

WEIGHT AND BALANCE

This is the easiest method of determining weight and balance (weighing the occupant(s) with the airplane). But it does require that you have scales for the main wheels that can weigh up to 500 pounds. Two bathroom scales side-by-side bridged by a 2 x 6 piece of lumber for each main wheel will typically have sufficient capacity. If you have only one scale per wheel, then you will need to do a weight and balance for the airplane by itself and then calculate the moments for the occupants.

	Weight (lbs)	Distance from L.E. of Wing (inches)	Moment (in-lbs)
Left wheel	A	E	$M1 = A \times E$
Right wheel	B	F	$M2 = B \times F$
Tailwheel	C	G	$M3 = C \times G$
Total weight $D=A+B+C$	D	$H = \text{Resultant Distance}$ (in inches)	
		$H = \frac{M1 + M2 + M3}{D}$	
$\% \text{ C.G.} = \frac{H \times 100}{64}$			
The 5 C.G. should be: greater than 20% and less than 37%			

- Set airplane on scales with wings at 9 degrees angle of attack. (Refer to drawing)
- Have 2 bathroom type scales under each main wheel (so you can weigh airplane with occupants)
- Critical C.G. will probably be the lightest pilot solo with full fuel - this would be the aft C.G.
- Forward critical C.G. would be with the 2 heaviest occupants with low fuel.

For each loading condition find the following:

- Find weights: A, B & C
- Measure: E, F & G
- Calculate: M1, M2 & M3
- Calculate: H
- Calculate: %C.G.

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	Weight (lbs)	Distance from L.E. of Wing (inches)	Moment (in-lbs)
Left wheel	A	E	$M1 = A \times E$
Right wheel	B	F	$M2 = B \times F$
Tailwheel	C	G	$M3 = C \times G$
Pilot*	J	N	$M4 = J \times N$
Passenger*	K	O	$M5 = K \times O$
Gas	L	P	$M6 = L \times P$
Parachute	M	Q	$M7 = M \times Q$
Total Weight = $A+B+C$ +(whichever items of J, K, L, M)			
Total Moment = $M1+M2+M3$ +(whichever of M4 thru M7)			
$H = \frac{\text{Total Moments}}{\text{Total Weight}} = \text{Resultant Distance}$			
$\% \text{ C.G.} = \frac{H \times 100}{64}$ The 5 C.G. should be: greater than 20% and less than 37%			

* The C.G. of a seated person is approximately at the front of the stomach (navel).

- Set airplane on scales with wings at 9 degrees angle of attack. (Refer to drawing)
- Set a scale under each wheel.
- Critical C.G. will probably be the lightest pilot solo with full fuel - this would be the aft C.G.
- Forward critical C.G. would be with the 2 heaviest occupants with low fuel.

For each loading condition find the following:

- Find weights: A, B & C
(Weigh items A, B & C plus whichever of items J thru M that you are including in the weight and balance calculations)
- Measure: E, F & G
- Calculate: M1, M2 & M3
- Calculate: H
- Calculate: %C.G.

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