284	292	299	
48	1867	1912	1956	2001	2045	2089	2133	2177	2221	2265	373
	306	313	321	328	335	342	349	356	363	370	
50	2309	2353	2396	2440	2483	2527	2569	2612	2655	2698	379
	377	384	391	397	404	411	418	424	431	438	
52	2741	2784	2826	2869	2911	2954	2996	3038	3080	3122	391
	444	451	457	464	470	477	483	489	496	502	
54	3164	3205	3247	3288	3330	3372	3413	3454	3495	3536	400
	508	514	521	527	533	539	545	551	558	564	
56	3578	3618	3659	3700	3741	3782	3822	3862	3903	3943	407
	570	576	582	588	594	600	606	612	617	623	
58	3984	4024	4064	4104	4144	4184	4224	4263	4303	4342	410
	629	635	641	647	653	658	664	670	676	681	
60	4382	4421	4460	4499	4538	4578	4616	4655	4694	4732	417
	687	693	698	704	709	715	721	726	732	737	
62	4771	4809	4848	4886	4924	4963	5000	5038	5076	5114	426
	742	748	753	759	764	769	775	780	785	790	
64	5152	5189	5227	5264	5302	5339	5376	5414	5451	5488	434
	796	801	806	811	816	821	827	832	837	842	
66	5525	5562	5598	5635	5672	5708	5745	5781	5817	5854	436
	847	852	857	862	867	872	877	882	887	892	
68	5890	5926	5962	5997	6033	6069	6105	6140	6176	6211	441
	897	902	907	912	916	921	926	931	936	940	
70	6246	6282	6317	6352	6387	6422	6457	6491	6526	6561	446
	945	950	955	959	964	969	973	978	983	987	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
Δ FUEL = - 0.4 %				Δ FUEL = + 3 %				Δ FUEL = + 5.5 %			

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		TIME (MIN)			
NORMAL AIR CONDITIONING								LR FL 290			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	47	92	138	182	227	272	317	365
	8			15	23	30	37	45	52		
42	362	407	451	496	540	585	629	674	718	762	367
	59	67	74	81	89	96	103	110	118	125	
44	807	851	895	939	983	1027	1071	1115	1158	1202	367
	132	139	146	154	161	168	175	182	190	197	
46	1246	1289	1333	1376	1419	1463	1506	1549	1592	1635	367
	204	211	218	225	232	239	246	253	260	267	
48	1678	1720	1763	1806	1848	1891	1933	1975	2017	2060	369
	274	281	288	295	302	309	316	323	329	336	
50	2102	2144	2185	2227	2269	2311	2352	2393	2435	2476	372
	343	350	357	363	370	377	383	390	396	403	
52	2517	2558	2599	2640	2681	2722	2762	2803	2843	2884	377
	410	416	423	429	436	442	449	455	461	468	
54	2924	2964	3004	3044	3084	3124	3164	3204	3243	3283	382
	474	480	487	493	499	505	512	518	524	530	
56	3323	3362	3401	3440	3479	3519	3558	3596	3635	3674	392
	536	542	548	554	560	566	572	578	583	589	
58	3713	3751	3790	3828	3867	3905	3943	3981	4020	4058	401
	595	601	607	612	618	624	629	635	641	646	
60	4096	4134	4171	4209	4247	4285	4322	4360	4397	4434	408
	652	657	663	668	674	680	685	690	696	701	
62	4472	4509	4546	4583	4620	4658	4694	4731	4768	4805	413
	707	712	718	723	728	734	739	744	750	755	
64	4842	4878	4915	4951	4988	5024	5060	5096	5132	5168	415
	760	766	771	776	781	787	792	797	802	807	
66	5205	5240	5276	5312	5347	5383	5419	5454	5489	5525	423
	812	817	822	828	833	838	843	847	852	857	
68	5560	5595	5630	5665	5700	5735	5770	5804	5839	5874	431
	862	867	872	877	882	887	891	896	901	906	
70	5909	5943	5977	6012	6046	6080	6114	6148	6182	6217	438
	910	915	920	925	929	934	939	943	948	953	
72	6251	6284	6318	6352	6385	6419	6453	6486	6519	6553	439
	957	962	966	971	976	980	985	989	994	998	
74	6586	6619	6652	6685	6718	6751	6784	6816	6849	6882	444
	1003	1007	1012	1016	1021	1025	1029	1034	1038	1043	
76	6914	6947	6979	7011	7044	7076	7108	7140	7172	7204	448
	1047	1051	1056	1060	1064	1069	1073	1077	1081	1086	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 0 .00 02901 .990 .000 .000 0 FCOM-NO-02-05-30-017-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL310			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	508	9816	14624	19432	24240	28948	33756	363
42	384 64	432 71	479 79	526 87	573 95	621102	667110	714118	761126	808133	363
44	854 141	901 149	947 156	993 164	1039171	1086179	1131186	1177194	1223201	1269209	366
46	1315 216	1360 223	1405 231	1450 238	1496 245	1541253	1586260	1630267	1675274	1720282	370
48	1765 289	1809 296	1853 303	1897 310	1942 317	1986324	2030331	2073338	2117345	2161352	375
50	2205 359	2248 365	2291 372	2334 379	2378 386	2421392	2464399	2506405	2549412	2592419	381
52	2634 425	2677 432	2719 438	2761 444	2804 451	2846457	2888464	2930470	2971476	3013482	393
54	3055 489	3097 495	3138 501	3180 507	3221 513	3262519	3303526	3344532	3386538	3427544	401
56	3468 550	3508 556	3549 562	3590 568	3630 574	3671580	3711586	3752592	3792597	3832603	407
58	3872 609	3912 615	3952 621	3992 627	4032 633	4072638	4111644	4151650	4190655	4230661	410
60	4269 667	4308 672	4347 678	4386 683	4425 689	4464695	4502700	4541706	4580711	4618716	418
62	4657 722	4695 727	4733 733	4771 738	4809 743	4847749	4885754	4923759	4961764	4998770	427
64	5036 775	5073 780	5111 785	5148 790	5185 795	5223801	5260806	5297811	5334816	5371821	433
66	5408 826	5444 831	5481 836	5517 841	5554 846	5590 851	5626856	5663861	5699866	5735871	436
68	5771 876	5807 881	5842 886	5878 890	5914 895	5950900	5985905	6020910	6056914	6091919	441
70	6126 924	6161 929	6196 933	6231 938	6266 943	6301947	6335952	6370957	6404961	6439966	446
72	6473 970	6508 975	6542 979	6576 984	6610 988	6644 993	6678 997	67121002	67461006	67791011	452
74	6813 1015	6847 1019	6880 1024	6914 1028	6947 1033	69811037	70141041	70471046	70801050	71131054	458
76	7146 1059	7179 1063	7212 1067	7245 1071	7278 1076	73101080	73431084	73751088	74081093	74401097	460
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = -0.3\%$				$\Delta FUEL = +2\%$				$\Delta FUEL = +5\%$			

10F -08FOA320-232 IAE V2527-A5 222000000C5KG330 0 018590 0 0 1.0.0.00 03101 .990 .000 .000 0 FCOM-N0-02-05-30-018-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 335KT		DISTANCE (NM) TIME (MIN)		LR		FL290	
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	46	92	138	184	230	276	321	367	413
	0	8	16	25	33	41	49	57	65	74
42	458	503	548	593	638	683	727	771	815	860
	82	90	98	105	113	121	129	137	144	152
44	904	948	991	1035	1079	1122	1165	1208	1252	1295
	160	167	175	182	190	197	205	212	219	227
46	1338	1380	1423	1465	1508	1550	1592	1634	1676	1718
	234	241	248	255	262	269	276	283	290	297
48	1760	1802	1843	1884	1926	1967	2008	2049	2090	2131
	304	310	317	324	331	337	344	351	357	364
50	2172	2212	2253	2293	2333	2374	2414	2454	2494	2533
	370	377	383	389	396	402	409	415	421	427
52	2573	2613	2652	2692	2731	2771	2810	2849	2888	2927
	434	440	446	452	458	464	470	476	482	488
54	2966	3004	3043	3081	3120	3158	3196	3234	3273	3311
	494	500	506	512	518	524	530	536	541	547
56	3349	3387	3424	3462	3500	3537	3575	3612	3649	3686
	553	559	564	570	576	582	587	593	598	604
58	3724	3761	3797	3834	3871	3908	3945	3981	4018	4054
	610	615	621	626	632	637	642	648	653	659
60	4090	4127	4163	4199	4235	4271	4307	4342	4378	4414
	664	669	675	680	685	691	696	701	706	712
62	4449	4485	4520	4555	4591	4626	4661	4696	4731	4766
	717	722	727	732	737	742	748	753	758	763
64	4800	4835	4870	4904	4939	4973	5007	5041	5076	5110
	768	773	777	782	787	792	797	802	806	811
66	5144	5178	5211	5245	5279	5313	5346	5379	5413	5446
	816	821	825	830	834	839	844	848	853	857
68	5480	5513	5546	5579	5612	5645	5678	5710	5743	5776
	862	866	871	875	879	884	888	893	897	901
ENGINE ANTI ICE ON Δ FUEL = + 2 %					TOTAL ANTI ICE ON Δ FUEL = + 6 %					

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 343KT		DISTANCE (NM) TIME (MIN)		LR			FL310
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	48	95	143	190	238	284	331	378	425	
	0	8	16	25	33	41	49	57	65	73	
42	472	518	564	610	656	702	748	793	839	885	
	81	89	97	104	112	120	127	135	142	150	
44	930	975	1020	1065	1110	1155	1199	1243	1288	1332	
	157	164	172	179	186	194	201	208	215	222	
46	1376	1420	1464	1508	1551	1595	1638	1682	1725	1768	
	229	236	243	250	257	264	271	278	284	291	
48	1811	1854	1897	1939	1982	2025	2067	2109	2151	2193	
	298	305	311	318	325	331	338	345	351	358	
50	2235	2277	2318	2360	2402	2443	2484	2525	2567	2608	
	364	371	377	383	390	396	402	409	415	421	
52	2649	2689	2730	2771	2811	2852	2892	2932	2972	3012	
	427	434	440	446	452	458	464	470	476	482	
54	3053	3092	3132	3172	3211	3251	3290	3329	3369	3408	
	488	494	500	506	512	518	524	530	536	541	
56	3447	3486	3524	3563	3602	3641	3679	3717	3755	3794	
	547	553	559	564	570	576	581	587	593	598	
58	3832	3870	3908	3945	3983	4021	4058	4096	4133	4170	
	604	609	615	620	626	631	637	642	647	652	
60	4208	4244	4281	4318	4355	4392	4428	4465	4501	4538	
	658	663	668	673	678	683	688	693	698	703	
62	4574	4610	4646	4682	4718	4754	4790	4826	4861	4897	
	708	713	718	723	728	733	738	743	747	752	
64	4932	4967	5003	5038	5073	5108	5143	5178	5213	5248	
	757	762	766	771	776	781	785	790	795	799	
66	5282	5317	5351	5386	5420	5455	5489	5523	5557	5591	
	804	808	813	818	822	827	831	836	840	845	
68	5626	5659	5693	5727	5761	5795	5828	5862	5895	5928	
	850	854	859	863	867	872	876	881	885	890	
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL330			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	51 8	101 17	152 25	203 34	254 42	304 50	354 59	404 67	454 75	361
42	505 84	554 92	604 100	653 108	703 116	753 124	802 132	851 140	900 148	949 156	364
44	998 164	1046 172	1094 180	1143 188	1191 195	1239 203	1287 211	1335 219	1382 226	1430 234	370
46	1478 241	1525 249	1572 256	1619 264	1666 271	1713 278	1760 286	1806 293	1853 300	1899 307	378
48	1946 314	1992 321	2038 328	2084 335	2130 342	2176 350	2221 356	2267 363	2312 370	2358 377	391
50	2403 384	2448 391	2493 397	2538 404	2583 411	2628 417	2673 424	2717 431	2762 437	2806 444	400
52	2850 450	2895 457	2939 463	2983 470	3027 476	3071 483	3114 489	3158 496	3201 502	3245 509	405
54	3289 515	3332 521	3375 528	3418 534	3461 540	3504 546	3546 552	3589 558	3631 565	3673 571	410
56	3716 577	3758 583	3800 589	3842 595	3884 601	3926 607	3967 612	4009 618	4050 624	4092 630	420
58	4133 636	4174 641	4215 647	4256 653	4297 659	4338 664	4379 670	4419 676	4460 681	4500 687	428
60	4541 693	4581 698	4621 704	4661 709	4701 715	4741 720	4781 726	4820 731	4860 737	4899 742	431
62	4939 748	4978 753	5017 758	5056 764	5095 769	5134 774	5173 780	5211 785	5250 790	5289 795	437
64	5327 801	5365 806	5403 811	5441 816	5480 821	5518 826	5555 831	5593 836	5631 842	5668 847	442
66	5706 852	5743 857	5780 861	5817 866	5855 871	5892 876	5929 881	5965 886	6002 891	6039 896	450
68	6076 901	6112 905	6149 910	6185 915	6221 920	6258 925	6294 929	6330 934	6366 939	6402 944	455
70	6438 948	6473 953	6509 958	6544 962	6580 967	6616 972	6651 976	6686 981	6721 985	6757 990	457
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 03301 .990 .000 .000 0 FCOM-N0-02-05-30-019-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL350			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0	53	106	158	211	264	316	368	420	472	366
	0	9	17	26	34	43	51	60	68	77	
42	524	576	627	678	730	781	832	882	933	983	376
	85	93	101	109	117	125	133	141	149	157	
44	1034	1084	1134	1184	1234	1284	1334	1383	1432	1482	388
	165	173	180	188	196	203	211	218	226	233	
46	1531	1580	1629	1678	1727	1775	1824	1872	1920	1969	397
	241	248	255	263	270	278	285	292	299	306	
48	2017	2065	2112	2160	2208	2255	2302	2349	2396	2443	401
	314	321	328	335	342	349	356	363	370	377	
50	2490	2537	2583	2630	2676	2722	2768	2814	2860	2905	411
	384	390	397	404	411	417	424	430	437	444	
52	2951	2996	3042	3087	3132	3177	3222	3266	3311	3356	422
	450	457	463	469	476	482	488	495	501	507	
54	3400	3444	3488	3532	3576	3620	3664	3707	3751	3794	426
	514	520	526	532	538	545	551	557	563	569	
56	3838	3880	3923	3966	4009	4052	4094	4136	4179	4221	432
	575	581	587	593	599	605	610	616	622	628	
58	4263	4305	4346	4388	4430	4472	4513	4554	4595	4636	438
	634	639	645	651	656	662	668	673	679	684	
60	4677	4718	4759	4799	4840	4880	4921	4961	5001	5041	446
	690	695	701	706	712	717	722	728	733	738	
62	5081	5121	5160	5200	5240	5279	5319	5358	5397	5436	451
	744	749	754	760	765	770	775	781	786	791	
64	5475	5514	5553	5592	5630	5669	5707	5746	5784	5822	453
	796	801	806	812	817	822	827	832	837	842	
66	5861	5898	5936	5974	6012	6050	6087	6124	6161	6198	453
	847	852	857	862	867	872	877	882	887	892	
68	6236	6272	6309	6346	6382	6419	6455	6491	6528	6564	453
	897	902	907	911	916	921	926	931	935	940	
70	6600	6636	6671	6707	6742	6778	6813	6848	6883	6919	453
	945	950	954	959	964	969	973	978	983	987	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0. 0.00 03501 .990 .000 .000 0 FCOM-N0-02-05-30-020-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL330			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	539	10317	15425	20434	25442	30350	35358	362
42	403	453	502	551	60199	650107	699115	747123	796130	845138	366
44	893	941	990	1038	1086	1134185	1181192	1229200	1276208	1324215	371
46	1371	1418	1465	1512	1559	1606259	1652266	1698274	1745281	1791288	381
48	1837	1883	1929	1975	2020	2066	2111	2157	2202	2247	392
50	295	302	309	316	323	330	337	343	350	357	
52	2293	2337	2382	2427	2472	2517	2561	2605	2650	2694	401
54	364	371	377	384	391	397	404	410	417	424	
56	2738	2782	2826	2870	2914	2958	3001	3045	3088	3131	405
58	430	437	443	450	456	463	469	475	482	488	
60	3175	3218	3260	3303	3346	3389	3431	3474	3516	3558	411
62	494	501	507	513	519	526	532	538	544	550	
64	3600	3642	3684	3726	3768	3809	3851	3892	3933	3975	421
66	556	562	568	574	580	586	591	597	603	609	
68	4016	4057	4098	4139	4180	4220	4261	4301	4342	4382	428
70	615	620	626	632	638	643	649	655	660	666	
72	4422	4462	4502	4542	4582	4622	4661	4701	4740	4779	431
74	671	677	682	688	694	699	704	710	715	721	
76	4819	4858	4896	4935	4974	5013	5052	5090	5128	5167	437
78	726	732	737	742	747	753	758	763	768	774	
80	5205	5243	5281	5319	5357	5395	5432	5470	5507	5545	442
82	779	784	789	794	799	805	810	815	820	825	
84	5582	5619	5656	5694	5731	5768	5804	5841	5878	5914	451
86	830	835	840	844	849	854	859	864	869	874	
88	5951	5987	6023	6060	6096	6132	6168	6204	6240	6276	455
90	878	883	888	893	898	902	907	912	916	921	
92	6312	6347	6383	6418	6454	6489	6524	6559	6595	6630	457
94	926	931	935	940	945	949	954	958	963	968	
96	6665	6700	6734	6769	6804	6839	6873	6907	6941	6976	457
98	972	977	981	986	991	995	1000	1004	1009	1013	
100	7010	7044	7078	7112	7146	7179	7213	7246	7280	7313	458
102	1018	1022	1026	1031	1035	1040	1044	1049	1053	1057	
104	7347	7380	7413	7446	7479	7512	7544	7577	7609	7642	458
106	1062	1066	1070	1075	1079	1083	1088	1092	1096	1100	
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1 0 .0 .00 03301 .990 .000 .000 0 FCOM-NO-02-05-30-019-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL350			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	559	10717	16026	21234	26342	31551	36759	367
42	41967	47075	52183	57291	62399	674107	725115	775123	825131	876139	379
44	926146	976154	1026162	1076169	1126177	1175185	1225192	1274200	1323207	1372214	390
46	1422222	1470229	1519237	1567244	1616251	1665258	1713266	1761273	1809280	1857287	398
48	1905295	1953302	2000309	2048316	2095323	2143330	2190337	2236344	2283350	2330357	401
50	2377364	2423371	2469378	2516384	2562391	2608398	2654404	2699411	2745417	2790424	412
52	2836430	2881437	2926443	2971449	3016456	3061462	3106468	3150475	3194481	3239487	422
54	3283494	3327500	3371506	3415512	3459518	3503524	3546530	3589536	3632543	3676549	426
56	3719555	3761560	3804566	3847572	3889578	3932584	3974590	4016596	4058601	4100607	432
58	4143613	4184619	4226624	4267630	4309636	4350641	4391647	4432652	4473658	4514664	438
60	4555669	4596674	4636680	4677685	4717691	4757696	4797701	4837707	4877712	4917717	447
62	4957723	4997728	5037733	5076739	5116744	5155749	5194754	5233759	5272765	5311770	451
64	5351775	5389780	5428785	5466790	5505795	5544801	5582806	5620811	5658816	5696821	453
66	5735826	5772831	5810836	5848841	5885846	5923851	5960856	5997861	6034866	6072870	453
68	6109875	6145880	6182885	6218890	6255895	6292900	6328904	6364909	6400914	6436919	454
70	6472923	6508928	6543933	6579938	6614942	6650947	6685952	6720956	6755961	6790965	454
72	6825970	6860975	6894979	6929984	6963988	6998993	7032997	70661002	71001006	71341011	454
74	71681015	72011020	72341024	72671029	73011033	73341037	73671042	74001046	74341051	74671055	454
76											
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 222000000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-N0-02-05-30-020-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 366KT		DISTANCE (NM) TIME (MIN)		LR		FL330	
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	49	98	147	196	245	293	341	389	438
	0	8	16	24	32	40	48	55	63	71
42	486	534	581	629	677	724	771	818	865	912
	79	86	94	102	109	117	124	132	139	147
44	959	1006	1052	1099	1145	1191	1237	1283	1329	1374
	154	162	169	176	184	191	198	205	212	219
46	1420	1465	1510	1556	1601	1646	1690	1735	1780	1824
	227	233	240	247	254	261	268	275	282	289
48	1869	1913	1956	2000	2044	2088	2132	2175	2219	2262
	296	302	309	316	322	329	336	342	349	355
50	2305	2348	2391	2434	2477	2519	2562	2604	2646	2688
	362	368	375	381	388	394	400	407	413	419
52	2731	2772	2814	2856	2897	2939	2980	3021	3063	3104
	426	432	438	444	450	456	462	468	474	480
54	3145	3185	3226	3267	3307	3348	3388	3428	3468	3508
	486	492	498	504	509	515	521	526	532	538
56	3548	3588	3627	3667	3706	3746	3785	3824	3863	3902
	543	549	554	560	565	571	576	581	587	592
58	3941	3979	4018	4056	4095	4133	4172	4210	4248	4286
	597	603	608	613	618	623	629	634	639	644
60	4324	4361	4399	4437	4474	4512	4549	4587	4624	4661
	649	654	659	664	669	674	679	684	689	694
62	4698	4735	4772	4809	4846	4882	4919	4955	4992	5028
	699	704	709	714	719	724	729	734	739	744
64	5065	5101	5137	5173	5209	5245	5280	5316	5352	5387
	748	753	758	763	768	772	777	782	787	791
66	5423	5458	5493	5528	5564	5599	5634	5668	5703	5738
	796	801	805	810	815	819	824	829	833	838
68	5773	5807	5841	5876	5910	5944	5978	6012	6046	6080
	842	847	852	856	861	865	870	874	879	883
ENGINE ANTI ICE ON					TOTAL ANTI ICE ON					
Δ FUEL = + 2 %					Δ FUEL = + 6 %					

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 376KT		DISTANCE (NM) TIME (MIN)		LR			FL350
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	51	101	152	203	254	304	353	403	453	
	0	8	16	24	32	40	48	56	64	72	
42	503	553	602	651	700	750	798	847	895	944	
	80	87	95	103	110	118	126	133	141	148	
44	992	1040	1088	1136	1183	1231	1278	1325	1373	1420	
	156	163	170	178	185	192	200	207	214	221	
46	1467	1513	1560	1606	1653	1699	1745	1791	1836	1882	
	228	235	242	249	256	263	270	277	284	291	
48	1928	1973	2018	2063	2108	2153	2198	2242	2287	2331	
	298	304	311	318	324	331	337	344	350	357	
50	2375	2419	2463	2507	2550	2594	2637	2681	2724	2767	
	363	369	376	382	388	394	400	406	412	418	
52	2810	2853	2895	2938	2980	3023	3065	3107	3149	3190	
	424	430	436	442	448	454	460	465	471	477	
54	3232	3274	3315	3357	3398	3439	3480	3521	3562	3603	
	482	488	494	499	505	511	516	522	527	533	
56	3644	3684	3725	3765	3806	3846	3886	3926	3966	4006	
	538	544	549	555	560	566	571	576	582	587	
58	4046	4085	4125	4164	4203	4243	4282	4321	4360	4399	
	593	598	603	609	614	619	624	630	635	640	
60	4438	4476	4515	4553	4591	4630	4668	4706	4744	4782	
	645	650	656	661	666	671	676	681	686	691	
62	4820	4857	4895	4932	4969	5007	5044	5081	5118	5154	
	696	701	706	711	716	721	726	731	736	741	
64	5191	5228	5264	5300	5337	5373	5409	5445	5481	5516	
	746	751	756	760	765	770	775	780	784	789	
66	5552	5587	5623	5658	5693	5728	5763	5797	5832	5867	
	794	799	803	808	813	817	822	827	831	836	
68	5901	5935	5970	6004	6038	6072	6105	6139	6172	6206	
	840	845	849	854	858	863	867	872	876	881	
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL370			
NORMAL AIR CONDITIONING				TIME (MIN)							
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	55 8	109 17	164 25	218 34	273 42	327 50	381 58	435 67	489 75	387
42	542 83	596 91	649 99	702 107	755 115	808 123	861 131	913 139	966 147	1019 155	396
44	1071 163	1123 171	1174 178	1226 186	1278 194	1330 201	1381 209	1432 216	1483 224	1533 231	400
46	1584 239	1635 246	1685 253	1735 260	1785 268	1836 275	1885 282	1935 289	1984 296	2034 303	412
48	2083 310	2132 317	2181 324	2230 331	2278 338	2327 345	2375 352	2423 359	2471 366	2520 372	420
50	2568 379	2615 386	2662 392	2710 399	2757 406	2804 412	2851 419	2898 425	2944 432	2991 438	427
52	3038 445	3084 451	3129 457	3175 464	3221 470	3267 476	3313 483	3358 489	3403 495	3448 501	433
54	3494 507	3538 513	3583 519	3628 525	3672 532	3717 538	3761 543	3805 549	3849 555	3893 561	442
56	3937 567	3981 573	4024 579	4068 585	4111 590	4155 596	4198 602	4240 608	4283 613	4326 619	448
58	4369 625	4412 630	4454 636	4496 642	4539 647	4581 653	4623 659	4665 664	4707 670	4748 675	450
60	4790 681	4831 686	4873 692	4914 697	4955 703	4996 708	5037 714	5077 719	5118 724	5158 730	451
62	5199 735	5239 741	5279 746	5318 751	5358 756	5398 762	5437 767	5477 772	5516 777	5555 783	451
64	5594 788	5633 793	5672 798	5710 803	5749 808	5788 814	5826 819	5864 824	5902 829	5940 834	451
66	5978 839	6015 844	6052 849	6090 854	6127 859	6165 864	6201 869	6238 874	6275 878	6312 883	451
68	6349 888	6384 893	6420 898	6456 903	6492 907	6528 912	6564 917	6600 922	6635 926	6671 931	450
70											
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$				$\Delta FUEL = + 3 \%$				$\Delta FUEL = + 5.5 \%$			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 FCOM-N0-02-05-30-021-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL390			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	56 8	113 17	169 25	225 33	282 42	337 50	393 58	448 66	503 74	400
42	559 82	613 90	668 98	722 106	777 114	832 122	885 129	939 137	993 145	1046 152	414
44	1100 160	1153 168	1206 175	1259 183	1311 190	1364 198	1416 205	1468 212	1520 220	1572 227	420
46	1624 234	1675 241	1726 248	1777 256	1828 263	1879 270	1929 277	1980 284	2030 291	2080 298	429
48	2130 304	2180 311	2229 318	2279 325	2328 331	2378 338	2426 345	2475 351	2524 358	2572 365	436
50	2621 371	2669 378	2717 384	2765 390	2813 397	2861 403	2908 410	2956 416	3003 422	3050 429	446
52	3098 435	3144 441	3191 447	3238 454	3284 460	3331 466	3377 472	3423 478	3469 485	3515 491	450
54	3561 497	3606 503	3652 509	3697 515	3742 521	3788 527	3832 533	3877 539	3921 545	3965 551	450
56	4010 557	4054 562	4097 568	4141 574	4185 580	4228 586	4271 591	4314 597	4357 603	4400 608	451
58	4443 614	4485 620	4528 625	4570 631	4612 637	4654 642	4696 648	4737 653	4779 659	4820 664	451
60	4862 670	4902 675	4943 681	4984 686	5025 692	5065 697	5105 702	5145 708	5185 713	5225 718	450
62	5265 724	5305 729	5344 734	5383 739	5422 745	5461 750					450
64											
66											
68											
70											
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
Δ FUEL = - 0.4 %				Δ FUEL = + 3 %				Δ FUEL = + 5.5 %			

10E -08FOA319-131 V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 03901 .990 .000 .000 0 FCOM-N0-02-05-30-022-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS				ISA CG=33.0%		DISTANCE (NM)		LR FL370			
NORMAL AIR CONDITIONING						TIME (MIN)					
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	579	11117	16525	21934	27342	32750	38058	388
42	43466	48774	54082	59390	64698	699106	751114	804122	856130	908138	396
44	961146	1012153	1064161	1115169	1167176	1218184	1269191	1320199	1370206	1421214	401
46	1472221	1522228	1572235	1622243	1672250	1722257	1771264	1821271	1870278	1919285	413
48	1969292	2017299	2066306	2115313	2163320	2212327	2260334	2308341	2355347	2403354	420
50	2451361	2498368	2546374	2593381	2640387	2687394	2733400	2780407	2826413	2873420	426
52	2919426	2965433	3011439	3057445	3102452	3148458	3193464	3238470	3283476	3328482	433
54	3374489	3418495	3462501	3507507	3551513	3596519	3640525	3684530	3728536	3771542	442
56	3815548	3859554	3902560	3945566	3989571	4032577	4075583	4118589	4160594	4203600	448
58	4246606	4288611	4331617	4373623	4415628	4457634	4499639	4541645	4582650	4624656	451
60	4666662	4707667	4748672	4789678	4830683	4871689	4912694	4952700	4992705	5033710	451
62	5073716	5113721	5153726	5193732	5232737	5272742	5311747	5351753	5390758	5429763	451
64	5468768	5507773	5545778	5584784	5622789	5661794	5699799	5737804	5775809	5812814	451
66	5850819	5888824	5925829	5962834	6000839	6037844	6074849	6110854	6147858	6184863	452
68	6221868	6256873	6292878	6328882	6364887	6400892	6436897	6471902	6507906		451
70											
72											
74											
76											
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
Δ FUEL = - 0.3 %				Δ FUEL = + 2 %				Δ FUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 0 FCOM-NO-02-05-30-021-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM)		LR FL390			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	599	11517	17125	22633	28141	33649	39157	401
42	44766	50173	55581	61089	66497	718105	772112	825120	879128	932135	414
44	986143	1038151	1091158	1144165	1196173	1249180	1301188	1352195	1404202	1456209	420
46	1507217	1558224	1609231	1660238	1711245	1762252	1812259	1862266	1912273	1962280	429
48	2012287	2061293	2110300	2160307	2209314	2258320	2307327	2355333	2404340	2452347	437
50	2501353	2549360	2596366	2644372	2692379	2740385	2787392	2834398	2882404	2929410	446
52	2976417	3022423	3069429	3115435	3162442	3209448	3254454	3300460	3346466	3392472	450
54	3438478	3483484	3528490	3573496	3618502	3664508	3708514	3752520	3797526	3841532	450
56	3885538	3929544	3973550	4016555	4060561	4103567	4146573	4189578	4232584	4275590	451
58	4318595	4360601	4402607	4444612	4486618	4528623	4570629	4611634	4652640	4694645	452
60	4735651	4776656	4816662	4857667	4898672	4938678	4978683	5018688	5058694	5098699	452
62	5138704	5177710	5216715	5255720	5295725	5334730					451
64											
66											
68											
70											
72											
74											
76											
LOW AIR CONDITIONING				ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$				$\Delta FUEL = + 2 \%$				$\Delta FUEL = + 5 \%$			

10F -08FOA320-232 IAE V2527-A5 222000000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-N0-02-05-30-022-140

INTEGRATED CRUISE										
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0% TAS = 388KT		DISTANCE (NM) TIME (MIN)		LR		FL370	
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40	0	52	104	157	209	261	312	364	415	466
	0	8	16	24	32	40	48	56	64	72
42	518	568	619	669	720	771	820	870	920	969
	79	87	95	102	110	118	125	133	140	148
44	1019	1068	1117	1166	1215	1264	1312	1360	1408	1456
	155	162	170	177	184	191	198	205	212	219
46	1504	1552	1599	1647	1694	1741	1788	1835	1881	1928
	226	233	239	246	253	260	266	273	279	286
48	1974	2020	2066	2112	2158	2204	2249	2294	2339	2385
	292	298	305	311	317	324	330	336	342	348
50	2430	2474	2519	2564	2608	2653	2697	2741	2785	2829
	355	361	367	373	379	385	391	397	403	409
52	2873	2917	2960	3004	3047	3090	3133	3176	3219	3262
	415	421	427	433	439	444	450	456	462	468
54	3305	3347	3389	3431	3474	3516	3557	3599	3641	3682
	473	479	485	490	496	502	507	513	519	524
56	3724	3765	3806	3847	3888	3929	3970	4010	4050	4091
	530	535	541	546	552	557	563	568	574	579
58	4131	4171	4211	4251	4290	4330	4369	4408	4447	4486
	584	590	595	600	606	611	616	621	627	632
60	4525	4564	4602	4640	4679	4717	4755	4793	4830	4868
	637	642	647	652	658	663	668	673	678	683
62	4906	4943	4980	5017	5054	5091	5127	5163	5200	5236
	688	693	698	703	708	712	717	722	727	732
64	5272	5308	5344	5380	5415	5451	5486	5521	5556	5591
	737	741	746	751	756	761	765	770	775	779
66	5627	5661	5696	5730	5765	5799				
	784	789	793	798	802	807				
68										
ENGINE ANTI ICE ON Δ FUEL = + 2 %						TOTAL ANTI ICE ON Δ FUEL = + 6 %				

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0% TAS= 402KT		DISTANCE (NM) TIME (MIN)		LR			FL390
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	
40	0	53	107	160	213	266	319	371	423	476	
40	0	8	16	24	32	39	47	55	62	70	
42	528	579	631	682	734	785	835	886	936	987	
42	77	84	92	99	106	114	121	128	135	142	
44	1037	1087	1137	1186	1236	1286	1335	1383	1432	1481	
44	149	155	162	169	176	183	189	196	203	209	
46	1530	1578	1627	1675	1723	1771	1819	1866	1914	1961	
46	216	223	229	236	242	249	255	262	268	275	
48	2009	2055	2102	2149	2196	2243	2289	2335	2381	2427	
48	281	287	294	300	306	313	319	325	331	337	
50	2473	2518	2563	2609	2654	2699	2744	2789	2833	2878	
50	344	350	356	362	368	374	380	386	392	398	
52	2922	2966	3010	3054	3098	3142	3185	3228	3271	3314	
52	404	410	416	422	428	433	439	445	451	456	
54	3357	3399	3441	3483	3526	3568	3609	3651	3692	3733	
54	462	468	473	479	485	490	496	501	507	512	
56	3775	3815	3856	3896	3937	3977	4017	4057	4097	4137	
56	518	523	529	534	540	545	550	556	561	566	
58	4176	4215	4254	4293	4332	4371	4410	4448	4486	4524	
58	572	577	582	587	592	598	603	608	613	618	
60	4563	4600	4638	4675	4713	4750	4787	4824	4860	4897	
60	623	628	633	638	643	648	653	658	663	668	
62	4934	4970	5006	5042	5078	5114					
62	673	678	682	687	692	697					
64											
66											
68											
ENGINE ANTI ICE ON △FUEL = + 2 %							TOTAL ANTI ICE ON △FUEL = + 6 %				

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.78 and long range speed take into account climbing from the brake release point at 250kt/300kt/M.78.

M.78 and LONG RANGE SPEED

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)							Time Correction
	WEIGHT AT BRAKE RELEASE (1000 KG)							
	46	50	54	58	62	66	70	Time Correction
390	0.8	0.8	0.9	0.9	1.0	—	—	4 min
370	0.8	0.8	0.8	0.9	0.9	1.0	1.0	4 min
350	0.7	0.8	0.8	0.9	0.9	1.0	1.0	4 min
330	0.7	0.7	0.8	0.8	0.9	0.9	1.0	4 min
310	0.7	0.7	0.8	0.8	0.8	0.9	0.9	4 min
290	0.6	0.7	0.7	0.8	0.8	0.8	0.9	5 min
270	0.6	0.6	0.7	0.7	0.8	0.8	0.8	5 min
250	0.5	0.6	0.6	0.7	0.7	0.7	0.8	5 min
200	0.4	0.5	0.5	0.6	0.6	0.6	0.7	4 min
150	0.4	0.4	0.4	0.5	0.5	0.5	0.5	3 min
100	0.3	0.3	0.3	0.3	0.4	0.4	0.4	3 min

STEP CLIMB CORRECTION

When the flight includes one or more step climbs (2000 feet below FL290, 4000 feet above), apply a correction of 50 kg per step climb to the fuel consumption.

DESCENT CORRECTION

Correct the fuel and time values determined in the integrated cruise tables as follows to take into account the descent down to 1500 feet followed by a 6 minute IFR approach and landing.

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)							Time Correction
	WEIGHT OVERHEAD DESTINATION (1000 KG)							
	46	50	54	58	62	66	70	
390	0.2	0.2	0.2	0.3	0.3	—	—	10 min
370	0.2	0.2	0.2	0.2	0.3	0.3	0.4	10 min
350	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
330	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
310	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
290	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
270	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
250	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
200	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
150	0.1	0.2	0.2	0.2	0.2	0.2	0.2	9 min
100	0.1	0.1	0.1	0.1	0.1	0.1	0.2	9 min

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.78 and long range speed, take into account climbing from the brake release point at 250kt/300kt/M.78.

M.78 and LONG RANGE SPEED

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)								Time Correction
	WEIGHT AT BRAKE RELEASE (1000 KG)								
50	54	58	62	66	70	74	78		
390	0.8	0.9	0.9	1.0	—	—	—	—	4 min
370	0.8	0.9	0.9	1.0	1.0	1.0	—	—	4 min
350	0.8	0.8	0.9	0.9	1.0	1.0	1.1	—	5 min
330	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	5 min
310	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.1	5 min
290	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	5 min
270	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	5 min
250	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	5 min
200	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	5 min
150	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	4 min
100	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	3 min

STEP CLIMB CORRECTION

When the flight includes one or more step climbs (2000 feet below FL290, 4000 feet above), apply a correction of 50 kg per step climb to the fuel consumption.

DESCENT CORRECTION

Correct the fuel and time values determined in the integrated cruise tables as follows to take into account the descent down to 1500 feet followed by a 6 minute IFR approach and landing.

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)							Time correction
	WEIGHT OVERHEAD DESTINATION (1000 KG)							
	46	50	54	58	62	66	70	
390	0.2	0.2	0.2	0.3	0.3	—	—	10 min
370	0.2	0.2	0.2	0.2	0.3	0.3	0.4	10 min
350	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
330	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
310	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
290	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
270	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
250	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
200	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
150	0.1	0.2	0.2	0.2	0.2	0.2	0.2	10 min
100	0.1	0.1	0.1	0.1	0.1	0.2	0.2	9 min

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.78 and long range speed, take into account climbing from the brake release point at 250kt/300kt/M.78.

M.78 and LONG RANGE SPEED

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)							Time Correction
	WEIGHT AT BRAKE RELEASE (1000 KG)							
	44	48	52	56	60	64	68	Time Correction
390	0.8	0.9	0.9	1.0	1.0	—	—	4 min
370	0.8	0.9	0.9	1.0	1.0	1.0	—	4 min
350	0.8	0.8	0.9	0.9	1.0	1.0	1.1	4 min
330	0.7	0.8	0.8	0.9	0.9	1.0	1.0	4 min
310	0.7	0.7	0.8	0.8	0.9	0.9	1.0	5 min
290	0.7	0.7	0.7	0.8	0.8	0.9	0.9	5 min
270	0.6	0.7	0.7	0.7	0.8	0.8	0.9	5 min
250	0.6	0.6	0.7	0.7	0.7	0.8	0.8	5 min
200	0.5	0.5	0.5	0.6	0.6	0.7	0.7	4 min
150	0.4	0.4	0.4	0.5	0.5	0.5	0.6	3 min
100	0.3	0.3	0.3	0.3	0.4	0.4	0.4	2 min

STEP CLIMB CORRECTION

When the flight includes one or more step climbs (2000 feet below FL290, 4000 feet above), apply a correction of 80 kg per step climb to the fuel consumption.

DESCENT CORRECTION

Correct the fuel and time values determined in the integrated cruise tables as follows to take into account the descent down to 1500 feet followed by a 6 minute IFR approach and landing.

R

FL	CORRECTION ON FUEL CONSUMPTION (1000 KG)							Time Correction
	42	46	50	54	58	62	66	
390	0.0	0.1	0.1	0.1	0.2	0.3	0.3	10 min
370	0.0	0.0	0.1	0.1	0.2	0.2	0.3	10 min
350	0.0	0.0	0.1	0.1	0.2	0.2	0.2	10 min
330	0.0	0.0	0.1	0.1	0.1	0.2	0.2	10 min
310	0.0	0.0	0.1	0.1	0.1	0.2	0.2	10 min
290	0.0	0.0	0.1	0.1	0.1	0.2	0.2	11 min
270	0.0	0.0	0.1	0.1	0.1	0.2	0.2	11 min
250	0.0	0.0	0.0	0.1	0.1	0.1	0.2	11 min
200	0.0	0.0	0.0	0.0	0.1	0.1	0.1	10 min
150	0.0	0.0	0.0	0.0	0.0	0.1	0.1	9 min
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8 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.78

R – Cruise Mach number M.78/LR
– Descent profile M.78/300kt/250kt

R – Approach and landing 120 kg – 6 minute IFR
– ISA
– CG = 33 %
– Normal air conditioning

R – Anti ice OFF

They are based upon a reference landing weight of 55 000 kg

Note : 1. In the tables, the asterisk () means that a step climb of 4000 ft 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.

R R 3. For each degree Celcius above ISA temperature apply fuel correction 0.015
(kg/C/NM) \times Δ ISA ($^{\circ}$ C) \times 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 : 60 000 kg = landing weight at alternate airport
- Cruise M.78 at FL370
- Ground distance from departure to destination : 1800 NM
- Average wind during flight : - 40 kt (headwind)
- ISA conditions
- "En route" 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).

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING QUICK DETERMINATION OF F-PLN	2.05.40 P 2	
		SEQ 140	REV 23

1. Alternate fuel and time
 - From 2.05.50 p 2 ;
Alternate time = 38 min
Alternate fuel : $1\ 573 + 9 \times (60 - 55) = 1\ 618$ kg
2. Holding fuel and time
 - A 30 min holding is assumed at 1500 ft. Read from 3.05.25 p 2, holding fuel = 1 090 kg
3. At destination, the landing weight = $60\ 000 + 1\ 618 + 1\ 090 = 62\ 708$ kg
4. Evaluation of the air distance between departure and destination.
 - The “Ground distance/Air distance” conversion table from 2.05.60 p 2 shows that the corresponding air distance is : 1 975 NM.
5. Trip fuel and time
 - Enter air distance and flight level 370 (see table on 2.05.40 p 5), read the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
Fuel = 10 205 kg
Time = 4 h 37 min
 - Correction for landing weight
 - △ fuel consumption = $146 \times (62.7 - 55) = 1\ 124$ kg
 - Trip reserves (5 %) = $0.05 \times (10\ 205 + 1\ 124) = 567$ kg
6. Taxi fuel = 140 kg (2.05.10 p 2)
7. Total fuel on board (Block fuel) :

$$10\ 205 + 1\ 124 + 567 + 1\ 090 + 1\ 618 + 140 = 14\ 744$$
 kg

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.78
- Cruise Mach number M.78/LR
- Descent profile M.78/300kt/250kt
- Approach and landing 110 kg – 6 minute IFR
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

They are based upon a reference landing weight of 50 000 kg

Note : 1. In the tables, the asterisk () means that a step climb of 4000 ft 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 Celcius above ISA temperature apply fuel correction 0.015 (kg/C/NM) × ΔISA (°C) × Air Distance (NM).

R
R

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 : 55 000 kg = landing weight at alternate airport
- Cruise M.78 at FL370
- Ground distance from departure to destination : 1800 NM
- Average wind during flight : - 40 kt (headwind)
- ISA conditions
- "En route" 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).

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.40	P 2
	QUICK DETERMINATION OF F-PLN	SEQ 160	REV 22

1. Alternate fuel and time
 - From 2.05.50 p 2 ;
Alternate time = 39 min
Alternate fuel : $1478 + 9 \times (55 - 50) = 1523$ kg
2. Holding fuel and time
 - A 30 min holding is assumed at 1500 ft. Read from 3.05.25 p 2
holding fuel = 1106 kg
3. At destination, the landing weight = $55\ 000 + 1523 + 1106 = 57\ 629$ kg
4. Evaluation of the air distance between departure and destination.
 - The "Ground distance/Air distance" conversion table from 2.05.60 p 2 shows that the corresponding air distance is : 1975 NM.
5. Trip fuel and time
 - Enter air distance and flight level 370 (see table on 2.05.40 p 5), read the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
Fuel = 9627 kg
Time = 4 h 37 min
 - Correction for landing weight
 - △ fuel consumption = $118 \times (57.629 - 50) = 901$ kg
 - Trip reserves (5 %) = $0.05 \times (9627 + 901) = 527$ kg
6. Taxi fuel = 120 (2.05.10 p 2)
7. Total fuel on board (Block fuel) :

$$9627 + 901 + 527 + 1106 + 1523 + 120 = 13\ 804$$
 kg

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.78
- Cruise Mach number M.78/LR
- Descent profile M.78/300kt/250kt
- Approach and landing 110 kg – 6 minute IFR
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

They are based upon a reference landing weight of 50 000 kg.

- Note :
1. In the tables, the asterisk (*) means that a step climb of 4000 ft 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 Celcius above ISA temperature apply fuel correction 0.015 $(\text{kg}/^\circ\text{C}/\text{NM}) \times \Delta\text{ISA } (^\circ\text{C}) \times \text{Air Distance } (\text{NM})$.

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 : 54 000 kg = landing weight at alternate airport
 - Cruise M.78 at FL370
 - Ground distance from departure to destination : 1800 NM
 - Average wind during flight : - 40 kt (headwind)
 - ISA conditions
 - "En route" 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).

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40	P 2
FLIGHT CREW OPERATING MANUAL	QUICK DETERMINATION OF F-PLN	SEQ 153	REV 39

1. Alternate fuel and time
 - From 2.05.50 p2 ;
Alternate time = 40 min
Alternate fuel : $1\ 455 + 9 \times (54 - 50) = 1\ 491$ kg
2. Holding fuel and time
 - A 30 min holding is assumed at 1500 ft. Read from 3.05.25 p2, holding fuel = 1 038 kg
3. At destination, the landing weight = $54\ 000 + 1\ 491 + 1\ 038 = 56\ 529$ kg
4. Evaluation of the air distance between departure and destination.
 - The "Ground distance/Air distance" conversion table from 2.05.60 p2 shows that the corresponding air distance is : 1 979 NM.
5. Trip fuel and time
 - Enter air distance and flight level 370 (see table on 2.05.40 p5), read the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
Fuel = 10 208 kg
Time = 4 h 39 min
 - Correction for landing weight
 - △ fuel consumption = $152 \times (56.529 - 50) = 993$ kg
 - Trip reserves (5 %) = $0.05 \times (10\ 208 + 993) = 561$ kg
6. Taxi fuel = 120 kg (2.05.10 p 2)
7. Total fuel on board (Block fuel) :

R $10\ 208 + 993 + 561 + 1\ 038 + 1\ 491 + 120 = 14\ 411$ kg

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING								
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT								
IMC PROCEDURE : 110 KG (6MIN)								
REF. LANDING WEIGHT = 50000 KG			ISA CG = 33.0 %		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING			TIME (H.MIN)					
ANTI-ICING OFF			CORRECTION ON FUEL CONSUMPTION (KG/1000KG)					
AIR DIST. (NM)	FLIGHT LEVEL					FL290 FL310		
	290	310	330	350	370	FL330 FL350		
200 0.38	1545 0.38	1525 0.38	1513 0.38	1509 0.38	1509 0.38	10 13 14		
225 0.41	1685 0.41	1656 0.41	1635 0.42	1624 0.42	1619 0.42	10 14 16		
250 0.45	1825 0.45	1786 0.45	1757 0.45	1739 0.45	1730 0.45	11 15 17		
275 0.48	1965 0.48	1916 0.48	1878 0.48	1855 0.48	1840 0.48	11 15 18		
300 0.51	2105 0.51	2046 0.51	2000 0.51	1970 0.52	1951 0.52	11 16 19		
325 0.54	2245 0.54	2177 0.55	2122 0.55	2086 0.55	2061 0.55	12 17 21		
350 0.58	2385 0.58	2307 0.58	2244 0.58	2202 0.58	2172 0.58	12 18 22		
375 1.01	2526 1.01	2437 1.01	2366 1.02	2318 1.02	2283 1.02	13 19 23		
400 1.04	2666 1.04	2568 1.04	2488 1.05	2433 1.05	2394 1.05	13 19 24		
425 1.07	2806 1.07	2698 1.08	2610 1.08	2550 1.08	2505 1.09	13 20 25		
450 1.11	2947 1.11	2829 1.11	2733 1.12	2666 1.12	2617 1.12	14 21 26		
475 1.14	3087 1.14	2960 1.14	2855 1.15	2782 1.15	2728 1.15	14 22 28		
500 1.17	3228 1.17	3090 1.18	2977 1.18	2898 1.18	2840 1.19	14 23 29		
525 1.20	3368 1.21	3221 1.21	3100 1.21	3015 1.22	2951 1.22	15 24 30		
550 1.24	3509 1.24	3352 1.24	3222 1.25	3131 1.25	3063 1.25	15 24 31		
575 1.27	3649 1.27	3483 1.27	3345 1.28	3248 1.28	3175 1.29	15 25 32		
600 1.30	3790 1.30	3613 1.31	3468 1.31	3365 1.32	3287 1.32	16 26 34		
625 1.33	3930 1.33	3744 1.34	3590 1.35	3482 1.35	3399 1.35	16 27 35		
650 1.37	4071 1.37	3875 1.37	3713 1.38	3599 1.38	3511 1.39	17 28 36		
675 1.40	4212 1.41	4006 1.41	3836 1.41	3716 1.42	3624 1.42	17 29 37		
700 1.43	4352 1.44	4137 1.45	3959 1.45	3833 1.45	3736 1.45	17 30 39		
725 1.47	4493 1.47	4268 1.47	4082 1.48	3951 1.48	3849 1.49	18 31 40		
750 1.50	4634 1.50	4399 1.50	4206 1.51	4068 1.52	3961 1.52	18 31 41		
775 1.53	4775 1.53	4531 1.54	4329 1.54	4186 1.55	4074 1.56	19 32 42		
800 1.56	4916 1.56	4662 1.57	4452 1.58	4303 1.58	4187 1.59	19 33 44		
825 2.00	5057 2.00	4793 2.00	4576 2.01	4421 2.02	4300 2.02	19 34 45		
LOW AIR CONDITIONING			ENGINE ANTI ICE ON		TOTAL ANTI ICE ON			
$\Delta FUEL = -0.4\%$			$\Delta FUEL = +3\%$		$\Delta FUEL = +5.5\%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 110 KG (6MIN)							FUEL CONSUMED (KG)		
REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 33.0 %				TIME (H.MIN)		
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
825	5057 2.00	4793 2.00	4576 2.01	4421 2.02	4300 2.02	4197 2.02	19	34	45
850	5198 2.03	4925 2.04	4699 2.04	4539 2.05	4413 2.06	4306 2.06	20	35	46
875	5339 2.06	5056 2.07	4823 2.08	4657 2.09	4527 2.09	4415 2.09	20	36	48
900	5480 2.09	5188 2.10	4947 2.11	4775 2.12	4640 2.12	4524 2.12	21	37	49
925	5622 2.13	5319 2.13	5071 2.14	4893 2.15	4754 2.16	4633 2.16	21	38	50
950	5763 2.16	5451 2.17	5195 2.18	5012 2.19	4867 2.19	4742 2.19	22	39	52
975	5905 2.19	5583 2.20	5320 2.21	5130 2.22	4981 2.22	4852 2.22	22	40	53
1000	6046 2.22	5715 2.23	5444 2.24	5249 2.25	5095 2.26	4962 2.26	23	41	54
1025	6187 2.26	5847 2.27	5569 2.28	5368 2.29	5209 2.29	5071 2.29	23	42	56
1050	6329 2.29	5979 2.30	5694 2.31	5487 2.32	5323 2.32	5182 2.32	23	43	57
1075	6471 2.32	6111 2.33	5819 2.34	5606 2.35	5437 2.36	5292 2.36	24	44	59
1100	6612 2.35	6243 2.36	5944 2.38	5725 2.39	5551 2.39	5403 2.39	24	45	60
1125	6754 2.39	6375 2.40	6069 2.41	5845 2.42	5666 2.43	5515 2.43	25	46	61
1150	6896 2.42	6508 2.43	6194 2.44	5964 2.45	5780 2.46	5626 2.46	25	47	63
1175	7037 2.45	6640 2.46	6319 2.47	6084 2.49	5895 2.49	5737 2.49	26	48	64
1200	7179 2.48	6772 2.50	6445 2.51	6204 2.52	6010 2.53	5849 2.53	26	49	66
1225	7321 2.52	6905 2.53	6570 2.54	6323 2.55	6125 2.56	5961 2.56	27	50	67
1250	7463 2.55	7037 2.56	6696 2.57	6443 2.59	6240 2.59	6073 2.59	27	51	69
1275	7605 2.58	7170 2.59	6822 3.01	6563 3.02	6355 3.03	6185 3.03	28	52	70
1300	7747 3.01	7302 3.03	6948 3.04	6684 3.05	6470 3.06	6297 3.06	29	53	72
1325	7889 3.05	7435 3.06	7074 3.07	6804 3.09	6585 3.09	6410 3.09	29	54	73
1350	8031 3.08	7568 3.09	7200 3.11	6924 3.12	6701 3.13	6522 3.13	30	55	75
1375	8173 3.11	7701 3.13	7326 3.14	7045 3.15	6816 3.16	6635 3.16	30	56	76
1400	8315 3.14	7833 3.16	7452 3.17	7166 3.19	6932 3.20	6748 3.20	31	57	78
1425	8457 3.18	7966 3.19	7579 3.21	7286 3.22	7048 3.23	6861 3.23	31	58	79
1450	8600 3.21	8099 3.22	7705 3.24	7407 3.25	7164 3.26	6975 3.26	32	59	81
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$			$\Delta FUEL = + 3 \%$			$\Delta FUEL = + 5.5 \%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)					
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
200	1615 0.39	1603 0.39	1600 0.39	1601 0.39			11	14	
225	1757 0.42	1736 0.42	1726 0.42	1722 0.42	1722		12	15	16
250	1899 0.45	1869 0.45	1853 0.46	1843 0.46	1838 0.46	1841 0.46	12	16	18
275	2042 0.49	2003 0.49	1979 0.49	1964 0.49	1955 0.49	1955 0.49	13	17	19
300	2184 0.52	2136 0.52	2106 0.52	2085 0.52	2071 0.52	2069 0.52	13	18	21
325	2327 0.55	2269 0.55	2233 0.55	2206 0.56	2187 0.56	2183 0.56	14	19	22
350	2469 0.58	2402 0.59	2359 0.59	2328 0.59	2304 0.59	2297 0.59	15	20	24
375	2612 1.02	2536 1.02	2486 1.02	2449 1.02	2420 1.02	2412 1.02	15	21	26
400	2754 1.05	2669 1.05	2613 1.05	2571 1.06	2537 1.06	2527 1.06	16	22	27
425	2897 1.08	2803 1.08	2740 1.09	2693 1.09	2654 1.09	2642 1.09	16	23	29
450	3040 1.11	2936 1.12	2868 1.12	2815 1.12	2771 1.13	2757 1.13	17	24	30
475	3182 1.15	3070 1.15	2995 1.15	2937 1.16	2888 1.16	2873 1.16	17	25	32
500	3325 1.18	3204 1.18	3123 1.19	3059 1.19	3005 1.19	2988 1.19	18	26	33
525	3468 1.21	3338 1.22	3250 1.22	3181 1.22	3123 1.23	3104 1.23	19	27	35
550	3611 1.24	3472 1.25	3378 1.25	3303 1.26	3240 1.26	3220 1.26	19	28	37
575	3754 1.28	3606 1.28	3506 1.29	3426 1.29	3358 1.29	3337 1.29	20	29	38
600	3897 1.31	3741 1.31	3634 1.32	3548 1.32	3475 1.33	3453 1.33	20	30	40
625	4040 1.34	3875 1.35	3762 1.35	3671 1.36	3593 1.36	3570 1.36	21	31	42
650	4183 1.37	4010 1.38	3890 1.39	3794 1.39	3711 1.39	3687 1.39	22	32	43
675	4327 1.41	4145 1.41	4018 1.42	3917 1.42	3830 1.43	3804 1.43	22	33	45
700	4470 1.44	4279 1.45	4147 1.45	4040 1.46	3948 1.46	3922 1.46	23	34	47
725	4613 1.47	4414 1.48	4276 1.49	4163 1.49	4066 1.49	4039 1.49	23	35	48
750	4757 1.51	4550 1.51	4404 1.52	4286 1.52	4185 1.53	4157 1.53	24	36	51
775	4900 1.54	4685 1.54	4533 1.55	4410 1.56	4304 1.56	4276 1.56	25	37	53
800	5044 1.57	4820 1.58	4662 1.58	4534 1.59	4423 2.00	4394 2.00	25	38	54
825	5187 2.00	4956 2.01	4792 2.02	4657 2.03	4542 2.03	4513 2.03	26	39	56
LOW AIR CONDITIONING		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
△FUEL = - 0.4 %		△FUEL = + 3 %				△FUEL = + 5.5 %			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 120 KG (6MIN)							FUEL CONSUMED (KG)		
REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0 %	TIME (H.MIN)				
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
825	5187 2.00	4956 2.01	4792 2.02	4657 2.03	4542 2.03	4513 2.03	26	39	56
850	5331 2.04	5091 2.04	4921 2.05	4781 2.06	4661 2.06	4632 2.06	27	40	58
875	5475 2.07	5227 2.08	5050 2.08	4905 2.09	4781 2.10	4751 2.10	28	41	60
900	5618 2.10	5363 2.11	5180 2.12	5029 2.13	4901 2.13	4871 2.13	28	42	61
925	5762 2.13	5499 2.14	5310 2.15	5153 2.16	5020 2.16	4991 2.16	29	44	63
950	5906 2.17	5635 2.17	5439 2.18	5278 2.19	5140 2.20	5111 2.20	30	45	65
975	6050 2.20	5771 2.21	5569 2.22	5402 2.23	5260 2.23	5231 2.23	30	46	67
1000	6194 2.23	5907 2.24	5699 2.25	5527 2.26	5380 2.26	5351 2.26	31	47	69
1025	6338 2.26	6043 2.27	5830 2.28	5652 2.29	5501 2.30	5472 2.30	32	48	70
1050	6482 2.30	6180 2.31	5960 2.32	5776 2.33	5621 2.33	5593 2.33	33	49	72
1075	6626 2.33	6316 2.34	6090 2.35	5901 2.36	5742 2.37	5714 2.37	33	50	74
1100	6770 2.36	6453 2.37	6221 2.38	6026 2.39	5862 2.40	5835 2.40	34	51	76
1125	6914 2.39	6590 2.40	6351 2.42	6152 2.43	5983 2.43	5957 2.43	35	52	78
1150	7058 2.43	6727 2.44	6482 2.45	6277 2.46	6104 2.47	6079 2.47	36	53	80
1175	7203 2.46	6864 2.47	6613 2.48	6402 2.49	6225 2.50	6201 2.50	37	55	81
1200	7347 2.49	7001 2.50	6744 2.51	6528 2.53	6347 2.53	6323 2.53	37	56	83
1225	7492 2.52	7138 2.54	6875 2.55	6654 2.56	6468 2.57	6446 2.57	38	57	85
1250	7636 2.56	7276 2.57	7007 2.58	6780 2.59	6590 3.00	6569 3.00	39	58	87
1275	7781 2.59	7413 3.00	7138 3.01	6906 3.03	6712 3.03	6692 3.03	40	59	89
1300	7925 3.02	7551 3.03	7270 3.05	7032 3.06	6834 3.07	6815 3.07	41	60	91
1325	8070 3.05	7689 3.07	7402 3.08	7158 3.09	6956 3.10	6939 3.10	42	61	93
1350	8215 3.09	7827 3.10	7534 3.11	7285 3.13	7078 3.13	7064 3.13	43	62	95
1375	8360 3.12	7965 3.13	7666 3.15	7411 3.16	7201 3.17	7188 3.17	43	64	97
1400	8504 3.15	8103 3.17	7798 3.18	7538 3.19	7323 3.20	7313 3.20	44	65	99
1425	8649 3.19	8241 3.20	7930 3.21	7665 3.23	7446 3.24	7438 3.24	45	66	101
1450	8794 3.22	8379 3.23	8063 3.25	7792 3.26	7569 3.27	7563 3.27	46	67	103
LOW AIR CONDITIONING				ENGINE ANTI ICE ON			TOTAL ANTI ICE ON		
$\Delta FUEL = -0.4\%$				$\Delta FUEL = +3\%$			$\Delta FUEL = +5.5\%$		

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF		ISA CG=33.0%	FUEL CONSUMED (KG)								
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)				
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390		
200	1563 0.39	1559 0.39					12				
225	1707 0.42	1694 0.42	1689 0.42				13	15			
250	1850 0.46	1828 0.46	1816 0.46	1811 0.46	1812 0.46		14	17	19		
275	1994 0.49	1963 0.49	1943 0.49	1931 0.49	1928 0.49	1933 0.49	15	18	21		
300	2137 0.52	2098 0.52	2070 0.52	2052 0.52	2044 0.53	2046 0.53	15	19	23		
325	2281 0.55	2233 0.56	2198 0.56	2173 0.56	2160 0.56	2159 0.56	16	20	24		
350	2425 0.59	2368 0.59	2325 0.59	2294 0.59	2276 0.59	2273 0.59	17	21	26		
375	2569 1.02	2503 1.02	2453 1.02	2416 1.02	2392 1.03	2386 1.03	17	22	27		
400	2712 1.05	2638 1.05	2581 1.06	2537 1.06	2509 1.06	2500 1.06	18	23	29		
425	2856 1.08	2774 1.09	2709 1.09	2659 1.09	2626 1.09	2614 1.09	19	24	31		
450	3001 1.12	2909 1.12	2837 1.12	2780 1.13	2742 1.13	2728 1.13	19	25	32		
475	3145 1.15	3045 1.15	2965 1.16	2902 1.16	2859 1.16	2843 1.16	20	26	34		
500	3289 1.18	3180 1.19	3093 1.19	3024 1.19	2976 1.19	2957 1.19	21	27	35		
525	3433 1.21	3316 1.22	3222 1.22	3146 1.23	3094 1.23	3072 1.23	21	28	37		
550	3578 1.25	3452 1.25	3350 1.26	3268 1.26	3211 1.26	3187 1.26	22	29	38		
575	3722 1.28	3588 1.28	3479 1.29	3390 1.29	3328 1.29	3302 1.29	23	30	40		
600	3867 1.31	3724 1.32	3607 1.32	3513 1.33	3446 1.33	3417 1.33	24	31	42		
625	4012 1.34	3860 1.35	3736 1.35	3635 1.36	3564 1.36	3533 1.36	24	32	43		
650	4156 1.38	3996 1.38	3865 1.39	3758 1.39	3682 1.40	3649 1.40	25	33	45		
675	4301 1.41	4133 1.42	3994 1.42	3880 1.43	3800 1.43	3765 1.43	26	34	47		
700	4446 1.44	4269 1.45	4123 1.45	4003 1.46	3918 1.46	3881 1.46	26	35	48		
725	4591 1.48	4406 1.48	4252 1.49	4126 1.49	4037 1.50	3997 1.50	27	36	50		
750	4737 1.51	4543 1.51	4382 1.52	4249 1.53	4155 1.53	4114 1.53	28	37	52		
775	4882 1.54	4679 1.55	4511 1.55	4373 1.56	4274 1.56	4231 1.56	29	38	54		
800	5027 1.57	4816 1.58	4641 1.59	4496 1.59	4393 2.00	4348 2.00	29	39	55		
825	5173 2.01	4953 2.01	4771 2.02	4620 2.03	4512 2.03	4465 2.03	30	40	57		
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON					
FUEL		+ 3.5 %				+ 7 %					

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES									
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT									
IMC PROCEDURE : 110 KG (6 MIN)									
REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF			ISA CG=33.0%	FUEL CONSUMED (KG)					
				TIME (H.MIN)					
AIR DIST. (NM)	FLIGHT LEVEL								
	290	310	330	350	370				
825	5173 2.01	4953 2.01	4771 2.02	4620 2.03	4512 2.03	4465 2.03	30	40	57
850	5318 2.04	5091 2.05	4900 2.05	4743 2.06	4632 2.06	4583 2.06	31	41	59
875	5464 2.07	5228 2.08	5030 2.09	4867 2.09	4751 2.10	4700 2.10	32	42	61
900	5610 2.10	5365 2.11	5160 2.12	4991 2.13	4871 2.13	4818 2.13	32	43	62
925	5756 2.14	5503 2.14	5291 2.15	5115 2.16	4990 2.17	4936 2.17	33	44	64
950	5901 2.17	5640 2.18	5421 2.19	5239 2.19	5110 2.20	5055 2.20	34	45	66
975	6047 2.20	5778 2.21	5551 2.22	5364 2.23	5230 2.23	5173 2.23	35	46	68
1000	6194 2.23	5916 2.24	5682 2.25	5488 2.26	5351 2.27	5292 2.27	35	48	70
1025	6340 2.27	6054 2.28	5813 2.29	5613 2.29	5471 2.30	5411 2.30	36	49	72
1050	6486 2.30	6192 2.31	5944 2.32	5737 2.33	5592 2.33	5530 2.33	37	50	74
1075	6633 2.33	6330 2.34	6074 2.35	5862 2.36	5712 2.37	5650 2.37	38	51	76
1100	6779 2.36	6468 2.37	6206 2.38	5987 2.39	5833 2.40	5769 2.40	39	52	77
1125	6926 2.40	6607 2.41	6337 2.42	6113 2.43	5955 2.43	5889 2.43	39	53	79
1150	7072 2.43	6745 2.44	6468 2.45	6238 2.46	6076 2.47	6009 2.47	40	54	81
1175	7219 2.46	6884 2.47	6600 2.48	6363 2.50	6197 2.50	6130 2.50	41	55	83
1200	7366 2.49	7023 2.51	6731 2.52	6489 2.53	6319 2.53	6251 2.53	42	56	85
1225	7513 2.53	7161 2.54	6863 2.55	6615 2.56	6441 2.57	6373 2.57	43	58	87
1250	7660 2.56	7300 2.57	6995 2.58	6741 3.00	6563 3.00	6494 3.00	43	59	89
1275	7807 2.59	7439 3.00	7127 3.02	6867 3.03	6685 3.04	6616 3.04	44	60	91
1300	7954 3.03	7579 3.04	7259 3.05	6993 3.06	6808 3.07	6738 3.07	45	61	93
1325	8102 3.06	7718 3.07	7391 3.08	7119 3.10	6931 3.10	6861 3.10	46	62	95
1350	8249 3.09	7857 3.10	7524 3.12	7246 3.13	7053 3.14	6983 3.14	47	63	97
1375	8397 3.12	7997 3.14	7656 3.15	7372 3.16	7176 3.17	7106 3.17	48	65	99
1400	8544 3.16	8137 3.17	7789 3.18	7499 3.20	7299 3.20	7229 3.20	49	66	101
1425	8692 3.19	8276 3.20	7922 3.22	7626 3.23	7423 3.24	7353 3.24	49	67	103
1450	8840 3.22	8416 3.23	8055 3.25	7753 3.26	7546 3.27	7476 3.27	50	68	105
CORRECTIONS		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
FUEL		+ 3.5 %			+ 7 %				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING									
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT									
IMC PROCEDURE : 110 KG (6MIN)									
REF. LANDING WEIGHT = 50000 KG		ISA		FUEL CONSUMED (KG)					
NORMAL AIR CONDITIONING		CG = 33.0 %		TIME (H.MIN)					
ANTI-ICING OFF		CORRECTION ON FUEL CONSUMPTION (KG/1000KG)							
AIR DIST. (NM)	FLIGHT LEVEL								
	290	310	330	350	370				
1450	8600 3.21	8099 3.22	7705 3.24	7407 3.25	7164 3.26	6975 3.26	32	59	81
1475	8742 3.24	8232 3.26	7832 3.27	7528 3.29	7280 3.30	7088 3.30	33	60	83
1500	8885 3.28	8365 3.29	7959 3.31	7650 3.32	7396 3.33	7202 3.33	33	61	84
1525	9027 3.31	8499 3.32	8086 3.34	7771 3.35	7512 3.36	7316 3.36	34	62	86
1550	9169 3.34	8632 3.36	8213 3.37	7892 3.39	7629 3.40	7430 3.40	34	63	88
1575	9312 3.37	8765 3.39	8340 3.40	8014 3.42	7745 3.43	7544 3.43	35	65	89
1600	9455 3.41	8899 3.42	8467 3.44	8136 3.45	7862 3.46	7659 3.46	36	66	91
1625	9597 3.44	9032 3.45	8595 3.47	8257 3.49	7979 3.50	7773 3.50	36	67	93
1650	9740 3.47	9165 3.49	8722 3.50	8380 3.52	8095 3.53	7888 3.53	37	68	94
1675	9883 3.50	9299 3.52	8850 3.54	8502 3.56	8212 3.56	8003 3.56	38	69	96
1700	10025 3.54	9433 3.55	8978 3.57	8624 3.59	8330 4.00	8118 4.00	38	70	98
1725	10168 3.57	9566 3.59	9106 4.00	8746 4.02	8447 4.03	8234 4.03	39	71	100
1750	10311 4.00	9700 4.02	9234 4.04	8869 4.06	8565 4.07	8349 4.07	40	72	101
1775	10454 4.03	9834 4.05	9362 4.07	8992 4.09	8682 4.10	8465 4.10	40	74	103
1800	10597 4.07	9968 4.08	9490 4.10	9114 4.12	8800 4.13	8581 4.13	41	75	105
1825	10740 4.10	10102 4.12	9618 4.14	9237 4.16	8918 4.17	8698 4.17	42	76	107
1850	10883 4.13	10236 4.15	9747 4.17	9360 4.19	9036 4.20	8814 4.20	42	77	109
1875	11026 4.16	10370 4.18	9875 4.20	9484 4.22	9154 4.23	8931 4.23	43	78	111
1900	11169 4.20	10504 4.22	10004 4.24	9607 4.26	9272 4.27	9048 4.27	44	79	113
1925	11313 4.23	10638 4.25	10133 4.27	9730 4.29	9390 4.30	9165 4.30	44	80	115
1950	11456 4.26	10772 4.28	10262 4.30	9854 4.32	9509 4.33	9282 4.33	45	81	117
1975	11600 4.29	10906 4.31	10391 4.34	9978 4.36	9627 4.37	9399 4.37	46	83	118
2000	11743 4.33	11041 4.35	10520 4.37	10101 4.39	9746 4.40	9517 4.40	47	84	120
2025	11887 4.36	11176 4.38	10649 4.40	10225 4.42	9865 4.44	9635 4.43	47	85	122
2050	12030 4.39	11312 4.41	10779 4.43	10350 4.46	9984 4.47	9753 4.47	48	86	125
2075	12174 4.42	11448 4.45	10908 4.47	10474 4.49	10103 4.50	9871 4.50	49	87	126
LOW AIR CONDITIONING		ENGINE ANTI ICE ON		TOTAL ANTI ICE ON					
$\Delta FUEL = - 0.4\%$		$\Delta FUEL = + 3\%$		$\Delta FUEL = + 5.5\%$					

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING									
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT									
IMC PROCEDURE : 110 KG (6MIN)									
REF. LANDING WEIGHT = 50000 KG				ISA	FUEL CONSUMED (KG)				
NORMAL AIR CONDITIONING				CG = 33.0 %	TIME (H.MIN)				
ANTI-ICING OFF					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)				
AIR DIST. (NM)	FLIGHT LEVEL								
	290	310	330	350	370	390			
2075	12174 4.42	11448 4.45	10908 4.47	10474 4.49	10103 4.50	9871 4.50	49	87	126
2100	12318 4.46	11584 4.48	11038 4.50	10598 4.52	10222 4.54	9989 4.54	49	88	128
2125	12462 4.49	11720 4.51	11168 4.53	10723 4.56	10341 4.57	10108 4.57	50	89	129
2150	12605 4.52	11856 4.54	11298 4.57	10847 4.59	10461 5.00	10227 5.00	51	91	131
2175	12749 4.56	11992 4.58	11428 5.00	10972 5.02	10580 5.04	10345 5.04	52	92	133
2200	12893 4.59	12128 5.01	11558 5.03	11097 5.06	10700 5.07	10465 5.07	53	93	135
2225	13037 5.02	12265 5.04	11689 5.07	11222 5.09	10820 5.10	10584 5.10	53	94	137
2250	13181 5.05	12401 5.08	11819 5.10	11347 5.12	10940 5.14	10704 5.14	54	95	139
2275	13325 5.09	12538 5.11	11950 5.13	11473 5.16	11060 5.17	10823 5.17	55	97	141
2300	13469 5.12	12675 5.14	12081 5.17	11598 5.19	11180 5.20	10943 5.20	56	98	143
2325	13614 5.15	12811 5.17	12212 5.20	11724 5.22	11301 5.24	11064 5.24	57	99	144
2350	13758 5.18	12948 5.21	12343 5.23	11849 5.26	11422 5.27	11184 5.27	58	100	146
2375	13902 5.22	13085 5.24	12474 5.27	11975 5.29	11543 5.31	11305 5.31	59	101	148
2400	14047 5.25	13222 5.27	12606 5.30	12101 5.32	11665 5.34	11427 5.34	60	103	150
2425	14191 5.28	13359 5.31	12737 5.33	12227 5.36	11786 5.37	11550 5.37	60	104	152
2450	14336 5.31	13496 5.34	12869 5.36	12354 5.39	11908 5.41	11673 5.41	61	105	154
2475	14480 5.35	13634 5.37	13000 5.40	12480 5.42	12029 5.44	11796 5.44	62	106	156
2500	14625 5.38	13771 5.40	13132 5.43	12607 5.46	12151 5.47	11920 5.47	63	108	158
2525	14770 5.41	13909 5.44	13264 5.46	12733 5.49	12273 5.51	12044 5.51	64	109	160
2550	14914 5.44	14046 5.47	13396 5.50	12860 5.53	12395 5.54	12168 5.54	65	110	162
2575	15059 5.48	14184 5.50	13529 5.53	12987 5.56	12518 5.57	12293 5.57	66	111	164
2600	15204 5.51	14322 5.54	13661 5.56	13114 5.59	12640 6.01	12418 6.01	67	113	166
2625	15349 5.54	14460 5.57	13794 6.00	13242 6.03	12763 6.04	12543 6.04	68	114	168
2650	15494 5.57	14598 6.00	13926 6.03	13369 6.06	12885 6.07	12668 6.07	69	115	171
2675	15639 6.01	14737 6.03	14059 6.06	13496 6.09	13008 6.11	12794 6.11	70	117	173
2700	15784 6.04	14875 6.07	14192 6.10	13624 6.13	13131 6.14	12920 6.14	71	118	175
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4 \%$			$\Delta FUEL = + 3 \%$			$\Delta FUEL = + 5.5 \%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350
1450	8794 3.22	8379 3.23	8063 3.25	7792 3.26	7569 3.27	7563 3.27	46	67
1475	8940 3.25	8518 3.26	8196 3.28	7919 3.29	7693 3.30	7689 3.30	47	68
1500	9085 3.28	8657 3.30	8328 3.31	8046 3.33	7816 3.34	7814 3.34	48	69
1525	9231 3.32	8795 3.33	8461 3.35	8174 3.36	7939 3.37	7940 3.37	49	71
1550	9377 3.35	8934 3.36	8594 3.38	8301 3.39	8063 3.40	8067 3.40	50	72
1575	9523 3.38	9073 3.40	8727 3.41	8429 3.43	8187 3.44	8193 3.44	50	73
1600	9669 3.41	9213 3.43	8861 3.45	8557 3.46	8311 3.47	8320 3.47	51	74
1625	9815 3.45	9352 3.46	8994 3.48	8685 3.50	8435 3.50	8447 3.50	52	75
1650	9962 3.48	9492 3.49	9128 3.51	8813 3.53	8559 3.54	8575 3.54	53	76
1675	10108 3.51	9631 3.53	9261 3.54	8941 3.56	8683 3.57	8703 3.57	54	78
1700	10255 3.54	9771 3.56	9395 3.58	9069 4.00	8808 4.01	8831 4.01	55	79
1725	10401 3.58	9911 3.59	9530 4.01	9198 4.03	8933 4.04	8959 4.04	56	80
1750	10548 4.01	10051 4.03	9664 4.04	9326 4.06	9058 4.07	9087 4.07	57	81
1775	10695 4.04	10191 4.06	9798 4.08	9455 4.10	9183 4.11	9216 4.11	58	82
1800	10842 4.07	10332 4.09	9933 4.11	9584 4.13	9309 4.14	9345 4.14	59	84
1825	10988 4.11	10472 4.12	10068 4.14	9713 4.16	9436 4.17	9475 4.17	60	85
1850	11135 4.14	10613 4.16	10203 4.18	9842 4.20	9563 4.21	9605 4.21	61	86
1875	11282 4.17	10754 4.19	10338 4.21	9972 4.23	9691 4.24	9747 4.24*	62	87
1900	11430 4.20	10895 4.22	10473 4.24	10101 4.26	9819 4.27	9877 4.27*	63	89
1925	11577 4.24	11036 4.26	10608 4.28	10231 4.30	9948 4.31	10006 4.31*	64	90
1950	11724 4.27	11177 4.29	10744 4.31	10361 4.33	10076 4.34	10136 4.34*	65	91
1975	11872 4.30	11318 4.32	10879 4.34	10491 4.36	10205 4.37	10266 4.38*	66	93
2000	12019 4.33	11460 4.35	11015 4.38	10621 4.40	10334 4.41	10396 4.41*	67	94
2025	12167 4.37	11601 4.39	11151 4.41	10751 4.43	10464 4.44	10526 4.44*	68	95
2050	12314 4.40	11743 4.42	11287 4.44	10881 4.46	10593 4.48	10657 4.48*	70	97
2075	12462 4.43	11885 4.45	11424 4.48	11012 4.50	10723 4.51	10787 4.51*	71	98
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.4\%$		$\Delta FUEL = + 3\%$			$\Delta FUEL = + 5.5\%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING									
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT									
IMC PROCEDURE : 120 KG (6MIN)									
REF. LANDING WEIGHT = 55000 KG				ISA	FUEL CONSUMED (KG)				
NORMAL AIR CONDITIONING				CG = 33.0 %	TIME (H.MIN)				
ANTI-ICING OFF					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)				
AIR DIST. (NM)	FLIGHT LEVEL								
	290	310	330	350	370	390			
2075	12462 4.43	11885 4.45	11424 4.48	11012 4.50	10723 4.51	10787 4.51*	71	98	155
2100	12610 4.47	12027 4.49	11560 4.51	11143 4.53	10853 4.54	10918 4.54*	72	99	157
2125	12758 4.50	12169 4.52	11696 4.54	11273 4.56	10983 4.58	11049 4.58*	73	101	160
2150	12906 4.53	12311 4.55	11833 4.57	11404 5.00	11114 5.01	11180 5.01*	74	102	162
2175	13054 4.56	12453 4.59	11970 5.01	11535 5.03	11245 5.04	11311 5.04*	75	103	165
2200	13202 5.00	12596 5.02	12107 5.04	11667 5.06	11376 5.08	11442 5.08*	76	105	167
2225	13351 5.03	12739 5.05	12244 5.07	11798 5.10	11507 5.11	11574 5.11*	77	106	169
2250	13499 5.06	12881 5.08	12381 5.11	11929 5.13	11639 5.14	11705 5.14*	79	107	171
2275	13647 5.09	13024 5.12	12519 5.14	12061 5.16	11770 5.18	11837 5.18*	80	109	173
2300	13796 5.13	13168 5.15	12657 5.17	12193 5.20	11902 5.21	11970 5.21*	81	110	175
2325	13945 5.16	13311 5.18	12794 5.21	12325 5.23	12035 5.25	12102 5.24*	82	112	178
2350	14093 5.19	13454 5.22	12932 5.24	12457 5.26	12167 5.28	12235 5.28*	83	113	180
2375	14242 5.22	13598 5.25	13071 5.27	12589 5.30	12300 5.31	12367 5.31*	84	115	182
2400	14391 5.26	13741 5.28	13209 5.31	12722 5.33	12433 5.35	12501 5.34*	86	116	184
2425	14540 5.29	13885 5.31	13347 5.34	12854 5.37	12567 5.38	12634 5.38*	87	117	187
2450	14691 5.32	14029 5.35	13486 5.37	12987 5.40	12701 5.41	12768 5.41*	88	119	189
2475	14842 5.35	14173 5.38	13625 5.41	13120 5.43	12835 5.45	12901 5.44*	89	120	191
2500	14993 5.39	14317 5.41	13764 5.44	13253 5.47	12969 5.48	13035 5.48*	90	122	193
2525	15144 5.42	14462 5.45	13903 5.47	13387 5.50	13104 5.51	13170 5.51*	92	123	196
2550	15295 5.45	14606 5.48	14042 5.51	13520 5.53	13239 5.55	13304 5.54*	93	125	198
2575	15446 5.48	14751 5.51	14181 5.54	13654 5.57	13374 5.58	13439 5.58*	94	126	200
2600	15598 5.52	14896 5.54	14321 5.57	13787 6.00	13510 6.01	13574 6.01*	95	128	202
2625	15750 5.55	15041 5.58	14461 6.01	13921 6.03	13645 6.05	13709 6.04*	96	129	205
2650	15901 5.58	15186 6.01	14600 6.04	14055 6.07	13781 6.08	13844 6.08*	97	131	207
2675	16053 6.01	15332 6.04	14740 6.07	14189 6.10	13918 6.12	13980 6.11*	99	132	209
2700	16205 6.05	15478 6.08	14880 6.10	14324 6.13	14054 6.15	14115 6.15*	100	134	211
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = -0.4\%$			$\Delta FUEL = +3\%$			$\Delta FUEL = +5.5\%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6 MIN)

AIR DIST. (NM)	FLIGHT LEVEL						FUEL CONSUMED (KG)		
							TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450 3.22	8840 3.23	8416 3.23	8055 3.25	7753 3.26	7546 3.27	7476 3.27	50	68	105
1475 3.25	8988 3.27	8556 3.27	8188 3.28	7880 3.30	7670 3.30	7600 3.30	51	69	107
1500 3.29	9136 3.30	8696 3.30	8321 3.32	8007 3.33	7794 3.34	7724 3.34	52	71	109
1525 3.32	9284 3.33	8836 3.35	8454 3.35	8135 3.36	7918 3.37	7849 3.37	53	72	110
1550 3.35	9433 3.37	8977 3.38	8587 3.38	8263 3.40	8042 3.41	7974 3.41	54	73	112
1575 3.38	9581 3.40	9117 3.41	8721 3.41	8390 3.43	8167 3.44	8099 3.44	55	74	114
1600 3.42	9729 3.43	9258 3.43	8855 3.45	8518 3.46	8292 3.47	8224 3.47	56	76	117
1625 3.45	9878 3.47	9399 3.48	8988 3.48	8646 3.50	8416 3.51	8350 3.51	56	77	119
1650 3.48	10027 3.50	9539 3.51	9122 3.51	8775 3.53	8541 3.54	8476 3.54	57	78	121
1675 3.51	10175 3.53	9680 3.55	9257 3.55	8903 3.56	8667 3.57	8602 3.57	58	79	123
1700 3.55	10324 3.56	9821 3.58	9391 3.58	9032 4.00	8792 4.01	8729 4.01	59	81	126
1725 3.58	10473 4.00	9963 4.01	9525 4.01	9160 4.03	8918 4.04	8855 4.04	60	82	128
1750 4.01	10622 4.03	10104 4.05	9660 4.05	9289 4.06	9044 4.07	8983 4.07	61	83	130
1775 4.05	10771 4.06	10245 4.08	9794 4.08	9418 4.10	9170 4.11	9110 4.11	62	85	132
1800 4.08	10921 4.10	10387 4.11	9929 4.11	9548 4.13	9296 4.14	9238 4.14	63	86	135
1825 4.11	11070 4.13	10529 4.13	10064 4.15	9677 4.17	9423 4.18	9366 4.18	64	87	137
1850 4.14	11220 4.16	10670 4.18	10199 4.18	9806 4.20	9550 4.21	9495 4.21	65	88	139
1875 4.18	11370 4.19	10812 4.21	10334 4.21	9936 4.23	9677 4.24	9624 4.24	66	90	142
1900 4.21	11520 4.23	10954 4.23	10470 4.25	10066 4.27	9804 4.28	9753 4.28	67	91	144
1925 4.24	11670 4.26	11096 4.26	10605 4.28	10196 4.30	9931 4.31	9882 4.31	68	93	146
1950 4.27	11820 4.29	11239 4.29	10741 4.31	10326 4.33	10059 4.34	10012 4.34	65	94	148
1975 4.31	11970 4.33	11381 4.33	10876 4.35	10456 4.37	10187 4.38	10142 4.38	66	95	151
2000 4.34	12121 4.36	11523 4.36	11012 4.38	10587 4.40	10314 4.41	10272 4.41	67	97	153
2025 4.37	12271 4.39	11666 4.41	11148 4.45	10717 4.47	10443 4.48	10403 4.48	68	98	155
2050 4.40	12422 4.42	11809 4.42	11284 4.45	10848 4.47	10571 4.48	10534 4.48	66	99	158
2075 4.44	12573 4.46	11952 4.48	11421 4.50	10979 4.50	10700 4.51	10671 4.51	67	101	160
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3.5 %				+ 7 %			

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FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 110 KG (6 MIN)						FUEL CONSUMED (KG)			
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2075	12573 4.44	11952 4.46	11421 4.48	10979 4.50	10700 4.51	10671 4.51	67	101	160
2100	12724 4.47	12095 4.49	11557 4.51	11110 4.53	10829 4.55	10803 4.55	68	102	162
2125	12874 4.50	12238 4.52	11694 4.54	11241 4.57	10958 4.58	10934 4.58	69	104	165
2150	13026 4.53	12381 4.56	11830 4.58	11373 5.00	11087 5.01	11066 5.01	70	101	167
2175	13177 4.57	12524 4.59	11967 5.01	11505 5.03	11217 5.05	11197 5.05	71	103	154
2200	13328 5.00	12668 5.02	12104 5.04	11637 5.07	11346 5.08	11329 5.08	71	104	156
2225	13480 5.03	12811 5.05	12242 5.08	11769 5.10	11476 5.11	11461 5.11	72	99	159
2250	13631 5.07	12955 5.09	12379 5.11	11902 5.13	11607 5.15	11594 5.15	73	100	161
2275	13783 5.10	13099 5.12	12516 5.14	12034 5.17	11738 5.18	11726 5.18	74	101	163
2300	13935 5.13	13243 5.15	12654 5.18	12167 5.20	11869 5.21	11859 5.21	75	103	166
2325	14087 5.16	13387 5.19	12792 5.21	12300 5.23	12000 5.25	11992 5.25	76	104	168
2350	14240 5.20	13531 5.22	12929 5.24	12433 5.27	12132 5.28	12125 5.28	77	105	170
2375	14392 5.23	13676 5.25	13068 5.28	12566 5.30	12264 5.31	12259 5.31	78	107	173
2400	14545 5.26	13820 5.29	13206 5.31	12700 5.33	12396 5.35	12392 5.35	79	108	175
2425	14697 5.29	13965 5.32	13344 5.34	12833 5.37	12528 5.38	12526 5.38	80	109	177
2450	14850 5.33	14110 5.35	13483 5.38	12967 5.40	12660 5.42	12660 5.41	81	111	180
2475	15003 5.36	14255 5.38	13621 5.41	13101 5.44	12793 5.45	12794 5.45	82	112	182
2500	15156 5.39	14400 5.42	13760 5.44	13235 5.47	12926 5.48	12928 5.48	83	113	184
2525	15310 5.42	14546 5.45	13899 5.48	13370 5.50	13059 5.52	13063 5.51	84	115	187
2550	15463 5.46	14692 5.48	14038 5.51	13504 5.54	13193 5.55	13198 5.55	85	116	189
2575	15616 5.49	14837 5.52	14177 5.54	13639 5.57	13327 5.58	13333 5.58	86	118	192
2600	15770 5.52	14983 5.55	14317 5.58	13774 6.00	13461 6.02	13468 6.02	87	119	194
2625	15924 5.55	15129 5.58	14457 6.01	13909 6.04	13571 6.05	13604 6.05	88	120	194
2650	16077 5.59	15275 6.01	14596 6.04	14044 6.07	13711 6.09	13740 6.08	89	122	197
2675	16231 6.02	15422 6.05	14736 6.07	14180 6.10	13850 6.12	13876 6.12	90	123	200
2700	16386 6.05	15568 6.08	14876 6.11	14316 6.14	13990 6.15	14012 6.15	91	125	203
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3.5 %				+ 7 %			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
							FL290 FL310	FL330 FL350	FL370 FL390
2700	15784 6.04	14875 6.07	14192 6.10	13624 6.13	13131 6.14	12920 6.14	71	118	175
2725	15929 6.07	15013 6.10	14325 6.13	13752 6.16	13254 6.18	13046 6.18	72	119	177
2750	16075 6.10	15152 6.13	14458 6.16	13880 6.19	13378 6.21	13172 6.21	73	120	179
2775	16220 6.14	15291 6.17	14592 6.20	14008 6.23	13501 6.24	13299 6.24	74	122	181
2800	16365 6.17	15429 6.20	14725 6.23	14136 6.26	13625 6.28	13426 6.28	75	123	184
2825	16510 6.20	15568 6.23	14859 6.26	14265 6.29	13749 6.31	13553 6.31	76	124	186
2850	16656 6.23	15707 6.26	14993 6.30	14393 6.33	13873 6.34	13681 6.34	77	126	188
2875	16801 6.27	15846 6.30	15127 6.33	14522 6.36	13997 6.38	13809 6.38	78	127	190
2900	16947 6.30	15985 6.33	15261 6.36	14651 6.39	14121 6.41	13937 6.41	79	129	193
2925	17092 6.33	16125 6.36	15395 6.39	14780 6.43	14245 6.44	14066 6.44	80	130	195
2950	17239 6.37	16264 6.40	15530 6.43	14910 6.46	14370 6.48	14194 6.48	81	131	197
2975	17386 6.40	16403 6.43	15664 6.46	15039 6.49	14495 6.51	14324 6.51	82	133	200
3000	17533 6.43	16543 6.46	15799 6.49	15169 6.53	14620 6.55	14453 6.55	83	134	202
3025	17680 6.46	16682 6.49	15934 6.53	15298 6.56	14745 6.58	14583 6.58	84	135	204
3050	17827 6.50	16822 6.53	16068 6.56	15428 6.59	14871 7.01	14714 7.01	85	137	207
3075	17975 6.53	16962 6.56	16204 6.59	15558 7.03	14996 7.05	14862 7.05*	86	138	209
3100	18122 6.56	17102 6.59	16339 7.03	15688 7.06	15122 7.08	14991 7.08*	87	139	211
LOW AIR CONDITIONING		ENGINE ANTI ICE ON		TOTAL ANTI ICE ON					
Δ FUEL = - 0,4 %		Δ FUEL = + 3 %		Δ FUEL = + 5,5 %					

FLIP23A A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-NO-02-05-40-007-130

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
200	1495 0.40	1498 0.40	1500 0.39	1503 0.39	1508 0.38		14	15	15
225	1616 0.44	1615 0.43	1613 0.43	1612 0.42	1615 0.42	1619 0.42	15	16	17
250	1737 0.48	1731 0.47	1726 0.46	1722 0.46	1723 0.45	1725 0.45	17	18	18
275	1858 0.52	1849 0.51	1839 0.50	1832 0.50	1830 0.49	1831 0.48	18	19	20
300	1980 0.56	1966 0.55	1952 0.54	1942 0.53	1938 0.52	1937 0.52	19	20	22
325	2101 1.00	2083 0.59	2065 0.58	2052 0.57	2046 0.56	2044 0.55	20	22	23
350	2223 1.04	2201 1.03	2179 1.01	2162 1.00	2154 0.99	2150 0.99	22	23	25
375	2344 1.08	2319 1.07	2293 1.05	2272 1.04	2262 1.03	2257 1.02	23	24	26
400	2466 1.12	2436 1.11	2406 1.09	2383 1.08	2370 1.06	2364 1.05	24	26	28
425	2588 1.16	2555 1.15	2520 1.13	2494 1.11	2479 1.10	2471 1.09	25	27	30
450	2711 1.20	2673 1.18	2635 1.16	2604 1.15	2588 1.13	2579 1.12	27	29	31
475	2833 1.24	2791 1.22	2749 1.20	2716 1.18	2697 1.17	2686 1.15	28	30	33
500	2955 1.28	2910 1.26	2863 1.24	2827 1.22	2806 1.20	2793 1.19	29	31	35
525	3078 1.32	3028 1.30	2978 1.27	2938 1.26	2916 1.24	2901 1.22	31	33	36
550	3201 1.36	3147 1.34	3093 1.31	3050 1.29	3025 1.27	3009 1.25	32	34	38
575	3324 1.40	3266 1.38	3207 1.35	3161 1.33	3135 1.31	3117 1.29	33	36	40
600	3447 1.44	3385 1.41	3322 1.39	3273 1.36	3245 1.34	3225 1.32	34	37	41
625	3570 1.48	3505 1.45	3438 1.42	3385 1.40	3355 1.38	3334 1.35	36	39	43
650	3693 1.52	3624 1.49	3553 1.46	3498 1.43	3465 1.41	3442 1.39	37	40	45
675	3817 1.56	3744 1.53	3668 1.50	3610 1.47	3576 1.45	3551 1.42	38	41	46
700	3941 2.00	3864 1.57	3784 1.53	3723 1.50	3686 1.48	3660 1.45	40	43	48
725	4064 2.04	3984 2.01	3900 1.57	3835 1.54	3797 1.52	3769 1.49	41	44	50
750	4188 2.08	4104 2.04	4015 2.01	3948 1.58	3908 1.55	3878 1.52	42	46	51
775	4313 2.12	4224 2.08	4131 2.04	4061 2.01	4019 1.58	3987 1.55	44	47	53
800	4437 2.16	4345 2.12	4248 2.08	4175 2.05	4131 2.02	4097 1.59	45	49	55
825	4561 2.20	4465 2.16	4364 2.12	4288 2.08	4242 2.05	4206 2.02	46	50	57
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
$\Delta FUEL = - 0.4 \%$		$\Delta FUEL = + 3 \%$			$\Delta FUEL = + 5.5 \%$				

FLIP23C A319-131 IAE V2522-A5 2420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-NO-02-05-40-008-130

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)		TIME (H.MIN)				
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)			
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2700	16205 6.05	15478 6.08	14880 6.10	14324 6.13	14054 6.15	14115 6.15*	100	134	211
2725	16358 6.08	15624 6.11	15020 6.14	14458 6.17	14191 6.18	14251 6.18*	101	135	214
2750	16510 6.11	15770 6.14	15160 6.17	14593 6.20	14328 6.22	14387 6.21*	102	137	216
2775	16662 6.15	15916 6.17	15301 6.20	14727 6.23	14466 6.25	14524 6.25*	104	138	218
2800	16815 6.18	16062 6.21	15441 6.24	14862 6.27	14603 6.28	14660 6.28*	105	140	221
2825	16968 6.21	16209 6.24	15582 6.27	14998 6.30	14741 6.32	14797 6.31*	106	142	223
2850	17121 6.24	16355 6.27	15723 6.30	15134 6.33	14879 6.35	14934 6.35*	107	143	225
2875	17273 6.28	16502 6.31	15864 6.34	15270 6.37	15018 6.38	15071 6.38*	109	145	228
2900	17427 6.31	16649 6.34	16005 6.37	15407 6.40	15157 6.42	15209 6.41*	110	147	230
2925	17580 6.34	16796 6.37	16146 6.40	15543 6.43	15297 6.45	15347 6.45*	111	148	232
2950	17733 6.37	16943 6.40	16288 6.44	15680 6.47	15437 6.49	15485 6.48*	113	150	235
2975	17887 6.41	17091 6.44	16429 6.47	15817 6.50	15578 6.52	15624 6.51*	114	152	237
3000	18040 6.44	17238 6.47	16571 6.50	15954 6.53	15719 6.55	15762 6.55*	115	154	239
3025	18194 6.47	17386 6.50	16713 6.54	16092 6.57	15860 6.59	15901 6.58*	117	155	242
3050	18348 6.50	17534 6.54	16855 6.57	16229 7.00	16001 7.02	16040 7.01*	118	157	244
3075	18502 6.54	17682 6.57	16997 7.00	16367 7.03	16143 7.05	16180 7.05*	119	159	246
3100	18657 6.57	17830 7.00	17140 7.03	16505 7.07	16285 7.09	16319 7.08*	121	161	248
LOW AIR CONDITIONING △FUEL = - 0.4 %		ENGINE ANTI ICE ON △FUEL = + 3 %			TOTAL ANTI ICE ON △FUEL = + 5.5 %				

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-007-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)						
AIR DIST. (NM)	290	310	330	350	370	390	TIME (H.MIN)		
							FL290 FL310	FL330 FL350	FL370 FL390
200	1587 0.40	1591 0.39	1595 0.39	1601 0.39			14	15	
225	1715 0.44	1714 0.43	1715 0.43	1718 0.42	1722 0.42		15	16	17
250	1844 0.48	1838 0.47	1835 0.46	1836 0.46	1838 0.46	1842 0.46	17	18	18
275	1972 0.52	1962 0.51	1956 0.50	1954 0.49	1954 0.49	1957 0.49	18	19	20
300	2101 0.55	2086 0.54	2076 0.54	2072 0.53	2071 0.52	2072 0.52	19	21	22
325	2229 0.59	2211 0.58	2197 0.57	2190 0.56	2187 0.56	2187 0.56	21	22	24
350	2358 1.03	2335 1.02	2318 1.01	2309 1.00	2304 0.99	2303 0.99	22	24	25
375	2488 1.07	2460 1.05	2439 1.04	2427 1.03	2420 1.03	2419 1.02	23	25	27
400	2617 1.11	2584 1.09	2560 1.08	2546 1.07	2537 1.06	2535 1.06	24	27	29
425	2746 1.15	2709 1.13	2682 1.11	2665 1.10	2654 1.09	2651 1.09	26	28	31
450	2876 1.18	2834 1.16	2804 1.15	2784 1.14	2772 1.13	2768 1.12	27	30	33
475	3006 1.22	2960 1.20	2925 1.18	2904 1.17	2889 1.16	2885 1.16	28	31	34
500	3136 1.26	3085 1.24	3047 1.22	3023 1.21	3007 1.19	3002 1.19	30	33	36
525	3266 1.30	3210 1.27	3170 1.26	3143 1.24	3125 1.23	3119 1.22	31	34	38
550	3396 1.34	3336 1.31	3292 1.29	3263 1.28	3242 1.26	3236 1.26	32	36	40
575	3527 1.37	3462 1.35	3415 1.33	3383 1.31	3361 1.29	3354 1.29	34	38	42
600	3657 1.41	3588 1.38	3537 1.36	3504 1.35	3479 1.33	3472 1.32	35	39	44
625	3788 1.45	3714 1.42	3660 1.40	3624 1.38	3598 1.36	3590 1.36	36	41	46
650	3919 1.49	3840 1.46	3783 1.43	3745 1.41	3716 1.39	3708 1.39	38	42	47
675	4050 1.52	3967 1.49	3906 1.47	3866 1.45	3835 1.43	3827 1.42	39	44	49
700	4181 1.56	4093 1.53	4029 1.50	3987 1.48	3954 1.46	3946 1.46	40	45	51
725	4312 2.00	4220 1.57	4153 1.54	4108 1.52	4073 1.49	4065 1.49	42	47	53
750	4444 2.04	4347 2.00	4276 1.57	4230 1.55	4193 1.53	4184 1.52	43	49	56
775	4576 2.07	4474 2.04	4400 2.01	4351 1.59	4312 1.56	4304 1.56	44	50	57
800	4707 2.11	4601 2.08	4524 2.04	4473 2.02	4432 1.59	4424 1.59	46	52	59
825	4840 2.15	4729 2.11	4648 2.08	4596 2.06	4552 2.03	4544 2.02	47	53	61
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
$\Delta FUEL = - 0.3 \%$		$\Delta FUEL = + 2 \%$			$\Delta FUEL = + 5 \%$				

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FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6 MIN)

AIR DIST. (NM)	FLIGHT LEVEL						FUEL CONSUMED (KG)		
	290	310	330	350	370	390	ISA CG=33.0%	TIME (H.MIN)	
2700	16386 6.05	15568 6.08	14876 6.11	14316 6.14	13990 6.15	14012 6.15	91	125	203
2725	16540 6.09	15715 6.11	15017 6.14	14452 6.17	14129 6.19	14148 6.18	92	126	206
2750	16694 6.12	15861 6.15	15157 6.17	14589 6.20	14269 6.22	14285 6.22	93	128	208
2775	16849 6.15	16008 6.18	15298 6.21	14725 6.24	14409 6.25	14422 6.25	94	129	211
2800	17004 6.18	16155 6.21	15438 6.24	14862 6.27	14550 6.29	14559 6.28	95	130	214
2825	17159 6.22	16302 6.24	15579 6.27	14999 6.30	14690 6.32	14696 6.32	96	132	217
2850		16449 6.28	15720 6.31	15136 6.34	14831 6.35	14834 6.35	105	133	220
2875		16597 6.31	15862 6.34	15274 6.37	14972 6.39	14972 6.38	106	135	223
2900		16745 6.34	16003 6.37	15411 6.40	15113 6.42	15110 6.42	107	137	225
2925		16893 6.38	16144 6.41	15549 6.44	15254 6.45	15248 6.45	108	138	228
2950		17041 6.41	16286 6.44	15687 6.47	15395 6.49	15387 6.48	109	140	231
2975		17189 6.44	16428 6.47	15825 6.50	15537 6.52	15525 6.52	111	141	234
3000			16570 6.51	15964 6.54	15679 6.55	15664 6.55		143	236
3025			16712 6.54	16102 6.57	15821 6.58	15804 6.58		144	239
3050			16855 6.57	16241 7.00	15963 7.02	15943 7.02		146	242
3075			16998 7.01	16380 7.04	16105 7.05	16083 7.05		147	245
3100			17141 7.04	16519 7.07	16248 7.08	16223 7.08		149	248
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3.5 %				+ 7 %			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 110 KG (6 MIN)						FUEL CONSUMED (KG)			
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290	FL330	FL370
	FL310	FL350	FL390	FL290	FL330	FL370	FL310	FL350	FL390
200	1543 0.40	1554 0.39					16		
225	1669 0.44	1676 0.43	1682 0.43				17	18	
250	1795 0.48	1798 0.47	1802 0.46	1806 0.46	1812 0.46		19	20	20
275	1921 0.52	1921 0.51	1921 0.50	1923 0.50	1926 0.49	1933 0.49	20	21	22
300	2047 0.56	2044 0.55	2040 0.54	2039 0.53	2041 0.53	2046 0.53	22	23	24
325	2174 1.00	2167 0.59	2160 0.58	2156 0.57	2156 0.56	2159 0.56	23	25	26
350	2301 1.04	2290 1.02	2279 1.01	2273 1.00	2271 0.59	2272 0.59	25	26	27
375	2428 1.08	2413 1.06	2399 1.05	2391 1.04	2386 1.03	2386 1.03	27	28	29
400	2555 1.11	2536 1.10	2520 1.09	2508 1.07	2501 1.06	2499 1.06	28	29	31
425	2683 1.15	2660 1.14	2640 1.13	2626 1.11	2617 1.10	2613 1.09	30	31	33
450	2811 1.19	2784 1.18	2761 1.16	2744 1.14	2733 1.13	2727 1.13	31	33	35
475	2938 1.23	2908 1.22	2881 1.20	2862 1.18	2849 1.17	2842 1.16	33	34	37
500	3066 1.27	3032 1.25	3002 1.24	2980 1.21	2965 1.20	2956 1.19	34	36	38
525	3194 1.31	3157 1.29	3123 1.28	3099 1.25	3081 1.23	3071 1.23	36	38	40
550	3323 1.35	3281 1.33	3245 1.31	3218 1.28	3197 1.27	3186 1.26	37	39	42
575	3451 1.39	3406 1.37	3366 1.35	3337 1.32	3314 1.30	3301 1.30	39	41	44
600	3580 1.43	3531 1.41	3488 1.39	3456 1.35	3430 1.34	3416 1.33	41	43	46
625	3709 1.47	3656 1.44	3609 1.42	3575 1.39	3547 1.37	3532 1.36	42	44	48
650	3838 1.51	3781 1.48	3731 1.46	3695 1.42	3664 1.40	3648 1.40	44	46	50
675	3967 1.54	3906 1.52	3854 1.50	3814 1.46	3782 1.44	3764 1.43	45	48	52
700	4097 1.58	4032 1.56	3976 1.54	3935 1.49	3899 1.47	3880 1.46	47	49	54
725	4226 2.02	4158 2.00	4099 1.57	4055 1.52	4017 1.51	3997 1.50	48	51	56
750	4356 2.06	4284 2.03	4221 2.01	4175 1.56	4135 1.54	4114 1.53	50	53	58
775	4486 2.10	4410 2.07	4344 2.05	4296 1.59	4253 1.57	4231 1.56	52	54	59
800	4617 2.14	4536 2.11	4468 2.08	4417 2.03	4371 2.01	4348 2.00	53	56	61
825	4747 2.18	4663 2.15	4591 2.12	4538 2.08	4490 2.04	4465 2.03	55	58	63
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3 %				+ 6 %			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
							FL290 FL310	FL330 FL350	FL370 FL390
825 2.20	4561 2.16	4465 2.16	4364 2.12	4288 2.08	4242 2.05	4206 2.02	46	50	57
850 2.24	4686 2.20	4586 2.20	4480 2.15	4401 2.12	4354 2.09	4316 2.05	47	52	58
875 2.28	4811 2.23	4707 2.23	4597 2.19	4515 2.15	4466 2.12	4426 2.09	49	53	60
900 2.32	4936 2.27	4828 2.23	4714 2.23	4629 2.19	4578 2.16	4536 2.12	50	55	62
925 2.36	5061 2.31	4949 2.26	4831 2.22	4743 2.19	4691 2.16	4647 2.15	51	56	64
950 2.40	5187 2.35	5071 2.30	4948 2.26	4858 2.23	4803 2.23	4757 2.19	53	58	65
975 2.44	5312 2.38	5192 2.34	5065 2.34	4972 2.29	4916 2.26	4868 2.22	54	59	67
1000 2.48	5438 2.42	5314 2.37	5183 2.33	5087 2.33	5029 2.29	4979 2.25	55	61	69
1025 2.52	5564 2.46	5435 2.41	5300 2.41	5201 2.36	5142 2.33	5090 2.29	57	62	71
1050 2.56	5691 2.50	5557 2.45	5418 2.45	5316 2.40	5255 2.36	5202 2.32	58	64	72
1075 3.00	5817 2.53	5679 2.48	5536 2.43	5431 2.43	5369 2.40	5313 2.35	59	65	74
1100 3.04	5944 2.57	5802 2.52	5654 2.52	5547 2.47	5482 2.43	5425 2.39	61	67	76
1125 3.08	6070 3.01	5924 2.56	5773 2.56	5662 2.50	5596 2.46	5537 2.42	62	68	78
1150 3.11	6197 3.05	6047 2.59	5891 2.54	5778 2.50	5710 2.50	5650 2.45	64	70	80
1175 3.15	6324 3.08	6169 3.03	6010 2.57	5894 2.57	5824 2.53	5762 2.49	65	71	81
1200 3.19	6452 3.12	6292 3.06	6129 3.01	6009 2.96	5938 2.56	5875 2.52	66	73	83
1225 3.23	6579 3.16	6415 3.10	6247 3.04	6126 3.00	6053 2.95	5988 2.55	68	75	85
1250 3.27	6707 3.19	6538 3.14	6367 3.08	6242 3.03	6168 2.93	6101 2.59	69	76	87
1275 3.31	6835 3.23	6662 3.17	6486 3.11	6358 3.07	6282 3.02	6214 3.02	70	78	89
1300 3.35	6963 3.27	6785 3.21	6605 3.15	6475 3.10	6397 3.10	6328 3.05	72	79	91
1325 3.39	7091 3.30	6909 3.24	6725 3.18	6592 3.13	6513 3.13	6441 3.09	73	81	93
1350 3.43	7219 3.34	7032 3.28	6845 3.22	6709 3.17	6628 3.12	6555 3.12	74	82	94
1375 3.46	7348 3.38	7156 3.32	6985 3.25	6826 3.20	6744 3.15	6669 3.15	76	84	96
1400 3.50	7477 3.41	7281 3.35	7085 3.29	6943 3.23	6860 3.23	6784 3.19	77	86	98
1425 3.54	7605 3.45	7405 3.39	7205 3.32	7061 3.27	6976 3.22	6898 3.22	79	87	100
1450 3.58	7735 3.49	7529 3.42	7325 3.36	7178 3.30	7092 3.25	7013 3.25	80	89	102
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
$\Delta FUEL = - 0.4 \%$		$\Delta FUEL = + 3 \%$			$\Delta FUEL = + 5.5 \%$				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450	7735 3.58	7529 3.49	7325 3.42	7178 3.36	7092 3.30	7013 3.25	80	89	102
1475	7864 4.02	7654 3.52	7446 3.46	7296 3.39	7208 3.33	7128 3.29	81	90	104
1500	7993 4.06	7779 3.56	7567 3.50	7414 3.43	7325 3.37	7243 3.32	83	92	106
1525	8123 4.10	7904 4.00	7688 3.53	7533 3.46	7441 3.40	7358 3.35	84	94	108
1550	8253 4.13	8029 4.03	7809 3.57	7651 3.50	7558 3.43	7473 3.39	86	95	110
1575	8383 4.17	8154 4.07	7930 4.00	7770 3.53	7676 3.47	7589 3.42	87	97	112
1600	8513 4.21	8279 4.11	8052 4.04	7888 3.57	7793 3.50	7705 3.45	89	99	114
1625	8644 4.25	8405 4.14	8173 4.07	8007 4.00	7911 3.53	7821 3.49	90	100	115
1650	8774 4.29	8531 4.18	8295 4.11	8127 4.04	8028 3.57	7937 3.52	91	102	117
1675	8905 4.33	8657 4.21	8417 4.14	8246 4.07	8146 4.00	8054 3.55	93	103	119
1700	9036 4.36	8783 4.25	8539 4.18	8366 4.10	8265 4.03	8171 3.59	94	105	121
1725	9168 4.40	8910 4.29	8662 4.22	8485 4.14	8383 4.06	8288 4.02	96	107	123
1750	9299 4.44	9036 4.32	8784 4.25	8605 4.17	8502 4.10	8405 4.05	97	108	125
1775	9431 4.48	9163 4.36	8907 4.29	8726 4.21	8621 4.13	8523 4.09	99	110	127
1800	9563 4.52	9290 4.39	9030 4.32	8846 4.24	8740 4.16	8640 4.12	100	112	129
1825	9695 4.55	9417 4.43	9153 4.36	8967 4.28	8859 4.20	8758 4.15	101	113	131
1850	9827 4.59	9544 4.47	9277 4.39	9087 4.31	8979 4.23	8877 4.19	103	115	134
1875	9959 5.03	9671 4.50	9400 4.43	9208 4.35	9099 4.26	8995 4.22	104	117	136
1900	10092 5.07	9799 4.54	9524 4.46	9329 4.38	9219 4.29	9114 4.25	106	119	138
1925	10225 5.11	9927 4.57	9647 4.50	9451 4.42	9339 4.33	9232 4.29	107	120	140
1950	10358 5.14	10054 5.01	9772 4.53	9572 4.45	9459 4.36	9352 4.32	109	122	142
1975	10491 5.18	10183 5.04	9896 4.57	9694 4.48	9580 4.39	9471 4.35	110	124	144
2000	10624 5.22	10311 5.08	10020 5.00	9816 4.52	9701 4.42	9590 4.39	112	126	146
2025	10758 5.26	10439 5.11	10145 5.04	9938 4.55	9822 4.46	9710 4.42	113	127	148
2050	10892 5.30	10568 5.15	10269 5.07	10061 4.59	9943 4.49	9830 4.45	115	129	150
2075	11025 5.33	10697 5.19	10394 5.11	10183 5.02	10065 4.52	9950 4.49	116	131	152
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
$\Delta FUEL = - 0.4 \%$		$\Delta FUEL = + 3 \%$			$\Delta FUEL = + 5.5 \%$				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)		TIME (H.MIN)				
AIR DIST. (NM)	290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
							FL290 FL310	FL330 FL350	FL370 FL390
825 2.15	4840 2.11	4729 2.11	4648 2.08	4596 2.06	4552 2.03	4544 2.02	47	53	61
850 2.19	4972 2.15	4856 2.12	4773 2.09	4718 2.06	4672 2.06	4664 2.06	48	55	63
875 2.22	5104 2.19	4984 2.15	4897 2.15	4840 2.12	4793 2.09	4785 2.09	50	57	65
900 2.26	5237 2.22	5112 2.19	5022 2.16	4963 2.16	4913 2.13	4906 2.12	51	58	67
925 2.30	5370 2.26	5240 2.22	5147 2.19	5086 2.19	5034 2.16	5027 2.16	52	60	69
950 2.33	5502 2.30	5368 2.30	5272 2.26	5209 2.23	5155 2.19	5149 2.19	54	62	71
975 2.37	5635 2.33	5496 2.33	5397 2.29	5332 2.26	5276 2.23	5270 2.22	55	63	73
1000 2.41	5769 2.37	5625 2.33	5522 2.29	5456 2.26	5398 2.26	5392 2.26	56	65	75
1025 2.45	5902 2.40	5754 2.36	5648 2.33	5580 2.33	5519 2.29	5514 2.29	58	66	76
1050 2.48	6036 2.44	5883 2.40	5773 2.36	5704 2.36	5641 2.33	5637 2.32	59	68	78
1075 2.52	6169 2.48	6012 2.43	5899 2.43	5828 2.40	5763 2.36	5759 2.36	60	70	80
1100 2.56	6303 2.51	6141 2.47	6025 2.43	5952 2.43	5885 2.39	5882 2.39	62	71	82
1125 2.59	6438 2.55	6270 2.50	6152 2.50	6077 2.46	6007 2.43	6005 2.42	63	73	84
1150 3.03	6572 2.59	6400 2.54	6278 2.54	6201 2.50	6130 2.46	6129 2.45	64	75	86
1175 3.07	6706 3.02	6529 3.02	6405 2.57	6326 2.53	6252 2.49	6252 2.49	66	76	88
1200 3.10	6841 3.06	6659 3.01	6531 2.56	6451 2.53	6375 2.53	6376 2.52	67	78	90
1225 3.14	6976 3.09	6789 3.04	6658 3.04	6577 3.00	6498 2.56	6500 2.55	68	80	92
1250 3.18	7111 3.13	6919 3.07	6785 3.03	6702 2.59	6621 2.59	6625 2.59	70	81	94
1275 3.21	7246 3.17	7050 3.11	6913 3.11	6828 3.07	6745 3.03	6749 3.02	71	83	96
1300 3.25	7381 3.20	7181 3.14	7040 3.10	6954 3.06	6868 3.05	6874 3.05	73	85	98
1325 3.28	7517 3.24	7311 3.18	7168 3.18	7080 3.13	6992 3.09	7000 3.09	74	87	100
1350 3.32	7653 3.27	7442 3.21	7296 3.21	7207 3.17	7117 3.13	7126 3.12	75	88	102
1375 3.36	7789 3.31	7574 3.25	7424 3.25	7334 3.20	7241 3.16	7252 3.15	77	90	104
1400 3.39	7925 3.35	7705 3.28	7553 3.28	7461 3.23	7366 3.19	7378 3.19	78	92	106
1425 3.43	8061 3.38	7836 3.32	7681 3.27	7588 3.23	7490 3.23	7505 3.22	79	93	108
1450 3.46	8198 3.42	7968 3.35	7810 3.30	7715 3.30	7615 3.26	7632 3.25	81	95	110
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
$\Delta FUEL = - 0.3\%$		$\Delta FUEL = + 2\%$			$\Delta FUEL = + 5\%$				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)			TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450	8198 3.46	7968 3.42	7810 3.35	7715 3.30	7615 3.26	7632 3.25	81	95	110
1475	8335 3.50	8100 3.45	7939 3.39	7843 3.33	7741 3.29	7759 3.29	82	97	112
1500	8471 3.54	8232 3.49	8068 3.42	7971 3.37	7866 3.33	7886 3.32	84	99	114
1525	8608 3.57	8364 3.53	8197 3.46	8099 3.40	7992 3.36	8014 3.35	85	100	116
1550	8746 4.01	8496 3.56	8327 3.49	8227 3.43	8117 3.39	8142 3.39	86	102	118
1575	8883 4.04	8629 4.00	8457 3.52	8356 3.47	8243 3.43	8270 3.42	88	104	120
1600	9020 4.08	8762 4.03	8586 3.56	8485 3.50	8370 3.46	8399 3.45	89	106	122
1625	9157 4.12	8895 4.07	8717 3.59	8613 3.53	8496 3.49	8528 3.49	91	107	125
1650	9295 4.15	9028 4.10	8847 4.03	8743 3.57	8623 3.53	8657 3.52	92	109	127
1675	9432 4.19	9162 4.14	8977 4.06	8872 4.00	8750 3.56	8786 3.55	94	111	129
1700	9570 4.22	9296 4.17	9108 4.10	9002 4.03	8877 3.59	8916 3.59	95	113	131
1725	9708 4.26	9430 4.21	9240 4.13	9132 4.07	9004 4.02	9046 4.02	97	114	133
1750	9846 4.30	9564 4.24	9371 4.16	9261 4.10	9132 4.06	9177 4.05	98	116	135
1775	9985 4.33	9699 4.28	9503 4.20	9391 4.13	9259 4.09	9307 4.09	100	118	137
1800	10123 4.37	9834 4.31	9635 4.23	9520 4.17	9388 4.12	9438 4.12	101	120	140
1825	10262 4.40	9969 4.35	9767 4.27	9650 4.20	9517 4.16	9569 4.15	103	122	142
1850	10401 4.44	10104 4.38	9900 4.30	9780 4.23	9646 4.19	9709 4.19*	104	123	144
1875	10540 4.48	10240 4.42	10033 4.34	9910 4.26	9775 4.22	9839 4.22*	106	125	146
1900	10679 4.51	10376 4.45	10166 4.37	10041 4.30	9905 4.26	9970 4.25*	107	127	148
1925	10818 4.55	10512 4.49	10299 4.40	10172 4.33	10035 4.29	10100 4.29*	109	129	150
1950	10958 4.58	10648 4.52	10433 4.44	10303 4.36	10166 4.32	10231 4.32*	110	130	153
1975	11097 5.02	10784 4.55	10566 4.47	10434 4.40	10296 4.36	10362 4.35*	112	132	155
2000	11237 5.05	10921 4.59	10700 4.50	10565 4.43	10427 4.39	10493 4.39*	114	134	157
2025	11377 5.09	11058 5.02	10835 4.54	10697 4.46	10558 4.42	10624 4.42*	115	136	159
2050	11517 5.12	11195 5.06	10969 4.57	10829 4.49	10689 4.46	10756 4.45*	117	138	161
2075	11658 5.16	11332 5.09	11104 5.01	10961 4.53	10821 4.49	10887 4.49*	118	139	164
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$			$\Delta FUEL = + 2 \%$			$\Delta FUEL = + 5 \%$			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 110 KG (6 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF		ISA CG=33.0%	FUEL CONSUMED (KG)			TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
825 2.18	4747 2.15	4663 2.15	4591 2.12	4538 2.06	4490 2.04	4465 2.03	55	58	63
850 2.22	4878 2.19	4790 2.19	4715 2.16	4659 2.10	4608 2.07	4583 2.06	56	59	65
875 2.25	5009 2.22	4916 2.19	4838 2.19	4781 2.13	4727 2.11	4701 2.10	58	61	67
900 2.29	5140 2.26	5044 2.26	4962 2.23	4903 2.16	4846 2.14	4820 2.13	60	63	69
925 2.33	5271 2.30	5171 2.30	5087 2.27	5025 2.20	4965 2.18	4938 2.16	61	65	71
950 2.37	5403 2.34	5298 2.34	5211 2.30	5147 2.23	5085 2.21	5057 2.20	63	66	74
975 2.41	5534 2.37	5426 2.37	5336 2.34	5270 2.27	5204 2.24	5176 2.23	64	68	76
1000 2.45	5666 2.41	5554 2.38	5460 2.38	5393 2.30	5324 2.28	5295 2.27	66	70	78
1025 2.48	5798 2.45	5682 2.41	5585 2.41	5516 2.33	5444 2.31	5415 2.30	68	71	80
1050 2.52	5931 2.49	5811 2.45	5711 2.45	5639 2.37	5564 2.35	5535 2.33	69	73	82
1075 2.56	6063 2.52	5939 2.49	5836 2.49	5762 2.40	5685 2.38	5655 2.37	71	75	84
1100 3.00	6196 2.56	6068 2.52	5962 2.44	5886 2.41	5805 2.41	5775 2.40	73	76	85
1125 3.04	6329 3.00	6197 2.56	6088 2.47	6009 2.47	5926 2.45	5896 2.43	74	78	87
1150 3.08	6462 3.04	6326 3.00	6214 2.50	6133 2.48	6047 2.47	6017 2.47	76	80	89
1175 3.11	6596 3.07	6456 3.03	6340 2.54	6257 2.54	6168 2.51	6138 2.50	78	82	91
1200 3.15	6729 3.11	6586 3.11	6467 3.07	6381 2.57	6290 2.55	6259 2.53	79	83	93
1225 3.19	6863 3.15	6715 3.10	6594 3.10	6506 3.00	6411 2.58	6380 2.57	81	85	95
1250 3.23	6997 3.18	6846 3.14	6721 3.14	6630 3.04	6533 3.02	6502 3.00	82	87	98
1275 3.27	7131 3.22	6976 3.17	6848 3.17	6755 3.07	6655 3.05	6625 3.03	84	89	100
1300 3.30	7266 3.26	7106 3.21	6976 3.11	6881 3.08	6778 3.07	6747 3.07	86	91	102
1325 3.34	7400 3.30	7237 3.25	7103 3.14	7006 3.14	6900 3.12	6870 3.10	87	92	104
1350 3.38	7535 3.33	7368 3.28	7231 3.17	7132 3.17	7023 3.15	6992 3.13	89	94	106
1375 3.42	7670 3.37	7499 3.32	7359 3.21	7257 3.21	7145 3.18	7116 3.17	91	96	108
1400 3.45	7806 3.41	7630 3.35	7488 3.24	7383 3.24	7268 3.22	7239 3.20	92	98	110
1425 3.49	7941 3.44	7762 3.39	7616 3.27	7510 3.25	7392 3.25	7363 3.23	94	100	112
1450 3.53	8077 3.48	7894 3.42	7745 3.31	7636 3.29	7515 3.29	7487 3.27	96	101	114
CORRECTIONS		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
FUEL		+ 3 %			+ 6 %				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 110 KG (6 MIN)									
REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF			ISA CG=33.0%		FUEL CONSUMED (KG)				
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450 3.53	8077 3.48	7894 3.42	7745 3.42	7636 3.31	7515 3.29	7487 3.27	96	101	114
1475 3.57	8213 3.52	8026 3.46	7874 3.46	7763 3.34	7639 3.32	7611 3.30	97	103	116
1500 4.01	8349 3.55	8158 3.49	8004 3.49	7890 3.37	7763 3.35	7735 3.34	99	105	118
1525 4.04	8485 3.59	8290 3.53	8133 3.53	8017 3.41	7887 3.39	7860 3.37	101	107	120
1550 4.08	8621 4.03	8423 3.56	8263 3.44	8145 3.44	8011 3.42	7986 3.40	102	109	122
1575 4.12	8758 4.06	8555 4.00	8393 4.00	8273 3.47	8136 3.45	8111 3.44	104	110	124
1600 4.16	8895 4.10	8688 4.03	8523 3.51	8401 3.51	8261 3.49	8237 3.47	106	112	127
1625 4.19	9032 4.14	8821 4.07	8653 4.07	8529 3.54	8386 3.52	8363 3.50	108	114	129
1650 4.23	9169 4.17	8954 4.10	8783 4.10	8656 3.57	8511 3.55	8489 3.54	109	116	131
1675 4.27	9306 4.21	9088 4.14	8914 4.14	8784 4.01	8636 3.59	8616 3.57	111	118	133
1700 4.31	9444 4.25	9222 4.17	9045 4.17	8911 4.04	8762 4.02	8742 4.00	113	120	135
1725 4.34	9582 4.28	9356 4.21	9176 4.21	9040 4.07	8888 4.05	8870 4.04	114	121	138
1750 4.38	9720 4.32	9490 4.24	9307 4.24	9168 4.11	9014 4.09	8998 4.07	116	123	140
1775 4.42	9859 4.36	9624 4.28	9439 4.28	9296 4.14	9141 4.12	9126 4.10	118	125	142
1800 4.45	9997 4.39	9759 4.31	9571 4.31	9425 4.18	9268 4.16	9255 4.14	119	127	144
1825 4.49	10136 4.43	9894 4.35	9703 4.35	9554 4.21	9395 4.19	9384 4.17	121	129	147
1850 4.53	10275 4.47	10029 4.38	9835 4.38	9683 4.24	9522 4.22	9513 4.20	123	130	149
1875 4.57	10414 4.50	10164 4.50	9967 4.41	9812 4.28	9649 4.26	9643 4.24	125	132	151
1900 5.00	10554 4.54	10299 4.45	10100 4.45	9942 4.31	9777 4.29	9773 4.27	126	134	153
1925 5.04	10693 5.04	10435 4.57	10233 4.48	10071 4.34	9905 4.32	9903 4.30	128	136	156
1950 5.08	10833 5.01	10571 5.01	10366 4.52	10201 4.38	10033 4.36	10034 4.34	130	138	158
1975 5.11	10973 5.05	10707 5.05	10500 4.55	10332 4.41	10161 4.39	10165 4.37	131	140	160
2000 5.15	11114 5.08	10844 5.08	10633 4.58	10462 4.45	10290 4.42	10296 4.40	133	141	162
2025 5.19	11254 5.12	10980 5.02	10767 4.48	10593 4.51	10419 4.46	10428 4.44	135	143	165
2050 5.22	11395 5.16	11117 5.05	10902 4.51	10723 4.51	10548 4.49	10560 4.47	137	145	167
2075 5.26	11535 5.19	11254 5.08	11036 4.55	10854 4.55	10678 4.52	10701 4.51	139	147	169
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3 %				+ 6 %			

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %	FUEL CONSUMED (KG)		TIME (H.MIN)				
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)			
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2075	11025 5.33	10697 5.19	10394 5.11	10183 5.02	10065 4.52	9950 4.49	116	131	152
2100	11159 5.37	10826 5.22	10519 5.14	10306 5.06	10186 4.55	10071 4.52	118	133	154
2125	11292 5.41	10955 5.26	10645 5.18	10429 5.09	10308 4.59	10191 4.55	119	134	156
2150	11426 5.44	11084 5.29	10770 5.21	10552 5.12	10430 5.02	10312 4.59	121	136	158
2175	11560 5.48	11212 5.33	10896 5.25	10675 5.16	10553 5.05	10433 5.02	122	138	160
2200	11694 5.51	11341 5.36	11022 5.28	10799 5.19	10675 5.08	10555 5.05	124	140	162
2225	11828 5.55	11470 5.40	11148 5.32	10923 5.23	10798 5.12	10676 5.08	125	141	164
2250	11962 5.59	11600 5.44	11274 5.35	11047 5.26	10921 5.15	10798 5.12	127	143	166
2275	12097 6.02	11729 5.47	11400 5.39	11171 5.29	11045 5.18	10920 5.15	128	145	168
2300	12232 6.06	11859 5.51	11527 5.42	11295 5.33	11168 5.21	11042 5.18	130	147	170
2325	12367 6.10	11988 5.54	11654 5.45	11420 5.36	11291 5.24	11165 5.22	131	149	172
2350	12502 6.13	12118 5.58	11781 5.49	11545 5.39	11414 5.28	11288 5.25	133	151	174
2375	12637 6.17	12248 6.02	11908 5.52	11670 5.43	11537 5.31	11412 5.28	134	152	176
2400	12773 6.20	12379 6.05	12035 5.56	11796 5.46	11660 5.34	11536 5.32	136	154	178
2425	12909 6.24	12509 6.09	12162 5.59	11921 5.50	11783 5.38	11661 5.35	137	156	181
2450	13045 6.27	12640 6.12	12290 6.02	12047 5.53	11906 5.41	11785 5.38	139	158	183
2475	13181 6.31	12770 6.16	12418 6.06	12173 5.56	12030 5.44	11911 5.42	140	160	185
2500	13317 6.35	12901 6.20	12546 6.09	12299 6.00	12154 5.48	12036 5.45	141	162	187
2525	13453 6.38	13032 6.23	12674 6.13	12426 6.03	12278 5.51	12162 5.48	143	164	189
2550	13590 6.42	13164 6.27	12803 6.16	12553 6.06	12402 5.54	12288 5.52	144	166	191
2575	13727 6.45	13295 6.30	12932 6.19	12680 6.10	12526 5.57	12414 5.55	146	167	193
2600	13864 6.49	13427 6.34	13060 6.23	12807 6.13	12651 6.01	12541 5.58	147	169	195
2625	14001 6.52	13558 6.37	13189 6.26	12934 6.16	12775 6.04	12667 6.02	149	171	198
2650	14139 6.56	13690 6.41	13319 6.29	13062 6.20	12900 6.07	12794 6.05	150	173	200
2675	14276 6.59	13822 6.45	13448 6.33	13189 6.23	13025 6.11	12922 6.08	152	175	202
2700	14414 7.03	13955 6.48	13578 6.36	13318 6.26	13151 6.14	13049 6.12	153	177	204
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
△FUEL = - 0.4 %		△FUEL = + 3 %			△FUEL = + 5.5 %				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF						ISA CG = 33.0 %	FUEL CONSUMED (KG)		
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2700	14414 7.03	13955 6.48	13578 6.36	13318 6.26	13151 6.14	13049 6.12	153	177	204
2725	14553 7.06	14087 6.52	13708 6.40	13446 6.30	13276 6.17	13177 6.15	155	178	206
2750	14691 7.10	14220 6.55	13838 6.43	13574 6.33	13402 6.21	13306 6.18	156	180	209
2775	14829 7.13	14353 6.59	13968 6.46	13703 6.36	13528 6.24	13434 6.22	158	182	211
2800	14968 7.17	14486 7.02	14099 6.50	13832 6.40	13654 6.27	13563 6.25	159	184	213
2825	15107 7.20	14619 7.06	14229 6.53	13961 6.43	13780 6.30	13692 6.28	161	186	215
2850	15246 7.24	14752 7.09	14360 6.56	14091 6.46	13907 6.34	13821 6.32	162	188	218
2875	15386 7.27	14886 7.13	14492 7.00	14220 6.50	14034 6.37	13951 6.35	164	190	220
2900	15525 7.31	15020 7.17	14623 7.03	14351 6.53	14161 6.40	14081 6.38	165	191	222
2925	15665 7.34	15154 7.20	14755 7.06	14481 6.56	14288 6.44	14212 6.42	167	193	225
2950	15805 7.37	15288 7.24	14887 7.10	14611 6.59	14416 6.47	14343 6.45	168	195	227
2975	15945 7.41	15422 7.27	15019 7.13	14742 7.03	14543 6.50	14474 6.48	170	197	229
3000	16085 7.44	15556 7.31	15151 7.16	14873 7.06	14671 6.54	14605 6.52	171	199	231
3025	16226 7.48	15691 7.34	15284 7.19	15005 7.09	14800 6.57	14737 6.55	173	201	234
3050	16366 7.51	15826 7.38	15416 7.23	15136 7.13	14928 7.00	14883 6.58*	174	203	236
3075	16507 7.55	15961 7.41	15549 7.26	15268 7.16	15057 7.03	15013 7.02*	176	205	238
3100	16649 7.58	16096 7.45	15682 7.29	15400 7.19	15186 7.07	15144 7.05*	177	207	241

LOW AIR CONDITIONING

 Δ FUEL = - 0.4 %

ENGINE ANTI ICE ON

 Δ FUEL = + 3 %

TOTAL ANTI ICE ON

 Δ FUEL = + 5.5 %

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)		TIME (H.MIN)			
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)			
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2075	11658 5.16	11332 5.09	11104 5.01	10961 4.53	10821 4.49	10887 4.49*	118	139	164
2100	11798 5.20	11469 5.12	11239 5.04	11093 4.56	10952 4.52	11019 4.52*	120	141	166
2125	11939 5.23	11607 5.16	11374 5.07	11225 4.59	11084 4.56	11151 4.55*	122	143	168
2150	12080 5.27	11745 5.19	11509 5.11	11358 5.02	11217 4.59	11284 4.59*	123	145	171
2175	12221 5.30	11883 5.23	11645 5.14	11491 5.06	11349 5.02	11416 5.02*	125	147	173
2200	12362 5.34	12021 5.26	11781 5.17	11624 5.09	11482 5.06	11549 5.05*	126	149	175
2225	12504 5.37	12160 5.29	11917 5.21	11757 5.12	11615 5.09	11682 5.08*	128	150	177
2250	12646 5.41	12298 5.33	12053 5.24	11890 5.15	11749 5.12	11815 5.12*	130	152	179
2275	12788 5.44	12438 5.36	12189 5.28	12024 5.19	11882 5.16	11948 5.15*	131	154	181
2300	12930 5.48	12577 5.40	12326 5.31	12158 5.22	12016 5.19	12082 5.18*	133	156	184
2325	13072 5.51	12716 5.43	12463 5.34	12292 5.25	12150 5.22	12216 5.22*	135	158	186
2350	13214 5.55	12856 5.46	12601 5.38	12426 5.28	12285 5.26	12350 5.25*	136	160	188
2375	13357 5.58	12996 5.50	12738 5.41	12561 5.32	12419 5.29	12484 5.28*	138	162	190
2400	13500 6.02	13136 5.53	12876 5.44	12696 5.35	12555 5.32	12619 5.32*	140	164	192
2425	13643 6.05	13277 5.56	13014 5.48	12831 5.38	12690 5.36	12754 5.35*	141	165	195
2450	13786 6.09	13418 6.00	13153 5.51	12967 5.41	12826 5.39	12889 5.38*	143	167	197
2475	13929 6.12	13558 6.03	13292 5.54	13102 5.45	12962 5.42	13024 5.42*	145	169	199
2500	14073 6.16	13700 6.06	13430 5.58	13238 5.48	13098 5.46	13160 5.45*	146	171	201
2525	14217 6.19	13841 6.10	13570 6.01	13374 5.51	13235 5.49	13295 5.48*	148	173	203
2550	14361 6.23	13983 6.13	13709 6.04	13510 5.54	13372 5.52	13432 5.52*	150	175	206
2575	14505 6.26	14124 6.16	13849 6.08	13647 5.57	13509 5.56	13568 5.55*	152	177	208
2600	14649 6.30	14266 6.19	13989 6.11	13783 6.01	13646 5.59	13704 5.58*	153	179	210
2625	14793 6.33	14409 6.23	14129 6.14	13920 6.04	13784 6.02	13841 6.02*	155	181	212
2650	14938 6.37	14551 6.26	14269 6.17	14058 6.07	13922 6.06	13978 6.05*	157	183	214
2675	15082 6.40	14694 6.29	14410 6.21	14195 6.10	14061 6.09	14115 6.08*	159	185	217
2700	15227 6.44	14836 6.33	14551 6.24	14333 6.13	14199 6.12	14253 6.11*	161	186	219
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
△FUEL = - 0.3 %		△FUEL = + 2 %			△FUEL = + 5 %				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT IMC PROCEDURE : 120 KG (6MIN)							FUEL CONSUMED (KG)		
REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 33.0 %		TIME (H.MIN)		CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
AIR DIST. (NM)	FLIGHT LEVEL						FL290 FL310	FL330 FL350	FL370 FL390
	290	310	330	350	370	390			
2700	15227 6.44	14836 6.33	14551 6.24	14333 6.13	14199 6.12	14253 6.11*	161	186	219
2725	15373 6.47	14978 6.36	14692 6.27	14471 6.17	14338 6.16	14390 6.15*	162	188	221
2750	15518 6.51	15120 6.40	14833 6.31	14609 6.20	14477 6.19	14528 6.18*	164	191	223
2775	15663 6.55	15263 6.43	14974 6.34	14747 6.23	14617 6.22	14666 6.21*	166	193	226
2800	15809 6.58	15406 6.46	15116 6.37	14886 6.26	14757 6.25	14805 6.25*	168	195	228
2825	15955 7.02	15549 6.50	15257 6.41	15024 6.29	14897 6.29	14943 6.28*	169	197	230
2850	16101 7.05	15692 6.53	15399 6.44	15162 6.33	15037 6.32	15082 6.31*	171	199	232
2875	16248 7.09	15835 6.56	15541 6.47	15301 6.36	15178 6.35	15221 6.35*	173	201	235
2900	16394 7.12	15979 7.00	15684 6.50	15441 6.39	15320 6.39	15361 6.38*	175	203	237
2925	16541 7.16	16123 7.03	15826 6.54	15580 6.43	15462 6.42	15501 6.41*	177	205	239
2950	16688 7.19	16267 7.06	15969 6.57	15720 6.46	15604 6.45	15641 6.45*	178	207	242
2975	16835 7.23	16412 7.10	16112 7.00	15860 6.49	15747 6.49	15781 6.48*	180	209	244
3000	16982 7.26	16556 7.13	16256 7.03	16000 6.52	15890 6.52	15922 6.51*	182	211	246
3025	17130 7.30	16701 7.16	16399 7.07	16140 6.56	16033 6.55	16063 6.55*	184	213	248
3050	17277 7.33	16846 7.20	16543 7.10	16281 6.59	16177 6.59	16204 6.58*	186	215	250
3075	17425 7.37	16991 7.23	16688 7.13	16421 7.02	16321 7.02	16345 7.01*	188	217	253
3100	17573 7.40	17137 7.26	16832 7.16	16562 7.06	16465 7.05	16487 7.05*	189	220	255
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
Δ FUEL = - 0.3 %			Δ FUEL = + 2 %			Δ FUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-012-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES

CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT

IMC PROCEDURE : 110 KG (6 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF			ISA CG=33.0%	FUEL CONSUMED (KG)			TIME (H.MIN)		
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2075 5.26	11535 5.19	11254 5.08	11036 4.95	10854 4.52	10678 4.51	10701 4.51	139	147	169
2100 5.30	11677 5.23	11392 5.12	11171 4.98	10986 4.56	10807 4.54	10832 4.54	141	149	171
2125 5.33	11818 5.26	11530 5.15	11306 5.01	11117 4.59	10937 4.57	10963 4.57	140	151	174
2150 5.37	11959 5.30	11668 5.18	11441 5.05	11249 5.02	11067 5.01	11094 5.01	142	152	176
2175 5.41	12101 5.33	11806 5.21	11577 5.08	11381 5.06	11198 5.04	11225 5.04	143	154	171
2200 5.44	12243 5.37	11944 5.24	11713 5.11	11513 5.09	11328 5.07	11357 5.07	145	156	173
2225 5.48	12385 5.41	12083 5.27	11849 5.15	11645 5.12	11459 5.11	11489 5.11	147	159	175
2250 5.52	12528 5.44	12222 5.30	11985 5.18	11778 5.18	11590 5.16	11621 5.14	148	161	178
2275 5.55	12671 5.48	12361 5.33	12122 5.21	11911 5.19	11722 5.19	11753 5.18	150	163	180
2300 5.59	12813 5.51	12501 5.37	12259 5.25	12044 5.22	11854 5.21	11885 5.21	152	165	182
2325 6.03	12957 5.55	12640 5.40	12396 5.28	12178 5.26	11987 5.24	12018 5.24	153	167	185
2350 6.06	13100 5.58	12780 5.43	12533 5.31	12312 5.29	12119 5.29	12151 5.28	155	169	187
2375 6.10	13244 6.02	12921 5.46	12671 5.35	12445 5.32	12252 5.32	12284 5.31	157	171	190
2400 6.14	13388 6.06	13061 5.49	12809 5.38	12580 5.35	12385 5.34	12417 5.34	159	173	192
2425 6.17	13532 6.09	13202 5.52	12947 5.41	12714 5.39	12518 5.38	12551 5.38	160	175	194
2450 6.21	13676 6.13	13343 5.55	13086 5.45	12848 5.42	12652 5.42	12685 5.41	162	177	197
2475 6.25	13820 6.16	13484 5.58	13225 5.48	12983 5.45	12786 5.45	12819 5.44	164	179	199
2500 6.28	13964 6.20	13626 6.01	13364 5.51	13119 5.49	12920 5.48	12953 5.48	165	181	201
2525 6.32	14108 6.23	13768 6.03	13503 5.55	13254 5.52	13055 5.52	13087 5.51	167	183	204
2550 6.36	14253 6.27	13909 6.06	13643 5.58	13390 5.55	13189 5.55	13222 5.54	169	185	206
2575 6.39	14398 6.30	14051 6.09	13783 6.01	13525 5.98	13325 5.98	13357 5.98	171	187	209
2600 6.43	14543 6.34	14194 6.12	13923 6.04	13662 6.02	13460 6.01	13492 6.01	173	189	211
2625 6.47	14688 6.37	14336 6.15	14063 6.08	13798 6.05	13596 6.05	13628 6.05	175	190	214
2650 6.50	14833 6.41	14479 6.19	14202 6.11	13934 6.09	13731 6.08	13763 6.08	176	192	216
2675 6.54	14979 6.44	14622 6.22	14342 6.14	14071 6.12	13869 6.11	13899 6.11	178	194	219
2700 6.58	15125 6.48	14766 6.25	14482 6.18	14208 6.15	14007 6.15	14035 6.15	180	196	221
CORRECTIONS		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON				
FUEL		+ 3 %			+ 6 %				

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF						ISA CG=33.0%	FUEL CONSUMED (KG)		
AIR DIST. (NM)	FLIGHT LEVEL						TIME (H.MIN)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2700	15125 6.58	14766 6.48	14482 6.25	14208 6.18	14007 6.15	14035 6.15	180	196	221
2725	15271 7.01	14909 6.51	14622 6.29	14344 6.21	14146 6.19	14172 6.18	182	198	224
2750	15417 7.05	15053 6.55	14763 6.32	14480 6.24	14285 6.22	14308 6.21	184	200	227
2775	15564 7.09	15197 6.58	14903 6.35	14617 6.28	14424 6.26	14445 6.25	186	202	229
2800	15711 7.12	15341 7.02	15044 6.38	14754 6.31	14563 6.29	14583 6.28	188	203	232
2825	15858 7.16	15486 7.05	15185 6.42	14891 6.34	14703 6.32	14720 6.31	190	205	235
2850	16005 7.20	15631 7.09	15327 6.45	15028 6.38	14843 6.36	14858 6.35	191	207	237
2875	16153 7.23	15776 7.12	15468 6.48	15166 6.41	14983 6.39	14995 6.38	193	209	240
2900	16301 7.27	15922 7.16	15610 6.52	15304 6.45	15123 6.42	15134 6.41	195	210	242
2925	16449 7.30	16067 7.19	15753 6.55	15442 6.48	15263 6.46	15272 6.45	197	212	245
2950	16598 7.34	16213 7.23	15895 6.58	15580 6.51	15404 6.49	15410 6.48	199	214	247
2975	16747 7.37	16360 7.26	16038 7.01	15718 6.55	15545 6.52	15549 6.51	201	216	250
3000	16897 7.41	16506 7.30	16181 7.05	15857 6.58	15686 6.56	15688 6.55	203	217	252
3025	17046 7.45	16653 7.33	16325 7.08	15996 7.01	15827 6.99	15828 6.58	205	219	255
3050	17197 7.48	16799 7.36	16468 7.11	16136 7.05	15969 7.02	15968 7.01	207	221	257
3075	17347 7.52	16946 7.40	16612 7.14	16275 7.08	16110 7.06	16108 7.05	209	223	260
3100		17093 7.43	16756 7.17	16415 7.11	16252 7.09	16249 7.08	217	225	262
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3 %				+ 6 %			

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 : 100 kg or 220 lb
- Climb profile : 250kt/300kt/M.78
- R – Long Range Speed
- Descent profile : M.78/300kt/250kt
- Approach and landing at alternate airport : 80 kg or 180 lb (4 minutes)
- ISA
- CG = 33 %
- Normal air conditioning

- R – Anti ice OFF

- R *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
 $0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$
 or $0.033 \text{ (lb/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$

R **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 : 100 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 80 KG (4MIN)						FUEL CONSUMED (KG)			
REF. LDG. WT AT ALTERNATE = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 33.0 %	TIME (H.MIN)					
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	120	140	160	180	200	FL100 FL120	FL140 FL160	FL180 FL200
20									
40	529 0.12						2		
60	680 0.16	658 0.16					3		
80	832 0.20	805 0.20	803 0.20	803 0.20	805 0.19		5	4	4
100	984 0.24	952 0.24	945 0.24	941 0.23	939 0.23	938 0.22	6	6	5
120	1136 0.28	1099 0.28	1088 0.28	1080 0.27	1072 0.26	1065 0.26	7	7	6
140	1289 0.32	1246 0.32	1230 0.30	1218 0.30	1206 0.29	1192 0.29	9	8	6
160	1441 0.36	1393 0.36	1373 0.35	1357 0.34	1340 0.33	1319 0.32	10	10	7
180	1594 0.40	1541 0.40	1517 0.39	1496 0.38	1474 0.36	1446 0.35	11	11	8
200	1747 0.45	1689 0.44	1660 0.43	1635 0.41	1608 0.39	1573 0.38	13	12	9
220	1900 0.49	1837 0.48	1804 0.47	1774 0.45	1742 0.42	1701 0.42	14	14	9
240	2054 0.53	1985 0.52	1947 0.51	1914 0.48	1877 0.46	1828 0.45	15	15	10
260	2208 0.57	2134 0.56	2091 0.55	2054 0.52	2011 0.49	1955 0.48	17	16	11
280	2361 1.01	2282 1.00	2236 0.58	2194 0.55	2146 0.52	2083 0.51	18	18	12
300	2515 1.05	2431 1.04	2380 1.02	2334 0.59	2281 0.55	2210 0.54	20	19	12
320	2670 1.09	2580 1.08	2525 1.06	2474 1.02	2416 0.58	2338 0.58	21	20	13
340	2824 1.13	2730 1.12	2670 1.10	2615 1.06	2551 1.02	2466 1.01	22	22	14
360	2979 1.17	2879 1.16	2815 1.14	2755 1.09	2686 1.05	2593 1.04	24	23	14
380	3134 1.21	3029 1.20	2960 1.17	2896 1.13	2821 1.08	2721 1.07	25	24	15
400	3289 1.25	3179 1.23	3105 1.21	3037 1.16	2957 1.11	2849 1.10	26	26	16
420	3444 1.29	3329 1.27	3251 1.25	3178 1.20	3092 1.14	2977 1.13	28	27	17
440	3599 1.33	3479 1.31	3396 1.29	3319 1.23	3227 1.18	3105 1.17	29	28	17
460	3755 1.37	3629 1.35	3542 1.32	3461 1.27	3362 1.21	3233 1.20	31	30	18
480	3911 1.41	3780 1.39	3688 1.36	3602 1.30	3498 1.24	3361 1.23	32	31	19
500	4067 1.45	3931 1.43	3834 1.40	3744 1.33	3633 1.27	3489 1.26	33	32	19
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
Δ FUEL = - 0.3 %			Δ FUEL = + 2 %			Δ FUEL = + 5 %			

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 : 80 kg or 180 lb
- Climb profile : 250kt/300kt/M.78
- Long Range Speed
- Descent profile : M.78/300kt/250kt
- Approach and landing at alternate airport : 60 kg or 140 lb (4 minutes)
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note : 1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.
 2. The flight level shown on the top of each column is the final flight level.
 3. For each degree Celsius above ISA temperature apply a fuel correction of
 $0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$
 or $0.033 \text{ (lb/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at 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 : 80 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
 DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 60 KG (4MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 33.0 %	FUEL CONSUMED (KG)					
AIR DIST. (NM)	TIME (H.MIN)								
	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	120	140	160	180	200	FL100 FL120	FL140 FL160	FL180 FL200
20									
40	482 0.12						2		
60	634 0.16	604 0.16	604 0.16				3	3	
80	788 0.20	750 0.20	743 0.20	741 0.20	742 0.19		4	4	4
100	941 0.24	896 0.24	882 0.24	874 0.23	869 0.23	868 0.22	4	5	5
120	1094 0.28	1041 0.28	1021 0.28	1007 0.27	997 0.26	990 0.26	5	6	6
140	1248 0.32	1188 0.32	1161 0.32	1141 0.31	1125 0.30	1112 0.29	6	7	7
160	1401 0.36	1334 0.36	1300 0.36	1274 0.35	1253 0.33	1234 0.33	7	8	8
180	1555 0.40	1480 0.40	1440 0.40	1408 0.39	1381 0.37	1356 0.36	8	9	9
200	1709 0.44	1627 0.44	1580 0.44	1542 0.42	1509 0.41	1478 0.39	9	10	9
220	1863 0.48	1773 0.48	1720 0.48	1676 0.46	1637 0.44	1601 0.43	10	11	10
240	2017 0.52	1920 0.52	1860 0.52	1810 0.50	1766 0.48	1723 0.46	11	12	11
260	2171 0.56	2067 0.56	2000 0.56	1944 0.54	1895 0.51	1846 0.50	12	13	12
280	2326 1.00	2214 1.00	2140 0.59	2079 0.57	2023 0.55	1968 0.53	13	14	13
300	2480 1.04	2361 1.04	2281 1.03	2213 1.01	2152 0.58	2091 0.56	14	15	14
320	2635 1.08	2508 1.08	2421 1.07	2348 1.05	2281 1.02	2214 1.00	15	16	15
340	2790 1.12	2656 1.12	2562 1.11	2483 1.08	2410 1.05	2337 1.03	15	17	16
360	2945 1.17	2803 1.16	2703 1.15	2618 1.12	2540 1.09	2460 1.06	16	18	16
380	3100 1.21	2951 1.20	2844 1.19	2753 1.16	2669 1.12	2583 1.10	17	19	17
400	3255 1.25	3099 1.24	2986 1.23	2888 1.19	2799 1.16	2707 1.13	18	20	18
420	3411 1.29	3247 1.28	3127 1.27	3024 1.23	2929 1.19	2830 1.16	19	21	19
440	3566 1.33	3395 1.32	3268 1.31	3160 1.27	3058 1.22	2954 1.20	20	22	20
460	3722 1.37	3543 1.36	3410 1.34	3295 1.30	3188 1.26	3077 1.23	21	23	21
480	3878 1.41	3691 1.40	3552 1.38	3431 1.34	3319 1.29	3201 1.26	22	25	22
500	4033 1.45	3840 1.44	3694 1.42	3567 1.38	3449 1.33	3325 1.30	23	26	22
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
Δ FUEL = - 0.3 %			Δ FUEL = + 2.5 %			Δ FUEL = + 6 %			

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 : 80 kg or 180 lb
- Climb profile : 250kt/300kt/M.78
- Long Range Speed
- Descent profile : M.78/300kt/250kt
- Approach and landing at alternate airport : 60 kg or 140 lb (4 minutes)
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

- Note :
1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.
 2. The flight level shown on the top of each column is the final flight level.
 3. For each degree Celsius above ISA temperature apply a fuel correction of $0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$ or $0.033 \text{ (lb/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{Air Distance (NM)}$

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at 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 - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
GO-AROUND : 80 KG - VMC PROCEDURE : 60 KG (4 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF			ISA CG=33.0%	FUEL CONSUMED (KG)					
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	120	140	160	180	200	FL100 FL120	FL140 FL160	FL180 FL200
20									
40	473 0.12						2		
60	618 0.16	603 0.16					3		
80	764 0.20	742 0.21	740 0.20	742 0.20			4	5	
100	909 0.24	881 0.25	874 0.24	871 0.23	870 0.23	874 0.23	5	6	6
120	1055 0.28	1021 0.29	1008 0.28	1000 0.26	992 0.26	990 0.26	6	7	7
140	1201 0.32	1160 0.33	1142 0.32	1130 0.30	1114 0.30	1106 0.30	7	8	7
160	1347 0.36	1300 0.37	1275 0.36	1259 0.33	1237 0.33	1223 0.33	8	8	8
180	1493 0.40	1440 0.41	1410 0.40	1388 0.37	1359 0.37	1339 0.36	9	9	9
200	1639 0.44	1579 0.45	1544 0.44	1517 0.40	1482 0.40	1455 0.40	10	10	9
220	1785 0.48	1719 0.49	1678 0.48	1647 0.44	1605 0.44	1572 0.43	11	11	10
240	1932 0.52	1860 0.53	1813 0.52	1776 0.47	1728 0.47	1689 0.47	12	12	11
260	2078 0.56	2000 0.57	1947 0.56	1906 0.50	1850 0.50	1806 0.50	13	13	12
280	2225 1.00	2140 1.01	2082 1.00	2036 0.54	1973 0.54	1922 0.54	14	14	12
300	2372 1.04	2281 1.05	2217 1.04	2166 0.57	2096 0.57	2039 0.57	15	15	13
320	2519 1.08	2421 1.09	2352 1.08	2295 1.01	2219 1.01	2156 1.01	16	16	14
340	2666 1.12	2562 1.13	2487 1.12	2425 1.04	2343 1.04	2273 1.04	17	17	14
360	2813 1.16	2703 1.17	2623 1.16	2555 1.08	2466 1.08	2391 1.08	18	18	15
380	2961 1.20	2844 1.21	2758 1.20	2686 1.11	2589 1.11	2508 1.11	19	19	16
400	3108 1.25	2986 1.25	2894 1.24	2816 1.14	2713 1.15	2625 1.15	20	20	17
420	3256 1.29	3127 1.29	3030 1.28	2946 1.18	2836 1.18	2743 1.18	21	21	17
440	3404 1.33	3268 1.33	3166 1.32	3076 1.21	2960 1.22	2860 1.22	22	22	18
460	3552 1.37	3410 1.37	3302 1.36	3207 1.25	3084 1.25	2978 1.25	23	23	19
480	3700 1.41	3552 1.41	3438 1.40	3337 1.28	3207 1.29	3095 1.29	24	23	19
500	3848 1.45	3694 1.45	3574 1.44	3468 1.32	3331 1.32	3213 1.32	25	24	20
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3 %				+ 5 %			

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 80 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 60 KG (4MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)					
AIR DIST. (NM)	FLIGHT LEVEL					TIME (H.MIN)			
	230	250	270	290	310	330	FL230 FL250	FL270 FL290	FL310 FL330
100	873 0.22						5		
120	986 0.25	989 0.25	1000 0.25				6	7	
140	1098 0.29	1096 0.28	1100 0.28	1112 0.28			7	8	
160	1211 0.32	1202 0.31	1201 0.31	1208 0.31	1217 0.30	1225 0.30	7	9	10
180	1324 0.35	1308 0.35	1301 0.34	1304 0.34	1310 0.33	1314 0.33	8	10	11
200	1436 0.38	1415 0.38	1402 0.38	1401 0.37	1403 0.37	1404 0.36	9	11	12
220	1549 0.41	1521 0.41	1503 0.41	1497 0.40	1496 0.40	1494 0.39	9	11	13
240	1662 0.45	1628 0.44	1604 0.44	1593 0.44	1589 0.43	1584 0.42	10	12	14
260	1775 0.48	1735 0.48	1705 0.47	1690 0.47	1682 0.46	1675 0.45	10	13	15
280	1888 0.51	1841 0.51	1806 0.51	1787 0.50	1776 0.49	1765 0.48	11	14	16
300	2002 0.54	1948 0.54	1907 0.54	1883 0.53	1869 0.52	1855 0.51	12	15	17
320	2115 0.58	2055 0.57	2008 0.57	1980 0.57	1963 0.55	1946 0.54	12	16	18
340	2228 1.01	2162 1.00	2109 1.00	2077 1.00	2057 0.58	2036 0.57	13	17	19
360	2341 1.04	2269 1.04	2210 1.04	2174 1.03	2150 1.02	2127 1.00	13	17	20
380	2455 1.07	2376 1.07	2312 1.07	2271 1.06	2244 1.05	2217 1.03	14	18	21
400	2568 1.11	2483 1.10	2413 1.10	2369 1.09	2338 1.08	2308 1.06	15	19	22
420	2682 1.14	2590 1.13	2515 1.13	2466 1.13	2433 1.11	2399 1.09	15	20	23
440	2796 1.17	2697 1.16	2616 1.17	2563 1.16	2527 1.14	2490 1.12	16	21	24
460	2909 1.20	2805 1.20	2718 1.20	2661 1.19	2621 1.17	2581 1.15	16	22	25
480	3023 1.24	2912 1.23	2820 1.23	2759 1.22	2716 1.20	2672 1.18	17	23	26
500	3137 1.27	3020 1.26	2921 1.26	2856 1.25	2810 1.23	2764 1.21	18	24	27

LOW AIR CONDITIONING

 Δ FUEL = - 0.3 %

ENGINE ANTI ICE ON

 Δ FUEL = + 2.5 %

TOTAL ANTI ICE ON

 Δ FUEL = + 6 %

FLIP23C A319-131 IAE V2522-A5 3520 03301.000010 80250300 .7801 .00200 60 300300 50 0 100100 30100 18590 FCOM-NO-02-05-50-003-130

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 100 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 80 KG (4MIN)

REF. LANDING WEIGHT = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF		ISA CG = 33.0 %		FUEL CONSUMED (KG)				
AIR DIST. (NM)	230	270	310	350	390	TIME (H.MIN)		
						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
						FL230 FL270	FL310 FL350	FL390
100								0
120	1063 0.25					6		0
140	1179 0.29	1190 0.28				7		0
160	1295 0.32	1295 0.31				8		0
180	1411 0.35	1400 0.34	1414 0.33			9	10	0
200	1527 0.38	1506 0.38	1512 0.36	1522 0.36		10	12	0
220	1643 0.41	1612 0.41	1611 0.39	1615 0.39		10	13	0
240	1760 0.45	1717 0.44	1710 0.42	1709 0.42		11	14	0
260	1876 0.48	1823 0.47	1809 0.45	1803 0.44	1806 0.44	12	15	16
280	1992 0.51	1929 0.50	1908 0.48	1897 0.47	1898 0.47	13	16	18
300	2109 0.54	2035 0.54	2007 0.51	1991 0.50	1990 0.49	13	17	19
320	2225 0.57	2141 0.57	2106 0.54	2086 0.53	2082 0.52	14	19	21
340	2342 1.00	2248 1.00	2205 0.57	2180 0.55	2174 0.55	15	20	22
360	2458 1.04	2354 1.03	2304 1.00	2274 0.58	2266 0.57	16	21	24
380	2575 1.07	2461 1.06	2404 1.03	2369 1.01	2359 1.00	17	22	25
400	2692 1.10	2567 1.09	2503 1.06	2464 1.04	2451 1.03	17	23	27
420	2809 1.13	2674 1.13	2603 1.09	2559 1.07	2544 1.05	18	24	28
440	2926 1.16	2781 1.16	2702 1.12	2654 1.09	2637 1.08	19	26	30
460	3043 1.20	2888 1.19	2802 1.15	2749 1.12	2730 1.11	20	27	31
480	3160 1.23	2995 1.22	2902 1.18	2844 1.15	2823 1.13	21	28	33
500	3277 1.26	3102 1.25	3002 1.21	2940 1.18	2916 1.16	21	29	35
LOW AIR CONDITIONING		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
$\Delta FUEL = - 0.3 \%$		$\Delta FUEL = + 2 \%$			$\Delta FUEL = + 5 \%$			

FLIP23D 25.02.98 ; AERO : A320-232 01/06/97 ; MOTO : A320-232 01/06/97 ; GENE : A320-232 01/10/97 END OF FLIP FCOM-NO-02-05-50-003-140

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT - ALL ENGINES
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
GO-AROUND : 80 KG - VMC PROCEDURE : 60 KG (4 MIN)

REF. LANDING WEIGHT = 50000 KG NORMAL AIR CONDITIONING ANTI ICE OFF					ISA CG=33.0%	FUEL CONSUMED (KG)		
AIR DIST. (NM)	FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	230	270	310	350	390	FL230 FL270	FL310 FL350	FL390
100								
120	999 0.26					8		
140	1108 0.29					9		
160	1217 0.33	1233 0.31				10		
180	1326 0.36	1336 0.35				11		
200	1435 0.40	1439 0.38	1460 0.36			13	14	
220	1544 0.43	1542 0.41	1558 0.39			14	15	
240	1654 0.47	1646 0.45	1655 0.43	1665 0.42		15	16	
260	1763 0.50	1749 0.48	1753 0.46	1758 0.44		16	17	
280	1873 0.54	1852 0.51	1851 0.49	1851 0.47	1859 0.47	17	19	20
300	1983 0.57	1956 0.55	1949 0.52	1944 0.50	1949 0.50	18	20	21
320	2092 1.01	2060 0.58	2047 0.55	2038 0.53	2040 0.52	19	21	23
340	2202 1.04	2164 1.01	2145 0.58	2131 0.56	2130 0.55	21	23	24
360	2312 1.08	2268 1.05	2244 1.01	2225 0.59	2221 0.58	22	24	26
380	2423 1.11	2372 1.08	2342 1.04	2318 1.01	2311 1.00	23	25	27
400	2533 1.15	2476 1.11	2441 1.07	2412 1.04	2402 1.03	24	26	29
420	2643 1.18	2580 1.15	2540 1.10	2506 1.07	2493 1.06	25	28	31
440	2754 1.22	2685 1.18	2639 1.13	2600 1.10	2585 1.08	27	29	32
460	2864 1.25	2789 1.21	2738 1.16	2695 1.13	2676 1.11	28	30	34
480	2975 1.29	2894 1.25	2837 1.19	2789 1.15	2767 1.14	29	31	35
500	3086 1.32	2999 1.28	2936 1.22	2883 1.18	2859 1.16	30	33	37
CORRECTIONS		ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
FUEL		+ 3 %			+ 5 %			

GENERAL

- R The ground distance/air distance conversion tables show the air distance for a given ground distance due to the influence of the wind.

The tables are given for:

- M.78
- Long range speed.

M.78

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
10	7	8	9	10	11	13	15
20	15	16	18	20	23	26	30
30	22	25	27	30	34	39	45
40	30	33	36	40	45	51	60
50	37	41	45	50	56	64	75
100	75	82	90	100	113	129	150
200	150	164	180	200	225	257	300
300	225	245	270	300	338	386	450
400	300	327	360	400	450	514	600
500	375	409	450	500	563	643	750
1000	750	818	900	1000	1125	1286	1501
1500	1125	1227	1350	1500	1688	1929	2251
2000	1500	1636	1800	2000	2248	2572	3001
2500	1875	2045	2250	2500	2813	3215	3752
3000	2250	2454	2700	3000	3375	3858	4502
3500	2624	2863	3150	3500	3938	4501	5252
4000	2999	3272	3600	4000	4500	5144	6003
4500	3374	3681	4050	4500	5063	5787	6753
5000	3749	4090	4500	5000	5626	6430	7503

FLIP23 A320211 M565A1PIP 3410 03301.000011 0250300 .7800 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-NO-03-50-002-001

R LONG RANGE SPEED UP TO FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
10	7	8	9	10	11	13	16
20	15	16	18	20	23	27	32
30	22	24	27	30	34	40	48
40	29	32	36	40	46	53	64
50	36	40	45	50	57	66	79
100	73	80	89	100	114	133	159
200	146	160	178	200	228	266	318
300	219	241	267	300	342	398	477
400	292	321	356	400	456	531	635
500	365	401	445	500	570	664	794
1000	730	802	890	1000	1141	1328	1589
1500	1094	1203	1335	1500	1711	1992	2383
2000	1459	1604	1780	2000	2282	2656	3177
2500	1824	2005	2225	2500	2852	3320	3971
3000	2189	2406	2670	3000	3423	3984	4766
3500	2554	2807	3115	3500	3993	4648	5560
4000	2919	3208	3560	4000	4564	5312	6354
4500	3283	3609	4005	4500	5134	5976	7149
5000	3648	4010	4450	5000	5705	6640	7943

FLIP23 A320211 M565A1PIP 3410 03301.0000011 0250300 .7801 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-NO-03-50-003-001

LONG RANGE SPEED ABOVE FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
10	8	8	9	10	11	13	15
20	15	16	18	20	22	26	30
30	23	25	27	30	34	38	45
40	30	33	36	40	45	51	60
50	38	41	45	50	56	64	75
100	75	82	90	100	112	128	149
200	150	164	180	200	225	256	299
300	226	246	270	300	337	385	448
400	301	328	360	400	449	513	597
500	376	410	450	500	562	641	746
1000	752	820	901	1000	1124	1282	1493
1500	1128	1230	1351	1500	1685	1923	2239
2000	1504	1639	1802	2000	2247	2564	2985
2500	1880	2049	2252	2500	2809	3205	3731
3000	2256	2459	2703	3000	3371	3846	4478
3500	2632	2869	3153	3500	3933	4487	5224
4000	3008	3279	3604	4000	4494	5128	5970
4500	3383	3689	4054	4500	5056	5769	6716
5000	3759	4098	4505	5000	5618	6410	7463

FLIP23 A320211 M565A1PIP 3410 03301.000011 0250300 .7801 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-NO-03-50-004-001

LONG RANGE SPEED UP TO FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
10	7	8	9	10	12	14	17
20	14	16	18	20	23	27	34
30	21	24	26	30	35	41	51
40	28	31	35	40	46	55	68
50	36	39	44	50	58	69	84
100	71	79	88	100	116	137	169
200	142	157	176	200	232	275	338
300	213	236	264	300	347	412	507
400	284	314	352	400	463	550	676
500	355	393	440	500	579	687	845
1000	710	786	880	1000	1158	1374	1690
1500	1065	1179	1320	1500	1736	2061	2535
2000	1420	1572	1760	2000	2315	2748	3380
2500	1775	1965	2201	2500	2894	3435	4225
3000	2130	2358	2641	3000	3473	4122	5070
3500	2485	2751	3081	3500	4051	4809	5915
4000	2840	3144	3521	4000	4630	5496	6760
4500	3195	3537	3961	4500	5209	6183	7605
5000	3550	3930	4401	5000	5788	6870	8450

FLIP23 A319-114 CFM56-5A5 3410 03301.000011 0250300 .7801 .00000 0 0300350 0 0 70 61 40 57 18590 FCOM-NO-03-50-003-210

LONG RANGE SPEED ABOVE FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	- 50	- 100	- 150
10	7	8	9	10	11	13	15
20	15	16	18	20	23	26	30
30	22	25	27	30	34	39	45
40	30	33	36	40	45	51	60
50	37	41	45	50	56	64	75
100	75	82	90	100	113	129	150
200	150	164	180	200	225	257	300
300	225	245	270	300	338	386	450
400	300	327	360	400	450	514	600
500	375	409	450	500	563	643	750
1000	750	818	900	1000	1125	1286	1500
1500	1125	1227	1350	1500	1688	1929	2251
2000	1500	1636	1800	2000	2250	2572	3001
2500	1875	2045	2250	2500	2813	3215	3751
3000	2250	2454	2700	3000	3375	3858	4501
3500	2625	2863	3150	3500	3938	4501	5252
4000	3000	3272	3600	4000	4500	5144	6002
4500	3375	3681	4050	4500	5063	5787	6752
5000	3749	4090	4500	5000	5625	6430	7502

FLIP23 A319-114 CFM56-5A5 3410 03301.000011 0250300 .7801 .00000 0 0300350 0 0 70 61 40 57 18590 FCOM-NO-03-50-004-210

LONG RANGE SPEED UP TO FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+150	+100	+ 50	0	-50	-100	-150
10	6	7	8	10	13	18	29
20	12	14	16	20	26	36	58
30	18	21	25	30	38	53	88
40	24	28	33	40	51	71	117
50	30	35	41	50	64	89	146
100	68	76	86	100	119	145	188
200	136	152	173	200	237	291	376
300	204	229	259	300	356	436	564
400	272	305	346	400	474	582	752
500	341	381	432	500	593	727	941
1000	681	762	865	1000	1185	1454	1881
1500	1022	1143	1297	1500	1778	2181	2822
2000	1362	1524	1730	2000	2370	2908	3762
2500	1703	1905	2162	2500	2963	3635	4703
3000	2043	2286	2595	3000	3555	4362	5643
3500	2384	2667	3027	3500	4148	5089	6584
4000	2724	3048	3460	4000	4740	5816	7524
4500	3065	3429	3892	4500	5333	6543	8465
5000	3405	3810	4325	5000	5925	7270	9405

LONG RANGE SPEED ABOVE FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)			HEAD WIND	
	+ 150	+ 100	+ 50	0	-50	-100	-150
10	7	8	9	10	12	14	18
20	14	15	17	20	24	28	36
30	21	23	26	30	35	43	54
40	28	31	35	40	47	57	72
50	35	39	44	50	59	71	90
100	72	80	89	100	115	134	162
200	145	159	177	200	229	268	324
300	217	239	266	300	344	402	485
400	289	319	355	400	458	537	647
500	362	399	444	500	573	671	809
1000	724	797	887	1000	1146	1342	1618
1500	1085	1196	1331	1500	1719	2012	2427
2000	1447	1594	1774	2000	2292	2683	3236
2500	1809	1993	2218	2500	2865	3354	4045
3000	2171	2391	2661	3000	3438	4025	4854
3500	2533	2790	3105	3500	4011	4695	5663
4000	2895	3188	3548	4000	4583	5366	6471
4500	3256	3587	3992	4500	5156	6037	7280
5000	3618	3985	4435	5000	5729	6708	8089

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 (tanked) 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 :

- FL290, 310, 330, 350, 370, 390
- Air distances from 250 to 2500 NM
- Flight profile :
 - Climb : 250KT/300KT/M.78
 - Cruise : M.78
 - Descent : M.78/300KT/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**R 1. Fuel price ratio = 0.948**

Cruising Altitude = FL310

Planned TOW = 66 000 kg (mission weight without fuel tankering)

R Air Distance = 1750 NM

Enter graph on page 2.05.70 P.4.

For the given air distance, the optimum fuel tankering weight is 58 000 kg, which is lower than the planned takeoff weight → no fuel tankering recommended.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.70	P 2
	FUEL TANKERING	SEQ 035	REV 22

2. Fuel price ratio = 0.942

Cruising Altitude = FL350

Planned TOW = 62 000 kg (mission weight without fuel tankering)

Air Distance = 1000 NM

Enter graph on page 2.05.70 P6.

For the given air distance, the optimum fuel tankering weight is 70 000 kg, which is 8000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 8000 kg.

Check :

- R a) new TOW less than or equal to MTOW from departure airport ;
b) total fuel to be loaded less than or equal to maximum fuel capacity ;
c) MLW at destination

3. Fuel price ratio = 0.888

Cruising Altitude = FL390

Planned TOW = 63 000 kg (mission weight without fuel tankering)

Air Distance = 1625 NM

Enter graph on page 2.05.70 P8.

Interpolate for the air distance of 1625 NM between the borderline and 1 750 NM.

For the given air distance, the optimum fuel tankering weight is 67 000 kg, which is 4000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 4000 kg.

Check :

- R a) new TOW less than or equal to MTOW from departure airport ;
R b) total fuel to be loaded less than or equal to maximum fuel capacity ;
c) MLW at destination

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 (tanked) 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 :

- FL290, 310, 330, 350, 370, 390
- Air distances from 250 to 2500 NM
- Flight profile :
 - Climb : 250KT/300KT/M.78
 - Cruise : M.78
 - Descent : M.78/300KT/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 = 0.942**

Cruising Altitude = FL310

Planned TOW = 66 000 kg (mission weight without fuel tankering)

Air Distance = 1750 NM

Enter graph on page 2.05.70 P.4.

For the given air distance, the optimum fuel tankering weight is 64 200 kg, which is lower than the planned takeoff weight → no fuel tankering recommended.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.70	P 2
	FUEL TANKERING	SEQ 045	REV 33

2. Fuel price ratio = 0.930

Cruising Altitude = FL350

Planned TOW = 60 000 kg (mission weight without fuel tankering)

Air Distance = 1250 NM

Enter graph on page 2.05.70 P6.

For the given air distance, the optimum fuel tankering weight is 69 500 kg, which is 9 500 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 9 500 kg.

Check :

- a) new TOW less than or equal to MTOW from departure airport ;
- b) total fuel to be loaded less than or equal to maximum fuel capacity ;
- c) MLW at destination

3. Fuel price ratio = 0.902

Cruising Altitude = FL390

Planned TOW = 60 000 kg (mission weight without fuel tankering)

Air Distance = 1375 NM

Enter graph on page 2.05.70 P8.

Interpolate for the air distance of 1375 NM between 1250 NM and 1500 NM.

For the given air distance, the optimum fuel tankering weight is 61 000 kg, which is 1 000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 1 000 kg.

Check :

- a) new TOW less than or equal to MTOW from departure airport ;
- b) total fuel to be loaded less than or equal to maximum fuel capacity ;
- c) MLW at destination

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 (tanked) 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 :

- FL290, 310, 330, 350, 370, 390
- Air distances from 250 to 2500 NM
- Flight profile :

Climb	: 250KT/300KT/M.78
Cruise	: M.78
Descent	: M.78/300KT/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 = 0.942**

Cruising Altitude = FL310

Planned TOW = 60 000 kg (mission weight without fuel tankering)

Air Distance = 2000 NM

Enter graph on page 2.05.70 P.4.

For the given air distance, the optimum fuel tankering weight is 56 000 kg, which is lower than the planned takeoff weight → no fuel tankering recommended.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.70	P 2
	FUEL TANKERING	SEQ 054	REV 38

2. Fuel price ratio = 0.930

Cruising Altitude = FL350

Planned TOW = 55 000 kg (mission weight without fuel tankering)

Air Distance = 1500 NM

Enter graph on page 2.05.70 P6.

For the given air distance, the optimum fuel tankering weight is 59 000 kg, which is 4000 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 4000 kg.

Check :

- a) new TOW less than or equal to MTOW from departure airport ;
- b) total fuel to be loaded less than or equal to maximum fuel capacity ;
- c) MLW at destination

3. Fuel price ratio = 0.902

Cruising Altitude = FL390

Planned TOW = 55 000 kg (mission weight without fuel tankering)

Air Distance = 1375 NM

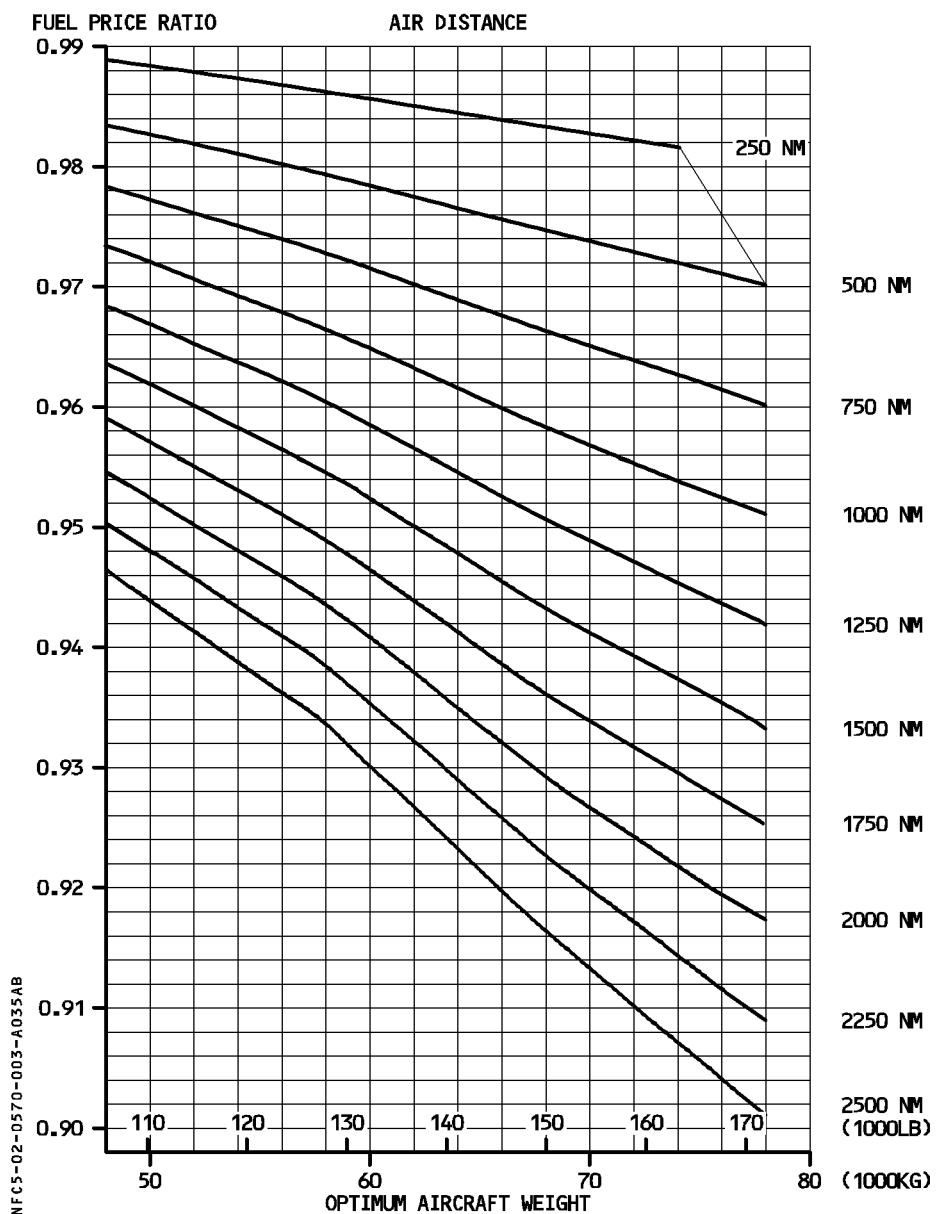
Enter graph on page 2.05.70 P8.

Interpolate for the air distance of 1375 NM between the 1250 NM and 1 500 NM. For the given air distance, the optimum fuel tankering weight is 57700 kg, which is 2700 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 2700 kg.

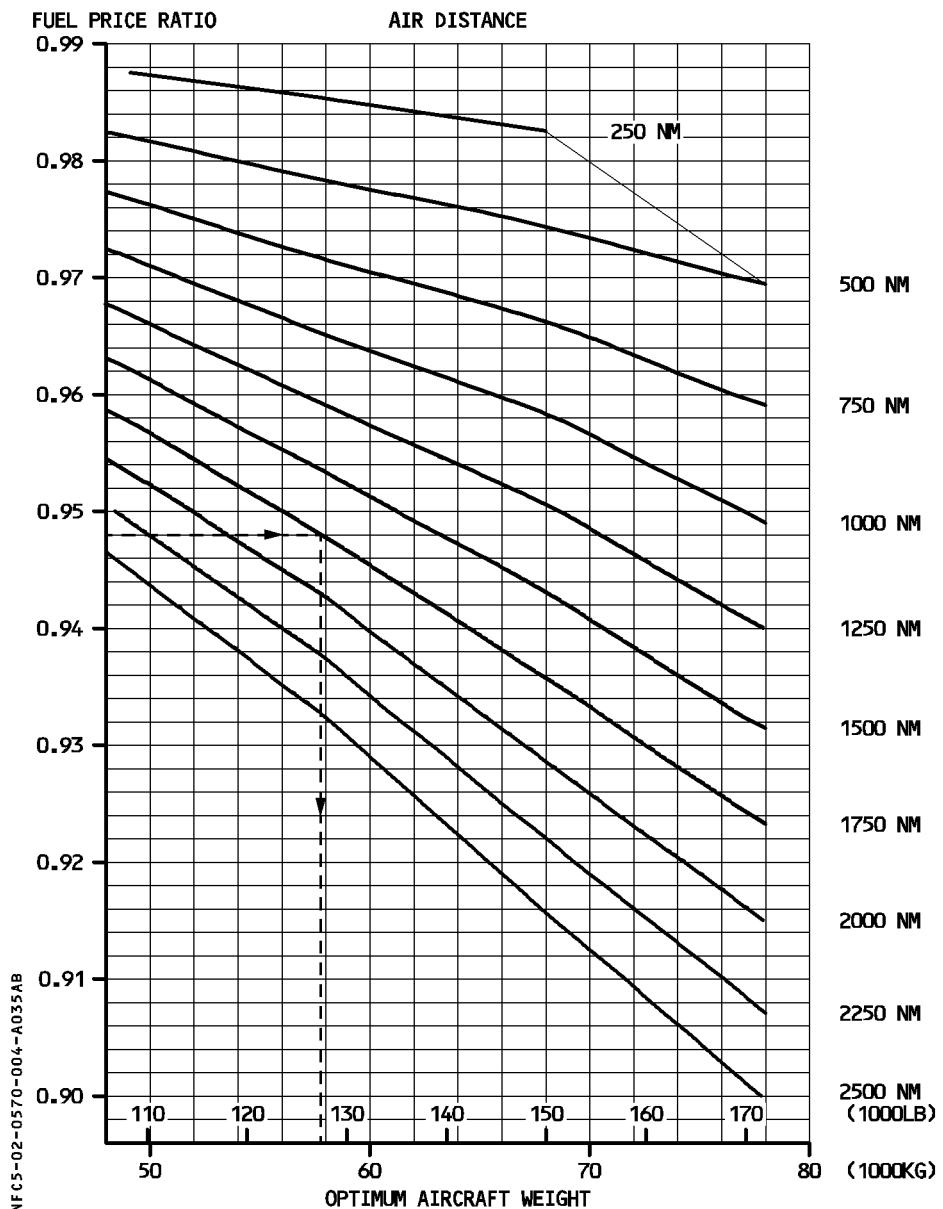
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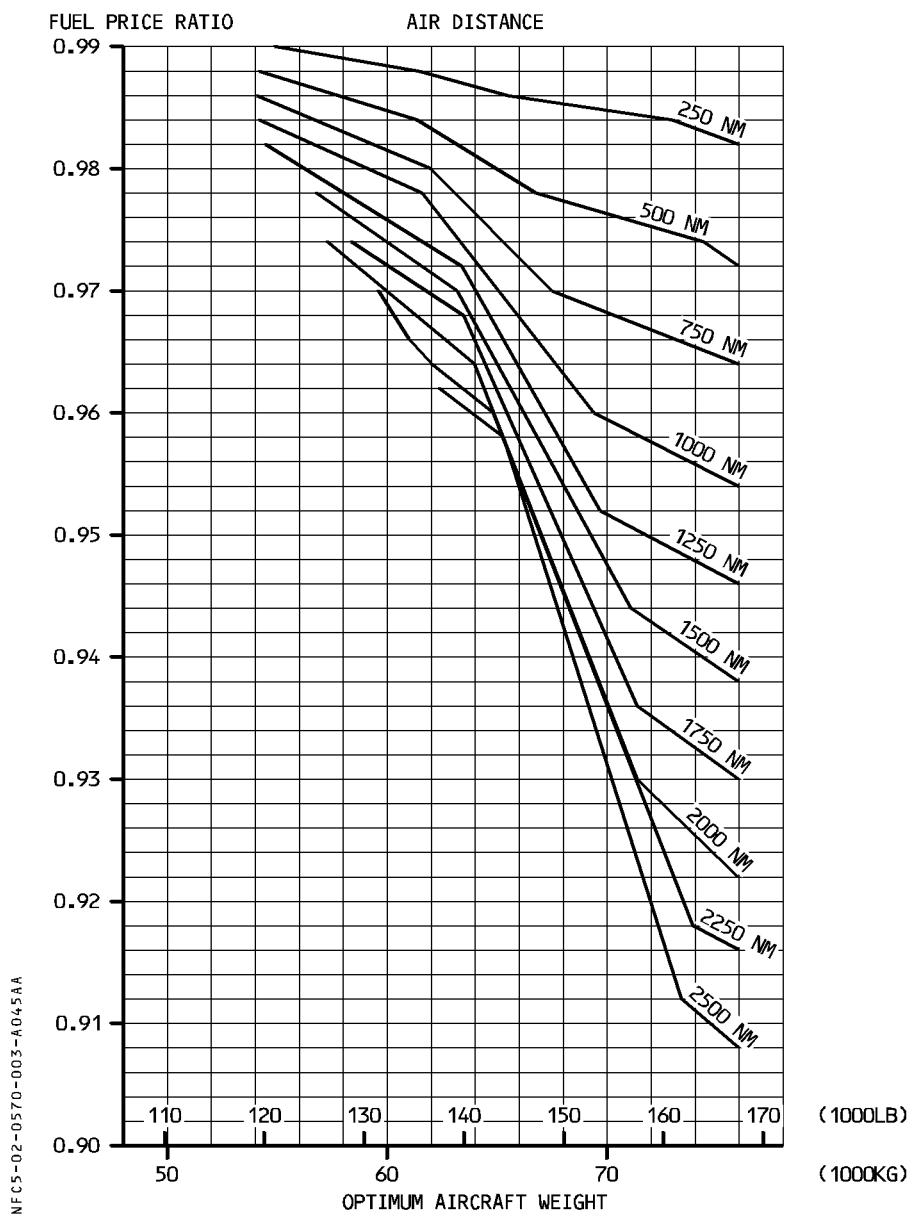
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- b) total fuel to be loaded less than or equal to maximum fuel capacity ;
- c) MLW at destination

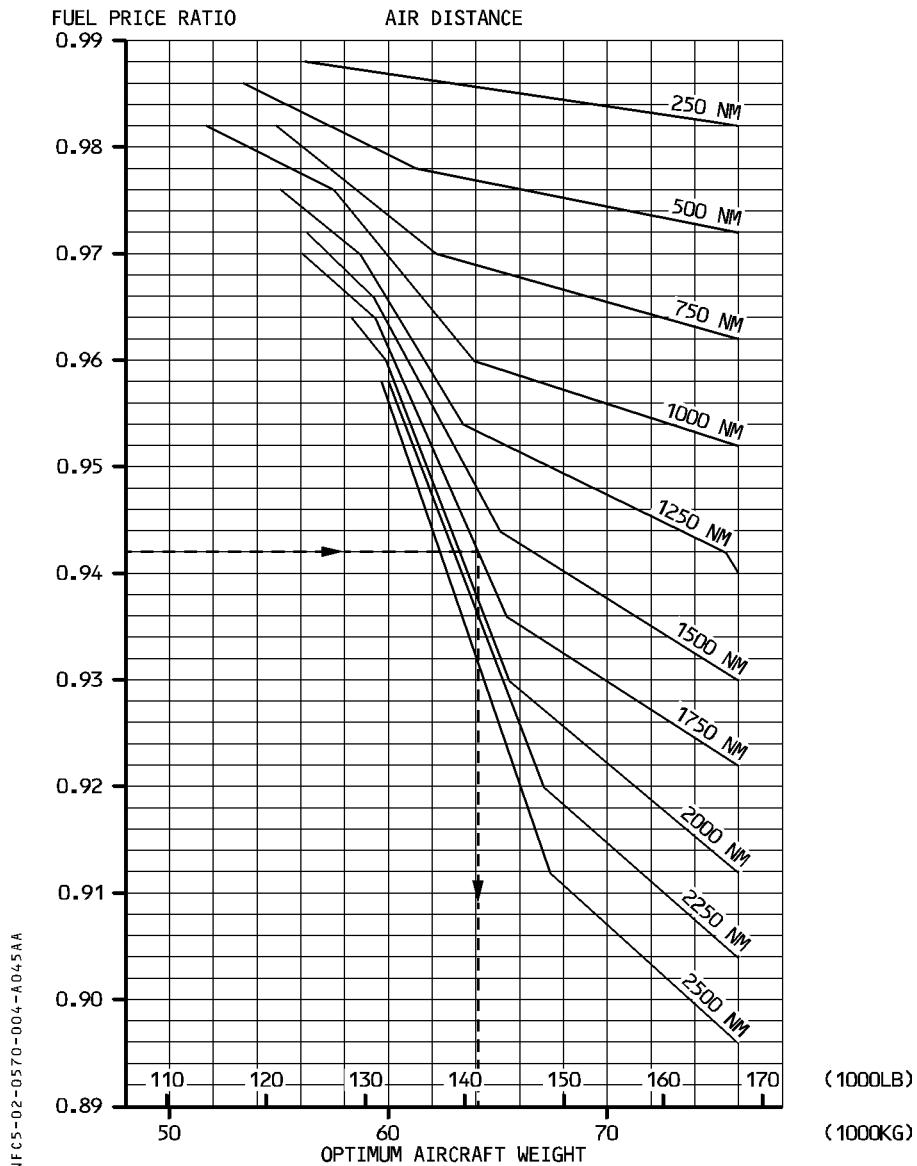
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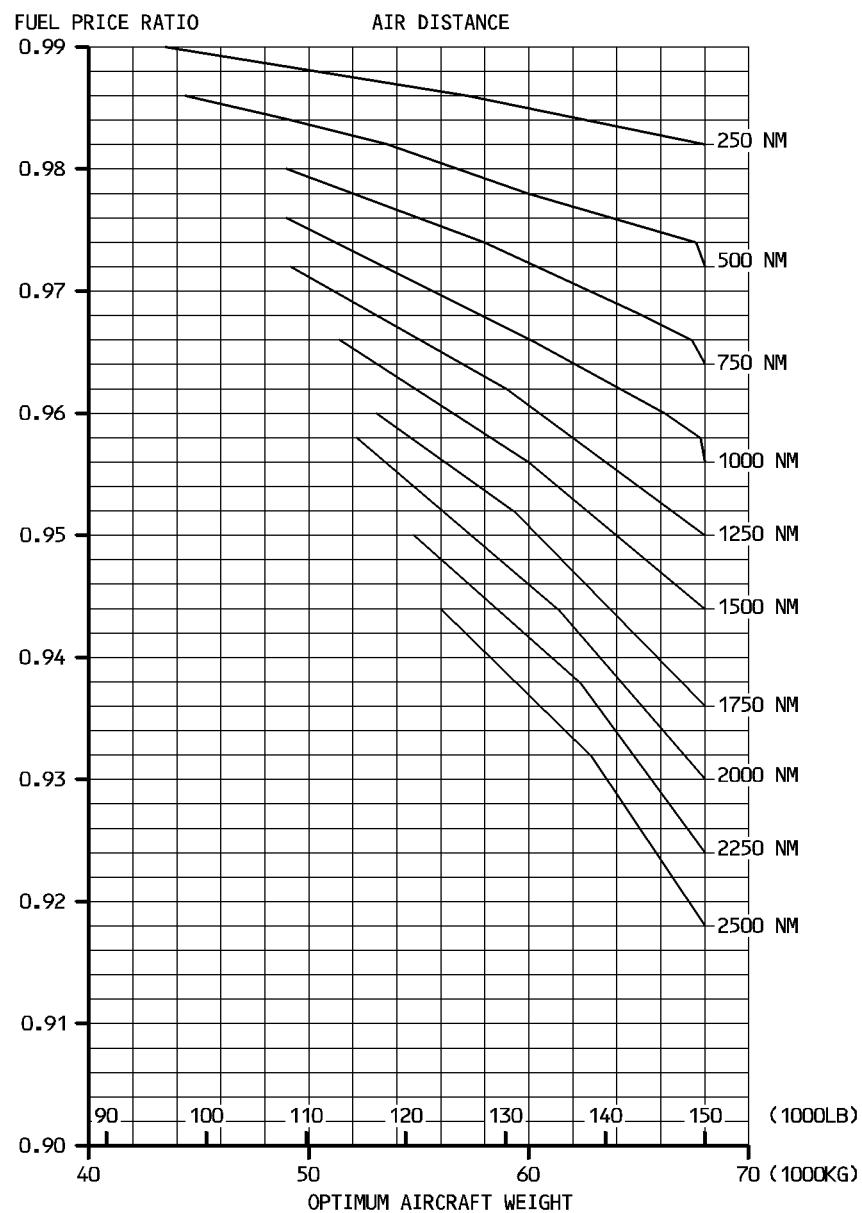


FL310



FL290

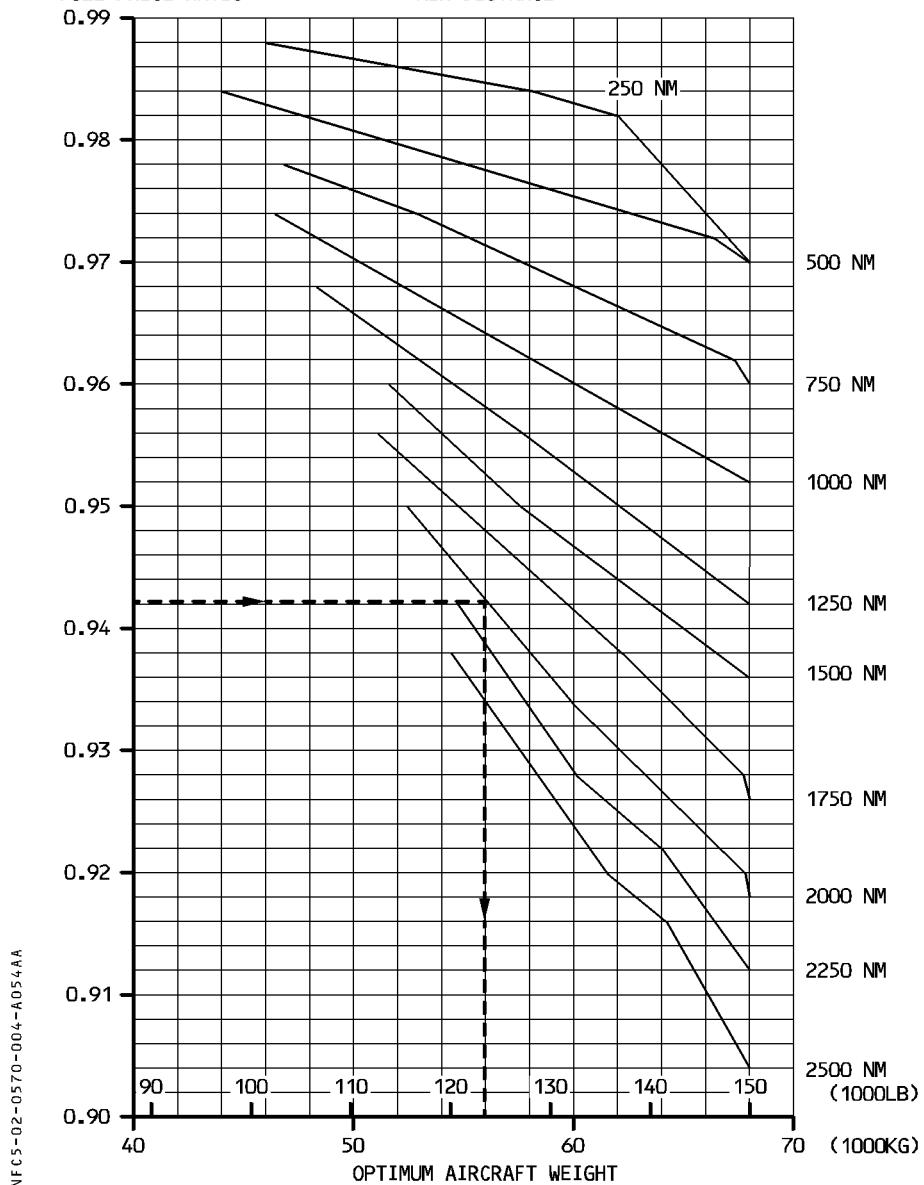
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FL290

FL310

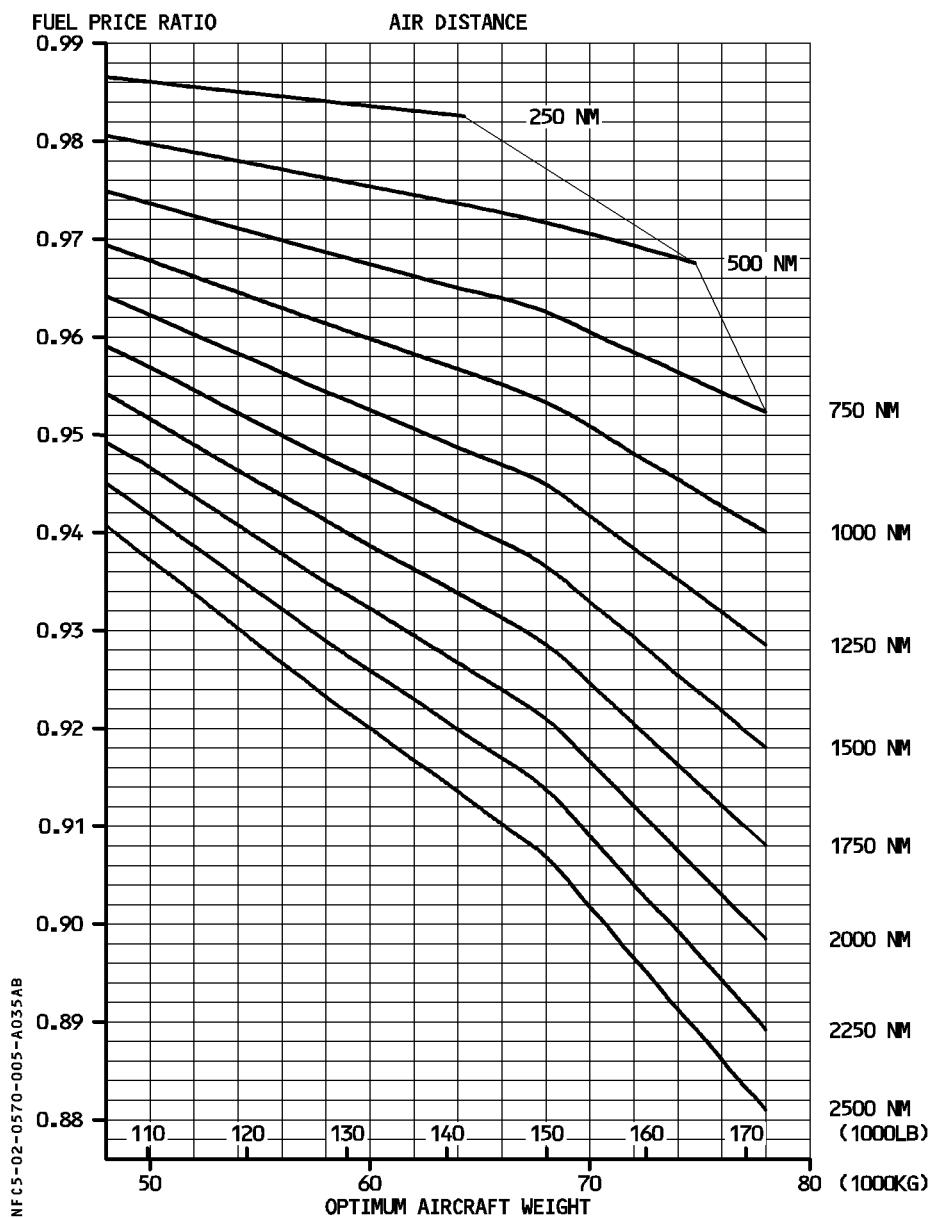
FUEL PRICE RATIO

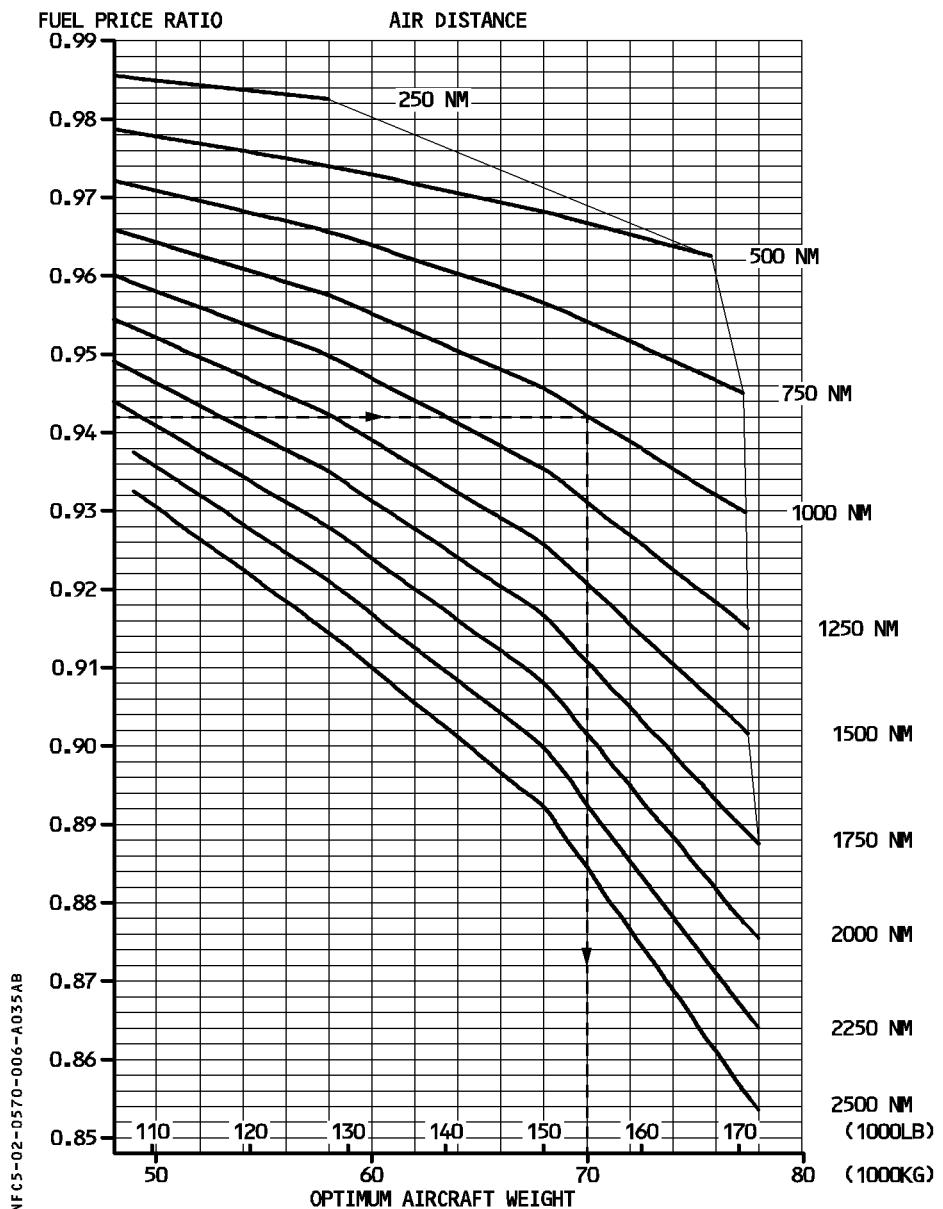
AIR DISTANCE

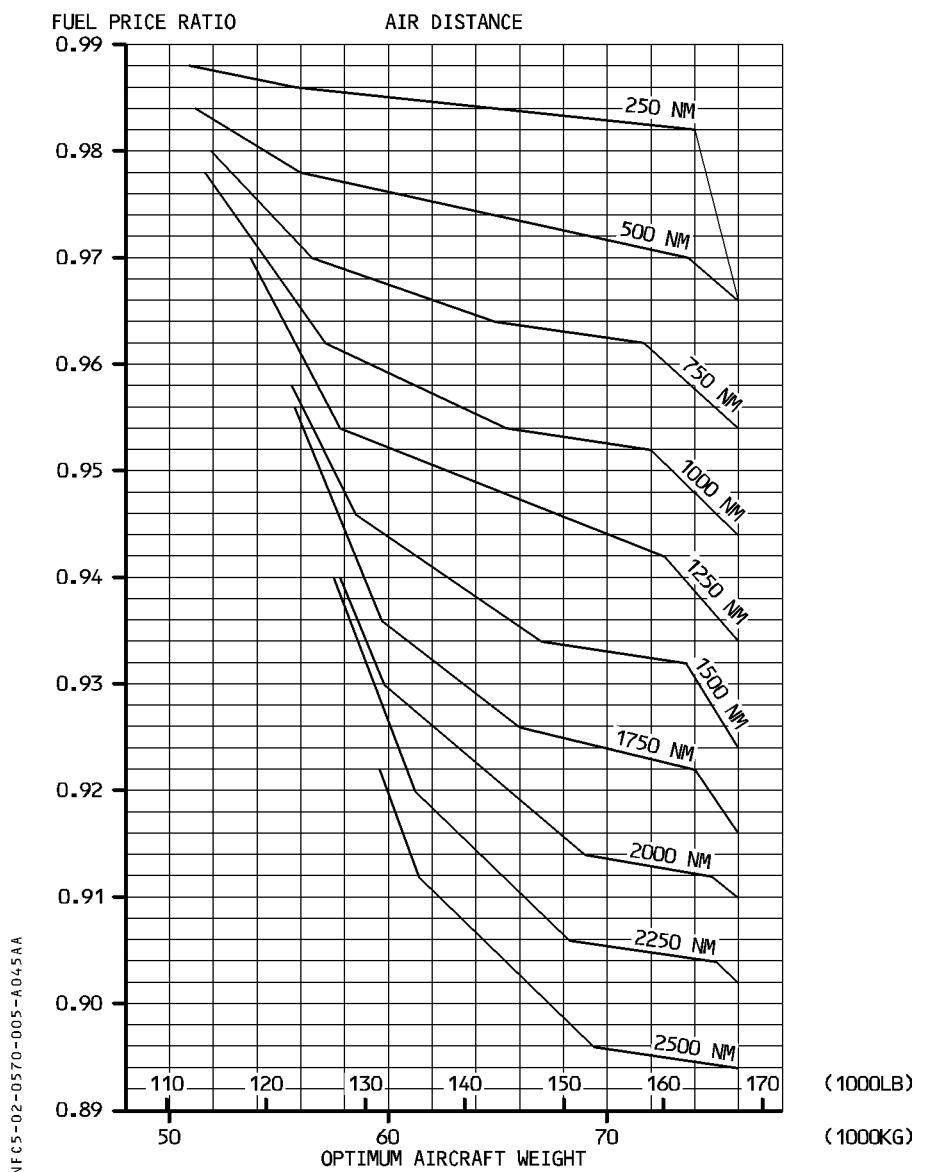


NFC5-02-0570-004-A054AA

FL330



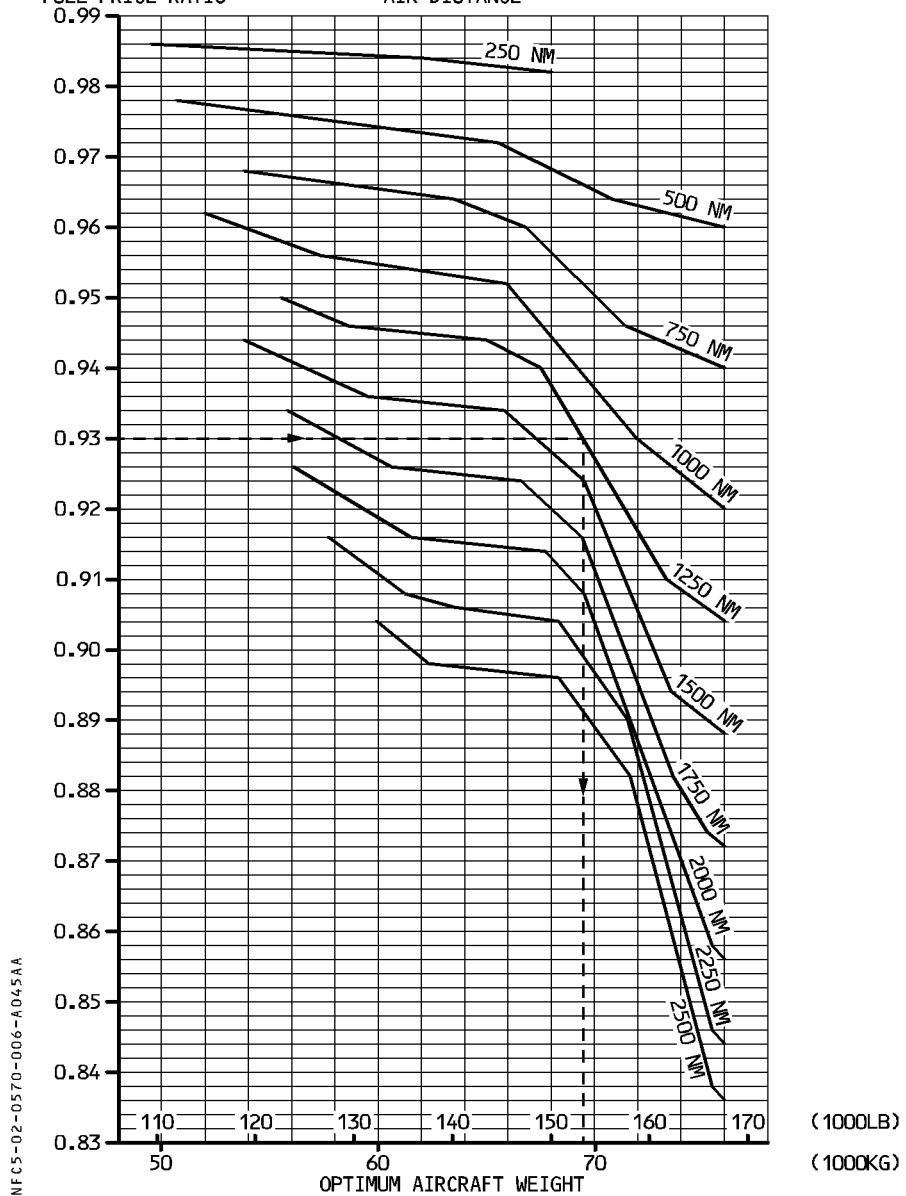
FL350

FL330

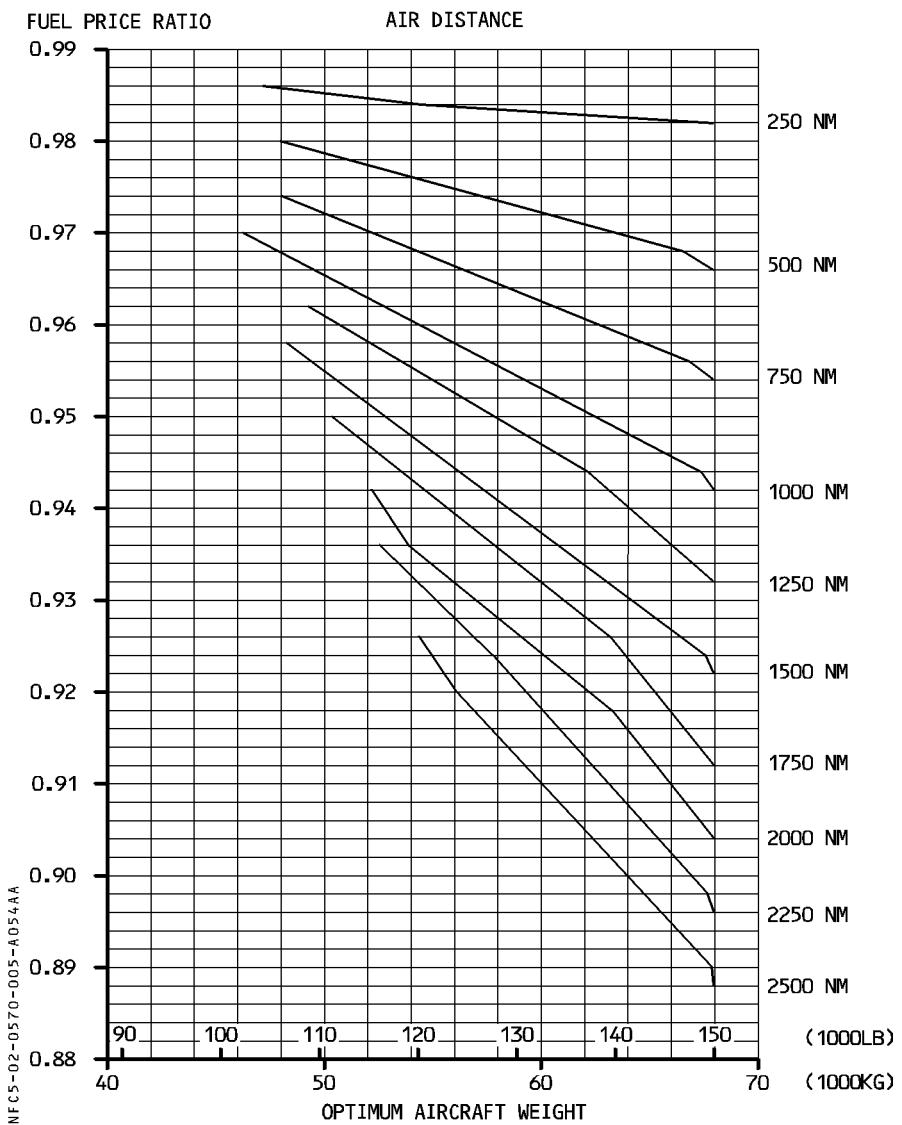
FL350

FUEL PRICE RATIO

AIR DISTANCE



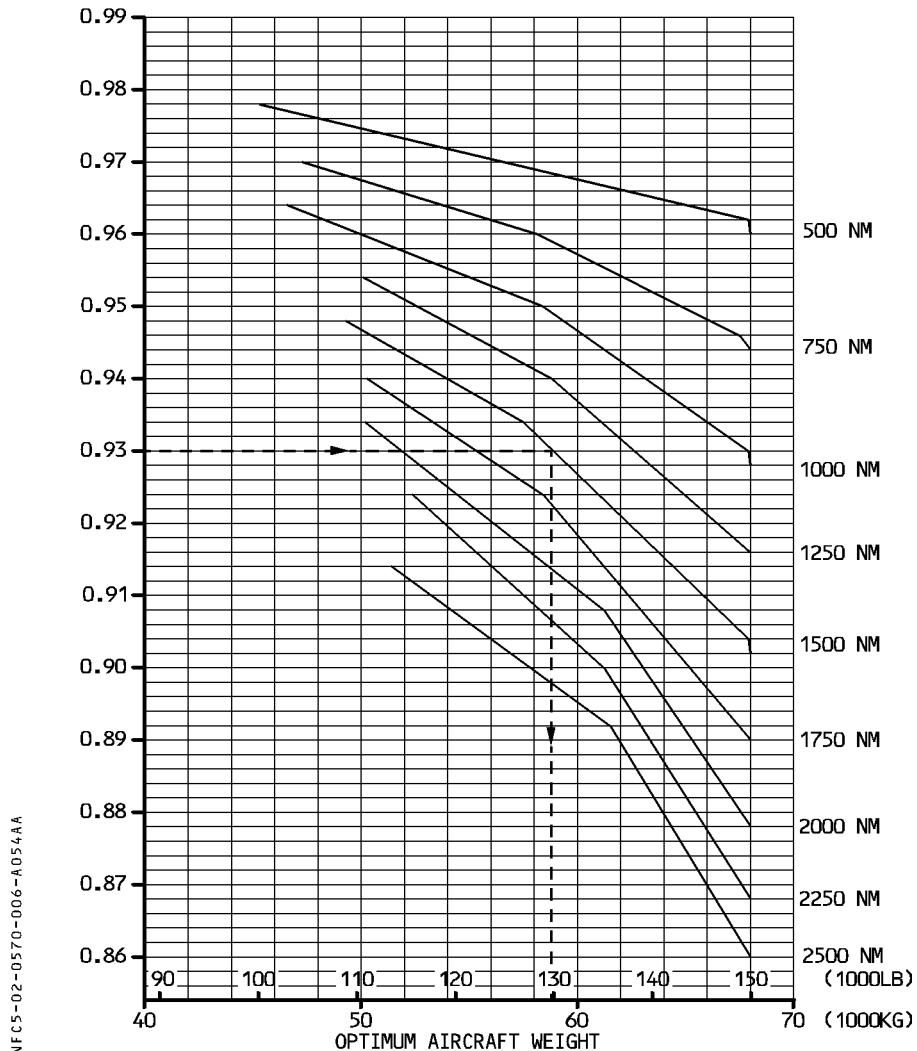
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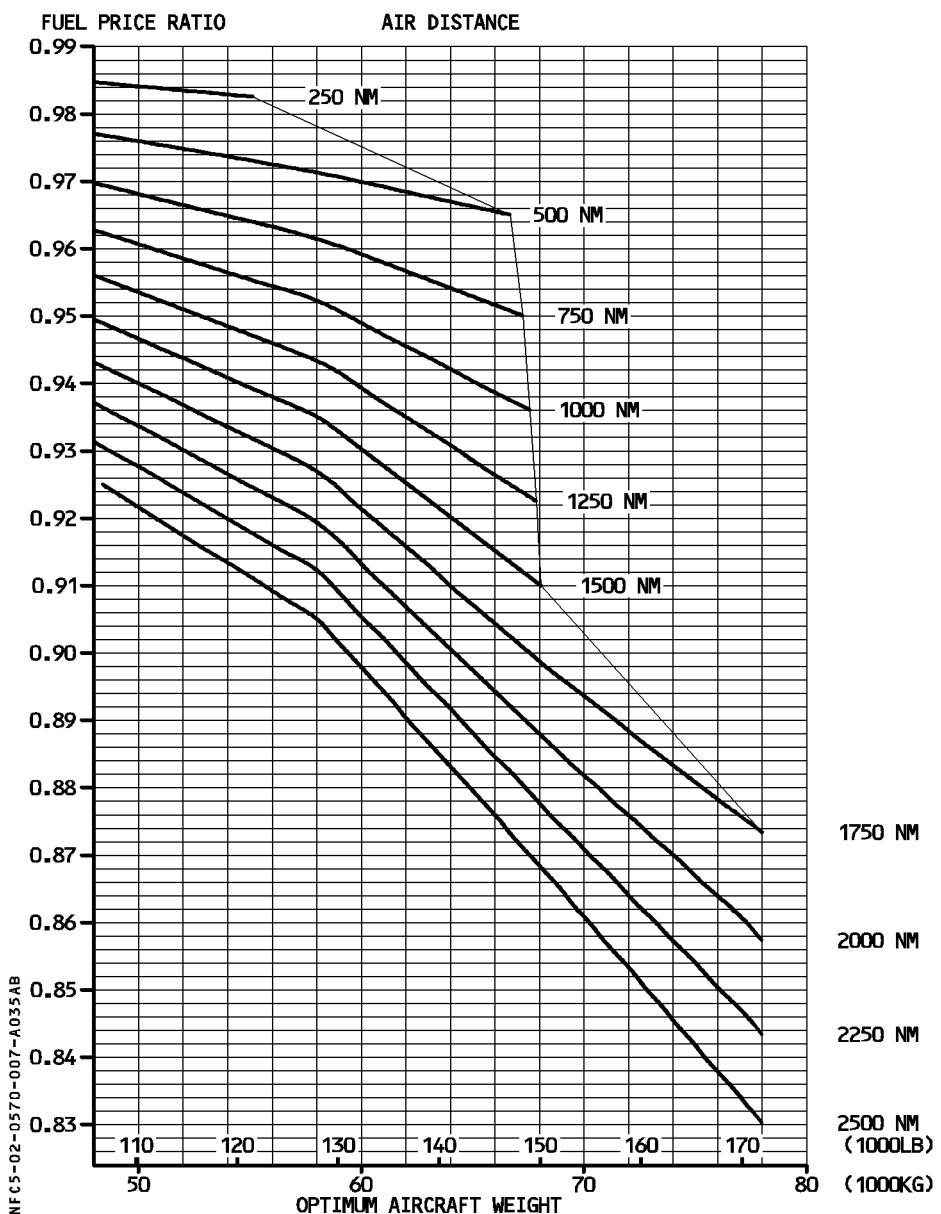
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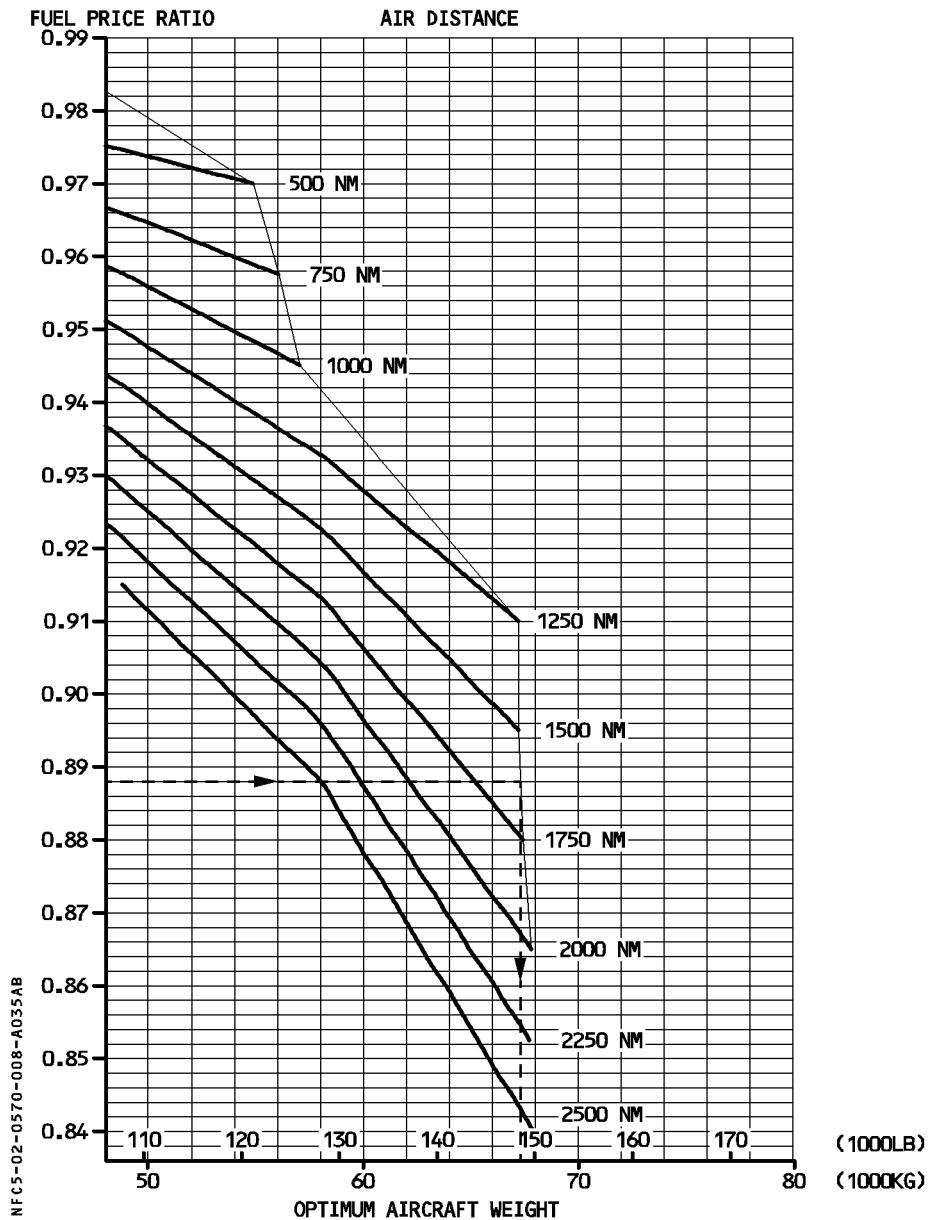
FUEL PRICE RATIO

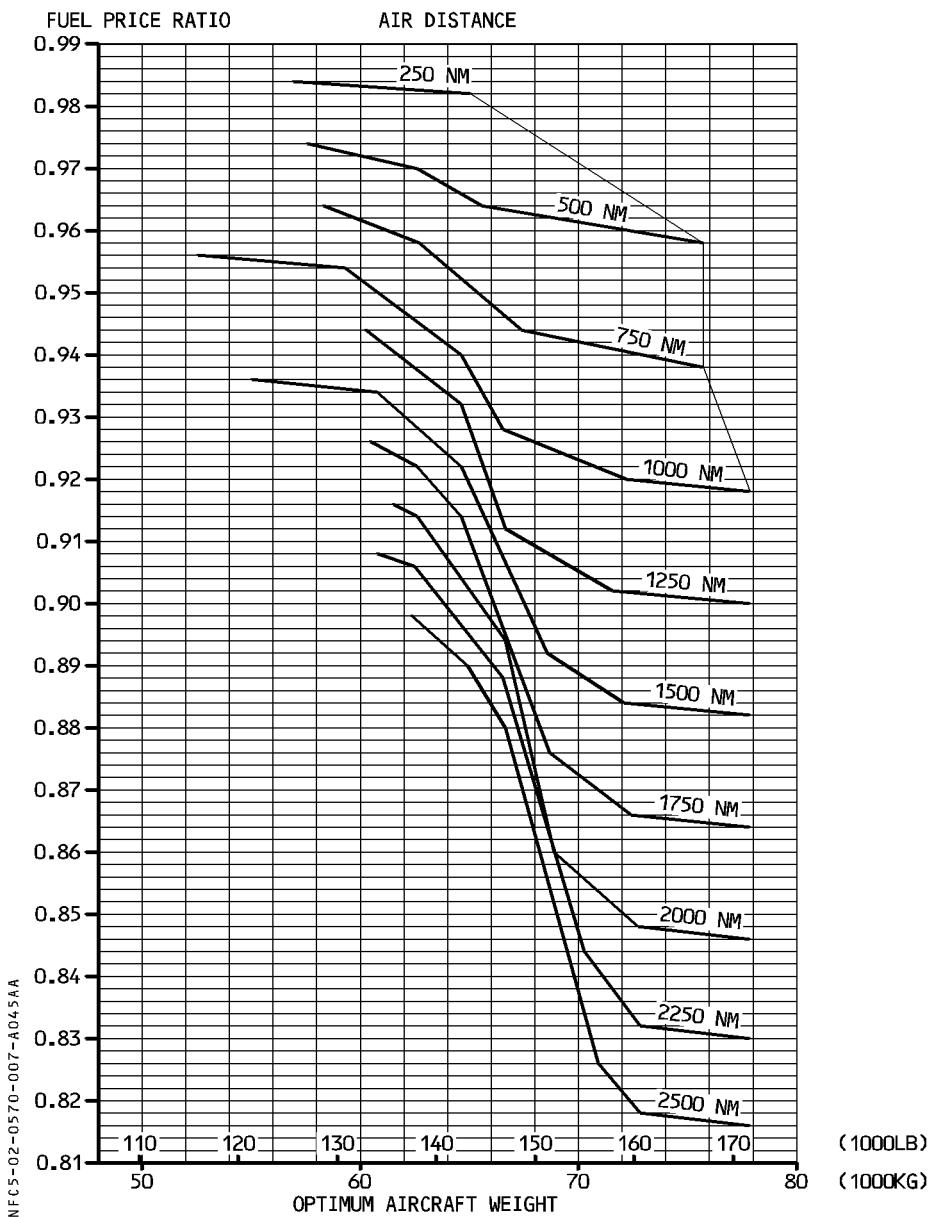
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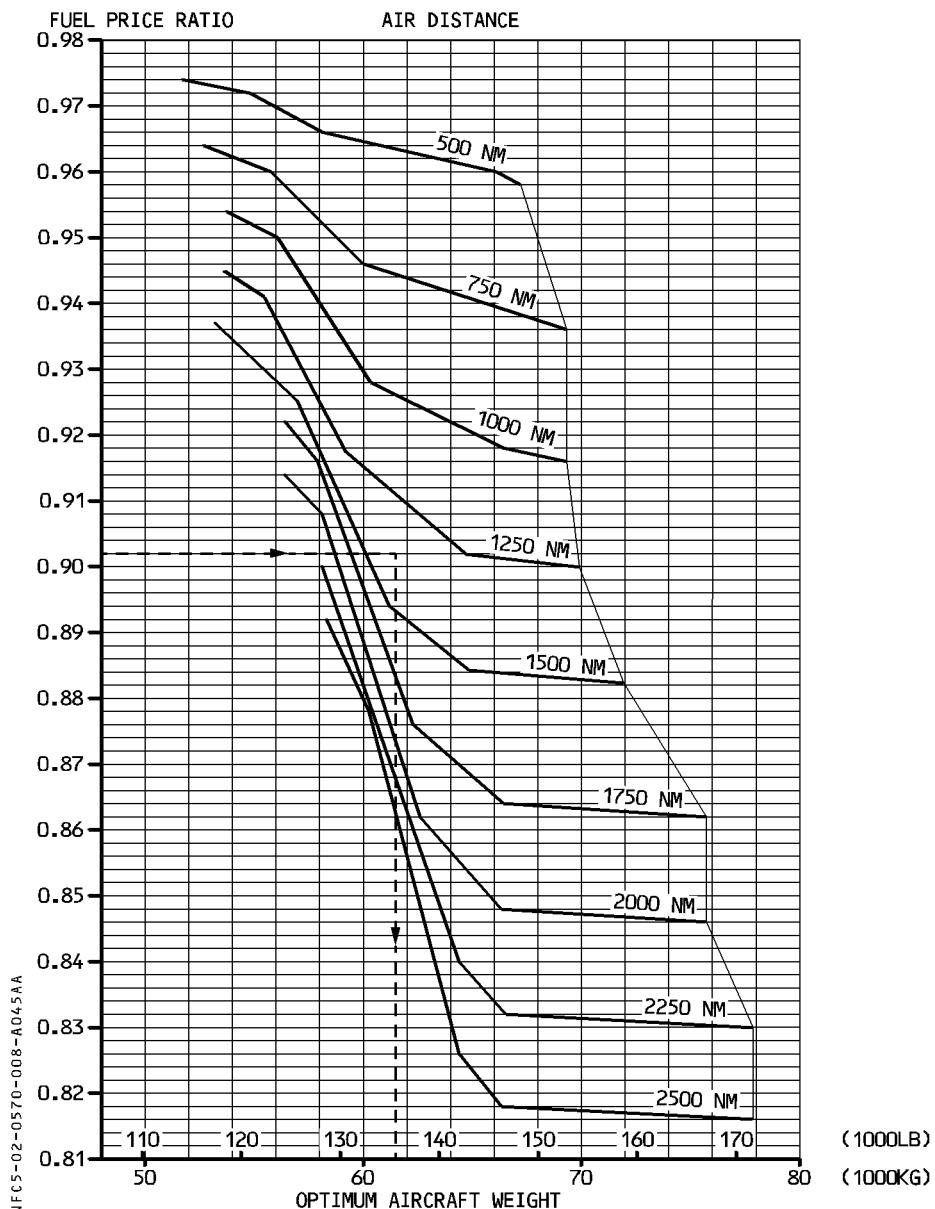


NFC5-02-0570-006-A054AA

FL370

FL390

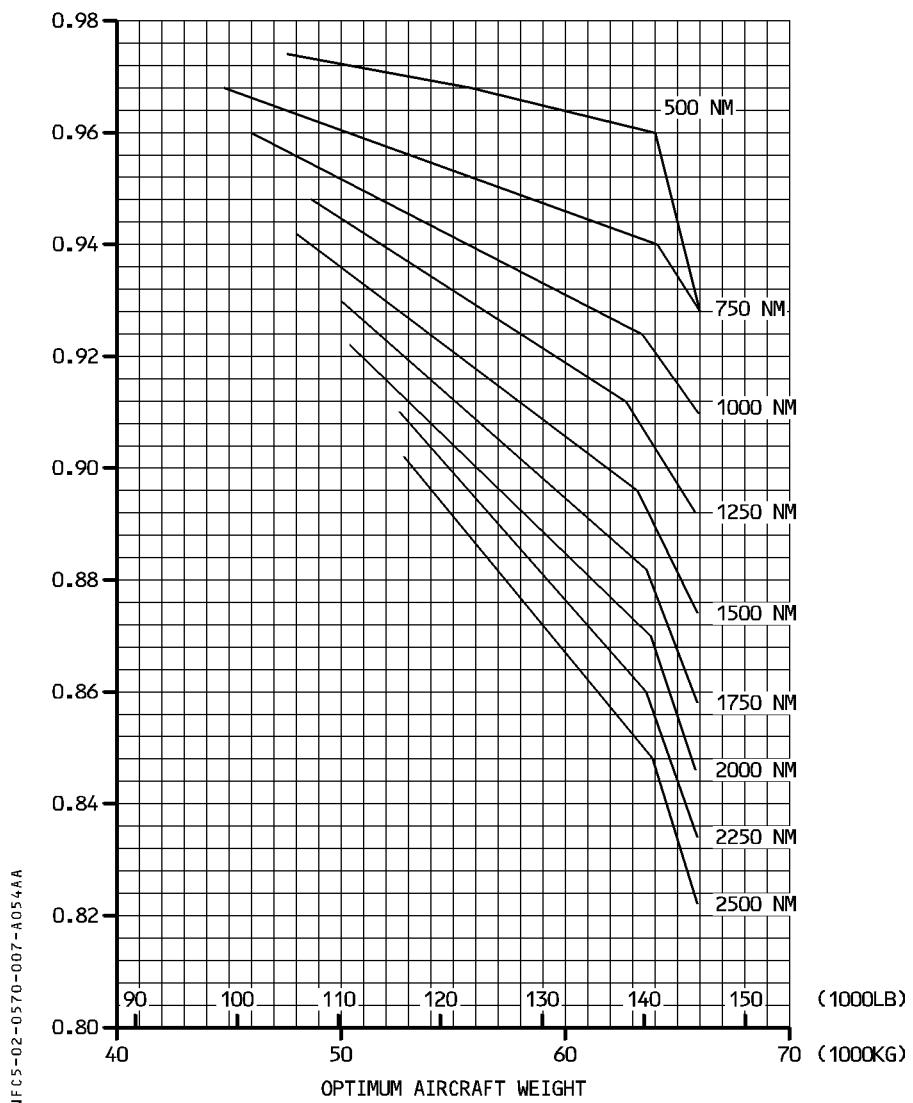
FL370

FL390

FL370

FUEL PRICE RATIO

AIR DISTANCE



NFC5-02-0570-007-A054AA

FL390