

FAA APPROVED
A I R P L A N E F L I G H T M A N U A L

MAULE AIRCRAFT CORPORATION
JACKSON, MICHIGAN

MODEL M-4-220 SERIES
(INCLUDES MODELS M-4-220, M-4-220S,
M-4-220C, M-4-220T)

AIRPLANE SERIAL NO. _____

FAA IDENT. NUMBER _____

(THIS DOCUMENT MUST BE KEPT IN THE AIRPLANE AT ALL TIMES)

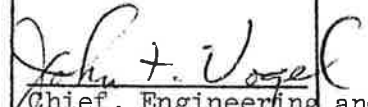

APPROVED: *John W. Hurley*
for JOHN A. CARRAN, CHIEF
Engineering & Manufacturing Branch
Central Region

DATE: September 28, 1966

MAULE MODEL M-4-220 SERIES

AIRPLANE FLIGHT MANUAL

LOG OF REVISIONS

Rev. No.	Page Number(s)	Description	Date of Revision	Approved by
1	2,3, & 4	Maximum take off weight increased to 2300 pounds and Center of Gravity Limits changed. (Rev. 1 not applicable to s/n 2001S.)	7/7/67	Original signed by J. W. Hurley, for Chief, Engineering and Manufacturing Br. Central Region
2	1	Add optional prop.	9/12/69	Original signed by H. E. Mannick Supervisor ATL EMDO
3	1	Add McCauley 2A34C22 propeller.	9/24/70	Original signed by John F. Vogel Chief, Engineering and Manufacturing Br. Southern Region
4	3	Revised "Type of Operation Authorized" placard and rearranged sections L and M, deleting the letter "M".	11/27/72	 Chief, Engineering and Manufacturing Branch Southern Region, FAA 27 NOV 1972
5	3, 4, 5	Added " <u>PREFLIGHT INSPECTION</u> " to II PROCEDURES.		 Manager, Atlanta Aircraft Certification Office FAA, Central Region Date: <u>May 1, 1984</u>

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Date: 7/7/67

MAULE AIRCRAFT CORPORATION

AIRPLANE FLIGHT MANUAL

MAULE M-4-220C/S

LOG OF SUPPLEMENTS

SUPP. NO.	NO. OF PAGES	DESCRIPTION	APPROVAL DATE
1	1	Installation of EDO Model 248A2440 or 248B2440 Floats - Maule STC SA610CE (Drawing 9047A, Rev. B & DCN M3902). Revised	11/29/68 09/19/69
2	2	Installation of Federal Model C2200H Retractable Skis.	11/29/68
3	1	Maximum Continuous Full Throttle Operation.	05/14/73
4	2 3	Operation of aircraft with Wing Tip Auxiliary Fuel Tanks installed. Revised	10/31/73 09/12/74
5	2	Flight operation with Right Rear Passenger Door removed.	05/12/83
6	2	Installation of Federal Model A2000A Wheel Replacement Skis.	01/25/84
7	3	Installation of Fleet Model 2500 Floats.	06/16/86
8	5	Installation of Fli-Lite 3000 MK IIIA Skis - Maule Drawing 9079A.	01/07/87
9	3	Operation of aircraft when existing Wing Assemblies, Ailerons, Flaps and Flap Ratchet are replaced with M-5 Wing Assemblies 2110X-L/R or 2110X-30, Ailerons, Flaps and 20°/40° Flap Ratchet in accordance with Maule Modification Kit No. 10.	10/17/97
-	5	Installation of Apollo MX20 Multi-Function Display - Maule Drawing 7265A.	08/15/02
-	8	Installation of GARMIN GNC-420 (GPS/COMM) System - Maule Drawing 7251A.	06/30/03
-	9	Installation of GARMIN GNS-530 (GPS/NAV/COMM) System - Maule Drawing 7253A.	06/30/03
-	4	Installation of GARMIN GTX-330 Mode S Transponder Traffic Information System (TIS) - Maule Drawing 7255A.	06/30/03
10	2	Flight operation with either one (not both) of the Front Doors removed.	09/02/03
-	3	Operation of aircraft when Micro AeroDynamics Vortex Generator System is installed per Maule Drawing 9177A.	12/16/05

MAULE MODEL M-4-220 SERIES

AIRPLANE FLIGHT MANUAL

TABLE OF CONTENTS

SECTION I - LIMITATIONS

Engine Page 1
Engine Limits. Page 1
Fuel Page 1
Propeller. Page 1
Power Plant Instruments. Page 1
Airspeed Limits. Page 2
Maneuvers. Page 2
Flight Load Factors. Page 2
Maximum Weight Page 2
Center of Gravity Limits Page 2
Placards Page 3
Fuel System Operation. Page 3

SECTION II - PROCEDURES

Normal Procedures. Page 3
Emergency Procedures Page 4

MAULE MODEL M-4-220 SERIES

AIRPLANE FLIGHT MANUAL

I. LIMITATIONS

The following limitations must be observed in the operation of this airplane:

- | | |
|-----------------------------|---|
| A. Engine | Franklin 6A-350-C1 |
| B. Engine Limits | Take Off (5 Min) 2800 RPM & F.T.
(220 HP). METO POWER 2800 RPM @
26.5 Hg (194 HP) |
| C. Fuel | 100-130 Minimum Grade
Aviation Gasoline |
| D. Propellers | McCaughey 2A31C21/84S-8
McCaughey 2A31C21/84S-6
McCaughey 2A34C22-N/S84SF-6
McCaughey 2A34C22-N/S84SF-8 |
| E. Power Plant Instruments: | |
| Cylinder Head Temp | Green Arc: 200-390° F.
(Normal Operating Range)
Red Radial: 390° F. |
| Manifold Pressure | Green Arc: 14.5-26.5 In. Hg.
(Normal Operating Range)
Yellow Arc: (Caution) 26.5-29.0 Hg.
Red Radial: 29.0 In. Hg. |
| Oil Temperature | Green Arc: 100-235° F.
(Normal Operating Range)
Red Radial: 235° F. |
| Oil Pressure | Green Arc: 55-80 psi
(Normal Operating Range)
Yellow Arc: (Caution) 0-55 psi
Red Radials: 80 psi |
| Tachometer | Green Arc: 1800-2800 RPM
(Normal Operating Range)
Red Radial: 2800 RPM |
| Fuel Pressure | Green Arc: .5-9 psi
Red Radials: .5 and 9 psi |

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REVISED:

MAULE MODEL M-4-220 SERIES
AIRPLANE FLIGHT MANUAL

F. Airspeed Limits: (Calibrated Airspeed)

Never Exceed (V_{ne})	180 mph (156K)	(Red Radial)
Caution Range	145-180 mph (126-156K)	(Yellow Arc)
Design Cruising Speed (V_C)		145 mph (126K)
Normal Operating Range	62-145 mph (54-126K)	(Green Arc)
Max. Design Maneuvering Speed (V_p)		125 mph (109K)
Max. Flap Extension Speed (V_F)		90 mph (82K)
Flap Operating Range	56-90 mph (49-82K)	(White Arc)

NOTE: Airspeed Instrument Markings and their Significance:

1. Radial **RED** line marks the never exceed speed, which is the maximum safe airspeed.
2. **YELLOW** Arc on indicator denotes range of speeds in which operations should be conducted with caution and only in smooth air.
3. **GREEN** Arc denotes normal operating speed range.
4. **WHITE** Arc denotes speed range in which flaps may be safely lowered.

G. Maneuvers: Normal Category maneuvers only are approved.

H. Flight Load Factors: (At maximum gross weight of 2300 lbs.)

Maneuver: Positive - 3.8g
 Negative - 1.5g
 Flaps Extended - 1.9g

WARNING: Use controls with caution above 125 mph (109K) CAS.

I. Maximum Weight - 2300 lbs.

J Center of Gravity Limits: (+15.6) to (+19.0) at 2300 lbs.
 (+14.5) to (+20.5) at 2100 lbs.
 (+11.1) to (+20.5) at 1500 lbs. or less

Straight line variation between points
 given. Datum: Wing Leading Edge

NOTE: It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See loading instructions provided in the Weight and Balance Section of the Airplane Flight Manual.

MAULE MODEL M-4-220 SERIES

AIRPLANE FLIGHT MANUAL

K. Placards:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATION LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUAL."

"NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED."

"ROUGH AIR OR MANEUVERING SPEED: 125 MPH (109K)"

"TAKE OFF WITH 15° FLAPS"

"SEE LOADING INSTRUCTIONS IN WEIGHT AND BALANCE SECTION OF AIRPLANE FLIGHT MANUAL."

Type of Operation Authorized:

"THIS AIRPLANE APPROVED FOR DAY OR NIGHT IFR NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135"

Fuel System Operation:

"FUEL REMAINING IN TANK WHEN INDICATOR READS ZERO CANNOT BE USED SAFELY IN FLIGHT."

L. Caution:

Take off and land on fullest main tank

Flight into icing conditions not approved

II. PROCEDURES

PREFLIGHT INSPECTION:

A. INTERIOR:

1. BAT. Switch.....ON
2. Fuel gauges.....CHECK INDICATIONS
3. All Electrical Switches.....OFF
4. BAT. Switch.....OFF
5. Flaps.....FULL DOWN

- B. EXTERIOR: Begin at the left front door, proceed around the left wing to the nose area, then around the right wing and back to the fuselage, then around the tail section.

1. Fuel drains behind step.....DRAIN (2)
2. Left Flap.....CHECK HINGES & CONTROL ATTACHMENT
3. Aileron.....CHECK HINGES & CONTROL ATTACHMENT
4. Wing Top.....CHECK FOR WRINKLES AS INDICATION OF INTERNAL DAMAGE

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MAULE MODEL M-4-220 SERIES
AIRPLANE FLIGHT MANUAL

II PROCEDURES: (Cont'd)

5. Wing Main & Aux Fuel Tank Drains.....DRAIN (2)
6. Wing tip and nav. light.....CHECK FOR DAMAGE
7. Auxiliary fuel tank.....VISUALLY CHECK QUANTITY
8. Landing light.....CHECK FOR DAMAGE
9. Wing Tiedown.....REMOVE
10. Pitot tube.....REMOVE COVER
11. Stall Warning Switch.....CHECK FOR FREEDOM OF MOVEMENT
12. Main Fuel Tank.....VISUALLY CHECK QUANTITY
13. Left Landing Gear.....CHECK TIRE INFLATION AND BRAKE LINE SECURITY
14. Bottom left side of cowl.....DRAIN GASCOLATOR (1)
15. Top Cowl; Oil access door.....CHECK OIL QUANTITY
16. Propeller.....CHECK LEADING EDGE FOR DAMAGE
17. Air inlets.....CHECK FOR FOREIGN OBJECTS, INSPECT VISIBLE CONNECTIONS AND COMPONENTS
18. Right landing gear.....CHECK TIRE INFLATION AND BRAKE LINE SECURITY
19. Right wing and controls.....INSPECT SAME AS LEFT WING
20. Wing Main & Aux Fuel Tank Drains.....DRAIN (2)
21. Right fuselage side and top.....INSPECT FOR WRINKLES AS INDICATION OF INTERNAL DAMAGE
22. Static port.....CLEAR
23. Right Stabilizer.....CHECK ATTACHMENT POINTS AND STRUT
24. Right Elevator.....CHECK HINGE POINTS
25. Rudder.....CHECK HINGE POINTS, CONTROL ATTACHMENTS AND NAV. LIGHT
26. Tailwheel.....CHECK INFLATION, ATTACHMENTS, REMOVE TIEDOWNS
27. Left Elevator.....CHECK TAB CONTROLS AND ALL HINGE POINTS
28. Left Stabilizer.....CHECK ATTACHMENT AND STRUT
29. Left Fuselage side and bottom.....CHECK FOR WRINKLES AS INDICATION OF INTERNAL DAMAGE
30. Left side Static port.....CLEAR

NORMAL FLIGHT OPERATIONS:

A. Normal Procedures

1. Wing Flap Settings:

Takeoff	15°	(First Notch)
Cruise	0°	(Full Up-Retracted)
Landing	35°	(Second Notch)

2. Best Rate of Climb Speed: 90 MPH (CAS) at sea level

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MAULE MODEL M-4-220 SERIES

AIRPLANE FLIGHT MANUAL

II PROCEDURES: (Cont'd)

3. Right Rudder Trim: Use of right rudder trim is recommended during takeoff and climb and high speed level flight to reduce the amount of right rudder force required. During level flight at moderate speeds and glide, the trim control should be in the OFF position.
4. Stall Warning Indicator: The electric stall warning system will light a red light on the instrument panel at approximately seven mph above the stalling speed. It will be inoperative when the master switch is off.
5. Loss of altitude prior to recovery from a stall may be as much as **200** feet.
6. Maximum 90° crosswind velocity demonstrated: 20 mph
7. Anti-Collision Beacon
WARNING: Anti-collision light may cause adverse effect on pilot when flying in overcast or haze. Recommend it be turned off under these conditions.

B. Emergency Procedures:

1. Air Restart
Check mixture rich
Use Aux. pump for engine restart.
2. Engine Failure
Use 15° flap setting (first notch), maintain 85 mph. (78K) CAS. If air restart is not possible, cut ignition and master switches. Execute forced landing.
3. Engine Fire
Turn fuel valve OFF.
Open throttle to full ON position.
Turn ignition switch OFF.

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WEIGHT AND BALANCE

Serial Number _____ Registration Number _____

It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The empty weight, empty weight center of gravity and useful load are listed below for this airplane as delivered from the factory. If the airplane has been altered, refer to the aircraft log and/or aircraft records for this information.

WEIGHT AND BALANCE DATA SUMMARY:

Basic Empty Weight (including engine oil)..... _____ Lbs.
Gross Weight (For M-4-220C ONLY)..... 2300 Lbs.
Gross Weight (For M-4-220S ONLY)..... 2100 Lbs.
Useful Load..... _____ Lbs.
Empty Center of Gravity..... _____ Inches
Empty Weight Moment..... _____ Inch Lbs.

CENTER OF GRAVITY RANGE: (For M-4-220C ONLY)

<u>Center of Gravity Range</u>	<u>At Weight of</u>
+15.6 to +19.0 inches	2300 lbs.
+14.5 to +20.5 inches	2100 lbs.
+11.1 to +20.5 inches	1500 lbs. or less

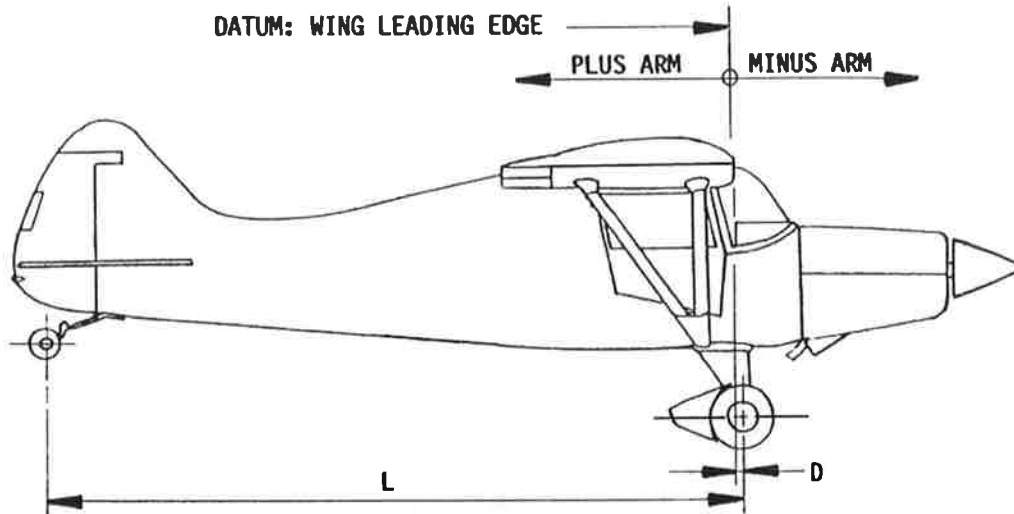
CENTER OF GRAVITY RANGE: (For M-4-220S ONLY)

+15.0 to +20.5 inches	2100 lbs.
+11.0 to +20.5 inches	1400 lbs. or less

NOTE: Straight line variation between given points
DATUM: Wing leading edge

CERTIFIED BY _____ DATE _____

DETAILED CALCULATIONS OF EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY AS DELIVERED FROM FACTORY:



PROCEDURE:

1. Place each of the wheels on a scale with the tailwheel elevated to place the airplane in approximately the flight attitude.
2. Place a level on the leveling mark and leveling lug on the bottom of the right wing near the root. Adjust the height of the tailwheel until the aircraft is level.
3. Measure the following distances:
 - a. Wheel base (**L**) - the horizontal distance from the tailwheel weight point (center of axle) to the main wheel weight point (center of axle).
 $L = \underline{\hspace{2cm}}$ Inches
 - b. Main Wheel Station (**D**) - the horizontal distance from the main wheel weight point (center of axle) to the datum line.
 $D = \underline{\hspace{2cm}}$ Inches
4. Measure the weights at the following points:
 - a. **Right Main Wheel**..... = $\underline{\hspace{2cm}}$ Lbs.
 - b. **Left Main Wheel**..... = $\underline{\hspace{2cm}}$ Lbs.
 - c. **Tailwheel**, with tare = $\underline{\hspace{2cm}}$ Lbs., minus tare of $\underline{\hspace{2cm}}$ Lbs.
 = net Tailwheel wt. (**T**) of $\underline{\hspace{2cm}}$ Lbs.

Total Weight as Weighted (**W**) = $\underline{\hspace{2cm}}$ Lbs.

The above empty weight includes unusable fuel of 18 lbs. at 24 inches and 8.8 quarts of oil at minus 37 inches, plus all items of equipment as marked on the accompanying Equipment Lists. The Certificated empty weight is the above weight less 11.6 lbs.

drainable oil at a minus arm of 37 inches and for this airplane is _____ lbs.

The corresponding empty weight center of gravity is _____ inches.

5. Calculations for determining weight, C.G. and moment:

a. Center of Gravity (inches) = $\frac{L \times T}{W} - D$

i.e., C.G. = _____ - _____ = _____ inches.

b. Moment (inch pounds) = $W \times C.G.$

i.e., Moment = _____ x _____ = _____ inch lbs.

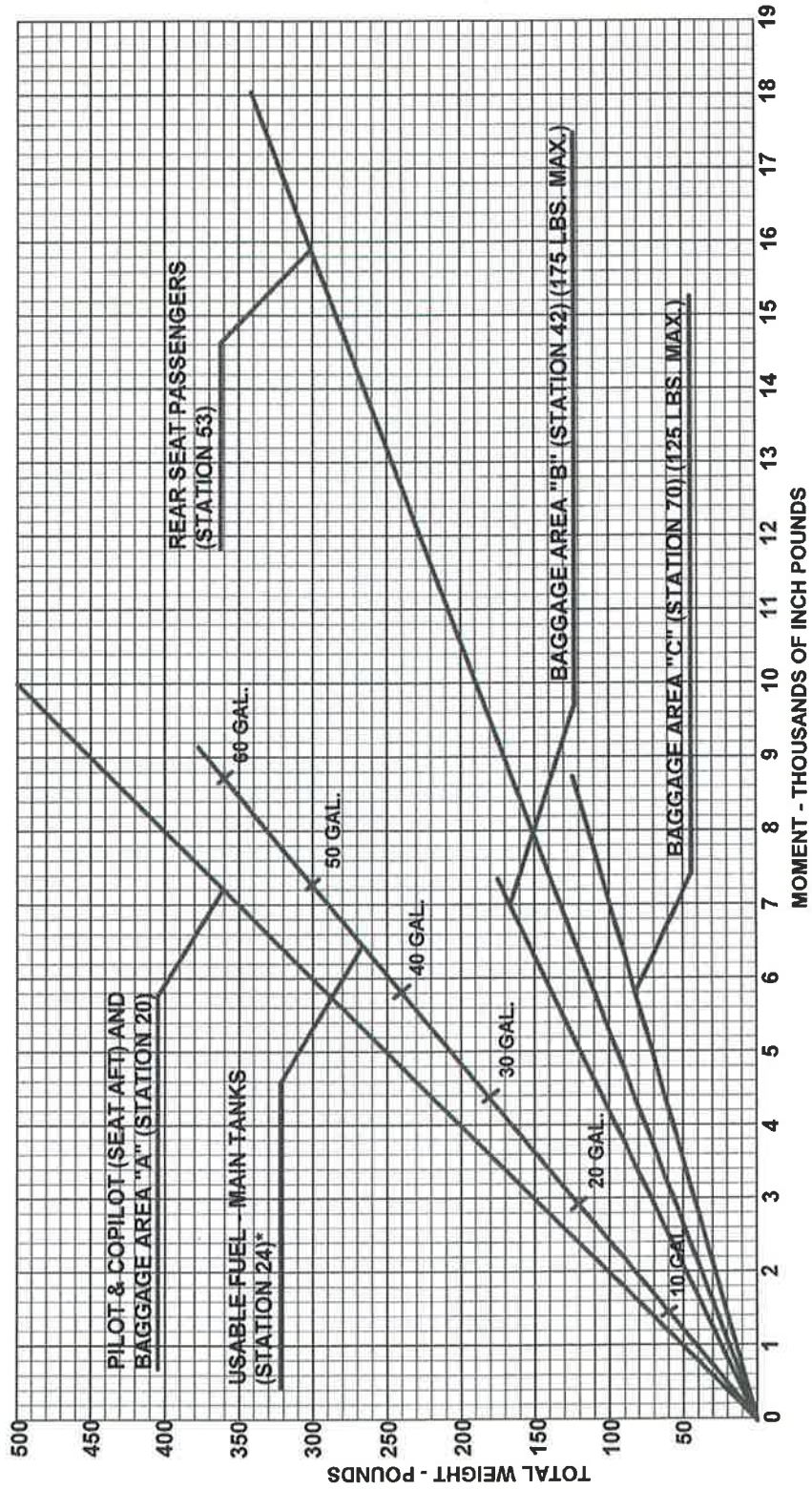
EXAMPLE OF WEIGHT AND BALANCE CALCULATION FOR LOADED AIRCRAFT:

An airplane with an empty weight of 1324 lbs. and empty weight C.G. location of 10.8 inches is loaded with a pilot and front seat passenger, fuel and baggage.

Item	Weight, lbs.	C.G. Location	Moment, In.lbs.
Empty Weight (including engine oil)	1324	10.8	14,299
Pilot and Front Passenger	340	*	6,800
Fuel - 40 gal. in Mains	240	*	5,760
Baggage (Area "C")	<u>50</u>	*	<u>3,500</u>
	1954	15.5	30,359

*Moments can be read directly from the loading graph.

By locating the point corresponding to 1954 lb. aircraft weight and a C.G. Location of 15.5 inches on the Center of Gravity envelope graph, you can see that this point falls within the envelope, signifying the loading is acceptable.



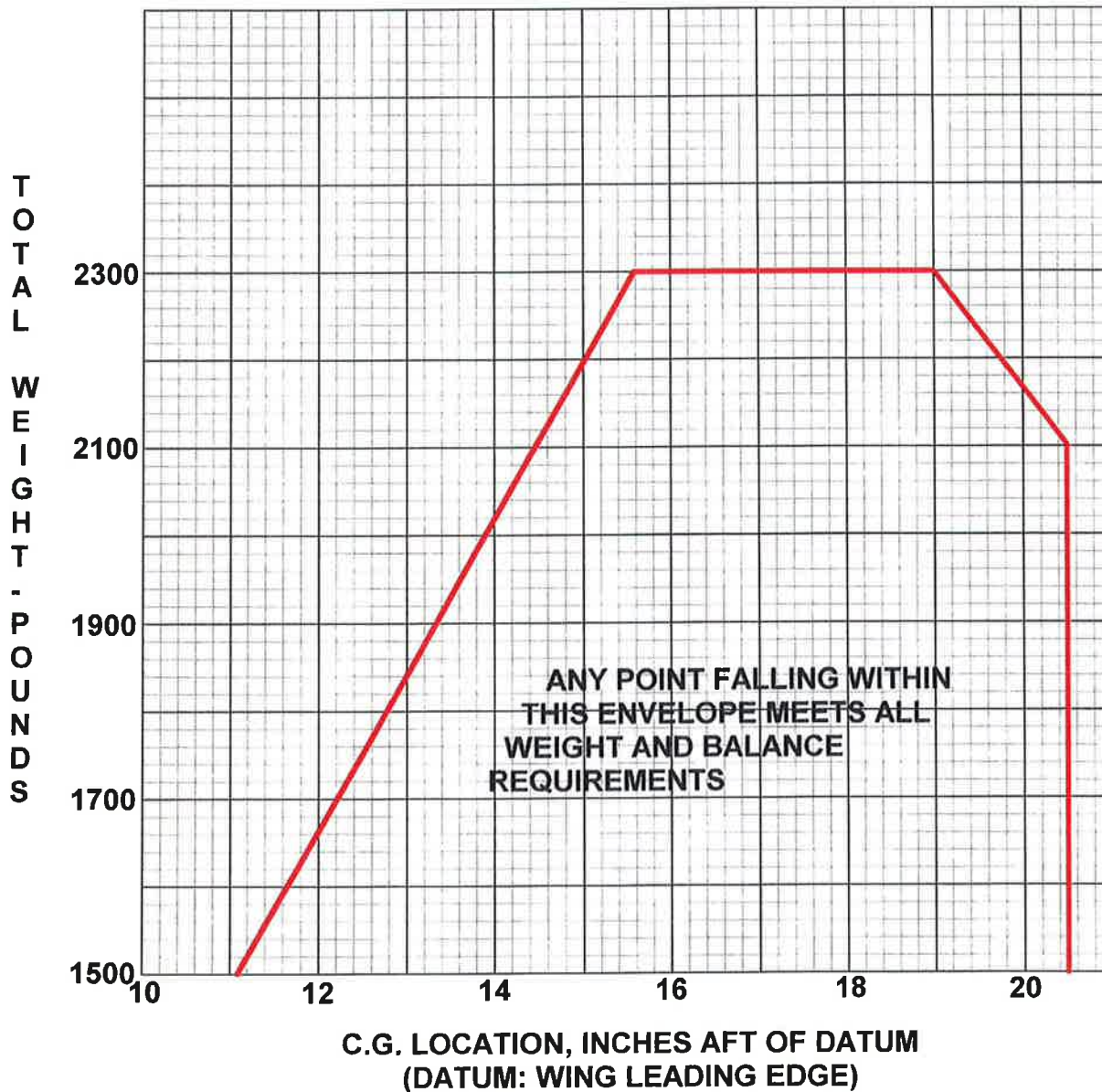
LOADING CHART

*USE (STATION 22.2) FOR FINDING AUX TANK USABLE FUEL MOMENT

PROCEDURE FOR DETERMINING WEIGHT & CENTER OF GRAVITY:

1. Add weight of items to be carried to the basic empty weight of the aircraft.
2. Find moments of items to be carried by using the above loading graph and add these moments to the empty moment of the aircraft. Divide total moment by total weight for aircraft C.G. location.
3. Using the C.G. location from Step 2, find the point on the Weight and Balance Envelope.

WEIGHT AND BALANCE ENVELOPE



Note: Weight and Balance Envelope above is for M-4-220C only. Also, see AFM Supplement No. 4 for Weight and Balance Envelope if Auxiliary Fuel Tanks are installed.

STRUCTURAL CAPACITY CHART

