

**\*\* VERY IMPORTANT – FIGURE WEIGHT AND BALANCE BEFORE FLIGHT. \*\***

**CENTER OF GRAVITY (C.G.) CALCULATION METHOD**

THE MOMENT IS MEASURED IN INCH POUNDS, WHERE THE INCH DIMENSION IS THE ARM LENGTH AND POUNDS ARE THE FORCE (WEIGHT) APPLIED AT THE ARM LOCATION. THE DATUM -0- IS THE POINT FROM WHICH ALL ARM LENGTHS ARE MEASURED.

FOR THE AIRPLANE, THE INDIVIDUAL MOMENTS FOR EACH ITEM ARE ADDED TO GIVE THE AIRPLANE'S TOTAL MOMENT (ABOUT DATUM -0-). NEXT THE TOTAL MOMENT IS DIVIDED BY THE AIRCRAFT'S FLYING WEIGHT, GIVING YOU THE C.G. LOCATION. THE FLYING WEIGHT WILL CHANGE FOR VARIOUS PILOT WEIGHTS, PASSENGER WEIGHTS, AND/OR FUEL QUANTITY.

**SAMPLE CALCULATION:**

1) PERFORM WEIGHT & BALANCE IN NO WIND CONDITIONS WITH AIRPLANE LEVELED USING FUSELAGE TUBE SHOWN AS A LEVEL REFERENCE.

2) MEASURE AND RECORD THE WEIGHTS OF ALL THREE WHEELS. (NOTE: AIRCRAFT SHOULD BE IN EMPTY CONFIGURATION AND SHOULD BE RESTING ON THE TWO MAIN WHEELS AND TAIL WHEEL IN LEVEL POSITION AT ALL TIMES DURING THE MEASURING PROCESS.)

3) NOW EXPERIMENT WITH DIFFERENT LOADING CONDITIONS, FOR EXAMPLE:  
AFT C.G. – 130 LBS PILOT, FULL FUEL, NO BAGGAGE OR PASSENGER.  
FORWARD C.G. – HEAVY PILOT, NO FUEL, HEAVY PASSENGER OR BAGGAGE.

- A) FILL IN WEIGHT OF AIRCRAFT, PILOT, PASSENGER, BAGGAGE AND FUEL.
- B) MULTIPLY WEIGHT TIMES ARM TO GET THE INDIVIDUAL MOMENTS.
- C) ADD UP TOTAL FLYING WEIGHT.
- D) ADD UP TOTAL MOMENT.
- E) DIVIDE MOMENT BY WEIGHT TO GET C.G. LOCATION.
- F) RECALCULATE TAKING INTO ACCOUNT FUEL CONSUMPTION.

ACCEPTABLE C.G. RANGE: (LEVELED AIRPLANE)  
S MODEL: 105.95" (FORWARD) TO 110.9" (AFT)

**SAMPLE CALCULATIONS**

|                      | WEIGHT | X | ARM   | =                 | MOMENT   |
|----------------------|--------|---|-------|-------------------|----------|
| TAIL WHEEL           | 17     | X | 223.8 | =                 | 3,804.6  |
| RIGHT MAIN           | 299    | X | 117.3 | =                 | 35,072.7 |
| LEFT MAIN            | 307    | X | 117.3 | =                 | 36,011.1 |
| PILOT                | 195    | X | 76.0  | =                 | 14,820.0 |
| PASSENGER            | 0      | X | 109.0 | =                 | 0        |
| FUEL                 | 90     | X | 125.5 | =                 | 11,295.0 |
| WEIGHT ADDED IN NOSE | 10     | X | 29.7  | =                 | 297.0    |
| OTHER ITEMS          | 0      | X |       | =                 | 0        |
| TOTAL = 918          |        |   |       | TOTAL = 101,300.4 |          |

C.G. LOCATION =  $\frac{\text{MOMENT}}{\text{WEIGHT}} = \frac{101,300.4}{918} = 110.35" \text{ C.G.}$

NOTE: AFT C.G. LOCATION IN THIS EXAMPLE.

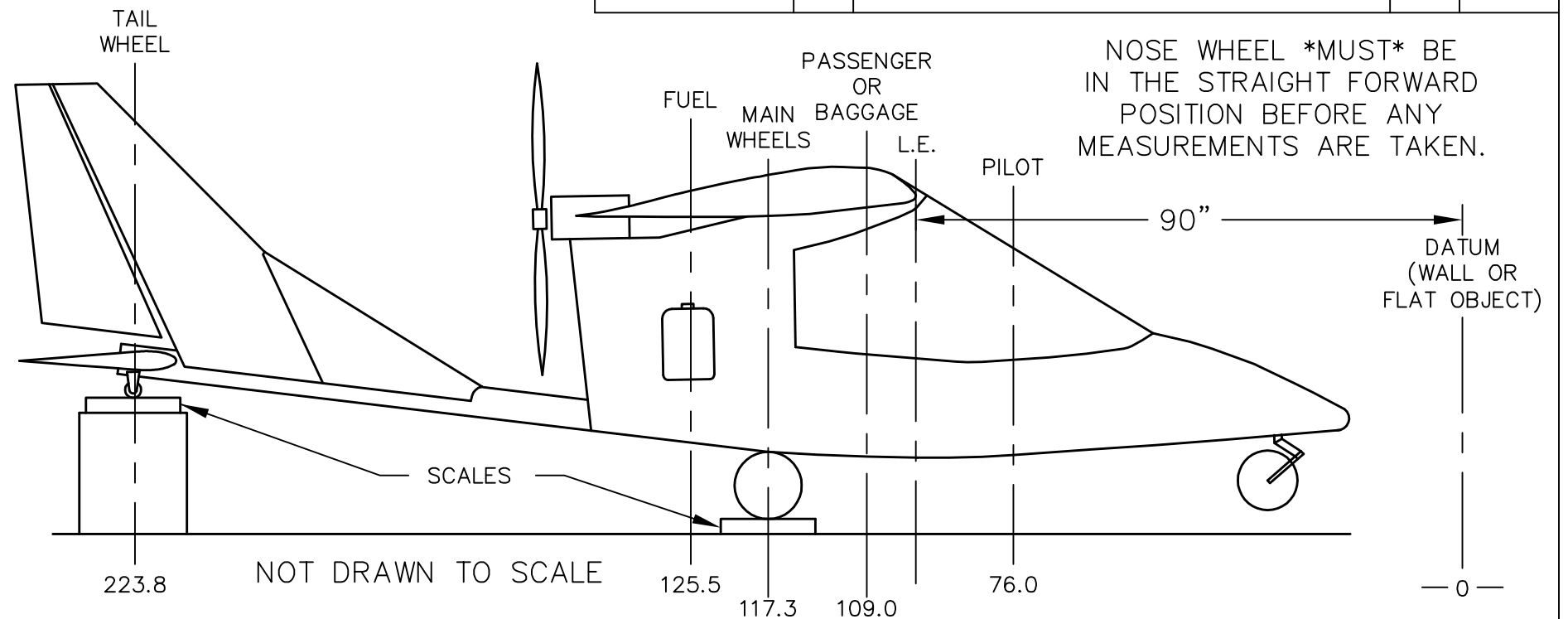
NOTE: ALL DIMENSIONS ARE AS FOLLOWS,  
WEIGHTS ARE POUNDS,  
ARMS ARE INCHES,  
MOMENTS ARE INCH POUNDS.

**YOUR CALCULATIONS**

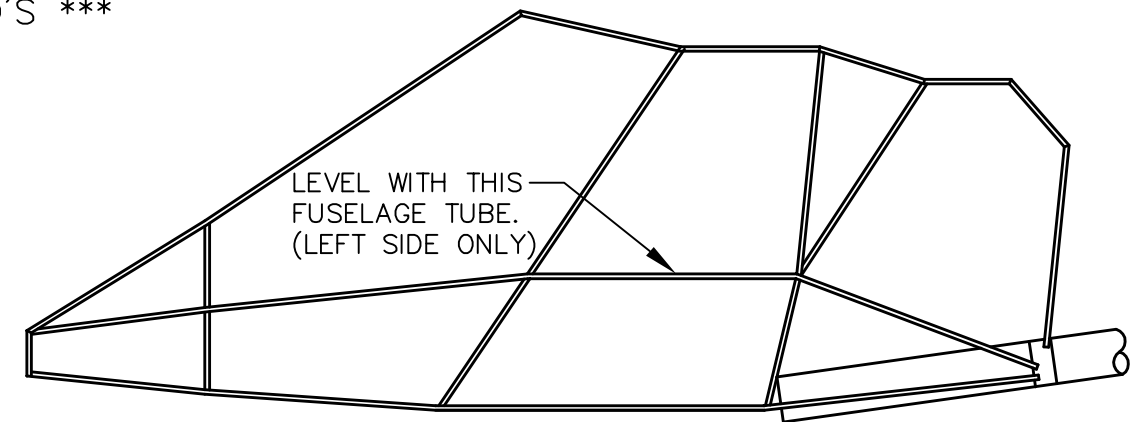
|             | WEIGHT | X | ARM | =       | MOMENT |
|-------------|--------|---|-----|---------|--------|
| TAIL WHEEL  |        | X |     | =       |        |
| RIGHT MAIN  |        | X |     | =       |        |
| LEFT MAIN   |        | X |     | =       |        |
| PILOT       |        | X |     | =       |        |
| PASSENGER   |        | X |     | =       |        |
| FUEL        |        | X |     | =       |        |
| OTHER ITEMS |        | X |     | =       |        |
| OTHER ITEMS |        | X |     | =       |        |
| TOTAL =     |        |   |     | TOTAL = |        |

C.G. LOCATION =  $\frac{\text{MOMENT}}{\text{WEIGHT}} = \text{---} = \text{---} \text{ C.G.}$

| REVISIONS |      |                  |    |      |
|-----------|------|------------------|----|------|
| E.C. NO.  | REV. | DESCRIPTION      | BY | DATE |
|           | A    | DRAWING RELEASED | KL | 8/02 |



\*S MODEL USE ONLY\*  
\*\*\* DO NOT USE FOR STANDARD SINGLE OR TWO PLACE TORNADO'S \*\*\*



**TITAN AIRCRAFT SUPPLY**  
1419 STATE ROUTE 45 SOUTH  
AUSTINBURG, OHIO 44010

|               |     |                    |  |
|---------------|-----|--------------------|--|
| DETAIL NAME   |     | WEIGHT AND BALANCE |  |
| SCALE         | N/A | PART NO.           |  |
| ASSEMBLY NAME |     | TORNADO S MODEL    |  |
| PART NO.      |     | DRAWING NO.        |  |
| DRAWING NO.   |     | B 02-INS-1375-A    |  |

|           |         |
|-----------|---------|
| DRAWN     | DATE    |
| K. LIPLIN | 8/22/02 |
| CHECKED   | DATE    |
| APPROVED  | DATE    |

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