

FLIGHT CREW OPERATING MANUAL



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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.

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

FOR TECHNICAL OR
PROCEDURAL
CONTENT

FOR PRINTING AND
DISTRIBUTION

NFC5-02-0010-001-A001AA

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

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

In addition, the purpose of the FCOM is to :

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

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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.

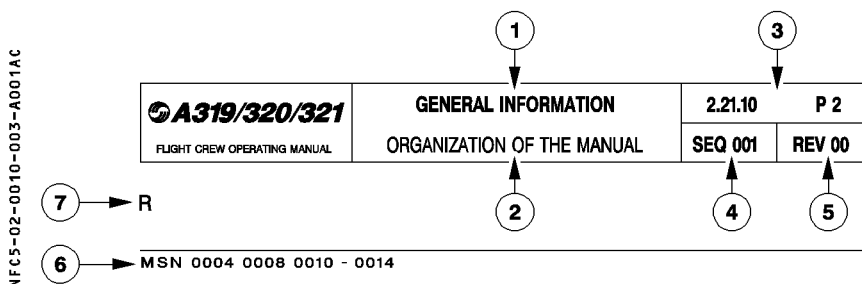
- Where a paragraph or schematic is preceded by the heading **FOR INFO** the details given are considered to be nice to know. Knowledge of these items is not required for the type rating qualification.
- ECAM warnings and cautions are summarized in a table at the end of each chapter of the volume 1.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

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PAGINATION



- ① Chapter title
- ② Subchapter title
- ③ FCOM volume number, chapter number, section number, page number
- ④ Sequence number is used for Airbus Industrie management of different aircraft configurations and allows to enter into list of effective pages
- ⑤ Revision number of the manual at which the page has been revised
- ⑥ Aircraft MSN
 - 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
R sequence e.g. 20A, 20B, 20C... for intermediate revisions issued between normal revisions
R 20 and 21.

R They are accompanied by filing instructions and an updated list of effective pages.

TEMPORARY REVISIONS

Printed on yellow paper, the Temporary Revisions (TR) are issued to 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.

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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
R 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)

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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)
R 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)
0023	Mod : (20268+25530) = (20268+25530+25800) = (20268+25800+27727) = (20268+25530+25800+27727)
0024	Mod : (20024+20167) = (20024+20167+22802) = (20024+20167+21120+23869) = (20024+20167+21120+22802+23869)
0025	Mod : (20024+20167+22013) = (20024+20167+22013+22802) = (20024+20167+20586+22013+22802)
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)
0030	Mod : 22013 = (22013+22802) = (20586+22013+22802)
0031	Mod : 20024 = (20024+22802) = (20024+20586+22802)
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)
0042	Mod : (20268+22013) = (20268+22013+25141)
0043	Mod : (20268+25714) = (20268+25714+26131)
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)
0045	Mod : (20268+22461) = (20268+23408) = (20268+22461+23408) = (20139+20268+22129+22461+23408)
0046	Mod : (25615+26018+26645) = (23108+25615+26018+26645)

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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)

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	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 R R	0099	Mod : (20268+25647+26965) = (20268+25647+31106)
	0100	Mod : (20024+20167+22013) = (20024+20167+20586+22013) = (20024+20167+22013+37565)
	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+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+26965+35040) = (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	$\text{Mod : (20268+24946+25647+27773) = (20268+25647+27773+32311) =}$ $(20268+25647+27773+32150) = (20268+25647+26760+27773) =$ $(20268+25647+27773+32238) = (20268+25647+27773+32239) =$ $(20268+25647+25951+27773) = (20268+24946+25647+26965) =$ $(20268+25647+26965+32311) = (20268+25647+26965+32150) =$ $(20268+25647+26760+26965) = (20268+25647+26965+32238) =$ $(20268+25647+26965+32239) = (20268+25647+25951+26965) =$ $(20268+25647+26965+35040) = (20268+25647+27773+35040) =$ $(20268+24946+27773+ACA) = (20268+27773+32311+ACA) =$ $(20268+27773+32150+ACA) = (20268+26760+27773+ACA) =$ $(20268+27773+32238+ACA) = (20268+27773+32239+ACA) =$ $(20268+25951+27773+ACA) = (20268+24946+26965+ACA) =$ $(20268+26965+32311+ACA) = (20268+26965+32150+ACA) =$ $(20268+26760+26965+ACA) = (20268+26965+32238+ACA) =$ $(20268+26965+32239+ACA) = (20268+25951+26965+ACA) =$ $(20268+26965+35040+ACA) = (20268+27773+35040+ACA)$
0106	$\text{Mod : (20268+22461+27773+32311) = (20268+22461+27773+32150) =}$ $(20268+22461+27773+24946) = (20268+22461+27773+26760) =$ $(20268+22461+27773+32238) = (20268+22461+27773+25951) =$ $(20268+22461+27773+32239) = (20268+22461+26965+32311) =$ $(20268+22461+26965+32150) = (20268+22461+26965+24946) =$ $(20268+22461+26965+26760) = (20268+22461+26965+32238) =$ $(20268+22461+26965+25951) = (20268+22461+26965+32239) =$ $(20268+22461+26965+35040) = (20268+22461+27773+35040) =$ $(20268+23408+27773+32311) = (20268+23408+27773+32150) =$ $(20268+23408+27773+24946) = (20268+23408+27773+26760) =$ $(20268+23408+27773+32238) = (20268+23408+27773+25951) =$ $(20268+23408+27773+32239) = (20268+23408+26965+32311) =$ $(20268+23408+26965+32150) = (20268+23408+26965+24946) =$ $(20268+23408+26965+26760) = (20268+23408+26965+32238) =$ $(20268+23408+26965+25951) = (20268+23408+26965+32239) =$ $(20268+23408+26965+35040) = (20268+23408+27773+35040) =$ $(20268+22461+23408+27773+32311) = (20268+22461+23408+27773+32150) =$ $(20268+22461+23408+27773+24946) = (20268+22461+23408+27773+26760) =$ $(20268+22461+23408+27773+32238) = (20268+22461+23408+27773+25951) =$ $(20268+22461+23408+26965+32311) = (20268+22461+23408+26965+32150) =$ $(20268+22461+23408+26965+24946) = (20268+22461+23408+26965+26760) =$ $(20268+22461+23408+26965+32238) = (20268+22461+23408+26965+25951) =$ $(20268+22461+23408+26965+32239) = (20268+22461+23408+26965+35040) =$ $(20268+22461+23408+27773+35040)$
0107	$\text{Mod : (24946+25647+27773) = (25647+27773+32311) = (25647+27773+32150) =}$ $(25647+26760+27773) = (25647+27773+32238) = (25647+27773+32239) =$ $(25647+25951+27773) = (24946+25647+26965) = (25647+26965+32311) =$ $(25647+26965+32150) = (25647+26760+26965) = (25647+26965+32238) =$ $(25647+26965+32239) = (25647+25951+26965) = (25647+26965+35040) =$ $(25647+27773+35040) = (24946+27773+ACA) = (27773+32311+ACA) =$ $(27773+32150+ACA) = (26760+27773+ACA) = (27773+32238+ACA) =$ $(27773+32239+ACA) = (25951+27773+ACA) = (24946+26965+ACA) =$ $(26965+32311+ACA) = (26965+32150+ACA) = (26760+26965+ACA) =$ $(26965+32238+ACA) = (26965+32239+ACA) = (25951+26965+ACA) =$ $(26965+35040+ACA) = (27773+35040+ACA)$

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R R R R R R R R R R R R R R R R R R R	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)
	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+26965+20268+33239) = (25951+27773+20268+33239) = (26760+26965+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) = (25951+27773+20268+32619+33239) = (26760+26965+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+32239) = (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+32239) = (ACA + 20268+25647+26965+25951) = (ACA+20268+25647+26965+35040) = (ACA+20268+25647+27773+35040)
	0121	Mod : (20024+28378) = (20024+33973) = (20024+20164+33973) = (20024+20164+20586+28378)

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		0122	Mod : 25453 = 28378 = 30422 = 33973 = 34456 = 37226
		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)

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

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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-a1)
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)

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	FLIGHT CREW OPERATING MANUAL	LIST OF CODES	

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+28686+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+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)”
0219	Mod : (20268+36311) = (20268+36297)

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

LIST OF CODES

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

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+36666) = (27727+35404+36667) = (24404+27727+32009+35404) = (24404+27727+35404+36664) = (24404+27727+35404+36666) = (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+36666) = (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+36666) = (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+36666)
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+36666) = (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+36297+36667) = (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+36297+36667) = (20268+25800+36885+32009) = (20268+25800+36885+36664) = (20268+25800+36885+36666) = (20268+25530+26505+36311+32009) = (20268+25530+26505+36311+36664) = (20268+25530+26505+36311+36666) = (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+25800+25530+26505+36297+32009) = (20268+25800+25530+26505+36297+36664) = (20268+25800+25530+26505+36297+36666) = (20268+25800+25530+26505+36311+32009) = (20268+25800+25530+26505+36311+36664) = (20268+25800+25530+26505+36311+36666)
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)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	GENERAL INFORMATION LIST OF NORMAL REVISIONS	2.00.30	P 1
		SEQ 001	REV 28

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	

R

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	

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-CP0
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

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	10	001	001	REV038		ORGANIZATION OF THE MANUAL		ALL
		2	00	10	002	001	REV038		ORGANIZATION OF THE MANUAL		
		2	00	10	003	001	REV022		ORGANIZATION OF THE MANUAL		ALL
		2	00	10	004	001	REV022		ORGANIZATION OF THE MANUAL		
		2	00	10	005	001	REV021		ORGANIZATION OF THE MANUAL		ALL
R		2	00	20	001	001	REV039		LIST OF CODES		ALL
R		2	00	20	002	001	REV039		LIST OF CODES		
R		2	00	20	003	001	REV039		LIST OF CODES		ALL
R		2	00	20	004	001	REV039		LIST OF CODES		
R		2	00	20	005	001	REV039		LIST OF CODES		ALL
R		2	00	20	006	001	REV039		LIST OF CODES		
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R		2	00	20	008	001	REV039		LIST OF CODES		
R		2	00	20	009	001	REV039		LIST OF CODES		ALL
R		2	00	20	010	001	REV039		LIST OF CODES		
N		2	00	20	011	001	REV039		LIST OF CODES		ALL
N		2	00	20	012	001	REV039		LIST OF CODES		
N		2	00	20	013	001	REV039		LIST OF CODES		ALL
R		2	00	30	001	001	REV028		LIST OF NORMAL REVISIONS		ALL
R		2	00	30	002	001	REV039		LIST OF NORMAL REVISIONS		
		2	00	35	001	001	REV022		RECORD OF TEMPORARY REVISION		ALL
R		2	00	36	001	001	REV039		LIST OF EFFECTIVE TR		ALL
R		2	00	70	001	001	REV039		CROSS REFERENCE TABLE		ALL
R		2	00	75	001	001	REV039		HIGHLIGHTS		ALL
R		2	00	80	001	001	REV039		LIST OF EFFECTIVE PAGES		ALL
R		2	00	85	001	001	REV039		LIST OF MODIFICATIONS		ALL
R		2	01	00	001	001	REV039				ALL
		2	01	10	001	001	REV031				ALL
		2	01	20	001	100	REV021	21103		0990-1903 3280-3319	
		2	01	20	002	110	REV035	CODE 0143			
		2	01	20	001	100	REV021	21103		2089-2894	
		2	01	20	002	210	REV035	M:21103+24105			
		2	01	20	001	110	REV034	M: 30020		3001-3216	
		2	01	20	002	100	REV034	M:30020+([21103+24105+30020])			

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2	01	20	003			100	REV020		MOD:21329		ALL
2	01	20	004			100	REV026		M:23320		
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
2	01	30	020			100	REV033		CODE 0031		
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	004			110	REV035		MOD 20268		
2	01	40	003			210	REV028		MOD:20268+24105		2089-2894
2	01	40	004			230	REV035		MOD 20268+24105		
2	01	40	003			305	REV038		M:20268+24105+30020		3001-3216
2	01	40	004			305	REV038		M:20268+24105+30020		
2	01	40	005			110	REV035		MOD 20268		0990-1903 3280-3319
2	01	40	006			001	REV030				
2	01	40	005			230	REV035		MOD 20268+24105		2089-2894
2	01	40	006			001	REV030				
2	01	40	005			305	REV038		M:20268+24105+30020		3001-3216
2	01	40	006			001	REV030				
2	02	00	001			100	REV025		CODE 0189		0990-1903
2	02	00	002			001	REV035				
2	02	00	001			100	REV025		CODE 0189		2089-3319
2	02	00	002			100	REV036		M:33309		
2	02	05	001			001	REV022				ALL
2	02	10	001			001	REV022				ALL
2	02	10	002			100	REV025		CODE 0189		
2	02	10	003			100	REV025		CODE 0188		2089-3216
2	02	10	004			100	REV025		CODE 0189		
2	02	10	003			370	REV034		C0090/2500/2527/27E/B4/A1/A3		0990-1903 3280-3319
2	02	10	004			100	REV025		CODE 0189		
2	02	10	005			100	REV025		CODE 0189		2089-2894
2	02	10	006			110	REV026		M:24105		
2	02	10	005			100	REV025		CODE 0189		3001-3216
2	02	10	006			201	REV036		M:24105+30020		
2	02	10	005			100	REV025		CODE 0189		0990-1903 3280-3319
2	02	10	006			270	REV034		C0092/2527/2500/27E/A1/A3/B4		
2	02	12	001			110	REV025		M:24105		2089-2894
2	02	12	002			055	REV030		IAE V2524		
R	2	02	12	001		200	REV034		M:24105+30020		3001-3216
R	2	02	12	002		078	REV039		PW:6122A		
2	02	12	001			270	REV037		C0092/V2500/27/27E/A1/A3/B4		0990-1903 3280-3319
2	02	12	002			270	REV037		CODE 0092/IAE V2527/2527EA5		
2	02	12	003			110	REV025		M:24105		2089-2894
2	02	12	004			055	REV030		IAE V2524		
2	02	12	003			200	REV034		M:24105+30020		3001-3216
2	02	12	004			078	REV038		PW:6122A		

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		2	02	12	004	270	REV037		CODE 0092/IAE V2527/2527EA5		
		2	02	12	005	055	REV030		IAE V2524	2089-2894	
		2	02	12	006	100	REV022		CODE 0189		
		2	02	12	005	078	REV038		PW:6122A	3001-3216	
		2	02	12	006	100	REV022		CODE 0189		
		2	02	12	005	270	REV037		CODE 0092/V2527/2527EA5	0990-1903 3280-3319	
		2	02	12	006	100	REV022		CODE 0189		
		2	02	14	001	055	REV022		IAE V2524	2089-2894	
		2	02	14	002	100	REV038		CODE 0192		
		2	02	14	001	075	REV022		IAE V2527/V2527E	0990-1903 3280-3319	
		2	02	14	002	100	REV038		CODE 0192		
		2	02	14	001	078	REV038		PW:6122A	3001-3216	
		2	02	14	002	100	REV038		CODE 0192		
		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	
		2	02	14	008	100	REV033		CODE 0192		
R		2	02	14	007	078	REV039		PW:6122A	3001-3216	
R		2	02	14	008	100	REV033		CODE 0192		
		2	02	14	007	270	REV034		CODE 0092/IAE V2527	0990	
		2	02	14	008	100	REV033		CODE 0192		
		2	02	14	007	275	REV034		CODE 0092/IAE V2527E	1304-1903 3280-3319	
		2	02	14	008	100	REV033		CODE 0192		
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		2	02	16	002	100	REV023		CODE 0189		

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2	02	16	004			100	REV025		CODE 0198		
2	02	16	003			370	REV034		0090/V2500/2527/27E/B4/A1/A3	0990-1903	3280-3319
2	02	16	004			100	REV025		CODE 0198		
2	02	16	005			100	REV037		CODE 0189		2089-2894
2	02	16	006			105	REV025		M:24105		
2	02	16	005			100	REV037		CODE 0189		3001-3216
2	02	16	006			201	REV036		M:24105+30020		
2	02	16	005			100	REV037		CODE 0189	0990-1903	3280-3319
2	02	16	006			270	REV034		0092 V2527/27E/2500/A1/A3/B4		
2	02	18	001			100	REV025		CODE 0189		2089-2894
2	02	18	002			100	REV025		M:24105		
2	02	18	001			100	REV025		CODE 0189		3001-3216
2	02	18	002			200	REV034		M:24105+30020		
2	02	18	001			100	REV025		CODE 0189	0990-1903	3280-3319
2	02	18	002			270	REV034		0092 V2527/27E/2500/A1/A3/B4		
2	02	18	003			050	REV030		IAE V2524		2089-2894
2	02	18	004			100	REV035		M:24105		
2	02	18	003			078	REV038		PW:6122A		3001-3216
2	02	18	004			200	REV034		M:24105+30020		
2	02	18	003			250	REV034		CODE 0092/V2527E	1304-1903	3280-3319
2	02	18	004			270	REV037		0092 V2527/27E/2500/A1/A3/B4		
2	02	18	003			270	REV033		CODE 0092 V2527A5	0990	
2	02	18	004			270	REV037		0092 V2527/27E/2500/A1/A3/B4		
2	02	18	005			050	REV030		IAE V2524		2089-2894
2	02	18	006			050	REV030		IAE V2524		
2	02	18	005			078	REV038		PW:6122A		3001-3216
2	02	18	006			078	REV038		PW:6122A		
2	02	18	005			250	REV037		CODE 0092/V2527E/V2527	1304-1903	3280-3319
2	02	18	006			250	REV034		CODE 0092/V2527E		
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2	02	18	006			270	REV033		CODE 0092 V2527A5		
2	02	18	007			100	REV022		CODE 0189	ALL	
2	02	20	001			060	REV022		IAE V2527/V2527E	0990-1903	3280-3319
2	02	20	002			100	REV038		CODE 0192		
2	02	20	001			070	REV022		IAE V2524		2089-2894
2	02	20	002			100	REV038		CODE 0192		
2	02	20	001			078	REV038		PW:6122A		3001-3216
2	02	20	002			100	REV038		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		
2	02	20	007			250	REV034		CODE 0092/V2527E		1304-1903 3280-3319
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
2	02	24	002			065	REV029		IAE V2524		
2	02	24	001			078	REV038		PW:6122A		3001-3216
2	02	24	002			078	REV038		PW:6122A		
2	02	24	001			240	REV034		CODE 0092/V2527E		1304-1903 3280-3319
2	02	24	002			240	REV034		CODE 0092/V2527E		
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	003			140	REV022		M:20268 IAE V2527		0990
2	02	25	004			140	REV022		M:20268 IAE V2527		
2	02	25	003			178	REV038		M:20268/PW:6122A		3001-3216
2	02	25	004			178	REV038		M:20268/PW:6122A		
2	02	25	003			182	REV038		M:20268 IAE V2527E		1304-1903 3280-3319
2	02	25	004			182	REV038		M:20268 IAE V2527E		
2	02	25	003			195	REV022		M:20268 IAE V2524		2089-2894
2	02	25	004			195	REV022		M:20268 IAE V2524		
2	02	27	001			020	REV038		PW6122A/6124A		3001-3216
2	02	27	002			020	REV038		PW6122A/6124A		
2	02	27	003			020	REV038		PW6122A/6124A		3001-3216
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2	02	40	002			110	REV021		M:24105		
2	02	40	001			100	REV037		CODE 0185		3001-3216
2	02	40	002			201	REV034		MOD:24105 + 30020		
2	02	40	001			360	REV037		CODE 0090 (IAE/CFM)		0990-1903 3280-3319
2	02	40	002			260	REV037		CODE 0092 (IAE/CFM)		
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		2	02	40	006	138	REV038		20268/PW 6122		
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		2	02	40	006	203	REV034		CODE 0124 IAE ENG: V2524		
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		2	02	40	008	138	REV038		20268/PW 6122		
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		2	02	40	008	312	REV034		CODE:0090/V2527E		
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		2	02	40	010	001	REV020				
		2	02	40	009	203	REV034		CODE 0124 IAE ENG: V2524		2089-2894
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		2	02	40	013	300	REV034		CODE:0090/56-5-B4		2572-2585
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2	02	50	001			001	REV032				3001-3216
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2	02	50	004			115	REV038		M:20268/PW6122		
2	02	50	003			312	REV034		CODE:0090/V2527E		1304-1903 3280-3319
2	02	50	004			312	REV034		CODE:0090/V2527E		
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2	02	50	004			370	REV033		CODE:0090/V2527		
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2	02	50	007			125	REV022		MOD 20268 IAE V2524		2089-2894
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2	02	50	007			370	REV033		CODE:0095/V2527		0990
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2	03	10	003			160	REV038		20268/6122A/6124A		3001-3216
2	03	10	004			160	REV038		20268/6122A/6124A		

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			2 03 10 005			160	REV038		20268/6122A/6124A		3001-3216
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			2 03 20 002			160	REV038		20268/6122A/6124A		
			2 03 20 001			001	REV033				2089-2894
			2 03 20 002			203	REV034		CODE 0124 IAE ENG: V2524		
			2 03 20 001			001	REV033				0990-1903 3280-3319
			2 03 20 002			300	REV035		CODE 0090 V2527A5/V2527E		
R	2	04	00 001			001	REV039				ALL
R	2	04	00 002			205A	REV038		CODE 0166		
			2 04 00 003			105	REV037		28177		1304-2894 3280-3319
			2 04 00 003			300	REV034		CODE 0236		3001-3216
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			2 04 10 002			001	REV037				
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			2 04 10 002A			340	REV037		C:90/V2527/27E/2500/B4/A1/A3		0990-1903 3280-3319
			2 04 10 002B			100	REV034		CODE 0189		ALL
			2 04 10 003			152	REV038		20268/PW 6122A		3001-3216
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		2	04	25	012	180	REV031	20268	IAE V2522/V2524		
		2	04	25	011	178	REV038	M:20268/PW:6122A			3001-3216
		2	04	25	012	178	REV038	M:20268/PW:6122A			
		2	04	25	011	260	REV035	M:20268+32656/2527/2527E			0990-1903 3280-3319
		2	04	25	012	225	REV035	20268+32656+IAEV2527A5=2527E			
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		2	04	35	002	001	REV021				
R	2	04	40	001	001	REV039					ALL
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N	2	04	40	009	110	REV037	26249				3001-3216
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		2	04	40	009	110	REV037	26249		1854-1903 2572-2894	
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R		2	04	40	0108	200	REV039	24105+30020			3001-3216
		2	04	40	0108	202	REV038	CODE 0214			2096-2894
R		2	04	40	011	161	REV038	20268/6122A/6124A			3001-3216
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		2	04	40	013	051	REV023	V2522A5/V2524A5			2089-2894
		2	04	40	014	051	REV023	V2522/V2524			
N		2	04	40	013	054	REV039	PW 6122A/6124A			3001-3216
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		2	04	51	002	001	REV038				
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		2	04	51	004	001	REV038	CODE 0203			
		2	04	51	003	103	REV038	CODE 0164			1304-3319
		2	04	51	004	103	REV038	CODE 0164			
		2	04	51	005	001	REV038	STD			ALL
		2	04	60	001	110	REV038	M0D 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			

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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

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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	M0D	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	M0D	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	M0D	20268 IAE V2522/V2524		2089-2894
		2	05	30	004	130	REV022	M0D	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	M0D	20268 IAE V2522/V2524		2089-2894
		2	05	30	006	130	REV022	M0D	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	M0D	20268 IAE V2522/V2524		2089-2894
		2	05	30	008	130	REV022	M0D	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	M0D	20268 IAE V2522/V2524		2089-2894
		2	05	30	010	130	REV022	M0D	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	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	011			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	012			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	011			161	REV038		20268/6122A		3001-3216
2	05	30	012			161	REV038		20268/6122A		
2	05	30	013			130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
2	05	30	014			130	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	013			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	014			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	013			161	REV038		20268/6122A		3001-3216
2	05	30	014			161	REV038		20268/6122A		
2	05	30	015			130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
2	05	30	016			130	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	015			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	016			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	015			161	REV038		20268/6122A		3001-3216
2	05	30	016			161	REV038		20268/6122A		
2	05	30	017			130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
2	05	30	018			130	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	017			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	018			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	017			161	REV038		20268/6122A		3001-3216
2	05	30	018			161	REV038		20268/6122A		
2	05	30	019			130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
2	05	30	020			130	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	019			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	020			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	019			161	REV038		20268/6122A		3001-3216
2	05	30	020			161	REV038		20268/6122A		
2	05	30	021			130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
2	05	30	022			130	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	021			140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
2	05	30	022			140	REV023		M:20268 IAE V2527/V2527E		
2	05	30	021			161	REV038		20268/6122A		3001-3216
2	05	30	022			161	REV038		20268/6122A		
2	05	30	023			133	REV022		20268/V2522/V2524		2089-2894
2	05	30	024			133	REV022		MOD 20268 IAE V2522/V2524		
2	05	30	023			140	REV023		20268/V2527/V2527E		0990-1903 3280-3319
2	05	30	024			140	REV023		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		

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		2	05	50	001	110	REV021		MOD 24105		2089-2894
		2	05	50	002	130	REV022		MOD 20268 IAE V2522/V2524		
N	2	05	50	001	110	REV021			MOD 24105		3001-3216
N	2	05	50	002	161	REV038			20268/6122A		
		2	05	50	003	130	REV022		MOD 20268 IAE V2522/V2524		2089-2894
		2	05	50	003	140	REV023		M:20268 IAE V2527/V2527E		0990-1903 3280-3319
		2	05	50	003	161	REV038		20268/6122A		3001-3216
		2	05	60	001	001	REV021				ALL
		2	05	60	002	001	REV023				
		2	05	60	003	001	REV022				0990-1903 3280-3319
		2	05	60	004	001	REV021				
		2	05	60	003	150	REV021		MOD:24105		2089-2894
		2	05	60	004	150	REV021		MOD:24105		
		2	05	60	003	252	REV038		24105+30020/PW 6122A		3001-3216
		2	05	60	004	252	REV038		24105+30020/PW 6122A		
		2	05	70	001	035	REV021		IAE V2500/V2527/V2527E		0990-1903 3280-3319
		2	05	70	002	035	REV022		IAE V2500/V2527/V2527E		
		2	05	70	001	045	REV033		IAE V2522/V2524		2089-2894
		2	05	70	002	045	REV033		IAE V2522/V2524		
		2	05	70	001	054	REV038		PW 6122A		3001-3216
		2	05	70	002	054	REV038		PW 6122A		
		2	05	70	003	035	REV021		IAE V2500/V2527/V2527E		0990-1903 3280-3319
		2	05	70	004	035	REV021		IAE V2500/V2527/V2527E		
		2	05	70	003	045	REV033		IAE V2522/V2524		2089-2894
		2	05	70	004	045	REV033		IAE V2522/V2524		
		2	05	70	003	054	REV038		PW 6122A		3001-3216
		2	05	70	004	054	REV038		PW 6122A		
		2	05	70	005	035	REV021		IAE V2500/V2527/V2527E		0990-1903 3280-3319
		2	05	70	006	035	REV021		IAE V2500/V2527/V2527E		
		2	05	70	005	045	REV033		IAE V2522/V2524		2089-2894
		2	05	70	006	045	REV033		IAE V2522/V2524		
		2	05	70	005	054	REV038		PW 6122A		3001-3216
		2	05	70	006	054	REV038		PW 6122A		
		2	05	70	007	035	REV021		IAE V2500/V2527/V2527E		0990-1903 3280-3319
		2	05	70	008	035	REV021		IAE V2500/V2527/V2527E		
		2	05	70	007	045	REV033		IAE V2522/V2524		2089-2894
		2	05	70	008	045	REV033		IAE V2522/V2524		
		2	05	70	007	054	REV038		PW 6122A		3001-3216
		2	05	70	008	054	REV038		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-COY 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
T				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-COE	CC-COF
					LV-BGU	CC-COI
					CC-COL	CC-COM
					LV-BFY	LV-BET
					CC-COU	LV-BFO
					CC-COZ	CC-COT
					CC-CPI	CC-COX
						CC-COY
						CC-CPE
						CC-CPF
.	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-COE	CC-COF
					LV-BGU	CC-COI
					CC-COL	CC-COM
					LV-BFY	LV-BET
					CC-COU	LV-BFO
					CC-COZ	CC-COT
					CC-CPI	CC-COX
						CC-COY
						CC-CPE
						CC-CPF

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	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-CPD 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-CPD	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	T	SB	TITLE	VALIDITY
.	028	25141	.....				NACELLES/PYLONS-PYLON STRUCTURE- ADAPT PRIMARY STRUCTURE TO A321-200 VERSION	
							CC-CZB	CC-COC
							CC-COE	CC-COF
							LV-BGU	CC-COI
							CC-COL	CC-COM
							LV-BFY	LV-BET
							CC-COU	CC-COX
							CC-COZ	CC-CPE
							CC-CPI	CC-CPJ
							CC-CPM	CC-CPQ
							CC-CPX	CC-CQK
							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-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-CPM
							CC-CQK	CC-CPX
							CC-CVB	CC-CVL
							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-COF	CC-COG
							CC-COI	CC-COK
							CC-COM	LV-BET
							LV-BFO	CC-COT
							CC-COX	CC-COY
							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)-INTRODCUE 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-COZ	CC-CPE
					CC-CPI	CC-CPJ
					CC-CPM	CC-CPQ
					CC-CPX	CC-CQK
					CC-COY	CC-COE
					CC-CPF	CC-CPL
					CC-CPQ	CC-CPL
					CC-CPQ	CC-CPL
					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-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-CPQ
					CC-CQK	CC-CQL
					CC-CVB	CC-CVF
					MSN 3216	MSN 3280
						MSN 3319

M	V	REV	MOD	MP	TITLE	VALIDITY
T				SB		
.	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	T	TITLE	VALIDITY
				SB			
.	037	27714	.....			NAVIGATION - ADIRS - REDUCE VERTICAL SEPARATION MINIMUM USING ADRI AND 2 ONLY	
		34-1172	01				
						CC-CZB	CC-COC
						CC-COE	CC-COF
						LV-BGU	CC-COI
						CC-COL	CC-COM
						LV-BFY	LV-BET
						CC-COU	CC-COX
						CC-COZ	CC-COY
						CC-CPI	CC-CPE
						CC-CPJ	CC-CPL
						CC-CPM	CC-CPD
						CC-CPX	CC-CPQ
						CC-CQK	CC-CQL
						MSN 3280	MSN 3319
.	030	27773	.....			LANDING GEAR-NORMAL BRAKING-INTRODUCE STD 8 BSCU (TWIN VERSION)	
		32-1232	01			ALL	
.	030	27845	.....			FLIGHT CONTROLS-ELAC-INTRODUCE ELAC WITH ADVANCED ELAC POWER SUPPLY BOARD	
						CC-COC	CC-COD
						CC-COF	CC-COG
						CC-COI	LV-BGU
						CC-COM	CC-COK
						LV-BET	CC-COL
						LV-BFY	LV-BFY
						CC-COU	CC-COT
						CC-COX	CC-COY
						CC-COZ	CC-COZ
						CC-CPI	CC-CPE
						CC-CPJ	CC-CPF
						CC-CPM	CC-CPI
						CC-CPD	CC-CPJ
						CC-CPQ	CC-CPM
						CC-CPX	CC-CPD
						CC-CQK	CC-CPQ
						CC-CQL	CC-CPX
						CC-CVA	CC-CQL
						CC-CVB	CC-CVF
						MSN 3216	MSN 3280
							MSN 3319

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	037	28009	.....				AIR CONDITIONING-PRESSURE CONTROL AND MONITORING-INTRODUCE PRESSURE CONTROLLER P/N 9022-15702-10	
						21-1116	04	
							CC-CZB	CC-COC
							CC-COE	CC-COF
							LV-BGU	CC-COI
							CC-COL	CC-COM
							LV-BFY	LV-BET
							CC-COU	CC-COX
							CC-COZ	CC-CPE
							CC-CPI	CC-CPJ
							CC-CPM	CC-CPQ
							CC-CPX	CC-CQK
							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-COF	CC-COG
							CC-COI	CC-COK
							CC-COM	LV-BET
							LV-BFO	CC-COT
							MSN 3319	MSN 3280
.	037A	28164	.....				LANDING GEAR - WHEELS AND BRAKES - INSTALL CARBON BRAKES TYPE SEPCARB III PLUS - MESSIER BUGATTI	
							CC-CPJ	CC-CPL
							CC-CPQ	CC-CPX
							CC-CQK	CC-CQL
							CC-CVB	CC-CVF
							MSN 3216	MSN 3280
								MSN 3319

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	036A	28177	.....				CERTIFICATION - GENERAL - CERTIFY OPERATION AT EL SALVADOR (CHILE) RUNWAY WITH SLOPE GREATER THAN +/- 3%	
		00-1135					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-CPQ	CC-CPX
							CC-CQK	CC-CQL CC-CVA
							CC-CVB	CC-CVF MSN 3214
							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 CC-CVF
							MSN 3214	MSN 3216
.	038	30034	.....				ENGINE - GENERAL - INSTALL PW 6100 ENGINE RATED AT 22.100 IBF ON A318	
							CC-CVA	CC-CVB CC-CVF
							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-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	T	TITLE	VALIDITY
.	029	30277	.....			OXYGEN - PASSENGER OXYGEN - INTRODUCE MODIFIED OPTIONAL CHEMICAL OXYGEN CONTAINER SERIES 22 MIN (DRAEGER)	
						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-CPO	CC-CPQ
						CC-CQK	CC-CQL
						CC-CVB	CC-CVF
						MSN 3216	MSN 3280
							MSN 3319
.	029	30397	.....			CERTIFICATION DOCUMENTS - GENERAL - CERTIFY AIRCRAFT FOR OPERATION ON RUNWAYS LESS THAN 45M WIDTH ALL	
		00-1058	49				
.	029	30961	.....			FUEL - MAIN FUEL PUMP SYSTEM - ADAPT PUMP CONTROL LATCH FOR FLIGHT DECK REFUEL CAPABILITY	
						LV-BGU	CC-COI
						CC-COL	CC-COM
						LV-BFY	LV-BET
						CC-COU	CC-COT
						CC-COZ	CC-COX
						CC-CPI	CC-CPE
						CC-CPJ	CC-CPF
						CC-CPM	CC-CPL
						CC-CPX	CC-CPO
						CC-CVA	CC-CPQ
						MSN 3214	CC-CQK
						MSN 3319	CC-CVL
							CC-CVF
							MSN 3280
.	033A	31106	.....			LANDING GEAR - NORMAL BRAKING - INTRODUCE STD 9 BSCU (TWIN VERSION) ALL	
		32-1232	01				

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	031	31146	.....				LANDING GEAR - WHEELS AND BRAKES - INTRODUCE OXIDATION RESISTANT BFG CARBON BRAKE	
		32-1228	04					
							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	.....				FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC STD L81 ALL	
		27-1135	02					
.	036	31426	.....				NAVIGATIONS-EGPWS-ACTIVATE GEOMETRIC ALTITUDE FUNCTION IN THE EGPWS	
		.....					CC-CPF	CC-CPI CC-CPJ
							CC-CPL	CC-CPM CC-CPD
							CC-CPQ	CC-CPX CC-CQK
							CC-CQL	CC-CVA CC-CVB
							CC-CVF	MSN 3214 MSN 3216
							MSN 3280	MSN 3319
.	031	31528	.....				NAVIGATION-ADIRU-RESTORE RVSM 3 CIRCUIT CAPABILITIES (SERIAL SOLUTION)	
		34-1252						
							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-CPD
							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	T	SB	TITLE	VALIDITY
.	031	31803	.....				LANDING GEAR-WHEELS AND BRAKES-INTRODU CE GOODRICH CARBON BRAKE (SEPCARB III) P/N 2-1600-3 WITH ANTI-OXIDANT "M1"	
		32-1238	06				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-COE	LV-BGU
							CC-COL	LV-BFY
							CC-COU	CC-COZ
							CC-CPI	CC-CPL
							CC-CPM	CC-CPQ
							CC-CPX	CC-CQL
							CC-CVA	CC-CVF
							MSN 3216	MSN 3280
							MSN 3319	
.	031	31897	.....				AUTOFLIGHT-FMGC-INSTALL FMGC IAE C13042BA01 (EQUIPPED WITH FMS2 HONEYWELL)	
		22-1090	11				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-CP0	CC-CPQ
							CC-CQK	CC-CQL
							CC-CVB	CC-CVF
							MSN 3216	MSN 3280
							MSN 3319	
.	033A	32115	.....				FUEL-MANUAL (MAGNETIC) INDICATORS- DELETE ATTITUDE MONITOR	
							CC-COU	CC-COX
							CC-COZ	CC-CPE
							CC-CPI	CC-CPJ
							CC-CPM	CC-CP0
							CC-CPX	CC-CQK
							CC-CVA	CC-CVB
							MSN 3214	MSN 3216
							MSN 3319	MSN 3280

M	V	REV	MOD	MP	T	SB	TITLE	VALIDITY
.	037B	32238	.....				LANDING GEAR-WHEELS AND BRAKES- INSTALL MESSIER WHEELS&SEPCARB III PLUS BRAKES IN PLACE OF GOODRICH WHEELS AND BRAKES	
		32-1244	28					
							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-COE
								LV-BGU
								CC-COL
								LV-BFY
								CC-COU
								CC-COZ
								CC-CPI
.	036B	32239	.....				LANDING GEAR-WHEELS AND BRAKES- INSTALL MESSIER WHEELS &SUBCARB III PLUS BRAKES IN PLACE OF ABS(A321TYPE) WHEELS&BRAKES	
		32-1242	06					
							CC-CZB	
.	035	32311	.....				LANDING GEAR-WHEELS AND BRAKES-CANCEL MIXABILITY BETWEEN GOODRICH BRAKES	
		32-1247	02					
							2-1600-2 AND -3 AUTHOR. WITH MOD 31803	
							CC-COC	CC-COD
							CC-COF	CC-COG
							CC-COI	CC-COK
							CC-COM	LV-BET
							LV-BFO	CC-COT
							CC-COU	CC-COY
							CC-COX	CC-COZ
							CC-CPE	CC-CPF
								CC-CPI
.	035	32656	.....				ENGINE FUEL AND CONTROL - CONTROLLING - INTRODUCE EEC SOFTWARE STANDARD "SCN17" ON V2500-A5 ENGINES	
		73-1075	01					
							CC-CZB	CC-COC
							CC-COE	CC-COF
							LV-BGU	CC-COI
							CC-COL	CC-COM
							LV-BFY	LV-BET
							LV-BFO	CC-COT
							CC-COU	CC-COX
							CC-COZ	CC-CPE
							CC-CPI	CC-CPJ
							CC-CPM	CC-CPQ
							CC-CPX	CC-CQK
							MSN 3280	MSN 3319
								CC-CQL

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M	V	REV	MOD	MP	TITLE	VALIDITY
T				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-CP0 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	

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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.
- R — **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.
- R — **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.

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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.

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)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING CARGO LOADING	2.01.20	P 1
		SEQ 100	REV 21

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.

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)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING CARGO LOADING	2.01.20	P 1
		SEQ 110	REV 34

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.

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	CARGO LOADING		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

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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.

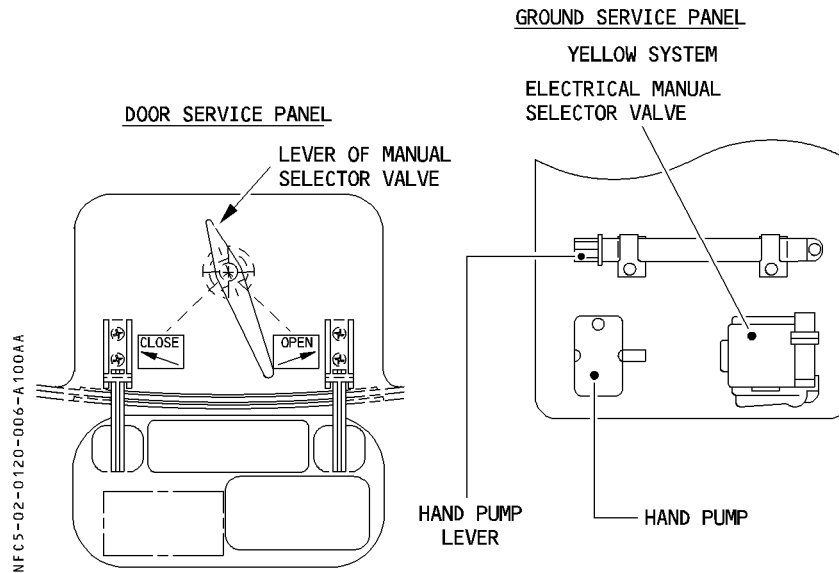
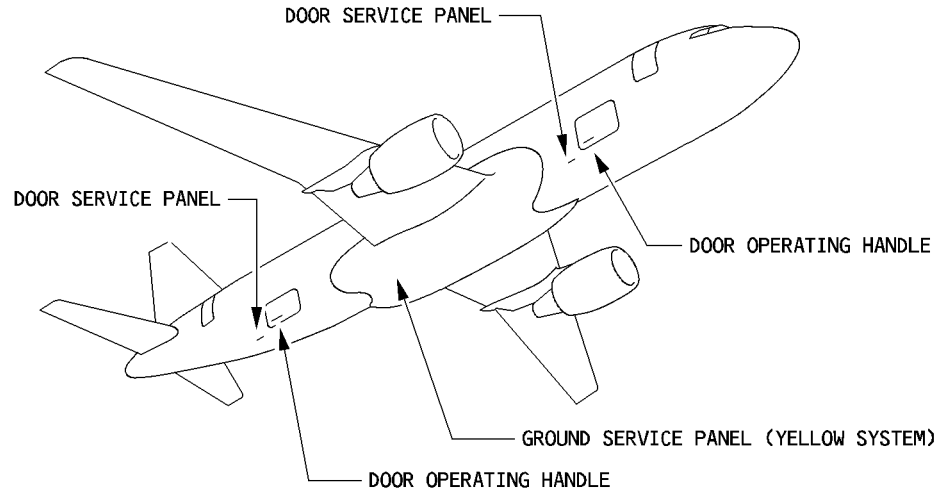
On door

– 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

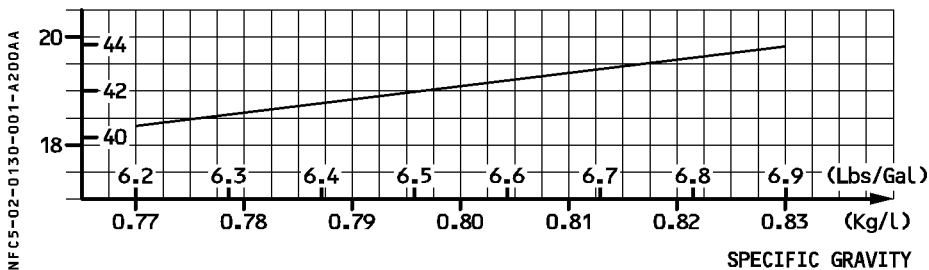


GENERAL INFORMATION**USABLE FUEL VOLUME**

	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**

- 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. During manual refueling, fill the wing tanks first, then the center tank.
 - 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.
- R
- R
- R

REFUELING CONTROL PANEL

NFC5-02-0130-002-A100AA

FUEL QTY KG X 1000		
LEFT	CTR	RIGHT
6.36	1.05	6.34

HI. LVL.

LEFT CTR RIGHT

REFUEL VALVES

OPEN NORM SHUT

OPEN NORM SHUT

OPEN NORM SHUT

MODE SELECT TEST

REFUEL HI.LVL BATT POWER

OFF

ON

DEFUEL XFR OPEN LTS NORM

PRESELECTED	REFUEL KG X 1000	ACTUAL
2.18		13.7
DEC.	INC. CKPT	END

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

Note : 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

- **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.

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
 R grounding point on the aircraft. In the cockpit, check that the PARK BRK is ON and that
 R the ACCU PRESS has sufficient pressure. Do not defuel, if a fire or engine overheat
 R warning is displayed. During defueling, do not operate the external lighting.

Note : 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

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	FUEL	SEQ 100	REV 37

● 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
 - R VALVE 2/WING/L and R C/B’s (M22 and M23 on 121VU) PUSH
 - 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

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	FUEL	SEQ 001	REV 33

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

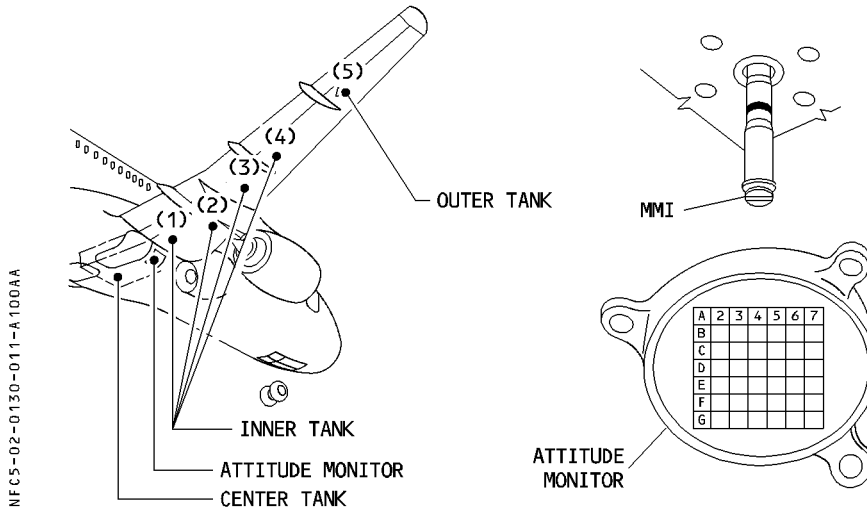
APU START/SHUTDOWN DURING REFUELING/DEFUELING

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



— **A/C ATTITUDE** **NOTE**

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

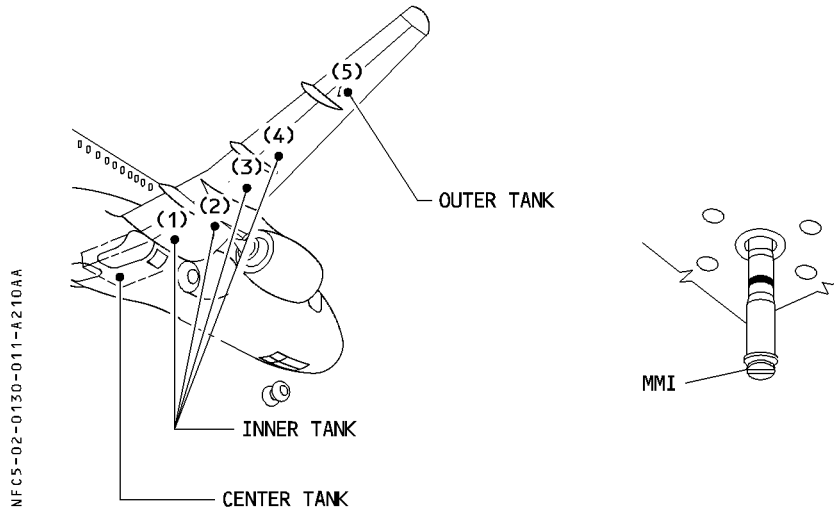
— **ACCESS PLATFORM** **IN POSITION**

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

**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.

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	FUEL	SEQ 001	REV 33

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.

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	FUEL	SEQ 100	REV 33

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°	M M I N°	R E A D I N G	LITERS							M M I N°	R E A D I N G	LITERS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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* GRID SQUARE LETTER

** GRID SQUARE NUMBER

M M I N°	M M I N G	LITERS ATTITUDE READING							M M 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	2800		
	4	2500	2450	2400	2400	2350	2350	2350	4	3050	3050	3050	3050	3050	3000	3000		
	6	2650	2600	2600	2600	2550	2500	2500	6	3200	3200	3200	3200	3200	3200	3150		
	8	2750	2750	2750	2700	2700	2650	2650	8	3300	3300	3300	3300	3300	3300	3250		
	10	2900	2900	2900	2900	2850	2850	2850	10	3500	3500	3500	3500	3450	3450	3400		
	12	3100	3100	3100	3100	3100	3050	3000	12	3650	3650	3600	3600	3600	3600	3600		
	14	3250	3250	3250	3250	3250	3250	3200	14	3800	3800	3750	3750	3750	3750	3750		
	16	3450	3450	3450	3450	3450	3400	3400	16	3950	3900	3900	3900	3900	3900	3900		
	18	3700	3650	3650	3650	3650	3600	3600	18	4050	4050	4050	4050	4050	4050	4050		
	20	3900	3900	3900	3900	3850	3850	3850	20	4200	4200	4200	4200	4200	4200	4200		
	22	4100	4100	4050	4050	4050	4050	4050	22	4250	4250	4250	4300	4300	4300	4300		
	24	4300	4300	4300	4300	4300	4300	4300	24	4400	4400	4400	4400	4450	4450	4450		
	26	4500	4500	4500	4500	4500	4500	4550	26	4500	4500	4550	4550	4550	4600	4600		
	28	4700	4700	4750	4750	4750	4750	4750	28	4600	4650	4650	4700	4700	4750	4800		
	30	4950	4950	4950	4950	5000	5000	5000	30	4750	4750	4800	4800	4850	4850	4900		
	32	5100	5100	5150	5150	5150	5200	5200	32	4850	4850	4900	4900	4950	5000	5000		
	MAX								MAX									
3																		
	2	4400	4350	4300	4250	4200	4150	4050	2	5050	5050	5100	5100	5100	5100	5100		
	4	4700	4700	4650	4600	4500	4400	4300	4	5150	5150	5200	5200	5200	5200	5200		
	6	4950	4950	4900	4850	4800	4700	4550	6	5250	5250	5300	5300	5300	5300	5300		
	8	5150	5100	5100	5050	5000	4950	4800	8	5350	5350	5400	5400	5400	5400	5400		
	10	5250	5250	5250	5250	5200	5150	5050	10	5450	5450	5500	5500	5500	5500	5500		
	12	5400	5400	5400	5400	5350	5300	5250	12	5500	5500	5550	5600	5600	5600	5650		
	14	5600	5600	5550	5550	5500	5500	5450	14	5600	5650	5650	5700	5700	5700	5750		
	16	5750	5750	5700	5700	5700	5650	5600	16	5650	5700	5700	5750	5750	5800	5800		
	18	5900	5900	5850	5850	5850	5850	5800	18	5800	5800	5850	5850	5900	5900	5950		
20	6000	6000	6000	6000	6000	6000	6000	20	5900	5900	5950	5950	6000	6000	6050			
4																		
	2	5700	5600	5550	5500	5450	5400	5300	2	6000	6050	6100	6100	6100	6100	6100		
	4	5850	5750	5700	5650	5600	5550	5500	4	6100	6100	6150	6150	6150	6200	6200		
	6	6000	5900	5850	5800	5750	5700	5650	6	6200	6200	6200	6250	6250	6250	6300		
	8	6150	6100	6050	6000	5950	5900	5850	8	6250	6300	6300	6350	6350	6350	6400		
	10	6300	6300	6250	6200	6150	6150	6100	10	6350	6400	6400	6400	6450	6450	6450		
	12	6450	6400	6400	6400	6350	6300	6250	12	6450	6450	6450	6500	6500	6550	6550		
	14	6550	6500	6500	6500	6500	6450	6450	14	6500	6550	6550	6550	6600	6600	6650		
	16	6600	6600	6600	6600	6600	6600	6550	16	6600	6600	6600	6650	6650	6700	6750		
	18	6650	6650	6650	6650	6650	6650	6650	18	6650	6700	6700	6750	6750	6750	6800		
MAX								MAX										
5																		
	2	650	600	550	550	550	500	500	2	700	700	700	700	700	700	700		
	4	700	650	650	600	600	550	550	4	750	750	750	750	750	750	750		
	6	750	700	700	650	650	650	600	6	800	800	800	800	750	750	750		
	8	750	750	750	750	700	700	700	8	800	800	800	800	800	800	800		
	10	800	800	800	750	750	750	750	10	850	850	850	850	850	850	850		
	12	800	800	800	800	800	800	800	12	850	850	850	850	850	850	850		
	14	850	850	850	850	850	850	850	14	850	850	850	850	850	850	850		
MAX	850	850	850	850	850	850	850	MAX	850	850	850	850	850	850	850			

M M I N°	M M I N°	R E A D I N G	LITERS							M M I N°	R E A D I N G	LITERS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			ATTITUDE MONITOR READING									ATTITUDE MONITOR READING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			B*	LEFT WING			F					RIGHT WING			B	RIGHT WING			F			LEFT WING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
			1	2	3	4	5	6	7			1	2	3	4	5	6	7**																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

M M I N°	M M I N G	LITERS ATTITUDE MONITOR READING							
		B	LEFT WING			F	RIGHT WING		
		1	2	3	4	5	6	7	
2	2	2350	2350	2300	2300	2250	2200	2200	
	4	2550	2500	2500	2450	2450	2400	2400	
	6	2750	2700	2700	2650	2650	2600	2600	
	8	2850	2850	2800	2800	2800	2750	2750	
	10	3000	3000	3000	3000	3000	2950	2900	
	12	3150	3150	3200	3150	3150	3150	3100	
	14	3350	3350	3350	3350	3350	3300	3300	
	16	3550	3550	3550	3550	3500	3500	3450	
	18	3750	3750	3750	3750	3700	3700	3650	
	20	4000	3950	3950	3950	3950	3900	3900	
	22	4150	4100	4100	4100	4100	4100	4100	
	24	4300	4300	4300	4300	4300	4300	4300	
	26	4500	4500	4500	4500	4500	4500	4500	
	28	4700	4700	4700	4700	4700	4750	4750	
	30	4850	4900	4900	4900	4950	4950	4950	
	32	5050	5100	5100	5100	5100	5150	5150	
	MAX								
3									
	2	4550	4500	4500	4450	4400	4350	4300	
	4	4800	4800	4800	4750	4650	4600	4500	
	6	5050	5000	5000	5000	4900	4850	4750	
	8	5150	5150	5150	5150	5100	5000	5000	
	10	5300	5300	5300	5300	5250	5200	5150	
	12	5450	5450	5450	5450	5400	5400	5350	
	14	5600	5600	5600	5550	5550	5550	5500	
	16	5700	5700	5700	5700	5700	5700	5700	
	18	5850	5850	5850	5850	5850	5850	5850	
	20	6000	6000	6050	6050	6050	6000	6000	
MAX									
4									
	2								
	4	5850	5750	5700	5650	5600	5600	5600	
	6	6000	6000	5950	5900	5850	5800	5800	
	8	6150	6150	6100	6100	6050	6000	6000	
	10	6300	6300	6250	6250	6250	6200	6150	
	12	6400	6400	6400	6400	6350	6350	6300	
	14	6500	6500	6500	6500	6500	6450	6450	
	16	6600	6600	6600	6600	6550	6550	6550	
	18	6760	6770	6770	6770	6770	6770	6760	
MAX									
5									
	2	650	650	600	600	600	550	550	
	4	750	700	700	650	650	600	600	
	6	750	750	750	700	700	650	650	
	8	800	800	750	750	750	750	700	
	10	800	800	800	800	800	750	750	
	12	850	850	800	800	800	800	800	
	14	850	850	850	850	850	850	850	
	MAX	850	850	850	850	850	850	850	
	2	2800	2750	2750	2750	2700	2700	2650	
	4	2950	2950	2900	2900	2900	2900	2850	
	6	3100	3100	3100	3100	3100	3050	3050	
	8	3200	3200	3200	3200	3200	3200	3150	
	10	3400	3400	3350	3350	3350	3350	3300	
	12	3550	3550	3550	3550	3500	3500	3450	
	14	3750	3700	3700	3700	3650	3650	3650	
	16	3900	3850	3850	3850	3850	3800	3800	
	18	4050	4000	4000	4000	4000	4000	3950	
	20	4200	4150	4150	4150	4150	4150	4150	
	22	4250	4250	4250	4250	4250	4250	4250	
	24	4400	4400	4400	4400	4400	4400	4400	
	26	4500	4500	4500	4550	4550	4550	4550	
28	4650	4650	4650	4650	4700	4700	4750		
30	4750	4750	4800	4800	4850	4850	4900		
32	4850	4900	4900	4950	4950	5000	5050		
MAX									
	2	5000	5000	5000	5000	5000	5000	4950	
	4	5100	5100	5100	5100	5100	5100	5100	
	6	5200	5200	5200	5250	5200	5200	5200	
	8	5300	5300	5350	5350	5350	5350	5350	
	10	5400	5400	5450	5450	5450	5450	5450	
	12	5500	5500	5550	5550	5550	5550	5550	
	14	5600	5600	5650	5650	5650	5650	5700	
	16	5700	5700	5700	5750	5750	5750	5800	
	18	5800	5800	5800	5850	5850	5850	5900	
20	5900	5900	5950	5950	6000	6000	6000		
MAX									
	2	5950	5950	6100	6000	6050	6050	6050	
	4	6050	6050	6100	6100	6100	6100	6150	
	6	6150	6150	6200	6200	6200	6200	6200	
	8	6250	6250	6250	6300	6300	6300	6300	
	10	6350	6350	6350	6400	6400	6400	6400	
	12	6400	6450	6450	6450	6500	6500	6500	
	14	6500	6500	6550	6550	6600	6600	6600	
	16	6600	6600	6600	6650	6650	6700	6700	
	18	6750	6770	6800	6830	6850	6870	6880	
MAX									
	2	750	700	700	700	700	700	700	
	4	750	750	750	750	750	750	750	
	6	800	800	800	800	750	750	750	
	8	800	800	800	800	800	800	800	
	10	850	850	850	850	800	800	800	
	12	850	850	850	850	850	850	850	
	14	850	850	850	850	850	850	850	
	MAX	850	850	850	850	850	850	850	

M M I N°	M M I N G	LITERS ATTITUDE MONITOR READING							M M 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**
1	2	50	50	50	50	50	50	50	2	50	50	50	50	50	50	50	50			
	4	50	50	50	50	50	50	50	4	50	50	50	50	50	50	50	50			
	6	100	100	100	100	100	100	100	6	100	100	100	100	100	100	100	100			
	8	150	150	150	150	150	150	150	8	150	150	150	150	150	150	150	150			
	10	200	200	200	200	200	200	200	10	200	200	200	200	200	200	200	150			
	12	250	250	250	250	250	250	250	12	250	250	250	250	250	250	250	200			
	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	300	250			
	16	350	350	350	350	350	350	350	16	350	350	350	350	350	350	350	350			
	18	400	400	400	400	400	400	400	18	400	400	400	400	400	400	400	400			
	20	450	450	450	450	450	450	450	20	450	450	450	450	450	450	450	450			
	22	550	550	550	550	500	500	500	22	500	500	500	500	500	500	500	500			
	24	600	600	600	600	600	600	600	24	600	600	600	600	600	600	550	550			
	26	700	700	700	700	650	650	650	26	650	650	650	650	650	650	650	650			
	28	750	750	750	750	750	750	750	28	750	750	750	750	750	750	700	700			
	30	850	850	850	850	850	850	850	30	800	800	800	800	800	800	800	800			
	32	950	950	950	950	950	950	950	32	900	900	900	900	900	900	900	900			
	34	1050	1050	1050	1050	1050	1050	1050	34	1000	1000	1000	1000	1000	1000	1000	1000			
	36	1200	1150	1150	1150	1150	1150	1150	36	1100	1100	1100	1100	1100	1100	1100	1100			
	38	1300	1300	1300	1250	1250	1250	1250	38	1200	1200	1200	1200	1200	1200	1200	1200			
	40	1400	1400	1400	1400	1400	1400	1400	40	1300	1300	1300	1300	1300	1300	1300	1300			
	42	1500	1500	1500	1500	1500	1500	1500	42	1400	1400	1400	1400	1400	1400	1400	1400			
	44	1600	1600	1600	1600	1600	1600	1600	44	1550	1550	1500	1500	1500	1500	1500	1500			
	46	1750	1750	1750	1750	1750	1750	1750	46	1650	1650	1650	1650	1650	1650	1650	1650			
	48	1850	1850	1850	1850	1900	1900	1900	48	1800	1750	1750	1750	1750	1750	1750	1800			
	50	2000	2000	2000	2000	2000	2000	2050	50	1900	1900	1900	1900	1900	1900	1900	1900			
	52	2150	2150	2150	2150	2150	2150	2200	52	2000	2000	2000	2000	2000	2000	2000	2050			
	54	2300	2300	2300	2300	2300	2300	2350	54	2150	2150	2150	2150	2150	2150	2150	2200			
	56	2450	2500	2500	2500	2500	2500	2500	56	2300	2300	2300	2300	2300	2300	2300	2350			
	58	2600	2650	2650	2650	2650	2650	2700	58	2450	2450	2450	2450	2450	2500	2500	2500			
	60	2800	2800	2800	2800	2850	2850	2850	60	2600	2600	2600	2600	2600	2650	2650	2650			
	62	2900	2950	2950	2950	2950	2950	3000	62	2750	2750	2750	2750	2800	2800	2800	2800			
	63	2950	3000	3000	3000	3050	3050	3100	63	2800	2800	2800	2800	2850	2850	2850	2850			
	MAX	3250	3250	3300	3350	3350	3350	3400	MAX	3100	3100	3100	3100	3100	3100	3100	3100			

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

M M I N°	R E A D I N G	LITERS ATTITUDE READING							R E A 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
2	2	2450	2400	2400	2400	2350	2350	2350	2	2700	2650	2650	2600	2600	2550	2550	2550			
	4	2650	2600	2600	2600	2550	2550	2500	4	2850	2800	2800	2800	2800	2750	2750				
	6	2800	2800	2800	2800	2750	2750	2700	6	3000	3000	3000	3000	3000	2950	2900				
	8	2900	2900	2900	2900	2900	2850	2850	8	3100	3100	3100	3100	3100	3100	3050				
	10	3100	3100	3100	3100	3100	3050	3000	10	3300	3300	3300	3250	3250	3250	3200				
	12	3250	3250	3250	3250	3250	3250	3200	12	3450	3450	3450	3450	3450	3400	3350				
	14	3450	3450	3450	3450	3400	3400	3350	14	3650	3650	3600	3600	3600	3550	3550				
	16	3650	3650	3650	3600	3600	3550	3550	16	3800	3800	3800	3750	3750	3750	3700				
	18	3850	3850	3800	3800	3800	3750	3750	18	4000	3950	3950	3950	3900	3900	3900				
	20	4050	4050	4000	4000	4000	3950	3950	20	4150	4100	4100	4100	4100	4100	4100				
	22	4200	4200	4150	4150	4150	4100	4100	22	4250	4250	4200	4200	4200	4200	4200				
	24	4350	4350	4300	4300	4300	4300	4300	24	4350	4350	4350	4350	4350	4350	4350				
	26	4500	4500	4500	4500	4500	4500	4500	26	4500	4500	4500	4500	4500	4500	4550				
	28	4650	4650	4650	4700	4700	4700	4700	28	4650	4650	4650	4650	4700	4700	4700				
	30	4850	4850	4850	4850	4900	4900	4900	30	4750	4800	4800	4800	4850	4850	4850				
	32	5000	5000	5000	5050	5050	5050	5100	32	4900	4900	4950	4950	5000	5000	5050				
	MAX								MAX											
3	2	4650	4650	4650	4600	4600	4500	4500	2	4900	4900	4900	4900	4900	4850	4800				
	4	4900	4900	4900	4900	4800	4750	4650	4	5050	5100	5100	5100	5100	5050	5000				
	6	5100	5100	5100	5050	5050	5000	4900	6	5150	5200	5200	5200	5200	5150	5150				
	8	5200	5200	5200	5200	5200	5150	5100	8	5250	5300	5300	5300	5300	5300	5300				
	10	5300	5350	5350	5350	5300	5300	5250	10	5350	5400	5400	5400	5400	5400	5400				
	12	5450	5450	5450	5450	5450	5450	5400	12	5500	5500	5500	5500	5550	5550	5550				
	14	5600	5600	5600	5600	5600	5600	5550	14	5600	5600	5600	5650	5650	5650	5650				
	16	5700	5700	5700	5700	5700	5700	5700	16	5700	5700	5750	5750	5750	5750	5800				
	18	5800	5850	5850	5850	5850	5850	5850	18	5800	5800	5850	5850	5900	5900	5900				
	20	5950	5950	6000	6000	6000	6000	6000	20	5900	5950	5950	6000	6000	6000	6000				
4	2	5800	5750	5750	5700	5700	5700	5700	2	5900	5900	5900	5900	5950	5950	5950				
	4	5950	5900	5900	5850	5850	5800	5800	4	6000	6000	6000	6050	6050	6050	6050				
	6	6050	6050	6000	6000	6000	5950	5950	6	6100	6100	6150	6150	6150	6150	6150				
	8	6200	6150	6150	6150	6150	6100	6100	8	6200	6250	6250	6250	6250	6250	6250				
	10	6300	6300	6300	6300	6300	6250	6250	10	6300	6350	6350	6350	6350	6350	6350				
	12	6400	6400	6400	6400	6400	6400	6400	12	6400	6400	6450	6450	6450	6450	6450				
	14	6500	6500	6500	6500	6500	6500	6500	14	6500	6500	6500	6550	6550	6550	6550				
	16	6600	6600	6600	6600	6600	6600	6600	16	6550	6600	6600	6600	6600	6600	6600				
	18	6730	6740	6750	6750	6760	6760	6770	18	6750	6750	6770	6790	6800	6810	6820				
	MAX								MAX											
5	2	700	700	650	650	600	600	600	2	750	700	700	700	700	650	650				
	4	750	750	700	700	650	650	650	4	750	750	750	750	700	700	700				
	6	750	750	750	750	700	700	700	6	800	800	750	750	750	750	750				
	8	800	800	800	750	750	750	750	8	800	800	800	800	800	800	800				
	10	800	800	800	800	800	800	800	10	850	850	850	800	800	800	800				
	12	850	850	850	800	800	800	800	12	850	850	850	850	850	850	850				
	14	850	850	850	850	850	850	850	14	900	900	850	850	850	850	850				

M M I N°	M M I N°	R E A D I N G	LITERS ATTITUDE MONITOR READING							M M I N°	R E 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					
	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	350	360	350	350	32	4950	4950	5000	5000	5000	5050	5100					
	18	400	400	400	400	400	400	400	MAX												
	20	450	450	450	450	450	450	450													
	22	500	500	500	500	500	500	500	2	4800	4800	4800	4800	4750	4750	4600	3				
	24	600	600	600	600	600	600	600	4	5000	5000	5000	5000	4950	4900	4850					
	26	650	650	650	650	650	650	650	6	5100	5150	5150	5100	5100	5100	5050					
	28	750	750	750	750	750	750	750	8	5250	5250	5250	5250	5250	5200	5200					
	30	850	850	850	850	850	850	850	10	5350	5350	5350	5400	5400	5350	5350					
	32	950	950	950	950	950	950	950	12	5450	5500	5500	5500	5500	5500	5500					
	34	1050	1050	1050	1050	1050	1000	1000	14	5600	5600	5600	5600	5600	5600	5600					
	36	1150	1150	1150	1150	1150	1100	1100	16	5700	5700	5700	5750	5750	5750	5750					
	38	1250	1250	1250	1250	1250	1250	1250	18	5800	5800	5850	5850	5850	5900	5900					
	40	1350	1350	1350	1350	1350	1350	1350	20	5900	5900	5950	5950	5950	6000	6000					
	42	1450	1450	1450	1450	1450	1450	1450	MAX												
	44	1550	1550	1550	1550	1550	1550	1550													
	46	1700	1700	1700	1700	1700	1700	1700	2	5900	5850	5800	5800	5800	5800	5800	4				
	48	1800	1800	1800	1800	1800	1800	1800	4	6000	5950	5950	5950	5950	5950	5950					
	50	1950	1950	1950	1950	1950	1950	1950	6	6100	6100	6050	6050	6050	6050	6050					
	52	2100	2100	2100	2100	2100	2100	2100	8	6200	6200	6200	6200	6200	6200	6200					
	54	2250	2250	2250	2250	2250	2250	2250	10	6300	6300	6300	6300	6300	6300	6300					
	56	2400	2400	2400	2400	2400	2400	2400	12	6400	6400	6400	6400	6400	6400	6400					
	58	2550	2550	2550	2550	2550	2600	2600	14	6500	6500	6500	6500	6500	6500	6500					
	60	2700	2700	2700	2700	2700	2750	2750	16	6600	6600	6600	6600	6600	6600	6600					
	62	2850	2850	2850	2850	2850	2900	2900	18	6750	6750	6770	6800	6800	6810	6820					
	63	2900	2900	2900	2900	2900	2950	2950	MAX												
	MAX	3050	3050	3100	3100	3100	3150	3150													
2																		5			
	2	2550	2550	2500	2500	2450	2450	2450	2	700	700	700	650	650	650	600					
	4	2750	2700	2700	2700	2650	2650	2600	4	750	750	750	700	700	700	650					
	6	2900	2900	2850	2850	2850	2800	2800	6	800	800	750	750	750	750	700					
	8	3000	3000	2950	2950	2950	2950	2900	8	800	800	800	800	800	750	750					
	10	3200	3150	3150	3150	3150	3100	3050	10	850	800	800	800	800	800	800					
	12	3350	3350	3350	3350	3300	3300	3250	12	850	850	850	850	850	850	850					
	14	3550	3550	3550	3500	3500	3450	3450	14	850	850	850	850	850	850	850					
16	3750	3750	3700	3700	3650	3650	3600	MAX	850	850	850	850	850	850	850						

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

CENTER TANK (LITERS)

M M I R E A D I N G	LITERS ATTITUDE MONITOR READING LINES A AND G*							M M I R E A D 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	5750	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	6150	6100
64	6400	6400	6400	6400	6350	6300	6300	64	6400	6400	6400	6400	6350	6350	6300
66	6600	6600	6600	6600	6550	6550	6500	66	6600	6600	6600	6600	6550	6550	6500
68	6800	6800	6750	6750	6750	6700	6700	68	6800	6800	6800	6800	6750	6750	6700
70	7000	6950	6950	6950	6900	6900	6900	70	7000	7000	7000	6950	6950	6950	6900
72	7200	7200	7150	7150	7100	7100	7050	72	7200	7200	7150	7150	7150	7100	7100
74	7400	7400	7350	7350	7300	7300	7300	74	7400	7400	7350	7350	7350	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	7850	7800	7800

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING WEIGHT and BALANCE	2.01.40	P 1
		SEQ 001	REV 28

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
R typical passenger arrangement.

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

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

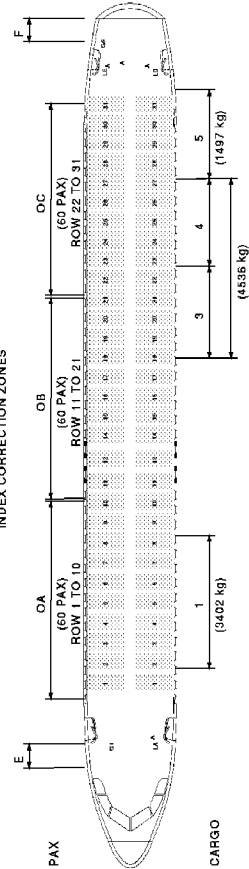
A320-200
VERSION : 180 YC

DRY OPERATING WEIGHT CONDITIONS	
WEIGHT (kg)	H-arm (m)
1 42 500	18.93
2 = $\frac{(\text{H-arm} - 18.8499) \times W}{1000} + 50$	
3 DRY OPERATING WEIGHT INDEX	53.4

AIRCRAFT REGISTER :	
DATE :	PREPARED BY :
FLT NO :	CAPT. SIGNATURE :
FROM :	TO :

DRY OPERATING WEIGHT		42 500
WEIGHT DEVIATION (PANTRY)	±	+ 100
CORRECTED DRY OPERATING WEIGHT		42 600
CARGO	+	5 500
PASSENGERS	1145 x 8 d =	12 180
ZERO FUEL WEIGHT		60 280
TOTAL FUEL ONBOARD	7	13 000
TAKEOFF WEIGHT	=	73 280

4 ONES	E	F	G	H
WEIGHT DEVIATION (kg)	0	+100		



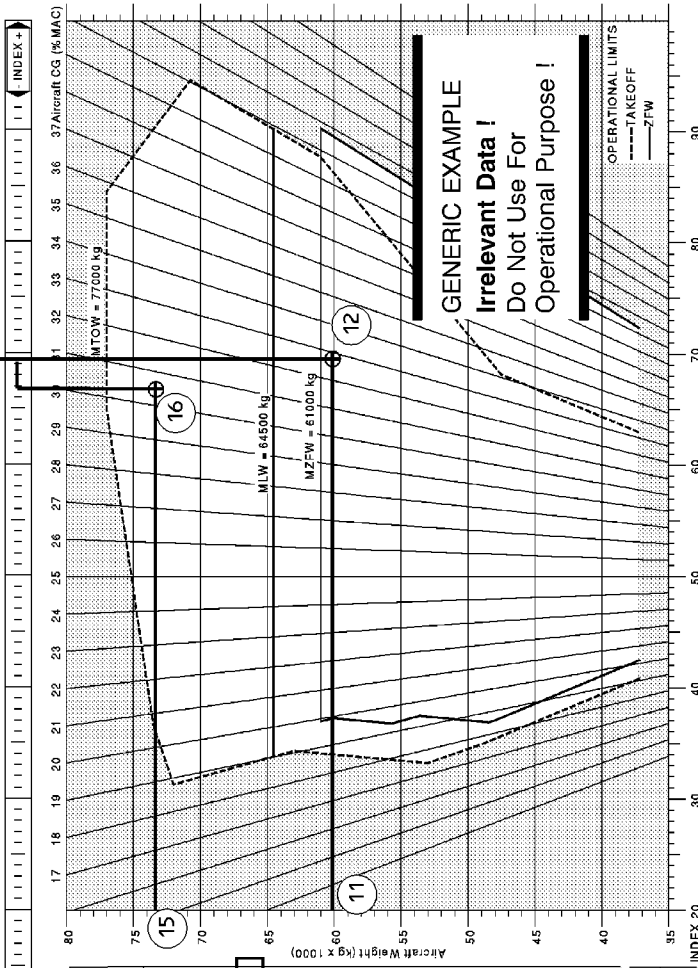
BASIC INDEX CORRECTION		ZONES			
DRY OPERAT. WEIGHT DEVIATION	E	F	G	H	1.43
	+100 kg	-1.22	+1.43		
-100 kg	+1.22	-1.43			

5 INDEX CORRECTION	1.43		CORRECTED INDEX	54.83	ALL WEIGHTS IN KILOGRAMS
NES	Nbr	WEIGHT(kg)			
8	AGO 1	2000			
	CARGO 3	1500			
	CARGO 4	1500			
	CARGO 5	500			
	CABIN OA	50			
	CABIN OB	55			
	CABIN OC	40			

FUEL INDEX	FUEL INDEX CORRECTION			
	weight index	density 0.735 kg/l	Weight	index
	(kg)		(kg)	
-2	3500	+1	1500	-2
	4000	+1	1200	-2
	4000	+1	1350	-2
	5000	+0	1300	-2
	5500	-1	1350	-3
	6000	-1	1400	-4
	6500	-2	1450	-4
	7000	-2	1500	-5
	7500	-2	1550	-6
	8000	-3	1600	-7
	8500	-3	1650	-8
	9000	-3	1700	-8
	9500	-3	1750	-9
	10000	-3	1800	-10
	10500	-3	1850	-11
	11000	-3	FULL	-11

18	TAKEOFF	
	CG % MAC	30.5

17	ZFW CDU INPUT	AIRCRAFT CG % MAC
	WEIGHT (kg x 1000)	
	16 0 13	3 12 7



CAUTION: WHEN THE T.O. CG IS LOWER THAN 27% MAC THE BASIC PERFORMANCE MUST BE CORRECTED

- T.O. : Make CG correction or use appropriate RTOW chart.
- LDG. : Make CG correction on LDG speed and distance.

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 :

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

(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

R



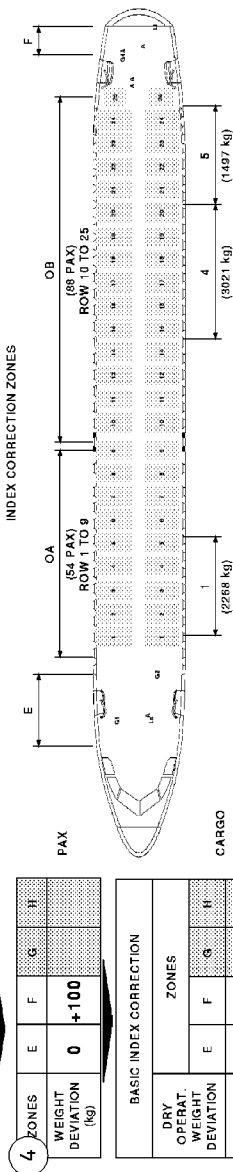
LOAD and TRIM SHEET

A319-100
VERSION : 142 Y

DRY OPERATING WEIGHT CONDITIONS	
WEIGHT (kg)	H-arm (m)
1 40 500	17.27
$2 \frac{(H\text{-arm} - 1.725(60) \times W)}{1000} = 50$	
DRY OPERATING WEIGHT INDEX	50.85

AIRCRAFT REGISTER :	
DATE :	PREPARED BY :
FLY Nbr :	CAPT. SIGNATURE :
FROM :	TO :

DRY OPERATING WEIGHT		40 500
WEIGHT DEVIATION (PANTRY)	±	+ 100
CORRECTED DRY OPERATING WEIGHT	=	40 600
CARGO	+	4 000
PASSENGERS	1210 x 184	
ZERO FUEL WEIGHT	7	10 080
TOTAL FUEL ONBOARD	=	54 680
TAKEOFF WEIGHT	=	14 000
		68 680



BASIC INDEX CORRECTION					
DRY OPERAT. WEIGHT DEVIATION	ZONES				
	E	F	G	H	
+100 kg	-1,01	+1,21			
-100 kg	+1,01	-1,21			
5 INDEX CORRECTION					+1.21

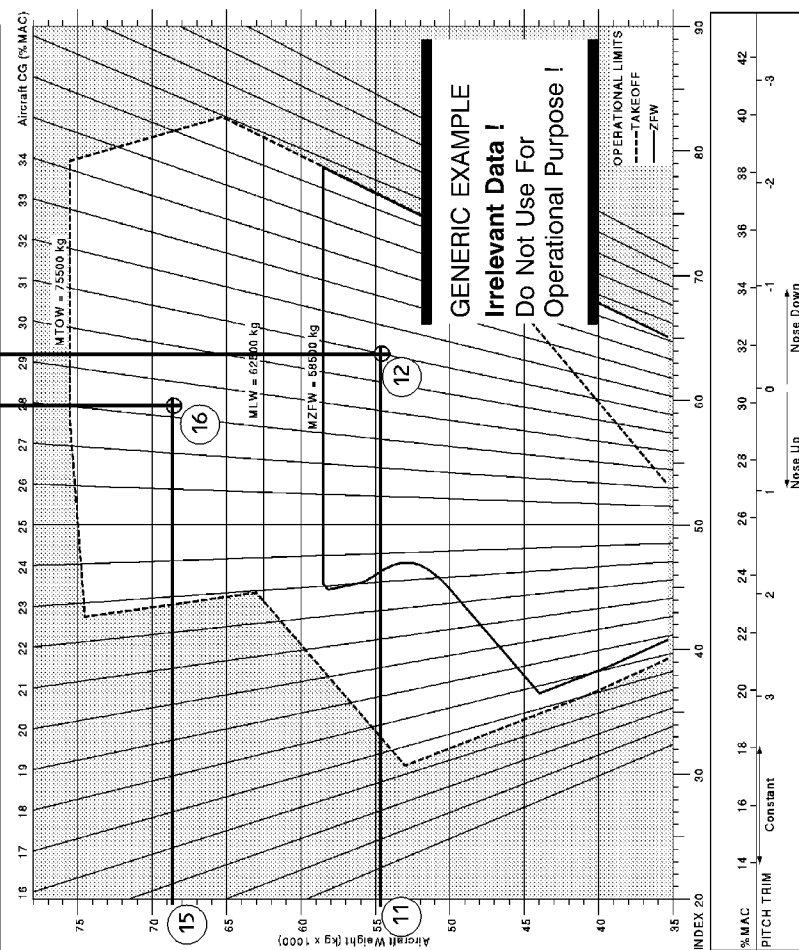
[illegible][illegible]

FUEL INDEX CORRECTION
47 density 0.785 kg/d

13	density 0.785 kg/m ³		Weight (kg)	Index	Weight (kg)	Index
	Weight (kg)	Index				
	3500	+1	11500	-2		
	4000	+1	12000	-2		
	4500	+0	12500	-2		
	5000	+0	13000	-2		
	5500	-1	13500	-3		
	6000	-1	14000	-4		
	6500	-2	14500	-4		
	7000	-2	15000	-5		
	7500	-2	15500	-6		
	8000	-3	16000	-7		
	8500	-3	16500	-8		
	9000	-3	17000	-8		
	9500	-3	17500	-9		
	10000	-3	18000	-10		
	10500	-3	18500	-11		
	11000	-3	FULL	-11		

18	TAKEOFF
CG % MAC	28.4

17	ZFW CDU INPUT	
	WEIGHT (kg x 1000)	AIRCRAFT CG % MAC
	5 4 7	3 1 0



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 :

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

(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

AIRBUS

LOAD and TRIM SHEET

A318-111
VERSION 114 YC

DRY OPERATING WEIGHT CONDITIONS		
WEIGHT (kg)	H-act (m)	
1 38 000	16.4	
2 $=(H_{act} - 16.485) \times W \div 50$		
3 WEIGHT INDEX 45		

AIRCRAFT REGISTER	
DATE:	PREPARED BY:
FLT Nbr:	CAPT SIGNATURE:
FROM:	TO:

DRY OPERATING WEIGHT	38 000
WEIGHT DEVIATION (PAMTRY)	0
CORRECTED DRY OPERATING WEIGHT	38 000
CARGO	2 800
PASSENGERS 9 5 x 9 4	7 980
ZERO FUEL WEIGHT	48 480
TOTAL FUEL ONBOARD	15 500
TAKEOFF WEIGHT	64 280

ZONES	E	F	G	H
WEIGHT DEVIATION (kg)	+50	-50		

INDEX CORRECTION ZONES

BASIC INDEX CORRECTION				
ZONES				
DRY OPERAT WEIGHT DEVIATION	E	F	G	H
+100 kg	-1.96	+2.11		
-100 kg	+1.96	-2.11		

ZONES	Nbr	WEIGHT (kg)
CARGO 1	1000	
CARGO 4	1300	
CARGO 5	500	
CABIN OA	38	
CABIN CB	57	

ALL WEIGHTS IN KILOGRAMS

CORRECTED INDEX **43**

ZONES	Nbr	WEIGHT (kg)	INDEX
CARGO 1	1000		
CARGO 4	1300		
CARGO 5	500		
CABIN OA	38		
CABIN CB	57		

FUEL INDEX	-12

INDEX	43

FUEL INDEX CORRECTION			
Weight (kg)	Index	Weight (kg)	Index
3500	+2	11500	-5
4000	+1	12000	-4
4500	+0	12500	-3
5000	-1	13000	-2
5500	-2	13500	-1
6000	-3	14000	0
6500	-4	14500	+1
7000	-5	15000	+2
7500	-6	15500	+3
8000	-7	16000	+4
8500	-8	16500	+5
9000	-9	17000	+6
9500	-10	17500	+7
10000	-11	18000	+8
10500	-12	18500	+9
11000	-13	19000	+10

CG % MAC	23.3

TAKEOFF	4

ZFW CGU INPUT	
WEIGHT (kg x 1000)	41.8
AIRCRAFT CG % MAC	21.5

PITCH TRIM	2
TAKEOFF	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 :

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

(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

R
R

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

$I = W \times (H - arm - 18.85) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$

(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 :
 $I = W \times (H - arm - 17.25) / 1000 + K$ or $I = [(CG - 25) \times W \times 0.000042] + K$
(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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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LOADING WEIGHT and BALANCE	2.01.40 P 5	
		SEQ 305	REV 38

FUEL INDEX TABLES PER TANK

Note :

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

R

$$I = W \times (H - arm - 16.46) / 500 + K$$

R

$$I = [(CG - 25) \times W \times 0.000084] + K$$

(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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A318/A319/A320/A321	TAKEOFF	2.02.00 P 1	
	CONTENTS	SEQ 100	REV 25
FLIGHT CREW OPERATING MANUAL			

	02.00	CONTENTS	
	02.05	INTRODUCTION	
	02.10	GENERAL (TEMPERATURE ENTRY)	
	–	TAKEOFF PERFORMANCE	1
	–	TAKEOFF CHART DESCRIPTION	2
R	–	ADDITIONAL INFORMATION	4
	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
	–	DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS	3
	–	FLEXIBLE TAKEOFF NOT POSSIBLE	7
	–	SUMMARY	8
	02.16	GENERAL (WEIGHT ENTRY)	
	–	TAKEOFF PERFORMANCE	1
	–	TAKEOFF CHART DESCRIPTION	2
R	–	ADDITIONAL INFORMATION	4
	02.18	MTOW CALCULATION (WEIGHT ENTRY)	
	–	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

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
– CONF 3	11

R

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

A318/A319/A320/A321	TAKEOFF	2.02.00 P 1	
	CONTENTS	SEQ 100	REV 25
FLIGHT CREW OPERATING MANUAL			

	02.00	CONTENTS	
	02.05	INTRODUCTION	
	02.10	GENERAL (TEMPERATURE ENTRY)	
	–	TAKEOFF PERFORMANCE	1
	–	TAKEOFF CHART DESCRIPTION	2
R	–	ADDITIONAL INFORMATION	4
	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
	–	DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS	3
	–	FLEXIBLE TAKEOFF NOT POSSIBLE	7
	–	SUMMARY	8
	02.16	GENERAL (WEIGHT ENTRY)	
	–	TAKEOFF PERFORMANCE	1
	–	TAKEOFF CHART DESCRIPTION	2
R	–	ADDITIONAL INFORMATION	4
	02.18	MTOW CALCULATION (WEIGHT ENTRY)	
	–	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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF CONTENTS	2.02.00	P 2
		SEQ 100	REV 36

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

R THE ENGINES 1

R – DETERMINATION OF THE MAXIMUM TAKEOFF WEIGHT AND

R 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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF INTRODUCTION	2.02.05	P 1
		SEQ 001	REV 22

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).

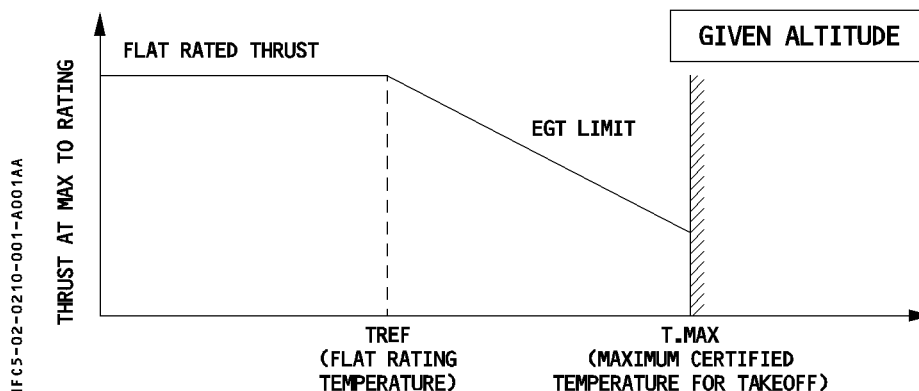
Both presentations are described here after. Sections 2.02.10, 2.02.12 and 2.02.14 are relative to temperature entry while 2.02.16, 2.02.18 and 2.02.20 are relative to weight entry.

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

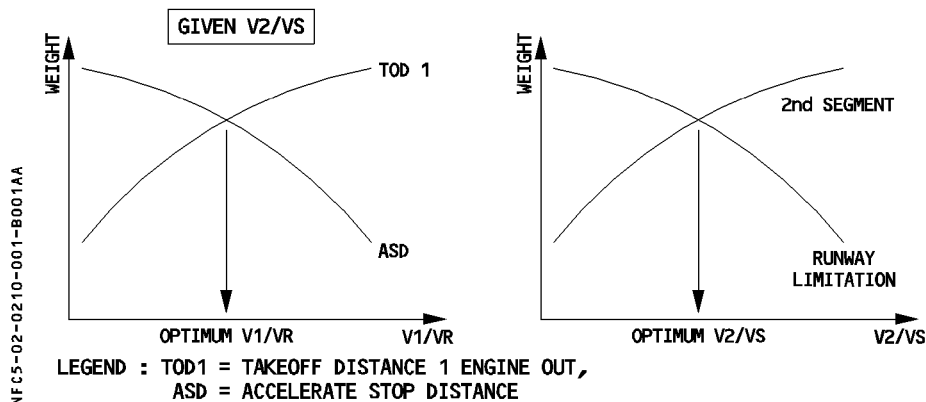
TAKEOFF PERFORMANCE

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 :



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.



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

TAKEOFF CHART DESCRIPTION

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

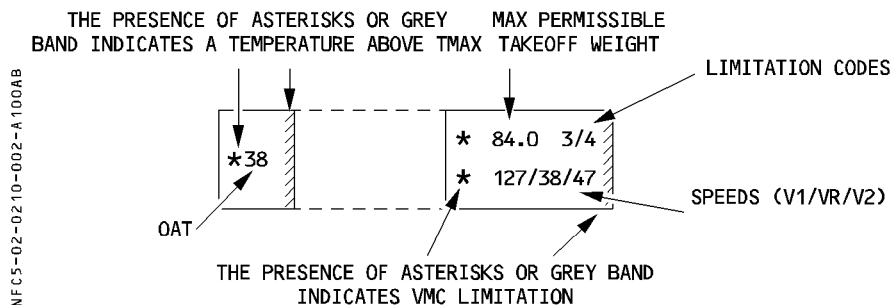
The chart is given for 2 different configurations and 5 wind values per configuration. This allows the crew to select the configuration that gives either :

- the highest permissible takeoff weight, or, for a given weight,
- the highest flexible temperature.

If different configurations give equivalent performance, the crew should select the configuration associated with the lowest takeoff speeds.

For each temperature value (and for a given configuration and wind), the chart provides the following information :

R



The available limitation codes are :

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

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

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

- Conservative corrections on 2.02.24 p 1 (to be used when not provided on the chart).
- Corrections (less restrictive) listed on the chart, to be applied as explained below.

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.

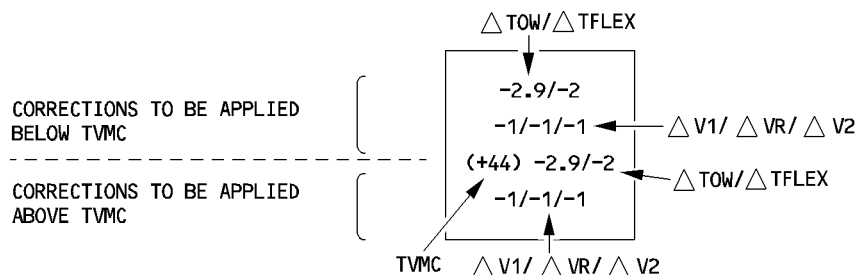
TAKEOFF ON A WET RUNWAY

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).*

UFC5-02-0210-003-A370AA

The corrections are presented on 4 lines :



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

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

MINIMUM SPEED

Minimum V1/VR/V2 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 V1/VR/V2 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 TMAX 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).*

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.10	P 5
	GENERAL (TEMPERATURE ENTRY)		SEQ 100	REV 25

RTOW CHARTS – COMPLEMENTARY INFORMATION

AIRCRAFT MODEL

TAKEOFF CONFIGURATION

ENGINE TYPE

AIRPORT CHARACTERISTICS

WIND

RUNWAY IDENTIFICATION

OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE

AXXXXXX

ENGINE

AIRPORT NAME

VERSION
AXXXXXX
V8

DATE
V8

QNH
Air conditioning
Anti-icing

1013 HPA
AC OFF
AI OFF

Elevation
Isa temp
Rwy slope

TORA
TORA
ASDA

3000 M
3100 M
3000 M

15L
4 obstacles

TAKEOFF CONDITIONS

CONF 1 + F

CONF 2

OAT °C	TAILWIND - 10.0 KT	HEADWIND + 10.0 KT	WIND 0 KT	TAILWIND - 10.0 KT	HEADWIND + 10.0 KT	WIND 0 KT	HEADWIND + 10.0 KT
-20	86.5 3/4	88.5 3/4	90.6 3/4	92.0 3/4	93.0 3/4	95.0 3/4	96.4 3/4
-10	151/56/58	156/59/61	161/62/64	164/65/67	167/69/71	171/72/74	174/76/78
0	85.8 3/4	87.8 3/4	89.8 3/4	91.2 3/4	92.3 3/4	93.4 3/4	94.5 3/4
10	149/55/57	154/57/59	159/60/62	162/63/65	165/67/68	168/69/71	171/72/74
20	85.0 3/4	87.0 3/4	89.1 3/4	90.5 3/4	91.6 3/4	92.7 3/4	93.8 3/4
30	147/54/56	152/56/58	157/58/61	160/61/63	163/65/66	167/68/70	170/71/73
46	84.2 3/4	86.3 3/4	88.3 3/4	89.7 3/4	90.9 3/4	92.0 3/4	93.1 3/4
48	145/53/56	150/55/58	155/57/59	158/59/61	161/63/64	164/65/67	167/68/70
50	83.3 3/4	85.4 3/4	87.4 3/4	88.8 3/4	90.1 3/4	91.2 3/4	92.3 3/4
*52	144/53/55	149/55/57	153/57/59	156/58/60	160/61/62	164/65/67	167/68/70
*54	82.1 3/4	84.2 3/4	86.2 3/4	87.5 3/4	88.9 3/4	90.0 3/4	91.1 3/4
	143/52/54	147/54/56	152/56/57	155/57/59	158/59/60	162/63/65	165/67/68
	72.8 3/4	74.3 3/4	75.9 3/4	76.9 3/4	78.0 3/4	79.1 3/4	80.2 3/4
	141/45/47	145/48/49	150/50/51	153/53/54	154/54/55	155/55/56	156/56/57
	71.4 3/4	73.0 3/4	74.5 3/4	75.9 3/4	77.3 3/4	78.7 3/4	80.1 3/4
	141/45/46	145/47/48	149/50/51	153/53/54	154/54/55	155/55/56	156/56/57
	70.1 3/4	71.6 3/4	73.1 3/4	74.5 3/4	75.9 3/4	77.3 3/4	78.7 3/4
	140/44/46	144/46/48	148/49/50	152/54/56	153/55/57	154/56/58	155/57/59
	68.8 3/4	70.2 3/4	71.7 3/4	72.6 3/4	73.5 3/4	74.4 3/4	75.3 3/4
	140/44/45	145/46/47	149/49/50	150/50/51	151/51/52	152/52/53	153/53/54
	67.4 3/4	68.9 3/4	70.2 3/4	71.1 3/4	72.0 3/4	72.9 3/4	73.8 3/4
	140/43/44	145/46/47	148/48/49	150/50/51	151/51/52	152/52/53	153/53/54
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57	158/58/58
	72.9 3/4	73.9 3/4	74.9 3/4	75.9 3/4	76.9 3/4	77.9 3/4	78.9 3/4
	150/50/50	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56	157/57/57
	70.1 3/4	71.0 3/4	71.9 3/4	72.8 3/4	73.7 3/4	74.6 3/4	75.5 3/4
	149/49/49	151/51/51	152/52/52	153/53/53	154/54/54	155/55/55	156/56/56
	74.3 3/4	75.4 3/4	76.4 3/4	77.3 3/4	78.2 3/4	79.1 3/4	80.0 3/4
	150/51/51	153/53/53					

A319XXX		ENGINES		AIRPORT NAME					VERSION		DATE	
QNH		1013.00 HPA		Elevation	489 FT	TORA	3000 M	15L	AXXXXXX		**V10	
Air cond.		AC OFF		Isa temp	14 C	TODA	3000 M		DRY			
Anti-icing		AI OFF		rvwy slope	.08 %	ASDA	3000 M					
All reversers operating									4 obstacles			
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	70.4 4/4 153/53/56	71.4 4/4 155/55/58				DOT NOT USE FOR OPERATIONAL PURPOSE						
-10	70.1 4/4 153/53/56	71.1 4/4 154/54/57				72.7 4/4 156/56/58	73.5 2/4 157/57/60	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		
10	69.3 3/4 152/52/55	70.3 4/4 152/52/55	71.3 4/4 153/53/56	72.1 4/4 154/54/57	72.9 4/4 155/55/58	68.8 4/4 148/48/50	69.7 4/4 149/49/51	70.8 4/4 150/50/53	71.6 4/4 151/51/53	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 4/4 153/53/56	72.4 4/4 154/54/57	68.3 4/4 147/47/49	69.2 4/4 148/48/50	70.3 4/4 149/49/51	71.1 4/4 149/49/51	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 4/4 148/48/51	70.5 4/4 148/48/50	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		
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		
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		
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		
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 4/4 152/52/54	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		
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	69.9 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 4/4 152/52/54	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	70.5 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		
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		
* 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 4/4 141/41/43	64.4 4/4 142/42/44	65.2 4/4 143/43/45	66.0 4/4 143/43/45	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 4/4 146/46/49	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		
* 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 4/4 146/46/48	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		
INFLUENCE OF RUNWAY CONDITION												
WET	-4/-1	-7/-2	.0/-1	.0/0	.0/0	-9/-2	-2/-1	.0/0	.0/-1	.0/-1		
	-10/-3/-3	-8/-1/-1	-4/-1/-1	-4/-1/-1	-1/0/0	-9/-2/-2	-4/0/0	-2/0/0	0/0/0	0/0/0		
	(+54) -8/-2	(+54) -7/-2	(+54) 0/-1	(+54) 0/0	(+54) 0/0	(+54) -9/-2	(+54) -2/-1	(+54) 0/0	(+54) 0/-1	(+54) -2/-1		
D QNH HPA												
	-6/-1	-6/-1	-7/-2	-7/-2	-7/-2	-8/-2	-8/-2	-9/-2	-8/-2	-8/-2		
	0/0/0	-1/0/0	0/0/0	0/0/0	0/0/0	-1/-1/-1	0/0/0	0/0/0	-2/-1/-1	-2/-2/-2		
+10	(+54) -6/-1	(+54) -6/-1	(+54) -7/-2	(+54) -7/-2	(+54) -9/-2	(+54) -7/-2	(+54) -8/-2	(+54) -8/-2	(+54) -9/-2	(+54) -8/-2		
	0/0/0	-1/0/0	0/0/0	0/0/0	0/0/0	-1/0/0	0/0/0	0/0/0	-2/0/0	-2/0/0		
	+3/0	+1/0	+1/0	+1/0	+1/0	+1/0	+1/0	+1/0	.0/0	.0/0		
LABEL FOR INFLUENCE	0/+1/+1	+1/+1/+1	+1/+1/+1	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/+1/+1	0/0/0		
	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) +1/0	(+54) .0/0	(+54) .0/0		
	0/+1/+1	+1/+1/+1	+1/+1/+1	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/+1/+1	0/0/0		
MTOW(1000 KG) codes		* VMC		Tref (OAT) = 44 C		Min acc height 810 FT		Min QNH alt 1306 FT				
V1min/VR/V2 (kt)		* LIMITATION		Tmax (OAT) = 50 C		Max acc height 1992 FT		Max QNH alt 2488 FT				
LIMITATION CODES												
1=1st segment 2=2nd segment 3=runway length 4=obstacles												
5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU												

A318/A319/A320/A321	TAKEOFF		2.02.10	P 5
	GENERAL (TEMPERATURE ENTRY)		SEQ 100	REV 25

RTOW CHARTS – COMPLEMENTARY INFORMATION

AIRCRAFT MODEL

TAKEOFF CONFIGURATION

AIRPORT CHARACTERISTICS

WIND

RUNWAY IDENTIFICATION

OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE

ENGINE

ENGINE TYPE

AIRPORT IDENTIFICATION

RUNWAY CONDITION AND DERATE

TAKEOFF CONDITIONS

AXXXXX

1013 HPA
AC OFF
AI OFF

Elevation
Isa temp
Rwy slope

AIRPORT NAME
TORA 3000 M
TODA 3100 M
ASDA 3000 M
.08 %

VERSION
AXXXXX V8
15L
4 obstacles

DATE
V8
DRY

CONF 1 + F

CONF 2

OAT °C	TAILWIND - 10.0 KT	HEADWIND + 10.0 KT	WIND 0 KT	TAILWIND - 10.0 KT	HEADWIND + 10.0 KT	WIND 0 KT	HEADWIND + 10.0 KT
-20	86.5 3/4	88.5 3/4	90.6 3/4	92.0 3/4	93.0 3/4	95.0 3/4	96.4 3/4
-10	85.8 3/4	87.8 3/4	89.8 3/4	91.2 3/4	92.3 3/4	94.3 3/4	95.7 3/4
0	85.0 3/4	87.0 3/4	89.0 3/4	90.5 3/4	91.6 3/4	93.6 3/4	95.1 3/4
10	84.2 3/4	86.3 3/4	88.3 3/4	89.7 3/4	90.9 3/4	92.9 3/4	94.3 3/4
20	83.3 3/4	85.4 3/4	87.4 3/4	88.8 3/4	90.1 3/4	92.1 3/4	93.5 3/4
30	82.1 3/4	84.2 3/4	86.2 3/4	87.5 3/4	88.9 3/4	90.9 3/4	92.3 3/4
46	72.8 3/4	74.3 3/4	75.9 3/4	76.9 3/4	78.0 3/4	79.7 3/4	81.4 3/4
48	71.4 3/4	73.0 3/4	74.5 3/4	75.5 3/4	76.6 3/4	78.3 3/4	79.9 3/4
50	70.1 3/4	71.6 3/4	73.1 3/4	74.1 3/4	75.2 3/4	76.9 3/4	78.5 3/4
*52	68.8 3/4	70.2 3/4	71.7 3/4	72.6 3/4	73.5 3/4	74.9 3/4	76.4 3/4
*54	67.4 3/4	68.9 3/4	70.2 3/4	71.1 3/4	72.0 3/4	73.4 3/4	74.9 3/4
WET	+0/+0 0/+0	+0/+0 0/+0	+0/+0 0/+0	+0/+0 0/+0	+0/+0 0/+0	+0/+0 0/+0	+0/+0 0/+0

DO NOT USE FOR OPERATIONAL PURPOSE

INFLUENCE OF DELTA PRESSURE

INFLUENCE OF RUNWAY CONDITION

MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.

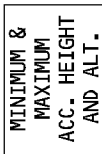
INFLUENCE CORRECTION
ΔWEIGHT ΔTFLEX
ΔV1/ΔVR/ΔV2
(TVMC) ΔWEIGHT ΔTFLEX
ΔV1/ΔVR/ΔV2

TAKEOFF PARAMETERS
MAX WEIGHT (1000 KG)
(72.0)
V1 (KT IAS) - VR (KT IAS) - V2 (KT IAS)
(150) (150) (151)

MINIMUM VALUES OF V1/VR/V2 TO WHICH TAKEOFF SPEEDS MUST BE LIMITED WHEN DECREMENTS ARE APPLIED
V1/VR/V2 DECREMENTS FOR WEIGHTS BELOW THE LOWEST WEIGHT OF A COLUMN

R

A318XXX		ENGINES			AIRPORT NAME					VERSION		DATE	
QNH		1013.25 HPA			Elevation	489	FT	TORA	3000	M	15L	AXXXXXXX **V22	
Air cond.		AC OFF			Isa temp	14	C	TODA	3000	M			
Anti-icing		AI OFF			rvwy slope	.08	%	ASDA	3000	M		4 obstacles	
All reversers operating					DRY								
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	69.6 4/4 151/51/55	70.7 4/4 152/52/57	72.0 4/4 154/54/59	72.9 3/4 156/56/60	73.6 3/4 157/57/61	69.0 4/4 145/45/50	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	69.2 4/4 150/50/55	70.3 4/4 151/51/55	71.6 4/4 154/54/58	72.5 3/4 155/55/60	73.3 3/4 157/57/61	68.7 4/4 145/45/50	69.8 4/4 146/46/50	70.9 4/4 148/48/53	71.9 2/4 151/51/56	72.4 3/4 155/55/59			
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	68.3 4/4 145/45/49	69.4 4/4 146/46/51	70.6 4/4 148/48/52	71.5 2/4 150/50/54	72.1 2/4 154/54/58			
10	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	67.9 4/4 143/43/48	69.0 4/4 145/45/50	70.2 4/4 147/47/51	71.1 2/4 149/49/53	71.8 2/4 152/52/57			
20	67.9 3/4 146/46/50	69.0 4/4 148/48/53	70.2 4/4 150/50/54	71.1 4/4 152/52/56	71.9 3/4 154/54/58	67.5 4/4 143/43/48	68.6 4/4 144/44/49	69.8 4/4 146/46/51	70.7 2/4 148/48/52	71.4 2/4 151/51/55			
30	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	67.1 4/4 142/42/46	68.1 4/4 144/44/48	69.3 4/4 145/45/49	70.2 4/4 146/46/51	70.9 2/4 149/49/54			
40	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	66.6 4/4 141/41/46	67.7 4/4 143/43/47	68.8 4/4 145/45/49	69.7 4/4 146/46/50	70.5 2/4 148/48/52			
44	66.6 3/4 142/42/46	67.8 3/4 146/46/50	69.0 3/4 148/48/53	69.9 4/4 149/49/54	70.7 3/4 152/52/56	66.4 3/4 141/41/46	67.5 4/4 142/42/47	68.7 4/4 144/44/49	69.6 4/4 145/45/49	70.3 2/4 147/47/52			
46	65.6 3/4 142/42/46	66.8 3/4 145/45/50	68.0 4/4 148/48/52	68.8 4/4 149/49/53	69.6 3/4 150/50/54	65.4 4/4 140/40/44	66.5 4/4 141/41/46	67.6 4/4 144/44/48	68.5 4/4 144/44/49	69.2 2/4 147/47/51			
48	64.6 3/4 141/41/46	65.7 3/4 144/44/48	66.8 4/4 147/47/51	67.7 4/4 148/48/51	68.5 4/4 148/48/52	64.3 4/4 138/38/43	65.4 4/4 140/40/45	66.4 4/4 143/43/47	67.3 4/4 143/43/47	68.0 2/4 146/46/50			
50	63.5 3/4 141/41/46	64.6 4/4 143/43/47	65.7 4/4 146/46/49	66.6 4/4 147/47/51	67.4 4/4 147/47/51	63.2 4/4 138/38/42	64.2 4/4 139/39/44	65.3 4/4 140/40/45	66.2 2/4 142/42/46	66.9 2/4 145/45/49			
52	62.5 3/4 141/41/45	63.5 4/4 142/42/46	DO NOT USE FOR OPERATIONAL PURPOSE							65.1 2/4 141/41/45	65.7 2/4 144/44/48		
54	61.4 3/4 140/40/44	62.4 4/4 142/42/46								63.9 2/4 140/40/44	64.5 2/4 143/43/48		
* 56	60.4 4/4 139/39/43	61.4 4/4 141/41/45								62.4 4/4 143/43/46	63.3 4/4 144/44/47	64.0 4/4 144/44/48	60.0 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	63.4 2/4 143/43/47
* 58	59.3 4/4 138/38/42	60.3 4/4 140/40/44	61.4 4/4 141/41/45	62.2 4/4 143/43/46	62.9 3/4 143/43/47	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	58.2 4/4 137/37/40	59.2 4/4 139/39/42	60.2 4/4 140/40/43	61.1 4/4 141/41/45	61.7 3/4 142/42/46	57.9 4/4 132/32/37	58.8 4/4 133/33/37	59.8 4/4 135/35/39	60.6 2/4 138/38/42	61.1 2/4 141/41/45			
* 62	57.3 4/4 136/36/39	58.3 4/4 138/38/41	59.3 4/4 139/39/43	60.1 4/4 140/40/43	60.7 2/4 141/41/45	57.0 4/4 131/31/36	57.8 4/4 132/32/36	58.8 4/4 134/34/39	59.6 2/4 137/37/41	60.1 2/4 140/40/44			
* 64	56.4 4/4 135/35/38	57.3 4/4 137/37/40	58.3 4/4 138/38/42	59.1 4/4 139/39/42	59.7 2/4 141/41/44	56.1 4/4 130/30/35	56.9 4/4 131/31/35	57.8 4/4 134/34/38	58.6 2/4 136/36/40	59.1 3/4 140/40/43			
INFLUENCE OF RUNWAY CONDITION													
WET	-2/2/-5	-2/2/-5	-1/7/-4	-1/4/-3	-0/5/-1	-2/5/-6	-1/9/-4	-1/2/-3	-0/5/-1	-0/8/-2			
	-15/-3/-3	-13/-2/-2	-10/-2/-2	-8/0/0	-6/-2/-2	-14/-1/-1	-10/0/0	-8/-1/-1	-5/-1/-1	-4/-1/-1			
	(+74) -2/9/-6	(+74) -2/2/-5	(+74) -1/7/-4	(+74) -1/4/-3	(+74) -0/8/-2	(+74) -2/8/-6	(+74) -2/1/-5	(+74) -1/2/-3	(+74) -0/5/-1	(+74) -0/8/-2			
D QNH HPA	-15/0/0	-13/0/0	-10/0/0	-8/0/0	-6/0/0	-14/0/0	-10/0/0	-8/0/0	-5/0/0	-4/0/0			
	-10.0	-0.5/-2	-0.5/-2	-0.5/-1	-0.5/-1	-0.6/-2	-0.5/-1	-0.5/-1	-0.6/-2	-0.6/-2			
	-1/-1/-2	-1/-1/-1	0/0/-1	0/0/-1	0/0/-1	0/0/-1	0/0/-1	0/0/-1	0/0/0	0/0/0			
+10.0	(+72) -0.5/-2	(+72) -0.5/-2	(+72) -0.5/-1	(+72) -0.5/-1	(+72) -0.8/-2	(+72) -0.7/-2	(+72) -0.5/-1	(+72) -0.5/-1	(+72) -0.6/-2	(+72) -0.6/-2			
	-1/0/0	-1/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0			
	+0.5/0	+0.4/0	+0.7/+1	+0.4/0	+0.5/0	+0.5/+1	+0.5/+1	+0.5/+1	+0.5/0	+0.4/0			
	0/0/0	0/0/0	+1/+1/0	0/0/0	+1/+1/+1	+1/+1/0	0/0/0	+1/+1/0	+1/+1/+1	0/0/0			
	(+74) +0.5/0	(+74) +0.4/0	(+74) +0.7/+1	(+74) +0.4/0	(+74) +0.5/0	(+74) +0.5/+1	(+74) +0.5/+1	(+74) +0.5/+1	(+74) +0.5/0	(+74) +0.4/0			
	0/0/0	0/0/0	+1/0/0	0/0/0	+1/+1/+1	+1/0/0	0/0/0	+1/0/0	+1/+1/+1	0/0/0			
LABEL FOR INFLUENCE		MTOW(1000 KG) codes			* VMC		Tref (OAT) = 44 C		Min acc height 464 FT		Min QNH alt 953 FT		
DW (1000 KG) DTFLEX		V1min/VR/V2 (kt)			*LIMITATION		Tmax (OAT) = 54 C		Max acc height 1796 FT		Max QNH alt 2285 FT		
DV1-DVR-DV2 (KT)		LIMITATION CODES									Min V1/VR/V2 = 105/09/12		
(TVMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles									CHECK VMU LIMITATION		
DW (1000 KG) DTFLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU									Correct. V1/VR/V2 = 1.0 KT/1000 KG		
DV1-DVR-DV2 (KT)													



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A320XXX		ENGINES			AIRPORT NAME					VERSION		DATE						
QNH		1013.25 HPA			Elevation	489	FT	TORA	3000	M	15L	AXXXXXX **V20						
Air cond.		AC OFF			Isa temp	14	C	TODA	3000	M								
Anti-icing		AI OFF			rvwy slope	.08	%	ASDA	3000	M		4 obstacles						
All reversers operating					DRY													
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 3/4 173/73/75	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 2/4 169/69/74								
-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								
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 3/4 166/66/70								
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								
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								
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								
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								
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								
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								
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								
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								
42	76.3 4/6 142/49/51	78.0 4/6 147/52/54	DO NOT USE FOR OPERATIONAL PURPOSE						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 4/6 155/56/58	80.7 2/4 154/56/58	75.7 4/6 141/45/49	77.3 4/6 145/47/52	79.1 4/6 150/50/55	80.3 3/4 152/53/58	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 4/6 155/56/57	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		
50	73.6 4/6 143/47/49	75.3 4/6 148/49/51	76.9 4/6 153/53/55	77.9 4/8 154/54/56	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								
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								
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								
INFLUENCE OF RUNWAY CONDITION																		
WET	-20/-5	-15/-4	-12/-3	-11/-2	-10/-2	-9/-4	-15/-4	-12/-3	-12/-2	-12/-2	-15/-3							
	-169/-1/1	-15/2/-2	-13/-4/-4	-11/-3/-3	-10/2/-2	-14/0/-	-13/0/-	-12/-2/-2	-10/-1/-1	-4/-2/-2								
	(+54) -20/-5	(+54) -15/-4	(+54) -13/-3	(+54) -11/-2	(+54) -10/-2	(+54) -9/-4	(+54) -15/-4	(+54) -13/-3	(+54) -12/-2	(+54) -12/-2	(+54) -15/-3							
		-16/0/0	-15/0/0	-13/0/0	-11/0/0	-10/0/0	-14/0/0	-13/0/0	-11/0/0	-10/0/0	-4/0/0							
D QNH HPA		INFLUENCE OF DELTA PRESSURE																
-10.0	-0.8/-2	-0.7/-2	-0.7/-2	-1.3/-3	-0.7/-2	-0.7/-2	-1.2/-3	-0.8/-2	-0.8/-2	-0.8/-2	-0.8/-2							
	0/0/0	0/0/0	0/0/0	-1/0/0	0/0/0	0/0/0	0/0/0	-1/-1/-2	-1/0/0	-1/-1/-1	-1/-1/-1							
	(+54) -0.8/-2	(+54) -0.7/-2	(+54) -0.7/-2	(+54) -1.3/-3	(+54) -0.7/-2	(+54) -0.7/-2	(+54) -1.2/-3	(+54) -0.8/-2	(+54) -0.8/-2	(+54) -0.8/-2	(+54) -0.8/-2							
+10.0	+0.2/0	+0.2/0	0.0/0	+0.2/0	+0.2/0	+0.2/0	+0.2/0	+0.2/0	+0.2/0	+0.2/0	+0.2/0							
	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/+1/+1	0/+1/+1	0/0/0	0/0/0	+1/+1/+1	+1/+1/+1							
	(+54) +0.2/0	(+54) +0.2/0	(+54) 0.0/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0	(+54) +0.2/0							
LABEL FOR INFLUENCE		MTOW(1000 KG) codes			* VMC	Tref (OAT)	= 44 C	Min acc height	464 FT	Min QNH alt 953 FT								
DW (1000 KG) DTFLEX		V1min/VR/V2 (kt)			*LIMITATION	Tmax (OAT)	= 54 C	Max acc height	1917 FT	Max QNH alt 2406 FT								
DV1-DVR-DV2 (KT)		LIMITATION CODES :																
(TVMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles																
DW (1000 KG) DTFLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU																
DV1-DVR-DV2 (KT)																		
		Min V1/VR/V2 = 108/114/117																
		CHECK VMU LIMITATION																
		Correct. V1/VR/V2 = 1.0 KT/1000 KG																

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

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 conversative 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.
- For the given wind and temperature conditions, read the maximum takeoff weight (choose the configuration giving the highest weight).
 - Apply the published weight correction(s) to the maximum takeoff weight (for each correction) to determine the maximum permissible takeoff weight.
 - 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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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 scheck 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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	MTOW CALCULATION (TEMP. ENTRY)	SEQ 270	REV 37
		FLIGHT CREW OPERATING MANUAL	

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.

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	MTOW CALCULATION (TEMP. ENTRY)	SEQ 110		REV 25	
FLIGHT CREW OPERATING MANUAL					

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 kt – 4 = 148 kt
 VR = 152 kt – 1 = 151 kt
 V2 = 155 kt – 1 = 154 kt
 (No speed check required for first correction)
 - Apply QNH correction
 For OAT < TVMC (54°), ΔW = 0.1 × 15/10 = ...+ 0.1
 Maximum permissible takeoff weight (1000 kg) 71.3
 Associated speeds,
 V1 = 148 kt + 0 × 15/10 = 148 kt
 VR = 151 kt + 0 × 15/10 = 151 kt
 V2 = 154 kt + 0 × 15/10 = 154 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
For OAT < TVMC (54°C), ΔW = ... 0.0
R Intermediate weight 69.2
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
For OAT < TVMC (54°C), ΔW = 0.1 × 15/10 = ... + 0.1
R Maximum permissible takeoff weight 69.3
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), ΔW =.- 1.4
Intermediate weight (1000 kg) 69.4
Associated speeds,
V1 = 151 kt – 8 = 143 kt
VR = 152 kt – 0 = 152 kt
V2 = 156 kt – 0 = 156 kt
(No speed check required for first correction)
- Apply QNH correction
For OAT < TVMC (74°C), ΔW = 0.4 × 15/10 = ...+ 0.6
Maximum permissible takeoff weight (1000 kg) 70.0
Associated speeds,
V1 = 143 kt + 0 × 15/10 = 143 kt
VR = 152 kt + 0 × 15/10 = 152 kt
V2 = 156 kt + 0 × 15/10 = 156 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 $\times$ 15/10 = 139 kt
 VR = 147 kt + 0 $\times$ 15/10 = 147 kt
 V2 = 151 kt + 0 $\times$ 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), ΔW = ... – 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), ΔW = 0.2 × 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

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		SEQ 270	REV 37
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (TEMP. ENTRY)		

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), ΔW = ...- 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
For OAT < TVMC (54°C), ΔW = 0.2 × 15/10 = ...+ 0.3
R Maximum permissible takeoff weight 79.4
Associated speed,
R V1 = 142 kt + 1 × 15/10 = 143 kt
R VR = 152 kt + 1× 15/10 = 154 kt
R V2 = 157 kt + 1× 15/10 = 159 kt

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	MTOW CALCULATION (TEMP. ENTRY)	SEQ 055	REV 30
FLIGHT CREW OPERATING MANUAL			

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 :

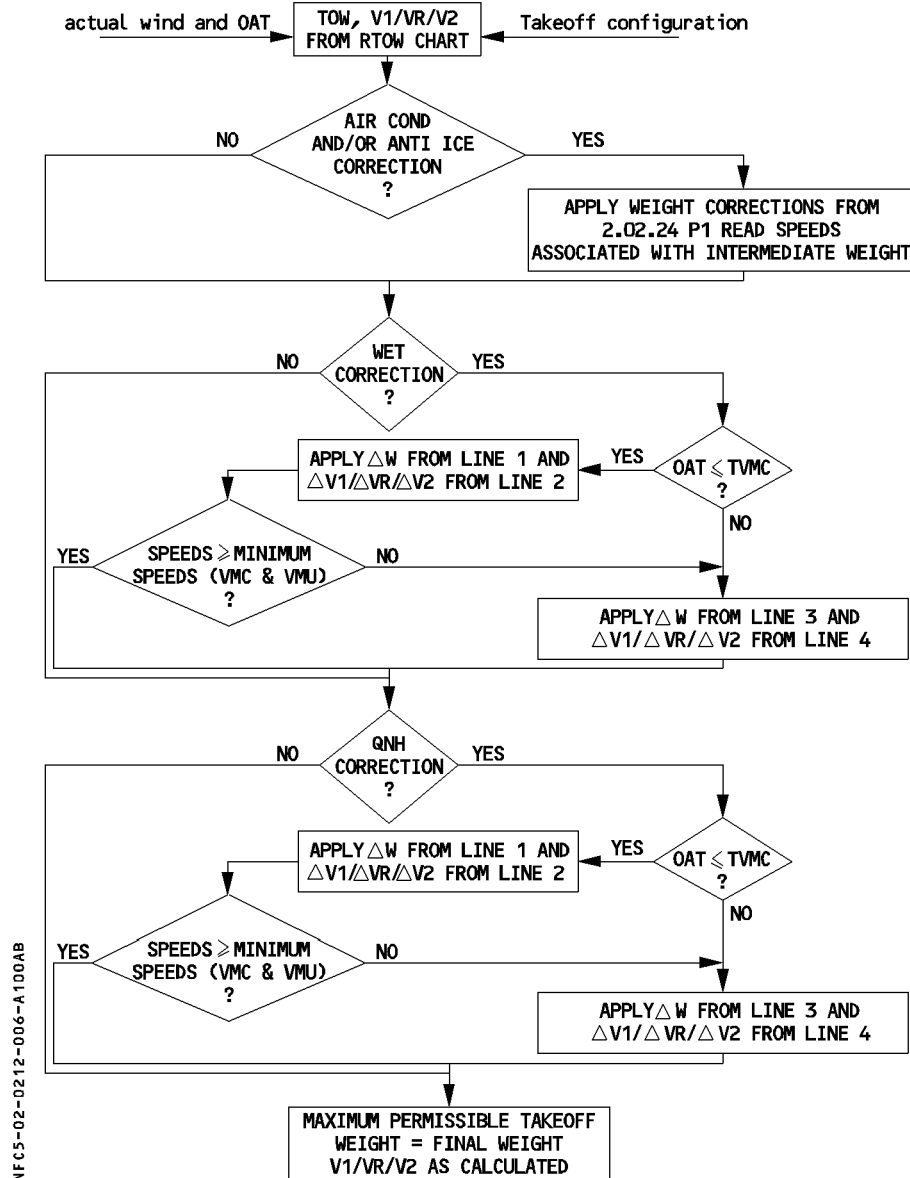
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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.



A318/A319/A320/A321	TAKEOFF	2.02.12	P 5
	MTOW CALCULATION (TEMP. ENTRY)	SEQ 078	REV 38
		FLIGHT CREW OPERATING MANUAL	

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 :

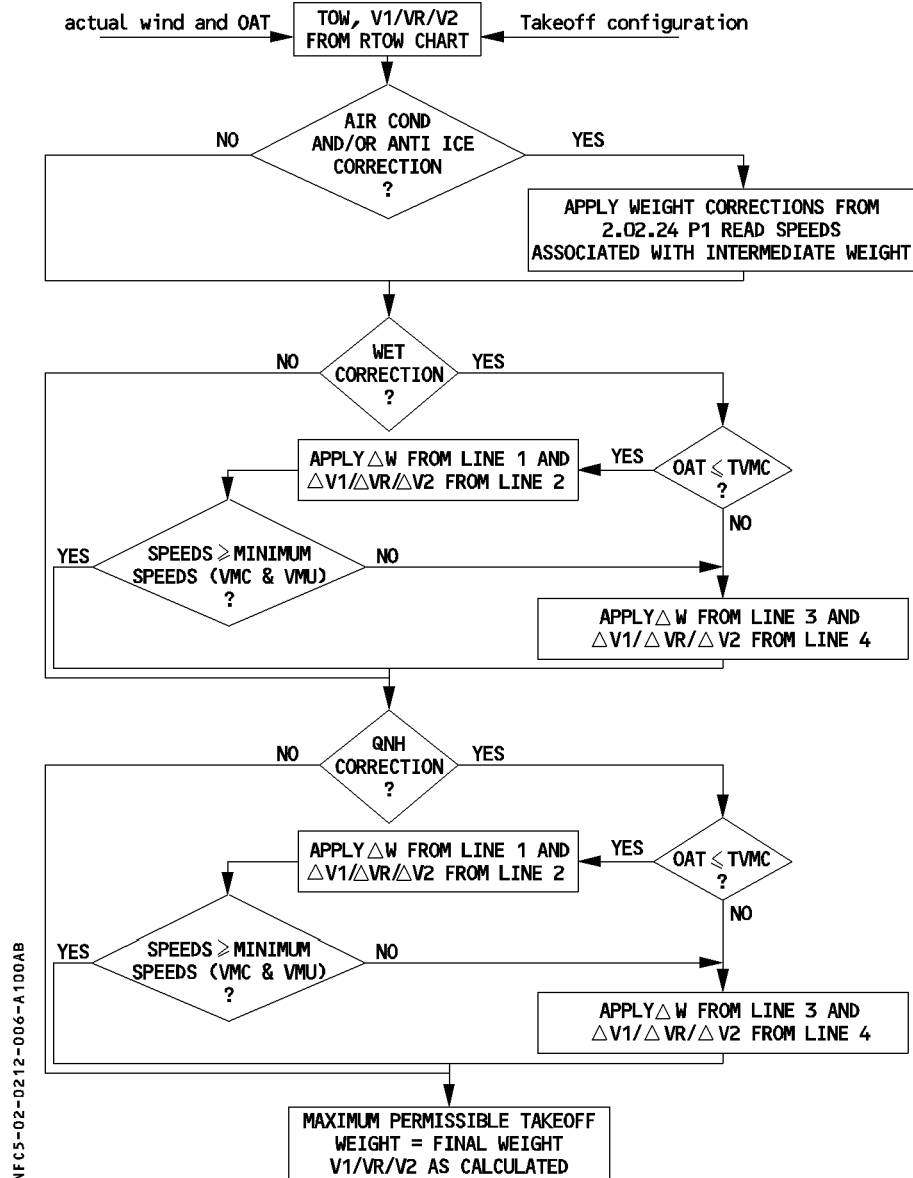
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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 :

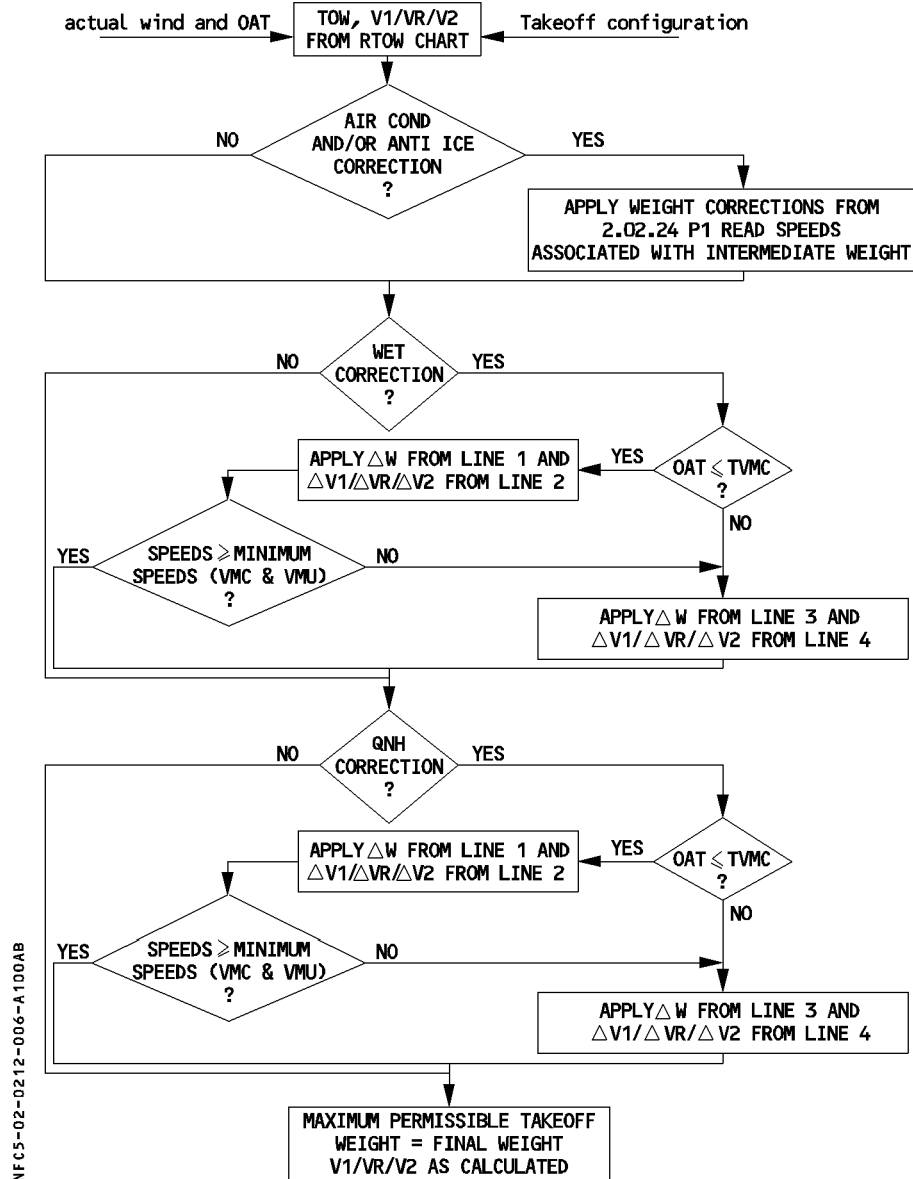
1. For given configuration and wind, note the speeds associated with the takeoff weight in the row displaying the highest permissible temperature.
2. Apply speed corrections provided at the bottom of the RTOW chart to V1, VR and V2 limited to the minimum speeds.

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.



NFC5-02-0212-006-A100AB

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

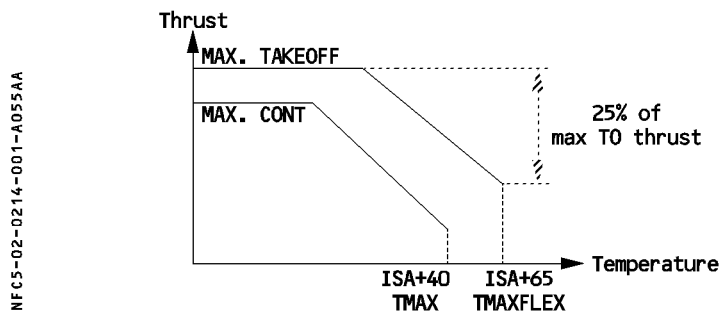
The pilot can use flexible takeoff when the actual takeoff weight is lower than the maximum permissible takeoff weight for the actual temperature. The maximum permissible takeoff weight decreases when temperature increases, so it is possible to assume a temperature at which the actual takeoff weight 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).



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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.14	P 2
	FLEXIBLE TAKEOFF (TEMP. ENTRY)		SEQ. 100	REV 38

- 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.

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

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.

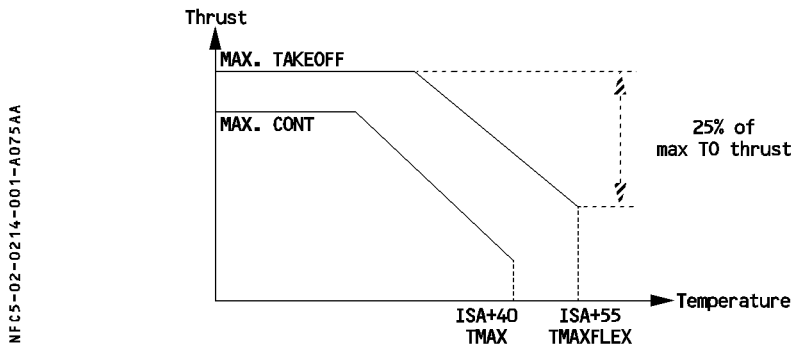
The use of flexible takeoff thrust saves engine life.

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).



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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 2
		SEQ. 100	REV 38

- 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.

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

DEFINITION OF FLEXIBLE TAKEOFF

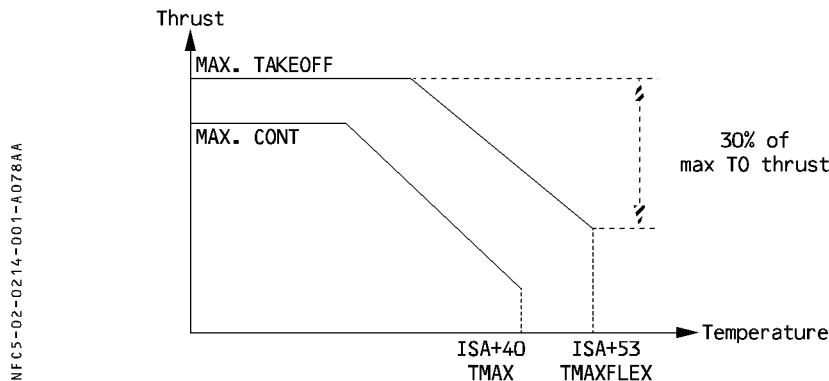
In many cases the aircraft takes off with a weight lower than the maximum permissible takeoff weight. When this happens, it can meet the required performance (runway, second segment, obstacle,...) with a decreased thrust that is adapted to the weight : this is called FLEXIBLE TAKEOFF and the thrust is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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 2
		SEQ 100	REV 38

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

RECOMMENDATION

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

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

DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS

- Before determining the flexible temperature, calculate the maximum permissible takeoff weight (see previous section) and ensure that the actual takeoff weight is lower than the determined maximum takeoff weight.
- Enter the RTOW chart with the wind condition and selected configuration to interpolate for the actual takeoff weight. Read the flexible temperature in the temperature column corresponding to the actual weight.
 - Repeat this process for the other configuration available. Select that configuration giving the highest flexible temperature.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

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

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 P 1

- Corrections are given for QNH $\neq$ 1013 hPa, air conditioning ON, anti ice ON.
1. For a given takeoff weight, wind condition and selected configuration, determine the flexible temperature. Retain the takeoff speeds associated with the actual weight.
 2. Apply the published temperature correction. To combine two or more corrections, add the different corrections and apply to temperature value.
(No speed corrections required).

Example 4

DATA : Actual takeoff weight = 65 000 kg
Head wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

- R Use the chart from 2.02.10 p 6. Determine the maximum permissible takeoff weight (see example1). The actual weight being lower than the maximum one, flexible takeoff is possible.
- Enter the 10 kt head wind column and interpolate for 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

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

Retain CONF 1+F for takeoff configuration.
Takeoff speeds are V1 = 146 kt, VR = 146 kt, V2 = 148 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 :

- Enter the chart with wind and selected configuration. Interpolate for actual takeoff weight. Read flexible temperature associated with this weight.
- 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).
- To combine a second and/or a third correction, proceed as per point 2.
- 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.

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

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

Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are V1 = 145 kt, VR = 146 kt, V2 = 150 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 ΔTflex correction from line 1 and apply speed corrections (ΔV1/ΔVR/ΔV2) from line 2.
 Else, (flexible temperature greater than TVMC), apply ΔTflex from line 3 and ΔV1/ ΔVR/ ΔV2 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 ≠ 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 temperature 52° C

Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2,
Flexible temperature 52° 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 ΔTflex correction from line 1 and apply speed corrections (ΔV1/ΔVR/ΔV2) from line 2.
 Else, (flexible temperature greater than TVMC), apply ΔTflex from line 3 and ΔV1/ ΔVR/ ΔV2 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 ≠ 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 temperature 52° C
Enter the 10 kt head wind column and interpolate for 76 000 kg, CONF 2,
Flexible temperature 52° C

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 4
		SEQ 275	REV 34

Retain CONF 2 for takeoff configuration.
 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.

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	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ 110	REV 25
FLIGHT CREW OPERATING MANUAL			

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), ΔTflex =. – 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), ΔTflex =. 0° C
Maximum flexible temperature 52° C
Check that OAT/TREF < flex temperature ≤ 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

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), ΔTflex = ... 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), ΔTflex = ... 0° C
- R Maximum flexible temperature 49° C
- Check that OAT/TREF < flex temperature ≤ 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), ΔTflex =. – 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), ΔTflex =. 0° C

Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature ≤ 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

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), ΔTflex = ... - 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), ΔTflex = ... 0° C

R

- Maximum flexible temperature 40° C
- Check that OAT/TREF < flex temperature ≤ TMAXFLEX
- No speed correction.
- Takeoff speeds are V1 = 137 kt, VR = 146 kt, V2 = 150 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), $\Delta T_{flex} =$ – 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), $\Delta T_{flex} =$ 0° C

R Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature ≤ 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

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 ≤ 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), $\Delta T_{flex} =$ – 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), $\Delta T_{flex} =$ 0° C

R Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature ≤ 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	TAKEOFF	2.02.14 P 6	
	FLEXIBLE TAKEOFF (TEMP. ENTRY)	SEQ. 275	REV 34
		FLIGHT CREW OPERATING MANUAL	

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), $\Delta T_{flex} =$ – 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), $\Delta T_{flex} =$ 0° C
 Maximum flexible temperature 48° C
 Check that OAT/TREF < flex temperature ≤ TMAXFLEX
 No speed correction.
 Takeoff speeds are V1 = 145 kt, VR = 149 kt, V2 = 154 kt

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 7
		SEQ 060	REV 31

	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

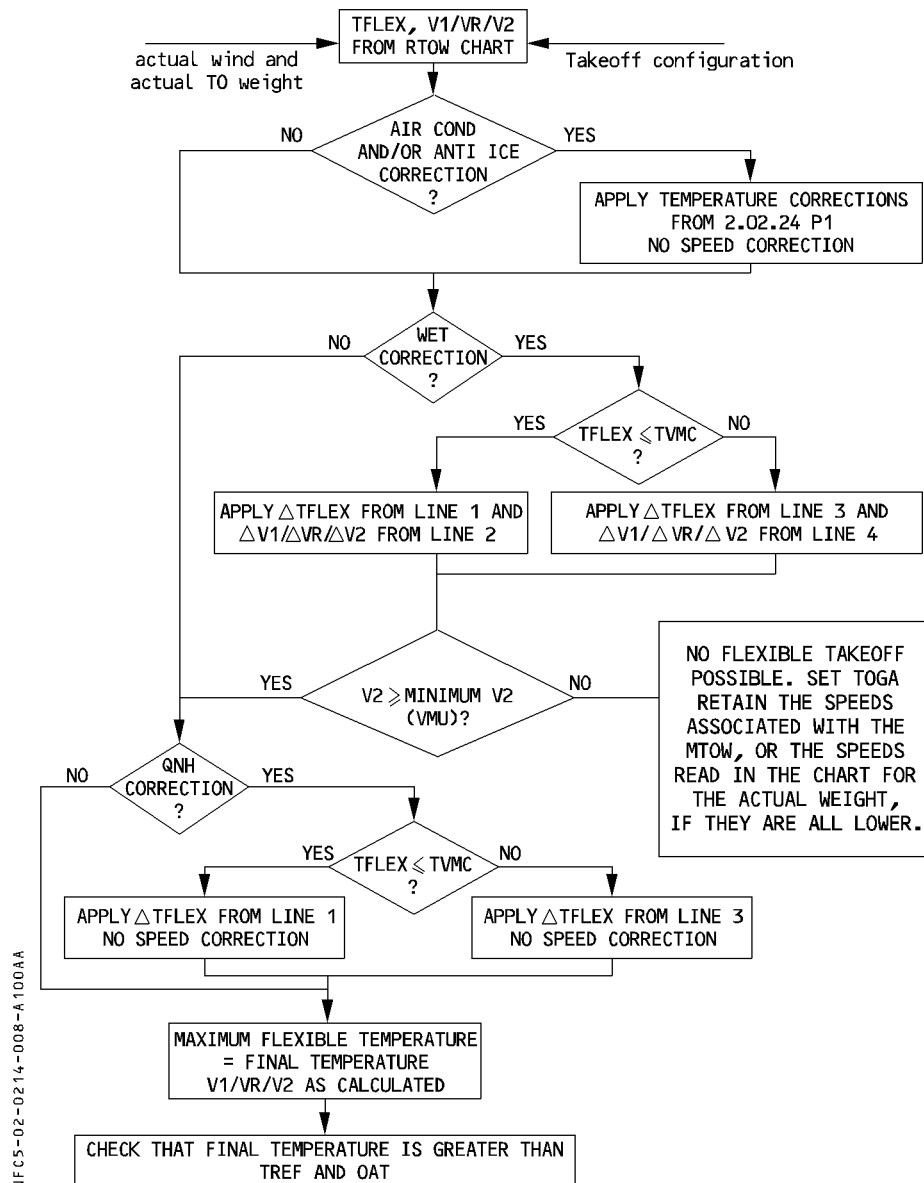
FLEXIBLE TAKEOFF NOT POSSIBLE

- 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
 - R all lower than the speeds calculated for the maximum permissible takeoff weight.

SUMMARY

The flow diagram gives the different steps to follow.

R



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 7
		SEQ 078	REV 39

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;

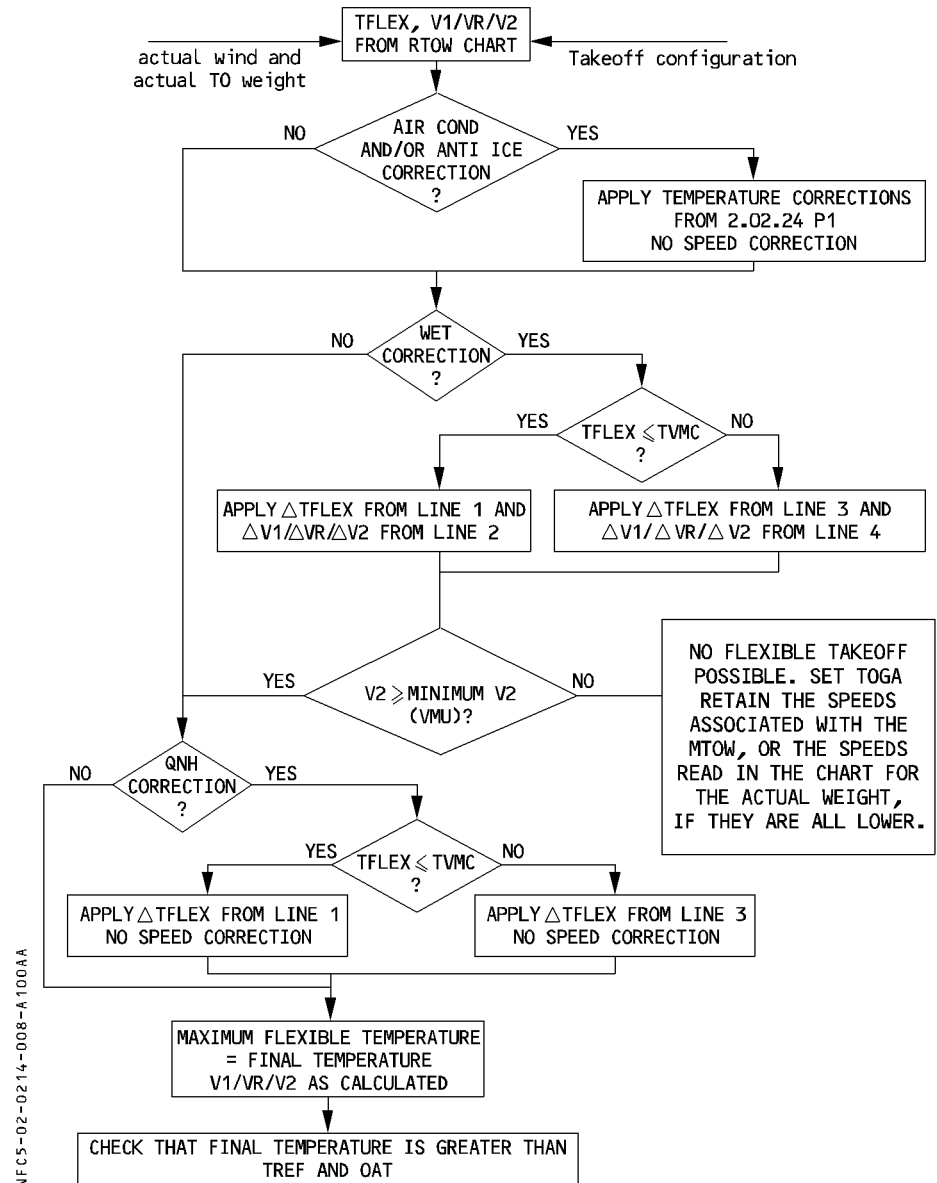
OR

- 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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 7
		SEQ 270	REV 34

	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;

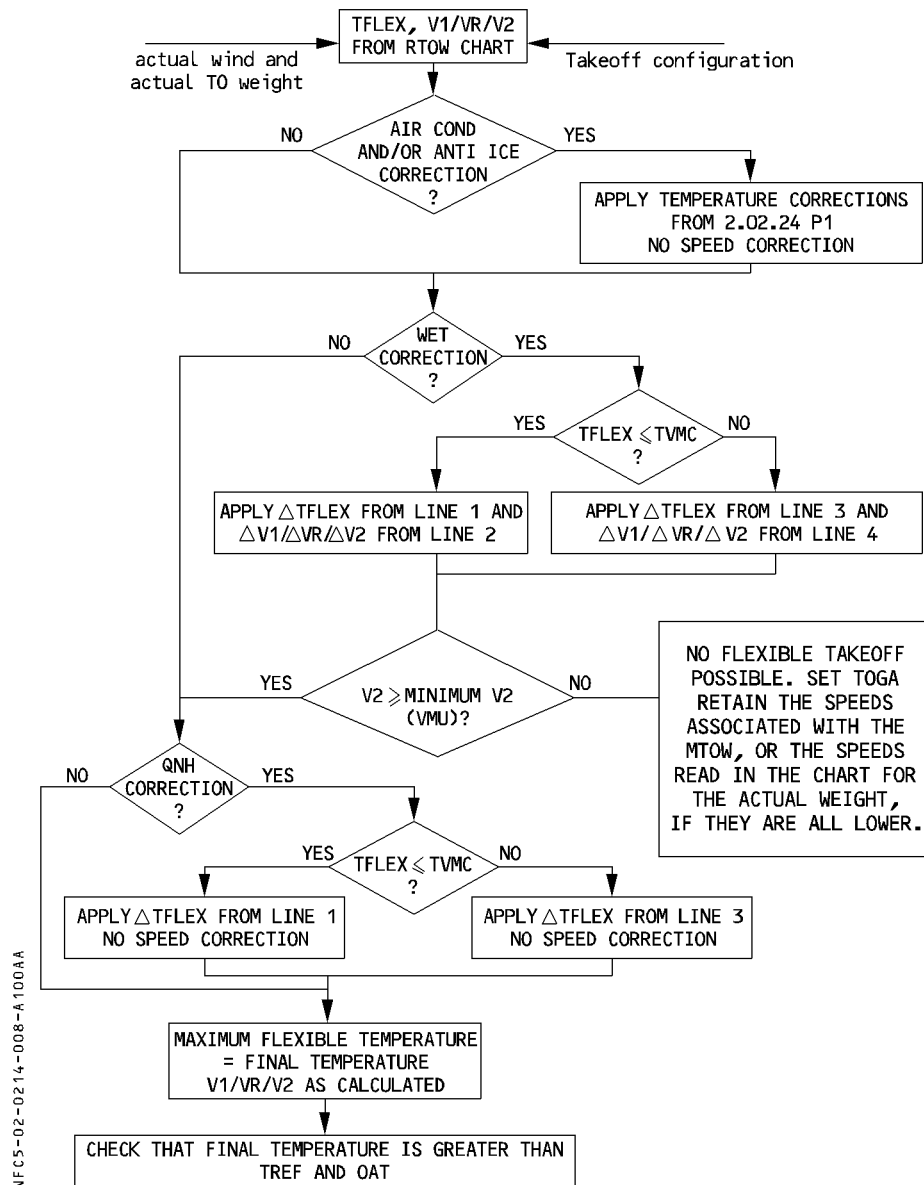
OR

- 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



NFC5-02-0214-008-A100AA

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (TEMP. ENTRY)	2.02.14	P 7
		SEQ 275	REV 34

	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;

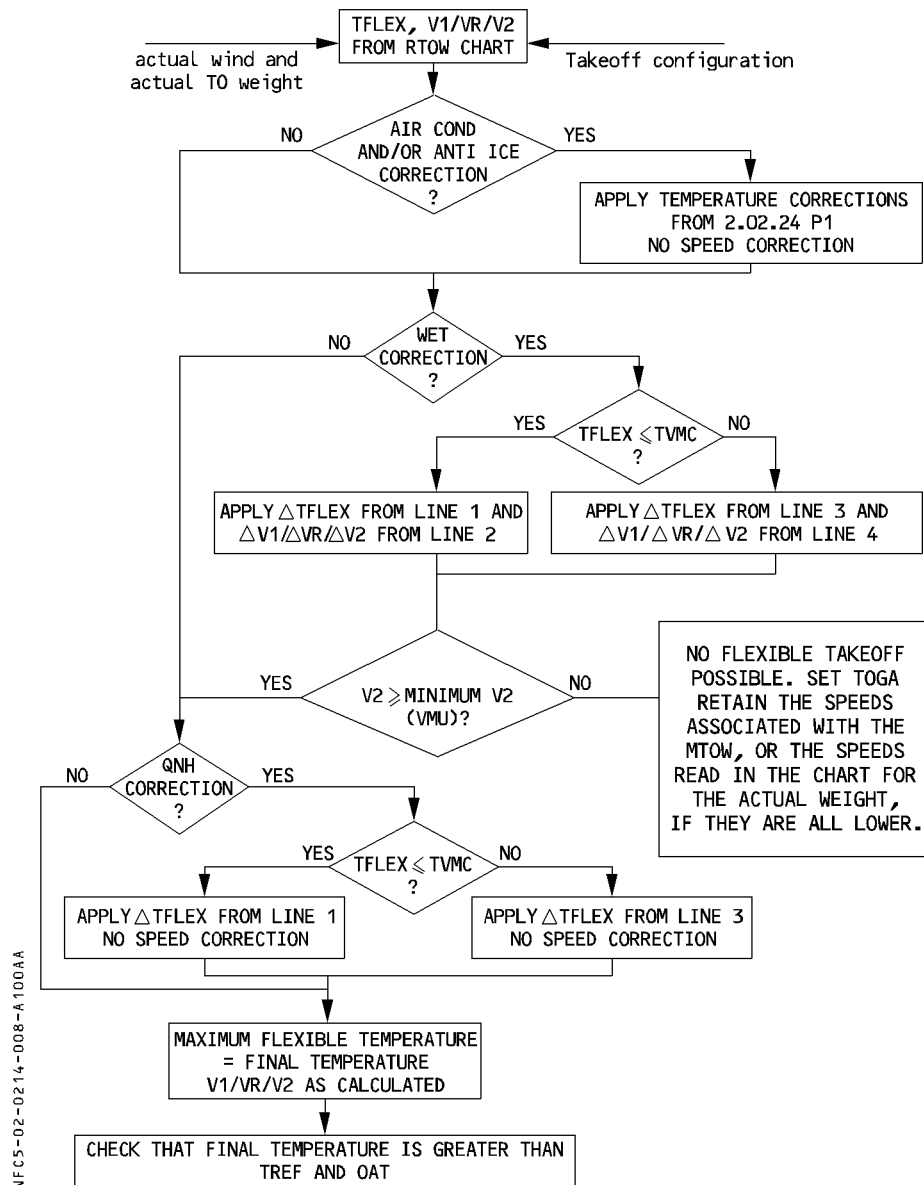
OR

- 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

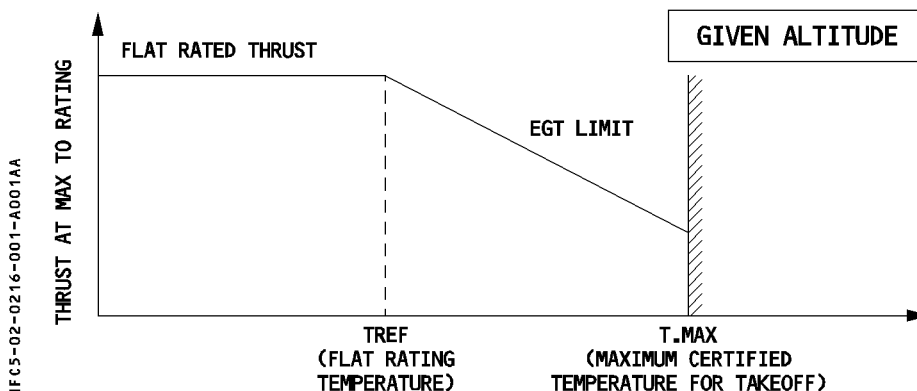


NFC5-02-0214-008-A100AA

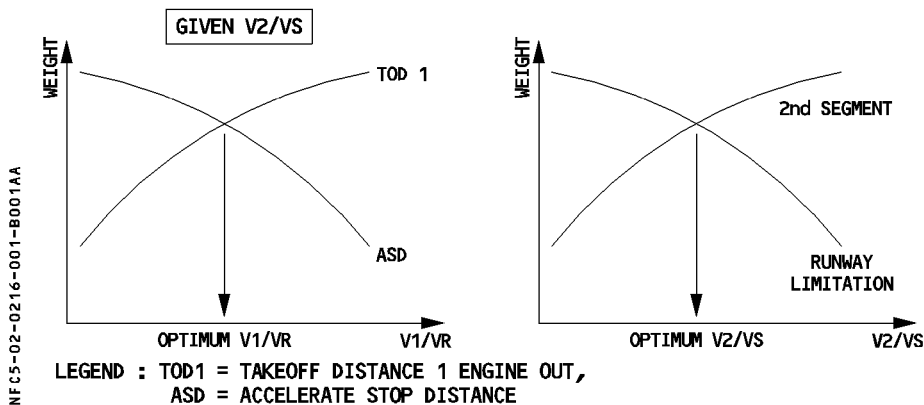
TAKEOFF PERFORMANCE

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

The takeoff thrust produced by the engine varies as follows :



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



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

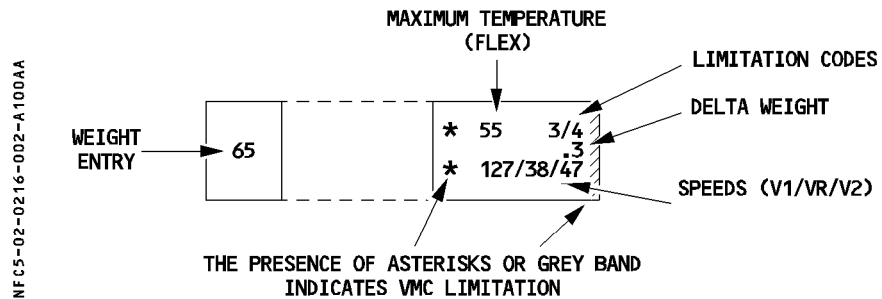
TAKEOFF CHART DESCRIPTION

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

- 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

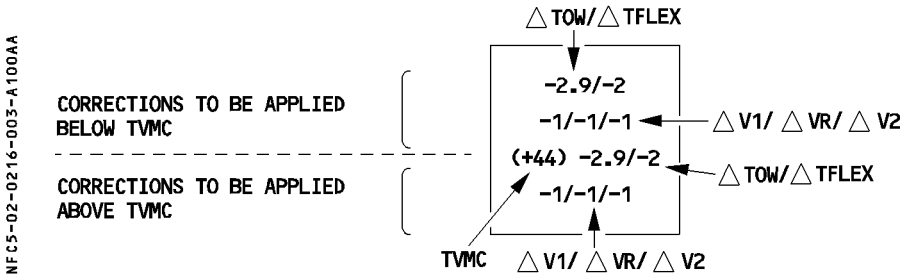
CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

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 :



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

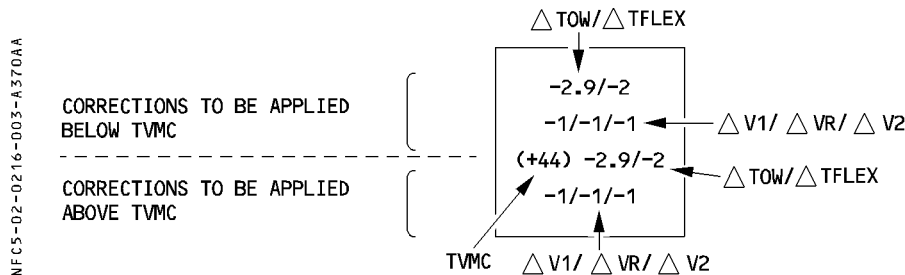
Takeoff charts computed for wet runway with a 15 feet screen height and/or use of reverse thrust may produce, in some conditions, a maximum takeoff weight (or flexible temperature) higher than that obtained for a dry runway. It is thus mandatory to compare both charts (dry and wet) and retain the lower 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 V1, VR and V2 by 1 knot.

R DESCRIPTION OF THE CORRECTIONS ON TAKEOFF CHART

R The corrections are presented on 4 lines :



R TVMC is a temperature value given per column. This is a fictitious value that indicates the
R 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 V1/VR/V2 due to VMC are provided on the bottom right side of the takeoff chart.
R They are only applicable in case of speed corrections.
R These speeds are conservative. They may be slightly higher than V1/VR/V2 displayed on
R the takeoff chart.

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).*

AIRCRAFT MODEL

TAKEOFF CONFIGURATION

AIRPORT CHARACTERISTICS

WIND

RUNWAY IDENTIFICATION

OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE

ENGINE TYPE

ENGINE

AIRPORT NAME

AIRPORT IDENTIFICATION

RUNWAY CONDITION AND DERATE

VERSION

DATE

TAKEOFF CONDITIONS

AXXXXX

QNH

1013 HPA

489 FT

3000 M

AXXXXX

V8

15L

DRY

Air cond.

AC OFF

Isa temp

14 C

3100 M

Anti-icing

AI OFF

Rwy slope

.08 %

3000 M

4 obstacles

CONF 1 + F					CONF 2				
WEIGHT 1000 KG	TAILWIND - 10 KT	TAILWIND - 5 KT	WIND 0 KT	HEADWIND 10 KT	TAILWIND - 10 KT	TAILWIND - 5 KT	WIND 0 KT	HEADWIND 10 KT	
76	6 3/3 .0	25 3/3 .0	37 3/3 .0	38 3/3 .2	0 3/3 .1	18 3/3 .0	35 3/3 .0	37 3/3 .0	
72	148/52/55 40 3/3 -2	149/53/56 42 3/3 5	151/54/57 44 3/3 -5	154/57/60 46 3/3 -1	150/53/56 40 3/3 -1	152/56/58 42 3/3 -1	152/56/58 43 3/3 5	155/58/60 44 3/3 -4	
68	142/46/49 48 3/3 -3	146/49/52 50 3/3 -3	150/52/55 52/3/3	153/54/57 53 3/3	143/47/49 48 3/3 -1	147/50/52 49 3/3 -5	151/53/55 51 3/3 -1	154/56/58 51 2/3 -4	
64	141/43/46 56 3/3 -3	145/47/49 58 3/7	149/50/52 58 3/7	153/53/55 58 3/7	142/44/46 56 3/7	146/48/50 57 3/3	151/52/53 57 2/3	153/54/56 57 2/3 -6	
60	141/42/44 58 3/7 -0	143/44/46 58 3/7 -0	140/44/46 58 2/7	138/44/46 58 2/7	142/43/45 58 3/7	147/47/48 58 3/7	149/50/51 58 2/7	148/50/51 58 2/7 -0	
56	118/30/33 58 7/9 -0	113/30/33 58 7/9 -0	* 111/30/33	* 111/30/33	117/30/32 58 7/7	* 113/31/32	* 111/31/32	* 111/31/32	
52	* 111/21/24 58 7/7 -0	* 111/21/24 58 7/7 -0	* 111/21/24	* 111/21/24	* 111/19/21	* 111/19/21	* 111/19/21	* 111/19/21	
48	* 111/19/22 58 7/7 -0	* 111/19/22 58 7/7 -0	* 111/19/22	* 111/19/22	* 111/19/21	* 111/19/22	* 111/19/21	* 111/19/21	
46	* 111/18/22 58 7/7 -0	* 111/18/22 58 7/7 -0	* 111/18/22	* 111/18/22	* 111/18/21	* 112/18/21	* 112/18/21	* 112/18/21	
40	* 112/18/22 58 7/7 -0	* 112/17/22 58 7/7 -0	* 112/17/22	* 112/17/22	* 112/18/21	* 112/18/21	* 112/18/21	* 112/18/21	
	GRAD1/GRAD2 (KG/C)								
	40/****	40/****	40/400	40/400	40/****	40/****	30/****	30/4/10	GRAD1/GRAD2

DO NOT USE FOR OPERATIONAL PURPOSE				
WET	INFLUENCE OF RUNWAY CONDITION	INFLUENCE OF DELTA PRESSURE	INFLUENCE OF DELTA PRESSURE	INFLUENCE OF DELTA PRESSURE
-10	-8/-2 0/-1/-1 0/+0/+0 (+54) -4/-1 0/+0/+0	-9/-2 0/-1/-1 0/+0/+0 (+54) -9/-2 0/+0/+0	-10/-2 0/-1/-1 0/+0/+0 (+54) -10/-2 0/+0/+0	-11/-2 0/-1/-1 0/+0/+0 (+54) -11/-2 0/+0/+0
+10	+6/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+7/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+8/+0 +1/+0/+0 (+54) +3/+0 +1/+0/+0	+9/+0 +1/+0/+0 (+54) +4/+0 +1/+0/+0
LABEL FOR INFLUENCE MTOW(1000 KG) codes				
DW (1000 KG) DTFLX	V1min/VR/V2(KT)	*VMC	Tref (OAT) =29 C	Min acc height 784ft Min QNH alt 1280ft
DW1+VR-W2 (KT)	*LIMITATION	Tmax (OAT) =54 C	Max acc height 1965ft Max QNH alt 2461ft	MIN V1/VR/V2 = 111/17/21
(TVMC) DTFLX	CHECK VMU LIMITATION CORRECT. V1/VR/V2 = 1 Kt/1000 Kg			
DW1+VR-W2 (KT)	1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final takeoff 9=VMU			

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

TAKEOFF PARAMETERS

MAX TEMPERATURE (58)

LIMITATION CODE (7-7)

DELTA WEIGHT (1000 KG) (.0)

V1 (KT IAS) - VR (KT IAS) - V2 (KT IAS)
(112) (117) (122)

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

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

A319XXX		ENGINES		AIRPORT NAME						VERSION DATE		
QNH		1013.00 HPA		Elevation		489	FT	TORA	3000	M	15L	AXXXXXX V10
Air cond.		AC OFF		Isa temp		14	C	TODA	3100	M		
Anti-icing		AI OFF		rwy slope		.08	%	ASDA	3000	M		4 obstacles
All reversers operating				DRY								
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				
76	6 3/3 .0	25 3/3 .0	37 3/3 .0	38 3/3 .2	0 3/3 .1	18 3/3 .0	35 3/3 .0	37 3/3 .0				
	148/52/55	149/53/56	151/54/57	154/57/60	150/53/56	150/54/57	152/56/58	155/58/60				
72	40 3/3 .2	42 3/3 .5	44 3/3 .5	46 3/3 .1	40 3/3 .1	42 3/3 .1	43 3/3 .5	44 3/3 .4				
	142/46/49	146/49/52	150/52/55	153/54/57	143/47/49	147/50/52	151/53/55	154/56/58				
68	48 3/3 .3	50 3/3 .3	52 3/3 .2	53 3/3 .0	48 3/3 .1	49 3/3 .5	51 3/3 .1	51 2/3 .4				
	141/43/46	145/47/49	149/50/52	153/53/55	142/44/46	146/48/50	151/52/53	153/54/56				
64	56 3/3 .3	58 3/7 .0	58 3/7 .0	58 3/7 .0	56 3/3 .1	57 3/3 .2	57 2/3 .6	57 2/3 .6				
	141/42/44	143/44/46	140/44/46	138/44/46	142/43/45	147/47/48	149/50/51	148/50/51				
60	58 3/7 .0	* 58 3/7 .0	* 58 2/7 .0	* 58 2/7 .0	58 3/7 .0	* 58 3/7 .0	* 58 2/7 .0	* 58 2/7 .0				
	118/30/33	* 113/30/33	* 111/30/33	* 111/30/33	117/30/32	* 113/31/32	* 111/31/32	* 111/31/32				
56	* 58 7/9 .0	* 58 7/9 .0	* 58 7/9 .0	* 58 7/9 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0				
	* 111/21/24	* 111/21/24	* 111/21/24	* 111/21/24	* 111/19/21	* 111/19/21	* 111/19/21	* 111/19/21				
52	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0				
	* 111/19/22	* 111/19/22	* 111/19/22	* 111/19/22	* 111/19/21	* 111/19/22	* 111/19/21	* 111/19/21				
48	* 58 7/7 .0	* 58 7/7 .0	DO NOT USE FOR OPERATIONAL PURPOSE						* 58 7/7 .0	* 58 7/7 .0		
	* 111/18/22	* 111/18/22							* 111/19/21	* 111/19/21		
46	* 58 7/7 .0	* 58 7/7 .0							* 58 7/7 .0	* 58 7/7 .0		
	* 111/18/22	* 111/18/22							* 111/18/21	* 111/18/21		
40	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0	* 58 7/7 .0				
	* 112/18/22	* 112/17/22	* 112/17/22	* 112/17/22	* 112/18/21	* 112/18/21	* 112/18/21	* 112/18/21				
GRAD1/GRAD2 (KG/C)												
	40/****	40/****	40/ 400	40/ 400	40/****	40/****	30/****	30/ 410				
INFLUENCE OF RUNWAY CONDITION												
WET	-5/- -2	-5/- -1	-5/- -1	-3/- -1	-7/- -2	-6/- -2	-4/- -1	-1/- -1				
	-9/- -1/- -1	-9/- -1/- -1	-8/- -1/- -1	-6/ 0/ 0	-11/- -1/- -1	-10/- -1/- -1	-7/ 0/ 0	-4/ 0/ 0				
	(+58)-.5/- -2	(+58)-.5/- -1	(+58)-.5/- -1	(+58)-.3/- -1	(+58)-.7/- -2	(+58)-.6/- -2	(+58)-.4/- -1	(+58)-.3/- -1				
	-9/ 0/ 0	-9/ 0/ 0	-8/ 0/ 0	-6/ 0/ 0	-11/ 0/ 0	-10/ 0/ 0	-7/ 0/ 0	-4/ 0/ 0				
D QNH HPA												
INFLUENCE OF DELTA PRESSURE												
-10	-9/- -2	-5/- -1	-6/- -2	-5/- -1	-5/- -1	-6/- -2	-6/- -2	-5/- -1				
	0/ 0/ 0	0/ 0/ 0	-1/- -1/- -1	-1/- -1/- -1	-1/ 0/ 0	-2/- -1/- -1	-1/- -1/- -1	-1/ 0/ 0				
	(+54)-.9/- -2	(+54)-.5/- -1	(+54)-.6/- -2	(+54)-.5/- -1	(+54)-.5/- -1	(+54)-.6/- -2	(+54)-.6/- -2	(+54)-.5/- -1				
	0/ 0/ 0	0/ 0/ 0	-1/ 0/ 0	-1/ 0/ 0	-1/ 0/ 0	-2/ 0/ 0	-1/ 0/ 0	-1/ 0/ 0				
+10	+3/ 0	+2/ 0	.0/ 0	.0/ 0	+1/ 0	+1/ 0	+2/ 0	+2/ 0				
	+1/+1/+1	+1/+1/+1	0/ 0/ 0	0/+1/+1	0/ 0/ 0	0/ 0/ 0	0/ 0/ 0	0/ 0/ 0				
	(+58)+.3/ 0	(+58)+.2/ 0	(+58)0/ 0	(+58)0/ 0	(+58)+.1/ 0	(+58)+.1/ 0	(+58)+.2/ 0	(+58)0/ 0				
	+1/+1/+1	+1/+1/+1	0/ 0/ 0	0/+1/+1	0/ 0/ 0	0/ 0/ 0	0/ 0/ 0	0/ 0/ 0				
LABEL FOR INFLUENCE			OAT C DW CODES	* VMC	Tref (OAT) = 36 C		Min acc height 515 FT		Min QNH alt 1011 FT			
DW (1000 KG) DTFLEX			V1min/VR/V2 (kt)	* LIMITATION	Tmax (OAT) = 54 C		Max acc height 1725 FT		Max QNH alt 2220 FT			
DV1-DVR-DV2 (KT)			LIMITATION CODES :				Min V1/VR/V2 = 111/16/21					
(TVMC OAT C)			1=1st segment 2=2nd segment 3=runway length 4=obstacles				CHECK VMU LIMITATION					
DW (1000 KG) DTFLEX			5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU				Correct. V1/VR/V2 = 1.0 KT/1000 KG					
DV1-DVR-DV2 (KT)												

AIRCRAFT MODEL

TAKEOFF CONFIGURATION

AIRPORT CHARACTERISTICS

WIND

RUNWAY IDENTIFICATION

OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE

AXXXXXX

ENGINE

AIRPORT NAME

15L

VERSION
AXXXXXX V8

DATE

QNH
Air cond.
Anti-icing

1013 HPA
AC OFF
AI OFF

Elevation
Isa temp
Rwy slope

TORA 3000 M
TODA 3100 M
ASDA 3000 M

DRY

4 obstacles

TAKEOFF CONDITIONS

CONF 1 + F				CONF 2			
WEIGHT 1000 KG	TAILWIND - 10 KT	WIND 0 KT	HEADWIND 10 KT	TAILWIND - 10 KT	WIND 0 KT	HEADWIND 10 KT	
76	6 3/3 .0	37 3/3 .0	38 3/3 .2	0 3/3 .1	18 3/3 .0	35 3/3 .0	37 3/3 .0
72	148/52/55 40 3/3 -2	149/53/56 44 3/3 5	154/54/57 46 3/3 -1	150/53/56 40 3/3 -1	152/56/58 43 3/3 5	155/58/60 44 3/3 -4	154/56/58 51 2/3 -4
68	142/46/49 48 3/3 -3	146/49/52 50 3/3 -3	153/54/57 53 3/3 -2	143/47/49 48 3/3 -1	147/50/52 49 3/3 -5	151/53/55 51 3/3 -1	154/56/58 51 2/3 -4
64	141/43/46 56 3/3 -3	145/47/49 58 3/7 0	153/53/55 58 3/7 0	142/44/46 56 3/7 -1	146/48/50 57 3/7 -2	151/52/53 57 2/3 -6	153/54/56 57 2/3 -6
60	141/42/44 58 3/7 0	143/44/46 58 3/7 0	138/44/46 58 2/7 0	142/43/45 58 3/7 0	147/47/48 58 3/7 0	149/50/51 58 2/7 0	148/50/51 58 2/7 0
56	118/30/33 58 7/9 0	113/30/33 58 7/9 0	111/30/33 58 7/9 0	117/30/32 58 7/7 0	113/31/32 58 7/7 0	111/31/32 58 7/7 0	111/31/32 58 7/7 0
52	111/21/24 58 7/7 0	111/21/24 58 7/7 0	111/21/24 58 7/7 0	111/19/21 58 7/7 0	111/19/21 58 7/7 0	111/19/21 58 7/7 0	111/19/21 58 7/7 0
48	111/19/22 58 7/7 0	111/19/22 58 7/7 0	111/19/22 58 7/7 0	111/19/21 58 7/7 0	111/19/22 58 7/7 0	111/19/21 58 7/7 0	111/19/21 58 7/7 0
46	111/18/22 58 7/7 0	111/18/22 58 7/7 0	111/18/22 58 7/7 0	111/18/21 58 7/7 0	111/18/21 58 7/7 0	111/18/21 58 7/7 0	111/18/21 58 7/7 0
40	112/18/22 58 7/7 0	112/17/22 58 7/7 0	112/17/22 58 7/7 0	112/18/21 58 7/7 0	112/18/21 58 7/7 0	112/18/21 58 7/7 0	112/18/21 58 7/7 0
GRAD1/GRAD2 (KG/C)				GRAD1/GRAD2 (KG/C)			
	40/****	40/400	40/400	40/****	40/****	30/****	30/410

DO NOT USE FOR OPERATIONAL PURPOSE			
WET	+0/+0 0/+0/+0 0/+0/+0	-0/-1 -1/+0/+0 +54/-4/-1	-2/-1 -1/+0/+0 +54/-2/-1
D QNH HPA	-8/-2 0/-1/-1 0/+0/+0	-1,0/-2 -1/-1/-1 0/+0/+0	-8/-2 0/-1/-1 0/+0/+0
-10	+6/+0 +1/+0/+0 +54/+2/+0	+6/+0 +1/+1/+1 +54/+3/+0	+5/+0 +0/+0/+0 +54/+1/+0
+10	+1/+0/+0 +1/+0/+0 +1/+0/+0	+1/+1/+1 +1/+1/+1 +1/+1/+1	+1/+1/+1 +1/+1/+1 +1/+1/+1
INFLUENCE OF DELTA PRESSURE			
INFLUENCE OF RUNWAY CONDITION			
MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.			
MINIMUM VALUES OF V1/VR/V2 TO WHICH TAKEOFF SPEEDS MUST BE LIMITED WHEN DECREMENTS ARE APPLIED			
V1/VR/V2 DECREMENTS FOR WEIGHTS BELOW THE LOWEST WEIGHT OF A COLUMN			

INFLUENCE CORRECTION

Δ WEIGHT Δ TFLEX

Δ V1/ Δ VR/ Δ V2

(TVMC) Δ WEIGHT Δ TFLEX

Δ V1/ Δ VR/ Δ V2

TAKEOFF PARAMETERS

MAX TEMPERATURE (58)

LIMITATION CODE (7-7)

DELTA WEIGHT (1000 KG) (.0)

V₁ (KT IAS) - V_R (KT IAS) - V₂ (KT IAS)

(112) (117) (122)

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

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

R

A318XXX		ENGINES		AIRPORT NAME						15L	VERSION DATE	
QNH		1013.25 HPA		Elevation		489 FT		TORA 3000 M			AXXXXXX **V22	
Air cond.		AC OFF		Isa temp		14 C		TODA 3100 M		4 obstacles		
Anti-icing		AI OFF		rwy slope		.08 %		ASDA 3000 M				
All reversers operating				DRY								
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				
70	-31 4/4 0.0 152/52/56	-2 4/4 0.0 152/52/56	23 4/4 0.0 150/50/54	41 4/4 0.1 150/50/54	-45 4/4 0.0 148/48/53	-17 4/4 0.0 148/48/52	14 4/4 0.0 147/47/51	33 4/4 0.0 146/46/50				
68	17 3/4 0.0 147/47/51	40 3/4 0.0 146/46/51	45 3/4 0.5 148/48/52	47 4/4 0.3 148/48/52	8 4/4 0.0 143/43/48	32 4/4 0.0 144/44/48	45 4/4 0.2 144/44/49	46 4/4 0.5 144/44/49				
64	49 3/4 0.0 141/41/46	51 4/4 0.1 143/43/47	53 4/4 0.1 144/44/48	54 4/4 0.4 145/45/49	48 4/4 0.3 138/38/43	50 4/4 0.2 139/39/44	52 4/4 0.2 140/40/44	53 2/4 0.5 141/41/45				
60	56 4/4 0.4 139/39/43	58 4/4 0.3 140/40/44	60 4/4 0.2 140/40/43	62 4/4 0.1 140/40/43	56 4/4 0.0 135/35/40	57 4/4 0.4 136/36/40	59 4/4 0.3 136/36/40	61 2/4 0.0 137/37/41				
56	64 4/4 0.4 135/35/38	66 4/4 0.4 136/36/40	69 4/4 0.0 136/36/39	70 4/4 0.3 136/36/39	64 4/4 0.1 130/30/35	66 4/4 0.0 130/30/35	68 4/4 0.0 132/32/36	69 2/4 0.3 134/34/38				
52	73 4/4 0.4 130/30/33	74 4/4 0.8 132/32/35	74 4/4 1.8 134/34/37	74 3/4 2.5 135/35/38	73 4/4 0.0 126/26/30	74 4/4 0.4 127/27/31	74 4/4 1.3 129/29/33	74 2/4 2.0 132/32/36				
48	74 4/4 4.0 129/29/32	* 74 7/7 * 0.0 * 105/09/13	DO NOT USE FOR OPERATIONAL PURPOSE				* 74 7/7 * 0.0 * 105/09/14	* 74 7/7 * 0.0 * 105/09/14				
44	* 74 7/7 * 0.0 * 106/09/13	* 74 7/7 * 0.0 * 106/09/13					* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14
40	* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 106/09/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14	* 74 7/7 * 0.0 * 105/08/14			
GRAD1/GRAD2 (KG/C)												
	40/****	40/****	40/****	40/****	30/****	30/****	30/****	30/****	30/****			
INFLUENCE OF RUNWAY CONDITION												
WET	-2.3/ -6 -14/ -3/ -3 (+74) -2.3/ -6 -14/ 0/ 0	-2.0/ -5 -12/ -2/ -2 (+74) -2.0/ -5 -12/ 0/ 0	-1.2/ -3 -8/ -2/ -2 (+74) -1.2/ -3 -8/ 0/ 0	-1.1/ -3 -6/ 0/ 0 (+74) -1.1/ -3 -6/ 0/ 0	-2.3/ -6 -13/ -1/ -1 (+74) -2.3/ -6 -13/ 0/ 0	-1.6/ -4 -9/ 0/ 0 (+74) -1.6/ -4 -9/ 0/ 0	-0.8/ -2 -5/ -1/ -1 (+74) -0.8/ -2 -5/ 0/ 0	-0.2/ -1 -3/ -1/ -1 (+74) -0.2/ -1 -3/ 0/ 0				
D QNH HPA	INFLUENCE OF DELTA PRESSURE											
-10.0	-0.6/ -2 -1/ -1/ -1 (+59) -0.6/ -2 -1/ 0/ 0	-0.6/ -2 -1/ -1/ -1 (+59) -0.6/ -2 -1/ 0/ 0	-0.5/ -2 0/ 0/ -1 (+59) -0.5/ -2 0/ 0/ 0	-0.6/ -2 -1/ -1/ -1 (+59) -0.6/ -2 -1/ 0/ 0	-0.6/ -2 -1/ -1/ -1 (+59) -0.6/ -2 -1/ 0/ 0	-0.5/ -2 0/ 0/ -1 (+59) -0.5/ -2 0/ 0/ 0	-0.6/ -2 -1/ -1/ -1 (+59) -0.6/ -2 -1/ 0/ 0	-0.6/ -2 0/ 0/ 0 (+59) -0.6/ -2 0/ 0/ 0	-0.6/ -2 0/ 0/ 0 (+59) -0.6/ -2 0/ 0/ 0	-0.6/ -2 0/ 0/ 0 (+59) -0.6/ -2 0/ 0/ 0	-0.6/ -2 0/ 0/ 0 (+59) -0.6/ -2 0/ 0/ 0	
+10.0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.5/ +1 0/ 0/ 0 (+74) +0.5/ +1 0/ 0/ 0	+0.6/ +1 0/ 0/ 0 (+74) +0.6/ +1 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.5/ +1 0/ 0/ 0 (+74) +0.5/ +1 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+74) +0.4/ 0 0/ 0/ 0	
LABEL FOR INFLUENCE		OAT C DW CODES		* VMC		Tref (OAT) = 44 C		Min acc height 536 FT		Min QNH alt 1025 FT		
DW (1000 KG) DTFLEX		V1min/Vr/V2 (kt)		* LIMITATION		Tmax (OAT) = 54 C		Max acc height 1796 FT		Max QNH alt 2285 FT		
DV1-DVR-DV2 (KT)		LIMITATION CODES										
(TVMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles										
DW (1000 KG) DTFLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU										
DV1-DVR-DV2 (KT)		Correct. V1/Vr/V2 = 1.0 KT/1000 KG										

AIRCRAFT MODEL

TAKEOFF CONFIGURATION

ENGINE TYPE

AIRPORT CHARACTERISTICS

WIND

RUNWAY IDENTIFICATION

OCTOPUS (TAKEOFF CHART PROGRAM) VERSION & COMPUTATION DATE

AXXXXXX

1013 HPA
AC OFF
AI OFF

ENGINE

AIRPORT NAME

489 FT
14 C
.08 %

3000 M
3100 M
3000 M

VERSION
AXXXXXX
V8

DATE

15L

DRY

4 obstacles

TAKEOFF CONDITIONS

CONF 1 + F		CONF 2				
WEIGHT 1000 KG	TAILWIND - 10 KT	TAILWIND - 5 KT	WIND 0 KT	HEADWIND 10 KT	TAILWIND - 10 KT	TAILWIND - 5 KT
76	6 3/3 .0	25 3/3 .0	37 3/3 .0	38 3/3 .2	0 3/3 .1	18 3/3 .0
72	148/52/55 40 3/3 -2	149/53/56 42 3/3 5	151/54/57 44 3/3 -5	154/57/60 46 3/3 -1	150/53/56 40 3/3 -1	152/56/58 43 3/3 5
68	142/46/49 48 3/3 -3	146/49/52 50 3/3 -3	150/52/55 52/3/3	153/54/57 53 3/3	143/47/49 48 3/3 -1	147/50/52 49 3/3 -5
64	141/43/46 56 3/3 -3	145/47/49 58 3/7	149/50/52 58 3/7	153/53/55 58 3/7	142/44/46 56 3/7	151/52/53 57 2/3
60	141/42/44 58 3/7 .0	143/44/46 58 3/7 .0	140/44/46 58 2/7	138/44/46 58 2/7	142/43/45 58 3/7	149/50/51 58 2/7
56	118/30/33 58 7/9 .0	113/30/33 58 7/9 .0	111/30/33 58 7/9 .0	111/30/33 58 7/9 .0	113/31/32 58 7/7	111/31/32 58 7/7
52	111/21/24 58 7/7 .0	111/21/24 58 7/7 .0	111/21/24 58 7/7 .0	111/21/24 58 7/7 .0	111/19/21 58 7/7	111/19/21 58 7/7
48	111/19/22 58 7/7 .0	111/19/22 58 7/7 .0	111/19/22 58 7/7 .0	111/19/22 58 7/7 .0	111/19/22 58 7/7	111/19/21 58 7/7
46	111/18/22 58 7/7 .0	111/18/22 58 7/7 .0	111/18/22 58 7/7 .0	111/18/22 58 7/7 .0	111/19/21 58 7/7	111/19/21 58 7/7
40	112/18/22 58 7/7 .0	112/17/22 58 7/7 .0	112/17/22 58 7/7 .0	112/17/22 58 7/7 .0	112/18/21 58 7/7	112/18/21 58 7/7
GRAD1/GRAD2 (KG/C)						
	40/****	40/****	40/400	40/400	40/****	30/410
GRAD1/GRAD2						

DO NOT USE FOR OPERATIONAL PURPOSE		INFLUENCE OF RUNWAY CONDITION		INFLUENCE OF DELTA PRESSURE	
WET	+0/+0 0/+0/+0 (+54) -4/-1 0/+0/+0	+0/+0 -1/+0/+0 (+54) -2/-1 -1/+0/+0	-2/-1 -1/+0/+0 (+54) -6/-1 -1/+0/+0	-8/-2 -1/+0/+0 (+54) -8/-2 -1/+0/+0	+0/+0 0/+0/+0 (+54) -2/-1 0/+0/+0
D QNH HPA	-8/-2 0/-1/-1 0/+0/+0	-1.4/-3 0/-1/-1 0/+0/+0	-1.0/-2 -1/-1/+1 0/+0/+0	-8/-2 0/-1/-1 0/+0/+0	-1.0/-2 0/0/0 (+54) -1.0/-2 0/+0/+0
-10	+6/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+6/+0 +1/+0/+0 (+54) +0/+0 +1/+0/+0	+6/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+5/+0 +0/+0/+0 (+54) +3/+0 +0/+0/+0	+2/+0 +0/+0/+0 (+54) +2/+0 +1/+0/+0
+10	+6/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+6/+0 +1/+0/+0 (+54) +0/+0 +1/+0/+0	+6/+0 +1/+0/+0 (+54) +2/+0 +1/+0/+0	+5/+0 +0/+0/+0 (+54) +3/+0 +0/+0/+0	+2/+0 +0/+0/+0 (+54) +2/+0 +1/+0/+0
MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.					

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

TAKEOFF PARAMETERS
MAX TEMPERATURE (58)
LIMITATION CODE (7-7)
DELTA WEIGHT (1000 KG) (.0)
V1 (KT IAS) - VR (KT IAS) - V2 (KT IAS)
(112) (117) (122)

MINIMUM VALUES OF V1/VR/V2 TO WHICH TAKEOFF SPEEDS MUST BE LIMITED WHEN DECREMENTS ARE APPLIED
V1/VR/V2 DECREMENTS FOR WEIGHTS BELOW THE LOWEST WEIGHT OF A COLUMN

MIN V1/VR/V2 = 111/17/21
CHECK VMU LIMITATION
CORRECT. V1/VR/V2 = 1 Kt/1000 Kg

MINIMUM & MAXIMUM ACC. HEIGHT AND ALT.

R

A320XXX		ENGINES		AIRPORT NAME						15L	VERSION DATE
QNH		1013.25 HPA		Elevation	489	FT	TORA	3000	M		AXXXXXX **V20
Air cond.		AC OFF		Isa temp	14	C	TODA	3100	M	4 obstacles	DRY
Anti-icing		AI OFF		rwy slope	.08	%	ASDA	3000	M		
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 3/4 4.0 141/41/44	* 69 7/9 * 0.0 * 112/26/29	* 69 7/9 * 0.0 * 112/26/29	* 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			
52	* 69 7/9 * 0.0 * 114/22/24	* 69 7/9 * 0.0 * 114/22/24					* 69 7/7 * 0.0 * 112/19/22	* 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 * 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			
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 0/ 0/ 0 (+61) -0.7/ -2 0/ 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	-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 +1/ +1/ +1 (+69) +0.2/ 0 +1/ +1/ +1	
		LABEL FOR INFLUENCE		OAT C DW CODES * VMC		Tref (OAT) = 44 C		Min acc height 515 FT		Min QNH alt 1004 FT	
DW (1000 KG) DTFLEX		V1min/V/R/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/R/V2 = 115/20/22					
(TVMC OAT C)		1=1st segment 2=2nd segment 3=runway length 4=obstacles				CHECK VMU LIMITATION					
DW (1000 KG) DTFLEX		5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU				Correct. V1/R/V2 = 1.0 KT/1000 KG					
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.

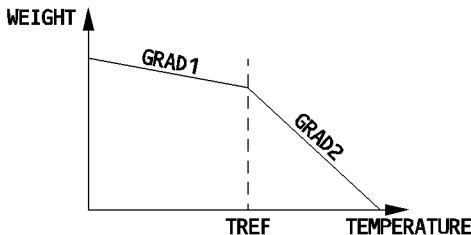
Correction to weight

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.

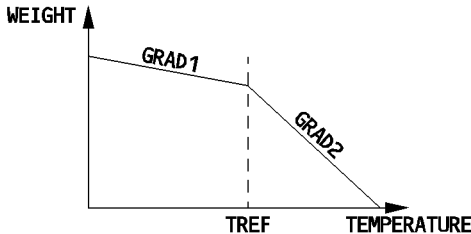
Correction to weight

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 MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 2
		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.

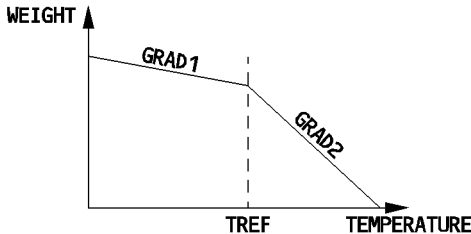
Correction to weight

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).

NFC5-02-0218-001-A100AA



- 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	TAKEOFF	2.02.18 P 2	
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 270	REV 34
FLIGHT CREW OPERATING MANUAL			

- 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.
R 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
R (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.

- 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 = $80.6 + 0.46 \times 1 + 0.06 \times 19 =$
R 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.

A318/A319/A320/A321	TAKEOFF	2.02.18	P 3
		SEQ 050	REV 30
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (WEIGHT ENTRY)		

Max TO weight (1000 kg) air conditioning OFF = 76.0 + 0.41 × 1 + 0.03 × 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 :

- Determine the maximum takeoff weight before correction for the given OAT and wind condition.
- Apply the first correction :
If OAT is less than or equal to TVMC (line 3), apply ΔW correction from line 1 and ΔV1/ΔVR/ΔV2 corrections from line 2.
Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and ΔV1/ΔVR/ΔV2 corrections from line 4.
- 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 ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 $\times$ 15/10 = 146 kt

VR = 157 kt - 1 $\times$ 15/10 = 156 kt

V2 = 160 kt - 1 $\times$ 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

A318/A319/A320/A321	TAKEOFF	2.02.18	P 3
		SEQ 078	REV 38
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (WEIGHT ENTRY)		

Max TO weight (1000 kg) air conditioning OFF = 70.0 + 0.03 × 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 ΔV1/ΔVR/ΔV2 corrections from line 2.
 Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 = 45°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 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,
 $V1 = 148 \text{ kt} - 6 = 142 \text{ kt}$
 $VR = 149 \text{ kt} - 0 = 149 \text{ kt}$
 $V2 = 153 \text{ kt} - 0 = 153 \text{ kt}$
 (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,
 $V1 = 142 \text{ kt} - 1 \times 15/10 = 140 \text{ kt}$
 $VR = 149 \text{ kt} - 1 \times 15/10 = 148 \text{ kt}$
 $V2 = 153 \text{ kt} - 1 \times 15/10 = 152 \text{ kt}$
- 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)	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

A318/A319/A320/A321	TAKEOFF	2.02.18	P 3
		SEQ 250	REV 34
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (WEIGHT ENTRY)		

Max TO weight (1000 kg) air conditioning OFF = 80.3 + 0.47 × 2 + 0.05 × 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 ΔV1/ΔVR/ΔV2 corrections from line 2.
 Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 = 45°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 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,
 $V1 = 155 \text{ kt} - 8 = 147 \text{ kt}$
 $VR = 156 \text{ kt} - 2 = 154 \text{ kt}$
 $V2 = 158 \text{ kt} - 2 = 156 \text{ kt}$

(No speed check required for first correction)

- Apply QNH correction

- R For OAT < TVMC (61°C), $\Delta W = - 0.7 \times 15/10 =$ - 1
 Maximum permissible takeoff weight (1000 kg) 78.9
 Associated speeds,
 $V1 = 147 \text{ kt} - 1 \times 15/10 = 145 \text{ kt}$
 $VR = 154 \text{ kt} - 1 \times 15/10 = 153 \text{ kt}$
 $V2 = 156 \text{ kt} - 1 \times 15/10 = 155 \text{ kt}$

- 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)	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

A318/A319/A320/A321	TAKEOFF	2.02.18	P 3
		SEQ 270	REV 33
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (WEIGHT ENTRY)		

Max TO weight (1000 kg) air conditioning OFF = 80.3 + 0.47 × 2 + 0.05 × 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 ΔV1/ΔVR/ΔV2 corrections from line 2.
 Else, (for OAT greater than TVMC), apply ΔW correction from line 3 and ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 ΔV1/ΔVR/ΔV2 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 = 45°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 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,
 $V1 = 155 \text{ kt} - 8 = 147 \text{ kt}$
 $VR = 156 \text{ kt} - 2 = 154 \text{ kt}$
 $V2 = 158 \text{ kt} - 2 = 156 \text{ kt}$

(No speed check required for first correction)

- Apply QNH correction

- R For OAT < TVMC (61°C), $\Delta W = - 0.7 \times 15/10 =$ - 1
 Maximum permissible takeoff weight (1000 kg) 78.9
 Associated speeds,
 $V1 = 147 \text{ kt} - 1 \times 15/10 = 145 \text{ kt}$
 $VR = 154 \text{ kt} - 1 \times 15/10 = 153 \text{ kt}$
 $V2 = 156 \text{ kt} - 1 \times 15/10 = 155 \text{ kt}$

- 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)	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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 5
		SEQ 050	REV 30

COMBINING CORRECTIONS FROM FCOM AND CHART

- Proceed as follows :
- Determine the maximum takeoff weight by entering the chart with selected configuration, OAT and wind.
 - Apply corrections from FCOM to determine an intermediate weight. Interpolate associated speeds for intermediate weight in the same column (same wind and configuration).
 - 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

- 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 = 76.2 + 0.4 × 2 + 0.04 × 11 = 77.4
Enter the 10 kt head wind column CONF 2, to read for 25°C
Max TO weight (1000 kg) air conditioning OFF = 76.0 + 0.41 × 1 + 0.03 × 11 = 76.7
Retain CONF 1+F for takeoff configuration.
- First, apply the correction from FCOM page 2.02.24 p 1.
Max TO weight (1000 kg) air conditioning OFF 77.4
R Air conditioning correction – 2.0
R Intermediate weight 75.4
R Interpolate takeoff speeds for 75.4 (1000 kg) in the 10 kt head wind column,
V1 = 154 kt, VR = 157 kt, V2 = 160 kt
- Apply WET correction
For OAT < TVMC (58°C), ΔW = ... – 0.3
R Intermediate weight 75.1
Associated speeds,
V1 = 154 kt – 6 = 148 kt
VR = 157 kt – 0 = 157 kt
V2 = 160 kt – 0 = 160 kt
Apply QNH correction
For OAT < TVMC (54°C), ΔW = – 0.5 × 15/10 = ... – 0.8
R Maximum permissible takeoff weight 74.3
Associated speed,
V1 = 148 kt – 1 × 15/10 = 146 kt
VR = 157 kt – 1 × 15/10 = 156 kt
V2 = 160 kt – 1 × 15/10 = 159 kt

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 6
		SEQ 050	REV 30

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.

A318/A319/A320/A321	TAKEOFF	2.02.18	P 5
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 078	REV 38
FLIGHT CREW OPERATING MANUAL			

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 × 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 × 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), ΔW = ... – 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), ΔW = – 0.6 × 15/10 = ... – 0.9
Maximum permissible takeoff weight 64.0
Associated speed,
V1 = 140 kt – 1 × 15/10 = 138 kt
VR = 147 kt – 1 × 15/10 = 146 kt
V2 = 151 kt – 1 × 15/10 = 150 kt

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.18	P 6
	MTOW CALCULATION (WEIGHT ENTRY)		SEQ 078	REV 38

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 5
		SEQ 250	REV 37

COMBINING CORRECTIONS FROM FCOM AND CHART

- Proceed as follows :
- Determine the maximum takeoff weight by entering the chart with selected configuration, OAT and wind.
 - Apply corrections from FCOM to determine an intermediate weight. Interpolate associated speeds for intermediate weight in the same column (same wind and configuration).
 - 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

- 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 = 80.6 + 0.46 × 1 + 0.06 × 19 = 82.2
 Enter the 10 kt head wind column CONF 2, to read for 25°C
 Max TO weight (1000 kg) air conditioning OFF = 80.3 + 0.47 × 2 + 0.05 × 19 = 82.2
 Retain CONF 1+F for takeoff configuration.
- First, apply the correction from FCOM page 2.02.24 p 1.
 Max TO weight (1000 kg) air conditioning OFF 82.2
 Air conditioning correction – 1.8
 Intermediate weight 80.4
 Interpolate takeoff speeds for 80.4 (1000 kg) in the 10 kt head wind column,
 V1 = 155 kt, VR = 156 kt, V2 = 158 kt
- Apply WET correction
 For OAT < TVMC (69°C), ΔW = ... – 0.7
 Intermediate weight 79.7
 Associated speeds,
 V1 = 155 kt – 8 = 147 kt
 VR = 156 kt – 2 = 154 kt
 V2 = 158 kt – 2 = 156 kt
 Apply QNH correction
 For OAT < TVMC (61°C), ΔW = – 0.7 × 15/10 = ... – 1
 Maximum permissible takeoff weight 78.7
 Associated speed,
 V1 = 147 kt – 1 × 15/10 = 145 kt
 VR = 154 kt – 1 × 15/10 = 153 kt
 V2 = 156 kt – 1 × 15/10 = 155 kt

A318/A319/A320/A321	TAKEOFF	2.02.18	P 6
		SEQ 250	REV 34
FLIGHT CREW OPERATING MANUAL	MTOW CALCULATION (WEIGHT ENTRY)		

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF MTOW CALCULATION (WEIGHT ENTRY)	2.02.18	P 5
		SEQ 250	REV 37

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 = 80.6 + 0.46 × 1 + 0.06 × 19 = 82.2
Enter the 10 kt head wind column CONF 2, to read for 25°C
Max TO weight (1000 kg) air conditioning OFF = 80.3 + 0.47 × 2 + 0.05 × 19 = 82.2
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 82.2
Air conditioning correction – 1.8
Intermediate weight 80.4
Interpolate takeoff speeds for 80.4 (1000 kg) in the 10 kt head wind column,
V1 = 155 kt, VR = 156 kt, V2 = 158 kt
3. Apply WET correction
For OAT < TVMC (69°C), ΔW = ... – 0.7
Intermediate weight 79.7
Associated speeds,
V1 = 155 kt – 8 = 147 kt
VR = 156 kt – 2 = 154 kt
V2 = 158 kt – 2 = 156 kt
Apply QNH correction
R For OAT < TVMC (61°C), ΔW = – 0.7 × 15/10 = ... – 1
Maximum permissible takeoff weight 78.7
Associated speed,
R V1 = 147 kt – 1 × 15/10 = 145 kt
VR = 154 kt – 1 × 15/10 = 153 kt
V2 = 156 kt – 1 × 15/10 = 155 kt

A318/A319/A320/A321	TAKEOFF	2.02.18	P 6
	MTOW CALCULATION (WEIGHT ENTRY)	SEQ 270	REV 33
FLIGHT CREW OPERATING MANUAL			

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

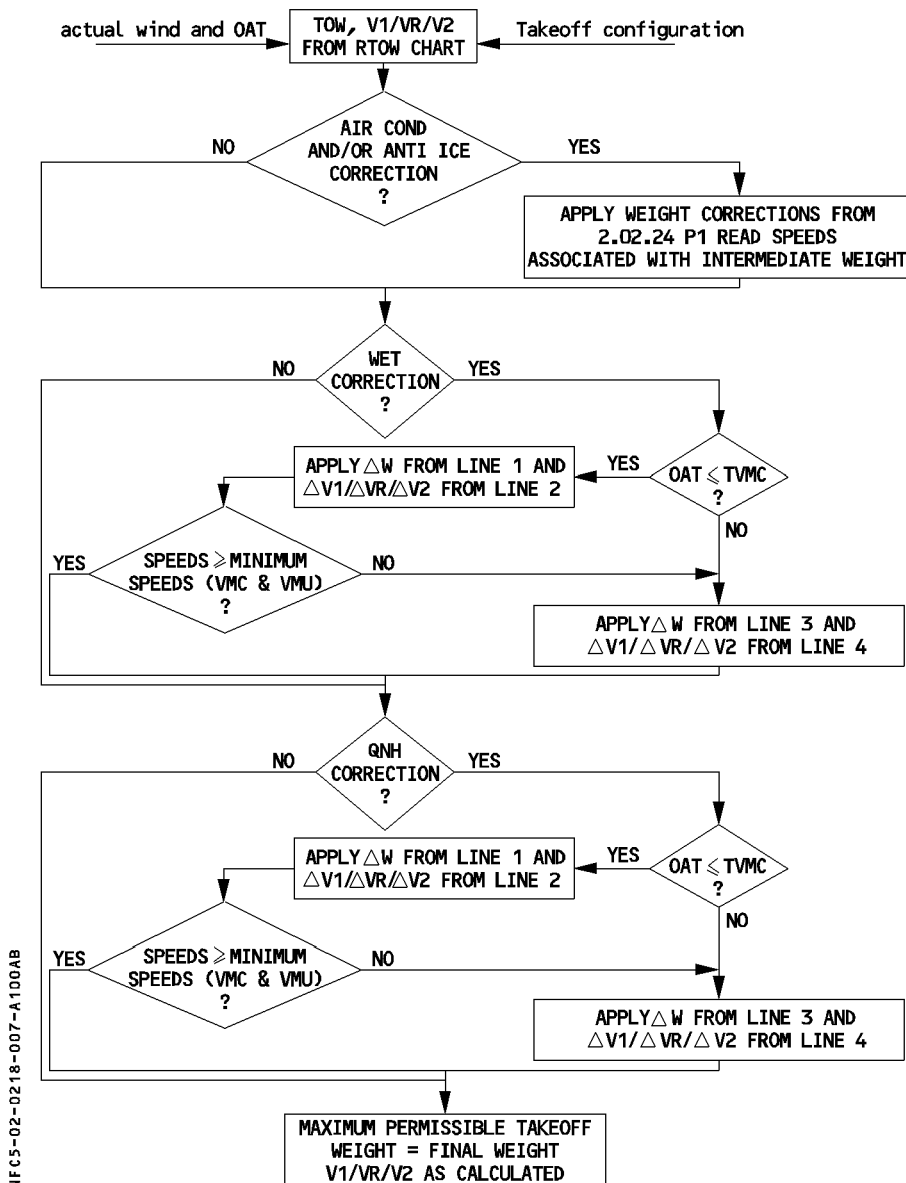
For OAT lower than the lowest temperature value of a wind column, it is possible to obtain a higher maximum permissible takeoff weight by using Grad 1/Grad 2 values. See page 1 for more details.

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.

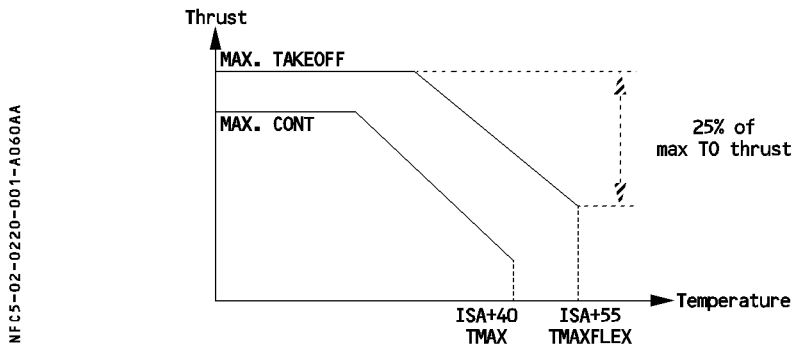
The use of flexible takeoff thrust saves engine life.

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).



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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 2
		SEQ 100	REV 38

- 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.

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

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.

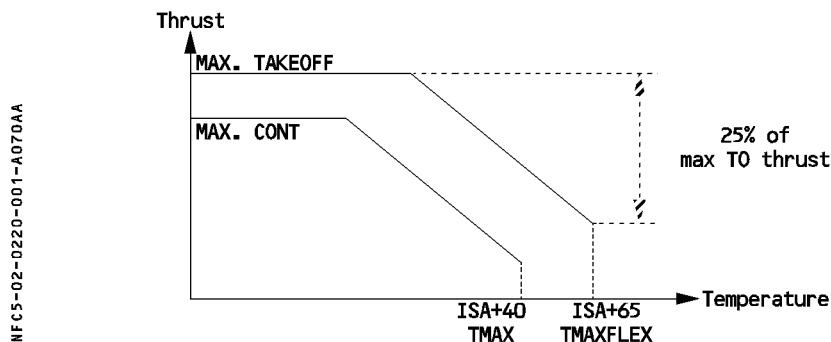
The use of flexible takeoff thrust saves engine life.

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).



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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 2
		SEQ 100	REV 38

- 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.

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

DEFINITION OF FLEXIBLE TAKEOFF

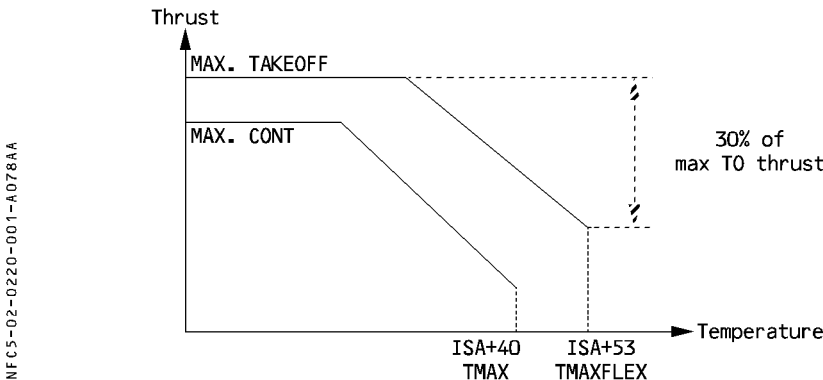
In many cases the aircraft takes off with a weight lower than the maximum permissible takeoff weight. When this happens, it can meet the required performance (runway, second segment, obstacle,...) with a decreased thrust that is adapted to the weight : this is called FLEXIBLE TAKEOFF and the thrust is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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 2
		SEQ 100	REV 38

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

DETERMINATION OF FLEXIBLE TAKEOFF TEMPERATURE AND SPEEDS

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

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

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

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 P 1

- Corrections are given for QNH $\neq$ 1013 hPa, air conditioning ON, anti ice ON.
- For a given takeoff weight, wind condition and selected configuration, read the flexible temperature. Retain the takeoff speeds associated with the actual weight.
 - 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 51° C

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 4
		SEQ 065	REV 30

Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 155 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 ΔTflex correction from line 1 and apply speed corrections (ΔV1/ΔVR/ΔV2) from line 2.
 Else, (flexible temperature greater than TVMC), apply ΔTflex from line 3 and ΔV1/ ΔVR/ ΔV2 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 ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.
 – Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.16 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.
- For a given takeoff weight, wind condition and selected configuration, read the flexible temperature. Retain the takeoff speeds associated with the actual weight.
 - 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

A318/A319/A320/A321	TAKEOFF	2.02.20 P 4	
	FLEXIBLE TAKEOFF (WEIGHT ENTRY)	SEQ 078	REV 38
		FLIGHT CREW OPERATING MANUAL	

Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are V1 = 148 kt, VR = 148 kt, V2 = 152 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 ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.
 – Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.16 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

R

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 ≠ 1013 hPa, air conditioning ON, anti ice ON.
- For a given takeoff weight, wind condition and selected configuration, read the flexible temperature. Retain the takeoff speeds associated with the actual weight.
 - 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
Head wind
Air conditioning ON
QNH

= 68 000 kg
= 10 kt
=
= 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

A318/A319/A320/A321	TAKEOFF	2.02.20 P 4	
		SEQ 250	REV 34
	FLIGHT CREW OPERATING MANUAL	FLEXIBLE TAKEOFF (WEIGHT ENTRY)	

Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 154 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 ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.

– Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.16 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
R
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.
- For a given takeoff weight, wind condition and selected configuration, read the flexible temperature. Retain the takeoff speeds associated with the actual weight.
 - 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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 4
		SEQ 270	REV 33

Retain CONF 1+F for takeoff configuration.
 Takeoff speeds are V1 = 153 kt, VR = 153 kt, V2 = 154 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 ΔTflex correction from line 1 and apply speed corrections (ΔV1/ΔVR/ΔV2) from line 2.

Else, (flexible temperature greater than TVMC), apply ΔTflex from line 3 and ΔV1/ ΔVR/ ΔV2 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 ± 10 hPa. It is allowed to extrapolate linearly for greater QNH deviation.
 – Corrections from the chart must be applied from top to bottom, i.e. in the RTOW on 2.02.16 p 6, apply the wet influence first.

A318/A319/A320/A321	TAKEOFF	2.02.20 P 5	
	FLEXIBLE TAKEOFF (WEIGHT ENTRY)	SEQ 100	REV 25
		FLIGHT CREW OPERATING MANUAL	

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), $\Delta T_{flex} =$ – 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 = 153 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), $\Delta T_{flex} =$ – 2° C

Maximum flexible temperature 50° C

Check that OAT/TREF < flex temperature ≤ TMAXFLEX

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

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), ΔTflex = ... – 1° C
- R Intermediate flex temperature 49° C
- Associated speeds,
V1 = 153 kt – 6 = 147 kt
VR = 153 kt – 0 = 153 kt
V2 = 155 kt – 0 = 155 kt
Since speed correction on V2 is 0, no V2 check against VMU limitation is necessary.
- Apply QNH correction
For flexible temperature ≤ TVMC (54° C), ΔTflex = ... – 2° C
- R Maximum flexible temperature 47° C
- Check that OAT/TREF < flex temperature ≤ 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 ≤ 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

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), ΔTflex = ... – 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 ≤ TVMC (59° C), ΔTflex = ... – 3° C
Maximum flexible temperature 31° C
Check that OAT/TREF < flex temperature ≤ 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 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 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), ΔTflex = ... – 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 ≥ TVMC (61° C), ΔTflex = ... – 3° C

Maximum flexible temperature 62° C

Check that OAT/TREF < flex temperature ≤ 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

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), $\Delta T_{flex} =$ – 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 ≥ TVMC (61° C), $\Delta T_{flex} =$ – 3° C
 Maximum flexible temperature 59° C
 Check that OAT/TREF < flex temperature ≤ TMAXFLEX
 No speed correction.
 Takeoff speeds are V1 = 145 kt, VR = 151 kt, V2 = 152 kt

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 7
		SEQ 065	REV 31

	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;

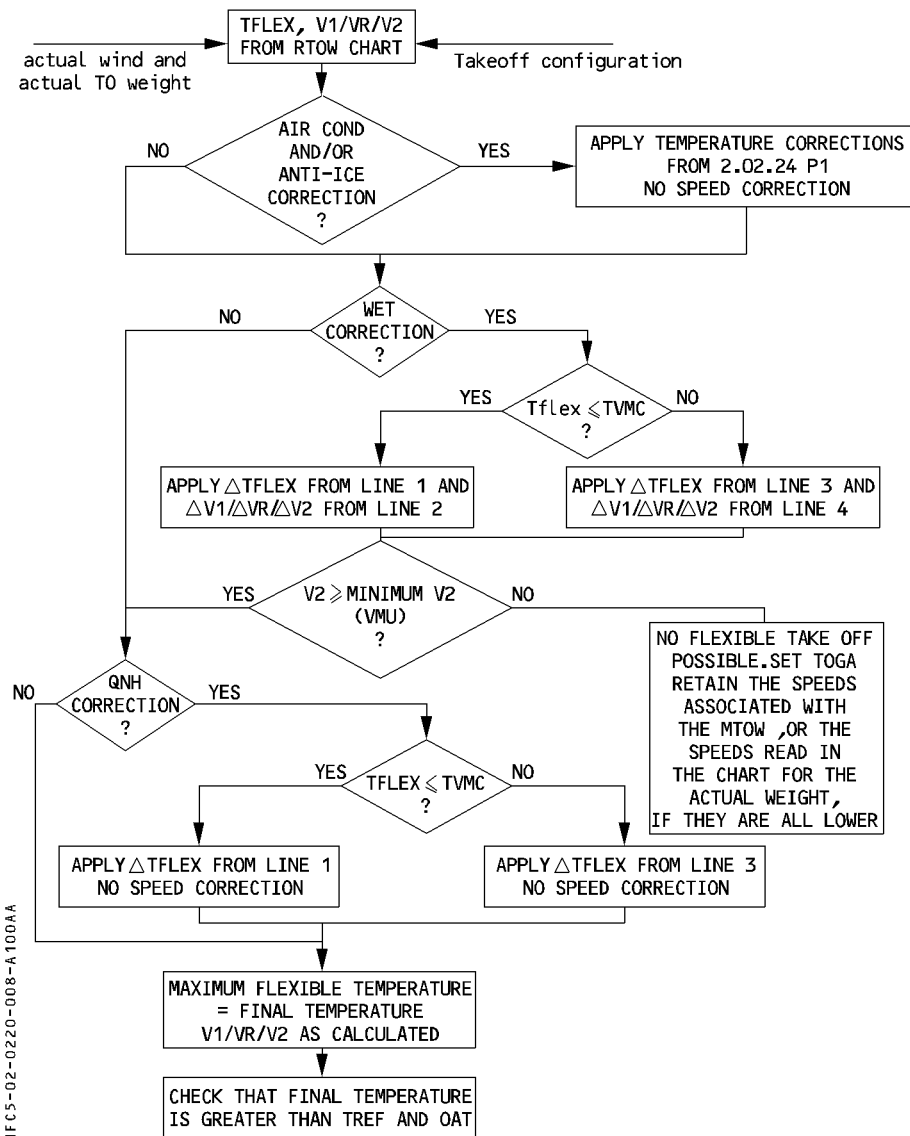
R OR

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

SUMMARY

The flow diagram gives the different steps to follow

R



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 7
		SEQ 078	REV 38

	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;

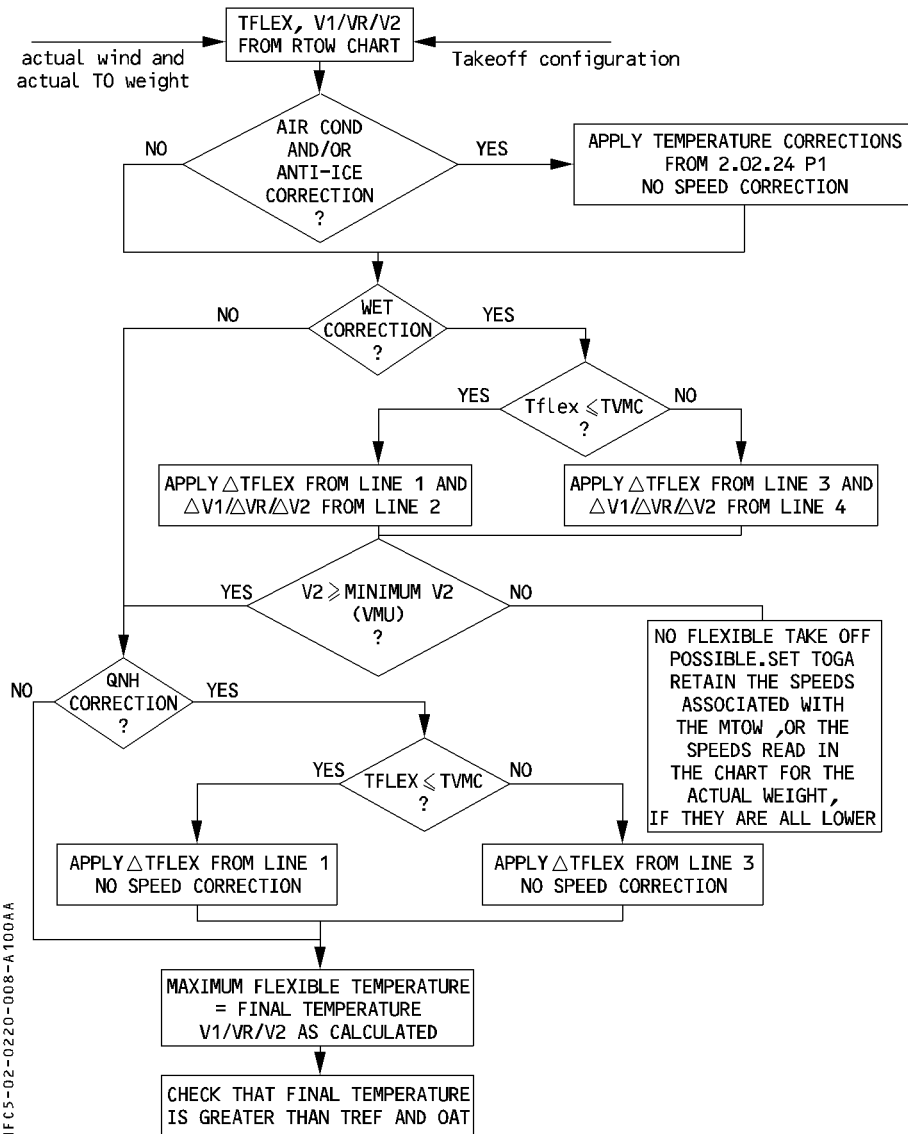
OR

- 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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 7
		SEQ 250	REV 34

	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 ;

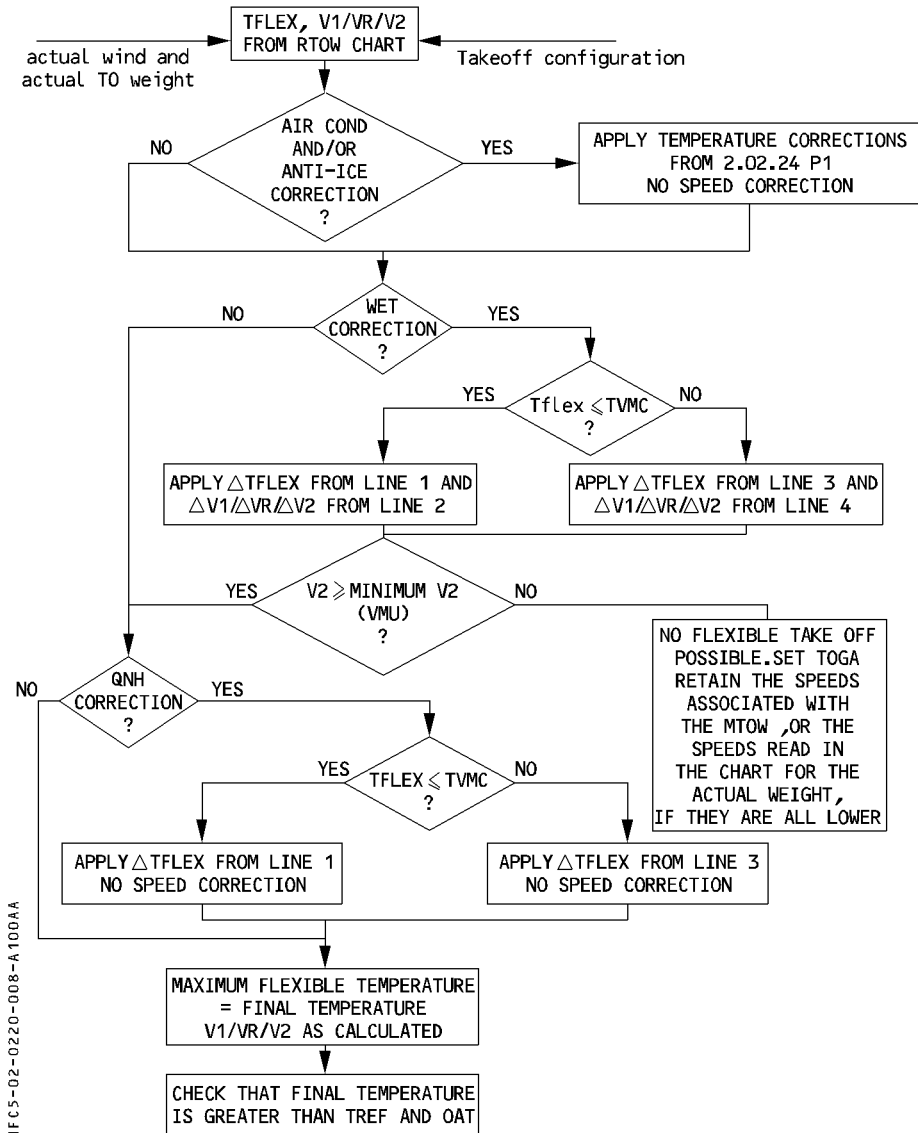
OR

- 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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF FLEXIBLE TAKEOFF (WEIGHT ENTRY)	2.02.20	P 7
		SEQ 270	REV 33

	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 ;

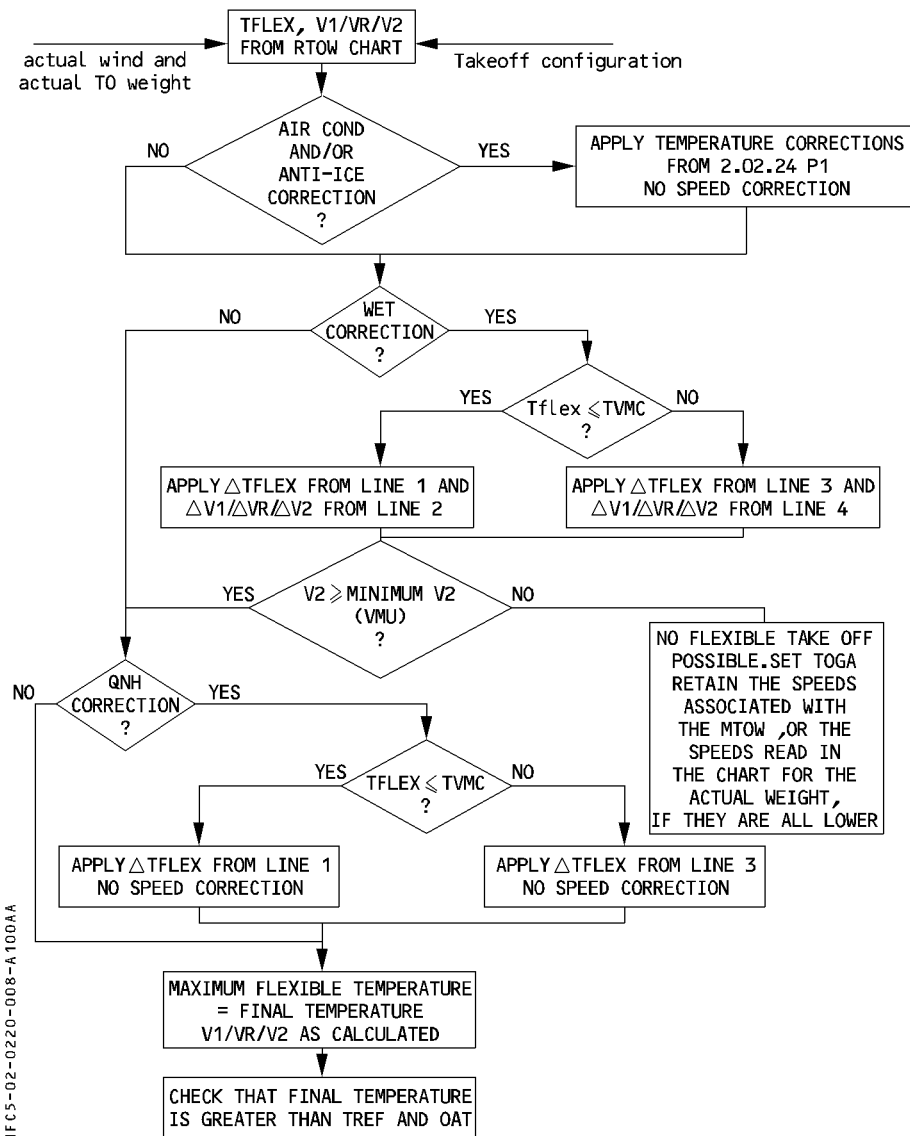
OR

- 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

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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	

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	
	QNH/BLEEDS CORRECTION	SEQ 065	REV 29
FLIGHT CREW OPERATING MANUAL			

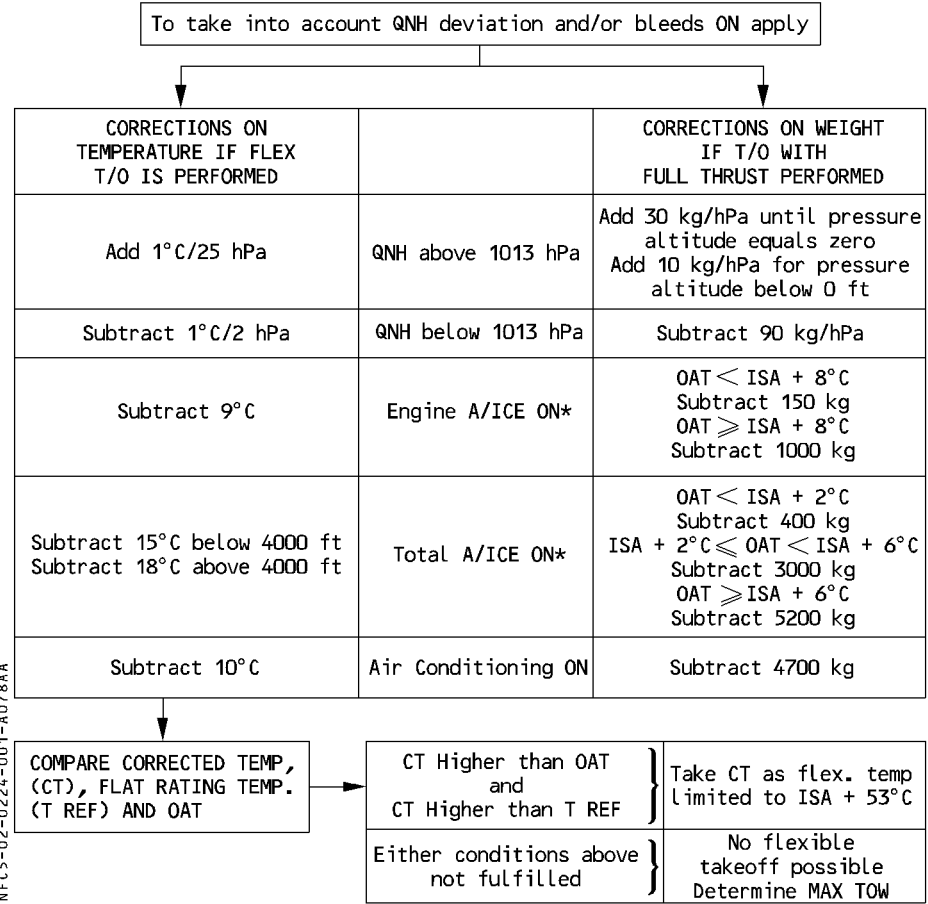
Example 1 - Full thrust takeoff

- 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)



NFCS-02-0224-001-A078A

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		2.02.24	P 2
	QNH/BLEEDS CORRECTION		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 = $30 \text{ kg} \times (450/28) + 10 \text{ kg} \times (306/28) = +591$ kg

Engine anti ice correction : -150 kg

The maximum permissible takeoff weight is $65000 + 592 - 150 = 65442$ 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 = $1^\circ\text{C}/25 \text{ hPa} \times (1040 - 1013) = 1^\circ\text{C}$

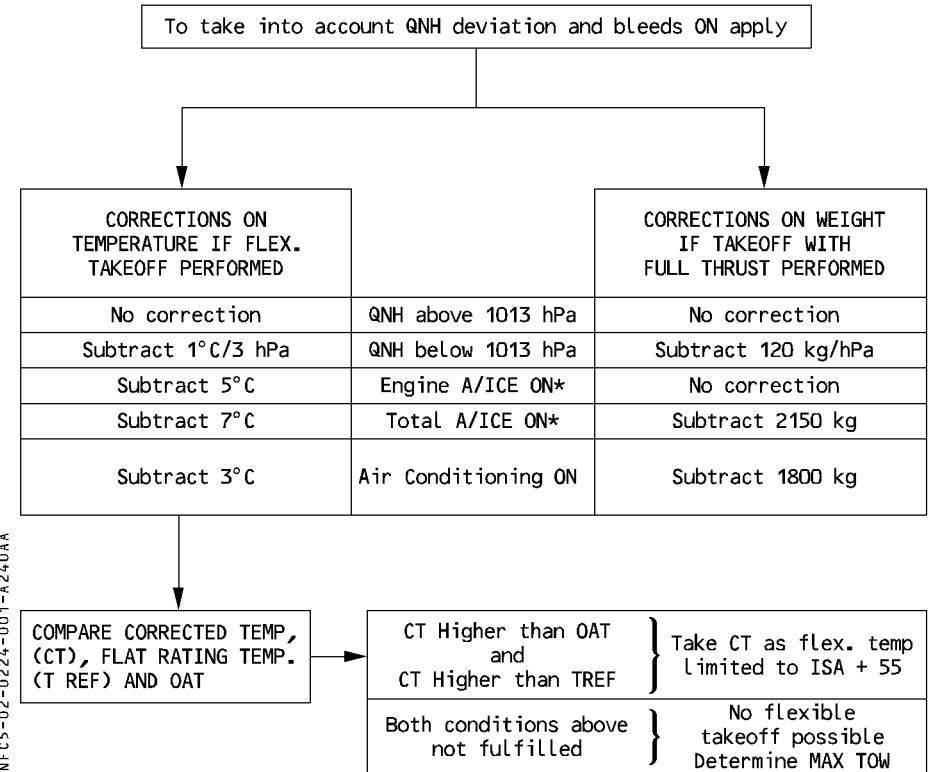
Air conditioning ON correction : -10°C

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)



NFC5-02-0224-001-A240AA

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

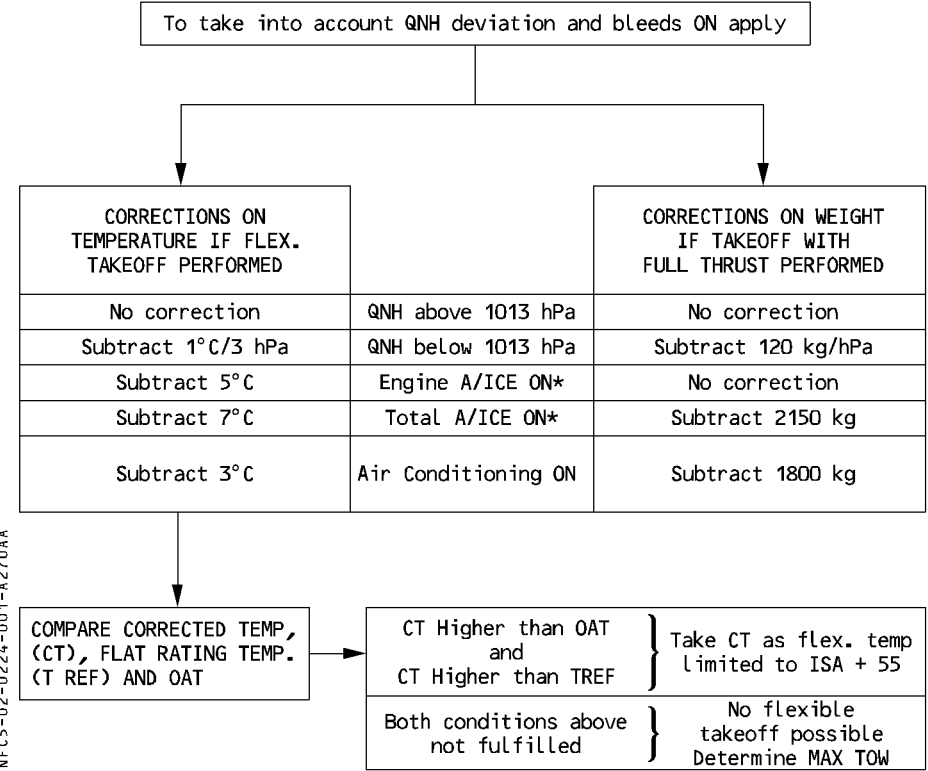
Example 1 - Full thrust takeoff

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)



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		2.02.24	P 2
	QNH/BLEEDS CORRECTION		SEQ 270	REV 33

Example 1 - Full thrust takeoff

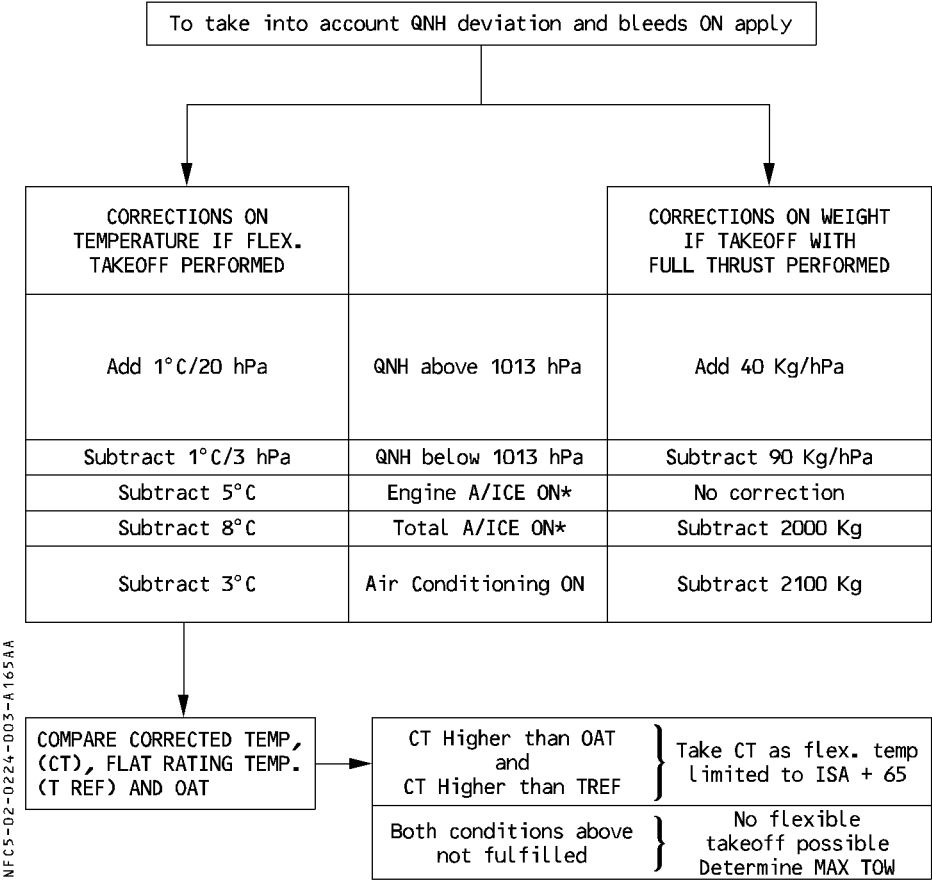
Actual data : OAT = 5°C
QNH = 1040 hPa
Engine anti ice ON
Air conditioning OFF
Weight read on the takeoff chart : 73 000 kg
Read in the above table the corrections for high QNH and engine anti ice ON.
QNH correction : none
Engine anti ice correction : none
The maximum permissible takeoff weight is $73000 + 0 - 0 = 73000$ 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



NFC5-02-0224-003-A165AA

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

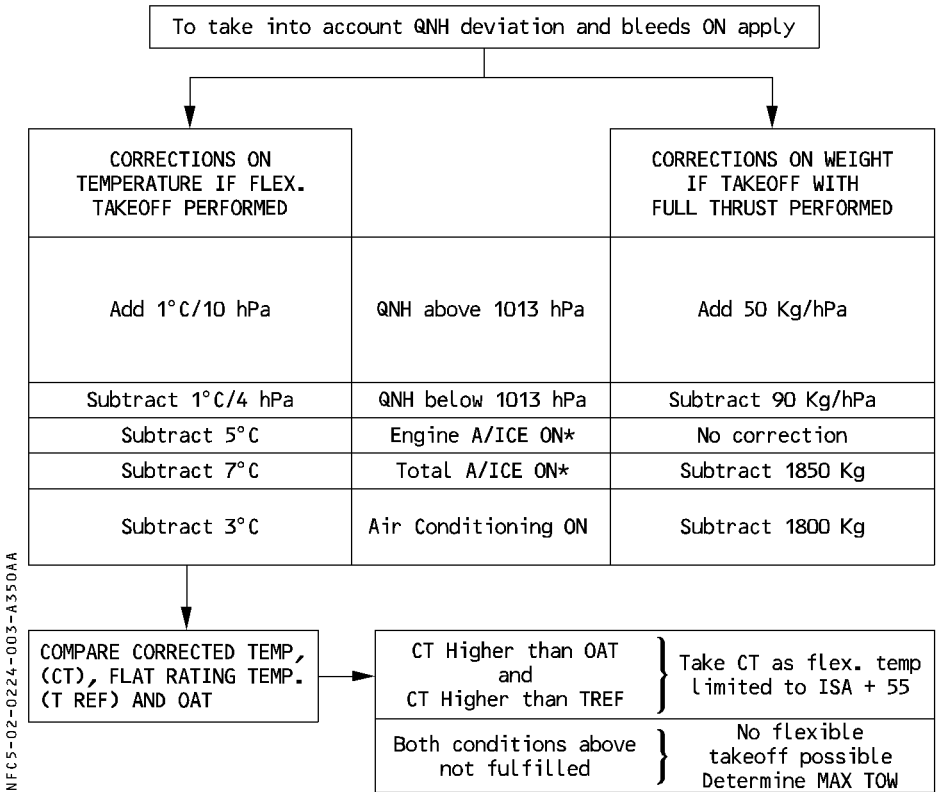
Example 1 - Full thrust takeoff

- 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)



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

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.

A318/A319/A320/A321	TAKEOFF	2.02.25 P 1	
	MINIMUM SPEEDS	SEQ 140	REV 31
FLIGHT CREW OPERATING MANUAL			

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

R speed and minimum control speed in the air.

A318/A319/A320/A321	TAKEOFF	2.02.25	P 2
	MINIMUM SPEEDS	SEQ 195	REV 22
FLIGHT CREW OPERATING MANUAL			

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

MINIMUM SPEEDS

SEQ 360

REV 34

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.25	P 2
	MINIMUM SPEEDS		SEQ 160	REV 22

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 MD2QC69C A320-232

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.25	P 3
	MINIMUM SPEEDS		SEQ 140	REV 22

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 MD2QC69C A320-232

A318/A319/A320/A321	TAKEOFF	2.02.25		P 3
		MINIMUM SPEEDS		SEQ 178	REV 38
	FLIGHT CREW OPERATING MANUAL			

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

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A318/A319/A320/A321	TAKEOFF	2.02.25	P 4
	MINIMUM SPEEDS	SEQ 195	REV 22
FLIGHT CREW OPERATING MANUAL			

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

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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 unforecast windshear.

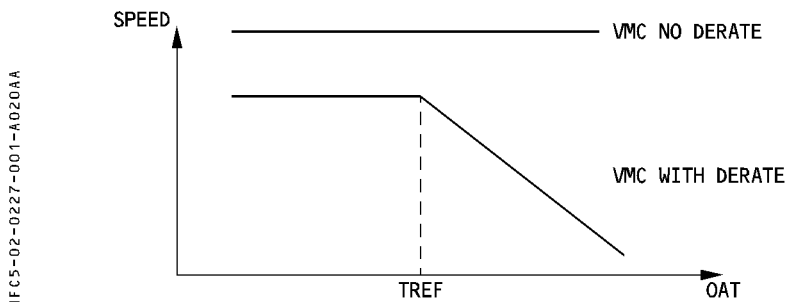
The use of derated takeoff is allowed on dry, wet and contaminated runway.

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)

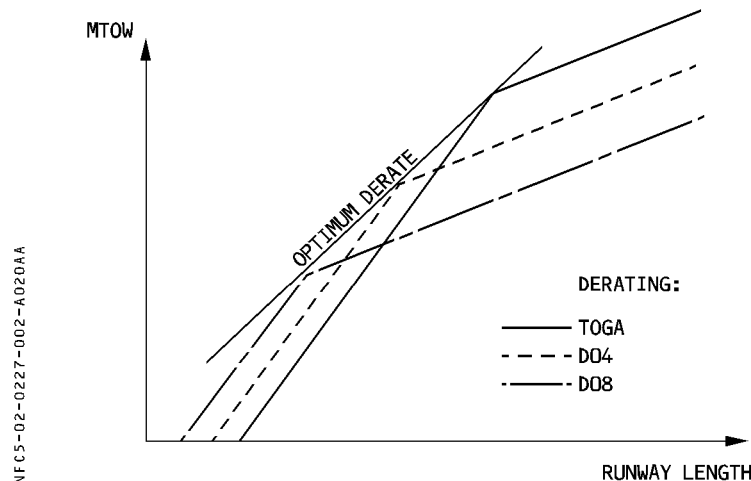


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The effect of the derate on the maximum takeoff weight is different depending on whether VMCG or VMCA is limiting. Indeed the effect on maximum takeoff weight is the result of a thrust decrease (downgrading the takeoff performance) and of a VMC decrease (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.

A3XXXXX	ENGINES	AIRPORT NAME						VERSION		DATE	
Wind	0 KT	Elevation	0	FT	TORA	1800	M	15L	AXXXXXXX	**20	
QNH	1013.25 HPA	Isa temp	15	C	TODA	1800	M		WATER 1/4" CONF 2		
Air cond.	Off	rwy slope	0.00	%	ASDA	1800	M				
Anti-icing	Off							0 obstacle			
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	DO NOT USE FOR OPERATIONAL PURPOSE		* 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 DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)		MTOW(1000 KG) codes V1min/VRA/2 (kt)		* VMC Tref (OAT)=46C *LIMITATIONMax (OAT)=55C		Min acc height 422 FT Max acc height 1586 FT		Min ONH alt 422 FT Max ONH alt 1586 FT			
		LIMITATION CODES 1=1st segment 2=2nd segment 3=runway length 4=obstacles 5=tire speed 6=brake energy 7=max weight 8=final take-off 9=VMU					Min V1/VRA/2 = 116/17/24 CHECK VMU LIMITATION Correct. V1/VRA/2 = 1.0KT/1000KG				

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	85.4							
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		-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	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									OAT <ISA+15(C) OAT >ISA+15(C)			
50.0												
54.0												

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	86.4	87.3	
34.0	85.3	86.0	86.5	86.4	86.3	86.2	86.1	86.1	86.0	85.9	86.8	
38.0	84.9	85.4	86.0	85.9	85.8	85.8	85.7	85.6	85.6	85.5	86.6	
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	OAT < ISA+15(C)				
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)				

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)			

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	87.7	88.7	
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	85.5	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	84.7	85.6	
38.0	83.6	84.2	84.7	84.6	84.6	84.5	84.4	84.4	84.3	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		-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	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)			

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)											
	-2000.	-1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	
-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			
46.0	81.3	81.8	82.4	82.4	82.3	82.3	82.3	OAT < ISA+15(C)				
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)				

[illegible]

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	OAT < ISA+15(C)			
50.0	79.7	80.2	80.8	80.8	80.7						
54.0	79.4	79.9	80.5								
58.0	79.1										

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	DERATED TAKEOFF		SEQ 020	REV 38

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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)											
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.	
-54.0	73.3	73.8	74.3	75.0	75.7	76.5	76.7	77.0	77.3	77.6	77.7	
-50.0	73.9	74.4	74.9	75.6	76.4	77.1	77.3	77.6	77.9	78.2	78.3	
-46.0	74.5	75.0	75.6	76.3	77.0	77.7	77.9	78.2	78.5	78.8	78.9	
-42.0	75.1	75.6	76.2	76.9	77.6	78.3	78.5	78.8	79.1	79.4	79.6	
-38.0	75.7	76.3	76.8	77.5	78.2	78.9	79.2	79.4	79.7	80.0	80.2	
-34.0	76.3	76.9	77.4	78.1	78.8	79.5	79.7	80.0	80.3	80.6	80.8	
-30.0	76.9	77.5	78.0	78.7	79.4	80.1	80.3	80.6	80.9	81.2	81.4	
-26.0	77.5	78.0	78.6	79.3	80.0	80.7	80.9	81.2	81.5	81.8	82.0	
-22.0	78.1	78.6	79.2	79.9	80.6	81.3	81.5	81.8	82.1	82.4	82.5	
-18.0	78.7	79.2	79.7	80.5	81.2	81.9	82.1	82.4	82.7	83.0	83.1	
-14.0	79.3	79.8	80.3	81.0	81.8	82.5	82.7	83.0	83.3	83.6	83.7	
-10.0	79.8	80.4	80.9	81.6	82.3	83.1	83.3	83.6	83.8	84.1	84.3	
-6.0	80.4	80.9	81.5	82.2	82.9	83.6	83.8	84.1	84.4	84.7	84.8	
-2.0	81.0	81.5	82.0	82.7	83.5	84.2	84.4	84.7	85.0	85.3	85.4	
2.0	81.5	82.0	82.6	83.3	84.0	84.7	85.0	85.2	85.5	85.8	85.9	
6.0	82.1	82.6	83.1	83.9	84.6	85.3	85.5	85.8	85.9	85.9	85.9	
10.0	82.6	83.2	83.7	84.4	85.1	85.8	85.9	85.9	85.9	85.9	85.9	
14.0	83.2	83.7	84.2	84.9	85.5	86.2	86.1	86.1	86.0	85.9	85.8	
18.0	83.7	84.2	84.4	84.8	85.4	86.2	86.2	85.9	85.7	85.5	85.5	
22.0	83.9	83.8	83.7	84.4	85.3	86.0	85.6	85.3	85.3	85.3	85.3	
26.0	83.2	83.2	83.0	84.1	84.7	85.1	85.0	85.0	85.0	85.1	85.1	
30.0	82.6	82.5	82.5	83.4	84.1	84.6	84.6	84.7				
34.0	82.2	82.1	82.0	82.9	83.6	84.1						
38.0	81.8	81.7	81.7	82.4								
42.0	81.4	81.4										
46.0												
50.0												
54.0												
									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)											
	-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	OAT < ISA+15(C)				
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)				

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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)

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	OAT < ISA+15(C)				
50.0	76.5	77.1	77.6	77.6	77.6							
54.0	76.1	76.7	77.3									
58.0	75.7											
								OAT > ISA+15(C)				

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	DERATED TAKEOFF		SEQ 020	REV 38

FLIGHT CREW OPERATING MANUAL

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)											
	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	82.3	82.3	82.2	82.1	82.0	
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)

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QUICK REFERENCE TABLES	2.02.40	P 1
		SEQ 100	REV 37

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
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

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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)	260	520	625	730	860	890	970	1060	1200
Effect of runway slope	per percent downhill slope add (meters)	31	41	50	59	69	78	87	97	106

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF QUICK REFERENCE TABLES	2.02.40	P 1
		SEQ 360	REV 37

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.

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.
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

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 × 11.5 = + 115
correction for slope- 1060
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 to 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

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
		FLIGHT CREW OPERATING MANUAL	

QUICK REFERENCE TABLES

QUICK REFERENCE TABLE - CONFIGURATION 1+F - PRESSURE ALTITUDE = 0 FT					
TREF=30°C TMAX=55°C		DRY RUNWAY SLOPE=0%		MAX TO WEIGHT (1000KG) CODES IAS (KT) : V1/VR/V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	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 length 2750
correction for wind 10 × 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 for to 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

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	QUICK REFERENCE TABLES		SEQ 203	REV 34

CONFIGURATION 1 + F				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)				
	2250	2500	2750	3000	3250
-20	76.6 2/3 147/48/53	78.4 2/3 153/54/59	79.7 2/3 158/60/65	80.3 3/6 159/62/67	80.7 3/6 159/64/69
-10	76.0 2/3 145/46/51	77.8 2/3 150/52/57	79.3 3/6 156/58/63	79.8 3/6 156/60/65	80.1 3/6 156/62/67
0	75.3 2/3 143/44/49	77.3 2/3 148/50/55	78.8 3/6 154/56/61	79.2 3/6 153/58/63	79.7 3/6 153/59/64
10	74.7 2/3 141/42/47	76.8 2/3 146/48/53	78.2 3/6 151/53/59	78.7 3/6 151/55/61	79.2 3/6 150/57/62
20	74.1 2/3 139/40/45	76.2 2/3 144/46/51	77.7 3/6 149/51/56	78.2 3/6 148/53/58	78.7 3/6 147/55/60
30	73.4 2/3 137/39/44	75.6 2/3 142/45/50	77.1 3/6 146/49/54	77.7 3/6 146/51/56	78.2 3/6 145/53/58
40	72.8 2/3 135/37/42	75.1 2/3 141/43/48	76.6 3/6 144/47/53	77.2 3/6 143/50/55	77.7 3/6 143/52/57
50	72.2 2/3 134/35/41	74.5 2/3 139/41/47	75.8 3/6 141/46/51	75.8 2/3 136/45/50	75.8 2/3 131/45/50
55	71.9 2/3 133/35/40	72.3 2/3 129/36/41	72.3 2/3 122/36/41	72.3 2/8 114/36/41	72.3 2/8 114/36/41
57	71.0 2/3 133/34/39	72.3 3/8 134/38/43	72.3 3/8 128/38/43	72.3 3/8 121/38/43	72.3 2/8 116/38/43
59	70.0 2/3 133/34/39	72.2 2/3 138/40/45	72.3 2/3 133/40/45	72.3 2/3 127/40/45	72.3 2/3 121/40/45
61	69.0 2/3 132/33/38	71.2 2/3 137/39/44	72.3 2/3 139/42/47	72.3 2/3 134/42/47	72.3 2/3 128/42/47
63	68.0 2/3 132/33/38	70.1 2/3 137/39/43	71.8 2/3 142/44/49	72.3 2/3 141/46/50	72.3 2/3 137/46/50
65	67.0 2/3 132/32/37	69.1 2/3 137/38/43	70.6 2/3 142/44/48	71.6 3/6 144/47/52	72.0 3/6 144/49/53
67	66.0 2/3 132/32/37	68.0 2/3 136/38/42	69.4 2/3 141/43/47	70.5 3/6 145/47/52	70.9 3/6 145/49/53
69	64.9 2/3 131/31/36	66.8 2/3 136/37/42	68.3 2/3 141/42/47	69.5 3/6 146/47/52	69.8 3/6 146/49/53
71	63.8 2/3 131/31/36	65.7 2/3 136/37/41	67.0 2/3 141/42/46	68.2 2/3 146/47/51	68.7 3/6 147/49/54
73	62.7 3/3 131/31/35	64.5 2/3 136/36/40	65.9 2/3 141/41/45	66.9 2/3 145/46/50	67.6 3/6 148/49/54
75	61.5 3/3 130/30/35	63.3 2/3 135/35/40	64.6 2/3 140/41/45	65.6 2/3 145/46/50	66.4 3/6 149/50/54
77	60.2 3/3 129/29/34	62.0 2/3 135/35/39	63.3 2/3 140/40/44	64.3 2/3 145/45/49	65.0 2/3 149/49/53
79	58.9 3/3 129/29/33	60.7 2/3 134/34/38	61.9 2/3 139/39/43	62.9 2/3 144/44/48	63.5 2/3 148/48/52
80	58.3 3/3 128/28/33	60.0 2/3 133/33/37	61.2 2/3 139/39/43	62.1 2/3 143/43/47	62.8 2/3 147/47/51

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 × 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

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	QUICK REFERENCE TABLES		SEQ 312		REV 34	
FLIGHT CREW OPERATING MANUAL						

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 3/9	81.9 2/3	83.8 2/3	85.4 2/3	86.0 3/6
	151/52/55	156/56/59	162/62/64	167/67/69	168/70/72
-10	78.3 3/9	81.2 3/3	83.2 2/3	84.8 3/6	85.4 3/6
	149/51/54	154/55/57	159/60/62	165/66/68	165/68/70
0	77.3 3/9	80.4 3/3	82.6 2/3	84.2 3/6	84.8 3/6
	147/50/53	152/54/56	157/58/60	162/64/66	162/66/68
10	76.3 3/9	79.5 3/9	82.0 2/3	83.6 3/6	84.2 3/6
	146/50/52	150/53/55	155/56/59	160/61/64	159/64/66
20	75.2 3/9	78.7 3/9	81.3 2/3	82.9 3/6	83.6 3/6
	144/49/52	149/52/54	153/55/57	157/59/62	156/62/64
30	74.1 3/9	77.8 3/9	80.6 3/3	82.3 3/6	83.0 3/6
	143/48/51	147/51/53	152/54/56	155/58/60	154/60/62
40	73.0 3/9	76.9 3/9	79.8 3/3	81.7 3/6	82.4 3/6
	142/48/50	146/50/53	150/53/56	152/56/58	152/58/60
46	72.5 3/9	76.3 3/9	79.3 3/9	81.3 3/6	81.8 2/3
	141/47/50	145/50/52	149/53/55	151/55/57	149/56/58
48	71.7 3/9	75.4 3/9	78.4 3/9	80.3 3/6	80.3 2/3
	140/46/49	145/49/52	149/52/54	152/55/57	146/54/56
50	70.9 3/9	74.4 3/9	77.5 3/9	78.9 2/3	78.9 2/3
	140/46/48	144/49/51	148/51/53	150/53/55	145/53/55
52	70.1 3/9	73.5 3/9	76.4 3/9	77.3 2/3	77.4 2/3
	140/45/47	144/48/50	148/50/52	147/51/53	142/52/53
54	69.4 3/9	72.5 3/9	75.4 3/9	76.0 3/9	76.0 3/8
	139/44/46	144/48/50	148/50/52	146/50/52	140/50/52
55	69.0 3/9	72.1 3/9	74.9 3/9	75.3 3/9	75.3 3/9
	139/44/46	144/47/49	148/49/51	145/50/52	139/50/52
56	68.6 3/9	71.7 3/9	74.4 3/9	75.3 2/3	75.2 2/3
	139/43/45	143/47/49	148/49/51	147/51/53	142/51/52
58	67.8 3/9	70.8 3/9	73.3 3/9	75.0 2/3	75.3 2/8
	139/43/44	143/46/48	147/49/50	152/53/54	150/54/56
60	67.0 3/9	70.0 3/9	72.3 3/9	73.9 2/3	75.0 3/6
	138/42/43	143/45/47	147/48/49	152/52/54	156/57/58
62	66.2 3/9	69.1 3/9	71.3 3/9	72.8 2/3	74.0 3/6
	138/41/43	142/44/46	147/47/48	151/52/53	156/56/58
64	65.4 3/9	68.1 3/9	70.2 3/3	71.6 2/3	72.6 3/3
	138/40/42	142/43/45	147/47/48	151/51/53	156/56/57
66	64.6 3/9	67.2 3/9	69.0 3/3	70.4 3/3	71.3 3/3
	137/39/41	142/42/44	146/46/48	151/51/52	156/56/57
68	63.7 3/9	66.2 3/9	67.8 3/3	69.0 3/3	70.0 3/3
	137/38/40	141/41/43	146/46/47	151/51/52	154/54/55
70	62.9 3/9	65.1 3/3	66.6 3/3	67.7 3/3	68.6 3/3
	136/37/39	141/41/42	146/46/47	150/50/51	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 × 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
 R 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 3/9	81.9 2/3	83.0 3/6	83.8 3/6	84.5 3/6
	151/52/54	156/56/59	157/60/62	157/62/64	156/64/67
-10	78.5 3/9	81.2 3/9	82.3 3/6	83.1 3/6	83.9 3/6
	149/51/53	154/54/57	155/58/60	154/60/62	153/62/65
0	77.5 3/9	80.5 3/6	81.6 3/6	82.5 3/6	83.2 3/6
	147/50/52	152/53/55	152/55/58	151/58/60	150/60/63
10	76.6 3/9	79.7 3/6	80.9 3/6	81.8 3/6	82.6 3/6
	145/49/51	150/52/54	150/53/56	149/56/58	148/58/61
20	75.5 3/9	78.8 3/6	80.1 3/6	81.1 3/6	82.0 3/6
	144/48/51	148/51/54	148/53/55	146/54/56	146/57/59
30	74.4 3/9	77.9 3/6	79.3 3/6	80.5 3/6	81.4 3/6
	142/48/50	146/50/53	146/52/54	144/53/55	144/55/57
40	73.3 3/9	77.1 3/6	78.4 3/6	79.7 3/6	80.8 3/6
	141/47/50	145/49/52	144/51/53	143/52/54	142/53/56
46	72.7 3/9	76.4 3/6	77.9 3/6	79.2 3/6	80.3 3/6
	140/46/49	144/49/51	143/50/53	142/52/54	141/53/55
48	71.9 3/9	75.7 3/6	77.2 3/6	78.4 3/6	79.5 3/6
	140/46/48	144/49/51	143/50/52	142/51/53	141/52/54
50	71.2 3/9	74.7 3/9	76.4 3/6	77.6 3/6	78.5 3/6
	140/45/47	144/48/50	144/49/51	143/50/52	142/52/54
52	70.4 3/9	73.7 3/9	75.6 3/6	76.7 3/6	77.5 3/6
	140/44/47	144/48/50	144/49/51	143/50/51	143/52/54
54	69.6 3/9	72.8 3/9	74.8 3/6	75.8 3/6	76.5 3/6
	139/44/46	144/47/49	145/49/50	144/49/51	143/52/53
55	69.2 3/9	72.3 3/9	74.4 3/6	75.3 3/6	76.0 3/6
	139/43/45	143/47/49	145/48/50	144/49/51	144/52/53
56	68.8 3/9	71.9 3/9	74.0 3/6	74.9 3/6	75.6 3/6
	139/43/45	143/46/48	146/48/50	145/49/51	144/52/53
58	68.0 3/9	71.0 3/9	73.2 3/6	74.0 3/6	74.6 3/6
	139/42/44	143/45/47	146/48/49	145/49/51	145/51/53
60	67.2 3/9	70.1 3/9	72.4 3/6	73.0 3/6	73.7 3/6
	138/41/43	143/45/46	147/47/49	146/49/51	145/51/53
62	66.4 3/9	69.2 3/9	71.3 3/9	72.1 3/6	72.7 3/6
	138/40/42	142/44/45	147/47/48	147/49/51	146/51/53
64	65.6 3/9	68.3 3/9	70.2 3/3	71.1 3/6	71.6 3/6
	137/40/41	142/43/44	147/47/48	148/49/51	147/51/53
66	64.7 3/9	67.3 3/9	69.0 3/3	70.1 3/6	70.6 3/6
	137/39/40	142/42/43	146/46/48	149/49/51	148/51/52
68	63.9 3/9	66.2 3/9	67.8 3/3	69.1 3/6	69.5 3/6
	137/38/39	141/41/43	146/46/47	150/50/51	149/51/52
70	63.0 3/9	65.1 3/3	66.6 3/3	67.8 3/3	68.4 3/6
	136/37/38	141/41/42	146/46/47	150/50/51	150/51/52

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
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QUICK REFERENCE TABLE - CONFIGURATION 1+F - PRESSURE ALTITUDE = 1000 FT					
TREF=28°C		DRY RUNWAY		MAX TO WEIGHT (1000KG) CODES	
TMAX=53°C		SLOPE=0%		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

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
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QUICK REFERENCE TABLES

QUICK REFERENCE TABLE - CONFIGURATION 1+F - PRESSURE ALTITUDE = 2000 FT					
TREF=26°C TMAX=51°C		DRY RUNWAY SLOPE=0%		MAX TO WEIGHT (1000KG) CODES IAS (KT) : V1/VR/V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	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 2/3 137/37/40	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

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	QUICK REFERENCE TABLES	SEQ 203	REV 34
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QUICK REFERENCE TABLES

CONFIGURATION 1+F			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)				
	2250	2500	2750	3000	3250
-20	75.3 2/3 145/46/51	77.0 2/3 151/52/57	78.4 2/3 156/58/63	79.1 3/6 157/60/65	79.4 3/6 157/62/67
-10	74.6 2/3 143/44/49	76.5 2/3 148/50/55	77.9 3/6 154/56/61	78.5 3/6 154/58/63	78.9 3/6 154/60/65
0	74.0 2/3 141/42/47	75.9 2/3 146/48/53	77.4 3/6 152/54/59	78.0 3/6 151/56/61	78.4 3/6 151/57/63
10	73.3 2/3 139/40/45	75.4 2/3 144/46/51	76.9 3/6 149/52/57	77.4 3/6 149/54/59	77.9 3/6 148/55/61
20	72.7 2/3 137/38/43	74.8 2/3 142/44/49	76.4 3/6 147/50/55	76.9 3/6 146/52/57	77.4 3/6 146/53/58
30	72.0 2/3 135/37/42	74.3 2/3 141/43/48	75.8 3/6 145/48/53	76.4 3/6 144/50/55	76.9 3/6 143/52/57
40	71.4 2/3 134/35/40	73.7 2/3 139/41/46	75.3 3/6 142/46/51	75.9 3/6 142/48/53	76.4 3/6 141/50/55
50	70.8 2/3 132/34/39	73.1 2/3 137/40/45	74.3 2/3 138/43/48	74.2 2/3 133/43/48	74.3 2/3 127/43/48
51	70.8 2/3 132/33/39	73.0 2/3 137/39/44	73.5 2/3 135/41/46	73.5 2/3 129/41/46	73.5 2/3 122/41/46
53	70.2 2/3 132/33/38	72.1 3/8 136/39/44	72.0 2/3 129/38/43	72.0 2/3 123/38/43	72.0 2/8 116/38/43
55	69.3 2/3 131/33/38	71.4 2/3 136/39/43	72.1 2/3 135/40/45	72.1 2/3 130/40/45	72.1 2/3 123/40/45
57	68.4 2/3 131/32/37	70.5 2/3 136/38/43	72.0 2/3 140/43/47	72.1 2/3 135/43/47	72.1 2/3 130/43/47
59	67.4 2/3 131/32/37	69.5 2/3 136/38/42	71.2 2/3 141/43/48	72.0 3/6 142/46/50	72.0 3/8 138/46/51
61	66.5 2/3 131/31/36	68.5 2/3 136/37/42	70.2 2/3 140/42/47	71.0 3/6 143/46/50	71.5 3/6 142/48/52
63	65.5 2/3 130/31/36	67.6 2/3 135/37/41	69.1 2/3 140/42/46	70.1 3/6 143/46/50	70.5 3/6 143/48/52
65	64.6 2/3 130/30/35	66.5 2/3 135/36/41	68.0 2/3 140/41/46	69.1 3/6 144/46/50	69.5 3/6 144/48/52
67	63.6 2/3 130/30/35	65.4 2/3 135/35/40	66.9 2/3 139/41/45	68.0 2/3 144/46/50	68.5 3/6 145/48/52
69	62.5 3/3 129/29/34	64.3 2/3 134/35/39	65.8 2/3 139/40/44	66.9 2/3 144/45/49	67.5 3/6 146/48/52
71	61.4 3/3 129/29/34	63.3 2/3 134/34/39	64.6 2/3 139/40/44	65.7 2/3 144/45/49	66.4 3/6 147/48/52
73	60.3 3/3 129/29/34	62.2 2/3 134/34/38	63.4 2/3 139/39/43	64.5 2/3 143/44/48	65.3 3/6 148/48/52
75	59.1 3/3 128/28/33	60.9 2/3 133/33/37	62.2 2/3 138/38/42	63.2 2/3 143/43/47	64.0 2/3 148/48/52
78	57.3 3/3 127/27/31	59.0 2/3 132/32/36	60.3 2/3 137/37/41	61.2 2/3 142/42/46	61.9 2/3 146/46/50

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	QUICK REFERENCE TABLES		SEQ 203	REV 34

CONFIGURATION 1+F			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)				
	2250	2500	2750	3000	3250
-20	74.0 2/3 143/44/49	75.8 2/3 148/50/55	77.2 2/3 154/55/61	77.9 3/6 155/58/63	78.3 3/6 155/60/65
-10	73.3 2/3 141/42/47	75.3 2/3 146/48/53	76.7 2/3 152/53/59	77.3 3/6 152/56/61	77.8 3/6 152/58/63
0	72.7 2/3 139/40/45	74.7 2/3 144/46/51	76.2 3/6 150/52/57	76.8 3/6 150/54/59	77.2 3/6 149/56/61
10	72.0 2/3 137/38/43	74.1 2/3 142/44/49	75.7 3/6 147/50/55	76.2 3/6 147/52/57	76.7 3/6 146/54/59
20	71.4 2/3 135/36/42	73.5 2/3 140/42/47	75.2 3/6 145/48/53	75.7 3/6 144/50/55	76.2 3/6 144/52/57
30	70.8 2/3 134/35/40	73.0 2/3 139/41/46	74.6 3/6 143/46/51	75.2 3/6 142/48/53	75.7 3/6 142/50/55
40	70.2 2/3 132/33/39	72.4 2/3 137/39/44	74.0 3/6 141/44/49	74.7 3/6 140/46/51	75.2 3/6 139/48/53
47	69.7 2/3 131/32/38	72.0 2/3 136/38/43	73.6 3/6 139/43/48	74.3 3/6 139/45/50	74.9 3/6 138/47/52
49	69.1 2/3 131/32/37	71.3 2/3 136/38/43	73.0 3/6 140/43/47	73.5 3/6 138/44/49	73.5 2/3 134/44/49
51	68.4 2/3 130/31/37	70.6 2/3 135/37/42	72.1 2/3 139/42/47	72.1 2/3 134/42/47	72.1 2/3 129/42/47
53	67.6 2/3 130/31/36	69.7 2/3 135/37/42	71.5 3/6 140/42/47	72.1 3/6 139/44/49	72.1 2/3 135/44/49
55	66.7 2/3 130/31/36	68.8 2/3 135/36/41	70.5 2/3 140/42/46	71.3 3/6 141/45/49	71.8 3/6 140/46/51
57	65.9 2/3 130/30/35	67.9 2/3 135/36/41	69.5 2/3 139/41/46	70.4 3/6 141/45/49	70.9 3/6 141/46/51
59	65.0 2/3 129/30/35	67.0 2/3 134/35/40	68.5 2/3 139/41/45	69.6 3/6 142/45/49	70.0 3/6 142/46/51
61	64.0 2/3 129/29/34	66.0 2/3 134/35/40	67.5 2/3 139/40/45	68.7 3/6 143/45/49	69.1 3/6 142/46/51
63	63.1 2/3 129/29/34	65.0 2/3 134/34/39	66.5 2/3 138/40/44	67.7 3/6 143/45/49	68.1 3/6 143/46/51
65	62.2 2/3 128/28/33	64.1 2/3 133/34/38	65.5 2/3 138/39/43	66.6 2/3 143/44/48	67.2 3/6 144/47/51
67	61.2 3/3 128/28/33	63.0 2/3 133/33/38	64.4 2/3 138/39/43	65.5 2/3 142/43/48	66.2 3/6 145/47/51
69	60.1 3/3 128/28/32	62.0 2/3 133/33/37	63.3 2/3 137/38/42	64.4 2/3 142/43/47	65.2 3/6 146/47/51
71	59.1 3/3 127/27/32	60.9 2/3 132/32/37	62.2 2/3 137/38/42	63.2 2/3 142/42/46	64.0 2/3 146/47/51
76	56.3 3/3 125/25/30	58.0 2/3 130/30/35	59.3 2/3 136/36/40	60.2 2/3 140/40/44	60.9 2/3 145/45/48

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	QUICK REFERENCE TABLES	SEQ 312	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 1+F			PRESSURE ALTITUDE = 1000 FT		FWD CG
TREF = 42 °C			DRY RUNWAY	MAX TO WEIGHT(1000KG) CODES	
TMAX = 53 °C			SLOPE = 0 %	IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
-20	78.2 3/9 149/52/54	81.1 3/3 154/55/57	83.1 2/3 160/60/62	84.7 3/6 165/66/68	85.3 3/6 165/68/70
	77.2 3/9 147/51/53	80.2 3/3 152/54/56	82.4 2/3 157/58/61	84.1 3/6 163/64/66	84.7 3/6 162/66/68
0	76.1 3/9 146/50/52	79.4 3/9 150/53/55	81.8 2/3 155/56/59	83.4 3/6 160/61/64	84.0 3/6 159/64/66
	75.0 3/9 144/49/52	78.5 3/9 149/52/54	81.1 3/3 153/55/57	82.8 3/6 157/59/62	83.4 3/6 156/62/64
10	73.8 3/9 143/48/51	77.6 3/9 147/51/53	80.4 3/3 151/54/56	82.1 3/6 155/57/60	82.8 3/6 154/60/62
	72.8 3/9 141/48/50	76.6 3/9 145/50/53	79.5 3/3 150/53/56	81.5 3/6 152/56/58	82.2 3/6 152/58/60
20	71.8 3/9 140/47/49	75.6 3/9 144/50/52	78.7 3/9 148/52/55	80.8 3/6 150/54/56	81.6 3/6 149/56/58
	71.5 3/9 140/46/49	75.3 3/9 144/49/52	78.5 3/9 148/52/54	80.6 3/6 150/53/56	81.4 3/6 149/56/58
30	71.0 3/9 140/46/48	74.6 3/9 144/49/51	77.8 3/9 148/52/54	79.9 3/6 150/53/55	80.6 3/6 149/56/57
	70.2 3/9 139/45/47	73.6 3/9 143/49/51	76.9 3/9 147/51/53	79.0 3/6 151/53/55	79.6 3/6 150/55/57
40	69.4 3/9 139/44/46	72.7 3/9 143/48/50	75.8 3/9 147/50/52	77.9 3/6 151/53/55	78.6 3/6 151/55/57
	68.7 3/9 138/43/46	71.8 3/9 143/47/49	74.8 3/9 147/50/51	76.8 2/3 151/53/54	77.5 2/3 151/55/57
42	67.9 3/9 138/43/45	71.0 3/9 142/46/48	73.8 3/9 147/49/51	75.8 2/3 151/52/54	76.1 2/3 149/53/55
	67.5 3/9 138/42/44	70.6 3/9 142/46/48	73.3 3/9 146/49/50	75.2 2/3 151/52/54	75.4 2/3 148/53/54
44	66.4 3/9 137/41/43	69.4 3/9 142/45/46	71.9 3/9 146/48/49	73.7 2/3 150/51/53	74.8 3/6 154/55/57
	65.7 3/9 137/40/42	68.6 3/9 141/44/45	70.9 3/9 146/47/48	72.6 2/3 150/51/52	73.8 3/6 155/55/57
46	64.9 3/9 137/40/41	67.7 3/9 141/43/44	70.0 3/9 145/46/47	71.5 2/3 150/50/51	72.7 2/3 154/55/56
	64.1 3/9 136/39/40	66.8 3/9 141/42/43	68.9 3/3 145/45/46	70.4 2/3 150/50/51	71.4 3/3 154/54/55
48	63.3 3/9 136/38/39	65.9 3/9 140/41/42	67.8 3/3 145/45/46	69.2 3/3 150/50/51	70.1 3/3 154/54/55
	62.5 3/9 136/37/38	65.0 3/9 140/40/41	66.7 3/3 145/45/46	67.9 3/3 149/49/50	68.8 3/3 153/53/54
50	61.7 3/9 135/36/37	64.0 3/3 140/40/41	65.5 3/3 144/44/45	66.7 3/3 148/48/49	67.5 3/3 151/51/52

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	QUICK REFERENCE TABLES	SEQ 312	REV 34	
FLIGHT CREW OPERATING MANUAL				

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 3/9 147/51/53	80.2 3/3 152/54/56	82.3 2/3 158/58/61	84.0 3/6 163/64/66	84.5 3/6 162/66/68
-10	76.0 3/9 146/50/52	79.3 3/3 150/53/55	81.7 2/3 155/57/59	83.3 3/6 160/62/64	83.9 3/6 159/64/66
0	74.8 3/9 144/49/52	78.4 3/9 149/52/54	81.0 3/3 153/55/57	82.6 3/6 157/59/62	83.3 3/6 156/62/64
10	73.6 3/9 143/48/51	77.4 3/9 147/51/53	80.2 3/3 151/54/56	81.9 3/6 154/57/59	82.6 3/6 154/60/62
20	72.5 3/9 141/48/50	76.4 3/9 145/50/53	79.3 3/3 150/53/56	81.3 3/6 152/55/57	82.0 3/6 151/58/60
30	71.5 3/9 140/47/49	75.2 3/9 144/50/52	78.5 3/3 148/52/55	80.4 3/6 150/55/57	81.4 3/6 149/56/58
37	70.9 3/9 139/46/48	74.5 3/9 143/49/52	77.9 3/9 147/52/54	79.8 3/6 149/54/56	80.9 3/6 148/55/57
40	70.1 3/9 139/45/47	73.6 3/9 143/49/51	77.0 3/9 147/51/53	79.0 3/6 149/53/55	80.0 3/6 148/54/56
42	69.5 3/9 138/44/47	72.9 3/9 143/48/50	76.2 3/9 146/50/52	78.4 3/6 149/53/54	79.2 3/6 148/54/56
44	68.7 3/9 138/44/46	72.0 3/9 142/47/49	75.1 3/9 146/50/52	77.5 3/6 150/52/54	78.2 3/6 149/54/56
46	67.9 3/9 138/43/45	71.1 3/9 142/47/49	74.0 3/9 146/49/51	76.4 2/3 150/52/53	77.1 3/6 150/54/56
48	67.2 3/9 137/42/44	70.3 3/9 141/46/48	73.1 3/9 146/49/50	75.3 2/3 150/51/53	76.2 3/6 151/54/56
50	66.5 3/9 137/41/43	69.5 3/9 141/45/47	72.2 3/9 145/48/50	74.3 2/3 149/51/52	75.3 3/6 151/54/56
51	66.1 3/9 137/41/43	69.1 3/9 141/45/46	71.7 3/9 145/48/49	73.8 2/3 149/50/52	74.8 3/6 152/54/55
54	65.0 3/9 136/40/42	67.9 3/9 140/43/45	70.4 3/9 145/46/48	72.2 2/3 149/50/51	73.4 3/6 153/54/55
56	64.3 3/9 136/39/41	67.2 3/9 140/43/44	69.5 3/9 144/45/47	71.2 2/3 149/49/50	72.4 3/6 153/54/55
58	63.6 3/9 135/38/40	66.3 3/9 140/42/43	68.6 3/9 144/44/46	70.2 2/3 148/49/50	71.3 2/3 153/53/54
60	62.8 3/9 135/38/39	65.5 3/9 139/41/42	67.7 3/9 144/44/45	69.1 2/3 148/48/49	70.1 3/3 153/53/54
62	62.0 3/9 135/37/38	64.7 3/9 139/40/41	66.6 3/3 143/43/44	67.9 3/3 148/48/49	68.9 3/3 152/52/53
64	61.3 3/9 134/36/37	63.8 3/9 139/39/40	65.5 3/3 143/43/44	66.7 3/3 148/48/49	67.6 3/3 151/51/52
66	60.5 3/9 134/35/36	62.8 3/3 138/38/39	64.3 3/3 143/43/44	65.5 3/3 146/46/47	66.3 3/3 150/50/51

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	QUICK REFERENCE TABLES	SEQ 370	REV 35
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R

CONFIGURATION 1 + F			PRESSURE ALTITUDE = 1000 FT		FWD CG
TREF = 43 °C			DRY RUNWAY	MAX TO WEIGHT(1000KG) CODES	
TMAX = 53 °C			SLOPE = 0 %	IAS(KT) : V1 / VR / V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
-20	78.1 3/9 149/51/53	80.8 3/9 154/54/57	82.0 3/6 155/58/60	82.7 3/6 154/60/62	83.4 3/6 154/63/65
	77.2 3/9 147/50/52	80.1 3/9 152/53/55	81.2 3/6 152/56/58	82.1 3/6 152/58/60	82.8 3/6 151/60/63
-10	76.1 3/9 145/49/51	79.3 3/6 150/52/54	80.5 3/6 150/54/56	81.4 3/6 149/56/58	82.2 3/6 148/58/61
	75.0 3/9 144/48/51	78.4 3/6 148/51/53	79.7 3/6 148/52/55	80.7 3/6 147/54/56	81.5 3/6 146/57/59
0	73.9 3/9 142/48/50	77.6 3/6 147/50/52	78.9 3/6 146/52/54	80.0 3/6 145/53/55	80.9 3/6 144/55/57
	72.8 3/9 141/47/49	76.6 3/6 145/49/52	77.9 3/6 143/51/53	79.2 3/6 143/52/54	80.3 3/6 142/53/55
10	71.8 3/9 140/46/48	75.6 3/6 144/49/51	77.1 3/6 142/50/52	78.4 3/6 141/51/53	79.5 3/6 140/52/54
	71.5 3/9 139/46/48	75.2 3/6 143/49/51	76.7 3/6 142/50/52	78.1 3/6 141/51/53	79.3 3/6 139/52/54
20	70.8 3/9 139/45/47	74.3 3/6 143/48/50	76.0 3/6 142/49/51	77.3 3/6 141/50/52	78.4 3/6 140/51/53
	70.0 3/9 139/44/46	73.4 3/9 143/48/50	75.2 3/6 143/49/51	76.5 3/6 142/50/52	77.5 3/6 141/51/53
30	69.2 3/9 138/43/45	72.5 3/9 143/47/49	74.4 3/6 143/48/50	75.6 3/6 142/49/51	76.5 3/6 141/51/52
	68.5 3/9 138/43/45	71.6 3/9 142/46/48	73.7 3/6 144/48/50	74.8 3/6 143/49/51	75.6 3/6 142/50/52
40	67.7 3/9 138/42/44	70.7 3/9 142/45/47	72.9 3/6 145/48/49	73.9 3/6 143/48/50	74.6 3/6 143/50/52
	66.9 3/9 137/41/43	69.9 3/9 142/44/46	72.2 3/6 145/47/49	73.1 3/6 144/48/50	73.7 3/6 143/50/52
50	66.2 3/9 137/40/42	69.1 3/9 141/44/45	71.4 3/6 146/46/48	72.2 3/6 145/48/49	72.8 3/6 144/50/52
	65.4 3/9 137/39/41	68.3 3/9 141/43/44	70.5 3/9 145/45/47	71.3 3/6 145/48/49	71.8 3/6 145/50/51
60	64.6 3/9 136/39/40	67.4 3/9 141/42/43	69.4 3/9 145/45/46	70.3 3/6 146/48/49	70.9 3/6 146/50/51
	63.8 3/9 136/38/39	66.5 3/9 140/41/42	68.3 3/3 145/45/46	69.4 3/6 147/48/49	69.9 3/6 147/50/51
70	63.0 3/9 136/37/38	65.5 3/9 140/40/41	67.2 3/3 145/45/46	68.4 3/6 148/48/49	68.8 3/6 148/50/51
	62.2 3/9 135/36/37	64.4 3/9 140/40/41	66.0 3/3 145/45/46	67.2 3/6 149/49/50	67.8 3/6 149/50/51
80	61.7 3/9 135/36/37	63.9 3/3 140/40/41	65.4 3/3 144/44/45	66.6 3/3 148/48/49	67.3 3/6 149/50/51

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 3/9 147/50/52	79.6 3/9 152/52/55	80.8 3/6 153/56/58	81.6 3/6 152/58/61	82.4 3/6 152/61/63
-10	75.7 3/9 145/49/51	78.8 3/9 150/52/54	80.1 3/6 151/54/56	80.9 3/6 150/56/58	81.7 3/6 149/59/61
0	74.5 3/9 144/48/51	78.0 3/9 148/51/53	79.3 3/6 148/52/54	80.2 3/6 147/54/56	81.1 3/6 147/57/59
10	73.4 3/9 142/47/50	77.1 3/6 147/50/52	78.5 3/6 146/51/54	79.6 3/6 145/53/55	80.4 3/6 144/55/57
20	72.3 3/9 141/47/49	76.1 3/6 145/49/52	77.6 3/6 144/51/53	78.8 3/6 143/52/54	79.8 3/6 142/53/55
30	71.3 3/9 140/46/48	75.0 3/6 144/49/51	76.6 3/6 142/50/52	77.9 3/6 141/51/53	79.0 3/6 140/52/54
40	70.3 3/9 138/44/47	73.8 3/6 142/48/50	75.5 3/6 141/49/51	76.9 3/6 139/50/52	78.1 3/6 138/51/53
42	69.6 3/9 138/44/46	73.0 3/6 142/47/50	74.7 3/6 141/49/51	76.1 3/6 140/50/52	77.3 3/6 139/50/52
44	68.8 3/9 138/43/45	72.1 3/9 142/47/49	74.0 3/6 142/48/50	75.3 3/6 141/49/51	76.4 3/6 140/50/52
46	68.0 3/9 137/42/44	71.2 3/9 142/46/48	73.2 3/6 143/48/50	74.4 3/6 141/49/50	75.5 3/6 140/49/51
48	67.3 3/9 137/42/43	70.4 3/9 141/45/47	72.5 3/6 143/47/49	73.6 3/6 142/48/50	74.6 3/6 141/49/51
50	66.6 3/9 137/41/43	69.6 3/9 141/44/46	71.8 3/6 143/47/48	72.8 3/6 142/48/49	73.7 3/6 142/49/51
51	66.2 3/9 136/40/42	69.2 3/9 141/44/46	71.5 3/6 144/46/48	72.4 3/6 143/47/49	73.2 3/6 142/49/50
52	65.8 3/9 136/40/42	68.8 3/9 141/43/45	71.1 3/6 144/46/48	72.0 3/6 143/47/49	72.8 3/6 142/49/50
54	65.1 3/9 136/39/41	68.0 3/9 140/43/44	70.4 3/6 144/45/47	71.2 3/6 144/47/48	71.9 3/6 143/49/50
56	64.4 3/9 135/38/40	67.2 3/9 140/42/43	69.5 3/9 144/45/46	70.4 3/6 144/47/48	71.0 3/6 144/49/50
58	63.6 3/9 135/38/39	66.4 3/9 139/41/42	68.5 3/9 144/44/45	69.5 3/6 145/47/48	70.0 3/6 144/49/50
60	62.9 3/9 135/37/38	65.5 3/9 139/40/41	67.5 3/3 144/44/45	68.6 3/6 146/47/48	69.1 3/6 145/49/50
62	62.1 3/9 134/36/37	64.7 3/9 139/39/40	66.4 3/3 143/43/44	67.7 3/6 147/47/48	68.1 3/6 146/49/50
64	61.3 3/9 134/35/36	63.7 3/9 138/38/39	65.3 3/3 143/43/44	66.5 3/6 148/48/49	67.1 3/6 147/48/49
66	60.5 3/9 134/34/35	62.7 3/3 138/38/39	64.1 3/3 143/43/44	65.3 3/3 147/47/48	66.1 3/6 148/48/49

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
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QUICK REFERENCE TABLE - CONFIGURATION 2 - PRESSURE ALTITUDE = 0 FT					
TREF=30°C		DRY RUNWAY		MAX TO WEIGHT (1000KG) CODES	
TMAX=55°C		SLOPE=0%		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

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

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	QUICK REFERENCE TABLES	SEQ 203	REV 34
FLIGHT CREW OPERATING MANUAL			

CONFIGURATION 2			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)				
	1750	2000	2250	2500	2750
-20	71.7 3/3 134/34/39	74.7 2/3 140/41/46	77.0 2/3 146/48/53	78.5 2/3 153/54/59	79.5 2/3 159/60/65
-10	71.0 3/3 132/32/37	74.0 2/3 138/39/44	76.4 2/3 144/46/51	78.1 2/3 150/52/57	79.2 2/3 156/58/63
0	70.4 3/3 130/30/35	73.3 2/3 136/37/42	75.8 2/3 142/44/49	77.6 2/3 148/50/55	78.8 2/3 154/56/61
10	69.8 3/3 129/29/34	72.6 2/3 135/36/40	75.2 2/3 140/42/47	77.1 2/3 146/48/53	78.5 3/6 152/54/59
20	69.1 3/3 127/27/32	72.0 2/3 133/34/39	74.5 2/3 139/41/45	76.6 2/3 144/47/51	78.1 3/6 149/52/57
30	68.5 3/3 125/25/31	71.4 2/3 131/32/37	73.9 2/3 137/39/44	76.1 2/3 142/45/49	77.6 3/6 147/50/55
40	67.9 3/9 124/24/29	70.8 2/3 130/31/36	73.3 2/3 135/38/42	75.5 2/3 140/43/48	77.1 3/6 145/48/53
50	67.2 3/9 123/23/28	70.3 2/3 128/29/34	72.7 2/3 134/36/40	74.9 2/3 139/42/46	75.8 2/3 138/44/49
55	66.9 3/9 122/23/28	70.0 2/3 127/29/33	72.3 2/3 132/35/39	72.3 2/3 126/35/40	72.3 2/3 119/35/40
57	66.0 3/9 122/22/27	69.1 2/3 127/28/33	71.5 2/3 133/35/39	72.3 3/8 131/37/42	72.3 3/8 125/37/42
59	65.2 3/9 121/21/27	68.1 2/3 127/28/32	70.5 2/3 132/34/39	72.3 3/8 136/40/44	72.3 3/8 131/40/44
61	64.2 3/9 121/21/26	67.1 2/3 127/27/32	69.5 2/3 132/34/38	71.5 2/3 137/40/44	72.3 3/8 138/43/47
63	63.3 3/3 121/21/26	66.1 2/3 126/27/31	68.5 2/3 132/33/38	70.5 2/3 137/39/43	72.0 2/3 142/44/48
65	62.3 3/3 121/21/25	65.1 2/3 126/27/31	67.5 2/3 131/33/37	69.4 2/3 137/39/43	70.8 2/3 142/44/48
67	61.2 3/3 120/20/25	64.1 2/3 126/26/30	66.4 2/3 131/32/36	68.3 2/3 136/38/42	69.6 2/3 141/43/47
69	60.1 3/3 120/20/24	63.0 2/3 126/26/30	65.3 2/3 131/32/36	67.2 2/3 136/37/41	68.4 2/3 141/43/47
71	59.0 3/3 119/19/24	61.9 3/3 125/25/30	64.2 2/3 131/31/35	66.0 2/3 136/37/41	67.2 2/3 141/42/46
73	57.9 3/3 119/19/23	60.8 3/3 125/25/29	63.1 2/3 130/31/35	64.8 2/3 135/36/40	65.9 2/3 140/42/45
75	56.8 3/3 118/18/22	59.6 3/3 124/24/28	62.0 2/3 130/30/34	63.6 2/3 135/36/39	64.6 2/3 140/41/45
77	* 55.6 3/3 * 117/17/22	58.4 3/3 123/23/28	60.8 2/3 129/30/33	62.3 2/3 135/35/39	63.3 2/3 140/40/44
79	* 54.4 3/3 * 117/17/21	57.1 3/3 123/23/27	59.5 2/3 129/29/32	60.9 2/3 134/35/38	61.9 2/3 140/40/43
80	* 53.8 3/3 * 116/16/21	56.6 3/3 123/23/27	58.8 2/3 128/28/32	60.3 2/3 134/34/38	61.2 2/3 139/39/43

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	QUICK REFERENCE TABLES		SEQ 203	REV 34

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 3/3	73.3 2/3	75.7 2/3	77.2 2/3	78.3 2/3
	132/32/37	138/39/44	145/46/51	150/52/57	156/58/63
-10	69.6 3/3	72.6 2/3	75.0 2/3	76.8 2/3	77.9 2/3
	131/31/35	137/37/42	142/44/49	148/50/55	154/56/60
0	69.0 3/3	71.9 2/3	74.4 2/3	76.3 2/3	77.6 2/3
	129/29/34	135/36/40	140/42/47	146/48/53	152/54/58
10	68.4 3/3	71.2 2/3	73.7 2/3	75.8 2/3	77.2 3/6
	127/27/32	133/34/38	139/40/45	144/46/51	149/52/56
20	67.8 3/3	70.6 2/3	73.1 2/3	75.2 2/3	76.7 3/6
	125/25/30	131/32/37	137/39/43	142/45/49	147/50/55
30	67.1 3/9	70.0 2/3	72.5 2/3	74.6 2/3	76.3 3/6
	124/24/29	130/31/35	135/37/42	140/43/48	145/48/53
40	66.5 3/9	69.5 2/3	71.9 2/3	74.1 2/3	75.7 3/6
	122/22/28	128/29/34	133/36/40	139/42/46	143/46/51
50	65.8 3/9	68.9 2/3	71.3 2/3	73.5 2/3	74.2 2/3
	121/22/27	126/28/32	132/34/39	137/40/44	136/42/46
51	65.8 3/9	68.9 2/3	71.2 2/3	73.5 2/3	73.5 2/3
	121/22/27	126/27/32	132/34/38	137/40/44	132/40/44
53	65.2 3/9	68.3 2/3	70.6 2/3	72.1 2/3	72.0 2/3
	121/21/26	126/27/32	132/34/38	133/37/42	127/37/41
55	64.5 3/9	67.4 2/3	69.8 2/3	71.9 2/3	72.1 2/3
	120/20/26	126/27/31	131/33/38	136/39/43	133/40/44
57	63.6 3/9	66.5 2/3	68.8 2/3	70.9 2/3	72.0 2/3
	120/20/25	126/26/31	131/33/37	136/38/43	138/42/46
59	62.7 3/9	65.6 2/3	67.9 2/3	69.9 2/3	71.5 2/3
	120/20/25	125/26/30	131/32/36	136/38/42	141/43/47
61	61.7 3/3	64.6 2/3	66.9 2/3	68.9 2/3	70.4 2/3
	119/19/24	125/25/30	130/32/36	135/37/41	140/43/47
63	60.8 3/3	63.7 2/3	66.0 2/3	67.9 2/3	69.3 2/3
	119/19/24	125/25/29	130/31/35	135/37/41	140/42/46
65	59.8 3/3	62.7 2/3	65.0 2/3	66.9 2/3	68.2 2/3
	119/19/23	124/25/29	130/31/35	135/36/40	140/42/45
67	58.8 3/3	61.7 2/3	64.0 2/3	65.8 2/3	67.1 2/3
	118/18/23	124/24/29	129/30/34	134/36/40	139/41/45
69	57.7 3/3	60.6 3/3	62.9 2/3	64.7 2/3	65.9 2/3
	117/17/22	124/24/28	129/30/34	134/35/39	139/40/44
71	56.7 3/3	59.6 3/3	61.9 2/3	63.5 2/3	64.7 2/3
	117/17/21	123/23/28	129/29/33	134/35/38	139/40/43
73	* 55.6 3/3	58.5 3/3	60.8 2/3	62.4 2/3	63.5 2/3
	* 116/16/21	123/23/27	128/29/32	133/34/38	139/39/43
75	* 54.6 3/3	57.4 3/3	59.7 2/3	61.2 2/3	62.2 2/3
	* 116/16/20	122/22/26	128/28/32	133/34/37	138/39/42
78	* 52.6 3/3	55.6 3/3	57.9 2/3	59.3 2/3	60.2 2/3
	* 115/16/20	121/21/25	127/27/30	133/33/36	138/38/41

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	QUICK REFERENCE TABLES	SEQ 312	REV 34
		FLIGHT CREW OPERATING MANUAL	

QUICK REFERENCE TABLES

CONFIGURATION 2			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)				
	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
	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
-10	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
	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
0	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
	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
10	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
	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
20	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
	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
30	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
	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
40	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
	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
46	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
	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
48	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
	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
50	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
	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
52	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

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	QUICK REFERENCE TABLES		SEQ 312	REV 34

CONFIGURATION 2		PRESSURE ALTITUDE = 1000 FT			FWD CG
TREF = 42 °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	72.4 3/9 135/39/43	76.9 3/9 140/42/46	79.5 2/3 145/48/53	81.6 2/3 151/54/59	83.3 2/3 156/59/65
-10	71.2 3/9 133/37/42	75.8 3/9 138/41/46	78.8 2/3 144/46/51	81.0 2/3 149/52/57	82.7 2/3 154/57/63
0	70.2 3/9 132/36/41	74.6 3/9 137/40/45	78.1 2/3 142/44/49	80.4 2/3 147/50/55	82.1 2/3 152/56/61
10	69.1 3/9 130/35/40	73.5 3/9 135/40/44	77.4 3/9 140/43/47	79.7 2/3 145/49/53	81.6 2/3 150/54/59
20	68.1 3/9 129/34/39	72.4 3/9 134/39/43	76.6 3/9 138/42/46	79.1 2/3 143/47/52	81.0 2/3 148/52/57
30	67.1 3/9 128/33/38	71.5 3/9 133/38/42	75.6 3/9 137/41/45	78.4 2/3 142/45/50	80.4 2/3 146/51/55
40	66.3 3/9 127/32/37	70.5 3/9 132/37/41	74.5 3/9 136/41/45	77.8 2/3 140/44/48	79.8 2/3 145/49/54
42	66.0 3/9 126/32/37	70.3 3/9 131/37/41	74.2 3/9 136/40/45	77.6 2/3 140/44/48	79.6 2/3 144/49/54
44	65.5 3/9 126/31/36	69.7 3/9 131/36/41	73.5 3/9 135/40/44	76.9 2/3 140/43/48	78.8 2/3 144/48/53
46	64.8 3/9 126/31/35	69.0 3/9 131/36/40	72.6 3/9 135/40/44	75.8 2/3 140/43/47	77.7 2/3 144/48/52
48	64.1 3/9 125/30/35	68.2 3/9 130/35/39	71.8 3/9 135/39/43	74.8 2/3 139/42/47	76.6 2/3 144/48/52
50	63.4 3/9 125/29/34	67.5 3/9 130/34/38	71.0 3/9 135/38/42	73.8 2/3 139/42/46	75.6 2/3 144/47/51
52	62.8 3/9 125/29/33	66.7 3/9 130/33/37	70.2 3/9 134/37/41	72.8 2/3 139/42/45	74.5 2/3 143/47/51
53	62.4 3/9 125/29/33	66.3 3/9 130/33/37	69.8 3/9 134/37/41	72.3 2/3 139/41/45	74.0 2/3 143/46/50
56	61.4 3/9 124/28/32	65.2 3/9 129/32/36	68.5 3/9 134/36/40	70.9 2/3 138/41/44	72.5 2/3 143/46/50
58	60.7 3/9 124/27/31	64.5 3/9 129/31/35	67.7 3/9 133/35/39	69.9 2/3 138/40/44	71.4 2/3 143/45/49
60	60.0 3/9 124/26/30	63.8 3/9 128/31/34	66.9 3/9 133/34/38	68.9 2/3 138/40/43	70.3 2/3 142/45/49
62	59.3 3/9 123/26/29	63.0 3/9 128/30/33	66.0 3/9 133/34/37	67.8 2/3 138/39/43	69.3 2/3 142/44/48
64	58.6 3/9 123/25/29	62.2 3/9 128/29/33	65.0 2/3 132/33/37	66.8 2/3 137/39/42	68.1 2/3 142/44/47
66	57.8 3/9 122/24/28	61.4 3/9 127/28/32	64.1 2/3 132/33/36	65.7 2/3 137/39/42	67.0 2/3 142/43/47
68	57.1 3/9 122/24/27	60.6 3/9 127/28/31	63.1 2/3 132/32/36	64.7 2/3 137/38/41	65.9 2/3 142/43/46

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		SEQ 370	REV 35
	FLIGHT CREW OPERATING MANUAL	QUICK REFERENCE TABLES	

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CONFIGURATION 2			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)				
	1750	2000	2250	2500	2750
-20	73.6 3/9	77.8 3/9	80.3 2/3	82.4 2/3	83.5 3/6
	136/39/44	142/43/48	147/50/55	153/56/61	155/60/65
-10	72.4 3/9	77.0 3/9	79.6 2/3	81.8 2/3	82.9 3/6
	135/38/43	140/41/46	145/48/53	151/54/59	152/57/63
0	71.3 3/9	75.9 3/9	78.9 2/3	81.1 2/3	82.2 3/6
	133/37/42	138/41/45	143/46/51	149/52/57	150/55/61
10	70.3 3/9	74.8 3/9	78.2 2/3	80.5 2/3	81.6 3/6
	132/36/41	137/40/45	142/44/49	147/50/55	148/53/58
20	69.3 3/9	73.7 3/9	77.6 3/9	79.9 2/3	80.9 3/6
	130/35/40	135/40/44	140/43/47	145/49/54	145/51/56
30	68.3 3/9	72.6 3/9	76.8 3/9	79.3 3/6	80.3 3/6
	129/34/39	134/39/43	139/42/46	143/47/52	143/50/55
40	67.4 3/9	71.7 3/9	75.8 3/9	78.6 3/6	79.6 3/6
	128/33/38	133/38/43	137/41/45	142/46/50	141/48/53
46	66.9 3/9	71.1 3/9	75.2 3/9	78.3 3/6	79.3 3/6
	127/33/37	132/37/42	136/41/45	141/45/49	140/47/52
48	66.2 3/9	70.4 3/9	74.3 3/9	77.3 2/3	78.4 3/6
	127/32/37	132/37/41	136/40/45	141/44/49	141/47/52
50	65.5 3/9	69.6 3/9	73.4 3/9	76.2 2/3	77.4 3/6
	127/31/36	132/36/40	136/40/44	141/44/48	142/47/52
52	64.8 3/9	68.9 3/9	72.5 3/9	75.2 2/3	76.5 3/6
	126/31/35	131/35/40	136/39/43	140/44/48	142/47/51
54	64.1 3/9	68.1 3/9	71.7 3/9	74.2 2/3	75.6 3/6
	126/30/34	131/35/39	135/39/42	140/43/47	143/47/51
55	63.8 3/9	67.7 3/9	71.2 3/9	73.7 2/3	75.1 3/6
	126/30/34	131/34/38	135/38/42	140/43/47	143/47/51
56	63.4 3/9	67.4 3/9	70.8 3/9	73.2 2/3	74.7 3/6
	126/29/34	131/34/38	135/38/42	140/43/47	144/47/51
58	62.7 3/9	66.6 3/9	70.0 3/9	72.2 2/3	73.8 3/6
	125/29/33	130/33/37	135/37/41	140/42/46	144/47/51
60	62.0 3/9	65.8 3/9	69.2 3/9	71.2 2/3	72.7 3/6
	125/28/32	130/33/36	134/36/40	139/42/46	144/47/51
62	61.3 3/9	65.0 3/9	68.2 3/9	70.1 2/3	71.6 2/3
	125/28/31	130/32/35	134/36/39	139/41/45	144/46/50
64	60.5 3/9	64.2 3/9	67.2 3/9	69.1 2/3	70.5 2/3
	124/27/31	129/31/35	134/35/39	139/41/44	144/46/50
66	59.8 3/9	63.4 3/9	66.2 2/3	68.0 2/3	69.3 2/3
	124/26/30	129/30/34	134/35/38	139/40/44	143/45/49
68	59.0 3/9	62.6 3/9	65.2 2/3	66.9 2/3	68.2 2/3
	124/26/29	128/30/33	133/34/38	139/40/43	143/45/48
70	58.2 3/9	61.8 3/9	64.2 2/3	65.8 2/3	67.0 2/3
	123/25/28	128/29/32	133/34/37	138/40/43	143/44/48

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	QUICK REFERENCE TABLES		SEQ 370	REV 35

R

CONFIGURATION 2			PRESSURE ALTITUDE = 1000 FT			FWD CG
TREF = 43 °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	72.1 3/9 135/38/43	76.6 3/9 140/41/46	79.2 2/3 145/48/53	81.3 2/3 151/54/59	82.5 3/6 153/58/63	
-10	71.0 3/9 133/37/42	75.5 3/9 138/41/45	78.5 2/3 144/46/51	80.7 2/3 149/52/57	81.8 3/6 150/55/61	
0	70.0 3/9 132/36/41	74.4 3/9 137/40/45	77.8 2/3 142/44/49	80.0 2/3 147/50/55	81.1 3/6 148/53/59	
10	68.9 3/9 130/35/40	73.2 3/9 135/40/44	77.1 3/9 140/43/47	79.4 2/3 145/49/53	80.5 3/6 146/52/57	
20	67.9 3/9 129/34/39	72.2 3/9 134/39/43	76.3 3/9 138/41/46	78.7 2/3 143/47/52	79.8 3/6 144/50/55	
30	67.0 3/9 128/33/38	71.2 3/9 133/38/42	75.3 3/9 137/41/45	78.1 3/6 142/45/50	79.2 3/6 142/48/53	
40	66.1 3/9 127/32/37	70.3 3/9 131/37/41	74.3 3/9 136/40/45	77.5 3/6 140/44/48	78.5 3/6 140/46/51	
43	65.8 3/9 126/32/36	70.0 3/9 131/36/41	73.9 3/9 135/40/44	77.2 3/6 140/43/48	78.3 3/6 139/46/50	
45	65.1 3/9 126/31/36	69.2 3/9 131/36/40	73.0 3/9 135/40/44	76.2 2/3 140/43/47	77.3 3/6 140/46/50	
47	64.4 3/9 126/30/35	68.5 3/9 130/35/39	72.1 3/9 135/39/43	75.2 2/3 139/43/47	76.4 3/6 140/46/50	
49	63.7 3/9 125/30/34	67.8 3/9 130/34/39	71.3 3/9 135/38/42	74.2 2/3 139/42/46	75.5 3/6 141/46/50	
51	63.0 3/9 125/29/33	67.0 3/9 130/34/38	70.5 3/9 134/38/41	73.2 2/3 139/42/46	74.7 3/6 142/46/50	
53	62.3 3/9 125/28/33	66.3 3/9 130/33/37	69.7 3/9 134/37/41	72.2 2/3 139/41/45	73.8 3/6 142/46/50	
55	61.7 3/9 124/28/32	65.5 3/9 129/32/36	68.9 3/9 134/36/40	71.3 2/3 138/41/45	72.9 3/6 143/46/50	
57	61.0 3/9 124/27/31	64.8 3/9 129/32/35	68.1 3/9 133/35/39	70.3 2/3 138/41/44	71.9 2/3 143/45/49	
59	60.3 3/9 124/27/30	64.1 3/9 128/31/35	67.3 3/9 133/35/38	69.3 2/3 138/40/44	70.8 2/3 143/45/49	
61	59.6 3/9 123/26/30	63.3 3/9 128/30/34	66.4 3/9 133/34/37	68.3 2/3 138/40/43	69.7 2/3 142/45/48	
63	58.9 3/9 123/25/29	62.5 3/9 128/29/33	65.4 3/9 132/34/37	67.2 2/3 137/39/42	68.6 2/3 142/44/48	
65	58.1 3/9 123/25/28	61.7 3/9 127/29/32	64.4 2/3 132/33/36	66.2 2/3 137/39/42	67.5 2/3 142/44/47	
67	57.4 3/9 122/24/27	60.9 3/9 127/28/31	63.4 2/3 132/33/36	65.1 2/3 137/38/41	66.4 2/3 142/43/46	
68	57.0 3/9 122/24/27	60.5 3/9 127/28/31	62.9 2/3 132/32/35	64.5 2/3 137/38/41	65.8 2/3 142/43/46	

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		SEQ 138	REV 38
	QUICK REFERENCE TABLES		
FLIGHT CREW OPERATING MANUAL			

QUICK REFERENCE TABLE - CONFIGURATION 2 - PRESSURE ALTITUDE = 2000 FT					
TREF=26°C		DRY RUNWAY		MAX TO WEIGHT (1000KG) CODES	
TMAX=51°C		SLOPE=0%		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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			SEQ 001	REV 20

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CONFIGURATION 2			PRESSURE ALTITUDE = 2000 FT		
TREF = 47 °C			DRY RUNWAY	MAX TO WEIGHT(1000KG) CODES	
TMAX = 51 °C			SLOPE = 0 %	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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	QUICK REFERENCE TABLES	SEQ 312	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 2		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)				
	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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		SEQ 370	REV 35
	FLIGHT CREW OPERATING MANUAL	QUICK REFERENCE TABLES	

QUICK REFERENCE TABLES

R

CONFIGURATION 2		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)				
	1750	2000	2250	2500	2750
-20	70.7 3/9 133/37/42	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	69.6 3/9 132/36/41	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	68.6 3/9 130/35/40	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	67.5 3/9 129/34/38	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	66.6 3/9 128/33/37	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	65.6 3/9 126/32/36	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	64.6 3/9 125/31/35	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	64.0 3/9 125/30/35	68.1 3/9 130/35/39	71.8 3/9 134/39/43	75.2 3/9 138/42/46	76.4 3/6 139/45/49
44	63.3 3/9 125/29/34	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	62.6 3/9 124/29/33	66.6 3/9 129/33/37	70.1 3/9 133/37/41	73.2 3/9 138/41/45	74.5 3/6 140/45/49
48	61.9 3/9 124/28/32	65.9 3/9 129/33/37	69.4 3/9 133/37/40	72.2 3/9 138/40/44	73.7 3/6 141/45/49
50	61.3 3/9 124/27/32	65.2 3/9 128/32/36	68.6 3/9 133/36/40	71.2 2/3 137/40/44	72.8 3/6 141/45/49
51	60.9 3/9 123/27/31	64.8 3/9 128/32/35	68.2 3/9 133/35/39	70.7 2/3 137/40/43	72.4 3/6 142/45/49
52	60.6 3/9 123/27/31	64.4 3/9 128/31/35	67.8 3/9 132/35/39	70.3 2/3 137/40/43	71.9 3/6 142/45/48
54	59.9 3/9 123/26/30	63.7 3/9 128/31/34	67.0 3/9 132/34/38	69.3 2/3 137/39/43	70.9 2/3 141/44/48
56	59.3 3/9 123/26/29	63.0 3/9 127/30/33	66.2 3/9 132/34/37	68.4 2/3 137/39/42	69.9 2/3 141/44/47
58	58.6 3/9 122/25/29	62.3 3/9 127/29/33	65.4 3/9 131/33/36	67.4 2/3 136/38/42	68.9 2/3 141/43/47
60	57.9 3/9 122/24/28	61.6 3/9 127/29/32	64.6 3/9 131/32/35	66.4 2/3 136/38/41	67.8 2/3 141/43/46
62	57.2 3/9 121/24/27	60.8 3/9 126/28/31	63.7 3/9 131/32/35	65.4 2/3 136/37/40	66.7 2/3 141/42/46
64	56.5 3/9 121/23/26	60.0 3/9 126/27/30	62.7 2/3 131/31/34	64.4 2/3 136/37/40	65.7 2/3 140/42/45
66	55.7 3/9 121/22/26	59.2 3/9 126/26/29	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 TABLES	SEQ 138	REV 38
FLIGHT CREW OPERATING MANUAL			

QUICK REFERENCE TABLE - CONFIGURATION 3 - PRESSURE ALTITUDE = 0 FT					
TREF=30°C		DRY RUNWAY		MAX TO WEIGHT (1000KG) CODES	
TMAX=55°C		SLOPE=0%		IAS (KT) : V1/VR/V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
-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

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
		FLIGHT CREW OPERATING MANUAL	

QUICK REFERENCE TABLES

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

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	QUICK REFERENCE TABLES	SEQ 203	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 3				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)				
	1500	1750	2000	2250	2500
-20	68.2 3/3 124/24/29	71.8 2/3 134/34/38	74.4 2/3 141/42/46	76.4 2/3 147/49/53	77.3 2/3 154/55/59
	-10	67.7 3/3 123/23/28	71.2 2/3 132/32/37	73.7 2/3 139/40/44	75.8 2/3 145/47/51	77.1 2/3 151/53/57
0	67.1 3/3 123/23/28	70.6 2/3 130/30/35	73.1 2/3 137/38/42	75.3 2/3 143/45/49	76.8 2/3 149/51/55
10	66.5 3/3 122/22/27	70.1 2/3 128/29/33	72.5 2/3 135/36/40	74.7 2/3 141/43/47	76.4 2/3 147/49/53
20	65.9 3/3 120/20/26	69.5 2/3 127/27/32	71.9 2/3 133/35/39	74.2 2/3 139/41/45	76.0 2/3 145/47/51
30	65.2 3/3 119/19/25	68.9 2/3 125/26/30	71.4 2/3 131/33/37	73.6 2/3 137/40/44	75.5 2/3 143/45/49
40	64.4 3/3 117/18/24	68.3 2/3 123/24/29	70.9 2/3 130/31/36	73.1 2/3 135/38/42	75.0 2/3 141/44/48
50	63.6 3/3 116/18/23	67.8 2/3 122/23/27	70.4 2/3 128/30/34	72.5 2/3 134/37/40	74.5 2/3 139/42/46
55	63.3 3/3 115/17/23	67.5 2/3 121/22/27	70.2 2/3 127/29/33	72.2 2/3 133/36/40	72.3 2/3 127/36/40
57	62.5 3/3 115/16/22	66.7 2/3 121/22/26	69.2 2/3 127/29/33	71.3 2/3 133/35/39	72.3 2/3 133/38/42
59	* 61.6 3/3 * 114/16/21	65.7 2/3 121/21/26	68.2 2/3 127/28/32	70.3 2/3 133/35/39	72.2 2/3 138/41/44
61	* 60.6 3/3 * 114/15/21	64.8 2/3 121/21/25	67.2 2/3 127/28/32	69.3 2/3 132/34/38	71.0 2/3 137/40/44
63	* 59.3 3/3 * 114/15/21	63.8 3/3 120/20/25	66.2 2/3 126/28/31	68.3 2/3 132/34/38	70.0 2/3 137/40/43
65	* 58.0 3/3 * 113/16/21	62.7 3/3 120/20/25	65.1 2/3 126/27/31	67.2 2/3 132/33/37	68.9 2/3 137/39/43
67	* 56.6 3/3 * 113/16/21	61.6 3/3 120/20/24	64.0 2/3 126/26/30	66.1 2/3 131/33/36	67.7 2/3 137/39/42
69	* 55.2 3/3 * 112/16/21	60.5 3/3 119/19/23	63.0 2/3 126/26/30	65.0 2/3 131/32/36	66.6 2/3 136/38/41
71	* 53.7 3/3 * 112/16/21	59.4 3/3 118/18/23	61.9 2/3 125/26/29	63.9 2/3 131/32/35	65.3 2/3 136/37/41
73	* 52.2 3/3 * 112/16/21	58.2 3/3 118/18/22	60.8 2/3 125/25/29	62.8 2/3 130/31/35	64.1 2/3 136/37/40
75	* 50.7 3/3 * 112/16/21	57.1 3/3 118/18/22	59.6 2/3 124/24/28	61.6 2/3 130/31/34	62.8 2/3 136/36/40
77	* 49.1 3/3 * 112/16/21	* 55.8 3/3 * 117/17/21	58.4 2/3 124/24/27	60.4 2/3 130/30/33	61.5 2/3 135/35/38
79	* 47.5 3/3 * 111/16/21	* 54.5 3/3 * 116/17/21	57.1 2/3 123/23/26	59.1 2/3 129/29/33	60.1 2/3 135/35/38
80	* 46.7 3/3 * 111/16/21	* 53.7 3/3 * 116/17/21	56.5 2/3 122/22/26	58.4 2/3 129/29/32	59.4 2/3 135/35/38

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.40	P 12
	QUICK REFERENCE TABLES		SEQ 203	REV 34

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 3/3 126/26/31	70.5 2/3 132/32/37	73.0 2/3 139/40/44	75.0 2/3 145/47/51	76.2 2/3 151/53/57
-10	66.3 3/3 122/22/27	69.9 2/3 130/30/35	72.4 2/3 137/38/42	74.5 2/3 143/45/49	75.8 2/3 148/51/54
0	65.8 3/3 121/21/26	69.3 2/3 128/29/33	71.8 2/3 135/36/40	73.9 2/3 141/43/47	75.5 2/3 147/49/53
10	65.2 3/3 120/20/25	68.8 2/3 127/27/31	71.1 2/3 133/34/39	73.3 2/3 139/41/45	75.1 2/3 144/47/51
20	64.6 3/3 119/19/24	68.2 2/3 125/25/30	70.6 2/3 131/33/37	72.8 2/3 137/39/43	74.6 2/3 143/45/49
30	63.8 3/3 117/18/23	67.6 2/3 123/24/29	70.1 2/3 130/31/35	72.3 2/3 135/38/42	74.1 2/3 141/44/47
40	63.0 3/3 116/17/23	67.1 2/3 122/22/27	69.6 2/3 128/30/34	71.7 2/3 134/36/40	73.6 2/3 139/42/46
50	62.1 3/3 114/16/22	66.5 3/3 121/21/26	69.1 2/3 126/28/32	71.2 2/3 132/35/39	73.1 2/3 137/40/44
51	62.0 3/3 114/16/22	66.4 3/3 120/21/26	69.0 2/3 126/28/32	71.1 2/3 132/35/38	73.1 2/3 137/40/44
53	61.5 3/3 114/16/21	65.9 2/3 120/20/25	68.4 2/3 126/28/32	70.5 2/3 132/34/38	72.1 2/3 135/39/43
55	* 60.7 3/3 * 113/15/21	65.1 2/3 120/20/25	67.5 2/3 126/27/31	69.6 2/3 131/34/37	71.4 2/3 137/39/43
57	* 59.8 3/3 * 113/15/20	64.2 2/3 120/20/24	66.6 2/3 125/27/31	68.7 2/3 131/33/37	70.5 2/3 136/39/43
59	* 58.6 3/3 * 112/15/20	63.2 2/3 119/19/24	65.7 2/3 125/26/30	67.7 2/3 131/33/36	69.5 2/3 136/38/42
61	* 57.4 3/3 * 112/15/20	62.3 3/3 119/19/24	64.7 2/3 125/26/30	66.7 2/3 131/32/36	68.4 2/3 136/38/41
63	* 56.1 3/3 * 112/15/20	61.3 3/3 119/19/23	63.7 2/3 125/26/29	65.7 2/3 130/32/35	67.4 2/3 135/37/41
65	* 54.8 3/3 * 111/15/20	60.2 3/3 118/18/23	62.7 2/3 124/25/29	64.7 2/3 130/31/35	66.3 2/3 135/37/40
67	* 53.4 3/3 * 111/15/20	59.2 3/3 118/18/22	61.7 2/3 124/25/28	63.7 2/3 130/31/34	65.2 2/3 135/36/40
69	* 52.0 3/3 * 111/15/20	58.1 3/3 117/17/21	60.6 2/3 124/24/28	62.6 2/3 129/30/34	64.0 2/3 134/36/39
71	* 50.6 3/3 * 111/15/20	* 57.0 3/3 * 116/16/20	59.5 2/3 123/23/27	61.5 2/3 129/30/33	62.9 2/3 134/35/38
73	* 49.2 3/3 * 110/15/20	* 55.9 3/3 * 116/16/20	58.4 2/3 123/23/27	60.4 2/3 129/29/32	61.7 2/3 134/35/38
75	* 47.7 3/3 * 110/15/20	* 54.7 3/3 * 115/16/20	57.3 2/3 122/22/26	59.3 2/3 128/29/32	60.4 2/3 133/34/37
78	* 45.4 3/3 * 110/15/20	* 52.5 3/3 * 115/16/20	55.5 2/3 121/21/25	57.4 2/3 127/27/31	58.5 2/3 133/33/36

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	QUICK REFERENCE TABLES	SEQ 312	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 3		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)				
	1500	1750	2000	2250	2500
-20	70.7 3/9	75.4 2/3	78.5 2/3	80.9 2/3	82.7 2/3
	129/30/36	135/36/40	141/44/48	148/51/55	154/57/61
-10	69.7 3/9	74.7 3/9	77.7 2/3	80.3 2/3	82.1 2/3
	127/29/35	133/34/39	139/42/46	145/49/53	151/55/59
0	68.6 3/9	73.5 3/9	77.0 2/3	79.6 2/3	81.6 2/3
	126/28/34	131/33/38	137/40/44	143/47/51	149/53/57
10	67.6 3/9	72.5 3/9	76.3 2/3	78.9 2/3	81.0 2/3
	124/27/33	130/32/37	135/38/43	141/45/49	147/51/55
20	66.7 3/9	71.5 3/9	75.6 2/3	78.3 2/3	80.5 2/3
	123/26/32	128/31/36	134/36/41	139/43/48	145/50/53
30	65.8 3/9	70.6 3/9	75.0 3/9	77.6 2/3	79.9 2/3
	122/25/31	127/31/35	132/34/39	138/42/46	143/48/52
40	64.8 3/9	69.7 3/9	74.1 3/9	77.0 2/3	79.3 2/3
	121/25/30	126/30/35	131/34/38	136/40/44	141/46/50
46	64.3 3/9	69.1 3/9	73.4 3/9	76.6 2/3	78.9 2/3
	120/24/29	125/29/34	130/33/38	135/39/43	140/45/49
48	63.7 3/9	68.4 3/9	72.6 3/9	75.5 2/3	77.9 2/3
	120/23/29	125/28/33	130/33/37	135/39/43	140/45/49
50	63.0 3/9	67.7 3/9	71.7 3/9	74.4 2/3	76.8 2/3
	119/23/28	125/28/32	130/32/37	135/38/43	140/44/48
52	62.4 3/9	67.0 3/9	70.9 3/9	73.4 2/3	75.7 2/3
	119/22/27	124/27/32	129/31/36	135/38/42	140/44/48
54	61.7 3/9	66.2 3/9	70.0 3/9	72.3 2/3	74.6 2/3
	119/22/26	124/27/31	129/31/35	135/38/42	140/44/47
55	61.3 3/9	65.8 3/9	69.5 3/9	71.8 2/3	74.0 2/3
	118/21/26	124/26/31	129/31/35	134/37/42	140/43/47
56	61.0 3/9	65.5 3/9	69.1 3/9	71.3 2/3	73.4 2/3
	118/21/26	124/26/30	129/30/35	134/37/41	139/43/47
58	60.3 3/9	64.7 3/9	68.1 2/3	70.4 2/3	72.3 2/3
	118/20/25	123/25/29	129/30/34	134/37/41	139/43/46
60	59.6 3/9	64.0 3/9	67.2 2/3	69.4 2/3	71.3 2/3
	118/20/24	123/24/29	128/30/34	134/36/40	139/42/46
62	* 58.9 3/9	63.2 3/9	66.2 2/3	68.4 2/3	70.2 2/3
	* 117/19/23	123/24/28	128/29/33	134/36/40	139/42/45
64	* 58.1 3/9	62.4 3/9	65.2 2/3	67.4 2/3	69.1 2/3
	* 117/18/23	123/23/27	128/29/33	133/35/39	139/41/45
66	* 56.9 3/3	61.6 3/9	64.2 2/3	66.3 2/3	68.0 2/3
	* 117/18/23	122/22/26	128/29/32	133/35/39	138/41/44
68	* 55.6 3/3	60.6 3/9	63.3 2/3	65.3 2/3	66.9 2/3
	* 116/19/23	122/22/26	127/28/32	133/35/38	138/40/43
70	* 54.3 3/3	59.6 3/3	62.3 2/3	64.3 2/3	65.7 2/3
	* 116/19/23	122/22/25	127/28/31	133/34/37	138/40/43

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF		2.02.40	P 12
	QUICK REFERENCE TABLES		SEQ 312	REV 34

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) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
-20	69.6 3/9 127/29/35	74.6 3/9 133/34/39	77.6 2/3 139/42/46	80.1 2/3 145/49/53	82.0 2/3 152/56/59
-10	68.6 3/9 126/28/34	73.4 3/9 131/33/38	76.9 2/3 137/40/45	79.4 2/3 143/47/51	81.4 2/3 149/53/57
0	67.5 3/9 124/27/33	72.3 3/9 130/32/37	76.1 2/3 135/38/43	78.8 2/3 141/45/49	80.9 2/3 147/51/55
10	66.6 3/9 123/26/32	71.3 3/9 128/31/36	75.4 2/3 134/36/41	78.1 2/3 139/43/48	80.3 2/3 145/50/53
20	65.6 3/9 122/25/31	70.4 3/9 127/30/35	74.8 3/9 132/34/39	77.4 2/3 137/42/46	79.7 2/3 143/48/52
30	64.7 3/9 120/24/30	69.4 3/9 126/30/34	73.8 3/9 131/34/38	76.7 2/3 136/40/44	79.0 2/3 141/46/50
40	63.7 3/9 119/23/29	68.5 3/9 125/29/33	72.8 3/9 129/33/38	76.1 2/3 134/38/43	78.4 2/3 139/44/48
42	63.5 3/9 119/23/29	68.3 3/9 124/28/33	72.6 3/9 129/33/37	75.9 2/3 134/38/42	78.2 2/3 139/44/48
44	63.0 3/9 119/23/28	67.8 3/9 124/28/33	71.9 3/9 129/32/37	75.1 2/3 134/38/42	77.5 2/3 139/44/48
46	62.4 3/9 118/22/27	67.0 3/9 124/27/32	71.1 3/9 129/32/36	74.0 2/3 134/37/42	76.4 2/3 139/43/47
48	61.7 3/9 118/22/27	66.3 3/9 123/27/31	70.3 3/9 128/31/35	72.9 2/3 134/37/41	75.2 2/3 139/43/47
50	61.0 3/9 118/21/26	65.6 3/9 123/26/30	69.5 3/9 128/30/34	71.9 2/3 133/37/41	74.1 2/3 138/42/46
52	* 60.3 3/9 * 117/20/25	64.8 3/9 123/25/30	68.6 3/9 128/29/34	70.9 2/3 133/36/40	73.0 2/3 138/42/46
53	* 60.0 3/9 * 117/20/25	64.5 3/9 123/25/29	68.2 3/9 128/29/33	70.4 2/3 133/36/40	72.4 2/3 138/42/46
56	* 59.0 3/9 * 117/19/24	63.4 3/9 122/24/28	66.8 3/9 127/29/33	69.0 2/3 133/35/39	70.9 2/3 138/41/45
58	* 58.3 3/9 * 116/18/23	62.7 3/9 122/23/27	65.9 2/3 127/28/32	68.1 2/3 132/35/39	70.0 2/3 138/41/44
60	* 57.3 3/9 * 116/18/23	61.9 3/9 122/23/27	65.0 2/3 127/28/32	67.1 2/3 132/34/38	68.9 2/3 137/40/44
62	* 56.1 3/3 * 116/18/23	61.2 3/9 121/22/26	64.0 2/3 127/28/31	66.2 2/3 132/34/38	67.9 2/3 137/40/43
64	* 54.9 3/3 * 116/18/23	60.4 3/9 121/21/25	63.1 2/3 126/27/31	65.2 2/3 132/34/37	66.8 2/3 137/39/42
66	* 53.6 3/3 * 115/19/23	59.5 3/9 120/20/24	62.1 2/3 126/27/30	64.2 2/3 131/33/37	65.7 2/3 137/39/42
68	* 52.3 3/3 * 115/19/23	58.5 3/9 120/20/24	61.2 2/3 126/27/30	63.2 2/3 131/33/36	64.6 2/3 136/38/41

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	QUICK REFERENCE TABLES	SEQ 370	REV 35
FLIGHT CREW OPERATING MANUAL			

R

CONFIGURATION 3			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)				
	1500	1750	2000	2250	2500
-20	70.7 3/9 129/30/36	75.4 2/3 135/36/40	78.5 2/3 141/44/48	80.9 2/3 148/51/55	82.7 2/3 154/58/61
	69.7 3/9 127/29/35	74.7 3/9 133/34/39	77.7 2/3 139/42/46	80.2 2/3 145/49/53	82.1 2/3 152/55/59
0	68.6 3/9 126/28/34	73.5 3/9 131/33/38	77.0 2/3 137/40/44	79.6 2/3 143/47/51	81.6 2/3 149/53/57
10	67.6 3/9 124/27/33	72.5 3/9 130/32/37	76.2 2/3 135/38/43	78.9 2/3 141/45/49	81.0 2/3 147/51/55
20	66.7 3/9 123/26/32	71.5 3/9 128/31/36	75.6 2/3 134/36/41	78.3 2/3 139/43/48	80.5 2/3 145/50/53
30	65.7 3/9 122/25/31	70.6 3/9 127/31/35	74.9 3/9 132/34/39	77.6 2/3 138/42/46	79.9 2/3 143/48/52
40	64.8 3/9 121/25/30	69.7 3/9 126/30/35	74.1 3/9 131/34/38	76.9 2/3 136/40/44	79.3 2/3 141/46/50
46	64.3 3/9 120/24/29	69.1 3/9 125/29/34	73.5 3/9 130/33/38	76.5 2/3 135/39/43	78.9 2/3 140/45/49
48	63.6 3/9 120/23/29	68.4 3/9 125/29/33	72.6 3/9 130/33/37	75.5 2/3 135/39/43	77.9 2/3 140/45/49
50	63.0 3/9 119/23/28	67.7 3/9 125/28/33	71.7 3/9 130/32/36	74.4 2/3 135/38/43	76.8 2/3 140/44/48
52	62.3 3/9 119/22/27	67.0 3/9 124/27/32	70.9 3/9 129/31/36	73.4 2/3 135/38/42	75.7 2/3 140/44/48
54	61.6 3/9 119/22/26	66.2 3/9 124/27/31	70.0 3/9 129/31/35	72.3 2/3 135/38/42	74.5 2/3 140/44/47
55	61.3 3/9 118/21/26	65.8 3/9 124/26/31	69.5 3/9 129/31/35	71.8 2/3 134/37/42	74.0 2/3 140/43/47
56	60.9 3/9 118/21/26	65.5 3/9 124/26/30	69.0 3/9 129/30/35	71.3 2/3 134/37/41	73.4 2/3 139/43/47
58	60.3 3/9 118/20/25	64.8 3/9 123/25/29	68.1 2/3 129/30/34	70.4 2/3 134/37/41	72.3 2/3 139/43/46
60	59.6 3/9 118/20/24	64.0 3/9 123/25/29	67.2 2/3 128/30/34	69.4 2/3 134/36/40	71.3 2/3 139/42/46
62	* 58.9 3/9 * 117/19/23	63.2 3/9 123/24/28	66.2 2/3 128/29/33	68.4 2/3 134/36/40	70.2 2/3 139/42/45
64	* 58.0 3/9 * 117/18/23	62.4 3/9 123/23/27	65.2 2/3 128/29/33	67.4 2/3 133/36/39	69.1 2/3 139/41/45
66	* 56.8 3/3 * 117/19/23	61.6 3/9 122/22/26	64.2 2/3 128/29/32	66.3 2/3 133/35/39	68.0 2/3 138/41/44
68	* 55.6 3/3 * 116/19/23	60.6 3/9 122/22/26	63.2 2/3 127/28/32	65.3 2/3 133/35/38	66.9 2/3 138/40/44
70	* 54.3 3/3 * 116/19/23	59.6 3/3 122/22/25	62.3 2/3 127/28/31	64.2 2/3 133/34/37	65.7 2/3 138/40/43

R

CONFIGURATION 3			PRESSURE ALTITUDE = 1000 FT		FWD CG
TREF = 43 °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	69.4 3/9	74.3 3/9	77.3 2/3	79.8 2/3	81.6 2/3
	127/29/34	133/34/39	139/42/46	145/49/53	152/55/59
-10	68.3 3/9	73.2 3/9	76.6 2/3	79.1 2/3	81.1 2/3
	126/28/33	131/33/38	137/40/44	143/47/51	149/53/57
0	67.3 3/9	72.1 3/9	75.8 2/3	78.4 2/3	80.5 2/3
	124/27/32	130/32/37	135/38/43	141/45/49	147/51/55
10	66.3 3/9	71.1 3/9	75.1 2/3	77.8 2/3	80.0 2/3
	123/26/31	128/31/36	134/36/41	139/43/47	145/49/53
20	65.4 3/9	70.2 3/9	74.4 3/9	77.1 2/3	79.3 2/3
	122/25/30	127/30/35	132/34/39	137/41/46	143/48/51
30	64.4 3/9	69.2 3/9	73.5 3/9	76.4 2/3	78.7 2/3
	120/24/29	126/29/34	131/33/38	136/40/44	141/46/50
40	63.5 3/9	68.3 3/9	72.6 3/9	75.7 2/3	78.1 2/3
	119/23/29	124/28/33	129/33/37	134/38/43	139/44/48
43	63.2 3/9	68.0 3/9	72.2 3/9	75.5 2/3	77.9 2/3
	119/23/28	124/28/33	129/33/37	134/38/42	139/44/48
45	62.6 3/9	67.3 3/9	71.4 3/9	74.4 2/3	76.8 2/3
	119/22/28	124/28/32	129/32/36	134/37/42	139/43/47
47	61.9 3/9	66.6 3/9	70.6 3/9	73.3 2/3	75.7 2/3
	118/22/27	124/27/32	128/31/35	134/37/41	139/43/47
49	61.2 3/9	65.9 3/9	69.8 3/9	72.3 2/3	74.6 2/3
	118/21/26	123/26/31	128/30/35	134/37/41	138/43/46
51	60.6 3/9	65.1 3/9	69.0 3/9	71.3 2/3	73.4 2/3
	118/21/25	123/26/30	128/30/34	133/36/40	138/42/46
53	59.9 3/9	64.4 3/9	68.1 3/9	70.3 2/3	72.3 2/3
	117/20/25	123/25/29	128/29/33	133/36/40	138/42/46
55	59.2 3/9	63.7 3/9	67.2 3/9	69.4 2/3	71.3 2/3
	117/19/24	122/24/28	127/29/33	133/36/39	138/41/45
57	* 58.5 3/9	63.0 3/9	66.3 2/3	68.5 2/3	70.4 2/3
	* 116/19/23	122/24/28	127/28/32	133/35/39	138/41/44
59	* 57.9 3/9	62.3 3/9	65.3 2/3	67.5 2/3	69.4 2/3
	* 116/18/22	122/23/27	127/28/32	132/35/38	137/40/44
61	* 56.9 3/9	61.5 3/9	64.4 2/3	66.5 2/3	68.3 2/3
	* 116/18/22	121/22/26	127/28/31	132/34/38	137/40/43
63	* 55.7 3/3	60.7 3/9	63.5 2/3	65.6 2/3	67.3 2/3
	* 115/18/22	121/22/25	127/27/31	132/34/37	137/39/43
65	* 54.4 3/3	59.9 3/9	62.5 2/3	64.6 2/3	66.2 2/3
	* 115/18/22	121/21/24	126/27/31	132/33/37	137/39/42
67	* 53.2 3/3	58.9 3/9	61.5 2/3	63.5 2/3	65.1 2/3
	* 115/18/22	120/20/24	126/27/30	131/33/36	136/38/42
68	* 52.6 3/3	58.4 3/3	61.1 2/3	63.0 2/3	64.5 2/3
	* 115/18/22	120/20/24	126/26/30	131/33/36	136/38/41

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	QUICK REFERENCE TABLES	SEQ 138	REV 38
		FLIGHT CREW OPERATING MANUAL	

QUICK REFERENCE TABLE - CONFIGURATION 3 - PRESSURE ALTITUDE = 2000 FT					
TREF=26°C		DRY RUNWAY		MAX TO WEIGHT (1000KG) CODES	
TMAX=51°C		SLOPE=0%		IAS (KT) : V1/VR/V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
-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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	QUICK REFERENCE TABLES	SEQ 203	REV 34
FLIGHT CREW OPERATING MANUAL			

CONFIGURATION 3			PRESSURE ALTITUDE = 2000 FT		
TREF = 47 °C			DRY RUNWAY	MAX TO WEIGHT(1000KG) CODES	
TMAX = 51 °C			SLOPE = 0 %	IAS(KT) : V1 / VR / V2	
TEMP (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
-20	65.7 3/3 121/21/27	69.3 2/3 131/31/35	71.8 2/3 137/38/42	73.8 2/3 143/45/49	75.0 2/3 149/51/55
	-10	65.2 3/3 121/21/26	68.7 2/3 129/29/33	71.1 2/3 135/36/40	73.2 2/3 141/43/47	74.7 2/3 147/49/53
0	64.6 3/3 120/20/25	68.1 2/3 127/27/31	70.5 2/3 133/34/38	72.7 2/3 139/41/45	74.2 2/3 145/47/51
10	64.0 3/3 118/18/24	67.5 2/3 125/25/30	69.9 2/3 131/33/37	72.1 2/3 137/39/43	73.8 2/3 143/45/49
20	63.2 3/3 117/17/23	67.0 2/3 123/24/28	69.4 2/3 129/31/35	71.5 2/3 135/37/41	73.4 2/3 141/43/47
30	62.3 3/3 115/17/22	66.4 2/3 122/22/27	68.9 2/3 128/29/33	71.0 2/3 133/36/40	72.9 2/3 139/42/46
40	61.5 3/3 114/16/21	65.9 2/3 120/21/25	68.4 2/3 126/28/32	70.5 2/3 132/34/38	72.4 2/3 137/40/44
47	60.9 3/3 113/15/21	65.4 3/3 119/20/25	68.0 2/3 125/27/31	70.1 2/3 131/33/37	72.0 2/3 136/39/43
49	* 60.3 3/3 * 112/15/20	64.8 3/3 119/20/24	67.4 2/3 125/26/31	69.4 2/3 130/33/37	71.3 2/3 136/39/42
51	* 59.7 3/3 * 112/14/20	64.2 2/3 119/19/24	66.7 2/3 125/26/30	68.7 2/3 130/33/36	70.6 2/3 135/38/42
53	* 58.9 3/3 * 112/14/19	63.4 2/3 119/19/23	65.9 2/3 124/26/30	67.9 2/3 130/32/36	69.7 2/3 135/38/41
55	* 57.8 3/3 * 111/14/19	62.6 2/3 118/18/23	65.0 2/3 124/25/29	67.0 2/3 130/32/35	68.8 2/3 135/37/41
57	* 56.6 3/3 * 111/14/19	61.7 3/3 118/18/23	64.1 2/3 124/25/29	66.1 2/3 129/31/35	67.8 2/3 135/37/40
59	* 55.4 3/3 * 111/14/19	60.7 3/3 117/17/22	63.2 2/3 124/25/28	65.2 2/3 129/31/34	66.8 2/3 134/36/40
61	* 54.2 3/3 * 110/14/19	59.8 3/3 117/17/22	62.2 2/3 123/24/28	64.2 2/3 129/30/34	65.9 2/3 134/36/39
63	* 52.9 3/3 * 110/14/19	58.8 3/3 116/16/21	61.3 2/3 123/24/27	63.3 2/3 128/30/33	64.9 2/3 134/35/39
65	* 51.6 3/3 * 110/14/19	57.8 3/3 116/16/20	60.3 2/3 123/23/27	62.3 2/3 128/29/33	63.8 2/3 133/35/38
67	* 50.3 3/3 * 110/14/19	* 56.8 3/3 * 115/15/20	59.3 2/3 122/22/26	61.3 2/3 128/29/32	62.8 2/3 133/34/37
69	* 48.9 3/3 * 109/14/19	* 55.8 3/3 * 115/15/19	58.2 2/3 122/22/26	60.2 2/3 127/28/31	61.6 2/3 133/34/37
71	* 47.6 3/3 * 109/14/19	* 54.6 3/3 * 114/15/19	57.2 2/3 121/21/25	59.2 2/3 127/28/31	60.5 2/3 132/33/36
76	* 44.0 3/3 * 109/15/19	* 51.3 3/3 * 113/15/19	54.5 2/3 119/20/23	56.4 2/3 125/26/29	57.5 2/3 131/32/34

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A318/A319/A320/A321	TAKEOFF	2.02.40 P 13	
	QUICK REFERENCE TABLES	SEQ 300	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 3			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)				
	1500	1750	2000	2250	2500
-20	68.2 3/3 126/29/34	72.7 3/3 132/34/38	76.5 3/3 137/37/41	79.0 2/3 143/44/48	80.8 2/3 149/51/54
	67.1 3/3 124/28/33	71.7 3/3 130/33/37	75.8 3/3 135/36/40	78.3 2/3 141/42/46	80.2 2/3 147/49/52
0	66.1 3/3 123/27/32	70.7 3/3 128/32/36	74.8 3/3 134/35/40	77.6 2/3 139/40/44	79.6 2/3 145/47/50
	65.1 3/3 122/25/31	69.7 3/3 127/31/35	73.8 3/3 132/35/39	76.9 2/3 137/38/43	78.9 2/3 143/45/49
10	64.1 3/3 120/24/29	68.6 3/3 126/30/34	72.7 3/3 131/34/38	76.1 2/3 135/37/41	78.2 3/6 141/44/47
	63.1 3/3 119/23/28	67.6 3/3 124/29/33	71.6 3/3 129/33/37	75.3 3/3 134/36/40	77.5 3/6 139/42/45
20	62.1 3/3 118/22/27	66.7 3/3 123/28/32	70.7 3/3 128/32/36	74.4 3/3 132/35/39	76.8 3/6 137/40/44
	61.3 3/3 117/22/26	65.8 3/3 123/27/31	69.7 3/3 128/31/35	73.1 3/3 132/34/39	75.4 2/3 137/40/43
42	60.5 3/3 117/21/26	64.9 3/3 122/26/30	68.7 3/3 127/30/34	71.8 3/3 132/34/38	73.9 2/3 137/39/43
	59.7 3/3 117/20/25	64.1 3/3 122/25/29	67.7 3/3 127/29/33	70.7 2/3 132/33/37	72.5 2/3 137/39/43
48	58.9 3/3 116/20/24	63.2 3/3 122/24/28	66.7 3/3 127/28/32	69.4 2/3 132/32/36	71.2 2/3 137/39/42
	58.0 3/3 116/19/23	62.3 3/3 122/24/28	65.7 3/3 127/28/31	68.2 2/3 132/32/36	69.8 2/3 137/38/42
51	57.6 3/3 116/18/22	61.8 3/3 121/23/27	65.2 3/3 126/27/31	67.5 2/3 132/32/35	69.2 2/3 137/38/41
	57.2 3/3 115/18/22	61.4 3/3 121/23/27	64.7 3/3 126/27/30	66.9 2/3 132/32/35	68.5 2/3 137/38/41
52	56.4 3/3 115/17/21	60.5 3/3 121/22/26	63.5 3/3 126/26/30	65.6 2/3 132/32/35	67.2 2/3 137/37/41
	* 55.5 3/3 * 114/16/20	59.5 3/3 121/21/25	62.2 3/3 126/26/29	64.3 3/3 131/31/35	65.8 2/3 137/37/40
58	* 54.6 3/3 * 114/15/19	58.5 3/3 120/20/23	60.9 3/3 126/26/29	63.0 3/3 131/31/34	64.4 2/3 136/36/39
	* 53.6 3/3 * 113/15/18	57.3 3/3 119/19/22	59.7 3/3 125/25/28	61.6 3/3 130/30/33	63.1 2/3 135/35/38
62	* 52.3 3/3 * 113/15/18	56.3 3/3 118/18/21	58.6 3/3 124/24/27	60.4 3/3 129/29/32	61.8 2/3 134/34/37
	* 51.1 3/3 * 113/15/18	55.2 3/3 117/17/20	57.4 3/3 123/23/26	59.2 3/3 128/28/31	60.5 2/3 134/34/36

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A318/A319/A320/A321	TAKEOFF	2.02.40 P 13	
	QUICK REFERENCE TABLES	SEQ 312	REV 34
		FLIGHT CREW OPERATING MANUAL	

CONFIGURATION 3		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)				
	1500	1750	2000	2250	2500
-20	68.6 3/9 126/28/34	73.4 3/9 132/33/38	76.8 2/3 137/40/45	79.4 2/3 143/47/51	81.3 2/3 150/54/57
-10	67.5 3/9 124/27/33	72.3 3/9 130/32/37	76.0 2/3 135/38/43	78.7 2/3 141/45/49	80.7 2/3 147/52/55
0	66.5 3/9 123/26/32	71.2 3/9 128/31/36	75.3 2/3 134/36/41	78.0 2/3 139/43/48	80.2 2/3 145/50/53
10	65.5 3/9 122/25/31	70.2 3/9 127/30/35	74.6 3/9 132/34/39	77.3 2/3 137/42/46	79.5 2/3 143/48/52
20	64.5 3/9 120/24/30	69.3 3/9 126/30/34	73.6 3/9 131/34/38	76.6 2/3 136/40/44	78.9 2/3 141/46/50
30	63.6 3/9 119/23/29	68.3 3/9 124/29/33	72.6 3/9 129/33/38	75.9 2/3 134/38/42	78.3 2/3 139/44/48
37	62.9 3/9 118/23/28	67.7 3/9 124/28/33	71.9 3/9 128/32/37	75.5 2/3 133/37/41	77.8 2/3 138/43/47
40	62.3 3/9 118/22/27	67.0 3/9 123/27/32	71.1 3/9 128/32/36	74.4 2/3 133/36/41	76.8 2/3 138/43/47
42	61.7 3/9 118/22/27	66.4 3/9 123/27/31	70.5 3/9 128/31/36	73.5 2/3 133/36/40	75.9 2/3 138/42/46
44	61.0 3/9 117/21/26	65.6 3/9 123/26/31	69.6 3/9 127/30/35	72.4 2/3 133/36/40	74.8 2/3 137/42/46
46	60.3 3/9 117/20/25	64.9 3/9 122/25/30	68.8 3/9 127/30/34	71.4 2/3 132/35/40	73.6 2/3 137/41/45
48	59.6 3/9 117/20/24	64.2 3/9 122/25/29	68.0 3/9 127/29/33	70.4 2/3 132/35/39	72.5 2/3 137/41/45
50	* 59.0 3/9 * 116/19/24	63.5 3/9 122/24/28	67.2 3/9 127/28/32	69.5 2/3 132/35/39	71.5 2/3 137/40/44
51	* 58.6 3/9 * 116/19/23	63.1 3/9 122/24/28	66.8 3/9 126/28/32	69.0 2/3 132/34/38	71.0 2/3 137/40/44
54	* 57.4 3/9 * 115/18/23	62.1 3/9 121/23/27	65.5 3/9 126/27/31	67.6 2/3 131/34/38	69.6 2/3 136/39/43
56	* 56.3 3/3 * 115/18/23	61.4 3/9 121/22/26	64.6 2/3 126/27/31	66.7 2/3 131/33/37	68.6 2/3 136/39/43
58	* 55.2 3/3 * 115/18/23	60.6 3/9 120/22/25	63.7 2/3 126/26/30	65.8 2/3 131/33/37	67.6 2/3 136/38/42
60	* 54.0 3/3 * 115/18/23	59.9 3/9 120/21/25	62.9 2/3 125/26/30	64.9 2/3 131/33/36	66.7 2/3 136/38/41
62	* 52.8 3/3 * 115/18/23	59.2 3/9 120/20/24	61.9 2/3 125/26/29	64.0 2/3 130/32/36	65.6 2/3 135/37/41
64	* 51.5 3/3 * 114/19/23	* 58.4 3/9 * 119/19/23	61.0 2/3 125/26/29	63.0 2/3 130/32/35	64.6 2/3 135/37/40
66	* 50.2 3/3 * 114/19/23	* 57.4 3/9 * 119/19/23	60.1 2/3 125/25/28	62.0 2/3 130/31/34	63.5 2/3 135/37/40

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A318/A319/A320/A321	TAKEOFF	2.02.40 P 13	
	QUICK REFERENCE TABLES	SEQ 370	REV 35
FLIGHT CREW OPERATING MANUAL			

R

CONFIGURATION 3			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)									
	1500		1750		2000		2250		2500	
-20	68.0	3/9	72.8	3/9	76.1	2/3	78.7	2/3	80.6	2/3
	126/28/33		132/33/38		137/40/44		143/47/51		150/53/57	
-10	67.0	3/9	71.7	3/9	75.3	2/3	78.0	2/3	80.0	2/3
	124/27/32		130/32/37		135/38/43		141/45/49		147/51/55	
0	66.0	3/9	70.7	3/9	74.6	2/3	77.3	2/3	79.4	2/3
	123/26/31		128/31/36		134/36/41		139/43/47		145/49/53	
10	65.0	3/9	69.7	3/9	73.9	3/9	76.6	2/3	78.8	2/3
	122/25/30		127/30/35		132/34/39		137/41/46		143/47/51	
20	64.0	3/9	68.8	3/9	73.0	3/9	75.9	2/3	78.2	2/3
	120/24/29		126/29/34		130/33/38		136/40/44		141/46/50	
30	63.1	3/9	67.8	3/9	72.0	3/9	75.1	2/3	77.6	2/3
	119/23/28		124/28/33		129/32/37		134/38/42		139/44/48	
40	62.1	3/9	66.9	3/9	71.0	3/9	74.4	2/3	76.8	2/3
	118/22/27		123/27/32		128/32/36		133/36/41		138/42/46	
42	61.5	3/9	66.2	3/9	70.3	3/9	73.3	2/3	75.7	2/3
	117/22/27		123/27/31		128/31/35		133/36/40		137/42/46	
44	60.8	3/9	65.5	3/9	69.5	3/9	72.2	2/3	74.6	2/3
	117/21/26		123/26/30		127/30/34		132/36/40		137/42/46	
46	60.1	3/9	64.7	3/9	68.6	3/9	71.2	2/3	73.4	2/3
	117/20/25		122/25/30		127/29/34		132/35/39		137/41/45	
48	59.5	3/9	64.0	3/9	67.9	3/9	70.3	2/3	72.4	2/3
	116/20/24		122/25/29		127/29/33		132/35/39		137/41/45	
50	58.8	3/9	63.3	3/9	67.1	3/9	69.3	2/3	71.3	2/3
	116/19/24		122/24/28		126/28/32		132/35/38		137/40/44	
51	58.5	3/9	63.0	3/9	66.7	3/9	68.8	2/3	70.8	2/3
	116/19/23		122/24/28		126/28/32		132/34/38		137/40/44	
52	58.1	3/9	62.6	3/9	66.2	3/9	68.4	2/3	70.3	2/3
	116/18/23		121/23/27		126/27/31		132/34/38		137/40/44	
54	* 57.5	3/9	61.9	3/9	65.3	3/9	67.5	2/3	69.4	2/3
	* 115/18/22		121/23/27		126/27/31		131/34/38		136/39/43	
56	* 56.7	3/9	61.2	3/9	64.4	2/3	66.6	2/3	68.4	2/3
	* 115/17/22		121/22/26		126/27/30		131/33/37		136/39/42	
58	* 55.6	3/3	60.5	3/9	63.6	2/3	65.7	2/3	67.5	2/3
	* 115/17/22		120/21/25		126/26/30		131/33/37		136/38/42	
60	* 54.4	3/3	59.8	3/9	62.7	2/3	64.7	2/3	66.5	2/3
	* 114/17/22		120/21/24		125/26/30		130/32/36		136/38/41	
62	* 53.2	3/3	59.0	3/9	61.7	2/3	63.7	2/3	65.4	2/3
	* 114/17/22		120/20/24		125/26/29		130/32/35		135/37/41	
64	* 52.0	3/3	* 58.2	3/9	60.8	2/3	62.8	2/3	64.4	2/3
	* 114/18/22		* 119/19/23		125/25/29		130/31/35		135/37/40	
66	* 50.8	3/3	* 57.3	3/9	59.9	2/3	61.8	2/3	63.3	2/3
	* 114/18/22		* 119/19/22		124/25/28		130/31/34		135/36/40	

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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF NET TAKEOFF FLIGHT PATH	2.02.50	P 1
		SEQ 001	REV 32

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

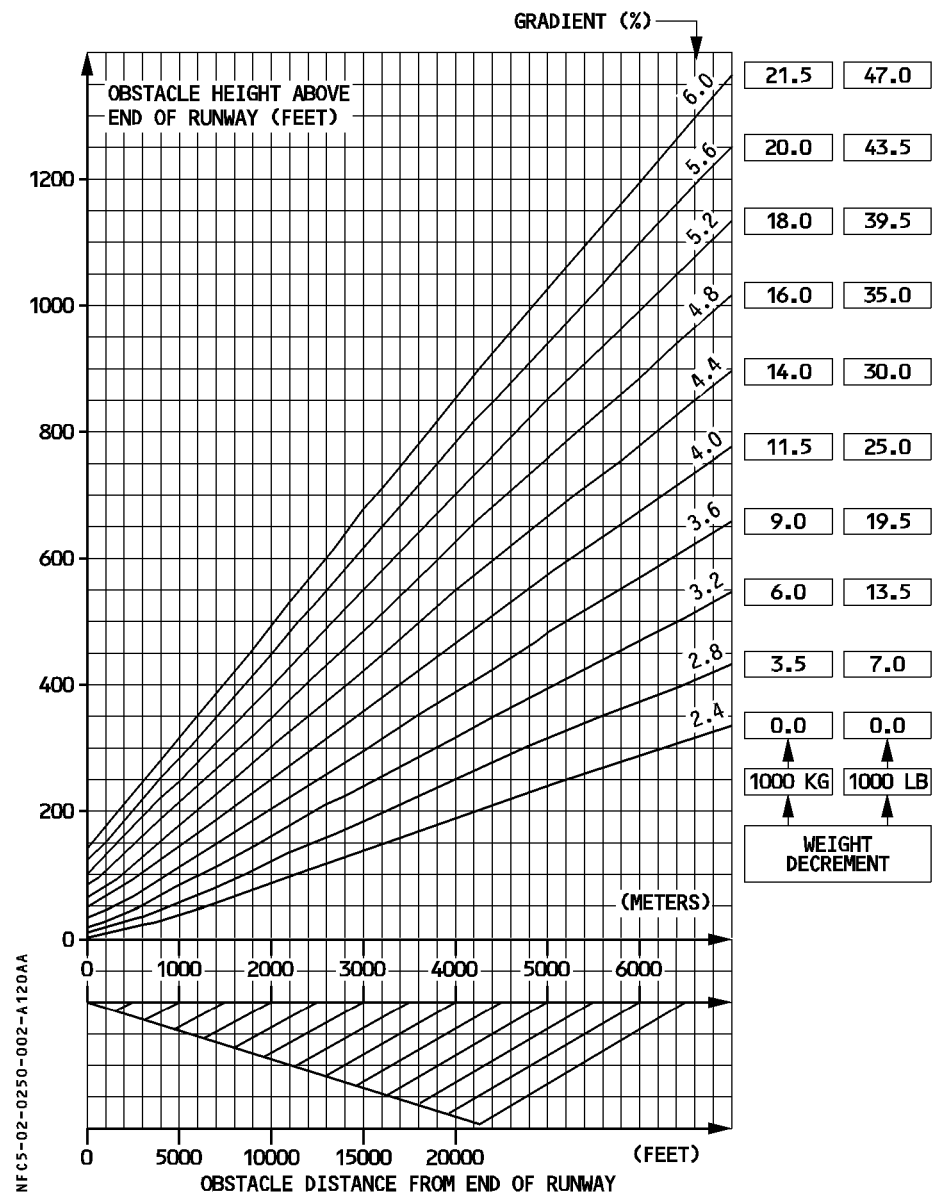
1. Position the obstacle by entering its distance from end of runway and its height above the end of runway (No 35 feet margin is required as this is already included).
In case of an ascending runway, increase the obstacle height by an additional value as indicated below each graph.

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF NET TAKEOFF FLIGHT PATH	2.02.50	P 1
		SEQ 001	REV 32

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.

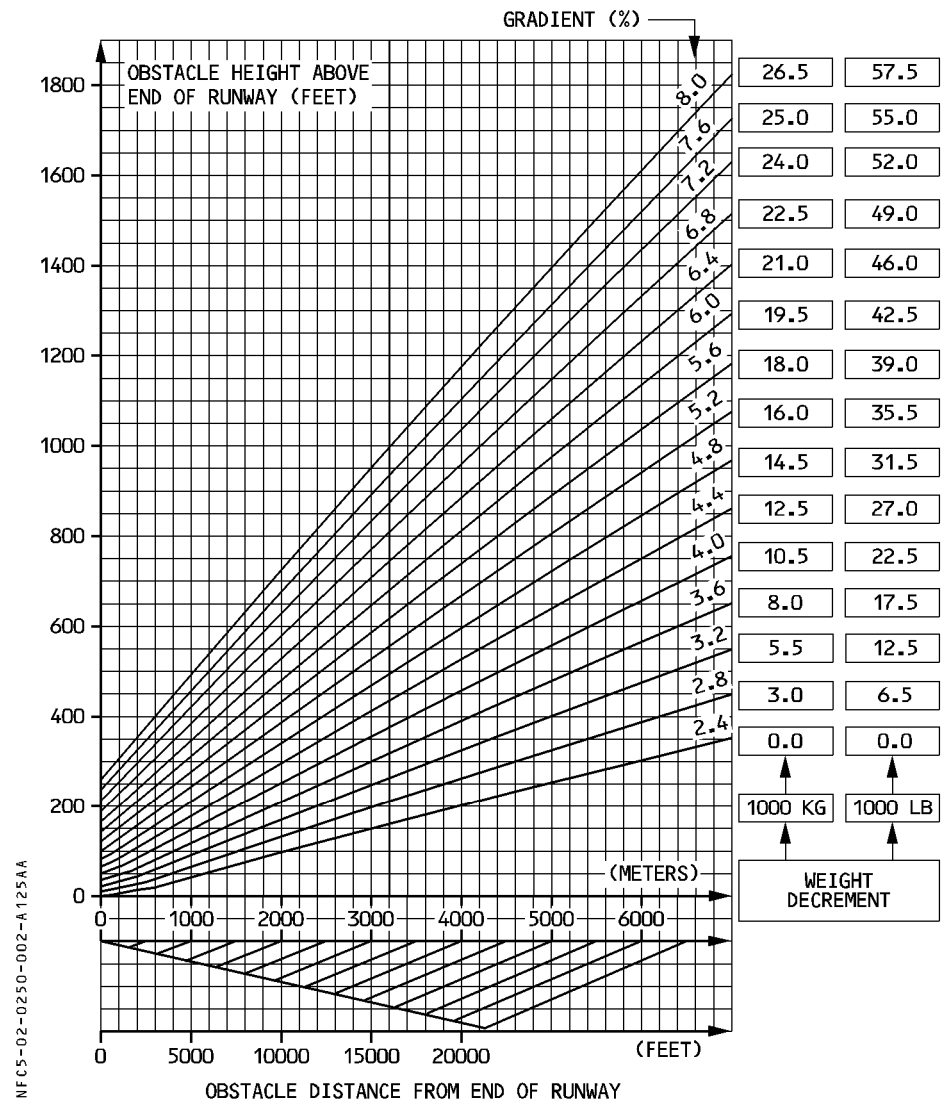
The net takeoff flight path and the associated weight decrement are conservative.

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 40 feet per percent runway slope.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF NET TAKEOFF FLIGHT PATH	2.02.50	P 1
		SEQ 001	REV 32

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

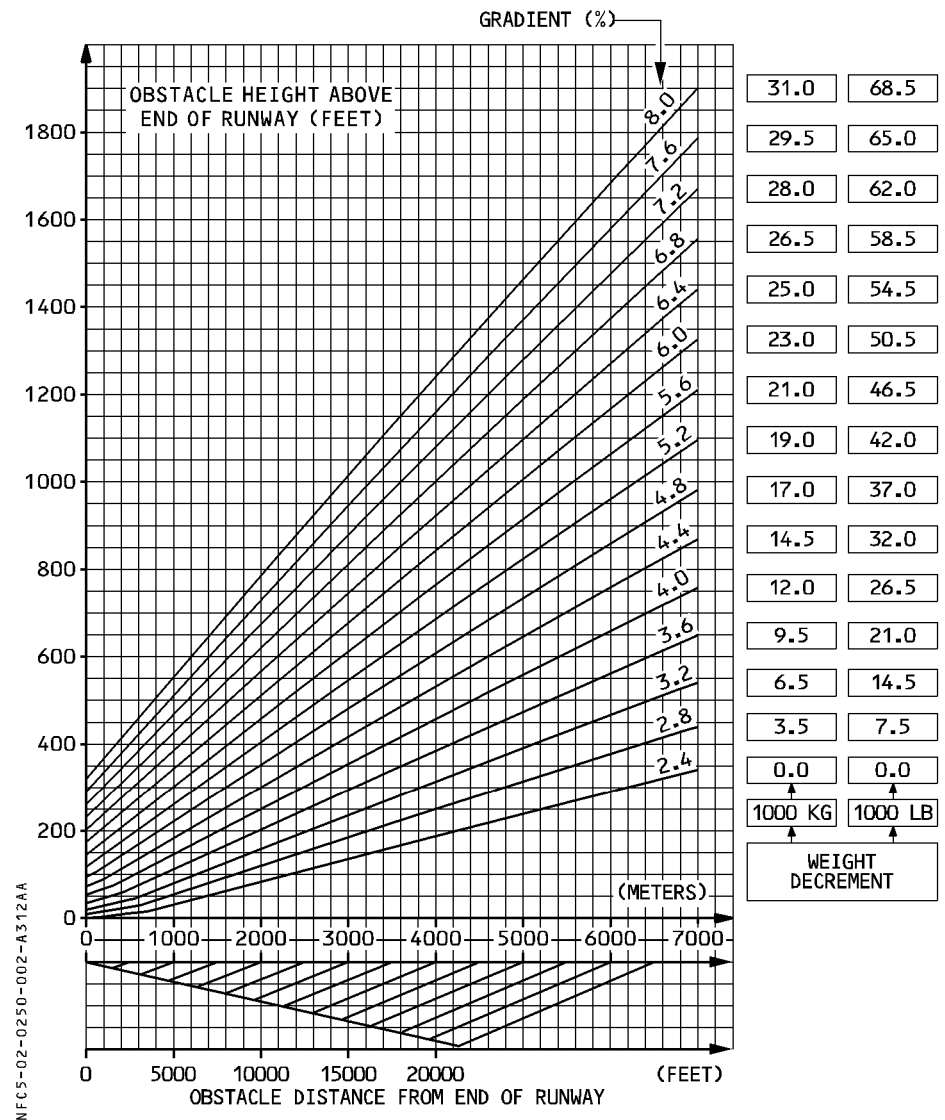
1. Position the obstacle by entering its distance from end of runway and its height above the end of runway (No 35 feet margin is required as this is already included).
In case of an ascending runway, increase the obstacle height by an additional value as indicated below each graph.

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 50 feet per percent runway slope.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	TAKEOFF NET TAKEOFF FLIGHT PATH	2.02.50	P 1
		SEQ 001	REV 32

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.

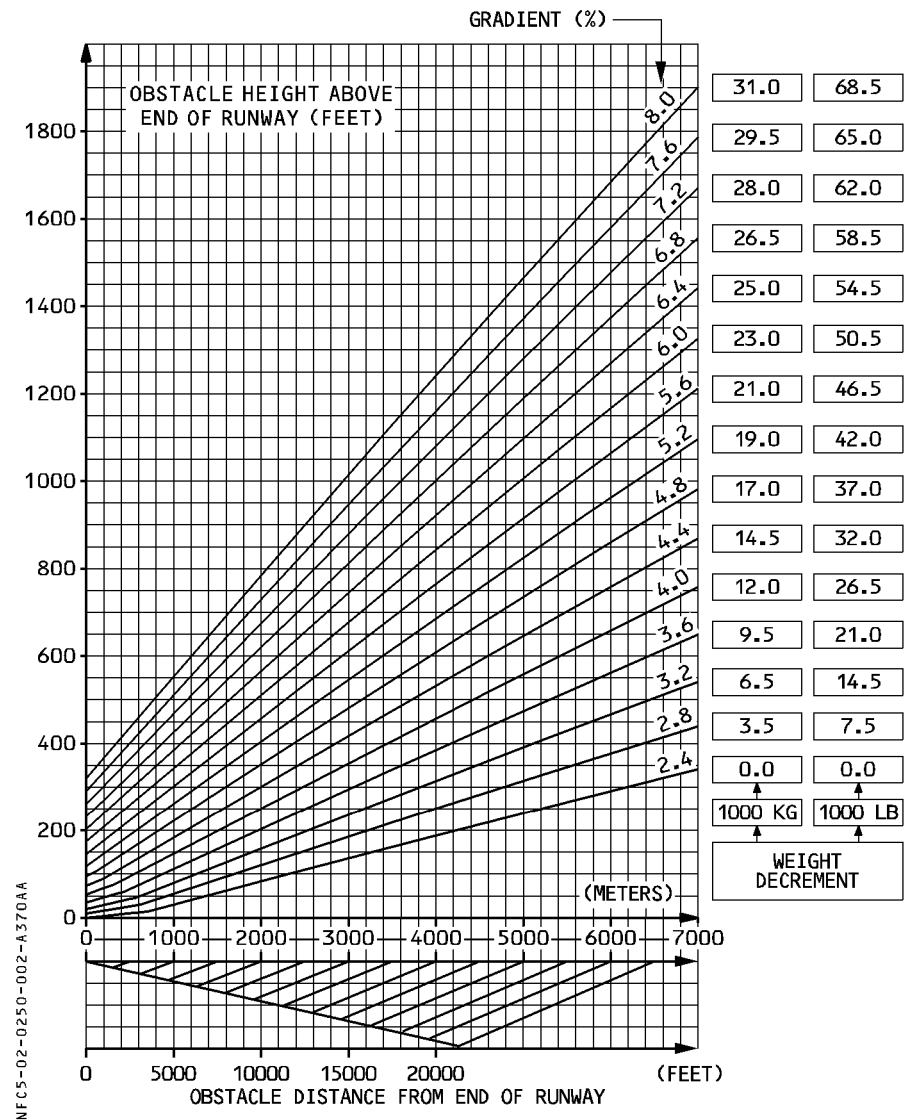
The net takeoff flight path and the associated weight decrement are conservative.

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.

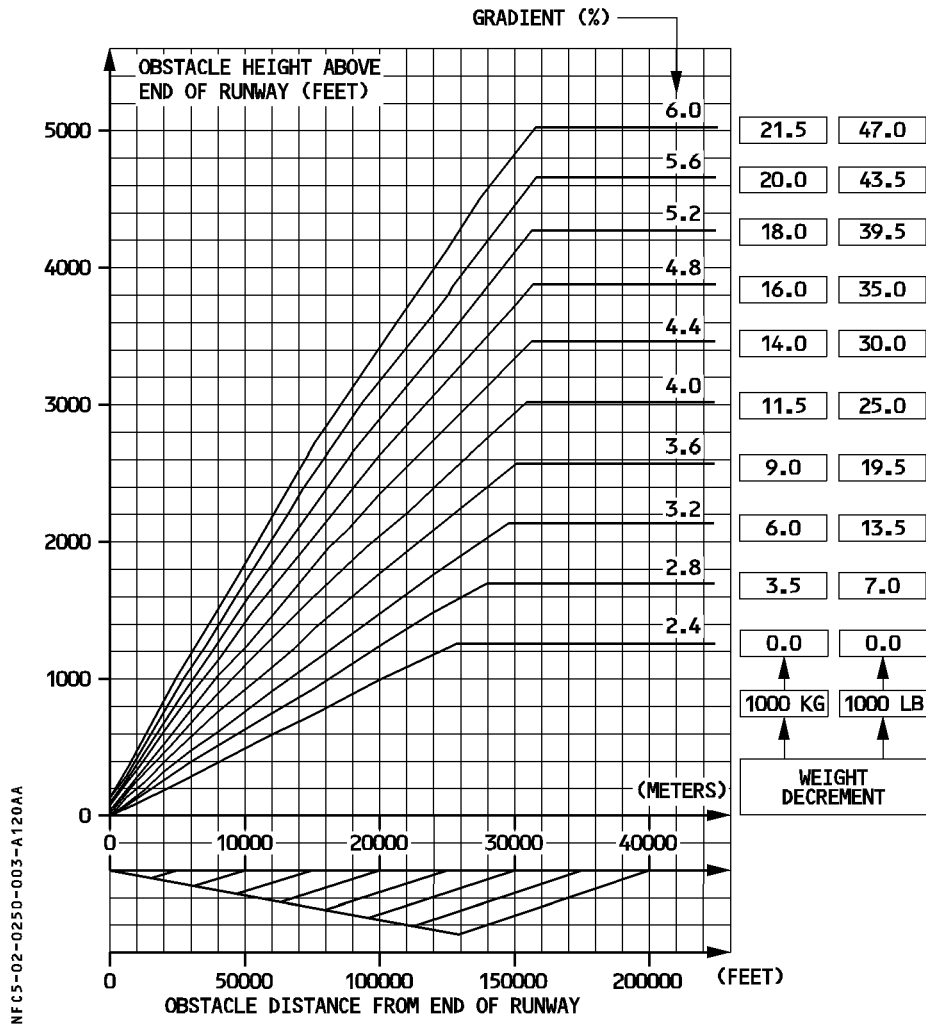
Note : In case of tailwind, do not use the obstacle clearance graphs.

CLOSE OBSTACLE CLEARANCE CONF 1 + F



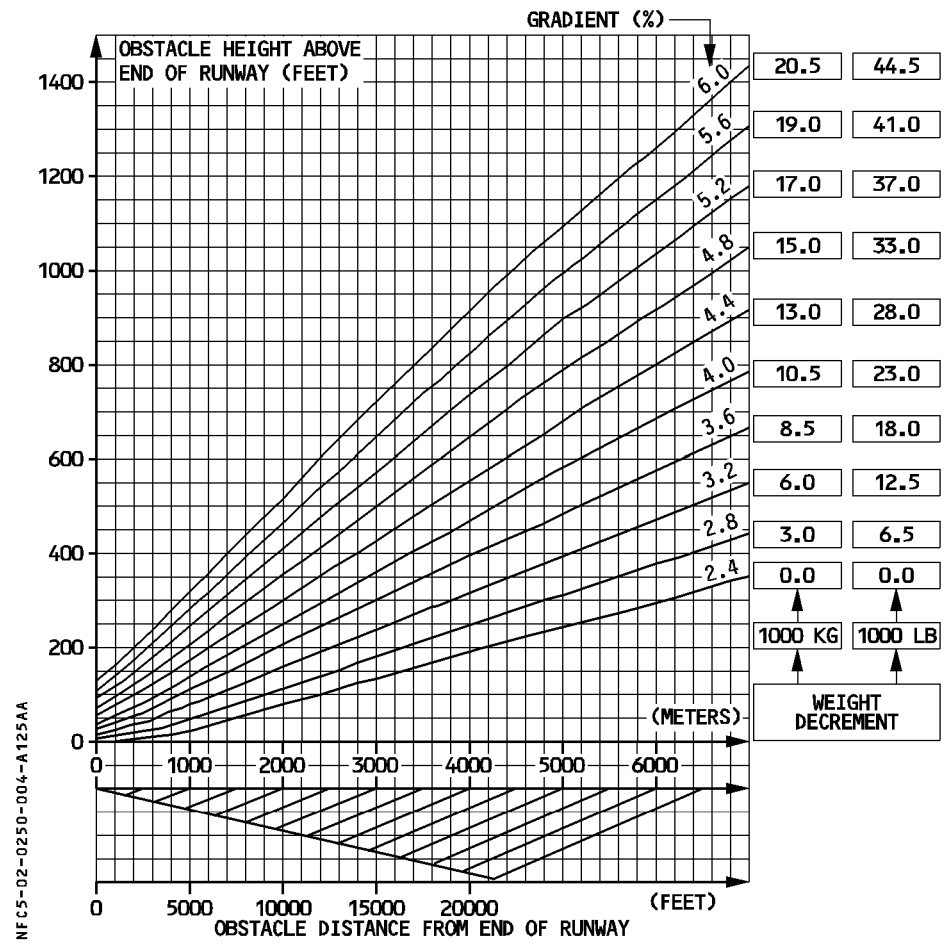
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



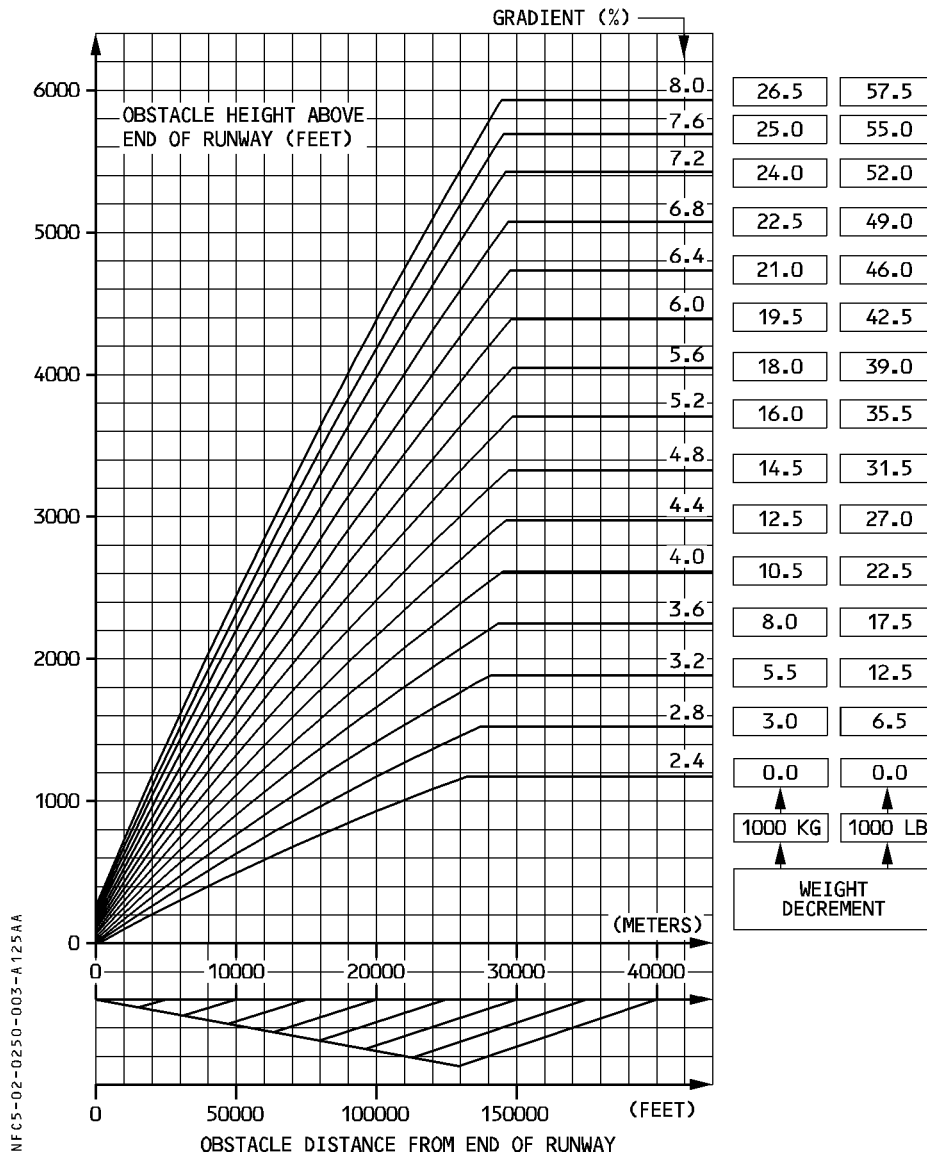
Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



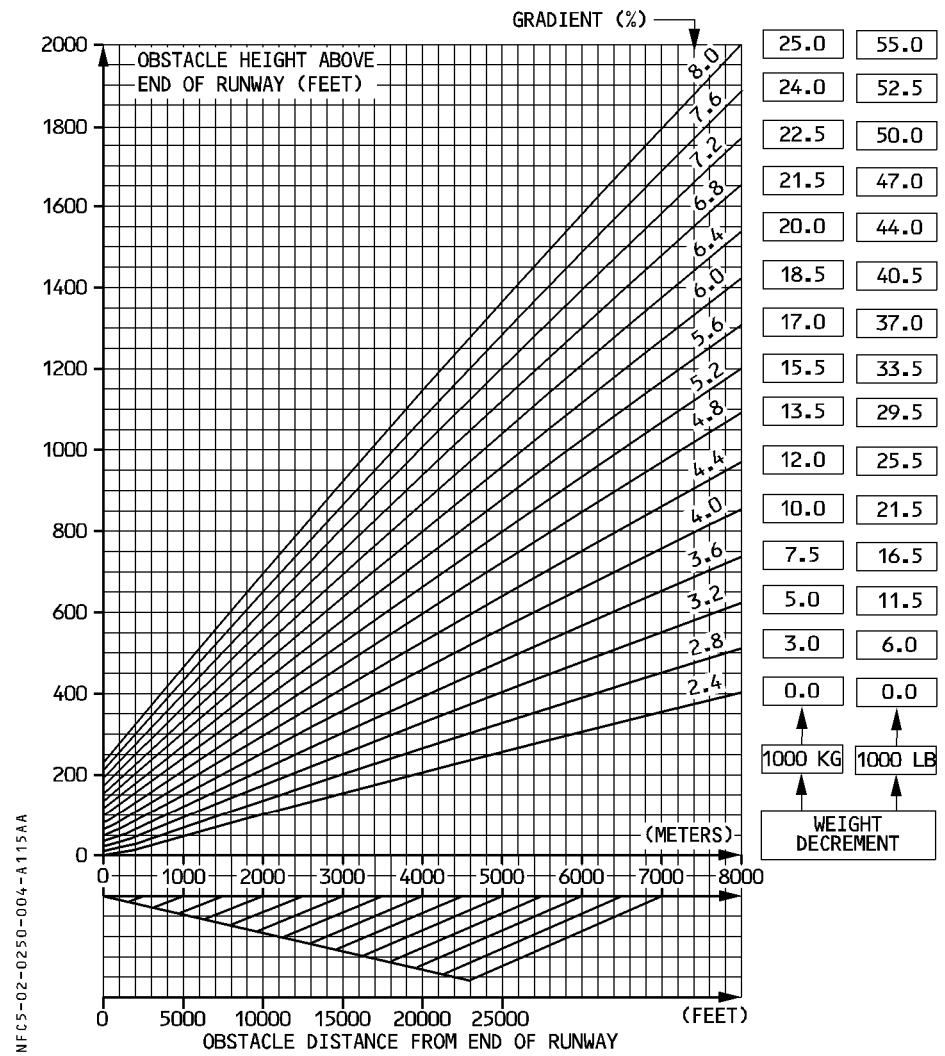
Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



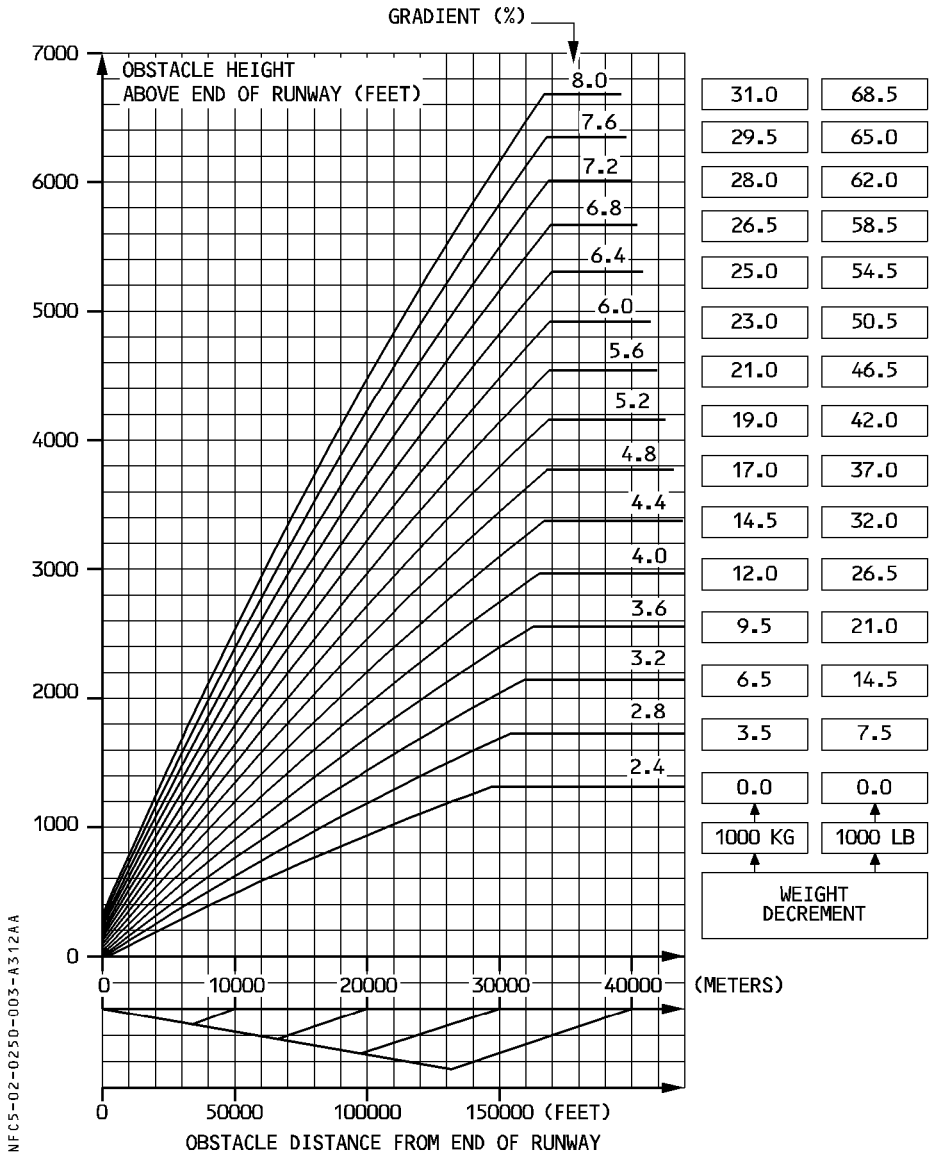
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2

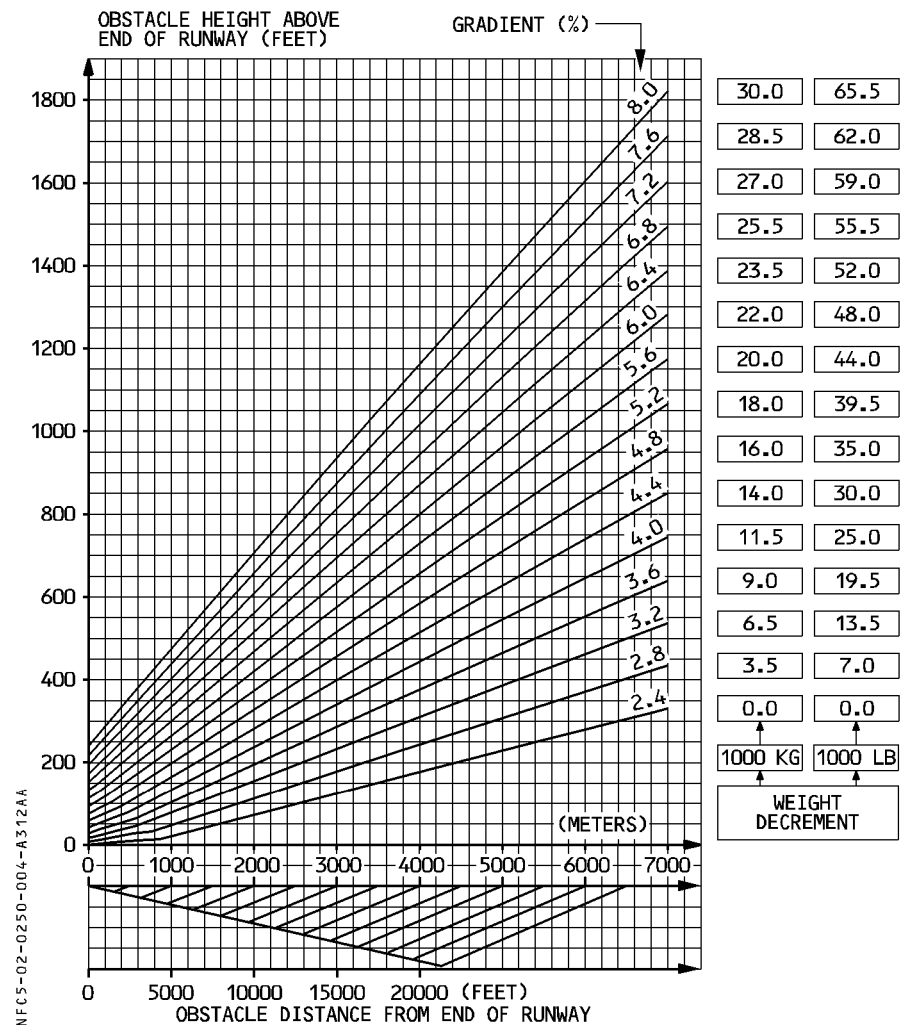


Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F

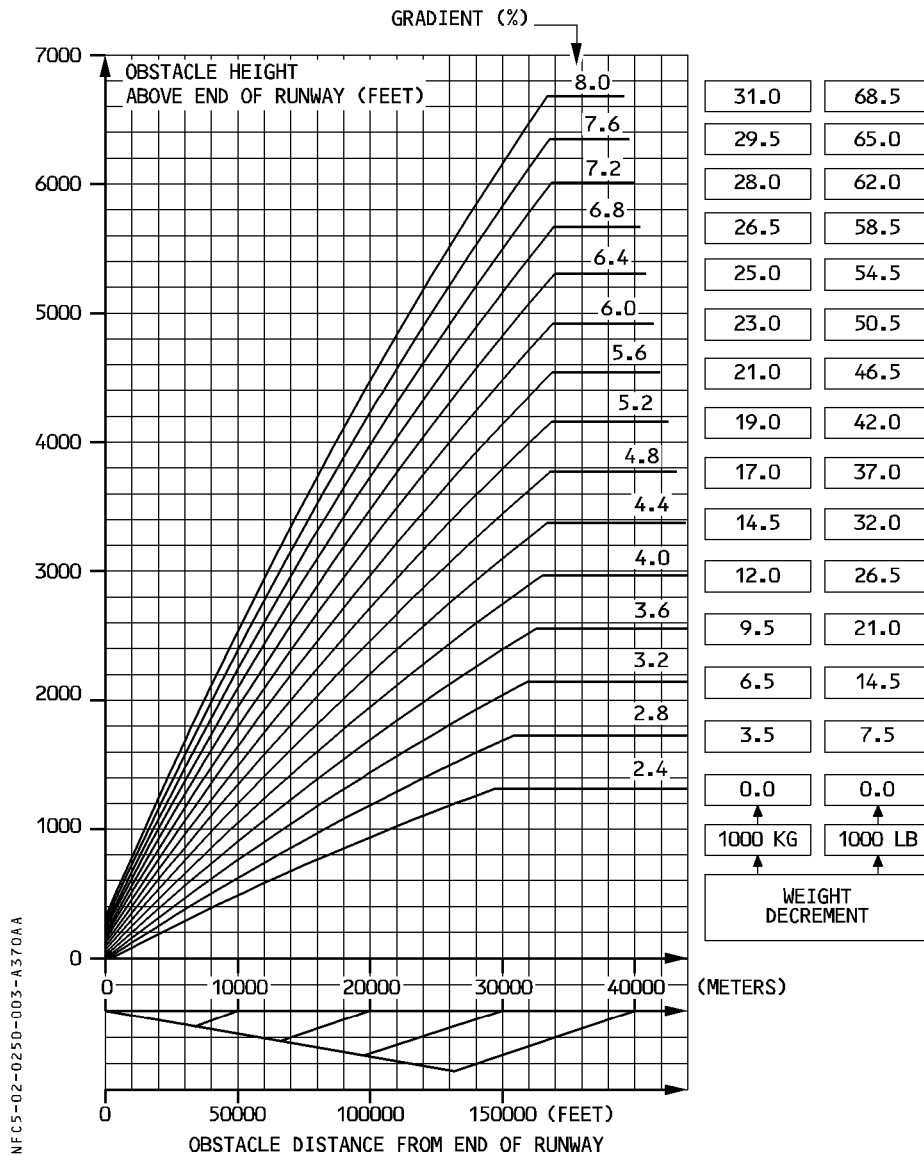


CLOSE OBSTACLE CLEARANCE CONF 2



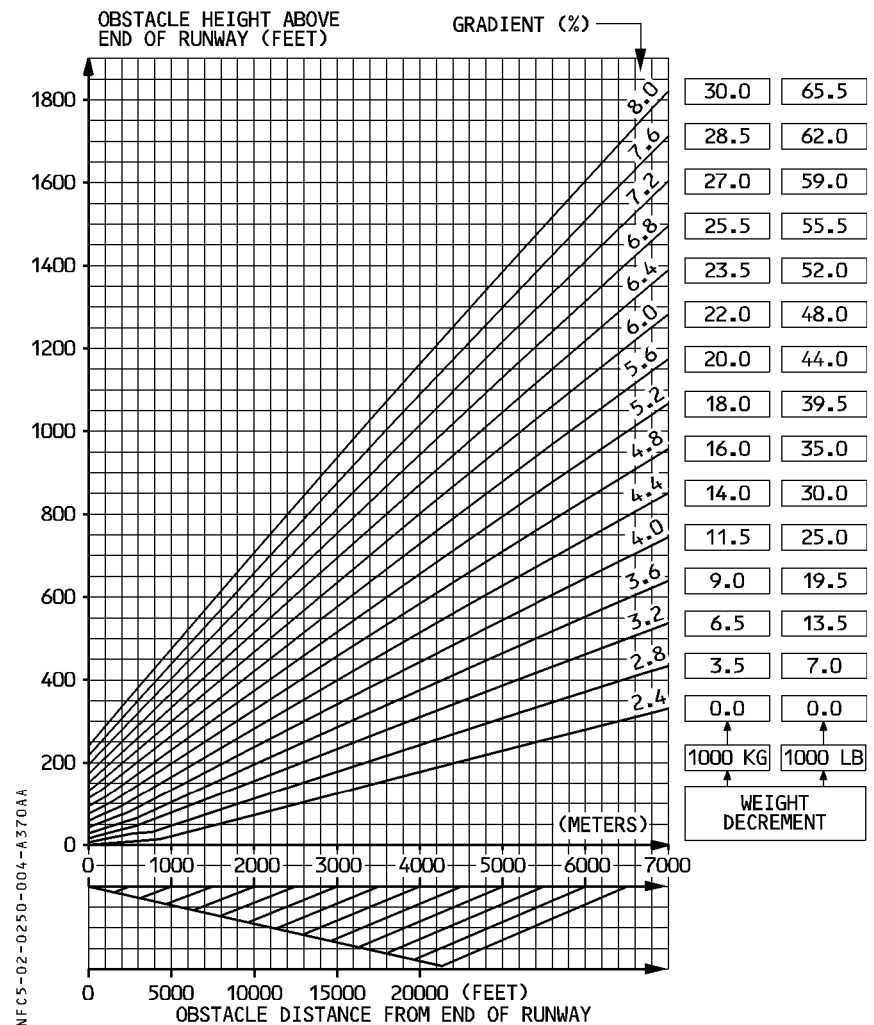
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



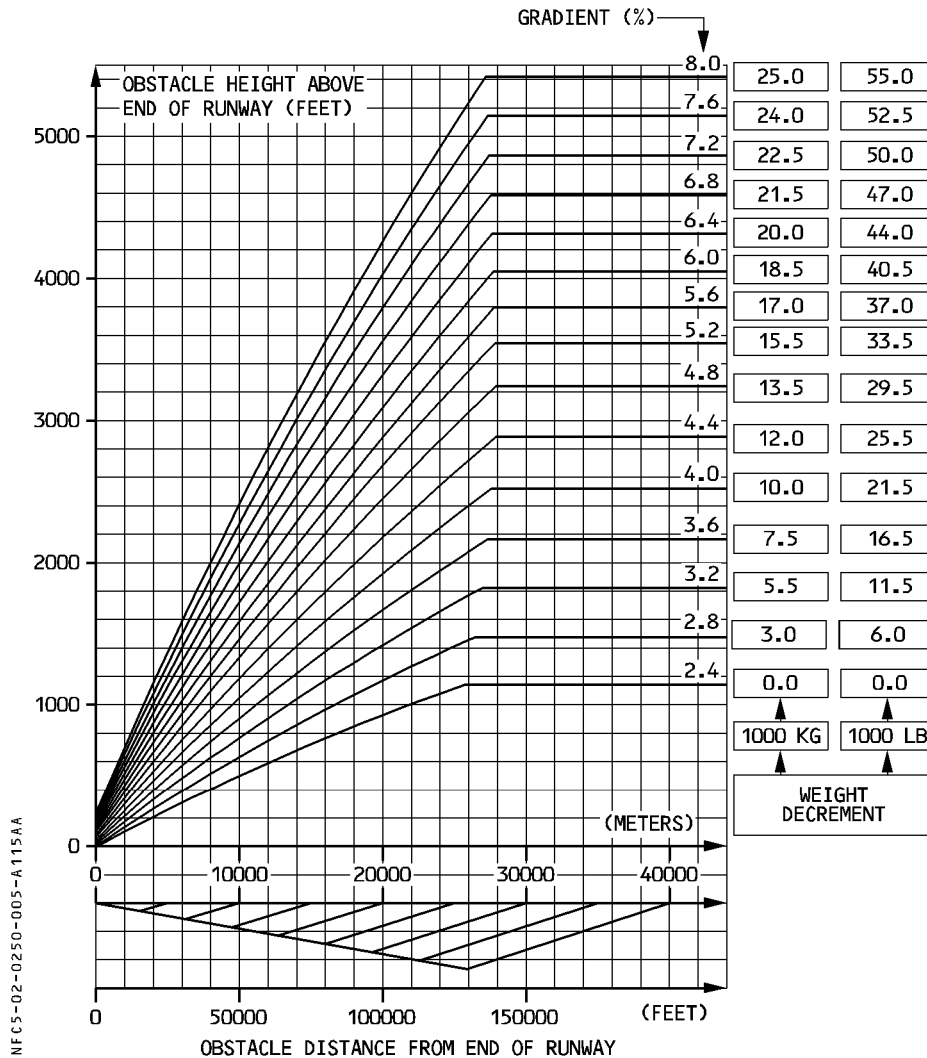
Note: In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



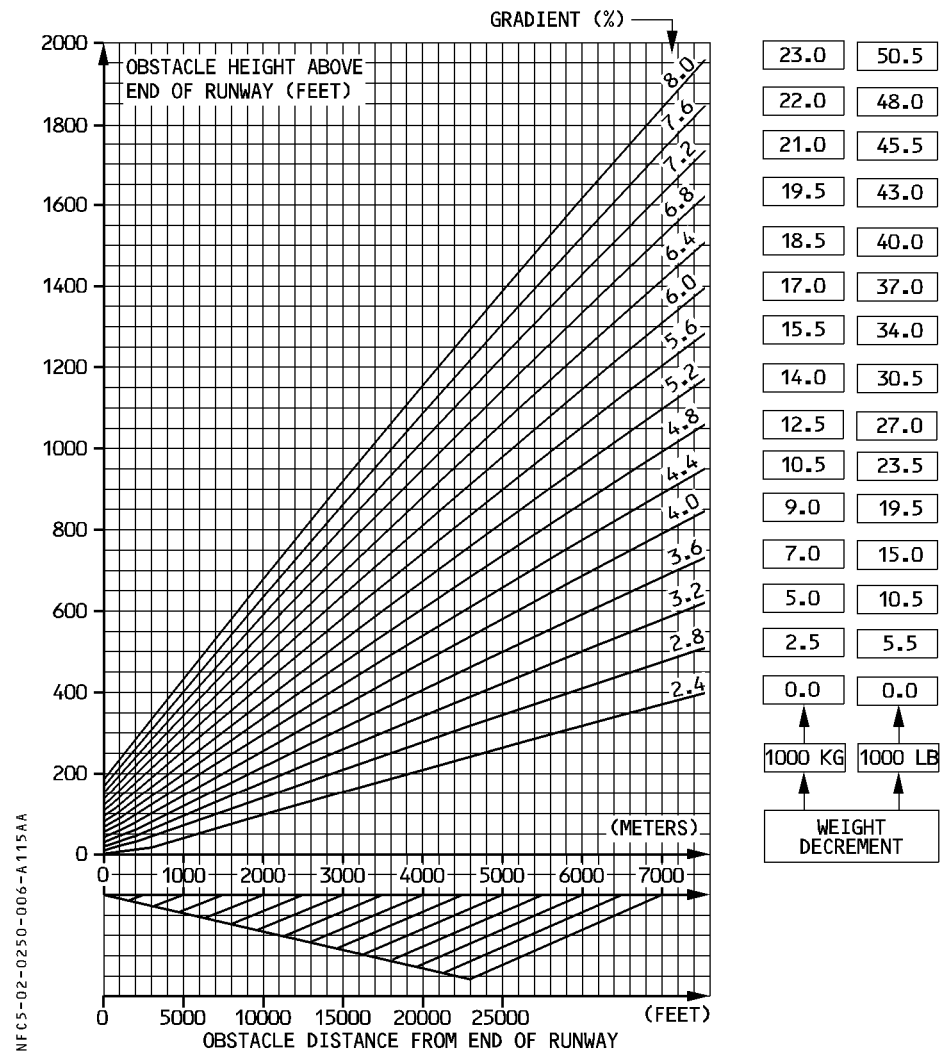
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 2



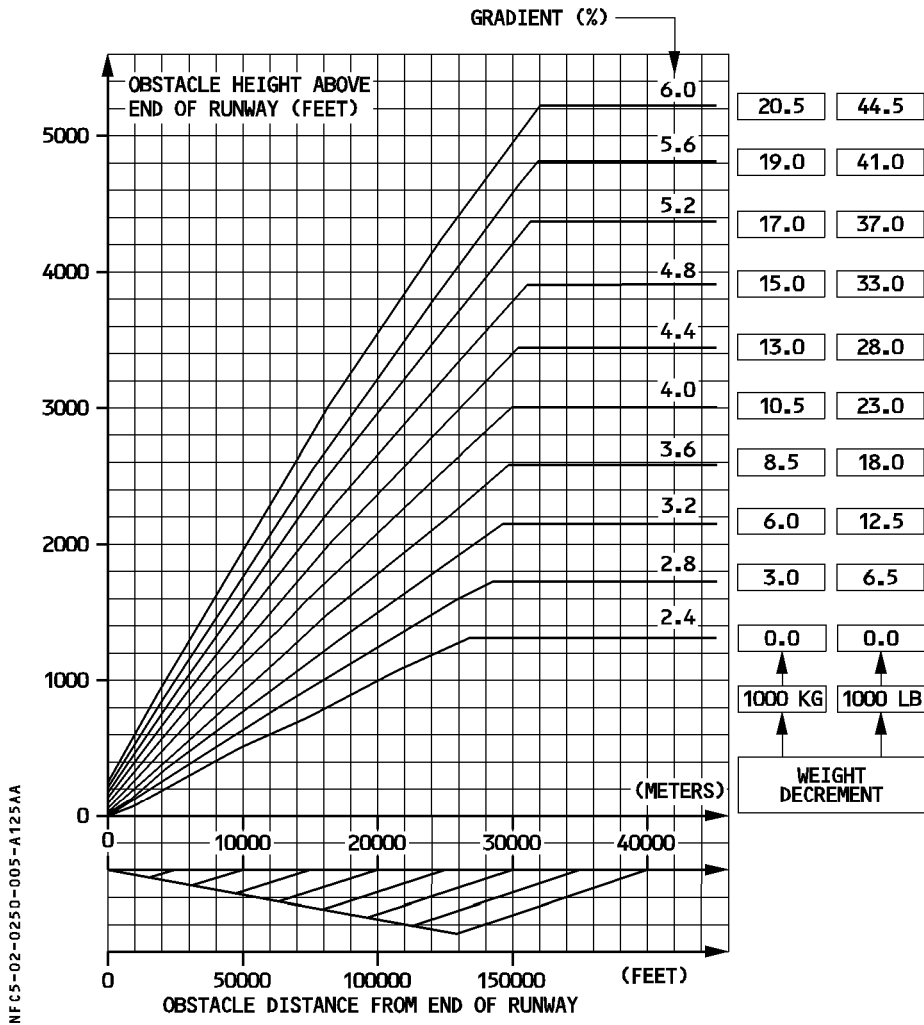
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



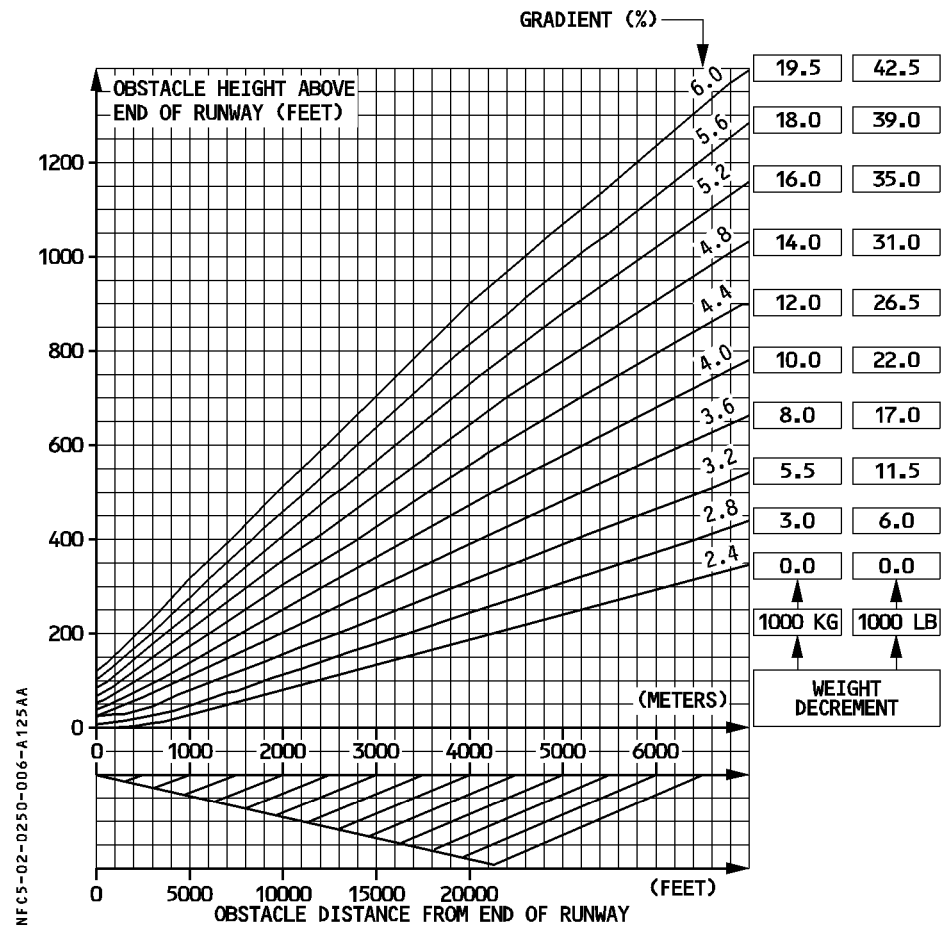
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 2



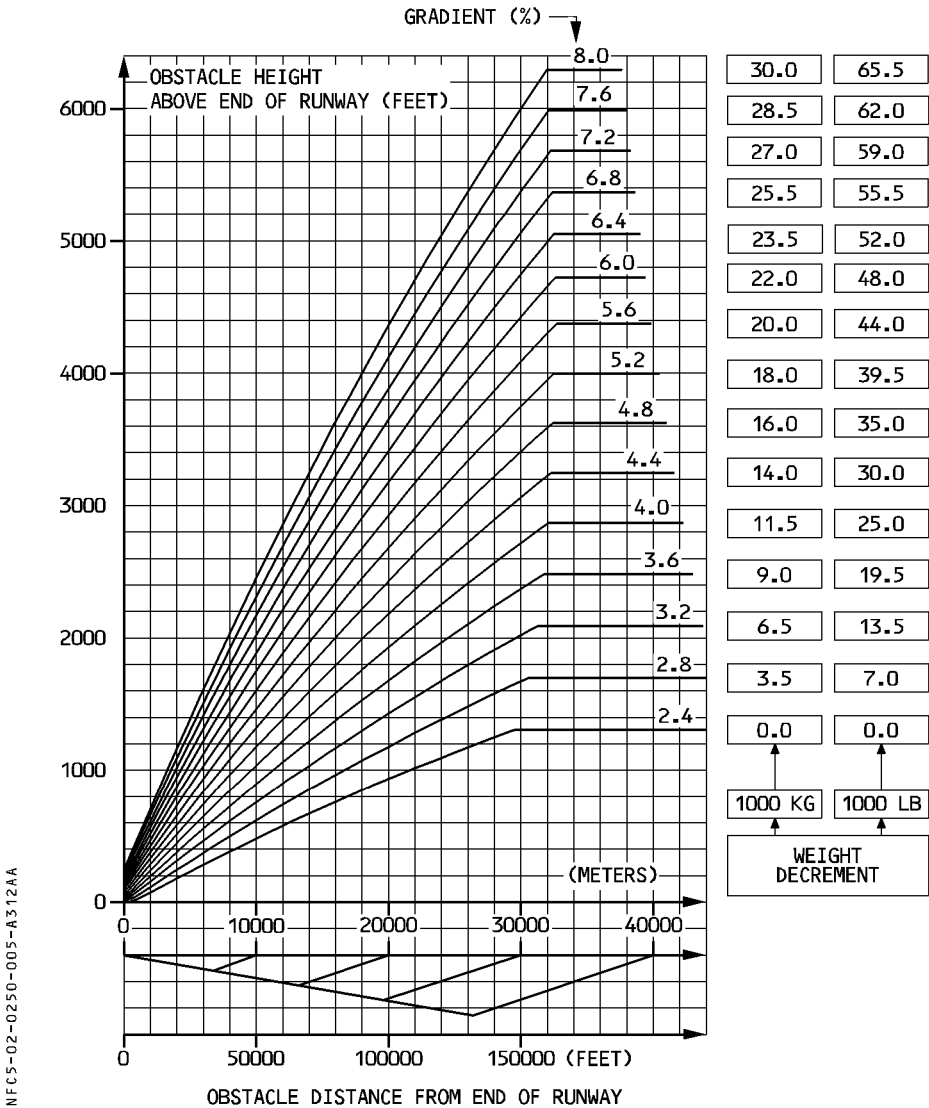
Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3

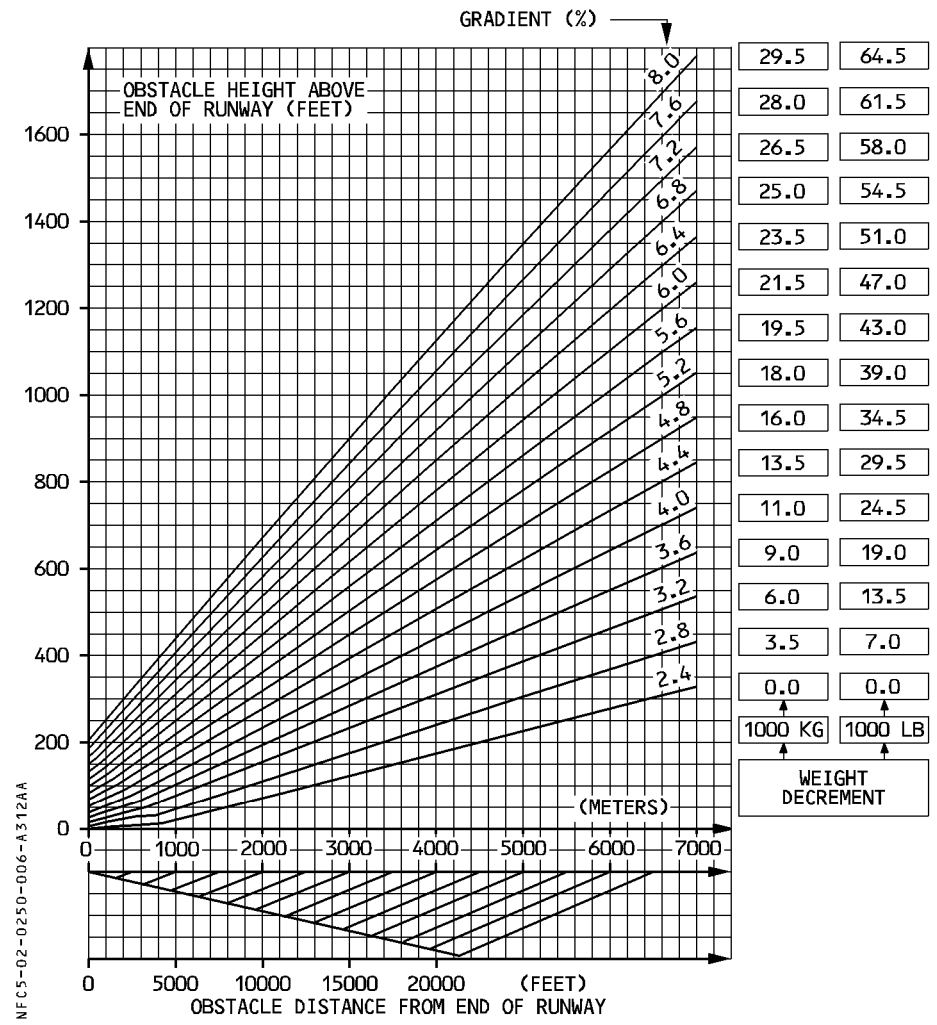


Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 2

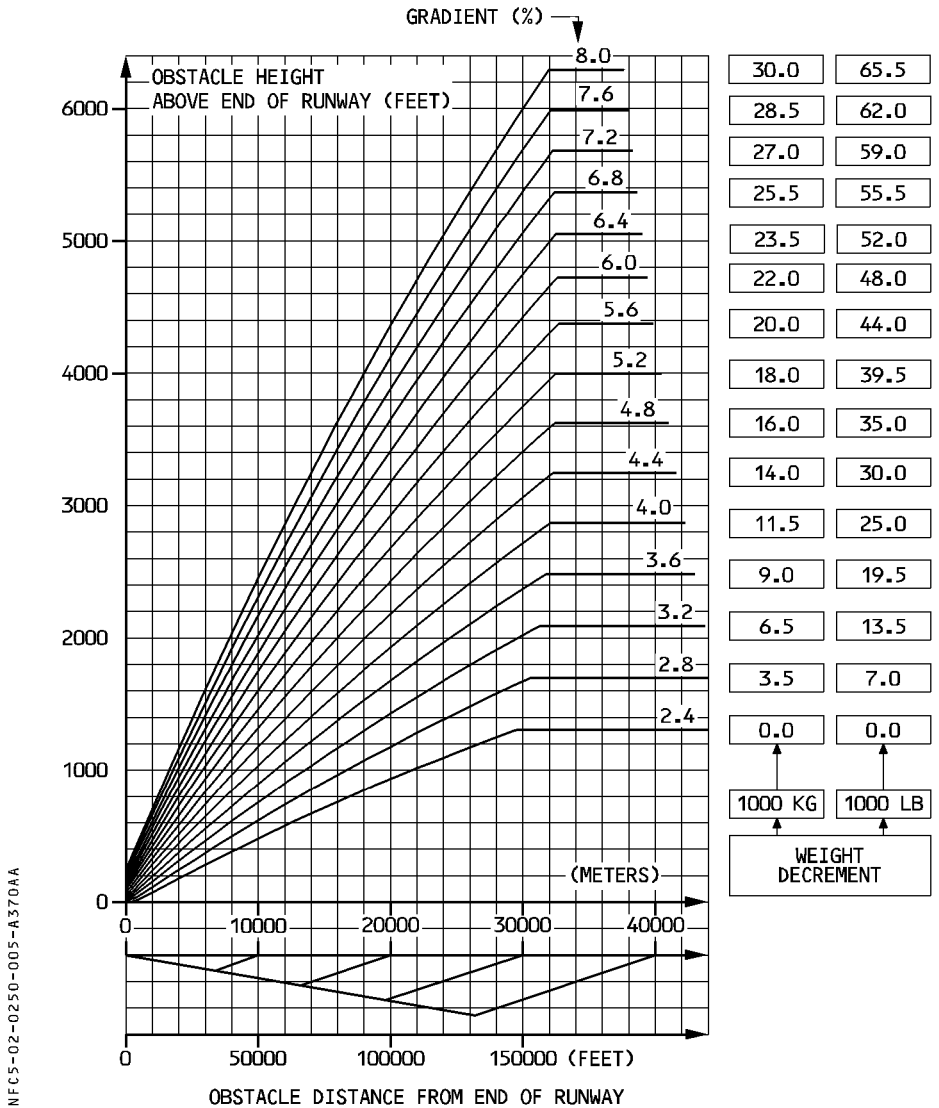


CLOSE OBSTACLE CLEARANCE CONF 3



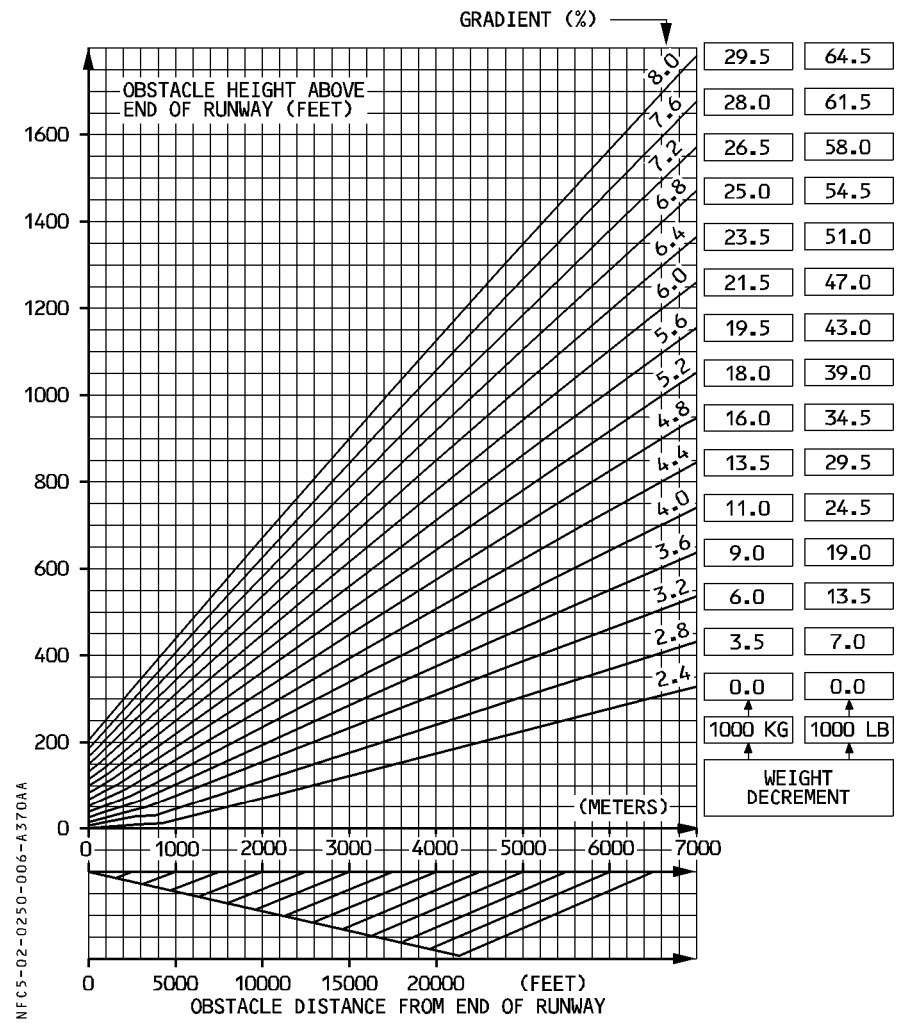
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 2



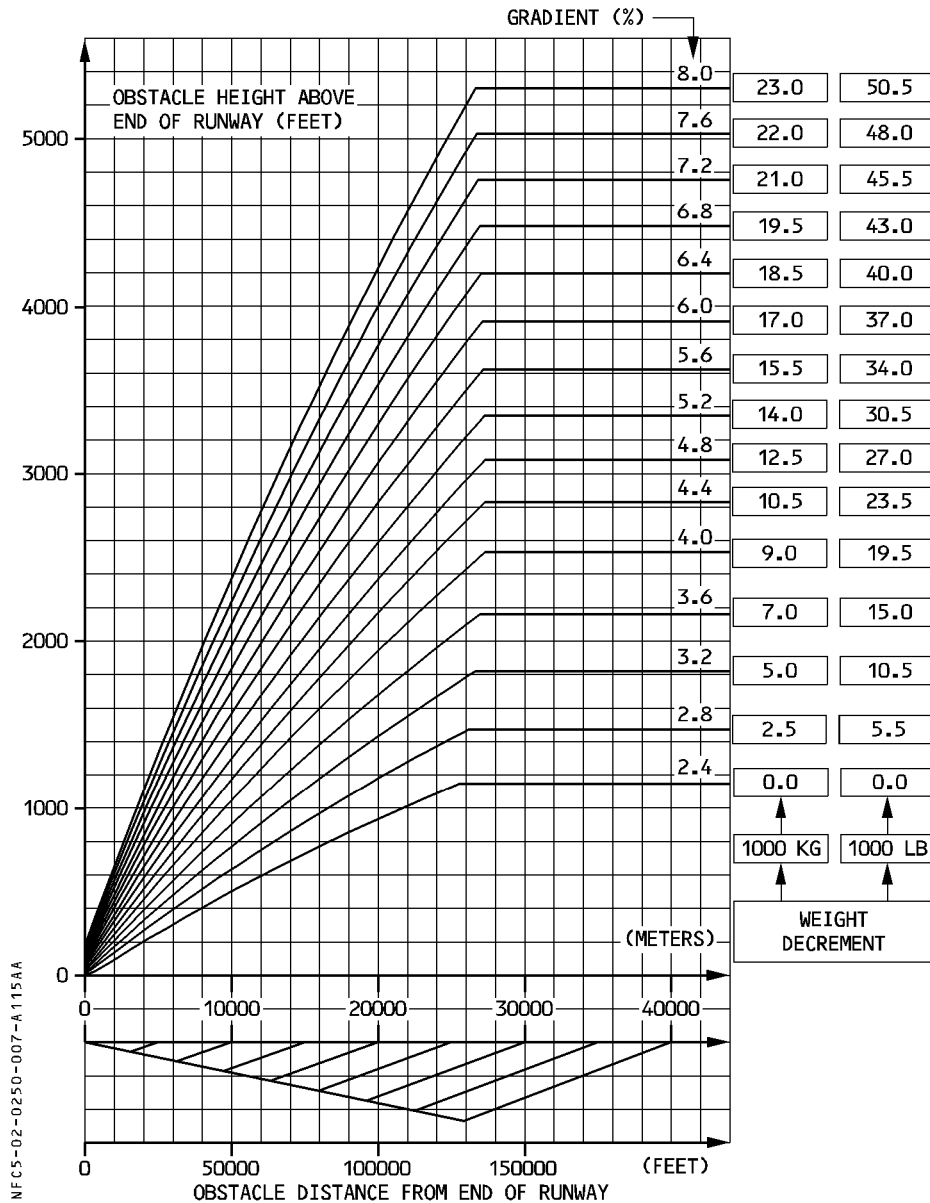
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 3



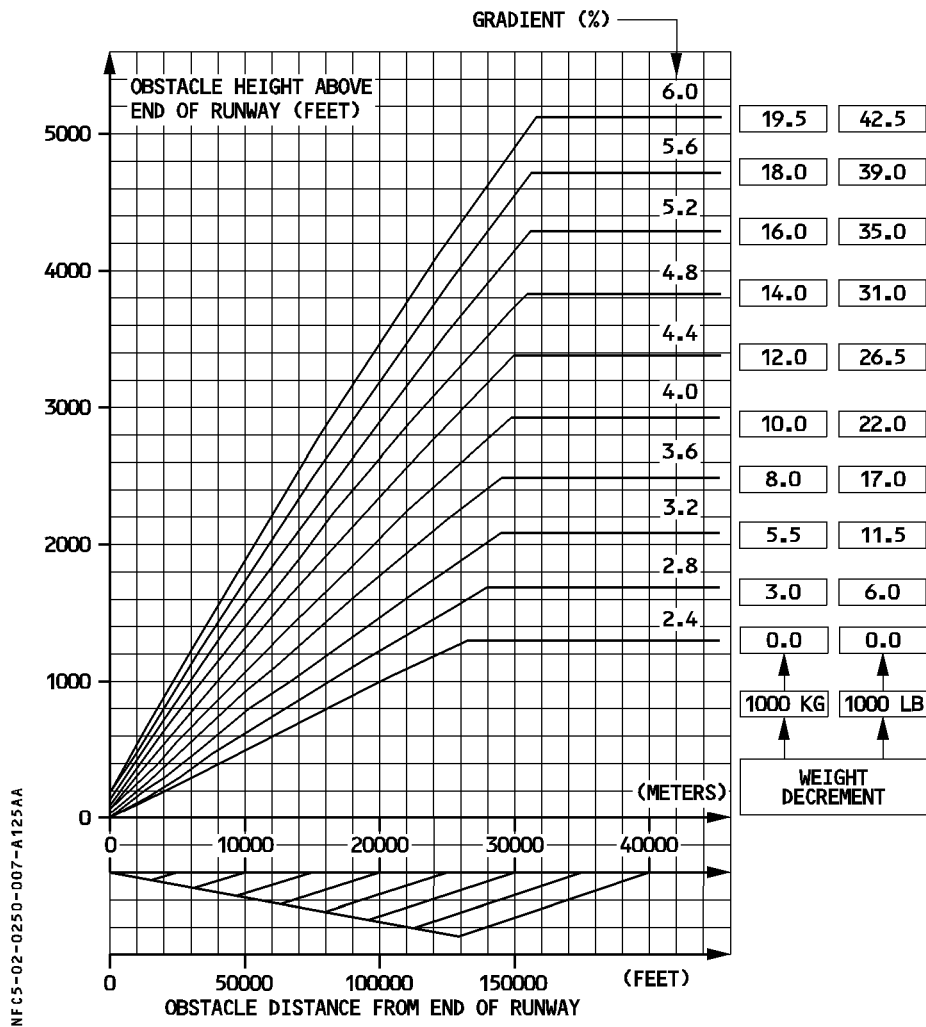
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3



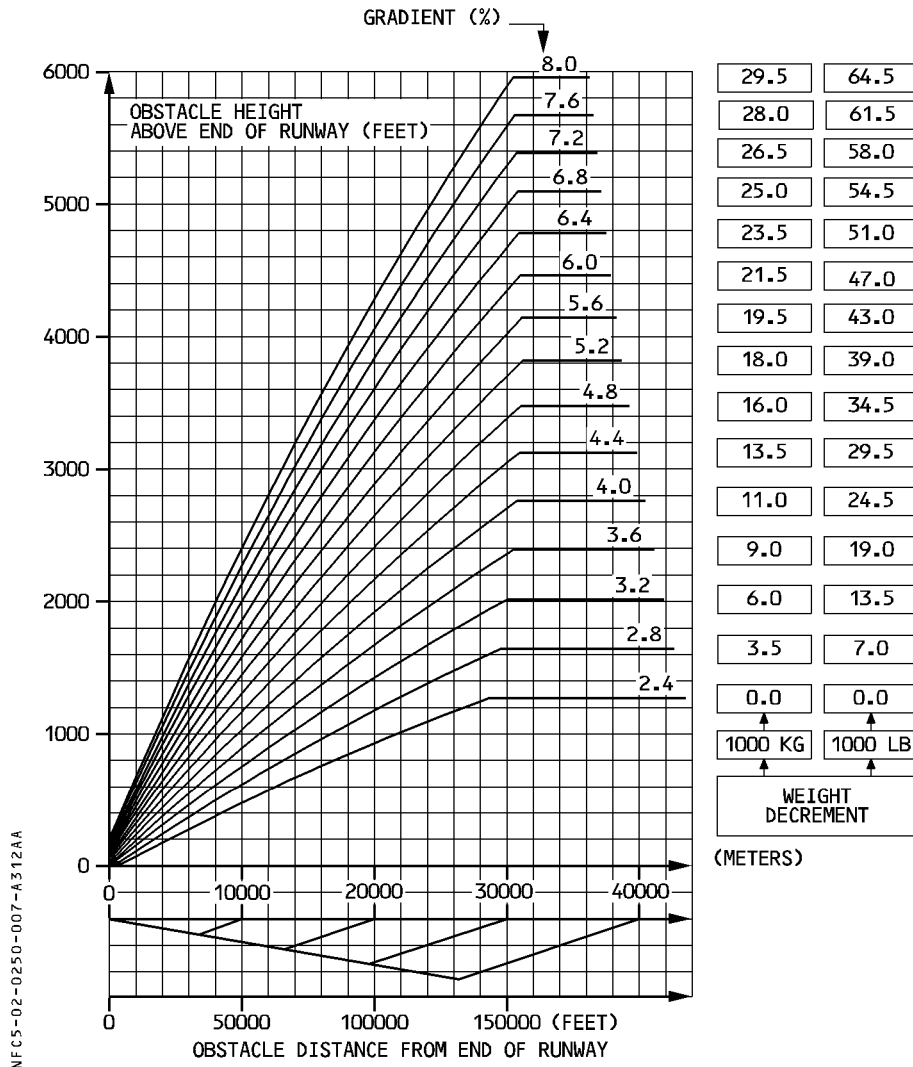
Note : In case of ascending runway, increase obstacle height by 40 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3



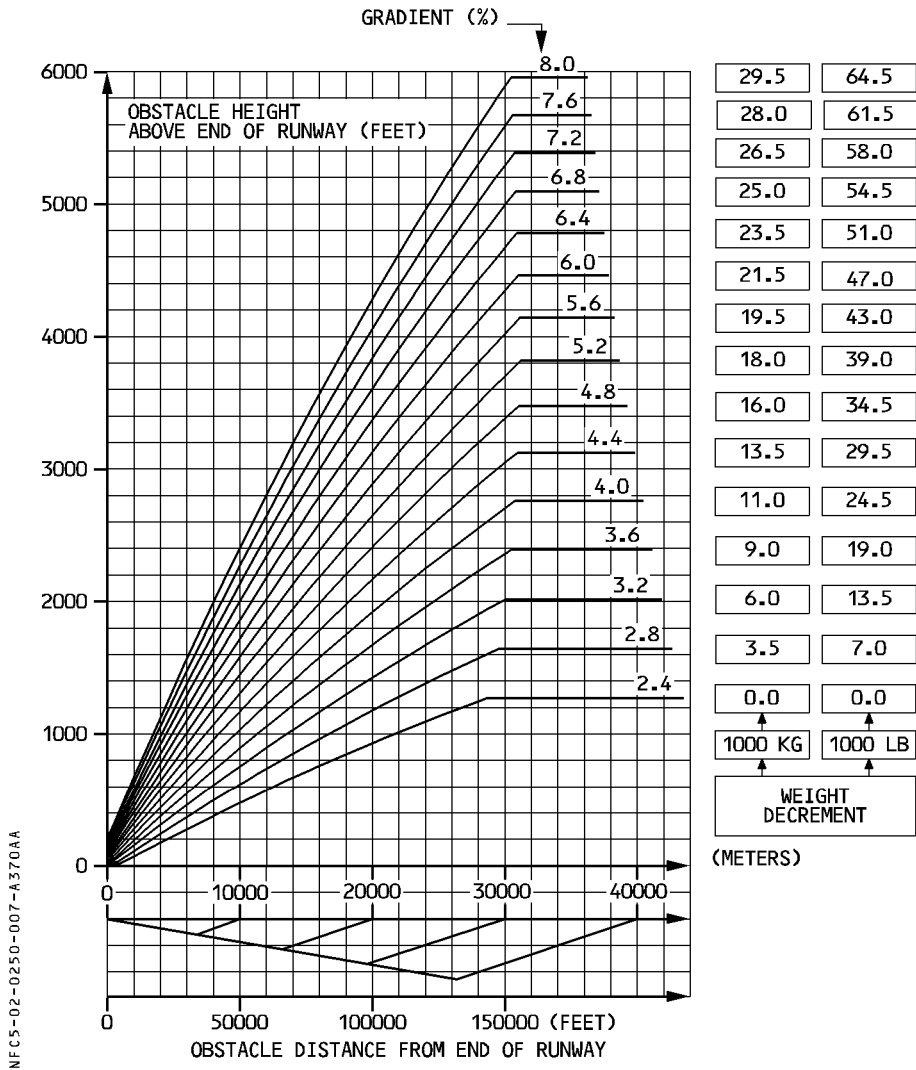
Note : In case of ascending runway, increase obstacle height by 30 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 3



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

REMOTE OBSTACLE CLEARANCE CONF 3



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

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03.00 CONTENTS

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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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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
	COVERED WITH	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)								

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LANDING PERFORMANCE		2.03.10	P 4
	LANDING		SEQ 160	REV 38

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
	COVERED WITH	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
	COVERED WITH	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
		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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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LANDING PERFORMANCE LANDING	2.03.10	P 5
		SEQ 203	REV 34

REQUIRED LANDING DISTANCE

MANUAL LANDING

REQUIRED LANDING DISTANCE (METERS)										
WEIGHT (1000 KG)	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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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LANDING PERFORMANCE USE OF THE AUTOBRAKE SYSTEM	2.03.20	P 1
		SEQ 001	REV 33

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 LOW	940 1360	1000 1460	1080 1580	1150 1700	1220 1830	1300 1950	+ 3 0	+16 +18	
WET		MED LOW	950 1360	1030 1460	1110 1580	1210 1700	1300 1830	1400 1950	+ 4 + 3	−1 0	+21 +18
COVERED	6.3 MM (1/4 INCH) WATER	MED LOW	1270 1360	1380 1470	1520 1600	1670 1740	1830 1890	2000 2050	+ 4 + 4	−11 − 1	+24 +22
	12.7 MM (1/2 INCH) WATER	MED LOW	1210 1330	1320 1440	1440 1560	1580 1690	1720 1820	1870 1960	+ 4 + 4	−10 0	+22 +18
	6.3 MM (1/4 INCH) SLUSH	MED LOW	1240 1320	1350 1440	1470 1560	1590 1690	1720 1820	1880 1950	+ 5 + 5	−11 −1	+23 +21
	12.7 MM (1/2 INCH) SLUSH	MED LOW	1190 1300	1300 1410	1410 1530	1530 1650	1650 1770	1790 1900	+ 5 + 4	−11 0	+21 +18
WET	COMPACTED SNOW	MED LOW	1230 1370	1310 1480	1420 1600	1520 1720	1610 1840	1720 1970	+ 4 + 4	− 10 − 2	+18 +18
	ICE	MED LOW	2630 2660	2780 2810	2950 2990	3140 3170	3320 3360	3520 3550	+ 4 + 4	−27 −26	+36 +36

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (FEET)								CORRECTIONS (%) ON LANDING DISTANCE			
WEIGHT (1000 LB)		MODE	40	45	50	55	60	65	PER 1000FT ABOVE SL	2 REV OP	PER 10KT TAIL WIND
RUNWAY CONDITION											
DRY		MED LOW	920 1310	920 1310	970 1390	1030 1500	1090 1600	1160 1710	+ 3 + 3	0 0	+16 +19
WET		MED LOW	920 1310	930 1310	990 1390	1060 1500	1140 1600	1220 1710	+ 4 + 3	0 0	+21 +19
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED LOW	1210 1310	1240 1330	1320 1420	1430 1530	1550 1640	1690 1760	+ 4 + 4	-9 0	+24 +20
	12.7 MM (1/2 INCH) WATER	MED LOW	1160 1290	1190 1310	1270 1390	1380 1500	1490 1610	1610 1720	+ 4 + 3	-9 0	+21 +17
	6.3 MM (1/4 INCH) SLUSH	MED LOW	1180 1280	1210 1300	1290 1380	1400 1490	1500 1600	1610 1710	+ 5 + 4	-10 -1	+22 +19
	12.7 MM (1/2 INCH) SLUSH	MED LOW	1140 1260	1170 1280	1250 1360	1350 1470	1450 1570	1550 1680	+ 5 + 4	-9 0	+21 +17
	COMPACTED SNOW	MED LOW	1180 1330	1200 1340	1270 1420	1360 1530	1440 1630	1530 1740	+ 4 + 4	-9 -2	+19 +18
	ICE	MED LOW	2330 2350	2370 2390	2490 2510	2640 2670	2790 2820	2960 2980	+ 4 + 4	-24 -23	+38 +38

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

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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 (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
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1220	1490	1750	2050	+ 5	-15	+24
		LOW	1310	1570	1820	2110	+ 5	0	+21
	12.7 MM (1/2 INCH) WATER	MED	1170	1410	1670	1930	+ 5	-13	+22
		LOW	1290	1540	1770	2030	+ 4	0	+18
	6.3 MM (1/4 INCH) SLUSH	MED	1190	1420	1660	1940	+ 6	-14	+23
		LOW	1280	1530	1750	2020	+ 6	0	+20
	12.7 MM (1/2 INCH) SLUSH	MED	1140	1370	1590	1860	+ 5	-13	+22
		LOW	1260	1500	1720	1960	+ 5	0	+19
	COMPACTED SNOW	MED	1160	1360	1530	1710	+ 4	-10	+19
		LOW	1310	1540	1760	2000	+ 4	0	+18
	ICE	MED	2380	2740	3060	3420	+ 6	-26	+33
		LOW	2400	2760	3090	3450	+ 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
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1160	1280	1500	1740	+ 5	-13	+25
		LOW	1280	1390	1600	1820	+ 4	0	+20
	12.7 MM (1/2 INCH) WATER	MED	1110	1230	1440	1660	+ 4	-11	+23
		LOW	1260	1380	1570	1790	+ 4	0	+17
	6.3 MM (1/4 INCH) SLUSH	MED	1130	1250	1430	1650	+ 5	-12	+23
		LOW	1240	1360	1550	1760	+ 5	0	+20
	12.7 MM (1/2 INCH) SLUSH	MED	1090	1210	1380	1590	+ 5	-11	+21
		LOW	1230	1340	1540	1740	+ 4	0	+18
	COMPACTED SNOW	MED	1120	1210	1360	1520	+ 4	-9	+19
		LOW	1280	1380	1570	1770	+ 4	0	+18
	ICE	MED	2150	2360	2630	2930	+ 6	-24	+35
		LOW	2180	2380	2650	2960	+ 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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	LANDING PERFORMANCE USE OF THE AUTOBRAKE SYSTEM	2.03.20	P 1
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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 (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
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1170	1390	1640	1960	+ 5	-15	+ 23	+ 3
		LOW	1330	1580	1830	2120	+ 4	-2	+ 18	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1140	1340	1580	1860	+ 5	-13	+ 20	+ 3
		LOW	1310	1550	1800	2060	+ 4	-2	+ 16	+ 2
	6.3 MM (1/4 INCH) SLUSH	MED	1140	1340	1560	1800	+ 6	-14	+ 21	+ 3
		LOW	1290	1530	1770	2020	+ 5	-2	+ 17	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1100	1300	1500	1720	+ 5	-13	+ 19	+ 3
		LOW	1270	1510	1750	1990	+ 5	-1	+ 17	+ 2
WITH	COMPACTED SNOW	MED	1160	1350	1540	1740	+ 4	-12	+ 17	+ 3
		LOW	1320	1550	1800	2050	+ 4	-1	+ 16	+ 2
WITH	ICE	MED	2100	2500	2910	3320	+ 6	-27	+ 26	+ 3
		LOW	2130	2530	2940	3360	+ 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
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1120	1280	1490	1760	+ 5	-12	+ 22	+ 3
		LOW	1300	1480	1720	1970	+ 4	-2	+ 17	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1090	1240	1440	1690	+ 4	-11	+ 20	+ 3
		LOW	1280	1460	1690	1930	+ 4	-1	+ 16	+ 2
	6.3 MM (1/4 INCH) SLUSH	MED	1090	1240	1440	1640	+ 6	-12	+ 20	+ 3
		LOW	1260	1440	1670	1900	+ 5	-1	+ 17	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1060	1200	1390	1590	+ 5	-11	+ 19	+ 3
		LOW	1240	1410	1640	1870	+ 4	-1	+ 16	+ 2
WITH	COMPACTED SNOW	MED	1110	1250	1440	1620	+ 4	-10	+ 17	+ 3
		LOW	1280	1460	1700	1930	+ 4	-1	+ 18	+ 2
WITH	ICE	MED	1880	2180	2540	2900	+ 6	-24	+ 26	+ 3
		LOW	1900	2210	2570	2930	+ 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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- LIMITATIONS 1
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– PROCEDURES	1
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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
- R
- 25.4 mm (1 inch) wet snow is equivalent to 12.7 mm (1/2 inch) slush
- R
- 50.8 mm (2 inches) dry snow is equivalent to 6.3 mm (1/4 inch) slush
- R
- 101.6 mm (4 inches) dry snow is equivalent to 12.7 mm (1/2 inch) slush

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

OPERATIONAL CONDITIONS

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

- The contaminant is in a layer of uniform depth and density over the entire length of the runway.
- Antiskid and spoilers are operative.
- The friction coefficient is based on studies and checked by actual tests.
- The screen height at the end of 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.

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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

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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.

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NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

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 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		
RUNWAY LENGTH (m) (ft)	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		
RUNWAY LENGTH (m) (ft)	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	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		
RUNWAY LENGTH (m) (ft)	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	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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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		
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
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.

CONF 1 + F	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

CONF 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	110	112	115	117	119	121	123	125		

CONF 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	2500 8000 and above
△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.

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<43	43	43.3	43.3 to 68													
	MTOW (1000 kg)	—	42	43.3	EQUAL TO CORRECTED WEIGHT													
	ACTUAL WEIGHT (1000 kg)	< 42	42	43.3	44	46	48	50	52	54	56	58	60	62	64	66	68	
	V2 (kt IAS)	115	115	117	118	121	124	126	129	132	134	137	139	141	144	145	147	
	VR (kt IAS)	113	113	115	116	119	122	124	127	130	132	135	137	139	142	143	145	
	V1 (kt IAS)	111	111	111	112	115	118	120	123	126	128	131	133	135	138	139	141	

CONF 2	CORRECTED WEIGHT (1000 kg)	<47	47	47.3	47.3 to 68										
	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
	V2 (kt IAS)	115	115	117	118	120	123	125	127	130	132	134	136	138	140
	VR (kt IAS)	112	112	114	115	117	120	122	124	127	129	131	133	135	137
V1 (kt IAS)	110	110	110	111	113	116	118	120	123	125	127	129	131	133	

CONF 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	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	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
ΔWEIGHT (1000 kg) With clearway Without clearway	13.1 13.1	10.1 10.1	7.4 7.4	6.3 6.3	15.9 14.6	12.9 12.9	11.2 11.2	14.9 13.9	14.9 13.9	12.0 12.0

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	76	
	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	

CONF 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	76	
	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	111	112	114	116	118	120	123	125	127	130	132	134	136	

CONF 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	76
	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

— Determine maximum takeoff weight on dry runway.

R — Apply the following weight decrement versus takeoff configuration, runway length and
R 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	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	16.9 15.5	14.8 14.0	12.6 12.0	10.5 10.0	19.3 17.5	17.3 16.0	15.2 14.5	19.2 17.0	18.5 17.0	16.0 15.0

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	< 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	

CONF 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	

CONF 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	149	151	153	155	
	VR (kt IAS)	118	120	121	123	126	128	130	132	134	136	139	141	143	146	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 Without clearway	12.2 10.0	11.6 10.0	8.9 7.9	6.4 5.5	13.6 11.1	12.8 11.1	11.0 10.1	14.9 12.1	14.3 12.1	13.1 12.0

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	< 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	68	70	72	74	76	78	
	V2 (kt IAS)	123	123	126	129	131	134	136	139	141	143	146	148	150	153	155	157	159	161	
	VR (kt IAS)	121	121	124	127	129	132	134	137	139	141	144	146	148	151	153	155	157	159	
	V1 (kt IAS)	116	116	116	116	116	116	116	119	121	123	126	128	130	133	135	137	139	141	

CONF 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	68	70	72	74	76	78	
	V2 (kt IAS)	123	123	124	127	129	132	134	136	139	141	143	146	148	150	152	155	157	158	
	VR (kt IAS)	118	118	119	122	124	127	129	131	134	136	138	141	143	145	147	150	152	153	
	V1 (kt IAS)	114	114	114	114	114	114	114	114	117	119	121	124	126	128	130	133	135	136	

CONF 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	78
	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)	118	118	119	121	124	126	128	130	131	133	136	138	140	142	145	147	149	151	153

	V1 (kt IAS)	113	113	113	113	113	113	113	113	114	116	119	121	123	125	128	130	132	134	136

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	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	15.5 13.3	14.9 13.3	12.2 11.2	9.6 8.7	16.4 13.9	15.6 13.9	14.3 13.4	17.3 14.1	17.3 15.1	16.4 15.3

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	78	
	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		

CONF 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	78	
	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	114	116	118	120	123	125	127	130	132	134	136	139	141	142		

CONF 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	78	
	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	113	114	116	119	121	124	126	128	130	133	135	137	139	141	

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

- R
- R
- R
- 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 5700	2000 6500	2500 8000 and above
ΔWEIGHT (1000 kg) With clearway Without clearway	11.8 9.7	10.9 9.7	8.7 7.7	6.4 5.5	12.9 10.6	11.8 10.6	10.2 9.4	14.6 11.9	13.7 11.9	12.1 11.0

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	78
	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

CONF 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	78	
	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	

CONF 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	78	
	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

– Determine maximum takeoff weight on dry runway.

R – Apply the following weight decrement versus takeoff configuration, runway length and
R 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 Without cleaway	15.2 13.1	14.3 13.1	11.9 10.9	9.2 8.3	16.0 13.7	14.9 13.7	13.9 13.1	18.9 15.0	16.4 14.6	15.7 14.6

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<49.4	49.4	50	50 to 78															
	MTOW (1000 kg)	—	46.7	50	EQUAL TO CORRECT WEIGHT															
	ACTUAL WEIGHT (1000 kg)	<46.7	46.7	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)	116	116	116	116	118	121	123	126	128	130	133	135	137	140	142	144	146	148	

CONF 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	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)	120	120	123	125	128	130	132	135	137	139	142	144	146	148	151	153	154		
	V1 (kt IAS)	114	114	114	114	117	119	121	124	126	128	131	133	135	137	140	142	143		

CONF 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	70	72	74	76	78
	V2 (kt IAS)	124	124	126	129	130	131	133	136	138	141	143	145	147	150	152	154	156	158
	VR (kt IAS)	120	120	122	125	126	127	129	132	134	137	139	141	143	146	148	150	152	154
	V1 (kt IAS)	114	114	114	114	114	115	117	120	122	125	127	129	131	134	136	138	140	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 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.

CONF 1 + F	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

CONF 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		

CONF 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	2500 8000 and above
△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.

CONF 1 + F	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	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	

CONF 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	68	
	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	

CONF 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	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	113	115	117	120	122	124	126	128	130

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 Without clearway	13.3 13.3	9.2 9.2	6.9 6.9	6.3 6.3	15.7 14.4	12.7 12.7	10.2 10.2	15.6 14.6	13.5 12.5	11.8 11.8

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

CONF 1 + F	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

CONF 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	111	113	115	117	119	121	123	126	128	130	133	135	137	139		

CONF 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	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	16.1 16.1	15.6 15.6	14.4 14.4	12.3 12.3	18.6 17.3	17.0 17.0	15.6 15.6	18.6 17.6	17.2 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.

CONF 1 + F	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	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

CONF 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	76
	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

CONF 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	76	
	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
ΔWEIGHT (1000 kg) With clearway Without clearway	12.9 10.7	12.3 10.7	9.6 8.6	7.1 6.2	14.1 11.6	13.3 11.6	12.0 11.1	15.6 12.8	15.0 12.8	14.2 13.1

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	< 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	78
	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

CONF 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	78
	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

CONF 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	78
	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	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	18.8 16.6	18.2 16.6	16.3 15.3	14.7 13.8	17.6 14.5	17.6 15.9	17.2 16.3	19.0 16.2	18.4 16.2	18.2 17.1

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	64	66	68	70	72	74	76	78
	V2 (kt IAS)	123	123	125	126	129	131	135	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

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	66	68	70	72	74	76	78	
	V2 (kt IAS)	123	123	124	127	129	132	134	136	139	141	143	146	148	150	152	155	157	158	
	VR (kt IAS)	120	120	121	124	126	129	131	133	136	138	140	143	145	147	149	152	154	155	
V1 (kt IAS)	114	114	114	116	118	121	123	125	128	130	132	135	137	139	141	144	146	147		

CONF 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	64	66	68	70	72	74	76	78
	V2 (kt IAS)	123	123	124	125	126	129	131	133	136	138	141	143	145	147	150	152	154	156	158
	VR (kt IAS)	120	120	121	122	123	126	128	130	133	135	138	140	142	144	147	149	151	153	155
	V1 (kt IAS)	113	113	113	113	114	117	119	121	124	126	129	131	133	135	138	140	142	144	146

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

- R
- R
- R
- 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 5700	2000 6500	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	12.2 10.1	10.7 9.5	8.5 7.5	6.4 5.5	13.4 11.1	12.3 11.1	10.7 9.9	14.0 12.2	14.0 12.2	13.0 11.9

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	78
	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

CONF 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	78	
	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	

CONF 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	78	
	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	114	115	118	120	123	125	127	129	132	134	136	138	140	

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

— Determine maximum takeoff weight on dry runway.

R — Apply the following weight decrement versus takeoff configuration, runway and
R 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	2500 8000 and above
△WEIGHT (1000 kg) With clearway Without clearway	16.8 14.7	15.9 14.7	14.5 13.5	13.0 12.1	17.4 15.1	16.3 15.1	15.9 15.1	19.0 16.6	17.3 16.2	17.3 16.2

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<47	47	47 to 78															
	MTOW (1000 kg)	—	47	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

CONF 2	CORRECTED WEIGHT (1000 kg)	<48	48	48 to 78															
	MTOW (1000 kg)	—	48	EQUAL TO CORRECTED WEIGHT															
	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	

CONF 3	CORRECTED WEIGHT (1000 kg)	<48	48	48 to 78															
	MTOW (1000 kg)	—	48	EQUAL TO CORRECTED WEIGHT															
	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	6.4	6.1	2.9
Without clearway	5.6	5.6	5.6	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.

CONF 1 + F	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

CONF 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		

CONF 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	113	115	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 Without clearway	7.2 7.2	6.3 6.3	6.3 6.3	6.3 6.3	11.7 10.4	6.9 6.9	4.7 4.7	12.7 11.7	10.3 9.3	6.4 6.4

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<49	49	50	50 to 76														
	MTOW (1000 kg)	–	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	66	68	70	72	74	76
	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

CONF 2	CORRECTED WEIGHT (1000 kg)	<50.1	50.1	51.3	51.3 to 76															
	MTOW (1000 kg)	—	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	64	66	68	70	72	74	76
	V2 (kt IAS)	121	121	123	126	128	130	131	133	135	137	139	141	144	146	148	151	153	155	157
	VR (kt IAS)	117	117	119	122	124	126	127	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	122	125	127	129	132	134	136	138

CONF 3	CORRECTED WEIGHT (1000 kg)	< 51.5	51.5	52	53	53 to 76														
	MTOW (1000 kg)	—	46	49	53	EQUAL TO CORRECTED WEIGHT														
	ACTUAL WEIGHT (1000 kg)	<46	46	48	50	52	53	54	56	58	60	62	64	66	68	70	72	74	76	
	V2 (kt IAS)	121	121	124	126	129	130	131	133	135	137	139	142	144	146	148	151	153	154	
	VR (kt IAS)	117	117	120	122	125	126	127	129	131	133	135	138	140	142	144	147	149	150	
	V1 (kt IAS)	111	111	111	111	111	111	112	114	116	118	120	123	125	127	129	132	134	137	

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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 Without clearway	7.7 5.5	7.1 5.5	6.5 5.5	6.4 5.5	9.5 7.0	8.1 6.4	5.8 4.9	11.9 9.1	10.9 8.7	8.9 7.8

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	< 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	78
	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

CONF 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	78		
	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		

CONF 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	78	
	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

- R
- R
- R
- 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 5700	2000 6500	2500 8000 and above
ΔWEIGHT (1000 kg) With clearway Without clearway	7.6 5.5	7.4 5.5	7.4 5.5	6.4 5.5	9.1 6.8	8.7 5.7	4.9 4.1	11.9 9.5	8.5 7.9	7.7 6.6

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

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<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	66	68	70	72	74	76	78
	V2 (kt IAS)	124	124	126	129	131	132	134	136	139	141	143	146	148	150	153	155	157	159	161
	VR (kt IAS)	122	122	124	127	129	130	132	134	137	139	141	144	146	148	151	153	155	157	159
	V1 (kt IAS)	116	116	116	116	116	116	118	120	123	125	127	130	132	134	137	139	141	143	145

CONF 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	68	70	72	74	76	78	
	V2 (kt IAS)	124	124	127	129	132	133	134	136	139	141	143	146	148	150	152	155	157	158	
	VR (kt IAS)	119	119	122	124	127	128	129	131	134	136	138	141	143	145	147	150	152	153	
	V1 (kt IAS)	114	114	114	114	114	114	115	117	120	122	124	127	129	131	133	136	138	139	

CONF 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	68	70	72	74	76	78	
	V2 (kt IAS)	124	124	126	129	131	133	134	136	138	141	143	145	147	150	152	154	156	158	
	VR (kt IAS)	120	120	122	125	127	129	130	132	134	137	139	141	143	146	148	150	152	154	
	V1 (kt IAS)	114	114	114	114	114	114	114	116	118	121	123	125	127	130	132	134	136	138	

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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

- R – For contaminated runways, select MAX TO.
- R – Do not abort takeoff for minor deficiencies even at low speeds.
- R If you have to abort takeoff, maintain directional control with the rudder and small
- R inputs to the nose wheel. If necessary, use differential braking to regain the center
- R line when stopping distance permits.
- R – Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the
- R aircraft, because this produces additional aerodynamic drag.
- R – 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).

NFC5-02-04.10-014-A161AA

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.

NFC5-02-04.10-014-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 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

• 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

- R – For contaminated runways, select MAX TO.
- R – Do not abort takeoff for minor deficiencies even at low speeds.
- R If you have to abort takeoff, maintain directional control with the rudder and small
- R inputs to the nose wheel. If necessary, use differential braking to regain the center
- R line when stopping distance permits.
- R – Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the
- R aircraft, because this produces additional aerodynamic drag.
- R – 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)

NFC5-02-04.10-014-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.

NFC5-02-04.10-014-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	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

- 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**
- R — For contaminated runways, select MAX TO.
- R — Do not abort takeoff for minor deficiencies even at low speeds.
- R If you have to abort takeoff, maintain directional control with the rudder and small
- R inputs to the nose wheel. If necessary, use differential braking to regain the center
- R line when stopping distance permits.
- R — Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the
- R aircraft, because this produces additional aerodynamic drag.
- R — 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	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

- 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

- R – For contaminated runways, select MAX TO.
- R – Do not abort takeoff for minor deficiencies even at low speeds.
- R If you have to abort takeoff, maintain directional control with the rudder and small
- R inputs to the nose wheel. If necessary, use differential braking to regain the center
- R line when stopping distance permits.
- R – Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the
- R aircraft, because this produces additional aerodynamic drag.
- R – 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	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

• 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
0.0	68.8	3/4	69.9	4/4	71.2	4/4
	149/49/54		152/52/56		153/53/57	154/54/58
10.0	68.4	3/4	69.5	4/4	70.7	4/4
	148/48/52		150/50/54		152/52/57	153/53/58

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	2500 8000 and above
ΔWEIGHT (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

CONF	CORRECTED WEIGHT (1000 kg)	< 42	42	42 to 68												
	MTOW (1000 kg)	—	42	EQUAL TO CORRECTED WEIGHT												
1 + F	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	3/4	70.7	4/4	71.7	4/4	72.6	4/4	73.4	4/4
	152/52/55		153/53/56		154/54/56		155/55/58		155/55/58	
10	69.3	3/4	70.3	4/4	71.3	4/4	72.1	4/4	72.9	4/4
	152/52/55		152/52/55		153/53/56		154/54/57		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
ΔWEIGHT (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

CONF 1 + F	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	76
CONF 1 + F	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)

NFC5-02-04-10-015-B342AA

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).

NFC5-02-04-10-015-B342AA

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
Δ 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 :

NFC5-02-04-10-015-C342AA

CONF 1 + F	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	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)

NFC5-02-04-10-015-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
R correction displayed on the second line (without clearway).
R

NFC5-02-04-10-015-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
ΔWEIGHT (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 :

NFC5-02-04-10-015-C370AA

CONF 1 + F	CORRECTED WEIGHT (1000 kg)	<47	47	47 to 78																
	MTOW (1000 kg)	-	47	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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FERRY FLIGHT WITH NO SLATS	2.04.15	P 1
		SEQ 001	REV 20

FERRY FLIGHT WITH NO SLATS

TO BE ISSUED LATER

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 1
		SEQ 001	REV 21

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 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 2
		SEQ. 001	REV 20

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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 3
		SEQ 001	REV 27

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.

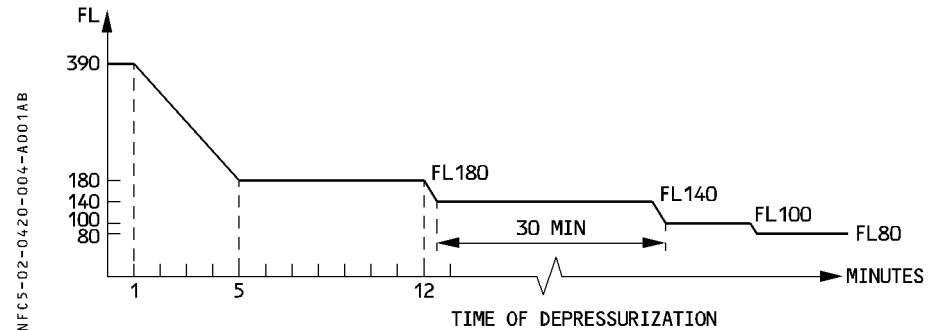
CLIMB AND DESCENT RATE

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.



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 3
		SEQ 001	REV 27

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.

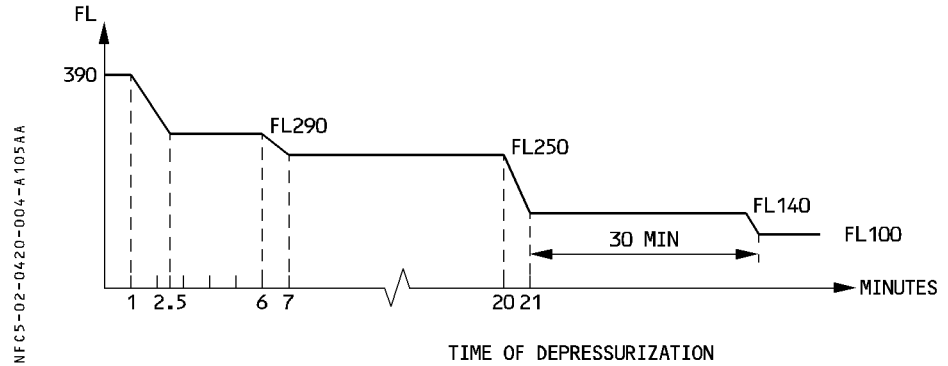
CLIMB AND DESCENT RATE

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.



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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 5a
		SEQ. 001	REV 36

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 6
		SEQ 001	REV 21

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).

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 6
		SEQ 110	REV 21

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 110 kg or 240 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).

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITHOUT CAB PRESSURIZATION	2.04.20	P 6
		SEQ 252	REV 38

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 110 kg or 240 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).

A318/A319/A320/A321	SPECIAL OPERATIONS	2.04.20 P 7	
	FLIGHT WITHOUT CAB PRESSURIZATION	SEQ 140	REV 28
FLIGHT CREW OPERATING MANUAL			

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			ISA		FUEL CONSUMED (KG)		
ANTI-ICING OFF			CG = 25.0%		TIME (H.MIN)		
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)						
	50	55	60	65	70	75	80
220	1883 0.55	1955 0.54	2033 0.53	2119 0.53	2211 0.52	2306 0.50	2392 0.50
240	2025 0.59	2103 0.58	2187 0.57	2279 0.57	2378 0.55	2480 0.54	2571 0.53
260	2166 1.04	2251 1.02	2341 1.01	2440 1.00	2545 0.59	2653 0.57	2750 0.56
280	2307 1.08	2399 1.07	2495 1.05	2600 1.04	2711 1.03	2827 1.01	2928 0.59
300	2448 1.13	2546 1.11	2649 1.09	2760 1.08	2878 1.07	3000 1.04	3106 1.02
320	2589 1.17	2693 1.15	2802 1.13	2919 1.12	3044 1.10	3173 1.07	3284 1.06
340	2729 1.21	2840 1.19	2956 1.17	3079 1.16	3210 1.14	3345 1.11	3462 1.09
360	2870 1.26	2987 1.24	3109 1.21	3238 1.20	3376 1.18	3518 1.14	3640 1.12
380	3010 1.30	3133 1.28	3262 1.26	3397 1.24	3542 1.22	3690 1.18	3818 1.15
400	3150 1.35	3279 1.32	3414 1.30	3556 1.28	3707 1.25	3862 1.21	3995 1.19
420	3290 1.39	3426 1.36	3567 1.34	3714 1.32	3872 1.29	4034 1.25	4173 1.22
440	3429 1.44	3572 1.40	3719 1.38	3872 1.36	4037 1.33	4205 1.28	4350 1.25
460	3569 1.48	3717 1.45	3871 1.42	4031 1.39	4202 1.37	4376 1.32	4527 1.29
480	3708 1.53	3863 1.49	4023 1.46	4188 1.43	4367 1.41	4547 1.35	4704 1.32
500	3847 1.57	4008 1.53	4175 1.50	4346 1.47	4531 1.44	4718 1.39	4880 1.35
520	3986 2.01	4153 1.57	4326 1.54	4503 1.51	4695 1.48	4889 1.42	5057 1.38
540	4125 2.06	4298 2.02	4478 1.58	4661 1.55	4859 1.52	5059 1.46	5233 1.42
560	4264 2.10	4443 2.06	4629 2.02	4818 1.59	5023 1.56	5229 1.49	5410 1.45
580	4402 2.15	4588 2.10	4780 2.06	4974 2.03	5187 1.59	5399 1.53	5586 1.48
600	4541 2.19	4733 2.15	4931 2.10	5131 2.07	5350 2.03	5568 1.57	5762 1.52
620	4679 2.24	4877 2.19	5081 2.14	5288 2.11	5513 2.07	5738 2.00	5938 1.55
640	4817 2.28	5021 2.23	5232 2.19	5444 2.15	5676 2.11	5907 2.04	6113 1.58
660	4955 2.33	5165 2.27	5382 2.23	5600 2.19	5839 2.15	6076 2.07	6289 2.02
680	5092 2.37	5309 2.32	5532 2.27	5756 2.23	6001 2.19	6245 2.11	6464 2.05
700	5230 2.42	5452 2.36	5682 2.31	5912 2.27	6164 2.22	6413 2.15	6639 2.08
AIR CONDITIONING OFF ΔFUEL = - 1.5 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %		TOTAL ANTI ICE ON ΔFUEL = + 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

A318/A319/A320/A321	SPECIAL OPERATIONS	2.04.20 P 7	
		SEQ 153	REV 38

FLIGHT CREW OPERATING MANUAL

FLIGHT WITHOUT CAB PRESSURIZATION

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 ANTI ICE OFF				ISA CG=25.0%		FUEL CONSUMED (KG) 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 CONDITONNING 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			ISA		FUEL CONSUMED (KG)		
ANTI-ICING OFF			CG = 25.0%		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 ΔFUEL = - 1.5 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %		TOTAL ANTI ICE ON ΔFUEL = + 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

- R
R
R

- Do not fly into expected icing conditions.
 - Ditching with the landing gear down has not been demonstrated.
 - Disregard FM fuel predictions. Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
 - Do not use managed speed (except in approach) and CLB and DES autopilot modes.
 - 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-MM0 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.

- 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
R 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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 1
		SEQ 100	REV 30

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, R 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-MM0 switch must be set to the «L/G DOWN» position.

INTENTIONALLY LEFT BLANK

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 3
		SEQ 050	REV 39

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.

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

R resulting from this all engine flame out situation, it is recommended to use the ENG DUAL

R 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

R 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**

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 3
		SEQ 080	REV 37

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
R resulting from this all engine flame out situation, it is recommended to use the ENG DUAL
R 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
R 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.

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS FLIGHT WITH GEAR DOWN	2.04.25	P 3
		SEQ 080	REV 37

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
R resulting from this all engine flame out situation, it is recommended to use the ENG DUAL
R 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
R 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.

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 %

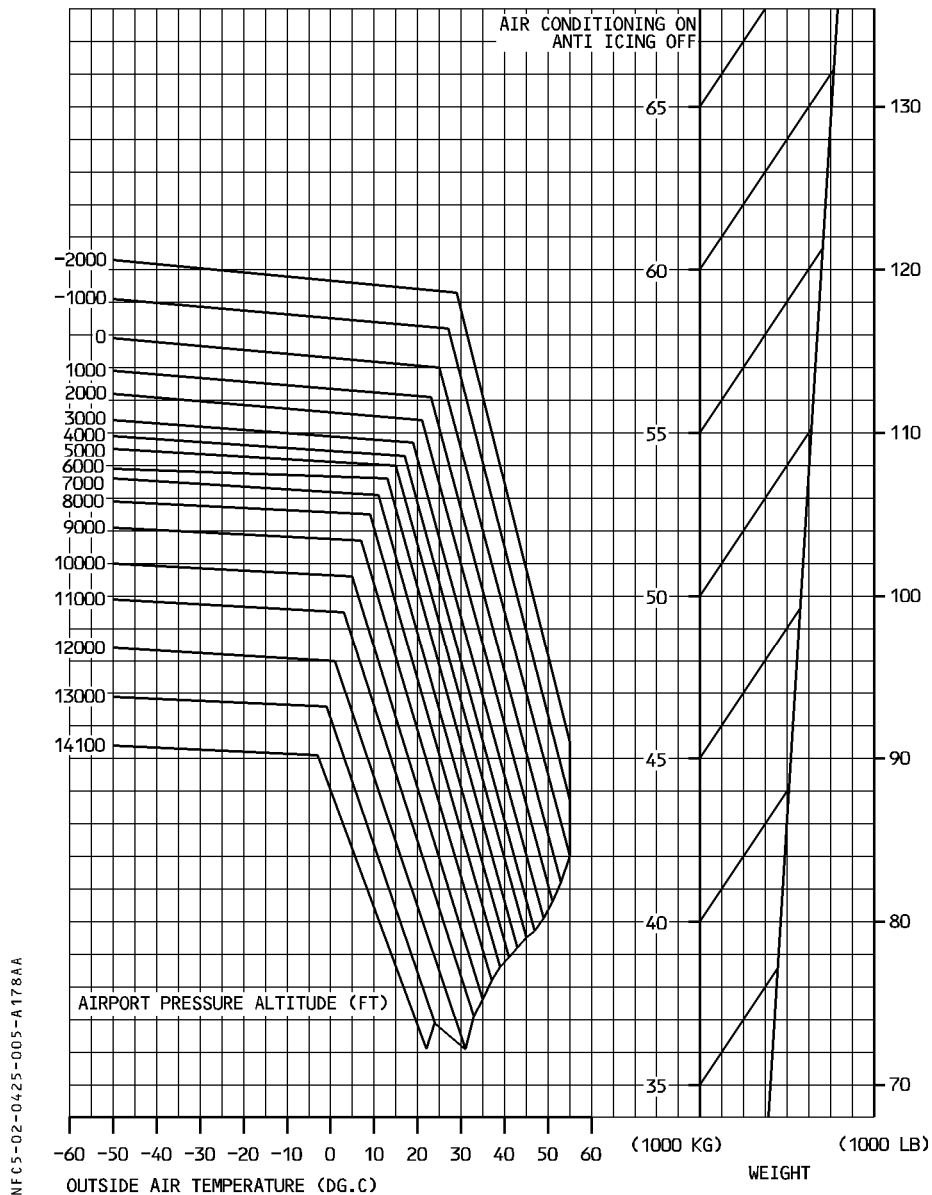
METHOD

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.



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS		2.04.25	P 6
	FLIGHT WITH GEAR DOWN		SEQ 063	REV 38

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

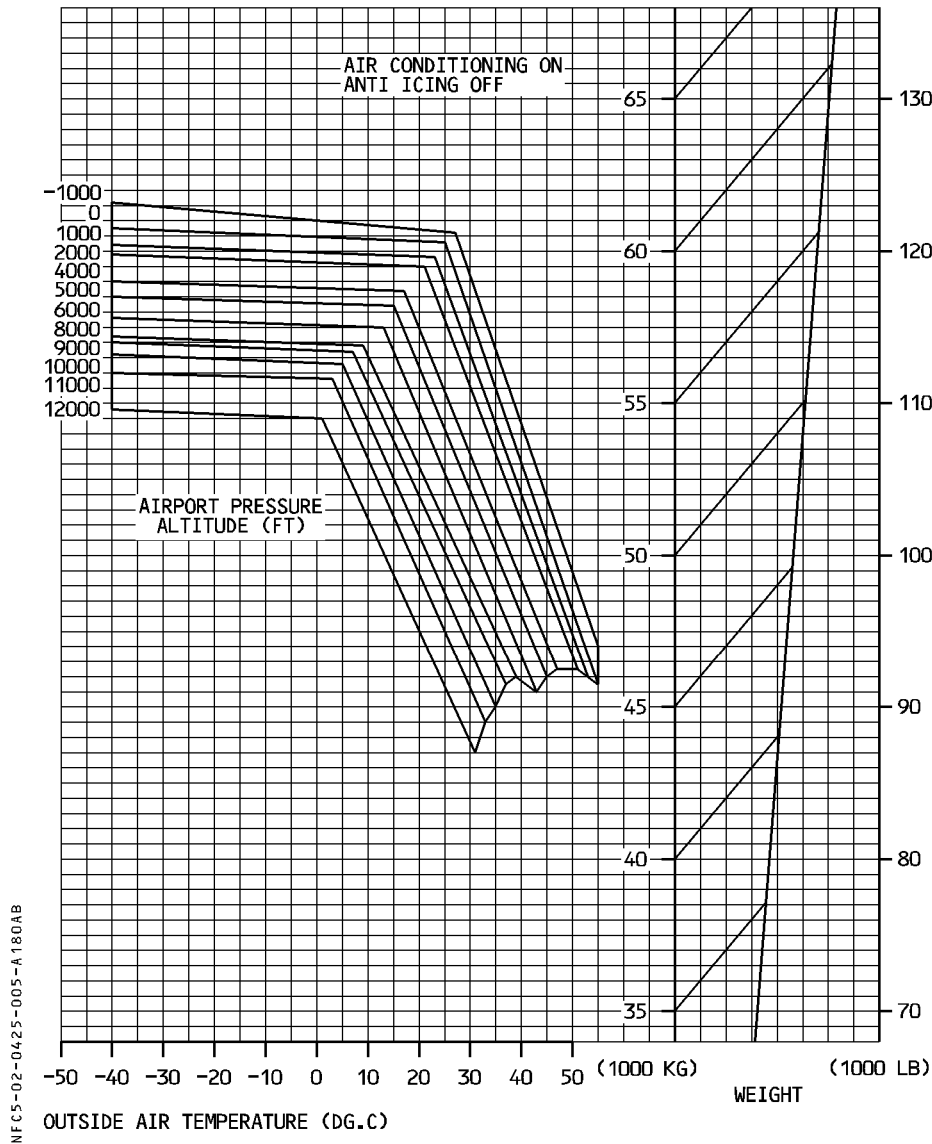
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

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		2.04.25	P 6
	FLIGHT WITH GEAR DOWN		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

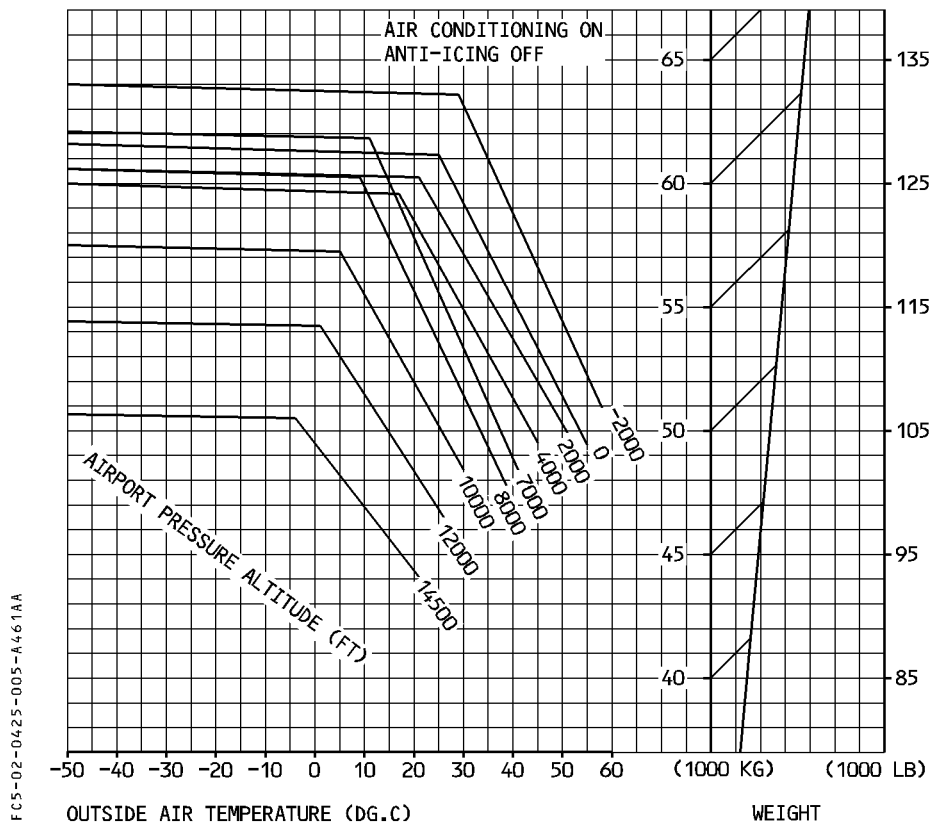
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

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		2.04.25	P 6
	FLIGHT WITH GEAR DOWN		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

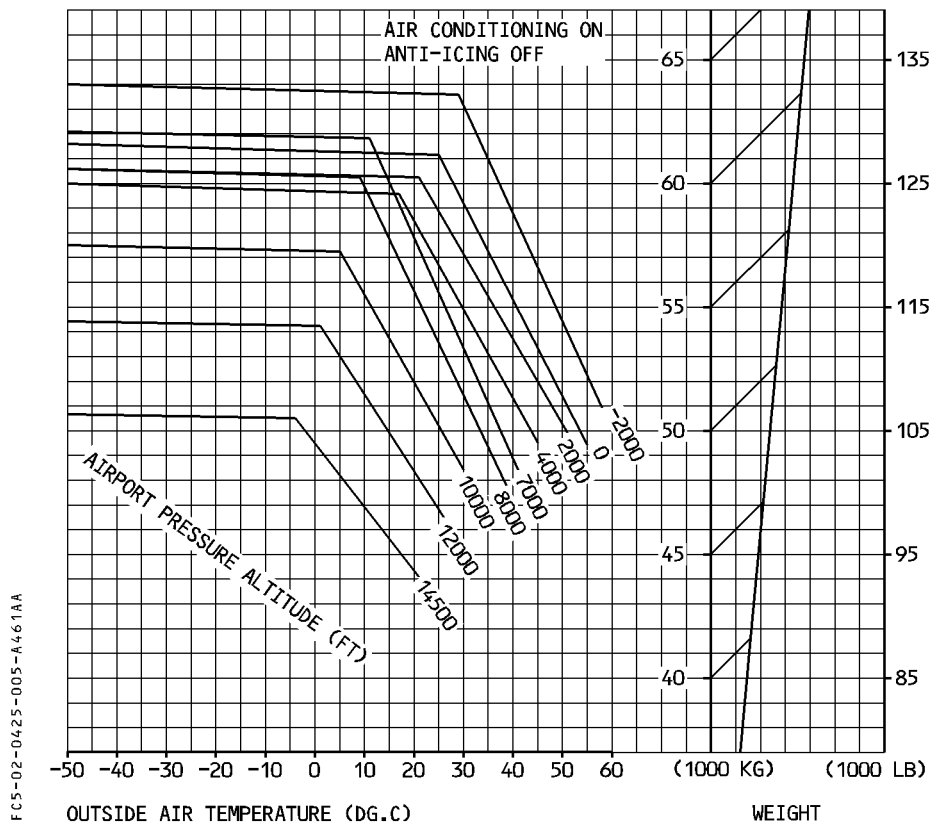
In case of engine failure, the airplane will drift down to the ceiling shown on page 12.
The thrust for drift down will be Maximum Continuous.
The drift down speed is equal to green dot speed.

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		2.04.25	P 6
	FLIGHT WITH GEAR DOWN		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	31 2387	38 2867	47 3556					
	123 282	146 283	178 285	226 287					
270	23 1864	28 2183	33 2586	40 3133					
	110 280	130 282	155 283	191 285					
250	22 1735	25 2028	30 2393	36 2886					
	100 279	118 280	141 282	172 284					
240	21 1675	24 1958	29 2310	35 2785					
	96 278	113 279	135 281	166 283					
220	19 1557	23 1822	27 2152	33 2599					
	89 276	105 277	125 279	154 282					
200	17 1388	20 1620	24 1909	29 2299					
	77 272	91 274	109 276	133 278					
180	13 1076	14 1228	17 1403	19 1612	22 1882	27 2274			
	55 260	63 262	73 263	84 265	100 266	123 269			
160	10 864	11 976	13 1102	14 1244	16 1417	19 1641	22 1944	25 2137	
	41 250	46 251	53 252	60 254	69 255	81 257	97 259	107 260	
140	8 703	9 789	10 883	11 989	12 1111	14 1262	16 1448	17 1557	
	31 240	35 241	39 242	44 244	50 245	57 246	66 248	71 249	
120	6 575	7 643	8 717	9 797	9 890	11 1000	12 1131	13 1205	
	24 230	26 231	30 233	33 234	37 235	42 236	48 238	51 238	
100	5 467	5 520	6 577	7 640	7 711	8 793	9 889	10 942	
	18 220	20 221	22 223	25 224	28 225	31 226	35 228	37 228	
50	2 240	3 265	3 292	3 321	3 353	4 389	4 429	4 451	
	7 182	8 184	9 186	10 188	11 189	12 191	14 193	14 194	
15	1 104	1 113	1 123	1 133	1 145	1 157	2 170	2 176	
	2 104	2 106	2 108	2 110	3 111	3 113	3 114	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 .417 1837 230 72.4 266	82.6 .500 1862 223 82.2 306	82.6 .500 1729 214 87.8 303	82.6 .500 1610 205 93.5 301	83.1 .500 1507 197 99.0 298	83.7 .500 1424 188 103.9 296
44	74.2 .417 1848 230 71.9 266	82.9 .500 1876 223 81.5 306	82.9 .500 1745 214 87.0 303	83.1 .500 1631 205 92.3 301	83.7 .500 1535 197 97.2 298	84.5 .500 1456 188 101.6 296
46	74.4 .417 1860 230 71.5 266	83.2 .500 1892 223 80.9 306	83.2 .500 1764 214 86.0 303	83.6 .500 1655 205 91.0 301	84.3 .500 1565 197 95.4 298	85.2 .500 1490 188 99.3 296
48	74.6 .417 1872 230 71.0 266	83.4 .500 1908 223 80.2 306	83.6 .500 1785 214 85.0 303	84.2 .500 1682 205 89.5 301	85.0 .500 1597 197 93.4 298	86.1 .500 1527 188 96.9 296
50	74.7 .417 1885 230 70.5 266	83.7 .500 1927 223 79.4 306	84.1 .500 1809 214 83.9 303	84.7 .500 1712 205 87.9 301	85.7 .500 1631 197 91.5 298	87.0 .500 1568 188 94.4 296
52	74.9 .417 1899 230 70.0 266	84.1 .500 1948 223 78.5 306	84.6 .500 1836 214 82.6 303	85.4 .500 1744 205 86.3 301	86.4 .500 1666 197 89.6 298	88.0 .500 1613 188 91.7 296
54	75.1 .417 1915 230 69.4 266	84.5 .500 1971 223 77.6 306	85.1 .500 1866 214 81.3 303	86.0 .500 1778 205 84.7 301	87.2 .500 1707 197 87.4 298	
56	75.3 .417 1931 230 68.8 266	84.9 .500 1997 223 76.6 306	85.7 .500 1898 214 80.0 303	86.7 .500 1812 205 83.1 301	88.1 .500 1750 197 85.3 298	
58	75.5 .417 1950 230 68.2 266	85.5 .500 2027 223 75.5 306	86.3 .500 1930 214 78.6 303	87.4 .500 1851 205 81.3 301	89.1 .500 1797 197 83.0 298	
60	75.8 .417 1971 230 67.5 266	85.9 .500 2058 223 74.3 306	86.9 .500 1965 214 77.2 303	88.2 .500 1893 205 79.5 301	90.0 .500 1844 197 80.9 298	
62	76.1 .417 1994 230 66.7 266	86.5 .500 2091 223 73.2 306	87.5 .500 2000 214 75.9 303	89.0 .500 1938 205 77.7 301		
64	76.4 .417 2017 230 65.9 266	87.0 .500 2124 223 72.0 306	88.2 .500 2041 214 74.3 303	89.9 .500 1984 205 75.8 301		
66	76.7 .417 2042 230 65.1 266	87.6 .500 2158 223 70.9 306	88.9 .500 2083 214 72.8 303	90.8 .500 2032 205 74.1 301		
68	77.0 .417 2068 230 64.3 266	88.2 .500 2195 223 69.7 306	89.7 .500 2129 214 71.3 303	91.7 .500 2084 205 72.2 301		

R

CLIMB 230KT/M.50 - ALL ENGINES - L/G DOWN									
MAX. CLIMG 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	24 1889	26 2037	29 2206	31 2404				
	104 280	113 281	123 281	135 282	148 283				
270	20 1604	21 1713	23 1835	24 1972	27 2129	29 2314	32 2532		
	91 277	98 278	105 279	114 280	124 281	137 282	151 283		
250	17 1456	18 1550	20 1651	21 1763	23 1890	25 2036	27 2206	29 2404	
	79 274	84 275	90 276	97 277	105 277	114 278	125 279	137 280	
240	16 1384	17 1469	18 1562	20 1664	21 1778	23 1909	24 2058	27 2231	29 2433
	73 272	78 273	83 274	89 275	96 275	104 276	113 277	124 278	136 280
220	14 1234	15 1306	16 1383	17 1466	18 1557	19 1661	20 1776	22 1906	24 2052
	62 268	66 268	70 269	74 269	79 270	85 271	92 272	99 273	107 274
200	12 1082	12 1142	13 1205	14 1272	15 1345	16 1426	17 1515	18 1612	19 1719
	51 261	54 261	57 262	60 262	64 263	68 264	73 264	78 265	84 266
180	10 921	10 969	11 1020	11 1073	12 1130	13 1193	13 1260	14 1332	15 1410
	40 251	42 251	45 252	47 252	50 253	53 253	56 254	59 255	63 255
160	8 785	8 825	9 866	9 910	10 956	10 1006	11 1059	11 1115	12 1175
	32 241	34 242	35 242	37 243	39 243	41 244	44 244	46 245	49 245
140	7 668	7 702	7 736	8 772	8 810	8 850	9 893	9 938	10 985
	25 232	27 232	28 233	29 233	31 234	33 234	34 235	36 235	38 236
120	5 565	6 593	6 621	6 651	7 682	7 715	7 750	8 787	8 824
	20 222	21 223	22 223	23 224	24 224	26 225	27 225	28 226	30 226
100	4 472	5 494	5 518	5 542	5 567	6 594	6 622	6 652	6 682
	16 212	16 213	17 213	18 214	19 214	20 215	21 215	22 216	23 216
50	2 261	3 273	3 285	3 298	3 311	3 325	3 340	3 355	3 370
	7 175	7 176	8 177	8 178	9 178	9 179	9 180	10 180	10 181
15	1 123	1 128	1 133	1 139	1 145	1 151	1 157	2 163	2 170
	2 108	2 109	2 110	2 110	3 111	3 112	3 113	3 113	3 114

11.0-08FOA320-232 IAE V2527-A5 2110100C5KG250 0 018590 0 0 2 1.0 500.0 300.00 1 02230.000 .500 .000 0 FCOM-NO-02-04-25-007-160

R

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									

11.0-08F0A320-232 IAE V2527-A5 12101000C5KG250 0 018590 0 0 1 1.0 .0 0 02230.000 .500 .000 0 FCOM-NO-02-04-25-008-160

R

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	19 1530	22 1755	27 2049					
	79 277	90 279	105 280	125 282					
270	15 1240	17 1399	20 1588	23 1820	27 2129				
	69 275	79 276	90 278	105 279	125 281				
250	13 1134	15 1273	17 1434	19 1624	22 1864	27 2184			
	61 272	68 273	78 274	89 276	104 277	124 279			
240	13 1081	14 1210	16 1359	18 1532	21 1746	24 2022			
	56 270	64 271	72 272	82 274	94 275	111 277			
220	11 969	12 1081	14 1207	15 1350	17 1520	20 1728	23 1999		
	48 265	54 266	60 267	68 268	77 270	89 271	105 274		
200	9 853	10 948	11 1054	13 1172	14 1307	16 1465	18 1659	21 1906	
	40 257	44 259	49 260	55 261	62 262	70 263	80 265	94 268	
180	8 729	8 807	9 894	10 988	11 1094	13 1215	14 1354	16 1520	18 1725
	31 247	35 249	39 250	43 251	48 252	54 253	60 254	68 256	78 258
160	6 623	7 690	8 761	8 839	9 925	10 1021	11 1128	13 1251	14 1395
	25 237	28 239	31 240	34 241	38 242	42 243	46 244	52 246	58 247
140	5 533	6 589	6 649	7 714	8 785	8 863	9 949	10 1044	11 1152
	20 227	22 229	24 230	27 231	30 232	33 233	36 234	40 236	45 237
120	4 454	5 501	5 551	6 605	6 664	7 728	8 797	8 873	9 956
	16 217	18 219	19 220	21 221	24 222	26 223	28 224	31 226	34 228
100	4 381	4 420	4 462	5 506	5 555	6 607	6 662	7 722	7 788
	12 206	14 208	15 210	17 211	18 212	20 213	22 214	24 216	27 217
50	2 217	2 238	2 260	3 285	3 311	3 338	3 367	4 398	4 431
	6 169	6 171	7 173	8 175	8 176	9 177	10 179	11 181	12 183
15	1 108	1 118	1 128	1 139	1 151	2 163	2 176	2 189	2 203
	2 105	2 107	2 109	2 110	3 112	3 113	3 115	3 118	4 120

R

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									

R

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	188
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

R

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=25.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
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

R

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				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR		IAS (KT)
290	7.6	83	35	IDLE	8.9	97	41	IDLE	188
270	7.0	77	32	IDLE	8.2	91	38	IDLE	197
250	6.4	72	29	IDLE	7.6	84	34	IDLE	205
240	6.2	69	28	IDLE	7.3	81	33	IDLE	210
220	5.7	64	25	IDLE	6.7	76	30	IDLE	219
200	5.2	59	23	IDLE	6.2	70	27	IDLE	228
180	4.7	55	21	IDLE	5.6	64	25	IDLE	230
160	4.2	49	18	IDLE	5.0	58	22	IDLE	230
140	3.7	43	16	IDLE	4.3	51	19	IDLE	230
120	3.1	37	13	IDLE	3.7	44	16	IDLE	230
100	2.6	31	11	IDLE	3.0	36	13	IDLE	230
50	1.1	14	4	IDLE	1.3	16	5	IDLE	230
15	.0	0	0	IDLE	.0	0	0	IDLE	230

R

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=25.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
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

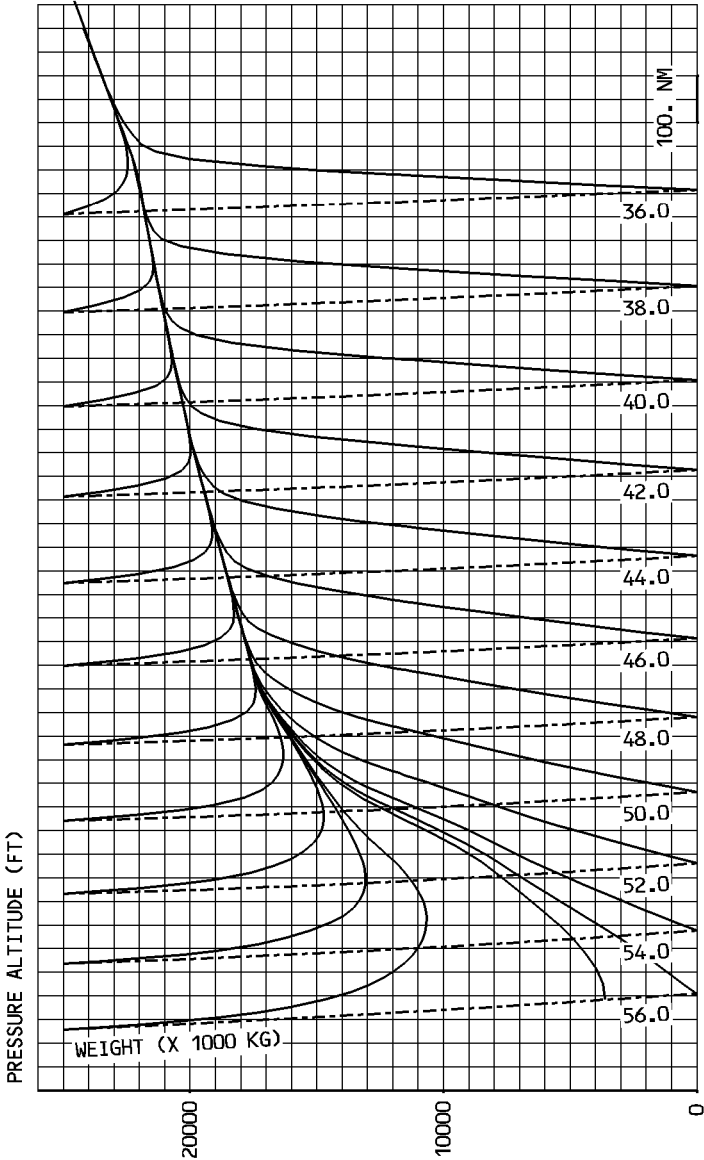
MINIMUM ENGINE

HIGH AIR CONDITIONING

CG = 25 %

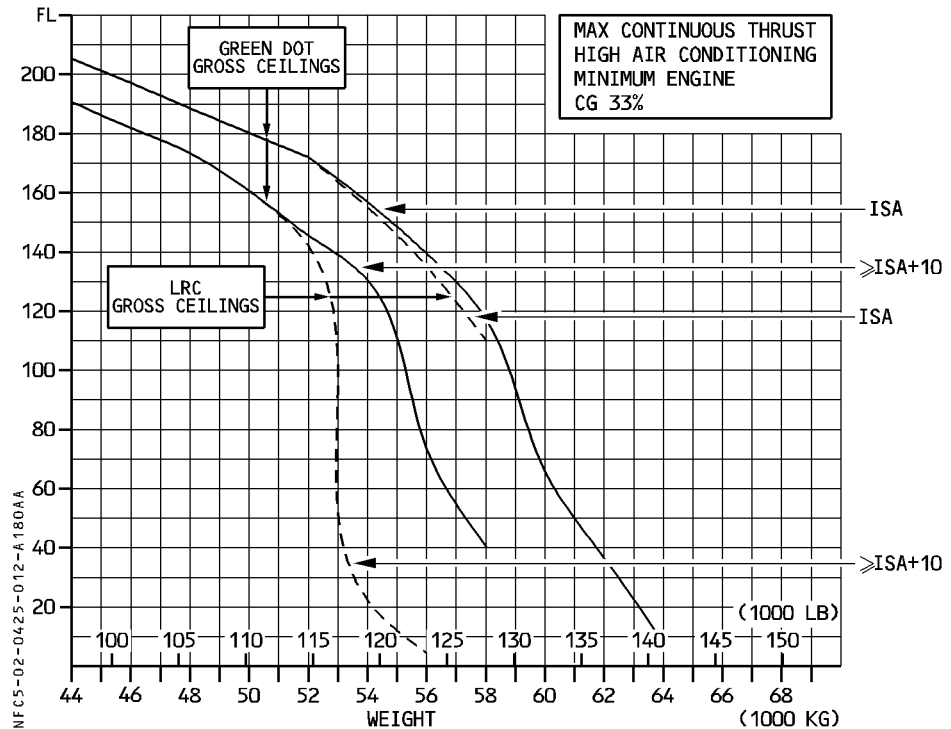
ANTI ICE OFF

NFC5-02-0425-011-A170AA



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

R



BLEED CORRECTIONS

R

		ISA	≥ ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	- 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

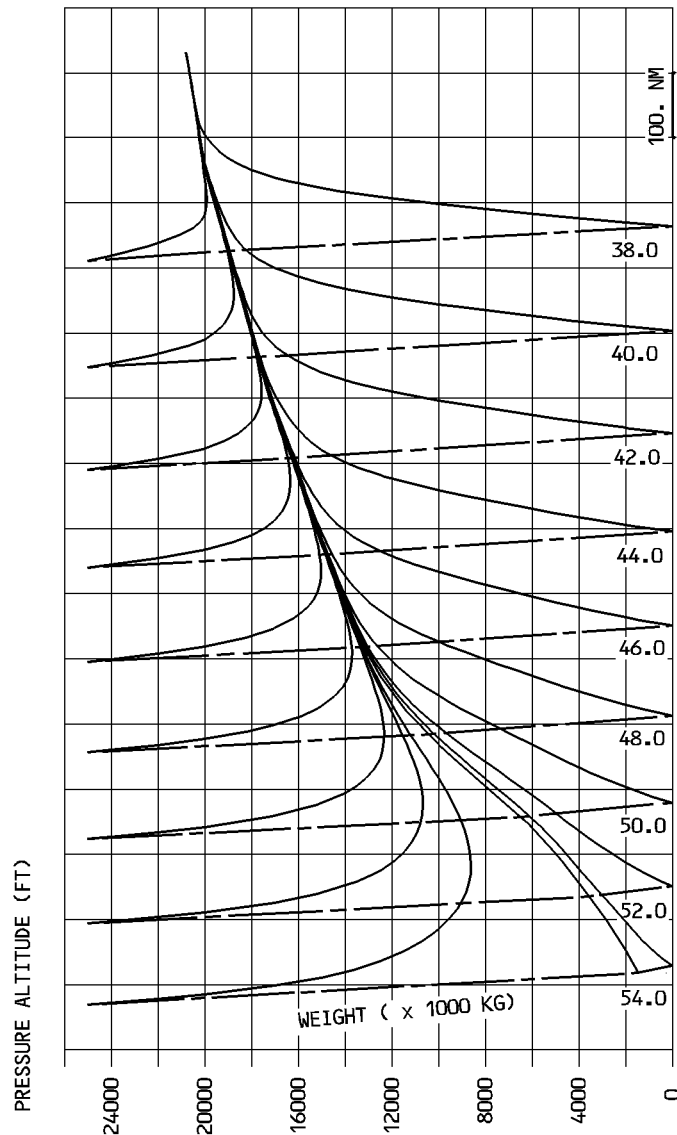
ISA

HIGH AIR CONDITIONING

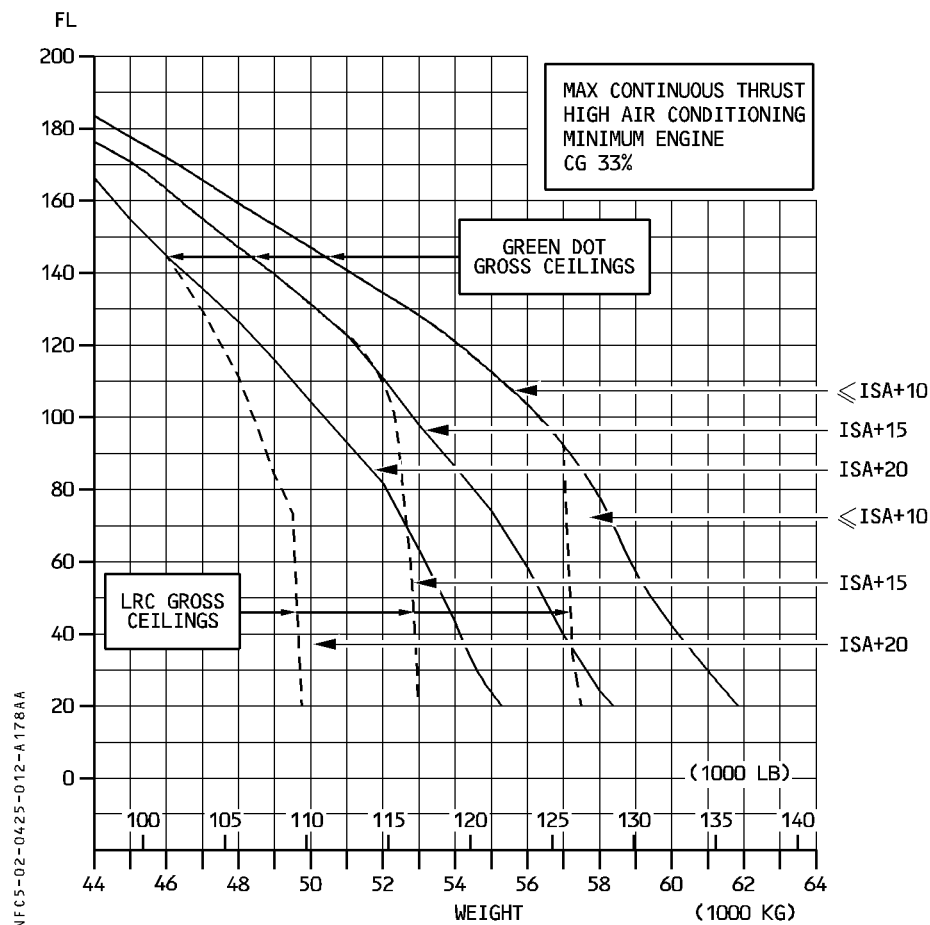
MINIMUM ENGINE

ANTI ICE OFF

CG = 25 %



NFC5-02-0425-011-A178AA

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

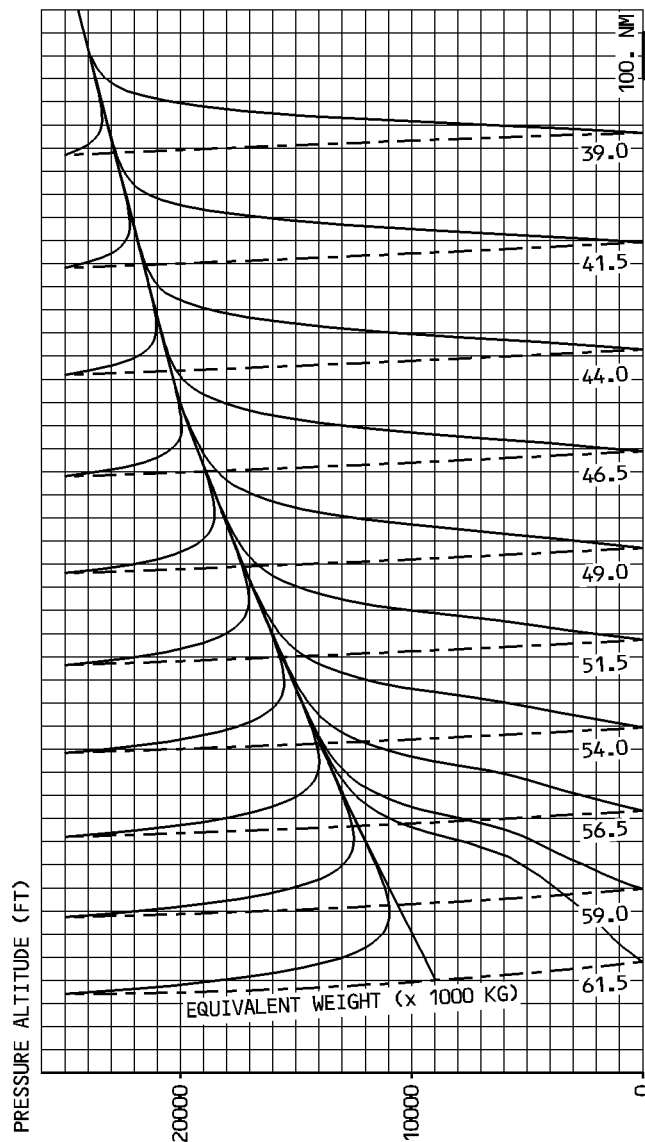
ISA

HIGH AIR CONDITIONING

CG = 23 %

MINIMUM ENGINE

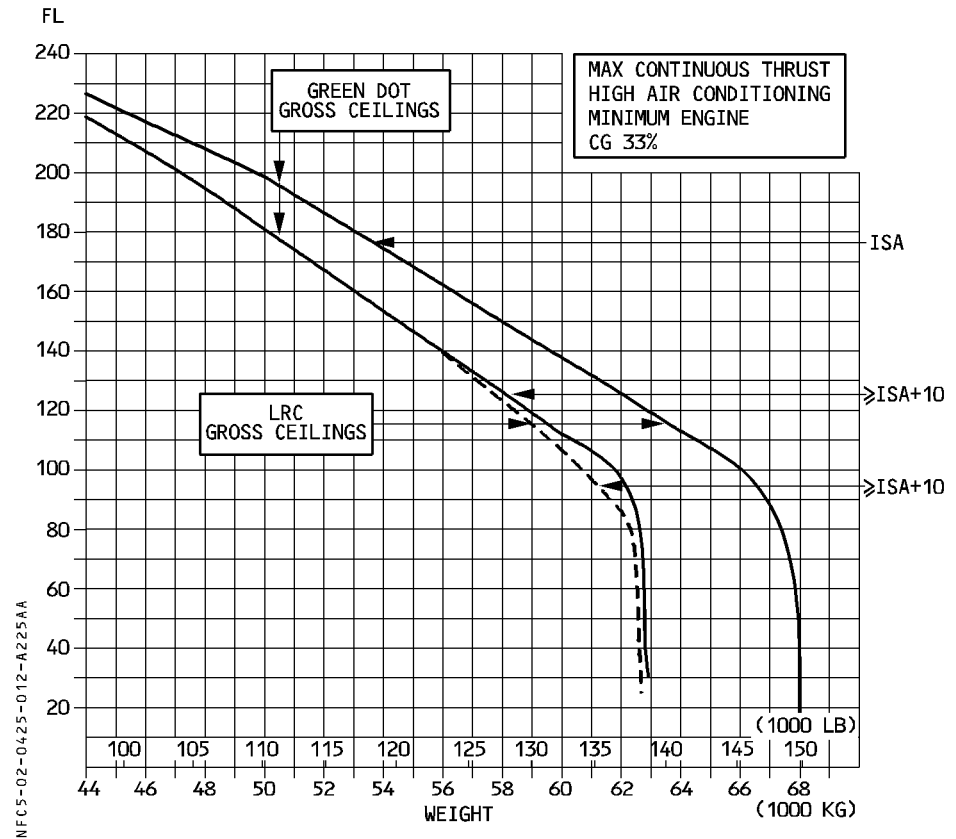
ANTI ICE OFF



NFC5-02-0425-011-A260AA

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

R



BLEED CORRECTIONS

R

		ISA	≥ ISA + 10
LONG RANGE	ENGINE ANTI ICE ON	- 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.

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*
- R *12000 ft in flight, at least one pilot must use the oxygen mask continuously.*
- 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

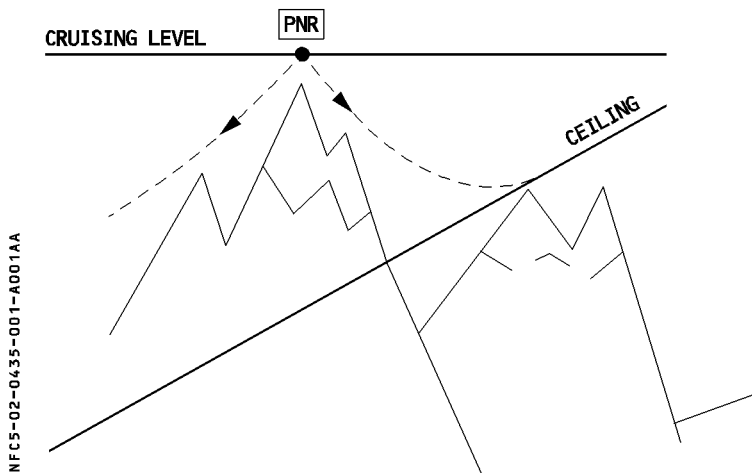
Two failures must be taken into consideration for en route obstacle clearance over mountainous area :

- 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
- R 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.
- If the aircraft in these circumstances cannot clear the obstacles on the route, a PNR must be determined and diversion procedures must be established.

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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.

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DISPATCH CONSIDERATION

M MEL

The M MEL 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 M MEL 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.

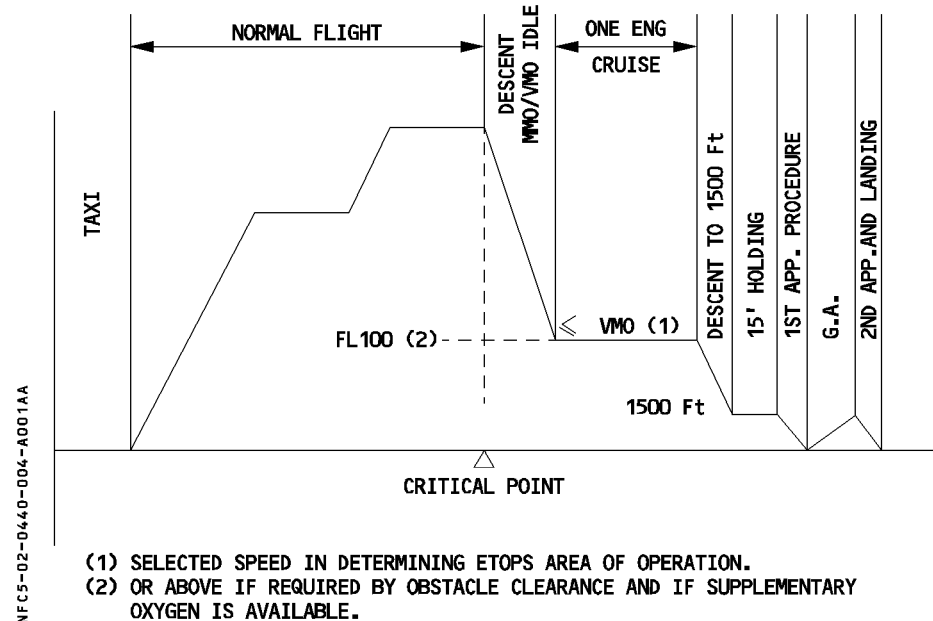
The operator must establish a routine for ETOPS critical fuel planning and compare it with the standard (non-ETOPS) fuel planning.

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**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.

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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

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- 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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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 :

- 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).

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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.

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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.

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 :

- 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.

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- Divert to the chosen enroute alternate.
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Note : For detailed guidelines and procedures in conducting the diversion (lateral and vertical navigation), see the FMGS Pilot’s Guide (FCOM Volume 4).

PROCEDURES

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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.

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		SEQ 010	REV 31

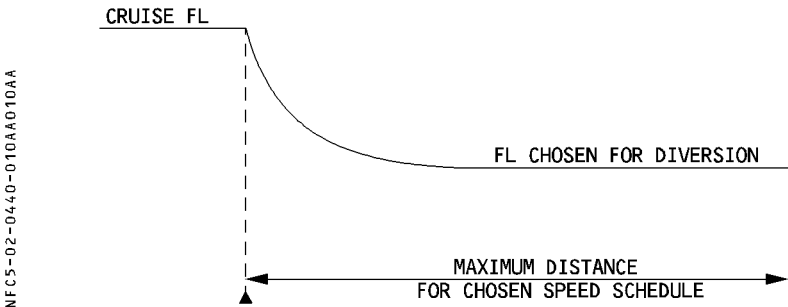
ENGINE OR IDG FAILURE

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



ENGINE OR IDG FAILURE

Start the APU and use the APU electrical channel.

PERFORMANCE

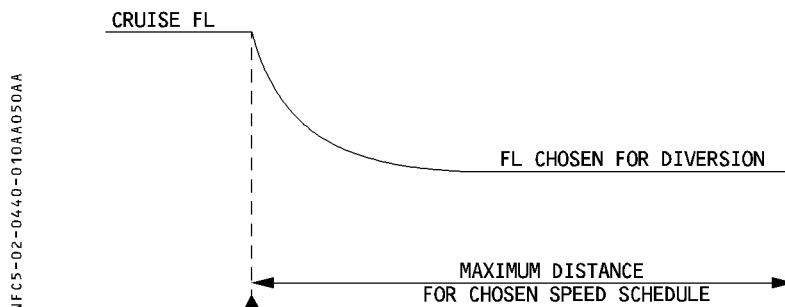
ONE ENGINE NET CEILINGS

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



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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

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		SEQ 102	REV 38

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS EXTENDED RANGE OPERATIONS	2.04.40	P 10b
		SEQ 107	REV 38

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS EXTENDED RANGE OPERATIONS	2.04.40	P 10b
		SEQ 200	REV 39

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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS	2.04.40	P 10b
	EXTENDED RANGE OPERATIONS	SEQ 202	REV 38

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	180
MCT/VM0	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	180
MCT/VM0	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

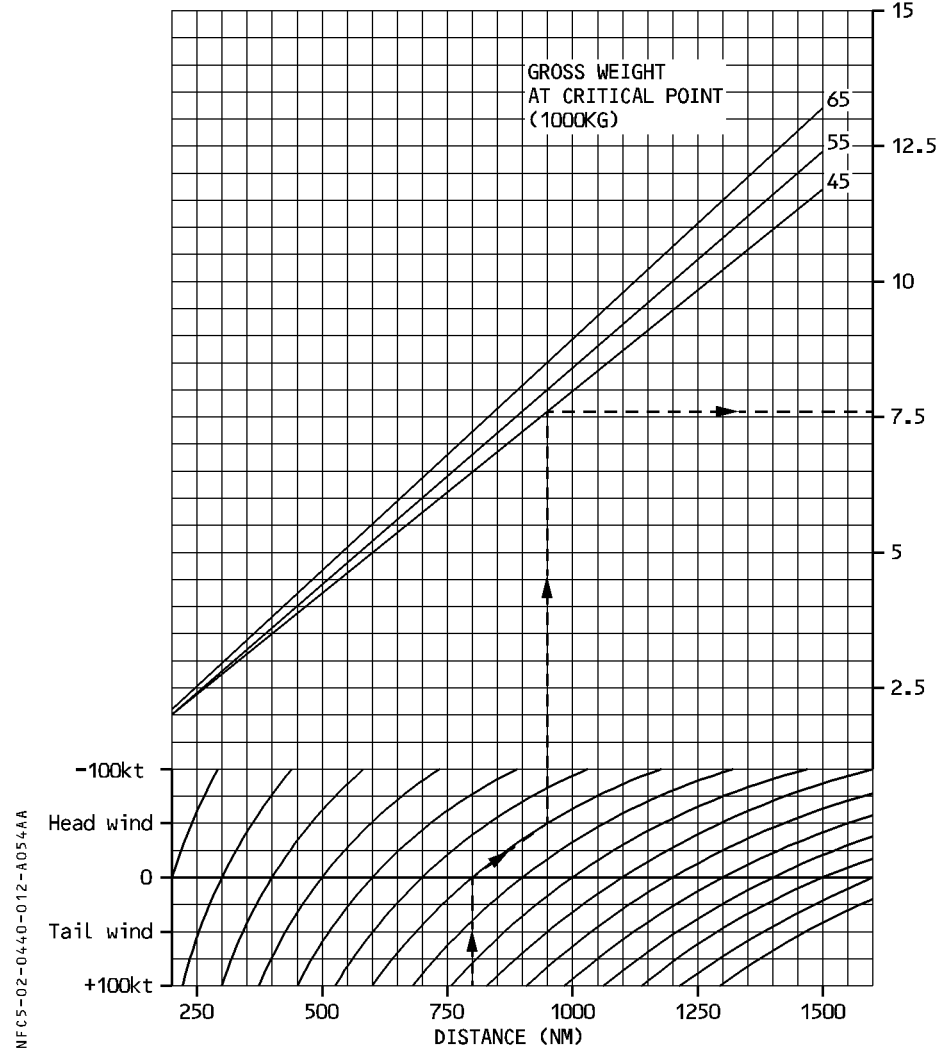
final descent 250kt—holding 15 min at FL15

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)



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS EXTENDED RANGE OPERATIONS	2.04.40	P 11
		SEQ 165	REV 31

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	180
MCT/VM0	45000	170	414	616	819	-	-
	50000	170	413	615	817	1019	1221
	55000	160	413	614	814	1015	1216
	60000	160	413	612	812	1012	1212
	65000	150	412	610	809	1008	1207
	70000	140	412	609	806	1004	1202
MCT/320 KT	45000	170	414	616	819	-	-
	50000	170	413	615	817	1019	1221
	55000	160	413	614	814	1015	1215
	60000	160	413	612	812	1012	1212
	65000	150	412	610	807	1005	1203
	70000	150	411	608	805	1002	1200

ISA + 10							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/VM0	45000	170	422	628	—	—	—
	50000	170	422	627	832	1038	1244
	55000	170	421	625	830	1035	1240
	60000	170	420	623	827	1031	1235
	65000	170	418	620	823	1025	1229
	70000	150	419	619	820	1021	1223
MCT/320KT	45000	170	422	628	—	—	—
	50000	170	422	627	832	1038	1244
	55000	170	421	625	830	1035	1240
	60000	170	420	623	827	1031	1235
	65000	170	418	620	823	1026	1229
	70000	150	417	617	818	1019	1221

ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING

ALL ENGINES—LONG RANGE CRUISE

Including: emergency descent—long range cruise at FL100

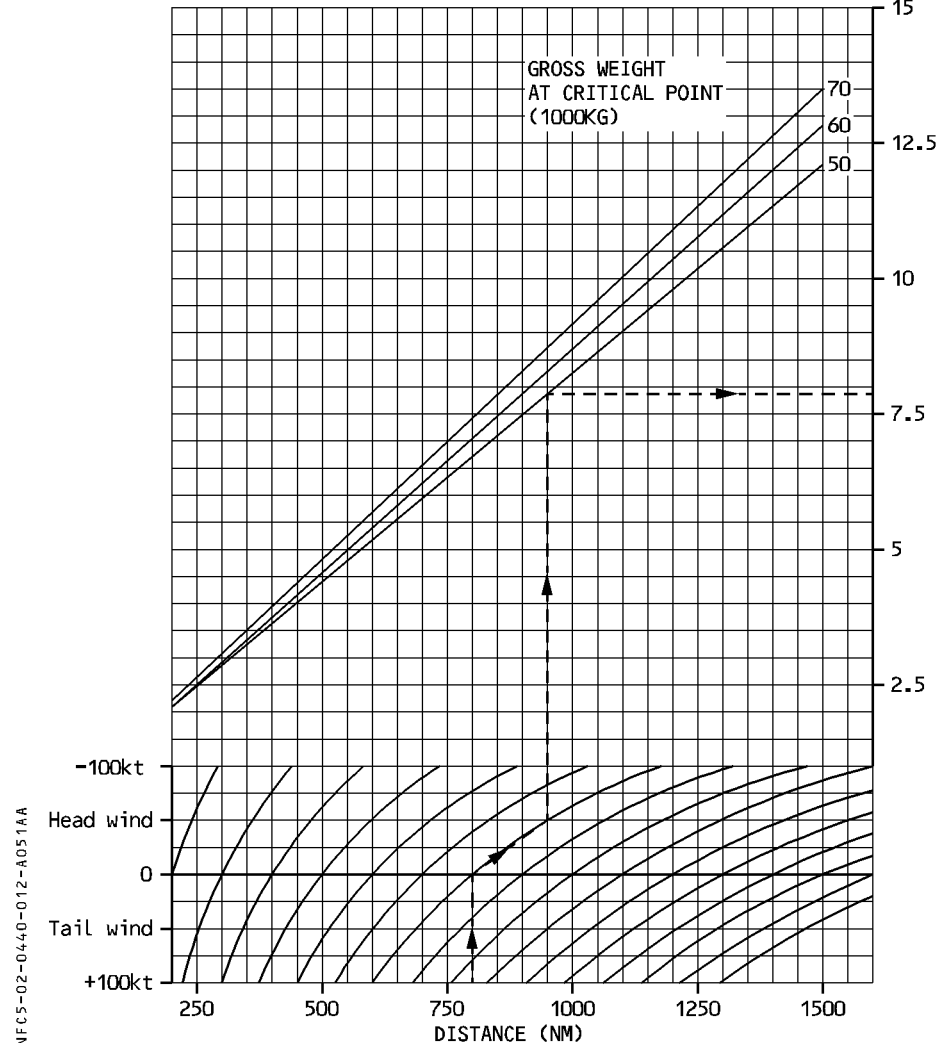
final descent 250kt—holding 15 min at FL15

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)



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS EXTENDED RANGE OPERATIONS	2.04.40	P 11
		SEQ 225	REV 38

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	180
MCT/VM0	50000	210	427	637	847	1057	1267
	55000	200	428	636	845	1054	1263
	60000	200	426	634	841	1049	1257
	65000	180	427	633	840	1046	1253
	70000	170	427	631	836	1042	1247
	75000	150	427	630	833	1037	1241
	80000	130	426	628	830	1032	1235
MCT/320KT	50000	210	427	637	847	1057	1267
	55000	200	426	635	843	1053	1262
	60000	200	425	632	840	1048	1256
	65000	190	423	629	835	1042	1249
	70000	180	421	626	831	1036	1242
	75000	170	419	622	825	1029	1232
	80000	160	416	617	817	1018	1219

ISA + 10							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/VM0	50000	220	434	648	861	1075	1289
	55000	200	436	648	860	1073	1286
	60000	200	434	645	857	1069	1281
	65000	180	436	645	855	1065	1276
	70000	170	435	643	852	1061	1270
	75000	160	434	640	847	1055	1263
	80000	130	434	639	845	1051	1257
MCT/320KT	50000	220	435	648	862	1076	1290
	55000	210	434	646	859	1072	1285
	60000	200	433	644	855	1067	1279
	65000	190	431	641	851	1061	1272
	70000	180	429	637	846	1055	1264
	75000	170	427	633	840	1048	1255
	80000	160	424	629	833	1037	1242

R

ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING

ALL ENGINES—LONG RANGE CRUISE

Including: emergency descent—Long range cruise at FL100

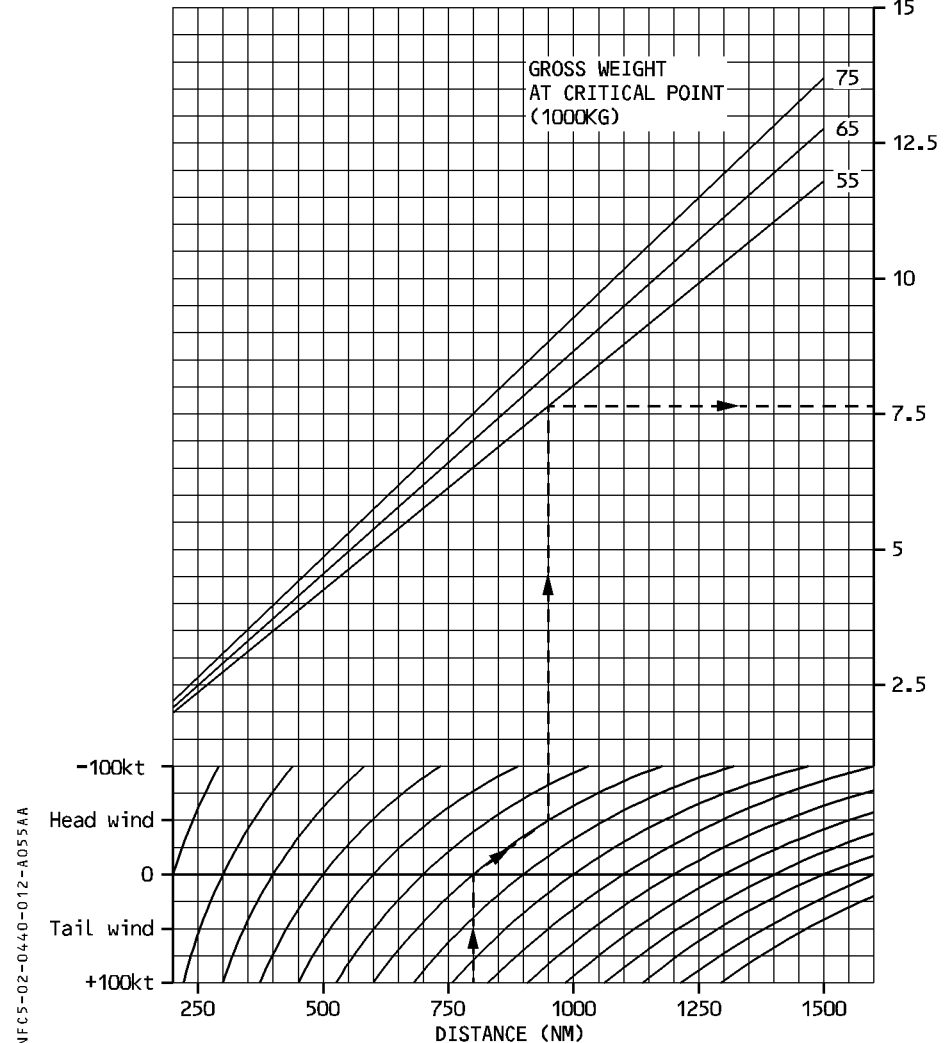
final descent 250kt—holding 15 min at FL15

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)



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS EXTENDED RANGE OPERATIONS	2.04.40	P 11
		SEQ 226	REV 38

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	180
MCT/VM0	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

ISA + 10							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/VM0	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

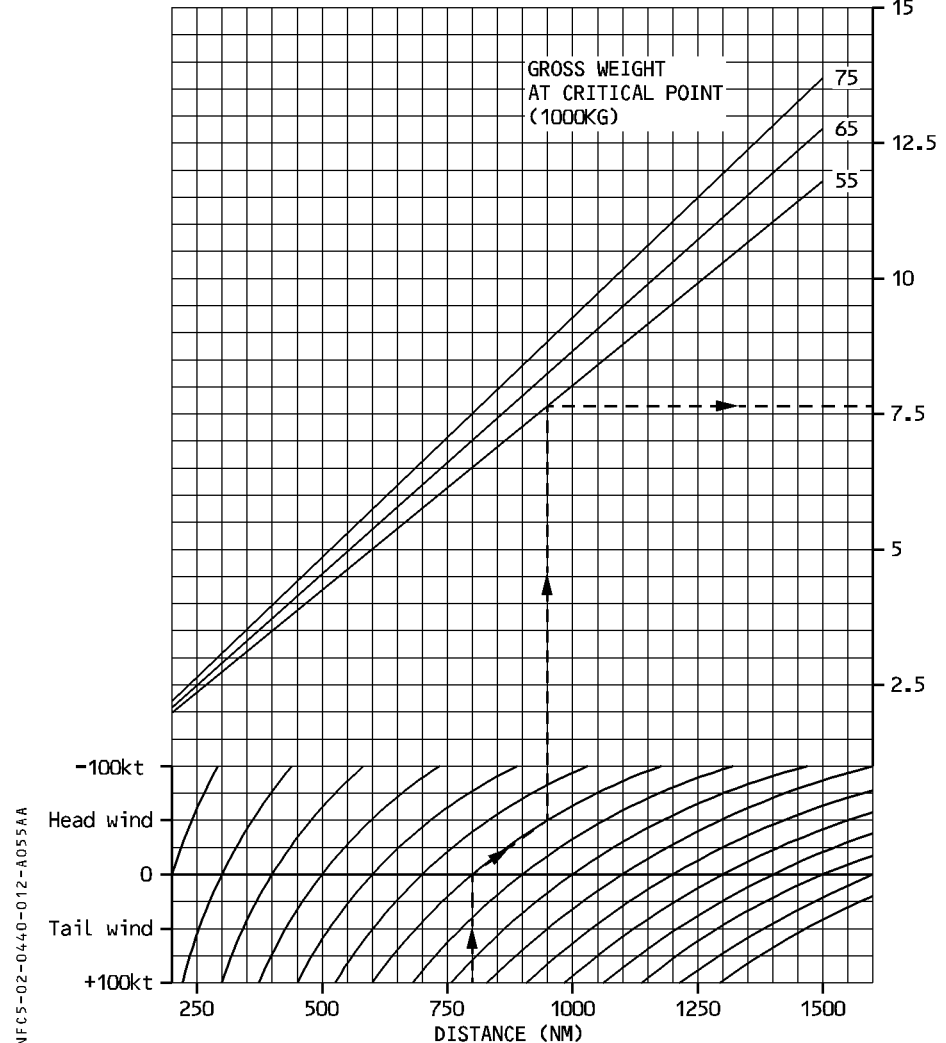
final descent 250kt—holding 15 min at FL15

IFR procedure—Go Around—2nd VFR procedure

5% allowance for wind errors

(NAI + WAI + effect of ice accretion + performance factor not included)

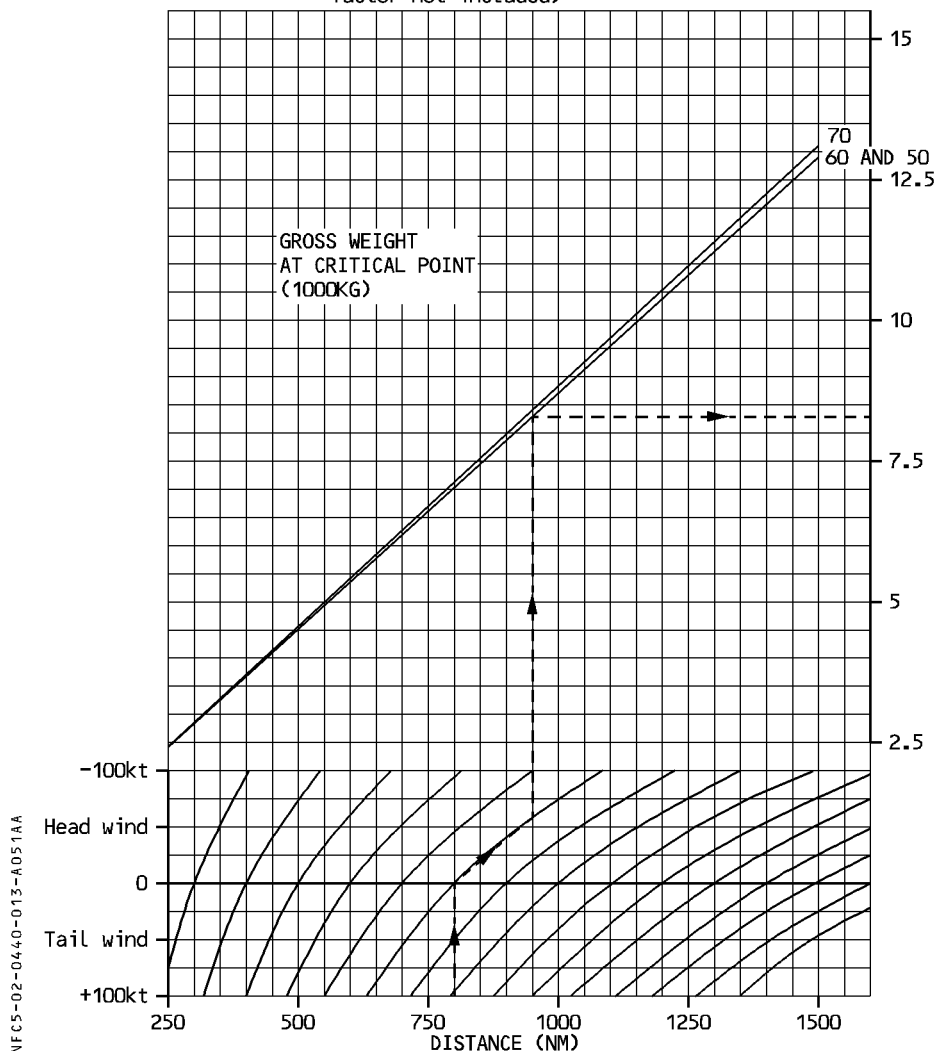
FUEL
CONSUMPTION
(1000KG)



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)



NFCS-02-0440-013-A051AA

ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING ONE ENGINE OUT-CRUISE AT 320KT

Including: emergency descent-cruise 320kt at FL100

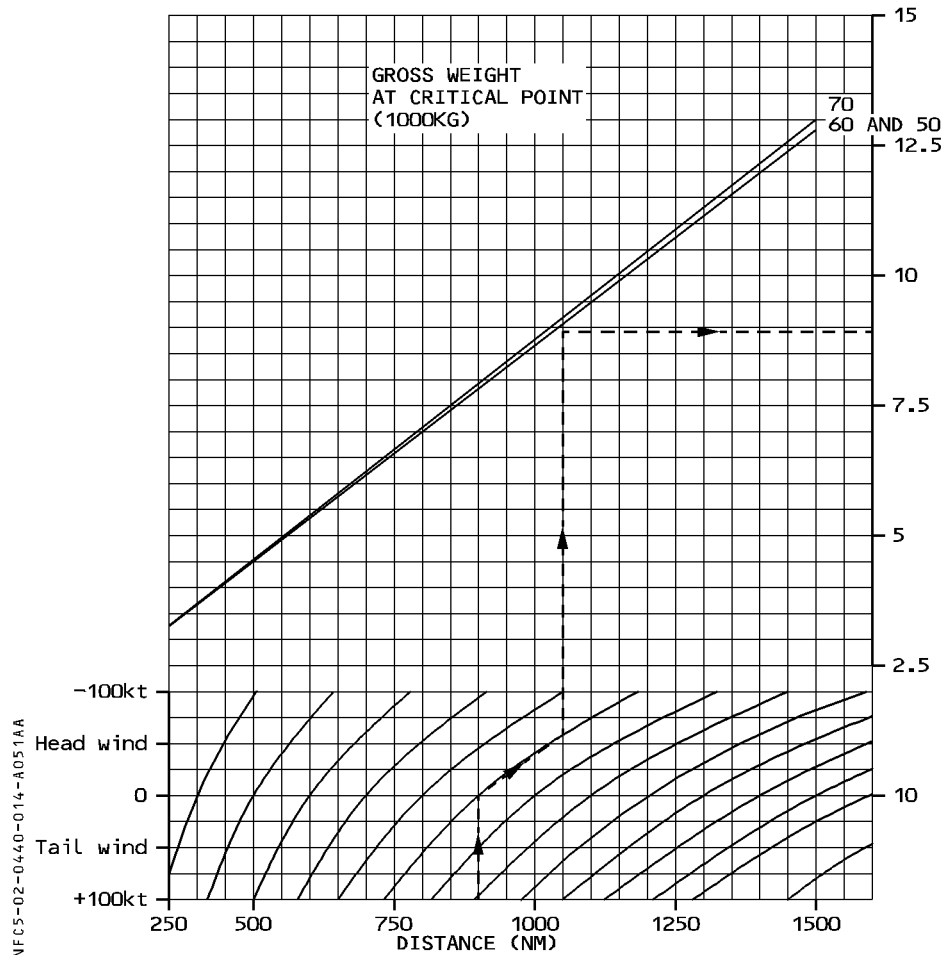
final descent 250kt-holding 15 min at FL15

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)

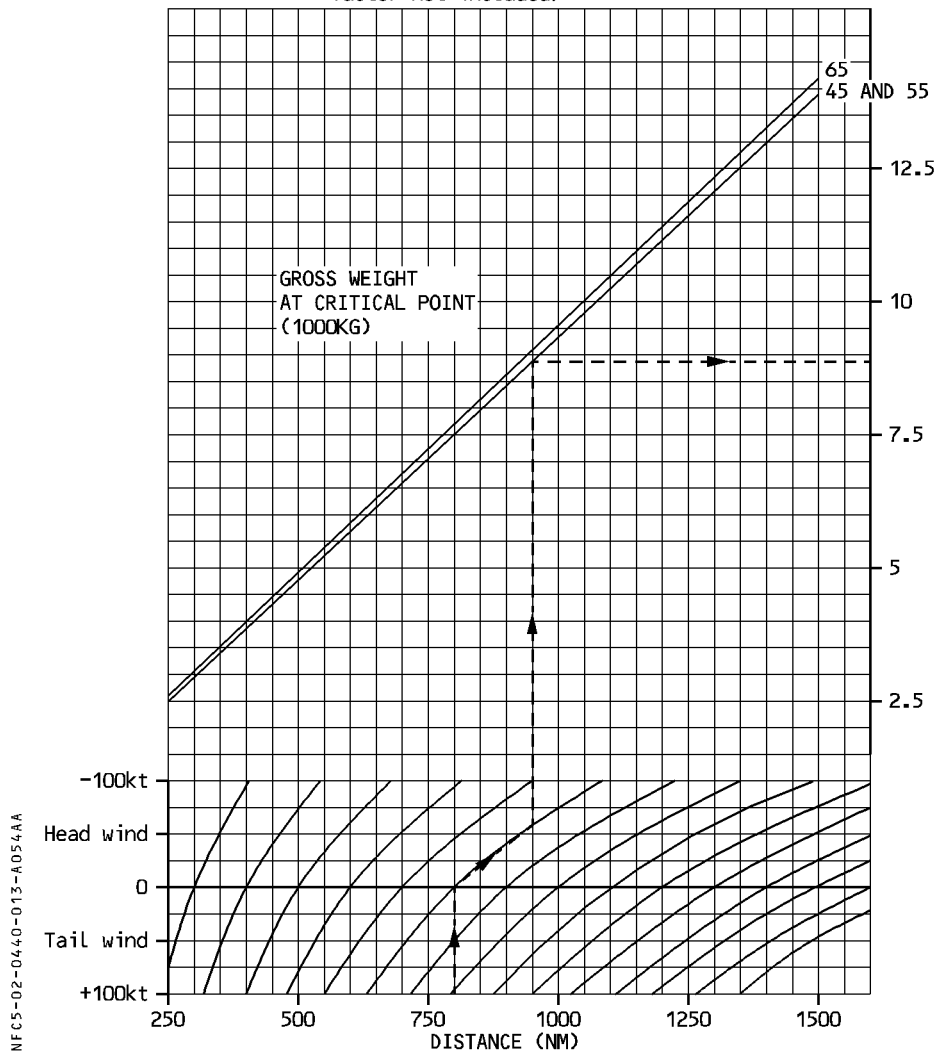
FUEL
CONSUMPTION
(1000KG)



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)

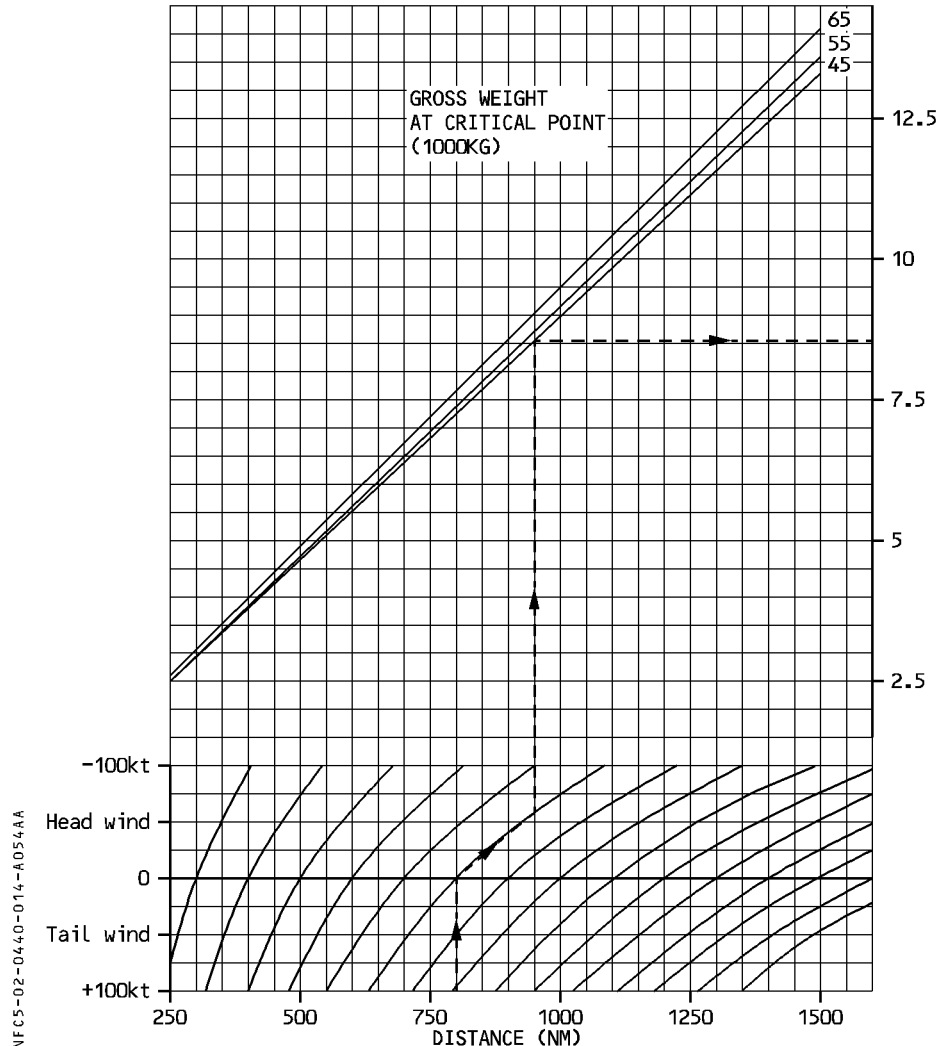


NFCS-02-0440-013-A054AA

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)

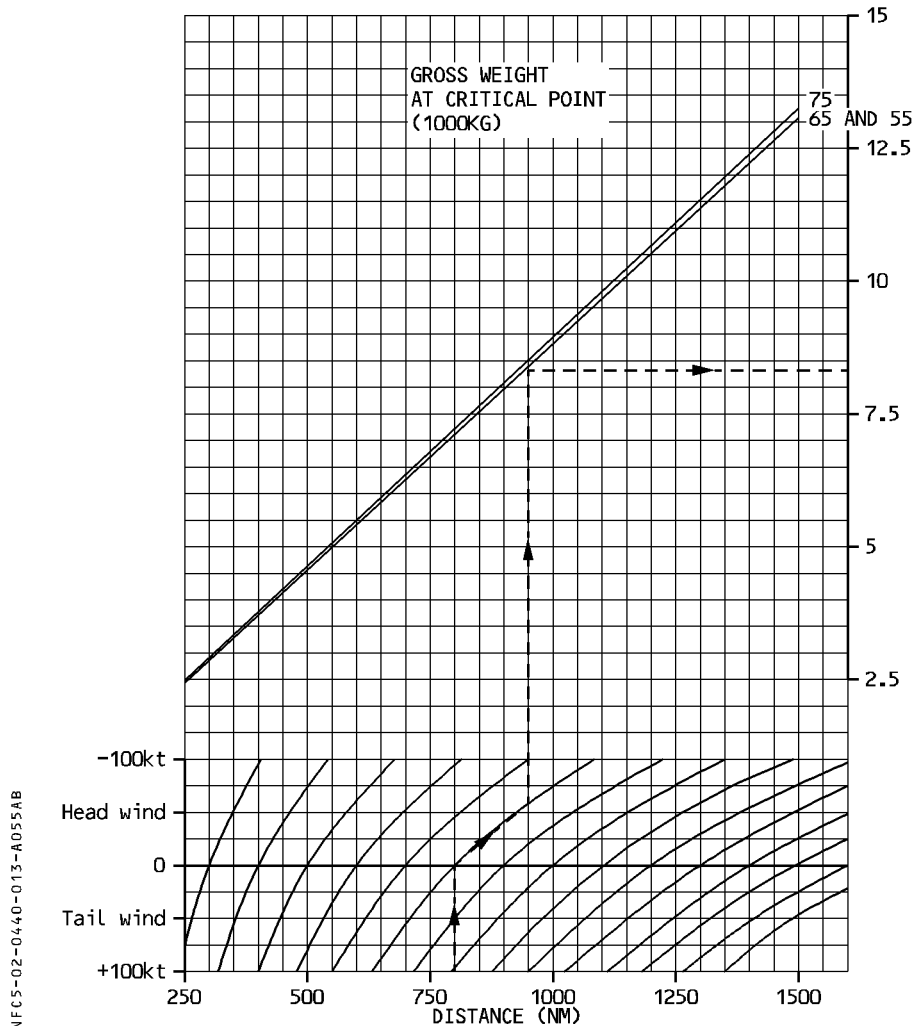
FUEL
CONSUMPTION
(1000KG)



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)

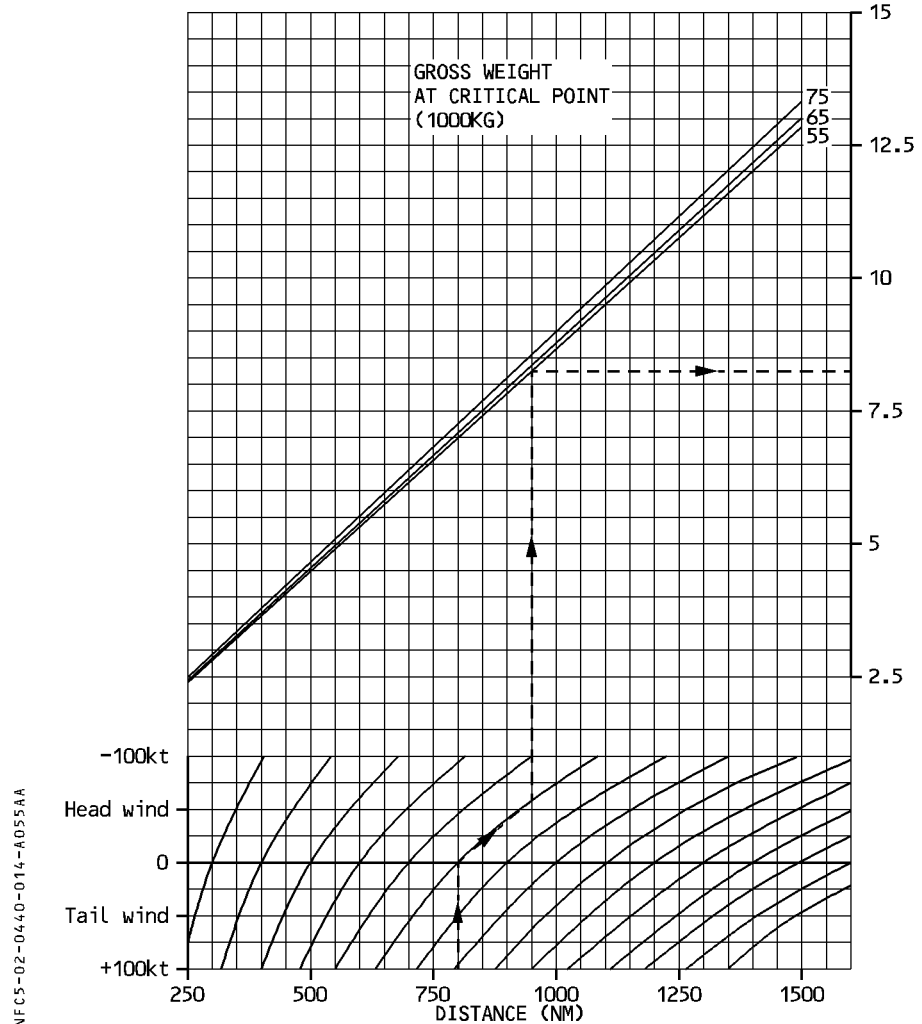
FUEL
CONSUMPTION
(1000KG)



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)

FUEL
CONSUMPTION
(1000KG)



NFC5-02-0440-014-A055AA

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS RVSM	2.04.50	P 1
		SEQ 110	REV 38

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)
- 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".

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS RVSM	2.04.50	P 2
		SEQ 205	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 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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS RVSM	2.04.50	P 1
		SEQ 115	REV 38

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)
- 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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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.

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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
R Navigation Performance Specification (MNPS) airspace by referring to specific
R manuals, such as, for example, the North Atlantic (NAT) MNPS Manual.

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

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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
R Navigation Performance Specification (MNPS) airspace by referring to specific
R manuals, such as, for example, the North Atlantic (NAT) MNPS Manual.

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

GENERAL

The aircraft navigation system, required by regulation to fly within a Required Navigation Performance (RNP) airspace, shall comply with RNAV functionality criteria and with navigation position accuracy and integrity criteria.

When referring to RNP-X, the value of X is the navigation accuracy expressed in NM, which has to be met with a probability of 95 %.

An RNP value can be associated with an airspace, a route, a SID, a STAR, a RNAV approach, or an RNAV missed approach procedure.

Depending on the RNP value, and on the airspace environment (ground radio navaid), different navigation equipment may be necessary.

An operational approval from the airline's national authorities may be necessary.

NAVIGATION SYSTEM CAPABILITY (for reference only)

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.

R 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.

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.

R 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.

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.

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- 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.

- R — 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
- R — 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 :
 - R — One RNAV system, which includes :
 - R · One FMGC
 - R · One MCDU
 - R · One GPS receiver, or one VOR and one DME, for FM navigation update*
 - R · One IRS, and
 - R · One FD in NAV mode.
 - R — Flight Plan data displayed on both NDs.
- R *GPS may be required for RNP-1 terminal procedures.
- R For terminal procedures with legs below the MSA, or with legs that may not have sufficient 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).

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		SEQ 103	REV 38

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

R **PROCEDURES**

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

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		SEQ 001	REV 38

- R ● **If GPS is required for the P-RNAV/RNP-1 procedure :**
- R – Before starting the departure/approach procedure, check that GPS PRIMARY is
- R available (GPS PRIMARY displayed on the MCDU PROG page).
- R – If GPS PRIMARY is not available before starting the procedure, inform the ATC, and
- R request another departure/arrival procedure that does not require GPS.
- R – If GPS PRIMARY is lost while flying the procedure, inform the ATC of this loss of
- R 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
- R page).
- R IF GPS PRIMARY is not available :
- R – Crosscheck the FM position with the navaid raw data, before starting the procedure.
- R – Check or enter RNP-1 in the REQUIRED field of the MCDU PROG page, and check that
- R HIGH accuracy is available. When completing the terminal procedure, revert to the
- R default value or enter the appropriate value on the MCDU PROG page.
- R If one of the following messages appears, while flying the procedure :
- R – “NAV ACCUR DOWNGRAD” (on MCDU and ND) on both sides, or
- R – “FMS1/FMS2 POS DIFF” (on MCDU and ND), or
- R – “NAV FM/GPS POS DISAGREE” (on ECAM)
- R Then :
- R – Inform the ATC of the loss of P-RNAV/RNP-1 capability, and follow ATC instructions.
- R *Note : If the “NAV ACCUR DOWNGRAD” message is displayed on one side only,*
- R *navigation may be continued using the other FMGC.*

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
R 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.

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 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
R 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.

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		SEQ 100	REV 37

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.

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	OPERATIONS AT QNH ABOVE 1050 hPa	SEQ 200	REV 37
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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

R page (i.e. as long as the aircraft altitude remains above –1000 feet standard pressure

R altitude).

R When the Standard Pressure altitude becomes less than –1000 feet STD, the FMS is no

R 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.

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	OPERATIONS AT QNH ABOVE 1050 hPa	SEQ 200	REV 37
FLIGHT CREW OPERATING MANUAL			

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
R longer capable to compute the aircraft position. The associated ND display (in ARC or
R 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
R guidance, and raw data reference.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS OPERATIONS AT QNH ABOVE 1050 hPa	2.04.65	P 3
		SEQ 200	REV 37

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.

For non-precision approaches :

- Perform non-precision approaches using selected lateral and vertical guidance, and raw data reference.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	SPECIAL OPERATIONS HIGH/HOT AIRPORT OPERATION	2.04.70	P 1
		SEQ 100	REV 34

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.

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 :

MFCS-02-0470-005-A 10044

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.

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	HIGH/HOT AIRPORT OPERATION		SEQ 050	REV 39

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% 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
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	

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05.15	CALCULATION TABLES	
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	– OPTIMUM AND MAXIMUM ALTITUDES	1
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05.30	INTEGRATED CRUISE	
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	– INTEGRATED CRUISE LR SPEED	8
	– CLIMB CORRECTION	23
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	– INTRODUCTION	1
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	– EXAMPLE	1
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05.50	ALTERNATE	
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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.

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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).

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INTRODUCTION

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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).

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INTRODUCTION

Use this flight planning chapter when no precalculated flight plan is available.

It contains the following general graphs and tables :

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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.

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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).

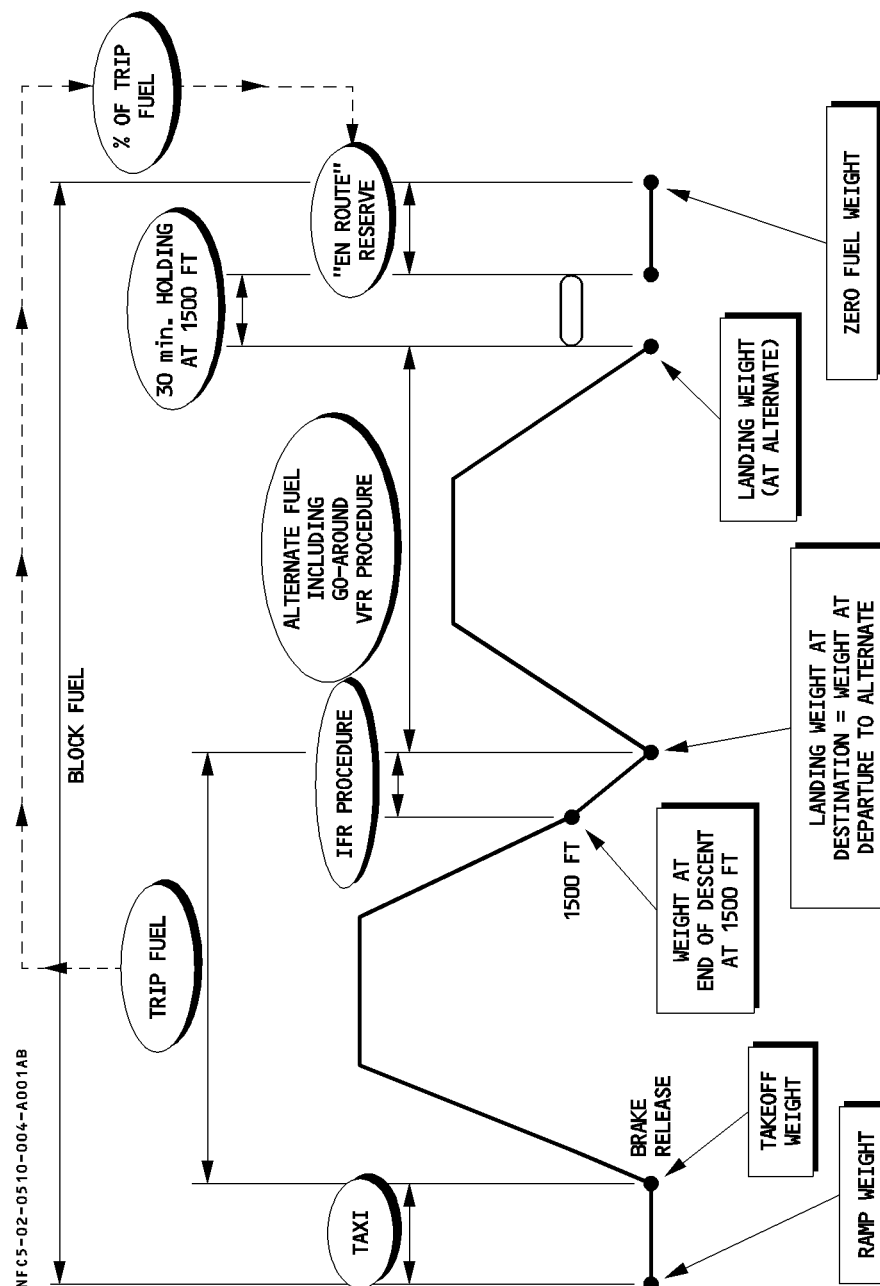
A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING GENERAL	2.05.10	P 3
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FLIGHT PLAN

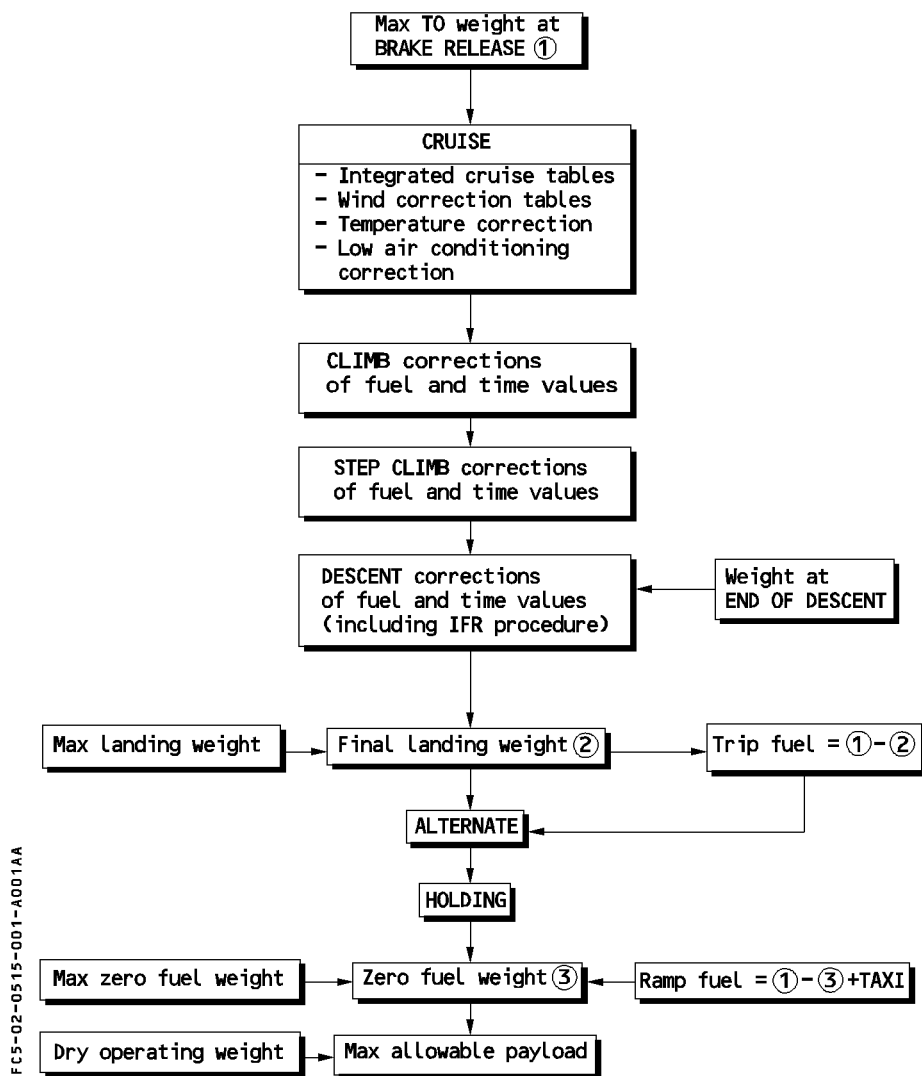
When no precalculated flight plan is available, flight planning can be determined by using the tables given in this chapter.

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



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A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.15	P 2
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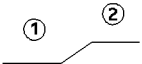
The following tables can be used for the flight planning.
The first table allows the planner to calculate fuel and time during cruise, with a possible step climb (see p 3).
The second table shows the fuel and time planning for the whole flight plan (see p 4).
At the end of the section an example shows 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
WEIGHT:
DISTANCE:
TIME:

START OF STEP CLIMB
WEIGHT:
DISTANCE:
TIME:

1

FUEL:
DISTANCE:
TIME:
REMAINING DISTANCE:

FL:

BEGIN OF FINAL CRUISE SEGMENT
WEIGHT:
DISTANCE:
TIME:

OVERHEAD DESTINATION
WEIGHT:
DISTANCE:
TIME:

2

FUEL:
DISTANCE:
TIME:
REMAINING DISTANCE:

REMAINING DISTANCE:

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

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1	(1) Max TO Weight at BRAKE RELEASE	▼	►				•	
2	WEIGHT Overhead Destination		►				•	
3	– Temperature Correction for CRUISE		–				•	
4	+ Correction for 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 :

$0.015 \text{ (kg/}^{\circ}\text{C/NM)} \times \Delta\text{ISA (}^{\circ}\text{C)} \times \text{air distance (NM)}$ 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 :

$0.5 \text{ (kg/1000 kg/1000 ft)} \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft)}$ 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
 R FL 390 → 62000 kg

D : Enter integrated cruise table (M.78, FL 350) and read the values for a weight of
 R 62000 kg (begin of first step climb)
 R → distance : 4813 NM → time : 642 min

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

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
- 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).
- R
- K : Calculate total values :
- R Fuel : $66000 - 55100 = 10900$ kg
- R Time : $105 + 196 = 301$ min = 5 h 01 min

A318/A319/A320/A321	FLIGHT PLANNING	2.05.15	P 5
	CALCULATION TABLES	SEQ 140	REV 31
FLIGHT CREW OPERATING MANUAL			

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
R FL390 → 62000 kg
- R D : Enter integrated cruise table (M.78, FL350) and read the values for a weight of
R 62000 kg (begin of first step climb)
R → distance : 4703 NM → time : 628 min
- 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

CRUISE TABLE FL390

F : Read from integrated cruise table (M.78, FL390) the values for time and

R 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

H : Interpolate in integrated cruise table (M.78, FL390) the weight and time values

R 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

R overhead destination (60200 kg).

K : Calculate total values :

R Fuel : $72000 - 60200 = 11800$ kg

R Time : $251 + 49 = 300$ min = 5 h 00 min

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING CALCULATION TABLES	2.05.15	P 5
		SEQ 161	REV 38

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

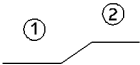
- F : Read from integrated cruise table (M.78, FL390) the values for time and distance for the weight of 58000 kg (2.05.30 P 7)
→ distance : 4132 NM → time : 554 min
- G : Subtract remaining distance : $4132 - 182 = 3950$ NM
- H : Interpolate in integrated cruise table (M.78, FL390) the weight and time 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

NFC5-02-0515-007-A130AA

A318/A319/A320/A321	FLIGHT PLANNING		2.05.15	P 8
	CALCULATION TABLES		SEQ 180	REV 31

FLIGHT CREW OPERATING MANUAL

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 :

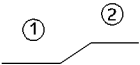
- 1 : Fill in Max TO weight → 66000 kg
- 2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See 2.05.15 P 7). Fill in → 55100 kg
- 3 : Apply temperature correction for given air distance :
 $2248 \text{ NM} \times 10^{\circ}\text{C} \times 0.015 \text{ kg}/^{\circ}\text{C}/\text{NM} = 337 \text{ kg}$ (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)
- 8 : Calculate corrected weight overhead destination → 53700 kg
- 9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (see 2.05.30 P 24) → 200 kg
- 10 : Calculate landing weight at destination → 53900 kg
- 11 : Subtract alternate fuel, e.g. : 100 NM at FL100 (see 2.05.50 P 2) → 941 kg
- Landing weight at alternate → $53900 - 941 = 52959 \text{ kg}$
- Correction due to deviation from reference landing weight at alternate (see 2.05.50 p 2) → $4 \times (52.9 - 50) = 11.6 \text{ kg}$
- Corrected alternate fuel → 953 kg
- 12 : Calculate alternate landing weight → 52900 kg
- 13 : Subtract holding fuel (Refer to 3.05.25) → 1072 kg
- 14 : Calculate weight at end of holding → 51800 kg
- 15 : Calculate trip fuel → 12100 kg
- 16 : Subtract "En Route" reserve (standard amount is 5 % of trip fuel) → 600 kg
- 17 : Calculate zero fuel weight → 51200 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).

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

TOTAL VALUES	
WEIGHT OVERHEAD DEPARTURE:	72000 Kg
WEIGHT OVERHEAD DESTINATION:	60200 Kg
FUEL:	11800 Kg
TIME:	300 Min

NFC5-02-0515-007-A140AA

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.15	P 8
	CALCULATION TABLES		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

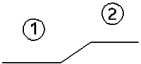
STEPS :

- 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 :
 $2248 \text{ NM} \times 10^{\circ}\text{C} \times 0.015 \text{ kg}/^{\circ}\text{C}/\text{NM} = 337 \text{ kg}$ (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 Landing weight at alternate → $59000 - 984 = 58016 \text{ kg}$
- R 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 Corrected alternate fuel → 1002 kg
- 12 : Calculate alternate landing weight → 58000 kg
- R 13 : Subtract holding fuel (Refer to 3.05.25) → 1098 kg
- 14 : Calculate weight at end of holding → 56200 kg
- 15 : Calculate trip fuel → 13000 kg
- 16 : Subtract "En Route" reserve (standard amount is 5 % of trip fuel) → 650 kg
- 17 : Calculate zero fuel weight → 56200 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).
- 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

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 :
 $1688 \text{ NM} \times 10^{\circ}\text{C} \times 0.015 \text{ kg}/^{\circ}\text{C}/\text{NM} = 254 \text{ kg}$
- 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 :

$$0.5 (\text{kg}/1000 \text{ kg}/1000 \text{ ft}) \times \text{TOW (1000 kg)} \times \text{airport elevation (1000 ft)}.$$

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.

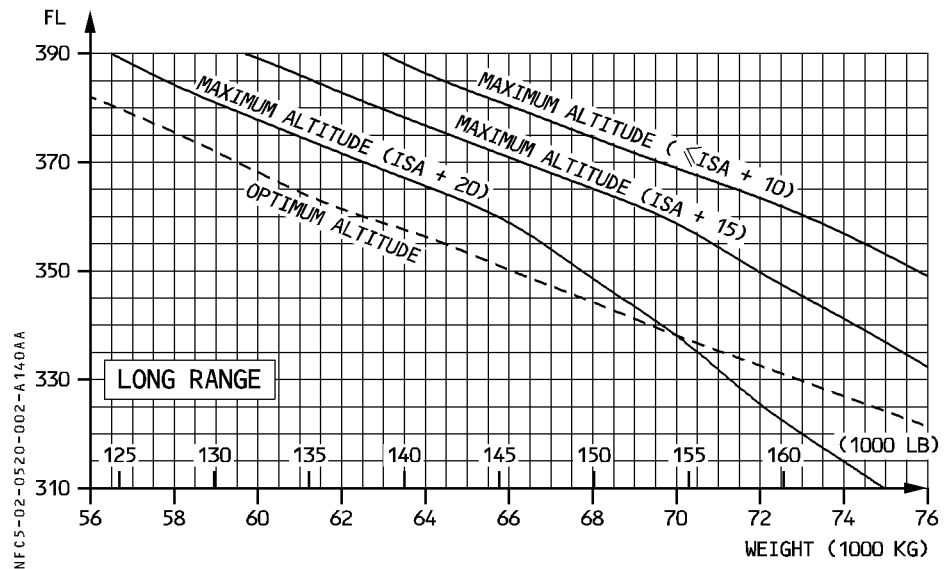
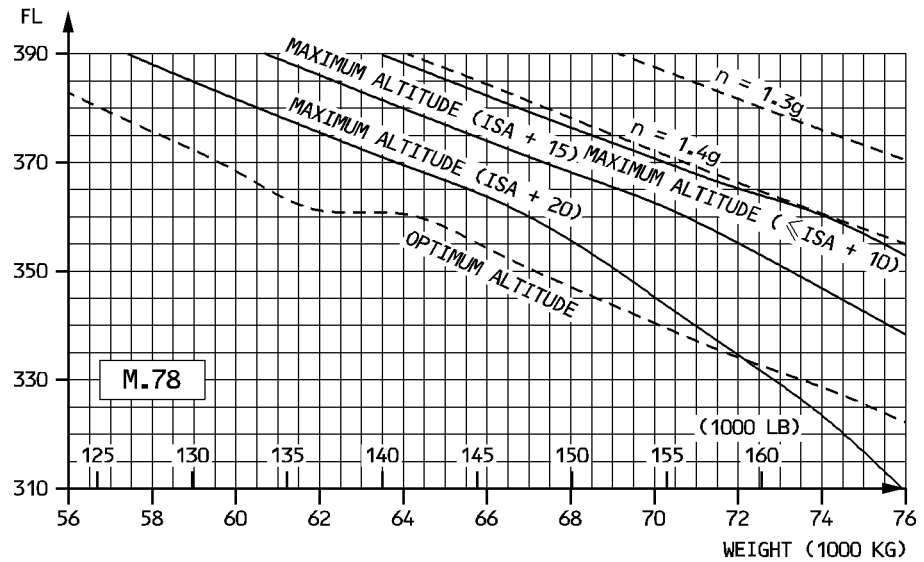
R OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

R

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	≤ 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
≤ 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



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.

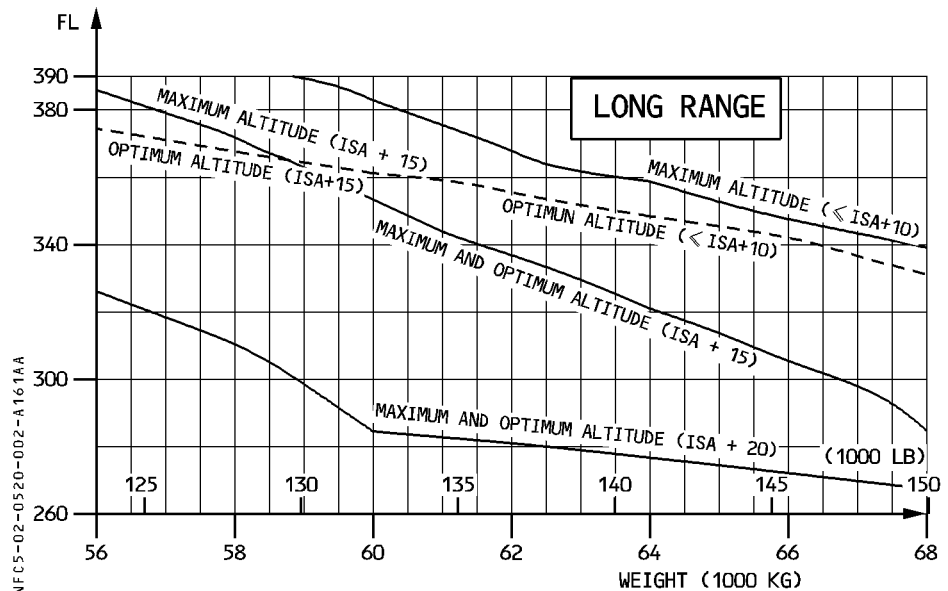
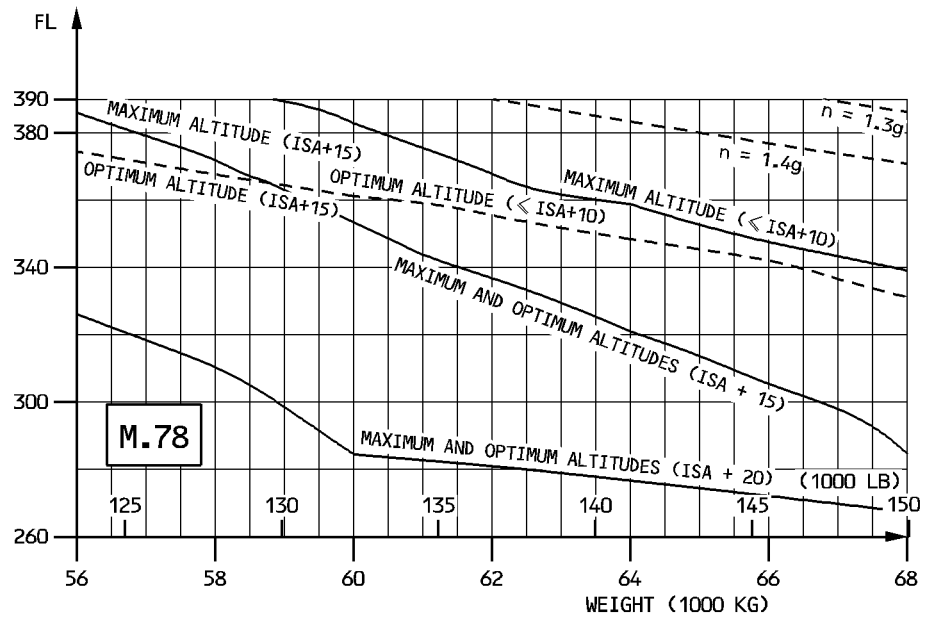
Note : The $n = 1.3$ g (1.4 g) curve indicates the buffet margin.

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	≤ 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

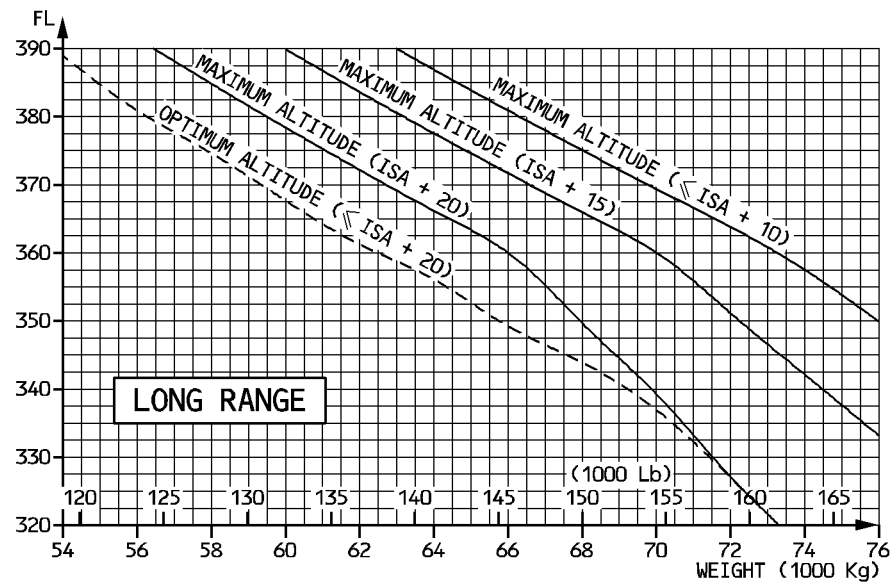
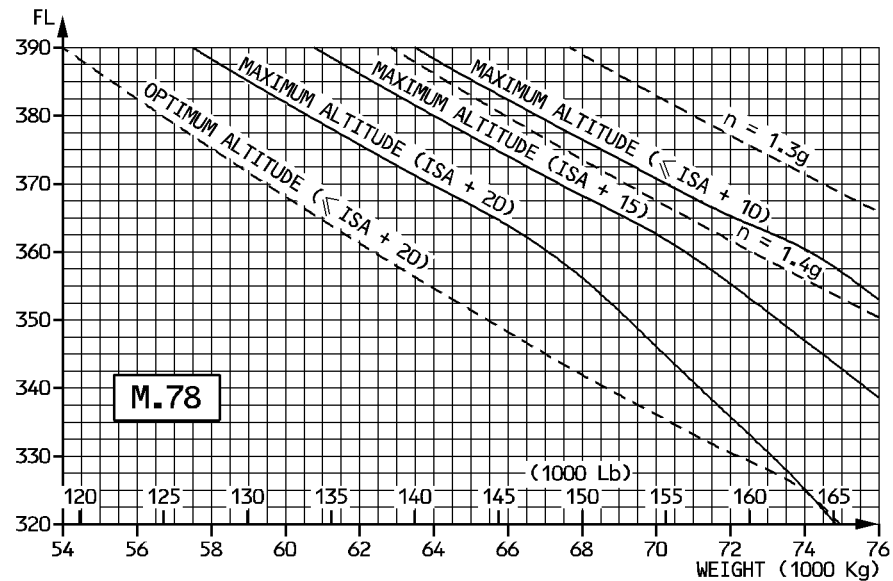
R

STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	≤ 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

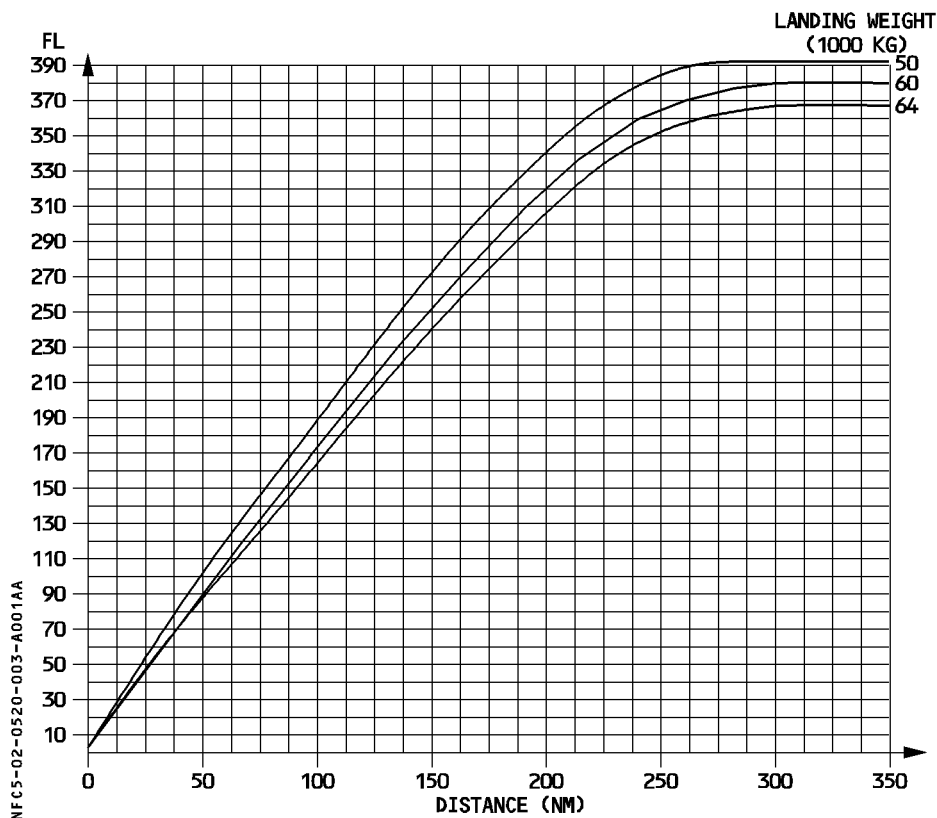
According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

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

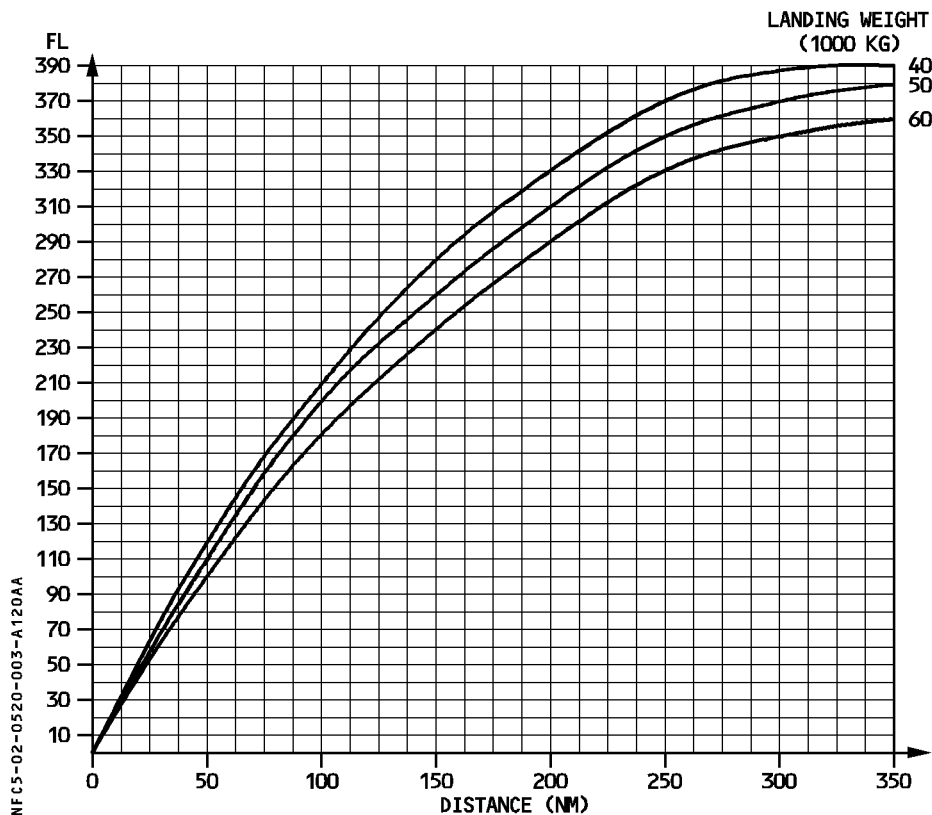
According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

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

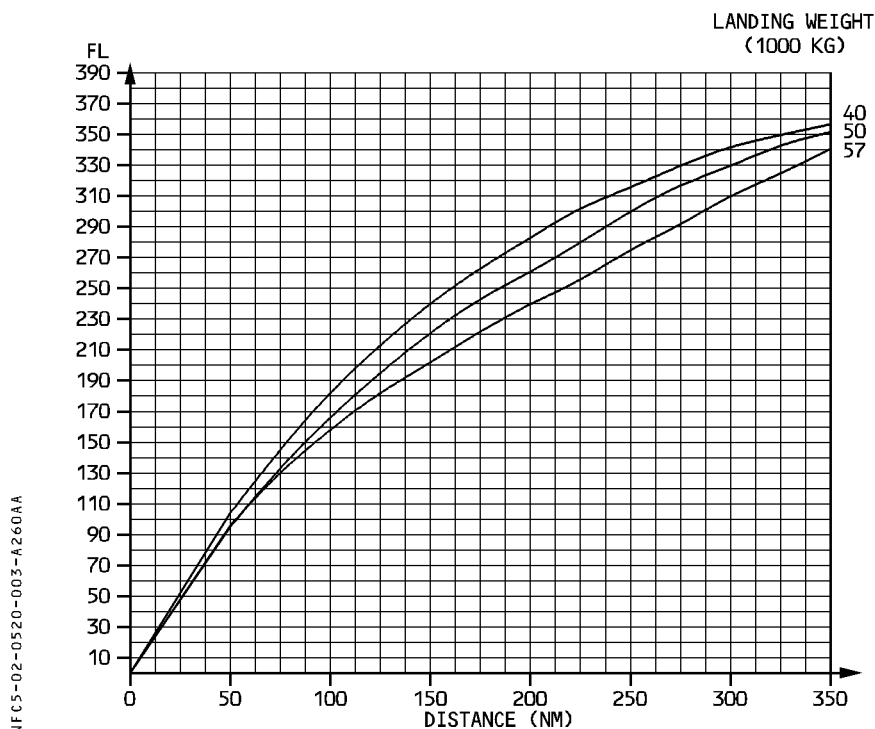
According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

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



A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 1
		SEQ. 001	REV 21

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 2
	INTEGRATED CRUISE		SEQ 130	REV 22

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	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 ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08F0A319-131 IAEV2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .0 02901 .780 .000 .000 0 FCOM-NO-02-05-30-002-130

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 1
		SEQ. 001	REV 21

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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 2
	INTEGRATED CRUISE		SEQ 140	REV 23

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			20	385	7510	11114	14819	18424	22129	25733
42	29438	33043	36748	40352	44057	47662	51367	54971	58676	62281
44	65886	69590	73195	767100	804104	840109	876114	913119	949123	985128
46	1022133	1058137	1094142	1130147	1167152	1203156	1239161	1275166	1312170	1348175
48	1384180	1420185	1456189	1492194	1529199	1565203	1601208	1637213	1673217	1709222
50	1745227	1781231	1817236	1853241	1889246	1925250	1961255	1997260	2033264	2069269
52	2105274	2141278	2177283	2213288	2249292	2285297	2321302	2356306	2392311	2428316
54	2464320	2500325	2535330	2571334	2607339	2643343	2678348	2714353	2750357	2785362
56	2821367	2856371	2892376	2928380	2963385	2999390	3034394	3070399	3105404	3141408
58	3176413	3212417	3247422	3282427	3318431	3353436	3388440	3424445	3459450	3494454
60	3530459	3565463	3600468	3635472	3670477	3705482	3740486	3775491	3810495	3845500
62	3880504	3915509	3950513	3985518	4020522	4055527	4089531	4124536	4159540	4193545
64	4228549	4262554	4297558	4331563	4366567	4400572	4434576	4469581	4503585	4537590
66	4571594	4605599	4640603	4674607	4708612	4742616	4775621	4809625	4843629	4877634
68	4911638	4944643	4978647	5012651	5045656	5079660	5112664	5146669	5179673	5213677
70	5246682	5279686	5312690	5346695	5379699	5412703	5445708	5478712	5511716	5544721
72	5577725	5610729	5642733	5675738	5708742	5741746	5773750	5806755	5838759	5871763
74	5903767	5936771	5968776	6000780	6033784	6065788	6097792	6129797	6161801	6193805
76	6226809	6257813	6289817	6321822	6353826	6385830	6417834	6448838	6480842	6512846
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 1
		SEQ. 001	REV. 21

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	0 0	37 5	73 10	110 14	147 19	183 24	220 29	256 33	293 38	330 43
42	366 48	402 52	439 57	475 62	512 67	548 71	585 76	621 81	657 85	694 90
44	730 95	766 100	802 104	839 109	875 114	911 118	947 123	983 128	1019 132	1055 137
46	1091 142	1127 147	1163 151	1199 156	1235 161	1271 165	1307 170	1343 175	1379 179	1415 184
48	1451 189	1486 193	1522 198	1558 202	1593 207	1629 212	1665 216	1700 221	1736 226	1771 230
50	1807 235	1842 239	1878 244	1913 249	1949 253	1984 258	2020 262	2055 267	2090 272	2125 276
52	2161 281	2196 285	2231 290	2266 295	2301 299	2336 304	2371 308	2406 313	2441 317	2476 322
54	2511 326	2546 331	2581 335	2616 340	2651 345	2686 349	2720 354	2755 358	2790 363	2825 367
56	2859 372	2894 376	2928 381	2963 385	2997 390	3032 394	3066 399	3101 403	3135 407	3169 412
58	3204 416	3238 421	3272 425	3306 430	3340 434	3375 439	3409 443	3443 447	3477 452	3511 456
60	3545 461	3578 465	3612 469	3646 474	3680 478	3714 483	3747 487	3781 491	3815 496	3848 500
62	3882 505	3915 509	3949 513	3982 518	4016 522	4049 526	4082 531	4116 535	4149 539	4182 544
64	4216 548	4249 552	4282 556	4315 561	4348 565	4381 569	4414 574	4447 578	4479 582	4512 586
66	4545 591	4578 595	4611 599	4643 603	4676 608	4709 612	4741 616	4774 620	4806 625	4838 629
68	4871 633	4903 637	4935 641	4968 646	5000 650	5032 654	5064 658	5096 662	5128 667	5161 671
ENGINE ANTI ICE ON ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 6.5 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 3
	INTEGRATED CRUISE		SEQ 130	REV 22

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 0	40 5	79 10	119 16	159 21	199 26	238 31	278 36	318 42	357 47
42	397 52	437 57	476 62	516 68	556 73	595 78	635 83	674 88	714 94	753 99
44	793 104	832 109	872 114	911 119	951 125	990 130	1030 135	1069 140	1109 145	1148 150
46	1187 156	1227 161	1266 166	1305 171	1345 176	1384 181	1423 187	1463 192	1502 197	1541 202
48	1580 207	1620 212	1659 217	1698 223	1737 228	1776 233	1815 238	1854 243	1894 248	1933 253
50	1972 258	2011 264	2050 269	2089 274	2128 279	2167 284	2205 289	2244 294	2283 299	2322 304
52	2361 310	2400 315	2439 320	2477 325	2516 330	2555 335	2594 340	2632 345	2671 350	2709 355
54	2748 360	2787 365	2825 370	2864 375	2902 380	2941 386	2979 391	3017 396	3056 401	3094 406
56	3132 411	3171 416	3209 421	3247 426	3285 431	3323 436	3361 441	3399 446	3437 451	3475 456
58	3513 461	3551 466	3589 470	3626 475	3664 480	3702 485	3739 490	3777 495	3814 500	3852 505
60	3889 510	3926 515	3964 520	4001 525	4038 529	4075 534	4112 539	4149 544	4186 549	4223 554
62	4260 559	4297 563	4334 568	4371 573	4407 578	4444 583	4481 587	4517 592	4553 597	4590 602
64	4626 607	4663 611	4699 616	4735 621	4771 626	4808 630	4844 635	4879 640	4915 644	4951 649
66	4987 654	5023 659	5059 663	5094 668	5130 673	5166 677	5201 682	5237 687	5272 691	5308 696
68	5343 700	5378 705	5413 710	5448 714	5484 719	5519 724	5554 728	5589 733	5624 737	5658 742
70	5693 746	5728 751	5763 755	5797 760	5832 765	5867 769	5901 774	5935 778	5970 783	6004 787
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .780 .000 .000 0 FCOM-NO-02-05-30-003-132

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 4
	INTEGRATED CRUISE		SEQ 130	REV 22

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	43 6	86 11	129 17	172 23	215 28	258 34	301 40	344 45	387 51
42	430 57	473 63	515 68	558 74	601 80	644 85	687 91	730 96	772 102	815 108
44	858 113	901 119	943 125	986 130	1028 136	1071 142	1114 147	1156 153	1199 159	1241 164
46	1284 170	1326 175	1369 181	1411 187	1453 192	1496 198	1538 203	1580 209	1623 215	1665 220
48	1707 226	1749 231	1792 237	1834 243	1876 248	1918 254	1960 259	2002 265	2044 270	2086 276
50	2128 281	2170 287	2212 293	2254 298	2295 304	2337 309	2379 315	2420 320	2462 326	2503 331
52	2545 337	2586 342	2628 348	2669 353	2710 358	2752 364	2793 369	2834 375	2875 380	2916 386
54	2957 391	2997 396	3038 402	3079 407	3120 413	3160 418	3201 423	3241 429	3282 434	3322 439
56	3363 445	3403 450	3443 455	3483 461	3523 466	3563 471	3603 477	3643 482	3683 487	3723 492
58	3762 498	3802 503	3841 508	3881 513	3921 519	3960 524	3999 529	4039 534	4078 539	4117 545
60	4156 550	4195 555	4234 560	4273 565	4312 570	4351 575	4389 581	4428 586	4467 591	4505 596
62	4544 601	4582 606	4620 611	4659 616	4697 621	4735 626	4773 631	4811 636	4849 641	4887 646
64	4925 651	4963 656	5000 661	5038 666	5076 671	5114 676	5151 681	5188 686	5226 691	5263 696
66	5301 701	5338 706	5375 711	5412 716	5449 721	5486 726	5523 730	5560 735	5597 740	5634 745
68	5670 750	5707 755	5744 760	5780 764	5817 769	5853 774	5889 779	5926 784	5962 789	5998 793
70	6034 798	6070 803	6106 808	6142 812	6178 817	6214 822	6250 827	6285 831	6321 836	6356 841
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .780 .000 .000 0 FCOM-N0-02-05-30-004-130

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			20	425	8111	12116	16021	20026	23931	27937
42	31842	35847	39752	43757	47662	51568	55573	59478	63483	67388
44	71293	75299	791104	830109	870114	909119	948124	987129	1027135	1066140
46	1105145	1144150	1184155	1223160	1262165	1301171	1340176	1379181	1418186	1458191
48	1497196	1536201	1575206	1614212	1653217	1692222	1731227	1770232	1808237	1847242
50	1886247	1925252	1964257	2003263	2042268	2080273	2119278	2158283	2197288	2235293
52	2274298	2313303	2351308	2390313	2429318	2467323	2506328	2544334	2583339	2621344
54	2660349	2698354	2736359	2775364	2813369	2852374	2890379	2928384	2966389	3004394
56	3043399	3081404	3119409	3157414	3195419	3233424	3270429	3308434	3346439	3384444
58	3422449	3459453	3497458	3534463	3572468	3609473	3647478	3684483	3721488	3759493
60	3796498	3833503	3870507	3907512	3944517	3981522	4018527	4055532	4092536	4129541
62	4166546	4202551	4239556	4275560	4312565	4348570	4385575	4421580	4457584	4494589
64	4530594	4566599	4602603	4638608	4674613	4711618	4746622	4782627	4818632	4854636
66	4890641	4925646	4961650	4996655	5032660	5067664	5103669	5138674	5173678	5208683
68	5244687	5279692	5314697	5349701	5384706	5419710	5454715	5488720	5523724	5558729
70	5593733	5627738	5662742	5696747	5731751	5765756	5800760	5834765	5868769	5903774
72	5937778	5971783	6005787	6039792	6073796	6107801	6141805	6175809	6209814	6242818
74	6276823	6310827	6343832	6377836	6411840	6444845	6477849	6511854	6544858	6577862
76	6611867	6644871	6677875	6710880	6743884	6776888	6809893	6842897	6875901	6907906
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %		

10F -08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .780 .000 .000 0 FCOM-NO-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			20	456	8812	13117	17323	21629	25934	30240
42	34446	38751	43057	47262	51568	55874	60079	64385	68691	72896
44	771102	813108	856113	898119	941124	983130	1025136	1068141	1110147	1153152
46	1195158	1237164	1279169	1322175	1364180	1406186	1448192	1490197	1533203	1575208
48	1617214	1659219	1701225	1743230	1785236	1827242	1869247	1910253	1952258	1994264
50	2036269	2078275	2119280	2161286	2202291	2244297	2285302	2327308	2368313	2410319
52	2451324	2492330	2533335	2574340	2616346	2657351	2698357	2738362	2779368	2820373
54	2861378	2901384	2942389	2983394	3023400	3064405	3104411	3144416	3184421	3225426
56	3265432	3305437	3345442	3385448	3425453	3465458	3505464	3544469	3584474	3624479
58	3663484	3703490	3742495	3781500	3821505	3860511	3899516	3938521	3977526	4016531
60	4055536	4094541	4133547	4172552	4210557	4249562	4288567	4326572	4365577	4403582
62	4441587	4480592	4518598	4556603	4594608	4632613	4670618	4708623	4746628	4784633
64	4821638	4859643	4896648	4934653	4972658	5009663	5046667	5084672	5121677	5158682
66	5196687	5233692	5270697	5307702	5344707	5381712	5417716	5454721	5491726	5527731
68	5564736	5601741	5637746	5673750	5710755	5746760	5782765	5819770	5855774	5891779
70	5927784	5963789	5999793	6034798	6070803	6106808	6142812	6177817	6213822	6248826
72	6283831	6319836	6354840	6389845	6424850	6459854	6494859	6528863	6563868	6598873
74	6633877	6667882	6701886	6735891	6770895	6804900	6838904	6871909	6905913	6939918
76	6973922	7006927	7040931	7073935	7106940	7140944	7173949	7206953	7239957	7272962
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 0 .00 03301 .780 .000 .000 0 FCOM-NO-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 0	39 5	79 10	118 16	158 21	197 26	236 31	276 36	315 41	354 46
42	393 52	433 57	472 62	511 67	550 72	589 77	628 82	667 87	706 93	745 98
44	784 103	823 108	862 113	900 118	939 123	978 128	1017 133	1055 138	1094 143	1133 148
46	1171 154	1210 159	1248 164	1287 169	1325 174	1364 179	1402 184	1440 189	1479 194	1517 199
48	1555 204	1593 209	1632 214	1670 219	1708 224	1746 229	1784 234	1822 239	1860 244	1898 249
50	1936 254	1974 259	2011 264	2049 269	2087 274	2125 279	2162 283	2200 288	2238 293	2275 298
52	2313 303	2350 308	2388 313	2425 318	2462 323	2500 328	2537 333	2574 337	2611 342	2648 347
54	2686 352	2722 357	2759 362	2796 367	2833 371	2870 376	2907 381	2944 386	2981 391	3017 396
56	3054 400	3091 405	3127 410	3164 415	3200 420	3237 424	3273 429	3309 434	3346 439	3382 443
58	3418 448	3454 453	3490 458	3526 462	3563 467	3599 472	3634 476	3670 481	3706 486	3742 491
60	3778 495	3813 500	3849 505	3885 509	3920 514	3956 519	3991 523	4027 528	4062 533	4097 537
62	4133 542	4168 546	4203 551	4238 556	4273 560	4308 565	4343 569	4378 574	4413 579	4448 583
64	4483 588	4517 592	4552 597	4587 601	4621 606	4656 610	4690 615	4725 619	4759 624	4793 628
66	4828 633	4862 637	4896 642	4930 646	4964 651	4998 655	5032 660	5066 664	5100 669	5134 673
68	5168 677	5201 682	5235 686	5268 691	5302 695	5336 699	5369 704	5402 708	5435 713	5469 717
ENGINE ANTI ICE ON ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 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 ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 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 0	47 6	93 12	140 19	186 25	233 31	279 37	326 43	372 50	418 56
42	465 62	511 68	557 74	604 81	650 87	696 93	742 99	788 105	835 111	881 118
44	927 124	973 130	1019 136	1065 142	1111 148	1157 154	1202 160	1248 167	1294 173	1340 179
46	1385 185	1431 191	1476 197	1522 203	1567 209	1613 215	1658 221	1703 227	1748 233	1793 239
48	1838 245	1883 251	1928 257	1973 263	2018 269	2062 275	2107 281	2151 287	2196 293	2240 299
50	2285 305	2329 311	2373 317	2417 323	2461 328	2505 334	2549 340	2593 346	2637 352	2680 358
52	2724 364	2768 369	2811 375	2854 381	2898 387	2941 392	2984 398	3027 404	3070 410	3113 415
54	3156 421	3199 427	3242 433	3284 438	3327 444	3370 450	3412 455	3454 461	3497 467	3539 472
56	3581 478	3623 483	3665 489	3707 495	3749 500	3791 506	3832 511	3874 517	3915 523	3957 528
58	3999 534	4040 539	4081 545	4122 550	4163 556	4205 561	4246 567	4286 572	4327 577	4368 583
60	4409 588	4450 594	4490 599	4531 605	4571 610	4612 615	4652 621	4692 626	4732 632	4773 637
62	4813 642	4853 648	4893 653	4932 658	4972 664	5012 669	5052 674	5091 679	5131 685	5170 690
64	5210 695	5249 700	5288 706	5327 711	5366 716	5405 721	5444 726	5483 732	5521 737	5560 742
66	5599 747	5637 752	5675 757	5713 762	5751 768	5790 773	5827 778	5865 783	5903 788	5940 793
68	5978 798	6015 803	6052 808	6089 813	6126 818	6163 823	6200 827	6237 832	6273 837	6310 842
70	6346 847	6382 852	6418 857	6454 861	6490 866	6526 871	6562 876	6597 880	6633 885	6668 890
LOW AIR CONDITIONING ΔFUEL = − 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .780 .000 .000 0 FCOM-NO-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)		M.78 FL370		
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 ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .780 .000 .000 0 FCOM-NO-02-05-30-006-130

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			20	496	9513	14119	18825	23431	28037	32644
42	37250	41956	46562	51168	55774	60380	64987	69593	74199	787105
44	833111	878117	924123	970129	1016136	1062142	1107148	1153154	1198160	1244166
46	1289172	1334178	1380184	1425190	1470196	1515202	1560208	1605214	1650220	1695226
48	1740232	1785238	1829244	1874250	1919256	1963262	2008268	2052274	2096280	2140286
50	2185292	2229297	2273303	2316309	2360315	2404321	2448327	2491332	2535338	2579344
52	2622350	2665356	2709361	2752367	2795373	2838379	2881385	2924390	2967396	3010402
54	3053407	3095413	3138419	3180424	3223430	3265436	3307441	3349447	3392453	3434458
56	3476464	3518469	3559475	3601481	3643486	3685492	3726497	3767503	3809508	3850514
58	3892519	3933525	3974530	4015536	4056541	4097547	4138552	4179558	4219563	4260569
60	4301574	4341579	4382585	4422590	4462596	4503601	4543606	4583612	4623617	4663622
62	4703628	4743633	4783638	4822644	4862649	4902654	4941659	4981665	5020670	5059675
64	5099680	5138686	5177691	5216696	5255701	5294706	5332712	5371717	5409722	5448727
66	5487732	5525737	5563742	5601747	5639752	5677758	5714763	5752768	5790773	5827778
68	5865783	5902788	5939793	5976797	6013802	6050807	6086812	6123817	6159822	6196827
70	6232832	6268837	6304841	6340846	6376851	6412856	6448860	6483865	6519870	6554875
72	6589879	6624884	6659889	6694893	6729898	6764903	6798907	6833912	6867916	6902921
74	6936926	6970930	7004935	7037939	7071944	7105948	7138953	7171957	7204961	7237966
76	7270970	7303975	7336979	7370983	7403988					
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10F -08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .780 .000 .000 0 FCOM-NO-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			20	527	10214	15220	20227	25134	30140	35047
42	40054	44960	49967	54873	59780	64687	69593	744100	793106	842113
44	891119	939126	988132	1036139	1085145	1133152	1181158	1229165	1277171	1325178
46	1374184	1421191	1469197	1517203	1564210	1612216	1659223	1706229	1754235	1801242
48	1848248	1895254	1942260	1988267	2035273	2082279	2128285	2175292	2221298	2268304
50	2314310	2360316	2406323	2452329	2498335	2544341	2589347	2635353	2680359	2726366
52	2771372	2816378	2861384	2906390	2952396	2997402	3041408	3086414	3131420	3176426
54	3220432	3265438	3309444	3353450	3398456	3442462	3486467	3530473	3574479	3618485
56	3662491	3705497	3749503	3792509	3836514	3879520	3922526	3965532	4008538	4051543
58	4095549	4137555	4180561	4222566	4265572	4308578	4350583	4392589	4434595	4476600
60	4518606	4560612	4601617	4643623	4684628	4726634	4767639	4807645	4848650	4889656
62	4930661	4970667	5011672	5051677	5091683	5131688	5171694	5211699	5250704	5290709
64	5330715	5369720	5408725	5447730	5486736	5525741	5563746	5601751	5640756	5678761
66	5716767	5754772	5792777	5830782	5867787	5905792	5942797	5979802	6016807	6053812
68	6091817	6127822	6163827	6200831	6236836	6273841	6308846	6344851	6380856	6415860
70	6451865	6487870	6522875	6558879						
72										
74										
76										
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 0 .00 03701 .780 .000 .000 0 FCOM-NO-02-05-30-006-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 5
	INTEGRATED CRUISE		SEQ 161	REV 38

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 ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 6.5 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 6
	INTEGRATED CRUISE		SEQ 161	REV 38

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 0	48 6	96 13	145 19	193 26	241 32	289 39	336 45	384 52	432 58
42	480 64	527 71	575 77	622 83	670 90	717 96	764 102	811 109	858 115	905 121
44	952 128	999 134	1046 140	1093 147	1139 153	1186 159	1232 165	1278 171	1325 178	1371 184
46	1417 190	1463 196	1509 202	1555 209	1601 215	1647 221	1692 227	1737 233	1783 239	1828 245
48	1874 251	1919 257	1964 263	2009 269	2054 275	2099 281	2144 287	2188 293	2233 299	2277 305
50	2322 311	2366 317	2410 323	2454 329	2498 335	2543 341	2586 347	2630 353	2674 359	2717 364
52	2761 370	2804 376	2847 382	2890 388	2934 393	2977 399	3019 405	3062 411	3105 416	3147 422
54	3190 428	3232 433	3274 439	3317 445	3359 450	3401 456	3442 462	3484 467	3526 473	3567 478
56	3609 484	3650 490	3691 495	3732 501	3773 506	3814 512	3855 517	3895 522	3936 528	3976 533
58	4017 539	4056 544	4096 549	4136 555	4176 560	4216 565	4255 571	4294 576	4333 581	4372 586
60	4412 592	4450 597	4489 602	4527 607	4566 612	4604 618	4642 623	4680 628	4718 633	4756 638
62	4794 643	4831 648	4868 653	4905 658	4943 663	4980 668	5016 673	5053 678	5090 683	5126 687
64	5163 692	5199 697	5234 702	5270 707	5306 712	5342 716	5377 721	5413 726	5448 731	5483 735
66	5518 740	5553 745	5588 749	5622 754	5657 759	5691 763				
68										
ENGINE ANTI ICE ON ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 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 0	53 7	106 14	159 21	212 28	265 36	317 43	370 50	422 57	475 64
42	527 71	579 78	631 85	683 92	735 99	787 106	839 113	890 119	942 126	993 133
44	1045 140	1096 147	1147 154	1198 161	1249 167	1300 174	1350 181	1401 188	1451 195	1501 201
46	1552 208	1602 215	1652 222	1702 228	1752 235	1802 242	1851 248	1900 255	1950 262	1999 268
48	2049 275	2098 281	2147 288	2196 294	2245 301	2294 308	2342 314	2391 321	2439 327	2488 334
50	2536 340	2584 347	2632 353	2680 359	2728 366	2777 372	2824 379	2872 385	2919 391	2967 398
52	3014 404	3061 411	3108 417	3155 423	3202 429	3249 436	3296 442	3342 448	3389 454	3435 461
54	3481 467	3527 473	3573 479	3619 485	3664 491	3710 498	3755 504	3800 510	3845 516	3890 522
56	3935 528	3979 534	4023 540	4067 545	4112 551	4156 557	4199 563	4243 569	4286 575	4329 581
58	4373 586	4415 592	4458 598	4501 604	4543 609	4586 615	4628 621	4670 626	4712 632	4754 638
60	4795 643	4837 649	4878 654	4919 660	4960 665	5001 671	5041 676	5082 682	5122 687	5162 692
62	5203 698	5242 703	5281 708	5321 714	5360 719	5399 724	5438 729	5478 735	5517 740	5556 745
64										
66										
68										
70										
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .780 .000 .000 0 FCOM-NO-02-05-30-007-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		LR FL100			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	28 6	56 12	84 18	111 24	139 30	167 36	195 42	222 48	250 54	275
42	278 60	305 66	333 72	360 78	388 83	415 89	442 95	470 101	497 107	524 112	281
44	552 118	579 124	606 129	633 135	660 141	687 146	714 152	741 158	768 163	795 169	286
46	822 174	849 180	876 185	903 191	929 197	956 202	983 208	1009 213	1036 218	1063 224	290
48	1089 229	1116 235	1142 240	1169 246	1195 251	1222 256	1248 262	1274 267	1301 273	1327 278	293
50	1353 283	1380 289	1406 294	1432 299	1458 304	1484 310	1510 315	1536 320	1563 325	1589 331	296
52	1615 336	1641 341	1666 346	1692 352	1718 357	1744 362	1770 367	1796 372	1821 377	1847 383	298
54	1873 388	1898 393	1924 398	1950 403	1975 408	2001 413	2026 418	2052 423	2077 428	2103 433	301
56	2128 438	2154 443	2179 448	2204 453	2229 458	2255 463	2280 468	2305 473	2330 478	2355 483	304
58	2381 488	2406 493	2431 498	2456 503	2481 507	2506 512	2530 517	2555 522	2580 527	2605 532	307
60	2630 536	2655 541	2679 546	2704 551	2729 555	2753 560	2778 565	2802 569	2827 574	2852 579	311
62	2876 583	2900 588	2925 593	2949 597	2974 602	2998 606	3022 611	3046 615	3071 620	3095 625	316
64	3119 629	3143 633	3167 638	3191 642	3215 647	3239 651	3263 655	3287 660	3311 664	3335 668	324
66	3359 673	3383 677	3407 681	3430 685	3454 690	3478 694	3502 698	3525 702	3549 706	3572 710	335
68	3596 714	3619 719	3643 723	3666 727	3690 731	3713 735	3737 739	3760 743	3783 747	3807 751	345
70	3830 755	3853 759	3877 763	3900 767	3923 770	3946 774	3969 778	3992 782	4015 786	4039 790	353
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-NO-02-05-30-008-130

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			30	557	10814	16122	21329	26536	31743	37050
42	42257	47464	52670	57777	62984	68191	73298	784105	835112	886119
44	937126	988133	1039139	1090146	1140153	1191160	1241166	1292173	1342180	1392187
46	1442193	1492200	1542207	1592213	1642220	1691227	1741233	1790240	1839247	1888253
48	1938260	1987266	2035273	2084280	2133286	2182293	2230299	2279306	2327312	2375319
50	2424325	2472331	2519338	2567344	2615351	2663357	2710363	2758370	2805376	2853383
52	2900389	2947395	2994401	3040408	3087414	3134420	3180427	3227433	3273439	3319445
54	3366451	3411457	3457464	3502470	3548476	3593482	3638488	3683494	3728500	3773506
56	3818512	3862518	3906524	3950530	3994536	4038542	4081547	4125553	4168559	4211565
58	4255571	4297576	4340582	4383588	4425593	4468599	4510605	4551610	4593616	4635622
60	4677627	4718633	4759638	4800644	4841649	4883655	4923660	4963666	5004671	5044676
62	5084682	5123687	5163692	5202698	5241703	5280708	5320713	5359719	5398724	
64										
66										
68										
70										
72										
74										
76										
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10F -08FOA320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .780 .000 .000 0 FCOM-NO-02-05-30-007-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		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	24155	27061	30068	32975	35981	38988	41895	447101	477108	506115	265
44	535121	564128	593134	623141	652147	681154	710160	739166	767173	796179	268
46	825186	854192	882198	911205	940211	968217	997223	1025230	1053236	1082242	271
48	1110248	1138254	1166261	1195267	1223273	1251279	1279285	1307291	1334297	1362303	275
50	1390309	1418315	1445321	1473327	1501332	1528338	1556344	1583350	1610356	1638361	280
52	1665367	1692373	1719379	1746384	1773390	1801396	1827401	1854407	1881412	1908418	286
54	1935423	1962429	1988434	2015440	2041445	2068451	2094456	2121462	2147467	2174472	291
56	2200478	2226483	2253488	2279494	2305499	2331504	2357509	2383515	2409520	2435525	296
58	2461530	2487535	2512540	2538546	2564551	2590556	2615561	2641566	2666571	2692576	300
60	2717581	2743586	2768591	2793596	2819601	2844606	2869611	2894616	2919620	2944625	305
62	2969630	2994635	3019640	3044645	3069649	3094654	3119659	3143664	3168668	3193673	309
64	3217678	3242683	3266687	3291692	3315697	3340701	3364706	3388710	3413715	3437720	314
66	3461724	3485729	3509733	3533738	3557742	3581747	3605751	3629755	3653760	3677764	319
68	3701769	3725773	3748777	3772781	3796786	3819790	3843794	3866798	3890803	3913807	328
70	3937811	3960815	3983819	4007823	4030827	4053831	4077835	4100840	4123844	4146848	339
72	4169852	4192855	4215859	4238863	4261867	4284871	4307875	4329879	4352883	4375886	349
74	4398890	4420894	4443898	4466901	4488905	4511909	4533913	4556916	4578920	4601924	360
76	4624927	4646931	4668935	4691938	4713942	4735945	4758949	4780953	4802956	4825960	369
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 01001 .990 .000 .000 0 FCOM-NO-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	2055 276	2101 282	2148 288	2194 294	2240 300	2286 307	2332 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 ΔFUEL = + 3 %						TOTAL ANTI ICE ON ΔFUEL = + 6.5 %				

A318/A319/A320/A321	FLIGHT PLANNING		2.05.30	P 8
	INTEGRATED CRUISE		SEQ 161	REV 38

FLIGHT CREW OPERATING MANUAL

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 0	29 7	59 14	88 20	118 27	147 34	177 41	206 48	235 54	264 61
42	294 68	323 75	352 81	381 88	410 95	439 101	468 108	496 115	525 121	554 128
44	583 134	612 141	640 148	669 154	697 161	726 167	754 173	783 180	811 186	839 193
46	868 199	896 205	924 211	952 217	980 223	1008 229	1036 234	1064 240	1093 246	1121 251
48	1149 257	1176 263	1204 268	1232 274	1260 280	1288 285	1316 291	1344 296	1371 302	1399 308
50	1427 313	1454 319	1482 324	1510 330	1537 336	1565 341	1592 347	1620 352	1647 358	1674 363
52	1702 369	1729 374	1756 380	1784 385	1811 391	1838 396	1865 402	1892 407	1919 412	1946 418
54	1973 423	2000 429	2027 434	2054 439	2081 445	2108 450	2135 456	2162 461	2188 466	2215 472
56	2242 477	2268 482	2295 488	2322 493	2348 498	2375 503	2401 509	2428 514	2454 519	2481 524
58	2507 530	2533 535	2559 540	2586 545	2612 551	2638 556	2664 561	2690 566	2716 571	2743 576
60	2769 582	2794 587	2820 592	2846 597	2872 602	2898 607	2924 612	2949 617	2975 622	3001 627
62	3027 632	3052 637	3078 642	3103 646	3129 651	3154 656	3180 660	3205 664	3230 669	3256 673
64	3281 677	3306 682	3331 686	3356 690	3382 694	3407 699	3432 703	3457 707	3482 711	3507 715
66	3532 720	3557 724	3581 728	3606 732	3631 736	3656 740	3681 745	3706 749	3730 753	3755 757
68	3780 761	3805 765	3829 769	3854 774	3879 778	3903 782	3928 786	3952 790	3977 794	4001 798
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%		DISTANCE (NM) TIME (MIN)		LR FL120			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	29 6	59 12	88 19	117 25	147 31	176 37	205 43	234 49	263 56	282
42	292 62	321 68	350 74	379 80	408 86	437 92	466 98	494 104	523 110	552 116	286
44	581 122	609 128	638 134	666 139	695 145	723 151	752 157	780 163	808 169	837 174	290
46	865 180	893 186	922 192	950 198	978 203	1006 209	1034 215	1062 221	1090 226	1118 232	293
48	1146 238	1174 243	1202 249	1230 255	1258 260	1286 266	1313 271	1341 277	1369 283	1396 288	296
50	1424 294	1452 299	1479 305	1507 310	1534 316	1562 321	1589 327	1617 332	1644 338	1671 343	299
52	1699 348	1726 354	1753 359	1780 365	1807 370	1835 375	1862 381	1889 386	1916 391	1943 397	302
54	1970 402	1996 407	2023 412	2050 418	2077 423	2104 428	2130 433	2157 439	2184 444	2210 449	306
56	2237 454	2263 459	2290 464	2316 469	2343 475	2369 480	2396 485	2422 490	2448 495	2474 500	310
58	2501 505	2527 510	2553 515	2579 520	2605 524	2631 529	2657 534	2683 539	2709 544	2735 549	315
60	2761 553	2787 558	2812 563	2838 567	2864 572	2890 577	2915 581	2941 586	2966 591	2992 595	326
62	3017 600	3043 604	3068 609	3094 613	3119 618	3144 622	3170 627	3195 631	3220 635	3245 640	337
64	3271 644	3296 649	3321 653	3346 657	3371 661	3396 666	3421 670	3446 674	3471 679	3496 683	347
66	3521 687	3545 691	3570 695	3595 700	3620 704	3645 708	3669 712	3694 716	3719 720	3743 724	355
68	3768 729	3792 733	3817 737	3842 741	3866 745	3891 749	3915 753	3939 757	3964 761	3988 765	360
70	4013 769	4037 773	4061 777	4086 781	4110 785	4134 789	4159 793	4183 797	4207 801	4231 805	365
LOW AIR CONDITIONING ΔFUEL = − 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01201 .990 .000 0 FCOM-NO-02-05-30-009-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		LR FL150			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	32 7	63 13	95 20	127 26	158 33	190 39	221 46	253 52	284 59	288
42	316 65	347 72	378 78	410 85	441 91	472 97	503 104	534 110	565 116	596 123	292
44	627 129	658 135	689 142	720 148	751 154	782 160	812 167	843 173	874 179	904 185	295
46	935 191	965 197	996 204	1026 210	1056 216	1087 222	1117 228	1147 234	1177 240	1208 246	298
48	1238 252	1268 258	1298 264	1328 270	1358 276	1388 282	1417 287	1447 293	1477 299	1507 305	302
50	1536 311	1566 317	1595 322	1625 328	1654 334	1684 340	1713 345	1743 351	1772 356	1801 362	307
52	1830 368	1859 373	1888 379	1918 384	1947 390	1976 395	2004 401	2033 406	2062 411	2091 417	312
54	2120 422	2148 427	2177 432	2206 438	2234 443	2263 448	2291 453	2320 458	2348 463	2376 468	327
56	2405 473	2433 478	2461 483	2489 488	2518 493	2546 498	2574 503	2602 508	2630 513	2658 518	338
58	2686 523	2713 527	2741 532	2769 537	2797 542	2825 546	2852 551	2880 556	2908 561	2935 565	348
60	2963 570	2990 575	3018 579	3045 584	3073 589	3100 593	3128 598	3155 602	3182 607	3210 611	354
62	3237 616	3264 621	3291 625	3318 630	3346 634	3373 639	3400 643	3427 648	3454 652	3481 657	360
64	3508 661	3535 665	3562 670	3589 674	3616 679	3643 683	3669 687	3696 692	3723 696	3750 700	365
66	3776 705	3803 709	3830 713	3856 717	3883 722	3909 726	3936 730	3962 734	3989 738	4015 743	374
68	4042 747	4068 751	4095 755	4121 759	4147 763	4174 768	4200 772	4226 776	4253 780	4279 784	379
70	4305 788	4331 792	4358 797	4384 801	4410 805	4436 809	4462 813	4488 817	4514 821	4540 825	381
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-NO-02-05-30-010-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL120			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	33 7	64 15	96 22	127 29	158 36	189 43	221 50	265
42	252 57	283 64	314 70	345 77	376 84	407 91	437 98	468 105	498 112	529 118	268
44	560 125	590 132	620 138	651 145	681 152	712 158	742 165	772 172	802 178	832 185	272
46	862 191	892 198	921 204	951 210	981 217	1011 223	1040 229	1069 236	1099 242	1128 248	277
48	1158 255	1187 261	1216 267	1245 273	1275 279	1304 285	1333 291	1361 298	1390 304	1419 310	283
50	1448 316	1477 322	1505 328	1534 333	1563 339	1591 345	1620 351	1648 357	1676 363	1705 369	288
52	1733 374	1761 380	1789 386	1817 392	1845 397	1874 403	1901 409	1929 414	1957 420	1985 426	293
54	2013 431	2040 437	2068 442	2096 448	2123 453	2151 459	2178 464	2205 470	2233 475	2260 480	299
56	2287 486	2314 491	2342 496	2369 502	2396 507	2423 512	2450 518	2477 523	2503 528	2530 533	304
58	2557 539	2584 544	2610 549	2637 554	2663 559	2690 564	2716 569	2743 574	2769 580	2795 585	309
60	2822 590	2848 595	2874 600	2900 605	2926 610	2952 615	2978 619	3004 624	3030 629	3056 634	314
62	3082 639	3107 644	3133 649	3159 653	3184 658	3210 663	3235 667	3261 672	3286 677	3312 681	320
64	3337 686	3362 690	3388 695	3413 700	3438 704	3463 709	3488 713	3513 717	3538 722	3563 726	332
66	3588 731	3613 735	3638 739	3663 743	3687 748	3712 752	3737 756	3761 760	3786 765	3810 769	343
68	3835 773	3859 777	3884 781	3908 785	3933 789	3957 793	3981 797	4005 801	4030 805	4054 809	356
70	4078 813	4102 817	4126 821	4151 825	4175 829	4199 833	4223 837	4247 841	4271 845	4295 849	365
72	4319 852	4342 856	4366 860	4390 864	4414 868	4438 871	4461 875	4485 879	4509 882	4533 886	377
74	4556 890	4580 894	4604 897	4627 901	4651 905	4674 908	4698 912	4722 916	4745 919	4769 923	384
76	4792 927	4816 930	4839 934	4862 938	4886 941	4909 945	4933 948	4956 952	4979 956	5003 959	387
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01201 .990 .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) TIME (MIN)		LR FL150			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	35 8	69 15	102 22	135 30	168 37	202 44	235 51	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 01501 .990 .000 .000 0 FCOM-NO-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 0	31 7	62 14	93 21	124 29	154 36	185 43	216 50	246 57	277 64
42	308 71	338 77	368 84	399 90	429 97	459 103	489 110	520 116	550 122	580 128
44	610 134	640 140	670 146	700 153	730 159	760 165	790 171	820 177	850 183	879 189
46	909 195	939 201	968 207	998 213	1028 220	1057 226	1087 232	1116 238	1146 244	1175 250
48	1205 255	1234 261	1263 267	1292 273	1322 279	1351 285	1380 291	1409 297	1438 303	1467 309
50	1496 315	1525 320	1554 326	1583 332	1612 338	1640 344	1669 349	1698 355	1726 361	1755 367
52	1784 373	1812 378	1841 384	1869 390	1898 395	1926 401	1954 407	1983 412	2011 418	2039 424
54	2067 429	2095 435	2123 441	2152 446	2180 452	2208 457	2236 463	2263 468	2291 474	2319 479
56	2347 485	2375 490	2402 496	2430 501	2458 507	2485 512	2513 518	2540 523	2568 529	2595 534
58	2623 539	2650 544	2677 549	2704 554	2731 559	2759 564	2786 569	2813 573	2840 578	2867 583
60	2894 587	2921 592	2947 596	2974 601	3001 605	3028 610	3055 614	3081 619	3108 623	3135 628
62	3162 632	3188 637	3215 641	3241 646	3268 650	3295 655	3321 659	3348 664	3374 668	3401 673
64	3427 677	3453 682	3480 686	3506 691	3533 695	3559 700	3585 704	3611 709	3638 713	3664 717
66	3690 722	3716 726	3743 731	3769 735	3795 740	3821 744	3847 748	3873 753	3899 757	3925 762
68	3951 766	3977 770	4003 775	4029 779	4055 783	4081 788	4107 792	4132 797	4158 801	4184 805
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= 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 0	33 7	66 14	100 21	133 28	166 34	199 41	232 48	265 55	298 62
42	331 68	364 75	396 82	429 89	462 95	495 102	527 109	559 116	592 122	624 129
44	657 136	689 142	721 149	754 155	786 162	818 169	850 175	882 182	914 188	946 195
46	978 201	1010 208	1041 214	1073 221	1105 227	1137 234	1168 240	1199 247	1231 253	1262 259
48	1294 266	1325 272	1356 278	1387 285	1419 291	1450 297	1481 303	1512 309	1543 316	1574 322
50	1604 328	1635 334	1666 340	1696 346	1727 353	1758 359	1788 365	1819 371	1849 377	1880 383
52	1910 389	1940 395	1970 401	2000 407	2031 413	2061 419	2091 424	2121 430	2151 435	2181 441
54	2210 446	2240 451	2270 456	2300 461	2330 467	2359 472	2389 477	2419 482	2448 487	2478 492
56	2508 497	2537 502	2567 507	2596 512	2626 517	2655 522	2685 527	2714 532	2744 537	2773 542
58	2802 547	2832 552	2861 557	2890 562	2919 567	2949 572	2978 577	3007 582	3036 587	3065 592
60	3094 597	3123 602	3152 607	3181 612	3210 617	3239 622	3268 627	3297 632	3326 637	3354 642
62	3383 646	3412 651	3441 656	3469 661	3498 666	3527 671	3555 676	3584 681	3612 685	3641 690
64	3669 695	3698 700	3726 705	3754 710	3783 715	3811 719	3839 724	3868 729	3896 734	3924 739
66	3952 744	3981 748	4009 753	4037 758	4065 763	4093 768	4121 772	4149 777	4177 782	4205 787
68	4233 791	4260 796	4288 801	4316 806	4344 811	4372 815	4399 820	4427 825	4454 829	4482 834
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%		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	0 0	33 7	67 14	100 21	134 27	167 34	200 41	233 48	266 55	300 61	291
42	333 68	366 75	399 81	432 88	464 95	497 102	530 108	563 115	595 121	628 128	295
44	661 134	693 141	725 147	758 154	790 160	823 167	855 173	887 179	919 186	951 192	299
46	983 199	1015 205	1047 211	1079 217	1111 224	1142 230	1174 236	1206 242	1237 248	1269 254	304
48	1300 261	1332 267	1363 273	1394 278	1426 284	1457 290	1488 296	1519 302	1550 308	1581 314	310
50	1612 319	1643 325	1674 331	1705 336	1735 342	1766 348	1797 353	1827 359	1858 364	1888 370	325
52	1919 375	1949 380	1980 386	2010 391	2040 396	2071 402	2101 407	2131 412	2161 418	2191 423	337
54	2221 428	2251 433	2281 438	2311 443	2340 449	2370 454	2400 459	2430 464	2459 469	2489 474	347
56	2519 479	2548 484	2578 489	2607 494	2637 499	2666 504	2696 509	2725 514	2754 519	2784 524	354
58	2813 529	2842 533	2871 538	2901 543	2930 548	2959 553	2988 558	3017 562	3046 567	3075 572	359
60	3104 577	3133 581	3162 586	3190 591	3219 595	3248 600	3277 605	3306 609	3334 614	3363 618	368
62	3392 623	3420 628	3449 632	3477 637	3506 641	3534 646	3563 650	3591 655	3620 659	3648 664	375
64	3677 669	3705 673	3733 678	3762 682	3790 686	3818 691	3846 695	3875 700	3903 704	3931 709	378
66	3959 713	3987 718	4015 722	4043 727	4071 731	4100 735	4128 740	4156 744	4184 749	4211 753	380
68	4239 757	4267 762	4295 766	4323 770	4351 775	4379 779	4407 784	4434 788	4462 792	4490 797	382
70	4518 801	4545 805	4573 810	4601 814	4628 818	4656 822	4683 827	4711 831	4739 835	4766 840	384
LOW AIR CONDITIONING ΔFUEL = − 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 2220000C5KG330 0 018590 0 0 1 1.0 .0 .00 01701 .990 .000 0 FCOM-NO-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 ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01701 .990 .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) TIME (MIN)		LR FL190			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	38	74	110	146	181	217	253	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 01901 .990 .000 .000 0 FCOM-NO-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 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= 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 0	36 8	73 15	109 23	146 30	182 38	218 45	254 53	290 60	327 68
42	363 75	398 82	434 89	470 96	505 103	541 110	576 116	612 122	647 128	682 135
44	717 141	752 147	787 153	822 159	857 165	892 171	927 177	962 183	996 189	1031 195
46	1066 202	1100 208	1135 213	1169 219	1204 225	1239 231	1273 237	1307 243	1342 249	1376 255
48	1410 261	1445 267	1479 273	1513 279	1547 285	1581 291	1615 297	1649 303	1683 309	1717 314
50	1751 320	1785 326	1819 332	1853 338	1887 344	1920 350	1954 356	1988 361	2021 367	2055 373
52	2088 379	2122 385	2155 390	2189 396	2222 402	2256 408	2289 414	2322 419	2355 425	2388 431
54	2422 437	2455 442	2488 448	2521 454	2554 459	2587 465	2620 471	2653 477	2685 482	2718 488
56	2751 494	2784 499	2816 505	2849 511	2882 516	2914 522	2947 528	2979 533	3012 539	3044 545
58	3076 550	3109 556	3141 561	3173 567	3205 573	3237 578	3269 584	3301 589	3333 595	3365 600
60	3397 606	3429 611	3460 617	3492 622	3524 628	3555 633	3587 639	3618 644	3649 650	3681 655
62	3712 660	3743 666	3774 671	3805 676	3837 682	3868 687	3899 692	3929 698	3960 703	3991 708
64	4022 714	4053 719	4083 724	4114 729	4144 735	4175 740	4205 745	4235 750	4266 755	4296 760
66	4326 766	4356 771	4386 776	4416 781	4446 786	4476 791	4506 796	4536 801	4565 806	4595 811
68	4625 816	4654 821	4684 826	4713 831	4742 836	4772 841	4801 846	4830 850	4859 855	4888 860
ENGINE ANTI ICE ON ΔFUEL = + 2 %						TOTAL ANTI ICE ON ΔFUEL = + 6 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 13
	INTEGRATED CRUISE		SEQ 130	REV 22

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL210				
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 ΔFUEL = − 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %				

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 02101 .990 .000 0 FCOM-NO-02-05-30-013-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		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 ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02301 .990 .000 .000 0 FCOM-NO-02-05-30-014-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		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	29860	33467	37174	40781	44488	48096	516102	552109	588116	624123	303
44	660130	695137	731144	766150	802157	837164	872170	907176	942183	977189	314
46	1012196	1047202	1082208	1116214	1151220	1186226	1220232	1254238	1288244	1322250	333
48	1357256	1391261	1425267	1459273	1492279	1526284	1560290	1594295	1627301	1661306	352
50	1695312	1728317	1762323	1795328	1829334	1862339	1895344	1929350	1962355	1995360	369
52	2028366	2061371	2095376	2128382	2161387	2194392	2227398	2260403	2293408	2326413	373
54	2359419	2392424	2424429	2457434	2490440	2523445	2556450	2588455	2621461	2654466	376
56	2687471	2719476	2752481	2784487	2817492	2850497	2882502	2915507	2947512	2980518	377
58	3012523	3045528	3077533	3109538	3142543	3174548	3206554	3239559	3271564	3303569	378
60	3335574	3367579	3400584	3432589	3464594	3496599	3528604	3560609	3592614	3624619	379
62	3656625	3688630	3719635	3751640	3783645	3815650	3846654	3878659	3910664	3942669	381
64	3973674	4005679	4036684	4068689	4099694	4131699	4162704	4194709	4225714	4256719	382
66	4288724	4319729	4350734	4381739	4413744	4444749	4475753	4506758	4537763	4568768	380
68	4599773	4630778	4661783	4691787	4722792	4753797	4784802	4814807	4845811	4875816	382
70	4906821	4936826	4967830	4997835	5028840	5058845	5088849	5118854	5148859	5179863	385
72	5209868	5239873	5269877	5299882	5328887	5358891	5388896	5418900	5448905	5477909	388
74	5507914	5537918	5566923	5596928	5625932	5655937	5684941	5713945	5742950	5772954	391
76	5801959	5830963	5859968	5888972	5917976	5946981	5975985	6004989	6033994	6062998	395
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02101 .990 .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) TIME (MIN)		LR FL230			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	40	79	117	155	194	232	270	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 02301 .990 .000 .000 0 FCOM-NO-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 0	38 7	76 13	114 20	151 27	189 33	227 40	264 46	302 53	339 60
42	377 66	414 73	452 79	489 86	526 92	564 99	601 105	638 112	675 118	712 125
44	749 131	786 138	823 144	860 151	897 157	934 163	970 170	1007 176	1044 183	1081 189
46	1117 196	1154 202	1190 208	1227 215	1263 221	1300 227	1336 234	1372 240	1408 246	1445 253
48	1481 259	1517 265	1553 272	1589 278	1625 284	1661 290	1697 297	1733 303	1768 309	1804 316
50	1840 322	1876 328	1911 334	1947 340	1982 347	2018 353	2053 359	2089 365	2124 371	2159 378
52	2195 384	2230 390	2265 396	2300 402	2335 409	2370 415	2405 421	2440 427	2475 433	2510 439
54	2544 445	2579 451	2613 457	2648 463	2682 469	2717 475	2751 481	2785 487	2820 493	2854 499
56	2888 505	2922 511	2956 517	2990 523	3024 529	3057 535	3091 540	3125 546	3158 552	3192 558
58	3225 564	3259 570	3292 575	3325 581	3358 587	3392 593	3425 598	3458 604	3491 610	3524 615
60	3556 621	3589 627	3622 632	3654 638	3687 643	3720 649	3752 654	3784 660	3816 665	3849 671
62	3881 676	3913 682	3945 687	3977 692	4009 698	4041 703	4072 709	4104 714	4135 719	4167 724
64	4199 730	4230 735	4261 740	4292 745	4324 751	4355 756	4386 761	4417 766	4448 771	4479 776
66	4510 781	4540 786	4571 791	4602 796	4632 801	4663 806	4693 811	4723 816	4754 821	4784 826
68	4814 831	4844 835	4874 840	4904 845	4934 850	4964 854	4994 859	5023 864	5053 868	5083 873
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= 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 0	40 7	80 14	120 21	160 28	200 35	239 42	279 49	319 56	359 63
42	398 70	438 77	477 84	517 91	556 98	596 105	635 112	674 119	713 126	752 133
44	792 139	830 146	869 153	908 160	947 167	986 174	1025 181	1064 187	1102 194	1141 201
46	1180 208	1218 215	1257 221	1295 228	1333 235	1372 242	1410 249	1448 255	1486 262	1524 269
48	1563 276	1600 282	1638 289	1676 296	1714 302	1752 309	1789 316	1827 322	1864 329	1902 336
50	1939 342	1976 349	2013 355	2051 362	2088 368	2125 375	2162 381	2198 388	2235 394	2272 401
52	2309 407	2345 413	2381 420	2418 426	2454 433	2491 439	2527 445	2563 451	2599 458	2635 464
54	2671 470	2706 476	2742 483	2778 489	2813 495	2849 501	2884 507	2920 513	2955 519	2990 526
56	3025 532	3060 538	3095 544	3130 550	3165 556	3200 561	3234 567	3269 573	3303 579	3338 585
58	3372 591	3406 596	3441 602	3475 608	3509 614	3543 619	3577 625	3610 631	3644 636	3678 642
60	3711 647	3745 653	3778 659	3812 664	3845 670	3878 675	3911 681	3944 686	3977 691	4010 697
62	4043 702	4076 707	4109 713	4141 718	4174 723	4206 728	4239 734	4271 739	4303 744	4335 749
64	4368 754	4400 759	4432 764	4463 769	4495 774	4527 779	4559 784	4590 789	4622 794	4654 799
66	4685 803	4716 808	4748 813	4779 818	4810 823	4842 827	4873 832	4904 837	4935 842	4966 846
68	4997 851	5027 856	5058 860	5089 865	5119 870	5150 874	5181 879	5211 883	5241 888	5272 892
ENGINE ANTI ICE ON ΔFUEL = + 2 %						TOTAL ANTI ICE ON ΔFUEL = + 6 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 15
	INTEGRATED CRUISE		SEQ 130	REV 22

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL250				
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	40 7	81 14	121 21	162 28	202 35	242 42	282 49	322 56	362 63	341
42	402 70	442 76	482 83	521 90	561 96	601 103	640 110	680 116	719 123	759 129	353
44	798 136	837 142	877 149	916 155	955 162	994 168	1033 175	1072 181	1111 188	1150 194	362
46	1189 200	1228 207	1267 213	1306 219	1344 226	1383 232	1422 238	1460 245	1499 251	1537 257	366
48	1576 263	1614 270	1653 276	1691 282	1729 288	1768 295	1806 301	1844 307	1882 313	1920 319	369
50	1958 325	1996 331	2034 338	2072 344	2110 350	2148 356	2186 362	2224 368	2261 374	2299 380	372
52	2337 386	2374 392	2412 398	2449 404	2487 410	2524 416	2562 422	2599 428	2636 434	2674 440	375
54	2711 446	2748 452	2785 458	2822 464	2859 470	2897 476	2934 482	2970 488	3007 493	3044 499	375
56	3081 505	3118 511	3154 517	3191 523	3228 529	3264 535	3301 541	3337 546	3373 552	3410 558	374
58	3446 564	3482 570	3518 575	3555 581	3591 587	3627 593	3663 598	3698 604	3734 610	3770 615	375
60	3806 621	3841 627	3877 632	3912 638	3948 644	3983 649	4019 655	4054 660	4089 666	4124 672	378
62	4160 677	4194 683	4229 688	4264 693	4299 699	4334 704	4369 710	4403 715	4438 721	4472 726	382
64	4507 731	4541 737	4576 742	4610 747	4644 753	4678 758	4712 763	4746 768	4780 774	4814 779	386
66	4848 784	4882 789	4916 794	4949 799	4983 805	5017 810	5050 815	5083 820	5117 825	5150 830	391
68	5183 835	5216 840	5250 845	5283 850	5316 854	5349 859	5382 864	5414 869	5447 874	5480 879	402
70	5513 883	5545 888	5578 893	5610 898	5643 902	5675 907	5708 912	5740 917	5772 921	5805 926	410
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %				

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 0 FCOM-NO-02-05-30-015-132

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 16
	INTEGRATED CRUISE		SEQ 130	REV 22

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		LR FL 270			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	43 7	85 14	128 21	171 28	213 36	256 43	298 50	341 57	383 64	359
42	425 71	468 78	510 85	552 92	594 99	636 106	678 112	720 119	762 126	804 133	363
44	846 140	887 147	929 154	970 160	1012 167	1054 174	1095 181	1137 187	1178 194	1219 201	366
46	1261 208	1302 214	1343 221	1384 228	1425 234	1466 241	1507 248	1548 254	1589 261	1630 267	369
48	1671 274	1712 281	1752 287	1793 294	1834 300	1874 307	1915 313	1955 320	1996 327	2036 333	372
50	2076 340	2117 346	2157 353	2197 359	2237 366	2277 372	2317 379	2357 385	2397 392	2437 398	370
52	2477 405	2516 411	2556 417	2595 424	2635 430	2674 436	2713 443	2753 449	2792 455	2831 462	371
54	2870 468	2909 474	2948 481	2987 487	3026 493	3065 499	3103 505	3142 512	3180 518	3219 524	373
56	3257 530	3296 536	3334 542	3372 548	3410 554	3448 561	3486 566	3524 572	3562 578	3600 584	376
58	3637 590	3675 596	3712 602	3750 608	3787 614	3824 620	3862 626	3899 631	3936 637	3973 643	381
60	4010 649	4046 654	4083 660	4120 666	4157 671	4193 677	4230 683	4266 688	4302 694	4339 699	386
62	4375 705	4411 710	4447 715	4483 721	4519 726	4555 732	4590 737	4626 742	4662 748	4697 753	397
64	4733 758	4768 763	4804 769	4839 774	4875 779	4910 784	4945 789	4980 794	5015 800	5050 805	406
66	5085 810	5120 815	5155 820	5189 825	5224 830	5259 835	5293 840	5328 845	5362 850	5397 855	412
68	5431 860	5466 865	5500 870	5534 875	5568 880	5603 884	5636 889	5670 894	5704 899	5738 904	417
70	5772 909	5806 914	5840 918	5873 923	5907 928	5941 933	5974 937	6008 942	6041 947	6074 952	420
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -A319-131 IAE V2522-A5 2220000C5KG330 0 018590 0 0 1 1.0 0 .00 02701 .990 .000 0 FCOM-N0-02-05-30-016-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL250			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	42	82	122	161	201	240	280	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 ΔFUEL = − 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02501 .990 .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) TIME (MIN)		LR FL270			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			20	44	86	129	171	213	255	297	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02701 .990 .000 .000 0 FCOM-NO-02-05-30-016-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 15
	INTEGRATED CRUISE		SEQ 161	REV 38

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 0	42 7	84 15	127 22	169 30	211 37	253 45	295 52	337 60	379 67
42	421 75	462 82	504 90	545 97	587 104	629 112	670 119	711 127	753 134	794 141
44	835 149	876 156	917 163	958 171	999 178	1040 185	1080 192	1121 200	1161 207	1202 214
46	1242 221	1282 228	1322 235	1362 243	1403 250	1443 257	1482 264	1522 271	1562 278	1601 285
48	1641 292	1680 299	1719 306	1759 313	1798 319	1837 326	1876 333	1915 340	1953 347	1992 354
50	2031 360	2069 367	2108 374	2146 381	2185 387	2223 394	2261 400	2299 407	2337 414	2375 420
52	2412 427	2450 433	2487 439	2525 446	2562 452	2600 459	2637 465	2674 471	2711 477	2748 484
54	2785 490	2821 496	2858 502	2894 508	2931 514	2967 521	3004 527	3040 533	3076 539	3112 545
56	3148 551	3184 557	3220 562	3255 568	3291 574	3327 580	3362 586	3397 592	3433 597	3468 603
58	3503 609	3538 614	3573 620	3608 625	3643 631	3678 637	3712 642	3747 647	3781 653	3816 658
60	3850 664	3884 669	3918 674	3952 679	3986 685	4021 690	4054 695	4088 700	4122 706	4156 711
62	4189 716	4223 721	4256 726	4290 731	4323 736	4356 742	4390 747	4423 752	4456 757	4489 762
64	4522 767	4555 772	4588 777	4620 782	4653 787	4686 791	4718 796	4751 801	4783 806	4816 811
66	4848 816	4881 821	4913 825	4945 830	4977 835	5009 840	5041 845	5073 849	5105 854	5137 859
68	5169 864	5200 868	5232 873	5264 878	5295 882	5327 887	5358 891	5389 896	5421 901	5452 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 0	44 8	89 16	133 24	178 32	222 40	266 48	310 56	354 64	398 71
42	442 79	485 87	528 95	572 103	615 110	659 118	701 126	744 133	787 141	830 149
44	873 156	916 164	958 171	1000 179	1043 186	1085 194	1127 201	1169 209	1211 216	1253 223
46	1295 231	1336 238	1378 245	1419 253	1461 260	1502 267	1543 274	1584 281	1625 288	1666 295
48	1706 303	1747 309	1787 316	1827 323	1868 330	1908 337	1948 344	1988 350	2028 357	2067 364
50	2107 371	2147 377	2186 384	2225 390	2265 397	2304 404	2343 410	2382 416	2421 423	2459 429
52	2498 436	2537 442	2575 448	2614 455	2652 461	2690 467	2728 473	2766 479	2804 485	2842 492
54	2880 498	2918 504	2955 510	2992 516	3030 521	3067 527	3104 533	3141 539	3178 545	3215 551
56	3252 556	3289 562	3326 568	3362 573	3399 579	3435 585	3472 590	3508 596	3544 601	3580 607
58	3616 613	3652 618	3688 624	3724 629	3760 635	3796 640	3831 645	3867 651	3902 656	3938 662
60	3973 667	4008 672	4043 678	4078 683	4113 688	4149 694	4183 699	4218 704	4253 709	4288 714
62	4322 720	4357 725	4391 730	4425 735	4460 740	4494 745	4528 750	4562 755	4596 760	4630 765
64	4665 770	4698 775	4732 780	4766 785	4799 790	4833 795	4867 800	4900 805	4933 810	4967 815
66	5000 820	5033 825	5066 829	5099 834	5132 839	5165 844	5198 849	5231 853	5264 858	5296 863
68	5329 868	5362 872	5394 877	5426 882	5459 886	5491 891	5523 895	5555 900	5587 905	5620 909
ENGINE ANTI ICE ON ΔFUEL = + 2 %						TOTAL ANTI ICE ON ΔFUEL = + 6 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 17
	INTEGRATED CRUISE		SEQ 130	REV 22

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL290			
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 ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 0 FCOM-NO-02-05-30-017-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		LR FL310			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	48 8	96 16	145 24	193 32	241 40	289 48	337 56	384 63	432 71	364
42	480 79	527 87	575 95	622 103	670 111	717 118	764 126	811 134	858 142	905 149	363
44	952 157	998 165	1045 172	1091 180	1138 188	1184 195	1230 203	1276 210	1322 218	1368 225	365
46	1414 233	1460 240	1505 248	1551 255	1596 263	1642 270	1687 277	1732 284	1777 292	1822 299	368
48	1867 306	1912 313	1956 321	2001 328	2045 335	2089 342	2133 349	2177 356	2221 363	2265 370	373
50	2309 377	2353 384	2396 391	2440 397	2483 404	2527 411	2569 418	2612 424	2655 431	2698 438	379
52	2741 444	2784 451	2826 457	2869 464	2911 470	2954 477	2996 483	3038 489	3080 496	3122 502	391
54	3164 508	3205 514	3247 521	3288 527	3330 533	3372 539	3413 545	3454 551	3495 558	3536 564	400
56	3578 570	3618 576	3659 582	3700 588	3741 594	3782 600	3822 606	3862 612	3903 617	3943 623	407
58	3984 629	4024 635	4064 641	4104 647	4144 653	4184 658	4224 664	4263 670	4303 676	4342 681	410
60	4382 687	4421 693	4460 698	4499 704	4538 709	4578 715	4616 721	4655 726	4694 732	4732 737	417
62	4771 742	4809 748	4848 753	4886 759	4924 764	4963 769	5000 775	5038 780	5076 785	5114 790	426
64	5152 796	5189 801	5227 806	5264 811	5302 816	5339 821	5376 827	5414 832	5451 837	5488 842	434
66	5525 847	5562 852	5598 857	5635 862	5672 867	5708 872	5745 877	5781 882	5817 887	5854 892	436
68	5890 897	5926 902	5962 907	5997 912	6033 916	6069 921	6105 926	6140 931	6176 936	6211 940	441
70	6246 945	6282 950	6317 955	6352 959	6387 964	6422 969	6457 973	6491 978	6526 983	6561 987	446
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL 290			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	47 8	92 15	138 23	182 30	227 37	272 45	317 52	365
42	362 59	407 67	451 74	496 81	540 89	585 96	629 103	674 110	718 118	762 125	367
44	807 132	851 139	895 146	939 154	983 161	1027 168	1071 175	1115 182	1158 190	1202 197	367
46	1246 204	1289 211	1333 218	1376 225	1419 232	1463 239	1506 246	1549 253	1592 260	1635 267	367
48	1678 274	1720 281	1763 288	1806 295	1848 302	1891 309	1933 316	1975 323	2017 329	2060 336	369
50	2102 343	2144 350	2185 357	2227 363	2269 370	2311 377	2352 383	2393 390	2435 396	2476 403	372
52	2517 410	2558 416	2599 423	2640 429	2681 436	2722 442	2762 449	2803 455	2843 461	2884 468	377
54	2924 474	2964 480	3004 487	3044 493	3084 499	3124 505	3164 512	3204 518	3243 524	3283 530	382
56	3323 536	3362 542	3401 548	3440 554	3479 560	3519 566	3558 572	3596 578	3635 583	3674 589	392
58	3713 595	3751 601	3790 607	3828 612	3867 618	3905 624	3943 629	3981 635	4020 641	4058 646	401
60	4096 652	4134 657	4171 663	4209 668	4247 674	4285 680	4322 685	4360 690	4397 696	4434 701	408
62	4472 707	4509 712	4546 718	4583 723	4620 728	4658 734	4694 739	4731 744	4768 750	4805 755	413
64	4842 760	4878 766	4915 771	4951 776	4988 781	5024 787	5060 792	5096 797	5132 802	5168 807	415
66	5205 812	5240 817	5276 822	5312 828	5347 833	5383 838	5419 843	5454 847	5489 852	5525 857	423
68	5560 862	5595 867	5630 872	5665 877	5700 882	5735 887	5770 891	5804 896	5839 901	5874 906	431
70	5909 910	5943 915	5977 920	6012 925	6046 929	6080 934	6114 939	6148 943	6182 948	6217 953	438
72	6251 957	6284 962	6318 966	6352 971	6385 976	6419 980	6453 985	6486 989	6519 994	6553 998	439
74	6586 1003	6619 1007	6652 1012	6685 1016	6718 1021	6751 1025	6784 1029	6816 1034	6849 1038	6882 1043	444
76	6914 1047	6947 1051	6979 1056	7011 1060	7044 1064	7076 1069	7108 1073	7140 1077	7172 1081	7204 1086	448
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-N0-02-05-30-017-140

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		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	38464	43271	47979	52687	57395	621102	667110	714118	761126	808133	363
44	854141	901149	947156	993164	1039171	1086179	1131186	1177194	1223201	1269209	366
46	1315216	1360223	1405231	1450238	1496245	1541253	1586260	1630267	1675274	1720282	370
48	1765289	1809296	1853303	1897310	1942317	1986324	2030331	2073338	2117345	2161352	375
50	2205359	2248365	2291372	2334379	2378386	2421392	2464399	2506405	2549412	2592419	381
52	2634425	2677432	2719438	2761444	2804451	2846457	2888464	2930470	2971476	3013482	393
54	3055489	3097495	3138501	3180507	3221513	3262519	3303526	3344532	3386538	3427544	401
56	3468550	3508556	3549562	3590568	3630574	3671580	3711586	3752592	3792597	3832603	407
58	3872609	3912615	3952621	3992627	4032633	4072638	4111644	4151650	4190655	4230661	410
60	4269667	4308672	4347678	4386683	4425689	4464695	4502700	4541706	4580711	4618716	418
62	4657722	4695727	4733733	4771738	4809743	4847749	4885754	4923759	4961764	4998770	427
64	5036775	5073780	5111785	5148790	5185795	5223801	5260806	5297811	5334816	5371821	433
66	5408826	5444831	5481836	5517841	5554846	5590851	5626856	5663861	5699866	5735871	436
68	5771876	5807881	5842886	5878890	5914895	5950900	5985905	6020910	6056914	6091919	441
70	6126924	6161929	6196933	6231938	6266943	6301947	6335952	6370957	6404961	6439966	446
72	6473970	6508975	6542979	6576984	6610988	6644993	6678997	67121002	67461006	67791011	452
74	68131015	68471019	68801024	69141028	69471033	69811037	70141041	70471046	70801050	71131054	458
76	71461059	71791063	72121067	72451071	72781076	73101080	73431084	73751088	74081093	74401097	460
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .00 03101 .990 .000 .000 0 FCOM-NO-02-05-30-018-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 17
	INTEGRATED CRUISE		SEQ 161	REV 38

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	00	468	9216	13825	18433	23041	27649	32157	36765	41374
42	45882	50390	54898	593105	638113	683121	727129	771137	815144	860152
44	904160	948167	991175	1035182	1079190	1122197	1165205	1208212	1252219	1295227
46	1338234	1380241	1423248	1465255	1508262	1550269	1592276	1634283	1676290	1718297
48	1760304	1802310	1843317	1884324	1926331	1967337	2008344	2049351	2090357	2131364
50	2172370	2212377	2253383	2293389	2333396	2374402	2414409	2454415	2494421	2533427
52	2573434	2613440	2652446	2692452	2731458	2771464	2810470	2849476	2888482	2927488
54	2966494	3004500	3043506	3081512	3120518	3158524	3196530	3234536	3273541	3311547
56	3349553	3387559	3424564	3462570	3500576	3537582	3575587	3612593	3649598	3686604
58	3724610	3761615	3797621	3834626	3871632	3908637	3945642	3981648	4018653	4054659
60	4090664	4127669	4163675	4199680	4235685	4271691	4307696	4342701	4378706	4414712
62	4449717	4485722	4520727	4555732	4591737	4626742	4661748	4696753	4731758	4766763
64	4800768	4835773	4870777	4904782	4939787	4973792	5007797	5041802	5076806	5110811
66	5144816	5178821	5211825	5245830	5279834	5313839	5346844	5379848	5413853	5446857
68	5480862	5513866	5546871	5579875	5612879	5645884	5678888	5710893	5743897	5776901
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= 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 0	48 8	95 16	143 25	190 33	238 41	284 49	331 57	378 65	425 73
42	472 81	518 89	564 97	610 104	656 112	702 120	748 127	793 135	839 142	885 150
44	930 157	975 164	1020 172	1065 179	1110 186	1155 194	1199 201	1243 208	1288 215	1332 222
46	1376 229	1420 236	1464 243	1508 250	1551 257	1595 264	1638 271	1682 278	1725 284	1768 291
48	1811 298	1854 305	1897 311	1939 318	1982 325	2025 331	2067 338	2109 345	2151 351	2193 358
50	2235 364	2277 371	2318 377	2360 383	2402 390	2443 396	2484 402	2525 409	2567 415	2608 421
52	2649 427	2689 434	2730 440	2771 446	2811 452	2852 458	2892 464	2932 470	2972 476	3012 482
54	3053 488	3092 494	3132 500	3172 506	3211 512	3251 518	3290 524	3329 530	3369 536	3408 541
56	3447 547	3486 553	3524 559	3563 564	3602 570	3641 576	3679 581	3717 587	3755 593	3794 598
58	3832 604	3870 609	3908 615	3945 620	3983 626	4021 631	4058 637	4096 642	4133 647	4170 652
60	4208 658	4244 663	4281 668	4318 673	4355 678	4392 683	4428 688	4465 693	4501 698	4538 703
62	4574 708	4610 713	4646 718	4682 723	4718 728	4754 733	4790 738	4826 743	4861 747	4897 752
64	4932 757	4967 762	5003 766	5038 771	5073 776	5108 781	5143 785	5178 790	5213 795	5248 799
66	5282 804	5317 808	5351 813	5386 818	5420 822	5455 827	5489 831	5523 836	5557 840	5591 845
68	5626 850	5659 854	5693 859	5727 863	5761 867	5795 872	5828 876	5862 881	5895 885	5928 890
ENGINE ANTI ICE ON ΔFUEL = + 2 %						TOTAL ANTI ICE ON ΔFUEL = + 6 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 19
	INTEGRATED CRUISE		SEQ 130	REV 22

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL330			
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 ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .990 .000 0 FCOM-NO-02-05-30-019-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		LR FL350			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40	0 0	53 9	106 17	158 26	211 34	264 43	316 51	368 60	420 68	472 77	366
42	524 85	576 93	627 101	678 109	730 117	781 125	832 133	882 141	933 149	983 157	376
44	1034 165	1084 173	1134 180	1184 188	1234 196	1284 203	1334 211	1383 218	1432 226	1482 233	388
46	1531 241	1580 248	1629 255	1678 263	1727 270	1775 278	1824 285	1872 292	1920 299	1969 306	397
48	2017 314	2065 321	2112 328	2160 335	2208 342	2255 349	2302 356	2349 363	2396 370	2443 377	401
50	2490 384	2537 390	2583 397	2630 404	2676 411	2722 417	2768 424	2814 430	2860 437	2905 444	411
52	2951 450	2996 457	3042 463	3087 469	3132 476	3177 482	3222 488	3266 495	3311 501	3356 507	422
54	3400 514	3444 520	3488 526	3532 532	3576 538	3620 545	3664 551	3707 557	3751 563	3794 569	426
56	3838 575	3880 581	3923 587	3966 593	4009 599	4052 605	4094 610	4136 616	4179 622	4221 628	432
58	4263 634	4305 639	4346 645	4388 651	4430 656	4472 662	4513 668	4554 673	4595 679	4636 684	438
60	4677 690	4718 695	4759 701	4799 706	4840 712	4880 717	4921 722	4961 728	5001 733	5041 738	446
62	5081 744	5121 749	5160 754	5200 760	5240 765	5279 770	5319 775	5358 781	5397 786	5436 791	451
64	5475 796	5514 801	5553 806	5592 812	5630 817	5669 822	5707 827	5746 832	5784 837	5822 842	453
66	5861 847	5898 852	5936 857	5974 862	6012 867	6050 872	6087 877	6124 882	6161 887	6198 892	453
68	6236 897	6272 902	6309 907	6346 911	6382 916	6419 921	6455 926	6491 931	6528 935	6564 940	453
70	6600 945	6636 950	6671 954	6707 959	6742 964	6778 969	6813 973	6848 978	6883 983	6919 987	453
LOW AIR CONDITIONING ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 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 NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL330			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	53	103	154	204	254	303	353	362
42	40366	45374	50283	55191	60199	650107	699115	747123	796130	845138	366
44	893146	941154	990162	1038169	1086177	1134185	1181192	1229200	1276208	1324215	371
46	1371223	1418230	1465237	1512245	1559252	1606259	1652266	1698274	1745281	1791288	381
48	1837295	1883302	1929309	1975316	2020323	2066330	2111337	2157343	2202350	2247357	392
50	2293364	2337371	2382377	2427384	2472391	2517397	2561404	2605410	2650417	2694424	401
52	2738430	2782437	2826443	2870450	2914456	2958463	3001469	3045475	3088482	3131488	405
54	3175494	3218501	3260507	3303513	3346519	3389526	3431532	3474538	3516544	3558550	411
56	3600556	3642562	3684568	3726574	3768580	3809586	3851591	3892597	3933603	3975609	421
58	4016615	4057620	4098626	4139632	4180638	4220643	4261649	4301655	4342660	4382666	428
60	4422671	4462677	4502682	4542688	4582694	4622699	4661704	4701710	4740715	4779721	431
62	4819726	4858732	4896737	4935742	4974747	5013753	5052758	5090763	5128768	5167774	437
64	5205779	5243784	5281789	5319794	5357799	5395805	5432810	5470815	5507820	5545825	442
66	5582830	5619835	5656840	5694844	5731849	5768854	5804859	5841864	5878869	5914874	451
68	5951878	5987883	6023888	6060893	6096898	6132902	6168907	6204912	6240916	6276921	455
70	6312926	6347931	6383935	6418940	6454945	6489949	6524954	6559958	6595963	6630968	457
72	6665972	6700977	6734981	6769986	6804991	6839995	68731000	69071004	69411009	69761013	457
74	70101018	70441022	70781026	71121031	71461035	71791040	72131044	72461049	72801053	73131057	458
76	73471062	73801066	74131070	74461075	74791079	75121083	75441088	75771092	76091096	76421100	458
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .990 .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) TIME (MIN)		LR FL350			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	55	107	160	212	263	315	367	367
42	419 67	470 75	521 83	572 91	623 99	674 107	725 115	775 123	825 131	876 139	379
44	926 146	976 154	1026 162	1076 169	1126 177	1175 185	1225 192	1274 200	1323 207	1372 214	390
46	1422 222	1470 229	1519 237	1567 244	1616 251	1665 258	1713 266	1761 273	1809 280	1857 287	398
48	1905 295	1953 302	2000 309	2048 316	2095 323	2143 330	2190 337	2236 344	2283 350	2330 357	401
50	2377 364	2423 371	2469 378	2516 384	2562 391	2608 398	2654 404	2699 411	2745 417	2790 424	412
52	2836 430	2881 437	2926 443	2971 449	3016 456	3061 462	3106 468	3150 475	3194 481	3239 487	422
54	3283 494	3327 500	3371 506	3415 512	3459 518	3503 524	3546 530	3589 536	3632 543	3676 549	426
56	3719 555	3761 560	3804 566	3847 572	3889 578	3932 584	3974 590	4016 596	4058 601	4100 607	432
58	4143 613	4184 619	4226 624	4267 630	4309 636	4350 641	4391 647	4432 652	4473 658	4514 664	438
60	4555 669	4596 674	4636 680	4677 685	4717 691	4757 696	4797 701	4837 707	4877 712	4917 717	447
62	4957 723	4997 728	5037 733	5076 739	5116 744	5155 749	5194 754	5233 759	5272 765	5311 770	451
64	5351 775	5389 780	5428 785	5466 790	5505 795	5544 801	5582 806	5620 811	5658 816	5696 821	453
66	5735 826	5772 831	5810 836	5848 841	5885 846	5923 851	5960 856	5997 861	6034 866	6072 870	453
68	6109 875	6145 880	6182 885	6218 890	6255 895	6292 900	6328 904	6364 909	6400 914	6436 919	454
70	6472 923	6508 928	6543 933	6579 938	6614 942	6650 947	6685 952	6720 956	6755 961	6790 965	454
72	6825 970	6860 975	6894 979	6929 984	6963 988	6998 993	7032 997	7066 1002	7100 1006	7134 1011	454
74	7168 1015	7201 1020	7234 1024	7267 1029	7301 1033	7334 1037	7367 1042	7400 1046	7434 1051	7467 1055	454
76											
LOW AIR CONDITIONING ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-NO-02-05-30-020-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 19
	INTEGRATED CRUISE		SEQ 161	REV 38

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 0	49 8	98 16	147 24	196 32	245 40	293 48	341 55	389 63	438 71
42	486 79	534 86	581 94	629 102	677 109	724 117	771 124	818 132	865 139	912 147
44	959 154	1006 162	1052 169	1099 176	1145 184	1191 191	1237 198	1283 205	1329 212	1374 219
46	1420 227	1465 233	1510 240	1556 247	1601 254	1646 261	1690 268	1735 275	1780 282	1824 289
48	1869 296	1913 302	1956 309	2000 316	2044 322	2088 329	2132 336	2175 342	2219 349	2262 355
50	2305 362	2348 368	2391 375	2434 381	2477 388	2519 394	2562 400	2604 407	2646 413	2688 419
52	2731 426	2772 432	2814 438	2856 444	2897 450	2939 456	2980 462	3021 468	3063 474	3104 480
54	3145 486	3185 492	3226 498	3267 504	3307 509	3348 515	3388 521	3428 526	3468 532	3508 538
56	3548 543	3588 549	3627 554	3667 560	3706 565	3746 571	3785 576	3824 581	3863 587	3902 592
58	3941 597	3979 603	4018 608	4056 613	4095 618	4133 623	4172 629	4210 634	4248 639	4286 644
60	4324 649	4361 654	4399 659	4437 664	4474 669	4512 674	4549 679	4587 684	4624 689	4661 694
62	4698 699	4735 704	4772 709	4809 714	4846 719	4882 724	4919 729	4955 734	4992 739	5028 744
64	5065 748	5101 753	5137 758	5173 763	5209 768	5245 772	5280 777	5316 782	5352 787	5387 791
66	5423 796	5458 801	5493 805	5528 810	5564 815	5599 819	5634 824	5668 829	5703 833	5738 838
68	5773 842	5807 847	5841 852	5876 856	5910 861	5944 865	5978 870	6012 874	6046 879	6080 883
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= 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 0	51 8	101 16	152 24	203 32	254 40	304 48	353 56	403 64	453 72
42	503 80	553 87	602 95	651 103	700 110	750 118	798 126	847 133	895 141	944 148
44	992 156	1040 163	1088 170	1136 178	1183 185	1231 192	1278 200	1325 207	1373 214	1420 221
46	1467 228	1513 235	1560 242	1606 249	1653 256	1699 263	1745 270	1791 277	1836 284	1882 291
48	1928 298	1973 304	2018 311	2063 318	2108 324	2153 331	2198 337	2242 344	2287 350	2331 357
50	2375 363	2419 369	2463 376	2507 382	2550 388	2594 394	2637 400	2681 406	2724 412	2767 418
52	2810 424	2853 430	2895 436	2938 442	2980 448	3023 454	3065 460	3107 465	3149 471	3190 477
54	3232 482	3274 488	3315 494	3357 499	3398 505	3439 511	3480 516	3521 522	3562 527	3603 533
56	3644 538	3684 544	3725 549	3765 555	3806 560	3846 566	3886 571	3926 576	3966 582	4006 587
58	4046 593	4085 598	4125 603	4164 609	4203 614	4243 619	4282 624	4321 630	4360 635	4399 640
60	4438 645	4476 650	4515 656	4553 661	4591 666	4630 671	4668 676	4706 681	4744 686	4782 691
62	4820 696	4857 701	4895 706	4932 711	4969 716	5007 721	5044 726	5081 731	5118 736	5154 741
64	5191 746	5228 751	5264 756	5300 760	5337 765	5373 770	5409 775	5445 780	5481 784	5516 789
66	5552 794	5587 799	5623 803	5658 808	5693 813	5728 817	5763 822	5797 827	5832 831	5867 836
68	5901 840	5935 845	5970 849	6004 854	6038 858	6072 863	6105 867	6139 872	6172 876	6206 881
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%		DISTANCE (NM) TIME (MIN)		LR FL370			
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 ΔFUEL = − 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 IAE V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 0 FCOM-NO-02-05-30-021-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0%		DISTANCE (NM) TIME (MIN)		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 ΔFUEL = - 0.4 %				ENGINE ANTI ICE ON ΔFUEL = + 3 %				TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

10E -08FOA319-131 V2522-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-N0-02-05-30-022-130

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR FL370			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	57	111	165	219	273	327	380	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08FOA320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .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) TIME (MIN)		LR FL390			
WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			30	59	115	171	226	281	336	391	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 ΔFUEL = - 0.3 %				ENGINE ANTI ICE ON ΔFUEL = + 2 %				TOTAL ANTI ICE ON ΔFUEL = + 5 %			

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-NO-02-05-30-022-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.30	P 21
	INTEGRATED CRUISE		SEQ 161	REV 38

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 0	52 8	104 16	157 24	209 32	261 40	312 48	364 56	415 64	466 72
42	518 79	568 87	619 95	669 102	720 110	771 118	820 125	870 133	920 140	969 148
44	1019 155	1068 162	1117 170	1166 177	1215 184	1264 191	1312 198	1360 205	1408 212	1456 219
46	1504 226	1552 233	1599 239	1647 246	1694 253	1741 260	1788 266	1835 273	1881 279	1928 286
48	1974 292	2020 298	2066 305	2112 311	2158 317	2204 324	2249 330	2294 336	2339 342	2385 348
50	2430 355	2474 361	2519 367	2564 373	2608 379	2653 385	2697 391	2741 397	2785 403	2829 409
52	2873 415	2917 421	2960 427	3004 433	3047 439	3090 444	3133 450	3176 456	3219 462	3262 468
54	3305 473	3347 479	3389 485	3431 490	3474 496	3516 502	3557 507	3599 513	3641 519	3682 524
56	3724 530	3765 535	3806 541	3847 546	3888 552	3929 557	3970 563	4010 568	4050 574	4091 579
58	4131 584	4171 590	4211 595	4251 600	4290 606	4330 611	4369 616	4408 621	4447 627	4486 632
60	4525 637	4564 642	4602 647	4640 652	4679 658	4717 663	4755 668	4793 673	4830 678	4868 683
62	4906 688	4943 693	4980 698	5017 703	5054 708	5091 712	5127 717	5163 722	5200 727	5236 732
64	5272 737	5308 741	5344 746	5380 751	5415 756	5451 761	5486 765	5521 770	5556 775	5591 779
66	5627 784	5661 789	5696 793	5730 798	5765 802	5799 807				
68										
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= 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
42	0	8	16	24	32	39	47	55	62	70
44	528	579	631	682	734	785	835	886	936	987
46	77	84	92	99	106	114	121	128	135	142
48	1037	1087	1137	1186	1236	1286	1335	1383	1432	1481
50	149	155	162	169	176	183	189	196	203	209
52	1530	1578	1627	1675	1723	1771	1819	1866	1914	1961
54	216	223	229	236	242	249	255	262	268	275
56	2009	2055	2102	2149	2196	2243	2289	2335	2381	2427
58	281	287	294	300	306	313	319	325	331	337
60	2473	2518	2563	2609	2654	2699	2744	2789	2833	2878
62	344	350	356	362	368	374	380	386	392	398
64	2922	2966	3010	3054	3098	3142	3185	3228	3271	3314
66	404	410	416	422	428	433	439	445	451	456
68	3357	3399	3441	3483	3526	3568	3609	3651	3692	3733
70	462	468	473	479	485	490	496	501	507	512
72	3775	3815	3856	3896	3937	3977	4017	4057	4097	4137
74	518	523	529	534	540	545	550	556	561	566
76	4176	4215	4254	4293	4332	4371	4410	4448	4486	4524
78	572	577	582	587	592	598	603	608	613	618
80	4563	4600	4638	4675	4713	4750	4787	4824	4860	4897
82	623	628	633	638	643	648	653	658	663	668
84	4934	4970	5006	5042	5078	5114				
86	673	678	682	687	692	697				
88										
90										
92										
94										
96										
98										
100										
ENGINE ANTI ICE ON ΔFUEL = + 2 %						TOTAL ANTI ICE ON ΔFUEL = + 6 %				

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 23
		SEQ 133	REV 22

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

CORRECTION ON FUEL CONSUMPTION (1000 KG)								
FL	WEIGHT AT BRAKE RELEASE (1000 KG)							Time Correction
	46	50	54	58	62	66	70	
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.

CORRECTION ON FUEL CONSUMPTION (1000 KG)								
FL	WEIGHT OVERHEAD DESTINATION (1000 KG)							Time Correction
	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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 23
		SEQ 140	REV 23

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

CORRECTION ON FUEL CONSUMPTION (1000 KG)									
FL	WEIGHT AT BRAKE RELEASE (1000 KG)								Time Correction
	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.

CORRECTION ON FUEL CONSUMPTION (1000 KG)								
FL	WEIGHT OVERHEAD DESTINATION (1000 KG)							Time correction
	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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING INTEGRATED CRUISE	2.05.30	P 23
		SEQ 161	REV 39

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

CORRECTION ON FUEL CONSUMPTION (1000 KG)								
FL	WEIGHT AT BRAKE RELEASE (1000 KG)							Time Correction
	44	48	52	56	60	64	68	
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

CORRECTION ON FUEL CONSUMPTION (1000 KG)								
FL	WEIGHT OVERHEAD DESTINATION (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 *3. For each degree Celcius above ISA temperature apply fuel correction 0.015 (kg/°C/NM) × ΔISA (°C) × Air Distance (NM).*
- 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 : 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		2.05.40	P 2
	QUICK DETERMINATION OF F-PLN		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
 Δ 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
 - Δ 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

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40	P 1
	QUICK DETERMINATION OF F-PLN	SEQ 252	REV 38
FLIGHT CREW OPERATING MANUAL			

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) × Δ ISA (°C) × Air Distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE LANDING WEIGHT

The fuel consumption must be corrected when the actual landing weight is different from the reference landing weight. If it is lower (or greater) than the reference landing weight, subtract (or add) the value given in the correction part of the table per 1000 kg below (or above) the reference landing weight.

EXAMPLE

The following is an example of a complete flight plan based on the assumptions :

- Zero fuel weight : 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
	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
 - Δ 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		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %		TIME (H.MIN)			
ANTI-ICING OFF									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
200	1545 0.38	1525 0.38	1513 0.38	1509 0.38	1509 0.38		10	13	14
225	1685 0.41	1656 0.41	1635 0.42	1624 0.42	1619 0.42	1619 0.42	10	14	16
250	1825 0.45	1786 0.45	1757 0.45	1739 0.45	1730 0.45	1725 0.45	11	15	17
275	1965 0.48	1916 0.48	1878 0.48	1855 0.48	1840 0.48	1831 0.48	11	15	18
300	2105 0.51	2046 0.51	2000 0.51	1970 0.52	1951 0.52	1938 0.52	11	16	19
325	2245 0.54	2177 0.55	2122 0.55	2086 0.55	2061 0.55	2044 0.55	12	17	21
350	2385 0.58	2307 0.58	2244 0.58	2202 0.58	2172 0.58	2151 0.58	12	18	22
375	2526 1.01	2437 1.01	2366 1.01	2318 1.02	2283 1.02	2257 1.02	13	19	23
400	2666 1.04	2568 1.04	2488 1.05	2433 1.05	2394 1.05	2364 1.05	13	19	24
425	2806 1.07	2698 1.08	2610 1.08	2550 1.08	2505 1.09	2471 1.09	13	20	25
450	2947 1.11	2829 1.11	2733 1.11	2666 1.12	2617 1.12	2578 1.12	14	21	26
475	3087 1.14	2960 1.14	2855 1.15	2782 1.15	2728 1.15	2685 1.15	14	22	28
500	3228 1.17	3090 1.18	2977 1.18	2898 1.18	2840 1.19	2792 1.19	14	23	29
525	3368 1.20	3221 1.21	3100 1.21	3015 1.22	2951 1.22	2900 1.22	15	24	30
550	3509 1.24	3352 1.24	3222 1.25	3131 1.25	3063 1.25	3007 1.25	15	24	31
575	3649 1.27	3483 1.27	3345 1.28	3248 1.28	3175 1.29	3115 1.29	15	25	32
600	3790 1.30	3613 1.31	3468 1.31	3365 1.32	3287 1.32	3222 1.32	16	26	34
625	3930 1.33	3744 1.34	3590 1.35	3482 1.35	3399 1.35	3330 1.35	16	27	35
650	4071 1.37	3875 1.37	3713 1.38	3599 1.38	3511 1.39	3438 1.39	17	28	36
675	4212 1.40	4006 1.41	3836 1.41	3716 1.42	3624 1.42	3546 1.42	17	29	37
700	4352 1.43	4137 1.44	3959 1.45	3833 1.45	3736 1.45	3654 1.45	17	30	39
725	4493 1.47	4268 1.47	4082 1.48	3951 1.48	3849 1.49	3763 1.49	18	31	40
750	4634 1.50	4399 1.50	4206 1.51	4068 1.52	3961 1.52	3871 1.52	18	31	41
775	4775 1.53	4531 1.54	4329 1.54	4186 1.55	4074 1.56	3980 1.56	19	32	42
800	4916 1.56	4662 1.57	4452 1.58	4303 1.58	4187 1.59	4088 1.59	19	33	44
825	5057 2.00	4793 2.00	4576 2.01	4421 2.02	4300 2.02	4197 2.02	19	34	45
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 0 100100 30 30 18590 FCOM-NO-02-05-40-003-130

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									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-NO-02-05-40-004-130

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			ISA		FUEL CONSUMED (KG)				
NORMAL AIR CONDITIONING			CG = 33.0 %		TIME (H.MIN)				
ANTI-ICING OFF									
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	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 0.42		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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-003-140

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 %					
ANTI-ICING OFF						TIME (H.MIN)			
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-004-140

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						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	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						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
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 %			

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40 P 5	
	QUICK DETERMINATION OF F-PLN	SEQ 130	REV 22
FLIGHT CREW OPERATING MANUAL			

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)				
AIR							TIME (H.MIN)			
DIST.	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)			
	(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
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 ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %			TOTAL ANTI ICE ON ΔFUEL = + 5.5 %				

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-005-130

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									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
							(KG/1000KG)		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-006-130

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40 P 5	
	QUICK DETERMINATION OF F-PLN	SEQ 140	REV 23
FLIGHT CREW OPERATING MANUAL			

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							TIME (H.MIN)		
DIST.	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450	8794 3.22	8379 3.23	8063 3.25	7792 3.26	7569 3.27	7563 3.27	46	67	103
1475	8940 3.25	8518 3.26	8196 3.28	7919 3.29	7693 3.30	7689 3.30	47	68	105
1500	9085 3.28	8657 3.30	8328 3.31	8046 3.33	7816 3.34	7814 3.34	48	69	107
1525	9231 3.32	8795 3.33	8461 3.35	8174 3.36	7939 3.37	7940 3.37	49	71	109
1550	9377 3.35	8934 3.36	8594 3.38	8301 3.39	8063 3.40	8067 3.40	50	72	111
1575	9523 3.38	9073 3.40	8727 3.41	8429 3.43	8187 3.44	8193 3.44	50	73	113
1600	9669 3.41	9213 3.43	8861 3.45	8557 3.46	8311 3.47	8320 3.47	51	74	115
1625	9815 3.45	9352 3.46	8994 3.48	8685 3.50	8435 3.50	8447 3.50	52	75	117
1650	9962 3.48	9492 3.49	9128 3.51	8813 3.53	8559 3.54	8575 3.54	53	76	119
1675	10108 3.51	9631 3.53	9261 3.54	8941 3.56	8683 3.57	8703 3.57	54	78	121
1700	10255 3.54	9771 3.56	9395 3.58	9069 4.00	8808 4.01	8831 4.01	55	79	123
1725	10401 3.58	9911 3.59	9530 4.01	9198 4.03	8933 4.04	8959 4.04	56	80	125
1750	10548 4.01	10051 4.03	9664 4.04	9326 4.06	9058 4.07	9087 4.07	57	81	127
1775	10695 4.04	10191 4.06	9798 4.08	9455 4.10	9183 4.11	9216 4.11	58	82	129
1800	10842 4.07	10332 4.09	9933 4.11	9584 4.13	9309 4.14	9345 4.14	59	84	132
1825	10988 4.11	10472 4.12	10068 4.14	9713 4.16	9436 4.17	9475 4.17	60	85	134
1850	11135 4.14	10613 4.16	10203 4.18	9842 4.20	9563 4.21	9605 4.21	61	86	136
1875	11282 4.17	10754 4.19	10338 4.21	9972 4.23	9691 4.24	9747 4.24*	62	87	138
1900	11430 4.20	10895 4.22	10473 4.24	10101 4.26	9819 4.27	9877 4.27*	63	89	140
1925	11577 4.24	11036 4.26	10608 4.28	10231 4.30	9948 4.31	10006 4.31*	64	90	142
1950	11724 4.27	11177 4.29	10744 4.31	10361 4.33	10076 4.34	10136 4.34*	65	91	144
1975	11872 4.30	11318 4.32	10879 4.34	10491 4.36	10205 4.37	10266 4.38*	66	93	146
2000	12019 4.33	11460 4.35	11015 4.38	10621 4.40	10334 4.41	10396 4.41*	67	94	149
2025	12167 4.37	11601 4.39	11151 4.41	10751 4.43	10464 4.44	10526 4.44*	68	95	151
2050	12314 4.40	11743 4.42	11287 4.44	10881 4.46	10593 4.48	10657 4.48*	70	97	153
2075	12462 4.43	11885 4.45	11424 4.48	11012 4.50	10723 4.51	10787 4.51*	71	98	155
LOW AIR CONDITIONING ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %			TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-005-140

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									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
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 6.00	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-006-140

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						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
1450	8840 3.22	8416 3.23	8055 3.25	7753 3.26	7546 3.27	7476 3.27	50	68	105
1475	8988 3.25	8556 3.27	8188 3.28	7880 3.30	7670 3.30	7600 3.30	51	69	107
1500	9136 3.29	8696 3.30	8321 3.32	8007 3.33	7794 3.34	7724 3.34	52	71	109
1525	9284 3.32	8836 3.33	8454 3.35	8135 3.36	7918 3.37	7849 3.37	53	72	110
1550	9433 3.35	8977 3.37	8587 3.38	8263 3.40	8042 3.41	7974 3.41	54	73	112
1575	9581 3.38	9117 3.40	8721 3.41	8390 3.43	8167 3.44	8099 3.44	55	74	114
1600	9729 3.42	9258 3.43	8855 3.45	8518 3.46	8292 3.47	8224 3.47	56	76	117
1625	9878 3.45	9399 3.47	8988 3.48	8646 3.50	8416 3.51	8350 3.51	56	77	119
1650	10027 3.48	9539 3.50	9122 3.51	8775 3.53	8541 3.54	8476 3.54	57	78	121
1675	10175 3.51	9680 3.53	9257 3.55	8903 3.56	8667 3.57	8602 3.57	58	79	123
1700	10324 3.55	9821 3.56	9391 3.58	9032 4.00	8792 4.01	8729 4.01	59	81	126
1725	10473 3.58	9963 4.00	9525 4.01	9160 4.03	8918 4.04	8855 4.04	60	82	128
1750	10622 4.01	10104 4.03	9660 4.05	9289 4.06	9044 4.07	8983 4.07	61	83	130
1775	10771 4.05	10245 4.06	9794 4.08	9418 4.10	9170 4.11	9110 4.11	62	85	132
1800	10921 4.08	10387 4.10	9929 4.11	9548 4.13	9296 4.14	9238 4.14	63	86	135
1825	11070 4.11	10529 4.13	10064 4.15	9677 4.17	9423 4.18	9366 4.18	64	87	137
1850	11220 4.14	10670 4.16	10199 4.18	9806 4.20	9550 4.21	9495 4.21	65	88	139
1875	11370 4.18	10812 4.19	10334 4.21	9936 4.23	9677 4.24	9624 4.24	66	90	142
1900	11520 4.21	10954 4.23	10470 4.25	10066 4.27	9804 4.28	9753 4.28	67	91	144
1925	11670 4.24	11096 4.26	10605 4.28	10196 4.30	9931 4.31	9882 4.31	68	93	146
1950	11820 4.27	11239 4.29	10741 4.31	10326 4.33	10059 4.34	10012 4.34	65	94	148
1975	11970 4.31	11381 4.33	10876 4.35	10456 4.37	10187 4.38	10142 4.38	66	95	151
2000	12121 4.34	11523 4.36	11012 4.38	10587 4.40	10314 4.41	10272 4.41	67	97	153
2025	12271 4.37	11666 4.39	11148 4.41	10717 4.43	10443 4.44	10403 4.44	68	98	155
2050	12422 4.40	11809 4.42	11284 4.45	10848 4.47	10571 4.48	10534 4.48	66	99	158
2075	12573 4.44	11952 4.46	11421 4.48	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 %			

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40	P 6
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FLIGHT CREW OPERATING MANUAL			

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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)									
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	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			ISA		FUEL CONSUMED (KG)				
NORMAL AIR CONDITIONING			CG = 33.0 %						
ANTI-ICING OFF			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	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23A A319-131 IAE V2522-A5 3420 03301.000011 0250300.7800.000200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-007-130

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %		TIME (H.MIN)			
ANTI-ICING OFF									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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 0.59	2150 0.59	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 2420 03301.000011 0250300 .7800 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-008-130

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			ISA		FUEL CONSUMED (KG)				
NORMAL AIR CONDITIONING			CG = 33.0 %						
ANTI-ICING OFF			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			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300.7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-007-140

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %		TIME (H.MIN)			
ANTI-ICING OFF									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	290	310	330	350	370	390	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 0.59	2303 0.59	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			
ΔFUEL = - 0.3 %			ΔFUEL = + 2 %			ΔFUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-008-140

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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)									
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
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 %			

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40 P 8	
	QUICK DETERMINATION OF F-PLN	SEQ 153	REV 38
FLIGHT CREW OPERATING MANUAL			

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
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 2.06	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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %					
ANTI-ICING OFF				TIME (H.MIN)					
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
825	4561 2.20	4465 2.16	4364 2.12	4288 2.08	4242 2.05	4206 2.02	46	50	57
850	4686 2.24	4586 2.20	4480 2.15	4401 2.12	4354 2.09	4316 2.05	47	52	58
875	4811 2.28	4707 2.23	4597 2.19	4515 2.15	4466 2.12	4426 2.09	49	53	60
900	4936 2.32	4828 2.27	4714 2.23	4629 2.19	4578 2.16	4536 2.12	50	55	62
925	5061 2.36	4949 2.31	4831 2.26	4743 2.22	4691 2.19	4647 2.15	51	56	64
950	5187 2.40	5071 2.35	4948 2.30	4858 2.26	4803 2.23	4757 2.19	53	58	65
975	5312 2.44	5192 2.38	5065 2.34	4972 2.29	4916 2.26	4868 2.22	54	59	67
1000	5438 2.48	5314 2.42	5183 2.37	5087 2.33	5029 2.29	4979 2.25	55	61	69
1025	5564 2.52	5435 2.46	5300 2.41	5201 2.36	5142 2.33	5090 2.29	57	62	71
1050	5691 2.56	5557 2.50	5418 2.45	5316 2.40	5255 2.36	5202 2.32	58	64	72
1075	5817 3.00	5679 2.53	5536 2.48	5431 2.43	5369 2.40	5313 2.35	59	65	74
1100	5944 3.04	5802 2.57	5654 2.52	5547 2.47	5482 2.43	5425 2.39	61	67	76
1125	6070 3.08	5924 3.01	5773 2.56	5662 2.50	5596 2.46	5537 2.42	62	68	78
1150	6197 3.11	6047 3.05	5891 2.59	5778 2.54	5710 2.50	5650 2.45	64	70	80
1175	6324 3.15	6169 3.08	6010 3.03	5894 2.57	5824 2.53	5762 2.49	65	71	81
1200	6452 3.19	6292 3.12	6129 3.06	6009 3.01	5938 2.56	5875 2.52	66	73	83
1225	6579 3.23	6415 3.16	6247 3.10	6126 3.04	6053 3.00	5988 2.55	68	75	85
1250	6707 3.27	6538 3.19	6367 3.14	6242 3.08	6168 3.03	6101 2.59	69	76	87
1275	6835 3.31	6662 3.23	6486 3.17	6358 3.11	6282 3.07	6214 3.02	70	78	89
1300	6963 3.35	6785 3.27	6605 3.21	6475 3.15	6397 3.10	6328 3.05	72	79	91
1325	7091 3.39	6909 3.30	6725 3.24	6592 3.18	6513 3.13	6441 3.09	73	81	93
1350	7219 3.43	7032 3.34	6845 3.28	6709 3.22	6628 3.17	6555 3.12	74	82	94
1375	7348 3.46	7156 3.38	6965 3.32	6826 3.25	6744 3.20	6669 3.15	76	84	96
1400	7477 3.50	7281 3.41	7085 3.35	6943 3.29	6860 3.23	6784 3.19	77	86	98
1425	7605 3.54	7405 3.45	7205 3.39	7061 3.32	6976 3.27	6898 3.22	79	87	100
1450	7735 3.58	7529 3.49	7325 3.42	7178 3.36	7092 3.30	7013 3.25	80	89	102
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7801 .000200 110 0300350 50 0 220220 30 30 18590 FCOM-NO-02-05-40-009-130

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %					
ANTI-ICING OFF				TIME (H.MIN)					
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 5.5 %			

FLIP23C A319-131 IAE V2522-A5 3420 03301.000011 0250300 .7801 .000200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-010-130

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %		TIME (H.MIN)			
ANTI-ICING OFF									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
825	4840 2.15	4729 2.11	4648 2.08	4596 2.06	4552 2.03	4544 2.02	47	53	61
850	4972 2.19	4856 2.15	4773 2.12	4718 2.09	4672 2.06	4664 2.06	48	55	63
875	5104 2.22	4984 2.19	4897 2.15	4840 2.12	4793 2.09	4785 2.09	50	57	65
900	5237 2.26	5112 2.22	5022 2.19	4963 2.16	4913 2.13	4906 2.12	51	58	67
925	5370 2.30	5240 2.26	5147 2.22	5086 2.19	5034 2.16	5027 2.16	52	60	69
950	5502 2.33	5368 2.30	5272 2.26	5209 2.23	5155 2.19	5149 2.19	54	62	71
975	5635 2.37	5496 2.33	5397 2.29	5332 2.26	5276 2.23	5270 2.22	55	63	73
1000	5769 2.41	5625 2.37	5522 2.33	5456 2.29	5398 2.26	5392 2.26	56	65	75
1025	5902 2.45	5754 2.40	5648 2.36	5580 2.33	5519 2.29	5514 2.29	58	66	76
1050	6036 2.48	5883 2.44	5773 2.40	5704 2.36	5641 2.33	5637 2.32	59	68	78
1075	6169 2.52	6012 2.48	5899 2.43	5828 2.40	5763 2.36	5759 2.36	60	70	80
1100	6303 2.56	6141 2.51	6025 2.47	5952 2.43	5885 2.39	5882 2.39	62	71	82
1125	6438 2.59	6270 2.55	6152 2.50	6077 2.46	6007 2.43	6005 2.42	63	73	84
1150	6572 3.03	6400 2.59	6278 2.54	6201 2.50	6130 2.46	6129 2.45	64	75	86
1175	6706 3.07	6529 3.02	6405 2.57	6326 2.53	6252 2.49	6252 2.49	66	76	88
1200	6841 3.10	6659 3.06	6531 3.01	6451 2.56	6375 2.53	6376 2.52	67	78	90
1225	6976 3.14	6789 3.09	6658 3.04	6577 3.00	6498 2.56	6500 2.55	68	80	92
1250	7111 3.18	6919 3.13	6785 3.07	6702 3.03	6621 2.59	6625 2.59	70	81	94
1275	7246 3.21	7050 3.17	6913 3.11	6828 3.07	6745 3.03	6749 3.02	71	83	96
1300	7381 3.25	7181 3.20	7040 3.14	6954 3.10	6868 3.06	6874 3.05	73	85	98
1325	7517 3.28	7311 3.24	7168 3.18	7080 3.13	6992 3.09	7000 3.09	74	87	100
1350	7653 3.32	7442 3.27	7296 3.21	7207 3.17	7117 3.13	7126 3.12	75	88	102
1375	7789 3.36	7574 3.31	7424 3.25	7334 3.20	7241 3.16	7252 3.15	77	90	104
1400	7925 3.39	7705 3.35	7553 3.28	7461 3.23	7366 3.19	7378 3.19	78	92	106
1425	8061 3.43	7836 3.38	7681 3.32	7588 3.27	7490 3.23	7505 3.22	79	93	108
1450	8198 3.46	7968 3.42	7810 3.35	7715 3.30	7615 3.26	7632 3.25	81	95	110
LOW AIR CONDITIONING			ENGINE ANTI ICE ON			TOTAL ANTI ICE ON			
ΔFUEL = - 0.3 %			ΔFUEL = + 2 %			ΔFUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-009-140

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %		TIME (H.MIN)			
ANTI-ICING OFF									
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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			
ΔFUEL = - 0.3 %			ΔFUEL = + 2 %			ΔFUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-010-140

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
825	4747 2.18	4663 2.15	4591 2.12	4538 2.06	4490 2.04	4465 2.03	55	58	63
850	4878 2.22	4790 2.19	4715 2.16	4659 2.10	4608 2.07	4583 2.06	56	59	65
875	5009 2.25	4916 2.22	4838 2.19	4781 2.13	4727 2.11	4701 2.10	58	61	67
900	5140 2.29	5044 2.26	4962 2.23	4903 2.16	4846 2.14	4820 2.13	60	63	69
925	5271 2.33	5171 2.30	5087 2.27	5025 2.20	4965 2.18	4938 2.16	61	65	71
950	5403 2.37	5298 2.34	5211 2.30	5147 2.23	5085 2.21	5057 2.20	63	66	74
975	5534 2.41	5426 2.37	5336 2.34	5270 2.27	5204 2.24	5176 2.23	64	68	76
1000	5666 2.45	5554 2.41	5460 2.38	5393 2.30	5324 2.28	5295 2.27	66	70	78
1025	5798 2.48	5682 2.45	5585 2.41	5516 2.33	5444 2.31	5415 2.30	68	71	80
1050	5931 2.52	5811 2.49	5711 2.45	5639 2.37	5564 2.35	5535 2.33	69	73	82
1075	6063 2.56	5939 2.52	5836 2.49	5762 2.40	5685 2.38	5655 2.37	71	75	84
1100	6196 3.00	6068 2.56	5962 2.52	5886 2.44	5805 2.41	5775 2.40	73	76	85
1125	6329 3.04	6197 3.00	6088 2.56	6009 2.47	5926 2.45	5896 2.43	74	78	87
1150	6462 3.08	6326 3.04	6214 3.00	6133 2.50	6047 2.48	6017 2.47	76	80	89
1175	6596 3.11	6456 3.07	6340 3.03	6257 2.54	6168 2.51	6138 2.50	78	82	91
1200	6729 3.15	6586 3.11	6467 3.07	6381 2.57	6290 2.55	6259 2.53	79	83	93
1225	6863 3.19	6715 3.15	6594 3.10	6506 3.00	6411 2.58	6380 2.57	81	85	95
1250	6997 3.23	6846 3.18	6721 3.14	6630 3.04	6533 3.02	6502 3.00	82	87	98
1275	7131 3.27	6976 3.22	6848 3.17	6755 3.07	6655 3.05	6625 3.03	84	89	100
1300	7266 3.30	7106 3.26	6976 3.21	6881 3.11	6778 3.08	6747 3.07	86	91	102
1325	7400 3.34	7237 3.30	7103 3.25	7006 3.14	6900 3.12	6870 3.10	87	92	104
1350	7535 3.38	7368 3.33	7231 3.28	7132 3.17	7023 3.15	6992 3.13	89	94	106
1375	7670 3.42	7499 3.37	7359 3.32	7257 3.21	7145 3.18	7116 3.17	91	96	108
1400	7806 3.45	7630 3.41	7488 3.35	7383 3.24	7268 3.22	7239 3.20	92	98	110
1425	7941 3.49	7762 3.44	7616 3.39	7510 3.27	7392 3.25	7363 3.23	94	100	112
1450	8077 3.53	7894 3.48	7745 3.42	7636 3.31	7515 3.29	7487 3.27	96	101	114
CORRECTIONS		ENGINE ANTI ICE ON				TOTAL ANTI ICE ON			
FUEL		+ 3 %				+ 6 %			

A318/A319/A320/A321	FLIGHT PLANNING		2.05.40	P 10
	QUICK DETERMINATION OF F-PLN		SEQ 153	REV 38

FLIGHT CREW OPERATING MANUAL

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
1450	8077 3.53	7894 3.48	7745 3.42	7636 3.31	7515 3.29	7487 3.27	96	101	114
1475	8213 3.57	8026 3.52	7874 3.46	7763 3.34	7639 3.32	7611 3.30	97	103	116
1500	8349 4.01	8158 3.55	8004 3.49	7890 3.37	7763 3.35	7735 3.34	99	105	118
1525	8485 4.04	8290 3.59	8133 3.53	8017 3.41	7887 3.39	7860 3.37	101	107	120
1550	8621 4.08	8423 4.03	8263 3.56	8145 3.44	8011 3.42	7986 3.40	102	109	122
1575	8758 4.12	8555 4.06	8393 4.00	8273 3.47	8136 3.45	8111 3.44	104	110	124
1600	8895 4.16	8688 4.10	8523 4.03	8401 3.51	8261 3.49	8237 3.47	106	112	127
1625	9032 4.19	8821 4.14	8653 4.07	8529 3.54	8386 3.52	8363 3.50	108	114	129
1650	9169 4.23	8954 4.17	8783 4.10	8656 3.57	8511 3.55	8489 3.54	109	116	131
1675	9306 4.27	9088 4.21	8914 4.14	8784 4.01	8636 3.59	8616 3.57	111	118	133
1700	9444 4.31	9222 4.25	9045 4.17	8911 4.04	8762 4.02	8742 4.00	113	120	135
1725	9582 4.34	9356 4.28	9176 4.21	9040 4.07	8888 4.05	8870 4.04	114	121	138
1750	9720 4.38	9490 4.32	9307 4.24	9168 4.11	9014 4.09	8998 4.07	116	123	140
1775	9859 4.42	9624 4.36	9439 4.28	9296 4.14	9141 4.12	9126 4.10	118	125	142
1800	9997 4.45	9759 4.39	9571 4.31	9425 4.18	9268 4.16	9255 4.14	119	127	144
1825	10136 4.49	9894 4.43	9703 4.35	9554 4.21	9395 4.19	9384 4.17	121	129	147
1850	10275 4.53	10029 4.47	9835 4.38	9683 4.24	9522 4.22	9513 4.20	123	130	149
1875	10414 4.57	10164 4.50	9967 4.41	9812 4.28	9649 4.26	9643 4.24	125	132	151
1900	10554 5.00	10299 4.54	10100 4.45	9942 4.31	9777 4.29	9773 4.27	126	134	153
1925	10693 5.04	10435 4.57	10233 4.48	10071 4.34	9905 4.32	9903 4.30	128	136	156
1950	10833 5.08	10571 5.01	10366 4.52	10201 4.38	10033 4.36	10034 4.34	130	138	158
1975	10973 5.11	10707 5.05	10500 4.55	10332 4.41	10161 4.39	10165 4.37	131	140	160
2000	11114 5.15	10844 5.08	10633 4.58	10462 4.45	10290 4.42	10296 4.40	133	141	162
2025	11254 5.19	10980 5.12	10767 5.02	10593 4.48	10419 4.46	10428 4.44	135	143	165
2050	11395 5.22	11117 5.16	10902 5.05	10723 4.51	10548 4.49	10560 4.47	137	145	167
2075	11535 5.26	11254 5.19	11036 5.08	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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %					
ANTI-ICING OFF				TIME (H.MIN)					
AIR							CORRECTION ON		
DIST.	FLIGHT LEVEL						FUEL CONSUMPTION		
(NM)	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			
ΔFUEL = - 0.4 %			ΔFUEL = + 3 %			ΔFUEL = + 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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %					
ANTI-ICING OFF				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	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 ΔFUEL = - 0.4 %			ENGINE ANTI ICE ON ΔFUEL = + 3 %			TOTAL ANTI ICE ON ΔFUEL = + 5.5 %			

FILP23C A319-131 IAE V2522-A5 3420 0331.000011 0250300 .7801 .00200 110 0300350 50 0 100100 30 30 18590 FCOM-N0-02-05-40-012-130

A318/A319/A320/A321	FLIGHT PLANNING	2.05.40 P 11	
	QUICK DETERMINATION OF F-PLN	SEQ 140	REV 23
FLIGHT CREW OPERATING MANUAL			

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)		FLIGHT LEVEL					CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
							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 ΔFUEL = - 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2 %			TOTAL ANTI ICE ON ΔFUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-011-140

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				ISA		FUEL CONSUMED (KG)			
NORMAL AIR CONDITIONING				CG = 33.0 %					
ANTI-ICING OFF				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	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 ΔFUEL = - 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2 %			TOTAL ANTI ICE ON ΔFUEL = + 5 %			

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-NO-02-05-40-012-140

A318/A319/A320/A321	FLIGHT PLANNING		2.05.40	P 11
	QUICK DETERMINATION OF F-PLN		SEQ 153	REV 38

FLIGHT CREW OPERATING MANUAL

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						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2075	11535 5.26	11254 5.19	11036 5.08	10854 4.55	10678 4.52	10701 4.51	139	147	169
2100	11677 5.30	11392 5.23	11171 5.12	10986 4.58	10807 4.56	10832 4.54	141	149	171
2125	11818 5.33	11530 5.26	11306 5.15	11117 5.01	10937 4.59	10963 4.57	140	151	174
2150	11959 5.37	11668 5.30	11441 5.18	11249 5.05	11067 5.02	11094 5.01	142	152	176
2175	12101 5.41	11806 5.33	11577 5.21	11381 5.08	11198 5.06	11225 5.04	143	154	171
2200	12243 5.44	11944 5.37	11713 5.24	11513 5.11	11328 5.09	11357 5.07	145	156	173
2225	12385 5.48	12083 5.41	11849 5.27	11645 5.15	11459 5.12	11489 5.11	147	159	175
2250	12528 5.52	12222 5.44	11985 5.30	11778 5.18	11590 5.16	11621 5.14	148	161	178
2275	12671 5.55	12361 5.48	12122 5.33	11911 5.21	11722 5.19	11753 5.18	150	163	180
2300	12813 5.59	12501 5.51	12259 5.37	12044 5.25	11854 5.22	11885 5.21	152	165	182
2325	12957 6.03	12640 5.55	12396 5.40	12178 5.28	11987 5.26	12018 5.24	153	167	185
2350	13100 6.06	12780 5.58	12533 5.43	12312 5.31	12119 5.29	12151 5.28	155	169	187
2375	13244 6.10	12921 6.02	12671 5.46	12445 5.35	12252 5.32	12284 5.31	157	171	190
2400	13388 6.14	13061 6.06	12809 5.49	12580 5.38	12385 5.35	12417 5.34	159	173	192
2425	13532 6.17	13202 6.09	12947 5.52	12714 5.41	12518 5.39	12551 5.38	160	175	194
2450	13676 6.21	13343 6.13	13086 5.55	12848 5.45	12652 5.42	12685 5.41	162	177	197
2475	13820 6.25	13484 6.16	13225 5.58	12983 5.48	12786 5.45	12819 5.44	164	179	199
2500	13964 6.28	13626 6.20	13364 6.01	13119 5.51	12920 5.49	12953 5.48	165	181	201
2525	14108 6.32	13768 6.23	13503 6.03	13254 5.55	13055 5.52	13087 5.51	167	183	204
2550	14253 6.36	13909 6.27	13643 6.06	13390 5.58	13189 5.55	13222 5.54	169	185	206
2575	14398 6.39	14051 6.30	13783 6.09	13525 6.01	13325 5.59	13357 5.58	171	187	209
2600	14543 6.43	14194 6.34	13923 6.12	13662 6.04	13460 6.02	13492 6.01	173	189	211
2625	14688 6.47	14336 6.37	14063 6.15	13798 6.08	13596 6.05	13628 6.05	175	190	214
2650	14833 6.50	14479 6.41	14202 6.19	13934 6.11	13731 6.09	13763 6.08	176	192	216
2675	14979 6.54	14622 6.44	14342 6.22	14071 6.14	13869 6.12	13899 6.11	178	194	219
2700	15125 6.58	14766 6.48	14482 6.25	14208 6.18	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)			
							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	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 6.59	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 %			

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING ALTERNATE	2.05.50	P 1
		SEQ 001	REV 21

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 (kg/°C/NM) × ΔISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) ×ΔISA (°C) × 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.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING		2.05.50	P 2
	ALTERNATE		SEQ 140	REV 23

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT GO-AROUND : 100 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 80 KG (4MIN)									
REF. LDG. WT AT ALTERNATE = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG = 33.0 %		FUEL CONSUMED (KG)			
							TIME (H.MIN)		
AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	120	140	160	180	200	FL100 FL120	FL140 FL160	FL180 FL200
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 0.32	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 ΔFUEL = - 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2 %			TOTAL ANTI ICE ON ΔFUEL = + 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-N0-02-05-50-002-140

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING ALTERNATE	2.05.50	P 1
		SEQ 110	REV 21

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)			
							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	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 ΔFUEL = - 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2.5 %			TOTAL ANTI ICE ON ΔFUEL = + 6 %			

FLIP23C A319-131 IAE V2522-A5 3520 03301.000010 80250300 .7801 .000200 60 0300300 50 0 100100 30100 18590 FCOM-NO-02-05-50-002-130

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING ALTERNATE	2.05.50	P 1
		SEQ 110	REV 21

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.

A318/A319/A320/A321	FLIGHT PLANNING		2.05.50	P 2
	ALTERNATE		SEQ 161	REV 38

FLIGHT CREW OPERATING MANUAL

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)			
							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	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.			FLIGHT LEVEL				TIME (H.MIN)		
(NM)							CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
			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 ΔFUEL = − 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2.5 %			TOTAL ANTI ICE ON ΔFUEL = + 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)	FLIGHT LEVEL					TIME (H.MIN) CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	230	270	310	350	390	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 ΔFUEL = - 0.3 %			ENGINE ANTI ICE ON ΔFUEL = + 2 %			TOTAL ANTI ICE ON ΔFUEL = + 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-N0-02-05-50-003-140

A318/A319/A320/A321	FLIGHT PLANNING	2.05.50 P 3	
		SEQ 161	REV 38
FLIGHT CREW OPERATING MANUAL	ALTERNATE		

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)		
						TIME (H.MIN)		
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 %			

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING GROUND DISTANCE/AIR DISTANCE	2.05.60	P 1
		SEQ 001	REV 21

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 03301.000011 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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING	2.05.70	P 1
	FUEL TANKERING	SEQ 035	REV 21

FUEL TANKERING

GENERAL

Fuel tankering graphs allow to determine the optimum fuel quantity to be tankered as a function of the fuel price ratio between departure and destination airports. The following pages present for one flight level per page the optimum aircraft takeoff weight depending on the fuel price ratio (departure fuel price divided by destination fuel price) and on the air distance to fly.

The computed optimum takeoff weight is based on the additional fuel consumption needed for the transport of the extra (tankered) fuel and it is the weight at which the maximum profit can be achieved. The quantity of extra fuel that can be loaded is calculated as the difference between the optimum takeoff weight (including extra fuel) and the planned takeoff weight (without fuel tankering).

The graphs are established for :

- 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 FUEL TANKERING	2.05.70	P 2
		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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING FUEL TANKERING	2.05.70	P 1
		SEQ 045	REV 33

FUEL TANKERING

GENERAL

Fuel tankering graphs allow to determine the optimum fuel quantity to be tankered as a function of the fuel price ratio between departure and destination airports. The following pages present for one flight level per page the optimum aircraft takeoff weight depending on the fuel price ratio (departure fuel price divided by destination fuel price) and on the air distance to fly.

The computed optimum takeoff weight is based on the additional fuel consumption needed for the transport of the extra (tankered) fuel and it is the weight at which the maximum profit can be achieved. The quantity of extra fuel that can be loaded is calculated as the difference between the optimum takeoff weight (including extra fuel) and the planned takeoff weight (without fuel tankering).

The graphs are established for :

- 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 FUEL TANKERING	2.05.70	P 2
		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

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	FLIGHT PLANNING FUEL TANKERING	2.05.70	P 1
		SEQ 054	REV 38

FUEL TANKERING

GENERAL

Fuel tankering graphs allow to determine the optimum fuel quantity to be tankered as a function of the fuel price ratio between departure and destination airports. The following pages present for one flight level per page the optimum aircraft takeoff weight depending on the fuel price ratio (departure fuel price divided by destination fuel price) and on the air distance to fly.

The computed optimum takeoff weight is based on the additional fuel consumption needed for the transport of the extra (tankered) fuel and it is the weight at which the maximum profit can be achieved. The quantity of extra fuel that can be loaded is calculated as the difference between the optimum takeoff weight (including extra fuel) and the planned takeoff weight (without fuel tankering).

The graphs are established for :

- 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)

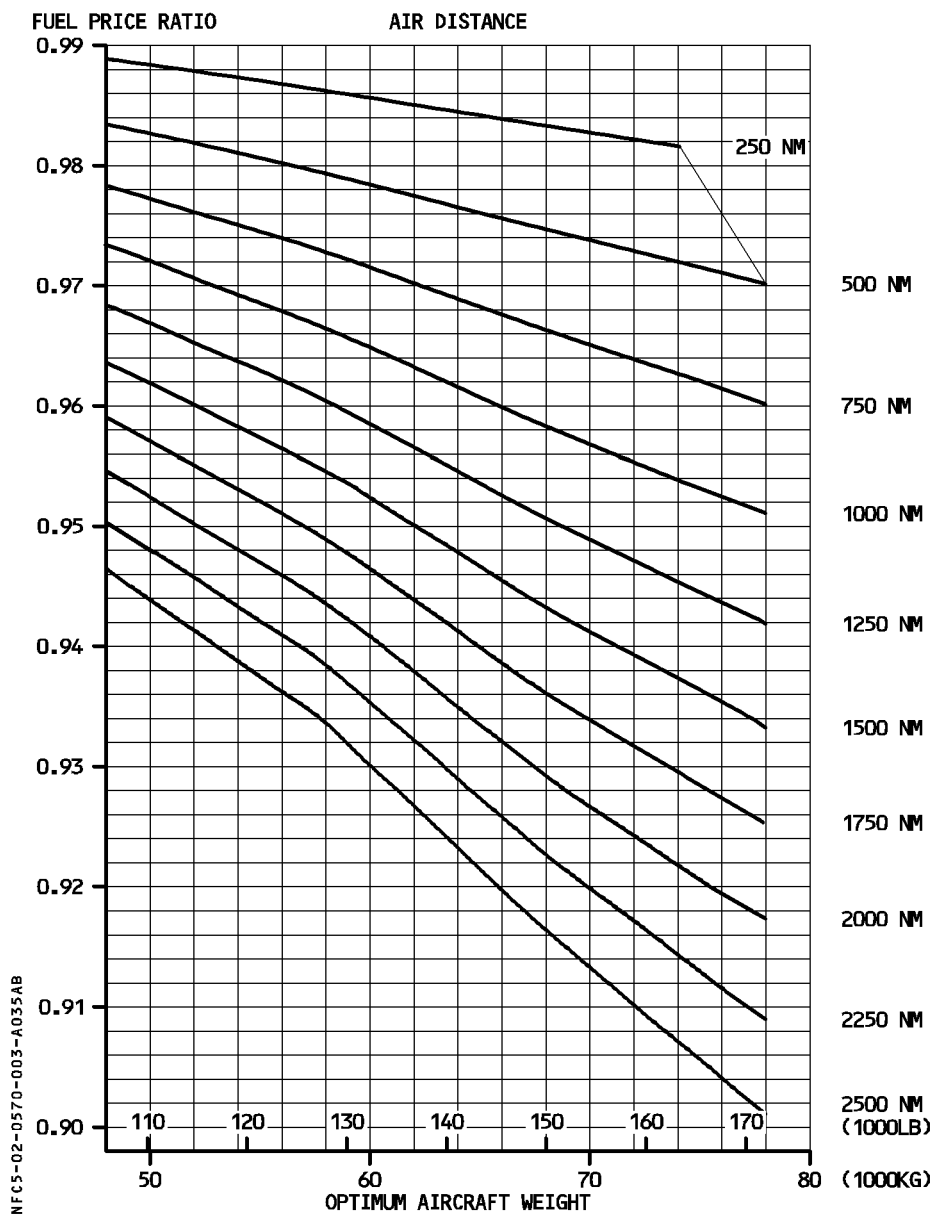
Air Distance = 1375 NM

Enter graph on page 2.05.70 P8.

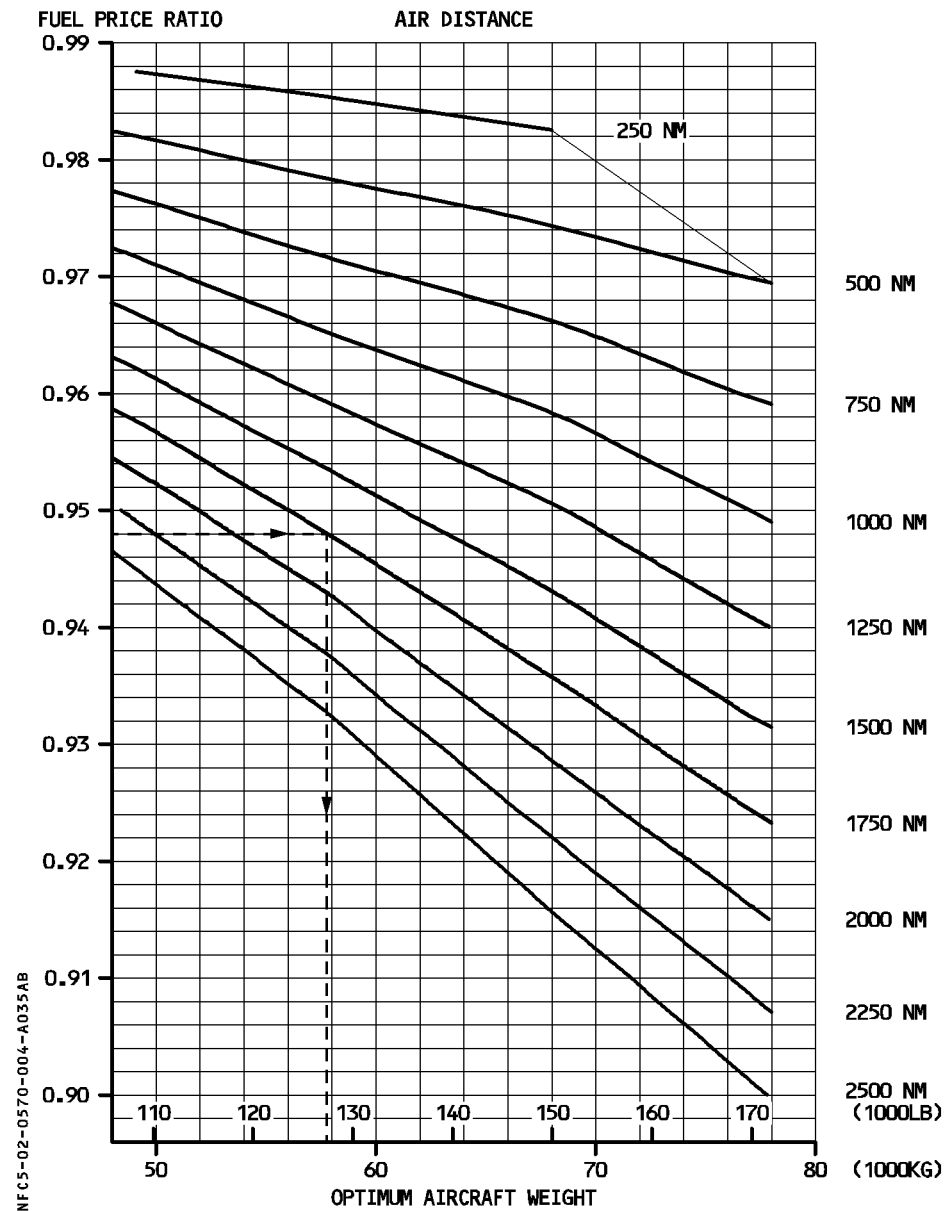
Interpolate for the air distance of 1375 NM between the 1250 NM and 1 500 NM. For the given air distance, the optimum fuel tankering weight is 57700 kg, which is 2700 kg higher than the planned takeoff weight → optimum quantity of extra fuel is 2700 kg.

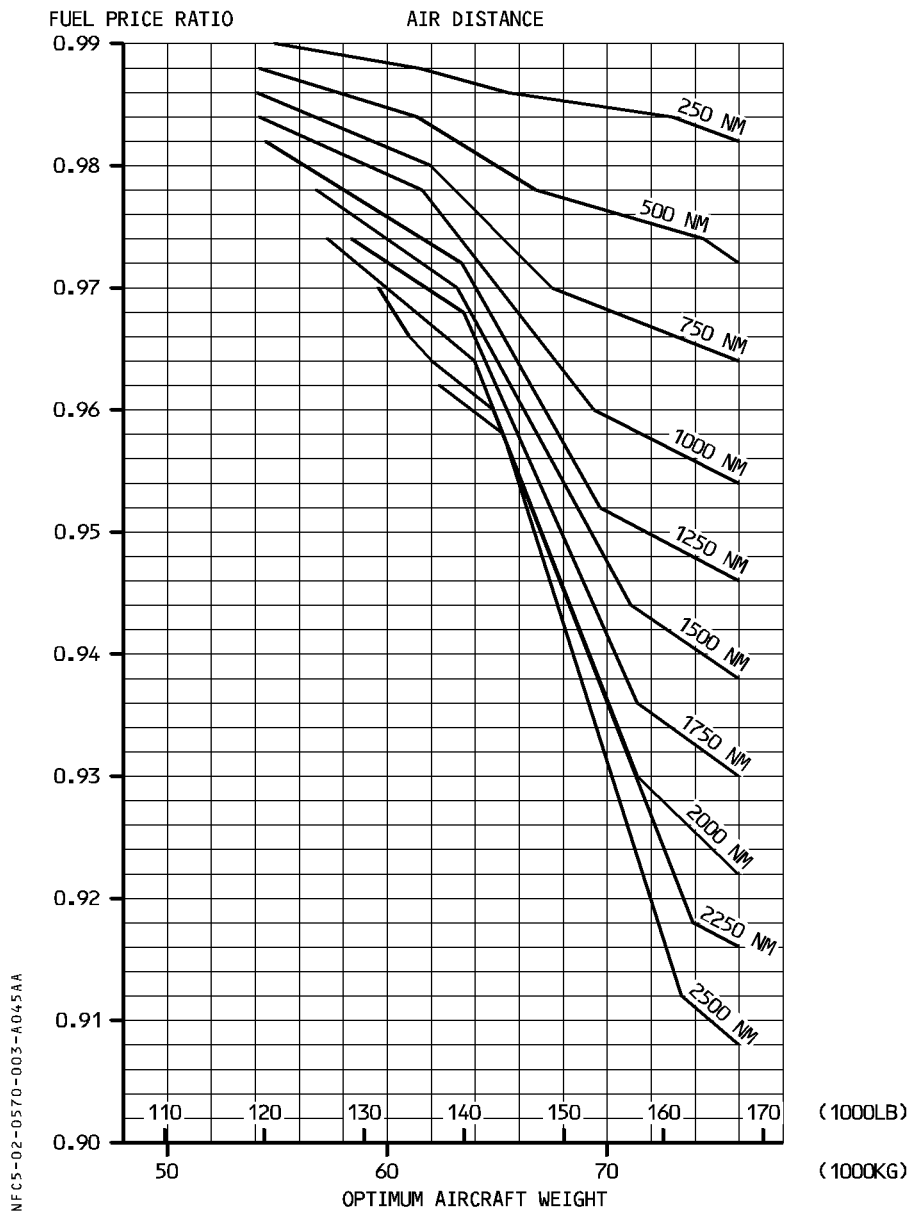
Check :

- 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

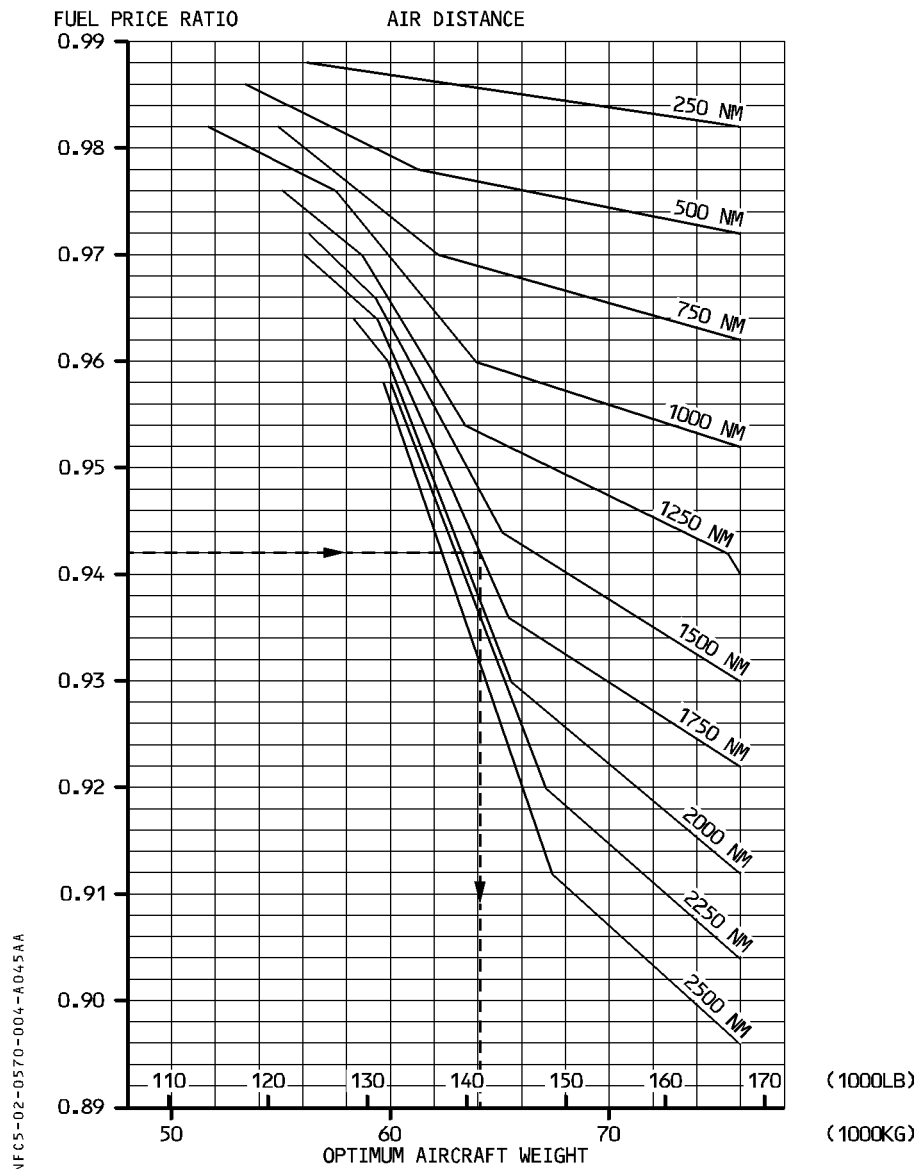
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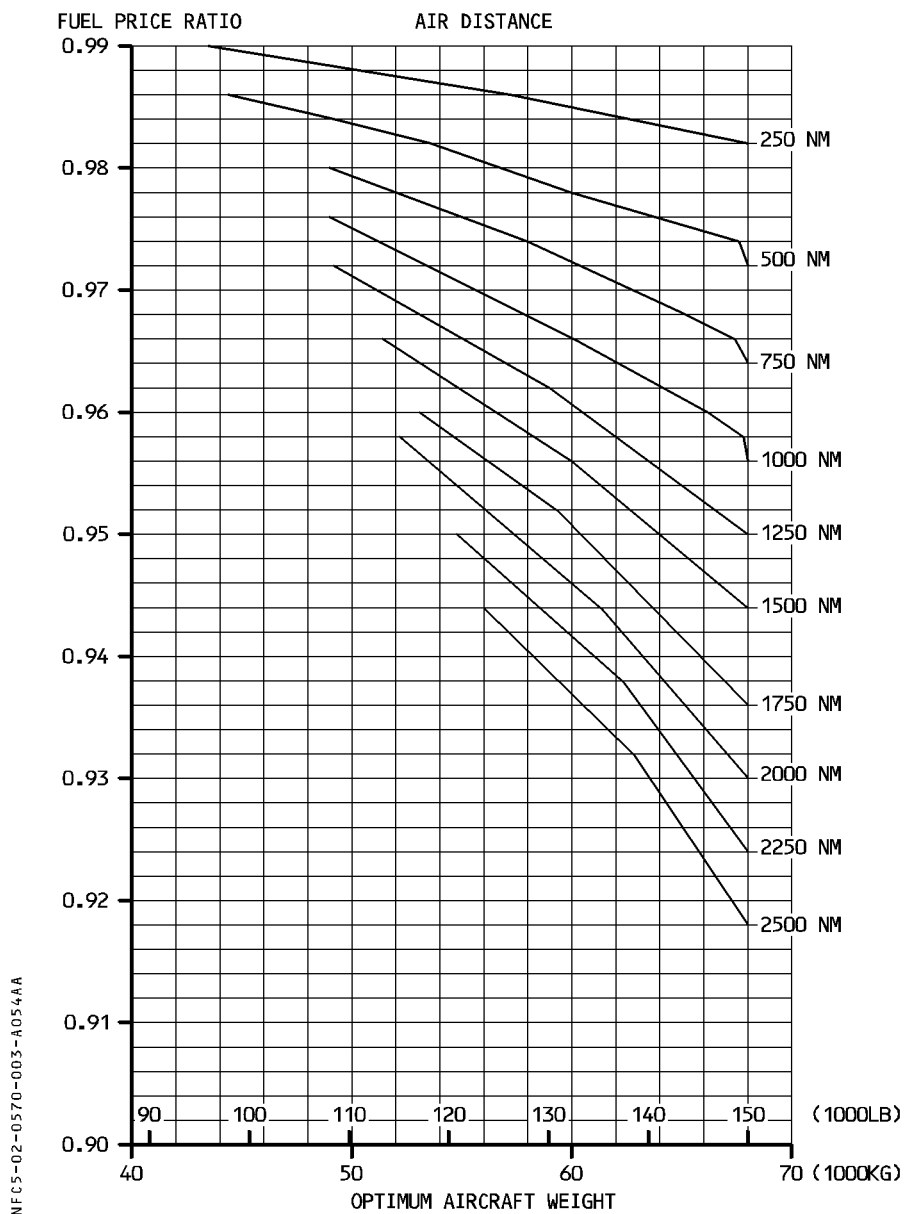
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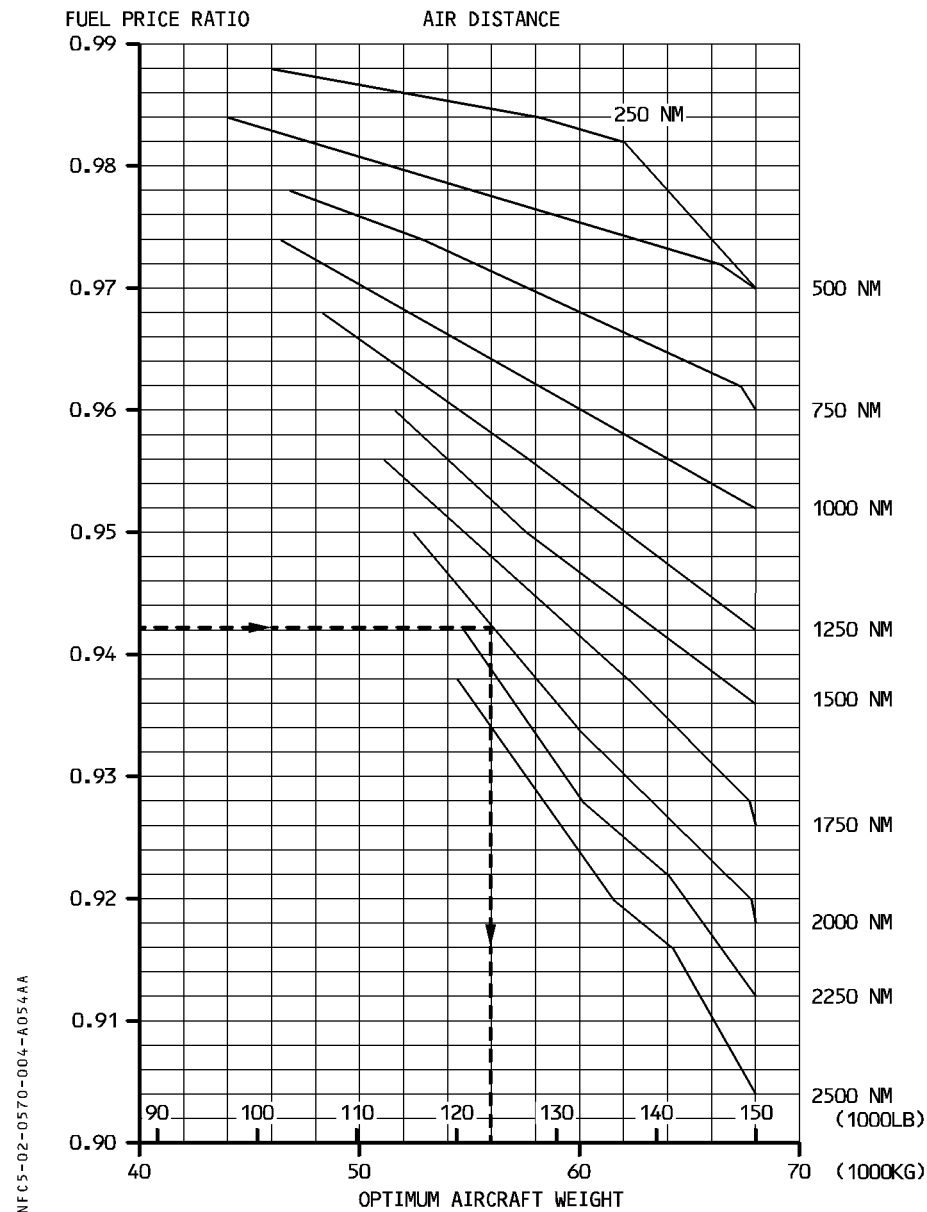
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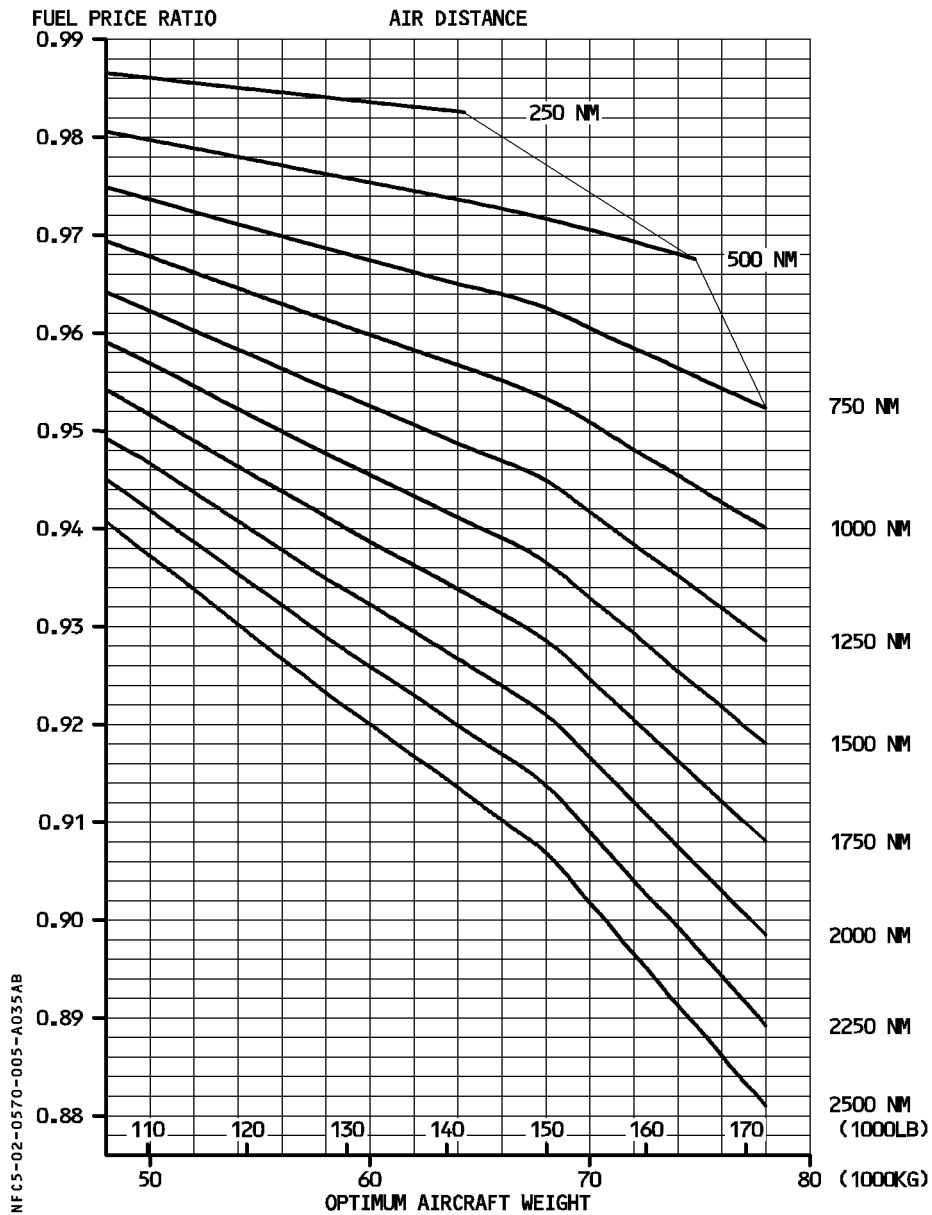


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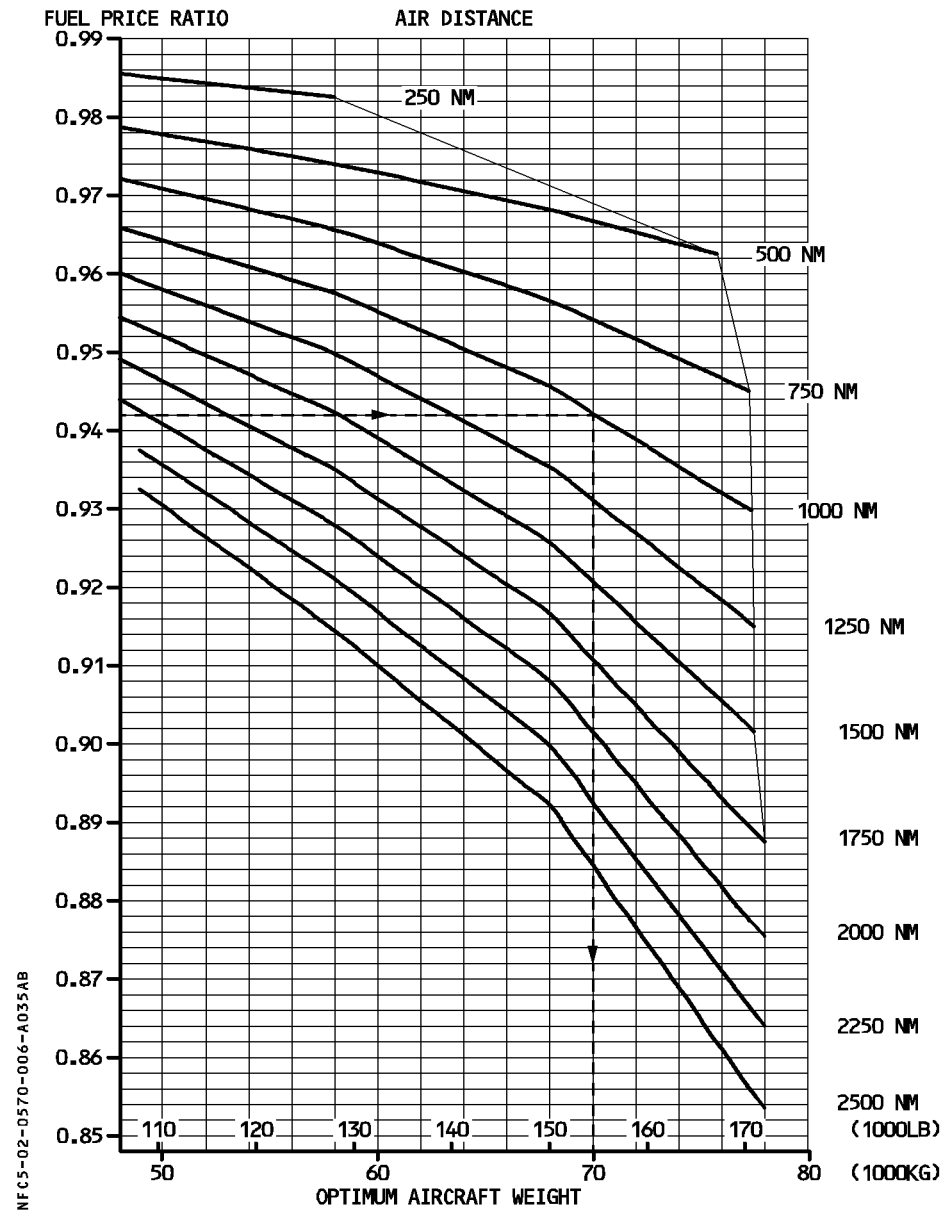
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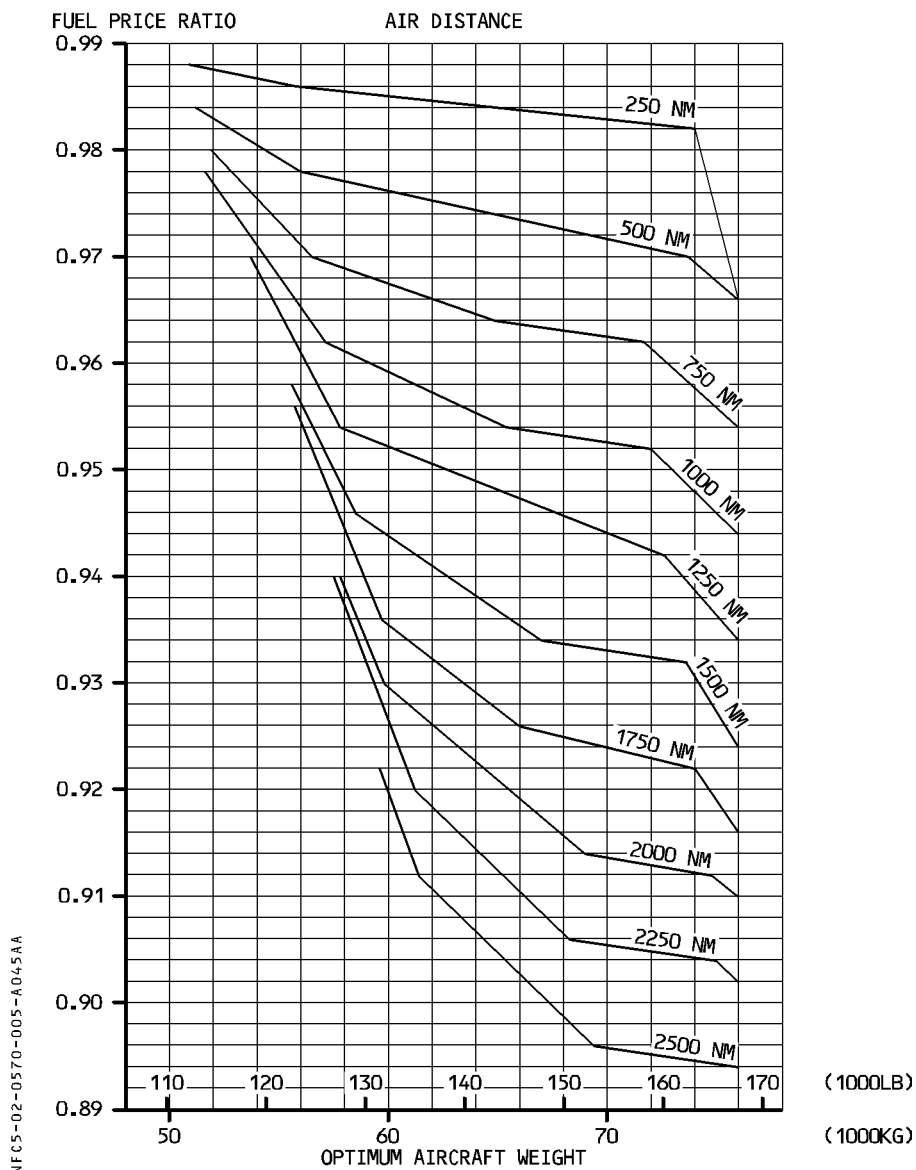


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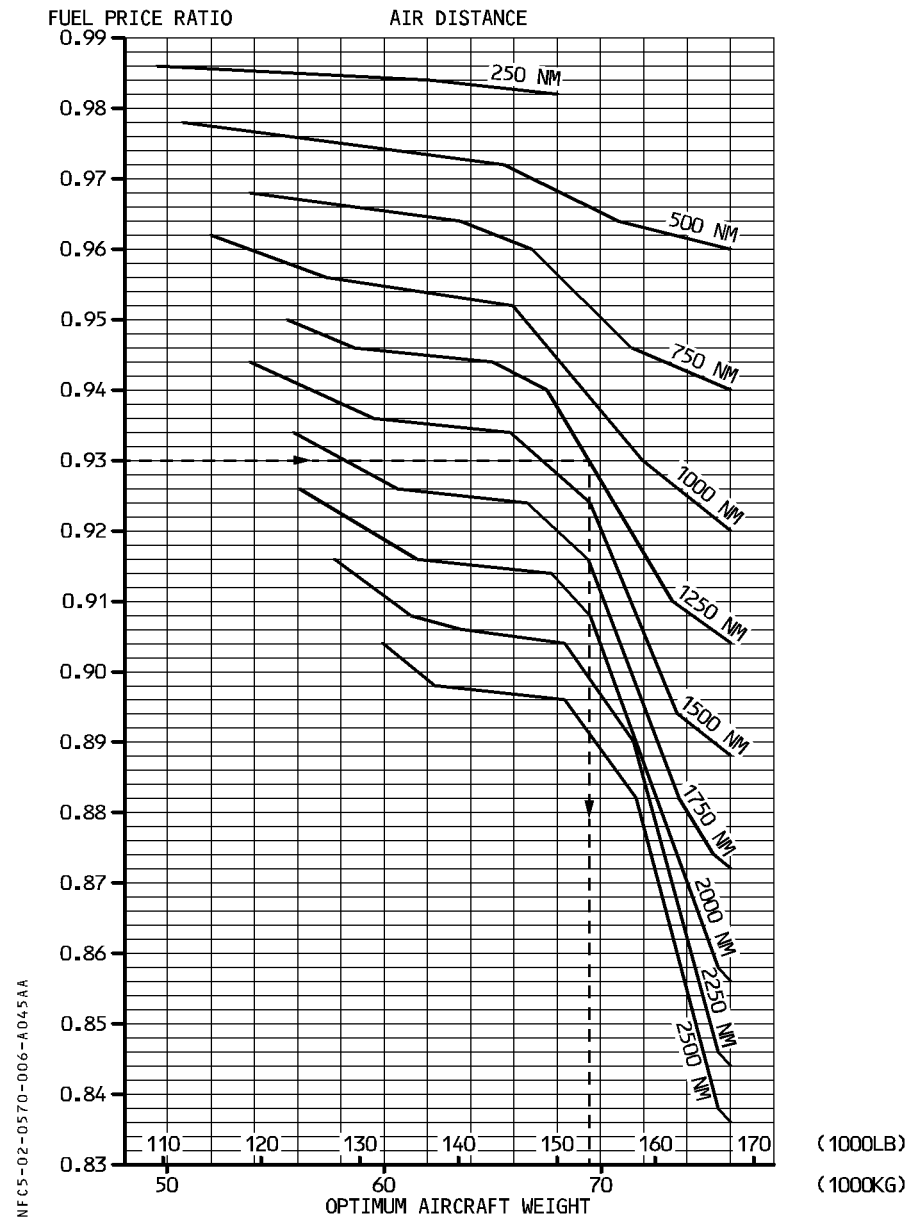


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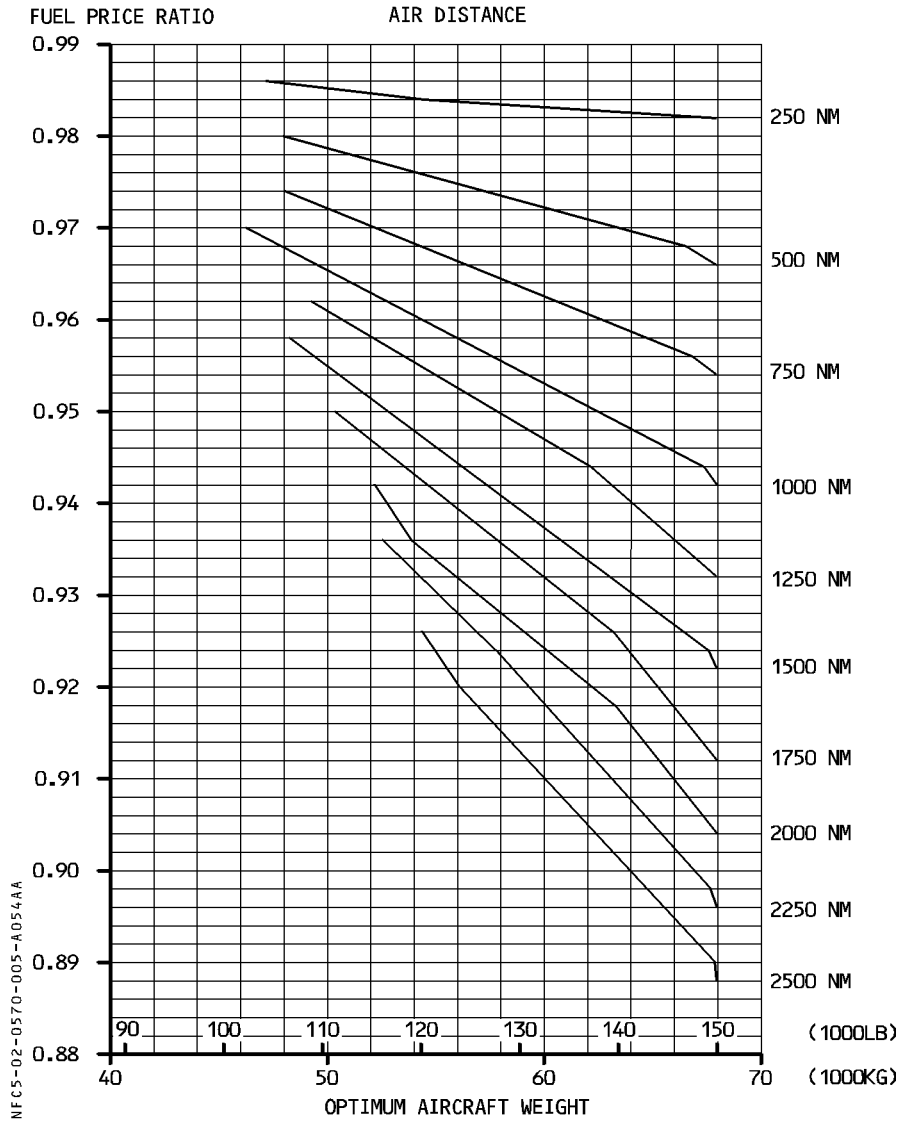


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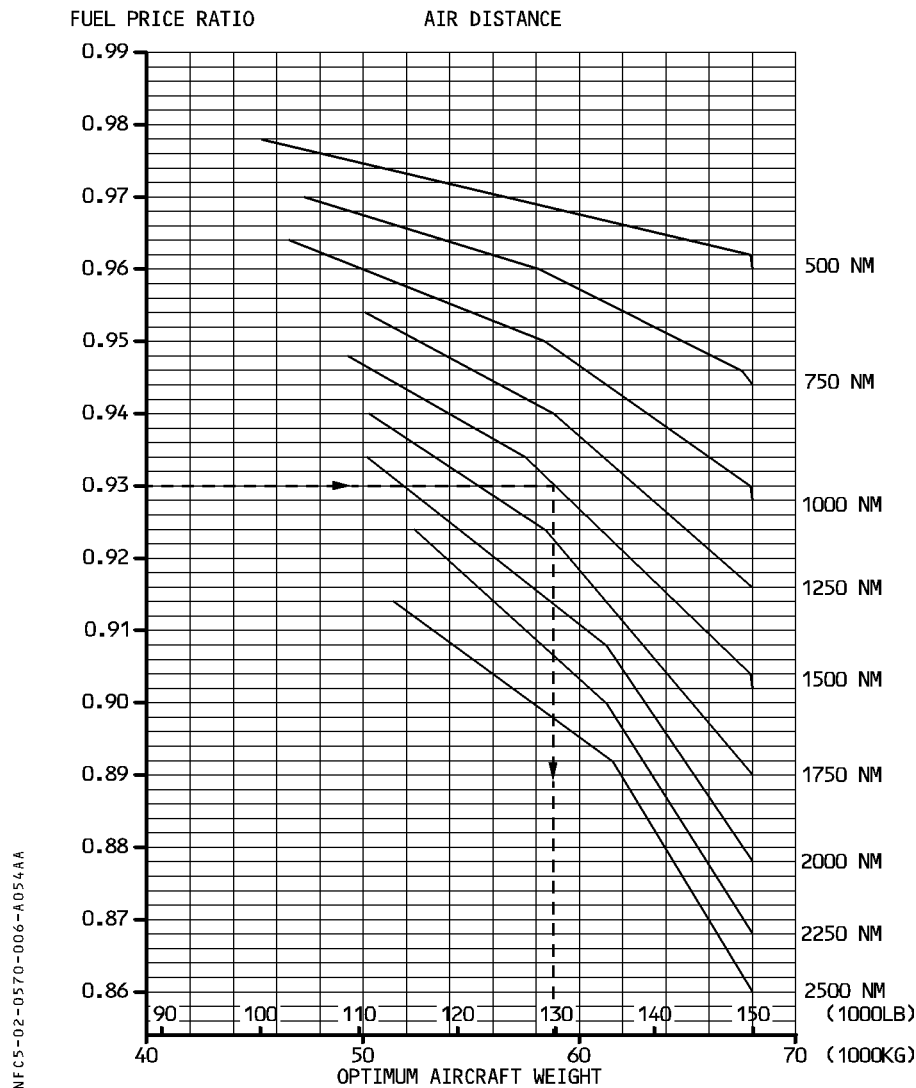
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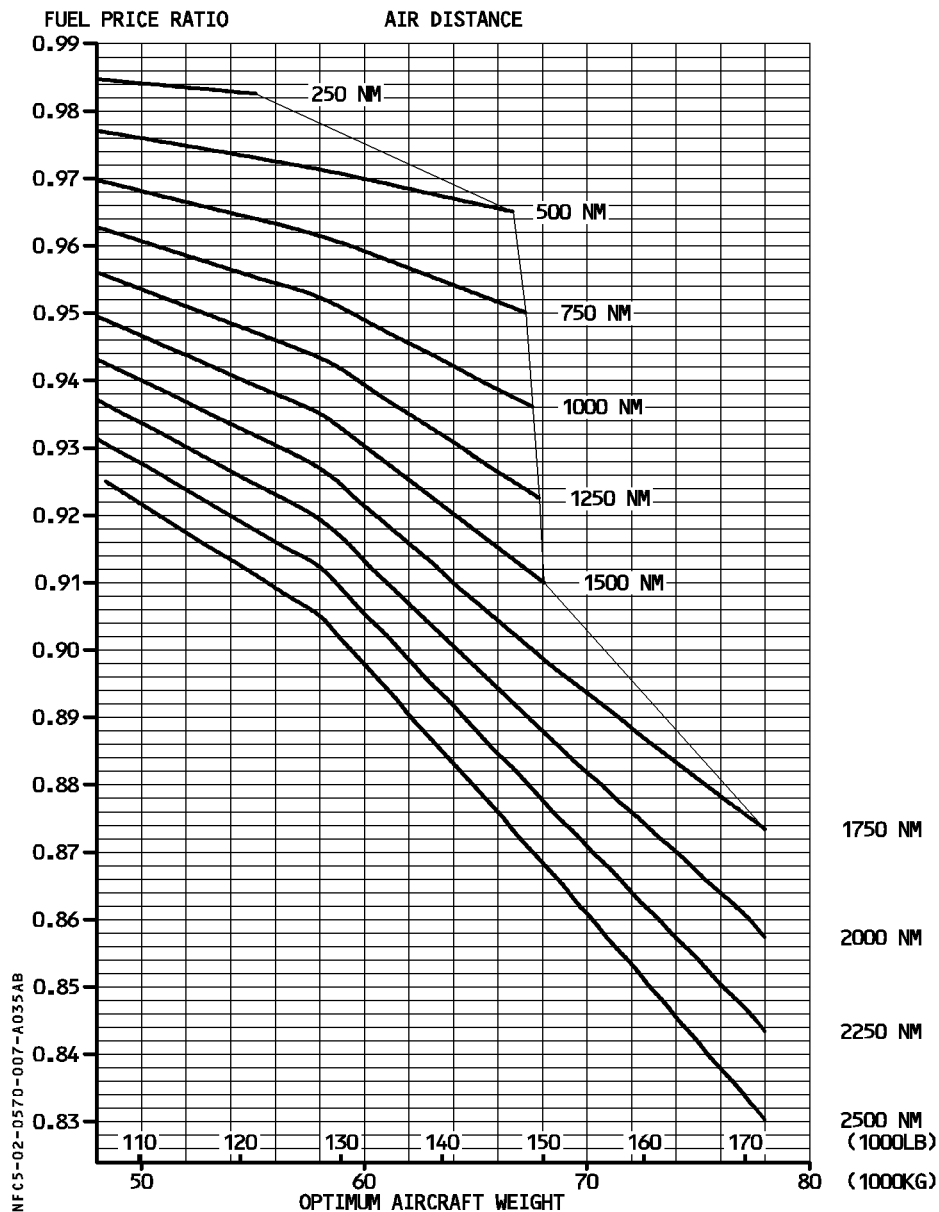


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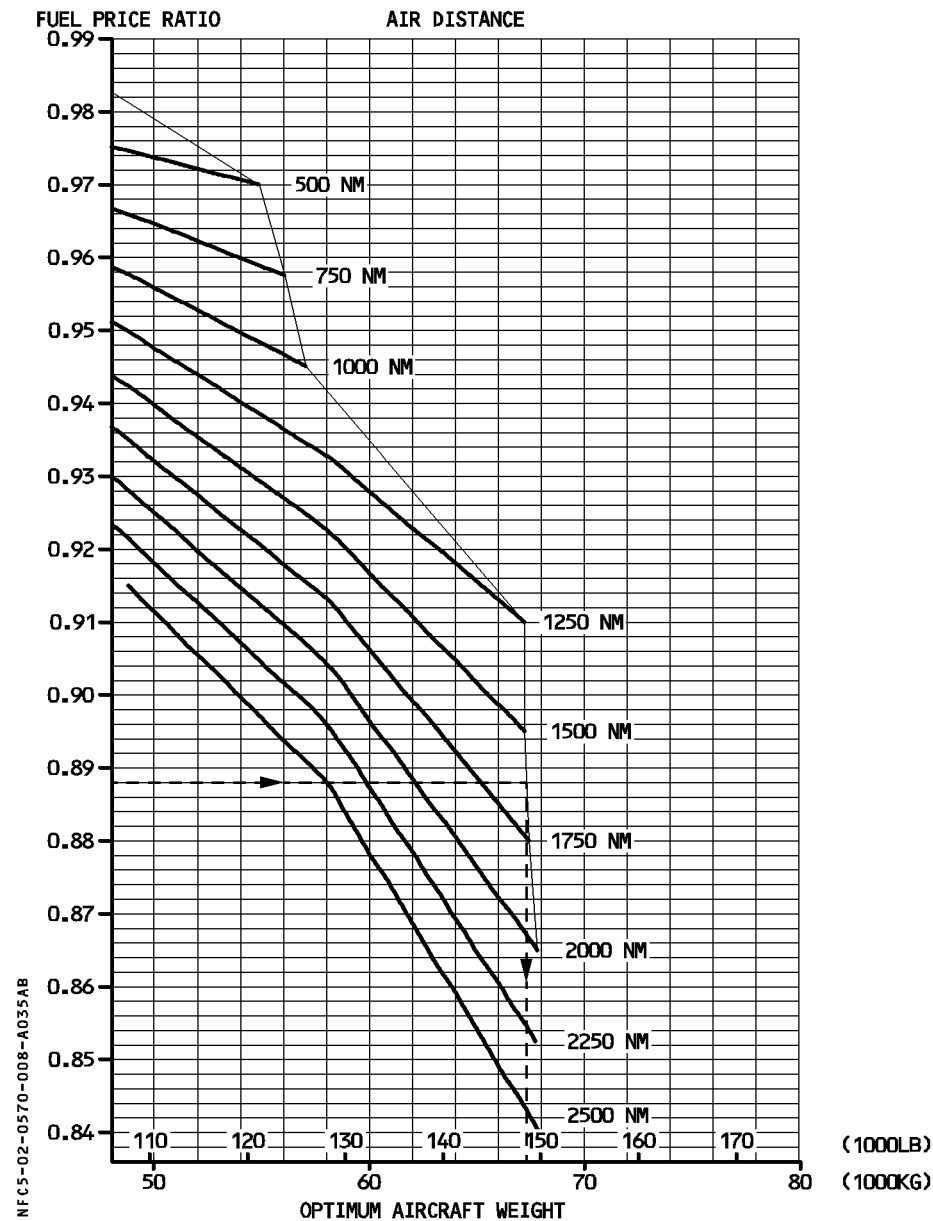


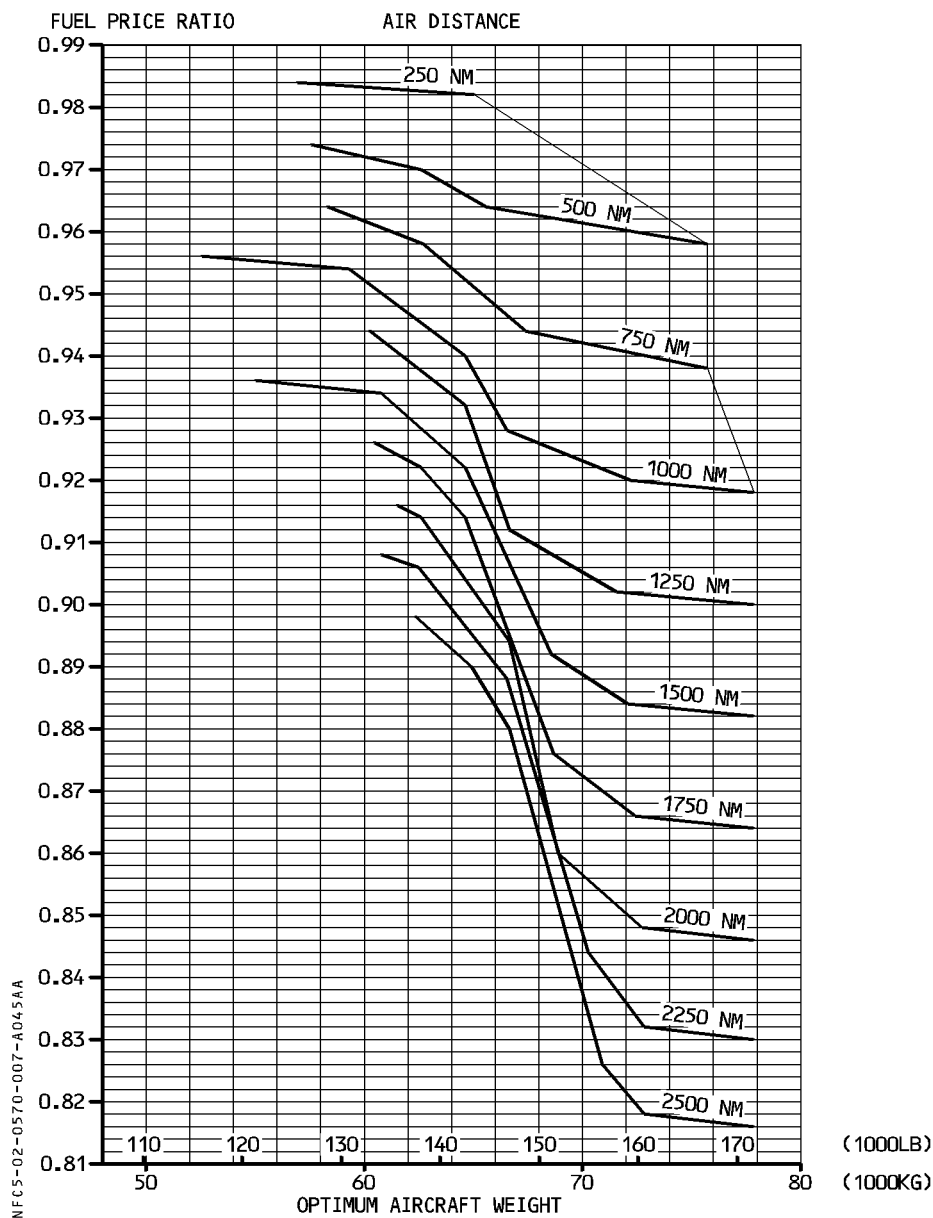
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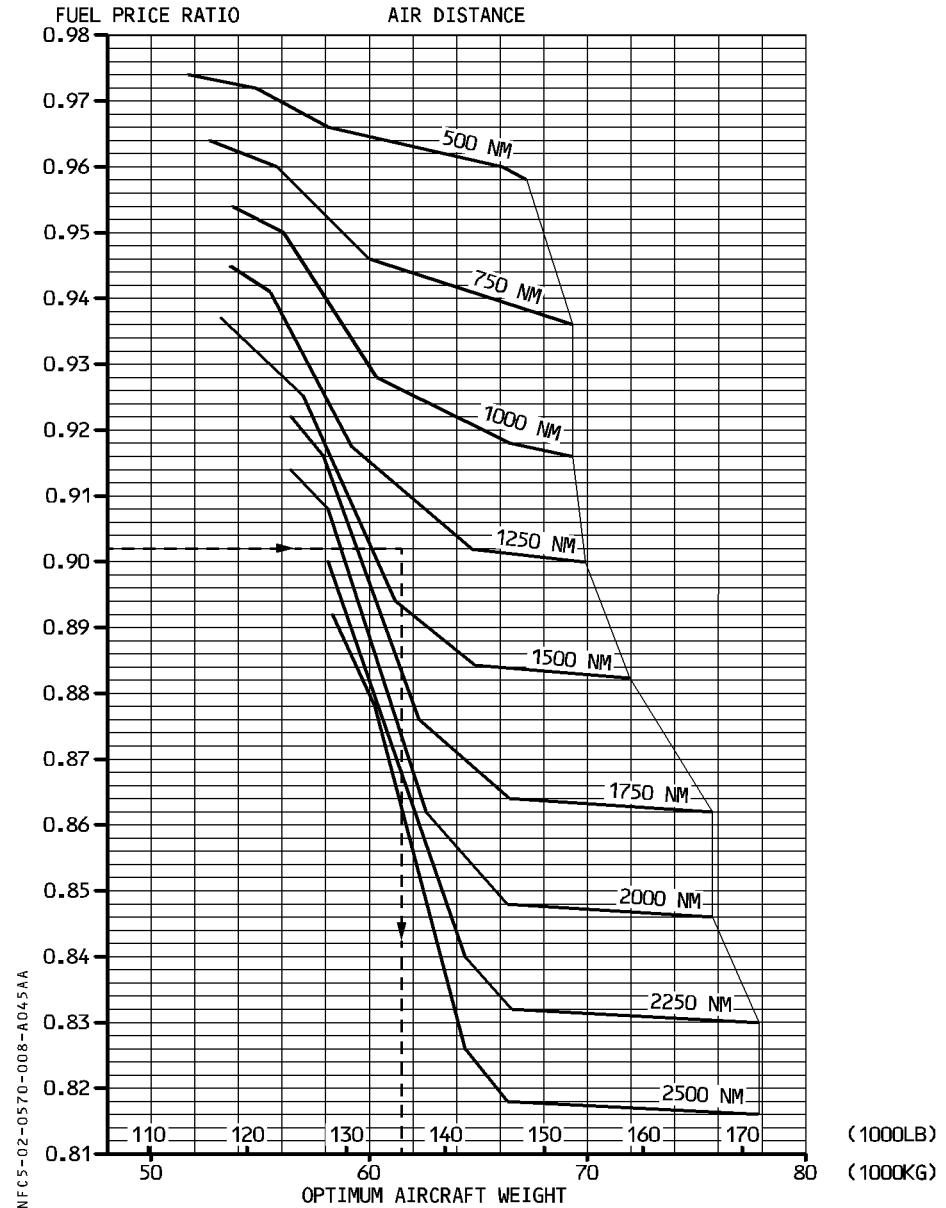
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FL390

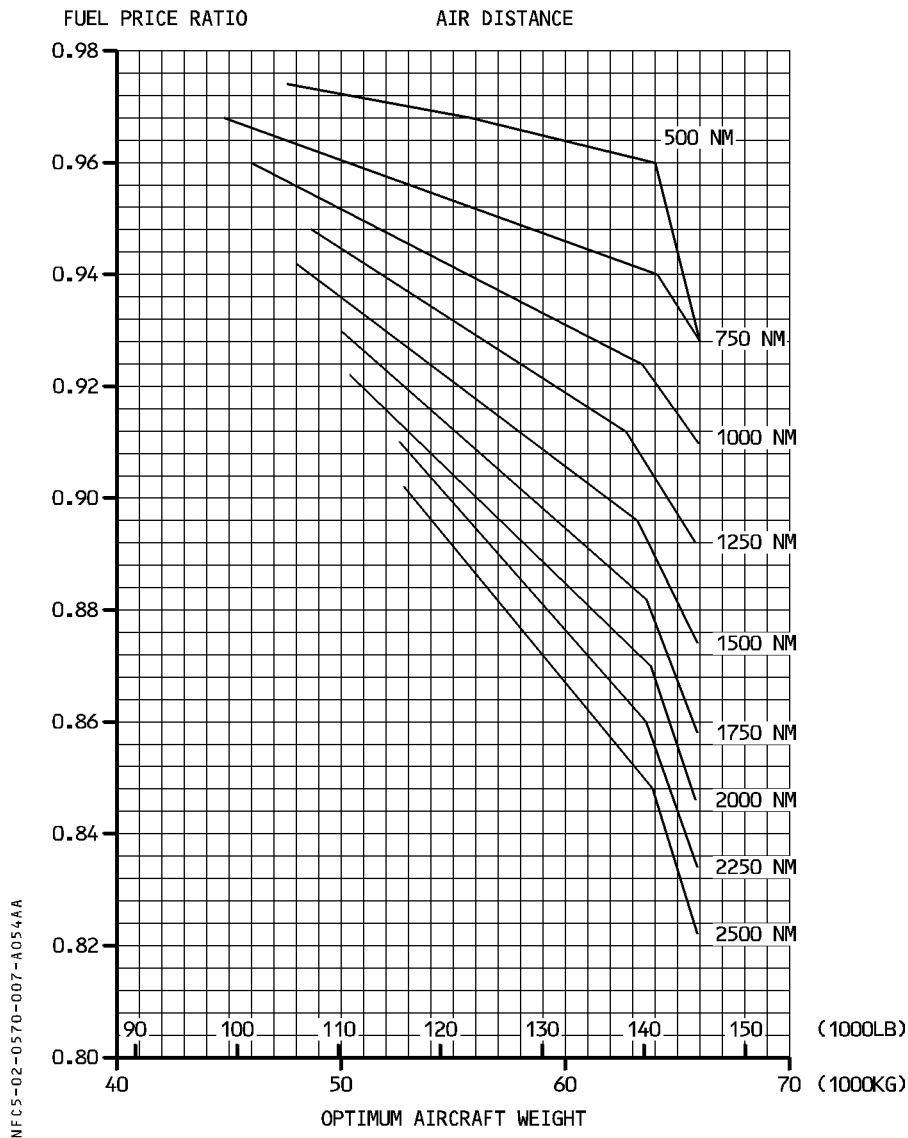


FL370

FL390



FL370



FL390

