SERVICE BULLETIN M20-248
DATE: 3 - 20 - 90

THIS SERVICE BULLETIN IS FAA APPROVED FOR ENGINEERING DESIGN.

SUBJECT: MOONEY TLS, M20M, INCREASED TAKEOFF WEIGHT RETROFIT

MODEL S/N AFFECTED: MOONEY MODEL M20M, S/N 27-0001 THRU 27-0052

TIME OF COMPLIANCE: AT OWNERS DISCRETION BUT **MANDATORY** IF AIRCRAFT IS TO BE FLOWN AT A TAKEOFF WEIGHT ABOVE 3200 POUNDS.

INTRODUCTION:
Some aircraft owners have expressed a desire to increase the useful load of the M20M aircraft. Mooney Aircraft Corporation is offering the retrofit procedures of this Service Bulletin to accomplish this. There are several areas that will be modified in order for the aircraft to be flown at the increased takeoff weight of 3368 pounds. It is recommended that the aircraft be brought back to Mooney Aircraft Corporation for the retrofit. Scheduling of the retrofit action will be co-ordinated by the Product Support Department, telephone (512) 896-6000.

INSTRUCTIONS:

1. Remove and replace the Main Landing retraction truss assembly, P/N 520024-501 (L/H) and -502 (R/H) per M20M Service and Maintenance Manual (S & M) No. 150, Section 32-10-00. The new truss will be identified by an “A-2" metal stamp on the fork (over center link) and a ink stamp ”A-2" after paint.

2. Check for proper operation and rigging of landing gear retraction system after replacement of retraction truss assembly per S & M No. 150, Section 32-30-00.

3. Remove the 8 ABS flap hinge fairings, (4 on each wing) by drilling out the rivets on fairing flanges and the side rivet on each outboard fairing. The two inboard fairings have screws attaching them to the fuselage belly fairing and one screw (inboard side) attaching ABS fairing to the inboard wing flap hinge arm aluminum fairing. All ABS flap hinge fairings will be modified prior to re-installation. (See Step 4 below)

4. Remove flap gap seals, P/N 210374-001 (1 pc) & -003 (2 pcs), from left wing and P/N 210374-002 (1 pc) & -004 (2 pcs), from right wing by: (1) Drill out the lower forward row of rivets holding forward edge of aluminum gap seal on, & (2) Lower flaps, drill out row of rivets holding aluminum channels, P/N 210375-1 (1 pc) and -003 (2 pcs) from each wing (Reference Figure SB M20-248-1). Remove the flap gap seals with the channels still attached.

5. The AVEX 1601-0401 rivets being drilled out will leave portions of the rivet inside the wing. THESE NEED TO BE REMOVED. Enlarge the existing No. 30 hole outboard of each aft rib (rib rivet line can be seen on wing skins) to a .250 hole (8 holes on each wing). Forcefully use hand or rubber mallet to hit wing skin area (DO NOT DAMAGE SKINS) and a magnet to move rivet residue toward .250 hole and remove all pieces, with magnet, through hole. This should be done between each rib bay.

6. After all drilled rivet residue is removed. Install A10-80 Rivnuts in each enlarged hole. (16 places)

7. Trim ABS flap hinge fairings, P/N 210398-005 (LH) & -006 (RH) (1 each side) inboard, P/N 210379-009 (LH) & -010 (RH) (2 each side) mid, and P/N 210379-011 & -012 (1 each side) outboard, per Figures SB M20-248-2A & 2B.

8. A new hole will be required in outboard “side wall” of each middle ABS fairing, now to be identified as P/N 210379-013 (LH)(2 ea) & -014 (RH)(2 ea) to match tooling hole in the two middle wing flap hinge arm aluminum fairings, P/N 210106, (L & R wing). Reference Figure SB M20-248-3 for basic instructions to drill holes.

9. **NOTE**: Outboard hole of middle & inboard fairings will require enlarging to .189 (No. 12 hole) so MS35207-263 screw can be used in the A10-80 rivnut to secure fairing flange. Re-install each modified fairing using appropriate existing rivet holes in wing skins that match remaining hole in flange of each ABS hinge fairing and new hole to match tooling hole in wing flap hinge arm fairings. Use AVEX 1601-0410 (or equivalent) blind rivets and MS35207-263 screws to attach ABS fairings.

10. Use AVEX 1601-0410 rivets (59 each row, minus ABS fairing attach holes and enlarged holes for rivnuts)) to fill remaining holes in wing skins drilled out during removal of gap seals and channels. Reference Figure SB M20-248-1.

11. Install MS35207-263 screws in all other enlarged holes to seal up wing skin area. (Total of (16) MS35207-263 screws are required for all enlarged holes.)

12. Repainting of the now exposed wing flap gap area will be required. Contact Mooney Service Parts Department for paint color P/N for aircraft Serial Number.

13. Remove existing airspeed indicator, P/N 820308-527, and replace with new airspeed indicator, P/N 820308-531, included in this kit; it incoporates new airspeed markings for the increased weight performance.

14. After airspeed indicator has been replaced and all lines secured, perform pitot/static check for leaks.

15. Remove the OPERATING LIMITATIONS placard from pilot's side panel and replace with new OPERATING LIMITATIONS placard, P/N 150080-980, included in kit.

16. Enter compliance note in A/C log book, insert AFM Supplement into POH/AFM and return aircraft to service.

WARRANTY: Mooney Aircraft Corporation will perform all retrofit action at the factory service facility. Aircraft owners will need to contact the Product Support Department, (830) 896-6000, ext. 1904, to make arrangements for scheduling aircraft.

REFERENCE DATA: N/A

PARTS LIST: KIT PART NUMBER SB M20-248-1

ITEM	P/N	DESCRIPTION	QTY.
1.	520024-501(A-2)	RETRACT TRUSS ASSY, LH	1
2.	520024-502 (A-2)	RETRACT TRUSS ASSY, RH	1
3.	820308-531	AIRSPEED INDICATOR	1
4.	150080-980	PLACARD	1
5.	1601-0410	RIVET, AVEX	240
6.	A10-80.	RIVNUT.	16
7.	MS35207-263	SCREWS	16
8.	N/A	AFM SUPPLEMENT SB M20-248	1

FIGURES/ TABLES: See Figures on next pages.

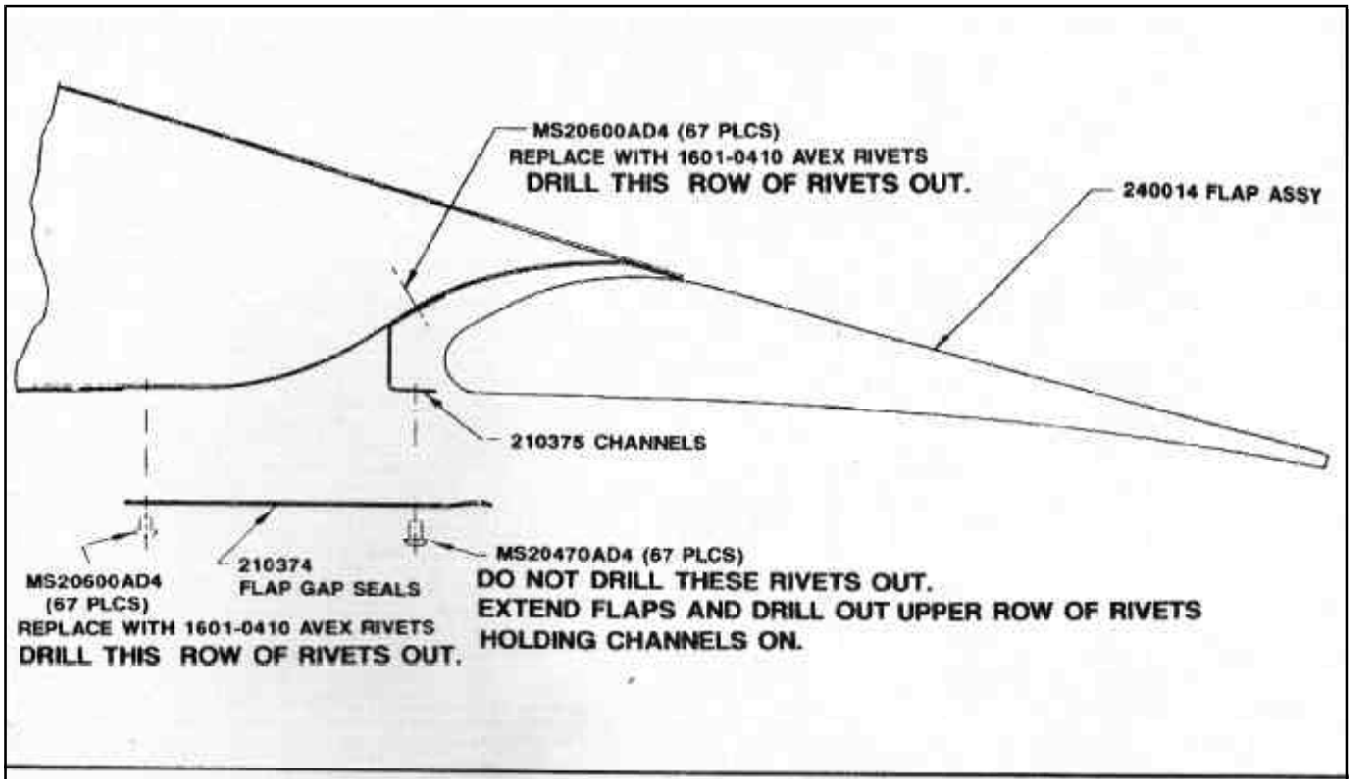

FIGURE SB M20-248-1

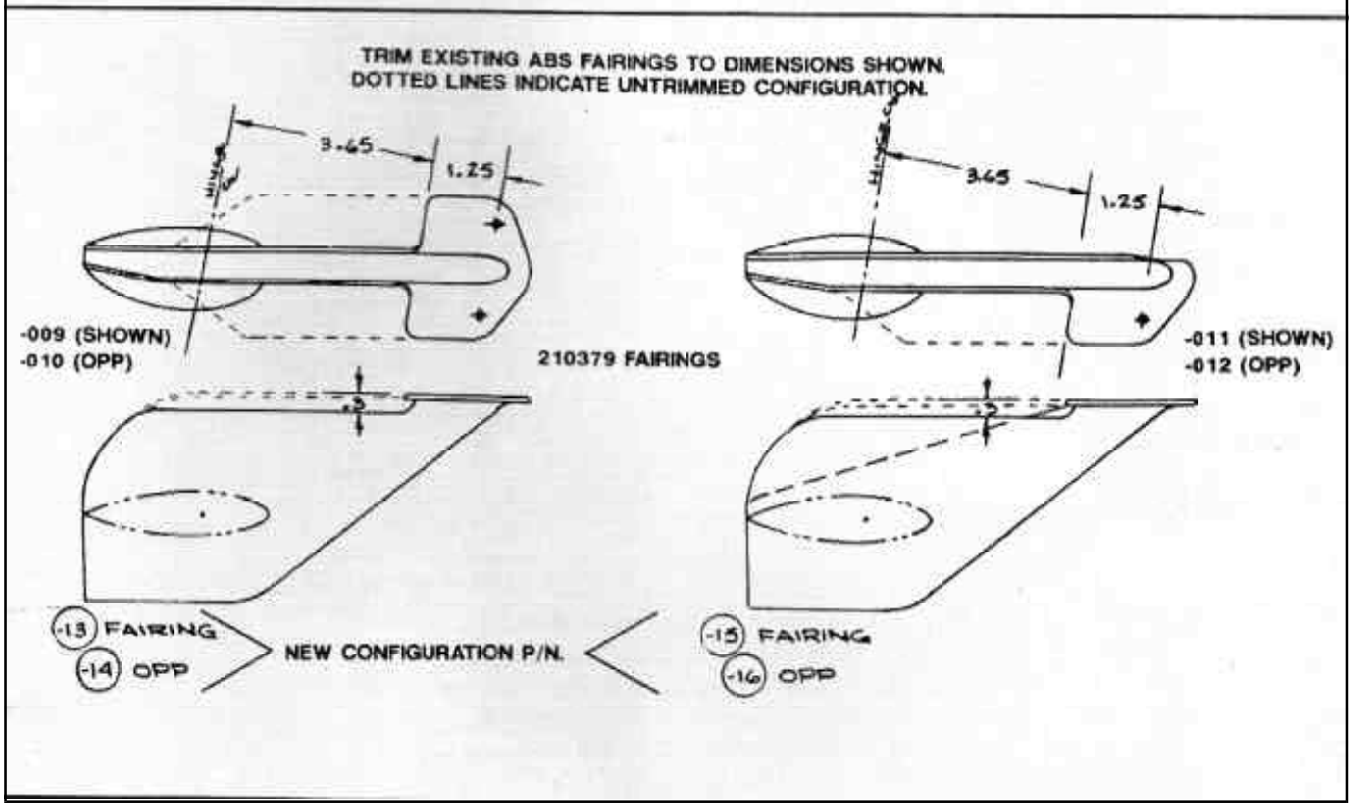

FIGURE SB M20-248-2A

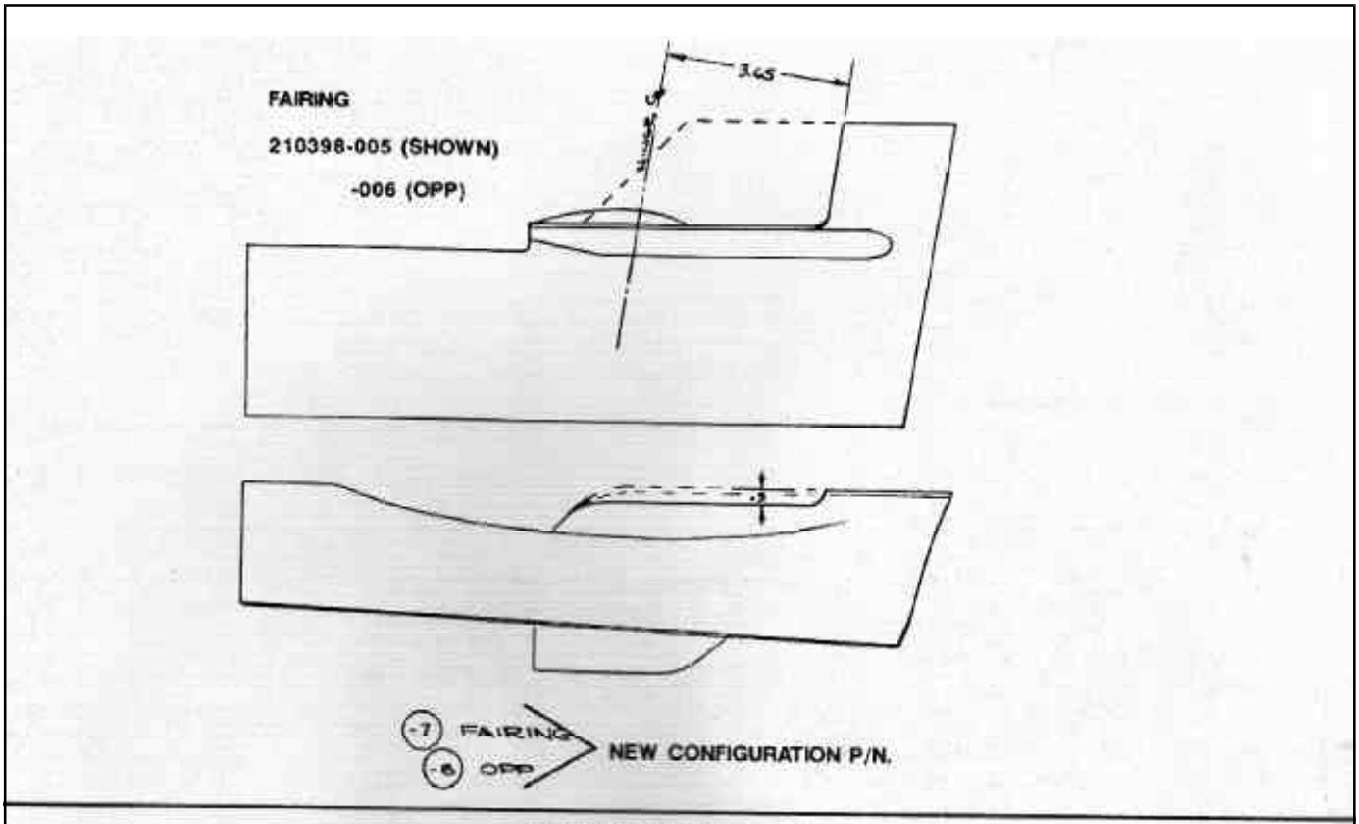

FIGURE SB M20-248-2B

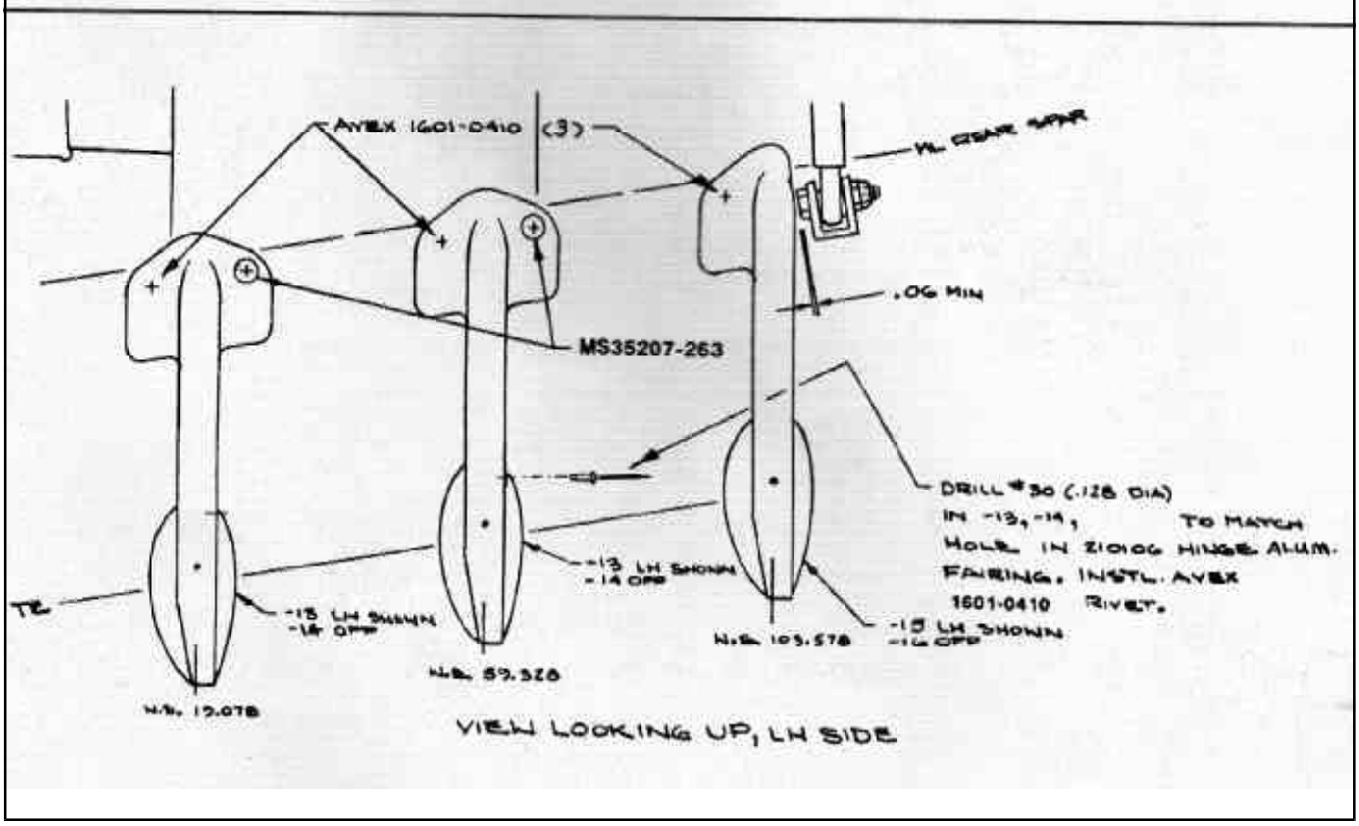

FIGURE SB M20-248-3

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

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

Mooney Aircraft Model

M20M

WITH

- INCREASED TAKEOFF WEIGHT MODIFICATIONS -
MOONEY SERVICE BULLETIN M20-248

REG. NO._____

SERIAL NO._____

This Supplement must be attached to the M20M FAA Approved Pilot's Operating Handbook and Airplane Flight Manual (POH/AFM), No. 3500, when the Increased Takeoff Wight modifications have been installed in accordance with Mooney Service Bulletin M20-248, dated 3-20-90 or subsequent revisions. 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 basic Airplane Flight Manual.

FAA APPROVED: Henry A. Armstrong

Henry A. Armstrong, Manager
Aircraft Certification Service
FEDERAL AVIATION ADMINISTRATION
Fort Worth, Texas.
76193-0150

MOONEY AIRCRAFT CORPORATION

P. O. BOX 72

Kerrville, Texas 78029-0072

LOG OF REVISIONS

Revisior Number	Revision Pages	Description of Revisions	FAA Approved	Date
A	Title Page, Log of Revisions, ii thru iv,	Added Revision A to pages.		
	1-5, 2-3, 2-4, 2-8, 5-13, 8-7	Revised Data		
	6-6, 6-7	Revised Graphs		

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

This supplement is to provide the operating procedures and performance data for the M20M aircraft, S/N 27-0001 thru 27-0052 when modified according to Mooney Service Bulletin M20-248 ,dated 3 - 20 - 90 or subsequent revisions.

The pages of AFM Supplement, SB M20-248, will supercede the basic pages of POH/AFM, No. 3500, Revision B or later revisions 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 SB M20-248 has been complied with:

Page Number 1-5

SECTION II - LIMITATIONS

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers 2-2, 2-3, 2-4, 2-8, 2-12

SECTION III - EMERGENCY PROCEDURES

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number 3-1, 3-5, 3-15, 3-16

SECTION IV - NORMAL PROCEDURES

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers 4-4, 4-14, 4-18, 4-19

SECTION V - PERFORMANCE

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers 5-13 thru 5-19, 5-21 thru 5-30

SECTION VI - WEIGHT AND BALANCE

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers 6-2, 6-6 thru 6-8

SECTION VII - AIRPLANE AND SYSTEMS DESCRIPTION:

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number No pages changed.

SECTION VII - HANDLING, SERVICE AND MAINTENANCE

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number 8-7

SECTION IX - SUPPLEMENTAL DATA

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Numbers All Supplemental Pages for SB M20-248 added to this Section.

SECTION X - SAFETY & OPERATIONAL TIPS

The following supplemental pages are to be used when SB M20-248 has been complied with:

Page Number No pages changed.

NOTE:
ALL PAGES LISTED UNDER SECTION HEADINGS ABOVE MUST BE INCLUDED IN THIS SUPPLEMENT AND INSERTED INTO THE POH/AFM OF ANY AIRCRAFT WHICH HAS MOONEY SERVICE BULLETIN M20-248, DATED 3 - 20 - 90 OR SUBSEQUENT REVISIONS COMPLIED WITH.

M CERTIFICATED WEIGHTS

Gross Weight	3368 Lbs. (1528 Kg)
Maximum Landing Weight	3200 Lbs. (1452 Kg)
Baggage Area	120 Lbs. (54.4 Kg)
Rear Storage Area	10 Lbs. (4.5 Kg)
Cargo (Rear Seats Folded down)	340 Lbs. (154.2 Kg)

STANDARD AIRPLANE WEIGHTS

Basic Empty Wight	See Definition, Page 1-8
Useful Load	Varies with installed equipment. See SECTION VI for specific airplane weight (pg. 6-6).

CABIN AND ENTRY DIMENSIONS

Cabin Wdth (Maximum)	43.5 In. (110.5 cm)
Cabin Length (Maximum)	126 In. (315 cm)
Cabin Height (Maximum)	44.5 In. (113 cm)
Entry Wdth (Minimum)	29.0 In. (73.4 cm)
Entry Height (Minimum)	35.0 In. (88.9 cm)

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Wdth	24 In. (60.9 cm)
Compartment Length	43 In. (109.2 cm)
Compartment Height	35 In. (88.9 cm)
Compartment Volume	20.9 Cu. Ft. (.592 cubic meters)
Cargo Area (with rear seat folded down)	38.6 Cu. Ft. (1.09 cubic meters)
Entry Height (Minimum)	20.5 In. (52.1 cm)
Entry Wdth	17.0 In. (43.2 cm)
Ground to Bottom of Sill	46.0 In. (116.8 cm)

SPECIFIC LOADINGS

Wing Loading - @ Maximum Gross Wight	18.3 Lbs./Sq. Ft. (89.5 Kg/sq. m)
Power Loading - @ Maximum Gross Wight	11.85 Lbs./HP (5.38 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.
Va	MANEUVERING SPEED - The maximum speed at which application of full available aerodynamic control will not overstress the airplane.
Vfe	MAXIMUM FLAP EXTENDED SPEED - The highest speed permissible with wing flaps in a prescribed extended position.
Vle	MAXIMUM LANDING GEAR EXTENDED SPEED -The maximum speed at which an aircraft can be safely flown with the landing gear extended.
Vlo	MAXIMUM LANDING GEAR OPERATING SPEED -The maximum speed at which the landing gear can be safely extended or retracted.
Vne	NEVER EXCEED SPEED or MACH NUMBER - The speed limit that may not be exceeded at any time.
Vno	MAXIMUM STRUCTURAL CRUISING SPEED - The speed that should not be exceeded except in smooth air and then only with caution.
vs	STALLING SPEED - The minimum steadyflight speed at which the airplane is controllable.
vso	STALLING SPEED - The minimum steady flight speed at which the airplane is controllable in the landing configuration.
vx	BEST ANGLE-OF-CLIMB SPEED - The airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

TABLE OF CONTENTS

INTRODUCTION

Section II includes the 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 M20M.

NOISE LIMITS

The certificated noise level for the Mooney M20M at 3368 lbs. (1528 Kg.) maximum weight is 74.03 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.

AIRSPEED LIMITATIONS

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

V / SPEED		KCAS/KIAS	REMARKS
V_{NE}	Never Exceed Speed	1951195	Do not exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	1741174	Do not exceed this speed except in smooth air, and then only with caution.
V_A	Maneuvering Speed at:		
	Ibs. /Kg.		
	260011179	1111111	Do not make full or abrupt control movement above this speed.
	290011315	1171117	
	320011452	1231123	
	336811528	126/127	
V_{FE}	Maximum Flap Extended Speed	1091110	Do not exceed this speed with flaps in full down position.
V_{LE}	Maximum Landing Gear Extended Speed	165/165	Maximum speed at which the aircraft can be safely flown with the landing gear extended.
V_{LO} (EXT)	Max. Speed for Gear Extension	1391140	Max. speed at which the landing gear can be safely extended.
V_{LO} (RET)	Max. Speed for Gear Retraction	1041106	Maximum speed at which the landing gear can be safely retracted.
	Maximum Pilot Window Open Speed	133/132 * *Some A/C may show lower speeds	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 (Flap Operating Range)	59-110 KIAS	Lower limit is maximum weight V_{so} in landing configuration. Upper limit is maximum speed permissable with flaps extended.
Green Arc (Normal Operating Range)	66-174 KIAS	Lower limit is maximum weight V_s with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc (Caution Range)	174-195 KIAS	Operations must be conducted with caution and only in smooth air.
Radial Red Line	195 KIAS	Maximum speed for all operations.

FIGURE 2-2 AIRSPEED INDICATOR MARKINGS

FUEL LIMITATIONS

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

Takeoff maneuvers when the selected fuel tank contains less than 12 gallons (45.4 liters) of fuel have not been demonstrated.

| NOTE |

Each fuel quantity gauge is calibrated to read zero (RED LINE) only in coordinated level flight when the quantity of fuel can no longer be safely used.

| NOTE |

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

Standard Tanks (2)	47.5 U.S. Gal. each (179.8 liters)
Total Fuel	95 U.S. Gal. (359.6 liters)
Usable Fuel:	89 U.S. Gal. (336.8 liters)
Unusable Fuel:	6 U.S. Gal. (22.7 liters)

Fuel Grade (and color):
100LL (low lead) (blue) or 100 (green) is 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 Wight - Takeoff	3368 lb. (1528 Kg.)
Maximum Wight - Landing	3200 lb. (1452 Kg)
Maximum Wight in Baggage Compartment	120 lb. (54.4 Kg.) @ Fus. Sta. 101.5(257.8 cm)
Maximum Wight in Rear Storage Area	10 lb. (4.54 Kg.) @ Fus. Sta. 131.0(332.7 cm)
Maximum Wight in Cargo Area (Rear seats folded down)	340 lbs. (154.2 KG) @ Fus. Sta. 70.7(179.5 cm)

CENTER OF GRAVITY LIMITS (GEAR DOWN)

Most Forward	Fus. Sta. 41.0 IN. (104.1 cm) @ 2430 LB. (1102 Kg) 16.79% MAC
Intermediate Forward	Fus. Sta. 44 IN.(111.7 cm) @ 3300 lb. (1497 Kg) 21.7% MAC
Forward Gross	Fus. Sta. 46.0 IN. (116.8 cm) @ 3368 lb (1528 Kg) 24.98% MAC
Aft Gross	Fus. Sta. 51.0 IN(129.5 cm) @ 3368 lb. (1528 Kg) 33.18% MAC
MAC (at Wing Sta. 94.85)(241 cm)	61.00 In.(154.9 cm)

Datum (station zero) is 13 inches (32.5 cm) aft of the center line of the nose gear trunion attach/pivot bolts.

MANEUVER LIMITS

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

NOTE

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

FLIGHT LOAD FACTOR LIMITS

Maximum Positive Load Factor	
Flaps Up	+ 3.8 g.
Flaps Down (33 Degrees)	+ 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

KINDS OF OPERATION EQUIPMENT LIST (con't.)

SYSTEM or COMPONENT (con't.)

	VFR DAY *	VFR NIGHT	IFR DAY	IFR NIGHT
GYRO-HORIZON			1	1
DIRECTIONAL GYRO			1	1
TURN COORDINATOR or TURN & BANK INDICATOR			1	1
LANDING LIGHT ****		1		1
INSTRUMENTS LIGHTS (INTERNAL or GLARESHIELD)		1		1
CLOCK (WITH SWEEP SECOND HAND or DIGITAL)			1	1
COMMUNICATION SYSTEM			1	1
NAVIGATION SYSTEM (APPROPRIATE TO FACILITIES BEING USED)			1	1
BATTERY	1	1	1	1
VACUUM SYSTEM/INDICATOR			1	1
FUEL BOOST PUMP	1	1	1	1
PILOT'S OPERATING HANDBOOK & AIRPLANE FLIGHT MANUAL	1	1	1	1
PITOT, Heated ****			1	1
OAT GAUGE ****			1	1
VSI ****			1	1
ALTERNATE STATIC SOURCE ****			1	1
STAND-BY VACUUM SYSTEM ****			1	1

* Equipment must be installed and operable for all operations.
**** When required by the apropriate regulations.

DECALS AND PLACARDS

CABIN INTERIOR

The following placards are relevent to proper operation of the airplane and must be installed inside the cabin at the locations specified.

OPERATING LIMITATIONS

M E MARKINGS AND PLACARDS INSTALLED IN THIS AIRPLANE CONTAIN OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THE NORMAL CATEGORY. THIS AIRPLANE IS CERTIFIED FOR DAY AND NIGHT VFR/IFR OPERATION WHEN THE REQUIRED EQUIPMENT IS INSTALLED AND OPERATIONAL. RIGHT INTO KNOWN ICING CONDITIONS IS PROHIBITED. NO AEROBATIC MANEUVERS, INCLUDINC SPINS ARE APPROVED. OTHER OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN M I S CATEGORY ARE CONTAINED IN THE AIRPLANE FLIGHT MANUAL. MANEUVERING SPEED (3368 LBS.),127 KIAS; (2600 LBS.),111 KIAS.

EMERGENCY MANUAL GEAR EXTENSION

1. PULL LANDING GEAR CIRCUIT BREAKER.
2. PUT GEAR SWITCH IN GEAR WWN POSITION.
3. PUSH RELEASE TAB FORWARD AND LIFT UP RED HANDLE.
4. PULL T-HANDLE STRAIGHT UP (12 TO m INCHES).
5. ALLOW T-HANDLE TO RETURN TO ORIGINAL POSITION
6. REPEAT UNTIL GEAR DOWN LIGHT COMES ON (12 TO 20 PULLS). F TOTAL ELECTRICAL FAILURE-SEE MECHANICAL INDICATOR.

CAUTION

1. TURN OFF STROBE LITES WHEN TAXIING NEAR OTHER ACFT OR W E N FLYING IN FOG OR IN CLOUDS. STD POSITION LITES MUST BE USED FOR ALL NIGHT OPERATIONS.
2. N CASE Of FIRE TURN OFF CABIN HEAT.
3. DO NOT SCREW VERNIER CONTROLS CLOSER THAN 1/8" FROM NUT FACE

-980

ON LEFT SIDE PANEL BELOW PILOT'S SIDE WINDOW

CHECK LIST

TAKEOFF

CONTROLS	RUN-UP	DOOR
FUEL	PROP	WINDOW
INSTRUMENTS	WING FLAPS	ALT AIR
TRIM	SEAT LATCH	PARK BRAKE
COWLFLAPS	BELTIHARNESS	MIXTURE

CONDUCT RUDDER/ELEV TRIM CHECK PRIOR TO FLIGHT, SEE PILOT'S OPERATING HANDBOOK.

LDG

BELTIHARNESS	GEAR	MIXTURE
FUEL	WING FLAPS	PROP
BOOST PUMP		PARK BRAKE

ON CONSOLE COMPART -MENT COVER

BATTERIES MUST BE INSTALLED FOR FLIGHT.

ON BATTERY ACCESS PANELS L/H & R/H

UPPER L/H INSTR. PANEL

START STOP | CLEAR | MODE

-839

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AIRSPEEDS FOR EMERGENCY OPERATIONS

Engine Failure after Takeoff	
Wing Flaps UP	85 KIAS
Wing Flaps DOWN	80 KIAS
Best Glide Speed	
3368 lb/1528 kg	93.5 KIAS
3200 lb/1452 kg	89.0 KIAS
2900 lb/1315 kg	84.5 KIAS
2600 lb/1179 kg	80.0 KIAS
Maneuvering Speed	
3368 lb/1528 kg	127 KIAS
3200 lb/1452 kg	123 KIAS
2900 lb/ 1315 kg	117 KIAS
2600 lb/1179 kg	111 KIAS
Precautionary Landing with Engine Power-Flaps DOWN	75 KIAS
Precautionary Landing above 3200 Lbs	80 KIAS
Emergency Descent (Gear UP)	
Smooth Air	195 KIAS
Turbulent Air	
3368 lb/1528 kg	127 KIAS
3200 lb/1452 kg	123 KIAS
2900 lb/1315 kg	117 KIAS
2600 lb/1179 kg	111 KIAS
Emergency Descent (Gear DOWN)	
Smooth Air	165 KIAS
Turbulent Air	
3368 lb/1528 kg	127 KIAS
3200 lb/1452 kg	123 KIAS
2900 lb/1315 kg	117 KIAS
2600 lb/1179 kg	111 KIAS

ANNUNCIATOR PANEL WARNING LIGHTS

WARNING LIGHT	FAULT & REMEDY
GEAR UNSAFE	RED light indicates landing gear is not in fully extended/or retracted position. Refer to "Failure of landing gear to extend electrically" procedure on page 3-17 or "Failure of Landing Gear to Retract" procedure on page 3-18.
LEFT or RIGHT FUEL	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.
FUEL PRESSURE	RED light indicates fuel pressure has dropped below 24 PSI. Refer to "LOW FUEL PRESSURE" procedures on Page 3-12
PROP DE-ICE	BLUE light indicates power applied to De-Ice boots
PITOT HEAT	BLUE light indicates power is applied to heater. (On French A/C ONLY-RED light indicates power is NOT applied to heater.)
STD BY VAC	AMBER light indicates stand by vacuum pump is clutched to the engine & providing vacuum to system.
LOW VOLTS	RED light indicates voltage has dropped below 26.0 volts. Refer to "Alternator Low Voltage" procedure on page 3-16.
HI/LO VAC	RED flashing light indicates suction is below 4.25 inches of mercury. RED steady light indicates suction is above 5.2 inches of mercury.

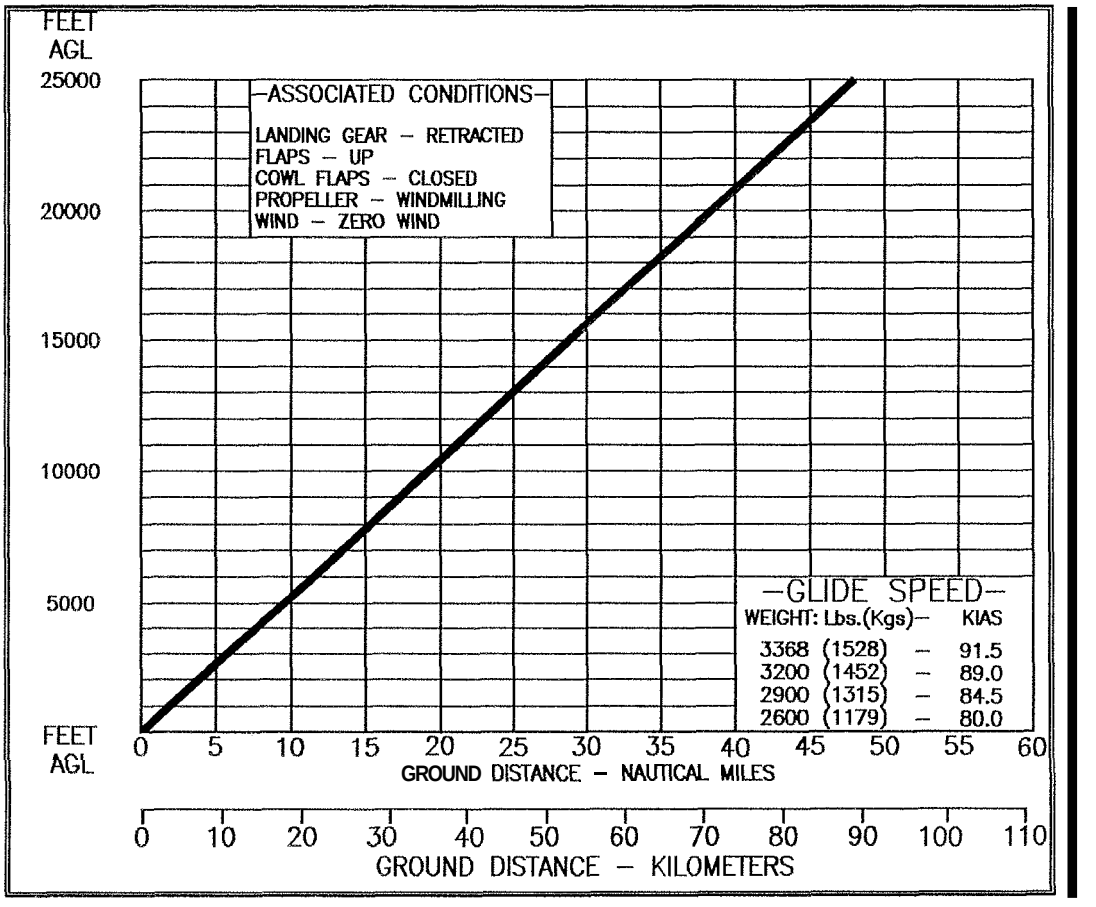
NOTE

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.

GLIDE

Note

Greater glide distances can be attained by moving the propeller control FULL AFT (LOW RPM).



MAXIMUM GLIDE DISTANCE
MODEL M20M

FORCED LANDING EMERGENCY

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 Switch	OFF
Flaps	Full DOWN
Gear	DOWN-If conditions permit
Approach Speed	80 KIAS
Master Switch	OFF, prior to landing

OVERWEIGHT LANDING PROCEDURES

In the event it is necessary to land with a weight exceeding 3200 Lbs. (max. landing weight) the following procedure is recommended in addition to normal Approach for Landing procedures:

Approach Airspeed . . . . . 80 KIAS

Use flatter approach angle than normal with power as necessary until a smooth touchdown is assured.

Expect landing distance over a 50 feet obstacle (Ref Section V) to increase at least 600 feet.

Conduct Gear & Tire Servicing inspection per Section VIII.

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 2575 RPM

FUEL

LOW FUEL FLOW

Check mixture . ENRICH
Fuel Selector .Switch TANKS

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

ELECTRICAL

ALTERNATOR OVERVOLTAGE

(Voltage warning light illuminated steady and Alternator Field circuit breaker popped on affected alternator.)

Alternator Field Circuit Breaker . RESET

If circuit breaker will not reset, the following procedures are required:

1. Monitor buss voltage and the output load of the remaining alternator.
2. Reduce electrical load, if needed, to maintain a buss voltage of 28 VDC and to operate within the load capacity of the remaining alternator.
3. Continue flight on the remaining alternator and land, when practical, to correct the malfunction.

ALTERNATOR OUTPUT LOW

(Output low or zero on one alternator)

Affected Alternator Field Switch . . OFF then ON

If output does not increase to near the same as the other alternator:

Affected Alternator Field Switch . . OFF
Electrical Load . MONITOR

1. Monitor buss voltage and the output load of the remaining alternator.
2. Reduce electrical load, if needed, to maintain a buss voltage of 28 VDC and to operate within the load capacity of the remaining alternator.
3. Continue flight on the remaining alternator and land, when practical, to correct the malfunction.

INTRODUCTION

This section describes the recommended procedures for the conduct of normal operations for the airplane. All of the required (FAA regulations) procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

These procedures are provided to present a source of reference and review and to supply information on procedures which are the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section IX (Supplemental Data).

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 3368 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section V for takeoff distance and climb performance, the speed appropriate to the particular weight must be used.

TAKEOFF:

Normal Climb Out	80-90 KIAS
Short Field Takeoff, Speed At 50 Ft.	75 KIAS

ENROUTE CLIMB, GEAR and FLAPS UP:

Best Rate of Climb	105 KIAS
Best Angle of Climb	85 KIAS

LANDING APPROACH (3200 lbs.):

Normal Approach, Flaps 10 degrees	80 KIAS
Normal Approach, Flaps 33 degrees	75 KIAS
Short Field Approach, Flaps 33 degrees	70 KIAS

BALKED LANDING (3200 lbs.):

Maximum Power, Flaps 10 degrees	85 KIAS

MAXIMUM RECOMMENDED TURBULENT AIR PENETRATION SPEED:

3368 lbs./1528 Kgs	127 KIAS
3200 lbs./1452 Kgs	123 KIAS
2900 lbs./1315 Kgs	117 KIAS
2600 lbs./1179 Kgs	111 KIAS
2400 lbs./1089 Kgs	106 KIAS

MAXIMUM DEMONSTRATED CROSSWIND VELOCITY

Takeoff or Landing	13 Knots (This is NOT a Limitation)

(See CROSSWIND COMPONENT CHART, Section V)

Wing Flaps	. CHECK operation. SET AT TAKEOFF position (10 Degrees)
Flight Controls .	. CHECK free and correct movement
Avionics and Auto Pilot .	. CHECK - (Refer to Section IX)
Seats, Seat Belts and Shoulder Harness	. SECURED
Cabin Door	. CHECK SECURED
Pilots Window	.CLOSED
Internal/External Lights	. AS DESIRED
Parking Brake	. RELEASE
Strobe Lights	. ON

TAKEOFF PROCEDURES

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

Proper engine operation should be checked early in the takeoff roll. Any significant 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 propeller area instead of being pulled into it.

TAKEOFF

If the turbocharger and its controlling system are properly rigged, manifold pressure will increase to 35 to 38 in. Hg. when the throttle is full open. However, engine operation with oil temperature below 100° F will result in an overboost (manifold pressure above 38 in. Hg.). If an overboost occurs, retard throttle to lower manifold pressure below 38 in. Hg. and continue flight. As the oil warms above 100° F, throttle can be moved to full throttle position and controller will maintain proper manifold pressure for maximum continuous power.

Full throttle operation during hot weather conditions may result in manifold pressure over 38 in. Hg. If this occurs retard the throttle below 38 in. Hg. and continue flight.

Power .	.FULL THROTTLE (2575 RPM)
Annunciator	. CHECK (BLUE Boost Pump Light - ON)
Engine Instruments	. CHECK for proper indications
Lift Off/Climb Speed .	. . As specified in Section V . (Takeoff Distance)
Landing gear .	.RETRACT IN CLIMB after clearing obstacles.
Wing flaps	. .UP
Fuel Pressure	. 24 PSI (minimum)

NOTE

If maximum performance takeoffs are desired obtain full power before brake release and lift off at **65** KIAS and climb at **75** KIAS.

CLIMB PROCEDURES

NOTE

If applicable,use noise abatement procedures as required.

CLIMB (CRUISE CLIMB)

Power	34 In. Hg./2400 RPM)
Mixture	RICH
Cowl Flaps	FULL OPEN or AS REQUIRED
Rudder Trim	As Desired
Airspeed	120 KIAS

NOTE

See Section V, for rate of climb graph.

CLIMB (BEST RATE)

Power	FULL THROTTLE 12575 RPM
Mixture	RICH
Cowl Flaps	FULL OPEN
Rudder Trim	As Desired
Airspeed	105 KIAS

CLIMB (BEST ANGLE)

Power	FULL THROTTLE12575 RPM
Mixture	RICH
Cowl flaps	FULL OPEN
Rudder Trim	As Desired
Airspeed	85 KIAS

CRUISE PROCEDURES

Airspeed	ACCELERATE to cruise airspeed
Throttle	SELECTED SETTING

(Ref. CRUISE PERFORMANCE CHARTS in Section V)

As the throttle is reduced, the BOOST PUMP annunciator light will extinguish.' Verify fuel pressure remains in GREEN arc.

NOTE

Prolonged climbs to high cruise altitudes during hot weather operations may result in some fuel pressure fluctuations(accompanied with possible fuel pressure annunciation)when the throttle is reduced. If fluctuations occur, turn Boost Pump Switch ON until cooling has alleviated fluctuations.

DESCENT PROCEDURES

| NOTE |

Avoid extended descents at manifold pressure setting below 15 **In.Hg.** as the engine can cool excessively and may not accelerate satisfactorily when power is reapplied. Additionally, leaning the mixture to peak TIT during descent will save fuel and will eliminate any engine roughness associated with an overly rich mixture setting. During descent engine MP will tend to increase as the aircraft loses altitude. Occasional power reductions with the throttle may be required to maintain the original descent manifold pressure setting.

NORMAL - GEAR UP

Seats, Seat Belts, Shoulder Harness	ADJUST AND SECURE
Wing Flaps	UP
Landing Gear	UP
Throttle	ABOVE 15 in.'Hg. (keep CHT in Green)
Propeller	2400 RPM
Mixture	Peak TIT
Cowl Flaps	CLOSED
CHT	MONITOR (250° F minimum)
Airspeed	AS DESIRED(195 KIAS max.)
Rudder Trim	AS DESIRED

| NOTE |

Plan descents to arrive at pattern altitude on downwind leg for maximum fuel effeciency and **minumum** aircraft noise.

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

DO NOT fly in the YELLOW ARC speed range unless the air is smooth.

NORMAL - GEAR DOWN

Seats, Seat Belts, Shoulder Harness	ADJUST AND SECURE
Airspeed	DECELERATE to 140 KIAS
Landing Gear	DOWN
Throttle	ABOVE '15 In. Hg. (Keep CHT in Green Arc)
Propeller	2400 RPM
Mixture	Peak TIT
Cowl Flaps	Closed
Cylinder Head Temperature	Monitor (250 ° F min)
Airspeed	165 KIAS or LESS.

NOTE

Using the landing gear as a descent aid will result in a steeper descent rate (greater altitude loss per horizontal distance traveled).

APPROACH FOR LANDING

CAUTION

The airplane must be within the allowable weight and balance envelope for landing (REF. Section VI). It will require a minimum of one hour of flight before a permissable landing weight is attained when takeoffs are made at maximum gross weight. If a landing at a weight exceeding maximum landing weight (3200 Lbs)(1452 Kgs.) is required, see OVERWEIGHT LANDING PROCEDURE, Section III.

Sears, Seat Belts, Shouider Harness	ADJUST AND SECURE
Internal/External lights	AS DESIRED
Landing gear	DOWN below 140 KIAS (Check Gear Down light ON-Check visual indicator)
Boost Pump	ON
Fuel Selector	FULLEST TANK
Wing flaps	AS DESIRED (FULL down below 110 KIAS)
ElevatorTrim	AS DESIRED
Rudder Trim	AS DESIRED

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

Parking Brake	VERIFY OFF

GO AROUND (BALKED LANDING)

Power	FULL FORWARD12575 RPM)
Mixture	Verify FULL RICH
Boost Pump	Verify ON(BLUE light on Annunciator) (Full Throttle automatically turns Boost Pump ON)
Wing Flaps	TAKEOFF POSITION (10°) (After POSITIVE climb established)
Trim	NOSE DOWN to reduce forces

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.

Airspeed	85 KIAS
Landing Gear	RETRACT
Wing Flaps	RETRACT
Airspeed	.105 KIAS

LANDING

Approach for Landing Checklist	COMPLETED
Wing Flaps	FULL DOWN
Landing Gear	DOWN and LOCKED
Approach Airspeed	As specified In Section V (Landing Distance)
Touchdown	MAIN WHEELS FIRST
Landing Roll	LOWER nose wheel gently
Brakes	MINIMUM required

| 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 the above procedures except, reduce the approach airspeed to 70 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 appropriate for the wind conditions. Allow aircraft to crab until the landing flare. Accomplish the touchdown in a slight wing low sideslip (low wing into the wind) and the aircraft aligned with the runway. During the landing roll, position the flight controls to counteract the crosswind.

~ CAUTION ~

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

TAXI AFTER LANDING

Throttle	AS REQUIRED
Boost Pump	OFF
Cowl Flaps	OPEN
Wing Flaps	RETRACT
Elevator Trim	TAKEOFF SETTING
Avionics/Radios	AS REQUIRED
Interior/Exterior Lights	AS DESIRED

SHUTDOWN

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

Operate the engine at idle (below 1000 RPM) for 5 minutes to allow the TURBOCHARGER to COOL. Taxi time after landing may be considered as part of the **5** minutes.

Parking brake	SET
Throttle	700 - 750 RPM
Radio Master Switch	OFF
Interior/Exterior Lights	OFF
Pitot Heat	OFF
Mixture	IDLE CUT-OFF
Alternator Field Switches (L/R)	OFF
Master Switch	OFF
Magneto/Starter Switch	OFF

SECURING THE AIRCRAFT

Magneto/Starter Switch	VERIFY **OFF**/ Key removed
Master Switch	VERIFY OFF
Radio Master Switch	Verify OFF
Rocker Switches	Verify OFF
Interior Light Switches	VERIFY OFF
Parking Brake	RELEASE - INSTALL WHEEL CHOCKS
Extended parking	CONTROL WHEEL SECURED with seat belts, cabin vents closed;
Cabin Windows and Doors	CLOSED AND LOCKED

TIE DOWN AIRCRAFT at wing and tail points.

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	3000 LBS (1361 KGS)
LANDING GEAR	DOWN
FLAPS	10°
ANGLE OF BANK	45°
STALL SPEED	72.5 KCAS (73.0 KIAS)

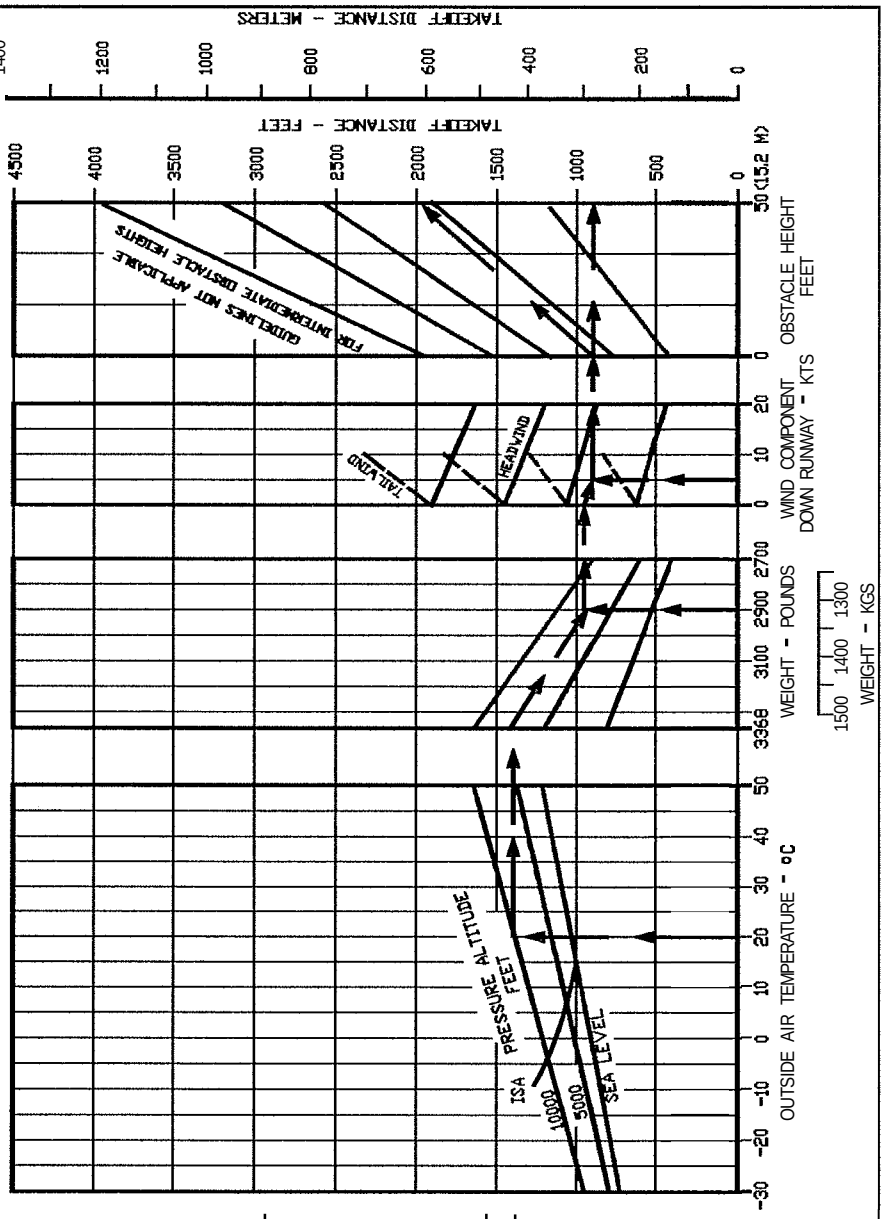
GROSS WEIGHT	GEAR AND FLAP POSITION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS
3368 LBS (1528 KGS)	GEAR UP, FLAPS 0°	66.0	66.0	71.0	71.5	78.5	79.0	93.5	94.0
	GEAR DOWN, FLAPS 10°	64.5	64.5	69.5	69.5	76.5	77.5	91.0	92.0
	GEAR DOWN FLAPS 33°	60.0	59.0	63.5	63.5	70.0	70.0	83.5	84.5
3000 LBS (1361 KGS)	GEAR UP, FLAPS 0°	62.5	63.0	67.0	67.5	74.5	75.0	88.5	89.5
	GEAR DOWN, FLAPS 10°	61.0	61.0	65.5	65.5	72.5	73.0	86.5	87.5
	GEAR DOWN FLAPS 33°	55.5	55.5	59.5	59.5	66.0	66.0	78.5	79.5
2700 LBS (1225 KGS)	GEAR UP, FLAPS 0°	59.0	59.5	63.5	64.0	70.0	70.5	83.5	84.0
	GEAR DOWN, FLAPS 10°	58.0	58.0	62.5	62.5	69.0	69.0	82.0	83.0
	GEAR DOWN FLAPS 33°	53.0	53.0	57.0	57.0	63.0	63.0	75.0	76.0

TAKEOFF DISTANCE - HARD SURFACE

TAKEOFF DISTANCE

1) MAXIMUM DEMONSTRATED CROSSWIND IS 13 KNOTS.
2) CONDITIONS OF HIGH HUMIDITY CAN RESULT IN AN INCREASE OF UP TO 10% TO THE TAKEOFF DISTANCE.

TAKEOFF WEIGHT - LBS (KGS)	TAKEOFF SPEED KIAS	SPEED AT 50 FT. - KIAS
3368 LBS (1528 KGS)	66	80
3100 LBS (1406 KGS)	64	78
2700 LBS (1225 KGS)	59	74



ASSOCIATED CONDITIONS:

POWER	FULL THROTTLE/2575 RPM
LANDING GEAR	DOWN UNTIL OBSTACLE CLEARED
WING FLAPS	10°
COWL FLAPS	FULL OPEN
RUNWAY SURFACE	PAVED, LEVEL DRY

EXAMPLE:

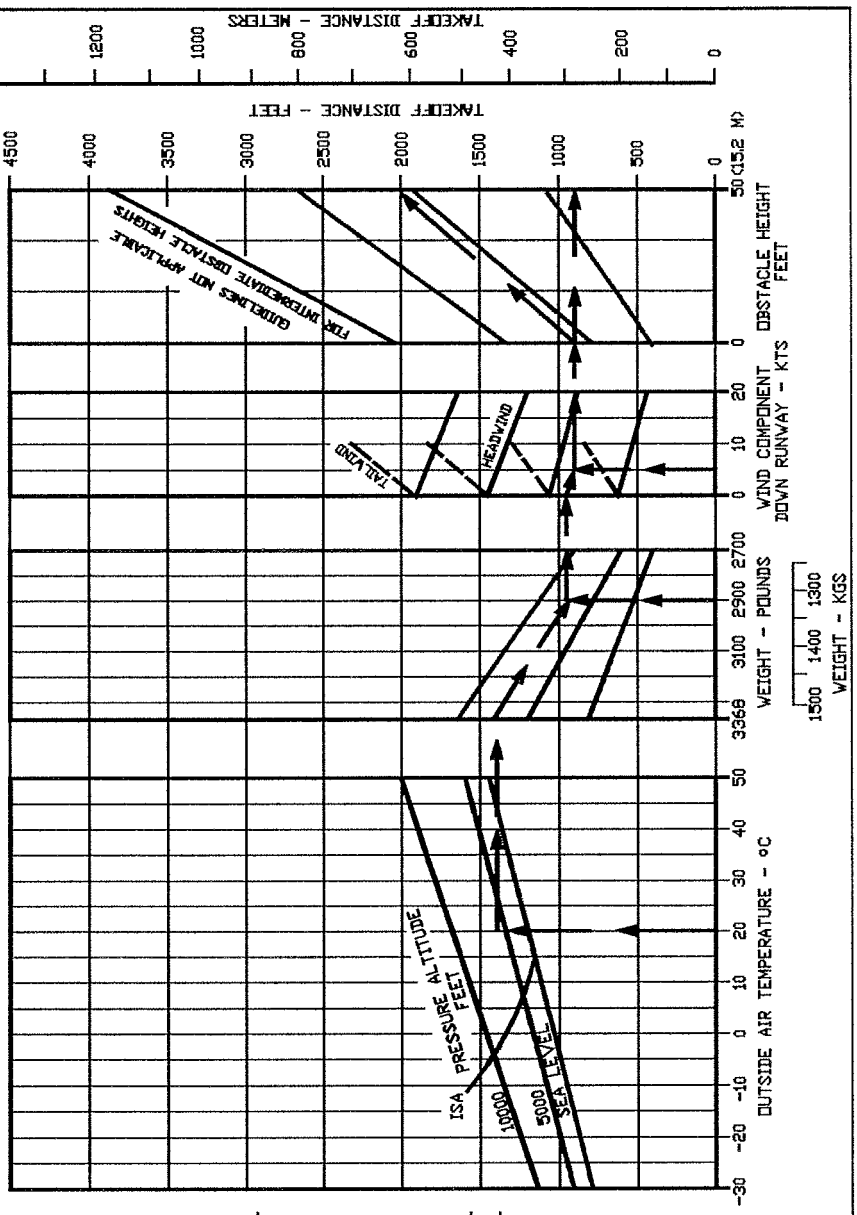
OAT	20° C
PRESSURE ALTITUDE	10000 FT.
WEIGHT	2900 LBS (1315 KGS)
HEADWIND COMPONENT	5 KTS
GROUND ROLL	900 FT. (274 M)
TOTAL TAKEOFF DISTANCE (50 FT. OBSTACLE)	1950 FT. (594 M)

TAKEOFF DISTANCE - GRASS SURFACE

TAKEOFF DISTANCE - GRASS SURFACE

TAKEOFF WEIGHT - LBS (KGS)	TAKEOFF SPEED KIAS	SPEED AT 50 FT. - KIAS
3368 LBS (1528 KGS)	66	80
3100 LBS (1406 KGS)	64	78
2700 LBS (1225 KGS)	59	74

NOTE:
1) MAXIMUM DEMONSTRATED CROSSWIND IS 13 KNOTS.
2) CONDITIONS OF HIGH HUMIDITY CAN RESULT IN AN INCREASE OF UP TO 10% TO THE TAKEOFF DISTANCE.



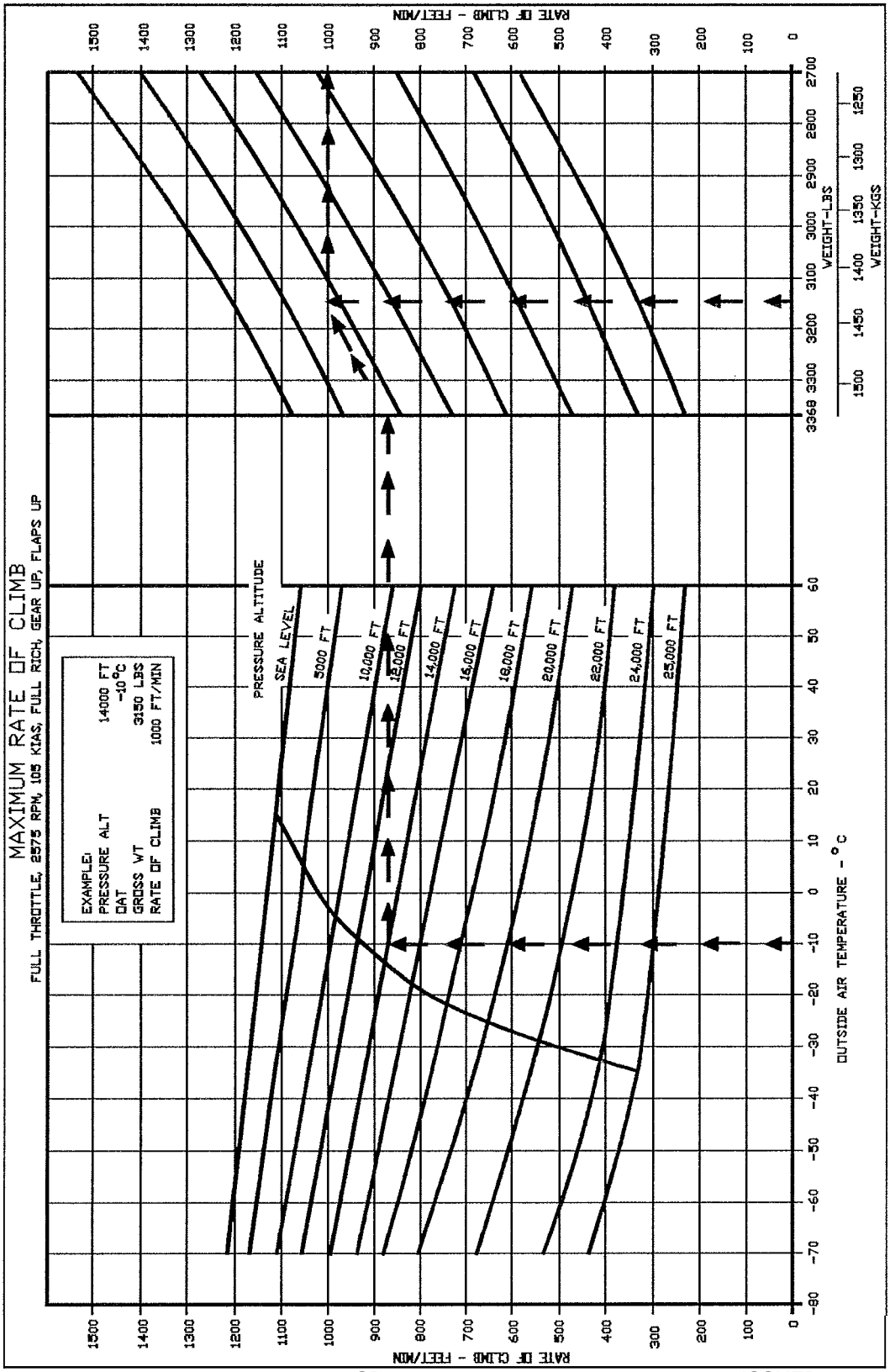
ASSOCIATED CONDITIONS:

POWER	FULL THROTTLE/2575 RPM
LANDING GEAR	DOWN UNTIL OBSTACLE CLEARED
WING FLAPS	10°
COWL FLAPS	FULL OPEN
RUNWAY SURFACE	SHORT DRY GRASS, LEVEL

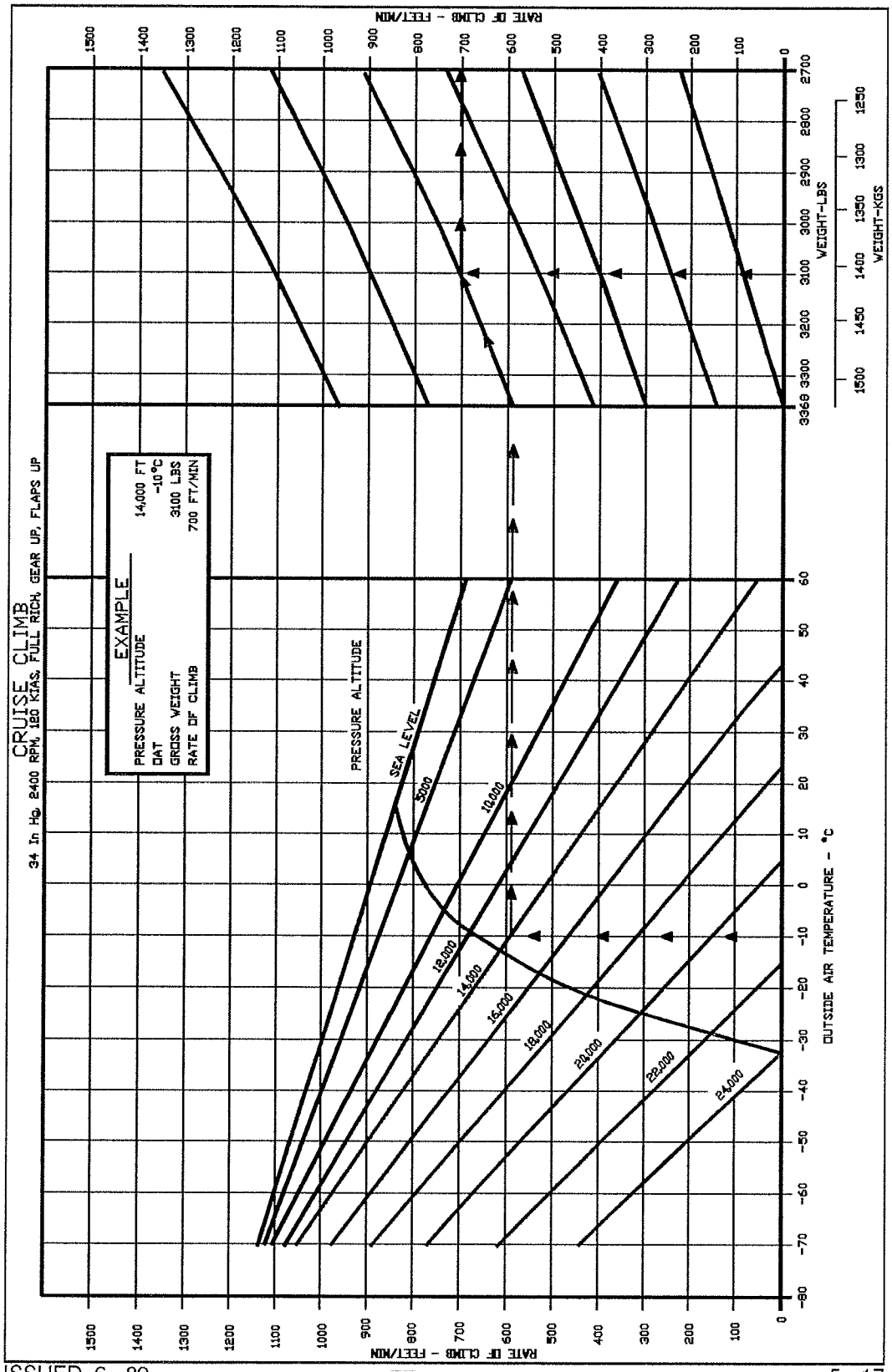
EXAMPLE:

OAT	20° C
PRESSURE ALTITUDE	6000 FT.
WEIGHT	2900 LBS (1315 KGS)
HEADWIND COMPONENT	5 KTS
GROUND ROLL	900 FT. (274 M)
TOTAL TAKEOFF DISTANCE (50 FT. OBSTACLE)	2000 FT. (610 M)

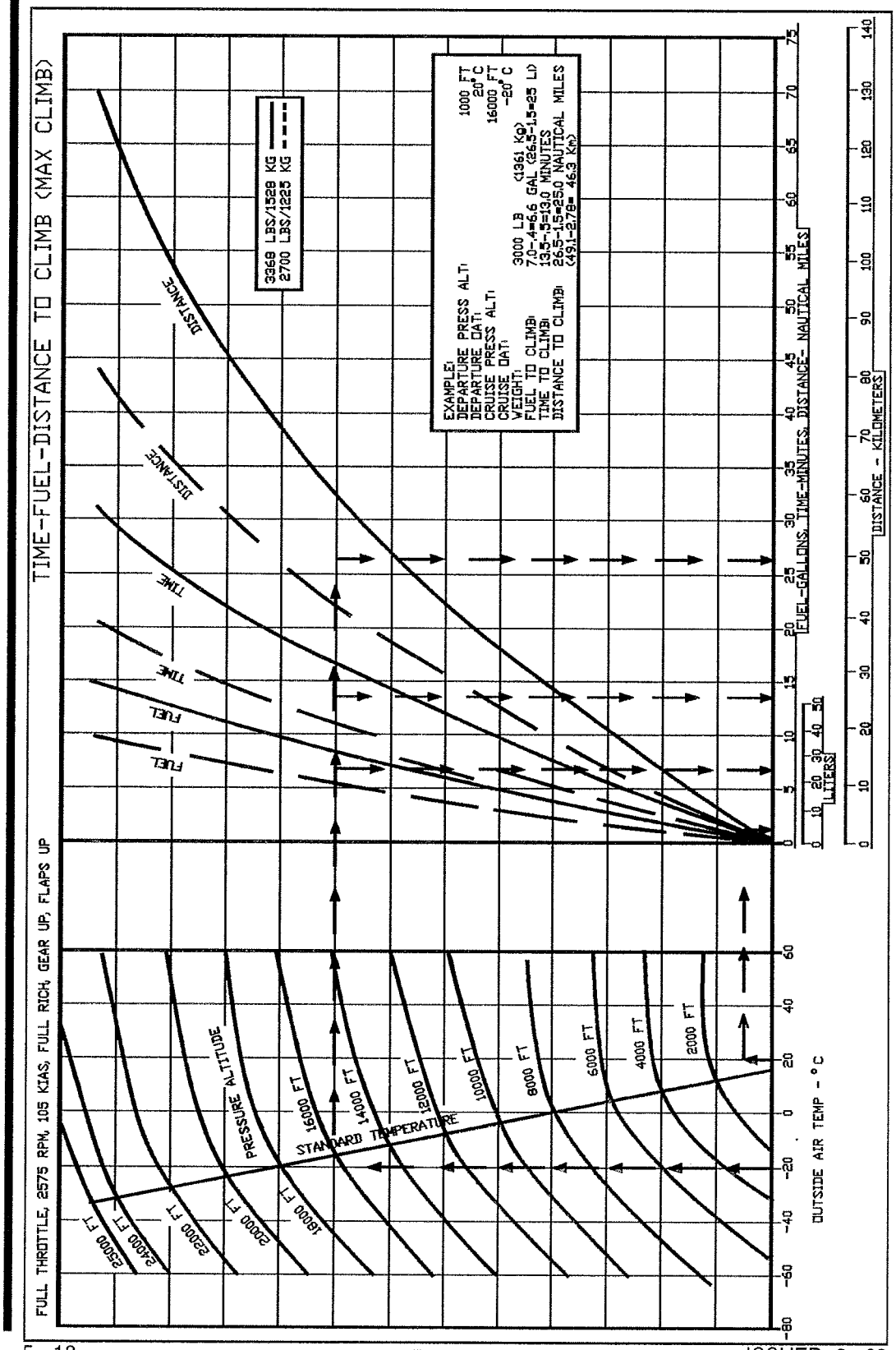
RATE OF CLIMB - MAX CLIMB



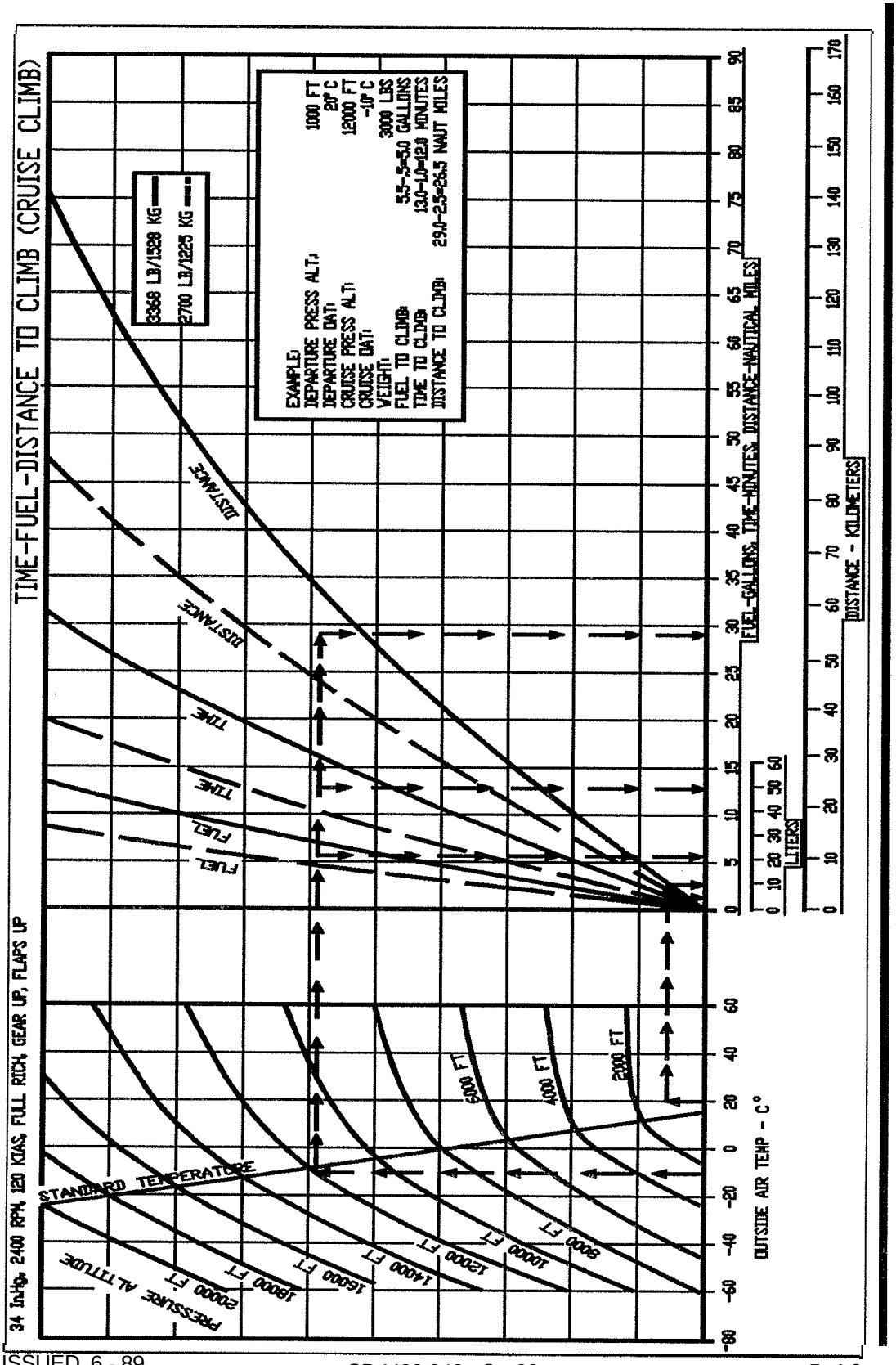
RATE OF CLIMB - CRUISE



TIME-FUEL-DISTANCE TO CLIMB (MAX CLIMB)



TIME-FUEL-DISTANCE TO CLIMB (CRUISE CLIMB)



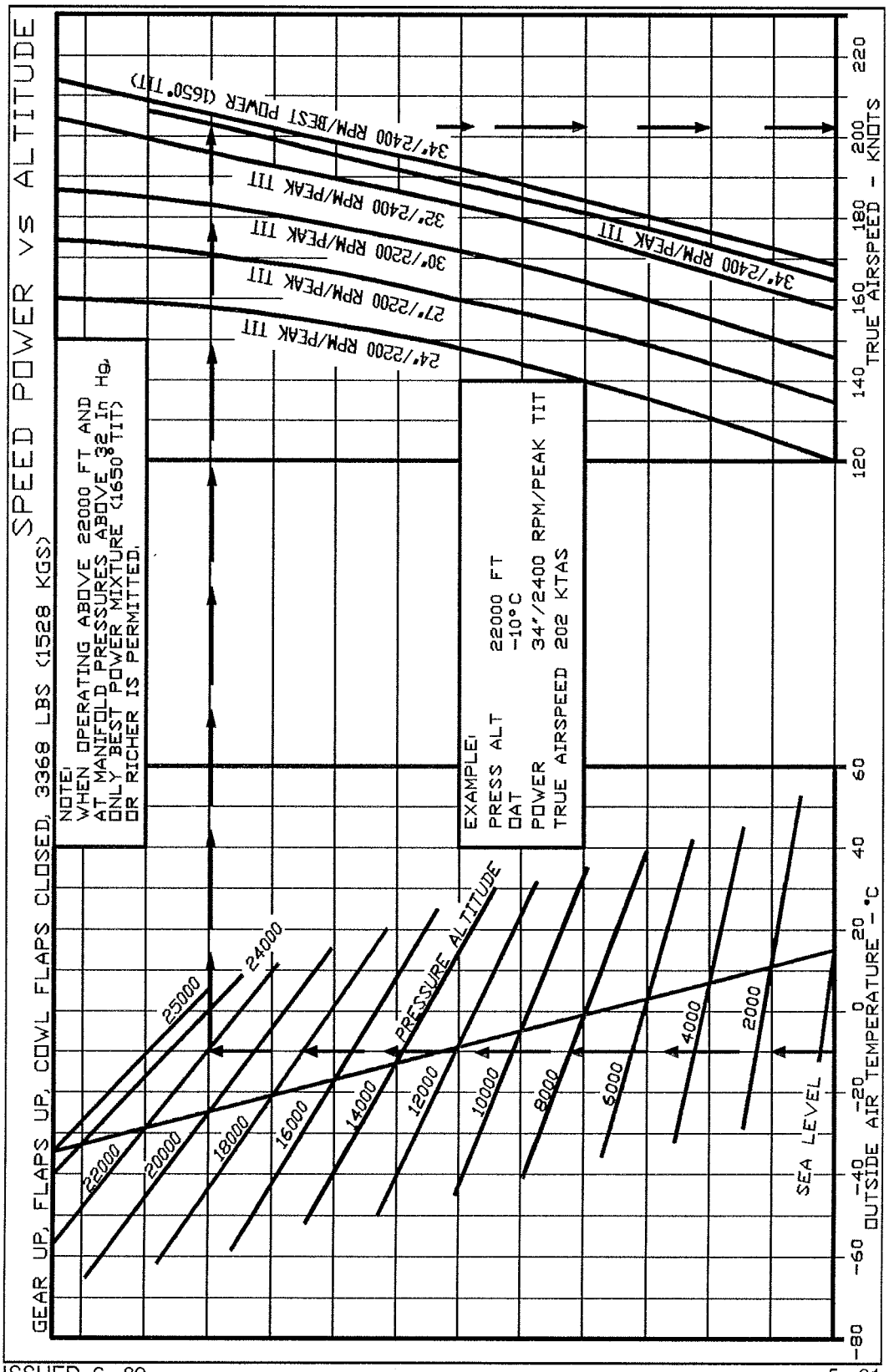
M20M CRUISE POWER SETTINGS AND FUEL FLOWS

STANDARD DAY CONDITIONS

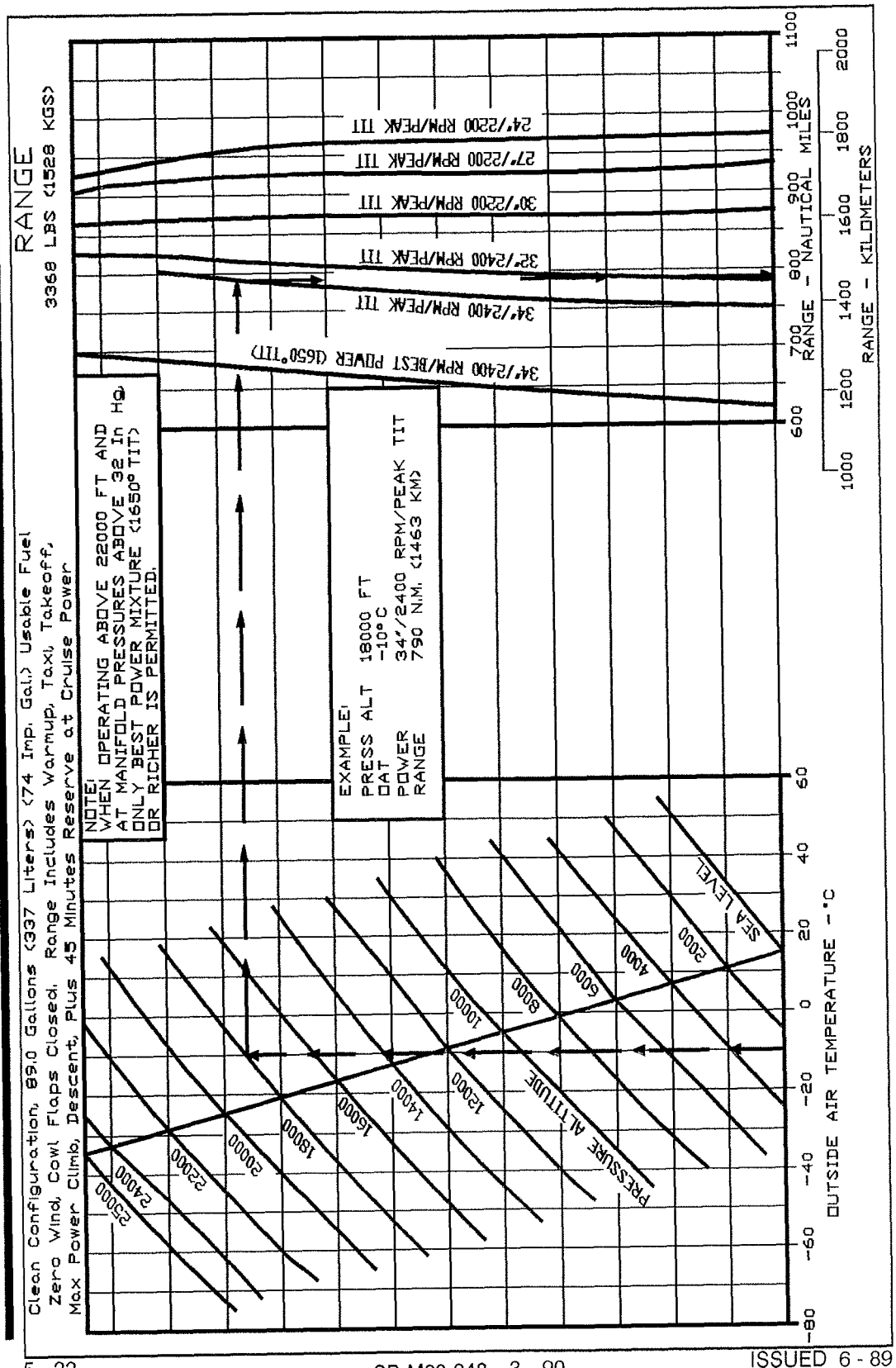
ALTITUDE	OAT °C	34"/2400 RPM		32"/2400 RPM	30"/2200 RPM	27"/2200 RPM	24"/2200 RPM
		BEST POWER	PEAK TIT	PEAK TIT	PEAK TIT	PEAK TIT	PEAK TIT
0	15	19.6	16.3	15.3	12.9	11.4	9.8
5000	5	20.1	17.0	16.0	13.7	12.3	10.7
10000	-5	20.4	17.4	16.4	14.3	12.8	11.3
15000	-15	20.6	17.5	16.5	14.5	13.1	11.7
20000	-25	20.6	17.6	16.6	14.7	13.3	12.0
25000	-35	20.5	---	16.6	14.6	13.3	12.1

NOTE:
1) PEAK TIT INDICATES PEAK TIT OR 1750' F TIT
2) BEST POWER (AT 34 In. Hg./2400 RPM) IS 1650' F TIT
3) WHEN OPERATING ABOVE 22000 FEET, AND AT MANIFOLD PRESSURES ABOVE 32 In.Hg., ONLY BEST POWER MIXTURE (1650' F TIT) OR RICHER IS PERMITTED.
4) CRUISE FUEL FLOWS DECREASE APPROXIMATELY .5 GPH FOR EACH 20° C ABOVE STANDARD TEMPERATURE.
5) CRUISE FUEL FLOWS INCREASE APPROXIMATELY .5 GPH FOR EACH 20' C BELOW STANDARD TEMPERATURE.

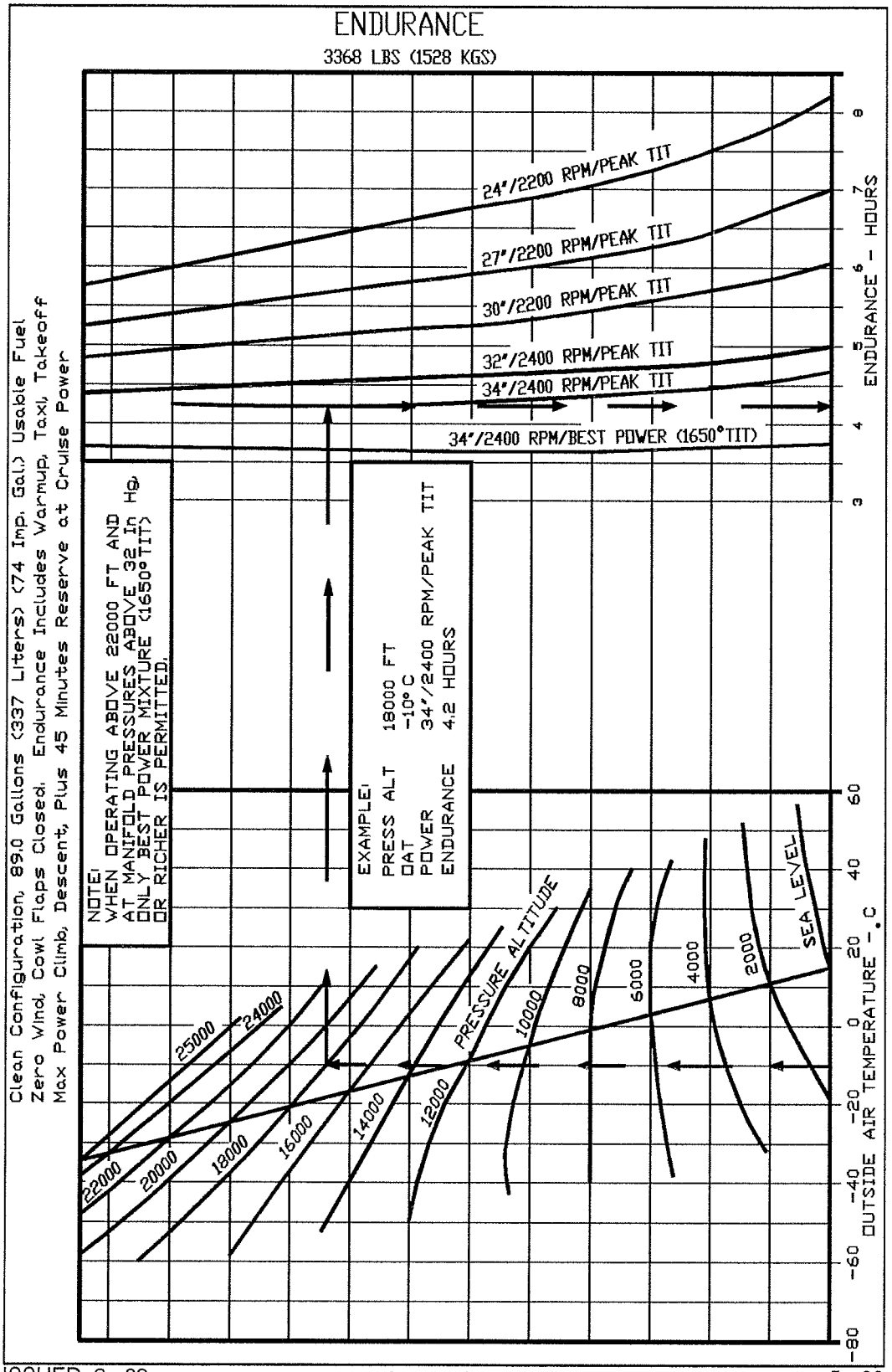
SPEED POWER VS ALTITUDE



RANGE


RANGE
3368 LBS (1528 KGS)
Clean Configuration, 89.0 Gallons (337 Liters) (74 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
NOTE: WHEN OPERATING ABOVE 22000 FT AND AT MANIFOLD PRESSURES ABOVE 32 In Hg ONLY BEST POWER MIXTURE (1650° TIT) OR RICHER IS PERMITTED.
EXAMPLE:
PRESS ALT 18000 FT
OAT -10° C
POWER 34"/2400 RPM/PEAK TIT
RANGE 790 N.M. (1463 KM)
34"/2400 RPM/BEST POWER (1650°TIT)
34"/2400 RPM/PEAK TIT
32"/2400 RPM/PEAK TIT
30"/2200 RPM/PEAK TIT
27"/2200 RPM/PEAK TIT
24"/2200 RPM/PEAK TIT
PRESSURE ALTITUDE
SEA LEVEL
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
25000
OUTSIDE AIR TEMPERATURE - °C
-80
-60
-40
-20
0
20
40
60
RANGE - NAUTICAL MILES
600
700
800
900
1000
1100
RANGE - KILOMETERS
1000
1200
1400
1600
1800
2000

ENDURANCE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NOTE:
WHEN OPERATING ABOVE 22000 FT AND
AT MANIFOLD PRESSURES ABOVE 32 In Hg,
ONLY BEST POWER MIXTURE (1650°TIT)
OR RICHER IS PERMITTED.
EXAMPLE:
PRESS ALT 18000 FT
OAT -10° C
POWER 34"/2400 RPM/PEAK TIT
ENDURANCE 4.2 HOURS
24"/2200 RPM/PEAK TIT
27"/2200 RPM/PEAK TIT
30"/2200 RPM/PEAK TIT
32"/2400 RPM/PEAK TIT
34"/2400 RPM/PEAK TIT
34"/2400 RPM/BEST POWER (1650°TIT)
PRESSURE ALTITUDE
25000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
SEA LEVEL
ENDURANCE - HOURS
3
4
5
6
7
8
OUTSIDE AIR TEMPERATURE - °C
-80
-60
-40
-20
0
20
40
60

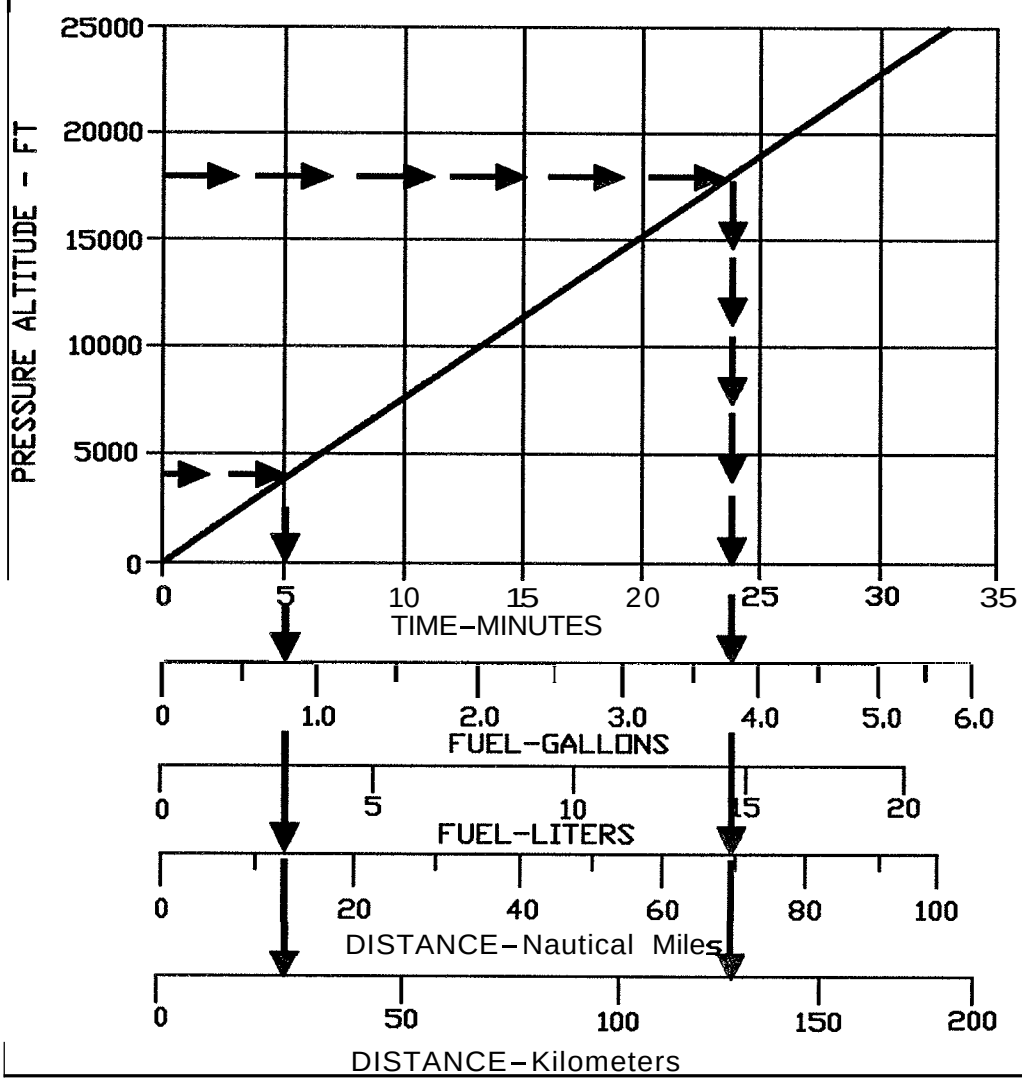
/TIME-FUEL-DISTANCE TO DESCEND!

TIME-FUEL-DISTANCE TO DESCEND

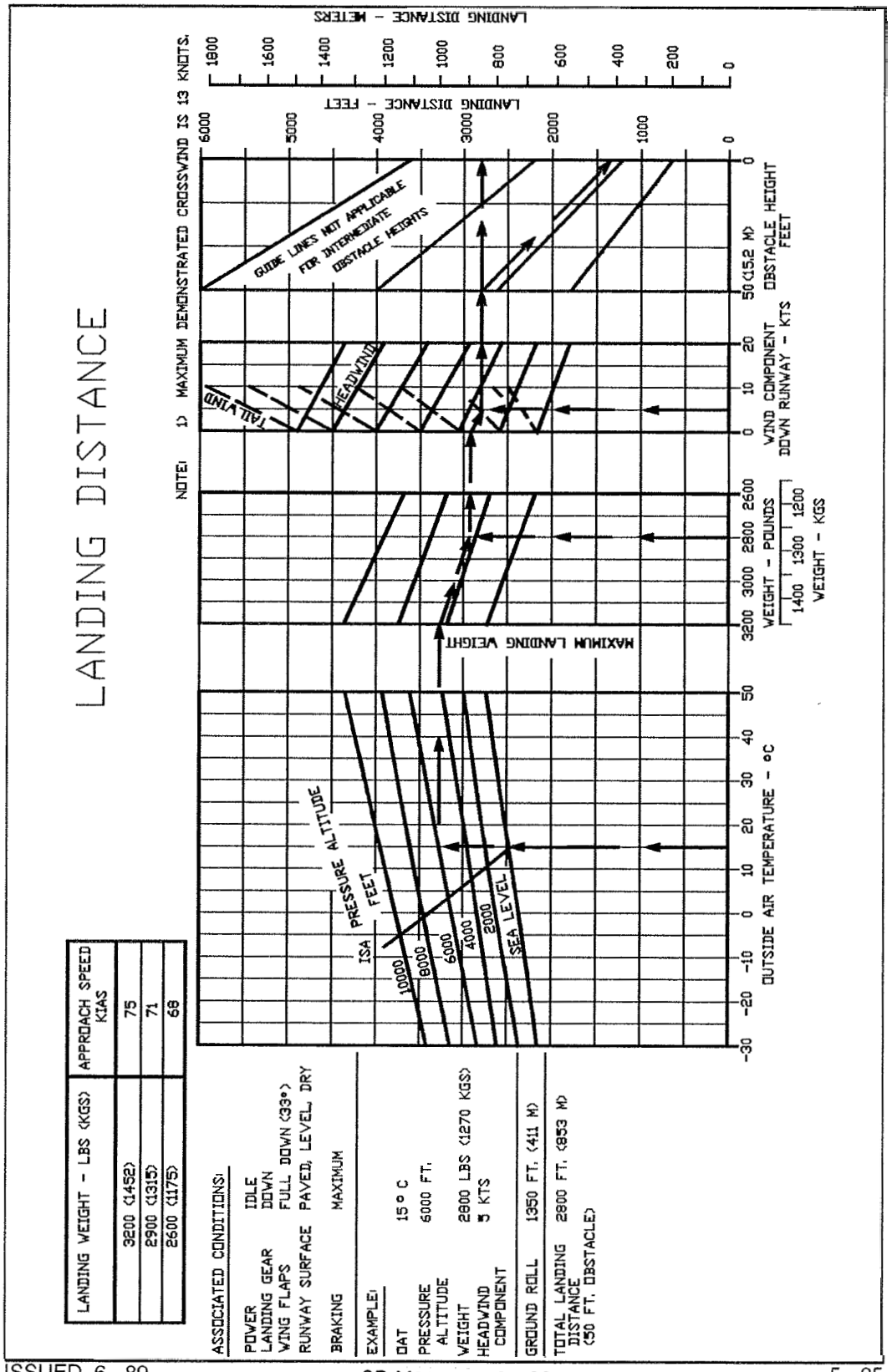
150 KIAS DESCENT SPEED

ASSOCIATED CONDITIONS:
POWER: 2000 RPM/MAP AS REQ'D TO MAINTAIN 750 FPM RATE OF DESCENT
LANDING GEAR: UP
FLAPS: UP
COWL FLAPS: CLOSED
MIXTURE: PEAK TIT (DO NOT EXCEED 1750°F TIT)

EXAMPLE:
INITIAL PRESSURE ALT: 18000
FINAL PRESSURE ALT: 4000
TIME TO DESCEND: 24.0-5.0=19 MINUTES
FUEL TO DESCEND: 3.8-0.8=3.0 GALLONS (14.39-3.03=11.36 L)
DISTANCE TO DESCEND: 69.0-13.0=56.0 NAUTICAL MILES (127.79-24.08=103.71 Km)



LANDING DISTANCE - HARD SURFACE



LANDING WEIGHT - LBS (KGS)	APPROACH SPEED KIAS
3200 (1452)	75
2900 (1315)	71
2600 (1175)	68

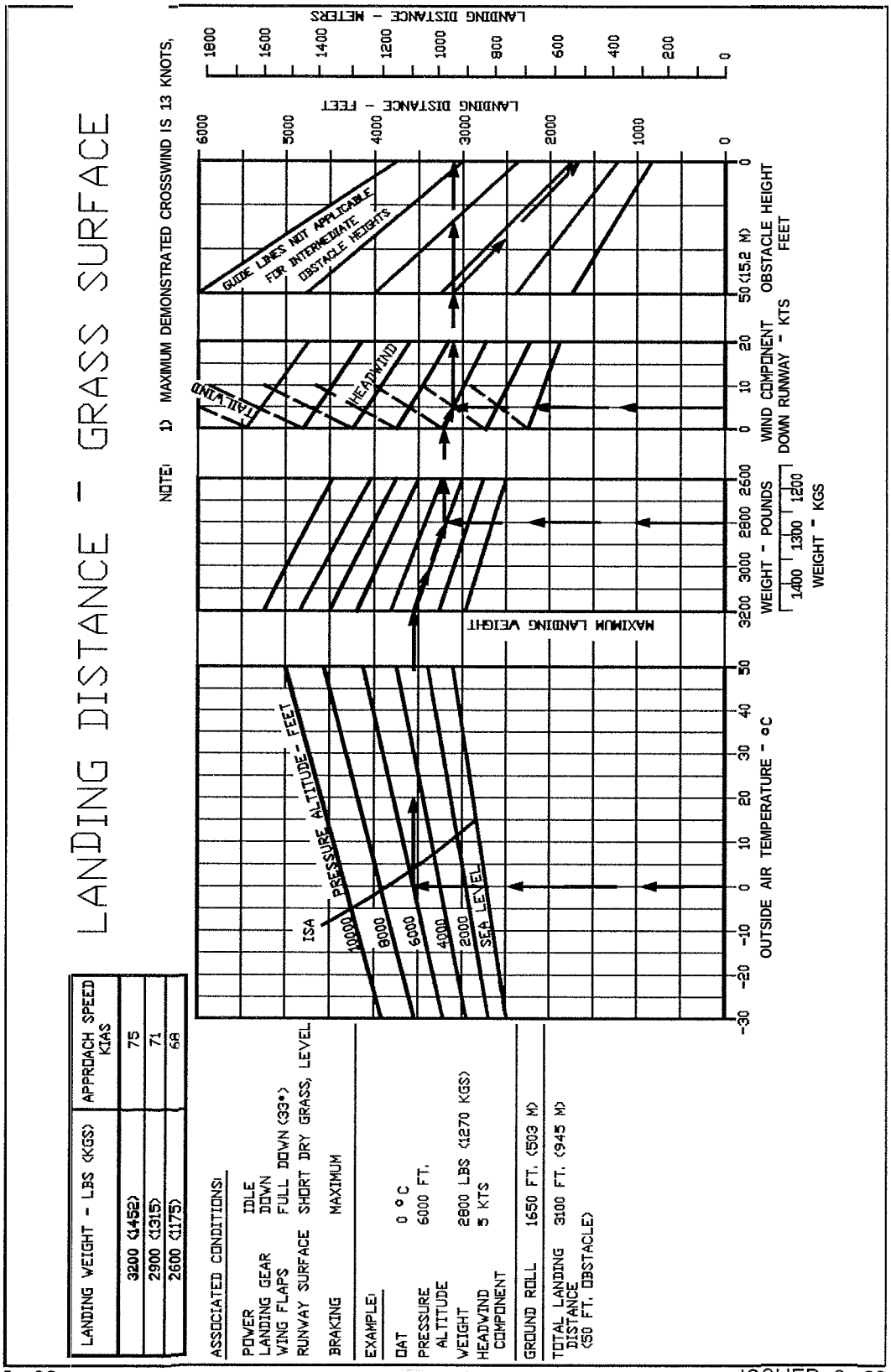
ASSOCIATED CONDITIONS:

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

EXAMPLE:

OAT	15° C
PRESSURE ALTITUDE	6000 FT.
WEIGHT	2800 LBS (1270 KGS)
HEADWIND COMPONENT	5 KTS
GROUND ROLL	1350 FT. (411 M)
TOTAL LANDING DISTANCE (50 FT. OBSTACLE)	2800 FT. (853 M)

LANDING DISTANCE - GRASS SURFACE



LANDING WEIGHT - LBS (KGS)	APPROACH SPEED KIAS
3200 (1452)	75
2900 (1315)	71
2600 (1175)	68

ASSOCIATED CONDITIONS:

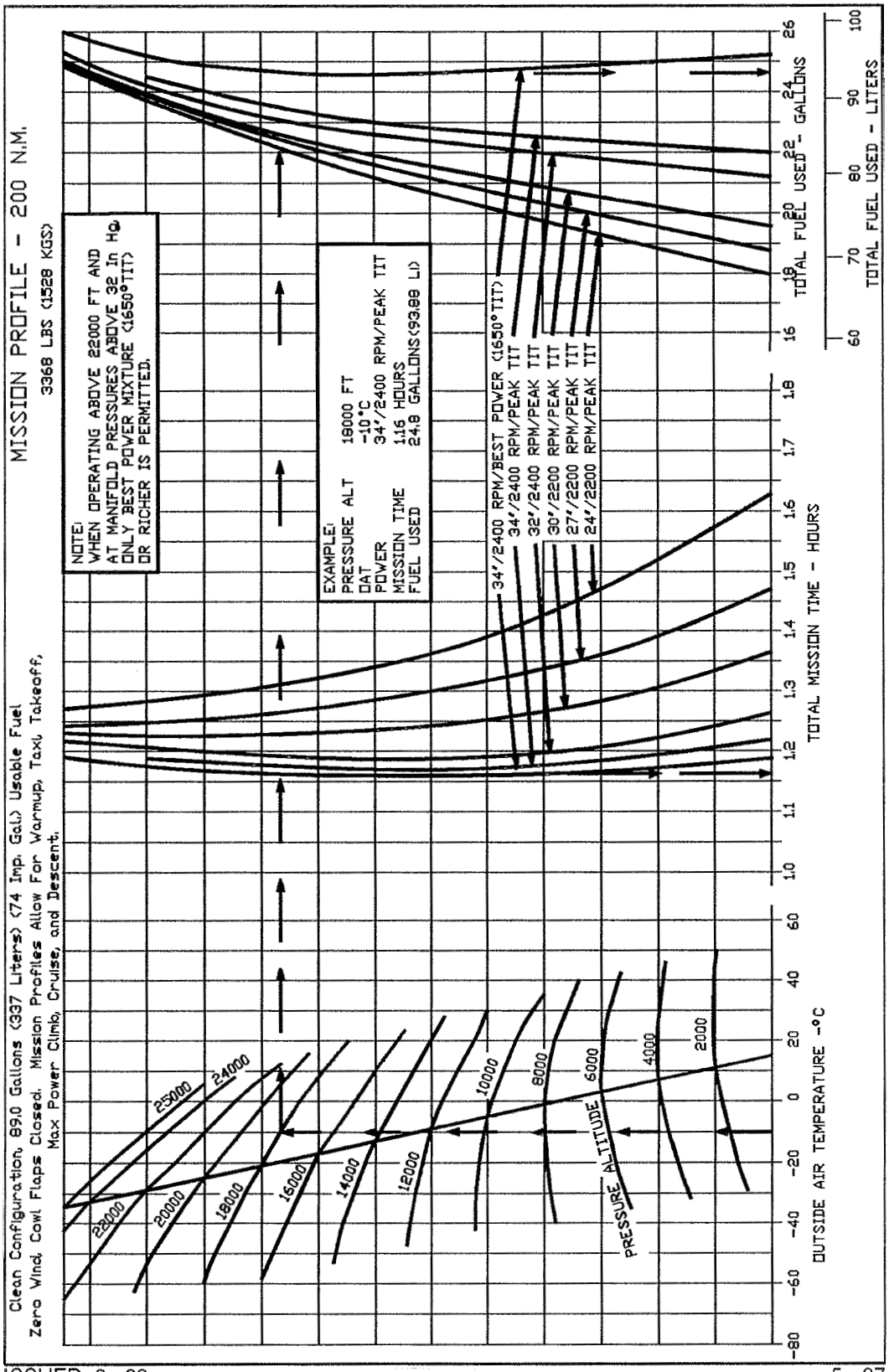
POWER IDLE
LANDING GEAR DOWN
WING FLAPS FULL DOWN (33°)
RUNWAY SURFACE SHORT DRY GRASS, LEVEL
BRAKING MAXIMUM

EXAMPLE:

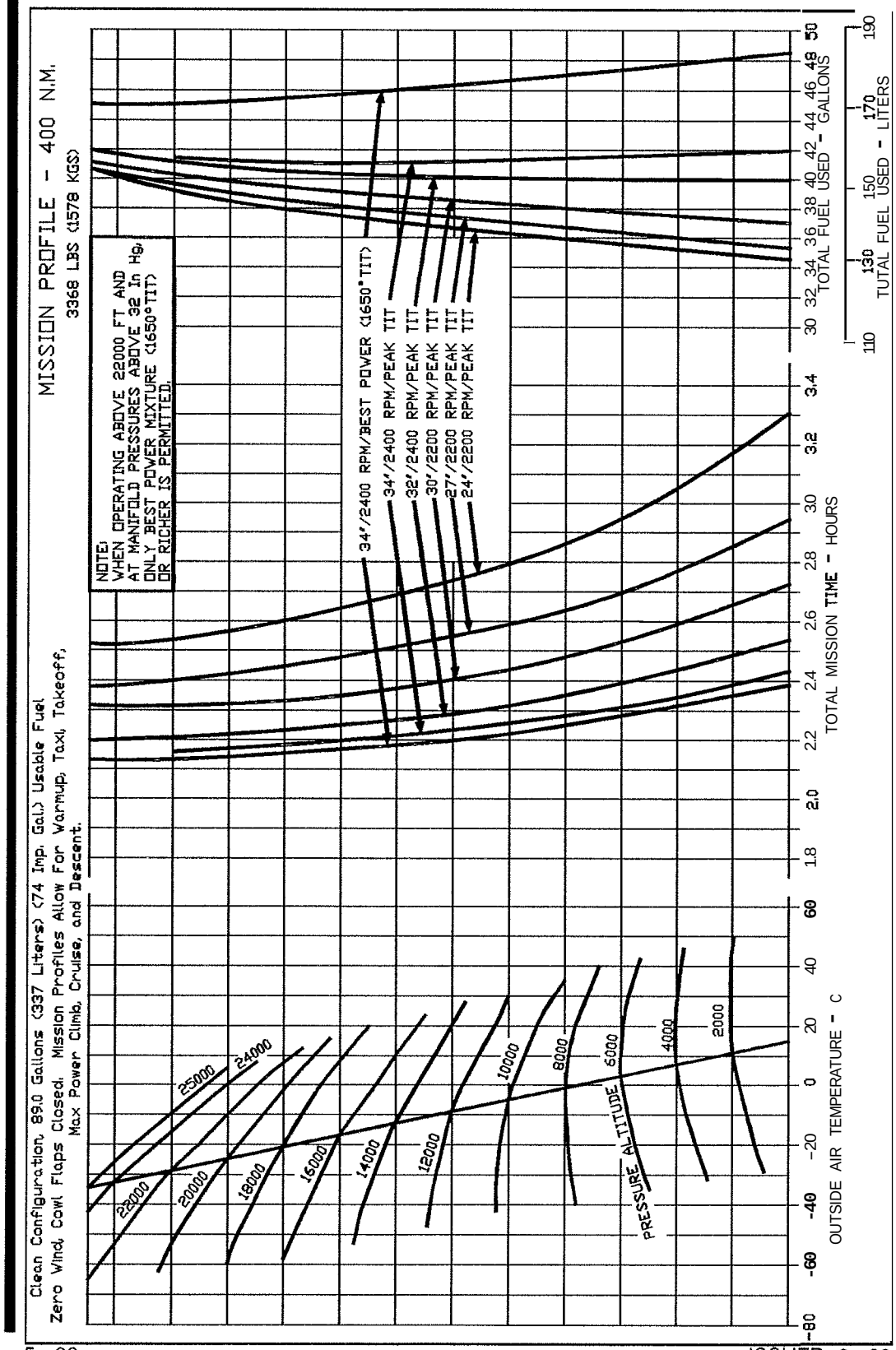
OAT 0 °C
PRESSURE ALTITUDE 6000 FT.
WEIGHT 2800 LBS (1270 KGS)
HEADWIND COMPONENT 5 KTS

GROUND ROLL 1650 FT. (503 M)
TOTAL LANDING DISTANCE (50 FT. OBSTACLE) 3100 FT. (945 M)

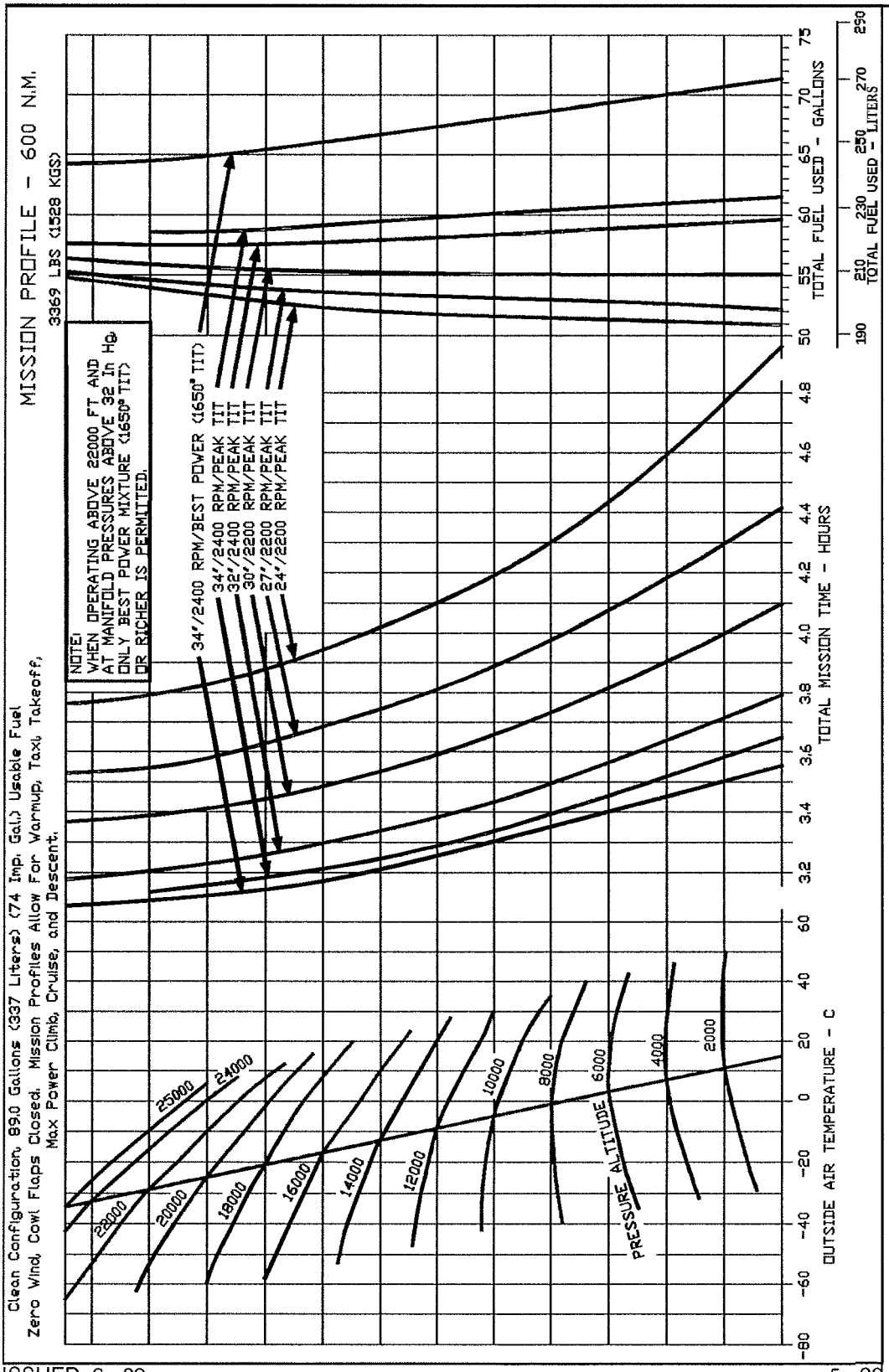
MISSION PROFILE - 200



MISSION PROFILE - 400



MISSION PROFILE - 600



MISSION PROFILE - 800

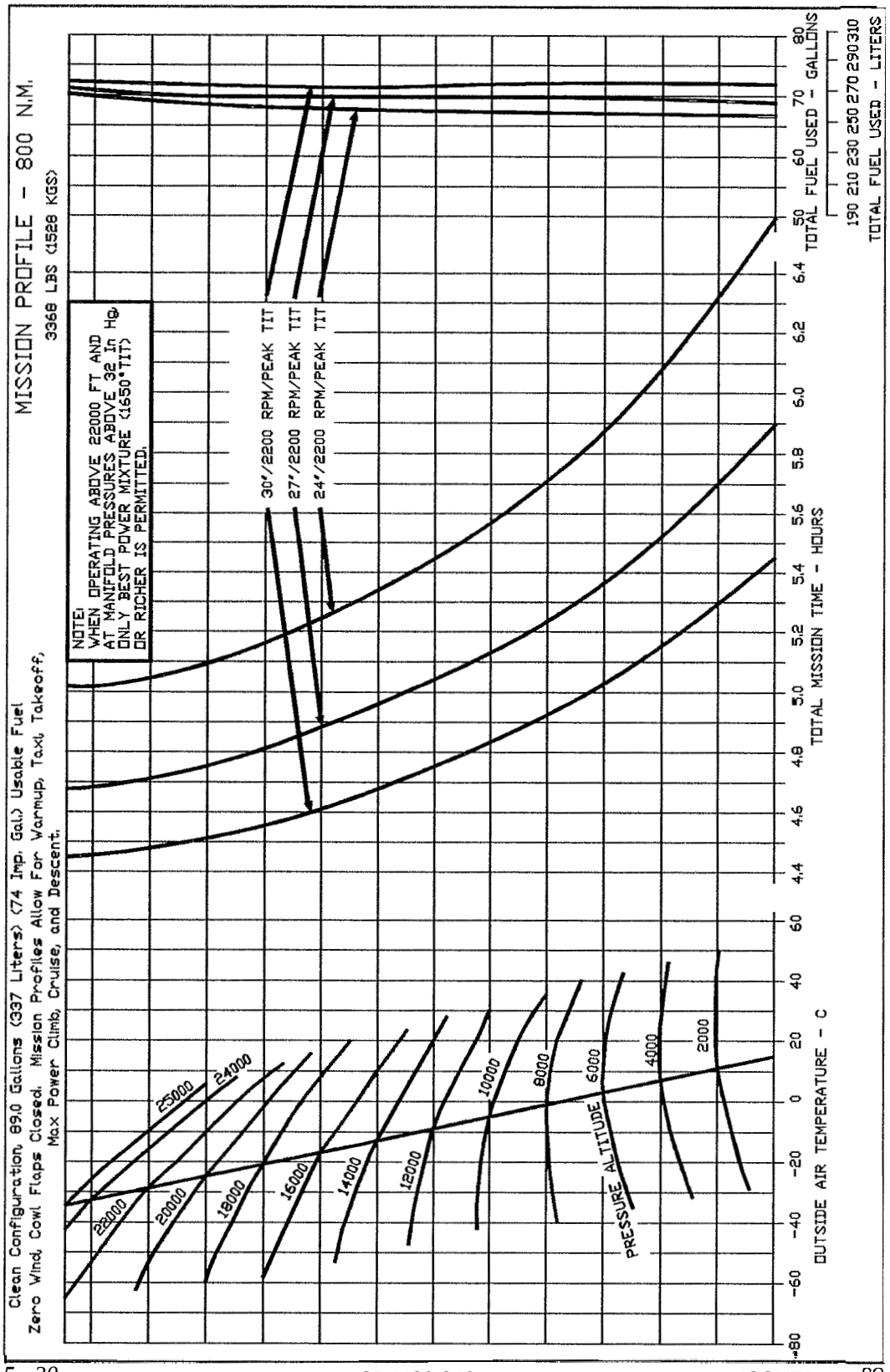


TABLE OF CONTENTS

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.

MOONEY - M20M

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/or 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 Textron-Lycoming powered M20M is 3368 lbs (1528 Kg) for Takeoff and 3200 pounds (1452 Kgs) for Landing. 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 6-7.

AIRPLANE WEIGHING PROCEDURE

(A) LEVELING: Place a spirit level on the leveling screws above the tailcone left 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 wing tanks with full fuel. Subtract usable fuel, 89.0 U.S. gals. (337 liters) @ 5.82 lb/gal(100LL)(.69 Kg/l) = 518 lbs. (235 Kgs.), from total weight as weighed.

OPTIONAL METHOD - Ground aircraft and defuel tanks as follows:

a. Disconnect fuel line at fuel system union located forward of the firewall on the lower left hand side.
b. Connect a flexible line to output fitting that will reach fuel receptacle.
c. Turn fuel selector valve to tank to be drained; remove filler cap from fuel filler port.

OWNERS WEIGHT AND BALANCE RECORD

CENTER BELOW ALL WEIGHT CHANGE DATA FROM AIRCRAFT LUG BOOK)

AIRPLANE MODEL - M20M	SERIAL NU,	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 - 10 Qts. (9.5 liters)								

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

O NERS WEIGHT & BALANCE RE ORD

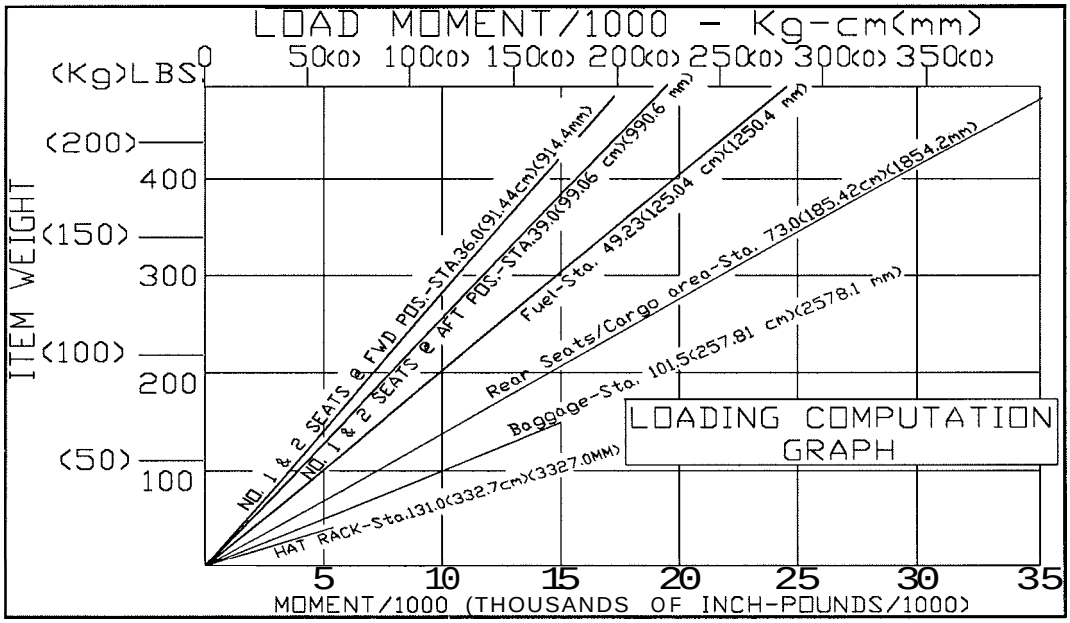
PROBLEM FORM

STEP	ITEM	SAMPLE PROBLEM WEIGHT (Kg) Lbs	SAMPLE PROBLEM MOMENT (Kg-cm /1000)	SAMPLE PROBLEM MOMENT lb-in /1000	YOUR PROBLEM WEIGHT (Kg) Lbs	YOUR PROBLEM MOMENT (Kg-cm /1000)	YOUR PROBLEM MOMENT lb-in /1000
1.	A/C Basic Empty Wt.(W)(from poge 6-5) (Includes Full Oil) 10 Qts.(9.5 Li) @1.875lbs /Qt.(.80 Kg/Li)(Sta. -20.19)(-51.3 cm) (Oil sump assumed FULL for all flights)	(1009) 2225	(114.6)	99.46			
2.	Pilot Seat (#1) *	(77.1) 170	(7.64)	6.63			
	Co-Pilot Seat (#2) *	(77.1) 170	(6.66)	5.78			
3.	Left Rear Seat (#3) or Corgo Area	(77.1) 170	13.85	12.02			
	Right Rear Seat (#4) or Corgo Area	(77.1) 170	13.85	12.02			
	Fuel (Max. Usoble - 89.0 Gal/534 Lbs) (337 Li/242Kg) @ Sta 49.23(125 cm)	(164.7) 363	20.59	17.87			
5.	Baggage (Max. 120 Lbs(54.4 cm)@Sta.101.5 (257.8 cm)	(45.4) 100	11.70	10.15			
	Hat Rock (Max. 10 Lbs(4.54 Kg)@Sta. 131.0 (332.7 cm)						
6.	Loaded A/C Weight(Takeoff at Max. Weight) A/C will have to burn off 168 lbs. fuel before normal landing is accomplished.	(1528) 3368	(190.2)	165.0			
7.	Required Fuel Burn-Off 28 Gols (105.9 Li) @ 6 Lbs./Gal.	(76.2) 168	(-9.53)	-8.27			
8.	MAXIMUM LANDING WEIGHT of A/C	(1452) 3200	(180.6)	156.7			
9.	Refer to Center of Grovity Moment Envelope, to determine whether your A/C loading is acceptable. CAUTION-DO NOT LAND A/C WHEN OVER 3200 LBS EXCEPT IN AN EMERGENCY SITUATION.						

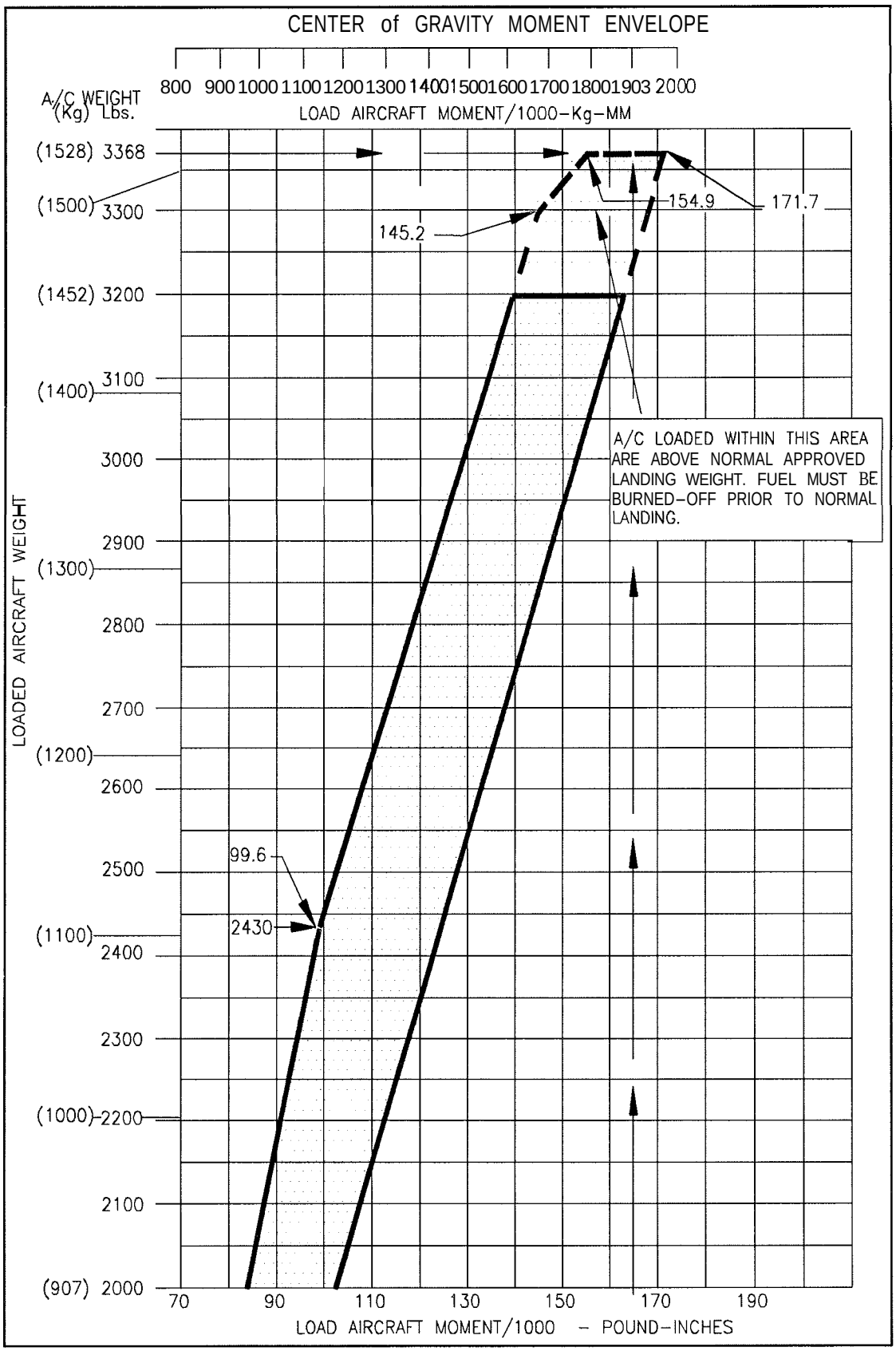
* Obtoin the moment/1000 value for each seot position (FWD, MID or AFT) from loading computation groph.

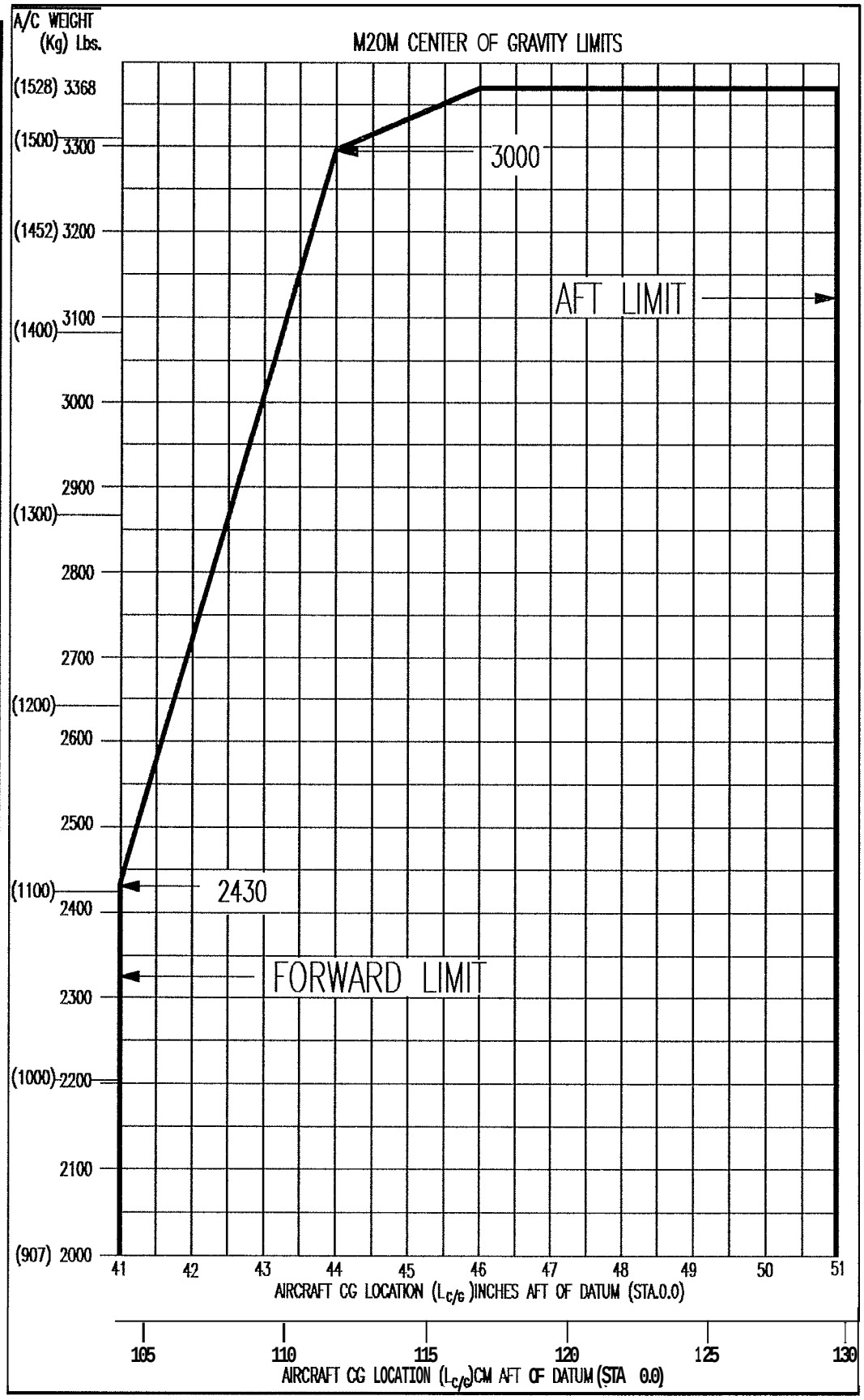
CAUTION

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



M20M - CENTER OF GRAVITY MOMENT ENVELOPE




A/C WEIGHT
(Kg) Lbs.
M20M CENTER OF GRAVITY LIMITS
(1528) 3368
(1500) 3300
(1452) 3200
(1400) 3100
3000
2900
(1300)
2800
2700
(1200)
2600
2500
(1100)
2400
2300
(1000) 2200
2100
(907) 2000
3000
AFT LIMIT
2430
FORWARD LIMIT
41
42
43
44
45
46
47
48
49
50
51
AIRCRAFT CG LOCATION ($L_{c/g}$)INCHES AFT OF DATUM (STA.0.0)
105
110
115
120
125
130
AIRCRAFT CG LOCATION ($L_{c/g}$)CM AFT OF DATUM (STA 0.0)

NOTE

A Donaldson D-1400 Filter Cleaner is also recommended. Do not use solvents.

f. Rinse filter element with a stream of clear water until rinse water is clear.

g. Dry filter thoroughly. Do not use a light bulb or air heated above 180° F. for filter drying.

h. Inspect for damage and ruptures by holding light bulb inside filter. If damage is evident, replace filter with a new one.

GEAR & TIRE SERVICING

The aircraft is equipped with 6-ply Type III standard-brand tires and tubes. Keep the main gear tires inflated at 42 PSI and the nose tire at 49 PSI for maximum service life. Proper inflation will minimize tire wear and impact damage. Visually inspect the tires at preflight for cracks and ruptures, and avoid taxi speeds that require heavy braking or fast turns. Keep the gear and exposed gear retraction system components free of mud and ice to avert retraction interference and binding. It is recommended that retraction/extension cycles (5 minimum) be done any time any tire is replaced to assure that no interference exists during the cycle.

CAUTION

After any landing, other than a smooth touchdown and rollout, when aircraft is above 3200 Lbs (1452 Kg), the aircraft should undergo the Gear System Operational Inspection as outlined in M20M Service and Maintenance Manual, No. 150, Chapter 32-30-01.

The gear warning horn may be checked in flight by retarding the throttle with the gear up. The gear horn should sound with an intermittent note when throttle is positioned 1/4 to 3/8 inch from idle, while the gear is up.

BATTERY SERVICE

The two 24-volt, 10 ampere-hour electrical storage batteries are located in the tailcone, aft of baggage compartment bulkhead, accessible through left and right side tailcone access panels. Check battery fluid level every 25 FLIGHT HOURS or each 30 DAYS whichever comes first.

To service the batteries, remove access cover and battery cover; check terminals and connectors for corrosion. Add distilled water to each battery cell as necessary; keep the fluid at one-quarter inch over the separator tops.
Check the fluid specific gravity for a reading of 1.265 to 1.275. A recharge is necessary when the specific gravity is 1.240 or lower. Start charging at four amperes and finish at two amperes; do not allow battery temperature to rise above 120° F. during recharging. Keep battery at full charge to prevent freezing in cold weather and to prolong service life.

CAUTION

Alternators and voltage regulators operate only as a one-polarity system. Be sure the polarity is correct when connecting a charger or booster battery.

If corrosion is present, flush the battery, shelf and mounting area with a solution of baking soda and water. Do not allow soda to enter the battery cells. Keep cable connections clean and tightly fastened, and keep overflow line free of obstruction.

HYDRAULIC BRAKE RESERVOIR SYSTEM

The brake system hydraulic reservoir is located on the tailcone bulkhead, forward of the avionics. To service, remove the left side tailcone access panel and check fluid level every 50 HOURS of operation. Fluid level should be no higher than two (2) inches(5 cm) below the filler cap. Use only hydraulic fluid (Red) conforming to specification MIL-H-5606. DO NOT FILL reservoir while parking brake is set.

MAINTENANCE

ENGINE PERFORMANCE CHECKS

When the aircraft leaves the factory the TEXTRON-Lycoming TIO-540-AF1A engine has been properly tuned and will perform at optimum efficiency. To insure that the engine is continuing to perform properly certain maintenance action should be performed during the 100 HOUR or ANNUAL inspection or whenever it is suspected that engine performance is not correct.

Refer to SERVICE AND MAINTENANCE MANUAL for specific maintenance actions to adjust engine if necessary.

PROPELLER CARE

The high stresses to which propeller blades are subjected makes their careful inspection and maintenance vitally important. Check the blades for nicks, cracks, or indications of other damage before each flight. Nicks tend to cause high stress concentrations in the blades which, if ignored, may result in cracks. It is very important that all nicks and scratches be repaired prior to next flight. It is not unusual for the propeller blades to have some end play or fore and aft movement as a result of manufacturing tolerances in the parts. This has no adverse effect on propeller performance or operation. With the first turn, centrifugal force firmly seats the blades, rigidly and positively against the retention bearing in the propeller hub.

Preflight inspection of the propeller blades should include, in addition to the foregoing, an occasional wiping with an cloth soaked in kerosene. NEVER USE AN ALKALINE CLEANER ON THE BLADES.

Your Mooney Service Center will answer any questions you may have concerning blade repair and inspection.

EXTERIOR CARE

As with any paint applied to a metal surface, an initial curing period is necessary for developing the desired qualities of durability and appearance. Therefore, DO NOT APPLY WAX TO THE NEW AIRCRAFT EXTERIOR UNTIL TWO OR THREE MONTHS AFTER DELIVERY. Wax substances will seal paint from the air and prevent curing. Wash the exterior to prevent dirt from working into the curing paint. Hold buffing to a minimum until curing is complete and there is no danger of disturbing the undercoat.