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## **PART IV – Flight Characteristics and Performance Data**

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## ABOUT THIS MANUAL

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**WARNING:**

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The '757 Captain' MANUAL is organized into five Parts:  
Each Part is provided as a separate Acrobat® PDF document:

- Part I – User's Manual
- Part II – Aircraft Systems
- Part III – Normal Procedures
- **Part IV – Flight Characteristics and Performance Data** - this document.
- Part V - Flight Management System

All Parts of the Manual are available free of charge via [Sim Ops](#).

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**DO NOT USE FOR FLIGHT****INTRODUCTION**

This chapter contains information to supplement performance data from the Flight Management Computer (FMC).

**TAKEOFF SPEEDS**

The speeds presented in the Takeoff Speeds table can be used for all performance conditions except where adjustments must be made to V1 for clearway, stopway, antiskid inoperative, brakes deactivated, improved climb, contaminated runway situations, brake energy limits, or obstacle clearance with unbalanced V1. These speeds may be used for weights less than or equal to the performance limited weight.

Normal takeoff speeds, V1, VR, and V2, with anti-skid on and all brakes operative, are read from the table by entering with takeoff flap setting, brake release weight and appropriate column. The appropriate column is obtained by entering the Column Reference chart with the airport pressure altitude and the actual temperature or assumed temperature for reduced thrust takeoffs. Slope and wind adjustments to V1 are obtained by entering the V1 Adjustment chart. Adjusted V1 must not exceed VR. These takeoff speeds are not valid when the brake release weight is based on clearway, stopway, improved climb or is limited by tire speed or brake energy.

**V1 (MCG)**

Regulations prohibit scheduling takeoff with a V1 less than minimum V1 for control on the ground, V1 (MCG). Therefore compare the adjusted V1 to the V1 (MCG). To find V1 (MCG) enter the V1 (MCG) table with the airport pressure altitude and actual OAT. If the adjusted V1 is less than V1 (MCG), set V1 equal to V1 (MCG). If VR is less than V1 (MCG), set VR equal to V1 (MCG), and determine a new V2 by adding the difference between the normal VR and V1 (MCG) to the normal V2. No takeoff weight adjustment is necessary provided that the actual field length exceeds the minimum field length.

**CLEARWAY AND STOPWAY V1 ADJUSTMENTS**

Takeoff speed adjustments are to be applied to V1 speed when using takeoff weights based on the use of clearway and stopway.

Adjust V1 speed by the amount shown in the table. The adjusted V1 speed must not exceed VR. Maximum allowable clearway limits are provided for guidance when more precise data is not available.

**STAB TRIM**

To find takeoff stabilizer trim setting, enter Stab Trim Setting table with anticipated brake release weight and center of gravity (C.G. % MAC) and read required stabilizer trim units.

WEIGHT (1000 LB)	STAB TRIM SETTING						
	C.G. %MAC						
	9	14	19	24	29	34	39
260	7	7	6	5	4 1/4	3 1/4	2 1/2
240	7	6 3/4	5 3/4	4 3/4	4	3 1/4	2 1/2
220	7	6 1/4	5 1/4	4 1/2	3 3/4	3 1/4	2 1/2
200	7	6	5	4 1/4	3 1/2	3	2 1/4
180	6 1/2	5 1/2	4 1/2	4	3 1/4	2 3/4	2 1/4
160	6 1/4	5 1/4	4 1/4	3 3/4	3	2 1/2	2

**VREF**

The Reference Speed table contains flaps 30, 25 and 20 landing speeds for a given weight.

**FLAP MANEUVER SPEEDS**

This table provides the flap speed schedule for minimum maneuver speeds. Using VREF as the basis for the schedule makes it variable as a function of weight and will provide adequate maneuver margin above stall at all weights. During flap retraction/extension, movement of the flap to the next position should be initiated when within 20 knots of the recommended speed for that position.

**SLUSH/STANDING WATER TAKEOFF**

Experience has shown that aircraft performance may deteriorate significantly on runways covered with snow, slush, standing water or ice. Therefore, reductions in runway/obstacle limited takeoff weight and revised takeoff speeds are necessary. The tables are intended for guidance in accordance with advisory material and assumes an engine failure at the critical point during the takeoff.

The entire runway is assumed to be completely covered by a contaminant of uniform thickness and density. Therefore this information is conservative when operating under typical colder weather conditions where patches of slush exist and some degree of sanding is common. Takeoffs in slush depths greater than 13mm (0.5 inches) are not recommended because of possible airplane damage as a result of slush impingement on the airplane structure. The use of assumed temperature for reduced thrust is not allowed on contaminated runways. Interpolation for slush/standing water depths between the values shown is permitted.

Takeoff weight is determined as follows:

1. Determine the field/obstacle limit weight for the takeoff flap setting.
2. Enter the Weight Adjustment table with the field/obstacle limit weight to obtain the weight reduction for the slush/standing water depth and airport pressure altitude.
3. Adjust field length available for temperature by amount shown on table.
4. Enter the V1 (MCG) Limit Weight table with the adjusted field length and pressure altitude to obtain the slush/standing water limit weight with respect to minimum field length required for V1 (MCG) speed.

The maximum allowable takeoff weight in slush/standing water is the lesser of the limit weights found in steps 2 and 4.

Takeoff speed determination:

1. Determine takeoff speeds V1, VR and V2 for actual brake release weight using the Takeoff Speeds table in this section.
2. If V1 (MCG) limited, set  $V1=V1(MCG)$ . If not limited by V1 (MCG) considerations, enter the V1 Adjustment table with actual brake release weight to determine the V1 reduction to apply to V1 speed. If the adjusted V1 is less than V1 (MCG), set  $V1=V1(MCG)$ . The adjusted V1 must not exceed VR.

**SLIPPERY RUNWAY TAKEOFF**

Airplane braking action is reported as good, medium or poor, depending on existing runway conditions. If braking action is reported as good, conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when stopping. Good reported braking action denotes wet runway conditions or runways covered by compact snow. Similarly, poor braking action denotes runways covered with wet ice. Performance is based on reversers operating and a 15 ft. screen height at the end of the runway. The tables provided are used in the same manner as the Slush/Standing Water tables.

**DO NOT USE FOR FLIGHT****ANTI-SKID INOPERATIVE**

When operating with anti-skid inoperative, the field limit weight and V1 must be reduced to account for the effect on accelerate-stop performance. A simplified method which conservatively accounts for the effects of antiskid inoperative on a dry runway is to reduce the normal runway/obstacle limited weight by 28000 lb and the V1 associated with the reduced weight by the amount shown in the table below.

ANTI-SKID INOPERATIVE ADJUSTMENT				
FIELD LENGTH (FT)	V1 ADJUSTMENT (KTS)*			
	FLAPS 1	FLAPS 5	FLAPS 15	FLAPS 20
6000	-46	-41	-39	-36
8000	-37	-33	-31	-29
10000	-30	-27	-26	-25
12000	-25	-23		
14000	-20	-19		

\*Reduce V1 adjustment by 1 knot per 10000 lb below 240000 lb.

If the resulting V1 is less than minimum V1, takeoff is permitted with V1 set equal to V1 (MCG) provided the accelerate-stop distance corrected for wind and slope exceeds approximately 7150 ft. Detailed analysis for the specific case from the Airplane Manual may yield a less restrictive penalty.

**BRAKES DEACTIVATED**

When operating with brakes deactivated, the field and brake energy limit weights and the V1 and VMBE must be reduced to allow for reduced braking capability. A simplified method which conservatively accounts for the reduced braking capability of one brake deactivated is to reduce the normal runway/obstacle limited weight by 4000 lb and the V1 associated with the reduced weight by the amount shown in the table below.

ONE BRAKE DEACTIVATED SPEED ADJUSTMENT	
FIELD LENGTH (FT)	V1 ADJUSTMENT (KTS)
6000	-3
8000	-2
10000	-2
12000	-2
14000	-1

If the resulting V1 is less than minimum V1, takeoff is permitted with V1 set equal to V1 (MCG) provided the accelerate-stop distance exceeds approximately 3750 ft for one brake deactivated.

**TAKEOFF EPR**

To find Max Takeoff EPR based on normal engine bleed for air conditioning packs on, enter Takeoff EPR table with airport pressure altitude and airport OAT and read EPR. EPR adjustments are shown for packs off and wing anti-ice on.

**MAX CLIMB EPR**

This table shows Max Climb EPR for a 250/290/.78 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read EPR. EPR adjustments are shown for packs off and anti-ice operation.

**GO-AROUND EPR**

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To find Max Go-around EPR based on normal engine bleed for packs on, enter the Go-Around EPR table with airport pressure altitude and reported OAT or TAT and read EPR. EPR adjustments are shown for packs off and wing anti-ice on.

**FLIGHT WITH UNRELIABLE AIRSPEED / TURBULENT AIR PENETRATION**

Pitch attitude and average EPR information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

**ALL ENGINES****LONG RANGE CRUISE MAXIMUM OPERATING ALTITUDE**

These tables provide the maximum operating altitude in the same manner as the FMC. Maximum altitudes are shown for a given cruise weight and maneuver capability. Note that these tables consider both thrust and buffet limits, providing the more limiting of the two. Any data that is thrust limited is denoted by an asterisk and represents only a thrust limited condition in level flight with maximum cruise thrust at 0 ft/min residual rate of climb or maximum climb thrust at 100 ft/min residual rate of climb. Flying above these altitudes with sustained banks in excess of approximately 12° may cause the airplane to lose speed and/or altitude.

Note that optimum altitudes shown in the tables result in buffet related maneuver margins of 1.5g (48° bank) or more. The altitudes shown in the table are limited to the maximum certified altitude of 42000 ft.

**LONG RANGE CRUISE CONTROL**

These tables provide target EPR, Long Range Cruise Mach number, IAS and standard day fuel flow per engine for the airplane weight and pressure altitude. As indicated by the shaded area, at optimum altitude .80M approximates the Long Range Cruise Mach schedule.

**APU OPERATION DURING FLIGHT**

For APU operation during flight, increase fuel flow according to the table in the Engine Inoperative text section.

**LONG RANGE CRUISE ENROUTE FUEL AND TIME**

Long Range Cruise Enroute Fuel and Time tables are provided to determine remaining time and fuel required to destination. The data is based on Long Range Cruise and .78/290/250 descent. Tables are presented for low altitudes and high altitudes.

To determine remaining fuel and time required, first enter the Ground to Air Miles Conversion table to convert ground distance and enroute wind to an equivalent still air distance for use with the Reference Fuel and Time tables. Next, enter the Reference Fuel and Time table with air distance from the Ground to Air Miles Conversion table and the desired altitude and read Reference Fuel and Time Required. Lastly, enter the Fuel Required Adjustment table with the Reference Fuel and the actual weight at checkpoint to obtain fuel required to destination.

**LONG RANGE CRUISE WIND-ALTITUDE TRADE**

Wind is a factor which may justify operations considerably below optimum altitude. For example, a favorable wind component may have an effect on ground speed which more than compensates for the loss in air range.

Using this table, it is possible to determine the break-even wind (advantage necessary or disadvantage that can be tolerated) to maintain the same range at another altitude and long range cruise speed. The table makes no allowance for climb or descent time, fuel or distance, and is based on comparing ground fuel mileage.

**DO NOT USE FOR FLIGHT****DESCENT**

Distance and time for descent are shown for a .78/290/250 descent speed schedule. Enter the table with top of descent pressure altitude and read distance in nautical miles and time in minutes. Data is based on flight idle thrust descent in zero wind. Allowances are included for a straight-in approach with gear down and landing flaps at the outer marker.

**HOLDING**

Target EPR, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read EPR, IAS and fuel flow per engine.

**ADVISORY INFORMATION****NORMAL CONFIGURATION LANDING DISTANCE**

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. If the surface is affected by water, snow, or ice and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

**SLIPPERY RUNWAY LANDING DISTANCE**

The guidance data provided reflects conservative judgement but is not representative of the absolute worst case. When landing on slippery runways with contaminated ice, snow, slush or standing water, the reported braking action must be considered. If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. Read landing distance for the reported braking action and apply the adjustments for weight, airport pressure altitude, and approach speed as required.

**NON-NORMAL CONFIGURATION LANDING DISTANCE**

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-

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reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects of max manual braking and reverse thrust.

**DO NOT USE FOR FLIGHT****RECOMMEDED BRAKE COOLING SCHEDULE**

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind, at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or Two Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

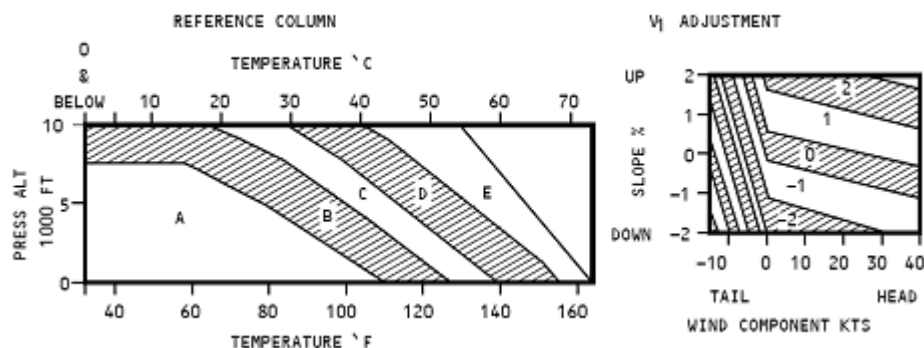
The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake or brake temperature monitor system (BTMS) indication on EICAS. Times are provided for ground cooling and inflight gear down cooling.

If brake temperature monitor indication on EICAS is available, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine the recommended cooling schedule by entering at the bottom of the chart. The brake temperature light illuminates when the hottest brake is registering 5 on the EICAS indication and extinguishes as the hottest brake cools with an EICAS indication of 4.

**APU OPERATION DURING FLIGHT**

For APU operation during flight, increase fuel flow according to the following table. These increments include the APU fuel flow and the effect of increased drag from the APU door.

PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW (LB/HR)
39	160
35	160
31	190
25	210
20	230
15	240
10	280
5	300

**DO NOT USE FOR FLIGHT****TABLES****TAKEOFF SPEEDS****MAX Takeoff Thrust**

FLAPS	WT 100 LB	A			B			C			D			E		
		V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2
1	260	180	183	185	182	185	186									
	240	171	174	177	173	176	177									
	220	162	165	169	164	167	169	166	169	170						
	200	153	155	161	155	157	161	157	159	161	159	162	162			
	180	143	145	153	145	148	153	147	150	153	149	152	153	152	154	154
	160	132	135	144	134	137	144	136	139	144	138	141	144	141	144	144
5	260	165	168	171	167	169	170									
	240	157	160	163	159	161	163									
	220	149	152	155	151	153	156	153	155	156						
	200	140	143	148	142	145	148	144	147	148						
	180	131	134	140	133	136	140	135	138	140	137	140	141			
	160	121	124	132	123	126	132	125	128	132	127	130	132	130	133	133
15	260	157	160	161												
	240	149	152	154												
	220	141	144	147	143	146	147									
	200	133	136	140	134	138	140	136	140	141						
	180	124	127	133	126	129	133	128	131	133	130	133	133			
	160	115	119	125	117	120	125	118	122	126	120	124	126	122	126	126
20	260	147	150	152												
	240	140	143	146												
	220	133	136	140												
	200	125	128	133	127	130	133									
	180	117	120	126	119	122	126	120	123	127						
	160	108	112	119	110	113	119	111	115	119	113	117	119			

**V1 ADJUSTMENT (KIAS)**

WEIGHT (1000 LB)	REPORTED BRAKING ACTION								
	GOOD			MEDIUM			POOR		
	PRESS ALT (FT)			PRESS ALT (FT)			PRESS ALT (FT)		
	S.L.	4000	8000	S.L.	4000	8000	S.L.	4000	8000
260	-6	-5	-4	-12	-11	-10	-21	-19	-17
240	-6	-5	-4	-15	-14	-13	-24	-22	-20
220	-7	-6	-5	-16	-15	-14	-27	-25	-23
200	-8	-7	-6	-18	-17	-16	-29	-27	-25
180	-8	-7	-6	-19	-18	-17	-30	-28	-26
160	-9	-8	-7	-20	-19	-18	-31	-29	-27

1. Obtain V1, VR and V2 for the actual weight.

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2. If V1(MCG) limited, set V1 = V1(MCG). If not V1(MCG) limited, enter V1 Adjustment table with the actual weight to obtain V1 speed adjustment. If adjusted V1 is less than V1(MCG), set V1 = V1(MCG).

**MAXIMUM ALLOWABLE CLEARWAY**

FIELD LENGTH (FT)	MAX ALLOWABLE CLEARWAY FOR V1 REDUCTION (FT)
4000	350
6000	450
8000	550
10000	650
12000	700
14000	750

**CLEARWAY AND STOPWAY V1 ADJUSTMENTS**

CLEARWAY MINUS STOPWAY (FT)	NORMAL V1 (KIAS)			
	120	140	160	180
800	-5	-4	-2	-1
600	-4	-3	-2	-1
400	-3	-2	-1	-1
200	-1	-1	-1	0
0	0	0	0	0
-200	1	1	1	0
-400	3	2	1	1
-600	4	3	2	1
-800	5	4	2	1

**VREF(KIAS)**

WEIGHT (1000 LB)	FLAPS		
	30	25	20
260	155	157	165
240	148	150	158
220	140	142	151
200	133	135	144
180	125	127	136
160	117	119	128
140	109	111	119

**FLAP MANEUVER SPEEDS**

FLAP POSITION	MANEUVER SPEED
UP	VREF30 + 80
1	VREF30 + 60
5	VREF30 + 40
15	VREF30 + 20
20	VREF30 + 20
25	VREF25
30	VREF30

**DO NOT USE FOR FLIGHT****TAKEOFF EPR****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

AIRPORT OAT		AIRPORT PRESSURE ALTITUDE (FT)							
°F	°C	0	1000	2000	3000	4000	5000	6000	8000
158	70	1.20	1.21	1.21	1.22	1.22	1.23	1.23	1.23
149	65	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
140	60	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
131	55	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
122	50	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
113	45	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
104	40	1.37	1.38	1.38	1.39	1.39	1.39	1.39	1.39
95	35	1.39	1.40	1.41	1.41	1.42	1.43	1.43	1.43
86	30	1.41	1.42	1.43	1.44	1.45	1.45	1.45	1.45
77	25	1.41	1.43	1.45	1.47	1.48	1.49	1.49	1.49
68	20	1.41	1.43	1.45	1.47	1.49	1.51	1.52	1.52
59	15	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.55
50 & BELOW	10 & BELOW	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.56

**EPR ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)							
	0	1000	2000	3000	4000	5000	6000	8000
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
WING ANTI-ICE ON	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02

**MAX CLIMB EPR****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	40
	250	250	250	290	290	290	290	.78	.78
60	1.15	1.14	1.12	1.08	1.05	1.02	0.99	0.98	0.97
50	1.18	1.17	1.16	1.11	1.09	1.06	1.04	1.03	1.02
40	1.22	1.21	1.19	1.15	1.13	1.11	1.09	1.08	1.07
30	1.24	1.25	1.23	1.20	1.18	1.16	1.14	1.13	1.12
20	1.24	1.27	1.28	1.25	1.23	1.21	1.19	1.18	1.18
10	1.24	1.27	1.30	1.29	1.29	1.27	1.26	1.25	1.24
0	1.24	1.27	1.30	1.29	1.32	1.35	1.33	1.32	1.32
-10	1.24	1.27	1.30	1.29	1.32	1.35	1.39	1.41	1.41
-20	1.24	1.27	1.30	1.29	1.32	1.35	1.39	1.48	1.50

**DO NOT USE FOR FLIGHT****EPR ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	40
PACKS OFF	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04
ENGINE ANTI-ICE ON	0.00	0.00	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05	-0.07
ENGINE & WING ANTI-ICE ON	-0.02	-0.02	-0.06	-0.06	-0.06	-0.07	-0.08	-0.10	-0.13

**GO-AROUND EPR****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

REPORTED OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)							
°F	°C		0	1000	2000	3000	4000	5000	6000	8000
131	55	58	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
122	50	53	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29
113	45	48	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
104	40	43	1.35	1.36	1.36	1.36	1.36	1.36	1.36	1.36
95	35	38	1.37	1.38	1.39	1.39	1.40	1.40	1.40	1.40
86	30	33	1.40	1.41	1.41	1.42	1.43	1.43	1.43	1.43
77	25	28	1.40	1.42	1.43	1.45	1.46	1.46	1.46	1.46
68	20	23	1.40	1.42	1.43	1.45	1.47	1.49	1.50	1.49
59	15	18	1.40	1.42	1.43	1.45	1.47	1.49	1.51	1.52
50 & BELOW	10 & BELOW	13 & BELOW	1.40	1.42	1.43	1.45	1.47	1.49	1.51	1.53

**EPR ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)							
	0	1000	2000	3000	4000	5000	6000	8000
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
WING ANTI-ICE ON	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE MAXIMUM OPERATING ALTITUDE****ISA + 10°C AND BELOW**

WEIGHT (1000 LB)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20(33°)	1.25 (36°)	1.30(39°)	1.40(44°)	1.50(48°)
260	31100	-6	34000*	34000*	34000*	33100	31600
250	31900	-8	35200*	35200*	35200*	33900	32500
240	32800	-10	36200*	36200*	36200*	34800	33300
230	33700	-12	37100*	37100*	37100*	35700	34200
220	34700	-14	37900*	37900*	37900*	36600	35200
210	35600	-17	38800*	38800*	38800*	37600	36100
200	36600	-18	39800*	39800*	39800*	38600	37200
190	37700	-18	40700*	40700*	40700*	39700	38200
180	38800	-18	41800*	41800*	41800*	40800	39400
170	40000	-18	42000	42000	42000	42000	40500
160	41300	-18	42000	42000	42000	42000	41800
150	42000	-18	42000	42000	42000	42000	42000
140	42000	-18	42000	42000	42000	42000	42000

**ISA + 15°C**

WEIGHT (1000 LB)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20(33°)	1.25 (36°)	1.30(39°)	1.40(44°)	1.50(48°)
260	31100	-1	32000*	32000*	32000*	32000*	31600
250	31900	-3	33400*	33400*	33400*	33400*	32500
240	32800	-5	34800*	34800*	34800*	34800	33300
230	33700	-7	36100*	36100*	36100*	35700	34200
220	34700	-9	37000*	37000*	37000*	36600	35200
210	35600	-11	37800*	37800*	37800*	37600	36100
200	36600	-12	38800*	38800*	38800*	38600	37200
190	37700	-12	39700*	39700*	39700*	39700	38200
180	38800	-12	40700*	40700*	40700*	40700*	39400
170	40000	-12	41800*	41800*	41800*	41800*	40500
160	41300	-12	42000	42000	42000	42000	41800
150	42000	-12	42000	42000	42000	42000	42000

**ISA + 20°C**

WEIGHT (1000 LB)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20(33°)	1.25 (36°)	1.30(39°)	1.40(44°)	1.50(48°)
260	31100	5	29100*	29100*	29100*	29100*	29100*
250	31900	3	30700*	30700*	30700*	30700*	30700*
240	32800	1	32300*	32300*	32300*	32300*	32300*
230	33700	-1	34000*	34000*	34000*	34000*	34000*
220	34700	-3	35700*	35700*	35700*	35700*	35200
210	35600	-5	36700*	36700*	36700*	36700*	36100
200	36600	-6	37600*	37600*	37600*	37600*	37200
190	37700	-6	38500*	38500*	38500*	38500*	38200
180	38800	-6	39500*	39500*	39500*	39500*	39400
170	40000	-6	40600*	40600*	40600*	40600*	40500
160	41300	-6	41700*	41700*	41700*	41700*	41700*
150	42000	-6	42000	42000	42000	42000	42000
140	42000	-6	42000	42000	42000	42000	42000

**DO NOT USE FOR FLIGHT**

\*Denotes altitude thrust limited in level flight, 100 fpm residual rate of climb.

**LONG RANGE CRUISE CONTROL**

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)										
		21	23	25	27	29	31	33	35	37	39	41
260	EPR	1.05	1.07	1.09	1.12	1.16	1.21	1.29				
	MACH	.718	.743	.770	.789	.796	.798	.796				
	KIAS	326	325	324	319	309	297	283				
	FF/ENG	4786	4776	4781	4730	4654	4580	4551				
240	EPR	1.03	1.05	1.08	1.10	1.13	1.17	1.23	1.30			
	MACH	.700	.719	.745	.773	.790	.796	.798	.795			
	KIAS	317	314	313	312	306	296	284	270			
	FF/ENG	4465	4415	4403	4410	4351	4280	4213	4196			
220	EPR	1.03	1.04	1.06	1.08	1.11	1.14	1.18	1.24	1.32		
	MACH	.668	.699	.719	.745	.773	.790	.797	.798	.794		
	KIAS	302	304	301	300	299	293	283	271	258		
	FF/ENG	4068	4092	4044	4032	4038	3978	3916	3850	3877		
200	EPR	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.18	1.24	1.32	
	MACH	.640	.664	.696	.717	.743	.772	.790	.797	.798	.794	
	KIAS	289	288	291	288	287	286	281	271	259	246	
	FF/ENG	3710	3697	3716	3676	3662	3665	3617	3556	3525	3575	
180	EPR	1.01	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.18	1.24	1.32
	MACH	.619	.635	.659	.690	.713	.739	.768	.789	.796	.798	.795
	KIAS	279	275	274	276	274	273	272	268	258	247	235
	FF/ENG	3404	3346	3324	3376	3345	3291	3298	3262	3230	3223	3263
160	EPR	1.00	1.01	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.18	1.24
	MACH	.600	.614	.629	.650	.680	.707	.731	.761	.787	.795	.798
	KIAS	270	265	261	259	260	260	258	257	255	246	236
	FF/ENG	3143	3082	3018	2986	2994	2952	2936	2941	2949	2937	2928
140	EPR	.99	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.10	1.13	1.17
	MACH	.573	.592	.606	.621	.638	.664	.698	.720	.749	.778	.792
	KIAS	257	255	251	247	243	243	245	242	241	240	234
	FF/ENG	2831	2790	2725	2668	2620	2582	2603	2580	2636	2682	2682
120	EPR	.99	.99	1.00	1.00	1.01	1.02	1.04	1.05	1.07	1.09	1.12
	MACH	.537	.557	.577	.595	.610	.625	.646	.676	.706	.731	.762
	KIAS	241	240	239	236	232	228	226	226	226	224	224
	FF/ENG	2486	2456	2422	2381	2326	2272	2242	2250	2278	2559	2611

Shaded area approximates optimum altitude.

**LONG RANGE CRUISE ENROUTE FUEL AND TIME - LOW ALTITUDES****GROUND TO AIR MILES CONVERSION**

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
282	261	242	226	213	200	191	182	174	167	160
563	521	484	452	425	400	382	365	349	335	322
844	782	726	679	637	600	573	548	525	503	484
1127	1044	970	906	850	800	764	731	700	672	646
1412	1307	1213	1133	1063	1000	955	914	875	840	808
1697	1570	1457	1361	1276	1200	1146	1096	1050	1008	970
1984	1835	1701	1588	1489	1400	1337	1278	1225	1176	1131
2273	2101	1948	1817	1703	1600	1528	1461	1400	1343	1292
2563	2367	2193	2045	1916	1800	1719	1643	1574	1511	1453

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE ENROUTE FUEL AND TIME - HIGH ALTITUDES****GROUND TO AIR MILES CONVERSION**

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
658	619	584	553	525	500	479	458	440	423	407
1309	1234	1166	1105	1050	1000	957	918	881	848	817
1964	1851	1749	1657	1575	1500	1437	1378	1323	1273	1228
2621	2470	2332	2210	2100	2000	1916	1838	1766	1699	1638
3282	3092	2918	2765	2627	2500	2395	2297	2207	2124	2048
3949	3717	3507	3320	3153	3000	2874	2756	2648	2548	2457
4621	4347	4098	3878	3681	3500	3353	3216	3089	2972	2866
5298	4980	4691	4437	4209	4000	3831	3674	3529	3396	3274

**LONG RANGE CRUISE WIND-ALTITUDE TRADE**

PRESSURE ALTITUDE (1000 FT)	CRUISE WEIGHT (1000 LB)											
	250	240	230	220	210	200	190	180	170	160	150	140
41							18	7	1	0	2	8
39					19	8	2	0	1	4	11	19
37			18	8	3	0	0	3	8	15	23	32
35	14	7	2	0	0	2	6	12	19	27	36	46
33	1	0	0	2	6	11	17	24	32	40	50	60
31	0	2	6	11	16	22	29	37	45	54	64	75
29	6	11	16	22	28	35	42	50	59	68	78	88
27	17	22	28	34	40	48	55	64	73	82	91	102
25	28	34	40	46	53	61	69	77	86	95	104	

The above wind factor table is for calculation of wind required to maintain present range capability at new pressure altitude, i.e., break-even wind.

Method:

1. Read wind factors for present and new altitudes from table.
2. Determine difference (new altitude wind factor minus present altitude wind factor); This difference may
3. be negative or positive.
4. Break-even wind at new altitude is present altitude wind plus difference from step 2.

**DESCENT AT .78/290/250**

PRESSURE ALT (1000 FT)	15	17	19	21	23	25	27	29	31	33	35	37	39	41
DISTANCE (NM)	51	57	64	70	77	83	90	97	10	10	11	12	12	13
TIME (MINUTES)	14	15	16	16	17	18	19	20	21	21	22	23	24	25

**DO NOT USE FOR FLIGHT****HOLDING****FLAPS UP**

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)								
		1500	5000	10000	15000	20000	25000	30000	35000	40000
260	EPR	1.03	1.03	1.05	1.07	1.11	1.16	1.25		
	KIAS	241	241	242	243	245	247	250		
	FF/ENG	4580	4490	4350	4290	4260	4310	4430		
240	EPR	1.02	1.03	1.04	1.06	1.09	1.14	1.21	1.32	
	KIAS	231	232	233	234	235	237	239	246	
	FF/ENG	4270	4170	4020	3960	3930	3950	4020	4180	
220	EPR	1.02	1.03	1.04	1.05	1.08	1.12	1.18	1.29	
	KIAS	221	222	223	224	225	226	228	231	
	FF/ENG	3960	3860	3700	3620	3600	3600	3680	3760	
200	EPR	1.02	1.02	1.03	1.04	1.07	1.10	1.16	1.24	1.37
	KIAS	213	213	213	213	214	215	217	220	234
	FF/ENG	3650	3560	3390	3320	3300	3290	3310	3360	3730
180	EPR	1.01	1.02	1.02	1.04	1.05	1.08	1.13	1.20	1.31
	KIAS	205	205	205	205	205	205	205	207	211
	FF/ENG	3350	3290	3120	3010	2970	2960	2960	2970	3190
160	EPR	1.01	1.01	1.02	1.03	1.04	1.06	1.10	1.16	1.26
	KIAS	197	197	197	197	197	197	197	197	197
	FF/ENG	3070	2990	2830	2710	2650	2640	2620	2640	2800
140	EPR	1.01	1.01	1.01	1.02	1.03	1.04	1.07	1.12	1.19
	KIAS	188	188	188	188	188	188	188	188	188
	FF/ENG	2770	2690	2540	2420	2350	2320	2300	2300	2410

This table includes 5% additional fuel for holding in a racetrack pattern.

**DO NOT USE FOR FLIGHT****ADVISORY INFORMATION****NORMAL CONFIGURATION LANDING DISTANCE****FLAPS 30****Dry Runway**

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURAT ION	1900 00 LB LAND ING WT	PER 10000 LB ABOVE BELOW 190000 LB	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2950	+110/-100	60	-120	410	30	-30	60	-60	230	80	180
MAX AUTO	4050	+160/-160	90	-180	570	50	-50	90	-90	310	180	360
AUTOBRAKE	4380	+190/-180	110	-210	680	60	-60	110	-100	360	190	390
AUTOBRAKE	4950	+240/-240	140	-250	850	90	-90	140	-130	410	240	470
AUTOBRAKE	5300	+290/-280	170	-290	980	150	-150	160	-140	410	540	800
AUTOBRAKE	5540	+330/-290	190	-320	1110	190	-170	170	-150	410	960	1450

**GOOD REPORTED BRAKING ACTION**

MAX. MANUAL	3710	+160/-150	90	-180	630	70	-70	90	-80	300	250	620
MAX AUTO	4210	+180/-170	100	-200	690	90	-80	100	-90	310	360	910
AUTOBRAKE 4	4430	+190/-190	110	-220	730	80	-70	110	-110	360	240	670
AUTOBRAKE 3	4950	+240/-240	140	-250	850	90	-90	140	-130	410	240	480

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	4700	+220/-210	130	-280	980	170	-140	120	-110	360	630	1740
MAX AUTO	4820	+240/-220	140	-280	1000	190	-160	130	-110	340	740	2050
AUTOBRAKE 4	4850	+240/-220	140	-280	1000	180	-150	130	-110	360	720	2020
AUTOBRAKE 3	5190	+250/-250	150	-300	1060	160	-150	140	-130	410	460	1660

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	5730	+300/-270	170	-400	1490	380	-280	160	-130	400	1230	3950
MAX AUTO	5620	+300/-280	180	-400	1480	390	-280	160	-130	370	1320	4200
AUTOBRAKE 4	5630	+300/-280	180	-400	1480	390	-280	160	-130	380	1320	4200
AUTOBRAKE 3	5740	+300/-280	170	-400	1490	370	-270	160	-140	410	1200	4080

**DO NOT USE FOR FLIGHT**

\*Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed, manual/auto spoilers and 2 engine reverse thrust.

Actual (unfactored) distances are shown.

Includes distance from 50 feet above threshold (1000 feet of air distance).

**FLAPS 25**

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	1900 00 LB LAND ING WT	PER 10000 LB ABOVE BELOW 190000 LB	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOW N HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2980	+100/-100	60	-120	410	30	-30	60	-60	230	90	190
MAX AUTO	4170	+160/-160	100	-180	580	50	-50	100	-90	320	190	400
AUTOBRAKE 4	4520	+190/-190	110	-210	690	60	-60	120	-110	380	210	430
AUTOBRAKE 3	5120	+240/-240	140	-260	860	90	-100	150	-130	430	270	530
AUTOBRAKE 2	5480	+290/-290	180	-300	1000	160	-160	180	-150	430	610	900
AUTOBRAKE 1	5720	+330/-300	200	-330	1120	200	-180	190	-150	430	1070	1600

**GOOD REPORTED BRAKING ACTION**

MAX MANUAL	3770	+150/-140	90	-180	630	80	-70	90	-80	300	270	670
MAX AUTO	4320	+180/-170	100	-210	690	90	-80	100	-100	320	380	990
AUTOBRAKE 4	4570	+190/-190	110	-220	740	80	-80	120	-110	380	250	720
AUTOBRAKE 3	5120	+240/-240	140	-260	860	90	-100	150	-130	430	270	530

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	4800	+220/-210	130	-280	990	170	-150	130	-110	360	680	1910
MAX AUTO	4950	+240/-220	140	-290	1010	190	-160	140	-120	350	810	2270
AUTOBRAKE 4	4990	+230/-220	140	-290	1010	180	-150	130	-120	380	770	2230
AUTOBRAKE 3	5360	+250/-250	150	-310	1080	170	-150	150	-140	430	500	1840

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	5870	+300/-280	180	-410	1500	390	-280	170	-140	410	1340	4430
MAX AUTO	5780	+300/-280	180	-400	1490	400	-290	170	-140	390	1440	4730
AUTOBRAKE 4	5790	+300/-280	180	-400	1490	400	-290	170	-140	390	1430	4720
AUTOBRAKE 3	5920	+300/-280	180	-410	1510	380	-270	170	-140	430	1290	4590

\*Reference distance is for sea level, standard day, no wind or slope, VREF25 approach speed, manual/auto spoilers and 2 engine reverse thrust.

Actual (unfactored) distances are shown.

Includes distance from 50 feet above threshold (1000 feet of air distance).

**DO NOT USE FOR FLIGHT****RECOMMENDED BRAKE COOLING SCHEDULE****REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)**

WEIGHT (100 0 LB)	OAT (°F)	BRAKES ON SPEED (KIAS)																	
		80			100			120			140			160			180		
		PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
260	40	9.2	9.9	10.6	14.0	15.0	16.0	19.6	21.0	22.4	26.2	28.1	30.2	33.5					
	60	9.6	10.3	11.0	14.6	15.7	16.7	20.5	22.0	23.6	27.4	29.4	31.5	34.9					
	80	9.9	10.6	11.4	15.1	16.3	17.3	21.2	22.8	24.4	28.4	30.5	32.7	36.2					
	100	10.2	11.0	11.8	15.7	16.8	17.9	22.0	23.7	25.3	29.5	31.6	33.8	37.5					
	120	10.5	11.3	12.1	16.2	17.4	18.5	22.8	24.5	26.1	30.5	32.7	35.0	38.8					
	140	10.9	11.7	12.5	16.7	18.0	19.1	23.6	25.3	27.0	31.5	33.7	36.1	40.0					
240	40	8.7	9.3	9.9	13.0	14.0	14.8	18.2	19.5	20.8	24.2	26.0	27.8	30.9					
	60	9.0	9.7	10.3	13.6	14.6	15.5	19.0	20.4	21.8	25.3	27.2	29.0	32.2					
	80	9.3	10.0	10.6	14.1	15.1	16.1	19.7	21.2	22.6	26.2	28.2	30.1	33.4					
	100	9.6	10.3	11.0	14.6	15.7	16.6	20.4	21.9	23.4	27.2	29.2	31.2	34.6					
	120	9.9	10.7	11.3	15.1	16.2	17.2	21.1	22.7	24.3	28.1	30.2	32.2	35.8					
	140	10.2	11.0	11.7	15.5	16.7	17.7	21.9	23.5	25.1	29.0	31.2	33.3	36.9					
220	40	8.0	8.6	9.1	12.1	12.9	13.7	16.7	17.9	19.1	23.0	23.9	25.6	28.2	30.4	32.5			
	60	8.3	8.9	9.5	12.6	13.5	14.3	17.5	18.7	20.0	23.3	25.0	26.7	29.5	31.7	33.9			
	80	8.6	9.2	9.8	13.1	14.0	14.8	18.2	19.4	20.8	24.1	25.9	27.7	30.6	32.9	35.2			
	100	8.9	9.5	10.1	13.5	14.5	15.3	18.8	20.1	21.5	25.0	26.8	28.7	31.7	34.0	36.4			
	120	9.1	9.8	10.4	13.9	14.9	15.8	19.5	20.8	22.3	25.8	27.7	29.7	32.8	35.7	37.6			
	140	9.4	10.1	10.8	14.4	15.4	16.4	20.1	21.5	23.0	26.7	28.7	30.7	33.9	36.4	38.9			
200	40	7.4	7.9	8.5	11.1	11.9	12.6	15.3	16.4	17.5	20.3	21.7	23.2	25.7	27.6	29.5	31.5		
	60	7.7	8.2	8.8	11.6	12.4	13.2	16.0	17.2	18.3	21.2	22.8	24.4	26.8	28.8	30.8	32.8		
	80	8.0	8.5	9.1	12.0	12.8	13.7	16.6	17.8	19.0	22.0	23.6	25.3	27.8	29.9	31.9	34.0		
	100	8.2	8.8	9.4	12.4	13.3	14.1	17.2	18.5	19.7	22.9	24.5	26.2	28.8	30.9	33.1	35.7		
	120	8.5	9.0	9.7	12.8	13.7	14.6	17.7	19.1	20.4	23.7	25.3	27.0	29.8	32.0	34.2	36.4		
	140	8.8	9.3	10.0	13.2	14.2	15.1	18.3	19.7	21.0	24.5	26.1	27.9	30.8	33.1	35.3	37.6		
180	40	6.9	7.3	7.8	10.1	10.8	11.5	13.9	14.8	15.9	18.3	19.6	20.9	22.8	24.7	26.3	28.1	30.3	32.4
	60	7.1	7.6	8.1	10.5	11.3	12.0	14.5	15.5	16.6	19.1	20.5	21.9	24.0	25.8	27.5	29.4	31.6	33.8
	80	7.4	7.9	8.4	10.8	11.7	12.4	15.0	16.1	17.2	19.8	21.3	22.7	24.9	26.8	28.5	30.5	32.8	35.0
	100	7.6	8.1	8.7	11.2	12.1	12.9	15.5	16.6	17.8	20.5	22.0	23.5	25.7	27.7	29.6	31.5	33.9	36.3
	120	7.8	8.4	8.9	11.6	12.5	13.3	16.2	17.2	18.4	21.3	22.8	24.4	26.6	28.7	30.6	32.6	35.1	37.5
	140	8.1	8.7	9.2	11.9	12.9	13.7	16.6	17.7	19.0	22.0	23.6	25.2	27.4	29.7	31.6	33.7	36.2	38.8
160	40	6.2	6.6	7.0	9.1	9.8	10.5	12.5	13.3	14.2	16.4	17.5	18.6	20.3	21.8	23.3	24.9	26.7	28.5
	60	6.4	6.8	7.3	9.5	10.2	10.9	13.0	13.9	14.8	17.1	18.3	19.5	21.3	22.9	24.5	26.0	27.9	29.8
	80	6.6	7.1	7.6	9.8	10.5	11.3	13.5	14.4	15.3	17.7	19.0	20.2	22.1	23.7	25.4	27.0	29.0	30.9
	100	6.9	7.3	7.8	10.1	10.9	11.6	14.0	14.9	15.9	18.4	19.7	21.0	22.9	24.6	26.3	28.0	30.0	32.0
	120	6.9	7.5	8.1	10.4	11.2	12.0	14.4	15.4	16.4	19.0	20.4	21.7	23.7	25.4	27.1	29.0	31.0	33.1
	140	7.3	7.8	8.3	10.8	11.5	12.4	14.9	15.9	16.9	19.6	21.1	22.4	24.5	26.3	28.0	29.9	32.1	34.2
140	40	5.6	6.0	6.4	8.2	8.8	9.3	11.0	11.8	12.6	14.4	15.4	16.4	17.8	19.0	20.3	21.5	23.1	24.9
	60	5.8	6.7	6.6	8.5	9.1	9.7	11.5	12.3	13.1	15.0	16.1	17.7	18.6	19.9	21.3	22.6	24.3	26.0
	80	6.0	6.4	6.8	8.8	9.4	10.0	11.9	12.7	13.6	15.5	16.7	17.8	19.3	20.7	22.1	23.4	25.2	27.0
	100	6.2	6.7	7.1	9.1	9.7	10.3	12.3	13.2	14.0	16.1	17.3	18.5	20.0	21.4	22.9	24.3	26.0	28.0
	120	6.5	6.9	7.3	9.4	10.0	10.7	12.7	13.6	14.5	16.6	17.8	19.1	20.7	22.1	23.7	25.1	26.9	28.9
	140	6.7	7.1	7.6	9.7	10.3	11.0	13.1	14.1	15.0	17.2	18.4	19.7	21.4	22.9	24.5	25.9	27.8	29.9

To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.

**DO NOT USE FOR FLIGHT****ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)**

No Reverse Thrust

EVENT		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT									
RTO MAX MAN		4	8	12	16	20	24	28	32	36	40
LANDING		4.0	8.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0
	MAX MAN	3.8	7.6	11.4	15.0	18.4	21.9	25.3	28.7	32.0	35.2
	MAX AUTO	3.7	7.3	11.0	14.5	17.6	21.0	24.3	28.7	32.0	35.2
	AUTOBRAKE	3.6	6.9	10.6	13.9	16.9	20.2	23.4	28.7	32.0	35.2
	AUTOBRAKE	3.2	6.4	9.7	12.6	15.5	18.5	21.3	28.7	32.0	35.2
	AUTOBRAKE	2.8	5.8	8.6	11.4	14.0	16.8	19.3	28.7	32.0	35.2
	AUTOBRAKE	2.5	5.2	7.9	10.0	12.7	15.1	17.6	28.7	32.0	35.2

**TWO ENGINE REVERSE**

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT									
EVENT		4	8	12	16	20	24	28	32	36	40
RTO MAX MAN		4.0	8.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0
LANDING	MAX MAN	3.8	7.6	11.4	15.0	18.4	21.9	25.3	28.7	32.0	35.2
	MAX AUTO	3.4	6.9	10.1	13.5	16.5	19.5	22.7	28.7	32.0	35.2
	AUTOBRAKE	2.7	6.2	8.9	12.0	14.9	17.1	20.0	28.7	32.0	35.2
	AUTOBRAKE	2.1	4.9	6.9	9.3	11.6	13.6	15.7	28.7	32.0	35.2
	AUTOBRAKE	1.4	3.6	4.8	6.7	8.5	9.8	11.6	28.7	32.0	35.2
	AUTOBRAKE	0.7	2.5	3.2	4.2	5.5	6.4	7.6	28.7	32.0	35.2

**COOLING TIME (MINUTES)**

		ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT							
		8 & BELOW	9	10	11	12	13	17	18 TO 27
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	0.8	1.5	3.1	4.5	6.1	7.0	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	38	51	62	66		
BTMS	UPTO2	2	2	3	3	4	5	5 TO 8	8 & ABOVE

Observe maximum quick turnaround limit.

Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added. Add 0.65 million foot pounds per brake for each tad mile.

For one brake deactivated, increase brake energy by 15 percent.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 8 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not attempt to tad for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on EICAS may be used to 10 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule.

**DO NOT USE FOR FLIGHT****TAKEOFF %N1****BASED ON ENGINE BLEED FOR PACKS ON, ENGINE ANTI-ICE ON OR OFF AND WING ANTI-ICE OFF.**

AIRPORT		AIRPORT PRESSURE ALTITUDE (FT)									
°F	°C	-	0	1000	2000	3000	4000	5000	6000	7000	8000
131	55	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6
122	50	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0
113	45	87.3	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4
104	40	87.9	88.0	88.4	88.8	89.1	89.1	89.1	89.1	89.1	89.1
95	35	88.4	88.5	89.0	89.4	89.9	90.2	90.4	90.4	90.4	90.4
86	30	88.4	88.9	89.5	90.0	90.5	90.8	91.1	91.1	91.1	91.1
77	25	87.7	88.1	89.1	90.1	91.1	91.4	91.7	91.7	91.7	91.7
68	20	87.0	87.3	88.4	89.4	90.3	91.3	92.2	92.4	92.4	92.4
59	15	86.2	86.5	87.6	88.6	89.5	90.4	91.3	91.9	92.5	92.7
50	10	85.4	85.7	86.8	87.8	88.7	89.6	90.5	91.1	91.6	92.2
41	5	84.5	84.9	85.9	86.9	87.8	88.8	89.6	90.2	90.8	91.4
32	0	83.7	84.1	85.1	86.1	87.0	87.9	88.8	89.4	89.9	90.5
23	-5	82.9	83.2	84.3	85.3	86.1	87.1	87.9	88.5	89.1	89.6
14	-10	82.0	82.4	83.5	84.4	85.3	86.2	87.0	87.7	88.2	88.7
5	-15	81.2	81.6	82.6	83.6	84.4	85.4	86.2	86.8	87.3	87.8
-4	-20	80.4	80.8	81.8	82.8	83.6	84.5	85.3	85.9	86.4	87.0
-13	-25	79.5	80.0	81.0	81.9	82.7	83.7	84.5	85.1	85.6	86.1
-22	-30	78.7	79.1	80.2	81.1	81.9	82.8	83.6	84.2	84.7	85.2
-31	-35	77.9	78.3	79.4	80.3	81.0	82.0	82.7	83.3	83.8	84.3
-40	-40	77.0	77.5	78.5	79.4	80.2	81.1	81.9	82.5	82.9	83.4
-49	-45	76.2	76.6	77.7	78.6	79.4	80.3	81.0	81.6	82.1	82.6
-58	-50	75.4	75.8	76.9	77.8	78.5	79.4	80.2	80.7	81.2	81.7

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)									
	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000
PACKS OFF	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
WING ANTI-ICE ON	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0

**DO NOT USE FOR FLIGHT****GO-AROUND %N1****BASED ON ENGINE BLEED FOR PACKS ON, ENGINE ANTI-ICE ON OR OFF AND WING ANTI-ICE OFF**

AIRPORT OAT		TAT	AIRPORT PRESSURE ALTITUDE (FT)									
°F	°C		-1000	0	1000	2000	3000	4000	5000	6000	7000	8000
131	55	58	85.0	84.9	84.9	84.8	84.8	84.8	84.8	84.7	84.7	84.7
122	50	53	86.1	86.1	86.1	86.1	86.0	86.0	86.0	86.0	86.0	85.9
113	45	48	87.2	87.3	87.3	87.3	87.3	87.3	87.3	87.3	87.3	87.2
104	40	43	87.8	87.9	88.2	88.5	88.9	88.9	88.9	88.9	88.9	88.8
95	35	37	88.4	88.5	88.9	89.2	89.7	90.0	90.1	90.1	90.1	90.1
86	30	32	88.3	88.9	89.5	89.9	90.4	90.7	91.1	91.1	91.1	91.1
77	25	27	87.5	88.1	89.0	90.0	91.0	91.4	91.8	91.8	91.8	91.8
68	20	22	86.8	87.3	88.3	89.3	90.2	91.1	92.1	92.4	92.4	92.5
59	15	17	86.0	86.5	87.5	88.5	89.4	90.3	91.2	91.9	92.3	92.7
50	10	12	85.1	85.7	86.7	87.7	88.6	89.5	90.4	91.0	91.5	92.1
41	5	7	84.3	84.9	85.8	86.9	87.8	88.7	89.5	90.2	90.7	91.3
32	0	2	83.5	84.0	85.0	86.0	86.9	87.9	88.7	89.3	89.8	90.4
23	-5	-3	82.7	83.2	84.2	85.2	86.1	87.0	87.8	88.4	89.0	89.5
14	-10	-8	81.9	82.4	83.4	84.4	85.2	86.2	87.0	87.6	88.1	88.6
5	-15	-13	81.0	81.6	82.6	83.5	84.4	85.3	86.1	86.7	87.2	87.8
-4	-20	-18	80.2	80.7	81.7	82.7	83.5	84.5	85.2	85.9	86.4	86.9
-13	-25	-23	79.4	79.9	80.9	81.9	82.7	83.6	84.4	85.0	85.5	86.0
-22	-30	-28	78.6	79.1	80.1	81.0	81.8	82.8	83.5	84.1	84.6	85.1
-31	-35	-33	77.8	78.3	79.3	80.2	81.0	81.9	82.7	83.3	83.7	84.2
-40	-40	-38	76.9	77.4	78.5	79.4	80.2	81.1	81.8	82.4	82.9	83.4
-49	-45	-43	76.1	76.6	77.6	78.5	79.3	80.2	81.0	81.5	82.0	82.5
-58	-50	-48	75.3	75.8	76.8	77.7	78.4	79.4	80.1	80.7	81.1	81.6

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)									
	-	0	1000	2000	3000	4000	5000	6000	7000	8000
PACKS OFF	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
WING ANTI-ICE	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0

**MAX CLIMB %N1****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

TAT (°C)	PRESSURE ALTITUDE (1000FT)/SPEED (KIASORMACH)								
	0	5	10	15	20	25	30	35	40
	250	250	250	290	290	290	290	78	78
60	83.4	85.4	85.4	85.8	84.9	82.7	80.4	80.2	80.1
50	84.6	86.6	86.8	87.1	86.3	84.1	81.7	81.5	81.3
40	85.9	87.8	88.0	88.4	87.6	85.5	83.0	82.8	82.6
30	86.2	89.0	89.2	89.5	88.8	86.8	84.2	83.9	83.7
20	84.8	88.9	90.3	90.5	89.7	87.8	85.3	85.0	84.7
10	83.3	87.4	89.5	90.8	90.9	89.1	86.6	86.4	86.2
0	81.9	85.8	87.9	89.2	90.5	90.6	88.2	88.0	87.7
-10	80.3	84.2	86.3	87.5	88.8	89.1	88.5	89.5	89.2
-20	78.8	82.6	84.6	85.9	87.1	87.3	86.8	89.9	90.6

**DO NOT USE FOR FLIGHT**

-30	77.2	81.0	82.9	84.1	85.4	85.6	85.0	88.1	88.8
^0	75.6	79.3	81.2	82.4	83.6	83.8	83.3	86.3	86.9
-50	74.0	77.6	79.5	80.6	81.8	82.0	81.5	84.4	85.0

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	40
PACKS OFF	0.5	0.4	0.4	0.5	0.7	0.8	1.0	1.2	1.4
ENGINE ANTI-ICE ON	0.0	0.0	-1.2	-1.2	-1.2	-1.3	-1.4	-1.7	-2.1
ENGINE & WING ANTI-ICE ON	-0.9	-1.0	-2.2	-2.3	-2.3	-2.4	-2.7	-3.2	-4.0

**MAX CRUISE %N1****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
55	80.7	80.4	80.2	80.0	79.7	79.5	79.2	79.0	78.8
50	81.8	81.6	81.4	81.2	81.0	80.8	80.6	80.3	80.2
45	82.5	82.4	82.2	82.0	81.9	81.7	81.5	81.4	81.2
40	83.1	82.9	82.8	82.6	82.5	82.3	82.2	82.1	81.9
35	83.7	83.5	83.4	83.2	83.1	82.9	82.8	82.6	82.5
30	84.2	84.0	83.9	83.8	83.6	83.5	83.3	83.2	83.1
25	84.7	84.5	84.4	84.3	84.2	84.0	83.9	83.8	83.7
20	85.2	85.0	84.9	84.8	84.6	84.5	84.4	84.3	84.2
15	85.6	85.5	85.4	85.3	85.1	85.0	84.9	84.3	84.7
10	85.9	85.8	85.7	85.6	85.5	85.4	85.3	85.2	85.1
5	85.7	86.1	86.1	86.0	85.9	85.8	85.7	85.6	85.5
0	85.0	85.8	86.4	86.3	86.2	86.1	86.0	85.9	85.9
-5	84.2	85.1	86.0	86.8	86.7	86.6	86.5	86.4	86.3
-10	83.4	84.3	85.2	86.2	87.2	87.1	87.0	86.9	86.9
-15	82.6	83.5	84.4	85.4	86.5	87.8	87.7	87.6	87.6
-20	81.8	82.6	83.6	84.6	85.7	86.9	87.6	87.5	87.5
-25	81.0	81.8	82.7	83.7	84.8	86.1	86.8	86.7	86.6
-30	80.2	81.0	81.9	82.9	84.0	85.2	85.9	85.8	85.7
-35	79.3	80.2	81.1	82.0	83.1	84.3	85.0	84.9	84.9
-40	78.5	79.3	80.2	81.2	82.2	83.4	84.1	84.0	84.0

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE ON	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
ENGINE & WING ANTI-ICE ON	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6

**DO NOT USE FOR FLIGHT**

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE ALTITUDE CAPABILITY**

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA+10°C & BELOW	ISA+15°C	ISA + 20°C
260	15500	13600	10700
250	17200	15100	12800
240	18900	16900	14800
230	20700	18600	16500
220	22600	20300	18400
210	24800	22100	20200
200	27000	24100	22100
190	29200	26300	24000
180	31500	28700	26000
170	33300	31300	28300
160	34600	33600	31100
150	35700	35500	33500
140	36900	36900	35600
130	38200	38100	37000
120	39500	39400	38200

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE CONTROL**

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
260	EPR	1.20	1.25									
	MACH	.451	.483									
	KIAS	251	250									
	FF/EN	7079	7051									
240	EPR	1.18	1.22	1.29								
	MACH	.434	.466	.506								
	KIAS	242	241	242								
	FF/EN	6515	6477	6483								
220	EPR	1.16	1.20	1.25	1.31							
	MACH	.417	.449	.482	.517							
	KIAS	232	232	231	233							
	FF/EN	5955	5928	5832	5934							
200	EPR	1.14	1.17	1.22	1.26	1.30	1.35	1.40				
	MACH	.400	.430	.462	.489	.514	.536	.553				
	KIAS	222	222	221	221	223	223	221				
	FF/EN	5409	5371	5282	5290	5363	5394	5396				
180	EPR	1.12	1.15	1.19	1.23	1.26	1.30	1.35	1.40	1.47		
	MACH	.383	.409	.441	.466	.484	.508	.532	.550	.569		
	KIAS	213	211	210	210	209	211	212	210	208		
	FF/EN	4907	4821	4741	4714	4722	4787	4828	4831	4854		
160	EPR	1.10	1.13	1.16	1.19	1.22	1.25	1.29	1.33	1.38	1.45	1.55
	MACH	.365	.389	.418	.442	.460	.477	.500	.525	.545	.564	.589
	KIAS	203	200	199	199	198	198	199	200	199	197	197
	FF/EN	4431	430	4198	4183	4176	4162	421	4258	4246	4279	4440
140	EPR	1.08	1.11	1.13	1.16	1.18	1.21	1.24	1.27	1.32	1.37	1.43
	MACH	.344	.369	.396	.420	.437	.456	.475	.495	.517	.539	.563
	KIAS	191	190	188	188	188	188	188	188	188	188	188
	FF/EN	3928	3828	3705	3692	3694	3693	3696	3713	3704	3717	3780
120	EPR	1.07	1.09	1.11	1.13	1.15	1.17	1.20	1.23	1.26	1.30	1.35
	MACH	.323	.349	.377	.400	.417	.434	.453	.472	.493	.514	.537
	KIAS	179	179	179	179	179	179	179	179	179	179	179
	FF/EN	3456	3380	3325	3294	3291	3288	3287	3287	3267	3258	3258

**GROUND TO AIR MILES CONVERSION**

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
329	293	262	237	217	200	188	178	168	160	153
664	590	527	477	436	400	377	357	338	321	306
1002	889	792	716	654	600	566	534	506	481	459
1345	1192	1060	957	873	800	754	712	675	641	612
1693	1497	1330	1199	1092	1000	943	890	843	801	764
2045	1805	1601	1441	1312	1200	1131	1067	1010	960	915
2404	2118	1875	1685	1532	1400	1318	1244	1178	1118	1066
2768	2434	2150	1930	1753	1600	1506	1420	1344	1276	1216
3140	2756	2429	2177	1975	1800	1693	1597	1510	1432	1365

**DO NOT USE FOR FLIGHT****REFERENCE FUEL AND TIME REQUIRED AT CHECK POINT**

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000)	TIME (HR:M)	FUEL (1000)	TIME (HR:M)	FUEL (1000)	TIME (HR:M)	FUEL (1000)	TIME (HR:M)	FUEL (1000)	TIME (HR:M)
200	7.9	0:51	7.2	0:49	6.5	0:47	6.0	0:45	5.3	0:42
400	16.2	1:40	15.0	1:35	13.7	1:30	12.8	1:25	11.6	1:19
600	24.2	2:29	22.5	2:21	20.7	2:14	19.4	2:07	17.7	1:56
800	32.1	3:19	29.9	3:09	27.6	2:58	25.9	2:48	23.7	2:33
1000	39.8	4:10	37.1	3:57	34.3	3:43	32.2	3:31	29.6	3:11
1200	47.3	5:02	44.1	4:46	40.9	4:30	38.4	4:14	35.4	3:50
1400	54.7	5:55	51.0	5:36	47.3	5:17	44.5	4:58	41.0	4:29
1600	61.9	6:49	57.8	6:27	53.6	6:04	50.4	5:43	46.5	5:09
1800	69.0	7:45	64.4	7:19	59.7	6:53	56.2	6:28	51.9	5:50

**FUEL REQUIRED ADJUSTMENT (1000 LB)**

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)					
	160	180	200	220	240	260
10	-0.9	-0.5	0.0	0.8	1.7	2.6
20	-2.0	-1.0	0.0	1.6	3.4	5.3
30	-3.0	-1.5	0.0	2.3	5.0	7.8
40	-4.1	-2.0	0.0	3.0	6.5	10.1
50	-5.1	-2.6	0.0	3.6	7.8	12.2
60	-6.2	-3.1	0.0	4.2	8.9	14.1
70	-7.2	-3.6	0.0	4.8	9.9	15.8

**DESCENT AT VREF30+80**

PRESSURE ALTITUDE	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	12	22	31	35	39	42	46	50	54	58	62	66	70
TIME (MINUTES)	7	9	12	13	14	14	15	16	17	18	18	19	20

**DO NOT USE FOR FLIGHT****HOLDING****FLAPS UP**

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
260	EPR	1.12	1.14	1.19	1.25			
	KIAS	235	235	235	235			
	FF/EN	7030	6940	6900	6850			
240	EPR	1.11	1.13	1.17	1.22	1.31		
	KIAS	228	228	228	228	228		
	FF/EN	6590	6430	6380	6320	6370		
220	EPR	1.09	1.11	1.15	1.20	1.27		
	KIAS	220	220	220	220	220		
	FF/EN	6130	5990	5880	5800	5830		
200	EPR	1.08	1.10	1.13	1.17	1.24	1.33	
	KIAS	213	213	213	213	213	213	
	FF/EN	5660	5570	5390	5310	5300	5360	
180	EPR	1.07	1.09	1.11	1.15	1.21	1.29	1.42
	KIAS	205	205	205	205	205	205	205
	FF/EN	5210	5110	4930	4830	4810	4850	4940
160	EPR	1.06	1.07	1.10	1.13	1.18	1.25	1.35
	KIAS	197	197	197	197	197	197	197
	FF/EN	4740	4670	4490	4370	4340	4350	4370
140	EPR	1.05	1.06	1.08	1.11	1.15	1.21	1.29
	KIAS	188	188	188	188	188	188	188
	FF/EN	4290	4220	4060	3930	3880	3880	3900
120	EPR	1.04	1.05	1.07	1.09	1.12	1.17	1.24
	KIAS	179	179	179	179	179	179	179
	FF/EN	3850	3770	3630	3500	3460	3450	3460

This table includes 5% additional fuel for holding in a racetrack pattern.

**DO NOT USE FOR FLIGHT**

## CUSTOMER CARE

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