

**DO NOT USE FOR FLIGHT**

# **'767 Captain' FLIGHT MANUAL**

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

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## ABOUT THIS MANUAL

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**WARNING: THIS MANUAL IS DESIGNED FOR MICROSOFT® FSX USE ONLY. DO NOT USE FOR FLIGHT**

The '767 Captain' FLIGHT MANUAL is organized into five Parts:  
Each Part is provided as a separate Acrobat® PDF document:

Click START > Programs > Captain Sim > 767 Captain >

- **Part I – User's Manual**
  - o The User's Manual describes the '767 Captain' Sim product as a software title.
- **Part II – Aircraft Systems**
- **Part III – Normal Procedures**
- **Part IV – Flight Characteristics and Performance Data- this document.**
- **Part V - Flight Management System**

This Part IV is provided for general information only. Please note: various operators may use various versions of the same aircraft so some characteristics and performance may vary dramatically. Also please do not expect the PC game entertainment title to be an exact representation of an actual Boeing 767 aircraft in terms of Flight Characteristics and Performance Data.

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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.

\* MCG - Minimum Control Speed

**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.

**GE ENGINES**

WEIGHT (1000 KG)	STAB TRIM SETTING						
	C.G. %MAC						
	12	16	20	24	28	32	36
160	7	7	6	5	4	3	2
150	7	6 1/2	6	5	4	3	2
140	7	6 1/2	5 1/2	4 1/2	3 1/2	3	2
130	7	6	5	4	3	2 1/2	1 1/2
120	6 1/2	5 1/2	4 1/2	3 1/2	2 1/2	1 1/2	1
110	6	5	4	3	2	1	1
100	5 1/2	4 1/2	3 1/2	2 1/2	1 1/2	1	1
90	4 1/2	3 1/2	3	2	1	1	1

**DO NOT USE FOR FLIGHT****PW ENGINES**

WEIGHT (1000 KG)	STAB TRIM SETTING						
	C.G %MAC						
	12	16	20	24	28	32	36
190	7	6 1/2	5 1/2	4 1/2	4	3	2
180	7	6	5 1/2	4 1/2	3 1/2	3	2
160	6 1/2	5 1/2	5	4	3	2 1/2	1 1/2
140	5 1/2	4 1/2	4	3	2	1 1/2	1/2
120	4	3 1/2	2 1/2	2	1	1/2	1/2
100	3 1/2	2 1/2	2	1	1/2	1/2	1/2

**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. 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).

**DO NOT USE FOR FLIGHT****SLIPPERY RUNWAY TAKEOFF**

Airplane braking action is reported as good or medium, 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. 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.

**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 is to reduce the normal runway/obstacle limited weight by 17250 kg and the V1 associated with the reduced weight by the amount shown in the table below.

**GE ENGINES**

ANTI-SKID INOPERATIVE ADJUSTMENT	
FIELD LENGTH (FT)	V1 ADJUSTMENT (KTS)
6000	-28
8000	-25
10000	-21
12000	-18
14000	-14

**PW ENGINES**

ANTI-SKID INOPERATIVE ADJUSTMENT		
FIELD LENGTH (FT)	WEIGHT (1000 KG)	V1 ADJUSTMENT (KTS)
8000	-59.7	-40
8100	-59.7	-40
8900	-44.6	-38
10000	-32.2	-35
12000	-24.3	-31
14000	-24.3	-27

If the resulting V1 is less than V1(MCG), takeoff is permitted with V1 set equal to V1(MCG) provided the accelerate-stop distance adjusted for wind and slope exceeds approximately 9600 ft. Detailed analysis for the specific case from the Airplane Flight Manual may yield a less restrictive penalty.

**DO NOT USE FOR FLIGHT****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 3400 kg and reduce the V1 associated with the reduced weight by 2 kts. If the resulting V1 is less than V1(MCG), takeoff is permitted with V1 set equal to V1(MCG) provided the accelerate-stop distance exceeds approximately 5400 ft for one brake deactivated.

ONE BRAKE DEACTIVATED SPEED ADJUSTMENT	
FIELD LENGTH (FT)	V1 ADJUSTMENT (KTS)
4000	-4
6000	-3
8000	-3
10000	-2
12000	-2
14000	-2

**TAKEOFF %N1 – GE ENGINES**

To find Max Takeoff %N1 based on normal engine bleed for air conditioning packs on, enter Takeoff %N1 table with airport pressure altitude and airport OAT and read %N1. %N1 adjustments are shown for packs off operation.

**MAX CLIMB %N1 – GE ENGINES**

This table shows Max Climb %N1 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 %N1. %N1 adjustments are shown for packs off and anti-ice operation.

**GO-AROUND %N1**

To find Max Go-around %N1 based on normal engine bleed for packs on, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. %N1 adjustments are shown for packs off and anti-ice operation.

**TAKEOFF EPR/GO-AROUND EPR/GO-AROUND %N1 – PW ENGINES**

Takeoff and Go-around power setting are presented for normal air conditioning bleed. Max Takeoff or Go-around EPR may be read directly from the tables for the desired pressure altitude and airport OAT. Goaround %N1 is provided in the event that EPR becomes unavailable during the flight.

Thrust protection is not provided in the Alternate EEC Mode and maximum rated thrust is reached at a thrust lever position less than full forward. As a result, thrust overboost can occur at full forward thrust lever positions.

**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.

**DO NOT USE FOR FLIGHT****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 43100 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.

**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 %N1, 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 %N1, IAS and fuel flow per engine.

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

Tables are provided as advisory information for normal configuration landing distances 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 appropriate to add the effects of slope and inoperative reversers when using the autobrake system.

**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-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.

**RECOMMENDED 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.

**DO NOT USE FOR FLIGHT****APU OPERATION DURING FLIGHT**

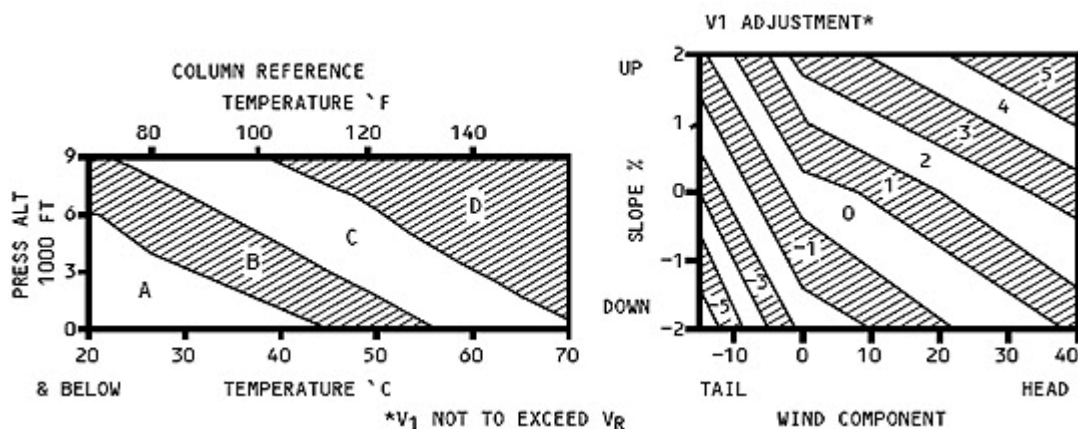
For APU operation during flight, increase fuel flow according to the following table. These increments include the APU fuel flow and the effect of increased drag from the APU door.

**GE ENGINES**

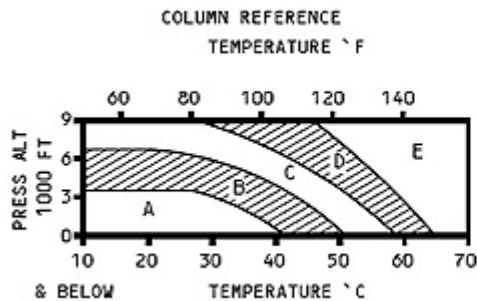
PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW PENALTY (KG/HR)					
	GROSS WEIGHT (KG)					
	190	170	150	130	110	90
43					60	55
39				65	60	60
35		75	70	70	65	65
31	75	75	75	75	70	65
27	75	80	80	75	75	70
25	85	85	85	80	75	70
20	95	90	85	85	80	75
15	105	100	95	95	90	85
10	115	110	105	105	100	100
5	125	125	120	115	115	110

**PW ENGINES**

PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW PENALTY (KG/HR)					
	GROSS WEIGHT (KG)					
	190	170	150	130	110	90
43					60	55
39				65	60	60
35		75	70	70	65	65
31	75	75	75	75	70	65
27	85	85	80	75	75	70
25	85	85	85	80	75	70
20	95	90	85	85	80	75
15	105	105	95	95	90	85
10	115	115	105	105	100	95
5	125	125	120	115	110	105

**DO NOT USE FOR FLIGHT****TABLES****TAKEOFF SPEEDS****MAX TAKEOFF THRUST****GE ENGINES**

FLAPS	WT 1000 KG	A			B			C			D		
		V1	V <sub>R</sub>	V2	V1	V <sub>R</sub>	V2	V1	V <sub>R</sub>	V2	V1	V <sub>R</sub>	V2
1	160	161	165	169	163	167	169						
	150	154	159	163	157	161	163						
	140	147	152	157	149	154	157	152	156	157			
	130	140	145	152	142	146	151	145	149	151			
	120	133	138	147	135	140	146	137	141	145	140	143	144
	110	126	131	141	128	132	140	130	134	139	133	130	139
	100	119	123	135	120	125	134	122	127	134	125	128	133
5	160	154	158	162	156	160	162						
	150	148	152	156	150	154	156						
	140	142	146	152	144	147	151	147	149	151			
	130	135	139	147	138	141	146	140	143	145			
	120	128	133	141	131	134	140	133	136	139	136	138	139
	110	121	126	136	124	127	135	126	129	134	129	131	133
	100	113	118	130	116	120	129	119	122	128	122	125	127
15	160	146	150	154									
	150	141	145	149	143	146	149						
	140	134	138	144	137	140	144	139	142	143			
	130	128	132	139	131	134	139	133	136	138			
	120	122	126	134	124	128	134	121	124	134	128	131	132
	110	114	120	129	117	121	129	120	123	128	122	125	127
	100	107	115	124	109	114	123	112	116	122	115	118	122
20	160	144	148	151									
	150	138	141	146									
	140	132	135	141	134	137	141						
	130	125	129	135	128	131	135						
	120	119	123	131	121	124	130	124	126	129			
	110	112	116	126	114	118	125	117	120	124	119	121	123
	100	105	109	121	107	111	120	110	113	119	112	114	118

**DO NOT USE FOR FLIGHT****PW ENGINES****SLOPE/WIND V1 ADJUSTMENT\***

WEIGHT 1000 KG	SLOPE %					WIND KTS							
	DN	UP	TAIL	HEAD									
190	-3	-2	0	2	2	-2	-1	0	0	0	0	0	1
170	-3	-1	0	2	2	-2	-1	0	0	0	1	1	1
150	-2	-1	0	2	3	-3	-2	-1	0	0	1	1	1
130	-2	-1	0	2	3	-3	-2	-1	0	0	1	1	2
110	-1	0	0	1	3	-4	-3	-1	0	0	1	1	2
90	0	0	0	1	2	-4	-3	-1	0	0	1	2	3

\*V1 NOT TO EXCEED VR

FLAPS	WT 100 KG	A			B			C			D			E		
		V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2
5	190	166	170	175	169	172	176									
	180	161	165	171	163	166	171									
	170	15	160	166	158	161	166	160	163	166						
	160	149	154	161	152	156	161	154	157	161						
	150	143	148	156	145	150	156	148	151	156	151	153	156			
	140	136	142	151	139	144	151	141	145	151	145	147	151	147	148	151
	130	129	136	145	132	137	145	135	139	145	138	141	145	141	142	145
	120	122	129	140	125	131	140	128	133	139	131	134	139	134	136	139
	110	115	122	134	118	124	134	121	126	134	124	128	133	127	129	133
	100	108	115	127	110	117	127	113	119	127	116	120	127	119	122	127
15	90	101	108	121	104	109	121	106	111	121	108	115	121	112	115	121
	190	161	163	168												
	180	156	158	164	158	159	164									
	170	150	155	159	153	154	159	154	156	160						
	160	144	147	154	147	149	154	149	150	155						
	150	138	142	149	141	143	149	143	145	149	146	146	150			
	140	132	136	144	134	138	144	137	139	144	140	141	145			
	130	125	130	139	128	132	139	130	133	139	134	135	139	136	136	140
	120	119	124	134	121	125	134	124	127	134	127	129	134	130	130	134
	110	112	117	128	114	119	128	117	120	128	120	122	128	125	124	128
	100	106	110	122	107	112	122	110	113	122	113	115	122	116	117	122
20	90	99	102	116	100	104	116	103	106	116	105	108	116	108	110	116
	190	159	159	165												
	180	153	154	160	154	155	160									
	170	147	148	154	149	149	155									
	160	141	142	149	145	144	149	145	145	150						
	150	135	137	144	137	138	144	140	140	145						
	140	129	131	140	131	135	140	134	134	140	135	136	140			
	130	122	125	135	125	127	135	127	128	134	130	130	135	132	132	135
	120	116	119	129	118	121	129	121	122	129	124	124	129	126	126	130
	110	109	115	124	111	114	124	114	116	124	117	118	124	119	120	124
	100	102	106	118	104	108	118	107	109	118	110	111	118	115	113	118
	90	93	98	112	96	100	112	99	102	112	102	104	112	106	106	112

**DO NOT USE FOR FLIGHT****V1 ADJUSTMENT (KIAS)****GE ENGINES**

WEIGHT (1000 KG)	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
170	-6	-6	-6	-14	-14	-14	-25	-25	-25
160	-7	-7	-7	-15	-15	-15	-27	-27	-27
150	-7	-7	-7	-17	-17	-17	-28	-28	-28
140	-8	-8	-8	-18	-18	-18	-30	-30	-30
130	-9	-9	-9	-19	-19	-19	-31	-31	-31
120	-10	-10	-10	-20	-20	-20	-33	-33	-33
110	-10	-10	-10	-21	-21	-21	-34	-34	-34
100	-11	-11	-11	-22	-22	-22	-35	-35	-35

**PW ENGINES**

WEIGHT (1000 KG)	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
190	-7	-7	-7	-17	-17	-17	-29	-29	-29
180	-8	-8	-8	-18	-18	-18	-31	-31	-31
170	-9	-9	-9	-19	-19	-19	-32	-32	-32
160	-10	-10	-10	-21	-21	-21	-34	-34	-34
150	-11	-11	-11	-22	-22	-22	-35	-35	-35
140	-11	-11	-11	-23	-23	-23	-37	-37	-37
130	-12	-12	-12	-24	-24	-24	-38	-38	-38
120	-12	-12	-12	-25	-25	-25	-40	-40	-40
110	-13	-13	-13	-26	-26	-26	-41	-41	-41
100	-13	-13	-13	-27	-27	-27	-42	-42	-42
90	-13	-13	-13	-28	-28	-28	-43	-43	-43

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

**DO NOT USE FOR FLIGHT****MAXIMUM ALLOWABLE CLEARWAY****GE ENGINES**

FIELD LENGTH (FT)	MAX ALLOWABLE CLEARWAY FOR V1 REDUCTION (FT)
4000	350
6000	500
8000	600
10000	700
12000	800
14000	900

**PW ENGINES**

FIELD LENGTH (FT)	MAX ALLOWABLE CLEARWAY FOR V1 REDUCTION (FT)
4000	350
6000	450
8000	550
10000	650
12000	750
14000	800

**CLEARWAY AND STOPWAY V1 ADJUSTMENTS****GE ENGINES**

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

**PW ENGINES**

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

**DO NOT USE FOR FLIGHT****VREF (KIAS)****GE ENGINES**

WEIGHT (1000 KG)	FLAPS		
	30	25	20
160	158	160	164
150	150	155	159
140	145	149	153
130	139	144	148
120	134	138	142
110	128	132	136
100	122	126	129
90	116	119	123

**PW ENGINES**

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	174
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	152
130	137	140	146
120	131	135	140
110	125	129	134
100	119	123	128

**FLAP MANEUVER SPEEDS****GE/PW ENGINES**

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 %N1 - GE ENGINES****BASED ON ENGINE BLEED FOR PACKS ON, EEC NORM AND ANTI-ICE ON OR OFF****Max Takeoff Thrust**

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°F	°C		-1000	0	2000	4000	6000	8000
131	55	58	100.5	101.0	101.3	102.0	103.5	104.8
122	50	53	101.3	101.8	101.8	101.9	102.7	104.0
113	45	48	101.7	102.3	102.5	102.4	102.9	103.3
104	40	43	102.3	102.8	103.0	103.1	103.6	103.9
95	35	38	102.6	103.3	103.6	103.5	104.3	104.6
86	30	33	102.0	103.1	104.1	104.1	104.8	105.3
77	25	28	101.1	102.2	103.6	104.7	105.5	105.9
68	20	23	100.3	101.3	102.7	103.9	106.1	106.8
59	15	18	99.4	100.5	101.8	102.9	105.1	107.3
50	10	13	98.6	99.6	100.9	102.0	104.2	106.4
32	0	3	96.9	97.9	99.1	100.2	102.3	104.5
14	-10	-7	95.1	96.1	97.4	98.4	100.5	102.6
-4	-20	-17	93.3	94.3	95.6	96.6	98.6	100.7
-22	-30	-27	91.5	92.5	93.8	94.8	96.7	98.7
-40	-40	-37	89.6	90.6	91.9	92.9	94.8	96.7
-58	-50	-47	87.7	88.7	90.0	91.0	92.8	94.7

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	-1000	0	2000	4000	6000	8000
PACKS OFF	0.3	0.3	0.3	0.4	0.5	0.5
EEC ALTN	0.2	0.2	0.0	0.4	0.3	0.1

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

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°F	°C		-1000	0	2000	4000	6000	8000
131	55	58	100.5	101.0	101.3	102.0	103.5	104.8
122	50	53	101.3	101.8	101.8	101.9	102.7	104.0
113	45	48	101.7	102.3	102.5	102.4	102.9	103.3
104	40	43	102.3	102.8	103.0	103.1	103.6	103.9
95	35	38	102.6	103.3	103.6	103.5	104.3	104.6
86	30	33	102.0	103.1	104.1	104.1	104.8	105.3
77	25	28	101.1	102.2	103.6	104.7	105.5	105.9
68	20	23	100.3	101.3	102.7	103.9	106.1	106.8
59	15	18	99.4	100.5	101.8	102.9	105.1	107.3
50	10	13	98.6	99.6	100.9	102.0	104.2	106.4
32	0	3	96.9	97.9	99.1	100.2	102.3	104.5
14	-10	-7	95.1	96.1	97.4	98.4	100.5	102.6
-4	-20	-17	93.3	94.3	95.6	96.6	98.6	100.7
-22	-30	-27	91.5	92.5	93.8	94.8	96.7	98.7
-40	-40	-37	89.6	90.6	91.9	92.9	94.8	96.7
-58	-50	-47	87.7	88.7	90.0	91.0	92.8	94.7

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	-1000	0	2000	4000	6000	8000
PACKS OFF	0.3	0.3	0.3	0.4	0.5	0.5
EEC ALTN	0.2	0.2	0.0	0.4	0.3	0.1

**DO NOT USE FOR FLIGHT****PW ENGINES****NO EPR AVAILABLE****BASED ON ENGINE BLEED FOR PACKS ON, ENGINE ANTI-ICE ON OR OFF AND WING ANTI-ICE OFF**

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°F	°C		-1000	0	2000	4000	6000	8000
131	55	58	94.6	94.6	94.5	94.5	94.4	94.4
122	50	53	96.3	96.3	96.2	96.1	96.1	96.0
113	45	48	97.2	97.1	97.0	97.0	96.9	96.9
104	40	43	97.8	97.8	97.7	97.6	97.6	97.5
95	35	38	98.4	98.3	98.2	98.2	98.1	98.1
86	30	33	99.0	98.9	98.8	98.8	98.7	98.7
77	25	28	99.3	99.5	99.4	99.4	99.3	99.3
68	20	23	98.2	100.1	100.0	100.0	99.9	99.9
59	15	18	97.4	99.2	100.4	100.8	100.5	100.5
50	10	13	96.6	98.4	99.4	100.5	101.1	101.1
41	5	8	95.7	97.5	98.6	99.5	100.2	101.5
32	0	3	94.9	96.6	97.7	98.6	99.3	100.4
23	-5	-2	94.0	95.7	96.8	97.7	98.4	99.5
14	-10	-7	93.1	94.8	95.9	96.8	97.5	98.6
5	-15	-13	92.1	93.8	94.8	95.7	96.4	97.4
-4	-20	-18	91.2	92.9	93.9	94.7	95.4	96.5
-13	-25	-23	90.3	91.9	92.9	93.8	94.5	95.5
-22	-30	-28	89.4	91.0	92.0	92.9	93.6	94.6
-31	-35	-33	88.5	90.1	91.1	91.9	92.6	93.6
-40	-40	-38	87.5	89.2	90.1	90.9	91.7	92.6
-49	-45	-43	86.6	88.1	89.1	90.0	90.7	91.6
-58	-50	-48	85.7	87.2	88.2	89.0	89.7	90.6

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	-1000	0	2000	4000	6000	8000
PACKS OFF	0.3	0.3	0.3	0.4	0.5	0.5
EEC ALTN	0.2	0.2	0.0	0.4	0.3	0.1

**DO NOT USE FOR FLIGHT****MAX CLIMB %N1 - GE ENGINES****BASED ON ENGINE BLEED FOR PACKS ON OR OFF 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	94.8	96.7	99.4	100.9	102.3	104.2	105.9	106.5	106.4
50	96.1	96.8	97.9	99.4	100.7	102.7	104.3	104.9	104.8
40	97.4	98.3	98.4	99.1	99.2	101.1	102.7	103.3	103.2
30	97.7	99.2	99.6	100.4	99.8	100.0	100.1	101.6	101.5
20	96.1	99.1	100.3	101.6	100.9	101.2	101.4	99.9	99.8
10	94.5	97.4	100.7	102.2	102.5	102.6	102.4	100.2	99.4
0	92.8	95.7	98.9	100.4	102.1	104.1	103.7	101.8	101.1
-10	91.9	94.0	97.1	98.5	100.2	102.4	104.0	103.3	102.7
-20	89.4	92.2	95.3	96.7	98.3	100.5	102.1	105.2	104.9
-30	87.6	90.3	93.4	94.8	96.4	98.5	100.0	103.1	102.8
-40	85.8	88.5	91.5	92.8	94.4	96.5	98.0	101.0	100.7
-50	83.9	86.6	89.5	90.8	92.3	94.4	95.9	98.8	98.5

**%N1 ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	40
ENGINE ANTI-ICE ON	-0.6	-0.6	-0.6	-0.6	-0.7	-0.9	-1.1	-1.4	-1.9
ENGINE & WING ANTI-ICE ON	-0.9	-0.9	-1.0	-1.1	-1.2	-1.4	-1.7	-2.2	-2.9

**DO NOT USE FOR FLIGHT****TAKEOFF EPR - PW ENGINES****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE ON OR OFF****Max Takeoff Thrust**

AIRPORT OAT		AIRPORT PRESSURE ALTITUDE (FT)					
°F	°C	-1000	0	2000	4000	6000	8000
158	70	1.24	1.23	1.25	1.25	1.25	1.25
149	65	1.29	1.28	1.27	1.27	1.27	1.27
140	60	1.34	1.33	1.33	1.32	1.32	1.32
131	55	1.39	1.38	1.38	1.37	1.37	1.37
122	50	1.43	1.42	1.42	1.42	1.42	1.42
113	45	1.46	1.46	1.46	1.46	1.46	1.46
104	40	1.51	1.51	1.51	1.51	1.50	1.51
95	35	1.53	1.55	1.55	1.54	1.54	1.54
86	30	1.53	1.56	1.58	1.58	1.58	1.58
77	25	1.53	1.56	1.58	1.60	1.60	1.60
68	20	1.53	1.56	1.58	1.60	1.61	1.62
59	15	1.53	1.56	1.58	1.60	1.61	1.64
50 & BELOW	10 & BELOW	1.53	1.56	1.58	1.60	1.61	1.64

**EPR ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)							
	-1000	0	2000	4000	4500	4501	6000	8000
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02

**DO NOT USE FOR FLIGHT****MAX CLIMB EPR - PW ENGINES****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	1.24	1.25	1.25	1.21	1.20	1.18	1.14	1.08	1.05
50	1.28	1.29	1.29	1.26	1.24	1.23	1.21	1.15	1.11
40	1.32	1.34	1.34	1.31	1.30	1.29	1.27	1.21	1.18
30	1.33	1.40	1.40	1.38	1.37	1.36	1.35	1.29	1.25
20	1.33	1.40	1.46	1.46	1.45	1.44	1.43	1.37	1.34
10	1.33	1.40	1.46	1.47	1.53	1.53	1.53	1.47	1.44
0	1.33	1.40	1.46	1.47	1.53	1.57	1.63	1.57	1.54
-10	1.33	1.40	1.46	1.47	1.53	1.57	1.64	1.67	1.63
-20 AND BELOW	1.33	1.40	1.46	1.47	1.53	1.57	1.64	1.68	1.66

**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	0.01	0.01	0.02	0.02	0.03
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05
ENGINE & WING ANTI-ICE ON	-0.02	-0.03	-0.04	-0.05	-0.05	-0.05	-0.07	-0.07	-0.08

**DO NOT USE FOR FLIGHT****GO-AROUND EPR - PW ENGINES****BASED ON ENGINE BLEED FOR PACKS ON AND ANTI-ICE OFF**

REPORTED OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°F	°C		-1000	0	2000	4000	6000	8000
131	55	58	1.38	1.38	1.37	1.37	1.36	1.37
122	50	53	1.42	1.42	1.42	1.42	1.41	1.42
113	45	48	1.46	1.46	1.47	1.46	1.46	1.46
104	40	43	1.51	1.51	1.51	1.51	1.51	1.51
95	35	38	1.54	1.56	1.55	1.55	1.55	1.55
86	30	33	1.54	1.57	1.59	1.59	1.59	1.59
77	25	28	1.54	1.57	1.60	1.62	1.61	1.62
68	20	23	1.54	1.57	1.60	1.62	1.63	1.64
59	15	18	1.54	1.57	1.60	1.62	1.63	1.66
50 & BELOW	10 & BELOW	13 & BELOW	1.54	1.57	1.60	1.62	1.63	1.66

**EPR ADJUSTMENTS FOR ENGINE BLEEDS**

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)							
	-1000	0	2000	4000	4500	4501	6000	8000
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
WING ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02

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

WEIGHT (1000 KG)	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°)
180	30100	-4	34400*	34400*	34400*	32900	31400
175	30700	-5	35100*	35100*	35100	33500	32000
170	31300	-7	35800*	35800*	35700	34100	32700
165	31900	-8	36500*	36500*	36300	34800	33300
160	32600	-10	37200*	37200*	36900	35400	33900
155	33300	-11	37700*	37700*	37600	36100	34600
150	34000	-13	38300*	38300*	38300	36700	35300
145	34700	-14	38900*	38900*	38900*	37400	36000
140	35400	-16	39600*	39600*	39600*	38200	36700
135	36200	-17	40300*	40300*	40300*	38900	37500
130	37000	-17	41000*	41000*	41000*	39700	38300
125	37800	-17	41800*	41800*	41800*	40500	39100
120	38600	-17	42600*	42600*	42600*	41400	39900
115	39500	-17	43100	43100	43100	42300	40800
110	40500	-17	43100	43100	43100	43100	41800
105	41400	-17	43100	43100	43100	43100	42700
100	42400	-17	43100	43100	43100	43100	43100
95	43100	-17	43100	43100	43100	43100	43100
90	43100	-17	43100	43100	43100	43100	43100

**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°)
180	30100	2	33000*	33000*	33000*	32900	31400
175	30700	0	33700*	33700*	33700*	33500	32000
170	31300	-1	34500*	34500*	34500*	34100	32700
165	31900	-3	35200*	35200*	35200*	34800	33300
160	32600	-4	35900*	35900*	35900*	35400	33900
155	33300	-6	36700*	36700*	36700*	36100	34600
150	34000	-7	37400*	37400*	37400*	36700	35300
145	34700	-9	38000*	38000*	38000*	37400	36000
140	35400	-10	38700*	38700*	38700*	38200	36700
135	36200	-12	39400*	39400*	39400*	38900	37500
130	37000	-12	40100*	40100*	40100*	39700	38300
125	37800	-12	40800*	40800*	40800*	40500	39100
120	38600	-12	41700*	41700*	41700*	41400	39900
115	39500	-12	42500*	42500*	42500*	42300	40800
110	40500	-12	43100	43100	43100	43100	41800
105	41400	-12	43100	43100	43100	43100	42700
100	42400	-12	43100	43100	43100	43100	43100
95	43100	-12	43100	43100	43100	43100	43100
90	43100	-12	43100	43100	43100	43100	43100

**DO NOT USE FOR FLIGHT****ISA + 20°C**

WEIGHT (1000 KG)	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°)
180	30100	7	31900*	31900*	31900*	31900*	31400
175	30700	6	32600*	32600*	32600*	32600*	32000
170	31300	4	33400*	33400*	33400*	33400*	32700
165	31900	3	34100*	34100*	34100*	34100*	33300
160	32600	2	34900*	34900*	34900*	34900*	33900
155	33300	0	35700*	35700*	35700*	35700*	34600
150	34000	-2	36400*	36400*	36400*	36400*	35300
145	34700	-3	37200*	37200*	37200*	37200*	36000
140	35400	-5	37800*	37800*	37800*	37800*	36700
135	36200	-6	38500*	38500*	38500*	38500*	37500
130	37000	-6	39200*	39200*	39200*	39200*	38300
125	37800	-6	39900*	39900*	39900*	39900*	39100
120	38600	-6	40700*	40700*	40700*	40700*	39900
115	39500	-6	41600*	41600*	41600*	41600*	40800
110	40500	-6	42500*	42500*	42500*	42500*	41800
105	41400	-6	43100	43100	43100	43100	42700
100	42400	-6	43100	43100	43100	43100	43100
95	43100	-6	43100	43100	43100	43100	43100
90	43100	-6	43100	43100	43100	43100	43100

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

**PW ENGINES****ISA + 10°C AND BELOW**

WEIGHT (1000 KG)	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°)
190	29000	-2	34000*	33600	32700	30900	29400
185	29600	-3	34600*	34200	33300	31500	30000
180	30200	-4	35100*	34800	33800	32100	30600
175	30800	-6	35700*	35400	34400	32700	31200
170	31500	-7	36200*	36000	35000	33300	31800
165	32100	-8	36800*	36600	35700	34000	32500
160	32800	-10	37400*	37200	36300	34600	33100
155	33400	-11	38100*	37900	37000	35300	33800
150	34100	-13	38700*	38600	37700	36000	34500
145	34900	-15	39400*	39300	38400	36700	35200
140	35600	-16	40100*	40000	39100	37400	36000
135	36400	-17	40800*	40800	39900	38200	36700
130	37100	-17	41600*	41600	40600	38900	37500
125	38000	-17	42400*	42400	41500	39800	38300
120	38800	-17	43100	43100	42300	40600	39200
115	39700	-17	43100	43100	43100	41500	40100
110	40600	-17	43100	43100	43100	42400	41000

**DO NOT USE FOR FLIGHT****ISA + 15°C**

WEIGHT (1000 KG)	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°)
190	29000	4	34000*	33600	32700	30900	29400
185	29600	3	34500*	34200	33300	31500	30000
180	30200	1	35100*	34800	33800	32100	30600
175	30800	0	35600*	35400	34400	32700	31200
170	31500	-1	36200*	36000	35000	33300	31800
165	32100	-3	36800*	36600	35700	34000	32500
160	32800	-4	37400*	37200	36300	34600	33100
155	33400	-6	38100*	37900	37000	35300	33800
150	34100	-7	38700*	38600	37700	36000	34500
145	34900	-9	39400*	39300	38400	36700	35200
140	35600	-11	40100*	40000	39100	37400	36000
135	36400	-12	40800*	40800	39900	38200	36700
130	37100	-12	41600*	41600	40600	38900	37500
125	38000	-12	42300*	42300*	41500	39800	38300
120	38800	-12	43100	43100	42300	40600	39200
115	39700	-12	43100	43100	43100	41500	40100
110	40600	-12	43100	43100	43100	42400	41000

**ISA + 20°C**

WEIGHT (1000 KG)	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°)
190	29000	10	34400*	33400*	32700	30900	29400
185	29600	8	34000*	34000*	33300	31500	30000
180	30200	7	34500*	34500*	33800	32100	30600
175	30800	6	35100*	35100*	34400	32700	31200
170	31500	4	35700*	35700*	35000	33300	31800
165	32100	3	36300*	36300*	35700	34000	32500
160	32800	1	36900*	36900*	36300	34600	33100
155	33400	0	37500*	37500*	37000	35300	33800
150	34100	-2	38200*	38200*	37700	36000	34500
145	34900	-3	38800*	38800*	38400	36700	35200
140	35600	-5	39500*	39500*	39100	37400	36000
135	36400	-6	40200*	40200*	39900	38200	36700
130	37100	-6	41000*	41000*	40600	38900	37500
125	38000	-6	41800*	41800*	41500	39800	38300
120	38800	-6	42600*	42600*	42300	40600	39200
115	39700	-6	43100	43100	43100	41500	40100
110	40600	-6	43100	43100	43100	42400	41000

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

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE CONTROL****GE ENGINES (FF PER ENGINE, KG)**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		23	25	27	29	31	33	35	37	39	41	43
180	%N1	88.4	89.4	90.6	91.8	93.5	96.1					
	MACH	.769	.781	.793	.799	.800	.800					
	KIAS	337	329	321	310	297	284					
	FF/ENG	3085	3008	2960	2908	2890	3006					
170	%N1	87.3	88.3	89.4	90.6	91.9	94.0	97.3				
	MACH	.759	.773	.785	.796	.800	.800	.800				
	KIAS	332	325	317	309	297	284	272				
	FF/ENG	2943	2872	2814	2775	2724	2752	2921				
160	%N1	86.0	87.2	88.2	89.4	90.6	92.1	94.5	99.3			
	MACH	.744	.763	.777	.789	.798	.800	.800	.800			
	KIAS	325	321	314	306	297	284	272	260			
	FF/ENG	2789	2733	2677	2634	2589	2553	2619	2860			
150	%N1	84.5	85.9	87.0	88.1	89.3	90.5	92.3	95.4			
	MACH	.722	.751	.767	.780	.793	.799	.800	.800			
	KIAS	315	315	310	302	294	284	272	260			
	FF/ENG	2608	2589	2540	2492	2456	2409	2398	2514			
140	%N1	82.9	84.3	85.7	86.8	87.9	89.1	90.4	92.8	97.0		
	MACH	.697	.728	.755	.771	.783	.795	.800	.800	.800		
	KIAS	303	305	304	298	290	283	272	260	248		
	FF/ENG	2423	2415	2400	2357	2312	2279	2237	2266	2425		
130	%N1	81.0	82.7	84.1	85.4	86.5	87.6	88.8	90.6	93.7	98.6	
	MACH	.672	.701	.733	.758	.773	.786	797	.800	.800	.800	
	KIAS	292	293	295	293	286	279	271	260	248	237	
	FF/ENG	2242	2233	2234	2217	2178	2138	2105	2081	2146	2327	
120	%N1	78.9	80.6	82.3	83.7	85.0	86.1	87.3	88.8	91.2	94.4	
	MACH	.647	.674	.704	.737	.760	.775	.788	.798	.800	.800	
	KIAS	280	281	282	284	281	275	267	259	248	237	
	FF/ENG	2067	2056	2052	2058	2040	2002	1968	1945	1941	2018	
110	%N1	76.9	78.4	80.1	81.8	83.2	84.5	85.5	87.1	89.2	91.6	94.9
	MACH	.622	.646	.674	.705	.738	.761	.776	.789	.798	.800	.800
	KIAS	269	269	269	271	272	269	263	256	247	237	226
	FF/ENG	1901	1887	1878	1877	1886	1867	1832	1812	1799	1799	1880
100	%N1	74.8	76.2	77.7	79.4	81.1	82.6	83.8	85.3	87.3	89.4	91.8
	MACH	.596	.619	.644	.672	.703	.737	.761	.776	.789	.798	.800
	KIAS	257	257	257	257	258	260	257	251	244	236	226
	FF/ENG	1742	1727	1712	1705	1707	1718	1698	1674	1666	1654	1653
90	%N1	72.2	73.9	75.3	76.8	78.5	80.2	81.7	83.4	85.3	87.3	89.4
	MACH	.570	.592	.615	.640	.667	.699	.733	.759	.775	.788	.798
	KIAS	246	245	244	244	244	245	247	245	239	233	225
	FF/ENG	1587	1571	1554	1541	1536	1543	1549	1541	1530	1520	1508

Shaded area approximates optimum altitude.

**DO NOT USE FOR FLIGHT****PW ENGINES (FF PER ENGINE, KG)**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		23	25	27	29	31	33	35	37	39	41	43
190	EPR	1.12	1.15	1.19	1.25	1.33	1.46					
	MACH	.776	.790	.797	.802	.802	.796					
	KIAS	340	333	323	311	298	283					
	FF/ENG	3306	3258	3201	3162	3175	3275					
180	EPR	1.10	1.13	1.17	1.21	1.28	1.38	1.54				
	MACH	.764	.782	.794	.799	.802	.800	.792				
	KIAS	335	329	321	310	298	284	269				
	FF/ENG	3146	3115	3061	3006	2984	3029	3208				
170	EPR	1.09	1.11	1.15	1.19	1.23	1.31	1.44				
	MACH	.752	.771	.787	.796	.801	.802	.797				
	KIAS	329	324	318	309	298	285	271				
	FF/ENG	2991	2962	2918	2867	2823	2823	2897				
160	EPR	1.08	1.10	1.13	1.16	1.20	1.20	1.36	1.50			
	MACH	.737	.758	.777	.791	.798	.798	.801	.794			
	KIAS	322	318	314	307	296	296	272	258			
	FF/ENG	2831	2807	2773	2729	2674	2674	2665	2798			
150	EPR	1.06	1.08	1.11	1.14	1.17	1.22	1.29	1.40			
	MACH	.720	.743	.763	.781	.794	.799	.802	.799			
	KIAS	314	312	308	303	295	284	273	259			
	FF/ENG	2660	2650	2619	2585	2541	2490	2477	2532			
140	EPR	1.05	1.07	1.09	1.12	1.15	1.19	1.24	1.32	1.44		
	MACH	.701	.725	.747	.767	.785	.796	.801	.802	.798		
	KIAS	305	303	301	297	291	283	272	260	247		
	FF/ENG	2483	2482	2465	2432	2401	2354	2317	2326	2416		
130	EPR	1.04	1.05	1.07	1.10	1.12	1.16	1.20	1.26	1.48		
	MACH	.681	.704	.728	.751	.771	.788	.801	.801	.796		
	KIAS	296	294	293	290	286	280	260	260	235		
	FF/ENG	2315	2308	2301	2282	2251	2219	2159	2159	2293		
120	EPR	1.03	1.04	1.06	1.08	1.10	1.13	1.17	1.21	1.28	1.37	1.52
	MACH	.659	.683	.707	.731	.753	.774	.790	.798	.802	.801	.794
	KIAS	286	285	283	281	278	274	268	259	249	237	224
	FF/ENG	2157	2142	2127	2122	2101	2041	2074	2012	2026	2050	2163
110	EPR	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.17	1.22	1.29	1.39
	MACH	.635	.659	.683	.707	.732	.755	.775	.791	.798	.802	.801
	KIAS	275	274	273	272	270	263	263	256	247	237	226
	FF/ENG	2014	1986	1968	1949	1945	1899	1899	1881	1868	1865	1899
100	EPR	1.01	1.02	1.03	1.04	1.06	1.08	1.11	1.14	1.18	1.22	1.29
	MACH	.609	.633	.657	.682	.706	.731	.754	.775	.791	.798	.802
	KIAS	263	263	262	261	260	258	255	251	245	236	226
	FF/ENG	1871	1844	1818	1798	1781	1767	1751	1738	1735	1716	1709

Shaded area approximates optimum altitude.

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

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	161
563	521	484	452	425	400	382	366	351	337	325
844	782	726	679	637	600	574	549	527	507	488
1128	1044	970	906	850	800	765	733	704	676	652
1412	1307	1214	1133	1063	1000	957	917	880	846	815
1698	1571	1458	1361	1276	1200	1148	1101	1056	1016	979
1984	1835	1701	1588	1489	1400	1340	1284	1233	1185	1142
2272	2100	1947	1816	1702	1600	1531	1467	1408	1354	1305
2560	2365	2192	2044	1915	1800	1723	1651	1584	1523	1467
2850	2632	2438	2273	2129	2000	1914	1834	1760	1692	1630

**PW ENGINES**

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
281	260	241	226	212	200	191	182	174	167	161
561	520	484	452	425	400	382	366	351	337	325
843	781	726	679	637	600	574	549	527	507	488
1126	1043	969	905	850	800	765	733	703	676	651
1411	1306	1213	1133	1063	1000	956	916	879	845	814
1697	1570	1457	1361	1276	1200	1148	1100	1055	1014	977
1985	1836	1703	1589	1489	1400	1339	1283	1231	1183	1140
2275	2102	1948	1817	1703	1600	1531	1466	1407	1352	1302
2566	2369	2194	2045	1916	1800	1722	1649	1582	1521	1465
2858	2638	2442	2275	2130	2000	1913	1832	1757	1689	1627

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

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
1294	1223	1158	1100	1048	1000	958	919	882	849	818
1938	1832	1736	1650	1572	1500	1437	1379	1324	1274	1228
2584	2443	2314	2199	2095	2000	1916	1838	1766	1699	1639
3233	3056	2894	2750	2620	2500	2395	2298	2208	2125	2049
3887	3673	3477	3302	3145	3000	2875	2758	2650	2551	2460
4545	4292	4061	3856	3670	3500	3354	3217	3091	2975	2869
5207	4915	4648	4410	4197	4000	3833	3678	3533	3400	3279
5873	5540	5236	4966	4723	4500	4311	4136	3973	3824	3688
6544	6169	5827	5523	5250	5000	4790	4595	4414	4248	4096
7220	6801	6420	6082	5778	5500	5269	5054	4854	4671	4504
7901	7437	7015	6642	6307	6000	5747	5512	5294	5094	4911

**PW ENGINES**

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
652	615	582	552	525	500	478	458	439	422	407
1296	1224	1158	1100	1048	1000	957	918	881	848	817
1942	1835	1737	1650	1572	1500	1437	1378	1323	1273	1227
2590	2448	2318	2201	2096	2000	1916	1838	1766	1699	1638
3242	3063	2899	2753	2621	2500	2395	2298	2208	2124	2048
3896	3679	3481	3305	3146	3000	2875	2758	2650	2550	2459
4554	4299	4066	3859	3672	3500	3354	3218	3092	2976	2870
5215	4920	4652	4413	4198	4000	3833	3678	3535	3402	3281
5880	5545	5240	4968	4724	4500	4312	4138	3976	3827	3691
6549	6172	5829	5525	5251	5000	4792	4598	4418	4253	4102
7222	6803	6421	6082	5779	5500	5271	5058	4860	4678	4512
7901	7437	7015	6642	6307	6000	5750	5517	5301	5103	4922

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE WIND-ALTITUDE TRADE****GE ENGINES**

PRESSURE ALTITUDE (1000 FT)	CRUISE WEIGHT (1000 KG)												
	150	145	140	135	130	125	120	115	110	105	100	95	90
43 41 39					24 5	14 2	7 1	17 3 1	8 1 4	3 1 7	1 4 13	1 8 19	4 14 27
37 35 33	12 2 2	7 1 4	3 1 7	1 3 7	1 5 16	2 9 21	4 14 27	4 14 27	13 26 41	19 33 48	26 41 56	34 49 65	42 58 74
31 29 27	10 21 35	14 26 40	18 31 46	18 31 46	29 43 58	35 50 65	42 57 71	42 57 71	56 71 85	64 79 93	72 86 100	80 94 108	89 102 115
25 23	49 63	55 69	61 75	61 75	73 87	79 93	86 99	92 105	99 111	106 118	113 124	120 131	127 137

**PW ENGINES**

PRESSURE ALTITUDE (1000 FT)	CRUISE WEIGHT (1000 KG)										
	190	180	170	160	150	140	130	120	110	100	90
43 41 39								37 10 0	12 1 2	1 2 10	2 11 24
37 35 33		46 15	24 5	36 10 0	16 2 1	4 0 5	0 3 13	2 11 23	10 22 37	22 37 53	39 55 70
31 29 27 25	7 0 2 10	2 1 7 17	0 4 13 25	2 10 21 35	7 18 31 45	15 28 42 57	25 40 55 69	38 53 68 82	52 67 82 95	68 83 96 109	85 99 111 122

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.

**DO NOT USE FOR FLIGHT****DESCENT AT .78/290/250****GE ENGINES**

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
DISTANCE (NM)	21	42	57	64	70	76	83	89	96	102	109	114	119	124	130	136	141
TIME (MINUTES)	8	12	15	16	17	18	19	20	21	22	22	23	24	24	25	26	27

**PW ENGINES**

PRESSURE ALT (1000 FT)	17	19	21	23	25	27	29	31	33	35	37	39	41	43
DISTANCE (NM)	62	68	74	81	87	93	100	106	111	116	122	128	134	139
TIME (MINUTES)	16	17	17	18	19	20	21	22	23	23	24	25	26	26

**HOLDING****FLAPS UP****GE ENGINES**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)								
		1500	5000	10000	15000	20000	25000	30000	35000	40000
180	%N1	66.8	69.5	73.9	78.2	82.5	86.8	91.4		
	KIAS	253	253	253	253	253	255	258		
	FF/ENG	2740	2710	2680	2670	2670	2710	276		
170	%N1	65.2	68.0	72.1	76.7	81.0	85.3	89.7	96.4	
	KIAS	246	246	246	246	246	248	250	250	
	FF/ENG	2590	2560	2530	2510	2510	2540	2580	2850	
160	%N1	63.4	66.4	70.4	75.0	79.4	83.6	88.1	93.4	
	KIAS	237	237	237	237	238	240	242	245	
	FF/ENG	2450	2410	2380	2360	2350	2370	2410	2540	
150	%N1	61.5	64.7	68.6	73.2	77.6	81.9	86.3	91.2	
	KIAS	230	230	230	230	230	232	234	237	
	FF/ENG	2310	2270	2230	2210	2200	2210	2240	2310	
140	%N1	59.7	62.7	66.9	71.1	75.7	80.1	84.5	89.1	
	KIAS	226	230	226	226	226	226	226	228	
	FF/ENG	2180	2270	2100	2070	2050	2050	2070	2120	
130	%N1	57.8	60.7	65.1	69.0	73.8	78.2	82.5	87.0	94.7
	KIAS	219	219	219	219	219	219	219	219	222
	FF/ENG	2040	2000	1960	1930	1910	1900	1900	1950	2160
120	%N1	55.9	58.6	63.0	67.0	71.6	76.0	80.3	84.8	91.5
	KIAS	214	214	214	214	214	214	214	214	214
	FF/ENG	1910	1880	1830	1790	1770	1760	1760	1780	1880
110	%N1	54.0	56.6	60.7	65.0	69.2	73.8	78.2	82.6	88.8
	KIAS	208	208	208	208	208	208	208	208	208
	FF/ENG	1780	1750	1700	1660	1640	1620	1610	1630	1700
100	%N1	52.1	54.5	58.4	62.9	66.8	71.7	75.9	80.2	86.3
	KIAS	202	202	202	202	202	202	202	202	202
	FF/ENG	1660	1620	1570	1540	1510	1490	1480	1490	1540
90	%N1	50.2	52.4	56.0	60.3	64.5	68.9	73.4	77.8	83.7
	KIAS	196	196	196	196	196	196	196	196	196
	FF/ENG	1540	1450	1450	1410	1380	1360	1340	1350	1390

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

**DO NOT USE FOR FLIGHT****PW ENGINES**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)								
		1500	5000	10000	15000	20000	25000	30000	35000	40000
190	EPR	1.03	1.04	1.06	1.09	1.13	1.20	1.30		
	KIAS	259	259	259	259	261	264	267		
	FF/ENG	3060	3050	3030	2980	2900	2940	3030		
180	EPR	1.03	1.04	1.05	1.08	1.12	1.18	1.27		
	KIAS	251	251	251	252	254	256	259		
	FF/ENG	2900	2880	2860	2820	2740	2760	2830		
170	EPR	1.03	1.04	1.05	1.07	1.11	1.16	1.24	1.43	
	KIAS	244	244	244	245	246	248	251	254	
	FF/ENG	2750	2720	2700	2670	2590	2590	2650	2870	
160	EPR	1.02	1.03	1.05	1.06	1.10	1.15	1.22	1.36	
	KIAS	236	236	236	238	239	241	243	246	
	FF/ENG	2600	2560	2540	2510	2440	2430	2470	2580	
150	EPR	1.02	1.03	1.04	1.06	1.09	1.13	1.20	1.31	
	KIAS	228	228	229	230	231	233	235	238	
	FF/ENG	2450	2410	2380	2380	2290	2270	2300	2370	
140	EPR	1.02	1.02	1.04	1.05	1.08	1.11	1.18	1.27	
	KIAS	222	222	222	222	223	225	226	229	
	FF/ENG	2300	2260	2230	2200	2140	2120	2130	2180	
130	EPR	1.01	1.02	1.03	1.04	1.06	1.10	1.15	1.23	1.40
	KIAS	217	217	217	217	217	217	218	220	222
	FF/ENG	2160	2110	2090	2060	1990	1980	1970	2010	2180
120	EPR	1.01	1.01	1.02	1.04	1.05	1.08	1.13	1.20	1.33
	KIAS	211	211	211	211	211	211	211	211	214
	FF/ENG	2020	1970	1950	1910	1840	1850	1830	1830	1940
110	EPR	1.01	1.01	1.02	1.03	1.04	1.07	1.11	1.17	1.27
	KIAS	205	205	205	205	205	205	205	205	205
	FF/ENG	1880	1830	1810	1770	1700	1710	1700	1680	1750
100	EPR	1.00	1.01	1.01	1.02	1.03	1.05	1.08	1.14	1.22
	KIAS	199	199	199	199	199	199	199	199	199
	FF/ENG	1740	1700	1680	1640	1570	1570	1560	1540	1600

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

**DO NOT USE FOR FLIGHT****ADVISORY INFORMATION****NORMAL CONFIGURATION LANDING DISTANCE****GE ENGINES****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	130000 KG LANDING WT	PER 5000 KG ABV/BLW 130000 KG	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	2930	+120/-70	60	-120	410	40	-40	60	-60	220	80	170
MAX AUTO	3840	+100/-100	100	-170	570	0	0	100	-100	410	0	0
AUTOBRAKE 4	4880	+140/-140	130	-230	780	0	0	130	-130	560	0	0
AUTOBRAKE 3	5700	+170/-170	160	-270	940	0	-30	160	-160	620	0	0
AUTOBRAKE 2	6430	+200/-200	190	-320	1110	80	-120	190	-180	550	220	220
AUTOBRAKE 1	6910	+230/-230	220	-360	1250	160	-190	210	-190	530	610	750

**GOOD REPORTED BRAKING ACTION**

MAX. MANUAL	3940	+110/-100	100	-180	660	100	-80	100	-90	300	250	580
MAX AUTO	3980	+110/-110	100	-190	660	60	-30	100	-100	400	160	490
AUTOBRAKE 4	4890	+140/-140	130	-230	790	10	0	130	-130	560	20	80
AUTOBRAKE 3	5700	+170/-170	160	-270	940	0	-30	160	-160	620	0	0

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	5330	+170/-160	150	-290	1070	230	-180	150	-130	380	380	1690
MAX AUTO	5270	+170/-160	150	-290	1060	230	-180	150	-130	380	380	1700
AUTOBRAKE 4	5410	+170/-160	160	-290	1080	190	-110	150	-140	520	520	1570
AUTOBRAKE 3	5950	+180/-180	170	-310	1150	110	-90	170	-160	620	620	1110

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	6800	+240/-220	210	-420	1640	510	-340	200	-180	450	1400	4040
MAX AUTO	6750	+240/-220	210	-420	1630	510	-340	200	-180	450	1410	4050
AUTOBRAKE 4	6750	+240/-220	210	-420	1630	510	-330	200	-180	460	1410	4050
AUTOBRAKE 3	6900	+230/-220	210	-420	1650	460	-280	210	-190	570	1250	3900

Reference distance is for sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.

Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.

Reference distance for auto braking is applicable for both auto and manual spoilers.

Actual (unfactored) distances are shown.

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

**DO NOT USE FOR FLIGHT****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 CONFIGURATION	130000 KG LANDING WT	PER 5000 KG ABV/BLW 130000 KG	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	2810	+140/-60	60	-110	390	40	-30	60	-60	220	70	140
MAX AUTO	3660	+130/-90	90	-160	550	0	0	90	-90	390	0	0
AUTOBRAKE 4	4640	+180/-130	120	-220	760	0	0	120	-120	540	0	0
AUTOBRAKE 3	5400	+220/-160	150	-260	920	0	-10	150	-150	640	0	0
AUTOBRAKE 2	6170	+250/-190	180	-310	1090	50	-110	180	-170	560	130	130
AUTOBRAKE 1	6670	+270/-220	200	-350	1230	150	-180	200	-190	520	460	570

**GOOD REPORTED BRAKING ACTION**

MAX. MANUAL	3860	+140/-100	100	-180	650	100	-80	100	-90	310	230	520
MAX AUTO	3840	+140/-100	100	-180	650	80	-40	100	-90	370	200	490
AUTOBRAKE 4	4640	+180/-130	120	-220	770	10	0	120	-120	540	20	90
AUTOBRAKE 3	5400	+220/-160	150	-260	920	0	-10	150	-150	640	0	0

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	5210	+200/-160	150	-290	1070	230	-180	150	-130	390	600	1490
MAX AUTO	5170	+200/-160	150	-280	1060	230	-190	150	-130	390	610	1500
AUTOBRAKE 4	5220	+210/-150	150	-290	1070	210	-130	150	-140	500	550	1450
AUTOBRAKE 3	5680	+240/-170	160	-310	1130	120	-70	160	-160	640	320	1050

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	6650	+280/-220	210	-420	1630	510	-340	200	-170	450	1270	3540
MAX AUTO	6610	+280/-220	210	-420	1630	510	-340	200	-170	450	1280	3560
AUTOBRAKE 4	6610	+280/-220	210	-420	1630	510	-330	200	-170	460	1280	3560
AUTOBRAKE 3	6690	+290/-210	210	-420	1640	480	-280	200	-180	580	1200	3480

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.

Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.

Reference distance for auto braking is applicable for both auto and manual spoilers.

Actual (unfactored) distances are shown.

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

**DO NOT USE FOR FLIGHT****PW ENGINES****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	150000 KG LANDING WT	PER 5000 KG ABV/BLW 130000 KG	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	3220	+110/-70	80	-130	440	50	-40	80	-80	250	70	140
MAX AUTO	5370	+130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	+140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	+160/-160	190	-300	1040	0	0	190	-190	740	0	0
AUTOBRAKE 2	7150	+190/-190	220	-350	1190	30	-110	230	-210	660	60	60
AUTOBRAKE 1	7840	+220/-220	260	-400	1370	170	-220	270	-230	580	430	520

**GOOD REPORTED BRAKING ACTION**

MAX. MANUAL	4460	+110/-100	130	-210	740	130	-110	130	-120	350	230	520
MAX AUTO	5380	+130/-130	150	-250	860	20	-10	160	-160	600	20	80
AUTOBRAKE 4	5540	+140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6370	+160/-160	190	-300	1040	0	0	190	-190	740	0	0

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	6140	+170/-160	200	-330	1220	310	-240	210	-180	450	640	1540
MAX AUTO	6120	+170/-160	200	-330	1220	300	-170	210	-180	570	610	1510
AUTOBRAKE 4	6190	+170/-160	200	-340	1220	270	-150	210	-190	620	550	1450
AUTOBRAKE 3	6710	+180/-180	210	-360	1280	170	-90	220	-210	740	350	1080

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	8000	+240/-230	280	-500	1910	720	-460	310	-250	520	1400	3700
MAX AUTO	7940	+240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 4	7940	+240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 3	8010	+230/-230	280	-500	1920	690	-370	300	-260	680	1340	3640

Reference distance is for sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.

Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.

Reference distance for auto braking is applicable for both auto and manual spoilers.

Actual (unfactored) distances are shown.

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

**DO NOT USE FOR FLIGHT****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 CONFIGURATION	130000 KG LANDING WT	PER 5000 KG ABV/BLW 130000 KG	PER 1000 FT ABOVE S.L.	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	3170	+140/-70	80	-130	440	50	-50	80	-80	260	60	130
MAX AUTO	5220	+210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	+220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	+260/-170	180	-300	1020	0	0	190	-190	730	0	0
AUTOBRAKE 2	6970	+280/-200	210	-350	1180	10	-100	220	-210	670	30	30
AUTOBRAKE 1	7690	+300/-220	250	-400	1360	160	-210	260	-230	580	350	440

**GOOD REPORTED BRAKING ACTION**

MAX. MANUAL	4400	+160/-110	120	-210	740	130	-110	130	-120	350	220	480
MAX AUTO	5230	+210/-140	150	-250	850	20	-10	150	-150	600	20	80
AUTOBRAKE 4	5390	+220/-140	160	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6180	+260/-170	180	-300	1020	0	-10	190	-190	730	0	0

**MEDIUM REPORTED BRAKING ACTION**

MAX. MANUAL	6070	+230/-170	200	-330	1220	320	-250	210	-180	450	600	1430
MAX AUTO	6040	+250/-170	190	-330	1220	310	-190	210	-180	550	600	1420
AUTOBRAKE 4	6080	+250/-170	200	-330	1220	290	-160	200	-190	600	550	1380
AUTOBRAKE 3	6550	+280/-190	210	-350	1280	180	-100	210	-200	730	360	1030

**POOR REPORTED BRAKING ACTION**

MAX. MANUAL	7920	+310/-240	280	-500	1920	730	-470	300	-250	520	1320	3420
MAX AUTO	7880	+310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 4	7880	+310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 3	7910	+330/-240	280	-500	1920	720	-380	300	-260	670	1290	3390

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.

Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.

Reference distance for auto braking is applicable for both auto and manual spoilers.

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)****GE ENGINES**

WEIGHT (1000 KG)	OAT (°C)	BRAKES ON SPEED (KIAS)																	
		80			100			120			140			160			180		
		PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)		
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
170	0	14.2	15.4	16.6	21.4	23.0	24.8	29.7	32.0	34.4	39.2	42.3	45.2						
	20	15.2	16.4	17.6	22.8	24.5	26.4	31.6	34.1	36.6	41.8	45.0	48.2						
	40	16.1	17.5	18.9	24.4	26.2	28.2	33.8	36.4	39.2	44.7	48.1	51.5						
	60	17.2	18.6	20.1	26.0	27.8	30.0	35.9	38.8	41.8	47.6	51.3	54.8						
160	0	13.4	14.5	15.6	20.2	21.7	23.3	28.0	30.1	32.3	36.8	39.7	42.6	46.8					
	20	14.5	15.6	16.6	21.5	23.1	24.8	29.8	32.1	34.4	39.3	42.3	45.3	49.9					
	40	15.2	16.5	17.8	23.0	24.7	26.5	31.9	34.3	36.8	42.0	45.2	48.5	53.3					
	60	16.2	17.6	18.9	24.6	26.3	28.2	33.9	36.5	39.2	44.8	48.2	51.6	56.7					
150	0	12.6	13.7	14.7	18.9	20.3	21.8	26.2	28.2	30.1	34.6	37.3	40.0	43.8	47.0				
	20	13.8	14.8	15.8	20.1	21.6	23.2	27.9	30.0	32.1	36.8	39.8	42.6	46.6	50.1				
	40	14.3	15.5	16.8	21.6	23.2	24.8	29.9	32.1	34.3	39.4	42.5	45.5	49.8	53.5				
	60	15.3	16.6	17.8	23.1	24.7	26.4	31.8	34.2	36.5	42.1	45.3	48.5	53.1	56.9				
140	0	11.9	12.8	13.8	17.6	19.1	20.5	24.5	26.4	28.3	32.2	34.8	37.2	40.8	44.1	47.2	49.5		
	20	13.1	14.0	14.9	18.8	20.3	21.8	26.1	28.1	30.1	34.3	37.0	39.7	43.5	46.9	50.3	52.7		
	40	13.4	14.5	15.6	20.1	21.8	23.4	27.9	30.1	32.2	36.6	39.7	42.4	46.5	50.2	53.7	56.4		
	60	14.4	15.5	16.7	21.5	23.3	24.9	29.7	32.1	34.3	39.0	42.3	45.2	49.6	53.4	57.2	60.0		
130	0	11.0	11.9	12.7	16.4	17.7	19.1	22.7	24.6	26.3	29.8	32.2	34.6	37.8	40.7	43.7	46.0	49.1	
	20	11.8	13.1	13.9	17.4	18.9	20.3	24.2	26.2	28.0	31.8	34.3	36.8	40.4	43.4	46.5	49.0	52.3	
	40	12.5	13.4	14.4	18.7	20.2	21.8	25.9	28.0	30.0	34.0	36.6	39.4	43.2	46.4	49.7	52.3	55.9	
	60	13.3	14.4	15.4	19.9	21.6	23.3	27.5	29.8	31.9	36.1	39.0	42.1	46.0	49.4	53.0	55.7	59.5	
120	0	10.3	11.0	11.9	15.1	16.5	17.7	21.1	22.6	24.3	27.5	29.6	31.8	35.0	37.6	40.4	42.6	45.8	49.0
	20	10.9	11.8	13.1	16.1	17.5	18.9	22.4	24.1	25.9	29.3	31.5	33.9	37.2	40.2	43.1	45.3	48.8	52.2
	40	11.7	12.5	13.4	17.2	18.8	20.2	24.0	25.8	27.6	31.4	33.7	36.2	39.9	43.0	46.1	48.5	52.1	55.8
	60	12.4	13.3	14.4	18.3	20.0	21.6	25.6	27.4	29.4	33.4	35.8	38.5	42.5	45.8	49.1	51.6	55.4	59.4
110	0	9.5	10.3	10.9	13.8	14.9	16.1	19.3	20.8	22.2	25.2	27.2	29.1	31.9	34.4	36.9	39.0	42.1	45.0
	20	10.1	10.9	11.7	14.9	16.0	17.1	20.5	22.1	23.6	26.9	28.9	31.0	34.0	36.6	39.4	41.6	44.8	48.0
	40	10.8	11.7	12.4	15.6	17.0	18.3	22.0	23.7	25.2	28.7	30.9	33.1	36.3	39.2	42.1	44.5	47.9	51.2
	60	11.5	12.4	13.2	16.7	18.1	19.5	23.5	25.2	26.9	30.6	33.0	35.3	38.7	41.8	44.9	47.4	51.0	54.5
100	0	8.7	9.4	10.0	12.5	13.6	14.5	17.5	19.0	20.3	22.8	24.7	26.4	28.9	31.2	33.4	35.6	38.3	41.1
	20	9.3	10.0	10.6	13.7	14.7	15.6	18.7	20.2	21.6	24.3	26.3	28.1	30.8	33.3	35.6	37.9	40.9	43.8
	40	10.0	10.7	11.4	14.2	15.4	16.5	20.0	21.7	23.2	26.0	28.1	30.1	32.9	35.5	38.1	40.6	43.7	46.8
	60	10.6	11.4	12.1	15.2	16.5	17.6	21.3	23.2	24.7	27.6	29.9	32.1	35.0	37.8	40.6	43.3	46.6	49.9

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, altitude, and OAT effects.

**DO NOT USE FOR FLIGHT****PW ENGINES**

WEIGHT T (1000 KG)	OAT (°C)	BRAKES ON SPEED (KIAS)																	
		80			100			120			140			160			180		
		PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)			PRESS ALT (1000 FT)		
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	14.9	15.8	16.7	22.4	23.9	25.4	31.3	33.4	35.5	41.2	44.0	46.8	52.0	55.6	59.4			
	10	15.4	16.4	17.3	23.2	24.7	26.3	32.3	34.5	36.7	42.6	45.5	48.5	53.8	57.6	61.3			
	20	15.9	16.9	17.9	24.0	25.6	27.1	33.4	35.7	37.9	44.0	47.1	50.1	55.6	59.5	63.4			
	30	16.4	17.4	18.4	24.7	26.4	28.0	34.5	36.8	39.1	45.5	48.6	51.7	57.4	61.5	65.5			
	40	16.7	17.7	18.8	25.2	26.9	28.6	35.3	37.7	40.1	46.5	49.8	53.0	58.9	63.0	67.2			
	50	16.9	18.0	19.0	25.7	27.4	29.1	35.9	38.4	40.8	47.5	50.8	54.1	60.2	64.5	68.7			
160	0	13.4	14.3	15.1	20.2	21.5	22.8	28.1	30.0	31.8	36.9	39.4	41.9	46.5	49.8	53.0	56.8	60.8	64.8
	10	13.9	14.8	15.6	20.9	22.3	23.6	29.1	31.0	32.9	38.2	40.8	43.4	48.2	51.5	54.9	58.9	63.0	67.1
	20	14.4	15.2	16.1	21.6	23.0	24.4	30.0	32.0	34.0	39.5	42.2	44.9	49.8	53.3	56.7	60.9	65.2	69.4
	30	14.8	15.7	16.6	22.3	23.7	25.2	31.0	33.1	35.1	40.8	43.5	46.3	51.4	55.0	58.6	62.8	67.3	71.7
	40	15.0	16.0	16.9	22.7	24.2	25.7	31.7	33.8	35.9	41.7	44.6	47.4	52.7	56.4	60.1	64.5	69.0	73.6
	50	15.2	16.2	17.1	23.1	24.6	26.1	32.2	34.4	36.6	42.5	45.5	48.4	53.8	57.6	61.4	65.9	70.7	75.4
140	0	12.0	12.8	13.5	18.0	19.1	20.3	24.9	26.5	28.1	32.6	34.7	36.9	40.9	43.7	46.5	49.9	53.3	56.8
	10	12.4	13.2	13.9	18.6	19.8	21.0	25.7	27.4	29.1	33.7	36.0	38.2	42.4	45.3	48.2	51.6	55.2	58.8
	20	12.8	13.6	14.4	19.2	20.4	21.7	26.6	28.3	30.1	34.8	37.2	39.5	43.8	46.8	49.8	53.4	57.1	60.8
	30	13.2	14.0	14.8	19.8	21.1	22.3	27.4	29.2	31.0	35.9	38.4	40.8	45.2	48.3	51.4	55.1	58.9	62.8
	40	13.4	14.3	15.1	20.2	21.5	22.8	28.0	29.9	31.7	36.7	39.2	41.7	46.3	49.5	52.7	56.5	60.5	64.4
	50	13.6	14.4	15.3	20.5	21.8	23.1	28.5	30.4	32.3	37.4	40.0	42.6	47.2	50.5	53.8	57.7	61.8	65.9
120	0	10.6	11.2	11.9	15.7	16.7	17.7	21.6	23.0	24.4	28.1	29.9	31.8	35.1	37.5	39.9	42.6	45.5	48.4
	10	11.0	11.6	12.3	16.2	17.3	18.3	22.3	23.8	25.2	29.0	31.0	32.9	36.3	38.8	41.3	44.1	47.1	50.2
	20	11.3	12.0	12.7	16.8	17.8	18.9	23.1	24.6	26.1	30.0	32.0	34.0	37.5	40.1	42.7	45.6	48.7	51.8
	30	11.6	12.4	13.1	17.3	18.4	19.5	23.8	25.3	26.9	31.0	33.0	35.1	38.7	41.4	44.0	47.0	50.3	53.5
	40	11.8	12.5	13.3	17.6	18.7	19.9	24.3	25.9	27.4	31.6	33.8	35.9	39.6	42.4	45.1	48.2	51.5	54.9
	50	11.9	12.7	13.4	17.8	19.0	20.1	24.6	26.3	27.9	32.2	34.4	36.6	40.4	43.2	46.0	49.2	52.6	56.1
100	0	9.2	9.7	10.3	13.4	14.3	15.1	18.2	19.4	20.6	23.5	25.0	26.6	29.1	31.0	33.0	35.0	37.4	39.7
	10	9.5	10.0	10.6	13.9	14.7	15.6	18.9	20.1	21.3	24.3	25.9	27.5	30.1	32.1	34.1	36.2	38.7	41.1
	20	9.8	10.4	10.9	14.3	15.2	16.1	19.5	20.7	22.0	25.1	26.7	28.4	31.1	33.2	35.3	37.4	40.0	42.5
	30	10.1	10.7	11.3	14.8	15.7	16.6	20.1	21.4	22.7	25.9	27.6	29.3	32.1	34.2	36.4	38.6	41.3	43.9
	40	10.2	10.8	11.4	15.0	16.0	16.9	20.5	21.8	23.1	26.4	28.2	29.9	32.8	35.0	37.2	39.5	42.2	44.9
	50	10.3	10.9	11.6	15.2	16.2	17.1	20.8	22.1	23.5	26.8	28.6	30.4	33.4	35.7	37.9	40.3	43.1	45.8

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, altitude, and OAT effects.

**TWO ENGINE REVERSE THRUST****PW ENGINES**

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
EVENT		5	10	15	20	25	30	35	40	45	50	55	60
LANDING	MAX MAN	0.7	5.7	10.5	15.3	19.9	24.5	29.0	33.5	37.9	42.3	46.6	51.0
	MAX AUTO	1.0	4.6	8.2	11.8	15.4	19.0	22.7	26.4	30.1	33.9	37.8	41.7
	AUTOBRAKE 4	0.6	3.8	6.9	10.0	13.2	16.3	19.5	22.7	26.0	29.3	32.6	36.0
	AUTOBRAKE 3	0.0	2.6	5.3	8.0	10.7	13.5	16.2	19.0	21.8	24.7	27.6	30.6
	AUTOBRAKE 2	0.0	1.2	3.5	5.7	8.0	10.3	12.6	15.0	17.3	19.8	22.2	24.8
	AUTOBRAKE 1	0.0	0.7	2.2	3.8	5.3	6.9	8.4	10.0	11.7	13.4	15.1	16.9

**DO NOT USE FOR FLIGHT****COOLING TIME (MINUTES)****Category "C" and "D" Brakes  
PW ENGINES**

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)									
	14 & BELOW	15	16	18	20	24	28	34	35 to 42	43 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON EICAS									
	UP TO 1	1	1	2	2	3	4	5	5 TO 6	7 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		11	15	19	24	34	44	59		

**Category "C" and "D" Brakes  
GE ENGINES**

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)							
	15 & BELOW	16	20	24	28	32	35 to 42	42 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON EICAS							
	UP TO 1	1	2	3	4	4	5 TO 6	7 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	CAUTION	FUSE PLUG MELT ZONE
GROUND		13	23	33	43	53		

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 1.0 million foot pounds per brake for each taxi 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 6 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required.

If overheat occurs after takeoff, extend gear soon for at least 10 minutes.

Brake temperature monitor system (BTMS) indication on EICAS may be used 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****ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)****NO REVERSE THRUST****GE ENGINES**

EVENT		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)				
		8	16	24	32	40
RTO MAX MAN		8.0	16.0	24.0	32.0	40.0
LANDING	MAX MAN	6.8	13.5	20.4	27.3	34.1
	MAX AUTO	6.4	12.7	19.0	25.3	31.6
	AUTOBRAKE 4	6.1	11.9	17.8	23.4	29.4
	AUTOBRAKE 3	5.7	11.0	16.4	21.6	27.0
	AUTOBRAKE 2	5.3	10.1	15.0	19.8	24.7
	AUTOBRAKE 1	5.0	9.2	13.8	18.1	22.6

**PW ENGINES**

EVENT		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
		5	10	15	20	25	30	35	40	45	50	55	60
RTO MAX MAN		5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0
LANDING	MAX MAN	1.6	6.6	11.6	16.5	21.3	26.1	30.8	35.5	40.2	44.8	49.5	54.2
	MAX AUTO	2.3	6.6	10.7	14.9	19.1	23.3	27.5	31.8	36.0	40.3	44.7	49.0
	AUTOBRAKE 4	2.5	6.4	10.4	14.3	18.3	22.2	26.1	30.1	34.0	38.0	42.0	46.1
	AUTOBRAKE 3	2.4	6.1	9.8	13.5	17.1	20.8	24.5	28.1	31.8	35.5	39.2	43.0
	AUTOBRAKE 2	2.4	5.8	9.3	12.7	16.0	19.4	22.8	26.2	29.6	33.0	36.4	39.9
	AUTOBRAKE 1	2.3	5.4	8.4	11.5	14.4	17.4	20.3	23.3	26.2	29.2	32.2	35.2

**DO NOT USE FOR FLIGHT****LONG RANGE CRUISE CONTROL****REFERENCE FUEL AND TIME REQUIRED AT CHECK POINT****GE ENGINES**

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)
200	2.6	0:39	2.3	0:38	1.9	0:36	1.7	0:35	1.5	0:35
400	5.5	1:14	4.9	1:11	4.3	1:07	3.9	1:03	3.6	1:01
600	8.3	1:49	7.5	1:44	6.7	1:37	6.1	1:32	5.6	1:28
800	11.1	2:24	10.1	2:17	9.0	2:07	8.3	2:00	7.7	1:55
1000	13.8	3:00	12.7	2:51	11.3	2:38	10.5	2:29	9.7	2:21
1200	16.6	3:35	15.3	3:25	13.6	3:09	12.6	2:58	11.7	2:48
1400	19.3	4:12	17.8	3:59	15.9	3:41	14.8	3:27	13.7	3:16
1600	21.9	4:48	20.3	4:34	18.2	4:12	16.9	3:57	15.7	3:43
1800	24.6	5:25	22.8	5:08	20.4	4:44	19.0	4:27	17.6	4:10
2000	27.2	6:02	25.2	5:44	22.6	5:16	21.0	4:57	19.6	4:38

**PW ENGINES**

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)	FUEL (1000 KG)	TIME (HR:MI N)
200	2.8	0:39	2.4	0:38	1.9	0:36	1.7	0:35	1.5	0:35
400	5.8	1:13	5.2	1:10	4.4	1:06	4.0	1:03	3.7	1:01
600	8.8	1:48	8.1	1:42	6.8	1:35	6.3	1:31	5.8	1:28
800	11.7	2:23	10.8	2:15	9.2	2:05	8.5	2:00	8.0	1:55
1000	14.7	2:59	13.6	2:48	11.6	2:36	10.7	2:28	10.1	2:22
1200	17.6	3:35	16.3	3:22	13.9	3:06	12.9	2:57	12.2	2:50
1400	20.4	4:12	19.0	3:56	16.3	3:37	15.1	3:26	14.2	3:17
1600	23.2	4:49	21.7	4:30	18.6	4:08	17.3	3:55	16.3	3:45
1800	26.0	5:27	24.3	5:05	20.9	4:39	19.4	4:25	18.3	4:13
2000	28.8	6:05	26.9	5:40	23.2	5:10	21.5	4:54	20.3	4:41

**DO NOT USE FOR FLIGHT****FUEL REQUIRED ADJUSTMENT (1000 KG)****GE ENGINES**

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.2	-0.1	0.0	0.1	0.2
4	-0.5	-0.2	0.0	0.3	0.6
6	-0.8	-0.4	0.0	0.4	0.9
8	-1.0	-0.5	0.0	0.6	1.3
10	-1.3	-0.7	0.0	0.8	1.6
12	-1.6	-0.8	0.0	1.0	2.0
14	-1.9	-0.9	0.0	1.1	2.3
16	-2.2	-1.1	0.0	1.3	2.7
18	-2.4	-1.2	0.0	1.5	3.0
20	-2.7	-1.4	0.0	1.6	3.4
22	-3.0	-1.5	0.0	1.8	3.7
24	-3.3	-1.6	0.0	2.0	4.0
26	-3.6	-1.8	0.0	2.1	4.4
28	-3.8	-1.9	0.0	2.3	4.7

**PW ENGINES**

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.2	-0.1	0.0	0.1	0.2
4	-0.5	-0.3	0.0	0.3	0.6
6	-0.8	-0.4	0.0	0.4	0.9
8	-1.1	-0.6	0.0	0.6	1.2
10	-1.4	-0.8	0.0	0.8	1.6
12	-1.8	-0.9	0.0	0.9	1.9
14	-2.1	-1.1	0.0	1.1	2.3
16	-2.4	-1.2	0.0	1.3	2.6
18	-2.7	-1.4	0.0	1.4	2.9
20	-3.0	-1.5	0.0	1.6	3.3
22	-3.3	-1.7	0.0	1.8	3.6
24	-3.5	-1.8	0.0	1.9	3.9
26	-3.8	-2.0	0.0	2.1	4.3
28	-4.1	-2.2	0.0	2.3	4.6
30	-4.4	-2.3	0.0	2.4	4.9

**DESCENT AT VREF30+70****Gear Down****GE ENGINES**

PRESSURE ALTITUDE (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	16	26	36	40	44	48	52	56	60	64	67	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

**PW ENGINES**

PRESSURE ALTITUDE (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	16	26	36	40	44	48	52	56	60	65	68	72	76
TIME (MINUTES)	7	10	12	13	14	15	16	17	17	18	19	20	20

**DO NOT USE FOR FLIGHT**

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