Weight and Balance

From the desk of Paul D Bessler   License: 2718447 A&P

Registration No. ____N6038____   Serial No. __14__
Glider Mfg. ____Start & Flug____   Model: H-101 Salto
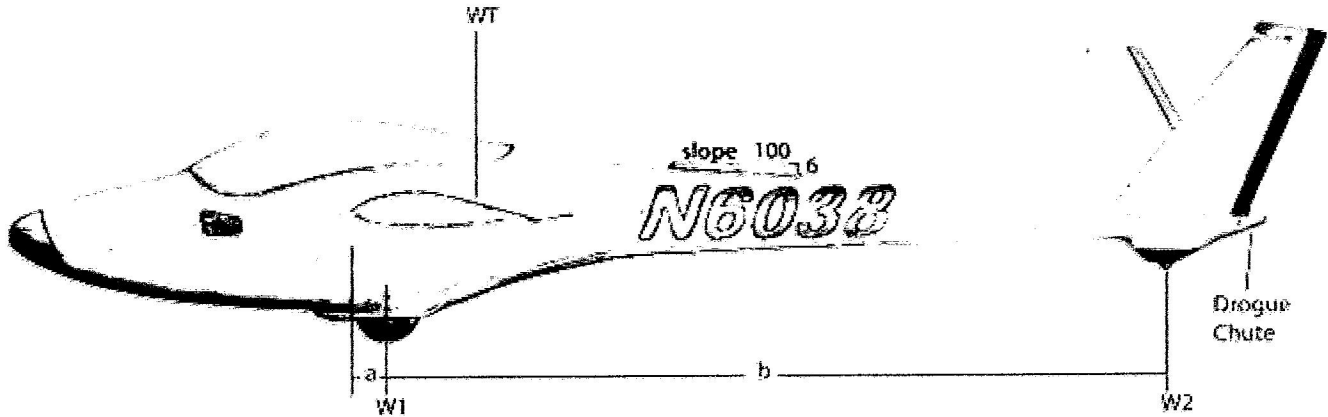
Leveling means: Slope of rear top fuselage : ____100 to 6____
Datum point : Wing leading edge 100mm (4") outwards wing/fuselage gap

Weight on main gear	: W1 = ____405____	lbs.
Weight on tail wheel	: W2 = ____50____	lbs.
Total weight	: WT = ____455____	lbs. W1 + W2

Distance a	: a = ____6.41____	in.
Distance b	: b = ____145.5____	in.
Center of gravity (CG empty)	: x = ____22.40____	in.

$$CG = x = \frac{(W2)(b)}{WT} + a$$

$$x = \frac{(50)(145.5)}{(455)} + 6.41$$

$$x = \underline{22.40}$$

List of equipment included:
Airspeed
Altimeter
G-meter
Compass
Mechanical vario
Clock
Attitude gyro (14v)
Directional gyro (14v)
2 batteries (14v)
22 ft^3 O$_2$ bottle and equipment [station = 21.5 in.   wgt = 11.95 lbs]
        (full vs empty less than 2 lbs)

Flying weight CG

Empty CG: _22.40_ in.
Flying weight CG Limits: _9.25 to 13.18 in._
Max. Gross weight: _683_ lbs
Pilot position from datum: _-9.55_ in. (ie 9.55 inches *in front of* datum)
Formulae allow for negative, so enter pilot arm without sign.

Max pilot weight with chute: = PH

$$PH = \text{Max gross weight} - \text{empty weight} \quad \{ie \ WT\}$$
$$PH = \underline{\ 683\ } \text{lbs} - \underline{\ 455\ } \text{lbs} = \underline{\ 228\ } \text{lbs}$$

Check CG for MAX pilot weight: $x = \dfrac{(WT)(CG\ empty) - (PH)(Pilot\ arm)}{\text{Max gross weight}}$

$$x = \frac{(455)(22.40) - (228)(9.55)}{683}$$

$$x = \underline{\ 11.73\ } \text{in.} \qquad \{\text{allowed 9.25 to 13.18 in.}\}$$

Therefore, _228_ lbs max pilot wgt is   OK / not OK.

MIN. pilot weight with chute PL:

Develop formula (x = max rear CG = 13.18):

$$x = \frac{(WT)(CG\ empty) - (PL)(Pilot\ arm)}{WT + PL}$$

Solve for PL

$$(PL)(x) + (PL)(Pilot\ arm) = (WT)(CG\ empty) - (WT)(x)$$

$$(PL)(x + Pilot\ arm) = (WT)(CG\ empty - x)$$

thus

$$PL = \frac{(WT)(CG\ empty - x)}{(x + pilot\ arm)}$$

$$PL = \frac{(455)(22.40 - 13.18)}{(13.18 + 9.55)} \qquad \text{........ enter data here}$$

$$PL = \underline{\ 184.6\ } \text{lbs}$$

Therefore, _184.6_ lbs is min. pilot (plus chute) weight.

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