

11) Chromate the mating surfaces of the Leading edge Root Rib, Doubler and Root Rib Stiffeners. Rivet together with 1/8" rivets (RV-1410).

12) Chromate the Root Rib Attach Bracket and rivet to the Root Rib and Doubler with six 3/16" rivets (RV-1613).

13) Chromate mating surfaces and rivet Front Spar, Leading Edge Ribs, Tripler and Doubler together with 1/8" Avex Rivets. Bolt the Front Spar Fittings, Doubler, Spar, Tripler, Root Rib Angle Bracket and Packer together with two AN4-6A bolts, two AN4-11A bolts, four AN960-416 washers and four AN365-428 nuts. **NOTE:** Bolt heads should face forward. Figure 8.13.5.

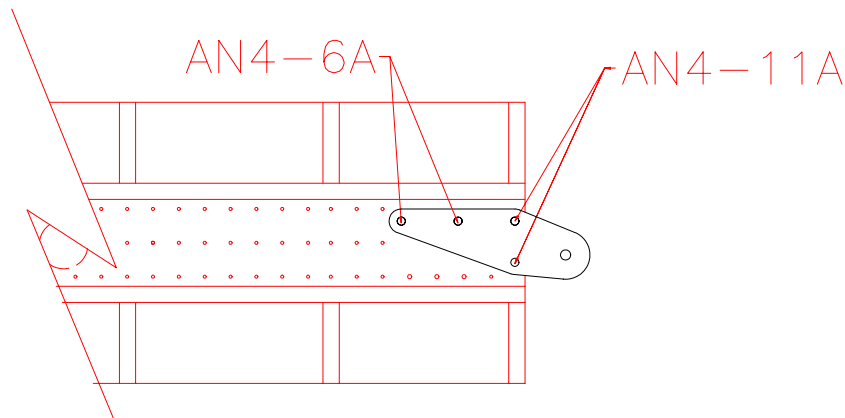


Figure 8.13.5

**NOTE:** Each wing has twelve full length extruded Stringers on the skins. Until these stringers are on, the skins are very easily damaged. It is recommended that two people carefully move the skin to avoid creasing.

#### 8.14 Top Tank Skins

**NOTE:** If you are installing Extended Fuel tanks skip to the “Extended Tank Supplement” at the end of this section.

1) Place a Top Wing Skin (W-126) on a flat table. Position a Top Tank Skin (W-158) under the Root End. Ensure the top edges are flush and the Tank Skin protrudes out 1/2". Figure 8.14.1.

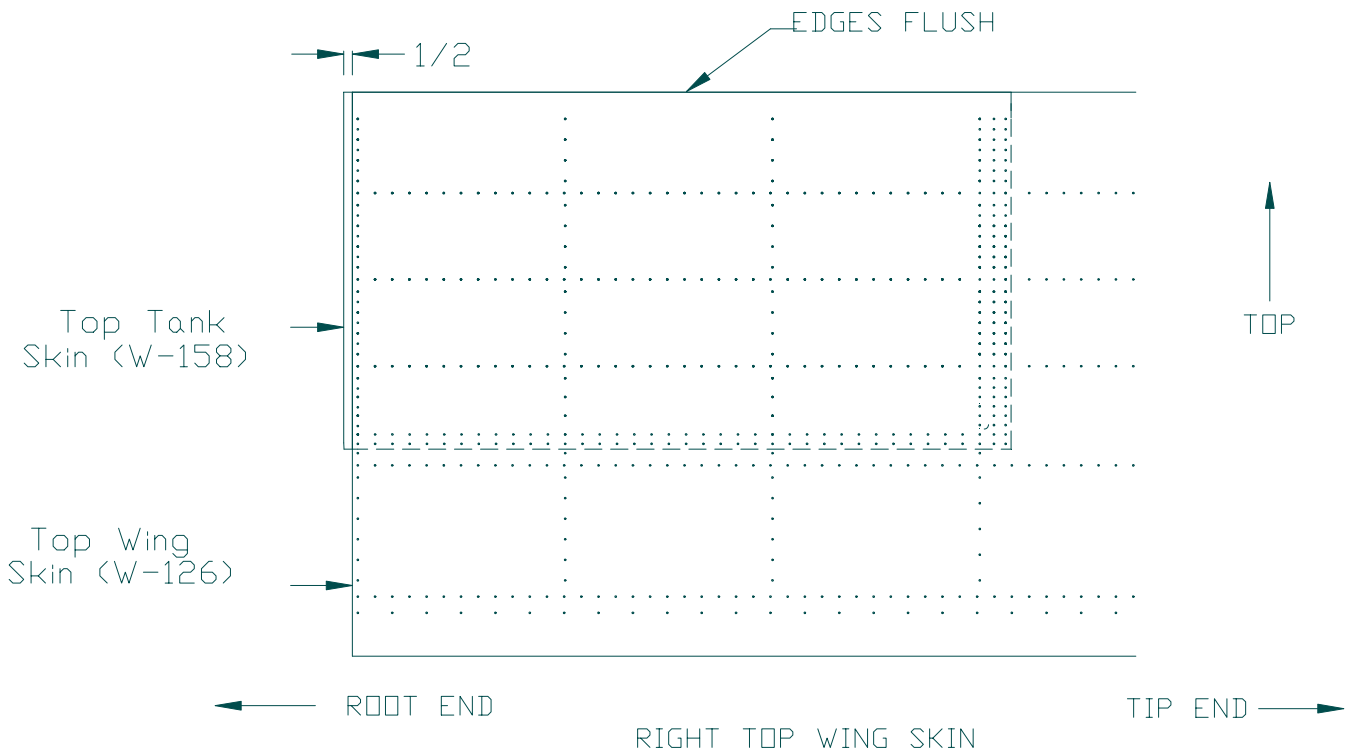


Figure 8.14.1

- 2) Using a #40 drill, transfer the holes in the tank area from the Top Wing Skin to the Top Tank Skin (W-158). Cleco as you go. Do not drill out to #30 at this time.
- 3) Repeat steps using the Bottom Wing Skin (W-127) and the Bottom Tank Skin (W-158). Put the Tank Skins aside for now.

### 8.15 Stringer Installation

All rivet locations for the Stringers have been prepunched in the skins. It is possible to mark the center of each Stringer rivet flange and drill back through the skin as you go. However, it is easier and the chance of damaging the skins is less if the following procedure is followed.

1) Nail 5/8" plywood strips to the workbench. Chamfer the bottom edge and radius the top edge of one piece. Figure 8.15.1.

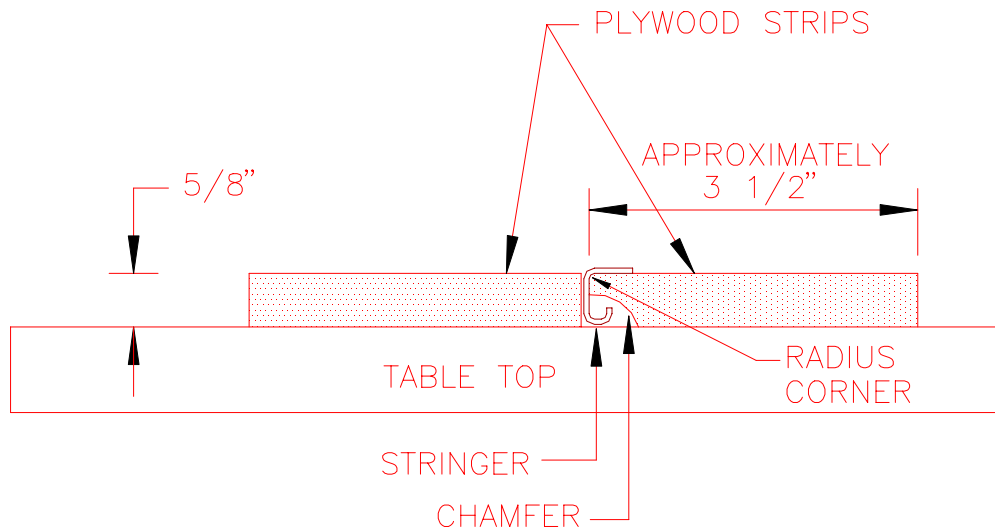


Figure 8.15.1

2) Draw a line down the center of a Stringer. Slide the Stringer between the plywood strips. Position a skin over the Stringer. When the line is visible through the center of the prepunched holes drill each hole out to #40. Use plenty of clecos. **DO NOT** drill out to #30 at this time. Figure 58. See Figure 8.15.3 for Stringer orientations.

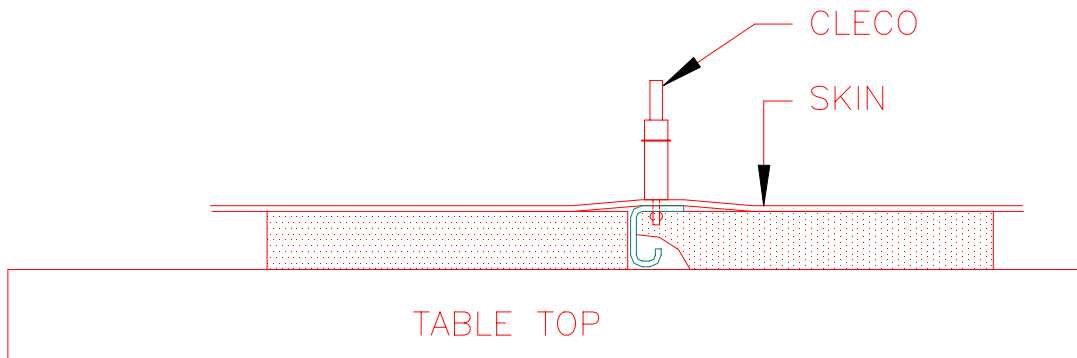


Figure 8.15.2

3) Fit the full length Stringers to the Leading Edge Skins. Trim 3/32" off the Root End of the six Leading Edge Stringers in the R/H wing. The Leading Edge Root Ribs will interfere with the Stringers otherwise.

**NOTE:** Trim 3/4” off the Root end of all six Leading Edge Stringers used in the L/H wing when doing this step.

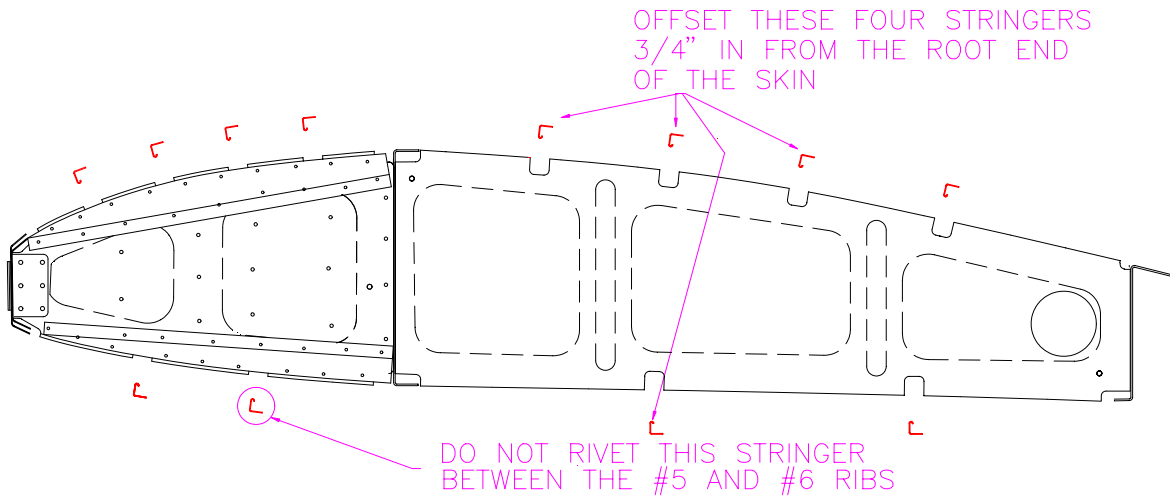


Figure 8.15.3

4) On the Leading Edge Skins you can at this time drill all the Stringers to #40 and then to #30. Disassemble and debur the Leading Edge Skins and the Stringers. After chromating the mating surfaces, rivet together with 1/8” avex rivets (RV-1410). Do not rivet the bottom Leading Edge Stringer between the #5 and #6 ribs. Figure 8.15.3.

### 8.16 Skin Install

1) Place the Wing assembly upside down on the table on two 2” x 4”s. Figure 8.16.1.

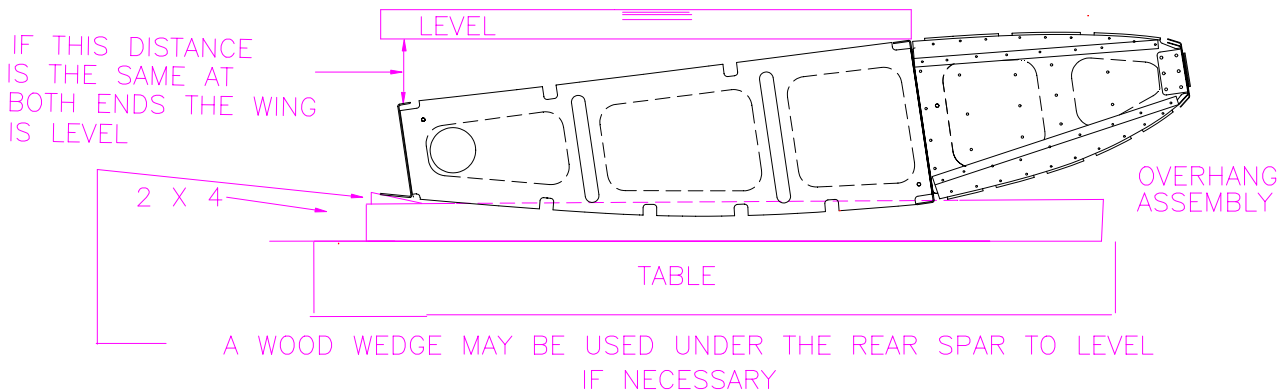


Figure 8.16.1

**NOTE:** Ensure the Wing is level from end to end. Small wood wedges may be used to level the wing.

2) Position the Bottom Skin with Stringers and Bottom Tank Skin (W-158) on the Wing assembly. Use six 3/32” clecos in each rib. Figure 8.16.2.

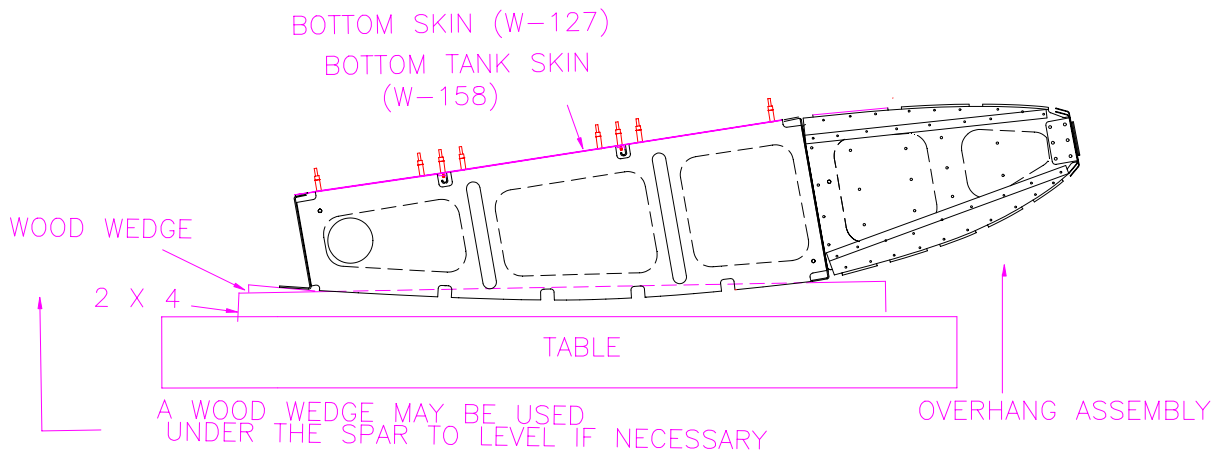


Figure 8.16.2

- 3) Back drill through the Skin all the rib holes to #40. **Do Not** drill into the Rear Spar at this time.
- 4) Draw a line down the center of each Leading Edge flange if you have not already done so.
- 5) At the root end replace the two long front Spar Caps (W-139) and the one short Front Spar Cap (W-140). A small amount of tape at two or three places along the Front Spar assembly helps to hold them in place. It is important that the Spar Caps are not pushed too tightly into place as to cause the edge to touch the radius of the spar. Remember that the Wing is upside down. Figure 8.16.3.

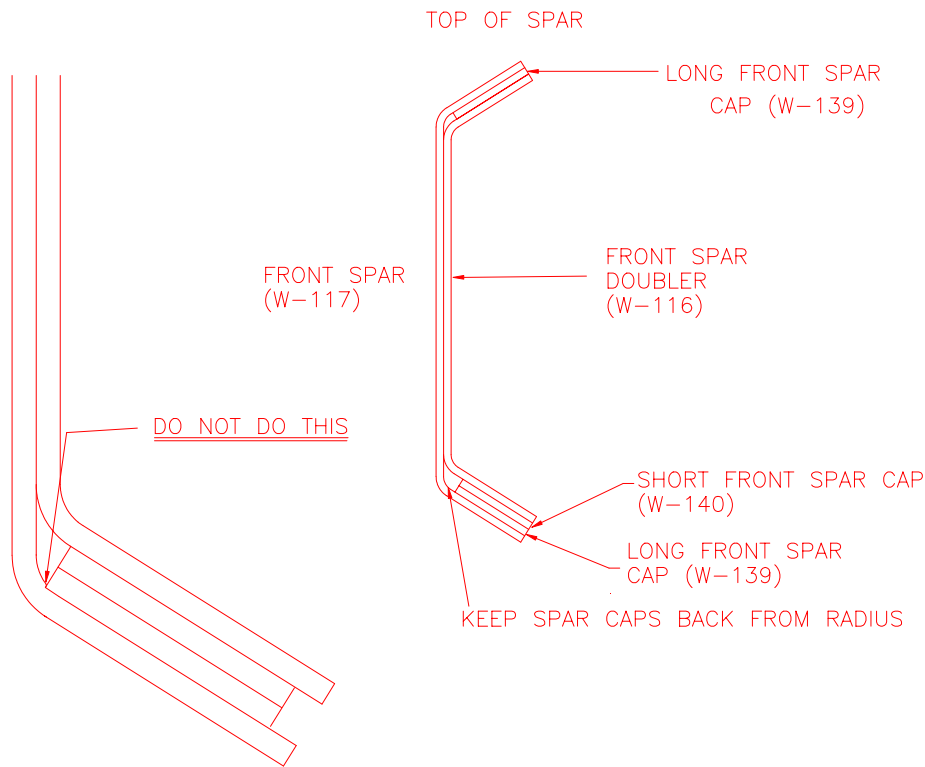


Figure 8.16.3

- 6) Cleco the Leading Edge Skin (W-600) to the Leading Edge Ribs. Figure 8.16.4.

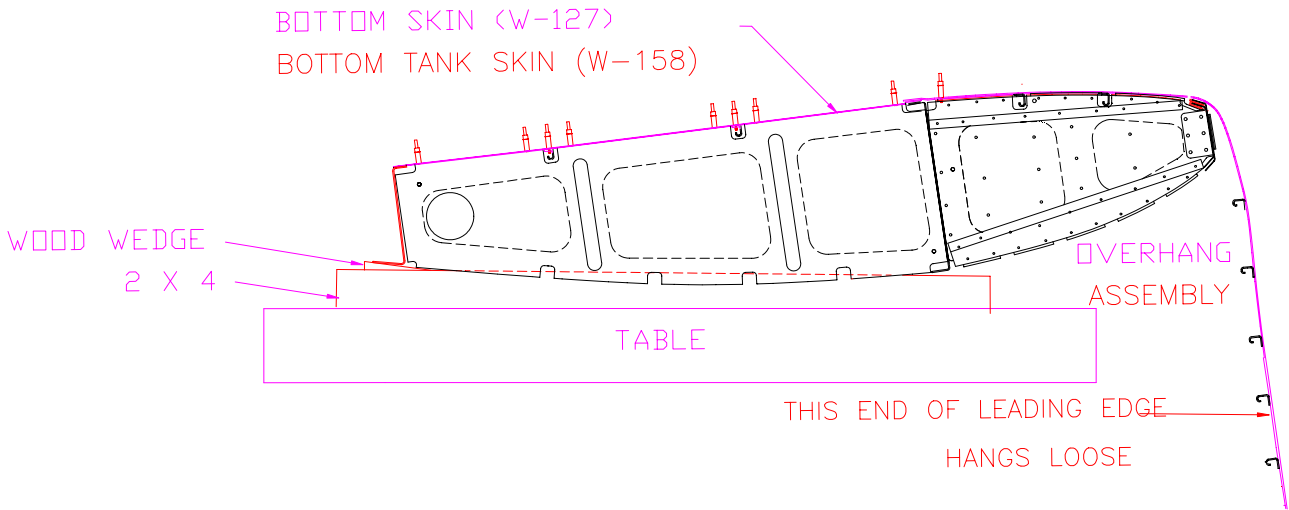


Figure 8.16.4

- 7) On the Leading Edge Skin draw a line connecting the Rib rivet holes on the nose radius. Figure 8.16.5.
- 8) Starting near the center of the Main Spar and insuring you can see the line on the flange of each Leading Edge Rib, drill the Leading Edge Ribs with a #40 drill bit. Work evenly across the ribs and use lots of clecos. **NOTE:** It is easiest at this point to have another person underneath the wing with a block of wood etc. to manipulate the rib flanges into position for drilling.
- 9) Standing in front of the Wing ensure the distance between the line drawn on the Leading Edge Skin earlier and the Front Spar Attach holes is 1 9/16". Figure 8.16.5.

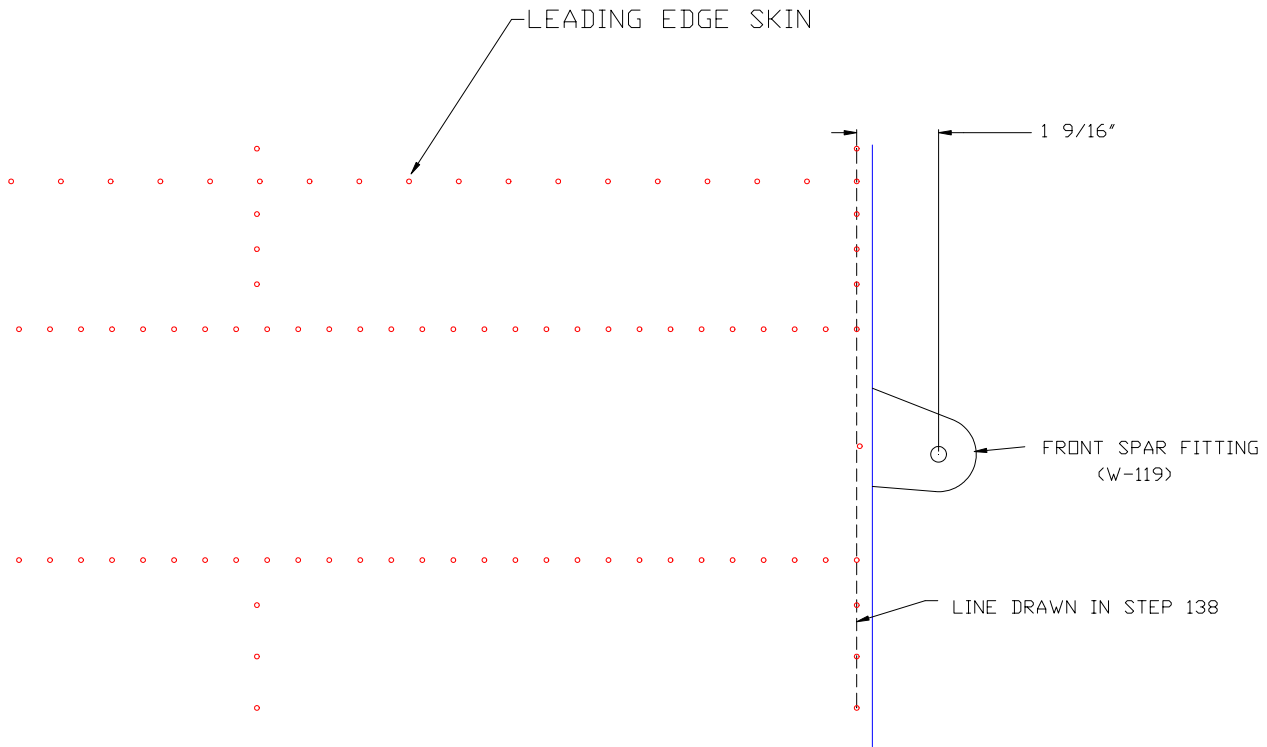


Figure 8.16.5

- 10) Drill a #40 hole through the Skin and into the Front Spar flange near the Root end.
- 11) Check alignment and then drill the Front Spar completely to #40. Drill the first hole in the center of the Wing, the next two at the tips, then keep dividing the spaces in half. Use plenty of clecos.
- 12) Remove the Leading Edge Skin. DO NOT remove the Bottom Skin.
- 13) Turn the wing over and level again as in Figure 8.16.6.

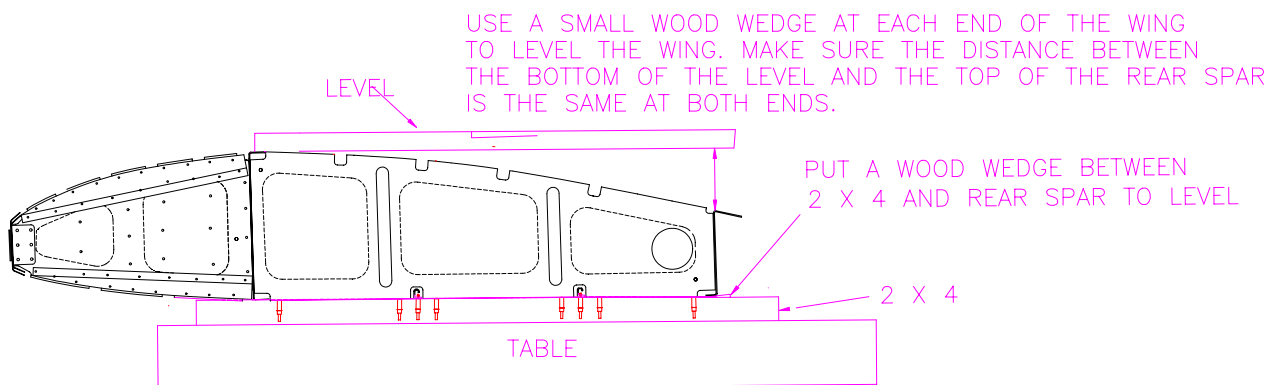


Figure 8.16.6

- 14) Mark the bottom skin where the torque tube horn will exit. See figure 8.16.7 for hole location.

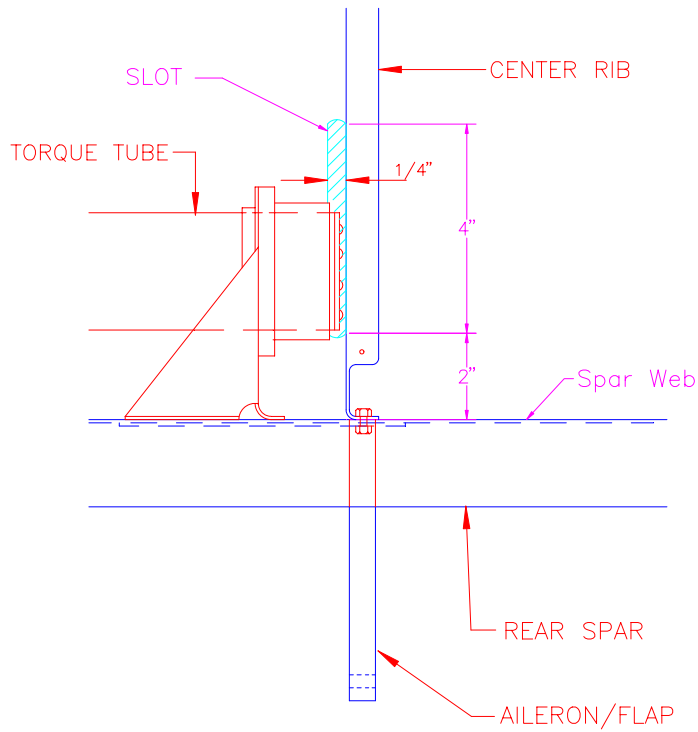


Figure 8.16.7

### 8.17 Wet Tank Bulkheads

1) Drill thirteen #40 holes on both the upper and lower flanges of each Fuel Tank Bulkhead (W-157).

Figure 8.17.1.

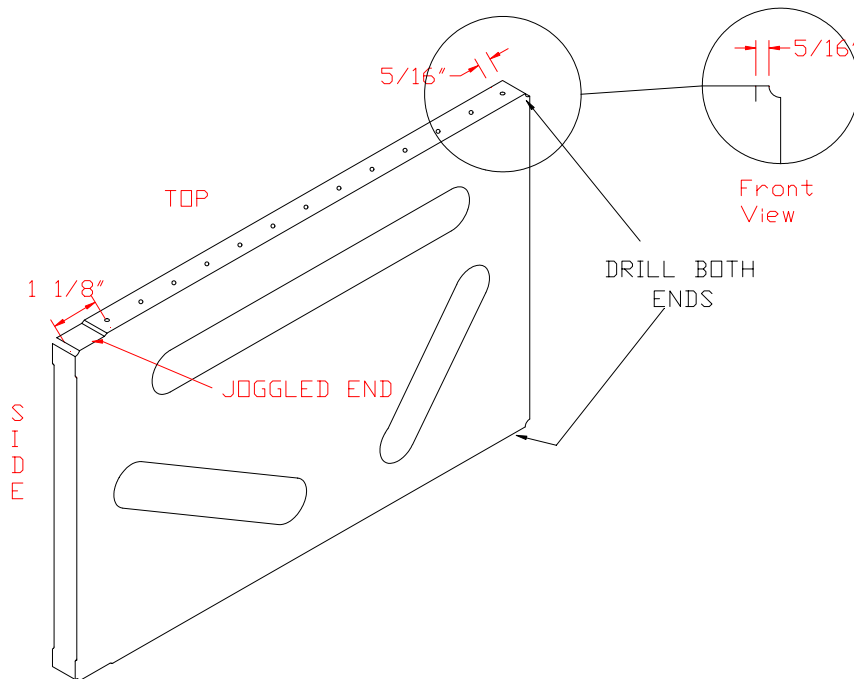


Figure 8.17.1

2) Drill ten equally spaced #40 holes through the side flanges of two of the Bulkheads only. **DO NOT** drill the third Bulkhead. Figure 8.17.2.

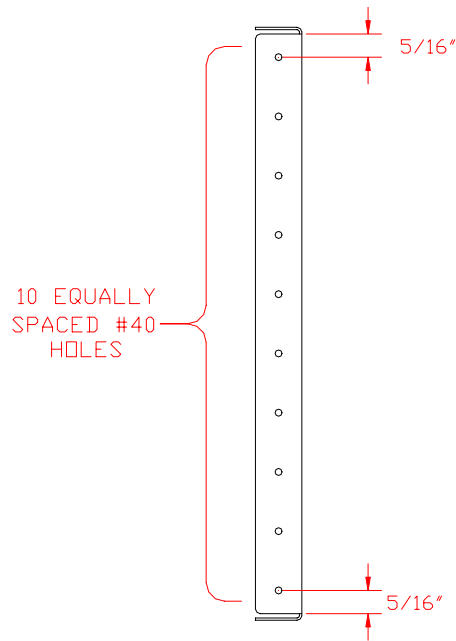


Figure 8.17.2

3) Bend the top flanges of the Bulkheads to match the camber top of the Wing Ribs. Rough fit the Bulkheads into the Wing to check the angle of the flange. Figure 8.17.3.

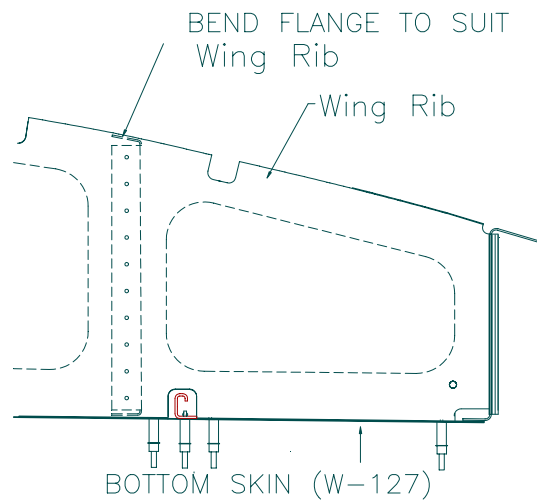


Figure 8.17.3

**Note:** The side flanges of the Bulkheads are joggled to fit the stiffening beads in the Wing Ribs. Be sure that the Bulkheads are properly seated in the Ribs, i.e.; the center of the Bulkhead side flanges must line up with the center of the Wing Rib beads. The two Bulkheads with the drilled sides should be in bays #1 and #3. Figure 8.17.4.

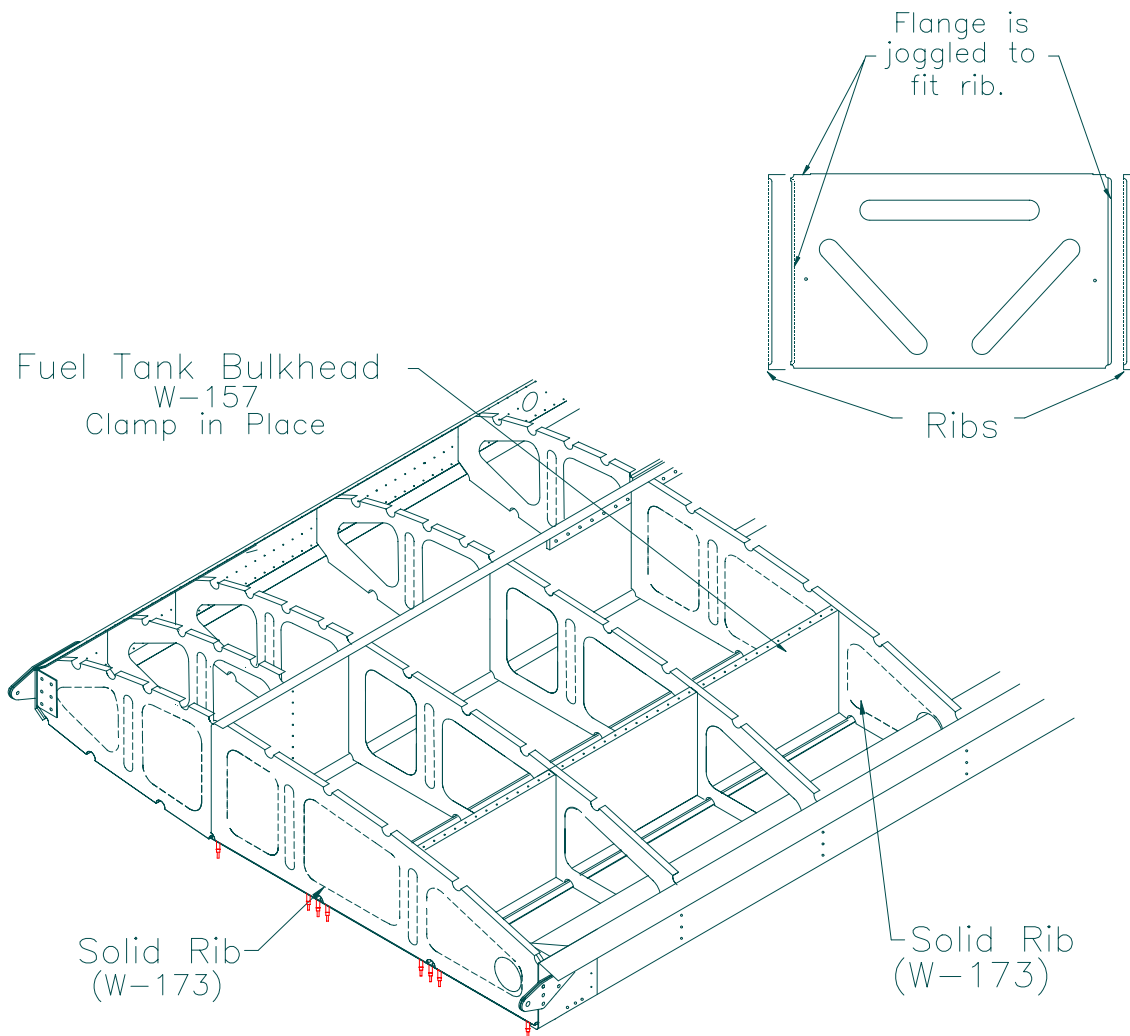


Figure 8.17.4

- 4) Remove the center Bulkhead.
- 5) Using a long #40 drill, back drill the ten holes in each Bulkhead side flange into the Wing Ribs. Ensure that the bottom flange is flush with the Bottom Skin.
- 6) Remove the two Bulkheads. Mark the center of the side flanges of the undrilled Bulkhead. Insert the undrilled Bulkhead into the middle bay. Use the holes drilled in Step 149 to back drill into the line on the middle Bulkhead.
- 7) Cleco all three Bulkheads securely into place.
- 8) With a long #40 drill bit, back drill the thirteen holes in each Bulkhead into the Bottom Skin and Bottom Tank Skin.
- 9) Position the Top Skin with Stringers and Top Tank Skin (W-158), cleco in place. Use six 3/32" clecos in each rib. Figure 8.17.5.

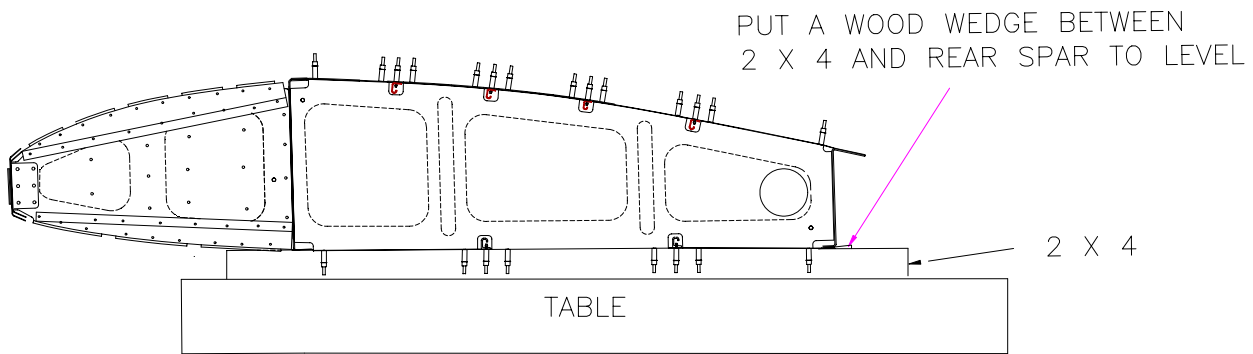


Figure 8.17.5

10) Back drill through the Skin all the Rib holes to #40. **DO NOT** drill into the Rear Spar at this time.

### 8.18 Leading Edge Skin

1) Cleco the Leading Edge Skin to the Leading Edge Ribs. Figure 8.18.1.

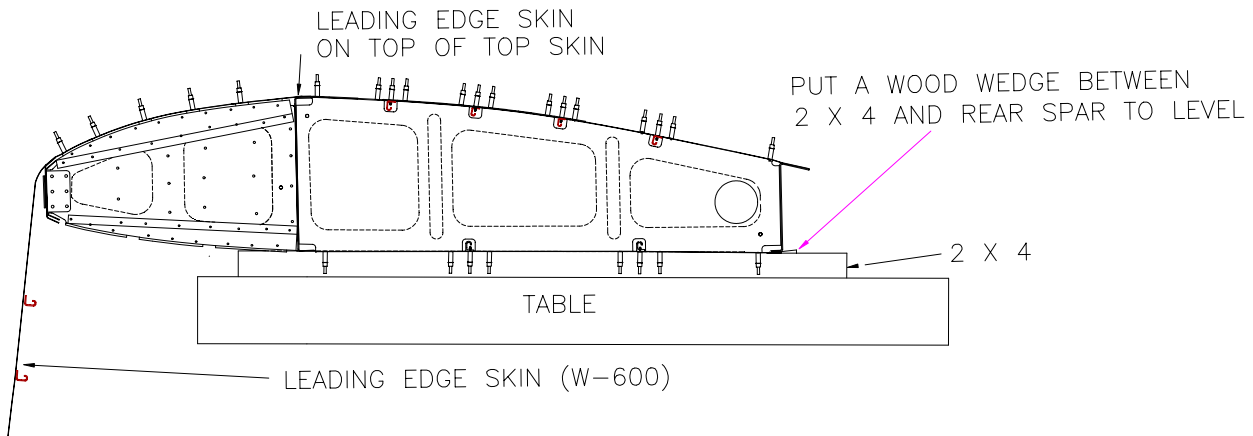


Figure 8.18.1

2) Repeat steps for hole drilling sequence that you did earlier.

3) Turn the wing over.

4) Cleco the bottom section of the Leading Edge Skin in place. Figure 8.18.2.

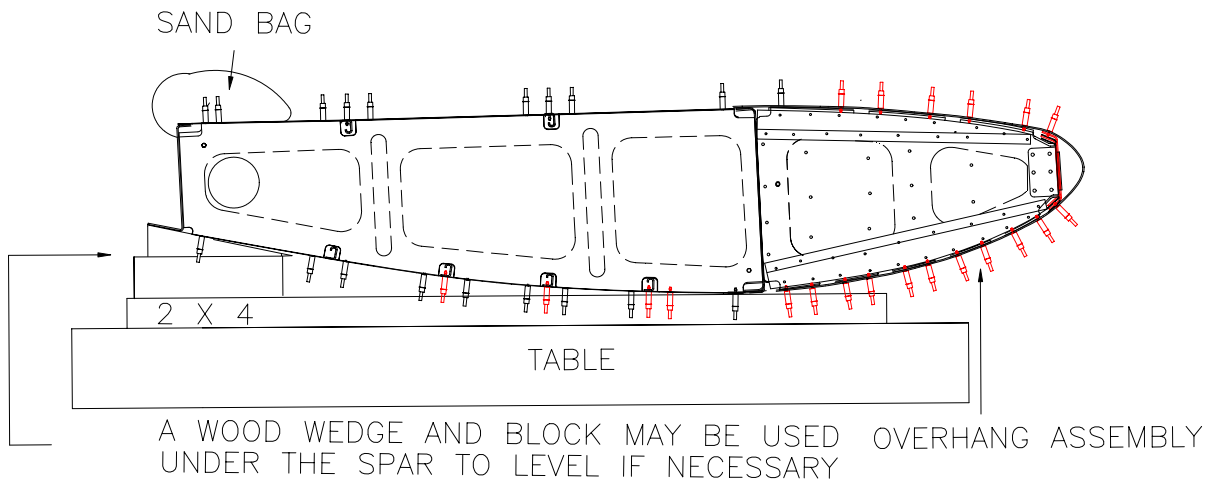


Figure 8.18.2

- 5) Ensure that the wing is absolutely level. **NOTE:** Sand, lead shot bags or any suitable weights can be used to hold the Wing in place.
- 6) Back drill through the Bottom Skin into the Rear Spar to #40. Use plenty of clecos.
- 7) Back drill through the Leading Edge Skin, Bottom Skin and Bottom Tank Skin into the Main Spar. Use a #40 Drill and plenty of clecos.

### 8.19 Wing Skin Doubler

- 1) Remove the clecos in the area where the Wing Skin Doubler (W-601) will go. Figure 8.19.1.

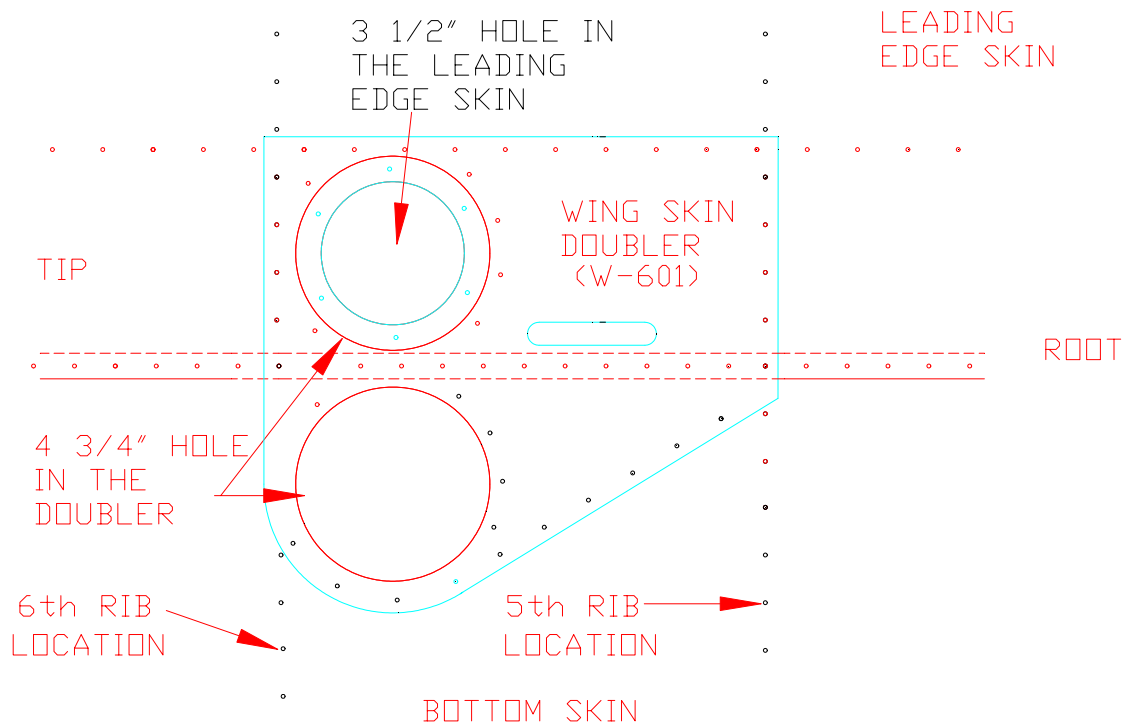


Figure 8.19.1

- 2) Cleco the Wing Skin Doubler in place. Figure 8.19.1.
- 3) Back drill through the Doubler into the Bottom Skin with a #40 drill. **NOTE:** The Main Rib hole locations in the Doubler can be drilled later when the Bottom Skin is removed.  
**NOTE:** You will need to locate and cut out the 3 1/2” hole in the Bottom Skin and drill the six holes for your Cover Plate before you mount the Skin to the Wing. Figure 8.19.1.
- 4) Turn the wing over and again ensure that the wing is absolutely level.
- 5) Repeat steps for doing the Top Skin and Top Tank Skin.
- 6) Level the Wing one more time then drill all the holes in the top of Wing to #30.
- 7) Dimple all the rivet holes in the Tip Rib location for Countersunk Rivets. Using Countersunk Rivets in this location will allow the fiberglass Wing Tip to lay flat. The Main Spar is too heavy to dimple so use a drill bit and by hand countersink the last hole in the Main Spar Flange.
- 8) Turn the wing over, ensure it is level and then drill out all holes in the bottom to # 30.
- 9) Repeat step for the Bottom Skin.
- 10) Remove the Bottom Skin and remove the clecos in the bottom of the Leading Edge Skin.

### 8.20 Wet Tank

- 1) With a long #40 drill bit, back drill the thirteen holes in each Fuel Tank Bulkhead into the Top Skin and Top Tank Skin.
- 2) Drill a #40 hole through the Top Skin and Top Tank Skin in the position shown in Figure 8.20.1. This will become the fuel filler hole.

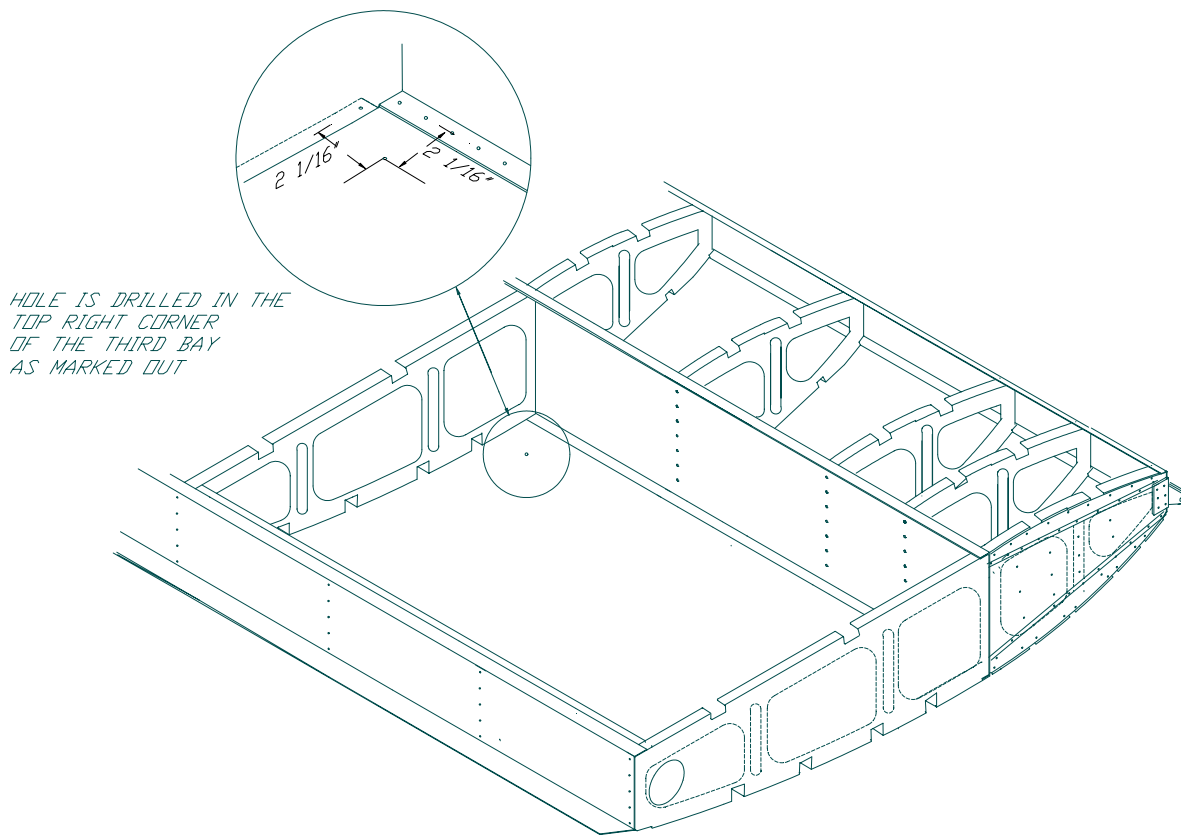


Figure 8.20.1

- 3) Turn the wing over.
- 4) Drill the Bulkhead holes out to #30.
- 5) Remove the Leading Edge Skin and Top Wing Skin. Dimple the Leading Edge Root Rib, Leading Edge Skin at the Root Rib location, the Tip Leading Edge Rib, Leading Edge Skin (at the tip end), Main #13 Rib and the Top And Bottom Wing Skins at the tip end. **DO NOT** dimple the Main Spar at these locations.
- 6) Remove the two center Gas Tank Ribs.
- 7) Drill 1/2" fuel flow holes into the lower rear most point of the Wet Tank area. These holes will allow fuel flow between the bays. Figure 8.20.2.

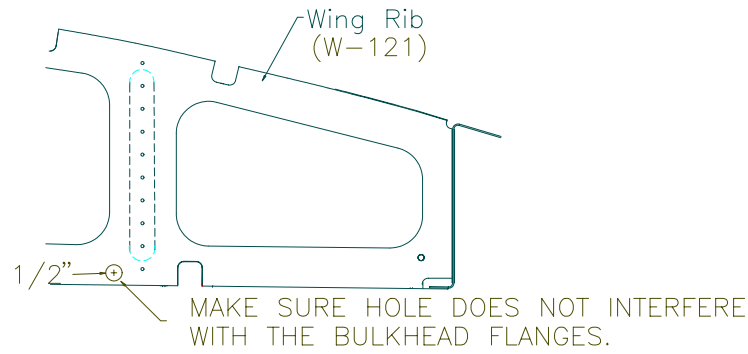


Figure 8.20.2

8) Install two Baffle Plates on each rib. The Baffle Plates will help prevent fuel sloshing. Figure 8.20.3

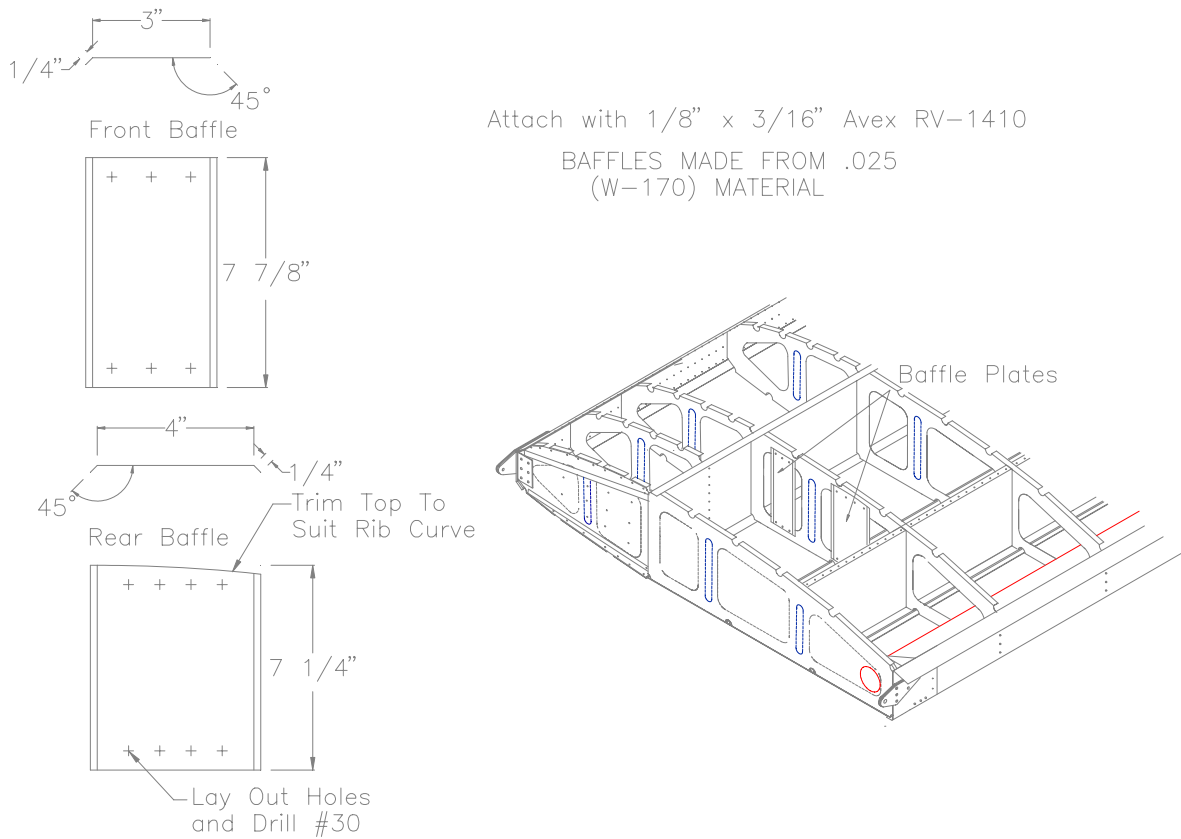


Figure 8.20.3

9) Trim the Top and Bottom Wing Skins as in Figure 8.20.4.

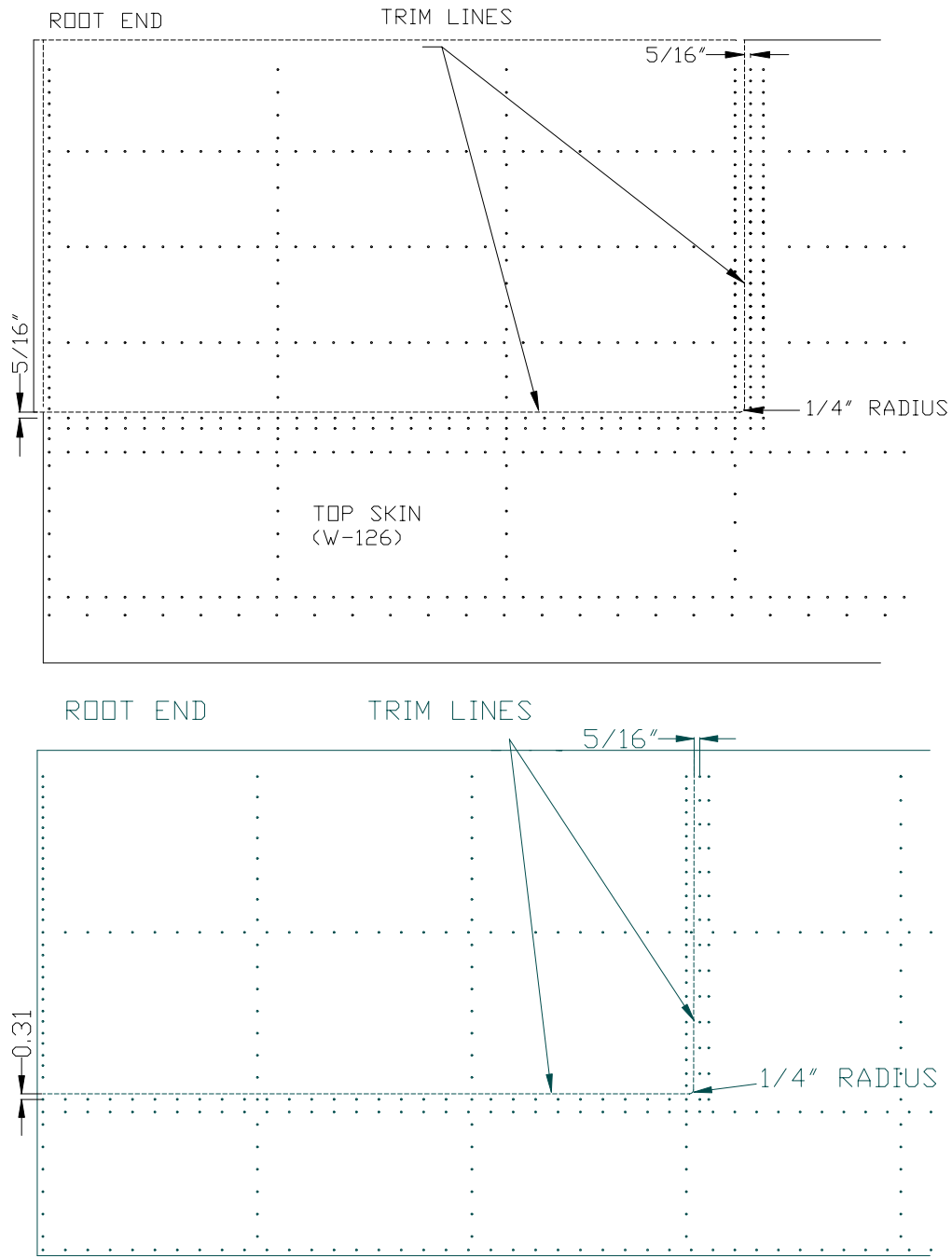


Figure 8.20.4

- 10) In the Top Tank Skin cut a 2 1/2" hole around the #40 hole drilled for the fuel filler.
- 11) Center the Fuel Filler Neck over the hole and drill twelve #30 holes through the Tank Skin using the Filler Neck as a drill guide. Figure 8.20.5

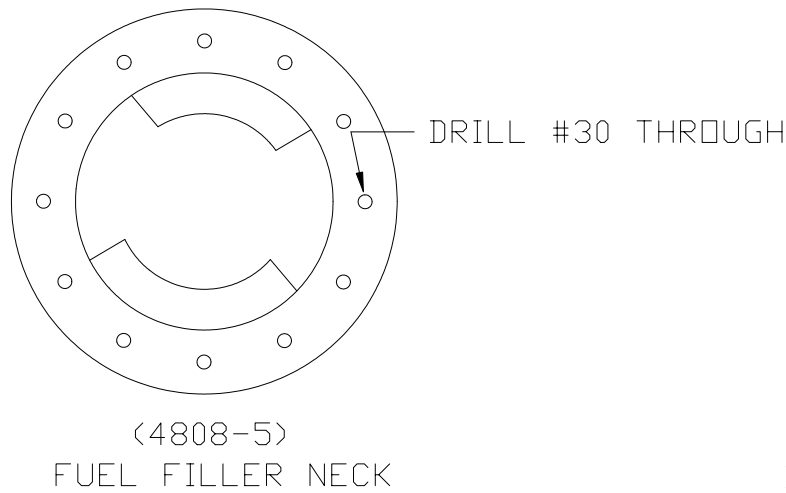


Figure 8.20.5

12) Debur the Skin.

13) Remove the Root Rib.

### 8.21 Fuel Tank Outlet

1) Trim two Fuel Tank Outlets (W-159) and fit one at the lower front corner and one at the top corner of the Root Rib (These will be used as sight gauge fittings). Drill five #30 holes through the flange into the Root Rib. **NOTE:** Locate the Fuel Tank Outlet as close as possible to the upper forward corner of the rib. It may be necessary to flatten, (with a hammer and dolly), the stiffening swage of the rib in the immediate area of the Fuel Tank Outlet. Figure 8.21.1.

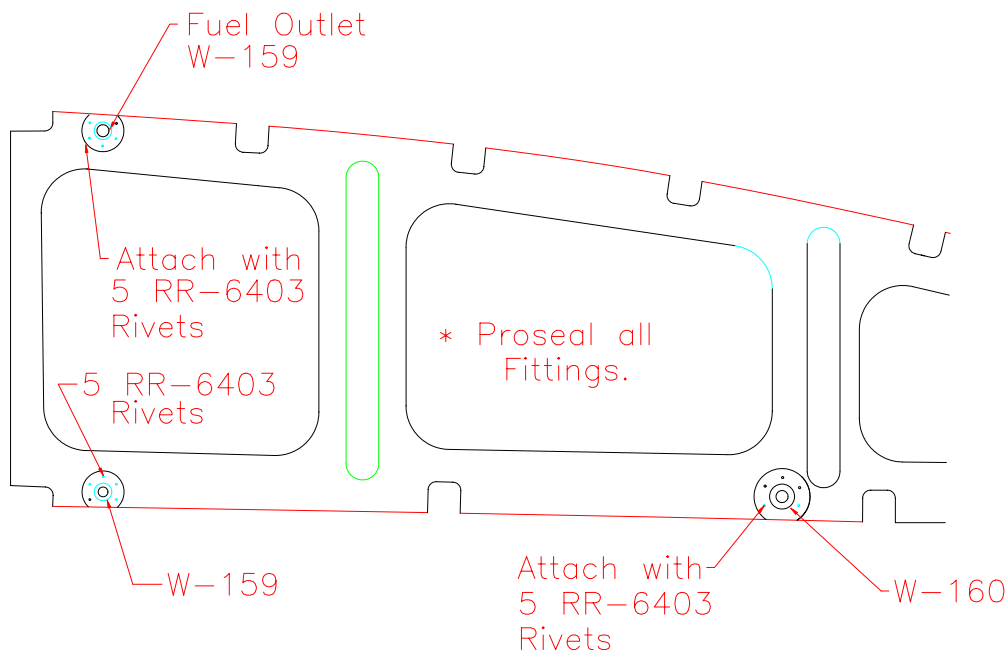


Figure 8.21.1

2) Trim a Fuel Tank Outlet (W-160) to fit at the lower rear corner of the Root Rib (just in front of the Bulkhead). Drill five #30 holes through the flange into the Root Rib as in Figure 8.21.1. **NOTE:** It should be as close as possible to the corner without overlapping the Bulkhead Flange. Carefully flatten, with a hammer and dolly, the stiffening swage of the Root Rib in the immediate area of the Fuel Tank Outlet (W-160) fitting.

**8.22 Stringer Seal**

1) For each Stringer cut out location in the tank area of the Root Rib, bend up an angle from .032 material to close the opening. Drill but do not rivet at this time. Figure 8.22.1.

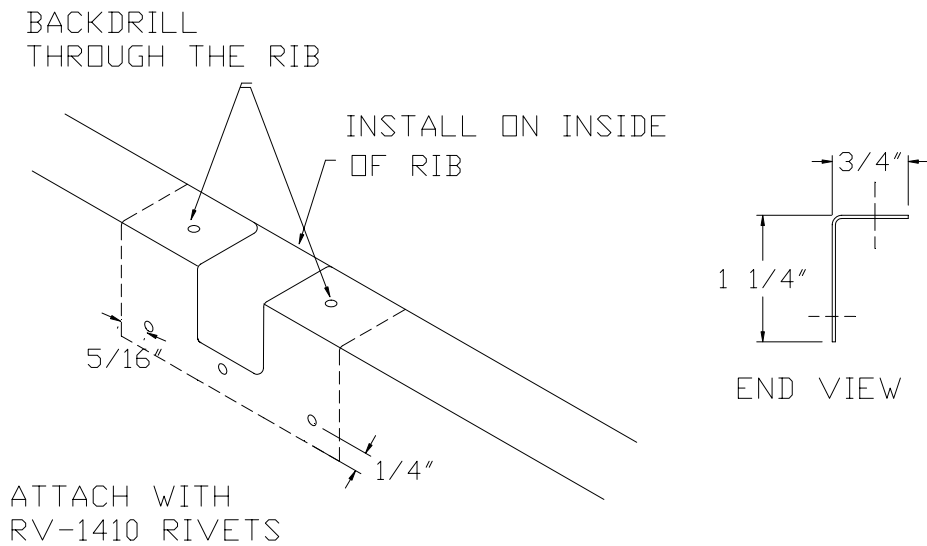


Figure 8.22.1

2) Replace the Root Rib into the Wing assembly.

3) At the top and bottom cutaways in the Root Rib for the Main Spar close the opening with a Corner Bracket made from .032. Figure 8.22.2.

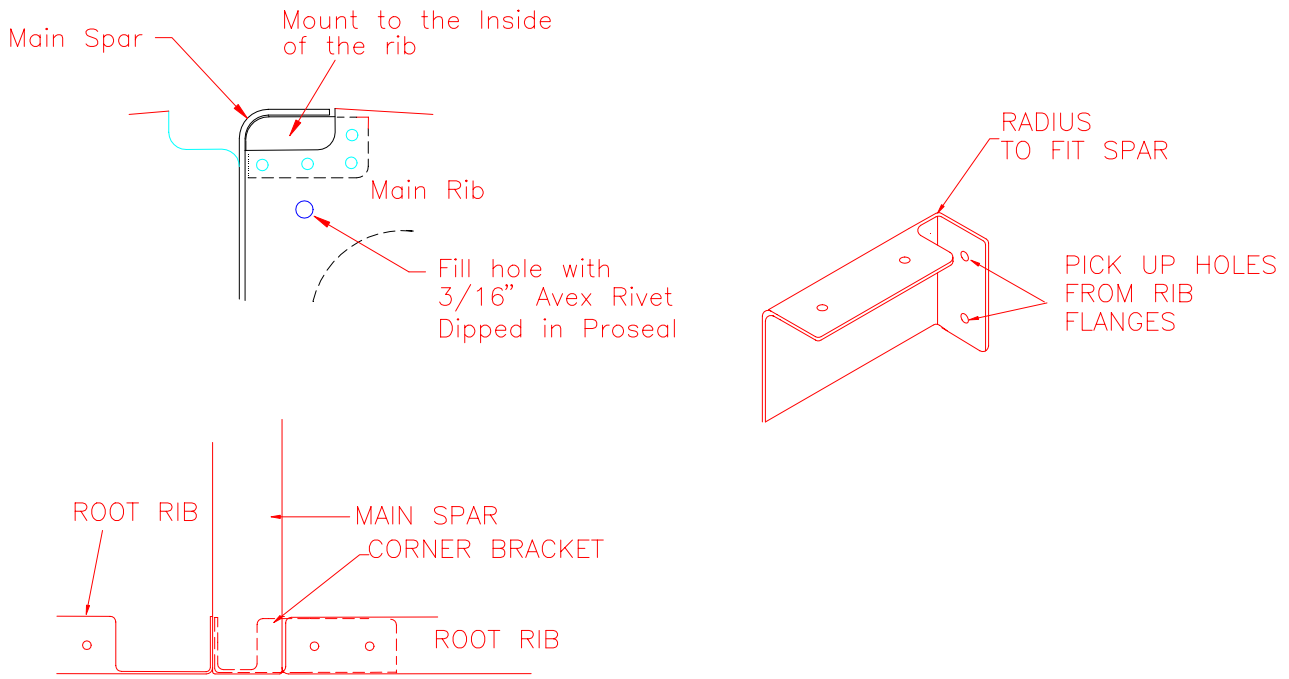


Figure 8.22.2

4) Where the outboard solid Wing Rib is cut away for the Spar Cap bend up a Corner Bracket as in Figure 8.22.3.

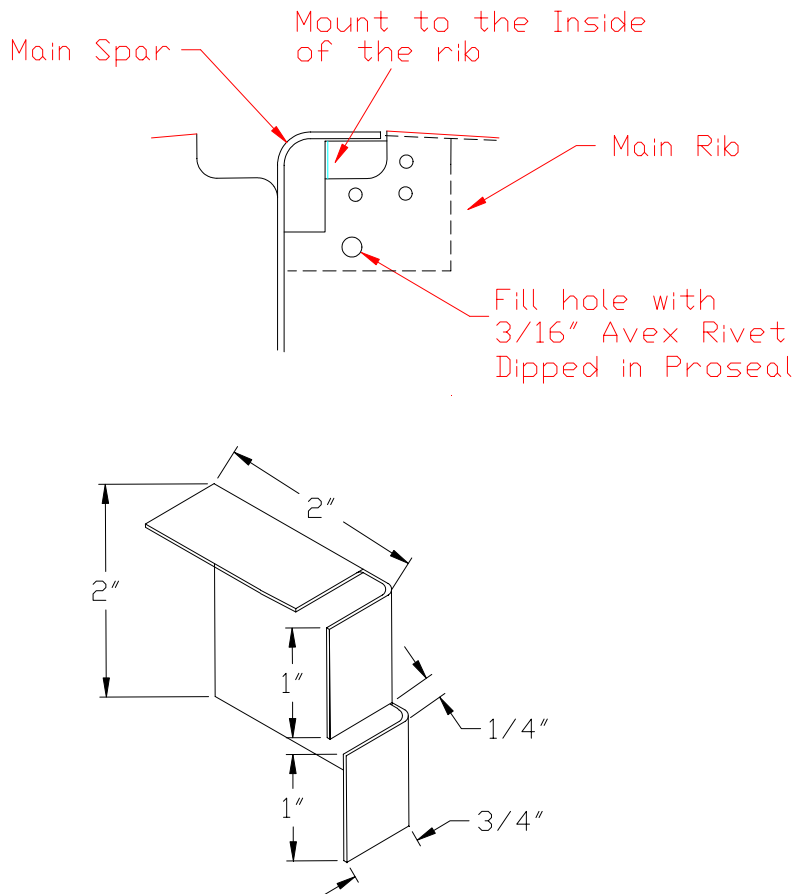


Figure 8.22.3

5) Where the Stringers pass through the outboard Main Root Rib , cut an angle to the shape as in Figure 8.22.4.

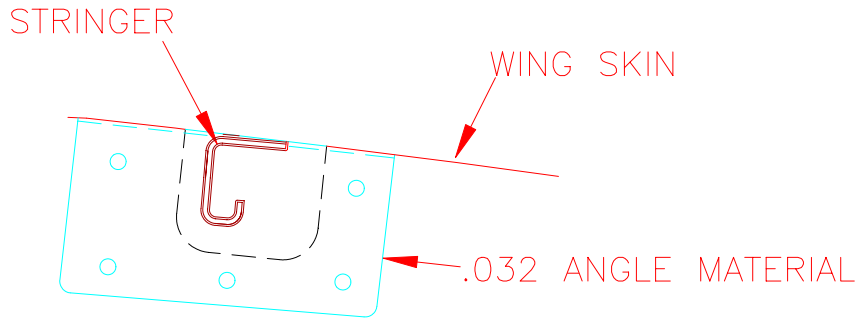


Figure 8.22.4

### 8.23 Inspection Holes

1) In the right Bottom Skin cut out four inspection holes as in Figure 8.23.1.

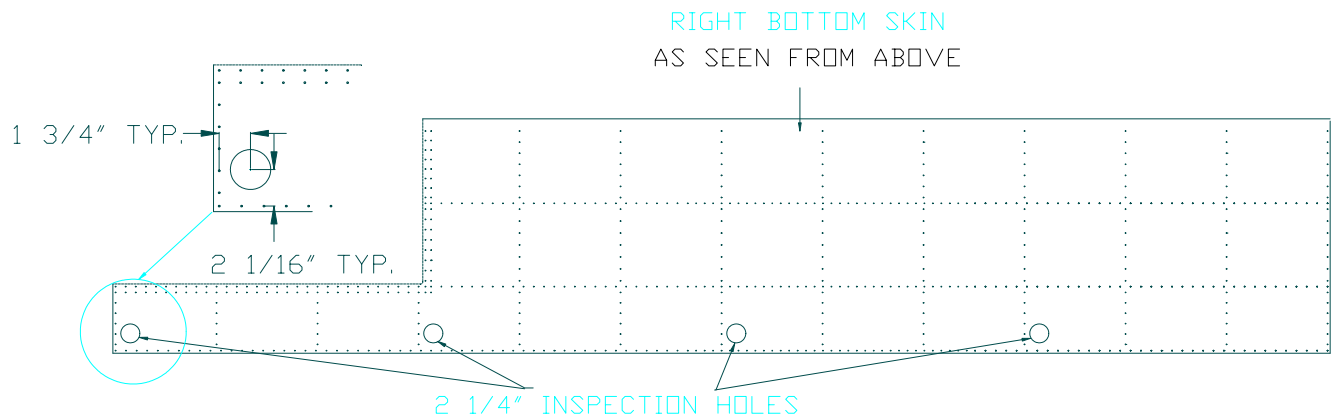


Figure 8.23.1

**NOTE:** These inspection holes are on the Flange side of the Ribs, except at rib 7 on left wing, where the hole will conflict with the aileron control horn. They allow access to the Aileron Hinge Bolts.

2) When doing the Left Wing, the inspection holes will be located as in Figure 8.23.2.

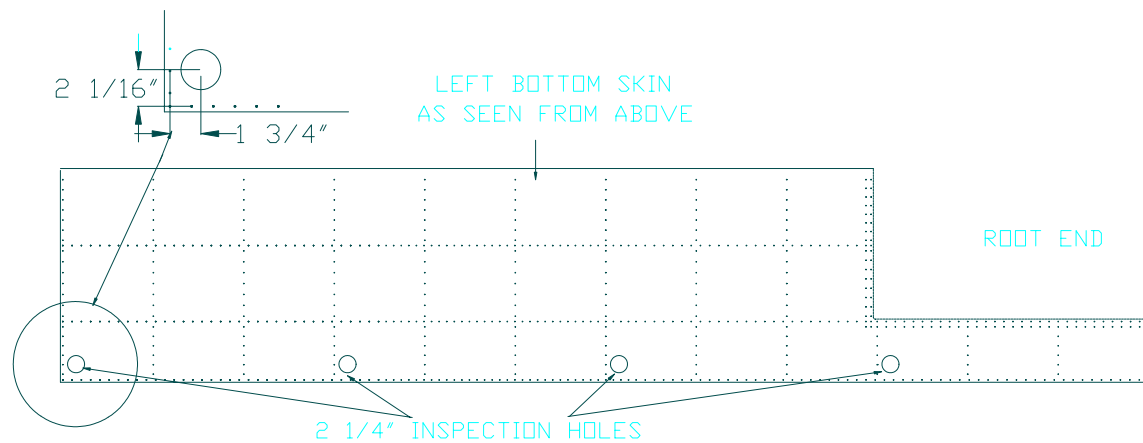


Figure 8.23.2

### 8.24 Water Drain

1) Drill five #30 holes through the Flange of a Water Drain Outlet (W-159) and into the Bottom Tank Skin. Drill out the center to 5/16". Figure 8.24.1.

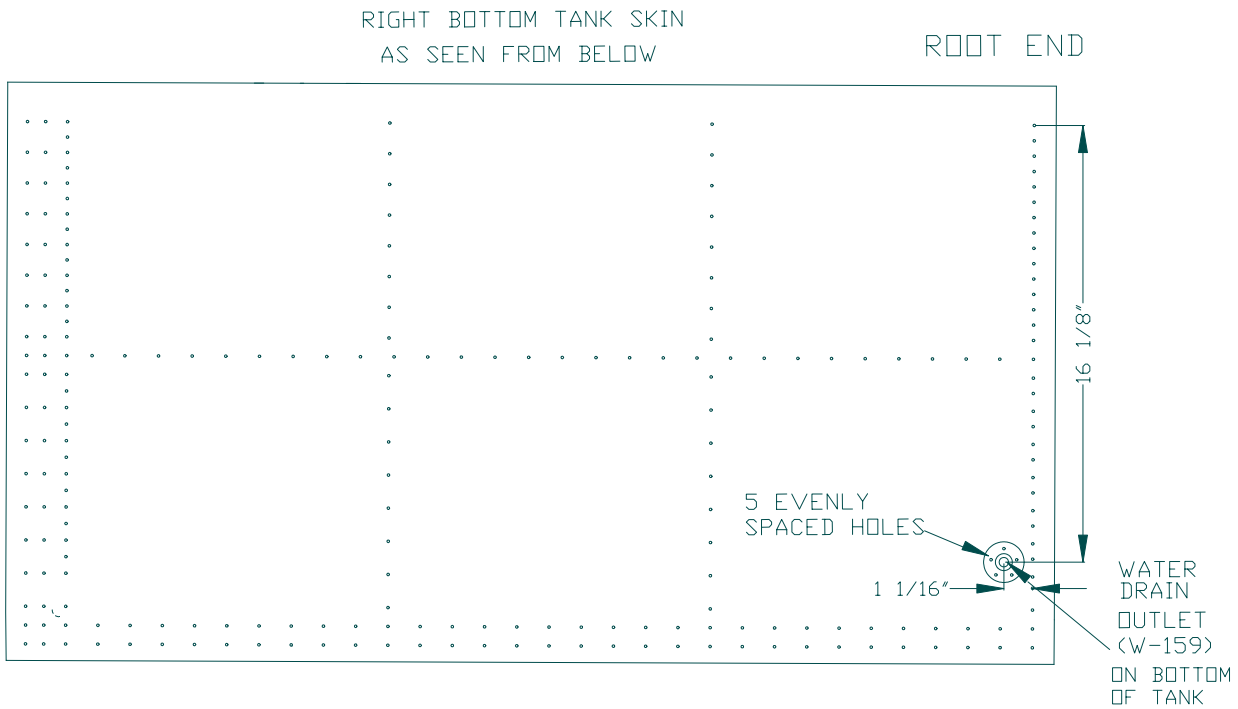


Figure 8.24.1

### 8.25 Final Install

- 1) Chromate mating surfaces and rivet together the Rear Spar, five Hinge Backing Plates, Spar Tip extension and two Bearing Bases with 1/8" avex rivet (RV-1410). Do not rivet where Ribs will go.
- 2) Chromate and bolt the Wing Strut Fittings (W-616 and W-617) to the Main Spar as in Figure 8.25.1.

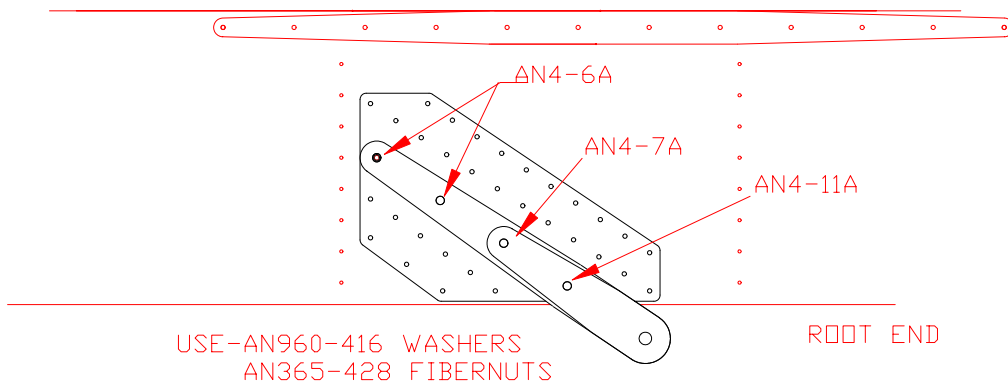


Figure 8.25.1

- 3) Chromate and rivet the Front Spar and Leading Edge Ribs and Main Ribs to Main Spar from Rib location #5 to the tip with 1/8" avex rivets (RV-1410). **NOTE:** When using Extended Tanks start at the #6 Rib location in this step and the next step.
- 4) Chromate and rivet the Rear Spar to the Main Rib from #5 location to the tip with 1/8" avex rivets (RV-1410).
- 5) STEPS 5 to 7 RELOCATED TO 8.26. Please complete torque tube installation now.
- 8) Wipe down with M.E.K. (Methyl Ethyl Keytone) or Acetone all mating areas of Gas Tank parts. Trim the excess off the Top and Bottom Tank Skins at this point, 3/8" from center of the hole to the outside edge. Figure 8.25.3.

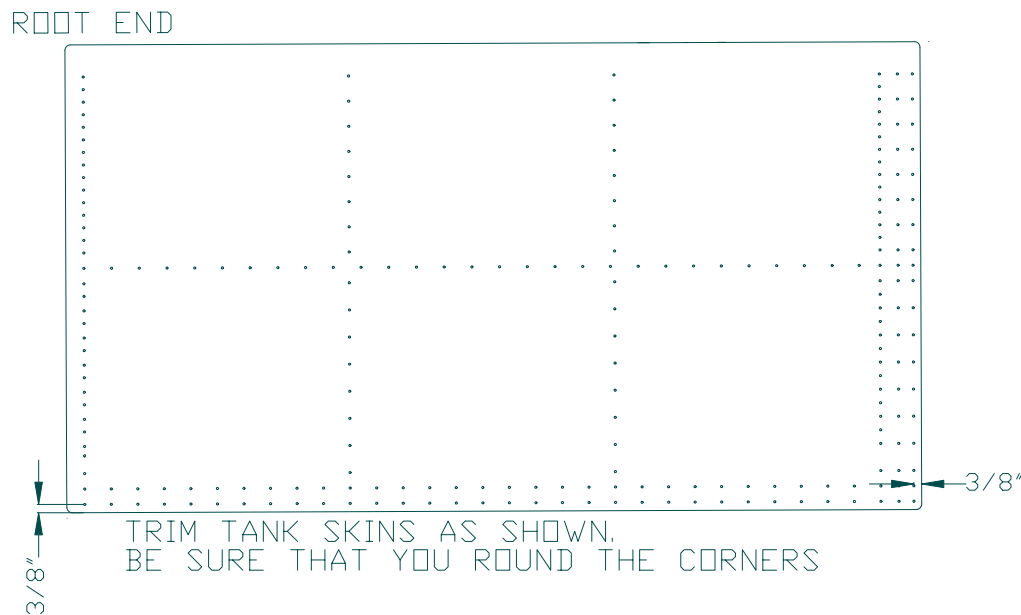


Figure 8.25.3

- 9) Scotchbrite all mating areas of Gas Tank parts. Wipe dust away with a clean cloth. **Do not use M.E.K. or Acetone after Scotchbriting.** Handle the parts as little as possible after cleaning to prevent the oil in your hands from transferring to the parts.
- 10) Mix up some Proseal.
 

**Note:** When using Proseal always cover both mating surfaces before fitting together and riveting. Always dip the rivet in Proseal before inserting in the hole.
- 11) Proseal and rivet the Fuel Outlets (W-159 and W-160) to the Tank Root Rib with 1/8" Tank Rivets (RR-6403).

- 12) Proseal and rivet the Corner Brackets made in steps #190 and #191 to the Solid Tank Ribs with 1/8” Tank Rivets (RR-6403).
- 13) Proseal and rivet the Leading Edge Ribs and Main Ribs from #1 to #4 to the Main Spar with 1/8” Tank Rivets (RR-6403).
- 14) Chromate and rivet the Rear Spar to the Main Ribs #1 to #4.
- 15) Bolt on the two Rear Spar Fittings to the Rear Spar with six AN3-5A Bolts.
- 16) Proseal and rivet the three or four Gas Tank Bulk Heads in place with 1/8” x 3/16” Tank Rivets (RR-6403).
- 17) Chromate the Mating surfaces and rivet the Bottom Tank Skin and Bottom Skin together with 1/8” avex rivets (RV-1410). Make sure the Tank Skin is on the outside.
- 18) Slide the angle made earlier down the Tank Stringer to its approximate location.
- 19) Rivet the two Bottom Stringers to the Tank Skin and Bottom Skin. Where the one Stringer goes into the Tank area use Proseal and 1/8” Tank Rivets (RR-6403). For the rest use Chromate and 1/8” avex rivets (RV-1410).
- 20) Proseal and rivet the Water Drain Outlet in place with 1/8” (RR-6403) Tank Rivets.
- 21) Place the Wing upside down and level.
- 22) Chromate all mating surfaces except in the Tank area.
- 23) Proseal the Tank Area.
- 24) Cleco the Bottom Skin and Tank Skin in place.
- 25) Chromate and Cleco securely the bottom of the Leading Edge in place. Use Proseal in the Tank Area.
- 26) Rivet the Tank and Spar area with 1/8” Tank Rivets (RR-6403).
- 27) Do not rivet the Bottom Skin at this time as you only have so much time to finish the Tank area.
- 28) After riveting, clean up any excess Proseal on the outside of the Tank with a cloth dampened with M.E.K. or Acetone.
- 29) Turn the Wing over and ensure it is level.

30) Slide the angle on the Stringer in place on the Rib and rivet in place with 1/8" Tank Rivets (RR-6403).

31) Inside the Tank, cover all Rivet ends with Proseal. A small stiff brush works well to do this.

32) Fillet all corners and edges with Proseal. Pay close attention to the corners where the Ribs, Bulkheads and Spars meet and where the Stringer goes through the #4 or #5 Solid Rib. Figure 8.25.4.

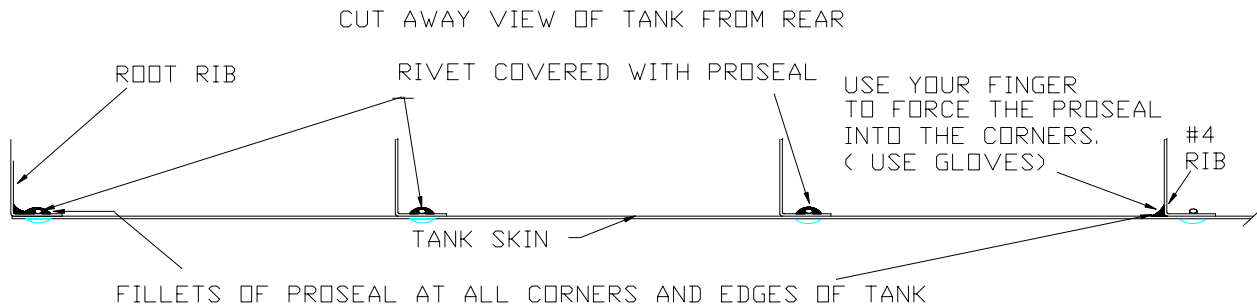


Figure 8.25.4

33) Let the wing sit for at least 24 hours.

34) Turn the wing over and rivet the Bottom Skin and bottom of the Leading Edge in place with 1/8" avex rivets (RV-1410).

35) At the Root end of the Front Spar, it is necessary to use 1/8" avex rivets (RV-1414).

36) Turn the wing over and ensure it is level.

37) Bolt on the five Aileron Hinges (W-125) with a 1/8" Hinge Spacer (W-605) and a 1/16" Hinge Spacer (W-610). Figure 8.25.5.

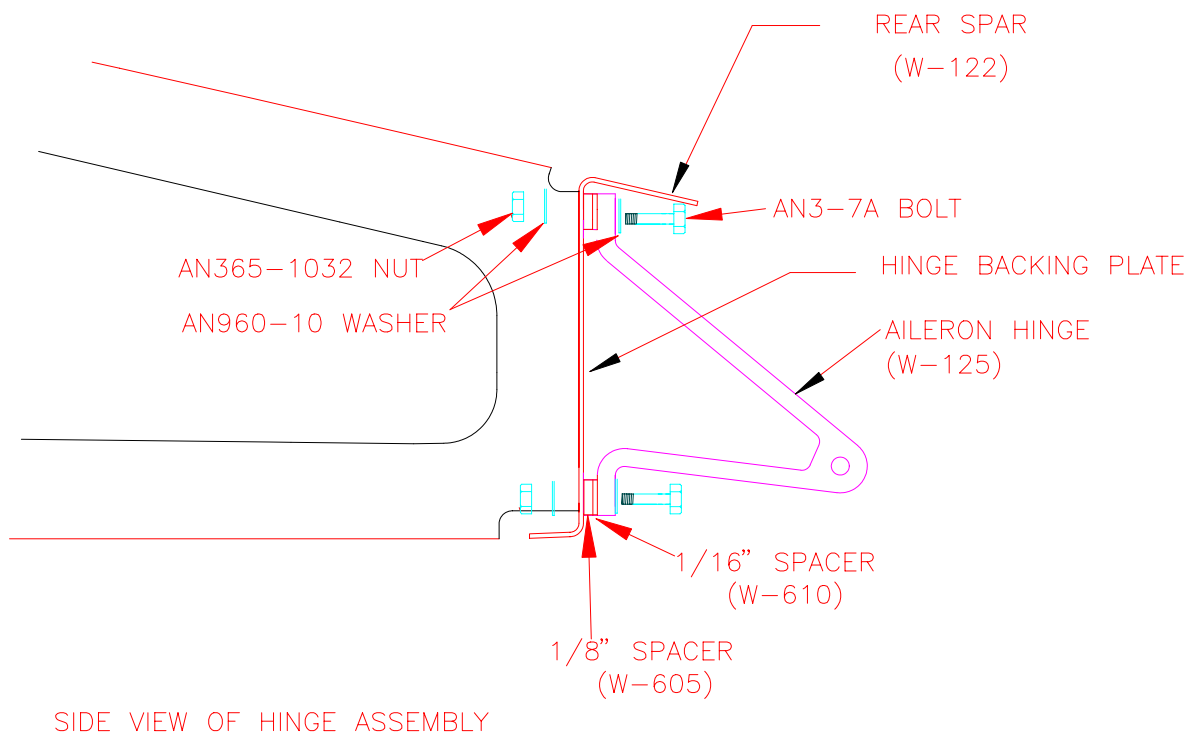


Figure 8.25.5

- 38) Chromate the Leading Edge Skin Front Spar and Leading Edge Ribs.
- 39) Rivet the top of the Leading Edge in place but do not rivet into the Main Spar or first hole in the Leading Edge Ribs. It will be necessary to slip the Tank Skin and Top Skin under the Leading Edge later.
- 40) Proseal and rivet the Fuel Filler Neck (4808-5) to the inside of the Top Tank Skin where you put the hole earlier using 1/8" RR 6403 Tank Rivets.
- 41) Make sure that the Fuel Sight fittings and the bottom fuel fitting are plugged. Test the Bottom Tank Skin for leaks by putting some gas into the tank and let it sit for awhile. If there are any leaks they should show. To seal them take some Proseal and mix a little MEK in it to thin it out and then just brush it around the whole inside of the tank. Let the Tank sit overnight.
- 42) Cleco the Top Skin and Stringers to the wing.
- 43) Proseal the two Main Rib Brackets you made previously. Rivet them in place using 1/8" (RR 6403) Tank Rivets.
- 44) Using the Stringers as a guide, slide the Stringer Brackets onto the end of the Stringers. Proseal them well and rivet them to the Ribs the same as you did the bottom ones. Use 1/8" (RR 6403) Tank Rivets.

- 45) Remove the Top Wing Skin, leaving the three Stringers that are in the Fuel Tank area still on the Wing.
- 46) Proseal the Stringers, Main Ribs, Main Spar Tank Bulkheads and the Top Tank Skin. Use lots of Proseal.
- 47) Cleco the Top Tank Skin to the Ribs, Main Spar, Stringers and Bulkheads. Using 1/8” (RR 6403) Tank Rivets, rivet the Top Tank Skin in place. Let the Wing sit for 72 hours to ensure proper drying of the Proseal.
- 48) Using air pressure test the tank for leaks. **DO NOT EXCEED 3 PSI.**
- 49) Chromate the Top Wing Skin, the Stringers, Rear Spar, Main Ribs and Main Spar. Cleco together.
- 50) Using 1/8” (RV 1410) rivets, starting in the middle of the Wing, rivet the Top Wing Skin. Make sure that you use 1/8” (RV-4412) Countersunk Rivets in the tip of the Wing .

### ***8.26 Torque Tube Install***

- 1) Slide a 2” washer (M2W) onto the torque tube root end.
  - 2) Measure the distance from the end of the torque tube to the 2” washer.
  - 3) Slide sleeve (CC-100) over the end of the tube and an end plug (EL-31) into tube.
  - 4) Ensure that the torque tube is pulled rootward and the 2” sleeve (CC-100) is against the 2” washer (M2W), then drill eight equally spaced #11 holes through the sleeve, tube and plug 1/2” from the end.
- Figure 8.26.1.

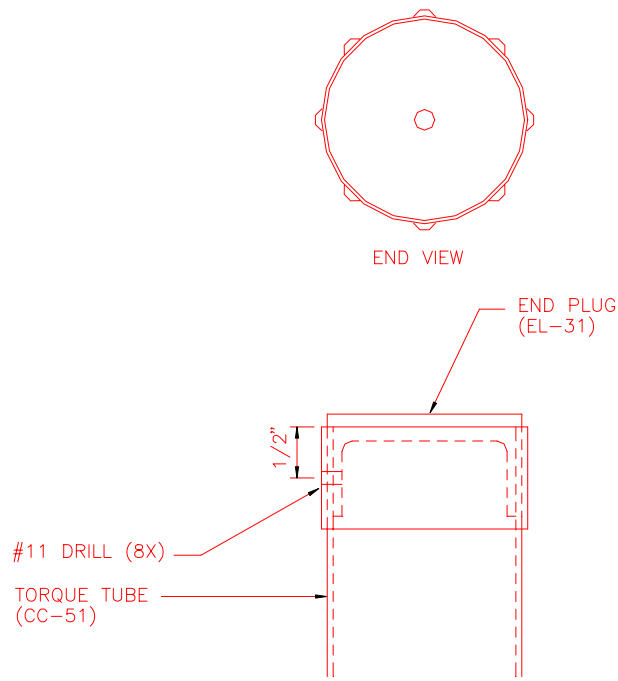
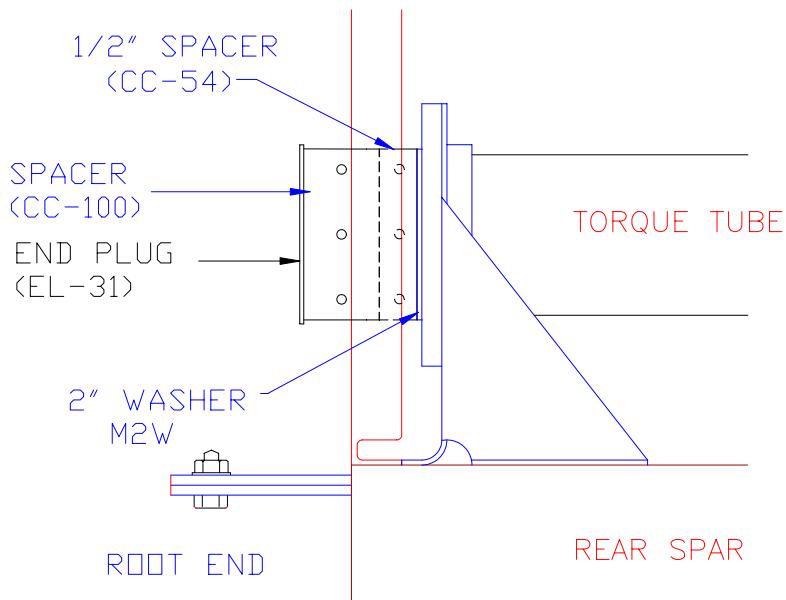


Figure 8.26.1



5) Disassemble and deburr.

### 8.27 Aileron Push Pull Tube

1) Make a push-pull tube (CC-82) from 3/4" x .035 tubing (CC-51) as in figure 8.27.1.

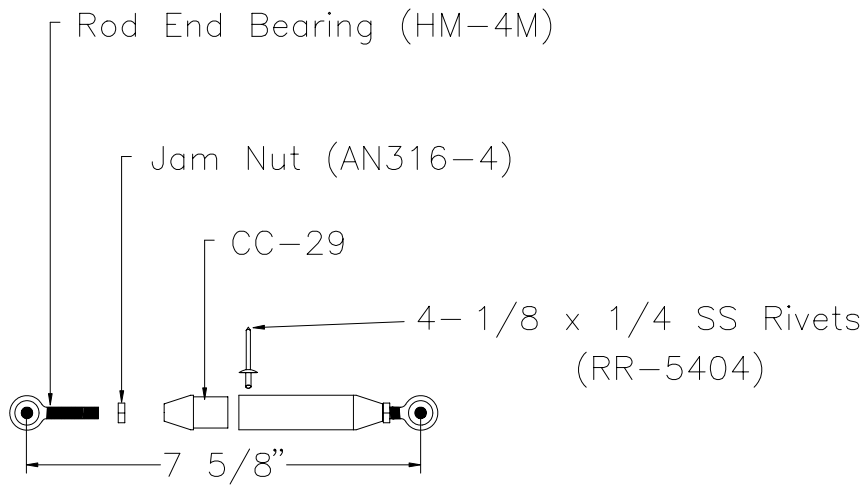


Figure 8.27.1

2) Attach push-pull tube (CC-82) to the control horn (CC-43) with an AN4-11A bolt, AN970-4 washer and an AN365-428 fibernut. Figure 8.27.2.

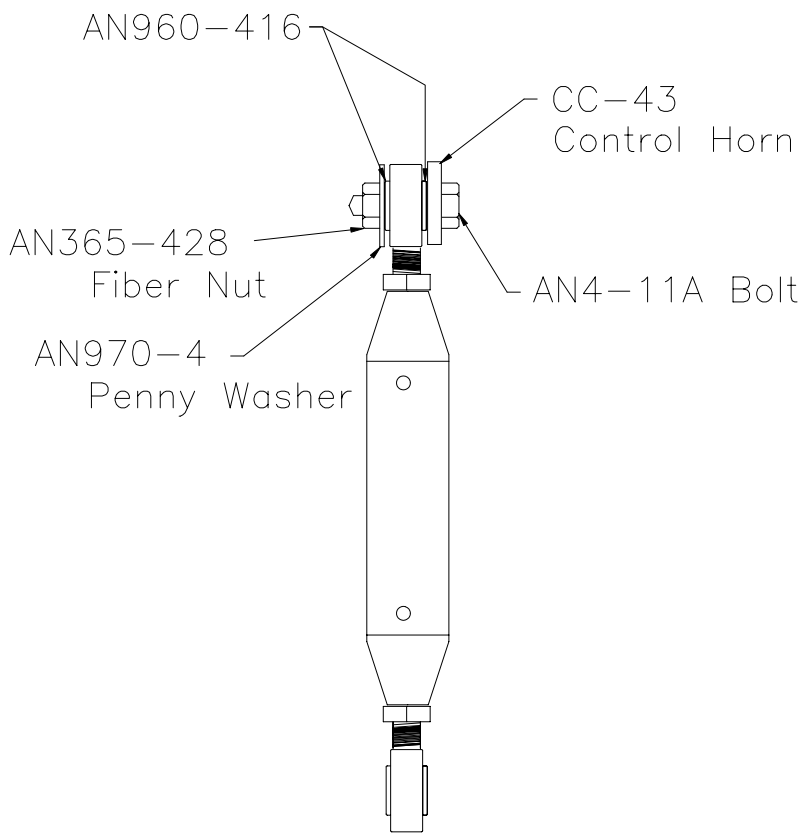


Figure 8.27.2

3) With the ailerons in neutral position attach the other end of the push-pull tube (CC-82) to the ailerons with an AN4-13A bolt, AN970-4 washer and AN365-428 fibernut.

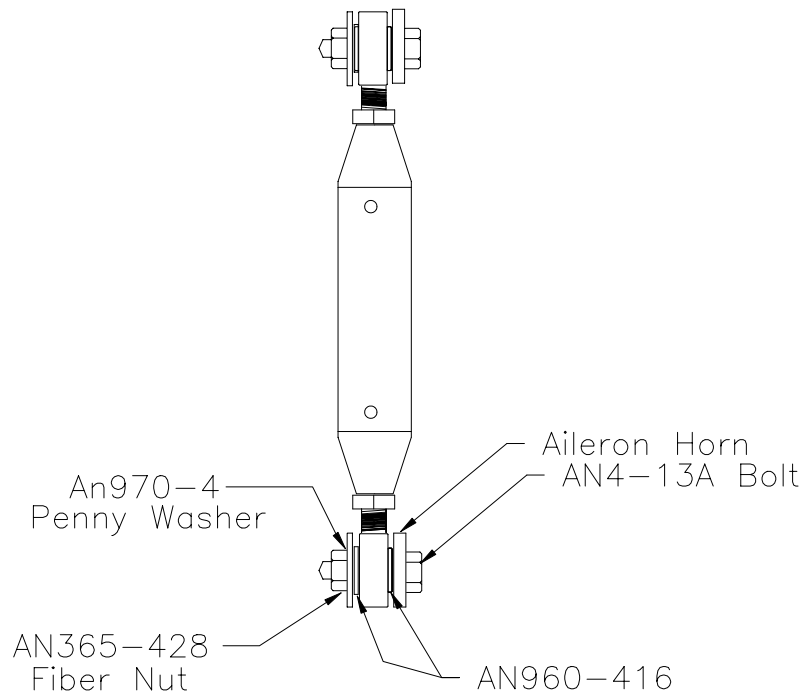
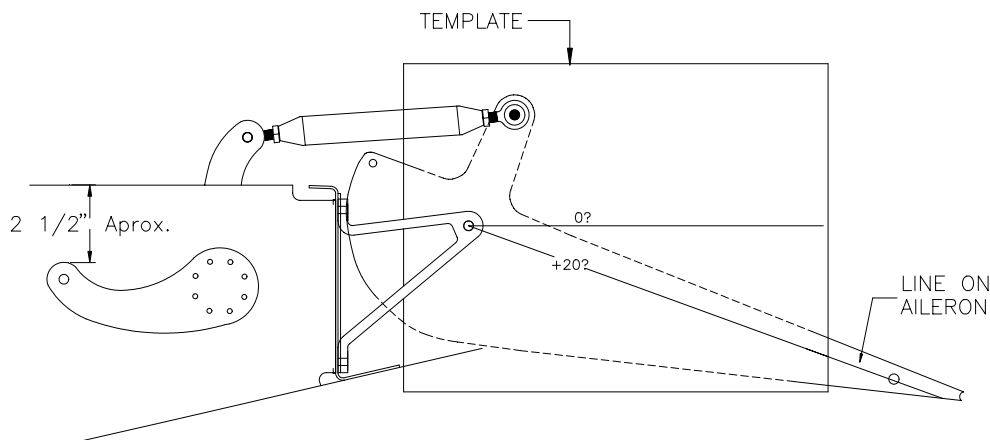


Figure 8.27.3.

- 4) Ensure aileron still has 20° up deflection and 40° down deflection.
- 5) Set aileron so it is at 20° up deflection.
- 6) Bolt, (allowing some movement) a control horn (CC-43) to the end plug at the root end of the torque tube. Securely cleco together all parts fitted earlier. Adjust control horn (CC-43) so that it clears the



bottom of the wing by 2 1/2". Figure 8.27.4.

Figure 8.27.4

### 8.28 Control Horn

1) Drill eight #11 holes through control horn into the end plug. Figure 8.28.1.

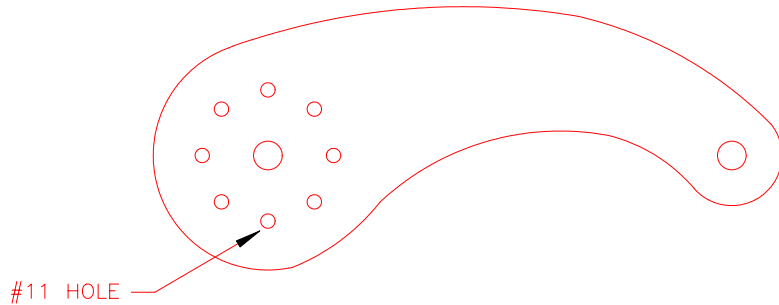


Figure 8.28.1

2) Remove and deburr parts.

3) With suitable 1/4" hardware, temporarily bolt another control horn (CC-43) onto the root control horn. Figure 8.28.2.

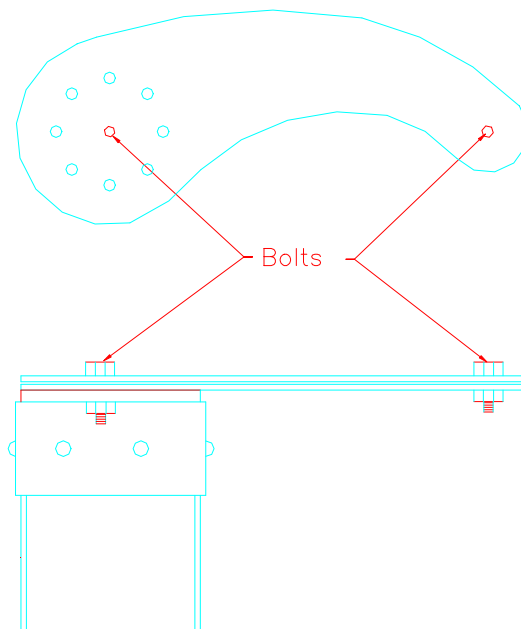


Figure 8.28.2

4) Drill a #11 hole through both parts approximately 1 1/2" from the end hole. Store the drilled horn. Deburr parts, chromate mating surfaces and rivet previously fitted root control horn and associated parts with sixteen 3/16" SS rivets (RV-5606). Figure 8.28.3.

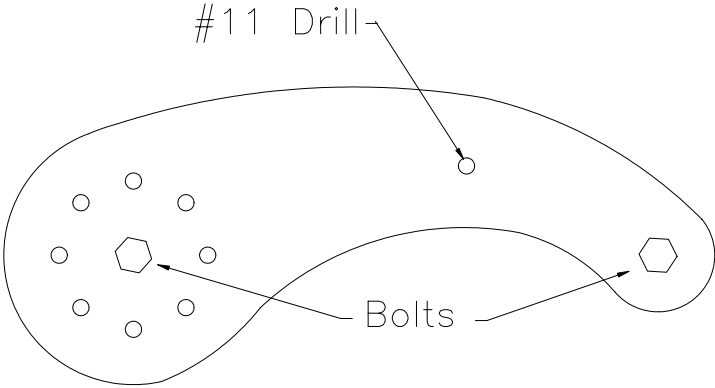
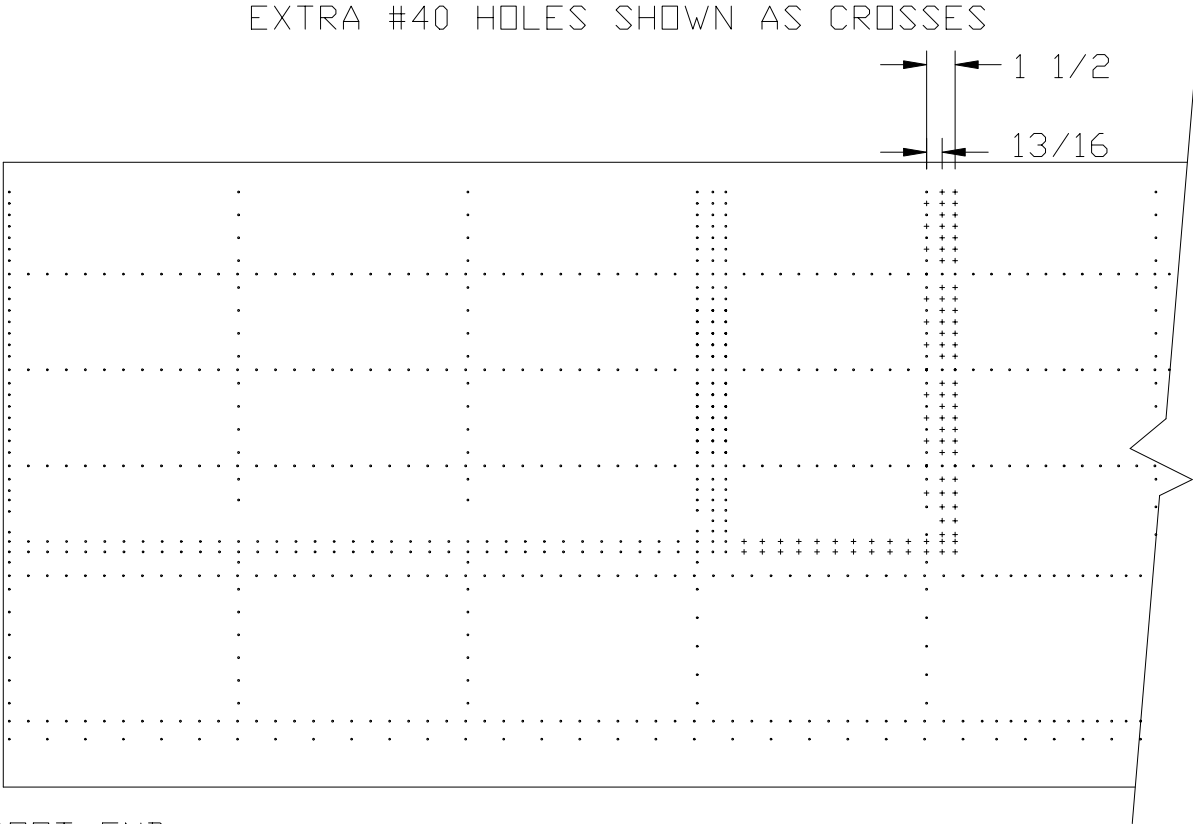


Figure 8.28.3

**8.29 Extended Tank Supplement**

- 1) At the fifth rib position at the root end of the Top Wing Skin drill extra #40 holes as in figure 8.29.1.



- 2) At the forth rib position, place tape over the holes as shown in figure 8.29.2. These holes are not to be used when drilling the Top Tank Skin.

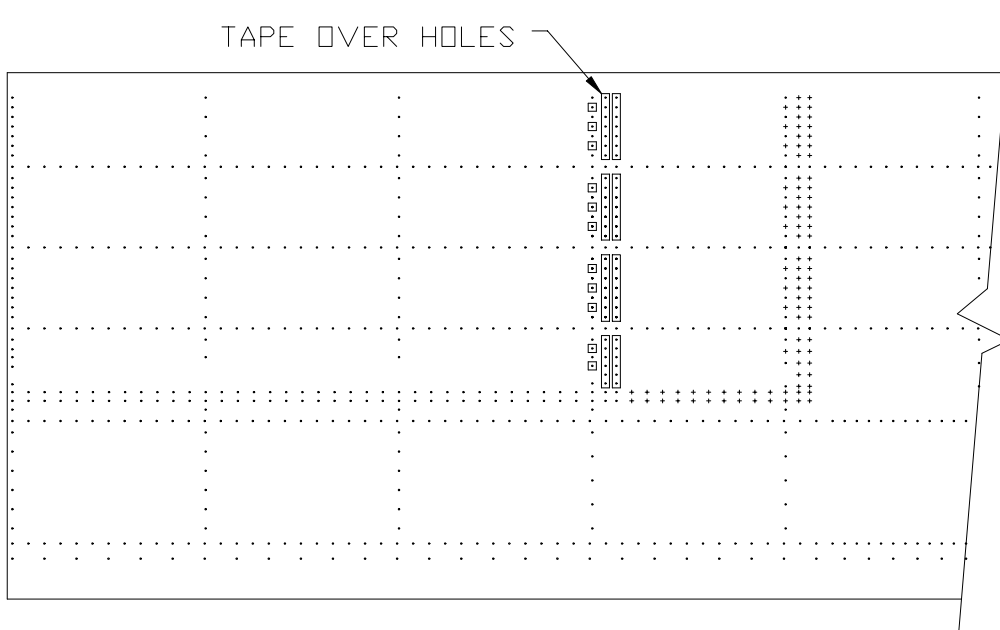


FIGURE 8.29.2

- 3) Repeat steps 1 and 2 for the Bottom Tank Skin as in figure 8.29.3 and figure 8.29.4.

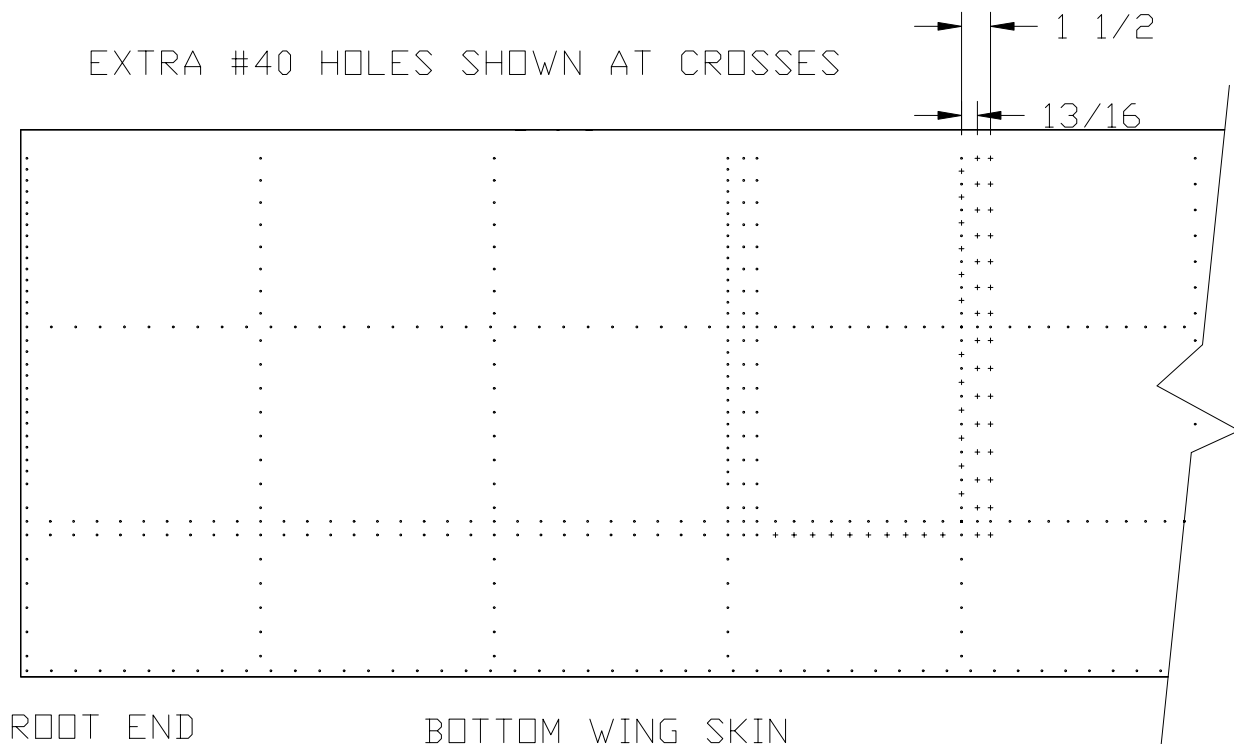


FIGURE 8.29.3

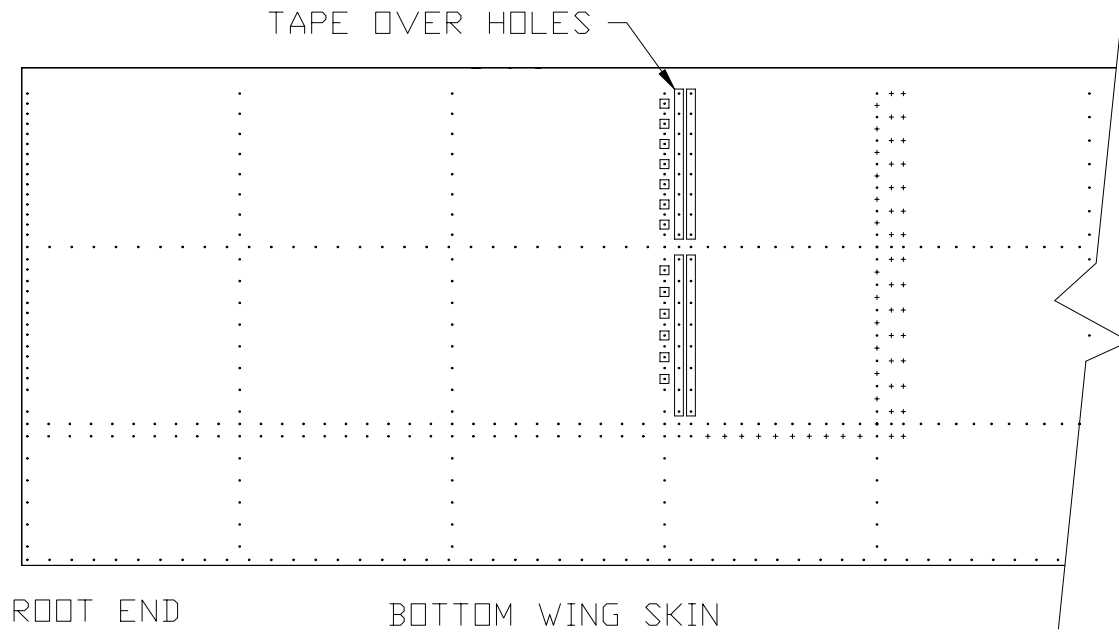


FIGURE 8.29.4

- 4) Return to step 8.14 in this section.
- 5) Follow the instructions, but substitute W-611 for W-158. Of course you will have four tank bays rather than three.