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MD-88

Operational Data

Manual

Revision Number: 85
Revision Date: September 23, 2016

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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.

Distribution of this manual is the responsibility of the Dept. 188, ATG, LibSvc.ATL188@delta.com.

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.

MANUAL RIGHTS

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Revision Notification

Publication: MD-88 OPERATIONAL DATA MANUAL

Date: 23 Sep 16

Revision Number: 85

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REMOVE	INSERT	REMARKS
TABLE OF CONTENTS	TABLE OF CONTENTS	Date updated to reflect revision.
COVER PAGE	COVER PAGE	Cover page updated to reflect revision.
LIST OF EFFECTIVE PAGES Page <i>i</i>	LIST OF EFFECTIVE PAGES Page <i>i</i>	List of Effective Pages updated to reflect revision.
QUICK REFERENCE Pages: All	QUICK REFERENCE Pages: All	Changed the table title and 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 85

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MD-88 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES

RUNWAY CONDITION ASSESSMENT MATRIX

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

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

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

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

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

CROSSWIND

On slippery runways, crosswind guidelines are a function of runway surface condition, airplane loading and assume proper pilot technique. 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	10KTS
Tailwind Limit	10KTS*	10KTS*	5KTS	0KTS

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

MD-88 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 28

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	DRY (6)				GOOD (5)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,400	8,900	5,500	4,900	12,400	8,900	7,100	6,600
155,000	12,100	8,700	5,400	4,800	12,100	8,700	7,000	6,400
150,000	11,800	8,500	5,300	4,700	11,800	8,500	6,800	6,300
145,000	11,500	8,300	5,200	4,600	11,500	8,300	6,700	6,200
140,000	11,100	8,100	5,100	4,500	11,100	8,100	6,500	6,000
139,500	11,100	8,100	5,100	4,500	11,100	8,100	6,500	6,000
135,000	10,800	7,900	5,000	4,400	10,800	7,900	6,400	5,900
130,000	10,500	7,700	4,800	4,300	10,500	7,700	6,200	5,700
125,000	10,200	7,500	4,700	4,200	10,200	7,500	6,100	5,600
120,000	9,900	7,300	4,600	4,100	9,900	7,300	5,900	5,400
115,000	9,600	7,100	4,500	4,000	9,600	7,100	5,700	5,300
110,000	9,300	6,900	4,400	3,900	9,300	6,900	5,600	5,100
105,000	9,000	6,800	4,300	3,800	9,000	6,800	5,400	5,000
100,000	8,700	6,600	4,200	3,700	8,700	6,600	5,300	4,800
95,000	8,400	6,400	4,100	3,600	8,400	6,400	5,100	4,700
90,000	8,100	6,200	3,900	3,500	8,100	6,200	5,000	4,500

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

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

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

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	150	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	250	300	300	300	300
PER 10°C ABOVE ISA	350	350	350	350	500	500	500	500
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% DOWN SLOPE	450	450	450	450	650	650	650	650
1.3 EPR REVERSE	0	0	0	0	0	0	-100	-50
1 REVERSER INOP	0	0	50	50	0	0	150	150
2 REVERSERS INOP	0	0	100	50	0	0	250	250

Note: Do not operate when Braking Action is Nil.

MD-88 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 28

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,500	10,500	9,900	9,400	13,500	13,400	12,800	12,300
155,000	12,200	10,200	9,700	9,100	13,200	13,100	12,600	12,000
150,000	11,900	10,000	9,400	8,900	12,900	12,800	12,300	11,800
145,000	11,600	9,700	9,200	8,700	12,600	12,500	12,000	11,500
140,000	11,200	9,500	9,000	8,500	12,300	12,300	11,700	11,200
139,500	11,200	9,500	8,900	8,400	12,300	12,200	11,700	11,200
135,000	10,900	9,300	8,700	8,200	12,000	11,900	11,400	10,900
130,000	10,600	9,000	8,500	8,000	11,700	11,600	11,100	10,600
125,000	10,300	8,800	8,300	7,800	11,300	11,300	10,800	10,300
120,000	10,000	8,500	8,100	7,600	11,000	10,900	10,400	10,000
115,000	9,700	8,300	7,800	7,400	10,700	10,600	10,100	9,700
110,000	9,400	8,100	7,600	7,100	10,300	10,300	9,800	9,400
105,000	9,100	7,800	7,400	6,900	10,000	9,900	9,500	9,000
100,000	8,800	7,600	7,100	6,700	9,600	9,600	9,200	8,700
95,000	8,500	7,300	6,900	6,500	9,300	9,300	8,800	8,400
90,000	8,200	7,100	6,700	6,300	9,000	8,900	8,500	8,100

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

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

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

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-100	-100	-100	-100
PER 1 KT TAILWIND	250	250	250	250	300	300	300	300
PER 5 KTS ADD'L SPD	450	450	450	450	600	600	600	600
PER 10°C ABOVE ISA	700	700	700	700	900	900	900	900
PER 10°C BELOW ISA	-250	-250	-250	-250	-300	-300	-300	-300
PER 1% UP SLOPE	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% DOWN SLOPE	900	900	900	900	1,150	1,150	1,150	1,150
1.3 EPR REVERSE	0	-400	-350	-350	-250	-800	-750	-750
1 REVERSER INOP	0	500	450	450	900	1,000	1,050	1,000
2 REVERSERS INOP	0	750	750	700	1,450	1,500	1,500	1,450

Note: Do not operate when Braking Action is Nil.

MD-88 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 40

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	DRY (6)				GOOD (5)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	11,900	8,700	5,200	4,700	11,900	8,700	6,900	6,300
155,000	11,600	8,500	5,200	4,600	11,600	8,500	6,700	6,200
150,000	11,300	8,300	5,100	4,500	11,300	8,300	6,600	6,100
145,000	11,000	8,100	5,000	4,400	11,000	8,100	6,400	5,900
140,000	10,700	7,900	4,900	4,400	10,700	7,900	6,300	5,800
139,500	10,600	7,900	4,900	4,400	10,600	7,900	6,300	5,800
135,000	10,400	7,700	4,800	4,300	10,400	7,700	6,100	5,600
130,000	10,100	7,500	4,700	4,200	10,100	7,500	6,000	5,500
125,000	9,800	7,300	4,600	4,100	9,800	7,300	5,800	5,400
120,000	9,600	7,100	4,500	4,000	9,600	7,100	5,700	5,200
115,000	9,300	7,000	4,300	3,900	9,300	7,000	5,500	5,100
110,000	9,000	6,800	4,200	3,800	9,000	6,800	5,400	4,900
105,000	8,700	6,600	4,100	3,700	8,700	6,600	5,200	4,800
100,000	8,500	6,400	4,000	3,600	8,500	6,400	5,100	4,600
95,000	8,200	6,200	3,900	3,500	8,200	6,200	4,900	4,500
90,000	7,900	6,100	3,800	3,400	7,900	6,100	4,800	4,400

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5

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

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

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	150	150	150	150	150
PER 5 KTS ADD'L SPD	250	250	250	250	300	300	300	300
PER 10°C ABOVE ISA	350	350	350	350	500	500	500	500
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% DOWN SLOPE	450	450	450	450	600	600	600	600
1.3 EPR REVERSE	0	0	0	0	0	0	-50	-50
1 REVERSER INOP	0	0	50	50	0	0	150	100
2 REVERSERS INOP	0	0	50	50	0	0	250	250

Note: Do not operate when Braking Action is Nil.

MD-88 QUICK REFERENCE CHART

OPERATIONAL LANDING DISTANCES FEET

FLAPS 40

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,000	9,900	9,300	8,800	12,800	12,400	11,900	11,300
155,000	11,700	9,600	9,100	8,600	12,500	12,100	11,600	11,100
150,000	11,400	9,400	8,900	8,400	12,200	11,800	11,300	10,800
145,000	11,100	9,200	8,700	8,200	11,900	11,600	11,100	10,600
140,000	10,800	8,900	8,400	7,900	11,600	11,300	10,800	10,300
139,500	10,700	8,900	8,400	7,900	11,600	11,300	10,800	10,300
135,000	10,500	8,700	8,200	7,700	11,300	11,000	10,600	10,100
130,000	10,200	8,500	8,000	7,600	11,000	10,800	10,300	9,800
125,000	9,900	8,300	7,800	7,400	10,700	10,500	10,000	9,600
120,000	9,700	8,100	7,600	7,200	10,500	10,200	9,800	9,300
115,000	9,400	7,900	7,400	7,000	10,200	10,000	9,500	9,100
110,000	9,100	7,700	7,200	6,800	9,900	9,700	9,300	8,800
105,000	8,800	7,400	7,000	6,600	9,600	9,400	9,000	8,600
100,000	8,600	7,200	6,800	6,400	9,300	9,200	8,700	8,300
95,000	8,300	7,000	6,600	6,200	9,000	8,900	8,500	8,100
90,000	8,000	6,800	6,400	6,000	8,800	8,600	8,200	7,800

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5

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

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

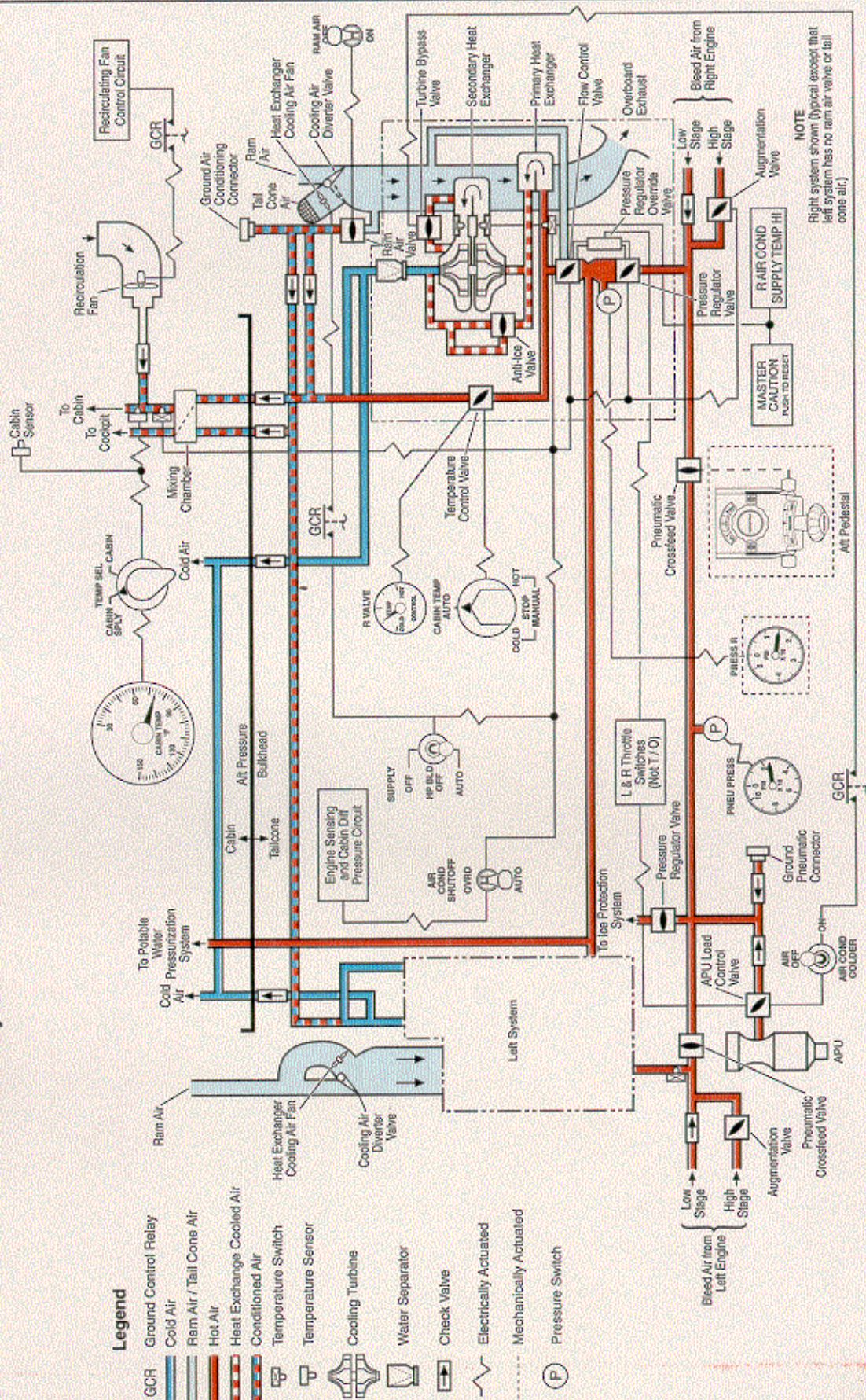
 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

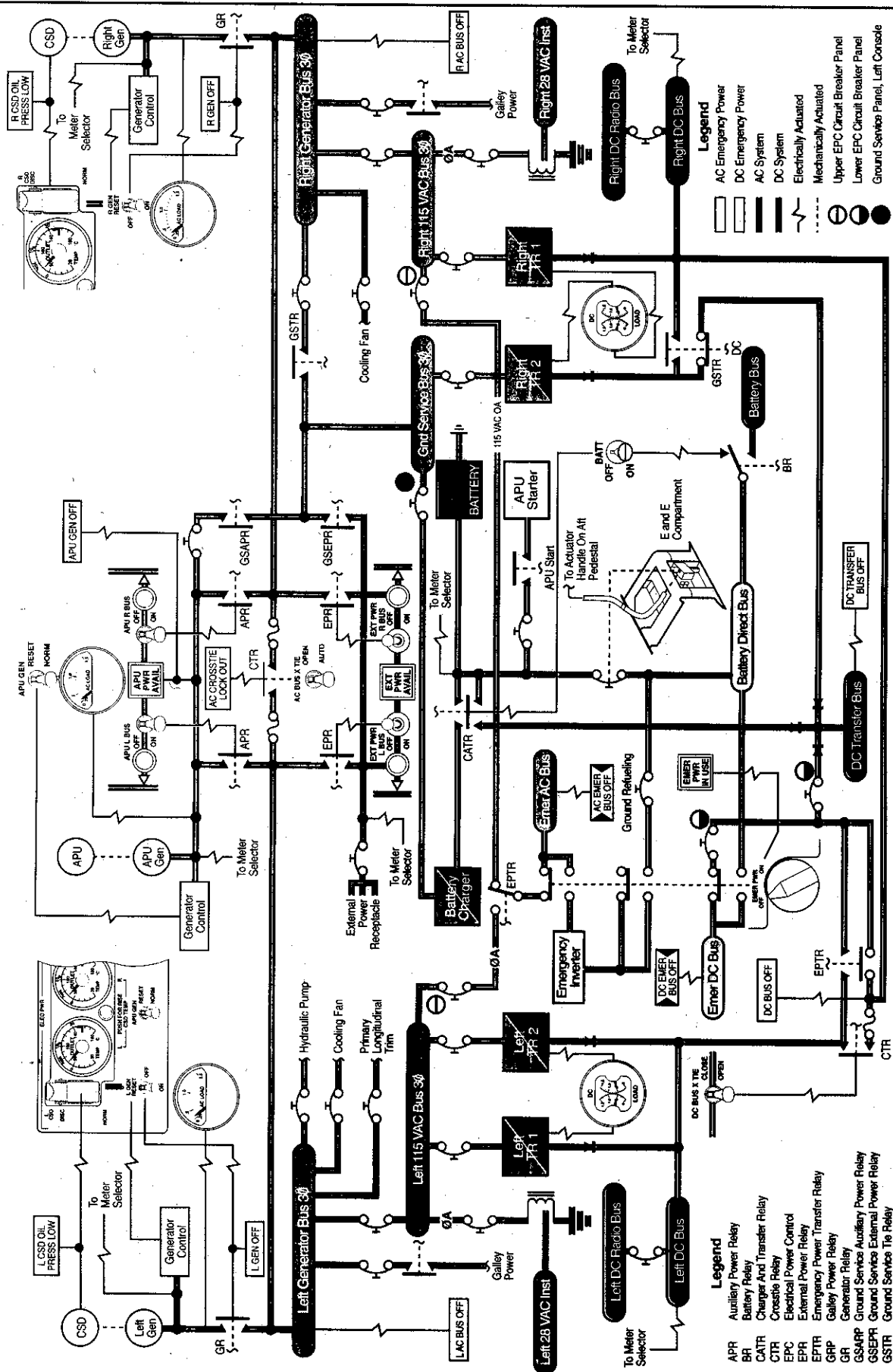
ALTITUDE (FEET)	MEDIUM (3)				POOR (1)			
0	-300	-300	-300	-300	-400	-400	-400	-400
2,000	0	0	0	0	0	0	0	0
4,000	500	500	500	500	600	600	600	600
6,000	1,000	1,000	1,000	1,000	1,200	1,200	1,200	1,200
8,000	1,500	1,500	1,500	1,500	1,900	1,900	1,900	1,900

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-100	-100	-100	-100
PER 1 KT TAILWIND	250	250	250	250	300	300	300	300
PER 5 KTS ADD'L SPD	450	450	450	450	600	600	600	600
PER 10°C ABOVE ISA	700	700	700	700	850	850	850	850
PER 10°C BELOW ISA	-250	-250	-250	-250	-300	-300	-300	-300
PER 1% UP SLOPE	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% DOWN SLOPE	850	850	850	850	1,100	1,100	1,100	1,100
1.3 EPR REVERSE	0	-300	-300	-300	-350	-750	-650	-650
1 REVERSER INOP	0	400	400	400	750	850	850	800
2 REVERSERS INOP	0	650	600	600	1,150	1,250	1,250	1,200

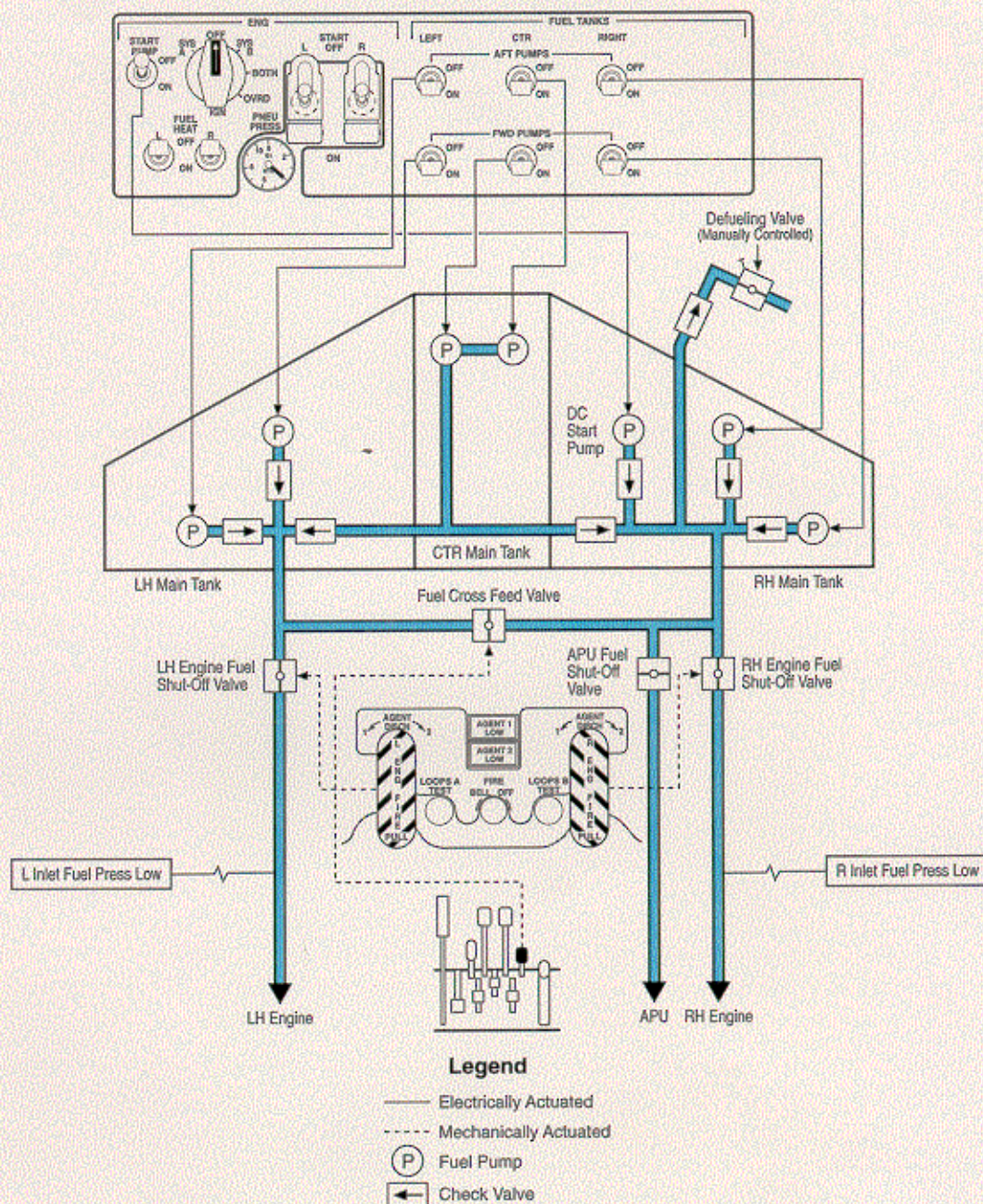
Note: Do not operate when Braking Action is Nil.

Air Conditioning/
Pressurization System

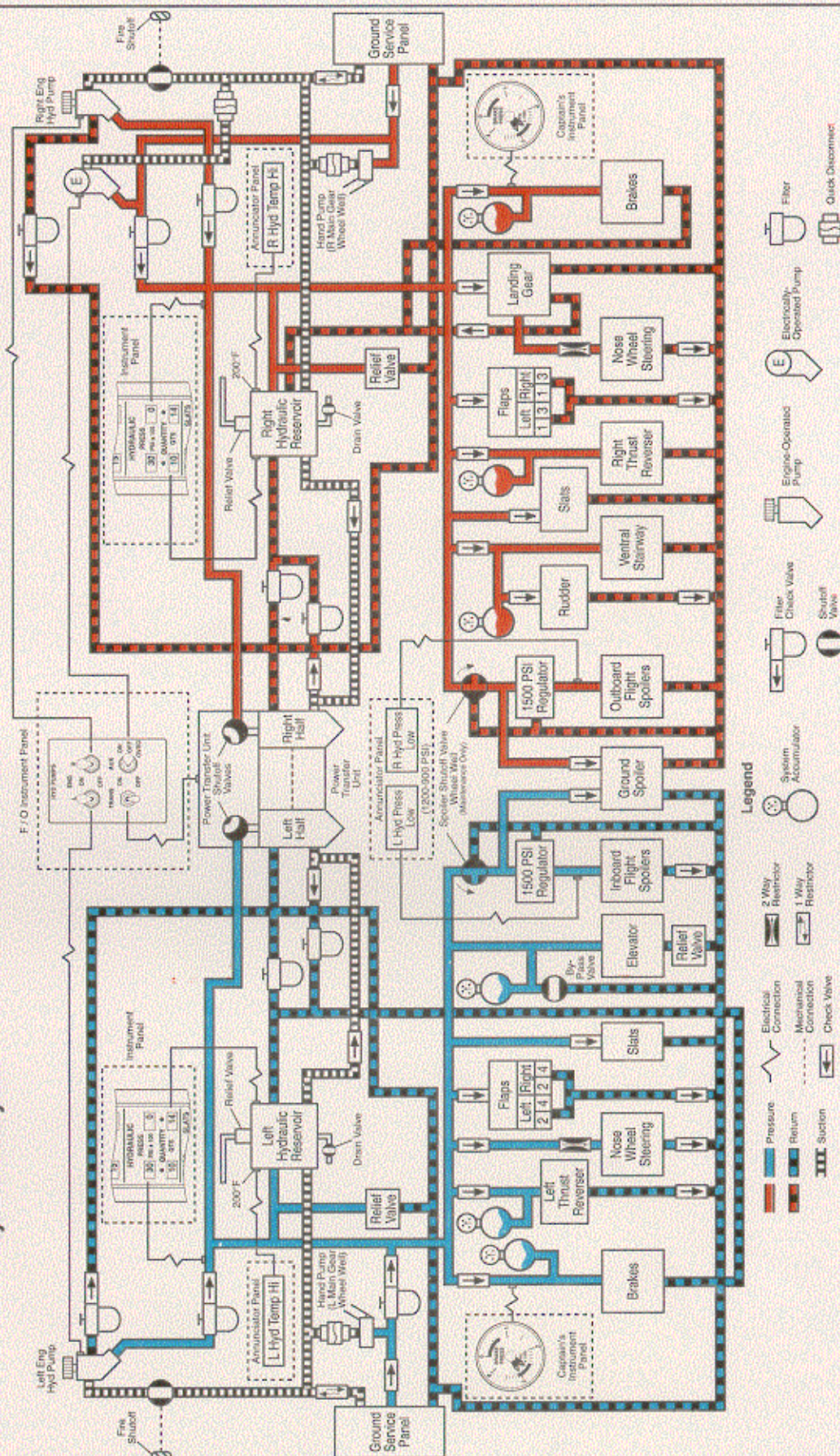
Electrical System (MD-88)



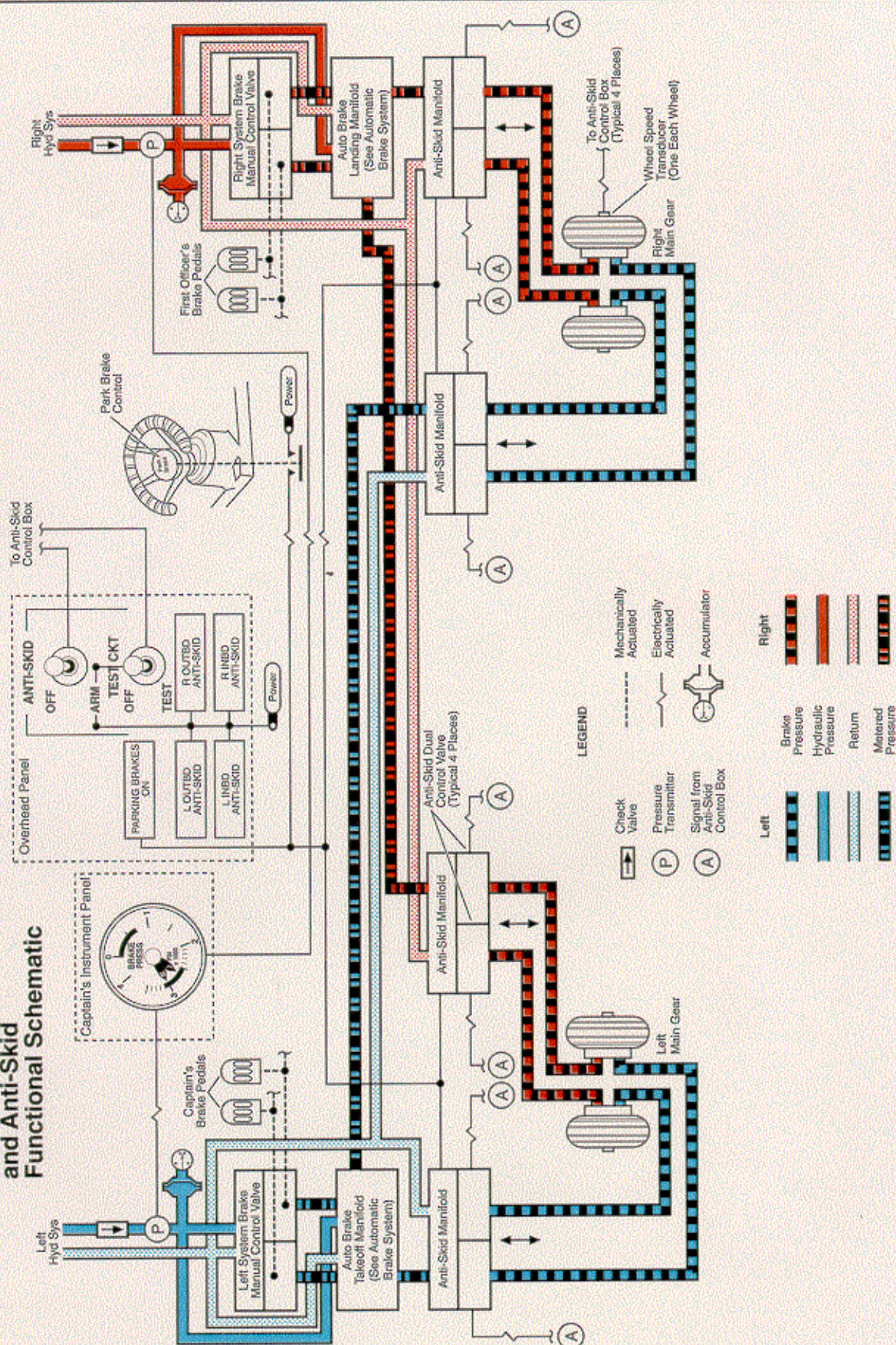
Fuel System

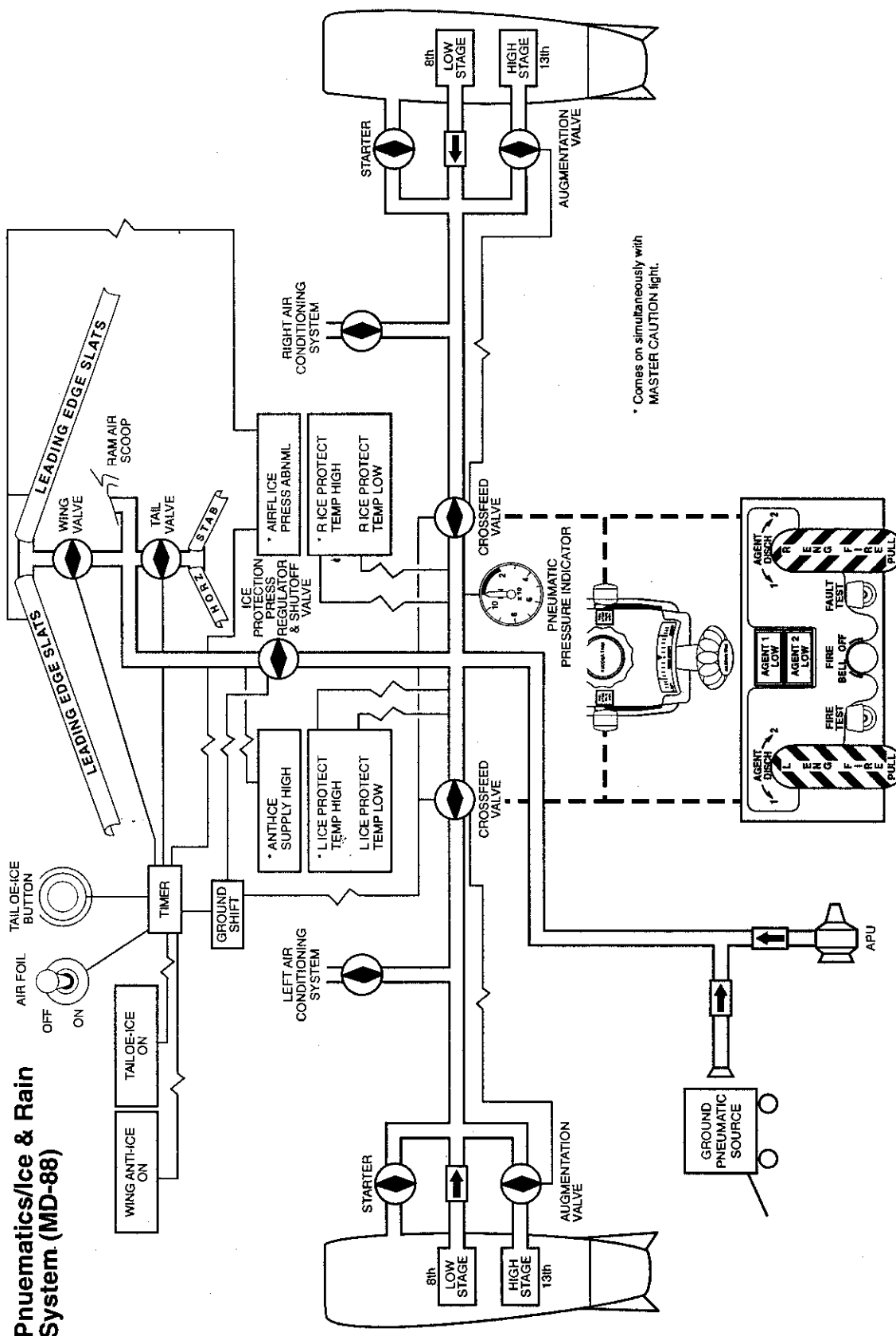


Hydraulic System



Main Wheel Brakes and Anti-Skid Functional Schematic





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DEFINITIONS AND ASSUMPTIONS

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

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

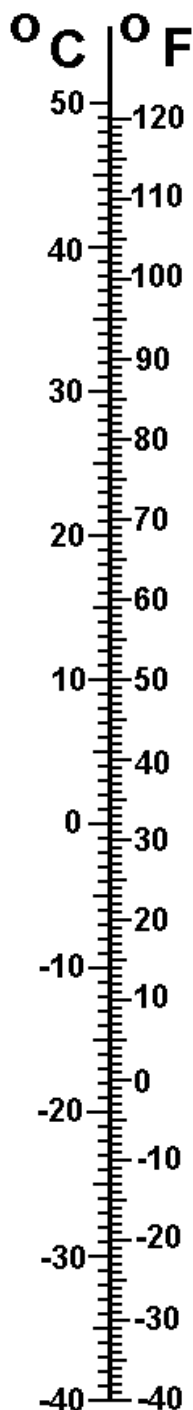
STATIC AIR TEMPERATURE (SAT) - The ambient still air temperature outside of the aircraft. Sometimes known as the Outside Air Temperature (OAT).

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

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

TEMPERATURE CONVERSION AND STATIC AIR TEMPERATURE

°C



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

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

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

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

TOTAL AIR TEMPERATURE vs STATIC AIR TEMPERATURE

°C

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

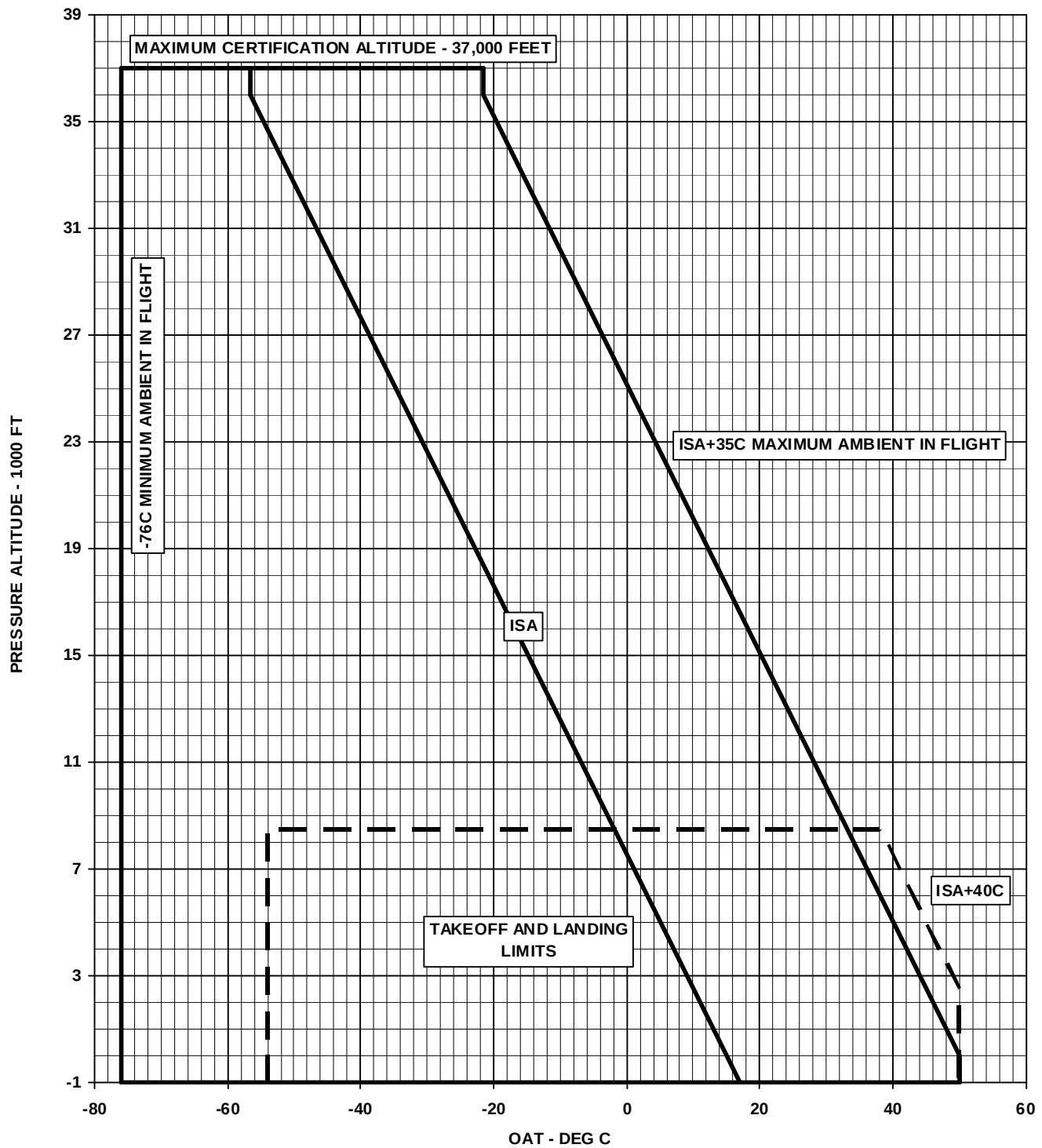
NORMAL OPERATING SPEED LIMIT

Vmo / Mmo

PRESSURE ALTITUDE	INDICATED Vmo (KIAS)	MACH Mmo
0	340	.550
5,000	340	.580
10,000	340	.620
15,000	340	.670
17,000	340	.690
19,000	340	.730
21,000	340	.750
23,000	340	.770
25,000	340	.810
27,000	340	.835
29,000	326	.840
31,000	312	.840
33,000	299	.840
35,000	285	.840
37,000	273	.840

NOTE: If the Mach Trim Compensator malfunctions or becomes inoperative during flight, DO NOT EXCEED 0.78 Mach.

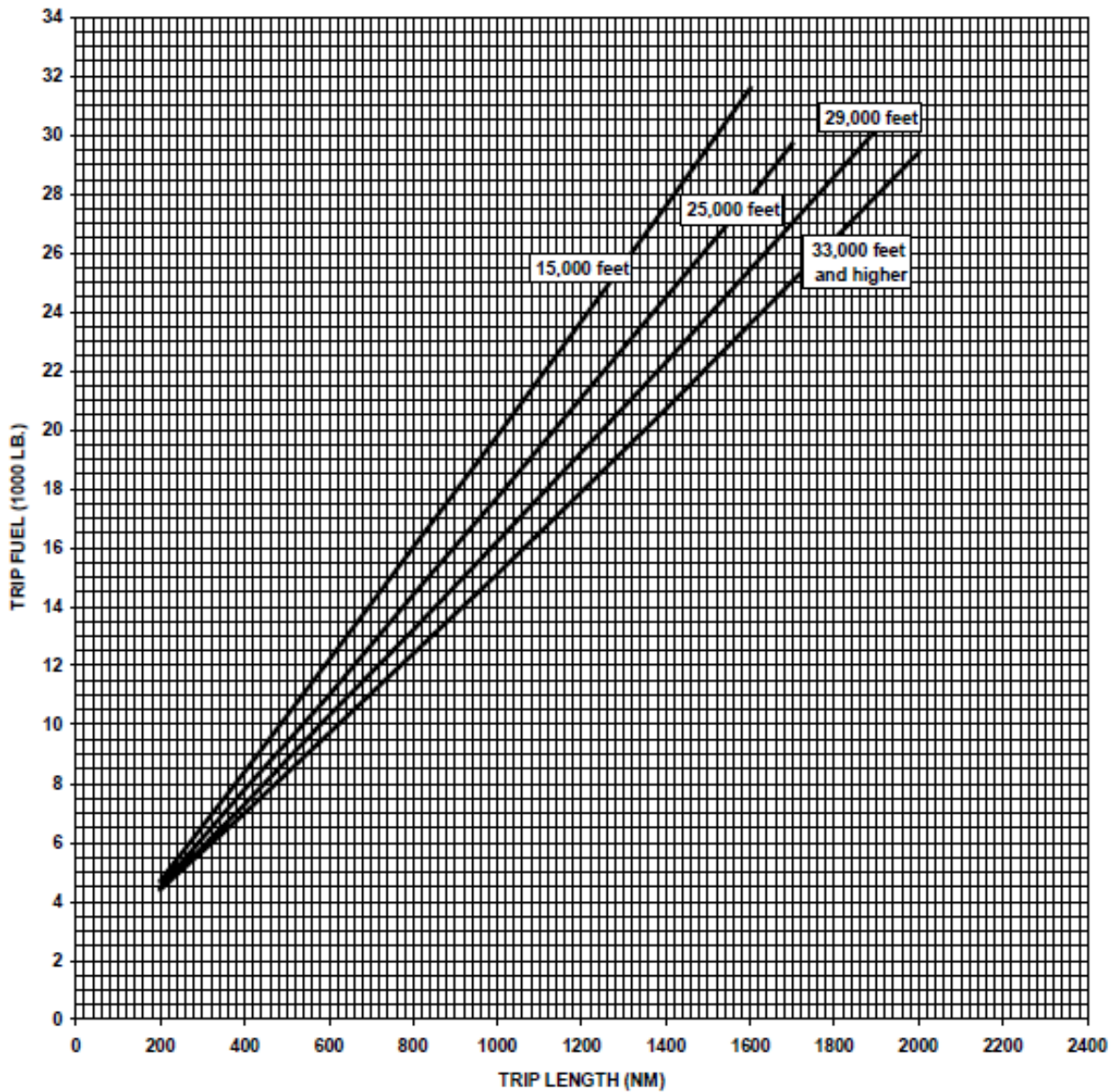
ENVIRONMENT ENVELOPE



TRIP FUEL ESTIMATE

STANDARD DAY, ZERO WIND

- Climb @ 250/300/.76Mn
- Cruise @ .76Mn
- Descent @ .76Mn/300/250
- 65% Space Limit Payload



- NOTES:
- 1.) To obtain block fuel add 750 pounds to trip fuel.
 - 2.) To determine start of takeoff weight, add trip fuel to landing weight.

SHORT RANGE FLIGHTS FUEL CONSUMPTION TABLE

Standard Day

Block Time (minutes)	Block Fuel (pounds)
20	1640
25	2150
30	2650
35	3160
40	3660
45	4170
50	4670
55	5180
60	5680
65	6190
70	6690
75	7200
80	7710

The above fuel consumptions are based on the following conditions:

1. 65% Limit Payload
2. Non - VFR reserves
3. Climb @ 250 KIAS / 310 KIAS / Cruise Mach
Cruise at Minimum Cost
Descent @ Cruise Mach / 300 KIAS / 250 KIAS
4. Block (time/fuel) = Trip (time/fuel) + Ground Maneuver (time/fuel)
5. Ground Maneuver = Taxi Time, 15 minutes; Taxi fuel, 600 lbs.

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DRIFTDOWN PERFORMANCE

(ONE ENGINE INOPERATIVE)

Net driftdown performance is provided for one engine inoperative. The data on Page 1-11 defines net level-off altitudes following driftdown. The data on Pages 1-12 – 1-13 defines the driftdown net flight path from normal operational altitudes.

This net driftdown performance data may be used to assess terrain clearance for operation over mountainous areas. In addition, the driftdown profiles on Pages 1-12 – 1-13 may be used to determine altitude capability during driftdown. For overwater operation without life rafts, the driftdown profiles may be used to assure that the aircraft has sufficient driftdown performance to the coastline so that the 162 nm limitation is not exceeded.

Instructions for determining ground distance during driftdown for a given weight and intercept altitude (charts on Pages 1-12 – 1-13):

- A) Determine equivalent gross weight from chart at top of Page 1-12 or 1-13 by entering chart at actual gross weight and exiting with equivalent gross weight.
- B) Select chart on Page 1-12 or 1-13 applicable to cruise altitude at engine failure.
- C) As shown by example trace lines on FL 330 chart, for a given intercept altitude, proceed over to equivalent gross weight, then down to wind reference line. Correct for wind, then proceed down to distance traveled.

APPLICABILITY:

The driftdown level-off altitude data presented in this manual are used for obstacle clearance analysis for ice protection ON and OFF, with various temperatures and airplane weights at a set initial cruise altitude. The net driftdown performance represents the gross (actual) driftdown gradient minus 1.1%. This is in accordance with FAR 25.123 for two-engine aircraft.

The net data (also stored in FPS 2.0) provide an additional margin to account for a number of possible navigational and procedural errors that could take place. It is used for pre-flight analysis of enroute obstacles to ensure clearance. Per FAR 121.191(a), the *net* level-off altitude must clear all enroute terrain by at least 1,000 feet.

The gross data represents the actual aircraft performance in the event of an in-flight engine failure and are directly available in the FMS, as well as the Abnormal section of this manual. These numbers cannot be used for dispatch/pre-flight analysis purposes.

DRIFTDOWN NET LEVEL OFF ALTITUDE (FOR FLIGHT PLANNING PURPOSES)

MAXIMUM CONTINUOUS THRUST JT8D-219 Engines

ENGINE ANTI-ICE OFF

GROSS WEIGHT – POUNDS		APPROXIMATE NET LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C	ISA + 0°C	ISA + 10°C	ISA + 20°C
160,000	153,200	10,000	9,800	7,700	4,600
150,000	143,600	11,600	11,600	10,200	7,400
140,000	134,200	13,400	13,400	12,500	10,200
130,000	124,800	15,200	15,200	14,800	12,900
120,000	115,200	17,100	17,100	17,000	15,700
110,000	105,700	19,100	19,200	19,200	18,300
100,000	96,200	21,300	21,300	21,400	21,100

ENGINE ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROXIMATE NET LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C	ISA + 0°C	ISA + 10°C	ISA + 20°C
160,000	152,900	7,800	7,100	4,700	200
150,000	143,400	9,500	9,300	7,400	3,900
140,000	133,900	11,300	11,300	10,000	7,200
130,000	124,500	13,100	13,200	12,400	10,300
120,000	115,100	15,100	15,100	14,900	13,100
110,000	105,600	17,200	17,200	17,200	16,000
100,000	96,100	19,400	19,400	19,500	18,800

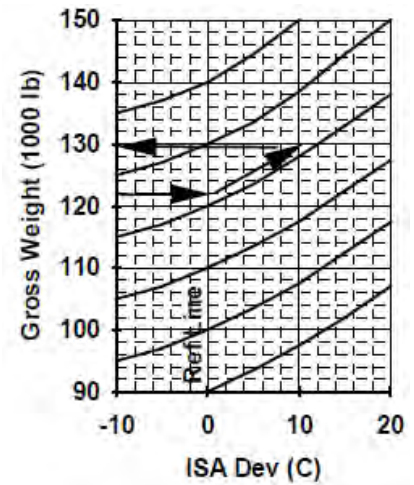
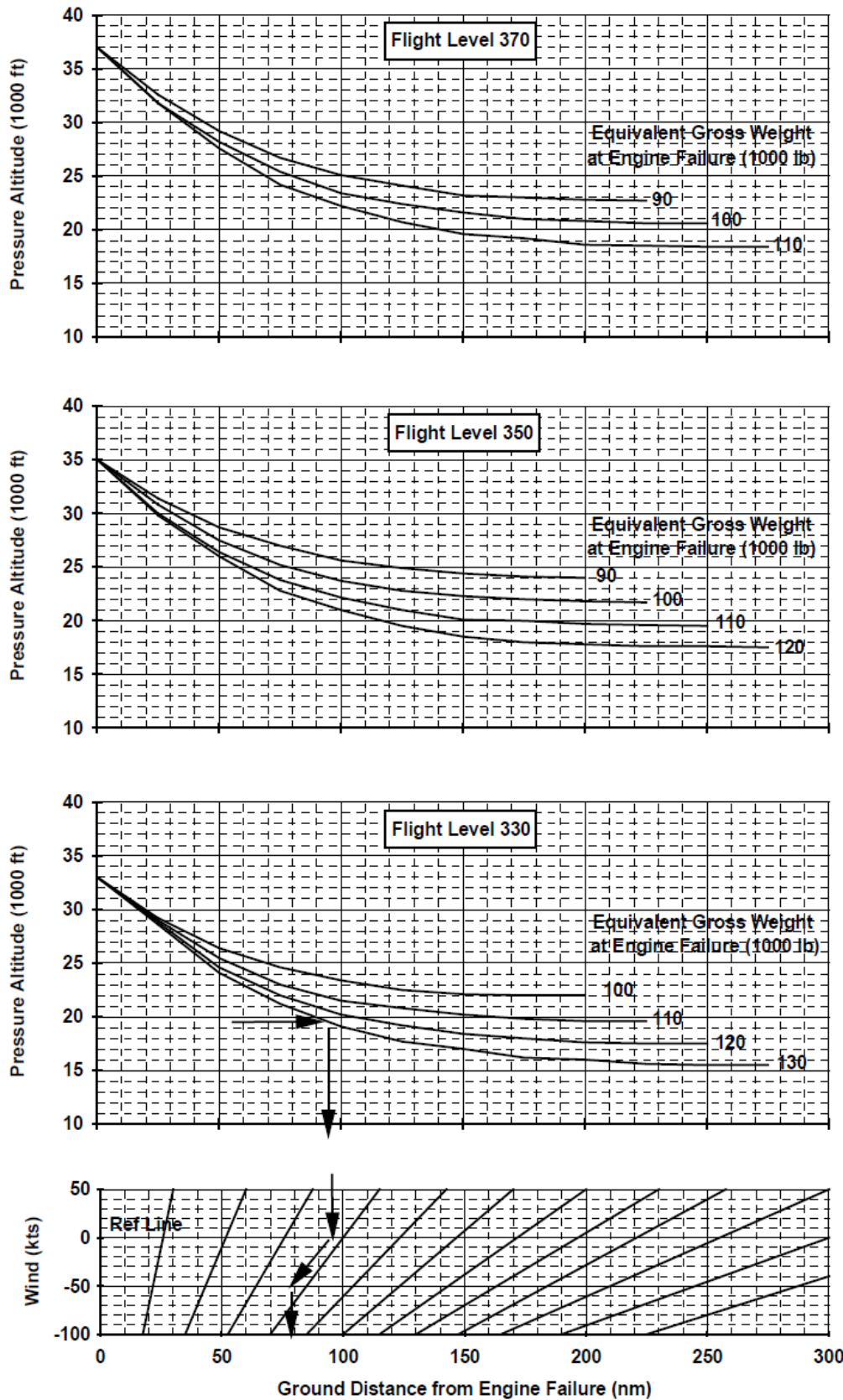
ENGINE & WING ANTI-ICE ON

GROSS WEIGHT – POUNDS		APPROXIMATE NET LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C	ISA + 0°C	ISA + 10°C	ISA + 20°C
160,000	152,900	6,500	5,500	2,600	
150,000	143,500	8,200	7,800	5,500	600
140,000	133,900	10,100	10,000	8,300	4,600
130,000	124,600	11,900	11,900	10,900	8,400
120,000	115,000	13,900	13,900	13,500	11,500
110,000	105,600	16,000	16,000	15,900	14,600
100,000	96,100	18,200	18,200	18,300	17,400

BASIS:

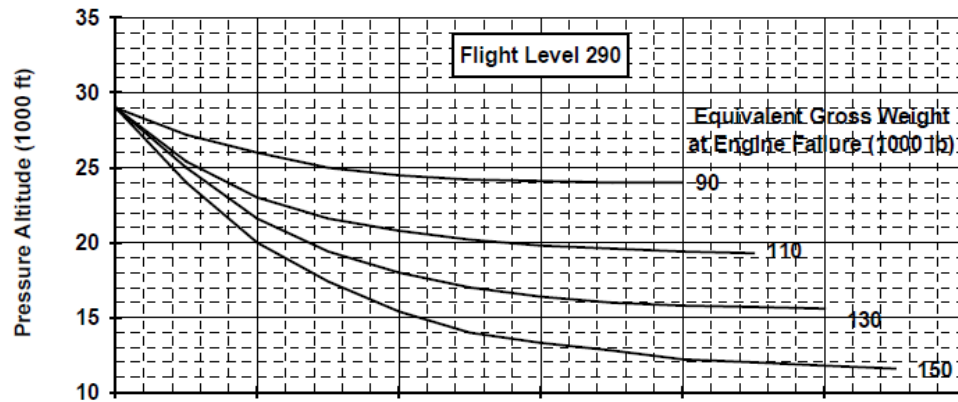
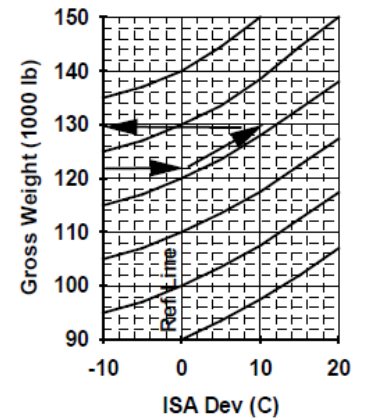
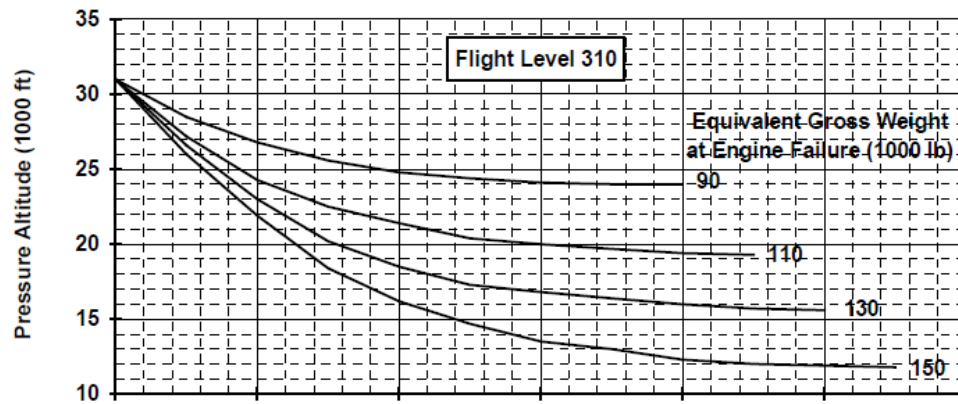
- APU Operating
- Maximum Continuous Thrust Limits
- 100 ft./min. residual rate of climb
- 35,000 ft. initial altitude
- 1.1% gradient decrement (net driftdown)

DRIFTDOWN NET FLIGHT PATH (ONE ENGINE OPERATING)

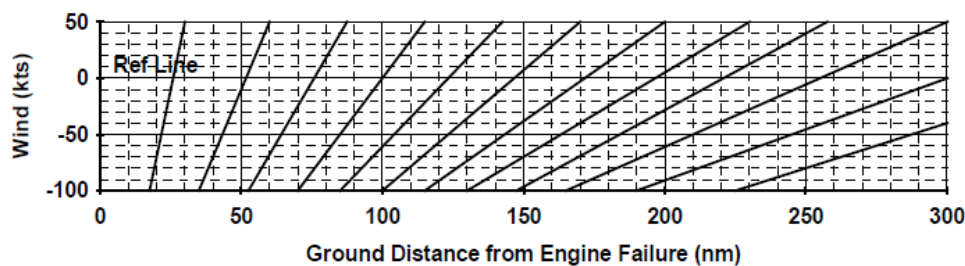
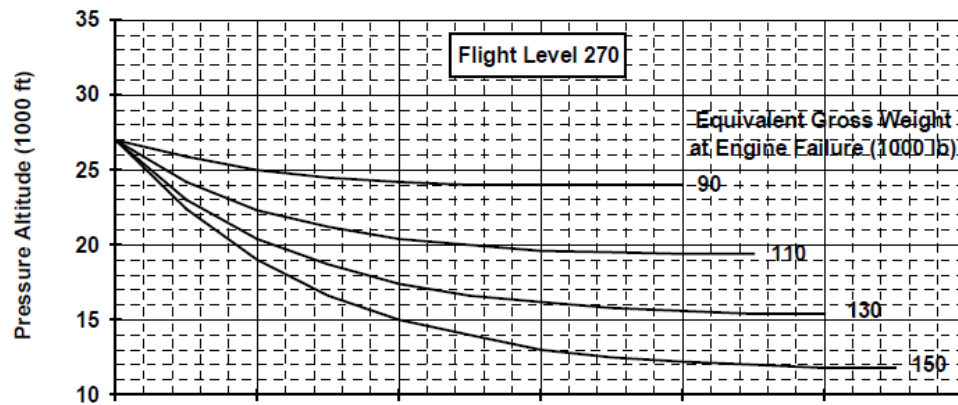


Instructions on Page 1-9.

DRIFTDOWN NET FLIGHT PATH (ONE ENGINE OPERATING)



Instructions on Page 1-9.



End of Section

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CROSS REFERENCES

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BUFFET ONSET BOUNDARY SPEEDS	CRUISE
MAXIMUM INITIAL CRUISE ALTITUDE	CRUISE
PATTERN AND APPROACH SPEED	APPROACH/LANDING
STALL SPEED	APPROACH/LANDING
DIVERSION PLANNING CHART	QUICK REFERENCE

DEFINITIONS AND ASSUMPTIONS

AWABS	Automated Weight and Balance System. The computerized system for determining the weight & balance and airport performance.
AIRPORT PRESSURE ALTITUDE	The altitude read from the altimeter while sitting on the airport and adjusting the altimeter setting to 29.92 inches of mercury.
EPR	Engine pressure ratio. Used as the primary thrust setting parameter for the JT8D-219 engine.
FMS	Flight Management System.
FMC	Flight Management Computer.
GWT	Gross Weight for Takeoff. The aircraft weight at the start of the takeoff roll.
N₁	Fan rotor speed in percent. Used as the backup thrust setting parameter for the JT8D-219 engine.
V₁	Takeoff Decision Speed. V ₁ is the speed that determines a go or no-go decision in the event of an engine failure. No time is allowed after V ₁ for reaction or decision; action must be initiated at or before V ₁ . FAR, Part 25 defines V ₁ 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 to rotate the aircraft to the takeoff pitch attitude. V _R is selected so that, with a normal rate of rotation, the aircraft will lift off and attain a height of 35 feet at a speed of V ₂ .
V₂	Takeoff Safety Speed. V ₂ is the speed used to achieve the required gradient during second climb segment.

TAKEOFF THRUST

THRUST SETTINGS

Takeoff thrust setting data is provided in this manual for the following ratings:

- TO** TO NORMAL (ARTS AUTO) power is based on the FULL JT8D-219 engine rating with Packs ON or OFF as required. (Pages 2-6 & 2-7)
- MAX** MAXIMUM (ARTS OFF) power is based on the MAXIMUM JT8D-219 engine rating with Packs ON or OFF as required. (Pages 2-8 & 2-9)

A logbook write-up is required when MAX THRUST is used.

Assumed temperature thrust setting tables are not provided in this manual. However, the MAX Takeoff Thrust table for **EPR only** may also be used to set AT Thrust. When using Assumed Temperature reduced thrust for takeoff, refer to Vol 1 of the AOM, section NP.20. Along with the full takeoff thrust settings, the WDR will display a range of assumed temperatures with the associated flap settings which meet the performance requirements of the flight for each runway, e.g.

THRUST/FLAP

D50 / 11

D49 / 11

D48 / 11

DTO / 11

AT's provided on the WDR will vary depending on aircraft weight and airport conditions.

Setting Takeoff Thrust using an assumed temperature results in the thrust that would be obtained from full rated thrust if the outside temperature was actually the temperature selected.

It is permissible to use an assumed temperature outside the environmental envelope; however, the aircraft may not be operated with an OAT greater than the environmental envelope.

Target N_1 settings corresponding to the selected assumed temperature are calculated and displayed on the PERF INIT page of the MCDU. (Refer to AOM Vol 1, Normal Procedures.)

TRP OPERATION

AT THRUST Select TO FLX Mode Button, ART switch off and select AT to be used by the ASSUMED TEMP selector.

TO Select TO Mode Button and ART switch ON (AUTO)

MAX Select TO Mode Button and ART switch OFF

A logbook line entry is required when MAX thrust is used.

Pressure Altitude

When using Takeoff Thrust charts, Pressure Altitude is obtained from the altimeter. However, an alternative method of obtaining pressure altitude is to:

Subtract 100 feet from elevation for every 0.11 inch barometric setting above 29.92 inches of Mercury **or**

Add 100 feet to elevation for every 0.11 inch barometric setting below 29.92 inches of Mercury.

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TAKEOFF THRUST NORMAL (TO) RATING

EPR

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.

TO

JT8D-219

BASED ON NORMAL RATING

STATIC SETTING

NORMAL BLEED – PACKS ON, ANTI-ICE OFF

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79
48	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
46	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
44	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
42	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
40	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
38	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
36	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92
34	1.93	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
32	1.93	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
30	1.93	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
28	1.93	1.99	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
26	1.93	1.99	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02
24	1.93	1.99	2.02	2.03	2.03	2.03	2.03	2.03	2.03	2.03
22	1.93	1.99	2.02	2.04	2.04	2.04	2.04	2.04	2.04	2.04
20	1.93	1.99	2.02	2.04	2.04	2.04	2.04	2.04	2.04	2.04
18	1.93	1.99	2.02	2.04	2.04	2.04	2.04	2.04	2.04	2.04
16	1.93	1.99	2.02	2.04	2.05	2.05	2.05	2.05	2.05	2.05
14	1.93	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
12	1.93	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
10	1.93	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
8	1.93	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
6	1.94	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
4	1.96	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
2	1.97	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
0	1.97	1.99	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
-2	1.97	2.00	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
-4	1.97	2.02	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06
-6	1.97	2.02	2.03	2.04	2.06	2.06	2.06	2.06	2.06	2.06
-8	1.97	2.02	2.04	2.04	2.06	2.06	2.06	2.06	2.06	2.06
-10	1.97	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06	2.06
-12	1.97	2.02	2.04	2.06	2.07	2.07	2.07	2.07	2.07	2.07
-14	1.97	2.02	2.04	2.06	2.08	2.08	2.08	2.08	2.08	2.08
-16 & below	1.97	2.02	2.04	2.06	2.08	2.08	2.09	2.09	2.09	2.09

CORRECTIONS:

CONFIGURATION	EPR CORRECTION
Packs OFF	+ 0.02
Engine Anti-Ice ON	none

NOTE:

- Based on TO thrust.
- Engine and/or Airplane ice protection not authorized above 10 °C OAT.

TAKEOFF THRUST

NORMAL (TO) RATING

N₁ – PERCENT

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.

EPR CHECK ONLY

STATIC SETTING

BASED ON NORMAL RATING

NORMAL BLEED – PACKS ON, ENGINE A/I ON OR OFF, WING A/I ON

TO**JT8D-219**

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	90.5	90.5	90.5	90.5	90.5	90.5	90.5	90.5	90.5	90.5
48	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9
46	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2
44	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.4
42	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8
40	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3
38	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9
36	93.6	93.6	93.6	93.6	93.6	93.6	93.6	93.6	93.6	93.6
34	93.7	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.2
32	93.4	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9
30	93.1	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
28	92.8	95.9	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
26	92.5	95.7	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3
24	92.2	95.4	97.0	97.6	97.6	97.6	97.6	97.6	97.6	97.6
22	91.8	95.0	96.7	97.7	97.7	97.7	97.7	97.7	97.7	97.7
20	91.5	94.7	96.3	97.4	97.4	97.4	97.4	97.4	97.4	97.4
18	91.2	94.4	96.0	97.1	97.1	97.1	97.1	97.1	97.1	97.1
16	90.9	94.1	95.7	96.8	97.3	97.3	97.3	97.3	97.3	97.3
14	90.6	93.7	95.3	96.4	97.6	97.6	97.6	97.6	97.6	97.6
12	90.3	93.4	95.0	96.1	97.2	97.2	97.2	97.2	97.2	97.2
10	90.0	93.1	94.7	95.8	96.9	96.9	96.9	96.9	96.9	96.9
8	89.6	92.8	94.3	95.4	96.6	96.6	96.6	96.6	96.6	96.6
6	89.8	92.4	94.0	95.1	96.2	96.2	96.2	96.2	96.2	96.2
4	90.4	92.1	93.7	94.7	95.9	95.9	95.9	95.9	95.9	95.9
2	90.7	91.8	93.3	94.4	95.5	95.5	95.5	95.5	95.5	95.5
0	90.3	91.4	93.0	94.1	95.2	95.2	95.2	95.2	95.2	95.2
-2	89.9	91.5	92.6	93.7	94.8	94.8	94.8	94.8	94.8	94.8
-4	89.6	92.3	92.3	93.4	94.5	94.5	94.5	94.5	94.5	94.5
-6	89.3	92.0	92.5	93.0	94.1	94.1	94.1	94.1	94.1	94.1
-8	88.9	91.6	92.7	92.7	93.8	93.8	93.8	93.8	93.8	93.8
-10	88.6	91.3	92.3	93.4	93.4	93.4	93.4	93.4	93.4	93.4
-15	87.7	90.4	91.4	92.5	93.7	93.7	94.2	94.2	94.2	94.2
-20	86.9	89.5	90.5	91.6	92.8	92.8	93.4	93.4	93.4	93.4
-25	86.0	88.6	89.6	90.7	91.9	91.9	92.4	92.4	92.4	92.4
-30	85.2	87.7	88.9	89.8	90.9	90.9	91.5	91.5	91.5	91.5

CORRECTIONS:

CONFIGURATION	N ₁ CORRECTION
Packs OFF	+ 1.0%
Engine Anti-Ice ON	+ 1.0%

TAKEOFF THRUST**MAX RATING****EPR**

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.

MAX**JT8D-219**

BASED ON MAX RATING

STATIC SETTING

NORMAL BLEED – PACKS ON, ANTI-ICE OFF

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
48	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
46	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
44	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91
42	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93
40	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
38	1.96	1.96	1.96	1.95	1.96	1.96	1.96	1.96	1.96	1.96
36	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
34	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99
32	1.99	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01
30	1.99	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03
28	1.99	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04
26	1.99	2.04	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06
24	1.99	2.04	2.06	2.07	2.07	2.07	2.07	2.07	2.07	2.07
22	1.99	2.04	2.06	2.08	2.08	2.08	2.08	2.08	2.08	2.08
20	1.99	2.04	2.06	2.08	2.08	2.08	2.08	2.08	2.08	2.08
18	1.99	2.04	2.06	2.08	2.09	2.09	2.09	2.09	2.09	2.09
16	1.99	2.04	2.06	2.08	2.10	2.10	2.10	2.10	2.10	2.10
14	1.99	2.04	2.06	2.08	2.10	2.10	2.10	2.10	2.10	2.10
12 & below	1.99	2.04	2.06	2.08	2.10	2.10	2.10	2.10	2.10	2.10

CORRECTIONS:

CONFIGURATION	EPR CORRECTION
Packs OFF	+ 0.02
Engine Anti-Ice ON	none

NOTES:

- Use of Maximum Takeoff Thrust EPR below 5,000 feet pressure altitude (shaded area) is not authorized except when MEL procedures require dispatch with ARTS OFF.
- The temperatures in this table may also be used to set AT takeoff thrust. For Assumed Temperature (ALT) takeoff, enter the above chart using the desired assumed temperature from the WDR in the "OAT" column. In some cases the derived AT Thrust will be less than MAX CLIMB EPR. When this occurs use MAX CLIMB EPR as the Takeoff Thrust setting.

TAKEOFF THRUST**MAX RATING****N₁ – PERCENT**

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.

EPR CHECK ONLY

STATIC SETTING

BASED ON MAX RATING

NORMAL BLEED – PACKS ON, ENGINE A/I ON OR OFF, WING A/I ON

MAX**JT8D-219**

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8
48	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3
46	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7
44	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
42	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5
40	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
38	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
36	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
34	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7
32	96.4	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6
30	96.1	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6
28	95.8	98.9	99.6	99.6	99.6	99.6	99.6	99.6	99.6	99.6
26	95.5	98.6	99.2	99.9	99.9	99.9	99.9	99.9	99.9	99.9
24	95.1	98.3	98.9	100.2	100.2	100.2	100.2	100.2	100.2	100.2
22	94.8	97.9	98.6	100.5	100.5	100.5	100.5	100.5	100.5	100.5
20	94.5	97.6	98.2	100.2	100.2	100.2	100.2	100.2	100.2	100.2
18	94.2	97.3	97.9	99.8	99.8	99.8	99.8	99.8	99.8	99.8
16	93.9	96.9	97.6	99.5	100.1	100.1	100.1	100.1	100.1	100.1
14	93.5	96.6	97.2	99.1	99.8	99.8	99.8	99.8	99.8	99.8
12	93.2	96.3	96.9	98.8	100.1	100.1	100.1	100.1	100.1	100.1
10	92.9	95.9	96.6	98.5	99.7	99.7	99.7	99.7	99.7	99.7
8	92.5	95.6	96.2	98.1	99.4	99.4	99.4	99.4	99.4	99.4
6	92.2	95.2	95.9	97.8	99.0	99.0	99.0	99.0	99.0	99.0
4	91.9	94.9	95.5	97.4	98.7	98.7	98.7	98.7	98.7	98.7
2	91.6	94.6	95.2	97.1	98.3	98.3	98.3	98.3	98.3	98.3
0	91.2	94.2	94.8	96.7	97.9	97.9	97.9	97.9	97.9	97.9
-2	90.9	93.9	94.5	96.3	97.6	97.6	97.6	97.6	97.6	97.6
-4	90.5	93.5	94.1	96.0	97.2	97.2	97.2	97.2	97.2	97.2
-6	90.2	93.2	93.8	95.6	96.9	96.9	96.9	96.9	96.9	96.9
-8	89.9	92.8	93.4	95.3	96.5	96.5	96.5	96.5	96.5	96.5
-10	89.5	92.5	93.1	94.9	96.1	96.1	96.1	96.1	96.1	96.1
-15	88.7	91.6	92.2	94.0	95.2	95.2	95.2	95.2	95.2	95.2
-20	87.8	90.7	91.3	93.1	94.3	94.3	94.3	94.3	94.3	94.3
-25	86.9	89.8	90.4	92.2	93.4	93.4	93.4	93.4	93.4	93.4
-30	86.1	88.9	89.5	91.2	92.4	92.4	92.4	92.4	92.4	92.4

CORRECTIONS:

CONFIGURATION	N ₁ CORRECTION
Packs OFF	+ 1.0%
Engine Anti-Ice ON	+ 1.0%

NOTES:

- Use of Maximum Takeoff Thrust N₁ below 5,000 feet pressure altitude (shaded area) is not authorized except when MEL procedures require dispatch with ARTS OFF.

DRY RUNWAY TAKEOFF SPEEDS – V_1 / V_R / V_2

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.

DRY
TO / 5

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
170,000	8,000	157 / 172 / 178	152 / 172 / 178	150 / 173 / 178	147 / 173 / 178	147 / 173 / 178
	6,000	163 / 172 / 178	158 / 172 / 178	155 / 172 / 178	153 / 173 / 178	153 / 173 / 178
	4,000	168 / 171 / 178	164 / 171 / 178	161 / 172 / 178	159 / 172 / 178	157 / 172 / 178
	2,000	167 / 171 / 178	166 / 171 / 178	167 / 171 / 178	164 / 172 / 178	162 / 172 / 178
	0	166 / 170 / 178	166 / 170 / 178	166 / 170 / 178	168 / 171 / 178	168 / 171 / 178
160,000	8,000	162 / 167 / 172	157 / 167 / 172	154 / 167 / 172	152 / 168 / 172	152 / 168 / 172
	6,000	164 / 166 / 172	163 / 166 / 172	160 / 167 / 172	157 / 167 / 172	157 / 167 / 172
	4,000	162 / 166 / 172	162 / 166 / 172	163 / 166 / 172	163 / 167 / 172	162 / 167 / 172
	2,000	160 / 165 / 172	160 / 165 / 172	161 / 166 / 172	164 / 166 / 172	166 / 166 / 172
	0	159 / 165 / 172	159 / 165 / 172	159 / 165 / 172	162 / 166 / 172	162 / 166 / 172
150,000	8,000	159 / 161 / 167	159 / 161 / 167	159 / 162 / 167	157 / 162 / 167	157 / 162 / 167
	6,000	157 / 161 / 167	157 / 161 / 167	158 / 161 / 167	161 / 162 / 167	161 / 162 / 167
	4,000	155 / 160 / 167	155 / 160 / 167	156 / 160 / 167	159 / 161 / 167	161 / 161 / 167
	2,000	153 / 159 / 167	153 / 159 / 167	154 / 160 / 167	157 / 161 / 167	159 / 161 / 167
	0	152 / 159 / 167	152 / 159 / 167	153 / 159 / 167	155 / 160 / 167	155 / 160 / 167
140,000	8,000	152 / 155 / 161	152 / 155 / 161	154 / 156 / 161	156 / 156 / 161	156 / 156 / 161
	6,000	150 / 155 / 161	151 / 155 / 161	152 / 155 / 161	154 / 156 / 161	154 / 156 / 161
	4,000	148 / 154 / 161	149 / 154 / 161	150 / 154 / 161	152 / 155 / 161	154 / 155 / 161
	2,000	147 / 153 / 161	147 / 153 / 161	148 / 154 / 161	150 / 155 / 161	152 / 155 / 161
	0	146 / 153 / 161	146 / 153 / 161	146 / 153 / 161	148 / 154 / 161	148 / 154 / 161
135,000	8,000	148 / 152 / 158	148 / 152 / 158	150 / 153 / 158	152 / 153 / 158	152 / 153 / 158
	6,000	146 / 151 / 158	147 / 152 / 158	148 / 152 / 158	150 / 153 / 158	150 / 153 / 158
	4,000	145 / 151 / 158	145 / 151 / 158	146 / 151 / 158	148 / 152 / 158	150 / 152 / 158
	2,000	143 / 150 / 158	143 / 150 / 158	144 / 151 / 158	146 / 151 / 158	148 / 151 / 158
	0	142 / 149 / 158	142 / 150 / 158	142 / 150 / 158	144 / 151 / 158	144 / 151 / 158
130,000	8,000	145 / 149 / 155	145 / 149 / 155	146 / 150 / 155	148 / 150 / 155	148 / 150 / 155
	6,000	143 / 148 / 155	143 / 149 / 155	145 / 149 / 155	147 / 150 / 155	147 / 150 / 155
	4,000	141 / 148 / 155	142 / 148 / 155	143 / 148 / 155	145 / 149 / 155	146 / 149 / 155
	2,000	140 / 147 / 155	140 / 147 / 155	141 / 148 / 155	143 / 148 / 155	145 / 148 / 155
	0	139 / 146 / 155	139 / 147 / 155	139 / 147 / 155	141 / 148 / 155	141 / 148 / 155
125,000	8,000	141 / 146 / 151	141 / 146 / 151	142 / 146 / 151	144 / 147 / 151	144 / 147 / 151
	6,000	139 / 145 / 151	139 / 145 / 151	141 / 146 / 151	143 / 146 / 151	143 / 146 / 151
	4,000	137 / 144 / 151	138 / 144 / 151	139 / 145 / 151	141 / 146 / 151	142 / 146 / 151
	2,000	136 / 143 / 151	136 / 144 / 151	137 / 144 / 151	139 / 145 / 151	141 / 145 / 151
	0	135 / 143 / 151	135 / 143 / 151	135 / 143 / 151	137 / 144 / 151	137 / 144 / 151

CORRECTIONS:

CONDITION		V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope	+ 1
	Per ½% downhill slope	- 1
Wind	Per 20 knots headwind	+ 1
	Tailwind	none

DRY RUNWAY TAKEOFF SPEEDS – $V_1 / V_R / V_2$

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.

DRY
TO / 5

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
120,000	8,000	137 / 143 / 148	137 / 143 / 148	139 / 143 / 148	140 / 144 / 148	140 / 144 / 148
	6,000	135 / 142 / 148	136 / 142 / 148	137 / 142 / 148	139 / 143 / 148	139 / 143 / 148
	4,000	134 / 141 / 148	134 / 141 / 148	135 / 142 / 148	137 / 142 / 148	139 / 142 / 148
	2,000	132 / 140 / 148	132 / 140 / 148	133 / 141 / 148	135 / 142 / 148	137 / 142 / 148
	0	131 / 139 / 148	131 / 140 / 148	131 / 140 / 148	134 / 141 / 148	136 / 141 / 148
115,000	8,000	133 / 139 / 145	134 / 139 / 145	135 / 140 / 145	136 / 140 / 145	136 / 140 / 145
	6,000	132 / 138 / 145	132 / 138 / 145	133 / 139 / 145	135 / 140 / 145	135 / 140 / 145
	4,000	130 / 137 / 145	130 / 137 / 145	131 / 138 / 145	133 / 139 / 145	135 / 139 / 145
	2,000	128 / 136 / 145	128 / 137 / 145	129 / 137 / 145	132 / 138 / 145	134 / 138 / 145
	0	127 / 136 / 145	127 / 136 / 145	127 / 136 / 145	130 / 137 / 145	132 / 137 / 145
110,000	8,000	129 / 136 / 142	130 / 136 / 142	131 / 136 / 142	133 / 137 / 142	133 / 137 / 142
	6,000	128 / 135 / 142	128 / 135 / 142	129 / 135 / 142	131 / 136 / 142	131 / 136 / 142
	4,000	126 / 134 / 142	126 / 134 / 142	127 / 135 / 142	129 / 136 / 142	131 / 136 / 142
	2,000	124 / 133 / 142	124 / 133 / 142	126 / 134 / 142	128 / 135 / 142	130 / 135 / 142
	0	123 / 132 / 142	123 / 132 / 142	123 / 133 / 142	126 / 134 / 142	128 / 134 / 142
105,000	8,000	125 / 132 / 138	126 / 132 / 138	127 / 133 / 138	129 / 133 / 138	129 / 133 / 138
	6,000	124 / 131 / 138	124 / 131 / 138	125 / 132 / 138	127 / 133 / 138	127 / 133 / 138
	4,000	122 / 130 / 138	122 / 130 / 138	123 / 131 / 138	125 / 132 / 138	127 / 132 / 138
	2,000	120 / 129 / 138	120 / 129 / 138	121 / 130 / 138	124 / 131 / 138	126 / 131 / 138
	0	119 / 128 / 138	119 / 129 / 138	119 / 129 / 138	122 / 130 / 138	124 / 130 / 138
100,000	8,000	121 / 128 / 135	122 / 128 / 135	123 / 129 / 135	125 / 130 / 135	125 / 130 / 135
	6,000	120 / 127 / 135	120 / 127 / 135	121 / 128 / 135	123 / 129 / 135	123 / 129 / 135
	4,000	118 / 126 / 135	118 / 126 / 135	119 / 127 / 135	121 / 128 / 135	123 / 128 / 135
	2,000	116 / 125 / 135	116 / 125 / 135	117 / 126 / 135	120 / 127 / 135	122 / 127 / 135
	0	119 / 125 / 135	118 / 125 / 135	118 / 125 / 135	118 / 126 / 135	120 / 126 / 135
95,000	8,000	117 / 124 / 132	118 / 124 / 132	119 / 125 / 132	121 / 126 / 132	121 / 126 / 132
	6,000	116 / 123 / 132	116 / 123 / 132	117 / 124 / 132	119 / 125 / 132	119 / 125 / 132
	4,000	115 / 122 / 132	115 / 122 / 132	115 / 123 / 132	117 / 124 / 132	119 / 124 / 132
	2,000	116 / 123 / 132	116 / 123 / 132	116 / 122 / 132	116 / 123 / 132	118 / 123 / 132
	0	118* / 124 / 132	118* / 124 / 132	118* / 123 / 132	116 / 122 / 132	116 / 122 / 132
90,000	8,000	113 / 120 / 128	113 / 120 / 128	114 / 121 / 128	116 / 122 / 128	116 / 122 / 128
	6,000	111 / 119 / 128	111 / 119 / 128	112 / 120 / 128	115 / 121 / 128	115 / 121 / 128
	4,000	112 / 118 / 128	112 / 118 / 128	111 / 119 / 128	113 / 120 / 128	114 / 120 / 128
	2,000	116 / 120 / 129	116 / 120 / 129	114 / 118 / 128	111 / 119 / 128	113 / 119 / 128
	0	118* / 122 / 131	118* / 122 / 131	118* / 121 / 131	114 / 118 / 128	111 / 118 / 128

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Per 20 knots headwind Tailwind
	+ 1 - 1 + 1 none

NOTE: Speeds denoted by an asterisk (*) are V_{MCG} limited. DO NOT APPLY NEGATIVE CORRECTIONS.

DRY RUNWAY TAKEOFF SPEEDS – $V_1 / V_R / V_2$

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.

DRY
TO / 11

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
170,000	8,000	157 / 160 / 167	152 / 160 / 167	150 / 160 / 167	147 / 160 / 167	147 / 160 / 167
	6,000	159 / 159 / 167	158 / 159 / 167	155 / 160 / 167	153 / 160 / 167	153 / 160 / 167
	4,000	157 / 159 / 167	158 / 159 / 167	159 / 159 / 167	159 / 160 / 167	157 / 160 / 167
	2,000	156 / 158 / 167	156 / 158 / 167	157 / 159 / 167	159 / 159 / 167	160 / 159 / 167
	0	155 / 158 / 167	155 / 158 / 167	155 / 158 / 167	157 / 159 / 167	159 / 159 / 167
160,000	8,000	155 / 155 / 161	155 / 155 / 161	154 / 155 / 161	152 / 156 / 161	152 / 156 / 161
	6,000	153 / 154 / 161	153 / 154 / 161	155 / 155 / 161	155 / 155 / 161	155 / 155 / 161
	4,000	151 / 154 / 161	151 / 154 / 161	153 / 154 / 161	155 / 155 / 161	155 / 155 / 161
	2,000	150 / 153 / 161	150 / 153 / 161	151 / 154 / 161	153 / 154 / 161	155 / 154 / 161
	0	149 / 153 / 161	149 / 153 / 161	149 / 153 / 161	151 / 154 / 161	154 / 154 / 161
150,000	8,000	148 / 150 / 156	149 / 150 / 156	150 / 150 / 156	151 / 151 / 156	151 / 151 / 156
	6,000	146 / 149 / 156	147 / 149 / 156	148 / 150 / 156	150 / 150 / 156	150 / 150 / 156
	4,000	145 / 149 / 156	145 / 149 / 156	146 / 149 / 156	148 / 150 / 156	150 / 150 / 156
	2,000	143 / 148 / 156	143 / 148 / 156	144 / 148 / 156	146 / 149 / 156	149 / 149 / 156
	0	142 / 148 / 156	142 / 148 / 156	143 / 148 / 156	145 / 148 / 156	147 / 148 / 156
140,000	8,000	142 / 145 / 151	142 / 145 / 151	144 / 145 / 151	145 / 146 / 151	145 / 146 / 151
	6,000	140 / 144 / 151	140 / 144 / 151	142 / 144 / 151	144 / 145 / 151	144 / 145 / 151
	4,000	138 / 143 / 151	139 / 143 / 151	140 / 144 / 151	142 / 144 / 151	144 / 144 / 151
	2,000	137 / 143 / 151	137 / 143 / 151	138 / 143 / 151	140 / 144 / 151	142 / 144 / 151
	0	136 / 142 / 151	136 / 142 / 151	136 / 142 / 151	138 / 143 / 151	141 / 143 / 151
135,000	8,000	138 / 142 / 148	139 / 142 / 148	140 / 142 / 148	142 / 143 / 148	142 / 143 / 148
	6,000	137 / 141 / 148	137 / 141 / 148	138 / 141 / 148	140 / 142 / 148	140 / 142 / 148
	4,000	135 / 140 / 148	135 / 140 / 148	136 / 141 / 148	138 / 141 / 148	140 / 141 / 148
	2,000	134 / 140 / 148	134 / 140 / 148	135 / 140 / 148	137 / 141 / 148	139 / 141 / 148
	0	133 / 139 / 148	133 / 139 / 148	133 / 139 / 148	135 / 140 / 148	137 / 140 / 148
130,000	8,000	135 / 139 / 145	136 / 139 / 145	137 / 139 / 145	139 / 140 / 145	139 / 140 / 145
	6,000	134 / 138 / 145	134 / 138 / 145	135 / 139 / 145	137 / 139 / 145	137 / 139 / 145
	4,000	132 / 137 / 145	132 / 137 / 145	133 / 138 / 145	135 / 139 / 145	137 / 139 / 145
	2,000	131 / 137 / 145	131 / 137 / 145	132 / 137 / 145	134 / 138 / 145	136 / 138 / 145
	0	130 / 136 / 145	130 / 136 / 145	130 / 136 / 145	132 / 137 / 145	134 / 137 / 145
125,000	8,000	132 / 136 / 142	132 / 136 / 142	133 / 136 / 142	135 / 137 / 142	135 / 137 / 142
	6,000	130 / 135 / 142	130 / 135 / 142	131 / 136 / 142	133 / 136 / 142	133 / 136 / 142
	4,000	128 / 134 / 142	128 / 134 / 142	130 / 135 / 142	131 / 136 / 142	133 / 136 / 142
	2,000	127 / 134 / 142	127 / 134 / 142	128 / 134 / 142	130 / 135 / 142	132 / 135 / 142
	0	126 / 133 / 142	126 / 133 / 142	126 / 133 / 142	128 / 134 / 142	130 / 134 / 142

CORRECTIONS:

CONDITION		V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope	+ 1
	Per ½% downhill slope	- 1
Wind	Per 20 knots headwind	+ 1
	Tailwind	none

DRY RUNWAY TAKEOFF SPEEDS – $V_1 / V_R / V_2$

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.

**DRY
TO / 11**

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
120,000	8,000	128 / 133 / 139	128 / 133 / 139	129 / 133 / 139	131 / 134 / 139	131 / 134 / 139
	6,000	126 / 132 / 139	127 / 132 / 139	128 / 133 / 139	130 / 133 / 139	130 / 133 / 139
	4,000	125 / 131 / 139	125 / 131 / 139	126 / 132 / 139	128 / 133 / 139	129 / 133 / 139
	2,000	123 / 131 / 139	123 / 131 / 139	124 / 131 / 139	126 / 132 / 139	128 / 132 / 139
	0	122 / 130 / 139	122 / 130 / 139	123 / 130 / 139	125 / 131 / 139	127 / 131 / 139
115,000	8,000	124 / 130 / 136	125 / 130 / 136	126 / 130 / 136	127 / 131 / 136	127 / 131 / 136
	6,000	123 / 129 / 136	123 / 129 / 136	124 / 129 / 136	126 / 130 / 136	126 / 130 / 136
	4,000	121 / 128 / 136	121 / 128 / 136	123 / 129 / 136	124 / 130 / 136	126 / 130 / 136
	2,000	120 / 127 / 136	120 / 127 / 136	121 / 128 / 136	123 / 129 / 136	125 / 129 / 136
	0	119 / 127 / 136	119 / 127 / 136	119 / 127 / 136	121 / 128 / 136	123 / 128 / 136
110,000	8,000	121 / 126 / 133	121 / 127 / 133	122 / 127 / 133	124 / 128 / 133	124 / 128 / 133
	6,000	119 / 126 / 133	119 / 126 / 133	121 / 126 / 133	122 / 127 / 133	122 / 127 / 133
	4,000	118 / 125 / 133	118 / 125 / 133	119 / 126 / 133	121 / 126 / 133	122 / 126 / 133
	2,000	116 / 124 / 133	116 / 124 / 133	117 / 125 / 133	119 / 126 / 133	121 / 126 / 133
	0	118 / 123 / 133	118 / 124 / 133	118 / 124 / 133	117 / 125 / 133	120 / 125 / 133
105,000	8,000	117 / 123 / 130	117 / 123 / 130	118 / 124 / 130	120 / 124 / 130	120 / 124 / 130
	6,000	115 / 122 / 130	116 / 122 / 130	117 / 123 / 130	119 / 124 / 130	119 / 124 / 130
	4,000	114 / 121 / 130	114 / 122 / 130	115 / 122 / 130	117 / 123 / 130	118 / 123 / 130
	2,000	115 / 121 / 130	115 / 121 / 130	113 / 121 / 130	115 / 122 / 130	117 / 122 / 130
	0	118* / 121 / 130	118* / 121 / 130	118* / 121 / 130	114 / 121 / 130	116 / 121 / 130
100,000	8,000	113 / 120 / 127	114 / 120 / 127	115 / 120 / 127	116 / 121 / 127	116 / 121 / 127
	6,000	112 / 119 / 127	112 / 119 / 127	113 / 120 / 127	115 / 120 / 127	115 / 120 / 127
	4,000	112 / 118 / 127	112 / 118 / 127	111 / 119 / 127	113 / 120 / 127	115 / 120 / 127
	2,000	115* / 119 / 128	115* / 119 / 128	113 / 118 / 127	112 / 119 / 127	114 / 120 / 127
	0	118* / 121 / 130	118* / 121 / 130	118* / 121 / 130	113 / 118 / 127	112 / 119 / 127
95,000	8,000	109 / 116 / 124	110 / 117 / 124	111 / 117 / 124	112 / 118 / 124	112 / 118 / 124
	6,000	110 / 116 / 124	110 / 116 / 124	109 / 116 / 124	111 / 117 / 124	111 / 117 / 124
	4,000	111* / 117 / 126	111* / 117 / 126	110 / 117 / 125	109 / 116 / 124	111 / 116 / 124
	2,000	115* / 119 / 128	115* / 119 / 128	113* / 118 / 127	111 / 117 / 125	110 / 117 / 125
	0	118* / 121 / 130	118* / 12* / 130	118* / 121 / 130	113 / 118 / 127	111 / 117 / 127
90,000	8,000	105 / 112 / 120	106 / 113 / 120	107 / 113 / 120	108 / 114 / 120	108 / 114 / 120
	6,000	108 / 113 / 121	107 / 112 / 120	105 / 112 / 120	107 / 113 / 120	107 / 113 / 120
	4,000	111* / 116 / 125	111* / 116 / 124	109 / 114 / 122	105 / 112 / 120	107 / 113 / 120
	2,000	115* / 119 / 128	115* / 119 / 128	113* / 117 / 126	109 / 114 / 122	106 / 112 / 122
	0	118* / 121 / 130	118* / 121 / 130	118* / 121 / 130	113 / 118 / 126	109 / 114 / 126

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Per 20 knots headwind Tailwind
	+ 1 - 1 + 1 none

NOTE: Speeds denoted by an asterisk (*) are V_{MCG} limited. DO NOT APPLY NEGATIVE CORRECTIONS.

DRY RUNWAY TAKEOFF SPEEDS – $V_1 / V_R / V_2$

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.

DRY
TO / 18

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
170,000	8,000	152 / 152 / 158	152 / 152 / 158	151 / 151 / 158	151 / 151 / 158	151 / 151 / 158
	6,000	150 / 150 / 158	150 / 150 / 158	152 / 152 / 158	151 / 151 / 158	151 / 151 / 158
	4,000	152 / 151 / 158	152 / 151 / 158	151 / 151 / 158	152 / 152 / 158	152 / 152 / 158
	2,000	153 / 150 / 158	153 / 149 / 158	153 / 151 / 158	151 / 151 / 158	151 / 151 / 158
	0	150 / 150 / 158	150 / 150 / 158	150 / 150 / 158	153 / 151 / 158	153 / 151 / 158
160,000	8,000	147 / 147 / 153	147 / 147 / 153	147 / 147 / 153	147 / 147 / 153	147 / 147 / 153
	6,000	146 / 146 / 153	146 / 146 / 153	147 / 147 / 153	147 / 147 / 153	147 / 147 / 153
	4,000	146 / 146 / 153	146 / 146 / 153	146 / 146 / 153	147 / 147 / 153	147 / 147 / 153
	2,000	145 / 145 / 153	145 / 145 / 153	146 / 146 / 153	146 / 146 / 153	146 / 146 / 153
	0	143 / 145 / 153	143 / 145 / 153	143 / 145 / 153	146 / 146 / 153	146 / 146 / 153
150,000	8,000	142 / 142 / 148	142 / 142 / 148	143 / 143 / 148	143 / 143 / 148	143 / 143 / 148
	6,000	142 / 142 / 148	142 / 142 / 148	142 / 142 / 148	143 / 143 / 148	143 / 143 / 148
	4,000	140 / 141 / 148	140 / 141 / 148	141 / 141 / 148	142 / 142 / 148	142 / 142 / 148
	2,000	137 / 140 / 148	137 / 141 / 148	139 / 141 / 148	141 / 141 / 148	142 / 141 / 148
	0	136 / 140 / 148	136 / 140 / 148	136 / 140 / 148	139 / 141 / 148	141 / 141 / 148
140,000	8,000	137 / 137 / 143	137 / 137 / 143	138 / 138 / 143	138 / 138 / 143	138 / 138 / 143
	6,000	135 / 136 / 143	135 / 137 / 143	137 / 137 / 143	138 / 138 / 143	138 / 138 / 143
	4,000	132 / 136 / 143	133 / 136 / 143	134 / 136 / 143	137 / 137 / 143	137 / 137 / 143
	2,000	130 / 135 / 143	130 / 135 / 143	132 / 136 / 143	135 / 136 / 143	137 / 136 / 143
	0	129 / 135 / 143	129 / 135 / 143	129 / 135 / 143	132 / 136 / 143	135 / 136 / 143
135,000	8,000	134 / 134 / 140	134 / 135 / 140	135 / 135 / 140	135 / 135 / 140	135 / 135 / 140
	6,000	131 / 134 / 140	132 / 134 / 140	133 / 134 / 140	135 / 135 / 140	135 / 135 / 140
	4,000	129 / 133 / 140	129 / 133 / 140	131 / 134 / 140	133 / 134 / 140	135 / 134 / 140
	2,000	127 / 132 / 140	127 / 132 / 140	128 / 133 / 140	131 / 134 / 140	134 / 134 / 140
	0	126 / 132 / 140	126 / 132 / 140	126 / 132 / 140	129 / 133 / 140	131 / 133 / 140
130,000	8,000	130 / 132 / 138	130 / 132 / 138	132 / 132 / 138	133 / 133 / 138	133 / 133 / 138
	6,000	128 / 131 / 138	128 / 131 / 138	129 / 132 / 138	132 / 132 / 138	132 / 132 / 138
	4,000	125 / 130 / 138	126 / 131 / 138	127 / 131 / 138	129 / 132 / 138	131 / 132 / 138
	2,000	124 / 130 / 138	124 / 130 / 138	125 / 130 / 138	127 / 131 / 138	130 / 131 / 138
	0	123 / 129 / 138	123 / 129 / 138	123 / 129 / 138	125 / 130 / 138	128 / 130 / 138
125,000	8,000	126 / 129 / 135	126 / 129 / 135	128 / 129 / 135	130 / 130 / 135	130 / 130 / 135
	6,000	124 / 128 / 135	124 / 128 / 135	126 / 129 / 135	128 / 129 / 135	129 / 129 / 135
	4,000	122 / 127 / 135	122 / 128 / 135	124 / 128 / 135	126 / 129 / 135	127 / 129 / 135
	2,000	121 / 127 / 135	121 / 127 / 135	122 / 127 / 135	124 / 128 / 135	126 / 128 / 135
	0	120 / 126 / 135	120 / 126 / 135	120 / 126 / 135	122 / 127 / 135	124 / 127 / 135

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Per 20 knots headwind Tailwind

DRY RUNWAY TAKEOFF SPEEDS – V_1 / V_R / V_2

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.

**DRY
TO / 18**

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C				
		10 & below	20	30	40	50
120,000	8,000	123 / 126 / 132	123 / 126 / 132	124 / 127 / 132	126 / 127 / 132	126 / 127 / 132
	6,000	121 / 125 / 132	121 / 126 / 132	122 / 126 / 132	124 / 127 / 132	125 / 127 / 132
	4,000	119 / 125 / 132	119 / 125 / 132	120 / 125 / 132	122 / 126 / 132	124 / 126 / 132
	2,000	117 / 124 / 132	117 / 124 / 132	118 / 124 / 132	120 / 125 / 132	123 / 125 / 132
	0	118 / 123 / 132	117 / 123 / 132	117 / 123 / 132	119 / 124 / 132	121 / 124 / 132
115,000	8,000	119 / 123 / 129	119 / 123 / 129	120 / 124 / 129	122 / 124 / 129	122 / 124 / 129
	6,000	117 / 122 / 129	118 / 123 / 129	119 / 123 / 129	121 / 124 / 129	121 / 124 / 129
	4,000	115 / 122 / 129	116 / 122 / 129	117 / 122 / 129	119 / 123 / 129	120 / 123 / 129
	2,000	115* / 121 / 129	115* / 121 / 129	115* / 121 / 129	117 / 122 / 129	119 / 122 / 129
	0	117* / 120 / 129	117* / 120 / 129	117* / 120 / 129	115 / 121 / 129	117 / 121 / 129
110,000	8,000	116 / 120 / 127	116 / 120 / 127	117 / 121 / 127	118 / 121 / 127	118 / 121 / 127
	6,000	114 / 119 / 127	114 / 120 / 127	115 / 120 / 127	117 / 121 / 127	117 / 121 / 127
	4,000	112 / 118 / 127	112 / 119 / 127	113 / 119 / 127	115 / 120 / 127	116 / 121 / 127
	2,000	115* / 118 / 127	115* / 118 / 127	113 / 118 / 127	114 / 119 / 127	115 / 119 / 127
	0	117* / 118 / 127	117* / 118 / 127	117* / 118 / 127	113 / 118 / 127	114 / 118 / 127
105,000	8,000	112 / 117 / 124	112 / 117 / 124	113 / 118 / 124	115 / 118 / 124	115 / 118 / 124
	6,000	110 / 116 / 124	110 / 116 / 124	111 / 117 / 124	113 / 118 / 124	114 / 118 / 124
	4,000	111 / 115 / 124	111 / 116 / 124	110 / 116 / 124	112 / 117 / 124	113 / 117 / 124
	2,000	115* / 116 / 125	115* / 116 / 125	113* / 115 / 124	110 / 116 / 124	112 / 117 / 124
	0	117* / 118 / 127	117* / 118 / 127	117* / 118 / 127	113 / 115 / 124	110 / 116 / 124
100,000	8,000	108 / 114 / 121	108 / 114 / 121	109 / 115 / 121	111 / 115 / 121	111 / 115 / 121
	6,000	107* / 113 / 121	107* / 113 / 121	108 / 114 / 121	109 / 115 / 121	110 / 115 / 121
	4,000	111* / 113 / 122	111* / 113 / 121	108* / 113 / 121	108 / 114 / 121	109 / 114 / 121
	2,000	115* / 116 / 125	115* / 116 / 125	113* / 114 / 123	109 / 113 / 121	108 / 114 / 121
	0	117* / 118 / 127	117* / 118 / 127	117* / 118 / 127	113* / 115 / 123	109* / 113 / 121
95,000	8,000	106 / 111 / 118	106 / 111 / 118	106 / 112 / 118	107 / 112 / 118	107 / 112 / 118
	6,000	107* / 111 / 119	107* / 111 / 119	106 / 111 / 118	106 / 112 / 118	106 / 112 / 118
	4,000	111* / 113 / 122	111* / 113 / 121	108* / 112 / 120	107 / 111 / 118	106 / 111 / 118
	2,000	115* / 116 / 125	115* / 116 / 125	113* / 114 / 123	109* / 112 / 120	107 / 111 / 120
	0	117* / 118 / 127	117* / 118 / 127	117* / 118 / 127	113* / 115 / 123	109* / 112 / 120
90,000	8,000	103 / 107 / 115	103 / 107 / 115	102 / 108 / 115	103 / 109 / 115	103 / 109 / 115
	6,000	107* / 109 / 117	107* / 109 / 117	104 / 107 / 115	102 / 108 / 115	102 / 108 / 115
	4,000	111* / 113 / 122	111* / 113 / 121	108* / 110 / 118	105 / 107 / 115	102 / 108 / 115
	2,000	115* / 116 / 125	115* / 116 / 125	113* / 114 / 123	109* / 111 / 119	105 / 107 / 119
	0	117* / 118 / 127	117* / 118 / 127	117* / 118 / 127	113* / 115 / 123	109* / 111 / 119

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Per 20 knots headwind Tailwind
	+ 1 - 1 + 1 none

NOTE: Speeds denoted by an asterisk (*) are V_{MCG} limited. DO NOT APPLY NEGATIVE CORRECTIONS.

DRY RUNWAY TAKEOFF SPEEDS – V_1 / V_R / V_2

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.

DRY
MAX / 5

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C			
		10 & below	20	30	40
160,000	8,000	167 / 167 / 173	167 / 167 / 173	168 / 168 / 173	168 / 168 / 173
	7,000	166 / 166 / 173	166 / 167 / 173	167 / 167 / 173	168 / 168 / 173
	6,000	164 / 166 / 173	165 / 166 / 173	167 / 167 / 173	168 / 168 / 173
	5,000	163 / 166 / 173	164 / 166 / 173	165 / 167 / 173	167 / 167 / 173
155,000	8,000	163 / 165 / 170	163 / 165 / 170	165 / 165 / 170	166 / 166 / 170
	7,000	162 / 165 / 170	162 / 165 / 170	164 / 165 / 170	166 / 166 / 170
	6,000	161 / 164 / 170	161 / 164 / 170	162 / 165 / 170	165 / 166 / 170
	5,000	160 / 163 / 170	161 / 163 / 170	162 / 164 / 170	164 / 165 / 170
150,000	8,000	160 / 161 / 167	160 / 162 / 167	162 / 162 / 167	163 / 163 / 167
	7,000	159 / 161 / 167	159 / 161 / 167	161 / 162 / 167	162 / 162 / 167
	6,000	158 / 161 / 167	158 / 161 / 167	160 / 162 / 167	162 / 162 / 167
	5,000	157 / 160 / 167	157 / 160 / 167	159 / 161 / 167	161 / 162 / 167
145,000	8,000	157 / 159 / 164	157 / 159 / 164	158 / 159 / 164	159 / 161 / 164
	7,000	156 / 159 / 164	156 / 159 / 164	157 / 159 / 164	160 / 160 / 164
	6,000	155 / 158 / 164	155 / 158 / 164	156 / 159 / 164	158 / 159 / 164
	5,000	154 / 158 / 164	154 / 158 / 164	155 / 158 / 164	157 / 159 / 164
140,000	8,000	153 / 155 / 161	154 / 155 / 161	154 / 156 / 161	157 / 157 / 161
	7,000	152 / 155 / 161	153 / 155 / 161	153 / 156 / 161	156 / 157 / 161
	6,000	151 / 155 / 161	151 / 155 / 161	153 / 155 / 161	155 / 156 / 161
	5,000	150 / 155 / 161	150 / 155 / 161	152 / 155 / 161	154 / 156 / 161
135,000	8,000	150 / 152 / 158	150 / 152 / 158	151 / 152 / 158	153 / 154 / 158
	7,000	149 / 152 / 158	149 / 152 / 158	150 / 152 / 158	152 / 154 / 158
	6,000	147 / 152 / 158	148 / 152 / 158	149 / 152 / 158	151 / 153 / 158
	5,000	146 / 152 / 158	147 / 152 / 158	148 / 152 / 158	150 / 153 / 158

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Headwind Per 10 knots tailwind
Engine and Airfoil Ice Protection	

DRY RUNWAY TAKEOFF SPEEDS – V_1 / V_R / V_2

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.

DRY
MAX / 5

TAKEOFF WEIGHT LBS	AIRPORT PRESSURE ALTITUDE FT	AMBIENT TEMPERATURE - °C			
		10 & below	20	30	40
130,000	8,000	146 / 149 / 155	146 / 149 / 155	147 / 150 / 155	149 / 151 / 155
	7,000	145 / 149 / 155	145 / 149 / 155	146 / 150 / 155	148 / 151 / 155
	6,000	144 / 149 / 155	144 / 149 / 155	145 / 149 / 155	148 / 150 / 155
	5,000	143 / 148 / 155	143 / 148 / 155	144 / 149 / 155	147 / 150 / 155
125,000	8,000	142 / 146 / 152	143 / 146 / 152	143 / 146 / 152	146 / 147 / 152
	7,000	141 / 146 / 152	142 / 146 / 152	142 / 146 / 152	145 / 147 / 152
	6,000	140 / 145 / 152	141 / 146 / 152	141 / 146 / 152	144 / 147 / 152
	5,000	139 / 145 / 152	140 / 145 / 152	140 / 146 / 152	143 / 147 / 152
120,000	8,000	138 / 143 / 148	139 / 143 / 148	139 / 143 / 148	142 / 144 / 148
	7,000	137 / 143 / 148	138 / 143 / 148	138 / 143 / 148	141 / 144 / 148
	6,000	136 / 142 / 148	137 / 143 / 148	138 / 143 / 148	140 / 144 / 148
	5,000	135 / 142 / 148	136 / 142 / 148	137 / 143 / 148	139 / 143 / 148
115,000	8,000	134 / 139 / 145	135 / 139 / 145	136 / 140 / 145	138 / 140 / 145
	7,000	133 / 139 / 145	134 / 139 / 145	135 / 140 / 145	137 / 140 / 145
	6,000	132 / 138 / 145	133 / 138 / 145	134 / 139 / 145	136 / 140 / 145
	5,000	131 / 138 / 145	132 / 138 / 145	133 / 139 / 145	136 / 140 / 145
110,000	8,000	130 / 135 / 142	131 / 135 / 142	132 / 136 / 142	134 / 137 / 142
	7,000	129 / 135 / 142	130 / 135 / 142	131 / 136 / 142	133 / 137 / 142
	6,000	128 / 135 / 142	129 / 135 / 142	130 / 136 / 142	132 / 137 / 142
	5,000	128 / 135 / 142	128 / 135 / 142	129 / 135 / 142	131 / 136 / 142

CORRECTIONS:

CONDITION	V_1 CORRECTION - KNOTS
Runway slope	Per ½% uphill slope Per ½% downhill slope
Wind	Headwind Per 10 knots tailwind
Engine and Airfoil Ice Protection	

TAKEOFF STABILIZER SETTINGS

DEGREES AIRPLANE NOSE UP

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

CENTER OF GRAVITY - %MAC	STABILIZER SETTINGS – DEGREES ANU		
	FLAPS 5°	FLAPS 11°	FLAPS 18°
-1	8.7	9.6	11.0
0	8.5	9.4	10.7
1	8.3	9.1	10.4
2	8.0	8.9	10.1
3	7.8	8.6	9.8
4	7.6	8.4	9.6
5	7.4	8.1	9.3
6	7.1	7.9	9.0
7	6.9	7.6	8.7
8	6.7	7.4	8.4
9	6.5	7.1	8.1
10	6.2	6.9	7.8
11	6.0	6.6	7.5
12	5.8	6.4	7.2
13	5.6	6.1	6.9
14	5.4	5.9	6.6
15	5.1	5.6	6.4
16	4.9	5.4	6.1
17	4.7	5.1	5.8
18	4.5	4.9	5.5
19	4.2	4.6	5.2
20	4.0	4.4	4.9
21	3.8	4.1	4.6
22	3.6	3.9	4.3
23	3.3	3.6	4.0
24	3.1	3.4	3.8
25	2.9	3.1	3.5
26	2.7	2.9	3.2
27	2.5	2.6	2.9
28	2.2	2.4	2.6
29	2.0	2.1	2.3
30	1.8	1.9	2.0
31	1.6	1.6	1.7
32	1.3	1.4	1.4
33	1.1	1.1	1.1

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CLIMB EPR SETTINGS

CL

JT8D-219

BASED ON 250 / 310 KIAS / 0.76M
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT		PRESSURE ALTITUDE - 1000 FT								
°C	°F	SL	5	10	15	20	25	30	35	37
50	122	1.66	1.66	1.66	1.65	1.65	1.64	1.64	1.64	1.64
45	113	1.72	1.72	1.72	1.71	1.71	1.70	1.70	1.70	1.70
40	104	1.78	1.78	1.78	1.77	1.77	1.76	1.76	1.76	1.76
38	100	1.79	1.80	1.80	1.79	1.79	1.78	1.78	1.78	1.78
36	97	1.79	1.82	1.82	1.81	1.81	1.80	1.80	1.80	1.80
34	93	1.79	1.84	1.84	1.83	1.83	1.82	1.82	1.82	1.82
32	90	1.79	1.85	1.84	1.84	1.84	1.83	1.83	1.83	1.83
30	86	1.79	1.85	1.84	1.86	1.86	1.85	1.85	1.85	1.85
28	82	1.79	1.85	1.84	1.87	1.87	1.86	1.86	1.86	1.86
26	79	1.79	1.85	1.84	1.88	1.88	1.87	1.87	1.87	1.87
24	75	1.79	1.85	1.84	1.90	1.90	1.89	1.89	1.89	1.89
22	72	1.81	1.85	1.85	1.91	1.91	1.90	1.90	1.90	1.90
20	68	1.83	1.85	1.85	1.93	1.93	1.92	1.92	1.92	1.92
18	64	1.84	1.85	1.85	1.94	1.95	1.94	1.94	1.94	1.94
16	61	1.86	1.86	1.86	1.94	1.96	1.95	1.95	1.95	1.95
14	57	1.87	1.87	1.87	1.94	1.97	1.96	1.96	1.96	1.96
12	54	1.89	1.89	1.89	1.94	1.97	1.98	1.98	1.98	1.98
10	50	1.90	1.90	1.90	1.94	1.97	1.99	1.99	1.99	1.99
8	46	1.92	1.92	1.92	1.94	1.97	2.01	2.01	2.01	2.01
6	43	1.94	1.94	1.94	1.94	1.97	2.02	2.02	2.02	2.02
4	39	1.96	1.96	1.96	1.95	1.97	2.03	2.04	2.04	2.04
2	36	1.97	1.97	1.97	1.96	1.97	2.03	2.05	2.05	2.05
0	32	1.99	1.99	1.99	1.98	1.98	2.03	2.07	2.07	2.07
-2	28	2.00	2.00	2.00	1.99	1.99	2.03	2.07	2.07	2.07
-4	25	2.01	2.01	2.01	2.00	2.00	2.03	2.07	2.07	2.07
-6	21	2.02	2.03	2.03	2.02	2.02	2.03	2.07	2.07	2.07
-8	18	2.02	2.04	2.04	2.03	2.03	2.03	2.07	2.07	2.07
-10	14	2.02	2.06	2.06	2.05	2.05	2.04	2.07	2.07	2.07
-15	5	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07
-20	-4	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07
-25	-13	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07
-30	-22	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07
-35	-31	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07
-40	-40	2.02	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.07

NOTE: For the following engine bleed conditions adjust EPR by the indicated amount

Packs Off	+0.02	+0.02	+0.02	+0.03	+0.03	+0.04	+0.04	+0.04	+0.04
Engine Anti-Ice On	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
Airplane Anti-Ice On (2 Eng)	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Airplane Anti-Ice On (1 Eng)	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.06

CLIMB TIME, DISTANCE, AND FUEL

SPEED SCHEDULE 250 KIAS / 310 KIAS / CRUISE MACH

TOGW 160,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370									
350	31	194	6300	31	203	6600	34	228	7100
330	24	146	5400	25	154	5700	28	179	6200
310	21	122	5000	22	131	5200	25	153	5700
290	19	106	4600	20	114	4800	22	134	5200
270	17	93	4300	18	99	4500	20	116	4800
250	15	80	4000	16	86	4100	18	99	4400
230	14	69	3600	14	74	3800	16	84	4000
210	12	58	3300	13	62	3500	14	70	3700
190	11	49	3050	12	52	3150	12	59	3300
150	9	35	2500	9	37	2600	10	41	2750
100	6	17	1700	6	18	1800	6	19	1900

TOGW 155,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370									
350	27	170	5700	28	179	6000	31	201	6400
330	23	135	5100	23	144	5300	26	165	5800
310	20	114	4700	21	122	4900	23	142	5300
290	18	100	4400	19	107	4600	21	124	4900
270	16	87	4000	17	93	4200	19	107	4500
250	14	69	3500	15	81	3900	17	92	4200
230	13	64	3400	14	69	3600	15	78	3800
210	11	54	3100	12	58	3300	13	65	3400
190	11	46	2900	11	49	3000	12	55	3150
150	9	33	2400	9	35	2500	10	39	2600
100	6	17	1700	6	17	1700	6	18	1800

TOGW 150,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370									
350	24	152	5130	25	160	5360	27	178	5740
330	20	123	4590	21	130	4800	23	147	5180
310	18	105	4240	19	112	4440	21	129	4800
290	16	93	3950	17	99	4140	19	114	4480
270	15	82	3710	15	88	3880	17	101	4180
250	13	73	3470	14	78	3630	15	89	3900
230	12	63	3180	12	67	3320	14	76	3540
210	11	53	2900	11	57	3030	12	64	3210
190	9	45	2640	10	48	2750	11	54	2910
150	7	32	2170	8	34	2260	8	37	2370
100	5	19	1640	6	20	1700	6	22	1760

CLIMB TIME, DISTANCE, AND FUEL

SPEED SCHEDULE 250 KIAS / 310 KIAS / CRUISE MACH

TOGW 145,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370									
350	22	137	4730	23	146	4960	25	162	5310
330	19	113	4280	20	121	4490	22	137	4840
310	17	99	3980	17	105	4170	19	121	4500
290	15	87	3720	16	93	3900	18	107	4210
270	14	78	3500	14	83	3660	16	95	3940
250	13	70	3280	13	74	3430	15	85	3670
230	11	59	3000	12	63	3140	13	72	3340
210	10	51	2740	11	54	2860	11	60	3030
190	9	43	2500	9	46	2600	10	51	2750
150	7	30	2050	7	32	2130	8	35	2230
100	5	18	1540	5	19	1600	6	21	1660

TOGW 140,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	26	164	4850	27	172	5270	28	187	5600
350	21	126	4210	21	133	4620	23	148	4940
330	18	107	4060	18	113	4250	20	128	4560
310	16	93	3790	16	99	3960	18	113	4260
290	14	83	3550	15	88	3710	17	101	4000
270	13	74	3340	14	79	3490	15	90	3750
250	12	66	3130	13	70	3270	14	80	3500
230	11	56	2870	11	60	3000	12	68	3190
210	10	48	2630	10	51	2740	11	57	2900
190	9	41	2400	9	43	2500	10	48	2640
150	7	29	1970	7	31	2050	7	34	2150
100	5	17	1490	5	18	1540	5	20	1600

TOGW 135,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	23	147	4540	24	155	4850	26	169	5160
350	19	117	4130	20	124	4230	21	137	4610
330	17	100	3810	17	106	3980	19	119	4270
310	15	88	3560	16	93	3730	17	106	4000
290	14	78	3340	14	83	3500	16	95	3760
270	12	70	3150	13	74	3290	14	85	3530
250	11	62	2960	12	66	3090	13	76	3300
230	10	53	2710	11	57	2830	12	64	3010
210	9	46	2480	10	49	2590	10	54	2740
190	8	39	2260	8	41	2360	9	46	2490
150	6	27	1860	7	29	1930	7	32	2030
100	5	16	1400	5	18	1450	5	19	1510

CLIMB TIME, DISTANCE, AND FUEL

SPEED SCHEDULE 250 KIAS / 310 KIAS / CRUISE MACH

TOGW 130,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	21	130	4230	21	137	4420	23	151	4710
350	18	108	3880	18	114	4050	20	127	4330
330	16	94	3610	16	99	3770	18	112	4040
310	14	83	3390	15	88	3540	16	100	3800
290	13	74	3190	13	78	3330	15	90	3570
270	12	66	3000	12	70	3140	14	80	3360
250	11	59	2820	11	63	2950	12	71	3150
230	10	51	2590	10	54	2710	11	61	2870
210	9	43	2380	9	46	2480	10	52	2620
190	8	37	2170	8	39	2260	9	44	2380
150	6	26	1790	6	28	1860	7	30	1940
100	4	16	1350	5	17	1400	5	18	1450

TOGW 125,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	19	120	3950	20	126	4130	21	139	4390
350	16	101	3620	17	106	3790	18	118	4040
330	15	88	3390	15	93	3540	17	105	3790
310	13	78	3180	14	82	3330	15	94	3570
290	12	69	3000	13	74	3140	14	84	3360
270	11	62	2830	12	66	2960	13	76	3160
250	10	56	2660	11	60	2780	12	67	2960
230	9	48	2450	10	51	2550	10	57	2710
210	8	41	2240	9	44	2340	9	49	2470
190	7	35	2050	8	37	2130	8	41	2240
150	6	25	1690	6	26	1750	6	29	1830
100	4	15	1270	4	16	1310	5	17	1360

TOGW 120,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	18	109	3670	18	115	3840	20	127	4080
350	15	94	3420	16	99	3580	17	110	3810
330	14	82	3210	14	87	3360	16	98	3580
310	13	73	3030	13	78	3160	14	88	3380
290	12	66	2860	12	70	2980	13	79	3190
270	11	59	2700	11	63	2820	12	71	3010
250	10	53	2540	10	56	2650	11	64	2820
230	9	45	2340	9	48	2440	10	54	2580
210	8	39	2140	8	41	2230	9	46	2360
190	7	33	1960	7	35	2040	8	39	2150
150	6	24	1620	6	25	1680	6	27	1760
100	4	14	1220	4	15	1270	4	16	1310

CLIMB TIME, DISTANCE, AND FUEL

SPEED SCHEDULE 250 KIAS / 310 KIAS / CRUISE MACH

TOGW 115,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	16	101	3440	17	107	3600	18	118	3820
350	14	87	3200	15	92	3350	16	103	3560
330	13	77	3010	13	82	3150	15	92	3360
310	12	69	2840	12	73	2970	13	83	3170
290	11	62	2690	11	66	2810	12	75	3000
270	10	56	2540	10	59	2650	11	67	2830
250	9	50	2390	10	53	2500	11	60	2650
230	8	43	2200	9	46	2290	9	51	2430
210	7	37	2020	8	39	2100	8	44	2220
190	7	31	1850	7	33	1920	7	37	2020
150	5	22	1520	5	24	1580	6	26	1650
100	4	13	1150	4	14	1190	4	15	1230

TOGW 110,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	15	94	3220	16	99	3360	17	109	3570
350	14	82	3030	14	86	3160	15	96	3360
330	12	72	2860	13	77	2980	14	86	3180
310	11	65	2700	12	69	2820	13	78	3010
290	10	58	2550	11	62	2670	12	70	2840
270	10	53	2420	10	56	2520	11	63	2680
250	9	47	2280	9	50	2380	10	57	2520
230	8	41	2100	8	43	2190	9	48	2310
210	7	35	1930	7	37	2010	8	41	2120
190	6	30	1770	7	32	1830	7	35	1930
150	5	21	1460	5	22	1510	6	25	1580
100	4	13	1110	4	14	1140	4	14	1180

TOGW 105,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	14	87	3020	15	92	3150	16	101	3350
350	13	76	2830	13	81	2960	14	89	3150
330	11	68	2680	12	72	2800	13	80	2980
310	11	61	2540	11	64	2650	12	73	2820
290	10	55	2400	10	58	2510	11	66	2670
270	9	49	2270	9	52	2370	10	59	2520
250	8	44	2140	9	47	2240	9	53	2370
230	7	38	1970	8	41	2060	8	46	2170
210	7	33	1810	7	35	1890	7	39	1990
190	6	28	1660	6	30	1730	7	33	1810
150	5	20	1370	5	21	1420	5	23	1490
100	3	12	1040	4	13	1070	4	14	1110

CLIMB TIME, DISTANCE, AND FUEL

SPEED SCHEDULE 250 KIAS / 310 KIAS / CRUISE MACH

TOGW 100,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	13	81	2830	14	85	2950	15	94	3130
350	12	71	2680	12	75	2790	13	83	2960
330	11	63	2530	11	67	2640	12	75	2810
310	10	57	2400	10	60	2510	11	68	2670
290	9	51	2280	10	55	2380	10	62	2530
270	8	46	2160	9	49	2450	10	56	2390
250	8	42	2040	8	44	2120	9	50	2250
230	7	36	1880	7	38	1960	8	43	2070
210	6	31	1730	7	33	1800	7	37	1890
190	6	26	1590	6	28	1650	6	31	1730
150	5	19	1310	5	20	1360	5	22	1420
100	3	11	1000	3	12	1030	4	13	1070

TOGW 95,000 LB

FL	ISA and lower			ISA+10			ISA+20		
	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)	Time (min)	Distance (nm)	Fuel (lb)
370	12	75	2650	13	79	2770	14	87	2930
350	11	66	2490	11	70	2600	12	78	2760
330	10	59	2360	10	63	2470	11	70	2620
310	9	53	2240	10	57	2340	10	64	2490
290	9	48	2130	9	51	2220	10	58	2360
270	8	44	2020	8	46	2100	9	52	2230
250	7	39	1900	8	42	1980	8	47	2100
230	7	34	1760	7	36	1830	7	40	1930
210	6	29	1620	6	31	1680	7	34	1770
190	5	25	1480	5	26	1540	6	29	1610
150	4	18	1230	4	19	1270	5	21	1320
100	3	11	930	3	11	960	3	12	990

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DEFINITIONS AND ASSUMPTIONS

Minimum Cost Cruise: Minimum cost speed schedule based on current fuel price and cruise-relevant hourly time costs.

Long Range Cruise: Speed which gives 99% maximum fuel mileage.

EPR: Power setting required to maintain level flight speed.

FF: Fuel flow for all engines combined in lb/hr.

IAS: Indicated airspeed in knots.

ISA: Standard day temperature at given altitude in °C.

MN: Indicated mach number.

SAR: Specific range with no wind (nm / 1000 lbs of fuel).

TAS: True Airspeed in knots.

TAT: Total air temperature in °C. (RAT + 1°C)

VB: Severe turbulence target speed.

MCR Thrust Limit lines (Max

Rec. Initial Cruise Alt. chart): Altitude vs. weight limit based on maximum cruise thrust.

Buffet Onset Ceiling lines (Max

Rec. Initial Cruise Alt. chart): Altitude vs. weight limit for light turbulence (1.3g) and moderate turbulence (1.5g) due to Mach buffet.

MAXIMUM CRUISE EPR SETTINGS

JT8D-219

BASED ON 250 / 310 KIAS / 0.77M
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

TAT		PRESSURE ALTITUDE - 1000 FT								
°C	°F	SL	5	10	15	20	25	30	35	37
40	104	1.51	1.51	1.50	1.50	1.49	1.48	1.52	1.51	1.51
35	95	1.56	1.56	1.55	1.55	1.54	1.53	1.57	1.56	1.56
30	86	1.61	1.61	1.60	1.60	1.59	1.58	1.62	1.61	1.61
25	77	1.66	1.66	1.65	1.65	1.64	1.63	1.67	1.66	1.66
20	68	1.71	1.71	1.70	1.70	1.69	1.68	1.72	1.71	1.71
15	59	1.75	1.75	1.74	1.74	1.73	1.72	1.76	1.75	1.75
10	50	1.79	1.79	1.78	1.78	1.77	1.76	1.80	1.79	1.79
5	41	1.82	1.82	1.81	1.81	1.80	1.79	1.83	1.82	1.82
0	32	1.86	1.86	1.85	1.85	1.84	1.83	1.87	1.86	1.86
-5	23	1.89	1.89	1.88	1.88	1.87	1.86	1.90	1.89	1.89
-10	14	1.93	1.93	1.92	1.92	1.91	1.90	1.94	1.93	1.93
-12	10	1.94	1.94	1.93	1.93	1.92	1.91	1.95	1.94	1.94
-14	7	1.96	1.96	1.95	1.95	1.94	1.93	1.97	1.96	1.96
-16	3	1.96	1.97	1.96	1.96	1.95	1.94	1.98	1.97	1.97
-18	0	1.96	1.99	1.98	1.98	1.97	1.96	2.00	1.99	1.99
-20	-4	1.96	2.00	1.99	1.99	1.98	1.97	2.01	2.00	2.00
-22	-8	1.96	2.02	2.01	2.01	2.00	1.99	2.03	2.02	2.02
-24	-11	1.96	2.03	2.02	2.02	2.01	2.00	2.04	2.03	2.03
-26	-15	1.96	2.04	2.03	2.03	2.02	2.01	2.05	2.04	2.04
-28	-18	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-30	-22	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-32	-26	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-34	-29	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-36	-33	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-38	-36	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-40	-40	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-42	-44	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-44	-47	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-46	-51	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-48	-54	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06
-50	-58	1.96	2.06	2.05	2.05	2.04	2.03	2.07	2.06	2.06

NOTE: For the following engine bleed conditions adjust EPR by the indicated amount

Packs Off	+0.02	+0.02	+0.03	+0.03	+0.04	+0.05	+0.01	+0.02	+0.02
Engine Anti-Ice On	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
Airplane Anti-Ice On (2 Eng)	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Airplane Anti-Ice On (1 Eng)	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.05	-0.06	-0.06

BUFFET ONSET BOUNDARY SPEEDS (KIAS)

Flight Level	Cruise Weight (1000 lbs)	V _b (KIAS)	G / Bank Angle (degrees)					
			1.0 / 0°		1.3 / 40°		1.5 / 48°	
			Low	High	Low	High	Low	High
370	140	0.79M	217	259	N/A	N/A	N/A	N/A
	130		207	260	N/A	N/A	N/A	N/A
	120		194	260	215	257	N/A	N/A
	110		182	260	202	258	N/A	N/A
	100		171	260	188	260	230	250
	90		160	260	174	260	212	260
350	150	0.79M	226	273	N/A	N/A	N/A	N/A
	140		213	278	N/A	N/A	N/A	N/A
	130		203	280	224	272	N/A	N/A
	120		190	288	212	273	N/A	N/A
	110		178	282	198	273	245	262
	100		166	274	184	274	226	272
330	160	0.79M	231	279	N/A	N/A	N/A	N/A
	150		222	279	N/A	N/A	N/A	N/A
	140		208	290	231	270	N/A	N/A
	130		197	296	220	278	N/A	N/A
	120		186	296	209	287	257	280
	110		174	296	194	288	240	283
310	160	285 KIAS	227	300	N/A	N/A	N/A	N/A
	150		218	305	256	292	N/A	N/A
	140		205	307	227	295	N/A	N/A
	130		193	310	217	298	260	290
	120		182	314	206	302	250	298
	110		169	314	190	302	234	300
290	160	285 KIAS	157	314	175	302	218	302
	150		145	314	160	302	202	302
	140		223	310	267	302	N/A	N/A
	130		215	310	253	305	N/A	N/A
	120		202	310	223	310	268	300
	110		190	310	213	310	254	306
270	160	285 KIAS	178	310	202	310	243	310
	150		165	310	187	310	229	310
	140		153	310	171	310	214	310
	130		141	310	155	310	199	310
	120		219	319	260	319	N/A	N/A
	110		211	319	249	319	273	319
250	160	285 KIAS	196	319	216	319	263	319
	150		186	319	207	319	250	319
	140		173	319	196	319	238	319
	130		162	319	182	319	224	319
	120		151	319	167	319	209	319
	110		140	319	153	319	194	319
230	160	285 KIAS	214	328	257	328	279	328
	150		203	328	246	328	268	328
	140		191	328	213	328	258	328
	130		182	328	202	328	245	328
	120		168	328	190	328	233	328
	110		158	328	176	328	219	328
210	100	285 KIAS	148	328	163	328	204	328
	90		138	328	150	328	188	328

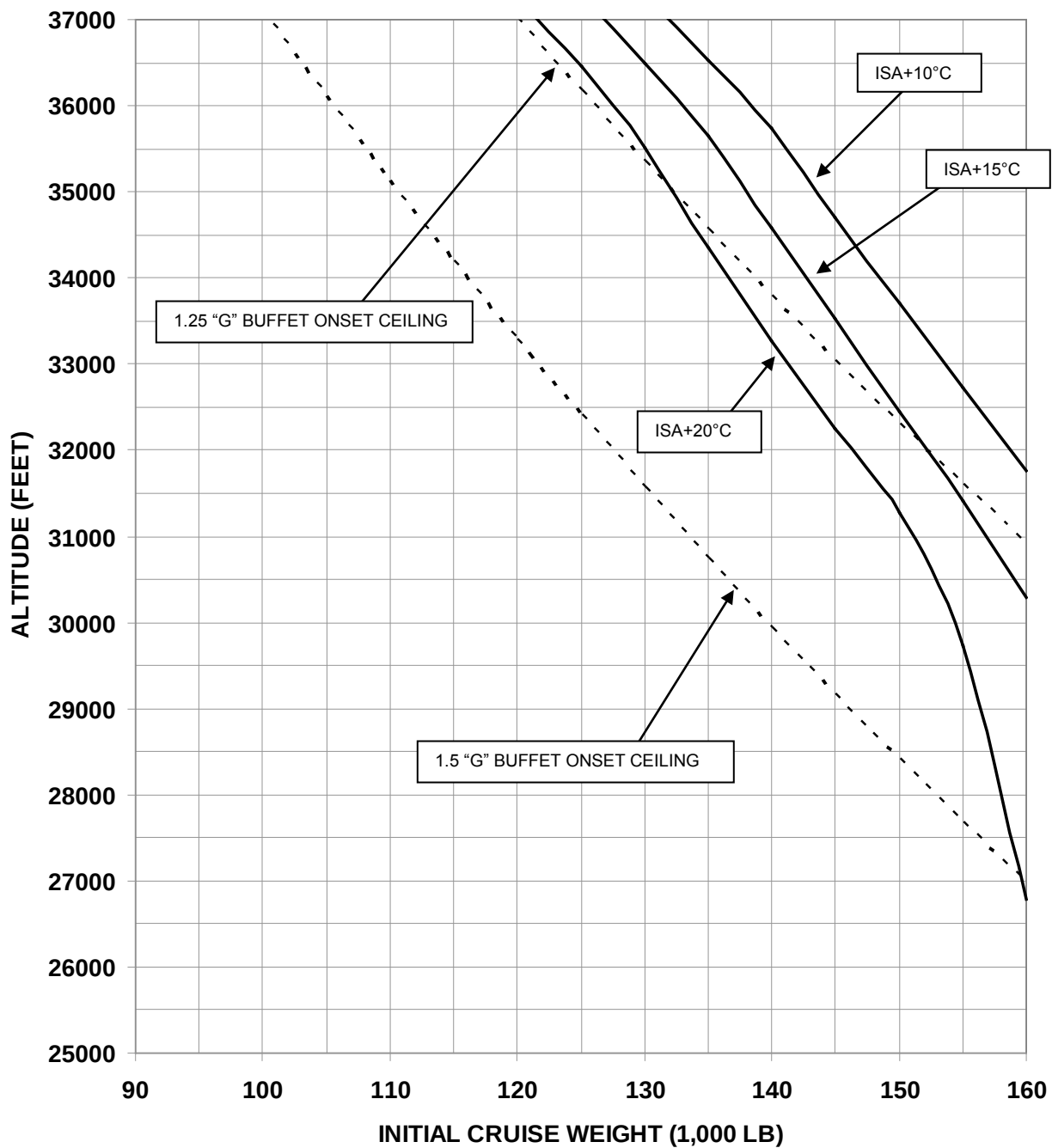
V_b - Severe turbulence target speed.

N/A - Denotes "Not Applicable"; Aircraft is above buffet onset ceiling at this weight and altitude.

MAXIMUM RECOMMENDED INITIAL CRUISE ALTITUDE

BASED ON LONG RANGE CRUISE

Limited by Maximum Cruise Thrust
and
Buffet Onset



BLEED ADJUSTMENTS (for ISA thrust limits (solid lines))

Weight (1,000 LB)	90	100	110	120	130	140	150	160
ENG ANTI-ICE ON	-1,800	-1,800	-1,800	-2,100	-3,100	-4,300	-8,200	-7,300
ENG & WING ANTI-ICE ON	-2,600	-2,600	-2,600	-3,700	-5,100	-8,900	-9,800	-9,200

LONG RANGE CRUISE DATA

ALL ENGINES OPERATING

FL ISA	GROSS WEIGHT (1000 LB)													
		160	155	150	145	140	135	130	125	120	115	110	105	100
370 -56	SAR									79.7	83.0	86.0	89.0	91.8
	EPR									1.87	1.84	1.80	1.77	1.74
	FF									5500	5270	5080	4890	4730
	MN									0.764	0.763	0.762	0.760	0.757
	IAS									247	246	246	245	244
	TAS									438	438	437	436	434
350 -54	SAR							74.0	76.5	79.1	81.5	83.9	86.5	89.4
	EPR							1.86	1.83	1.80	1.77	1.74	1.71	1.68
	FF							5940	5740	5550	5370	5200	4980	4750
	MN							0.763	0.763	0.762	0.760	0.757	0.748	0.738
	IAS							258	258	258	257	256	252	249
	TAS							440	440	439	438	436	431	425
330 -50	SAR				66.4	68.6	70.7	72.8	74.7	76.7	78.9	81.2	83.7	86.5
	EPR				1.87	1.84	1.81	1.79	1.76	1.74	1.71	1.69	1.66	1.63
	FF				6690	6460	6250	6070	5910	5720	5510	5290	5060	4800
	MN				0.764	0.763	0.761	0.761	0.760	0.756	0.748	0.739	0.729	0.714
	IAS				270	270	269	269	269	267	264	261	257	251
	TAS				444	444	443	443	442	440	435	430	424	415
310 -46	SAR		62.2	63.8	65.6	67.2	68.8	70.6	72.5	74.3	76.4	78.7	81.1	83.5
	EPR		1.85	1.82	1.80	1.78	1.75	1.73	1.70	1.68	1.66	1.63	1.61	1.59
	FF		7200	7010	6810	6640	6470	6260	6030	5830	5600	5340	5060	4850
	MN		0.763	0.763	0.762	0.761	0.759	0.754	0.745	0.739	0.730	0.716	0.700	0.690
	IAS		282	282	282	281	281	279	275	273	269	263	257	253
	TAS		448	448	447	447	445	442	437	434	428	420	411	405
290 -42	SAR	59.6	61.0	62.4	63.7	65.2	66.8	68.4	70.2	72.1	74.1	76.1	78.3	80.1
	EPR	1.80	1.78	1.76	1.74	1.72	1.70	1.68	1.65	1.63	1.61	1.59	1.56	1.55
	FF	7580	7390	7200	7030	6810	6570	6360	6130	5870	5590	5360	5140	5020
	MN	0.762	0.761	0.759	0.757	0.751	0.742	0.736	0.727	0.715	0.700	0.690	0.680	0.680
	IAS	294	294	293	292	290	286	284	280	275	269	264	260	260
	TAS	451	450	449	448	444	439	436	430	423	414	408	402	402

Definitions:

IAS: Indicated airspeed in knots

ISA: Standard Day temperature in °C

TAS: True airspeed in knots

SAR: Specific Range (nm / 1000 lbs of fuel)

EPR: EPR Required for flight

FF: Fuel Flow (lb / hr)

Temperature Trade Factors:

- SAR decreases 0.7% for +10°C and increases 0.7% for every -10°C difference from ISA.
- TAS increases 1 knot per °C above ISA and decreases 1 knot per °C below ISA.
- FF increases 3% for +10°C and decreases 3% for -10°C difference from ISA.

Notes:

Blank areas indicate flight regimes in exceedance of 1.25g buffet limit.

Shaded areas indicate optimum performance for given weight.

LONG RANGE CRUISE DATA

ALL ENGINES OPERATING

FL ISA	GROSS WEIGHT (1000 LB)													
		160	155	150	145	140	135	130	125	120	115	110	105	100
280 -40	SAR	58.8	60.1	61.4	62.8	64.2	65.7	67.4	69.1	70.9	72.8	74.8	76.5	78.7
	EPR	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.61	1.59	1.57	1.55	1.53
	FF	7690	7500	7310	7090	6850	6640	6400	6140	5860	5630	5400	5280	5050
	MN	0.760	0.759	0.755	0.749	0.741	0.735	0.726	0.714	0.700	0.690	0.680	0.680	0.670
	IAS	300	299	298	295	292	289	285	280	274	270	266	266	262
	TAS	452	451	449	445	440	437	432	424	416	410	404	404	398
270 -38	SAR	58.0	59.3	60.5	61.8	63.2	64.7	66.3	68.0	69.7	71.6	73.1	75.2	76.8
	EPR	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.60	1.59	1.57	1.55	1.53	1.52
	FF	7790	7580	7360	7130	6920	6670	6400	6130	5900	5670	5550	5320	5200
	MN	0.757	0.753	0.746	0.739	0.733	0.724	0.712	0.699	0.690	0.680	0.680	0.670	0.670
	IAS	305	303	300	297	295	291	286	280	276	272	272	268	268
	TAS	452	449	445	441	438	432	425	417	412	406	406	400	400
260 -37	SAR	57.2	58.4	59.5	60.8	62.2	63.7	65.3	67.0	68.8	70.7	72.3	74.0	75.4
	EPR	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.52	1.51	1.50
	FF	7870	7610	7430	7200	6950	6670	6380	6100	5840	5600	5460	5330	5250
	MN	0.750	0.742	0.738	0.731	0.722	0.710	0.696	0.683	0.671	0.661	0.659	0.659	0.661
	IAS	308	305	303	300	296	291	285	279	274	269	269	269	269
	TAS	450	445	442	438	433	426	417	409	402	396	395	395	396
250 -35	SAR	56.3	57.5	58.6	60.0	61.3	62.8	64.4	66.0	67.8	69.7	71.2	72.5	74.0
	EPR	1.69	1.67	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.52	1.50	1.49	1.47
	FF	7900	7700	7480	7200	6940	6640	6350	6090	5830	5610	5490	5390	5200
	MN	0.739	0.735	0.729	0.718	0.707	0.693	0.680	0.669	0.657	0.650	0.650	0.650	0.640
	IAS	310	308	305	300	296	289	284	279	273	270	270	270	266
	TAS	445	442	439	432	426	417	409	403	395	391	391	391	385
240 -33	SAR	55.5	56.6	57.8	59.0	60.4	61.9	63.6	65.3	66.9	68.3	69.7	71.1	72.3
	EPR	1.67	1.65	1.63	1.61	1.60	1.57	1.55	1.53	1.51	1.50	1.48	1.47	1.45
	FF	7990	7740	7480	7200	6900	6620	6280	5980	5810	5700	5550	5350	5260
	MN	0.732	0.725	0.715	0.704	0.690	0.678	0.661	0.647	0.644	0.645	0.640	0.630	0.630
	IAS	313	310	305	300	294	289	281	275	273	274	271	267	267
	TAS	443	438	432	426	417	410	400	391	389	390	387	381	381
230 -31	SAR	54.6	55.7	56.9	58.2	59.5	61.1	62.8	64.2	65.6	66.9	68.1	69.5	70.6
	EPR	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.51	1.50	1.48	1.47	1.45	1.44
	FF	8030	7760	7460	7170	6880	6540	6230	6070	5910	5710	5590	5410	5330
	MN	0.722	0.712	0.700	0.688	0.676	0.659	0.645	0.643	0.640	0.630	0.628	0.620	0.620
	IAS	315	310	305	299	294	286	279	278	277	273	272	268	268
	TAS	438	432	425	418	410	400	391	390	388	382	381	376	376

Definitions:

IAS: Indicated airspeed in knots

ISA: Standard Day temperature in °C

TAS: True airspeed in knots

SAR: Specific Range (nm / 1000 lbs of fuel)

EPR: EPR Required for flight

FF: Fuel Flow (lb / hr)

Temperature Trade Factors:

- SAR decreases 0.7% for +10°C and increases 0.7% for every -10°C difference from ISA.
- TAS increases 1 knot per °C above ISA and decreases 1 knot per °C below ISA.
- FF increases 3% for +10°C and decreases 3% for -10°C difference from ISA.

LONG RANGE CRUISE DATA

ALL ENGINES OPERATING

FL ISA	GROSS WEIGHT (1000 LB)													
		160	155	150	145	140	135	130	125	120	115	110	105	100
210 -27	SAR	53.1	54.2	55.3	56.7	58.1	59.3	60.5	61.7	62.8	64.0	65.2	66.6	67.8
	EPR	1.60	1.58	1.56	1.54	1.52	1.51	1.49	1.47	1.46	1.44	1.43	1.41	1.40
	FF	7980	7670	7380	7060	6770	6620	6440	6190	6000	5820	5630	5410	5320
	MN	0.691	0.679	0.668	0.654	0.643	0.642	0.637	0.624	0.617	0.609	0.601	0.590	0.590
	IAS	313	307	302	295	290	290	287	281	278	274	270	265	265
	TAS	423	415	409	400	393	393	390	382	378	373	368	361	361
190 -23	SAR	51.6	52.7	53.9	54.9	55.9	56.9	57.9	59.0	60.1	61.3	62.6	63.9	65.3
	EPR	1.55	1.53	1.52	1.50	1.49	1.47	1.46	1.44	1.42	1.40	1.39	1.38	1.36
	FF	7890	7590	7340	7200	6980	6740	6540	6330	6100	5850	5660	5470	5280
	MN	0.660	0.649	0.642	0.641	0.633	0.622	0.615	0.606	0.595	0.582	0.575	0.567	0.560
	IAS	310	305	301	301	297	292	288	284	278	272	269	265	261
	TAS	407	400	396	395	390	384	379	374	367	359	355	350	345
170 -19	SAR	50.0	50.8	51.8	52.7	53.6	54.4	55.4	56.5	57.6	58.8	59.9	61.1	62.4
	EPR	1.51	1.50	1.48	1.47	1.45	1.44	1.42	1.40	1.39	1.38	1.36	1.35	1.34
	FF	7940	7800	7540	7310	7100	6890	6660	6400	6180	5960	5800	5590	5410
	MN	0.638	0.638	0.629	0.620	0.612	0.604	0.594	0.582	0.573	0.564	0.559	0.550	0.543
	IAS	312	311	307	302	298	294	289	283	279	274	271	267	263
	TAS	397	396	391	385	380	375	369	362	356	351	347	342	338
150 -15	SAR	48.2	49.0	49.7	50.4	51.3	52.2	53.1	54.1	55.1	56.2	57.2	58.3	59.5
	EPR	1.47	1.46	1.45	1.43	1.42	1.40	1.39	1.38	1.36	1.35	1.34	1.33	1.31
	FF	8110	7850	7680	7460	7210	6960	6740	6540	6350	6140	5950	5770	5550
	MN	0.624	0.614	0.609	0.601	0.591	0.580	0.572	0.565	0.559	0.551	0.544	0.537	0.527
	IAS	316	311	308	304	299	293	289	285	282	278	274	271	266
	TAS	391	385	382	376	370	363	358	354	350	345	341	336	330
130 -11	SAR	46.2	46.9	47.6	48.4	49.2	50.0	50.9	51.8	52.7	53.6	54.6	55.6	56.7
	EPR	1.44	1.43	1.41	1.40	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.30	1.29
	FF	8250	8030	7780	7540	7320	7110	6930	6710	6520	6340	6130	5880	5680
	MN	0.604	0.596	0.587	0.578	0.571	0.564	0.559	0.551	0.545	0.539	0.530	0.519	0.511
	IAS	318	314	308	303	300	296	293	289	286	282	278	272	267
	TAS	381	376	371	365	360	356	353	348	344	340	335	328	323
110 -7	SAR	44.3	45.0	45.7	46.4	47.1	47.9	48.7	49.4	50.3	51.2	52.1	53.0	54.1
	EPR	1.41	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.28	1.27
	FF	8360	8120	7920	7710	7520	7310	7120	6930	6710	6470	6260	6050	5830
	MN	0.583	0.575	0.569	0.563	0.558	0.551	0.545	0.539	0.531	0.521	0.513	0.505	0.496
	IAS	318	313	310	307	304	300	297	293	289	283	279	274	269
	TAS	371	366	362	358	355	350	347	343	338	331	326	321	315

Definitions:

IAS: Indicated airspeed in knots

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- FF increases 3% for +10°C and decreases 3% for -10°C difference from ISA.

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MACH 0.77 / 325 KIAS CRUISE DATA

ALL ENGINES OPERATING

FLT LVL	IAS ISA TAS		GROSS WEIGHT (1000 LB)												
			160	155	150	145	140	135	130	125	120	115	110	105	100
370	249	SAR									78.4	81.5	84.5	87.3	89.8
	-56	EPR									1.89	1.85	1.82	1.79	1.76
	442	FF									5630	5420	5220	5060	4910
350	261	SAR							72.7	75.2	77.7	80.0	82.0	84.0	86.0
	-54	EPR							1.87	1.84	1.81	1.79	1.76	1.74	1.72
	444	FF							6100	5890	5710	5550	5410	5280	5160
330	273	SAR					67.4	69.5	71.5	73.3	75.0	76.7	78.3	80.0	81.8
	-50	EPR					1.86	1.83	1.81	1.78	1.76	1.74	1.72	1.70	1.68
	448	FF					6640	6440	6260	6100	5970	5840	5720	5590	5470
310	285	SAR		61.2	62.7	64.4	66.0	67.5	68.9	70.2	71.6	73.0	74.5	76.0	77.5
	-46	EPR		1.86	1.84	1.82	1.79	1.77	1.75	1.74	1.72	1.70	1.69	1.67	1.65
	452	FF		7390	7200	7010	6840	6690	6550	6430	6310	6180	6060	5940	5830
290	298	SAR	58.6	59.9	61.1	62.3	63.5	64.6	65.7	66.9	68.2	69.4	70.7	71.9	73.0
	-42	EPR	1.82	1.80	1.78	1.76	1.75	1.73	1.72	1.70	1.68	1.67	1.66	1.64	1.63
	456	FF	7790	7610	7450	7310	7180	7050	6930	6800	6680	6560	6440	6340	6240
280	304	SAR	57.8	58.9	59.9	61.0	62.0	63.1	64.2	65.3	66.5	67.6	68.7	69.8	70.8
	-40	EPR	1.79	1.77	1.76	1.74	1.73	1.71	1.70	1.68	1.67	1.66	1.64	1.63	1.62
	458	FF	7930	7780	7630	7500	7380	7250	7130	7000	6880	6770	6660	6560	6460
270	311	SAR	56.7	57.7	58.6	59.6	60.6	61.6	62.6	63.7	64.7	65.7	66.7	67.6	68.5
	-38	EPR	1.77	1.75	1.74	1.72	1.71	1.69	1.68	1.67	1.65	1.64	1.63	1.62	1.61
	460	FF	8110	7970	7830	7710	7590	7460	7330	7210	7100	6990	6890	6790	6710
260	317	SAR	55.6	56.4	57.3	58.2	59.1	60.1	61.1	62.0	62.9	63.8	64.7	65.5	66.3
	-37	EPR	1.75	1.73	1.72	1.70	1.69	1.68	1.67	1.65	1.64	1.63	1.62	1.61	1.60
	462	FF	8310	8180	8050	7930	7800	7670	7560	7440	7330	7230	7130	7050	6960
250	324	SAR	54.3	55.1	56.0	56.8	57.7	58.6	59.5	60.3	61.1	61.9	62.6	63.4	64.1
	-35	EPR	1.73	1.71	1.70	1.69	1.68	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.60
	464	FF	8540	8410	8280	8150	8030	7910	7790	7680	7580	7480	7400	7310	7220
240	325	SAR	55.1	55.9	55.8	56.7	57.5	58.3	59.1	59.9	60.6	61.4	62.1	62.8	63.5
	-33	EPR	1.68	1.67	1.67	1.66	1.65	1.63	1.62	1.61	1.60	1.60	1.59	1.58	1.57
	458	FF	8310	8190	8200	8080	7960	7850	7750	7650	7550	7460	7370	7290	7210

Definitions:

IAS: Indicated airspeed in knots

ISA: Standard Day temperature in °C

TAS: True airspeed in knots

SAR: Specific Range (nm / 1000 lbs of fuel)

EPR: EPR Required for flight

FF: Fuel Flow (lb / hr)

Temperature Trade Factors:

- SAR decreases 0.7% for +10°C and increases 0.7% for every -10°C difference from ISA.
- TAS increases 1 knot per °C above ISA and decreases 1 knot per °C below ISA.
- FF increases 3% for +10°C and decreases 3% for -10°C difference from ISA.

Notes:

Blank areas indicate flight regimes in exceedance of 1.25g buffet limit.

Shaded areas indicate optimum performance for given weight.

MACH 0.77 / 325 KIAS CRUISE DATA

ALL ENGINES OPERATING

FLT LVL	IAS ISA TAS	GROSS WEIGHT (1000 LB)													
			160	155	150	145	140	135	130	125	120	115	110	105	100
230	325	SAR	53.9	54.7	55.5	56.3	57.1	57.8	58.6	59.3	60.1	60.8	61.6	62.3	63.0
	-56	EPR	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.56	1.55
	451	FF	8380	8250	8120	8010	7900	7790	7690	7590	7500	7410	7320	7240	7160
220	325	SAR	53.2	54.0	54.7	55.5	56.3	57.0	57.8	58.5	59.2	60.0	60.7	61.3	62.0
	-54	EPR	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.57	1.56	1.55	1.54	1.54	1.53
	445	FF	8360	8240	8120	8010	7900	7790	7700	7600	7510	7420	7330	7250	7170
210	325	SAR	52.4	53.2	53.9	54.7	55.5	56.2	56.9	57.7	58.4	59.1	59.7	60.4	61.0
	-50	EPR	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.55	1.54	1.53	1.52	1.52	1.51
	438	FF	8360	8240	8120	8000	7890	7790	7690	7590	7500	7410	7330	7250	7170
200	325	SAR	51.6	52.4	53.1	53.9	54.6	55.3	56.0	56.7	57.4	58.1	58.8	59.4	59.9
	-46	EPR	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.53	1.52	1.51	1.51	1.50	1.49
	432	FF	8370	8250	8130	8010	7900	7800	7700	7610	7520	7430	7340	7270	7210
190	325	SAR	50.9	51.6	52.3	53.1	53.8	54.5	55.2	55.9	56.6	57.1	57.6	58.1	58.6
	-42	EPR	1.57	1.56	1.55	1.54	1.53	1.52	1.52	1.51	1.50	1.49	1.49	1.48	1.48
	426	FF	8370	8250	8130	8010	7910	7810	7710	7610	7520	7450	7390	7320	7260
180	325	SAR	50.1	50.9	51.6	52.3	53.0	53.7	54.3	54.8	55.3	55.8	56.3	56.8	57.3
	-40	EPR	1.55	1.54	1.53	1.52	1.51	1.50	1.50	1.49	1.48	1.48	1.47	1.46	1.46
	419	FF	8370	8250	8120	8010	7900	7800	7720	7640	7570	7500	7430	7370	7310
170	325	SAR	49.4	50.1	50.8	51.5	52.1	52.6	53.1	53.6	54.1	54.6	55.1	55.6	56.1
	-38	EPR	1.53	1.52	1.51	1.50	1.49	1.48	1.48	1.47	1.47	1.46	1.45	1.45	1.44
	413	FF	8360	8250	8130	8020	7940	7860	7780	7710	7630	7560	7500	7430	7370
150	325	SAR	47.8	48.4	48.9	49.4	49.9	50.4	50.9	51.4	51.9	52.3	52.8	53.3	53.8
	-37	EPR	1.49	1.48	1.47	1.46	1.46	1.45	1.44	1.44	1.43	1.43	1.42	1.41	1.41
	402	FF	8400	8290	8210	8120	8040	7960	7880	7810	7740	7670	7600	7530	7460
130	325	SAR	46.0	46.5	46.9	47.4	47.9	48.3	48.8	49.3	49.7	50.2	50.7	51.2	51.7
	-35	EPR	1.45	1.44	1.44	1.43	1.42	1.42	1.41	1.40	1.40	1.39	1.39	1.38	1.38
	390	FF	8480	8390	8310	8230	8140	8060	7990	7910	7840	7760	7690	7620	7540
110	325	SAR	44.1	44.6	45.0	45.5	46.0	46.4	46.9	47.4	47.8	48.3	48.8	49.2	49.7
	-33	EPR	1.42	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.36	1.36	1.35	1.35
	379	FF	8600	8500	8420	8330	8240	8160	8080	8000	7920	7840	7760	7690	7620

Definitions:

IAS: Indicated airspeed in knots

ISA: Standard Day temperature in °C

TAS: True airspeed in knots

SAR: Specific Range (nm / 1000 lbs of fuel)

EPR: EPR Required for flight

FF: Fuel Flow (lb / hr)

Temperature Trade Factors:

- SAR decreases 0.7% for +10°C and increases 0.7% for every -10°C difference from ISA.
- TAS increases 1 knot per °C above ISA and decreases 1 knot per °C below ISA.
- FF increases 3% for +10°C and decreases 3% for -10°C difference from ISA.

End of Section

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HOLDING SPEED / EPR / FUEL FLOW

STANDARD DAY - FLAPS UP

FL		GROSS WEIGHT - 1000 LB											
		90	95	100	105	110	115	120	125	130	140	150	160
370	CIAS	194	200	205	210	215	220						
	EPR	1.669	1.705	1.740	1.784	1.828	1.851						
	FF (lb/hr)	4010	4140	4280	4610	4940	5240						
350	CIAS	194	200	205	210	215	220	224	228				
	EPR	1.602	1.642	1.685	1.721	1.756	1.789	1.823	1.847				
	FF (lb/hr)	3920	4120	4320	4580	4840	5120	5400	5690				
330	CIAS	194	200	205	210	215	220	224	228	233	242		
	EPR	1.542	1.579	1.616	1.651	1.686	1.719	1.751	1.782	1.813	1.854		
	FF (lb/hr)	3890	4090	4280	4540	4800	5060	5320	5600	5880	6460		
310	CIAS	194	200	205	210	215	220	224	228	233	242	251	
	EPR	1.486	1.520	1.555	1.586	1.618	1.650	1.682	1.712	1.742	1.798	1.846	
	FF (lb/hr)	3870	4070	4280	4520	4760	5020	5280	5540	5800	6350	6930	
290	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.438	1.467	1.497	1.527	1.558	1.587	1.616	1.645	1.674	1.729	1.781	1.810
	FF (lb/hr)	3870	4070	4270	4510	4750	4990	5240	5500	5760	6280	6820	7580
280	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.419	1.445	1.473	1.500	1.529	1.557	1.585	1.613	1.642	1.695	1.747	1.775
	FF (lb/hr)	3880	4080	4280	4510	4740	4980	5260	5480	5740	6250	6790	7520
260	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.380	1.402	1.424	1.447	1.470	1.496	1.525	1.550	1.577	1.627	1.678	1.705
	FF (lb/hr)	3900	4100	4300	4510	4720	4960	5200	5450	5710	6190	6720	7440
240	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.350	1.370	1.391	1.412	1.433	1.456	1.479	1.503	1.527	1.573	1.620	1.640
	FF (lb/hr)	3950	4160	4360	4570	4780	5010	5240	5480	5710	6190	6700	7370
220	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.321	1.340	1.360	1.379	1.398	1.418	1.438	1.459	1.480	1.522	1.565	1.585
	FF (lb/hr)	4010	4220	4420	4630	4840	5040	5250	5490	5730	6200	6690	7290
200	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.292	1.310	1.328	1.345	1.363	1.380	1.397	1.415	1.433	1.470	1.510	1.530
	FF (lb/hr)	4070	4280	4490	4700	4910	5080	5250	5500	5750	6210	6680	7230
180	CIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.267	1.283	1.300	1.316	1.332	1.348	1.364	1.380	1.397	1.429	1.463	1.480
	FF (lb/hr)	4160	4350	4550	4760	4980	5190	5400	5610	5820	6250	6700	7200

- NOTES: 1) Based on racetrack pattern - Fuel Flow increased by 5%.
 2) Speeds based on 1.5 Vs

HOLDING SPEED / EPR / FUEL FLOW

STANDARD DAY - FLAPS UP

PRESSURE ALTITUDE (FT)		GROSS WEIGHT - 1000 LB											
		90	95	100	105	110	115	120	125	130	140	150	160
16,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.245	1.260	1.275	1.290	1.305	1.320	1.334	1.349	1.364	1.393	1.423	1.440
	FF (lb/hr)	4190	4370	4550	4800	5050	5260	5470	5680	5900	6240	6750	7240
14,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.226	1.239	1.253	1.267	1.281	1.294	1.308	1.322	1.336	1.363	1.391	1.400
	FF (lb/hr)	4260	4430	4620	4860	5120	5330	5540	5760	5980	6360	6840	7340
12,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.207	1.219	1.231	1.244	1.257	1.269	1.282	1.295	1.308	1.333	1.358	1.370
	FF (lb/hr)	4330	4500	4680	4930	5190	5400	5620	5840	6060	6490	6940	7450
10,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.190	1.201	1.213	1.225	1.237	1.248	1.260	1.272	1.284	1.308	1.331	1.340
	FF (lb/hr)	4410	4600	4800	5030	5270	5480	5700	5920	6140	6570	7040	7550
8,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.173	1.184	1.195	1.206	1.217	1.228	1.239	1.250	1.261	1.282	1.304	1.320
	FF (lb/hr)	4490	4710	4920	5130	5350	5560	5780	6000	6220	6660	7140	7680
6,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.161	1.171	1.181	1.191	1.200	1.210	1.221	1.231	1.241	1.261	1.282	1.29
	FF (lb/hr)	4580	4800	5010	5220	5450	5650	5880	6090	6310	6750	7220	7810
4,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.150	1.158	1.167	1.176	1.184	1.193	1.203	1.212	1.221	1.240	1.259	1.270
	FF (lb/hr)	4680	4890	5110	5320	5540	5750	5970	6190	6410	6850	7300	7920
2,000	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.139	1.147	1.154	1.162	1.171	1.179	1.188	1.196	1.205	1.222	1.239	1.250
	FF (lb/hr)	4780	4990	5210	5420	5640	5860	6070	6290	6510	6960	7400	8060
1,500	KIAS	194	200	205	210	215	220	224	228	233	242	251	259
	EPR	1.136	1.144	1.151	1.159	1.167	1.176	1.184	1.192	1.200	1.217	1.234	1.245
	FF (lb/hr)	4800	5020	5230	5450	5660	5880	6100	6320	6540	6980	7430	8090

- NOTES: 1) Based on racetrack pattern - Fuel Flow increased by 5%.
 2) Speeds based on 1.5 Vs
 3) Shaded areas indicate exceedance of ATC Hold Speeds

DESCENT REFERENCE GUIDE

START DESCENT		FOLLOW 3:1 LINE		
1000 FPM Entry Cruise Mach / 300 KIAS		Cruise Mach / 300 KIAS		
Cruise Altitude (1000 Ft)	Top of Descent Distance (NM)	Intercept Altitude (1000 Ft)	Distance (NM)	Rate of Descent Zero wind (FPM)
37	126	33	99	2600
35	120	31	93	2600
33	114	29	87	2600
31	108	27	81	2500
29	102	25	75	2400
28	99	24	72	2400
27	96	23	69	2300
26	93	22	66	2300
25	90	21	63	2300
24	87	20	60	2200
23	84	19	57	2200
22	81	18	54	2200
21	78	17	51	2100
20	75	16	48	2100
19	72	15	45	2100
18	69	14	42	2000
17	66	13	39	2000
16	63	12	36	2000
15	60	11	33	1900
14	57	10	30	1900
13	52	10	30	1900
12	47	10	30	1900
11	42	10	30	1900
10	36	10	30	1900

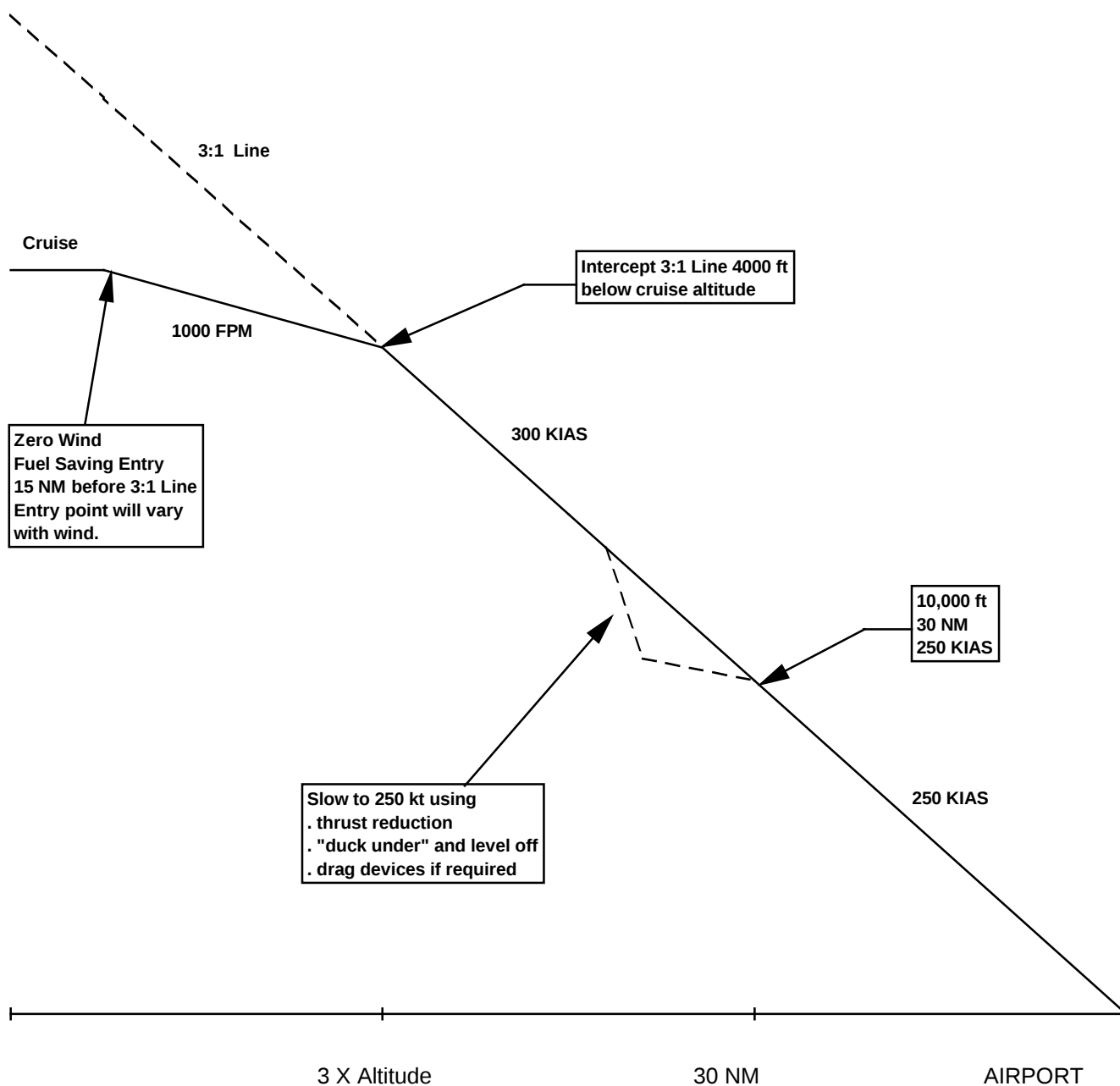
Descent entry point distance will increase/decrease with tailwind/headwind.

Example

1. From FL 350 start descent 120 NM out with a 1000 fpm rate of descent.
2. You will intercept 3:1 line at FL 310, 93 NM out.
3. A target 2600 fpm rate of descent will put you on the 3:1 line initially.
4. Read down to check 3:1 distance and rate of descent at lower altitudes.

DESCENT PROFILE

- SPEED - Cruise Mach/300 KIAS
- THRUST - as required



DESCENT PLANNING

Cruise Mach / 300 KIAS / 250 KIAS

Cruise Altitude (FL / ALT)	Top of Descent Distance (NM)	Fuel (LB)	Zero Wind Time (min)	Average TAS to S.L. (KT)
FL 370	126	1240	23	322
350	120	1210	22	317
330	114	1190	21	312
310	108	1150	20	307
290	102	1120	20	303
280	99	1110	19	300
270	96	1090	19	297
260	93	1070	18	295
250	90	1060	18	292
240	87	1040	18	290
230	84	1020	17	286
220	81	1000	17	284
210	78	990	16	280
200	75	970	16	278
190	72	960	15	275
180	69	940	15	272
ALT 17	66	920	14	269
16	63	900	14	266
15	60	880	13	263
14	57	850	13	259
13	52	810	13	248
12	47	770	12	235
11	42	740	12	230
10	36	690	10	216
10*	30	640	9	200

* 250 KIAS

ALTITUDE FOR ALTERNATE DESTINATION

Based on Missed Approach

Distance (NM)	Cruise Altitude/ Flight Level	Cruise Speed Schedule
25	5,000 Ft	Min Cost
50	7 - 9,000 Ft.	
100	11 - 15,000 Ft.	
125	14,000 Ft. - FL 180	
150	17,000 Ft. - FL 210	
200	FL 230 - 270	
250	FL 350/370	
300	FL 350/370	
400	FL 350/370	V

MD-88 DIVERSION CHARTS

(MIN FUEL = 4,000 lb)

**DIVERSION FROM MISSED APPROACH
FUEL & TIME REQUIRED**

DIST (NM)	CRUISE ALTITUDE - 1000 FT						
	5	10	15	20	25	29	35
400			14.7 1:02	13.5 1:04	12.7 1:06	12.2 1:07	11.9 1:07
300			12.3 0:50	11.4 0:51	10.9 0:53	11.6 0:53	10.5 0:54
200			9.8 0:37	9.3 0:39	9.1 0:40	9 0:40	
180		10 0:33	9.3 0:35	8.9 0:36	8.8 0:37	8.7 0:38	
160		9.4 0:31	8.8 0:32	8.5 0:34	8.4 0:35		
140		8.8 0:28	8.3 0:30	8.1 0:31	8 0:32		
120		8.2 0:26	7.8 0:27	7.7 0:29			
100	8.2 0:21	7.6 0:23	7.4 0:25	7.3 0:26			
80	7.5 0:18	7 0:21	6.9 0:22				
70	7.1 0:17	6.8 0:20	6.6 0:21				
60	6.8 0:16	6.5 0:18					
50	6.4 0:15	6.2 0:17					
40 OR LESS	6.1 0:13						

**DIVERSION FROM HOLDING
FUEL & TIME REQUIRED**

DIST (NM)	CRUISE ALTITUDE - 1000 FT				
	15	20	25	29	35
400		12.2 1:01	11.3 1:02	10.8 1:04	10.4 1:04
300	11.1 0:46	10.1 0:48	9.6 0:50	9.2 0:50	9 0:51
200	8.6 0:34	8.1 0:35	8 0:37	7.5 0:37	
180	8.1 0:31	7.7 0:33	7.6 0:34	7.3 0:34	
160	7.7 0:29	7.2 0:30	7.1 0:31	7 0:32	
140	7.2 0:26	6.8 0:28	6.7 0:29		
120	6.7 0:24	6.4 0:25	6.3 0:26		
100	6.2 0:21	6 0:23			
80	5.7 0:19	5.6 0:20			
70 OR LESS	5.5 0:18				

End of Section

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DEFINITIONS AND ASSUMPTIONS

ACTUAL LANDING DISTANCE	The actual distance required to land starting at 50 feet above the runway (usually at the threshold) to a complete stop on the runway. This distance is based on a 1.3 V_s speed at 50 feet and assumes maximum braking and NO reverse thrust.
APPROACH CLIMB LIMIT WEIGHT	Approach Climb Limit Weight is defined in FAR 25.121 as the maximum weight at which a missed approach climb meets the FAR prescribed climb gradient (2.1% for a two engine aircraft). This gradient is determined with the critical engine inoperative, remaining engine at takeoff thrust, landing gear retracted, and approach flap setting (as defined in the FAA Approved Flight Manual). This weight takes into account an air conditioning pack ON and operated from engine bleed air.
F.A.R. LANDING FIELD LENGTH	This is the landing field length as defined in the Federal Air Regulations Part 121, and is the actual landing distance plus an additional safety margin of 67%. Dispatch is based on F.A.R. Landing Field Length at the destination airport.
GO-AROUND THRUST	Maximum thrust setting available for use during a missed approach.
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_{REF}	Reference speed for the aircraft weight and configuration. This value typically represents 1.3 V_s for the configuration (unless otherwise noted). These speeds assume minimum maneuvering is required after being established on final approach.
V_s	Indicated stall speed for the aircraft weight and configuration. 1.3 V_s is 1.3 times the stall speed, or an increase of 30% above stall speed.

GO-AROUND EPR SETTINGS

BASED ON FULL INFLIGHT TAKEOFF RATING
NORMAL BLEED - PACKS ON / ANTI-ICE OFF

JT8D-219

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
48	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
46	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
44	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89
42	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91
40	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92
38	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
36	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
34	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97
32	1.97	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99
30	1.97	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
28	1.97	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02
26	1.97	2.02	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04
24	1.97	2.02	2.04	2.05	2.05	2.05	2.05	2.05	2.05	2.05
22	1.97	2.02	2.04	2.06	2.06	2.06	2.06	2.06	2.06	2.06
20	1.97	2.02	2.04	2.06	2.07	2.07	2.07	2.07	2.07	2.07
18	1.97	2.02	2.04	2.06	2.08	2.08	2.08	2.08	2.08	2.08
16	1.97	2.02	2.04	2.06	2.09	2.09	2.09	2.09	2.09	2.09
14	1.97	2.02	2.04	2.06	2.09	2.09	2.09	2.09	2.09	2.09
12 & below	1.97	2.02	2.04	2.06	2.09	2.09	2.09	2.09	2.09	2.09

CORRECTIONS:

CONFIGURATION	EPR CORRECTION
Packs Off	+ 0.02
Engine Ice Protection On	0.00
Airplane Ice Protection On (2 engines operating)	- 0.02
Airplane Ice Protection On (1 engine operating)	- 0.04

PATTERN AND APPROACH SPEEDS

KIAS NORMAL CONFIGURATION

GROSS WEIGHT - POUNDS	APPROACH - GEAR UP			LANDING - GEAR DOWN	
	SLATS RET.	SLATS EXTENDED		SLATS EXTENDED	
	FLAPS 0	FLAPS 0	FLAPS 15	FLAPS 28	FLAPS 40
	1.5Vs	1.5Vs	1.4Vs		
160,000	260	203	174	151	146
155,000	256	200	172	149	144
150,000	251	197	169	146	141
145,000	247	193	165	144	139
140,000	243	190	162	141	136
135,000	238	186	160	139	134
130,000	234	183	157	136	131
125,000	229	179	154	134	129
120,000	225	175	150	131	126
115,000	220	172	147	128	124
110,000	215	168	144	125	121
105,000	211	164	141	122	118
100,000	205	160	137	119	115
95,000	200	156	134	116	112
90,000	195	152	130	113	110

NOTE: MD-88/MD-90 Speed Book common maneuver and approach speeds represent the more conservative (i.e. higher) speed of either the MD-88 or the MD-90. For this reason, the chart speeds above may not agree with the Speed Book values. The Speed Book values should always be equal to or greater than the chart KIAS.

STALL SPEEDS - V_s **KIAS**

GROSS WEIGHT - POUNDS	GEAR UP						GEAR DOWN	
	FLAPS 0 SLATS RET	FLAPS 0 SLATS EXT	FLAPS 5 SLATS EXT	FLAPS 11 SLATS EXT	FLAPS 15 SLATS EXT	FLAPS 18 SLATS EXT	FLAPS 28 SLATS EXT	FLAPS 40 SLATS EXT
160,000	177	139	135	131	129	128	122	119
155,000	174	137	133	129	127	126	120	117
150,000	171	134	131	127	125	124	118	116
145,000	168	132	129	125	123	121	116	113
140,000	165	130	126	123	120	119	114	111
135,000	162	127	124	121	118	117	112	109
130,000	159	125	122	118	116	114	110	107
125,000	156	123	119	116	114	112	108	105
120,000	153	120	117	114	111	110	106	103
115,000	149	118	115	111	109	108	104	101
110,000	146	115	112	109	107	105	101	99
105,000	143	112	109	106	104	103	99	97
100,000	139	110	107	104	102	100	97	94
95,000	136	107	104	101	99	98	94	92
90,000	132	104	101	98	97	95	92	89

F.A.R. DRY LANDING FIELD LENGTH**FEET****JT8D-219****FLAPS 28**

AIRCRAFT WEIGHT - POUNDS	AIRPORT PRESSURE ALTITUDE - FEET								
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
160,000	5,900	6,030	6,160	6,310	6,450	6,600	6,750	6,930	7,100
155,000	5,750	5,890	6,030	6,170	6,300	6,450	6,600	6,750	6,900
150,000	5,630	5,750	5,870	6,010	6,150	6,290	6,420	6,590	6,750
145,000	5,480	5,600	5,720	5,860	6,000	6,140	6,270	6,430	6,580
140,000	5,350	5,470	5,580	5,710	5,840	5,980	6,110	6,260	6,410
135,000	5,210	5,330	5,440	5,560	5,680	5,820	5,950	6,100	6,240
130,000	5,070	5,180	5,290	5,410	5,530	5,650	5,770	5,920	6,060
125,000	4,920	5,030	5,130	5,250	5,370	5,490	5,610	5,750	5,880
120,000	4,780	4,880	4,980	5,090	5,200	5,330	5,460	5,580	5,690
115,000	4,640	4,740	4,830	4,940	5,050	5,170	5,280	5,400	5,510
110,000	4,500	4,600	4,690	4,790	4,880	4,990	5,100	5,220	5,340
105,000	4,350	4,450	4,540	4,640	4,730	4,840	4,940	5,050	5,150
100,000	4,200	4,290	4,380	4,470	4,560	4,660	4,760	4,870	4,980
95,000	4,060	4,150	4,230	4,320	4,410	4,510	4,610	4,710	4,800
90,000	3,910	4,000	4,090	4,180	4,260	4,350	4,430	4,520	4,610

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 V_{Ref28} .
- Based on Maximum Braking, Speed Brakes Extended and No Thrust Reverse.

CORRECTIONS:

CONDITION	CORRECTIONS
Headwind	- 25 ft. per knot
Tailwind	+ 170 ft. per knot
Auto or Inboard Ground Spoilers Inoperative	+ 470 ft.
Approach Idle Failed High	+1,600 ft. (dry or wet runway)
Wet runway and/or Low Minima	increase distance by 15%

F.A.R. DRY LANDING FIELD LENGTH**FEET****JT8D-219****FLAPS 40**

AIRCRAFT WEIGHT - POUNDS	AIRPORT PRESSURE ALTITUDE - FEET								
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
160,000	5,600	5,720	5,830	5,970	6,100	6,250	6,400	6,550	6,700
155,000	5,470	5,590	5,700	5,830	5,950	6,100	6,250	6,400	6,540
150,000	5,330	5,450	5,570	5,690	5,810	5,950	6,080	6,230	6,370
145,000	5,200	5,310	5,420	5,540	5,660	5,800	5,930	6,065	6,200
140,000	5,070	5,180	5,280	5,400	5,510	5,640	5,770	5,910	6,050
135,000	4,930	5,040	5,150	5,260	5,360	5,490	5,620	5,720	5,880
130,000	4,800	4,910	5,020	5,130	5,230	5,360	5,480	5,600	5,710
125,000	4,670	4,770	4,870	4,980	5,090	5,210	5,320	5,440	5,560
120,000	4,540	4,635	4,730	4,840	4,940	5,050	5,160	5,290	5,410
115,000	4,410	4,500	4,590	4,700	4,800	4,900	5,000	5,120	5,240
110,000	4,280	4,370	4,450	4,550	4,640	4,745	4,850	4,960	5,070
105,000	4,140	4,220	4,300	4,400	4,500	4,600	4,700	4,800	4,900
100,000	4,000	4,080	4,160	4,260	4,360	4,460	4,550	4,640	4,720
95,000	3,860	3,940	4,020	4,110	4,190	4,290	4,380	4,470	4,550
90,000	3,730	3,805	3,880	3,970	4,050	4,130	4,200	4,290	4,380

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 V_{Ref40} .
- Based on Maximum Braking, Speed Brakes Extended and No Thrust Reverse.

CORRECTIONS:

CONDITION	CORRECTIONS
Headwind	- 25 ft. per knot
Tailwind	+ 170 ft. per knot
Auto or Inboard Ground Spoilers Inoperative	+ 470 ft.
Approach Idle Failed High	+1,600 ft. (dry or wet runway)
Wet runway and/or Low Minima	increase distance by 15%

APPROACH AND LANDING CLIMB LIMITS

POUNDS

JT8D-219
**APPROACH FLAPS 11
LANDING FLAPS 28**

ONE PACK ON, ANTI-ICE OFF

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET								
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	149,000	144,000	138,500						
45	156,000	150,000	145,000	140,000	134,500	129,500			
40	162,500	157,000	151,000	145,500	140,000	135,000	130,000	125,000	
35	169,000	162,500	157,000	151,000	145,500	140,000	135,000	129,500	125,000
32	172,500	166,000	160,000	154,000	148,500	143,000	137,500	132,500	127,500
30	174,500	168,500	162,500	156,000	150,500	145,000	139,500	134,500	129,000
28	176,500	170,500	164,500	158,500	152,500	147,000	141,500	136,000	131,000
26	179,500	173,000	167,000	160,500	155,000	149,000	143,500	138,000	133,000
24	180,000	175,500	169,500	163,000	157,000	151,500	145,500	140,000	135,000
22	180,000	177,000	171,500	165,000	159,500	153,500	147,500	142,000	136,500
20	180,000	177,000	173,500	167,000	161,000	155,000	149,000	143,500	138,000
18	179,500	177,000	173,500	168,500	162,500	156,500	150,500	145,000	139,500
16	179,500	177,000	173,500	169,500	163,500	157,500	151,500	146,000	140,500
10 & below	179,000	176,000	173,000	171,000	164,500	158,500	152,500	147,000	141,000

NOTES:

1. Shaded region represents conditions outside environmental envelope.
2. Reduce Gross Weight by 1,250 lbs. when operating in icing conditions during any part of the flight when the forecast landing temperature is below 20°C.
3. Apply the following Gross Weight Corrections (pounds) for applicable bleed configuration:

CONFIGURATION	CORRECTIONS – POUNDS
Packs OFF	+ 2,500
Engine Ice Protection only	0
Engine and Airplane Ice Protection	- 8,000

BASIS:

In accordance with FAR 25.119 and FAR 25.121(d), the limit weights shown are the more restrictive of the following two scenarios:

Approach Climb

- One engine inoperative.
- Flaps at approach setting. (Flaps 11)
- Landing gear retracted.

Landing Climb

- All engines operating.
- Flaps at landing setting. (Flaps 28)
- Landing gear extended.

APPROACH AND LANDING CLIMB LIMITS**POUNDS****JT8D-219****APPROACH FLAPS 15
LANDING FLAPS 28 OR 40**

ONE PACK ON, ANTI-ICE OFF

OAT - °C	AIRPORT PRESSURE ALTITUDE - FEET								
	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	140,000	134,900	130,200						
45	146,100	140,700	136,000						
40	152,000	146,500	141,300						
35	157,500	151,900	146,400	141,200	136,100	131,000	126,300	121,400	116,700
32	160,600	155,000	149,400	143,900	138,800	133,500	128,700	123,800	119,200
30	162,800	157,000	151,500	146,000	140,600	135,400	130,400	125,500	120,900
28	165,100	159,100	153,500	147,900	142,500	137,200	132,000	127,200	122,400
26	167,300	161,200	155,400	149,900	144,400	139,100	134,000	128,900	124,200
24	167,500	163,800	157,900	152,400	146,700	141,300	136,200	131,100	126,200
22	167,400	164,600	159,800	154,200	148,400	142,900	137,800	132,600	127,500
20	167,400	164,600	161,400	155,600	149,900	144,400	139,200	133,900	128,900
18	167,300	164,500	161,700	156,900	151,200	145,700	140,300	135,000	130,000
16	167,300	164,500	161,600	157,900	152,200	146,500	141,100	135,800	130,600
10 & below	167,300	164,500	161,600	159,400	153,600	147,800	142,200	136,900	131,700

NOTES:

1. Shaded region represents conditions outside environmental envelope.
2. Reduce Gross Weight by 1,250 lbs. when operating in icing conditions during any part of the flight when the forecast landing temperature is below 20°C.
3. Apply the following Gross Weight Corrections (pounds) for applicable bleed configuration:

CONFIGURATION	CORRECTIONS - POUNDS
Packs OFF	+ 1,700
Engine Ice Protection only	-70
Engine and Airplane Ice Protection	- 9,200

BASIS:

In accordance with FAR 25.119 and FAR 25.121(d), the limit weights shown are the more restrictive of the following two scenarios:

Approach Climb

- One engine inoperative.
- Flaps at approach setting. (Flaps 15)
- Landing gear retracted.

Landing Climb

- All engines operating.
- Flaps at landing setting. (Flaps 28 or 40)
- Landing gear extended.

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 28

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	DRY (6)				GOOD (5)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,400	8,900	5,500	4,900	12,400	8,900	7,100	6,600
155,000	12,100	8,700	5,400	4,800	12,100	8,700	7,000	6,400
150,000	11,800	8,500	5,300	4,700	11,800	8,500	6,800	6,300
145,000	11,500	8,300	5,200	4,600	11,500	8,300	6,700	6,200
140,000	11,100	8,100	5,100	4,500	11,100	8,100	6,500	6,000
139,500	11,100	8,100	5,100	4,500	11,100	8,100	6,500	6,000
135,000	10,800	7,900	5,000	4,400	10,800	7,900	6,400	5,900
130,000	10,500	7,700	4,800	4,300	10,500	7,700	6,200	5,700
125,000	10,200	7,500	4,700	4,200	10,200	7,500	6,100	5,600
120,000	9,900	7,300	4,600	4,100	9,900	7,300	5,900	5,400
115,000	9,600	7,100	4,500	4,000	9,600	7,100	5,700	5,300
110,000	9,300	6,900	4,400	3,900	9,300	6,900	5,600	5,100
105,000	9,000	6,800	4,300	3,800	9,000	6,800	5,400	5,000
100,000	8,700	6,600	4,200	3,700	8,700	6,600	5,300	4,800
95,000	8,400	6,400	4,100	3,600	8,400	6,400	5,100	4,700
90,000	8,100	6,200	3,900	3,500	8,100	6,200	5,000	4,500

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

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

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

Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	150	200	200	200	200
PER 5 KTS ADD'L SPD	250	250	250	250	300	300	300	300
PER 10°C ABOVE ISA	350	350	350	350	500	500	500	500
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% DOWN SLOPE	450	450	450	450	650	650	650	650
1.3 EPR REVERSE	0	0	0	0	0	0	-100	-50
1 REVERSER INOP	0	0	50	50	0	0	150	150
2 REVERSERS INOP	0	0	100	50	0	0	250	250

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 28

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,500	10,500	9,900	9,400	13,500	13,400	12,800	12,300
155,000	12,200	10,200	9,700	9,100	13,200	13,100	12,600	12,000
150,000	11,900	10,000	9,400	8,900	12,900	12,800	12,300	11,800
145,000	11,600	9,700	9,200	8,700	12,600	12,500	12,000	11,500
140,000	11,200	9,500	9,000	8,500	12,300	12,300	11,700	11,200
139,500	11,200	9,500	8,900	8,400	12,300	12,200	11,700	11,200
135,000	10,900	9,300	8,700	8,200	12,000	11,900	11,400	10,900
130,000	10,600	9,000	8,500	8,000	11,700	11,600	11,100	10,600
125,000	10,300	8,800	8,300	7,800	11,300	11,300	10,800	10,300
120,000	10,000	8,500	8,100	7,600	11,000	10,900	10,400	10,000
115,000	9,700	8,300	7,800	7,400	10,700	10,600	10,100	9,700
110,000	9,400	8,100	7,600	7,100	10,300	10,300	9,800	9,400
105,000	9,100	7,800	7,400	6,900	10,000	9,900	9,500	9,000
100,000	8,800	7,600	7,100	6,700	9,600	9,600	9,200	8,700
95,000	8,500	7,300	6,900	6,500	9,300	9,300	8,800	8,400
90,000	8,200	7,100	6,700	6,300	9,000	8,900	8,500	8,100

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

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

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



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-100	-100	-100	-100
PER 1 KT TAILWIND	250	250	250	250	300	300	300	300
PER 5 KTS ADD'L SPD	450	450	450	450	600	600	600	600
PER 10°C ABOVE ISA	700	700	700	700	900	900	900	900
PER 10°C BELOW ISA	-250	-250	-250	-250	-300	-300	-300	-300
PER 1% UP SLOPE	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% DOWN SLOPE	900	900	900	900	1,150	1,150	1,150	1,150
1.3 EPR REVERSE	0	-400	-350	-350	-250	-800	-750	-750
1 REVERSER INOP	0	500	450	450	900	1,000	1,050	1,000
2 REVERSERS INOP	0	750	750	700	1,450	1,500	1,500	1,450

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 40

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	DRY (6)				GOOD (5)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	11,900	8,700	5,200	4,700	11,900	8,700	6,900	6,300
155,000	11,600	8,500	5,200	4,600	11,600	8,500	6,700	6,200
150,000	11,300	8,300	5,100	4,500	11,300	8,300	6,600	6,100
145,000	11,000	8,100	5,000	4,400	11,000	8,100	6,400	5,900
140,000	10,700	7,900	4,900	4,400	10,700	7,900	6,300	5,800
139,500	10,600	7,900	4,900	4,400	10,600	7,900	6,300	5,800
135,000	10,400	7,700	4,800	4,300	10,400	7,700	6,100	5,600
130,000	10,100	7,500	4,700	4,200	10,100	7,500	6,000	5,500
125,000	9,800	7,300	4,600	4,100	9,800	7,300	5,800	5,400
120,000	9,600	7,100	4,500	4,000	9,600	7,100	5,700	5,200
115,000	9,300	7,000	4,300	3,900	9,300	7,000	5,500	5,100
110,000	9,000	6,800	4,200	3,800	9,000	6,800	5,400	4,900
105,000	8,700	6,600	4,100	3,700	8,700	6,600	5,200	4,800
100,000	8,500	6,400	4,000	3,600	8,500	6,400	5,100	4,600
95,000	8,200	6,200	3,900	3,500	8,200	6,200	4,900	4,500
90,000	7,900	6,100	3,800	3,400	7,900	6,100	4,800	4,400

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5

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

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

 Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	150	150	150	150	150	150	150	150
PER 5 KTS ADD'L SPD	250	250	250	250	300	300	300	300
PER 10°C ABOVE ISA	350	350	350	350	500	500	500	500
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% DOWN SLOPE	450	450	450	450	600	600	600	600
1.3 EPR REVERSE	0	0	0	0	0	0	-50	-50
1 REVERSER INOP	0	0	50	50	0	0	150	100
2 REVERSERS INOP	0	0	50	50	0	0	250	250

Note: Do not operate when Braking Action is Nil.

OPERATIONAL LANDING DISTANCES

FEET

FLAPS 40

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	12,000	9,900	9,300	8,800	12,800	12,400	11,900	11,300
155,000	11,700	9,600	9,100	8,600	12,500	12,100	11,600	11,100
150,000	11,400	9,400	8,900	8,400	12,200	11,800	11,300	10,800
145,000	11,100	9,200	8,700	8,200	11,900	11,600	11,100	10,600
140,000	10,800	8,900	8,400	7,900	11,600	11,300	10,800	10,300
139,500	10,700	8,900	8,400	7,900	11,600	11,300	10,800	10,300
135,000	10,500	8,700	8,200	7,700	11,300	11,000	10,600	10,100
130,000	10,200	8,500	8,000	7,600	11,000	10,800	10,300	9,800
125,000	9,900	8,300	7,800	7,400	10,700	10,500	10,000	9,600
120,000	9,700	8,100	7,600	7,200	10,500	10,200	9,800	9,300
115,000	9,400	7,900	7,400	7,000	10,200	10,000	9,500	9,100
110,000	9,100	7,700	7,200	6,800	9,900	9,700	9,300	8,800
105,000	8,800	7,400	7,000	6,600	9,600	9,400	9,000	8,600
100,000	8,600	7,200	6,800	6,400	9,300	9,200	8,700	8,300
95,000	8,300	7,000	6,600	6,200	9,000	8,900	8,500	8,100
90,000	8,000	6,800	6,400	6,000	8,800	8,600	8,200	7,800

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5

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

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



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-100	-100	-100	-100
PER 1 KT TAILWIND	250	250	250	250	300	300	300	300
PER 5 KTS ADD'L SPD	450	450	450	450	600	600	600	600
PER 10°C ABOVE ISA	700	700	700	700	850	850	850	850
PER 10°C BELOW ISA	-250	-250	-250	-250	-300	-300	-300	-300
PER 1% UP SLOPE	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% DOWN SLOPE	850	850	850	850	1,100	1,100	1,100	1,100
1.3 EPR REVERSE	0	-300	-300	-300	-350	-750	-650	-650
1 REVERSER INOP	0	400	400	400	750	850	850	800
2 REVERSERS INOP	0	650	600	600	1,150	1,250	1,250	1,200

Note: Do not operate when Braking Action is Nil.

End of Section

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DEFINITIONS AND ASSUMPTIONS

GROSS LEVEL OFF ALTITUDE	Altitude at which the aircraft is expected to level off after the loss of one engine. No conservatism is built into this value. For use during flight, not for flight planning.
LONG RANGE CRUISE	The speed of the aircraft that will result in 99% of the maximum range of the aircraft in no wind conditions for a given weight and altitude.
MAXIMUM CONTINUOUS THRUST (MCT)	The maximum thrust level for which the engine is rated with no time constraint.
SPECIFIC AIR RANGE (SAR)	The gas mileage range an aircraft can fly per 1,000 lbs of fuel for a given weight, altitude, Mach number, and temperature. The SAR changes as the weight of the aircraft changes, all other parameters remaining constant. Fuel burn required for a given flight segment is the segment length divided by the average SAR for the leg.
STATIC AIR TEMPERATURE (SAT)	The static air temperature outside of the aircraft. Also referred to as the Outside Air Temperature or OAT.
TOTAL AIR TEMPERATURE (TAT)	The sum of both the ambient air temperature plus the total increase in temperature due to compression heating.
V_{REF}	Reference speed for the aircraft weight and configuration. This value typically represents 1.3 V _S for the configuration (unless otherwise noted). These speeds assume minimum maneuvering is required after being established on final approach.

ONE ENGINE INOPERATIVE

MAXIMUM CONTINUOUS THRUST EPR

PERCENT

JT8D-219

ONE ENGINE INOPERATIVE
 BASED ON 250 KIAS / 310 KIAS / 0.77 MACH SPEED SCHEDULE
 NORMAL BLEED - PACKS ON, ANTI-ICE OFF

MCT

TAT - °C	PRESSURE ALTITUDE - FEET									
	-1,000	0	700	1,000	2,000	3,000	10,000	20,000	30,000	40,000
50	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.79	1.77	1.75
45	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.83	1.81	1.79
40	1.86	1.86	1.89	1.89	1.89	1.89	1.89	1.87	1.85	1.83
35	1.86	1.86	1.92	1.92	1.92	1.92	1.92	1.90	1.88	1.86
30	1.86	1.86	1.96	1.96	1.96	1.96	1.96	1.94	1.92	1.90
25	1.86	1.86	2.00	2.00	2.00	2.00	2.00	1.98	1.96	1.94
20	1.86	1.86	2.03	2.03	2.03	2.03	2.03	2.01	1.99	1.97
15	1.86	1.86	2.04	2.04	2.06	2.06	2.06	2.04	2.02	2.00
10	1.91	1.91	2.04	2.04	2.06	2.08	2.08	2.06	2.04	2.02
5	1.95	1.95	2.04	2.04	2.06	2.08	2.09	2.09	2.06	2.04
0	1.97	1.99	2.04	2.04	2.06	2.08	2.09	2.09	2.08	2.07
- 5 & below	1.97	2.02	2.04	2.04	2.06	2.08	2.09	2.09	2.08	2.07

CORRECTIONS:

Packs OFF	+ 0.02	+ 0.02	+ 0.02	+ 0.02	+ 0.02	+ 0.02	+ 0.02	+ 0.04	+ 0.06	+ 0.08
Engine Anti-Ice ON	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08	- 0.08
Airplane Anti-Ice ON	- 0.05	- 0.05	- 0.05	- 0.05	- 0.05	- 0.05	- 0.05	- 0.05	- 0.06	- 0.06

ONE ENGINE INOPERATIVE DRIFTDOWN PROCEDURES

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

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

DRIFTDOWN SPEED SCHEDULE KIAS

GROSS WEIGHT – POUNDS	PRESSURE ALTITUDE – FEET						
	15,000 & below	18,000	20,000	25,000	29,000	31,000	33,000 & above
160,000	232	239	246	256	264		
155,000	228	233	240	251	258	275	
150,000	224	227	233	246	252	259	
145,000	219	222	227	240	247	251	
140,000	216	217	220	235	242	244	
135,000	212	213	214	229	236	239	
130,000	208	209	209	223	231	234	235
125,000	204	204	205	216	225	228	230
120,000	200	200	201	209	219	222	225
115,000	195	196	196	201	213	216	219
110,000	191	192	192	193	206	210	213
105,000	186	187	187	188	199	203	206
100,000	182	183	183	184	192	196	200
95,000	177	178	178	179	184	188	192
90,000	173	173	173	174	175	180	185

ONE ENGINE INOPERATIVE

DRIFTDOWN GROSS LEVEL OFF ALTITUDE FEET

ENGINE ANTI-ICE OFF

GROSS WEIGHT – POUNDS		GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C & COLDER	ISA	ISA + 10°C	ISA + 20°C
160,000	155,100	14,200	14,300	13,500	11,000
150,000	145,500	15,800	15,800	15,500	13,500
140,000	135,700	17,400	17,500	17,400	16,100
130,000	126,200	19,200	19,200	19,200	18,400
120,000	116,600	21,000	21,100	21,100	20,600
110,000	107,000	23,000	23,100	23,100	22,900
100,000	97,400	25,100	25,200	25,200	25,200

ENGINE ANTI-ICE ON

GROSS WEIGHT – POUNDS		GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C & COLDER	ISA	ISA + 10°C	ISA + 20°C
160,000	154,600	12,300	12,200	10,700	7,400
150,000	145,100	13,900	13,900	13,000	10,300
140,000	135,300	15,600	15,600	15,200	13,000
130,000	125,800	17,400	17,400	17,300	15,600
120,000	116,200	19,200	19,300	19,200	18,200
110,000	106,500	21,200	21,300	21,300	20,800
100,000	97,000	23,400	23,400	23,400	23,300

ENGINE & WING ANTI-ICE ON

GROSS WEIGHT – POUNDS		GROSS LEVEL OFF ALTITUDE – FEET			
AT ENGINE FAILURE	AT LEVEL OFF (APPROX)	ISA - 10°C & COLDER	ISA	ISA + 10°C	ISA + 20°C
160,000	154,000	10,900	10,700	8,800	4,900
150,000	144,500	12,500	12,500	11,200	8,100
140,000	135,000	14,200	14,300	13,500	11,000
130,000	125,500	16,000	16,000	15,700	13,800
120,000	116,000	17,900	17,900	17,800	16,500
110,000	106,400	19,900	19,900	19,900	19,100
100,000	96,800	22,000	22,000	22,000	21,800

BASIS:

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

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ONE ENGINE INOPERATIVE

LONG RANGE CRUISE

FL ISA		GROSS WEIGHT – 1,000 POUNDS													
		160	155	150	145	140	135	130	125	120	115	110	105	100	95
240 - 33	SAR											64.8	67.1	70.4	74.4
	EPR											2.046	1.998	1.954	1.912
	FF											5,200	4,900	4,600	4,300
	MN											.558	.544	.535	.529
	IAS											235	229	225	222
	TAS											337	329	324	320
230 - 31	SAR										62.4	64.9	67.3	71.3	72.7
	EPR										2.044	2.003	1.954	1.916	1.882
	FF										5,400	5,100	4,800	4,500	4,200
	MN										.554	.546	.533	.529	.521
	IAS										238	235	229	227	226
	TAS										337	331	323	321	320
220 - 29	SAR								45.2	51.5	58.1	64.1	67.5	69.8	72.3
	EPR								2.075	2.037	2.000	1.962	1.925	1.886	1.850
	FF								7,500	6,500	5,700	5,100	4,800	4,600	4,400
	MN								.556	.549	.543	.537	.531	.526	.521
	IAS								244	241	238	235	233	230	228
	TAS								339	335	331	327	324	321	318
210 - 27	SAR								56.7	59.5	61.7	64.4	66.1	69.6	71.8
	EPR								2.043	2.002	1.960	1.921	1.895	1.856	1.817
	FF								6,000	5,600	5,300	5,000	4,900	4,600	4,400
	MN								.555	.544	.534	.527	.530	.524	.516
	IAS								249	244	239	236	237	234	231
	TAS								340	333	327	322	324	320	316
200 - 25	SAR						52.2	54.3	56.6	58.8	61.5	63.3	65.7	67.7	71.1
	EPR						2.086	2.043	2.001	1.964	1.902	1.893	1.862	1.825	1.786
	FF						6,700	6,300	5,900	5,600	5,300	5,100	4,900	4,700	4,400
	MN						.569	.557	.544	.536	.531	.526	.525	.517	.509
	IAS						261	255	249	245	243	240	239	236	232
	TAS						350	342	334	329	326	323	322	318	313
190 - 23	SAR					50.6	52.3	54.4	56.7	59.1	61.5	63.5	65.3	67.0	68.7
	EPR					2.076	2.034	2.002	1.959	1.923	1.843	1.865	1.829	1.792	1.754
	FF					6,900	6,500	6,200	5,800	5,500	5,300	5,100	4,900	4,700	4,500
	MN					.565	.552	.546	.534	.527	.528	.525	.518	.511	.501
	IAS					264	257	255	249	246	246	245	241	238	233
	TAS					349	340	337	329	325	326	324	320	315	309

DEFINITIONS:

FL: Flight level.

ISA: Standard Day temperature in °C.

SAR: Specific Air Range (nm per 1000 lbs of fuel).

EPR: Target EPR.

FF: Fuel Flow (lb per hr).

MN: Mach number.

IAS: Indicated airspeed in knots.

TAS: True airspeed in knots.

TEMPERATURE TRADE FACTORS:

- SAR decreases 0.7% for every +10°C and increases 0.7% for every -10°C difference from ISA.
- FF increases 3% for every +10°C and decreases 3% for every -10°C difference from ISA.
- TAS increases 1 knot per 1°C above ISA and decreases 1 knot per 1°C below ISA.

ONE ENGINE INOPERATIVE LONG RANGE CRUISE

FL ISA		GROSS WEIGHT – 1,000 POUNDS													
		160	155	150	145	140	135	130	125	120	115	110	105	100	95
180 - 21	SAR				48.8	50.6	52.5	54.6	56.7	58.2	60.0	61.7	64.7	66.2	67.8
	EPR				2.076	2.035	1.994	1.962	1.929	1.896	1.839	1.833	1.798	1.762	1.726
	FF				7,200	6,800	6,400	6,100	5,800	5,600	5,400	5,200	4,900	4,700	4,500
	MN				.567	.555	.542	.537	.531	.526	.524	.519	.512	.503	.493
	IAS				270	264	258	255	253	250	249	247	243	239	234
	TAS				351	344	336	333	329	326	324	321	317	311	305
170 - 19	SAR			47.2	49.4	51.1	52.5	54.7	55.8	57.4	59.8	61.2	62.8	65.3	66.9
	EPR			2.061	2.023	1.992	1.953	1.921	1.899	1.868	1.834	1.800	1.767	1.731	1.697
	FF			7,400	6,900	6,600	6,300	6,000	5,900	5,700	5,400	5,200	5,000	4,700	4,500
	MN			.561	.548	.542	.532	.527	.529	.525	.519	.512	.505	.494	.485
	IAS			273	266	263	258	255	257	255	252	248	244	239	235
	TAS			349	341	337	331	328	329	327	323	318	314	307	301
160 - 17	SAR			47.1	48.8	50.6	52.5	53.8	55.6	56.8	58.2	60.6	62.0	64.7	66.2
	EPR			2.021	1.984	1.955	1.924	1.894	1.868	1.837	1.805	1.771	1.739	1.705	1.671
	FF			7,300	6,900	6,600	6,300	6,100	5,900	5,700	5,500	5,200	5,000	4,700	4,500
	MN			.551	.540	.535	.530	.526	.525	.520	.513	.505	.497	.487	.478
	IAS			273	267	265	262	260	260	257	254	249	245	240	236
	TAS			344	337	334	331	328	328	324	320	315	310	304	298
150 - 15	SAR	44.1	45.3	47.6	48.8	50.9	51.6	53.1	55.3	56.5	57.6	59.8	61.2	62.5	65.3
	EPR	2.040	2.010	1.979	1.944	1.918	1.895	1.867	1.837	1.806	1.775	1.740	1.709	1.677	1.645
	FF	7,800	7,500	7,100	6,800	6,500	6,400	6,200	5,900	5,700	5,500	5,200	5,000	4,800	4,500
	MN	.550	.540	.540	.531	.528	.527	.525	.520	.513	.506	.497	.488	.479	.470
	IAS	279	275	272	268	266	266	265	262	259	255	250	246	241	236
	TAS	345	338	338	332	331	330	329	326	322	317	311	306	300	294
130 - 11	SAR	44.1	45.3	47.7	49.0	50.2	52.1	53.1	55.2	56.4	57.4	59.6	61.0	62.6	65.1
	EPR	1.960	1.920	1.979	1.944	1.918	1.895	1.867	1.837	1.806	1.775	1.740	1.709	1.677	1.645
	FF	7,600	7,200	7,000	6,800	6,600	6,300	6,100	5,800	5,600	5,400	5,100	4,900	4,700	4,500
	MN	.530	.520	.529	.527	.525	.519	.513	.507	.500	.491	.482	.473	.465	.464
	IAS	280	275	277	276	275	272	269	265	262	257	252	247	243	243
	TAS	335	328	334	333	331	328	324	320	316	310	304	299	294	293
110 - 7	SAR	43.9	44.4	46.3	47.0	47.9	49.5	50.3	52.2	52.9	53.9	56.2	57.5	58.8	60.2
	EPR	1.900	1.870	1.855	1.828	1.802	1.776	1.747	1.720	1.692	1.665	1.637	1.613	1.585	1.558
	FF	7,700	7,500	7,200	7,000	6,800	6,500	6,300	6,000	5,800	5,600	5,300	5,100	4,900	4,700
	MN	.530	.520	.523	.518	.512	.507	.499	.491	.484	.475	.468	.461	.453	.445
	IAS	288	286	284	282	279	276	271	267	263	258	254	250	246	241
	TAS	337	331	333	329	326	322	317	313	307	302	298	293	288	283

DEFINITIONS:

FL: Flight level or altitude (below 18,000 feet).	FF: Fuel Flow (lb per hr).
ISA: Standard Day temperature in °C.	MN: Mach number.
SAR: Specific Air Range (nm per 1000 lbs of fuel).	IAS: Indicated airspeed in knots.
EPR: Target EPR.	TAS: True airspeed in knots.

TEMPERATURE TRADE FACTORS:

- SAR decreases 0.7% for every +10°C and increases 0.7% for every -10°C difference from ISA.
- FF increases 3% for every +10°C and decreases 3% for every -10°C difference from ISA.
- TAS increases 1 knot per 1°C above ISA and decreases 1 knot per 1°C below ISA.

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS FEET

BASIS:

- Sea level, standard day, no wind, no slope.
- All brakes operating.
- Manual Braking Technique*
- Forward idle thrust
- Hydraulics operating
- Includes 1,500 foot air distance

NOTE: Use the charts on this page when referred by QRH, Anti-skid Inoperative Non-normal procedure.
These distances are NOT authorized for dispatch purposes.

ANTI-SKID INOPERATIVE, FLAPS 28

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,860	5,710	5,630	5,490	5,350	5,190	5,040	4,890	4,750	4,600	4,450	4,300	4,150
WET	6,660	6,490	6,410	6,240	6,070	5,900	5,720	5,550	5,380	5,210	5,040	4,870	4,700
VREF28	151	149	146	144	141	139	136	134	131	128	125	122	119

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+ 350	+ 405

ANTI-SKID INOPERATIVE, FLAPS 40

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,540	5,410	5,390	5,240	5,100	4,960	4,820	4,680	4,540	4,400	4,270	4,130	3,980
WET	6,300	6,150	6,120	5,960	5,800	5,630	5,470	5,310	5,150	4,990	4,830	4,670	4,510
VREF40	146	144	141	139	136	134	131	129	126	124	121	118	115

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+ 210	+ 240

***NOTE:** The manual braking technique is to gradually increase brake pedal force until a moderate deceleration is felt. Reverse thrust effects are not included in the stopping performance but use of reverse thrust is recommended.

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS FEET

BASIS:

- Sea level, standard day, no wind, no slope.
- All brakes operating.
- Forward idle thrust.
- Includes 1,500 foot air distance.

FLAPS 0, SLATS RET

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	7,940	7,740	7,520	7,320	7,120	6,905	6,690	6,480	6,270	6,055	5,840	5,630	5,420
WET	9,060	8,830	8,580	8,350	8,120	7,870	7,620	7,380	7,140	6,890	6,640	6,400	6,160
1.25Vs	217	214	210	207	203	200	196	192	188	184	180	176	171

CONDITION			DRY CORRECTION – FEET			WET CORRECTION – FEET		
Altitude		Per 1,000 feet	+ 165			+ 190		

FLAPS 0, SLATS TO

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,950	5,830	5,670	5,525	5,380	5,235	5,090	4,945	4,800	4,655	4,510	4,365	4,220
WET	6,770	6,630	6,450	6,285	6,120	5,950	5,780	5,615	5,450	5,285	5,120	4,950	4,780
1.35Vs	183	181	178	175	171	169	165	162	159	156	152	149	145

CONDITION			DRY CORRECTION – FEET			WET CORRECTION – FEET		
Altitude		Per 1,000 feet	+ 120			+ 140		

FLAPS 11, SLATS TO

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,240	5,100	4,960	4,845	4,730	4,610	4,495	4,375	4,260	4,140	4,025	3,910	3,790
WET	5,960	5,790	5,630	5,500	5,360	5,230	5,090	4,960	4,820	4,690	4,550	4,420	4,280
1.3Vs	166	164	161	158	155	153	150	147	144	141	138	135	131

CONDITION			DRY CORRECTION – FEET			WET CORRECTION – FEET		
Altitude		Per 1,000 feet	+160			+185		

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS FEET

BASIS:

- Sea level, standard day, no wind, no slope.
- All brakes operating.
- Forward idle thrust.
- Includes 1,500 foot air distance.

FLAPS 15, SLATS TO

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	4,980	4,870	4,760	4,650	4,540	4,430	4,320	4,205	4,090	3,980	3,870	3,760	3,650
WET	5,660	5,530	5,400	5,275	5,150	5,025	4,900	4,765	4,630	4,505	4,380	4,255	4,130
1.3Vs	162	160	157	155	152	150	146	144	141	138	135	132	128

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+ 170	+ 200

FLAPS 28, SLATS RET

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	6,420	6,260	6,090	5,945	5,800	5,645	5,490	5,335	5,180	5,025	4,870	4,715	4,560
WET	7,310	7,130	6,930	6,765	6,600	6,420	6,240	6,065	5,890	5,710	5,530	5,350	5,170
1.3Vs	188	186	182	179	176	173	170	166	163	160	156	152	148

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+ 130	+ 150

FLAPS 40, SLATS RET

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,930	5,780	5,630	5,495	5,360	5,215	5,070	4,925	4,780	4,635	4,490	4,345	4,200
WET	6,750	6,580	6,400	6,245	6,090	5,925	5,760	5,595	5,430	5,260	5,090	4,925	4,760
1.3Vs	175	173	170	167	164	161	158	155	152	149	146	142	138

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+ 120	+ 140

ABNORMAL CONFIGURATION ACTUAL LANDING DISTANCES AND APPROACH SPEEDS FEET

BASIS:

- Sea level, standard day, no wind, no slope.
- All brakes operating.
- Forward idle thrust.
- Includes 1,500 foot air distance.

STABILIZER INOPERATIVE IN FLIGHT – FLAPS 15, SLATS TO

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	5,510	5,400	5,290	5,140	5,020	4,900	4,750	4,610	4,490	4,370	4,250	4,080	4,000
WET	6,270	6,140	6,010	5,840	5,700	5,560	5,390	5,230	5,090	4,960	4,820	4,620	4,530
1.4Vs	174	172	169	166	163	160	157	154	151	147	145	141	138

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+170	+200
V _{REF}	Per knot above 1.4Vs	+50	+60

BASIS:

- Sea level, standard day, no wind, no slope.
- Anti Skid on
- Reverse idle thrust.
- Includes 1,500 foot air distance.

COMPLETE HYDRAULIC FAILURE - FLAPS 0, SLATS RET

RWY COND VREF	LANDING WEIGHT (1000 POUNDS)												
	160	155	150	145	140	135	130	125	120	115	110	105	100
DRY	9,650	9,400	9,140	8,875	8,610	8,355	8,100	7,850	7,600	7,350	7,100	6,830	6,560
WET	11,030	10,740	10,440	10,135	9,830	9,535	9,240	8,955	8,670	8,380	8,090	7,780	7,470
1.25Vs	217	214	210	207	203	200	196	192	188	184	180	176	171

CONDITION		DRY CORRECTION – FEET	WET CORRECTION – FEET
Altitude	Per 1,000 feet	+270	+310

EMERGENCY LANDING DISTANCES FEET

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

FLAPS 28

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)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	10,800	7,800	4,800	4,300	10,800	7,800	6,200	5,800
155,000	10,500	7,600	4,700	4,200	10,500	7,600	6,100	5,600
150,000	10,300	7,500	4,600	4,100	10,300	7,500	6,000	5,500
145,000	10,000	7,300	4,500	4,100	10,000	7,300	5,800	5,400
140,000	9,700	7,100	4,400	4,000	9,700	7,100	5,700	5,300
139,500	9,700	7,100	4,400	4,000	9,700	7,100	5,700	5,200
135,000	9,500	6,900	4,300	3,900	9,500	6,900	5,600	5,100
130,000	9,200	6,800	4,200	3,800	9,200	6,800	5,400	5,000
125,000	8,900	6,600	4,100	3,700	8,900	6,600	5,300	4,900
120,000	8,700	6,400	4,000	3,600	8,700	6,400	5,200	4,700
115,000	8,400	6,200	3,900	3,500	8,400	6,200	5,000	4,600
110,000	8,100	6,100	3,900	3,400	8,100	6,100	4,900	4,500
105,000	7,900	5,900	3,800	3,400	7,900	5,900	4,800	4,400
100,000	7,600	5,700	3,700	3,300	7,600	5,700	4,600	4,200
95,000	7,300	5,600	3,600	3,200	7,300	5,600	4,500	4,100
90,000	7,100	5,400	3,500	3,100	7,100	5,400	4,300	4,000

BASIS: Zero wind and slope Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

Distances include 1,500 ft. air distance from threshold to touchdown.

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

Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	100	100	100	100	150	150	150	150
PER 5 KTS ADD'L SPD	200	200	200	200	300	300	300	300
PER 10°C ABOVE ISA	300	300	300	300	450	450	450	450
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% DOWN SLOPE	400	400	400	400	550	550	550	550
1.3 EPR REVERSE	0	0	0	0	0	0	-100	-50
1 REVERSER INOP	0	0	50	50	0	0	150	150
2 REVERSERS INOP	0	0	100	50	0	0	200	200

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 28

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	10,900	9,200	8,700	8,200	11,800	11,700	11,200	10,800
155,000	10,600	8,900	8,500	8,000	11,600	11,500	11,000	10,500
150,000	10,400	8,700	8,300	7,800	11,300	11,200	10,700	10,300
145,000	10,100	8,500	8,100	7,600	11,100	11,000	10,500	10,100
140,000	9,800	8,300	7,800	7,400	10,800	10,700	10,200	9,800
139,500	9,800	8,300	7,800	7,400	10,800	10,700	10,200	9,800
135,000	9,600	8,100	7,600	7,200	10,500	10,400	10,000	9,600
130,000	9,300	7,900	7,400	7,000	10,200	10,100	9,700	9,300
125,000	9,000	7,700	7,200	6,800	9,900	9,900	9,400	9,000
120,000	8,800	7,500	7,000	6,600	9,600	9,600	9,100	8,700
115,000	8,500	7,300	6,800	6,400	9,300	9,300	8,900	8,500
110,000	8,200	7,000	6,600	6,300	9,000	9,000	8,600	8,200
105,000	8,000	6,800	6,400	6,100	8,700	8,700	8,300	7,900
100,000	7,700	6,600	6,200	5,900	8,400	8,400	8,000	7,700
95,000	7,400	6,400	6,000	5,700	8,100	8,100	7,700	7,400
90,000	7,200	6,200	5,800	5,500	7,900	7,800	7,500	7,100

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF28 - 5

Distances include 1,500 ft. air distance from threshold to touchdown.

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



Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-100	-100	-100	-100
PER 1 KT TAILWIND	200	200	200	200	300	300	300	300
PER 5 KTS ADD'L SPD	400	400	400	400	500	500	500	500
PER 10°C ABOVE ISA	600	600	600	600	800	800	800	800
PER 10°C BELOW ISA	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% UP SLOPE	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% DOWN SLOPE	800	800	800	800	1,000	1,000	1,000	1,000
1.3 EPR REVERSE	0	-350	-300	-300	-200	-700	-650	-650
1 REVERSER INOP	0	450	400	400	800	850	900	850
2 REVERSERS INOP	0	650	650	600	1,250	1,300	1,300	1,250

EMERGENCY LANDING DISTANCES FEET

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

FLAPS 40

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)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	10,400	7,600	4,600	4,100	10,400	7,600	6,000	5,500
155,000	10,100	7,400	4,500	4,000	10,100	7,400	5,900	5,400
150,000	9,800	7,200	4,400	4,000	9,800	7,200	5,800	5,300
145,000	9,600	7,000	4,400	3,900	9,600	7,000	5,600	5,200
140,000	9,300	6,900	4,300	3,800	9,300	6,900	5,500	5,100
139,500	9,300	6,900	4,300	3,800	9,300	6,900	5,500	5,100
135,000	9,100	6,700	4,200	3,700	9,100	6,700	5,400	4,900
130,000	8,800	6,600	4,100	3,700	8,800	6,600	5,200	4,800
125,000	8,600	6,400	4,000	3,600	8,600	6,400	5,100	4,700
120,000	8,300	6,200	3,900	3,500	8,300	6,200	5,000	4,600
115,000	8,100	6,100	3,800	3,400	8,100	6,100	4,800	4,400
110,000	7,900	5,900	3,700	3,300	7,900	5,900	4,700	4,300
105,000	7,600	5,800	3,600	3,200	7,600	5,800	4,600	4,200
100,000	7,400	5,600	3,500	3,200	7,400	5,600	4,400	4,100
95,000	7,100	5,500	3,400	3,100	7,100	5,500	4,300	3,900
90,000	6,900	5,300	3,400	3,000	6,900	5,300	4,200	3,800

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5

Distances include 1,500 ft. air distance from threshold to touchdown.

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

Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS

	DRY (6)				GOOD (5)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	100	100	100	100	150	150	150	150
PER 5 KTS ADD'L SPD	200	200	200	200	300	300	300	300
PER 10°C ABOVE ISA	300	300	300	300	450	450	450	450
PER 10°C BELOW ISA	-100	-100	-100	-100	-150	-150	-150	-150
PER 1% UP SLOPE	-100	-100	-100	-100	-100	-100	-100	-100
PER 1% DOWN SLOPE	400	400	400	400	550	550	550	550
1.3 EPR REVERSE	0	0	0	0	0	0	-50	-50
1 REVERSER INOP	0	0	50	50	0	0	150	100
2 REVERSERS INOP	0	0	50	50	0	0	200	200

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 40

Landing Weight (lb)	NOTE: Interpolate for GOOD-TO-MEDIUM (4) or MEDIUM-TO-POOR (2).							
	MEDIUM (3)				POOR (1)			
	Min AB	Med AB	Max AB	Max Manual	Min AB	Med AB	Max AB	Max Manual
160,000	10,500	8,600	8,200	7,700	11,200	10,800	10,400	9,900
155,000	10,200	8,400	8,000	7,500	10,900	10,600	10,100	9,700
150,000	9,900	8,200	7,800	7,300	10,600	10,300	9,900	9,500
145,000	9,700	8,000	7,600	7,100	10,400	10,100	9,700	9,200
140,000	9,400	7,800	7,400	6,900	10,100	9,900	9,500	9,000
139,500	9,400	7,800	7,400	6,900	10,100	9,900	9,400	9,000
135,000	9,200	7,600	7,200	6,800	9,900	9,600	9,200	8,800
130,000	8,900	7,400	7,000	6,600	9,600	9,400	9,000	8,600
125,000	8,700	7,300	6,900	6,400	9,400	9,200	8,800	8,400
120,000	8,400	7,100	6,700	6,300	9,100	9,000	8,600	8,200
115,000	8,200	6,900	6,500	6,100	8,900	8,700	8,300	7,900
110,000	8,000	6,700	6,300	5,900	8,700	8,500	8,100	7,700
105,000	7,700	6,500	6,100	5,800	8,400	8,300	7,900	7,500
100,000	7,500	6,300	6,000	5,600	8,200	8,000	7,700	7,300
95,000	7,200	6,200	5,800	5,400	7,900	7,800	7,400	7,100
90,000	7,000	6,000	5,600	5,300	7,700	7,600	7,200	6,900

BASIS: Zero wind and slope • Runway distances include the use of reverse idle thrust. • Touchdown Speed = VREF40 - 5
Distances include 1,500 ft. air distance from threshold to touchdown.

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

Shaded region corresponds to Max Landing Weight (MLW)

ALTITUDE ADJUSTMENT

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

CORRECTIONS	MEDIUM (3)				POOR (1)			
PER 1 KT HEADWIND	-50	-50	-50	-50	-50	-50	-50	-50
PER 1 KT TAILWIND	200	200	200	200	250	250	250	250
PER 5 KTS ADD'L SPD	400	400	400	400	500	500	500	500
PER 10°C ABOVE ISA	600	600	600	600	750	750	750	750
PER 10°C BELOW ISA	-200	-200	-200	-200	-250	-250	-250	-250
PER 1% UP SLOPE	-150	-150	-150	-150	-200	-200	-200	-200
PER 1% DOWN SLOPE	750	750	750	750	950	950	950	950
1.3 EPR REVERSE	0	-250	-250	-250	-300	-650	-550	-550
1 REVERSER INOP	0	350	350	350	650	750	750	700
2 REVERSERS INOP	0	550	500	500	1000	1100	1100	1050

OPERATION WITHOUT AIRSPEED INDICATION

Use the following body attitude and EPR 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: $1.5 \cdot V_s + 10$ (see below)		THRUST: see below FLAPS: UP		
PRESSURE ALTITUDE – FEET		GROSS WEIGHT – POUNDS		
		160,000	120,000	80,000
15,000	AIRSPEED - KIAS	273	237	195
	BODY ATT	6.6	9.0	13.9
	% N1	90.3	90.7	91.3
	V/S (FPM)	+1,860	+2,850	+4,490
10,000	AIRSPEED - KIAS	270	234	193
	BODY ATT	7.7	10.5	16.2
	% N1	88.9	89.4	89.6
	V/S (FPM)	+2,270	+3,350	+5,100
5,000	AIRSPEED - KIAS	270	234	193
	BODY ATT	8.7	12.0	18.7
	% N1	87.6	87.5	87.4
	V/S (FPM)	+2,640	+3,760	+5,610
0	AIRSPEED - KIAS	270	234	193
	BODY ATT	9.8	13.6	21.4
	% N1	86.5	86.5	86.5
	V/S (FPM)	+2,990	+4,160	+6,080

CRUISE				
SPEED: see below		THRUST: %N ₁ FOR LEVEL FLIGHT FLAPS: UP		
PRESSURE ALTITUDE – FEET		GROSS WEIGHT – POUNDS		
		160,000	120,000	80,000
35,000 (268 KIAS)	BODY ATT		2.8	1.2
	% N ₁		84.5	78.2
30,000 (285 KIAS)	BODY ATT	3.6	2.1	0.7
	% N ₁	84.5	79.9	77.1
25,000 (285 KIAS)	BODY ATT	3.4	2.0	0.6
	% N ₁	80.4	77.0	74.4
20,000 (285 KIAS)	BODY ATT	3.3	1.9	0.6
	% N ₁	77.4	73.8	71.8

BASIS:

- One air conditioning pack per operating engine
- Ice protection off
- Both engines operating
- Standard day temperature

OPERATION WITHOUT AIRSPEED INDICATION

Use the following body attitude and N₁ Setting data to estimate airspeed and rate of climb/descent, if the airspeed system becomes unreliable or unusable enroute. ***If the damage to the airspeed indication system is detected during early stages of the flight (takeoff or initial climb), return to departure airport.***

DESCENT				
SPEED: 285 KIAS			THRUST: IDLE FLAPS: UP	
PRESSURE ALTITUDE – FEET		GROSS WEIGHT – POUNDS		
		160,000	120,000	80,000
30,000	BODY ATT	0.6	-1.1	-3.5
	V/S (FPM)	-2,250	-2,540	-3,290
20,000	BODY ATT	0.0	-1.7	-4.2
	V/S (FPM)	-2,150	-2,430	-3,210
10,000	BODY ATT	-0.4	-2.2	-4.8
	V/S (FPM)	-1,980	-2,290	-3,060

HOLDING				
SPEED: AS REQ'D		THRUST: %N ₁ FOR LEVEL FLIGHT		
		FLAPS: UP		
PRESSURE ALTITUDE – FEET		GEAR: UP		
		GROSS WEIGHT – POUNDS		
		160,000	120,000	80,000
10,000	AIRSPED - KIAS	259	224	183
	BODY ATT	4.1	4.1	4.1
	% N ₁	70.2	64.4	56.3

TERMINAL AREA					
SPEED: AS REQ'D			THRUST: %N ₁ FOR LEVEL FLIGHT FLAPS: AS REQ'D GEAR: UP		
PRESSURE ALTITUDE – FEET	FLAPS/ SLATS		GROSS WEIGHT – POUNDS		
			160,000	120,000	80,000
0	0/RET	KIAS	259	224	183
		BODY ATT	4.1	4.1	4.1
		% N ₁	64.9	58.9	50.2
	15/EXT	KIAS	173	150	122
		BODY ATT	8.3	8.3	8.3
		% N ₁	68.4	62.2	53.3
	28/EXT	KIAS	161	140	115
		BODY ATT	6.8	6.8	6.8
		% N ₁	72.5	66.5	58.1

BASIS:

- One air conditioning pack per operating engine
- Ice protection off
- Both engines operating
- Standard day temperature

OPERATION WITHOUT AIRSPEED INDICATION

Use the following body attitude and N₁ 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.***

FINAL APPROACH					
SPEED: AS REQ'D			THRUST: %N1 FOR 3° GLIDESLOPE FLAPS: AS REQ'D GEAR: DOWN		
PRESSURE ALTITUDE – FEET	FLAPS/ SLATS		GROSS WEIGHT – POUNDS		
			160,000	120,000	80,000
0	40/EXT	CIAS	156	135	110
		BODY ATT	2.2	2.2	2.2
		% N ₁	66.9	61.0	51.7
		V/S (FPM)	-840	-730	-590

GO AROUND					
SPEED: V ₂ + 20 (see below)			THRUST: %N1 FOR PITCH ATTITUDE FLAPS: AS REQ'D GEAR: UP ON POSITIVE CLIMB		
PRESSURE ALTITUDE – FEET	FLAPS/ SLATS		GROSS WEIGHT – POUNDS		
			160,000	120,000	80,000
10,000	15/EXT	CIAS	178	157	132
		BODY ATT	11.7	14.4	20.1
		% N ₁	93.7	93.4	93.1
		V/S (FPM)	+1,550	+2,390	+3,780
5,000	15/EXT	CIAS	178	157	141
		BODY ATT	13.7	17.1	22.6
		% N ₁	95.3	95.1	94.9
		V/S (FPM)	+2,120	+3,040	+4,820
0	15/EXT	CIAS	178	157	149
		BODY ATT	15.2	19.2	24.3
		% N ₁	93.1	92.9	92.8
		V/S (FPM)	+2,450	+3,420	+5,560

BASIS:

- One air conditioning pack per operating engine
- Ice protection off
- Both engines operating
- Standard day temperature

BRAKE COOLING PROCEDURES

LANDING

1. Compare the Maximum Permissible Quick Turn-Around Landing Weight, corrected for runway slope and wind, with the actual landing weight. **If the actual landing weight exceeds the Maximum Permissible Quick Turn-Around Landing Weight, wait at least 27 minutes on the ramp and check that wheel thermal plugs have not melted before executing a takeoff.** The Maximum Quick Turnaround Weight table takes precedence over the Brake Cooling Schedules for Landing and Rejected Takeoff.
2. If the Brake Overheat light illuminates, refer to the following page for procedures.

REJECTED TAKEOFF

1. If the Brake Overheat light illuminates, refer to the following page for procedures.

BRAKE COOLING

BRAKE OVERHEAT LIGHT

BRAKE OVERHEAT

NOTE

OVHT light comes on when any one brake temperature exceeds 305°C and goes off when brakes cool to 260°C.

NOTE: Allow 10 minutes after parking to take brake temperature reading

After landing or rejected takeoff

Brake Temperature CHECK



Above 205°C but less than 305°C

Allow brakes to cool until temperature is below 205°C before next takeoff unless other data is available.

NOTE

If brake temperature is above 300°C, do not set parking brake.

[END]

Above 305°C and/or OVHT light is on

WARNING

Keep all personnel clear of main landing gear area. If a 305°C temperature exists for approximately 5 minutes, wheel fuse plugs may activate and deflate the tires.

Brakes, wheels, and tires will require maintenance inspection before next flight.

NOTE

Do not set parking brake until brake temperature is below 300°C.

BRAKE COOLING

MAXIMUM QUICK TURN-AROUND LANDING WEIGHT

POUNDS

FLAPS 28

AIRPORT PRESSURE ALTITUDE – FT.	AMBIENT TEMPERATURE – °C						
	-40	-20	-10	0	10	20	40
0	160,000	160,000	160,000	160,000	160,000	157,500	155,000
2,000	160,000	160,000	160,000	157,500	155,000	152,000	147,000
4,000	160,000	157,500	155,000	152,000	149,000	146,500	142,000
6,000	158,000	152,000	149,000	146,000	143,500	141,000	136,500
8,000	152,500	146,000	143,500	141,000	138,000	136,000	131,500

FLAPS 40

AIRPORT PRESSURE ALTITUDE – FT.	AMBIENT TEMPERATURE – °C						
	-40	-20	-10	0	10	20	40
0	160,000	160,000	160,000	160,000	160,000	160,000	160,000
2,000	160,000	160,000	160,000	160,000	160,000	160,000	155,000
4,000	160,000	160,000	160,000	160,000	157,500	155,000	150,000
6,000	160,000	160,000	157,500	154,500	151,500	149,000	144,400
8,000	160,000	154,000	151,000	148,500	146,000	143,000	138,500

CORRECTIONS: valid for both tables

CONDITION		CORRECTION – POUNDS
Wind	per 1 kt. of headwind	+ 300
	per 1 kt. of tailwind	- 1,100
Runway slope	per 0.1% uphill slope	+ 200
	per 0.1% downhill slope	- 200

NOTE:

- If actual landing weight exceeds Maximum Permissible Quick Turn-Around Landing Weight, a waiting period (ramp time) of 27 minutes and a check of the wheel fuse plugs are required before takeoff is permitted.

MEL SUPPORT

**77-00-01: EPR INDICATING SYSTEM INOPERATIVE
TO (NORMAL) THRUST
N₁ SETTING**

ARTS OFF

STATIC SETTING

NORMAL BLEED - PACKS ON, ANTI-ICE OFF

JT8D-219

TAT – °C	AIRPORT PRESSURE ALTITUDE – FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
50	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9
48	90.2	90.2	90.2	90.2	90.2	90.2	90.2	90.2	90.2	90.2
46	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8
44	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5
42	92.1	92.1	92.1	92.1	92.1	92.1	92.1	92.1	92.1	92.1
40	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7
38	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3
36	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9
34	94.2	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6
32	93.8	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3
30	93.5	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0
28	93.2	96.2	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7
26	92.9	95.9	97.1	97.3	97.3	97.3	97.3	97.3	97.3	97.3
24	92.6	95.6	96.7	97.6	97.6	97.6	97.6	97.6	97.6	97.6
22	92.3	95.2	96.4	97.9	97.9	97.9	97.9	97.9	97.9	97.9
20	92.0	94.9	96.1	97.6	97.9	97.9	97.9	97.9	97.9	97.9
18	91.6	94.6	95.7	97.2	97.8	97.8	97.8	97.8	97.8	97.8
16	91.3	94.3	95.4	96.9	97.8	97.8	97.8	97.8	97.8	97.8
14	91.0	93.9	95.1	96.6	97.7	97.7	97.7	97.7	97.7	97.7
12	90.7	93.6	94.7	96.2	97.5	97.5	97.5	97.5	97.5	97.5
10	90.4	93.3	94.4	95.9	97.1	97.1	97.1	97.1	97.1	97.1
8	90.1	93.0	94.1	95.5	96.8	96.8	96.8	96.8	96.8	96.8
6	89.7	92.6	93.7	95.2	96.4	96.4	96.4	96.4	96.4	96.4
4	89.4	92.3	93.4	94.8	96.1	96.1	96.1	96.1	96.1	96.1
2	89.0	91.9	93.0	94.5	95.7	95.7	95.7	95.7	95.7	95.7
0	88.7	91.6	92.7	94.1	95.4	95.4	95.4	95.4	95.4	95.4
-2	88.4	91.3	92.4	93.8	95.0	95.0	95.0	95.0	95.0	95.0
-4	88.1	90.0	92.0	93.4	94.7	94.7	94.7	94.7	94.7	94.7
-6	87.7	90.6	91.7	93.1	94.3	94.3	94.3	94.3	94.3	94.3
-8	87.4	90.2	91.3	92.7	94.0	94.0	94.0	94.0	94.0	94.0
-10	87.1	89.9	91.0	92.4	93.6	93.6	93.6	93.6	93.6	93.6
-15	86.3	89.0	90.1	91.5	92.7	92.7	92.7	92.7	92.7	92.7
-20	85.4	88.1	89.2	90.6	91.8	91.8	91.8	91.8	91.8	91.8
-25	84.6	87.3	88.3	89.7	90.9	90.9	90.9	90.9	90.9	90.9
-30	83.7	86.4	87.4	88.8	89.9	89.9	89.9	89.9	89.9	89.9

CORRECTIONS:

CONFIGURATION	N ₁ CORRECTION – PCT.
Packs OFF	+ 1.0%
Engine Anti-Ice ON	+ 1.2%

MEL SUPPORT**77-00-01: EPR INDICATING SYSTEM INOPERATIVE****GO-AROUND N_1 SETTING****ARTS OFF**

NORMAL BLEED - PACKS ON, ANTI-ICE OFF

JT8D-219

TAT – °C	AIRPORT PRESSURE ALTITUDE – FEET									
	-1,000	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
47	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8	90.8
45	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.2
43	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8
41	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3
39	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9
37	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.5
35	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1
33	94.1	94.7	94.7	94.7	94.7	94.7	94.7	94.7	94.7	94.7
31	93.8	95.2	95.2	95.2	95.2	95.2	95.2	95.2	95.2	95.2
29	93.5	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
27	93.2	95.8	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4
25	92.9	95.5	96.7	96.9	96.9	96.9	96.9	96.9	96.9	96.9
23	92.6	95.2	96.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3
21	92.3	94.9	96.0	97.2	97.5	97.5	97.5	97.5	97.5	97.5
19	92.0	94.6	95.7	96.8	97.6	97.6	97.6	97.6	97.6	97.6
17	91.6	94.2	95.4	96.5	97.6	97.6	97.6	97.6	97.6	97.6
15	91.3	93.9	95.0	96.2	97.5	97.5	97.5	97.5	97.5	97.5
13	91.0	93.6	94.7	95.8	97.4	97.4	97.4	97.4	97.4	97.4
11	90.7	93.3	94.4	95.5	97.0	97.0	97.0	97.0	97.0	97.0
9	90.1	92.9	94.0	95.2	96.7	96.7	96.7	96.7	96.7	96.7
7	90.1	92.6	93.7	94.8	96.3	96.3	96.3	96.3	96.3	96.3
5	89.8	92.3	93.4	94.5	96.0	96.0	96.0	96.0	96.0	96.0
3	89.4	91.9	93.0	94.1	95.6	95.6	95.6	95.6	95.6	95.6
1	89.1	91.6	92.7	93.8	95.3	95.3	95.3	95.3	95.3	95.3
-1	88.7	91.2	92.3	93.4	94.9	94.9	94.9	94.9	94.9	94.9
-3	88.4	90.9	92.0	93.1	94.6	94.6	94.6	94.6	94.6	94.6
-5	88.1	90.6	91.7	92.8	94.3	94.3	94.3	94.3	94.3	94.3
-7	87.8	90.2	91.3	92.4	93.9	93.9	93.9	93.9	93.9	93.9
-9	87.4	89.9	91.0	92.1	93.6	93.6	93.6	93.6	93.6	93.6
-11	87.1	89.5	90.6	91.7	93.2	93.2	93.2	93.2	93.2	93.2
-13	86.8	89.2	90.3	91.4	92.9	92.9	92.9	92.9	92.9	92.9
-18	85.9	88.4	89.5	90.5	92.0	92.0	92.0	92.0	92.0	92.0
-23	85.0	87.5	88.5	89.6	91.1	91.1	91.1	91.1	91.1	91.1
-28	84.2	86.6	87.7	88.7	90.2	90.2	90.2	90.2	90.2	90.2
-33	83.4	85.7	86.8	87.8	89.2	89.2	89.2	89.2	89.2	89.2

CORRECTIONS:

CONFIGURATION	N_1 CORRECTION – PCT.
Packs OFF	+ 0.8 %
Engine Anti-Ice ON	+ 1.2%
Airfoil Anti-Ice ON, 2 Engines operating	+ 0.3 %
Airfoil Anti-Ice ON, 1 Engine operating	- 0.2 %

MEL SUPPORT**77-00-01: EPR INDICATING SYSTEM INOPERATIVE****MAXIMUM CONTINUOUS N_1 SETTING****ARTS OFF**

NORMAL BLEED - PACKS ON, ANTI-ICE OFF

JT8D-219

TAT – °C	AIRPORT PRESSURE ALTITUDE – FEET									
	0	2,000	5,000	10,000	15,000	20,000	25,000	30,000	35,000	40,000
50	88.5	88.5	88.5	88.2	88.6	88.3	88.0	87.8	87.6	87.4
48	88.8	88.8	88.8	88.5	89.0	88.7	88.4	88.2	87.9	87.6
46	89.1	89.1	89.1	88.8	89.4	89.1	88.9	88.6	88.3	88.0
44	89.4	89.4	89.4	89.1	89.8	89.5	89.2	88.9	88.7	88.4
42	89.7	89.8	89.8	89.4	90.2	89.9	89.6	89.3	89.0	88.7
40	89.4	90.1	90.1	89.8	90.7	90.4	90.1	89.8	89.5	89.1
38	89.1	90.7	90.7	90.3	91.1	90.8	90.5	90.2	89.9	89.6
36	88.8	91.2	91.2	90.9	91.6	91.3	90.9	90.6	90.3	90.0
34	88.5	91.7	91.7	91.4	92.0	91.7	91.4	91.1	90.7	90.4
32	88.2	92.3	92.3	91.9	92.4	92.1	91.8	91.5	91.2	90.9
30	87.9	92.8	92.8	92.4	92.8	92.5	92.2	91.9	91.6	91.2
28	87.6	93.2	93.2	92.9	93.1	92.8	92.5	92.2	91.9	91.6
26	87.4	93.6	93.6	93.3	93.4	93.1	92.8	92.5	92.2	91.9
24	87.1	94.0	94.0	93.7	93.7	93.4	93.1	92.8	92.5	92.2
22	86.8	94.3	94.3	94.0	94.1	93.7	93.4	93.1	92.8	92.5
20	86.5	94.7	94.7	94.4	94.4	94.0	93.7	93.4	93.1	92.8
18	86.2	95.0	95.0	94.7	94.7	94.4	94.1	93.7	93.4	93.1
16	85.9	95.2	95.2	94.9	94.8	94.5	94.2	93.9	93.5	93.2
15	85.7	95.3	95.3	94.9	94.9	94.6	94.2	93.9	93.6	93.3
14	85.9	95.3	95.3	95.0	95.0	94.6	94.3	94.0	93.7	93.4
12	86.5	95.0	95.5	95.1	95.1	94.8	94.4	94.1	93.8	93.5
10	87.0	94.6	95.6	95.3	95.2	94.9	94.6	94.3	93.9	93.6
8	87.5	94.3	95.5	95.5	95.4	95.0	94.7	94.4	94.1	93.7
6	88.0	93.9	95.1	95.2	95.5	95.2	94.8	94.5	94.2	93.9
4	88.5	93.6	94.8	94.9	95.2	95.2	95.0	94.6	94.3	94.0
2	89.0	93.3	94.4	94.5	94.8	94.8	94.9	94.9	94.5	94.1
0	89.4	92.9	94.1	94.2	94.5	94.5	94.5	94.5	94.5	94.3
-2	89.8	92.6	93.7	93.8	94.1	94.1	94.2	94.2	94.2	94.2
-4	90.1	92.2	93.4	93.5	93.8	93.8	93.8	93.8	93.8	93.8
-6	89.9	91.9	93.0	93.1	93.4	93.4	93.5	93.5	93.5	93.5
-8	89.6	91.5	92.7	92.8	93.1	93.1	93.1	93.1	93.1	93.1
-10	89.2	91.2	92.3	92.4	92.7	92.7	92.7	92.8	92.8	92.7
-20	87.5	89.4	90.5	90.6	90.9	90.9	90.9	91.0	91.0	90.9
-30	85.8	87.6	88.7	88.8	89.1	89.1	89.1	89.1	89.1	89.1
-40	84.0	85.8	86.9	86.9	87.2	87.2	87.2	87.3	87.2	87.2
-50	82.1	83.9	85.0	85.0	85.3	85.3	85.3	85.3	85.3	85.3
-60	80.2	82.0	83.0	83.1	83.3	83.3	83.4	83.4	83.4	83.4

CORRECTIONS:

CONFIGURATION	N_1 CORRECTION – PCT.	
	0 – 5,000 FT.	5,001 – 40,000 FT.
Packs OFF	+ 0.8%	+ 1.1%
Engine Anti-Ice ON	- 2.7%	- 2.6 %
Engine & Airfoil Anti-Ice ON	- 4.3 %	- 4.3 %

End of Section

FERRY FLIGHT PLANNING AND OPERATION

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CROSS REFERENCES

TAKEOFF THRUST	TAKEOFF
TAKEOFF DECISION, ROTATION AND SAFETY SPEEDS	TAKEOFF
MAXIMUM CLIMB THRUST EPR SETTINGS	CLIMB
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FAR LANDING FIELD LENGTH, ANTI-SKID INOPERATIVE	ABNORMAL

AUTHORIZATION AND FLIGHT PLANNING

Authorization, procedures, and applicability of data for ferry operations is described in the Flight Operations Manual (Chapters 9 and 35) and the Technical Operations Policies and Procedures Manual (TOPP 40-60-05). Procedures outlined in these manuals must be strictly adhered to.

Ferry operational data is available for the following configurations:

- Landing Gear Extended, Doors Closed
- Landing Gear Extended, Doors Removed
- Landing Gear Doors Removed, Gear Retracted
- Leading Edge Slats Extended (Fully)
- Leading Edge Slats Retracted
- Flaps Retracted
- Anti-Skid Inoperative

The following method should be used for ferry flight planning and operations:

1. Obtain a normal, unfiled flight plan using minimum fuel cruise (MNF) at the cruise altitude for the ferry configuration listed below.
2. Calculate the trip time and fuel load based on the values in the flight plan by multiplying the time and fuel values obtained in Step 1 by the factors listed under the appropriate ferry configuration. Enter this data either in the Dispatcher Remarks section of the Computerized Flight Plan or on the Standby Flight Plan form (NS80172).
3. Add remarks containing the ferry speed, speed limit, altitude limit, total time, leg times if appropriate, and engine-out altitude capability.
Note: Suggested cruise altitudes are for reference, and reasonable adjustments may be made to accommodate ATC and direction of flight.
4. Assure adequate terrain clearance by referring to the Engine Out Altitude Limit table.
5. Adjust the Runway Allowable and Climb Limit Takeoff Weights, and the Landing Climb Limit Weight. Subtract the weight decrements indicated under the ferry configuration from the NORMAL Thrust takeoff weights and the Landing Climb weight obtained from the ARM (SP 3947 or 3949).

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 done with ARTS On at NORMAL thrust (TRP TO/ODM) and climb out will be made at MAXIMUM Climb Thrust (TRP CL/ODM) unless otherwise specified on ferry configuration data page. Operation without TRP will be conducted in compliance with SP 469 (Minimum Equipment List Item 34-00-09). Use of MAXIMUM Thrust (ARTS Off) is at Captain's discretion.
3. Observe additional limitations and restrictions as listed for each ferry configuration on the following data pages.

LANDING GEAR EXTENDED, DOORS CLOSED

Use the following conditions and factors for gear down ferry, doors closed operations:

LIMITATIONS

Maximum Cruise Altitude: 33,000 feet.
 Maximum Speed: 250 IAS/M.70.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: Dispatch into known icing prohibited.

FLIGHT PLANNING

Time and fuel factors (multiply by basic flight plan values - interpolate linearly):

Range-NM	Recommended Altitude	Time	Fuel
300	25,000	1.14	1.42
600	25,000	1.15	1.49
900	25,000	1.15	1.52

Estimated Maximum Ferry Range: 1150 NM.

Target Gate Arrival Fuel: 12,000 lb. plus fuel to Alternate.

TAKEOFF

Dispatcher- ADD S Item S32-10-01 Landing Gear Extended – Doors Closed – This allows AWABS calculations for gear down takeoff and landing – **Remove item after operation is completed**

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 5 deg., Subtract 14,000 pounds.

Packs On or Off, Flaps 11 deg., Subtract 12,000 pounds.

NOTE: These weight adjustments are automatically applied once the S Item above is added.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO/ODM), Flaps 5 or 11 as applicable.

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 5 and 11 degrees only.

Operation from Contaminated Runway: permitted, use standard procedures at adjusted runway allowable takeoff weight.

ENROUTE

Climb or Cruise Weight	Climb IAS	25,000 feet		Engine-Out		
		Cruise IAS	Target EPR	Altitude Limit		@ Speed IAS
				ISA+10	ISA+20	
100,000	220	210	1.71	16,500	16,100	186
110,000	220	216	1.76	14,200	13,500	195
120,000	220	224	1.84	11,700	10,600	204

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

Engine-Out Altitude Limit based on Maximum Continuous Thrust, TRP(MCT)/ODM.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

Adjustment to Landing Climb Limit Weights: subtract 18,000 pounds.

HOLDING SPEED/THRUST - IAS/EPR

Weight	10,000 Feet	15,000 Feet
100,000 lb.	214/1.38	218/1.48
110,000 lb.	227/1.42	227/1.52

LANDING GEAR EXTENDED, DOORS REMOVED

Use the following conditions and factors for gear down ferry, doors removed operations:

LIMITATIONS

Maximum Cruise Altitude: 33,000 feet.
 Maximum Speed: 250 IAS/M.70.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: Dispatch into known icing prohibited.

FLIGHT PLANNING

Time and fuel factors (multiply by basic flight plan values - interpolate linearly):

Range-NM	Recommended Altitude	Time	Fuel
300	25,000	1.14	1.62
600	25,000	1.15	1.69
900	25,000	1.15	1.74

Estimated Maximum Ferry Range: 990 NM.

Target Gate Arrival Fuel: 13,700 lb. plus fuel to Alternate.

TAKEOFF

Dispatcher- ADD S Item S32-10-02 Landing Gear Extended – Doors Removed – This allows AWABS calculations for gear down takeoff and landing – **Remove item after operation is completed**

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 5 deg., Subtract 17,000 pounds.

Packs On or Off, Flaps 11 deg., Subtract 14,000 pounds.

NOTE: These weight adjustments are automatically applied once the S Item above is added.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO/ODM), Flaps 5 or 11 as applicable.

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 5 and 11 degrees only.

Operation from Contaminated Runway: permitted, use standard procedures at adjusted runway allowable takeoff weight.

ENROUTE

Climb or Cruise Weight	Climb IAS	25,000 feet		Engine-Out		
		Cruise IAS	Target EPR	Altitude Limit		@ Speed IAS
				ISA+10	ISA+20	
100,000	210	210	1.80	15,500	14,900	186
110,000	210	216	1.87	13,000	12,100	195
120,000	210	224	1.95	10,400	9,000	204

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

Engine-Out Altitude Limit based on Maximum Continuous Thrust, TRP(MCT)/ODM.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

Adjustment to Landing Climb Limit Weights: subtract 22,000 pounds.

HOLDING SPEED/THRUST - IAS/EPR

Weight	10,000 Feet	15,000 Feet
100,000 lb.	214/1.44	218/1.55
110,000 lb.	226/1.48	227/1.60

LANDING GEAR DOORS REMOVED, GEAR RETRACTED

Use the following conditions and factors for landing gear strut doors removed, gear retracted ferry operations:

LIMITATIONS

Maximum Cruise Altitude: 33,000 feet.
 Maximum Speed: 250 IAS/M.70.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: Dispatch into known icing prohibited.

FLIGHT PLANNING

Time and fuel factors (multiply by basic flight plan values - interpolate linearly):

Range-NM	Recommended Altitude	Time	Fuel
600	25,000	1.00	1.05
900	25,000	1.00	1.05
1200	25,000	1.00	1.05

Estimated Maximum Ferry Range: 2000 NM.

Target Gate Arrival Fuel: 8,300 lb. plus fuel to Alternate.

TAKEOFF

Dispatcher- ADD S Item S32-10-03 Landing Gear Doors Removed – Gear Retracted – This allows AWABS calculations for gear down takeoff and landing – **Remove item after operation is completed**

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 5 or 11 deg., Subtract 1,000 pounds.

NOTE: This weight adjustment is automatically applied once the S Item above is added.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO/ODM), Flaps 5 or 11 as applicable.

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 5 and 11 degrees only.

Operation from Contaminated Runway: permitted, use standard procedures at adjusted runway allowable takeoff weight.

ENROUTE

Climb or Cruise Weight	Climb IAS	25,000 feet		Engine-Out		
		Cruise IAS/M	Target EPR	Altitude Limit		@ Speed IAS
				ISA+10	ISA+20	
100,000	270	251/.61	1.46	22,800	22,800	186
110,000	270	262/.63	1.50	20,400	20,400	195
120,000	270	274/.66	1.55	18,000	17,900	204

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

If excessive buffet occurs, reduce speed.

Engine-Out Altitude Limit based on Maximum Continuous Thrust, TRP(MCT)/ODM.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

Adjustment to Landing Climb Limit Weights: subtract 2,300 pounds.

HOLDING SPEED/THRUST - IAS/EPR

Standard FMS/ODM speeds and thrusts.

LEADING EDGE SLATS EXTENDED (FULLY)

Use the following conditions and factors for leading edge slats extended ferry operations:

LIMITATIONS

Maximum Cruise Altitude: 30,000 feet.
 Maximum Speed: 240 IAS/M.57.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: Dispatch into known icing prohibited.

FLIGHT PLANNING

Time and fuel factors (multiply by basic flight plan values - interpolate linearly):

<u>Range-NM</u>	<u>Recommended Altitude</u>	<u>Time</u>	<u>Fuel</u>
300	25,000	1.11	1.46
600	25,000	1.14	1.57
900	25,000	1.15	1.63

Estimated Maximum Ferry Range: 1070 NM.

Target Gate Arrival Fuel: 11,800 lb. plus fuel to Alternate.

TAKEOFF

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

No additional restrictions.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO/ODM), Flaps 5 or 11 as applicable.

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 5 and 11 degrees only.

Operation from Contaminated Runway: permitted, use standard procedures at adjusted runway allowable takeoff weight.

ENROUTE

Climb or Cruise Weight	Climb IAS	25,000 feet		Engine-Out		
		Cruise IAS/M	Target EPR	Altitude Limit		@ Speed IAS
				ISA+10	ISA+20	
100,000	220	220/.51	1.76	17,400	17,200	146
110,000	220	220/.51	1.80	14,900	14,200	153
120,000	220	220/.51	1.85	12,500	11,600	160

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

If excessive buffet occurs, reduce speed.

Engine-Out Altitude Limit based on Maximum Continuous Thrust, TRP(MCT)/ODM.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

Adjustment to Landing Climb Limit Weights: none.

HOLDING SPEED/THRUST - IAS/EPR

<u>Weight</u>	<u>10,000 Feet</u>	<u>15,000 Feet</u>
100,000 lb.	214/1.38	218/1.48
110,000 lb.	220/1.42	220/1.52

LEADING EDGE SLATS RETRACTED

Use the following conditions and factors for leading edge slats retracted ferry operations:

LIMITATIONS

Maximum Cruise Altitude: Normal.
 Maximum Speed: Normal.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: no additional restrictions.
 Note stabilizer setting differences below.

FLIGHT PLANNING

Flight Plan as Normal.

Target Gate Arrival Fuel: 7,900 lb. plus fuel to Alternate.

TAKEOFF

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 24 deg., Slats Retracted, Subtract 22,000 lbs from Flaps 11 Data to obtain Flaps 24/Retracted Runway Allowable and Climb Limit Takeoff Weights.

Takeoff V Speeds:

WEIGHT	Field Elev.	V1		VR		V2	
		Ambient Temperature - degrees C					
		20 & below	40	20 & below	40	20 & below	40
90,000	SL	118	114	123	124	134	134
	4000	113	116	124	127	134	134
100,000	SL	120	122	132	133	142	142
	4000	121	126	133	134	142	142
110,000	SL	128	131	139	140	149	149
	4000	131	134	140	143	149	149
120,000	SL	137	139	146	148	156	156
	4000	139	144	148	149	156	156

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 24 degrees only.

Stabilizer Setting: Normal Center of Gravity (15% MAC):4.4 DEG ANU. Subtract 0.22 DEG ANU per 1% MAC Increase from Nominal CG, Add 0.22 DEG ANU for each 1% Decrease from Nominal CG.

Operation from Contaminated Runway: NOT permitted.

ENROUTE

Use Normal climb, cruise, and descent speeds and thrusts (FMS/ODM).

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

LANDING

Landing Speed Restrictions: Flaps 40 degrees/Slats Retracted Speed per ODM, ABNORMAL Section.

Flap Setting Restrictions: 40 degrees only for Landing.

Minimum Runway Length: See ABNORMAL Section for ACTUAL landing distances.

Adjustment to Landing Climb Limit Weights: none.

HOLDING

Standard FMS/ODM speeds and thrusts.

FLAPS RETRACTED

(SLATS EXTENDED FOR TAKEOFF AND LANDING)

Use the following conditions and factors for flaps retracted ferry operations:

LIMITATIONS

Maximum Cruise Altitude: Normal.
 Maximum Speed: Normal.
 C. G. Limitations: no additional restrictions.
 En Route Weather Restrictions: no additional restrictions.
 Note stabilizer setting differences below.

FLIGHT PLANNING

Flight Plan as Normal.
 Target Gate Arrival Fuel: 7,900 lb. plus fuel to Alternate.

TAKEOFF

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 0 deg., Slats Extended, Subtract 31,000 lbs from Flaps 11 Data to obtain Flaps 0/Extended Runway Allowable and Climb Limit Takeoff Weights.

Takeoff V Speeds:

Access V-Speeds:

WEIGHT	Field Elev.	V1		VR		V2	
		Ambient Temperature - degrees C					
		20 & below	40	20 & below	40	20 & below	40
90,000	SL	122	125	134	135	145	145
	4000	124	129	136	138	145	145
100,000	SL	132	135	143	144	153	153
	4000	135	139	145	147	153	153
110,000	SL	141	144	151	153	160	160
	4000	144	148	153	155	160	160
120,000	SL	150	153	159	161	168	168
	4000	153	157	161	163	168	168

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 0 degrees/Slats Extended.

Stabilizer Setting: Normal Center of Gravity (15% MAC): 4.7 DEG ANU. Subtract 0.20 DEG ANU per 1% MAC Increase from Nominal CG, Add 0.20 DEG ANU for each 1% Decrease from Nominal CG.

Operation from Contaminated Runway: NOT permitted.

ENROUTE

Use Normal climb, cruise, and descent speeds and thrusts (FMS/ODM).

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

LANDING

Landing Speed Restrictions: Flaps 0 degrees/Slats Extended Speed per ODM, ABNORMAL Section.

Flap Setting Restrictions: 0 degrees/Slats Extended.

Minimum Runway Length: See ABNORMAL Section for ACTUAL landing distances.

Adjustment to Landing Climb Limit Weights: none.

HOLDING

Standard FMS/ODM speeds and thrusts.

ANTI-SKID INOPERATIVE

Use the following conditions and factors for anti-skid inoperative ferry operations:

LIMITATIONS

Maximum Cruise Altitude:	Normal.
Maximum Speed:	Normal.
C. G. Limitations:	no additional restrictions.
En Route Weather Restrictions:	no additional restrictions.

FLIGHT PLANNING

Flight Plan as Normal.

Target Gate Arrival Fuel: 7,900 lb. plus fuel to Alternate.

TAKEOFF

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 5 degrees, subtract 22,600 pounds.

Packs On or Off, Flaps 11 degrees, subtract 16,000 pounds.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO)/ODM.

Thrust Setting Restrictions: NORMAL only, ALTERNATE thrust NOT approved.

Flap Setting Restrictions: no additional restrictions.

Operation from Contaminated Runway: NOT permitted.

ENROUTE

Use Normal climb, cruise, and descent speeds and thrusts (FMS/ODM).

Climb - Use MAXIMUM Climb Thrust (TRP CL)/ODM.

Cruise - Cruise Limits per TRP(CR)/ODM.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

For Landing Distances, see ODM, ABNORMAL Section.

Do NOT exceed 1.6 EPR reverse thrust above 80 knots, idle reverse below 80 knots. Should difficulty be experienced in maintaining directional control, reduce reverse thrust as required. Do NOT attempt to maintain directional control by using asymmetric reverse thrust.

Adjustment to Landing Climb Limit Weights: None.

HOLDING

Standard FMS/ODM speeds and thrusts.

TAIL CONE REMOVED

Use the following conditions and factors for tail cone removed ferry operations:

LIMITATIONS

Maximum Cruise Altitude:	no additional restrictions.
Maximum Speed:	300 IAS
C. G. Limitations:	no additional restrictions.
En Route Weather Restrictions:	no additional restrictions.

FLIGHT PLANNING

Time and fuel factors (multiply by basic flight plan values - interpolate linearly):

<u>Range-NM</u>	<u>Recommended Altitude</u>	<u>Time</u>	<u>Fuel</u>
600	normal*	1.00	1.10
900	normal*	1.00	1.10
1200	normal*	1.00	1.10

Estimated Maximum Ferry Range: 1900 NM.

Target Gate Arrival Fuel: 8,700 lb. plus fuel to Alternate.

*Aircraft can be pressurized without restriction.

TAKEOFF

Adjustment to Runway Allowable and Climb Limit Takeoff Weights:

Packs On or Off, Flaps 5 or 11 deg., Subtract 10,000 pounds.

Adjustment to Takeoff V Speeds: use speeds for NORMAL THRUST (TRP TO/ODM), Flaps 5 or 11 as applicable.

Thrust Setting Restrictions: NORMAL only, ALTERNATE Thrust NOT approved.

Flap Setting Restrictions: 5 and 11 degrees only.

Operation from Contaminated Runway: permitted, use standard procedures at adjusted runway allowable takeoff weight.

ENROUTE

Flight Plan as Normal. Avoid known areas of turbulence.

Climb - Use MAXIMUM Climb Thrust TRP(CL)/ODM.

Cruise - Do Not Exceed 300 KIAS.

If excessive buffet occurs, reduce speed. Light rudder buffet can be expected. Rudder trim may be more than normal. Rudder travel unrestricted light may illuminate 6-8 knots higher than normal. Avoid abrupt maneuvers.

Engine-Out Altitude Limit based on Maximum Continuous Thrust, TRP(MCT)/ODM. Reduce Driftdown Gross Level Off Altitude weights at engine failure by 10,000 pounds.

LANDING

Landing Speed Restrictions: no additional restrictions.

Flap Setting Restrictions: no additional restrictions.

Adjustment to Landing Climb Limit Weights: subtract 10,000 pounds.

HOLDING SPEED/THRUST - IAS/EPR

Standard FMS/ODM speeds and thrusts.

End of Section

