

## PROCEDURE 4.220

## INSTALLATION OF WINGS ON FUSELAGE

**In this procedure...**

The main wing will be aligned and mated to the fuselage. The 8 spar pins will be installed and the forward and aft shear tie brackets will be installed.

**Supplied Material:**

| <u>Part No</u> | <u>Qty</u> | <u>Description</u>      |
|----------------|------------|-------------------------|
| 111-11-019-01  | 1          | Wing Root Fairing Lower |
| 111-11-019-02  | 1          | Wing Root Fairing Lower |
| 111-11-019-03  | 1          | Wing Root Fairing Upper |
| 111-11-019-04  | 1          | Wing Root Fairing Upper |
| 111-12-020     | 8          | Spacer Main Spar        |
| 111-12-008     | 2          | Bracket Front           |
| 111-12-008-01  | 1          | Bracket, Right Rear     |
| 111-12-008-02  | 1          | Bracket, Left Rear      |
| 112-14-004     | 8          | Wing Pin Carrythrough   |
| AN970-8        | 16         | Washers                 |
| 1/8 x 20 x 1   | 16         | Bolts                   |

**Step 1. Lever Fuselage.**

Construct two saw horses to support the fuselage during the wing installation process. These saw horses should be constructed so that they will support 1000 lbs each. The forward sawhorse should be 37 inches high and the rear sawhorse should be 48 inches high. Set the fuselage on the sawhorses and level the fuselage in the pitch and roll axes. Use waterline 40 to level the fuselage in the pitch axes and the top of the

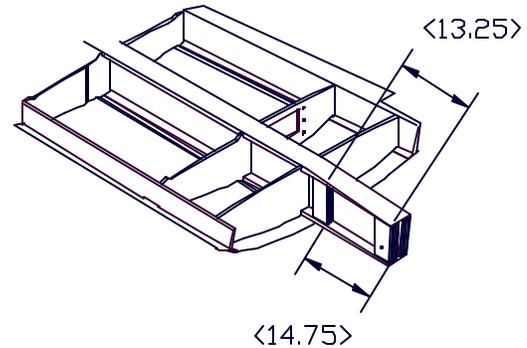
carrythrough to level the fuselage in the roll axes. Since the waterline 40 mark will be sanded off during the bodywork process it is recommended that you establish a leveling reference by dropping a plum bob down from the cabin door and mark the target on top of the carrythrough. This will allow you to level the aircraft when required in future procedures. Check to make sure the horizontal stabilizer is at 0 degrees incidents with the fuselage in this position.



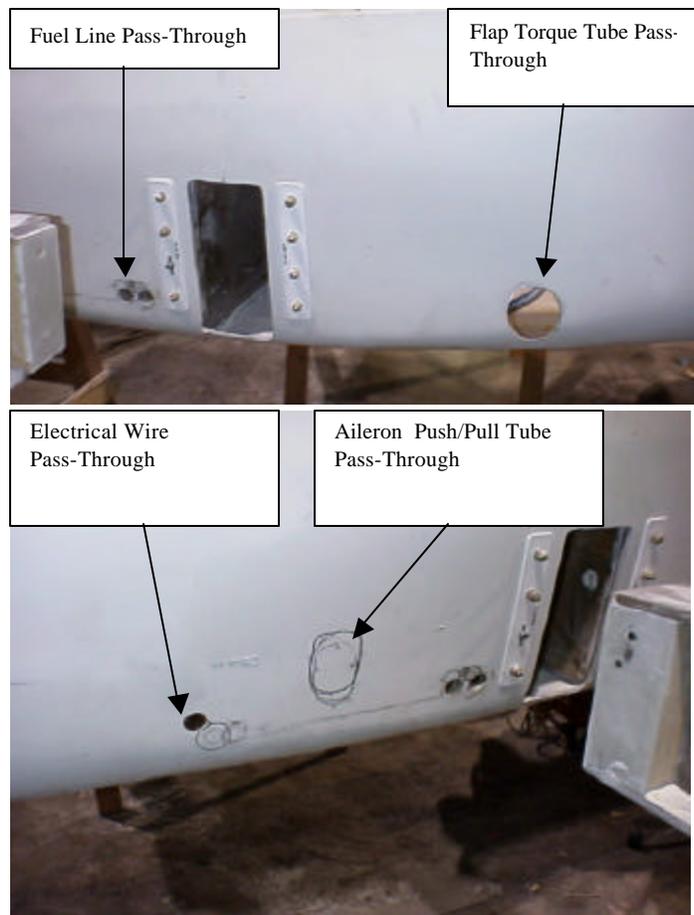
**Step 2. Prep the Wings for Initial Alignment.**

Install the wing spar blocks. Locate the wing spar blocks in the wing spar web per the dimensions in the drawing at the right. Trim the wing spar blocks so that they fit snugly into the spar web. Using a milled fiber mixture laminate the spar blocks into one side of the spar, holding in place with a large C clamp. When cured back drill the upper inboard spar-pin hole through the newly installed spar block. Position the remaining two spar blocks and laminate in place.

When cured back drill the inboard upper pin hole through the newly installed spar block.

**Step 3 Complete the Initial Fit of the Wing.**

With the spar of the wing resting on the spar cutout and the outboard position on the wing sawhorse slowly slide the wing into the fuselage. As the wing butt nears the fuselage side check to determine the position of the flap torque tube. Mark the area on the fuselage where the flap torque tube will pass through the fuselage side. Also note where the aileron push pull tube will pass through the fuselage and mark these locations. Cut holes in the fuselage side to allow the flap torque tube to pass through. (Note the wing will have 1.1/2 degrees of incidence and 5 degrees of dihedral so make sure the wing is in the correct position so that these holes do not become excessively large.) Once these holes are cut out reinstall the wing and check to see if the upper inboard hole in the carrythrough aligns with the hole in the inboard end of the spar. If not remove the material from the wing that is preventing the wing from sliding into the fuselage. Install the forward shear web attach bracket onto the inboard end of the forward shear web.



Slide the wing into the fuselage and install the upper inboard temporary pin partially into the wing spar to hold the inboard end into position. These temporary pins are not supplied in the kit. We recommend that you use 7/16" drill rod purchased from your local hardware store. (Note: You may need to remove some of the material on the aft leg of the forward attach bracket in order to allow it to slip far enough onto the forward shear web.)

#### **Step 4. Set the wing Dihedral and Incidents.**

Use a digital level or inclinometer on the bottom surface of the wing at the spar centerline and lift the end of the wing to achieve a 5-degree dihedral.



Set the wing template at the WBL 36 scribe line and set the wing at 1.5 degrees of positive incidents.



#### **Step 5. Set wing sweep.**

If you are installing both wings at the same time you can set wing sweep by measuring from the spar centerline and the wing tip joggle back to a point on the aft fuselage at the fuselage centerline. Both wings should be within 1/4 inch of each other. Check to see that the spar centerline on the wing aligns with the centerline of the carrythrough and the centerline of the other wing.

If you are installing only one wing at a time you can measure from the carrythrough centerline back to bulkhead 262 and record this measurement (A). Measure from the center of the fuselage at the carrythrough centerline outboard to the wing tip joggle and the spar centerline and record this measurement (B). Determine the square route of the sum of the two-recorded numbers squared. This value is the distance from the point on the wing tip to the point of the aft fuselage. Position the wing to match this measurement. ( $A^2 + B^2 = C^2$ )

#### **Step 6. Drill initial Wing Pin Holes.**

Recheck all the alignment measurements and settings. When satisfied that the wing is positioned properly drill the outboard upper hole through the wing spar and the aft side of the carrythrough and install the temporary 7/16" pin. Remove the inboard upper pin and finish the drilling of that hole and install the pin.

**Step 7. Drill and bolt forward and aft shear tie brackets.**

Drill and bolt the forward shear tie brackets to the fuselage and the forward and aft shear webs. (**Note: Do not install more than the one bolt into the wing shear tie. The wing must be able to rotate at this point. Additional bolts will cause high stress areas and could cause a shear tie failure.**)

**Step 8. Final drill / ream the 8 spar pin holes and install spar pins.**

Remove one temporary spar pin at a time and drill the hole to its final dimension using piloted drill bits and an 90° offset 1/2" Drill. Step drill, no more than 1/8" at a pass, and the spar pinhole to 23/32" Diameter. Use a 3/4" piloted ream and ream the hole to its final dimension. Drive the spar pin into the hole so that it is flush with the aft side of the carrythrough. Install the safety bolts and washers. Use lock tight to secure bolt into hole.



**Step 9. Install Wing Root Fairing**

Position the wing root fairing on the wing. Trim to fit properly. Temporally attach the fairing to the wing and the fuselage using sheet metal screws. Attach the lower wing root fairing in the same manner. The wing fairing can be bonded to the fuselage and wing upon completion of initial test flights.

