



# 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 1991 and 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

SPECIAL LETTER 92-1  
DATE: April 20, 1992

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

PARTS LIST: (con't.)

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

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

ITEM	Mooney Kit Number SL92-1-5 (for S/N's 24-3154 THRU 24-3200, 24-3202 THRU 24-3217)	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 Service Bulletin effort if necessary paperwork is received by Service Parts within 180 days of the date of this Service Bulletin.

SB M20-252  
DATE: 4-6-92

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.
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## 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.
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## 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.
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## 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.
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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.



## INTRODUCTION

This Operators Manual conforms to GAMA Specification No. 1 and includes both manufacturers material and FAA APPROVED material required to be furnished to Pilot by applicable Federal Aviation Regulations. Section IX contains supplemental data supplied by Mooney Aircraft Corporation.

Section I contains information of general interest to pilot. It also contains definitions of terminology used in this Operators Manual.

This Pilot's Operating Handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air regulations or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in an up to date status.

All limitations, procedures, safety practices, servicing and maintenance requirements published in this POH/AFM are considered mandatory for the Continued Airworthiness of this airplane in a condition equal to that of its original manufacture.

## DESCRIPTIVE DATA

## ENGINE

Number of engines	1
Engine Manufacturer	TEXTRON Lycoming
Model	IO-360-A3B6D
Recommended TBO	1800 Hours
Type	Reciprocating, aircooled, fuel injected.
Number of cylinders	4. Horizontally opposed
Displacement	361 Cu. In. (5915.7 cc)
Bore	5.125 In. (13.02 cm)
Stroke	4.375 In. (11.11 cm)
Compression ratio	8.7:1

## Fuel System

Type	Fuel Injection Flow
Make	Bendix, RSA-5-AD1
Fuel-Aviation Gasoline	100 or 100LL min. grade

## Accessories

Magnetos	Bendix D4LN 2021 or D4LN3021
Spark Plugs	18 MM X .750-20 Thd. Connection
Alternator	Prestolite 12V, 60A *
Starter	Prestolite 12 Volts *
* (24 Volt Starter and 28 Volt, 70 amp. alternator are OPTIONAL)	

## Ratings

Maximum Continuous Sea Level - BHP/RPM	200/2700
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## PROPELLER

Number	1
Manufacturer	McCaughey
Model Number	B2D34C214/90DHB-16E
Number of Blades	2
Diameter Max.	74.0 in. (187.9 cm)
Min.	73.0 in. (185.4 cm)
Type	Constant Speed

Governing  
Blade Angles @ 30 in. Sta.(75 cm):

Hydraulically controlled by engine oil  
Low .13.9 degrees +/- .2 degrees  
High 33.0 degrees +/- .5 degrees

FUEL

Minimum Fuel Grade (Color)  
Total Capacity  
Usable

100/130 (Green)/100 LL (Blue)  
66.5 U.S. Gal. (251.8 Liters)(55.4 Imp. Gal.)  
64.0 U.S. Gal. (242.4 Liters)(53.3 Imp. Gal.)

OIL

(After Break-in Period)  
Oil Specification  
Total Oil Capacity  
Oil Capacity Minimum for Flight  
Oil Filter

MIL-L-22851  
and as approved by TEXTRON Lycoming  
(Reference Engine Operators Manual)  
8 Qts. (7.57 Liters)  
5 Qts. (4.73 Liters)  
Full Flow

Oil grades, specifications and changing recommendations are contained in SECTION VIII.

LANDING GEAR

TYPE: Electrically operated, fully retractable tricycle gear with rubber shock discs. The main wheels have hydraulically operated disc brakes. The nose wheel is fully steerable 14 degrees left or right of center.

Wheel Base  
Wheel Track  
Tire Size:  
Nose  
Main

71 9/16 in. (181.73 cm)  
110 in. (279.4 cm)  
5.00 x 5 (6 ply)Type III  
6.00 x 6 (6 ply)Type III

Tire Pressure:  
Nose  
Main  
Minimum Turning Radius (No brakes applied)

49 PSI  
30 PSI  
41 ft. (12.5 m)

MAXIMUM CERTIFICATED WEIGHTS

Gross Weight  
Baggage Area  
Hat Rack  
Cargo (Rear Seats Folded Down)

2900 Lbs. (1315 Kg)  
120 Lbs. (54.4 Kg)  
10 Lbs. (4.54 Kg)  
340 Lbs. (154.2 Kg)

STANDARD AIRPLANE WEIGHTS

Basic Empty Weight  
Useful Load

See Page 1-10  
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	
S/N 24-1686-14	17.0 cu. ft. (.481 cu m)
S/N 24-1687-14 thru 24-2999	15.3 cu. Ft. (.433 cu m)
Cargo Area (with rear seat folded down)	33.0 cu. Ft. (.924 cu. m)
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 hand book assume zero instrument error.
KTAS	KNOTS TRUE AIRSPEED - The airspeed of an airplane relative to undisturbed air which is the KCAS corrected for altitude and temperature..
V <sub>a</sub>	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 - 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.
$V_y$	BEST RATE-OF-CLIMB SPEED - The airspeed which delivers the greatest gain in altitude in the shortest possible time with gear and flaps up.

#### ENGINE POWER TERMINOLOGY

BHP	BRAKE HORSEPOWER - The power developed by the engine.
MCP	MAXIMUM CONTINUOUS POWER - The maximum power for takeoff, normal, abnormal or emergency operations.
MP	MANIFOLD PRESSURE - Pressure measured in the engine's induction system and is expressed in inches of mercury (Hg).
RPM	REVOLUTIONS PER MINUTE - Engine speed.

#### AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

Demonstrated Crosswind	The velocity of the crosswind component for which adequate control of the airplane during takeoff and landing test was actually demonstrated during certification. The value shown is NOT considered to be limiting.
Service Ceiling	The maximum altitude at which aircraft at gross weight has the capability of climbing at the rate of 100 ft/min.

#### ENGINE CONTROLS & INSTRUMENTS TERMINOLOGY

Propeller Control	The control used to select engine/propeller speed.
Throttle Control	The control used to select engine power by controlling MP.

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**INTRODUCTION**

SECTION II includes mandatory operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment.

The limitations included in this section have been approved by the Federal Aviation Administration.

When applicable, limitations associated with optional systems or equipment such as autopilots are included in SECTION IX.

**| NOTE |**

The airspeeds listed in the Airspeed Limitations chart (Figure 2-1) and the Airspeed Indicator Markings chart (Figure 2-2) are based on Airspeed Calibration data shown in Section V with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section V.

Your Mooney is certificated under FAA Type Certificate No. 2A3 as a Mooney M20J.

**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.



**AIRSPPEED LIMITATIONS**

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

	SPEED	KCAS/KIAS	REMARKS
$V_{no}$	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: <u>Lb./Kg.</u> 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.
$V_{lo}$	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 AIRSPPEED LIMITATIONS

**AIRSPED 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 $V_{SO}$ in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc (Normal Operating Range)	65-176	Lower limit is maximum weight $V_S$ 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 AIRSPED INDICATOR MARKINGS**

100LL (low lead) aviation fuel (blue) with a lead content limited to 2 cc per gallon is also approved.

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

To reduce the possibility of ice formation within the aircraft or engine fuel system it is permissible to add ISO-PROPYL alcohol to the fuel supply in quantities NOT TO EXCEED 1% of the total fuel volume per tank. DO NOT add other additives to the fuel system due to potential deteriorating effects within the fuel system.

### 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.(1020 Kg.) 13.3%
MAC	
Intermediate Forward	Fuse. Sta. 41.8 IN.(106 cm) @ 2740 lb. (1120 Kg.) 14.7%
MAC	
Forward Gross	Fuse. Sta. 45.0 IN.(113 cm) @ 2900 lb. (1315 Kg.) 20.1%
MAC	
Aft Gross	Fuse. Sta. 50.1 IN.(127 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).

### MANEUVER LIMITS

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

/////////////////  
//WARNING//  
/////////////////

Takeoff maneuvers, prolonged sideslips or steep descents when the selected fuel tank contains less than 8 gallons (48.0 lbs., 30.3 liters, 6.6 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 in momentary propeller RPM overspeed.

FLIGHT LOAD FACTOR LIMITS

Maximum Positive Load Factor	
Flaps Up	+3.8 g.
Flaps Down (33°)	+2.0 g.
Maximum Negative Load Factor	
Flaps Up	-1.5 g.
Flaps Down	0.0 g.

FLIGHT CREW

Pilot	One
Maximum passenger seating configuration	Three

OPERATING LIMITATIONS

If this airplane is not equipped with an approved oxygen system and flight operations above 12,500 feet are desired, this airplane must be, (1) equipped with supplemental oxygen in accordance with FAR 23.1441, (2) operated in accordance with FAR 91 or FAR 135.

KINDS OF OPERATION LIMITS

This is a Normal Category airplane certified for VFR/IFR day or night operations when the required equipment is installed and operational as specified in the KINDS OF OPERATION EQUIPMENT LIST and the applicable operating rules.

Optional equipment installations may not be required to be operable.

The pilot must determine that the applicable operating rules requirements for each kind of operation are met.

DO NOT OPERATE IN KNOWN ICING CONDITIONS

Autopilot Limitations - See SECTION IX.

KINDS OF OPERATION EQUIPMENT LIST

The following equipment was approved during Type Certification and must be installed and operable for each kind of operation as specified.

NOTE

The KINDS OF OPERATION EQUIPMENT list may not include all the equipment as required by applicable operating rules.

SEE NEXT PAGE FOR LISTINGS

**AIRSPEDS FOR EMERGENCY OPERATIONS**

CONDITION	.	.	.	.	.	RECOMMENDED SPEED
-----------	---	---	---	---	---	-------------------

**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 kg	.	.	.	.	.	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 kg	.	.	.	.	.	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 UNSFE

RED light indicates landing gear is not in fully extended or retracted position. Refer to "FAILURE OF LANDING GEAR TO EXTEND ELECTRICALLY" or "FAILURE OF LANDING GEAR TO RETRACT".

LEFT or RIGHT  
FUEL LOW

RED light indicates 2 1/2 to 3 gallons (9.5 to 11.4 liters) of usable fuel remain in the respective tanks. Switch to fuller tank.

HI/LO VAC (Flashing)

Suction is below 4.25 In. Hg. (RED)

HI/LO VAC (Steady)

Suction is above 5.5 In. Hg. (RED)

---  
NOTE

When either a steady (HI) or flashing (LO) VAC light is illuminated, the information obtained from the attitude and directional gyros is unreliable. Vacuum system should be checked and/or adjusted as soon as practicable.

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

**HI/LO VAC lights inoperable when STBY-BY VAC System in ON.**

HI/LO VOLTS (Flashing)

RED light indicates Alternator Output Low. Refer to "ALTERNATOR LOW VOLTAGE".

HI/LO VOLTS (Steady)

RED light indicates overvoltage or tripped Voltage Relay. Refer to "ALTERNATOR FAILURE".

START POWER ON

RED light indicates switch or relay is engaged and starter is energized. Flight should be terminated as soon as practicable. Engine damage may result. This is normal indication during engine start.

Mixture	.....	IDLE CUTOFF
Throttle	.....	CRUISE
Fuel Boost Pump	.....	ON
Mixture	.....	INCREASE

## References

Magneto/Starter Switch	CONTINUE CRANKING
Mixture	IDLE CUTOFF
Throttle	FULL FORWARD
Fuel Selector Valve	OFF
Magneto/Starter Switch	OFF
Master Switch	OFF
Fire	EXTINGUISH with Fire Extinguisher

Fuel Selector Valve	OFF
Throttle	CLOSED
Mixture	IDLE CUTOFF
Magneto/Starter Switch	OFF
Cabin Ventilation & Heating Controls	CLOSED
Cowl Flaps	CLOSED
Landing Gear	DOWN or UP, depending on terrain
Wing Flaps	EXTEND as necessary

If fire is not extinguished, attempt to increase airflow over the engine by increasing glide speed and open cowl flaps. Proceed with a FORCED LANDING EMERGENCY. Do not attempt an engine restart.

## Master Switch OFF

////////////////////  
 ///WARNING///  
 //////////////////////

Cabin Ventilation	.	.	.	.	.	.	OPEN
Heating Controls	.	.	.	.	.	CLOSED (Control Forward)	
Circuit Breakers	.	.	.	.	.	CHECK	

to identify faulty circuit if possible.

3 - 7

If electrical power is essential for the flight, attempt to identify and isolate the faulty circuit as follows:  
Master Switch . . . . . ON

Select ESSENTIAL switches ON one at a time; permit a short time to elapse before activating an additional circuit.

EMERGENCY DESCENT PROCEDURE

In the event an emergency descent from high altitude is required, rates of descent of approximately 2,000 feet per minute or greater can be attained with the aircraft in two different configurations.

With the gear and flaps retracted and cowl flaps closed, an airspeed of 196 knots will be required for maximum rate of descent. With the gear extended, flaps retracted and cowl flaps closed, an airspeed of 132 knots will also give 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

Airspeed

Landing Gear

Wing Flaps

Cowl Flaps

Power During Descent
- RETARD initially

132 KIAS

EXTEND

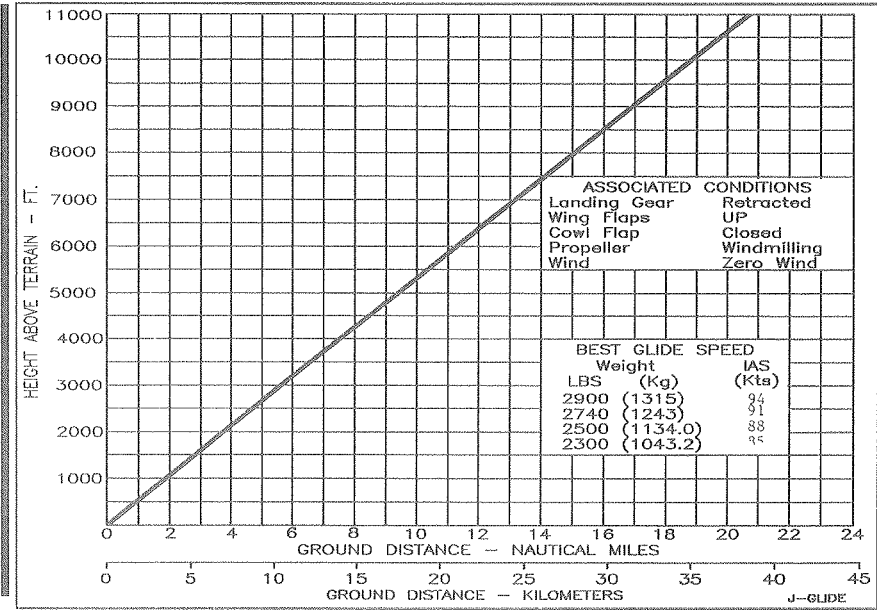
UP

CLOSED

AS REQUIRED to Maintain
- Cylinder Head Temperature 300° F (149° C) minimum

GLIDE

MAXIMUM GLIDE DISTANCE - MODEL M20J





**FORCED 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
Wing Flaps	. . . . .	Full DOWN (33 Degrees)
Landing 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
Fuel Selector	. . . . .	When sure of making landing area: OFF
Mixture	. . . . .	IDLE CUTOFF
Magneto/Starter	. . . . .	OFF
Wing Flaps	. . . . .	Full DOWN (33 Degrees)
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 available
Airspeed	. . . . .	REDUCE
Throttle	. . . . .	AS REQUIRED to maintain RPM below 2700 RPM

**FUEL****LOW FUEL FLOW**

Check Mixture	. . . . .	ENRICH
Fuel Selector	. . . . .	Fulllest TANK

If condition persists, use Boost Pump if necessary and LANDING SHOULD BE MADE  
AS SOON AS PRACTICABLE.

**ELECTRICAL****ALTERNATOR OVERVOLTAGE**

(Voltage warning light illuminated steady/Alternator C/B may be tripped)

Alternator Field Circuit Breaker . . . . . RESET or PULL out then PUSH IN  
If circuit breaker/alternator will not reset, the following procedures are required:  
1. Reduce electrical load  
2. Land, when practical, to correct malfunction.

ALTERNATOR OUTPUT LOW AND AMMETER SHOWING DISCHARGE  
(Voltage warning light flashing)

Radio Master . . . . . OFF

Master Switch . . . . . OFF, then ON

If Warning Light is still flashing, the following steps are required:

Non-essential Electrical Equipment . . . . . OFF

Ammeter . . . . . CHECK

for charging condition as each unit of Electrical Equipment is turned OFF

If still showing discharge:

Alternator Field Circuit Breaker . . . . . PULL

Non-essential electrical Equipment . . . . . OFF

LAND AS SOON AS PRACTICABLE.

---  
NOTE

A tripped main alternator circuit breaker can only be caused by a shorted alternator circuit and cannot be corrected by resetting the breaker. This should be verified by attempting to reset the breaker not more than one time. If this fails, pull alternator field circuit breaker. Turn off all non-essential electrical equipment and terminate flight as soon as practical. Repair malfunctioning alternator prior to next flight.

LANDING GEAR

FAILURE OF LANDING GEAR TO EXTEND ELECTRICALLY

Airspeed . . . . . 132 KIAS or less

Landing Gear Actuator Circuit Breaker . . . . . PULL

Landing Gear Switch . . . . . DOWN

Manual Gear Extension Mechanism . . . . . LATCH FORWARD/LEVER BACK

to engage manual extension mechanism.

---  
NOTE

Slowly pull "T" handle 1 to 2 inches (2.5 to 5.1 cm) to rotate clutch mechanism and allow it to engage drive shaft.

T-Handle . . . . . PULL

(12 to 20 times and RETURN until gear is down and locked,

GEAR DOWN light illuminated; STOP when resistance is felt.

— SYSTEM MAY BECOME DAMAGED —

Visual Gear Down Indicator . . . . . CHECK ALIGNMENT

by viewing from directly above the indicator.

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

Continuing to pull on T-Handle after GEAR DOWN light ON will bind actuator; electrical retraction MAY NOT be possible until binding is eliminated.

Return lever to normal position and secure with latch. Reset Landing Gear Actuator Circuit Breaker.

/////////////////  
//WARNING//  
/////////////////

Do not operate landing gear electrically with manual extension system engaged.

### TAKEOFF (NORMAL)

Electric Fuel Boost Pump	.	.	.	.	.	.	.	ON at start of takeoff roll
Power	.	.	.	.	.	.	.	FULL THROTTLE (2700 RPM)
Aircraft Attitude	.	.	.	.	.	.	.	Lift Nose Wheel at 62 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, 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 |

If applicable,use noise abatement procedures as required.

### 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.

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

### 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, 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

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 and close cowl flaps. Cowl flaps may be partially opened (control pulled AFT approximately three (3) inches) if necessary, to maintain oil and cylinder head temperatures within normal operating range.

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 EGT indicator drops 14° C (25° 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 peak EGT to be rechecked and the mixture re-set.
- 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 accompanied 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 operate the controls slowly and smoothly.

DESCENT

Mixture

LEAN to 14° C (25° F) 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" Hg. manifold pressure.

| NOTE |

Exercise caution with power settings below 15" Hg 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

| 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 ~  
~ ~ ~ ~ ~

To minimize control wheel forces during maneuvering, timely nose-up trimming is recommended to counteract the nose down pitching moment as power is reduced and/or the flaps are extended.

[illegible]

NOTE

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

**GO AROUND (BALKED LANDING)**

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

To minimize control wheel forces during maneuvering, timely nose-down trimming is recommended to counteract the nose-up pitching moment as power is increased and/or the flaps are retracted.

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 Speed	82 KIAS (Full Flaps)
Touchdown	Main wheels first (aligned with runway)
Landing Roll	Lower nose wheel gently
Brakes	As required
Fuel Boost Pump	OFF after landing

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 procedures except, reduce approach airspeed to 66 KIAS (flaps full down) and apply maximum braking (without skidding tires) during rollout.

## | NOTE |

Crosswind landings should be accomplished by using the above procedures except maintain approach speed approximately 10 KIAS above normal. Use 15° flaps for crosswind 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 the touchdown in a slight wing low sideslip and aircraft aligned with runway. During landing roll, position the flight controls to counteract the crosswind.

## | NOTE |

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

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

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

## TAXI AFTER LANDING

Throttle	.	.	.	.	.	.	.	.	.	1000 to 1200 RPM
Boost Pump	.	.	.	.	.	.	.	.	.	OFF
Flaps	.	.	.	.	.	.	.	.	.	RETRACT
Cowl Flaps	.	.	.	.	.	.	.	.	.	FULL OPEN
Trim	.	.	.	.	.	.	.	.	.	RESET to Takeoff
Avionics/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
Pitot Heat	.	.	.	.	.	.	.	.	.	OFF
Magneto/Starter Switch	.	.	.	.	.	.	.	.	.	Grounding Check
Mixture	.	.	.	.	.	.	.	.	.	IDLE CUTOFF
Magneto/Starter Switch	.	.	.	.	.	.	.	.	.	OFF when propeller stops
Master Switch	.	.	.	.	.	.	.	.	.	OFF
Oxygen System (if equipped)	.	.	.	.	.	.	.	.	.	OFF

## SECURING THE 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.
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NORMAL LANDING DISTANCE - GRASS SURFACE . . . . .	5-33

## INTRODUCTION

The purpose of this section is to present the owner or operator with information needed to facilitate planning of flights with reasonable accuracy. The Performance Data and charts presented herein are calculated, based upon actual flight tests with the 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.

## VARIABLES

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 the 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 Mooney M20J.

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.

To obtain effect of altitude and OAT on aircraft performance:

1. Set altimeter to 29.92 In. and read "pressure altitude".
2. Using the OAT grid for the applicable chart read the corresponding effect of OAT on performance.

### CAUTION

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

## OPERATIONAL PROCEDURES FOR MAXIMUM FUEL EFFICIENCY

For maximum 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 (25° F) 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 pressure 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.

**LANDING GEAR DOORS 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	-4	-15
70	-17	-20	-21	-28
78	-26	-37	-36	-50
87	-32	-54	-43	-71
96	-40	-55	-55	-77
104	-54	-63	-73	-86
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

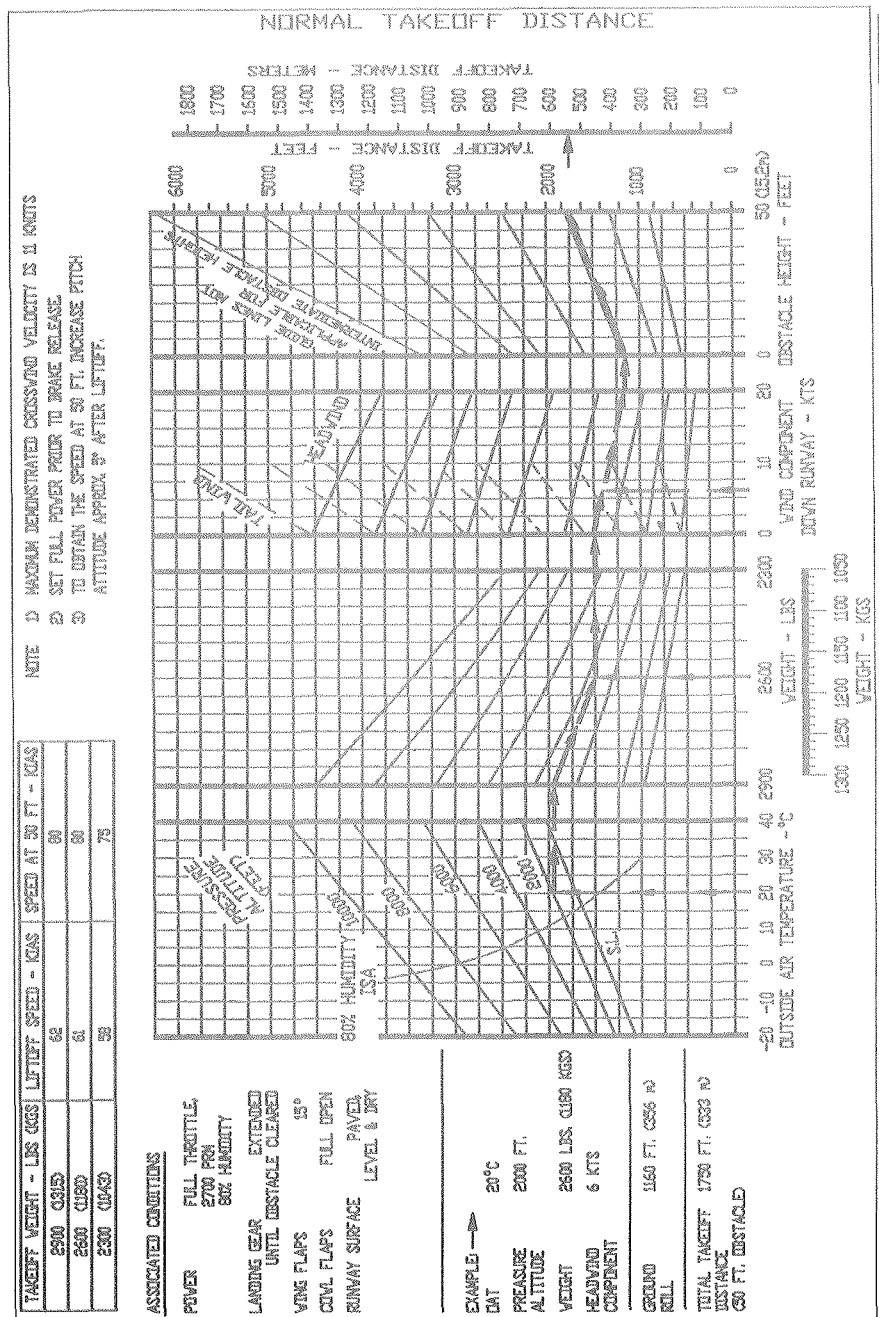
## ASSOCIATED CONDITIONS:

FORWARD C.G.  
POWER IDLENOTE: UP TO 400 FEET ALTITUDE LOSS MAY  
OCCUR DURING STALLS AT MAXIMUM WEIGHT

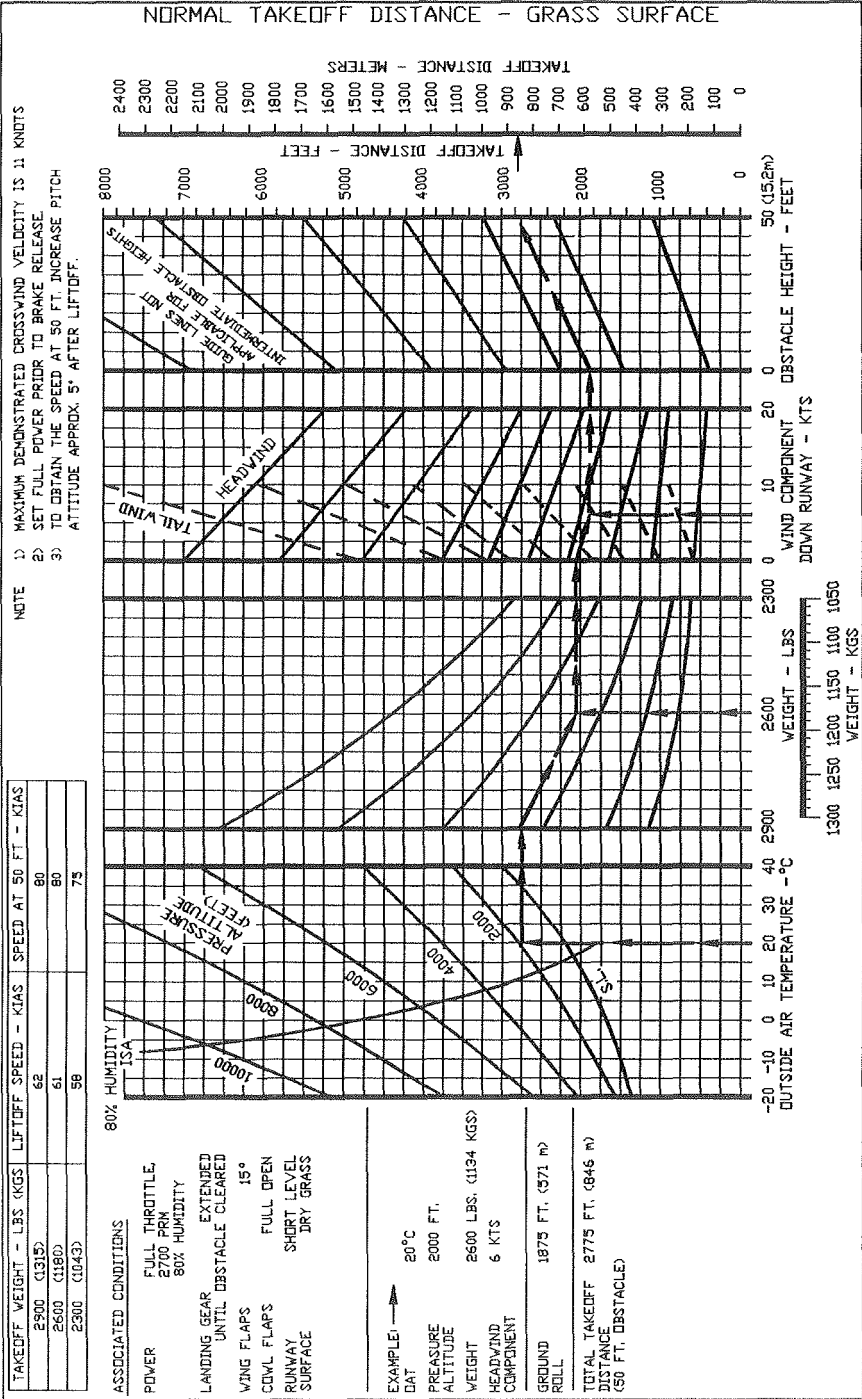
## EXAMPLE:

WEIGHT 2500 LBS (1134 KGS)  
LANDING GEAR DOWN  
FLAPS 15°  
ANGLE OF BANK 45°  
STALL SPEED 64.0 KCAS (63 KIAS)

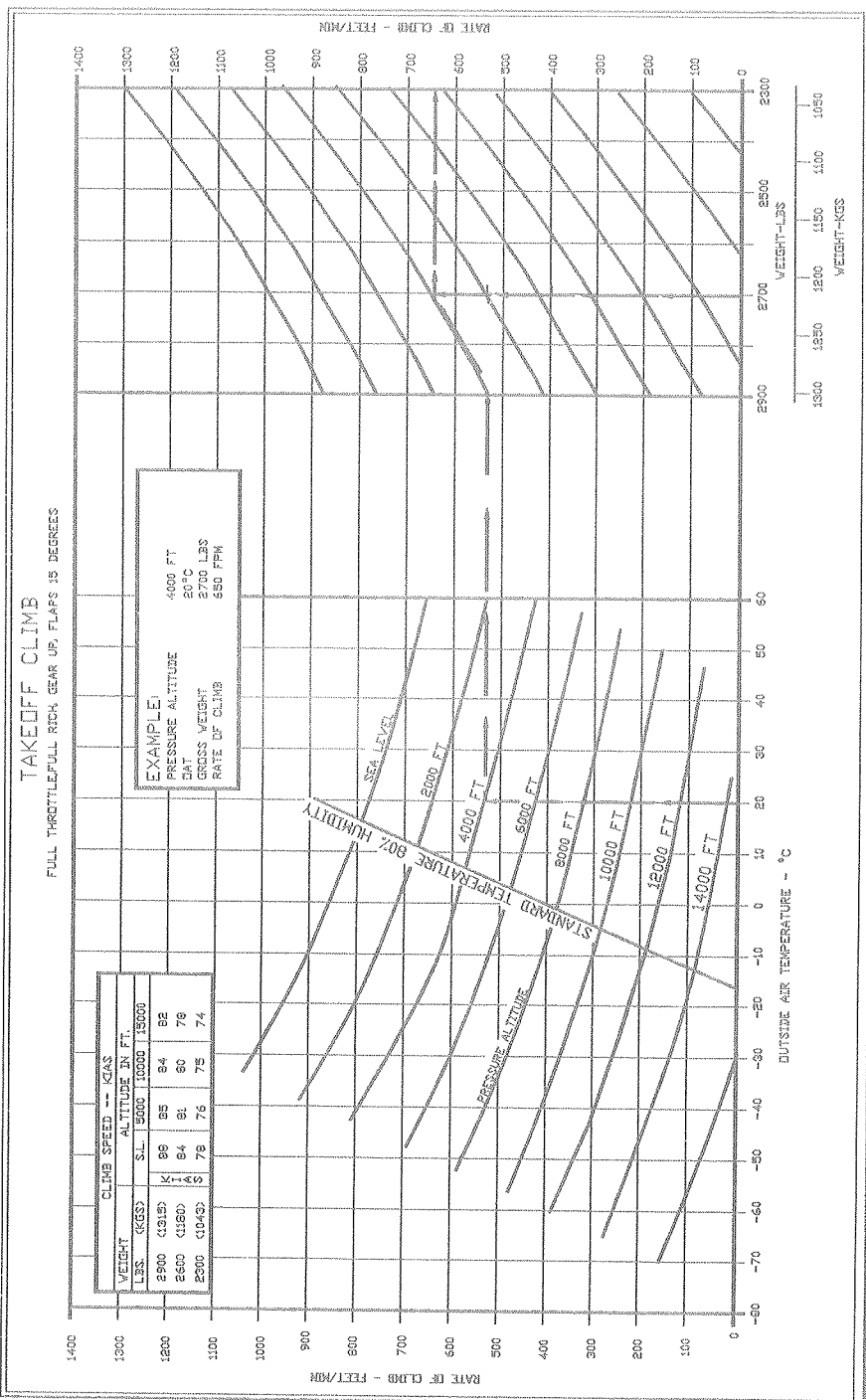
GROSS WEIGHT	GEAR AND FLAP POSITION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS
2900 LBS (1315 KGS)	GEAR UP FLAPS 0°	63	62	68	68	75	75	89	91
	GEAR DOWN FLAPS 15°	62	61	66	65	73	72	87	88
	GEAR DOWN FLAPS 33°	56	58	61	63	67	69	80	83
2740 LBS (1243 KGS)	GEAR UP, FLAPS 0°	59	57	64	63	70	70	84	85
	GEAR DOWN, FLAPS 15°	57	56	61	60	67	66	80	80
	GEAR DOWN FLAPS 33°	53	55	57	59	63	65	75	77
2500 LBS (1134 KGS)	GEAR UP, FLAPS 0°	57	55	61	59	67	67	80	81
	GEAR DOWN, FLAPS 15°	54	53	58	57	64	63	77	76
	GEAR DOWN FLAPS 33°	51	53	55	57	60	62	72	75
2300 LBS (1032 KGS)	GEAR UP, FLAPS 0°	54	52	58	56	65	64	77	77
	GEAR DOWN, FLAPS 15°	52	51	56	55	62	61	73	72
	GEAR DOWN FLAPS 33°	49	51	52	54	58	60	69	71



FOR MAXIMUM TAKEOFF DISTANCES - SEE SECTION IV

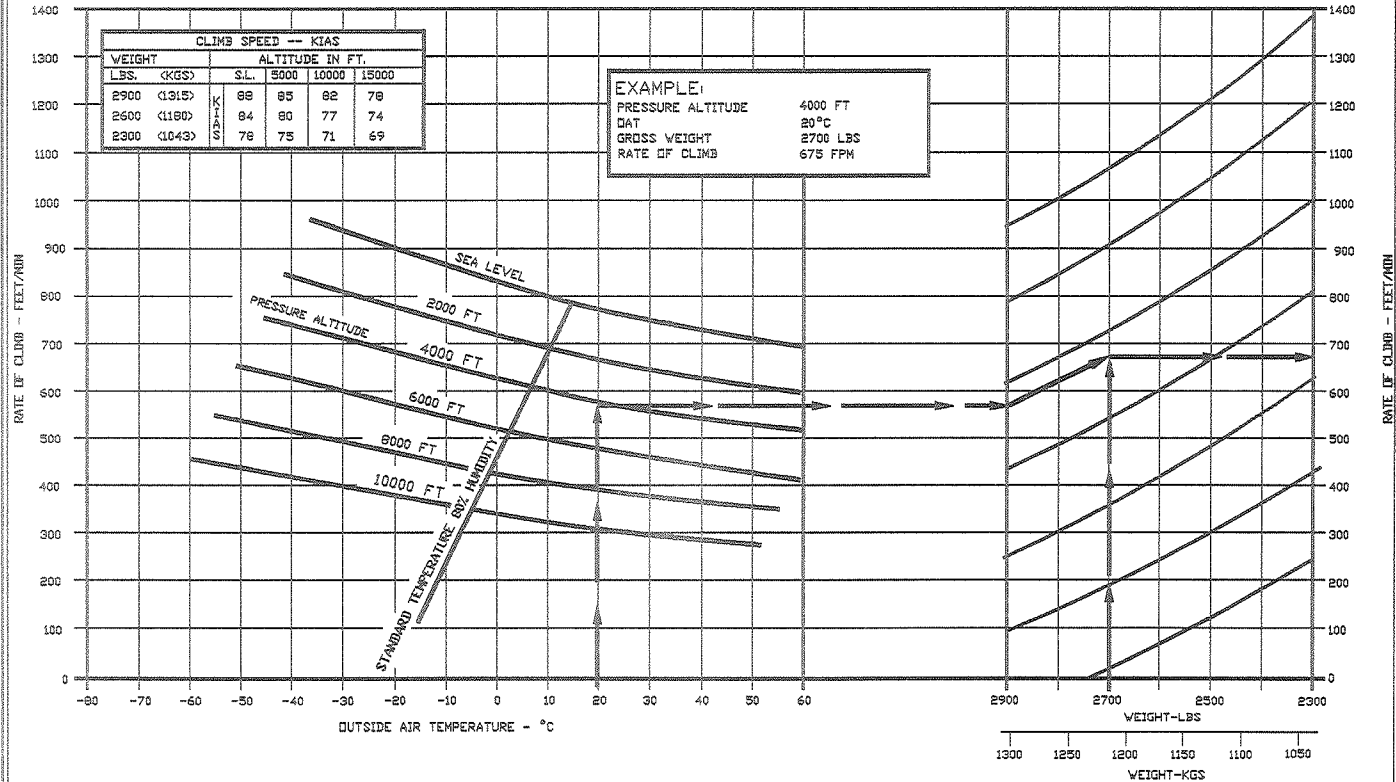


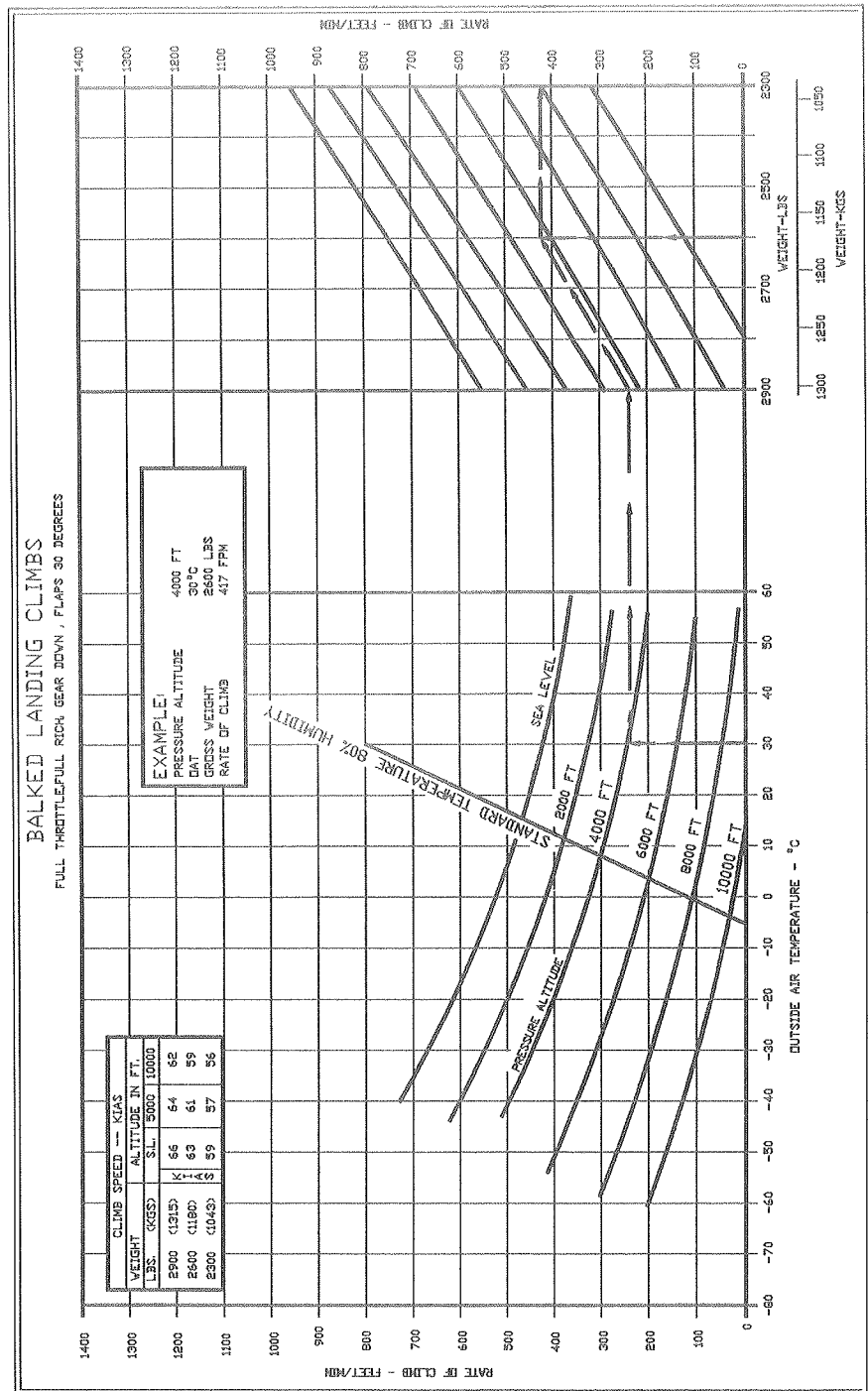




## NORMAL CLIMB

FULL THROTTLE, FULL RICH, GEAR UP, FLAPS UP





**TIME, FUEL AND DISTANCE TO CLIMB:**

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

Climb Speed:  $V_y$  from Climb performance graph on preceding page.

Power: . . . . . 2700 RPM, FULL Throttle  
Mixture: . . . . . FULL FORWARD  
Cowl Flaps: . . . . . FULL OPEN  
Landing Gear: . . . . . UP  
Wing Flaps: . . . . . UP

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

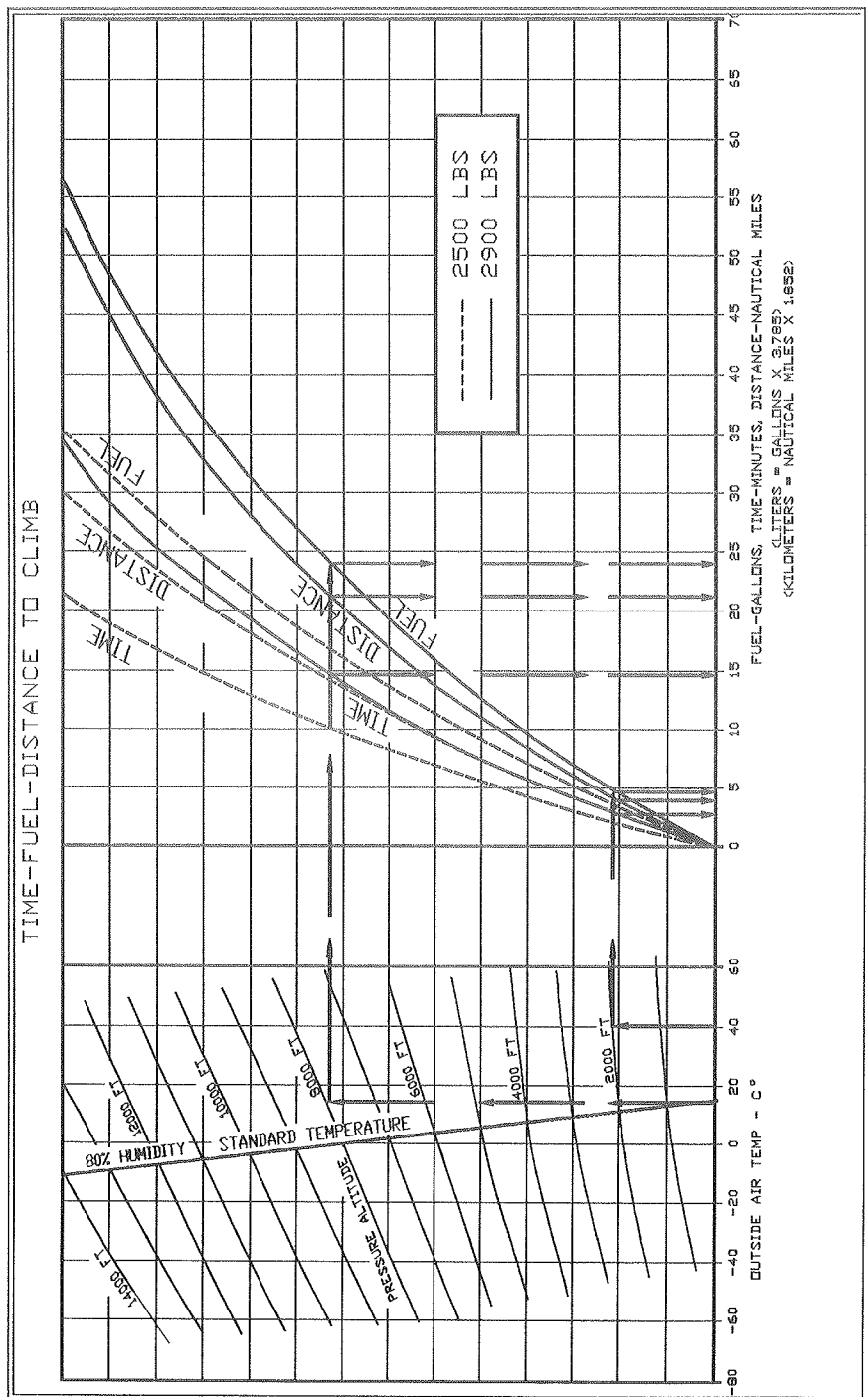
NOTE:

- 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.



**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 usable 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.

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

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.

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.

# 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.

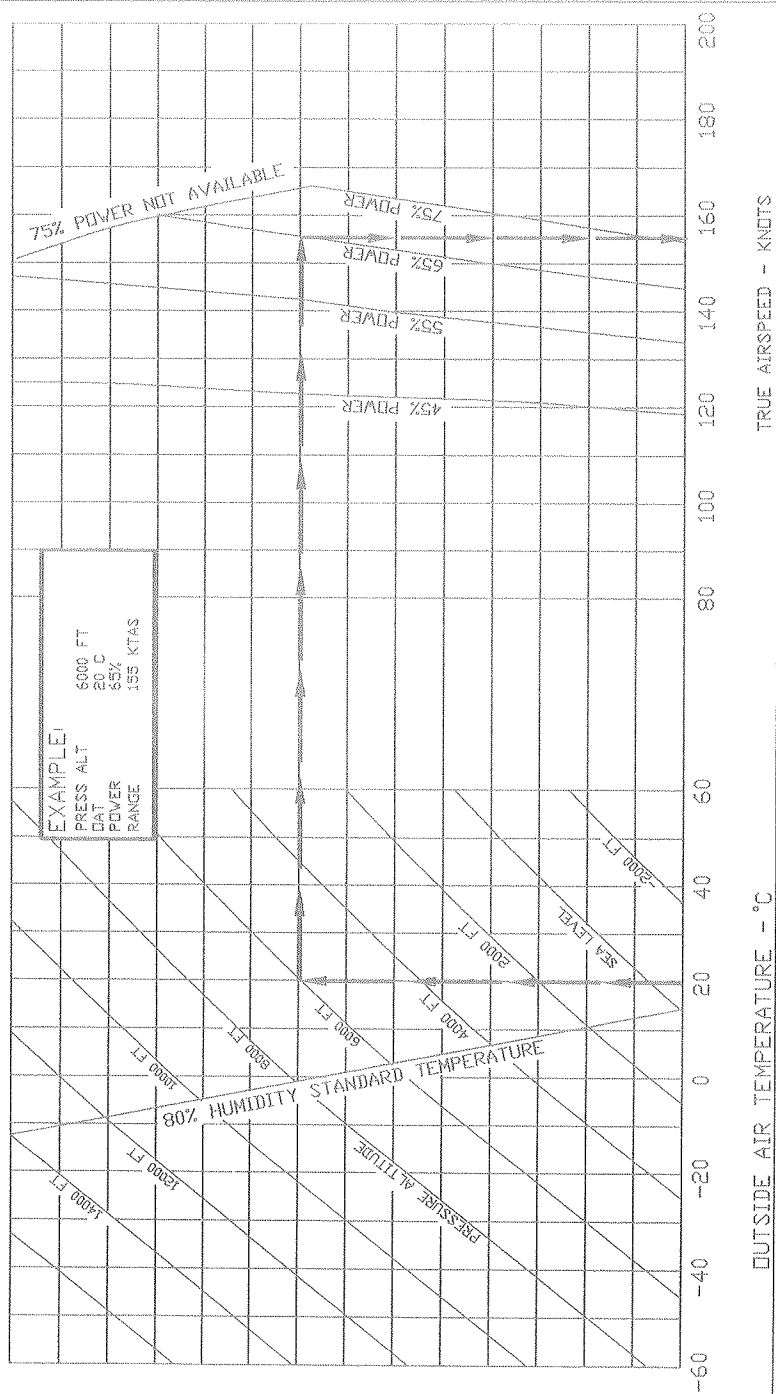
			60% Power (120 BHP)					55% Power (110 BHP)					45% Power (90 BHP)									
Pressure Altitude Feet	RPM	Fuel Flow Best POWER	2200	2300	2400	2500	2600	2700	2200	2300	2400	2500	2600	2700	2000	2100	2200	2300	2400	2500	2600	2700
			8.4	8.5	8.6	8.7	8.8	9.1	7.8	8.0	8.1	8.2	8.3	8.6	6.5	6.7	6.8	6.9	7.0	7.2	7.3	7.5
			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. Day			MANIFOLD PRESSURE — INCHES OF MERCURY																			
			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
S.L.	15°C		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
2000	11°		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
4000	7°		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
6000	3°				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
8000	-1°				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
10000	-5°						19.6	18.8			19.3	18.8	18.2	17.5			18.0	17.2	16.4	16.0	15.5	14.9
12000	-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

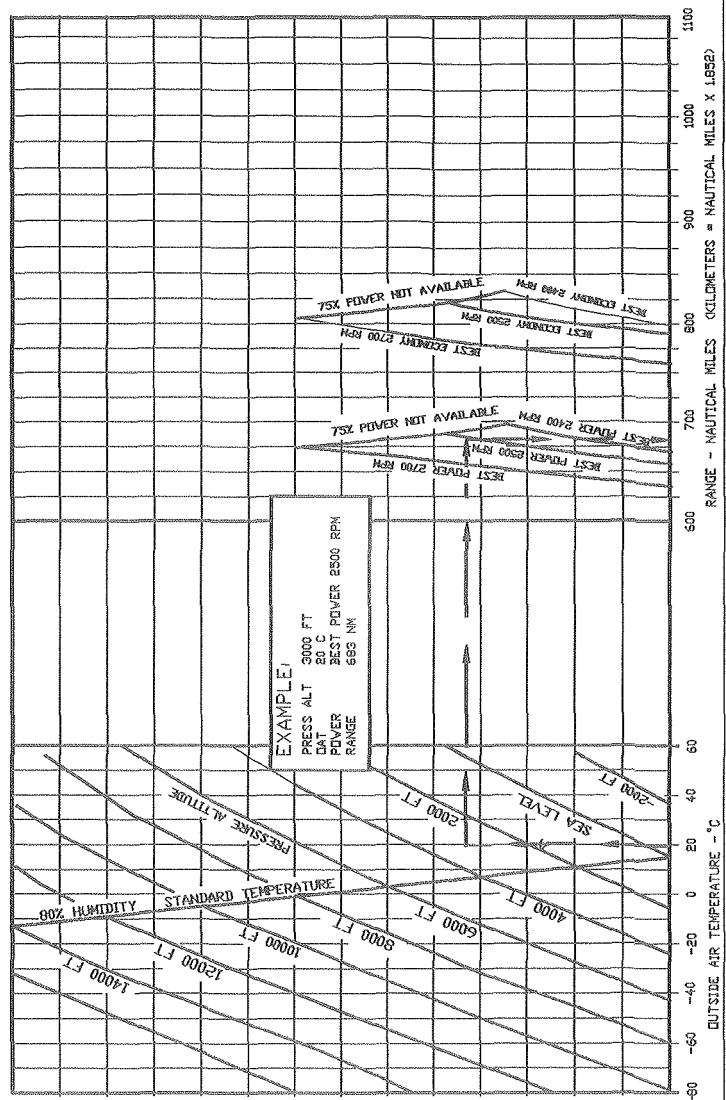
GEAR UP, FLAPS UP, CDWL FLAPS CLOSED, 2900 LBS (1315 KGS)



RANGE 75% POWER

2900 LBS (1315.4 KGS)

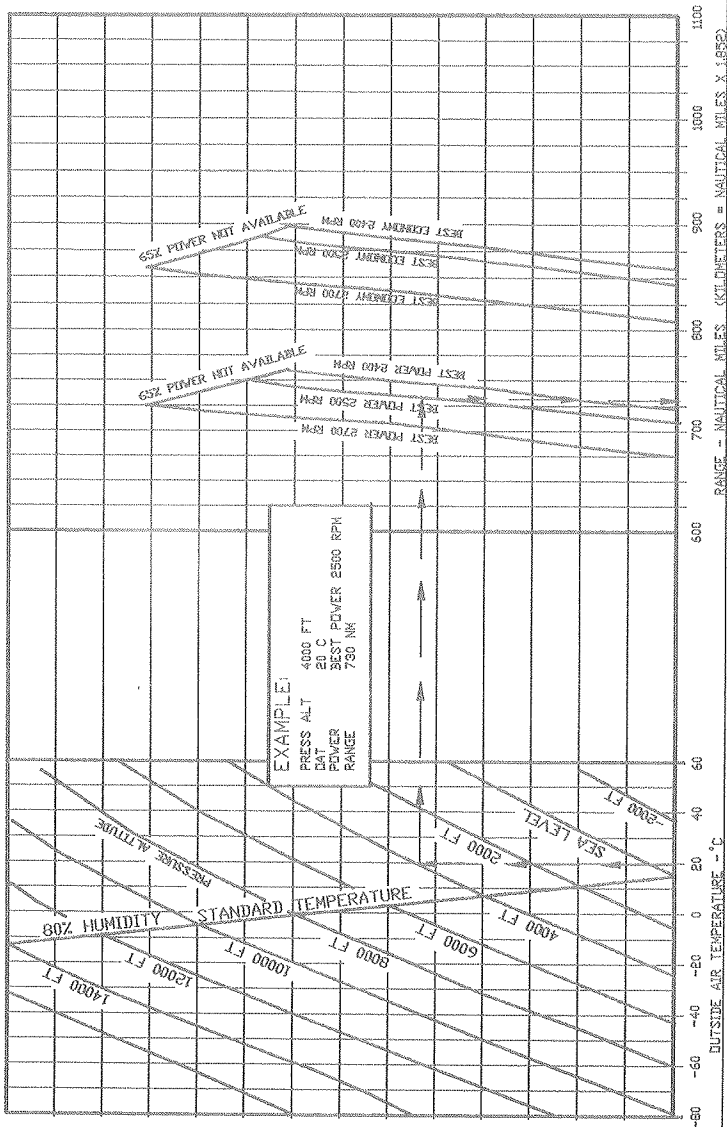
Clean Configuration, 64.0 Gallons (254 Imp. Gal.) Usable Fuel  
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Tax, Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



# RANGE 65% POWER

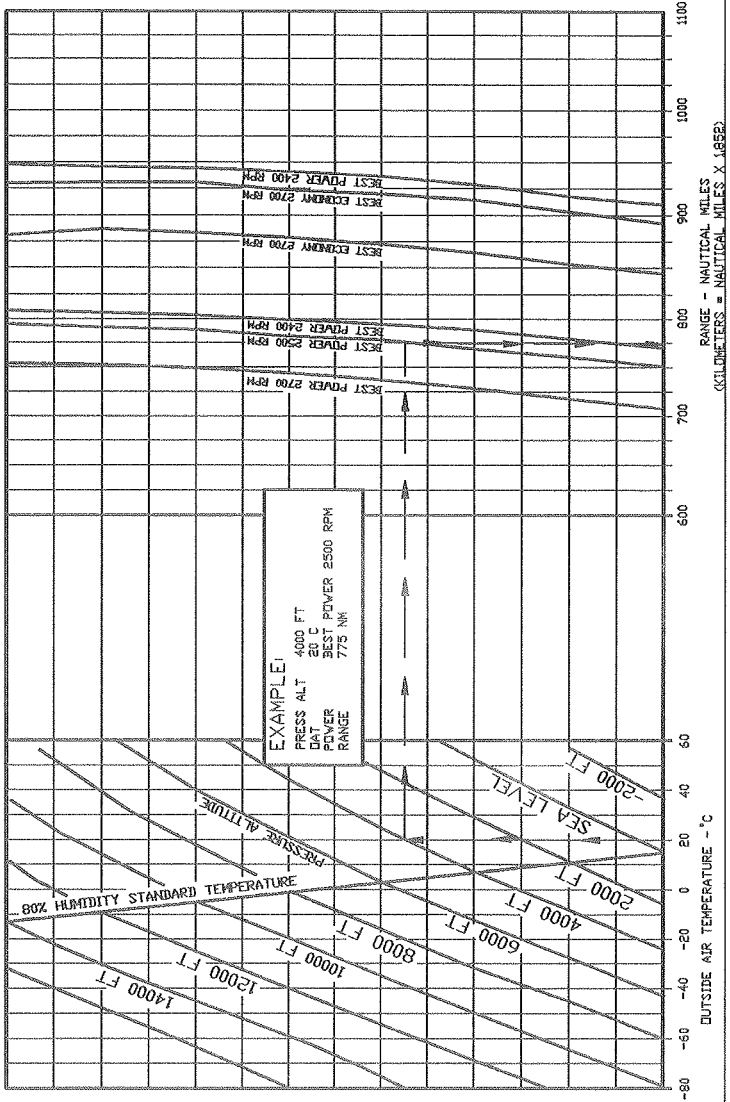
2900 LBS (1315.4 KGS)

Clean Configuration, 64.0 Gallons (243.8 Liters) (35.4 Imp. Gal.) Usable Fuel  
Zero Wind, Cowl Flaps Closed, Range Includes Varnup, Taxi, Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



RANGE 55% POWER  
2900 LBS (1315.4 KGS)

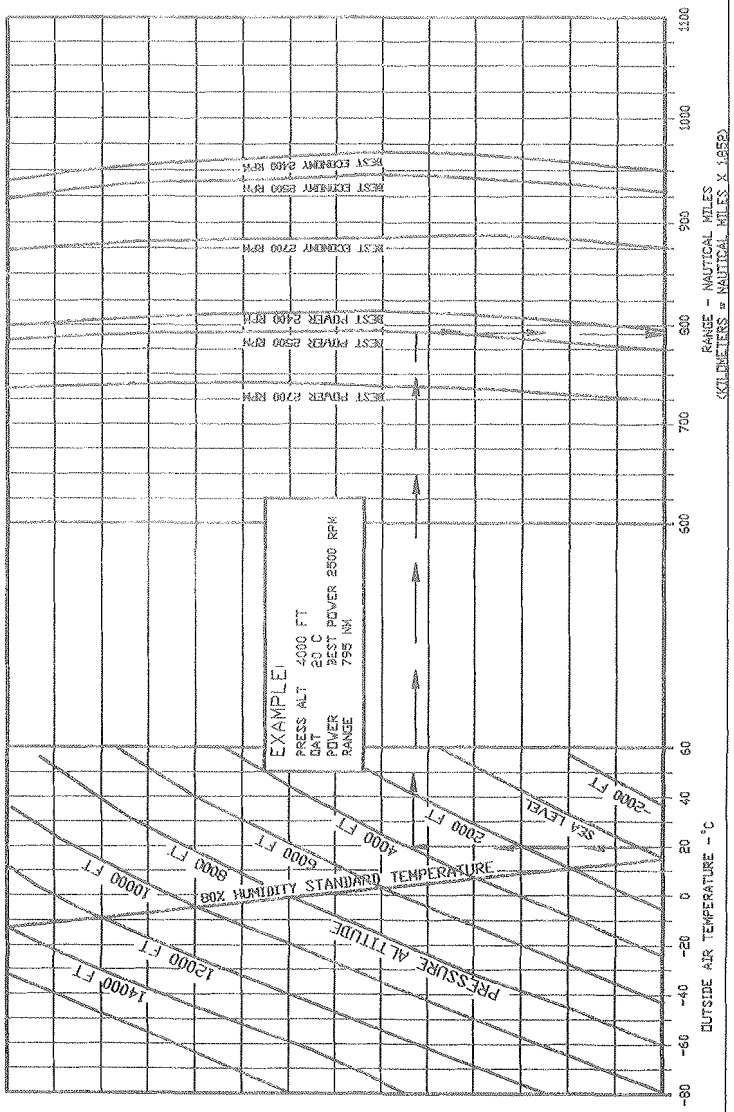
Clean Configuration, 64.0 Gallons (252 Liters) (53.4 Imp Gal) Usable Fuel  
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



RANGE 45% POWER

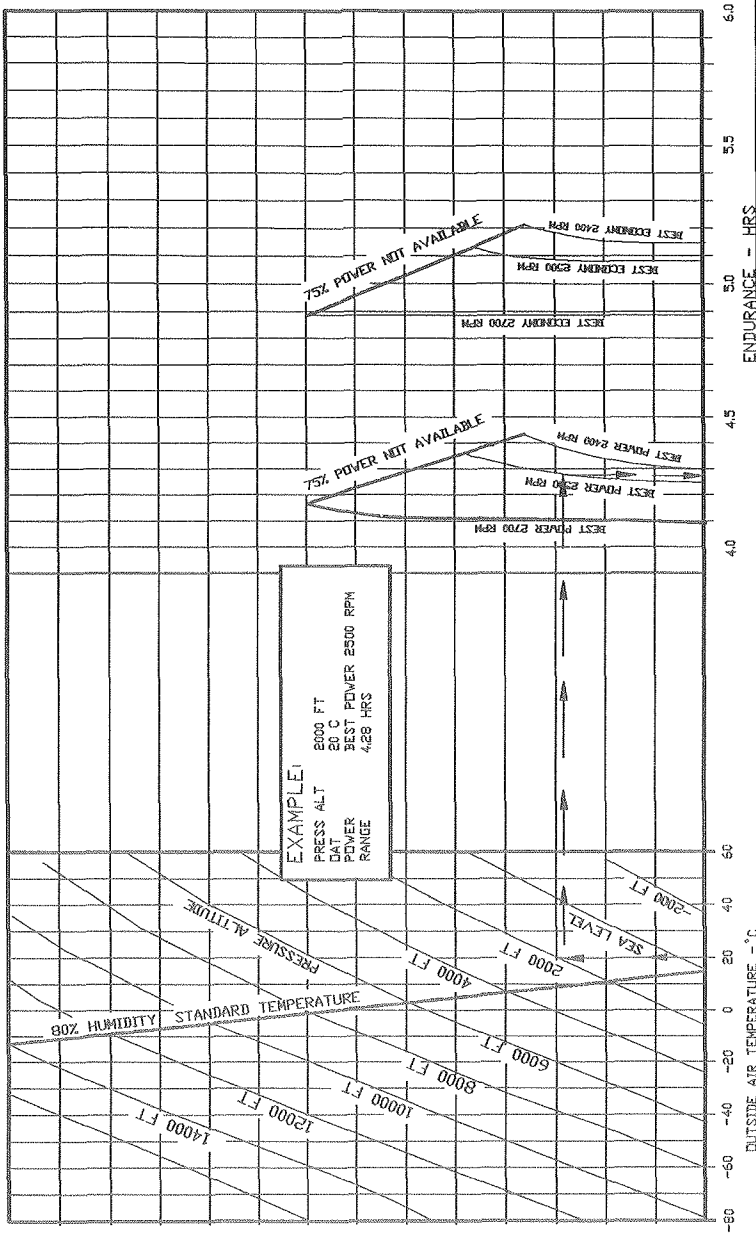
2900 LBS (1315.4 KGS)

Clean Configuration, 64.0 Gallons (242 Liters) CS5-A Imp. Gold Usable Fuel  
Zero Wind, Climb Flaps Closed, Range Includes Vornup, Taxi, Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



ENDURANCE 75% POWER

2900 LBS (1315.4 KGS)  
Clean Configuration, 640 Gallons (252 Liters) (35.4 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

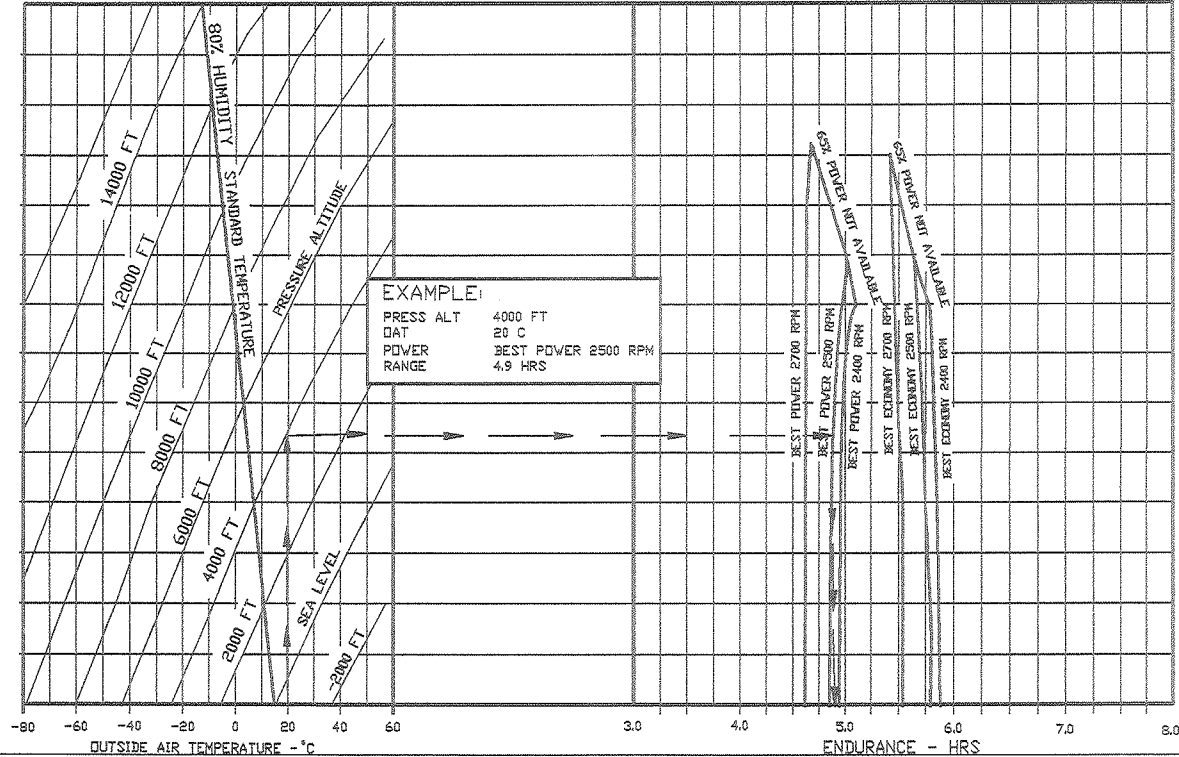


EXAMPLE:  
PRESS ALT 2000 FT  
OAT 20°C  
BEST POWER 2500 RPM  
RANGE 4.88 HRS

## ENDURANCE 65% POWER

2900 LBS (1315.4 KGS)

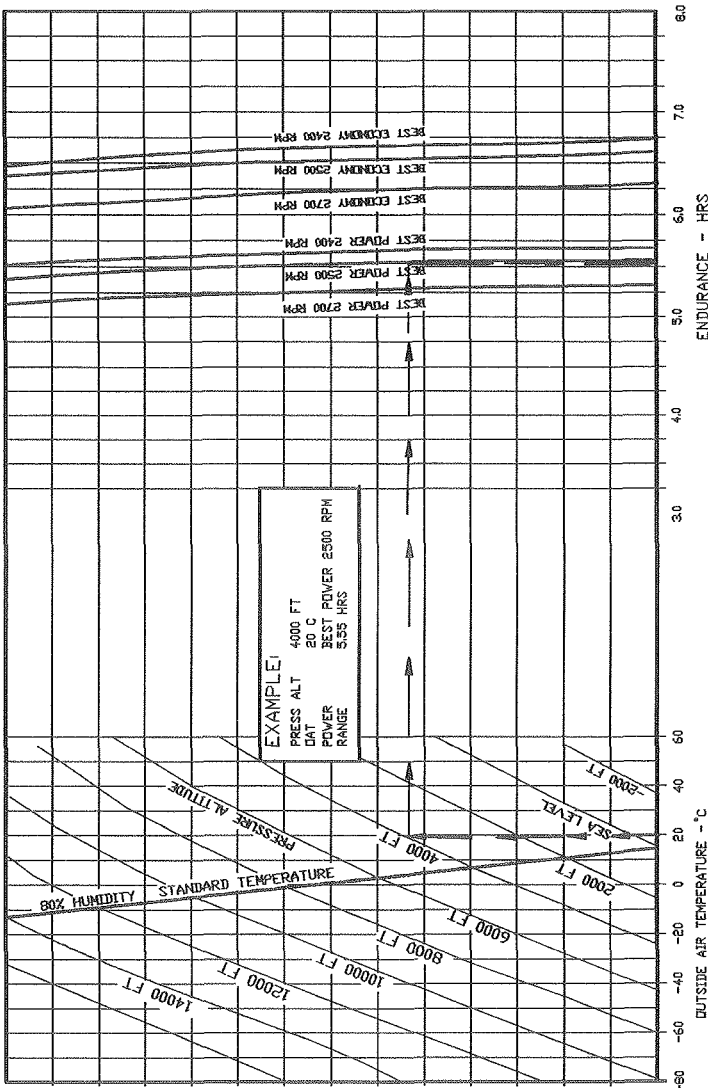
Clean Configuration, 64.0 Gallons (252 Liters) (55.4 Imp. Gal.) Usable Fuel  
Zero Wind, Cowl Flaps Closed, Range Includes Warmup, Taxi, Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power



ENDURANCE 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

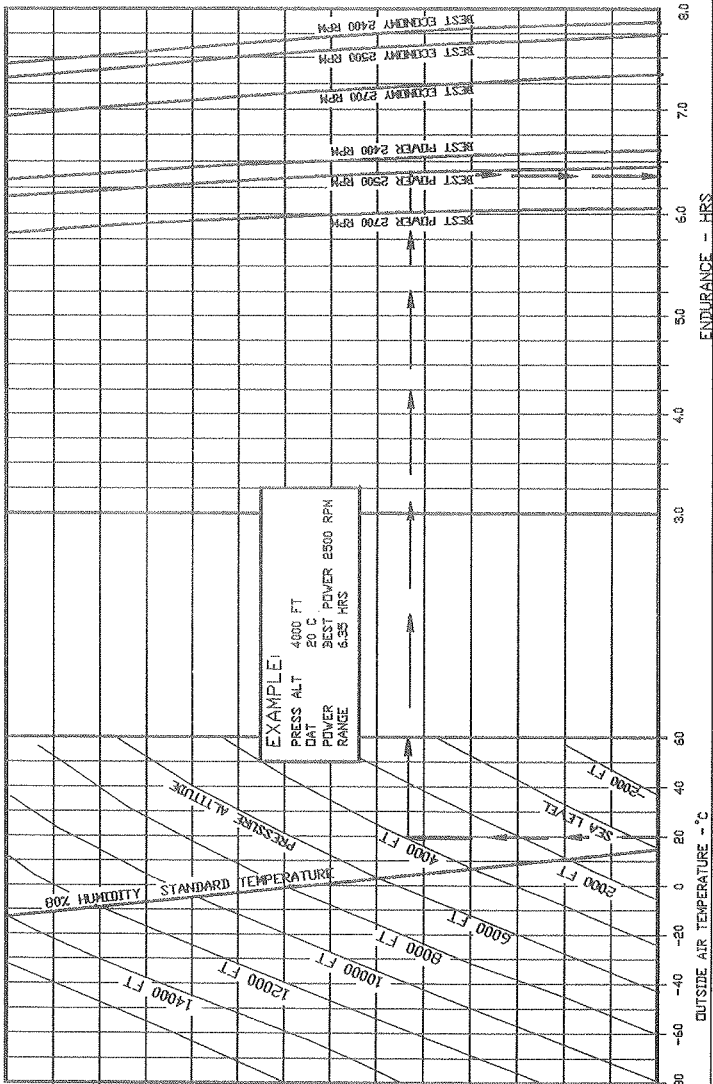


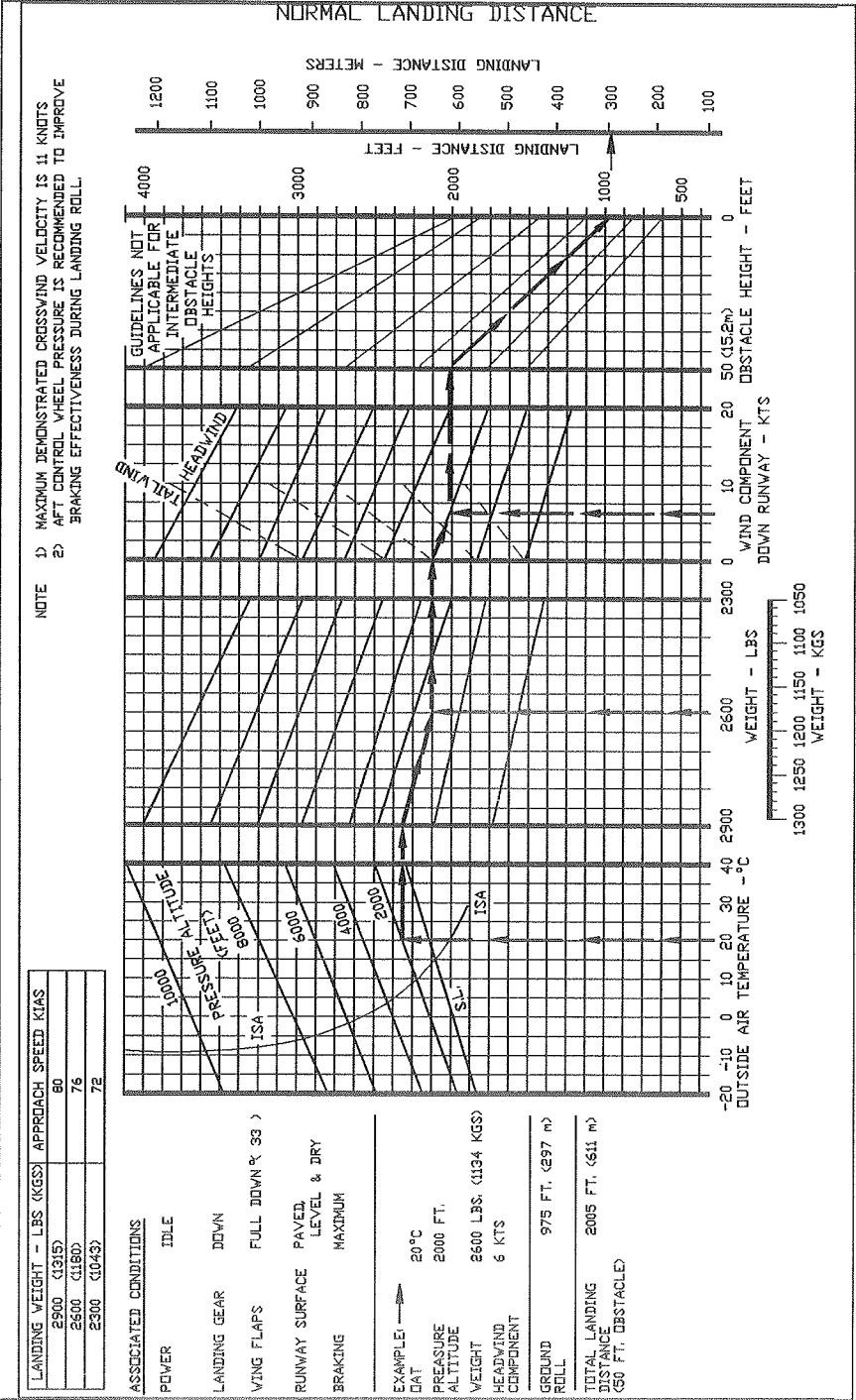


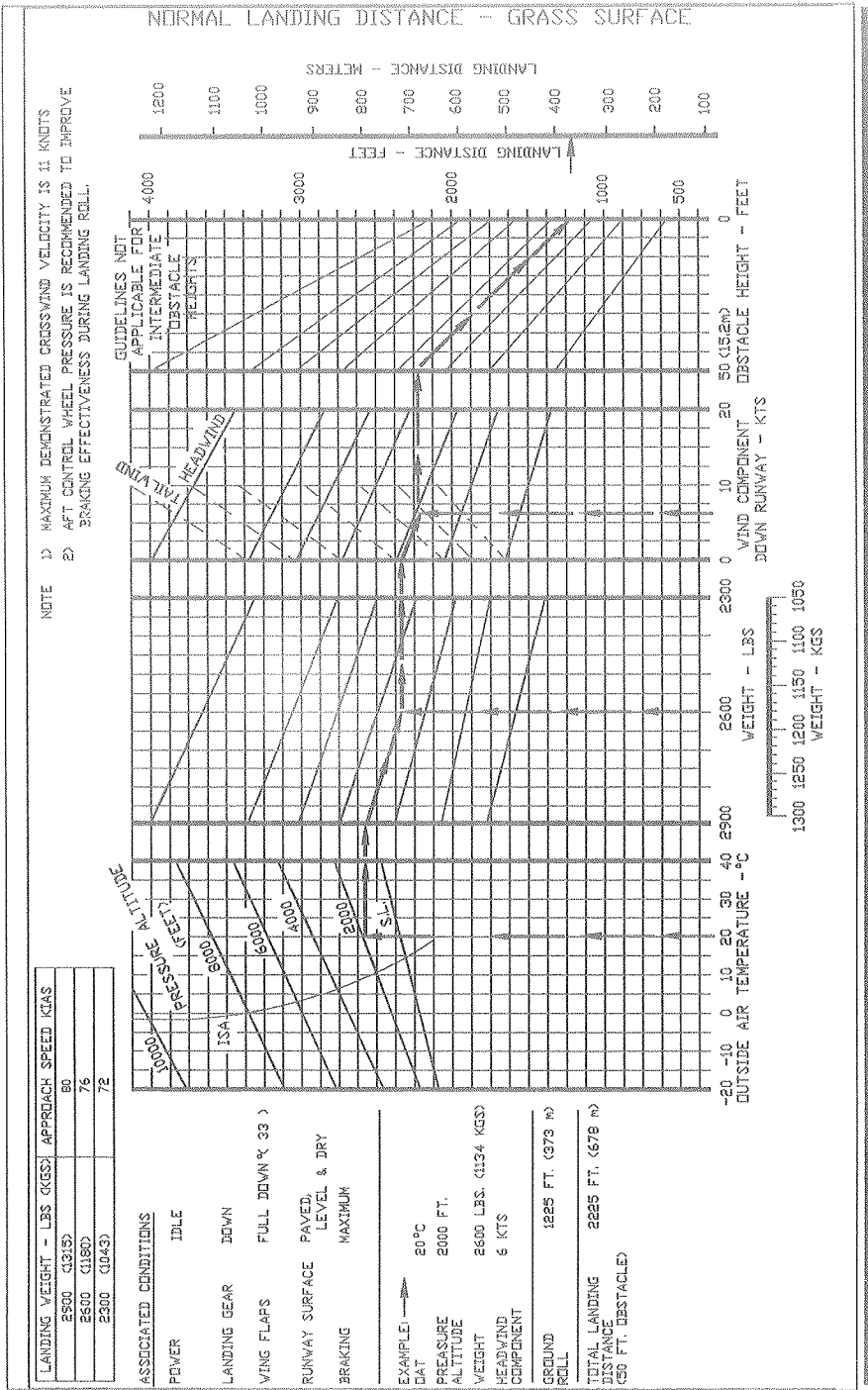
ENDURANCE 45% POWER

2900 LBS (1315.4 KGS)

Clean Configuration, 640 Gallons (2554 Liters) 55.4 Imp. Gall. Usable Fuel  
Zero Wind, Cowl Flaps Closed, Range Includes Warmup Taxi Takeoff,  
Max Power Climb, Descent, Plus 45 Minutes Reserve at Cruise Power







**FOR MAXIMUM PERFORMANCE LANDING  
DISTANCE - SEE SECTION IV**

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CENTER OF GRAVITY LIMITS	6-8
EQUIPMENT LIST	6-9

### 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 -- A T

AIRCRAFT SERIAL NO. \_\_\_\_\_

AIRCRAFT REGISTRATION NO. \_\_\_\_\_

\_\_\_\_\_  
Mooney Aircraft Corporation 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 6-5 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 6-5. 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 6-5, 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 flexible line to output fitting to reach fuel receptacle.
- c. Turn fuel selector valve to 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 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 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. Nosewheel jack point is propeller yoke. Use a yoke jack to lift aircraft. Refer to SECTION VIII, Jacking, for procedures.

M20J - WEIGHT AND BALANCE CHART

REF. POINT  
(NOSE GEAR TRUNNION STA. -5)  
(-12.7 cm)

REFERENCE DATUM (STA. 0)

LEVEL REF. (LEVELING SCREWS)

M20J

Wn

Wl

Lc/g

Lm/r

Lm/n

MEASUREMENTS	
L <sub>H/R</sub>	INCHES/CM/MM
L <sub>H/N</sub>	INCHES/CM/MM

SCALE POSITION AND SYMBOL	SCALE READING	TARE	NET WEIGHT
NOSE WHEEL (W <sub>N</sub> )			
RIGHT MAIN WHEEL (W <sub>R</sub> )			
LEFT MAIN WHEEL (W <sub>L</sub> )			
BASIC EMPTY WEIGHT (W <sub>T</sub> )			if fuel has been drained
AS WEIGHED (W <sub>T</sub> )			if fuel has not been drained

a. CG Forward of Main Wheels:

Weight of Nose  
(W<sub>N</sub>)

X

Distance Between Main and Nose Wheel Axle Centers  
(L<sub>HN</sub>)

÷

Total weight of Aircraft  
(W<sub>T</sub>)

=

CG Forward of Main Wheels  
(L<sub>H</sub>)

b. CG Aft of Datum (Station 0):

Distance from Center Nose Gear Trunion to Center of Main Wheel Axles (Horizontal)  
(L<sub>NR</sub>)

—

5 IN./12.7 cm/127 mm

Distance from Nose Gear Trunion to Datum  
(CONSTANT)

—

Result of Computation Above  
(L<sub>H</sub>)

=

CG (FUS. STA) Distance Aft of Datum (Empty Weight CG)  
(L<sub>CG</sub>)

IF fuel has not been drained, the usable fuel must be analytically subtracted to determine the Basic Empty Wt. and CG. Use loading calculation procedure shown on page 6-6.

WEIGHT	LBS. (Kg)	C.G. IN/cm/mm	MOMENT Lb-In (Kg-cm) (Kg-mm)/1000
As Weighed (W <sub>T</sub> )			
Usable fuel	—	48.42 in/123 cm/1230 mm	—
Basic Empty Wt.			





## 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

FAA REGISTRATION NO.

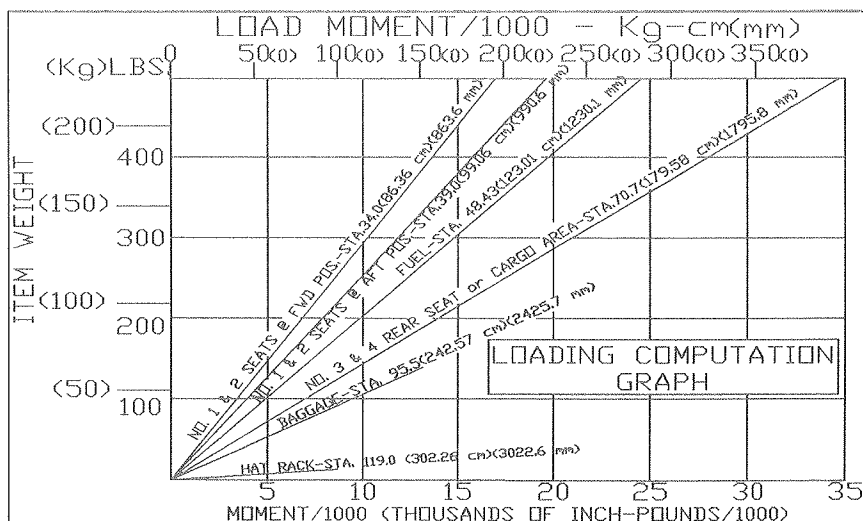
M20J SERIAL NO.

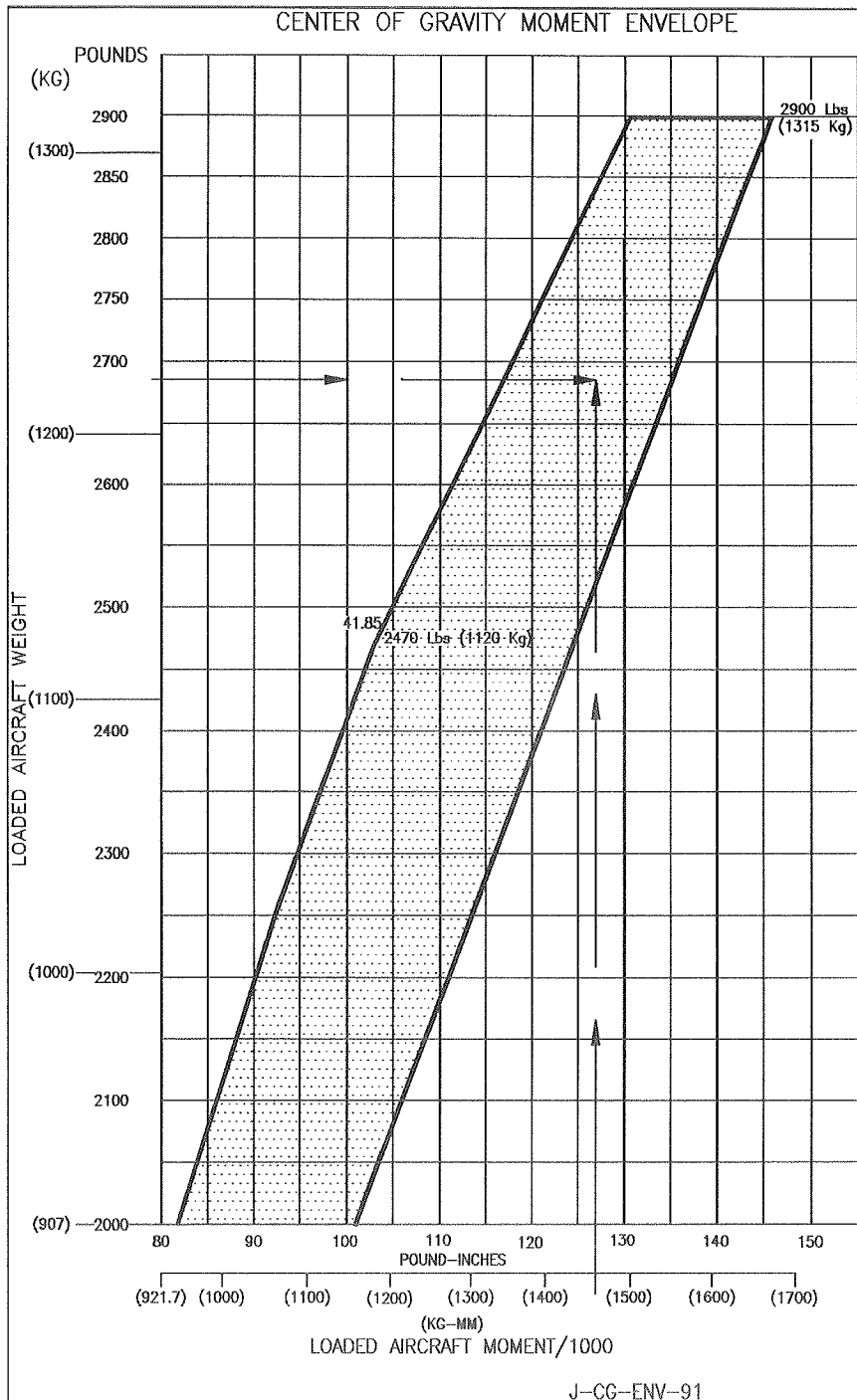
PROBLEM FORM					
STEP	ITEM	Sample Problem		Your Problem	
		WEIGHT Lbs. (Kg.)	MOMENT Lb.in/1000 (Kg.cm/1000)	WEIGHT Lbs. (Kg.)	MOMENT Lb.in/1000 (Kg.cm/1000)
1	A/C Basic Empty WL(W <sub>1</sub> ) (From page 6--5) (Includes Full Oil) 8 Qts.(7.6 L)@Sta.11.5 (29.2 cm)(Oil sump assumed FULL for all flights)	1750 (793.79)	77.02 (687.38)		
2	Pilot Seat (#1) *	170 (77.11)	6.0/2nd pos (69.15)		
	Co-Pilot Seat (#2) *	170 (77.11)	5.78/2nd (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 L), 384 Lbs.(174.2 Kg) @ Sta. 48.43 (123.0 cm)	312.0 (141.5)	15.11 (174.4)		
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 (1.36)	.38 (4.15)		
6	Loaded Aircraft Weight	2885 (1218)			
	Total Moment/1000		127 (1483.7)		
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

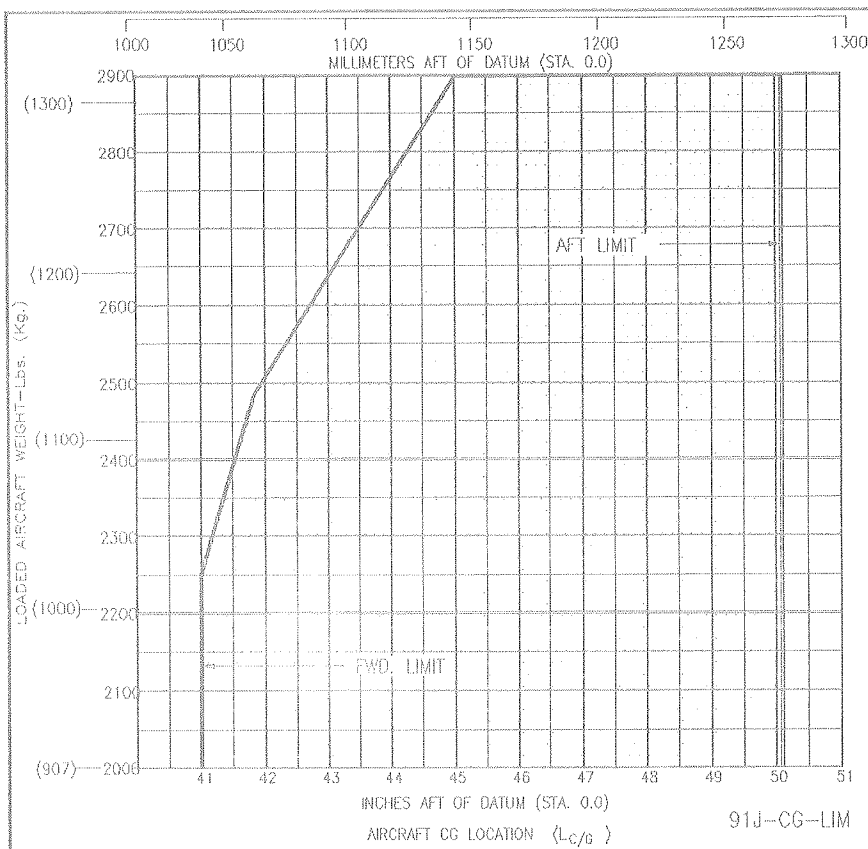
## CAUTION

Cargo loaded in rear seat area, with seat backs folded down, should have center of gravity over fuselage station 70.7.





## 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

MO.  
DAY  
YEAR

J-EQ-A1

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		
6A	Spinner Installation	680031	(2.18) 4.80	(-88.9) -35.00	X		
7A	Induction Air Filter	600355	(.45) 1.00	(-64.8) -25.50	X		
8A	Fuel Selector Valve	610152	(.41) 0.9	(66.7) 26.25	X		
9A	Propeller - Constant Speed (HARTZELL) HC-C2YK-1BF/F7666A-3Q	680031	(24.6) 54.25	(-90.2) -35.50			

SECTION VI  
WEIGHT AND BALANCE AT AFM 3210 SUPPLEMENT  
2900 # WEIGHTMOONEY  
M20J