Mooney Aircraft Corporation

P.O. BOX 72, KERRVILLE, TEXAS 78029-0072 PHONE (512) 896-6000

SPECIAL LETTER 92-1
DATE: April 20, 1992

SUBJECT: Mooney M20J 2900 POUND GROSS WEIGHT INCREASE, RETROFIT KITS

MODEL/S/N AFFECTED: M20J, Mooney 205, 201, ATS, MSE; S/N 24-1686 thru 24-3200, 24-3202 thru 24-3217

TIME OF COMPLIANCE: At owners discretion.

INTRODUCTION: The gross weight of 1991and later M20J aircraft has been increased from 2740 pounds to 2900 pounds. This increase in useful load is retrofitable to some earlier M20J aircraft. See S/N's listed above. The incorporation of this retrofit is up to the discretion of the aircraft owner/operator.

Five kits are provided for incorporation of: (1) the proper airspeed indicator, (2) the applicable AFM Supplement required for each listed series of S/N aircraft and (3) the inspection of the rudder static balance limits.

CAUTION

This Special Letter is to advise M20J owners (for S/N's listed above only) of the opportunity to incorporate this new configuration, if desired. HOWEVER, it is essential that the Serial Number of each aircraft and the number of the Pilot's Operating Handbook and Airplane Flight Manual (POH/AFM) being used for each aircraft be provided to the Service Parts Dept. at the time of the retrofit kit order. This will assist in assuring that the proper set of components are being provided for your aircraft.

INSTRUCTIONS:

1. Procure correct retrofit kit listed below. (Refer to S/N and POH/AFM of existing aircraft)
2. Retrofit Kit (for specific aircraft serial numbers) may be ordered direct from Mooney Service Parts Department, (512) 257-8601, using Master Card, Visa or C.O.D. The kits are priced at $1,750.00 net.
3. See instructions shown on field of Mooney 940071 drawing.
4. Install correct airspeed indicator supplied in appropriate kit.
5. Incorporate **proper** AFM Supplement into the appropriate POH/AFM for aircraft S/N

In addition:

6. Refer to Mooney Service Bulletin M20-252, dated 4-6-92. The INSTRUCTIONS shown therein MUST be followed for the above S/N aircraft to complete retrofit incorporation of the 2900 pound gross weight increase for these M20J's.

NOTE

When complying with this Special Letter, the instructions of SB M20-252, dated 4-6-92 or subsequent revision, must be accomplished on the above serial numbered aircraft even though the Serial Numbers on SB M20-252 do not specifically refer to the above aircraft.

WARRANTY: N/A

REFERENCE DATA:

1. Mooney drawing number 940071
2. Mooney Service Bulletin M20-252, dated 4-6-92 (or subsequent revision)
3. M20J Service and Maintenance Manual, No. 121, Chapter 27.

PARTS LIST: **CAUTION** – ORDER CORRECT KIT FOR YOUR AIRCRAFT – REFER TO S/N & POH/AFM LISTED

Mooney Kit Number SL92-1-1 (for S/N's 24-1686 THRU 24-2999)

ITEM	P/N	DESCRIPTION	QUANTITY
1.	940071-501	RETROFIT DRAWING	1
2.	POH/AFM # 3210 (Rev. A or B)	AFM SUPPLEMENT PAGES	1
3.	820308-537	INDICATOR, AIRSPEED	1

Mooney Kit Number SL92-1-2 (for S/N's 24-3000 THRU 24-3056)

ITEM	P/N	DESCRIPTION	QUANTITY
1.	940071-503	RETROFIT DRAWING	1
2.	# POH/AFM # 1233(A)	AFM SUPPLEMENT PAGES	1
3.	820308-539	INDICATOR, AIRSPEED	1

SUBJECT: Mooney M20J 2900 POUND GROSS WEIGHT INCREASE, RETROFIT KITS (con't.)

PARTS LIST: (con't.)

Mooney Kit Number SL92-1-3 (for S/N's 24-3000 THRU 24-3078)

ITEM	P/N	DESCRIPTION	QUANTITY
1.	940071-503	RETROFIT DRAWING	1
2.	# POH/AFM # 1233(B)	AFM SUPPLEMENT PAGES	1
3.	820308-539	INDICATOR, AIRSPEED	1

POH/AFM #1233(B) MAY BE USED FOR 24-3000 THRU 24-3078 AIRCRAFT. HOWEVER, AIRCRAFT SERIAL NUMBER's 24-3000 THRU 24-3056 MAY BE USING POH/AFM # 1233(A). BE SURE WHICH POH/AFM IS BEING USED PRIOR TO ORDERING THE APPROPRIATE KIT.

Mooney Kit Number SL92-1-4 (for S/N's 24-3079 THRU 24-3153)

ITEM	P/N	DESCRIPTION	QUANTITY
1.	940071-503	RETROFIT DRAWING	1
2.	POH/AFM # 3200(A)	AFM SUPPLEMENT PAGES	1
3.	820308-539	INDICATOR, AIRSPEED	1

Mooney Kit Number SL92-1-5 (for S/N's 24-3154 THRU 24-3200, 24-3202 THRU 24-3217)

ITEM	P/N	DESCRIPTION	QUANTITY
1.	940071-505	RETROFIT DRAWING	1
2.	POH/AFM # 3201	AFM SUPPLEMENT PAGES	1
3.	820308-535	INDICATOR, AIRSPEED	1

FIGURES/
TABLES: Refer to M20J S & M No. 121, Chapter 27, Figure 27-18 and 27-19 for the rudder balance inspection portion of the procedures.

CAUTION

Use the balance limits specified in Service Bulletin M20-252. The S & M will be revised in the near future to reflect the new limits for the 2900 pound gross weight aircraft.

MOONEY AIRCRAFT CORPORATION

PO BOX 72 KERRVILLE, TX 78029-0072

SERVICE BULLETIN

THIS BULLETIN IS FAA APPROVED FOR ENGINEERING DESIGN

SB M20-252
DATE: 4-6-92

SUBJECT: MOONEY M20J RUDDER BALANCE WEIGHT INSPECTION

MODEL/
S/N AFFECTED: 24-3201, 24-3218 THRU 24-3256 (EXCLUDING 24-3239 & 24-3251)

TIME OF
COMPLIANCE: WITHIN NEXT 15 FLIGHT HOURS

INTRODUCTION: The continual evaluation of data and testing of various systems on M20 Series aircraft models has led, among other things, to the introduction of the 2900 pound gross weight M20J aircraft. An analysis of computer data has determined that a slight change to the rudder static balance limits are necessary on the 2900 pound gross weight M20J. These new limits are listed in INSTRUCTIONS below. The possibility exists that the rudders on some of the affected aircraft listed herein may be outside these new limits. Therefore, it is mandatory that this Service Bulletin be complied with as indicated.

INSTRUCTIONS:

1. Remove rudder from empennage of the aircraft per M20J Service and Maintenance (S & M) manual, No. 121, Section 27-20-00, paragraphs 2, A, B, C,

2. Check rudder balance per M20J S & M, Section 27-92-00 thru 27-93-01 & Tables 27-18 and 27-19 (See **CAUTIONS** below).

CAUTION: Table 27-18 - Use GAUGE WEIGHT DISTANCE LIMITS of: **+6.69 in.** to +10.68 in. for 2900 pound aircraft. – The +3.37 in. to +10.68 in. limits remain in effect for 2740 pound gross weight aircraft.

CAUTION: Table 27-19 - Use ABSOLUTE BALANCE LIMITS of: **+15.50 in. lbs.** to +12.50 in. lbs. for 2900 pound aircraft. –The +18.00 in. lbs. to +12.50 in. lbs. limits remain in effect for 2740 pound gross weight aircraft.

3. If rudder balance **falls within the above limits,** re-install rudder on the aircraft per M20J S & M, Section 27-20-00, paragraph 2, D. Proceed to Step 8.

If rudder **does not fall within the above limits**, proceed to Step 4.

4. Temporarily add additional weight (washers or any other items) until static balance falls within limits. Remove temporary weights and weigh them to see approximately how much additional weight was needed to balance within limits. If 2.66 oz. or less is needed, the addition of washers described in Step 5 will provide the necessary added weight (ie. 16 each AN970-3 washers weigh 2.66 oz.)

5. If balance just exceeds limit, one method is to remove the balance weight attach screws, one at a time and add washers under screw head (up to two under each screw) as required to balance rudder within the 2900 pound limits. If necessary, proceed to each attaching screw and add washers. It is recommended that the washers be distributed among all 8 attaching screws for a neater appearance. Either AN960-10 or AN970-3 washers may be used. However, for **each washer** added under screw head, the length of the NAS623-3 screw MUST BE increased by one dash number. (See Service Bulletin Kit for Part Numbers. You will need to request the quantity of washers and/or screws desired)

6. If greater than 2.66 oz. is required, remove the balance weight and weigh it together with the temporary weights. The total weight of these should be the specified weight of the new 460011-503 balance weight ordered. The maximum 460011-503 balance weight available is 2.88 pounds.

7. Re-check rudder after each change to the balance weight per S & M manual procedures until within limits.

8. Enter compliance statement in Airframe log book and return aircraft to service.

WARRANTY: Mooney Aircraft Corporation will allow up to 2.5 hours labor to inspect the rudder balance. If the rudder is out of balance, up to an additional 2.0 hours will be approved to balance and repaint as necessary. The necessary weights and hardware can be ordered through the nearest Mooney Service Center. Warranty credit will be allowed for this Servie Bulletin effort if necessary paperwork is received by Service Parts within 180 days of the date of this Service Bulletin.

REFERENCE DATA: N/A

PARTS LIST: KIT PART NUMBER - SB M20-252-1

ITEM	P/N	DESCRIPTION	QTY	
1.	460011-503	WEIGHT, BALANCE	.1	*
2.	AN960-10	WASHER	.16	**
3.	AN970-3	WASHER, LARGE OD	.16	**
4.	NAS623-3-2	SCREW	.8	**
5.	NAS623-3-3	SCREW	.8	**

* Order weight as needed. 2.88 pounds is heaviest weight available from MAC.
** Use as required per Step 5

FIGURES/ TABLES: Refer to M20J Service and Maintenance Manual,No. 121, Chapter 27, FIGURE 27-18 and 27-19.

CAUTION

Use the limits depicted in this SB for 2900 pound gross weight aircraft until S & M can be revised.

MOONEY AIRCRAFT CORPORATION
P.O. BOX 72
KERRVILLE, TEXAS 78029-0072

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

Mooney Aircraft Model

M20J
(S/N 24-1686 THRU 24-3153)

WITH

INCREASED GROSS WEIGHT MODIFICATIONS
FOR 2900 POUND OPERATIONS

REG. NO._____

SERIAL NO._____

This Supplement must be attached to the appropriate M20J FAA Approved Pilot's Operating Handbook and Airplane Flight Manual (POH/AFM) when aircraft (within Serial Numbers listed above) are operated with increased gross weight of 2900 pounds. The information contained herein supplements or supersedes the basic manual only in those areas listed by a vertical black mark in the margin. For limitations, procedures and performance information not contained in this supplement, consult the appropriate basic Airplane Flight Manual.

FAA APPROVED: Michele M Owsley

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MOONEY AIRCRAFT CORPORATION

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LOG OF REVISIONS

Revision Number	Revision Pages	Description of Revisions	FAA Approved	Date

The revised portions of affected pages are indicated by vertical black lines in the margin.

This supplement is to provide operating procedures and performance data for M20J aircraft, S/N's 24-1686 thru 24-3153 when operating at 2900 pounds gross weight and modified according to Mooney Retrofit Kit, 940071.

The POH/AFM pages included in this AFM Supplement, will supercede the basic pages of the appropriate POH/AFM in the areas marked with a vertical black line in the margin. The data on the entire page is provided for immediate reference even though some of it may be the same as the basic POH/AFM.

SECTION I - GENERAL

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	1-5/1-6
POH/AFM No. 3210	Page Numbers	1-3/1-4, 1-5/1-6
POH/AFM No. 1233A	Page Numbers	1-5/1-6
POH/AFM No. 1233B	Page Numbers	1-5/1-6

SECTION II - LIMITATIONS

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	2-3/2-4, 2-7/2-8
POH/AFM No. 3210	Page Numbers	2-1/2-2, 2-3/2-4, 2-7/2-8
POH/AFM No. 1233A	Page Numbers	2-3/2-4, 2-7/2-8,
POH/AFM No. 1233B	Page Numbers	2-3/2-4, 2-7/2-8

SECTION III - EMERGENCY PROCEDURES

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	3-3/3-4, 3-9/3-10
POH/AFM No. 3210	Page Numbers	3-3/3-4, 3-7 THRU 3-10
POH/AFM No. 1233A	Page Numbers	3-3/3-4, 3-13/3-14
POH/AFM No. 1233B	Page Numbers	3-3/3-4, 3-9/3-10

SECTION IV - NORMAL PROCEDURES

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	4-9 THRU 4-16
POH/AFM No. 3210	Page Numbers	4-9 THRU 4-14
POH/AFM No. 1233A	Page Numbers	4-1/4-2, 4-11 THRU 4-18,
POH/AFM No. 1233B	Page Numbers	4-11 THRU 4-18

SECTION V - PERFORMANCE

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	5-3/5-4, 5-11 THRU 5-34
POH/AFM No. 3210	Page Numbers	5-3/5-4, 5-11 THRU 5-34
POH/AFM No. 1233A	Page Numbers	5-1/5-2, 5-5/5-6, 5-13 THRU 5-36
POH/AFM No. 1233B	Page Numbers	5-1 THRU 5-4, 5-11 THRU 5-34

SECTION VI - WEIGHT AND BALANCE

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

POH/AFM No. 3200	Page Numbers	6-1 THRU 6-10
POH/AFM No. 3210	Page Numbers	6-1 THRU 6-10
POH/AFM No. 1233A	Page Numbers	6-1 THRU 6-4, 6-7 THRU 6-10
POH/AFM No. 1233B	Page Numbers	6-1 THRU 6-10

SECTION VII - AIRPLANE AND SYSTEMS DESCRIPTION

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

Page Number	No pages changed for any POH/AFM.

SECTION VIII - HANDLING, SERVICE AND MAINTENANCE

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

Page Number	No pages changed for any POH/AFM.

SECTION IX - SUPPLEMENTAL DATA

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

Page Numbers	Supplemental Pages for M20J 2900# Gross Weight operations added to this Section.

SECTION X - SAFETY & OPERATIONAL TIPS

The following supplemental pages are to be used when compliance with retrofit Kit 940071 has been complied with:

Page Number	No pages changed for any POH/AFM.

| NOTE |

ALL PAGES LISTED UNDER SECTION HEADINGS ABOVE MUST BE INCLUDED IN THIS SUPPLEMENT FOR THE APPROPRIATE POH/AFM LISTED AND INSERTED INTO THE APPROPRIATE POH/AFM OF ANY AIRCRAFT WHICH HAS COMPLIED WITH MOONEY RETROFIT KIT NO. 940071.

~ CAUTION ~

THE AIRCRAFT WEIGHT AND BALANCE DATA AND EQUIPMENT LISTINGS (SECTION VI) FROM THE ORIGINAL POH/AFM **MUST** BE ENTERED ON TO ANY SUPPLEMENTAL PAGES INSERTED INTO THE POH/AFM WHEN THE AIRCRAFT IS TO BE OPERATED AT 2900 POUNDS GROSS WEIGHT.

Tire Pressure:	
Nose	49 PSI
Main	30 PSI
Min. Turning Radius (No brakes applied)	41 ft. (12.5 m)

MAXIMUM CERTIFICATED WEIGHTS

Maximum Loading (unless limited by C.G. envelope)	
Gross Weight	2900 Lbs. (1315 Kg)
Baggage Area	120 Lbs. (54.4 Kg)
Hat Rack	10 Lbs. (4.54 Kg)
Cargo (Rear Seats Folded Down)	340 Lbs. (154.2 Kg)

STANDARD AIRPLANE WEIGHTS

Basic Empty Weight	See Page 1-10
Useful Load	Varies with installed equipment. See Section VI for specific airplane weight (pg. 6-5)

CABIN AND ENTRY DIMENSIONS

Cabin Width (Maximum)	43.5 In. (110.5 cm)
Cabin Length (Maximum)	114 In. (290 cm)
Cabin Height (Maximum)	44.5 In. (113 cm)
Entry Width (Minimum)	29.0 In. (73.4 cm)
Entry Height (Minimum)	35.0 In. (88.9 cm)

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Width	24 In. (60.9 cm)
Compartment Length	35 In. (88.9 cm)
Compartment Height	35 In. (88.9 cm)
Compartment Volume	17.0 Cu. Ft. (.476 cubic meters)
Cargo Area (with rear seat folded down)	33.0 Cu. Ft. (.924 cubic meters)
Entry Height (Minimum)	20.5 In. (52.1 cm)
Entry Width	17.0 In. (43.2 cm)
Ground to Bottom of Sill	46.0 In. (116.8 cm)

SPECIFIC LOADINGS

Wing Loading @ Maximum Gross Weight	16.59 Lbs./Sq. Ft (83.62 Kg/Sq. m)
Power Loading @ Maximum Gross Weight	14.5 Lbs./HP (6.57 Kg/HP)

IDENTIFICATION PLATE

All correspondence regarding your airplane should include the Serial Number as depicted on the identification plate. The identification plate is located on the left hand side, aft end of the tail cone, below the horizontal stabilizer leading edge. The aircraft Serial Number and type certificate are shown.

SYMBOLS, ABBREVIATIONS & TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY & SYMBOLS

g	Acceleration due to gravity.
GS	GROUND SPEED - Speed of an airplane relative to the ground.
KCAS	KNOTS CALIBRATED AIRSPEED - The indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KIAS	KNOTS INDICATED AIRSPEED - The speed of an aircraft as shown on its airspeed indicator. IAS values published in this handbook assume zero instrument error.
KTAS	KNOTS TRUE AIRSPEED - The airspeed of an airplane relative to undisturbed air.
V_a	MANEUVERING SPEED - The maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{fe}	MAXIMUM FLAP EXTENDED SPEED - The highest speed permissible with wing flaps in a prescribed extended position.
V_{le}	MAXIMUM LANDING GEAR EXTENDED SPEED - The maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{lo}	MAXIMUM LANDING GEAR OPERATING SPEED -The maximum speed at which the landing gear can be safely extended or retracted.
V_{ne}	NEVER EXCEED SPEED or MACH NUMBER - The speed limit that may not be exceeded at any time.
V_{no}	MAXIMUM STRUCTURAL CRUISING SPEED - The speed that should not be exceeded except in smooth air and then only with caution.
V_s	STALLING SPEED - The minimum steady flight speed at which the airplane is controllable.
V_{so}	STALLING SPEED - The minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_x	BEST ANGLE-OF-CLIMB SPEED - The airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown in Figure 2-1. This calibration assumes zero instrument error.

	SPEED	KCAS/KIAS	REMARKS
V_{NE}	Never Exceed Speed	195/198	Do not exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	174/176	Do not exceed this speed except in smooth air, and then only with caution.
V_A	Maneuvering Speed at: lb./Kg. 2250/1021 2470/1120 2740/1243 2900/1315	 103/105 108/110 114/116 117/119	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap Extended Speed	109/115	Do not exceed this speed with flaps in full down position.
V_{LE}	Maximum Landing Gear Extended Speed	130/132	Maximum speed at which the aircraft can be safely flown with the landing gear extended.
V_{LO} (EXT)	Max. Speed for Gear Extension	130/132	Max. speed at which the landing gear can be safely extended.
V_{LO} (RET)	Max. Speed for Gear Retraction	104/107	Maximum speed at which the landing gear can be safely retracted.
	Maximum Pilot Window Open Speed	130/132	Do not exceed this speed with pilot window open.

FIGURE 2-1 AIRSPEED LIMITATIONS

AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings, their color code and operational significance are shown in Figure 2-2.

MARKING	IAS VALUE OR RANGE(KIAS)	SIGNIFICANCE
White Arc (Full Flap Operating Range)	58-115	Lower limit is maximum weight Vso in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc (Normal Operating Range)	65-176	Lower limit is maximum weight Vs with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc (Caution Range)	176-198	Operations must be conducted with caution and only in smooth air.
Radial Red Line	198	Maximum speed for all operations.

FIGURE 2-2 AIRSPEED INDICATOR MARKINGS

WEIGHT LIMITS

Maximum Weight (takeoff and landing) . . . . . 2900 lb.
. . . . . (1315 Kg.)

Maximum Weight in Baggage Compartment . . . . . 120 lb.
. . . . . (54.4 Kg.) @ Fuse. Sta. 95.5

Maximum Weight in Hatrack . . . . . 10 lb.
. . . . . (4.54 Kg.) @ Fuse. Sta. 119.0

Maximum Weight in Cargo Area
(Rear seats folded down) . . . . . 340 lbs.
. . . . . (154.2 Kg) @ Fuse. Sta. 70.7

CENTER OF GRAVITY (GEAR DOWN)

Most Forward . . . . . Fuse. Sta. 41.0 IN.(104 cm)
. . . . . @ 2250 lb.(1022 Kg.) 13.3% MAC

Intermediate Forward . . . . . Fuse. Sta. 41.8 IN.(106 cm)
. . . . . @ 2470 lb.(1120 Kg.) 14.7% MAC

Forward Gross . . . . . Fuse. Sta. 45.0 IN.(114 cm)
. . . . . @ 2900 lb.(1315 Kg.) 20.1% MAC

Aft Gross . . . . . Fuse. Sta. 50.1 IN. (126 cm)
. . . . . @ 2900 lb.(1315 Kg.) 28.7% MAC

MAC (at Wing Sta. 93.83)(238 cm) . . . . 59.18 IN.(150 cm)

Datum (station zero) is 5 inches (12.7 cm) aft of the center line of the nose gear attaching bolts, and 33 inches (84 cm) forward of the wing leading edge at wing station 59.25 (150 cm).

NOISE LIMITS

The certificated noise level for the M20J at 2900 lbs. (1315 Kg.) maximum weight is 80.64 dB (A). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

MANEUVER LIMITS

This airplane must be operated as a Normal Category airplane. Aerobatic maneuvers, including spins, are prohibited.

Extreme sustained sideslips may result in fuel venting thereby causing fuel fumes in the cabin.

////////////////////
///WARNING///
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Takeoff maneuvers, prolonged sideslips or steep descents when the selected fuel tank contains less than 8 gallons (48.0 lbs., 30.3 liters, 6.7 IMP. Gal.) of fuel have not been demonstrated and may cause loss of power.

| NOTE |

Up to 400 foot altitude loss may occur during stalls at maximum weight.

Slow throttle movement required at airspeed above 165 KIAS. Above 165 KIAS, rapid throttle movement may result momentary propeller RPM overspeed.

FLIGHT LOAD FACTOR LIMITS

Maximum Positive Load Factor
- Flaps Up . . . . . +3.8 g.
- Flaps Down (33^{O}) . . . . . +2.0 g.

Maximum Negative Load Factor
- Flaps Up . . . . . -1.5 g.
- Flaps Down . . . . . 0.0 g.

KINDS OF OPERATION LIMITS

This is a Normal Category airplane approved for VFR/IFR day or night operations when equipped in accordance with FAR 91.

DO NOT OPERATE IN KNOWN ICING CONDITIONS.

TAKEOFFS WITH COWL FLAPS INOPERATIVE ARE PROHIBITED.

Autopilot Limitations - See Section IX.

FUEL LIMITATIONS

| NOTE |

A reduced fuel quantity indicator is installed in each tank. The bottom tip of these indicators shows the 25 U.S. gallon (94.7 liters) (20.8 IMP. Gal.) usable fuel level in each tank.

| NOTE |

An optional visual fuel quantity gauge may be installed on top of each tank and is to be used as a reference for refueling the tanks only.

AIRSPEEDS FOR EMERGENCY OPERATIONS

Engine Failure after Takeoff	
Wing Flaps UP	85 KIAS
Wing Flaps DOWN	75 KIAS
Maximum Glide Speed	
2900 lb/1315 kg	94 KIAS
2740 lb/1243 kg	91 KIAS
2500 lb/1134 kg	88 KIAS
2300 lb/1043 kg	85 KIAS
Maneuvering Speed	
2900 lb/1315	.119 KIAS
2740 lb/1243 kg	.116 KIAS
2470 lb/1120 kg	.110 KIAS
2250 lb/1021 kg	.105 KIAS
Precautionary Landing with Engine Power,	
Flaps DOWN	75 KIAS
Emergency Descent (Gear UP)	
Smooth Air	.198 KIAS
Turbulent Air	
2900 lb/1315	.119 KIAS
2740 lb/1243 kg	.116 KIAS
2470 lb/1120 kg	.110 KIAS
2250 lb/1021 kg	.105 KIAS
Emergency Descent (Gear DOWN)	
Smooth Air	.132 KIAS
Turbulent Air	
2900 lb/1315 kg	.119 KIAS
2740 lb/1243 kg	.116 KIAS
2470 lb/1120 kg	.110 KIAS
2250 lb/1021 kg	.105 KIAS

ANNUNCIATOR PANEL WARNING LIGHTS

WARNING LIGHT	FAULT & REMEDY
Gear Unsafe	LDG. GR. in transit or not fully extended or retracted. Refer to "Failure of Landing Gear to Extend Electrically", pg. 3-11 or "Failure of Landing Gear to Retract", page 3-12.
Left or Right Fuel Low	2 1/2 to 3 gallons of usable fuel remain in the respective tanks. Switch to fuller tank.
VAC (Flashing)	Suction is below 4.25 In. Hg.
VAC (Steady)	Suction is above 5.5 In. Hg.

| NOTE |

Attitude and directional gyros are unreliable when VAC light is illuminated (steady or flashing). Vacuum system should be checked and/or adjusted as soon as practicable.

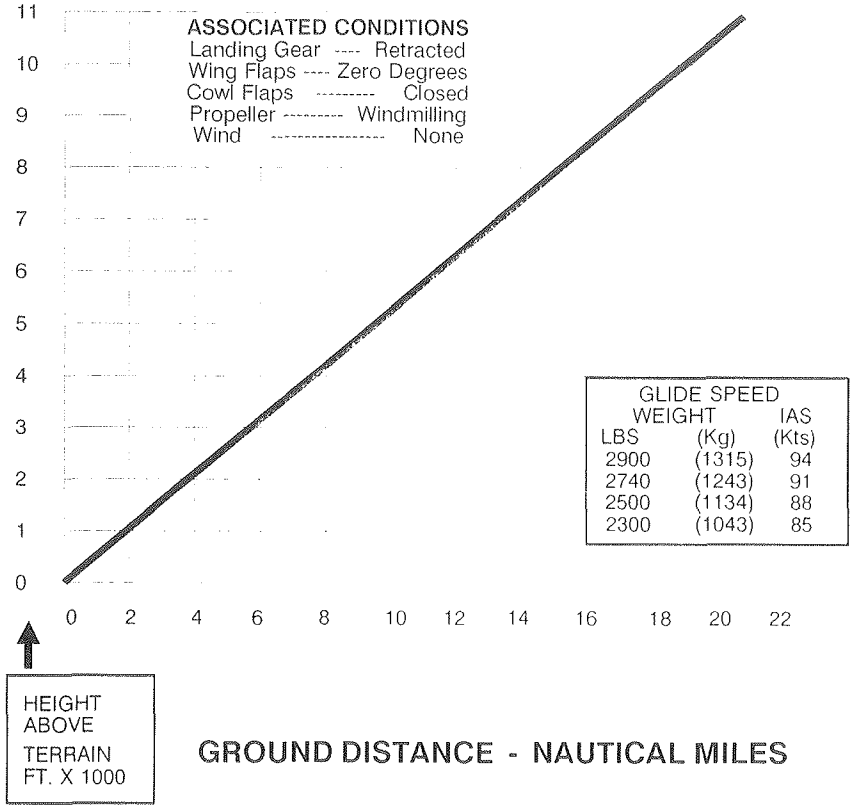
Volts (Flashing)	Low voltage. Refer to"Alternator Low Voltage" on page 3-11.
Volts (Steady)	Overvoltage or tripped Voltage Relay. Refer to "Alternator Failure" on page 3-11.
Ram Air	Ram Air light is ON when landing gear is extended. Close Ram Air before landing.
Start Power ON	Switch or relay has malfunctioned and starter is energized. Flight should be terminated as soon as practicable. Engine damage may result.

approximately the same maximum rate of descent. At 132 knots and the gear extended, the angle of descent will be greater, thus resulting in less horizontal distance traveled than a descent at 196 knots. Additionally, a descent at 132 knots will provide a smoother ride, resulting in less pilot workload.

Therefore: The following procedure should be used for an emergency descent.

Power	RETARD initially
Airspeed	132 KIAS
Landing Gear	EXTEND
Wing Flaps	UP
Cowl Flaps	CLOSED
Power During Descent	AS REQUIRED to Maintain Cylinder Head Temperature 300° F (149° C) minimum

GLIDE
MAXIMUM GLIDE DISTANCE
MODEL M20J



LANDING EMERGENCY

POWER OFF-GEAR RETRACTED OR EXTENDED

Emergency Locator Transmitter	ARMED
Seat Belts and Shoulder Harnesses	SECURE
Cabin Door	UNLATCHED
Fuel Selector	OFF
Mixture	IDLE CUTOFF
Magneto/Starter	OFF
Flaps	Full DOWN (33 Degrees)
Gear	DOWN or UP Depending on Terrain
Approach Speed	AS SLOW AS POSSIBLE
Master	OFF, prior to landing

POWER ON - GEAR RETRACTED

Emergency Locator Transmitter	ARMED
Seat Belts and Shoulder Harnesses	SECURE
Cabin Door	UNLATCHED
	When sure of making landing area:
Fuel Selector	OFF
Throttle	CLOSED
Mixture	IDLE CUTOFF
Magneto/Starter	OFF
Flaps	Full DOWN (33 Degrees)
Master	OFF
Approach Speed	As Slow As Possible
Wings Keep	LEVEL

SYSTEMS EMERGENCIES

PROPELLER

PROPELLER OVERSPEED

Throttle	RETARD
Oil Pressure	CHECK
Propeller	DECREASE, set if any control avaliable
Airspeed	REDUCE
Throttle	AS REQUIRED
	to maintain RPM below 2700 RPM

FUEL

LOW FUEL FLOW

Check Mixture	ENRICH
Fuel Selector	Fullest TANK

If condition persists, use Boost Pump if necessary and LANDING should be made as soon as practicable.

Throttle	1200 RPM
Propeller	HIGH RPM
Mixture	Full Forward (RICH)
Cowl Flaps	FULL OPEN or AS REQUIRED
Ram Air	CLOSED
Magneto/Starter Switch	GROUND CHECK

~ ~ ~ ~ ~ ~ ~
~ CAUTION ~
~ ~ ~ ~ ~ ~ ~

Do not operate the engine at run-up speed unless the oil temperature is 75 Degrees F. minimum (needle moves off White dot). Operation of the engine at too high a speed before reaching minimum oil temperature may cause loss of oil pressure.

Throttle	1900-2000 RPM
Magnetos	CHECK. Both to L, Both to R, Both, (Maximum 175 RPM drop each magneto, 50 RPM Difference)

_ _ _ _ _
| NOTE |
_ _ _ _ _

An absence of RPM drop may be an indication of faulty magneto grounding or improper timing. If there is doubt concerning ignition system operation, RPM checks at a leaner mixture setting or higher engine speed will usually confirm whether a deficiency exists.

Propeller	CYCLE/return to high RPM (3 times)
Throttle	Retard to IDLE RPM
Trim	Takeoff setting
Flaps	Check operation-SET TAKEOFF POSITION (15 degrees)
Controls	Check free and correct movement
Cabin Door	CHECK SECURED
Seat Belts and Shoulder Harness	SECURED
Avionics and Auto Pilot	CHECK (Refer to Section IX)
Annunciator Lights	Press to Test
Internal/External Light	As Desired
Rotating Beacon/Strobe Lights	ON
Pilots Window	CLOSED
Emergency Gear Extension Red Handle	DOWN and LATCHED
Parking Brake	Release

TAKEOFF PROCEDURES

| NOTE |

Move the engine controls slowly and smoothly. In particular, avoid rapid opening and closing of the throttle as the engine is equipped with a counterweighted crank shaft and there is a possibility of detuning the counter-weights with subsequent engine damage.

Proper engine operation should be checked early in the takeoff roll. Any siginificant indication of rough or sluggish engine response is reason to discontinue the takeoff. When takeoff must be made over a gravel surface, it is important that the throttle be applied slowly. This will allow the aircraft to start rolling before a high RPM is developed. and gravel or loose material will be blown back from the prop area instead of being pulled into it.

TAKEOFF (NORMAL)

Electric Fuel Boost Pump	ON at start of takeoff roll
Power	FULL THROTTLE and 2700 RPM
Aircraft Attitude	Lift Nose Wheel at 63 KIAS
Climb Speed	80 KIAS
Landing Gear	Retract in Climb Before Attaining an Airspeed of 107 KIAS
Wing Flaps	Retract in Climb
Electric Fuel Boost Pump	OFF
	CHECK Pressure

| NOTE |

See Section V, page 5-16 for takeoff distances and aircraft weight versus speed table.

| NOTE |

If maximum performance takeoffs are desired, obtain full power before brake release; lift off at 62 KIAS and climb at 95 KIAS.

CLIMB

NOTE

Use noise abatement procedure as published by airport and/or this manual.

CLIMB (CRUISE)

Throttle	26" Hg Manifold Pressure
Propeller	2600 RPM
Mixture	RICH (Lean for Smooth Operation at high elevation)
Cowl Flaps	FULL OPEN or As Required
Airspeed	90 to 100 KIAS

Maintain these power settings and attitude to at least 3000 feet AGL or cruise altitude.

CLIMB (BEST RATE)(Vy)

Power	FULL THROTTLE and 2700 RPM
Mixture	FULL RICH (Lean at higher altitudes for smooth operation)
Cowl Flaps	FULL OPEN
Airspeed	88 KIAS at sea level decreasing to 82 KIAS at 10.000 ft

NOTE

See Section V, page 5-17 for rate of climb graph.

CLIMB (BEST ANGLE)(Vx)

Power	FULL THROTTLE and 2700 RPM
Mixture	FULL RICH (Lean at higher altitude for smooth operation)
Cowl Flaps	FULL OPEN
Airspeed	69 KIAS at sea level increasing approximately 1.0 KIAS for each 5000 feet altitude
Ram Air	ON after entering clear air

| NOTE |

To increase performance at full throttle pull the Ram Air control aft (Ram Air ON position) allowing induction air to bypass air filter and increase manifold pressure.

Manifold pressure will drop with increasing altitude at any throttle setting.Power can be restored by gradually opening the throttle.

////////////////////
///WARNING///
////////////////////
-DO NOT FLY AIRCRAFT INTO KNOWN ICING CONDITIONS-

CRUISE

Upon reaching cruise altitude, accelerate to cruise airspeed; retrim aircraft as necessary for level flight. Set manifold pressure and RPM for desired power setting per Cruise Power Chart in Section V. Position cowl flaps as required to maintain the oil and cylinder head temperature within their normal operating ranges.

| NOTE |

When cruising in conditions where the OAT is well above standard, it may be necessary to OPEN cowl flaps slightly in order to keep engine temperatures in the green arc. When cowl flaps are OPEN during cruise, the following effects on cruise speed will result:

Cowl Flaps 1/4 open (1st Index)
Approximate loss in TAS . . . . . 2 KTAS
Cowl Flaps 1/2 open (2nd Index)
Approximate loss in TAS . . . . . 4 KTAS

When cruising at 75 % power or less. lean the mixture after cruise power is established in accordance with one of the following methods:

A. Leaning using exhaust gas temperature gauge (EGT) (if installed).
1. Lean the mixture exhaust gas temperature peaks on the EGT indicator.

ECONOMY CRUISE - Enrich mixture (push mixture control forward) until the EGT indicator drops 14° C (25 degrees F.) below peak.

BEST POWER MIXTURE - Enrich mixture until EGT indicator drops 55 ° C(100° F.) below peak.

| NOTE |

Compared to Economy Cruise, Best Power mixture will result in an increase in fuel flow and a reduction in range.

2. Changes in altitude and power settings require the peak EGT to be rechecked and the mixture reset.

B. Leaning without exhaust gas temperature gauge (EGT):
1. Slowly move mixture control lever aft from "FULL RICH" position toward "LEAN" position.
2. Continue leaning until slight loss of power is noted (loss of power may or may not be accompained by roughness.
3. Enrich until engine runs smoothly and power is regained.

When increasing power always return mixture to full rich, then increase RPM before increasing manifold pressure, when decreasing power, decrease manifold pressure before reducing RPM. Always stay within the established operating limits and always oerate the controls slowly an smoothly.

DESCENT

Mixture . . . . . LEAN to 14° C rich of peak EGT as required for smooth engine operation

Power . . . . . AS REQUIRED to keep CHT in Green Arc (300° F (149° C) minimum)

~ ~ ~ ~ ~ ~ ~ ~
~ CAUTION ~
~ ~ ~ ~ ~ ~ ~ ~

Avoid continuous operation between 1500 and 1950 RPM with power settings below 15" manifold pressure.

| NOTE |

Exercise caution with power settings below 15" manifold pressure at airspeeds between 70 - 113 KIAS to preclude continuous operation in the 1500 - 1950 RPM restricted range.

~ ~ ~ ~ ~ ~ ~ ~
~ CAUTION ~
~ ~ ~ ~ ~ ~ ~ ~

Avoid long high speed descents at low manifold pressure as the engine can cool excessively.

Cowl Flaps . . . . . FULL CLOSED
Ram Air . . . . . OFF before entering dusty air layers.

| NOTE |

Plan descents to arrive at pattern altitude on downwind leg for maximum fuel efficiency and minimum aircraft noise.

APPROACH FOR LANDING

Internal/External Lights	As desired
Seat Belts, Shoulder Harness	FASTENED
Landing Gear	EXTEND below 132 KIAS
	(Gear down light on - Check visual indicator on floor)
Mixture	FULL RICH
Propeller	HIGH RPM
Fuel Boost Pump	ON
Fuel Selector	FULLEST TANK
Wing Flaps	AS DESIRED
FULL DOWN	below 115 KIAS

~ CAUTION ~

From a flaps retracted trimmed condition, the force required for nose up pitch control will rapidly increase when power is reduced to idle and as flaps are fully extended. Timely trimming action should be accomplished to minimize forces. Control force change with extending landing gear is minimal.

Trim	As desired
Ram Air	Verify OFF (warning light OFF)
Parking Brake	OFF

| NOTE |

The parking brake should be rechecked to preclude partially applied brakes during touchdown.

GO AROUND (BALKED LANDING)

~ CAUTION ~

From a flaps extended and power at idle trimmed condition, the force required for nose down pitch control will rapidly increase when Maximum Continuous Power (MCP) is applied and as flaps are fully retracted. Little control force change will be experienced when retracting the landing gear.

Power	FULL THROTTLE/ 2700 RPM
Mixture	FULL RICH
Airspeed	71 KIAS

Wing Flaps	TAKEOFF position after climb established
Trim	NOSE DOWN (to reduce control force)
Airspeed	Accelerate to 80 KIAS
Landing Gear	RETRACT
Wing Flaps	RETRACT
Cowl Flaps	OPEN
Airspeed	Accelerate to 88 KIAS

LANDING

LANDING (NORMAL)

Approach for Landing Checklist	COMPLETED
Approach Airspeed	82 KIAS (Full Flaps)
Touchdown	Main wheels first (aligned with runway)
Landing Roll	Lower nose wheel gently
Brakes	As required
Wing Flaps	Retract after clearing runway
Boost Pump	OFF after landing
Trim	TAKEOFF position

| NOTE |

Landing information for reduced flap settings are not available. See Section V for Landing Distance Tables.

| NOTE |

If maximum performance landings are desired, use above procedure except, reduce the approach airspeed to 66 KIAS (flaps full down) and apply maximum braking (without skidding tires) during rollout.

LANDING (CROSSWIND)

~ CAUTION ~

Crosswind landings should be accomplished by using above procedures except maintain approach speed approximately 10 KIAS above normal. Use 15° flaps for crosswinds below 10 Kts and flaps UP for crosswinds over 10 Kts. Allow aircraft to crab until short final, then set up sideslip (low wing into the wind). Accomplish touchdown in slight wing low sideslip and and aircraft alighed with runway. During landing roll, position flight controls to counteract crosswind.

~ ~ ~ ~ ~ ~ ~

~ CAUTION ~

~ ~ ~ ~ ~ ~ ~

The landing gear may retract during landing roll if landing gear switch is inadvertently placed in the UP position.

TAXI AFTER LANDING

Throttle	1000 to 1200 RPM
Flaps	RETRACT
Cowl Flaps	FULL OPEN
Trim	RESET to Takeoff
Radios	As required
Lighting	As required

SHUTDOWN

Parking brake	SET
Throttle	1000 to 1200 RPM (until cylinder head temperature starts to drop)
Radio Master	OFF
Internal/External Lights	OFF
Magneto/Starter Switch	Grounding Check
Mixture	IDLE CUTOFF
Magneto/Starter Switch	OFF when propeller stops
Alternator Field Switch	OFF
Master Switch	OFF
Oxygen System (if equipped)	OFF

SECURING AIRCRAFT

Magneto/Starter	OFF/Key removed
Master Switch	VERIFY OFF
Radio Master	VERIFY OFF
Electrical Switches	VERIFY OFF
Parking Brake	RELEASE and install wheel chocks
For extended parking.Control wheel	SECURED with seat belts; cabin vents closed, tie down aircraft at wing and tail points.

TABLE OF CONTENTS

INTRODUCTION

The purpose of this section is to present the owner or operator with information needed to facilitate planning of flight with resonable accuracy. The Performance Data and Charts presented are calculated based upon actual flight tests with airplane and engine in good condition and the engine power control system properly adjusted.
The flight test data has been corrected to International Standard Atmosphere conditions and then expanded analytically to cover various airplane gross weights, operating altitudes and outside air temperatures.

It is not possible to make allowances in the charts for varying levels of pilot technique, proficiency or environmental conditions. Mechanical or aerodynamic changes are not authorized because they can affect performance or flight characteristics of the airplane. The effect of such things as soft runways, sloped runways, winds aloft or airplane configuration changes must be evaluated by the pilot. However, the performance data on the charts can be duplicated, by following the stated procedures, in a properly maintained, standard M20J.

Mechanical or aerodynamic modifications to the aircraft are not authorized since they can affect the performance or flight characteristics of the aircraft.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Examples are given to show how each chart is used. The only charts with no example are those where such an example of use would be repetitive.

Generally, three items are required before entering each performance chart: (1) aircraft weight, (2) outside air temperature and (3) aircraft pressure altitide. The aircraft weight can be calculated utilizing the information provided in Section VI of this handbook. Outside air temperature is obtained by reading the OAT gauge in the instrument cluster. Set aircraft's altimeter to 29.92 in. Hg. and read the indicated (pressure) altitude. (BE SURE TO RETURN ALTIMETER TO THE LOCAL BAROMETRIC PRESSURE SETTING AFTER OBTAINING PRESSURE ALTITUDE).

Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes. REMEMBER--To get chart performance, follow the chart procedures.

CAUTION
Be sure to return to local altimeter setting in calculating aircraft elevation above sea level.

OPERATIONAL PROCEDURES FOR MAXIMUM FUEL EFFICIENCY

For maximuim fuel efficiency in the M20J, proper mixture leaning during cruise flight must be accomplished. The IO-360-A3B6D engine in the M20J has been designed to attain maximum fuel efficiency, at desired cruise power, at 14°C rich of peak EGT. EGT is usually a more accurate indication of engine operation and fuel burn than indicated fuel flow. Therefore it is recommended that the mixture be set using EGT as the primary reference instead of setting to a particular fuel flow.

The following procedure is recommended for setting cruise power and leaning to best economy at 75% power or less:

1. After leveling off, set the manifold pressure and RPM for the desired cruise power in accordance with the cruise power schedule on page 5-21. At this point, the mixture control is at full rich from the climb.

2. Next, slowly move the mixture control toward lean while observing the EGT indicator. If leaning the mixture causes the original manifold pressure setting to change, use the throttle to maintain that desired cruise manifold pessure and continue leaning until best economy setting is obtained.

PERFORMANCE CONSIDERATIONS

RANGE ASSUMPTIONS

Range data climb allowance is based on climbing at maximum continuous power to cruise altitude.

Range reserves of 45 minutes at cruise power have been allowed on Range Data. Other conditions used in the Ranges shown are listed on each chart.

USE OF COWL FLAPS

When in level cruise flight with outside air temperatures well above standard or when cruising at very high altitudes, it may be necessary to open the cowl flaps to keep engine temperatures in the normal operating range. Since the cowl flaps in the M20J are multi-position, numerous open settings are available to keep cylinder head and oil temperatures in the green arc under the most adverse conditions.

Using the cowl flap's position indicator as a reference, the following cowl flap's open positions are given along with their effects on cruise speed:

Cowl flaps closed to cowl flap's indicator- 1/4 open, (Indicator positioned at first index);

(approximate loss in TAS) . . . . . 2 Kts.

Cowl flaps closed to cowl flap's indicator- 1/2 open, (Indicator positioned at second index);

(approximate loss in TAS) . . . . . 4 Kts.

An appropriate adjustment to the range data shown for the cowl flaps closed condition can be made based on the flight time planned with the cowl flaps partially open. For example, using the above speed decrement for the cowl flaps 1/2 open for a 5 hour flight will result in the following decrease in range:

5 hr. x 4 Kts. = 20 N.M. reduction in range

MAIN GEAR LOWER DOOR REMOVAL

If numerous takeoffs and landings are to be conducted on soft fields or in tall grass, or if ice and snow are likely to be present on runway and taxiway surfaces for extended periods, it may be advantageous to remove the lower doors(extended position) installed on each main landing gear. These doors can be damaged during operations in soft field conditions, or a heavy accumulation of packed snow or ice inside the doors could prevent proper landing gear operation.

If these small gear doors are removed, a decrease in cruise speed and range can be expected and should be considered in preflight planning. To be conservative, the following figures should be used:

A. Decrease true airspeed at cruise by approximately 5 Kts.

B. Decrease range by as much as 50 N.M.(92 Km) for 64.0 gallon(243 liters) fuel capacity.

OPERATIONAL CONSIDERATIONS

| NOTE |

Engine cooling has been satisfactorily demonstrated for an outside air temperature of 23° C (40° F) above standard. This is not an operating limitation. (See Powerplant Limitations in Section II).

ALTIMETER CORRECTION – ALTERNATE STATIC SYSTEM

CONDITIONS: Storm Window and Vents: CLOSED; Defroster:ON; Power: ON

KIAS	SEA LEVEL			10,000 FT.		
	GEAR & FLAPS UP	GEAR & FLAPS DOWN		GEAR & FLAPS UP	GEAR & FLAPS DOWN	
		15°	33°		15°	33°
61	--	-10	-21	-4	-15	-28
70	-17	-20	-35	-21	-28	-39
78	-26	-37	-55	-36	-50	-76
87	-32	-54	-71	-43	-71	-99
96	-40	-55	-82	-55	-77	-102
104	-54	-63	-96	-73	-86	-130
113	-54	--	--	-84	--	--
122	-64	--	--	-87	--	--
130	-72	--	--	-99	--	--
139	-75	--	--	-101	--	--
148	-99	--	--	-134	--	--
156	-54	--	--	-73	--	--
165	-54	--	--	-73	--	--
174	-68	--	--	-94	--	--
182	-64	--	--	-83	--	--
191	-75	--	--	-103	--	--
200	-91	--	--	-125	--	--

NOTE: The minus sign indicates subtraction of the given numbers from the indicated pressure altitude to obtain pressure altitude, assuming zero instrument error.

STALL SPEED vs. ANGLE OF BANK

ASSOCIATED CONDITIONS:
FORWARD C.G.
POWER IDLE

NOTE: UP TO 400 FEET ALTITUDE LOSS MAY OCCUR DURING STALLS AT MAXIMUM WEIGHT

EXAMPLE:

WEIGHT	2500 LBS (1134 KGS)
LANDING GEAR	DOWN
FLAPS	15°
ANGLE OF BANK	45°
STALL SPEED	64.0 KCAS (68 KIAS)

GROSS WEIGHT	GEAR AND FLAP POSITION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS
2900 LBS (1315 KGS)	GEAR UP FLAPS 0°	63	65	68	70	75	77	89	91
	GEAR DOWN FLAPS 15°	62	65	66	70	73	77	87	91
	GEAR DOWN FLAPS 33°	56	58	61	63	67	69	80	82
2740 LBS (1243 KGS)	GEAR UP, FLAPS 0°	59	61	64	66	70	72	84	86
	GEAR DOWN, FLAPS 15°	57	60	61	64	67	71	80	84
	GEAR DOWN FLAPS 33°	53	54	57	59	63	65	75	77
2500 LBS (1134 KGS)	GEAR UP, FLAPS 0°	57	59	61	63	67	69	80	82
	GEAR DOWN, FLAPS 15°	54	57	58	62	64	68	77	81
	GEAR DOWN FLAPS 33°	51	52	55	56	60	62	72	74
2300 LBS (1032 KGS)	GEAR UP, FLAPS 0°	54	56	58	60	65	67	77	79
	GEAR DOWN, FLAPS 15°	52	55	56	59	62	65	73	77
	GEAR DOWN FLAPS 33°	49	49	52	53	58	60	69	71

NORMAL TAKEOFF DISTANCE

TAKEOFF WEIGHT - LBS (KGS)	LIFTOFF SPEED - KIAS	SPEED AT 50 FT - KIAS
2900 (1315)	62	80
2600 (1180)	61	80
2300 (1043)	59	75

ASSOCIATED CONDITIONS

POWER — FULL THROTTLE, 2700 RPM, 80% HUMIDITY
LANDING GEAR — EXTENDED UNTIL OBSTACLE CLEARED
WING FLAPS — 15°
COWL FLAPS — FULL OPEN
RUNWAY SURFACE — PAVED, LEVEL & DRY

EXAMPLE:
OAT — 20°C
PRESSURE ALTITUDE — 2000 FT.
WEIGHT — 2600 LBS. (1180 KGS)
HEADWIND COMPONENT — 6 KTS
GROUND ROLL — 1160 FT. (356 m)
TOTAL TAKEOFF DISTANCE OVER 50 FT. OBSTACLE — 1750 FT. (533 m)

NOTE
1) MAXIMUM DEMONSTRATED CROSSWIND VELOCITY IS 11 KNOTS
2) SET FULL POWER PRIOR TO BRAKE RELEASE
3) TO OBTAIN THE SPEED AT 50 FT. INCREASE PITCH ATTITUDE APPROX. 5° AFTER LIFTOFF.

FOR MAXIMUM TAKEOFF DISTANCES - SEE SECTION IV. PAGE 4-11

NORMAL TAKEOFF DISTANCE - GRASS SURFACE

TAKEOFF WEIGHT - LBS (KGS	LIFTOFF SPEED - KIAS	SPEED AT 50 FT - KIAS
2900 (1315)	62	80
2600 (1180)	61	80
2300 (1043)	58	75

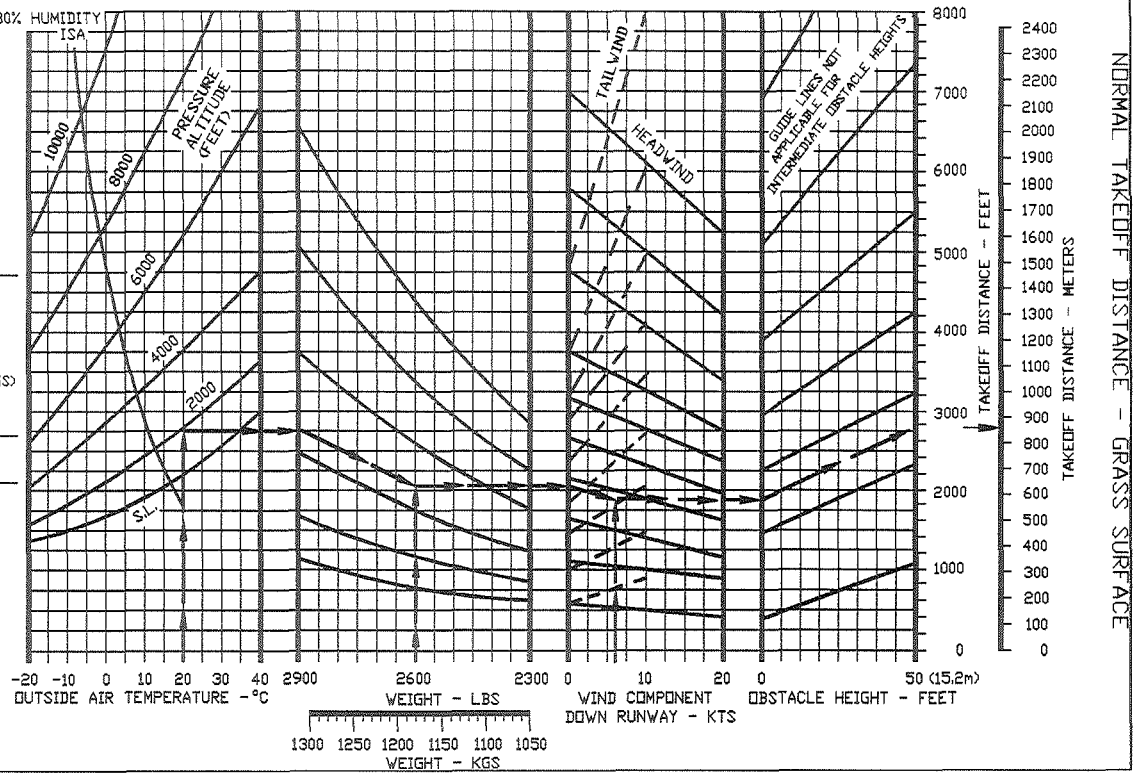
NOTE
1) MAXIMUM DEMONSTRATED CROSSWIND VELOCITY IS 11 KNOTS
2) SET FULL POWER PRIOR TO BRAKE RELEASE.
3) TO OBTAIN THE SPEED AT 50 FT, INCREASE PITCH ATTITUDE APPROX. 5° AFTER LIFTOFF.

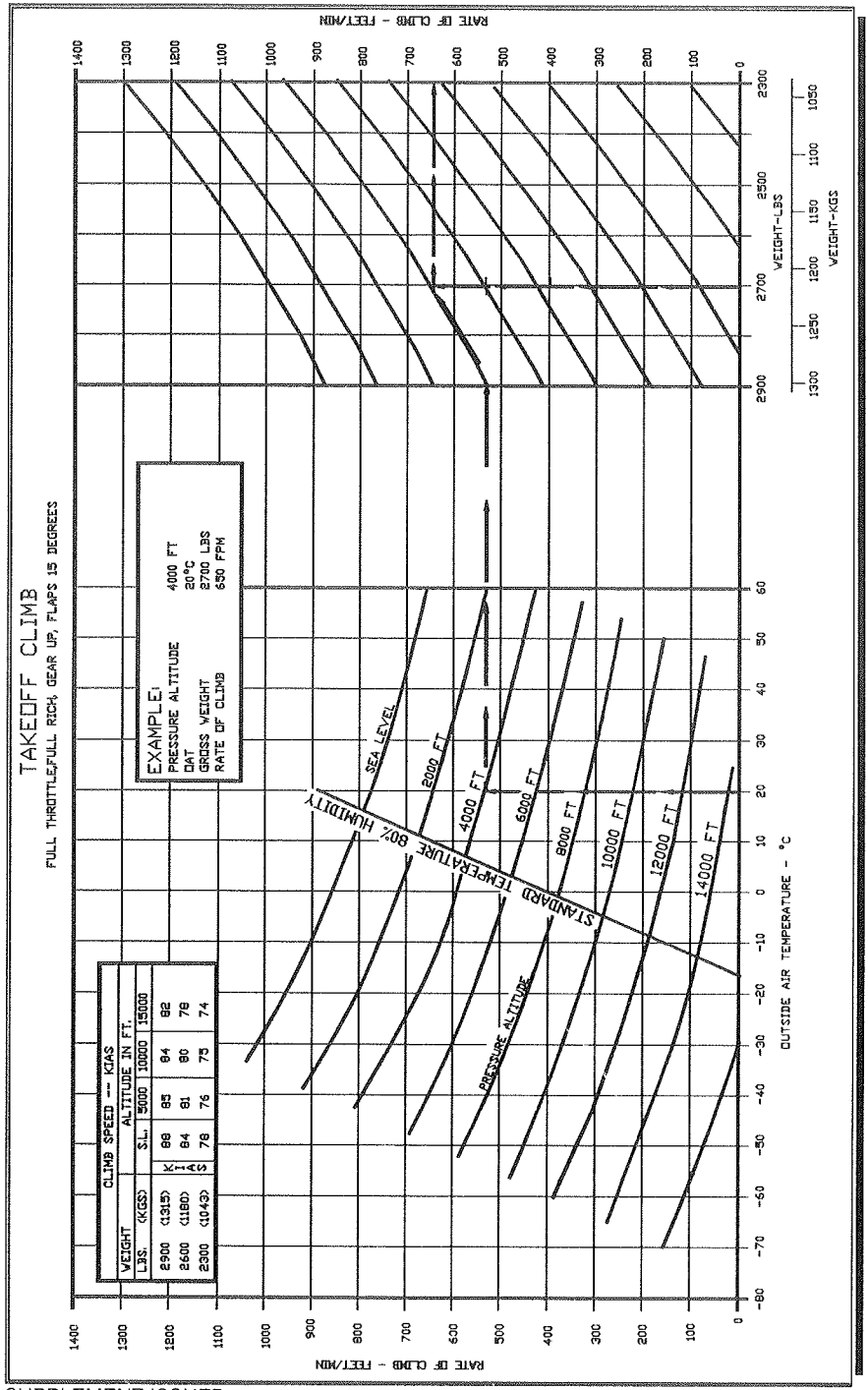
ASSOCIATED CONDITIONS

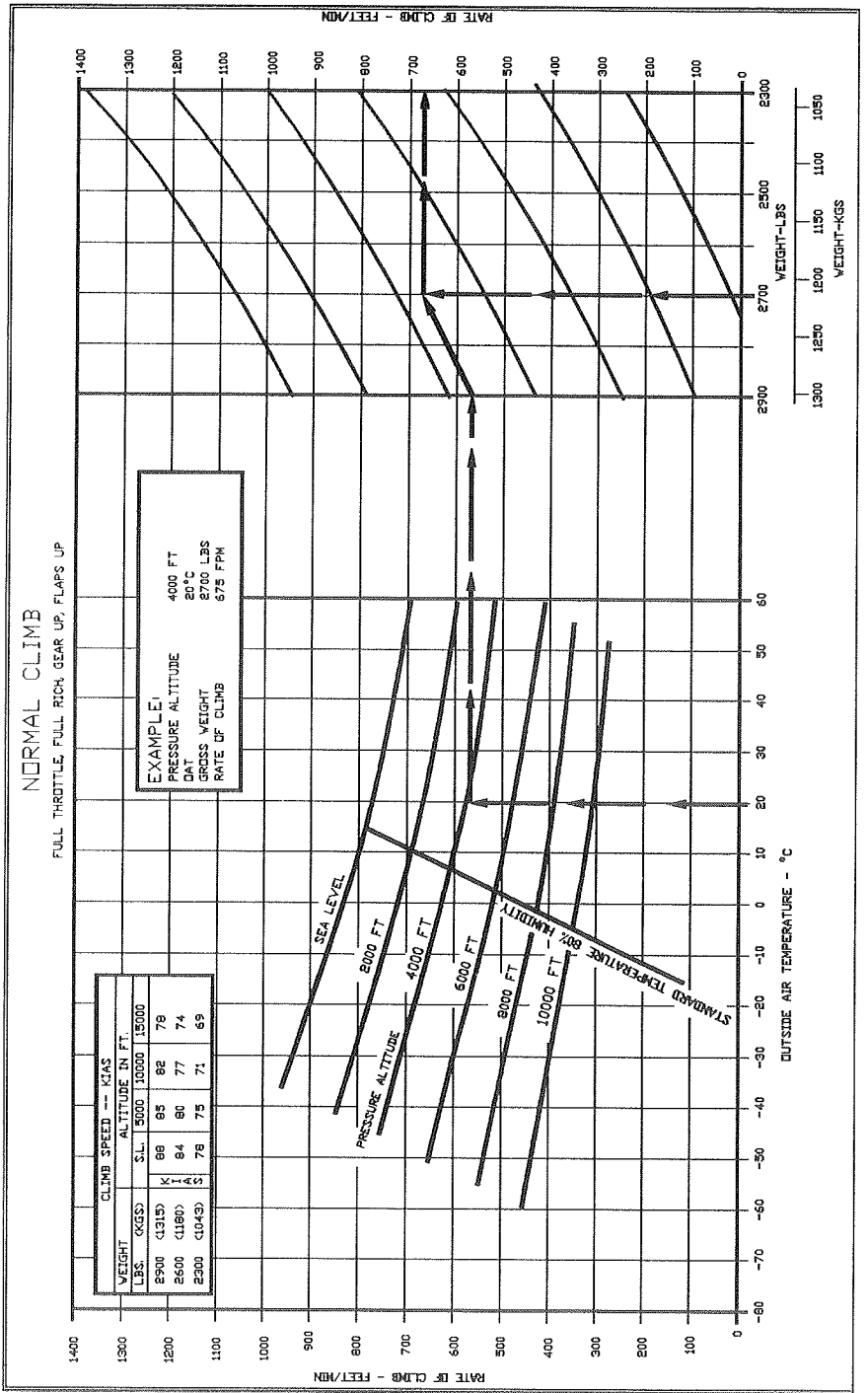
POWER	FULL THROTTLE, 2700 PRM 80% HUMIDITY
LANDING GEAR	EXTENDED UNTIL OBSTACLE CLEARED
WING FLAPS	15°
COWL FLAPS	FULL OPEN
RUNWAY SURFACE	SHORT LEVEL DRY GRASS

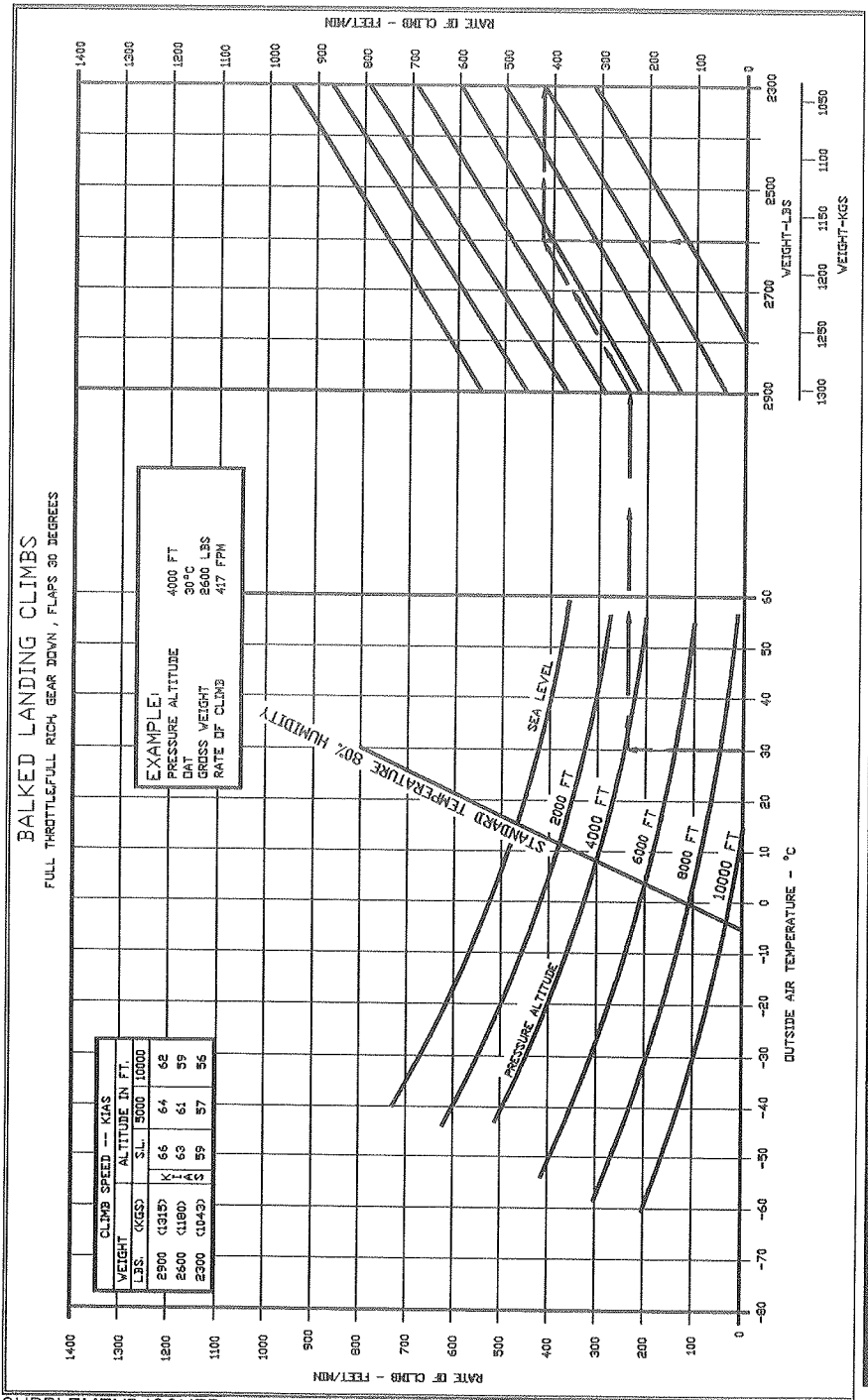
EXAMPLE:

OAT	20°C
PREASURE ALTITUDE	2000 FT.
WEIGHT	2600 LBS. (1134 KGS)
HEADWIND COMPONENT	6 KTS
GROUND ROLL	1875 FT. (571 m)
TOTAL TAKEOFF DISTANCE (50 FT. OBSTACLE)	2775 FT. (846 m)




TAKEOFF CLIMB
FULL THROTTLE,FULL RICH, GEAR UP, FLAPS 15 DEGREES
CLIMB SPEED -- KIAS
WEIGHT
ALTITUDE IN FT.
LBS. (KGS) S.L. 5000 10000 15000
2900 (1315) 88 85 84 82
2600 (1180) 84 81 80 78
2300 (1043) 78 76 75 74
KIAS
EXAMPLE:
PRESSURE ALTITUDE 4000 FT
OAT 20°C
GROSS WEIGHT 2700 LBS
RATE OF CLIMB 690 FPM
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
12000 FT
14000 FT
STANDARD TEMPERATURE
80% HUMIDITY
PRESSURE ALTITUDE
RATE OF CLIMB - FEET/MIN
OUTSIDE AIR TEMPERATURE - °C
WEIGHT-LBS
WEIGHT-KGS


NORMAL CLIMB
FULL THROTTLE, FULL RICH, GEAR UP, FLAPS UP
CLIMB SPEED -- KIAS
WEIGHT
LBS. (KGS)
ALTITUDE IN FT.
S.L. 5000 10000 15000
2900 (1315) K 88 85 82 78
2600 (1180) I 84 80 77 74
2300 (1043) S 78 75 71 69
EXAMPLE:
PRESSURE ALTITUDE 4000 FT
OAT 20°C
GROSS WEIGHT 2700 LBS
RATE OF CLIMB 675 FPM
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
PRESSURE ALTITUDE
STANDARD TEMPERATURE - 60% HUMIDITY
RATE OF CLIMB - FEET/MIN
OUTSIDE AIR TEMPERATURE - °C
WEIGHT-LBS
WEIGHT-KGS


BALKED LANDING CLIMBS
FULL THROTTLE,FULL RICH, GEAR DOWN , FLAPS 30 DEGREES
CLIMB SPEED -- KIAS
WEIGHT LBS. (KGS)
ALTITUDE IN FT.
SL. 5000 10000
2900 (1315) 66 64 62
2600 (1180) 63 61 59
2300 (1043) 59 57 56
EXAMPLE:
PRESSURE ALTITUDE 4000 FT
OAT 30°C
GROSS WEIGHT 2600 LBS
RATE OF CLIMB 417 FPM
STANDARD TEMPERATURE
80% HUMIDITY
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
PRESSURE ALTITUDE
RATE OF CLIMB - FEET/MIN
OUTSIDE AIR TEMPERATURE - °C
WEIGHT-LBS
WEIGHT-KGS

TIME,FUEL AND DISTANCE TO CLIMB

Associated Conditions for the Time, Fuel and Distance to Climb graph on the following page:

Climb Speed: Vy from Climb performance graph on preceeding page.

Power:	2700 RPM,Full Throttle
Mixture:	Full Rich
Ram Air:	ON
Cowl Flaps:	Full Open
Landing Gear:	UP
Wing Flaps:	UP

Fuel Density 6.0 lbs/gal (.72 Kg/liter)

NOTE:

1. Distances shown are based on zero wind.
2. Add 9 lbs (4.1Kg) of fuel for start, taxi & T.O.

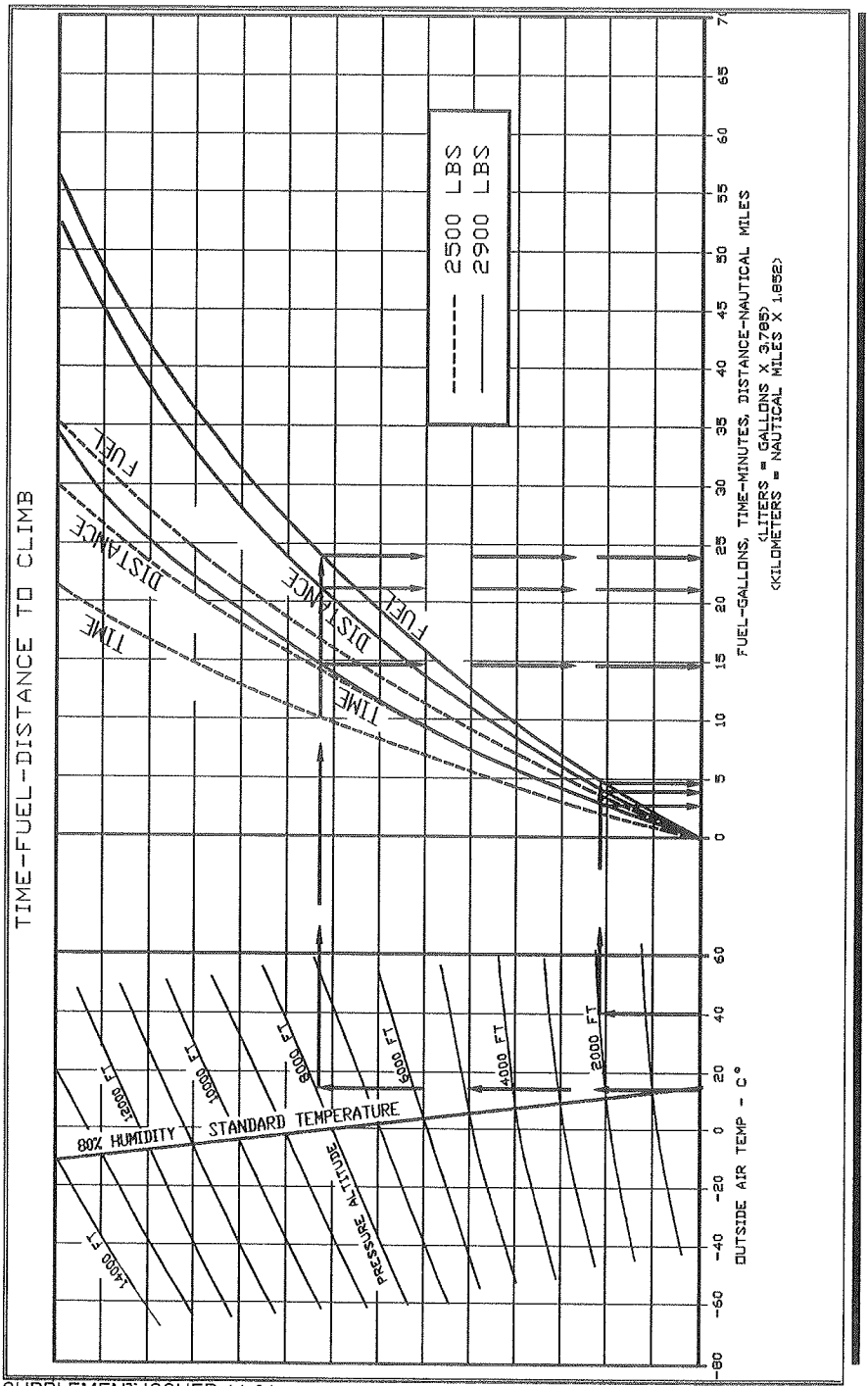
EXAMPLE:

GIVEN:

Initial Pressure Altitude/OAT	2000 Ft./40° C
Final Pressure Altitude/OAT	8000 Ft./15° C
Takeoff Weight	2900 lbs./1315 Kg.

FIND:

Time to Climb	(14.9 − 2.5) = 12.4 Minutes
Distance to Climb	(21.5 −4.0) = 17.5 Naut. Mi.
Fuel to Climb	(24.0 −4.8) = 19.2 lbs.


TIME-FUEL-DISTANCE TO CLIMB
2500 LBS
2900 LBS
FUEL
DISTANCE
TIME
FUEL
DISTANCE
TIME
FUEL-GALLONS, TIME-MINUTES, DISTANCE-NAUTICAL MILES
(LITERS = GALLONS X 3.785)
(KILOMETERS = NAUTICAL MILES X 1.852)
OUTSIDE AIR TEMP - C°
80% HUMIDITY
STANDARD TEMPERATURE
PRESSURE ALTITUDE
14000 FT
12000 FT
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT

CRUISE & RANGE DATA CONDITIONS

1. All Cruise & Range Data tables allow for: warmup, taxi, takeoff, climb at max. power at best rate of climb speed (Vy) to cruise altitude, cruise to destination at the specified power and mixture setting, descent to pattern altitude and a 45 minute fuel reserve at the same altitude and power setting. The data is also based on 64 U.S. gals. of usuable fuel, standard atmosphere and no wind.

2. To obtain the performance shown by the Cruise and Range Data Tables on non-standard days, increase or decrease the manifold pressure approximately .4 in. Hg. for each 10°C variation in outside air temperature. INCREASE manifold pressure for air temperatures ABOVE standard and DECREASE manifold pressure for air temperatures LOWER than standard.

Mooney M20J

CRUISE POWER SCHEDULE

EXAMPLE:
CRUISE ALT. 6000 FT.
OAT 10°C(50°F)
POWER 65%
RPM 2600
M.P. 22.0
(7° C CORRECTION)

1. BEST POWER IS 55°C(100°F) RICH OF PEAK EGT.
2. ECONOMY CRUISE IS 14°C(25°F) RICH OF PEAK EGT.

NOTE: ADD .4" M.P. FOR EACH 10°C(50°F) OAT ABOVE STANDARD DAY TEMPERATURE. SUBTRACT .4" M.P. FOR EACH 10°C (50°F) BELOW STD. DAY TEMPERATURE. IF OAT ABOVE STANDARD PRECLUDES OBTAINING THE DESIRED M.P. USE THE NEXT HIGHER RPM/ M.P. WITH APPROPRIATE TEMPERATURE CORRECTION TO M.P.

Pressure Altitude Feet	Std. Day Temp.	RPM	75% Power (150 BHP)				70% Power (140 BHP)				65% Power (130 BHP)			
			2400	2500	2600	2700	2400	2500	2600	2700	2400	2500	2600	2700
		Fuel Flow Best ECON.	10.3	10.4	10.5	10.8	9.7	9.8	9.9	10.2	9.2	9.3	9.4	9.6
		Fuel Flow Best POWER	12.0	12.2	12.3	12.5	11.3	11.5	11.7	11.9	10.5	10.8	11.0	11.2
			MANIFOLD PRESSURE – INCHES OF MERCURY											
S.L.	15°C		27.0	25.8	24.5	23.5	25.5	24.3	23.0	22.0	24.0	22.9	21.7	21.0
2000	11°C		26.8	25.6	24.4	23.3	25.1	24.1	23.0	22.0	23.6	22.6	21.6	20.6
4000	7°				24.4	23.2	24.9	23.9	22.9	21.8	23.3	22.4	21.5	20.5
6000	3°				24.1	23.1	24.4	23.6	22.7	21.7	22.8	22.1	21.3	20.4
8000	−1°					23.6			22.7	21.7			21.2	20.4
10000	−5°									21.4			21.1	20.2
12000	−9°													
14000	−13°													

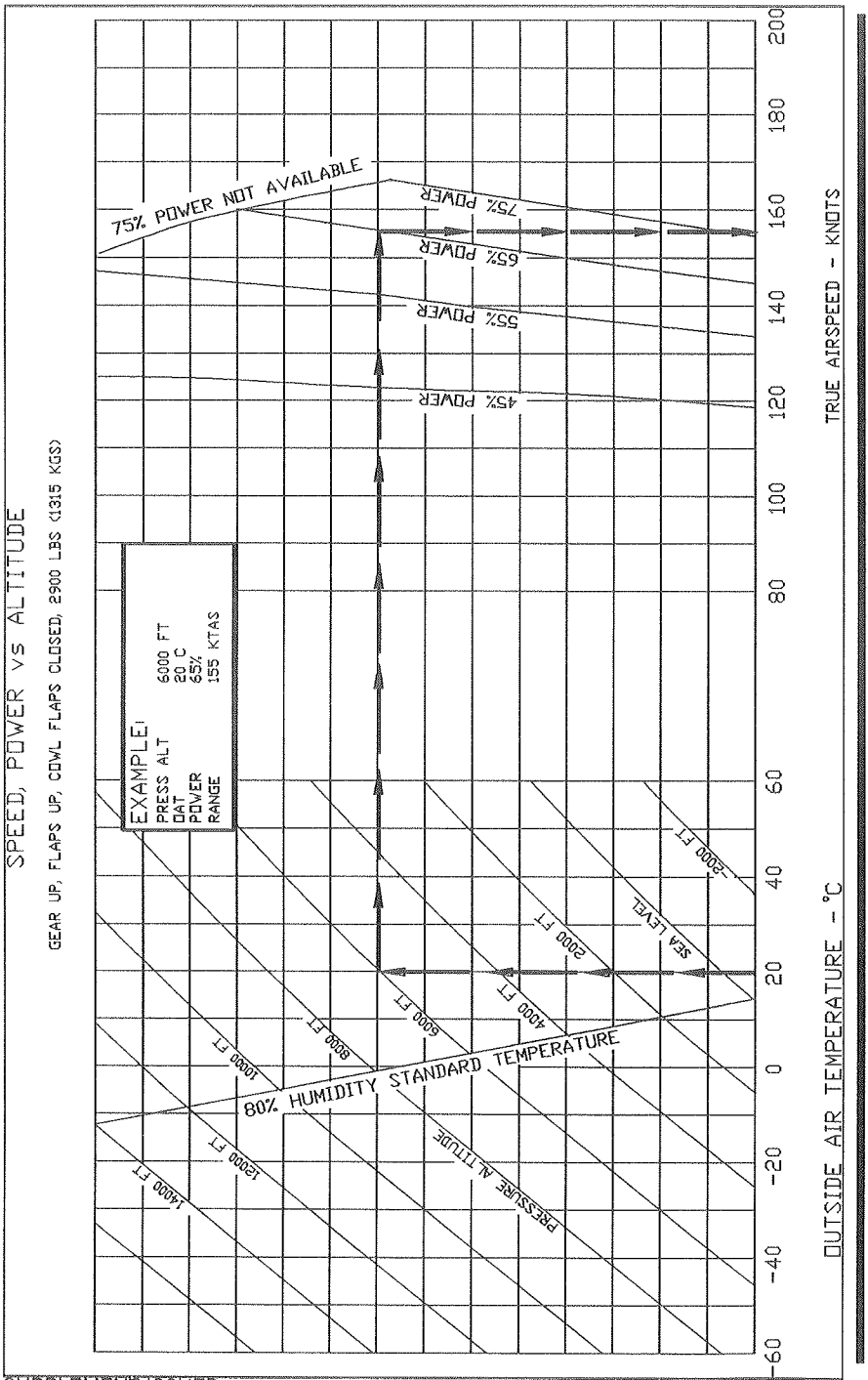
Mooney M20 J

CRUISE POWER SCHEDULE

1. BEST POWER IS 55°C(100°F) RICH OF PEAK EGT. 2.ECONOMY CRUISE IS 14°C(25°F) RICH OF PEAK EGT.

Pressure Altitude Feet / Std. Day	RPM	Fuel Flow	60% Power (120 BHP)						55% Power (110 BHP)						45% Power (90 BHP)							
			2200	2300	2400	2500	2600	2700	2200	2300	2400	2500	2600	2700	2000	2100	2200	2300	2400	2500	2600	2700
		Best ECON.	8.4	8.5	8.6	8.7	8.8	9.1	7.8	8.0	8.1	8.2	8.3	8.6	6.5	6.7	6.8	6.9	7.0	7.2	7.3	7.5
		Best POWER	9.8	9.9	10.0	10.2	10.4	10.7	9.2	9.3	9.4	9.6	9.8	10.0	7.7	7.9	8.0	8.2	8.3	8.5	8.6	8.9
	Std. Temp.		MANIFOLD PRESSURE — INCHES OF MERCURY																			
S.L.	15°c		24.2	23.4	22.5	21.5	20.5	19.5	22.5	21.8	21.0	20.0	19.0	18.0	21.0	20.0	19.0	18.3	17.5	16.9	16.3	15.4
2000	11°		24.0	23.0	22.0	21.1	20.2	19.3	22.2	21.3	20.4	19.6	18.8	18.0	20.5	19.6	18.7	18.0	17.2	16.6	16.0	15.3
4000	7°		23.7	22.7	21.7	20.9	20.1	19.2	22.0	21.1	20.2	19.5	18.7	17.9	20.4	19.5	18.6	17.9	17.1	16.5	15.8	15.3
6000	3°		23.6	22.5	21.3	20.6	19.9	19.1	22.0	20.9	19.8	19.2	18.6	17.8	20.4	19.4	18.3	17.6	16.8	16.3	15.7	15.2
8000	−1°				21.3	20.6	19.8	19.0	22.0	20.9	19.8	19.2	18.6	17.8	20.3	19.3	18.2	17.4	16.5	16.1	15.7	15.1
10000	−5°				21.0	20.4	19.8	18.8			19.5	18.9	18.3	17.6			18.2	17.4	16.5	16.1	15.6	15.0
12000	−9°						19.6	18.8			19.3	18.8	18.2	17.5			18.0	17.2	16.4	16.0	15.5	14.9
14000	−13°												17.9	17.3					16.2	15.8	15.4	14.7

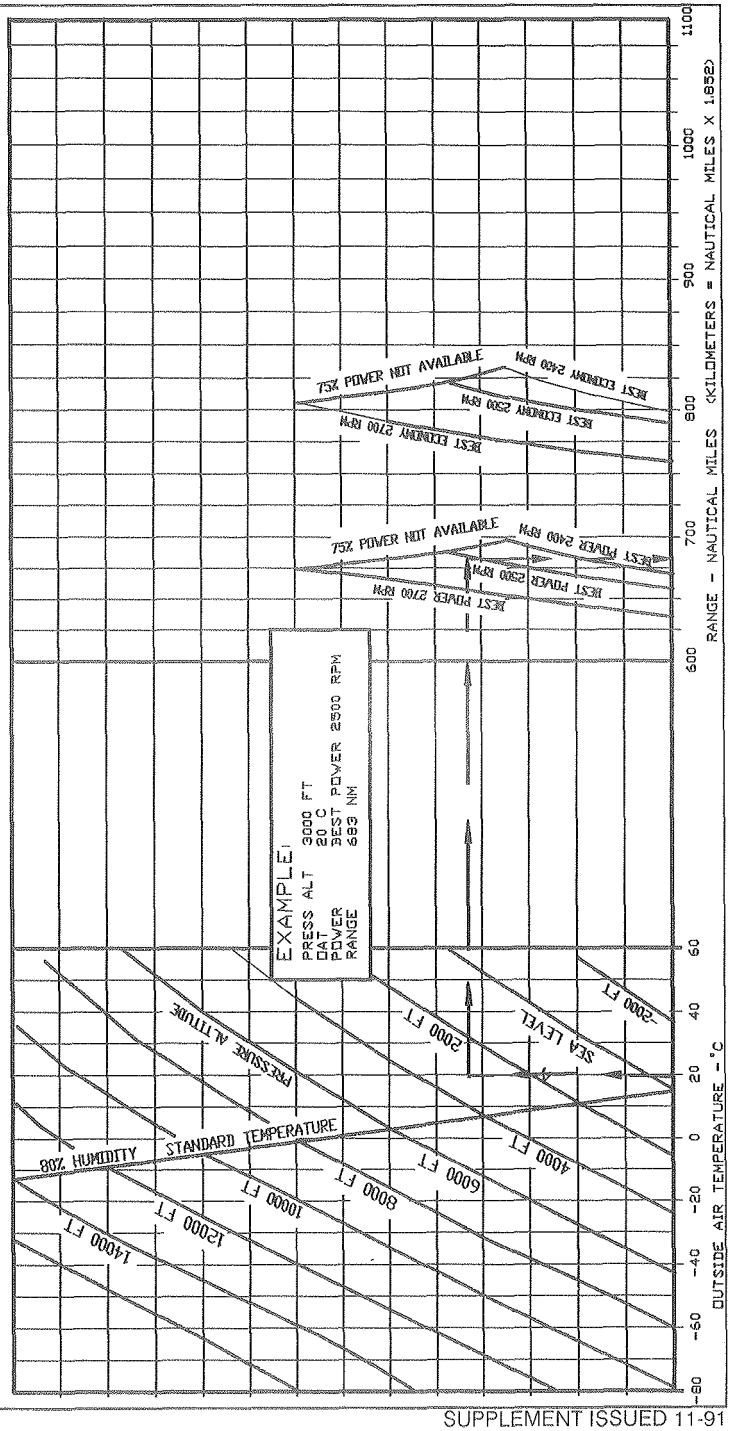
NOTE: Add .4" M.P. for each 10° C OAT above Std. Day Temperature. Subtract .4" M.P. for each 10°C OAT below STD. If OAT above STD. precludes obtaining desired M.P., use next higher RPM/MP with appropriate temperature correction to M.P.


SPEED, POWER vs ALTITUDE
GEAR UP, FLAPS UP, COWL FLAPS CLOSED, 2900 LBS (1315 KGS)
EXAMPLE:
PRESS ALT 6000 FT
OAT 20 C
POWER 65%
RANGE 155 KTAS
75% POWER NOT AVAILABLE
75% POWER
65% POWER
55% POWER
45% POWER
80% HUMIDITY STANDARD TEMPERATURE
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
12000 FT
14000 FT
PRESSURE ALTITUDE
TRUE AIRSPEED - KNOTS
OUTSIDE AIR TEMPERATURE - °C
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60

RANGE 75% POWER

2900 LBS (1315.4 KGS)

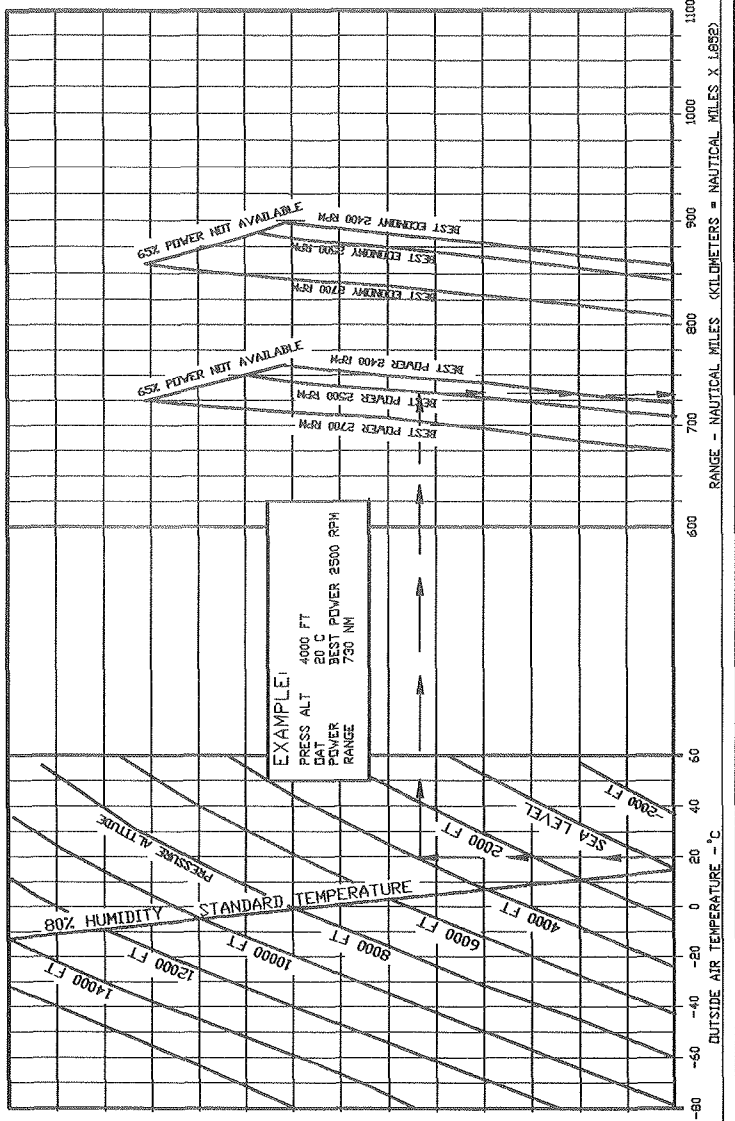
Clean Configuration, 64.0 Gallons (252 Liters) (55.4 Imp. Gal.) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



RANGE 65% POWER

2900 LBS (1315.4 KGS)

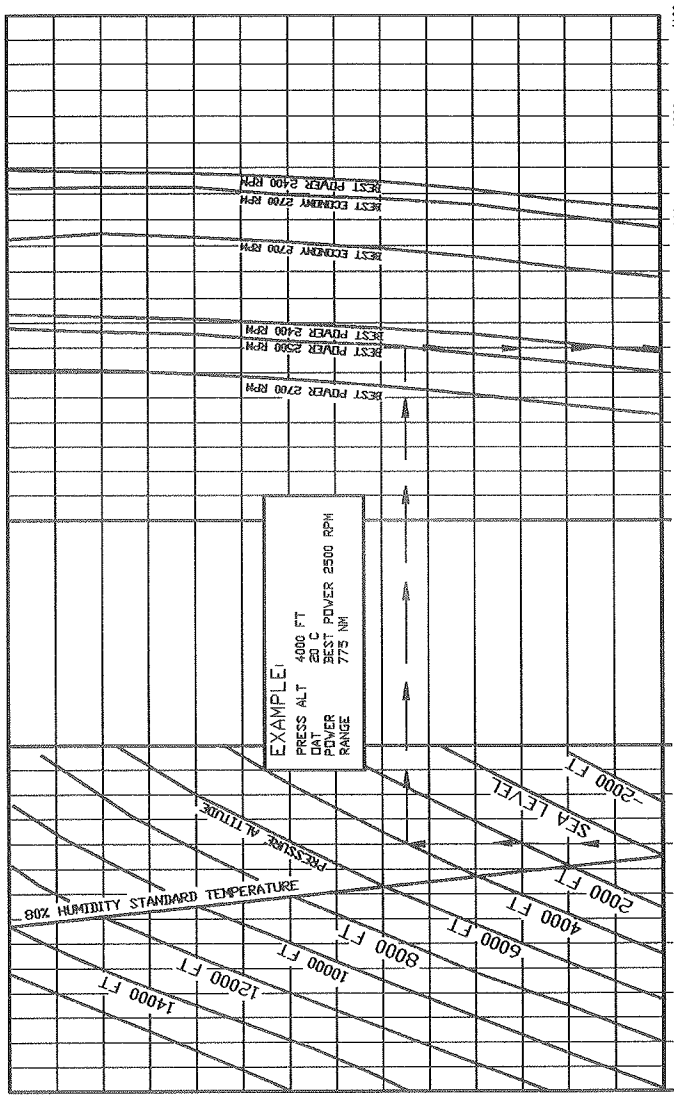
Clean Configuration, 64.0 Gallons (252 Liters) (53.4 Imp. Gal.) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



RANGE 55% POWER

2900 LBS (1315.4 KGS)

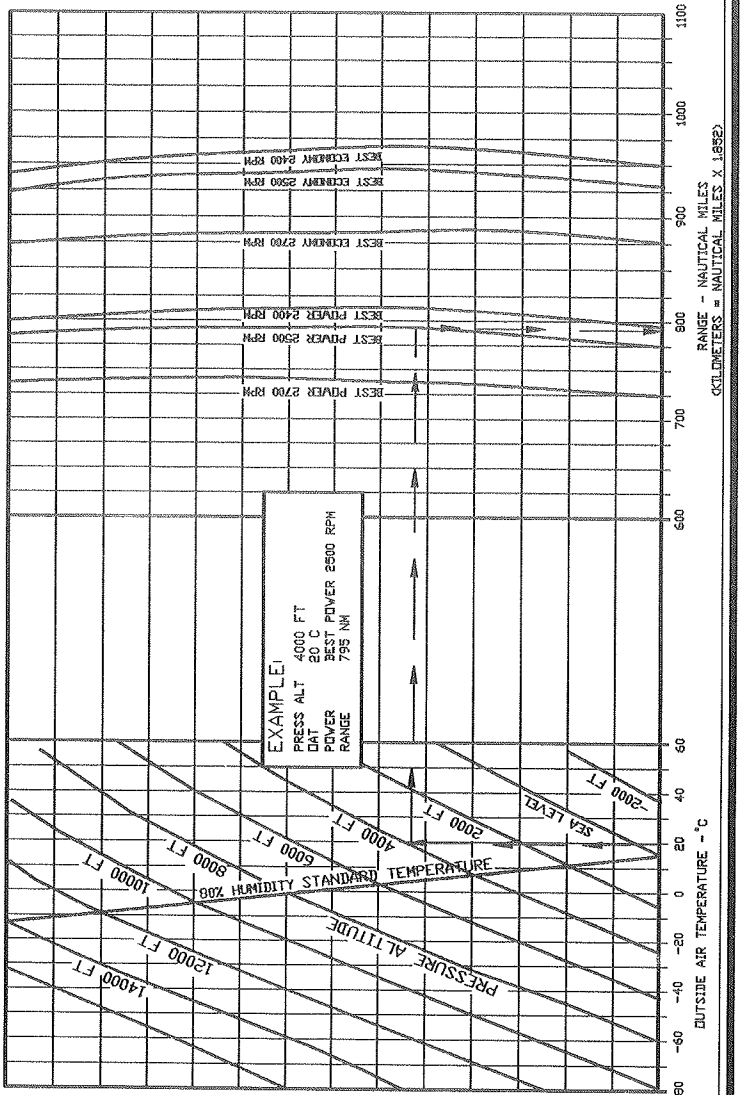
Clean Configuration 64.0 Gallons (232 Liters) (55.4 Imp. Gals) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb Descent, Plus 45 Minutes Reserve at Cruise Power

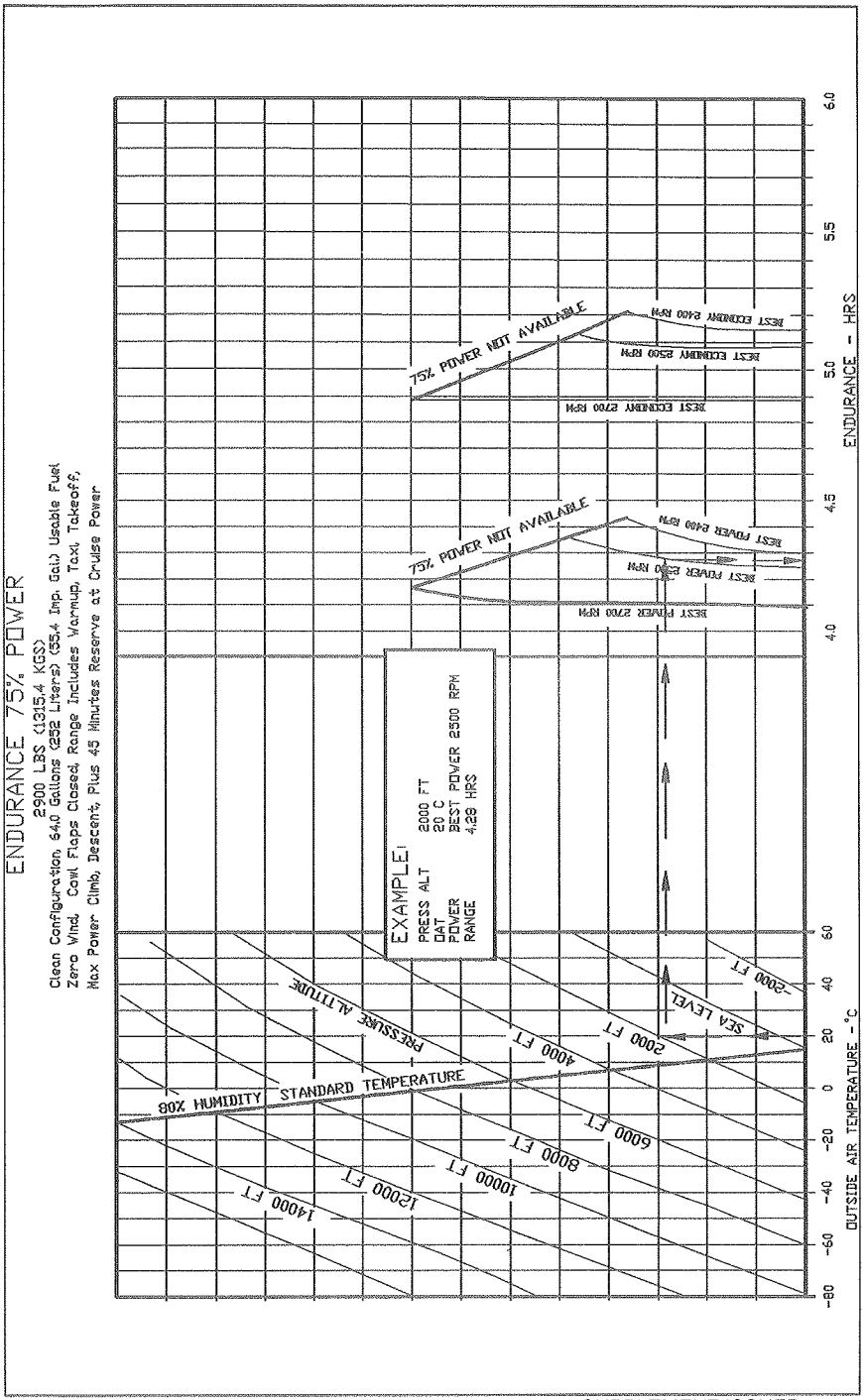


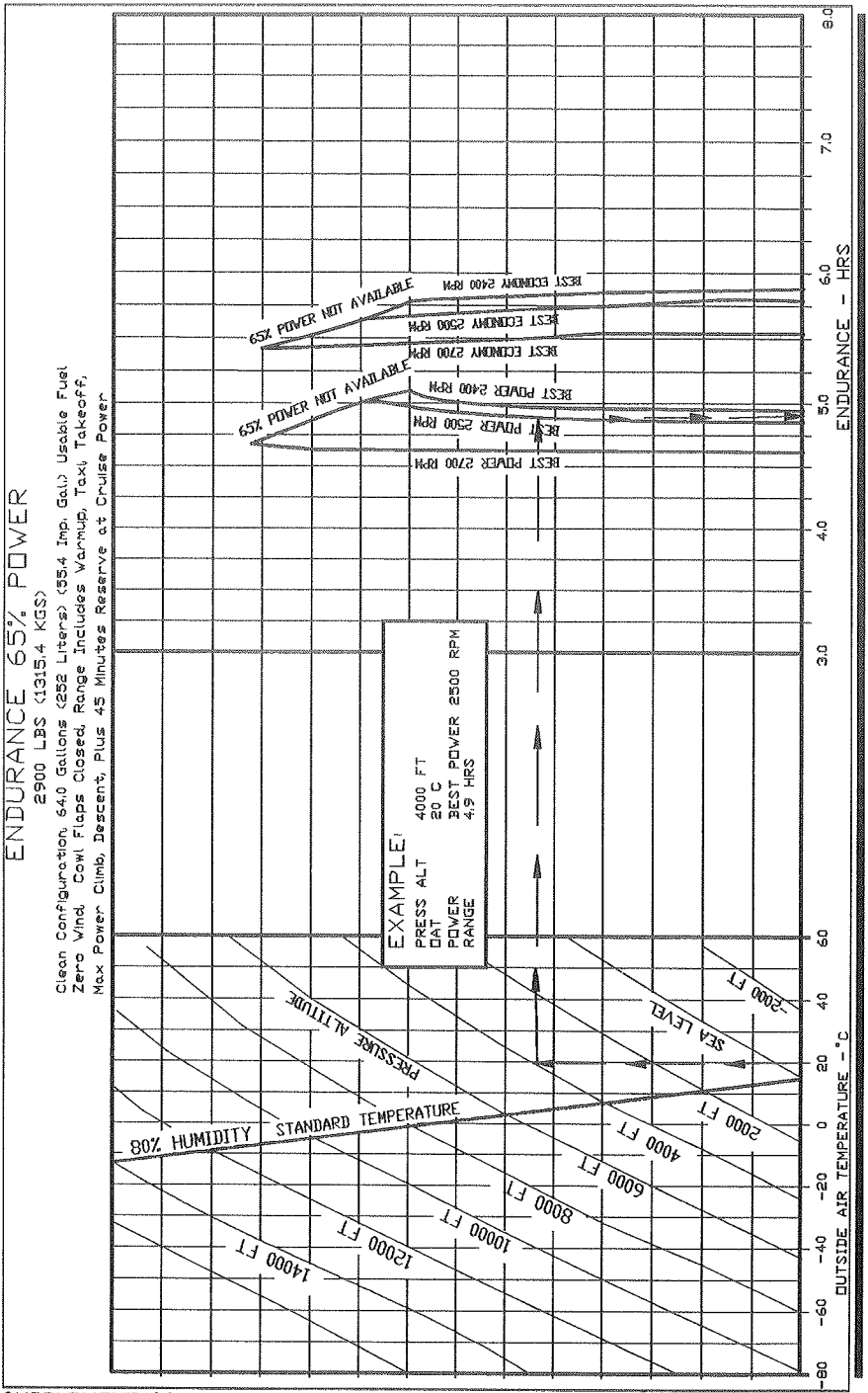
RANGE 45% POWER

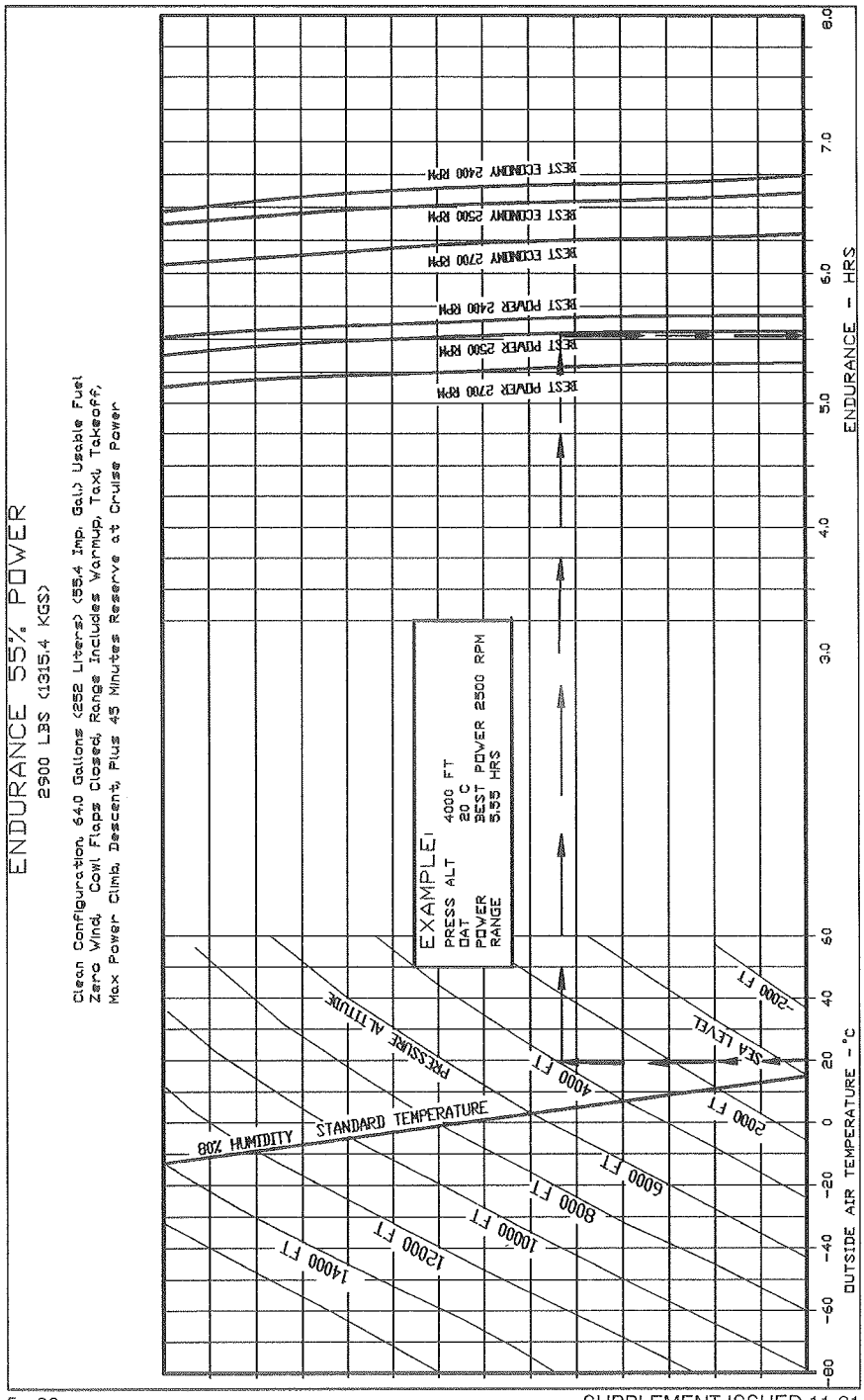
2900 LBS (1315.4 KGS)

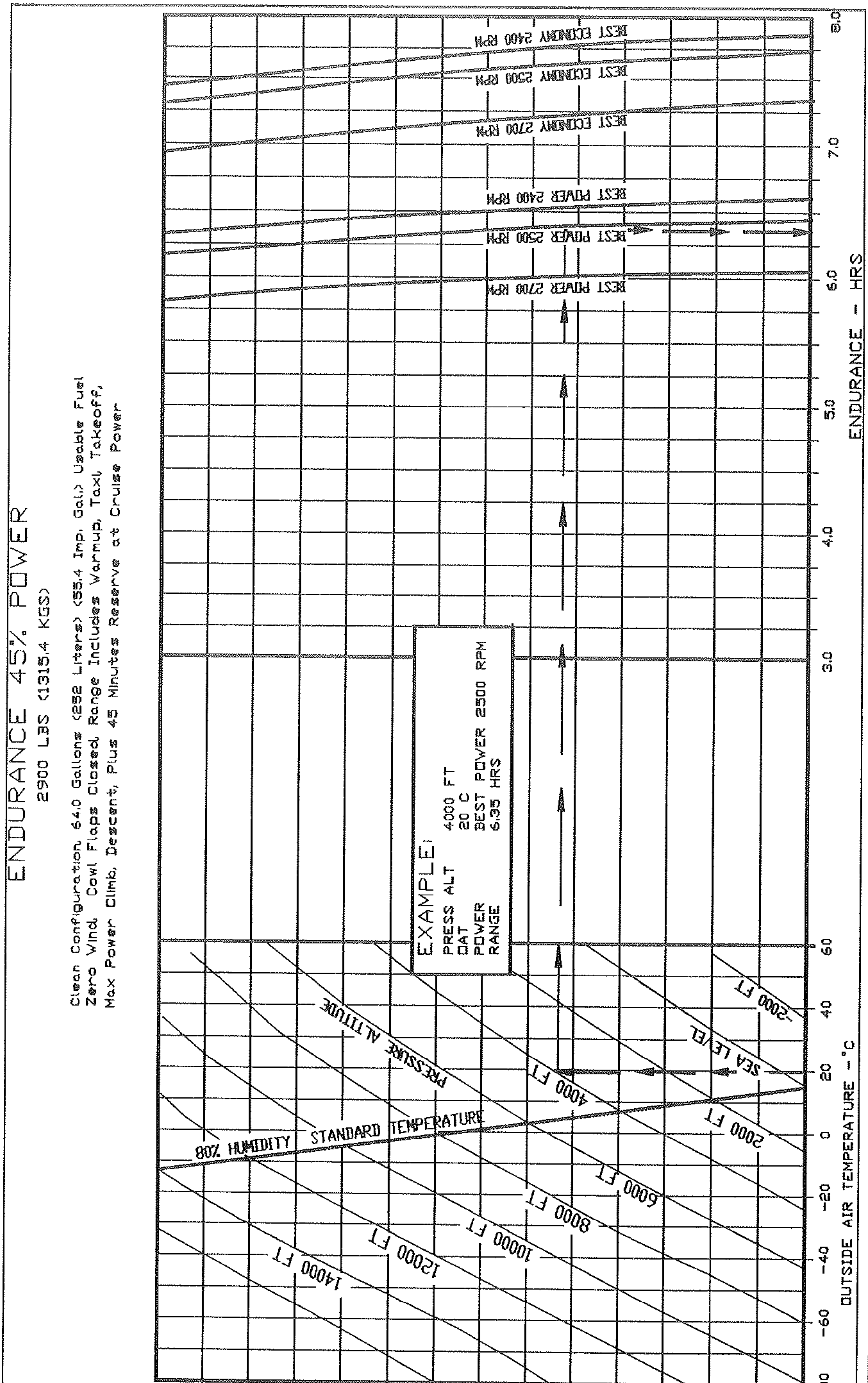
Clean Configuration, 64.0 Gallons (252 Liters) (55.4 Imp. Gal.) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power

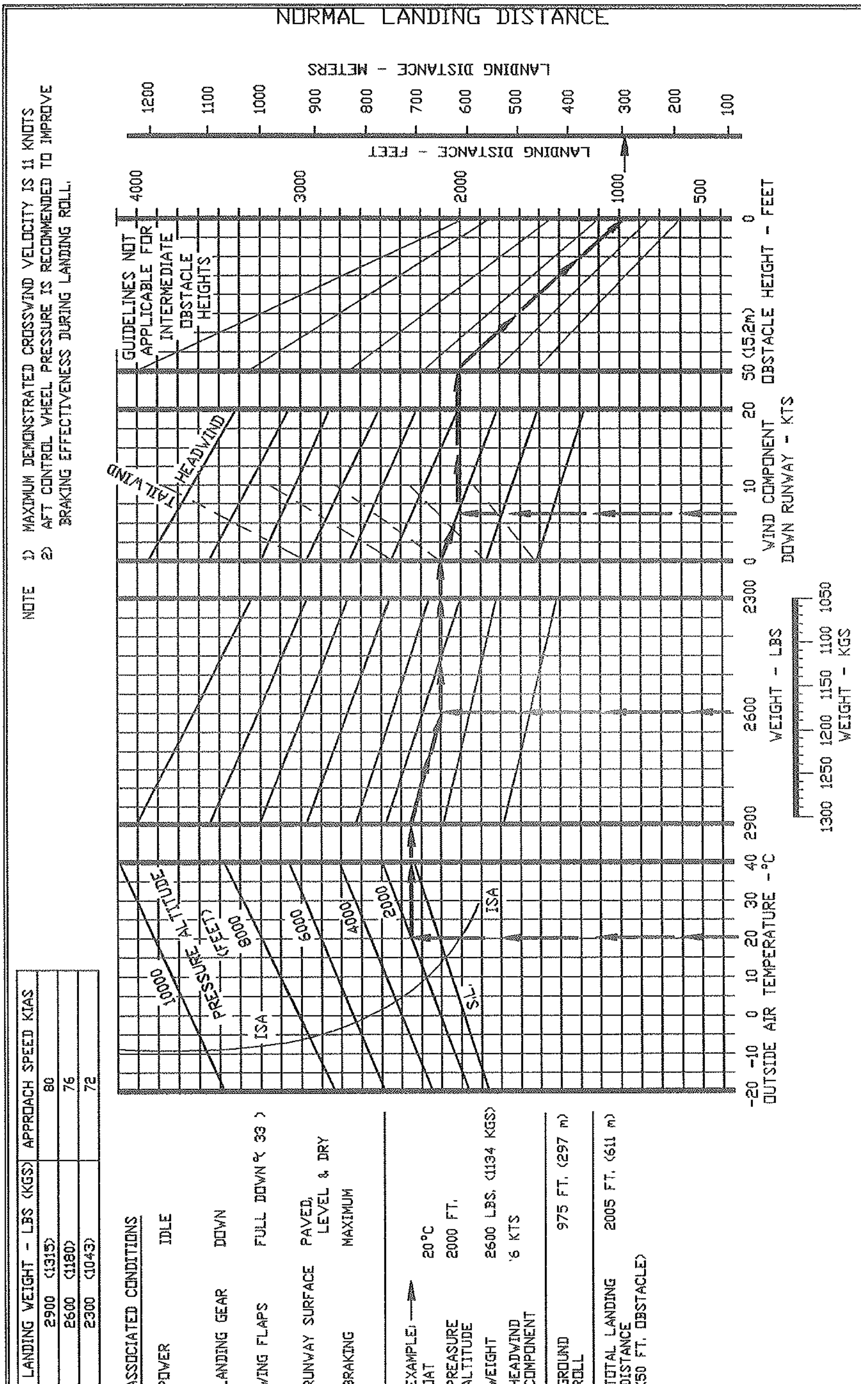



ENDURANCE 75% POWER
2900 LBS (1315.4 KGS)
Clean Configuration, 64.0 Gallons (292 Liters) (55.4 Imp. Gal.) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power
EXAMPLE:
PRESS ALT 2000 FT
OAT 20°C
POWER BEST POWER 2500 RPM
RANGE 4.29 HRS
75% POWER NOT AVAILABLE
BEST ECONOMY 2400 RPM
BEST ECONOMY 2500 RPM
BEST ECONOMY 2700 RPM
75% POWER NOT AVAILABLE
BEST POWER 2400 RPM
BEST POWER 2500 RPM
BEST POWER 2700 RPM
ENDURANCE - HRS
6.0
5.5
5.0
4.5
4.0
80% HUMIDITY
STANDARD TEMPERATURE
PRESSURE ALTITUDE
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
12000 FT
14000 FT
OUTSIDE AIR TEMPERATURE - °C
60
40
20
0
-20
-40
-60
-80


ENDURANCE 65% POWER
2900 LBS (1315.4 KGS)
Clean Configuration, 64.0 Gallons (252 Liters) (55.4 Imp. Gals. Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power
65% POWER NOT AVAILABLE
65% POWER NOT AVAILABLE
BEST ECONOMY 2400 RPM
BEST ECONOMY 2500 RPM
BEST ECONOMY 2700 RPM
BEST POWER 2400 RPM
BEST POWER 2500 RPM
BEST POWER 2700 RPM
EXAMPLE:
PRESS ALT 4000 FT
OAT 20 C
POWER BEST POWER 2500 RPM
RANGE 4.9 HRS
80% HUMIDITY
STANDARD TEMPERATURE
PRESSURE ALTITUDE
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
12000 FT
14000 FT
ENDURANCE - HRS
OUTSIDE AIR TEMPERATURE - °C


ENDURANCE 55% POWER
2900 LBS (1315.4 KGS)
Clean Configuration, 64.0 Gallons (252 Liters) (55.4 Imp. Gal.) Usable Fuel
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power
EXAMPLE:
PRESS ALT 4000 FT
OAT 20 C
POWER BEST POWER 2500 RPM
RANGE 5.55 HRS
BEST ECONOMY 2400 RPM
BEST ECONOMY 2500 RPM
BEST ECONOMY 2700 RPM
BEST POWER 2400 RPM
BEST POWER 2500 RPM
BEST POWER 2700 RPM
ENDURANCE - HRS
OUTSIDE AIR TEMPERATURE - °C
PRESSURE ALTITUDE
STANDARD TEMPERATURE
80% HUMIDITY
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10000 FT
12000 FT
14000 FT


ENDURANCE 45% POWER
2900 LBS (1315.4 KGS)
Clean Configuration, 64.0 Gallons (252 Liters) (53.4 Imp. Gal.) Usable Fuel
Zero Wind. Cowl Flaps Closed. Range Includes Warmup, Taxi, Takeoff,
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power
EXAMPLE:
PRESS ALT 4000 FT
OAT 20 C
POWER BEST POWER 2500 RPM
RANGE 6.35 HRS
80% HUMIDITY
STANDARD TEMPERATURE
PRESSURE ALTITUDE
14000 FT
12000 FT
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
-2000 FT
BEST POWER 2700 RPM
BEST POWER 2500 RPM
BEST POWER 2400 RPM
BEST ECONOMY 2700 RPM
BEST ECONOMY 2500 RPM
BEST ECONOMY 2400 RPM
OUTSIDE AIR TEMPERATURE - °C
-80
-60
-40
-20
0
20
40
60
ENDURANCE - HRS
3.0
4.0
5.0
6.0
7.0
8.0


NORMAL LANDING DISTANCE
NOTE 1) MAXIMUM DEMONSTRATED CROSSWIND VELOCITY IS 11 KNOTS
2) AFT CONTROL WHEEL PRESSURE IS RECOMMENDED TO IMPROVE BRAKING EFFECTIVENESS DURING LANDING ROLL.
LANDING WEIGHT - LBS (KGS) | APPROACH SPEED KIAS
2900 (1315) | 80
2600 (1180) | 76
2300 (1043) | 72
ASSOCIATED CONDITIONS
POWER IDLE
LANDING GEAR DOWN
WING FLAPS FULL DOWN (33°)
RUNWAY SURFACE PAVED, LEVEL & DRY
BRAKING MAXIMUM
EXAMPLE:
OAT 20°C
PRESSURE ALTITUDE 2000 FT.
WEIGHT 2600 LBS. (1134 KGS)
HEADWIND COMPONENT 6 KTS
GROUND ROLL 975 FT. (297 m)
TOTAL LANDING DISTANCE (50 FT. OBSTACLE) 2005 FT. (611 m)
LANDING DISTANCE - METERS
LANDING DISTANCE - FEET
GUIDELINES NOT APPLICABLE FOR INTERMEDIATE OBSTACLE HEIGHTS
OBSTACLE HEIGHT - FEET
50 (15.2m)
WIND COMPONENT DOWN RUNWAY - KTS
TAILWIND
HEADWIND
WEIGHT - LBS
WEIGHT - KGS
OUTSIDE AIR TEMPERATURE - °C
PRESSURE ALTITUDE (FEET)
10000
8000
6000
4000
2000
S.L.
ISA

NORMAL LANDING DISTANCE - GRASS SURFACE

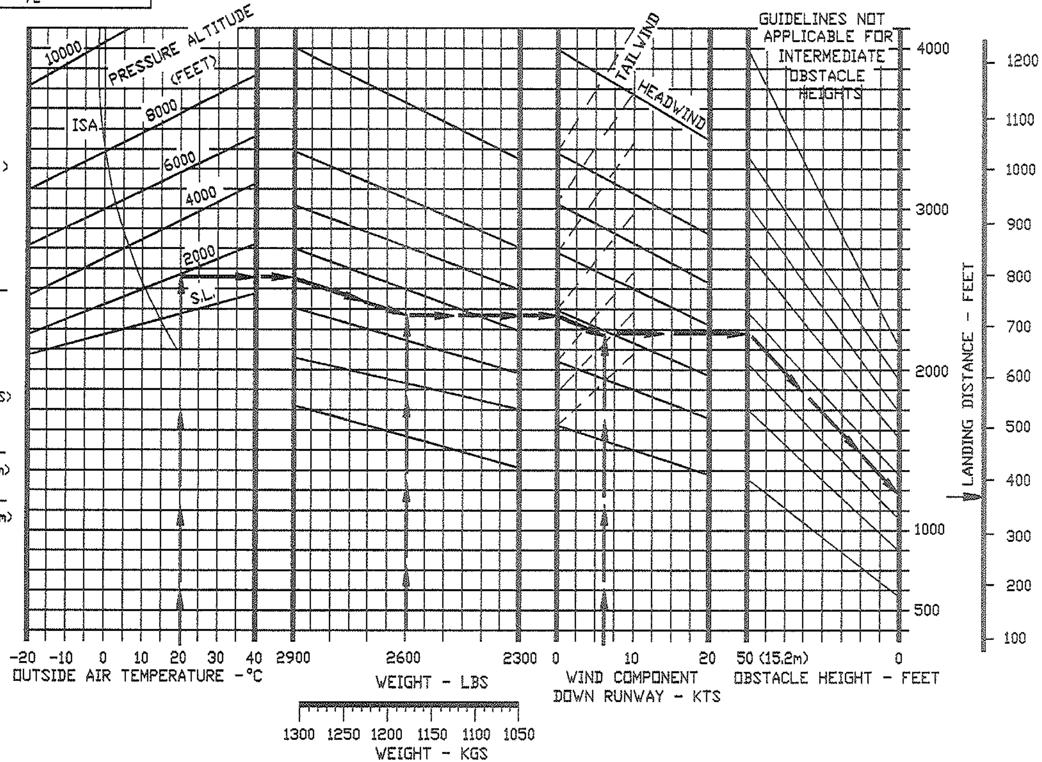
LANDING WEIGHT - LBS (KGS)	APPROACH SPEED KIAS
2900 (1315)	80
2600 (1180)	76
2300 (1043)	72

NOTE 1) MAXIMUM DEMONSTRATED CROSSWIND VELOCITY IS 11 KNOTS
2) AFT CONTROL WHEEL PRESSURE IS RECOMMENDED TO IMPROVE BRAKING EFFECTIVENESS DURING LANDING ROLL.

ASSOCIATED CONDITIONS

POWER	IDLE
LANDING GEAR	DOWN
WING FLAPS	FULL DOWN (< 33)
RUNWAY SURFACE	PAVED, LEVEL & DRY
BRAKING	MAXIMUM

EXAMPLE: →	
OAT	20°C
PRESSURE ALTITUDE	2000 FT.
WEIGHT	2600 LBS. (1134 KGS)
HEADWIND COMPONENT	6 KTS
GROUND ROLL	1225 FT. (373 m)
TOTAL LANDING DISTANCE (50 FT. OBSTACLE)	2225 FT. (678 m)



FOR MAXIMUM PERFORMANCE LANDING DISTANCE - SEE SECTION IV, PAGE 4-15.

TABLE OF CONTENTS

NOTE:

The empty weight, center of gravity, and equipment list for the airplane as delivered from Mooney Aircraft Corporation is contained in this section. The use of this section is valid for use with the airplane identified below when approved by Mooney Aircraft Corporation.

MODEL - M20J

AIRCRAFT SERIAL NO._____

AIRCRAFT REGISTRATION NO._____

_____
Mooney Aircraft Corp. Approval Signature & Date

INTRODUCTION

This section describes the procedure for calculating loaded aircraft weight and moment for various flight operations. In addition, procedures are provided for calculating the empty weight and moment of the aircraft when the removal or addition of equipment results in changes to the empty weight and center of gravity. A comprehensive list of all Mooney equipment available for this airplane is included in this section. Only those items checked (X) were installed at Mooney and are included in the empty weight-and-balance data.

The aircraft owner and pilot has the responsibility of properly loading the aircraft for safe flight. Data presented in this section will enable you to carry out this responsibility and insure that your airplane is loaded to operate within the prescribed weight and center- of-gravity limitations.

At the time of delivery, Mooney Aircraft Corporation provides the empty weight and center of gravity data for the computation of individual loadings. (The empty weight and C.G. (gear extended) as delivered from the factory is tabulated on page 6-6 when this manual is supplied with the aircraft from the factory.)

FAA regulations also require that any change in the original equipment affecting the empty weight and center of gravity be recorded in the Aircraft Log Book. A convenient form for maintaining a permanent record of all such changes is provided on page 6-6. This form, if properly maintained, will enable you to determine the current weight-and-balance status of the airplane for load scheduling. The weight-and-balance data entered as your aircraft left the factory, plus the record you maintain on page 6-6, is all of the data needed to compute loading schedules.

The maximum certificated gross weight for the Model M20J under all operating conditions is 2900 pounds (1315 Kg). Maximum useful load is determined by subtracting the corrected aircraft empty weight from its maximum gross weight. The aircraft must be operated strictly within the limits of the Center-of-Gravity Moment Envelope shown on page 6-8.

AIRPLANE WEIGHING PROCEDURE

(A) LEVELING: Place a spirit level on the leveling screws above the tailcone access door when leveling the aircraft longitudinally. Level the aircraft by increasing or decreasing air pressure in the nose wheel tire.

(B) WEIGHING: To weigh the aircraft, select a level work area and:

1. Check for installation of all equipment as listed in the Weight & Balance Record Equipment List.

2. Top off both tanks with full fuel. Subtract usable fuel 64.0 gal. (242.4 liters, 53.3 Imp. Gal.) @ 6 lb/gal = 384.0 lbs. (174.2 Kg.)(.72 Kg/l) from total weight as weighed, (use 5.82 lb/gal(.69 Kg/l) for 100LL fuel).

OPTIONAL METHOD - Ground aircraft and defuel tanks as follows:

a. Disconnect fuel line at electric boost pump outlet fitting.
b. Connect to output fitting a flexible line that will reach fuel receptacle.
c. Turn fuel selector valve to the tank to be drained, and remove filler cap from fuel filler port.
d. Turn on boost pump until tank is empty.

Repeat steps c. and d. to drain the other tank.

e. Replace 1.25 gal. (4.7 liters, 1.0 Imp.Gal.) fuel @ 6.0 lb./gal. (.72 Kg/l) into each tank (unusable fuel). (Use 5.82 lb/gal.(.69 Kg/l) for 100LL fuel).

f. Replace filler caps.

3. Fill oil to capacity-8 qts. (7.6 liters).

4. Position front seats in full forward position.

5. Position flaps in full up position.

6. Position a 2000-pound (907.2 Kg.) capacity scale under each of the three wheels.

7. Level aircraft as previously described making certain nose wheel is centered.

8. Weigh the aircraft and deduct any tare from each reading.

9. Find reference point by dropping a plumb bob from center of nose gear trunnion (retracting pivot axis) to the floor. Mark the point of intersection.

10. Locate center line of nose wheel axle and main wheel axles in the same manner.

11. Measure the horizontal distance from the reference point to main wheel axle center line. Measure horizontal distance from center line of nose wheel axle to center line of main wheel axles.

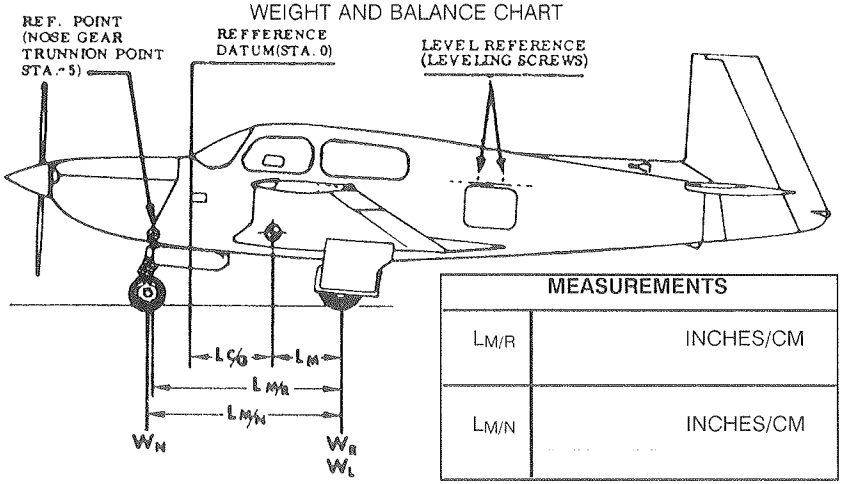
| NOTE |

Depending on the aircraft C.G. location the distance from the centerline of the main wheel axles to the trunnion reference point may be longer than to the centerline of the nose wheel axle.

12. Record weights and measurements, and compute basic weight and CG as follows on next page:

NOTE:
Wing jack points are located at Fus. Sta. 56.658 in.

WEIGHT AND BALANCE CHART



MEASUREMENTS	
$L_{M/R}$	INCHES/CM
$L_{M/N}$	INCHES/CM

SCALE POSITION AND SYMBOL	SCALE READING	TARE	NET WEIGHT
Nose Wheel (W_N)			
Right Main Wheel (W_R)			
Left Main Wheel (W_L)			
Basic Empty Wt..as Weighed (W_T)			
As Weighed (W_T)			

If fuel has been drained.
If fuel has not been drained.

a. CG Forward of Main Wheels:

Lbs/Kg Weight of Nose (W_N)	X	IN/CM Distance Between Main and Nose Wheel Axle Centers ($L_{M/N}$)	÷	Lbs/Kg Total Weight of aircraft (W_T)	=	IN/CM CG Forward of Main Wheels (L_M)

b. CG Aft of Datum (Station 0):

IN/CM Distance form Center Nose Gear Trunion to Center of Main Wheel Axles (Horizontal) ($L_{M/R}$)	--	5 IN(12.7 Cm) Distance from Nose Gear Trunion to Datum Constant	-	IN/CM Result of Computation Above (L_M)	=	IN/CM CG (Fus. Sta) Distance Aft of Datum. (Empty Wt. CG) ($L_{C/G}$)

If fuel has not been drained. the usable fuel must be analytically subtracted to determine the basic empty wt. and c.g. Use the loading calculation procedure shown on page 6-7.

Weight	Lbs.	C.G. (in.)	Moment lb-in / 1000
As Weighed (wt)			
Usable Fuel		48.43	
Basic Empty Wt.			

OWNERS WEIGHT AND BALANCE RECORD

(ENTER BELOW ALL WEIGHT CHANGE DATA FROM AIRCRAFT LOG BOOK)

AIRPLANE MODEL - M20J	SERIAL NO.	FAA REG. NO.

DATE	DESCRIPTION OF MODIFICATION	WEIGHT CHANGE				RUNNING EMPTY WEIGHT			
		ADDED (+)		REMOVED (-)					
		WT. (LBS) (Kg)	ARM (INCHES) (cm)/(mm)	WT. (LBS) (Kg)	ARM (INCHES) (cm)/(mm)	WT. (LBS) (Kg)	MOMENT /1000	ARM (IN) (cm)/(mm)	USEFUL LOAD
	BASIC EMPTY WEIGHT AS DELIVERED (Wt) (Includes full oil - 8 Qts.(7.6 liters)	———	———	———	———				

(Mult. inches by 25.4 for mm) (Mult. inches by 2.54 for Cm) (Mult. pounds by .4536 for Kg)

PILOT'S LOADING GUIDE

LOADING CALCULATION PROCEDURE

Proper loading of the aircraft is essential for maximum flight performance and safety. This section will assist you in determining whether the aircraft loading schedule is within the approved weight and center-of-gravity limits.

To figure an actual loading problem for your aircraft, proceed as follows:

Step 1. Refer to the latest entry on page 6-6 for the current empty weight and moment.

| NOTE |

Since the engine oil is normally kept at the full level, the oil weight and moment is included in basic empty weight and is constant in calculating all loading problems.

Step 2: Note the pilot's weight and the position his seat will occupy in flight. Find this weight on the left scale of the Loading Computation Graph (page 6-7) and cross the graph horizontally to the graph for #1 and #2 seats. When this point is located, drop down to the bottom scale to find the value of the moment/1000 due to the pilot's weight and seat position.

Repeat the procedure for the co-pilot and enter these weights and moment/1000 values in the proper subcolumns in the Problem Form on page 6-7.

Step 3: Proceed as in Step 2 to account for the passengers in seats 3 and 4. Enter the weight and value of moment/1000 in the proper columns.

Step 4: Again proceed as in Step 2 to account for the amount of fuel carried, and enter the weight and moment/1000 values in the proper columns.

Step 5: Once more proceed as in Step 2 to account for the baggage to be carried and enter the figures in the proper columns.

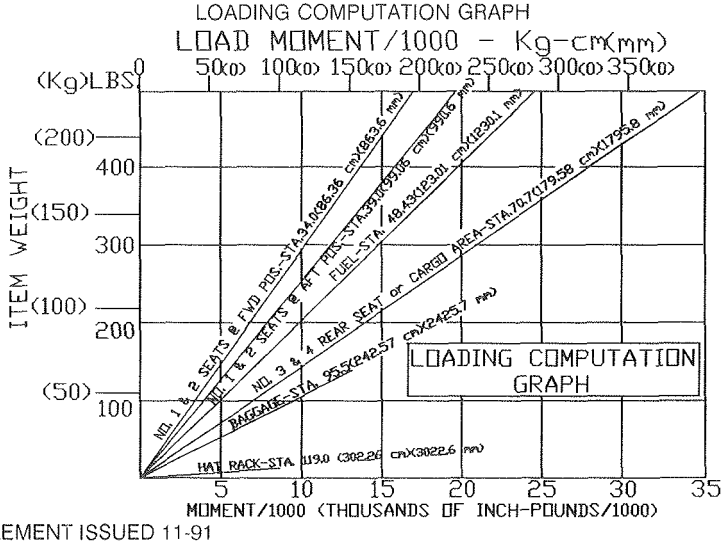
Step 6: Total the weight columns. This total must be 2900 Pounds(1315 Kg) or less. Total the Moment/1000 column. DO NOT FORGET TO SUBTRACT NEGATIVE NUMBERS.

Step 7: Refer to the Center-of-Gravity Moment Envelope (page 6-8). Locate the loaded weight of your airplane on the left scale of the graph and trace a line horizontally to the right. Locate the total moment/1000 value for your airplane on the bottom scale of the graph and trace a line vertically above this point until the horizontal line for weight is intersected. If the point of intersection is within the shaded area, your aircraft loading is acceptable. If the point of intersection falls outside the shaded area, you must rearrange the load before takeoff.

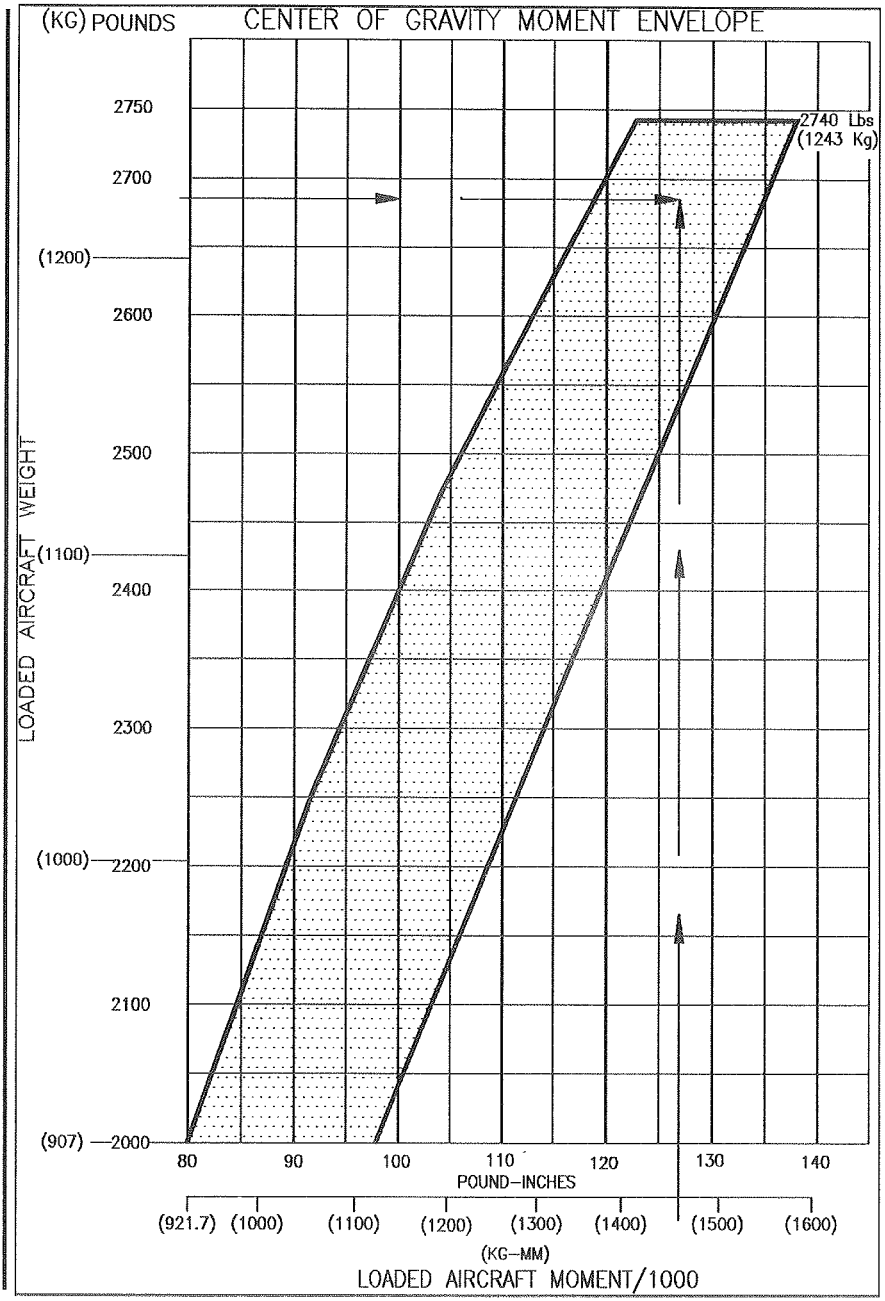
PROBLEM FORM

STEP	ITEM	Sample Problem		Your Problem	
		WEIGHT Lbs. (Kg.)	MOMENT Lb.in/1000 (Kg.cm/1000)	WEIGHT Lbs. (Kg.)	MOMENT Lb.in/1000 (Kg.cm/1000)
1	A/C Basic Empty Wt.(W_T) (From page 6-5) (Includes Full Oil) 8 Qts.(7.6 Li)@Sta.11.5 (29.2 cm)(Oil sump assumed FULL for all flights)	1750 (793.79)	77.02 (887.38)		
2	Pilot Seat (#1) *	170 (77.11)	6.0/2nd pos (69.15)		
	Co-Pilot Seat (#2) *	170 (77.11)	5.78/Fwd (66.8)		
3	Left Rear Seat (#3) or Cargo Area	170 (77.11)	12.5 (144.4)		
	Right Rear Seat (#4) or Cargo Area				
4	Fuel (Max. Usable 64 Gal.(242.3 Li), 384 Lbs.(174.2 Kg) @ Sta. 48.43 (123.0 cm)	312.0 (141.5)	15.11 (174.14)		
5	Baggage (Max. 120 Lbs.)(54.43 Kg) @ Sta. 95.5 (242.57 cm)	110 (49.9)	10.23 (117.9)		
	Hat Rack (Max. 10 Lbs.)(4.54 Kg) @ Sta. 119.0 (302.26 cm)	3.0 (1.38)	.36 (4.15)		
6	Loaded Aircraft Weight	2685 (1218)			
	Total Moment/1000		127 (1463.7)		
7	Refer to Center of Gravity Moment Envelope to determine whether your A/C loading is acceptable.				
*	Obtain the moment/1000 value for each seat position(FWD, MID or AFT) from loading computation graph below.				

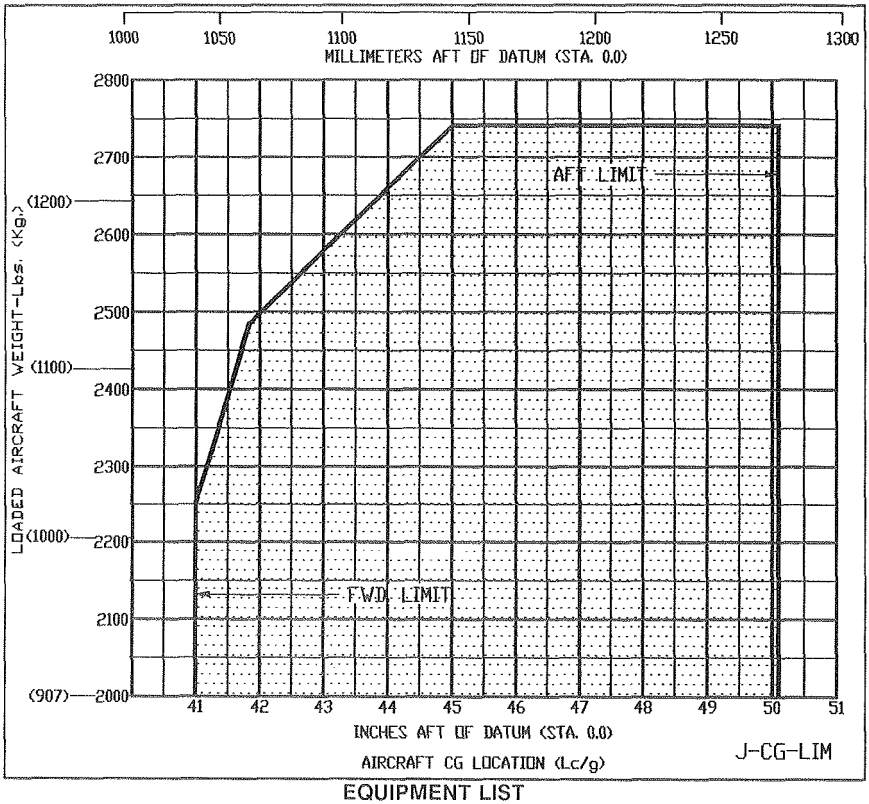
J-LD-PRB



CENTER OF GRAVITY MOMENT ENVELOPE



CENTER OF GRAVITY LIMITS ENVELOPE



EQUIPMENT LIST

The following equipment list is a listing of all items approved at the time of publication of this manual for the Mooney M20J.

Only those items having an X in the "Mark If Installed" column and dated were installed at Mooney.

If additional equipment is to be installed it must be done in accordance with the reference drawing or a separate FAA approval.

| NOTE |

Positive arms are distances aft of the airplane datum. Negative arms are distances forward of the airplane datum.

Asterisks (*) after the item weight and arm indicate complete assembly installations. Some major components of the assembly are listed and indented on the lines following. The summation of the major components will not necessarily equal the complete assembly installation.

EQUIPMENT LIST

J-EQ-A1

	MO.		
	DAY		
	YEAR		

ITEM NO.	ITEM DESCRIPTION	REF. DRAWING	WEIGHT (Kg) (POUNDS)	ARM (cm) (INCHES)	MARK IF INSTLD
	A. POWERPLANT & ACCESSORIES				
1A	Engine, Lycoming IO360-A3B6D (Includes Starter, Prestolite 60 Amp Alternator, and Oil Filter) (70 Amp Alternator OPT.)	600363	(149.7) 330.00 *	(-40.0) -15.76 *	X
2A	Oil Radiator (Stewart Warner)	620052	(1.1) 2.4	(-9.7) -3.8	X
3A	Valve, Oil Quick Drain (Net Change)	600363	(.005) 0.00	(-35.6) -14.00	
4A	Propeller - Constant Speed (McCauley-B2D34C214/90DHB -16E or -16EP)	680031	(22.5) 49.50	(-90.2) -35.50	
5A	Governor, Propeller (McCauley C290D5/T17)	660115	(1.25) 2.75	(-3.6) -1.40	X