N2130L

1976 Beech 58TC Baron

Performance Data

Aircraft S/N: TK-25

Prepared by the worldwide aviation specialists at RidgeAire, Inc.

SECTION V
PERFORMANCE

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INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

All airspeeds quoted in this section are indicated airspeeds (IAS) except as noted and assume zero instrument error.

The graphs and tables in this section present performance information for takeoff, climb, landing and flight planning at various parameters of weight, power, altitude, and temperature. All FAA approved performance information is included in this section. Examples are presented on all performance graphs. In addition, the calculations for flight time, block speed, and fuel required are presented using the conditions listed.

Performance at a take-off weight of 5995 lbs (Baron 58TCA) will be equal to or better than that of the higher weight Baron 58TC.

CONDITIONS

At Billings:

Outside Air Temperature	25°C (77°F)
Field Elevation	3606 feet
Altimeter Setting	29.56 in. Hg
Wind	360° at 10 knots
Runway 34 Length	5585 feet

Route of Trip:

BIL-V19-CZI-V247-DGW-V19E-CYS-V19-DEN

Weather conditions IFR for cruise altitude of 17,000 feet

ROUTE SEGMENT	DIST NM	MEA FEET	WIND 17,000 FEET DIR/KTS	OAT 17,000 FEET °C	OAT AT MEA °C	ALT SET IN.HG
BIL-SHR	88	8000	010/30	-10	0	29.56
SHR-CZI	57	9000	350/40	-10	-4	29.60
CZI-DGW	95	8000	040/45	-10	0	29.60
DGW-CYS	47	8000	040/45	-10	0	29.60
	46	8000	040/45	-10	0	29.60
CYS-DEN	81	8000	040/45	-10	0	29.60

REFERENCE: Enroute Low Altitude Charts L-8 and L-9

At Denver:

Outside Air Temperature . . . . . 15°C (59°F)
Field Elevation . . . . . 5330 feet
Altimeter Setting . . . . . 29.60 in. Hg
Wind . . . . . 270° at 10 knots
Runway 26L Length . . . . . 10,010 feet

To determine pressure altitude at origin and destination airports, add 100 feet to field elevation for each .1 in. Hg below 29.92, and subtract 100 feet from field elevation for each .1 in. Hg above 29.92.

Pressure Altitude at BIL:

29.92 - 29.56 = .36 in. Hg

The pressure altitude at BIL is 360 feet above the field elevation.

3606 + 360 = 3966 feet

Pressure Altitude at DEN:

29.92 - 29.60 = .32 in. Hg

The pressure altitude at DEN is 320 feet above the field elevation.
5330 + 320 = 5650 feet

For enroute altitudes and MEA's this pressure correction has been ignored.

Maximum Allowable Take-off Weight = 6100 lbs

Ramp Weight = 6100 + 32 = 6132 lbs

NOTE

Fuel for start and taxi is normally 32 pounds.

Enter the Take-Off Weight graph at 3966 feet pressure altitude and 25°C.

The take-off weight to achieve a positive rate-of-climb at lift-off for one engine inoperative is:

Take-off Weight = 4975 pounds

Enter the Take-Off Distance graph at 25°C, 3966 feet pressure altitude, 6100 pounds, and 9.5 knots headwind component.

Ground Roll	1970 feet
Total Distance over 50 ft Obstacle	3020 feet
Lift-off Speed	81 knots
50 Foot Speed	96 knots

Enter the Accelerate-Stop graph at 25°C, 3966 feet pressure altitude, 6100 pounds, and 9.5 knots headwind component:

Accelerate-Stop Distance.....3670 feet
Engine Failure Speed.....81 knots

NOTE

Since 3670 feet is less than the available field length (5585 ft), the accelerate-stop procedure can be performed at any weight.

Takeoff at 6100 lbs can be accomplished. However, if an engine failure occurs prior to retraction of landing gear, the accelerate-stop procedure must be performed (even if airborne, unless sufficient altitude is available for retraction of landing gear while descending).

The following example assumes the airplane is loaded so that the take-off weight is 4975 pounds.

Although not required by regulations, information has been presented to determine the take-off weight, field requirements and take-off flight path assuming an engine failure occurs during the take-off procedure. The following illustrates the use of these charts.

Enter the Accelerate-Go graph at 25°C, 3966 feet pressure altitude, 4975 pounds, and 9.5 knots headwind component:

Ground Roll ..... 1500 feet
Total Distance Over 50 ft Obstacle ..... 4550 feet
Lift-off Speed ..... 81 knots
50 Foot Speed ..... 96 knots

Enter the graph for Take-off Climb Gradient - One Engine Inoperative at 25°C, 3966 feet pressure altitude, and 4975 pounds.

Climb Gradient 2.9%
Climb Speed . . . . . 96 knots

A 2.9% climb gradient is 29 feet of vertical height per 1000 feet of horizontal distance.

NOTE

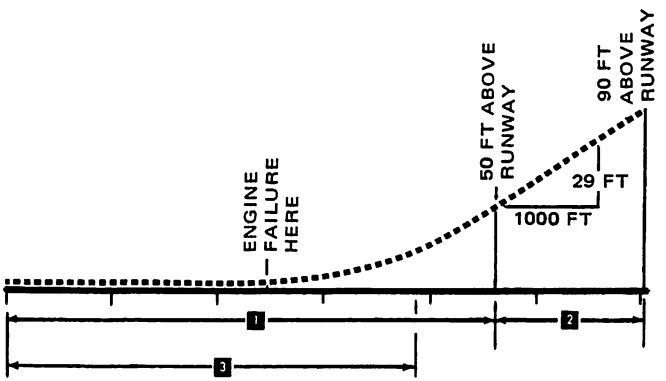
The Take-Off Climb Gradient - One Engine Inoperative graph assumes zero wind conditions. Climbing into a headwind will result in higher angles of climb, and hence, better obstacle clearance capabilities.

Calculation of horizontal distance to clear an obstacle 90 feet above the runway surface:

Horizontal distance used to climb from 50 feet to 90 feet = (90 − 50)(1000 ÷ 29) = 1379 feet

Total Distance = 4550 + 1379 = 5929 feet

The above results are illustrated below:



1. Accelerate - go take-off distance = 4550 feet
2. Distance to climb from 50 ft to 90 ft above runway = 1379 feet
3. Accelerate-stop distance for 6100 lbs take-off weight = 3670 feet

The following calculations provide information for the flight planning procedure. All examples are presented on the performance graphs. A take-off weight of 6100 pounds has been assumed.

Enter the Time, Fuel, and Distance to Climb graph at 25°C to 3966 feet and to 6100 pounds and enter at -10°C to 17,000 feet and to 6100 pounds, and read:

Time to Climb = 25 - 6 = 19 min
Fuel Used to Climb = 132 - 34 = 98 pounds
Distance Traveled = 63 - 13 = 50 NM

Enter the graph for ISA Conversion at the enroute conditions.

Pressure Altitude	=	17,000 feet
OAT	=	-10°C
ISA Condition	=	ISA + 9°C

The cruise power setting is assumed to be Recommended Cruise Power - 30 in. Hg, 2400 RPM.

Enter the table for Recommended Cruise Power - 30 in. Hg, 2400 RPM at ISA, and ISA + 36°F (ISA + 20°C)

Interpolate to obtain cruise speeds and fuel flow rates at 17,000 feet.

CRUISE TRUE AIRSPEED ~ KTS		CRUISE FUEL FLOWS ~ GAL/HR/ENG	
ISA	ISA + 20°C	ISA	ISA + 20°C
218	210	17.5	14.8

Interpolate between these speeds for ISA + 9°C

Cruise True Airspeed = 214 knots

Interpolate between these fuel flows for ISA + 9°C

Fuel Flow Per Engine	=	16.3 gal/hr
Total Fuel Flow	=	32.6 gal/hr (196 lb/hr)

Enter the graph for Descent at 17,000 feet to the descent line and enter again at 5650 feet to the descent line, and read:

Time to Descend	=	16.5 - 6.5 = 10 min
Fuel Used to Descend	=	44 - 16 = 28 pounds
Descent Distance	=	59 - 21 = 38 NM

Time and fuel used were calculated at Recommended Cruise Power - 30 in. Hg, 2400 RPM as follows:

Time = Distance ÷ Ground Speed

Fuel Used = (Time) (Total Fuel Flow)

Results are as follows:

ROUTE	MAG COURSE	MAG VAR	EST GROUND SPEED KTS	DIST NM	TIME AT CRUISE ALT HRS:MIN	FUEL USED FOR CRUISE LBS
BIL-SHR	114°	16°E	227	*38	:10	33
SHR-CZI	136°	15°E	252	57	:14	44
CZI-DGW	131°	15°E	222	95	:26	84
DGW-CYS	138°	14°E	227	47	:12	41
	169°	14°E	249	46	:11	36
CYS-DEN	166°	14°E	247	*43	:10	34

*Distance required to climb or descend has been subtracted from segment distance.

Fuel used from BIL to SHR is:

98 + 33 = 131 pounds

The estimated weight upon reaching SHR is:

6100 - 131 = 5969 pounds

NOTE

The two engine rate of climb was determined for the cruise altitude and estimated weight at SHR. The MEA at SHR was the highest MEA encountered during the flight. Climb - One Engine Inoperative and Service Ceiling were determined for the MEA and weight at SHR.

DETERMINATION OF FLIGHT TIME, BLOCK SPEED AND FUEL REQUIREMENTS

ITEM	TIME HRS:MIN	FUEL LBS	DIS NM
Start, Runup, Taxi and Take-off Acceleration	: 00	32	0
Climb	: 19	98	50
Cruise	1 : 23	272	326
Descent	: 10	28	38
Total	1 : 52	430	414

Total Flight Time: 1 hour, 52 minutes
Block Speed: 414 NM ÷ 1 hour, 52 minutes = 222 knots

Reserve Fuel (45 minutes at Economy Cruise Power):

Obtain fuel flow rate from Economy Cruise Power table at 17,000 feet for ISA (assume ISA fuel flow rate).

Fuel Flow Per Engine	=	11.3 gal/hr
Total Fuel Flow	=	22.6 gal/hr (135.6 lbs/hr)

Reserve Fuel = (45 min) (135.6 lbs/hr) = 102 lbs (17 gal)

Total Fuel: 430 + 102 = 532 lbs (87 gal aviation gasoline)

Check for Maximum Zero Fuel Weight requirement:

Ramp Weight - Fuel Requirement = 6132 – 532 = 5600 lbs

The maximum zero fuel weight requirement of 5700 lbs has not been exceeded.

If the requirement had not been met, two options would have existed:

1. Reduce the Zero Fuel Weight to 5700 pounds, then add the fuel required for the flight.
2. Increase the fuel load to at least 72 gal (6132 - 5700 = 432 lbs).

The estimated landing weight is determined by subtracting the fuel required for the flight from the ramp weight.

6132 – 430 = 5702 lbs

Enter the graph for Landing Distance — Flaps 30 Degrees at 15°C, 5650 feet pressure altitude, 5702 pounds, and 9.5 knots headwind component.

Ground Roll	1610 feet
Total Over 50 ft Obstacle	2690 feet
Approach Speed	99 knots

Enter the graph for Climb — Balked Landing at 15°C, 5650 feet pressure altitude, and 5702 pounds.

Rate of Climb	900 ft/min
Climb Gradient	7.2%

COMMENTS PERTINENT TO THE USE OF PERFORMANCE GRAPHS:

1. The example, in addition to presenting an answer for a particular set of conditions, also presents the order in which the graphs should normally be used, i.e., if the first item in the example is OAT, then enter the graph at the known OAT.

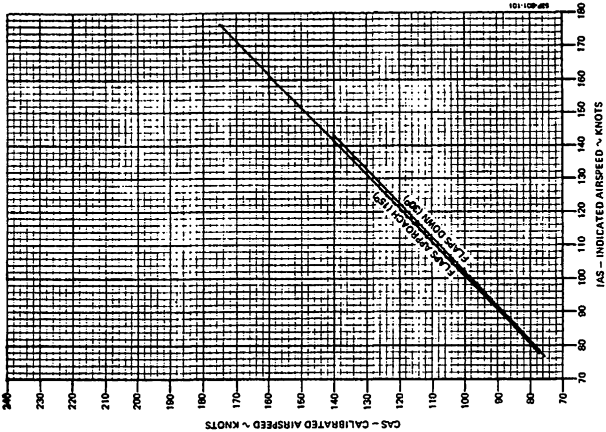
2. The reference lines indicate where to begin following guide lines. Always project to the reference line first, then follow the guide lines to the next known item.

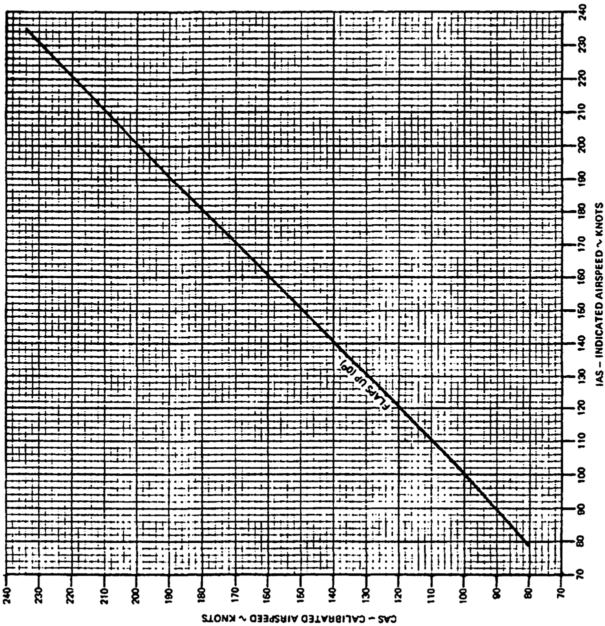
3. Indicated airspeeds (IAS) were obtained in flight, by using the Airspeed Calibration Normal System, and the Airspeed Calibration Normal System Take-off Ground Roll, for all lift off speeds.

4. The associated conditions define the specific conditions from which performance parameters have been determined. They are not inteded to be used as instructions; however, performance values determined from charts can only be achieved if specified conditions exist.

5. The full amount of usable fuel is available for all approved flight conditions.

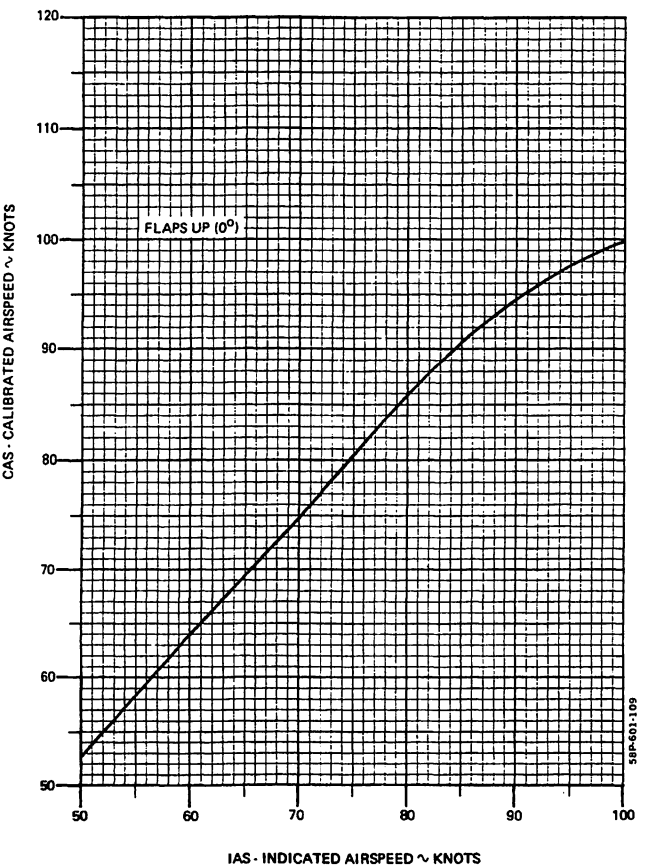
AIRSPEED CALIBRATION NORMAL SYSTEM



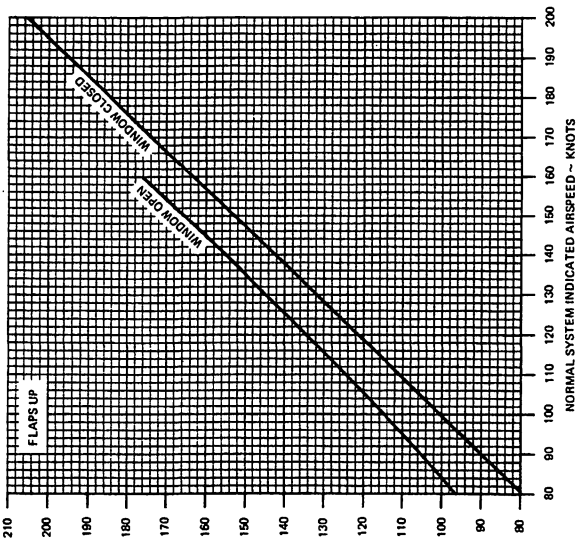


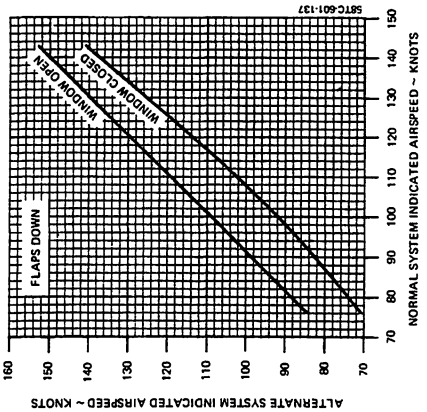
AIRSPEED CALIBRATION NORMAL SYSTEM

TAKE-OFF GROUND ROLL

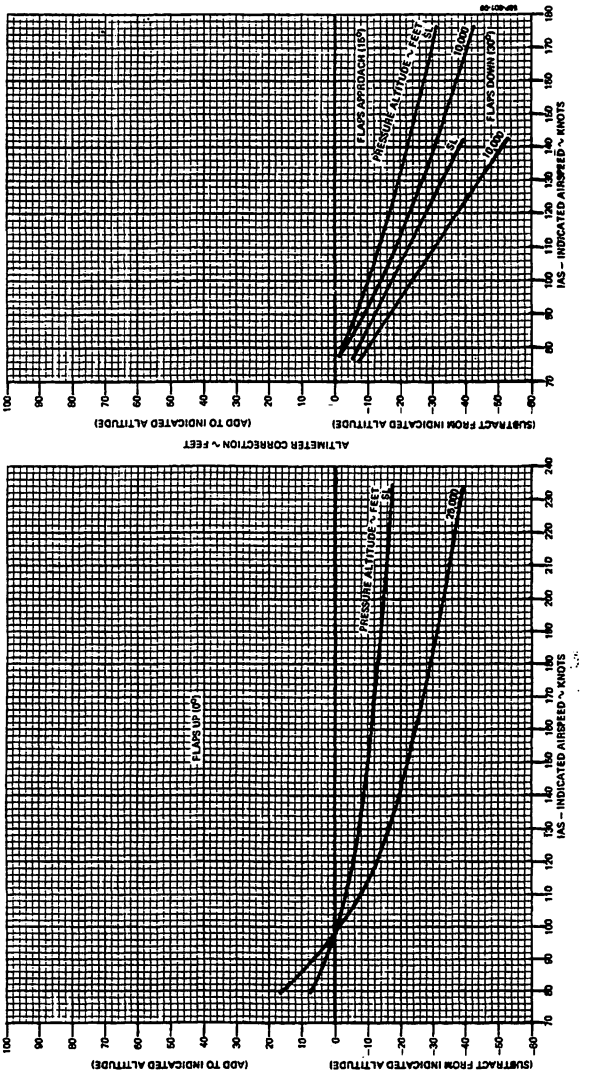


AIRSPEED CALIBRATION ALTERNATE SYSTEM

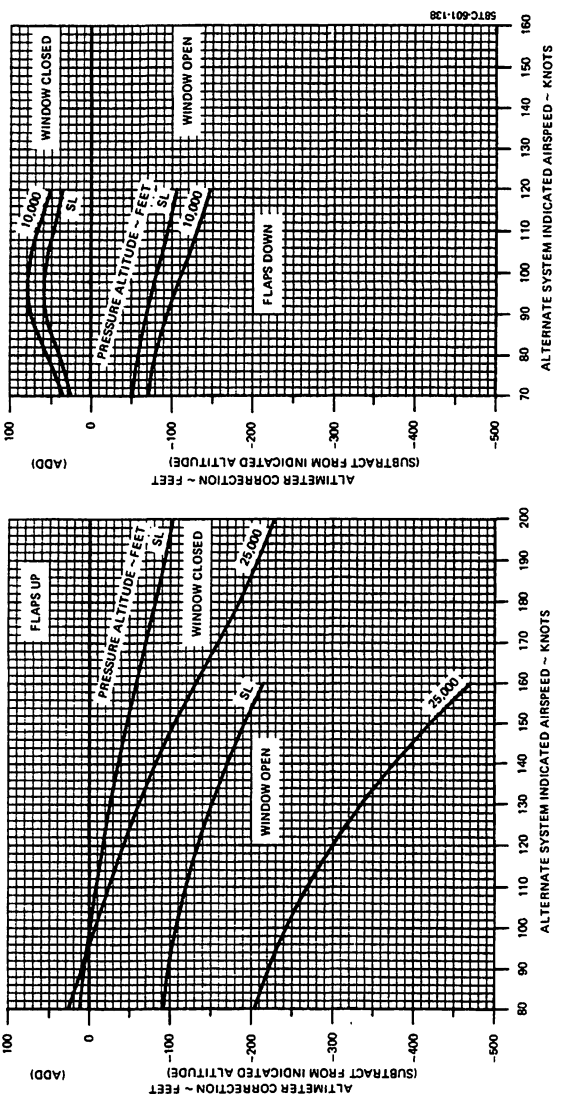




ALTIMETER CORRECTION NORMAL SYSTEM



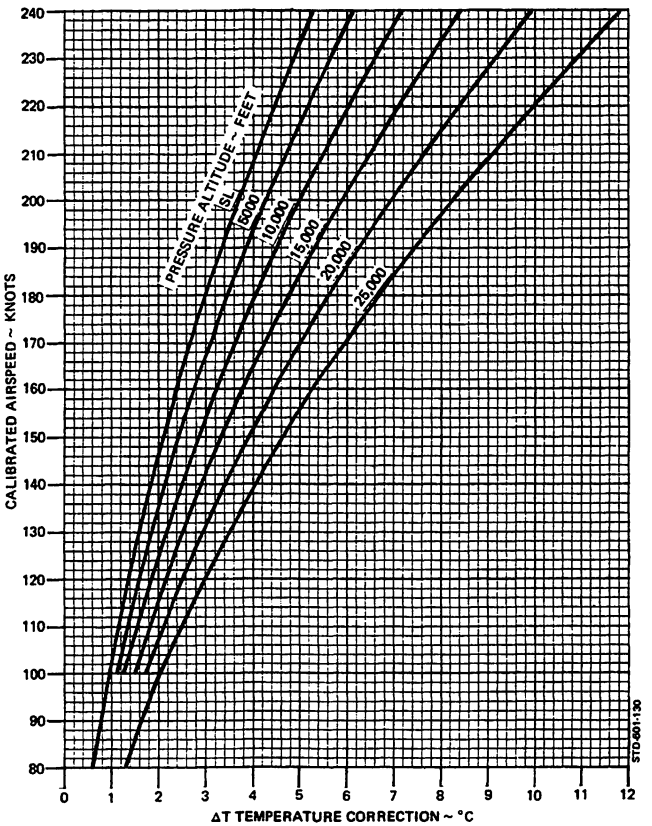
ALTIMETER CORRECTION ALTERNATE SYSTEM



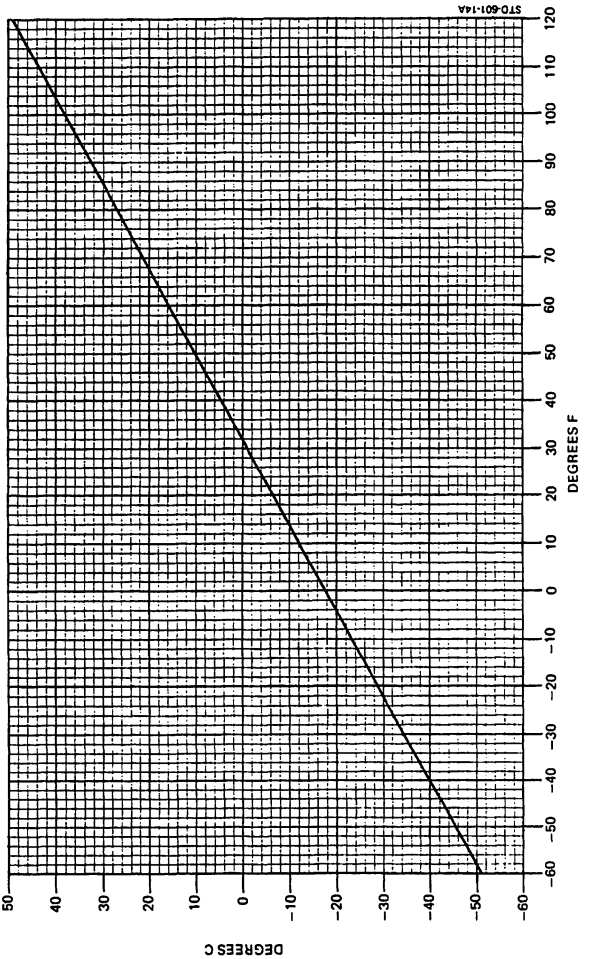
INDICATED OUTSIDE AIR TEMPERATURE CORRECTION

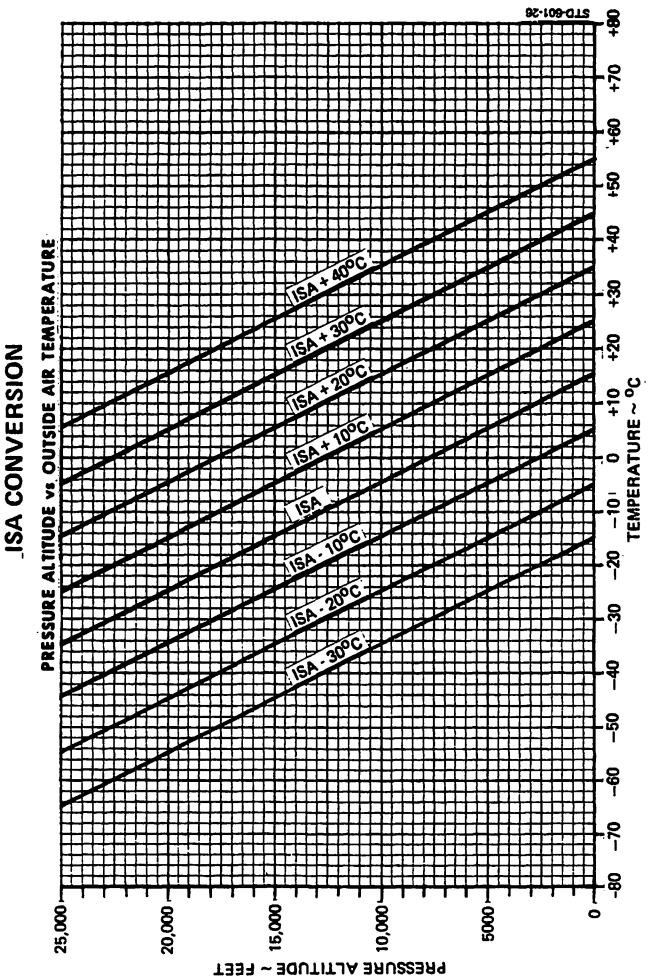
STANDARD DAY (ISA)

NOTE: SUBTRACT ΔT FROM INDICATED (GAGE) OAT TO OBTAIN TRUE OAT (ΔT ASSUMES A RECOVERY FACTOR OF 0.7)

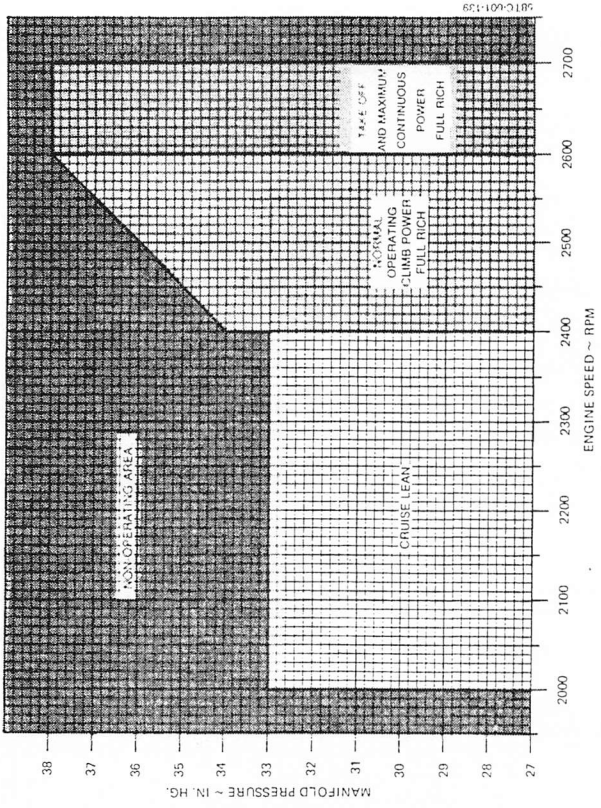


FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION




ISA CONVERSION
PRESSURE ALTITUDE vs. OUTSIDE AIR TEMPERATURE
STD-601-26
ISA + 40°C
ISA + 30°C
ISA + 20°C
ISA + 10°C
ISA
ISA - 10°C
ISA - 20°C
ISA - 30°C
PRESSURE ALTITUDE ~ FEET
25,000
20,000
15,000
10,000
5000
0
TEMPERATURE ~ °C
+80
+70
+60
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
-60
-70
-80

RECOMMENDED MANIFOLD PRESSURE



TAKE-OFF WEIGHT

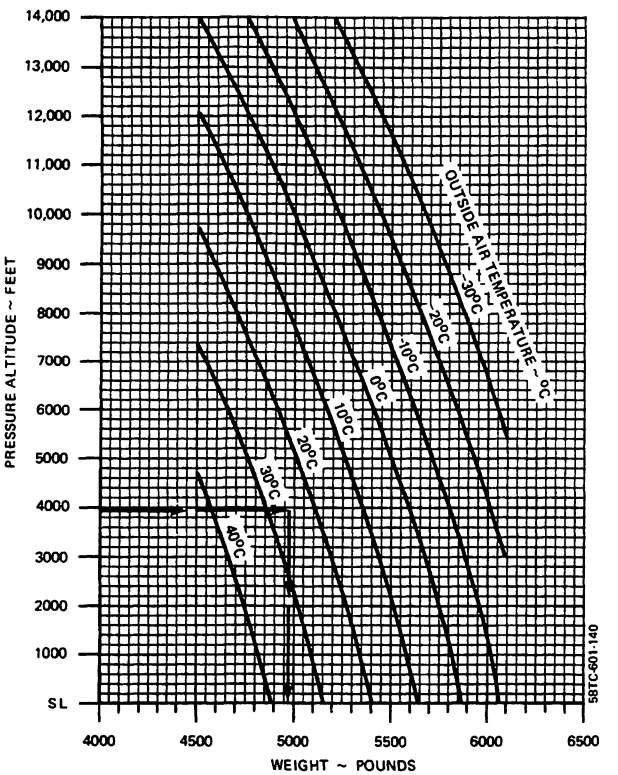
TO ACHIEVE POSITIVE SINGLE ENGINE RATE OF CLIMB AT LIFT-OFF

ASSOCIATED CONDITIONS:

AIRPLANE	AIRBORNE
POWER	TAKE-OFF AT 2700 RPM
FLAPS	UP (0°)
LANDING GEAR	DOWN
INOPERATIVE PROPELLER	FEATHERED

EXAMPLE:

PRESSURE ALTITUDE	3966 FT
OAT	25°C
TAKE-OFF WEIGHT	4975 LBS



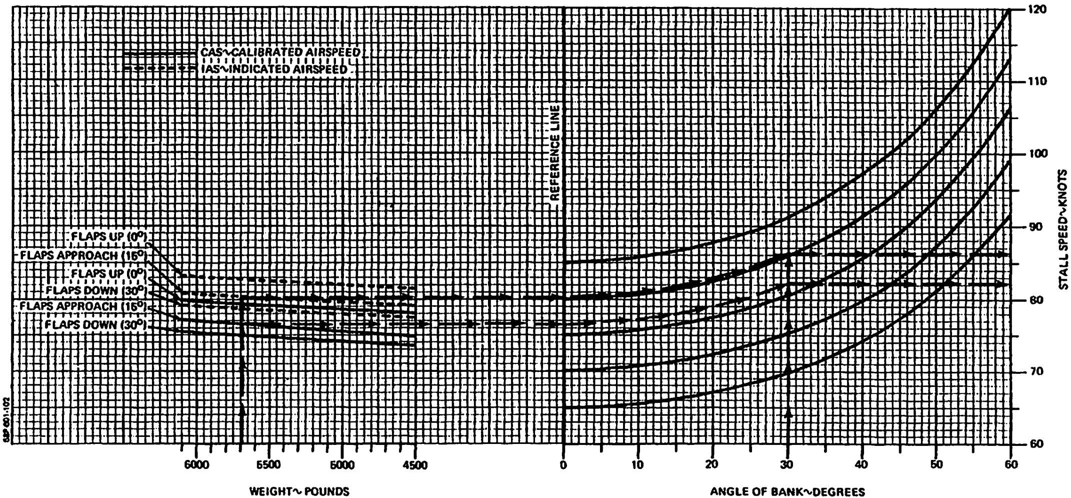
STALL SPEEDS - POWER IDLE

NOTES:

1. THE MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH FAR 23.201 WAS 350 FEET.
2. MAXIMUM NOSE DOWN PITCH ATTITUDE AND ALTITUDE LOSS DURING RECOVERY FROM ONE ENGINE INOPERATIVE STALLS PER FAR 23.205 ARE APPROXIMATELY 3° AND 100 FEET RESPECTIVELY.
3. A NORMAL STALL RECOVERY TECHNIQUE MAY BE USED

EXAMPLE:

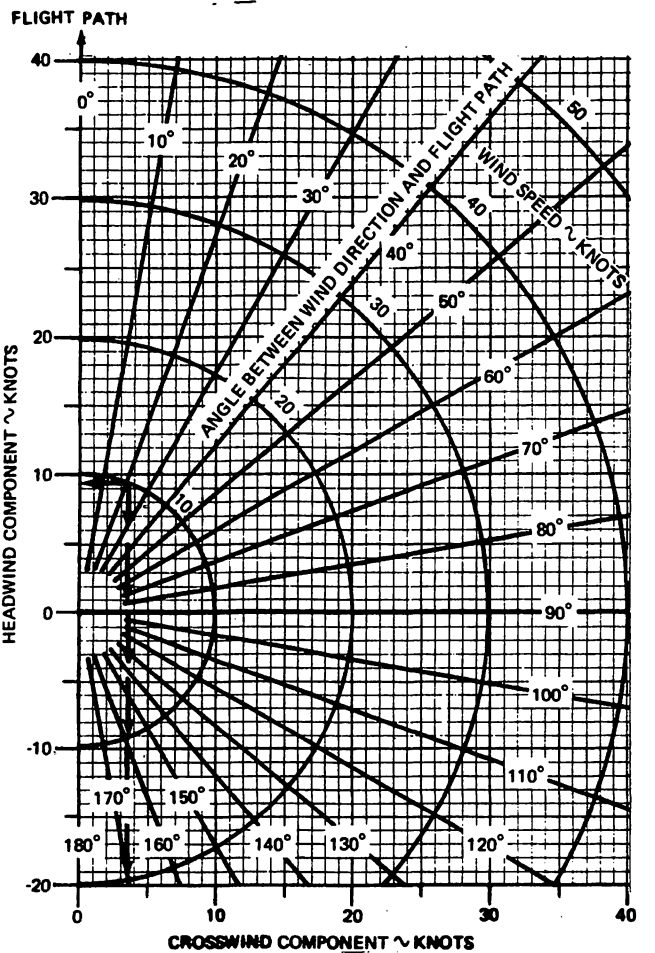
WEIGHT	5686 LBS
FLAPS	15°
ANGLE OF BANK	30°
STALL SPEED	82 KTS CAS 86 KTS IAS



WIND COMPONENTS
Demonstrated Crosswind is 30 kts

EXAMPLE:

WIND SPEED	10 KNOTS
ANGLE BETWEEN WIND DIRECTION AND FLIGHT PATH	20°
HEADWIND COMPONENT	9.5 KNOTS
CROSSWIND COMPONENT	3.5 KNOTS



TAKE-OFF DISTANCE

ASSOCIATED CONDITIONS:

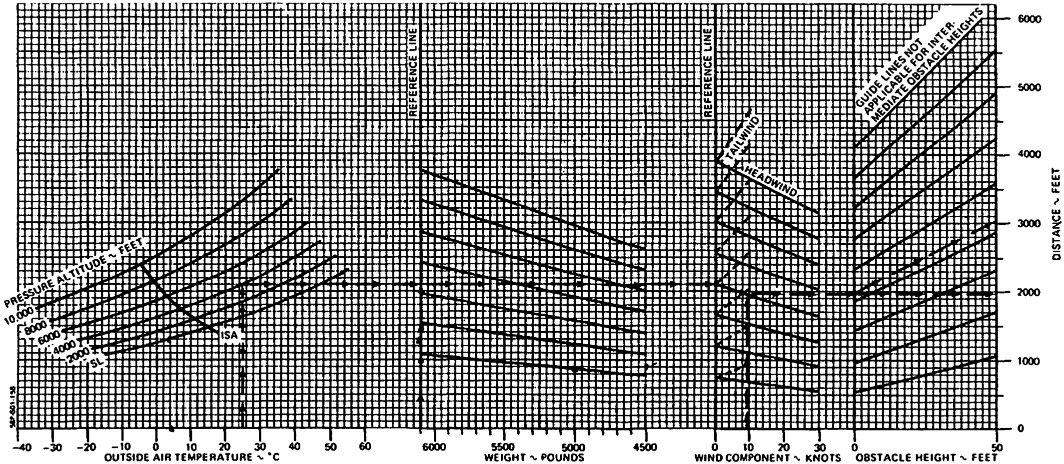
POWER . . . . TAKE-OFF AT 2700 RPM SET BEFORE BRAKE RELEASE
FLAPS. . . . . UP (0°)
LANDING GEAR . . . . RETRACT AFTER LIFT-OFF
RUNWAY. . . . . PAVED, LEVEL, DRY SURFACE
COWL FLAPS . . . . . . OPEN

WEIGHT ~ LBS	TAKE-OFF SPEED ~ KTS	
	LIFT-OFF	50 FT
6100	81	96
6000	81	96
5500	81	95
5000	81	94
4500	81	94

EXAMPLE:

OAT. . . . . 25°C
PRESSURE ALTITUDE . . . . 3966 FT
TAKE-OFF WEIGHT . . . . 6100 LBS
HEADWIND COMPONENT. . . . . 9.5 KTS

GROUND ROLL . . . . 1970 FT
TOTAL DISTANCE OVER 50 FT OBSTACLE . . . . 3020 FT
TAKE-OFF SPEEDS: AT LIFT-OFF . . . . 81 KTS
AT 50 FT. . . . . 96 KTS



TAKE-OFF DISTANCE—GRASS SURFACE

ASSOCIATED CONDITIONS:

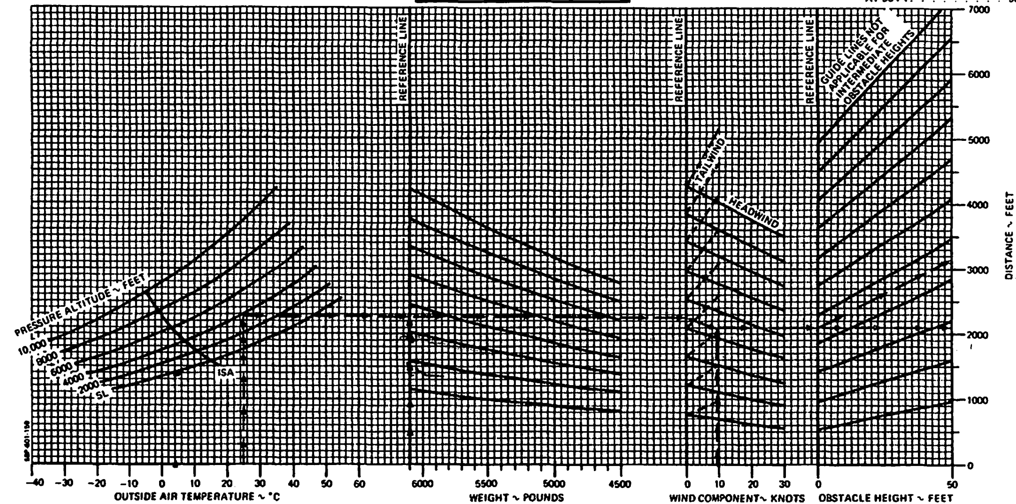
POWER . . . TAKE OFF AT 2700 RPM SET BEFORE BRAKE RELEASE
FLAPS . . . . . UP (0°)
LANDING GEAR . RETRACT AFTER LIFT-OFF
RUNWAY . . . . SHORT, DRY GRASS, LEVEL SURFACE
COWL FLAPS . . . OPEN

WEIGHT ~ LBS	TAKE-OFF SPEED ~ KTS	
	LIFT-OFF	50 FT
6100	81	96
6000	81	96
5500	81	95
5000	81	94
4500	81	94

EXAMPLE:

OAT . . . . 25°C
PRESSURE ALTITUDE . . . . . . 3966 FT
TAKE-OFF WEIGHT . . . . . . 6100 LBS
HEADWIND COMPONENT . . . . . 9.5 KTS

GROUND ROLL . . . . 2100 FT
TOTAL DISTANCE OVER 50 FT OBSTACLE . . . 3150 FT
TAKE-OFF SPEEDS: AT LIFT-OFF . . . . . . 81 KTS
AT 50 FT . . . . . . 96 KTS



ACCELERATE - STOP

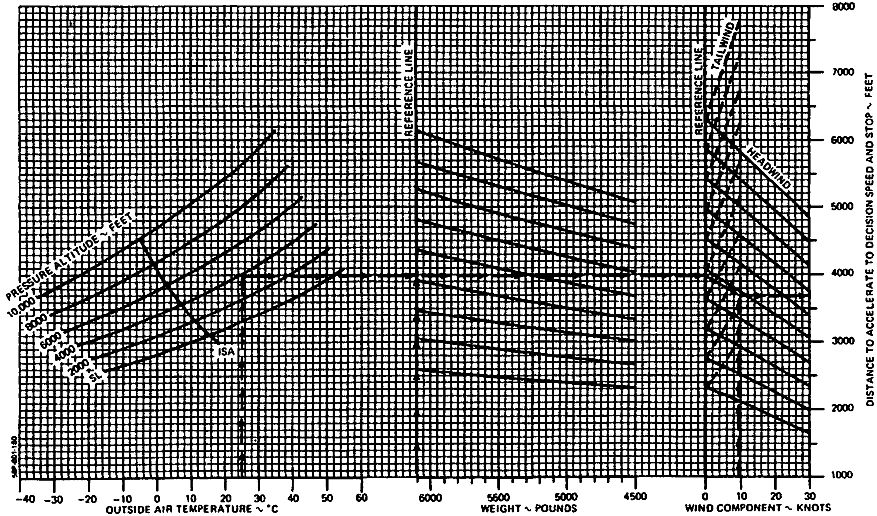
DECISION SPEED—81 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER . . . . 1. TAKE-OFF POWER AT 2700 RPM SET BEFORE BRAKE RELEASE
2. ENGINE IDLE AT DECISION SPEED
FLAPS. . . . . UP (0°)
RUNWAY. . . . . . PAVED, LEVEL, DRY SURFACE
COWL FLAPS . . . . OPEN

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3966 FT
TAKE-OFF WEIGHT	6100 LBS
HEADWIND COMPONENT	9.5 KTS
ACCELERATE AND STOP DISTANCE	3670 FT
DECISION SPEED	81 KTS



ACCELERATE - GO

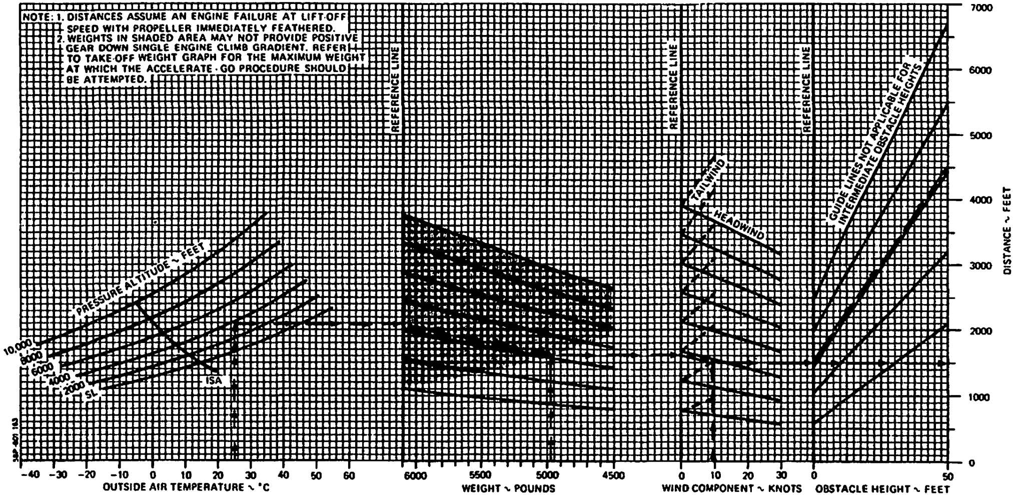
ASSOCIATED CONDITIONS:

POWER	TAKE-OFF AT 2700 RPM SET BEFORE BRAKE RELEASE
FLAPS	UP (0°)
LANDING GEAR	RETRACT AFTER LIFT-OFF
RUNWAY	PAVED, LEVEL, DRY SURFACE
COWL FLAPS	OPEN

TAKE-OFF SPEEDS	
LIFT-OFF	81 KTS
50 FT	96 KTS

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3968 FT
TAKE-OFF WEIGHT	4975 LBS
HEADWIND COMPONENT	9.5 KTS
GROUND ROLL	1500 FT
TOTAL DISTANCE OVER 50 FT OBSTACLE	4550 FT
TAKE-OFF SPEEDS: AT LIFT-OFF	81 KTS
AT 50 FT	96 KTS



CLIMB - TWO ENGINES

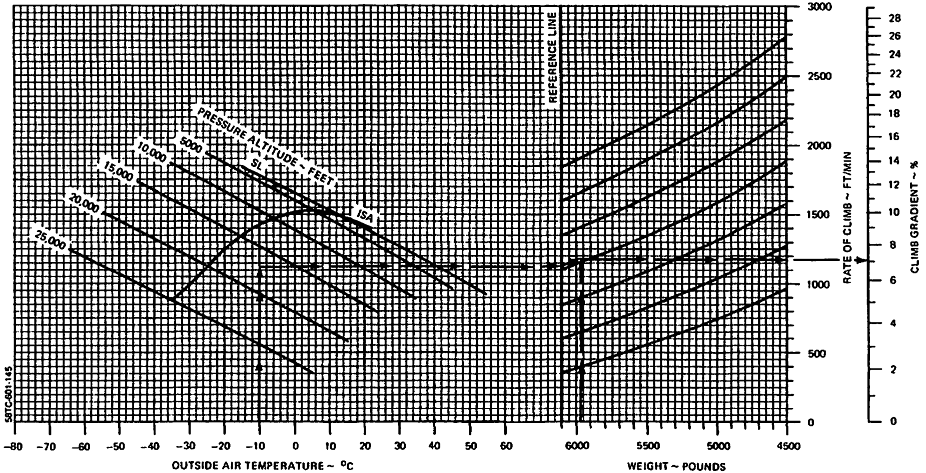
CLIMB SPEED-115 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS AT 2600 RPM
FLAPS.	UP (0°)
LANDING GEAR .	UP
COWL FLAPS . . .	OPEN

EXAMPLE:

OAT.	−10°C
PRESSURE ALTITUDE	17,000 FT
WEIGHT	5969 LBS
RATE OF CLIMB	1175 FT/MIN
CLIMB GRADIENT.	7.1%
CLIMB SPEED.	115 KTS



TAKE-OFF CLIMB GRADIENT - ONE ENGINE INOPERATIVE

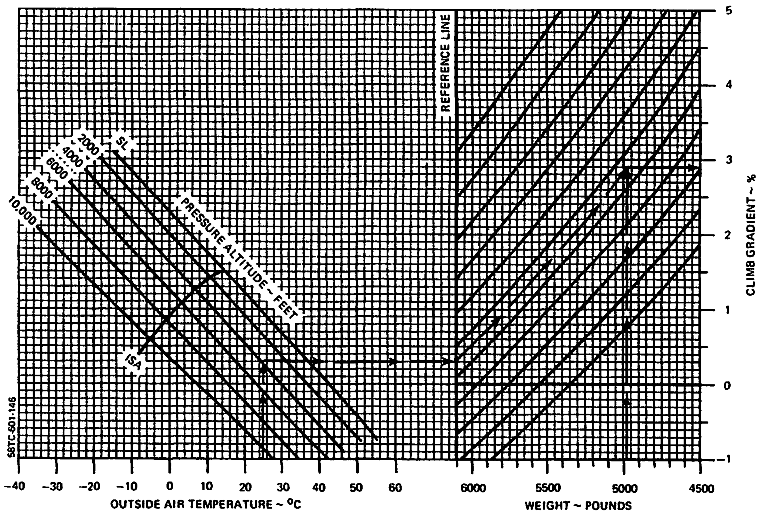
CLIMB SPEED-96 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF AT 2700 RPM
FLAPS	UP (0°)
LANDING GEAR	UP
COWL FLAPS	OPEN
INOPERATIVE PROPELLER	FEATHERED

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3966 FT
WEIGHT	4975 LBS
CLIMB GRADIENT	2.9%
CLIMB SPEED	96 KTS



TIME, FUEL, AND DISTANCE TO CLIMB

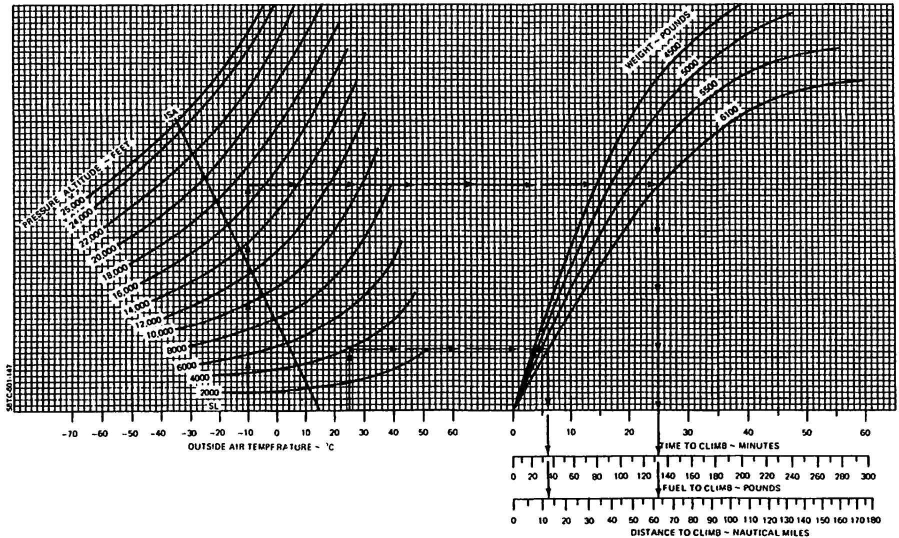
CLIMB SPEED-130 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

PROPELLER SPEED	2400 RPM
MANIFOLD PRESSURE	34 IN. HG
FUEL DENSITY	6.0 LBS/GAL
MIXTURE	FULL RICH
COWL FLAPS	OPEN

EXAMPLE:

OAT AT TAKE-OFF	25°C
OAT AT CRUISE	-10°C
AIRPORT PRESSURE ALTITUDE	3966 FT
CRUISE PRESSURE ALTITUDE	17,000 FT
INITIAL CLIMB WEIGHT	6100 LBS
TIME TO CLIMB	25-6=19 MIN
FUEL TO CLIMB	132-34=98 LBS
DISTANCE TO CLIMB	63-13=50 NM



CLIMB - ONE ENGINE INOPERATIVE

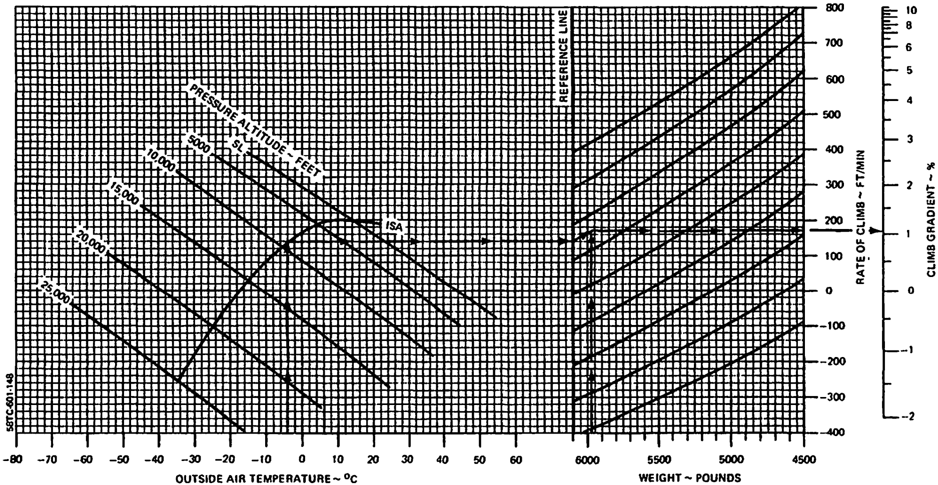
CLIMB SPEED-115 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS AT 2700 RPM
FLAPS	UP (0°)
LANDING GEAR	UP
INOPERATIVE PROPELLER	FEATHERED
COWL FLAP	OPEN

EXAMPLE:

OAT	−4°C
PRESSURE ALTITUDE	9000 FT
WEIGHT	5969 LBS
RATE OF CLIMB	170 FT/MIN
CLIMB GRADIENT	1.10%
CLIMB SPEED	115 KTS



SERVICE CEILING-ONE ENGINE INOPERATIVE

CLIMB SPEED-115 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

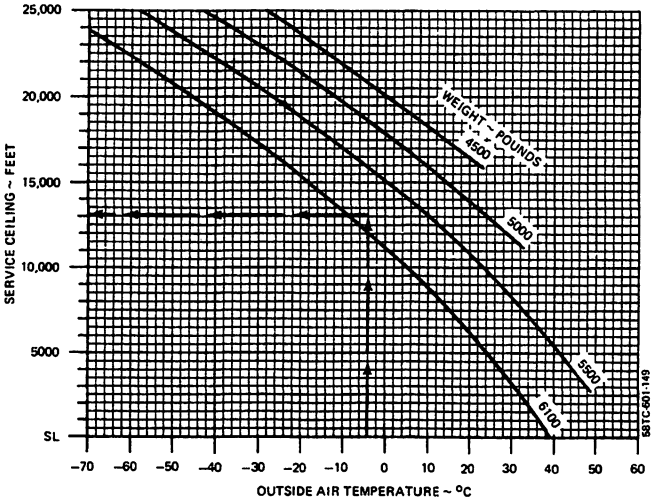
POWER	MAXIMUM CONTINUOUS AT 2700 RPM
FLAPS	UP (0°)
LANDING GEAR	UP
INOPERATIVE PROPELLER	FEATHERED

EXAMPLE:

OAT AT MEA	−4°C
WEIGHT	5969 LBS
ROUTE SEGMENT MEA	9000 FT
SERVICE CEILING	13,050 FT

SERVICE CEILING IS ABOVE MEA

NOTE:
SERVICE CEILING IS ALTITUDE WHERE AIRPLANE HAS CAPABILITY OF CLIMBING 50 FT/MIN WITH ONE PROPELLER FEATHERED



CLIMB—BALKED LANDING

CLIMB SPEED—92 KNOTS (ALL WEIGHTS)

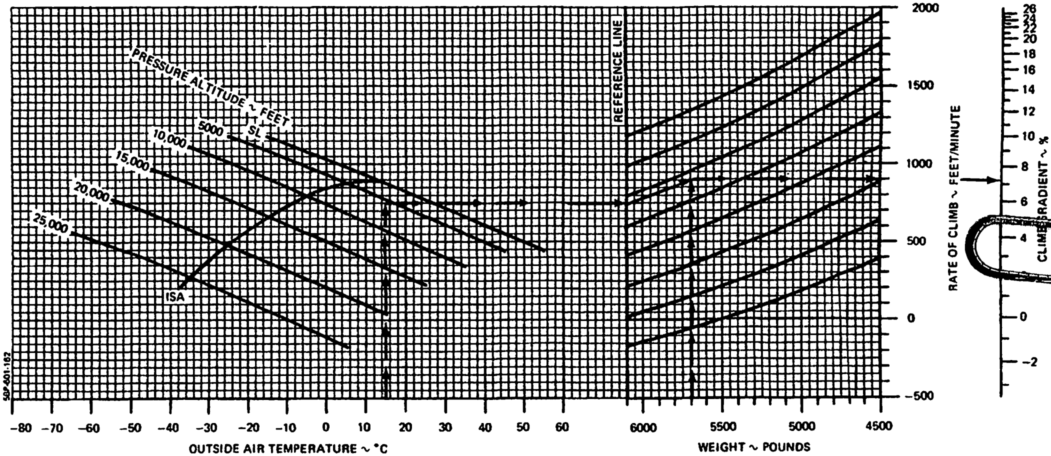
ASSOCIATED CONDITIONS:

POWER . . . . TAKE-OFF AT 2700 RPM
FLAPS . . . . DOWN (30°)
LANDING GEAR . . . . DOWN

EXAMPLE:

OAT . . . . 15°C
PRESSURE ALTITUDE . . . . 5650 FT
WEIGHT . . . . 5702 LBS

RATE OF CLIMB . . . . 900 FT/MIN
CLIMB GRADIENT 7.2%
CLIMB SPEED . . . . 92 KNOTS



MAXIMUM CRUISE POWER
MANIFOLD PRESSURE: 33 IN HG - PROPELLER SPEED: 2400 RPM

PRESS ALT.	ISA - 36°F (-20°C)					STANDARD DAY (ISA)					ISA + 36°F (+20°C)				
	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS
FEET	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS
SL	28	-2	20.9	195	188	64	18	18.3	184	184	100	38	16.5	172	177
2000	23	-5	21.3	197	195	57	14	18.7	185	191	93	34	16.9	173	184
4000	16	-9	21.6	196	201	52	11	19.0	185	196	86	30	16.2	173	190
6000	9	-13	21.8	196	206	45	7	19.2	185	201	81	27	16.4	173	195
8000	1	-17	22.1	195	211	37	3	19.4	184	207	73	23	16.6	172	200
10,000	-6	-21	22.3	194	216	30	-1	19.7	182	212	66	19	16.8	171	205
12,000	-11	-24	22.3	192	220	25	-4	19.7	181	216	59	15	16.8	169	209
14,000	-18	-28	22.3	190	225	18	-8	19.7	179	220	52	11	16.8	166	213
16,000	-26	-32	22.2	188	229	10	-12	19.6	176	224	46	8	16.7	164	217
18,000	-33	-36	22.1	185	233	3	-16	19.5	174	228	39	4	16.6	162	221
20,000	-38	-39	21.8	182	237	-4	-20	19.2	171	232	32	0	16.3	158	224
22,000	-45	-43	21.5	179	241	-11	-24	18.9	168	235	25	-4	16.1	155	227
24,000	-53	-47	21.3	177	245	-17	-27	18.7	165	239	18	-8	15.9	152	230
25,000	-56	-49	21.2	175	247	-20	-29	18.54	164	241	14	-10	15.8	151	232

NOTES:
1. Fuel flows are to be used for flight planning only and will vary from engine to engine; lean using TIT.
2. Extend cowl flaps as required to maintain cylinder head temperatures at 420°F or less.
3. Cowl flaps full open reduce true airspeed by approximately 9 knots.
4. Cruise speeds are presented at an average weight of 5800 lbs.

RECOMMENDED CRUISE POWER
MANIFOLD PRESSURE: 30 IN HG - PROPELLER SPEED: 2400 RPM

PRESS ALT.	ISA - 36°F (-20°C)					STANDARD DAY (ISA)					ISA + 36°F (+20°C)				
	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS
FEET	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS
SL	28	-2	18.7	187	180	64	18	16.2	176	176	100	38	13.7	164	170
2000	21	-6	19.1	189	187	57	14	16.6	177	183	93	34	14.0	165	176
4000	14	-10	19.4	189	193	50	10	16.8	178	188	86	30	14.3	165	181
6000	9	-13	19.6	188	198	45	7	17.0	177	193	79	26	14.5	165	186
8000	1	-17	19.8	187	203	37	3	17.2	176	198	73	23	14.6	164	191
10,000	-6	-21	19.9	186	207	30	-1	17.3	175	203	66	19	14.7	163	196
12,000	-13	-25	20.1	185	212	23	-5	17.5	174	208	59	15	14.9	162	201
14,000	-18	-28	20.1	183	216	16	-9	17.5	172	212	52	11	14.9	160	204
16,000	-26	-32	20.1	181	221	10	-12	17.5	170	216	45	7	14.8	157	208
18,000	-33	-36	20.0	179	225	3	-16	17.4	167	220	39	4	14.8	155	211
20,000	-40	-40	19.8	176	229	-4	-20	17.2	164	223	32	0	14.6	152	215
22,000	-45	-43	19.6	173	232	-11	-24	17.0	162	227	25	-4	14.5	149	218
24,000	-53	-47	19.3	170	236	-18	-28	16.7	158	230	18	-8	14.2	145	220
25,000	-56	-49	19.1	168	238	-22	-30	16.6	157	231	14	-10	14.0	144	221

NOTES:

1. Fuel flows are to be used for flight planning only and will vary from engine to engine; lean using TIT.
2. Extend cowl flaps as required to maintain cylinder head temperatures at 420°F or less.
3. Cowl flaps full open reduce true airspeed by approximately 9 knots.
4. Cruise speeds are presented at an average weight of 5800 lbs.

RECOMMENDED CRUISE POWER
MANIFOLD PRESSURE: 30 IN HG - PROPELLER SPEED: 2200 RPM

PRESS ALT.	ISA - 36°F (-20°C)					STANDARD DAY (ISA)					ISA + 36°F (+20°C)				
	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS
FEET	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS
SL	28	-2	15.6	178	171	64	18	13.5	167	167	99	37	12.0	154	159
2000	21	-6	15.9	178	177	57	14	13.7	167	172	93	34	12.1	155	165
4000	14	-10	16.1	178	182	50	10	13.9	167	177	86	30	12.2	155	170
6000	7	-14	16.3	178	187	43	6	14.1	166	182	79	26	12.3	154	175
8000	1	-17	16.5	176	191	36	2	14.3	165	186	72	22	12.4	153	179
10,000	-6	-21	16.6	175	195	30	-1	14.3	164	190	64	18	12.4	152	183
12,000	-13	-25	16.7	173	199	23	-5	14.4	162	194	57	14	12.5	150	186
14,000	-20	-29	16.8	172	204	16	-9	14.5	161	199	52	11	12.5	148	190
16,000	-27	-33	16.9	170	208	9	-13	14.6	159	203	45	7	12.6	146	194
18,000	-35	-37	16.9	168	212	1	-17	14.6	157	206	37	3	12.6	144	197
20,000	-40	-40	16.9	166	216	-6	-21	14.6	154	210	30	-1	12.6	141	200
22,000	-47	-44	16.8	163	220	-11	-24	14.5	152	213	23	-5	12.5	138	202
24,000	-54	-48	16.7	161	224	-18	-28	14.4	149	216	16	-9	12.5	135	205
25,000	-58	-50	16.6	160	226	-22	-30	14.3	147	218	12	-11	12.4	133	206

NOTES:
1. Fuel flows are to be used for flight planning only and will vary from engine to engine; lean using TIT.
2. Extend cowl flaps as required to maintain cylinder head temperatures at 420°F or less.
3. Cowl flaps full open reduce true airspeed by approximately 9 knots.
4. Cruise speeds are presented at an average weight of 5800 lbs.

RECOMMENDED CRUISE POWER
MANIFOLD PRESSURE: 26 IN HG - PROPELLER SPEED: 2200 RPM

PRESS ALT.	ISA - 36°F (-20°C)					STANDARD DAY (ISA)					ISA + 36°F (+20°C)				
	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS
FEET	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS
SL	27	-3	12.6	161	156	63	17	11.4	152	152	99	37	10.2	140	144
2000	19	-7	12.7	162	161	55	13	11.5	153	157	91	33	10.3	140	150
4000	14	-10	12.9	163	166	50	10	11.7	153	162	84	29	10.5	140	154
6000	7	-14	13.1	163	171	43	6	11.8	153	167	77	25	10.6	140	158
8000	0	-18	13.2	162	175	36	2	11.9	152	171	72	22	10.7	139	162
10,000	-8	-22	13.4	161	179	28	-2	12.0	151	175	64	18	10.8	138	166
12,000	-15	-26	13.6	160	184	21	-6	12.1	150	179	57	14	10.9	137	170
14,000	-20	-29	13.7	158	188	14	-10	12.2	149	183	50	10	11.0	135	173
16,000	-27	-33	13.8	157	192	9	-13	12.3	147	187	43	6	11.0	133	176
18,000	-35	-37	13.9	155	195	1	-17	12.3	145	191	36	2	11.1	130	179
20,000	-42	-41	13.9	152	199	-6	-21	12.3	142	194	28	-2	11.1	128	181
22,000	-49	-45	14.0	151	203	-13	-25	12.4	140	198	23	-5	11.1	125	184
24,000	-54	-48	14.0	148	206	-20	-29	12.4	138	201	16	-9	11.1	122	185
25,000	-58	-50	14.0	147	208	-24	-31	12.4	137	202	12	-11	11.1	120	185

NOTES:

1. Fuel flows are to be used for flight planning only and will vary from engine to engine: lean using TIT.
2. Extend cowl flaps as required to maintain cylinder head temperatures at 420°F or less.
3. Cowl flaps full open reduce true airspeed by approximatley 9 knots.
4. Cruise speeds are presented at an average weight of 5800 lbs.

ECONOMY CRUISE POWER
MANIFOLD PRESSURE: 24 IN HG - PROPELLER SPEED: 2200 RPM

PRESS ALT.	ISA - 36°F (-20°C)					STANDARD DAY (ISA)					ISA + 36°F (+20°C)				
	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS	IOAT		FUEL FLOW PER ENG	CAS	TAS
FEET	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS	°F	°C	GAL/HR	KTS	KTS
SL	27	-3	11.4	154	149	63	17	10.3	143	143	99	37	9.2	127	132
2000	19	-7	11.5	155	154	55	13	10.5	144	148	91	33	9.3	130	138
4000	12	-11	11.7	155	158	48	9	10.6	144	153	84	29	9.5	130	143
6000	7	-14	11.8	155	163	41	5	10.7	143	156	77	25	9.6	130	147
8000	0	-18	11.9	154	167	36	2	10.8	142	160	70	21	9.6	129	150
10,000	-8	-22	12.0	154	172	28	-2	10.9	142	164	63	17	9.7	127	153
12,000	-15	-26	12.1	152	175	21	-6	11.0	140	168	57	14	9.8	126	156
14,000	-22	-30	12.2	151	179	14	-10	11.1	139	172	50	10	9.9	124	160
16,000	-30	-34	12.3	150	184	7	-14	11.2	138	176	43	6	10.0	122	162
18,000	-35	-37	12.4	149	188	0	-18	11.3	136	179	36	2	10.1	120	164
20,000	-42	-41	12.5	147	192	-8	-22	11.3	134	182	28	-2	10.1	117	166
22,000	-49	-45	12.5	145	196	-13	-25	11.4	132	186	21	-6	10.2	114	167
24,000	-56	-49	12.6	143	200	-20	-29	11.4	130	189	14	-10	10.2	109	166
25,000	-60	-51	12.6	142	202	-24	-31	11.5	128	190	10	-12	10.2	106	165

NOTES:
1. Fuel flows are to be used for flight planning only and will vary from engine to engine; lean using TIT.
2. Extend cowl flaps as required to maintain cylinder head temperatures at 420°F or less.
3. Cowl flaps full open reduce true airspeed by approximately 9 knots.
4. Cruise speeds are presented at an average weight of 5800 lbs.

RANGE PROFILE – 190 GALLONS

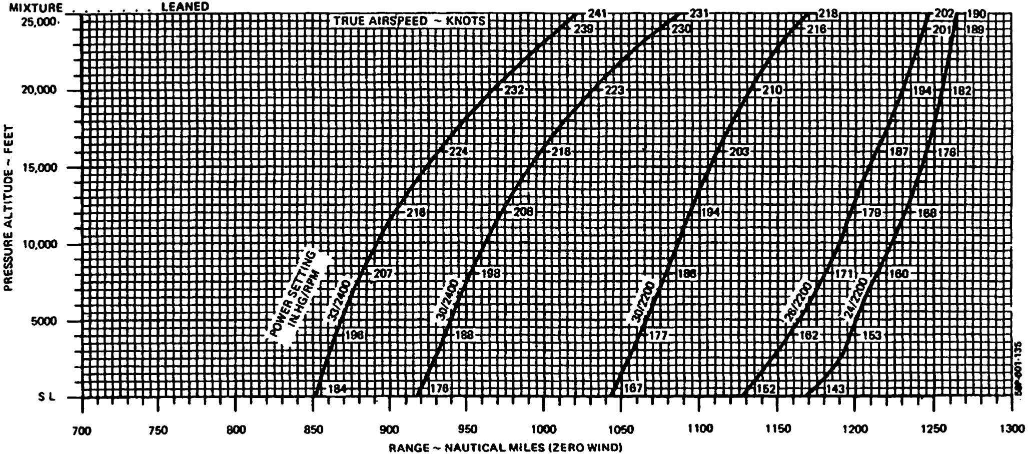
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT . . . . 6132 LBS BEFORE ENGINE START
FUEL . . . . AVIATION GASOLINE
FUEL DENSITY . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING . 190 U.S. GAL.(1140 LBS)
COWL FLAPS . . . . . . CLOSED
MIXTURE . . . . LEANED

NOTE:

RANGE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



RANGE PROFILE - 166 GALLONS

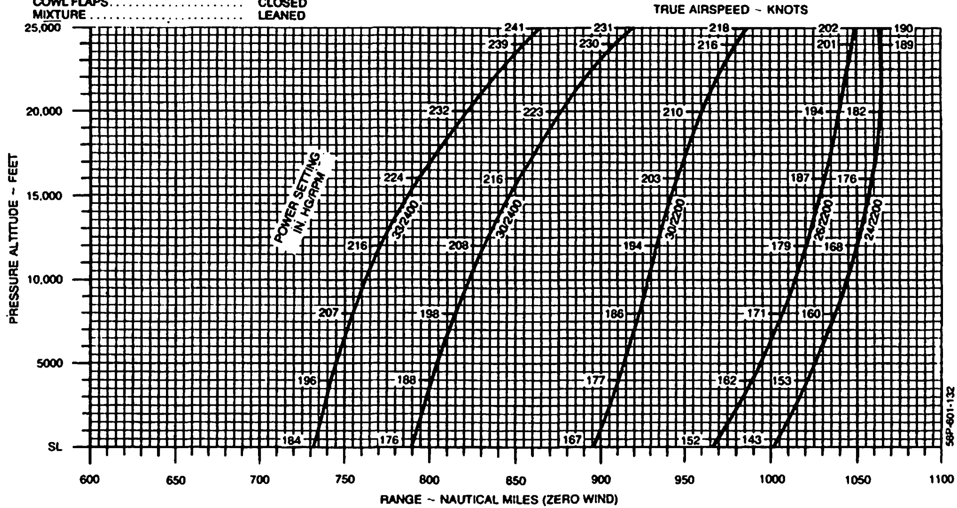
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT	6132 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	166 U.S. GAL (996 LBS)
COWL FLAPS	CLOSED
MIXTURE	LEANED

NOTE:

RANGE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



RANGE PROFILE — 100 GALLONS

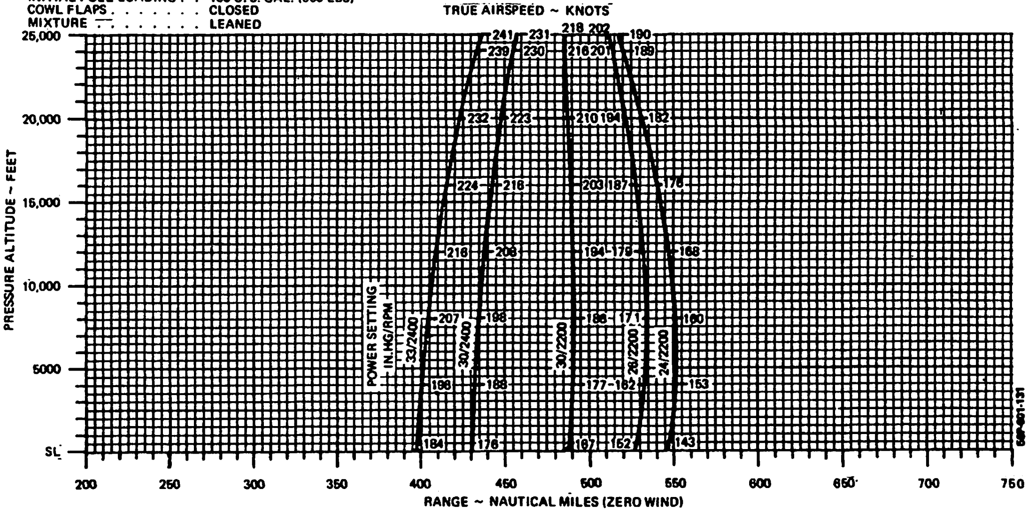
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT . . . . 6132 LBS BEFORE ENGINE START
FUEL . . . . AVIATION GASOLINE
FUEL DENSITY . . . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING . . 100 U. S. GAL. (600 LBS)
COWL FLAPS . . . . CLOSED
MIXTURE . . . . LEANED

NOTE:

RANGE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



ENDURANCE PROFILE—190 GALLONS

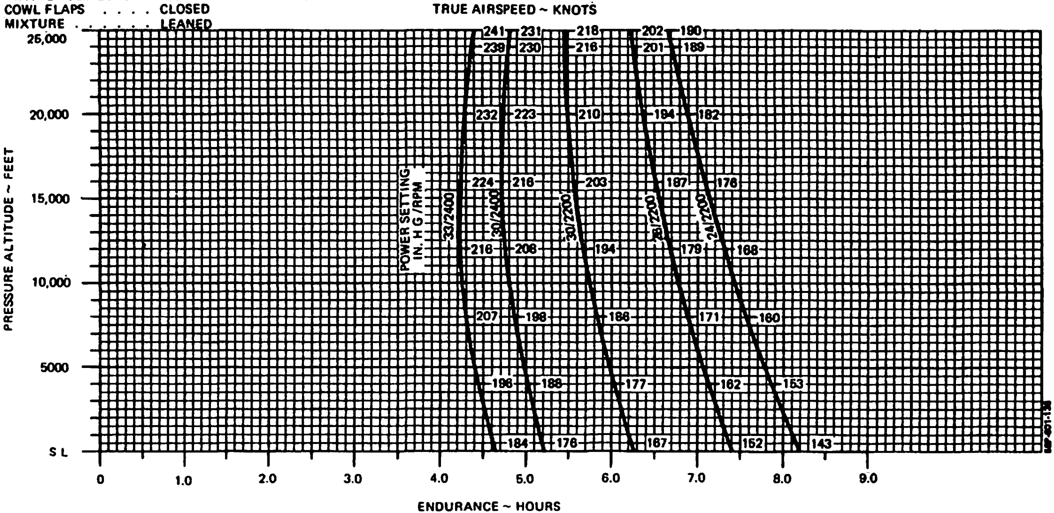
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT . . . . 6132 LBS BEFORE ENGINE START
FUEL . . . . AVIATION GASOLINE
FUEL DENSITY . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING 190 U.S. GAL. (1140 LBS)
COWL FLAPS . . . . . CLOSED
MIXTURE . . . . LEANED

NOTE:

ENDURANCE INCLUDES START, TAXI, CLIMB, AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



ENDURANCE PROFILE — 166 GALLONS

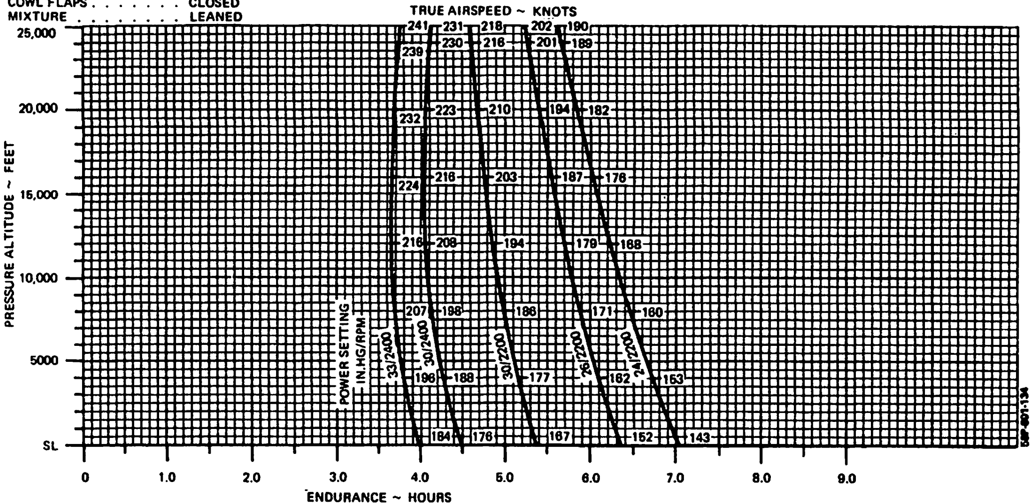
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT . . . . 6132 LBS BEFORE ENGINE START
FUEL . . . . AVIATION GASOLINE
FUEL DENSITY . . . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING . . 166 U. S. GAL. (996 LBS)
COWL FLAPS . . . . CLOSED
MIXTURE . . . . LEANED

NOTE:

ENDURANCE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



ENDURANCE PROFILE — 100 GALLONS

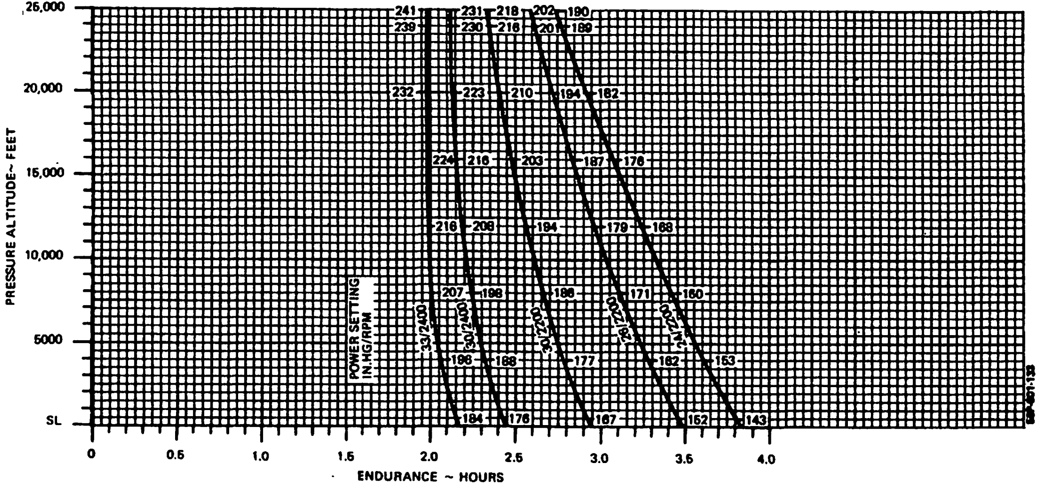
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT . . . . 6132 LBS BEFORE ENGINE START
FUEL . . . . AVIATION GASOLINE
FUEL DENSITY . . . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING . . 100 U. S. GAL. (600 LBS)
COWL FLAPS . . . . CLOSED
MIXTURE . . . . LEANED

NOTE:

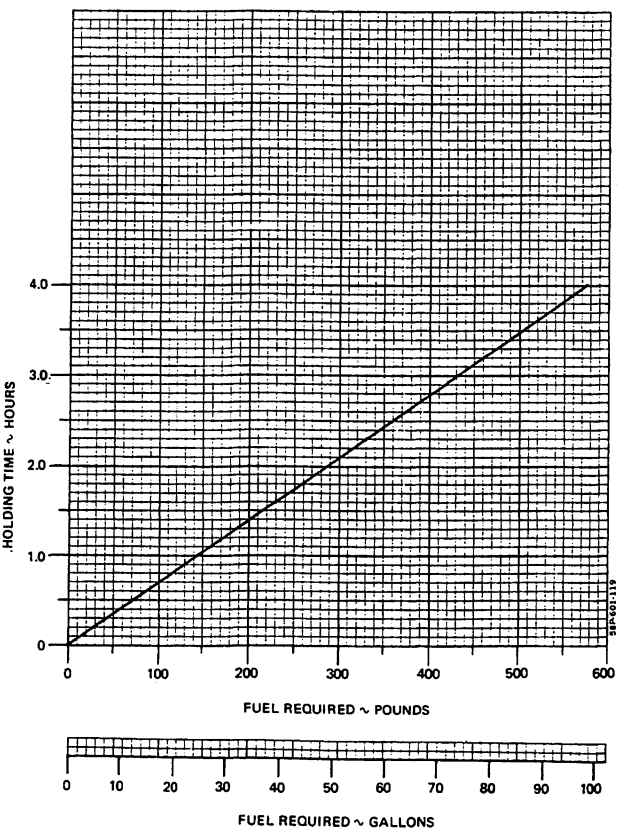
ENDURANCE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE (24/2200)



HOLDING TIME

ASSOCIATED CONDITIONS:

MANIFOLD PRESSURE . . . . . 24 IN. HG
PROPELLER SPEED . . . . . 2200 RPM
FUEL FLOW PER ENG . . . . . 12 GAL/HR
APPLICABLE FOR ALL TEMPERATURES AND ALTITUDES



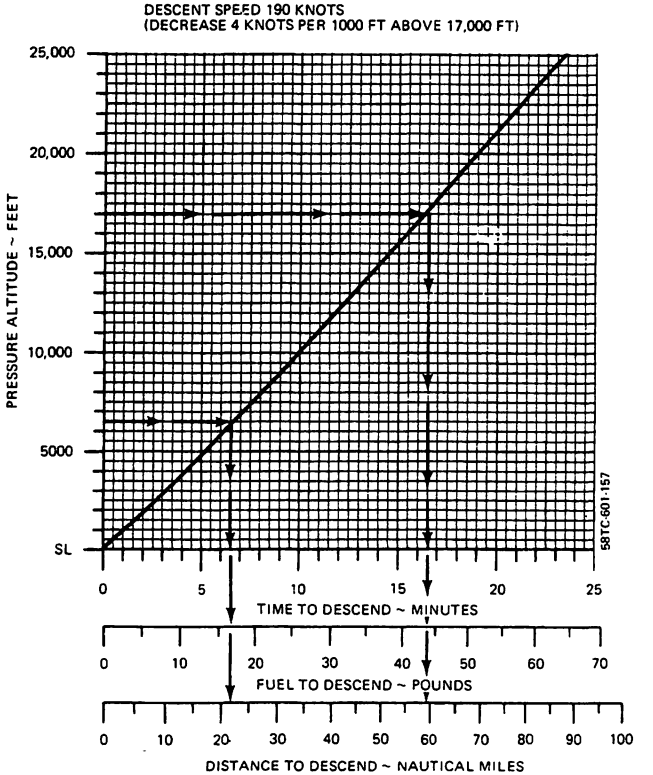
DESCENT

ASSOCIATED CONDITIONS:

POWER	30 IN. HG AND 2200 RPM ABOVE 10,000 FT AS REQUIRED FOR LESS THAN 1000 FT/MIN BELOW 10,000 FT
FLAPS	UP (0°)
LANDING GEAR	UP

EXAMPLE:

INITIAL ALTITUDE	17,000 FT
FINAL ALTITUDE	5650 FT
TIME TO DESCEND	(16.5-6.5) = 10 MIN
FUEL TO DESCEND	(44-16) = 28 LBS
DISTANCE TO DESCEND	(59-21) = 38 NM



LANDING DISTANCE - FLAPS 30°

ASSOCIATED CONDITIONS:

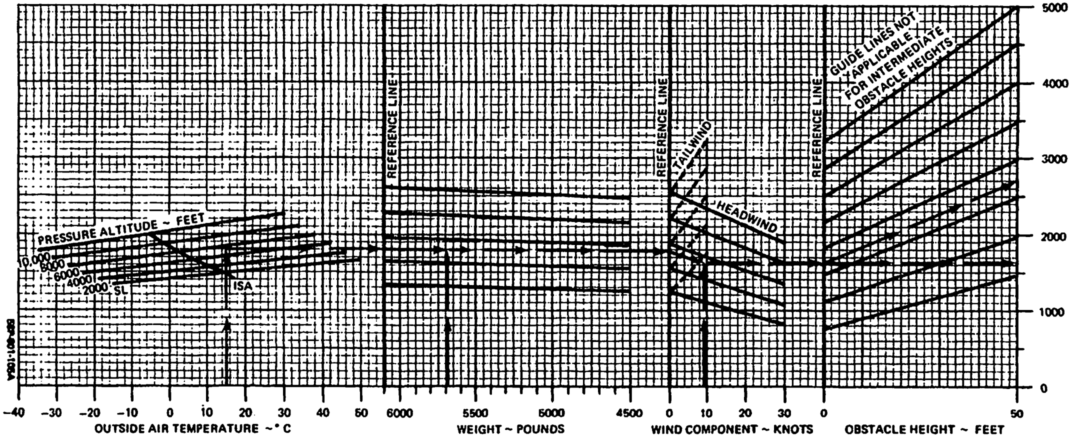
POWER . . . . . . RETARD TO MAINTAIN 1000 FT/MIN ON FINAL APPROACH
FLAPS . . . . . . DOWN (30°)
RUNWAY . . . . . PAVED, LEVEL, DRY SURFACE
APPROACH SPEED . IAS AS TABULATED
BRAKING . . . . . MAXIMUM

WEIGHT ~ LBS	APPROACH SPEED ~ KTS
6100	100
6000	100
5500	99
5000	99
4500	98

EXAMPLE:

OAT . . . . 15°C
PRESSURE ALTITUDE . . . . . . 5650 FT
LANDING WEIGHT . . . . . . 5702 LBS
HEADWIND COMPONENT . . . . . . 9.5 KTS

GROUND ROLL . . . . . . 1610 FT
TOTAL OVER 50 FT OBSTACLE . . . . . . 2690 FT
APPROACH SPEED . . . . . . 99 KTS



LANDING DISTANCE - FLAPS 0°

WEIGHT ~ POUNDS	APPROACH SPEED ~ KNOTS
6100	104
6000	104
5500	103
5000	103
4500	102

ASSOCIATED CONDITIONS:

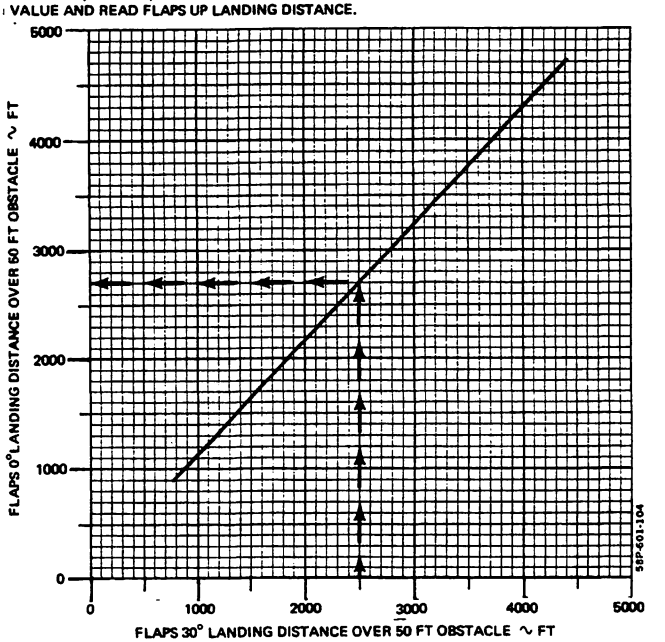
POWER . . . . RETARD TO MAINTAIN 800 FT/MIN ON FINAL APPROACH
FLAPS . . . . UP (0°)
RUNWAY . . . PAVED, LEVEL, DRY SURFACE
APPROACH SPEED IAS AS TABULATED
BRAKING . . . MAXIMUM

EXAMPLE:

FLAPS 30° LANDING DISTANCE OVER 50 FT OBSTACLE . . . . . 2600 FEET
LANDING WEIGHT . . . . . 5702 LBS

FLAPS 0° LANDING DISTANCE OVER 50 FT OBSTACLE . . . .2720 FEET
APPROACH SPEED . . . .103 KNOTS

NOTE: TO DETERMINE FLAPS UP LANDING DISTANCE, READ FROM THE LANDING DISTANCE - FLAPS 30 DEGREES GRAPH, THE LANDING DISTANCE APPROPRIATE TO OAT, ALTITUDE, WEIGHT, WIND AND 50 FT OBSTACLE. ENTER THIS GRAPH WITH DERIVED VALUE AND READ FLAPS UP LANDING DISTANCE.



LANDING DISTANCE - FLAPS 30° GRASS SURFACE

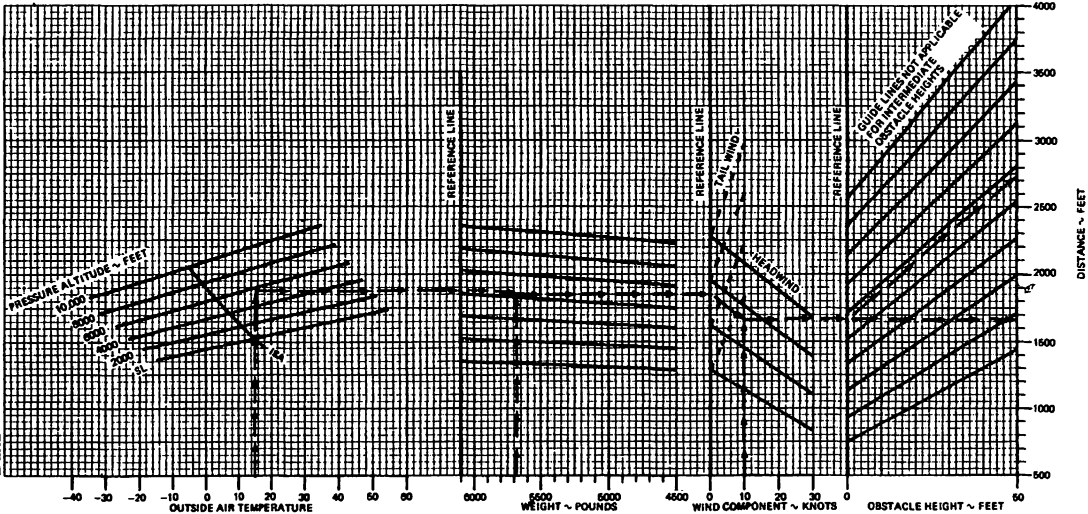
ASSOCIATED CONDITIONS:

POWER . . . . RETARD TO MAINTAIN 1000 FT/MIN ON FINAL APPROACH
FLAPS . . . . . . DOWN (30°)
RUNWAY . . . . . SHORT, DRY, GRASS
APPROACH SPEED . . IAS AS TABULATED
BRAKING . . . . . MAXIMUM

WEIGHT ~ POUNDS	APPROACH SPEED ~ KNOTS
6100	100
6000	100
5500	99
5000	99
4500	98

EXAMPLE:

OAT . . . . 15°C
PRESSURE ALTITUDE . . . . . 5650 FEET
LANDING WEIGHT . . . . . 5702 LBS
HEADWIND COMPONENT . . . . 10 KNOTS
GROUND ROLL . . . . . . 1660 FEET
TOTAL OVER 50 FT OBSTACLE . 2730 FEET
APPROACH SPEED . . . . . . 100 KNOTS



LANDING DISTANCE - FLAPS 0° GRASS SURFACE

WEIGHT ~ POUNDS	APPROACH SPEED ~ KNOTS
6100	104
6000	104
5500	103
5000	103
4500	102

ASSOCIATED CONDITIONS:

POWER . . . . . RETARD TO MAINTAIN 800 FT/MIN ON FINAL APPROACH
FLAPS . . . . . UP (0°)
RUNWAY . . . . . SHORT, DRY GRASS
APPROACH SPEED . IAS AS TABULATED
BRAKING . . . . . MAXIMUM

EXAMPLE:

FLAPS 30° LANDING DISTANCE OVER 50 FT. OBSTACLE . . 2730 FEET
LANDING WEIGHT . . 5702 LBS

FLAPS 0° LANDING DISTANCE OVER 50 FT OBSTACLE . . 3110 FEET
APPROACH SPEED . . 104 KNOTS

NOTE: TO DETERMINE FLAPS UP LANDING DISTANCE READ FROM THE LANDING DISTANCE - FLAPS 30° GRAPH, THE LANDING DISTANCE APPROPRIATE TO OAT, ALTITUDE, WEIGHT, WIND, AND 50 FT OBSTACLE. ENTER THIS GRAPH WITH DERIVED VALUE AND READ FLAPS UP LANDING DISTANCE.