
A320 Operational Data Manual (ODM)

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A320

Operational Data

Manual

Revision Number: 45
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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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Maintenance, safeguard, and revision of this manual are the responsibilities of the individual to whom it is issued.

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: A320 OPERATIONAL DATA MANUAL

Date: 23 Sep 16

Revision Number: 45

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REMOVE	INSERT	REMARKS
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	Changed the table title and eliminated fair nomenclature to make it consistent with new FAA policy
APPROACH/LANDING Pages: 3-5, 3-7	APPROACH/LANDING Pages: 3-5, 3-7	Eliminated fair nomenclature to make it consistent with new FAA policy.
ABNORMAL Pages: 4-35, 4-37	ABNORMAL Pages: 4-35, 4-37	Eliminated fair nomenclature to make it consistent with new FAA policy.

**Pages not displaying a revision date of 23 Sep 16 were unchanged and included only for filing purposes.*

This list is effective with ODM Revision #45

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TOC / COVER PAGE

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END

A320 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	
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	30 to 39	13 – 18
Medium to Poor	Braking deceleration OR directional control is between Medium and Poor.	Greater than 1/8" depth of: - Water - Slush	2	21 to 29	
Poor	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	• Ice	1	20 or lower	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. The following crosswind guidelines are applicable to all Delta aircraft for takeoff and landing.

	DRY	GOOD	MEDIUM	POOR
Crosswind Limit	Aircraft Limits	Aircraft Limits	20KTS	15KTS
Tailwind Limit	10KTS	10KTS	5KTS	0KTS

A320 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS FULL

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	DRY (6)			GOOD (5)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,600	6,900	6,000	9,600	7,000	7,000
155,000	9,400	6,700	5,800	9,400	6,900	6,900
150,000	9,100	6,600	5,600	9,100	6,700	6,700
145,000	8,900	6,400	5,400	8,900	6,500	6,500
142,198	8,000	5,700	4,300	8,000	5,700	5,500
140,000	7,900	5,600	4,300	7,900	5,600	5,400
135,000	7,700	5,500	4,200	7,700	5,500	5,200
130,000	7,500	5,300	4,100	7,500	5,300	5,100
125,000	7,300	5,200	4,000	7,300	5,200	4,900
120,000	7,000	5,000	3,900	7,000	5,000	4,700
115,000	6,800	4,900	3,800	6,800	4,900	4,600
110,000	6,600	4,700	3,600	6,600	4,700	4,400
105,000	6,300	4,600	3,500	6,300	4,600	4,200
100,000	6,100	4,400	3,400	6,100	4,400	4,100
95,000	5,900	4,200	3,300	5,900	4,200	3,900
90,000	5,600	4,100	3,200	5,600	4,100	3,700

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)
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	-300	-300	-500	-500	-500
2,000	0	0	0	0	0	0
4,000	500	300	300	500	500	500
6,000	1,000	600	600	1,000	1,000	1,000
8,000	1,500	1,000	900	1,500	1,400	1,400

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	500	350	300	500	400	400
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	250	150	150	250	250	250
PER 1% DOWN SLOPE	100	50	50	100	150	150
1 REV INOP	0	0	0	0	0	0
2 REV INOP or NO REV USED	100	0	100	100	0	200
Autoland	1,100			1,300		

Note: Do not operate when Braking Action is Nil.

A320 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS FULL

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,700	8,500	8,500	13,000	12,900	12,900
155,000	9,500	8,300	8,300	12,700	12,500	12,500
150,000	9,300	8,000	8,000	12,300	12,200	12,200
145,000	9,000	7,800	7,800	12,000	11,800	11,800
142,198	8,200	6,900	6,800	11,100	10,900	10,800
140,000	8,100	6,800	6,800	10,900	10,700	10,700
135,000	7,900	6,700	6,600	10,600	10,400	10,400
130,000	7,600	6,500	6,400	10,200	10,100	10,000
125,000	7,400	6,300	6,200	9,900	9,700	9,700
120,000	7,200	6,100	6,000	9,500	9,400	9,400
115,000	6,900	5,900	5,800	9,200	9,000	9,000
110,000	6,700	5,700	5,600	8,900	8,700	8,700
105,000	6,400	5,500	5,400	8,500	8,300	8,300
100,000	6,200	5,300	5,200	8,200	8,000	8,000
95,000	5,900	5,100	5,000	7,800	7,700	7,600
90,000	5,700	4,800	4,800	7,400	7,300	7,300

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-500	-500	-1,000	-1,000	-1,000
2,000	0	0	0	0	0	0
4,000	500	500	500	1,000	1,000	1,000
6,000	1,100	1,000	1,000	2,000	2,000	2,000
8,000	1,600	1,400	1,400	3,000	3,000	3,000

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	500	400	400	600	550	550
PER 1 KT TAILWIND	150	150	150	400	400	400
PER 10°C ABOVE ISA	250	250	250	500	500	500
PER 1% DOWN SLOPE	300	400	350	2,900	2,900	2,900
1 REV INOP	0	0	0	500	500	400
2 REV INOP or NO REV USED	200	600	500	2,200	2,200	2,100
Autoland	1,300			1,500		

Note: Do not operate when Braking Action is Nil.

A320 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 3

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	DRY (6)			GOOD (5)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	10,300	7,300	6,600	10,300	7,800	7,800
155,000	10,100	7,100	6,300	10,100	7,600	7,600
150,000	9,800	7,000	6,100	9,800	7,400	7,400
145,000	9,500	6,800	5,900	9,500	7,100	7,100
142,198	8,600	6,000	4,700	8,600	6,200	6,000
140,000	8,500	6,000	4,600	8,500	6,100	5,900
135,000	8,300	5,800	4,400	8,300	5,900	5,700
130,000	8,000	5,600	4,300	8,000	5,700	5,500
125,000	7,800	5,500	4,200	7,800	5,500	5,300
120,000	7,500	5,300	4,100	7,500	5,400	5,100
115,000	7,300	5,200	4,000	7,300	5,200	5,000
110,000	7,000	5,000	3,800	7,000	5,000	4,800
105,000	6,800	4,800	3,700	6,800	4,800	4,600
100,000	6,500	4,700	3,600	6,500	4,700	4,400
95,000	6,300	4,500	3,500	6,300	4,500	4,200
90,000	6,000	4,300	3,400	6,000	4,300	4,000

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)
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	-300	-300	-500	-500	-500
2,000	0	0	0	0	0	0
4,000	500	300	300	500	500	500
6,000	1,100	700	600	1,100	1,100	1,100
8,000	1,600	1,000	900	1,600	1,600	1,600

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	550	350	300	550	450	450
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	300	200	150	300	300	300
PER 1% DOWN SLOPE	100	50	100	100	200	200
1 REV INOP	0	0	0	0	0	0
2 REV INOP or NO REV USED	100	0	100	100	100	200
Autoland	1,200			1,500		

Note: Do not operate when Braking Action is Nil.

A320 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 3

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	10,500	9,300	9,300	14,400	14,400	14,400
155,000	10,200	9,100	9,100	14,100	14,000	14,000
150,000	10,000	8,800	8,800	13,700	13,600	13,600
145,000	9,700	8,600	8,600	13,200	13,200	13,200
142,198	8,800	7,500	7,400	12,300	12,100	12,100
140,000	8,700	7,400	7,300	12,100	12,000	12,000
135,000	8,400	7,200	7,100	11,700	11,600	11,600
130,000	8,200	7,000	6,900	11,300	11,200	11,200
125,000	7,900	6,800	6,700	10,900	10,800	10,800
120,000	7,700	6,600	6,500	10,600	10,500	10,400
115,000	7,400	6,400	6,300	10,200	10,100	10,100
110,000	7,200	6,100	6,100	9,800	9,700	9,700
105,000	6,900	5,900	5,800	9,400	9,300	9,300
100,000	6,600	5,700	5,600	9,000	8,900	8,900
95,000	6,400	5,500	5,400	8,600	8,500	8,500
90,000	6,100	5,200	5,200	8,200	8,100	8,100

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-600	-500	-500	-1,100	-1,100	-1,100
2,000	0	0	0	0	0	0
4,000	600	500	500	1,100	1,100	1,100
6,000	1,200	1,100	1,100	2,300	2,300	2,300
8,000	1,700	1,600	1,600	3,400	3,400	3,400

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	550	400	400	650	650	650
PER 1 KT TAILWIND	200	150	150	450	450	450
PER 10°C ABOVE ISA	300	250	250	550	550	550
PER 1% DOWN SLOPE	350	450	450	3,550	3,550	3,550
1 REV INOP	0	100	0	700	700	600
2 REV INOP or NO REV USED	300	700	600	2,700	2,700	2,600
Autoland	1,500			1,800		

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).

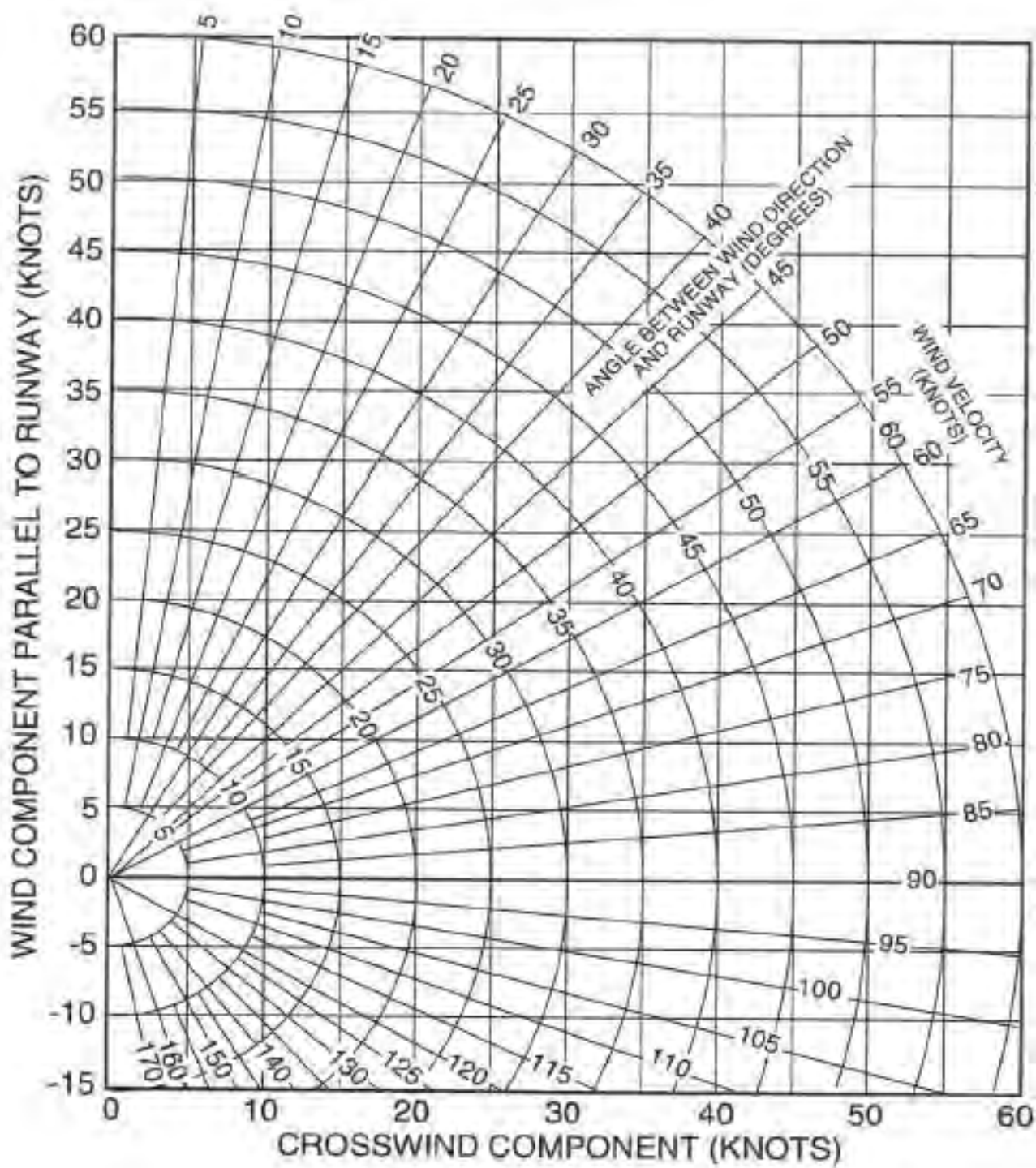
ISA DEVIATION - The difference between the standard ISA temperature and the ambient temperature in °C.

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

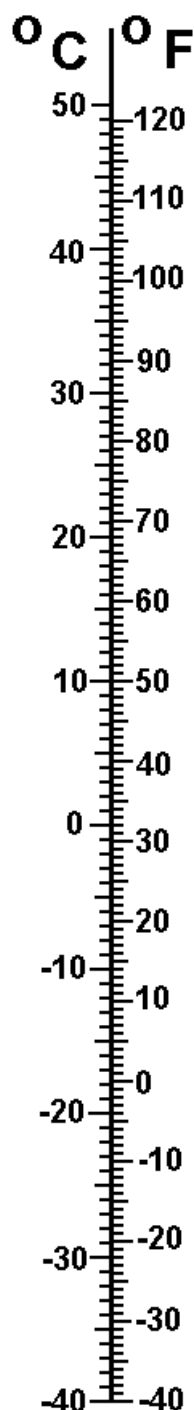
TOTAL AIR TEMPERATURE (TAT) - The total of the ambient air temperature (SAT) plus the increase in temperature due to compression heating.

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

WIND COMPONENT CHART



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

METRIC ALTIMETER CONVERSION CHART

MBS	Inch	MBS	Inch	MBS	Inch
940	27.76	977	28.85	1014	29.94
941	27.79	978	28.88	1015	29.97
942	27.82	979	28.91	1016	30.00
943	27.85	980	28.94	1017	30.03
944	27.88	981	28.97	1018	30.06
945	27.91	982	29.00	1019	30.09
946	27.94	983	29.03	1020	30.12
947	27.96	984	29.06	1021	30.15
948	27.99	985	29.09	1022	30.18
949	28.02	986	29.12	1023	30.21
950	28.05	987	29.15	1024	30.24
951	28.08	988	29.18	1025	30.27
952	28.11	989	29.21	1026	30.30
953	28.14	990	29.23	1027	30.33
954	28.17	991	29.26	1028	30.36
955	28.20	992	29.29	1029	30.39
956	28.23	993	29.32	1030	30.42
957	28.26	994	29.35	1031	30.45
958	28.29	995	29.38	1032	30.47
959	28.32	996	29.41	1033	30.50
960	28.35	997	29.44	1034	30.53
961	28.38	998	29.47	1035	30.56
962	28.41	999	29.50	1036	30.59
963	28.44	1000	29.53	1037	30.62
964	28.47	1001	29.56	1038	30.65
965	28.50	1002	29.59	1039	30.68
966	28.53	1003	29.62	1040	30.71
967	28.56	1004	29.65	1041	30.74
968	28.58	1005	29.68	1042	30.77
969	28.61	1006	29.71	1043	30.80
970	28.64	1007	29.74	1044	30.83
971	28.67	1008	29.77	1045	30.86
972	28.70	1009	29.80	1046	30.89
973	28.73	1010	29.83	1047	30.92
974	28.76	1011	29.85	1048	30.95
975	28.79	1012	29.88	1049	30.98
976	28.82	1013	29.91	1050	31.01

NORMAL OPERATING SPEED LIMIT

Vmo / Mmo

PRESSURE ALTITUDE	INDICATED Vmo (KIAS)	MACH Mmo
0	350	0.529
5,000	350	0.576
10,000	350	0.629
15,000	350	0.688
17,000	350	0.713
19,000	350	0.740
21,000	350	0.767
23,000	350	0.796
25,000	347	0.820
27,000	333	0.820
29,000	319	0.820
31,000	306	0.820
33,000	293	0.820
35,000	280	0.820
37,000	267	0.820
39,000	244	0.820

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.

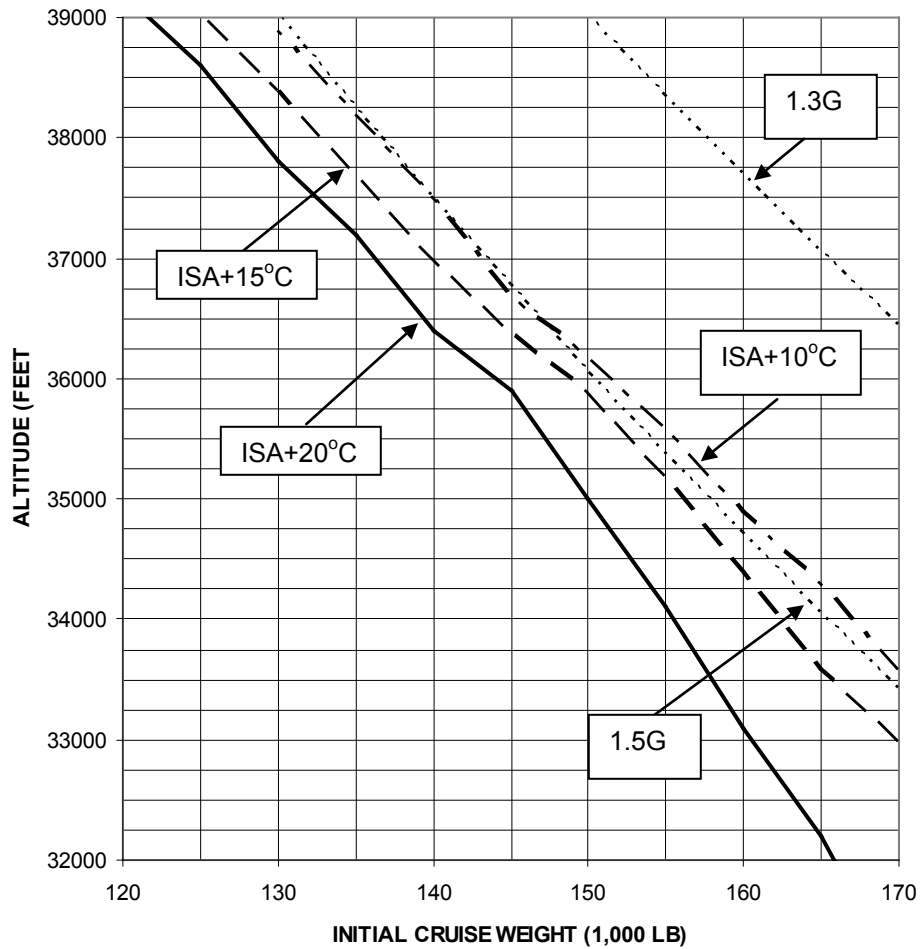
FUEL CONVERSION TABLE

Fuel Conversion Table — Kero @ 6.7 lbs/Gal							
Gallons	Pounds	Imperial Gallons	Liters	Gallons	Pounds	Imperial Gallons	Liters
100	670	83	379	3,300	22,110	2,748	12,501
200	1,340	167	758	3,400	22,780	2,831	12,879
300	2,010	250	1,136	3,500	23,450	2,914	13,258
400	2,680	333	1,515	3,600	24,120	2,998	13,636
500	3,350	416	1,894	3,700	24,790	3,081	14,051
600	4,020	500	2,273	3,800	25,460	3,164	14,394
700	4,690	583	2,652	3,900	26,130	3,247	14,773
800	5,360	666	3,030	4,000	26,800	3,331	15,152
900	6,030	749	3,409	4,100	27,470	3,414	15,530
1,000	6,700	833	3,788	4,200	28,140	3,497	15,909
1,100	7,370	916	4,167	4,300	28,810	3,580	16,288
1,200	8,040	999	4,545	4,400	29,480	3,664	16,667
1,300	8,710	1,082	4,924	4,500	30,150	3,747	17,045
1,400	9,380	1,166	5,303	4,600	30,820	3,830	17,424
1,500	10,050	1,249	5,682	4,700	31,490	3,913	17,803
1,600	10,720	1,332	6,061	4,800	32,160	3,997	18,182
1,700	11,390	1,415	6,439	4,900	32,830	4,080	18,561
1,800	12,060	1,499	6,818	5,000	33,500	4,163	18,939
1,900	12,730	1,582	7,197	5,100	34,170	4,246	19,318
2,000	13,400	1,665	7,576	5,200	34,840	4,330	19,697
2,100	14,070	1,749	7,955	5,300	35,510	4,413	20,076
2,200	14,740	1,832	8,333	5,400	36,180	4,496	20,455
2,300	15,410	1,915	8,712	5,500	36,850	4,580	20,833
2,400	16,080	1,998	9,091	5,600	37,520	4,663	21,212
2,500	16,750	2,082	9,470	5,700	38,190	4,746	21,591
2,600	17,420	2,165	9,848	5,800	38,860	4,829	21,970
2,700	18,090	2,248	10,227	5,900	39,530	4,913	22,348
2,800	18,760	2,331	10,606	6,000	40,200	4,996	22,727
2,900	19,430	2,415	10,985	6,100	40,870	5,079	23,106
3,000	20,100	2,498	11,364	6,200	41,540	5,162	23,485
3,100	20,770	2,581	11,742	6,300	42,210	5,245	23,864
3,200	21,440	2,664	12,121				

Given	Multiply By	To Find
Kilograms	2.205	Pounds
Liters	0.264	U.S. Gallons
Imperial Gallons	1.201	U.S. Gallons

MAXIMUM RECOMMENDED INITIAL CRUISE ALTITUDE

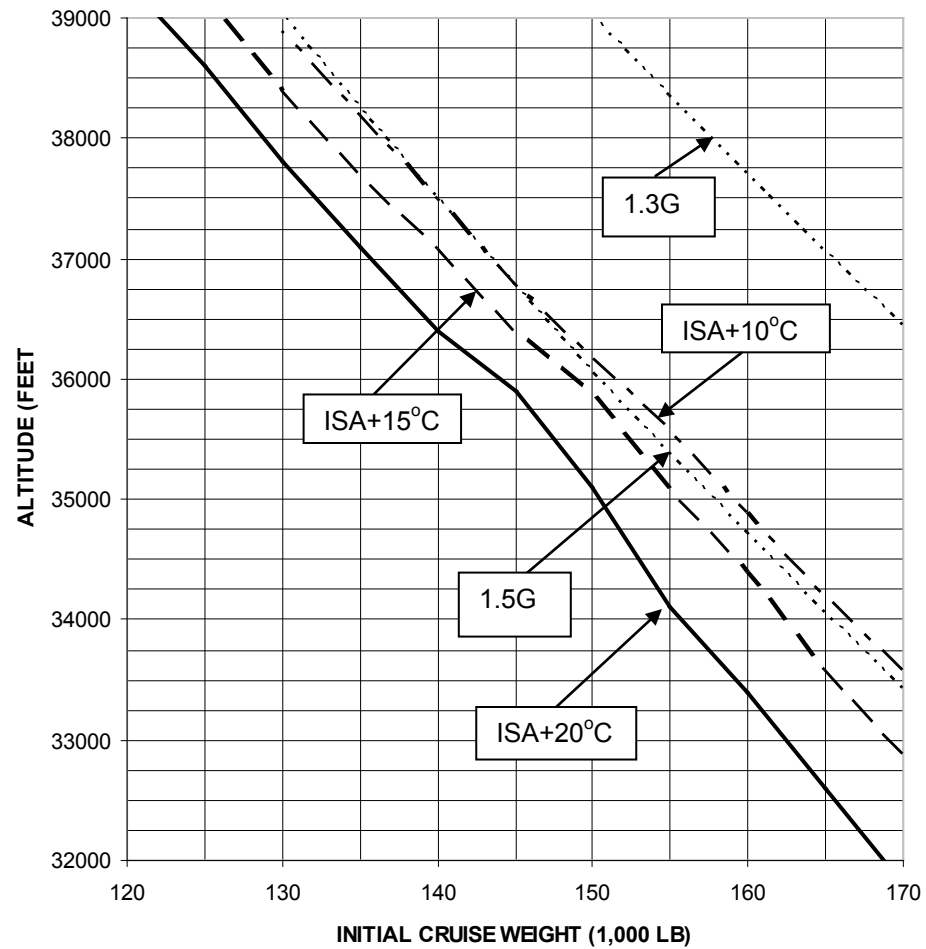
LRC



Config	Corrections - Ft		
	≤ ISA+10	ISA+15	ISA+20
Engine Anti-Ice ON	-500	-500	-1,200
Engine and Wing Anti-Ice ON	-1,500	-1,500	-3,000

MAXIMUM RECOMMENDED INITIAL CRUISE ALTITUDE

.78 MACH



Config	Corrections - Ft		
	≤ ISA+11	ISA+15	ISA+20
Engine Anti-Ice ON	-500	-500	-1,200
Engine and Wind Anti-Ice ON	-1,500	-1,500	-3,000

BUFFET ONSET BOUNDARY SPEEDS

KIAS

FLIGHT LEVEL	CRUISE WEIGHT LBS	Vb - M KIAS	G / BANK ANGLE - DEGREES		
			1.0/0°	1.15/30°	1.5/48°
			LOW SPEED		
390	160,000	0.79 244	209	227	
	140,000		193	210	
	120,000		175	191	224
	100,000		154	170	201
	80,000		132	146	175
370	160,000	0.79 256	207	225	
	140,000		190	208	245
	120,000		172	188	222
	100,000		151	167	199
	80,000		130	143	172
350	160,000	0.79 268	204	223	
	140,000		187	205	241
	120,000		168	185	220
	100,000		148	164	196
	80,000		127	140	168
330	160,000	0.79 281	201	220	258
	140,000		184	202	239
	120,000		165	182	217
	100,000		146	160	193
	80,000		124	138	165
310	160,000	0.79 293	198	217	256
	140,000		181	199	236
	120,000		162	179	214
	100,000		143	158	189
	80,000		122	135	162
290	160,000	0.79 306	194	214	253
	140,000		177	195	233
	120,000		160	175	211
	100,000		140	155	186
	80,000		120	132	160

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

End of Section

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INTENTIONALLY BLANK

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: The following takeoff speeds in this manual 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.

TAKEOFF SPEEDS

Ships 3209-3233, 3277-3278

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 / 1**

5-A1 Engines

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
180	8,000	177 / 177 / 178	177 / 177 / 178	177 / 177 / 178	178 / 178 / 179	182 / 182 / 183	
	6,000	176 / 176 / 177	174 / 176 / 177	174 / 176 / 177	177 / 177 / 178	178 / 178 / 179	
	4,000	174 / 174 / 175	170 / 174 / 175	167 / 174 / 175	176 / 176 / 177	176 / 176 / 177	
	2,000	169 / 169 / 170	167 / 169 / 170	164 / 169 / 170	169 / 173 / 174	176 / 176 / 177	176 / 176 / 177
	0	169 / 169 / 170	167 / 170 / 171	164 / 170 / 171	161 / 170 / 171	173 / 173 / 174	174 / 174 / 175
175	8,000	174 / 174 / 175	174 / 174 / 175	174 / 174 / 175	175 / 175 / 176	178 / 178 / 179	
	6,000	173 / 173 / 174	171 / 173 / 174	171 / 173 / 174	174 / 174 / 175	175 / 175 / 176	
	4,000	171 / 171 / 172	167 / 171 / 172	164 / 171 / 172	173 / 173 / 174	173 / 173 / 174	
	2,000	167 / 167 / 168	165 / 167 / 168	162 / 167 / 168	166 / 170 / 171	172 / 172 / 173	173 / 173 / 174
	0	167 / 167 / 168	166 / 167 / 168	162 / 167 / 168	159 / 167 / 168	170 / 170 / 171	171 / 171 / 172
170	8,000	171 / 171 / 172	171 / 171 / 172	171 / 171 / 172	172 / 172 / 173	175 / 175 / 176	
	6,000	170 / 170 / 171	168 / 170 / 171	168 / 170 / 171	171 / 171 / 172	171 / 171 / 172	
	4,000	168 / 168 / 169	165 / 168 / 169	162 / 168 / 169	170 / 170 / 171	170 / 170 / 171	
	2,000	165 / 165 / 166	163 / 165 / 166	160 / 165 / 166	163 / 167 / 168	169 / 169 / 170	170 / 170 / 171
	0	164 / 164 / 165	164 / 164 / 165	164 / 164 / 165	162 / 164 / 165	167 / 167 / 168	168 / 168 / 169
165	8,000	168 / 168 / 169	168 / 168 / 169	168 / 168 / 169	169 / 169 / 170	172 / 172 / 173	
	6,000	167 / 167 / 168	165 / 167 / 168	165 / 167 / 168	167 / 167 / 168	168 / 168 / 169	
	4,000	165 / 165 / 166	162 / 165 / 166	159 / 165 / 166	167 / 167 / 168	167 / 167 / 168	
	2,000	163 / 163 / 164	163 / 163 / 164	161 / 163 / 164	161 / 164 / 165	166 / 166 / 167	167 / 167 / 168
	0	162 / 162 / 164	162 / 162 / 164	162 / 162 / 164	162 / 162 / 164	164 / 164 / 165	165 / 165 / 166
160	8,000	165 / 165 / 166	165 / 165 / 166	165 / 165 / 166	166 / 166 / 167	168 / 168 / 169	
	6,000	164 / 164 / 165	162 / 164 / 165	162 / 164 / 165	164 / 164 / 165	165 / 165 / 166	
	4,000	162 / 162 / 163	161 / 162 / 163	158 / 162 / 163	164 / 164 / 165	164 / 164 / 165	
	2,000	161 / 161 / 162	161 / 161 / 162	161 / 161 / 162	161 / 162 / 163	163 / 163 / 164	164 / 164 / 165
	0	160 / 160 / 162	160 / 160 / 162	161 / 161 / 162	161 / 161 / 162	161 / 161 / 162	162 / 162 / 163
155	8,000	161 / 161 / 162	161 / 161 / 162	162 / 162 / 163	163 / 163 / 164	165 / 165 / 166	
	6,000	160 / 160 / 161	158 / 160 / 161	158 / 160 / 161	161 / 161 / 162	162 / 162 / 163	
	4,000	159 / 159 / 160	159 / 159 / 160	159 / 159 / 160	160 / 160 / 161	161 / 161 / 162	
	2,000	158 / 158 / 160	159 / 159 / 160	159 / 159 / 160	159 / 159 / 160	159 / 159 / 160	160 / 160 / 161
	0	157 / 157 / 160	158 / 158 / 160	158 / 158 / 160	158 / 158 / 160	158 / 158 / 160	159 / 159 / 160
150	8,000	158 / 158 / 159	158 / 158 / 159	159 / 159 / 160	160 / 160 / 161	162 / 162 / 163	
	6,000	157 / 157 / 158	157 / 157 / 158	157 / 157 / 158	158 / 158 / 159	159 / 159 / 160	
	4,000	156 / 156 / 158	157 / 157 / 158	157 / 157 / 158	157 / 157 / 158	158 / 158 / 159	
	2,000	155 / 155 / 157	156 / 156 / 157	156 / 156 / 157	156 / 156 / 157	157 / 157 / 158	157 / 157 / 158
	0	155 / 155 / 157	155 / 155 / 157	155 / 155 / 157	155 / 155 / 157	156 / 156 / 157	156 / 156 / 157

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

TAKEOFF SPEEDS

Ships 3209-3233, 3277-3278

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.

5-A1 Engines

**V₁ / V_R / V₂
TO / 1**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
145	8,000	155 / 155 / 156	155 / 155 / 156	156 / 156 / 157	156 / 156 / 157	158 / 158 / 159	
	6,000	154 / 154 / 155	154 / 154 / 155	155 / 155 / 156	155 / 155 / 156	156 / 156 / 157	
	4,000	153 / 153 / 155	154 / 154 / 155	154 / 154 / 155	154 / 154 / 155	155 / 155 / 156	146 / 146 / 147
	2,000	153 / 153 / 154	153 / 153 / 154	153 / 153 / 154	153 / 153 / 154	154 / 154 / 155	154 / 154 / 155
	0	152 / 152 / 154	152 / 152 / 154	152 / 152 / 154	152 / 152 / 154	153 / 153 / 154	153 / 153 / 154
140	8,000	152 / 152 / 153	152 / 152 / 153	153 / 153 / 154	153 / 153 / 154	155 / 155 / 156	
	6,000	151 / 151 / 152	151 / 151 / 152	152 / 152 / 153	152 / 152 / 153	153 / 153 / 154	
	4,000	150 / 150 / 152	151 / 151 / 152	151 / 151 / 152	151 / 151 / 152	152 / 152 / 153	146 / 146 / 147
	2,000	149 / 149 / 151	150 / 150 / 151	150 / 150 / 151	150 / 150 / 151	151 / 151 / 152	151 / 151 / 152
	0	149 / 149 / 151	149 / 149 / 151	149 / 149 / 151	149 / 149 / 151	150 / 150 / 151	150 / 150 / 151
135	8,000	149 / 149 / 150	149 / 149 / 150	150 / 150 / 151	150 / 150 / 151	152 / 152 / 153	
	6,000	148 / 148 / 149	149 / 149 / 150	149 / 149 / 150	149 / 149 / 150	150 / 150 / 151	
	4,000	147 / 147 / 149	148 / 148 / 149	148 / 148 / 149	148 / 148 / 149	149 / 149 / 150	146 / 146 / 147
	2,000	146 / 146 / 149	147 / 147 / 149	147 / 147 / 149	147 / 147 / 149	148 / 148 / 149	148 / 148 / 149
	0	146 / 146 / 148	146 / 146 / 148	146 / 146 / 148	146 / 146 / 148	147 / 147 / 148	148 / 148 / 149
130	8,000	146 / 146 / 147	146 / 146 / 147	147 / 147 / 148	147 / 147 / 148	148 / 148 / 149	
	6,000	145 / 145 / 147	145 / 145 / 147	146 / 146 / 147	146 / 146 / 147	147 / 147 / 148	
	4,000	144 / 144 / 146	145 / 145 / 146	145 / 145 / 146	145 / 145 / 146	146 / 146 / 147	146 / 146 / 147
	2,000	143 / 143 / 146	144 / 144 / 146	144 / 144 / 146	144 / 144 / 146	145 / 145 / 146	145 / 145 / 146
	0	143 / 143 / 146	143 / 143 / 146	143 / 143 / 146	143 / 143 / 146	144 / 144 / 146	145 / 145 / 146
125	8,000	143 / 143 / 144	143 / 143 / 144	144 / 144 / 145	144 / 144 / 145	145 / 145 / 146	
	6,000	142 / 142 / 144	142 / 142 / 144	143 / 143 / 144	143 / 143 / 144	144 / 144 / 145	
	4,000	141 / 141 / 143	142 / 142 / 143	142 / 142 / 143	142 / 142 / 143	143 / 143 / 144	146 / 146 / 147
	2,000	140 / 140 / 143	141 / 141 / 143	141 / 141 / 143	141 / 141 / 143	142 / 142 / 143	142 / 142 / 143
	0	140 / 140 / 143	140 / 140 / 143	140 / 140 / 143	140 / 140 / 143	141 / 141 / 143	142 / 142 / 143
120	8,000	140 / 140 / 141	140 / 140 / 141	141 / 141 / 142	141 / 141 / 142	142 / 142 / 143	
	6,000	139 / 139 / 141	139 / 139 / 141	139 / 139 / 141	140 / 140 / 141	141 / 141 / 142	
	4,000	138 / 138 / 140	138 / 138 / 140	138 / 138 / 140	139 / 139 / 140	140 / 140 / 141	140 / 140 / 141
	2,000	137 / 137 / 140	138 / 138 / 140	138 / 138 / 140	138 / 138 / 140	139 / 139 / 140	139 / 139 / 140
	0	136 / 136 / 140	137 / 137 / 140	137 / 137 / 140	137 / 137 / 140	138 / 138 / 140	139 / 139 / 140
115	8,000	137 / 137 / 138	137 / 137 / 138	137 / 137 / 138	138 / 138 / 139	138 / 138 / 139	
	6,000	136 / 136 / 138	136 / 136 / 138	136 / 136 / 138	137 / 137 / 138	137 / 137 / 138	
	4,000	135 / 135 / 137	135 / 135 / 137	135 / 135 / 137	136 / 136 / 137	136 / 136 / 137	137 / 137 / 138
	2,000	134 / 134 / 137	134 / 134 / 137	135 / 135 / 137	135 / 135 / 137	136 / 136 / 137	136 / 136 / 137
	0	133 / 133 / 137	134 / 134 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 137	136 / 136 / 137

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 / 3**

5-A1 Engines

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
180	8,000	157 / 157 / 159	157 / 157 / 159	158 / 158 / 160	161 / 161 / 162	165 / 165 / 166	
	6,000	157 / 157 / 159	157 / 157 / 159	157 / 157 / 159	157 / 157 / 159	161 / 161 / 162	
	4,000	156 / 156 / 159	156 / 156 / 159	156 / 156 / 159	156 / 156 / 159	157 / 157 / 159	
	2,000	155 / 155 / 158	155 / 155 / 158	155 / 155 / 158	155 / 155 / 158	156 / 156 / 158	
	0	149 / 149 / 152	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	155 / 155 / 158	157 / 157 / 159 156 / 156 / 158
175	8,000	154 / 154 / 157	154 / 154 / 157	155 / 155 / 157	158 / 158 / 159	162 / 162 / 163	
	6,000	154 / 154 / 156	154 / 154 / 156	154 / 154 / 156	155 / 155 / 157	158 / 158 / 159	
	4,000	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	154 / 154 / 156	
	2,000	152 / 152 / 156	152 / 152 / 156	152 / 152 / 156	152 / 152 / 156	153 / 153 / 156	
	0	147 / 147 / 150	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	152 / 152 / 155	154 / 154 / 156 153 / 153 / 155
170	8,000	151 / 151 / 154	152 / 152 / 154	152 / 152 / 154	155 / 155 / 156	158 / 158 / 159	
	6,000	151 / 151 / 154	151 / 151 / 154	151 / 151 / 154	152 / 152 / 154	155 / 155 / 156	
	4,000	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	151 / 151 / 153	152 / 152 / 154	
	2,000	149 / 149 / 153	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	
	0	146 / 146 / 149	148 / 148 / 151	148 / 148 / 151	148 / 148 / 151	149 / 149 / 153	151 / 151 / 153 150 / 150 / 153
165	8,000	149 / 149 / 151	149 / 149 / 151	150 / 150 / 152	152 / 152 / 154	155 / 155 / 156	
	6,000	148 / 148 / 151	148 / 148 / 151	148 / 148 / 151	149 / 149 / 151	152 / 152 / 153	
	4,000	147 / 147 / 151	147 / 147 / 151	147 / 147 / 151	148 / 148 / 151	149 / 149 / 151	
	2,000	147 / 147 / 150	147 / 147 / 150	147 / 147 / 150	147 / 147 / 150	148 / 148 / 150	
	0	144 / 144 / 147	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	147 / 147 / 150	148 / 148 / 151 147 / 147 / 150
160	8,000	146 / 146 / 149	146 / 146 / 149	147 / 147 / 149	149 / 149 / 151	152 / 152 / 153	
	6,000	145 / 145 / 148	145 / 145 / 148	146 / 146 / 148	146 / 146 / 149	149 / 149 / 150	
	4,000	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	146 / 146 / 148	
	2,000	144 / 144 / 148	144 / 144 / 148	144 / 144 / 148	144 / 144 / 148	145 / 145 / 148	
	0	142 / 142 / 146	142 / 142 / 146	143 / 143 / 146	143 / 143 / 146	144 / 144 / 147	146 / 146 / 148 145 / 145 / 147
155	8,000	143 / 143 / 146	143 / 143 / 146	144 / 144 / 146	146 / 146 / 148	149 / 149 / 150	
	6,000	142 / 142 / 145	142 / 142 / 145	142 / 142 / 145	144 / 144 / 146	146 / 146 / 147	
	4,000	141 / 141 / 144	141 / 141 / 144	141 / 141 / 144	142 / 142 / 145	143 / 143 / 146	
	2,000	140 / 140 / 144	141 / 141 / 144	141 / 141 / 144	141 / 141 / 144	142 / 142 / 145	
	0	140 / 140 / 144	140 / 140 / 144	140 / 140 / 144	140 / 140 / 144	141 / 141 / 144	143 / 143 / 145 141 / 141 / 144
150	8,000	140 / 140 / 143	141 / 141 / 143	141 / 141 / 144	143 / 143 / 145	146 / 146 / 147	
	6,000	139 / 139 / 143	139 / 139 / 143	140 / 140 / 143	141 / 141 / 143	143 / 143 / 144	
	4,000	138 / 138 / 142	139 / 139 / 142	139 / 139 / 142	139 / 139 / 142	140 / 140 / 143	
	2,000	138 / 138 / 142	138 / 138 / 142	138 / 138 / 142	138 / 138 / 142	139 / 139 / 142	
	0	137 / 137 / 142	137 / 137 / 142	137 / 137 / 142	137 / 137 / 142	138 / 138 / 142	140 / 140 / 143 139 / 139 / 142

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.

5-A1 Engines

**V₁ / V_R / V₂
TO / 3**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
145	8,000	137 / 137 / 140	138 / 138 / 141	138 / 138 / 141	140 / 140 / 142	142 / 142 / 143	
	6,000	137 / 137 / 140	137 / 137 / 140	137 / 137 / 140	138 / 138 / 140	140 / 140 / 142	122 / 122 / 125
	4,000	136 / 136 / 140	136 / 136 / 140	136 / 136 / 140	137 / 137 / 140	138 / 138 / 140	125 / 125 / 127
	2,000	135 / 135 / 139	135 / 135 / 139	135 / 135 / 139	136 / 136 / 139	136 / 136 / 139	137 / 137 / 140
	0	134 / 134 / 139	135 / 135 / 139	135 / 135 / 139	135 / 135 / 139	135 / 135 / 139	136 / 136 / 139
140	8,000	135 / 135 / 138	135 / 135 / 138	136 / 136 / 138	137 / 137 / 139	139 / 139 / 140	
	6,000	134 / 134 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 138	137 / 137 / 139	
	4,000	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 137	125 / 125 / 127
	2,000	132 / 132 / 137	133 / 133 / 137	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	135 / 135 / 137
	0	132 / 132 / 137	132 / 132 / 137	132 / 132 / 137	132 / 132 / 137	133 / 133 / 137	133 / 133 / 137
135	8,000	132 / 132 / 135	132 / 132 / 135	133 / 133 / 135	134 / 134 / 136	136 / 136 / 137	
	6,000	131 / 131 / 135	132 / 132 / 135	132 / 132 / 135	132 / 132 / 135	134 / 134 / 136	
	4,000	130 / 130 / 135	131 / 131 / 135	131 / 131 / 135	131 / 131 / 135	132 / 132 / 135	125 / 125 / 127
	2,000	130 / 130 / 134	130 / 130 / 134	130 / 130 / 134	130 / 130 / 134	131 / 131 / 134	132 / 132 / 134
	0	129 / 129 / 134	129 / 129 / 134	129 / 129 / 134	129 / 129 / 134	130 / 130 / 134	131 / 131 / 134
130	8,000	129 / 129 / 133	130 / 130 / 133	130 / 130 / 133	131 / 131 / 133	133 / 133 / 134	
	6,000	129 / 129 / 132	129 / 129 / 132	129 / 129 / 132	130 / 130 / 132	131 / 131 / 133	
	4,000	128 / 128 / 132	128 / 128 / 132	128 / 128 / 132	129 / 129 / 132	129 / 129 / 132	125 / 125 / 127
	2,000	127 / 127 / 132	127 / 127 / 132	127 / 127 / 132	128 / 128 / 132	128 / 128 / 132	129 / 129 / 132
	0	126 / 126 / 131	127 / 127 / 131	127 / 127 / 131	127 / 127 / 131	127 / 127 / 131	128 / 128 / 131
125	8,000	127 / 127 / 130	127 / 127 / 130	127 / 127 / 130	128 / 128 / 130	129 / 129 / 130	
	6,000	126 / 126 / 130	126 / 126 / 130	126 / 126 / 130	127 / 127 / 130	128 / 128 / 130	
	4,000	125 / 125 / 129	125 / 125 / 129	125 / 125 / 129	126 / 126 / 129	127 / 127 / 129	125 / 125 / 127
	2,000	124 / 124 / 129	125 / 125 / 129	125 / 125 / 129	125 / 125 / 129	126 / 126 / 129	126 / 126 / 129
	0	123 / 123 / 129	124 / 124 / 129	124 / 124 / 129	124 / 124 / 129	125 / 125 / 129	125 / 125 / 129
120	8,000	124 / 124 / 127	124 / 124 / 127	124 / 124 / 127	125 / 125 / 127	126 / 126 / 127	
	6,000	123 / 123 / 127	123 / 123 / 127	123 / 123 / 127	124 / 124 / 127	125 / 125 / 127	
	4,000	122 / 122 / 127	122 / 122 / 127	123 / 123 / 127	123 / 123 / 127	124 / 124 / 127	125 / 125 / 127
	2,000	121 / 121 / 126	122 / 122 / 126	122 / 122 / 126	122 / 122 / 126	123 / 123 / 126	124 / 124 / 126
	0	120 / 120 / 126	121 / 121 / 126	121 / 121 / 126	121 / 121 / 126	122 / 122 / 126	123 / 123 / 126
115	8,000	121 / 121 / 124	121 / 121 / 124	122 / 122 / 124	122 / 122 / 124	123 / 123 / 124	
	6,000	120 / 120 / 124	120 / 120 / 124	121 / 121 / 124	121 / 121 / 124	122 / 122 / 124	
	4,000	119 / 119 / 124	120 / 120 / 124	120 / 120 / 124	120 / 120 / 124	121 / 121 / 124	124 / 124 / 126
	2,000	118 / 118 / 124	119 / 119 / 124	119 / 119 / 124	119 / 119 / 124	120 / 120 / 124	121 / 121 / 124
	0	117 / 117 / 124	118 / 118 / 124	118 / 118 / 124	118 / 118 / 124	119 / 119 / 124	120 / 120 / 124

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

TAKEOFF SPEEDS

Ships 3234-3245, 3247-3276

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 / 1**

5-A3 Engines

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
180	8,000	173 / 173 / 174	164 / 173 / 174	170 / 173 / 174	173 / 173 / 174	174 / 174 / 175	
	6,000	165 / 165 / 166	160 / 170 / 171	159 / 170 / 171	172 / 173 / 174	173 / 173 / 174	
	4,000	165 / 165 / 166	160 / 165 / 166	157 / 165 / 166	165 / 170 / 171	172 / 172 / 173	172 / 172 / 173
	2,000	163 / 163 / 165	160 / 163 / 165	157 / 164 / 165	160 / 164 / 165	171 / 171 / 172	172 / 172 / 173
	0	165 / 165 / 166	162 / 165 / 166	159 / 165 / 166	156 / 165 / 166	162 / 163 / 164	170 / 170 / 171
175	8,000	170 / 170 / 171	161 / 170 / 171	167 / 170 / 171	170 / 170 / 171	171 / 171 / 172	
	6,000	164 / 164 / 165	157 / 167 / 168	156 / 167 / 168	169 / 170 / 171	170 / 170 / 171	
	4,000	163 / 163 / 164	158 / 163 / 164	155 / 163 / 164	163 / 167 / 168	169 / 169 / 170	169 / 169 / 170
	2,000	162 / 162 / 163	158 / 162 / 163	156 / 162 / 163	158 / 163 / 164	168 / 168 / 169	169 / 169 / 170
	0	162 / 162 / 164	162 / 162 / 164	161 / 162 / 164	158 / 162 / 164	160 / 162 / 163	167 / 167 / 168
170	8,000	167 / 167 / 168	158 / 167 / 168	164 / 167 / 168	167 / 167 / 168	168 / 168 / 169	
	6,000	162 / 162 / 163	155 / 164 / 165	153 / 164 / 165	166 / 167 / 168	167 / 167 / 168	
	4,000	161 / 161 / 162	156 / 161 / 162	153 / 161 / 162	160 / 164 / 165	166 / 166 / 167	166 / 166 / 167
	2,000	160 / 160 / 162	160 / 160 / 162	158 / 160 / 162	156 / 161 / 162	165 / 165 / 166	166 / 166 / 167
	0	159 / 159 / 161	159 / 159 / 161	160 / 160 / 161	160 / 160 / 161	159 / 160 / 161	164 / 164 / 165
165	8,000	164 / 164 / 165	155 / 164 / 165	161 / 164 / 165	164 / 164 / 165	165 / 165 / 166	
	6,000	160 / 160 / 161	152 / 161 / 162	151 / 161 / 162	163 / 163 / 164	164 / 164 / 165	
	4,000	159 / 159 / 161	158 / 160 / 161	154 / 160 / 161	157 / 161 / 162	163 / 163 / 164	163 / 163 / 164
	2,000	158 / 158 / 160	159 / 159 / 160	159 / 159 / 160	158 / 159 / 160	162 / 162 / 163	163 / 163 / 164
	0	158 / 158 / 160	158 / 158 / 160	158 / 158 / 160	158 / 158 / 160	159 / 159 / 160	161 / 161 / 162
160	8,000	160 / 160 / 161	153 / 161 / 162	158 / 161 / 162	161 / 161 / 162	162 / 162 / 163	
	6,000	158 / 158 / 159	154 / 158 / 159	151 / 159 / 160	160 / 160 / 161	161 / 161 / 162	
	4,000	157 / 157 / 159	158 / 158 / 159	157 / 158 / 159	155 / 158 / 159	160 / 160 / 161	160 / 160 / 161
	2,000	157 / 157 / 159	157 / 157 / 159	157 / 157 / 159	157 / 157 / 159	159 / 159 / 160	160 / 160 / 161
	0	156 / 156 / 158	156 / 156 / 158	156 / 156 / 158	156 / 156 / 158	157 / 157 / 158	158 / 158 / 159
155	8,000	157 / 157 / 158	151 / 157 / 158	154 / 157 / 158	158 / 158 / 159	159 / 159 / 160	
	6,000	156 / 156 / 157	156 / 156 / 157	154 / 156 / 157	156 / 156 / 157	157 / 157 / 158	
	4,000	155 / 155 / 156	155 / 155 / 156	155 / 155 / 156	156 / 156 / 157	156 / 156 / 157	157 / 157 / 158
	2,000	154 / 154 / 156	154 / 154 / 156	154 / 154 / 156	155 / 155 / 156	155 / 155 / 156	156 / 156 / 157
	0	153 / 153 / 156	153 / 153 / 156	154 / 154 / 156	154 / 154 / 156	154 / 154 / 156	155 / 155 / 156
150	8,000	154 / 154 / 155	153 / 154 / 155	151 / 154 / 155	155 / 155 / 156	156 / 156 / 157	
	6,000	153 / 153 / 154	153 / 153 / 154	153 / 153 / 154	154 / 154 / 155	154 / 154 / 155	
	4,000	152 / 152 / 154	152 / 152 / 154	152 / 152 / 154	153 / 153 / 154	153 / 153 / 154	154 / 154 / 155
	2,000	151 / 151 / 153	152 / 152 / 153	152 / 152 / 153	152 / 152 / 153	152 / 152 / 153	153 / 153 / 154
	0	150 / 150 / 153	151 / 151 / 153	151 / 151 / 153	151 / 151 / 153	151 / 151 / 153	152 / 152 / 153

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

TAKEOFF SPEEDS

Ships 3234-3245, 3247-3276

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.

5-A3 Engines

**V₁ / V_R / V₂
TO / 1**

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
145	8,000	151 / 151 / 152	151 / 151 / 152	151 / 151 / 152	152 / 152 / 153	153 / 153 / 154	
	6,000	150 / 150 / 151	150 / 150 / 151	150 / 150 / 151	151 / 151 / 152	151 / 151 / 152	144 / 144 / 145
	4,000	149 / 149 / 151	149 / 149 / 151	149 / 149 / 151	150 / 150 / 151	150 / 150 / 151	151 / 151 / 152
	2,000	148 / 148 / 151	149 / 149 / 151	149 / 149 / 151	149 / 149 / 151	150 / 150 / 151	150 / 150 / 151
	0	147 / 147 / 150	148 / 148 / 150	148 / 148 / 150	148 / 148 / 150	148 / 148 / 150	149 / 149 / 150
140	8,000	148 / 148 / 149	148 / 148 / 149	148 / 148 / 149	149 / 149 / 150	150 / 150 / 151	
	6,000	147 / 147 / 149	147 / 147 / 149	147 / 147 / 149	148 / 148 / 149	148 / 148 / 149	144 / 144 / 145
	4,000	146 / 146 / 148	146 / 146 / 148	147 / 147 / 148	147 / 147 / 148	148 / 148 / 149	148 / 148 / 149
	2,000	145 / 145 / 148	146 / 146 / 148	146 / 146 / 148	146 / 146 / 148	147 / 147 / 148	147 / 147 / 148
	0	144 / 144 / 148	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	146 / 146 / 148	146 / 146 / 148
135	8,000	148 / 148 / 149	148 / 148 / 149	148 / 148 / 149	149 / 149 / 150	150 / 150 / 151	
	6,000	144 / 144 / 146	144 / 144 / 146	144 / 144 / 146	145 / 145 / 146	146 / 146 / 147	144 / 144 / 145
	4,000	143 / 143 / 145	144 / 144 / 145	144 / 144 / 145	144 / 144 / 145	145 / 145 / 146	145 / 145 / 146
	2,000	142 / 142 / 145	143 / 143 / 145	143 / 143 / 145	143 / 143 / 145	144 / 144 / 145	144 / 144 / 145
	0	141 / 141 / 145	142 / 142 / 145	142 / 142 / 145	142 / 142 / 145	143 / 143 / 145	143 / 143 / 145
130	8,000	142 / 142 / 143	142 / 142 / 143	143 / 143 / 144	143 / 143 / 144	144 / 144 / 145	
	6,000	141 / 141 / 143	141 / 141 / 143	141 / 141 / 143	142 / 142 / 143	143 / 143 / 144	144 / 144 / 145
	4,000	140 / 140 / 143	141 / 141 / 143	141 / 141 / 143	141 / 141 / 143	142 / 142 / 143	142 / 142 / 143
	2,000	139 / 139 / 142	140 / 140 / 142	140 / 140 / 142	140 / 140 / 142	141 / 141 / 142	141 / 141 / 142
	0	138 / 138 / 142	139 / 139 / 142	139 / 139 / 142	139 / 139 / 142	140 / 140 / 142	141 / 141 / 142
125	8,000	139 / 139 / 141	139 / 139 / 141	139 / 139 / 141	140 / 140 / 141	141 / 141 / 142	
	6,000	138 / 138 / 140	138 / 138 / 140	138 / 138 / 140	139 / 139 / 140	140 / 140 / 141	142 / 142 / 143
	4,000	137 / 137 / 140	137 / 137 / 140	138 / 138 / 140	138 / 138 / 140	139 / 139 / 140	139 / 139 / 140
	2,000	136 / 136 / 140	137 / 137 / 140	137 / 137 / 140	137 / 137 / 140	138 / 138 / 140	138 / 138 / 140
	0	135 / 135 / 140	136 / 136 / 140	136 / 136 / 140	136 / 136 / 140	137 / 137 / 140	138 / 138 / 140
120	8,000	136 / 136 / 138	136 / 136 / 138	136 / 136 / 138	137 / 137 / 138	138 / 138 / 139	
	6,000	135 / 135 / 137	135 / 135 / 137	135 / 135 / 137	136 / 136 / 137	136 / 136 / 137	137 / 137 / 138
	4,000	134 / 134 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 137	136 / 136 / 137	136 / 136 / 137
	2,000	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 137	135 / 135 / 137
	0	132 / 132 / 137	133 / 133 / 137	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	135 / 135 / 137
115	8,000	132 / 132 / 135	133 / 133 / 135	133 / 133 / 135	134 / 134 / 135	134 / 134 / 135	
	6,000	131 / 131 / 134	132 / 132 / 134	132 / 132 / 134	133 / 133 / 134	133 / 133 / 134	134 / 134 / 135
	4,000	130 / 130 / 134	131 / 131 / 134	131 / 131 / 134	132 / 132 / 134	132 / 132 / 134	133 / 133 / 134
	2,000	130 / 130 / 134	130 / 130 / 134	130 / 130 / 134	131 / 131 / 134	132 / 132 / 134	132 / 132 / 134
	0	129 / 129 / 134	129 / 129 / 134	130 / 130 / 134	130 / 130 / 134	131 / 131 / 134	132 / 132 / 134

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

TAKEOFF SPEEDS

Ships 3234-3245, 3247-3276

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 / 3**

5-A3 Engines

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
180	8,000	154 / 154 / 157	154 / 154 / 157	154 / 154 / 157	155 / 155 / 157	160 / 160 / 161	
	6,000	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	154 / 154 / 156	154 / 154 / 156	
	4,000	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	153 / 153 / 156	154 / 154 / 156	155 / 155 / 156
	2,000	150 / 150 / 154	151 / 151 / 154	151 / 151 / 154	153 / 153 / 155	153 / 153 / 155	153 / 153 / 155
	0	145 / 145 / 149	146 / 146 / 149	146 / 146 / 149	146 / 146 / 149	150 / 150 / 153	161 / 161 / 162
175	8,000	152 / 152 / 154	152 / 152 / 154	152 / 152 / 154	153 / 153 / 155	157 / 157 / 158	
	6,000	151 / 151 / 154	151 / 151 / 154	151 / 151 / 154	151 / 151 / 154	151 / 151 / 154	
	4,000	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	150 / 150 / 153	151 / 151 / 153	152 / 152 / 154
	2,000	148 / 148 / 151	148 / 148 / 151	148 / 148 / 151	150 / 150 / 153	150 / 150 / 153	151 / 151 / 153
	0	144 / 144 / 148	144 / 144 / 148	144 / 144 / 148	144 / 144 / 148	148 / 148 / 151	157 / 157 / 158
170	8,000	149 / 149 / 151	149 / 149 / 151	149 / 149 / 151	150 / 150 / 152	154 / 154 / 155	
	6,000	148 / 148 / 151	148 / 148 / 151	148 / 148 / 151	149 / 149 / 151	149 / 149 / 151	
	4,000	147 / 147 / 151	147 / 147 / 151	147 / 147 / 151	148 / 148 / 151	148 / 148 / 151	149 / 149 / 151
	2,000	145 / 145 / 149	145 / 145 / 149	145 / 145 / 149	147 / 147 / 150	148 / 148 / 150	148 / 148 / 150
	0	142 / 142 / 146	143 / 143 / 146	143 / 143 / 146	143 / 143 / 146	145 / 145 / 149	154 / 154 / 155
165	8,000	146 / 146 / 149	146 / 146 / 149	146 / 146 / 149	147 / 147 / 149	150 / 150 / 151	
	6,000	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	146 / 146 / 148	146 / 146 / 148	
	4,000	144 / 144 / 148	145 / 145 / 148	145 / 145 / 148	145 / 145 / 148	146 / 146 / 148	146 / 146 / 148
	2,000	142 / 142 / 146	143 / 143 / 146	143 / 143 / 146	144 / 144 / 148	145 / 145 / 148	145 / 145 / 148
	0	141 / 141 / 145	141 / 141 / 145	141 / 141 / 145	141 / 141 / 145	143 / 143 / 146	150 / 150 / 151
160	8,000	143 / 143 / 146	143 / 143 / 146	144 / 144 / 146	144 / 144 / 146	147 / 147 / 148	
	6,000	142 / 142 / 146	142 / 142 / 146	142 / 142 / 146	143 / 143 / 146	143 / 143 / 146	
	4,000	142 / 142 / 145	142 / 142 / 145	142 / 142 / 145	142 / 142 / 145	143 / 143 / 145	144 / 144 / 146
	2,000	140 / 140 / 144	140 / 140 / 144	140 / 140 / 144	142 / 142 / 145	142 / 142 / 145	143 / 143 / 145
	0	139 / 139 / 144	139 / 139 / 144	139 / 139 / 144	139 / 139 / 144	140 / 140 / 144	147 / 147 / 148
155	8,000	140 / 140 / 143	140 / 140 / 143	140 / 140 / 143	142 / 142 / 144	144 / 144 / 145	
	6,000	139 / 139 / 142	139 / 139 / 143	139 / 139 / 143	140 / 140 / 143	141 / 141 / 143	
	4,000	138 / 138 / 142	138 / 138 / 142	138 / 138 / 142	139 / 139 / 143	140 / 140 / 143	141 / 141 / 143
	2,000	137 / 137 / 142	138 / 138 / 142	138 / 138 / 142	138 / 138 / 142	139 / 139 / 142	139 / 139 / 142
	0	136 / 136 / 142	137 / 137 / 142	137 / 137 / 142	137 / 137 / 142	138 / 138 / 142	138 / 138 / 142
150	8,000	137 / 137 / 141	137 / 137 / 141	138 / 138 / 141	139 / 139 / 141	141 / 141 / 142	
	6,000	136 / 136 / 140	136 / 136 / 140	137 / 137 / 140	137 / 137 / 140	138 / 138 / 141	
	4,000	136 / 136 / 140	136 / 136 / 140	136 / 136 / 140	136 / 136 / 140	137 / 137 / 140	138 / 138 / 140
	2,000	135 / 135 / 140	135 / 135 / 140	135 / 135 / 140	136 / 136 / 140	136 / 136 / 140	137 / 137 / 140
	0	133 / 133 / 139	134 / 134 / 139	134 / 134 / 139	134 / 134 / 139	135 / 135 / 139	136 / 136 / 139

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

TAKEOFF SPEEDS

Ships 3234-3245, 3247-3276

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.

5-A3 Engines

V₁ / V_R / V₂
TO / 3

TAKEOFF WEIGHT 1,000 LBS	AIRPORT PRESS ALT FT	AMBIENT TEMPERATURE – °C					
		0 & below	10	20	30	40	50
145	8,000	134 / 134 / 138	135 / 135 / 138	135 / 135 / 138	136 / 136 / 138	138 / 138 / 139	
	6,000	134 / 134 / 138	134 / 134 / 138	134 / 134 / 138	135 / 135 / 138	135 / 135 / 138	124 / 124 / 126
	4,000	133 / 133 / 137	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	134 / 134 / 137	135 / 135 / 138
	2,000	132 / 132 / 137	133 / 133 / 137	133 / 133 / 137	133 / 133 / 137	134 / 134 / 137	134 / 134 / 137
	0	131 / 131 / 137	131 / 131 / 137	132 / 132 / 137	132 / 132 / 137	132 / 132 / 137	133 / 133 / 137
140	8,000	132 / 132 / 135	132 / 132 / 135	132 / 132 / 136	133 / 133 / 136	135 / 135 / 137	
	6,000	131 / 131 / 135	131 / 131 / 135	131 / 131 / 135	132 / 132 / 135	133 / 133 / 135	124 / 124 / 126
	4,000	130 / 130 / 135	131 / 131 / 135	131 / 131 / 135	131 / 131 / 135	132 / 132 / 135	133 / 133 / 135
	2,000	129 / 129 / 135	130 / 130 / 135	130 / 130 / 135	130 / 130 / 135	131 / 131 / 135	132 / 132 / 135
	0	129 / 129 / 134	129 / 129 / 134	129 / 129 / 134	129 / 129 / 134	130 / 130 / 134	131 / 131 / 134
135	8,000	129 / 129 / 133	129 / 129 / 133	130 / 130 / 133	131 / 131 / 133	132 / 132 / 134	
	6,000	128 / 128 / 133	129 / 129 / 133	129 / 129 / 133	129 / 129 / 133	130 / 130 / 133	124 / 124 / 126
	4,000	128 / 128 / 132	128 / 128 / 132	128 / 128 / 132	129 / 129 / 132	129 / 129 / 132	130 / 130 / 132
	2,000	127 / 127 / 132	127 / 127 / 132	127 / 127 / 132	128 / 128 / 132	128 / 128 / 132	129 / 129 / 132
	0	126 / 126 / 132	126 / 126 / 132	126 / 126 / 132	126 / 126 / 132	126 / 126 / 132	128 / 128 / 132
130	8,000	126 / 126 / 130	127 / 127 / 130	127 / 127 / 130	128 / 128 / 130	129 / 129 / 131	
	6,000	125 / 125 / 130	126 / 126 / 130	126 / 126 / 130	127 / 127 / 130	127 / 127 / 130	124 / 124 / 126
	4,000	125 / 125 / 130	125 / 125 / 130	125 / 125 / 130	126 / 126 / 130	126 / 126 / 130	127 / 127 / 130
	2,000	124 / 124 / 129	125 / 125 / 129	125 / 125 / 129	125 / 125 / 129	126 / 126 / 129	126 / 126 / 129
	0	124 / 124 / 129	124 / 124 / 129	124 / 124 / 129	124 / 124 / 129	124 / 124 / 129	125 / 125 / 129
125	8,000	124 / 124 / 128	124 / 124 / 128	124 / 124 / 128	125 / 125 / 128	126 / 126 / 128	
	6,000	123 / 123 / 127	123 / 123 / 127	123 / 123 / 127	124 / 124 / 127	125 / 125 / 127	124 / 124 / 126
	4,000	122 / 122 / 127	123 / 123 / 127	123 / 123 / 127	123 / 123 / 127	124 / 124 / 127	124 / 124 / 127
	2,000	121 / 121 / 127	122 / 122 / 127	122 / 122 / 127	122 / 122 / 127	123 / 123 / 127	124 / 124 / 127
	0	120 / 120 / 127	122 / 122 / 127	122 / 122 / 127	122 / 122 / 127	122 / 122 / 127	122 / 122 / 127
120	8,000	121 / 121 / 125	121 / 121 / 125	122 / 122 / 125	122 / 122 / 125	123 / 123 / 125	
	6,000	120 / 120 / 125	120 / 120 / 125	121 / 121 / 125	121 / 121 / 125	122 / 122 / 125	124 / 124 / 126
	4,000	119 / 119 / 124	120 / 120 / 124	120 / 120 / 124	120 / 120 / 124	121 / 121 / 124	122 / 122 / 124
	2,000	118 / 118 / 124	119 / 119 / 124	119 / 119 / 124	119 / 119 / 124	120 / 120 / 124	121 / 121 / 124
	0	117 / 117 / 124	118 / 118 / 124	118 / 118 / 124	118 / 118 / 124	119 / 119 / 124	119 / 119 / 124
115	8,000	118 / 118 / 122	118 / 118 / 122	119 / 119 / 122	119 / 119 / 122	120 / 120 / 122	
	6,000	117 / 117 / 122	117 / 117 / 122	118 / 118 / 122	118 / 118 / 122	119 / 119 / 122	121 / 121 / 123
	4,000	116 / 116 / 122	117 / 117 / 122	117 / 117 / 122	117 / 117 / 122	118 / 118 / 122	119 / 119 / 122
	2,000	115 / 115 / 122	116 / 116 / 122	116 / 116 / 122	116 / 116 / 122	117 / 117 / 122	118 / 118 / 122
	0	115 / 115 / 122	115 / 115 / 121	115 / 115 / 121	115 / 115 / 121	116 / 116 / 121	117 / 117 / 121

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

TAKEOFF STABILIZER SETTINGS

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.

Valid for all weights and configurations

%MAC	Trim	%MAC	Trim
15	-2.5	30	+0.3
16	-2.5	31	+0.5
17	-2.5	32	+0.8
18	-2.3	33	+1.0
19	-2.1	34	+1.2
20	-1.8	35	+1.4
21	-1.6	36	+1.6
22	-1.4	37	+1.8
23	-1.2	38	+2.1
24	-1.0	39	+2.3
25	-0.8	40	+2.5
26	-0.5	41	+2.5
27	-0.3	42	+2.5
28	-0.1	43	+2.5
29	+0.1	44	+2.5

Negative Units are Airplane Nose Up
Positive Units are Airplane Nose Down

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 1.23 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. Actual demonstrated landing distance is 60% of the F.A.R landing distance. 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. 1.23 V_S is 1.23 times the stall speed, or an increase of 30% above stall speed.

OPERATIONAL LANDING DISTANCES FEET

FLAPS FULL

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	DRY (6)			GOOD (5)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,600	6,900	6,000	9,600	7,000	7,000
155,000	9,400	6,700	5,800	9,400	6,900	6,900
150,000	9,100	6,600	5,600	9,100	6,700	6,700
145,000	8,900	6,400	5,400	8,900	6,500	6,500
142,198	8,000	5,700	4,300	8,000	5,700	5,500
140,000	7,900	5,600	4,300	7,900	5,600	5,400
135,000	7,700	5,500	4,200	7,700	5,500	5,200
130,000	7,500	5,300	4,100	7,500	5,300	5,100
125,000	7,300	5,200	4,000	7,300	5,200	4,900
120,000	7,000	5,000	3,900	7,000	5,000	4,700
115,000	6,800	4,900	3,800	6,800	4,900	4,600
110,000	6,600	4,700	3,600	6,600	4,700	4,400
105,000	6,300	4,600	3,500	6,300	4,600	4,200
100,000	6,100	4,400	3,400	6,100	4,400	4,100
95,000	5,900	4,200	3,300	5,900	4,200	3,900
90,000	5,600	4,100	3,200	5,600	4,100	3,700

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-300	-300	-500	-500	-500
2,000	0	0	0	0	0	0
4,000	500	300	300	500	500	500
6,000	1,000	600	600	1,000	1,000	1,000
8,000	1,500	1,000	900	1,500	1,400	1,400

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	500	350	300	500	400	400
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	250	150	150	250	250	250
PER 1% DOWN SLOPE	100	50	50	100	150	150
1 REV INOP	0	0	0	0	0	0
2 REV INOP or NO REV USED	100	0	100	100	0	200
Autoland	1,100			1,300		

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS FULL

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,700	8,500	8,500	13,000	12,900	12,900
155,000	9,500	8,300	8,300	12,700	12,500	12,500
150,000	9,300	8,000	8,000	12,300	12,200	12,200
145,000	9,000	7,800	7,800	12,000	11,800	11,800
142,198	8,200	6,900	6,800	11,100	10,900	10,800
140,000	8,100	6,800	6,800	10,900	10,700	10,700
135,000	7,900	6,700	6,600	10,600	10,400	10,400
130,000	7,600	6,500	6,400	10,200	10,100	10,000
125,000	7,400	6,300	6,200	9,900	9,700	9,700
120,000	7,200	6,100	6,000	9,500	9,400	9,400
115,000	6,900	5,900	5,800	9,200	9,000	9,000
110,000	6,700	5,700	5,600	8,900	8,700	8,700
105,000	6,400	5,500	5,400	8,500	8,300	8,300
100,000	6,200	5,300	5,200	8,200	8,000	8,000
95,000	5,900	5,100	5,000	7,800	7,700	7,600
90,000	5,700	4,800	4,800	7,400	7,300	7,300

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-500	-500	-1,000	-1,000	-1,000
2,000	0	0	0	0	0	0
4,000	500	500	500	1,000	1,000	1,000
6,000	1,100	1,000	1,000	2,000	2,000	2,000
8,000	1,600	1,400	1,400	3,000	3,000	3,000

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	500	400	400	600	550	550
PER 1 KT TAILWIND	150	150	150	400	400	400
PER 10°C ABOVE ISA	250	250	250	500	500	500
PER 1% DOWN SLOPE	300	400	350	2,900	2,900	2,900
1 REV INOP	0	0	0	500	500	400
2 REV INOP or NO REV USED	200	600	500	2,200	2,200	2,100
Autoland	1,300			1,500		

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 3

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	DRY (6)			GOOD (5)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	10,300	7,300	6,600	10,300	7,800	7,800
155,000	10,100	7,100	6,300	10,100	7,600	7,600
150,000	9,800	7,000	6,100	9,800	7,400	7,400
145,000	9,500	6,800	5,900	9,500	7,100	7,100
142,198	8,600	6,000	4,700	8,600	6,200	6,000
140,000	8,500	6,000	4,600	8,500	6,100	5,900
135,000	8,300	5,800	4,400	8,300	5,900	5,700
130,000	8,000	5,600	4,300	8,000	5,700	5,500
125,000	7,800	5,500	4,200	7,800	5,500	5,300
120,000	7,500	5,300	4,100	7,500	5,400	5,100
115,000	7,300	5,200	4,000	7,300	5,200	5,000
110,000	7,000	5,000	3,800	7,000	5,000	4,800
105,000	6,800	4,800	3,700	6,800	4,800	4,600
100,000	6,500	4,700	3,600	6,500	4,700	4,400
95,000	6,300	4,500	3,500	6,300	4,500	4,200
90,000	6,000	4,300	3,400	6,000	4,300	4,000

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-300	-300	-500	-500	-500
2,000	0	0	0	0	0	0
4,000	500	300	300	500	500	500
6,000	1,100	700	600	1,100	1,100	1,100
8,000	1,600	1,000	900	1,600	1,600	1,600

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	550	350	300	550	450	450
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	300	200	150	300	300	300
PER 1% DOWN SLOPE	100	50	100	100	200	200
1 REV INOP	0	0	0	0	0	0
2 REV INOP or NO REV USED	100	0	100	100	100	200
Autoland	1,200			1,500		

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES FEET

FLAPS 3

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	10,500	9,300	9,300	14,400	14,400	14,400
155,000	10,200	9,100	9,100	14,100	14,000	14,000
150,000	10,000	8,800	8,800	13,700	13,600	13,600
145,000	9,700	8,600	8,600	13,200	13,200	13,200
142,198	8,800	7,500	7,400	12,300	12,100	12,100
140,000	8,700	7,400	7,300	12,100	12,000	12,000
135,000	8,400	7,200	7,100	11,700	11,600	11,600
130,000	8,200	7,000	6,900	11,300	11,200	11,200
125,000	7,900	6,800	6,700	10,900	10,800	10,800
120,000	7,700	6,600	6,500	10,600	10,500	10,400
115,000	7,400	6,400	6,300	10,200	10,100	10,100
110,000	7,200	6,100	6,100	9,800	9,700	9,700
105,000	6,900	5,900	5,800	9,400	9,300	9,300
100,000	6,600	5,700	5,600	9,000	8,900	8,900
95,000	6,400	5,500	5,400	8,600	8,500	8,500
90,000	6,100	5,200	5,200	8,200	8,100	8,100

BASIS: Zero wind • Standard approach procedure • Two Engines at Full Reverse Thrust • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes 15% safety margin and standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-600	-500	-500	-1,100	-1,100	-1,100
2,000	0	0	0	0	0	0
4,000	600	500	500	1,100	1,100	1,100
6,000	1,200	1,100	1,100	2,300	2,300	2,300
8,000	1,700	1,600	1,600	3,400	3,400	3,400

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	550	400	400	650	650	650
PER 1 KT TAILWIND	200	150	150	450	450	450
PER 10°C ABOVE ISA	300	250	250	550	550	550
PER 1% DOWN SLOPE	350	450	450	3,550	3,550	3,550
1 REV INOP	0	100	0	700	700	600
2 REV INOP or NO REV USED	300	700	600	2,700	2,700	2,600
Autoland	1,500			1,800		

Note: Do not operate when Braking Action is Nil.

STALL SPEEDS

KCAS

Landing Gear UP

Aircraft Weight (lb)	Configuration					
	CONF 0	CONF 1	CONF 1+F	CONF 2	CONF 3	CONF FULL
166,400	169	141	133	125	124	119
165,000	168	140	133	125	124	118
160,000	166	138	130	123	122	116
155,000	163	136	128	121	120	114
150,000	160	133	126	119	118	112
145,000	158	131	124	116	115	110
140,000	155	129	122	114	113	108
135,000	152	126	119	112	111	106
130,000	149	124	117	110	109	104
125,000	147	122	115	108	107	102
120,000	144	119	112	106	105	100
115,000	141	117	110	104	103	98
110,000	138	114	108	101	100	96
105,000	134	112	105	99	98	94
100,000	131	109	103	97	96	91
95,000	128	106	100	94	93	89

Landing Gear DOWN

Aircraft Weight (lb)	Configuration					
	CONF 0	CONF 1	CONF 1+F	CONF 2	CONF 3	CONF FULL
166,400	171	143	135	126	125	120
165,000	170	142	134	126	124	119
160,000	168	139	132	124	122	117
155,000	165	137	130	122	120	115
150,000	162	135	127	120	118	113
145,000	160	132	125	117	116	111
140,000	157	130	123	115	114	109
135,000	154	128	120	113	112	107
130,000	151	125	118	111	109	105
125,000	148	123	116	109	107	103
120,000	145	120	114	107	105	101
115,000	142	118	111	104	103	99
110,000	139	115	109	102	101	96
105,000	136	113	106	100	98	94
100,000	133	110	104	97	96	92
95,000	129	107	101	95	93	90

APPROACH AND LANDING SPEEDS

KIAS

FLAPS 3 - Approach FLAPS FULL - Landing
--

Aircraft Weight	V _{LS}	F	S	O
166,400	148	162	210	236
165,000	147	161	209	234
160,000	144	158	206	230
155,000	142	156	203	226
150,000	139	153	200	221
145,000	137	151	197	217
140,000	134	148	194	212
135,000	132	145	190	207
130,000	129	143	187	203
125,000	127	140	183	198
120,000	124	137	179	194
115,000	121	135	176	189
110,000	118	131	172	185
105,000	116	127	168	180
100,000	113	125	163	176

F.A.R. DRY LANDING FIELD LENGTH

FEET

**CFM56
-5A1/-5A3**

FLAPS FULL

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
166,400	6,000	6,170	6,340	6,510	6,690	6,870	7,060	7,260	7,470	7,680	7,720
165,000	5,920	6,090	6,260	6,430	6,610	6,790	6,980	7,170	7,370	7,580	7,620
160,000	5,650	5,810	5,980	6,140	6,310	6,490	6,670	6,850	7,040	7,240	7,280
155,000	5,370	5,530	5,690	5,860	6,020	6,190	6,360	6,540	6,720	6,910	6,950
150,000	5,090	5,250	5,400	5,570	5,730	5,890	6,060	6,230	6,410	6,590	6,630
145,000	4,820	4,970	5,120	5,270	5,430	5,590	5,760	5,930	6,100	6,270	6,310
140,000	4,600	4,730	4,860	5,000	5,140	5,290	5,450	5,620	5,780	5,950	5,990
135,000	4,450	4,540	4,650	4,770	4,890	5,030	5,170	5,320	5,480	5,640	5,670
130,000	4,330	4,420	4,510	4,600	4,700	4,810	4,930	5,070	5,200	5,350	5,380
125,000	4,230	4,310	4,390	4,480	4,570	4,660	4,760	4,870	4,980	5,100	5,130
120,000	4,120	4,200	4,280	4,360	4,450	4,540	4,630	4,730	4,830	4,930	4,960
115,000	4,020	4,090	4,170	4,250	4,330	4,420	4,510	4,600	4,690	4,790	4,810
110,000	3,920	3,990	4,060	4,140	4,220	4,300	4,380	4,470	4,560	4,660	4,680
105,000	3,820	3,890	3,960	4,030	4,100	4,180	4,260	4,350	4,430	4,520	4,540
100,000	3,720	3,780	3,850	3,920	3,990	4,060	4,140	4,220	4,300	4,390	4,410

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 VLS.
- Based on Maximum Manual Braking, Ground Spoilers, anti-skid and No Reverse Thrust.

CONDITION	CORRECTION
Headwind	- 16 ft. per knot
Tailwind	+ 107 ft. per knot
Wet Runway and/or Low Minima	Increase distance by 15%

F.A.R. DRY LANDING FIELD LENGTH

FEET

**CFM56
-5A1/-5A3**

FLAPS 3

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
166,400	6,620	6,800	6,980	7,170	7,370	7,570	7,790	8,000	8,230	8,470	8,520
165,000	6,530	6,710	6,900	7,080	7,280	7,480	7,690	7,900	8,130	8,360	8,410
160,000	6,240	6,410	6,590	6,770	6,950	7,140	7,340	7,550	7,760	7,980	8,020
155,000	5,950	6,110	6,280	6,460	6,630	6,810	7,000	7,200	7,400	7,610	7,650
150,000	5,650	5,810	5,980	6,150	6,320	6,490	6,670	6,860	7,050	7,250	7,290
145,000	5,350	5,510	5,670	5,840	6,000	6,170	6,350	6,520	6,700	6,890	6,930
140,000	5,060	5,210	5,370	5,520	5,690	5,850	6,020	6,190	6,370	6,550	6,580
135,000	4,830	4,960	5,090	5,230	5,380	5,540	5,700	5,860	6,030	6,210	6,240
130,000	4,660	4,750	4,870	4,990	5,120	5,260	5,400	5,560	5,710	5,880	5,910
125,000	4,530	4,620	4,720	4,820	4,920	5,030	5,160	5,290	5,430	5,580	5,610
120,000	4,410	4,500	4,590	4,680	4,780	4,880	4,990	5,090	5,210	5,330	5,350
115,000	4,300	4,380	4,460	4,550	4,640	4,740	4,840	4,940	5,050	5,160	5,180
110,000	4,190	4,270	4,350	4,430	4,510	4,600	4,700	4,800	4,900	5,000	5,030
105,000	4,080	4,150	4,230	4,310	4,390	4,470	4,560	4,660	4,750	4,850	4,870
100,000	3,970	4,040	4,110	4,190	4,260	4,340	4,430	4,510	4,610	4,700	4,720

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 VLS.
- Based on Maximum Manual Braking, Ground Spoilers, anti-skid and No Reverse Thrust.

CONDITION	CORRECTION
Headwind	- 16 ft. per knot
Tailwind	+ 114 ft. per knot
Wet Runway and/or Low Minima	Increase distance by 15%

APPROACH AND LANDING CLIMB LIMITS

POUNDS

CFM56-5A1
**APPROACH FLAPS 3
LANDING FLAPS FULL**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
50	145,200	139,600	134,200								
45	152,000	146,200	140,500	134,900	129,700	124,600					
40	158,500	152,600	146,700	140,900	135,400	130,200	125,100	120,100			
35	164,700	158,600	152,600	146,700	141,100	135,600	130,300	125,200	119,200	113,500	112,300
32	168,400	162,400	156,300	150,200	144,400	138,800	133,400	128,200	122,100	116,300	115,200
30	170,900	165,000	158,900	152,700	146,800	141,000	135,600	130,300	124,100	118,200	117,000
28	171,000	167,600	161,400	155,200	149,200	143,400	137,700	132,300	126,200	120,100	118,900
26	171,100	167,700	164,000	157,800	151,700	145,800	140,000	134,400	128,200	122,100	120,900
24	171,200	167,800	164,100	160,400	154,300	148,300	142,300	136,500	130,100	124,000	122,800
22	171,300	167,900	164,200	160,500	156,900	150,900	144,800	138,900	132,300	126,000	124,700
20	171,400	167,900	164,200	160,600	157,000	153,400	147,200	141,200	134,500	128,000	126,800
18	171,500	168,000	164,300	160,600	157,000	153,400	149,500	143,500	136,700	130,200	128,900
16	171,700	168,100	164,400	160,700	157,100	153,500	149,600	145,700	138,900	132,300	131,000
14	171,700	168,200	164,500	160,800	157,200	153,600	149,700	145,700	141,000	134,400	133,100
12	171,900	168,300	164,600	160,900	157,300	153,700	149,700	145,800	141,100	136,400	135,300
10	172,000	168,400	164,700	161,000	157,300	153,700	149,800	145,900	141,100	136,500	135,600
8	172,100	168,500	164,800	161,000	157,400	153,800	149,800	145,900	141,200	136,500	135,600
6	172,200	168,500	164,900	161,100	157,500	153,800	149,900	146,000	141,200	136,600	135,700
4	172,200	168,600	164,900	161,200	157,600	153,900	150,000	146,000	141,300	136,600	135,700
2	172,300	168,700	165,000	161,300	157,600	154,000	150,000	146,100	141,300	136,700	135,800
0 & below	172,400	168,700	165,100	161,300	157,700	154,100	150,100	146,100	141,400	136,700	135,800

NOTES:

- AFM Maximum Structural Landing Weight should not be exceeded (unless overweight landing is deemed necessary in flight).
- Limit Weights are for packs on.
- Reduce Limit Weight by 26,000 pounds when operating in icing conditions during any part of the flight and the forecast landing temperature is below 10 degrees C.

Bleed Adjustments

Eng AI on	-3,200
Eng & Wing AI on	-9,400

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.

APPROACH AND LANDING CLIMB LIMITS

POUNDS

CFM56-5A1
**APPROACH FLAPS 2
LANDING FLAPS 3**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
50	145,700	140,100	134,700								
45	152,600	146,700	141,000	135,400	130,200	125,100					
40	159,200	153,200	147,300	141,500	136,000	130,700	125,600	120,600			
35	165,300	159,300	153,200	147,300	141,700	136,100	130,800	125,700	119,700	113,900	112,800
32	168,900	163,100	156,900	150,800	145,000	139,400	134,000	128,700	122,600	116,800	115,600
30	171,400	165,700	159,500	153,400	147,400	141,600	136,100	130,800	124,600	118,600	117,500
28	171,500	168,100	162,100	155,900	149,900	144,000	138,300	132,900	126,700	120,600	119,400
26	171,600	168,200	164,700	158,400	152,400	146,400	140,600	134,900	128,700	122,600	121,400
24	171,700	168,300	164,800	161,100	155,000	148,900	142,900	137,100	130,700	124,600	123,400
22	171,800	168,400	164,900	161,200	157,600	151,600	145,400	139,500	132,800	126,500	125,300
20	171,900	168,500	164,900	161,200	157,600	154,100	147,900	141,800	135,100	128,600	127,300
18	172,000	168,500	165,000	161,300	157,700	154,100	150,200	144,100	137,300	130,700	129,500
16	172,100	168,600	165,100	161,400	157,800	154,200	150,300	146,300	139,500	132,900	131,600
14	172,200	168,700	165,200	161,500	157,900	154,300	150,300	146,400	141,700	135,000	133,700
12	172,300	168,800	165,300	161,600	157,900	154,300	150,400	146,500	141,700	137,100	135,900
10	172,500	168,900	165,400	161,700	158,000	154,400	150,500	146,500	141,800	137,100	136,200
8	172,500	168,900	165,500	161,700	158,100	154,500	150,500	146,600	141,800	137,200	136,200
6	172,600	169,000	165,600	161,800	158,200	154,500	150,600	146,600	141,900	137,200	136,300
4	172,700	169,100	165,600	161,900	158,200	154,600	150,600	146,700	141,900	137,300	136,300
2	172,800	169,100	165,700	162,000	158,300	154,700	150,700	146,700	142,000	137,300	136,400
0 & below	172,800	169,200	165,800	162,000	158,400	154,700	150,800	146,800	142,000	137,300	136,400

NOTES:

- AFM Maximum Structural Landing Weight should not be exceeded (unless overweight landing is deemed necessary in flight).
- Limit weights are for packs on.
- Reduce Limit Weight by 27,300 pounds when operating in icing conditions during any part of the flight and the forecast landing temperature is below 10 degrees C.

Bleed Adjustments

Eng AI on	-3,200
Eng & Wing AI on	-9,400

BASIS:

The limit weights shown are the more restrictive of:

- | | |
|---|--|
| APPROACH | LANDING |
| <ul style="list-style-type: none"> • One Engine Inoperative • Flaps at approach setting. • Landing gear retracted. | <ul style="list-style-type: none"> • All Engines Operating • Flaps at landing setting. • Landing gear extended. |

APPROACH AND LANDING CLIMB LIMITS

POUNDS

CFM56-5A3
**APPROACH FLAPS 3
LANDING FLAPS FULL**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
50	154,100	148,800	143,900								
45	162,000	156,000	150,500	145,300	141,100	136,900					
40	169,100	162,800	156,700	150,900	146,600	142,300	137,500	132,100			
35	174,500	168,600	162,800	156,700	152,500	148,100	143,300	137,700	131,000	122,700	121,100
32	177,800	171,700	166,000	160,000	155,900	151,500	146,800	141,100	134,200	125,700	124,000
30	180,100	173,900	168,000	162,000	158,100	153,700	149,100	143,300	136,400	127,600	125,900
28	180,200	176,100	170,000	164,100	160,300	156,100	151,300	145,500	138,600	129,500	127,800
26	180,300	176,200	172,100	166,300	162,600	158,400	153,700	147,700	140,700	131,500	129,800
24	180,400	176,300	172,200	168,200	164,800	160,700	156,100	150,000	142,800	133,500	131,700
22	180,500	176,400	172,300	168,300	166,900	163,000	158,500	152,300	145,200	135,400	133,600
20	180,600	176,500	172,400	168,400	167,000	165,200	160,800	154,700	147,500	137,700	135,800
18	180,700	176,600	172,500	168,400	167,100	165,200	162,900	156,800	149,900	139,900	138,000
16	180,800	176,700	172,600	168,500	167,200	165,300	163,000	158,800	152,000	142,200	140,200
14	181,000	176,800	172,700	168,600	167,200	165,400	163,000	158,800	153,900	144,400	142,400
12	181,100	176,900	172,700	168,600	167,300	165,500	163,100	158,900	153,900	146,200	144,500
10	181,200	177,000	172,800	168,700	167,400	165,500	163,200	159,000	154,000	146,300	144,800
8	181,300	177,100	172,900	168,800	167,400	165,600	163,300	159,000	154,100	146,300	144,800
6	181,400	177,200	173,000	168,900	167,500	165,700	163,300	159,100	154,100	146,400	144,900
4	181,500	177,300	173,100	169,000	167,600	165,800	163,400	159,200	154,200	146,400	144,900
2	181,500	177,400	173,200	169,000	167,700	165,800	163,500	159,200	154,300	146,500	145,000
≤0	181,600	177,400	173,200	169,100	167,700	165,900	163,600	159,300	154,300	146,500	145,000

NOTES:

- AFM Maximum Structural Landing Weight should not be exceeded (unless overweight landing is deemed necessary in flight).
- Limit weights are for packs on.
- Reduce Limit Weight by 26,000 pounds when operating in icing conditions during any part of the flight and the forecast landing temperature is below 10 degrees C.

Bleed Adjustments

Eng AI on	-3,200
Eng & Wing AI on	-9,400

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.

APPROACH AND LANDING CLIMB LIMITS**POUNDS****CFM56-5A3****APPROACH FLAPS 2
LANDING FLAPS 3**

OAT °C	AIRPORT PRESSURE ALTITUDE – FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
50	154,600	149,300	144,400								
45	162,700	156,600	151,100	145,900	141,700	137,500					
40	169,500	163,400	157,300	151,500	147,100	142,800	138,000	132,600			
35	174,900	169,000	163,400	157,300	153,100	148,700	143,900	138,200	131,500	123,200	121,600
32	178,300	172,100	166,600	160,600	156,500	152,100	147,400	141,600	134,800	126,100	124,500
30	180,500	174,300	168,400	162,600	158,700	154,300	149,700	143,900	137,000	128,100	126,400
28	180,700	176,600	170,400	164,800	161,000	156,700	151,900	146,100	139,200	130,100	128,400
26	180,800	176,700	172,600	166,900	163,200	159,000	154,400	148,300	141,300	132,100	130,300
24	180,900	176,800	172,600	168,700	165,500	161,300	156,700	150,600	143,400	134,000	132,200
22	181,000	176,900	172,700	168,800	167,500	163,700	159,100	153,000	145,800	135,900	134,100
20	181,100	177,000	172,800	168,800	167,600	165,800	161,500	155,300	148,200	138,200	136,300
18	181,200	177,100	172,900	168,900	167,700	165,900	163,600	157,500	150,500	140,500	138,500
16	181,300	177,200	173,000	169,000	167,700	166,000	163,700	159,400	152,600	142,700	140,800
14	181,400	177,300	173,100	169,000	167,800	166,100	163,700	159,500	154,500	145,000	143,000
12	181,500	177,400	173,200	169,100	167,900	166,200	163,800	159,600	154,600	146,800	145,100
10	181,700	177,500	173,300	169,200	167,900	166,200	163,900	159,600	154,700	146,900	145,400
8	181,700	177,600	173,400	169,200	168,000	166,300	164,000	159,700	154,700	146,900	145,400
6	181,800	177,700	173,500	169,300	168,100	166,400	164,000	159,800	154,800	147,000	145,500
4	181,900	177,800	173,500	169,300	168,100	166,500	164,100	159,900	154,900	147,000	145,500
2	182,000	177,800	173,600	169,400	168,200	166,500	164,200	159,900	154,900	147,100	145,600
≤0	182,000	177,900	173,700	169,500	168,300	166,600	164,200	160,000	155,000	147,100	145,600

NOTES:

- AFM Maximum Structural Landing Weight should not be exceeded (unless overweight landing is deemed necessary in flight).
- Limit weights are for packs on.
- Reduce Limit Weight by 27,300 pounds when operating in icing conditions during any part of the flight and the forecast landing temperature is below 10 degrees C.

Bleed Adjustments

Eng AI on	-3,200
Eng & Wing AI on	-9,400

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.

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

2SP	AWABS has automatically corrected the allowable weights and V1 speeds due to two pairs of ground spoilers (four spoilers) being inoperative.
ASP	AWABS has automatically corrected the allowable weights and V1 speeds due to the Ground Spoiler Control System being inoperative (all spoilers inoperative).
BKI	AWABS has automatically corrected the allowable weights and V1 speeds due to one inoperative brake.
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.
TRI	AWABS has automatically corrected the allowable weights and V1 speeds due to one thrust reverser inoperative.

THRUST SETTINGS – ALL ENGINE

TAKEOFF %N1

CFM56-5A1

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

OAT °C	PRESSURE ALTITUDE - FEET											
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000		
54	92.2	93.1	OUTSIDE ENVIRONMENTAL ENVELOPE									
50	92.8	93.7									93.7	93.6
46	93.4	94.3									94.3	94.2
42	93.9	94.9	94.8	94.7	94.7	94.6	94.6	94.6	95.0 94.7			
38	94.5	95.4	95.3	95.3	95.2	95.1	95.1	95.0				
34	95.1	95.9	95.8	95.8	95.7	95.6	95.6	95.5			95.5	95.2
30	95.1	96.3	96.3	96.3	96.2	96.1	96.0	96.0	95.9	95.6		
26	94.5	95.7	96.2	96.8	96.7	96.6	96.6	96.5	96.4	96.1		
22	93.9	95.1	95.6	96.1	96.6	97.1	97.1	97.0	96.9	96.5		
18	93.3	94.5	95.0	95.5	96.0	96.5	97.0	97.4	97.3	97.0		
14	92.6	93.9	94.4	94.9	95.4	95.9	96.4	96.8	97.2	97.4		
10	92.0	93.3	93.8	94.3	94.7	95.2	95.7	96.2	96.6	96.8		
6	91.4	92.6	93.1	93.6	94.1	94.6	95.1	95.5	95.9	96.1		
2	90.8	92.0	92.5	93.0	93.5	94.0	94.5	94.9	95.3	95.5		
-2	90.2	91.4	91.9	92.4	92.8	93.3	93.8	94.2	94.6	94.8		
-6	89.5	90.7	91.2	91.7	92.2	92.7	93.1	93.6	93.9	94.1		
-10	88.9	90.1	90.6	91.1	91.5	92.0	92.5	92.9	93.3	93.5		
-14	88.2	89.4	89.9	90.4	90.9	91.3	91.8	92.2	92.6	92.8		
-18	87.6	88.8	89.3	89.7	90.2	90.7	91.1	91.5	91.9	92.1		
-22	86.9	88.1	88.6	89.1	89.5	90.0	90.5	90.9	91.2	91.4		
-26	86.3	87.4	87.9	88.4	88.8	89.3	89.8	90.2	90.5	90.7		
-30	85.6	86.8	87.2	87.7	88.2	88.6	89.1	89.5	89.9	90.0		
-34	85.0	86.1	86.6	87.0	87.5	87.9	88.4	88.8	89.1	89.3		
-38	84.3	85.4	85.9	86.3	86.8	87.2	87.7	88.1	88.4	88.6		
-42	83.6	84.7	85.2	85.6	86.1	86.5	87.0	87.4	87.7	87.9		
-46	82.9	84.0	84.5	84.9	85.4	85.8	86.3	86.6	87.0	87.2		
-50	82.2	83.3	83.8	84.2	84.6	85.1	85.5	85.9	86.3	86.5		
-54	81.5	82.6	83.1	83.5	83.9	84.4	84.8	85.2	85.5	85.7		

Engine Bleed Adjustment

Packs Off	-0.7
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-1.3
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.9

OAT greater than or equal to ISA + 10

THRUST SETTINGS – ALL ENGINE

TAKEOFF %N1

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

CFM56-5A3

OAT °C	PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
54	92.4	92.8	OUTSIDE ENVIRONMENTAL ENVELOPE							
50	93.2	93.6								
46	94.0	94.4								
42	94.8	95.1	95.6	96.1	96.2	96.6	96.9	97.1		
38	95.1	95.6	96.2	96.6	96.7	97.1	97.4	97.6		
34	95.4	95.9	96.5	97.1	97.2	97.6	97.9	98.1	98.1	97.7
30	95.2	96.2	96.8	97.4	97.5	98.0	98.3	98.6	98.6	98.2
26	94.6	95.6	96.7	97.7	97.8	98.4	98.8	99.1	99.1	98.7
22	94.0	95.0	96.1	97.1	97.6	98.7	99.3	99.7	99.6	99.3
18	93.4	94.4	95.4	96.4	97.0	98.1	99.2	100.2	100.2	99.9
14	92.8	93.8	94.8	95.8	96.4	97.5	98.5	99.5	100.1	100.4
10	92.2	93.2	94.2	95.2	95.7	96.8	97.9	98.9	99.4	99.8
6	91.6	92.5	93.6	94.5	95.1	96.2	97.2	98.2	98.8	99.1
2	91.0	91.9	92.9	93.9	94.4	95.5	96.5	97.5	98.1	98.4
-2	90.3	91.3	92.3	93.2	93.8	94.8	95.9	96.9	97.4	97.8
-6	89.7	90.6	91.6	92.6	93.1	94.2	95.2	96.2	96.7	97.1
-10	89.1	90.0	91.0	91.9	92.5	93.5	94.5	95.5	96.1	96.4
-14	88.4	89.3	90.3	91.3	91.8	92.8	93.8	94.8	95.4	95.7
-18	87.8	88.7	89.7	90.6	91.1	92.2	93.2	94.1	94.7	95.0
-22	87.1	88.0	89.0	89.9	90.5	91.5	92.5	93.4	94.0	94.3
-26	86.5	87.4	88.3	89.2	89.8	90.8	91.8	92.7	93.2	93.6
-30	85.8	86.7	87.6	88.6	89.1	90.1	91.1	92.0	92.5	92.8
-34	85.1	86.0	86.9	87.9	88.4	89.4	90.3	91.3	91.8	92.1
-38	84.4	85.3	86.3	87.2	87.7	88.7	89.6	90.5	91.1	91.4
-42	83.8	84.6	85.6	86.5	87.0	87.9	88.9	89.8	90.3	90.6
-46	83.1	83.9	84.9	85.7	86.2	87.2	88.2	89.1	89.6	89.9
-50	82.4	83.2	84.1	85.0	85.5	86.5	87.4	88.3	88.8	89.1
-54	81.7	82.5	83.4	84.3	84.8	85.7	86.7	87.6	88.1	88.4

Engine Bleed Adjustment

Packs Off	-0.7
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-1.3
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.9

 OAT greater than or equal to ISA + 10

THRUST SETTINGS – ALL ENGINE

CLIMB %N1

CFM56-5A1/-5A3

Based on 250/300/.78
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT	PRESSURE ALTITUDE - FEET															
	-1,000	3,000	7,000	11,000	15,000	19,000	23,000	27,000	31,000	35,000	39,000					
54	88.0	89.5	OUTSIDE ENVIRONMENTAL ENVELOPE													
50	88.6	90.1										90.4	91.1			
46	89.3	90.7										90.9	91.6	91.7		
42	89.9	91.3										91.5	92.0	92.2		
38	90.6	91.8										91.9	92.4	92.6	92.6	
34	90.8	92.3										92.3	92.9	93.0	93.0	93.1
30	90.2	92.8	92.8	93.3	93.4	93.4	93.5	93.6								
26	89.7	92.6	93.2	93.6	93.8	93.7	93.8	93.9				93.7				
22	89.1	92.0	93.6	94.0	94.1	94.0	94.1	94.3				94.1				
18	88.6	91.5	93.1	93.8	94.4	94.4	94.5	94.6				94.5				
14	88.0	90.9	92.5	93.2	94.7	94.7	94.8	94.9				94.7			94.3	93.6
10	87.4	90.3	90.9	92.6	94.1	94.9	95.1	94.9				94.7			94.3	93.8
6	86.8	89.7	91.3	92.0	93.4	94.6	95.1	94.8	94.7	94.3	93.9					
2	86.2	89.1	90.7	91.4	92.8	94.0	94.9	94.9	94.8	94.4	93.8					
-2	85.6	88.4	90.1	90.8	92.2	93.3	94.2	95.0	95.0	94.7	94.1					
-6	85.0	87.8	89.4	90.1	91.5	92.7	93.6	94.3	95.2	94.9	94.4					
-10	84.4	87.2	88.8	89.5	90.9	92.0	92.9	93.7	94.8	95.0	94.5					
-14	93.8	86.6	88.2	88.8	90.2	91.4	92.2	93.0	94.1	95.2	94.7					
-18	93.2	86.0	87.5	88.2	89.6	90.7	91.5	92.3	93.5	95.0	94.8					
-22	82.6	85.3	86.9	87.5	88.9	90.0	90.9	91.6	91.8	94.3	94.3					
-26	82.0	84.7	86.2	86.9	88.2	89.4	90.2	91.0	92.1	93.6	93.6					
-30	81.4	84.0	85.6	86.2	87.6	88.7	89.5	90.3	91.4	92.9	92.9					
-34	80.7	83.4	84.9	85.6	86.9	88.0	88.8	89.6	90.7	92.1	92.2					
-38	80.1	82.7	84.2	84.9	86.2	87.3	88.1	88.9	89.9	91.4	91.5					
-42	79.4	82.1	83.6	84.2	85.5	86.6	87.4	88.1	89.1	90.7	90.7					
-46	78.8	81.4	82.9	83.5	84.8	85.9	86.7	87.4	88.5	89.9	90.7					
-50	78.1	80.7	82.2	82.8	84.1	85.2	86.0	86.7	87.8	89.2	89.2					
-54	77.5	80.0	81.5	82.1	83.4	84.4	85.2	86.0	87.0	88.4	88.5					

Engine Bleed Adjustment

Packs Off	0.8
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-0.6
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.1

 OAT greater than or equal to ISA + 10

THRUST SETTINGS – ALL ENGINE

CRUISE %N1

Based on 250/300/.78

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

CFM56-5A1/-5A3

TAT	PRESSURE ALTITUDE - FEET																
	3,000	7,000	11,000	15,000	19,000	23,000	27,000	31,000	35,000	39,000							
54	87.1	OUTSIDE ENVIRONMENTAL ENVELOPE															
50	87.7										88.0	88.7					
46	88.3										88.5	89.2	89.3				
42	88.9										89.1	89.6	89.8				
38	89.4										89.5	90.0	90.2	90.2			
34	89.9										89.9	90.5	90.6	90.6	90.7		
30	90.4										90.4	90.9	91.0	91.0	91.1	91.2	
26	90.2										90.8	91.2	91.4	91.3	91.4	91.5	91.3
22	89.6										91.2	91.6	91.7	91.6	91.7	91.9	91.7
18	89.1										90.7	91.4	92.0	92.0	92.1	92.2	92.1
14	88.5	90.1	90.8	92.3	92.3	92.4	92.5	92.3	91.9	91.2							
10	87.9	89.5	90.2	91.7	92.5	92.7	92.5	92.3	91.9	91.4							
6	87.3	88.9	89.6	91.0	92.2	92.7	92.4	92.3	91.9	91.5							
2	86.7	88.3	89.0	90.4	91.6	92.5	92.5	92.4	92.0	91.4							
-2	86.0	87.7	88.4	89.8	90.9	91.8	92.6	92.6	92.3	91.7							
-6	85.4	87.0	87.7	89.1	90.3	91.1	91.9	92.8	92.5	92.0							
-10	84.8	86.4	87.1	88.5	89.6	90.5	91.3	92.4	92.6	92.1							
-14	84.2	85.8	86.4	87.8	89.0	89.8	90.6	91.7	92.8	92.3							
-18	83.6	85.1	85.8	87.2	88.3	89.1	89.9	91.1	92.6	92.4							
-22	82.9	84.5	85.1	86.5	87.6	88.5	89.2	90.4	91.9	91.9							
-26	82.3	83.8	84.5	85.8	87.0	87.8	88.6	89.7	91.2	91.2							
-30	81.6	83.2	83.8	85.2	86.3	87.1	87.9	89.0	90.5	90.5							
-34	81.0	82.5	83.2	84.5	85.6	86.4	87.2	88.3	89.7	89.8							
-38	80.3	81.8	92.5	83.8	84.9	85.7	86.5	87.5	89.0	89.1							
-42	79.7	81.2	81.8	83.1	84.2	85.0	85.7	86.8	88.3	88.3							
-46	79.0	80.5	81.1	82.4	83.5	84.3	85.0	86.1	87.5	87.6							
-50	78.3	79.8	80.4	81.7	82.8	83.6	84.3	85.4	86.8	86.8							
-54	77.6	79.1	79.7	81.0	82.0	82.8	83.6	84.6	86.0	86.1							

Engine Bleed Adjustment

Packs Off	0.800
Eng A/I ON (OAT < ISA+10)	0.000
Eng A/I ON (OAT ≥ ISA+10)	-0.600
Eng & Wing A/I ON (OAT < ISA+10)	0.000
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.100

OAT greater than or equal to ISA + 10

THRUST SETTINGS – ALL ENGINE

GO AROUND %N1

CFM56-5A1

Based on Mach 0.225
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT °C	PRESSURE ALTITUDE - FEET										
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
54	92.9	93.8	93.8	93.7	OUTSIDE ENVIRONMENTAL ENVELOPE						
50	93.5	94.4	94.3	94.2							
46	94.0	95.0	94.9	94.8							
42	94.6	95.5	95.4	95.3	95.2	95.1	95.1	95.0	95.0	94.6	94.7
38	95.2	96.0	95.9	95.8	95.7	95.6	95.6	95.5	95.4	95.1	
34	95.4	96.4	96.4	96.3	96.2	96.1	96.0	96.0	95.9	95.6	
30	94.8	96.1	96.6	96.8	96.7	96.7	96.6	96.4	96.4	96.0	95.7
26	94.2	95.5	96.0	96.5	96.9	97.2	97.1	97.0	96.8	96.5	96.1
22	93.6	94.9	95.4	95.9	96.3	96.8	97.3	97.4	97.3	96.9	96.6
18	93.0	94.3	94.8	95.2	95.7	96.2	96.7	97.1	97.5	97.4	97.0
14	92.4	93.7	94.2	94.6	95.1	95.6	96.0	96.4	96.8	97.0	97.2
10	91.8	93.0	93.5	94.0	94.5	94.9	95.4	95.8	96.2	96.4	96.5
6	91.2	92.4	92.9	93.4	93.8	94.3	94.8	95.2	95.6	95.7	95.9
2	90.6	91.8	92.3	92.7	93.2	93.7	94.1	94.5	94.9	95.1	95.3
-2	90.0	91.2	91.6	92.1	92.6	93.0	93.5	93.9	94.3	94.4	94.6
-6	89.4	90.5	91.0	91.5	91.9	92.4	92.8	93.2	93.6	93.8	93.9
-10	88.7	89.9	90.4	90.8	91.3	91.7	92.2	92.6	92.9	93.1	93.3
-14	88.1	89.3	89.7	90.2	90.6	91.1	91.5	91.9	92.3	92.4	92.6
-18	87.4	88.6	89.1	89.5	90.0	90.4	90.9	91.2	91.6	91.8	91.9
-22	86.8	87.9	88.4	88.9	89.3	89.7	90.2	90.6	90.9	91.1	91.3
-26	86.1	87.3	87.7	88.2	88.6	89.1	89.5	89.9	90.2	90.4	90.6
-30	85.5	86.6	87.1	87.5	87.9	88.4	88.8	89.2	89.6	89.7	89.9
-34	84.8	85.9	86.4	86.8	87.3	87.7	88.1	88.5	88.9	89.0	89.2
-38	84.2	85.3	85.7	86.1	86.6	87.0	87.4	87.8	88.2	88.3	88.5
-42	83.5	84.6	85.0	85.5	85.9	86.3	86.7	87.1	87.4	87.6	87.8
-46	82.8	83.9	84.3	84.8	85.2	85.6	86.0	86.4	86.7	86.9	87.0
-50	82.1	83.2	83.6	84.1	84.5	84.9	85.3	85.7	86.0	86.2	86.3
-54	81.4	82.5	82.9	83.3	83.7	84.2	84.6	84.9	85.3	85.4	85.6

Engine Bleed Adjustment

Packs Off	0.6
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-1.2
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.8

 OAT greater than or equal to ISA + 10

THRUST SETTINGS – ALL ENGINE

GO AROUND %N1

Based on Mach 0.225

NORMAL BLEED - PACKS ON / ANTI-ICE OFF

CFM56-5A3

TAT °C	PRESSURE ALTITUDE - FEET										
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
54	94.4	94.7	94.8	95.0	OUTSIDE ENVIRONMENTAL ENVELOPE						
50	95.1	95.5	95.5	95.6							
46	95.9	96.2	96.2	96.1							
42	96.3	96.9	96.8	96.7	96.7	97.0	97.3	97.5	97.4	97.0	96.6
38	96.6	97.2	97.2	97.2	97.2	97.5	97.8	98.0	98.0	97.5	
34	96.7	97.5	97.5	97.5	97.5	97.9	98.3	98.5	98.5	98.1	
30	96.1	97.1	97.6	97.8	97.8	98.3	98.7	99.0	98.9	98.5	97.5
26	95.5	96.5	97.0	97.4	97.9	98.7	99.2	99.6	99.5	99.1	97.9
22	94.9	95.9	96.3	96.8	97.3	98.3	99.4	100.1	100.1	99.7	98.5
18	94.3	95.2	95.7	96.2	96.6	97.7	98.7	99.7	100.3	100.3	99.1
14	93.7	94.6	95.1	95.6	96.0	97.1	98.1	99.1	99.6	100.0	99.3
10	93.1	94.0	94.5	94.9	95.4	96.4	97.5	98.4	99.0	99.3	98.7
6	92.4	93.4	93.8	94.3	94.7	95.8	96.8	97.8	98.3	98.6	98.0
2	91.8	92.7	93.2	93.7	94.1	95.1	96.2	97.1	97.7	98.0	97.4
-2	91.2	92.1	92.6	93.0	93.5	94.5	95.5	96.5	97.0	97.3	96.7
-6	90.6	91.5	91.9	92.4	92.8	93.8	94.8	95.8	96.3	96.6	96.0
-10	89.9	90.8	91.3	91.7	92.1	93.2	94.2	95.1	95.6	95.9	95.3
-14	89.3	90.2	90.6	91.1	91.5	92.5	93.5	94.4	95.0	95.3	94.7
-18	88.6	89.5	90.0	90.4	90.8	91.8	92.8	93.7	94.3	94.6	94.0
-22	88.0	88.9	89.3	89.7	90.2	91.1	92.1	93.0	93.6	93.9	93.3
-26	87.3	88.2	88.6	89.1	89.5	90.5	91.4	92.3	92.9	93.2	92.6
-30	86.6	87.5	88.0	88.4	88.8	89.8	90.7	91.6	92.2	92.4	91.9
-34	86.0	86.8	87.3	87.7	88.1	89.1	90.0	90.9	91.4	91.7	91.1
-38	85.3	86.1	86.6	87.0	87.4	88.4	89.3	90.2	90.7	91.0	90.4
-42	84.6	85.5	85.9	86.3	86.7	87.7	88.6	89.5	90.0	90.3	89.7
-46	83.9	84.8	85.2	85.6	86.0	86.9	87.9	88.7	89.3	89.5	89.0
-50	83.2	84.1	84.5	84.9	85.3	86.2	87.1	88.0	88.5	88.8	88.2
-54	82.5	83.3	83.8	84.2	84.6	85.5	86.4	87.3	87.8	88.0	87.5

Engine Bleed Adjustment

Packs Off	0.6
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-1.2
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-1.8

 OAT greater than or equal to ISA + 10

ONE ENGINE INOPERATIVE

MAXIMUM CONTINUOUS %N1

CFM56-5A1/-5A3

Based on 230 KIAS
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT	PRESSURE ALTITUDE - FEET											
°C	-1,000	3,000	7,000	11,000	15,000	19,000	23,000	27,000	31,000	35,000	39,000	
54	90.3	91.6	OUTSIDE ENVIRONMENTAL ENVELOPE									
50	90.9	92.2										92.5
46	91.5	92.7										93.0
42	92.1	93.2	93.4	93.4	OUTSIDE ENVIRONMENTAL ENVELOPE							
38	92.7	93.7	93.9	93.9								
34	93.2	94.1	94.3	94.2	94.2	OUTSIDE ENVIRONMENTAL ENVELOPE						
30	92.6	94.6	94.7	94.6	94.6							92.5
26	92.0	94.8	95.1	95.0	95.0	93.0	OUTSIDE ENVIRONMENTAL ENVELOPE					
22	91.4	94.2	95.4	95.3	95.3	93.3						93.3
18	90.9	93.6	95.3	95.6	95.6	93.7	93.6	93.4	OUTSIDE ENVIRONMENTAL ENVELOPE			
14	90.3	93.0	94.7	96.0	95.9	94.0	93.9	93.7				93.6
10	89.7	92.3	94.1	95.5	96.2	94.4	94.3	94.1	94.0	93.7	93.5	
6	89.1	91.7	93.4	94.9	96.4	94.7	94.6	94.4	94.4	94.1	93.6	
2	88.5	91.1	92.8	94.2	95.7	95.0	95.0	94.7	94.5	94.1	93.6	
-2	87.9	90.5	92.2	93.6	95.1	94.8	95.2	94.8	94.6	94.1	93.6	
-6	87.3	89.9	91.5	92.9	94.4	94.2	95.3	94.9	94.7	94.3	93.9	
-10	86.6	89.2	90.9	92.3	93.7	93.5	94.7	95.1	94.9	94.5	94.2	
-14	86.0	88.6	90.2	90.6	93.1	92.8	94.0	94.9	95.1	94.7	94.3	
-18	85.4	87.9	89.6	91.0	92.4	92.2	93.3	94.3	95.1	94.8	94.5	
-22	84.8	87.3	88.9	90.3	91.7	91.5	92.6	93.6	94.4	94.9	94.4	
-26	84.1	86.6	88.2	89.6	91.0	90.8	91.9	92.9	93.7	94.4	93.7	
-30	83.5	86.0	87.6	88.9	90.3	90.1	91.2	92.1	93.0	93.7	93.0	
-34	82.8	85.3	86.9	88.2	89.6	89.4	90.5	91.4	92.3	92.9	92.3	
-38	82.2	84.6	86.2	87.5	88.9	88.7	89.8	90.7	91.5	92.2	91.5	
-42	81.5	83.9	85.5	86.8	88.2	88.0	89.1	90.0	90.8	91.5	90.8	
-46	80.9	83.3	84.8	86.1	87.5	83.7	88.3	89.2	90.0	90.7	90.1	
-50	80.2	82.6	84.1	85.4	86.7	86.5	87.6	88.5	89.3	90.0	89.3	
-54	80.3	81.9	83.4	84.7	86.0	85.8	86.9	87.7	88.5	89.2	88.6	

Engine Bleed Adjustment

Packs Off	0.8
Eng A/I ON (OAT < ISA+10)	0.0
Eng A/I ON (OAT ≥ ISA+10)	-0.9
Eng & Wing A/I ON (OAT < ISA+10)	0.0
Eng & Wing A/I ON (OAT ≥ ISA+10)	-2.1

 OAT greater than or equal to ISA + 10

ONE ENGINE INOPERATIVE

LONG RANGE CRUISE ALTITUDE CAPABILITY

GROSS WEIGHT - POUNDS	PRESSURE ALTITUDE - FEET		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
165,000	15,900	14,200	11,000
160,000	16,600	15,400	12,300
155,000	17,100	16,300	13,600
150,000	17,600	16,900	15,600
145,000	18,300	17,500	16,400
140,000	20,000	17,900	17,000
135,000	21,300	19,500	17,500
130,000	22,600	21,000	18,100
125,000	23,700	22,500	20,400
120,000	24,900	23,800	22,100
115,000	26,300	25,000	23,500
110,000	27,600	26,300	25,000
105,000	28,900	27,600	26,700
100,000	30,300	29,100	28,100

BASIS:

- Max continuous thrust (CFM56-5A1 Engines)
- One Engine Inoperative

Engine Bleed Adjustment (lb.)

Eng A/I ON	-2,500
Engine & Wing A/I ON	-4,600

ONE ENGINE INOPERATIVE

DRIFTDOWN GROSS LEVEL OFF ALTITUDE

ENGINE ANTI-ICE OFF

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET		
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
160,000	154,200	19,800	18,600	17,600
150,000	144,700	21,700	20,800	19,600
140,000	135,300	23,600	22,900	21,800
130,000	125,800	25,600	24,800	24,000
120,000	116,400	27,600	26,900	26,300
110,000	106,900	29,600	29,200	28,500
100,000	97,500	31,800	31,400	30,900

ENGINE ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET		
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
160,000	153,800	18,800	17,700	17,000
150,000	144,600	20,900	19,800	18,400
140,000	135,200	22,900	21,900	20,800
130,000	125,700	24,900	24,100	23,000
120,000	116,200	27,000	26,300	25,400
110,000	106,800	29,200	28,600	27,900
100,000	97,500	31,400	30,900	30,300

ENGINE & WING ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROX GROSS LEVEL OFF ALTITUDE – FEET		
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA + 10°C & COLDER	ISA + 15°C	ISA + 20°C
160,000	154,400	17,500	16,900	16,200
150,000	144,200	19,400	18,100	17,200
140,000	134,900	21,500	20,400	19,000
130,000	125,500	23,600	22,600	21,400
120,000	116,000	25,800	24,800	23,800
110,000	106,700	28,100	27,300	26,300
100,000	97,300	30,300	29,700	28,900

BASED ON AN INITIAL ALTITUDE OF 35,000 FT.

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES FEET

BASIS:

- Sea level, standard day, no wind, no slope.
- MAX PEDAL braking.
- Approach speed V_{APP} ($V_{LS} + 5$).
- No reverse thrust.
- Includes 7 seconds of air run.

FLAPS FULL

RWY COND.	LANDING WEIGHT – (1,000) POUNDS						
	100	110	120	130	140	150	160
DRY	2,340	2,460	2,590	2,720	2,930	3,250	3,580
GOOD	3,050	3,290	3,530	3,790	4,060	4,340	4,620
MEDIUM	3,920	4,210	4,520	4,830	5,140	5,510	5,900
POOR	7,770	8,290	8,820	9,350	9,900	10,440	10,990

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 ft	+3%	+4%	+4%	+4%
Wind	Per 5 kts. headwind	0%	0%	0%	0%
	Per 5 kts. tailwind	+10%	+12%	+12%	+16%
Two Reversers Operative		-2%	-6%	-7%	-17%

Procedure:

1. Determine Flaps Full stopping distance
2. Determine total correction factor by summing all applicable correction percentages
3. Apply total correction factor to the Flaps Full stopping distance to get the Corrected Landing Distance
4. Determine Landing Distance Multiplier below
5. Multiply the Corrected Landing Dist by the Landing Dist Multiplier to determine the landing distance required for the abnormal condition.

Abnormal Description	Multiply Full Flap Dist By:	Abnormal Description	Multiply Full Flap Dist By:
Flaps 3 Landing	1.20	Slats ≥ 1 but ≤ 3	1.15
Auto Flt FAC 1+2	1.35	Slats > 3	1.10
Elec Emer Config	2.30	Speed Brakes/Spoilers, one or two pair	1.10
Elec AC Bus 1 Fault	1.20	Speed Brakes/Spoilers, three or more pair	1.30
Elec DC Bus 1+2 Fault	1.75	Zero Flap/Zero Slat	1.80
Elec DC Bus 2 Fault	1.35	Fuel Leak	1.20
Elec DC Emer Config	2.55	Blue Hyd Pump	1.20
Elec DC ESS Bus Fault w/ Ice Accretion	1.40	Yellow Hyd Pump	1.30
Elec DC ESS Bus Fault w/o Ice Accretion	1.25	Blue + Yellow Hyd Pump	1.90
Avionics Smoke	1.20	Green Hyd Pump	1.35
Engine 1(2) Fail	1.20	Green + Blue Hyd Pump	2.00
F/Ctl Direct Law	1.20	Green + Yellow Hyd Pump	2.45
F/Ctl ELAC Fault	1.20	Wing Anti-Ice Fault with Ice Accretion	1.10
Flaps < 1	1.30	Anti-Skid Inop	1.30
Flaps ≥ 1 but < 2	1.20	Anti-Skid and Nose Wheel Steering	1.30
Flaps ≥ 2	1.15	Auto Brake Mode or Wheel Tach	1.30
Ground Spoiler, one or two pair	1.10	Brakes Release Fault	1.30
Ground Spoiler, three or more pair	1.30	ADR Fault(s)	1.35
SEC single failure	1.10	IR Fault (1&2 or 2&3)	1.20
SEC double failure	1.30	IR Fault (1&3)	2.10
SEC triple failure	1.50	Reverser Doors Unstowed (All), buffet persists	2.05
Slats < 1	1.35	Reverser Doors Unstowed (3 or less), buffet persists	1.40

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

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:

- One Brake Inoperative
- All Spoilers Inoperative
- Two Pairs of Spoilers Inoperative

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
- No slope
- MAX PEDAL braking
- Includes 7 second air run from threshold to touchdown (850 to 1,800 feet of air distance depending on weight)
- Based on demonstrated landing performance produced by the manufacturer during certification process
- Does not include any other safety factors or margins

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 thrust reverser credit
- Manual landing

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

AUTO FLT FAC 1 + 2 FAULT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	4,110	4,430	4,770	5,120	5,480	5,850	6,240
MEDIUM	5,280	5,690	6,090	6,510	6,930	7,440	7,970
POOR	10,490	11,190	11,900	12,630	13,360	14,090	14,830

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+250	+410	+600
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+130	+171	+354
Reverse Thrust	Two Reversers Operative	-50	-250	-410	-2,440
Autoland	Automatic Landing	+510	+510	+510	+500

AUTO FLT YAW DAMPER SYS

AVIONICS SMOKE

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,800	2,960	3,100	3,260	3,510	3,900	4,300
GOOD	3,650	3,940	4,240	4,550	4,870	5,200	5,550
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+220	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+70	+116	+152	+315
Reverse Thrust	Two Reversers Operative	-40	-220	-370	-2,170
Autoland	Automatic Landing	+510	+510	+510	+500

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

BRAKES ANTI SKID NWS FAULT (INCL. 1,000PSI BRAKING LIMIT)

BRAKES ANTI SKID/NWS OFF (INCL. 1,000PSI BRAKING LIMIT)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	4,090	4,310	4,520	4,750	5,120	5,680	6,260
GOOD	4,090	4,310	4,590	4,930	5,280	5,640	6,010
MEDIUM	4,310	4,630	4,970	5,310	5,650	6,060	6,490
POOR	8,550	9,120	9,700	10,290	10,880	11,480	12,080

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+200	+240	+330	+490
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+102	+125	+139	+289
Reverse Thrust	Two Reversers Operative	-70	-240	-340	-1,990
Autoland	Automatic Landing	+500	+510	+510	+550

BRAKES AUTO BRK FAULT

BRAKES RELEASE FAULT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,270	3,450	3,620	3,800	4,100	4,540	5,010
GOOD	3,810	4,110	4,420	4,740	5,080	5,420	5,780
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+160	+230	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+82	+120	+152	+315
Reverse Thrust	Two Reversers Operative	-50	-230	-370	-2,170
Autoland	Automatic Landing	+500	+510	+510	+550

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ELEC DC BUS 2 FAULT

ELEC AC BUS 1 FAULT

ELEC DC ESS BUS FAULT (WITHOUT ICE ACCRETION)

ELEC DC ESS BUS FAULT (WITH ICE ACCRETION)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	4,260	4,600	4,940	5,310	5,680	6,070	6,470
MEDIUM	5,090	5,480	5,870	6,270	6,680	7,160	7,670
POOR	10,100	10,780	11,460	12,160	12,860	13,570	14,280

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+260	+390	+580
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+135	+164	+341
Reverse Thrust	Per Reverser Operative	0	0	-30	-420
Autoland	Automatic Landing	+530	+540	+550	+630

ELEC DC BUS 1+2 FAULT (INCL. 1,000PSI BRAKING LIMIT)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	5,140	5,410	5,690	5,970	6,430	7,140	7,870
GOOD	5,630	6,070	6,530	7,010	7,510	8,020	8,550
MEDIUM	6,460	6,950	7,450	7,960	8,470	9,090	9,740
POOR	12,820	13,680	14,540	15,430	16,320	17,220	18,120

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+250	+340	+500	+730
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+128	+178	+208	+433
Reverse Thrust	Two Reversers Operative	0	0	0	0
Autoland	Automatic Landing	+530	+540	+550	+630

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ELEC DC EMER CONF

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	7,120	7,500	7,880	8,280	8,920	9,890	10,910
GOOD	7,760	8,370	9,000	9,670	10,350	11,050	11,780
MEDIUM	8,800	9,470	10,150	10,850	11,550	12,390	13,280
POOR	17,480	18,650	19,830	21,040	22,260	23,480	24,710

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+340	+460	+680	+990
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+177	+245	+284	+590
Reverse Thrust	Two Reversers Operative	0	0	0	0
Autoland	Automatic Landing	+530	+540	+550	+630

ELEC EMER CONFIG (INCL. 1,000PSI BRAKING LIMIT)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	6,190	6,520	6,850	7,190	7,750	8,600	9,480
GOOD	7,000	7,550	8,120	8,720	9,340	9,970	10,630
MEDIUM	8,410	9,050	9,700	10,370	11,040	11,840	12,690
POOR	16,700	17,820	18,950	20,110	21,270	22,440	23,610

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+300	+420	+650	+950
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+154	+221	+271	+564
Reverse Thrust	Two Reversers Operative	0	0	0	0
Autoland	Automatic Landing	+530	+540	+550	+630

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ENG 1 (2) EGT OVERLIMIT
ENG 1 (2) FADEC FAULT
ENG 1 (2) FAIL
ENG 1 (2) FIRE
ENG 1 (2) N1 OVERLIMIT
ENG 1 (2) N2 OVERLIMIT
ENG 1 (2) OIL HI TEMP
ENG 1 (2) OIL LO PR
ENGINE RELIGHT

FLAPS 3

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,550	3,750	3,950	4,150	4,350	4,550	5,150
GOOD	4,410	4,710	5,010	5,310	5,610	5,910	6,610
MEDIUM	5,840	6,140	6,440	6,740	7,040	7,340	7,940
POOR	9,990	10,590	11,190	11,790	12,390	12,990	14,090

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+260	+250	+500
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+80	+150	+150	+350
Reverse Thrust	Per Reverser Operative	-50	-150	-320	-1,240
Autoland	Automatic Landing	+430	+460	+460	+500

FLAPS FULL

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,170	3,370	3,570	3,770	3,970	4,170	4,770
GOOD	3,830	4,130	4,430	4,730	5,030	5,330	5,930
MEDIUM	5,170	5,470	5,770	6,070	6,370	6,670	7,170
POOR	8,330	8,930	9,530	10,130	10,730	11,330	12,330

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+230	+230	+440
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+80	+140	+150	+330
Reverse Thrust	Per Reverser Operative	-40	-110	-260	-970
Autoland	Automatic Landing	+430	+460	+460	+500

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ENG 1 (2) REVERSE UNLOCKED (LITTLE TO NO BUFFETING)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	4,260	4,600	4,940	5,310	5,680	6,070	6,470
MEDIUM	5,280	5,690	6,090	6,510	6,930	7,440	7,970
POOR	10,490	11,190	11,900	12,630	13,360	14,090	14,830

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+260	+410	+600
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+135	+171	+354
Reverse Thrust	Per Reverser Operative	-40	-130	-300	-1,200
Autoland	Automatic Landing	+430	+460	+460	+500

ENG 1 (2) REVERSE UNLOCKED (HEAVY BUFFETING)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	5,020	5,290	5,560	5,840	6,290	6,970	7,690
GOOD	6,240	6,730	7,240	7,770	8,320	8,890	9,470
MEDIUM	8,020	8,630	9,250	9,890	10,530	11,290	12,100
POOR	15,930	16,990	18,070	19,170	20,280	21,400	22,520

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+240	+370	+620	+910
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+125	+197	+259	+538
Reverse Thrust	Per Reverser Operative	-40	-130	-300	-1,200
Autoland	Automatic Landing	+430	+460	+460	+500

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ENG 1 (2) REVERSER FAULT
ENG 1 (2) SHUTDOWN
ENG 1 (2) STALL
ENG 1 (2) THR LEVER DISAGREE
ENG 1 (2) THR LEVER FAULT

FLAPS 3

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,550	3,750	3,950	4,150	4,350	4,550	5,150
GOOD	4,410	4,710	5,010	5,310	5,610	5,910	6,610
MEDIUM	5,840	6,140	6,440	6,740	7,040	7,340	7,940
POOR	9,990	10,590	11,190	11,790	12,390	12,990	14,090

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+260	+250	+500
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+80	+150	+150	+350
Reverse Thrust	Per Reverser Operative	-50	-150	-320	-1,240
Autoland	Automatic Landing	+430	+460	+460	+500

FLAPS FULL

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,170	3,370	3,570	3,770	3,970	4,170	4,770
GOOD	3,830	4,130	4,430	4,730	5,030	5,330	5,930
MEDIUM	5,170	5,470	5,770	6,070	6,370	6,670	7,170
POOR	8,330	8,930	9,530	10,130	10,730	11,330	12,330

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+230	+230	+440
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+80	+140	+150	+330
Reverse Thrust	Per Reverser Operative	-40	-110	-260	-970
Autoland	Automatic Landing	+430	+460	+460	+500

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

F/CTL ALTN LAW

F/CTL DIRECT LAW

F/CTL ELAC 1 (2) FAULT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	3,960	4,270	4,590	4,930	5,280	5,640	6,010
MEDIUM	4,890	5,270	5,640	6,030	6,420	6,890	7,380
POOR	9,710	10,360	11,020	11,690	12,370	13,050	13,730

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+240	+380	+550
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+125	+158	+328
Reverse Thrust	Two Reversers Operative	-50	-240	-380	-2,260
Autoland	Automatic Landing	+520	+600	+620	+710

F/CTL FLAPS FAULT (FLAPS < 1)

F/CTL FLAPS LOCKED (FLAPS < 1)

F/CTL SLATS FAULT (SLATS < 1)

F/CTL SLATS LOCKED (SLATS < 1)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	4,110	4,430	4,770	5,120	5,480	5,850	6,240
MEDIUM	5,280	5,690	6,090	6,510	6,930	7,440	7,970
POOR	10,490	11,190	11,900	12,630	13,360	14,090	14,830

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+250	+410	+600
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+130	+171	+354
Reverse Thrust	Two Reversers Operative	-50	-250	-410	-2,440
Autoland	Automatic Landing	+480	+520	+520	+570

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

F/CTL FLAPS FAULT (FLAPS 1 TO LESS THAN 2)

F/CTL FLAPS LOCKED (FLAPS 1 TO LESS THAN 2)

F/CTL SLATS FAULT (SLATS 1 TO 3)

F/CTL SLATS LOCKED (SLATS 1 TO 3)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,800	2,960	3,100	3,260	3,510	3,900	4,300
GOOD	3,650	3,940	4,240	4,550	4,870	5,200	5,550
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+220	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+70	+116	+152	+315
Reverse Thrust	Two Reversers Operative	-40	-220	-370	-2,170
Autoland	Automatic Landing	+480	+520	+520	+570

F/CTL FLAPS FAULT (FLAPS 2 TO 3)

F/CTL FLAPS LOCKED (FLAPS 2 TO 3)

F/CTL SLATS FAULT (SLATS > 3)

F/CTL SLATS LOCKED (SLATS > 3)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,690	2,830	2,980	3,120	3,370	3,730	4,120
GOOD	3,500	3,780	4,060	4,360	4,670	4,990	5,320
MEDIUM	4,500	4,850	5,190	5,550	5,910	6,340	6,790
POOR	8,940	9,530	10,140	10,760	11,380	12,000	12,630

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+130	+210	+350	+510
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+67	+111	+145	+302
Reverse Thrust	Two Reversers Operative	-40	-210	-350	-2,080
Autoland	Automatic Landing	+480	+520	+520	+570

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

F/CTL GND SPLR FAULT

F/CTL GND SPLR 1 + 2 (3 + 4) FAULT

F/CTL SPLR FAULT

F/CTL SPD BRK FAULT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,500	3,690	3,880	4,070	4,390	4,870	5,370
GOOD	4,570	4,930	5,300	5,690	6,090	6,500	6,930
MEDIUM	5,480	5,900	6,320	6,750	7,190	7,710	8,260
POOR	10,880	11,600	12,340	13,090	13,850	14,610	15,380

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+170	+270	+420	+620
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+87	+144	+177	+367
Reverse Thrust	Two Reversers Operative	-60	-280	-430	-2,530
Autoland	Automatic Landing	+520	+600	+620	+710

F/CTL L (R) ELEV FAULT

F/CTL L + R ELEVATOR FAULT

F/CTL STABILIZER JAM

STABILIZER JAM

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	3,960	4,270	4,590	4,930	5,280	5,640	6,010
MEDIUM	4,890	5,270	5,640	6,030	6,420	6,890	7,380
POOR	9,710	10,360	11,020	11,690	12,370	13,050	13,730

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+240	+380	+550
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+125	+158	+328
Reverse Thrust	Two Reversers Operative	-50	-240	-380	-2,260
Autoland	Automatic Landing	+520	+600	+620	+710

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

F/CTL SEC FAULT (IF SEC 1, 2, OR 3 IS INOPERATIVE)

F/CTL SEC FAULT (IF TWO SECS ARE INOPERATIVE)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,150	3,320	3,490	3,670	3,950	4,380	4,830
GOOD	4,410	4,760	5,120	5,500	5,890	6,290	6,700
MEDIUM	5,480	5,900	6,320	6,750	7,190	7,710	8,260
POOR	10,880	11,600	12,340	13,090	13,850	14,610	15,380

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+270	+420	+620
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+79	+140	+177	+367
Reverse Thrust	Per Reverser Operative	0	0	-30	-420
Autoland	Automatic Landing	+520	+600	+620	+710

F/CTL SEC FAULT (ALL THREE SECS FAILED)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,740	3,940	4,140	4,340	4,680	5,190	5,730
GOOD	6,690	7,220	7,770	8,340	8,930	9,540	10,160
MEDIUM	8,800	9,470	10,150	10,850	11,550	12,390	13,280
POOR	17,480	18,650	19,830	21,040	22,260	23,480	24,710

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+180	+400	+680	+990
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+93	+212	+284	+590
Reverse Thrust	Two Reversers Operative	0	0	0	0
Autoland	Automatic Landing	+520	+600	+620	+710

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

FMGC FAILURE OR RESET (DUAL) FUEL LEAK

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,800	2,960	3,100	3,260	3,510	3,900	4,300
GOOD	3,650	3,940	4,240	4,550	4,870	5,200	5,550
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+220	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+70	+116	+152	+315
Reverse Thrust	Two Reversers Operative	-40	-220	-370	-2,170
Autoland	Automatic Landing	+510	+510	+510	+500

HYD B ELEC PUMP LO PR HYD B ELEC PUMP OVHT HYD B RSVR LO AIR PR HYD B RSVR LO LVL HYD B RSVR OVHT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,800	2,960	3,100	3,260	3,510	3,900	4,300
GOOD	3,650	3,940	4,240	4,550	4,870	5,200	5,550
MEDIUM	4,310	4,630	4,970	5,310	5,650	6,060	6,490
POOR	8,550	9,120	9,700	10,290	10,880	11,480	12,080

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+220	+330	+490
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+70	+116	+139	+289
Reverse Thrust	Two Reversers Operative	-40	-220	-340	-1,990
Autoland	Automatic Landing	+490	+540	+550	+610

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

HYD G ENG PUMP LO PR

HYD G RSVR LO AIR PR

HYD G RSVR LO LVL

HYD G RSVR OVHT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,040	3,200	3,360	3,530	3,800	4,220	4,650
GOOD	4,110	4,430	4,770	5,120	5,480	5,850	6,240
MEDIUM	5,090	5,480	5,870	6,270	6,680	7,160	7,670
POOR	10,100	10,780	11,460	12,160	12,860	13,570	14,280

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+150	+250	+390	+580
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+76	+130	+164	+341
Reverse Thrust	Per Reverser Operative	0	0	-50	-520
Autoland	Automatic Landing	+490	+540	+550	+610

HYD Y ELEC PUMP LO PR

HYD Y ELEC PUMP OVHT

HYD Y ENG PUMP LO PR

HYD Y RSVR LO AIR PR

HYD Y RSVR LO LVL

HYD Y RSVR OVHT

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,920	3,080	3,230	3,400	3,660	4,060	4,470
GOOD	3,960	4,270	4,590	4,930	5,280	5,640	6,010
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+240	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+73	+125	+152	+315
Reverse Thrust	Per Reverser Operative	0	0	-30	-100
Autoland	Automatic Landing	+490	+540	+550	+610

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

HYD B + Y SYS LO PR

HYD G + B SYS LO PR

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	4,200	4,430	4,650	4,890	5,270	5,840	6,440
GOOD	6,090	6,570	7,060	7,580	8,120	8,670	9,240
MEDIUM	7,630	8,210	8,800	9,400	10,010	10,740	11,510
POOR	15,150	16,160	17,190	18,240	19,290	20,350	21,420

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+200	+360	+590	+860
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+105	+192	+246	+511
Reverse Thrust	Per Reverser Operative	0	0	-50	-230
Autoland	Automatic Landing	+490	+540	+550	+610

HYD G + Y SYS LO PR (INCL. 1,000PSI BRAKING LIMIT)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	6,540	6,890	7,240	7,600	8,190	9,080	10,020
GOOD	7,460	8,040	8,650	9,290	9,940	10,620	11,320
MEDIUM	9,590	10,320	11,050	11,810	12,580	13,490	14,460
POOR	19,030	20,300	21,590	22,910	24,240	25,570	26,910

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+310	+450	+740	+1,080
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+163	+236	+309	+642
Reverse Thrust	Two Reversers Operative	0	0	0	0
Autoland	Automatic Landing	+490	+540	+550	+610

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

NAV ADR DISAGREE

NAV RA 1 + 2 FAULT (DUAL FAILURE)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	2,800	2,960	3,100	3,260	3,510	3,900	4,300
GOOD	3,650	3,940	4,240	4,550	4,870	5,200	5,550
MEDIUM	4,700	5,060	5,420	5,790	6,160	6,610	7,080
POOR	9,330	9,950	10,580	11,220	11,870	12,530	13,180

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+140	+220	+360	+530
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+70	+116	+152	+315
Reverse Thrust	Two Reversers Operative	-40	-220	-370	-2,170
Autoland	Automatic Landing	+510	+510	+510	+500

NAV ADR FAULT (1 + 2)

NAV ADR FAULT (1 + 3)

NAV ADR FAULT (2 + 3)

NAV ADR FAULT (TRIPLE)

NAV IR FAULT (1 & 2 OR 2 & 3)

NAV IR FAULT (1 & 3)

WING A. ICE SYS FAULT (IF ICE ACCRETION)

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	3,390	3,570	3,750	3,940	4,240	4,710	5,190
GOOD	4,260	4,600	4,940	5,310	5,680	6,070	6,470
MEDIUM	5,090	5,480	5,870	6,270	6,680	7,160	7,670
POOR	10,100	10,780	11,460	12,160	12,860	13,570	14,280

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+160	+260	+390	+580
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+85	+135	+164	+341
Reverse Thrust	Two Reversers Operative	-50	-260	-400	-2,350
Autoland	Automatic Landing	+510	+510	+510	+500

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES

FEET

NOTE: Data below assumes MAX PEDAL Braking and does NOT include 15% safety margin. Refer to Page 4-9 for all assumed conditions.

ZERO FLAP / ZERO SLAT APPROACH AND LANDING

BRAKING ACTION	LANDING WEIGHT – 1,000 POUNDS						
	100	110	120	130	140	150	160
DRY	5,600	5,910	6,200	6,510	7,020	7,790	8,590
GOOD	6,390	6,890	7,410	7,960	8,520	9,100	9,700
MEDIUM	8,220	8,840	9,480	10,130	10,780	11,560	12,390
POOR	16,320	17,400	18,510	19,640	20,780	21,920	23,060

CORRECTIONS		DRY	GOOD	MEDIUM	POOR
Altitude	Per 1,000 feet	+270	+380	+630	+930
Wind	Per 1 kt. headwind	-0	-0	-0	-0
	Per 1 kt. tailwind	+140	+202	+265	+551
Reverse Thrust	Two Reversers Operative	-90	-390	-650	-3,800
Autoland	Automatic Landing	+480	+520	+520	+570

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EMERGENCY LANDING DISTANCES

FEET

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

FLAPS FULL

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)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	8,300	6,000	5,200	8,300	6,100	6,100
155,000	8,200	5,800	5,000	8,200	6,000	6,000
150,000	7,900	5,700	4,900	7,900	5,800	5,800
145,000	7,700	5,600	4,700	7,700	5,700	5,700
142,198	7,000	5,000	3,700	7,000	5,000	4,800
140,000	6,900	4,900	3,700	6,900	4,900	4,700
135,000	6,700	4,800	3,700	6,700	4,800	4,500
130,000	6,500	4,600	3,600	6,500	4,600	4,400
125,000	6,300	4,500	3,500	6,300	4,500	4,300
120,000	6,100	4,300	3,400	6,100	4,300	4,100
115,000	5,900	4,300	3,300	5,900	4,300	4,000
110,000	5,700	4,100	3,100	5,700	4,100	3,800
105,000	5,500	4,000	3,000	5,500	4,000	3,700
100,000	5,300	3,800	3,000	5,300	3,800	3,600
95,000	5,100	3,700	2,900	5,100	3,700	3,400
90,000	4,900	3,600	2,800	4,900	3,600	3,200

BASIS: Zero wind • Standard approach procedure • Both Reversers Operating • Approach speed V_{APP} ($V_{LS}+5$)

Data is advisory and includes a standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-400	-300	-300	-400	-400	-400
2,000	0	0	0	0	0	0
4,000	400	300	300	400	400	400
6,000	900	600	500	900	800	800
8,000	1,300	800	800	1,300	1,300	1,300

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	450	300	250	450	350	350
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	250	150	100	250	200	200
PER 1% DOWN SLOPE	100	50	50	100	150	150
1 REV INOPERATIVE	0	0	0	0	0	0
2 REV INOPERATIVE	100	0	100	100	0	200
Autoland	900			1,100		

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 FULL

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	8,400	7,400	7,400	11,300	11,200	11,200
155,000	8,300	7,200	7,200	11,000	10,900	10,900
150,000	8,100	7,000	7,000	10,700	10,600	10,600
145,000	7,800	6,800	6,800	10,400	10,300	10,300
142,198	7,100	6,000	5,900	9,700	9,500	9,400
140,000	7,000	5,900	5,900	9,500	9,300	9,300
135,000	6,900	5,800	5,700	9,200	9,000	9,000
130,000	6,600	5,700	5,600	8,900	8,800	8,700
125,000	6,400	5,500	5,400	8,600	8,400	8,400
120,000	6,300	5,300	5,200	8,300	8,200	8,200
115,000	6,000	5,100	5,000	8,000	7,800	7,800
110,000	5,800	5,000	4,900	7,700	7,600	7,600
105,000	5,600	4,800	4,700	7,400	7,200	7,200
100,000	5,400	4,600	4,500	7,100	7,000	7,000
95,000	5,100	4,400	4,300	6,800	6,700	6,600
90,000	5,000	4,200	4,200	6,400	6,300	6,300

BASIS: Zero wind • Standard approach procedure • Both Reversers Operating • Approach speed V_{APP} ($V_{LS}+5$)

Data is advisory and includes a standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-900	-900	-900
2,000	0	0	0	0	0	0
4,000	500	400	400	900	900	900
6,000	900	800	800	1,700	1,700	1,700
8,000	1,400	1,300	1,300	2,600	2,600	2,600

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	450	350	350	500	500	500
PER 1 KT TAILWIND	150	150	150	350	350	350
PER 10°C ABOVE ISA	250	200	200	450	400	400
PER 1% DOWN SLOPE	250	350	300	2,500	2,500	2,500
1 REV INOPERATIVE	0	0	0	400	400	400
2 REV INOPERATIVE	200	500	500	1,900	1,900	1,800
Autoland	1,100			1,300		

EMERGENCY LANDING DISTANCES

FEET

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

FLAPS 3

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)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,000	6,300	5,700	9,000	6,800	6,800
155,000	8,800	6,200	5,500	8,800	6,600	6,600
150,000	8,500	6,100	5,300	8,500	6,400	6,400
145,000	8,300	5,900	5,100	8,300	6,200	6,200
142,198	7,500	5,200	4,100	7,500	5,400	5,200
140,000	7,400	5,200	4,000	7,400	5,300	5,100
135,000	7,200	5,000	3,800	7,200	5,100	5,000
130,000	7,000	4,900	3,700	7,000	5,000	4,800
125,000	6,800	4,800	3,700	6,800	4,800	4,600
120,000	6,500	4,600	3,600	6,500	4,700	4,400
115,000	6,300	4,500	3,500	6,300	4,500	4,300
110,000	6,100	4,300	3,300	6,100	4,300	4,200
105,000	5,900	4,200	3,200	5,900	4,200	4,000
100,000	5,700	4,100	3,100	5,700	4,100	3,800
95,000	5,500	3,900	3,000	5,500	3,900	3,700
90,000	5,200	3,700	3,000	5,200	3,700	3,500

BASIS: Zero wind • Standard approach procedure • Both Reversers Operating • Approach speed V_{APP} ($V_{LS}+5$)
Data is advisory and includes a standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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	-300	-300	-500	-500	-500
2,000	0	0	0	0	0	0
4,000	500	300	300	500	500	500
6,000	900	600	500	900	900	900
8,000	1,400	900	800	1,400	1,400	1,400

CORRECTIONS	DRY (6)			GOOD (5)		
PER 5 ADD'L APP SPD	500	300	250	500	400	400
PER 1 KT TAILWIND	150	100	100	150	150	150
PER 10°C ABOVE ISA	250	150	150	250	250	250
PER 1% DOWN SLOPE	100	50	100	100	200	200
1 REV INOPERATIVE	0	0	0	0	0	0
2 REV INOPERATIVE	100	0	100	100	100	200
Autoland	1,100			1,300		

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 3

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).					
	MEDIUM (3)			POOR (1)		
	Low AB	Med AB	Max Pedal	Low AB	Med AB	Max Pedal
160,000	9,100	7,800	8,100	12,500	12,500	12,500
155,000	8,900	7,700	7,900	12,300	12,200	12,200
150,000	8,700	7,500	7,700	11,900	11,800	11,800
145,000	8,400	7,200	7,500	11,500	11,500	11,500
142,198	7,700	6,500	6,400	10,700	10,500	10,500
140,000	7,600	6,400	6,300	10,500	10,400	10,400
135,000	7,300	6,300	6,200	10,200	10,100	10,100
130,000	7,100	6,100	6,000	9,800	9,700	9,700
125,000	6,900	5,900	5,800	9,500	9,400	9,400
120,000	6,700	5,700	5,700	9,200	9,100	9,000
115,000	6,400	5,600	5,500	8,900	8,800	8,800
110,000	6,300	5,300	5,300	8,500	8,400	8,400
105,000	6,000	5,100	5,000	8,200	8,100	8,100
100,000	5,700	5,000	4,900	7,800	7,700	7,700
95,000	5,600	4,800	4,700	7,500	7,400	7,400
90,000	5,300	4,500	4,500	7,100	7,000	7,000

BASIS: Zero wind • Standard approach procedure • Both Reversers Operating • Approach speed V_{APP} ($V_{LS}+5$)

Data is advisory and includes a standard air run from threshold to touchdown (approx. 1,200 ft to 2,000 ft depending on weight)

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)

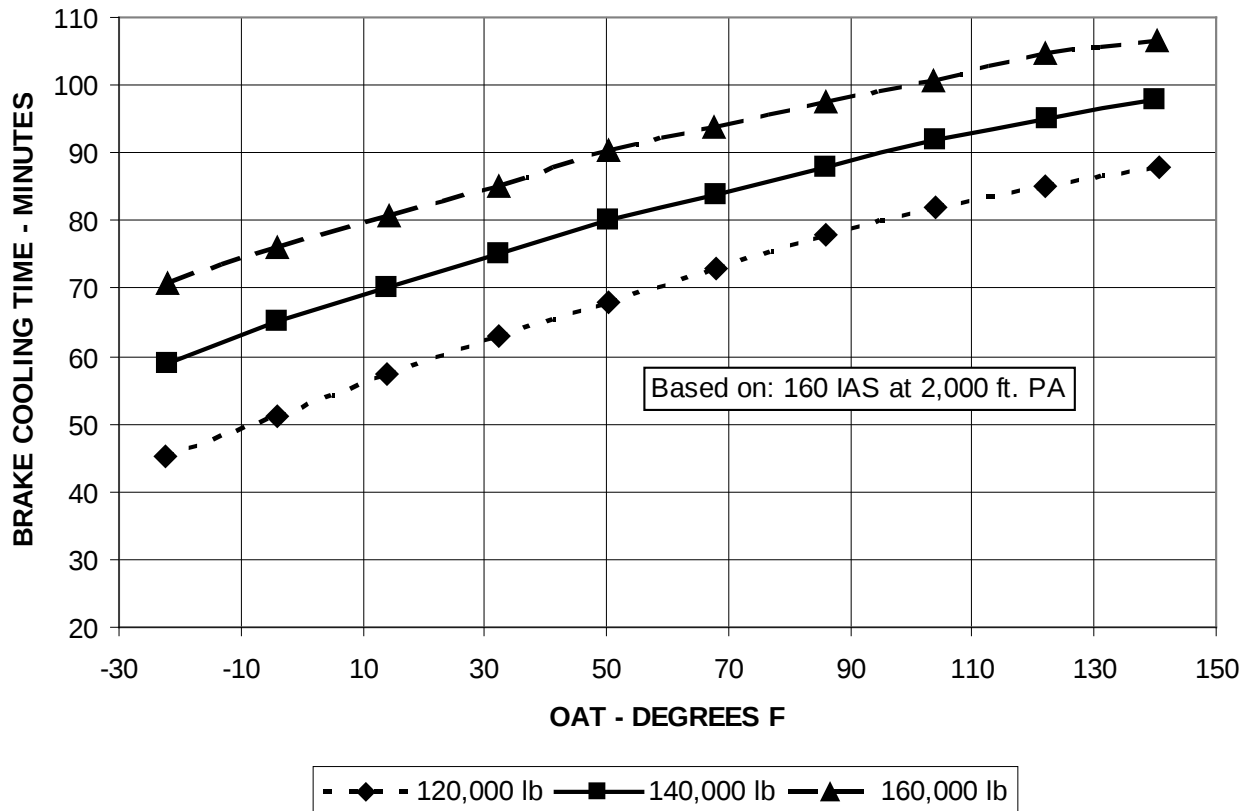
ALTITUDE ADJUSTMENT

ALTITUDE (FEET)	MEDIUM (3)			POOR (1)		
0	-500	-500	-500	-1,000	-1,000	-1,000
2,000	0	0	0	0	0	0
4,000	500	500	500	1,000	1,000	1,000
6,000	1,000	900	900	2,000	2,000	2,000
8,000	1,500	1,400	1,400	2,900	2,900	2,900

CORRECTIONS	MEDIUM (3)			POOR (1)		
PER 5 ADD'L APP SPD	500	350	350	600	550	550
PER 1 KT TAILWIND	150	150	150	400	400	400
PER 10°C ABOVE ISA	250	250	250	500	500	500
PER 1% DOWN SLOPE	300	400	350	3,050	3,050	3,050
1 REV INOPERATIVE	0	100	0	600	600	500
2 REV INOPERATIVE	300	600	500	2,400	2,300	2,300
Autoland	1,300			1,600		

REQUIRED BRAKE COOLING TIME

REJECTED TAKEOFF



NOTE: The maximum brake temperature for takeoff is 300°C but a maximum of 275°C is suggested to prevent BRAKES HOT condition after takeoff.

NOTE: Do NOT taxi if the temperature difference between two brakes on the same gear is greater than 150°C and the temperature of one brake is above 600°C. This may be indicative of a brake binding.

Use this chart for planning purposes to determine the brake cooling time required following a high speed, rejected takeoff. Timing begins when the brakes are released after the chocks have been installed. The MDM contains the procedures/guidance for inoperative Brake Temperature indications.

Instructions: Enter chart from bottom using OAT – DEGREES F. Move vertically until crossing the weight closest to your weight at the time of the rejected takeoff. Move horizontally to the left scale to determine the anticipated cooling time.

REQUIRED BRAKE COOLING TIME**NORMAL QUICK TURNAROUND****(minutes)**

Gross Weight	Airport Altitude FT	OAT (°C)					
		0	10	20	30	40	50
142,000	0	14	19	23	27	60	62
	2000	14	19	23	57	60	62
	4000	14	51	54	57	60	62
	6000	48	51	54	57	60	62
	8000	48	51	54	57	60	62
135,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	57	60	62
	6000	14	19	54	57	60	62
	8000	48	51	54	57	60	62
130,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	54	57	60	62
	8000	14	51	54	57	60	62
125,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	23	27	31	62
	8000	14	19	23	27	31	62
120,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	23	27	31	35
	8000	14	19	23	27	31	62
115,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	23	27	31	35
	8000	14	19	23	27	31	35
110,000	0	14	19	23	27	31	35
	2000	14	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	23	27	31	35
	8000	14	19	23	27	31	35
105,000	0	0	0	23	27	31	35
	2000	0	19	23	27	31	35
	4000	14	19	23	27	31	35
	6000	14	19	23	27	31	35
	8000	14	19	23	27	31	35

Use this chart to determine the brake cooling time required following a norm landing when MEL 32-60-03H ECAM Brake Temp Indication is inoperative.

Enter chart with landing weight and destination airport elevation and OAT. Read the required cooling time in minutes prior to subsequent takeoff.

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: 250/275/0.76				
PRESSURE ALTITUDE FEET	SPEED	GROSS WEIGHT – LBS		
		Above 150,000	150,000 - 125,000	Below 125,000
		Pitch Attitude - degrees		
Above 32,000	M 0.76	+3.5	+3.5	+3.5
25,000 - 32,000	275	+3.5	+3.5	+3.5
20,000 - 25,000	275	+4.5	+4.5	+5.0
15,000 - 20,000	250	+6.0	+6.0	+6.0
10,000 - 15,000	250	+8.0	+8.5	+9.0
5,000 - 10,000	250	+9.0	+10.0	+10.5
Below 5,000	250	+10.5	+11.0	+12.0

CRUISE				
SPEED: 250/275/0.76		THRUST: N1 FOR LEVEL FLIGHT FLAPS: UP		
PRESSURE ALTITUDE FEET		GROSS WEIGHT - POUNDS		
		Above 150,000	150,000 - 125,000	Below 125,000
Above 32,000	PITCH ATTITUDE	+2.5	+2.5	+2.0
	Alt Mode %N1	88.2	86.7	84.8
20,000 - 32,000	PITCH ATTITUDE	+2.5	+2.0	+1.5
	Alt Mode %N1	83.3	81.3	79.7
Below 20,000	PITCH ATTITUDE	+3.5	+3.0	+2.0
	Alt Mode %N1	71.6	69.4	67.3

DESCENT				
SPEED: 250/275/0.76				
PRESSURE ALTITUDE FEET	SPEED	GROSS WEIGHT – LBS		
		Above 150,000	150,000 - 125,000	Below 125,000
		Pitch Attitude - degrees		
Above 32,000	M 0.76	-1.0	-1.5	-2.0
32,000 - 20,000	275	-0.5	-1.0	-2.0
20,000 - 10,000	250	0.0	-0.5	-1.5
Below 10,000	250	+0.5	-0.5	-1.5
Below 10,000	G-Dot	+1.5	+2.0	+2.0

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: N1 FOR LEVEL FLIGHT FLAPS: AS REQ'D			
PRESSURE ALTITUDE FEET	FLAPS / GEAR	SPEED		GROSS WEIGHT – POUNDS		
				Above 150,000	150,000 - 125,000	Below 125,000
5,000	0/Up	G-Dot	PITCH ATT (Alt Mode %N1)	+5.0 64.6	+5.0 60.3	+5.5 55.8
5,000	1/Up	S	PITCH ATT (Alt Mode %N1)	+7.5 66.1	+7.5 61.8	+7.5 57.2
5,000	1+F/Up	S	PITCH ATT (Alt Mode %N1)	+4.5 67.2	+4.5 63.1	+4.5 58.4
5,000	2/Up	F	PITCH ATT (Alt Mode %N1)	+8.5 68.2	+8.5 63.8	+8.5 59.1
5,000	3/Down	F	PITCH ATT (Alt Mode %N1)	+7.0 73.5	+7.0 69.4	+7.5 64.0

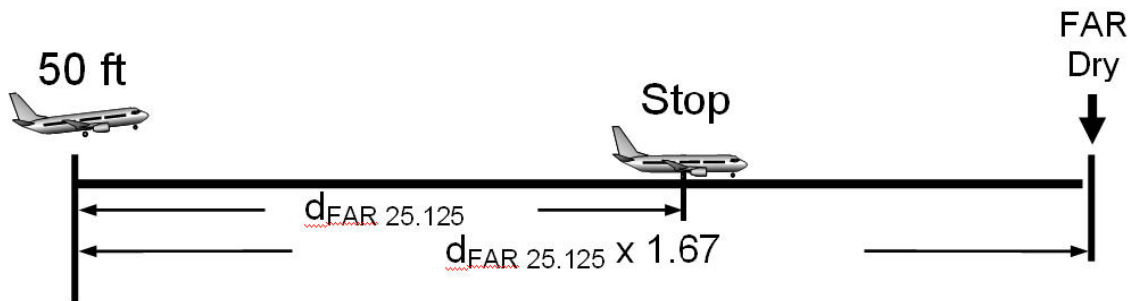
FINAL APPROACH						
SPEED: see below			THRUST: N1 FOR 3° GLIDESLOPE FLAPS: AS REQ'D			
PRESSURE ALTITUDE – FEET	FLAPS / GEAR	SPEED		GROSS WEIGHT – POUNDS		
				Above 150,000	150,000 - 125,000	Below 125,000
1,500	3/Down	VLS+10 VLS+10	PITCH ATT (Alt Mode %N1)	+4.0 56.0	+4.0 52.6	+4.0 48.8

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 and approach speeds 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” page in this section of the ODM on Page 4-8 (distance multiplier table) or Pages 4-9 – 4-24 (lookup tables).

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 in FAR Landing Distances
- MAX PEDAL braking
- Includes distance from 50 feet above threshold to stop

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

FLAPS FULL

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

ONE BRAKE INOP - DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	7,400	7,600	7,810	8,030	8,260	8,490	8,730	8,990	9,250	9,520	9,580
160,000	7,070	7,270	7,470	7,670	7,890	8,110	8,340	8,580	8,830	9,090	9,140
155,000	6,750	6,940	7,130	7,320	7,530	7,740	7,950	8,180	8,420	8,660	8,710
150,000	6,440	6,620	6,800	6,980	7,180	7,370	7,580	7,790	8,020	8,250	8,300
145,000	6,120	6,300	6,470	6,650	6,830	7,020	7,220	7,420	7,630	7,850	7,890
140,000	5,810	5,980	6,150	6,320	6,490	6,670	6,860	7,050	7,250	7,450	7,500
135,000	5,490	5,660	5,820	5,990	6,160	6,330	6,510	6,690	6,880	7,070	7,110
130,000	5,200	5,350	5,500	5,660	5,820	5,990	6,160	6,340	6,520	6,700	6,740
125,000	4,980	5,090	5,230	5,370	5,510	5,670	5,830	6,000	6,160	6,340	6,370
120,000	4,860	4,960	5,060	5,160	5,270	5,400	5,540	5,690	5,840	6,000	6,040
115,000	4,730	4,830	4,920	5,030	5,130	5,240	5,350	5,470	5,590	5,720	5,750
110,000	4,610	4,700	4,790	4,890	4,990	5,090	5,200	5,310	5,430	5,550	5,570
105,000	4,490	4,570	4,660	4,750	4,850	4,950	5,050	5,160	5,270	5,380	5,410
100,000	4,360	4,440	4,530	4,620	4,710	4,800	4,900	5,000	5,110	5,220	5,240

CORRECTIONS:

Headwind per kt	-20 ft
Tailwind per kt	+ 135 ft

ONE BRAKE INOP - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	8,510	8,740	8,980	9,240	9,500	9,760	10,050	10,330	10,640	10,950	11,010
160,000	8,130	8,360	8,590	8,820	9,070	9,320	9,590	9,870	10,150	10,450	10,510
155,000	7,770	7,980	8,200	8,420	8,660	8,900	9,150	9,410	9,680	9,960	10,020
150,000	7,400	7,610	7,820	8,030	8,250	8,480	8,720	8,960	9,220	9,490	9,540
145,000	7,040	7,240	7,440	7,650	7,860	8,070	8,300	8,530	8,770	9,020	9,070
140,000	6,680	6,870	7,070	7,270	7,470	7,670	7,890	8,110	8,330	8,570	8,620
135,000	6,320	6,510	6,700	6,890	7,080	7,280	7,490	7,690	7,910	8,130	8,180
130,000	5,980	6,150	6,330	6,510	6,700	6,890	7,090	7,290	7,490	7,700	7,750
125,000	5,730	5,860	6,010	6,170	6,340	6,520	6,700	6,900	7,090	7,290	7,330
120,000	5,590	5,700	5,820	5,940	6,060	6,210	6,370	6,540	6,720	6,910	6,940
115,000	5,440	5,550	5,660	5,780	5,900	6,020	6,150	6,290	6,430	6,580	6,620
110,000	5,300	5,400	5,510	5,620	5,740	5,860	5,980	6,110	6,240	6,380	6,410
105,000	5,160	5,260	5,360	5,460	5,570	5,690	5,810	5,930	6,060	6,190	6,220
100,000	5,010	5,110	5,210	5,310	5,410	5,520	5,640	5,750	5,880	6,000	6,030

CORRECTIONS:

Headwind per kt	-20 ft
Tailwind per kt	+ 155 ft

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

FLAPS FULL

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

ALL SPOILERS INOP - DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	7,340	7,530	7,730	7,940	8,150	8,370	8,610	8,850	9,110	9,380	7,340
160,000	7,100	7,280	7,470	7,660	7,870	8,080	8,300	8,540	8,780	9,040	7,100
155,000	6,860	7,040	7,220	7,410	7,600	7,810	8,020	8,240	8,470	8,710	6,860
150,000	6,640	6,810	6,990	7,170	7,350	7,550	7,750	7,960	8,170	8,410	6,640
145,000	6,440	6,600	6,770	6,940	7,120	7,300	7,490	7,690	7,900	8,120	6,440
140,000	6,280	6,430	6,580	6,740	6,910	7,080	7,260	7,450	7,650	7,850	6,280
135,000	6,120	6,270	6,420	6,570	6,730	6,890	7,060	7,240	7,420	7,610	6,120
130,000	5,970	6,110	6,250	6,400	6,550	6,710	6,870	7,040	7,220	7,400	5,970
125,000	5,810	5,940	6,080	6,220	6,370	6,520	6,680	6,850	7,020	7,190	5,810
120,000	5,660	5,790	5,920	6,050	6,190	6,340	6,490	6,650	6,820	6,990	5,660
115,000	5,510	5,630	5,750	5,880	6,020	6,160	6,310	6,460	6,610	6,780	5,510
110,000	5,360	5,470	5,590	5,720	5,840	5,980	6,120	6,260	6,410	6,570	5,360
105,000	5,220	5,330	5,440	5,550	5,670	5,800	5,930	6,070	6,220	6,370	5,220
100,000	5,070	5,170	5,280	5,390	5,500	5,620	5,750	5,880	6,020	6,160	5,070

CORRECTIONS:

Headwind per kt	-20 ft
Tailwind per kt	+ 125 ft

ALL SPOILERS INOP - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	8,440	8,660	8,890	9,130	9,370	9,630	9,900	10,180	10,480	10,790	8,440
160,000	8,160	8,370	8,590	8,810	9,050	9,290	9,550	9,820	10,100	10,390	8,160
155,000	7,890	8,100	8,310	8,520	8,740	8,980	9,220	9,470	9,740	10,020	7,890
150,000	7,640	7,840	8,040	8,240	8,460	8,680	8,910	9,150	9,400	9,670	7,640
145,000	7,410	7,590	7,790	7,980	8,190	8,400	8,620	8,850	9,080	9,340	7,410
140,000	7,220	7,400	7,570	7,750	7,940	8,140	8,350	8,570	8,790	9,030	7,220
135,000	7,040	7,210	7,380	7,550	7,740	7,920	8,120	8,320	8,530	8,760	7,040
130,000	6,860	7,020	7,190	7,350	7,530	7,710	7,900	8,100	8,300	8,510	6,860
125,000	6,680	6,840	7,000	7,160	7,330	7,500	7,680	7,870	8,070	8,270	6,680
120,000	6,510	6,650	6,800	6,960	7,120	7,290	7,470	7,650	7,840	8,030	6,510
115,000	6,330	6,470	6,620	6,770	6,920	7,080	7,250	7,420	7,610	7,790	6,330
110,000	6,170	6,300	6,430	6,570	6,720	6,880	7,040	7,200	7,380	7,560	6,170
105,000	6,000	6,120	6,250	6,380	6,520	6,670	6,820	6,980	7,150	7,320	6,000
100,000	5,830	5,950	6,080	6,200	6,330	6,470	6,610	6,770	6,920	7,090	5,830

CORRECTIONS:

Headwind per kt	-25 ft
Tailwind per kt	+ 140 ft

MEL SUPPORT

FAR LANDING DISTANCES (FACTORED)

FLAPS FULL

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

TWO PAIRS OF SPOILERS INOP - DRY RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	6,470	6,640	6,820	7,010	7,200	7,400	7,600	7,820	8,040	8,270	8,310
160,000	6,180	6,350	6,520	6,700	6,880	7,070	7,260	7,460	7,670	7,890	7,940
155,000	5,890	6,050	6,220	6,390	6,560	6,740	6,930	7,120	7,320	7,530	7,570
150,000	5,600	5,760	5,920	6,090	6,250	6,430	6,600	6,790	6,970	7,170	7,210
145,000	5,320	5,480	5,640	5,790	5,960	6,120	6,290	6,460	6,640	6,820	6,860
140,000	5,110	5,230	5,360	5,510	5,670	5,830	5,990	6,150	6,320	6,490	6,530
135,000	4,990	5,090	5,200	5,310	5,430	5,560	5,710	5,860	6,020	6,180	6,220
130,000	4,870	4,970	5,070	5,180	5,290	5,410	5,530	5,650	5,780	5,920	5,950
125,000	4,750	4,850	4,950	5,050	5,160	5,270	5,380	5,500	5,630	5,750	5,780
120,000	4,630	4,730	4,820	4,920	5,020	5,130	5,240	5,360	5,470	5,600	5,620
115,000	4,520	4,610	4,700	4,790	4,890	4,990	5,100	5,210	5,320	5,440	5,470
110,000	4,400	4,490	4,570	4,660	4,760	4,860	4,960	5,060	5,170	5,290	5,310
105,000	4,290	4,370	4,450	4,540	4,630	4,720	4,820	4,920	5,020	5,130	5,150
100,000	4,170	4,250	4,330	4,410	4,490	4,580	4,670	4,770	4,870	4,970	5,000

CORRECTIONS:

Headwind per kt	-15 ft
Tailwind per kt	+ 115 ft

TWO PAIRS OF SPOILERS INOP - WET RUNWAY

AIRCRAFT WEIGHT LBS	AIRPORT PRESSURE ALTITUDE - FEET										
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	9,200
165,000	7,440	7,640	7,850	8,060	8,280	8,510	8,740	8,990	9,240	9,510	7,440
160,000	7,100	7,300	7,500	7,700	7,910	8,130	8,350	8,580	8,830	9,080	7,100
155,000	6,770	6,960	7,150	7,350	7,550	7,750	7,970	8,190	8,420	8,660	6,770
150,000	6,440	6,620	6,810	7,000	7,190	7,390	7,590	7,800	8,020	8,250	6,440
145,000	6,120	6,300	6,480	6,660	6,850	7,040	7,230	7,430	7,630	7,850	6,120
140,000	5,880	6,010	6,170	6,340	6,520	6,700	6,880	7,070	7,270	7,470	5,880
135,000	5,740	5,860	5,980	6,110	6,250	6,400	6,560	6,740	6,920	7,110	5,740
130,000	5,600	5,720	5,840	5,960	6,090	6,220	6,360	6,500	6,650	6,810	5,600
125,000	5,470	5,580	5,690	5,810	5,930	6,060	6,190	6,330	6,470	6,620	5,470
120,000	5,330	5,440	5,550	5,660	5,780	5,900	6,030	6,160	6,300	6,440	5,330
115,000	5,200	5,300	5,400	5,510	5,630	5,740	5,860	5,990	6,120	6,260	5,200
110,000	5,070	5,160	5,260	5,360	5,470	5,580	5,700	5,820	5,950	6,080	5,070
105,000	4,930	5,020	5,120	5,220	5,320	5,430	5,540	5,650	5,770	5,900	4,930
100,000	4,800	4,890	4,980	5,070	5,170	5,270	5,380	5,490	5,600	5,720	4,800

CORRECTIONS:

Headwind per kt	-20 ft
Tailwind per kt	+ 130 ft

MEL SUPPORT

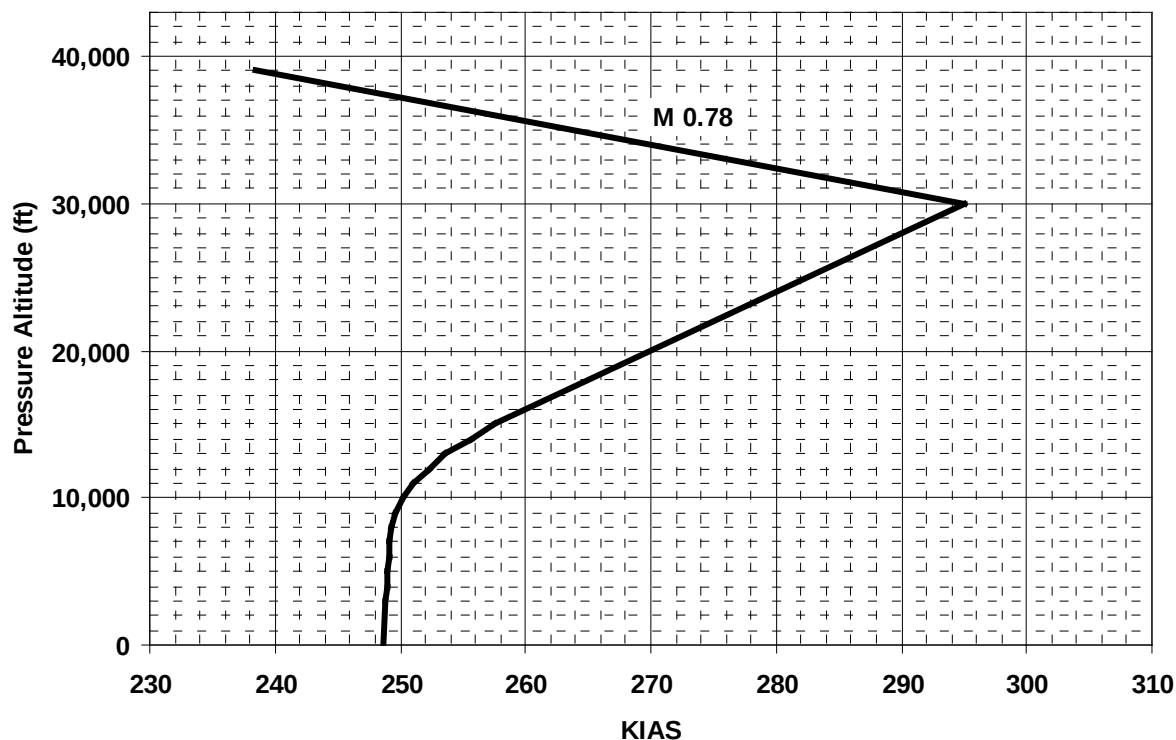
V_{MCG} – MINIMUM CONTROL SPEED, GROUND

Configuration	A320 (CFM56-5-A1) V_{MCG} – KIAS	A320 (CFM56-5-A3) V_{MCG} – KIAS
Flaps 1+F	105	109
Flaps 3	103	106

NOTES:

- V_{MCG} is defined as the minimum control speed on the *ground*. It is the speed where the airplane can maintain directional control after a critical engine failure using the primary aerodynamic controls only.

V_A – MAXIMUM DESIGN MANEUVERING SPEED



NOTES:

- This limitation only applies in alternate or direct flight control laws. If alternate or direct law is active:
 - o Full ailerons and rudder application should be confined to speeds below V_A .
 - o Maneuvers involving angle of attack near stall should be confined to speeds below V_A .

End of Section

FERRY FLIGHT PLANNING AND OPERATION

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AUTHORIZATION AND FLIGHT PLANNING

(DISPATCHER INSTRUCTIONS)

Ferry operational data is available for the following configuration:

- Flight with Landing Gear Down

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) unfiled flight plan using Long Range Cruise (LRC) at the proposed cruise altitude.
2. Calculate the trip time and fuel load based on the values displayed 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 and climb out will be made using Maximum Climb thrust 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.

FLIGHT WITH LANDING GEAR DOWN

GENERAL

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

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. VMO / MMO = 235 kt. IAS / M 0.60
2. Ditching with landing gear down has not been demonstrated.
3. Flight in forecasted icing conditions is not permitted.
4. Managed vertical modes CLB and DES must not be used.
5. Managed speed (except in approach) must not be used.
6. The FMS fuel predictions must be disregarded. Other predictions should also be disregarded (altitude, speed, and time), except time predictions at waypoints when in cruise.
7. Extended Operations (ETOPS) is not allowed to be used during Flight with Gear Down.
8. ALTITUDE ALERT is not available.
9. The APU must run during the whole flight. APU GEN must be available.
10. Failures that would normally lead to ALTN law will, with the landing gear extended, degrade flight control laws down to DIRECT law.

PROCEDURE (PREFLIGHT):

The L/G DOWN VMO/MMO switch located in the avionic bay on 188VU must be set to L/G DOWN position.

FLIGHT PLANNING (TAKEOFF)

RATOW & Takeoff climb limit weight:	Use GRD TPI in AWABS (Dispatchers)
Takeoff V Speeds:	Use GRD TPI in AWABS (Dispatchers)
Takeoff Thrust Settings:	Use TO only, use of AT (FLEX) settings NOT approved.
Takeoff Flap Settings:	Use GRD TPI in AWABS (Dispatchers)
Operation from Contaminated Runway:	Permitted, use GRD TPI (Dispatchers)

Note: Takeoff with tailwind is not recommended.

LANDING GEAR EXTENDED

FLIGHT PLANNING (ENROUTE)

-Use flight planning data in FPS if available. If no data is available, the following tables may be used as necessary.

MAXIMUM CRUISE ALTITUDE

WEIGHT (LB)	MAX ALTITUDE (FT)
160,000	22,400
150,000	24,600
140,000	26,500
130,000	28,300
120,000	30,300
110,000	32,500
100,000	34,600
90,000	36,800

BASIS:

- Buffet Margin = 1.0 G
- Landing Gear Extended, Doors Closed
- CG Position = 27.0%
- Anti-Ice OFF, Packs NORM
- Max Cruise thrust limits

LANDING GEAR EXTENDED (cont'd)

FLIGHT PLANNING (ENROUTE) (cont.)

CLIMB

-Climb at 230 kt / M 0.50 with all engines at maximum climb thrust. The tables below give the time, distance, and fuel consumption according to takeoff weight.

CLIMB - 230KT / 0.50M - ALL ENGINES - GEAR DOWN																		
MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF						ISA CG = 27.0 %			FROM BRAKE RELEASE TIME (MIN) DISTANCE (NM)				FUEL (LB)					
FL	WEIGHT AT BRAKE RELEASE (1000 LB)																	
	90		100		105		115		125		135		145		155		165	
300	18 86	3102																
290	17 80	2959																
280	16 74	2821	19 89	3325														
270	15 69	2688	18 82	3154														
260	14 64	2559	16 76	2989	18 83	3234												
250	13 60	2431	15 70	2830	18 83	3301												
240	12 55	2304	14 65	2673	17 76	3103	18 82	3354										
220	11 46	2048	12 54	2362	14 63	2718	15 68	2921	18 80	3394								
200	9 38	1785	10 44	2045	12 51	2334	12 54	2495	14 63	2859	17 73	3302						
180	7 30	1507	8 34	1715	9 39	1941	10 41	2065	11 47	2336	13 54	2651						
160	6 24	1282	7 27	1452	8 31	1636	8 32	1735	9 37	1950	10 41	2193	11 47	2469				
140	5 19	1094	6 21	1235	6 24	1387	7 26	1468	7 29	1643	8 32	1838	9 37	2056				
120	4 15	928	5 17	1045	5 19	1170	5 20	1237	6 23	1381	7 25	1539	8 28	1713				
100	3 12	776	4 13	872	4 15	974	4 16	1029	5 18	1145	6 20	1272	6 22	1411				
50	2 5	437	2 6	487	2 7	541	2 7	569	3 8	630	3 9	695	3 10	765	3 11	840		
10	1 2	223	1 2	245	1 2	270	1 2	283	1 3	311	1 3	341	2 3	373	2 3	405	2 4	439

LANDING GEAR EXTENDED (cont'd)

FLIGHT PLANNING (ENROUTE) (cont.)

CRUISE

-The recommended cruise speed is 230 kt / M 0.50.

-The ceiling with an engine inoperative may be a limiting factor, and the choice of the route should reflect this concern.

CRUISE - 230KT / 0.50M - ALL ENGINES - GEAR DOWN															
MAX. CRUISE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF								ISA CG = 27.0 %		%N1 LB/H/ENG NM/1000 LB				MACH IAS (KT) TAS (KT)	
WEIGHT (1000 LB)	FL100		FL150		FL200		FL220		FL240		FL260		FL280		FL300
90	78.5	0.417	83.6	0.458	87.8	0.500	87.5	0.500	87.3	0.500	87.1	0.500	87.0	0.500	87.2
	3795	230	3900	230	3985	228	3692	219	3423	210	3182	201	2967	192	2794
	35.0	266	36.8	287	38.5	307	41.3	305	44.1	302	47.1	300	50.1	297	52.7
100	78.9	0.417	84.0	0.458	88.2	0.500	88.0	0.500	87.8	0.500	87.8	0.500	88.1	0.500	88.5
	3855	230	3962	230	4052	228	3763	219	3504	210	3276	201	3091	192	2937
	34.5	266	36.2	287	37.9	307	40.5	305	43.1	302	45.7	300	48.1	297	50.2
110	79.4	0.417	84.4	0.458	88.7	0.500	88.5	0.500	88.5	0.500	88.8	0.500	89.2	0.500	89.9
	3919	230	4030	230	4127	228	3848	219	3605	210	3408	201	3242	192	3111
	33.9	266	35.6	287	37.2	307	39.6	305	41.9	302	44.0	300	45.8	297	47.4
120	79.9	0.417	84.9	0.458	89.2	0.500	89.2	0.500	89.4	0.500	89.9	0.500	90.6	0.500	
	3994	230	4109	230	4213	228	3951	219	3739	210	3561	201	3417	192	
	33.3	266	34.9	287	36.5	307	38.6	305	40.4	302	42.1	300	43.5	297	
130	80.6	0.417	85.5	0.458	89.8	0.500	90.0	0.500	90.5	0.500	91.1	0.500			
	4081	230	4201	230	4315	228	4085	219	3892	210	3735	201			
	32.6	266	34.1	287	35.6	307	37.3	305	38.8	302	40.1	300			
140	81.3	0.417	86.1	0.458	90.5	0.500	90.9	0.500							
	4178	230	4304	230	4449	228	4236	219							
	31.8	266	33.3	287	34.5	307	36.0	305							
150	82.1	0.417	86.7	0.458											
	4285	230	4418	230											
	31.0	266	32.5	287											
160	82.9	0.417	87.4	0.458											
	4401	230	4541	230											
	30.2	266	31.6	287											

LANDING GEAR EXTENDED (cont'd)

FLIGHT PLANNING (ENROUTE) (cont.)

DESCENT

-The recommended descent speed is 230 kt / M 0.55.

DESCENT - 220KT / 0.60M - ALL ENGINES - GEAR DOWN					
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 27.0 %		
MAXIMUM CABIN RATE OF DESCENT 350 FT/MIN					
FL	TIME (MIN)	FUEL (LB)	DIST. (NM)	EPR	IAS (KT)
330	19.6	1167	100	IDLE	208
320	19.3	1163	98	IDLE	213
310	19.0	1160	95	IDLE	218
300	18.8	1157	93	IDLE	220
290	18.4	1152	91	IDLE	220
280	18.0	1147	88	IDLE	220
270	17.6	1142	85	IDLE	220
260	17.3	1137	82	IDLE	220
250	16.9	1132	79	IDLE	220
240	16.5	1126	76	IDLE	220
220	15.7	1115	71	IDLE	220
200	14.9	1103	66	IDLE	220
180	14.1	1090	60	IDLE	220
160	13.3	1077	55	IDLE	220
140	12.4	1062	50	IDLE	220
120	11.6	1046	45	IDLE	220
100	9.7	1010	35	IDLE	220
50	6.4	936	20	IDLE	180
10	2.7	718	6	IDLE	180

LANDING GEAR EXTENDED (cont'd)

FLIGHT PLANNING (ENROUTE) (cont.)

HOLDING

-The chart below represents holding parameters with slats out, this configuration being the least penalizing for holding.

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - GEAR DOWN									
MAX CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG = 27.0 %		%N1 FF (LB/H/ENG)		
WEIGHT (1000 LB)	FL 15	FL 50	FL100	FL120	FL140	FL150	FL160	FL180	FL200
100	57.3 2374	60.2 2306	65.0 2337	67.0 2352	68.8 2348	69.6 2344	70.6 2340	72.4 2341	74.3 2360
110	60.1 2565	63.3 2568	68.1 2613	69.8 2605	71.7 2597	72.6 2597	73.4 2603	75.4 2629	77.6 2651
120	62.6 2799	66.0 2833	70.5 2846	72.3 2837	74.0 2845	75.0 2859	76.0 2873	78.2 2896	80.5 2913
130	65.3 3072	68.6 3112	73.0 3095	74.7 3107	76.6 3138	77.7 3152	78.8 3161	81.1 3184	83.0 3223
140	67.6 3354	70.8 3360	75.1 3357	77.0 3390	79.1 3415	80.3 3426	81.5 3442	83.3 3485	85.3 3534
150	69.7 3608	72.7 3593	77.1 3628	79.2 3656	81.5 3684	82.6 3707	83.5 3730	85.3 3779	87.3 3840
160	71.6 3848	74.6 3833	79.2 3901	81.5 3930	83.5 3978	84.4 4002	85.4 4028	87.3 4088	89.3 4160

LANDING GEAR EXTENDED (cont'd)

FLIGHT PLANNING (ENROUTE) (cont.)

ENGINE FAILURE

GROSS DRIFTDOWN FLIGHT PROFILE - GEAR DOWN					
MAX CONTINUOUS THRUST LIMITS			25,000 FT. INITIAL ALTITUDE		
HIGH AIR CONDITIONING			CG = 27.0%		
ANTI-ICING OFF					
INITIAL WEIGHT (1000 LB)	LEVEL OFF WEIGHT (1000 LB)	OPTIMUM DRIFTDOWN SPEED (KIAS)	GROSS LEVEL OFF ALTITUDE (FEET)		
			ISA + 10°C AND BELOW	ISA + 15°C	ISA + 20°C
160	153.2	229	2,500	800	
150	143.9	220	5,500	4,000	2,400
140	134.7	211	8,500	7,100	5,600
130	125.3	202	11,300	10,100	8,800
120	116.1	193	14,000	13,200	12,100
110	107.0	184	16,400	15,900	15,200
100	96.9	175	18,700	17,800	17,200

FLIGHT PLANNING (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 25,000 lbs. (Dispatchers)

End of Section

