

PERFORMANCE DATA

C-295M VT01

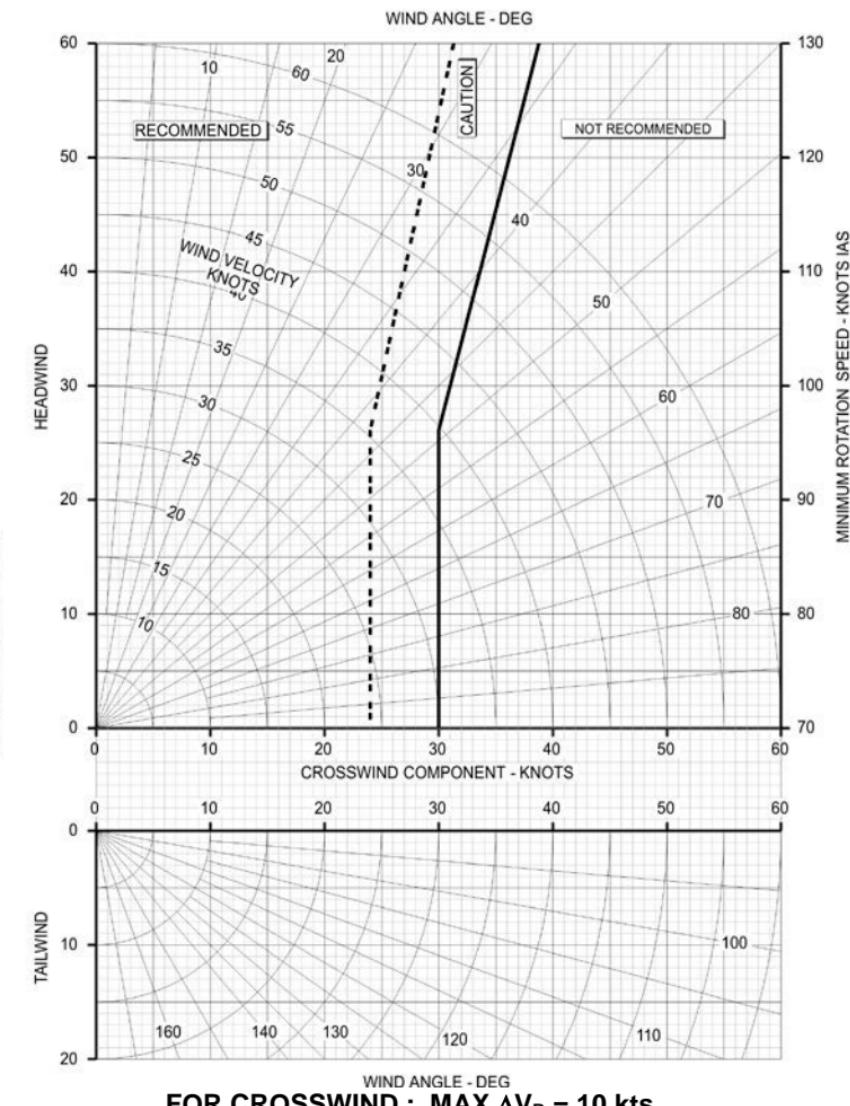
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TAKEOFF

USE OF TAKEOFF TABLES						
OPERATION	CRITERIA	TYPE		TABLE	PAGE	CALCULATE
M.O. NORMAL TAKEOFF	V1=VR	1.13V _{SR}	→	TABLE A1	PD-5	DISTANCE
			→	TABLE B1	PD-7	MTOW
			→	TABLE E1	PD-11	VR-V2
		1.23V _{SR}	→	TABLE A2	PD-6	DISTANCE
			→	TABLE B1	PD-7	MTOW
	CFL		→	TABLE E2	PD-12	VR-V2
	1.13V _{SR}	→	TABLE B1	PD-7	MTOW	
		→	TABLE C1	PD-9	DISTANCE	
		→	TABLE E1	PD-11	MTOW V1	
	1.23V _{SR}	→	TABLE B1	PD-7	VR-V2	
		→	TABLE C2	PD-10	MTOW	
		→	TABLE E2	PD-12	DISTANCE	
		→			MTOW V1	
		→			VR-V2	
M.O. SHORT FIELD TAKEOFF	CFL	F-TO (10°)	→	TABLE B2	PD-13	MTOW
			→	TABLE C3	PD-15	DISTANCE
			→	TABLE E3	PD-17	MTOW V1
		F-APP (15°)	→	TABLE B3	PD-14	VR-V2
			→	TABLE C4	PD-16	MTOW
			→	TABLE E4	PD-18	DISTANCE
			→			MTOW V1
			→			VR-V2
	2 ENGINES	F-TO (10°)	→	TABLE D1	PD-19	DISTANCE
			→	TABLE E3	PD-17	MTOW
		F-APP (15°)	→	TABLE D2	PD-20	VR-V2
			→	TABLE E4	PD-18	DISTANCE
			→			MTOW
			→			VR-V2

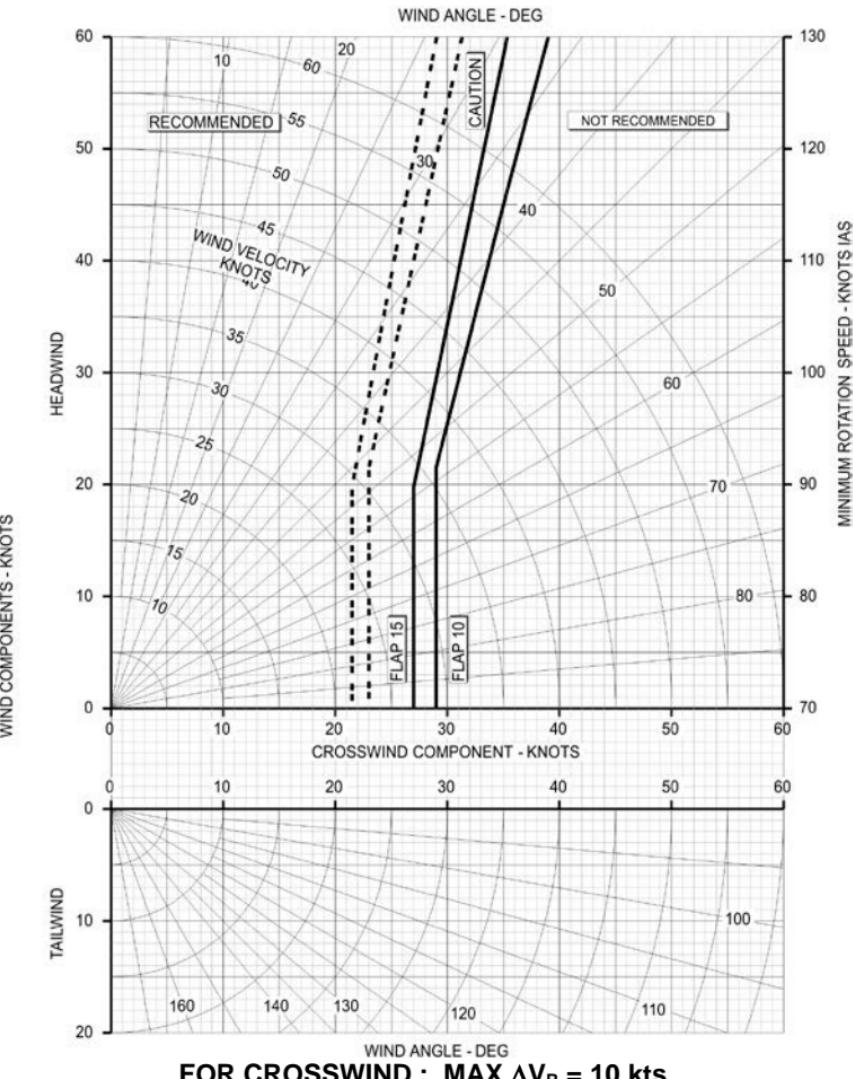
WIND COMPONENTS AND CROSSWIND LIMITATIONS

NORMAL TAKEOFF



WIND COMPONENTS AND CROSSWIND LIMITATIONS

SHORT FIELD TAKEOFF



WEIGHT/RUNWAY LIMITATIONS

NORMAL TAKEOFF

MILITARY OPERATION – NORMAL TAKEOFF [FLAPS-TO (10°)]. $V_2/V_{SR} = 1.13$ (See TABLE E1)						
PR. ALT. (FT)	TOW (KG)	OAT (°C)	REQUIRED RWY		V_1 (KIAS)	1 ENGINE CLIMB GRADIENT (%)
			DRY (FT)	WET (FT)		
≤ 1000	≤ 16000	≤ 15	≥ 3120	≥ 3650	V_R	≥ 8.9
		≤ 40	≥ 3580	≥ 4150	V_R	≥ 7.0
	≤ 21000	≤ 15	≥ 5010	≥ 5720	V_R	≥ 3.6
		≤ 40	≥ 5560	≥ 6320	$V_R - 3$	≥ 2.4
	≤ 23200	≤ 5	≥ 5350	≥ 5700	$V_R - 9$	≥ 2.4
		≤ 33	≥ 7480	≥ 7480	$V_R - 16$	≥ 1.8
≤ 2000	≤ 16000	≤ 15	≥ 3250	≥ 3800	V_R	≥ 8.5
		≤ 40	≥ 3810	≥ 4410	V_R	≥ 6.1
	≤ 21000	≤ 15	≥ 5260	≥ 5990	V_R	≥ 3.4
		≤ 35	≥ 5590	≥ 6350	$V_R - 4$	≥ 2.4
	≤ 22000	≤ 26	≥ 5730	≥ 5940	$V_R - 9$	≥ 2.4
	≤ 23200	≤ 24	≥ 7550	≥ 7550	$V_R - 16$	≥ 1.8
≤ 3000	≤ 16000	≤ 15	≥ 3400	≥ 3960	V_R	≥ 8.2
		≤ 40	≥ 4070	≥ 4700	V_R	≥ 5.4
	≤ 21000	≤ 15	≥ 5340	≥ 6070	$V_R - 2$	≥ 3.2
		≤ 29	≥ 5470	≥ 6210	$V_R - 6$	≥ 2.4
	≤ 22000	≤ 20	≥ 5950	≥ 5950	$V_R - 10$	≥ 2.4
	≤ 23200	≤ 18	≥ 7800	≥ 7800	$V_R - 17$	≥ 1.8
REQUIRED RWY: (ASD or TOGR) + 200 ft					TABLE A1	
Paved runway with $\pm 1\%$ slope. Wind calm or Headwind. $V_1 = V_R$ is assumed. When there is limitation by Maximum Brake Energy, V_1 is reduced. (See V_R on TABLE E1). Shaded values correspond to maximum ambient temperature to comply with Minimum Climb Gradient limitation ($>1.8\%$ or $>2.4\%$).					TABLE A1	

MILITARY OPERATION - NORMAL TAKEOFF [FLAPS-TO (10°)]. $V_2/V_{SR} = 1.23$ (See TABLE E2)							
PR. ALT. (FT)	TOW (KG)	OAT (°C)	REQUIRED RWY		V_1 (KIAS)	1 ENGINE CLIMB GRADIENT (%)	
			DRY (FT)	WET (FT)			
≤ 1000	≤ 16000	≤ 15	≥ 3830	≥ 4440	V_R	≥ 8.5	
		≤ 40	≥ 4380	≥ 5040	V_R	≥ 6.8	
	≤ 21000	≤ 15	≥ 5330	≥ 6070	$V_R - 8$	≥ 3.8	
		≤ 40	≥ 8080	≥ 8080	$V_R - 14$	≥ 2.7	
	≤ 23200	≤ 19	≥ 10160	≥ 10160	$V_R - 24$	≥ 2.4	
		≤ 35	≥ 12400	≥ 12400	$V_R - 27$	≥ 1.9	
	≤ 16000	≤ 15	≥ 3990	≥ 4620	V_R	≥ 8.1	
		≤ 40	≥ 4660	≥ 5350	V_R	≥ 6.1	
	≤ 21000	≤ 15	≥ 6080	≥ 6080	$V_R - 11$	≥ 3.6	
		≤ 38	≥ 9220	≥ 9220	$V_R - 16$	≥ 2.4	
	≤ 23200	≤ 9	≥ 10460	≥ 10460	$V_R - 26$	≥ 2.4	
		≤ 28	≥ 12690	≥ 12690	$V_R - 28$	≥ 1.9	
≤ 3000	≤ 16000	≤ 15	≥ 4170	≥ 4810	V_R	≥ 7.9	
		≤ 40	≥ 4980	≥ 5690	V_R	≥ 5.4	
	≤ 21000	≤ 15	≥ 7000	≥ 7000	$V_R - 14$	≥ 3.4	
		≤ 32	≥ 9540	≥ 9540	$V_R - 17$	≥ 2.4	
	≤ 23200	≤ 0	≥ 10420	≥ 10420	$V_R - 25$	≥ 2.4	
		≤ 21	≥ 12930	≥ 12930	$V_R - 29$	≥ 1.9	
REQUIRED RWY: (ASD or TOGR) + 200 ft						TABLE A2	
Paved runway with $\pm 1\%$ slope. Wind calm or Headwind. $V_1 = V_R$ is assumed. When there is limitation by Maximum Brake Energy, V_1 is reduced. (See V_R on TABLE E2). Shaded values correspond to maximum ambient temperature to comply with Minimum Climb Gradient limitation ($>1.9\%$ or 2.4%).							

MILITARY OPERATION - NORMAL TAKEOFF [FLAPS-TO (10°)]

(*) MTOW ($\times 10$ Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE					1.8%	$V_2 = 1.13V_{SR}$ (See TABLE E1)	
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL
44	1969	2010	2054	2096	2142	2188	2231
42	2001	2045	2088	2134	2178	2221	2263
40	2035	2079	2122	2167	2211	2254	2293
38	2068	2110	2155	2199	2246	2285	
36	2098	2143	2187	2233	2279	2317	
34	2130	2174	2219	2266	2312		
32	2161	2205	2252	2298			
30	2191	2238	2276	2311			
25	2253	2285	2315				
20	2307				2320		
10							
0							

(*) MTOW ($\times 10$ Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE					1.9%	$V_2 = 1.23V_{SR}$ (See TABLE E2)	
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL
44	1996	2040	2083	2128	2173	2220	2264
42	2031	2075	2119	2165	2210	2254	2293
40	2065	2109	2154	2198	2245	2286	
38	2097	2143	2187	2234	2280	2318	
36	2130	2175	2221	2268	2314		
34	2163	2208	2255	2301			
32	2194	2241	2288				
30	2227	2274	2311				
25	2286	2318			2320		
20							
10							
0							

(*) NOTE: This table only shows MTOW limitation by Single Engine Minimum Climb Gradient. Use other tables to check the rest of MTOW limitations.

TABLE B1

MILITARY OPERATION - NORMAL TAKEOFF [FLAPS-TO (10°)]							
(*) MTOW (x10 Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE						2.4%	V ₂ =1.13V _{SR} (See TABLE E1)
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL
44	1880	1920	1961	2003	2046	2090	2131
42	1911	1952	1994	2037	2079	2121	2160
40	1943	1985	2026	2069	2112	2151	2190
38	1974	2015	2057	2100	2144	2182	2219
36	2003	2046	2088	2132	2176	2213	2249
34	2033	2076	2119	2164	2209	2244	2267
32	2063	2106	2150	2195	2229	2252	2273
30	2092	2136	2173	2207	2238	2259	2279
25	2151	2183	2212	2237	2259	2277	2294
20	2206	2229	2245	2261	2277	2293	2309
10	2244	2260	2276	2292	2308		
0	2276	2292	2308			2320	

(*) MTOW (x10 Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE						2.4%	V ₂ =1.23V _{SR} (See TABLE E2)
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL
44	1918	1959	2001	2044	2087	2133	2174
42	1951	1992	2035	2079	2122	2164	2203
40	1983	2026	2068	2112	2156	2195	2232
38	2015	2057	2100	2145	2189	2226	2261
36	2045	2089	2132	2177	2223	2258	2290
34	2076	2120	2164	2210	2256	2289	2308
32	2107	2151	2196	2242	2276	2295	2314
30	2137	2182	2219	2253	2283	2302	
25	2194	2226	2254	2279	2301	2318	
20	2246	2269	2285	2301	2317		
10	2283	2300	2316			2320	
0	2316						

(*) NOTE: This table only shows MTOW limitation by Single Engine Minimum Climb Gradient. Use other tables to check the rest of MTOW limitations.	TABLE B1
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MTOW ($\times 10$ Kg)		% GRADIENT		NORMAL TAKEOFF [FLAPS-TO (10°)]				
V ₁	RWY (Ft)	V ₂ = 1.13 V _{SR} (TABLE E1)						
OAT (°C)	0	10	20	25	30	34	40	
PR. ALT. (Ft)								
3000	2240 2.6 112 4940	2198 2.7 111 4990	2160 2.7 110 5070	2136 2.5 110 5200	2115 2.3 110 5360	2096 2.0 110 5510	2035 1.8 109 5540	
2500	2261 2.6 113 4920	2220 2.7 112 4960	2181 2.7 111 5020	2157 2.6 111 5130	2136 2.4 110 5260	2119 2.1 111 5410	2079 1.8 110 5560	
2000	2282 2.6 113 4890	2241 2.6 112 4940	2200 2.7 111 4980	2180 2.6 111 5070	2157 2.5 111 5160	2140 2.3 111 5300	2112 1.9 111 5520	
1500	2303 2.5 114 4860	2262 2.6 113 4910	2222 2.6 112 4960	2201 2.6 111 5010	2181 2.6 111 5090	2163 2.4 111 5200	2135 2.0 111 5420	
1000	2320 2.5 114 4810	2283 2.6 113 4890	2243 2.6 112 4940	2223 2.6 112 4970	2203 2.6 111 5030	2186 2.5 111 5100	2158 2.1 111 5330	
500	2320 2.6 114 4680	2303 2.5 114 4860	2264 2.6 113 4910	2245 2.6 112 4940	2225 2.6 112 4980	2209 2.6 112 5010	2180 2.2 112 5230	
SL	2320 2.7 114 4550	2320 2.5 114 4800	2285 2.5 113 4880	2266 2.6 113 4910	2247 2.6 112 4930	2231 2.6 112 4950	2203 2.3 112 5130	
RWY = CFL V1 = VCEF								
<p>Minimum runway valid: RWY = 2300 ft (dry) or RWY = 2800 ft (wet).</p> <p>Paved runway with $\pm 1\%$ slope. Wind calm or Headwind.</p> <p>Weights are limited by: Maximum Brake Energy (37.32 MJ) in shaded area.</p> <p>Minimum Climb Gradient (1.8 %) in right upper corner.</p> <p>Structural Weight Limitation (23200 kg) in left lower corner.</p>								
<p>Gradient increment by weight reduction: +0.11% / -200 kg.</p> <p>V₁ decrement by weight reduction: -1 kt / -200 kg.</p> <p>Required runway (RWY) decrement by weight reduction: -80 ft / -200 kg.</p> <p>Do not reduce TOW by more than 2000 kg with respect to the table value.</p> <p>Do not reduce V₁ by more than 10 kt with respect to the table value.</p> <p>Do not reduce the required runway by more than 700 ft with respect to the table value.</p> <p>Additionally to above corrections, for wet runways, increase +550 ft required runway (RWY) and reduce -4 kt V₁.</p>							TABLE C1	

MTOW ($\times 10$ Kg)		% GRADIENT		NORMAL TAKEOFF [FLAPS-TO (10°)]													
V_1		RWY (Ft)		$V_2 = 1.23 V_{SR}$ (TABLE E2)													
OAT (°C)	PR. ALT. (Ft)	0	10	20	25	30	34	40									
3000	2094 3.8	2056 3.8	2022 3.9	2000 3.6	1978 3.4	1959 3.2	1933 2.7										
	118 5230	117 5300	116 5390	116 5560	116 5730	116 5910	117 6200										
2500	2114 3.8	2075 3.8	2041 3.9	2020 3.7	2000 3.6	1980 3.3	1954 2.9										
	119 5210	117 5260	116 5330	116 5470	116 5610	116 5780	117 6060										
2000	2133 3.7	2095 3.8	2059 3.8	2040 3.8	2021 3.7	2002 3.4	1975 3.0										
	119 5180	118 5230	117 5290	117 5390	116 5510	117 5660	117 5930										
1500	2153 3.7	2114 3.7	2077 3.8	2059 3.8	2041 3.7	2024 3.6	1995 3.1										
	120 5150	119 5210	117 5260	117 5330	117 5420	117 5540	117 5810										
1000	2172 3.7	2134 3.7	2097 3.8	2078 3.8	2061 3.8	2046 3.7	2015 3.3										
	120 5120	119 5180	118 5230	118 5270	117 5330	117 5420	117 5680										
500	2191 3.6	2153 3.7	2116 3.7	2098 3.8	2080 3.8	2066 3.8	2036 3.4										
	121 5090	120 5150	119 5210	118 5230	118 5280	117 5310	118 5570										
SL	2211 3.6	2172 3.7	2136 3.7	2118 3.7	2100 3.8	2086 3.8	2058 3.5										
	121 5070	120 5120	119 5180	119 5200	118 5230	118 5250	118 5460										
RWY = CFL						$V_1 = V_{CEF}$											
Minimum runway valid: RWY = 2250 ft (dry) or RWY = 2750 ft (wet). Paved runway with $\pm 1\%$ slope. Wind calm or Headwind.																	
Weights are limited by Maximum Brake Energy (37.32MJ).																	
Gradient increment by weight reduction: +0.12% / -200 kg. V_1 decrement by weight reduction: -1 kt / -200 kg. Required runway (RWY) decrement by weight reduction: -90 ft / -200 kg.								TABLE C2									
Additionally to above corrections, for wet runways, increase +550 ft required runway (RWY) and reduce -4 kt V_1 .																	

NORMAL TAKEOFF - [FLAPS-TO (10%)] - $V_2=1.13 V_{SR}$

PRES. ALT. (ft)			WEIGHT (TONS)															
SL	1000	2000	3000	12	13	14	15	16	17	18	19	20	21	22	23.2			
O	-40/8	-40/-2	-40/-12	-40/-23	A	106	103	102	101	100	98	102	106	110	114	118	121	
A	9/39	-1/33	-11/25	-22/19	A	101	99	98	97	96	100	104	108	112	115			V_R 1.13
T (°C)	40/49	34/44	26/38	20/30	A	97	95	94	93	97	101	105	109	112				
	50/55	45/53	39/47	31/42	A	94	92	90	94	98	102	106	110	113	116	119	122	
	-	-	48/51	43/49	A	89	88	91	95	100	104	107						
						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

PRES. ALT. (ft)

SL	1000	2000	3000	109	108	106	105	104	103	102	101	100	106	109	112	115	117	120	123
O	-40/8	-40/-2	-40/-12	-40/-23	A	106	104	103	102										
A	9/39	-1/33	-11/25	-22/19	A	102	100	98											
T (°C)	40/49	34/44	26/38	20/30	A	97	96	99											
	50/55	45/53	39/47	31/42	A	93	93												
	-	-	48/51	43/49	A														
						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

TABLE E1 $V_2 + 10 \text{ KIAS}$

	V_{F0}
	V_{FTO} V_{4seg}

V_R and V_2 shaded values applies to limitation by V_{MCA}

NORMAL TAKEOFF- [FLAPS-TO (10°)] - V₂=1.23 V_{SR}

PRES. ALT. (ft)			
SL	1000	2000	3000
O	-40/-2	-40/-12	-40/-23
A	9/39	-1/33	-11/25
T (°C)	40/49	34/44	26/38
	50/55	45/53	39/47
	-	-	48/51
			43/49

W E I G H T (T O N S)

12	13	14	15	16	17	18	19	20	21	22	23.2
106	103	102	101	104	108	112	116	120	124	128	131
101	99	98	101	106	110	114	118	122	125		
97	95	98	103	107	111	115	119	122			
94	95	99	104	108	112	116	120	123	126	129	132
92	96	101	105	110	114	117					

PRES. ALT. (ft)

SL	1000	2000	3000
O	-40/-2	-40/-12	-40/-23
A	9/39	-1/33	-11/25
T (°C)	40/49	34/44	26/38
	50/55	45/53	39/47
	-	-	48/51
			43/49

TABLE E2V₂ KIAS

V _{F0}
V _{F0}
V _{4seg}

V_R and **V₂** shaded values applies to limitation by V_{MCAS}

WEIGHT/RUNWAY LIMITATIONS

SHORT FIELD TAKEOFF

MILITARY OPERATION - SHORT FIELD TAKEOFF [FLAPS-TO (10°)]

(*) MTOW ($\times 10$ Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE						1.7%	$V_2 = 1.05 V_{SR}$ (See TABLE E3)	
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL	
44	1868	1907	1949	1988	2030	2074	2116	
42	1896	1939	1979	2021	2064	2105	2148	
40	1927	1970	2010	2053	2095	2137	2177	
38	1958	1998	2041	2083	2127	2168	2206	
36	1986	2029	2070	2113	2158	2196	2237	
34	2015	2058	2098	2144	2187	2227	2256	
32	2044	2086	2129	2174	2208	2237	2263	
30	2072	2114	2153	2188	2220	2247	2270	
25	2136	2169	2198	2226	2250	2270	2288	
20	2194	2220	2238	2255	2271	2287	2302	
10	2236	2253	2269	2285	2301	2317		
0	2268	2284	2300	2316	2320			

(*) NOTE: This table only shows MTOW limitation by Single Engine Minimum Climb Gradient. Use other tables to check the rest of MTOW limitations.

TABLE B2

**MILITARY OPERATION - SHORT FIELD TAKEOFF
[FLAPS-APP (15°)]**

(*) MTOW ($\times 10$ Kg) LIMITED BY MINIMUM CLIMB GRADIENT WITH ONE ENGINE INOPERATIVE						1.6%	$V_2 = 1.03 V_{SR}$ (See TABLE E4)
PR. ALT. (Ft) OAT (°C)	3000	2500	2000	1500	1000	500	SL
44	1775	1813	1852	1890	1931	1972	2012
42	1803	1843	1882	1922	1962	2001	2042
40	1833	1872	1910	1951	1990	2031	2071
38	1861	1898	1939	1979	2020	2060	2099
36	1887	1927	1967	2007	2050	2089	2128
34	1914	1954	1994	2037	2079	2118	2147
32	1941	1981	2023	2065	2098	2128	2154
30	1968	2008	2046	2080	2111	2138	2161
25	2028	2061	2091	2118	2142	2162	2179
20	2085	2111	2130	2146	2162	2178	2193
10	2128	2144	2160	2176	2192	2208	2224
0	2160	2175	2191	2207	2224	2240	2256

(*) NOTE: This table only shows MTOW limitation by Single Engine Minimum Climb Gradient. Use other tables to check the rest of MTOW limitations.

TABLE B3

MTOW ($\times 10$ Kg) V_1		% GRADIENT RWY (Ft)		SHORT FIELD TAKEOFF [FLAPS-TO (10°)]						
OAT (°C)	PR. ALT. (Ft)	0	10	20	25	30	34	40		
3000	2268 1.7 104 4010	2236 1.7 103 4090	2194 1.7 102 4150	2136 1.7 101 4090	2072 1.7 99 4020	2015 1.7 98 3940	1927 1.7 96 3830			
2500	2284 1.7 104 3960	2253 1.7 103 4050	2220 1.7 103 4130	2169 1.7 101 4090	2114 1.7 100 4040	2058 1.7 99 3960	1970 1.7 97 3850			
2000	2300 1.7 104 3920	2269 1.7 103 4010	2238 1.7 103 4090	2198 1.7 102 4070	2153 1.7 101 4050	2098 1.7 100 3970	2010 1.7 98 3860			
1500	2316 1.7 104 3870	2285 1.7 104 3960	2255 1.7 103 4050	2226 1.7 103 4060	2188 1.7 102 4050	2144 1.7 101 4000	2053 1.7 98 3880			
1000	2320 1.8 104 3790	2301 1.7 104 3920	2271 1.7 104 4000	2250 1.7 103 4030	2220 1.7 102 4040	2187 1.7 102 4020	2095 1.7 99 3880			
500	2320 1.9 104 3690	2317 1.7 104 3870	2287 1.7 104 3950	2270 1.7 103 3990	2247 1.7 103 4020	2227 1.7 102 4020	2137 1.7 100 3900			
SL	2320 2.0 104 3590	2320 1.8 104 3790	2302 1.7 104 3910	2288 1.7 104 3950	2270 1.7 103 3980	2256 1.7 103 4000	2177 1.7 101 3910			
RWY = CFL						$V_1 = V_{CEF}$				
<p>Minimum runway valid: RWY = 2250 ft (dry) or RWY = 2800 ft (wet). Paved runway with $\pm 1\%$ slope. Wind calm or Headwind.</p> <p>Weights are limited by: Minimum Climb Gradient (1.7%) right side of thick line Structural Weight Limitation (23200 kg) left side of thick line</p>										
Gradient increment by weight reduction: +0.12% / -200 kg. V_1 decrement by weight reduction: -1 kt / -200 kg. Required runway (RWY) decrement by weight reduction: -80 ft / -200 kg.						TABLE C3				
Additionally to above corrections, for wet runways, increase +550 ft required runway (RWY) and reduce -4 kt V_1 .						TABLE C3				
Additionally to above corrections, for runways with $\pm 2\%$ slope, increase +200 ft required runway (RWY) and reduce -1 kt V_1 .						TABLE C3				

MTOW ($\times 10$ Kg)			% GRADIENT		SHORT FIELD TAKEOFF [FLAPS-APP (15°)]						
V ₁		RWY (Ft)		V ₂ = 1.03 V _{SR} (TABLE E4)							
OAT (°C)	0	10	20	25	30	34	40				
3000	2160 1.6 96 3350	2128 1.6 95 3420	2085 1.6 94 3450	2028 1.6 93 3400	1968 1.6 92 3350	1914 1.6 90 3280	1833 1.6 89 3210				
2500	2175 1.6 96 3310	2144 1.6 96 3380	2111 1.6 95 3450	2061 1.6 94 3400	2008 1.6 93 3370	1954 1.6 91 3290	1872 1.6 90 3220				
2000	2191 1.6 97 3270	2160 1.6 96 3350	2130 1.6 96 3420	2091 1.6 95 3400	2046 1.6 94 3370	1994 1.6 92 3320	1910 1.6 90 3230				
1500	2207 1.6 97 3240	2176 1.6 96 3310	2146 1.6 96 3380	2118 1.6 95 3390	2080 1.6 94 3370	2037 1.6 93 3330	1951 1.6 91 3230				
1000	2224 1.6 97 3210	2192 1.6 97 3270	2162 1.6 96 3340	2142 1.6 96 3370	2111 1.6 95 3370	2079 1.6 94 3350	1990 1.6 92 3240				
500	2240 1.6 97 3180	2208 1.6 97 3240	2178 1.6 96 3310	2162 1.6 96 3340	2138 1.6 96 3350	2118 1.6 95 3360	2031 1.6 93 3240				
SL	2256 1.6 98 3140	2224 1.6 97 3210	2193 1.6 97 3270	2179 1.6 96 3310	2161 1.6 96 3330	2147 1.6 96 3350	2071 1.6 94 3260				
RWY = CFL				V₁ = V_{CEF}							
Minimum runway valid: RWY = 2500 ft (dry) or RWY = 3100 ft (wet). Paved runway with $\pm 1\%$ slope. Wind calm or Headwind. Weights are limited by Minimum Climb Gradient (1.6%).											
Gradient increment by weight reduction: +0.09% / -200 kg. V ₁ decrement by weight reduction: -1 kt / -200 kg. Required runway (RWY) decrement by weight reduction: -60 ft / -200 kg. Additionally to above corrections, for wet runways, increase +550 ft required runway (RWY) and reduce -4 kt V ₁ . Additionally to above corrections, for runways with $\pm 2\%$ slope, increase +150 ft required runway (RWY) and increase +1 kt V ₁ .											
TABLE C4											

SHORT FIELD TAKEOFF - [FLAPS-TO (10°)]

		PRES. ALT. (ft)												WEIGHT (TONS)														
		SL	1000	2000	3000	12	13	14	15	16	17	18	19	20	21	22	23.2											
O	-40/-15	-40/-25	-40/-35	-	A	103	101	100	98	96	95	94	93	95	93	95	93	95	93	95	93	95	93	95	93	95	93	
A	-14/13	-24/2	-34/-8	-40/-18	A	100	98	97	95	94	93	92	93	93	97	97	97	97	97	97	97	97	97	97	97	97	97	97
T	12/36	1/30	-7/21	-17/10	A	97	95	94	92	91	90	90	90	90	94	94	94	94	94	94	94	94	94	94	94	94	94	94
(C)	35/45	31/38	22/32	11/24	A	94	92	91	89	88	87	91	96	96	101	101	101	101	101	101	101	101	101	101	101	101	101	101
	46/50	39/45	33/39	25/33	A	92	90	89	87	86	85	93	98	98	103	103	103	103	103	103	103	103	103	103	103	103	103	103
	-	46/50	40/45	34/40	A	89	87	86	84	86	84	90	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

		PRES. ALT. (ft)												WEIGHT (ft)															
		SL	1000	2000	3000	105	104	102	101	100	105	104	102	101	100	105	104	102	101	100	105	104	102	101	100	105	104		
O	-40/-15	-40/-25	-40/-35	-	A	103	102	101	100	98	98	97	96	95	94	98	97	96	95	94	98	97	96	95	94	98	97	96	
A	-14/13	-24/2	-34/-8	-40/-18	A	100	99	98	97	96	96	95	94	93	92	98	97	96	95	94	93	98	97	96	95	94	98	97	96
T	12/36	1/30	-7/21	-17/10	A	97	95	94	93	92	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	
(C)	35/45	31/38	22/32	11/24	A	94	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	

TABLE E3

Minimum Flap Retraction Speed from F10° to F0° ($V_2 + 17$ KIAS)	V_{F0}
Final Takeoff Speed ($V_2 + 27$ KIAS)	$\frac{V_{FTO}}{V_{4seq}}$

V_R and **V₂** shaded values applies to limitation by **V_{MCA}**

SHORT FIELD TAKEOFF – [FLAPS-APP (15%)

		PRES. ALT. (ft)												WEIGHT (TONS)												
		SL	1000	2000	3000	12	13	14	15	16	17	18	19	20	21	22	23.2									
O	-40/-13	-40/-24	-40/-33	-	A	101	99	98	97	96	94	93	93	92	92	96	102	V _R								
A	-12/14	-23/4	-32/-6	-40/-16	A	99	97	96	95	93	92	91	91	93	93	99										
T	15/37	5/30	-5/21	-15/11	A	98	95	93	92	91	89	88	91	96												
(C)	38/45	31/38	22/33	12/25	A	96	93	91	90	89	87	88	94													
	-	39/45	33/40	26/33	A	93	90	88	87	86	85	90	97	99												
		-	41/46	34/41	A	91	88	86	85	84	88	94														

		PRES. ALT. (ft)												WEIGHT (TONS)													
		SL	1000	2000	3000	12	13	14	15	16	17	18	19	20	21	22	23.2	V _{F0}	V _{FTO}	V _{4seq}							
O	-40/-13	-40/-24	-40/-33	-	A	104	103	102	100	99	99																
A	-12/14	-23/4	-32/-6	-40/-16	A	102	100	99	98	97	97																
T	15/37	5/30	-5/21	-15/11	A	99	98	97	96			98		101	104	106	108	112	V ₂								
(C)	38/45	31/38	22/33	12/25	A	97	95	94		96																	
	-	39/45	33/40	26/33	A	94	93	92	93																		

TABLE E4

Minimum Flap Retraction Speed from F15° to F0° ($V_2 + 21$ KIAS) V_{F0}
Final Takeoff Speed ($V_2 + 31$ KIAS) V_{FTO}
 V_{4seq}

V_R and V_2 shaded values applies to limitation by V_{MCA}

WEIGHT/RUNWAY LIMITATIONS

2-ENGINES SHORT FIELD TAKEOFF

MTOW ($\times 10$ Kg)		% GRADIENT		2-ENGINES SHORT FIELD TAKEOFF [FLAPS-TO (10°)] $V_2 = 1.05 V_{SR}$ (TABLE E3)					
OAT (°C)	PR. ALT. (Ft)	0	10	20	25	30	34	40	
3000	2269 3620	1.7 3700	2236 3790	1.7 3790	2194 3740	1.7 3740	2136 3660	1.7 3600	2073 3600
2500	2285 3580	1.7 3660	2253 3730	1.7 3730	2220 3790	1.7 3790	2169 3680	1.7 3605	2114 3605
2000	2300 3540	1.7 3615	2270 3690	1.7 3690	2238 3770	1.7 3770	2198 3705	1.7 3625	2154 3625
1500	2317 3500	1.7 3575	2286 3655	1.7 3655	2255 3720	1.7 3720	2189 3735	1.7 3640	2145 3640
1000	2320 3420	1.8 3540	2301 3610	1.7 3610	2271 3665	1.7 3665	2251 3725	1.7 3655	2221 3655
500	2320 3335	1.9 3500	2317 3570	1.7 3570	2287 3605	1.7 3605	2271 3665	1.7 3645	2247 3645
SL	2320 3245	2.0 3420	2320 3535	1.8 3535	2302 3570	1.7 3570	2288 3600	1.7 3640	2271 3640
NOTE: For 2-Engines Short Field Takeoff, engine failure during takeoff is not considered for Runway Length Limitation, but is taken into account for Minimum Climb Gradient Limitation.									
Paved dry runway with $\pm 2\%$ slope. Wind calm or Headwind. Minimum runway valid = 1400 ft.									
Weights are limited by: Minimum Climb Gradient (1.7%) right side of thick line. Structural Weight Limitation (23200 kg) left side of thick line.									
Required runway (RWY) decrement by weight reduction = -60 ft/-200 kg. Climb gradient increment by weight reduction = +0.12%/-200 kg.								TABLE D1	
For unpaved hard runway = Subtract 300 ft to available runway length. For unpaved soft runway (CBR=4) = Subtract 1000 ft to available runway length.								TABLE D1	

MTOW ($\times 10$ Kg)		% GRADIENT		2-ENGINES SHORT FIELD TAKEOFF [FLAPS-APP (15°)]					
		RWY (Ft) = TOGR + 300 Ft		$V_2 = 1.03 V_{SR}$ (TABLE E4)					
OAT (°C)\ PR. ALT. (Ft)	0	10	20	25	30	34	38	40	
3000	2160 1.6 3130	2128 1.6 3195	2086 1.6 3300	2028 1.6 3220	1968 1.6 3155	1914 1.6 3100	1833 1.6 3035		
2500	2176 1.6 3100	2145 1.6 3160	2112 1.6 3225	2062 1.6 3250	2009 1.6 3170	1955 1.6 3100	1873 1.6 3035		
2000	2192 1.6 3060	2161 1.6 3130	2130 1.6 3195	2091 1.6 3260	2047 1.6 3175	1995 1.6 3125	1911 1.6 3045		
1500	2208 1.6 3030	2177 1.6 3095	2147 1.6 3160	2118 1.6 3215	2080 1.6 3205	2037 1.6 3130	1952 1.6 3045		
1000	2225 1.6 3000	2192 1.6 3060	2163 1.6 3125	2142 1.6 3165	2111 1.6 3215	2079 1.6 3145	1991 1.6 3050		
500	2241 1.6 2970	2208 1.6 3030	2178 1.6 3090	2162 1.6 3130	2138 1.6 3175	2118 1.6 3145	2031 1.6 3055		
SL	2257 1.6 2940	2225 1.6 3000	2194 1.6 3060	2179 1.6 3090	2162 1.6 3120	2147 1.6 3145	2071 1.6 3060		
NOTE: For 2-Engines Short Field Takeoff, engine failure during takeoff is not considered for Runway Length Limitation, but is taken into account for Minimum Climb Gradient Limitation.									
Paved dry runway with $\pm 2\%$ slope. Wind calm or Headwind. Minimum runway valid = 1400 ft.									
Weights are limited by Minimum Climb Gradient (1.6%).									
Required runway (RWY) decrement by weight reduction = -50 ft/-200 kg. Climb gradient increment by weight reduction = +0.1%/-200 kg.								TABLE D2	
For unpaved hard runway = Subtract 200 ft to available runway length.								TABLE D2	
For unpaved soft runways (CBR=4) = Subtract 800 ft to available runway length.								TABLE D2	

CLIMB WITH 2 ENGINES

CLIMB SPEED WITH 2 ENGINES				
ALTITUDE (FT)	0	10000	15000	30000
SPEED (KIAS)	140	140	130	130
Linear transition between 10000 ft and 15000 ft.				

OPTIMUM ALTITUDE WITH 2 ENGINES

MAXIMUM RANGE → MAXIMUM ALTITUDE (Ceiling with 300 FPM, LRC).
 MINIMUM TIME → 15000 FT (FL150, Max. Cruise).
 MAXIMUM ENDURANCE → Use Tables for Max. Endurance Cruise.

CRUISE CEILINGS (300 FPM) WITH 2 ENGINES ($\times 1000$ FT)

WEIGHT ($\times 1000$ KG) ▷	12	14	16	18	20	22	23
ISA	30.0	30.0	28.5	25.5	22.5	19.5	18.3
ISA+20°C	29.7	26.5	23.2	19.7	16.5	13.2	11.5

MAXIMUM CRUISE ALTITUDE FOR SHORT RANGE ($\times 1000$ FT)

TAKEOFF WEIGHT ($\times 1000$ KG) ▷		DISTANCE (NM) ▷								
		40	60	80	100	120	140	160	180	200
ISA	16	13.3	18.5	22.6	25.7	27.8	29.3	30.0	30.0	30.0
	18	11.9	16.6	20.3	23.2	25.3	26.8	27.8	28.6	29.2
	20	10.7	14.9	18.3	20.9	22.9	24.3	25.2	25.9	26.3
	23	9.0	12.6	15.5	17.8	19.5	20.7	21.6	22.1	22.4
ISA +20°C	16	10.5	14.0	16.8	19.2	21.1	22.4	23.5	24.6	25.5
	18	9.3	12.5	15.0	17.2	19.0	20.1	21.2	22.2	23.0
	20	8.4	11.3	13.5	15.4	17.1	18.1	19.1	20.0	20.8
	23	7.1	9.5	11.4	13.1	14.4	15.3	16.2	16.9	17.6

Altitudes in shaded values are above Cruise Ceiling with two engines.

CLIMB WITH 2 ENGINES FROM BRAKE RELEASE

(CLB, 140/130 KIAS, WEIGHT AT TAKEOFF, AIRFIELD AT S.L.)

Kg NM min

ISA -20 °C	ALTITUDE (x 100 FT) ▼						
WEIGHT (KG) ▼	20	100	160	200	230	270	300
16000 2 3	52 10 6	106 17 9	146 24 11	178 31 14	204 43 18	246 58 23	288
18000 2 3	54 12 7	118 20 10	168 29 13	207 38 17	242 56 23	302 81 30	370
20000 2 3	57 14 8	133 25 12	193 36 16	245 48 20	293 78 30	390	-
23000 3 3	63 18 10	162 33 15	247 51 22	330 76 31	425 - -	-	-

For every 1000 ft of Airfield Altitude: Subtract 8 kg, 1.1 NM and 29 secs.

ISA	ALTITUDE (x 100 FT) ▼						
WEIGHT (KG) ▼	20	100	160	200	240	270	300
16000 2 3	54 12 7	117 23 11	167 32 14	207 47 19	255 65 25	304 97 34	380
18000 2 3	57 15 8	133 27 13	195 40 17	246 62 24	316 92 34	401	-
20000 3 3	60 18 9	151 34 15	230 52 21	302 87 33	418 - -	-	-
23000 4 4	67 24 12	190 49 21	311 84 33	450 - -	-	-	-

For every 1000 ft of Airfield Altitude: Subtract 9 kg, 1.2 NM and 31 secs.

ISA +20 °C	ALTITUDE (x 100 FT) ▼						
WEIGHT (KG) ▼	20	100	140	180	210	230	250
16000 3 3	58 19 10	143 31 14	190 46 19	245 64 25	299 81 30	346 107 38	410
18000 4 3	62 24 11	167 39 17	228 61 24	307 90 34	395 - -	-	-
20000 4 4	67 30 14	198 51 21	283 87 34	411 - -	-	-	-
23000 6 4	77 46 20	279 86 34	446 - -	-	-	-	-

For every 1000 ft of Airfield Altitude: Subtract 12 kg, 1.7 NM and 42 secs.

MAX CRUISE CRZ1										(FF: kg/h/eng)	TQ	FF		
										IAS	TAS			
FL 250										TONS	FL 240			
SAT ↘											SAT ↘			
-55	-45	-35	-25	-15	▼	14	-53	-43	-33	-23	-13			
61 300	57 282	53 268	47 246	43 232			64 311	59 293	55 278	49 256	44 239			
189 263	181 258	174 254	163 243	154 234			193 264	185 260	178 256	168 246	158 236			
61 298	56 280	52 265	46 242		18	63	309	58 291	54 275	48 253				
181 252	171 244	161 235	144 216				186 255	177 248	167 240	152 223				
60 296	55 277	51 262			20	62	307	58 289	53 273					
174 243	161 231	148 217					180 247	169 237	156 225					
FL 230										TONS	FL 220			
SAT ↘											SAT ↘			
-51	-41	-31	-21	-11	▼	14	-49	-39	-29	-19	-9			
66 321	61 304	57 288	51 266	45 246			68 332	64 315	59 298	53 276	46 253			
197 265	189 261	182 257	172 248	161 237			201 266	194 262	186 258	176 249	164 237			
65 320	61 302	56 286	50 263	44 243	18	68	330	63 313	58 297	52 273	45 250			
190 257	182 251	173 244	158 228	141 209			195 258	187 254	178 247	164 233	147 213			
65 318	60 300	55 283			21	67	329	62 311	57 294					
182 245	170 236	158 223					187 249	177 241	165 230					
FL 210										TONS	FL 200			
SAT ↘											SAT ↘			
-47	-37	-27	-17	-7	▼	14	-45	-35	-25	-15	-5			
70 343	66 326	61 309	55 286	47 260			73 353	68 337	63 319	57 296	48 267			
204 267	197 263	190 259	180 251	167 238			208 267	201 264	194 260	184 252	170 238			
70 341	65 324	61 307	54 284	46 257	18	72	352	68 335	63 317	56 294	48 264			
199 260	191 255	183 249	170 237	152 216			203 261	196 257	187 251	175 240	157 219			
69 338	64 320	59 302			23	71	349	66 332	61 313					
186 243	174 233	160 219					192 246	181 238	168 226					

MAX CRUISE CRZ1										(FF: kg/h/eng)	TQ	FF
										IAS	TAS	
FL 190										TONS	FL 180	
SAT ↘											SAT ↘	
-43	-33	-23	-13	-3			▼	-41	-31	-21	-11	-1
76 367	71 349	65 330	58 304	50 276			14	78 381	73 361	67 341	59 313	52 285
212 268	205 265	198 261	187 252	174 239				217 269	209 266	201 261	190 252	178 240
75 366	70 347	65 328	57 302	49 274			18	78 380	73 360	67 339	59 311	51 283
208 263	200 259	192 253	179 241	162 223				213 265	205 260	196 254	183 242	167 226
74 363	69 344	63 325					23	77 378	72 357	66 336	57 307	
198 251	188 243	175 231						204 254	194 246	181 236	161 215	
FL 170										TONS	FL 160	
SAT ↘											SAT ↘	
-39	-29	-19	-9	1			▼	-37	-27	-17	-7	3
81 395	76 373	69 351	61 321	53 294			14	84 408	78 385	71 362	62 329	55 302
221 270	213 267	205 262	193 252	181 240				225 271	217 267	208 262	196 251	184 241
81 394	75 372	69 350	60 320	52 292			18	84 407	78 384	71 361	62 328	54 301
217 266	209 262	200 256	187 243	172 228				222 267	213 263	204 256	190 244	176 230
80 392	74 369	68 348	59 316				23	83 405	77 382	70 359	61 325	
209 256	199 250	187 239	167 219					214 259	205 252	193 243	173 222	
FL 150										TONS	FL 140	
SAT ↘											SAT ↘	
-35	-25	-15	-5	5			▼	-33	-23	-13	-3	7
87 422	80 397	74 373	64 338	56 311			14	87 425	82 407	75 382	65 347	57 320
229 272	221 268	212 262	199 251	187 241				231 270	224 267	215 262	202 251	190 241
87 421	80 396	73 372	63 337	56 310			18	87 425	82 406	75 382	65 346	57 319
226 268	217 263	208 257	193 244	180 232				228 266	221 263	211 257	197 244	184 232
86 419	79 394	72 370	62 334				23	87 424	81 405	74 380	64 343	56 315
219 261	210 254	198 245	178 225					222 259	214 255	202 246	183 228	163 207

MAX CRUISE CRZ1										(FF: kg/h/eng)	TQ	FF		
										IAS	TAS			
FL 130										TONS	FL 120			
SAT ↘											SAT ↘			
-31	-21	-11	-1	9	▼	TONS	-29	-19	-9	1	11			
88 429	84 417	77 392	66 356	59 328			88 433	86 427	78 401	68 365	60 337			
232 268	227 267	218 261	205 250	193 241			234 266	230 266	220 260	207 250	196 240			
88 429	84 417	76 391	66 355	58 327	18	TONS	88 433	86 427	78 401	68 364	59 336			
230 264	224 263	214 257	200 244	187 233			231 262	227 263	217 256	203 244	190 233			
87 428	83 416	76 389	65 353	57 324	23	TONS	88 433	85 426	77 399	67 362	58 333			
224 258	218 256	206 247	188 230	169 211			226 257	221 256	209 247	192 231	174 213			
FL 110										TONS	FL 100			
SAT ↘											SAT ↘			
-27	-17	-7	3	13	▼	TONS	-25	-15	-5	5	15			
89 437	88 438	80 411	69 374	61 345			90 442	90 448	81 420	71 383	62 354			
236 264	233 266	223 260	210 249	198 240			238 262	236 265	226 259	213 248	201 239			
89 437	88 438	79 410	69 373	61 344	18	TONS	90 442	90 448	81 419	70 382	62 353			
233 261	230 263	220 256	206 244	193 233			235 259	234 262	223 255	209 244	196 233			
89 438	87 437	79 409	68 371	60 342	23	TONS	90 443	89 448	80 418	70 381	61 351			
229 256	225 257	213 248	196 233	178 216			231 254	229 257	216 248	200 234	183 218			
FL 90										TONS	FL 80			
SAT ↘											SAT ↘			
-23	-13	-3	7	17	▼	TONS	-21	-11	-1	9	19			
90 446	90 452	83 430	72 393	64 364			90 449	90 456	84 440	74 403	65 373			
239 260	238 263	229 258	216 248	204 239			241 257	239 260	231 257	218 247	207 238			
90 446	90 452	82 429	72 392	63 363	18	TONS	90 450	89 455	84 439	73 402	65 372			
237 257	235 260	226 255	212 244	199 233			238 254	236 257	228 254	215 243	203 234			
90 447	89 451	82 428	71 391	62 360	23	TONS	90 450	89 455	83 438	73 401	64 370			
232 252	230 255	220 248	204 234	187 220			234 250	231 252	223 248	207 235	192 221			

For shaded values: IAS higher than V_{MO}

MAX CRUISE CRZ1										(FF: kg/h/eng)	TQ	FF	
										IAS	TAS		
FL 70					TONS ▼	FL 60							
SAT ▼						SAT ▼							
-19	-9	1	11	21		-17	-7	3	13	23			
90 453	89 459	86 449	75 413	66 383	14	90 457	89 463	87 459	76 423	68 393			
242 255	240 258	234 256	221 247	210 238		243 253	241 255	237 255	224 246	212 238			
90 454	89 459	85 448	74 411	65 380	23	90 458	89 463	86 457	76 421	67 390			
235 248	233 250	226 247	211 235	196 223		236 246	234 248	229 247	214 236	200 224			
FL 50					TONS ▼	FL 40							
SAT ▼						SAT ▼							
-15	-5	5	15	25		-13	-3	7	17	27			
90 460	90 467	88 469	78 433	69 402	14	90 465	90 472	89 474	80 446	71 415			
244 250	242 253	239 255	227 245	215 237		245 248	244 251	241 252	230 246	219 237			
90 461	90 468	88 467	77 431	68 400	23	90 466	90 473	88 473	79 445	70 413			
238 244	236 246	232 247	218 236	204 224		239 241	237 244	233 245	222 237	208 226			
FL 30					TONS ▼	FL 20							
SAT ▼						SAT ▼							
-11	-1	9	19	29		-9	1	11	21	31			
90 470	90 477	89 479	82 460	73 429	14	90 475	90 481	89 485	84 473	75 442			
247 246	245 248	242 250	234 246	222 238		248 243	246 246	243 248	237 246	226 238			
90 471	90 477	88 479	82 458	72 427	23	90 476	90 482	89 485	84 472	75 440			
240 239	238 242	235 243	226 238	213 227		242 237	240 240	237 241	230 238	217 229			
FL 10					TONS ▼	FL 0							
SAT ▼						SAT ▼							
-7	3	13	23	33		-5	5	15	25	35			
90 480	90 486	89 491	87 487	77 455	14	90 485	90 491	90 497	89 500	79 468			
249 241	247 244	245 246	241 246	229 238		250 239	248 241	246 244	244 246	233 238			
90 481	90 487	89 491	86 486	77 453	23	90 485	90 492	90 498	88 500	79 466			
243 235	241 238	238 239	234 239	221 229		244 233	242 236	240 238	237 239	225 230			

For shaded values: IAS higher than V_{MO}

MAX CRUISE CRZ2										(FF: kg/h/eng)	TQ	FF		
										IAS	TAS			
FL 250										TONS	FL 240			
SAT ↘											SAT ↘			
-55	-45	-35	-25	-15	▼	14	-53	-43	-33	-23	-13			
66 299	61 282	57 267	51 246	47 232			68 309	64 293	60 277	54 256	48 240			
185 258	178 254	171 249	161 240	151 231			189 259	182 255	175 251	165 242	155 233			
65 296	60 279	56 263			18	68 307	63 290	59 274	52 252					
176 246	166 238	156 228					181 249	172 242	162 233	147 216				
64 294	59 276				20	67 306	62 288	58 271						
168 234	155 223						174 239	163 230	150 216					
FL 230										TONS	FL 220			
SAT ↘											SAT ↘			
-51	-41	-31	-21	-11	▼	14	-49	-39	-29	-19	-9			
71 320	66 303	62 288	56 266	50 247			73 331	69 314	64 298	58 276	51 254			
193 260	186 257	179 253	170 245	159 234			197 261	190 258	183 254	174 246	163 235			
70 318	66 301	61 285	55 263		18	73 329	68 312	63 296	57 273	50 251				
186 251	178 246	168 238	154 223				191 253	183 248	174 241	161 228	144 208			
70 317	65 299	60 282			20	72 328	68 311	63 294	56 271					
180 243	170 235	158 224					186 247	176 239	165 229	148 211				
FL 210										TONS	FL 200			
SAT ↘											SAT ↘			
-47	-37	-27	-17	-7	▼	14	-45	-35	-25	-15	-5			
76 342	71 325	67 308	60 286	53 261			78 353	74 336	69 319	62 296	54 268			
201 262	194 259	187 255	178 248	166 236			204 262	198 260	191 256	182 249	169 236			
75 340	71 324	66 306	59 284	51 258	18	78 351	73 335	68 317	61 294	53 266				
195 255	188 250	179 244	167 232	149 213			199 256	192 252	184 247	172 236	154 216			
74 338	69 320	64 302			22	77 349	72 331	67 313						
184 241	173 232	160 219					190 244	180 237	167 225					

MAX CRUISE CRZ2										(FF: kg/h/eng)	TQ	FF
										IAS	TAS	
FL 190					TONS ▼	FL 180						
SAT ▼						SAT ▼						
-43	-33	-23	-13	-3		-41	-31	-21	-11	-1		
82	366	77	348	71	330	64	305	56	277		14	85 380 79 360 74 341 66 314 57 286
209	264	202	261	195	257	185	249	173	238			213 265 206 262 199 258 188 250 176 238
81	365	76	347	71	328	63	303	55	275		18	84 379 79 359 73 340 65 312 57 284
204	258	197	254	188	249	177	238	160	220			209 260 201 256 193 251 181 240 165 224
80	362	75	343	69	324						23	83 376 78 356 72 336
193	244	182	236	169	224							199 248 189 240 176 229
FL 170					TONS ▼	FL 160						
SAT ▼						SAT ▼						
-39	-29	-19	-9	1		-37	-27	-17	-7	3		
88	394	82	372	76	352	67	323	59	295		14	91 408 85 385 78 363 69 331 61 304
217	266	210	263	202	258	192	250	180	239			221 267 214 263 206 259 195 250 183 240
88	393	82	371	76	351	67	321	58	294		18	91 407 85 384 78 362 69 330 60 303
213	261	206	257	197	252	185	241	170	226			218 263 210 259 201 253 188 242 175 228
87	391	81	369	74	348	65	317				23	90 405 84 381 77 359 67 326
205	251	195	244	183	234	163	214					210 253 200 247 189 238 170 218
FL 150					TONS ▼	FL 140						
SAT ▼						SAT ▼						
-35	-25	-15	-5	5		-33	-23	-13	-3	7		
94	421	88	397	81	374	71	340	62	313		14	96 427 90 408 83 384 72 349 64 322
226	268	218	264	210	259	198	250	186	240			228 266 221 264 213 259 201 249 189 240
94	420	87	396	80	373	70	339	62	312		18	95 426 90 407 82 383 72 348 63 321
222	264	214	259	205	254	192	242	179	230			225 263 218 260 209 254 195 243 182 231
93	418	87	394	79	371	69	336				23	95 425 89 405 81 381 71 345 62 317
215	256	206	249	194	241	175	222					218 255 210 251 199 243 181 225 161 204

MAX CRUISE CRZ2										(FF: kg/h/eng)	TQ	FF
										IAS	TAS	
FL 130										TONS	FL 120	
SAT ↘										TONS	SAT ↘	
-31	-21	-11	-1	9	▼	-29	-19	-9	1	11		
97 432	92 419	85 394	74 358	65 330	14	98 438	95 430	86 403	76	367	67	339
230 265	224 264	216 259	204 249	192 239		233 264	228 264	219 258	207	249	195	239
97 432	92 418	84 393	74 357	65 329	18	98 438	94 429	86 403	75	367	66	338
227 262	221 260	212 254	199 243	186 232		230 261	225 260	215 254	202	243	189	232
96 432	91 416	83 391	73 355	63 326	23	98 438	94 427	85 401	74	364	65	335
222 255	214 252	203 244	186 227	167 208		225 255	218 253	207 245	190	229	172	211
FL 110										TONS	FL 100	
SAT ↘										TONS	SAT ↘	
-27	-17	-7	3	13	▼	-25	-15	-5	5	15		
99 444	97 441	88 413	77 377	68 348	14	101 451	99 452	90 423	79	386	70	356
235 263	231 263	222 258	209 248	198 239		238 262	234 263	225 257	212	248	201	238
99 445	97 440	88 413	77 376	68 347	18	101 451	99 451	90 422	78	385	69	355
232 260	228 260	218 254	205 243	192 232		235 259	231 260	221 254	208	243	196	232
99 445	96 439	87 411	76 374	67 344	23	101 452	98 450	89 421	78	383	68	353
228 254	222 254	211 246	194 231	177 214		231 254	226 254	215 246	199	232	182	216
FL 90										TONS	FL 80	
SAT ↘										TONS	SAT ↘	
-23	-13	-3	7	17	▼	-21	-11	-1	9	19		
101 454	99 455	92 433	81 396	71 366	14	101 457	100 459	94 443	82	406	73	376
239 259	236 261	227 257	215 247	204 238		240 257	237 259	230 256	218	247	207	238
101 454	99 455	92 432	80 395	71 365	18	101 457	99 459	93 442	82	405	73	375
236 257	233 258	224 253	211 243	199 233		238 254	235 256	227 253	214	243	202	233
101 455	99 454	91 431	80 393	70 363	23	101 458	99 459	93 441	81	403	72	373
232 252	228 252	218 246	203 233	187 219		233 250	230 251	221 246	206	234	191	221

For shaded values: IAS higher than V_{MO}

MAX CRUISE CRZ2					(FF: kg/h/eng)					TQ	FF
										IAS	TAS
FL 70					TONS	FL 60					
SAT ↘						SAT ↘					
-19	-9	1	11	21	▼	-17	-7	3	13	23	
101 460	100 463	95 453	84 416	74 386	14	101 463	100 468	97 462	86 426	76 396	
242 255	239 257	233 255	221 246	210 238		243 253	241 255	236 255	223 245	212 238	
101 461	100 463	95 451	83 414	73 383	23	101 464	100 468	96 461	85 424	75 393	
235 248	232 249	225 246	210 234	196 222		236 246	234 248	228 246	213 235	200 224	
FL 50					TONS	FL 40					
SAT ↘						SAT ↘					
-15	-5	5	15	25	▼	-13	-3	7	17	27	
101 466	101 473	99 472	87 436	78 405	14	101 470	101 477	99 477	90 450	80 419	
244 250	242 253	239 254	226 245	215 237		246 248	244 251	240 252	230 245	219 238	
101 467	101 473	98 471	87 434	77 403	23	101 471	101 478	99 476	89 448	79 417	
238 243	236 246	231 246	217 235	204 225		239 241	237 244	233 244	221 236	209 227	
FL 30					TONS	FL 20					
SAT ↘						SAT ↘					
-11	-1	9	19	29	▼	-9	1	11	21	31	
101 474	101 481	99 483	92 463	83 432	14	101 478	101 485	100 489	95 477	85 446	
247 246	245 248	242 250	234 246	223 238		248 244	246 246	243 248	237 246	226 239	
101 475	101 482	99 482	92 462	82 430	23	101 479	101 486	100 489	94 476	84 444	
240 239	238 242	234 242	225 237	213 228		242 237	239 240	236 241	229 238	217 229	
FL 10					TONS	FL 0					
SAT ↘						SAT ↘					
-7	3	13	23	33	▼	-5	5	15	25	35	
101 483	101 490	100 495	97 491	87 459	14	101 487	101 494	101 501	100 505	90 472	
249 241	247 244	245 246	241 246	230 239		250 239	248 242	246 244	244 246	233 239	
101 483	101 491	100 495	97 490	87 457	23	101 488	101 495	101 502	100 504	89 471	
243 235	241 238	238 239	233 239	222 230		244 233	242 236	240 238	237 239	226 231	

For shaded values: IAS higher than V_{MO}

LONG RANGE CRZ1 (FF = 50 X TAS/SR SR : NM/100 Kg)										T _o	SR
SAT >	FL 250			FL 240			FL 230			IAS	TAS
TONS	-55	-35	-15	-53	-33	-13	-51	-31	-11		
14	38 53.2	38 52.4	39 51.3	38 52.1	38 51.4	39 50.5	38 51.1	38 50.4	39 49.6		
	151 212	148 216	147 224	153 211	149 215	148 222	154 209	151 214	150 221		
16	43 49.6	44 48.5	42 47.7	43 48.8	44 47.8	43 47.0	43 47.9	44 47.0	45 46.1		
	155 217	154 225	144 220	157 216	155 223	149 223	159 215	156 221	153 226		
18	49 46.0	50 44.8		48 45.4	50 44.3		48 44.8	50 43.8	44 43.0		
	159 223	157 230		160 221	159 229		162 220	161 228	143 209		
20	54 42.4	51 41.5		54 42.1	53 41.3		55 41.7	56 40.8			
	162 227	148 217		164 226	156 225		167 226	164 232			
FL 220				FL 210			FL 200				
SAT >	-49	-29	-9	-47	-27	-7	-45	-25	-5		
14	38 50.0	38 49.5	39 48.7	38 49.0	39 48.6	40 47.8	38 48.0	38 47.7	39 47.0		
	155 207	153 212	152 219	157 206	154 211	153 218	158 204	155 209	155 216		
16	43 47.1	44 46.3	45 45.4	44 46.2	44 45.5	45 44.7	44 45.4	44 44.8	45 44.0		
	161 214	158 219	156 226	162 213	159 218	158 224	164 211	161 216	159 223		
20	55 41.3	56 40.3		54 40.8	56 39.9		54 40.3	56 39.5			
	169 225	167 232		171 223	168 230		172 221	170 229			
22	60 38.5	57 37.8		60 38.2	59 37.5		61 37.8	61 37.0			
	171 228	159 221		174 228	166 228		177 228	173 233			
FL 190				FL 180			FL 170				
SAT >	-43	-23	-3	-41	-21	-1	-39	-19	1		
14	38 46.9	38 46.7	39 46.0	38 45.9	38 45.7	39 45.1	38 44.9	38 44.7	39 44.2		
	160 203	157 208	156 214	161 201	158 206	157 212	162 199	159 204	157 209		
16	44 44.5	44 44.0	45 43.2	44 43.6	44 43.2	45 42.4	44 42.7	44 42.4	46 41.6		
	165 210	162 215	161 222	167 208	164 213	163 221	168 207	165 212	165 220		
20	54 39.8	56 39.0	49 38.2	54 39.2	56 38.4	50 37.9	54 38.5	56 37.9	52 37.4		
	173 220	172 228	151 208	175 218	174 226	157 213	177 217	175 224	163 217		
23	63 36.3	63 35.6		64 35.9	65 35.1		63 35.5	65 34.7			
	180 229	175 231		183 228	180 234		184 226	182 233			

LONG RANGE CRZ1/CRZ2 (FF = 50XTAS/SR SR : NM/100 Kg)											T ₀	SR
SAT >	FL 160 (CRZ1)			FL 150 (CRZ1)				FL 140 (CRZ1)				IAS
TONS▼	-37	-17	3	-35	-15	5	-33	-13	7			TAS
14	38 43.9 163 197	38 43.8 160 202	39 43.3 158 207	38 42.9 164 195	38 42.9 161 200	38 42.5 158 204	38 41.8 165 194	38 41.8 163 199	38 41.4 159 202			
16	44 41.8 170 205	44 41.6 167 210	46 40.9 167 218	44 41.0 171 204	44 40.8 168 208	45 40.2 168 216	44 40.0 172 202	44 39.9 169 206	45 39.3 168 213			
20	54 37.9 179 216	55 37.3 177 223	53 36.8 168 220	54 37.3 181 215	56 36.7 179 222	55 36.2 173 223	54 36.6 182 214	56 36.1 181 221	56 35.4 178 225			
23	63 35.1 185 224	65 34.4 183 231		63 34.6 187 222	64 34.0 185 229			63 34.1 188 221	64 33.5 186 227	56 32.8 163 207		
FL 130 (CRZ1)				FL 120 (CRZ1)				FL 110(CRZ1)				
SAT >	-31	-11	9	-29	-9	11	-27	-7	13			
14	39 40.8 167 193	39 40.8 164 198	38 40.5 161 200	39 39.7 169 193	39 39.8 166 197	38 39.5 162 199	40 38.7 172 193	40 38.8 169 197	39 38.6 164 198			
16	44 39.1 173 200	44 39.0 170 204	44 38.5 168 210	44 38.3 174 198	43 38.1 171 202	44 37.7 168 207	44 37.4 176 197	43 37.3 172 200	44 36.9 169 204			
20	55 35.9 184 213	56 35.4 183 219	57 34.8 180 224	55 35.2 186 211	56 34.8 184 218	57 34.2 182 223	54 34.5 187 210	56 34.1 186 217	57 33.5 184 222			
23	62 33.5 190 219	64 32.9 188 226	57 32.5 169 211	63 32.9 192 218	64 32.4 190 225	58 32.0 174 213	63 32.4 194 217	64 31.9 192 223	60 31.6 178 216			
FL 100 (CRZ2)				FL 90 (CRZ2)				FL 80 (CRZ2)				
SAT >	-25	-5	15	-23	-3	17	-21	-1	19			
14	39 39.6 164 181	40 39.2 162 186	41 38.6 161 191	39 38.6 161 180	40 38.3 164 186	41 37.7 162 190	40 37.6 168 180	41 37.3 166 185	41 36.8 164 189			
16	44 36.6 177 196	43 36.5 173 199	44 36.1 170 202	45 35.6 180 196	44 35.6 175 198	44 35.3 172 201	45 34.7 182 195	45 34.7 178 198	44 34.5 173 200			
20	54 33.9 188 208	56 33.5 187 214	57 32.9 186 221	54 33.1 190 206	55 32.9 187 212	57 32.3 187 219	54 32.4 191 205	55 32.2 188 209	57 31.7 187 216			
23	63 31.8 195216	64 31.4 194 222	61 31.0 183 218	63 31.2 197 214	64 30.8 196 221	62 30.5 187 220	63 30.7 199 213	65 30.2 198 220	64 29.9 192 221			

LONG RANGE CRZ2 (FF = 50 X TAS/SR SR : NM/100 Kg)										T ₀	SR
SAT >	FL 70			FL 60			FL 50			IAS	TAS
TONS ✓	-19	1	21	-17	3	23	-15	5	25		
14	40 36.7	41 36.4	41 36.0	41 35.8	42 35.5	41 35.1	41 34.9	42 34.6	41 34.3		
	170 179	168 184	165 187	172 179	170 184	166 186	174 179	172 184	168 185		
16	45 35.3	46 35.0	47 34.4	45 34.5	46 34.2	48 33.6	46 33.7	46 33.4	48 32.9		
	175 185	172 189	172 196	176 184	174 188	174 194	178 183	176 187	175 193		
20	57 32.5	58 31.9	60 31.3	56 31.9	58 31.3	59 30.8	56 31.3	58 30.8	59 30.3		
	186 196	184 202	184 209	187 194	185 200	184 205	188 192	187 199	184 203		
23	67 30.4	69 29.8	72 29.1	67 29.9	68 29.3	72 28.7	67 29.4	68 28.8	71 28.3		
	195 206	193 212	193 220	196 204	194 210	195 218	198 203	195 208	196 217		
FL 40			FL 30			FL 20					
SAT >	-13	7	27	-11	9	29	-9	11	31		
14	42 33.9	43 33.6	42 33.4	43 32.9	43 32.7	42 32.5	44 32.0	43 31.8	43 31.6		
	176 178	174 183	170 185	179 178	176 182	172 184	181 178	177 181	173 183		
16	45 35.3	46 35.0	47 34.4	45 34.5	46 34.2	48 33.6	46 33.7	46 33.4	48 32.9		
	175 185	172 189	172 196	176 184	174 188	174 194	178 183	176 187	175 193		
20	57 32.5	58 31.9	60 31.3	56 31.9	58 31.3	59 30.8	56 31.3	58 30.8	59 30.3		
	186 196	184 202	184 209	187 194	185 200	184 205	188 192	187 199	184 203		
23	67 30.4	69 29.8	72 29.1	67 29.9	68 29.3	72 28.7	67 29.4	68 28.8	71 28.3		
	195 206	193 212	193 220	196 204	194 210	195 218	198 203	195 208	196 217		
FL 10			FL 0								
SAT >	-7	13	33	-5	15	35					
14	45 31.1	43 31.0	43 30.8	45 30.2	43 30.2	43 30.0					
	184 178	178 179	174 181	186 178	178 176	176 180					
16	49 30.3	48 30.1	48 29.8	50 29.5	49 29.3	48 29.1					
	189 183	184 185	181 188	191 183	186 185	182 187					
20	58 28.7	59 28.3	61 27.9	58 28.1	59 27.7	61 27.3					
	195 189	194 195	193 201	197 189	196 194	196 200					
23	65 27.3	67 26.9	69 26.5	65 26.8	67 26.4	69 26.0					
	202 195	199 200	200 207	203 194	201 199	201 206					

WIND EFFECT IN LONG RANGE CRUISE

CORRECTION TO LONG RANGE CRUISE SPEED	
TAILWIND (Every 25 kt wind speed)	-3%
HEADWIND (Every 25 kt wind speed)	+4%
Minimum Speed for Long Range = Maximum Endurance Speed. Maximum Speed for Long Range = Maximum Cruise Speed (or V_{MO}).	

WIND CONSIDERATION IN LRC FOR FLIGHT LEVEL SELECTION

		SPECIFIC RANGE (NM/100 KG, ISA, 12000 KG, BASELINE)						
		FLIGHT LEVEL ↘						
WIND SPEED (KT) ↘		0	50	100	150	200	250	300
TAILWIND	80	46.0	52.0	59.1	64.7	71.8	78.4	82.8
	40	38.6	43.9	50.0	54.7	61.2	67.4	72.0
WIND CALM	0	31.1	35.8	41.0	44.7	50.6	56.3	61.1
HEADWIND	40	23.7	27.7	32.0	34.7	40.0	45.3	50.2
	80	16.2	19.6	22.9	24.7	29.4	34.3	39.3

SPECIFIC RANGE CORRECTION BY WEIGHT (NM/100 KG, ISA)

12000 KG (BASELINE)	20.0	30.0	40.0	50.0	60.0	70.0	80.0
18000 KG	19.5	27.6	35.8	42.7	50.1	55.3	59.6
23000 KG	18.4	25.6	32.7	37.8	43.1	46.6	49.7

SPECIFIC RANGE CORRECTION BY ISA DEVIATION

ISA – 20°C	+3%
ISA + 20°C	-5%

MAXIMUM ENDURANCE CRZ2 (FF: Kg/h/eng)												T _Q	FF	
SAT >	FL 170				FL 160				FL 150				IAS	TAS
TONS\Y	-39	-19	1		-37	-17	3		-35	-15	5			
14	28 169	29 177	30 187	27 170	28 178	30 188	27 170	28 179	29 189					
	122 151	122 157	122 163	122 149	122 154	122 161	122 146	122 152	122 158					
16	34 189	35 200	37 212	33 189	35 201	36 212	32 190	34 201	35 212					
	131 162	131 168	131 174	131 159	131 165	130 171	131 156	131 163	130 169					
20	47 237	49 252	52 269	46 236	48 252	51 268	46 236	48 251	50 266					
	146 181	146 188	146 195	146 178	146 185	146 192	146 175	146 182	146 189					
23	58 276	61 296		57 275	60 294		56 274	59 293						
	157 194	157 202		157 191	157 198		157 187	157 195						
FL 140				FL 130				FL 120						
TONS\Y	-33	-13	7		-31	-11	9		-29	-9	11			
14	26 172	27 180	29 190	26 174	27 182	28 192	26 177	27 184	28 193					
	122 144	122 150	122 155	122 142	122 147	122 153	122 140	122 145	122 150					
16	32 191	34 203	35 213	31 193	33 204	34 215	31 195	32 205	34 216					
	131 154	131 160	130 166	131 151	131 158	130 163	131 149	131 155	130 161					
20	45 236	47 252	49 266	44 237	46 252	48 267	43 238	45 252	47 267					
	146 172	146 179	146 186	146 170	146 176	146 183	146 167	146 173	146 180					
23	55 274	58 292	60 311	54 274	57 291	59 310	54 274	56 291	58 309					
	157 185	157 192	157 199	157 182	157 189	157 196	157 179	157 186	157 193					
FL 110				FL 100				FL 90						
TONS\Y	-27	-7	13		-25	-5	15		-23	-3	17			
14	25 179	26 186	27 195	25 181	26 189	27 197	25 184	26 192	27 200					
	122 137	122 143	122 148	122 135	122 140	122 145	122 133	122 138	122 143					
16	31 197	32 206	33 217	30 199	31 208	33 219	30 201	31 210	32 221					
	131 147	131 153	130 158	131 145	130 150	130 156	131 142	131 148	130 153					
20	43 238	44 252	46 267	42 239	44 253	46 267	41 241	43 254	45 268					
	146 164	146 171	146 177	146 162	146 168	146 174	146 159	146 165	146 171					
23	53 274	55 291	57 308	52 274	54 291	56 308	51 275	53 291	55 308					
	157 176	157 183	157 190	157 174	157 180	157 187	157 171	157 177	157 184					

MAXIMUM ENDURANCE CRZ2 (FF: Kg/h/eng)												T _Q	FF
SAT >	FL 80			FL 70				FL 60				IAS	TAS
TONS\Y	-21	-1	19	-19	1	21	-17	3	23				
14	25 187	25 194	26 203	24 190	25 197	26 205	24 193	25 200	26 208				
	122 131	122 136	122 141	122 129	122 134	122 139	122 127	122 132	122 137				
16	30 204	31 213	32 223	29 207	30 215	31 225	29 210	30 218	31 227				
	131 140	130 146	130 151	130 138	130 143	130 148	130 136	130 141	130 146				
20	41 243	42 256	44 269	40 244	42 257	43 270	39 246	41 259	43 271				
	146 157	146 163	146 169	146 155	146 160	146 166	146 152	146 158	146 163				
23	50 276	52 292	54 308	49 277	51 292	53 309	49 278	51 293	52 309				
	157 168	157 175	157 181	157 166	157 172	157 178	157 163	157 169	156 175				
FL 50				FL 40				FL 30					
SAT >	-15	5	25	-13	7	27	-11	9	29				
14	24 195	25 202	25 211	24 199	24 206	25 214	23 201	24 209	25 217				
	122 125	122 130	122 135	122 124	122 128	122 133	122 122	122 126	122 130				
16	29 213	30 221	31 230	28 216	29 224	30 233	28 219	29 227	30 236				
	130 134	130 139	130 144	130 132	130 137	130 142	130 130	130 135	130 140				
20	39 248	40 260	42 273	38 251	40 263	41 275	38 254	39 266	41 278				
	146 150	146 156	146 161	146 148	146 153	146 158	146 146	146 151	146 156				
23	48 279	50 294	52 309	47 282	49 296	51 310	46 284	48 298	50 312				
	157 161	157 167	156 173	157 159	157 164	156 170	157 156	156 162	156 167				
FL 20				FL 10				FL 0					
SAT >	-9	11	31	-7	13	33	-5	15	35				
14	23 205	24 212	25 221	23 208	23 215	24 224	22 211	23 218	24 228				
	122 120	122 124	122 129	122 118	122 122	122 127	122 116	122 121	122 125				
16	28 223	29 230	30 240	27 226	28 233	29 243	27 229	28 236	29 246				
	130 128	130 133	130 138	130 126	130 131	130 136	130 125	130 129	130 133				
20	37 258	39 269	40 281	37 261	38 272	40 283	37 265	38 275	39 286				
	146 144	146 149	146 154	146 142	146 147	146 152	146 139	146 144	146 149				
23	46 286	48 300	49 314	45 289	47 303	48 317	44 291	46 305	48 319				
	157 154	156 160	156 165	156 152	156 157	156 162	157 150	156 155	156 160				

ENGINE ANTI-ICE EFFECT IN MAX. ENDURANCE CRUISE

EFFECT OF ENGINE ANTI-ICE			
Δ SPEED (KIAS)	Δ FUEL FLOW (KG/H/ENGINE)	Δ SPECIFIC RANGE (NM/100KG)	Δ TORQUE (%)
0	+20	-2.5	-10

Torque reduction is only due to increment in propeller rpm setting:
 For Engine Anti-ice OFF: Use CRZ2 (80%).
 For Engine Anti-ice ON: Use CRZ1 (90%).

BANK ANGLE EFFECT IN MAX. ENDURANCE CRUISE

FUEL FLOW INCREMENT BY BANK ANGLE			
BANK ANGLE (DEG)	10°	20°	30°
Δ FUEL FLOW (%)	+1.5	+7.0	+15.5

HOLDING

HOLDING	2 ENGINES	MAX. ENDURANCE
T _Q , FF, IAS, TAS: Use Tables for Max. Endurance Cruise.		

DESCENT, APPROACH AND LANDING

DESCENT WITH 2 ENGINES TO SEA LEVEL

 Kg
NM min

180 KIAS Constant R/D	R/D (fpm) ▼	ALTITUDE (x100 FT) ▼						Every 1000 Ft of Landing Altitude
		300	250	200	150	100	20	
1200	141 94 25	119 75 21	97 58 17	74 41 13	51 27 8	11 5 2	6 -6	Every 1000 Ft of Landing Altitude
1600	89 71 19	76 56 16	63 43 13	49 31 9	34 20 6	7 4 1	-3 -0.8 -4 -0.6	Every 1000 Ft of Landing Altitude

200 KIAS HIGH - FI	WEIGHT (KG) ▼	ALTITUDE (x100 FT) ▼						Every 1000 Ft of Landing Altitude
		300	250	200	150	100	20	
12000	46 43 10	40 34 9	35 27 7	28 20 5	20 13 4	4 2 1	-2 -1 -0.4	Every 1000 Ft of Landing Altitude
17000	61 56 14	53 46 12	46 36 10	38 27 7	27 18 5	5 3 1	-3 -2 -0.5	Every 1000 Ft of Landing Altitude
22000	72 66 16	63 54 14	55 43 11	44 32 9	32 21 6	7 4 1	-3 -2 -0.6	Every 1000 Ft of Landing Altitude

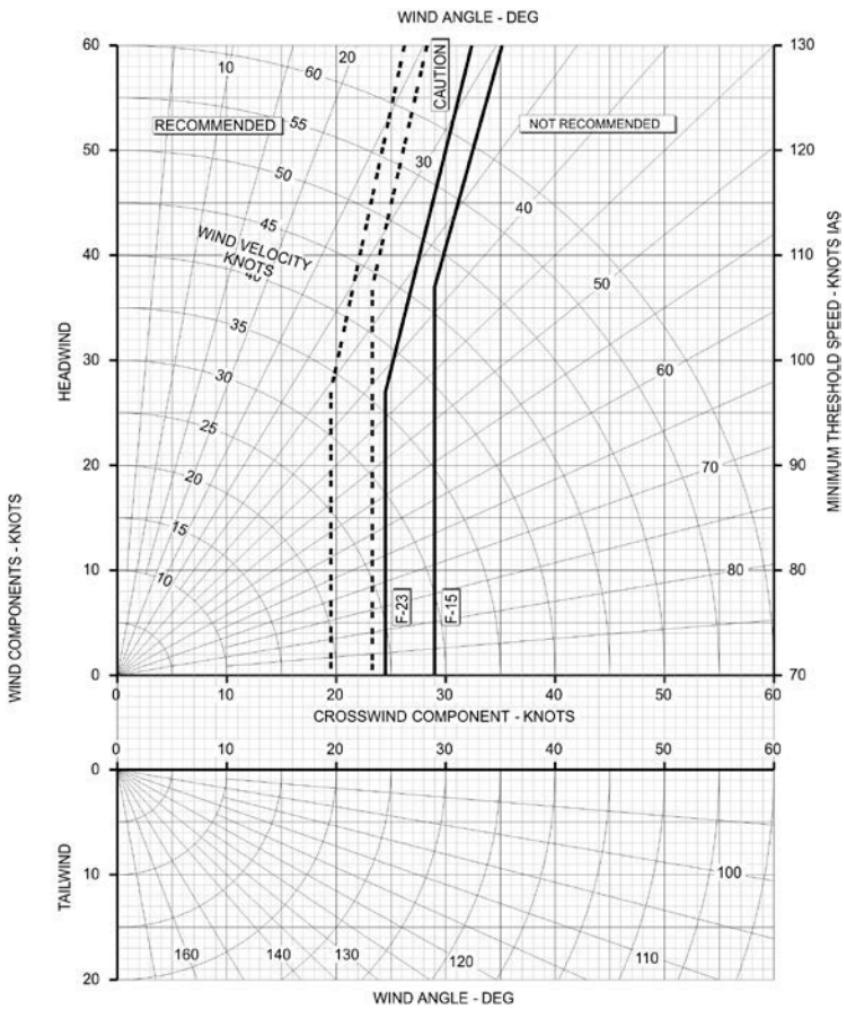
200 KIAS LOW - FI	WEIGHT (KG) ▼	31 38 9	25 30 8	21 23 6	17 17 5	12 11 3	3 2 1	Every 1000 Ft of Landing Altitude
		300	250	200	150	100	20	
12000	42 51 12	34 40 10	29 31 8	23 23 6	17 15 4	17 15 4	3 3 1	Every 1000 Ft of Landing Altitude
17000	49 60 15	41 48 12	34 38 10	28 28 8	28 18 5	20 18 5	4 3 1	Every 1000 Ft of Landing Altitude
22000	20 28 6	16 21 5	13 16 3	10 12 3	7 8 2	2 2 0	-1 -1 -0.2	Every 1000 Ft of Landing Altitude

V _{MO} LOW - FI	WEIGHT (KG) ▼	28 38 8	22 29 6	18 22 5	14 16 4	10 11 3	2 2 1	Every 1000 Ft of Landing Altitude
		300	250	200	150	100	20	
12000	28 38 8	22 29 6	18 22 5	14 16 4	10 11 3	2 2 1	-1 -1 -0.3	Every 1000 Ft of Landing Altitude
17000	34 46 10	27 36 8	22 28 6	18 21 5	13 14 3	3 3 1	-2 -1 -0.3	Every 1000 Ft of Landing Altitude
22000	20 28 6	16 21 5	13 16 3	10 12 3	7 8 2	2 2 0	-1 -1 -0.2	Every 1000 Ft of Landing Altitude

Weights at Top of Descent.

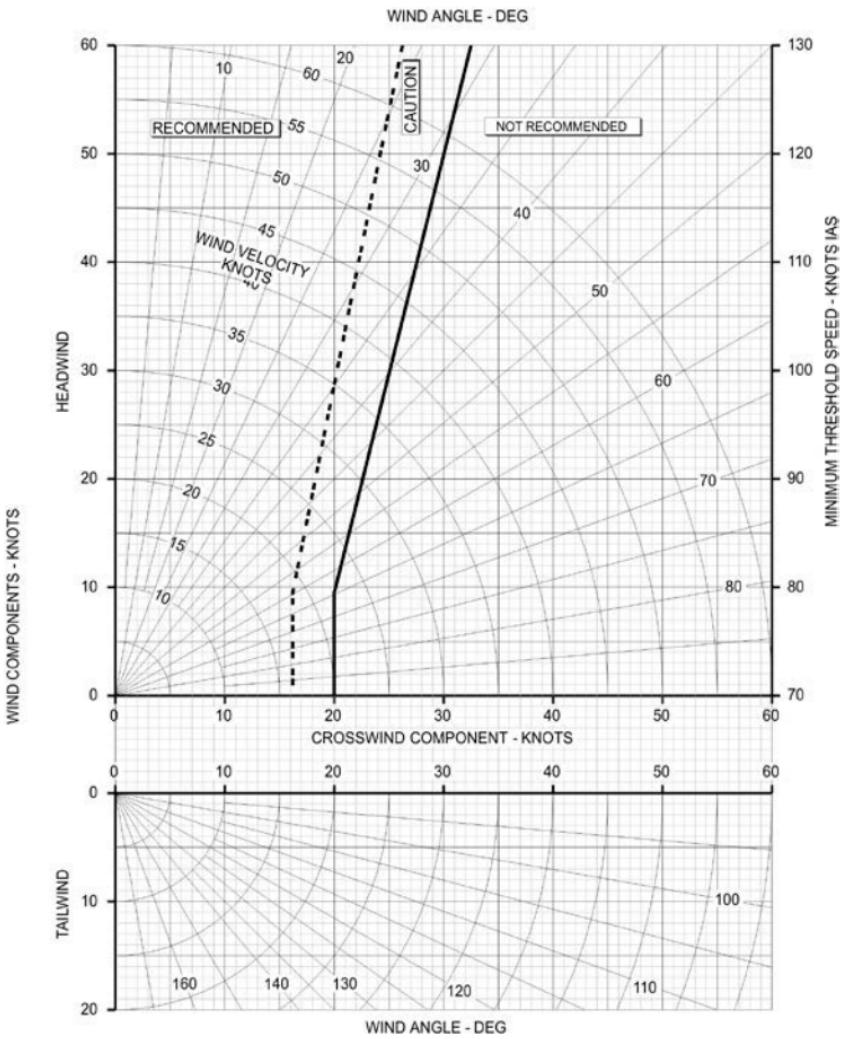
WIND COMPONENTS AND CROSSWIND LIMITATIONS

NORMAL LANDING



WIND COMPONENTS AND CROSSWIND LIMITATIONS

SHORT FIELD LANDING



FOR CROSSWIND : MAX $\Delta VTH = 15$ kts

APPROACH & LANDING SPEEDS

$V_{MAN} = V_{APP} + 10$ $V_{APP} = V_{REF} + \Delta V_{FLAP} + \Delta V_{ICE} + ADD$ $V_{TH} = V_{REF} + \Delta V_{FLAP} + \Delta V_{ICE} + ADD$	ΔV_{FLAP}		1 Kt every flap degree under 25°.
	ΔV_{ICE}		15 Kt for all flap settings.
	ADD (MAX 15 Kt)	1 ENGINE	5 Kt
		WIND	Headwind (1/2 Steady Wind + Gust)

NORMAL LANDING 2 ENGINES												
WEIGHT ➤ (× 1000 Kg)	12	13	14	15	16	17	18	19	20	21	22	23.2
V_2 (F10° [1.13])	109	108	106	105	104	106	109	112	115	117	120	123
V_{MAN} (F15°)	106	110	113	116	120	123	126	129	132	134	137	140
V_{APP} (F15°)	96	100	103	106	110	113	116	119	122	124	127	130
V_{REF} (F23°)	86	90	93	96	100	103	106	109	112	114	117	120

▼ ▼ ▼ ▼

OAT (°C) \ ALT. (Ft)	-10	0	15	40	Min. V_{TH} (V_{MCL})
SL	99	98	97	93	
1000	98	97	96	92	
2000	97	96	95	90	
3000	96	95	94	88	
Min. $V_{APP} = \text{Min. } V_{TH} + 5 \text{ KIAS}$					

SHORT FIELD LANDING 2 ENGINES												
WEIGHT ➤ (× 1000 Kg)	12	13	14	15	16	17	18	19	20	21	22	23.2
V_{MAN} (F15°)	100	103	106	109	112	115	117	120	123	125	128	131
V_{APP} (F15°)	90	93	96	99	102	105	107	110	113	115	118	121
V_{REF} (F23°)	80	83	86	89	92	95	97	100	103	105	108	111

LANDING DISTANCE (FT)

		Landing Distance from 50 ft over threshold using Reverse															
FLAP	RUNWAY	LANDING WEIGHT (x 1000 Kg)															
		12	14	16	17	18	19	20	21	22	23.2						
23°	DRY	2015	2015	2090	2160	2220	2285	2355	2425	2500	2590						
	WET	2195	2195	2285	2375	2450	2540	2625	2710	2805	2930						
15°	DRY	2215	2215	2300	2375	2440	2515	2590	2665	2750	2850						
	WET	2445	2445	2555	2645	2725	2820	2930	3015	3110	3225						
10°	DRY	2315	2315	2405	2485	2550	2625	2705	2790	2875	2975						
	WET	2570	2570	2685	2785	2875	2965	3055	3180	3275	3400						
0°	DRY	2515	2515	2610	2700	2775	2855	2935	3030	3125	3235						
	WET	2830	2830	2945	3050	3160	3255	3350	3455	3625	3750						
(Assumed Conditions: ISA and SL)						Runway Values Not Factorized.											
Corrections above SL / ISA:																	
ALTITUDE: Add 40 ft every 1000 ft of airfield altitude.																	
OAT: Add 50 ft every 10°C increment above 15°C.																	
Without Reverse: Add 200 ft.																	

CLIMB WITH 1 ENGINE INOPERATIVE

SINGLE-ENGINE CLIMB SPEED ($V_{CLIMB} = 1.24 V_{SR}$)

WEIGHT (1000 KG)	12	14	16	18	20	22	23
SPEED (KIAS)	107	115	123	131	138	144	148

ALTITUDE FOR MAX. RANGE → MAX. ALT. (CRUISE CEILING)

CEILINGS WITH 1 ENGINE INOPERATIVE ($\times 1000 \text{ FT}$)

WEIGHT \triangleright ($\times 1000 \text{ KG}$)		12	14	16	18	20	22	23
SERVICE (100fpm)	ISA	27.5	23.2	19.5	16.2	13.0	10.0	8.6
	ISA+20°C	24.2	19.8	16.0	12.2	8.7	5.6	4.0
CRUISE (300fpm)	ISA	24.0	19.8	16.0	12.5	9.2	6.2	4.7
	ISA+20°C	20.7	16.2	12.0	8.2	4.6	1.2	-0.5

Ceilings with ECS OFF are obtained reducing 5% the weight before using this table.

DESCENT WITH 1 ENGINE INOPERATIVE

SINGLE-ENGINE DESCENT TO SEA LEVEL

Kg
NM min

170 KIAS HIGH FI	WEIGHT (KG) \triangleright	ALTITUDE ($\times 100 \text{ FT}$) \triangleright						Every 1000 Ft of Landing Altitude
		250	200	150	100	60	20	
	12000	25 34	22 10	18 27	13 6	8 13	3 4	-1 -1 -0.4
	17000	37 50	32 15	26 39	18 12	11 6	4 4	-2 -2 -0.6
	22000	44 60	38 18	31 47	22 14	14 8	5 4	-2 -2 -0.8

Weights at Top of Descent.

DRIFTDOWN 1 ENGINE MCT 100%N _P A/I OFF												
INITIAL FL ▼	WEIGHT ▷ (x1000 Kg)	13	14	15	16	17	18	19	20	21	22	23
	KIAS ▷ ▼ OAT (°C)	111	115	119	123	127	131	134	138	141	144	148
300	-35	26.2	24.2	22.3								
	-45	27.7	25.7	23.8								
	-55	29.0	27.1	25.3	23.5							
280	-31	26.1	24.1	22.2	20.4							
	-41	27.5	25.6	23.8	22.0							
	-51		27.0	25.2	23.5	21.8						
260	-27		24.0	22.2	20.4							
	-37	26.0	25.4	23.7	21.9	20.3						
	-47			25.0	23.4	21.8	20.2					
240	-23			22.0	20.3	17.0						
	-33		24.0	23.5	21.8	20.2	18.6					
	-43				23.2	21.7	20.1	18.7	17.2			
220	-19				20.2	18.6	17.0					
	-29		22.0		21.6	20.1	18.6	17.1	15.6			
	-39					21.5	20.1	18.6	17.2	15.8		
200	-15					18.4	16.9	15.4				
	-25		20.0				18.4	17.0	15.6	14.1		
	-35							18.5	17.1	15.7	14.4	
180	-11						16.8	15.3	13.8	12.3		
	-21		18.0					16.8	15.5	14.1	12.7	11.4
	-31								17.0	15.6	14.3	13.0
160	-7							15.1	13.7	12.3	10.9	-
	-17		16.0						15.3	14.0	12.6	11.3
	-27									15.4	14.2	13.0
140	-3						LEVEL-OFF		13.5	12.1	10.8	9.4
	-13		14.0				ALTITUDE (*)				12.5	11.2
	-23						(x 1000 FT)					12.8

(*) Level-off Altitude on this table is Absolute Ceiling.

For Service Ceiling or Cruise Ceiling see table in previous page.

LONG RANGE CRUISE - 1 ENGINE MCT

CORRECTION TO LONG RANGE CRUISE SPEED - SINGLE-ENGINE									
TAILWIND (Every 25 kt wind speed)								-1.5%	
HEADWIND (Every 25 kt wind speed)								+2.5%	
Minimum Speed for Long Range = Maximum Endurance Speed. Maximum Speed for Long Range = Maximum Cruise Speed.									

LONG RANGE 1 ENGINE MCT (FF = 100XTAS/SR SR: NM/100KG) T_Q SR IAS TAS									
	FL 230			FL 220			FL 210		
SAT TONS	-51	-31	-11	-49	-29	-9	-47	-27	-7
14	58 56.8 133 181	59 55.4 131 186	-	57 56.6 133 178	58 55.4 132 184	-	56 56.3 134 176	58 55.2 133 182	56 54.0 125 179
16	68 49.7 138 188	-	-	67 50.1 139 186	-	-	66 50.3 140 184	-	-
	FL 200			FL 190			FL 180		
SAT TONS	-45	-25	-5	-43	-23	-3	-41	-21	-1
14	56 55.9 135 174	58 54.9 134 180	58 53.7 131 184	55 55.3 136 173	57 54.4 135 179	60 53.0 134 185	55 54.5 137 172	57 53.8 136 177	59 52.5 135 183
16	66 50.2 141 183	67 48.9 138 186	-	65 50.0 142 181	68 48.7 141 187	-	65 49.8 143 179	67 48.7 142 185	-
18	76 44.6 145 188	-	-	76 44.7 148 188	-	-	75 44.9 149 186	-	-
	FL 170			FL 160			FL 150		
SAT TONS	-39	-19	+1	-37	-17	+3	-35	-15	+5
14	55 53.7 138 170	57 53.0 137 176	58 52.0 135 181	55 52.9 139 169	57 52.3 138 175	58 51.3 136 179	54 52.2 139 166	56 51.5 139 173	58 50.7 137 177
16	64 49.4 144 177	67 48.5 143 183	64 47.5 134 179	64 49.0 144 175	66 48.1 144 182	67 47.1 140 184	63 48.5 146 174	66 47.7 145 180	68 46.5 144 185
18	75 44.9 150 184	74 43.9 144 185	-	74 44.8 151 183	77 43.6 149 188	-	73 44.6 151 181	76 43.5 150 187	-

LONG RANGE 1 ENGINE MCT (FF = 100XTAS/SR SR: NM/100KG)										T ₀	SR
SAT>	FL 140			FL 130			FL 120			IAS	TAS
TONS	-33	-13	+7	-31	-11	+9	-29	-9	+11		
14	54 51.3 139 164	56 50.5 140 171	57 49.8 138 175	53 50.4 140 162	56 49.6 141 170	57 49 139 174	53 49.5 140 160	55 48.7 141 167	57 48.1 140 172		
16	63 47.8 147 173	65 47.1 146 178	68 46.0 144 183	63 47.0 148 171	65 46.4 147 177	67 45.4 145 181	63 46.2 149 170	65 45.6 148 176	66 44.8 146 179		
18	73 44.2 152 179	75 43.3 151 185	-	72 43.8 153 177	75 43 152 183	73 42.2 145 181	72 43.3 154 176	74 42.6 153 182	75 41.7 150 185		
20	83 40.6 158 186	82 39.7 151 185	-	82 40.4 159 184	85 39.3 157 190	-	82 40.2 159 182	85 39.2 158 188	-		
23	-	-	-	97 35.5 163 189	-	-	98 35.4 168 191	-	-		
FL 110				FL 100				FL 90			
SAT>	-27	-7	+13	-25	-5	+15	-23	-3	+17		
14	53 48.5 141 159	54 47.9 140 164	57 47.2 141 171	53 47.6 142 158	53 47.1 140 161	57 46.4 142 169	53 46.5 143 156	52 46.3 140 158	56 45.5 142 167		
16	62 45.5 149 167	65 44.9 149 174	66 44.2 147 178	61 44.8 149 165	64 44.2 150 172	66 43.5 148 176	61 44.0 149 163	64 43.3 151 170	65 42.8 148 174		
18	71 42.7 155 174	74 42.1 154 180	77 41 153 185	71 42.1 156 173	74 41.5 155 178	76 40.6 153 183	71 41.4 157 171	74 40.9 156 177	75 40.1 154 181		
20	81 39.9 160 180	84 39.0 159 186	-	81 39.5 161 179	83 38.8 160 184	79 38.0 150 178	80 39.0 162 177	83 38.4 161 183	82 37.7 156 183		
23	97 35.4 169 189	-	-	96 35.4 169 187	93 34.6 159 183	-	95 35.2 170 185	97 34.5 166 188	-		

LONG RANGE 1 ENGINE MCT (FF = 100XTAS/SR SR: NM/100KG)										T ₀	SR
SAT>	FL 80			FL 70			FL 60			IAS	TAS
TONS	-21	-1	+19	-19	+1	+21	-17	+3	+23		
14	53 45.5 144 155	52 45.4 140 156	55 44.7 142 165	53 44.6 145 154	52 44.5 142 156	55 43.8 142 162	53 43.6 146 152	53 43.5 143 155	54 43 142 159		
16	60 43.2 149 160	64 42.6 151 168	65 42.1 149 173	59 42.4 149 158	62 41.9 150 165	65 41.4 150 171	59 41.7 150 156	61 41.2 149 162	64 40.6 151 169		
20	80 38.5 163 176	82 37.9 162 181	85 37.1 160 185	80 37.9 165 174	82 37.4 163 179	84 36.6 162 184	79 37.4 166 173	82 36.9 164 178	84 36.2 163 182		
23	94 35.0 171 184	98 34.2 170 190	-	94 34.7 172 182	97 34.0 171 188	-	93 34.4 173 180	97 33.7 172 186	-		
FL 50				FL 40			FL 30				
SAT>	-15	+5	+25	-13	+7	27	-11	+9	29		
14	53 42.7 147 151	53 42.6 145 154	53 42.2 143 158	53 41.6 148 149	53 41.6 146 153	53 41.3 144 156	53 40.7 149 148	53 40.6 147 152	53 40.5 144 154		
16	58 40.9 151 155	60 40.5 149 159	64 40.0 151 167	58 40.0 151 153	59 39.7 150 157	63 39.2 152 165	58 39.2 152 152	59 38.9 150 156	63 38.4 152 163		
20	79 36.8 167 171	82 36.3 166 177	83 35.8 163 180	79 36.1 168 170	81 35.7 166 175	82 35.3 164 178	78 35.5 168 168	81 35.1 167 173	81 34.7 165 177		
23	93 34.1 174 179	96 33.4 173 184	91 32.9 162 179	92 33.6 175 177	95 33.0 173 182	94 32.6 168 183	92 33.1 176 176	94 32.6 174 180	97 32.0 173 185		
FL 20				FL 10			FL 0				
SAT>	-9	+11	+31	-7	+13	+33	-5	+15	+35		
14	53 39.7 149 147	53 39.7 148 151	53 39.6 145 153	53 38.8 150 146	54 38.8 149 149	53 38.8 146 152	53 37.9 151 144	54 37.9 150 148	53 37.9 147 151		
16	58 38.4 153 151	59 38.1 151 154	62 37.7 153 161	58 37.6 154 149	59 37.4 152 153	61 37.0 153 159	58 36.8 155 148	59 36.6 153 152	61 36.3 154 157		
20	77 34.9 168 166	81 34.5 168 172	81 34.2 166 175	77 34.3 169 163	80 33.9 169 170	81 33.7 167 173	76 33.7 168 161	79 33.3 169 168	80 33.1 167 172		
23	91 32.6 177 174	94 32.1 175 179	97 31.6 174 184	91 32.1 178 173	94 31.7 176 177	96 31.2 175 182	91 31.6 180 172	93 31.2 178 176	95 30.8 175 180		

APPROACH & LANDING SPEEDS

Approach & Landing Speeds with 1 Engine

Speed (KIAS): Use Table for Approach & Landing Speeds. PD-41

LANDING DISTANCE (FT)

Landing Distance from 50 ft over threshold without Reverse

Distance (ft): Use Table for Landing Distance. PD-42