

SECTION 6 WEIGHT AND BALANCE / EQUIPMENT LIST

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INTRODUCTION

This section describes the procedure for establishing the Basic Empty Weight and Moment of the airplane. These procedures involve weighing the airplane and are typically performed by maintenance organizations after major modifications, relocation of equipment, accomplishment of service bulletins, etc. Sample forms are provided for reference in this section.

The basic empty weight and centre of gravity of the airplane were established at the factory before delivery of the airplane and this information is provided in the Weight and Balance Record.

The procedures for calculating the weight and moment for various operations are also provided in this section.

WARNING

IT IS THE RESPONSIBILITY OF THE PILOT TO ENSURE THE AIRPLANE IS LOADED PROPERLY. OPERATION OUTSIDE OF PRESCRIBED WEIGHT AND BALANCE LIMITATIONS COULD RESULT IN AN ACCIDENT AND SERIOUS OR FATAL INJURY.

NOTE

The data in this section utilizes pounds for weight and inches aft of datum for C of G (centre of gravity).

AIRPLANE WEIGHING PROCEDURES

1. Preparation:

- a) Inflate tires to recommended operating pressures.
- b) De-fuel airplane. Refer to FAC2-M200 Maintenance Manual.
- c) Service engine oil as required to obtain a normal full indication.
- d) Move sliding seats to the most forward position.
- e) Raise flaps to the fully retracted position.
- f) Place all control surfaces in neutral position.
- g) Remove all non-required items from airplane.

2. Levelling:

- a) Place scales under each wheel (minimum scale capacity, 1000 pounds each main, 500 pounds nose wheel).
- b) Deflate the main wheel and/or lower or raise the nose wheel to properly centre the bubble in the level longitudinally and laterally (See Figure 6-1).

3. Weighing:

- a) With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

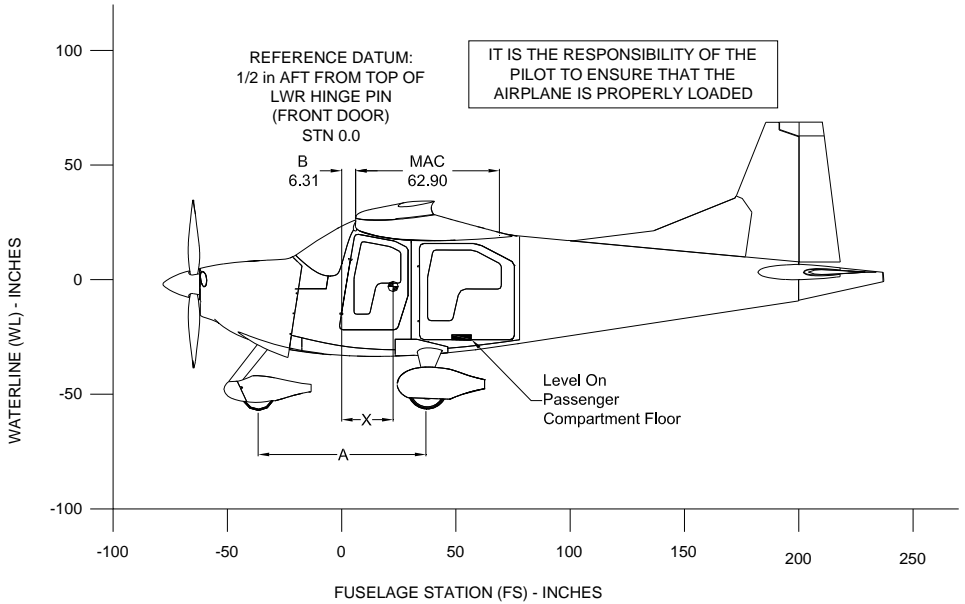
4. Measuring:

- a) Obtain measurement A in Figure 6-1 by measuring horizontally and parallel to the airplane centre line, from centre of nose wheel axle, left side, to a plumb bob dropped from the line between the main wheel centres. Repeat on right side and average the measurements.

5. Calculate C.G. and Weight:

- a) Using weights from Item 3 and measurements from Item 4, the airplane Basic Empty Weight and C.G. can be determined by completing the table in Figure 6-1.
- b) Transfer the basic empty weight and moment data from the table in Figure 6-1 to the Weight and Balance Record, a sample of which is shown in Figure 6-2.

AIRPLANE WEIGHING FORM



MEASURE "A"
Measure "A" per item 4 of this Section, to assist in locating CG with airplane weighed on landing gear

LEVELING PROVISIONS
Longitudinal & Lateral:
Floor of the Passenger Compartment

Figure 6-1 Airplane Weighing Form (Sheet 1 of 2)

| Weighing Point | Tare (lbs) | Scale Reading (lbs) | Net Weight (lbs) | Arm (inches) | Moment (in-lbs) |
|--|------------|---------------------|------------------|--------------|-----------------|
| Nose Wheel | | | | | |
| Right Main | | | | | |
| Left Main | | | | | |
| Total (Weighed) | | | | CG = | |
| CG = Total Moment / Total Net Weight | | | | | |
| Use spaces below to add or subtract items from weighed condition | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Empty Weight | | | | CG = | |
| Drainable Unusable Fuel (6lbs/USG) 1.7 USG | | | 10.2 | 21.8 | 222.4 |
| Basic Empty Weight | | | | | |
| Net Weight = Scale Reading - Tare Moment = Net Weight * Arm Arm is measured from the aircraft datum (See Figure 6-1) | | | | | |

Formula for Longitudinal CG (X):

$$(X) = \frac{(37.25 \times \text{Total Weight}) - (A \times \text{Nose Wheel Weight})}{\text{Total Weight}}$$

= () IN. AOD

Figure 6-1 Airplane Weighing Form (Sheet 2 of 2)

LOADING INSTRUCTIONS

It is the responsibility of the pilot to ensure that the airplane is properly loaded and operated within the weight and center of gravity limits. The following information will enable you to operate your FBA-2C3 within these limits. To calculate the weight and balance for a particular loading use the Sample Weight and Balance Loading Form (Figure 6-4), Loading Graph (Figure 6-5), Centre of Gravity and Moment Envelopes (Figure 6-6) and Centre of Gravity Range Envelope (Figure 6-7) as follows:

1. Take the Basic Empty Weight and Moment from appropriate Weight and Balance Record carried in your airplane and enter them on the Weight and Balance Loading Form (Figure 6-4).

NOTE

The moment which is shown must be divided by 1000 and this value is used as the moment/1000 on the loading form.

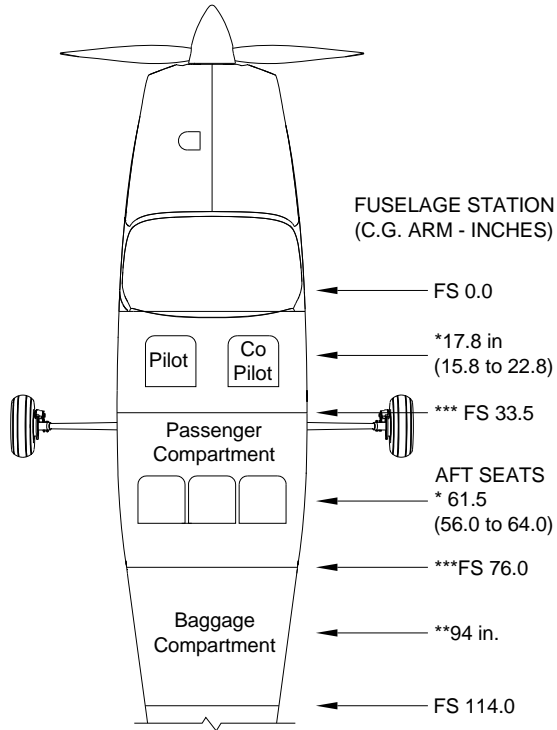
2. Use the Loading Graph (Figure 6-5) to determine the moment/1000 for each item (pilot & co-pilot, passengers, fuel, and baggage); then list these on the loading form (Figure 6-4).

NOTE

Loading Graph information for the pilot, passengers and baggage is based on seats positioned for average occupants and baggage loaded in the centre of the aft baggage compartment. For loadings which differ from these; additional moment calculations, based on the actual weight and C.G. arm (fuselage station) of the item being loaded, must be made if the position of the load is different from that shown in Figure 6-3 Basic Loading Configuration.

3. Sum the weights and moments/1000 (Item 9 in the Figure 6-4 Sample Weight and Balance Loading Form). Plot these values on the Centre of Gravity Moment Envelope (Figure 6-6) and on the Centre of Gravity Range Envelope (Figure 6-7) to determine whether the point falls within the envelope, and see if the loading is acceptable.

BASIC LOADING CONFIGURATION



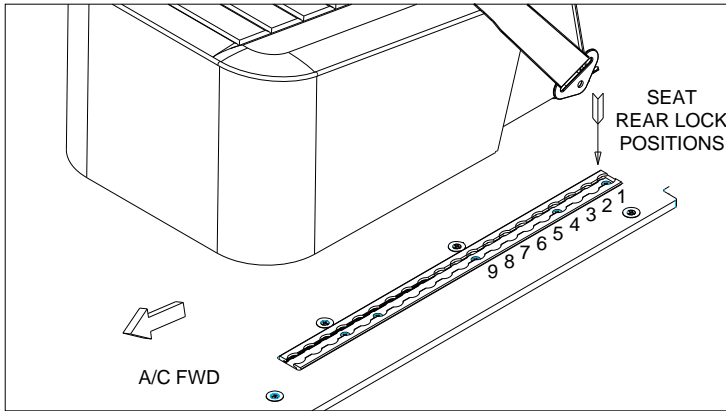
- * Pilot and passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parentheses indicate forward and aft limits of occupant center of gravity range.
- ** Arm measured to the centre of the area shown.
- *** The aft door forward edge (approx. stn 33.5) or the forward edge the baggage compartment floor (approx. stn 76.0) can be used as convenient interior points for determining the location.

Figure 6-3 Basic Loading Configuration

AFT SEATS

ALLOWABLE AFT SEAT POSITIONS

The aft seats are approved for the 9 positions shown below. The first position in figure below is the most aft position on the rail. The seats are to be installed facing **forward** only.



PASSENGER LOADING, WEIGHT & BALANCE

Following is a typical passenger loading table for a passenger weight of 175 lbs and 13.4 lbs seat. Actual passenger weight must be used for actual weight and balance calculation. Centers of gravity of the Passenger and seat locations are shown in the following Table.

2C3 AFT SEAT SEAT LOADING TABLE

| POSITION | WEIGHT (lbs) | ARM (in AOD) | MOMENT (in-lbs/1000) |
|----------|---|--------------|----------------------|
| 1 | AFT SEAT (ONE 175 LB PERSON & ONE AFT SEAT) = 188 lbs | 64 | 12.0 |
| 2 | | 63 | 11.8 |
| 3 | | 62 | 11.7 |
| 4 | | 61 | 11.5 |
| 5 | | 60 | 11.3 |
| 6 | | 59 | 11.1 |
| 7 | | 58 | 10.9 |
| 8 | | 57 | 10.7 |
| 9 | | 56 | 10.5 |

WEIGHT & BALANCE LOADING FORM

Serial # :

Date:

Registration:

| ITEM | DESCRIPTION | SAMPLE AIRPLANE | | | YOUR AIRPLANE | | |
|---|--|-----------------|---------------------|------------------------------|-----------------|---------------------|------------------------------|
| | | WEIGHT (lbs) | ARM (in. AOD) | MOMENT (in-lbs / 1000) | WEIGHT (lbs) | ARM (in. AOD) | MOMENT (in-lbs / 1000) |
| 1 | Basic Empty Weight <i>Includes unusable fuel & oil</i> | 2300 | 16.5 | 38.0 | | | |
| 2 | Front Seat Occupants <i>Pilot and Front Passenger at 22 in. arm for example</i> | 400 | 22.0 | 8.8 | | | |
| 3 | Rear Seat Occupants <i>Two 200lb passengers @ 56 in. arm for example</i> | 400 | 56.0 | 22.4 | | | |
| 4 | Baggage compartment (250 lbs Maximum) <i>75 lbs @ 94 in. arm for example</i> | 75 | 94.0 | 7.05 | | | |
| 5 | Zero Fuel Condition <i>Sub total from 1 through 4</i> | 3175 | 24.0 | 76.2 | | | |
| 6 | Usable Fuel (6.0 lb/USG) 98 Gallon Max. @ 21.8 in. Arm <i>98 Gallon @ 21.8 in. arm for example</i> | 588 | 21.8 | 12.8 | | | |
| 7 | Ramp Condition <i>Sub total item 5 & 6</i> | 3763 | 23.7 | 89.0 | | | |
| 8 | Fuel Allowance for Engine Start, Taxi and Run-Up <i>Normally 2 Gallon (12 lbs) @ 21.8 in. Arm.</i> | -12 | 21.8 | -0.3 | | | |
| 9 | Takeoff Condition <i>Subtract item 8 from 7. For CG (arm), divide Moment by weight. Example: 88800/3751 = 23.7</i> | 3751 | 23.7 | 88.8 | | | |
| Note 1: The takeoff weight in item 9 must not exceed 3800 lbs | | | | | | | |
| Note 2: The takeoff condition moment and CG must be within the limits shown in Figure 6-6 and Figure 6-7 at the takeoff weight condition. | | | | | | | |

Figure 6-4 Sample Weight and Balance Loading Form

LOADING GRAPH

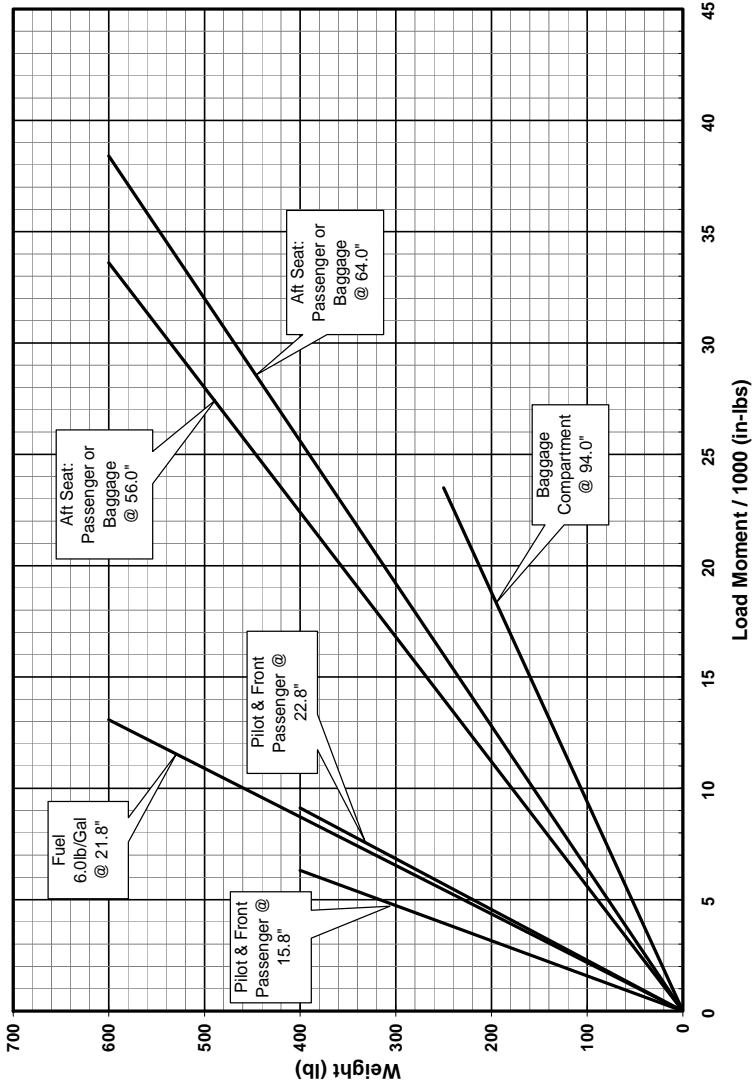


Figure 6-5 Loading Graph

CENTER OF GRAVITY MOMENT ENVELOPE

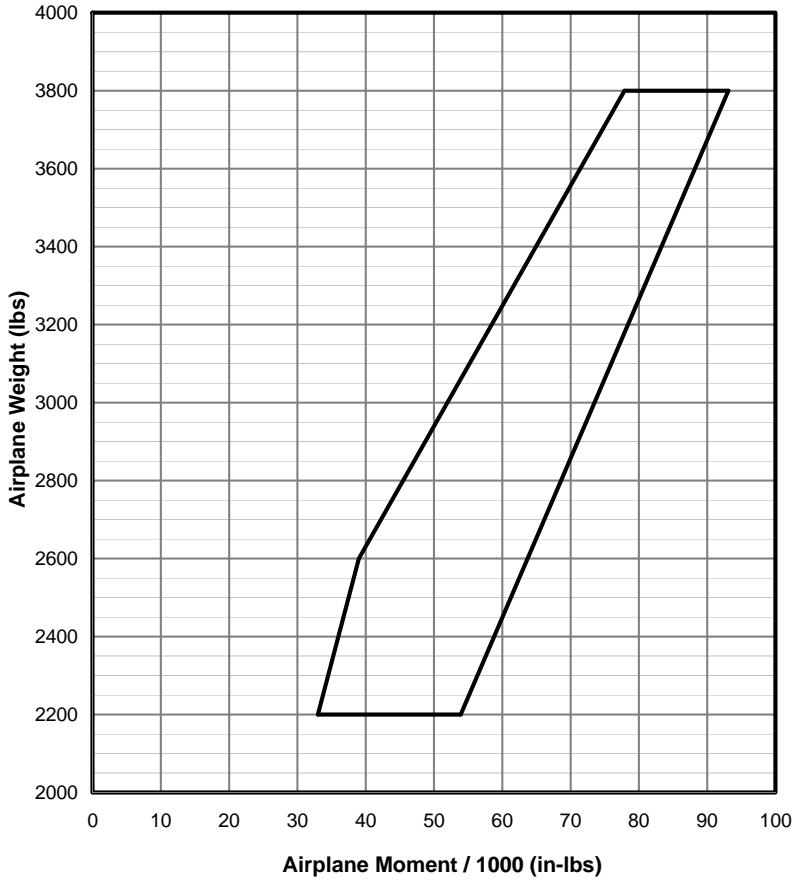


Figure 6-6 Centre of Gravity Moment Envelope

CENTER OF GRAVITY RANGE ENVELOPE

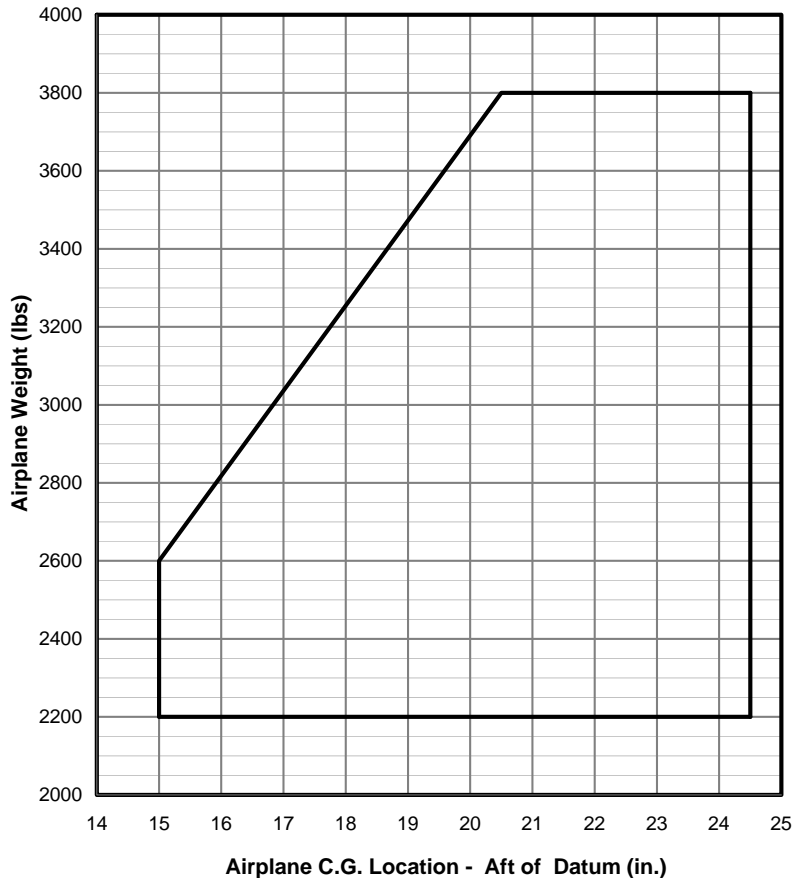


Figure 6-7 Centre of Gravity Range Envelope

BAGGAGE TIE-DOWN

14 tie-down rings are provided as standard equipment to secure baggage on the cabin floor aft of the pilot and the co-pilot seats. 4 of these rings are located on the pilot and co-pilot seat rails. 6 are located on frame just aft of the aft doors. The remaining 4 are located on the frame just aft of the pilot seat and the co-pilot seat just beneath the spar.

The baggage compartment begins aft of the aft doors. There are 2 tie-down rings located in the aft corners of this compartment as well as the 6 tie-down rings described above on the frame just aft of the aft doors.

CABIN HEIGHT MEASUREMENTS

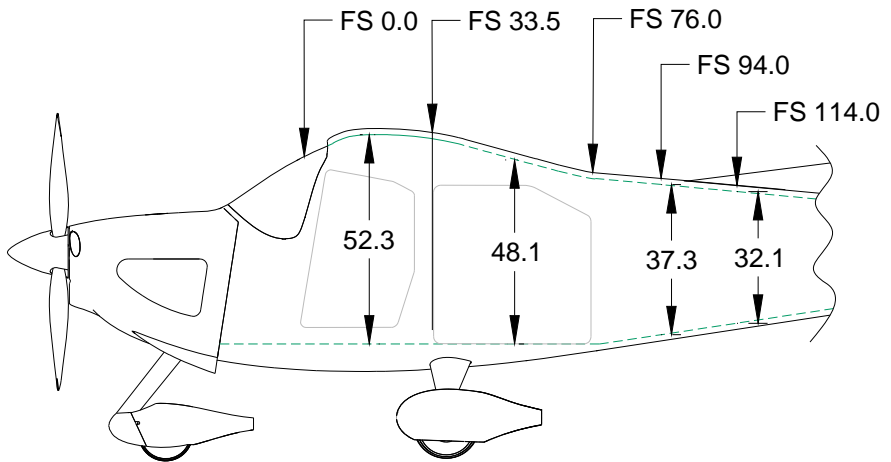


Figure 6-8 Internal Cabin Dimensions

DOOR OPENING DIMENSIONS

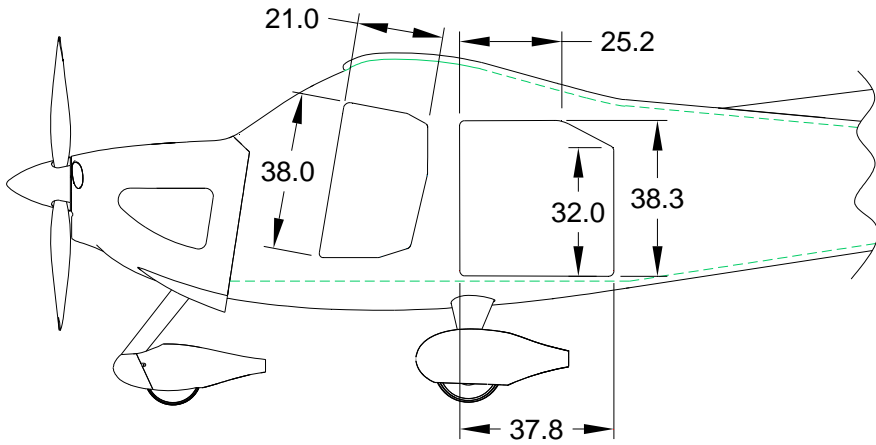


Figure 6-9 Door Opening Dimensions

CABIN WIDTH MEASUREMENTS

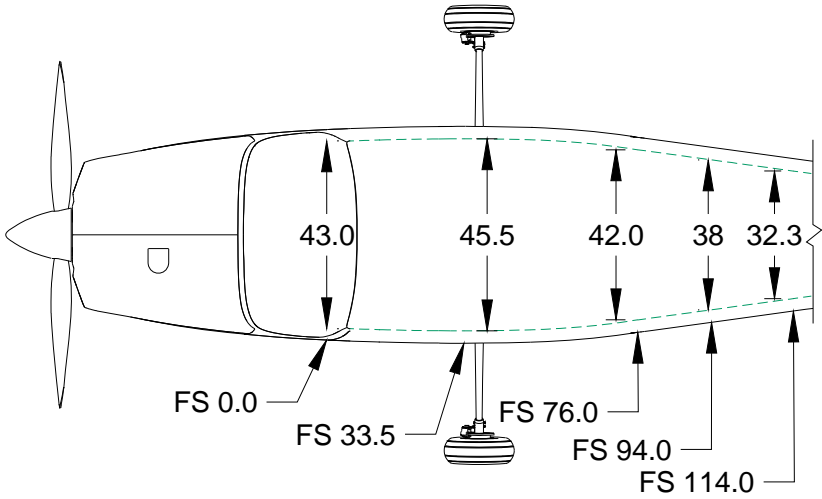


Figure 6-10 Cabin Width Measurements

COMPREHENSIVE EQUIPMENT LIST

A comprehensive list of the equipment installed in an FBA-2C3 airplane is provided with the Pilot's Operating Handbook at the time of delivery.