
B-757-300 Operational Data Manual (ODM)

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B-757-300

Operational Data

Manual

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FUNCTION

The Aircraft Operational Data Manual (ODM) serves to provide trained Delta Flight Operations and Operations Control personnel with some of the information and instructions necessary for safe and economical operation of the aircraft.

AUTHORITY

This manual is published by the General Manager – Performance Engineering, Dept. 088, ATL under the authority of the Vice President – Operations Reliability and Control.

The procedures and data contained in this manual include those in the FAA Approved Airplane Flight Manual and aircraft manufacturer's data.

RESPONSIBILITY

The General Manager – Performance Engineering has been designated the responsibility for the quality of this manual.

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All manual holders and users are encouraged to contribute their suggestions and criticisms regarding the manual so that its function is well served. Inputs concerning data and technical content should be addressed to Performance Engineering, Dept. 088, ATL.

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Revision Notification

Publication: B-757-300 OPERATIONAL DATA MANUAL

Date: 10 Oct 16

Revision Number: 34

Page: 1 of 1

REMOVE	INSERT	REMARKS
TABLE OF CONTENTS	TABLE OF CONTENTS	Date updated to reflect revision.
COVER PAGE	COVER PAGE	Cover page updated to reflect revision.
LIST OF EFFECTIVE PAGES Page <i>i</i>	LIST OF EFFECTIVE PAGES Page <i>i</i>	List of Effective Pages updated to reflect revision.
QUICK REFERENCE Pages: All	QUICK REFERENCE Pages: All	Replaced pages with correct pages for fleet

**Pages not displaying a revision date of 10 Oct 16 were unchanged and included only for filing purposes.*

This list is effective with ODM Revision #34

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INTRODUCTION

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END

757-300 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES

RUNWAY CONDITION ASSESSMENT MATRIX

For additional guidance regarding the classification of the braking action based on existing contaminant types and the ICAO/Runway Condition Code values, please refer to Airway Manual, Supplemental, 4 – Weather, Braking Action.

Reported Braking Action		Reported Runway Surface Conditions			
PIREP	Definition	Runway Contaminant	ICAO/Runway Condition Code	Mu ⁽²⁾	RCR
--	--	• Dry	6		--
Good	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal	- Frost - Wet or Damp 1/8" or less depth of: - Water - Slush - Dry Snow - Wet Snow	5	40 or higher	19 & above
Good to Medium	Braking deceleration OR directional control is between Good and Medium.	-15°C and colder OAT: Compacted Snow	4	39 to 30	
Medium	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	- Wet ("slippery when wet" runway) - Dry Snow or Wet Snow (any depth) over Compacted Snow Greater than 1/8" depth of: - Dry Snow - Wet Snow Warmer than -15°C OAT: - Compacted Snow	3	29 to 21	13 – 18
Medium to Poor	Braking deceleration OR directional control is between Medium and Poor.	Greater than 1/8" depth of: - Water - Slush	2	20 or lower	
Poor	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	• Ice	1		6 – 12
Nil ⁽¹⁾	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	- Wet Ice - Water on top of Compacted Snow - Dry Snow or Wet Snow over Ice	0		5 & below
--	--	• Unreliable	9 (ICAO only)	N/A	N/A

⁽¹⁾ Operations on any runway with a PIREP or runway contaminant of nil are prohibited.

⁽²⁾ The overlapping Mu scales reflect the inherent inaccuracies of ground based Mu devices. Do not base the calculation of a landing distance solely on runway friction meter readings.

Braking actions "GOOD TO MEDIUM (4)" and "MEDIUM TO POOR (2)" are not displayed on the following pages. It is acceptable to interpolate between the provided data to calculate the desired landing performance when these conditions are present.

CROSSWIND

On slippery runways, crosswind guidelines are a function of runway surface condition, airplane loading and assume proper pilot technique.

	DRY	GOOD	MEDIUM	POOR
Crosswind Guidelines	40 kt	40 kt	35 kt	17 kt
Tailwind Limit	10 kt*	10 kt*	5 kt	0 kt

*Or as permitted by Delta 10-0 special pages.

757-300 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 25

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	11,700	11,000	10,300	9,400	8,600	5,600	10,300	9,400	8,700	6,700
260,000	11,300	10,700	10,000	9,100	8,400	5,400	10,000	9,100	8,500	6,500
250,000	10,900	10,300	9,700	8,800	8,200	5,200	9,700	8,800	8,200	6,400
240,000	10,500	10,000	9,400	8,600	8,000	5,100	9,400	8,600	8,000	6,200
230,000	10,100	9,600	9,100	8,300	7,700	4,900	9,100	8,300	7,800	6,000
224,000	9,900	9,400	8,900	8,100	7,600	4,800	8,900	8,100	7,600	5,900
220,000	9,700	9,200	8,800	8,000	7,500	4,700	8,800	8,000	7,500	5,800
210,000	9,300	8,900	8,500	7,800	7,300	4,500	8,500	7,800	7,300	5,700
200,000	8,900	8,500	8,200	7,500	7,000	4,300	8,200	7,500	7,100	5,500
190,000	8,600	8,200	7,800	7,200	6,800	4,200	7,800	7,200	6,800	5,300
180,000	8,200	7,800	7,500	7,000	6,500	4,100	7,500	7,000	6,600	5,200
170,000	7,800	7,500	7,200	6,700	6,300	4,000	7,200	6,700	6,400	5,000
160,000	7,500	7,100	6,900	6,400	6,100	3,900	6,900	6,400	6,100	4,800
150,000	7,100	6,800	6,600	6,200	5,800	3,800	6,600	6,200	5,900	4,700

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-700	-600	-500	-400	-300	-200	-500	-400	-300	-300
2,000	0	0	0	0	0	0	0	0	0	0
4,000	700	600	500	400	300	200	500	400	300	300
6,000	1,400	1,200	1,000	700	600	300	1,000	700	600	600
8,000	2,100	1,800	1,500	1,100	900	500	1,500	1,100	1,000	800
10,000	2,900	2,500	2,100	1,500	1,300	700	2,100	1,500	1,400	1,100

CORRECTIONS

	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	0	-50	-50	-50	0
PER 1 KT TAILWIND	150	150	100	100	100	50	100	100	100	50
PER 5 KTS ADD'L SPD	250	300	250	250	250	100	250	250	250	150
PER 10°C ABOVE ISA	250	200	200	150	150	50	200	150	150	100
PER 10°C BELOW ISA	-200	-200	-200	-150	-150	-50	-200	-150	-150	-100
PER 1% UP SLOPE	-250	-200	-150	-100	-100	-50	-150	-100	-100	-100
PER 1% DOWN SLOPE	250	200	150	100	100	50	150	100	100	100
1 REVERSER INOP	1,400	900	500	100	0	100	500	100	100	300
2 REVERSERS INOP	2,000	1,100	500	100	0	300	500	100	200	900
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

757-300 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 25

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,600	9,900	9,500	8,800	11,800	11,500	11,300	11,100
260,000	10,300	9,600	9,300	8,500	11,400	11,100	10,900	10,700
250,000	10,000	9,300	9,000	8,300	11,000	10,700	10,600	10,400
240,000	9,700	9,000	8,700	8,000	10,700	10,400	10,200	10,000
230,000	9,400	8,800	8,500	7,800	10,300	10,000	9,900	9,700
224,000	9,200	8,600	8,300	7,600	10,100	9,800	9,700	9,500
220,000	9,000	8,500	8,200	7,500	9,900	9,700	9,500	9,300
210,000	8,700	8,200	7,900	7,300	9,600	9,300	9,200	9,000
200,000	8,400	7,900	7,700	7,000	9,200	9,000	8,800	8,700
190,000	8,100	7,600	7,400	6,800	8,800	8,600	8,500	8,300
180,000	7,700	7,400	7,100	6,500	8,500	8,300	8,200	8,000
170,000	7,400	7,100	6,900	6,300	8,100	7,900	7,800	7,700
160,000	7,100	6,800	6,600	6,100	7,800	7,600	7,500	7,300
150,000	6,800	6,500	6,400	5,800	7,400	7,200	7,200	7,000

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-500	-400	-400	-400	-700	-600	-600	-600
2,000	0	0	0	0	0	0	0	0
4,000	500	400	400	400	700	600	600	600
6,000	1,100	900	900	900	1,300	1,300	1,200	1,300
8,000	1,600	1,300	1,300	1,300	2,000	1,900	1,900	1,900
10,000	2,200	1,900	1,900	1,900	2,900	2,800	2,800	2,800

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	100	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	200	250	250	250	250
PER 10°C ABOVE ISA	200	200	150	150	200	200	200	200
PER 10°C BELOW ISA	-200	-150	-150	-150	-200	-200	-200	-150
PER 1% UP SLOPE	-200	-200	-150	-200	-350	-350	-350	-400
PER 1% DOWN SLOPE	250	200	200	250	500	500	500	500
1 REVERSER INOP	700	500	600	900	1,400	1,400	1,500	1,700
2 REVERSERS INOP	1,500	1,800	2,000	2,400	4,900	5,000	5,100	5,300
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

757-300 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 30

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,800	10,300	9,700	8,700	8,100	5,200	9,700	8,700	8,100	6,400
260,000	10,400	9,900	9,300	8,500	7,900	5,100	9,300	8,500	7,900	6,200
250,000	10,000	9,600	9,000	8,200	7,600	4,900	9,000	8,200	7,700	6,000
240,000	9,700	9,200	8,700	7,900	7,400	4,700	8,700	7,900	7,400	5,900
230,000	9,300	8,900	8,400	7,700	7,200	4,600	8,400	7,700	7,200	5,700
224,000	9,100	8,700	8,200	7,500	7,000	4,500	8,200	7,500	7,100	5,600
220,000	8,900	8,500	8,100	7,400	6,900	4,400	8,100	7,400	7,000	5,500
210,000	8,600	8,200	7,800	7,100	6,700	4,300	7,800	7,100	6,700	5,300
200,000	8,200	7,800	7,500	6,900	6,500	4,100	7,500	6,900	6,500	5,200
190,000	7,900	7,500	7,200	6,700	6,300	4,000	7,200	6,700	6,300	5,000
180,000	7,600	7,200	6,900	6,400	6,100	3,900	6,900	6,400	6,100	4,900
170,000	7,200	6,900	6,700	6,200	5,900	3,800	6,700	6,200	5,900	4,700
160,000	6,900	6,600	6,400	6,000	5,700	3,700	6,400	6,000	5,700	4,600
150,000	6,600	6,300	6,100	5,700	5,400	3,600	6,100	5,700	5,500	4,400

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-600	-500	-400	-300	-300	-100	-400	-300	-300	-300
2,000	0	0	0	0	0	0	0	0	0	0
4,000	600	500	400	300	300	100	400	300	300	300
6,000	1,200	1,100	900	600	600	300	900	600	600	500
8,000	1,800	1,600	1,300	1,000	800	400	1,300	1,000	800	800
10,000	2,500	2,200	1,800	1,400	1,100	600	1,800	1,400	1,100	1,100

CORRECTIONS

	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	0	-50	-50	-50	0
PER 1 KT TAILWIND	150	100	100	100	100	50	100	100	100	50
PER 5 KTS ADD'L SPD	250	250	250	250	250	100	250	250	250	150
PER 10°C ABOVE ISA	200	200	200	150	150	50	200	150	150	100
PER 10°C BELOW ISA	-150	-150	-150	-150	-150	-50	-150	-150	-150	-100
PER 1% UP SLOPE	-200	-150	-150	-100	-50	-50	-150	-100	-100	-100
PER 1% DOWN SLOPE	200	150	150	100	50	50	150	100	100	100
1 REVERSER INOP	1,100	800	400	100	0	100	400	100	0	300
2 REVERSERS INOP	1,600	800	400	100	0	100	400	100	200	700
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

757-300 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 30

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,000	9,200	8,900	8,300	11,000	10,700	10,500	10,500
260,000	9,600	9,000	8,700	8,100	10,600	10,300	10,200	10,100
250,000	9,300	8,700	8,400	7,800	10,300	10,000	9,800	9,800
240,000	9,000	8,400	8,100	7,600	9,900	9,600	9,500	9,400
230,000	8,700	8,100	7,900	7,300	9,500	9,300	9,200	9,100
224,000	8,500	8,000	7,700	7,200	9,300	9,100	9,000	8,900
220,000	8,300	7,900	7,600	7,100	9,200	9,000	8,800	8,700
210,000	8,000	7,600	7,400	6,800	8,800	8,600	8,500	8,400
200,000	7,700	7,300	7,100	6,600	8,500	8,300	8,200	8,000
190,000	7,400	7,100	6,900	6,300	8,100	8,000	7,900	7,700
180,000	7,100	6,800	6,600	6,100	7,800	7,700	7,600	7,400
170,000	6,800	6,500	6,400	5,900	7,500	7,400	7,300	7,100
160,000	6,500	6,300	6,200	5,700	7,200	7,100	7,000	6,800
150,000	6,300	6,000	5,900	5,500	6,900	6,800	6,700	6,500

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-500	-400	-400	-400	-600	-600	-600	-600
2,000	0	0	0	0	0	0	0	0
4,000	500	400	400	400	600	600	600	600
6,000	900	800	800	800	1,200	1,100	1,100	1,200
8,000	1,400	1,200	1,200	1,200	1,700	1,700	1,700	1,700
10,000	1,900	1,700	1,700	1,700	2,500	2,500	2,500	2,500

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	100	100	100	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	200	250	250	250	200
PER 10°C ABOVE ISA	200	150	150	150	200	200	200	200
PER 10°C BELOW ISA	-150	-150	-150	-150	-150	-150	-150	-150
PER 1% UP SLOPE	-200	-150	-150	-200	-350	-350	-350	-350
PER 1% DOWN SLOPE	200	200	200	200	450	450	450	500
1 REVERSER INOP	500	400	500	700	1,200	1,300	1,300	1,500
2 REVERSERS INOP	1,300	1,500	1,700	2,000	4,100	4,300	4,300	4,500
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

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DEFINITIONS AND ASSUMPTIONS

ISA - International Standard Atmosphere temperature, in °C, for a given pressure altitude. ISA temperature for Sea Level is 15°C (59°F).

ISA DEVIATION - The difference between the standard ISA temperature and the ambient temperature in °C.

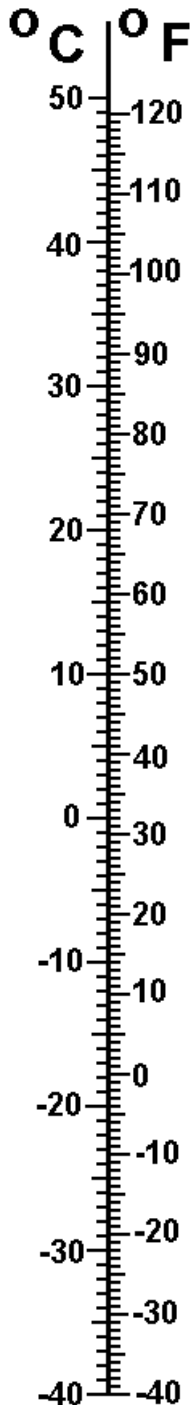
STATIC AIR TEMPERATURE (SAT) - The ambient still air temperature outside of the aircraft. Sometimes known as the Outside Air Temperature (OAT).

TOTAL AIR TEMPERATURE (TAT) - The total of the ambient air temperature (SAT) plus the increase in temperature due to compression heating.

V_{mo}/M_{mo} - Maximum allowable operating indicated airspeed or Mach number.

TEMPERATURE CONVERSION AND STATIC AIR TEMPERATURE

°C



ALTITUDE - FEET	ISA DEVIATION					
	ISA-20°C	ISA-10°C	ISA	ISA+10°C	ISA+20°C	ISA+30°C
36,000 & Higher	-76.5	-66.5	-56.5	-46.5	-36.5	-26.5
35,000	-74.2	-64.2	-54.2	-44.2	-34.2	-24.2
34,000	-72.3	-62.3	-52.3	-42.3	-32.3	-22.3
33,000	-70.3	-60.3	-50.3	-40.3	-30.3	-20.3
32,000	-68.3	-58.3	-48.3	-38.3	-28.3	-18.3
31,000	-66.3	-56.3	-46.3	-36.3	-26.3	-16.3
30,000	-64.3	-54.3	-44.3	-34.3	-24.3	-14.3
29,000	-62.4	-52.4	-42.4	-32.4	-22.4	-12.4
28,000	-60.4	-50.4	-40.4	-30.4	-20.4	-10.4
27,000	-58.4	-48.4	-38.4	-28.4	-18.4	-8.4
26,000	-56.5	-46.5	-36.5	-26.5	-16.5	-6.5
25,000	-54.5	-44.5	-34.5	-24.5	-14.5	-4.5
24,000	-52.5	-42.5	-32.5	-22.5	-12.5	-2.5
23,000	-50.5	-40.5	-30.5	-20.5	-10.5	-0.5
22,000	-48.5	-38.5	-28.5	-18.5	-8.5	+1.5
21,000	-46.6	-36.6	-26.6	-16.6	-6.6	+3.4
20,000	-44.6	-34.6	-24.6	-14.6	-4.6	+5.4
19,000	-42.6	-32.6	-22.6	-12.6	-2.6	+7.4
18,000	-40.6	-30.6	-20.6	-10.6	-0.6	+9.4
17,000	-38.7	-28.7	-18.7	-8.7	+1.3	+11.3
16,000	-36.7	-26.7	-16.7	-6.7	+3.3	+13.3
15,000	-34.7	-24.7	-14.7	-4.7	+5.3	+15.3
14,000	-32.7	-22.7	-12.7	-2.7	+7.3	+17.3
13,000	-30.7	-20.7	-10.7	-0.7	+9.3	+19.3
12,000	-28.8	-18.8	-8.8	+1.2	+11.2	+21.2
11,000	-26.8	-16.8	-6.8	+3.2	+13.2	+23.2
10,000	-24.8	-14.8	-4.8	+5.2	+15.2	+25.2
5000	-14.9	-4.9	+5.1	+15.1	+25.1	+35.1
0	-5.0	+5.0	+15.0	+25.0	+35.0	+45.0

RULE OF THUMB: For standard temperature (ISA) at or below 36,000 feet:

Double altitude (in thousands of feet), subtract 15, change sign.

EXAMPLES:	<u>ALT</u>	<u>DOUBLE ALT</u>	<u>SUBTRACT 15</u>	<u>CHANGE SIGN</u>
	0	0	-15	+15
	33	66	51	-51

TOTAL AIR TEMPERATURE vs STATIC AIR TEMPERATURE**°C**

TAT °C	INDICATED MACH NUMBER													
	.40	.50	.60	.70	.74	.75	.76	.77	.78	.80	.82	.84	.86	.88
75	64	58	52	44	41	40	39	38	37	35	34	32	30	28
70	59	54	47	39	36	35	34	33	33	31	29	28	26	24
65	55	49	42	35	32	31	30	29	28	27	25	23	21	20
60	50	44	38	30	27	26	25	24	24	22	21	19	17	15
55	45	39	33	26	23	22	21	20	19	18	16	14	13	11
50	40	35	28	21	18	17	16	15	14	13	12	10	8	7
45	35	30	24	17	14	13	12	11	10	9	7	6	4	2
40	30	25	19	12	9	8	7	6	6	4	3	1	0	-2
35	25	20	14	7	5	4	3	2	1	0	-1	-3	-5	-6
30	21	16	10	3	0	-1	-2	-3	-3	-4	-6	-7	-9	-11
25	16	11	5	-2	-4	-5	-6	-7	-7	-9	-10	-12	-13	-15
20	11	6	0	-6	-9	-10	-11	-12	-12	-13	-15	-16	-18	-19
15	6	1	-4	-11	-13	-14	-15	-16	-16	-18	-19	-21	-22	-24
10	1	-3	-9	-15	-18	-19	-20	-21	-21	-22	-23	-25	-27	-28
5	-4	-8	-14	-20	-22	-23	-24	-25	-25	-27	-28	-29	-31	-32
0	-8	-13	-18	-24	-27	-28	-29	-30	-30	-31	-32	-34	-35	-37
-5	-13	-18	-23	-29	-31	-32	-33	-34	-34	-35	-37	-38	-40	-41
-10	-18	-23	-28	-33	-36	-37	-38	-39	-39	-40	-41	-43	-44	-45
-15	-23	-27	-32	-38	-40	-41	-42	-43	-43	-44	-46	-47	-48	-50
-20	-28	-32	-37	-43	-45	-46	-47	-48	-48	-49	-50	-51	-53	-54
-25	-33	-37	-42	-47	-49	-50	-51	-52	-52	-53	-54	-56	-57	-58
-30	-38	-42	-46	-52	-54	-54	-55	-55	-56	-58	-59	-60	-61	-63
-35	-42	-46	-51	-56	-58	-59	-60	-61	-61	-62	-63	-64	-66	-67
-40	-47	-51	-56	-61	-63	-63	-64	-64	-65	-66	-68	-69	-70	-71
-45	-52	-56	-60	-65	-67	-68	-69	-70	-70	-71	-72	-73	-74	-76
-50	-57	-61	-65	-70	-72	-72	-73	-73	-74	-75	-76	-78	-79	-80
-55	-62	-65	-70	-74	-76	-77	-78	-79	-79	-80	-81	-82	-83	-84

NORMAL OPERATING SPEED LIMIT **V_{MO} / M_{MO}**

PRESSURE ALTITUDE	INDICATED V_{MO} (KIAS)	MACH M_{MO}
0	350	0.529
5,000	350	0.576
10,000	350	0.629
15,000	350	0.687
17,000	350	0.713
19,000	350	0.739
21,000	350	0.767
23,000	350	0.796
25,000	350	0.826
27,000	350	0.858
29,000	336	0.860
31,000	322	0.860
33,000	308	0.860
35,000	294	0.860
37,000	281	0.860
39,000	268	0.860
41,000	256	0.860
42,000	250	0.860

EN ROUTE FUEL TEMPERATURE

FOR DETERMINING DISPATCH CAPABILITY BASED ON FUEL FREEZE POINT.

FUEL TYPE		ISA	JET A	JP-5	JET A1	Jet B	TS-1
ADJUSTED FUEL FREEZE TEMP.			-37°C	-43°C	-44°C	-47°C	-57°C
MACH	FLT LEVEL		MAXIMUM ISA DEVIATION - °C				
0.77	330	-50	-12	-17	-18	-21	-30
	350	-54	-8	-13	-14	-17	-26
	370 & HIGHER	-57	-6	-11	-12	-14	-23
0.78	330	-50	-12	-18	-18	-21	-30
	350	-54	-8	-14	-15	-17	-26
	370 & HIGHER	-57	-6	-11	-12	-15	-24
0.79	330	-50	-13	-18	-19	-22	-31
	350	-54	-9	-14	-15	-18	-27
	370 & HIGHER	-57	-7	-12	-13	-16	-24
0.80	330	-50	-13	-19	-20	-22	-31
	350	-54	-9	-15	-16	-18	-27
	370 & HIGHER	-57	-7	-13	-14	-16	-25
0.81	330	-50	-14	-19	-20	-23	-32
	350	-54	-10	-15	-16	-19	-28
	370 & HIGHER	-57	-8	-13	-14	-17	-26

INSTRUCTIONS:

1. Locate type of fuel being used.

NOTE: THE ADJUSTED FUEL FREEZING TEMPERATURE IS THE BASIC FUEL FREEZING TEMPERATURE + 3°C (PER THE APPROVED AIRCRAFT FLIGHT MANUAL).

2. Move down to the Mach number and Altitude expected en route and read the Maximum ISA Deviation.
3. Do not dispatch aircraft into en route temperatures colder than the Maximum ISA Deviation obtained in Step 2 above.

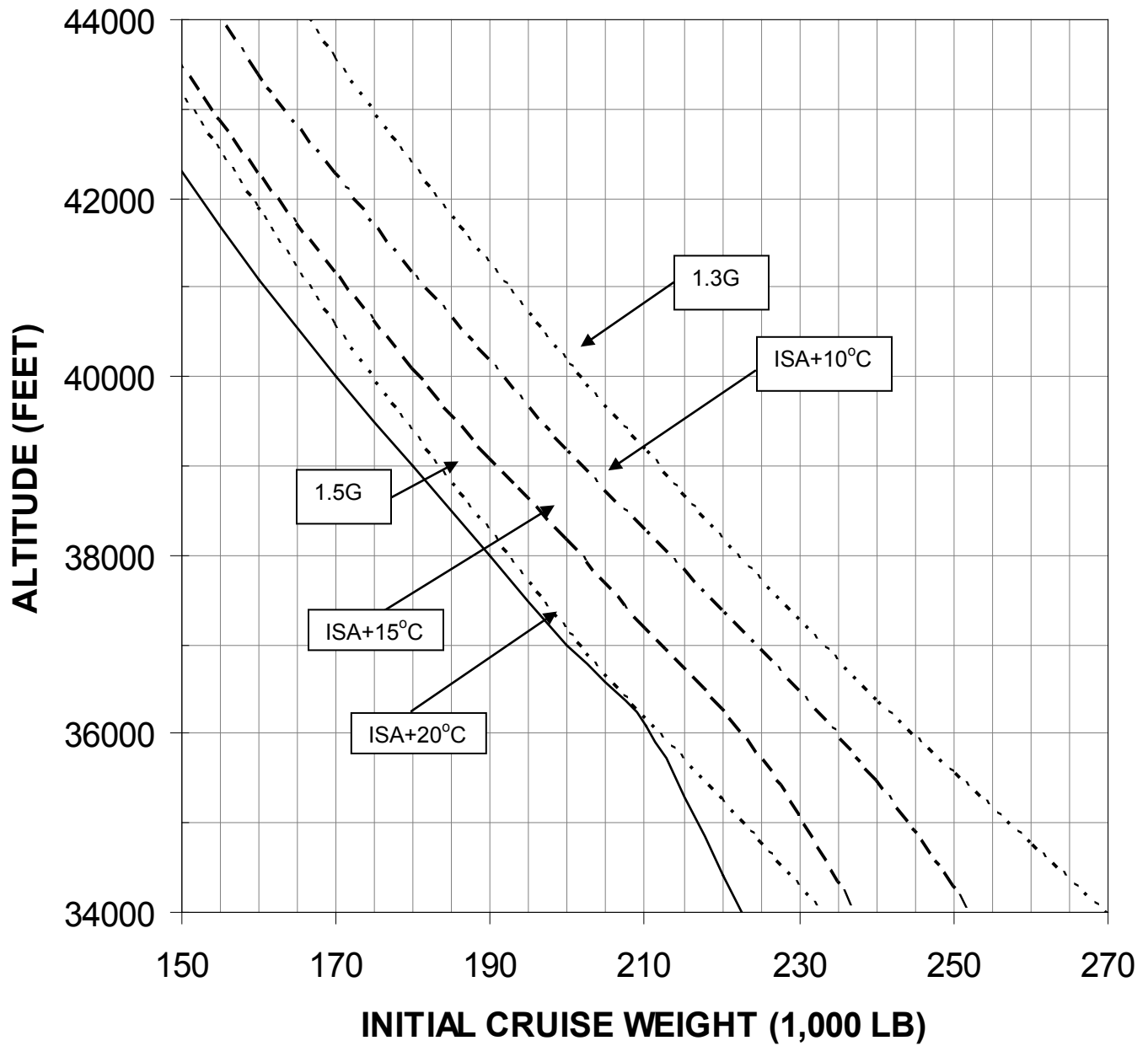
EXAMPLE:

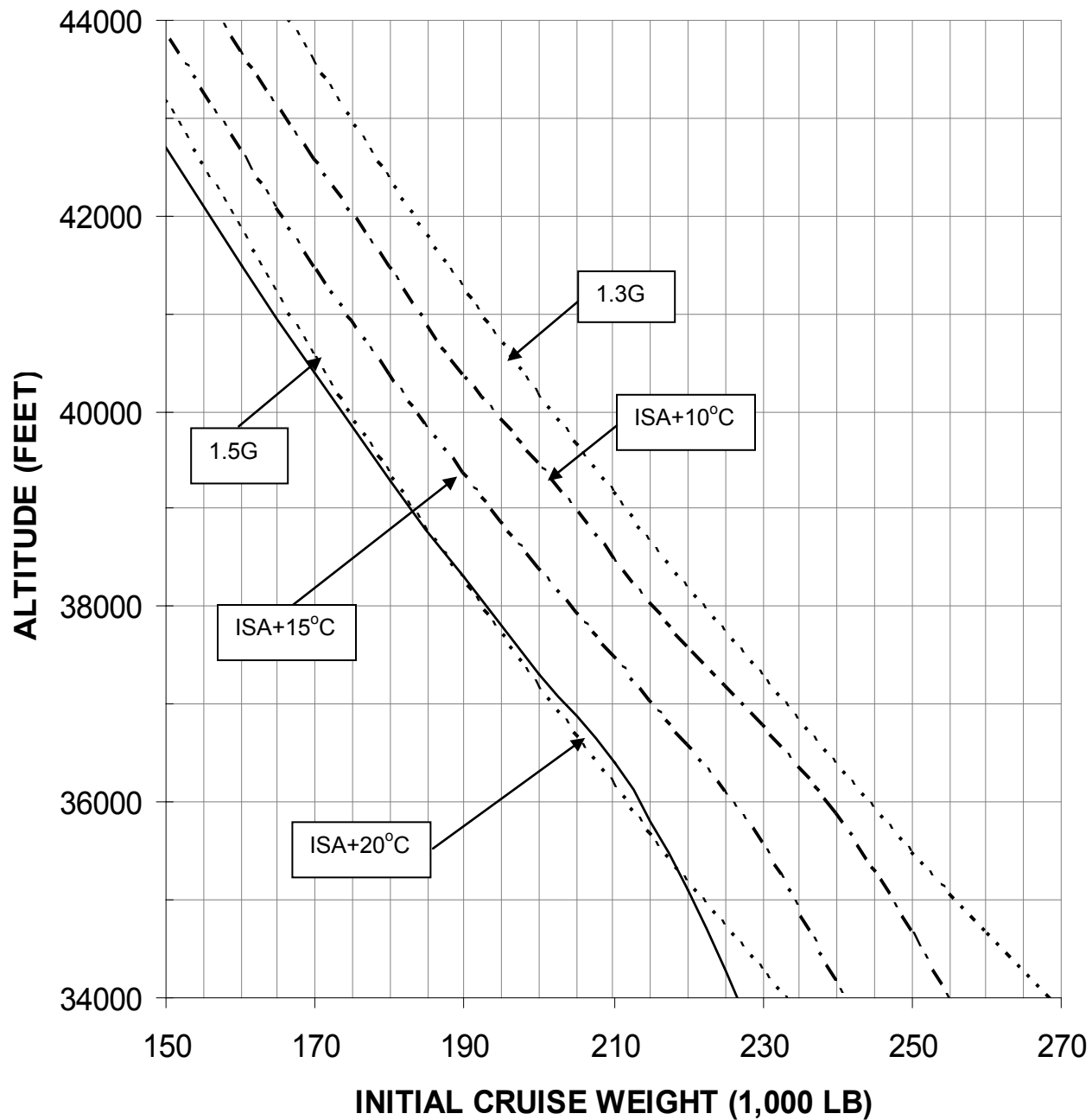
Fuel Type = Jet A (adjusted freeze point -37°C).

Expected Flight Level = 350.

Expected Mach Number = 0.81.

1. Enter the top of the Chart under JET A (Adjusted Fuel Freezing Temperature = -37°C).
2. Move down the chart to the flight conditions of Mach 0.81 and FL 350 and read the Maximum ISA Deviation (-10°C).
3. Do not dispatch aircraft into temperatures colder than ISA -10°C at FL 350.

MAXIMUM RECOMMENDED INITIAL CRUISE ALTITUDE**LRC**

MAXIMUM RECOMMENDED INITIAL CRUISE ALTITUDE**.78 MACH**

BUFFET ONSET BOUNDARY SPEEDS

KIAS

FLIGHT LEVEL	CRUISE WEIGHT - POUNDS	V _b - M KIAS	G / BANK ANGLE - DEGREES					
			1.0 / 0°		1.15 / 30°		1.5 / 48°	
			LOW	HIGH	LOW	HIGH	LOW	HIGH
410	260,000	.78 229						
	240,000		216	249+				
	220,000		202	256+				
	200,000		190	256+	211	251+		
	180,000		177	256+	198	251+		
	160,000		160	256+	181	257+	217	247+
390	260,000	.78 241	226	260+				
	240,000		211	268+				
	220,000		201	268+	219	263+		
	200,000		189	268+	207	269+		
	180,000		174	268+	195	269+	232	256+
	160,000		156	268+	177	269+	211	268+
370	260,000	.78 252	221	280+	244	265+		
	240,000		208	281+	230	276+		
	220,000		195	281+	216	281+		
	200,000		181	281+	204	281+	249	265+
	180,000		168	281+	190	281+	226	278+
	160,000		152	281+	172	281+	208	281+
350	260,000	.78 264	217	293+	238	280+		
	240,000		204	293+	227	293+		
	220,000		189	293+	213	293+	260	278+
	200,000		176	293+	200	293+	238	290+
	180,000		164	293+	184	293+	222	293+
	160,000		150	293+	168	293+	204	293+
330	260,000	.78 277	213	308+	235	301+		
	240,000		198	308+	223	309+	272	291+
	220,000		185	308+	208	309+	249	303+
	200,000		172	308+	194	309+	235	309+
	180,000		160	308+	181	309+	218	309+
	160,000		147	308+	165	309+	199	309+
310	260,000	.78 289	207	322+	232	322+	277	309+
	240,000		193	322+	219	322+	261	317+
	220,000		182	322+	203	322+	246	322+
	200,000		169	322+	190	322+	232	322+
	180,000		158	322+	177	322+	213	322+
	160,000		144	322+	161	322+	195	322+
290	260,000	.78 290	203	336+	227	336+	269	332+
	240,000		189	336+	213	336+	257	336+
	220,000		178	336+	198	336+	243	336+
	200,000		167	336+	186	336+	226	336+
	180,000		156	336+	174	336+	208	336+
	160,000		145	336+	159	336+	190	336+

NOTE: Buffet Speeds shown with a **following + sign** are higher than the aircraft Vmo/Mmo.
The displayed speed is Vmo/Mmo.



Aircraft is above buffet onset ceiling at this weight and altitude.

End of Section

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DEFINITIONS AND ASSUMPTIONS

- V₁ Takeoff Decision Speed** V₁ is the speed that determines the go or no-go decision in the event of an engine failure. No time is allowed after V₁ for reaction or decision. Action must be initiated at or before V₁. The Federal Aviation Regulations define V₁ as “the speed at which an engine failure has been recognized and action initiated to either continue or stop the takeoff”.
- V_R - Rotation Speed** V_R is the speed at which the pilot begins rotation of the aircraft to the takeoff pitch attitude. V_R is selected so that, with normal rate of rotation, the aircraft will lift off and attain a height of 35 feet at a speed of V₂.
- V₂ - Takeoff Safety Speed** V₂ is the speed used to achieve the required gradient during the second climb segment (landing gear retracted and flaps in the takeoff position).

NOTE: Except when using the increased V_R speed procedure shown in Operations Manual Volume 1 Adverse Weather, the following takeoff speeds may only be used with a manual weight data record based on ARM takeoff performance weight limits. These speeds may not be used with takeoff performance weight limits from AWABS. Optimum V₁ speeds are calculated in AWABS versus Balanced or fixed V₁ speeds which are to be used for a manual WDR.

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TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

$V_1 / V_R / V_2$

TO / 5

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
280	8,000	173 / 186 / 188					
	6,000						
	4,000						
	2,000						
	0						
270	8,000	170 / 183 / 185					
	6,000						
	4,000	174 / 182 / 185	173 / 182 / 185				
	2,000						
	0						
260	8,000	167 / 180 / 182					
	6,000						
	4,000	171 / 179 / 182	170 / 179 / 182				
	2,000						
	0						
250	8,000	164 / 177 / 179					
	6,000						
	4,000	169 / 176 / 179	167 / 176 / 178	163 / 176 / 178	167 / 176 / 178		
	2,000						
	0						
240	8,000	161 / 174 / 176					
	6,000						
	4,000	166 / 173 / 175	164 / 173 / 175	161 / 173 / 175	165 / 174 / 175		
	2,000						
	0						
230	8,000	163 / 170 / 172	161 / 170 / 172				
	6,000						
	4,000	162 / 169 / 172	162 / 169 / 172	162 / 169 / 172	163 / 171 / 172	168 / 172 / 172	171 / 173 / 173
	2,000						
	0						

Limited by either Maximum Brake Energy, Tire Limit Speed and/or Environmental Envelope.

TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

**V₁ / V_R / V₂
TO / 5**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
220	8,000	159 / 165 / 168	159 / 165 / 168	161 / 166 / 168			
	6,000	158 / 164 / 168	157 / 164 / 168	158 / 164 / 168	161 / 166 / 168	166 / 169 / 169	167 / 169 / 169
	4,000	156 / 163 / 168	156 / 163 / 168	156 / 163 / 168	159 / 165 / 168	163 / 167 / 169	166 / 169 / 169
	2,000	155 / 162 / 168	155 / 162 / 168	155 / 162 / 168	156 / 163 / 168	161 / 166 / 168	166 / 168 / 169
	0	154 / 162 / 168	154 / 162 / 168	154 / 162 / 168	154 / 162 / 168	159 / 164 / 168	164 / 167 / 168
210	8,000	155 / 161 / 165	154 / 161 / 165	156 / 162 / 164	160 / 164 / 165		
	6,000	153 / 160 / 165	153 / 160 / 165	153 / 160 / 159	157 / 162 / 164	161 / 164 / 165	162 / 165 / 165
	4,000	151 / 159 / 165	151 / 159 / 165	151 / 159 / 165	154 / 160 / 164	159 / 163 / 165	162 / 164 / 165
	2,000	150 / 158 / 165	150 / 158 / 165	150 / 158 / 165	151 / 159 / 165	156 / 161 / 164	161 / 164 / 165
	0	149 / 157 / 165	149 / 157 / 165	149 / 157 / 165	148 / 157 / 165	154 / 160 / 164	159 / 163 / 164
200	8,000	149 / 156 / 161	149 / 156 / 161	151 / 157 / 161	155 / 159 / 161		
	6,000	147 / 155 / 161	147 / 155 / 161	148 / 155 / 161	152 / 157 / 161	156 / 160 / 161	157 / 160 / 161
	4,000	146 / 154 / 161	146 / 154 / 161	146 / 154 / 161	149 / 156 / 161	154 / 158 / 161	157 / 160 / 161
	2,000	144 / 153 / 161	144 / 153 / 161	144 / 153 / 161	146 / 154 / 161	151 / 157 / 161	156 / 160 / 161
	0	143 / 152 / 161	143 / 152 / 161	143 / 152 / 161	143 / 152 / 161	148 / 155 / 161	154 / 158 / 160
190	8,000	144 / 151 / 157	144 / 151 / 157	145 / 152 / 157	149 / 154 / 157		
	6,000	142 / 150 / 157	142 / 150 / 157	142 / 150 / 157	146 / 153 / 157	151 / 155 / 157	152 / 156 / 157
	4,000	140 / 149 / 158	140 / 149 / 158	140 / 149 / 158	143 / 151 / 157	148 / 154 / 157	151 / 155 / 157
	2,000	139 / 148 / 158	139 / 148 / 158	139 / 148 / 158	140 / 149 / 157	146 / 152 / 157	151 / 155 / 157
	0	138 / 148 / 158	138 / 148 / 158	138 / 148 / 158	138 / 148 / 158	143 / 150 / 157	149 / 153 / 156
180	8,000	138 / 146 / 153	138 / 146 / 153	139 / 147 / 153	143 / 149 / 153		
	6,000	136 / 145 / 154	136 / 145 / 154	136 / 145 / 153	140 / 148 / 153	145 / 150 / 152	146 / 151 / 153
	4,000	135 / 144 / 154	134 / 144 / 154	134 / 144 / 154	138 / 146 / 153	143 / 149 / 153	146 / 150 / 152
	2,000	133 / 143 / 154	133 / 143 / 154	133 / 143 / 154	135 / 144 / 154	140 / 147 / 153	146 / 150 / 152
	0	132 / 143 / 154	132 / 143 / 154	132 / 143 / 154	132 / 143 / 154	137 / 145 / 153	143 / 148 / 152
170	8,000	132 / 141 / 149	132 / 141 / 149	133 / 142 / 149	137 / 144 / 149		
	6,000	130 / 140 / 150	130 / 140 / 150	130 / 140 / 150	134 / 142 / 149	139 / 145 / 148	141 / 145 / 148
	4,000	129 / 139 / 150	129 / 139 / 150	129 / 139 / 150	131 / 140 / 149	137 / 143 / 149	140 / 145 / 148
	2,000	128 / 138 / 150	128 / 138 / 150	127 / 138 / 150	129 / 139 / 150	134 / 142 / 149	140 / 145 / 148
	0	127 / 138 / 151	127 / 138 / 151	126 / 138 / 151	126 / 138 / 151	131 / 140 / 149	137 / 143 / 148

 Limited by either Maximum Brake Energy, Tire Limit Speed, Climb Limit and/or Environmental Envelope.

TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

**V₁ / V_R / V₂
TO / 15**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
280	8,000	153 / 177 / 178					
	6,000	160 / 176 / 177					
	4,000	167 / 175 / 176	164 / 175 / 176				
	2,000	168 / 174 / 176	168 / 174 / 176	167 / 174 / 176	164 / 174 / 176		
	0						
270	8,000	150 / 174 / 175					
	6,000	157 / 173 / 174					
	4,000	164 / 172 / 174	160 / 172 / 174				
	2,000	165 / 171 / 173	165 / 171 / 173	164 / 171 / 173	161 / 172 / 173		
	0	164 / 170 / 173	164 / 170 / 173	164 / 170 / 173	164 / 170 / 173	165 / 173 / 174	
260	8,000	154 / 170 / 171					
	6,000	161 / 169 / 171	157 / 169 / 171				
	4,000	162 / 168 / 170	162 / 168 / 170	160 / 168 / 170			
	2,000	162 / 167 / 170	161 / 167 / 170	161 / 167 / 170	162 / 168 / 170	163 / 170 / 171	
	0	161 / 167 / 170	161 / 167 / 170	160 / 167 / 170	160 / 167 / 170	165 / 169 / 170	
250	8,000	158 / 166 / 168					
	6,000	160 / 165 / 167	160 / 165 / 167	158 / 165 / 167			
	4,000	159 / 164 / 167	159 / 164 / 167	158 / 164 / 167	161 / 166 / 167		
	2,000	158 / 163 / 167	158 / 163 / 167	157 / 163 / 167	159 / 164 / 167	163 / 167 / 168	
	0	157 / 163 / 167	157 / 163 / 167	157 / 163 / 167	156 / 163 / 167	161 / 165 / 167	166 / 168 / 169
240	8,000	158 / 162 / 164	157 / 162 / 164				
	6,000	156 / 161 / 164	156 / 161 / 164	156 / 161 / 164	160 / 163 / 164		
	4,000	155 / 160 / 164	155 / 160 / 164	155 / 160 / 164	157 / 162 / 164	162 / 164 / 165	
	2,000	154 / 160 / 164	154 / 160 / 164	154 / 160 / 164	155 / 160 / 164	160 / 163 / 164	164 / 165 / 166
	0	154 / 159 / 164	153 / 159 / 164	153 / 159 / 164	153 / 159 / 164	157 / 161 / 164	162 / 164 / 165
230	8,000	154 / 158 / 161	154 / 158 / 161	155 / 159 / 161	157 / 161 / 162		
	6,000	153 / 157 / 160	152 / 157 / 160	153 / 158 / 160	156 / 159 / 161	160 / 161 / 162	
	4,000	151 / 156 / 161	151 / 156 / 161	151 / 156 / 161	154 / 158 / 160	158 / 160 / 161	160 / 162 / 163
	2,000	150 / 156 / 161	150 / 156 / 161	150 / 156 / 161	151 / 156 / 160	156 / 159 / 161	160 / 161 / 162
	0	149 / 155 / 161	149 / 155 / 161	149 / 155 / 161	149 / 155 / 161	154 / 157 / 160	158 / 160 / 161

Limited by either Maximum Brake Energy, Tire Limit Speed, Climb Limit and/or Environmental Envelope.

TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

**V₁ / V_R / V₂
TO / 15**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
220	8,000	150 / 154 / 157	150 / 154 / 157	151 / 155 / 157	154 / 157 / 158		
	6,000	148 / 153 / 157	148 / 153 / 157	148 / 153 / 157	152 / 155 / 157	156 / 158 / 159	
	4,000	147 / 152 / 157	147 / 152 / 157	146 / 152 / 157	149 / 154 / 157	154 / 156 / 157	156 / 158 / 159
	2,000	145 / 151 / 157	145 / 151 / 157	145 / 151 / 157	147 / 152 / 157	151 / 155 / 157	156 / 157 / 158
	0	145 / 151 / 157	144 / 151 / 157	144 / 151 / 157	144 / 151 / 157	149 / 153 / 157	154 / 156 / 157
210	8,000	145 / 150 / 154	145 / 150 / 154	146 / 151 / 154	150 / 153 / 154		
	6,000	143 / 149 / 154	143 / 149 / 154	144 / 149 / 150	147 / 151 / 154	151 / 153 / 154	
	4,000	142 / 148 / 154	142 / 148 / 154	142 / 148 / 154	145 / 150 / 154	149 / 152 / 154	152 / 154 / 155
	2,000	141 / 147 / 154	140 / 147 / 154	140 / 147 / 154	142 / 148 / 154	147 / 151 / 153	152 / 153 / 154
	0	140 / 147 / 154	139 / 146 / 154	139 / 146 / 154	139 / 146 / 154	144 / 149 / 154	150 / 152 / 154
200	8,000	140 / 146 / 151	140 / 146 / 151	141 / 146 / 150	145 / 148 / 150		
	6,000	138 / 145 / 151	138 / 145 / 151	138 / 145 / 151	142 / 147 / 150	147 / 149 / 150	
	4,000	137 / 144 / 151	137 / 144 / 151	136 / 144 / 151	140 / 145 / 150	144 / 148 / 150	147 / 149 / 150
	2,000	135 / 143 / 151	135 / 143 / 151	135 / 143 / 151	137 / 144 / 151	142 / 146 / 150	147 / 149 / 150
	0	134 / 142 / 151	134 / 142 / 151	134 / 142 / 151	134 / 142 / 151	139 / 145 / 150	145 / 148 / 150
190	8,000	135 / 141 / 147	135 / 141 / 147	136 / 142 / 147	140 / 144 / 146		
	6,000	133 / 140 / 147	133 / 140 / 147	133 / 140 / 147	137 / 142 / 147	142 / 145 / 146	
	4,000	131 / 139 / 147	131 / 139 / 147	131 / 139 / 147	134 / 141 / 147	139 / 143 / 146	142 / 145 / 146
	2,000	130 / 138 / 148	130 / 138 / 148	130 / 138 / 148	131 / 139 / 147	137 / 142 / 147	142 / 145 / 146
	0	129 / 138 / 148	129 / 138 / 148	129 / 138 / 148	129 / 138 / 148	134 / 140 / 147	140 / 143 / 146
180	8,000	129 / 136 / 143	129 / 136 / 143	131 / 137 / 143	135 / 139 / 143		
	6,000	127 / 135 / 144	127 / 135 / 144	128 / 135 / 143	132 / 138 / 143	136 / 140 / 142	
	4,000	126 / 134 / 144	126 / 134 / 144	126 / 134 / 144	129 / 136 / 143	134 / 139 / 143	137 / 140 / 142
	2,000	125 / 134 / 144	125 / 134 / 144	125 / 134 / 144	126 / 134 / 144	131 / 137 / 143	137 / 140 / 142
	0	124 / 133 / 144	124 / 133 / 144	124 / 133 / 144	124 / 133 / 144	128 / 135 / 143	135 / 139 / 143
170	8,000	124 / 131 / 140	123 / 131 / 140	125 / 132 / 139	129 / 134 / 139		
	6,000	122 / 130 / 140	122 / 130 / 140	122 / 131 / 140	126 / 133 / 139	131 / 135 / 139	
	4,000	121 / 130 / 140	121 / 130 / 140	120 / 130 / 140	123 / 131 / 140	128 / 134 / 139	132 / 135 / 138
	2,000	120 / 129 / 141	119 / 129 / 141	119 / 129 / 141	121 / 130 / 140	126 / 132 / 139	131 / 135 / 138
	0	119 / 128 / 141	119 / 128 / 141	118 / 128 / 141	118 / 128 / 141	123 / 131 / 140	129 / 134 / 139

Limited by either Maximum Brake Energy, Tire Limit Speed, Climb Limit and/or Environmental Envelope.

TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

**V₁ / V_R / V₂
TO / 20**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
280	8,000						
	6,000						
	4,000	158 / 162 / 164	158 / 162 / 164				
	2,000	157 / 162 / 163	157 / 162 / 163	157 / 162 / 163	158 / 162 / 164		
	0	156 / 161 / 163	156 / 161 / 163	156 / 161 / 163	156 / 161 / 163	160 / 163 / 164	
270	8,000						
	6,000	155 / 160 / 161	155 / 160 / 161				
	4,000	154 / 159 / 160	154 / 159 / 160	154 / 159 / 160	156 / 160 / 161		
	2,000	154 / 158 / 160	153 / 158 / 160	153 / 158 / 160	154 / 159 / 160	158 / 161 / 162	
	0	153 / 157 / 160	153 / 157 / 160	152 / 157 / 160	152 / 157 / 160	156 / 160 / 161	161 / 162 / 163
260	8,000	153 / 157 / 158	153 / 157 / 158				
	6,000	152 / 156 / 158	152 / 156 / 158	152 / 156 / 158			
	4,000	151 / 155 / 157	151 / 155 / 157	151 / 155 / 157	153 / 157 / 158	157 / 159 / 160	
	2,000	150 / 155 / 157	150 / 155 / 157	150 / 155 / 157	151 / 155 / 157	155 / 157 / 158	159 / 160 / 161
	0	150 / 154 / 157	149 / 154 / 157	149 / 154 / 157	149 / 154 / 157	153 / 156 / 158	157 / 159 / 160
250	8,000	150 / 154 / 155	150 / 154 / 155				
	6,000	149 / 153 / 155	149 / 153 / 155	149 / 153 / 155	152 / 155 / 156	155 / 156 / 157	156 / 157 / 158
	4,000	148 / 152 / 154	148 / 152 / 154	147 / 152 / 154	150 / 153 / 155	154 / 155 / 156	156 / 157 / 158
	2,000	147 / 151 / 154	147 / 151 / 154	146 / 151 / 154	148 / 152 / 154	152 / 154 / 155	156 / 156 / 157
	0	146 / 151 / 154	146 / 151 / 154	146 / 151 / 154	146 / 151 / 154	150 / 153 / 154	154 / 155 / 156
240	8,000	147 / 150 / 152	146 / 150 / 152	148 / 151 / 152	150 / 152 / 153		
	6,000	145 / 149 / 151	145 / 149 / 151	145 / 149 / 152	148 / 151 / 152	152 / 153 / 154	153 / 153 / 154
	4,000	144 / 148 / 151	144 / 148 / 151	144 / 148 / 151	146 / 150 / 152	150 / 152 / 153	152 / 153 / 154
	2,000	143 / 148 / 151	143 / 148 / 151	143 / 148 / 151	144 / 148 / 151	148 / 151 / 152	152 / 153 / 154
	0	142 / 147 / 152	142 / 147 / 152	142 / 147 / 152	142 / 147 / 152	146 / 149 / 151	151 / 152 / 153
230	8,000	143 / 146 / 149	143 / 146 / 149	144 / 147 / 149	147 / 149 / 150		
	6,000	141 / 145 / 148	141 / 145 / 148	141 / 146 / 148	145 / 147 / 149	148 / 149 / 150	149 / 150 / 151
	4,000	140 / 145 / 149	140 / 145 / 149	140 / 145 / 149	142 / 146 / 148	146 / 148 / 149	149 / 149 / 150
	2,000	139 / 144 / 149	139 / 144 / 149	138 / 144 / 149	140 / 145 / 148	144 / 147 / 149	148 / 149 / 150
	0	138 / 143 / 149	138 / 143 / 149	138 / 143 / 149	137 / 143 / 149	142 / 146 / 148	147 / 148 / 149

Limited by either Maximum Brake Energy, Tire Limit Speed, Climb Limit and/or Environmental Envelope.

TAKEOFF SPEEDS

DRY RUNWAY KIAS

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

**V₁ / V_R / V₂
TO / 20**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
220	8,000	138 / 143 / 145	138 / 143 / 145	140 / 143 / 145	143 / 145 / 146		
	6,000	137 / 142 / 146	137 / 142 / 146	137 / 142 / 145	140 / 144 / 145	144 / 146 / 147	145 / 146 / 147
	4,000	135 / 141 / 146	135 / 141 / 146	135 / 141 / 146	138 / 142 / 145	142 / 144 / 146	145 / 146 / 147
	2,000	134 / 140 / 146	134 / 140 / 146	134 / 140 / 146	135 / 141 / 146	140 / 143 / 145	144 / 146 / 147
	0	133 / 139 / 146	133 / 139 / 146	133 / 139 / 146	133 / 139 / 146	138 / 142 / 145	143 / 144 / 145
210	8,000	134 / 139 / 142	134 / 139 / 142	135 / 139 / 142	138 / 141 / 142		
	6,000	132 / 138 / 143	132 / 138 / 143	133 / 138 / 138	136 / 140 / 142	140 / 142 / 143	141 / 142 / 143
	4,000	131 / 137 / 143	131 / 137 / 143	131 / 137 / 143	134 / 138 / 142	138 / 141 / 142	140 / 142 / 143
	2,000	130 / 136 / 143	130 / 136 / 143	129 / 136 / 143	131 / 137 / 143	136 / 139 / 142	140 / 142 / 143
	0	129 / 135 / 143	129 / 135 / 143	128 / 135 / 143	128 / 135 / 143	133 / 138 / 142	138 / 141 / 142
200	8,000	129 / 135 / 139	129 / 135 / 139	131 / 135 / 139	134 / 137 / 139		
	6,000	128 / 134 / 139	127 / 134 / 139	128 / 134 / 139	131 / 136 / 139	136 / 138 / 139	136 / 138 / 139
	4,000	126 / 133 / 140	126 / 133 / 140	126 / 133 / 140	129 / 134 / 139	133 / 137 / 139	136 / 138 / 139
	2,000	125 / 132 / 140	125 / 132 / 140	125 / 132 / 140	126 / 133 / 139	131 / 135 / 139	136 / 138 / 139
	0	124 / 131 / 140	124 / 131 / 140	124 / 131 / 140	124 / 131 / 140	129 / 134 / 139	134 / 137 / 139
190	8,000	124 / 131 / 136	124 / 131 / 136	126 / 131 / 136	129 / 133 / 136		
	6,000	123 / 129 / 136	123 / 129 / 136	123 / 130 / 136	127 / 132 / 136	131 / 134 / 135	132 / 134 / 136
	4,000	121 / 129 / 136	121 / 129 / 136	121 / 129 / 136	124 / 130 / 136	129 / 133 / 135	132 / 134 / 135
	2,000	120 / 128 / 137	120 / 128 / 137	120 / 128 / 137	121 / 129 / 136	126 / 131 / 136	131 / 134 / 135
	0	119 / 127 / 137	119 / 127 / 137	119 / 127 / 137	119 / 127 / 137	124 / 130 / 136	129 / 133 / 135
180	8,000	119 / 126 / 133	119 / 126 / 133	121 / 127 / 132	124 / 129 / 132		
	6,000	118 / 125 / 133	117 / 125 / 133	118 / 125 / 133	122 / 127 / 132	126 / 130 / 132	127 / 130 / 132
	4,000	116 / 124 / 133	116 / 124 / 133	116 / 124 / 133	119 / 126 / 133	124 / 128 / 132	127 / 130 / 132
	2,000	115 / 124 / 134	115 / 124 / 134	115 / 124 / 134	116 / 124 / 133	121 / 127 / 132	126 / 129 / 132
	0	114 / 123 / 134	114 / 123 / 134	114 / 123 / 134	114 / 123 / 134	118 / 125 / 133	124 / 128 / 132
170	8,000	114 / 122 / 129	114 / 122 / 129	115 / 122 / 129	119 / 124 / 128		
	6,000	113 / 121 / 130	112 / 121 / 130	113 / 121 / 129	116 / 123 / 129	121 / 125 / 128	122 / 125 / 128
	4,000	111 / 120 / 130	111 / 120 / 130	111 / 120 / 130	114 / 121 / 129	118 / 124 / 128	122 / 125 / 128
	2,000	110 / 119 / 130	110 / 119 / 130	110 / 119 / 130	111 / 120 / 130	116 / 122 / 129	121 / 125 / 128
	0	109 / 119 / 131	109 / 119 / 131	109 / 119 / 131	109 / 119 / 131	113 / 121 / 129	119 / 124 / 128

Limited by either Maximum Brake Energy, Tire Limit Speed, Climb Limit and/or Environmental Envelope.

TAKEOFF STABILIZER SETTINGS

UNITS AIRPLANE NOSE UP

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

FLAPS 5

GROSS WEIGHT - POUNDS	CENTER OF GRAVITY PERCENT M.A.C.													
	2	4	6	8	10	12	14	18	22	26	30	32	36	38
280,000	7.0	7.0	7.0	7.0	7.0	6.75	6.5	5.75	5.25	4.75	4.25	4.0	3.25	3.0
260,000	7.0	7.0	7.0	7.0	6.75	6.5	6.25	5.5	5.0	4.5	4.0	3.75	3.25	3.0
240,000	7.0	7.0	7.0	6.75	6.5	6.25	6.0	5.25	4.75	4.25	3.75	3.5	3.0	2.75
220,000	7.0	7.0	6.5	6.25	6.0	5.75	5.5	5.0	4.5	4.0	3.5	3.25	3.0	2.75
200,000	6.75	6.5	6.25	6.0	5.75	5.5	5.25	4.75	4.0	3.75	3.25	3.0	2.75	2.5
180,000	6.25	6.0	5.75	5.25	5.25	5.0	4.75	4.25	3.75	3.5	3.0	2.75	2.5	2.25
160,000	5.75	5.5	5.25	5.0	4.75	4.5	4.25	4.0	3.5	3.25	2.75	2.75	2.25	2.25

FLAPS 15

GROSS WEIGHT - POUNDS	CENTER OF GRAVITY PERCENT M.A.C.													
	2	4	6	8	10	12	14	18	22	26	30	32	36	38
280,000	7.0	7.0	7.0	7.0	7.0	6.75	6.5	6.0	5.25	4.75	4.25	4.0	3.5	3.25
260,000	7.0	7.0	7.0	7.0	6.75	6.5	6.25	5.5	5.0	4.5	4.0	3.75	3.5	3.25
240,000	7.0	7.0	7.0	6.75	6.5	6.25	6.0	5.25	4.75	4.25	3.75	3.5	3.25	3.0
220,000	7.0	7.0	6.75	6.5	6.25	6.0	5.5	5.0	4.5	4.0	3.75	3.5	3.0	3.0
200,000	6.75	6.5	6.0	5.75	5.5	5.25	5.0	4.25	4.0	3.5	3.25	3.0	2.75	2.25
180,000	6.0	5.75	5.5	5.0	4.75	4.5	4.25	3.75	3.5	3.0	2.75	2.5	2.25	2.0
160,000	5.5	5.25	5.0	4.75	4.25	4.0	3.75	3.5	3.25	2.75	2.5	2.25	2.0	2.0

TAKEOFF STABILIZER SETTINGS

UNITS AIRPLANE NOSE UP

CAUTION: Crews are not authorized to perform manual weight and balance computations without coordination and approval from Flight Control and the LCC. Refer to FOM Ch 5, Manual WDR.

FLAPS 20

GROSS WEIGHT - POUNDS	CENTER OF GRAVITY PERCENT M.A.C.													
	2	4	6	8	10	12	14	18	22	26	30	32	36	38
280,000	7.0	7.0	7.0	7.0	7.0	6.75	6.25	5.5	5.0	4.25	3.75	3.5	3.0	2.75
260,000	7.0	7.0	7.0	7.0	6.75	6.25	6.0	5.25	4.5	4.0	3.5	3.25	3.0	2.75
240,000	7.0	7.0	7.0	6.75	6.25	6.0	5.75	5.0	4.25	3.75	3.5	3.25	2.75	2.5
220,000	7.0	7.0	6.75	6.25	6.0	5.25	5.25	4.25	4.0	3.75	3.25	3.0	2.5	2.5
200,000	6.5	6.25	5.75	5.5	5.25	4.75	4.5	4.0	3.5	3.25	2.75	2.5	2.25	2.0
180,000	5.75	5.5	5.0	4.75	4.5	4.25	3.75	3.5	3.0	2.75	2.25	2.0	2.0	2.0
160,000	5.25	4.75	4.25	4.25	4.0	3.75	3.5	3.25	2.75	2.5	2.0	2.0	2.0	2.0

End of Section

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DEFINITIONS AND ASSUMPTIONS

ACTUAL LANDING DISTANCE	The actual distance required to land starting at 50 feet above the runway (usually at the threshold) to a complete stop on the runway. This distance is based on a 1.3 V_S speed at 50 feet and assumes maximum braking and NO reverse thrust.
APPROACH CLIMB LIMIT WEIGHT	Approach Climb Limit Weight is defined in FAR 25.121 as the maximum weight at which a missed approach climb meets the FAR prescribed climb gradient (2.1% for a two engine aircraft). This gradient is determined with the critical engine inoperative, remaining engine at takeoff thrust, landing gear retracted, and approach flap setting (as defined in the FAA Approved Flight Manual). This weight takes into account an air conditioning pack ON and operated from engine bleed air.
F.A.R. LANDING FIELD LENGTH	This is the landing field length as defined in the Federal Air Regulations Part 121, and is the actual landing distance plus an additional safety margin of 67%. Dispatch is based on F.A.R. Landing Field Length at the destination airport.
LANDING CLIMB LIMIT WEIGHT	Landing Climb Limit Weight is defined in FAR 25.119 as the maximum weight at which the aircraft meets the FAR prescribed climb gradient (3.2%). This gradient is determined with all engines operating, landing gear extended, and landing flap setting.
V_S	Indicated stall speed for the aircraft weight and configuration. 1.3 V_S is 1.3 times the stall speed, or an increase of 30% above stall speed.

PATTERN AND APPROACH SPEEDS

KIAS NORMAL CONFIGURATION

GROSS WEIGHT LBS	V _{Ref}	APPROACH - GEAR UP					LANDING - GEAR DOWN	
		SLATS RET.	SLATS EXTENDED				SLATS EXTENDED	
		FLAPS 0	FLAPS 1	FLAPS 5	FLAPS 15	FLAPS 20	FLAPS 25	FLAPS 30
		V _{ref} + 80	V _{ref} + 60	V _{ref} + 40	V _{ref} + 20	V _{ref} + 20		
270,000	161	241	221	201	181	181	168	161
260,000	157	237	217	197	177	177	164	157
250,000	153	233	213	193	173	173	161	153
240,000	149	229	209	189	169	169	158	149
230,000	146	226	206	186	166	166	154	146
220,000	142	222	202	182	162	162	151	142
210,000	139	219	199	179	159	159	148	139
200,000	135	215	195	175	155	155	144	135
190,000	131	211	191	171	151	151	140	131
180,000	127	207	187	167	147	147	136	127
170,000	124	204	184	164	144	144	132	124
160,000	120	200	180	160	140	140	128	120
150,000	116	196	176	156	136	136	125	116

F.A.R. DRY LANDING FIELD LENGTH**FEET****PW 2040****FLAPS 25**

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE – FEET									
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	8,400
270,000	7,880	8,110	8,350	8,600	8,870	9,150	9,450	9,760	10,100	10,240
260,000	7,390	7,600	7,820	8,050	8,290	8,550	8,820	9,110	9,410	9,540
250,000	6,930	7,120	7,320	7,530	7,750	7,980	8,230	8,490	8,770	8,890
240,000	6,520	6,670	6,850	7,040	7,240	7,450	7,680	7,910	8,160	8,270
230,000	6,300	6,450	6,600	6,760	6,920	7,090	7,270	7,460	7,650	7,730
220,000	6,090	6,230	6,380	6,530	6,690	6,850	7,020	7,200	7,380	7,460
210,000	5,870	6,010	6,150	6,300	6,450	6,600	6,770	6,940	7,120	7,200
200,000	5,660	5,790	5,920	6,060	6,200	6,350	6,510	6,680	6,850	6,930
190,000	5,440	5,560	5,690	5,820	5,960	6,110	6,260	6,410	6,580	6,650
180,000	5,220	5,340	5,460	5,590	5,720	5,850	6,000	6,150	6,310	6,380
170,000	5,000	5,110	5,230	5,350	5,470	5,600	5,740	5,880	6,030	6,100
160,000	4,770	4,880	4,990	5,110	5,230	5,350	5,480	5,620	5,760	5,820
150,000	4,550	4,650	4,760	4,860	4,980	5,090	5,220	5,350	5,480	5,540

NOTE:

Actual Landing Distance is:

- 60 percent of the F.A.R. Landing Field Lengths above.
- The distance to a complete stop from 50 feet above the runway threshold at VREF.
- Based on Maximum Braking, Speed Brakes Extended and No Thrust Reverse.

CONDITION	CORRECTION
Headwind	- 55 ft. per knot
Tailwind	+ 150 ft. per knot
Manual Spoilers	increase distance by 6%
Wet runway and/or Low Minima	increase distance by 15%

F.A.R. DRY LANDING FIELD LENGTH**FEET****PW 2040****FLAPS 30**

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE – FEET									
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	8,400
270,000	7,190	7,390	7,600	7,820	8,060	8,300	8,560	8,840	9,130	9,260
260,000	6,690	6,880	7,070	7,270	7,480	7,710	7,940	8,190	8,450	8,570
250,000	6,290	6,440	6,590	6,760	6,950	7,150	7,360	7,590	7,820	7,920
240,000	6,040	6,180	6,330	6,480	6,630	6,790	6,960	7,140	7,330	7,410
230,000	5,790	5,930	6,070	6,210	6,360	6,510	6,680	6,850	7,020	7,100
220,000	5,600	5,730	5,860	6,000	6,140	6,290	6,450	6,610	6,780	6,850
210,000	5,400	5,520	5,650	5,780	5,920	6,060	6,220	6,370	6,530	6,600
200,000	5,200	5,320	5,440	5,570	5,700	5,840	5,980	6,130	6,290	6,360
190,000	5,000	5,120	5,230	5,350	5,480	5,610	5,750	5,890	6,040	6,110
180,000	4,800	4,910	5,020	5,140	5,260	5,380	5,510	5,650	5,790	5,850
170,000	4,600	4,700	4,810	4,920	5,030	5,150	5,280	5,410	5,550	5,610
160,000	4,400	4,490	4,590	4,700	4,810	4,920	5,040	5,160	5,290	5,350
150,000	4,190	4,280	4,380	4,480	4,580	4,690	4,800	4,920	5,040	5,100

NOTE:

Actual Landing Distance is:

- 60 percent of the F.A.R. Landing Field Lengths above.
- The distance to a complete stop from 50 feet above the runway threshold at VREF.
- Based on Maximum Braking, Speed Brakes Extended and No Thrust Reverse.

CONDITION	CORRECTION
Headwind	- 50 ft. per knot
Tailwind	+ 130 ft. per knot
Manual Spoilers	increase distance by 6%
Wet runway and/or Low Minima	increase distance by 15%

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APPROACH AND LANDING CLIMB LIMITS

POUNDS

PW 2040
**APPROACH FLAPS 20
LANDING FLAPS 25 or 30**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET									
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	8,400
50	207,500	199,900	192,500							
45	224,800	216,500	208,400	200,600	193,000					
40	242,400	233,400	224,700	216,200	208,000	200,000	192,300	184,800		
35	259,900	250,200	240,800	231,700	222,800	214,300	206,000	197,900	190,100	187,100
32	272,100	260,000	250,200	240,800	231,600	222,700	214,000	205,700	197,500	194,400
30	274,700	266,500	256,400	246,700	237,300	228,100	219,300	210,700	202,400	199,200
28	274,800	271,000	262,600	252,600	243,000	233,600	224,500	215,700	207,200	203,900
26	274,800	271,100	266,900	258,400	248,500	238,900	229,600	220,600	211,900	208,500
24	274,800	271,100	266,900	262,200	253,800	244,000	234,500	225,200	216,300	212,900
22	274,800	271,100	266,900	262,200	257,400	249,100	239,400	229,900	220,800	217,300
20	274,800	271,100	266,900	262,200	257,400	252,500	244,000	234,400	225,100	221,500
18	274,800	271,100	267,000	262,200	257,500	252,500	246,900	238,600	229,200	225,600
16	274,800	271,100	267,000	262,300	257,500	252,500	246,900	241,300	233,100	229,400
14	274,800	271,100	267,000	262,300	257,500	252,500	247,000	241,300	235,500	232,100
12	274,800	271,100	267,000	262,300	257,500	252,500	247,000	241,400	235,500	232,700
10	274,800	271,100	267,000	262,300	257,500	252,500	247,000	241,400	235,600	233,100
8	274,800	271,200	267,000	262,300	257,600	252,600	247,000	241,400	235,600	233,100
6	274,800	271,200	267,000	262,300	257,600	252,600	247,000	241,400	235,600	233,200
4	274,900	271,200	267,000	262,300	257,600	252,600	247,000	241,400	235,600	233,200
2	274,900	271,200	267,000	262,300	257,600	252,600	247,000	241,400	235,600	233,200
≤0	274,900	271,200	267,100	262,400	257,600	252,600	247,100	241,400	235,600	233,200

NOTES:

- AFM Maximum Structural Landing Weight should not be exceeded (unless overweight landing is deemed necessary in flight).
- Reduce Limit Weight by 11,500 pounds when operating in icing conditions during any part of the flight when the forecast landing temperature is below 10 degrees C.

CORRECTIONS:

PACKS OFF	+2,400
ENGINE ANTI-ICE ON	-6,900
ENGINE & WING ANTI-ICE ON	-18,900

BASIS:

The limit weights shown are the more restrictive of:

APPROACH

- One engine inoperative.
- Flaps at approach setting.
- Landing gear retracted.

LANDING

- All engines operating.
- Flaps at landing setting.
- Landing gear extended.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 25

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	11,700	11,000	10,300	9,400	8,600	5,600	10,300	9,400	8,700	6,700
260,000	11,300	10,700	10,000	9,100	8,400	5,400	10,000	9,100	8,500	6,500
250,000	10,900	10,300	9,700	8,800	8,200	5,200	9,700	8,800	8,200	6,400
240,000	10,500	10,000	9,400	8,600	8,000	5,100	9,400	8,600	8,000	6,200
230,000	10,100	9,600	9,100	8,300	7,700	4,900	9,100	8,300	7,800	6,000
224,000	9,900	9,400	8,900	8,100	7,600	4,800	8,900	8,100	7,600	5,900
220,000	9,700	9,200	8,800	8,000	7,500	4,700	8,800	8,000	7,500	5,800
210,000	9,300	8,900	8,500	7,800	7,300	4,500	8,500	7,800	7,300	5,700
200,000	8,900	8,500	8,200	7,500	7,000	4,300	8,200	7,500	7,100	5,500
190,000	8,600	8,200	7,800	7,200	6,800	4,200	7,800	7,200	6,800	5,300
180,000	8,200	7,800	7,500	7,000	6,500	4,100	7,500	7,000	6,600	5,200
170,000	7,800	7,500	7,200	6,700	6,300	4,000	7,200	6,700	6,400	5,000
160,000	7,500	7,100	6,900	6,400	6,100	3,900	6,900	6,400	6,100	4,800
150,000	7,100	6,800	6,600	6,200	5,800	3,800	6,600	6,200	5,900	4,700

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-700	-600	-500	-400	-300	-200	-500	-400	-300	-300
2,000	0	0	0	0	0	0	0	0	0	0
4,000	700	600	500	400	300	200	500	400	300	300
6,000	1,400	1,200	1,000	700	600	300	1,000	700	600	600
8,000	2,100	1,800	1,500	1,100	900	500	1,500	1,100	1,000	800
10,000	2,900	2,500	2,100	1,500	1,300	700	2,100	1,500	1,400	1,100

CORRECTIONS	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	0	-50	-50	-50	0
PER 1 KT TAILWIND	150	150	100	100	100	50	100	100	100	50
PER 5 KTS ADD'L SPD	250	300	250	250	250	100	250	250	250	150
PER 10°C ABOVE ISA	250	200	200	150	150	50	200	150	150	100
PER 10°C BELOW ISA	-200	-200	-200	-150	-150	-50	-200	-150	-150	-100
PER 1% UP SLOPE	-250	-200	-150	-100	-100	-50	-150	-100	-100	-100
PER 1% DOWN SLOPE	250	200	150	100	100	50	150	100	100	100
1 REVERSER INOP	1,400	900	500	100	0	100	500	100	100	300
2 REVERSERS INOP	2,000	1,100	500	100	0	300	500	100	200	900
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 25

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,600	9,900	9,500	8,800	11,800	11,500	11,300	11,100
260,000	10,300	9,600	9,300	8,500	11,400	11,100	10,900	10,700
250,000	10,000	9,300	9,000	8,300	11,000	10,700	10,600	10,400
240,000	9,700	9,000	8,700	8,000	10,700	10,400	10,200	10,000
230,000	9,400	8,800	8,500	7,800	10,300	10,000	9,900	9,700
224,000	9,200	8,600	8,300	7,600	10,100	9,800	9,700	9,500
220,000	9,000	8,500	8,200	7,500	9,900	9,700	9,500	9,300
210,000	8,700	8,200	7,900	7,300	9,600	9,300	9,200	9,000
200,000	8,400	7,900	7,700	7,000	9,200	9,000	8,800	8,700
190,000	8,100	7,600	7,400	6,800	8,800	8,600	8,500	8,300
180,000	7,700	7,400	7,100	6,500	8,500	8,300	8,200	8,000
170,000	7,400	7,100	6,900	6,300	8,100	7,900	7,800	7,700
160,000	7,100	6,800	6,600	6,100	7,800	7,600	7,500	7,300
150,000	6,800	6,500	6,400	5,800	7,400	7,200	7,200	7,000

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-500	-400	-400	-400	-700	-600	-600	-600
2,000	0	0	0	0	0	0	0	0
4,000	500	400	400	400	700	600	600	600
6,000	1,100	900	900	900	1,300	1,300	1,200	1,300
8,000	1,600	1,300	1,300	1,300	2,000	1,900	1,900	1,900
10,000	2,200	1,900	1,900	1,900	2,900	2,800	2,800	2,800

CORRECTIONS

	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	100	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	200	250	250	250	250
PER 10°C ABOVE ISA	200	200	150	150	200	200	200	200
PER 10°C BELOW ISA	-200	-150	-150	-150	-200	-200	-200	-150
PER 1% UP SLOPE	-200	-200	-150	-200	-350	-350	-350	-400
PER 1% DOWN SLOPE	250	200	200	250	500	500	500	500
1 REVERSER INOP	700	500	600	900	1,400	1,400	1,500	1,700
2 REVERSERS INOP	1,500	1,800	2,000	2,400	4,900	5,000	5,100	5,300
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 30

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,800	10,300	9,700	8,700	8,100	5,200	9,700	8,700	8,100	6,400
260,000	10,400	9,900	9,300	8,500	7,900	5,100	9,300	8,500	7,900	6,200
250,000	10,000	9,600	9,000	8,200	7,600	4,900	9,000	8,200	7,700	6,000
240,000	9,700	9,200	8,700	7,900	7,400	4,700	8,700	7,900	7,400	5,900
230,000	9,300	8,900	8,400	7,700	7,200	4,600	8,400	7,700	7,200	5,700
224,000	9,100	8,700	8,200	7,500	7,000	4,500	8,200	7,500	7,100	5,600
220,000	8,900	8,500	8,100	7,400	6,900	4,400	8,100	7,400	7,000	5,500
210,000	8,600	8,200	7,800	7,100	6,700	4,300	7,800	7,100	6,700	5,300
200,000	8,200	7,800	7,500	6,900	6,500	4,100	7,500	6,900	6,500	5,200
190,000	7,900	7,500	7,200	6,700	6,300	4,000	7,200	6,700	6,300	5,000
180,000	7,600	7,200	6,900	6,400	6,100	3,900	6,900	6,400	6,100	4,900
170,000	7,200	6,900	6,700	6,200	5,900	3,800	6,700	6,200	5,900	4,700
160,000	6,900	6,600	6,400	6,000	5,700	3,700	6,400	6,000	5,700	4,600
150,000	6,600	6,300	6,100	5,700	5,400	3,600	6,100	5,700	5,500	4,400

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-600	-500	-400	-300	-300	-100	-400	-300	-300	-300
2,000	0	0	0	0	0	0	0	0	0	0
4,000	600	500	400	300	300	100	400	300	300	300
6,000	1,200	1,100	900	600	600	300	900	600	600	500
8,000	1,800	1,600	1,300	1,000	800	400	1,300	1,000	800	800
10,000	2,500	2,200	1,800	1,400	1,100	600	1,800	1,400	1,100	1,100

CORRECTIONS	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	0	-50	-50	-50	0
PER 1 KT TAILWIND	150	100	100	100	100	50	100	100	100	50
PER 5 KTS ADD'L SPD	250	250	250	250	250	100	250	250	250	150
PER 10°C ABOVE ISA	200	200	200	150	150	50	200	150	150	100
PER 10°C BELOW ISA	-150	-150	-150	-150	-150	-50	-150	-150	-150	-100
PER 1% UP SLOPE	-200	-150	-150	-100	-50	-50	-150	-100	-100	-100
PER 1% DOWN SLOPE	200	150	150	100	50	50	150	100	100	100
1 REVERSER INOP	1,100	800	400	100	0	100	400	100	0	300
2 REVERSERS INOP	1,600	800	400	100	0	100	400	100	200	700
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 30

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,000	9,200	8,900	8,300	11,000	10,700	10,500	10,500
260,000	9,600	9,000	8,700	8,100	10,600	10,300	10,200	10,100
250,000	9,300	8,700	8,400	7,800	10,300	10,000	9,800	9,800
240,000	9,000	8,400	8,100	7,600	9,900	9,600	9,500	9,400
230,000	8,700	8,100	7,900	7,300	9,500	9,300	9,200	9,100
224,000	8,500	8,000	7,700	7,200	9,300	9,100	9,000	8,900
220,000	8,300	7,900	7,600	7,100	9,200	9,000	8,800	8,700
210,000	8,000	7,600	7,400	6,800	8,800	8,600	8,500	8,400
200,000	7,700	7,300	7,100	6,600	8,500	8,300	8,200	8,000
190,000	7,400	7,100	6,900	6,300	8,100	8,000	7,900	7,700
180,000	7,100	6,800	6,600	6,100	7,800	7,700	7,600	7,400
170,000	6,800	6,500	6,400	5,900	7,500	7,400	7,300	7,100
160,000	6,500	6,300	6,200	5,700	7,200	7,100	7,000	6,800
150,000	6,300	6,000	5,900	5,500	6,900	6,800	6,700	6,500

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 15% safety margin and 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-500	-400	-400	-400	-600	-600	-600	-600
2,000	0	0	0	0	0	0	0	0
4,000	500	400	400	400	600	600	600	600
6,000	900	800	800	800	1,200	1,100	1,100	1,200
8,000	1,400	1,200	1,200	1,200	1,700	1,700	1,700	1,700
10,000	1,900	1,700	1,700	1,700	2,500	2,500	2,500	2,500

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	100	100	100	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	200	250	250	250	200
PER 10°C ABOVE ISA	200	150	150	150	200	200	200	200
PER 10°C BELOW ISA	-150	-150	-150	-150	-150	-150	-150	-150
PER 1% UP SLOPE	-200	-150	-150	-200	-350	-350	-350	-350
PER 1% DOWN SLOPE	200	200	200	200	450	450	450	500
1 REVERSER INOP	500	400	500	700	1,200	1,300	1,300	1,500
2 REVERSERS INOP	1,300	1,500	1,700	2,000	4,100	4,300	4,300	4,500
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

End of Section

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DEFINITIONS AND ASSUMPTIONS

GROSS LEVEL OFF ALTITUDE	Altitude at which the aircraft is expected to level off after the loss of one engine. No conservatism is built into this value. For use during flight, not for flight planning.
LONG RANGE CRUISE	The speed of the aircraft that will result in 99% of the maximum range of the aircraft in no wind conditions for a given weight and altitude.
MAXIMUM CONTINUOUS THRUST (MCT)	The maximum thrust level for which the engine is rated with no time constraint.
SPECIFIC AIR RANGE (SAR)	The gas mileage range an aircraft can fly per 1,000 lbs of fuel for a given weight, altitude, Mach number, and temperature. The SAR changes as the weight of the aircraft changes, all other parameters remaining constant. Fuel burn required for a given flight segment is the segment length divided by the average SAR for the leg.
STATIC AIR TEMPERATURE (SAT)	The static air temperature outside of the aircraft. Also referred to as the Outside Air Temperature or OAT.
TOTAL AIR TEMPERATURE (TAT)	The sum of both the ambient air temperature plus the total increase in temperature due to compression heating.

MEL RELATED PERFORMANCE ABBREVIATIONS DISPLAYED ON WDR

ASI	AWABS has automatically corrected the allowable weights and V1 speeds due to a completely inoperative anti-skid braking system.
BKI	AWABS has automatically corrected the allowable weights and V1 speeds due to an inoperative brake or one anti-skid channel inoperative.
GRD	AWABS has automatically corrected the allowable weights and V1 speeds due to gear down dispatch. Used when an MEL item requires delayed gear retraction or gear down flight.

THRUST SETTINGS – ALL ENGINE**TAKEOFF EPR****PW 2040**0 TO 60 KNOTS
BASED ON NORMAL BLEED**TO**

OAT °C	AIRPORT PRESSURE ALTITUDE - FEET								
	0	1,000	2,000	3,000	4,000	5,000	6,000	8,000	10,000
60	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
55	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
50	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
45	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
40	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
35	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43
30	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47
25	1.47	1.48	1.50	1.51	1.51	1.51	1.51	1.51	1.51
20	1.47	1.48	1.50	1.52	1.53	1.55	1.55	1.55	1.55
15	1.47	1.48	1.50	1.52	1.53	1.55	1.56	1.59	1.59
10 & below	1.47	1.48	1.50	1.52	1.53	1.55	1.56	1.59	1.61

Engine Bleed Adjustment

Packs OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Wing AI On	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03

THRUST SETTINGS – ALL ENGINE

CLIMB EPR

CLB

PW 2040

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT °C	PRESSURE ALTITUDE - FEET								
	SL	5000	10,000	15,000	20,000	25,000	30,000	35,000	40,000
50	1.18	1.17	1.16	1.11	1.09	1.06	1.04	1.03	1.02
40	1.22	1.21	1.19	1.15	1.13	1.11	1.09	1.08	1.07
30	1.24	1.25	1.23	1.20	1.18	1.16	1.14	1.13	1.12
20	1.24	1.27	1.28	1.25	1.23	1.21	1.19	1.18	1.18
10	1.24	1.27	1.30	1.29	1.29	1.27	1.26	1.25	1.24
0	1.24	1.27	1.30	1.29	1.32	1.35	1.33	1.32	1.32
-10	1.24	1.27	1.30	1.29	1.32	1.35	1.39	1.41	1.41
-20	1.24	1.27	1.30	1.29	1.32	1.35	1.39	1.48	1.50

Engine Bleed Adjustments

Packs off	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04
Engine Anti-Ice On	0.00	0.00	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05	-0.07
Engine & Wing Anti-Ice On	-0.02	-0.02	-0.06	-0.06	-0.06	-0.07	-0.08	-0.10	-0.13

THRUST SETTINGS – ALL ENGINE**CRUISE EPR****CRZ****PW2040**

TAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	30,000	31,000	32,000	33,000	34,000	35,000	36,000	37,000	39,000	41,000
15	1.15	1.14	1.14	1.14	1.14	1.14	1.14			
10	1.18	1.17	1.17	1.17	1.17	1.17	1.17	1.17		
5	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.20	1.19	
0	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23
-5	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27
-10	1.29	1.31	1.32	1.32	1.32	1.32	1.32	1.32	1.31	1.31
-15	1.29	1.31	1.32	1.34	1.36	1.36	1.37	1.37	1.37	1.36
-20	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-25	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-30	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-35	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-40	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-45	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40
-50	1.29	1.31	1.32	1.34	1.36	1.36	1.41	1.41	1.41	1.40

Bleed Adjustments	33,000ft & below	Above 33,000ft
Eng. A/I ON	-0.05	-0.09
Eng. & Wing A/I ON	-0.10	-0.16

THRUST SETTINGS – ALL ENGINE

GO-AROUND EPR

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

PW 2040

OAT - °C	PRESSURE ALTITUDE - FEET							
	0	1,000	2,000	3,000	4,000	6,000	8,000	10,000
50	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.29
45	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33
40	1.38	1.37	1.37	1.37	1.37	1.37	1.37	1.37
35	1.42	1.41	1.41	1.41	1.41	1.41	1.41	1.41
30	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
25	1.45	1.47	1.48	1.49	1.49	1.49	1.49	1.49
20	1.45	1.47	1.48	1.5	1.51	1.53	1.53	1.53
15	1.45	1.47	1.48	1.5	1.51	1.53	1.54	1.57
10	1.45	1.47	1.48	1.5	1.51	1.53	1.54	1.57

Bleed Adjustments:

Packs OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Eng AI On	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
Eng & Wing AI on	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.06

ONE ENGINE INOPERATIVE

MAXIMUM CONTINUOUS THRUST EPR

PW2040

BASED ON 250 KIAS / 290 KIAS / 0.78 MACH SPEED SCHEDULE
NORMAL BLEED - PACKS ON, ANTI-ICE OFF

TAT °C	PRESSURE ALTITUDE - FEET												
	5,000	10,000	15,000	20,000	25,000	27,000	29,000	31,000	33,000	35,000	37,000	39,000	41,000
25	1.39	1.40	1.38						Outside Environmental Envelope				
20	1.39	1.43	1.42										
15	1.39	1.46	1.47	1.47									
10	1.39	1.46	1.49	1.51									
5	1.39	1.46	1.49	1.55	1.48	1.46	1.44	1.31					
0	1.39	1.46	1.49	1.55	1.53	1.51	1.49	1.36	1.38	1.37	1.41	1.43	1.46
-5	1.39	1.46	1.49	1.55	1.54	1.54	1.53	1.42	1.44	1.42	1.47	1.49	1.49
-10	1.39	1.46	1.49	1.55	1.54	1.54	1.53	1.47	1.49	1.50	1.52	1.52	1.49
-15	1.39	1.46	1.49	1.55	1.54	1.54	1.53	1.53	1.55	1.56	1.54	1.52	1.49
-20	1.39	1.46	1.49	1.55	1.54	1.54	1.53	1.57	1.59	1.58	1.54	1.52	1.49
-25	1.39	1.46	1.49	1.55	1.54	1.54	1.53	1.57	1.59	1.58	1.54	1.52	1.49

Bleed Adjustments:

	12,000 ft & below	Above 12,000 ft
Engine Anti-Ice ON	-0.04	-0.05
Engine & Wing Anti-Ice ON	-0.10	-0.14

ONE ENGINE INOPERATIVE DRIFTDOWN PROCEDURES

IN THE EVENT OF AN ENGINE FAILURE OR SHUTDOWN DURING CRUISE:

1. Immediately set Maximum Continuous Thrust (MCT) from previous page.
2. Allow aircraft to decelerate in level flight to driftdown speed prior to initiating descent.
 - Aircraft will level off at or above altitudes shown in DRIFTDOWN GROSS LEVEL-OFF ALTITUDE chart.
 - Cross-check FMS engine-out level-off altitude if so equipped. Otherwise, cross-check with level-off altitude in ODM.
3. If driftdown terrain clearance is critical, consult Flight Plan Remarks to determine:
 - Recommended en route alternate airports, if required.
 - ISA temperature deviation at 18,000 feet.
4. If terrain clearance is a factor, select a suitable alternate airport as follows:
 - Terrain clearance is assured for flight to any flight plan alternate airport listed.
 - Comply with Unrestricted/Restricted Critical Terrain Procedures as described in Airway Manual – Section 6.
 - Use flight plan recommended en route alternate airport, or:
 - Determine aircraft position on appropriate Jeppesen Low Level or High/Low Level enroute chart and locations of other suitable alternates.
 - Check terrain clearance for flight via MEA / MOCA on airway or Grid MORA for a non-flight-plan suitable enroute alternate.
 - Maintain MCT / driftdown speed after level-off and allow aircraft to climb until at/above MEA / MOCA on airway or Grid MORA.
 - Maintain airway MEA / MOCA until established on the arrival to selected alternate airport.
5. Proceed to selected nearest suitable alternate.
6. Except as specified in Step 4, maintain Maximum Continuous Thrust (MCT) and allow aircraft to accelerate to engine-out Long Range Cruise speed at level-off altitude.

DRIFTDOWN SPEED SCHEDULE KIAS

GROSS WEIGHT - POUNDS	PRESSURE ALTITUDE - FEET				
	15,000	20,000	25,000	30,000	35,000
270,000	269	270	274	278	253
260,000	264	266	268	272	253
250,000	259	261	263	266	253
240,000	253	255	257	260	253
230,000	248	250	251	254	253
220,000	242	244	244	248	252
210,000	236	238	240	242	246
200,000	231	232	234	236	239
190,000	224	226	228	229	233
180,000		220	221	223	226
170,000		213	215	217	219
160,000			208	210	212
150,000			201	203	205

ONE ENGINE INOPERATIVE

DRIFTDOWN SPEED AND GROSS LEVEL OFF ALTITUDE

ENGINE ANTI-ICE OFF

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	OPTIMUM DRIFTDOWN SPEED - KIAS	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
270,000	263,500	276	20,300	18,900	17,100
250,000	244,100	265	22,300	21,200	19,900
230,000	224,700	254	24,200	23,400	22,200
210,000	205,300	242	26,100	25,800	24,600
190,000	185,900	229	28,100	28,100	27,200
170,000	166,500	217	30,400	30,400	30,000
150,000	147,300	204	33,000	32,900	32,800

ENGINE ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	OPTIMUM DRIFTDOWN SPEED - KIAS	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
270,000	262,800	276	19,300	17,500	15,100
250,000	244,000	265	21,600	20,200	18,300
230,000	224,500	254	23,800	22,500	21,100
210,000	205,400	242	25,900	25,000	23,700
190,000	186,000	229	28,000	27,500	26,300
170,000	166,500	217	30,300	30,200	29,100
150,000	147,200	204	32,800	32,800	32,100

ENGINE & WING ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	OPTIMUM DRIFTDOWN SPEED - KIAS	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
270,000	262,100	276	17,200	14,700	10,600
250,000	243,800	265	20,000	18,000	14,900
230,000	224,400	254	22,200	20,900	18,800
210,000	205,200	242	24,500	23,200	21,700
190,000	185,700	229	27,000	25,700	24,300
170,000	166,400	217	29,700	28,500	27,100
150,000	147,300	204	32,600	31,500	30,300

BASIS:

- APU operating
- Maximum Continuous Thrust Limits
- 100 ft/min residual rate of climb
- 35,000 ft initial altitude

ONE ENGINE INOPERATIVE

LONG RANGE CRUISE ALTITUDE CAPABILITY

FEET

GROSS WEIGHT - POUNDS	PRESSURE ALTITUDE - FEET		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
270,000	16,100	13,800	8,900
260,000	17,500	15,500	11,600
250,000	18,900	17,100	14,300
240,000	20,200	18,700	16,300
230,000	21,400	20,200	18,300
220,000	22,600	21,400	20,100
210,000	23,800	22,600	21,400
200,000	25,100	23,900	22,700
190,000	26,400	25,200	24,000
180,000	27,600	26,600	25,400
170,000	28,800	28,100	26,900
160,000	30,000	29,600	28,500
150,000	31,400	31,300	30,100

CORRECTIONS:

CONFIGURATION	ALT. CORRECTION (FEET)
Engine Anti-Ice ON	-1,400
Engine and Wing Anti-Ice ON	-6,500

BASIS:

- Max continuous thrust.
- Long range cruise speed.
- 100 ft/min residual rate of climb

ONE ENGINE INOPERATIVE LONG RANGE CRUISE SPEEDS

FL ISA		GROSS WEIGHT – 1,000 LB												
		270	260	250	240	230	220	210	200	190	180	170	160	150
300 -26	MN IAS TAS													.651 243 384
290 -24	MN IAS TAS												.656 250 388	.637 243 377
280 -22	MN IAS TAS											.660 258 392	.642 250 381	.625 243 371
270 -20	MN IAS TAS										.663 265 396	.646 257 385	.629 250 375	.615 244 367
260 -18	MN IAS TAS									.665 271 399	.649 264 389	.633 257 379	.618 251 371	.605 245 363
250 -16	MN IAS TAS								.667 278 401	.651 271 392	.635 264 382	.621 258 374	.609 252 366	.597 247 359
240 -14	MN IAS TAS							.653 277 395	.638 270 385	.624 264 377	.612 259 370	.600 254 363	.588 249 356	.576 243 348
230 -13	MN IAS TAS						.654 283 397	.639 277 388	.626 271 380	.614 265 373	.603 260 366	.592 255 359	.580 250 352	.567 244 344
220 -11	MN IAS TAS					.654 290 399	.640 283 390	.627 277 382	.616 272 375	.605 267 369	.594 262 362	.584 257 356	.571 251 348	.558 245 340
210 -9	MN IAS TAS				.654 296 400	.641 289 392	.629 283 385	.617 278 378	.607 273 371	.597 268 365	.586 263 359	.575 258 352	.563 252 344	.550 246 336
200 -7	MN IAS TAS			.654 301 402	.641 295 394	.629 289 387	.618 284 380	.608 279 374	.598 275 368	.589 270 362	.578 265 355	.567 259 348	.554 254 341	.541 247 332
190 -5	MN IAS TAS		.653 307 403	.641 301 395	.629 295 388	.619 290 382	.609 285 376	.600 281 370	.590 276 364	.581 271 358	.570 266 351	.558 261 344	.546 255 337	.532 248 328
180 -3	MN IAS TAS		.640 307 396	.629 301 390	.619 296 383	.610 291 378	.601 287 372	.592 282 366	.583 278 361	.572 273 354	.561 267 348	.550 262 340	.537 255 333	.524 249 324

Definitions:

FL: Flight level / altitude (feet).

ISA: Standard Day temperature in °C.

IAS: Indicated airspeed in knots.

MN: Mach number.

TAS: True airspeed in knots.

ONE ENGINE INOPERATIVE LONG RANGE CRUISE SPEEDS

FL ISA		GROSS WEIGHT – 1,000 LB												
		270	260	250	240	230	220	210	200	190	180	170	160	150
170 -1	MN	.639	.629	.619	.610	.601	.593	.584	.574	.564	.553	.541	.529	.515
	IAS	312	307	302	297	293	289	284	279	274	268	263	256	249
	TAS	397	391	385	379	374	369	363	357	351	344	336	329	320
160 0	MN	.628	.619	.61	.602	.594	.585	.576	.566	.556	.545	.533	.520	.506
	IAS	312	308	303	299	295	290	286	281	275	270	263	257	250
	TAS	392	386	381	375	370	365	359	353	347	340	332	324	316
150 -2	MN	.618	.61	.602	.594	.586	.577	.568	.558	.547	.536	.524	.511	.497
	IAS	313	309	305	301	296	292	287	282	276	270	264	257	250
	TAS	387	382	377	372	367	362	356	350	343	336	328	320	311
140 -3	MN	.609	.602	.594	.586	.578	.569	.560	.550	.539	.528	.516	.502	.489
	IAS	315	310	306	302	298	293	288	283	277	271	265	258	251
	TAS	383	378	374	369	363	358	352	346	339	332	324	316	307
130 -5	MN	.601	.594	.587	.579	.570	.561	.552	.541	.531	.519	.507	.494	.480
	IAS	316	312	308	304	299	294	289	284	278	272	265	258	251
	TAS	379	375	370	365	360	354	348	342	335	328	320	312	303
120 -7	MN	.594	.587	.579	.571	.562	.553	.543	.533	.522	.511	.498	.486	.472
	IAS	318	314	310	305	301	296	290	285	279	273	266	259	252
	TAS	376	372	367	362	356	350	344	338	331	324	316	308	299
110 -8	MN	.586	.579	.571	.563	.554	.545	.535	.525	.514	.502	.490	.477	.464
	IAS	320	316	311	307	302	297	291	286	279	273	266	259	252
	TAS	373	368	363	358	352	347	340	334	327	319	312	304	295
100 -10	MN	.579	.571	.563	.555	.546	.537	.527	.517	.506	.494	.482	.469	.457
	IAS	321	317	312	308	303	298	292	286	280	273	267	260	253
	TAS	369	364	359	354	349	343	336	330	323	315	308	300	292
90 -12	MN	.571	.563	.555	.547	.538	.529	.519	.508	.497	.486	.474	.462	.450
	IAS	323	318	314	309	304	298	293	287	280	274	267	260	253
	TAS	366	361	356	350	345	339	332	326	319	311	304	296	288
80 -13	MN	.563	.555	.547	.539	.530	.521	.511	.500	.489	.478	.466	.454	.443
	IAS	324	320	315	310	305	299	293	287	281	274	268	261	254
	TAS	362	357	352	347	341	335	328	322	314	307	300	292	285
70 -15	MN	.555	.548	.539	.531	.522	.512	.502	.492	.481	.470	.459	.447	.436
	IAS	325	321	316	311	305	300	294	288	281	275	268	261	255
	TAS	358	353	348	343	337	331	324	317	310	303	296	289	282

FL: Flight level / altitude (feet).

ISA: Standard Day temperature in °C.

IAS: Indicated airspeed in knots.

MN: Mach number.

TAS: True airspeed in knots.

LANDING GEAR EXTENDED REVENUE OPERATIONS PROCEDURES

OPERATIONAL LIMITATIONS

The following are the FAA Airplane Flight Manual mandated limitations for gear down operations. Limitations are unchanged from normal except as listed below.

1. All components required for a landing gear extended operation must be functional in accordance with the appropriate maintenance manual.
2. The use of speed increase for improved climb performance in order to increase maximum takeoff weight is prohibited.
3. Dispatch into known icing conditions is prohibited.
4. The airplane is not eligible for extended over-water operations when landing gear down lock pins are installed. "Extended over-water operation" includes any operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline.
5. Use of reduced thrust takeoff is prohibited.
6. Limitations relating to engine-out drift down are contained in the FLIGHT PLANNING and ABNORMAL sections of this Operational Data Manual (ODM).
7. Takeoff flap settings of 5, 15, or 20 are allowed.
8. V_{MO} and M_{MO} are reduced to 270 KIAS and .73 Mach.
9. The airspeed indicator and Mach-airspeed warning switch must be reprogrammed for V_{MO} and M_{MO} .
10. The EPR indication system must be operational.

PREPARATION OF AIRCRAFT

Maintenance will prepare the aircraft in accordance with the appropriate Maintenance Manual Procedures and make the appropriate log book entries.

EMERGENCY PROCEDURES

Procedures are unchanged for Emergency Procedures except as follows:

Emergency Descent: **Target speed is 270 KIAS**

NORMAL PROCEDURES

Operating Procedures are unchanged except as follows:

Severe Turbulent Air Penetration: The conditions for severe turbulence penetration are unchanged except the recommended airspeed for flight is $V_{Ref} + 80$ KIAS.

FLIGHT MANAGEMENT COMPUTER SYSTEMS (FMCS)

The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA) and maximum altitude, and computer an overly shallow descent path. Use of VNAV during descent is not recommended.

LANDING GEAR EXTENDED REVENUE OPERATIONS

DRIFTDOWN PERFORMANCE

FEET

GROSS WEIGHT - POUNDS		OPTIMUM DRIFT DOWN SPEED - KIAS	GROSS LEVEL OFF ALTITUDE - FEET		
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)		ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
240,000	228,000	207	6,400	4,000	
220,000	210,000	199	10,100	8,400	6,200
200,000	191,000	190	13,600	12,300	10,600
180,000	172,000	180	17,000	16,000	14,800
160,000	154,000	170	20,400	19,700	18,700

BASIS:

- One engine inoperative, APU operating
- Maximum Continuous Thrust Limits
- No Anti-Ice, one pack on
- 100 ft/min residual rate of climb

LONG RANGE CRUISE ALTITUDE CAPABILITY

FEET

GROSS WEIGHT - POUNDS	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
220,000	3,800		
210,000	6,900		
200,000	8,800	6,500	
190,000	10,600	8,600	5,900
180,000	12,300	10,700	8,400
170,000	14,000	12,600	10,600
160,000	15,700	14,400	12,800
150,000	17,500	16,200	14,800

BASIS:

- One engine inoperative, APU operating
- Maximum Continuous Thrust Limits
- 100 ft/min residual rate of climb

LANDING GEAR EXTENDED REVENUE OPERATIONS

LONG RANGE CRUISE

GROSS WEIGHT - POUNDS	PRESSURE ALTITUDE - FEET CRUISE SPEED - KIAS TARGET EPR FUEL FLOW – LB/HR						
	5,000	7,000	9,000	11,000	13,000	15,000	17,000
220,000	226	224					
	1.38	1.43					
	11585	11556					
200,000	218	217	217				
	1.34	1.38	1.43				
	10559	10554	10613				
180,000	210	210	210	210	210		
	1.30	1.33	1.37	1.42	1.48		
	9639	9610	9625	9674	9826		
160,000	202	202	202	202	202	202	202
	1.26	1.29	1.32	1.36	1.41	1.47	1.55
	8713	8721	8698	8702	8744	8796	9048
150,000	198	198	198	198	198	198	198
	1.24	1.27	1.30	1.34	1.38	1.43	1.50
	8280	8261	8266	8243	8265	8255	8432

BASIS:

- One engine inoperative, APU operating
- Maximum Continuous Thrust Limits
- Increase/decrease fuel flow 3% per 10°C above/below standard TAT.

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

APPLICABILITY

The tables on the following pages provide landing distances and approach speeds to be used in the event of in-flight system failures. **The values in this section are not to be used for dispatch purposes.**

Refer to the “MEL Support” pages at the end of this section of the ODM for dispatch landing distances with the following MELs applied:

- Anti-skid Inoperative
- One Brake Inoperative
- Manual Spoilers

The landing distances provided in this section are classified by runway braking action. These classifications include “DRY,” “GOOD,” “MEDIUM,” or “POOR.” Refer to the Airway Manual – Section 4 (Weather) to find the relationship between these terms, the current environmental conditions, and runway friction values.

ASSUMPTIONS

The data within this section was generated based on a set of assumed conditions:

- Standard day conditions
- Operating engines at maximum reverse thrust, except for hydraulic system failures
- Maximum manual braking (more aggressive than Max Autobrakes)
- Includes distance from 50 feet above threshold to stop (1,500 feet of air distance)
- Based on demonstrated landing performance produced by the manufacturer during certification process

In addition, the data within this section were also calculated with certain baseline conditions. There are corrections provided for each abnormal configuration accounting for any variances from the following:

- Sea level altitude
- No wind
- No slope
- Each abnormal configuration landing distance table is based on the approach speed stated within each table.

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

**FEET
KIAS**

AIR-GROUND LOGIC IN AIR MODE

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,310	5,030	4,750	4,470	4,190	3,960	3,730
GOOD	7,390	6,960	6,530	6,100	5,670	5,310	4,950
MEDIUM	10,940	10,270	9,600	8,930	8,260	7,700	7,140
POOR	15,950	15,000	14,050	13,100	12,150	11,370	10,590
VREF30	164	157	149	142	135	127	120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+80	+130	+215	+350
Wind	Per 10 kt. headwind	-155	-255	-445	-795
	Per 10 kt. tailwind	+540	+895	+1640	+3120
Slope	Per 1% downhill	+75	+210	+680	+1915
	Per 1% uphill	-65	-170	-460	-1180
Approach Speed	Per 10 kt. Above VREF	+410	+565	+750	+895

AIRSPEED UNRELIABLE

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,110	4,780	4,450	4,120	3,790	3,580	3,370
GOOD	6,310	5,970	5,630	5,290	4,950	4,610	4,270
MEDIUM	8,780	8,240	7,700	7,160	6,620	6,100	5,580
POOR	11,580	10,810	10,040	9,270	8,500	7,770	7,040
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+220	+335
Wind	Per 10 kt. headwind	-130	-205	-325	-495
	Per 10 kt. tailwind	+490	+735	+1225	+1955
Slope	Per 1% downhill	+50	+115	+295	+720
	Per 1% uphill	-40	-100	-230	-450
Approach Speed	Per 10 kt. Above VREF	+265	+340	+445	+525

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

ANTI-SKID SYSTEM INOP - (For Inflight Failure ONLY, see MEL SUPPORT for dispatch with Anti-skid Inop)

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	6,200	5,850	5,500	5,150	4,800	4,500	4,200
GOOD	7,440	6,990	6,540	6,090	5,640	5,250	4,860
MEDIUM	9,160	8,560	7,960	7,360	6,760	6,250	5,740
POOR	11,870	11,040	10,210	9,380	8,550	7,840	7,130
VREF30	164	157	149	142	135	127	120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+120	+175	+250	+380
Wind	Per 10 kt. headwind	-205	-280	-395	-645
	Per 10 kt. tailwind	+755	+1075	+1640	+3070
Slope	Per 1% downhill	+95	+185	+425	+1325
	Per 1% uphill	-85	-145	-270	-640
Approach Speed	Per 10 kt. Above VREF	+330	+380	+415	+450

FLAPS UP

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	7,000	6,380	5,760	5,140	4,520	4,280	4,040
GOOD	7,470	7,070	6,670	6,270	5,870	5,500	5,130
MEDIUM	10,010	9,400	8,790	8,180	7,570	7,060	6,550
POOR	12,630	11,790	10,950	10,110	9,270	8,530	7,790
VREF30+50	214	207	199	192	185	177	170

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+145	+180	+300	+440
Wind	Per 10 kt. headwind	-160	-215	-325	-465
	Per 10 kt. tailwind	+615	+765	+1215	+1840
Slope	Per 1% downhill	+65	+115	+265	+595
	Per 1% uphill	-55	-100	-205	-375
Approach Speed	Per 10 kt. Above VREF	+305	+310	+390	+450

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

HYDRAULIC SYSTEM CENTER INOP

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,360	4,140	3,920	3,700	3,480	3,300	3,120
GOOD	5,610	5,290	4,970	4,650	4,330	4,060	3,790
MEDIUM	7,270	6,810	6,350	5,890	5,430	5,040	4,650
POOR	9,010	8,400	7,790	7,180	6,570	6,060	5,550
VREF30	164	157	149	142	135	127	120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+70	+115	+180	+265
Wind	Per 10 kt. headwind	-120	-180	-275	-395
	Per 10 kt. tailwind	+420	+660	+1055	+1630
Slope	Per 1% downhill	+40	+90	+210	+495
	Per 1% uphill	-35	-80	-160	-295
Approach Speed	Per 10 kt. Above VREF	+245	+315	+375	+415

HYDRAULIC SYSTEM LEFT INOP

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,900	4,650	4,400	4,150	3,900	3,690	3,480
GOOD	6,540	6,160	5,780	5,400	5,020	4,700	4,380
MEDIUM	8,900	8,340	7,780	7,220	6,660	6,190	5,720
POOR	11,800	11,030	10,260	9,490	8,720	8,090	7,460
VREF30	164	157	149	142	135	127	120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+75	+125	+210	+325
Wind	Per 10 kt. headwind	-140	-220	-355	-570
	Per 10 kt. tailwind	+485	+785	+1350	+2385
Slope	Per 1% downhill	+55	+135	+360	+1100
	Per 1% uphill	-50	-115	-265	-550
Approach Speed	Per 10 kt. Above VREF	+325	+425	+520	+590

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

HYDRAULIC SYSTEM LEFT INOP W/ LE SLAT OR TE FLAPS DISAGREE FOR FLAPS≥20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,420	5,150	4,880	4,610	4,340	4,090	3,840
GOOD	7,250	6,860	6,470	6,080	5,690	5,300	4,910
MEDIUM	10,120	9,510	8,900	8,290	7,680	7,100	6,520
POOR	13,580	12,720	11,860	11,000	10,140	9,350	8,560
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+95	+155	+265	+415
Wind	Per 10 kt. headwind	-150	-235	-385	-620
	Per 10 kt. tailwind	+520	+845	+1445	+2540
Slope	Per 1% downhill	+60	+155	+415	+1250
	Per 1% uphill	-55	-130	-310	-640
Approach Speed	Per 10 kt. Above VREF	+335	+450	+570	+660

HYDRAULIC SYSTEM RIGHT INOP

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,230	4,940	4,650	4,360	4,070	3,830	3,590
GOOD	6,570	6,180	5,790	5,400	5,010	4,680	4,350
MEDIUM	9,070	8,480	7,890	7,300	6,710	6,220	5,730
POOR	12,030	11,230	10,430	9,630	8,830	8,170	7,510
VREF30	164	157	149	142	135	127	120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+90	+135	+225	+340
Wind	Per 10 kt. headwind	-155	-220	-360	-580
	Per 10 kt. tailwind	+540	+490	+1365	+2410
Slope	Per 1% downhill	+75	+150	+385	+1155
	Per 1% uphill	-65	-125	-285	-580
Approach Speed	Per 10 kt. Above VREF	+375	+455	+550	+615

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

HYDRAULIC SYSTEM CENTER AND LEFT INOP, FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,830	5,530	5,230	4,930	4,630	4,380	4,130
GOOD	7,910	7,460	7,010	6,560	6,110	5,720	5,330
MEDIUM	10,990	10,300	9,610	8,920	8,230	7,640	7,050
POOR	14,660	13,700	12,740	11,780	10,820	10,010	9,200
VREF30+20	184	177	169	162	155	147	140

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+105	+175	+295	+460
Wind	Per 10 kt. headwind	-160	-250	-405	-645
	Per 10 kt. tailwind	+545	+880	+1500	+2615
Slope	Per 1% downhill	+70	+175	+455	+1330
	Per 1% uphill	-65	-150	-340	-685
Approach Speed	Per 10 kt. Above VREF	+375	+495	+610	+695

HYDRAULIC SYSTEM CENTER AND RIGHT INOP, FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	6,240	5,910	5,580	5,250	4,920	4,640	4,360
GOOD	8,040	7,570	7,100	6,630	6,160	5,760	5,360
MEDIUM	11,260	10,540	9,820	9,100	8,380	7,760	7,140
POOR	15,100	14,090	13,080	12,070	11,060	10,220	9,380
VREF30+20	184	177	169	162	155	147	140

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+125	+185	+315	+490
Wind	Per 10 kt. headwind	-175	-255	-410	-660
	Per 10 kt. tailwind	+610	+895	+1525	+2655
Slope	Per 1% downhill	+100	+200	+500	+1425
	Per 1% uphill	-90	-165	-370	-735
Approach Speed	Per 10 kt. Above VREF	+445	+540	+660	+740

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

HYDRAULIC SYSTEM LEFT AND RIGHT INOP**, FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	8,050	7,620	7,190	6,760	6,330	5,990	5,650
GOOD	10,220	9,640	9,060	8,480	7,900	7,430	6,960
MEDIUM	15,900	14,970	14,040	13,110	12,180	11,410	10,640
POOR	>15,000	>15,000	>15,000	>15,000	>15,000	>15,000	>15,000
VREF30+20	184	177	169	162	155	147	140

**Reserve Brake System Only.

CORRECTIONS		DRY	Good	MEDIUM	POOR
Altitude	Per 1,000 feet	+145	+200	+340	+N/A
Wind	Per 10 kt. headwind	-240	-330	-590	+N/A
	Per 10 kt. tailwind	+820	+1120	+2070	+N/A
Slope	Per 1% downhill	+215	+405	+1325	+N/A
	Per 1% uphill	-175	-310	-845	+N/A
Approach Speed	Per 10 kt. Above VREF	+770	+930	+1250	+N/A

LE SLAT ASYMMETRY, GREATER THAN FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,910	4,610	4,310	4,010	3,710	3,510	3,310
GOOD	5,970	5,650	5,330	5,010	4,690	4,380	4,070
MEDIUM	7,870	7,390	6,910	6,430	5,950	5,500	5,050
POOR	9,850	9,200	8,550	7,900	7,250	6,660	6,070
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	Good	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+210	+310
Wind	Per 10 kt. headwind	-125	-190	-285	-410
	Per 10 kt. tailwind	+470	+685	+1095	+1685
Slope	Per 1% downhill	+40	+95	+220	+520
	Per 1% uphill	-35	-80	-170	-315
Approach Speed	Per 10 kt. Above VREF	+240	+305	+375	+425

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

**FEET
KIAS**

LE SLAT ASYMMETRY, LESS THAN OR EQUAL TO FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,600	5,220	4,840	4,460	4,080	3,870	3,660
GOOD	6,620	6,260	5,900	5,540	5,180	4,860	4,540
MEDIUM	8,670	8,140	7,610	7,080	6,550	6,080	5,610
POOR	10,770	10,060	9,350	8,640	7,930	7,310	6,690
VREF30+30	194	187	179	172	165	157	150

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+100	+150	+245	+350
Wind	Per 10 kt. headwind	-135	-200	-300	-430
	Per 10 kt. tailwind	+510	+720	+1140	+1735
Slope	Per 1% downhill	+50	+100	+225	+485
	Per 1% uphill	-45	-90	-180	-320
Approach Speed	Per 10 kt. Above VREF	+255	+305	+370	+415

LE SLAT DISAGREE

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,910	4,610	4,310	4,010	3,710	3,510	3,310
GOOD	5,970	5,650	5,330	5,010	4,690	4,380	4,070
MEDIUM	7,870	7,390	6,910	6,430	5,950	5,500	5,050
POOR	9,850	9,200	8,550	7,900	7,250	6,660	6,070
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+210	+310
Wind	Per 10 kt. headwind	-125	-190	-285	-410
	Per 10 kt. tailwind	+470	+685	+1095	+1685
Slope	Per 1% downhill	+40	+95	+220	+520
	Per 1% uphill	-35	-80	-170	-315
Approach Speed	Per 10 kt. Above VREF	+240	+305	+375	+425

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

**FEET
KIAS**

ONE ENGINE INOPERATIVE

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,110	4,780	4,450	4,120	3,790	3,580	3,370
GOOD	6,310	5,970	5,630	5,290	4,950	4,610	4,270
MEDIUM	8,780	8,240	7,700	7,160	6,620	6,100	5,580
POOR	11,580	10,810	10,040	9,270	8,500	7,770	7,040
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+220	+335
Wind	Per 10 kt. headwind	-130	-205	-325	-495
	Per 10 kt. tailwind	+490	+735	+1225	+1955
Slope	Per 1% downhill	+50	+115	+295	+720
	Per 1% uphill	-40	-100	-230	-450
Approach Speed	Per 10 kt. Above VREF	+265	+340	+445	+525

REVERSER UNLOCK, FLAPS 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,870	5,450	5,030	4,610	4,190	3,970	3,750
GOOD	7,060	6,670	6,280	5,890	5,500	5,150	4,800
MEDIUM	9,740	9,140	8,540	7,940	7,340	6,800	6,260
POOR	12,760	11,910	11,060	10,210	9,360	8,600	7,840
VREF30+30	194	187	179	172	165	157	150

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+105	+150	+250	+375
Wind	Per 10 kt. headwind	-145	-220	-345	-515
	Per 10 kt. tailwind	+540	+780	+1280	+2025
Slope	Per 1% downhill	+60	+135	+335	+840
	Per 1% uphill	-50	-110	-250	-495
Approach Speed	Per 10 kt. Above VREF	+280	+345	+440	+515

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

**FEET
KIAS**

TE FLAP ASYMMETRY, FLAPS 20 OR GREATER

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,910	4,610	4,310	4,010	3,710	3,510	3,310
GOOD	5,970	5,650	5,330	5,010	4,690	4,380	4,070
MEDIUM	7,870	7,390	6,910	6,430	5,950	5,500	5,050
POOR	9,850	9,200	8,550	7,900	7,250	6,660	6,070
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+210	+310
Wind	Per 10 kt. headwind	-125	-190	-285	-410
	Per 10 kt. tailwind	+470	+685	+1095	+1685
Slope	Per 1% downhill	+40	+95	+220	+520
	Per 1% uphill	-35	-80	-170	-315
Approach Speed	Per 10 kt. Above VREF	+240	+305	+375	+425

TE FLAP ASYMMETRY, 5 < FLAPS < 20

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	5,810	5,360	4,910	4,460	4,010	3,810	3,610
GOOD	6,580	6,220	5,860	5,500	5,140	4,820	4,500
MEDIUM	8,760	8,220	7,680	7,140	6,600	6,130	5,660
POOR	11,050	10,310	9,570	8,830	8,090	7,450	6,810
VREF30+30	194	187	179	172	165	157	150

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+100	+150	+245	+365
Wind	Per 10 kt. headwind	-140	-200	-305	-435
	Per 10 kt. tailwind	+515	+715	+1145	+1755
Slope	Per 1% downhill	+50	+100	+240	+555
	Per 1% uphill	-45	-85	-185	-340
Approach Speed	Per 10 kt. Above VREF	+255	+300	+380	+435

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS

FEET
KIAS

TE FLAP ASYMMETRY, FLAPS 5 OR LESS

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	6,410	5,860	5,310	4,760	4,210	3,990	3,770
GOOD	6,900	6,530	6,160	5,790	5,420	5,080	4,740
MEDIUM	9,220	8,660	8,100	7,540	6,980	6,480	5,980
POOR	11,630	10,860	10,090	9,320	8,550	7,870	7,190
VREF30+40	204	197	189	182	175	167	160

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+120	+160	+265	+390
Wind	Per 10 kt. headwind	-150	-205	-310	-445
	Per 10 kt. tailwind	+575	+730	+1165	+1780
Slope	Per 1% downhill	+55	+100	+240	+560
	Per 1% uphill	-50	-90	-185	-395
Approach Speed	Per 10 kt. Above VREF	+275	+290	+370	+425

TE FLAP DISAGREE

RWY COND & APPCH SPEED	LANDING WEIGHT - POUNDS						
	280,000	260,000	240,000	220,000	200,000	180,000	160,000
DRY	4,910	4,610	4,310	4,010	3,710	3,490	3,270
GOOD	5,970	5,650	5,330	5,010	4,690	4,380	4,070
MEDIUM	7,870	7,390	6,910	6,430	5,950	5,500	5,050
POOR	9,850	9,200	8,550	7,900	7,250	6,660	6,070
VREF20	177	171	164	157	149	142	133

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+85	+130	+210	+310
Wind	Per 10 kt. headwind	-125	-190	-285	-410
	Per 10 kt. tailwind	+470	+685	+1095	+1685
Slope	Per 1% downhill	+40	+95	+220	+520
	Per 1% uphill	-35	-80	-170	-315
Approach Speed	Per 10 kt. Above VREF	+240	+345	+375	+425

EMERGENCY LANDING DISTANCES

FEET

NOTE: TO BE USED ONLY UNDER CAPTAIN'S EMERGENCY AUTHORITY. PROVIDES ACTUAL LANDING DISTANCES ON CONTAMINATED RUNWAYS.

FLAPS 25

DATA IS ADVISORY AND DOES NOT INCLUDE 15% SAFETY MARGIN.

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	10,100	9,600	9,000	8,100	7,500	4,900	9,000	8,100	7,600	5,800
260,000	9,800	9,300	8,700	7,900	7,300	4,700	8,700	7,900	7,400	5,700
250,000	9,500	9,000	8,400	7,700	7,100	4,600	8,400	7,700	7,200	5,500
240,000	9,100	8,700	8,200	7,400	6,900	4,400	8,200	7,400	7,000	5,400
230,000	8,800	8,400	7,900	7,200	6,700	4,200	7,900	7,200	6,800	5,200
224,000	8,600	8,200	7,700	7,100	6,600	4,100	7,700	7,100	6,600	5,100
220,000	8,400	8,000	7,600	7,000	6,500	4,100	7,600	7,000	6,600	5,100
210,000	8,100	7,700	7,400	6,800	6,300	3,900	7,400	6,800	6,400	4,900
200,000	7,800	7,400	7,100	6,500	6,100	3,800	7,100	6,500	6,200	4,800
190,000	7,400	7,100	6,800	6,300	5,900	3,700	6,800	6,300	6,000	4,600
180,000	7,100	6,800	6,600	6,100	5,700	3,600	6,600	6,100	5,700	4,500
170,000	6,800	6,500	6,300	5,800	5,500	3,500	6,300	5,800	5,500	4,400
160,000	6,500	6,200	6,000	5,600	5,300	3,400	6,000	5,600	5,300	4,200
150,000	6,200	5,900	5,700	5,400	5,100	3,300	5,700	5,400	5,100	4,100

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-600	-500	-400	-300	-300	-100	-400	-300	-300	-200
2,000	0	0	0	0	0	0	0	0	0	0
4,000	600	500	400	300	300	100	400	300	300	200
6,000	1,200	1,000	900	600	500	300	900	600	600	500
8,000	1,800	1,600	1,300	1,000	800	400	1,300	1,000	800	700
10,000	2,500	2,200	1,800	1,400	1,100	600	1,800	1,400	1,100	1,000

CORRECTIONS

	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	0	0	-50	-50	0	0
PER 1 KT TAILWIND	100	100	100	100	100	50	100	100	100	50
PER 5 KTS ADD'L SPD	200	250	200	200	200	100	200	200	200	150
PER 10°C ABOVE ISA	200	200	200	150	150	50	200	150	150	100
PER 10°C BELOW ISA	-150	-150	-150	-150	-150	-50	-150	-150	-150	-100
PER 1% UP SLOPE	-200	-150	-150	-100	-50	-50	-150	-100	-100	-100
PER 1% DOWN SLOPE	200	150	150	100	50	50	150	100	100	100
1 REVERSER INOP	1,200	800	400	100	0	100	400	100	100	300
2 REVERSERS INOP	1,700	900	400	100	0	200	400	100	200	700
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

EMERGENCY LANDING DISTANCES

FEET

NOTE: TO BE USED ONLY UNDER CAPTAIN'S EMERGENCY AUTHORITY. PROVIDES ACTUAL LANDING DISTANCES ON CONTAMINATED RUNWAYS.

DATA IS ADVISORY AND DOES NOT INCLUDE 15% SAFETY MARGIN.

FLAPS 25

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	9,300	8,600	8,300	7,600	10,200	10,000	9,800	9,600
260,000	9,000	8,300	8,100	7,400	9,900	9,700	9,500	9,300
250,000	8,700	8,100	7,800	7,200	9,600	9,300	9,200	9,000
240,000	8,400	7,900	7,600	7,000	9,300	9,000	8,900	8,700
230,000	8,100	7,600	7,400	6,800	9,000	8,700	8,600	8,400
224,000	8,000	7,500	7,200	6,600	8,800	8,500	8,400	8,200
220,000	7,900	7,400	7,100	6,500	8,600	8,400	8,300	8,100
210,000	7,600	7,100	6,900	6,300	8,300	8,100	8,000	7,800
200,000	7,300	6,900	6,700	6,100	8,000	7,800	7,700	7,500
190,000	7,000	6,600	6,400	5,900	7,700	7,500	7,400	7,200
180,000	6,700	6,400	6,200	5,700	7,400	7,200	7,100	6,900
170,000	6,500	6,100	6,000	5,500	7,100	6,900	6,800	6,700
160,000	6,200	5,900	5,800	5,300	6,800	6,600	6,500	6,400
150,000	5,900	5,600	5,500	5,100	6,400	6,300	6,200	6,100

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF25 - 5 •

Data is advisory and includes 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-500	-400	-400	-400	-600	-600	-500	-600
2,000	0	0	0	0	0	0	0	0
4,000	500	400	400	400	600	600	500	600
6,000	900	800	800	800	1,200	1,100	1,100	1,100
8,000	1,400	1,100	1,100	1,100	1,700	1,700	1,600	1,700
10,000	1,900	1,600	1,600	1,600	2,500	2,500	2,400	2,500

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	100	100	100	100	150	150	150	150
PER 5 KTS ADD'L SPD	200	200	200	200	200	200	200	200
PER 10°C ABOVE ISA	200	150	150	150	200	200	200	200
PER 10°C BELOW ISA	-150	-150	-150	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-200	-150	-150	-150	-300	-300	-300	-350
PER 1% DOWN SLOPE	200	200	200	200	450	450	450	450
1 REVERSER INOP	600	400	500	800	1,300	1,300	1,300	1,500
2 REVERSERS INOP	1,300	1,600	1,700	2,100	4,200	4,400	4,400	4,600
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

EMERGENCY LANDING DISTANCES

FEET

NOTE: TO BE USED ONLY UNDER CAPTAIN'S EMERGENCY AUTHORITY. PROVIDES ACTUAL LANDING DISTANCES ON CONTAMINATED RUNWAYS.

FLAPS 30

DATA IS ADVISORY AND DOES NOT INCLUDE 15% SAFETY MARGIN.

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).									
	DRY (6)						GOOD (5)			
	AB 1	AB 2	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	9,400	8,900	8,400	7,600	7,000	4,500	8,400	7,600	7,100	5,500
260,000	9,100	8,600	8,100	7,400	6,800	4,400	8,100	7,400	6,900	5,400
250,000	8,700	8,300	7,900	7,100	6,600	4,300	7,900	7,100	6,700	5,200
240,000	8,400	8,000	7,600	6,900	6,400	4,100	7,600	6,900	6,500	5,100
230,000	8,100	7,700	7,300	6,700	6,200	4,000	7,300	6,700	6,300	4,900
224,000	7,900	7,500	7,200	6,500	6,100	3,900	7,200	6,500	6,100	4,900
220,000	7,800	7,400	7,000	6,400	6,000	3,800	7,000	6,400	6,100	4,800
210,000	7,500	7,100	6,800	6,200	5,800	3,700	6,800	6,200	5,900	4,600
200,000	7,100	6,800	6,500	6,000	5,600	3,600	6,500	6,000	5,700	4,500
190,000	6,900	6,600	6,300	5,800	5,500	3,500	6,300	5,800	5,500	4,400
180,000	6,600	6,300	6,000	5,600	5,300	3,400	6,000	5,600	5,300	4,200
170,000	6,300	6,000	5,800	5,400	5,100	3,300	5,800	5,400	5,100	4,100
160,000	6,000	5,700	5,500	5,200	4,900	3,200	5,500	5,200	4,900	4,000
150,000	5,700	5,500	5,300	5,000	4,700	3,200	5,300	5,000	4,800	3,800

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	DRY (6)						GOOD (5)			
0	-500	-500	-400	-300	-200	-100	-400	-300	-200	-200
2,000	0	0	0	0	0	0	0	0	0	0
4,000	500	500	400	300	200	100	400	300	200	200
6,000	1,000	900	800	600	500	200	800	600	500	400
8,000	1,600	1,400	1,100	800	700	400	1,100	800	700	700
10,000	2,200	1,900	1,500	1,100	1,000	600	1,500	1,100	1,000	1,000

CORRECTIONS

	DRY (6)						GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	0	0	-50	-50	0	0
PER 1 KT TAILWIND	100	100	100	100	50	50	100	100	100	50
PER 5 KTS ADD'L SPD	200	250	200	200	200	100	200	200	200	150
PER 10°C ABOVE ISA	200	150	150	150	100	50	150	150	100	100
PER 10°C BELOW ISA	-150	-150	-150	-150	-100	-50	-150	-150	-100	-100
PER 1% UP SLOPE	-200	-150	-100	-100	-50	-50	-100	-100	-50	-100
PER 1% DOWN SLOPE	200	150	100	50	50	50	100	100	50	100
1 REVERSER INOP	1,000	700	300	100	0	100	300	100	0	300
2 REVERSERS INOP	1,400	700	300	100	0	100	300	100	200	600
MANUAL SPOILERS	0	0	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

EMERGENCY LANDING DISTANCES

FEET

NOTE: TO BE USED ONLY UNDER CAPTAIN'S EMERGENCY AUTHORITY. PROVIDES ACTUAL LANDING DISTANCES ON CONTAMINATED RUNWAYS.

DATA IS ADVISORY AND DOES NOT INCLUDE 15% SAFETY MARGIN.

FLAPS 30

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	AB 3	AB 4	Max AB	Max Manual	AB 3	AB 4	Max AB	Max Manual
270,000	8,700	8,000	7,800	7,200	9,500	9,300	9,100	9,100
260,000	8,400	7,800	7,500	7,000	9,200	9,000	8,800	8,800
250,000	8,100	7,600	7,300	6,800	8,900	8,700	8,600	8,500
240,000	7,800	7,300	7,100	6,600	8,600	8,400	8,300	8,200
230,000	7,500	7,100	6,900	6,400	8,300	8,100	8,000	7,900
224,000	7,400	6,900	6,700	6,200	8,100	7,900	7,800	7,700
220,000	7,300	6,800	6,600	6,100	8,000	7,800	7,700	7,600
210,000	7,000	6,600	6,400	5,900	7,700	7,500	7,400	7,300
200,000	6,700	6,400	6,200	5,700	7,400	7,200	7,100	7,000
190,000	6,400	6,100	6,000	5,500	7,100	6,900	6,800	6,700
180,000	6,200	5,900	5,800	5,300	6,800	6,700	6,600	6,500
170,000	5,900	5,700	5,600	5,100	6,500	6,400	6,300	6,200
160,000	5,700	5,500	5,400	4,900	6,200	6,100	6,100	6,000
150,000	5,400	5,300	5,200	4,800	6,000	5,900	5,800	5,700

BASIS: Zero wind • Two Engine Full Reverse Thrust • Touchdown Speed = VREF30 - 5 •

Data is advisory and includes 1,500 ft. air distance from threshold to touchdown.

REFERENCE DISTANCES BASED UPON PRESSURE ALTITUDE OF 2,000 FEET AND ARE CONSERVATIVE FOR ALL LOWER ALTITUDES.

Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-400	-300	-300	-300	-500	-500	-500	-500
2,000	0	0	0	0	0	0	0	0
4,000	400	300	300	300	500	500	500	500
6,000	800	700	700	700	1,000	1,000	1,000	1,000
8,000	1,200	1,000	1,000	1,000	1,500	1,400	1,400	1,500
10,000	1,700	1,400	1,500	1,500	2,200	2,100	2,100	2,200

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	100	100	100	100	150	150	150	150
PER 5 KTS ADD'L SPD	200	200	200	150	200	200	200	200
PER 10°C ABOVE ISA	150	150	150	100	150	150	150	150
PER 10°C BELOW ISA	-150	-150	-150	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-150	-150	-150	-150	-300	-300	-300	-300
PER 1% DOWN SLOPE	200	150	150	200	400	400	400	450
1 REVERSER INOP	500	400	500	700	1,100	1,100	1,100	1,300
2 REVERSERS INOP	1,100	1,300	1,500	1,800	3,600	3,700	3,800	3,900
MANUAL SPOILERS	0	0	0	200	0	0	0	200

Note: Do not operate when Braking Action is Nil.

BRAKE COOLING FOLLOWING LANDING

GOVERNING CONDITIONS

NOTE: Maximum Quick Turnaround Landing Weight (QTLW) is not limiting for most normal operations.

If any of the following conditions apply, accomplish the procedures below to determine QTLW and Brake Cooling requirements.

- “QTLW Warning Remark” appears on the WDR **or**
- Landing above MLW **or**
- Landing using NO reversers **or**
- Landing using reversers with autobrake 4 or higher **or**
- Landing with non-standard aircraft configurations (flaps inoperative, brake deactivated, etc.)

PROCEDURES

- A) Determine if the Maximum Quick Turn Landing Weight has been exceeded.
- B) Obtain a Landing Brake Cooling time.
- C) **Wait the longer of the two times** once the aircraft is parked at the gate (or other designated location).

QUICK TURNAROUND LANDING WEIGHT

Determine the Maximum Quick Turnaround Landing Weight from Page 4-33.

If the Actual Landing Weight is greater than the Maximum Quick Turnaround Landing Weight then:

A **45 minute** ground cooling period is required.

NOTE: Check that wheel thermal plugs have not melted before executing a takeoff.

LANDING BRAKE COOLING

Determine the Cooling Time and associated action if applicable from the Brake Cooling Time and AutoBrake Adjustment tables on Page 4-34. Comply with the specified procedures for the Caution Zone and Fuse Plug Melt Zone.

BRAKE COOLING FOLLOWING LANDING

MAXIMUM QUICK TURN-AROUND LANDING WEIGHT

POUNDS

FLAPS 25

AIRPORT PRESSURE ALTITUDE FEET	AMBIENT TEMPERATURE – °C							
	-20	-10	0	10	20	30	40	50
-1000	240.3	235.7	231.3	227.0	223.0	219.2	215.6	212.2
0	236.3	231.6	227.2	223.1	219.1	215.4	211.9	208.5
1,000	232.0	227.5	223.1	219.1	215.2	211.6	208.1	204.8
2,000	227.8	223.4	219.1	215.2	211.4	207.8	204.4	201.1
3,000	223.7	219.3	215.2	211.3	207.6	204.0	200.7	----
4,000	219.6	215.3	211.3	207.5	203.8	200.4	197.1	----
5,000	215.6	211.4	207.4	203.6	200.1	196.7	193.5	----
6,000	211.5	207.4	203.5	199.8	196.3	193.0	189.9	----
7,000	207.4	203.4	199.6	196.0	192.6	189.3	186.2	----
8,000	203.4	199.4	195.7	192.2	188.8	185.6	----	----
8,400	201.8	197.9	194.2	190.7	187.3	184.1	----	----

FLAPS 30

AIRPORT PRESSURE ALTITUDE FEET	AMBIENT TEMPERATURE – °C							
	-20	-10	0	10	20	30	40	50
-1000	254.8	250.2	246.1	242.1	238.2	234.6	231.1	227.6
0	250.7	246.4	242.3	238.3	234.5	230.9	227.2	223.7
1,000	246.8	242.5	238.4	234.5	230.8	226.9	223.2	219.7
2,000	242.8	238.6	234.5	230.7	226.7	222.9	219.2	215.7
3,000	238.9	234.7	230.7	226.6	222.7	218.9	215.3	----
4,000	235.0	230.8	226.6	222.5	218.6	214.9	211.4	----
5,000	231.1	226.7	222.4	218.4	214.6	210.9	207.5	----
6,000	226.8	222.4	218.2	214.3	210.5	207.0	203.6	----
7,000	222.5	218.2	214.0	210.1	206.5	203.1	199.7	----
8,000	218.2	213.9	209.9	206.1	202.6	199.1	----	----
8,400	216.5	212.2	208.3	204.5	201.0	197.5	----	----

CONDITION		CORRECTION – POUNDS
Wind	per 1 kt. of headwind	+ 540
	per 1 kt. of tailwind	- 2,750
Runway slope	per 0.1% uphill slope	+ 220
	per 0.1% downhill slope	- 380

BRAKE COOLING FOLLOWING LANDING

LANDING BRAKE COOLING

LANDING USING MAX MANUAL BRAKING:

Obtain a brake cooling time from the following table. A quick assessment can be made by using the next highest weight and speed. If the resulting wait time has the potential of causing a delay or is in the Caution or Fuse Plug Melt Zones, interpolation may be used to determine a more precise wait time with the associated zone action. Zones are indicated in the table for quicker identification. Refer to the time ranges for Caution and Fuse Plug Melt Zones below.

NOTE: Wait time begins once the aircraft is parked at the gate (or other designated location).

BRAKE COOLING TIME (h:mm)

WEIGHT (1,000 lbs)	Brakes on Speed (Ground Speed KTS)					
	80	100	120	140	160	180
Reverse	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng
270	0:08 / 0:00	0:46 / 0:27	1:16C / 1:01	1:43C / 1:26C	2:07F / 1:49C	2:33F / 2:13F
260	0:05 / 0:00	0:43 / 0:23	1:13C / 0:57	1:40C / 1:23C	2:04F / 1:46C	2:28F / 2:08F
240	0:00 / 0:00	0:37 / 0:17	1:07 / 0:50	1:32C / 1:16C	1:56F / 1:39C	2:18F / 1:59F
220	0:00 / 0:00	0:30 / 0:09	1:00 / 0:42	1:24C / 1:08	1:47C / 1:30C	2:08F / 1:49C
200	0:00 / 0:00	0:22 / 0:00	0:52 / 0:33	1:15C / 1:00	1:38C / 1:21C	1:58F / 1:41C
180	0:00 / 0:00	0:14 / 0:00	0:43 / 0:24	1:07 / 0:50	1:28C / 1:11	1:47C / 1:30C
160	0:00 / 0:00	0:05 / 0:00	0:33 / 0:13	0:58 / 0:39	1:16C / 1:01	1:35C / 1:18C
140	0:00 / 0:00	0:00 / 0:00	0:23 / 0:00	0:46 / 0:26	1:05 / 0:48	1:21C / 1:05

C - CAUTION ZONE (1:12 – 1:50) – Fuse plugs may melt. Wait the specified time. After the landing gear assembly has cooled, visually inspect for tire damage and seal leakage.

F - FUSE PLUG MELT ZONE (1:51 +) – Under these conditions, consider that fuse plugs will likely melt and deflate the tires. Unless required, do not set parking brake. The possibility of tire, grease or hydraulic fluid fires should also be considered. Maintenance inspection of tires, wheels and brakes is recommended.

LANDING USING AUTOBRAKES:

- 1) Determine the time from the table above. This is the reference time.
- 2) Subtract the time in the adjustment table below from the reference time in the table above to get proper cooling time for the respective brake setting. **Any resulting wait time of 1:51 or above is in the Fuse Plug Melt Zone.**

AUTOBRAKE ADJUSTMENT

NW INDICATES NO WAITING REQUIRED

	Brakes on Speed (Ground Speed KTS)					
	80	100	120	140	160	180
Reverse	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng	0 Eng / 2 Eng
MaxAuto	NW / NW	0:12 / NW	0:11 / NW	0:12 / 0:44	0:13 / 0:43	0:13 / 0:40
Auto 4	NW / NW	0:15 / NW	0:16 / NW	0:16 / NW	0:18 / 1:17	0:19 / 1:15
Auto 3	NW / NW	0:16 / NW	0:19 / NW	0:20 / NW	0:22 / NW	0:24 / 1:35
Auto 2	NW / NW	NW / NW	0:22 / NW	0:24 / NW	0:27 / NW	0:30 / NW
Auto 1	NW / NW	NW / NW	0:27 / NW	0:30 / NW	0:34 / NW	0:39 / NW

BRAKE COOLING FOLLOWING REJECTED TAKEOFF

REJECTED TAKEOFF BRAKE COOLING

PROCEDURES

Use the table below. A quick assessment can be made by using the next highest weight and speed. If the resulting wait time has the potential of causing a delay or is in the Caution or Fuse Plug Melt Zones, interpolation may be used to determine a more precise wait time with the associated zone action. Zones are indicated in the table for quicker identification. Refer to the time ranges for Caution and Fuse Plug Melt Zones below.

NOTE: Wait time begins once the aircraft is parked at the gate (or other designated location).

BRAKE COOLING TIME (h:mm)

WEIGHT (1,000 lbs)	Brakes on Speed (Ground Speed KTS)					
	80	100	120	140	160	180
270	0:33	1:07	1:36C	2:01F	2:28F	2:55F
260	0:30	1:04	1:33C	1:58F	2:24F	2:50F
240	0:25	1:00	1:26C	1:51F	2:15F	2:40F
220	0:19	0:53	1:19C	1:43C	2:05F	2:29F
200	0:13	0:46	1:12	1:35C	1:56F	2:18F
180	0:07	0:39	1:05	1:26C	1:46C	2:05F
160	0:00	0:31	0:56	1:17C	1:36C	1:53F
140	0:00	0:22	0:47	1:07	1:24C	1:40C

C - CAUTION ZONE (1:12 – 1:50) – Fuse plugs may melt. Wait the specified time. After the landing gear assembly has cooled, visually inspect for tire damage and seal leakage.

F - FUSE PLUG MELT ZONE (1:51 +) – Under these conditions, consider that fuse plugs will likely melt and deflate the tires. Unless required, do not set parking brake. The possibility of tire, grease or hydraulic fluid fires should also be considered. Maintenance inspection of tires, wheels and brakes is recommended.

OPERATION WITHOUT AIRSPEED INDICATION

Use the following pitch attitude and thrust setting data to estimate airspeed and rate of climb/descent, if the airspeed system becomes unreliable or unusable enroute. ***If the damage to the airspeed indication system is detected during early stages of the flight (takeoff or initial climb), return to departure airport.***

CLIMB						
SPEED: 290/0.78			THRUST: MAX CLIMB FLAPS: UP			
PRESSURE ALTITUDE FEET		GROSS WEIGHT – POUNDS				
		300,000	260,000	220,000	180,000	140,000
40,000	PITCH ATTITUDE				+ 4.0	+ 4.0
	RATE OF CLIMB (FT/MIN)				+ 600	+ 1500
30,000	PITCH ATTITUDE		+ 4.0	+ 3.5	+ 4.0	4.0
	RATE OF CLIMB (FT/MIN)		+ 600	+ 1,000	+ 1,500	+ 2,200
20,000	PITCH ATTITUDE	+ 5.5	+ 5.5	+ 5.5	+ 5.5	+ 6.5
	RATE OF CLIMB (FT/MIN)	+ 1,000	+ 1,300	+ 1,800	+ 2,500	+ 3,400
10,000	PITCH ATTITUDE	+ 7.0	+ 7.5	+ 7.5	+ 8.0	+ 9.0
	RATE OF CLIMB (FT/MIN)	+ 1,600	+ 2,000	+ 2,600	+ 3,400	+ 4,500
0	PITCH ATTITUDE	+ 8.5	+ 8.5	+ 9.0	+ 10.0	+ 12.0
	RATE OF CLIMB (FT/MIN)	+ 2,100	+ 2,600	+ 3,200	+ 4,100	+ 5,500

CRUISE						
SPEED: 0.78/290			THRUST: EPR FOR LEVEL FLIGHT FLAPS: UP			
PRESSURE ALTITUDE FEET		GROSS WEIGHT - POUNDS				
		300,000	260,000	220,000	180,000	140,000
40,000	PITCH ATTITUDE				+3.5	+2.5
	EPR (Alt Mode %N1)				1.29 (82.3)	1.16 (77.9)
35,000	PITCH ATTITUDE			+3.0	+2.5	+1.5
	EPR (Alt Mode %N1)			1.25 (81.2)	1.15 (77.9)	1.08 (75.1)
30,000	PITCH ATTITUDE	+3.5	+3.0	+2.5	+2.0	+1.5
	EPR (Alt Mode %N1)	1.30 (84.3)	1.19 (80.8)	1.13 (78.3)	1.07 (75.8)	1.04 (74.0)
25,000	PITCH ATTITUDE	+4.0	+3.5	+2.5	+2.0	+1.5
	EPR (Alt Mode %N1)	1.17 (79.8)	1.11 (76.9)	1.06 (74.5)	+1.02 (72.4)	1.00 (70.8)
20,000	PITCH ATTITUDE	+4.5	+3.5	+3.0	+2.0	+1.5
	EPR (Alt Mode %N1)	1.10 (76.1)	1.06 (73.5)	1.03 (71.2)	1.00 (69.2)	0.99 (67.9)
15,000	PITCH ATTITUDE	+4.5	+3.5	+3.0	+2.0	+1.5
	EPR (Alt Mode %N1)	1.06 (72.5)	1.03 (70.1)	1.01 (68.0)	0.99 (66.2)	0.98 (64.9)

OPERATION WITHOUT AIRSPEED INDICATION

Use the following pitch attitude and thrust setting data to estimate airspeed and rate of climb/descent, if the airspeed system becomes unreliable or unusable enroute. ***If the damage to the airspeed indication system is detected during early stages of the flight (takeoff or initial climb), return to departure airport.***

DESCENT						
SPEED: 0.76/280				THRUST: IDLE FLAPS: UP		
PRESSURE ALTITUDE FEET		GROSS WEIGHT – POUNDS				
		300,000	260,000	220,000	180,000	140,000
40,000	PITCH ATTITUDE				-0.5	-0.5
	RATE OF CLIMB (FT/MIN)				-2,400	-2,400
30,000	PITCH ATTITUDE	+1.0	+0.5	0.0	-1.0	-2.0
	RATE OF CLIMB (FT/MIN)	-2,100	-2,000	-2,100	-2,300	-2,700
20,000	PITCH ATTITUDE	+1.5	+1.0	0.0	-1.0	-2.5
	RATE OF CLIMB (FT/MIN)	-1,800	-1,900	-2,000	-2,200	-2,600
10,000	PITCH ATTITUDE	+1.5	+1.0	0.0	-1.0	-2.5
	RATE OF CLIMB (FT/MIN)	-1,600	-1,700	-1,800	-2,000	-2,400
0	PITCH ATTITUDE	+1.5	+0.5	-0.5	-1.5	-3.0
	RATE OF CLIMB (FT/MIN)	-1,600	-1,600	-1,700	-1,900	-2,300

HOLDING						
SPEED: $V_{Ref40} + 70$			THRUST: EPR FOR LEVEL FLIGHT FLAPS: UP			
PRESSURE ALTITUDE FEET		GROSS WEIGHT – POUNDS				
		300,000	260,000	220,000	180,000	140,000
10,000	PITCH ATTITUDE	+4.5	+4.5	+4.5	+4.5	+4.5
	EPR	1.04	1.03	1.02	1.01	1.01
	(Alt Mode %N1)	(69.0)	(65.8)	(62.0)	(57.5)	(51.9)
	KIAS	288	267	246	222	195
5,000	PITCH ATTITUDE	+4.5	+4.5	+4.5	+4.5	+4.5
	EPR	1.02	1.02	1.01	1.01	1.00
	(Alt Mode %N1)	(65.8)	(62.4)	(58.6)	(54.1)	(48.4)
	KIAS	286	266	244	221	194

OPERATION WITHOUT AIRSPEED INDICATION

Use the following pitch attitude and thrust setting data to estimate airspeed and rate of climb/descent, if the airspeed system becomes unreliable or unusable enroute. ***If the damage to the airspeed indication system is detected during early stages of the flight (takeoff or initial climb), return to departure airport.***

TERMINAL AREA							
SPEED: see below			THRUST: EPR (OR %N1) FOR LEVEL FLIGHT FLAPS: AS REQ'D				
PRESSURE ALTITUDE FEET	FLAPS, SPEED		GROSS WEIGHT – POUNDS				
			300,000	260,000	220,000	180,000	140,000
5,000	FLAPS UP GEAR UP VREF30+80	PITCH ATT	+ 6.5	+ 6.5	+ 6.0	+ 5.5	+ 5.0
		EPR	1.06	1.04	1.03	1.02	1.01
		ALT MODE %N1	65.5	61.4	56.8	52.1	46.8
		KIAS	251	238	223	209	193
5,000	FLAPS 1 GEAR UP VREF30+60	PITCH ATT	+ 8.0	+ 8.0	+ 8.0	+ 7.5	+ 6.5
		EPR	1.09	1.07	1.06	1.04	1.02
		ALT MODE %N1	67.3	63.9	59.0	53.7	48.2
		KIAS	229	216	201	188	172
5,000	FLAPS 5 GEAR UP VREF30 + 40	PITCH ATT	+ 8.0	+ 7.5	+ 7.5	+ 7.0	+ 6.5
		EPR	1.11	1.09	1.07	1.05	1.03
		ALT MODE %N1	67.9	64.3	59.9	53.9	47.6
		KIAS	209	196	181	167	152
5,000	FLAPS 15 GEAR UP VREF30 + 20	PITCH ATT	+ 8.5	+ 8.5	+ 8.5	+ 8.0	+ 7.5
		EPR	1.14	1.12	1.10	1.07	1.05
		ALT MODE %N1	69.8	65.9	61.7	55.4	48.4
		KIAS	189	176	161	147	132
5,000	FLAPS 20 GEAR DOWN VREF30 + 20	PITCH ATT	+ 5.5	+ 5.5	+ 5.5	+ 5.0	+ 5.0
		EPR	1.21	1.17	1.14	1.12	1.07
		ALT MODE %N1	75.9	72.0	67.4	62.1	55.1
		KIAS	189	176	161	147	132

FINAL APPROACH							
SPEED: see below			THRUST: EPR (OR %N1) FOR 3° GLIDESLOPE FLAPS: AS REQ'D				
PRESSURE ALTITUDE – FEET	FLAPS, SPEED		GROSS WEIGHT – POUNDS				
			300,000	260,000	220,000	180,000	140,000
1,500	FLAPS 20 GEAR DOWN VREF20+10	PITCH ATT	+ 2.0	+ 2.0	+ 2.0	+ 1.5	+ 1.5
		EPR	1.05	1.04	1.03	1.03	1.02
		ALT MODE %N1	55.9	52.2	48.3	43.9	39.3
		KIAS	193	181	167	151	134
1,500	FLAPS 25 GEAR DOWN VREF25+10	PITCH ATT	+ 2.0	+ 1.5	+ 1.5	+ 1.5	+ 1.0
		EPR	1.10	1.08	1.06	1.05	1.04
		ALT MODE %N1	63.5	59.6	54.6	49.5	43.9
		KIAS	187	174	161	146	129
1,500	FLAPS 30 GEAR DOWN VREF30+10	PITCH ATT	0.0	0.0	+ 0.5	0.0	0.0
		EPR	1.14	1.14	1.09	1.07	1.05
		ALT MODE %N1	69.2	65.2	60.8	55.8	48.0
		KIAS	180	167	152	138	122

 Shaded cells exceed flap placard speed.

MEL SUPPORT

73-21-01: EEC NORMAL MODE INOPERATIVE

77-11-01: EPR INDICATION INOPERATIVE

RESTRICTIONS

The following restrictions apply to all MEL items presented on this page:

1. Set takeoff thrust manually. Use of Alternate Thrust for takeoff is NOT authorized.

73-21-01

EEC ALTERNATE
MODE

MEL 73-21-01 allows dispatch with the Electronic Engine Control inoperative. MEL 77-11-01 allows dispatch with EPR Indication inoperative. The following N_1 power setting must be used in lieu of the NORMAL thrust setting charts. Refer to the next page for the N_1 takeoff power setting chart for EEC ALT mode.

77-11-01

EPR INDICATION
INOP

NOTE:

Maximum rated thrust may be reached at a reduced thrust lever position.

V-SPEED CORRECTIONS

The takeoff speeds must be adjusted using the table below.

TAKEOFF SPEEDS	TAKEOFF SPEED ADJUSTMENT – KNOTS
V_1	+ 1
V_R	+ 1
V_2	0

MEL SUPPORT**73-21-01: EEC ALTERNATE MODE****77-11-01: EPR INDICATION INOPERATIVE****TAKEOFF THRUST %N1****PW 2040**

NORMAL BLEED - PACKS ON / ENGINE AND WING ANTI-ICE OFF

AIRPORT OAT		AIRPORT PRESSURE ALTITUDE - FEET										
°C	°F	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	10,000
55	131	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4
50	122	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
45	113	89.4	89.4	89.4	89.4	89.4	89.4	89.4	89.4	89.4	89.4	89.4
40	104	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
35	95	92.0	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.4
30	86	92.0	93.6	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8
25	77	91.2	92.8	93.7	94.5	95.1	95.1	95.1	95.1	95.1	95.1	95.1
20	68	90.5	92.0	92.9	93.7	94.5	95.2	96.0	96.2	96.2	96.2	96.2
15	59	89.7	91.3	92.1	92.9	93.6	94.4	95.1	95.9	96.6	97.2	97.2
10	50	88.9	90.5	91.3	92.1	92.8	93.6	94.3	95.0	95.8	96.5	97.7
5	41	88.1	89.7	90.5	91.3	92.0	92.7	93.5	94.2	94.9	95.6	96.9
0	32	87.3	88.8	89.6	90.4	91.2	91.9	92.6	93.4	94.1	94.7	96.1
-5	23	86.5	88.0	88.8	89.6	90.3	91.1	91.8	92.5	93.2	93.9	95.2
-10	14	85.7	87.2	88.0	88.8	89.5	90.2	90.9	91.6	92.3	93.0	94.3
-15	5	84.9	86.4	87.1	87.9	88.6	89.3	90.1	90.8	91.4	92.1	93.4
-20	-4	84.1	85.5	86.3	87.1	87.8	88.5	89.2	89.9	90.5	91.2	92.5
-25	-13	83.2	84.7	85.4	86.2	86.9	87.6	88.3	89.0	89.7	90.3	91.6
-30	-22	82.4	83.8	84.6	85.3	86.0	86.7	87.4	88.1	88.7	89.4	90.6
-35	-31	81.5	83.0	83.7	84.4	85.1	85.8	86.5	87.2	87.8	88.5	89.7
-40	-40	80.7	82.1	82.8	83.5	84.2	84.9	85.6	86.2	86.9	87.5	88.7
-45	-49	79.8	81.2	81.9	82.6	83.3	84.0	84.7	85.3	86.0	86.6	87.8
-50	-58	78.9	80.3	81.0	81.7	82.4	83.1	83.7	84.4	85.0	85.6	86.8

%N1 Adjustments for Engine Bleed:

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE - FEET											
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	8,001	10,000
Packs OFF	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Eng A/I ON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.5
Eng & Wing A/I ON	-0.7	-0.8	-0.9	-0.9	-1.0	-1.0	-1.1	-1.1	-1.1	-1.2	-2.6	-2.8

MEL SUPPORT
73-21-01: EEC ALTERNATE MODE
77-11-01: EPR INDICATION INOPERATIVE
GO AROUND THRUST %N1

NORMAL BLEED - PACKS ON / ENGINE AND WING ANTI-ICE OFF

PW 2040

AIRPORT OAT		TAT	AIRPORT PRESSURE ALTITUDE - FEET										
°C	°F	°C	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	10,000
55	131	58	85.1	85.1	85.1	85.1	85.1	85.2	85.2	85.2	85.3	85.3	85.3
50	122	53	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2
45	113	48	89.1	89.1	89.0	89.0	89.0	89.0	89.0	89.1	89.1	89.1	89.0
40	104	43	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7
35	95	38	91.8	92.2	92.2	92.2	92.2	92.2	92.2	92.2	92.2	92.2	92.1
30	86	33	91.8	93.4	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.6
25	77	28	91.0	92.7	93.5	94.3	95.0	95.0	95.0	95.0	95.0	95.0	95.0
20	68	23	90.2	91.9	92.7	93.6	94.4	95.2	96.0	96.2	96.2	96.2	96.2
15	59	18	89.5	91.1	91.9	92.8	93.6	94.4	95.1	95.9	96.7	97.3	97.3
10	50	13	88.7	90.3	91.1	91.9	92.8	93.5	94.3	95.1	95.8	96.6	97.3
5	41	8	87.9	89.5	90.3	91.1	91.9	92.7	93.5	94.2	95.0	95.7	97.2
0	32	3	87.1	88.7	89.5	90.3	91.1	91.9	92.6	93.4	94.1	94.9	96.3
-5	23	-2	86.3	87.9	88.7	89.5	90.3	91.0	91.8	92.5	93.3	94.0	95.4
-10	14	-7	85.5	87.1	87.8	88.6	89.4	90.2	90.9	91.7	92.4	93.1	94.5
-15	5	-13	84.7	86.2	87.0	87.8	88.6	89.3	90.1	90.8	91.5	92.2	93.6
-20	-4	-18	83.9	85.4	86.2	86.9	87.7	88.5	89.2	89.9	90.6	91.3	92.7
-25	-13	-23	83.0	84.5	85.3	86.1	86.8	87.6	88.3	89.0	89.7	90.4	91.8
-30	-22	-28	82.2	83.7	84.4	85.2	86.0	86.7	87.4	88.1	88.8	89.5	90.9
-35	-31	-33	81.3	82.8	83.6	84.3	85.1	85.8	86.5	87.2	87.9	88.6	89.9
-40	-40	-38	80.5	82.0	82.7	83.4	84.2	84.9	85.6	86.3	87.0	87.7	89.0
-45	-49	-43	79.6	81.1	81.8	82.5	83.3	84.0	84.7	85.4	86.0	86.7	88.0

-50	-58	-48	78.7	80.2	80.9	81.6	82.4	83.0	83.7	84.4	85.1	85.8	87.1
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%N1 Adjustments for Engine Bleed:

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE - FEET											
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	8,001	10,000
Packs OFF	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Eng A/I ON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.5
Eng & Wing A/I ON	-0.7	-0.8	-0.9	-0.9	-1.0	-1.0	-1.1	-1.1	-1.1	-1.1	-2.6	-2.7

MEL SUPPORT

73-21-01: EEC ALTERNATE MODE
77-11-01: EPR INDICATION INOPERATIVE

INITIAL MAX CONTINUOUS THRUST %N₁

PW 2040

NORMAL BLEED - PACKS ON / ENGINE AND WING ANTI-ICE OFF
 BASED ON MACH 0.80

TAT	PRESSURE ALTITUDE - FEET								
°C	27,000	29,000	31,000	33,000	35,000	37,000	39,000	41,000	42,000
20	90.7	89.8	89.0	88.2	87.4	86.6	86.1	86.0	86.0
15	91.4	90.5	89.7	88.8	88.0	87.3	86.6	86.5	86.5
10	92.1	91.2	90.4	89.6	88.8	88.0	87.3	86.9	86.9
5	92.7	92.0	91.2	90.4	89.6	88.9	88.1	87.4	87.4
0	92.6	92.7	91.9	91.2	90.4	89.8	89.0	88.2	88.0
-5	91.7	92.4	92.9	92.1	91.3	90.7	90.0	89.2	88.9
-10	90.9	91.6	92.4	93.2	92.5	91.8	91.1	90.3	90.0
-15	90.0	90.7	91.5	92.5	93.7	93.1	92.4	91.6	91.3
-20	89.1	89.8	90.6	91.6	92.9	93.4	92.7	91.9	91.6
-25	88.2	88.9	89.7	90.7	91.9	92.4	91.7	91.0	90.7
-30	87.3	88.0	88.8	89.8	91.0	91.5	90.8	90.1	89.7
-35	86.4	87.1	87.9	88.9	90.1	90.6	89.9	89.2	88.8
-40	85.5	86.2	87.0	87.9	89.1	89.6	88.9	88.2	87.9

%N₁ Adjustments for Engine Bleed:

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE - FEET								
	27,000	29,000	31,000	33,000	35,000	37,000	39,000	41,000	42,000
Packs OFF	1.0	1.1	1.2	1.4	1.4	1.3	1.5	1.6	1.6
Eng A/I ON	-1.2	-1.4	-1.5	-1.6	-1.8	-2.0	-2.3	-2.6	-2.8
Eng & Wing A/I ON	-2.4	-2.6	-2.8	-3.1	-3.4	-3.9	-4.5	-5.2	-5.6

MEL SUPPORT V_{MCG} **FLAPS 5****Max TO Thrust**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET						
	-2,000	0	2,000	4,000	6,000	8,000	10,000
70	90	87					
60	90	87	86	86			
50	94	90	87	86	85	84	82
40	100	97	94	90	86	84	82
30	103	104	100	96	92	88	85
20	103	104	102	99	96	92	89
-60	104	105	103	100	98	95	92

FLAPS 15 & 20**Max TO Thrust**

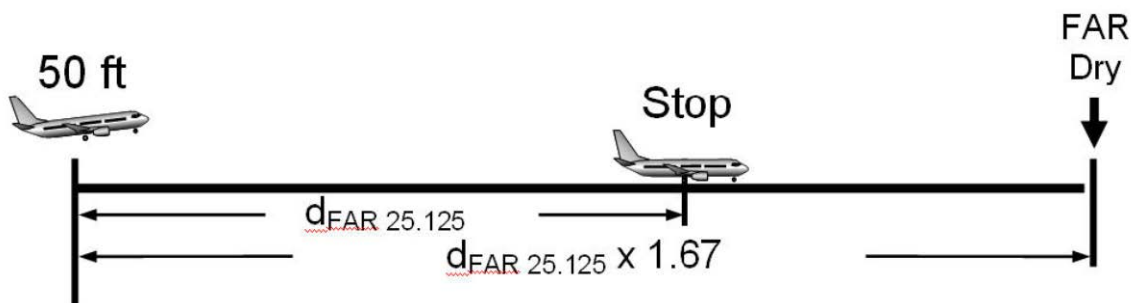
OAT °C	AIRPORT PRESSURE ALTITUDE – FEET						
	-2,000	0	2,000	4,000	6,000	8,000	10,000
70	90	87					
60	90	87	86	86			
50	94	90	87	86	85	84	82
40	100	97	94	90	86	84	82
30	103	104	100	96	92	88	85
20	103	104	102	99	96	92	89
-60	104	105	103	100	98	95	92

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

DEFINITION

All given distances in this section are FAR (Factored) Landing Distances. These distances represent the actual (or demonstrated) landing distances – designated as d_{FAR} in the diagram below – multiplied by a factor of 1.67.



FAR Landing Distance Diagram

This is in accordance with FAR 121.195, requiring the aircraft to be able to come to a complete stop within 60% of the effective length of the runway.

APPLICABILITY

The tables on the following pages provide landing distances to be used for dispatch with the given conditions and the associated MEL applied. For landing distances in the event of an in-flight system failure or abnormality not detected at or prior to dispatch, please refer to the “Abnormal Configuration Actual Landing Distances and Approach Speeds” pages in this section of the ODM.

ASSUMPTIONS

The data within this section was generated based on a set of assumed conditions:

- Standard day conditions
- No wind
- No slope
- No reverse thrust credit factored into FAR Landing Distances
- Maximum manual braking
- Includes distance from 50 feet above threshold to stop (1,000 feet of air distance)

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

Actual (unfactored) landing distances are 60% of the distances indicated.

FLAPS 30

ANTI-SKID INOP - DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	11,030	11,280	11,550	11,830	12,120	12,420	12,730	13,060	13,410	13,780
260,000	10,620	10,860	11,120	11,390	11,660	11,950	12,250	12,570	12,900	13,250
250,000	10,220	10,450	10,690	10,950	11,210	11,490	11,770	12,080	12,400	12,730
240,000	9,820	10,040	10,270	10,520	10,770	11,030	11,300	11,600	11,910	12,220
230,000	9,430	9,640	9,860	10,090	10,330	10,580	10,840	11,120	11,420	11,720
220,000	9,110	9,310	9,530	9,750	9,980	10,220	10,470	10,740	11,020	11,320
210,000	8,800	8,990	9,190	9,410	9,630	9,860	10,100	10,360	10,630	10,910
200,000	8,480	8,660	8,860	9,060	9,270	9,490	9,720	9,970	10,230	10,510
190,000	8,160	8,330	8,520	8,720	8,920	9,130	9,350	9,580	9,840	10,100
180,000	7,840	8,000	8,180	8,370	8,560	8,760	8,970	9,200	9,440	9,690
170,000	7,520	7,670	7,840	8,020	8,200	8,390	8,590	8,810	9,040	9,280
160,000	7,200	7,340	7,500	7,670	7,840	8,020	8,210	8,420	8,640	8,860

ANTI-SKID INOP - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	12,690	12,980	13,290	13,610	13,940	14,290	14,640	15,020	15,430	15,850
260,000	12,220	12,490	12,790	13,100	13,410	13,750	14,090	14,460	14,840	15,240
250,000	11,760	12,020	12,300	12,600	12,900	13,220	13,540	13,900	14,260	14,640
240,000	11,300	11,550	11,820	12,100	12,390	12,690	13,000	13,340	13,700	14,060
230,000	10,850	11,090	11,340	11,610	11,880	12,170	12,470	12,790	13,140	13,480
220,000	10,480	10,710	10,960	11,220	11,480	11,760	12,050	12,360	12,680	13,020
210,000	10,120	10,340	10,570	10,830	11,080	11,340	11,620	11,920	12,230	12,550
200,000	9,760	9,960	10,190	10,420	10,670	10,920	11,180	11,470	11,770	12,090
190,000	9,390	9,580	9,800	10,030	10,260	10,500	10,760	11,020	11,320	11,620
180,000	9,020	9,200	9,410	9,630	9,850	10,080	10,320	10,580	10,860	11,150
170,000	8,650	8,830	9,020	9,230	9,430	9,650	9,880	10,140	10,400	10,680
160,000	8,280	8,450	8,630	8,830	9,020	9,230	9,450	9,690	9,940	10,190

CORRECTIONS:

Headwind per kt	-50 ft
Tailwind per kt	+180 ft

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

Actual (unfactored) landing distances are 60% of the distances indicated.

FLAPS 30

ONE BRAKE INOP - DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	7,540	7,740	7,960	8,190	8,440	8,690	8,950	9,240	9,540	9,850
260,000	7,030	7,210	7,410	7,620	7,840	8,060	8,310	8,560	8,830	9,120
250,000	6,630	6,780	6,940	7,110	7,280	7,480	7,700	7,930	8,180	8,440
240,000	6,360	6,510	6,660	6,820	6,990	7,160	7,330	7,520	7,710	7,920
230,000	6,100	6,240	6,390	6,540	6,700	6,860	7,030	7,210	7,390	7,580
220,000	5,890	6,030	6,170	6,310	6,460	6,620	6,780	6,950	7,130	7,320
210,000	5,690	5,810	5,950	6,090	6,230	6,380	6,540	6,700	6,870	7,050
200,000	5,480	5,600	5,730	5,860	6,000	6,140	6,290	6,450	6,610	6,790
190,000	5,260	5,380	5,500	5,630	5,760	5,900	6,040	6,200	6,350	6,520
180,000	5,050	5,160	5,280	5,400	5,530	5,660	5,800	5,940	6,090	6,250
170,000	4,840	4,940	5,060	5,170	5,290	5,420	5,550	5,680	5,830	5,980
160,000	4,620	4,720	4,830	4,940	5,050	5,170	5,290	5,420	5,560	5,700

ONE BRAKE INOP - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	8,680	8,910	9,160	9,420	9,710	10,000	10,300	10,630	10,980	11,330
260,000	8,090	8,300	8,530	8,770	9,020	9,270	9,560	9,850	10,160	10,490
250,000	7,630	7,800	7,990	8,180	8,380	8,610	8,860	9,120	9,410	9,710
240,000	7,320	7,490	7,660	7,850	8,040	8,240	8,430	8,650	8,870	9,110
230,000	7,020	7,180	7,350	7,530	7,710	7,890	8,090	8,300	8,500	8,720
220,000	6,780	6,940	7,100	7,260	7,430	7,620	7,800	8,000	8,200	8,420
210,000	6,550	6,690	6,850	7,010	7,170	7,340	7,530	7,710	7,910	8,110
200,000	6,310	6,440	6,590	6,740	6,900	7,070	7,240	7,420	7,610	7,810
190,000	6,050	6,190	6,330	6,480	6,630	6,790	6,950	7,130	7,310	7,500
180,000	5,810	5,940	6,080	6,210	6,360	6,510	6,670	6,840	7,010	7,190
170,000	5,570	5,690	5,820	5,950	6,090	6,240	6,390	6,540	6,710	6,880
160,000	5,320	5,430	5,560	5,690	5,810	5,950	6,090	6,240	6,400	6,560

CORRECTIONS:

Headwind per kt	-35 ft
Tailwind per kt	+ 110 ft

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

Actual (unfactored) landing distances are 60% of the distances indicated.

FLAPS 30

MANUAL SPOILERS – DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	7,290	7,490	7,690	7,900	8,130	8,360	8,600	8,870	9,140	9,430
260,000	6,840	7,000	7,180	7,380	7,580	7,790	8,010	8,250	8,500	8,760
250,000	6,460	6,600	6,750	6,910	7,070	7,260	7,460	7,670	7,900	8,140
240,000	6,210	6,350	6,490	6,640	6,790	6,950	7,120	7,290	7,470	7,660
230,000	5,960	6,090	6,230	6,370	6,520	6,670	6,830	7,000	7,170	7,350
220,000	5,770	5,890	6,030	6,160	6,300	6,450	6,600	6,760	6,930	7,100
210,000	5,570	5,690	5,820	5,950	6,090	6,230	6,370	6,530	6,690	6,850
200,000	5,370	5,490	5,610	5,740	5,870	6,000	6,140	6,290	6,440	6,600
190,000	5,170	5,280	5,400	5,520	5,650	5,770	5,910	6,050	6,200	6,350
180,000	4,970	5,080	5,190	5,300	5,420	5,550	5,670	5,810	5,950	6,100
170,000	4,770	4,870	4,970	5,080	5,200	5,310	5,440	5,570	5,700	5,840
160,000	4,560	4,660	4,760	4,860	4,970	5,080	5,200	5,320	5,450	5,580

MANUAL SPOILERS - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
270,000	8,390	8,620	8,850	9,090	9,350	9,620	9,890	10,210	10,520	10,850
260,000	7,870	8,050	8,260	8,490	8,720	8,960	9,220	9,490	9,780	10,080
250,000	7,430	7,590	7,770	7,950	8,140	8,350	8,580	8,830	9,090	9,370
240,000	7,150	7,310	7,470	7,640	7,810	8,000	8,190	8,390	8,600	8,810
230,000	6,860	7,010	7,170	7,330	7,500	7,680	7,860	8,050	8,250	8,460
220,000	6,640	6,780	6,940	7,090	7,250	7,420	7,590	7,780	7,970	8,170
210,000	6,410	6,550	6,700	6,850	7,010	7,170	7,330	7,510	7,700	7,880
200,000	6,180	6,320	6,460	6,610	6,760	6,900	7,070	7,240	7,410	7,590
190,000	5,950	6,080	6,210	6,350	6,500	6,640	6,800	6,960	7,130	7,310
180,000	5,720	5,850	5,970	6,100	6,240	6,390	6,530	6,690	6,850	7,020
170,000	5,490	5,610	5,720	5,850	5,980	6,110	6,260	6,410	6,560	6,720
160,000	5,250	5,360	5,480	5,590	5,720	5,850	5,980	6,120	6,270	6,420

CORRECTIONS:

Headwind per kt	-45 ft
Tailwind per kt	+110 ft

End of Section

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AUTHORIZATION AND FLIGHT PLANNING

Authorization, procedures, and applicability of data for ferry operations is described in SP 4786 (Aircraft Restrictions Manual). Procedures outlined in SP 4786 must be strictly adhered to.

Ferry operational data is available for the following configurations:

- Landing Gear Extended
- Winglet / Wing Extension Removal

The following method should be used for ferry flight planning and certain revenue flight planning (as noted) and operations:

1. Obtain a normal aircraft configuration (computerized or manual) unfilled flight plan using Long Range Cruise (LRC) at the proposed cruise altitude. (The following FERRY pages contain recommended cruise altitude under the FLIGHT PLANNING heading.)
2. Calculate the trip time and fuel load by using the values listed under the appropriate ferry configuration. Enter this data either in the Dispatcher Remarks section of the Computerized Flight Plan or on the Standby Flight Plan form (NS80172).
3. Add remarks containing the ferry speed, speed limit, altitude limit, total time, leg times if appropriate, and engine-out altitude capability.
Note: Suggested cruise altitudes are for reference, and reasonable adjustments may be made to accommodate ATC and direction of flight.
4. Assure adequate terrain clearance by referring to the Engine Out Altitude Limit table, if available. (See FERRY, ENROUTE heading)
5. Adjust the Runway Allowable and Climb Limit Takeoff Weights, and the Landing Climb Limit Weight as follows:
Go to the appropriate ferry configuration page and subtract the weight decrements indicated under headings for TAKEOFF and LANDING from the NORMAL Thrust takeoff weight and the Landing Climb weight, respectively, obtained from the ARM (Airport Sections).

The following limitations should be applied to all ferry flights:

1. Do not combine two or more ferry configurations.
2. All ferry flight takeoffs will be made using full (NORMAL) thrust (TMC TO) and climb out will be made using Maximum Climb thrust (TMC CLB) unless otherwise specified on ferry configuration data page.
3. Observe additional limitations and restrictions as listed for each ferry configuration on the following data pages.

LANDING GEAR EXTENDED

LIMITATIONS:

Refer to "Landing Gear Extended Revenue Operations" in the Abnormal section of the ODM for a list of operational limitations.

FLIGHT PLANNING

Fuel Required / Trip Time (1,000 lb / hours):

PRESSURE ALTITUDE - FEET	RANGE – NAUTICAL GROUND MILES					
	300	600	900	1,200	1,500	1,800
10,000	14.0 / 1.3	27.3 / 2.4	42.0 / 3.5	56.3 / 4.6	71.0 / 5.7	86.0 / 6.6
14,000	13.5 / 1.2	26.0 / 2.3	39.4 / 3.4	53.0 / 4.4	66.7 / 5.4	
18,000	12.5 / 1.2	24.5 / 2.2	36.8 / 3.2	49.4 / 4.1		
22,000	12.0 / 1.2	23.5 / 2.1				

NOTE: Based on Long Range Cruise, VREF30 + 80 climb/descent, standard day conditions, zero winds.

TAKEOFF

RATOW & Takeoff climb limit weight:	Use GRD TPI in AWABS
Takeoff V Speeds:	Use GRD TPI in AWABS
Takeoff Thrust Settings:	Use NORMAL only, ALTERNATE thrust NOT approved.
Takeoff Flap Settings:	5, 15, or 20 allowed.
Operation from Contaminated Runway:	Permitted, use GRD TPI.

(Continued on Next Page)

LANDING GEAR EXTENDED (continued)

ENROUTE

Long Range Cruise Table

GROSS WEIGHT - POUNDS	PRESSURE ALTITUDE - 1,000 FEET CRUISE SPEED - KIAS TARGET EPR FUEL FLOW / ENGINE - LB/HR									
	10	15	17	19	21	23	25	27	29	31
270,000	255 1.21 7423									
250,000	246 1.18 6862	245 1.25 6754	245 1.28 6750							
230,000	237 1.16 6302	236 1.22 6183	235 1.25 6175	235 1.29 6169						
210,000	227 1.14 5741	226 1.19 5632	226 1.22 5621	225 1.25 5604	225 1.28 5601	224 1.33 5767				
190,000	216 1.12 5184	216 1.17 5087	215 1.19 5071	215 1.21 5050	215 1.24 5040	214 1.28 5042	214 1.32 5037	214 1.38 5080		
170,000	206 1.11 4685	206 1.14 4589	206 1.16 4581	206 1.18 4571	206 1.21 4568	206 1.24 4575	206 1.28 4584	206 1.32 4583	206 1.38 4619	206 1.45 4683
150,000	198 1.09 4273	198 1.12 4155	198 1.14 4143	198 1.16 4132	198 1.18 4128	198 1.20 4129	198 1.24 4129	198 1.27 4135	198 1.32 4132	198 1.37 4138

Refer to "Landing Gear Extended Revenue Operations" in the Abnormal section of the ODM for One Engine Inoperative driftdown performance, Long Range Cruise speeds, EPR settings, and altitude capability.

LANDING

Landing Speed restrictions:

No additional restrictions

Flap Setting Restrictions:

No additional restrictions

Approach & Landing climb limit weights:

Use GRD LPI data if available, otherwise reduce standard landing climb limit by 45,000 lbs

HOLDING SPEED / THRUST (KIAS / EPR)

WEIGHT - POUNDS	ALTITUDE - FEET	
	10,000	15,000
230,000	228 / 1.16	228 / 1.21
220,000	224 / 1.15	224 / 1.20
210,000	221 / 1.14	221 / 1.19
200,000	217 / 1.13	217 / 1.18
190,000	214 / 1.12	214 / 1.16
180,000	210 / 1.11	210 / 1.15
170,000	206 / 1.11	206 / 1.14
160,000	202 / 1.10	202 / 1.13
150,000	198 / 1.09	198 / 1.12

WINGLET / WING EXTENSION REMOVAL

Use the following conditions and factors for one winglet or both winglets removed and with wing extensions either both installed or both removed.

LIMITATIONS:

Wing extension installation is symmetrical.

The wing extension has the ballast weight installation.

Both wing extensions shall remain in place if either winglet is installed.

Airplane must be flown during daytime hours since the position and anti-collision lights on the removed winglet(s) will be missing.

Avoid turbulence. Avoid abrupt control inputs.

Avoid flight in icing conditions.

Maximum Cruise Altitude: Normal

Maximum Speed: 300KIAS or 0.82 MACH. Whichever is lower.

C. G. Limitations No additional restrictions.

En Route Weather Restrictions: No additional restrictions.

Configuration combinations of winglet and wing extension installation.

757 Winglet and Wing Extension Component Removal Matrix				
LH Winglet	RH Winglet	LH Wing Extension	RH Wing Extension	Configuration Status
				STC Baseline: All Components Installed
Removed				Ferry Allowed
	Removed			Ferry Allowed
Removed	Removed			Ferry Allowed
Removed	Removed	Removed	Removed	Ferry Allowed
Removed		Removed		Not Allowed**
	Removed		Removed	Not Allowed**
Removed	Removed	Removed		Not Allowed**
Removed	Removed		Removed	Not Allowed**

** Unsymmetrical wing extension installation ferry is not allowed.

Ferry flights are allowed for the following configurations:

- A winglet is removed from one wing and a winglet is installed on the other wing and both wing extensions are installed.
- The winglets are removed from both wings and the wing extensions are installed on both wings.
- Both winglets and both wing extensions are removed.

FLIGHT PLANNING

Increase trip fuel by 15%

Reduce all climb performance limited weights, i.e., takeoff climb and obstacle clearance, enroute climb, approach climb, and landing climb weight limits by 25,000 pounds

WINGLET / WING EXTENSION REMOVAL

TAKEOFF

Maximum crosswind:	15 knots.
RATOW & Climb limit weight:	Reduce by 25,000 lbs

ENROUTE

Trim with rudder if/as required during cruise flight so the autopilot can be used.

Climb:	Normal climb speeds and thrusts (TMC/ODM)
Cruise:	Normal cruise speeds and thrusts (TMC/ODM)
Climb limit weight:	Reduce by 25,000 lbs

LANDING

Cat. I landing approaches only.

Maximum crosswind:	15 knots.
Landing Speed restrictions:	No additional restrictions
Flap Setting Restrictions:	No additional restrictions
Approach & Landing Climb Limit Weights:	Reduce by 25,000 lbs

End of Section

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ETOPS PERFORMANCE PROCEDURES

This section provides performance data for use in the event of an ETOPS enroute diversion and for flight planning to assure availability of engine-out terrain clearance and ETOPS fuel requirements. The performance levels in this section are based upon the following thrust setting and speed criteria:

1. Maximum Continuous Thrust.
2. Mach 0.78/290 KIAS driftdown speeds.
3. 290 KIAS engine-out cruise speed.

In the event of pressurization loss in addition to or independent of an engine shutdown, cruise at 290 KIAS (engine-out) or LRC (all-engines) following emergency descent to 10,000 feet or to 14,000 feet over terrain - critical areas of Greenland. Refer to the Airway Manual and QRH for driftdown and emergency descent procedures.

Refer to ABNORMAL Section for one engine operating LRC data.

FLIGHT PLANNING CONSIDERATIONS

Flight Planning data provided in ETOPS CRITICAL FUEL RESERVES reflects the analysis used by Flight Control to assure availability of required ETOPS fuel reserves. Critical Fuel Reserves are shown on the flight plan as "ETP Diversion Fuel" and are provided for both icing conditions and non-icing conditions.. The ETOPS Critical Fuel Reserves are based upon the greater of engine-out or all-engines fuel consumption and reflect the following flight profile:

- Pressurization Inoperative
- Emergency descent to 10,000 feet
- Cruise at 10,000 feet/290 KIAS (engine-out) or LRC (all engines)
- 250 KIAS descent to 1,500 feet
- Missed approach, approach and land
- 5000 lb. of hold fuel (approximately double AC120-42 requirement)
- 5% fuel added for wind errors

- APU operating
- 5% fuel added for weather avoidance (180 minute ETOPS)

For icing conditions, eighteen percent additional fuel is added to account for both engine and wing anti-ice and ice accumulation on unheated surfaces. The normal mode of transatlantic operation assumes icing conditions. The flight planning system applies appropriate adjustment to these Reserves to account for performance deterioration of each specific ship number. These adjustments are updated weekly based upon Delta's aircraft/engine trend monitoring system.

Use of these procedures and Critical Fuel Reserves allows the following ETOPS Area of Operation (still air operating radius):

120 minutes - 808 NM
180 minutes - 1207 NM

CRITICAL FUEL RESERVES

ANTI-ICE NOT REQUIRED
ISA & BELOW

ANTI-ICE OFF

INITIAL GROSS WT LB	CRITICAL FUEL RESERVES – 1,000 LB									
	DISTANCE TO ALTERNATE - NAM									
	400	500	600	700	800	900	1,000	1,100	1,200	1,300
270,000	11.9	14.5	17.1	19.9	22.6	25.1	27.7	30.1	32.7	35.3
260,000	11.6	14.1	16.7	19.5	22.1	24.5	27.1	29.4	31.9	34.5
250,000	11.4	13.9	16.4	19.0	21.6	24.0	26.5	28.9	31.3	33.8
240,000	11.2	13.6	16.1	18.6	21.0	23.5	25.9	28.3	30.6	33.1
230,000	10.9	13.3	15.8	18.3	20.6	23.1	25.3	27.7	30.1	32.4
220,000	10.6	13.0	15.5	17.9	20.2	22.6	24.8	27.1	29.5	31.8
210,000	10.4	12.7	15.2	17.5	19.9	22.2	24.4	26.6	29.0	31.2
200,000	10.2	12.5	14.8	17.2	19.5	21.8	24.0	26.1	28.4	30.6
190,000	10.0	12.2	14.5	16.9	19.1	21.4	23.6	25.7	27.9	30.1
180,000	9.8	12.0	14.2	16.6	18.7	21.0	23.1	25.3	27.4	29.6
170,000	9.6	11.8	14.0	16.3	18.4	20.6	22.8	24.9	27.0	29.1
160,000	9.4	11.5	13.7	16.0	18.1	20.2	22.4	24.5	26.6	28.7

NOTES

1. Based upon the greater of fuel burn for one-engine inoperative or for all-engines operating using the following flight profile:
 - a. Emergency descent to 10,000 ft.
 - b. Cruise @ 10,000 ft @ 290 KIAS.
 - c. 250 KIAS descent to landing.
 - d. 5000 lb. hold fuel.
 - e. Missed approach, approach and land.
 - f. APU Operating.
2. Includes the following fuel allowances:
 - a. 5% for wind forecast errors.
3. This data reflects ETOPS data used by FLIGHT CONTROL for ETP Diversion Fuel analysis.
4. The flight planning system adjusts Critical Fuel Reserve data to account for individual ship number performance deterioration
5. Increase fuel burns by 0.9% per 10°C above ISA.

CRITICAL FUEL RESERVES

FORECAST ICING CONDITIONS
ISA & BELOW

ENG & WING ANTI-ICE ON

INITIAL GROSS WT LB	CRITICAL FUEL RESERVES – 1,000 LB									
	DISTANCE TO ALTERNATE - NAM									
	400	500	600	700	800	900	1,000	1,100	1,200	1,300
270,000	13.6	16.7	19.7	22.9	26.0	28.9	31.8	34.7	37.6	40.6
260,000	13.3	16.3	19.2	22.4	25.4	28.2	31.2	33.9	36.7	39.7
250,000	13.1	15.9	18.9	21.9	24.8	27.6	30.5	33.2	36.0	38.9
240,000	12.8	15.6	18.6	21.4	24.2	27.1	29.7	32.5	35.2	38.1
230,000	12.5	15.3	18.2	21.0	23.7	26.6	29.1	31.9	34.6	37.3
220,000	12.2	14.9	17.8	20.6	23.3	26.0	28.5	31.2	34.0	36.5
210,000	11.9	14.7	17.4	20.2	22.8	25.6	28.0	30.6	33.3	35.9
200,000	11.7	14.4	17.0	19.7	22.4	25.1	27.6	30.1	32.6	35.2
190,000	11.5	14.1	16.7	19.4	22.0	24.6	27.1	29.6	32.1	34.6
180,000	11.3	13.8	16.4	19.1	21.5	24.1	26.6	29.1	31.5	34.0
170,000	11.1	13.5	16.1	18.7	21.2	23.7	26.2	28.6	31.1	33.5
160,000	10.8	13.2	15.8	18.4	20.8	23.2	25.8	28.2	30.6	33.0

NOTES:

- Based upon the greater of fuel burn for one-engine inoperative or. all-engines operating using the following flight profile:
 - Emergency descent to 10,000 ft
 - Cruise @ 290 KIAS @ 10,000 ft.
 - 250 KIAS descent to landing.
 - 5000 lb. hold fuel.
 - Missed approach, approach and land.
 - APU Operating .
- Includes the following fuel allowances.
 - 5% for wind forecast errors.
 - 5% for weather avoidance (180 minute ETOPS).**
 - 15% for Engine/Wing Anti-Ice ON and ice accumulation.
- This data reflects data used by FLIGHT CONTROL for ETP Diversion Fuel analysis.
- The flight planning system adjusts this critical fuel data to account for individual ship number performance deterioration.
- For ambient temperatures above ISA, increase fuel required by 0.9% for each 10 °C above ISA.

End of Section