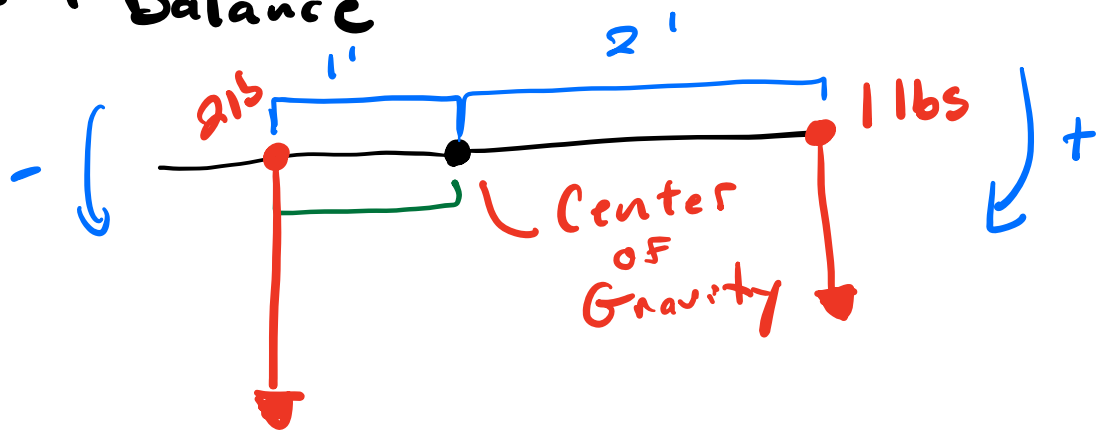


Weight + Balance



$$\text{Moments: } +2 + (-2) = 0$$

Terms:

Datum: Line measure from

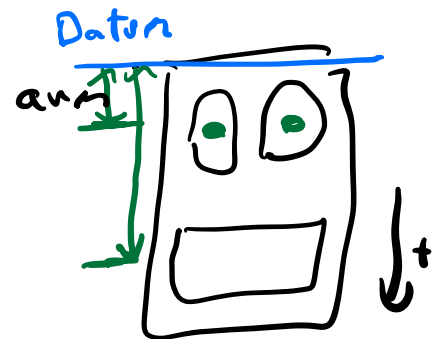
Station: Payload area

Arm: Distance from datum

Moment: Arm \times weight

CoG: Total moments / Total weight

Envelope: Acceptable range weight / moment



Weights:

Basic empty weight \leftarrow

Standard empty weight: weight from factory

Licensed empty weight: old term

Max ramp weight: taxi, not T/O

Fuel 100LL: 6 lbs/gallon

T182 50 gal 100LL

Pilot 160 lbs
Copilot 180 lbs
Pass. 120 lbs

Fuel burn: 40 gal

	<u>Old</u>	<u>New</u>
(37") Front	Pilot 160	Front 160
	Copilot 180	Back 180
(74") Back	Pass 120	120

Front: -180

Back: +180

2667.1 lbs

Old
105.3 in-lbs/100

$$1000 \cdot 105.3 - 180 \cdot 37'' + 180 \cdot 74''$$

$$1000 \cdot 105.3 + 180 (74'' - 37'') = \boxed{111,960} \text{ New}$$

SAMPLE LOADING PROBLEM	SAMPLE AIRPLANE		YOUR AIRPLANE		Weight lbs	Moment lb.-in./1000
	Weight (lbs.)	Moment (lb.-ins./1000)	Weight (lbs.)	Moment (lb.-ins./1000)		
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	1815	64.0	1914	70.4	1907.1	69.91
2. Usable Fuel (At 6 Lbs./Gal) 46.5 Standard Tanks (88 Gal. Maximum)	528	24.6				
Reduced Fuel (65 Gal.)	390	18.2	390	18.2	300	14
3. Pilot and Front Passenger (Station 32 to 50) 37"	340	12.6	400	15.0	340	12.6
4. Second Row Passengers 74"	340	25.2	200	15.6	120	8.8
Cargo Replacing Second Row Seats - (Sta. 65 to 82)						
5. *Baggage (Area "A") or Passenger on Child's Seat (Sta. 82 to 109) 120 Lbs. Maximum	70	6.8	50	5.0		
6. *Baggage (Area "B") (Sta. 109 to 124) 80 Lbs. Maximum	19	2.2				
7. *Baggage (Area "C") (Sta. 124 to 134) 80 Lbs. Maximum			50	6.5		
8. RAMP WEIGHT AND MOMENT	3112	135.4			2667.1 lbs	105.3
9. Fuel allowance for engine start, taxi and runup.	-12	-.6				
10. TAKEOFF WEIGHT AND MOMENT (Subtract step 9 from step 8)	3100	134.8	3004	130.9		
11. Locate this point (3100 at 134.8) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable, provided that flight time is allowed for fuel burn-off to a maximum of 2950 pounds before landing. *The maximum allowable combined weight capacity for baggage in areas A, B, and C is 200 pounds. *The maximum allowable combined weight capacity for baggage in areas B and C is 80 pounds.					40 gal @ 6 - 240 lbs	-11.6

$$\frac{105.3 \times 1000 \text{ in.-lbs}}{2667.1 \text{ lbs}} = \boxed{39.48 \text{ in}}$$

2427.1	93.7
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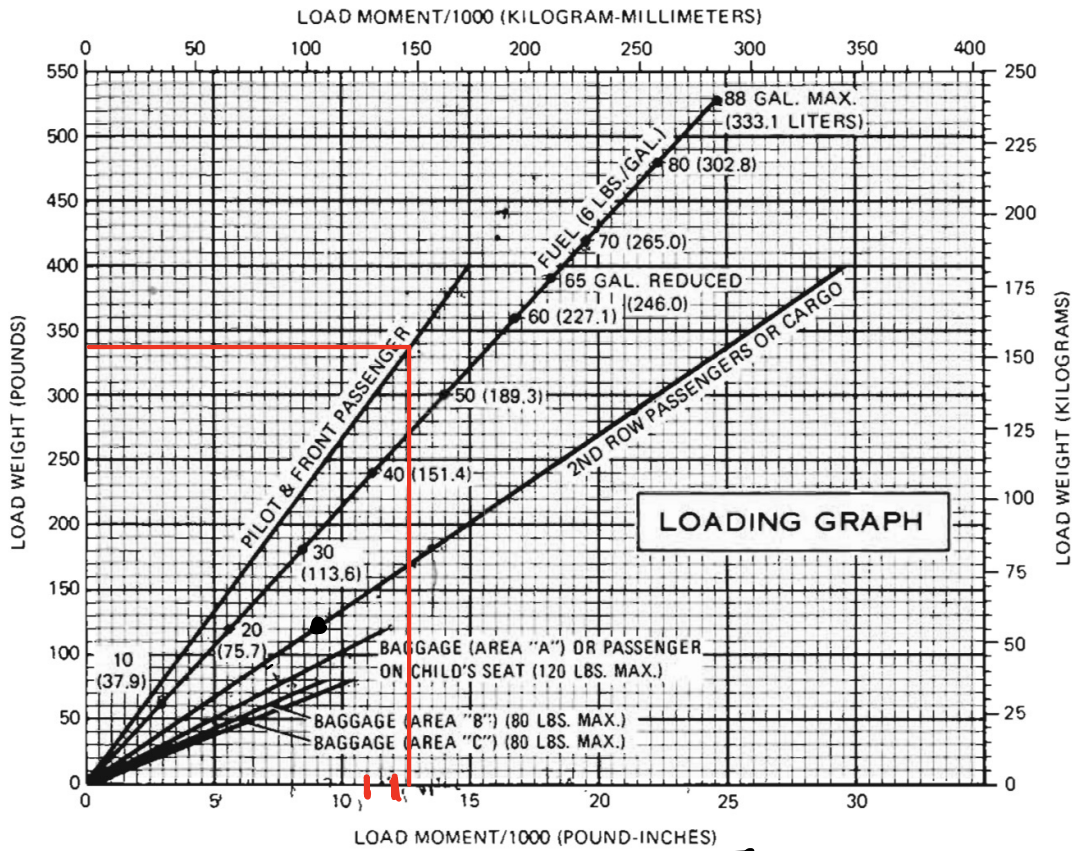


WEIGHT & BALANCE AND EQUIPMENT LIST AMENDMENT

DATE	WO #	OWNER	REG. #	MAKE & MODEL	SERIAL #
4/1/2024	4626	Plane Fun	N2017E	Cessna T182	18268183

ITEM	WEIGHT	ARM	MOMENT
Previous empty weight as of 4/10/2020	1911.0		69891.300
Remove Nose Wheel Pant:	-3.9	-6.00	23.400
			0.000
			0.000
			0.000
			0.000
			0.000
			0.000
			0.000
Totals	1907.1	36.66	69914.700
NEW EMPTY WEIGHT	1907.1		
E.W.C.G.	36.66		
MOMENT			69914.700
MAX TAKE-OFF WEIGHT	3100		
USEFUL LOAD	1192.9		

Robert L. Reinecke
 Robert L. Reinecke AP34555791A



NOTE: 1. Line representing adjustable seats shows pilot and front seat passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant C.G. range.

Figure 6-6. Loading Graph

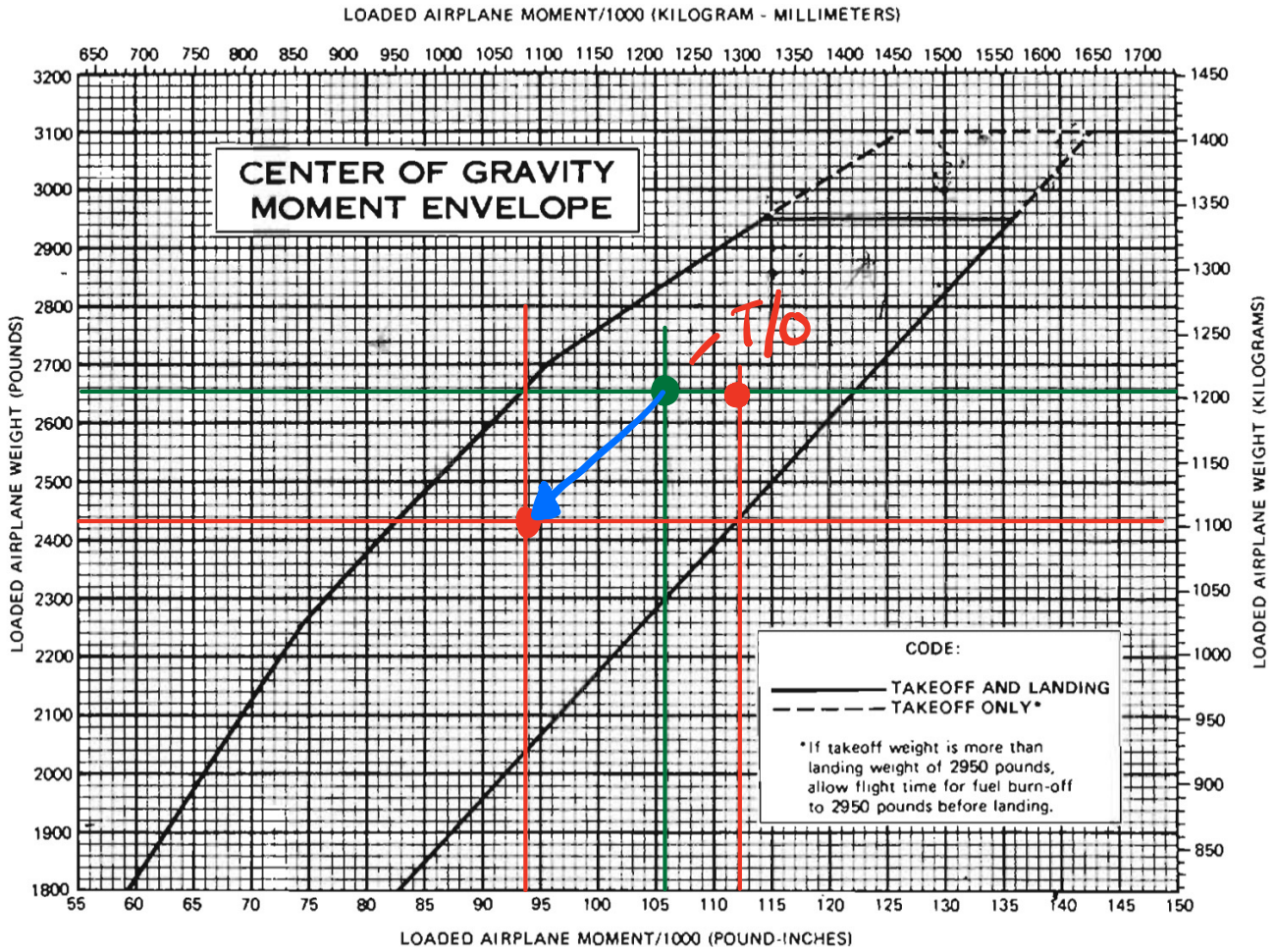


Figure 6-7. Center of Gravity Moment Envelope

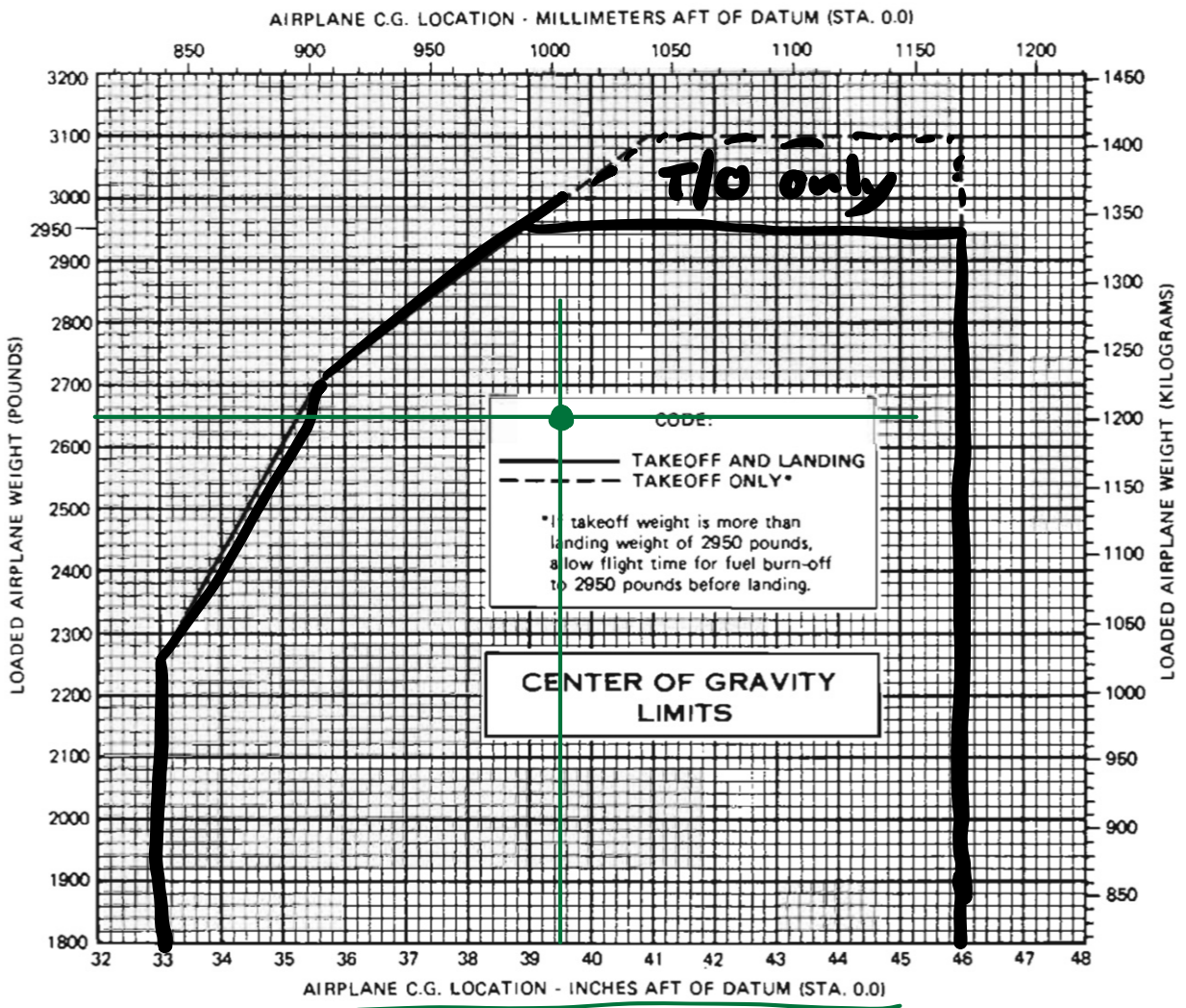


Figure 6-8 Center of Gravity Limits

Overweight

- Longer T/O roll
- Slower climb
- Long landing roll
- Structural damage

Aft CG

Less stable, faster cruise speed
Limited forward elevator, stall

Forward CG

More stable, slower cruise speed
Limited rear elevator, landing