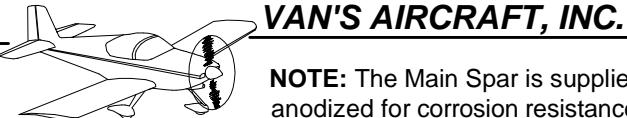


# SECTION 13: MAIN SPAR



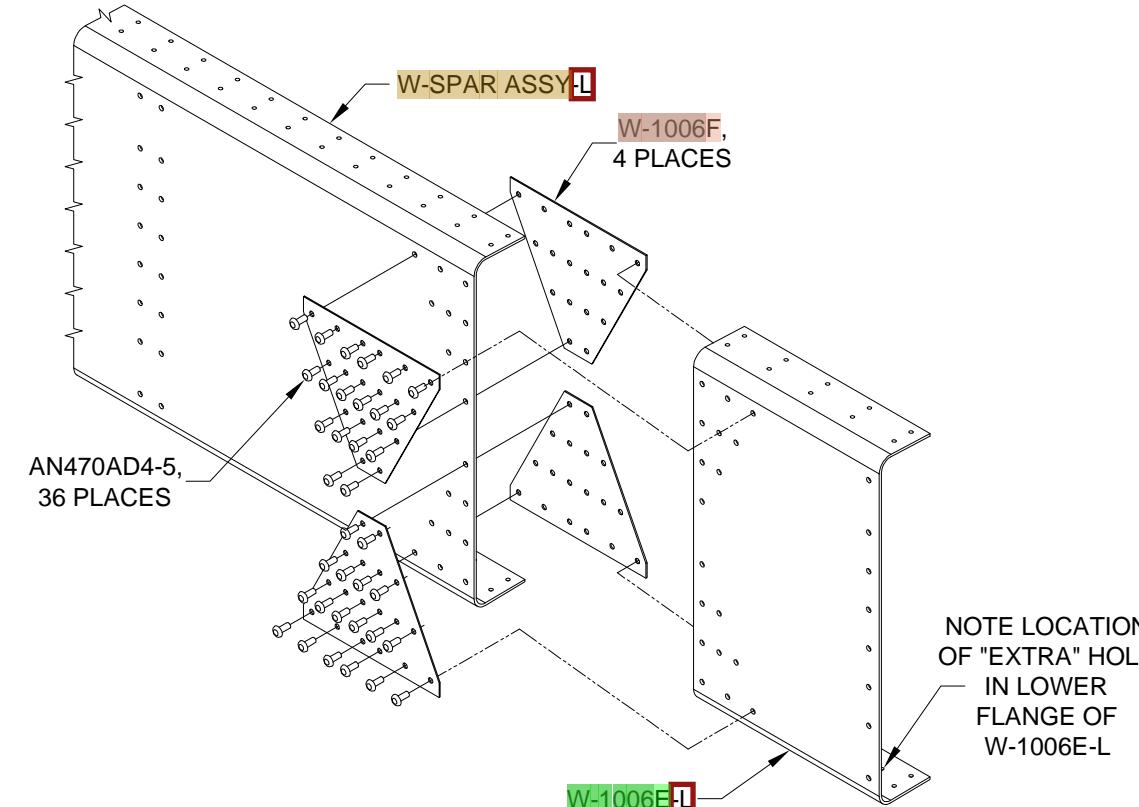
**NOTE:** The Main Spar is supplied assembled and gold anodized for corrosion resistance. The spar assembly consists of upper and lower step bars attached to one side of a C-channel spar web with a doubler plate attached to the other side of the web. The flanges of the C-channel spar web face aft. The inboard end of the spar has large holes for attaching to the fuselage. The upper spar step bar is longer and thicker than the lower spar step bar. **Be sure that you know "up", "down", "inboard", and "outboard" on your spar assembly.**

Step 1: Cleco the W-1006E-L Main Spar Web Extension to the W-SPAR ASSY-L Spar Assembly - Left using four W-1006F Spar Splice Plates. Correct orientation of the main spar web extension places the "extra" hole in one of the flanges on the bottom. See Figure 1. Final-Drill the spar splice plates to the spar assembly and web extension using a #30 drill.

Step 2: Mark or label the four W-1006F Spar Splice Plates "Upper Fwd", "Lower Aft", etc. so that when they are riveted in place their location and orientation will be the same as when they were final-drilled. See Section 5C for more information on marking parts.

Step 3: Un-cleco the four W-1006F Spar Splice Plates and W-1006E-L Main Spar Web Extension from the W-SPAR ASSY-L Spar Assembly - Left and deburr holes in all parts. Prime the spar splice plates and main spar web extension if/as desired.

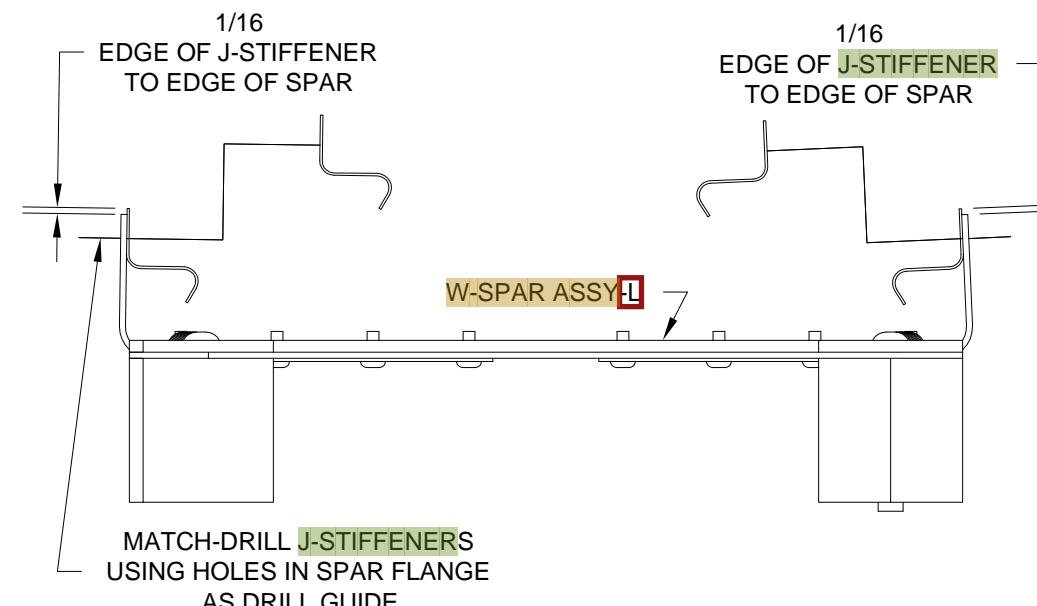
Step 4: Re-cleco the four W-1006F Spar Splice Plates and W-1006E-L Main Spar Web Extension to the W-SPAR ASSY-L Spar Assembly - Left and install rivets as shown in Figure 1.



**FIGURE 1:**  
MAIN SPAR WEB EXTENSION  
INSTALLATION



**FIGURE 2:**  
WING BOX J-STIFFENER  
ORIENTATION TO SPAR ASSEMBLY  
ISOMETRIC VIEW



**FIGURE 3:**  
WING BOX J-STIFFENER  
ORIENTATION TO SPAR ASSEMBLY  
END VIEW

Step 5: Fabricate two W-1028A Wing Box J-Stiffener - Long by cutting two pieces of J-Channel each one 92 1/4 inches long.

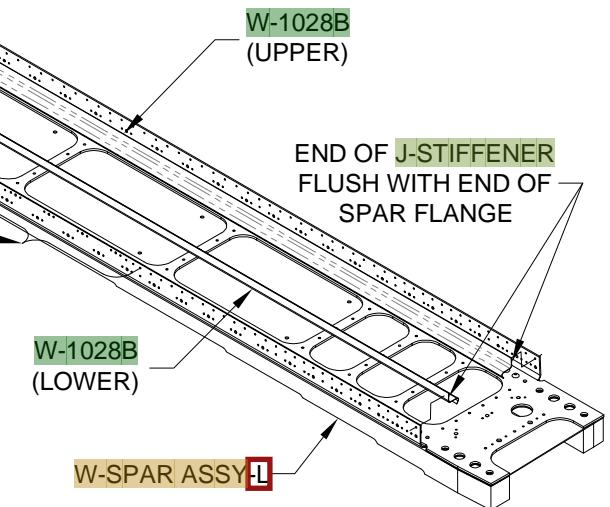
Step 6: Fabricate two W-1028B Wing Box J-Stiffener - Short by cutting two pieces of J-Channel each one 53 3/4 inches long.

Step 7: Place the W-SPAR ASSY-L Spar Assembly - Left on the work surface with the flanges "up". Because the spar assembly - left will sag due to its own weight, use wood blocks to support the spar in the middle and at the tip end as required to keep the spar straight.

Orient the W-1028A Wing Box J-Stiffeners - Long and W-1028B Wing Box J-Stiffeners - Short to the flanges of the W-SPAR ASSY-L Spar Assembly - Left as shown in Figures 2 and 3.

Use "spring clamps" or cleco clamps to hold the wing box j-stiffeners to the spar flanges.

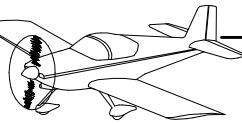
The wing box j-stiffeners - long should be clamped first, followed by the wing box j-stiffeners - short which nest inside the wing box j-stiffeners - long.



Step 8: Using a #40 drill, match-drill the W-1028A Wing Box J-Stiffeners - Long and W-1028B Wing Box J-Stiffeners - Short to the flanges of the W-SPAR ASSY-L Spar Assembly - Left using the aft most row of 3/32 inch diameter holes in the spar flanges as drill guides. See Figure 3. Do NOT match-drill the lower wing box j-stiffeners in the three areas on the lower spar flange shown in Figure 2 and in Page 13-5, Figure 2.

Insert clecos in the holes as match-drilling progresses along the length of the wing box j-stiffeners. Monitor the position of the wing box j-stiffener relative to the spar flange (see Figure 3) as match-drilling progresses and make corrections as required.

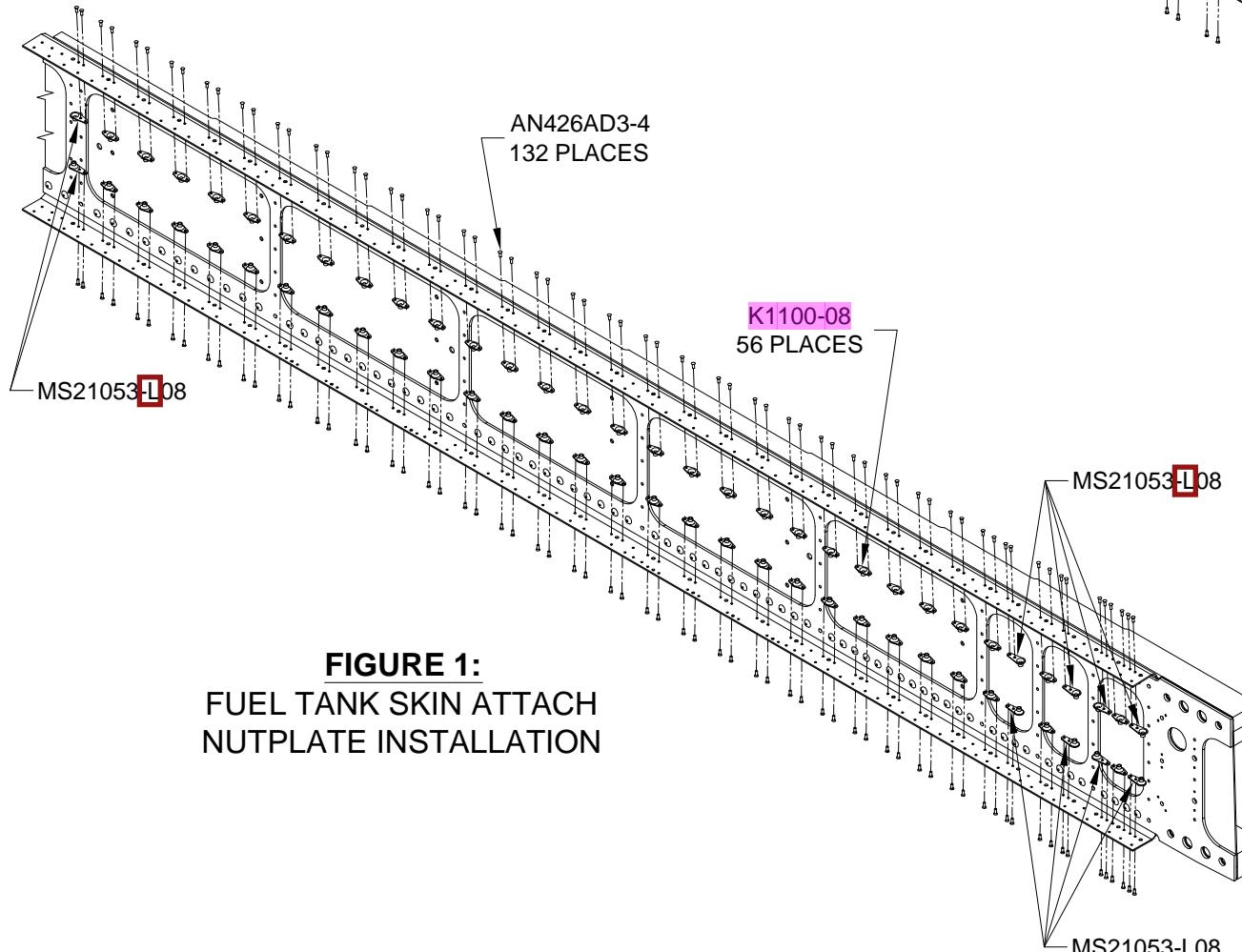
After match-drilling, remove the wing box j-stiffeners, mark them for the left wing, then set them aside for later use during wing assembly.



Step 1: Except for holes already match-drilled, run a #40 drill through all the 3/32 holes in the flanges of the **W-SPAR ASSY-L** Spar Assembly - Left.

Step 2: Machine Countersink the nutplate attach rivet holes in the flanges of the **W-SPAR ASSY-L** Spar Assembly - Left. Machine countersink those rib to spar flange attach rivet holes that are in line with the nutplate attach rivet holes and are inboard of the most outboard fuel tank attach nutplate.

Countersink just deep enough to fit the head of an AN426AD3 rivet. Read Section 5E for more information on countersinking and dimpling. The fuel tank skin attach nutplate locations are shown in Figure 1. The wing access plate attach nutplate locations are shown in Figure 3.

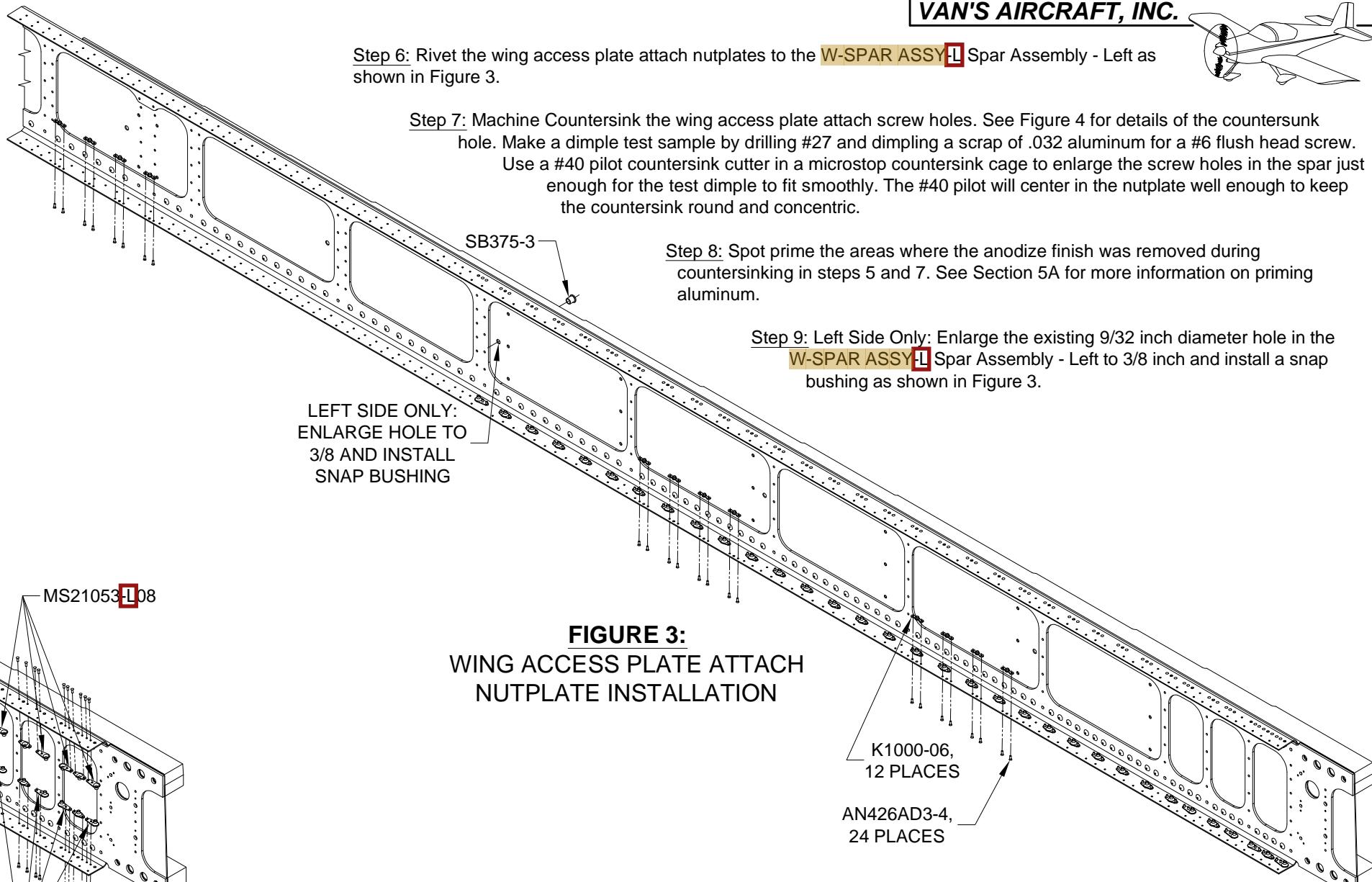


**FIGURE 1:**  
FUEL TANK SKIN ATTACH  
NUTPLATE INSTALLATION

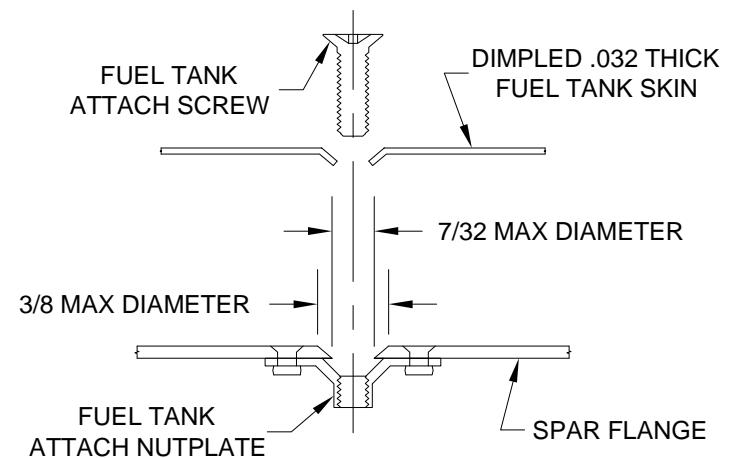
Step 3: Machine Countersink the skin and rib attach rivet holes in the flanges of the **W-SPAR ASSY-L** Spar Assembly - Left. Countersink just deep enough to fit the dimples in the wing skins. Make a dimple test sample by drilling and dimpling a scrap of .032 aluminum for an AN426AD3 rivet. See Section 5E.

Step 4: Rivet the fuel tank skin attach nutplates to the **W-SPAR ASSY-L** Spar Assembly - Left as shown in Figure 1.

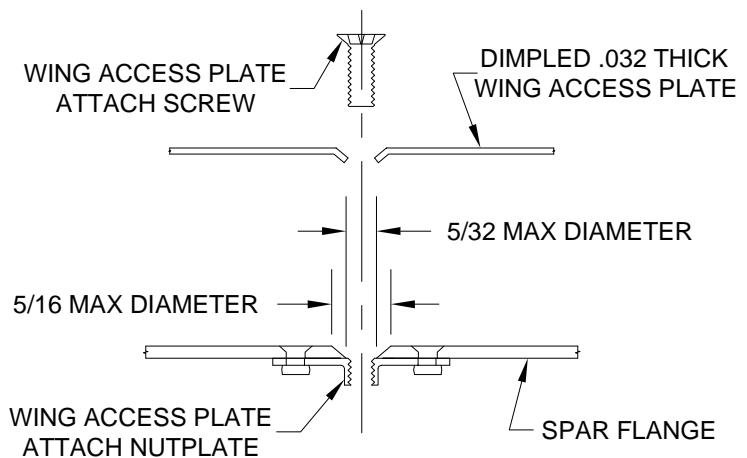
Step 5: Machine Countersink the fuel tank attach screw holes. See Figure 2 for details of the countersunk hole. Make a dimple test sample by drilling #19 and dimpling a scrap of .032 aluminum for a #8 flush head screw. Use a #30 pilot countersink cutter in a microstop countersink cage to enlarge the screw holes in the spar just enough for the test dimple to fit smoothly. The #30 pilot will center in the nutplate well enough to keep the countersink round and concentric.



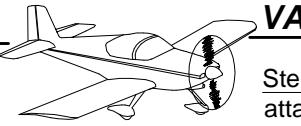
**FIGURE 3:**  
WING ACCESS PLATE ATTACH  
NUTPLATE INSTALLATION



**FIGURE 2:**  
FUEL TANK ATTACH  
COUNTERSINK DETAIL



**FIGURE 4:**  
WING ACCESS PLATE ATTACH  
COUNTERSINK DETAIL



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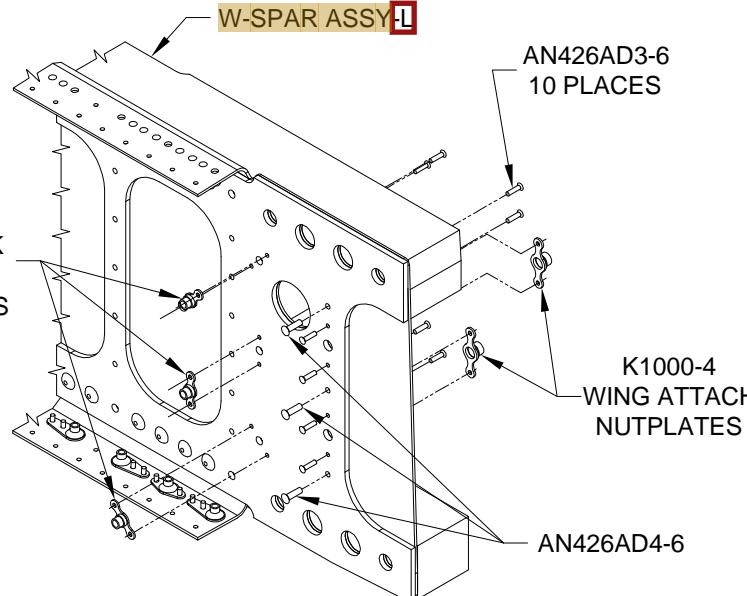
Step 1: Run a #40 drill through all the 3/32 diameter fuel tank attach nutplate and wing attach nutplate rivet holes in the web of the W-SPAR ASSY-L Spar Assembly - Left. See Figure 1.

Step 2: Run a #30 drill through the three spar doubler to spar web rivet holes in the web of the W-SPAR ASSY-L Spar Assembly - Left. See Figure 1.

Step 3: Machine Countersink the nutplate attach rivet holes in the web of the W-SPAR ASSY-L Spar Assembly - Left. Countersink just deep enough to fit the head of an AN426AD3 rivet. The countersinks for the fuel tank attach nutplate rivet holes are on the forward side of the spar assembly and the countersinks for the wing attach nutplate rivet holes are on the aft side of the spar assembly. See Figure 1.

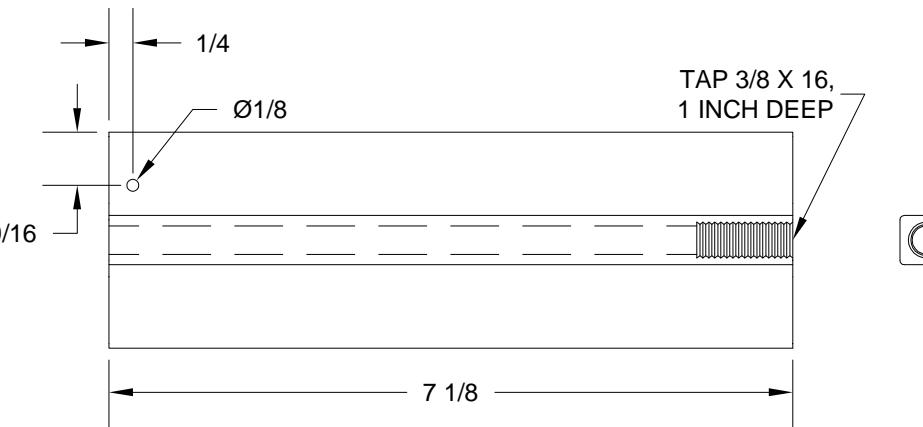
Step 4: Machine Countersink the aft side of the W-SPAR ASSY-L Spar Assembly - Left for the three AN426AD4 rivets shown in Figure 1. Countersink just deep enough to fit the head of an AN426AD4 rivet. Install the three rivets as shown in Figure 1.

Step 5: Rivet the fuel tank attach nutplates and wing attach nutplates to the W-SPAR ASSY-L Spar Assembly - Left as shown in Figure 1.



**FIGURE 1:**  
FUEL TANK AND WING ATTACH  
NUTPLATE INSTALLATION

Step 6: Fabricate the W-1020 Tie-Down Bracket from a piece of AEX TIE-DOWN by cutting to length, tapping, and drilling a pilot hole as shown in Figure 2.



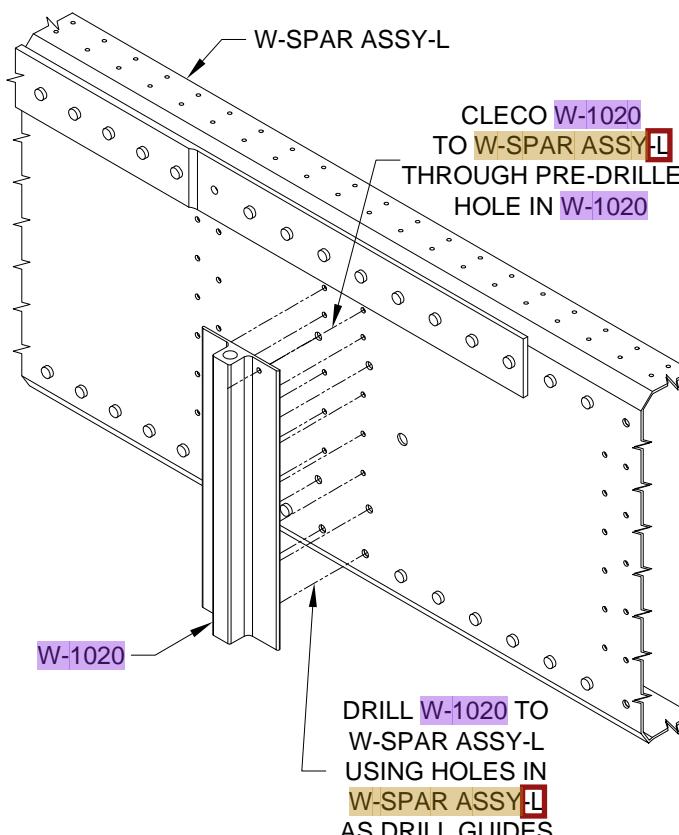
**FIGURE 2:**  
TIE DOWN BRACKET FABRICATION

Step 8: Remove the W-1020 Tie-Down Bracket from the W-SPAR ASSY-L Spar Assembly - Left. Using a #40 bit, match-drill the nutplate attach rivet holes in the W-1020 Tie-Down Bracket as shown in Figure 4. Use the nutplates as drill guides for properly locating the holes.

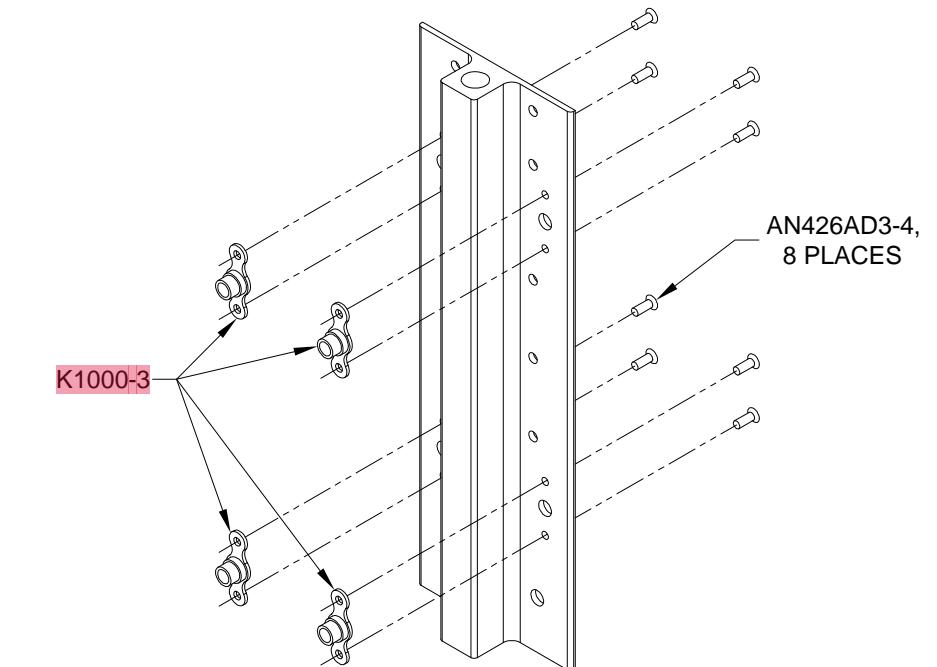
Step 9: Machine countersink the aft side of the W-1020 Tie-Down Bracket for the heads of the nutplate attach rivets. See Figure 4. Deburr all holes in the tie-down bracket.

Step 10: Prime the W-1020 Tie-Down Bracket. See Section 5A for more information on priming aluminum.

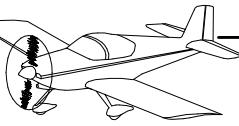
Step 11: Rivet nutplates to the W-1020 Tie-Down Bracket as shown in Figure 4.



**FIGURE 3:**  
FITTING TIE DOWN BRACKET  
TO SPAR ASSEMBLY

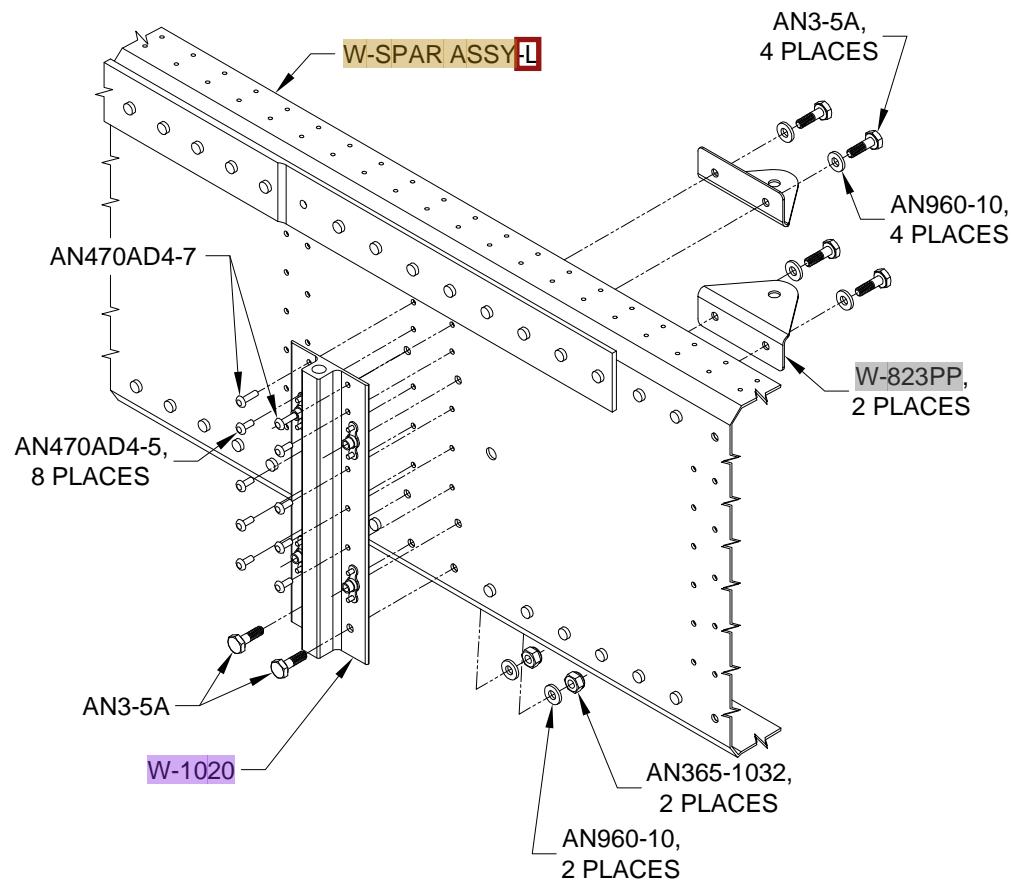


**FIGURE 4:**  
TIE-DOWN BRACKET  
NUTPLATE INSTALLATION



Step 1: Clean the powder coating from the insides of the holes in the W-823PP Aileron Bellcrank Brackets by running a #12 drill through the two smaller holes and a 1/4" drill through the single larger hole.

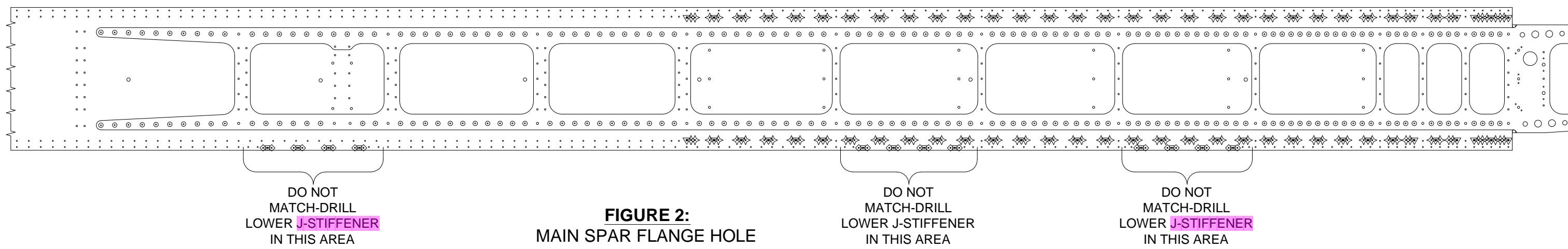
Attach the W-1020 Tie-Down Bracket and two aileron bellcrank brackets to the W-SPAR ASSY-L Spar Assembly - Left as shown in Figure 1.



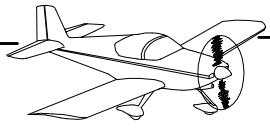
**FIGURE 1:**  
TIE-DOWN BRACKET AND  
AILERON BELLCRANK BRACKET  
INSTALLATION

- ▽ FUEL TANK SKIN ATTACH
- ACCESS PLATE ATTACH
- ◊ ACCESS PLATE NUTPLATE ATTACH
- ◆ FUEL TANK SKIN NUTPLATE ATTACH

NO SYMBOL = SKIN or SKIN AND RIB or RIB ATTACH

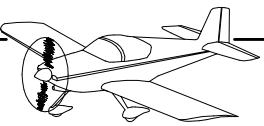


**FIGURE 2:**  
MAIN SPAR FLANGE HOLE  
IDENTIFICATION DIAGRAM

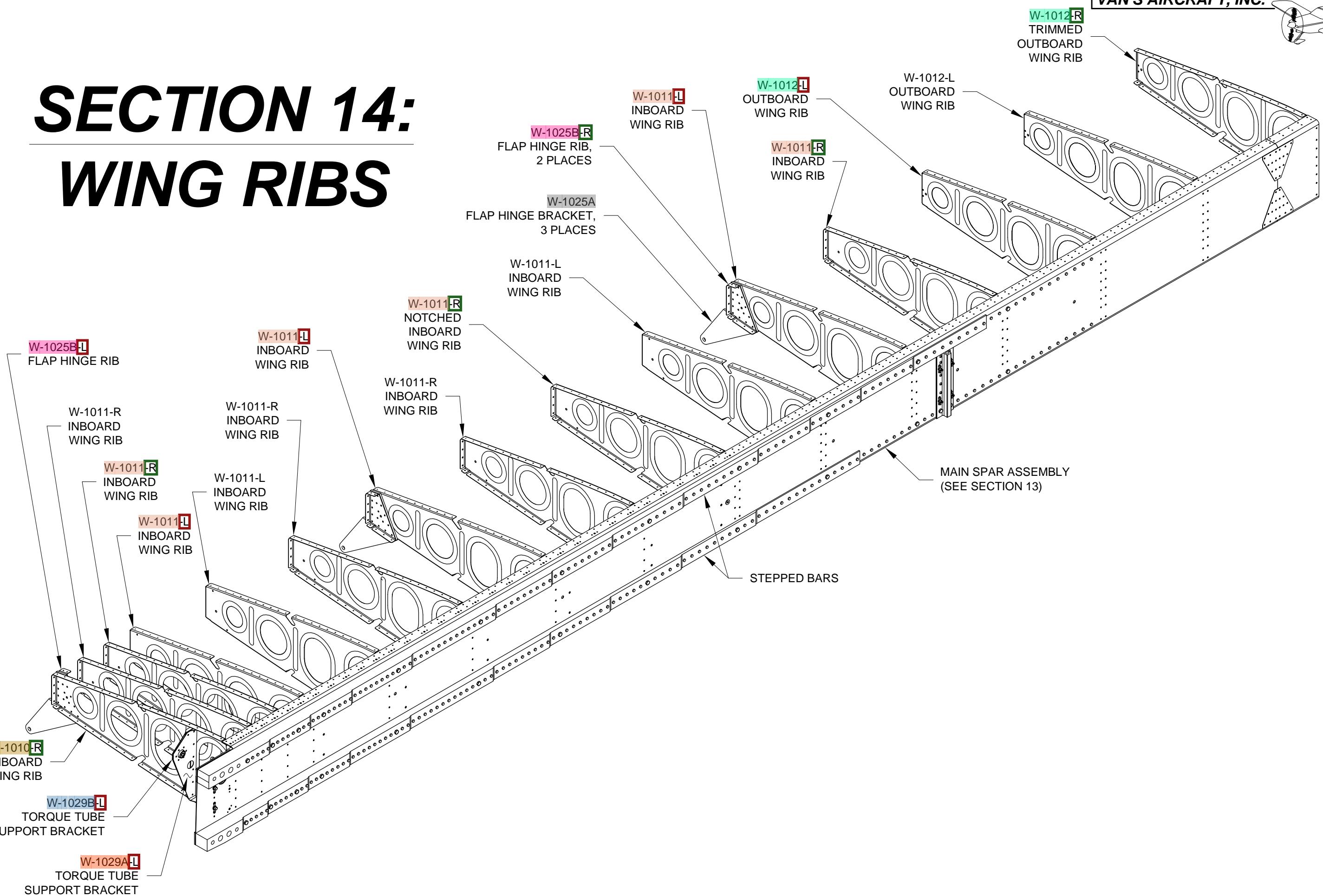


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# SECTION 14: WING RIBS

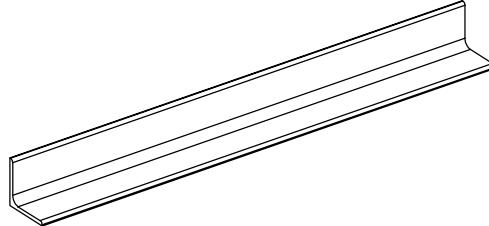




Note: This entire section depicts the wing rib installation for the left wing only. The right wing is a mirror of the left.

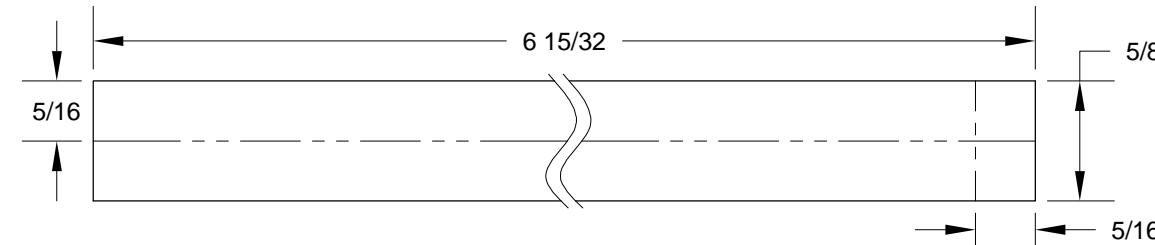
Step 1: Flute and straighten all ribs per Section 5N.

Step 2: Cut a piece of AA6-063X3/4X3/4, 7 13/16 inches long as shown in Figure 1.



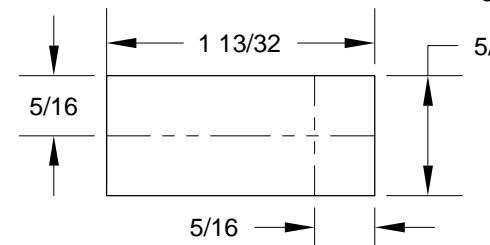
**FIGURE 1: CUTTING THE W-1029C ANGLE**

Step 3: Cut a piece of .063 2024-T3 ALCLAD and mark the alignment lines per the dimensions in Figure 2.



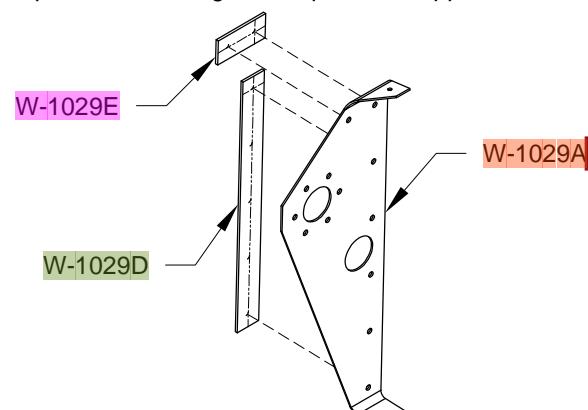
**FIGURE 2: CUTTING AND MARKING THE W-1029D SPACER**

Step 4: Cut a piece of .063 2024-T3 ALCLAD and mark the alignment lines per the dimensions in Figure 3.



**FIGURE 3: CUTTING AND MARKING THE W-1029E SPACER**

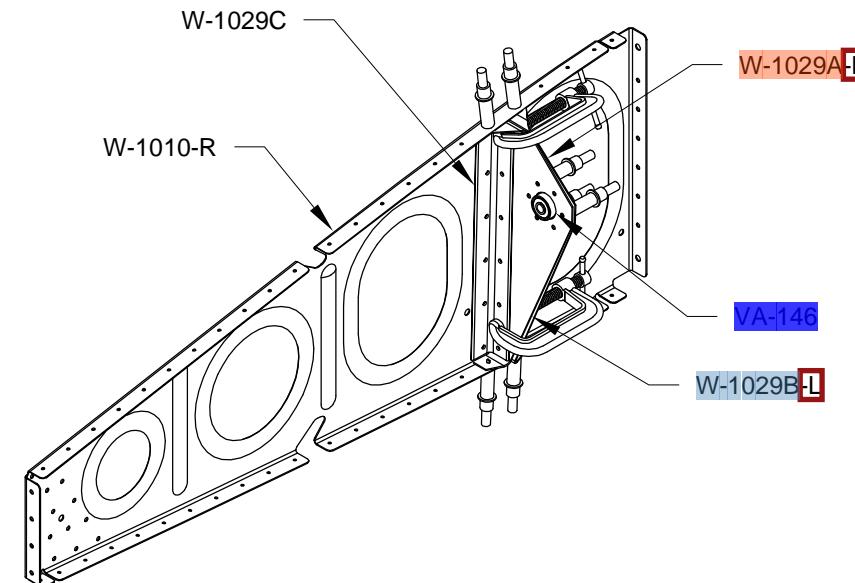
Step 5: Clamp W-1029A-L Torque Tube Support Bracket, W-1029D Spacer and W-1029E Spacer together with the centerlines drawn in steps 2 and 3 aligned with the holes in the support bracket as shown in Figure 4. Match-Drill the spacers #30 using the torque tube support bracket as a drill guide.



Step 6: Cleco the VA-146 Flange Bearing in-between the W-1029A-L and W-1029B-L Torque Tube Support Brackets. Cleco the assembly to the upper and lower flanges of the W-1010-R Inboard Wing Rib as shown in Figure 5. (The support brackets cleco into the fourth and fifth holes back from the front of the main flange not counting the tab.) Clamp the W-1029C Angle flush against the aft face of the W-1029B-L Torque Tube Support Bracket and the inboard face of the inboard wing rib.

Step 7: Match-Drill #30 and cleco the W-1010-R Inboard Wing Rib to the W-1029C Angle using the holes in the rib as a drill guide.

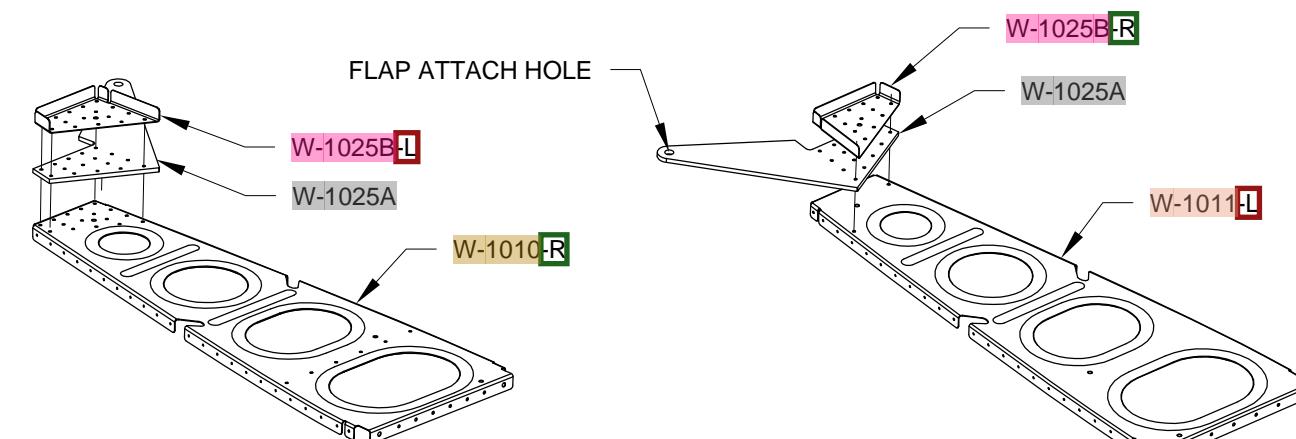
Step 8: Match-Drill #30 and cleco the W-1029A-L and W-1029B-L Torque Tube Support Brackets to the W-1029C Angle at two attach points using the support brackets as a drill guide. Use a right angle drill or extension bit for best results. Match-drill the holes common between the torque tube support brackets and the VA-146 Flange Bearing. Disassemble all parts from the inboard wing rib. Cleco the W-1029B-L Torque Tube Support Bracket to the angle at the two locations just drilled and Match-Drill #30 the remaining attach holes.



**FIGURE 5: MATCH-DRILLING W-1029C ANGLE**

Step 9: Cleco the W-1025B-L Flap Hinge Rib and W-1025A Flap Hinge Bracket to the W-1010-R Inboard Wing Rib as shown in Figure 7. Final-Drill all common attach holes in the assembly to #30.

Step 10: Cleco the W-1025B-R Flap Hinge Rib and W-1025A Flap Hinge Bracket to the two alignment holes in the W-1011-L Inboard Wing Rib as shown in Figure 8. Match-Drill #30 the inboard wing rib using the holes in the flap hinge rib and bracket as a drill guide. Final-Drill #30 the two alignment holes. Repeat this process to create two assemblies as shown in Figure 8. Ream the flap attach hole in all flap hinge brackets to 3/8.

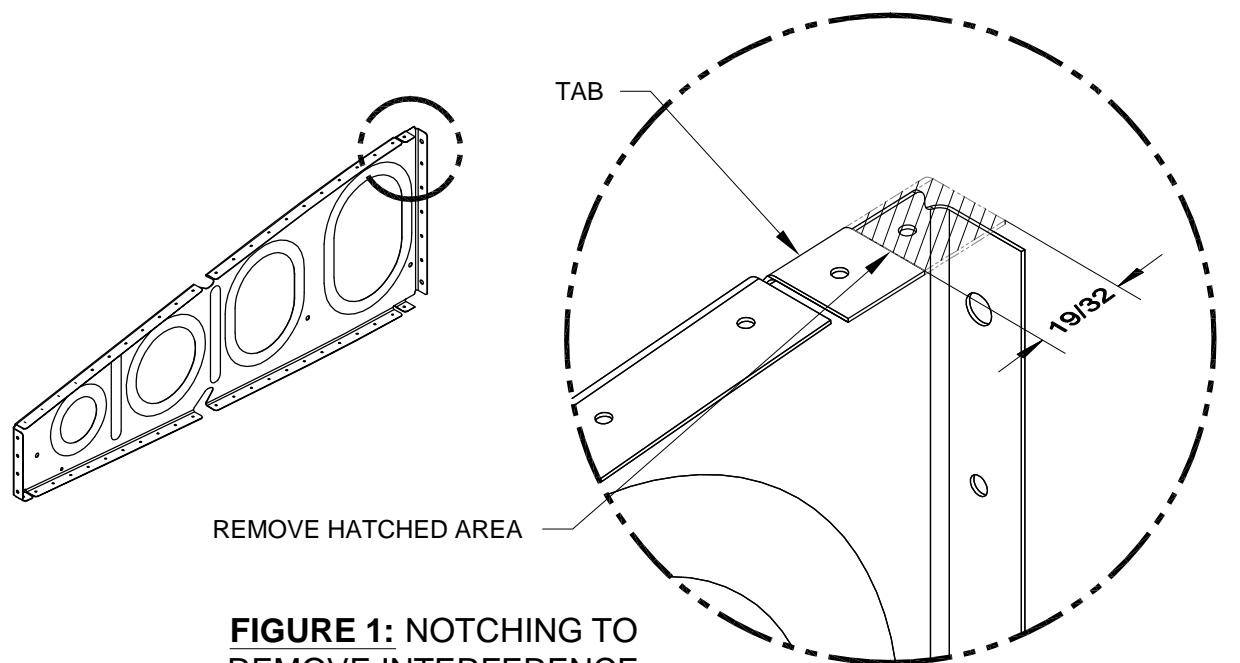


**FIGURE 7: INBOARD FLAP HINGE ASSEMBLY**

**FIGURE 8: OUTBOARD FLAP HINGE ASSEMBLIES**

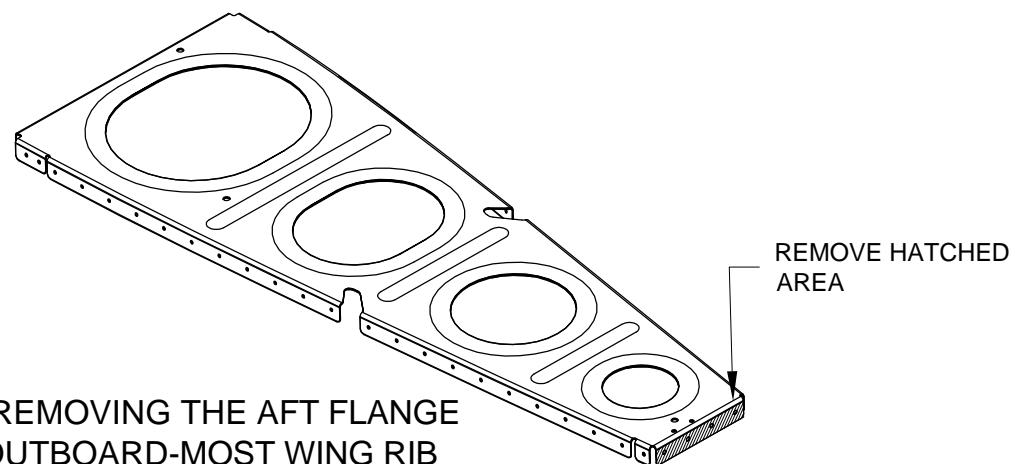


Step 1: Remove the flange and flange radius from the top and bottom tabs of a **single W-1011-R** Inboard Wing Rib as shown in Figure 1. This notch will remove interference between the outboard-most tank attach nutplate and the **W-1011-L/R** Inboard Wing Rib that attaches to the main spar assembly at that span wise location. The amount of trim is the same on both the top and bottom tab.



**FIGURE 1: NOTCHING TO REMOVE INTERFERENCE**

Step 2: Remove the aft flange but not the flange radius from the **W-1012-R** Outboard Wing Rib as shown in Figure 2.



**FIGURE 2: REMOVING THE AFT FLANGE OF THE OUTBOARD-MOST WING RIB**

Step 3: Cleco the **W-1010-R** Inboard Wing Rib, **W-1011-L/R** Inboard Wing Ribs and **W-1012-L/R** Outboard Wing Ribs to the main spar assembly as shown in the isometric view on Page 14-1.

Match-Drill to #12 the upper and lower attach points on the **W-1010-R** and all the **W-1011-L/R** Inboard Wing Ribs that will be attached with bolts to the main spar assembly (see Page 14-6, Figure 1), using the holes in the main spar assembly as a drill guide. Use a wood block to support the forward flange of the ribs while drilling.

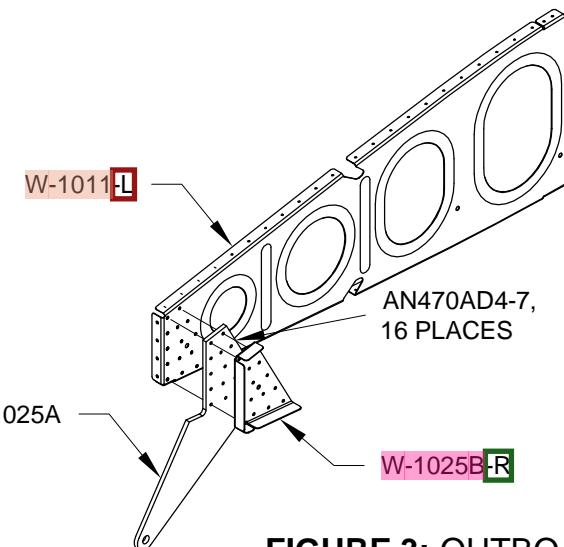
Final-Drill #30 all the remaining common attach holes in the forward flange of the ribs and web of the main spar assembly.

Final-Drill #40 all the common attach holes in the upper and lower rib tabs and the flanges of the main spar assembly.

Step 4: Disassemble the ribs from the main spar assembly. Disassemble the **W-1025A** Flap Hinge Brackets and **W-1025B-L** Flap Hinge Ribs from the inboard ribs.

Deburr all holes in all parts. Prime all parts if/as desired.

Step 5: Cleco the **W-1025B-R** Flap Hinge Rib and **W-1025A** Flap Hinge Bracket to the **W-1011-L** Inboard Wing Rib. Rivet the flap hinge rib and flap hinge bracket to the inboard wing rib as shown in Figure 3. Repeat this process to create two assemblies using the **W-1011-R** Inboard Wing Rib.

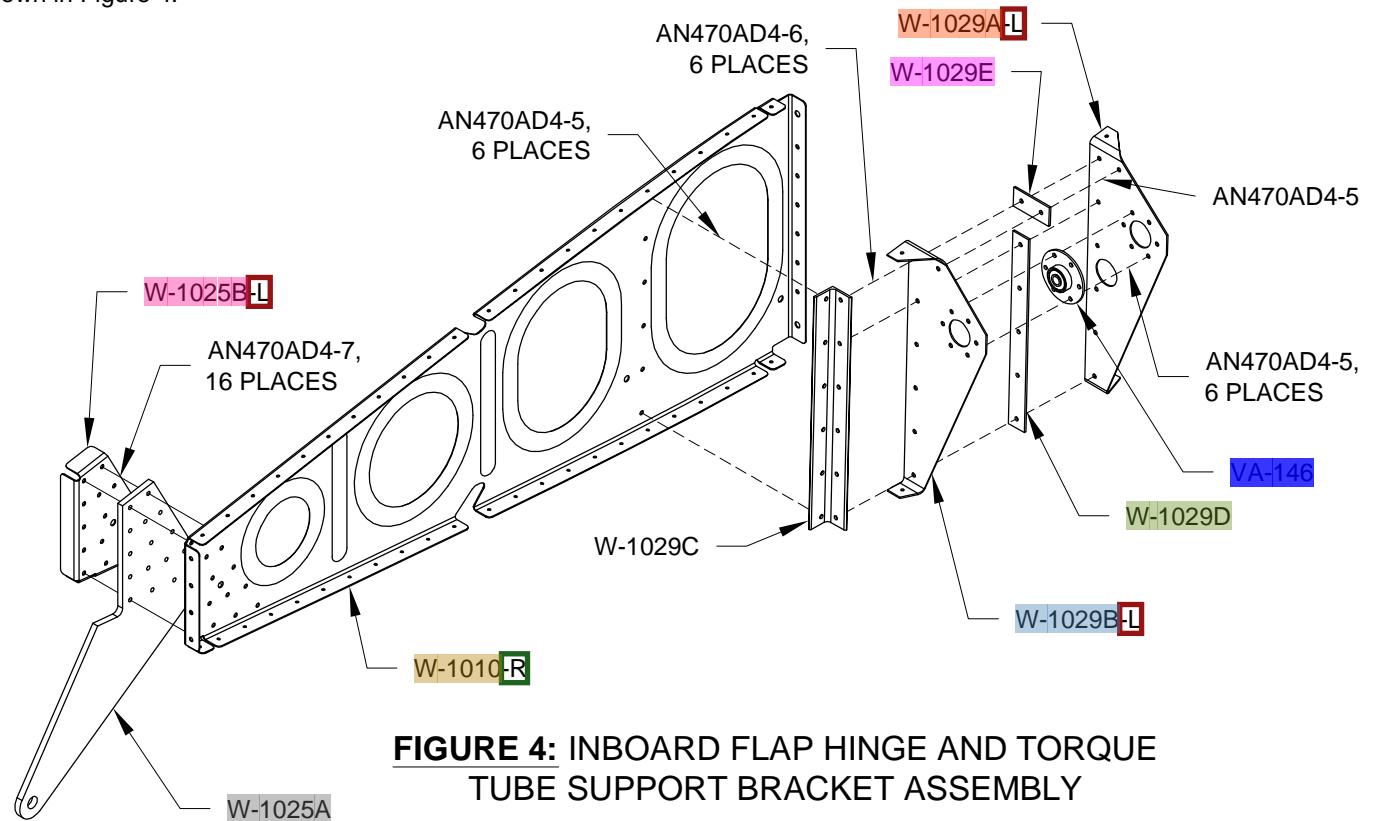


**FIGURE 3: OUTBOARD FLAP HINGE ASSEMBLY**

Step 6: Cleco and rivet the **VA146** Flange Bearing, **W-1029A-L** and **W-1029B-L** Torque Tube Support Brackets, **W-1029C** Angle, **W-1029D** and **W-1029E** Spacers together as shown in Figure 4.

Step 7: Cleco and rivet the **W-1029C** Angle and support bracket assembly to the web of the **W-1010-R** Inboard Wing Rib as shown in Figure 4.

Step 8: Cleco and rivet the **W-1025B-L** Flap Hinge Rib and **W-1025A** Flap Hinge Bracket to the **W-1010-R** Inboard Wing Rib as shown in Figure 4.



**FIGURE 4: INBOARD FLAP HINGE AND TORQUE TUBE SUPPORT BRACKET ASSEMBLY**

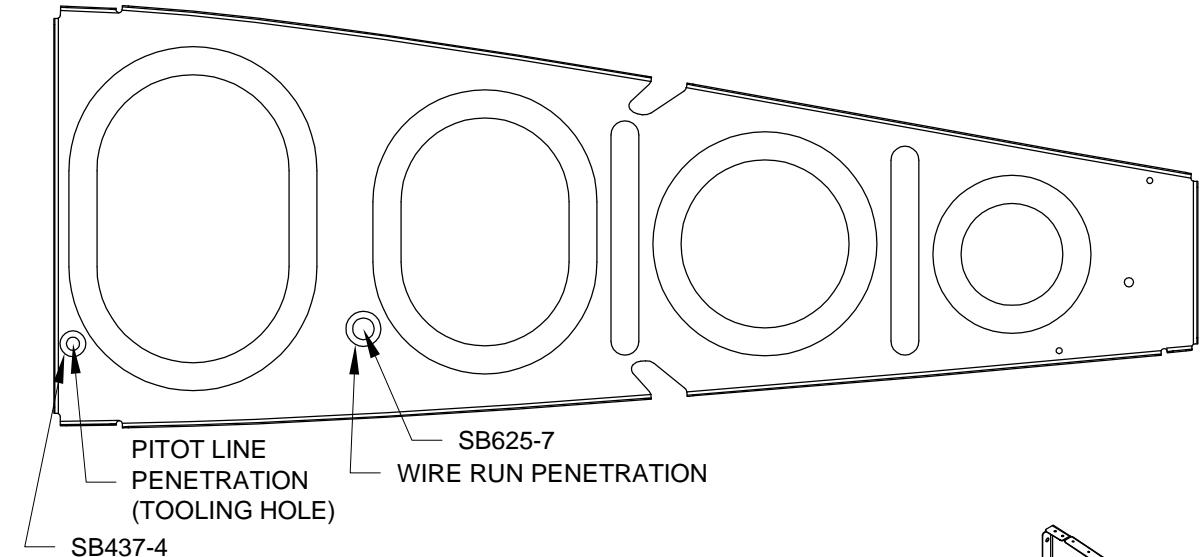


**NOTE:** Before enlarging holes and installing snap bushings, check the snap bushing size by inserting the anticipated wires and AOA lines etc. (see Page 20-3) through a SB625-7 Snap Bushing. If the snap bushing is too big order and install a smaller snap bushing from VAN'S ACCESSORY CATALOG to prevent wires from chaffing. Once the penetration size has been established, enlarge holes to final size using a unibit.

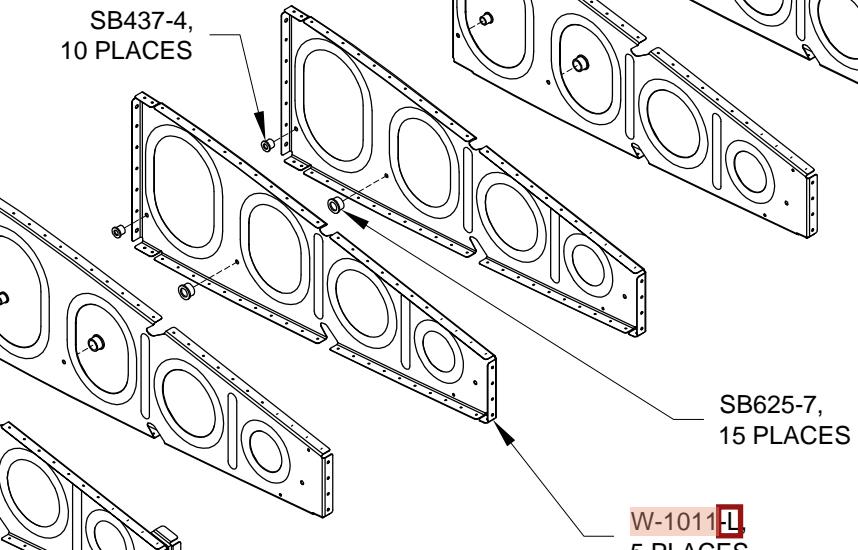
Step 1: This step is for the left wing only. Enlarge the forward tooling hole to 7/16 diameter and install a SB437-4 Snap Bushing in the W-1010-R Inboard Wing Rib and all but the two most outboard instances of the W-1011-L/R Inboard Wing Ribs, see Figure 1 and Figure 2.

Step 2: Enlarge the wire run pilot hole to 5/8 diameter in all W-1011-L/R Inboard Wing Ribs and W-1012-L/R Outboard Wing Ribs and install SB625-7 Snap Bushings oriented as shown in Figure 2.

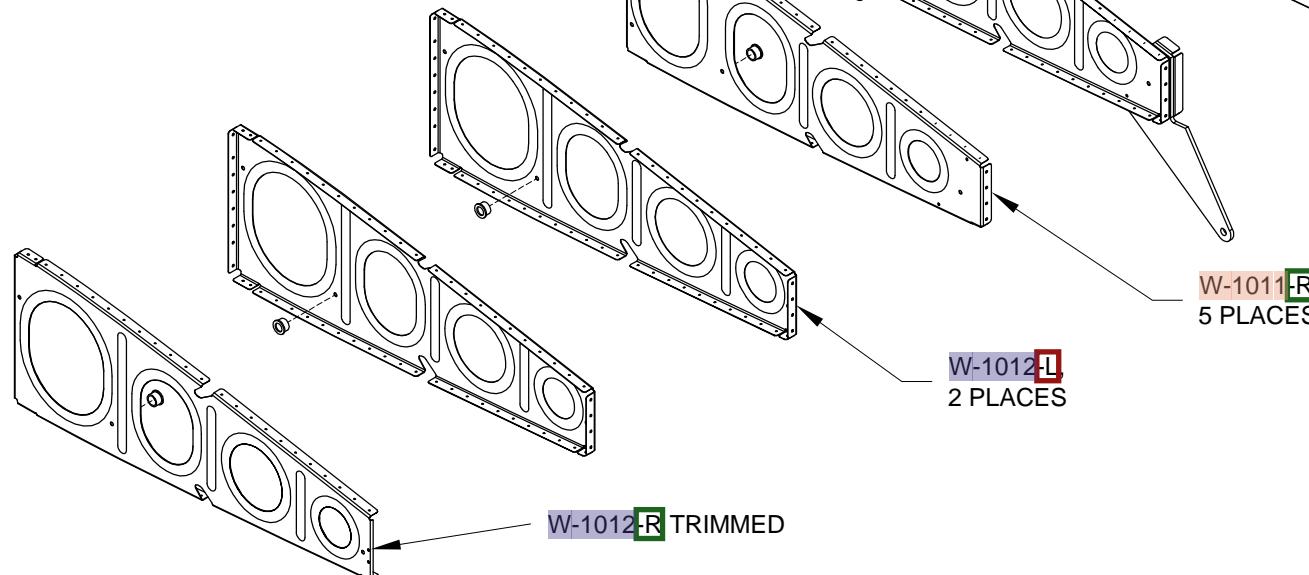
Enlarge the wire run pilot hole to 5/8 diameter in the W-1010-L/R Inboard Wing Rib (this will make a small notch in the W-1029C Angle, which is acceptable). Install an SB625-7 Snap Bushing, inserted from the inboard side of the rib as shown in Figure 2.



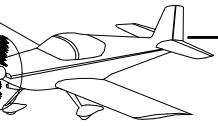
**FIGURE 1: ENLARGING PILOT HOLES  
FOR SYSTEM PENETRATIONS**



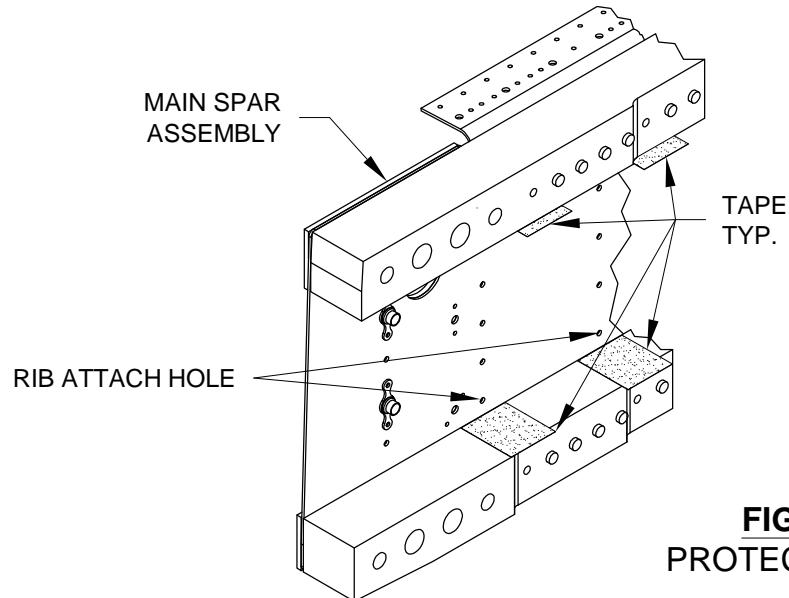
**W-1011-R NOTCHED**



**FIGURE 2: INSTALLING SNAP BUSHINGS  
(RIBS ARE DEPICTED ARRANGED AS INSTALLED IN THE AIRCRAFT)**



Step 1: Apply a protective layer of tape near the rib attach points to cover the stepped bars on the forward side of the main spar assembly as shown in Figure 1. This will help prevent damage to the main spar during riveting.



## **FIGURE 1: PROTECTIVE TAPE**

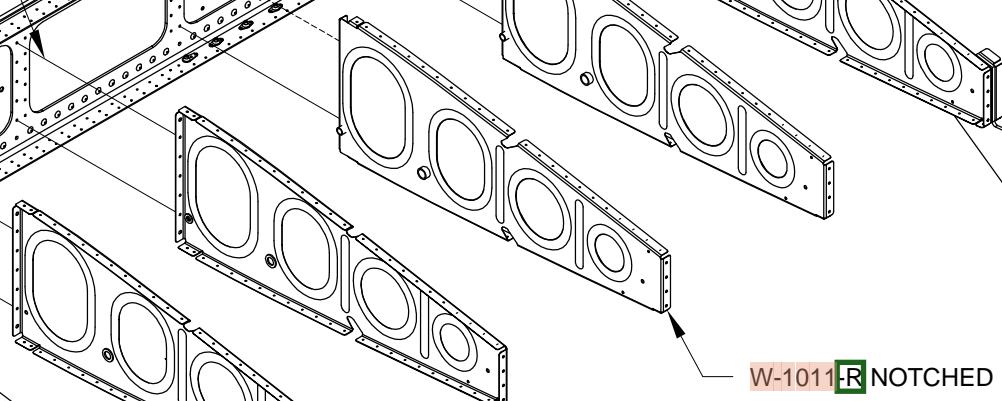
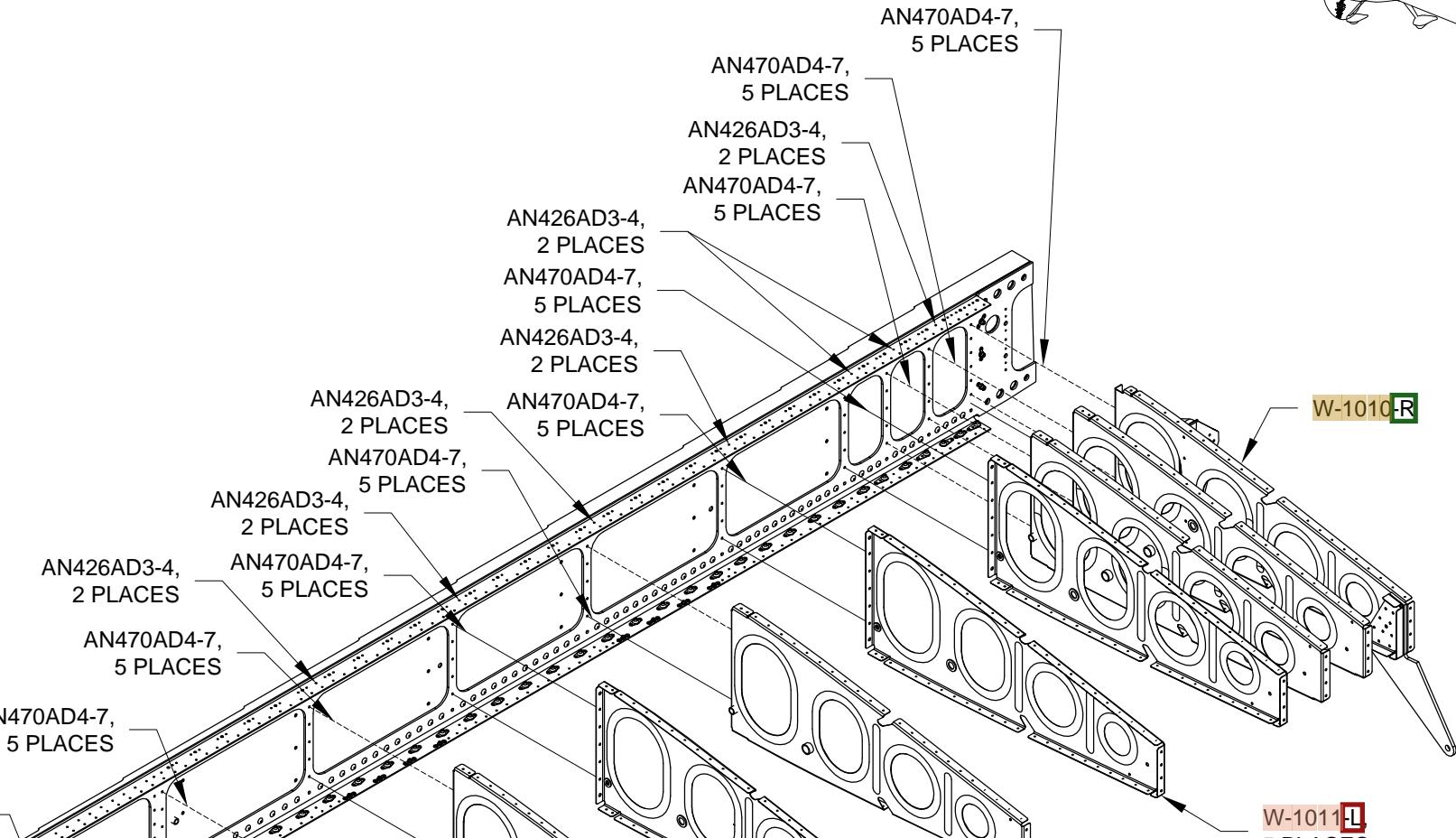
Step 2: Cleco the W-1010-R and W-1011-L/R Inboard Wing Ribs and W-1012-L/R Outboard Wing Ribs to the main spar assembly. There may be some misalignment between the holes punched between the C Channel Spar Web and the Doubler at the three most outboard attachment locations for the inboard wing ribs. Run a #30 drill through these holes if required to insert clecos.

Final-Drill #40 the forward most hole in the forward tabs of the seven inboard most W-1011-L/R Inboard Wing Ribs.

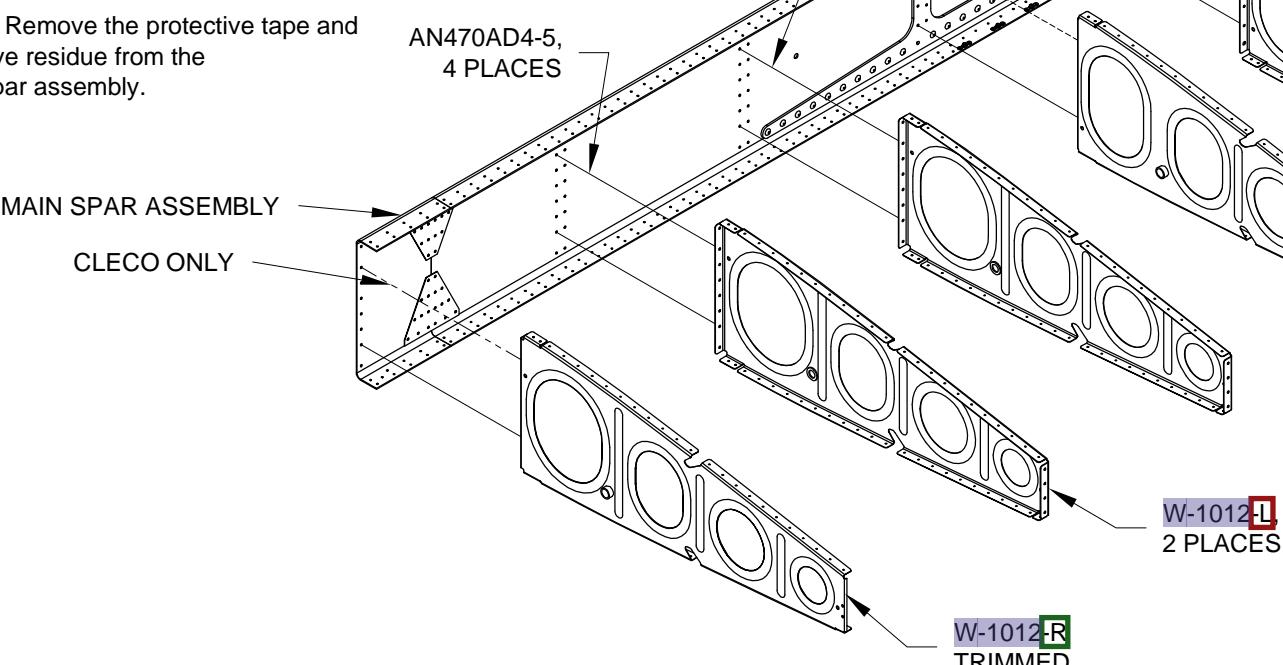
**Step 3:** Rivet the forward flange of all the wing ribs **except the W-1012-R Trimmed Outboard Wing Rib** to the main spar assembly as shown in Figure 2. The outboard most wing rib will be riveted in assembly with the **W-1009-R Leading Edge Rib** in Section 17. When riveting the three most inboard wing ribs, attach the outboard most rib first and then work inboard.

Rivet the forward most hole in the forward tabs of the seven inboard most W-1011 L/R Inboard Wing Ribs to the main spar assembly.

Step 4: Remove the protective tape and adhesive residue from the main spar assembly.

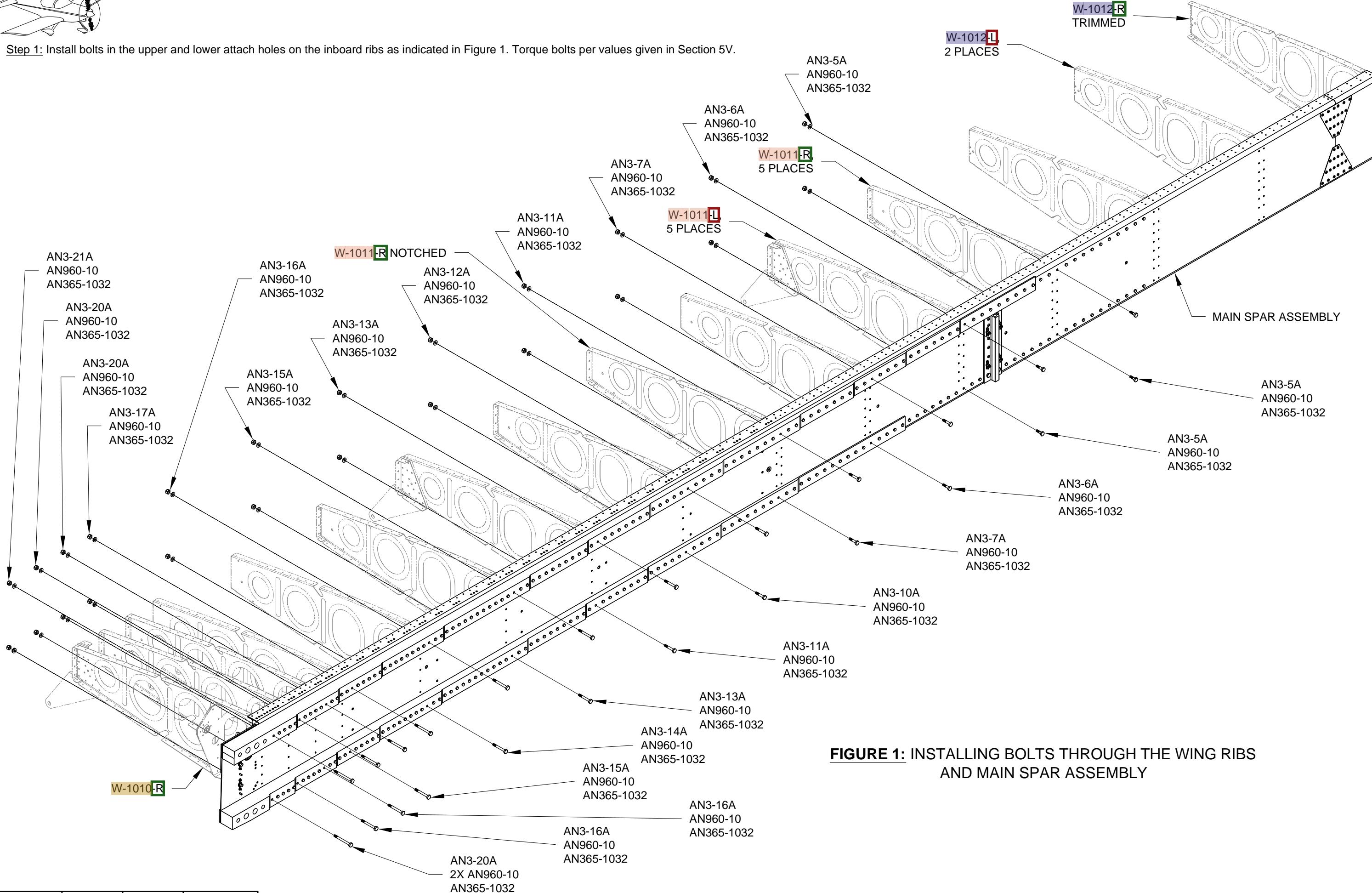


## **FIGURE 2: RIVETING THE WING RIBS TO THE MAIN SPAR ASSEMBLY**

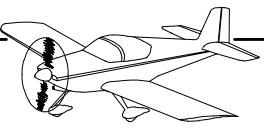




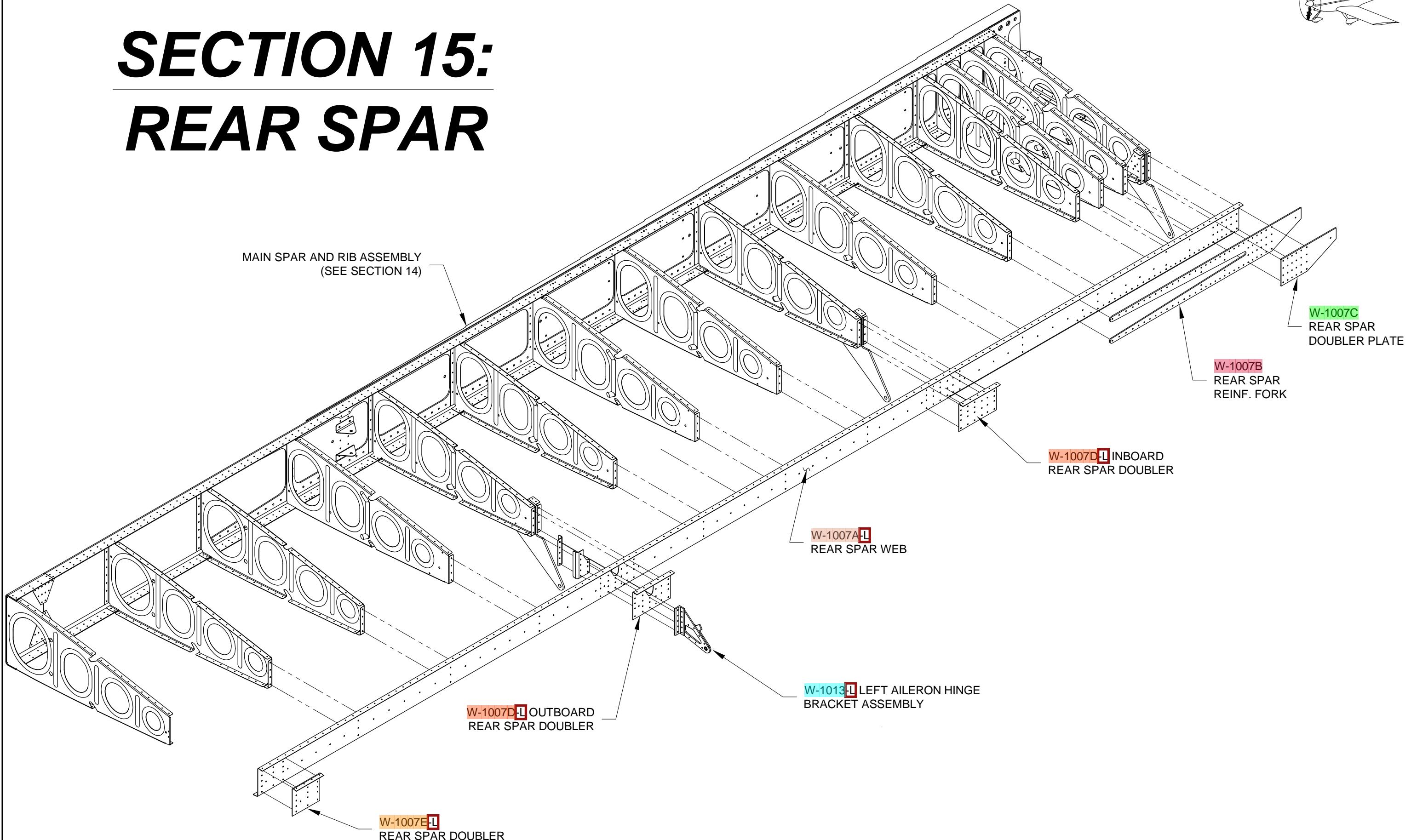
Step 1: Install bolts in the upper and lower attach holes on the inboard ribs as indicated in Figure 1. Torque bolts per values given in Section 5V.



**FIGURE 1: INSTALLING BOLTS THROUGH THE WING RIBS AND MAIN SPAR ASSEMBLY**



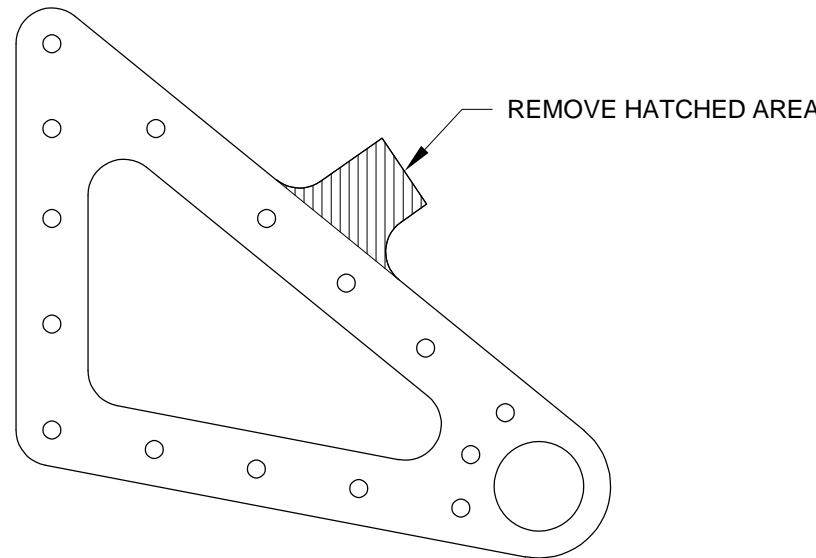
# SECTION 15: REAR SPAR





Note: Before working on assembling the aileron hinge bracket assemblies, refer to page 15-1 to become familiar with the bracket's orientation as installed on the aircraft.

Step 1: Trim off the tab on both W-1013A Aileron Hinge Bracket Spacers as shown in Figure 1.



**FIGURE 1: HINGE BRACKET SPACER TRIM FOR OUTBOARD AILERON HINGE BRACKET ASSEMBLIES**

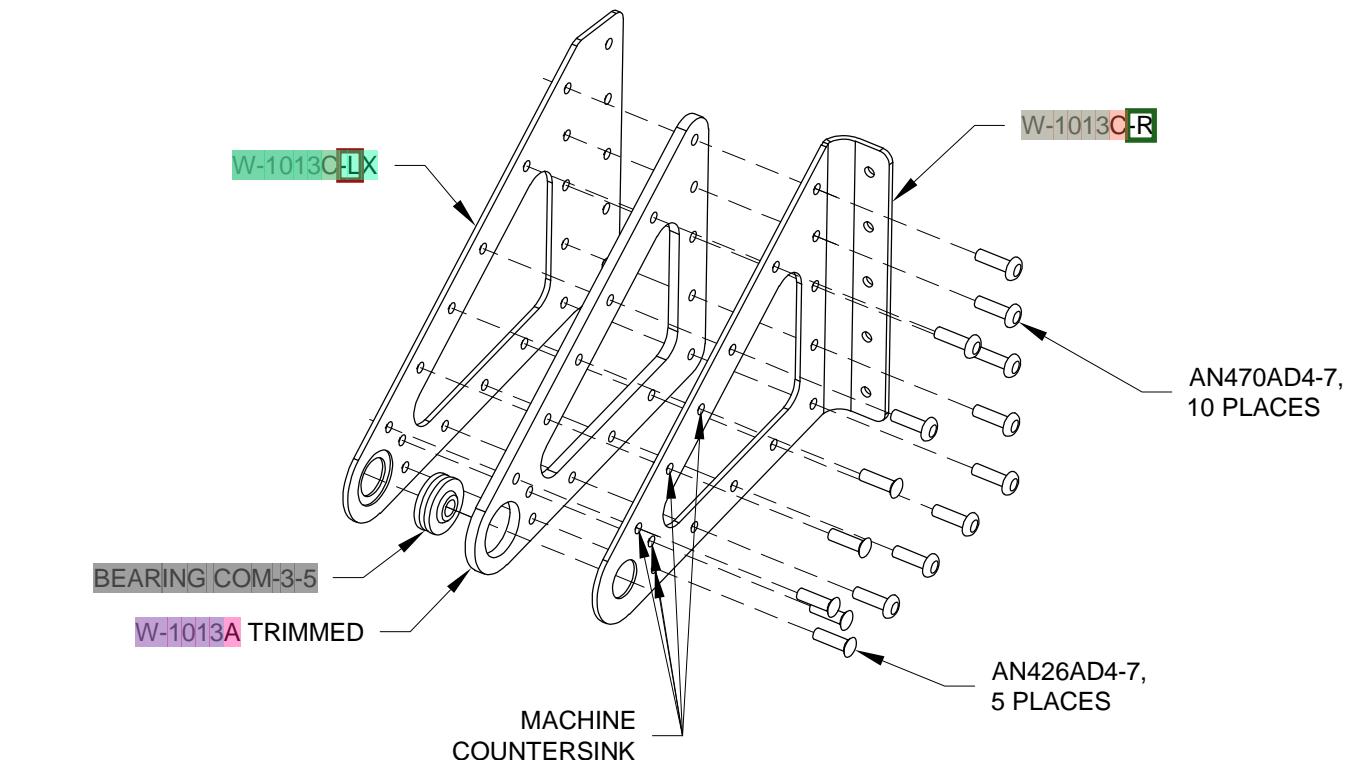
Step 2: Cleco the W-1013A TRIMMED Aileron Hinge Bracket Spacer, W-1013C-LX and W-1013C-R Alleron Hinge Bracket Sides together as shown in Figure 2. Match-Drill #30 all common attach holes. Machine countersink the aft holes (as indicated in Figure 2) on the **inboard** face of the W-1013C-R Aileron Hinge Bracket Side for the head of an AN426AD4 rivet. Repeat this process for the right outboard aileron bracket assembly.

Step 3: Disassemble outboard aileron bracket assemblies. Thoroughly deburr the edges and holes in all parts. Prime all parts.

Step 4: Press a BEARING COM-3-5 into both W-1013A TRIMMED Aileron Hinge Bracket Spacers as shown in Figure 2. Use a 7/16 inch, 3/8 inch drive socket to push and a 9/16 inch, 3/8 inch drive socket to push into. Squeeze with a vise or c-clamp.

Step 5: Cleco the assemblies back together per Step 2. Press the aft ends of the assemblies together to insure that the BEARING COM-3-5 bearings are seated into the recesses on the aileron hinge bracket sides and not spreading the assemblies aft edges apart.

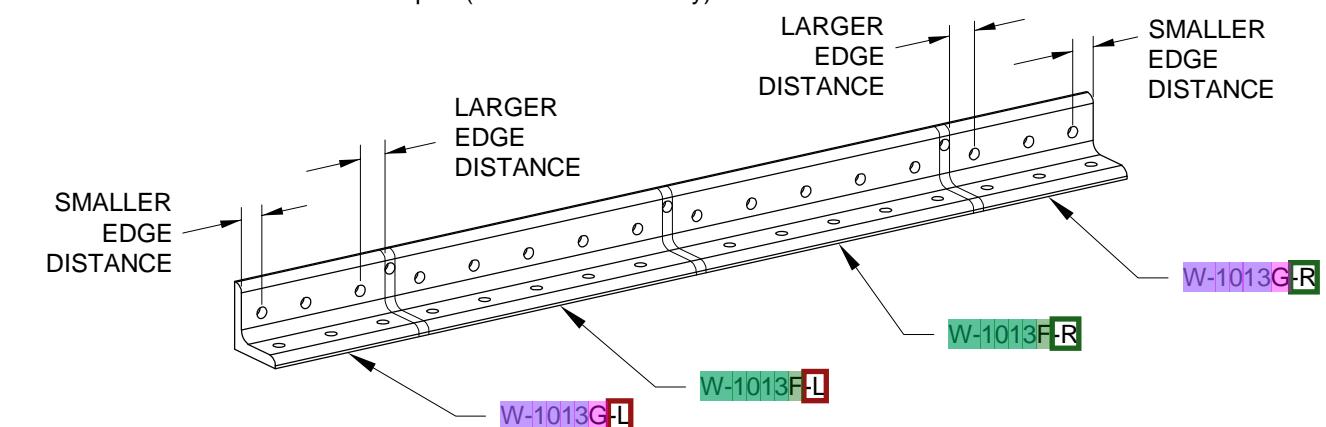
Step 6: Rivet the assemblies together using the rivet callouts shown in Figure 2. Set the rivets in a random pattern to inhibit warping in the final assemblies. Set both the W-1014-L and W-1014-R Outboard Aileron Bracket Assemblies aside, to be installed after the W-1002 Top Inboard Wing Skin and W-1003 Top Outboard Wing Skin are riveted in place. This will allow access to buck the outboard-most rivet on the upper flange of the W-1007A-L Rear Spar Web.



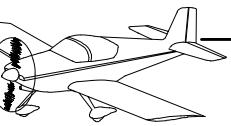
**FIGURE 2: W-1014-L OUTBOARD AILERON BRACKET ASSEMBLY**

**Note:** As shown in Figure 3, there is a slightly larger edge distance for the hole at one end of the W-1013G-L & -R Angle Brackets than at the other end. When orienting the parts in later steps, the hole with the larger edge distance is placed on the bottom and the flange with this hole attaches to the spar web.

Step 7: First label (see Figure 3 below), then separate the W-1013FG Aileron Angle Bracket into individual parts as shown in Figure 3. Separate the part at the three holes that are offset to the edge of one of the flanges. Cut perpendicular to the part, and trim away material the width of the hole across the entire part (file/sand if necessary).



**FIGURE 3: SEPARATING THE W-1013FG AILERON ANGLE BRACKET**



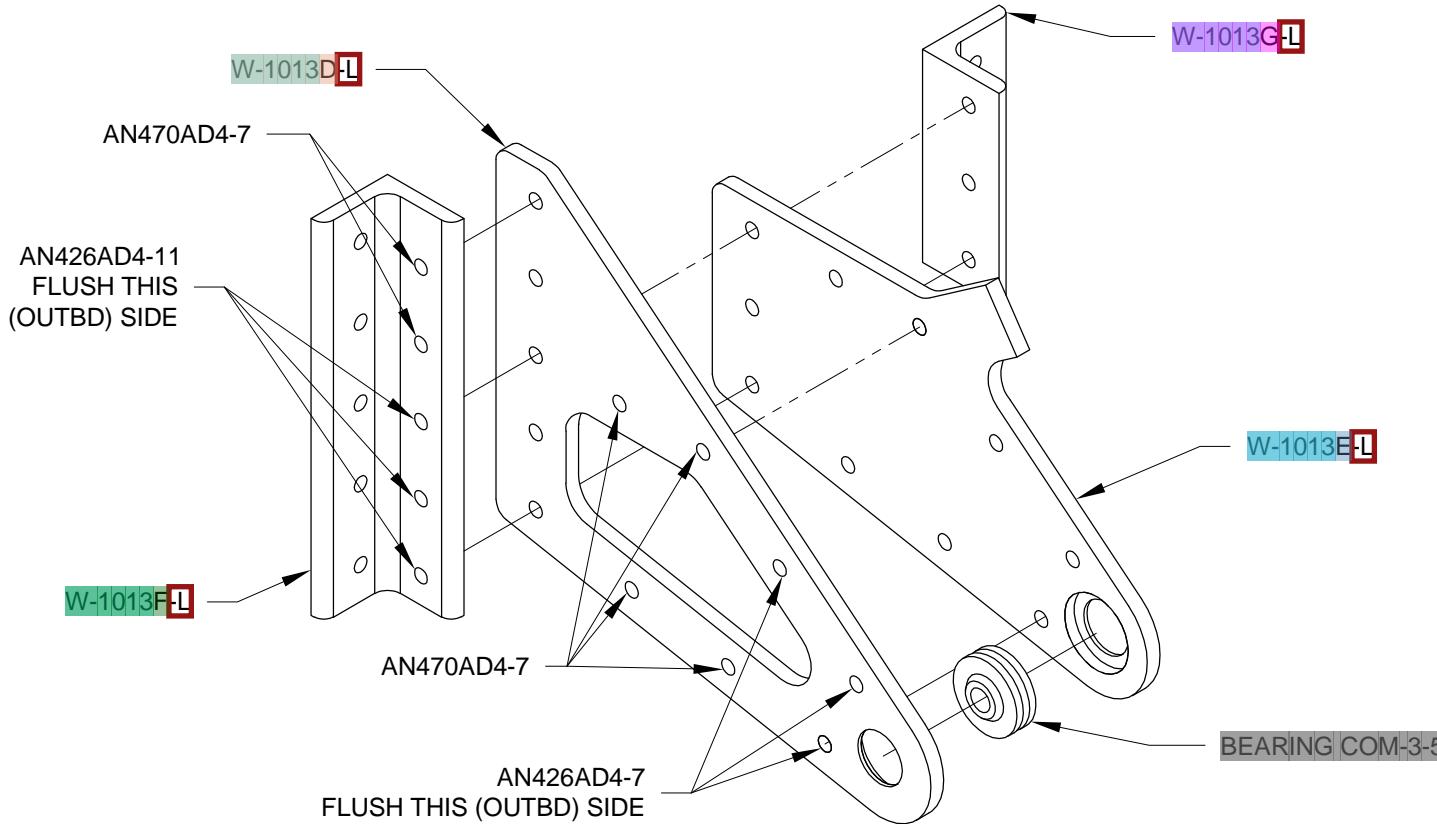
Step 1: If necessary, straighten the W-1013D & E Aileron Hinge Side Brackets as much as possible by clamping the parts in a bench vise and applying firm hand pressure. Sight along the edges to verify straightness and re-adjust as required.

Step 2: Cleco together all of the parts shown in Figure 1 for the W-1013-L & -R Aileron Hinge Brackets (with the BEARING COM-3-5 bearings in place). Be sure to orient the W-1013F Aileron Angle Brackets to place the hole with the larger edge distance at the top, and, as previously noted, orient the W-1013G Aileron Angle Brackets to place the hole with the larger edge distance on the bottom. Final-Drill #30 all of the common holes.

Step 3: Draw a line on the flange of the W-1013F Angle Brackets that matches the sloped edge of the W-1013D Side Brackets. Disassemble the parts, trim the flange along the line, then deburr the edge.

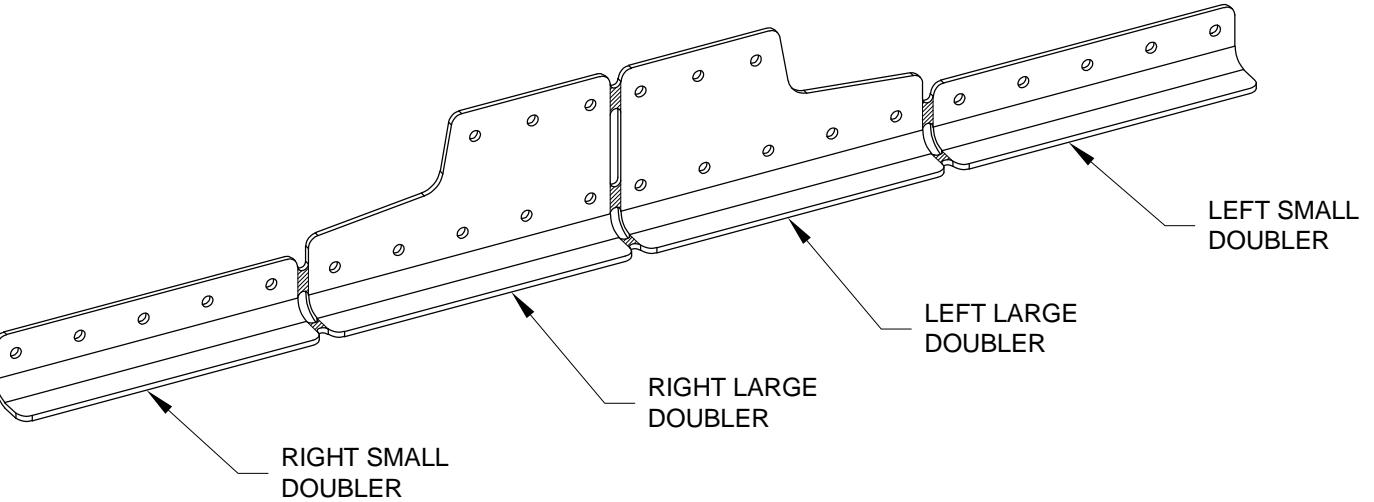
Machine countersink the three holes in the W-1013D-L & -R Side Brackets flush on the outboard side. Machine countersink the three lower holes in the W-1013F-L & -R for the flush rivets common to the W-1013G-L & -R. Disassemble, deburr, and prime all parts.

Step 4: Cleco the Left and Right Aileron Hinge Bracket assemblies back together and rivet them as called out in Figure 1. Set the rivets in a random pattern to inhibit warping.



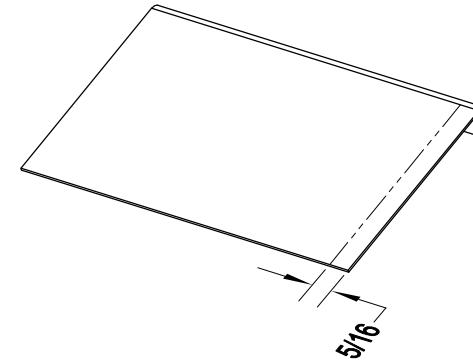
**FIGURE 1:** W-1013-L INBOARD AILERON BRACKET ASSEMBLY

Step 5: Label, then separate the Aileron Attach Doubler into individual parts by removing the shaded areas shown in Figure 2.



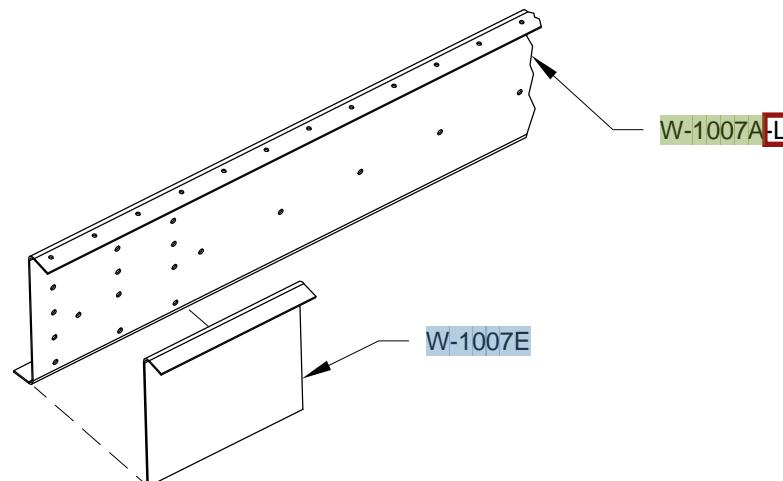
**FIGURE 2:** SEPARATE THE W-00007CD AILERON ATTACH DOUBLERS

Step 1: With the **W-1007D** Rear Spar Doubler Plate oriented as shown in Figure 1 draw a line parallel with the edge of the doubler per the dimensions given. Repeat this process on all four rear spar doubler plates.



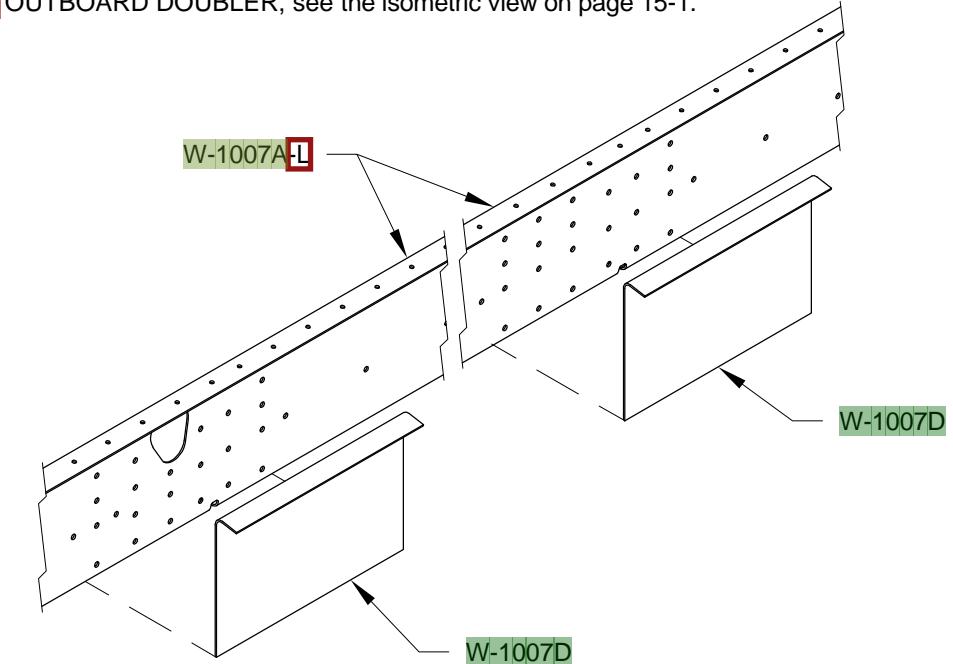
**FIGURE 1: MARKING **W-1007D****

Step 2: Align the **W-1007E** Rear Spar Doubler Plate by nesting the upper flange underneath the upper flange of the **W-1007A-L** Rear Spar Web and aligning the doubler plate's outboard edge with outboard edge of the rear spar web. Match-Drill #30 all holes used to attach the doubler plate to the web of the rear spar web using the rear spar web as a drill guide. Match-Drill #40 all common attach holes in the upper flange of the rear spar web and the rear spar doubler plate using the rear spar web as a drill guide. This will create **W-1007E-L**.



**FIGURE 2: MATCH-DRILLING THE REAR SPAR DOUBLER PLATE**

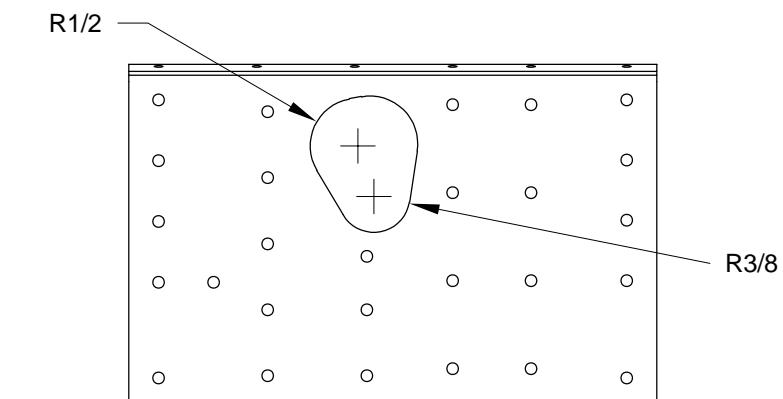
Step 3: Align the **W-1007D** Rear Spar Doubler Plates by nesting the upper flange underneath the upper flange of the **W-1007A-L** Rear Spar Web and centering the line drawn in step 1 with the outboard-most row of attach holes (inboard-most row on right wing) for each doubler plate. Match-Drill #30 all holes used to attach the doubler plate to the web of the rear spar web, using the rear spar web as a drill guide. Match-Drill #40 all common attach holes in the upper flange of the rear spar web and the rear spar doubler plate using the rear spar web as a drill guide. This will create an **W-1007D-L** INBOARD DOUBLER and **W-1007D-L** OUTBOARD DOUBLER, see the isometric view on page 15-1.



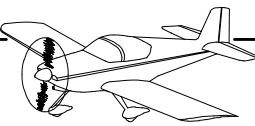
**FIGURE 3: MATCH-DRILL THE **W-1007D** REAR SPAR DOUBLER PLATES**

Step 4: With the the **W-1007D** Outboard Rear Spar Doubler clecoed in place, trace the aileron pushrod hole in the **W-1007A-L** Rear Spar Web onto the doubler plate. Remove the doubler plate.

Mark, center punch and pilot drill #30 the center of the radii as shown in Figure 4. Remove the remaining material. Smooth the edges of the hole as required.



**FIGURE 4: COPYING THE AILERON PUSHROD HOLE INTO **W-1007D-L** OUTBOARD REAR SPAR DOUBLER**



Step 1: Cleco the W-1007B Rear Spar Reinforcement Fork, W-1007C Rear Spar Doubler Plate, W-1007D-L INBOARD Rear Spar Doubler, W-1007D-L OUTBOARD Rear Spar Doubler, W-1013-L Aileron Hinge Bracket Assembly and main spar and rib assembly to the W-1007A-L Rear Spar Web as shown in Figure 1. Match-Drill #30 the holes common between the rear spar parts and all three W-1025B Flap Hinge Ribs. Final-Drill #30 all common attach holes that have rivet callouts shown in Figure 2 including all holes that will attach the main wing ribs to the rear spar. Note that all the rib to spar attach points are not shown in Figure 2. Final-Drill #40 the holes common between the lower rear spar web flange and the ribs lower aft tab.

Step 2: Machine countersink the bottom row of rivet holes on the W-1007C Rear Spar Doubler Plate where indicated in Figure 2 for the head of an AN426AD4 rivet. Machine Countersink the holes in the upper flange of the rear spar web that correspond to the W-1007D-L INBOARD, W-1007D-L OUTBOARD and W-1007E-L Rear Spar Doublers. See Figure 2.

Step 3: Disassemble all parts. Deburr the edges and holes for all parts.

Final-Drill #40 and dimple the 26 inboard most holes that are located in the upper flange of the W-1007A-L Rear Spar Web above the W-1007B Rear Spar Reinforcement Fork.

Dimple the holes in the ribs lower aft tab and the holes in the W-1007A-L Rear Spar Web lower flange that correspond to the tabs.

Prime all parts if/as required.

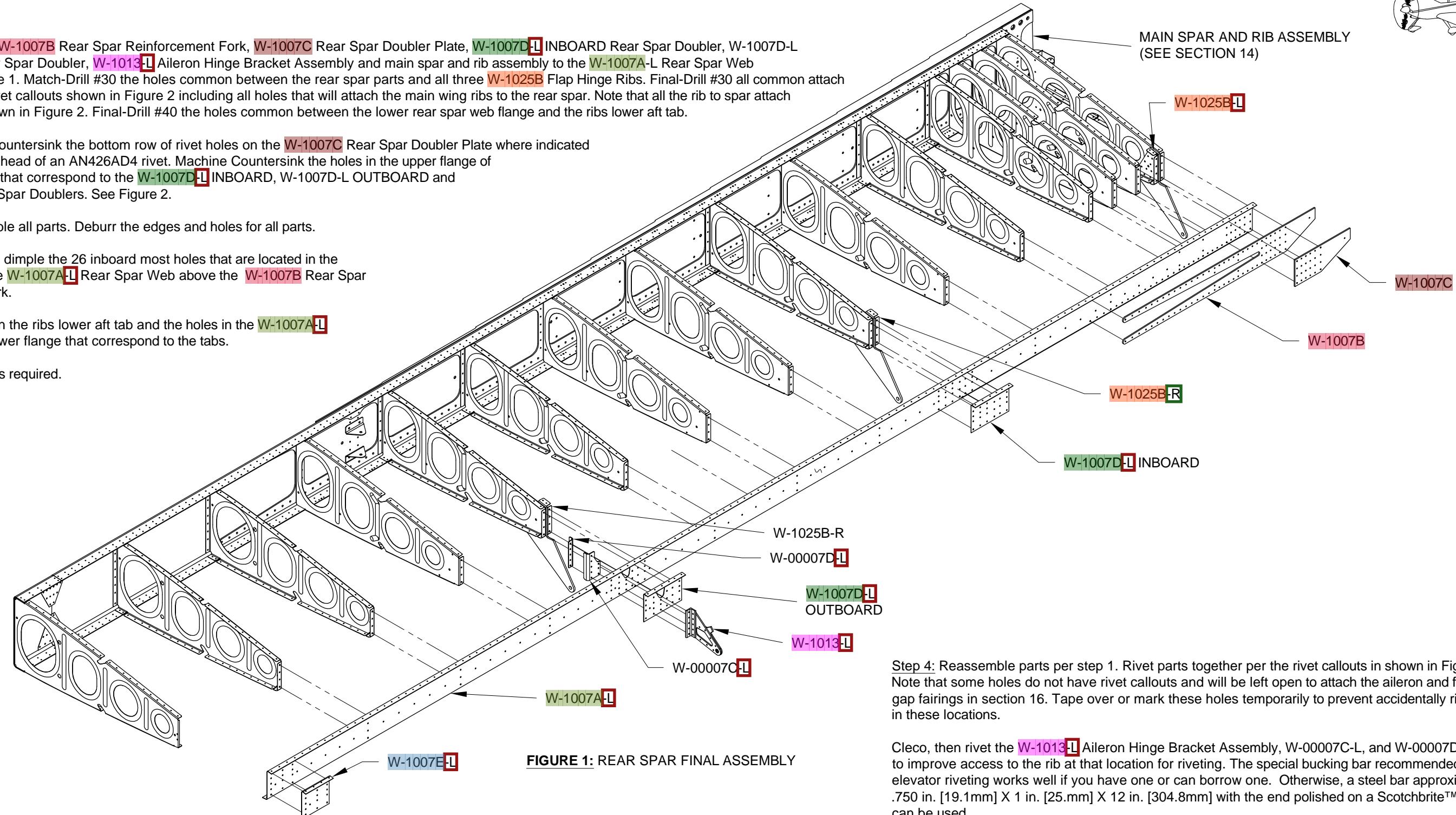


FIGURE 1: REAR SPAR FINAL ASSEMBLY

Step 4: Reassemble parts per step 1. Rivet parts together per the rivet callouts in shown in Figure 2. Note that some holes do not have rivet callouts and will be left open to attach the aileron and flap gap fairings in section 16. Tape over or mark these holes temporarily to prevent accidentally riveting in these locations.

Cleco, then rivet the W-1013-L Aileron Hinge Bracket Assembly, W-00007C-L, and W-00007D-L last to improve access to the rib at that location for riveting. The special bucking bar recommended for elevator riveting works well if you have one or can borrow one. Otherwise, a steel bar approximately .750 in. [19.1mm] X 1 in. [25.0mm] X 12 in. [304.8mm] with the end polished on a Scotchbrite™ wheel can be used.

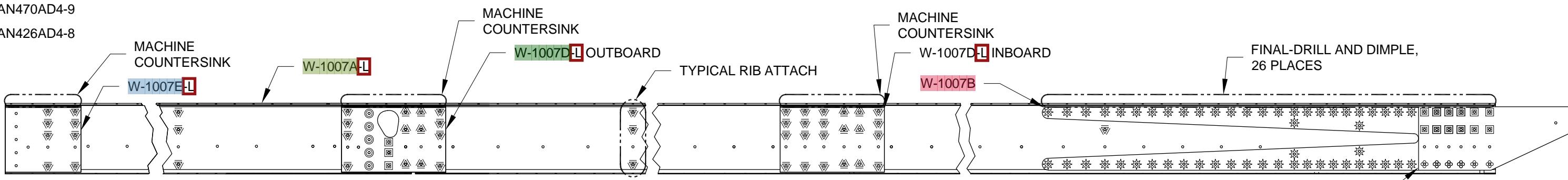
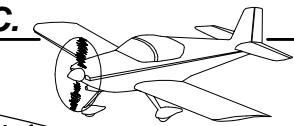


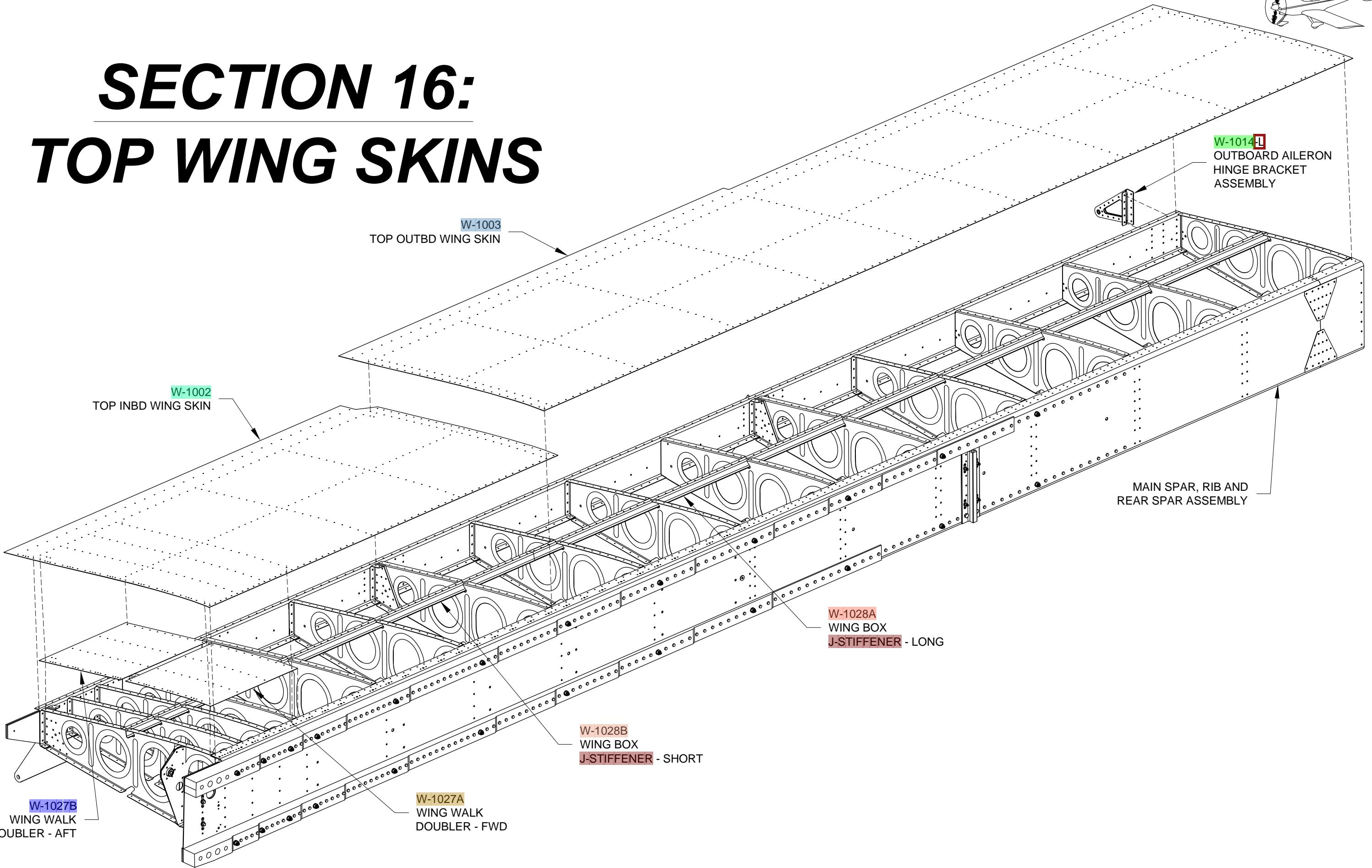
FIGURE 2: REAR SPAR RIVET CALLOUTS



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# SECTION 16: TOP WING SKINS





**NOTE: This section only covers the steps required for the left wing. The right wing is a mirror of the left.**

**Step 1:** Lay the **W-1028A** Wing Box J-Stiffener - Long and **W-1028B** Wing Box J-Stiffener - Short into the J-stiffener cutout in the cutout in the wing ribs. See the isometric view on Page 16-1. Cleco the **W-1002** Top Inbd Wing Skin, **W-1003** Top Outbd Wing Skin, and the **W-1027A** and **W-1027B** Wing Walk Doublers to the main spar, rear spar and wing ribs. (Note that the outboard wing skin overlaps the inboard skin.) Cleco the J-stiffeners to the wing skins.

**NOTE: Do not drill the aft most row of holes in each top skin. These holes will attach the gap fairings in Section 20.**

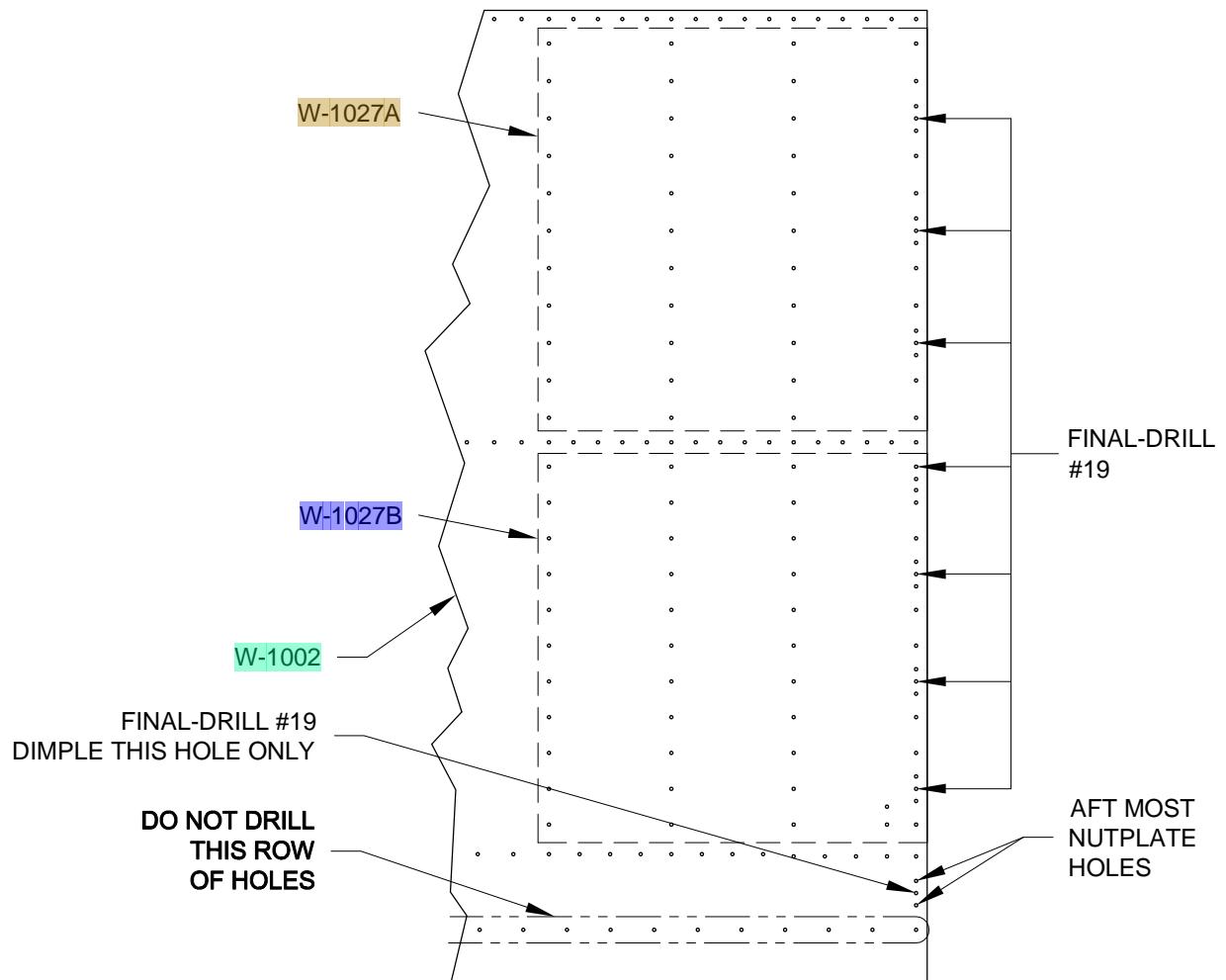
**Step 2:** Final-Drill #40 all the holes common to the top wing skins and the spars, J-stiffeners, wing walk doublers and ribs.

Final-Drill #40 the two holes that will be used to attach the aft most inboard nutplate to the **W-1002** Top Inbd Wing Skin (holes are called out in Figure 1).

**Step 3:** Final-Drill #19 the screw holes for the nutplates that will be installed along the inboard edge of the **W-1002** Top Inbd Wing Skin as shown in, Figure 1.

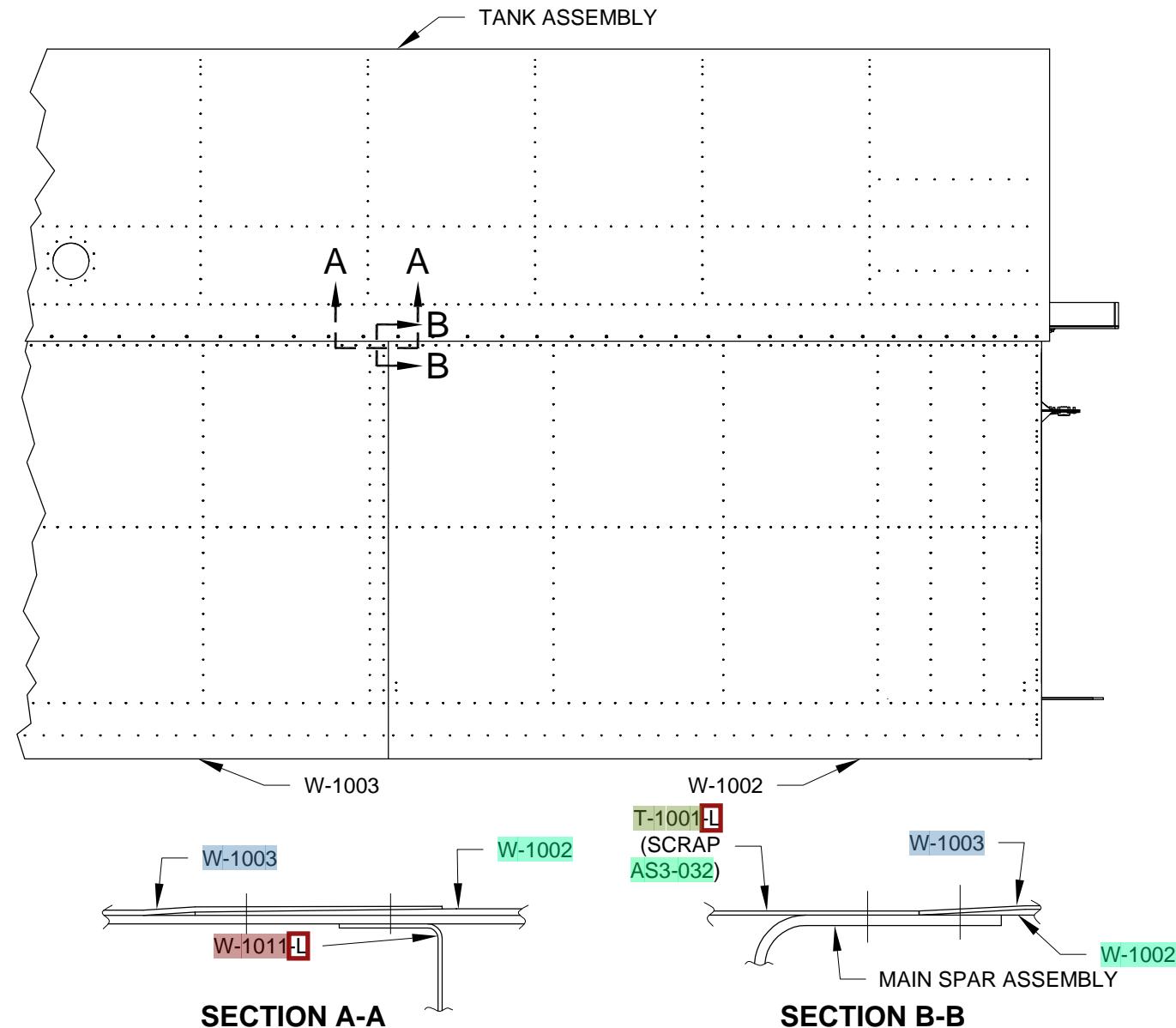
Dimple the aft most screw hole for a #8 flush head screw (see Figure 1), then machine countersink the rest of the screw holes for a #8 flush head screw dimple. Machine countersink all the rivet holes of the top inbd wing skin that correspond to the **W-1027A** and **W-1027B** Wing Walk Doublers for the head of an AN426AD3 rivet.

**Step 4:** Disassemble the parts clecoed on in Step 1 from the wing assembly.



**FIGURE 1: FINAL-DRILLING THE  
WING WALK DOUBLERS**

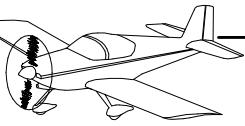
**Step 5:** To make a more aesthetically pleasing joint between the top wing skins it is permissible to remove material from the edges of the skins as shown in Figure 2. Remove material as shown in Figure 2, Section A-A from the top outboard side of **W-1002** Top Inbd Wing Skin and the lower inboard side of the **W-1003** Top Outbd Wing Skin to create a smooth transition from one skin to another along the chord wise portion of the skin joint. Remove material from the top outboard forward edge of the top inbd wing skin to allow the top surface of the top outbd wing skin to be flush with the top surface of the tank skin (use a scrap piece of **AS3-032** to simulate the tank skin) as shown in Figure 2, Section B-B.



**FIGURE 2: WING SKIN JOINT DETAIL  
(TANK SHOWN INSTALLED  
SECTION B-B SHOWN ROTATED 90° CCW)**

**Step 6:** Deburr the edges and holes of all parts. Dimple the **W-1002** and **W-1003** Top Wing Skins and **W-1028A** and **W-1028B** Wing Box J-Stiffeners (note the screw holes on the inboard edge of the top inbd wing skin have already been machine countersunk or dimpled in Step 3). Dimple the holes on the upper flange of the rear spar and the upper flange of all but the four inboard most wing ribs.

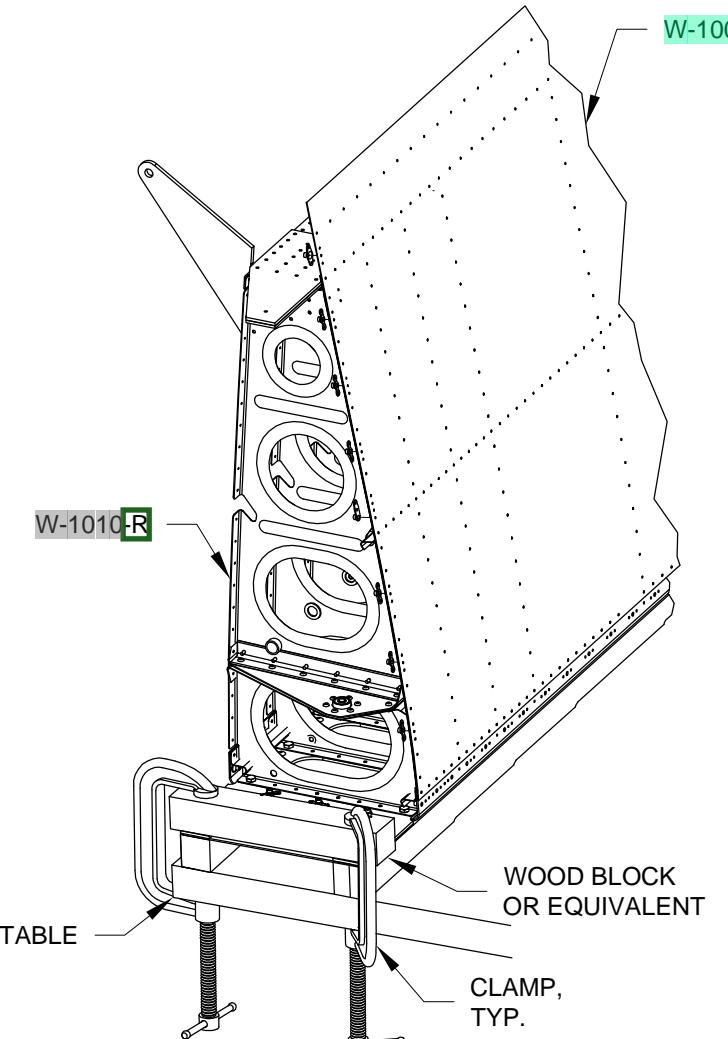
Prime all parts if/as desired.



Step 1: Place the wing with the forward face of the wing spar assembly flat against the table. Block up the spar as required. Clamp the spar firmly to the table at both ends. Protect the spar from the clamp face with wood blocks as shown in Figure 1. Do not distort (bow or twist) the spar with the clamps.

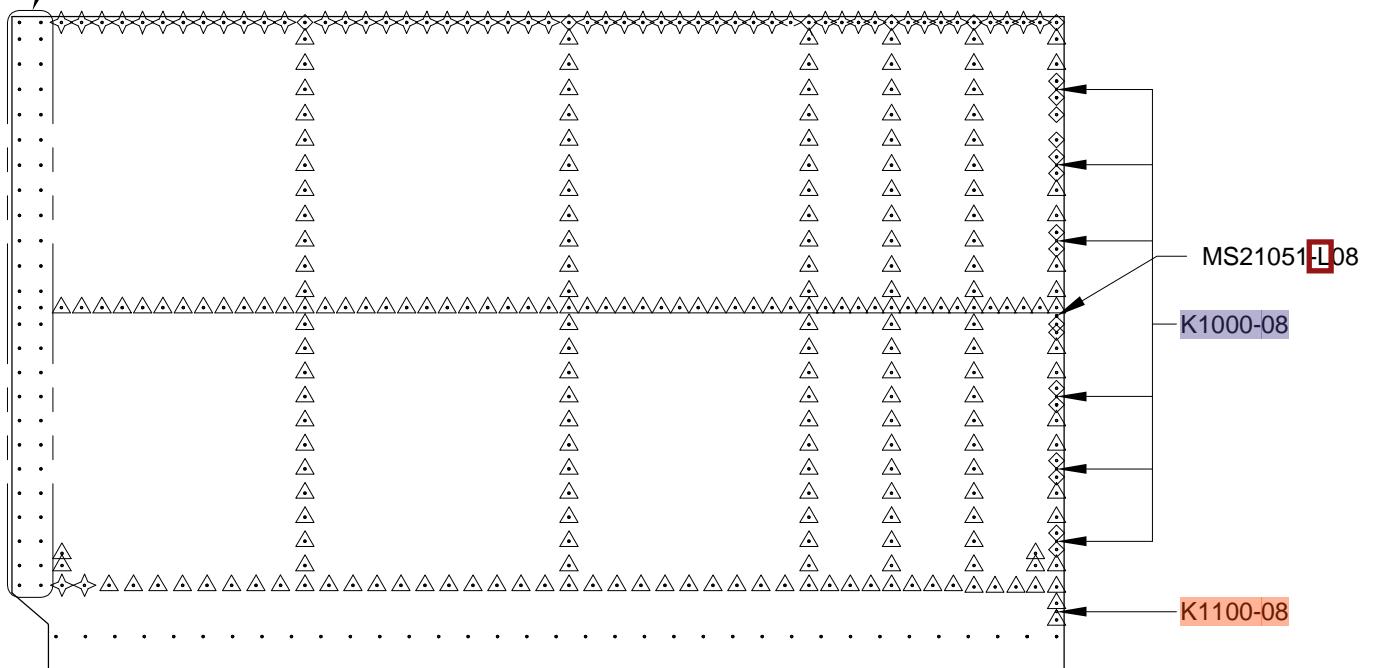
Step 2: Lay the W-1028A and W-1028B Wing Box J-Stiffeners into the J-stiffener notches in the wing ribs. Cleco the W-1002 Top Inbd Wing Skin, W-1003 Top Outbd Wing Skin, W-1027A and W-1027B Wing Walk Doublers to the spars and ribs. Cleco the stiffeners to the top wing skins. Cleco the nutplates that attach along the inboard edge of the top inbd wing skin to the wing assembly (see Figure 1). Check that the top outbd wing skin is **on top** of the top inbd wing skin.

Step 3: Rivet the W-1002 Top Inbd Wing Skin and W-1003 Top Outbd Wing Skin to the W-1028A and W-1028B J-Stiffeners, ribs, rear spar and main spar. See Figure 2 and Figure 3 for the rivet callouts. When riveting the inboard most row of rivets, install the nutplates as indicated in Figure 1 to the W-1010-R Inbd Wing Rib, W-1027A and W-1027B Wing Walk Doublers and top inbd wing skin. To assure maximum skin tightness, rivet from the center of each skin outwards towards the root and tip. Do this on both skins saving the double row of rivets at the lap joint until last. For a higher quality skin finish, back rivet the skins in place. This will require a large bucking bar, covered with plastic packaging tape, laid over the manufactured head of the rivet on the outside face of the skin and an extended back rivet set.

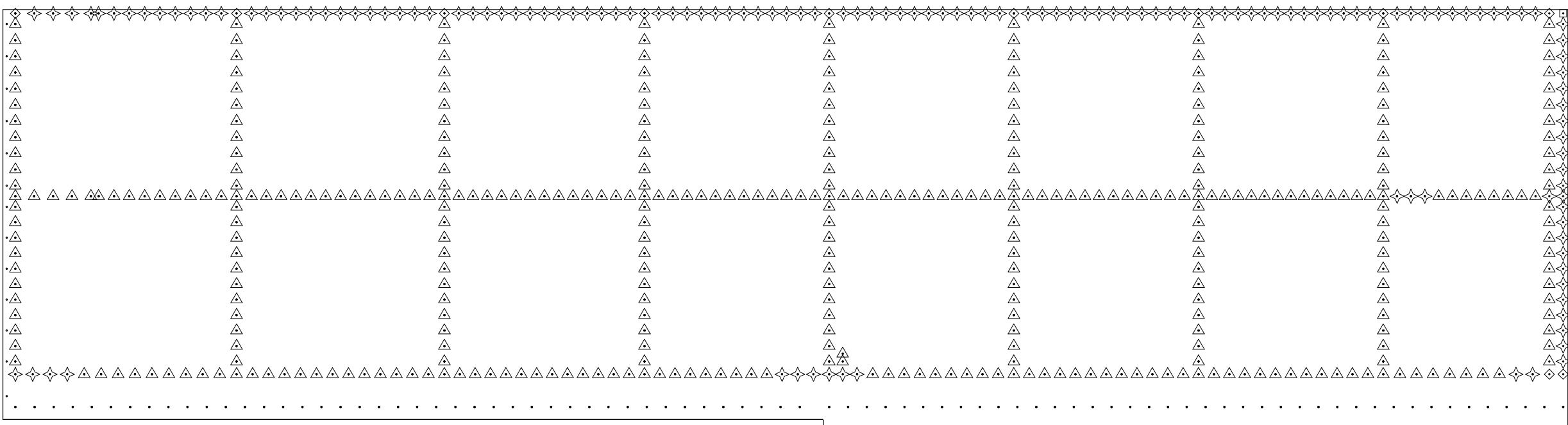


**FIGURE 1: NUTPLATE INSTALL**

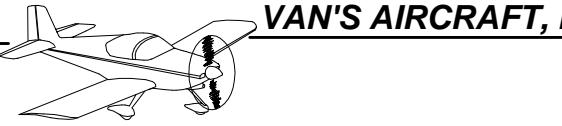
SEE FIGURE 3



**FIGURE 2: TOP INBD WING SKIN RIVET CALLOUT**



**FIGURE 3: TOP OUTBD WING SKIN RIVET CALLOUT**



Note: Do not complete any steps from this page until the top skins are completely riveted on! Riveting the W-1014-L Outboard Aileron Hinge Bracket Assembly on prematurely will remove access to the outboard most rivet attaching the W-1003 Top Outboard Wing Skin to the W-1007A-L Rear Spar Web.

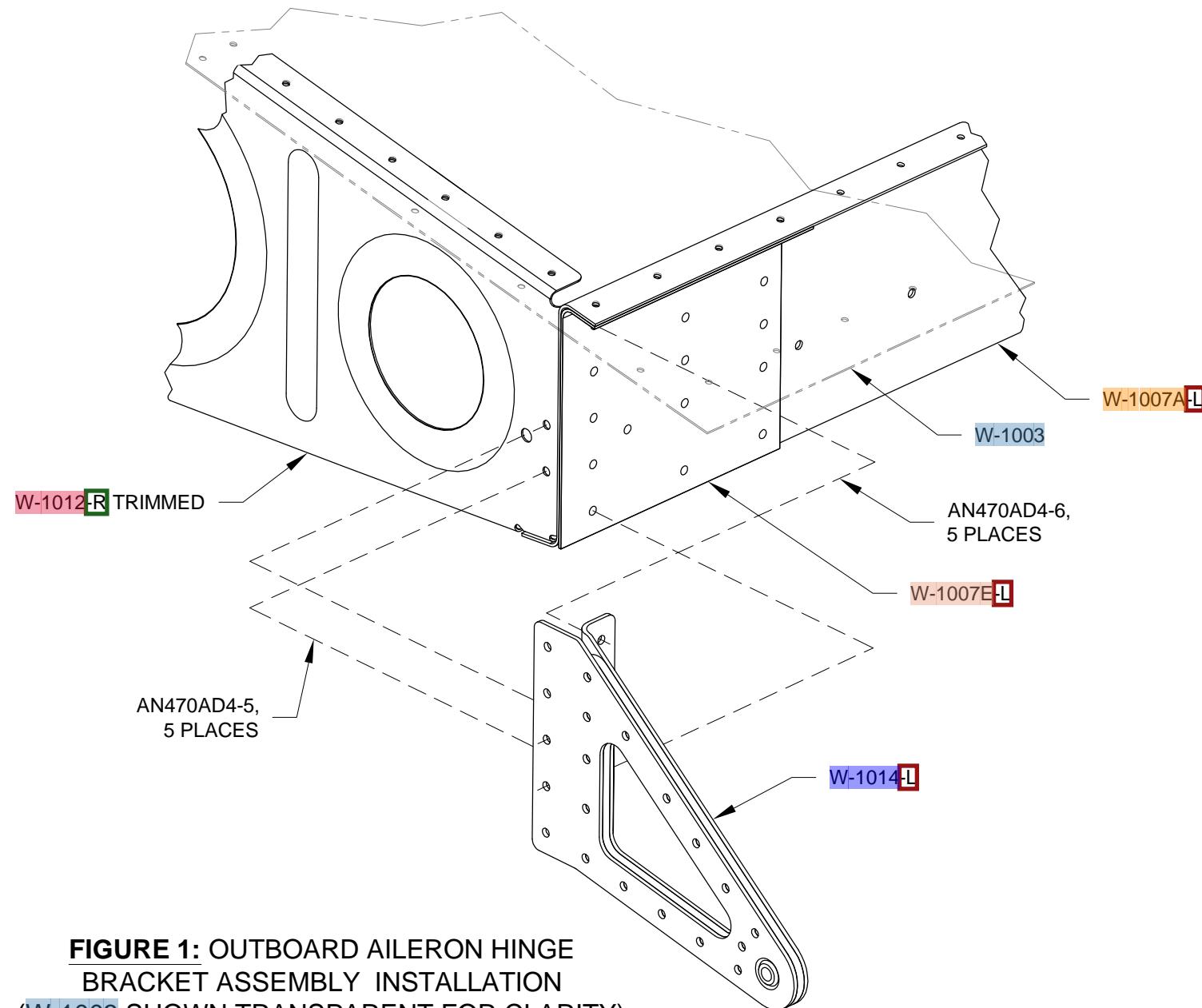
Step 1: Cleco the W-1014-L Outboard Aileron Hinge Bracket Assembly to the W-1012-R TRIMMED Outboard Wing Rib, two places as shown in Figure 1. Cleco the outboard aileron hinge bracket assembly to the W-1007A-L Rear Spar Web and W-1007E-L Rear Spar Doubler Plate as shown in Figure 1.

Step 2: Final-Dill #30 the W-1014-L Outboard Aileron Hinge Bracket Assembly to the W-1007-L Rear Spar Assembly. Match-Drill #30 and cleco the outboard aileron hinge bracket assembly to the W-1012-R TRIMMED Outboard Wing Rib using the hinge bracket as a drill guide. Remove the two clecoes holding the hinge bracket to the outboard wing rib and final-drill #30 the holes in the hinge bracket and outboard wing rib.

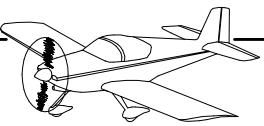
Step 3: Un-cleco the W-1014-L Outboard Aileron Hinge Bracket from the wing assembly.

Deburr all parts.

Step 4: Cleco the W-1014-L Outboard Aileron Hinge Bracket Assembly to the wing assembly per Step 1. Rivet the outboard hinge bracket assembly to the wing assembly as indicated in Figure 1.



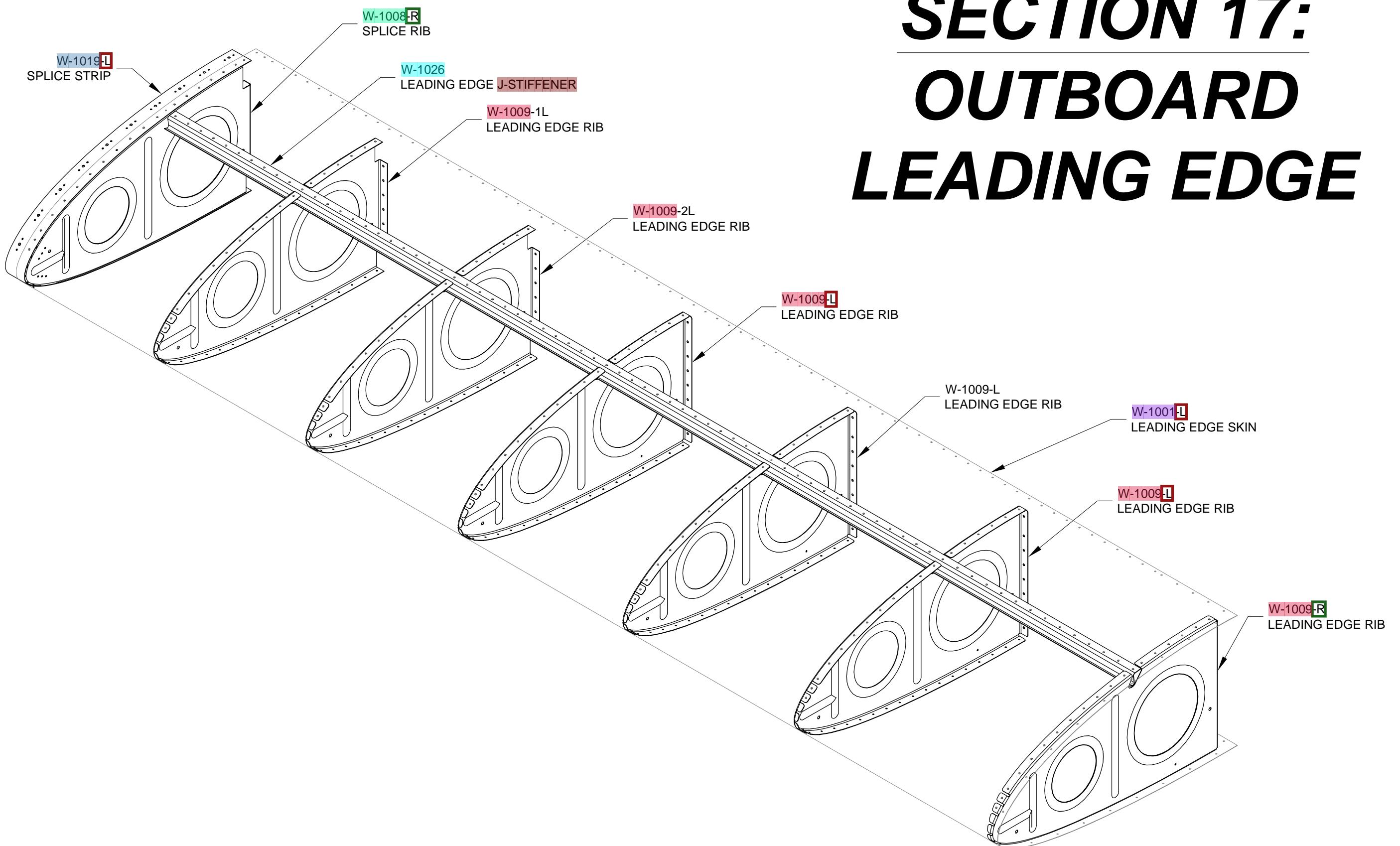
**FIGURE 1: OUTBOARD AILERON HINGE  
BRACKET ASSEMBLY INSTALLATION  
(W-1003 SHOWN TRANSPARENT FOR CLARITY)**



# SECTION 17:

# OUTBOARD

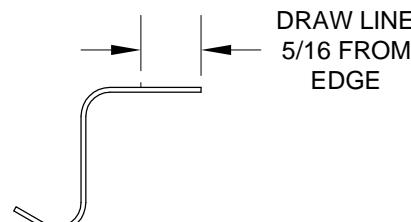
# LEADING EDGE





Step 1: Flute, straighten and adjust all flange angles of all the ribs per Section 5-12.

Step 2: Fabricate the W-1026 Leading Edge J-Stiffener for both the left and right wing assemblies by cutting two pieces of J-channel, each one 76 1/8 inches long. Draw a centerline on the flange of each J-stiffener as shown in Figure 1. Set one J-stiffener aside for use on the right outboard leading edge assembly.

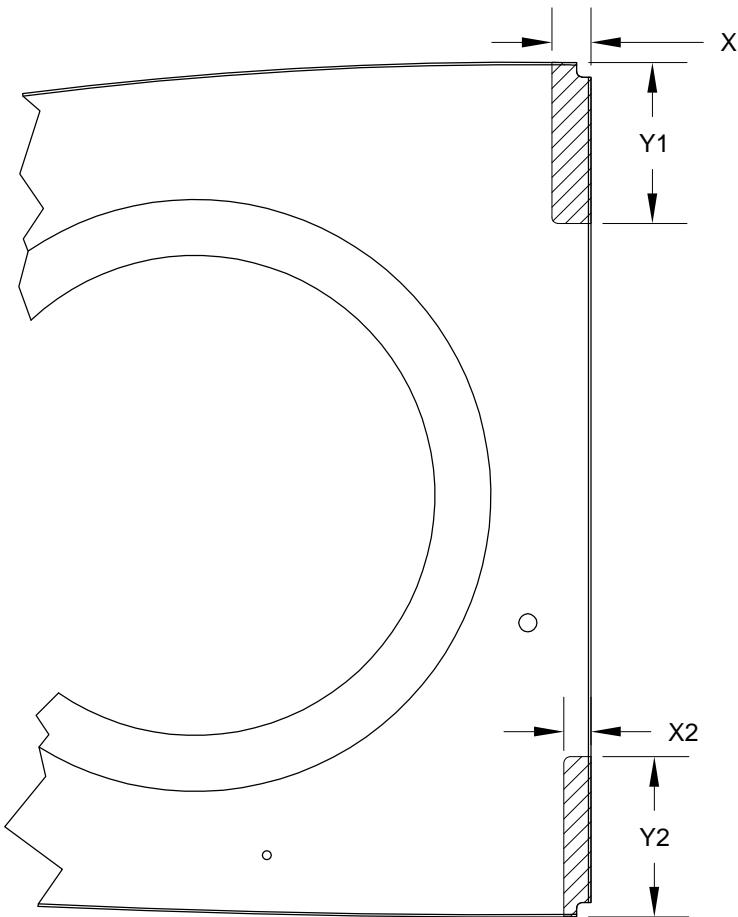


**FIGURE 1: J-STIFFENER END VIEW**

Step 3: Modify two W-1009-L for the left wing assembly and two W-1009-R Leading Edge Ribs for the right wing assembly per the dimensions given in Table 1 and as shown in Figure 2. This will create W-1009-1L, W-1009-2L, W-1009-1R and W-1009-2R. The ribs must be notched to fit around the spar bars and rivet heads on the main spar assembly. Because the main spar bars are stepped (spanwise thickness changes) two different modified ribs will be required, see isometric view on page 1.

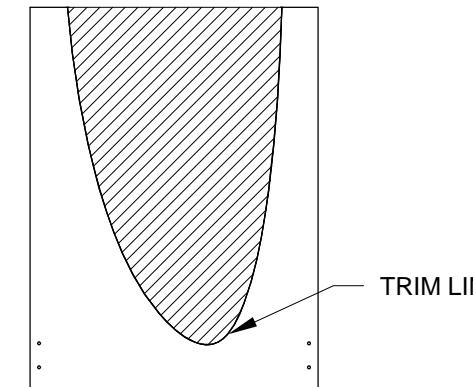
	X1	Y1	X2	Y2
W-1009-1L/R	13/32	1 11/16	9/32	1 21/32
W-1009-2L/R	11/32	1 11/16	5/32	1 1/16

**TABLE 1: LEADING EDGE RIB TRIM**

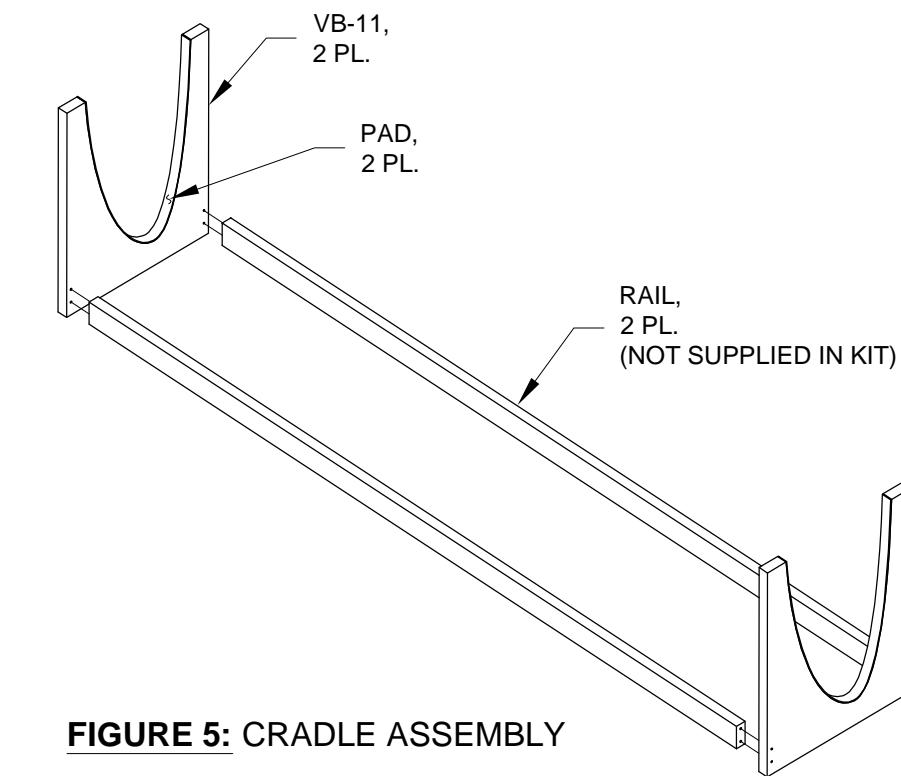


**FIGURE 2:  
LEADING EDGE  
RIB TRIM**

Step 4: Create a cradle to hold both the leading edge and tank assemblies during assembly. First remove the material indicated by the hatched area in Figure 4 from the VB-11 Wing Leading Edge Vee Blocks. Save the removed material, it will be used later to create the flap cradle. Make rails 57 1/2 inches long to interconnect the vee blocks. Assemble the cradle as shown in Figure 5. Line the inside face of the cradle with duct tape or weather strip as shown in Figure 5.



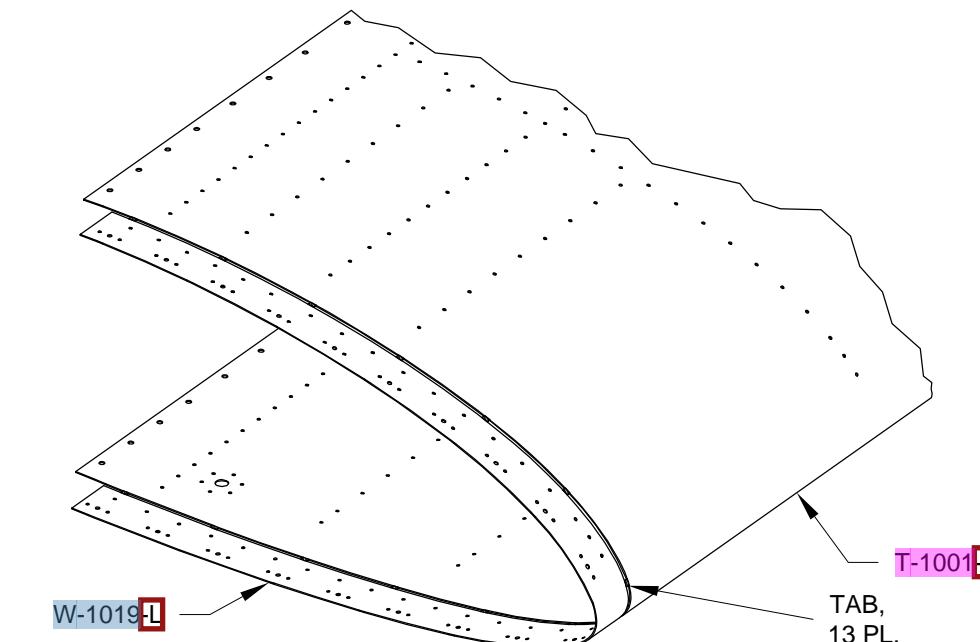
**FIGURE 4: WING LEADING  
EDGE VEE BLOCK**



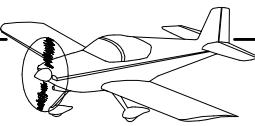
**FIGURE 5: CRADLE ASSEMBLY**

Step 5: Remove the W-1019-L and W-1019-R Splice Strips from the T-1001-L and T-1001-R Fuel Tank Skins, see Figure 3. Careful use of a die-grinder works well. File off the remaining tab material.

Step 6: Deburr all edges on all the parts in the leading edge assembly. Smooth the inboard edge of the T-1001-L and T-1001-R Fuel Tank Skins.



**FIGURE 3: REMOVING SPLICE STRIP FROM FUEL TANK SKIN**



**NOTE:** The remaining steps in this section are for the left outboard leading edge assembly except step 12 on this page.

Step 1: Remove the protective vinyl coating from the inside surface of the W-1001-L Leading Edge Skins.

Step 2: Insert the W-1001-L Leading Edge Skin into the cradle. Cleco the W-1009-R, W-1009-1L and W-1009-2L Leading Edge ribs to the leading edge skin. Insert the W-1019-L Splice Strip into the inboard end of the leading edge skin then insert the W-1008-R Splice Rib and cleco the splice rib, splice strip and leading edge skin together. See Figure 1.

Step 3: Insert the W-1026 Leading Edge J-Stiffener into the assembly as shown in Figure 1. Position the outboard edge of the J-stiffener flush with the outboard face of the W-1009-R Leading Edge Rib. See the isometric view on Page 17-1. Align the centerline drawn on the flange of the J-stiffener with the holes in the leading edge skin, then drill and cleco the J-stiffener to the skin.

Step 4: Final-Drill #40 all the ribs and splice strip to the skin. Run a #40 bit through the aft row of main spar attach holes on the bottom and top of the W-1001-L Leading Edge Skin. Run a #40 bit through the platenut attach holes on the W-1019-L Splice Strip.

Step 5: Enlarge all screw holes on the W-1019-L Splice Strip to #19.

Step 6: Disassemble the leading edge.

Step 7: Machine countersink the #40 nutplate attach holes in the W-1019-L Splice Strip for the head of an AN426AD3 rivet.

Step 8: Deburr all holes in all parts.

**CAUTION!** Holes dimpled for a #8 screw have a tendency to crack if not deburred carefully! First check that the hole has been drilled to final size. Before dimpling thoroughly deburr the holes.

Step 9: Dimple the screw holes in the splice strip for a #8 screw.

Dimple remaining holes in all parts as required (including the aft top and bottom rows of holes on the W-1001-L Leading Edge Skin).

Step 10: Prime all parts if/as desired.

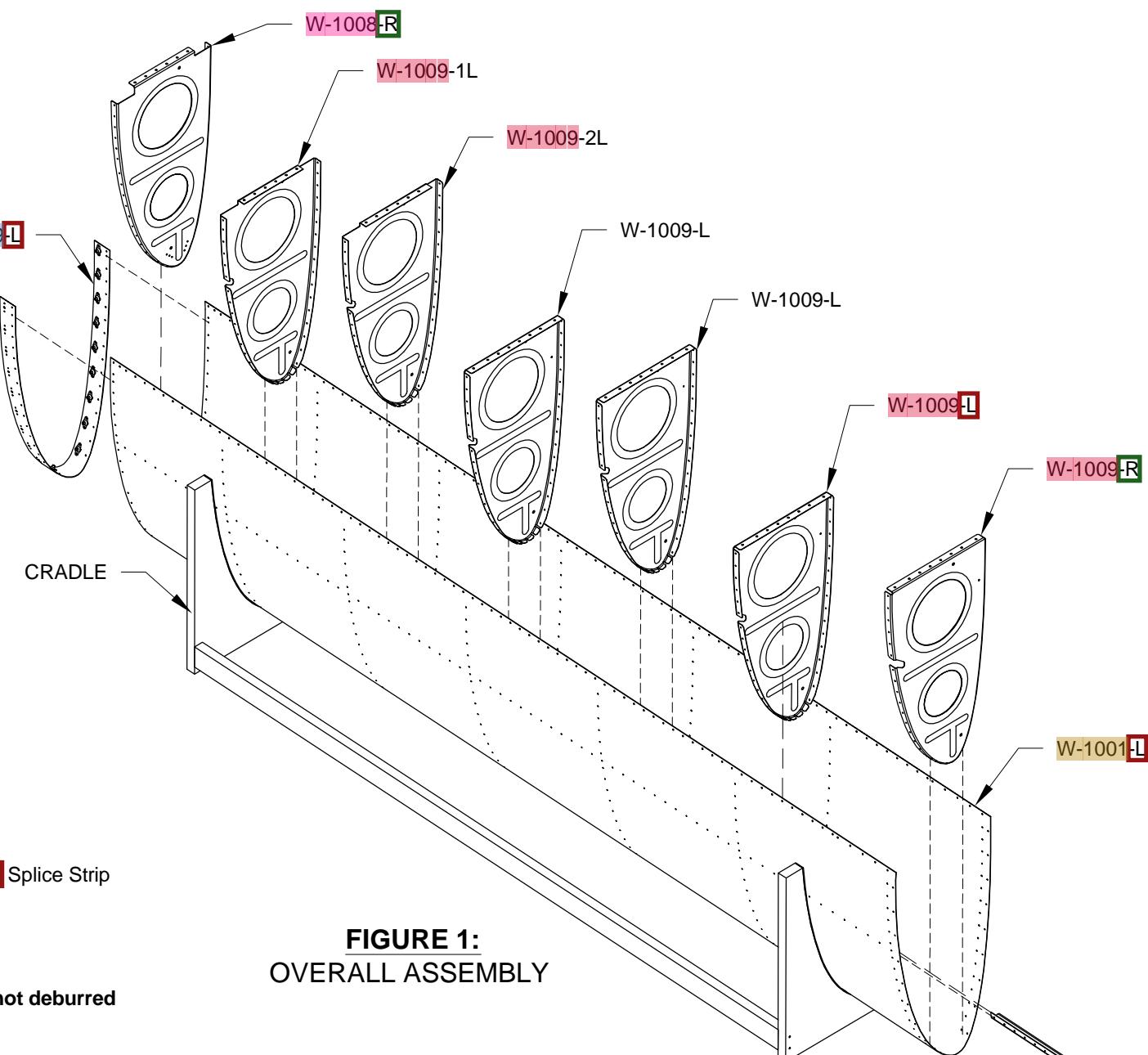
Step 11: Rivet the nutplates onto the W-1019-L Splice Strip as shown in Figure 2.

Step 12: Rivet (fill) the two stall warning slot guide holes in the W-1001-R Leading Edge Skin with AN426AD3-3 rivets. See Page 17-4, Figure 1.

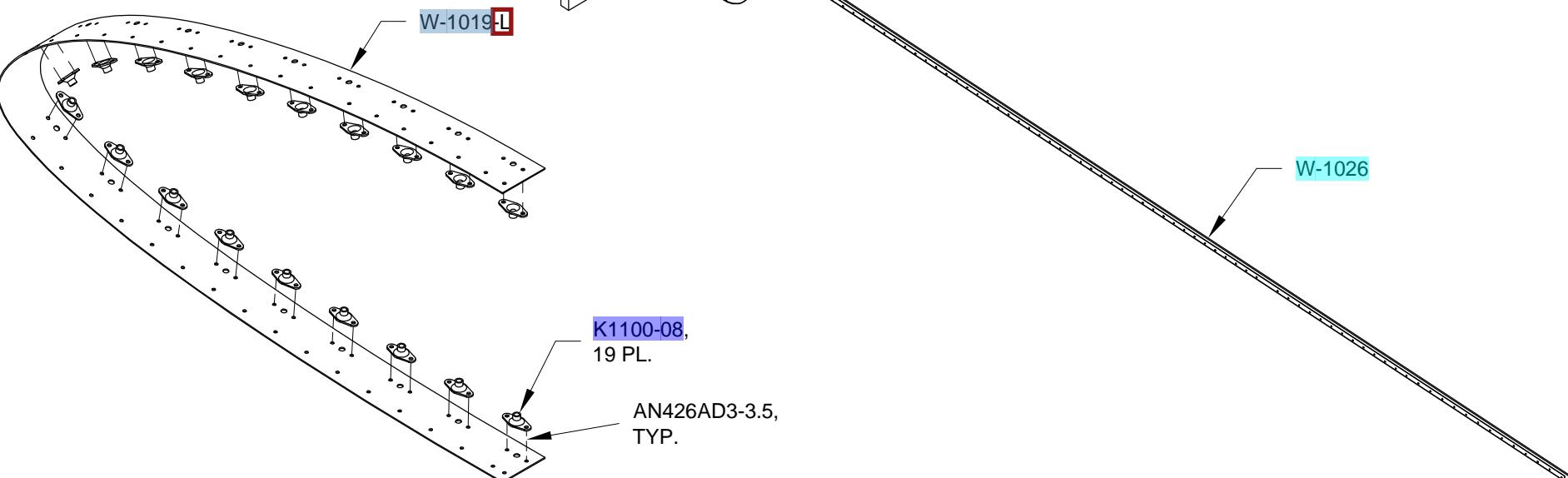
**NOTE:** If using the standard stall warning device it is easier to complete the steps on Page 19-2 now before finishing the steps on this page.

Step 13: Reassemble the parts per step 1.

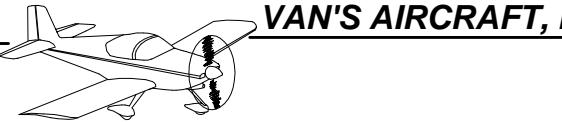
Step 14: Rivet the assembly together per the rivet call-outs given on Page 17-4, Figure 1. Start by riveting the aft most two holes in the leading edge ribs and splice rib, top and bottom, then rivet all parts together progressively working towards the leading edge.



**FIGURE 1:**  
OVERALL ASSEMBLY



**FIGURE 2:** NUTPLATE TO SPLICE STRIP ATTACH



Step 1: Enlarge the tie-down hole (indicated in Figure 1) to allow a tie-down ring to be inserted through the W-1001-L Leading Edge Skin into the W-1020 Tie-Down. Tie down rings are not provided in kit, order BOLT EYE 3/8-16 T.D. from VAN'S ACCESSORIES CATALOG.

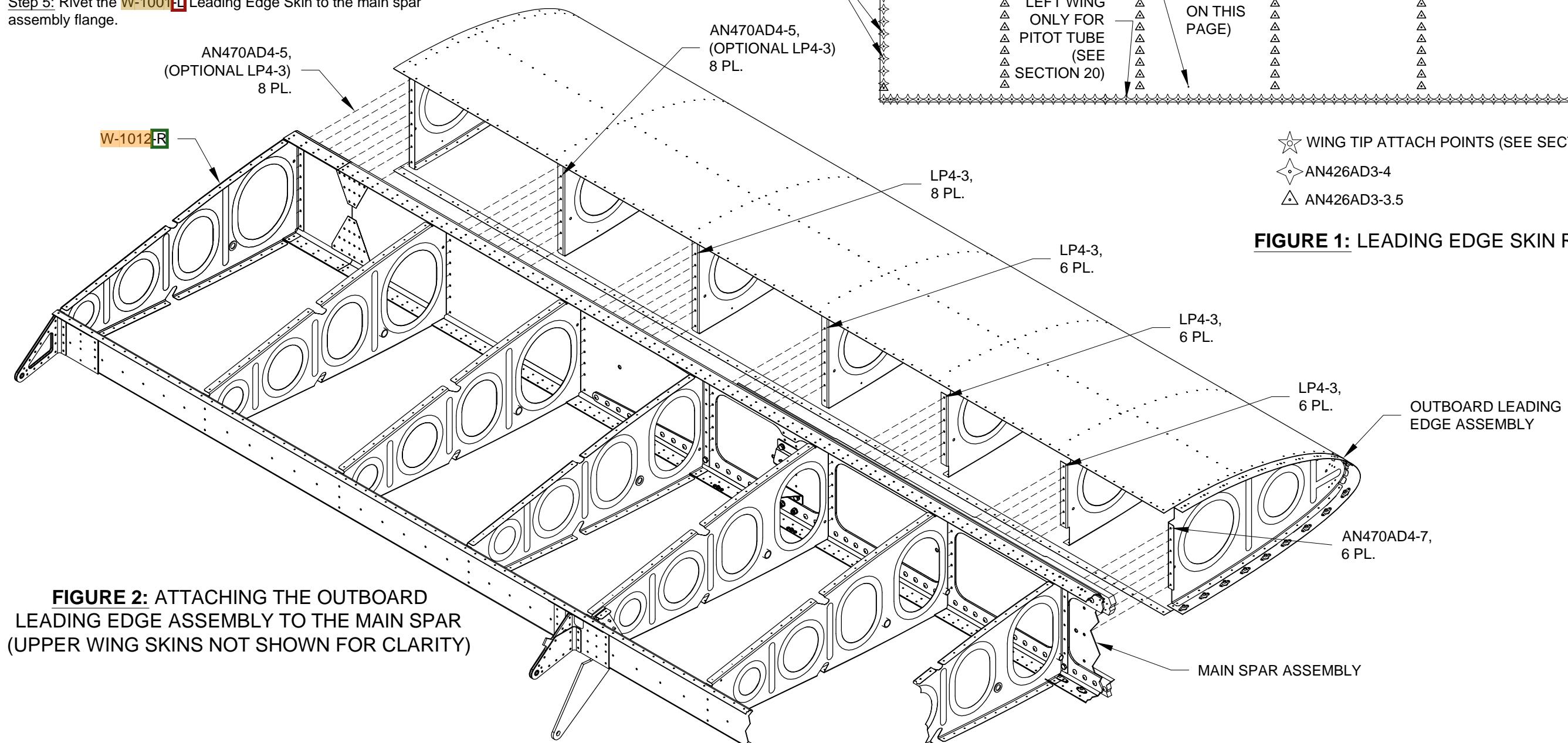
Step 2: Remove any clecos holding the W-1012-R Outboard Wing Rib to the main spar assembly. Cleco the leading edge assembly to the main spar assembly. There may be some misalignment in the main spar assembly between the holes punched in the C Channel Spar Web and the Doubler. Run a #30 drill through these holes if required to insert clecos.

Final-Drill #30 the holes common to the main spar assembly and the aft flange of the ribs in the leading edge assembly. Check that the tie-down hole is located in the proper position.

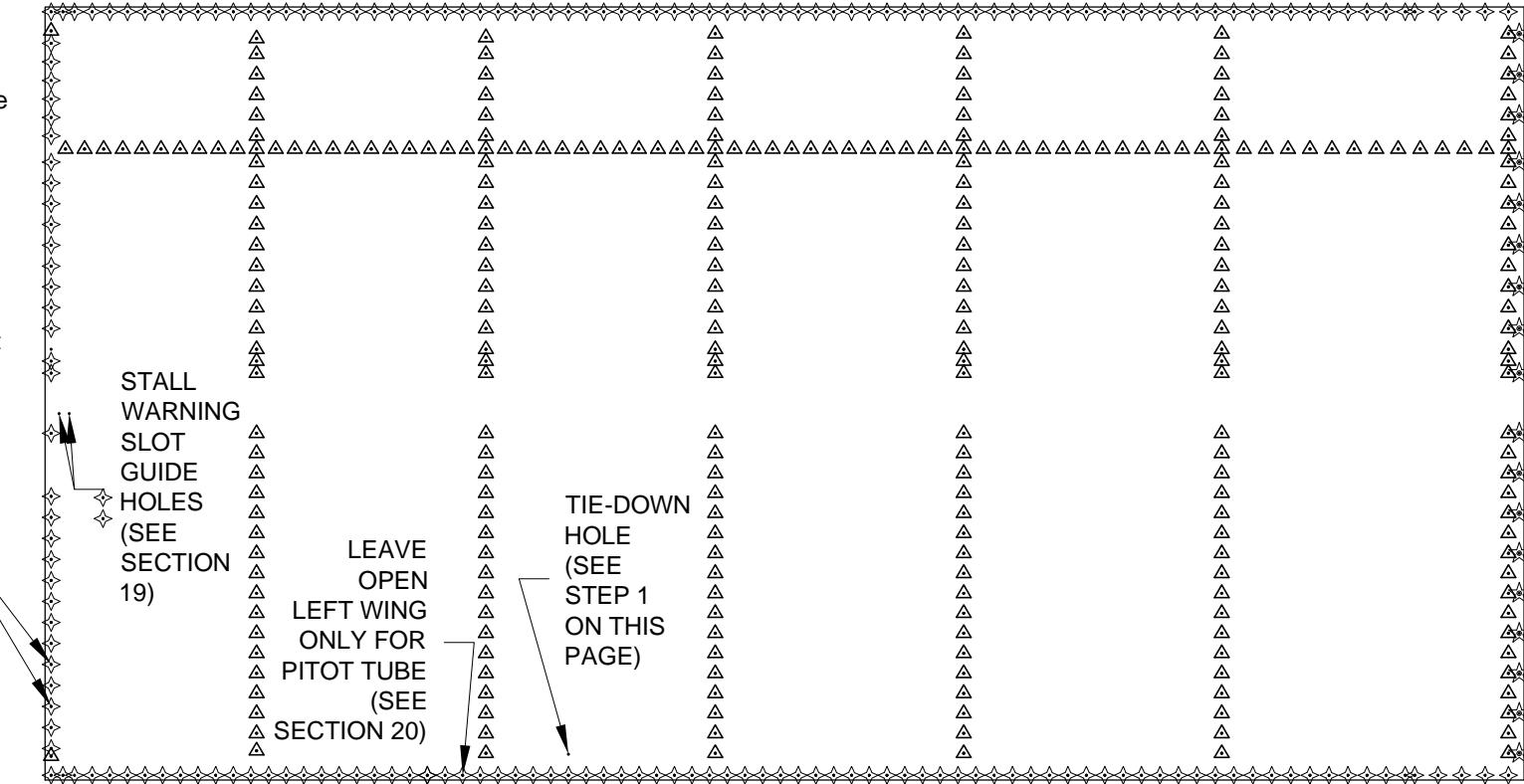
Step 3: Rivet the W-1009-R Leading Edge Rib to the main spar and outboard wing rib as shown in Figure 2.

Step 4: Rivet the leading edge ribs to the main spar assembly per the rivet call-outs shown in Figure 2.

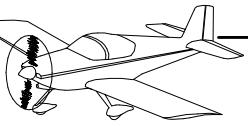
Step 5: Rivet the W-1001-L Leading Edge Skin to the main spar assembly flange.



**FIGURE 2: ATTACHING THE OUTBOARD LEADING EDGE ASSEMBLY TO THE MAIN SPAR (UPPER WING SKINS NOT SHOWN FOR CLARITY)**

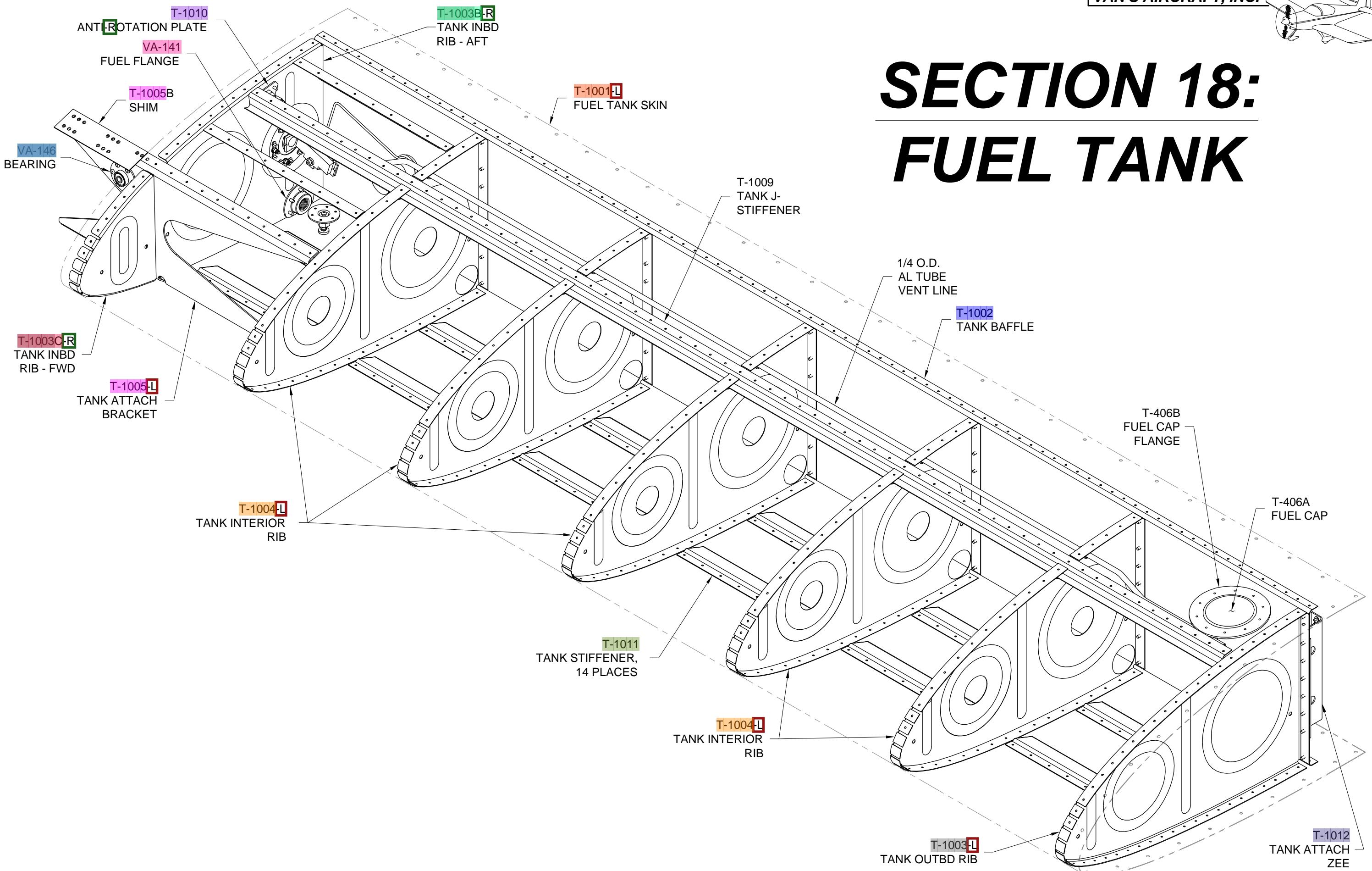


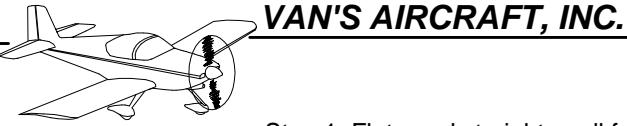
**FIGURE 1: LEADING EDGE SKIN RIVET DIAGRAM**



# SECTION 18:

# FUEL TANK



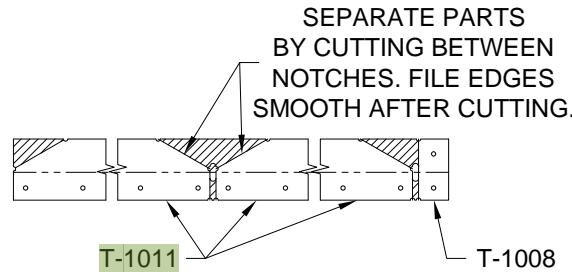


Step 1: Flute and straighten all fuel tank ribs per Section 5-12.

Step 2: Trim T-1011 Tank Stiffeners as shown in Figure 1. (Figure 1 shows the untrimmed stiffeners "flat" or "un-bent" for clarity.)

One T-1008 Vent Line Clip is trimmed from the end of each "stick" of stiffeners. Only one vent line clip is required for each tank and extras may be discarded.

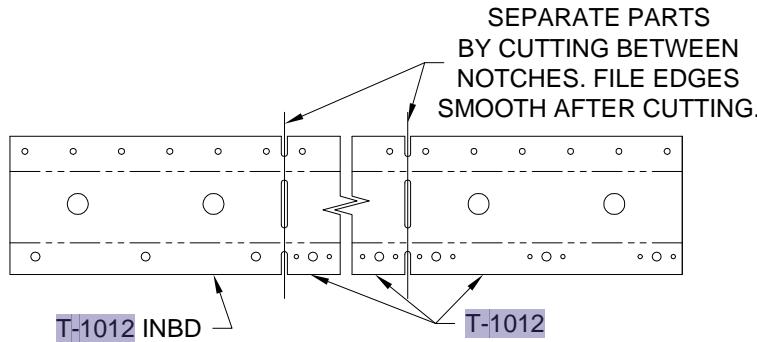
Set half the tank stiffeners aside for assembly into the right fuel tank.



**FIGURE 1: TANK STIFFENER TRIM DIAGRAM**

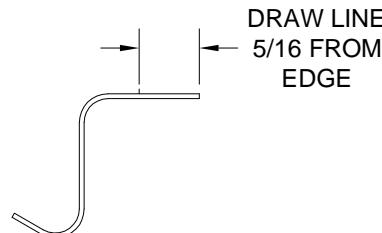
Step 3: Trim T-1012 Tank Attach Zee's as shown in Figure 2. (Figure 2 shows the untrimmed zee's "flat" or "un-bent" for clarity.)

Note that the inboard tank attach zee has no holes for nutplate attachment.



**FIGURE 2: TANK ATTACH ZEE TRIM DIAGRAM**

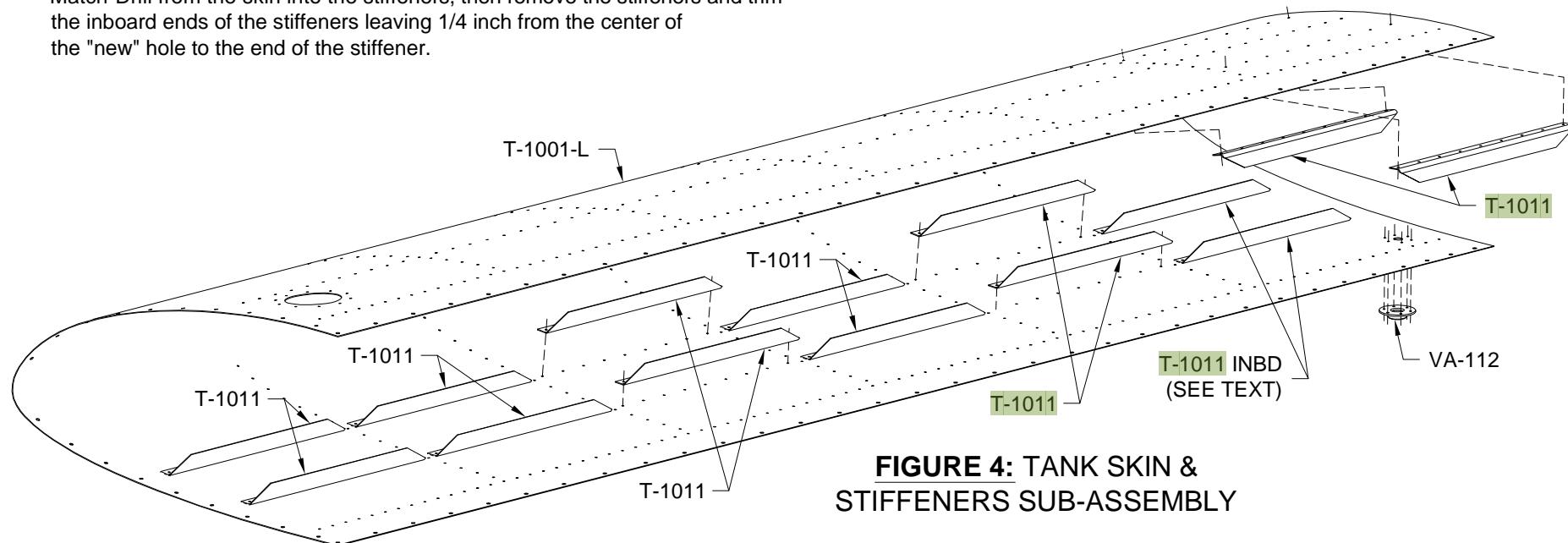
Step 4: Fabricate two T-1009 Tank J-Stiffeners by cutting two pieces of J-Channel each one 64 1/4 inches long. Draw a centerline on each tank J-stiffener as shown in Figure 3. Set one tank J-stiffener aside for assembly into the right fuel tank.



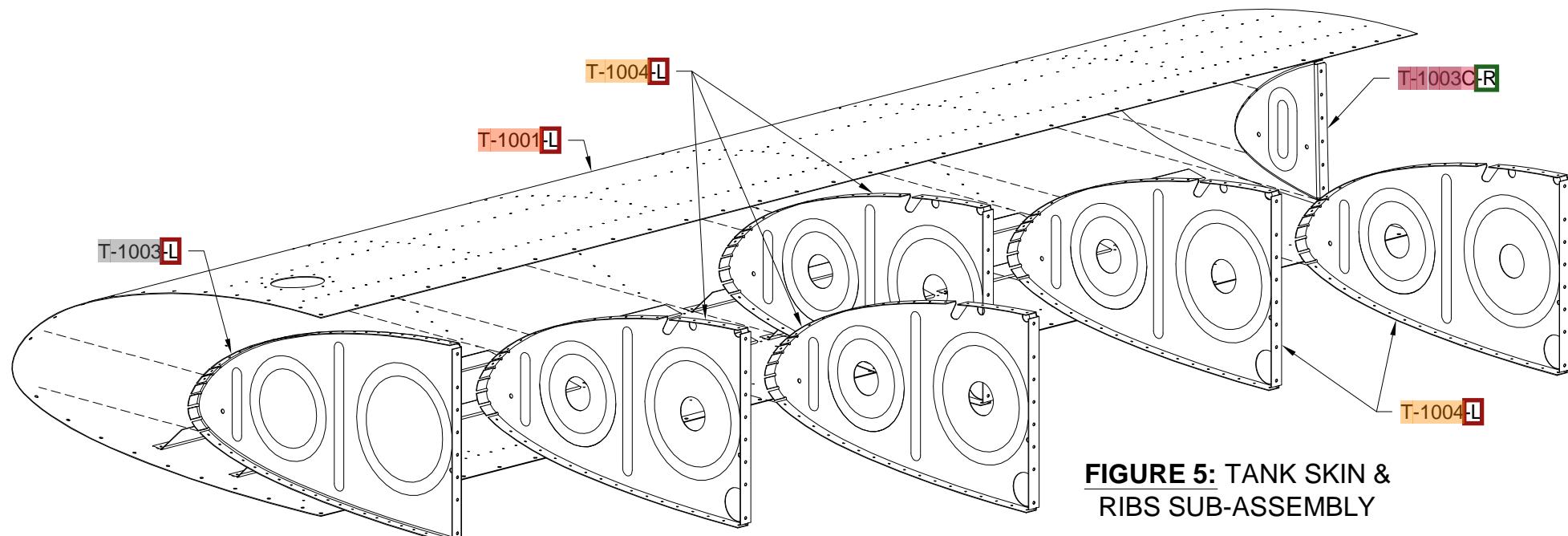
**FIGURE 3: TANK J-STIFFENER END VIEW**

Step 5: Place the T-1001-L Tank Skin in the Leading Edge Assembly cradle. Remove the vinyl film from the inside surface of the tank skin and deburr edges. Cleco all the T-1011 Tank Stiffeners and the VA-112 Drain Flange to the tank skin as shown in Figure 4.

Final-Drill all the tank stiffeners and the drain flange to the tank skin. The most inboard rivet hole in the two tank stiffeners in the bottom of the inboard rib bay do not correspond to the most inboard hole in the tank skin. Match-Drill from the skin into the stiffeners, then remove the stiffeners and trim the inboard ends of the stiffeners leaving 1/4 inch from the center of the "new" hole to the end of the stiffener.



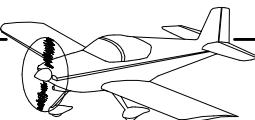
**FIGURE 4: TANK SKIN & STIFFENERS SUB-ASSEMBLY**



**FIGURE 5: TANK SKIN & RIBS SUB-ASSEMBLY**

Step 6: Cleco the T-1003-L Tank Outboard End Rib, T-1003C-R Tank Inboard Rib - Fwd, and T-1004-L Tank Interior Ribs to the T-1001-L Tank Skin as shown in Figure 5.

Final-Drill all the ribs to the skin.



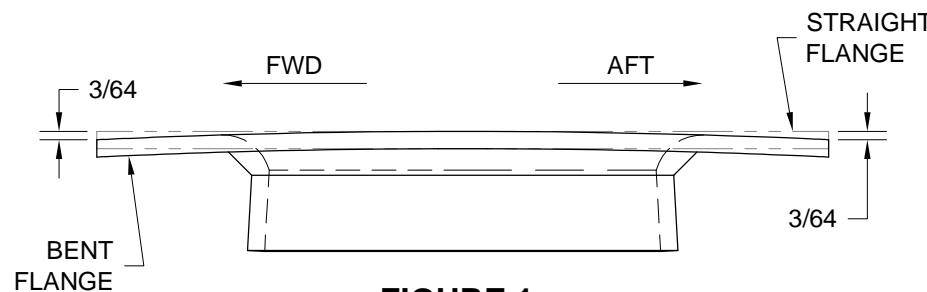
Step 1: Fit the T-1009 Tank J-Stiffener to the T-1001-L Tank Skin as shown in Figure 2.

Position the J-stiffener such that there is 1/4 inch from the first hole center to the end of the J-stiffener. Align the centerline drawn on the flange of the J-stiffener with the holes in the tank skin, then match-drill and cleco the J-stiffener to the tank skin.

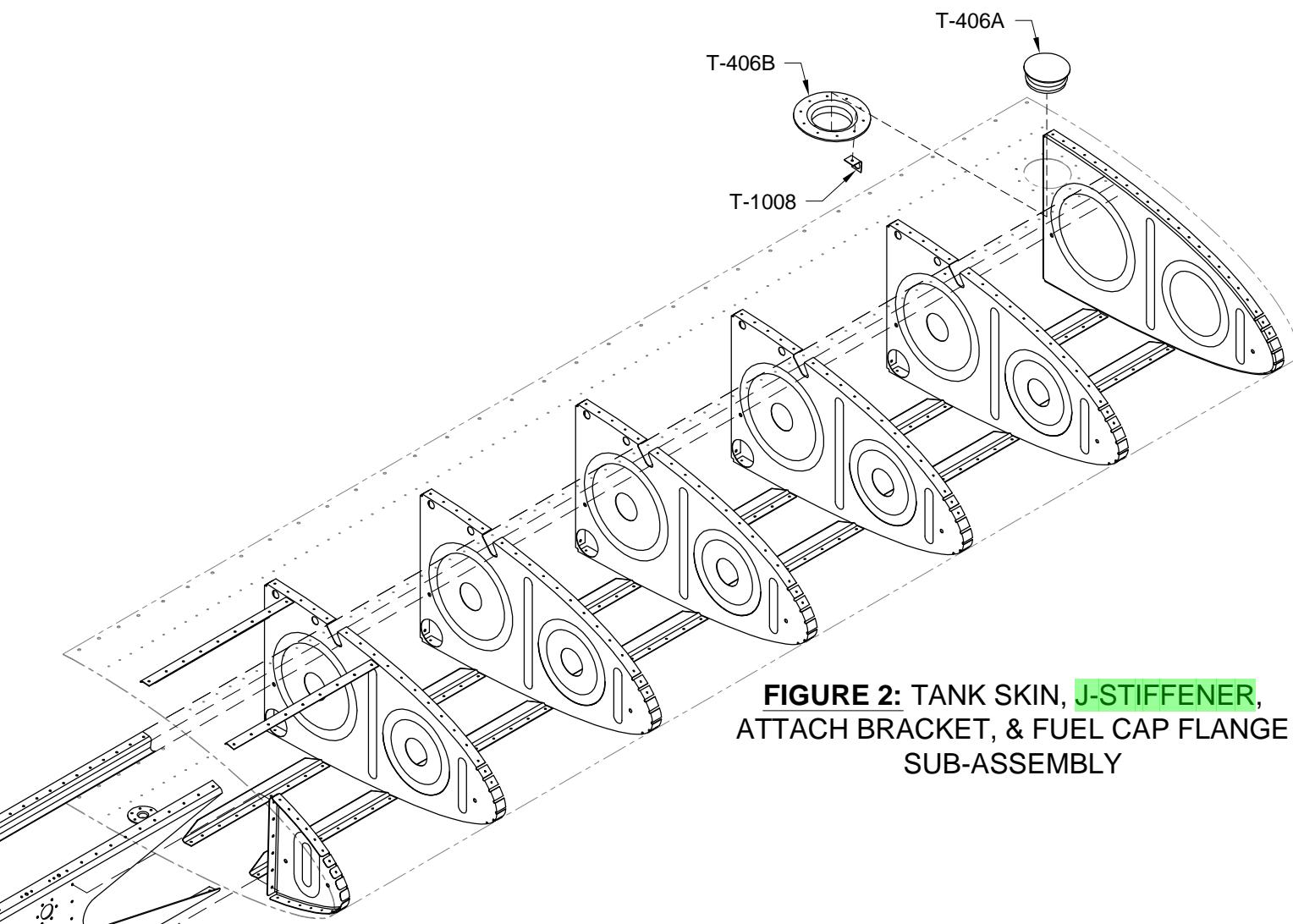
Step 2: Cleco the T-1005-L Tank Attach Bracket to the T-1001-L Tank Skin and T-1003C-R Tank Inboard Nose Rib as shown in Figure 2.

Final-Drill all tank attach bracket rivet holes to final size.

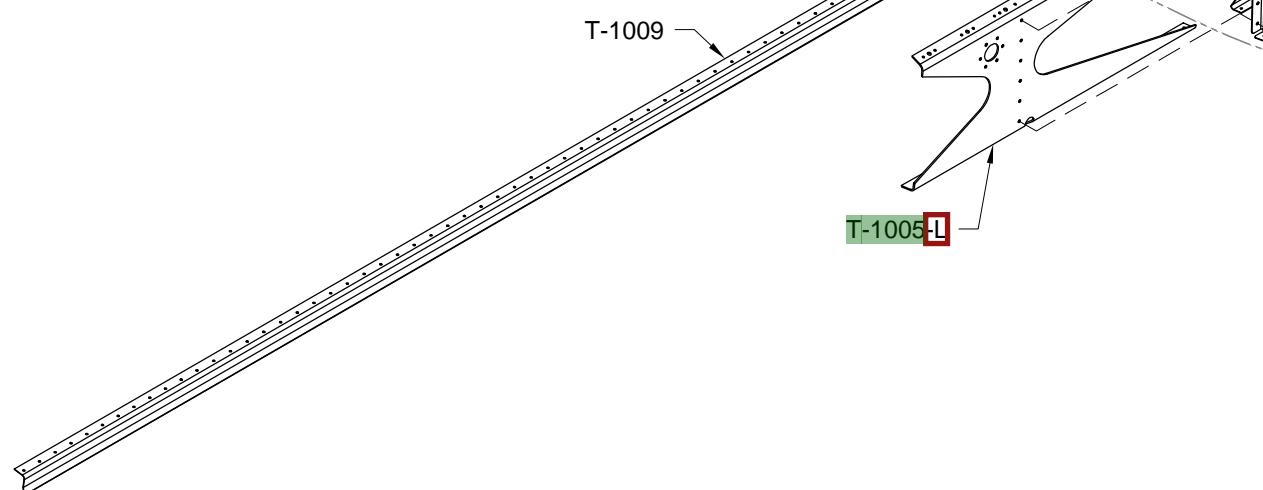
Step 3: The T-406B Fuel Cap Flange is provided with a slight bend in the fwd/aft direction. In preparation for fitting the fuel cap flange to the tank skin, adjust the amount of bend in the flange so that it conforms to the curve of the tank skin. See Figure 1 for the approximate shape.



**FIGURE 1:**  
FUEL CAP FLANGE  
EDGE VIEW  
(FULL SCALE)

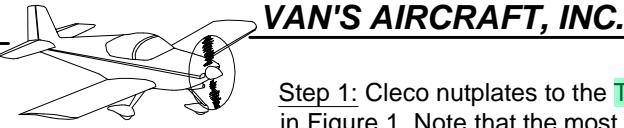


**FIGURE 2: TANK SKIN, J-STIFFENER,  
ATTACH BRACKET, & FUEL CAP FLANGE  
SUB-ASSEMBLY**

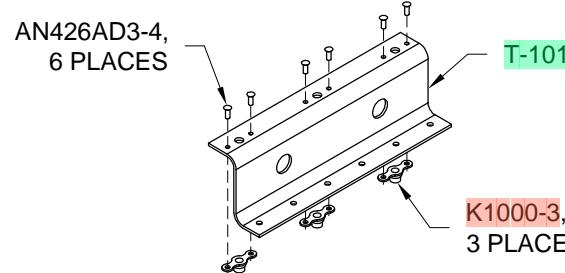


Step 4: Fit and drill the T-406B Fuel Cap Flange and T-1008 Vent Clip to the T-1001-L Tank Skin as shown in Figure 2. Use the T-406A Fuel Cap as a guide for centering the fuel cap flange in the tank skin opening.

The vent clip clecos through the most forward rivet hole in the cap flange.



Step 1: Cleco nutplates to the T-1012 Tank Attach Zee's as shown in Figure 1. Note that the most inboard tank attach zee does not have nutplates. Final-Drill the nutplate attach rivet holes to #40. Remove the nutplates, countersink the tank attach zee's for the nutplate attach rivets, and deburr holes. Prime all attach zee's if/as desired. Rivet the nutplates to the attach zee's. Read Section 5R for more information on installing nutplates.

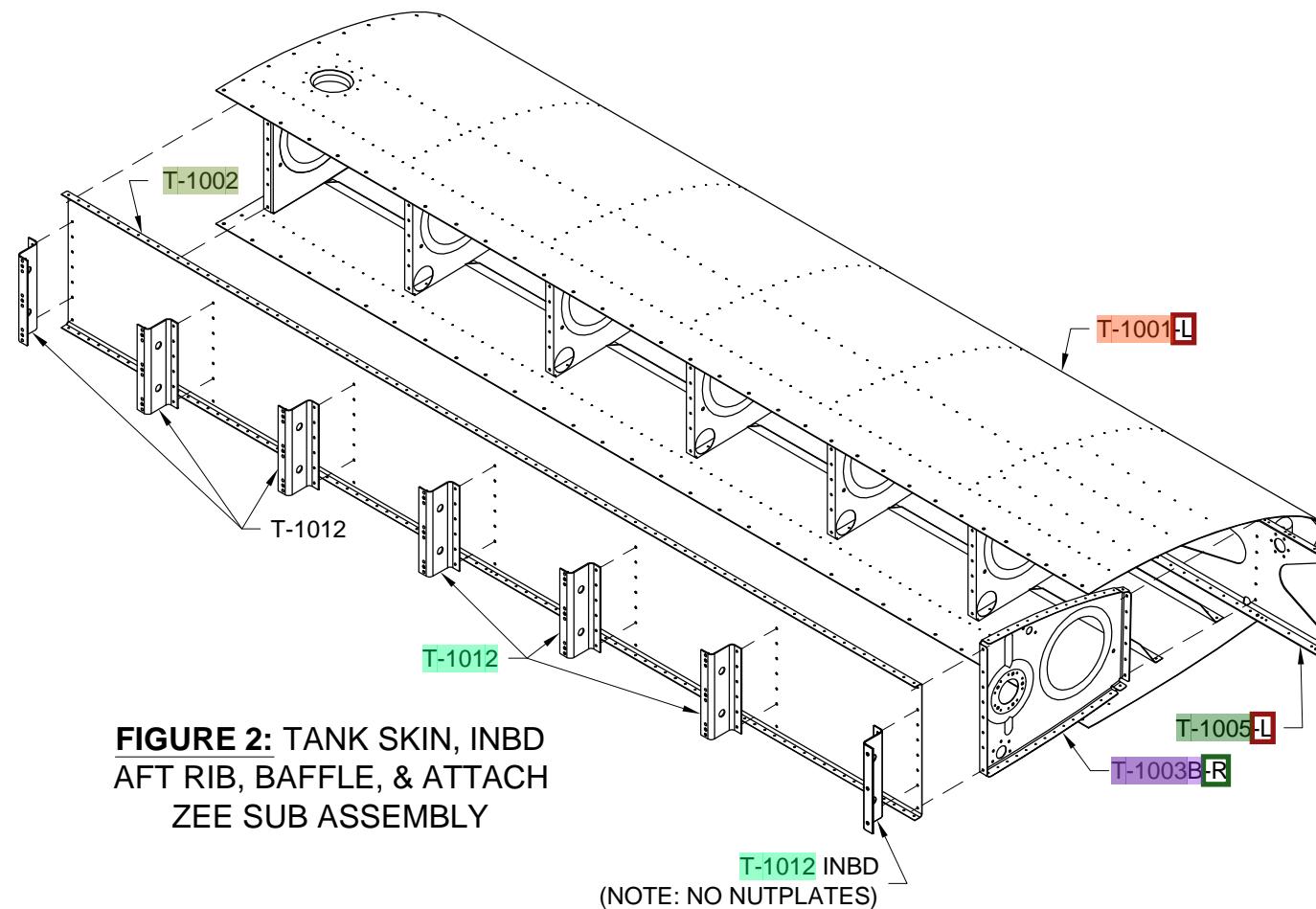


**FIGURE 1:** T-1012 NUTPLATE ATTACH

Step 2: Cleco the T-1003B-R Tank Inbd Rib-Aft to the T-1001-L Tank Skin and T-1005-L Attach Bracket as shown in Figure 2.

Final-Drill the aft tank inboard rib to the tank skin and attach bracket.

Step 3: Cleco the T-1002 Tank Baffle and T-1012 Tank Attach Zee's to the tank rib aft flanges as shown in Figure 2.



**FIGURE 2:** TANK SKIN, INBD AFT RIB, BAFFLE, & ATTACH ZEE SUB ASSEMBLY

Step 3 (continued): Note that the tank attach zee's are not all installed in the same orientation. Note also that the most inboard attach zee has no nutplates installed on it.

Final-Drill all attach zee to tank baffle to rib flange holes and all tank baffle to rib flange holes to #30.

Step 4: Cleco the T-1001-L Tank Skin to the upper and lower flanges of the T-1002 Tank Baffle.

Final-Drill all tank skin to tank baffle flange holes to #40.

Step 5: Final-Drill all the screw holes in the T-1001-L Fuel Tank Skin to #19.

Step 6: Machine countersink the row of holes that attach the T-1001-L Fuel Tank Skin to the T-1002 Tank Baffle. Read Section 5E for more information on countersinking and dimpling. The baffle must be in place during this step to provide a good pilot for the countersink. **IMPORTANT:** To assure proper part alignment on reassembly, leave every 10th hole un-countersunk. Go back and countersink these holes and install rivets after the tank has been assembled and the sealant has cured.

Step 7: Permanently label the position of each T-1012 Tank Attach Zee so that they will be in the same location for final assembly as they were for prior assembly steps. Remove the attach zees and baffle.

**NOTE:** If you plan to use the capacitive fuel gauge senders offered in the VAN'S AIRCRAFT ACCESSORIES CATALOG you should complete their installation at this point using the instructions supplied in the sender kit.

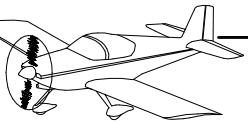
Step 8: Disassemble the tank.

Machine countersink the top of the T-406B Fuel Cap Flange to accept the dimples in the tank skin.

Deburr all holes in all parts. Dimple all holes as required. Do not dimple the two screw holes in the inboard edge of the T-1001-L Tank Skin as shown on Page 18-5, Figure 3. Dimple the screw holes in the tank skin using the C-frame tool and a hammer rather than forming them with a rivet squeezer. This will result in "crisper", better looking skin dimples.

At this point, all parts of the fuel tank should be deburred, countersunk and/or dimpled.

Step 9: Prime parts if/as desired except do not prime any area that will be in the inside of the tank.



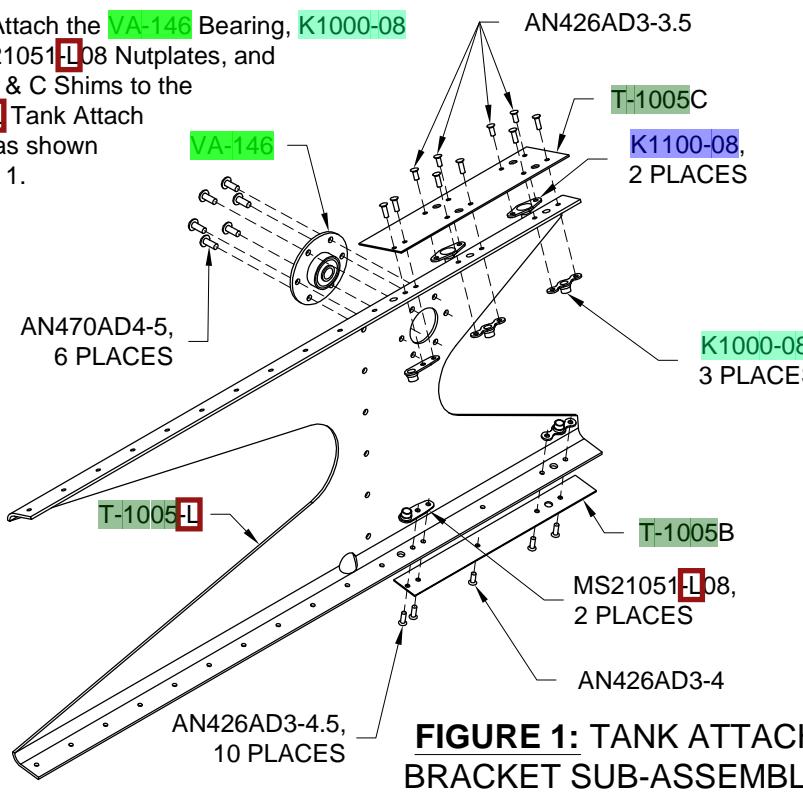
**Step 1:** The T-1005B and T-1005C Shims are provided as a single piece of metal with the parts "tabbed together". Separate the shims from each other, file-off the tabs, and deburr edges.

**Step 2:** Final-Drill holes in T-1005B and T-1005C Shims. Use a #40 bit for the small holes; use a #19 bit for the large holes. Deburr all holes.

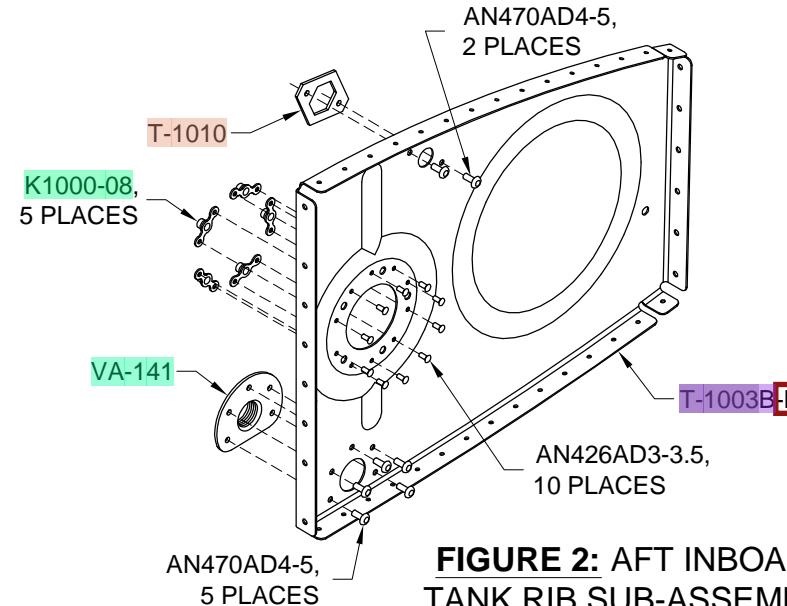
**Step 3:** Study Figure 1 until there is no question as to the position and/or orientation of each part or hardware item.

**Step 4:** Dimple the two #19 holes in the T-1005C Shim which will have K1100-08 Nutplates attached. Dimple the K1100-08 Nutplates and the corresponding nutplate attach rivet holes in the shim. Rivet the K1100-08 Nutplates to the shim as shown in Figure 1.

**Step 5:** Attach the VA-146 Bearing, K1000-08 and MS2105-08 Nutplates, and T-1005B & C Shims to the T-1005-L Tank Attach Bracket as shown in Figure 1.



**FIGURE 1: TANK ATTACH BRACKET SUB-ASSEMBLY**



**FIGURE 2: AFT INBOARD TANK RIB SUB-ASSEMBLY**

**NOTE:** Assembly steps from this point on require that sealant be installed between mating parts.

Read Section 5S for more information on fuel tank sealant.

The tank is riveted together just like any other structure with one very important difference: Apply sealant between the parts comprising a seam through which fuel could conceivably leak. This includes every rivet.

**Step 6:** Fabricate and install small plates made from scrap .025 or .032 aluminum to close-off the 3/16 diameter holes in the webs of the T-1003-L Tank Outbd Rib, T-1003B-R Tank Inbd Rib - Aft, and T-1003C-R Tank Inbd Rib - Fwd. These holes are used to hold the ribs and formblocks in proper alignment during hydropress forming of the ribs

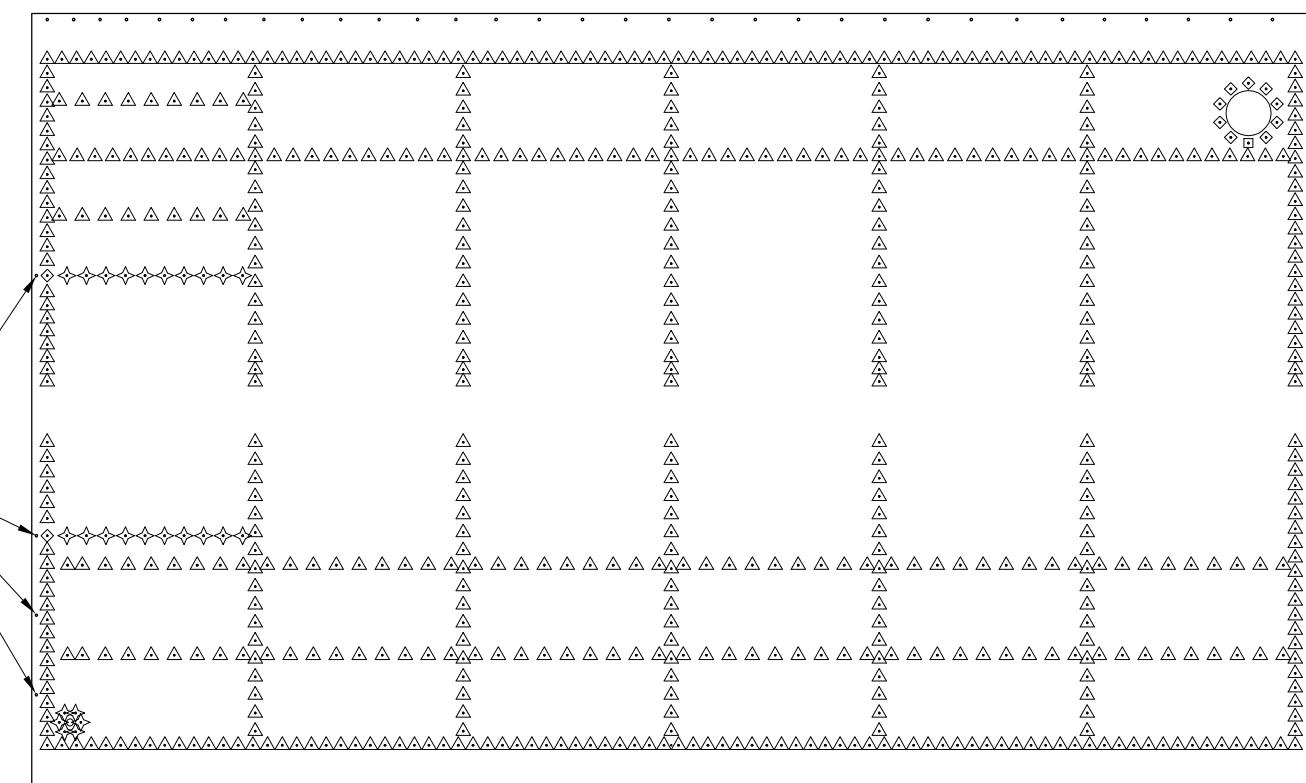
**Step 7:** Attach the VA-141 Fuel Flange, T-1010 Anti-Rotation Plate, and nutplates to the T-1003B-L Tank Inbd Rib - Aft as shown in Figure 2.

**Step 8:** Rivet the T-1011 Stiffeners and VA-112 Drain Flange to the T-1001-L Tank Skin as shown on Page 18-2, Figure 4. See Figure 3 for rivet call-out.

Recall that the two stiffeners on the bottom of the most inboard rib bay have been shortened to allow water accumulation to migrate aft to the drain point.

- AN426AD3-5
- AN426AD3-4.5
- ❖ AN426AD3-4
- △ AN426AD3-3.5

**FIGURE 3: FUEL TANK SKIN RIVET DIAGRAM**



**Step 9:** Rivet the T-406B Fuel Cap Flange and T-1008 Vent Clip to the T-1001-L Tank Skin as shown on Page 18-3, Figure 2. See Figure 3 for rivet call-outs.

**Step 10:** Rivet the T-1003C-R Tank Inbd Rib - Fwd, T-1004-L Tank Interior Ribs, and T-1003-L Tank Outboard Rib, to the T-1001-L Tank Skin as shown on Page 18-2, Figure 5. See Figure 3 for rivet call-outs.

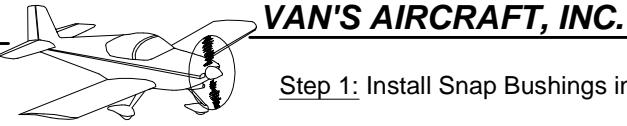
Begin with the tank inbd rib - fwd and progress from inboard to outboard, finishing with the tank outboard rib.

**Step 11:** Rivet the T-1009 Tank J-Channel to the T-1001-L Tank Skin as shown on Page 18-3, Figure 2. See Figure 3 for rivet call-outs.

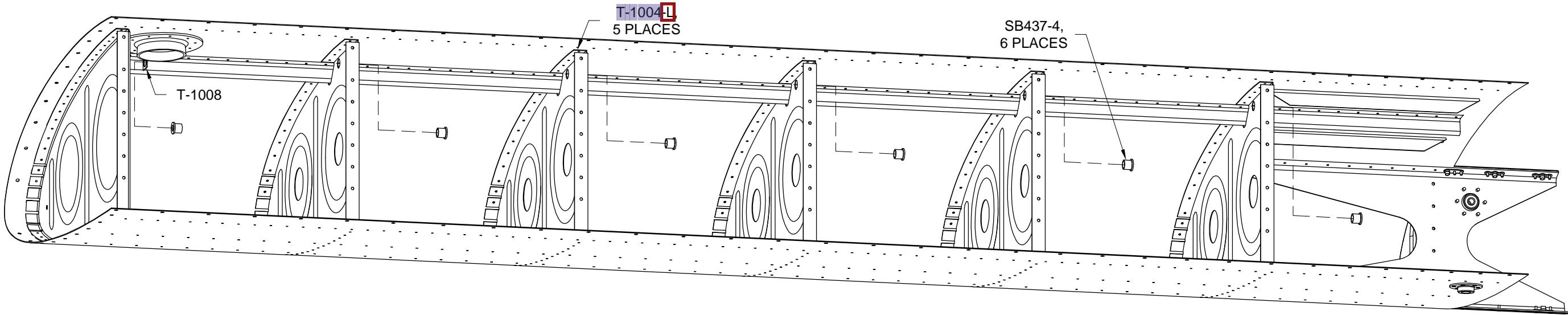
To minimize mess, it is recommended to apply the sealant to the tank skin as opposed to the J-stiffener. Hold the J-stiffener away from the skin while sliding it into place to avoid smearing sealant.

**Step 12:** Rivet the T-1005-L Tank Attach Bracket Sub Assembly to the T-1001-L Tank Skin as shown on Page 18-3, Figure 2. See Figure 3 for rivet call-outs.

Cleco, but do not rivet the tank attach bracket to the inboard nose rib.



Step 1: Install Snap Bushings into holes pre-punched in the T-1004 Tank Interior Ribs and T-1008 Vent Clip as shown in Figure 1.



**FIGURE 1: TANK VENT SNAP BUSHING INSTALLATION**

Step 2: Fabricate the Fuel Vent Line by cutting a piece of 1/4 inch O.D. X .032 W soft aluminum tube 63 inches long. Read Section 5P for more information on Aluminum Tubing. Place an AN818-4D Nut and AN819-4D Sleeve on one end of the tube and flare the end of the tube.

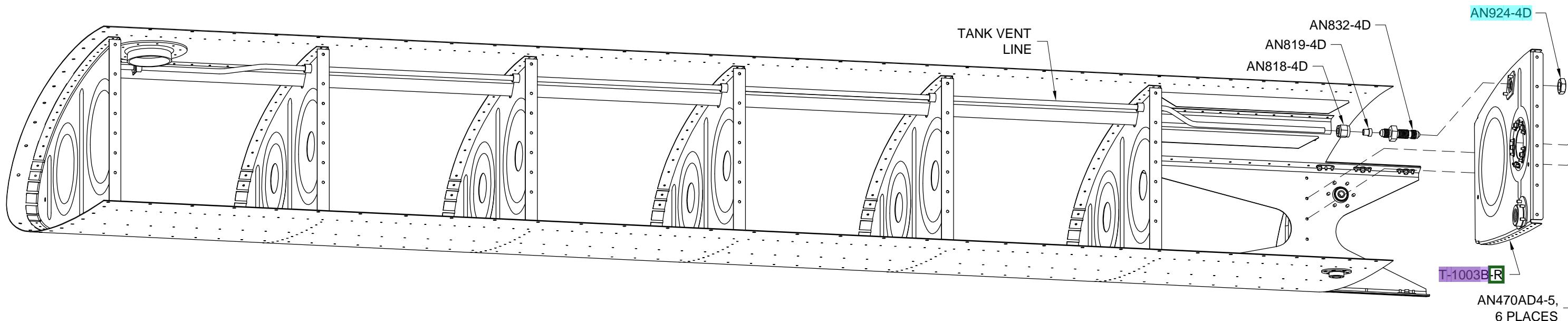
Step 3: Install the vent line into the tank by inserting the un-flared end into the snap bushing in the most inboard tank interior rib and feeding it through the rest of the snap bushings in the ribs and finally through the snap bushing in the vent clip installed under the fuel cap flange. See Figure 2.

Hand-bend the vent line tube as required in the most outboard rib bay to allow the vent line to pass through the rib snap bushing and into the vent clip snap bushing. Hand-bend the vent line tube in the most inboard rib bay to align the flared end of the tube with the bulkhead fitting that will be installed into the inboard tank end rib.

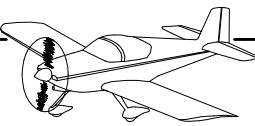
Step 4: Install the AN832-4D Bulkhead Union and AN924-4D Nut on the T-1003B-R tank end rib as shown in Figure 2.

Step 5: Rivet the T-1003B-R Tank Inbd Rib - Aft sub-assembly to the T-1001-L Fuel Tank Skin and T-1005-L Tank Attach Bracket as shown in Figure 2. See page 18-5, Figure 3 for rivet call-out.

Step 6: Thread the AN818-4D Nut onto the AN832-4D Bulkhead Union and torque the nut. Adjust the bend in the vent line if/as required to align the nut and bulkhead union. Double-check that the nut is torqued properly because this is the last time that it can easily be done.



**FIGURE 2: TANK VENT LINE AND INBOARD END RIB INSTALLATION**



**NOTE:** The fuel level sender units are not provided with the kit but are available in VAN'S AIRCRAFT ACCESSORIES CATALOG. Use part number IE-385B for the left fuel tank; use part number IE F-385C for the right fuel tank.

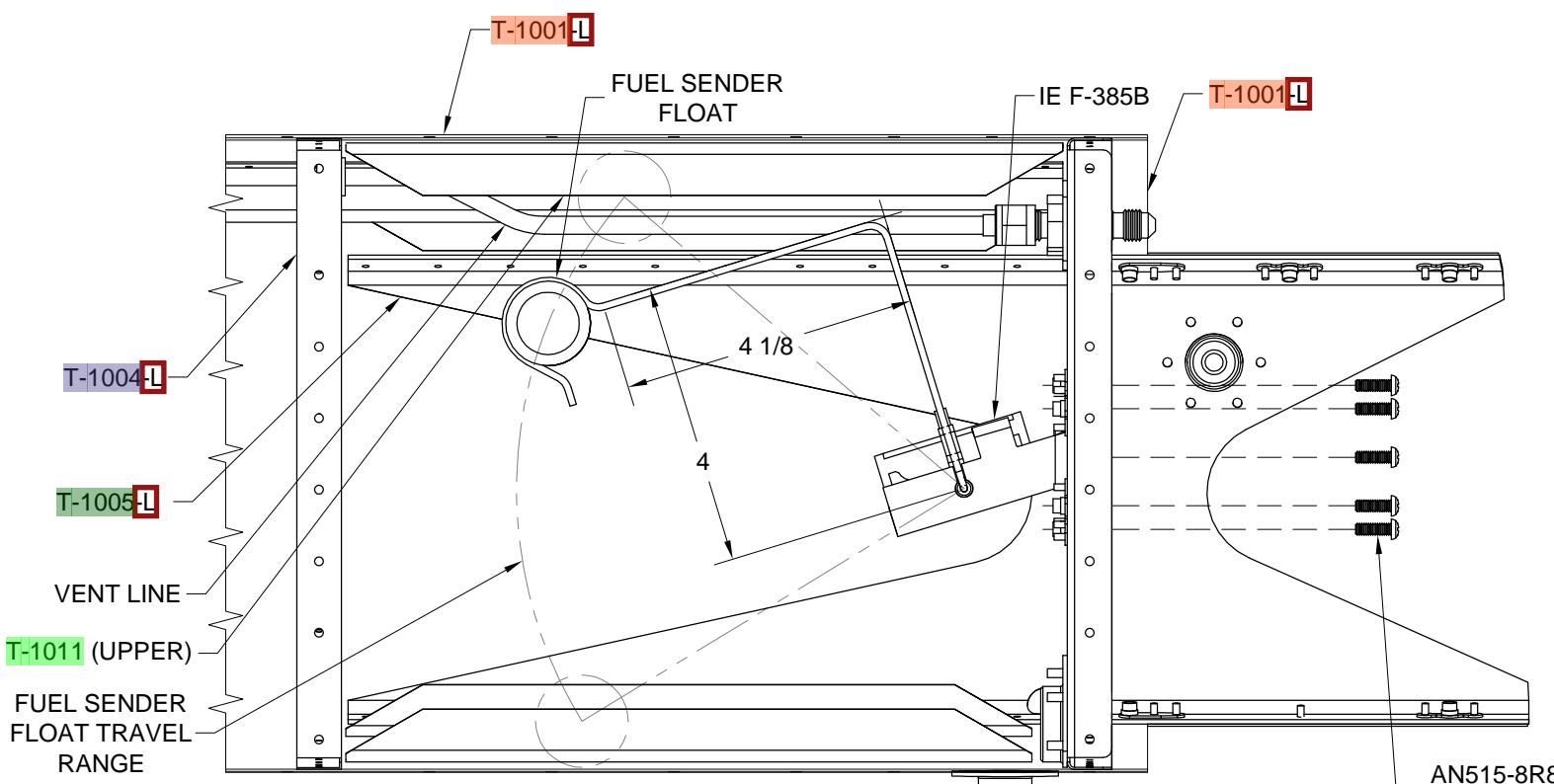
**Step 1:** Bend the sender unit float wire to fit the fuel tank as shown in Figure 1 and as shown in the Float Wire Bending Diagram supplied with the sender unit. Install the bent wire to the sender.

**Step 2:** Temporarily install the IE F-385B fuel level sender as shown in Figure 1 and Figure 2. Do not use tank sealant for this initial installation.

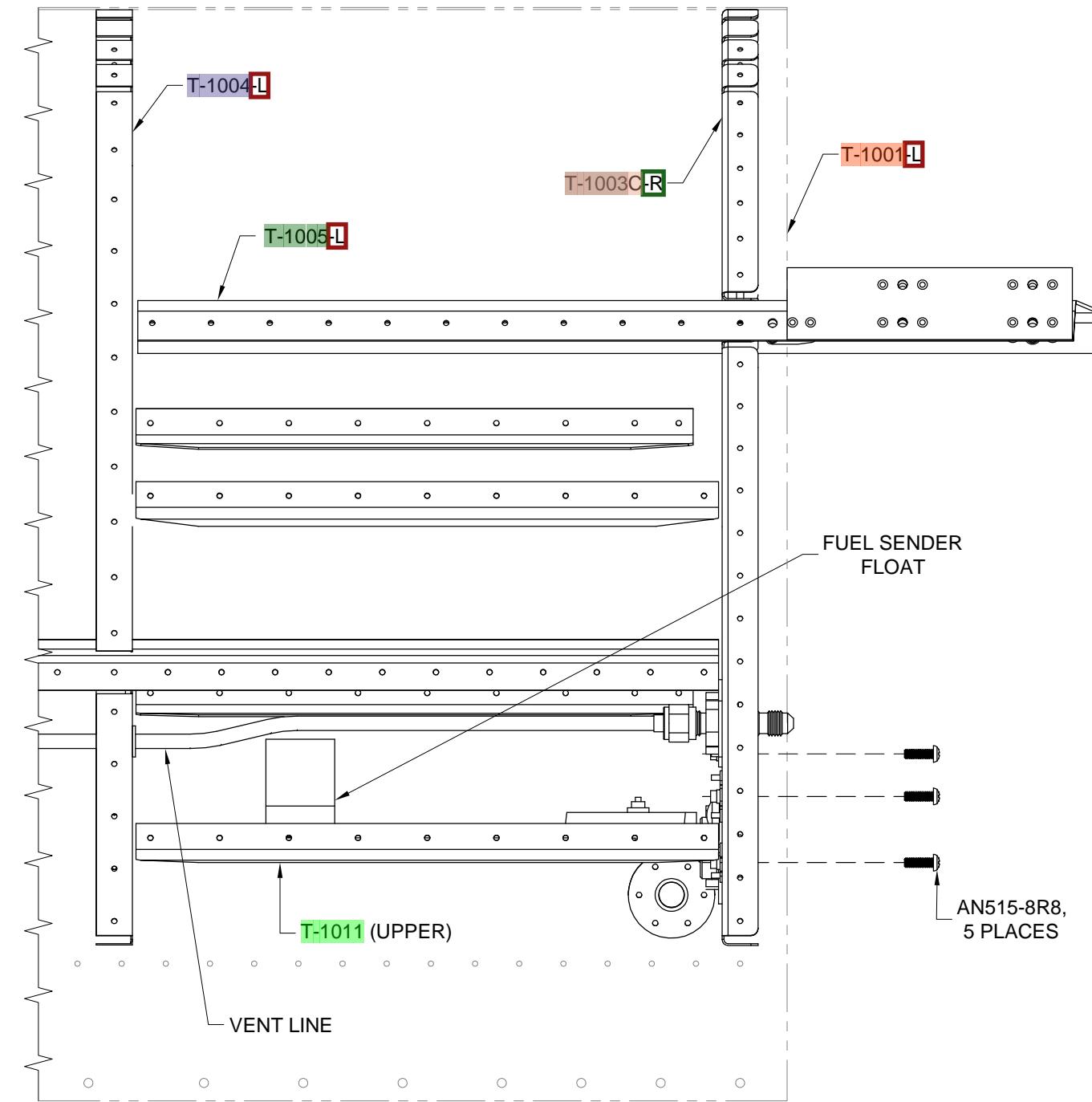
Adjust the float wire bends if/as required to match the full travel of the float arm to the full height of the tank.

Make sure that the float clears the vent line and upper tank stiffener as shown in Figure 2. Bend the float wire if/as required to center the float in the gap between the flange of the aft upper tank stiffener and the vent line.

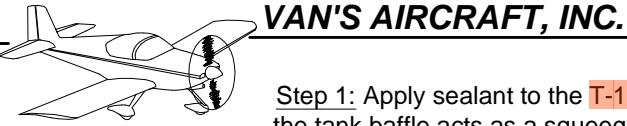
**Step 3:** Final install the IE F-385B Fuel Level Sender as shown in Figure 1 and Figure 2. Use tank sealant for this final installation.



**FIGURE 1: FUEL LEVEL SENDER  
INSTALLATION REAR VIEW**



**FIGURE 2: FUEL LEVEL SENDER  
INSTALLATION PLAN VIEW**



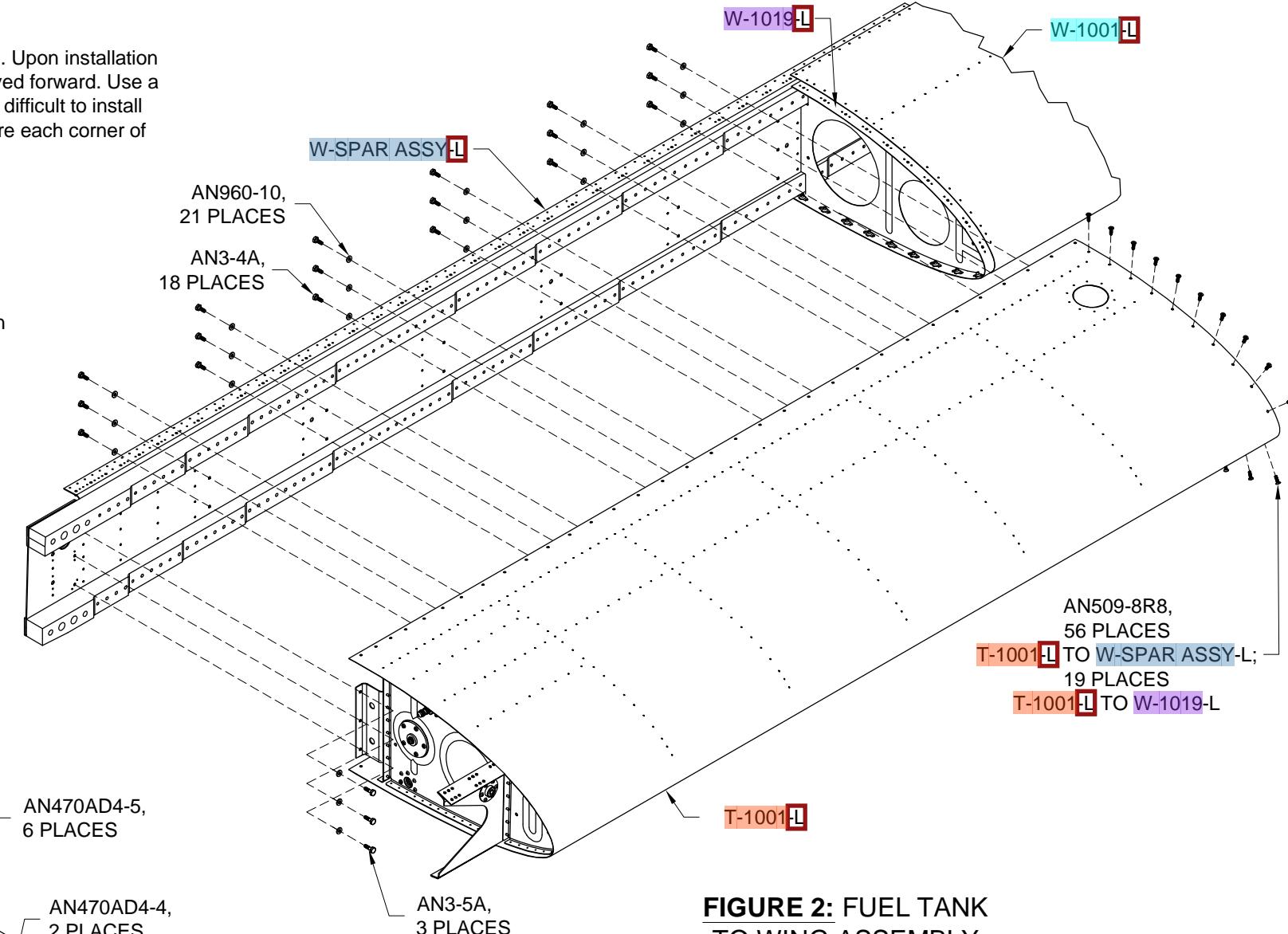
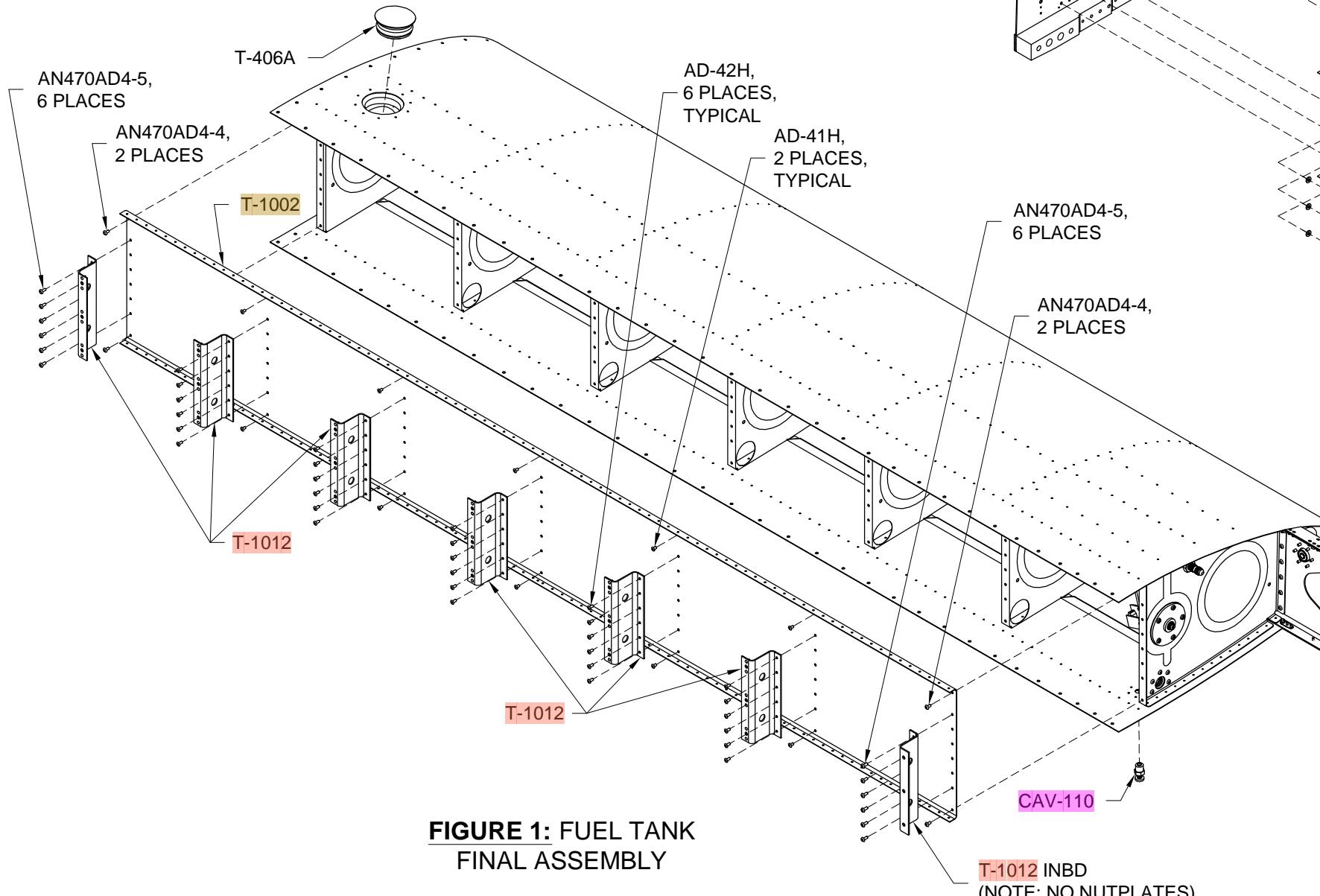
Step 1: Apply sealant to the **T-1001-L** Fuel Tank Skin from the **T-1002** Tank Baffle rivet holes forward. Upon installation the tank baffle acts as a squeegee and the bead of sealant will be pushed ahead as the baffle is moved forward. Use a maximum of 3/16" bead of sealant; too much and the thickness can start to build-up making the tank difficult to install on the wing. Put a bead of sealant along the inside edge of the flange on each end rib. Put a heavy glob of sealant where each corner of the baffle will meet the end ribs (this is one of the most common locations for leaks).

Put a thin smear of sealant around each of the rivet holes on the back flanges of the tank ribs.

With the tank sitting in the Leading Edge Assembly cradle, install the rear baffle by dropping it straight down on the the rear flanges of the ribs as shown in Figure 1.

Put a cleco in every hole of the tank skin to baffle joint. After clecoing, inspect the skin to see if it is pillow-ed-out between the clecos. The contact surface of the tank baffle flange may require pressure to force out excess sealant. The easiest method to squeeze-out the excess is to apply a c-clamp or strong spring clamp between each set of rivets. If you are unsure, clamp the flange in a couple of spots and see if it makes a difference.

Step 2: Install the rivets attaching the **T-1002** Tank Baffle to the **T-1003** and **T-1004** Fuel Tank Rib flanges as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.



Step 3: Apply a thin smear of sealant over each hole for mounting the **T-1012** Tank Attach Zee's. Cleco the tank attach zee's in place. Check for proper tank attach zee orientation as shown in Figure 1.

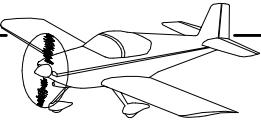
Install the tank attach zee to tank baffle to rib flange rivets as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

Step 4: Install rivets attaching the **T-1001-L** Fuel Tank Skin to **T-1002** Tank Baffle in all skin holes that have been countersunk. See Page 18-5, Figure 3 for rivet call-outs. After sealant has cured, machine countersink the remaining skin holes and install rivets.

Step 5: Install the **T-406A** Fuel Cap and **CAV-110** Drain Fitting as shown in Figure 1.

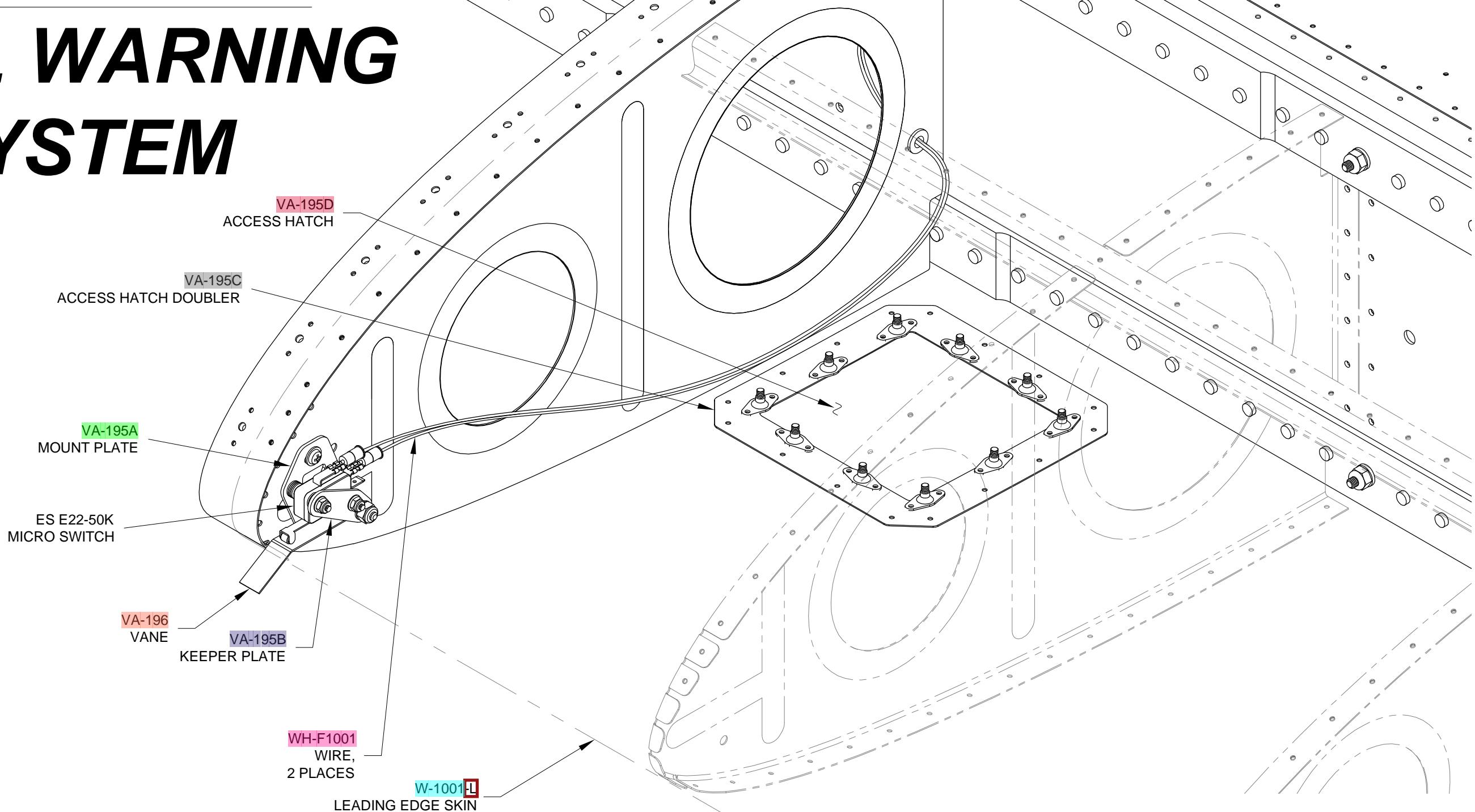
It is recommended to use a cut-off rubber glove finger or similar cover over the open end of the vent line. This is to keep debris and/or nesting insects from blocking the vent line.

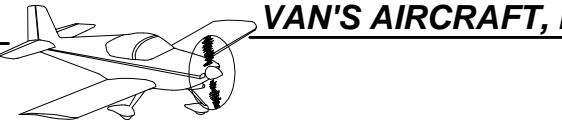
Step 6: Install the tank to the spar and leading edge sub-assembly as shown in Figure 2.



# SECTION 19:

# STALL WARNING SYSTEM





**CAUTION! Only modify the left W-1001-L Leading Edge Skin for the stall warning system and access hatch.**

Step 1: Remove the fuel tank from the left wing assembly.

Step 2: Cleco the VA-195C Access Hatch Doubler to the W-1001-L Leading Edge Skin as shown in Figure 1 and Figure 2. Note that the front reference tab has three holes. Ignore the front two holes.

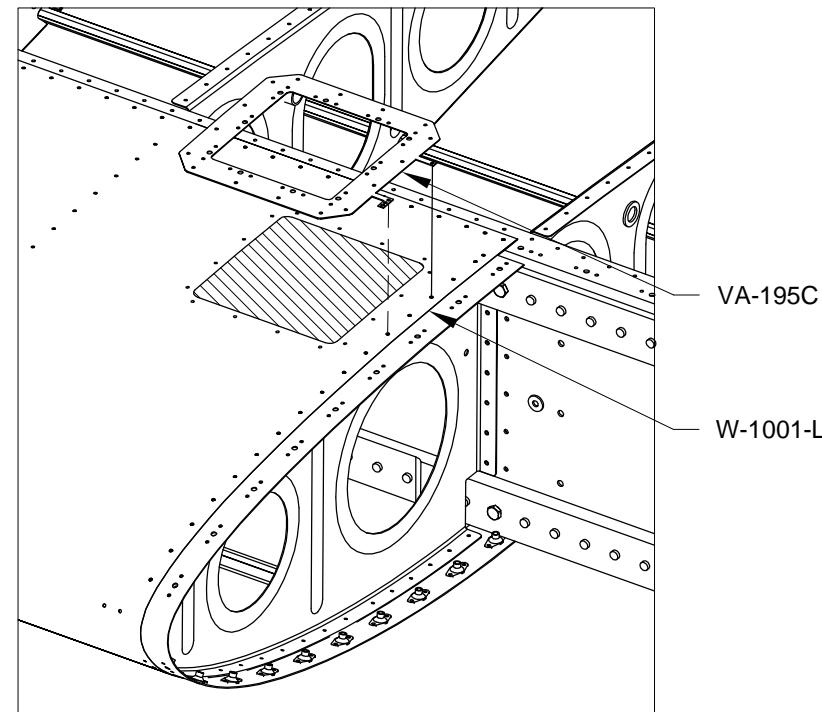
Step 3: Match-Drill #40 the four corner radius pilot holes and the sixteen VA-195C Access Hatch Doubler attach holes indicated in Figure 2 into the W-1001-L Leading Edge Skin.

Final-Drill #40 the nutplate attach holes along the inside edge of the access hatch doubler.

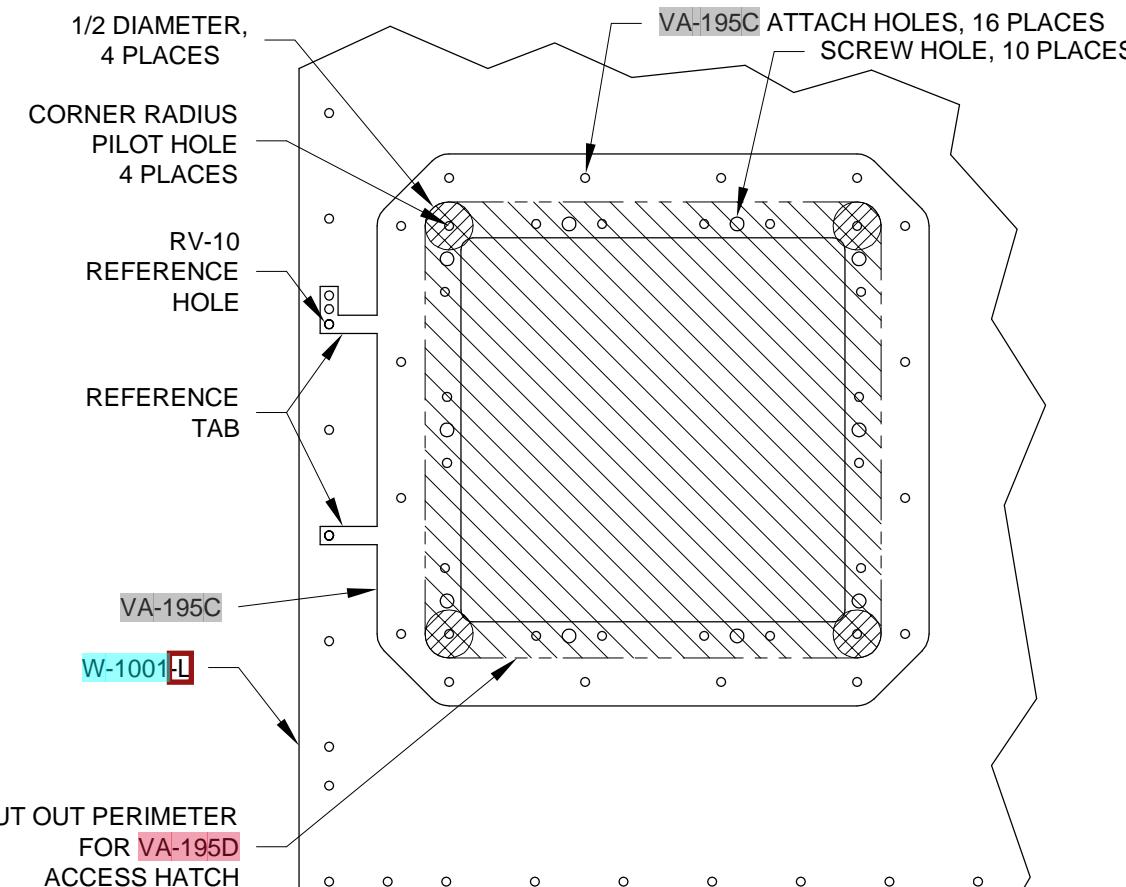
Step 4: Use a Unibit to enlarge the four corner pilot holes created in Step 3 to 1/2 diameter. Cut between the quadrants of the four corner holes to create the cutout for the access hatch.

Step 5: Remove the reference tabs indicated in Figure 2 from the VA-195C Access Hatch Doubler.

Step 6: Remove the vinyl from the VA-195C Access Hatch Doubler and VA-195D Access Hatch. Deburr the edges and holes of both parts.



**FIGURE 1: ACCESS HATCH CUTOUT  
(WING SHOWN UPSIDE DOWN)**



**FIGURE 2: SKIN DETAIL  
(ALL PARTS SHOWN FLAT)**

Step 6 (Continued): Dimple the screw holes in the access hatch for the head of a #6 flush head screw. Dimple the screw holes in the doubler for the dimples in the access hatch. Dimple the remaining holes in both parts and the W-1001-L Leading Edge Skin for the head of an AN426AD3 Rivet.

Prime both parts if/as desired.

Step 7: Rivet the nutplates onto the VA-195C Access Hatch Doubler. See Figure 3.

Rivet the access hatch doubler onto the W-1001-L Leading Edge Skin. See Figure 3.

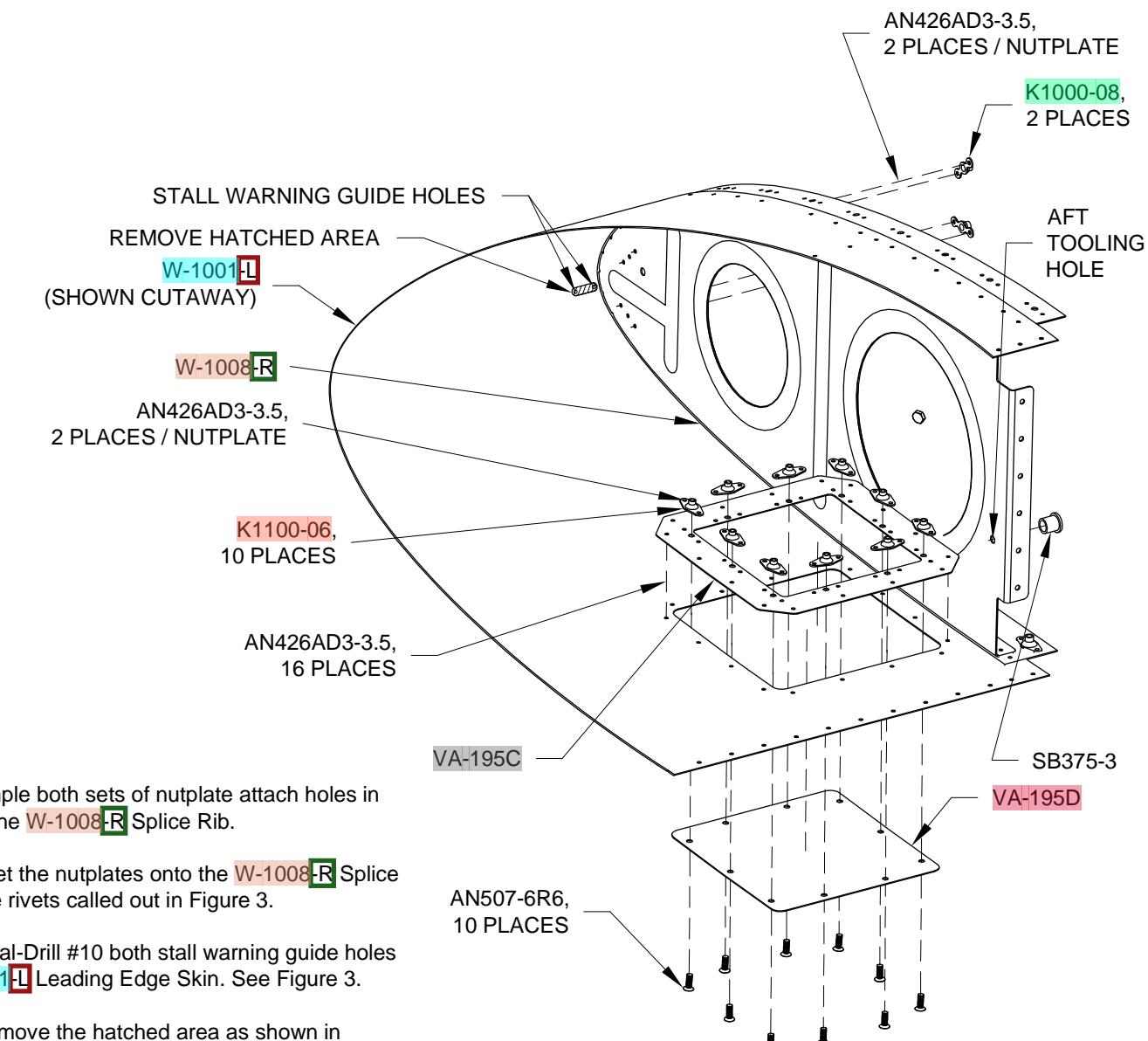
Rivet the two holes left open in the leading edge skin and W-1008-R Splice Rib that were used to locate the reference tabs in Step 2 with AN426AD3-4 rivets.

Step 8: Install the VA-195D Access Hatch using the hardware called out in Figure 3.

Step 9: Final-Drill the aft tooling hole in the W-1008-R Splice Rib to 3/8 diameter. Install the snap bushing indicated in Figure 3.

Step 10: Final-Drill #40 the two sets of nutplate attach holes near the nose of the W-1008-R Splice Rib.

Final-Drill the screw holes for these two nutplates to #19. See Figure 3.



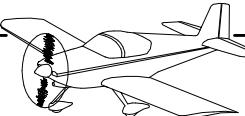
Step 12: Dimple both sets of nutplate attach holes in the nose of the W-1008-R Splice Rib.

Step 13: Rivet the nutplates onto the W-1008-R Splice Rib using the rivets called out in Figure 3.

Step 14: Final-Drill #10 both stall warning guide holes in the W-1001-L Leading Edge Skin. See Figure 3.

Step 15: Remove the hatched area as shown in Figure 3, between the quadrants of the stall warning guide holes with a file. Deburr the final edge.

**FIGURE 3: ACCESS HATCH INSTALLATION AND SPLICE RIB MODIFICATION  
(SOME PARTS OF THE WING ASSEMBLY HAVE BEEN OMITTED FOR CLARITY)**



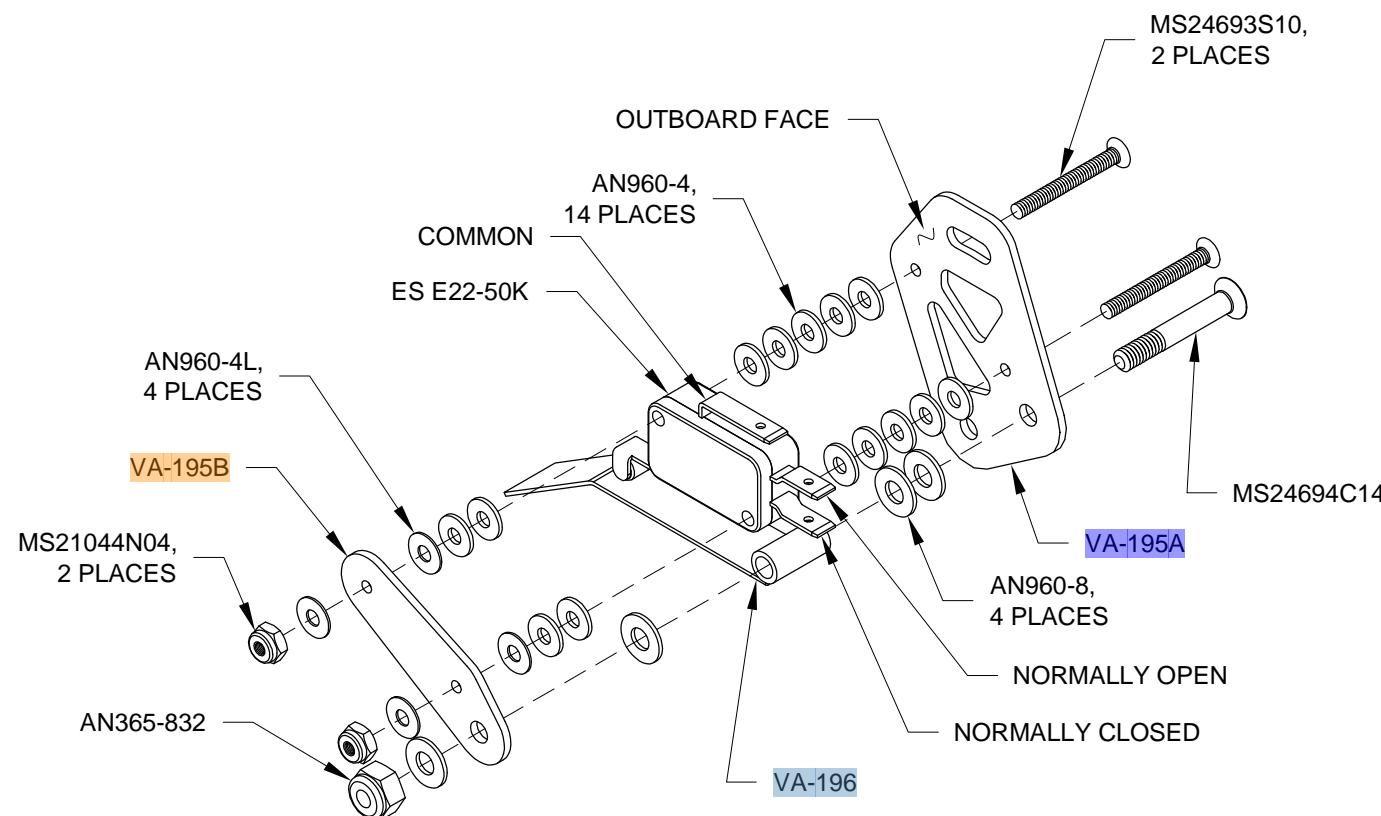
Step 1: Final-Drill #31 the holes in the **VA-195A** Mount Plate and **VA-195B** Keeper Plate that are used to mount the ES E22-50K Micro Switch. Machine countersink both holes of the mount plates inboard side for the flush head of a #4 screw. See Figure 1.

Step 2: Final-Drill #19 the hole in the **VA-195A** Mount Plate and **VA-195B** Keeper Plate that holds the #8 screw on which the **VA-196** Stall Warning Vane pivots. Machine countersink this hole in the mount plate on the inboard side for the flush head of a #8 screw. See Figure 1.

Step 3: Deburr all holes and edges.

Prime the parts if/as desired.

Step 4: Assemble the Stall Warning Subassembly as shown in Figure 1. Do not over-torque the nut on the screw about which the vane pivots. Insure that the vane can rotate freely.



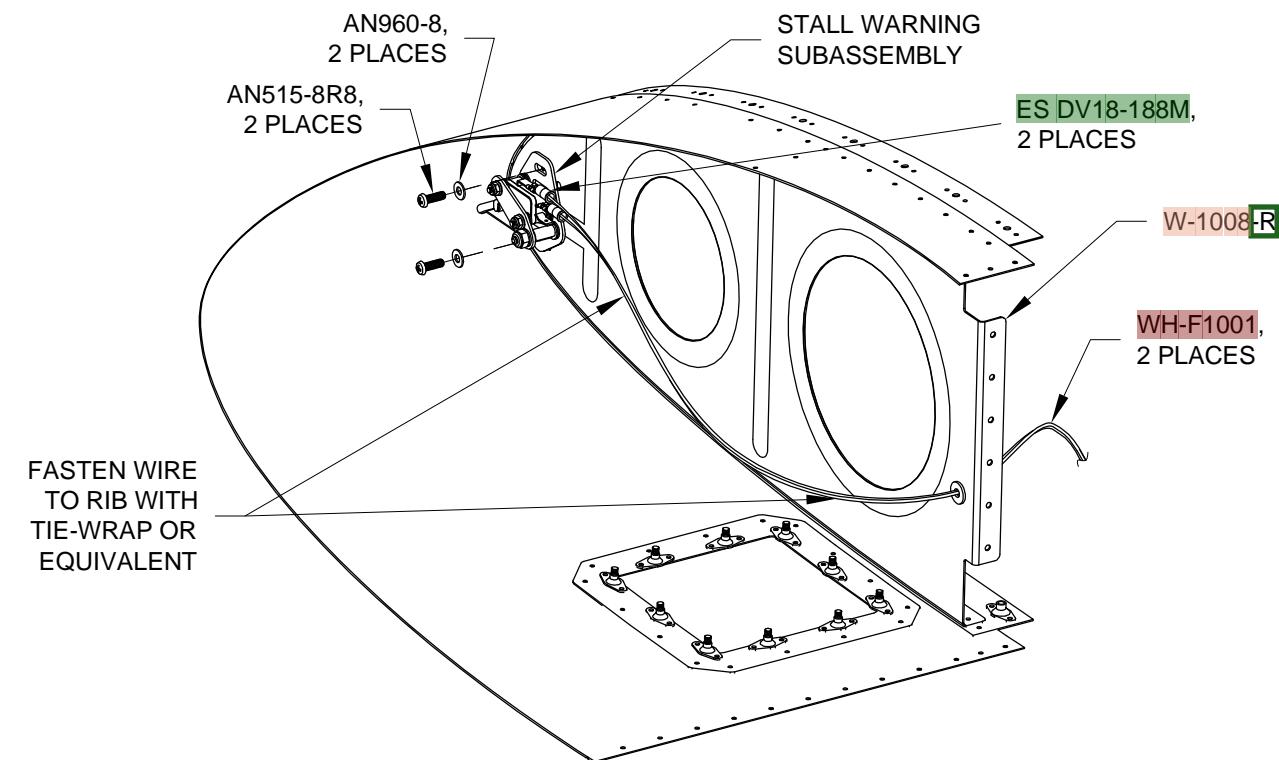
**FIGURE 1: STALL WARNING SUBASSEMBLY**

Step 5: Install the Stall Warning Subassembly on the **W-1008-R** Splice Rib as shown in Figure 2. The upper screw goes through the slot in the **VA-195A** Mount Plate and allows the angle of the Stall Warning Subassembly to be adjusted. Adjust the subassembly until the **VA-196** Vane activates and deactivates the ES E22-50K micro switch with the minimum travel possible (it is permissible to bend the arm on the micro switch if/as required).

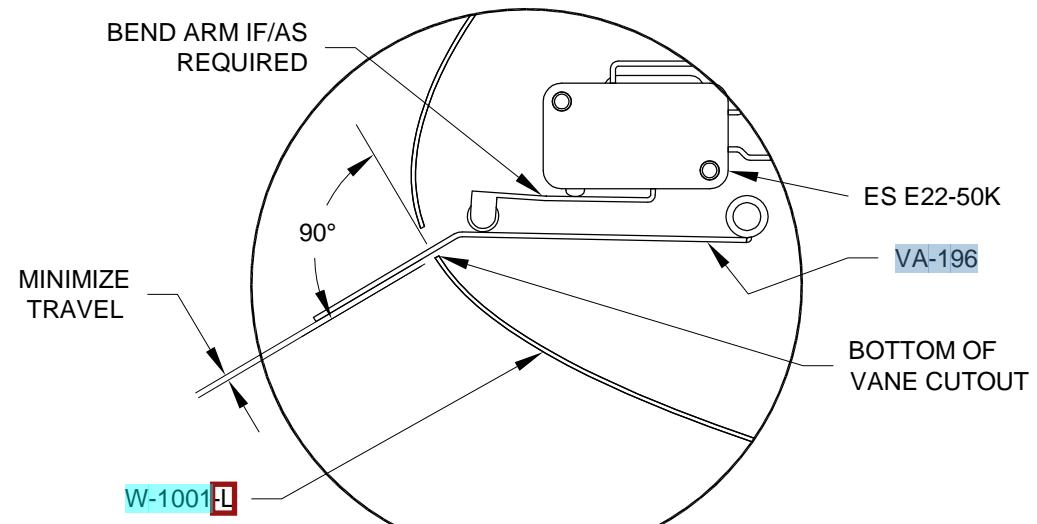
Step 6: Double check that the **VA-196** Vane in the at rest position is perpendicular to the surface of the wing skin. If the vane is not perpendicular, remove the Stall Warning Subassembly and bend the vane as required. See Figure 3.

Step 7: Make the **WH-F1001** Wires by cutting two #18 gauge wires 100 inches long. Install an **ES DV18-188M** female spade connector on one end of each wire. Double check that the spade connector is properly installed!

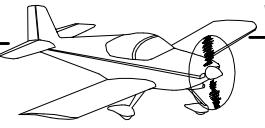
Step 8: Install the **WH-F1001** Wires to the COM. (common) and N.O. (normally open) terminals of the ES E22-50K Micro Switch. Rout the wires inboard through the snap bushing in the **W-1008-R** Splice Ribs aft tooling hole. See Figure 2.



**FIGURE 2: INSTALLING THE STALL WARNING SUBASSEMBLY**

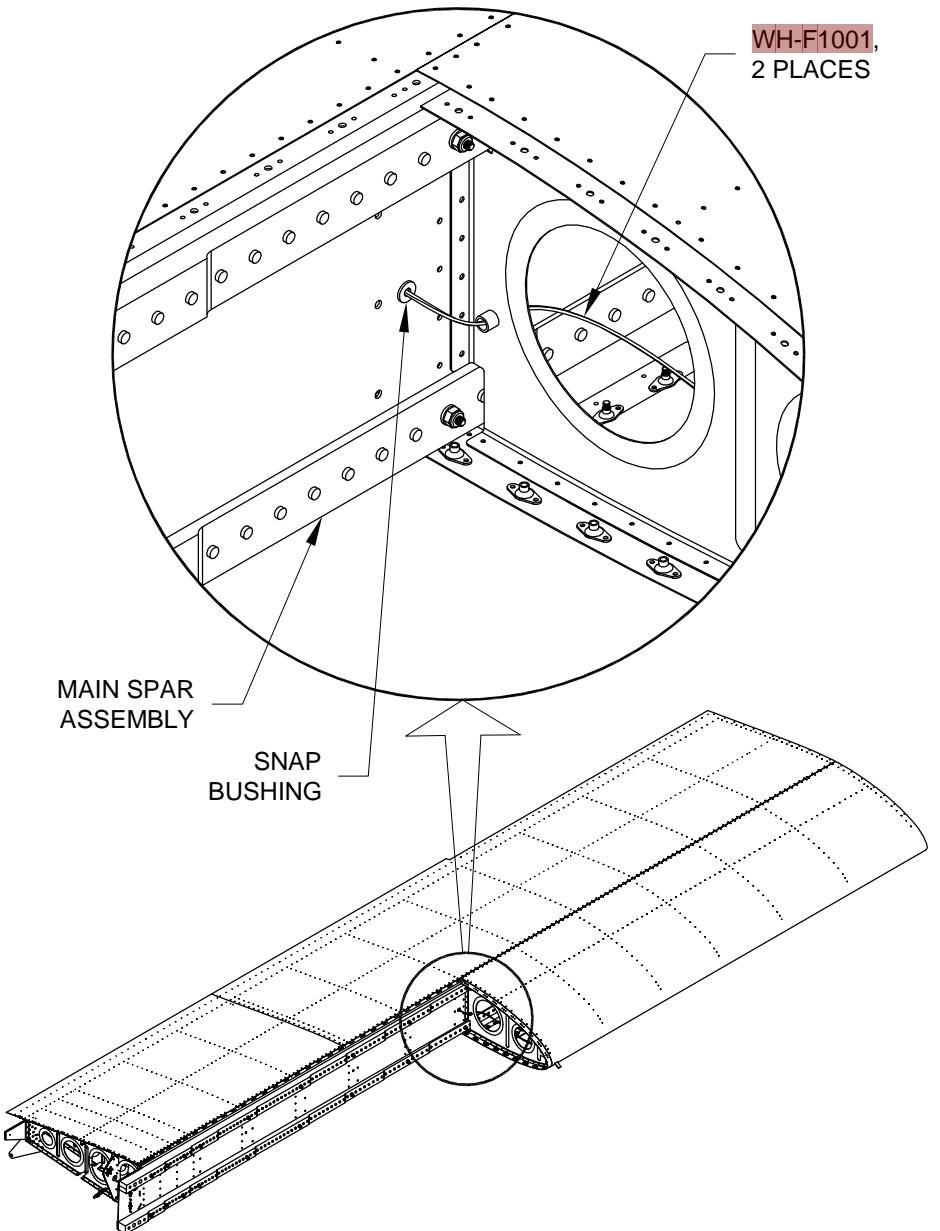


**FIGURE 3: ACTIVATING THE MICRO SWITCH**



Step 1: Route both WH-F1001 Wires through the snap bushing in the main spar assembly as shown in Figure 1.

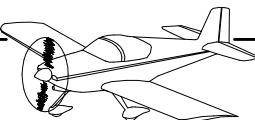
Step 2: Coil and temporarily tape the wire to a rib in the main rib bay. The wires will be run to the root end of the wing on Page 20-3 after the Pitot Tube has been installed.



**FIGURE 1: ROUTING WIRES THROUGH THE MAIN SPAR**

**NOTE:** Complete this page when wiring the fuselage. The ES Audio Warn may be located in the most convenient position. Allow additional wire as required.

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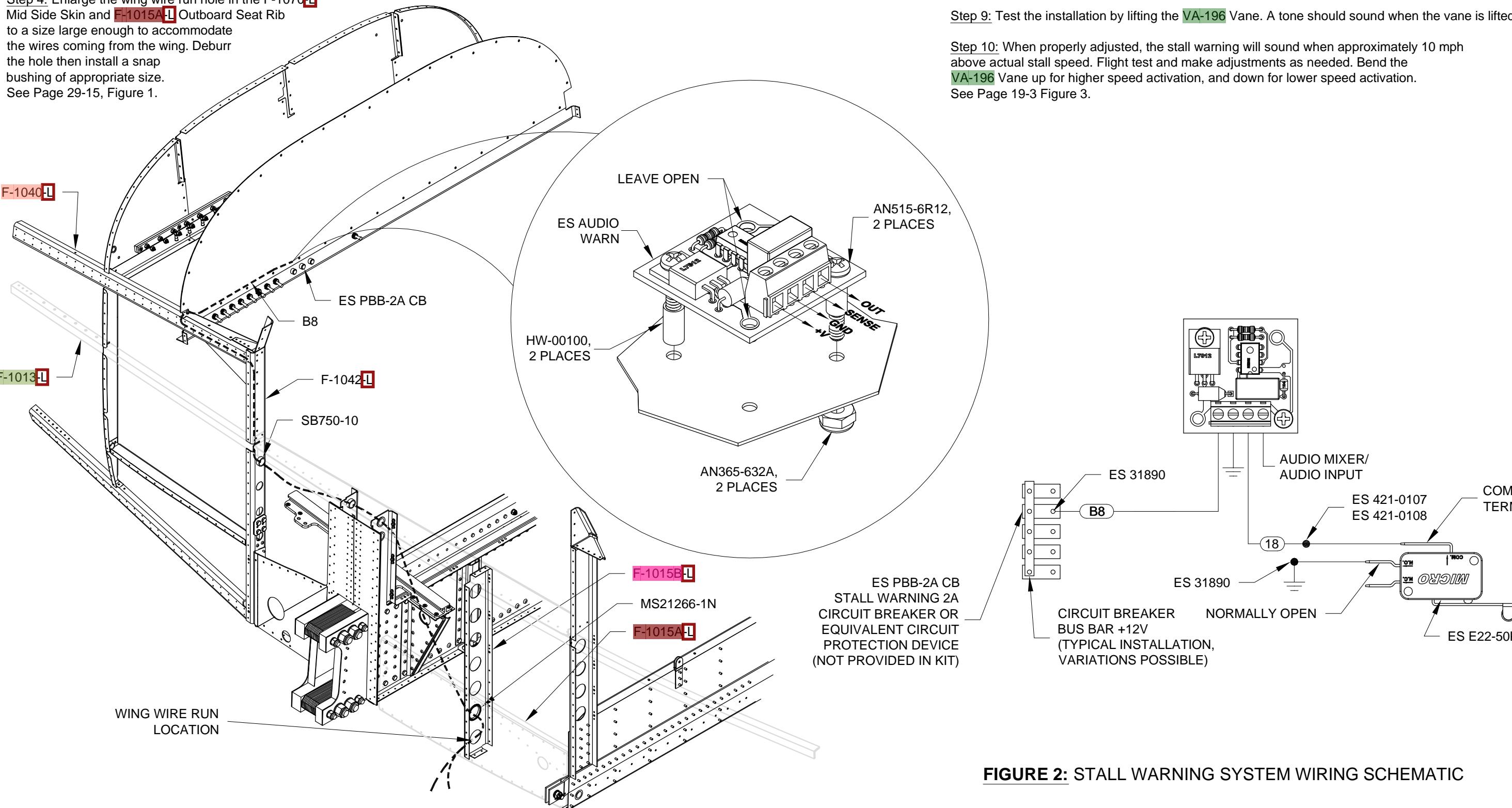
Step 1: Position the ES Audio Warn on the upper forward fuselage as shown in Figure 1. Final-Drill #27 the two screw holes in the ES Audio Warn into the upper forward fuselage. Deburr holes. See Figure 1.

Step 2: Install the ES Audio Warn with the hardware shown in Figure 1.

Step 3: Cut a 3 29/32 inch length of MS21266-1N to fit inside a lightening hole in the F-1015B-L Seat Rib Intercostal. Install the strip of MS21266-1N in the second lightening hole from the bottom. See Figure 1.

Step 4: Enlarge the wing wire run hole in the F-1070-L

Mid Side Skin and F-1015A-L Outboard Seat Rib  
to a size large enough to accommodate  
the wires coming from the wing. Deburr  
the hole then install a snap  
bushing of appropriate size.  
See Page 29-15, Figure 1.



**FIGURE 1: WIRE ROUTING AND BUZZER INSTALLATION**

Step 5: Install an SB750-10 snap bushing in the F-1042-L Bulkhead Side Channel as shown in Figure 1.

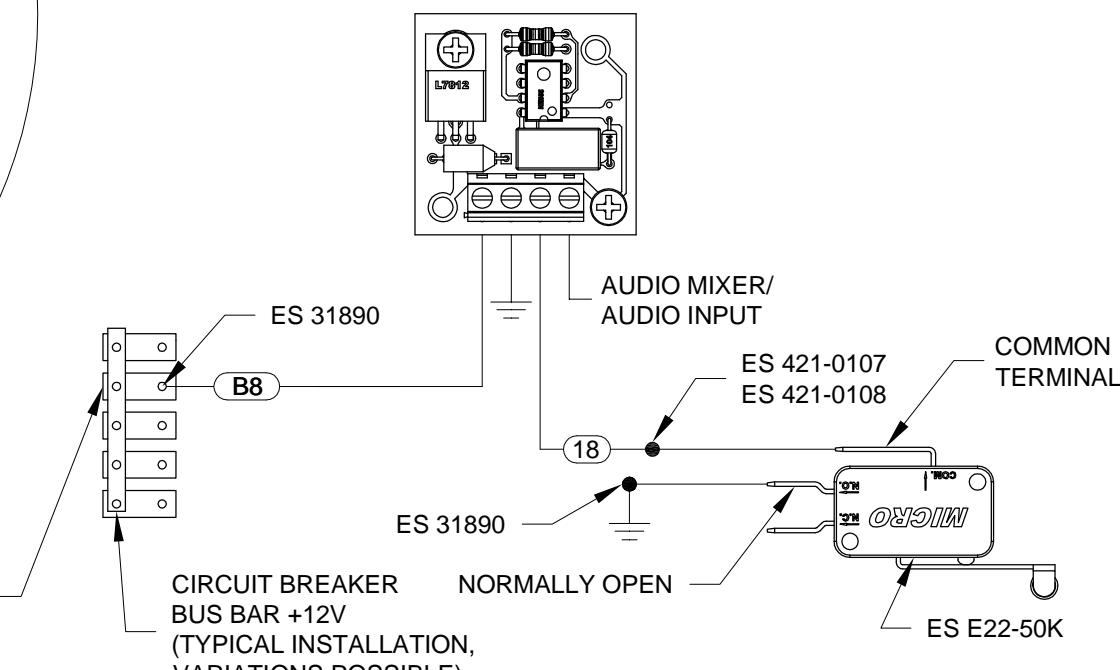
Step 6: Make the B8 wire from #18 gauge wire. Install an ES 421-0108 spade connector on the end of B8. See Page 20-3, Figure 2. Double check that the spade connector is properly installed!

Step 7: Route B8 as shown in Figure 1 and as diagrammed in Figure 2. It does not matter which side of the ES E22-50K switch is connected to the ES PBB-2A CB circuit breaker or the ES Audio Warn.

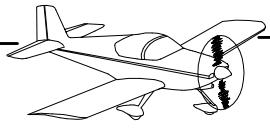
Step 8: Connect ES Audio Warn to the audio system as shown in Figure 2.

Step 9: Test the installation by lifting the VA-196 Vane. A tone should sound when the vane is lifted.

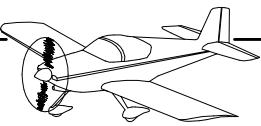
Step 10: When properly adjusted, the stall warning will sound when approximately 10 mph above actual stall speed. Flight test and make adjustments as needed. Bend the VA-196 Vane up for higher speed activation, and down for lower speed activation. See Page 19-3 Figure 3.



**FIGURE 2: STALL WARNING SYSTEM WIRING SCHEMATIC**

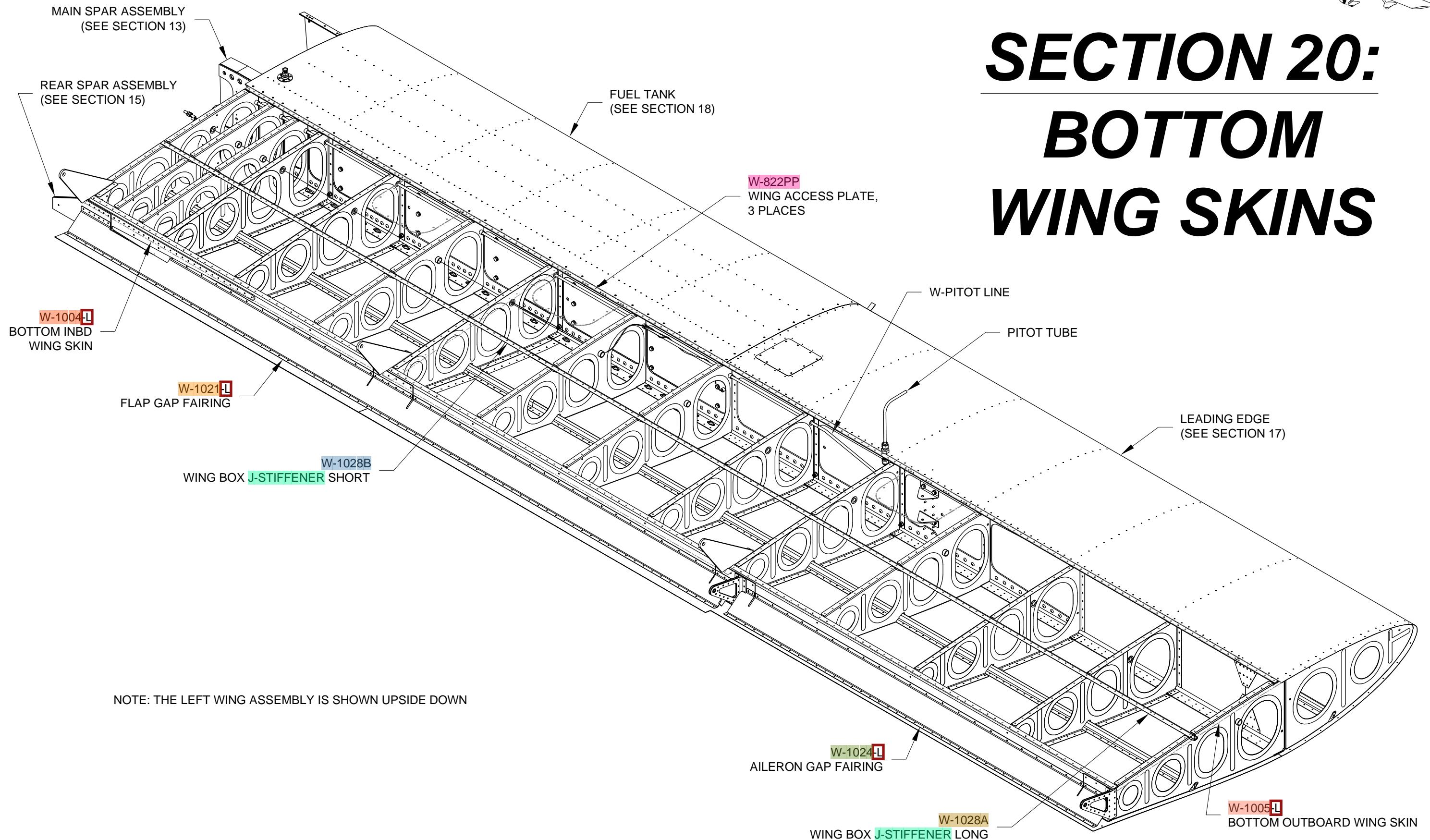


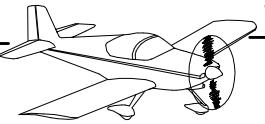
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# SECTION 20:

## BOTTOM WING SKINS

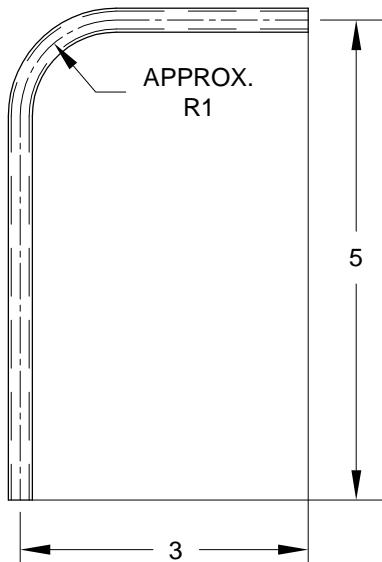




NOTE: A stainless steel pitot tube with cover is available from the VAN'S ACCESSORIES CATALOG part number VENT P-100.

NOTE: The pitot installation is for the left wing only.

Step 1: Make the PITOT TUBE from ATO-032 X 1/4. Start with a piece of tubing at least 8 inches long, bend the tubing and then trim to match the dimensions shown in Figure 1. See Section 5P for more information on aluminum tubing. Do **not** flare the end yet!



**FIGURE 1: PITOT TUBE**

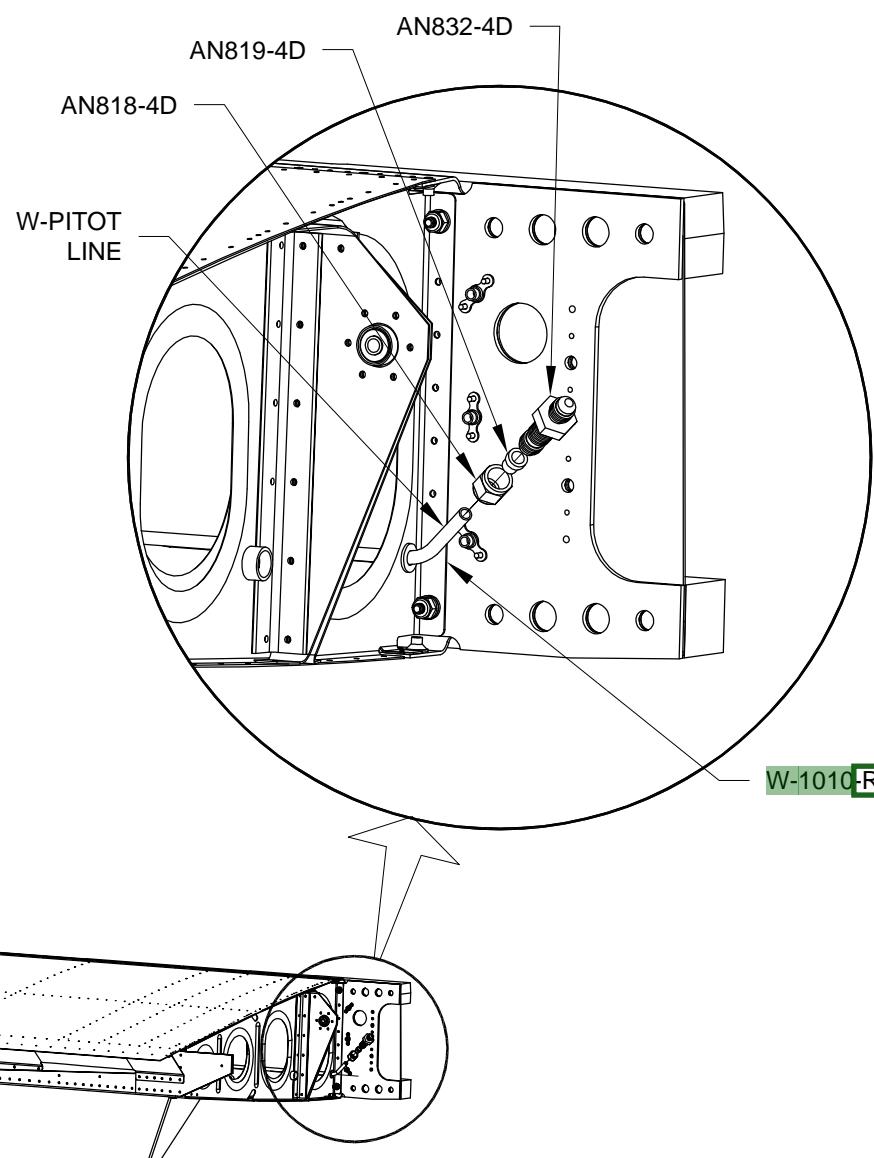
Step 2: Enlarge the hole in the **bottom** aft row of rivets left open in Section 17 for the PITOT TUBE in the **W-1001-L** Leading Edge Skin and main spar assembly to 7/16 diameter.

Step 3: Install the bulkhead fitting and retaining nut onto the main spar and leading edge assembly (where the PITOT TUBE attaches), see Figure 2.

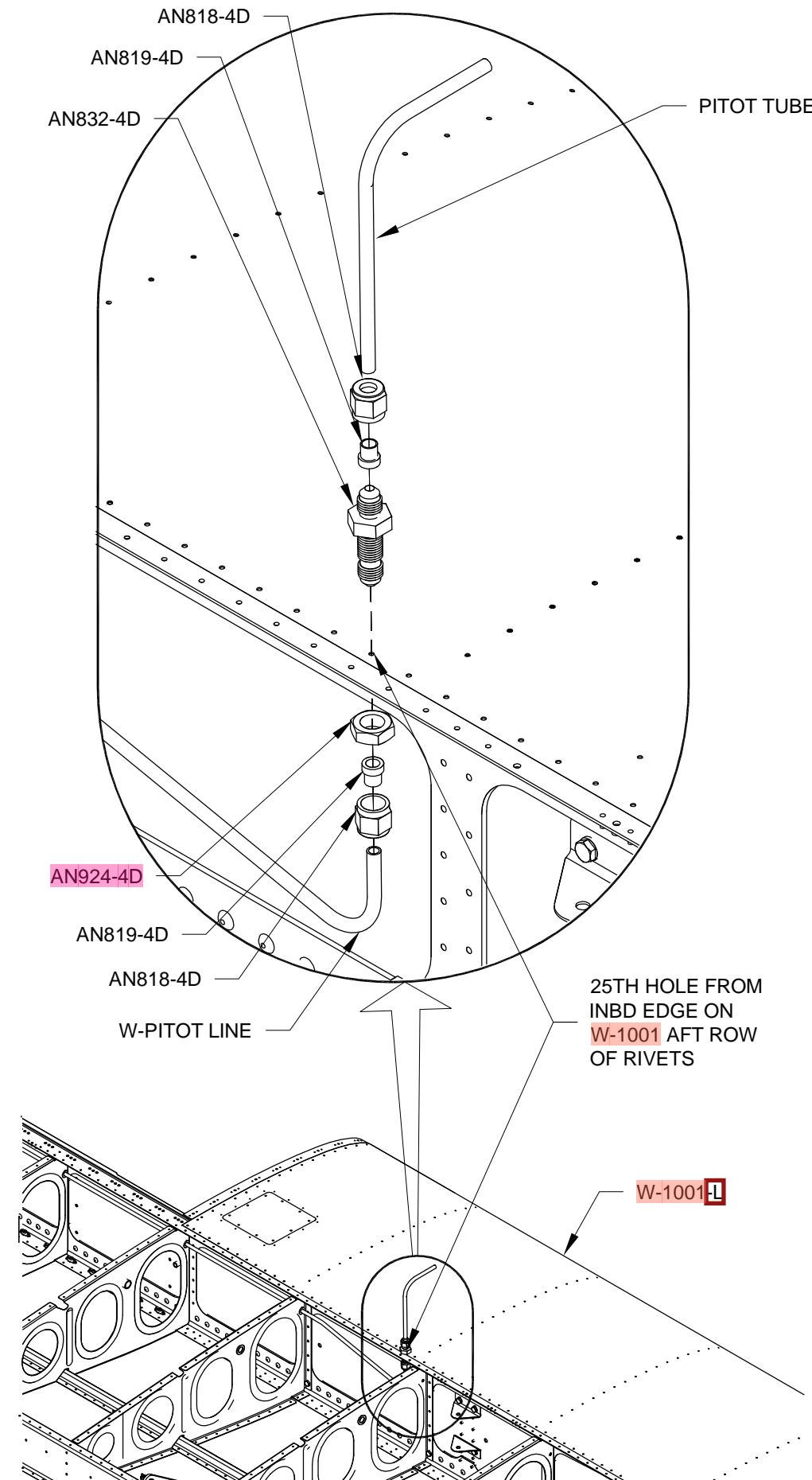
Step 4: Make the W-PITOT LINE Pitot Line from ATO-032 X 1/4. Start with a piece of tubing at least 92 1/2 inches long. Insert the pitot line through snap bushings installed in the forward tooling hole of the inboard wing ribs. Slide the nut and sleeve onto the inboard end of the pitot line as shown in the exploded view in Figure 2. Check that the last sentence has been completed, lest you flare the pitot line to soon. Flare the end of the pitot line. Attach the inboard bulkhead fitting to the pitot line as shown in Figure 2.

Step 5: Bend and trim the W-PITOT LINE Pitot Line to connect with the bulkhead fitting used to attach the PITOT TUBE. Insert the nut and sleeve onto the pitot line. Flare the end of the pitot line. Connect the pitot line to the outboard bulkhead fitting on the main spar assembly.

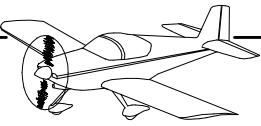
Step 6: Insert the nut and sleeve onto the long leg of the PITOT TUBE as shown in Figure 3. Flare the end of the long leg of the pitot tube. The pitot tube can be installed now, but since it can easily be damaged during storage of the wings it is safest to delay the installation until the final assembly of the aircraft.



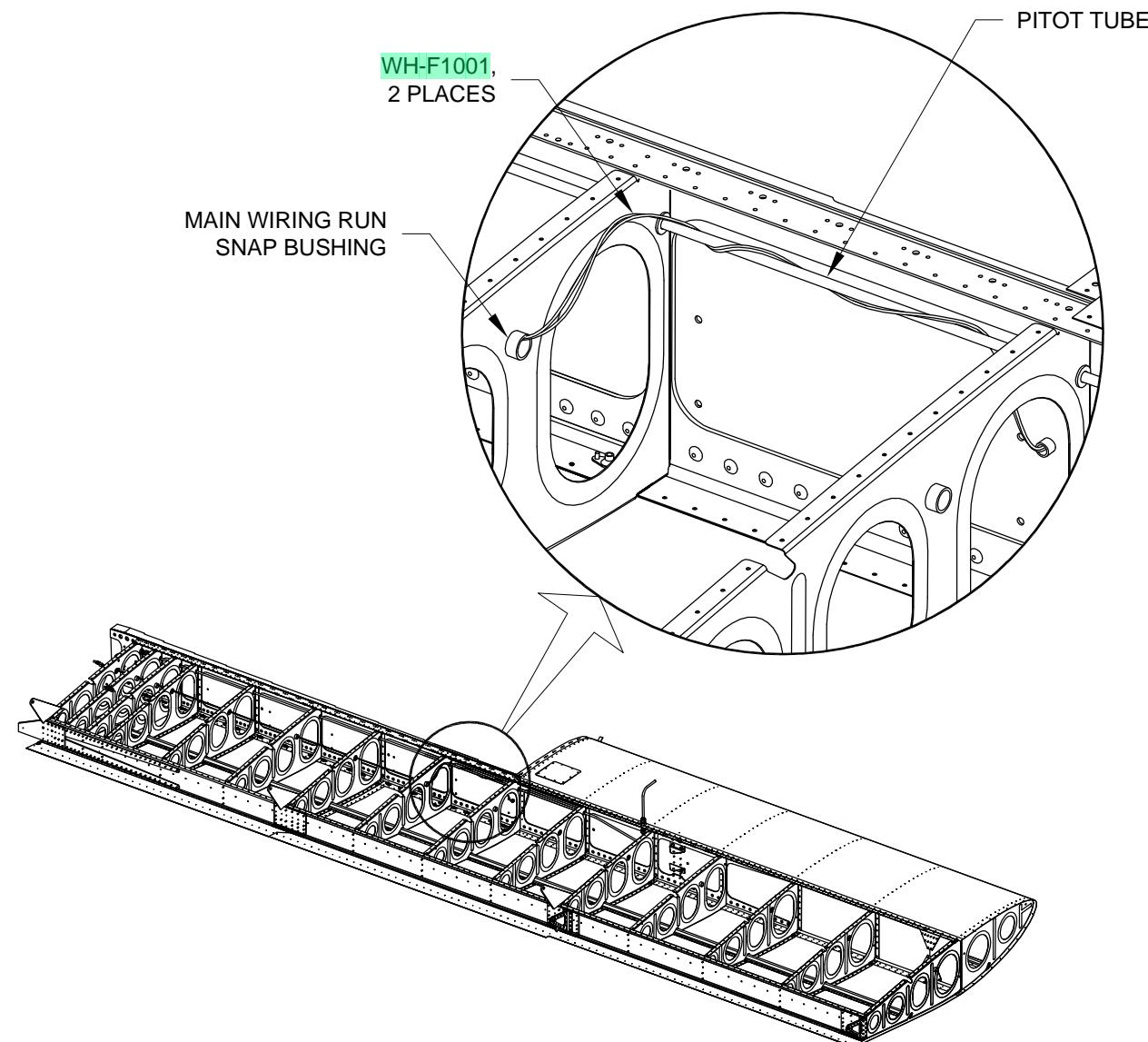
**FIGURE 2: INBOARD PITOT LINE INSTALLATION**



**FIGURE 3: OUTBOARD PITOT LINE AND PITOT TUBE INSTALLATION**



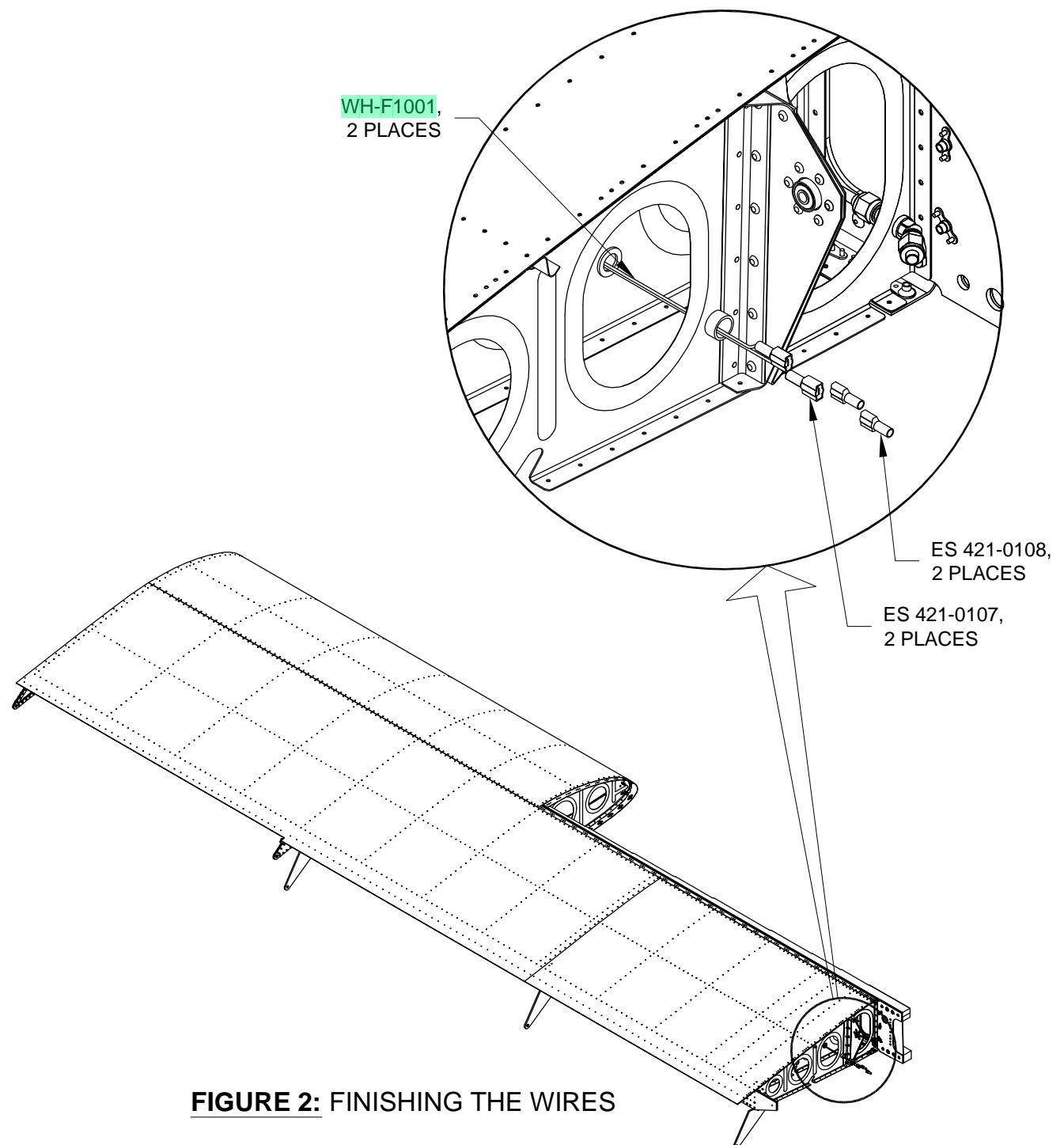
Step 1: To prevent the **WH-F1001** Wires from interfering or rubbing on the **W-1017A** Stick To Bellcrank Pushrod wrap the wire around the pitot tube along the entire length of the rib bay as shown in Figure 1. Cross over from the pitot tube to the main wiring run snap bushing and to the root end of the wing assembly.



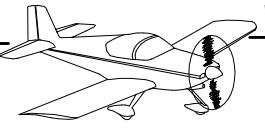
**FIGURE 1: ROUTING WIRES INTO THE MAIN WING WIRE RUN**

Step 2: Attach a set of spade connectors to the end of both **WH-F1001** Wires as shown in Figure 2.

Step 3: Reinstall the fuel tank to the wing per Section 18.



**FIGURE 2: FINISHING THE WIRES**



## VAN'S AIRCRAFT, INC.

Step 1: Complete all wire runs in both wings before the bottom skins are attached. Wire runs and systems can be added later but with much greater difficulty. The following is a list of the common systems and wire runs used in the wing. All the systems listed below are optional equipment available in the **Vans Accessories Catalog**. Also include with the wire runs an extra string or wire which can be used to pull additional wires through if accessories are added in the future.

Auto Pilot: A wing leveling servo usually added in the bellcrank rib bay. Wire runs need to be added back to the root end of the wing.

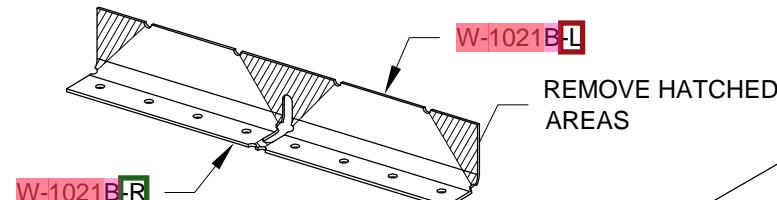
Angle of Attack Indicator: Pressure ports are added in the outboard-most rib bay of the leading edge assembly. Two pressure lines are routed through the spar and back to the root of the wing.

Navigation and Strobe Lights: A single power wire supplies the navigation light in the tip. The light will be grounded to the outboard most wing ribs so no ground wire needs to be threaded through the wing. Use special shielded multi-conducting wire provided in the optional lighting system kit to connect the strobe light. Leave enough extra wire past the outboard-most rib of the wing to connect to the navigation and strobe lights in the forward edge of the wing tip with slack. The most common lighting system used is LN SYS6.

Landing Lights: A single power wire supplies the landing lights in the wing tip. The lights will be grounded to the outboard-most wing rib.

Antenna: If installing an internal antenna within the wing tip (transmission quality will not be quite as good as an external antenna) a coax cable will need to be run to the wing tip. Make the cable from WIRE RG 58/U Coax 50 ohm cable available from Van's Aircraft.

Step 2: Mark then break apart the **W-1021B** Flap Gap Stiffener to create the **W-1021B-L** and **R** Flap Gap Stiffeners as shown in Figure 1.



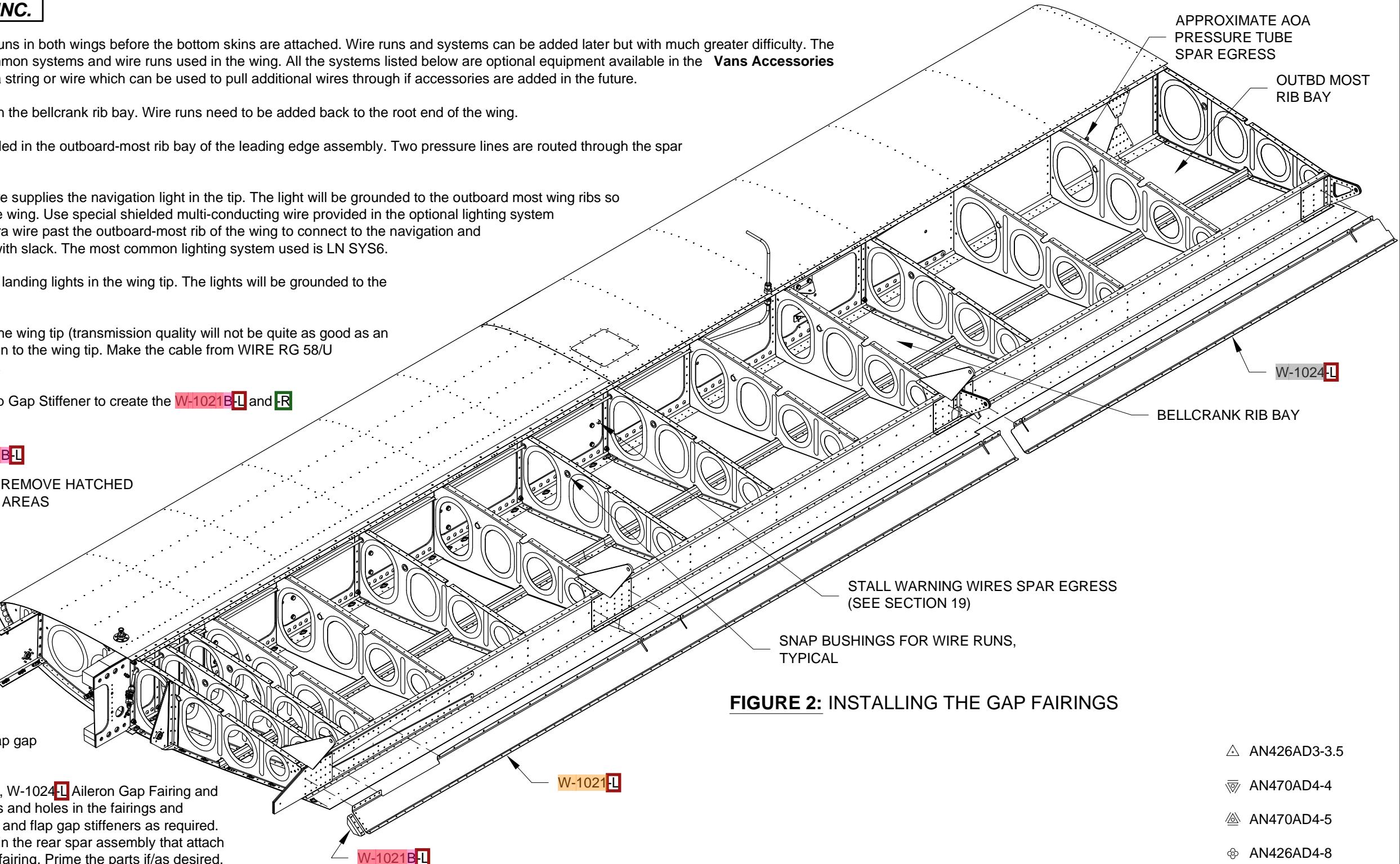
**FIGURE 1: STIFFENERS**

Step 3: Cleco the **W-1021B-L** Flap Gap Stiffener to the **W-1021L** Flap Gap Fairing. Cleco the flap gap fairing and **W-1024L** Aileron Gap Fairing to the rear spar and top wing skins as shown in Figure 2. Final-Drill #40 the holes common to the gap fairings and wing skins. Final-Drill #30 the holes common to the gap fairings and the rear spar assembly. Final-Drill #40 the holes common between the flap gap stiffener and the flap gap fairing.

Step 4: Remove the **W-1021L** Flap Gap Fairing, **W-1024L** Aileron Gap Fairing and **W-1021B-L** Flap Gap Stiffener. Deburr the edges and holes in the fairings and stiffener. Dimple the wing skins, flap gap fairings and flap gap stiffeners as required. Machine countersink the six inboard most holes in the rear spar assembly that attach the flap gap fairing for the dimple in the flap gap fairing. Prime the parts if/as desired.

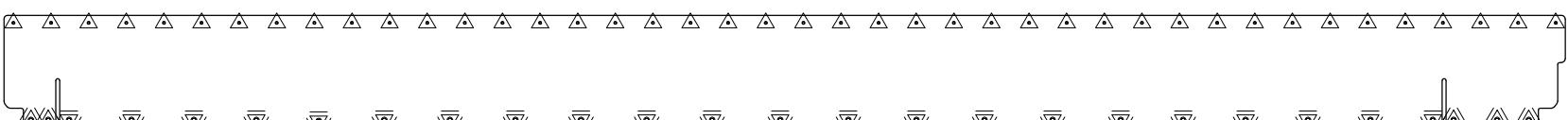
Step 5: Cleco then rivet the **W-1021B-L** Flap Gap Stiffener to the **W-1021L** Flap Gap Fairing as shown in Figure 2 and per the callouts in Figure 4.

Step 6: Cleco the **W-1021L** Flap Gap Fairing and **W-1024L** Aileron Gap Fairing back onto the top skins and rear spar. Rivet the gap fairings to the rear spar and the top skins using the call outs in Figure 3 and Figure 4.

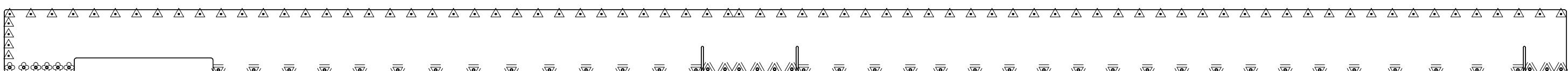


**FIGURE 2: INSTALLING THE GAP FAIRINGS**

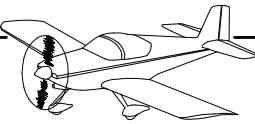
- △ AN426AD3-3.5
- ▽ AN470AD4-4
- △ AN470AD4-5
- ◇ AN426AD4-8



**FIGURE 3: AILERON GAP FAIRING RIVET CALLOUTS**



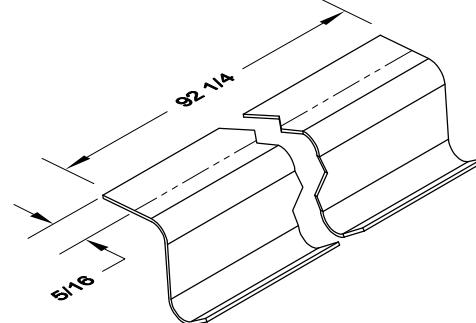
**FIGURE 4: FLAP GAP FAIRING RIVET CALLOUTS**



Note: The W-1028B Wing Box J-Stiffener - Short and W-1004-L Inboard Wing Skin has already been installed in the Quick Build kit. The remaining instructions in this section are for the left wing only, the right wing is a mirror of the left.

Step 1 (Quick Build): Fabricate the W-1028A Wing Box J-Stiffener - Long by cutting a piece of J-channel, 92 1/4 inches long. Draw a centerline on the flange as shown in Figure 1.

Draw a similar centerline on the portion of the W-1028B Wing Box J-Stiffener - Short that protrudes from beneath the installed W-1004-L Bottom Inboard Wing Skin.



**FIGURE 1: J-STIFFENER DETAIL**

Step 2: Place the wing top face down onto a padded surface. Insert the W-1028A Wing Box J-Stiffener - Long into the J-stiffener cutout in the wing ribs.

Step 3 (Standard Kit): Insert the W-1028B Wing Box J-Stiffener - Short into the J-stiffener cutout in the wing ribs. Cleco the W-1004-L Bottom Inboard Wing Skin to the main spar, rear spar, wing ribs and stiffener.

Step 3 (Quick Build Kit): Align the outboard edge of the W-1028A Wing Box J-Stiffener - Long with the web of the W-1012-R Outboard Wing Rib, then clamp the webs of both J-Stiffeners together where they overlap (Check that the rib is straight).

Step 4: Cleco the W-1005-L Bottom Outbd Wing Skin to the spars, ribs, stiffeners and bottom inbd wing skin (note the outboard skin overlaps the inboard skin)

Step 5 (Standard Kit): Final-Drill #40 all the common holes between the W-1004-L and W-1005-L Bottom Wing Skins and the W-1028A and W-1028B Wing Box J-Stiffeners.

Step 5 (Quick Build Kit): Align the line drawn on the W-1028A Wing Box J-Stiffener - Long with the center of the holes common to the line in the bottom wing skins.

Match-Drill #40 the bottom outbd wing skin to both the wing box stiffeners.

Step 6: Final-Drill #40 all the holes that are common to the bottom wing skins, spars and ribs of the wing. Final-Drill #19 the screw holes for the nutplates called out on Page 20-6, Figure 2, that will be installed along the inboard edge of the W-1004-L Bottom Inbd Wing Skin. Match-Drill #40 the attach holes for these nutplates into the W-1010-R Inboard Wing Rib using the bottom inbd wing skin as a drill guide.

Step 7: Disassemble the bottom skins and J-stiffeners from the wing assembly.

Step 8: Modify the lap joint between the W-1004-L and W-1005-L Bottom Wing Skins in a similar way as described on Page 16-2, Step 5.

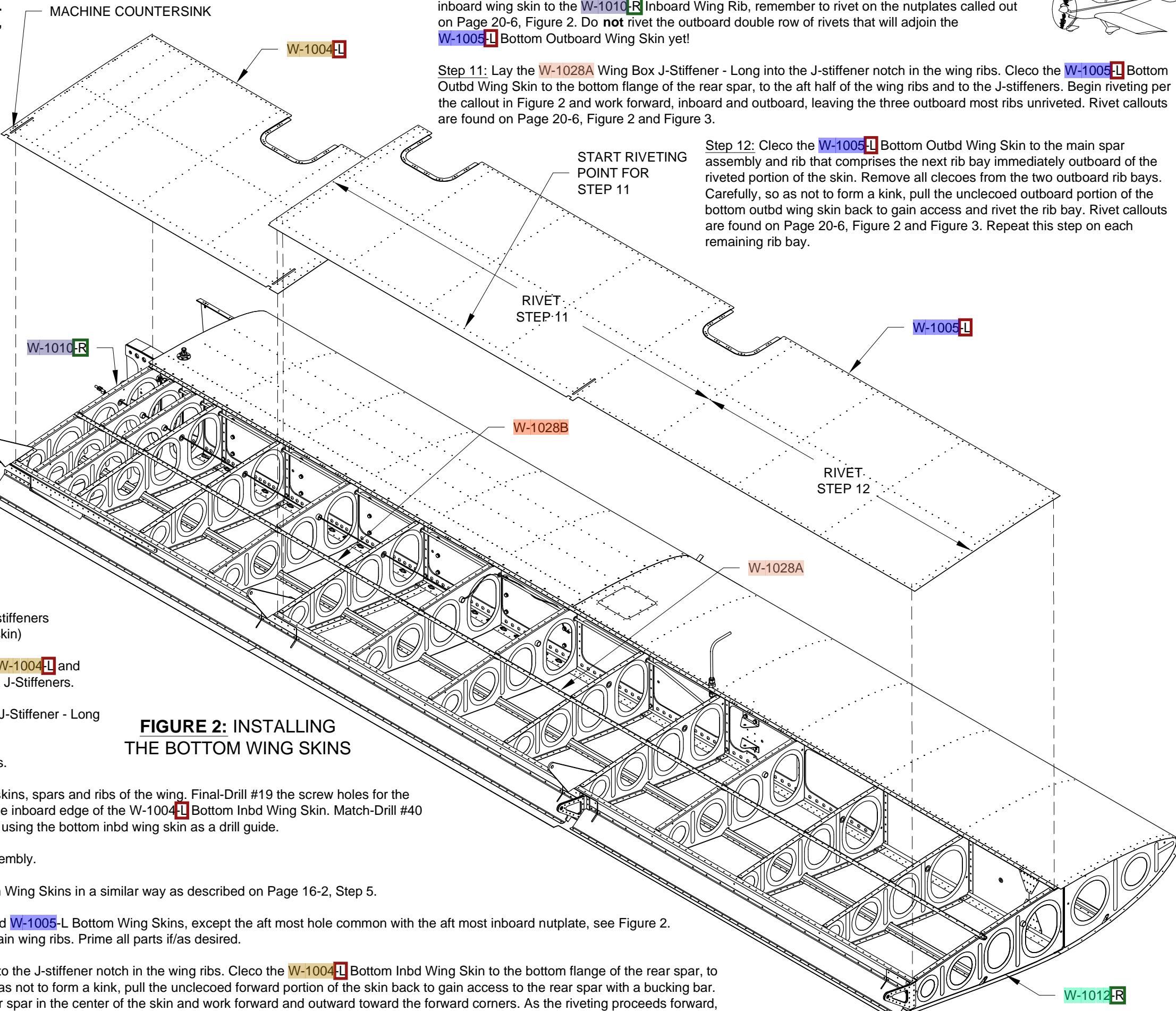
Step 9: Deburr the edges and holes of all parts. Dimple the W-1004-L and W-1005-L Bottom Wing Skins, except the aft most hole common with the aft most inboard nutplate, see Figure 2. Dimple the W-1028A and W-1028B Wing Box J-Stiffeners. Dimple the main wing ribs. Prime all parts if/as desired.

Step 10 (Standard Kit): Lay the W-1028B Wing Box J-Stiffener - Short into the J-stiffener notch in the wing ribs. Cleco the W-1004-L Bottom Inbd Wing Skin to the bottom flange of the rear spar, to the aft half of the wing ribs, and to the wing box J-stiffener. Carefully, so as not to form a kink, pull the unclecoed forward portion of the skin back to gain access to the rear spar with a bucking bar. Rivet callouts are found on Page 20-6, Figure 2. Begin riveting at the rear spar in the center of the skin and work forward and outward toward the forward corners. As the riveting proceeds forward, gain access for bucking the rivets through the larger lightening holes in the wing ribs and the access holes in the skin.

Step 10 (Standard Kit - Continued): When riveting the bottom inboard wing skin to the W-1010-R Inboard Wing Rib, remember to rivet on the nutplates called out on Page 20-6, Figure 2. Do not rivet the outboard double row of rivets that will adjoin the W-1005-L Bottom Outboard Wing Skin yet!

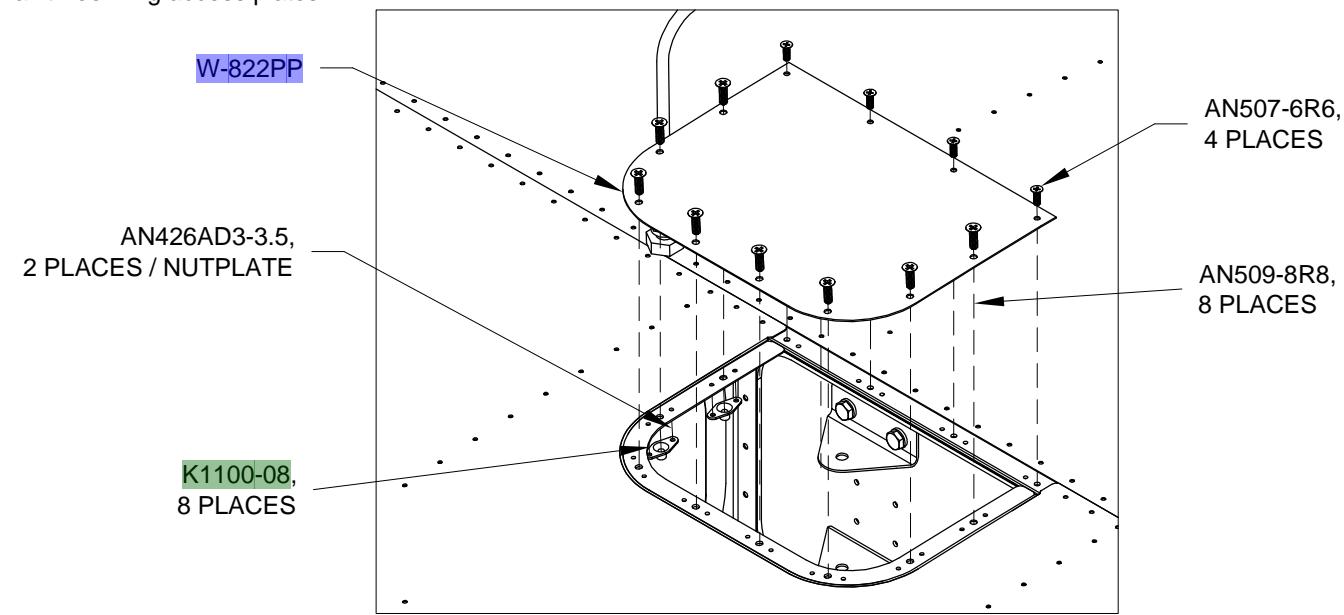
Step 11: Lay the W-1028A Wing Box J-Stiffener - Long into the J-stiffener notch in the wing ribs. Cleco the W-1005-L Bottom Outbd Wing Skin to the bottom flange of the rear spar, to the aft half of the wing ribs and to the J-stiffeners. Begin riveting per the callout in Figure 2 and work forward, inboard and outboard, leaving the three outboard most ribs unriveted. Rivet callouts are found on Page 20-6, Figure 2 and Figure 3.

Step 12: Cleco the W-1005-L Bottom Outbd Wing Skin to the main spar assembly and rib that comprises the next rib bay immediately outboard of the riveted portion of the skin. Remove all clecoes from the two outboard rib bays. Carefully, so as not to form a kink, pull the unclecoed outboard portion of the bottom outbd wing skin back to gain access and rivet the rib bay. Rivet callouts are found on Page 20-6, Figure 2 and Figure 3. Repeat this step on each remaining rib bay.





Step 1: Final-Drill #28 the forward row of holes in the **W-822PP** Wing Access Plate that will be used to attach the plate to the main spar assembly. See Figure 1. Final-Drill #19 the remaining holes that will attach the wing access plate to the bottom skins. Repeat Step 1 for all three wing access plates.

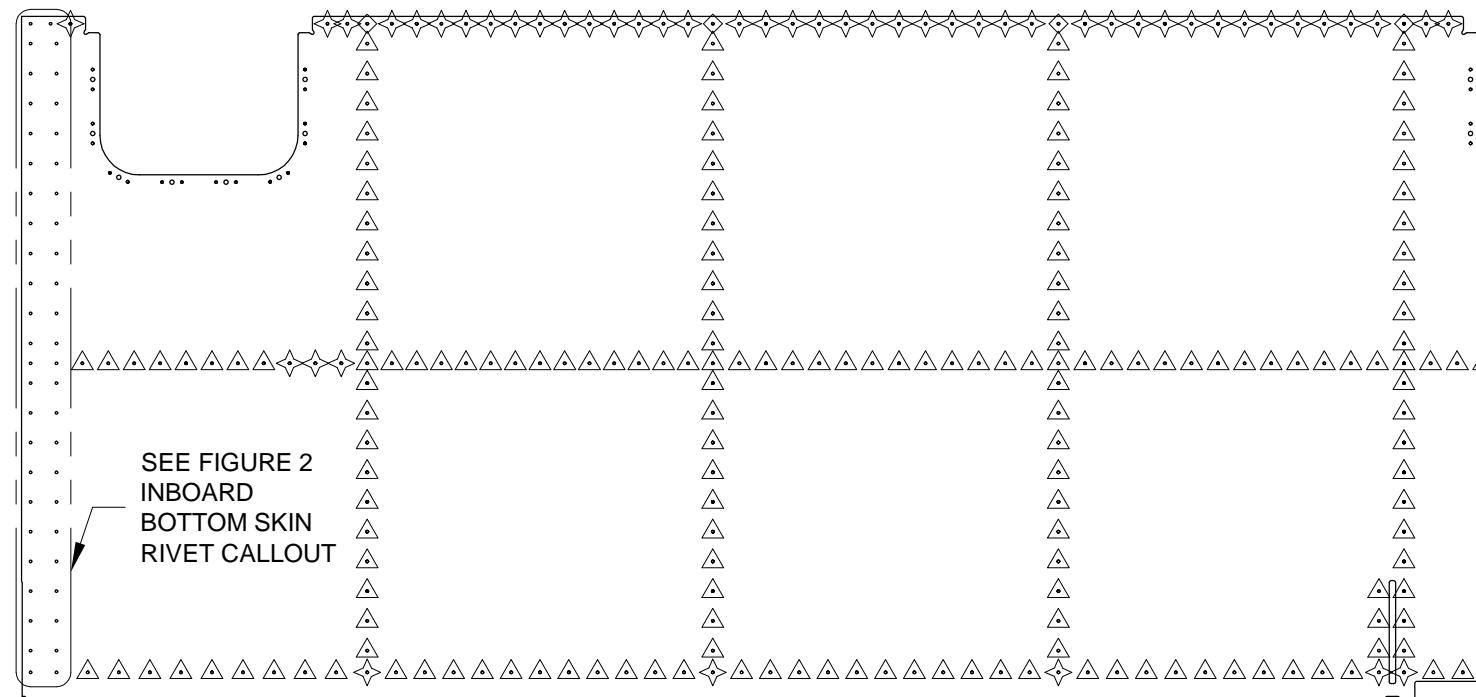


**FIGURE 1: TYPICAL WING ACCESS PLATE ATTACH**

Step 2: Deburr the holes and edges on all three W-822PP Wing Access Plates. Dimple the forward row of attach holes on all three wing access plates for the head of a #6 screw. Dimple the remaining holes in all three wing access plates for the head of an #8 screw. Prime the access plates if/as desired.

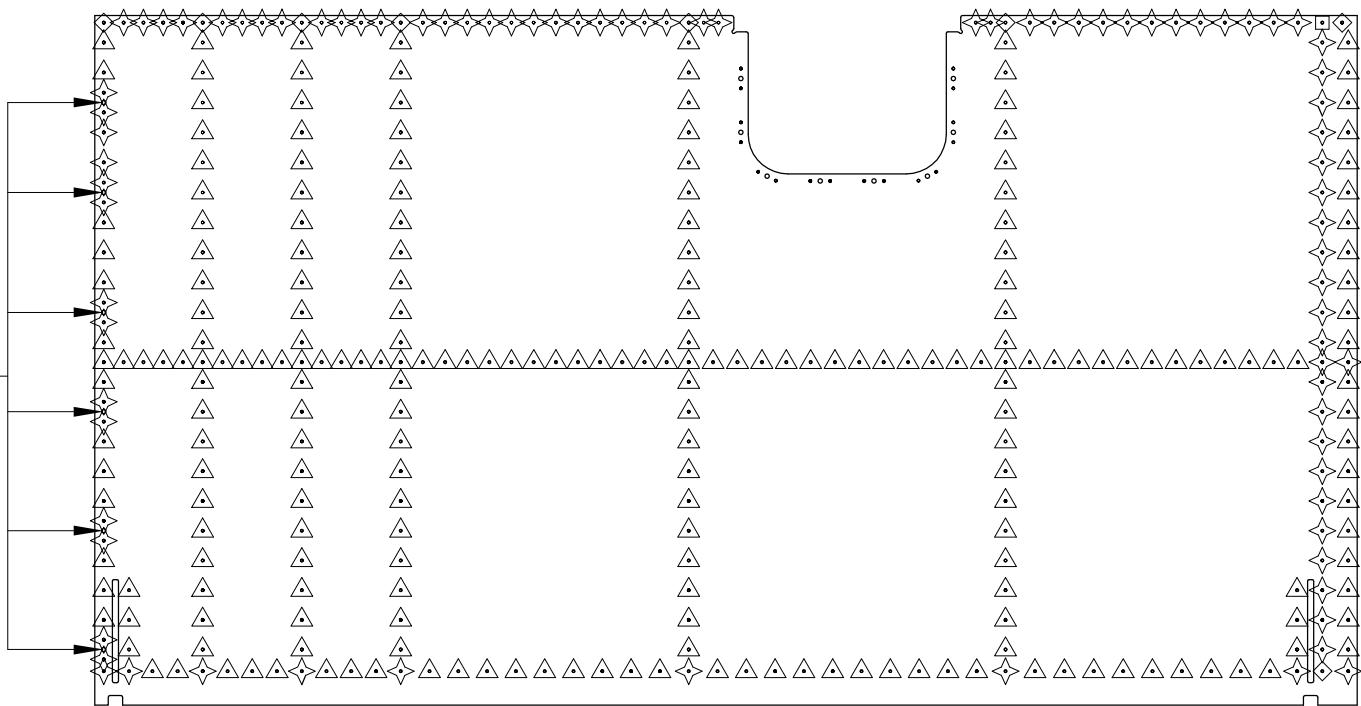
Step 3: Rivet the nutplates that will attach the W-822PP Wing Access Plates to the bottom wing skins. See Figure 1.

Step 4: Install the **W-822PP** Wing Access Plates to the two inboard-most locations on the bottom of the wing. Install the outboard-most wing access plate temporarily with two or three fasteners, finger tight (it will be removed later to provide access for installing the aileron control system).



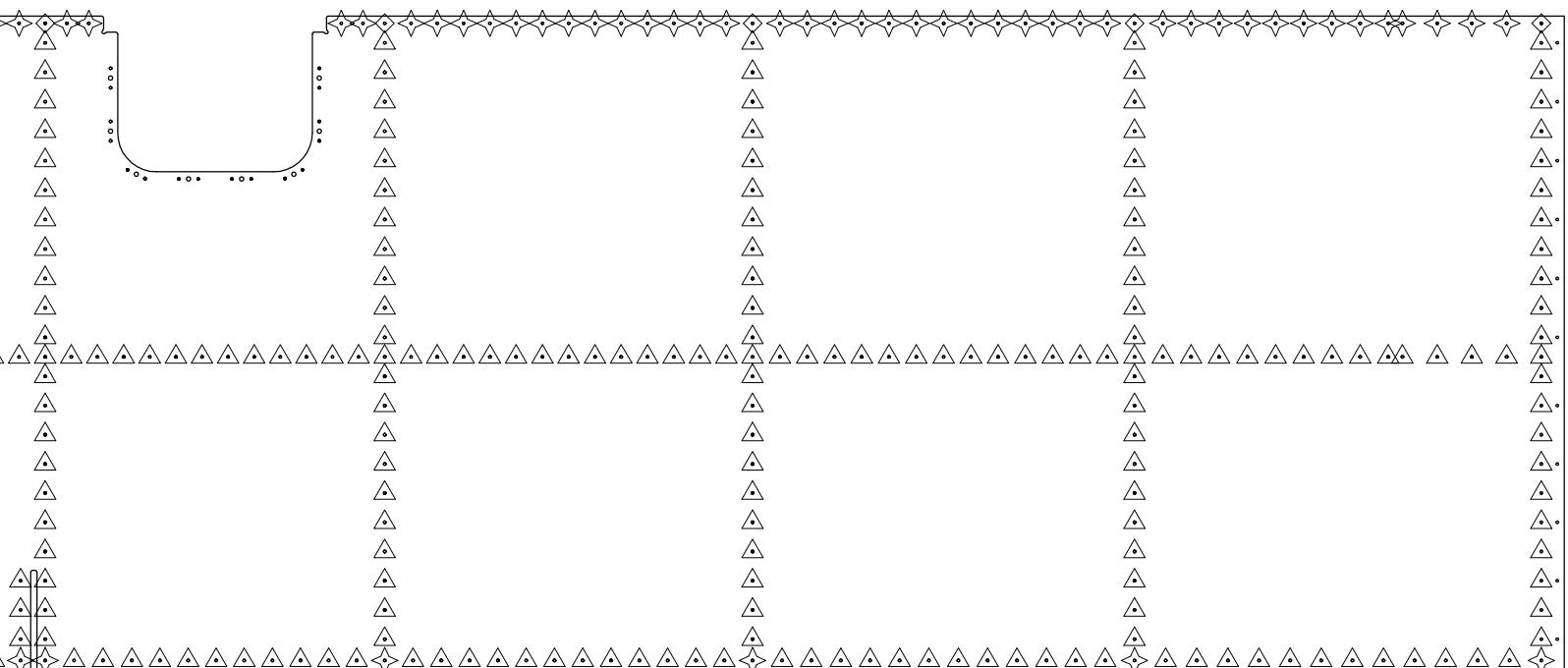
**FIGURE 2: BOTTOM INBOARD SKIN RIVET CALLOUTS**

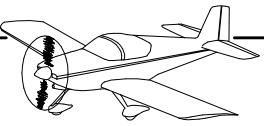
△ AN426AD3-3.5   ◇ AN426AD3-4.5  
◇ AN426AD3-4   □ AN426AD3-5



**FIGURE 3: OUTBOARD BOTTOM SKIN RIVET CALLOUTS**

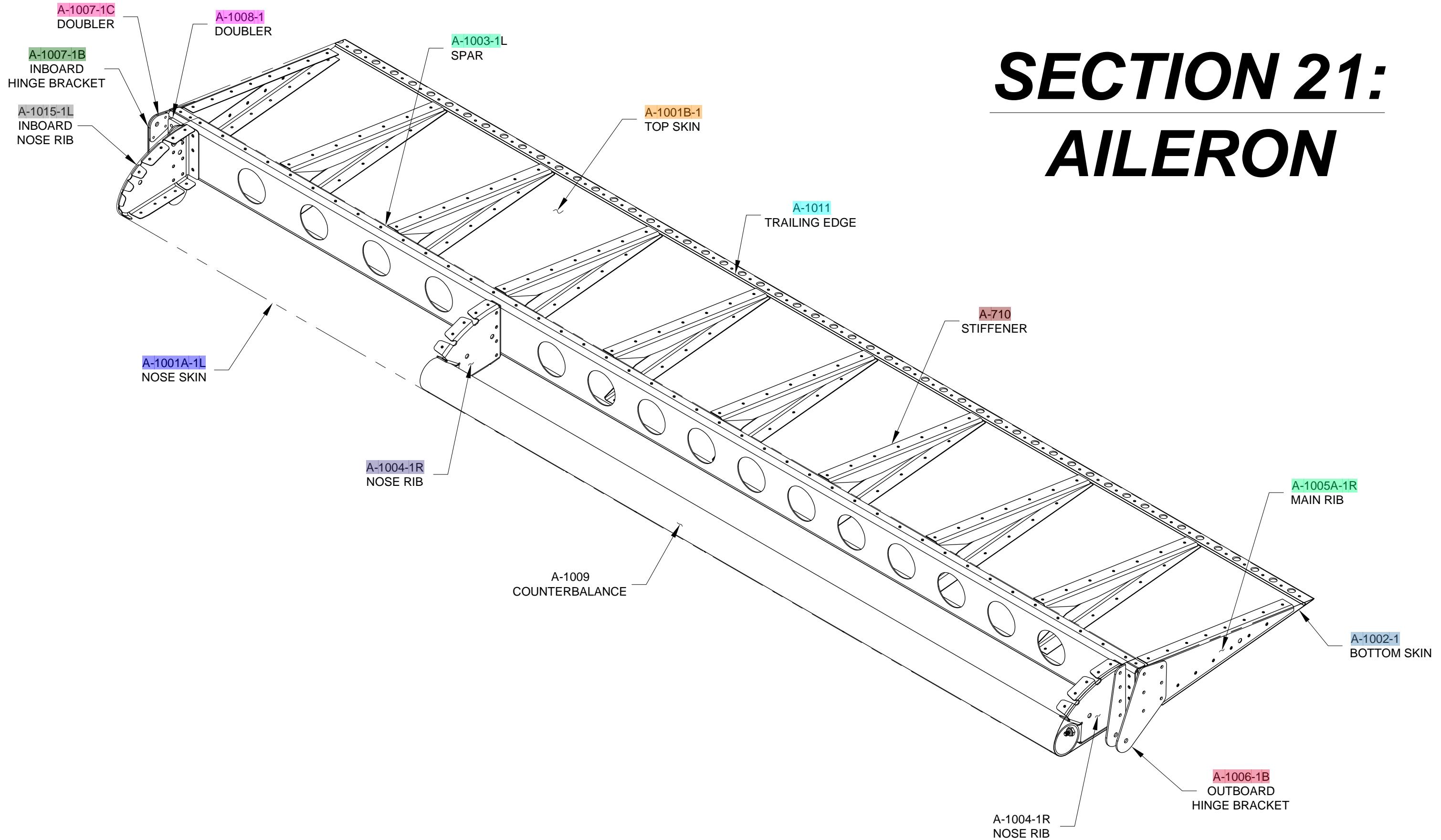
△ AN426AD3-3.5   ◇ AN426AD3-4.5  
◇ AN426AD3-4   □ AN426AD3-5





# SECTION 21:

## AILERON



DATE OF COMPLETION: \_\_\_\_\_

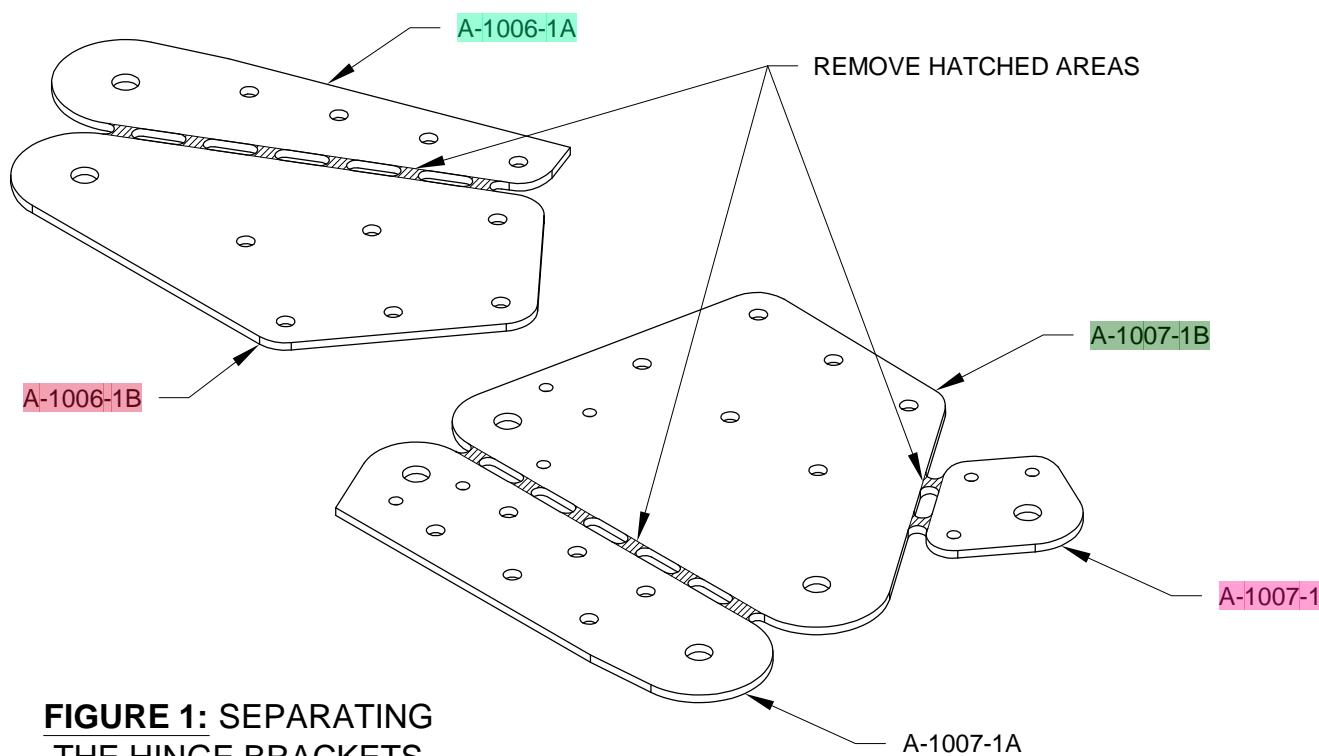
PARTICIPANTS: \_\_\_\_\_

DATE: 02/23/12 REVISION: 1 RV-10 PAGE 21-01



**VAN'S AIRCRAFT, INC.**

Step 1: Separate the A-1006-1 Outboard Hinge Brackets into parts A and B. Separate A-1007-1 Inboard Hinge Brackets into parts A, B, and C. See Figure 1.

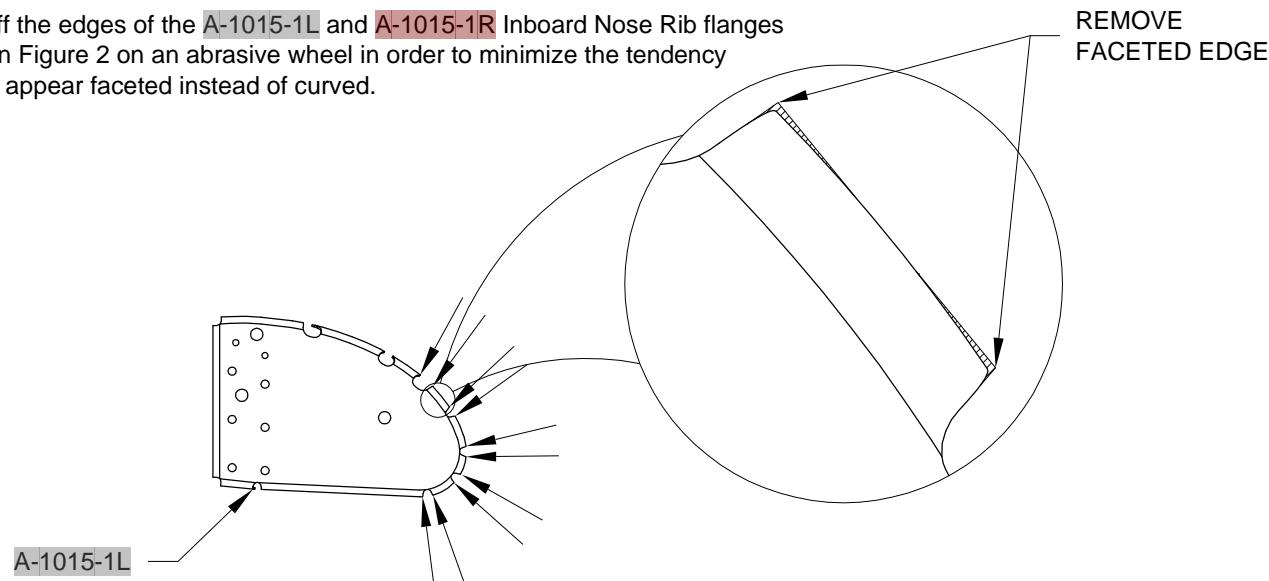


**FIGURE 1: SEPARATING THE HINGE BRACKETS**

Step 2: Flute and straighten as required to adjust the flanges of the A-1004-1L and A-1004-1R Nose Ribs and A-1015-1L and A-1015-1R Inboard Nose Ribs to 90°.

Final-Drill #40, deburr and dimple all the holes in the flanged of the nose ribs and inboard nose ribs.

Step 3: Buff the edges of the A-1015-1L and A-1015-1R Inboard Nose Rib flanges as shown in Figure 2 on an abrasive wheel in order to minimize the tendency for them to appear faceted instead of curved.



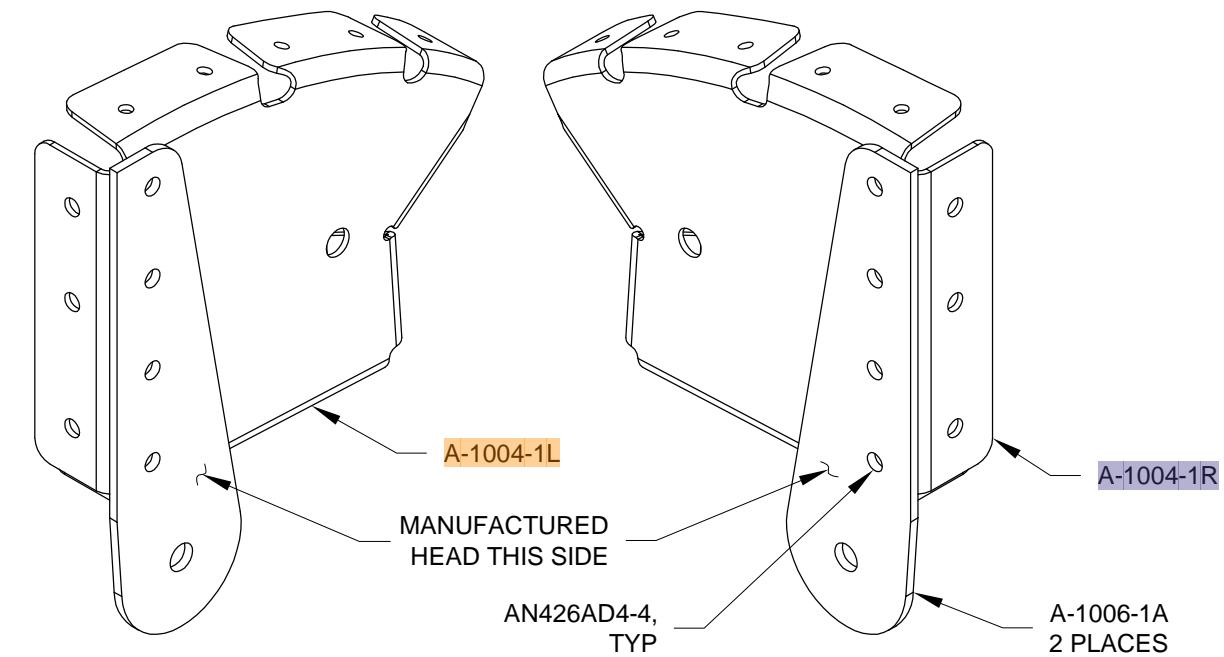
**FIGURE 2: BUFF FLANGE EDGES**

Step 4: Final-Drill #30 the .129 [3.3 mm] holes common to the A-1006-1A Outboard Hinge Brackets and the A-1004-1R and A-1004-1L Nose Ribs. Machine countersink the outboard hinge brackets for the head of a AN426AD4 rivet as shown in Figure 3. Deburr the outboard hinge brackets and the A-1004-1R and A-1004-1L Nose Ribs.

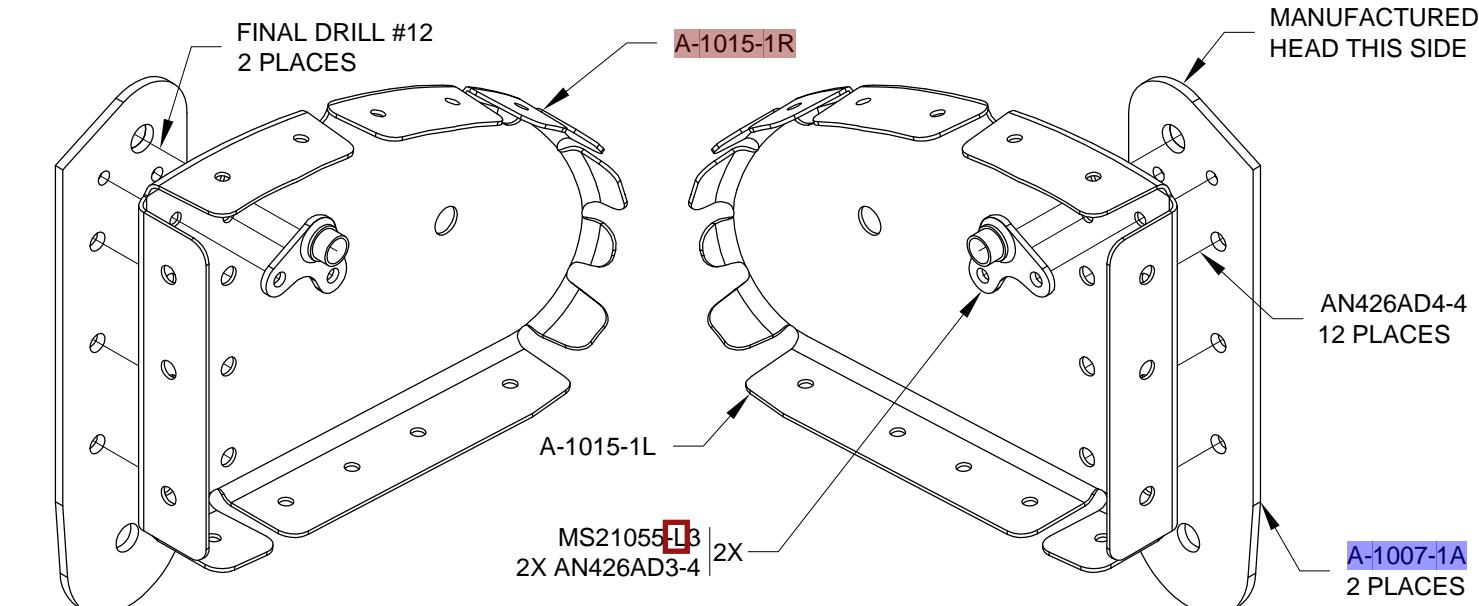
Step 5: Final-Drill #30 the .129 [3.3 mm] holes common to the A-1007-1A Inboard Hinge Brackets and the A-1015-1L and A-1015-1R Ribs. Final-Drill #12 the bolt holes in the inboard hinge brackets and ribs. Machine countersink the inboard hinge bracket and deburr. See Figure 4.

Step 6: Attach the A-1006-1A Outboard Hinge Brackets to the A-1004-1R and A-1004-1L Nose Ribs with the rivets called out in Figure 3.

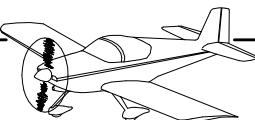
Step 7: Rivet the A-1007-1A Inboard Hinge Brackets to the A-1015-1L and A-1015-1R Ribs with the rivets called out in Figure 4. Install the nutplates called out in Figure 4.



**FIGURE 3: OUTBOARD HINGE BRACKET TO NOSE RIB INSTALLATION**



**FIGURE 4: INBOARD HINGE BRACKET TO NOSE RIB INSTALLATION**



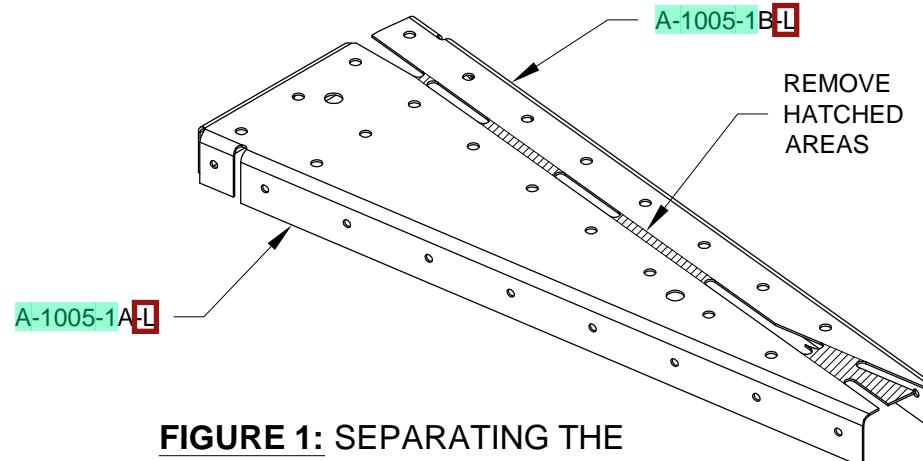
Step 1: Separate the A-1005-1L Main Ribs into A-1005-1A-L and A-1005-1B-L.

Separate the A-1005-1R Main Ribs into A-1005-1A-R and A-1005-1B-R. See Figure 1.

Dimple the .098 [2.5 mm] holes in the main ribs.

Step 2: Deburr the A-1005-1A-L and A-1005-1A-R Main Ribs and the A-1005-1B-L and A-1005-1B-R Main Ribs.

Deburr the A-1006-1B Outboard Hinge Brackets, A-1007-1B and A-1007-1C Inboard Hinge Brackets.



**FIGURE 1: SEPARATING THE MAIN RIBS (LEFT SHOWN)**

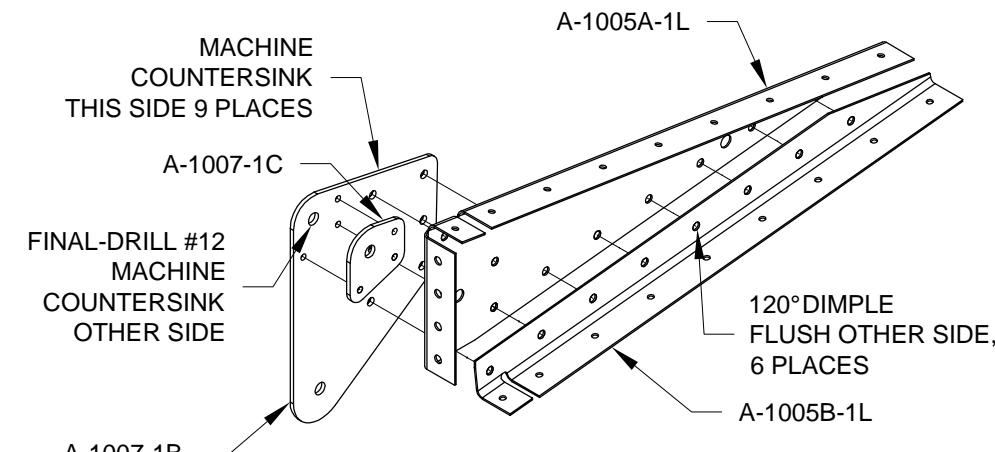
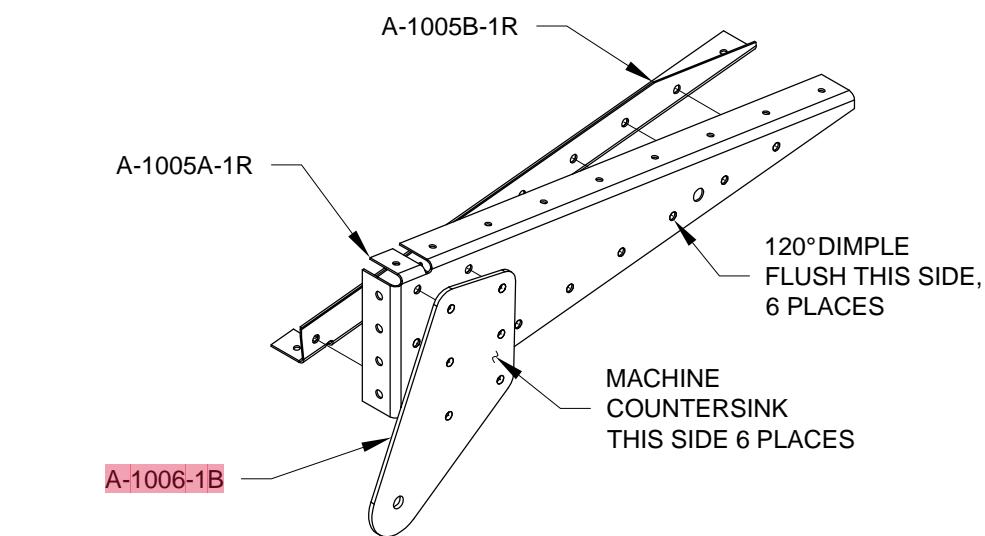
Step 3: Machine countersink the .129 [3.3 mm] holes in the A-1006-1B Outboard Hinge Brackets and A-1007-1B Inboard Hinge Brackets to fit the head of an AN426AD4 rivet. See Figures 2, 4, and 5.

Parts for the right aileron must be countersunk on the side opposite that shown in Figures 2, 4, and 5.

Step 4: Cleco the A-1007-1B and A-1007-1C Inboard Hinge Brackets to each other. Final-Drill #12 the .188 [4.8 mm] hole and machine countersink for the head of an AN509-10 countersunk screw. See Figure 2.

Machine countersink the .098 [2.5 mm] holes in the A-1007-1B Inboard Hinge Bracket to fit the head of an AN426AD3 rivet as shown in Figures 2 and 4.

Parts for the right aileron must be countersunk on the side opposite that shown in Figures 2 and 4.

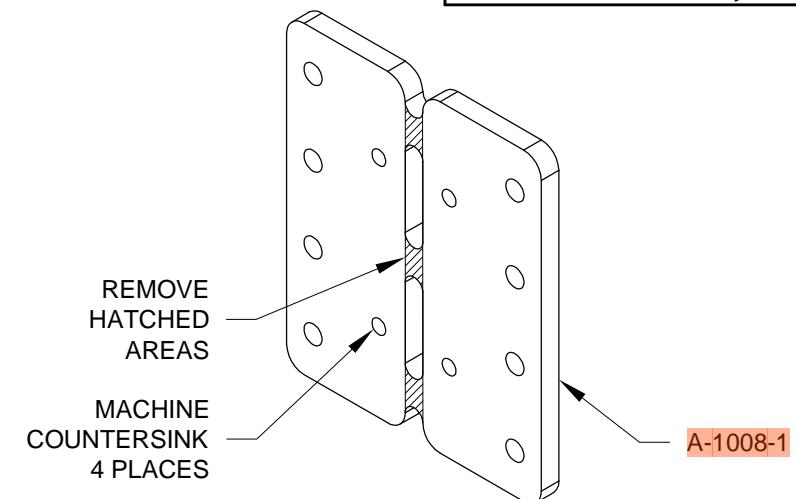


**FIGURE 2: MACHINE COUNTERSINK MAIN RIBS AND HINGE BRACKETS**

Step 5: Machine countersink the A-1008-1 Doubler for the head of AN426AD3 rivets as shown in Figure 3.

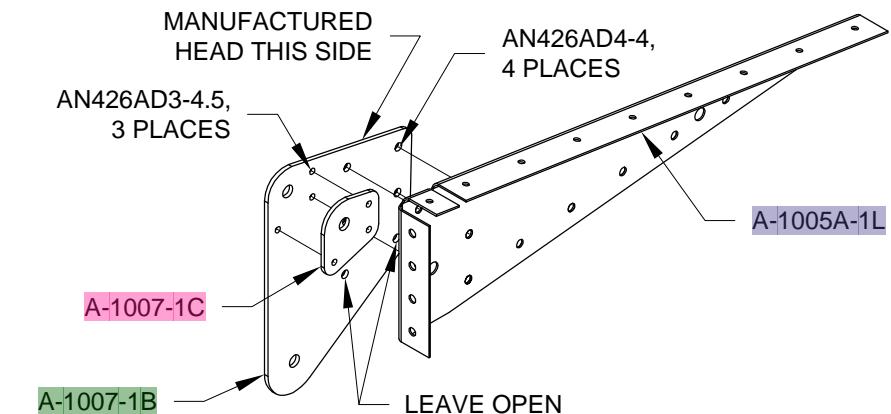
Removed the hatched areas on the doubler as shown in Figure 3 to make 2 parts.

Step 6: Prime all A-1005A-1, A-1005B-1, A-1006-1, A-1007-1, and A-1008-1 parts



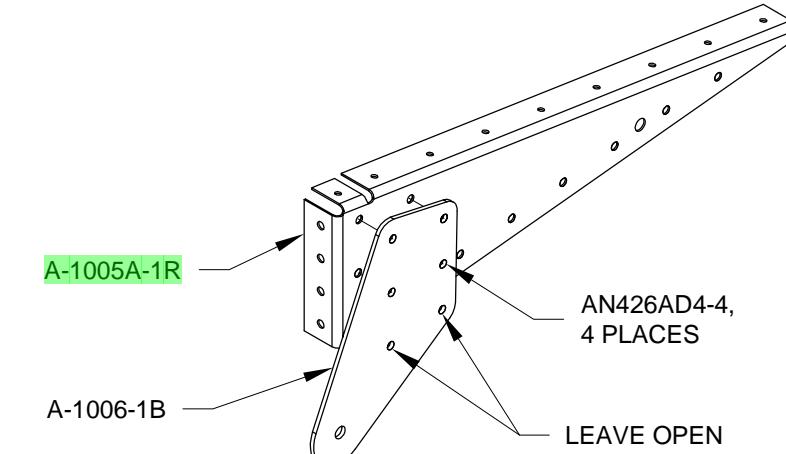
**FIGURE 3: SEPARATING THE DOUBLERS**

Step 7: Cleco then rivet the A-1007-1B and A-1007-1C Inboard Hinge Brackets to the A-1005A-1L and A-1005A-1R Main Ribs. Leave open the 2 bottom holes as noted in Figure 4.

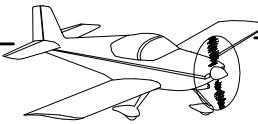


**FIGURE 4: INBOARD HINGE BRACKET ATTACH**

Step 8: Cleco then rivet the A-1006-1B Outboard Hinge Brackets to the A-1005A-1L and A-1005A-1R Main Ribs. Leave open the 2 bottom holes as noted in Figure 5.



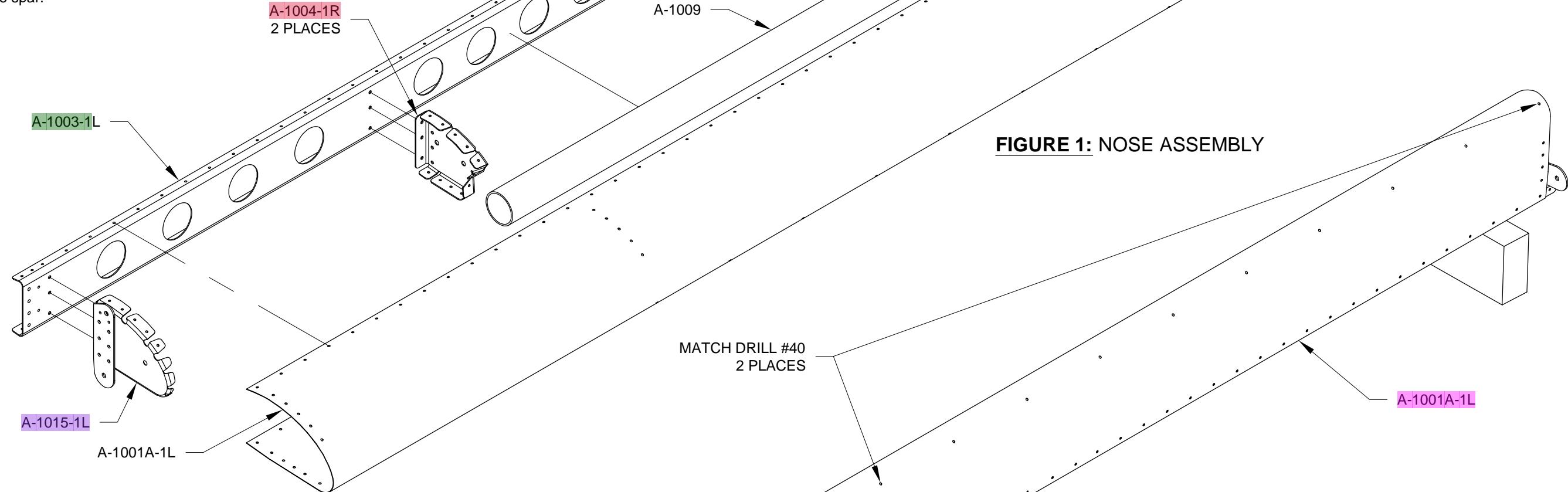
**FIGURE 5: OUTBOARD HINGE BRACKET ATTACH**



NOTE: The construction technique for the ailerons is similar to that of the rudder and elevators. The aileron uses ribs at the ends only while light angle stiffeners support the rest of the skin. The aileron must be kept flat while drilling and riveting. A cradle to hold the aileron in a vertical position while riveting is required. Since the aileron has a thinner cross section than the flap, make the cradle using the **FL-1004-1L** Flap Nose Rib as shown in the flap assembly manual Page 2, Figure 1. The cradle need not be a perfect fit for the aileron. It is intended mainly as a support for holding the aileron in a position suitable for riveting.

Assembly instructions are for the Left Aileron Assembly. The Right Aileron Assembly is a mirror of the Left. The builder may choose to complete all steps for the left side before repeating those steps for the right side or to complete each step for both left and right sides before moving to the next step.

Step 1: Cleco the **A-1004-1R** Nose Ribs to the **A-1003-1L** Spar. See Figure 1. Cleco the **A-1015-1L** Inboard Nose Rib and **A-1008-1** Doubler to the spar.



Step 2: Cut ST304-065X1.375X46 Steel Tube to 34.625 [879.5 mm] to make the **A-1009** Counterbalance.

Step 3: Cleco the **A-1001A-1L** Nose Skin to the lower flange of the **A-1003-1L** Spar at every third hole. Lay the **A-1009** Counterbalance into the nose skin so that it is flush with the outboard edge of the nose skin. Cleco the nose skin to the top flange of the spar at every third hole applying downward pressure on the nose skin if/as required to insert the clecos. Cleco the nose skin to the **A-1004-1R** Nose Ribs and to the **A-1015-1L** Inboard Nose Rib as shown in Figure 1. Place the assembly leading edge up onto a narrow table or blocks as shown in Figure 2.

Step 4: Match-Drill #40 the most outboard hole and most inboard hole of the **A-1001A-1L** Nose Skin into the **A-1009** Aileron Counterbalance. See "match-drill" call-outs in Figure 2.

Remove the nose skin.

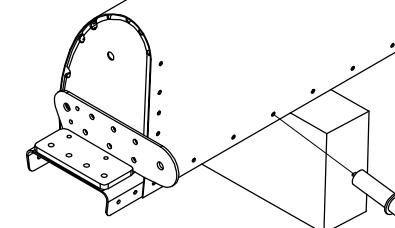
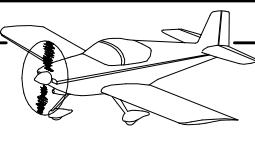
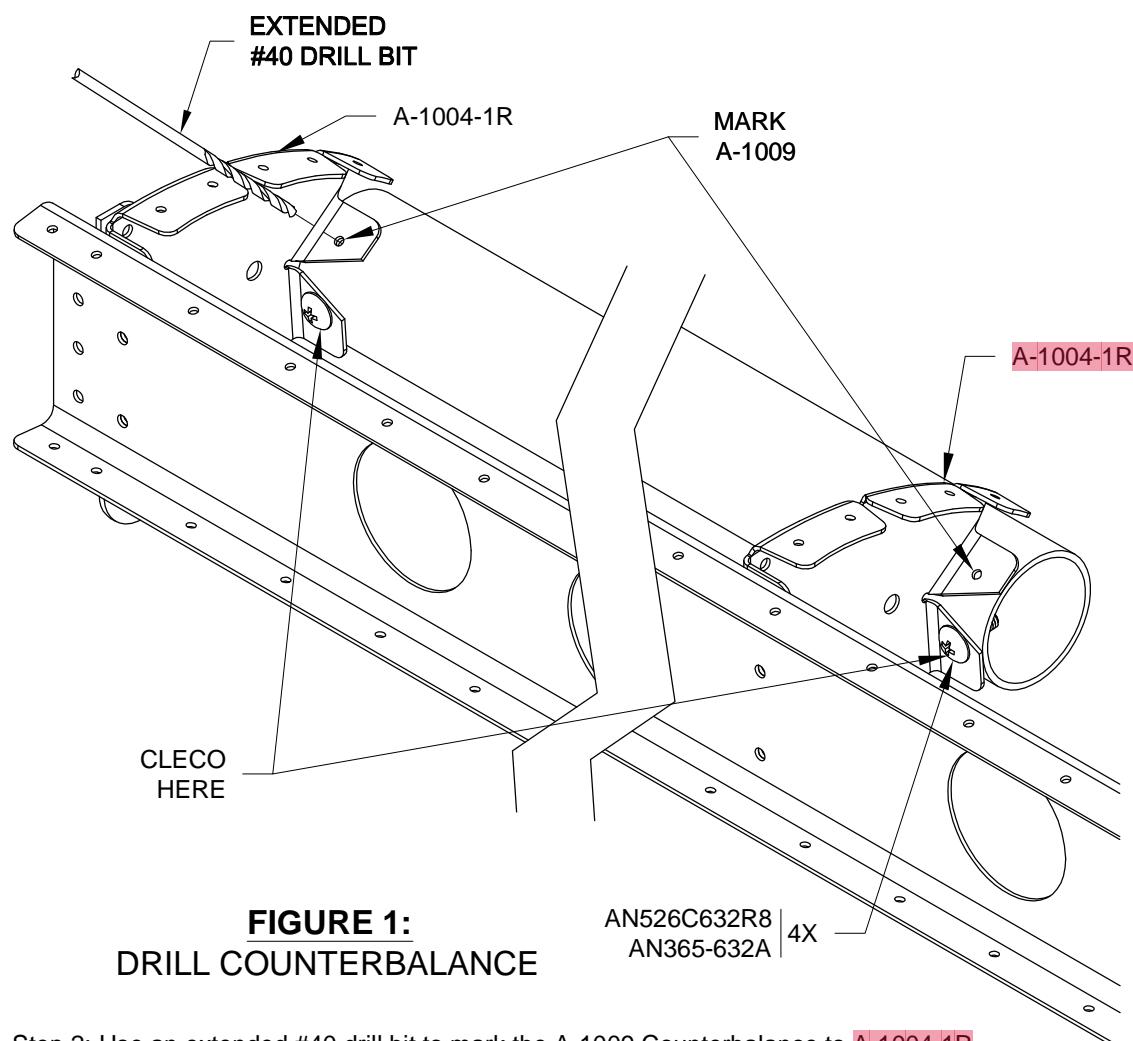


FIGURE 2: CLECO NOSE SKIN



Step 1: Cleco the A-1009 Counterbalance to the A-1004-1R Nose Ribs as shown in Figure 1.



**FIGURE 1:**  
DRILL COUNTERBALANCE

Step 2: Use an extended #40 drill bit to mark the A-1009 Counterbalance to A-1004-1R Nose Rib attach holes on the spar by leaning the drill in alongside the rib as shown in Figure 1.

Remove the counterbalance. Final-Drill #27 the marked holes and the two #40 holes in the counterbalance. Final-Drill #27 the four corresponding holes in the nose ribs.

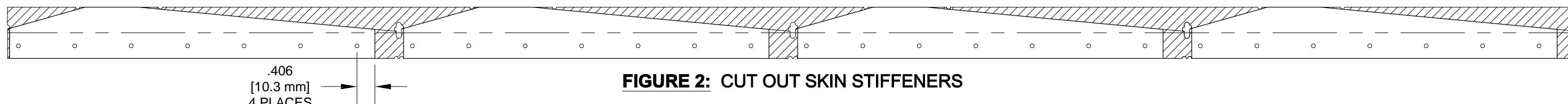
Attach the counter balance to the nose ribs using the hardware called out in Figure 1. If you have difficulty getting a screwdriver on the head of the screw use an offset screwdriver or a Phillips bit tip held in Vise-Grip pliers at 90°.

Step 3: Cleco the A-1001A-1L Nose Skin to the A-1004-1R Nose Ribs, A-1015-1L Inboard Nose Rib, and A-1003-1L Spar. Match-Drill #40 into the counterbalance along its length using the holes in the leading edge of the nose skin as drill guides. Start drilling at one end. Insert a cleco after each hole is drilled to prevent the counterbalance from being pushed away from the skin. Go back through and final-drill #30 these same holes. See Page 21-04, Figure 2 for hole locations.

Step 4: Remove the A-1001A-1L Nose Skin.

Remove the A-1004-1R Nose Ribs and A-1015-1L Inboard Nose Rib from the spar.

Step 5: Final-Drill #40 all the .094 [2.4 mm] holes in the A-710 Stiffeners. Cut the stiffeners from the angle strip provided and trim as shown in Figure 2. The angle strip is shown unbent for clarity.



**FIGURE 2: CUT OUT SKIN STIFFENERS**

**CAUTION: Be careful to dimple the skins in the correct direction.**

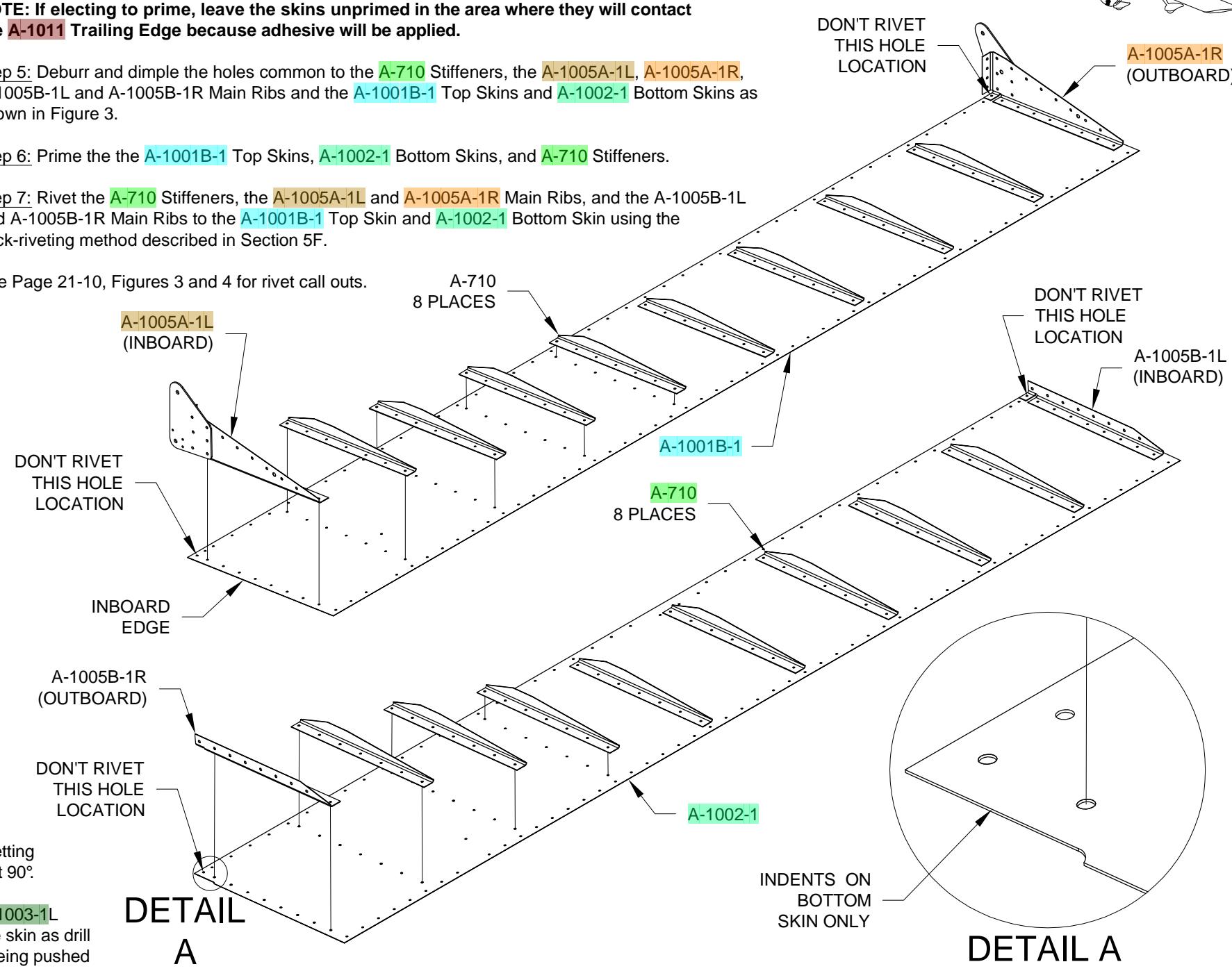
**NOTE: If electing to prime, leave the skins unprimed in the area where they will contact the A-1011 Trailing Edge because adhesive will be applied.**

Step 5: Deburr and dimple the holes common to the A-710 Stiffeners, the A-1005A-1L, A-1005A-1R, A-1005B-1L and A-1005B-1R Main Ribs and the A-1001B-1 Top Skins and A-1002-1 Bottom Skins as shown in Figure 3.

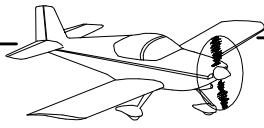
Step 6: Prime the the A-1001B-1 Top Skins, A-1002-1 Bottom Skins, and A-710 Stiffeners.

Step 7: Rivet the A-710 Stiffeners, the A-1005A-1L and A-1005A-1R Main Ribs, and the A-1005B-1L and A-1005B-1R Main Ribs to the A-1001B-1 Top Skin and A-1002-1 Bottom Skin using the back-riveting method described in Section 5F.

See Page 21-10, Figures 3 and 4 for rivet call outs.



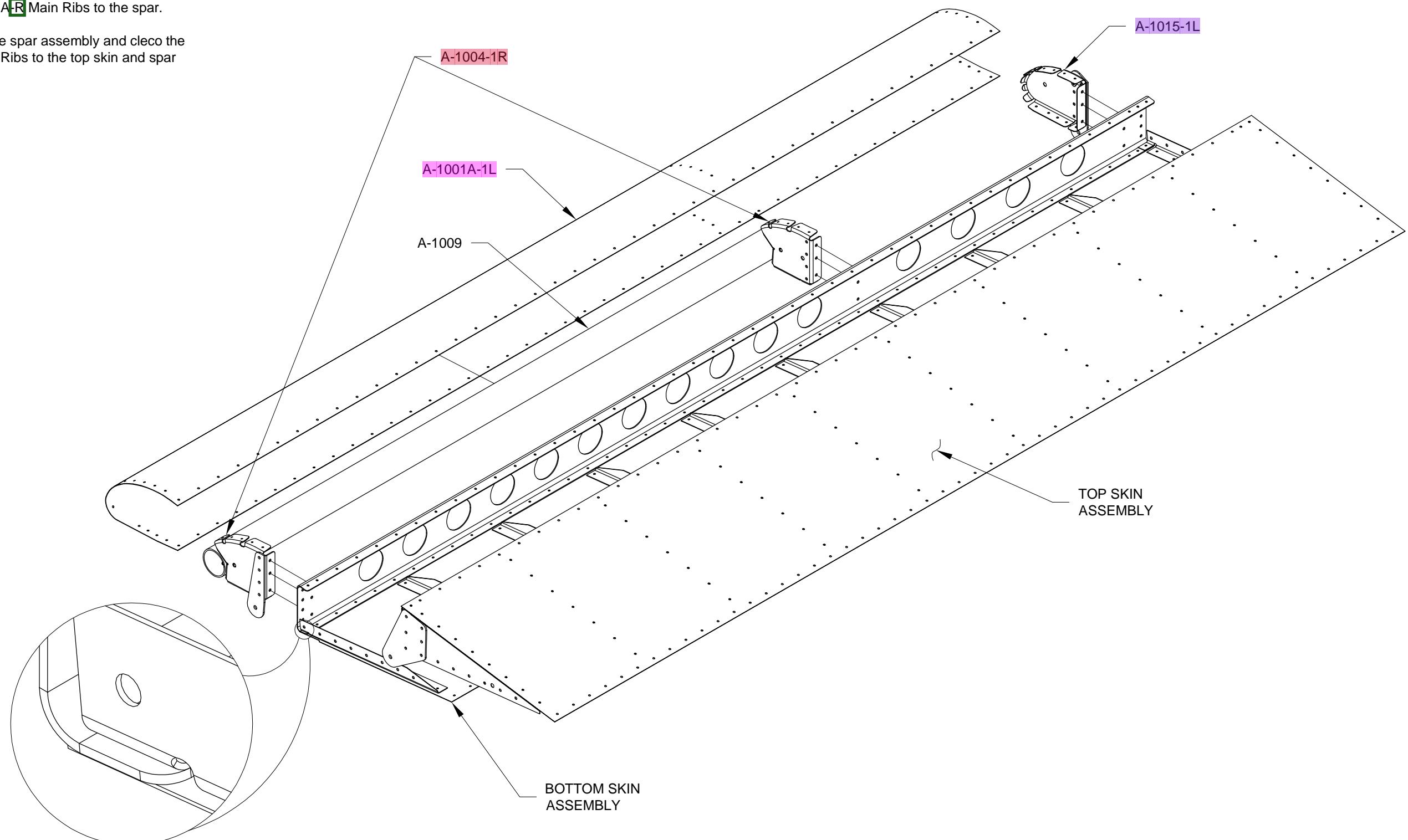
**FIGURE 3: ATTACHING STIFFENERS AND MAIN RIBS TO SKINS**



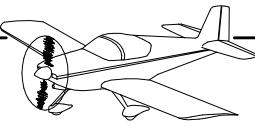
Step 1: Cleco the top skin assembly and the A-1001A-1L Nose Skin to the top flange of the spar at every other hole. Cleco the nose skin to the A-1004-1R Nose Ribs, and A-1015-1L Inboard Nose Rib.

Cleco the A-1005-1A-L and A-1005-1A-R Main Ribs to the spar.

Cleco the bottom skin assembly to the spar assembly and cleco the A-1005-1B-L and A-1005-1B-R Main Ribs to the top skin and spar assemblies.

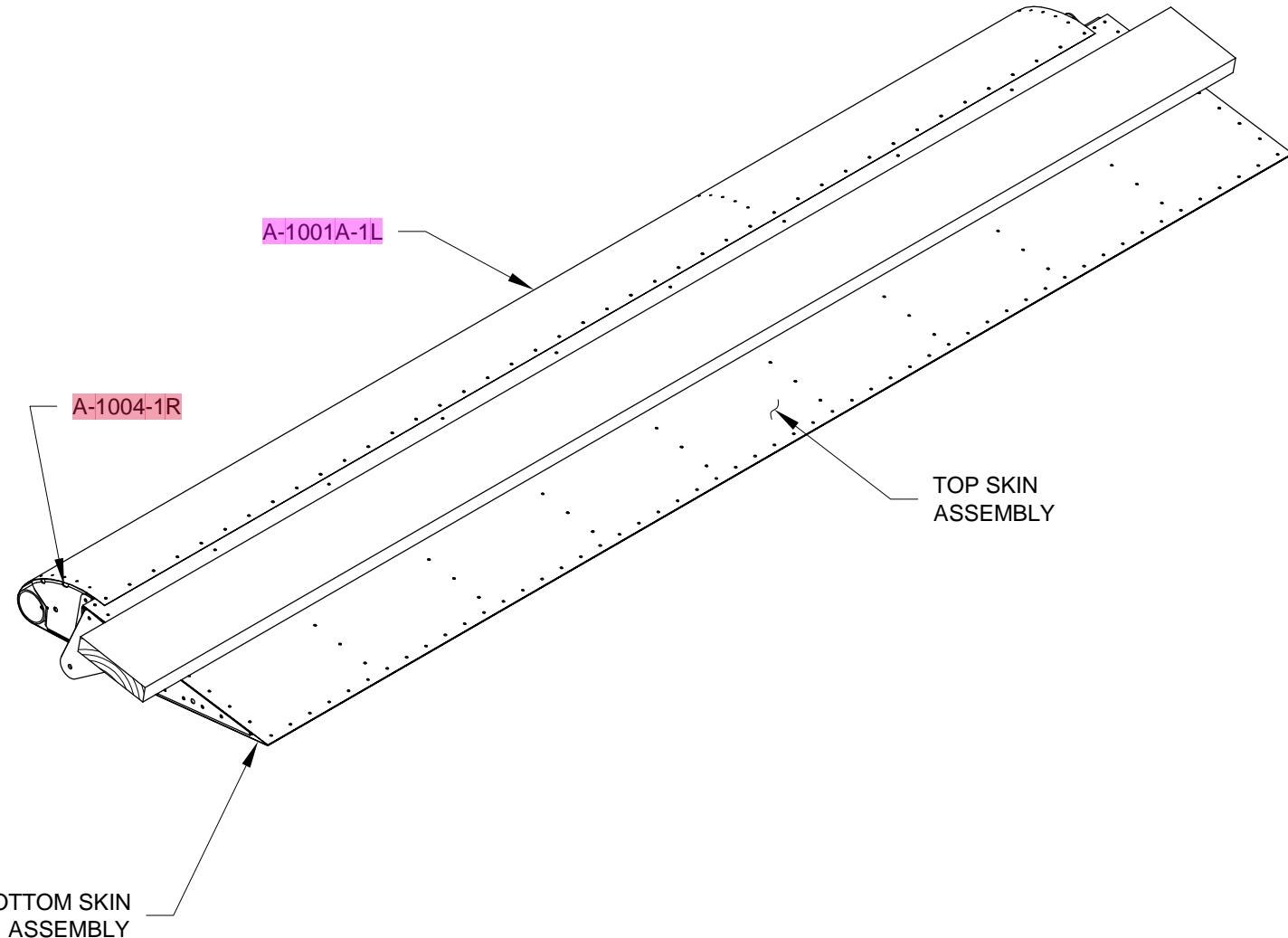


**FIGURE 1: FITTING ASSEMBLY**



Step 1: Lay the assembly flat on the table top hanging the clecos which are holding the A-1001A-1L Nose Skin to the A-1002-1 Bottom Skin and A-1003-1L Spar over the edge. Use weights over the main ribs to keep it firmly against the table with no twist. A straight board can be used to distribute the weight and hold the aileron flat to the table. See Figure 1.

Step 2: Check the A-1001A-1 Nose Skin for bowing with a straight edge held spanwise midway between the leading edge and spar. About .063 [1.6 mm] of rise is acceptable. If necessary the skin can be squeezed down by hand to minimize the bow.

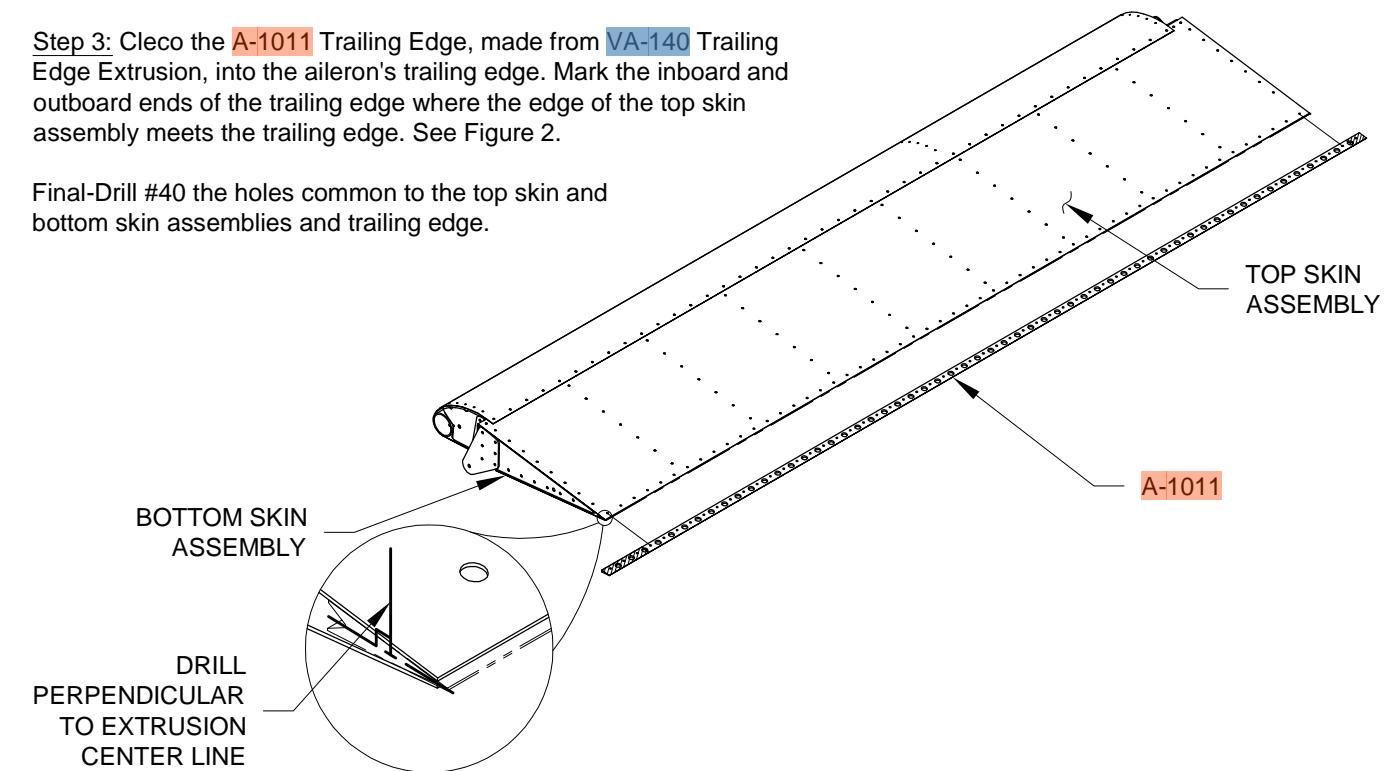


**FIGURE 1: FINAL-DRILL SPAR AND NOSE RIBS**

Note: Drill perpendicular to the centerline of the extrusion, not the surface of the top skin. The difference is only a few degrees, but using the correct reference will give better results.

Step 3: Cleco the A-1011 Trailing Edge, made from VA-140 Trailing Edge Extrusion, into the aileron's trailing edge. Mark the inboard and outboard ends of the trailing edge where the edge of the top skin assembly meets the trailing edge. See Figure 2.

Final-Drill #40 the holes common to the top skin and bottom skin assemblies and trailing edge.



**FIGURE 2: INSERT TRAILING EDGE**

Step 4: Disassemble the aileron. Deburr all the parts including the insides of the lightening holes in the A-1003-1L Spar.

Trim the A-1011 Trailing Edge at the marks made on the inboard and outboard locations as marked in Step 3.

Step 5: Make a edge break in the aft edge of the A-1001A-1L Leading Edge, A-1001B-1 Top Skin, and A-1002-1 Bottom Skin (see Section 5K).

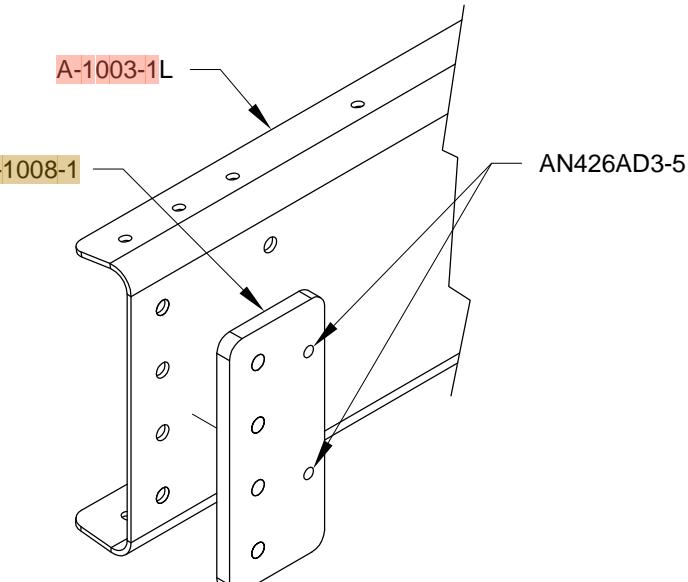
Step 6: With the exception of the A-1011 Trailing Edge, dimple wherever exterior flush rivets will be installed, including the spar flanges. Since the spar is .040 thick it may bow slightly when dimpled but it will straighten during final assembly.

Machine countersink the holes in the trailing edge with the tool perpendicular to the surface of the part.

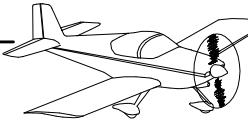
Dimple all remaining holes in the skins.

If electing to prime, note that the A-1009 Counterbalance is stainless steel and need not be primed. The A-1011 Trailing Edge should not be primed because adhesive will be applied.

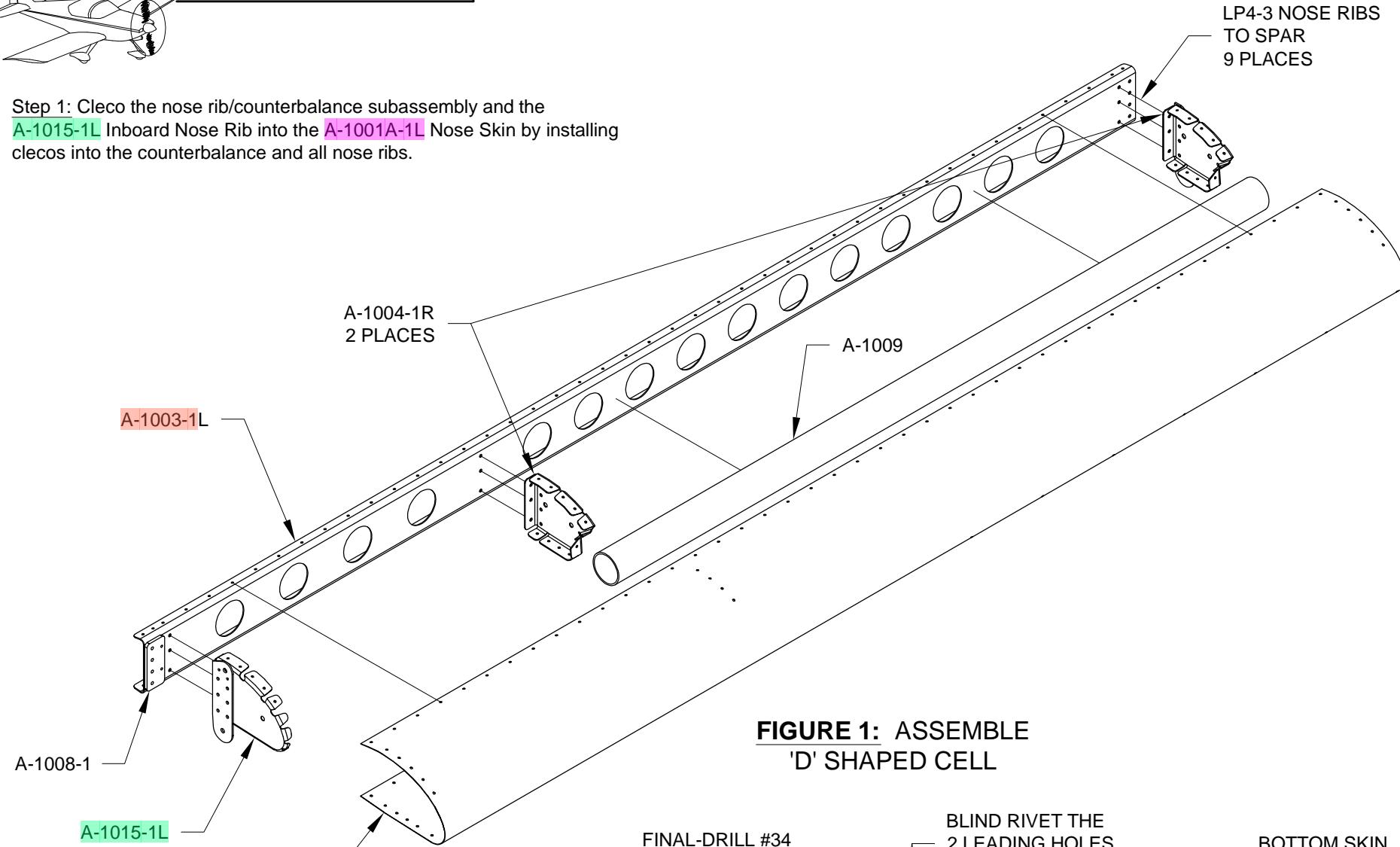
Step 7: Rivet the A-1008-1 Doubler to the A-1003-1L Spar using the rivets called out in Figure 3.



**FIGURE 3: ATTACHING THE DOUBLER TO THE SPAR**



Step 1: Cleco the nose rib/counterbalance subassembly and the A-1015-1L Inboard Nose Rib into the A-1001A-1L Nose Skin by installing clecos into the counterbalance and all nose ribs.

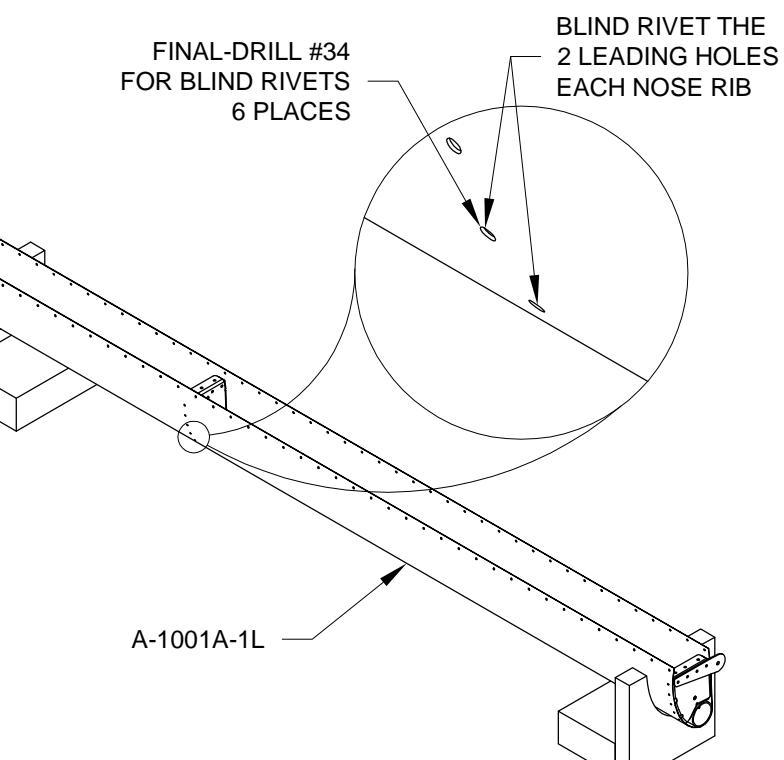


**FIGURE 1: ASSEMBLE  
'D' SHAPED CELL**

**CAUTION:** Damage to the nose skin may result if solid rivets are substituted for the blind rivets shown in Figure 2.

Step 2: Rivet the A-1004-1R and A-1015-1L Nose Ribs to the A-1001A-1L Nose Skin as shown in Figure 2. For rivet call outs see Page 21-09, Figure 2. The solid rivets can be set with a hand squeezer if a .500 [12.7 mm] tall set is used on the shop head side.

Final-Drill #34 the holes shown in Figure 2. Blind rivet the nose skin to nose rib holes as shown in Figure 2.



**FIGURE 2: RIVETING NOSE SKIN**

Step 3: Cleco the spar assembly to the A-1001A-1L Nose Skin and to the A-1004-1R Nose Ribs as shown in Figure 1. Cleco the spar assembly to the A-1015-1L Inboard Nose Rib.

Blind rivet the nose ribs to the A-1003-1L Spar using the rivets called out in Figure 1.

**CAUTION:** When reaching down between the skins with the bucking bar be especially careful in this confined area that the bucking bar is not driven into the top aileron skin while you are concentrating on the bottom.

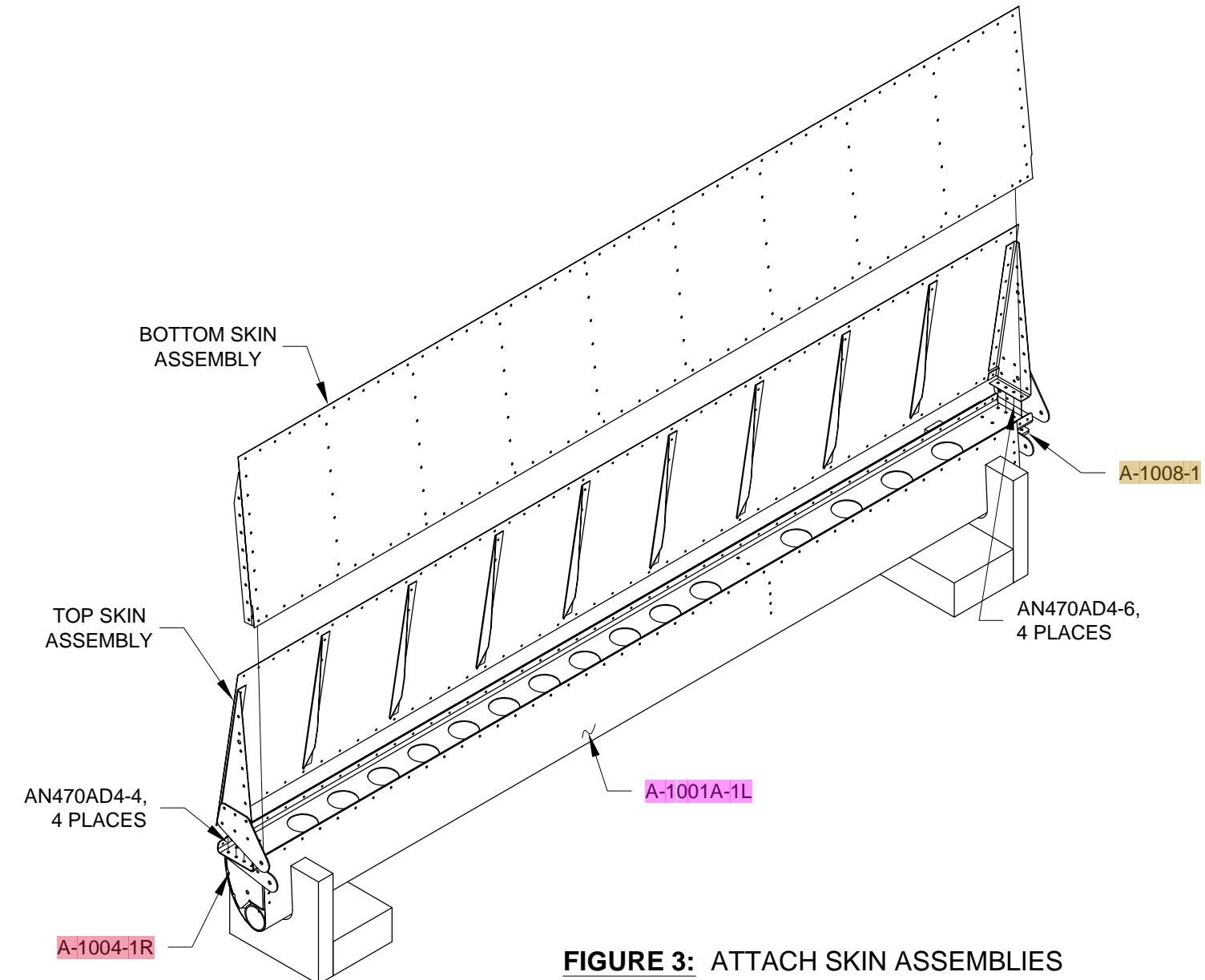
Step 4: Remove the clecos from the top flange of the spar assembly and insert the top skin assembly.

Cleco the top skin assembly to the spar at every other hole. Clamp a straight board to the top skin near the trailing edge (to hold the top skin straight while riveting).

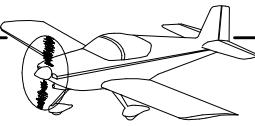
Rivet the top skin assembly to the spar (see Page 21-09, Figure 2 for all A-1001-1L Nose Skin rivets).

Rivet the A-1005A-1L and -1R Main Ribs to the spar using the rivets called-out in Figure 3.

Cleco then rivet the bottom skin assembly to the spar.



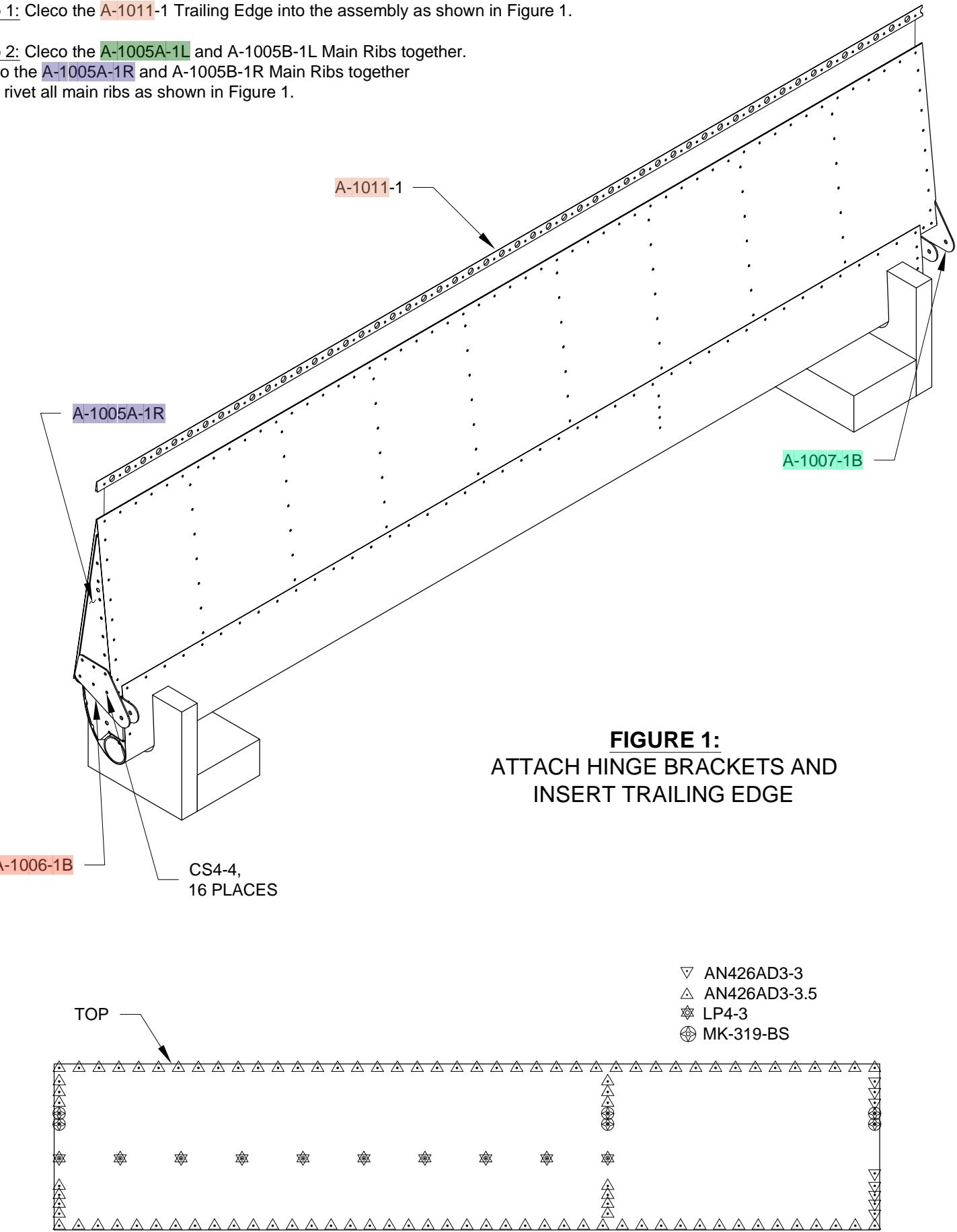
**FIGURE 3: ATTACH SKIN ASSEMBLIES**



Step 1: Cleco the A-1011-1 Trailing Edge into the assembly as shown in Figure 1.

Step 2: Cleco the A-1005A-1L and A-1005B-1L Main Ribs together.

Cleco the A-1005A-1R and A-1005B-1R Main Ribs together  
then rivet all main ribs as shown in Figure 1.



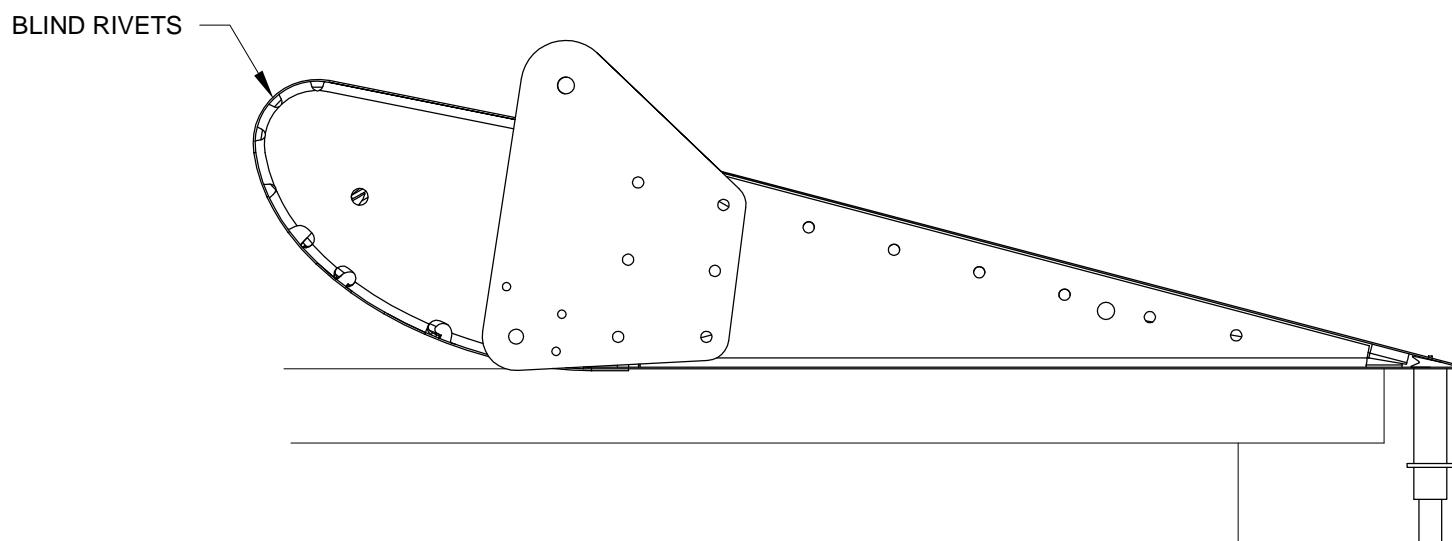
**FIGURE 2: NOSE SKIN RIVETS**

Step 3: Remove the aileron assembly from the cradle and lay it on its top with the trailing edge clecos hanging over the edge of the table as shown in Figure 3. Blind rivet the A-1009 Counterbalance to the A-1001A-1L Nose Skin (see Figure 2 for rivet call-outs). For a nicer finish use a small hammer to tap the top and bottom edges of the blind rivet heads down flush to the skin so that the rivet head follows the tight radius of the leading edge.

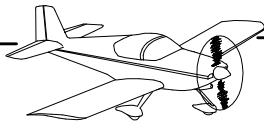
Step 4: Turn the aileron over top side up.

Remove the A-1011 Trailing Edge as shown in Figure 1.

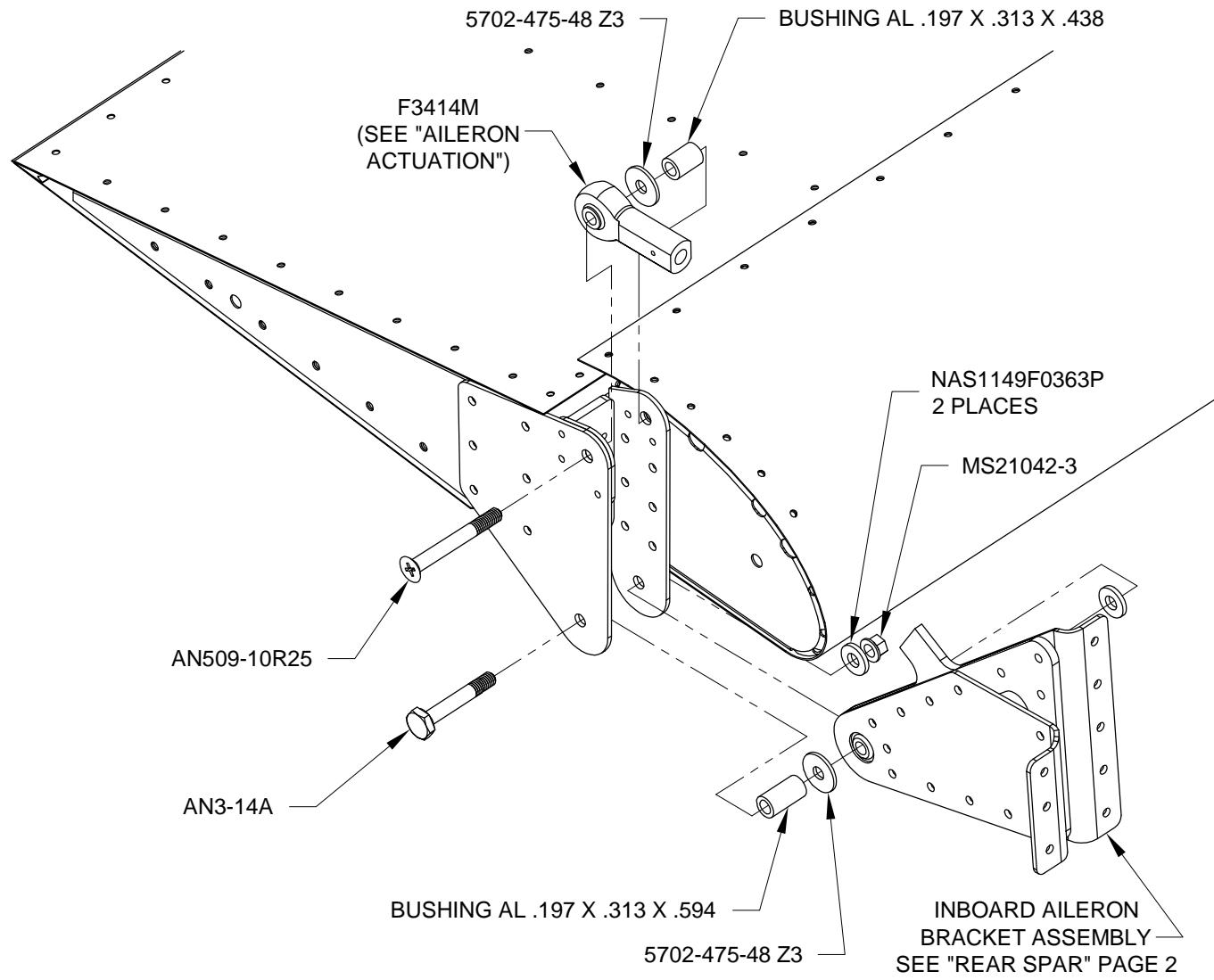
Complete the riveting of the aileron, refer to Section 5H for further instruction/technique. See Page 21-10, Figure 3 for trailing edge rivet call-outs.



**FIGURE 3: LEADING EDGE RIVETS**

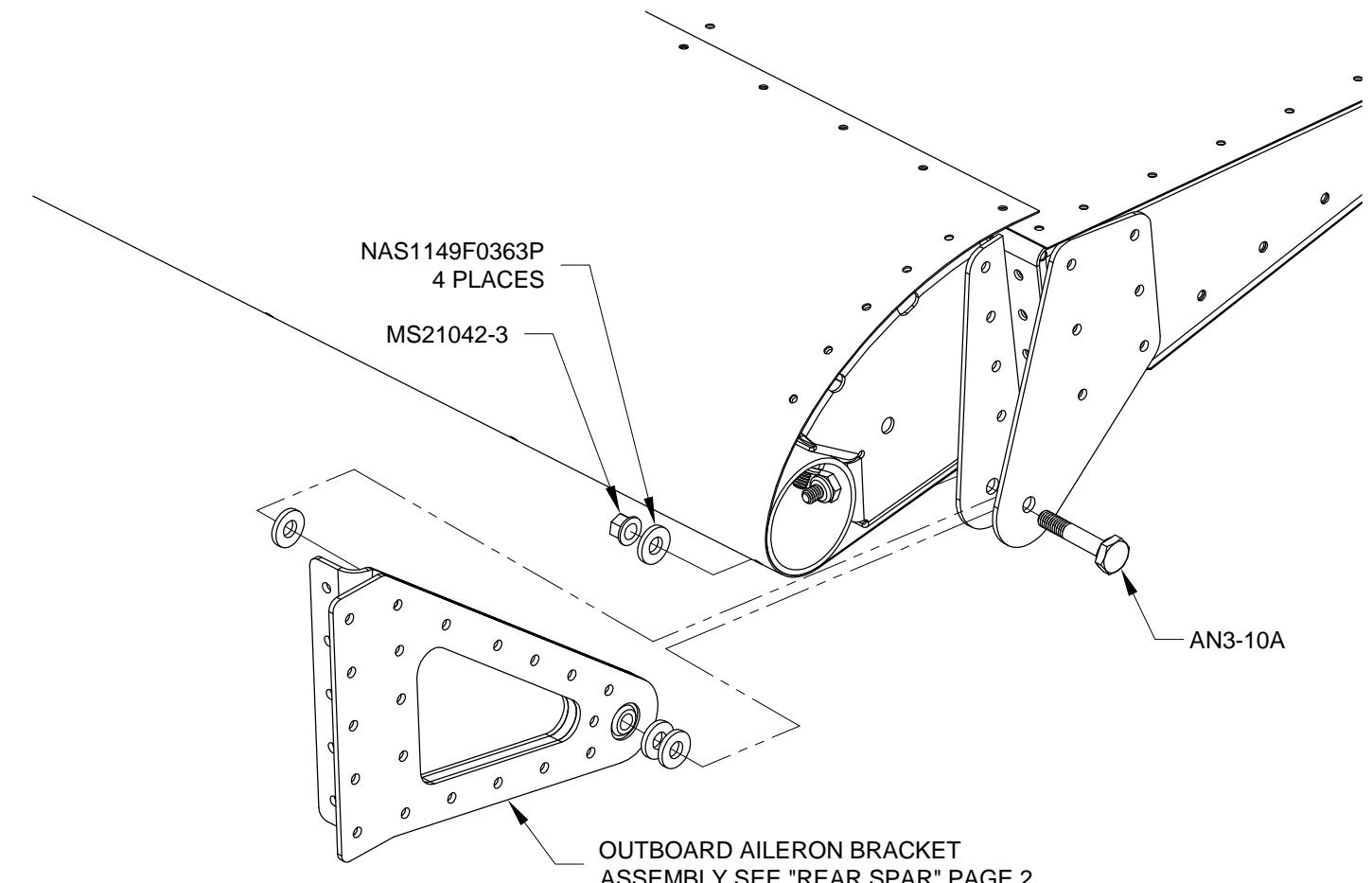


Step 1: The hardware called-out in Figure 1 for attachment of the inboard hinge bracket to the wing will be used during completion of the aileron actuation system as covered in Section 23.

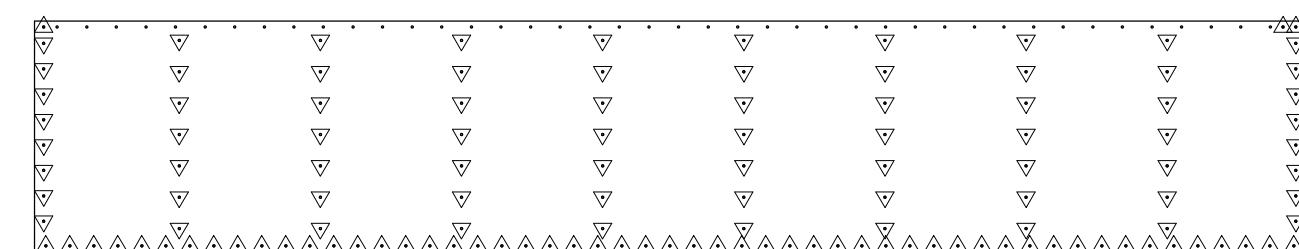


**FIGURE 1: INBOARD HINGE BRACKET ATTACH HARDWARE**

Step 2: The hardware called-out in Figure 2 for attachment of the outboard hinge bracket to the wing will be used during completion of the aileron actuation system as covered in the "Aileron Actuation" section of the manual.

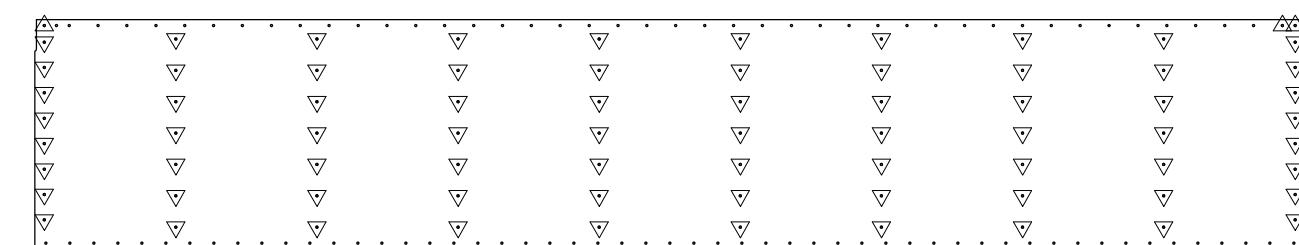


**FIGURE 2: OUTBOARD HINGE BRACKET ATTACH HARDWARE**

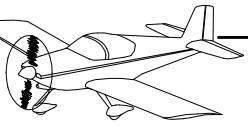


**FIGURE 3: A-1001B-1 TOP SKIN RIVETS**

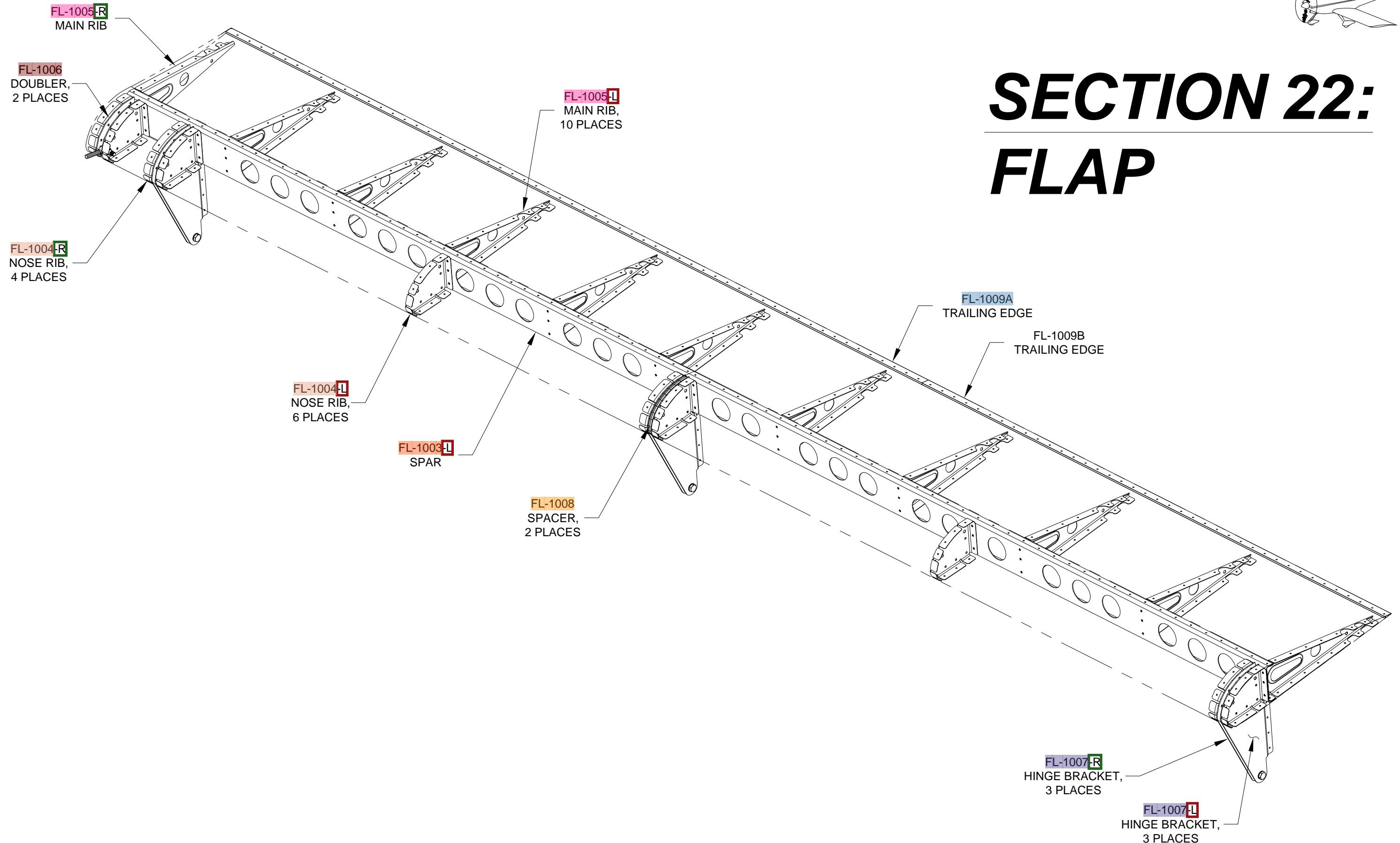
KEY: ▼ AN426AD3-3  
△ AN426AD3-3.5

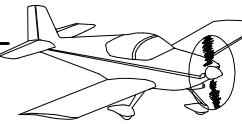


**FIGURE 4: A-1002-1 BOTTOM SKIN RIVETS**



# SECTION 22: FLAP

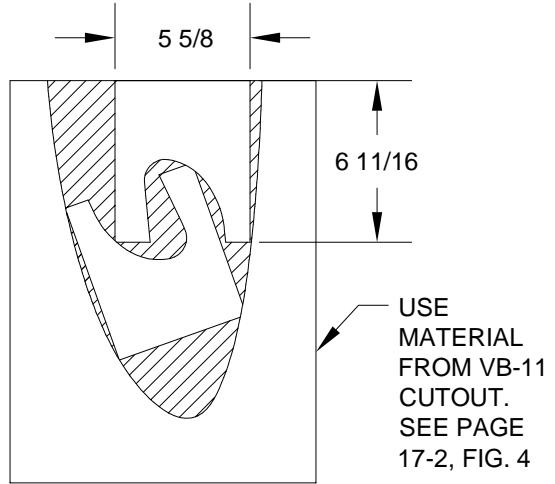




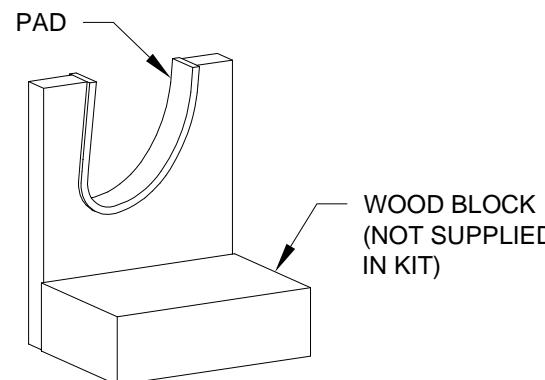
## VAN'S AIRCRAFT, INC.

**NOTE:** This manual provides building instruction for the left flap only; the right flap is simply the mirror of the left. Unless otherwise specified, any instructions given for the left flap applies to the right as well. To help prevent mistakes and speed up the construction process, assemble both flaps at the same time.

**Step 1:** The construction of the flap requires a flat work surface and three cradles (three per flap, six total) to hold the flap upright when riveting. Make some of them from the same material supplied for the wing leading edge and tank cradles as shown in Figure 1. Using an FL-1004 Nose Rib as a template, cut out the cradles. As shown in Figure 2, cut them slightly oversize to allow for padding, such as duct tape, to prevent scratching the skins.



**FIGURE 1: CRADLE MATERIAL**

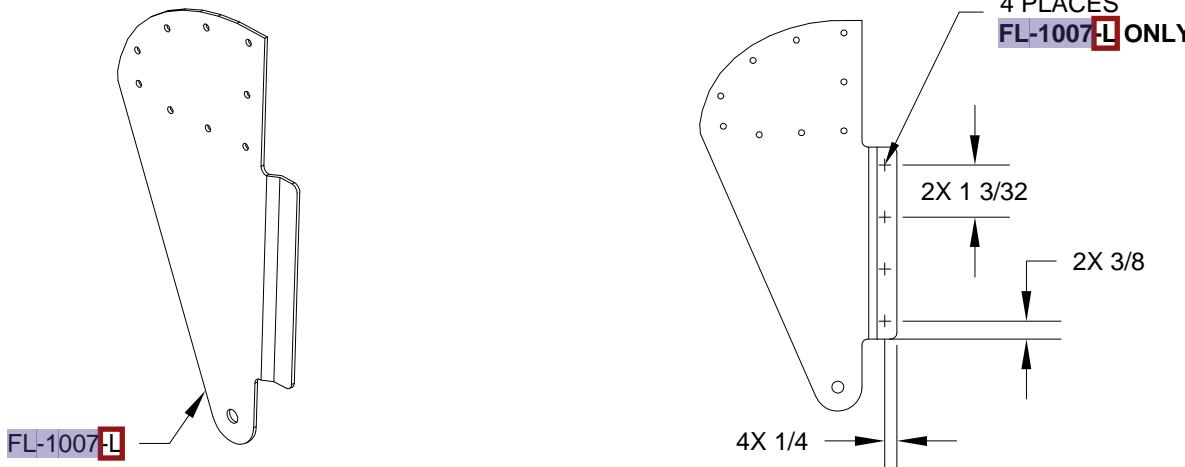


**FIGURE 2: CRADLE**

**Step 2:** Identify all the flap components from Page 22-1. Adjust all rib flange angles to 90° except for the FL-1005-R Main Rib whose spar attach flange must be over bent to allow the rib to angle inboard and hug the tapering fuselage. The match holes in the FL-1001C Top Skin and FL-1002 Bottom Skin will determine this angle. Cleco the FL-1005-R Main Rib to the bottom skin at the inboard end as shown on Page 22-1. Bend the rib's spar attach flange until it's parallel to the forward edge of the skin.

**Step 3:** Layout and drill #40 the joggled portion of the three FL-1007-L Hinge Brackets as shown in Figure 3.

**CAUTION: Do not drill the joggled portion of the FL-1007-R Hinge Brackets at this time. They will be match-drilled from the FL-1007-L Hinge Brackets while assembled on the FL-1003-L Spar.**

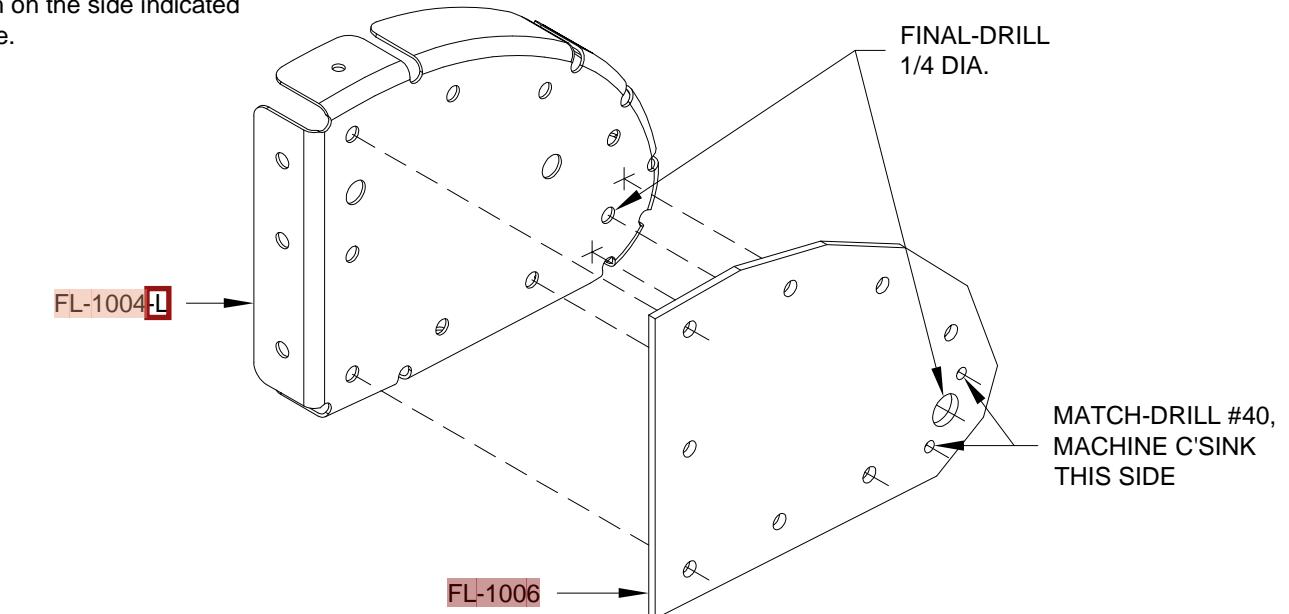


**FIGURE 3: DRILL LEFT HINGE BRACKETS ONLY**

**Step 4:** Make the outboard rod end rib subassembly by clecoing an FL-1006 Doubler to an FL-1004-L Nose Rib as shown in Figure 4. Final-Drill #30 the 1/8" holes common to the two parts.

Final-Drill the 1/4" hole in the doubler and the corresponding 1/8" hole in the rib using a 1/4" drill.

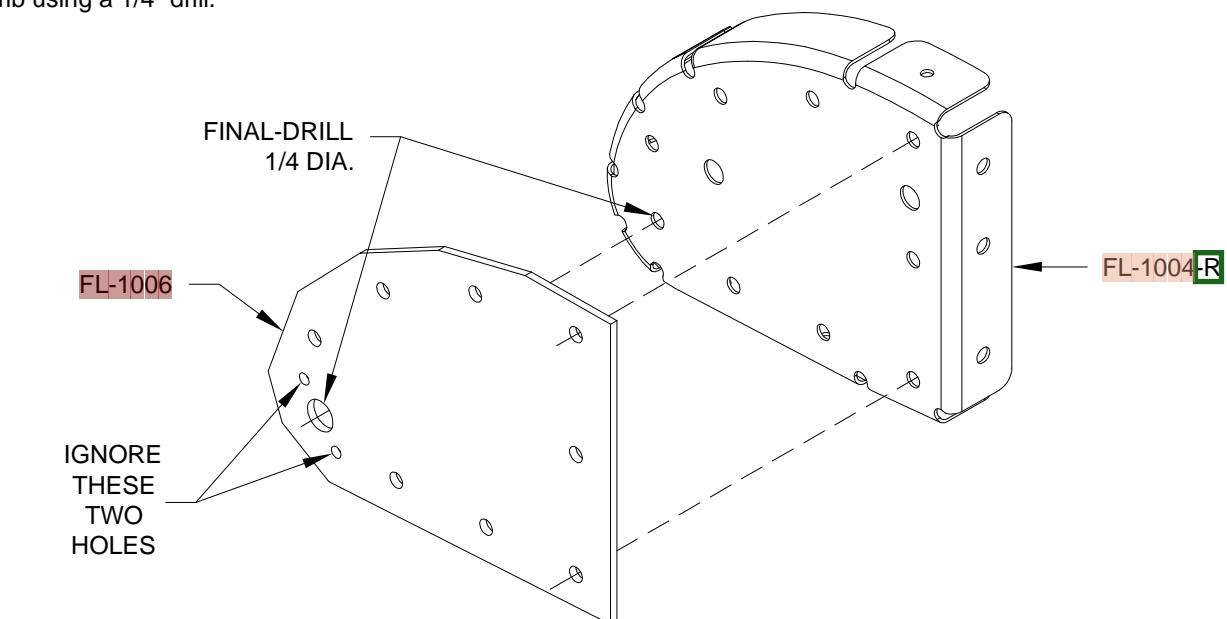
Match-Drill #40 the two 3/32" doubler holes into the nose rib. Machine countersink these two holes in the doubler for AN426AD3 rivets, flush on the side indicated in the figure.



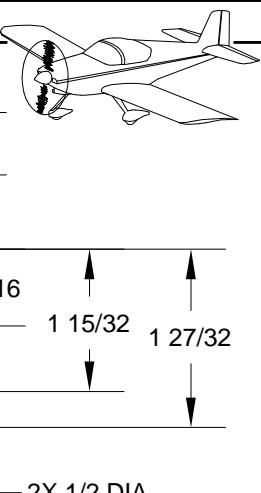
**FIGURE 4: OUTBOARD ROD END RIB SUBASSEMBLY**

**Step 5:** Make the inboard rod end rib subassembly by clecoing an FL-1006 Doubler to an FL-1004-R Nose Rib as shown in Figure 5. Final-Drill #30 the 1/8" holes common to the two parts.

Final-Drill the 1/4" hole in the doubler and the corresponding 1/8" hole in the rib using a 1/4" drill.

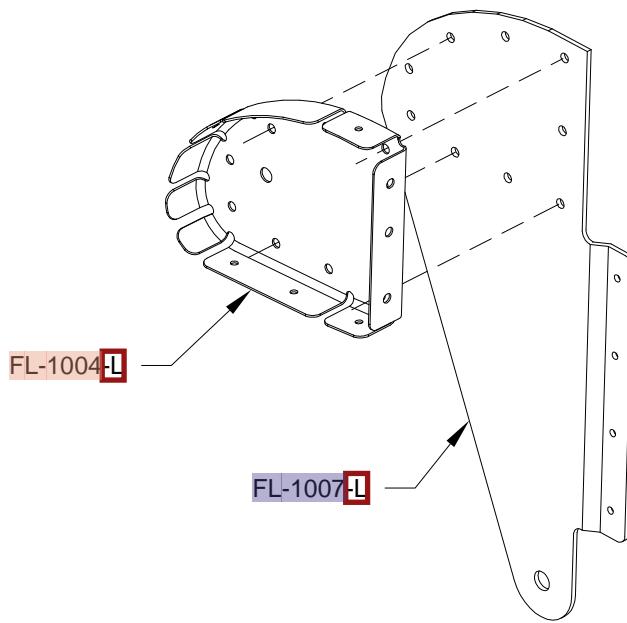


**FIGURE 5: INBOARD ROD END RIB SUBASSEMBLY**



Step 1: Cleco together two left hinge pair rib subassemblies which are made up of an FL-1004-L Nose Rib and an FL-1007-L Hinge Bracket as shown in Figure 1.

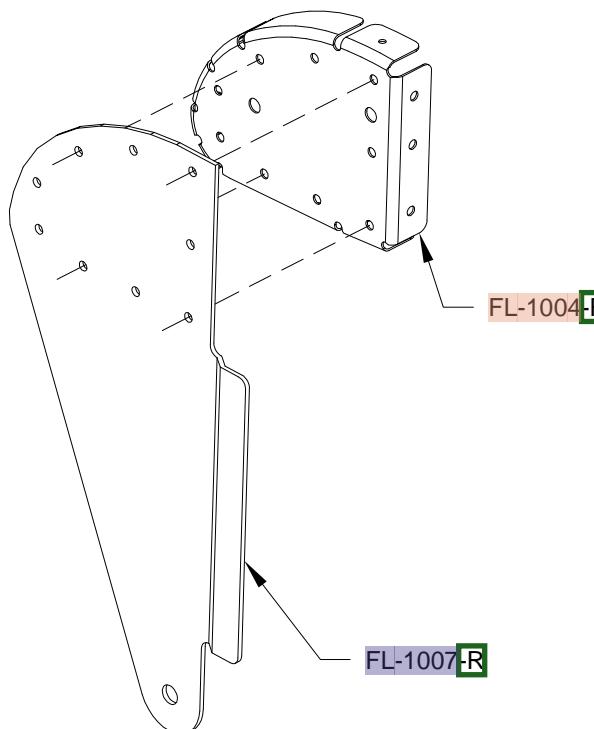
Final-Drill #30 the 1/8" holes common to the two parts.



**FIGURE 1: LEFT HINGE PAIR RIB SUBASSEMBLY**

Step 2: Cleco together two right hinge pair rib subassemblies which are made up of an FL-1004-R Nose Rib and an FL-1007-R Hinge Bracket as shown in Figure 2.

Final-Drill #30 the 1/8" holes common to the two parts.

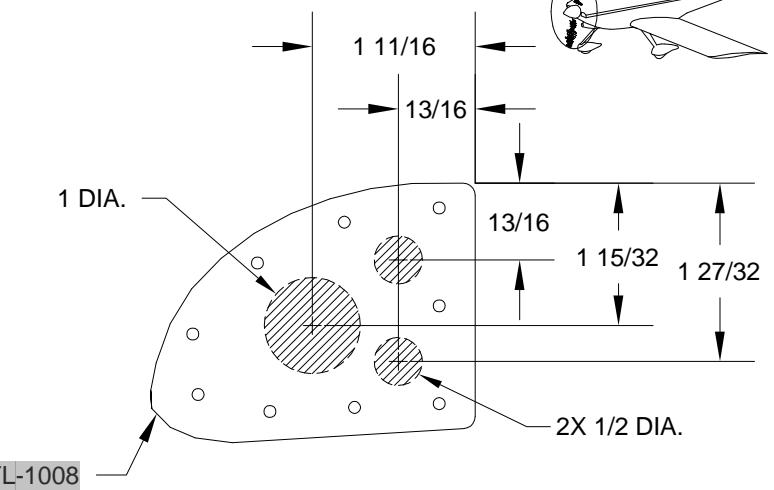


**FIGURE 2: RIGHT HINGE PAIR RIB SUBASSEMBLY**

Step 3: Flatten two FL-1008 Spacers if/as required since they may be bowed due to the punching process.

Make sure they nest between the FL-1007-L and FL-1007-R Hinge Brackets without gaps.

If desired, drill optional lightening holes in the spacers using the dimensions provided in Figure 3.



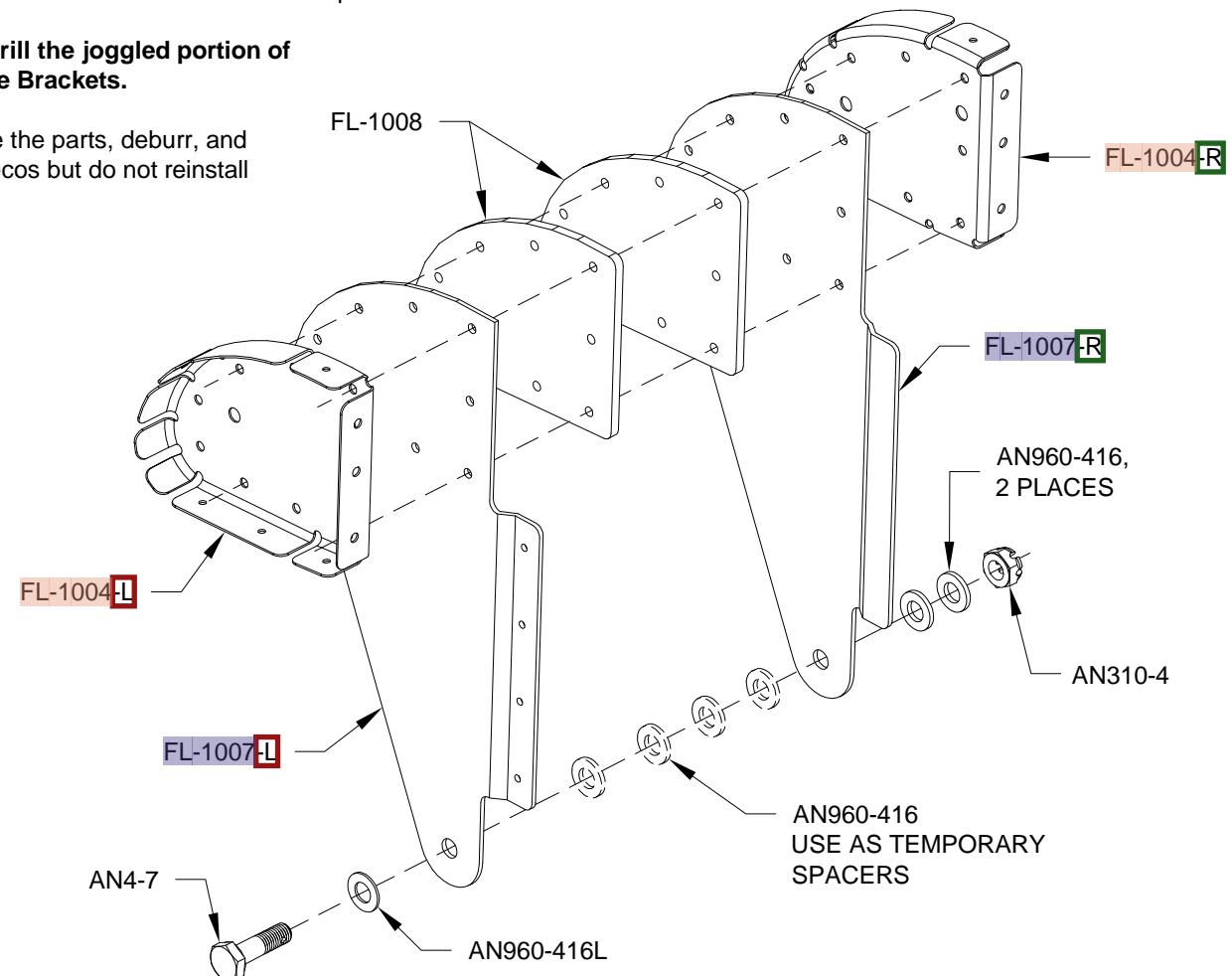
**FIGURE 3: SPACER**

Step 4: Cleco together the center hinge subassembly using the parts shown in Figure 4. Space the FL-1007-L & R Hinge Brackets using the washers shown and insert a 1/4 in. bolt to maintain alignment.

Final-Drill #30 the nine 1/8" holes common to all six parts.

**CAUTION: Do not drill the jogged portion of the FL-1007-R Hinge Brackets.**

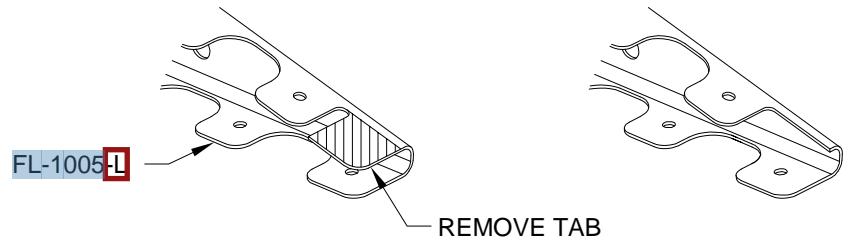
Step 5: Disassemble the parts, deburr, and reassemble using clecos but do not reinstall the hardware.



**FIGURE 4: CENTER HINGE SUBASSEMBLY**



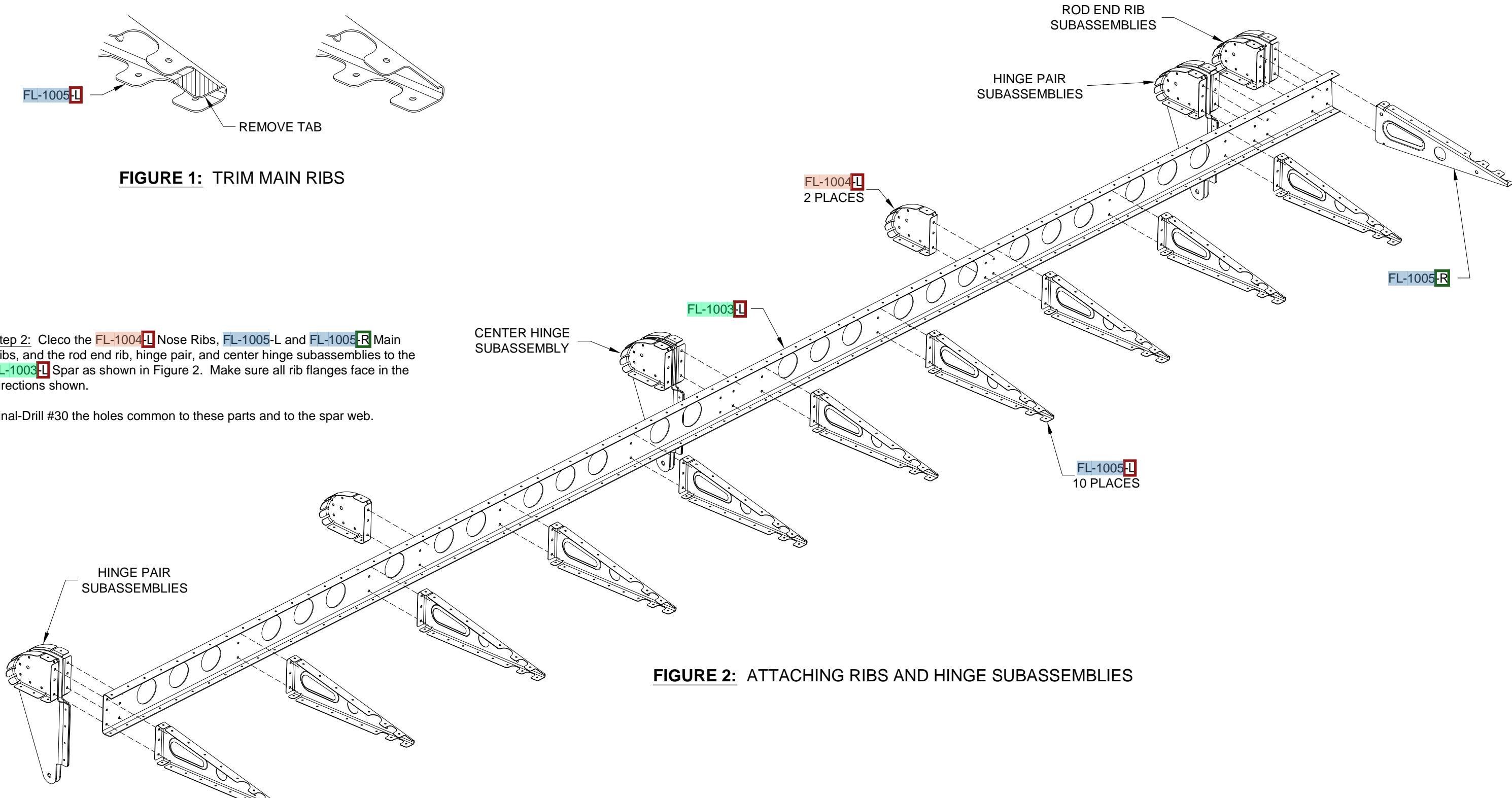
Step 1: Trim away the small tab which has no pre-punched hole on all **FL-1005-L** and **FL-1005-R** Main Ribs as shown in Figure 1. Trim only as deep as the notch. This will permit dimpling of the rivet hole in the lower aft-most flange.



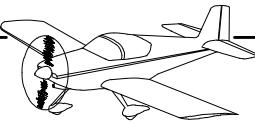
**FIGURE 1: TRIM MAIN RIBS**

Step 2: Cleco the **FL-1004-L** Nose Ribs, **FL-1005-L** and **FL-1005-R** Main Ribs, and the rod end rib, hinge pair, and center hinge subassemblies to the **FL-1003-L** Spar as shown in Figure 2. Make sure all rib flanges face in the directions shown.

Final-Drill #30 the holes common to these parts and to the spar web.



**FIGURE 2: ATTACHING RIBS AND HINGE SUBASSEMBLIES**



Note: Cleco the FL-1001B and FL-1001A Nose Skins to the bottom spar flange first, then wrap it around to the top spar flange. Failure to do this can cause the flap to be built with a twist.

Step 1: Cleco the FL-1002 Bottom Skin, FL-1001C Top Skin, FL-1001A-L Inboard Nose Skin and FL-1001B-R Outboard Nose Skin in place as shown in Figure 1.

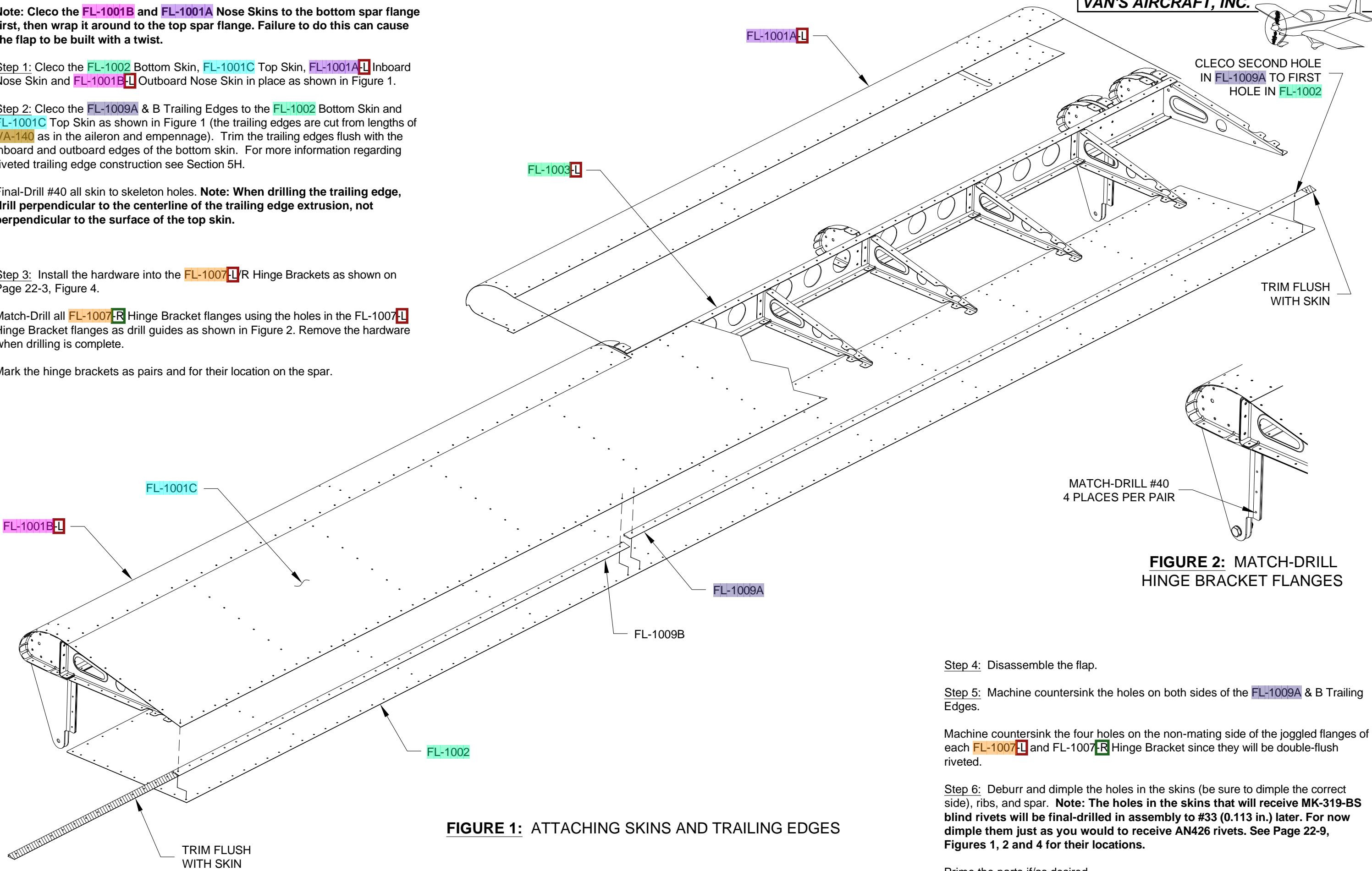
Step 2: Cleco the FL-1009A & B Trailing Edges to the FL-1002 Bottom Skin and FL-1001C Top Skin as shown in Figure 1 (the trailing edges are cut from lengths of VA-140 as in the aileron and empennage). Trim the trailing edges flush with the inboard and outboard edges of the bottom skin. For more information regarding riveted trailing edge construction see Section 5H.

Final-Drill #40 all skin to skeleton holes. Note: When drilling the trailing edge, drill perpendicular to the centerline of the trailing edge extrusion, not perpendicular to the surface of the top skin.

Step 3: Install the hardware into the FL-1007-L/R Hinge Brackets as shown on Page 22-3, Figure 4.

Match-Drill all FL-1007-R Hinge Bracket flanges using the holes in the FL-1007-L Hinge Bracket flanges as drill guides as shown in Figure 2. Remove the hardware when drilling is complete.

Mark the hinge brackets as pairs and for their location on the spar.



Step 4: Disassemble the flap.

Step 5: Machine countersink the holes on both sides of the FL-1009A & B Trailing Edges.

Machine countersink the four holes on the non-mating side of the joggled flanges of each FL-1007-L and FL-1007-R Hinge Bracket since they will be double-flush riveted.

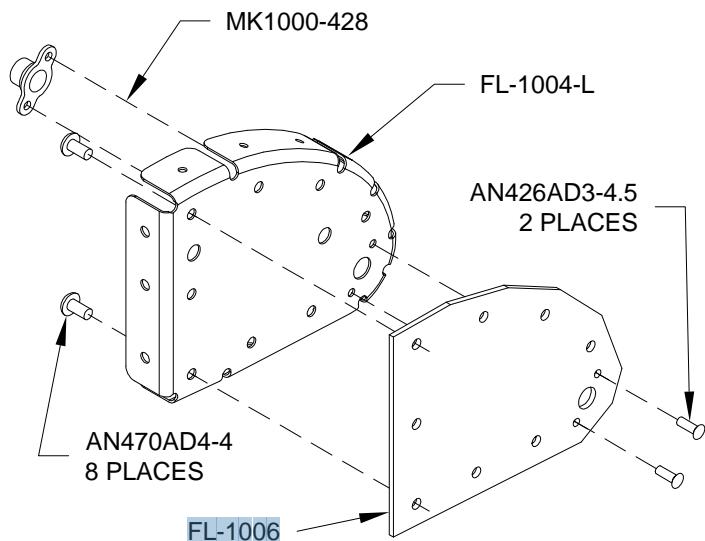
Step 6: Deburr and dimple the holes in the skins (be sure to dimple the correct side), ribs, and spar. Note: The holes in the skins that will receive MK-319-BS blind rivets will be final-drilled in assembly to #33 (0.113 in.) later. For now dimple them just as you would to receive AN426 rivets. See Page 22-9, Figures 1, 2 and 4 for their locations.

Prime the parts if/as desired.



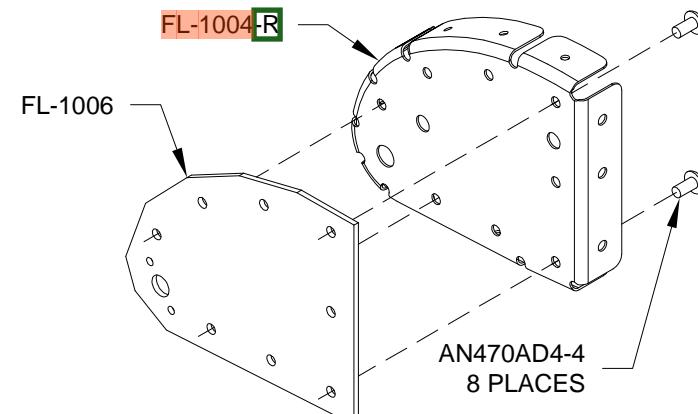
Now begins final assembly and riveting.

Step 1: Rivet the outboard rod end rib subassembly together using the rivets called out in Figure 1.



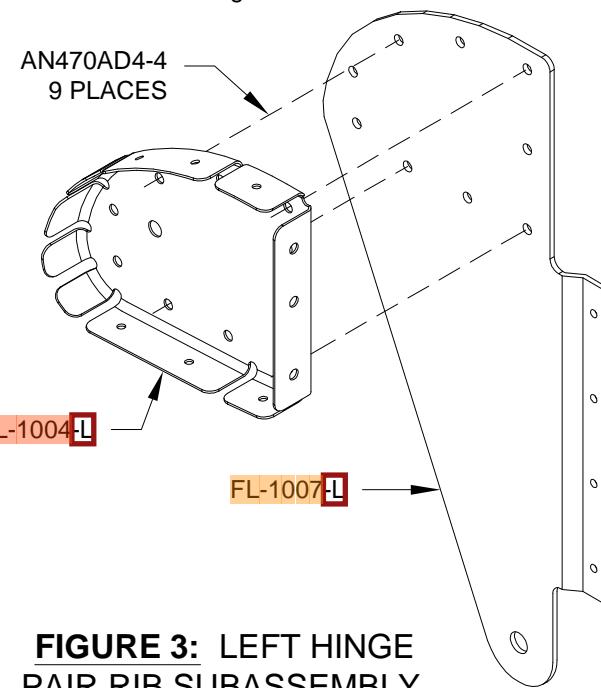
**FIGURE 1: OUTBOARD ROD END RIB SUBASSEMBLY**

Step 2: Rivet the inboard rod end rib subassembly together using the rivets called out in Figure 2. Place the manufactured head on the thinner material.



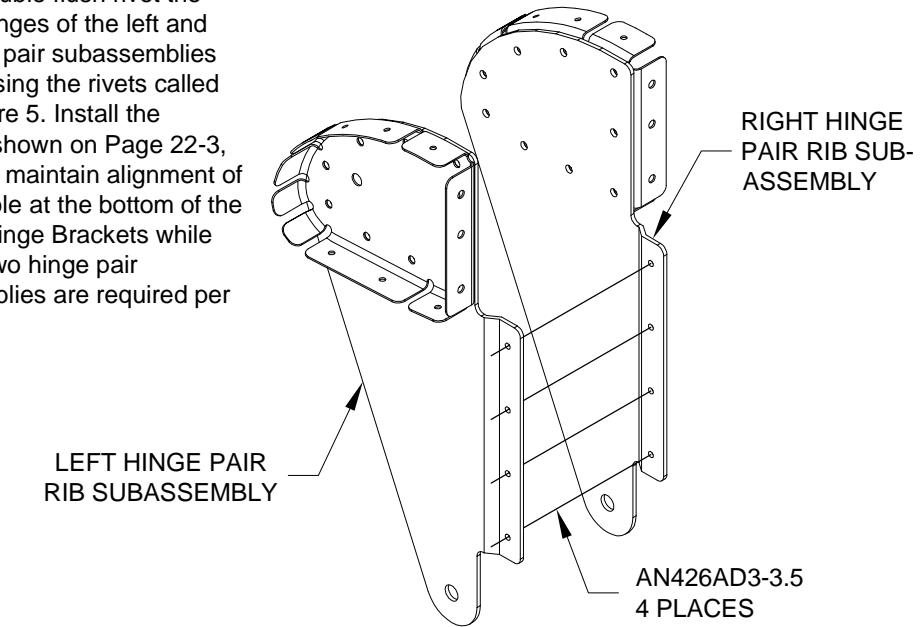
**FIGURE 2: INBOARD ROD END RIB SUBASSEMBLY**

Step 3: Rivet together the two left hinge pair rib subassemblies using the rivets called out in Figure 3.



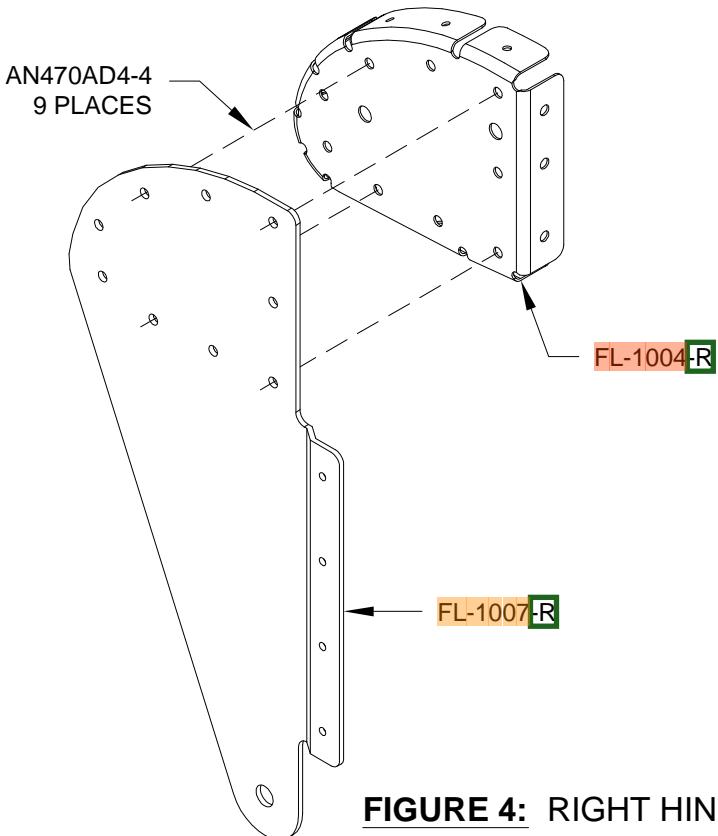
**FIGURE 3: LEFT HINGE PAIR RIB SUBASSEMBLY**

Step 5: Double flush rivet the joggled flanges of the left and right hinge pair subassemblies together using the rivets called out in Figure 5. Install the hardware shown on Page 22-3, Figure 4 to maintain alignment of the 1/4" hole at the bottom of the **FL-1007** Hinge Brackets while riveting. Two hinge pair subassemblies are required per flap.



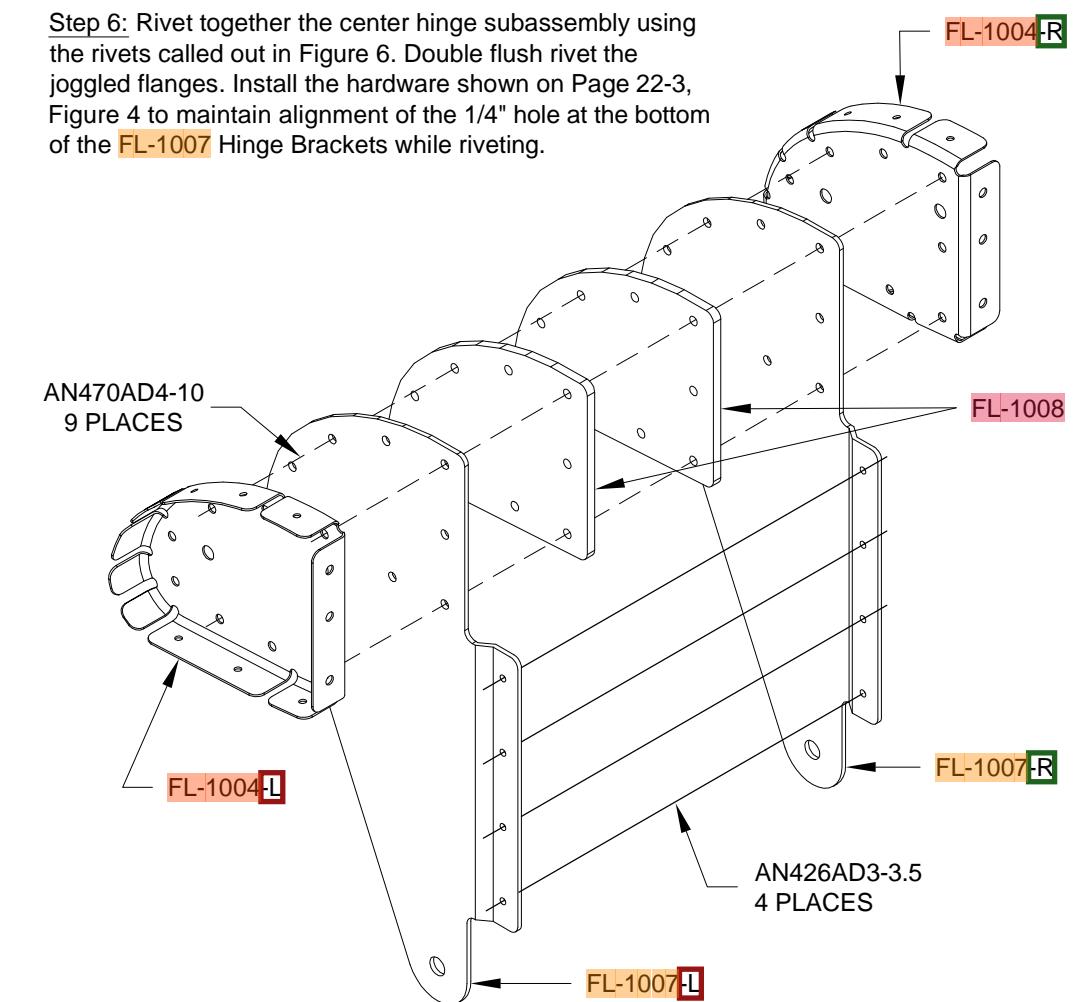
**FIGURE 5: HINGE PAIR SUBASSEMBLY**

Step 4: Rivet together the two right hinge pair rib subassemblies using the rivets called out in Figure 4.

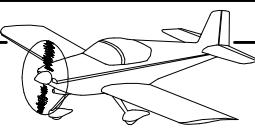


**FIGURE 4: RIGHT HINGE PAIR RIB SUBASSEMBLY**

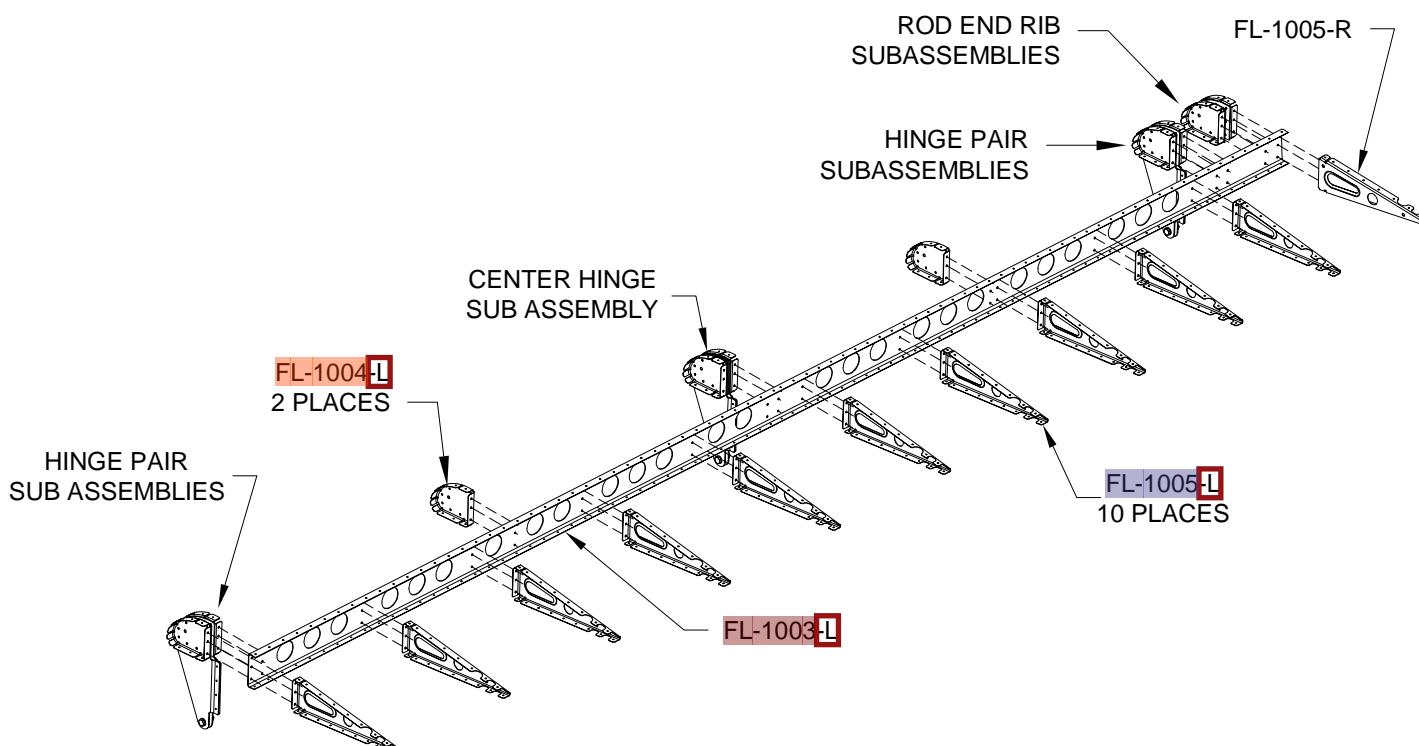
Step 6: Rivet together the center hinge subassembly using the rivets called out in Figure 6. Double flush rivet the joggled flanges. Install the hardware shown on Page 22-3, Figure 4 to maintain alignment of the 1/4" hole at the bottom of the **FL-1007** Hinge Brackets while riveting.



**FIGURE 6: CENTER HINGE SUBASSEMBLY**

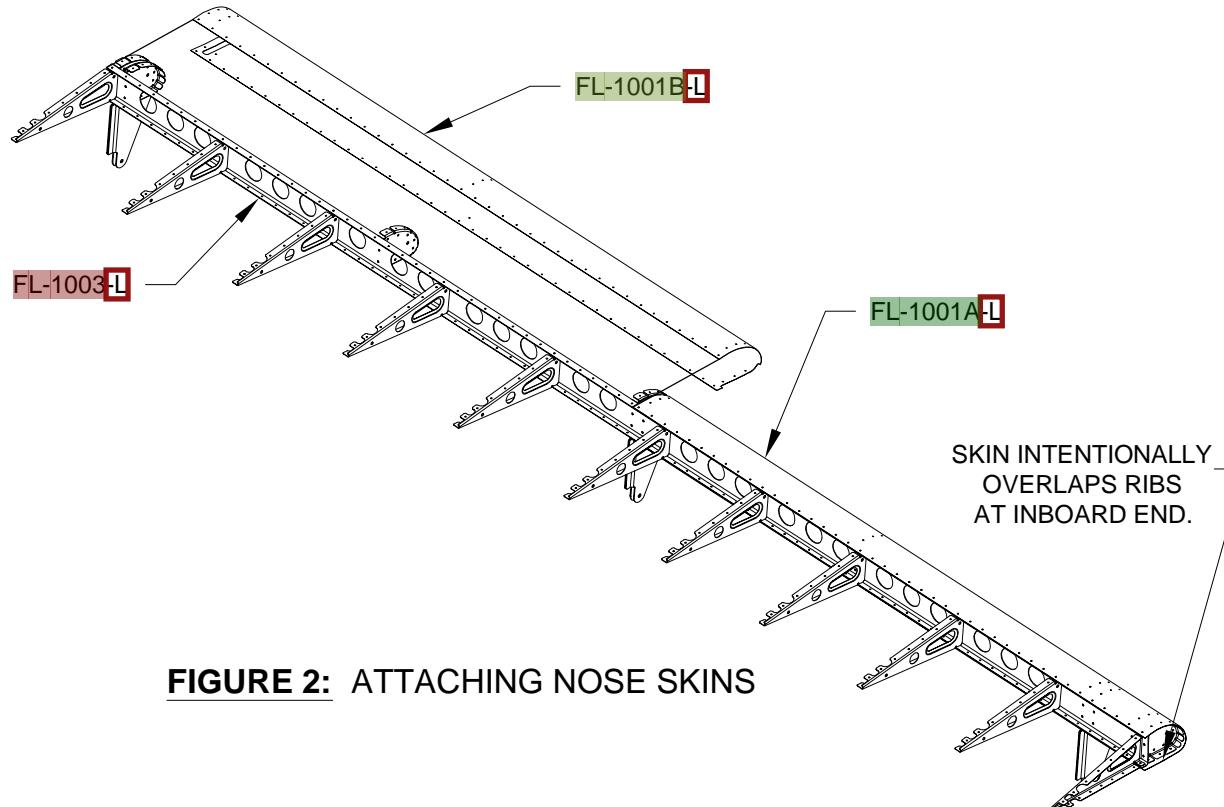


Step 1: Using AN470AD4-4 rivets, rivet the **FL-1004-L** Nose Ribs, **FL-1005-L** and **FL-1005-R** Main Ribs, rod end rib subassemblies, hinge pair subassemblies, and center hinge subassembly to the **FL-1003-L** Spar web as shown in Figure 1. The nose and main ribs on each end of the spar share rivets. Remove the hardware from all of the hinge brackets.



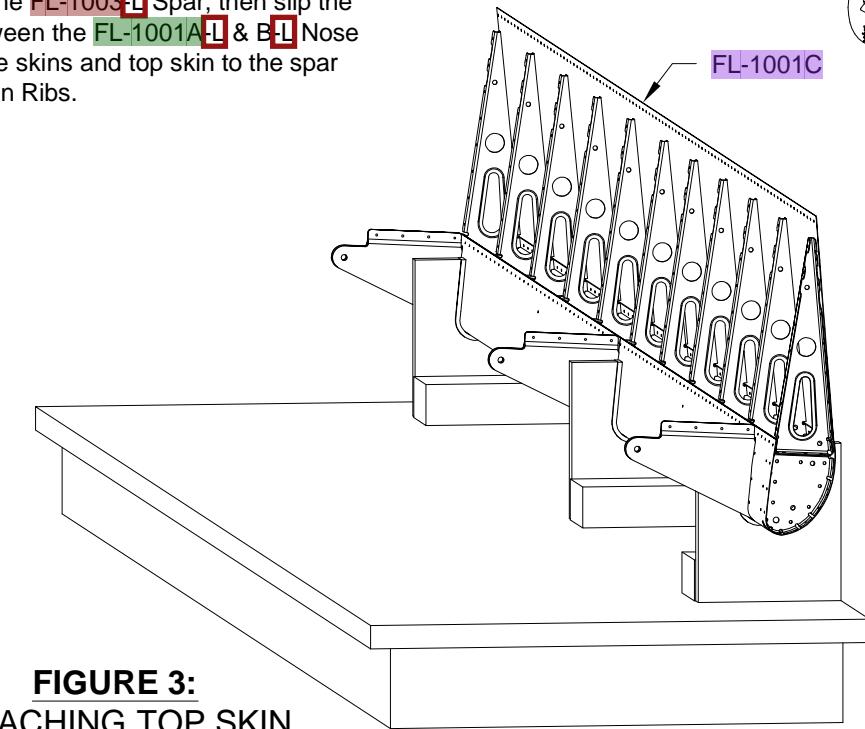
**FIGURE 1: RIVETING RIBS AND SUB ASSEMBLIES**

Step 2: Put a slight bend in the trailing edges of the **FL-1001A-L** Inboard Nose Skin and **FL-1001B-L** Outboard Nose Skin so that they will lay down flat and tight on the **FL-1001C** Top Skin and **FL-1002** Bottom Skin after riveting. Slide the inboard nose skin and the outboard nose skin over the **FL-1007** Hinge Brackets and cleco the nose skins in place as shown in Figure 2. This makes the **FL-1003-L** Spar somewhat rigid. Use only a few clecos on the top; they will be removed in the next step.



**FIGURE 2: ATTACHING NOSE SKINS**

Step 3: Put the flap in the cradles as shown in Figure 3. Remove the clecos along the top flange of the **FL-1003-L** Spar, then slip the **FL-1001C** Top Skin into place between the **FL-1001A-L** & **B-L** Nose Skins and the spar. Cleco the nose skins and top skin to the spar and **FL-1005-L** and **FL-1005-R** Main Ribs.

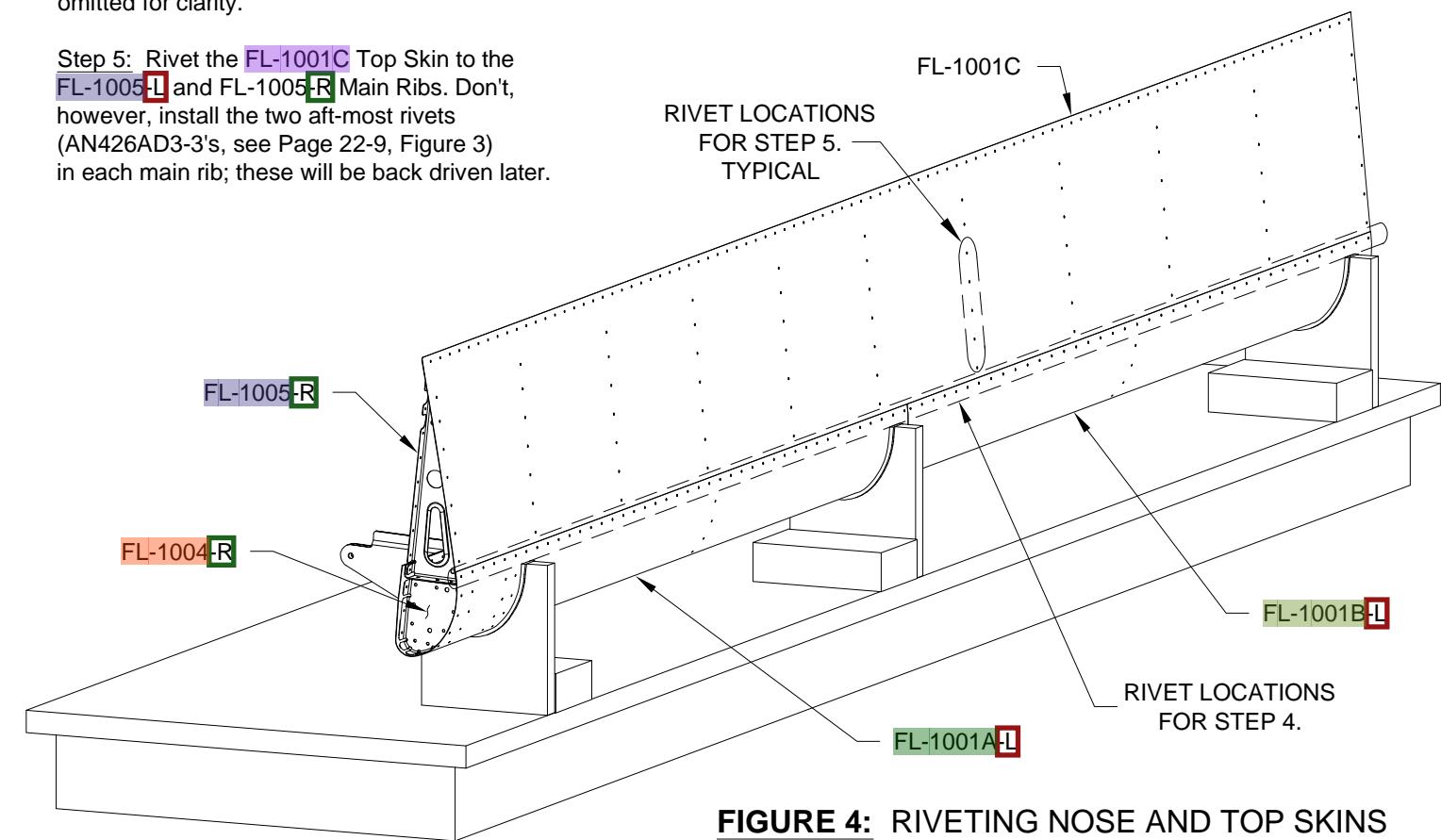


**FIGURE 3:  
ATTACHING TOP SKIN**

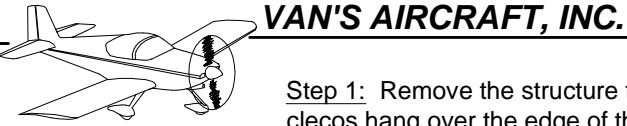
**NOTE:** All the rivets used to attach the skins to the skeleton can be found on Page 22-9, Figures 1,2,3, and 4.

Step 4: Rivet the **FL-1001A-L** Inboard Nose Skin, **FL-1001B-L** Outboard Nose Skin, **FL-1001C** Top Skin, and the small flange at the front of the **FL-1005-L** & **R** Main Ribs to the top flange of the **FL-1003-L** Spar as shown in Figure 4. Some rivet holes have been omitted for clarity.

Step 5: Rivet the **FL-1001C** Top Skin to the **FL-1005-L** and **FL-1005-R** Main Ribs. Don't, however, install the two aft-most rivets (AN426AD3-3's, see Page 22-9, Figure 3) in each main rib; these will be back driven later.

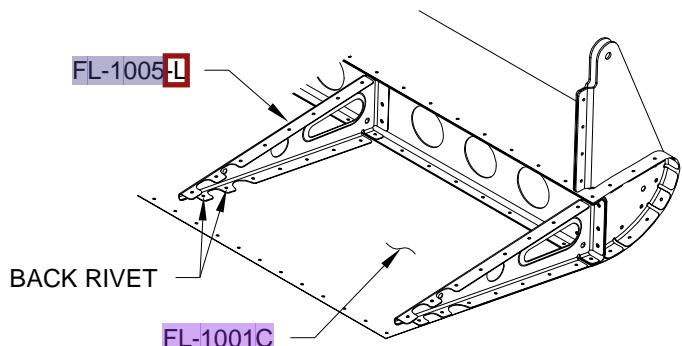


**FIGURE 4: RIVETING NOSE AND TOP SKINS**



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**Step 1:** Remove the structure from the cradles and lay it top side down on a flat plate, letting the nose rib clecos hang over the edge of the table. Back rivet the two aft most rivets in the top flange of the **FL-1005** Main Ribs to the **FL-1001C** Top Skin as shown in Figure 1. (AN426AD3-3.5 Rivets, which were used to attach the forward portion of the ribs to the skins, have a tendency here to bend over when back riveting. Therefore, the shorter AN426AD3-3 rivets are used.)



**FIGURE 1: BACK RIVETING TOP SKIN**

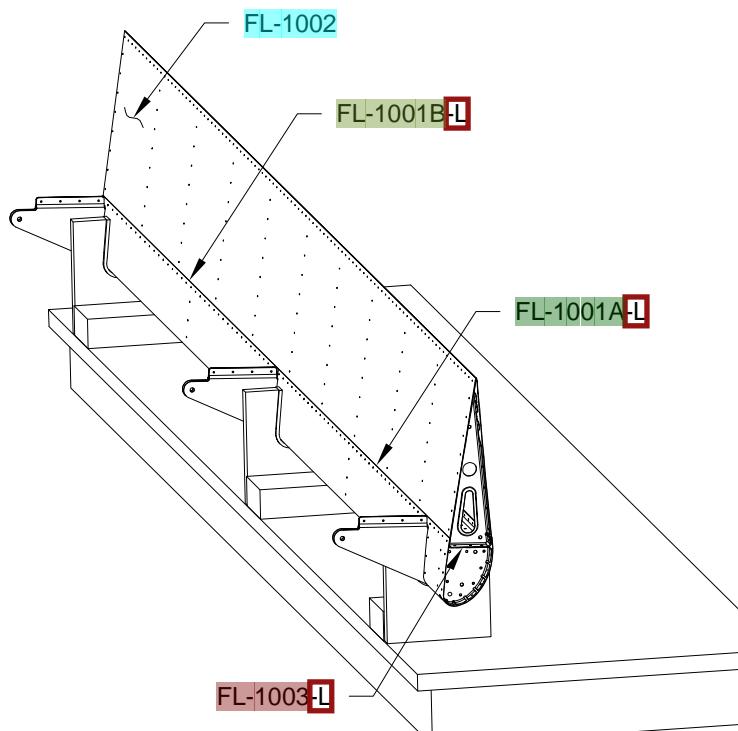
**Step 2:** Reposition the cradles on the bench as shown in Figure 2. Place the flap back into the cradles. Remove clecos from the bottom flange of the **FL-1003-L** Spar.

Insert the **FL-1002** Bottom Skin between the **FL-1001A-L** and **FL-1001B-L** Nose Skins and the spar. Cleco the bottom skin and nose skins to the spar only.

Rivet the bottom and nose skins to the spar only.

**Step 3:** Final-Drill #33 the underside of the **FL-1001A-L** and **FL-1001B-L** Nose Skins to the **FL-1004** Nose Ribs. Blind rivet these holes.

Remove the flap from the cradles. Final-Drill #33 the top side of the nose skin to nose rib holes, then blind rivet.

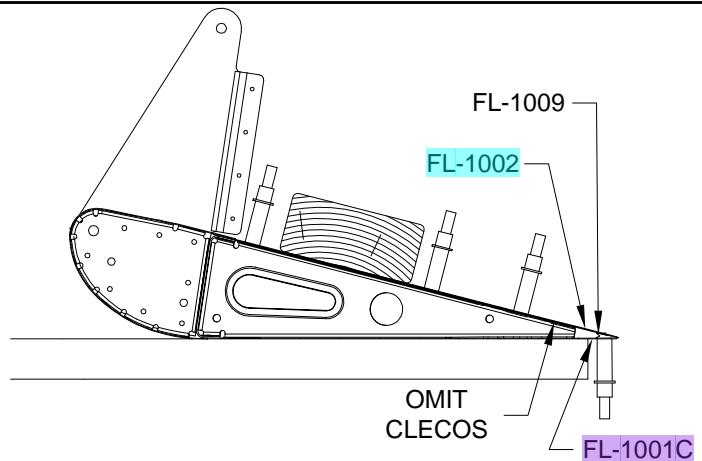


**FIGURE 2: BOTTOM SKIN INSTALLATION**

**Step 4:** Lay the flap top side down on a very flat surface as shown in Figure 3.

**Step 5:** Using the directions for cleaning the fuel tank components in Section 5S, clean the **FL-1009A** and **B** Trailing Edges and the contact area of the trailing edge along both **FL-1001C** Top Skin and **FL-1002** Bottom Skin. These parts need to be cleaned in preparation for applying fuel tank sealant which will bond the trailing edge together before riveting and help insure a straight trailing edge after riveting.

**NOTE:** The tank sealant currently sold by Van's has a working time of two hours. Steps 6 through 8 will have to be accomplished within this time.



**FIGURE 3: RIVETING BOTTOM SKIN**

**Step 6:** Mix and apply a **thin** coat of tank sealant to both surfaces of the **FL-1009A** and **FL-1009B** Trailing Edges.

Cleco the trailing edge to the **FL-1001C** Top Skin and the **FL-1002** Bottom Skin as shown in Figure 3.

**Step 7:** Cleco the **FL-1002** Bottom Skin to the **FL-1005-L** and **R** Main Ribs. **CAUTION: Do not cleco the aft most main rib hole because the top skin may be dented since the cleco tip is longer than the trailing edge is deep.**

**Step 8:** Weight the flap down to keep it flat until the tank sealant has cured.

**Step 9:** After curing remove the clecos only from the trailing edge. Clear the holes of any sealant with a drill spun with your fingers. Keep the weight on the flap.

**Step 10:** Final-Drill #33 then blind rivet the **FL-1002** Bottom Skin to **FL-1005-L** and **FL-1005-R** Main Ribs.

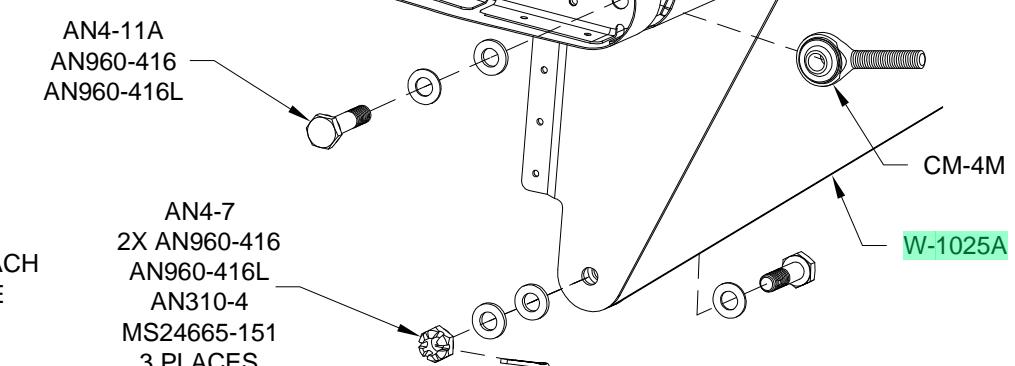
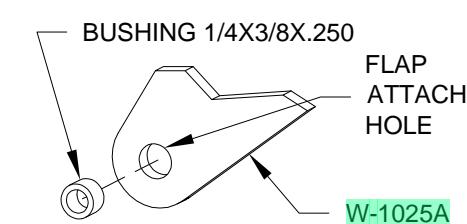
**Step 11:** Rivet, using a hand squeezer, the solid rivets into the **FL-1005** Main Ribs at each end of the flap.

**Step 12:** Refer to Section 5H to complete the riveting of the flap trailing edge.

**Step 13:** Press fit a **BUSHING 1/4X3/8X.250** into the flap attach hole in each of the six **W-1025A** Flap Hinge Brackets. See Figure 4.

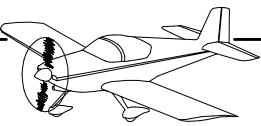
**Step 14:** Attach the CM-4M Rod End to the flap's inboard end using the hardware shown in Figure 5. This step may be delayed until after painting.

Use the hardware shown to attach the flap to the flap hinge brackets.



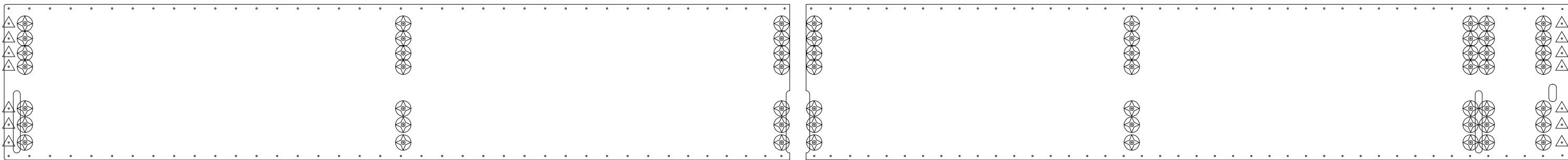
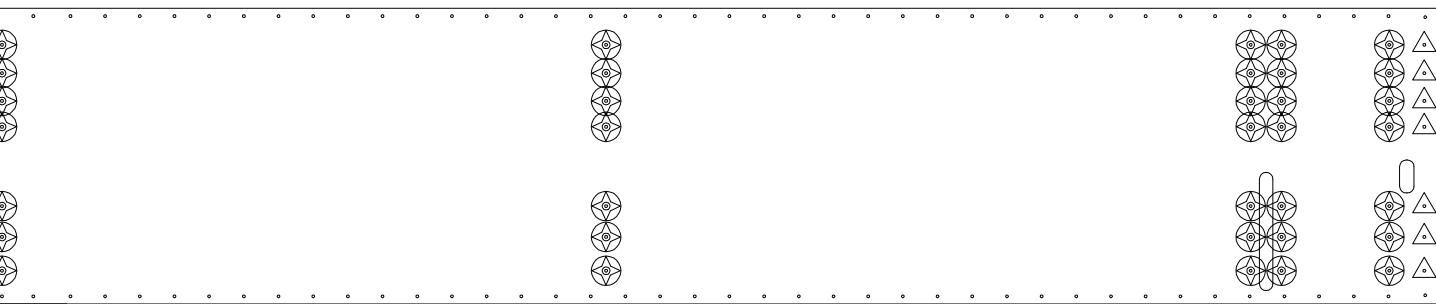
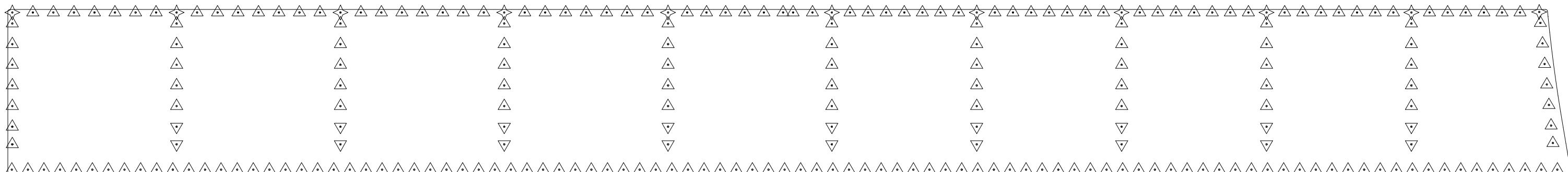
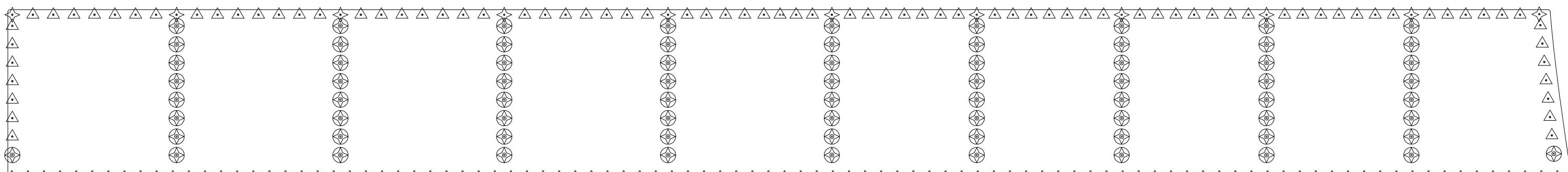
**FIGURE 4: BUSHING PRESS FIT**

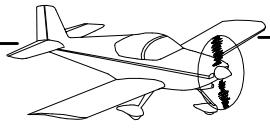
**FIGURE 5: ATTACHING ROD END**



## RIVET LEGEND

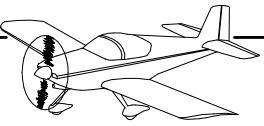
- ▽ AN426AD3-3
- △ AN426AD3-3.5
- ◇ AN426AD3-4
- ◎ MK-319-BS

**FIGURE 1:** FL-1001B-L OUTBOARD NOSE SKIN RIVETS**FIGURE 2:** FL-1001A-L INBOARD NOSE SKIN RIVETS**FIGURE 3:** FL-1001C TOP SKIN RIVETS**FIGURE 4:** FL-1002 BOTTOM SKIN RIVETS



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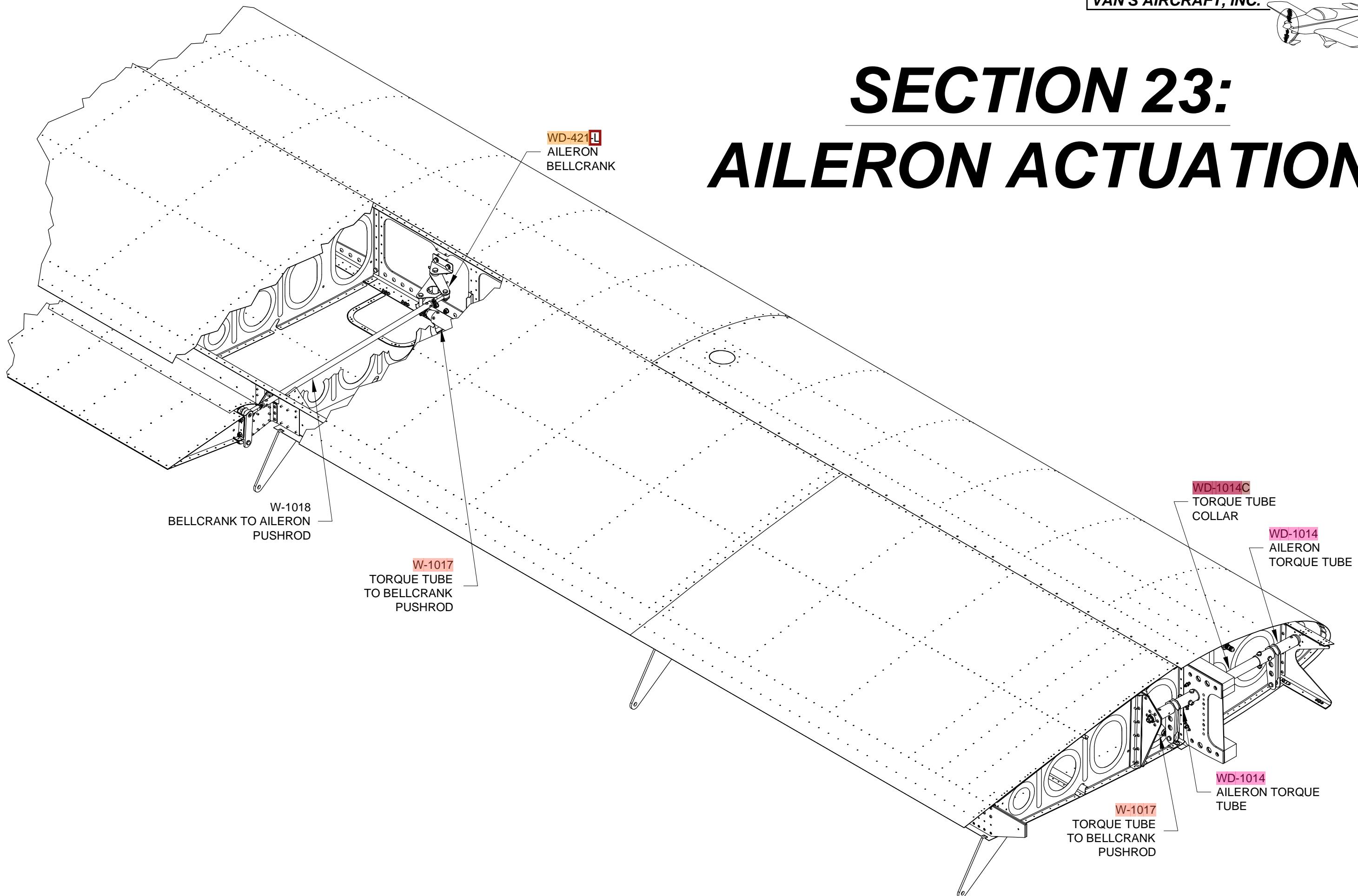
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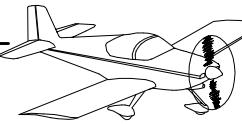


# SECTION 23:

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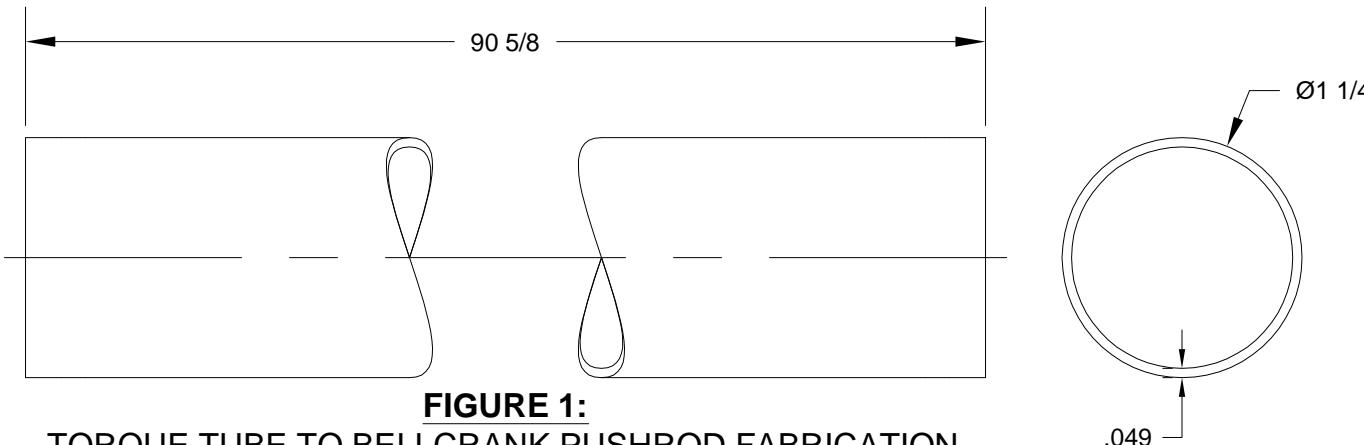
# AILERON ACTUATION





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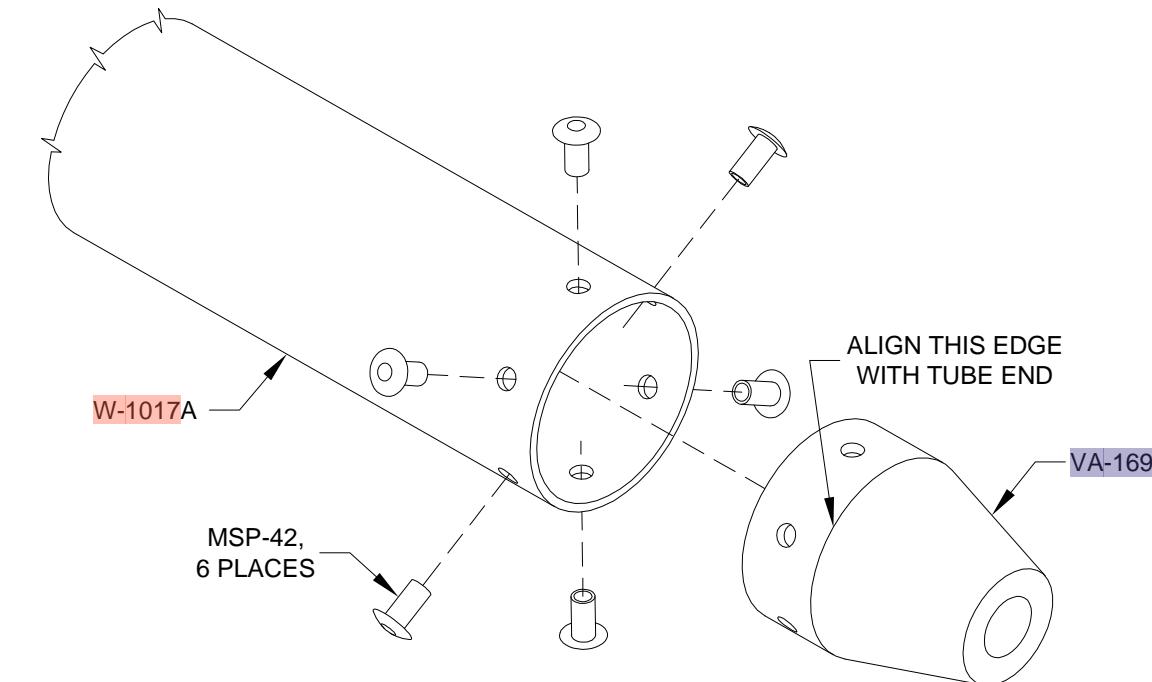
Step 1: Fabricate two **W-1017A** Torque Tube to Bellcrank Pushrods by cutting two pieces of AT6-049 X 1 1/4 to the length shown in Figure 1.



**FIGURE 1:**  
TORQUE TUBE TO BELLCRANK PUSHROD FABRICATION

Step 3 (continued): Mark the threaded rod ends so that they can be re-installed in the same position as when they were match-drilled. Remove the threaded rod ends from the torque tube to bellcrank pushrods and deburr all holes in all parts and prime all parts inside and out.

Permanently install the threaded rod ends to the torque tube to bellcrank pushrods using the rivets called-out in Figure 2.



**FIGURE 2:**  
THREADED ROD END INSTALLATION

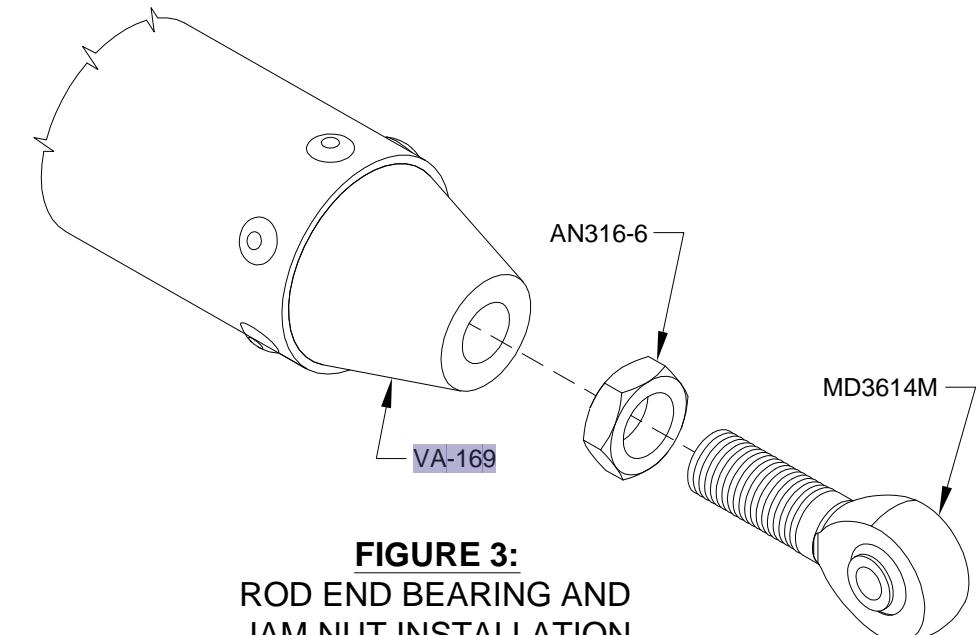
Step 2: Cut-out Page 23-10, Figure 1 and use it as a wrap-around template for locating the rivet holes in both ends of both **W-1017A** Torque Tube to Bellcrank Pushrods. Use clear tape to make the template into a ring and align it with the end of the pushrod. Center-punch the "cross hairs" in the wrap-around template. Remove the template and use a #40 drill to make six pilot holes in each end of both torque tube to bellcrank pushrods. Deburr the hole edges on the inside of the pushrod tubes.

Step 3: Insert a **VA-169** Threaded Rod End into the end of one of the **W-1017A** Torque Tube to Bellcrank Pushrods. Proper engagement of the threaded rod end in the torque tube to bellcrank pushrod is when the end of the tube coincides with the edge of the taper in the threaded rod end. See Figure 2.

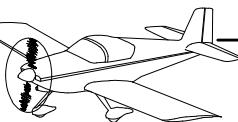
Using a #30 bit, match-drill the threaded rod end using the pilot holes in the torque tube to bellcrank pushrod as drill guides. Insert clecos in the holes as match-drilling progresses around the circumference of the torque tube to bellcrank pushrod.

Repeat until threaded rod ends have been match-drilled to both ends of both torque tube to bellcrank pushrods.

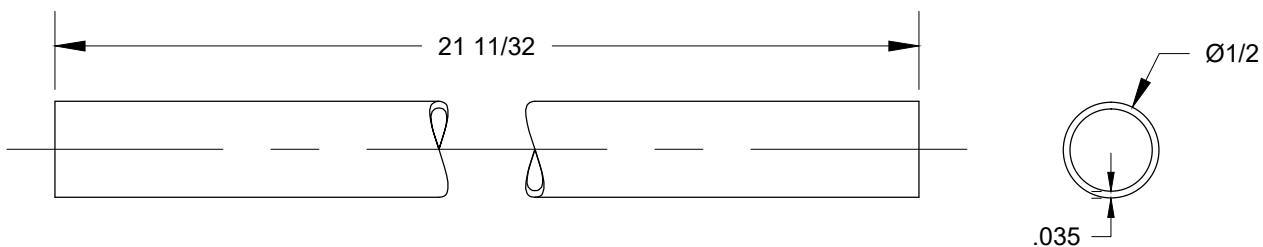
Step 4: Install rod end bearings and jam nuts into the **VA-169** Threaded Rod Ends as shown in Figure 3. Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length of 94 7/16 inches. The rod end bearing engagement may be adjusted during installation of the **W-1017** Torque Tube to Bellcrank Pushrod.



**FIGURE 3:**  
ROD END BEARING AND  
JAM NUT INSTALLATION

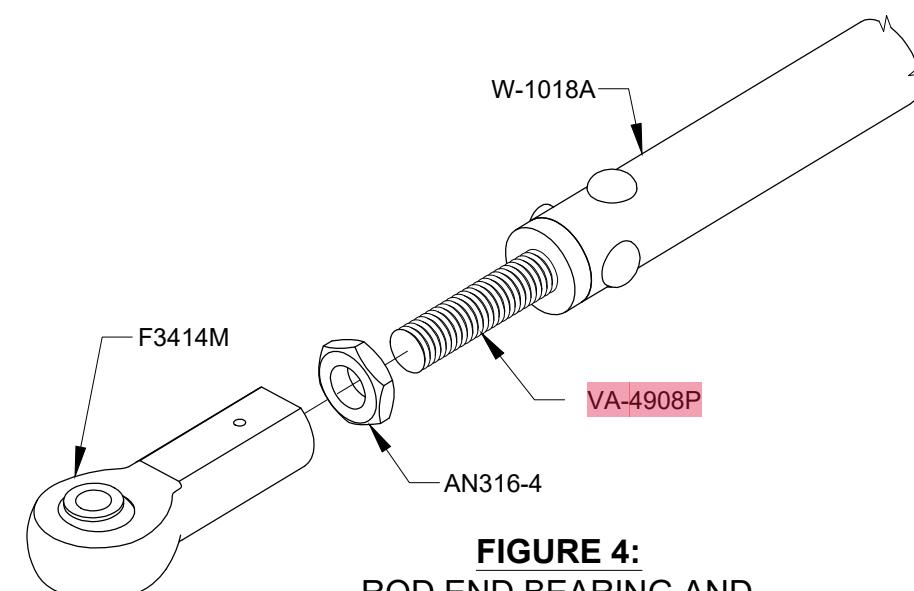


Step 1: Fabricate two **W-1018A** Bellcrank to Aileron Pushrods by cutting two pieces of ST4130-035 X 1/2 to the length shown in Figure 1.



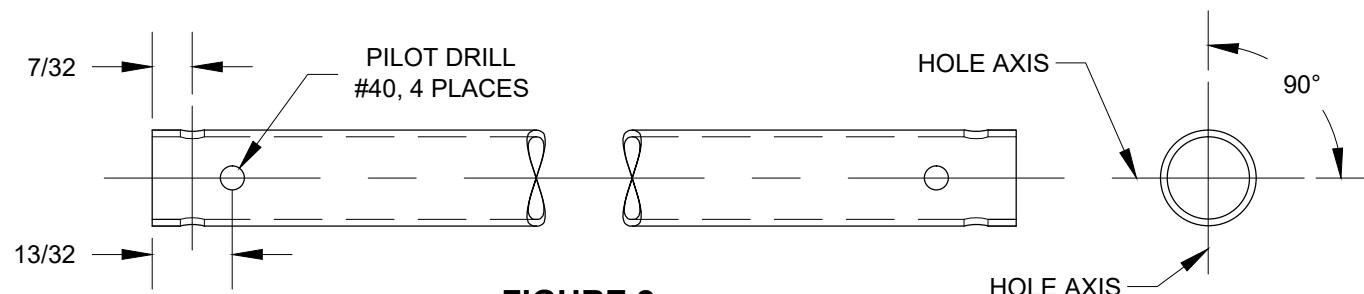
**FIGURE 1:**  
BELLCRANK TO AILERON PUSHROD FABRICATION

Step 4: Install rod end bearings and jam nuts into the **VA-4908P** Threaded Rod Ends as shown in Figure 4. Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length of 25 1/4 inches. The rod end bearing engagement may be adjusted during installation of the W-1018 Bellcrank to Aileron Pushrod.



**FIGURE 4:**  
ROD END BEARING AND JAM NUT INSTALLATION

Step 2: Use a #40 drill to make four pilot holes in each end of both **W-1018A** Bellcrank to Aileron Pushrods as shown in Figure 2. Use a drill press to drill the holes and use a vee-block to support the pushrod tube while drilling. Deburr the hole edges on the inside of the pushrod tubes.



**FIGURE 2:**  
PILOT-DRILL BELLCRANK TO AILERON PUSHROD

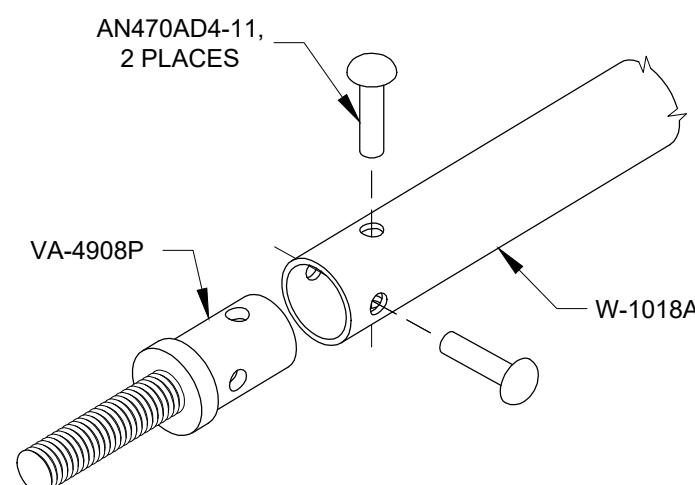
Step 3: Insert an **VA-4908P** Threaded Rod End into the end of one of the **W-1018A** Bellcrank to Aileron Pushrods until the step on the threaded rod end rests on the end of the bellcrank to aileron pushrod.

Using a #30 bit, match-drill the threaded rod end using the pilot holes in the bellcrank to aileron pushrod as drill guides. Insert clecos in the holes as match-drilling progresses.

Repeat until threaded rod ends have been match-drilled to both ends of both bellcrank to aileron pushrods.

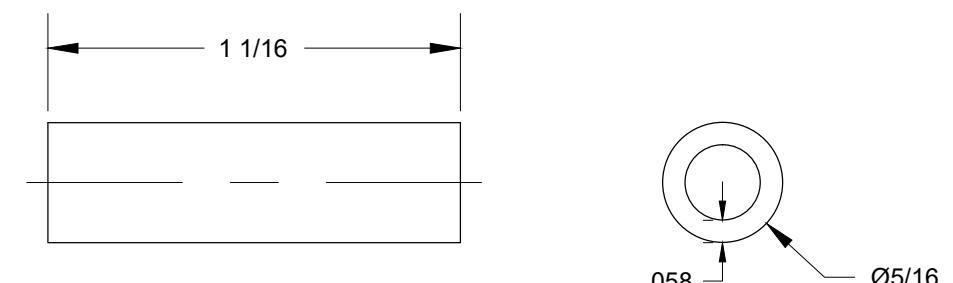
Mark the threaded rod ends so that they can be re-installed in the same position as when they were match-drilled. Remove the threaded rod ends from the bellcrank to aileron pushrods and deburr all holes in all parts. Prime the bellcrank to aileron pushrod inside and out.

Permanently install the threaded rod ends to the bellcrank to aileron pushrods using the rivets called-out in Figure 3.

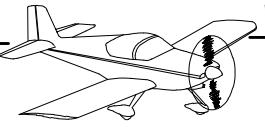


**FIGURE 3:**  
THREADED ROD END INSTALLATION

Step 5: Fabricate two W-1031 Aileron Bellcrank Spacers by cutting two pieces of AT6-058 X 5/16 to the length shown in Figure 5.



**FIGURE 5:**  
AILERON BELLCRANK SPACER FABRICATION

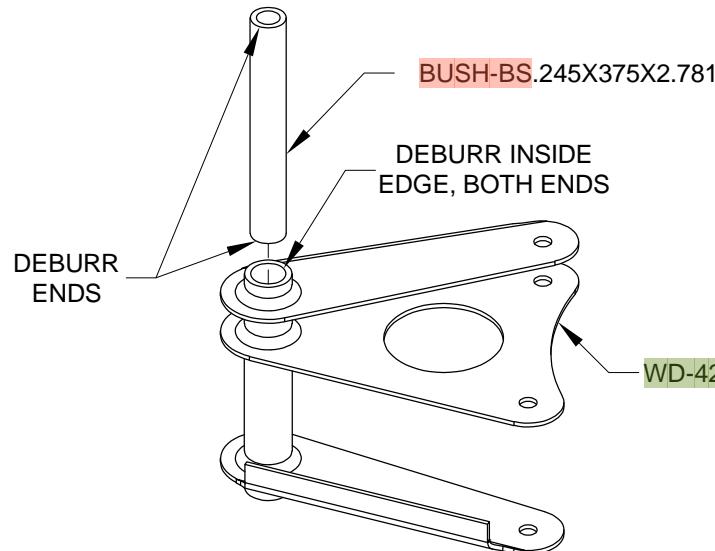


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Step 1: Check that the length of both of the **BUSH-BS.245X375X2.781** Aileron Bellcrank Bushings is between 2 3/4 inches and 2 25/32 inches. Check that an AN4 bolt will fit the inside diameter of the aileron bellcrank bushings and ream if required. Deburr the ends of the aileron bellcrank bushings so that they slide easily inside the **WD-421** Aileron Bellcranks. See Figure 1.

The pivot tube of the aileron bellcrank must be 1/32 inch to 1/16 inch shorter than the aileron bellcrank bushing. File the ends of the aileron bellcrank pivot tubes if/as required to achieve the correct length. Deburr the inside edges of the aileron bellcrank pivot tubes. See Figure 1.

Insert an aileron bellcrank bushing into each aileron bellcrank as shown in Figure 1.

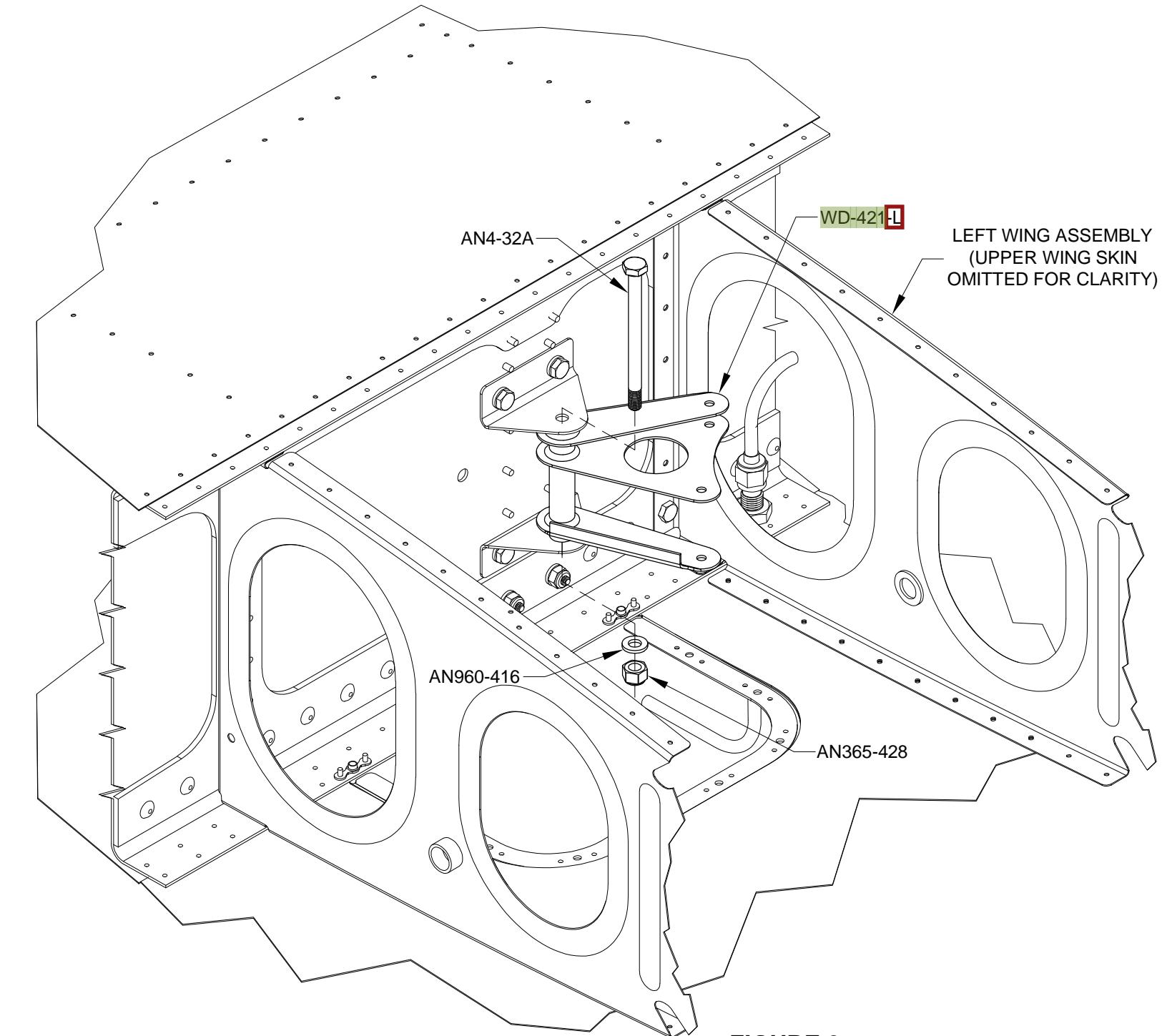


**FIGURE 1:**  
AILERON BELLCRANK BUSHING INSTALLATION

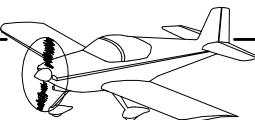
Step 2: Install the **WD-421-L** Aileron Bellcrank/**BUSH-BS.245X375X2.781** Aileron Bellcrank Bushing subassembly into the left wing as shown in Figure 2.

Install the **WD-421-R** Aileron Bellcrank/**BUSH-BS.245X375X2.781** Aileron Bellcrank Bushing subassembly into the right wing.

When the nuts are torqued to the value called-out in Section 5V, the aileron bellcranks must rotate freely on their aileron bellcrank bushings.



**FIGURE 2:**  
AILERON BELLCRANK INSTALLATION

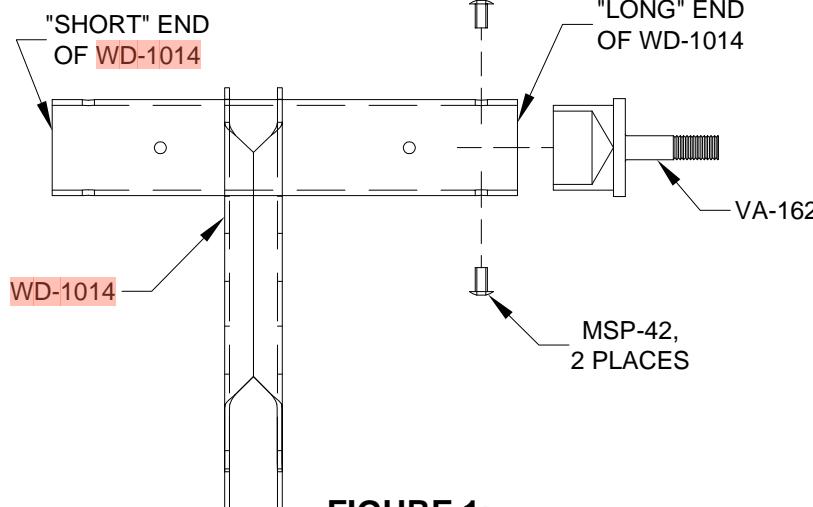


Step 1: Insert a VA-162 Pushrod End in the "long" end of two **WD-1014** Aileron Torque Tubes until the step on the pushrod end rests on the end of the aileron torque tube. See Figure 1.

Using a #30 bit, match-drill the pushrod ends using the holes in the aileron torque tubes as drill guides. See Figure 1. Install a cleco in each hole as it is match-drilled.

Mark the pushrod ends and aileron torque tubes so that the pushrod ends can be re-installed in the same orientation as when they were match-drilled. Remove the pushrod ends from the aileron torque tubes and deburr the holes. Attach the pushrod ends to the aileron torque tubes using the hardware called out in Figure 1.

The aileron torque tube subassemblies created in this step will subsequently be referred to as the **WD-1014 FORWARD** Forward Torque Tube Subassemblies.



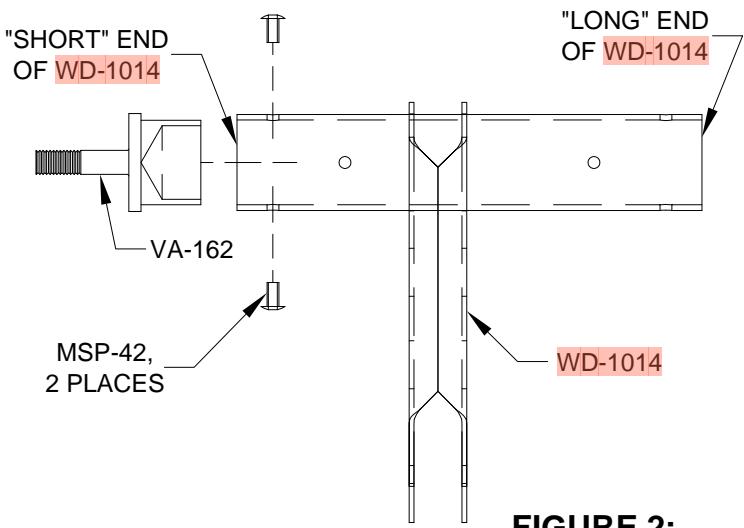
**FIGURE 1:**  
FORWARD TORQUE TUBE SUBASSEMBLY

Step 2: Insert a VA-162 Pushrod End in the "short" end of the two remaining **WD-1014** Aileron Torque Tubes until the step on the pushrod end rests on the end of the aileron torque tube. See Figure 2.

Using a #30 bit, match-drill the pushrod ends using the holes in the aileron torque tubes as drill guides. See Figure 2. Install a cleco in each hole as it is match-drilled.

Mark the pushrod ends and aileron torque tubes so that the pushrod ends can be re-installed in the same orientation as when they were match-drilled. Remove the pushrod ends from the aileron torque tubes and deburr the holes. Attach the pushrod ends to the torque tubes using the hardware called out in Figure 2.

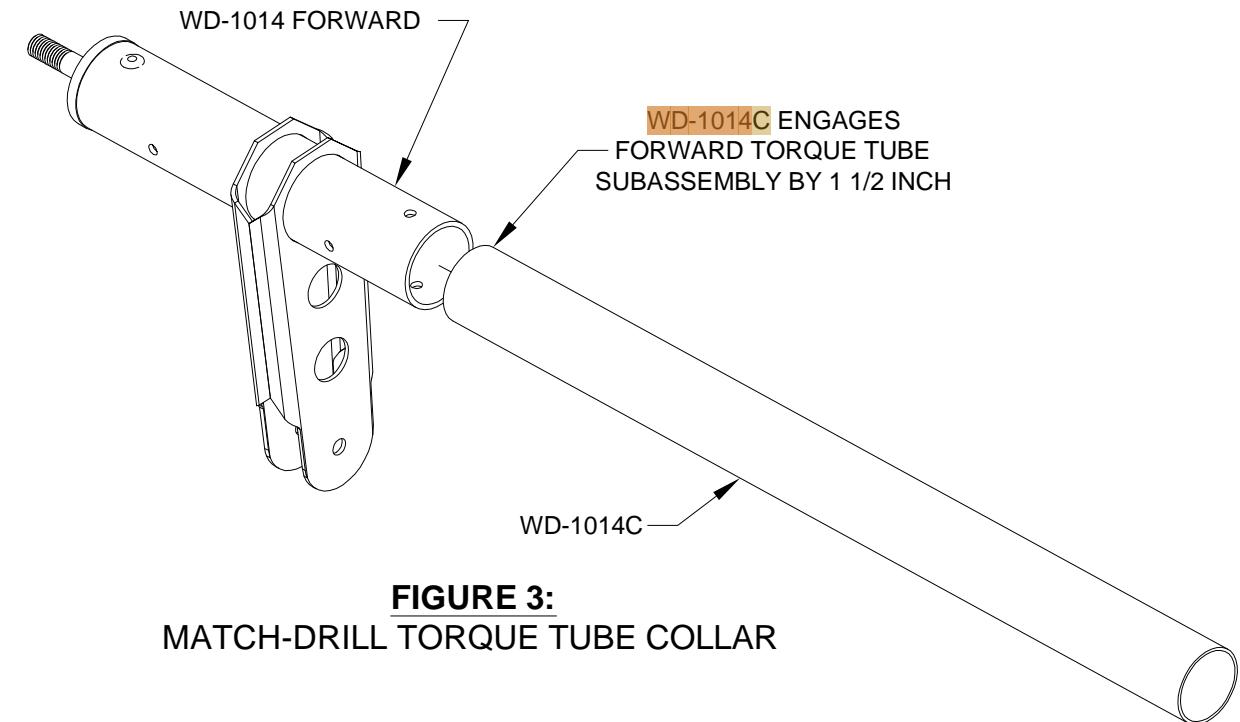
The aileron torque tube subassemblies created in this step will subsequently be referred to as the **WD-1014 AFT** Aft Torque Tube Subassemblies.



**FIGURE 2:**  
AFT TORQUE TUBE SUBASSEMBLY

Step 3: Insert **WD-1014C** Torque Tube Collars in the open ends of the **WD-1014 FORWARD** Forward Torque Tube Subassemblies as shown in Figure 3.

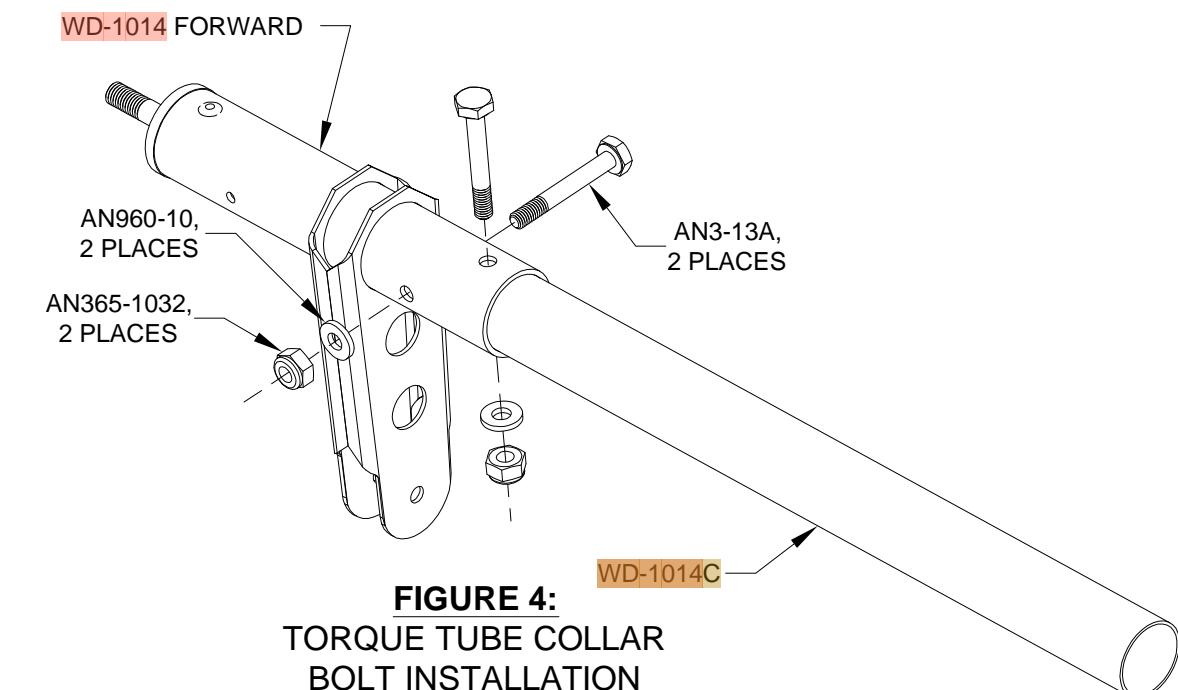
Using a #30 bit, match-drill the torque tube collar using the holes in the forward torque tube subassemblies as drill guides. See Figure 3. Install a cleco in each hole as it is match-drilled. Using a #12 bit, final-drill through both sides of the forward torque tube subassembly and torque tube collar. Install a bolt, washer, and nut as shown in Figure 4 to hold alignment while the other bolt hole is final-drilled #12.



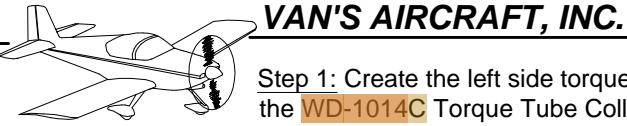
**FIGURE 3:**  
MATCH-DRILL TORQUE TUBE COLLAR

Step 4: Mark the **WD-1014 FORWARD** Forward Torque Tube Subassemblies and **WD-1014C** Torque Tube Collars so that they can be re-installed in the same orientation as when they were match-drilled. Remove the nut, washer, and bolt that were installed during match-drilling. Remove the torque tube collars from the forward torque tube subassemblies and deburr the holes. Prime the torque tube collars both inside and out; prime the inside of the forward torque tube subassemblies.

Attach the forward torque tube subassemblies to the torque tube collars using the hardware called out in Figure 4.



**FIGURE 4:**  
TORQUE TUBE COLLAR  
BOLT INSTALLATION



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Step 1: Create the left side torque tube assembly by inserting the aft end of one of the **WD-1014C** Torque Tube Collars (which are bolted to the **WD-1014 FORWARD** Forward Torque Tube Subassemblies) into the open end of one of the **WD-1014 AFT** Aft Torque Tube Subassemblies as shown in Figure 1.

Place the torque tube assembly on a flat surface as shown in Figure 3.

Adjust the engagement of the torque tube collar and the aft torque tube subassembly such that the overall length is as shown in Figure 1.

Adjust the clocking of the torque tube collar and the aft torque tube subassembly such that when a 5/16 inch thick spacer block is placed under the arm of the aft torque tube subassembly, the arm of the forward torque tube subassembly is flat on the table. See Figures 2 and 3.

**Step 2:** When assured that both the engagement and clocking of the torque tube assembly is correct, use a #30 bit to match-drill the torque tube collar using the holes in the aft torque tube subassembly as drill guides. Install a cleco in each hole as it is match-drilled. After the first hole is match-drilled and clecoed, the torque tube assembly can be moved off of the flat surface for drilling the remaining holes. See Figures 3 and 4. Using a #12 bit, final-drill through both sides of the torque tube and torque tube collar. Install a bolt, washer, and nut as shown in Page 23-7, Figure 1 to hold alignment while the other bolt hole is final drilled #12.

**Step 3:** Create the right side torque tube assembly by inserting the aft end of the remaining **WD-1014C** Torque Tube Collar into the open end of the remaining **WD-1014 AFT** Aft Torque Tube Subassembly as shown in Figure 1.

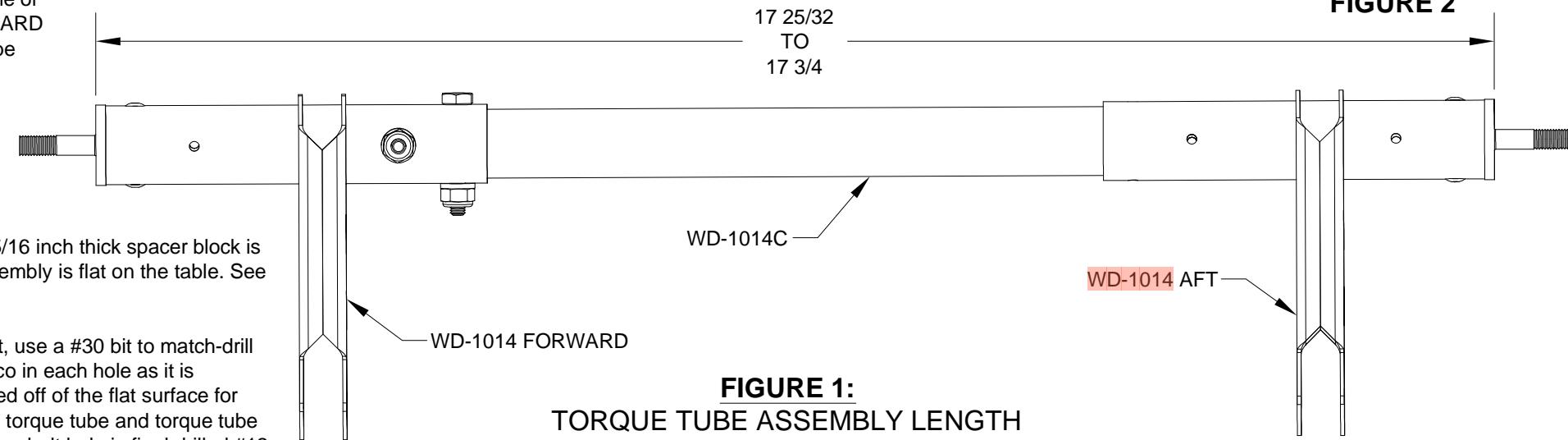
Place the torque tube assembly on a flat surface as shown in Figure 4.

Adjust the engagement of the torque tube collar and the aft torque tube subassembly such that the overall length is as shown in Figure 1.

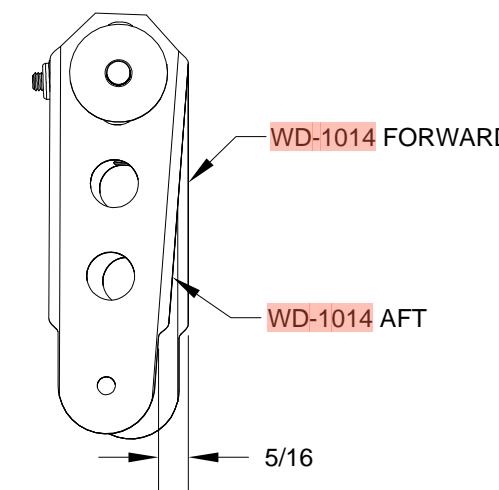
Adjust the clocking of the torque tube collar and the aft torque tube subassembly such that when a 5/16 inch thick spacer block is placed under the arm of the aft torque tube sub-assembly, the arm of the forward torque tube subassembly is flat on the table. See Figures 2 and 4.

**Step 4:** Drill the right side torque tube subassembly as previously described in Step 2.

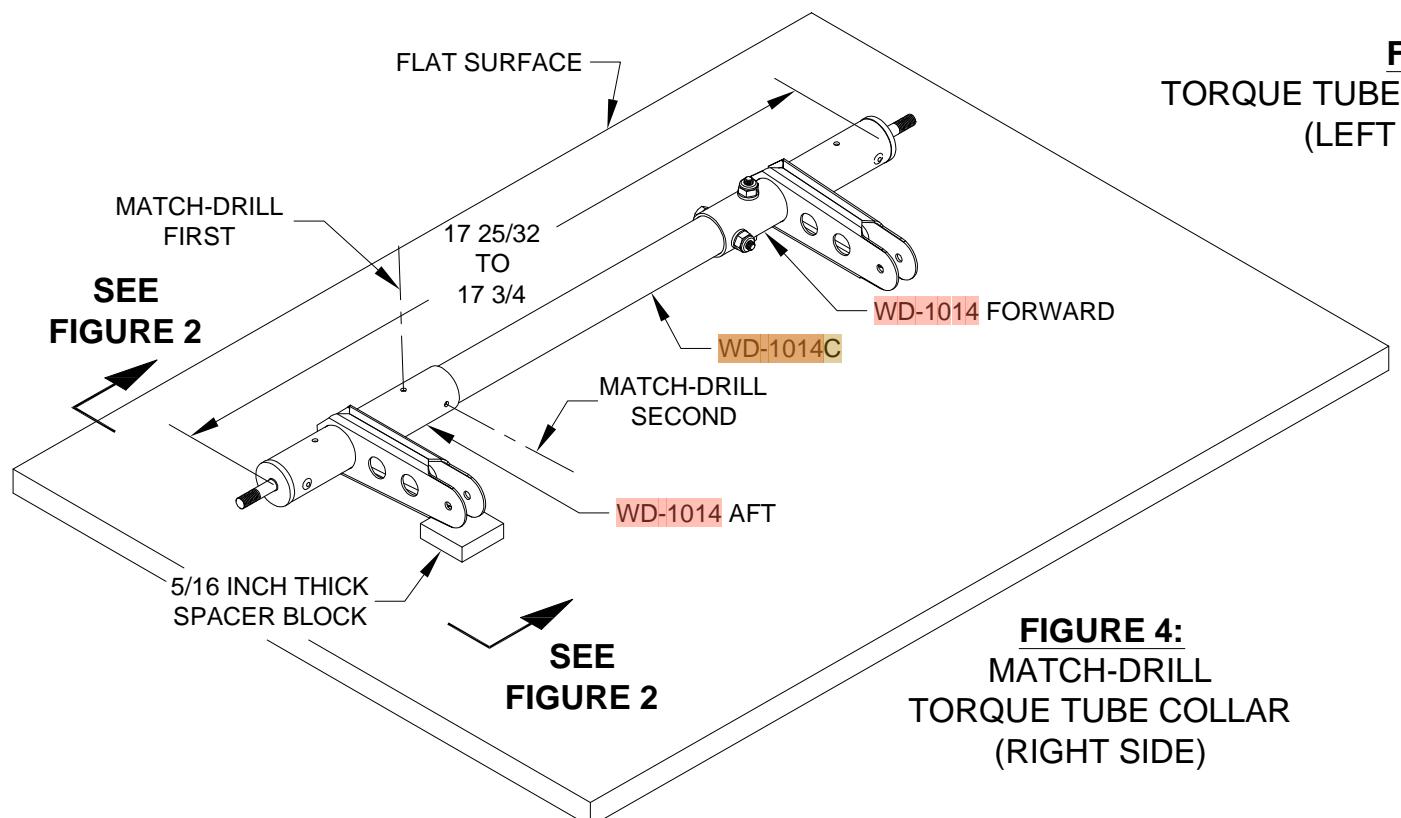
**Step 5:** Remove the nuts, washers, and bolts that were installed during final-drilling. Remove the **WD-1014 AFT** Aft Torque Tube Subassemblies from the **WD-1014C** Torque Tube Collars and deburr the holes.



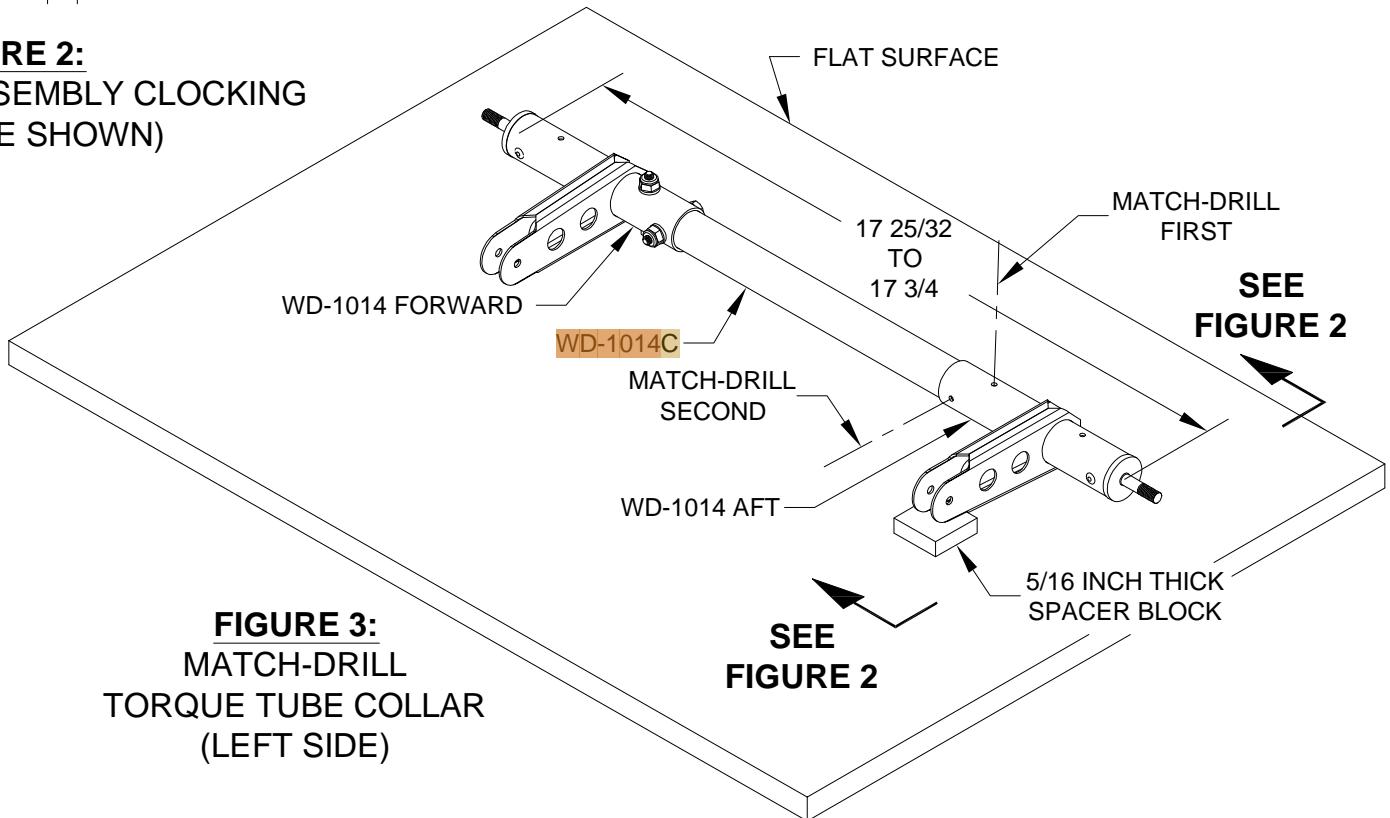
**FIGURE 1:**  
TORQUE TUBE ASSEMBLY LENGTH



**FIGURE 2:**  
TORQUE TUBE ASSEMBLY CLOCKING  
(LEFT SIDE SHOWN)



**FIGURE 3:**  
MATCH-DRILL  
TORQUE TUBE COLLAR  
(LEFT SIDE)





Step 1: Insert **WD-1014C** Torque Tube Collar (which is bolted to the WD-1014 FORWARD Forward Torque Tube Subassembly) through the forward side of the 1 1/8 inch diameter hole in the spar web. See Figure 1.

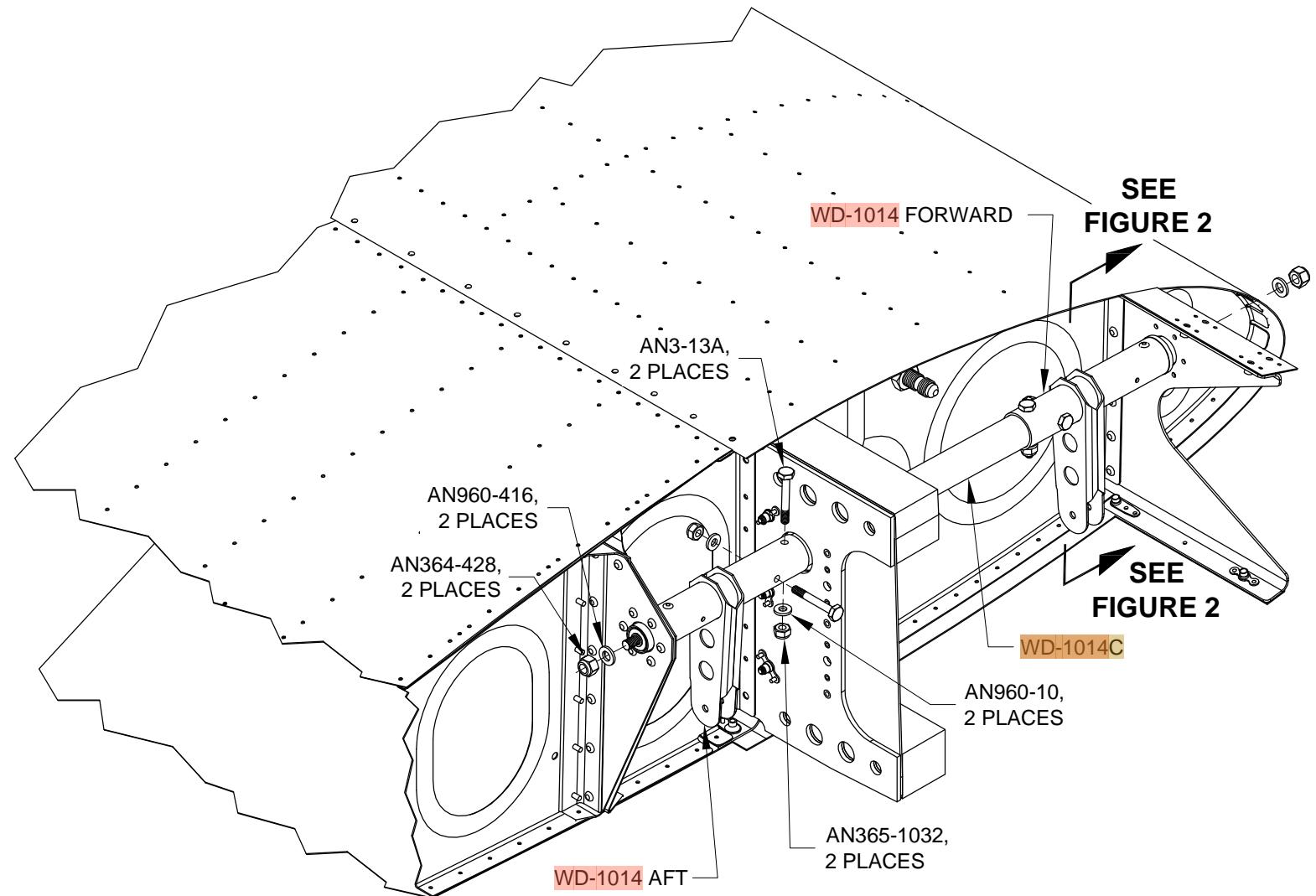
Step 2: Angle the **WD-1014C** Torque Tube Collar down as it extends aft through the hole in the spar web and slip the WD-1014 AFT Aft Torque Tube Subassembly over the torque tube collar. Engage the **WD-1014** AFT Aft Torque Tube Subassembly and the torque tube collar far enough to allow the threaded ends of the torque tube subassemblies to be inserted into the flanged bearings riveted into the wing structure. Disengage the aft torque tube subassembly and torque tube collar slightly as the threaded ends of the torque tube subassemblies are inserted into the bearings. See Figure 1.

Step 3: Install washers and nuts on the **WD-1014** FORWARD and WD-1014 AFT Torque Tube Subassemblies as shown in Figure 1.

Step 4: Check to see if the bolt holes in the **WD-1014** AFT Aft Torque Tube Subassembly and **WD-1014C** Torque Tube Collar line-up properly.

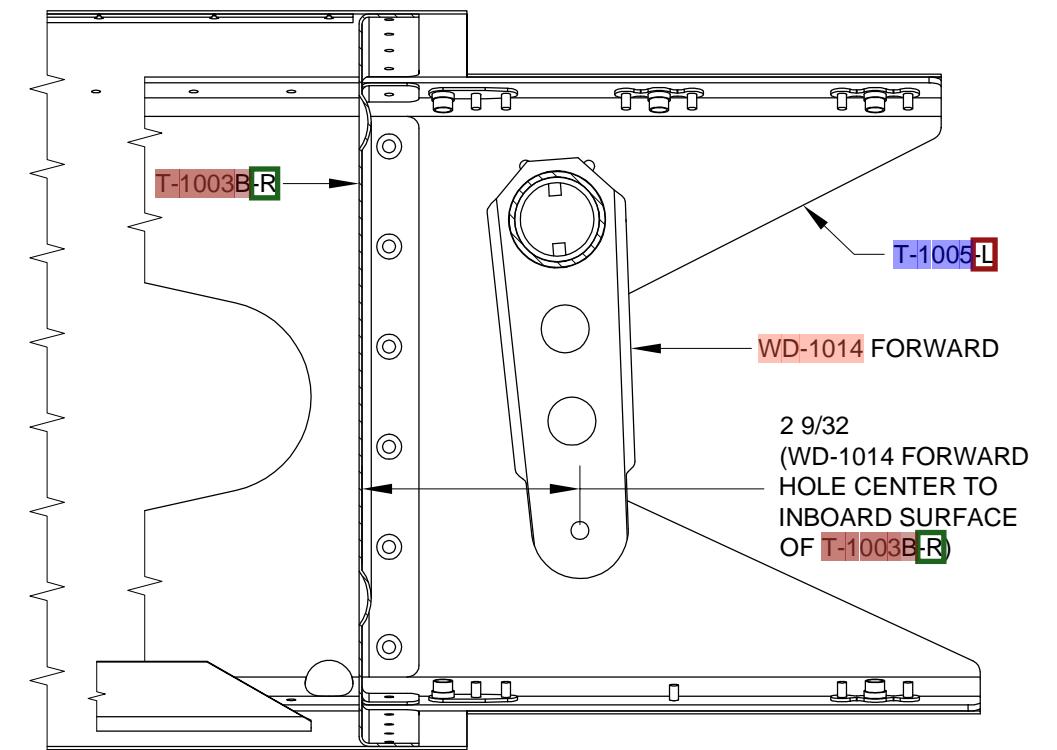
If the bolt holes in the aft torque tube subassembly and torque tube collar misalign in the forward/aft direction then AN960-416 or AN960-416L washers should be installed between the torque tube subassemblies and the flanged bearings as required to eliminate the forward/aft hole misalignment. There should be little or no pre-load on the wing structure when the aileron torque tube installation is complete.

Install bolts, washers, and nuts as shown in Figure 1 to attach the aft torque tube subassembly to the torque tube collar.



**FIGURE 1:**  
TORQUE TUBE INSTALLATION

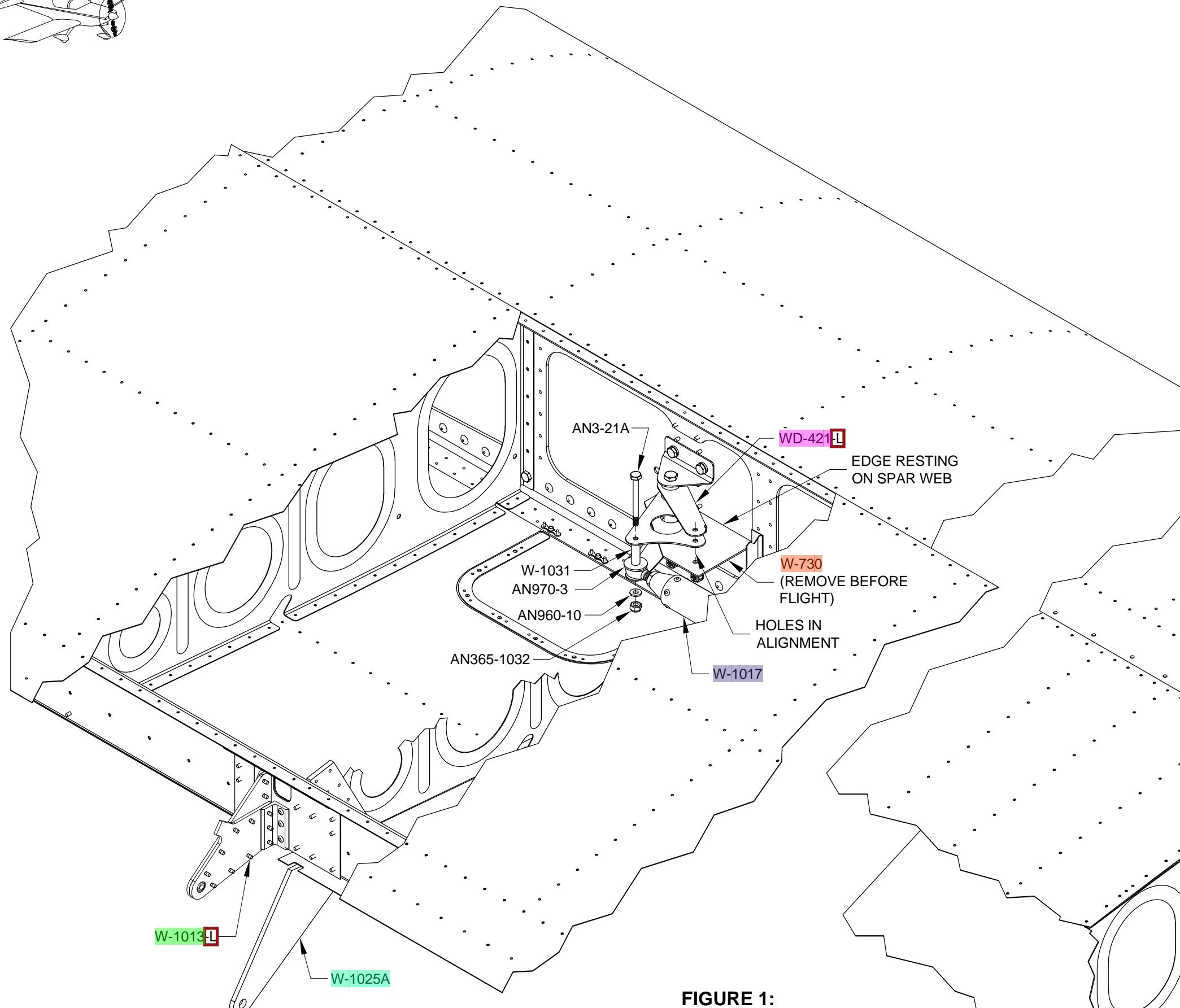
Step 5: Figure 2 shows the "neutral position" of the **WD-1014** FORWARD Forward Torque Tube Subassembly. The correct rigging of the aileron actuation system is defined by the forward torque tube subassembly, **WD-421** Aileron Bellcrank, and Aileron all being in their neutral positions at the same time.



**FIGURE 2:**  
FORWARD TORQUE TUBE  
SUBASSEMBLY NEUTRAL POSITION



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**FIGURE 1:**  
TORQUE TUBE TO  
BELLCRANK PUSHROD  
INSTALLATION

Step 1: Insert the **W-1017** Torque Tube to Bellcrank Pushrod into the wing through the most forward lightening hole in the **W-1010-R** Inbd Wing Rib. Attach the torque tube to bellcrank pushrod to the **WD-421-L** Aileron Bellcrank as shown in Figure 1.

Step 2: Attach the **W-1017** Torque Tube to Bellcrank Pushrod to the **WD-1014 AFT** AFT Torque Tube Subassembly as shown on Figure 1. There are TWO washers called-out; one washer is installed inside the torque tube clevis arm along with the pushrod rod end bearing and the other washer is installed under the nut.

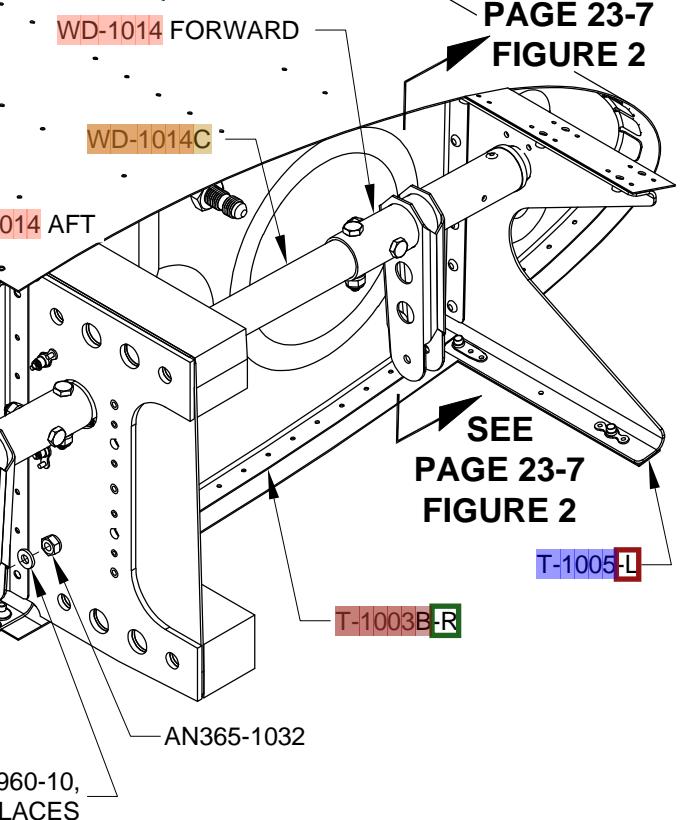
Step 3: Use the **W-730** Bellcrank Jig to verify that when the **WD-421-L** Aileron Bellcrank is in its neutral position, the **WD-1014 FORWARD** Forward Torque Tube Subassembly is also in its neutral position.

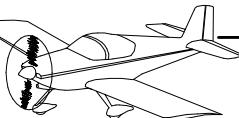
See Figure 1 for proper position of the bellcrank jig. See Page 23-7, Figure 2 for depiction of the forward torque tube subassembly neutral position.

Adjust the engagement of the **W-1017** Torque Tube to Bellcrank Pushrod rod end bearings and jam nuts if/as required.

Step 4: Double-check that all nuts are tight and properly torqued and that all bearings and bushings rotate freely and without binding.

**SEE  
PAGE 23-7  
FIGURE 2**





Step 1: Insert the W-1018 Bellcrank to Aileron Pushrod into the wing through the hole in the W-1007 Rear Spar Assembly. Attach the bellcrank to aileron pushrod to the **WD-421-L** Aileron Bellcrank as shown in Figure 1.

Step 2: Attach the Aileron Assembly to the **W-1014** Outboard Aileron Hinge Bracket and **W-1013** Inboard Aileron Hinge Bracket using the hardware shown on Page 21-8, Figure 4 and Figure 3.

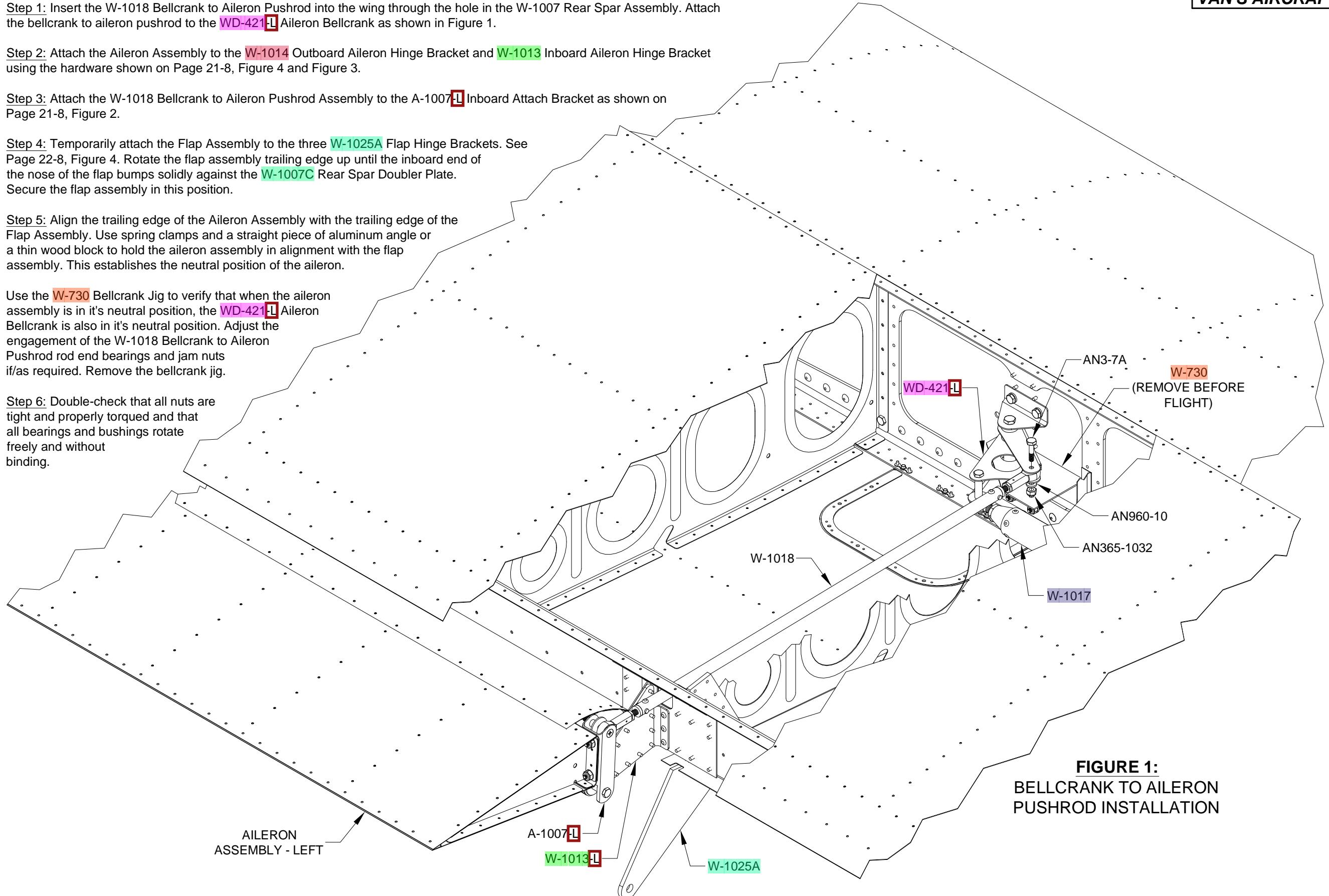
Step 3: Attach the W-1018 Bellcrank to Aileron Pushrod Assembly to the **A-1007-L** Inboard Attach Bracket as shown on Page 21-8, Figure 2.

Step 4: Temporarily attach the Flap Assembly to the three **W-1025A** Flap Hinge Brackets. See Page 22-8, Figure 4. Rotate the flap assembly trailing edge up until the inboard end of the nose of the flap bumps solidly against the **W-1007C** Rear Spar Doubler Plate. Secure the flap assembly in this position.

Step 5: Align the trailing edge of the Aileron Assembly with the trailing edge of the Flap Assembly. Use spring clamps and a straight piece of aluminum angle or a thin wood block to hold the aileron assembly in alignment with the flap assembly. This establishes the neutral position of the aileron.

Use the **W-730** Bellcrank Jig to verify that when the aileron assembly is in its neutral position, the **WD-421-L** Aileron Bellcrank is also in its neutral position. Adjust the engagement of the W-1018 Bellcrank to Aileron Pushrod rod end bearings and jam nuts if/as required. Remove the bellcrank jig.

Step 6: Double-check that all nuts are tight and properly torqued and that all bearings and bushings rotate freely and without binding.

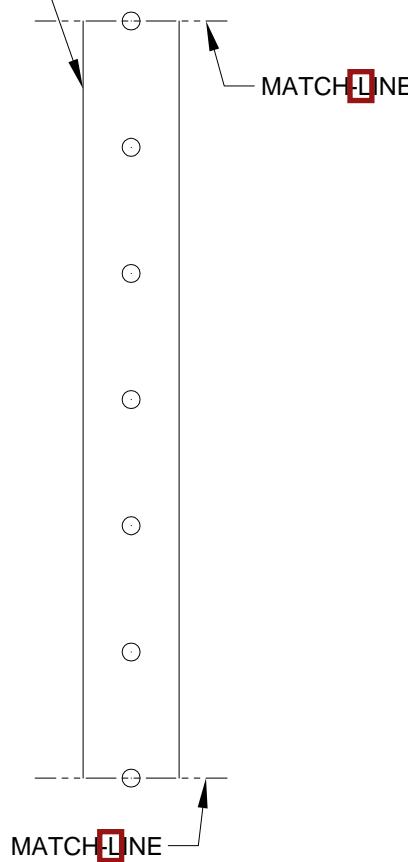


**FIGURE 1:**  
BELLCRANK TO AILERON  
PUSHROD INSTALLATION



ALIGN THIS EDGE WITH  
THE END OF TUBE

MATCH LINE

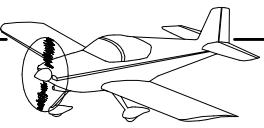


10 9/16  
[268.29 mm]

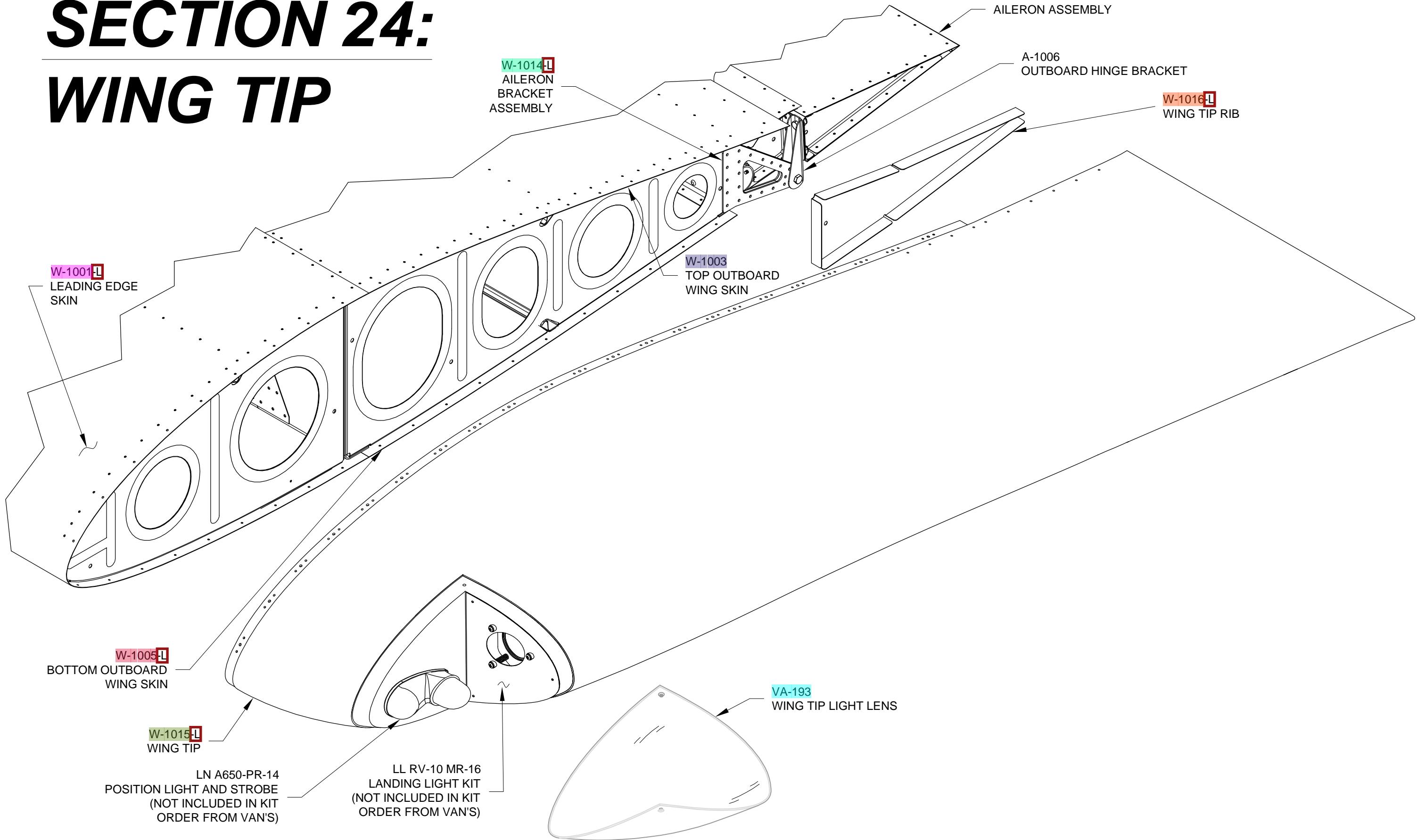
**FIGURE 1:**  
PUSHROD RIVET  
HOLE LOCATION  
TEMPLATE

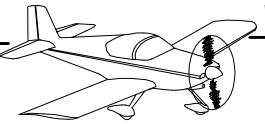
16  
[406.40 mm]

NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!



# SECTION 24: WING TIP



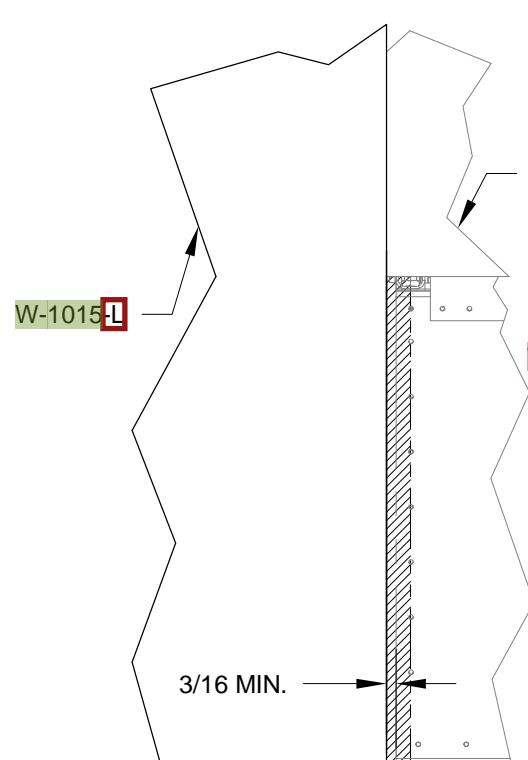


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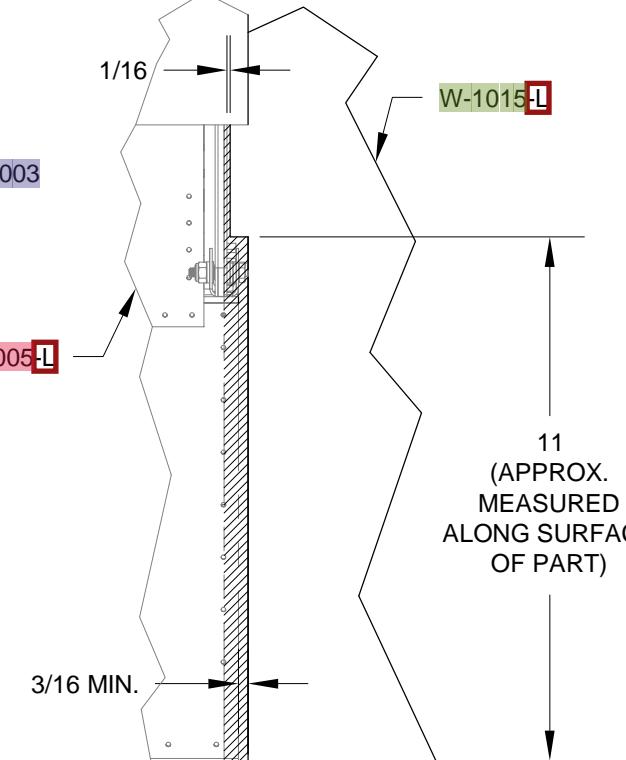
**NOTE:** The following instructions are for the left wing tip only. The right wing tip is a mirror of the left.

**NOTE:** Fiberglass will quickly dull tools. Locate and use the tools set aside for use in attaching the empennage fairings when working with the fiberglass wing tip.

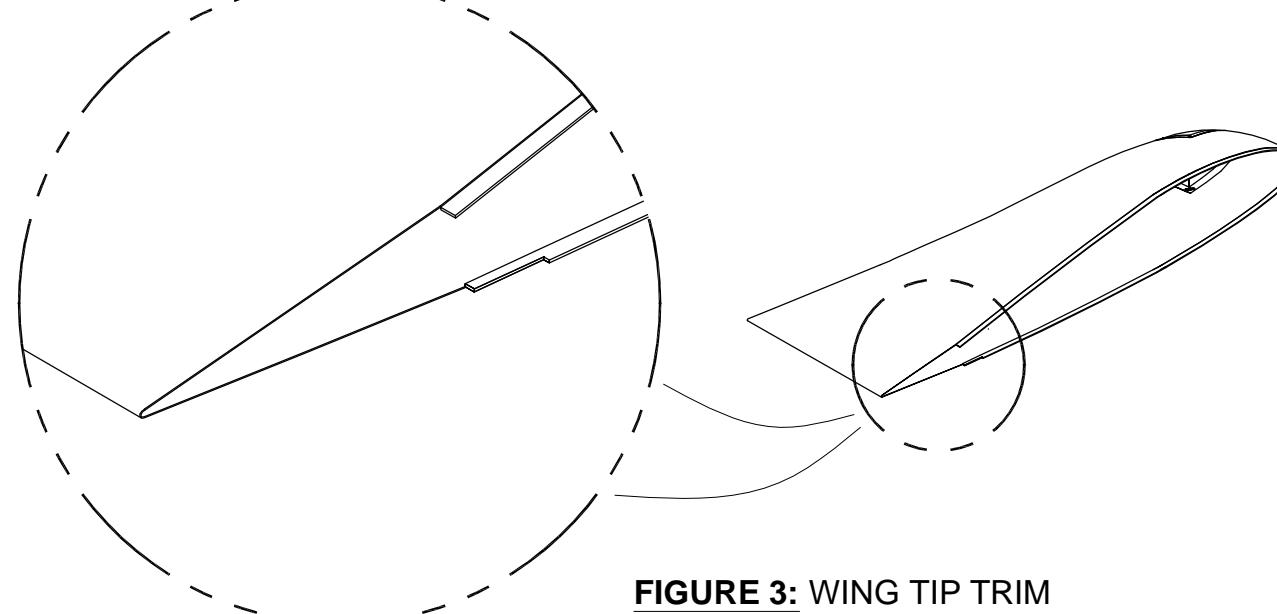
**Step 1:** Trim away material in the shaded areas from the **W-1015** Wing Tip as shown in Figure 1, Figure 2 and Figure 3. This will provide clearance between the wing tip, the **W-1014** Outboard Aileron Hinge Bracket Assembly and the aileron assembly. Trim both the top and bottom sides of the wing tip to provide a  $3/16$  minimum gap between the wing tip and the outboard edge of the aileron assembly (see Figure 1 and Figure 2). Trim the top of the wing tip even with the aft edge of the **W-1003** Wing Skin (see Figure 1). Trim the bottom of the wing tip starting with the dimensions given in Figure 2. Check that this trim provides a  $3/16$  gap between the forward edge of the **A-1006** Outboard Hinge Bracket and the wing tip when the aileron is rotated to full up deflection. See Section 23 for aileron travel.



**FIGURE 1: WING TIP TOP TRIM**



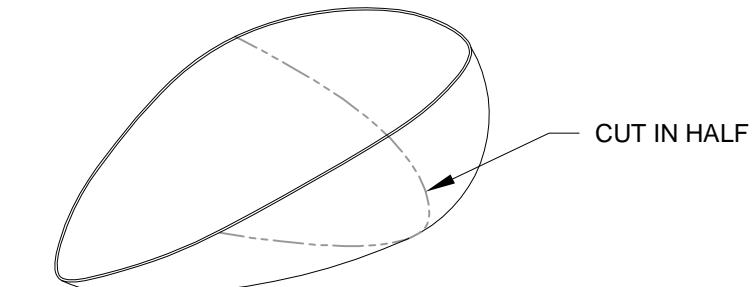
**FIGURE 2: WING TIP BOTTOM TRIM**



**FIGURE 3: WING TIP TRIM**

**Step 2:** Square the inside edge and corner of the lens recess in the **W-1015-L** Wing Tip with a file and/or a razor blade to allow the lens to lay flush with the wing tip.

**Step 3:** Cut the **VA-193** Wing Tip Light Lens in half as shown in Figure 4. Determine the right and left lenses by placing them on their respective wing tips, then set the **VA-193-R** Right Lens aside.



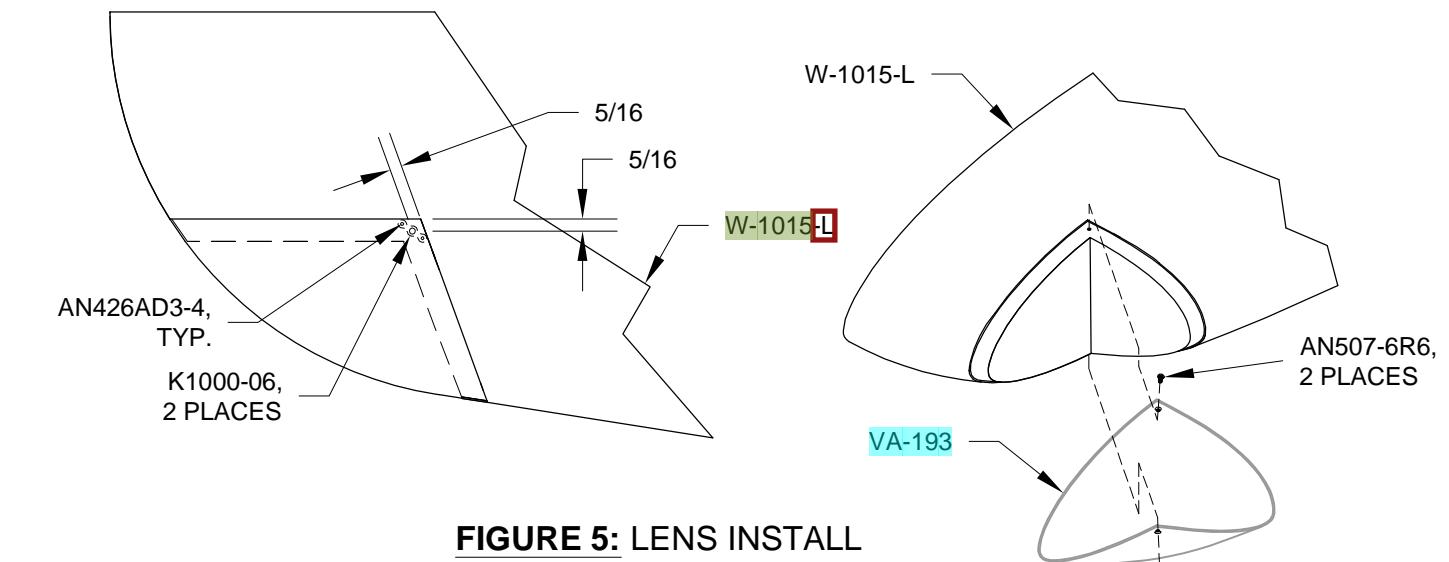
**FIGURE 4: LENS MODIFICATION**

**Step 4:** Mark a trim line for the recess onto the **VA-193-L** Left Lens. Remove and roughly trim the left lens to within  $1/8$  inch of the trim line. Carefully trim the left lens a little at a time to fit the recess until satisfied with the fit, then tape the left lens in place on the **W-1015-L** Wing Tip.

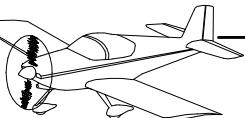
**Step 5:** Drill #40 the **VA-193-L** Left Lens into the **W-1015-L** Wing Tip at the upper and lower corners using the dimensions given in Figure 5. After drilling cleco each hole. Remove the tape and check the fit. Final-Drill #28 both holes in the wing tip and the left lens.

**Step 6:** Match-Drill #40 the nutplate attach pattern into the **W-1015-L** Wing Tip, orient the nutplate approximately as shown in Figure 5. Countersink the **VA-193-L** Left Lens for the head of a #6 flush head screw and the **W-1015-L** Wing Tip for the **AN426AD3** nutplate attach rivets.

**Step 7:** Install the **VA-193-L** Left Lens using the hardware called out in Figure 5.



**FIGURE 5: LENS INSTALL**



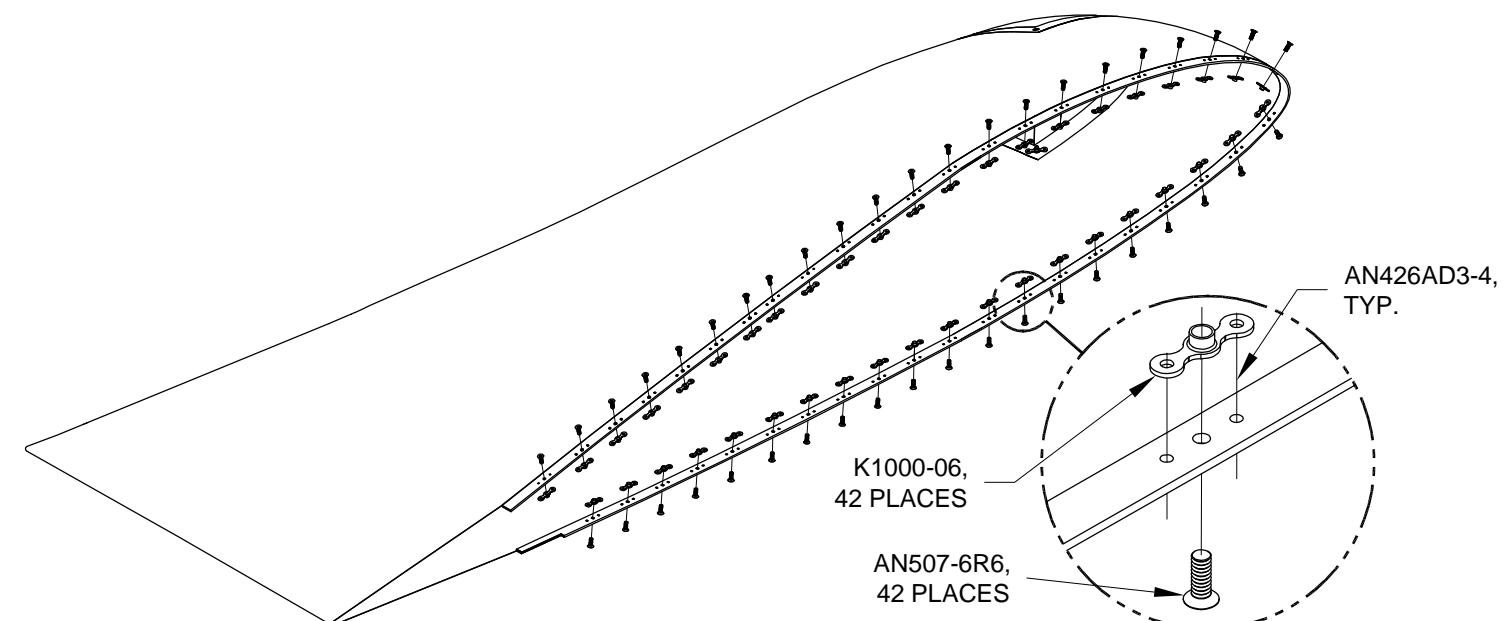
Step 1: Insert the **W-1015-L** Wing Tip into the wing assembly. Match-Drill #40 and cleco the wing tip attach holes using the **W-1001** Leading Edge Skin, **W-1003** Top Outbd Wing Skin and the **W-1005-L** Bottom Outbd Wing Skin as drill guides. Start drilling the forward most holes, then progress towards the trailing edge alternating between the top and bottom holes.

Step 2: Remove the **W-1015-L** Wing Tip.

Step 3: Final-Drill #28 all wing tip attach holes in the **W-1001-L** Leading Edge Skin, **W-1003** Top Outboard Wing Skin and **W-1005-L** Bottom Outboard Wing Skin, then deburr and dimple the holes for #6 flush head screws.

Step 4: Final-Drill the screw attach holes in the **W-1015-L** Wing Tip to #28. Match-drill #40 the nutplate attach pattern into the **W-1015-L** Wing Tip using a nutplate as a drill guide. Use a screw to position the nutplate in each hole, this will keep the nutplates aligned and will minimize puckering of the wing skins between attach the fasteners when the wing tip is secured to the wing.

Machine countersink the nutplate attach holes for the head of an AN426AD3 rivet. Rivet the nutplates to the wing tip as shown in Figure 1. Machine countersink the screw holes in the tip for the corresponding dimple in the wing skin.

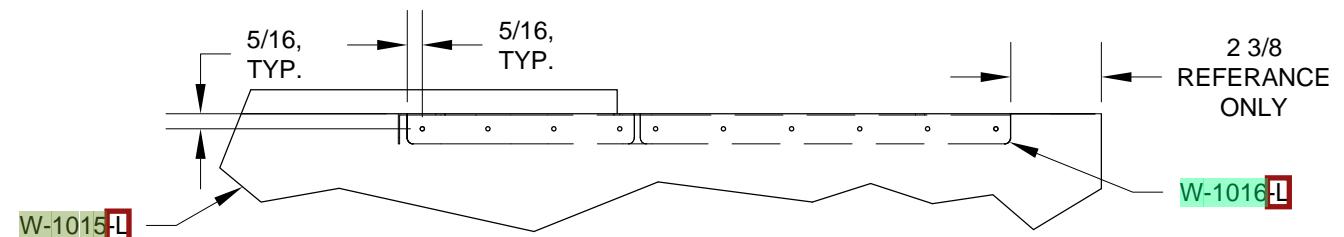


**FIGURE 1: NUTPLATE ATTACH**

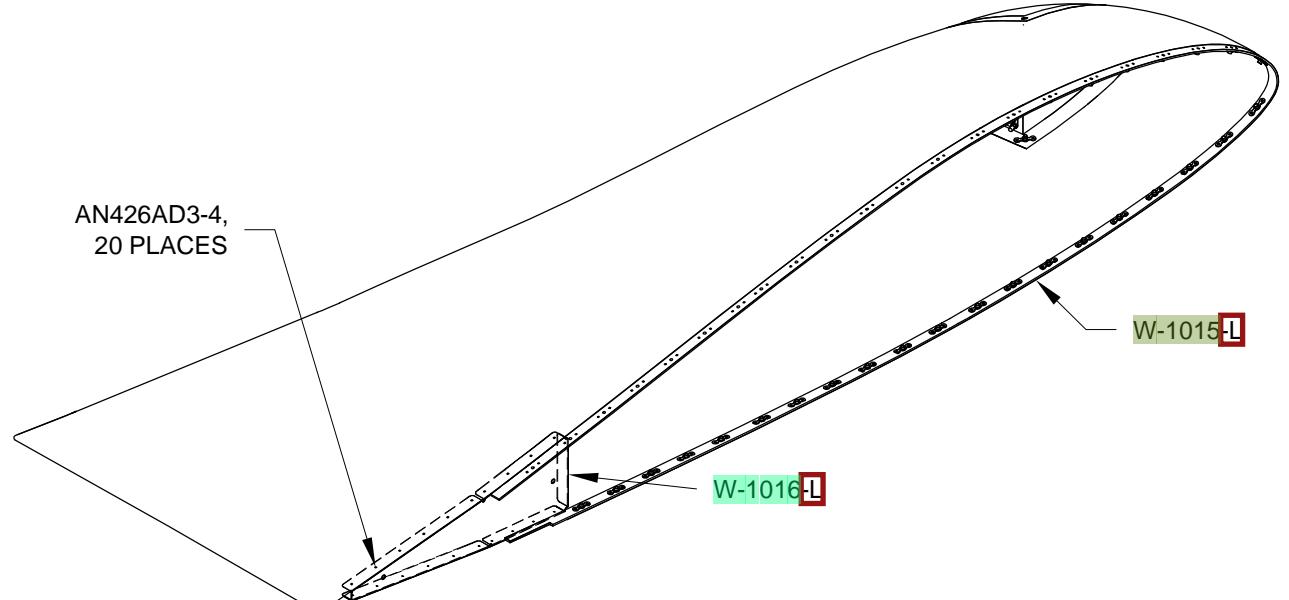
Step 5: Attach the **W-1015-L** Wing Tip to the wing assembly and insert the **W-1016-L** Wing Tip Rib into the aft edge of the wing tip. Properly position the wing tip rib to fit snug into the wing tip without distorting the wing tip. Flush the inboard face of the web with the inboard edges of the wing tip (see Figure 2). With the wing tip rib positioned, mark the ends of the flanges onto the bottom and top sides of the wing tip. Using an edge distance of 5/16 layout a rivet pattern on the bottom and top of the wing tip using an approximate 1 1/2 inch spacing between rivets. See Figure 2.

Step 6: Drill #40 the forward and aft most holes of the pattern created in Step 5 into the **W-1015-L** Wing Tip. Draw a centerline on the flanges of the **W-1016-L** Wing Tip Rib and mark the forward most rivet location, 5/16 from the forward edge of the forward upper flange. Insert the rib back into the wing tip. Use the marks visible through the holes in the wing tip for alignment. Match-Drill #40 and cleco the rib using the guide holes in the wing tip. Drill #40 and cleco the remaining holes through the wing tip into the wing tip rib using the rivet pattern created in Step 5 as a drill guide.

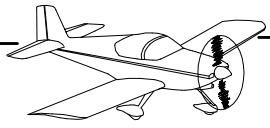
Step 7: Machine countersink the **W-1016-L** Tip Rib attach holes in the **W-1015-L** Wing Tip for the head of an AN426AD3 rivet. Remove and deburr the wing tip rib. Prime the tip rib if/as desired. Clean out any debris from the wing tip. Rivet the wing tip rib to the wing tip per the callout in Figure 3.



**FIGURE 2: LAYING OUT THE TIP RIB RIVET PATTERN**

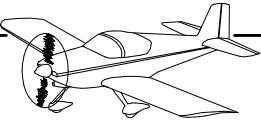


**FIGURE 3: TIP RIB ISO VIEW  
(TIP RIB SHOWN WITH HIDDEN LINES  
FOR CLARITY)**



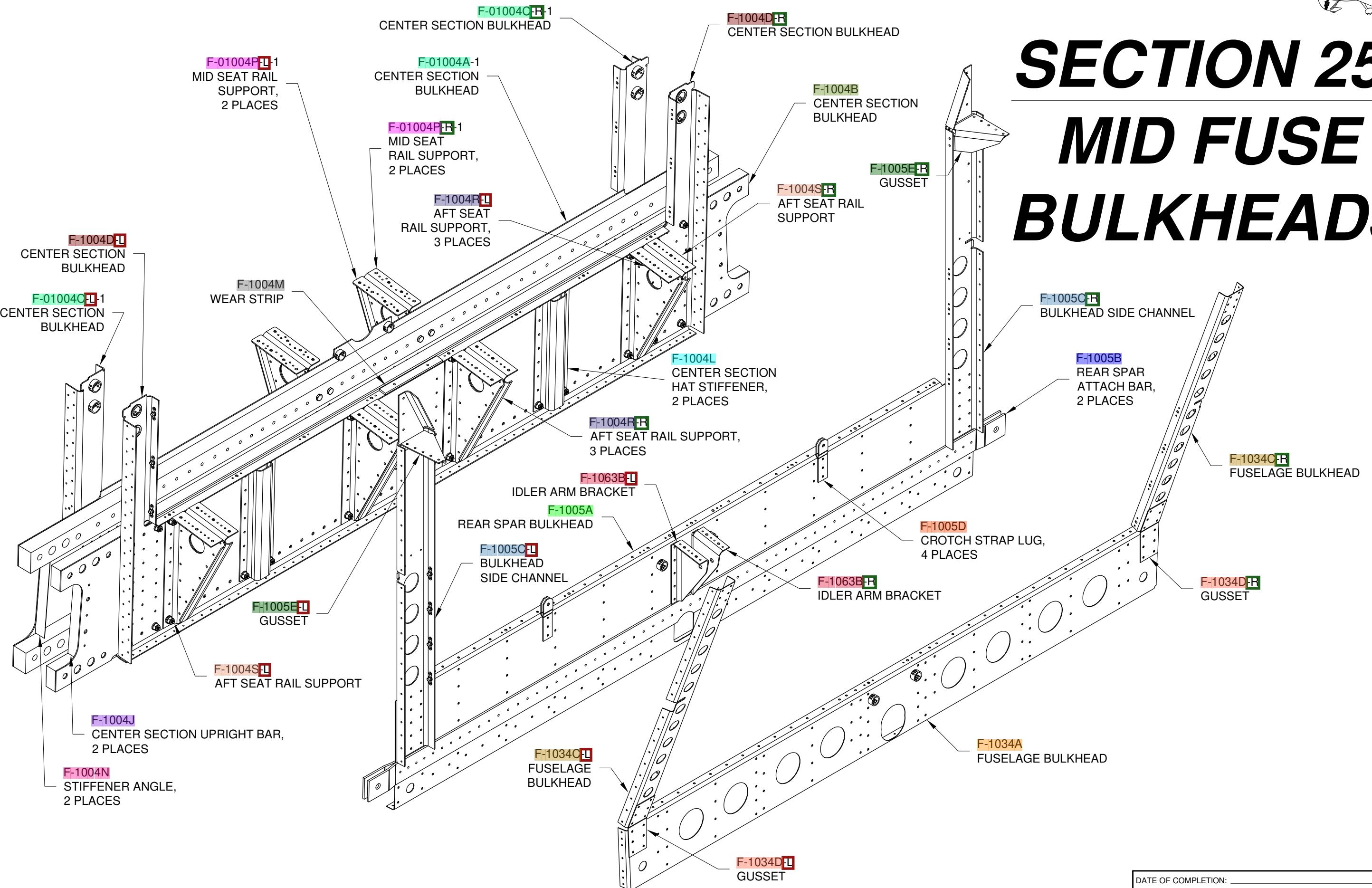
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# SECTION 25:

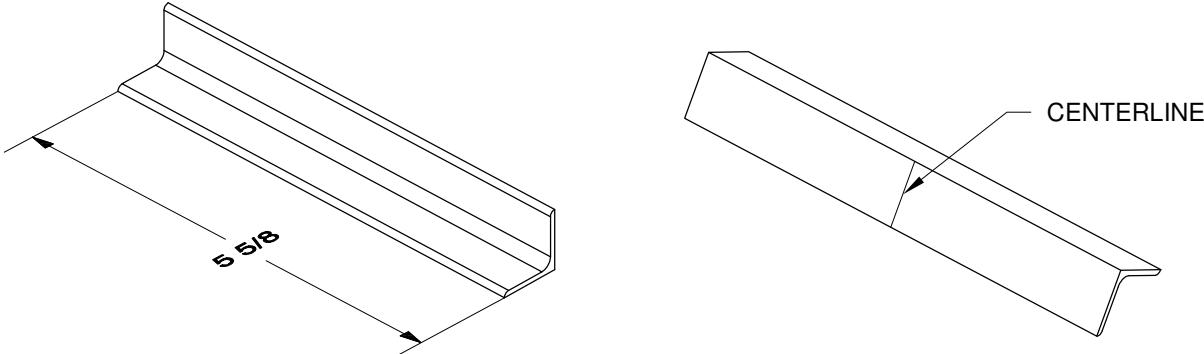
## MID FUSE BULKHEADS





Step 1: Create two F-1004N Stiffener Angles from AA6-063X3/4X3/4 per the dimensions given in Figure 1.

Step 2: Mark a centerline on one outside face of each F-1004N Stiffener Angle, see Figure 2.



**FIGURE 1: CREATING STIFFENER ANGLES**

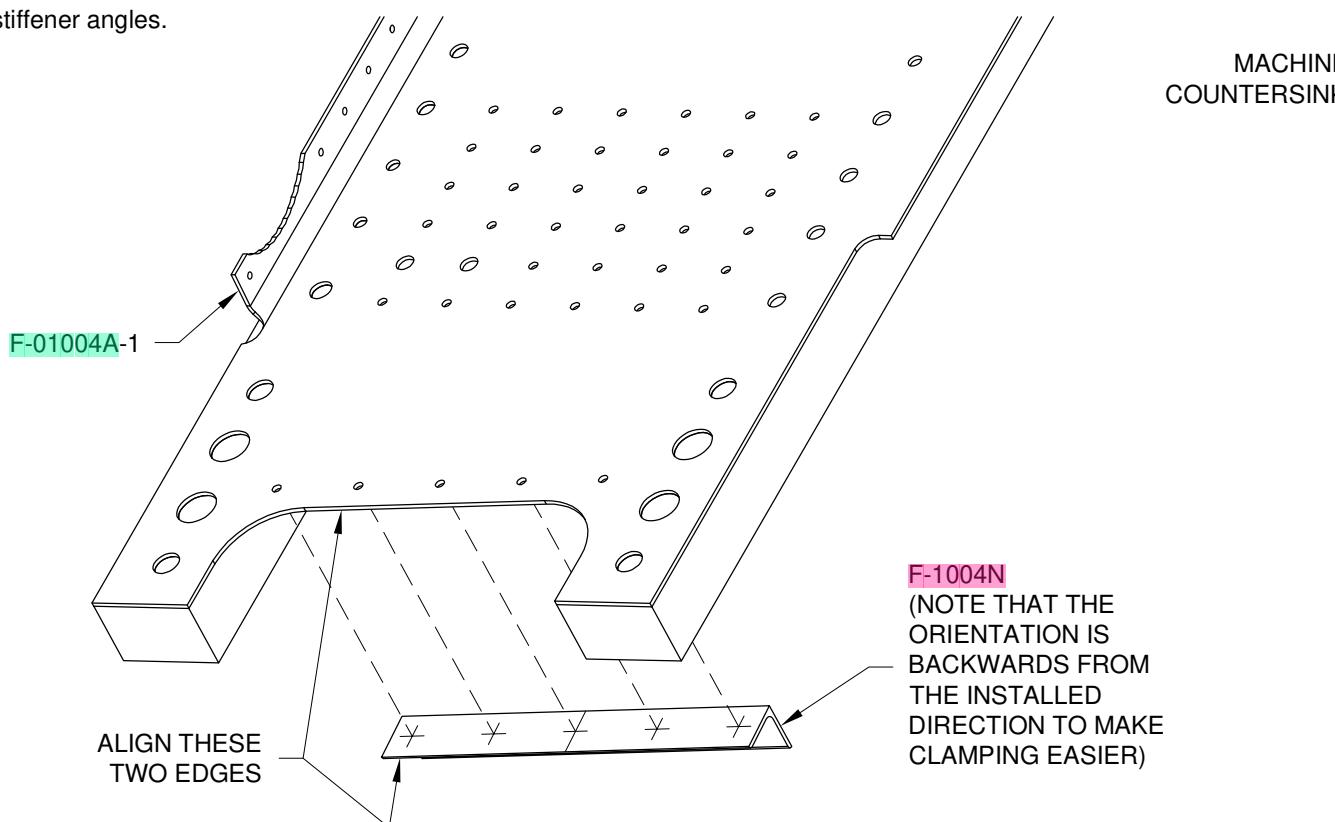
**FIGURE 2: MARKING STIFFENER ANGLES**

Step 3: Clamp a F-1004N Stiffener Angle to the F-01004A-1 Center Section Bulkhead as shown in Figure 3. Align the edge of the angle with the outboard edge of the bulkhead as shown in Figure 3. Center the centerline in the center hole of the bulkhead. Clamp both parts together.

Step 4: Match-Drill #30 the five holes of the F-01004A-1 Center Section Bulkhead into the F-1004N Stiffener Angle using the center section bulkhead as a drill guide. Cleco each hole as it is drilled. Repeat this step for the remaining stiffener angle.

Step 5: Remove the F-1004N Stiffener Angles from the F-01004A-1 Center Section Bulkhead and deburr the edges on all parts.

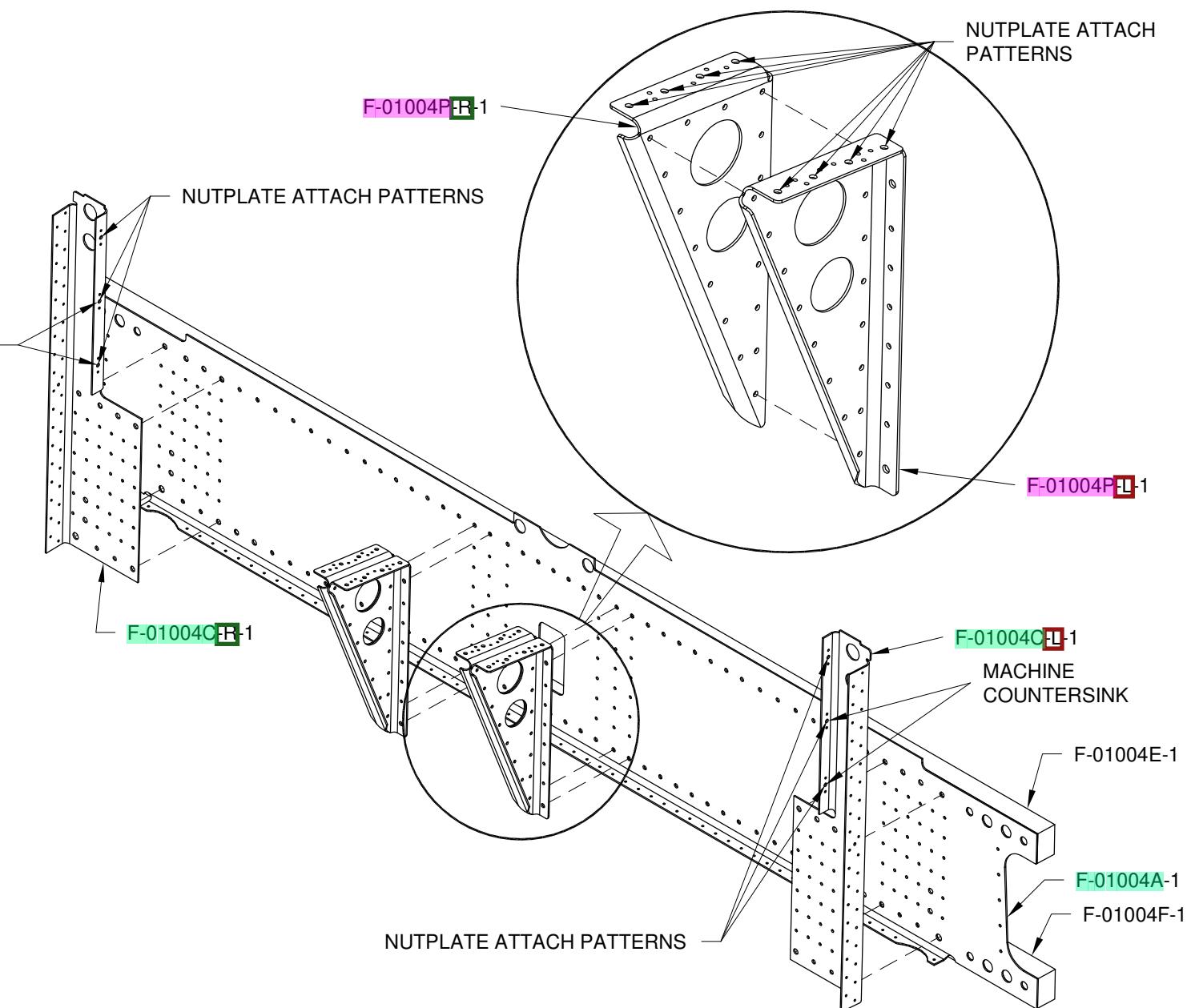
Prime the stiffener angles.



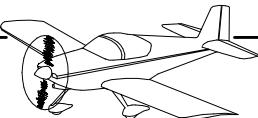
**FIGURE 3: MATCH-DRILLING STIFFENER ANGLES**

Step 6: There are three nutplate attach patterns in the inboard flange of the F-01004C-L-1 & F-01004F-1 Center Section Bulkheads. Machine countersink the screw holes for the lower two nutplates for the head of an #8 screw (see Figure 4).

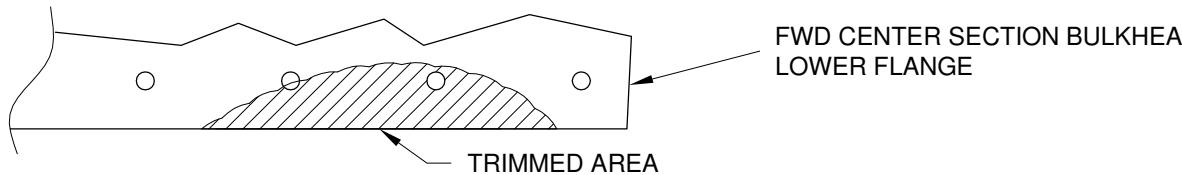
Step 7: Cleco the F-01004PL-1 & F-01004PR-1 Mid Seat Rail Supports and F-01004CL-1 & F-01004FR-1 Center Section Bulkheads to the F-01004A-1 Center Section Bulkhead as shown in Figure 4.



**FIGURE 4: DRILLING THE FWD CENTER SECTION ASSEMBLY**



Step 1: Temporarily bolt the WD-01021-L-1 Landing Gear Mount Left to the Fwd Center Section Bulkhead Assembly as shown in Figure 2. This will require trimming the outboard portion of the fwd center section bulkhead lower flange to remove interference with the gear leg socket as shown in Figure 1. Figure 1 gives only the general idea of how the final trim will look and is not a final trim template. Trim the fwd center section bulkhead progressively using the landing gear mount left as a guide. Repeat for the WD-01021-R-1 Landing Gear Mount Right.

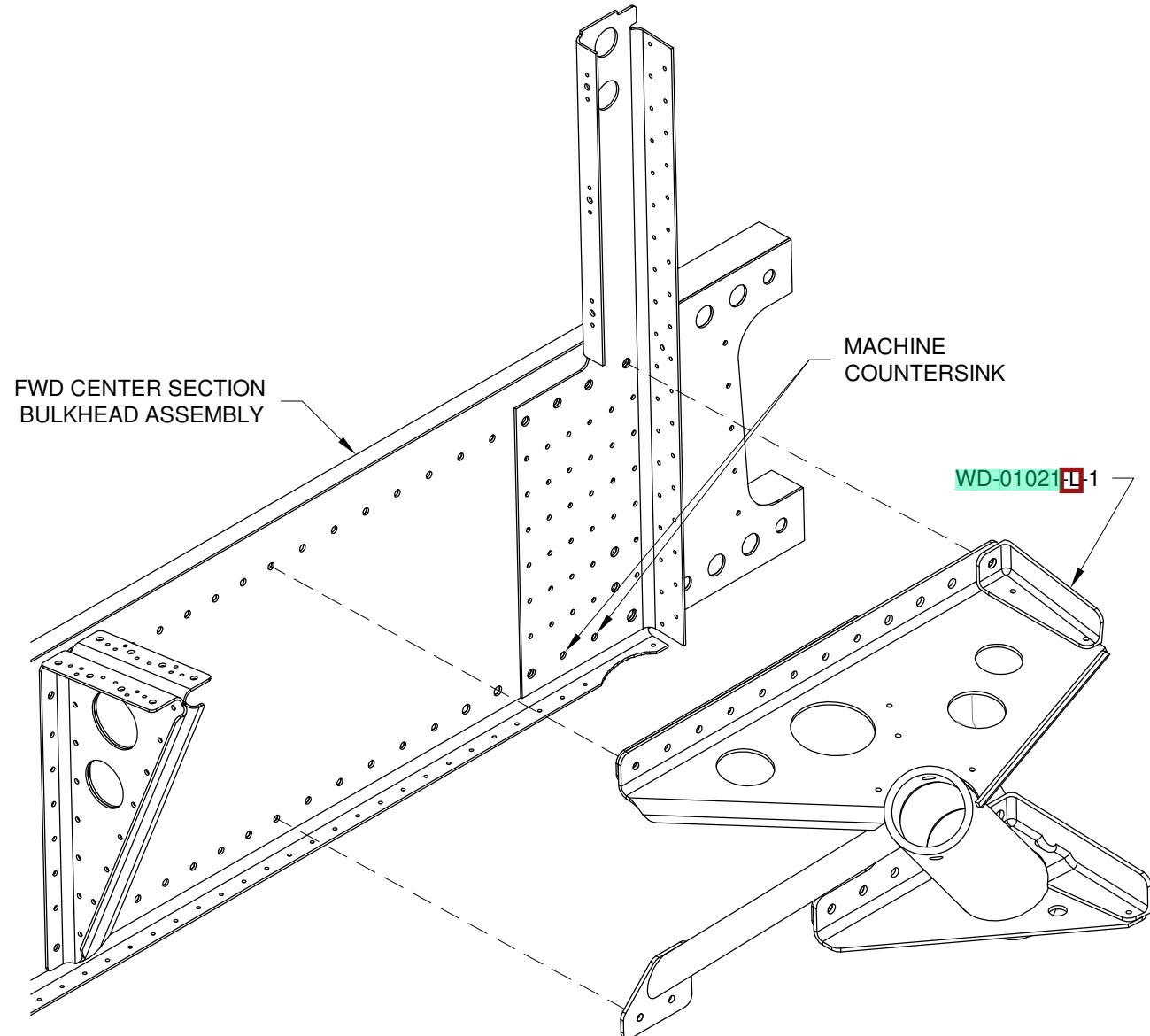


**FIGURE 1: TRIMMING THE FWD CENTER SECTION BULKHEAD LOWER FLANGE**

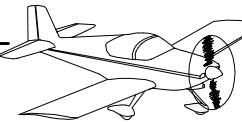
Step 2: Temporarily bolt the WD-01021-L-1 & WD-01021-R-1 Landing Gear Mounts to the Fwd Center Section Bulkhead Assembly and check that an AN3 Bolt will pass through all parts. Remove the landing gear mounts from the bulkhead assembly and deburr or ream as required.

Step 3: Machine countersink two places each (left/right) side as shown in Figure 2 to fit the head of a #10 screw.

Step 4: Disassemble all the parts in the Fwd Center Section Bulkhead Assembly and deburr all edges. Machine countersink all the nutplate attach holes for the head of an AN426AD3 rivet. Prime parts if/as desired.

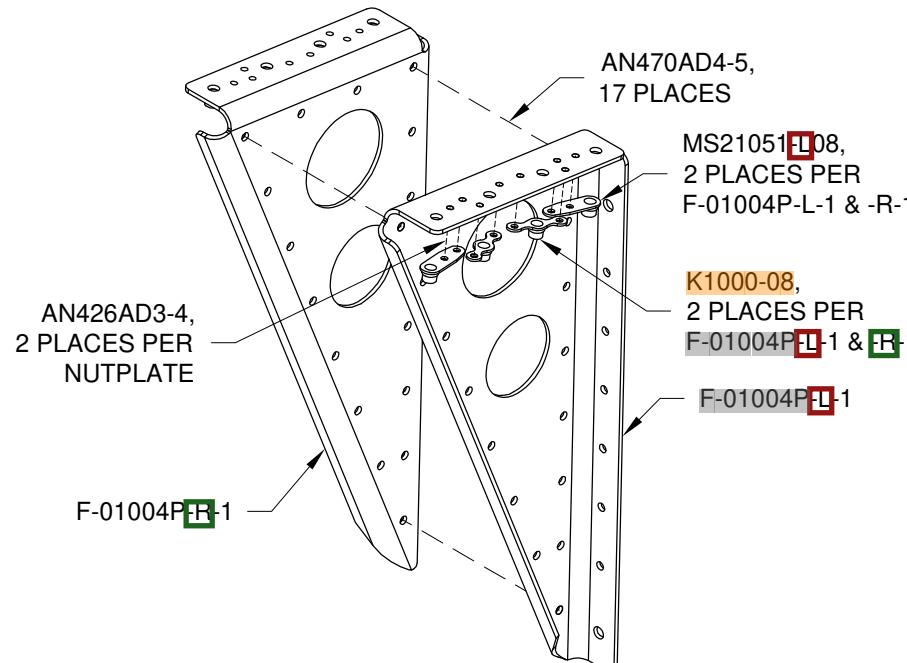


**FIGURE 2: TEMP BOLT LANDING GEAR MOUNT TO FORWARD CENTER SECTION BULKHEAD ASSEMBLY**



Step 1: Cleco the F-01004P-L-1 & F-01004P-R-1 Mid Seat Rail Support together as shown in Figure 1. Rivet the F-01004P-L-1 and F-01004P-R-1 Mid Seat Rail Support together per the callouts in Figure 1. Repeat this step to create two Mid Seat Rail Support Subassemblies.

Step 2: Cleco then rivet the nutplates onto the upper flanges of both Mid Seat Rail Support Subassemblies as shown in Figure 1. Repeat this step on both Mid Seat Rail Support Subassemblies.



**FIGURE 1: RIVETING THE MID SEAT RAIL SUPPORT SUBASSEMBLIES**

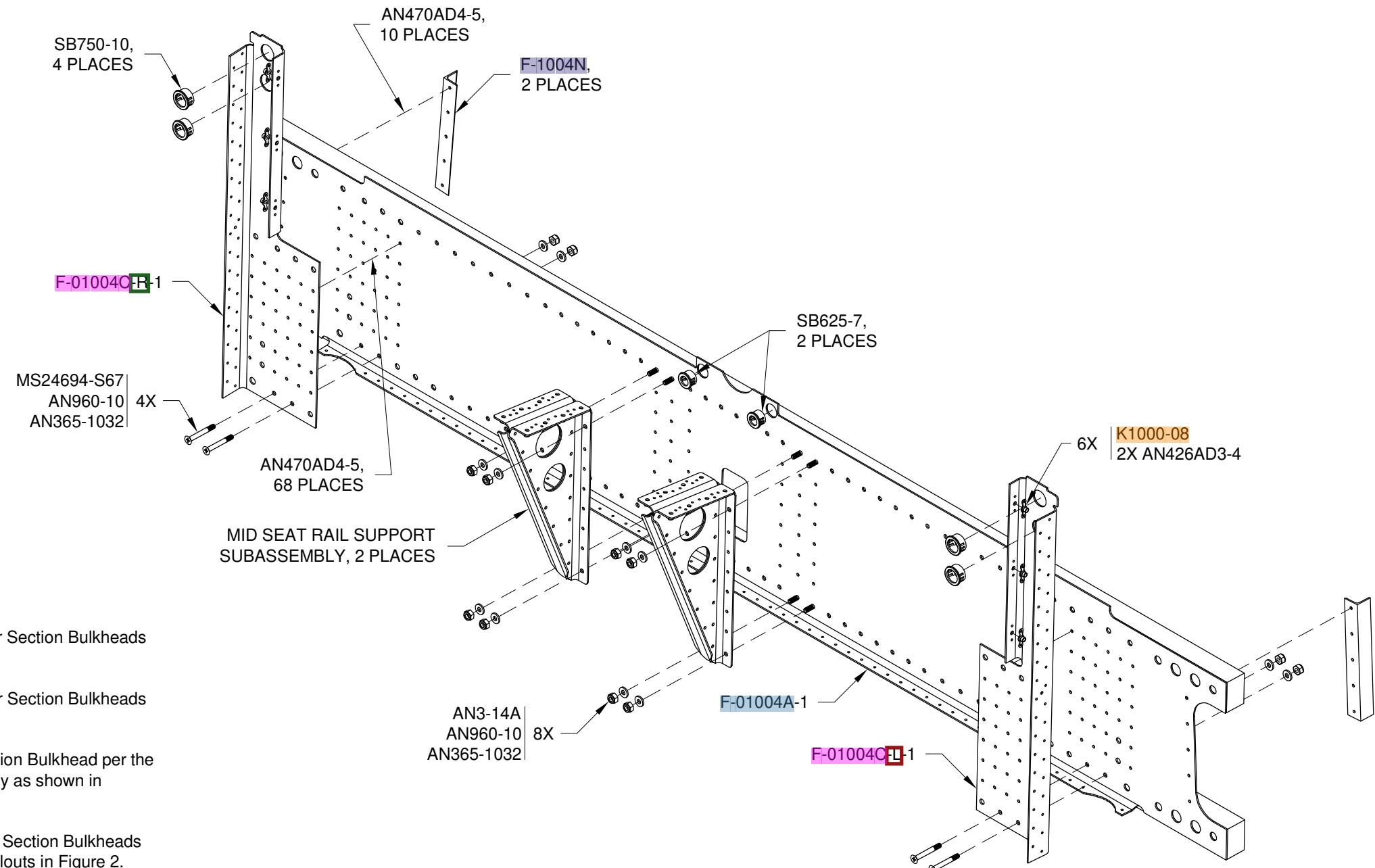
Step 3: Rivet the nutplates onto the inboard flange of the F-01004C-L-1 & F-01004C-R-1 Center Section Bulkheads per the callouts in Figure 2.

Step 4: Cleco the Mid Seat Rail Support Subassemblies, F-01004C-L-1 & F-01004C-R-1 Center Section Bulkheads and F-1004N Stiffener Angles to the F-01004A-1 Center Section Bulkhead.

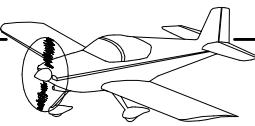
Step 5: Bolt the Mid Seat Rail Support Subassemblies to the F-01004A-1 Center Section Bulkhead per the callouts in Figure 2. Install two screws on each side of the fwd center section assembly as shown in Figure 2.

Step 6: Rivet the Mid Seat Rail Support Subassemblies, F-01004C-L-1 & F-01004C-R-1 Center Section Bulkheads and F-1004N Stiffener Angles to the F-01004A-1 Center Section Bulkhead per the callouts in Figure 2.

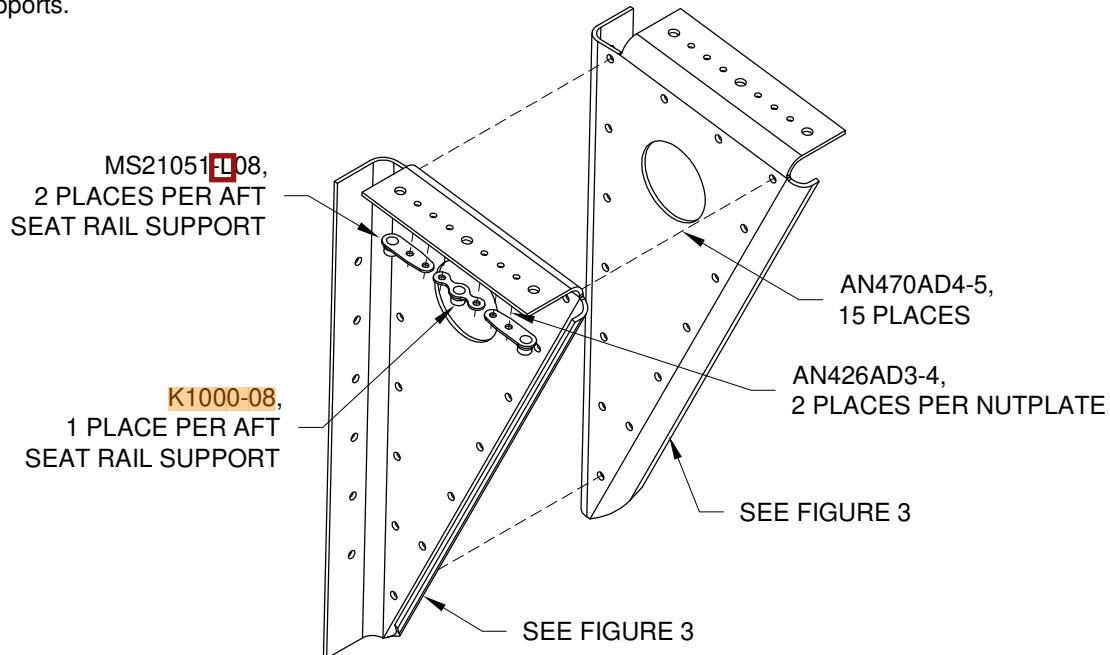
Step 7: Insert snap bushings into the F-01004C-L-1 & F-01004C-R-1 Center Section Bulkheads per the callouts in Figure 2.



**FIGURE 2: RIVETING THE FWD CENTER SECTION BULKHEAD ASSEMBLY**



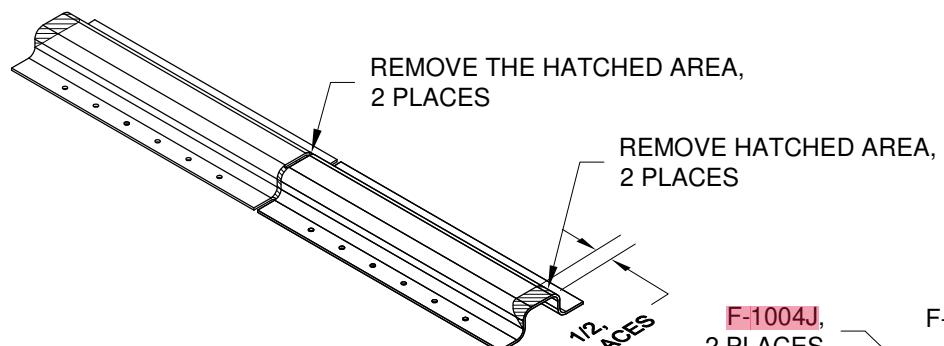
Step 1: Cleco the F-1004S-L and F-R and the F-1004R-L and F-R Aft Seat Rail Supports together as shown in Figure 1 and called out in Figure 2 to create four Aft Seat Rail Support Subassemblies. Final-Drill #30 all the holes common between both parts in all four subassemblies. Final-Drill #40 the nutplate attach holes and #19 all the screw holes in the upper flanges of all the aft seat rail supports.



**FIGURE 1: TYPICAL AFT SEAT RAIL SUPPORT SUBASSEMBLY**

Step 2: Final-Drill #40 the nutplate attach holes and #19 the screw holes in the upper flange of the F-1004B Center Section Bulkhead and the inboard flanges of the F-1004D-L and F-R Center Section Bulkheads. Machine countersink the screw holes for the lower two nutplates in the inboard flange of the center section bulkheads for the head of an #8 screw (see Figure 3).

Step 3: Cut the F-1004L Hat Stiffener apart as shown in Figure 2 to form two F-1004L Hat Stiffeners. Trim the hatched area from either end of the hat stiffener as required to allow access to buck the rivets on the lower flange of the F-1004B Center Section Bulkhead.



**FIGURE 2: HAT STIFFENER**

Step 4: Cleco the Aft Seat Rail Support Subassemblies, F-1004D-L and F-R Center Section Bulkheads and F-1004L Center Section Hat Stiffeners to the F-1004B Center Section Bulkhead.

Step 5: Final-Drill #30 all holes common between the F-1004B Center Section Bulkhead and the Aft Seat Rail Support Subassemblies, F-1004D-L and F-R Center Section Bulkheads and F-1004L Center Section Hat Stiffeners. Note that only one flange of the center section hat stiffeners have holes and the other is blank. Match-Drill #30 the holes from the center section bulkhead into the hat stiffener.

Step 6: Match-Drill #12 all holes common between the F-1004B Center Section Bulkhead, F-1004G and F-1004H Center Section Bars and the Aft Seat Rail Support Subassemblies, F-1004D-L and F-R Center Section Bulkheads and F-1004L Center Section Hat Stiffeners. Mark the seat rail support subassemblies so they can return to the same position.

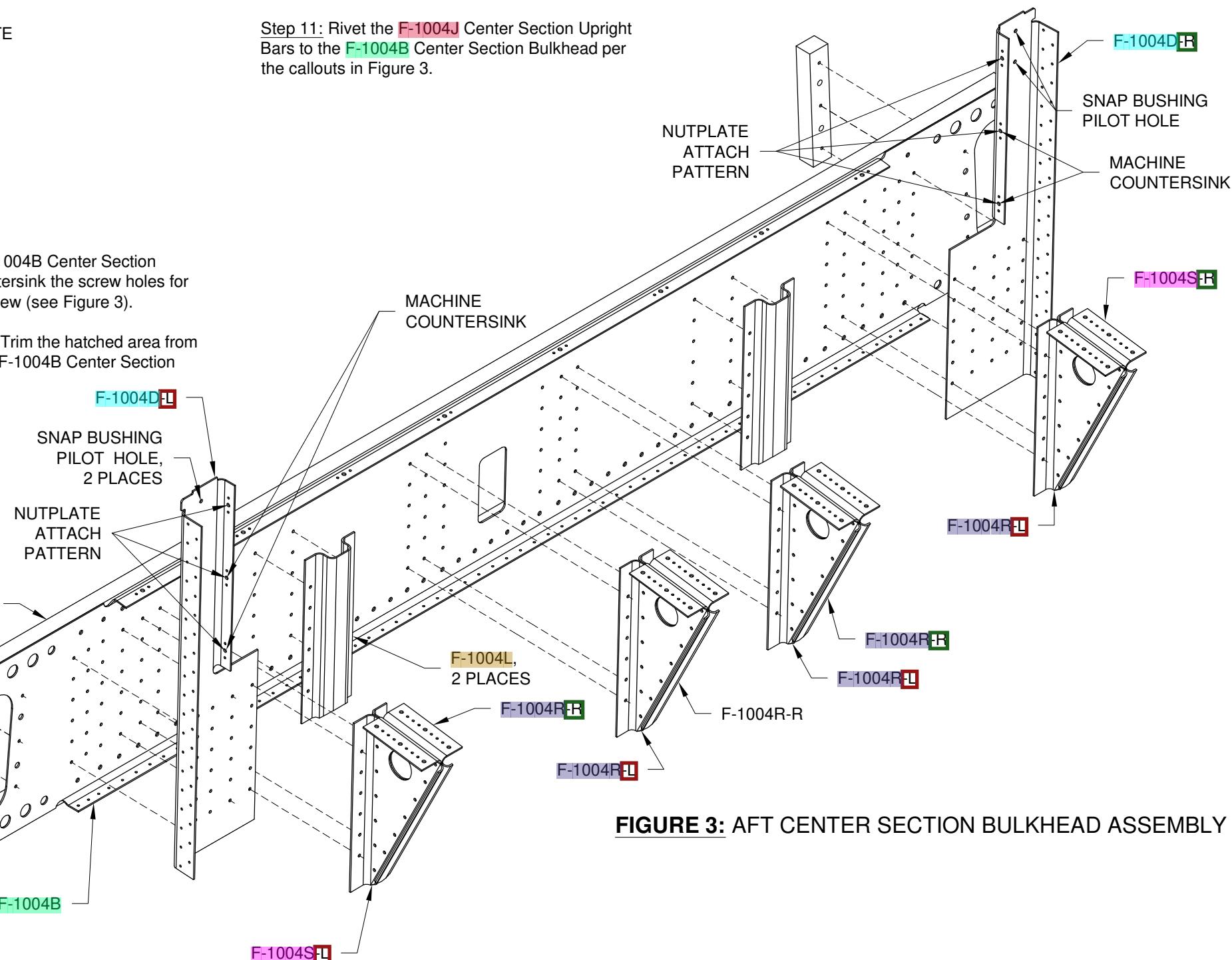
Step 7: Align the F-1004J Center Section Upright Bars with the F-1004B Center Section Bulkhead using two AN4 bolts. Final-Drill #30 the three 1/8 inch holes that attach both center section upright bars to the center section bulkhead. Mark the upright bars forward side so they can be returned to the same position.

Step 8: Disassemble the aft center section bulkhead assembly and deburr all edges. Enlarge the snap bushing pilot holes as indicated in Figure 3 to 3/4 diameter. Machine countersink the all nutplate attach holes for the head of an AN426AD3 rivet. Machine countersink the #30 holes on the forward side of the F-1004J Center Section Upright Bars for the head of an AN426AD4 rivet. Prime the center section upright bars. Prime the remaining parts if/as desired.

Step 9: Cleco then rivet the four Aft Seat Rail Support Subassemblies together per the callouts in Figure 1. Rivet nutplates to the upper flanges of the aft seat rail support subassemblies as shown in Figure 1.

Step 10: Reassemble the bulkhead per Step 4. Align the F-1004J Center Section Upright Bars with the F-1004B Center Section Bulkhead using two AN4 bolts.

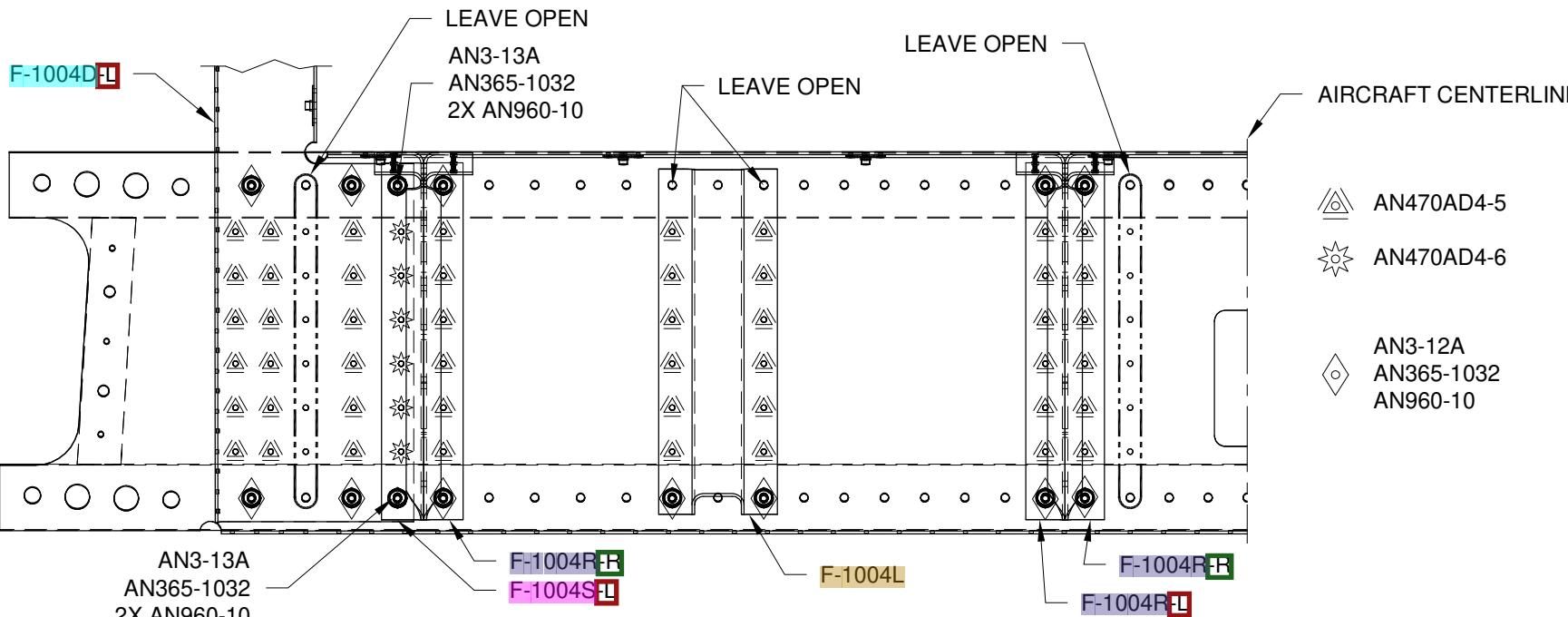
Step 11: Rivet the F-1004J Center Section Upright Bars to the F-1004B Center Section Bulkhead per the callouts in Figure 3.



**FIGURE 3: AFT CENTER SECTION BULKHEAD ASSEMBLY**



Step 1: Rivet nutplates to the F-1004B, F-1004D-L and F-1004R Center Section Bulkheads as shown in Figure 2.



**FIGURE 1: AFT BULKHEAD HARDWARE**  
(CALLOUTS ARE FOR THE LEFT SIDE OF THE AIRCRAFT  
CALLOUTS ARE SYMMETRICAL ABOUT  
THE AIRCRAFT CENTERLINE)

Step 2: Bolt the Aft Seat Rail Support Subassemblies, F-1004D-L and F-1004R Center Section Bulkheads and F-1004L Center Section Hat Stiffeners to the F-1004B Center Section Bulkhead as shown in Figure 2.

Step 3: Rivet the F-1004D-L and F-1004R Center Section Bulkheads, F-1004L Center Section Hat Stiffeners and Aft Seat Rail Support Subassemblies to the F-1004B Center Section Bulkhead as shown in Page 25-5, Figure 3 and per the callouts in Figure 1.

Step 4: Insert snap bushings into the F-1004D-L and -R Center Section Bulkheads as shown in Figure 2.

Step 5: Fabricate the F-1004M Wear Strip by cutting a piece of 1/8 inch thick by 1/2 inch wide UHMW plastic to 4 3/4 inches long. The wear strip may be up to 1/32 inch short but must not be over length.

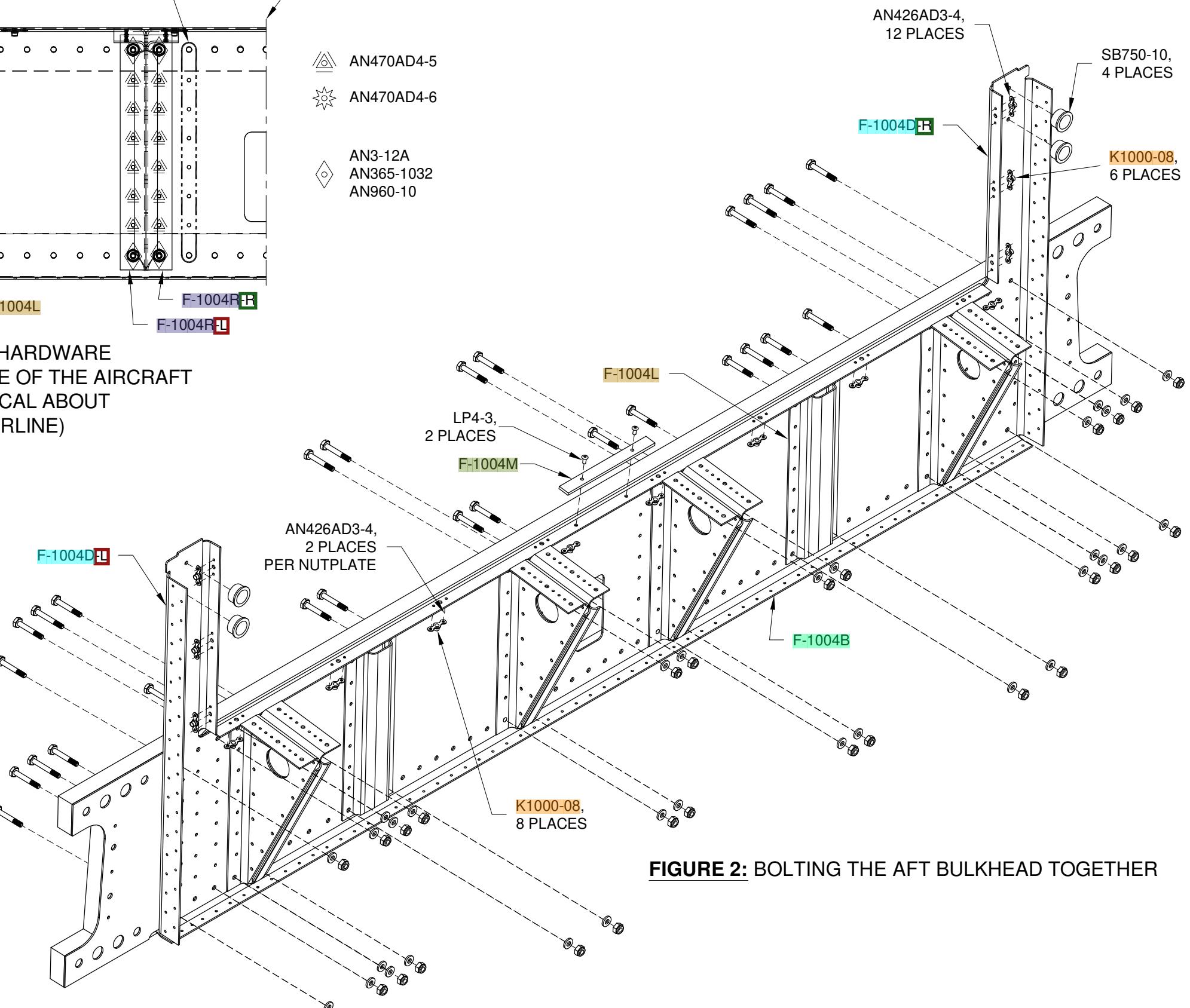
Drill two #30 holes centered on the width of the wear strip, each one 1 inch from the end.

Step 6: Clamp the F-1004M Wear Strip to the upper flange of the F-1004B Center Section Bulkhead.

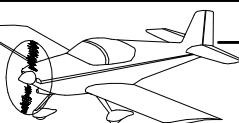
Position the wear strip such that the aft edge of the wear strip is flush with the center section bulkhead upper flange aft edge and such that the wear strip is exactly centered on the center section bulkhead upper flange.

Match-drill two #30 holes through the center section bulkhead upper flange using the holes in the wear strip as drill guides. Remove the wear strip and deburr the holes in the center section bulkhead.

Step 7: Rivet the F-1004M Wear Strip to the upper flange of the F-1004B Center Section Bulkhead as shown in Figure 2.

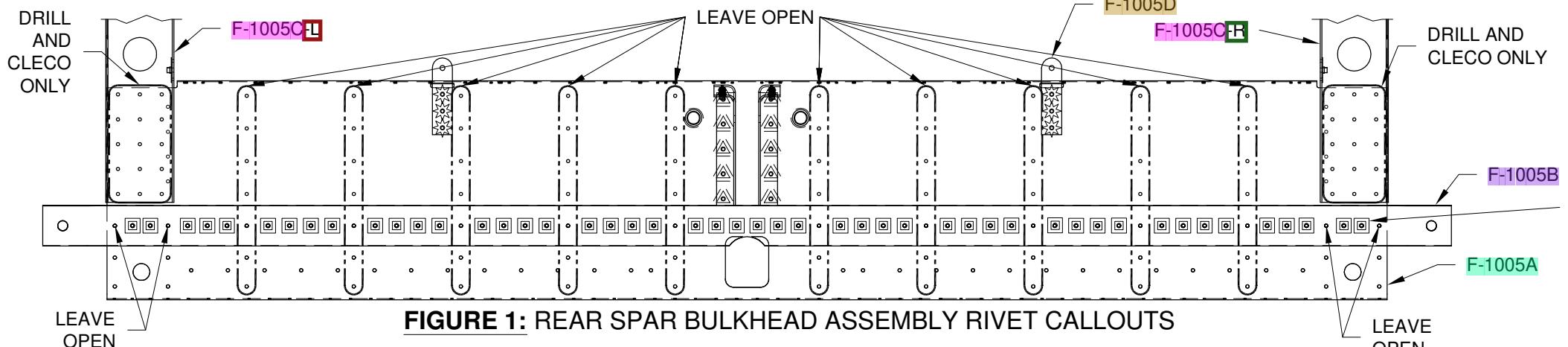


**FIGURE 2: BOLTING THE AFT BULKHEAD TOGETHER**



Step 1: Final-Drill #40 all the nutplate attach holes and #19 all the nutplate screw holes in the F-1005A Rear Spar Bulkhead, F-1005C-L and F-1005C-R Bulkhead Side Channel and F-1063B-L and F-1063B-R Idler Arm Brackets as shown in Figure 2.

Step 2: Cleco the F-1005B Rear Spar Attach Bars, F-1005C-L and F-1005C-R Bulkhead Side Channels, F-1005D Crotch Strap Lugs, F-1005E-L and F-1005E-R Gussets and F-1063B-L and F-1063B-R Idler Arm Brackets to the F-1005A Rear Spar Bulkhead, as shown in Figure 2. Using Figure 1 as a guide tape over or mark the holes to be left open. Final-Drill #30 the remaining holes common between the parts just clecoed together.



**FIGURE 1: REAR SPAR BULKHEAD ASSEMBLY RIVET CALLOUTS**

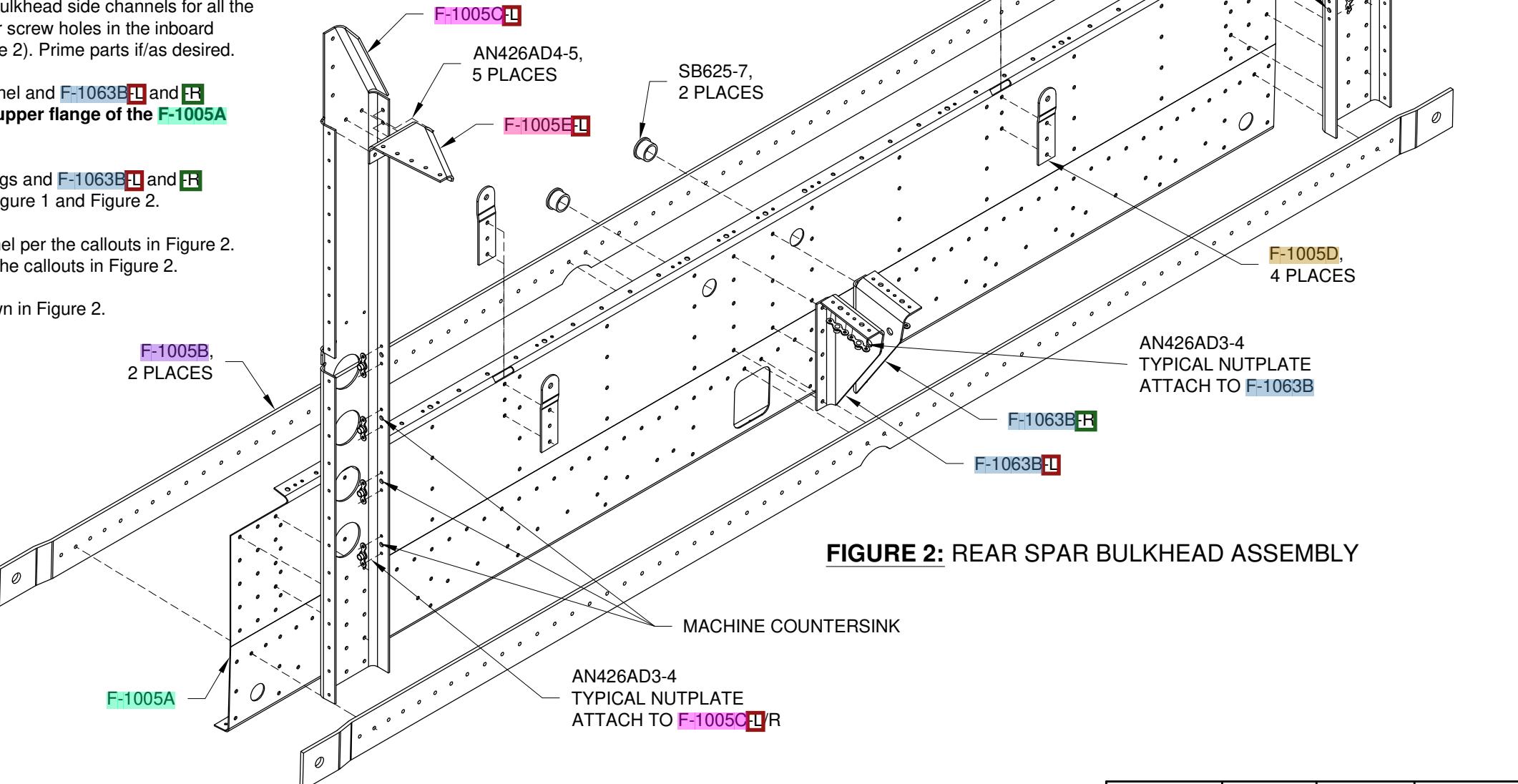
Step 3: Disassemble and deburr all the bulkhead parts. Machine countersink the nutplate attach holes in the F-1005C-L and F-1005C-R Bulkhead Side Channels and F-1063B-L and F-1063B-R Idler Arm Brackets for the head of an AN426AD3 rivet. Machine countersink the forward and inboard face of the bulkhead side channels for all the F-1005E-L and F-1005E-R Gusset attach holes. Machine countersink the three lower screw holes in the inboard flange of the bulkhead side channels for the head of an #8 screw (see Figure 2). Prime parts if/as desired.

Step 4: Rivet the nutplates onto the F-1005C-L and F-1005C-R Bulkhead Side Channel and F-1063B-L and F-1063B-R Idler Arm Brackets as shown in Figure 2. **Do not rivet nutplates onto the upper flange of the F-1005A Rear Spar Bulkhead.**

Step 5: Rivet the F-1005B Rear Spar Attach Bars, F-1005D Crotch Strap Lugs and F-1063B-L and F-1063B-R Idler Arm Brackets to the F-1005A Rear Spar Bulkhead per the callouts in Figure 1 and Figure 2.

Step 6: Rivet the F-1005E-L Gusset to the F-1005C-L Bulkhead Side Channel per the callouts in Figure 2. Rivet the F-1005E-R Gusset to the F-1005C-R Bulkhead Side Channel per the callouts in Figure 2.

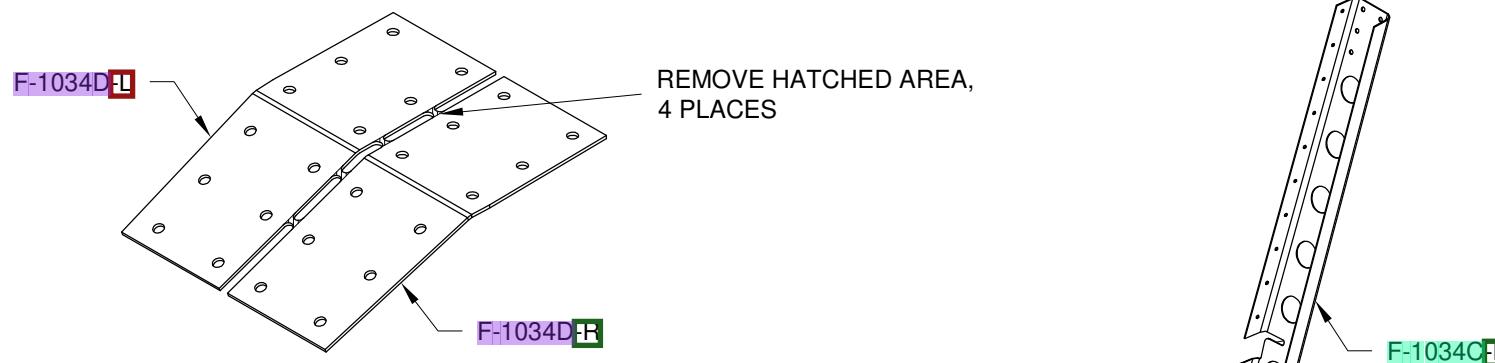
Step 7: Install snap bushings into the F-1005A Rear Spar Bulkhead as shown in Figure 2.



**FIGURE 2: REAR SPAR BULKHEAD ASSEMBLY**



Step 1: Cut the F-1034D-L and F-1034D-R Gussets apart from one another as shown in Figure 1.



**FIGURE 1: BREAKING APART THE GUSSETS**

Step 2: Cleco the F-1034A Fuselage Bulkhead, F-1034C-L and F-1034C-R Fuselage Bulkheads, and F-1034D-L and F-1034D-R Gussets together as shown in Figure 2.

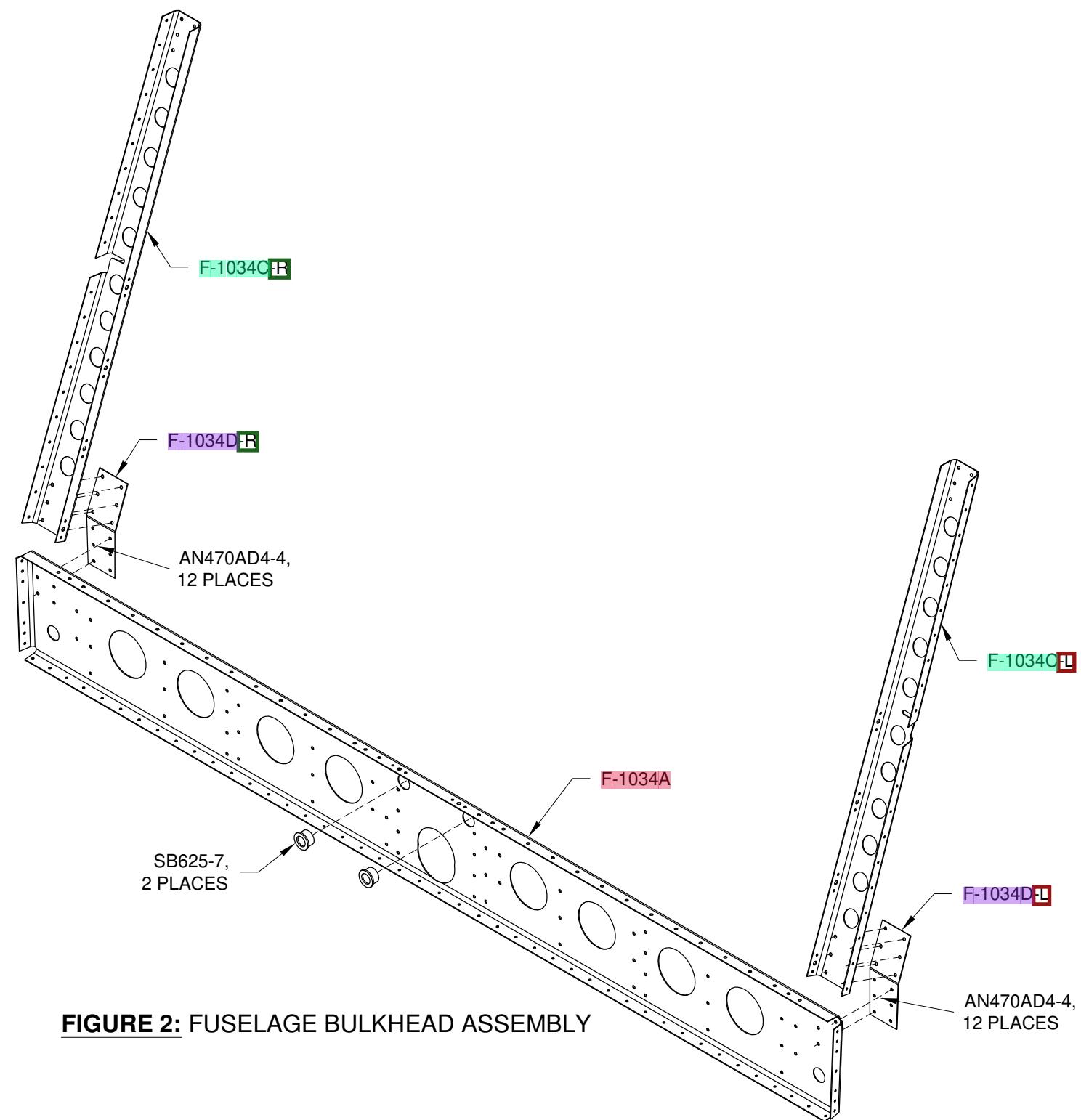
Step 3: Final-Drill #30 all holes common between the parts clecoed together in Step 2.

Step 4: Final-Drill the nutplate attach holes for both nutplates near the center of the F-1034A Fuselage Bulkheads upper flange. Final-Drill #19 the screw holes for these nutplates.

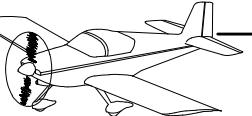
Step 5: Disassemble all parts and deburr all edges. Prime parts if/as desired.

Step 6: Rivet the F-1034D-L and F-1034D-R Gussets to the F-1034A Fuselage Bulkhead per the callouts in Figure 2. To this subassembly rivet the F-1034C-L and F-1034C-R Fuselage Bulkheads per the callouts in Figure 2.

Step 7: Install snap bushings into the F-1034A Fuselage Bulkhead as shown in Figure 2.

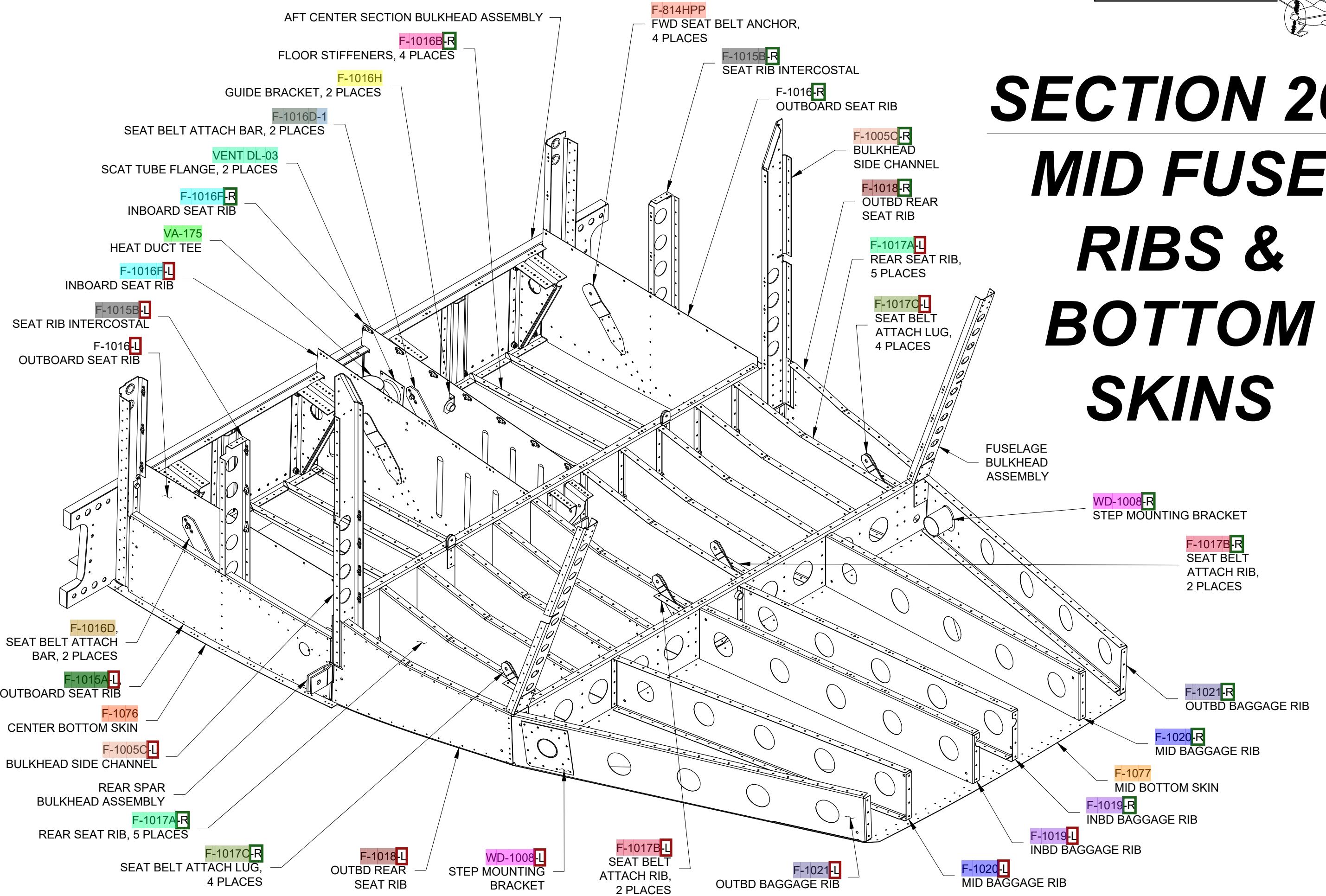


**FIGURE 2: FUSELAGE BULKHEAD ASSEMBLY**



# SECTION 26:

## MID FUSE RIBS & BOTTOM SKINS



**NOTE:** The following instructions are for the Left INBD Footwell Rib Subassembly. The right is a mirror of the left.

Step 1: Cut apart the F-1066C-2 Reinforcing Angles into F-1066C-2-L & -R as shown in Figure 1. Mark them 'L' and 'R'.

Step 2: Cleco the F-1016D-1 Seat Belt Attach Bar, F-814HPP Fwd Seat Belt Anchor, and the VENT DL-03 to the F-1016F-L Left INBD Footwell Rib shown in Figure 2, hereafter referred to as the Left INBD Footwell Rib Subassembly.

Step 3: Final-Drill in assembly the 1/4 diameter bolt hole through the F-1016D-1, F-814HPP, and F-1016F-L.

Final-Drill the holes common to the VENT DL-03 and F-1016F-L. See Figure 2.

Step 4: Disassemble the Left INBD Footwell Rib Subassembly.

Deburr the edges and holes in all parts.

Dimple the screw holes along the upper edge of the Left INBD Footwell Rib per the Figure 2 call-out.

Dimple all nutplate attach holes in the F-1016F-L.

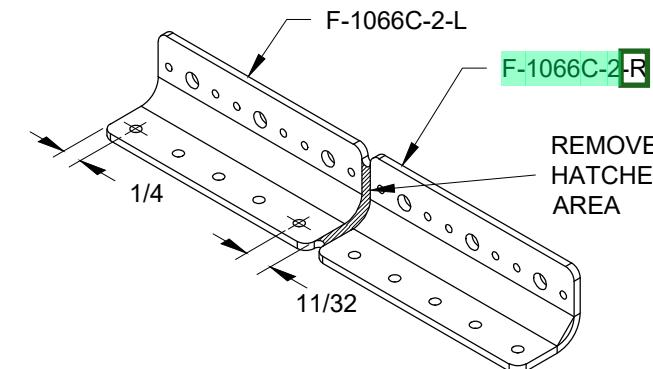
Machine countersink the F-1016D-1 for the dimples in the F-1016F-L coinciding with the holes that will attach the K1000-4 nutplate.

Step 5: Machine countersink the F-1066C-2-L for the nutplate attach rivets per the call-out in Figure 2.

Dimple the attach holes in the K1100-08 and MS21053-L08 nutplates.

Flute the bottom flange of the Left INBD Footwell Rib as required.

Prime parts if/as desired.



**FIGURE 1:**  
SEPARATE THE REINFORCING ANGLES

Step 6: Cleco the K1000-4 nutplate and F-1016D-1-L onto the F-1016F-L. Rivet the K1000-4 in place.

Cleco the remaining parts back together except the F-1066C-2-L.

Step 7: Mark the holes called out "LEAVE OPEN" in Figure 2.

Step 8: Tape over the five rivet holes in F-1016D-1 attaching F-1016C-2-L.

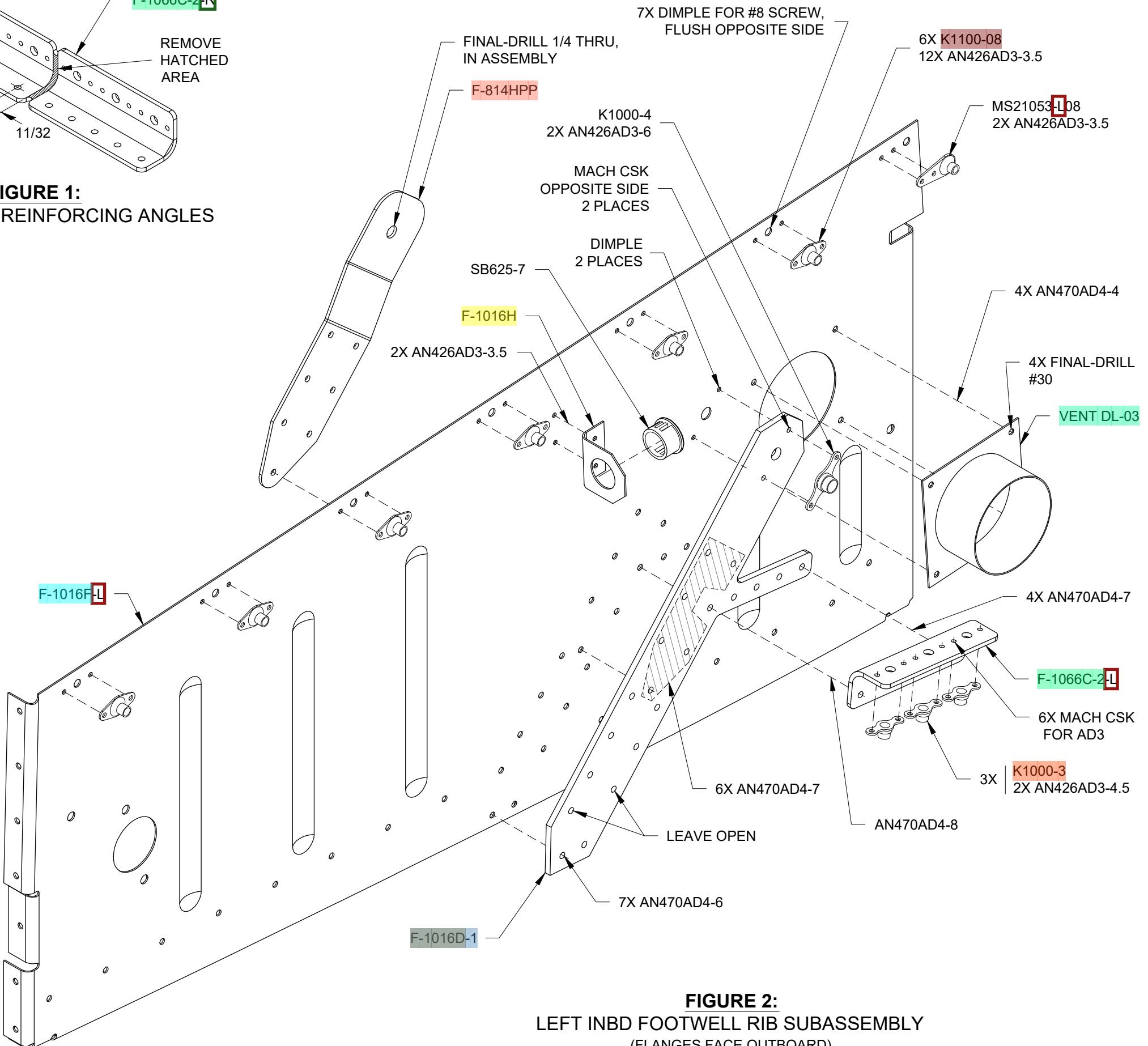
Rivet the F-1016D-1, F-814HPP, F-1016H, VENT DL-03 and nutplates to the F-1016F-L per the call-outs in Figure 2.

Rivet the nutplates to the underside of the F-1066C-2-L.

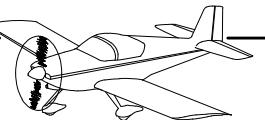
Rivet the F-1016C-2-L to F-1016D-1, F-1016F-L and F-814HPP per the call-outs in Figure 2.

Insert the snap bushing into the F-1016H to finish the Left INBD Footwell Rib Subassembly.

Step 9: Repeat Steps 2-8 to complete the Right INBD Footwell Rib Subassembly.



**FIGURE 2:**  
LEFT INBD FOOTWELL RIB SUBASSEMBLY  
(FLANGES FACE OUTBOARD)



Step 1: Cleco the F-1016D Seat Belt Attach Bar, and F-814HPP Fwd Seat Belt Anchor to the F-1016-L Outboard Seat Rib as shown in Figure 1.

Step 2: Final-Drill 1/4 the hole in the F-814HPP, F-1016-L, and F-1016D.

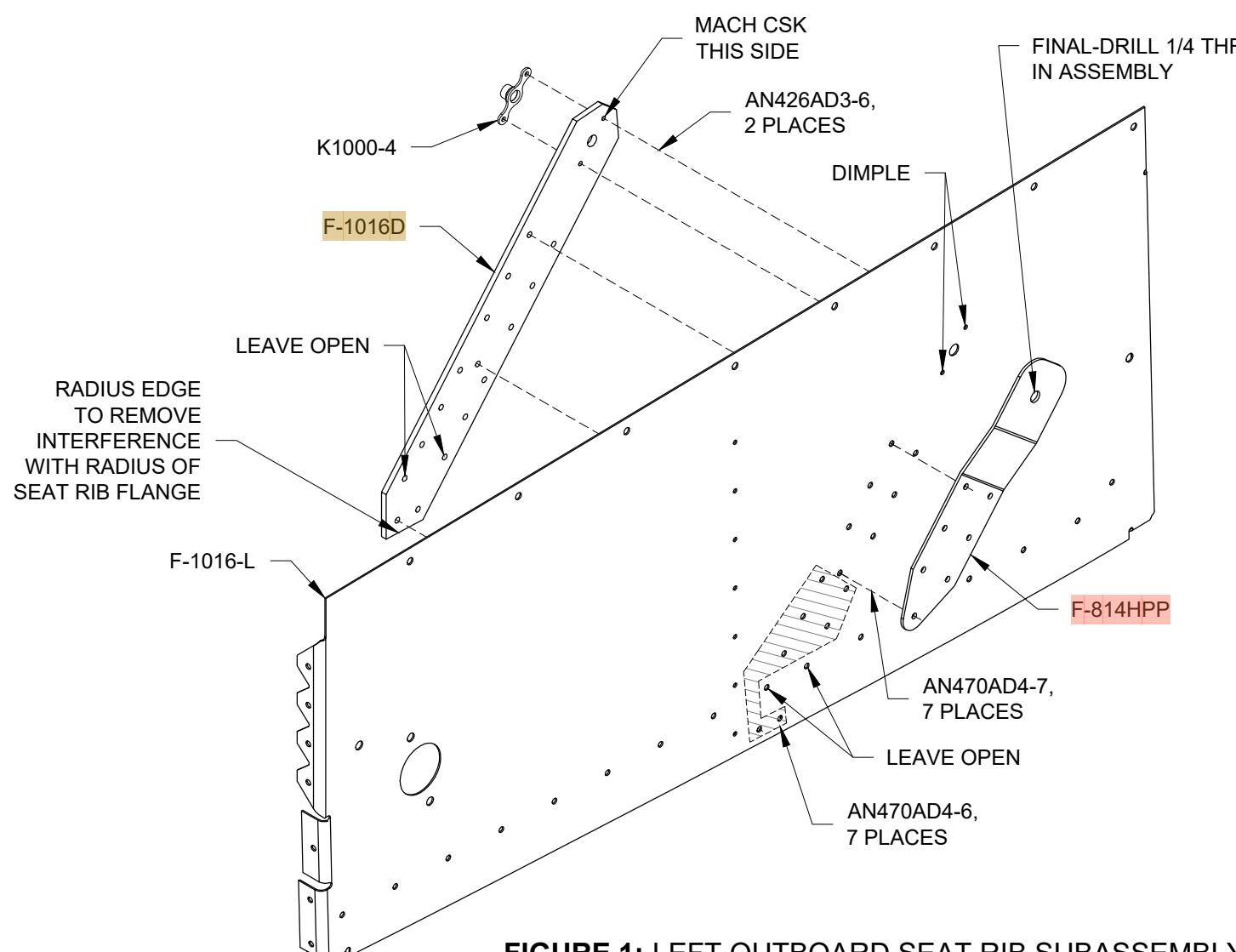
Step 3: Cut apart the F-1015EF Spacers into two F-1015E and two F-1015F Spacers. Label each part (the two parts with seven holes in them are F-1015E Spacers).

Step 4: Cleco the F-1015B-L Seat Rib Intercostal and F-1015E Spacer to the F-1016-L Outboard Seat Rib as shown in Figure 2. Final-Drill #40 the holes common between these three parts. Final-Drill #40 the nutplate attach holes and #19 the screw holes in the inboard flange of the seat rib intercostal.

Final-Drill #19 the open screw holes along the upper edge of the outboard seat rib to create the Left Outboard Seat Rib Subassembly. Dimple the lower six #40 holes in the outboard flange of F-1015B-L (see Figure 2).

Step 5: Repeat Steps 1, 2, and 4 to create the Right Outboard Seat Rib Subassembly. The right is a mirror of the left.

Step 6: Disassemble both Right and Left Outboard Seat Rib



**FIGURE 1: LEFT OUTBOARD SEAT RIB SUBASSEMBLY  
(FLANGES FACE OUTBOARD)**

Subassemblies. Deburr the edges and holes of all parts. Place the flush side of the following dimples on the inbd side of the subassembly.

Dimple both nutplate attach holes in the F-1016-L & -R Outboard Seat Ribs. Machine countersink the F-1016D Seat Belt Attach Bars for the dimples in the outboard seat ribs. See Figure 1.

Dimple the screw holes in the inboard flange of the seat rib intercostals that correspond to the flush nutplates and the screw holes along the upper edge of the outboard seat rib for a #8 screw.

Dimple the holes common to the outboard seat ribs, F-1015E Spacers and F-1015B-L & -R Seat Rib Intercostals. Dimple the nutplate attach holes in the inboard flange of the seat rib intercostals.

Dimple the two rivet holes in the lower flange of the outboard seat ribs that are below the lower edge of the seat belt attach bars (see Figure 2). Flute the bottom flange of both the outboard seat rib subassemblies. Prime all parts if/as desired.

Step 7: Dimple the K1000-08, K1100-08 and MS21053-L08 nutplates.

Rivet the nutplates to the inboard flange of the F-1015B-L & -R Seat Rib Intercostals per the callouts in Figure 2.

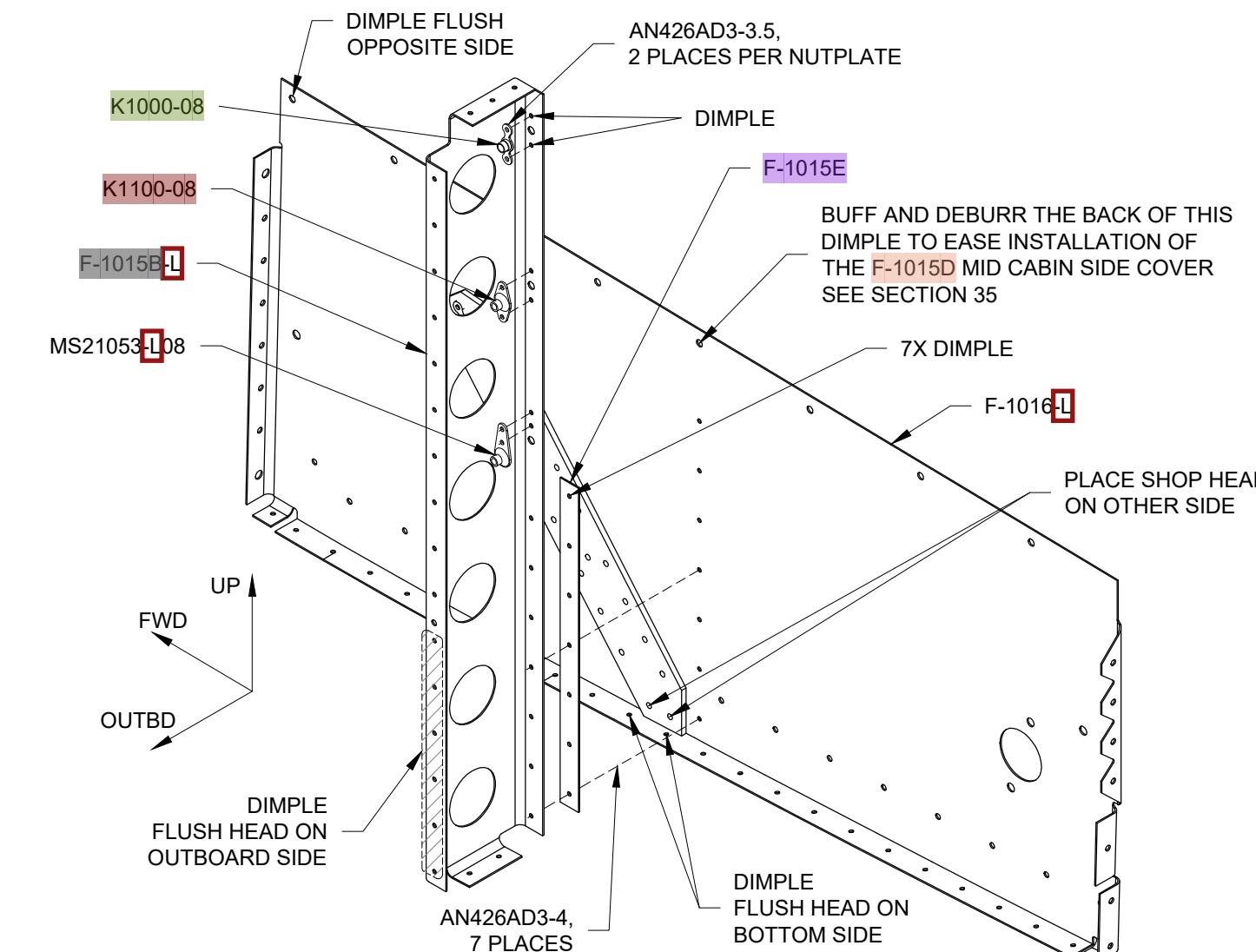
Step 8: Cleco the K1000-4 nutplates and F-1016D Seat Belt Attach Bars onto the F-1016-L & -R Outboard Seat Ribs.

Rivet the K1000-4 nutplates in place per the callouts in Figure 1. Cleco the rest of the parts together per Step 2 and Step 4 to form the Left and Right Outboard Seat Rib Subassemblies.

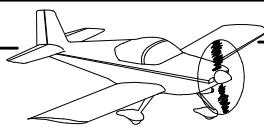
Step 9: Rivet the F-1016D Seat Belt Attach Bar, and F-814HPP Fwd Seat Belt Anchor to the F-1016-L Outboard Seat Rib per the call-outs in Figure 1 (leave the holes open where indicated).

Rivet the F-1015B-L Seat Rib Intercostal and F-1015E Spacer to the F-1016-L Outboard Seat Rib per the call-outs in Figure 2 to finish the Left Outboard Seat Rib Subassembly.

Repeat this step to finish the Right Outboard Seat Rib Subassembly.



**FIGURE 2: LEFT OUTBOARD SEAT RIB SUBASSEMBLY**



Step 1: Break apart the F-1016G Inboard Seat Rib Spacers into two parts. See Figure 1.

Step 2: Cleco the left and right, inboard and outboard seat rib subassemblies and inboard seat rib spacers to the Aft Center Section Bulkhead Assembly as shown in Figure 2.

Step 3: Final-Drill #30 all the holes common between the seat rib subassemblies and the Aft Center Section Bulkhead Assembly.

Step 4: Match-Drill #12 the upper and lower holes in the forward flanges of the seat rib subassemblies and inboard seat rib spacers using holes in the Aft Center Section Bulkhead Assembly as drill guides.

Step 5: Disassemble and deburr all parts.

Prime the parts if/as desired.

Step 6: Insert the VA-175 Heat Duct Tee into the VENT DL-03 Scat Tube Flanges on the inboard seat rib subassemblies as shown in Figure 2.

Step 7: Cleco the seat rib subassemblies to the Aft Center Section Bulkhead Assembly.

Step 8: Bolt the seat rib subassemblies to the Aft Center Section Bulkhead Assembly as shown in Figure 2.

Step 9: Rivet the seat rib subassemblies to the Aft Center Section Bulkhead Assembly as shown in Figure 2.

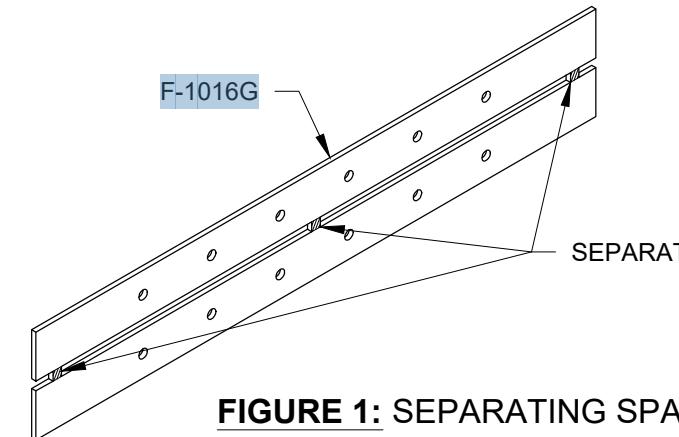


FIGURE 1: SEPARATING SPACERS

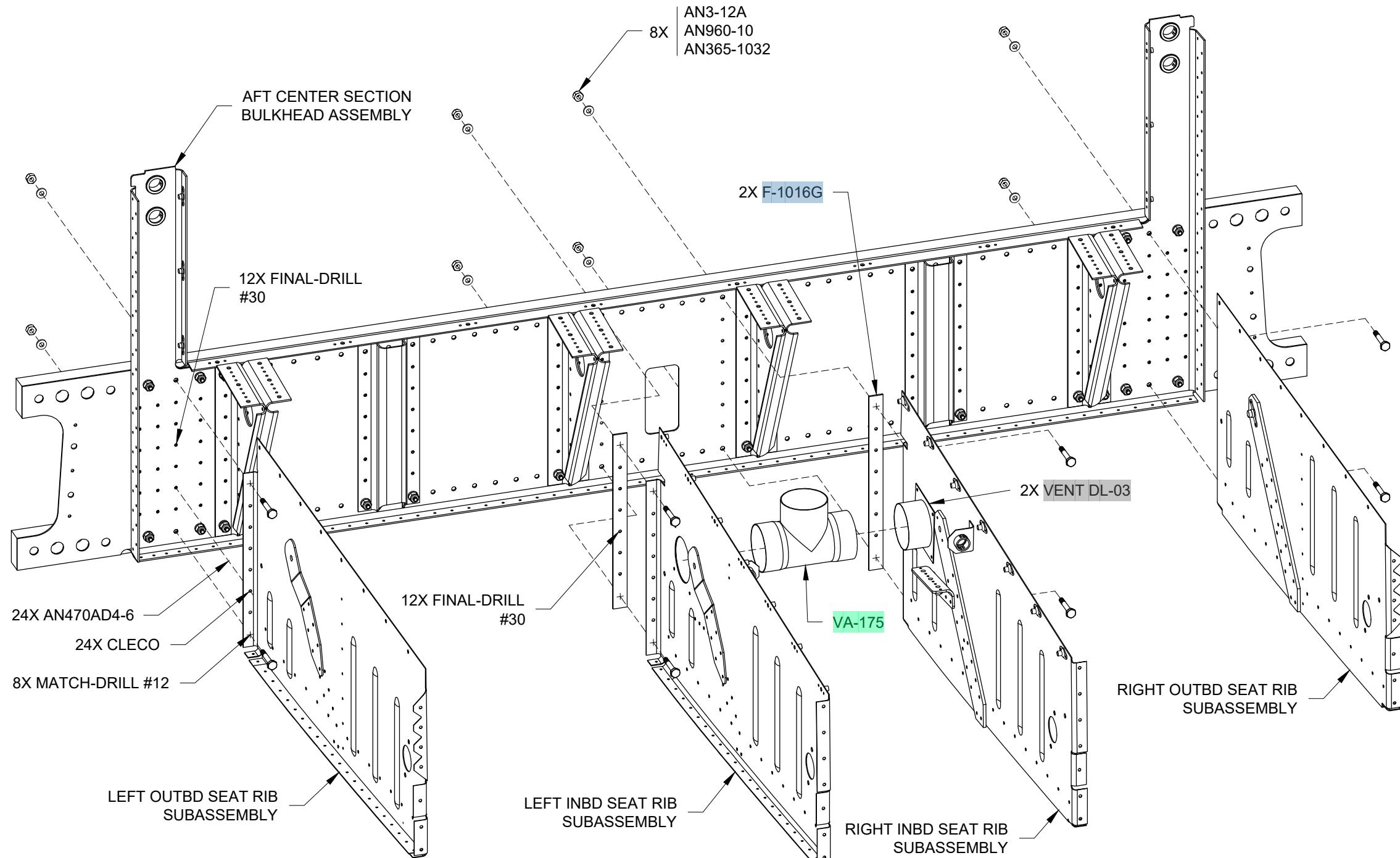
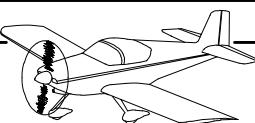


FIGURE 2: ATTACHING SEAT RIB SUBASSEMBLIES TO AFT CENTER SECTION BULKHEAD SUBASSEMBLY

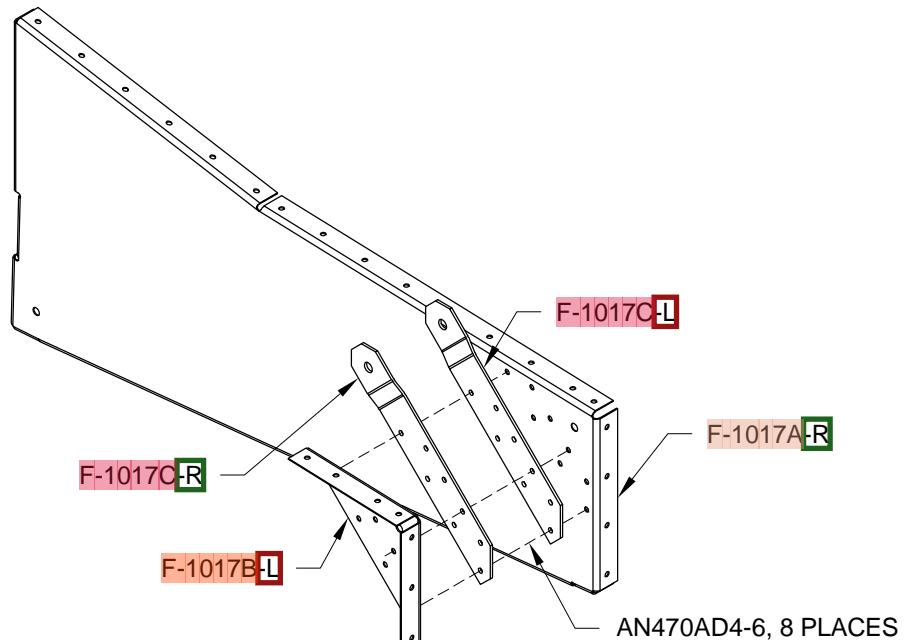


Step 1: Dimple all #40 holes in the web of the F-1015A-L Outboard Seat Ribs. Flute the lower flange of the F-1015A-L ribs until the holes in the rib match the corresponding holes in the F-1076 Center Bottom Skin. Cleco the outboard seat ribs and Inboard Seat Rib Subassemblies to the Rear Spar Bulkhead Assembly as shown in Figure 2 and Figure 3. Final-Drill #30 all the holes common between the ribs and the rear spar bulkhead. Uncleco the outboard seat ribs and inboard seat rib subassemblies.

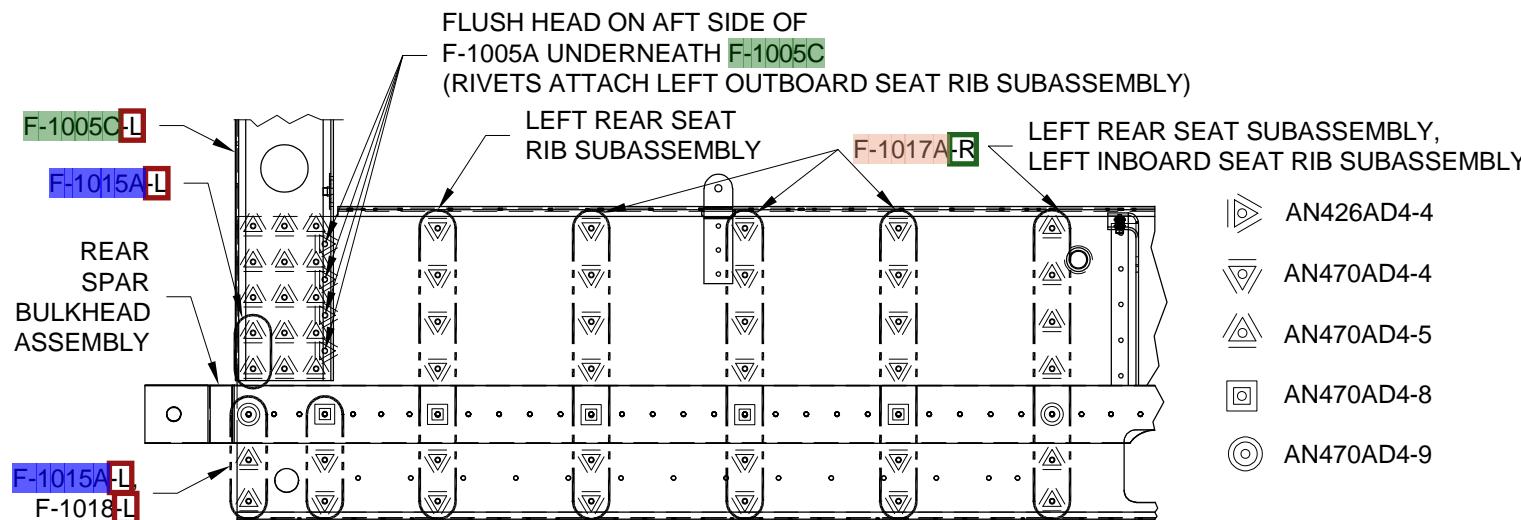
Step 2: Uncleco the F-1005C-L and F-R Bulkhead Side Channels from the Rear Bulkhead Assembly. Cleco then final-drill #30 Left and Right Outboard Seat Rib Subassemblies to the rear spar bulkhead assembly as shown in Figure 3. Uncleco the outboard seat rib subassemblies from the rear spar bulkhead assembly. Note that the rivets that attach this flange to the rear spar bulkhead assembly are AN426AD4 rivets and that the flush head goes on the aft side of the rear spar bulkhead assembly underneath the F-1005C-L and F-R Bulkhead Side Channels, see Figure 2. Deburr and dimple these holes now for the head of an AN426AD4 rivet. Cleco the bulkhead side channels back in place.

Step 3: Break apart F-1017B to make the F-1017B-L and F-R Seat Belt Attach Ribs. Cut apart F-1017C to make the F-1017C-L and -R Seat Belt Attach Lugs.

Step 4: Cleco then final-drill #30 the F-1017B-L Seat Belt Attach Rib and F-1017C-L and F-R Seat Belt Attach Lugs to the F-1017A-R Rear Seat Rib as shown in Figure 1. This will form a Left Rear Seat Rib Subassembly. Repeat this step to form another Left Rear Seat Rib Subassembly and two Right Rear Seat Rib Subassemblies. The right assembly is a mirror of the left.



**FIGURE 1: REAR SEAT RIB SUBASSEMBLY**



**FIGURE 2: RIB TO REAR SPAR BULKHEAD RIVETS  
(BULKHEAD ASSEMBLY IS SYMMETRICAL ABOUT THE CENTERLINE OF THE AIRCRAFT)**

Step 5: Cleco the F-1017A-L and F-R Rear Seat Ribs, Left and Right Rear Seat Rib Subassemblies and F-1018-L and F-R Outboard Rear Seat Ribs to the to the Rear Spar Bulkhead Assembly as shown in Figure 2 and Figure 3. Final-Drill #30 all the holes common between the ribs and the rear spar bulkhead.

Step 6: Disassemble and deburr all parts. Final-Drill #40 and dimple the 3/32 holes in the web of the F-1018-L and F-R Outbd Rear Seat Ribs **except** the holes common to the F-1005C-L and F-R Bulkhead Side Channels and the aft row of holes. Dimple the three #30 holes in the web of F-1018-L and F-R as shown in Figure 3. Prime parts if/as desired.

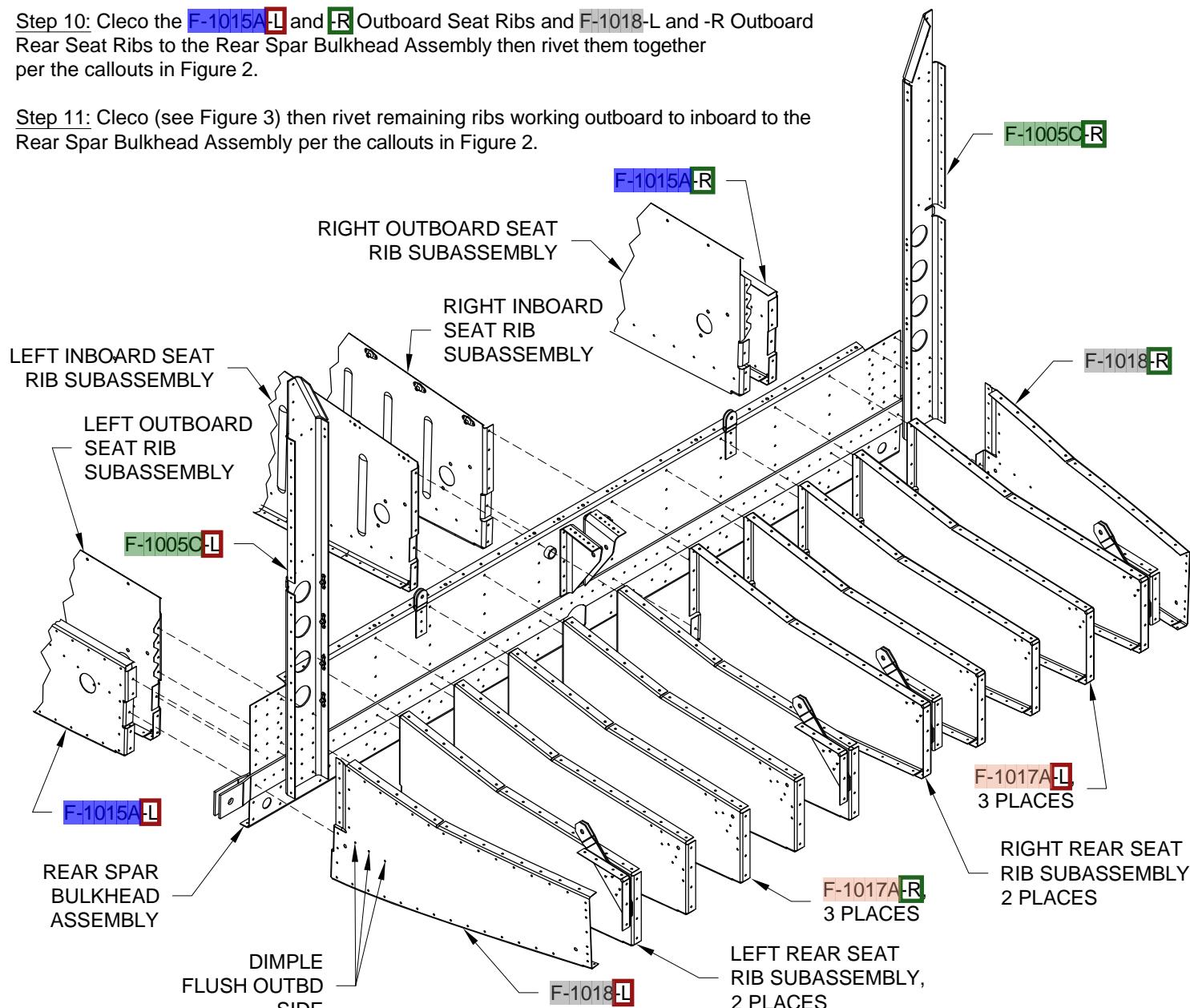
Step 7: Cleco the Left and Right Rear Seat Rib Subassemblies together per Step 4 then rivet them together per the callouts in Figure 1.

Step 8: Cleco the Outboard Seat Rib Subassemblies to the Rear Spar Bulkhead Assembly then rivet them together per the callouts in Figure 2.

Step 9: Cleco the F-1005C-L and F-R Bulkhead Side Channels to the Rear Spar Bulkhead Assembly then rivet (all but the two rivet locations that will attach the F-1015A-L and F-R Outboard Seat Ribs) them together per the callouts in Figure 2.

Step 10: Cleco the F-1015A-L and F-R Outboard Seat Ribs and F-1018-L and -R Outboard Rear Seat Ribs to the Rear Spar Bulkhead Assembly then rivet them together per the callouts in Figure 2.

Step 11: Cleco (see Figure 3) then rivet remaining ribs working outboard to inboard to the Rear Spar Bulkhead Assembly per the callouts in Figure 2.



**FIGURE 3: RIB ATTACH TO REAR SPAR BULKHEAD**



Step 1: Cleco the Left and Right Rear Seat Rib Subassemblies and F-1017A-L and -R Rear Seat Ribs to the Fuselage Bulkhead Assembly as shown in Figure 1. Final-Drill #30 the holes common between the parts just clecoed together. Cleco the F-1019-L and -R Inbd Baggage Ribs and F-1020-L and -R Mid Baggage Ribs to the fuselage bulkhead assembly as shown in Figure 1. Final-Drill #30 the holes common between the parts just clecoed together.

Step 2: Cleco the F-1021-L Outbd Baggage Rib between the F-1018-L Outbd Rear Seat Rib and the Fuselage Bulkhead Assembly (See isometric view on Page 26-1). Final-Drill #40 the holes common to the outbd seat rib, outbd baggage rib and the fuselage bulkhead assembly. Repeat this step for the F-1021-R Outbd Baggage Rib. Cleco then final-drill #30 the WD-1008-L and -R Step Mounting Brackets to the outbd baggage ribs as shown in Figure 1.

Step 3: Final-Drill #30 then dimple all the holes in the upper flanges of the F-1020-L and -R Mid Baggage Ribs and F-1021-L and -R Outbd Baggage Ribs.

Step 4: Final-Drill #40 the hole in the aft lower tabs on the F-1019-L and -R Inbd Baggage Rib, mid baggage rib and outbd baggage rib. See Figure 1.

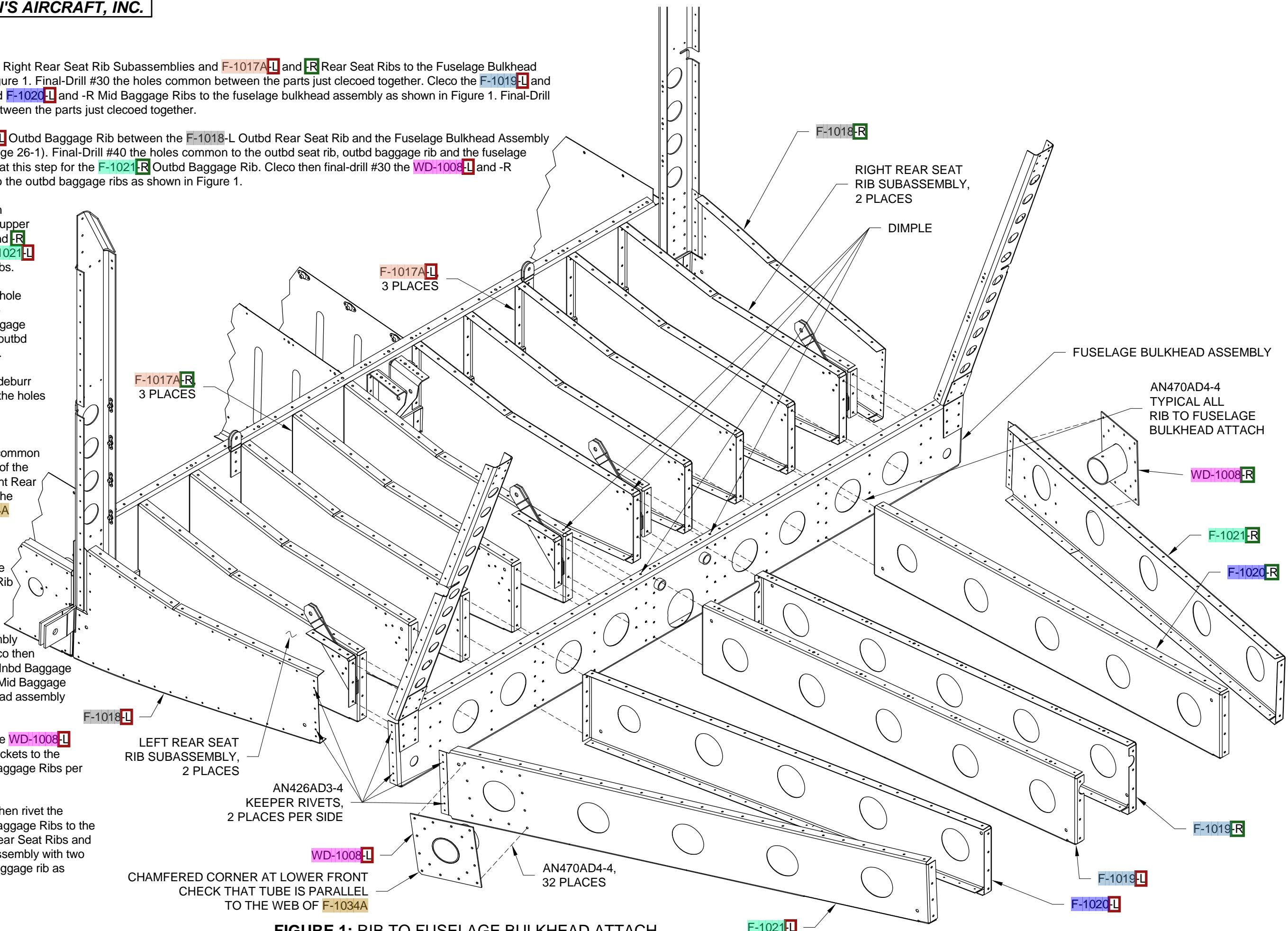
Step 5: Disassemble and deburr parts as required. Dimple the holes final-drilled #40 in Step 2. Prime parts if/as desired.

Step 6: Dimple the holes common between the upper flange of the inboard most Left and Right Rear Seat Subassemblies and the upper flange of the F-1034A Fuselage Bulkhead. See Figure 1.

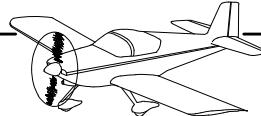
Step 7: Cleco then rivet the Left and Right Rear Seat Rib Subassemblies and F-1017A-L and -R Rear Seat Ribs to the F-1034 Fuselage Bulkhead Assembly as shown in Figure 1. Cleco then rivet the F-1019-L and -R Inbd Baggage Rib and F-1020-L and -R Mid Baggage Rib to the fuselage bulkhead assembly as shown in Figure 1.

Step 8: Cleco then rivet the WD-1008-L and -R Step Mounting Brackets to the F-1021-L and -R Outbd Baggage Ribs per the callout in Figure 1.

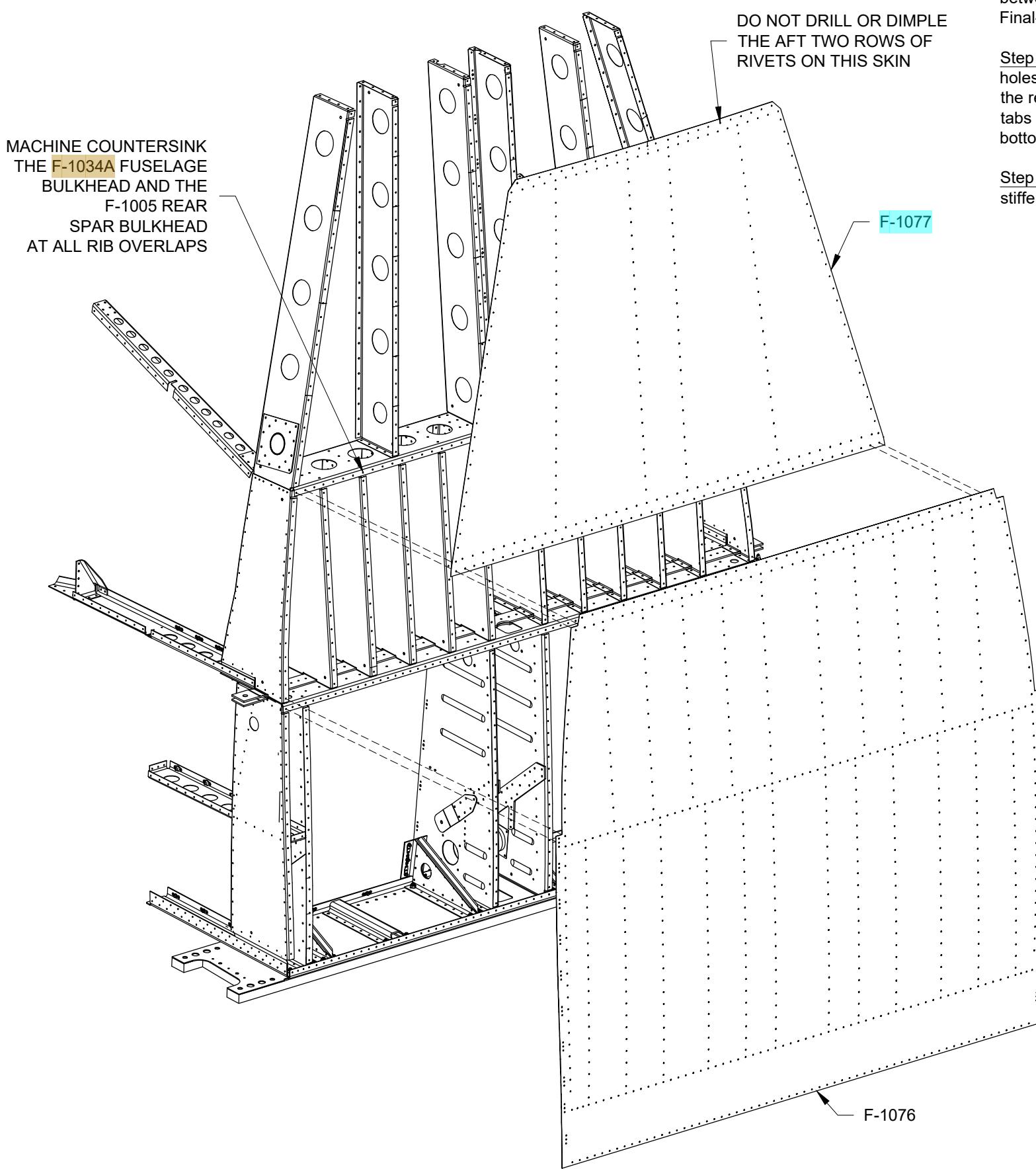
Step 9: Cleco per Step 2 then rivet the F-1021-L and -R Outbd Baggage Ribs to the F-1018-L and -R Outbd Rear Seat Ribs and the Fuselage Bulkhead Assembly with two keeper rivets per outbd baggage rib as shown in Figure 1.



**FIGURE 1: RIB TO FUSELAGE BULKHEAD ATTACH**



Step 1: Cleco the F-1077 Mid Bottom Skin then the F-1076 Center Bottom Skin to the ribs and bulkheads as shown in Figure 1.

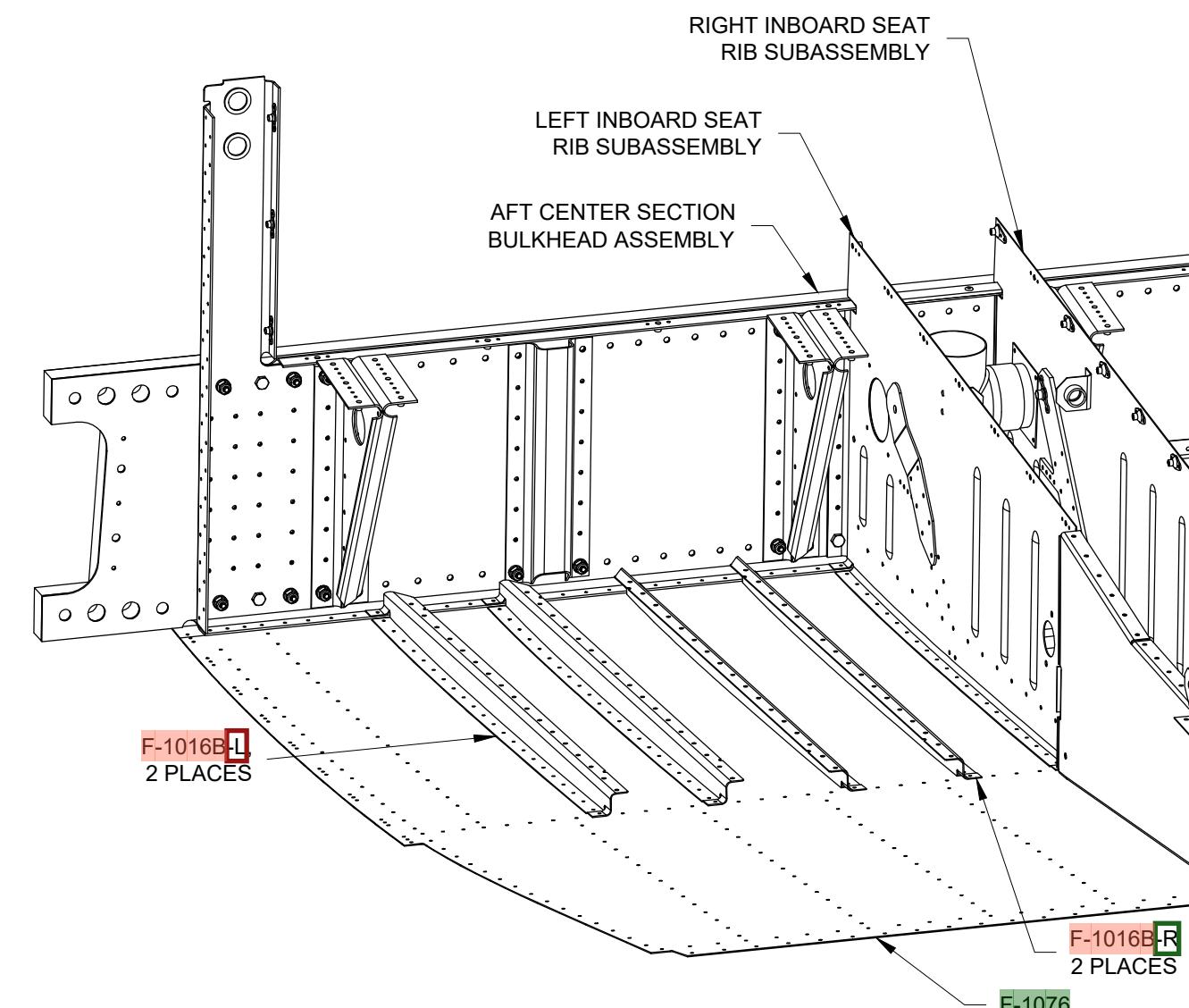


**FIGURE 1: BOTTOM SKINS**

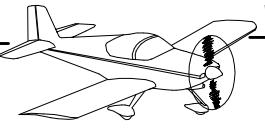
Step 2: Cleco the F-1016B-L and F-1016B-R Floor Stiffeners to the F-1076 Center Bottom Skin, Aft Center Section Bulkhead Assembly, and Rear Spar Bulkhead Assembly (see Figure 2). Final-Drill #40 all holes common between the F-1076 Center Bottom Skin or the F-1077 Mid Bottom Skin and the underlying ribs and bulkheads. Final-Drill #30 the holes in the upper flanges of the floor stiffeners.

Step 3: Disassemble the F-1016B-L and F-1016B-R Floor Stiffeners, F-1076 Center Bottom Skin and F-1077 Mid Bottom Skin. Deburr the holes and edges. Machine countersink the Aft Center Section Bulkhead Assembly holes common to the center bottom skin. Dimple the remaining common holes in the center bottom skin, mid bottom skin, ribs and bulkheads (except the holes that correspond to tabs that overlay the F-1034A Fuselage Bulkhead and F-1005A Rear Spar Bulkheads lower flange). Dimple the holes in the top and bottom flanges of the stiffeners except the holes in the lower tabs. Prime parts if/as desired.

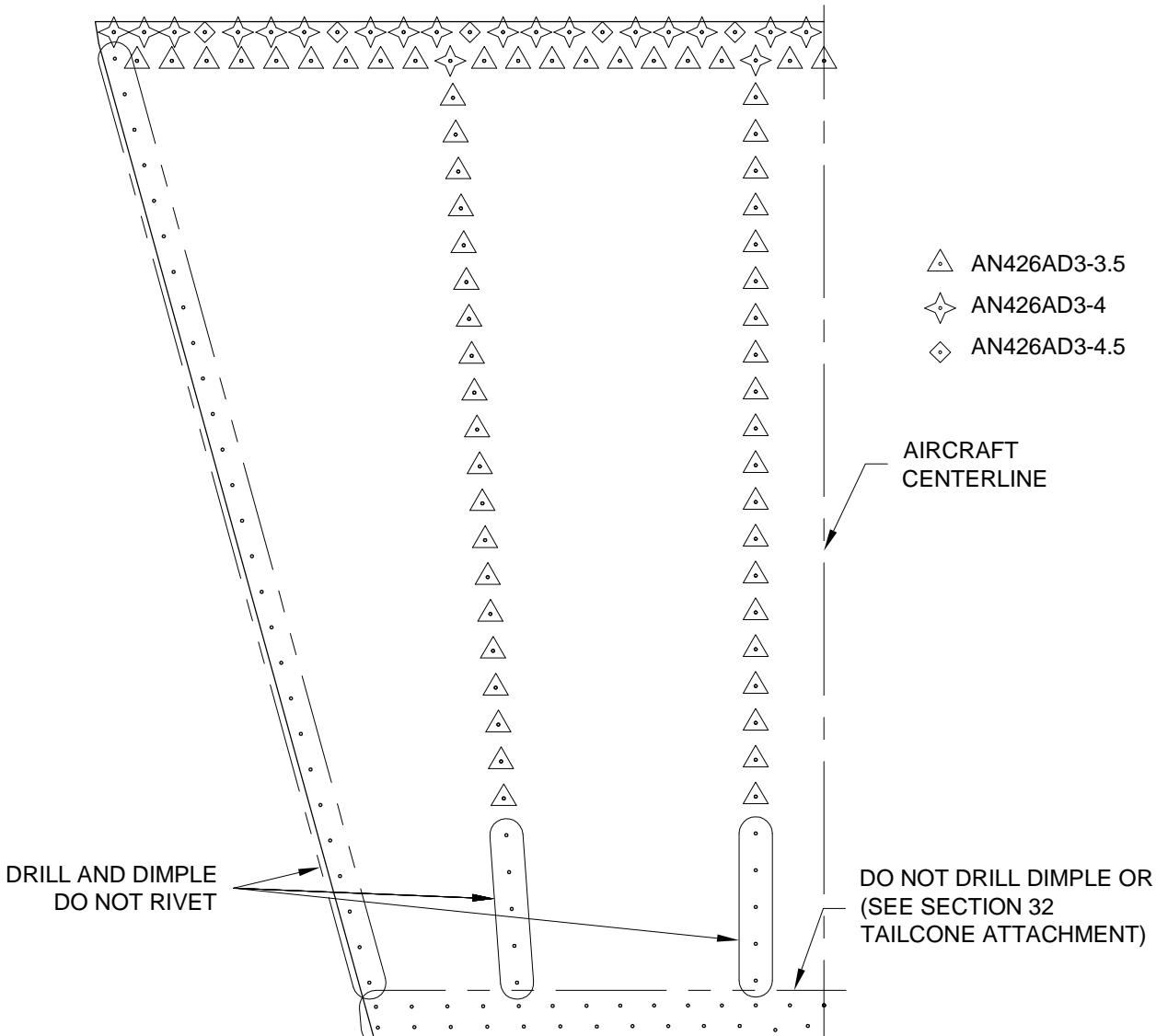
Step 4: Repeat Step 1, cleco the F-1016B-L and F-1016B-R Floor Stiffeners in place then rivet the skins to the ribs, bulkheads and floor stiffeners per the rivet callouts in Page 26-8, Figure 1 and Page 26-8, Figure 2.



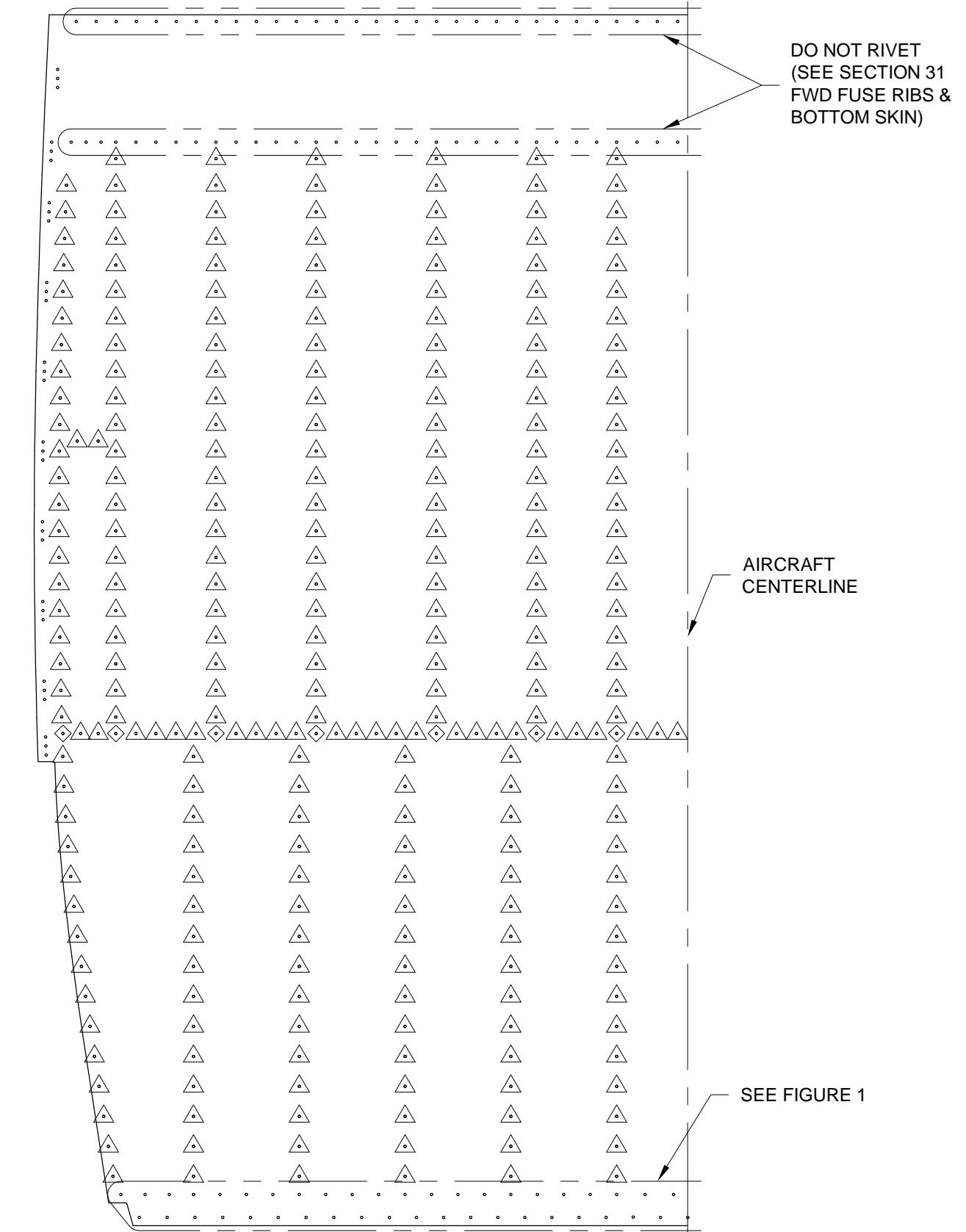
**FIGURE 2: FLOOR STIFFENER INSTALLATION**  
(SOME PARTS NOT SHOWN FOR CLARITY,  
LEFT SIDE OF AIRCRAFT SHOWN, CALLOUTS FOR  
THE RIGHT SIDE ARE A MIRROR OF THE LEFT)



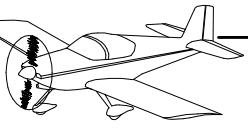
VAN'S AIRCRAFT, INC.



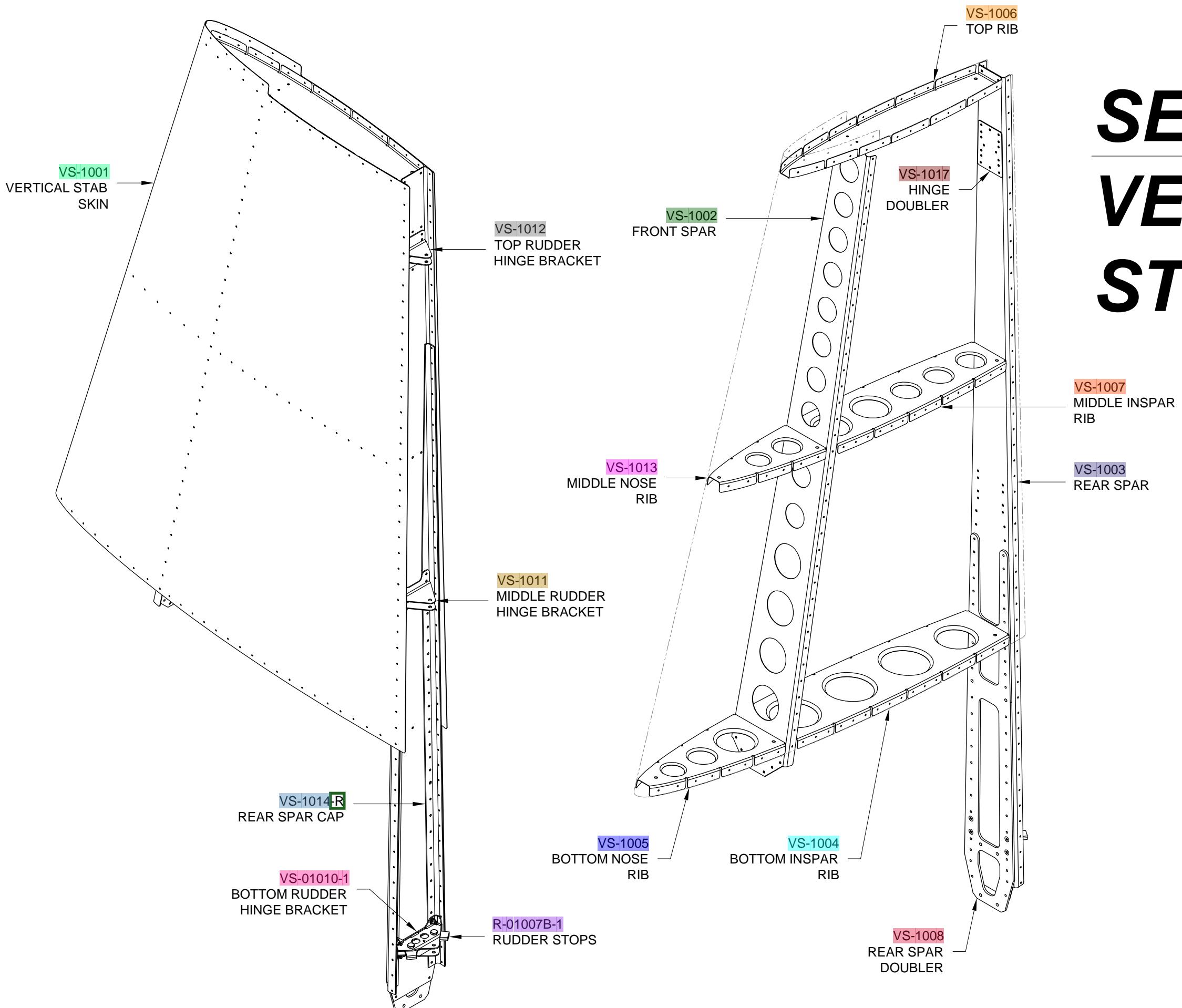
**FIGURE 1: MID BOTTOM SKIN RIVET CALLOUTS  
(CALLOUTS ARE SYMMETRICAL ABOUT  
THE AIRCRAFT CENTERLINE)**



**FIGURE 2: CENTER BOTTOM SKIN RIVET CALLOUTS  
(CALLOUTS ARE SYMMETRICAL ABOUT  
THE AIRCRAFT CENTERLINE)**

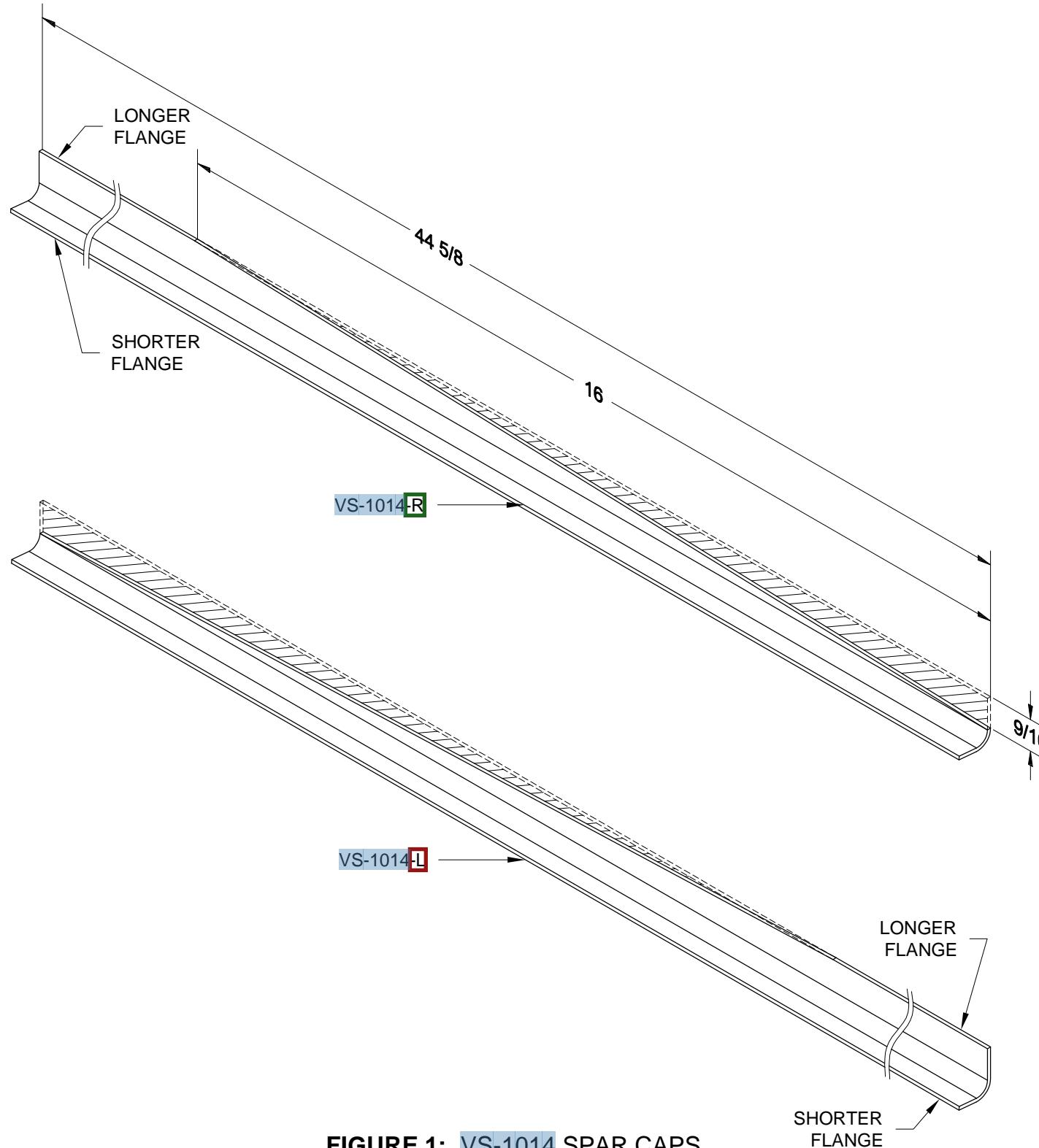


# SECTION 6: VERTICAL STABILIZER





Step 1: Trim flange material (shaded areas) from opposite ends of the two VS-1014 Rear Spar Caps using the dimensions (which apply to both spar caps) in Figure 1. Make sure to trim the material from the longer of the two flanges. (When marking the parts for trimming, clamp them to a table or back to back to remove the bow in the parts.) Once trimmed the spar caps become dedicated left and right parts (VS-1014-L and VS-1014-R respectively) as labeled in the figure. Deburr (Section 5B) the edges of both spar caps to prevent them from scratching mating parts.



**FIGURE 1:** VS-1014 SPAR CAPS

Step 2: Nest the VS-1014-L & VS-1014-R Rear Spar Caps into the corners of the VS-1003 Rear Spar as shown in Figure 2. Note that the trimmed flange of the rear spar caps fits against the web of the rear spar. Flush the bottom of the rear spar caps with the bottom edge of the spar flanges then clamp them in place along the spar flange.

Starting from the bottom of the spar, match-drill about every fourth hole of the rear spar web into the spar caps using a 1/8" drill (ignore the 3/16" upper attach bolt holes; these holes are drilled in Step 6). Cleco each hole as you drill and be sure to drill perpendicular to the spar web, particularly any holes common to the VS-01010-1 and VS-1011 Bottom and Middle Rudder Hinge Brackets. After reaching the top of the spar caps, go back with the same drill and match-drill the remaining 1/8" holes of the rear spar web into the spar caps.

Remove the spar caps and deburr the holes. Clear away any chips, then cleco the rear spar caps back in place.

Step 3: Match-Drill the flange holes of the VS-1003 Rear Spar into the VS-1014-L and VS-1014-R Rear Spar Caps using a #40 drill, cleco as you go.

Once again, remove the spar caps and deburr the holes. Clear away any chips, then cleco the rear spar caps back in place.

Step 4: Deburr the edges of the VS-1008 Rear Spar Doubler. Cleco the doubler, the VS-1014-L and VS-1014-R Spar Caps, the VS-01010-1 Bottom Rudder Hinge Brackets, and the VS-1011 Middle Rudder Hinge Brackets to the VS-1003 Rear Spar as shown in Figure 2. Cleco the VS-1012 Top Rudder Hinge Brackets and the VS-1017 Hinge Doubler in place.

With all the parts clecoed together, final-drill #30 the holes of the top and middle rudder hinge brackets, the hinge doubler, and all the 1/8" holes of the spar doubler and spar caps.

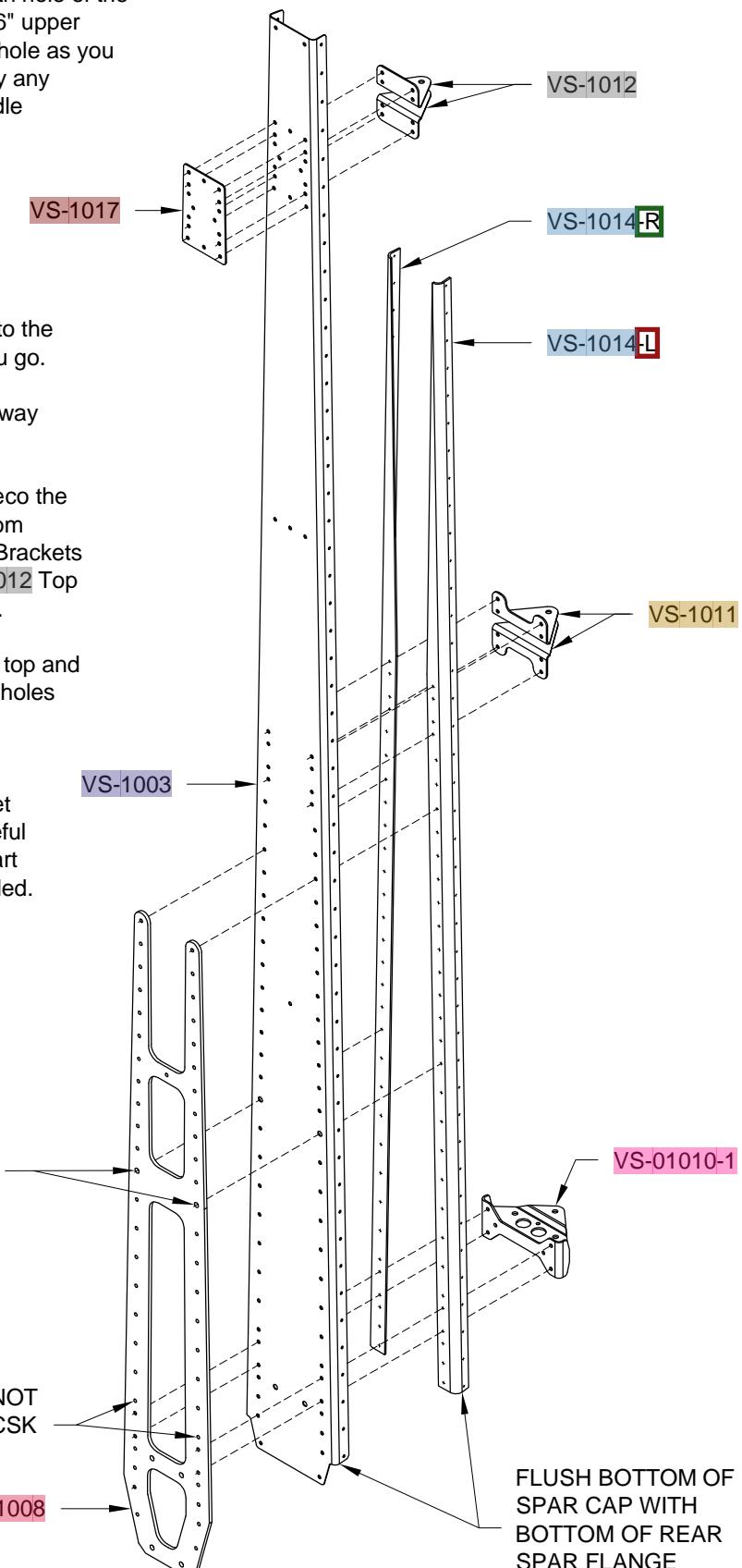
Step 5: Final-Drill #19 the four holes common to the VS-01010-1 Bottom Rudder Hinge Bracket. Drill from the bottom hinge bracket (aft side of the spar) forward into the aluminum parts and be careful to keep the drill bit perpendicular to the spar web. To maintain part alignment, temporarily insert a #8 screw into each hole when drilled. After drilling, the bracket can be set aside.

Step 6: Match-Drill the upper attach bolt holes of the VS-1003 Rear Spar and VS-1008 Rear Spar Doubler into the VS-1014-L and VS-1014-R Spar Caps using a 3/16" drill. Don't final-drill these holes to size (#12) yet; this is done when the vertical stabilizer is fitted to the tailcone.

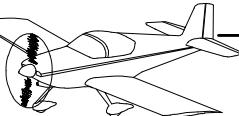
UPPER ATTACH BOLT HOLES:  
MACH CSK ALL #30 HOLES  
BELOW THESE TWO HOLES  
FLUSH ON THIS (FORWARD) SIDE.

Step 7: Machine countersink (Section 5E) all of the #30 holes in the VS-1008 Spar Doubler below the upper attach bolt holes; machine countersink flush on the forward side for AN426AD4 rivets. Do not, however, machine countersink the two holes directly above the VS-01010-1 Bottom Rudder Hinge Bracket.

Step 8: Machine countersink the four #19 holes in the VS-1008 Spar Doubler that are common to the VS-01010-1 Bottom Rudder Hinge Bracket. Machine countersink the holes flush on the forward side for AN509 screws (see Page 6-5).



**FIGURE 2:** REAR SPAR ASSEMBLY

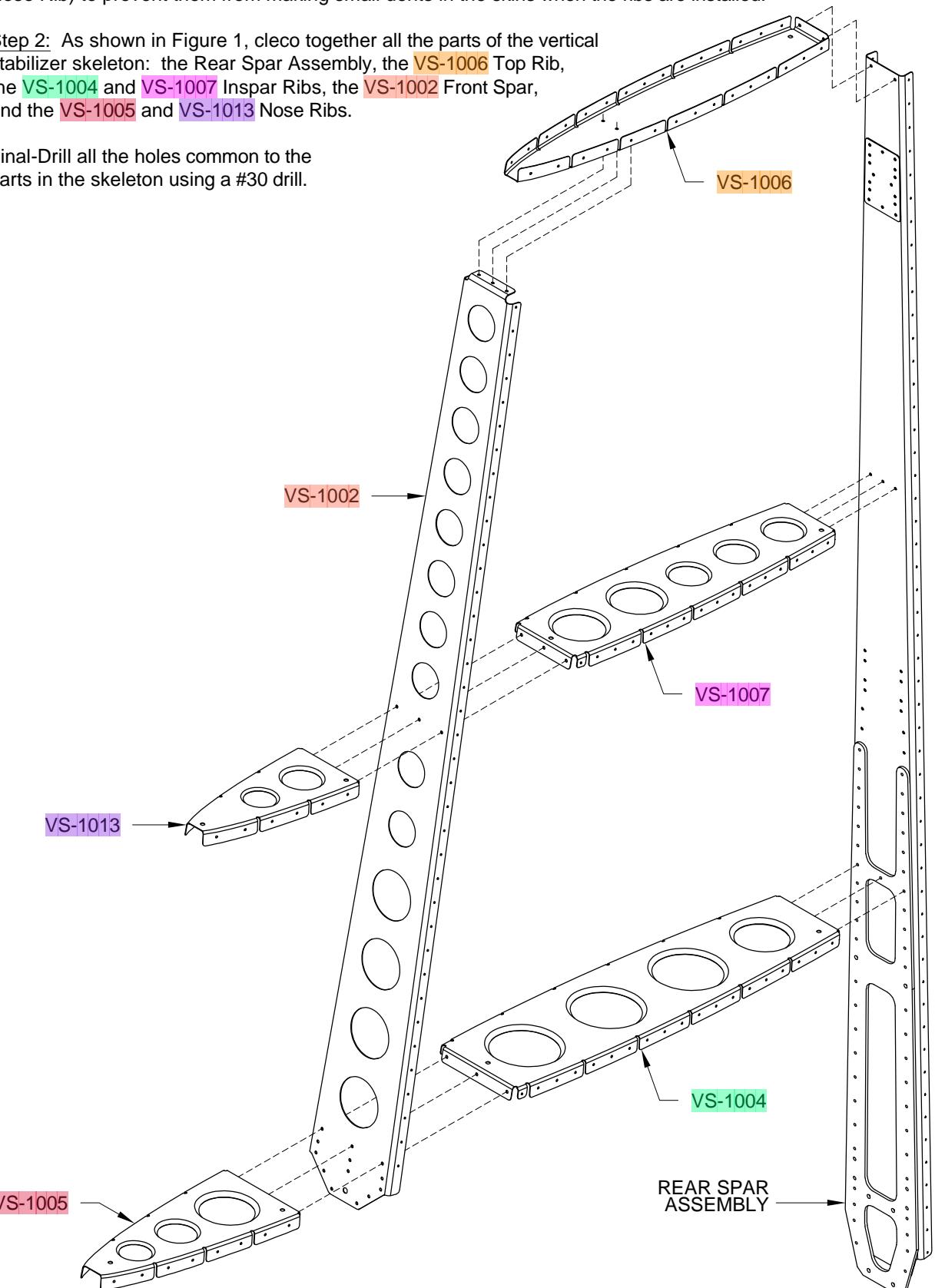


**Step 1:** Deburr the edges of all remaining parts to prevent scratching during fitting.

Radius the corners at the forward end of the nose rib flanges (VS-1006 Top Rib, VS-1013 Nose Rib, and VS-1005 Nose Rib) to prevent them from making small dents in the skins when the ribs are installed.

**Step 2:** As shown in Figure 1, cleco together all the parts of the vertical stabilizer skeleton: the Rear Spar Assembly, the VS-1006 Top Rib, the VS-1004 and VS-1007 Inspar Ribs, the VS-1002 Front Spar, and the VS-1005 and VS-1013 Nose Ribs.

Final-Drill all the holes common to the parts in the skeleton using a #30 drill.



**FIGURE 1: SKELETON ASSEMBLY**

**Step 3:** Remove the vinyl from the inside surface of the VS-1001 Vertical Stab Skin then cleco it to the skeleton as shown in Figure 2.

**Step 4:** Final-Drill all the holes common to the skin and skeleton with a #40 drill, then remove the skin from the skeleton and deburr the holes.

**Step 5:** Empennage fairing screw holes are indicated on Page 6-6, Figure 1, along the bottom edge of the depicted skin. Mark the corresponding holes in the VS-1001 Vertical Stab Skin, and in the flanges of the VS-1005 Bottom Nose Rib, the VS-1004 Bottom Inspar Rib, and the VS-1003 Rear Spar.

**Step 6:** Dimple all the holes of the VS-1001 Vertical Stab Skin except for the following: the eight vertical stab tip fairing attachment holes at the top of the skin (see Page 6-6, Figure 1) and the holes just marked in Step 5. Depending on the vintage of your "C" frame tool, you may not be able to reach all of the holes to dimple. The unreachable holes can be dimpled with a pop rivet dimple die set available from tool suppliers.

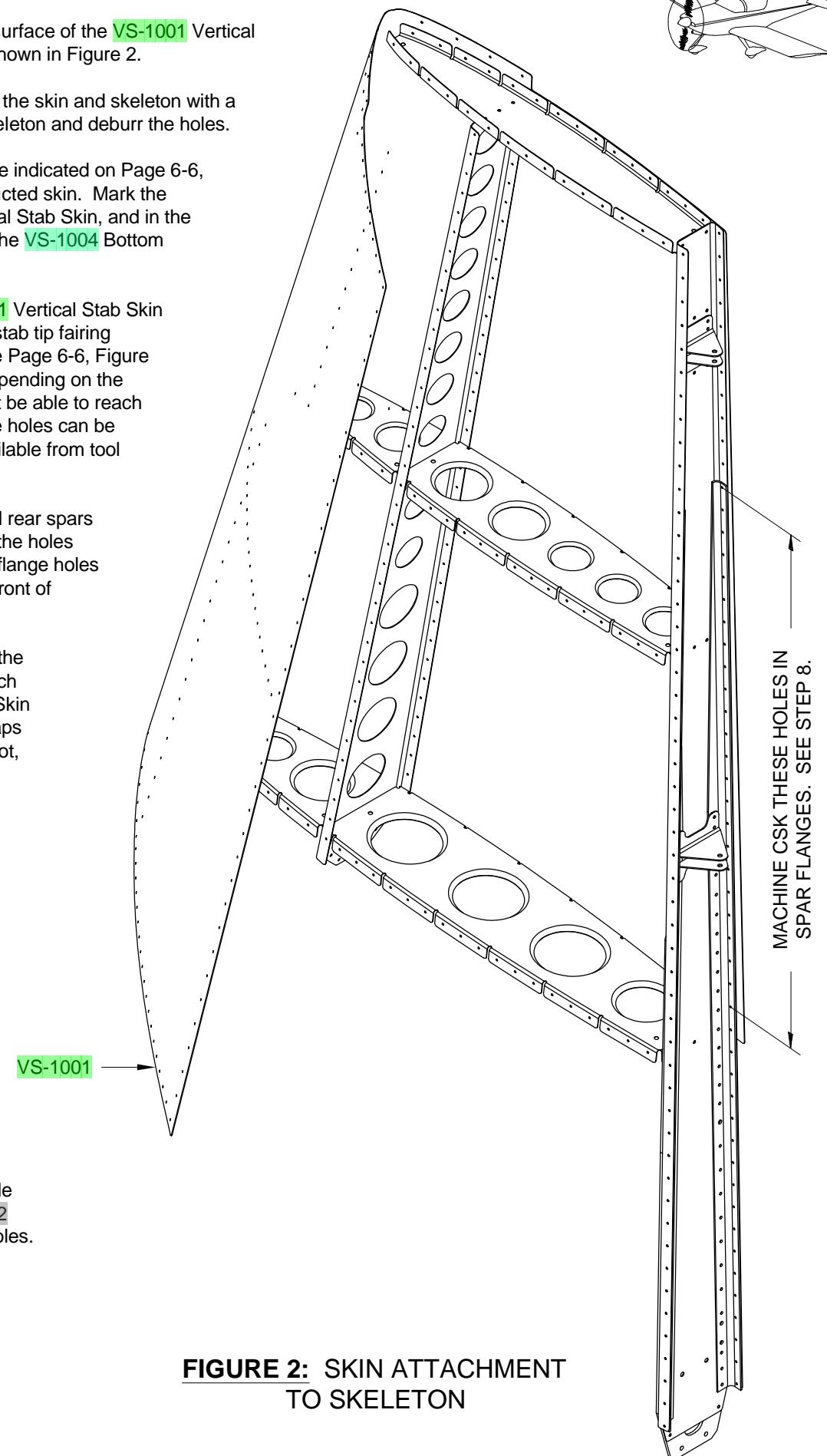
**Step 7:** Remove the ribs from the front and rear spars then deburr all of the rib holes. Except for the holes marked in Step 5, dimple all of the rib side flange holes (including the hole in the small tabs at the front of the VS-1004 & -1007 Inspar ribs).

**Step 8:** Machine countersink (Section 5E) the flange holes in the VS-1003 Rear Spar which are common to the VS-1001 Vertical Stab Skin and to the VS-1014-L and VS-1014-R Rear Spar Caps (see note along the side of Figure 2). Do not, however, countersink the holes in the spar (located at the bottom of the skin) which were marked in Step 5. The countersink should be deep enough to accept the dimple of the skin. Leave the spar caps clecoed in place during this operation.

**Step 9:** Disassemble the rear spar assembly and deburr all holes. Be sure to mark (Section 5C) the top and middle rudder hinge brackets as they are removed so they can be reinstalled in the same position as drilled.

**Step 10:** Dimple the flange holes of the VS-1003 Rear Spar above the machine countersunk holes.

**Step 11:** Final-Drill #12 the single 3/16" hole in each of the VS-1011 Middle and VS-1012 Top Rudder Hinge Brackets. Deburr the holes.



**FIGURE 2: SKIN ATTACHMENT TO SKELETON**



Step 1: Cleco the VS-1015 Front Spar Doubler to the aft side of the VS-1002 Front Spar as shown in Figure 1. Final-Drill the holes of the doubler and spar using a #30 drill.

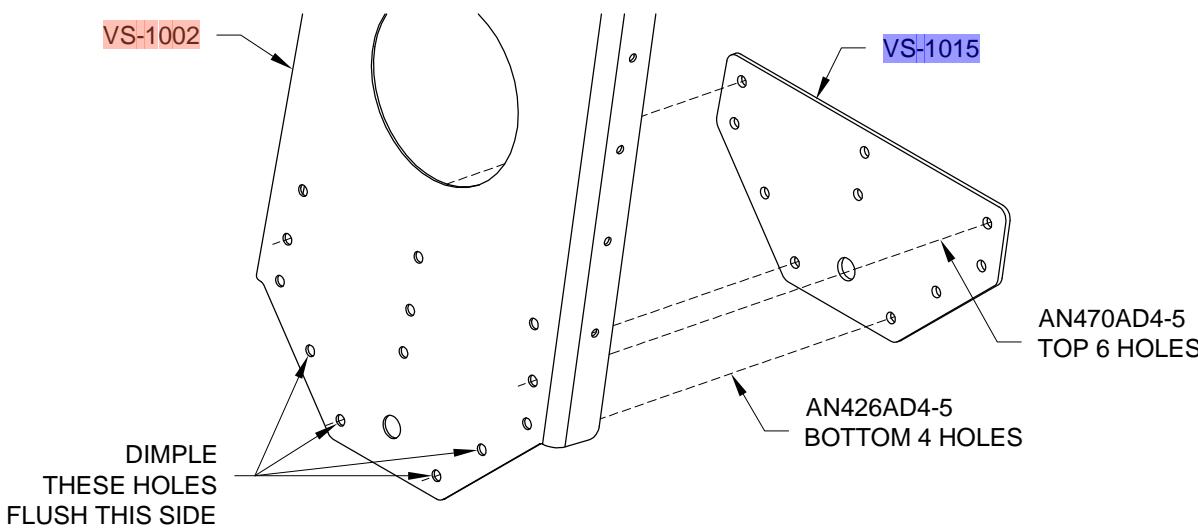
Remove the front spar doubler and deburr the holes.

Step 2: Deburr all the holes in the flanges and web of the front spar.

Dimple the four bottom holes in the front spar (see Figure 1) and machine countersink (Section 5E) the corresponding holes in the front spar doubler. Dimple the flange holes of the front spar for the skin.

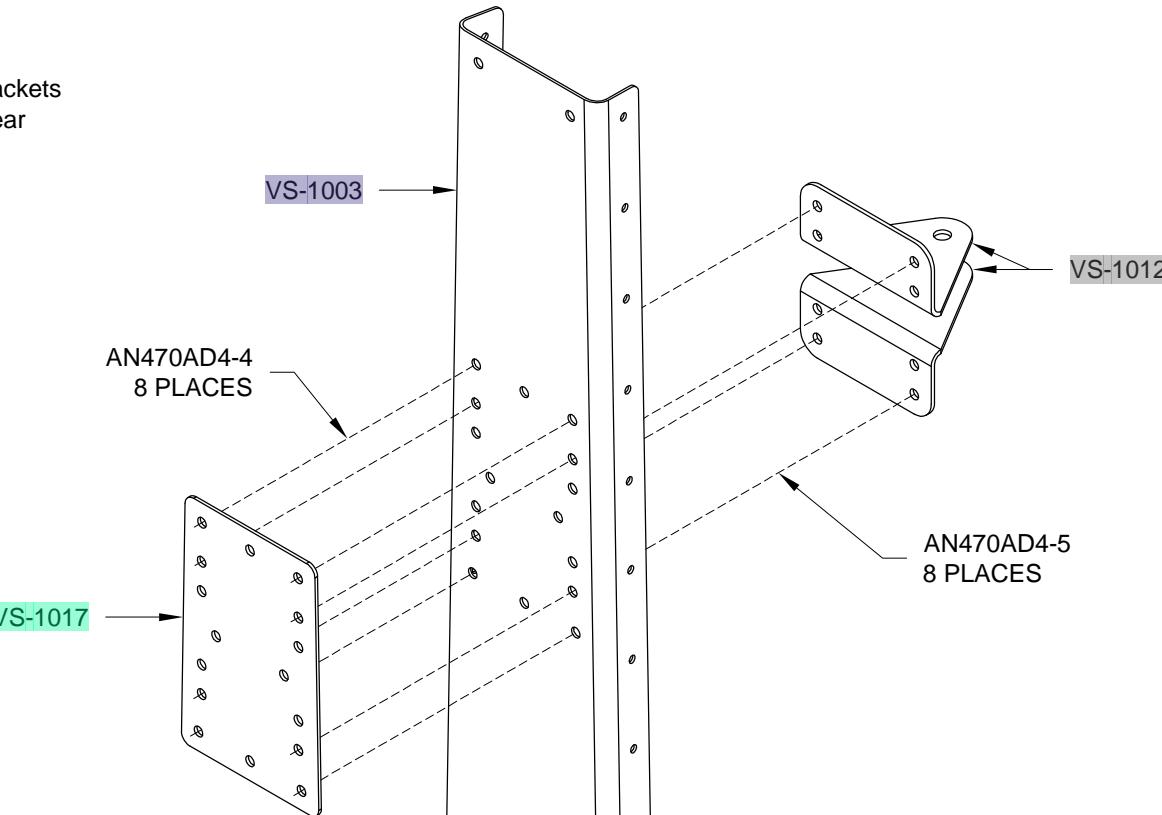
Step 3: Double check that all parts are properly deburred and prime the parts, if desired, in preparation for riveting. If you plan on painting the VS-01010-1, VS-1011, and VS-1012 Rudder Hinge Brackets when the completed airplane is painted, you should first scuff the powder coat with sand paper or some other type of abrasive pad.

Step 4: Attach the VS-1015 Front Spar Doubler to the VS-1002 Front Spar using the rivets called out in Figure 1.



**FIGURE 1: FRONT SPAR DOUBLER ATTACHMENT**

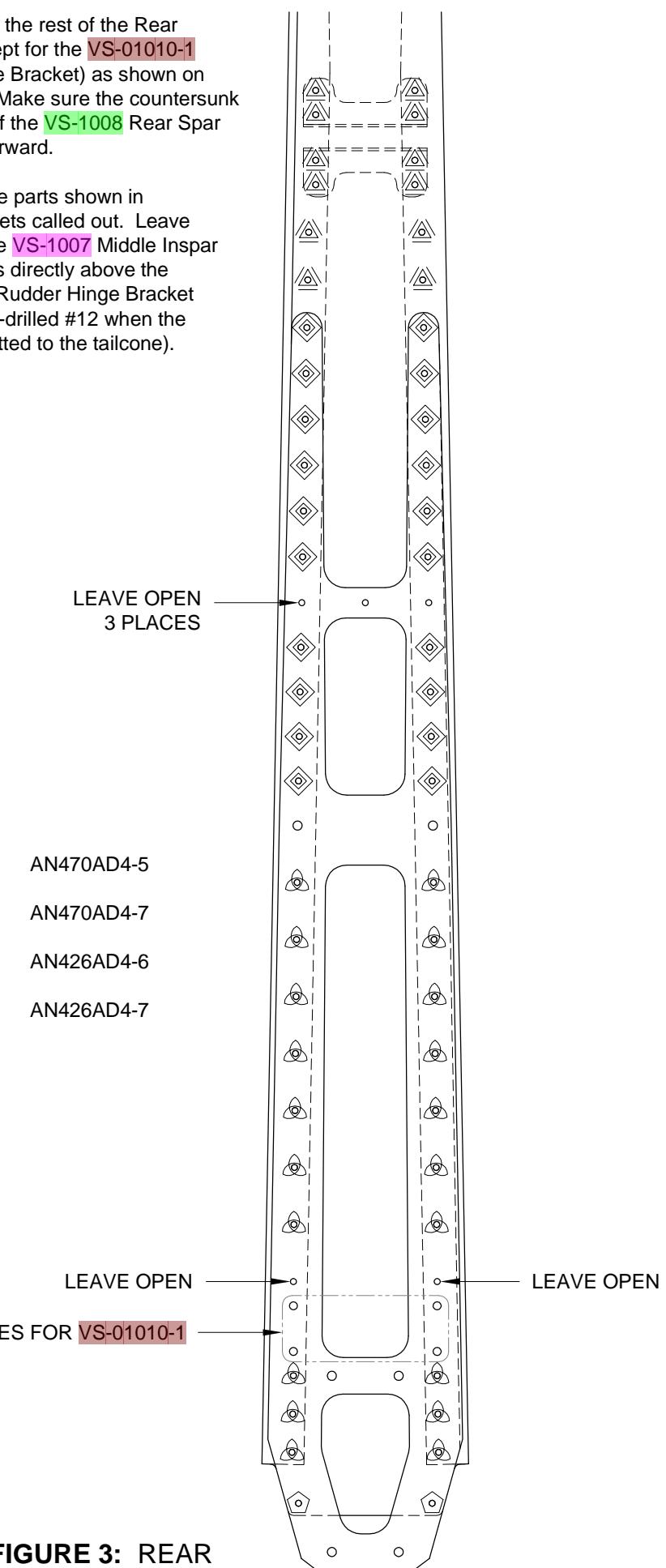
Step 5: Attach the VS-1012 Top Rudder Hinge Brackets and the VS-1017 Hinge Doubler to the VS-1003 Rear Spar using the rivets called out in Figure 2.



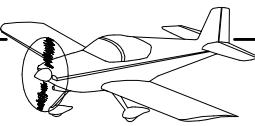
**FIGURE 2: TOP RUDDER HINGE BRACKET AND HINGE DOUBLER RIVETS**

Step 6: Reassemble the rest of the Rear Spar Assembly (except for the VS-01010-1 Bottom Rudder Hinge Bracket) as shown on Page 6-2, Figure 2. Make sure the countersunk holes at the bottom of the VS-1008 Rear Spar Doubler are facing forward.

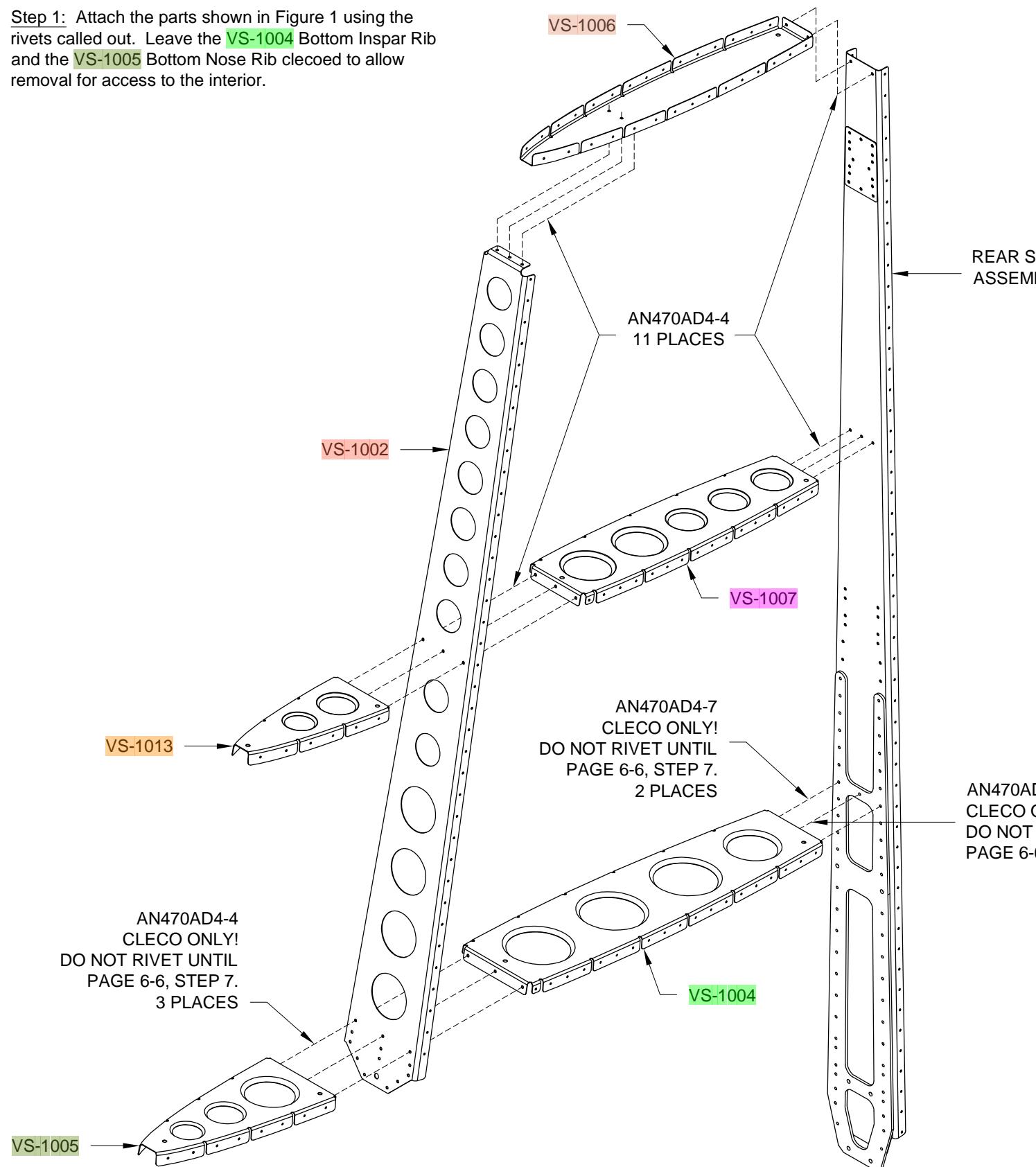
Rivet (Section 5D) the parts shown in Figure 3 using the rivets called out. Leave open the holes for the VS-1007 Middle Inspar Rib and the two holes directly above the VS-01010-1 Bottom Rudder Hinge Bracket (these holes are final-drilled #12 when the vertical stabilizer is fitted to the tailcone).



**FIGURE 3: REAR SPAR ASSEMBLY RIVETS**



Step 1: Attach the parts shown in Figure 1 using the rivets called out. Leave the VS-1004 Bottom Inspar Rib and the VS-1005 Bottom Nose Rib clecoed to allow removal for access to the interior.

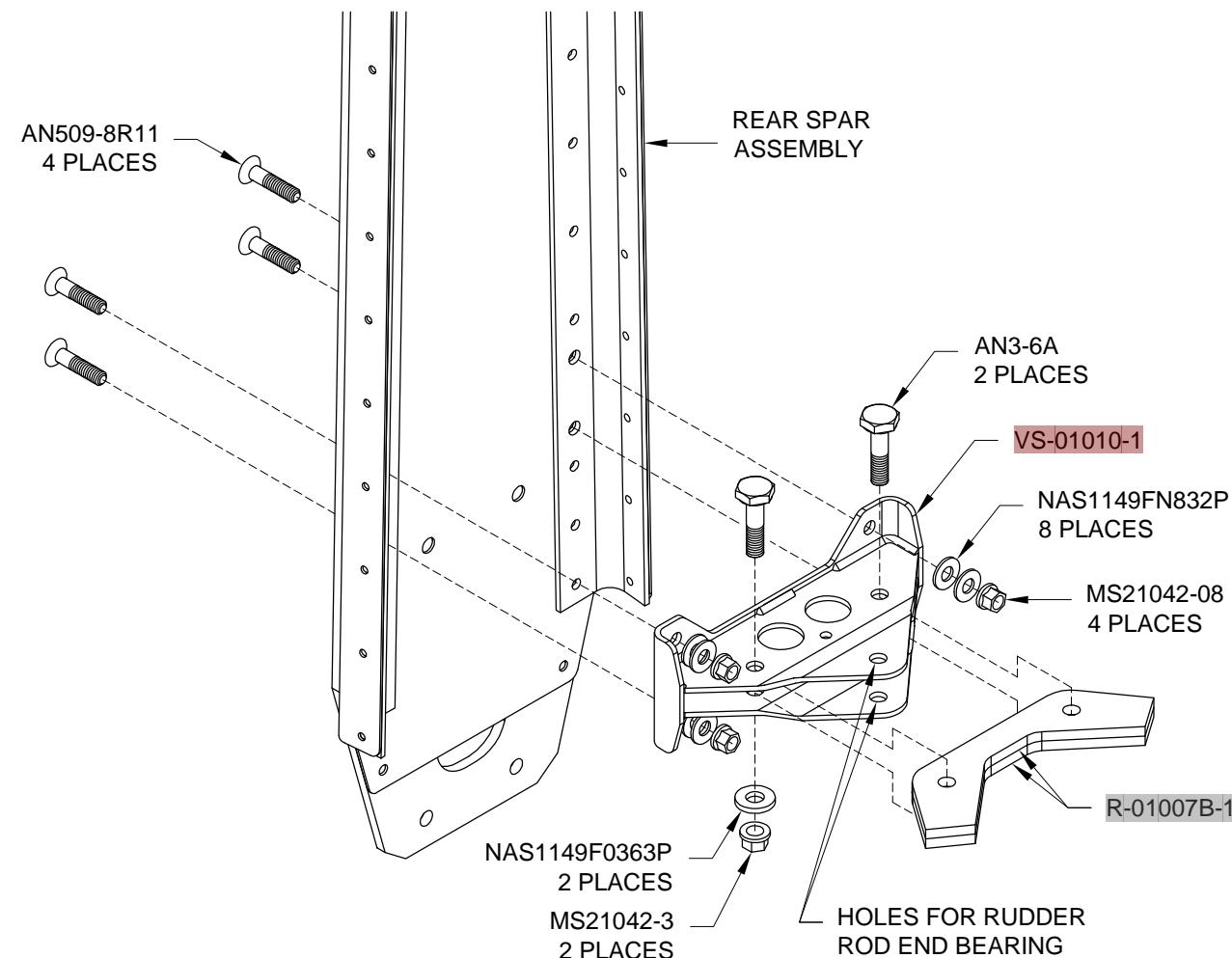


**FIGURE 1: RIB RIVETS**

Step 2: Use a #12 drill bit to clean the powder coating from the three sets of #12 holes in the VS-01010-1 Bottom Rudder Hinge Bracket. These holes are used to bolt on the R-01007B-1 Rudder Stops and the bottom rod end bearing of the rudder. See Figure 2.

Step 3: Heavily deburr (and straighten if necessary) the two R-01007B-1 Rudder Stops, then bolt them in the VS-01010-1 Bottom Rudder Hinge Bracket as shown in Figure 2.

To maintain access for riveting the rear spar flanges, do not attach the bottom rudder hinge bracket to the rear spar until the end of the next page.



**FIGURE 2: ATTACHING THE BOTTOM HINGE BRACKET AND RUDDER STOPS**



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Step 1: Cleco the VS-1001 Vertical Stab Skin to the skeleton. Use plenty of clecos to keep the parts aligned while riveting. Figure 1 provides rivet sizes for the vertical stab skin.

Step 2: Remove the VS-1005 Bottom Nose Rib to gain access to the VS-1013 Middle Nose Rib. Rivet the skin to the middle nose rib starting at the VS-1002 Front Spar and moving forward on both sides.

Step 3: Rivet the VS-1006 Top Rib to the skin forward of the front spar only.

Step 4: Cleco the bottom nose rib back in place and rivet it to the skin only, not to the front spar. Do not install rivets into the holes which will be used to attach the empennage fairing.

Step 5: Rivet the skin to the front spar on both sides. The portion of the spar below the VS-1007 Middle Inspar Rib can be reached by removing the VS-1004 Bottom Inspar Rib. Make sure to capture the holes in the tabs of the middle inspar rib which are common to the front spar flanges. Since the bottom inspar rib is removed, do not rivet the bottom hole in the front spar flange. Access to the upper portion of the spar requires removing some of the clecos in the skin along the top rib and rear spar. Remove as few as possible to insure that the parts remain aligned and only uncleco one side at a time.

Step 6: Replace any clecos previously removed for access, then rivet the skin to the middle inspar rib and to the remainder of the top rib.

Step 7: Cleco the bottom inspar rib in place. Rivet the spar flanges of the bottom ribs to the spars using the rivets called out on Page 6-5, Figure 1. With the exception of the empennage fairing screw holes, rivet the skin to the bottom inspar rib.

Step 8: Rivet the skin to the rear spar leaving the bottom hole open for the empennage fairing.

Step 9: Finish riveting the VS-1014 L and R Rear Spar Caps to the rear spar, below the skin, with AN470AD3-4 rivets.

Step 10: Attach the VS-01010-1 Bottom Rudder Hinge Bracket to the rear spar as shown on Page 6-5, Figure 2.

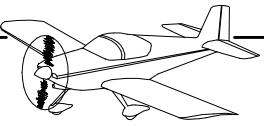
NOTE: The VS-1009 Vertical Stabilizer Tip Fairing is installed, along with the other empennage tip fairings, in section 12.

VERTICAL STAB TIP FAIRING ATTACHMENT HOLES  
LEAVE OPEN  
8 PLACES

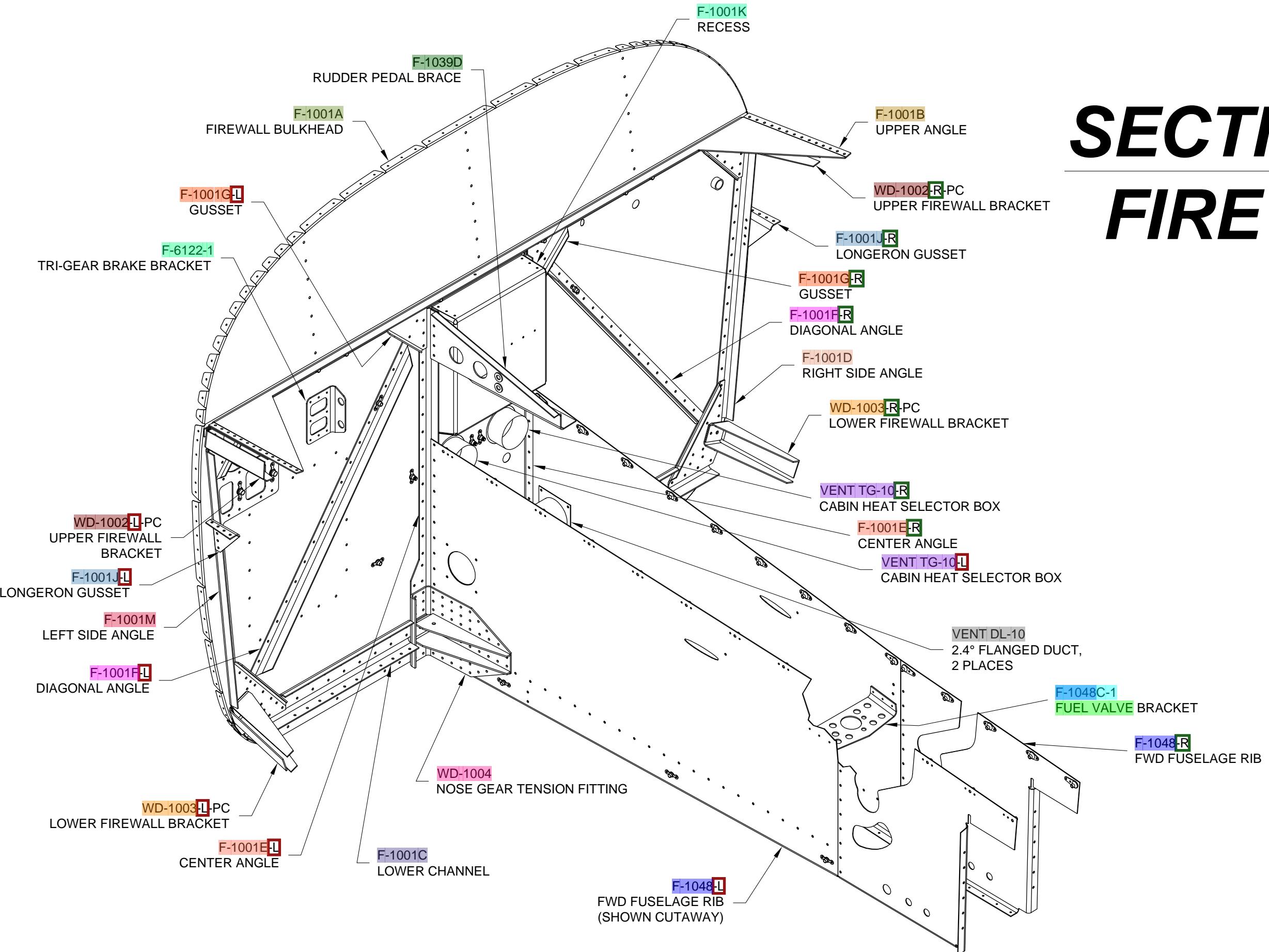
- △ AN426AD3-3.5
- ◇ AN426AD3-4
- ◊ AN426AD3-4.5

EMPENNAGE FAIRING SCREW HOLES  
LEAVE OPEN  
18 PLACES

FIGURE 1: VERTICAL STABILIZER SKIN RIVETS



# SECTION 27: FIREWALL





**VAN'S AIRCRAFT, INC.**

**CAUTION! Stainless steel edges are very sharp, handle parts with care.**

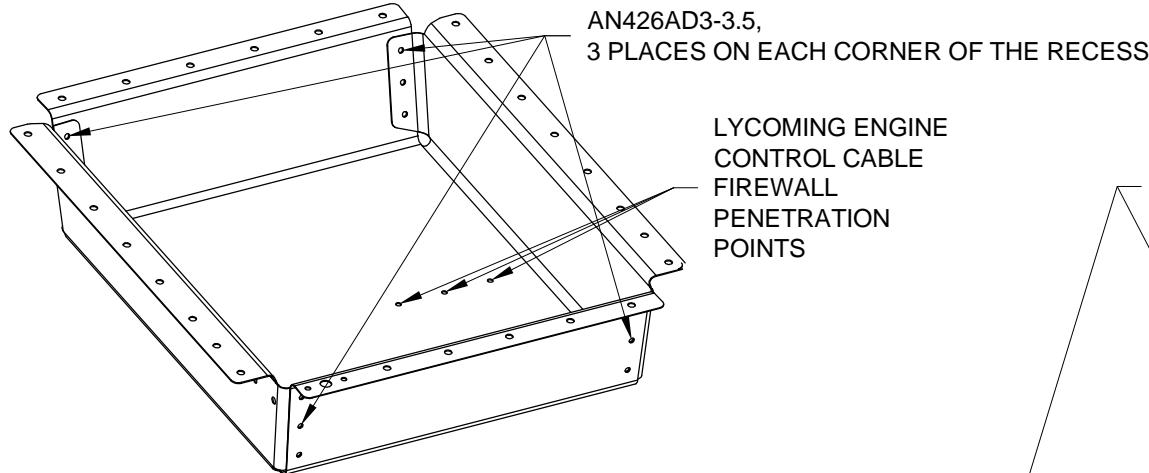
**NOTE: Stainless steel will quickly dull cutting tools (drills, deburring tools and unibits). Use plenty of lubricant (Van's Aircraft uses Boelube) and keep the cutter speed low. Use a unibit to make any holes over 1/4 diameter.**

Step 1: Cleco then final-drill #40 all the holes that attach the F-1001K Recess to itself (See Figure 1). Final-Drill #30 the five F-1039D Rudder Pedal Brace attach holes in the side of the recess as called out in Figure 2.

**NOTE: Flush heads on all AN426 rivets should be on the front of the firewall assembly (inside face of the F-1001K Recess) to keep the forward face of the firewall and the inside face of the recess smooth.**

Step 2: Dimple the holes that connect the corners of the F-1001K Recess for the head of an AN426AD3 rivet. It is permissible in this instance to dimple both the tab and flange of the recess at the same time. Dimple the five F-1039D Rudder Pedal Brace attach holes for the head of an AN426AD4 rivet. Dimple the upper most rudder pedal brace hole using a female dimple die and a rivet.

Step 3: Rivet the holes that attach the F-1001K Recess to itself as called out in Figure 1. If using a Lycoming engine enlarge the three control cable holes indicated in Figure 1 to 5/8 diameter. If not using a Lycoming engine final-drill and dimple these holes #40 then fill them with AN426AD3-3 rivets.



**FIGURE 1: PREPARING THE RECESS**

Step 4: Cleco the F-1001B Upper Angle, F-1001C Lower Channel, F-1001D Right Side Angle, F-1001E-L and -R Center Angles, F-1001F-L and -R Diagonal Angles, F-1001G Gussets, F-1001K Recess, F-1001M Left Side Angle, F-6122-1 Tri-Gear Brake Bracket, WD-1002-L-PC and -R-PC Upper Firewall Brackets, WD-1003-L-PC and -R-PC Lower Firewall Brackets and WD-1004 Nose Gear Tension Fittings to the F-1001A Firewall Bulkhead as shown in Figure 2.

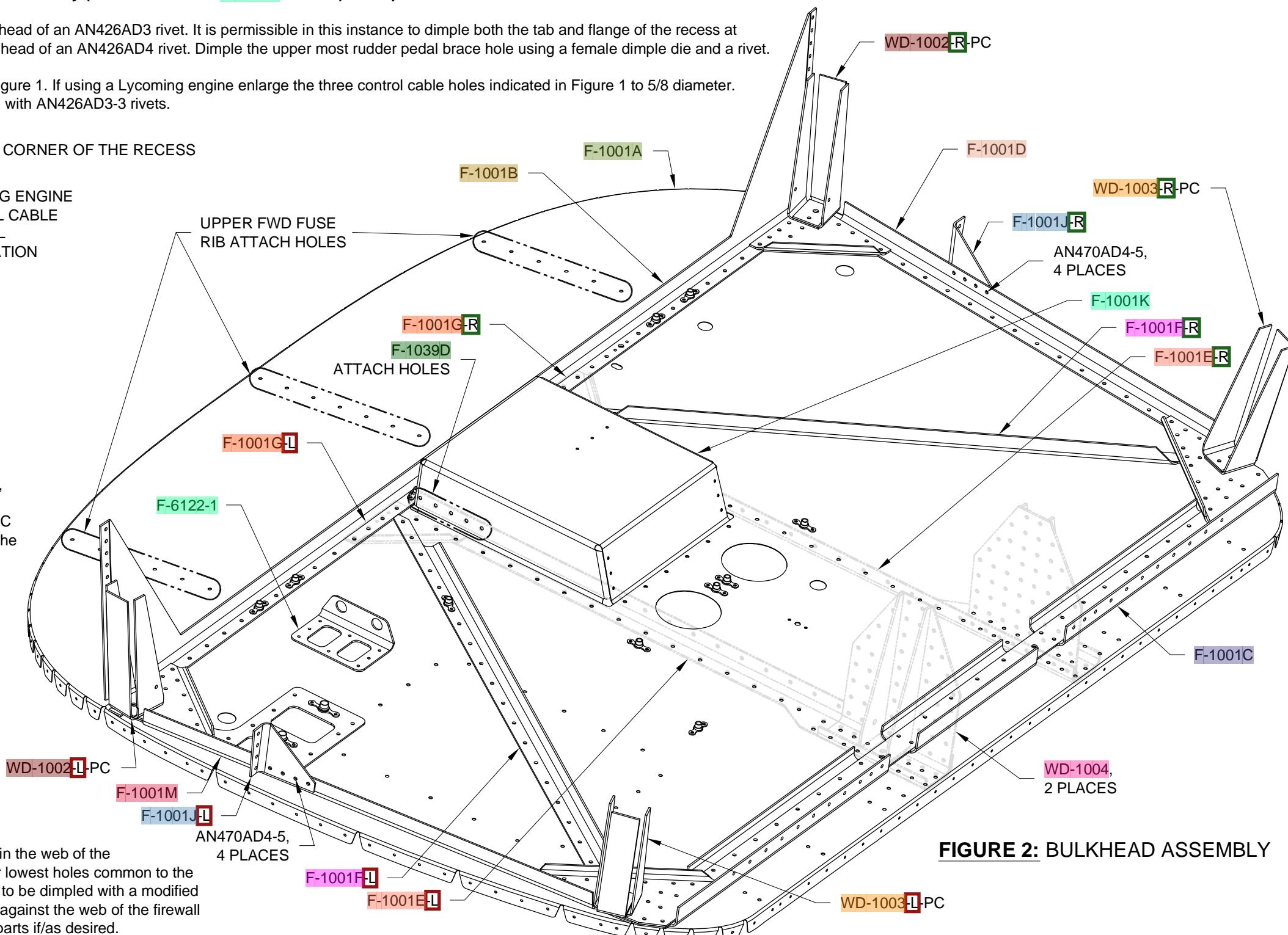
The F-1001J-L and -R Longeron Gussets come tabbed together. Break the F-1001J into the left and right gussets and deburr the edges. Cleco the gussets to the left and right side angles as shown in Figure 2.

Step 5: Final-Drill #40 all the nutplate attach rivet holes. Final-Drill the screw holes for the two K1000-4 nutplates 1/4 diameter and the screw holes for the fourteen K1000-3 nutplates #12. Final-Drill #40 the eight holes common to the F-1001A Bulkhead and the F-6122-1 Tri-Gear Brake Bracket. Final-Drill #30 all the remaining holes common between the bulkhead and the parts clecoed together in Step 4. Final-Drill #30 all the holes common to the F-1001J-L and -R Longeron Gussets and the F-1001D and F-1001M Side Angles. Final-Drill #30 all remaining open holes that attach the oil cooler (see Page 27-5 Figure 1) and the open holes for the upper fwd fuse ribs, see Figure 2.

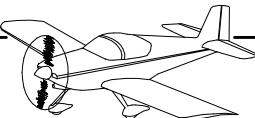
Step 6: Disassemble the parts. Dimple (flush head on forward side) all rivet holes in the web of the F-1001A Firewall Bulkhead and flanges of the F-1001K Recess. Note that the four lowest holes common to the F-1001E-L and -R Center Angles and WD-1004 Nose Gear Tension Fittings need to be dimpled with a modified dimple die set or a rivet and the female die. Machine countersink all parts that lay against the web of the firewall bulkhead for the dimples in the firewall bulkhead and recess. Prime all aluminum parts if/as desired.

Step 7: Reassemble the bulkhead assembly per Step 4 except the F-1001E-L and -R Center Angles, F-1001G-L and -R Gussets and WD-1004 Nose Gear Tension Fittings.

Cleco the two K1000-4 and fourteen K1000-3 nutplates to the firewall as shown in Figure 2 and Page 27-5, Figure 1. Note that all but two of the nutplates attach to the aft side of the firewall, see Page 27-5, Figure 1. Rivet the assembly together per the callouts in Page 27-5, Figure 1. **Do not rivet any of the holes common to the center angles, gussets or nose gear tension fittings until Page 27-4!** If not using a Lycoming engine fill the holes that attach the oil cooler box (see Page 27-5, Figure 1) except those common with the F-1001M Left Side Angle with AN426AD4-4 rivets. The finished Firewall Bulkhead Subassembly is shown in Figure 2 (note the center angles, gussets and nose gear tension fittings that are not riveted at this time are shown transparent).



**FIGURE 2: BULKHEAD ASSEMBLY**

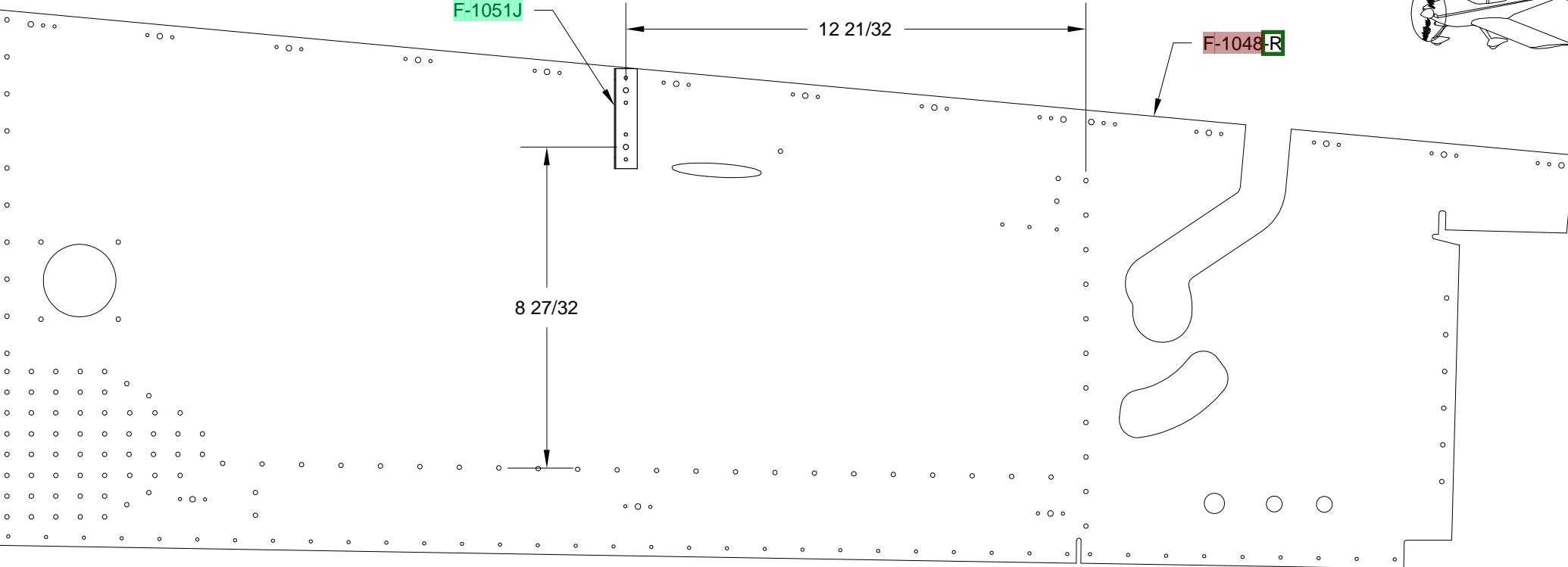


Step 1: Layout the bottom most attach hole for the F-1051J Scat Tube Support on the F-1048-R Fwd Fuselage Rib using the dimensions given in Figure 1. The exact location is not critical.

Step 2: Drill #19 the location marked out in Step 1.

Step 3: Using a #8 screw align the F-1051J Scat Tube Support parallel with the forward edge of the F-1048-R Fwd Fuselage Rib as shown in Figure 1. Match-Drill #19 the upper screw hole into the fwd fuselage rib. Remove the scat tube support. Final-drill #19 the lower screw hole in the scat tube support.

Step 4: Deburr then dimple the two #19 holes drilled in the F-1048-R Fwd Fuselage Rib for the head of a #8 screw, flush on the outboard face.

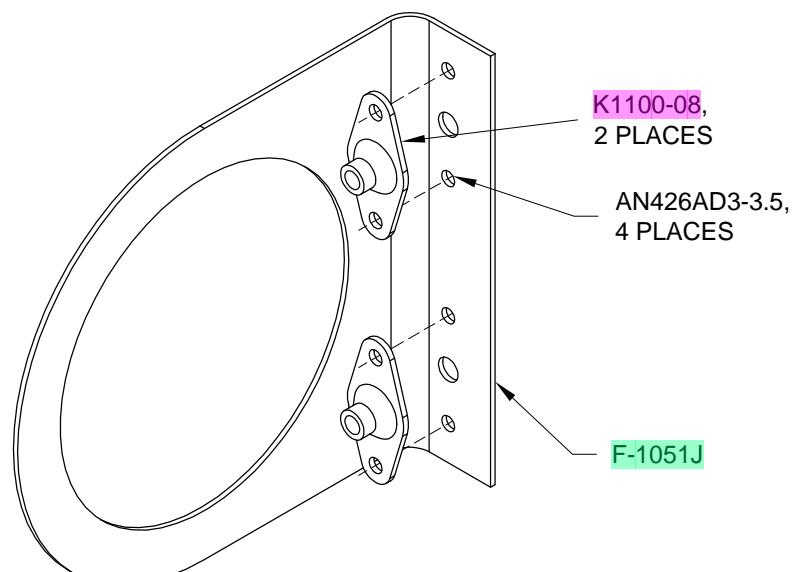


**FIGURE 1: DRILLING THE F-1048-R FWD FUSELAGE RIB**

Step 5: Final-Drill #40 the nutplate attach holes in the F-1051J Scat Tube Support. See Figure 2.

Step 6: Deburr the edges and holes in the F-1051J Scat Tube Support. Dimple the nutplate attach holes in the scat tube support. Dimple the nutplates. Dimple both screw holes in the scat tube support for the head of a #8 screw. Prime the support if desired.

Step 7: Rivet nutplates to the F-1051J Scat Tube Support as shown in Figure 2.



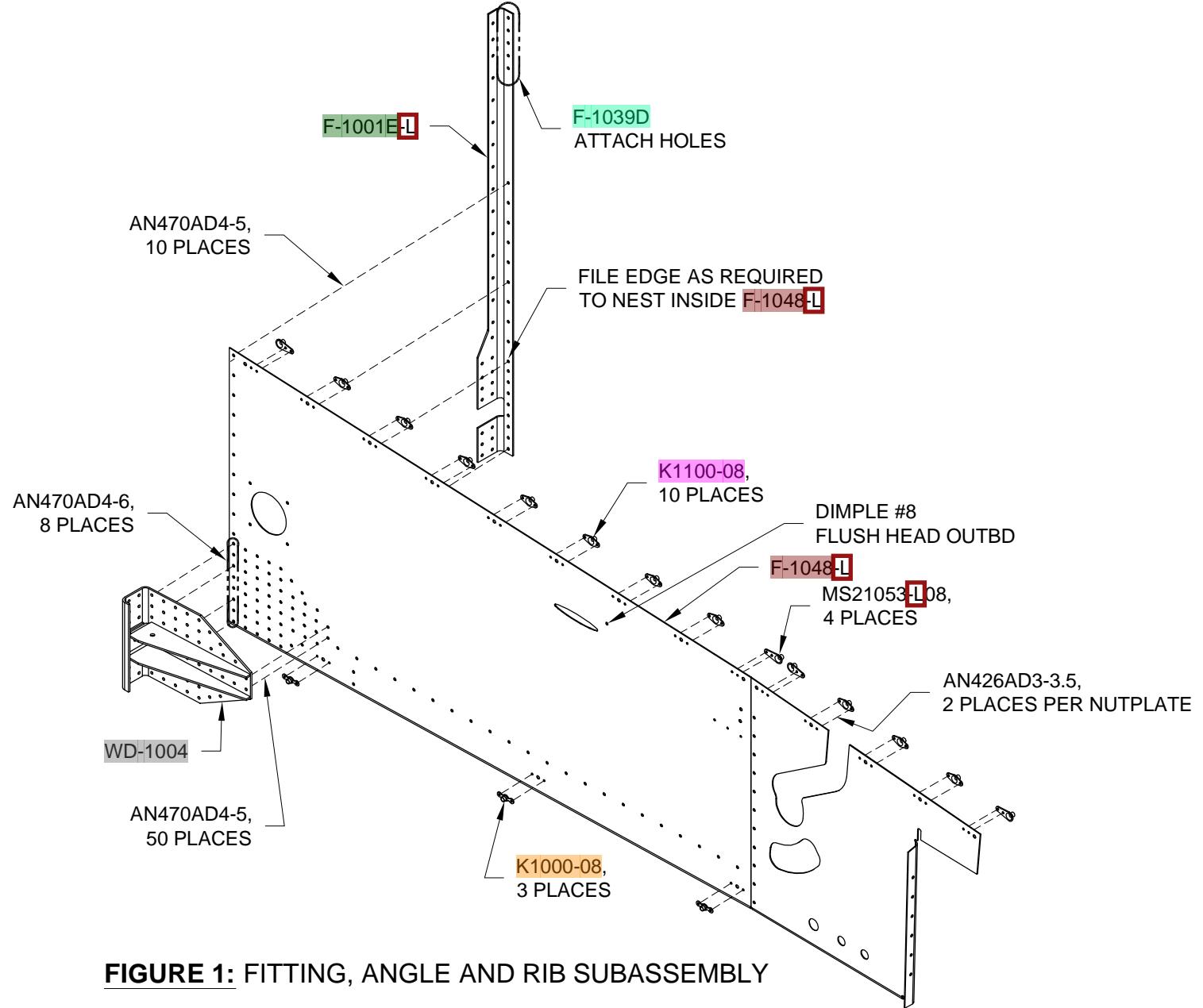
**FIGURE 2: SCAT TUBE SUPPORT NUTPLATE INSTALLATION**



Step 1: Cleco the **WD-1004** Nose Gear Tension Fitting, **F-1001E-L** Center Angle and **F-1048-L** Fwd Fuselage Rib together as shown in Figure 1 to create the Left Forward Rib Subassembly. Repeat this step to create the Right Forward Rib Subassembly. The right subassembly is a mirror of the left.

Step 2: Final-Drill #30 all the holes common between the parts assembled in Step 1. Final-Drill #40 the nutplate attach holes in the **F-1048-L** and **-R** Fwd Fuselage Ribs. Final-Drill #19 the screw holes for the nutplates in the fwd fuselage ribs. Final-Drill #30 the five **F-1039D** Rudder Pedal Brace attach holes (see callout in Figure 1) in the **F-1001E-L** Center Angle only.

Step 3: Machine countersink the **F-1039D** Rudder Pedal Brace attach holes on the inboard face of the **F-1001E-L** Center Angle that will lay against the **F-1001K** Recess, for the dimples in the recess.



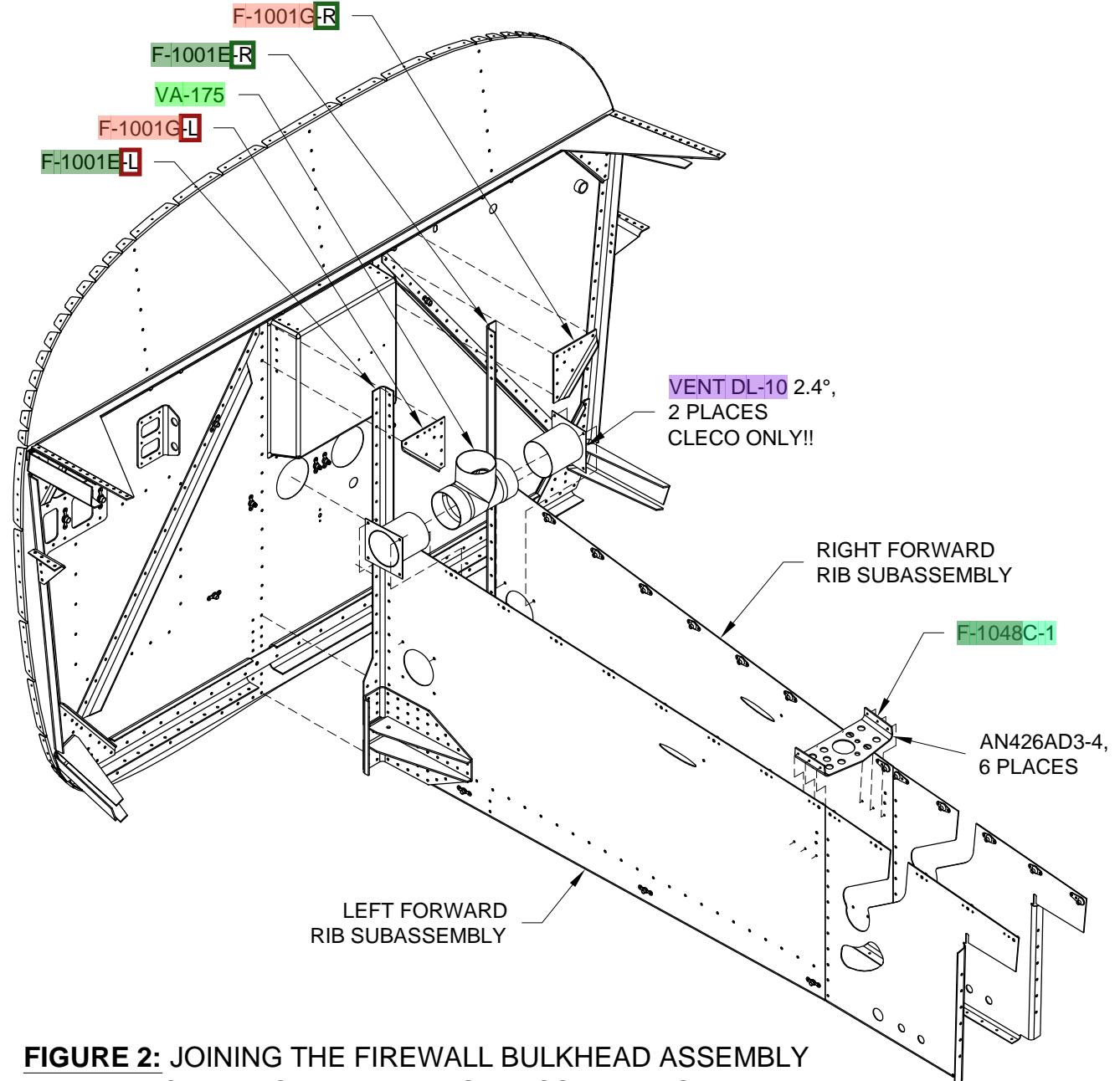
**FIGURE 1: FITTING, ANGLE AND RIB SUBASSEMBLY**

Step 4: Cleco the Left and Right Forward Rib Subassemblies and **F-1001G-L** and **-R** Gusssets to the Firewall Bulkhead Subassembly as shown in Figure 2. Cleco the **F-1048C-1** Fuel Valve Bracket between the **F-1048-L** and **-R** Fwd Fuselage Ribs.

Insert both **VENT DL-10** 2.4° Flanged Ducts into the **VA-175** Heat Duct Tee. Rotate the flanged ducts until their mounting plates are parallel with the fwd fuselage ribs (the ribs taper between the firewall bulkhead subassembly and the fuel valve bracket). Cleco the flanged ducts to the fwd fuselage ribs.

Step 5: Final-Drill #30 all the holes common between the parts just clecoed together and the Firewall Bulkhead Subassembly. Final-Drill #30 the holes common between the **F-1048-L** and **-R** Fwd Fuselage Ribs and the **VENT DL-10** 2.4° Flanged Ducts. Final-Drill #40 the holes common between the **F-1048C-1** Fuel Valve Bracket and the fwd fuselage ribs.

Step 6: Disassemble and deburr all parts assembled in Step 1 and Step 4. Dimple the nutplate attach holes in the **F-1048-L** and **-R** Fwd Fuselage Ribs and the holes that attach the **F-1048C-1** Fuel Valve Bracket for the head of an AN426AD3 rivet. Final-Drill #19 then dimple (flush head outbd) the hole near the oval slot in the center of the fwd fuselage ribs (see Figure 1). Prime aluminum parts if/as desired.



**FIGURE 2: JOINING THE FIREWALL BULKHEAD ASSEMBLY  
TO THE FORWARD RIB SUBASSEMBLIES**

Step 7: Rivet the **WD-1004** Nose Gear Tension Fitting, **F-1001E-L** Center Angle and nutplates to the **F-1048-L** Fwd Fuselage Rib per the callouts in Figure 1 to create the Left Forward Rib Subassembly (place the shop head of the rivet on the outboard face of the nose gear tension fitting). Repeat this step to create the Right Forward Rib Subassembly.

Step 8: Rivet the Left and Right Forward Rib Subassemblies and **F-1001G-L** and **-R** Gusssets to the Firewall Bulkhead Subassembly per the callouts in Page 27-5, Figure 1. Rivet the **F-1048C-1** Fuel Valve Bracket to the the fwd fuselage ribs per the callouts in Figure 2. Insert the **VENT DL-10** 2.4° Flanged Ducts into the **VA-175** Heat Duct Tee, then cleco the flanged ducts to the fwd fuselage ribs per the callouts in Figure 2.

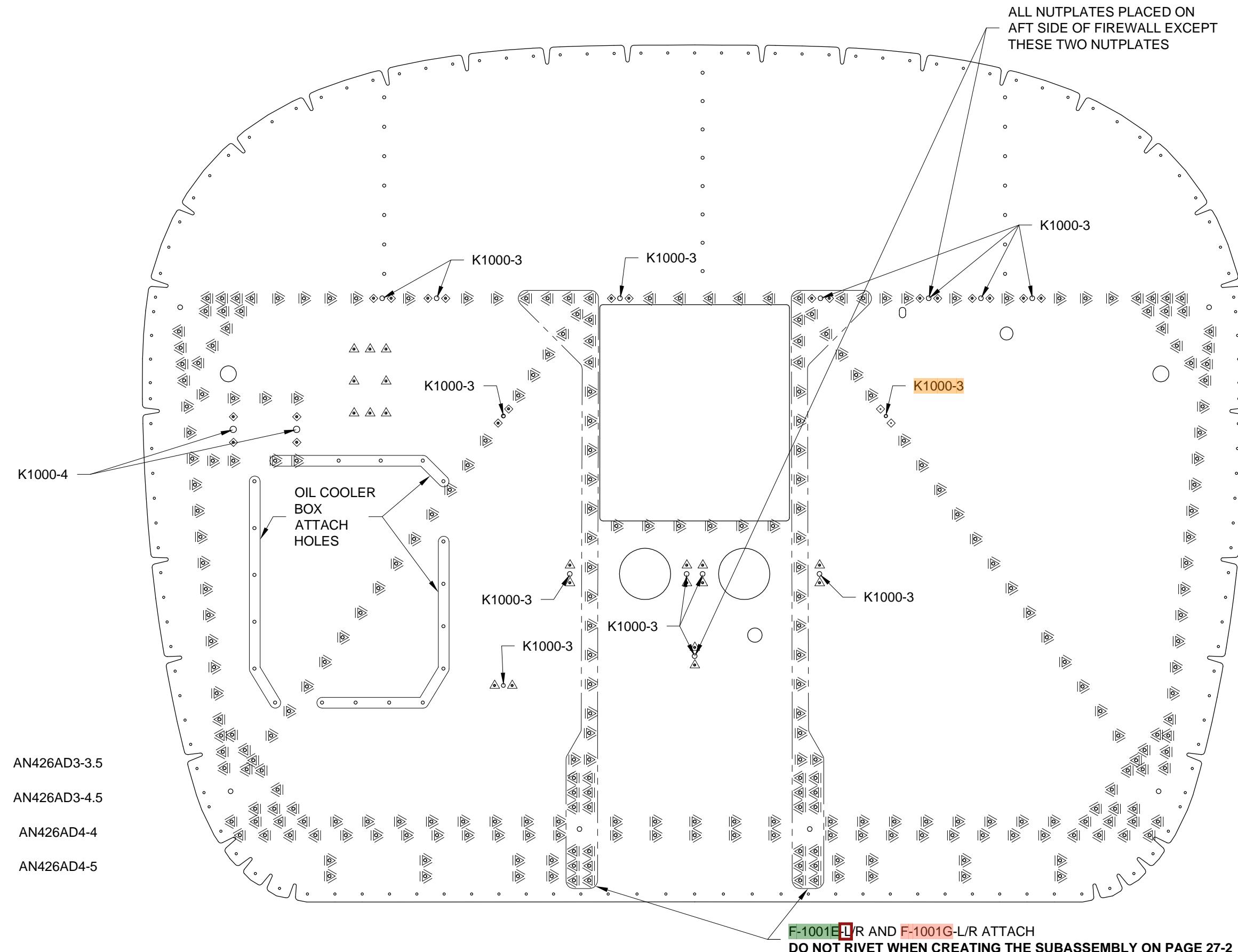
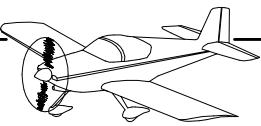
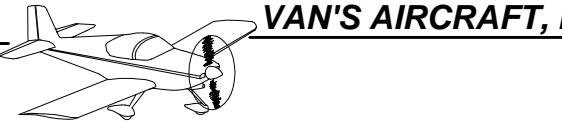


FIGURE 1: BULKHEAD RIVET CALLOUTS



Step 1: Cleco, then Final-Drill #30 the F-1039D Rudder Pedal Brace to the Firewall Bulkhead Subassembly as shown in Figure 1. Remove deburr and prime the rudder pedal brace if desired.

Step 2: Rivet the F-1039D Rudder Pedal Brace to the firewall bulkhead subassembly per the callouts in Figure 1.

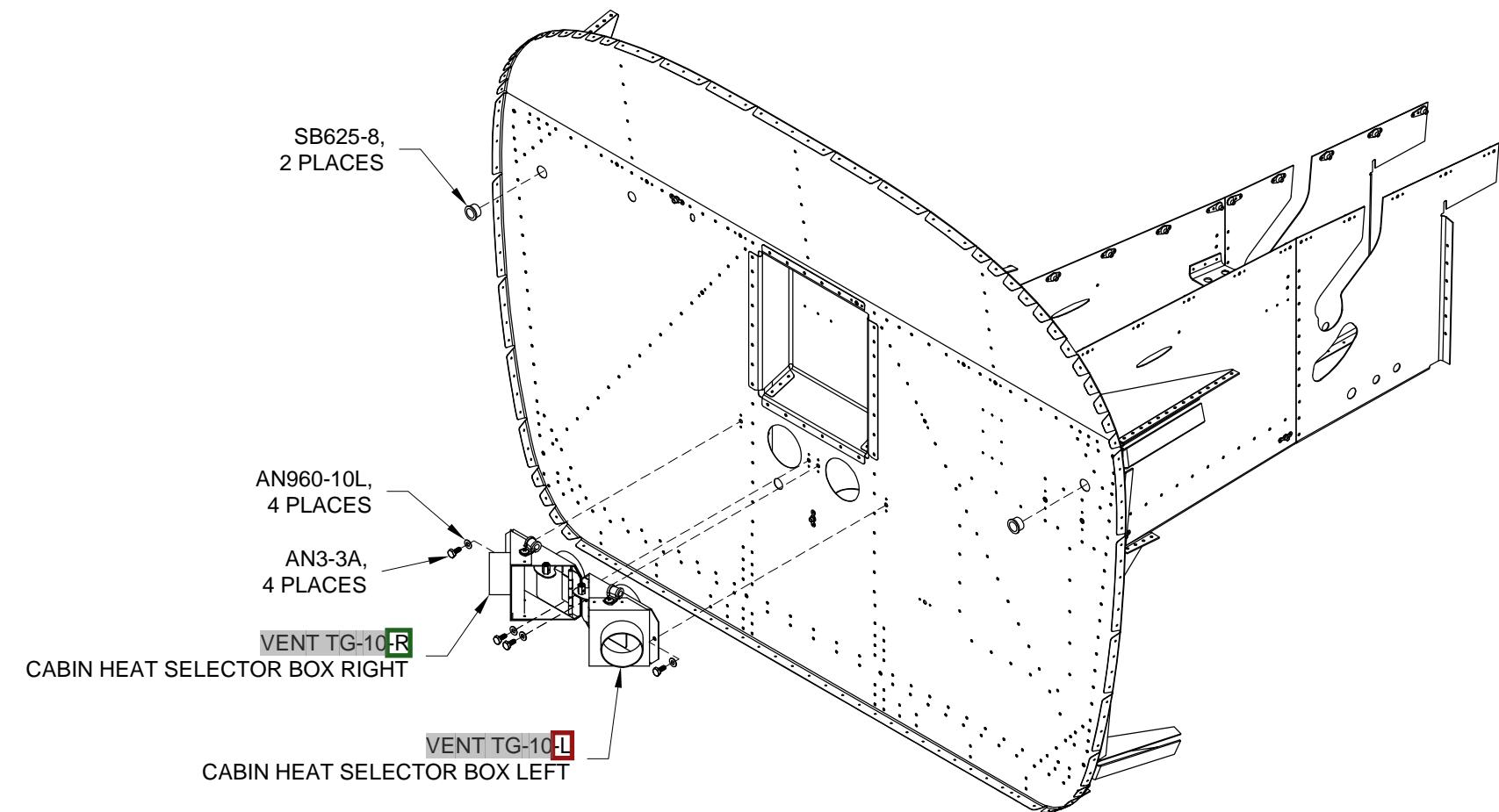
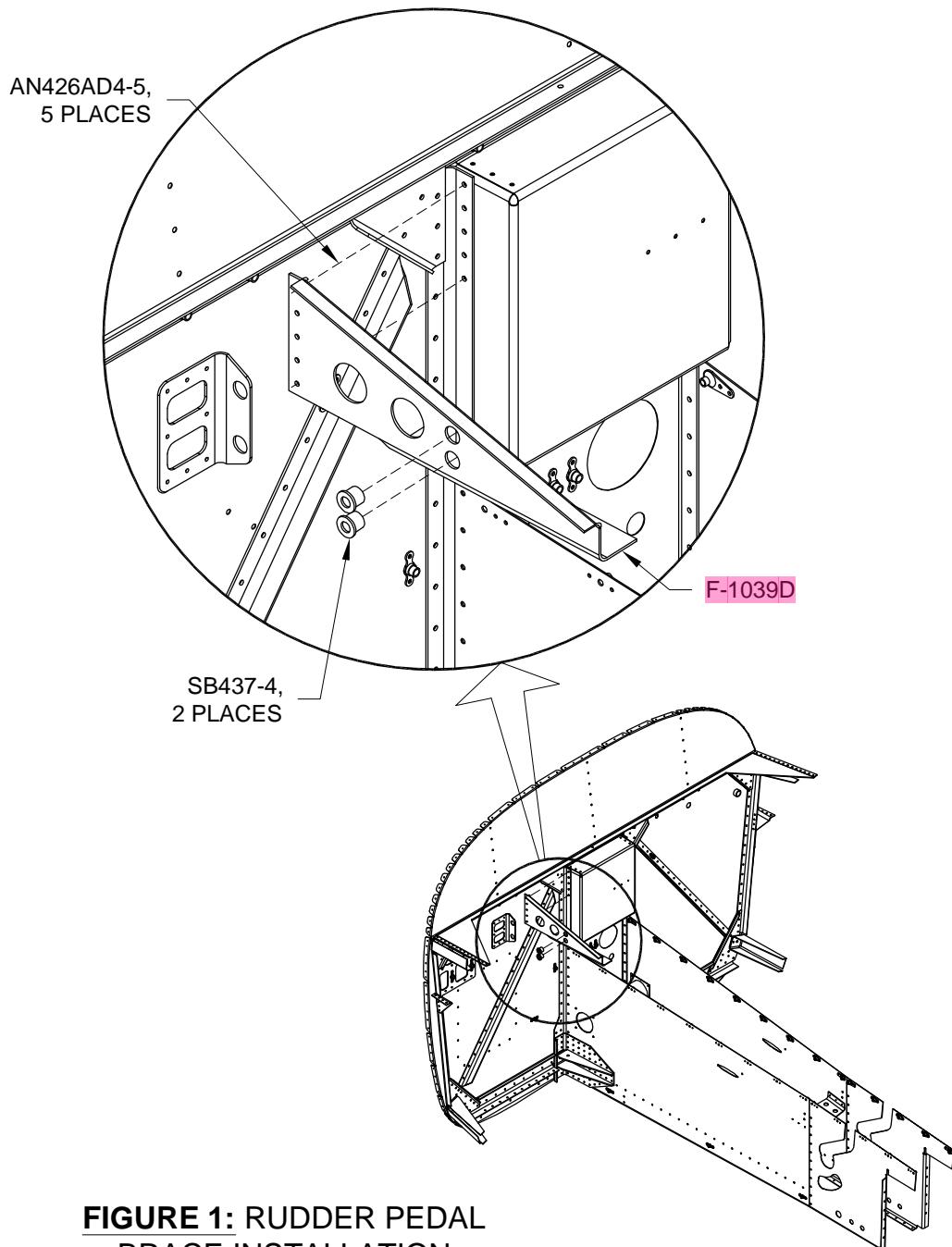
Step 3: Insert two snap bushings into the F-1039D Rudder Pedal Brace as shown in Figure 1.

Step 4: Install SB625-8 snap bushings in the Firewall Bulkhead Subassembly as shown in Figure 2.

Step 5: Bolt the VENT TG-10-L and VENT TG-10-R Cabin Heat Selector Boxes to the Firewall Bulkhead Subassembly per the callouts in Figure 2.

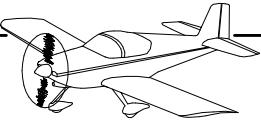
Step 6: Proseal any gaps around the F-1001K Recess and around the holes through which the VENT TG-10-L and VENT TG-10-R Cabin Heat Selector Boxes protrude.

**NOTE: Parts of the brake system can be installed at this time, see Section 36.**



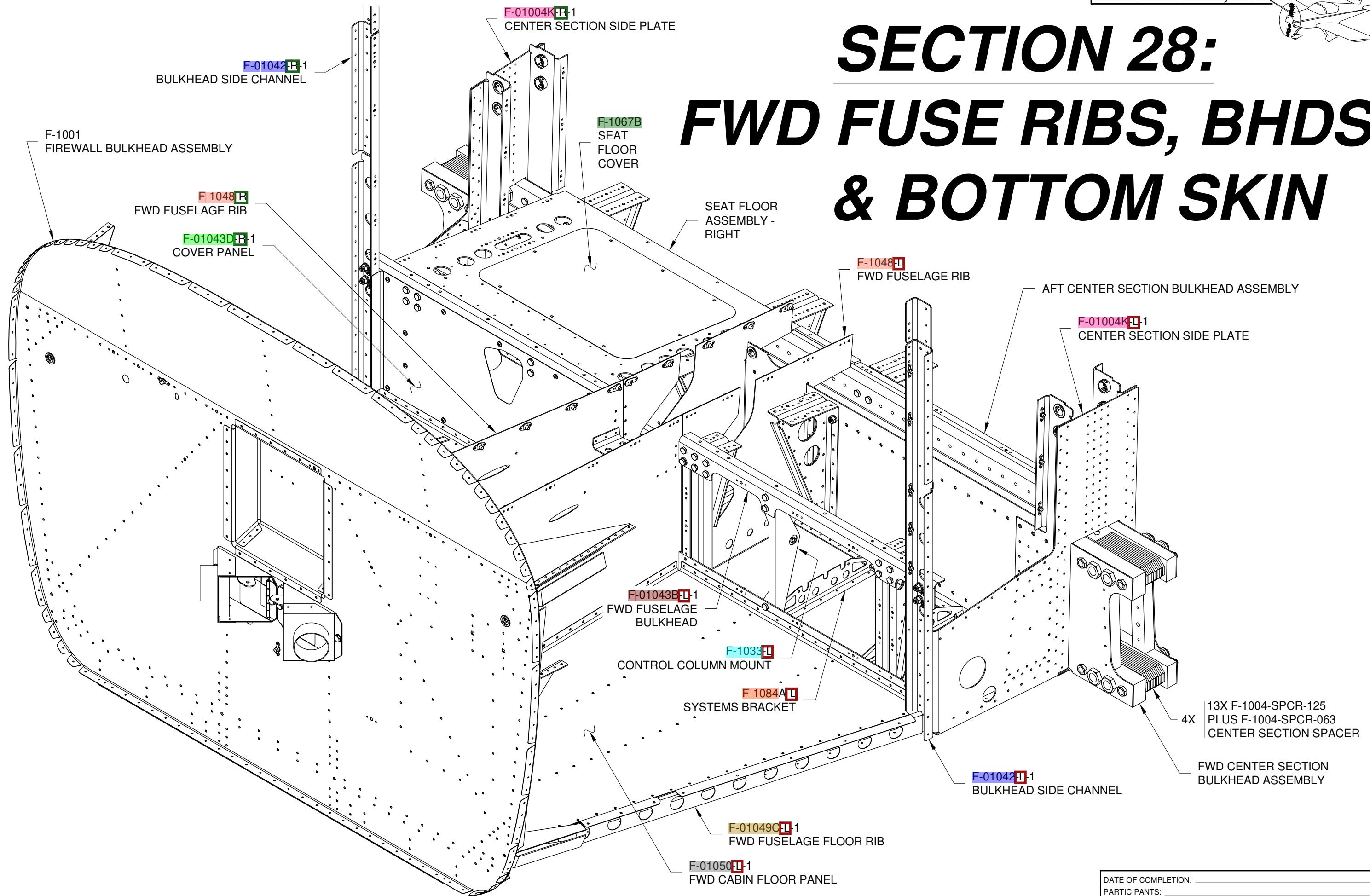
**FIGURE 2: CABIN HEAT SELECTOR BOX INSTALLATION**

**FIGURE 1: RUDDER PEDAL  
BRACE INSTALLATION**



# SECTION 28:

## FWD FUSE RIBS, BHDS & BOTTOM SKIN



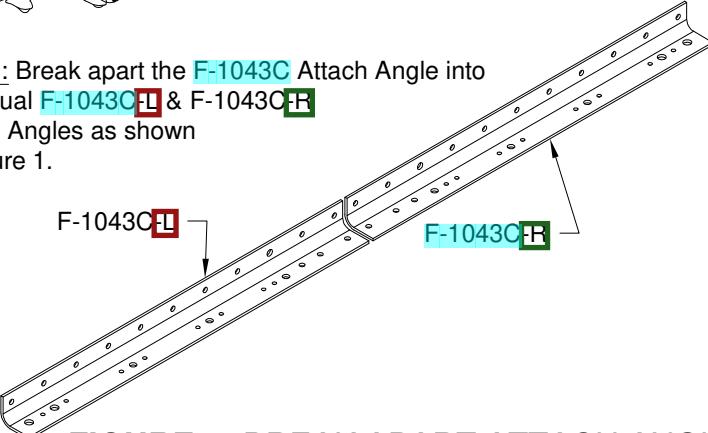
DATE OF COMPLETION: \_\_\_\_\_

PARTICIPANTS: \_\_\_\_\_

DATE 01/07/21 REVISION: 1 RV-10 PAGE: 28-1



Step 1: Break apart the F-1043C Attach Angle into individual F-1043C-L & F-1043C-R Attach Angles as shown in Figure 1.

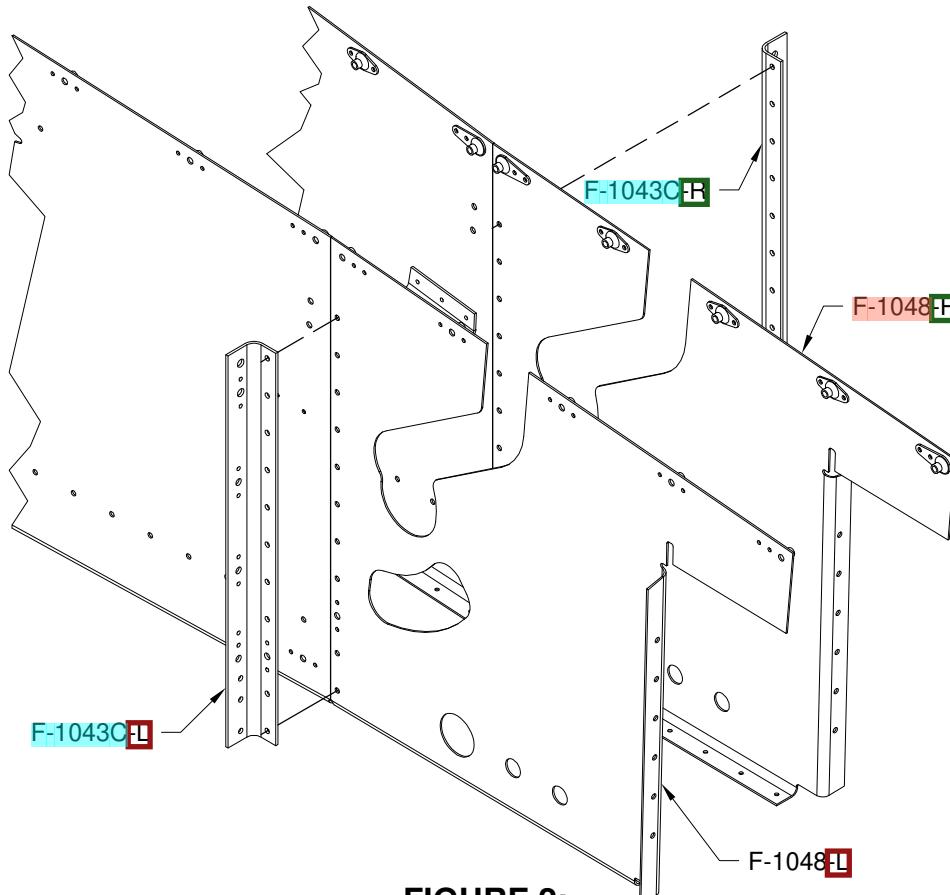


**FIGURE 1: BREAK APART ATTACH ANGLE**

Step 2: Cleco the F-1043C-L & R Attach Angles to the F-1048-L & R Fwd Fuselage Ribs as shown in Figure 2.

Final-Drill #19, #30, and #40 all holes in the flanges of the attach angles that mate to the fwd fuselage ribs.

Uncleco the attach angles.

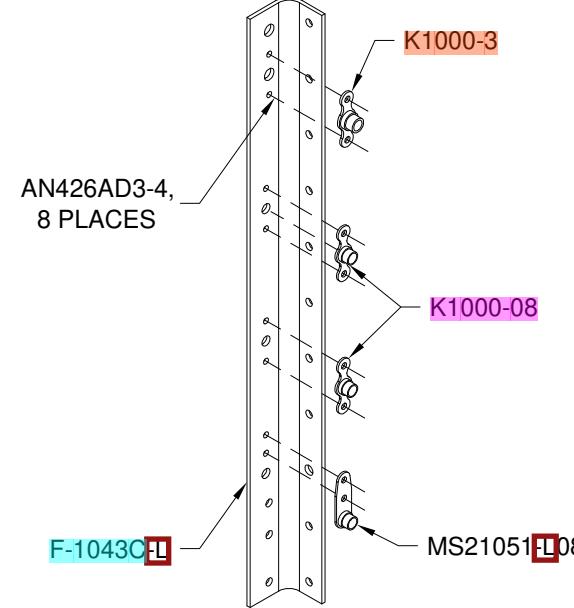


**FIGURE 2:**  
FINAL-DRILL ATTACH ANGLES TO FWD FUSELAGE RIBS

Step 3: Final-Drill #40 the remaining nutplate attach holes in the F-1043C-L & R Attach Angles. Final-Drill #19 the K1000-08 and MS21051-L08 nutplate screw holes in the attach angles. Final-Drill #12 the K1000-3 nutplate bolt hole in the attach angles. See Figure 3.

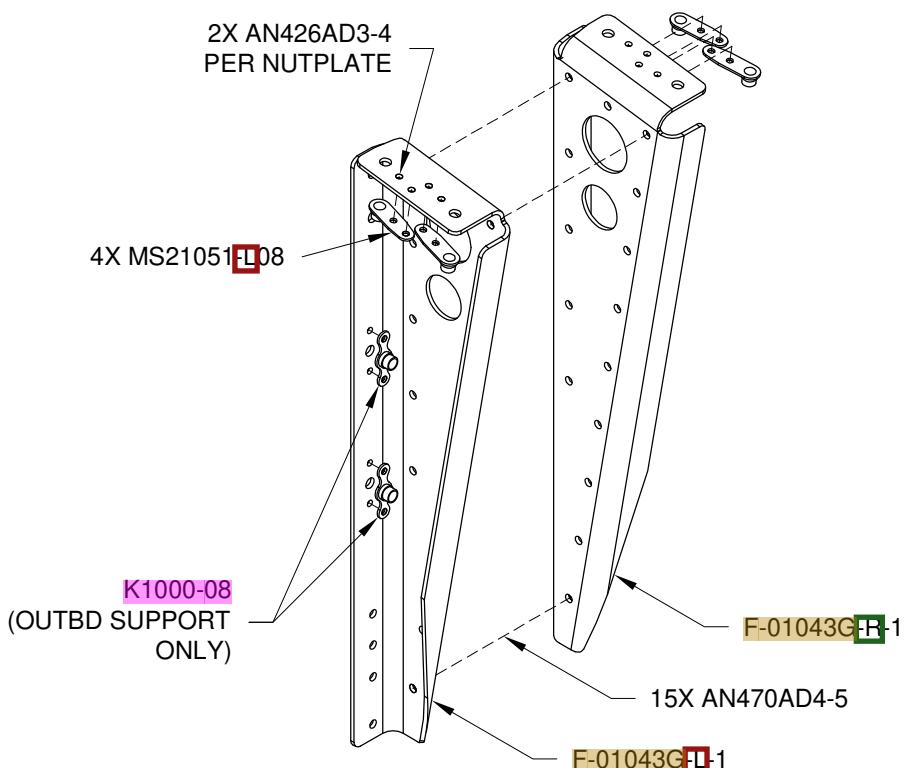
Machine countersink the nutplate attach holes in the attach angles for the head of an AN426AD3 rivet. See Figure 3.

Deburr the holes and edges of the attach angles.



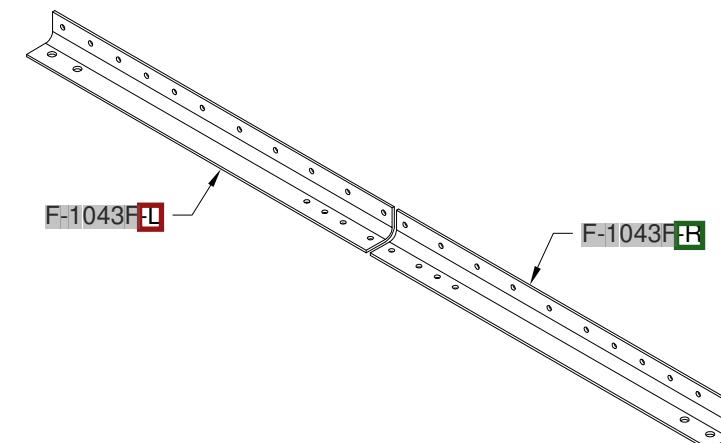
**FIGURE 3: ATTACH ANGLE NUTPLATE INSTALLATION**

Step 4: For the nutplates shown in Figure 4, machine countersink the nutplate attach holes in the two left and two right F-01043G-L-1 & F-01043G-R-1 Fwd Seat Rail Supports for the head of an AN426AD3 rivet.

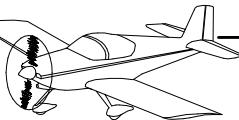


**FIGURE 4: FWD SEAT RAIL SUPPORT**

Step 5: Break apart the two F-1043F Seat Rail Support Angles into individual F-1043F-L & F-1043F-R Seat Rail Support Angles as shown in Figure 5.



**FIGURE 5: BREAK APART SEAT RAIL SUPPORT ANGLE**



Step 1: Cleco the F-1043E-L and F-1043E-R Fwd Seat Rail Supports to the F-1043F-L and F-1043F-R Seat Rail Support Angles as shown in Figure 1.

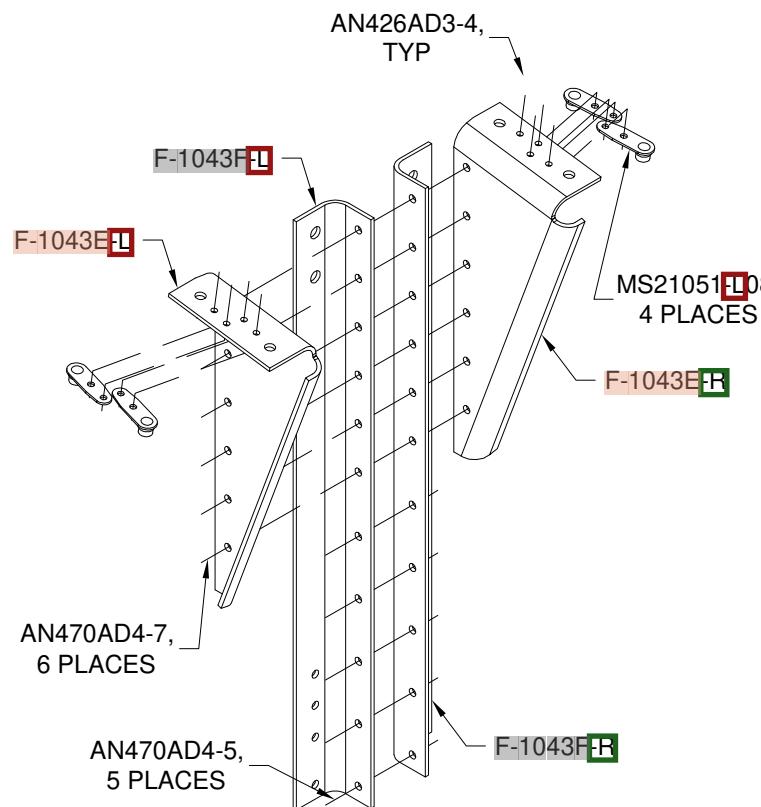
Repeat.

The two subassemblies created in this step will subsequently be referred to as Inbd Fwd Seat Rail Supports.

Final-Drill #30 the holes common between the fwd seat rail supports and seat rail support angles. Final-Drill #30 the holes common between the seat rail support angles. Final-Drill #40 the nutplate attach holes in the fwd seat rail supports. Final-Drill #19 the nutplate screw holes in the fwd seat rail supports. See Figure 1.

Machine countersink the nutplate attach holes in the fwd seat rail supports for the head of an AN426AD3 rivet. See Figure 1.

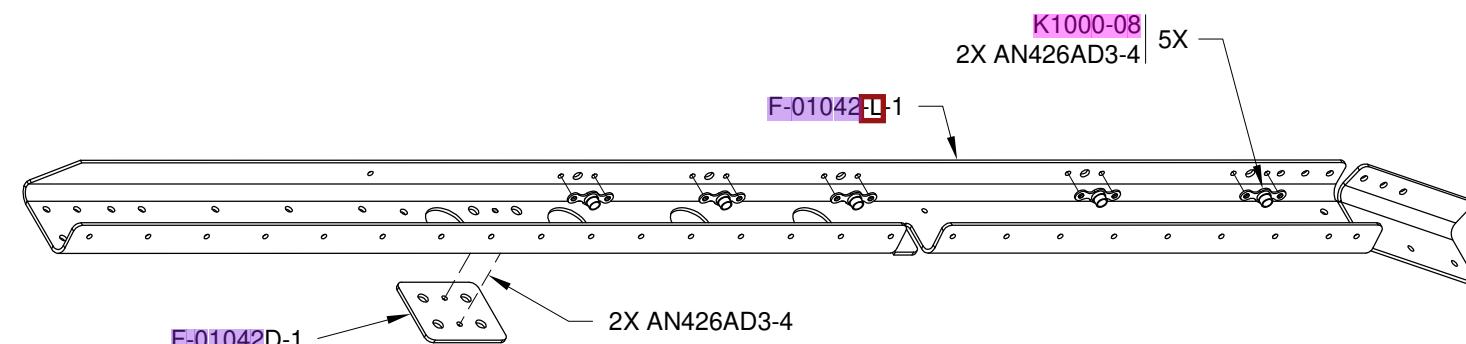
Uncleco the inbd fwd seat rail supports, deburr holes, and deburr edges.



**FIGURE 1: INBD FWD SEAT RAIL SUPPORT**

Step 3: Machine countersink the F-01042D-1 Spacers and the nutplate attach holes in the F-01042-L-1 & F-01042-R-1 Bulkhead Side Channels for the head of an AN426AD3 rivet. See Figure 3.

Machine countersink the nutplate screw holes. See Page 13-3, Figure 2 for details of the countersunk hole.



**FIGURE 3: BULKHEAD SIDE CHANNEL NUTPLATE INSTALLATION**

Step 4: Prime the following parts if/as desired:

F-1043C-L and F-1043C-R Attach Angles;  
F-1043E-L and F-1043E-R Fwd Seat Rail Supports;  
F-1043F-L and F-1043F-R Seat Rail Support Angles;  
F-01043G-L-1 & F-01043G-R-1 Fwd Seat Rail Supports;  
F-01042-L-1 & F-01042-R-1 Bulkhead Side Channels;  
F-01042D-1 Spacers.

Step 5: Install nutplates to the F-1043C-L and F-1043C-R Attach Angles as shown on Page 28-2, Figure 3.

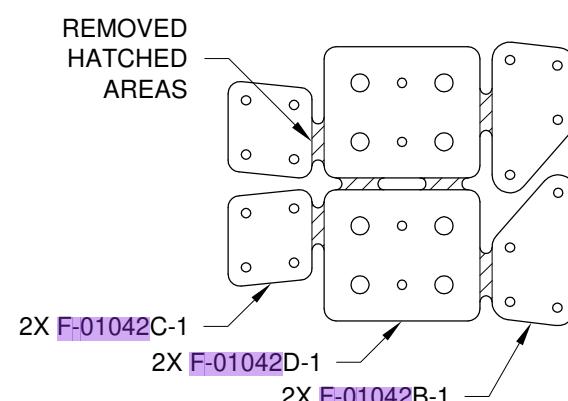
Step 6: Rivet the F-01043G-L-1 & F-01043G-R-1 Fwd Seat Rail Supports together as shown on Page 28-2, Figure 4 to create the Outbd Fwd Seat Rail Support - Left. Repeat this step to create the Outbd Fwd Seat Rail Support - Right.

Rivet the nutplates to the F-01043G-L-1 & F-01043G-R-1 Fwd Seat Rail Supports. Note that the K1000-08 nutplates are only on the outboard supports.

Step 7: Assemble two Inbd Fwd Seat Rail Supports as shown in Figure 1.

Step 8: Install nutplates and attach F-01042D-1 Spacers to the F-01042-L-1 & F-01042-R-1 Bulkhead Side Channels as shown in Figure 3.

Step 2: Break apart the F-01042BCD-1 Clips and Spacers into individual F-01042B-1 Clips, F-01042C-1 Clips, and F-01042D-1 Spacers as shown in Figure 2.



**FIGURE 2: BREAK APART CLIPS & SPACERS**

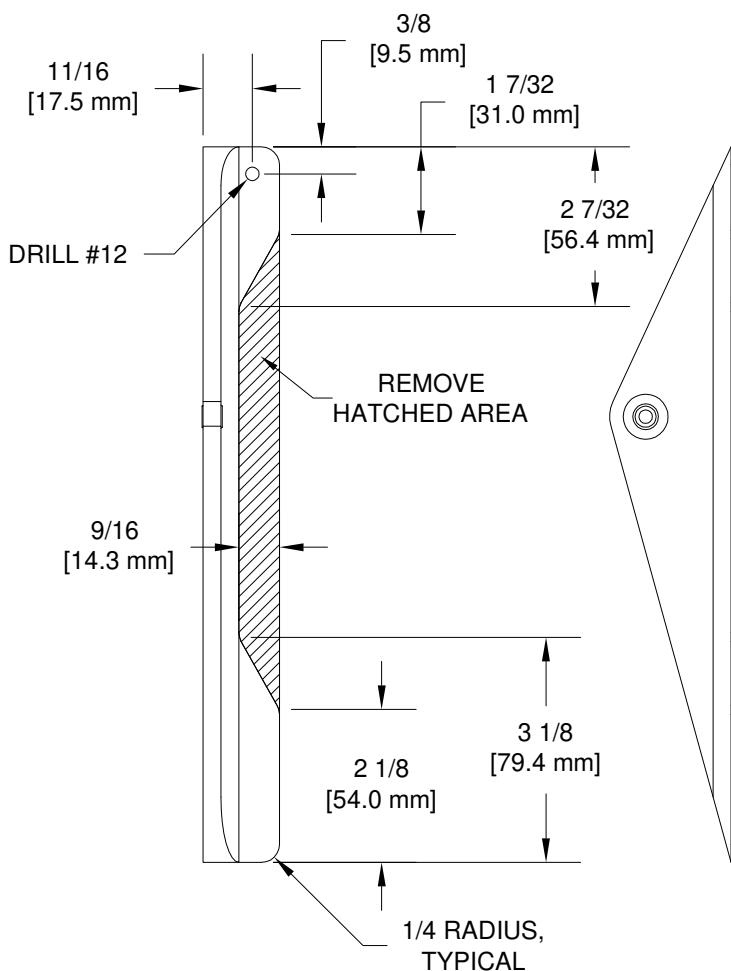


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Step 1: Using a #12 bit, drill a hole in the F-1033-L Control Column Mount located as shown in Figure 1.

Repeat for the F-1033-R Control Column Mount.

Radius the corners and remove material from the middle of both control column mounts as shown in Figure 1.



**FIGURE 1: DRILL AND TRIM CONTROL COLUMN MOUNT**

Step 2: Bolt the F-01043E-L-1 Fwd Fuselage Bulkhead to the F-01042-L-1 Bulkhead Side Channel as shown in Figure 2.

Bolt the Outbd Fwd Seat Rail Support - Left to the fwd fuselage bulkhead as shown in Figure 2.

Bolt one of the Inbd Fwd Seat Rail Supports to the fwd fuselage bulkhead as shown in Figure 2.

Bolt the F-1043O-L Attach Angle and F-01043D-L-1 Cover Panel to the fwd fuselage bulkhead as shown in Figure 2.

Cleco the F-01004T-L Center Section Side Plate Doubler to the F-01004K-L-1 Center Section Side Plate as shown in Figure 2.

Cleco the F-01004K-L-1 Center Section Side Plate to the bulkhead side channel as shown in Figure 2.

Cleco the F-1043A-L Fwd Fuselage Bulkhead to the center section side plate, outbd fwd seat rail support, inbd fwd seat rail support, and attach angle as shown in Figure 2.

Install screws through the cover panel into the fwd fuselage bulkhead/attach angle, attach angle, and outbd fwd seat rail support as shown in Figure 2.

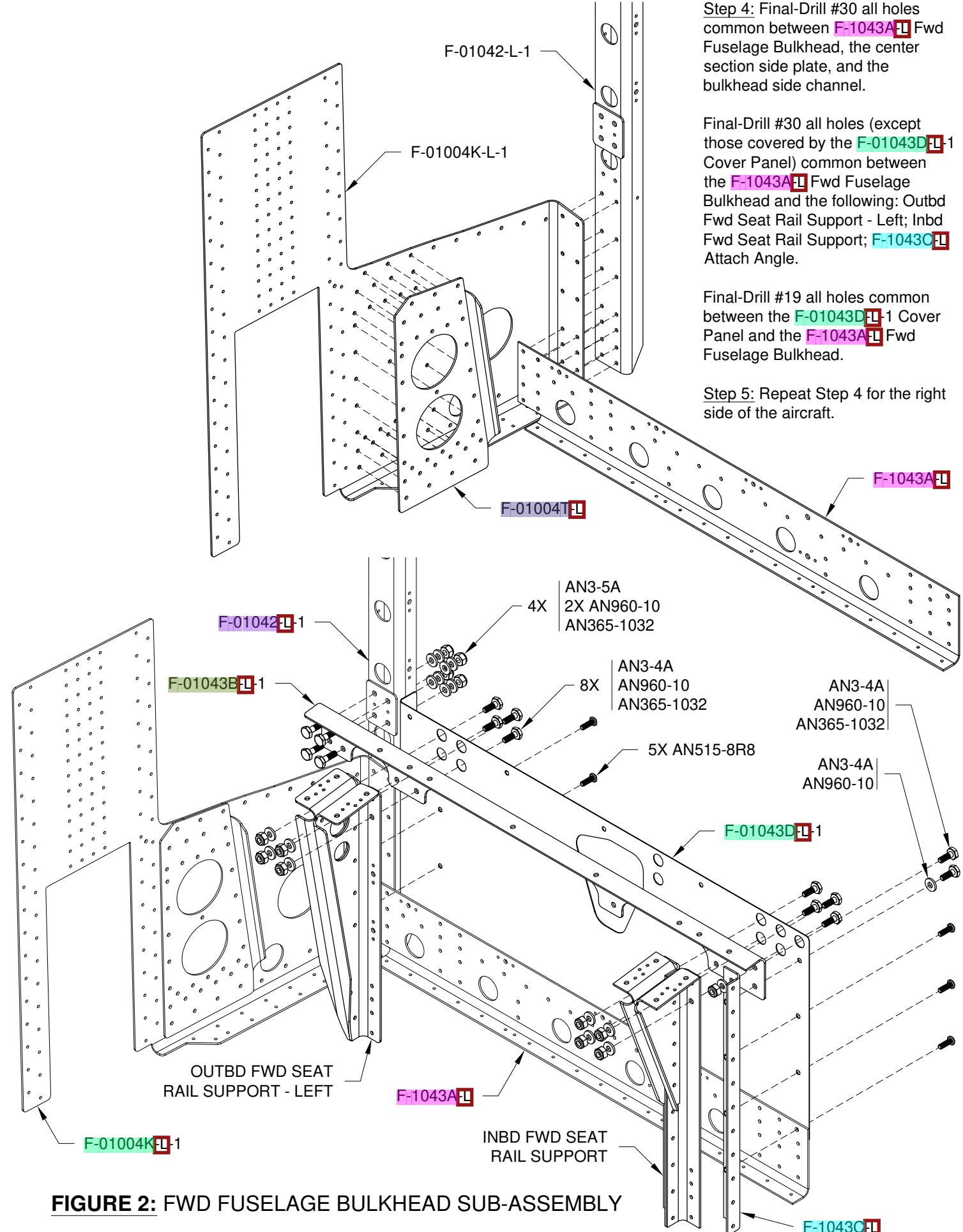
Step 3: Repeat Step 2 for the right side of the aircraft.

Step 4: Final-Drill #30 all holes common between F-1043A-L Fwd Fuselage Bulkhead, the center section side plate, and the bulkhead side channel.

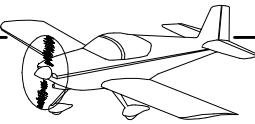
Final-Drill #30 all holes (except those covered by the F-01043D-L-1 Cover Panel) common between the F-1043A-L Fwd Fuselage Bulkhead and the following: Outbd Fwd Seat Rail Support - Left; Inbd Fwd Seat Rail Support; F-1043O-L Attach Angle.

Final-Drill #19 all holes common between the F-01043D-L-1 Cover Panel and the F-1043A-L Fwd Fuselage Bulkhead.

Step 5: Repeat Step 4 for the right side of the aircraft.



**FIGURE 2: FWD FUSELAGE BULKHEAD SUB-ASSEMBLY**



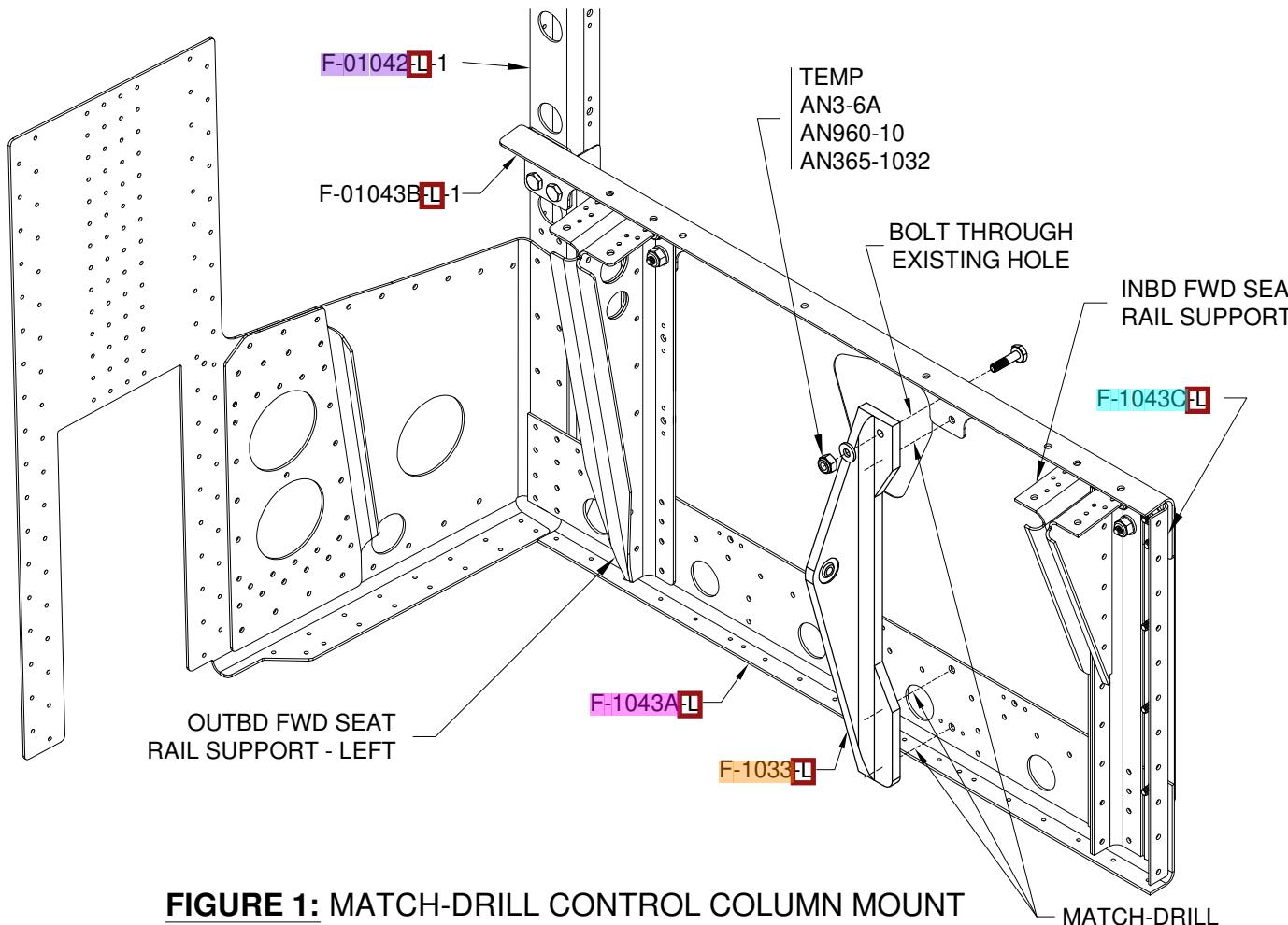
Step 1: Bolt the F-1033-L Control Column Mount to the F-01043B-L-1 Fwd Fuselage Bulkhead as shown in Figure 1.

Bolt the F-1033-R Control Column Mount to the F-01043B-R-1 Fwd Fuselage Bulkhead.

Align each control column mount so that it is parallel to the Inbd Fwd Seat Rail Support and Outbd Fwd Seat Rail Support and clamp it in that position.

Match-Drill #12 three holes in each control column mount using the existing holes in the F-01043B-L-1 & R-1 and F-1043A-L & -R Fwd Fuselage Bulkheads as drill guides. See Figure 1.

Un-clamp and un-bolt the control column mounts from the fwd fuselage bulkheads and deburr holes in the control column mounts.



**FIGURE 1: MATCH-DRILL CONTROL COLUMN MOUNT**

Step 2: Remove one bolt from each of the following parts: F-01042L-1 Bulkhead Side Channel; Outbd Fwd Seat Rail Support; Inbd Fwd Seat Rail Support; F-1043C-L Attach Angle.

Repeat for the right side of the aircraft.

Final-Drill #12 the open bolt holes.

Remove one of the remaining bolts in each location mentioned above and re-install in a hole that has already been final-drilled.

Final-Drill #12 the open bolt holes.

Repeat this process until all bolt holes have been final-drilled.

Un-bolt the F-01043B-L-1 & R-1.

Step 3: Remove the F-01043D-L-1 & R-1 Cover Panels from the Outbd Fwd Seat Rail Supports, Inbd Fwd Seat Rail Supports, and F-1043C-L & R Attach Angles.

Final-Drill #30 the holes common to the F-1043A-L and F-1043A-R Fwd Fuselage Bulkheads, outbd and inbd fwd seat rail supports, and attach angles that had been blocked by the cover panels.

Uncleco the inbd and outbd fwd seat rail supports from the fwd fuselage bulkheads and deburr holes in the fwd seat rail supports.

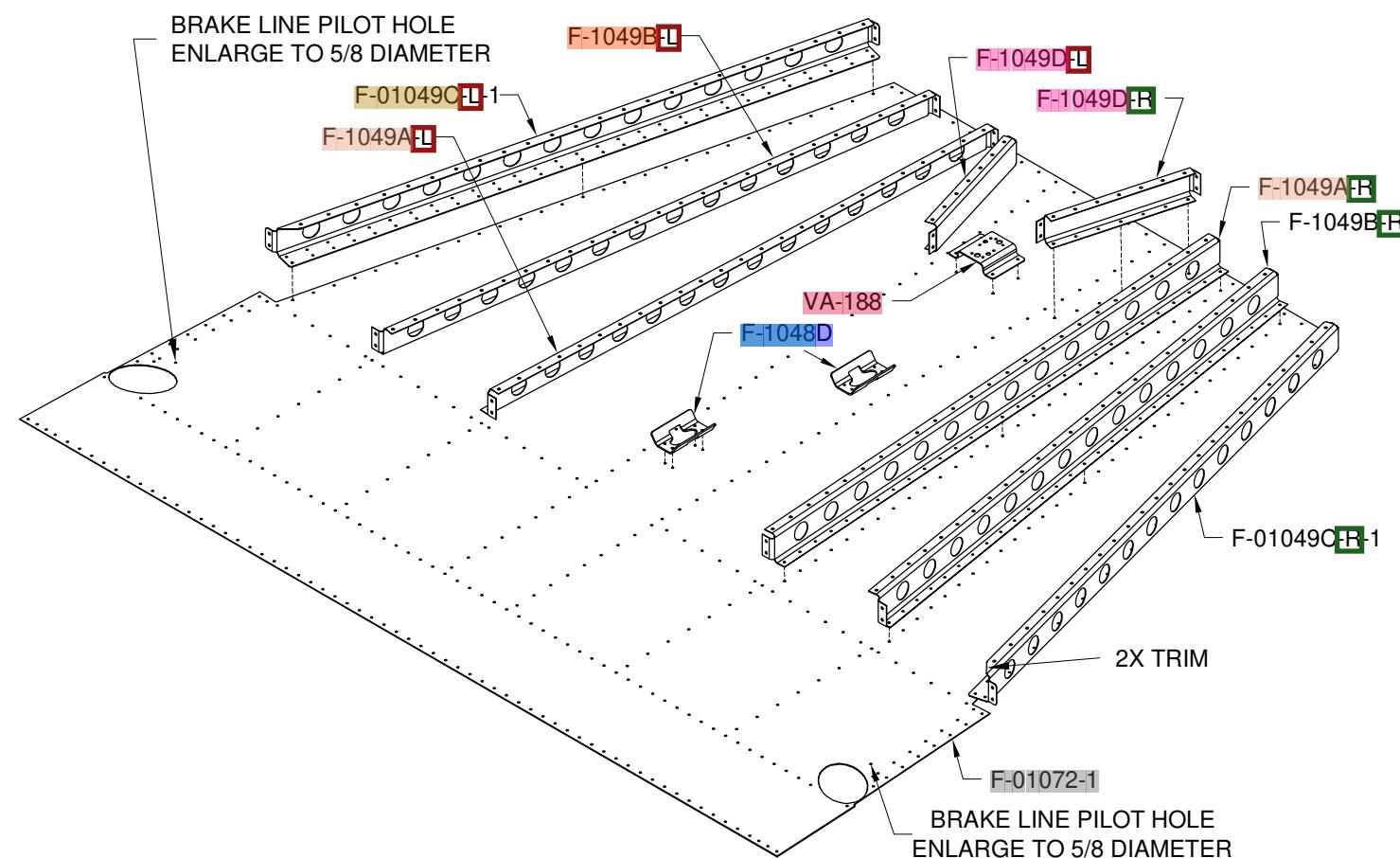
Step 4: Study Figure 2 until you understand the proper orientation of the F-01072-1 Fwd Fuse Bottom Skin, it is NOT symmetrical.

Trim the aft end of the upper flanges of the F-01049C-L-1 & R-1 Fwd Fuselage Floor Rib as shown in Figure 2. Trim from center-to-center of the two "notches" punched in the flange of each fwd fuselage floor rib.

Enlarge the two pre-punched brake line pilot holes to 5/8" diameter as shown in Figure 2.

Inserting clecos from the bottom up, cleco the F-1049A-L & R, F-1049B-L & R, F-01049C-L-1 & R-1, F-1049D-L & R Fwd Fuselage Floor Ribs, two F-1048D Fuel Filter Brackets, and VA-188 Flo-Scan Mount Bracket to the fwd fuse bottom skin as shown in Figure 2.

Final-Drill #40 all the holes common to the fwd fuse bottom skin and the parts clecoed to it.



**FIGURE 2: FINAL-DRILL FWD FUSE BOTTOM SKIN**



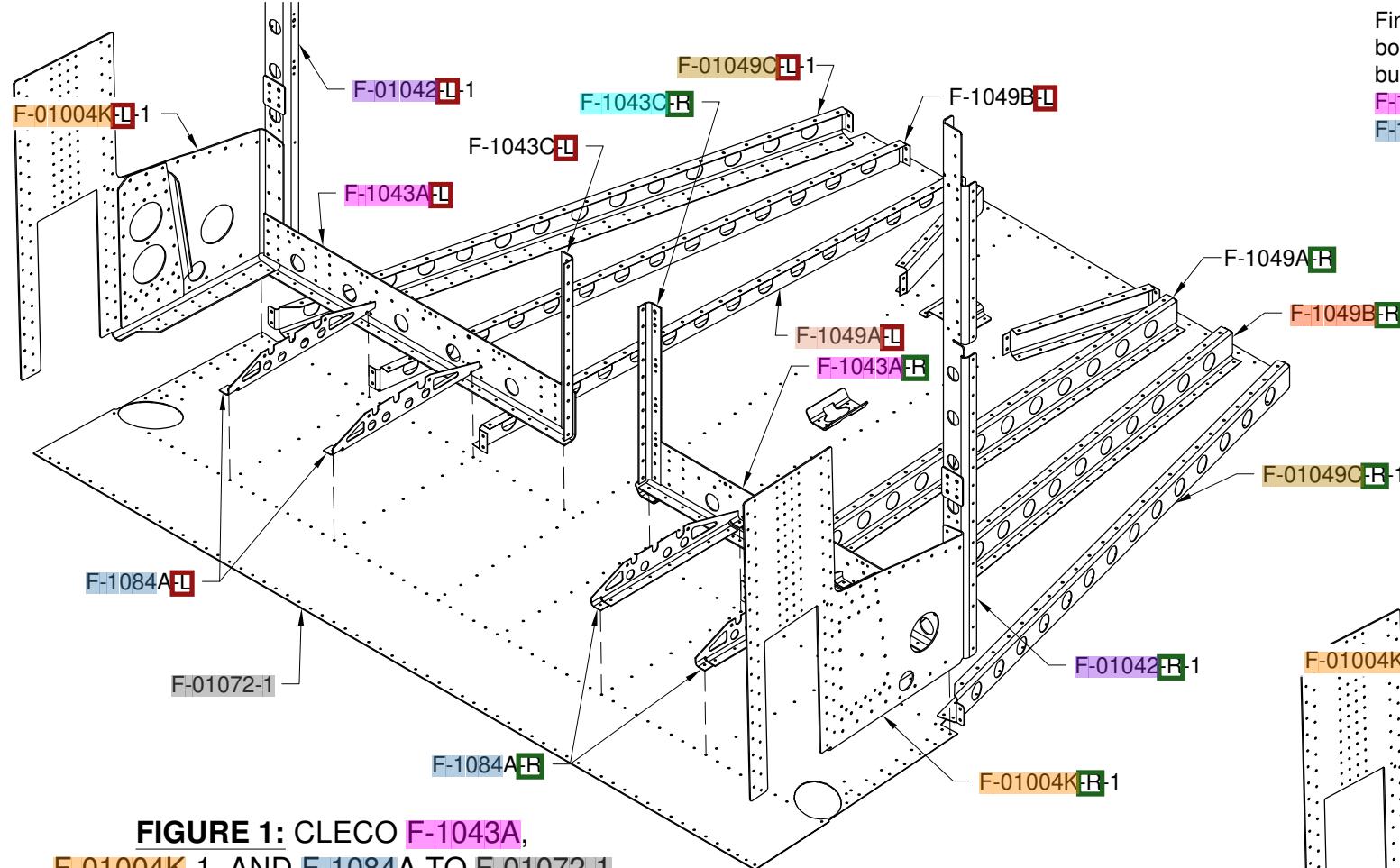
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Step 1: Cleco the subassembly of the F-1043A-L Fwd Fuselage Bulkhead, F-1043C-L Attach Angle, F-01004K-L-1 Center Section Side Plate, and F-01042-L-1 Bulkhead Side Channel to the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 1.

Cleco the subassembly of the F-1043A-R Fwd Fuselage Bulkhead, F-1043C-R Attach Angle, F-01004K-R-1 Center Section Side Plate, and F-01042-R-1 Bulkhead Side Channel to the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 1.

Cleco the aft tabs of the F-1049A-L & R, F-1049B-L & R, and F-01049C-L-1 & R-1 Fwd Fuselage Floor Ribs to the fwd fuselage bulkheads. See Figure 1.

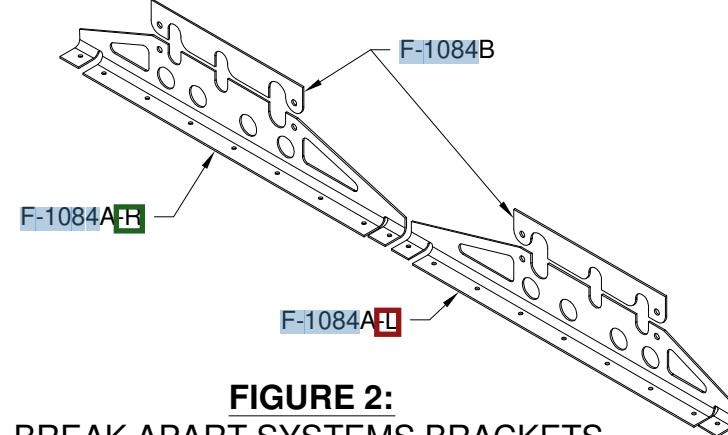
Final-Drill #30 the aft tabs of the fwd fuselage floor ribs to the fuselage bulkheads.



**FIGURE 1:** CLECO F-1043A, F-01004K-1, AND F-1084A TO F-01072-1

Step 2: Break apart the two F-1084 Systems Brackets into individual F-1084A-L, F-1084A-R, and F-1084B brackets as shown in Figure 2.

Cleco the F-1084A-L and F-1084A-R Systems Brackets to the F-01072-1 Fwd Fuse Bottom Skin and F-1043A-L and F-1043C-R Fwd Fuselage Bulkheads as shown in Figure 1. Do not insert a cleco into the single hole in the aft tab of the systems brackets.



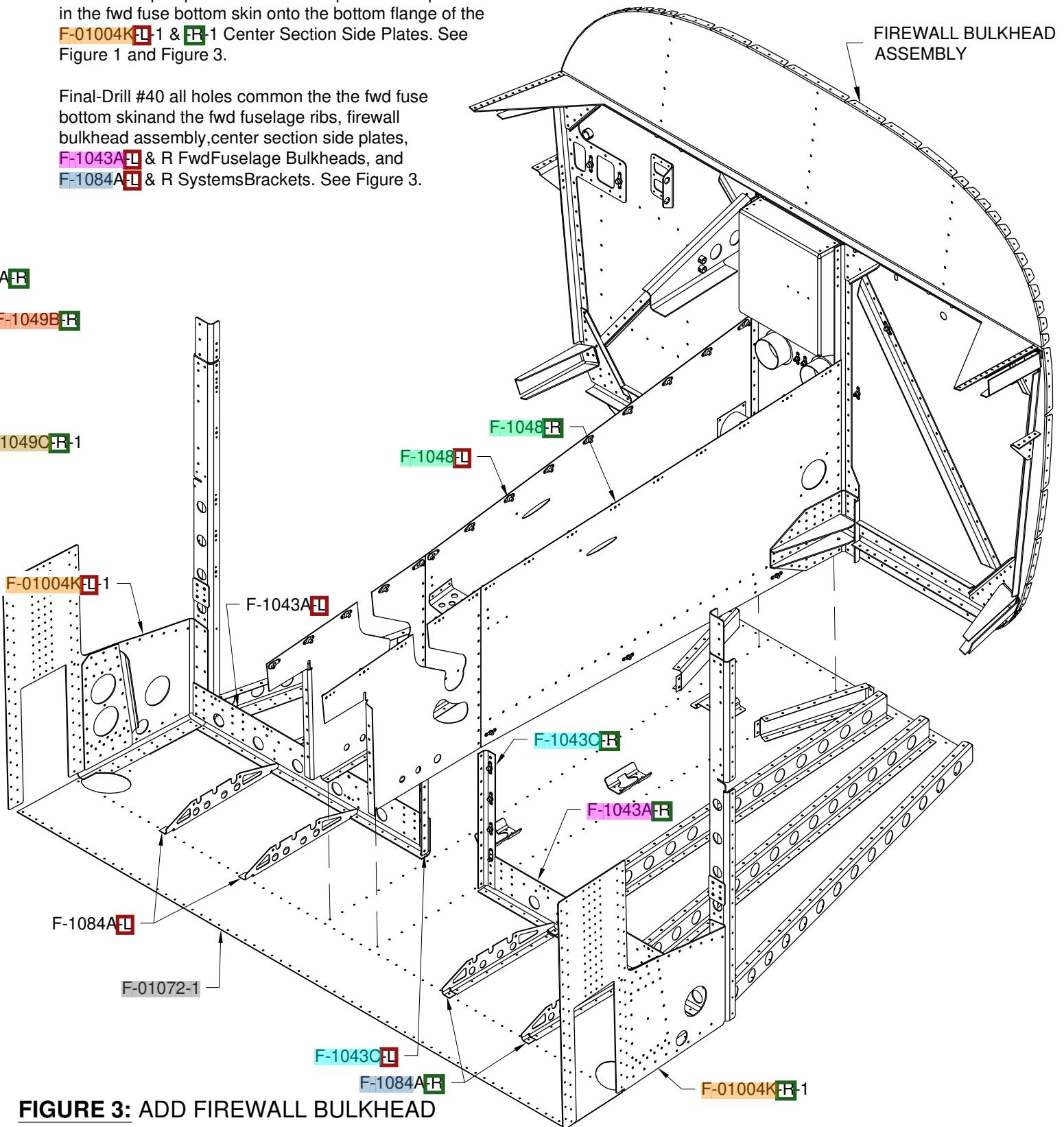
**FIGURE 2:**  
BREAK APART SYSTEMS BRACKETS

Step 3: Position the Firewall Bulkhead Assembly to the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 3. Cleco the F-1048-L & R Fwd Fuselage Ribs to the F-1043C-L & R Attach Angles, then tip up the entire assembly so it rests on the firewall bulkhead assembly. Place blocks between the work surface and the four corners of the firewall bulkhead. The blocks must be at least 3 inches thick to keep the weight from resting on the cabin heat selector boxes.

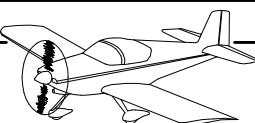
Inserting clecos from the bottom up, cleco the fwd fuse bottom skin to the flanges of the fwd fuselage ribs and to the bottom flange of the firewall bulkhead assembly.

Use a "Sharpie" pen to trace the shape of the elliptical holes in the fwd fuse bottom skin onto the bottom flange of the F-01004K-L-1 & R-1 Center Section Side Plates. See Figure 1 and Figure 3.

Final-Drill #40 all holes common to the fwd fuse bottom skin and the fwd fuselage ribs, firewall bulkhead assembly, center section side plates, F-1043A-L & R Fwd Fuselage Bulkheads, and F-1084A-L & R Systems Brackets. See Figure 3.



**FIGURE 3:** ADD FIREWALL BULKHEAD ASSEMBLY TO FWD FUSE BOTTOM SKIN

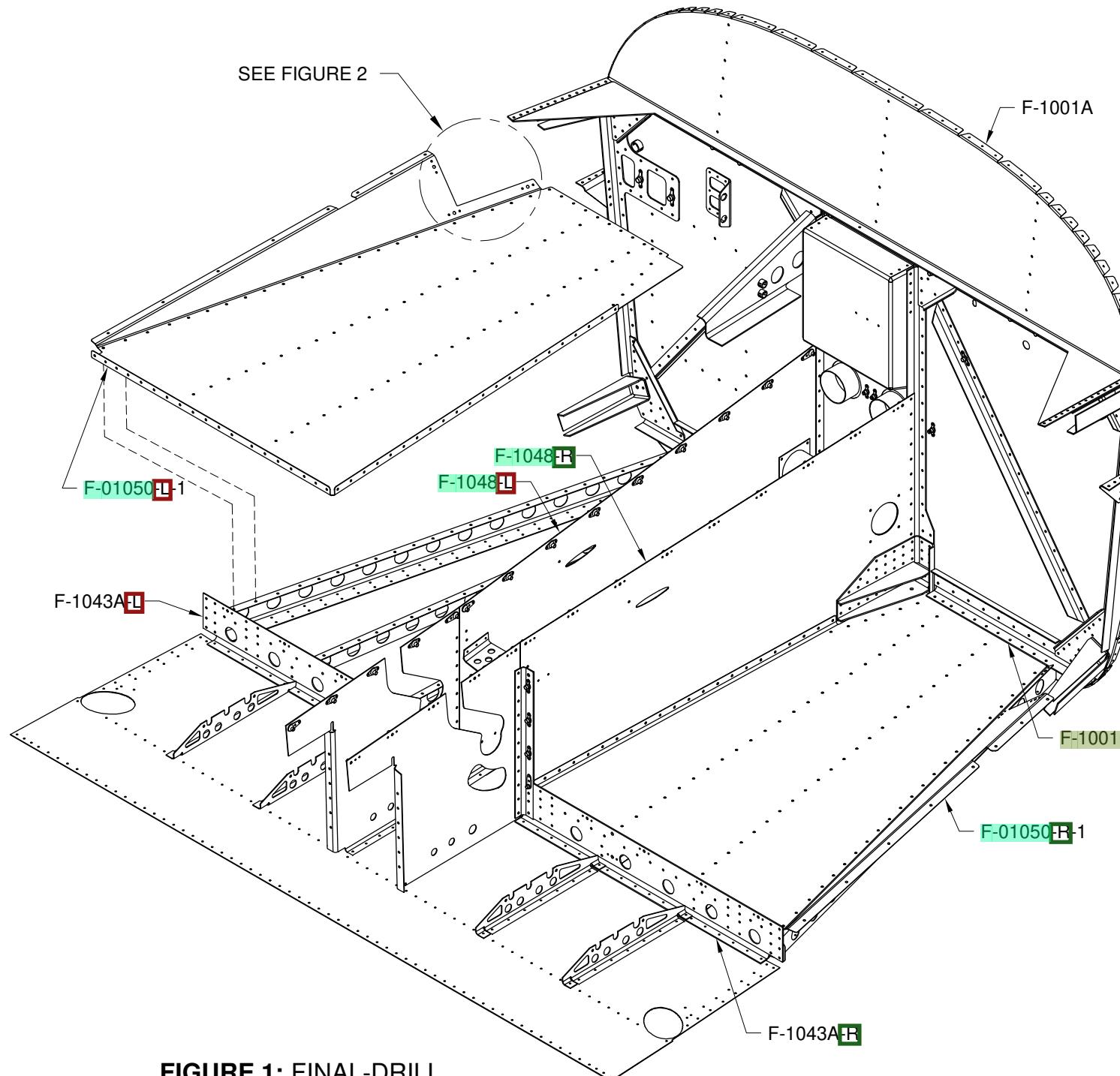


Step 1: Tip the Forward Fuselage assembly down to be oriented as shown in Figure 1.

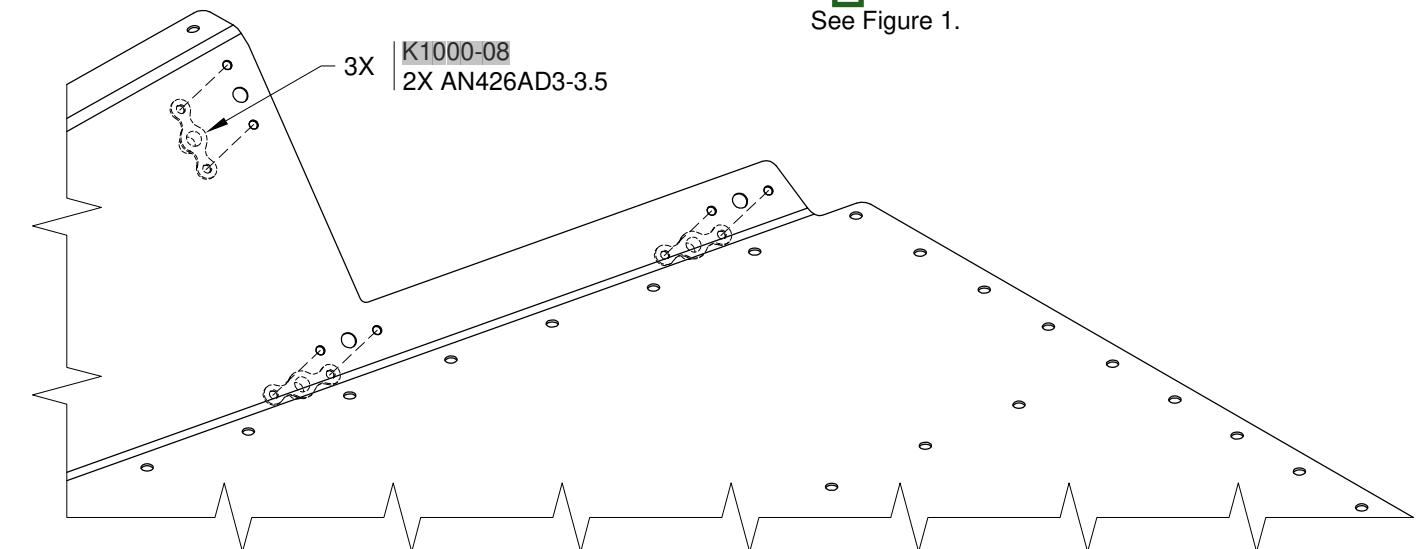
Final-Drill #30 the holes common to the F-1001A Firewall Bulkhead and the forward tabs of the F-1049A-L & R, F-1049B-L & R, F-01049C-L-1 & -R-1, and F-1049D-L & -R Fwd Fuselage Floor Ribs. See Page 28-5, Figure 2.

Step 2: Cleco the F-01050-L-1 & R-1 Fwd Cabin Floor Panels to the F-1048-L & -R Fwd Fuselage Ribs, F-1043A-L & -R Fwd Fuselage Bulkheads, F-1001C Firewall Lower Channel, and the F-1049A-L & R, F-1049B-L & R, F-01049C-L-1 & -R-1, and F-1049D-L & R Fwd Fuselage Floor Ribs. See Figure 1. The forward end of the fwd cabin floor panel slips UNDER the firewall lower channel.

Final-Drill #30 all holes common to the fwd cabin floor panels and fwd fuselage floor ribs, fwd fuselage bulkheads, firewall bulkhead, and fwd fuselage ribs.



**FIGURE 1: FINAL-DRILL  
FWD CABIN FLOOR PANELS**  
(NOTE: SOME PARTS OMITTED FOR CLARITY)

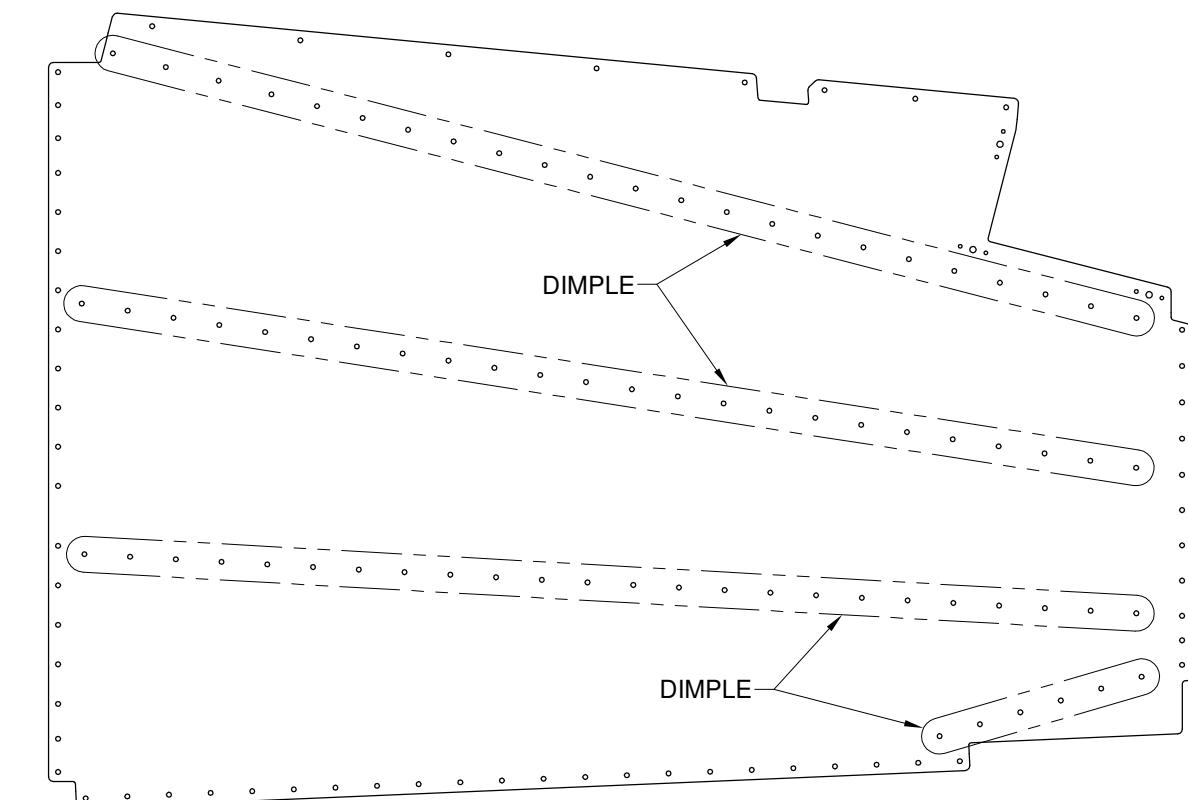


**FIGURE 2: FWD CABIN FLOOR PANEL NUTPLATE INSTALLATION**

Step 4: Deburr all edges and final-drilled holes in the F-01050-L-1 & R-1 Fwd Cabin Floor Panels.

Dimple the nutplate attach holes in the fwd cabin floor panels. See Figure 2.

Dimple the holes in the fwd cabin floor panels as called-out in Figure 3.



**FIGURE 3: FWD CABIN FLOOR PANEL DIMPLE DIAGRAM**  
(NOTE: PART SHOWN FLAT FOR CLARITY)



Step 1: Remove the F-01004K-L-1 & F-1 Center Section Side Plates and F-01042-L-1 & F-1 Bulkhead Side Channels from the F-1043A-L & R Fwd Fuselage Bulkheads and F-01072-1 Fwd Fuse Bottom Skin.

Remove the F-1084A-L & R Systems Brackets from the fwd fuse bottom skin.

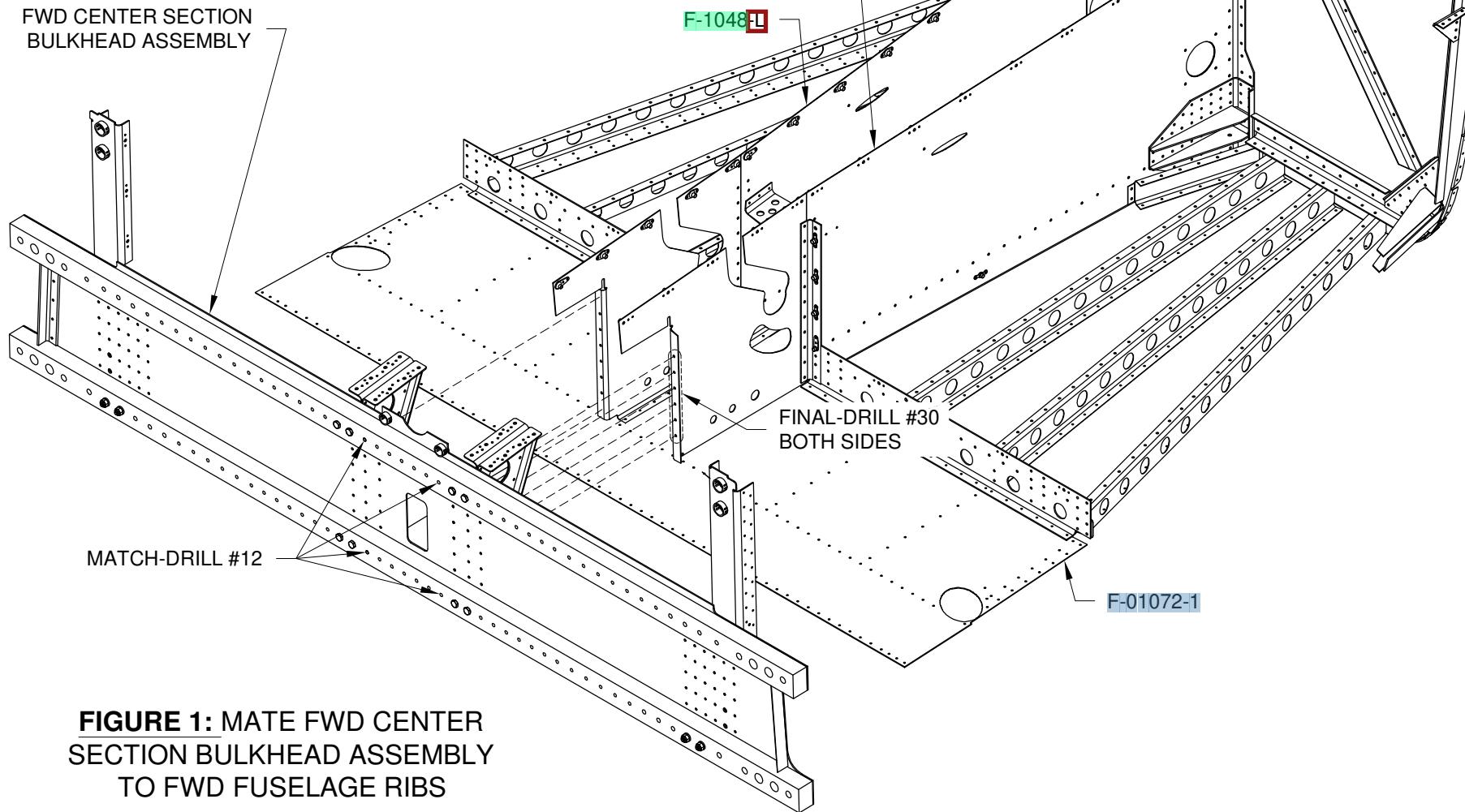
Step 2: Trim the bottom flanges of the F-01004K-L-1 & F-1 Center Section Side Plates to match the elliptical holes in the F-01072-1 Fwd Fuse Bottom Skin.

Step 3: Cleco the aft flanges of the F-1048-L & R Fwd Fuselage Ribs to the web of the Fwd Center Section Bulkhead Assembly as shown in Figure 1.

Match-Drill #12 through the Fwd Center Section Bulkhead Assembly into the aft flanges of the fwd fuselage ribs 4 places as shown in Figure 1.

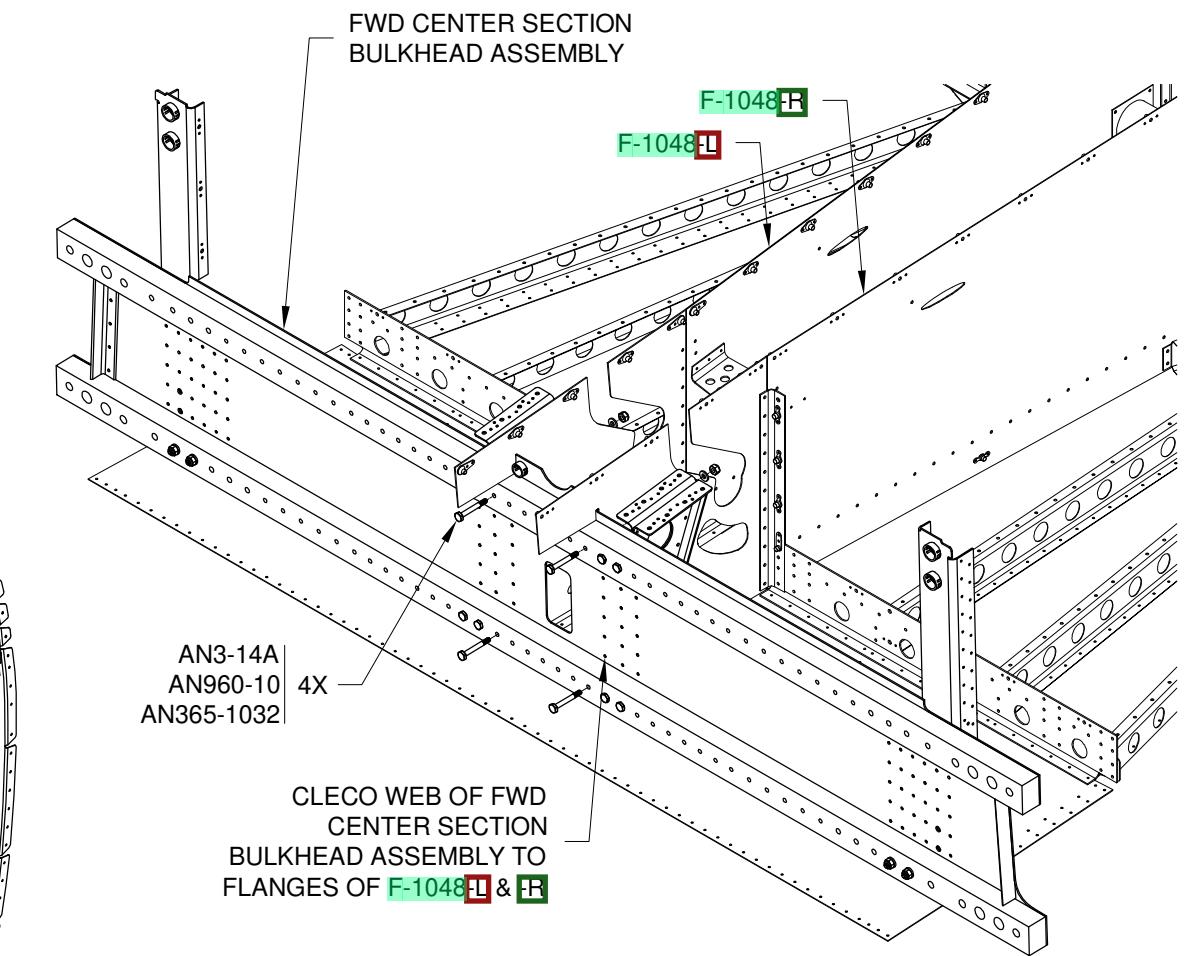
Final-Drill #30 through the Fwd Center Section Bulkhead Assembly and fwd fuselage ribs 12 places as shown in Figure 1.

Step 4: Uncleco the Fwd Center Section Bulkhead Assembly from the F-1048-L & R Fwd Fuselage Ribs. Deburr the holes in all parts that were drilled in the previous step.

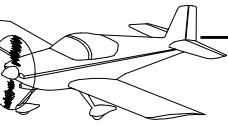


**FIGURE 1: MATE FWD CENTER SECTION BULKHEAD ASSEMBLY TO FWD FUSELAGE RIBS**

Step 5: Attach the Fwd Center Section Bulkhead Assembly to the F-1048-L & F-1048-R Fwd Fuselage Ribs using bolts and clecos as shown in Figure 2.



**FIGURE 2: BOLT FWD CENTER SECTION BULKHEAD ASSEMBLY TO FWD FUSELAGE RIBS**



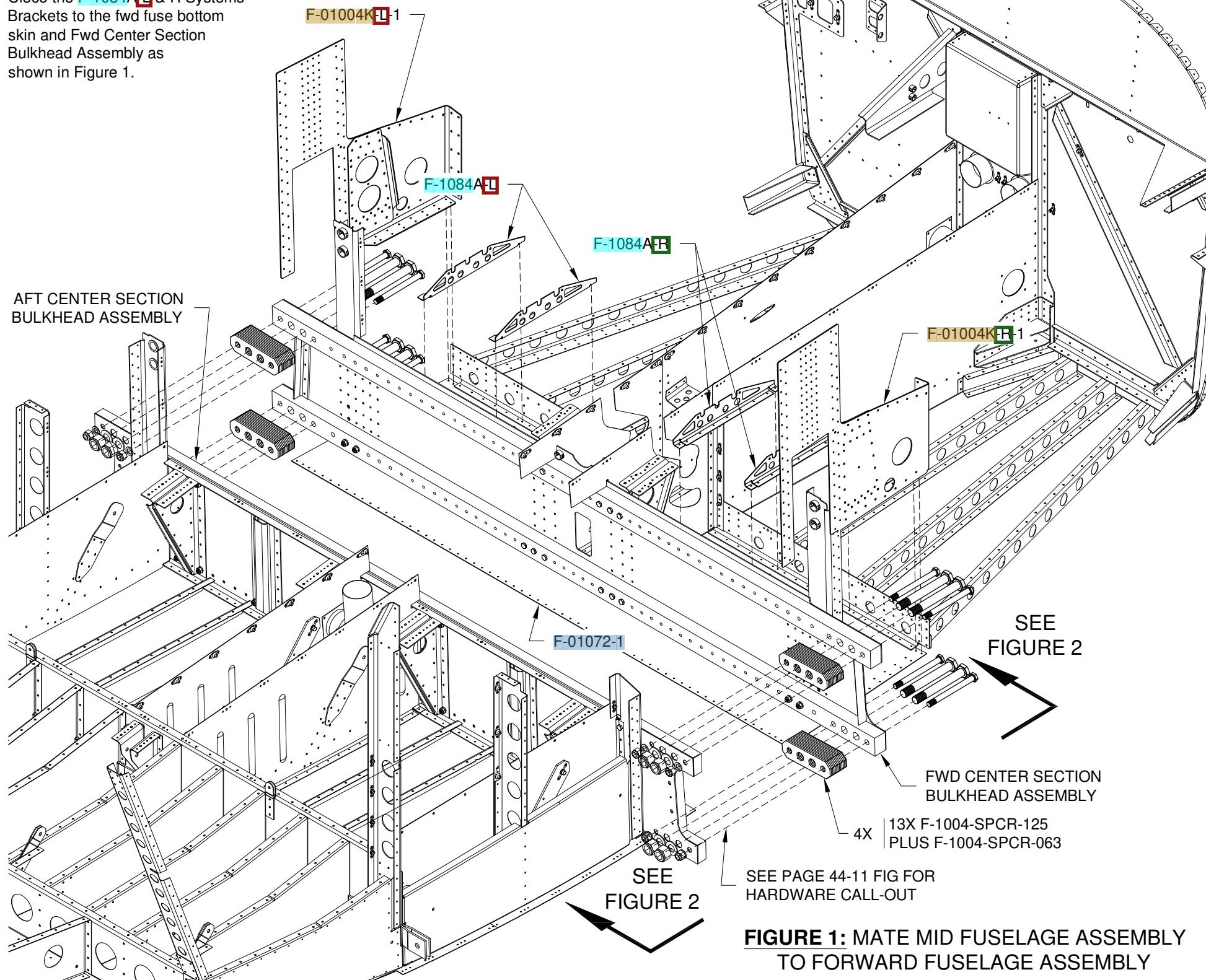
Step 1: Mate the Mid Fuselage Assembly to the Forward Fuselage Assembly as shown in Figure 1. The F-1076 Center Bottom Skin (part of the Mid Fuselage Assembly) fits BETWEEN the Fwd Center Section Bulkhead Assembly and the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 2.

Cleco together the center bottom skin, Fwd Center Section Bulkhead Assembly, and fwd fuse bottom skin.

Cleco together the fwd fuse bottom skin, center bottom skin, and Aft Center Section Bulkhead Assembly.

Cleco the F-01004KL-1 & FR-1 Center Section Side Plates to the Aft Center Section Bulkhead Assembly, Fwd Center Section Assembly, and fwd fuse bottom skin as shown in Figure 1.

Cleco the F-1084AL & R Systems Brackets to the fwd fuse bottom skin and Fwd Center Section Bulkhead Assembly as shown in Figure 1.

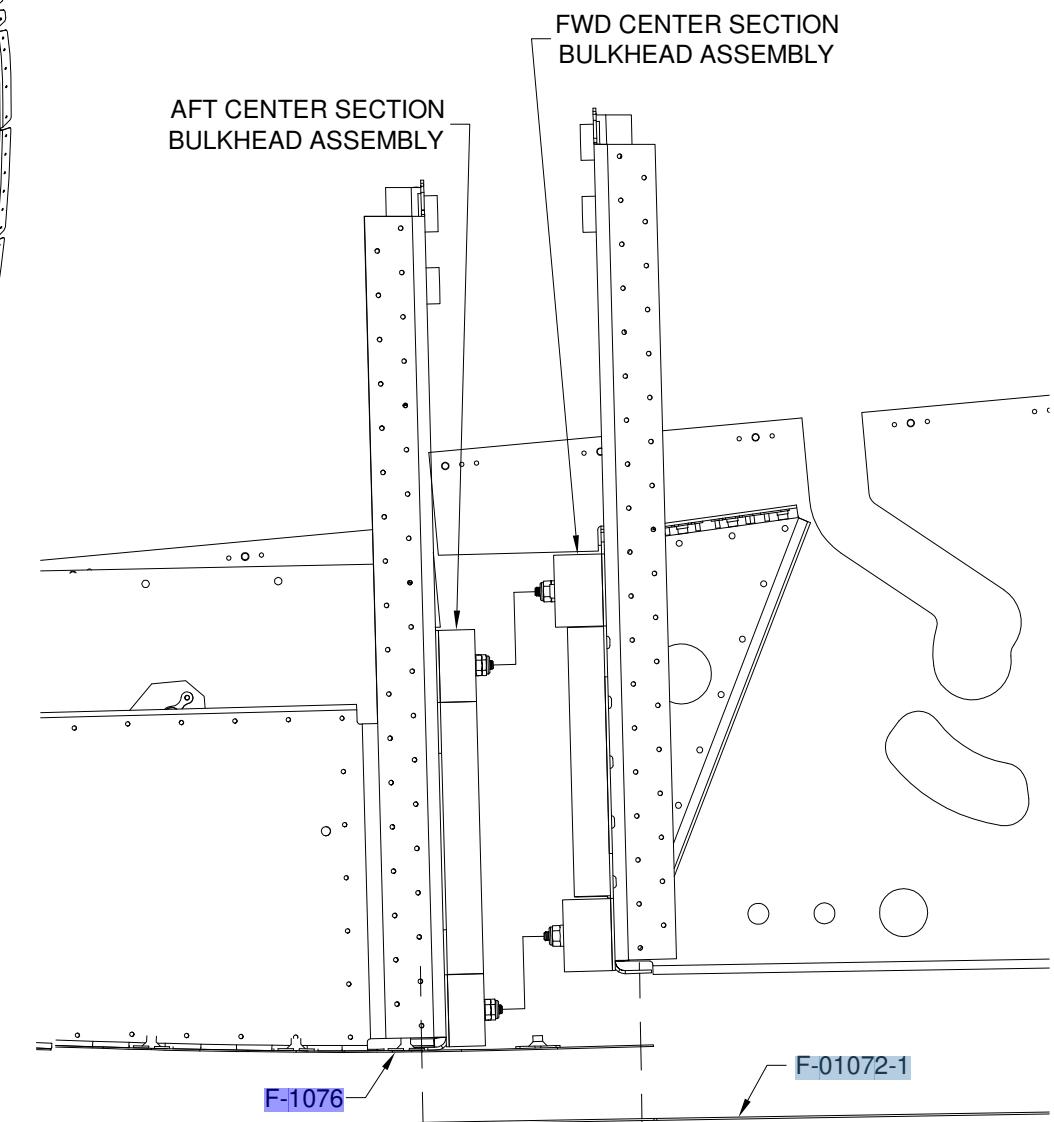


**FIGURE 1: MATE MID FUSELAGE ASSEMBLY  
TO FORWARD FUSELAGE ASSEMBLY**

Step 2: Final-Drill #40 the holes common to the F-1076 Center Bottom Skin, Fwd Center Section Bulkhead Assembly, and F-01072-1 Fwd Fuse Bottom Skin. Note that at four locations the aft tabs of the F-1084AL & R Systems Brackets will have been final-drilled.

Final-Drill #40 the holes common to the fwd fuse bottom skin, center bottom skin, and Aft Center Section Bulkhead Assembly.

Final-Drill #40 the holes common to the F-01004KL-1 & FR-1 Center Section Side Plates to the Aft Center Section Bulkhead Assembly and Fwd Center Section Bulkhead Assembly.



**FIGURE 2: SKIN OVERLAP DETAIL**



**Step 1:** Remove the F-01004K-L-1 & R-1 Center Section Side Plates.

Machine countersink the holes on the bottom flange of the center section side plates to fit a piece of .040 skin that has been dimpled for an AN426AD3 rivet.

Deburr all final-drilled holes in the center section side plates.

**Step 2:** Remove the F-1084A-L & R Systems Brackets.

Deburr all holes and edges.

Dimple all rivet holes EXCEPT the single hole in each of the "tabs" at each end of the systems brackets.

**Step 3:** Un-cleco the F-1076 Center Bottom Skin, Fwd Center Section Bulkhead Assembly, Aft Center Section Bulkhead Assembly, and F-01072-1 Fwd Fuselage Bottom Skin.

Separate the Mid Fuselage Assembly from the Forward Fuselage Assembly.

**Step 4:** Deburr and dimple the holes along the forward edge of the F-1076 Center Bottom Skin.

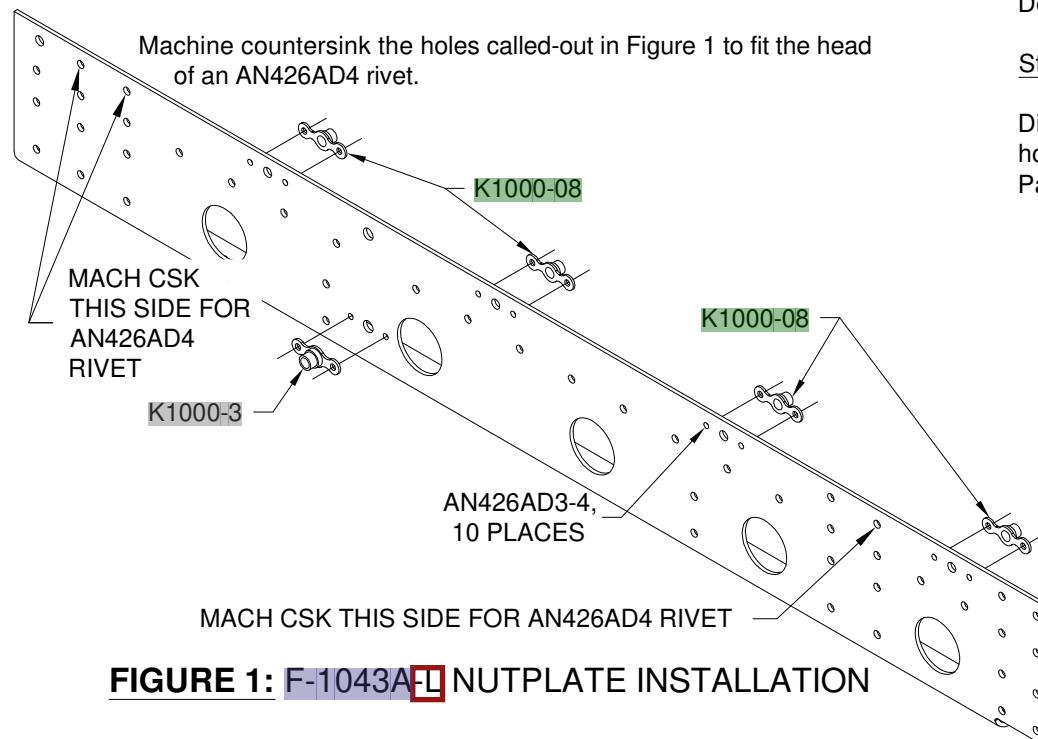
**Step 5:** Remove the Fwd Center Section Bulkhead Assembly from the F-1048 Fwd Fuselage Ribs.

Machine countersink the holes on the bottom flange of the Fwd Center Section Bulkhead Assembly to fit a piece of .032 skin that has been dimpled for an AN426AD3 rivet.

Deburr all holes in the Fwd Center Section Bulkhead Assembly that have been final-drilled.

**Step 6:** Remove the F-1043A-L & R Fwd Fuselage Bulkheads.

Machine countersink the holes on the bottom flange of the fwd fuselage bulkheads to fit a piece of .040 skin that has been dimpled for an AN426AD3 rivet.



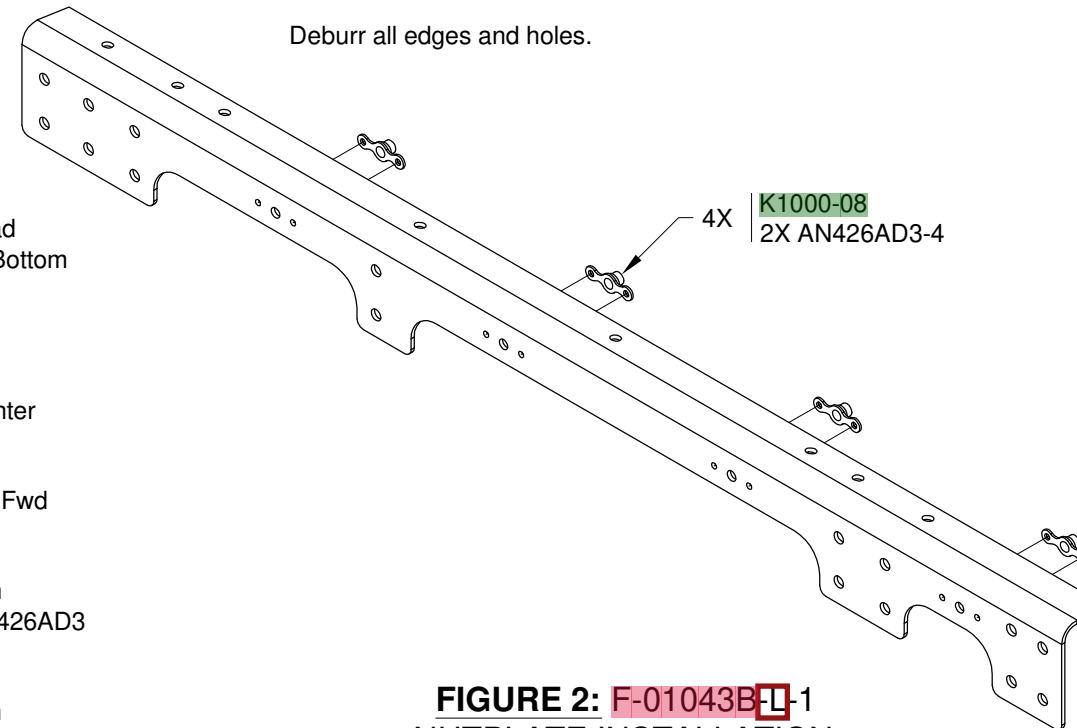
**FIGURE 1:** F-1043A-L NUTPLATE INSTALLATION

**Step 6 (continued):** Machine countersink the nutplate attach holes in the web of the fwd fuselage bulkheads to fit the head of an AN426AD3 rivet. See Figure 1.

Deburr all holes and edges.

**Step 7:** Locate the F-01043B-L-1 & R-1 Fwd Fuselage Bulkheads.

Machine countersink the nutplate attach holes in the web of the fwd fuselage bulkheads to fit the head of an AN426AD3 rivet. See Figure 2.



**FIGURE 2:** F-01043B-L-1 NUTPLATE INSTALLATION

**Step 8:** Remove the F-1049A-L & R, F-1049B-L & -R, F-01049C-L-1 & -R-1, and F-1049D-L & R Fwd Fuselage Floor Ribs. See Page 28-5, Figure 2.

Deburr all holes and edges.

**Step 9:** Dimple all of the #40 holes in all of the F-1049 Fwd Fuselage Floor Ribs.

Dimple all of the #30 holes in all of the F-1049 Fwd Fuselage Floor Ribs EXCEPT the holes in the forward and aft tabs and the most forward hole in the upper flange. See Page 28-5, Figure 2.

**Step 10:** Remove the F-01072-1 Fwd Bottom Skin from the F-1048 Fwd Fuselage Ribs. See Page 28-6, Figure 3.

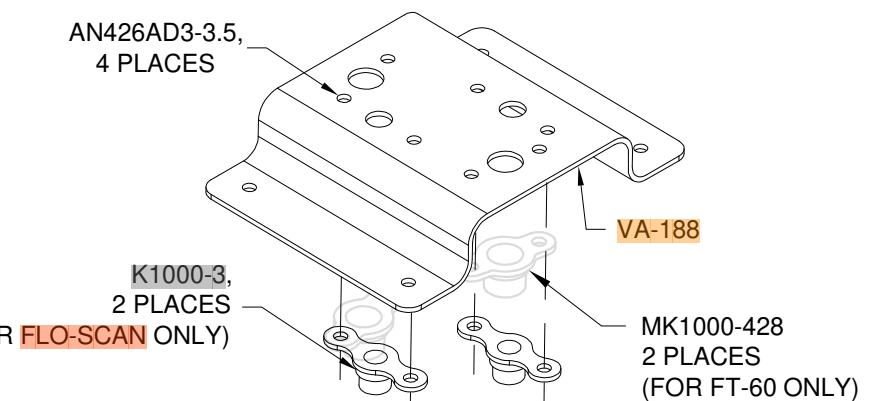
Remove the F-1048D Fuel Filter Brackets and VA-188 Flo-Scan Mount Bracket from the fwd bottom skin.

Final-Drill #40 the nutplate attach holes in the flo-scan mount bracket. Final-Drill #12 and 1/4 the nutplate screw holes in the flo-scan mount bracket. See Figure 3.

Machine countersink the fuel filter brackets to fit a piece of .040 skin dimpled for an AN426AD3 rivet.

Deburr holes and edges of the fuel filter brackets and flo-scan mount bracket

Dimple the rivet holes in the flo-scan mount bracket. See Figure 3.



**FIGURE 3:** FLO-SCAN MOUNT BRACKET NUTPLATE INSTALLATION

**Step 11:** Deburr holes and edges of the F-01072-1 Fwd Bottom Skin.

Dimple all holes.

**Step 12:** Prime the following parts if/as desired:

F-01004K-L-1 & R-1 Center Section Side Plates

F-1043A-L & R and F-1043B-L-1 & R-1 Fwd Fuselage Bulkheads

F-01043D-L-1 & R-1 Cover Panels

F-1048D Fuel Filter Brackets

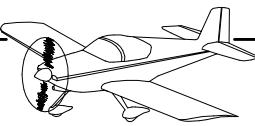
F-1049A-L & R, F-1049B-L & R, F-01049C-L-1 & R-1, and F-1049D-L & R Fwd Fuselage Floor Ribs

F-01050F-L-1 & R-1 Fwd Cabin Floor Panels

F-01072-1 Fwd Bottom Skin

F-1084A-L & R and F-1084B Systems Brackets

VA-188 Flo-Scan Mount Bracket



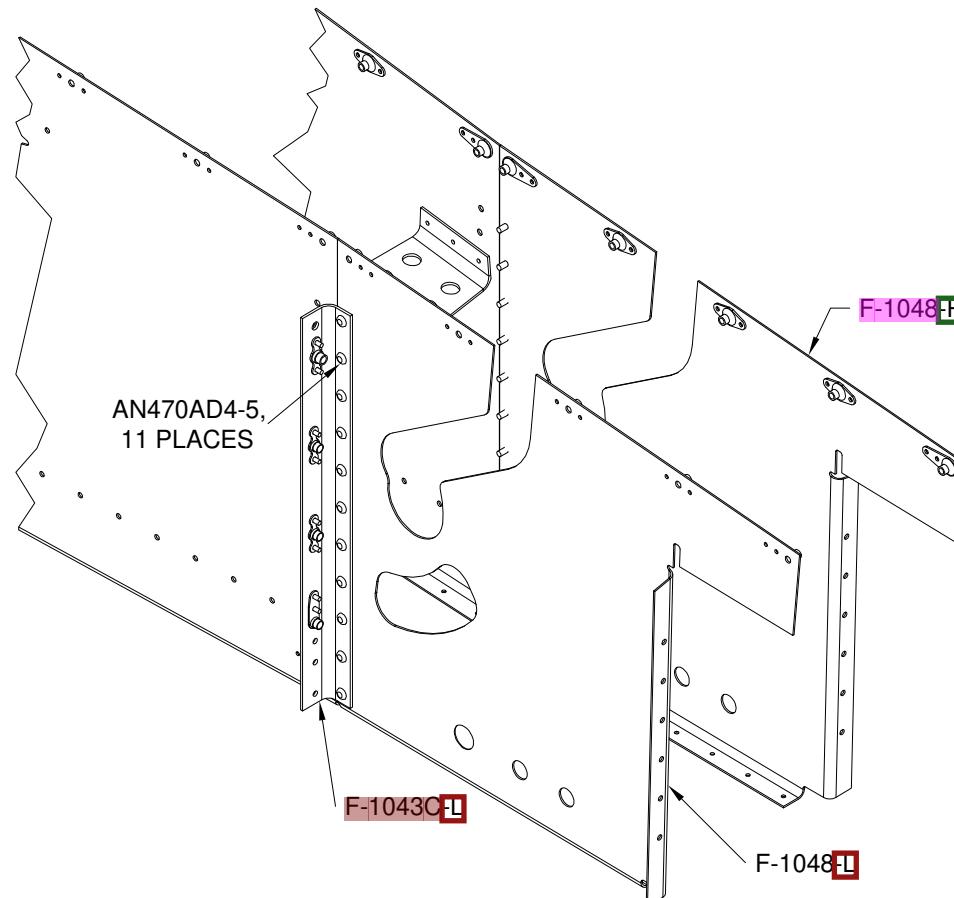
Step 1: Dimple the nutplates that will be installed to the VA-188 Flo Scan Mount Bracket. Rivet nutplates to the flo scan mount bracket as shown on Page 28-10, Figure 3.

Step 2: Rivet nutplates to the F-1043A-L & R Fwd Fuselage Bulkheads as shown on Page 28-10, Figure 1.

Step 3: Rivet nutplates to the F-01043B-L-1 & FR-1 Fwd Fuselage Bulkheads as shown on Page 28-10, Figure 2.

Step 4: Rivet the F-1043C-L Attach Angle to the F-1048-L Forward Fuselage Rib as shown in Figure 1.

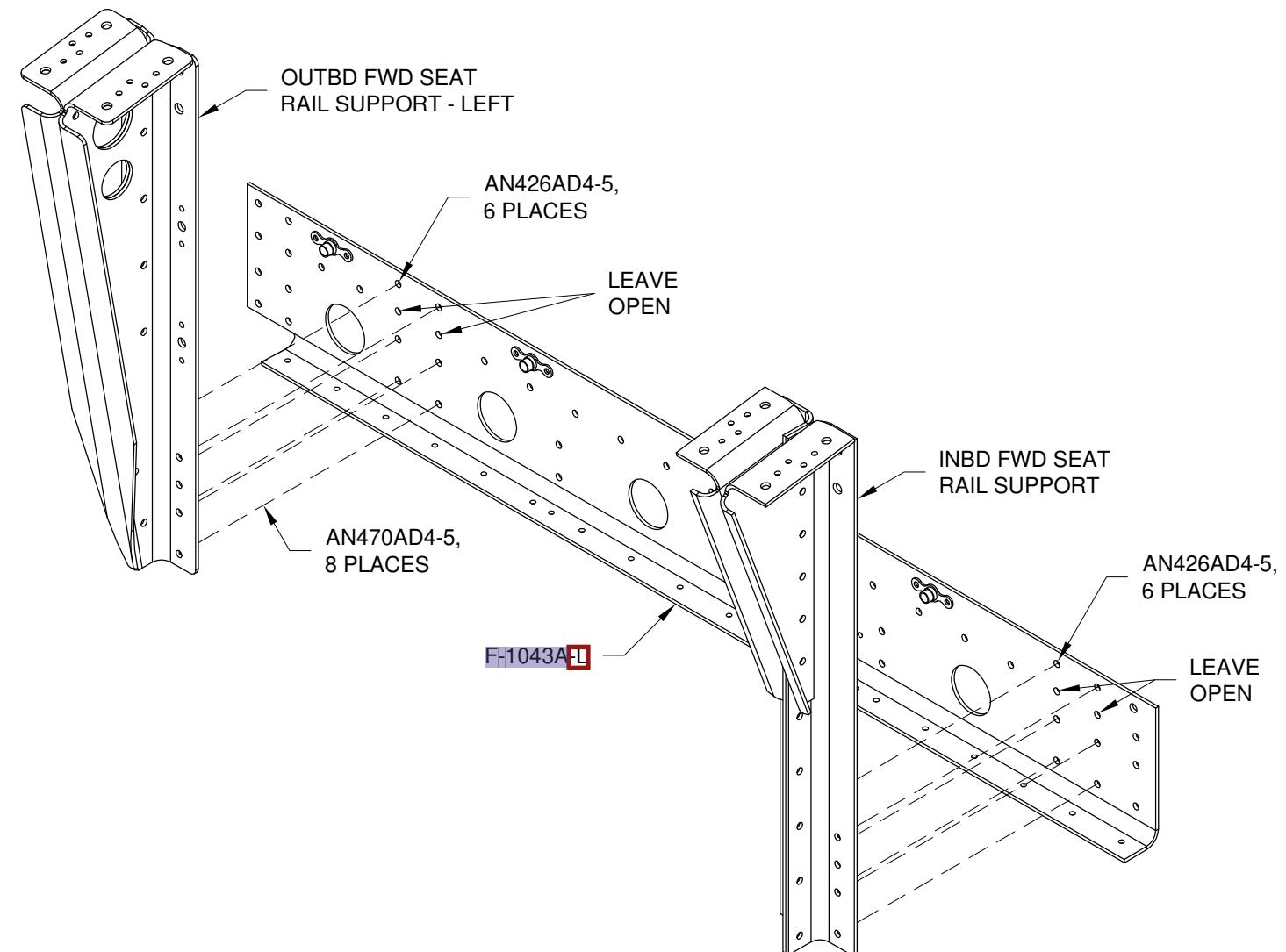
Similarly, rivet the F-1043C-R Attach Angle to the F-1048-R Forward Fuselage Rib.



**FIGURE 1:** RIVET F-1043C-L & R TO F-1048-L & R

Step 5: Rivet the Outbd Fwd Seat Rail Support - Left and one of the Inbd Fwd Seat Rail Supports to the F-1043A-L Fwd Fuselage Bulkhead as shown in Figure 2.

Similarly, rivet the Outbd Fwd Seat Rail Support - Right and the remaining Inbd Fwd Seat Rail Support to the F-1043A-R Fwd Fuselage Bulkhead.



**FIGURE 2:** RIVET FWD SEAT RAIL SUPPORTS TO FWD FUSELAGE BULKHEAD

Step 6: Rivet the F-1049A-L & R, F-1049B-L & R, F-01049C-L-1 & FR-1, F-1049D-L & R Fwd Fuselage Floor Ribs, two F-1048D Fuel Filter Brackets, and VA-188 Flo-Scan Mount Bracket to the F-01072-1 Fwd Fuse Bottom Skin as shown on Page 28-5, Figure 2. See Page 28-12, Figure 2 for rivet call-outs.

Dimple the forward tabs of the fwd fuselage floor ribs.

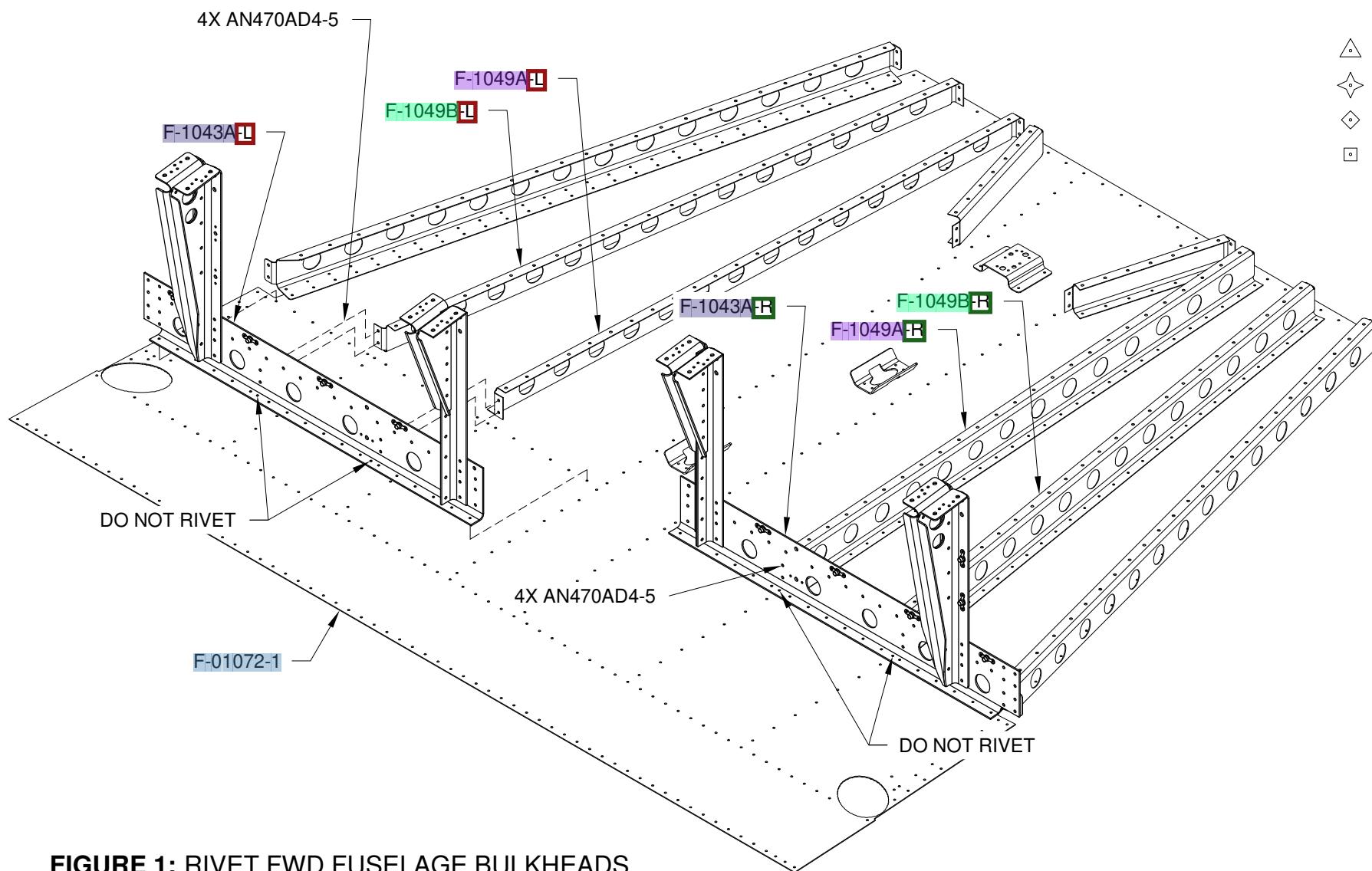


Step 1: Rivet the F-1043A-L and F-1043A-R Fwd Fuselage Bulkheads to the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 1. See Figure 2 for rivet call-outs.

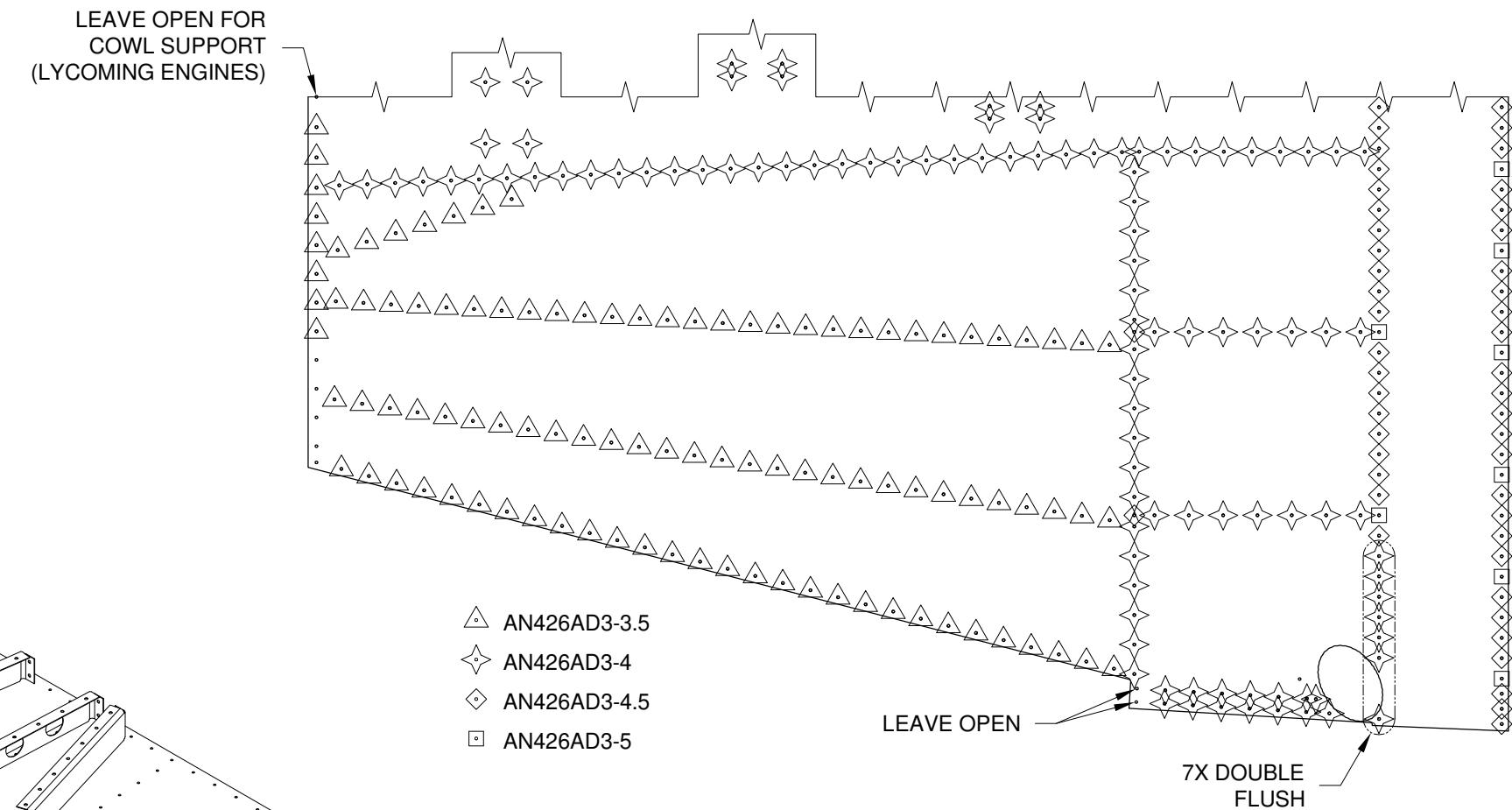
Note that Figure 1 calls out "DO NOT RIVET" in four locations.

Step 2: Rivet the aft tabs of the F-1049A-L and F-1049B-L Fwd Fuselage Floor Ribs to the F-1043A-L Fwd Fuselage Bulkhead as shown in Figure 1.

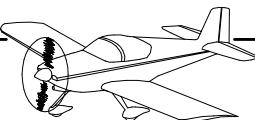
Rivet the aft tabs of the F-1049A-R and F-1049B-R Fwd Fuselage Floor Ribs to the F-1043A-R Fwd Fuselage Bulkhead as shown in Figure 1.



**FIGURE 1: RIVET FWD FUSELAGE BULKHEADS TO FWD FUSE BOTTOM SKIN**



**FIGURE 2: FWD FUSE BOTTOM SKIN RIVET DIAGRAM**



Step 1: Rivet the F-1084A-L and F-1084A-R Systems Brackets to the F-01072-1 Fwd Fuse Bottom Skin and F-1043A-L and F-1043A-R Fwd Fuselage Bulkheads as shown on Page 28-6, Figures 1 and 3.

Leave the aft three holes in each systems bracket unriveted for now. (These rivets will be installed after mating the Forward Fuselage and Mid Fuselage Assemblies.)

See Page 28-12, Figure 2 for rivet call-outs.

Step 2: It is recommended to use a thin layer of Pro-Seal between the firewall flanges and the fuselage skins. Apply Pro-Seal to the lower flange of the F-1001A Firewall Bulkhead then cleco the Firewall Assembly to the F-01072-1 Fwd Fuse Bottom Skin as shown in Figure 1.

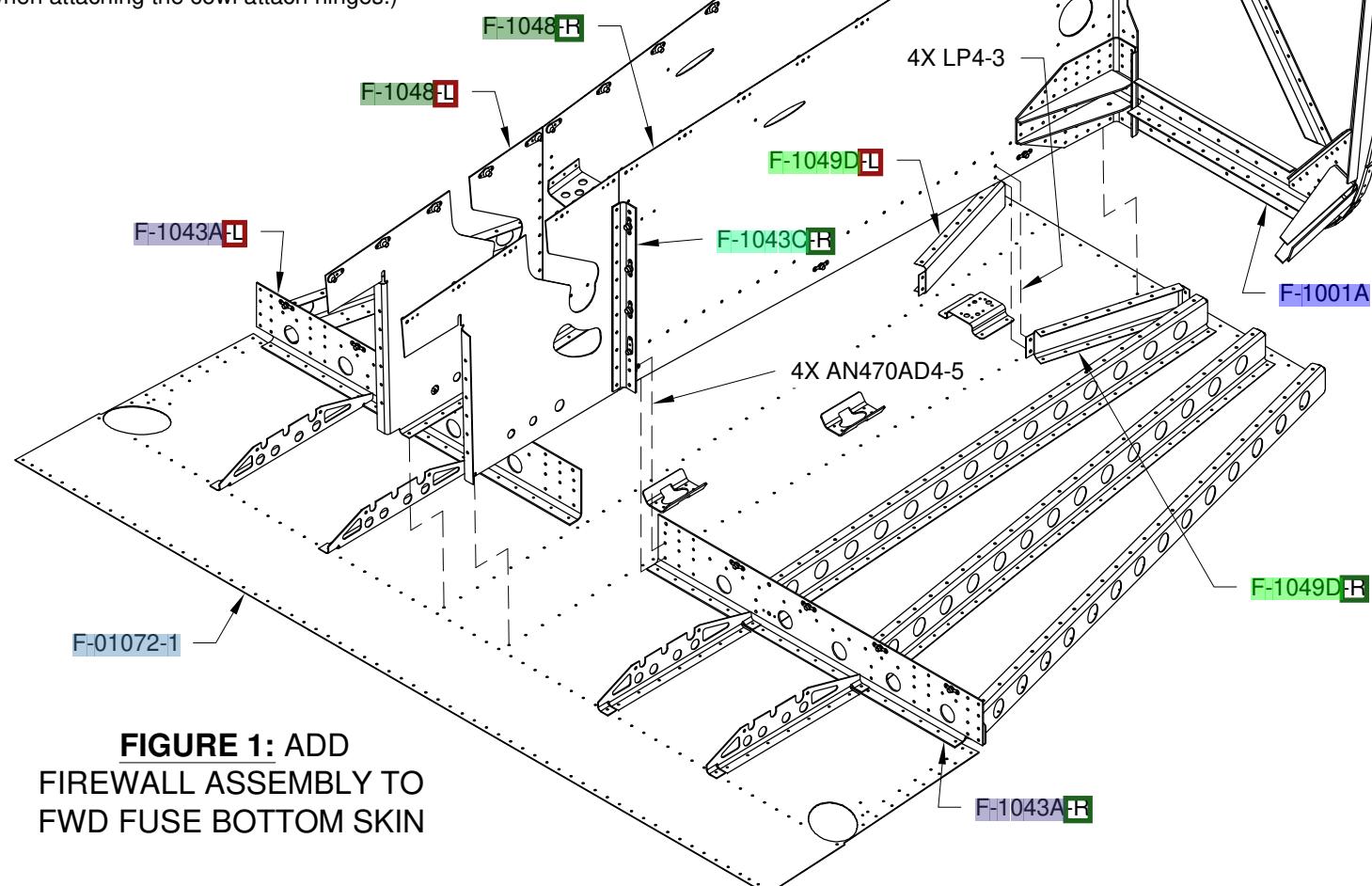
Rivet the flanges of the F-1048-L and F-1048-R Fwd Fuselage Ribs to the fwd fuse bottom skin. Leave the aft three holes in each fwd fuselage rib unriveted for now. (These rivets will be installed after mating the Forward Fuselage and Mid Fuselage Assemblies.) See Page 28-12, Figure 2 for rivet call-outs.

Rivet the F-1043C-R Attach Angle to the F-1043A-R Fwd Fuselage Bulkhead as shown in Figure 1. Rivet the F-1043C-L Attach Angle to the F-1043A-L Fwd Fuselage Bulkhead.

Rivet the aft tabs of the F-1049D-L and F-1049D-R Fwd Fuselage Floor Ribs to the webs of the fwd fuselage ribs as shown in Figure 1.

Rivet the forward tabs of all the F-1049 Fwd Fuselage Floor Ribs to the firewall bulkhead using the rivets called-out on Page 27-5, Figure 1.

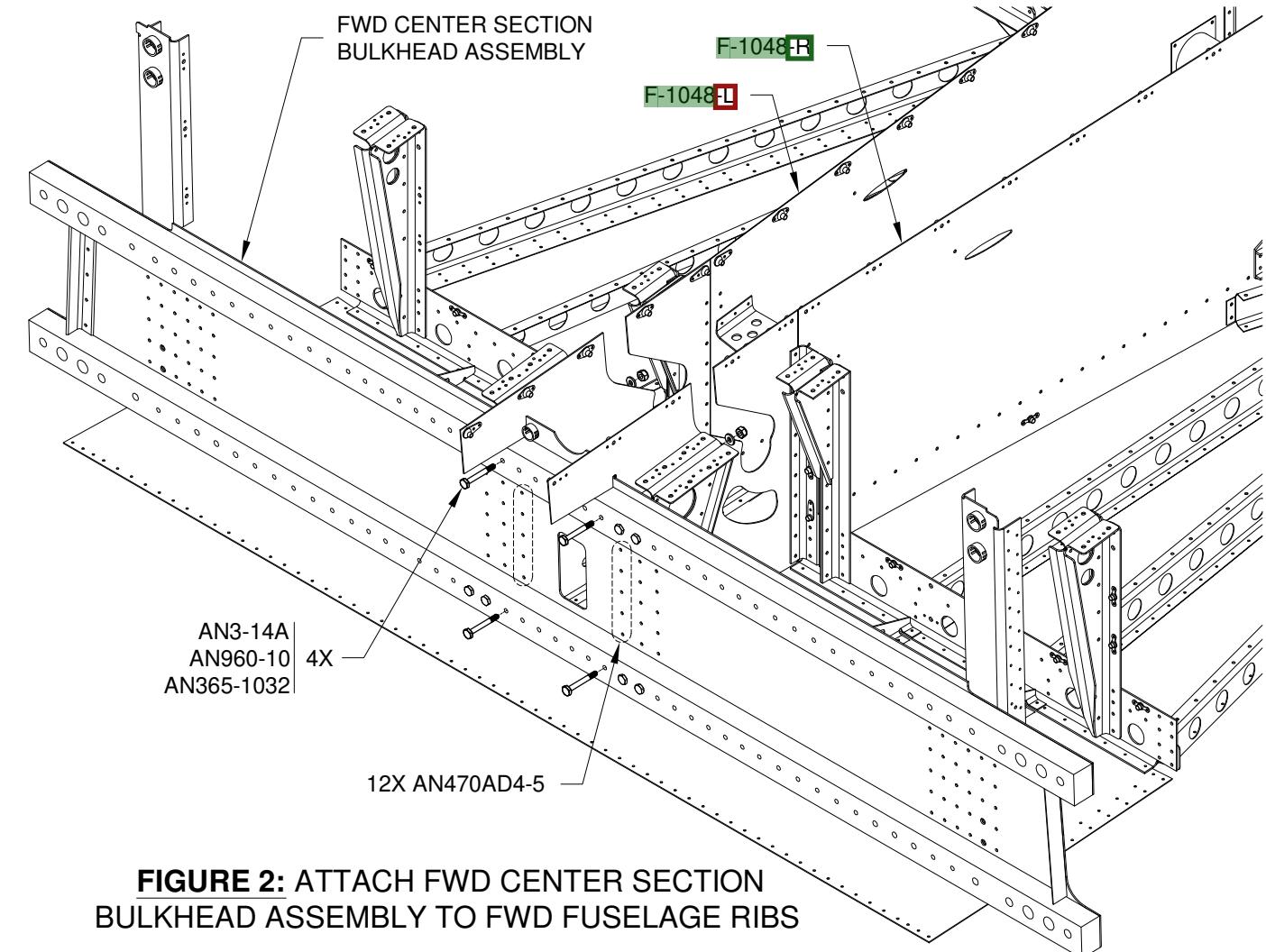
Rivet the lower flange of the firewall bulkhead to the fwd fuselage bottom skin EXCEPT leave the five most outboard holes on each side unriveted for now. (These rivets will be installed later when attaching the cowl attach hinges.)



**FIGURE 1: ADD FIREWALL ASSEMBLY TO FWD FUSE BOTTOM SKIN**

Step 3: Bolt the Fwd Center Section Bulkhead Assembly to the F-1048-L & R Fwd Fuselage Ribs as shown in Figure 2.

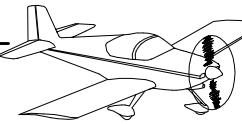
Rivet the web of the Fwd Center Section Bulkhead Assembly to the fwd fuselage ribs as shown in Figure 2.



**FIGURE 2: ATTACH FWD CENTER SECTION BULKHEAD ASSEMBLY TO FWD FUSELAGE RIBS**

Step 4: Mate the Mid Fuselage Assembly to the Fwd Fuselage Assembly as shown on Page 28-9, Figures 1 & 2.

Inserting bolts into the holes in the Fwd and Aft Center Section Bulkhead Assemblies and using the spacers between the Fwd and Aft Center Section Bulkhead Assemblies ensures proper alignment of the center section bulkhead assemblies.



Step 1: Rivet the bottom flange of the Aft Center Section Bulkhead Assembly to the F-1076 Center Bottom Skin and F-01072-1 Fwd Fuse Bottom Skin. See Page 28-12, Figure 2 for rivet call-outs.

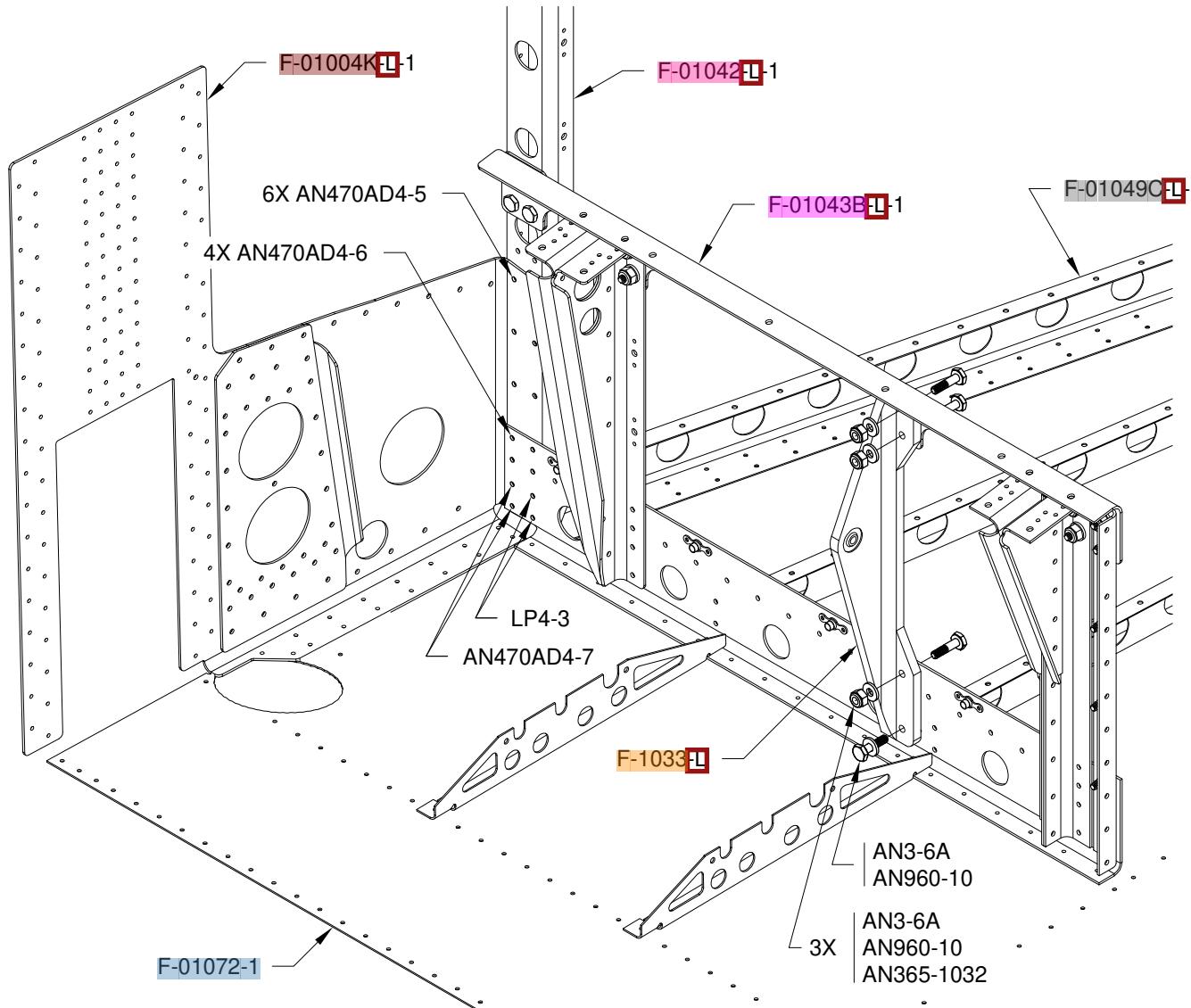
Step 2: Rivet the open holes in the aft ends of the F-1048 Fwd Fuselage Ribs and F-1084A-L & R Systems Brackets to the F-01072-1 Fwd Fuse Bottom Skin. See Page 28-12, Figure 2 for rivet call-outs.

Step 3: Rivet the bottom flange of the Fwd Center Section Bulkhead Assembly to the F-1076 Center Bottom Skin and F-01072-1 Fwd Fuse Bottom Skin. See Page 28-12, Figure 2 for rivet call-outs.

Step 4: Cleco the F-01004K-L-1 & F-1 Center Section Side Plates to the Fwd and Aft Center Section Bulkhead Assemblies. Cleco the center section side plates to the F-01072-1 Fwd Fuse Bottom Skin. See Page 28-9, Figure 1.

Note that the forward flange of the center section side plates are FORWARD of the F-1043A-L & R Fwd Fuselage Bulkheads as shown on Page 28-4, Figure 2.

Step 5: Cleco the F-01042-L-1 & F-1 Bulkhead Side Channels to the F-01004K-L-1 & -R-1 Center Section Side Plates and F-1043A-L & R Fwd Fuselage Bulkheads as shown in Figure 1 and Page 28-4, Figure 2.



**FIGURE 1: INSTALL BULKHEAD SIDE CHANNEL, FWD FUSELAGE BULKHEAD, AND CONTROL COLUMN MOUNT  
(SOME PARTS NOT SHOWN FOR CLARITY)**

Step 6: Bolt the F-01043B-L-1 & F-1 Fwd Fuselage Bulkheads to the F-1043C-L & R Attach Angles, Inbd Fwd Seat Rail Supports, Outbd Fwd Seat Rail Supports, and F-01042-L-1 & F-1 Bulkhead Side Channels as shown in Figure 1 and Page 28-4, Figure 2.

Step 7: Bolt the F-1033-L Control Column Mount to the F-1043A-L and F-01043B-L-1 Fwd Fuselage Bulkheads as shown in Figure 1.

Bolt the F-1033-R Control Column Mount to the F-1043A-R and F-01043B-R-1 Fwd Fuselage Bulkheads.

Step 8: Rivet the bottom flange of the F-01004K-L-1 & F-1 Center Section Side Plates to the F-01072-1 Fwd Fuse Bottom Skin. See Page 28-12, Figure 2 for rivet call-outs.

Step 9: Blind rivet the F-1043A-L Fwd Fuselage Bulkhead, forward flange of the F-01004K-L-1 Center Section Side Plate, and F-01042-L-1 Bulkhead Side Channel as shown in Figure 1.

Repeat this step for the right side of the aircraft.

Step 10: Rivet the F-1043A-L Fwd Fuselage Bulkhead, forward flange of the F-01004K-L-1 Center Section Side Plate, F-01042-L-1 Bulkhead Side Channel, and the aft tab of the F-01049C-L-1 Fwd Fuselage Floor Rib as shown in Figure 1. See Page 28-6, Figure 1.

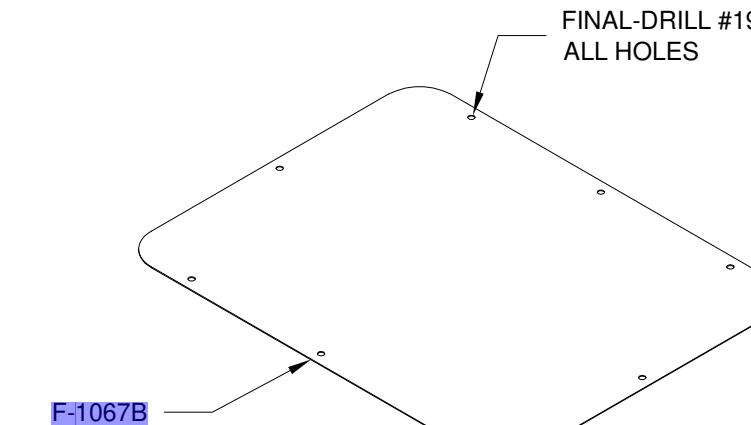
Repeat this step for the right side of the aircraft.

Step 11: Rivet the forward flange of the F-01004K-L-1 Center Section Side Plate, and F-01042-L-1 Bulkhead Side Channel as shown in Figure 1.

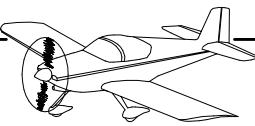
Repeat this step for the right side of the aircraft.

Step 12: Final-Drill #19 all the holes in the F-1067B Seat Floor Covers as shown in Figure 2.

Deburr the holes and edges of the seat floor covers.



**FIGURE 2: SEAT FLOOR COVER**



**NOTE:** Two Seat Floor Assemblies are created on this page, one left and one right. The right is a mirror image of what is shown in Figure 1.

Step 1: Machine countersink the nutplate attach holes in the F-01067A-1 Seat Floors and F-01067D-1 Seat Floor Attach Strips to fit the head of an AN426AD3 rivet. See Figure 1.

Step 2: Separate the F-01067C-1 Seat Floor Angle.

Step 3: Machine countersink the holes in the F-01067A-1 Seat Floors that are common to the F-01067D-1 Seat Floor Attach Strips and F-01067C-1 Seat Floor Angles to fit the head of an AN426AD3 rivet. See Figure 1.

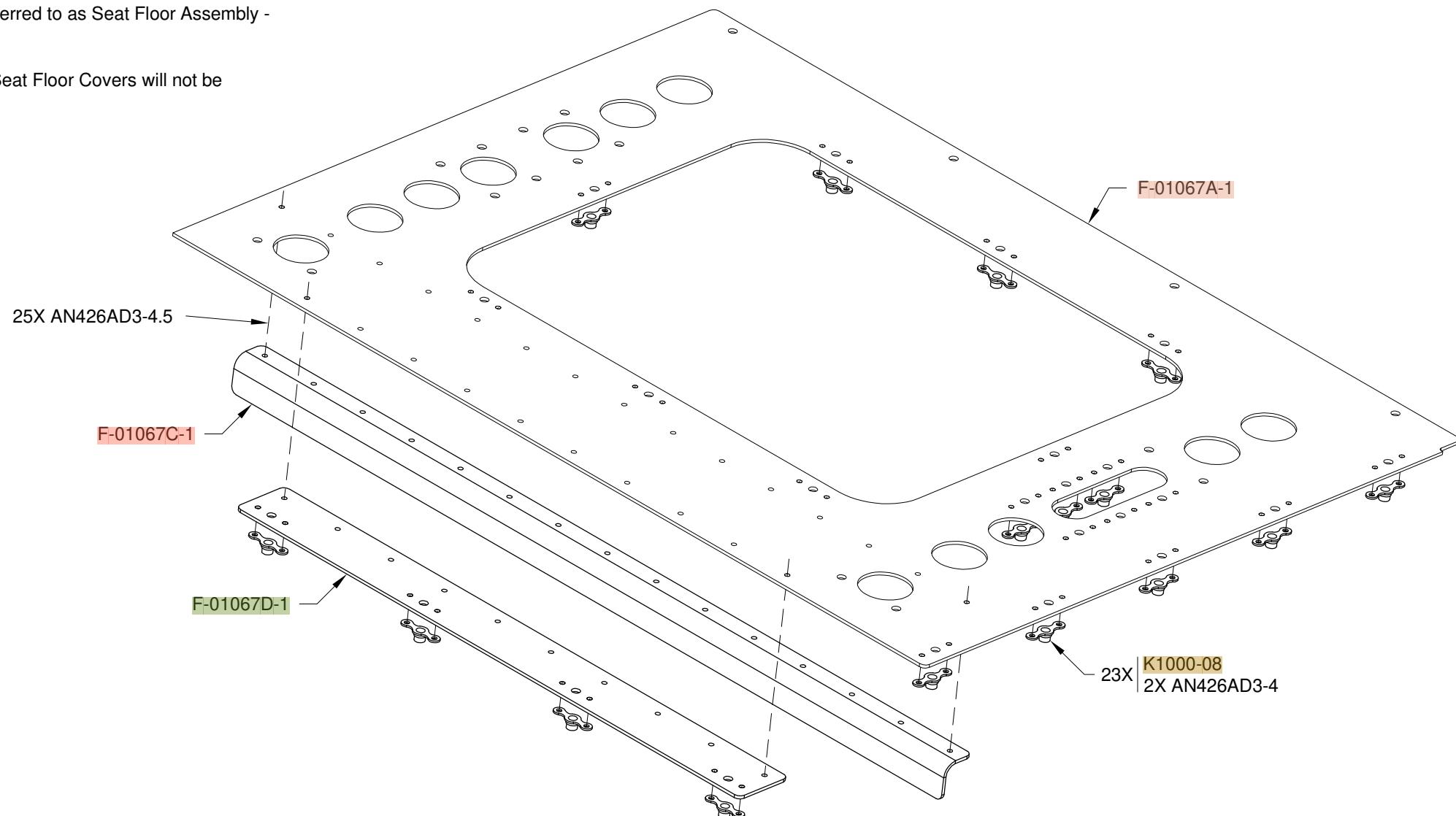
Step 4: Prime the parts if/as desired.

Step 5: Rivet the F-01067C-1 Seat Floor Angles and F-01067D-1 Seat Floor Attach Strips to the F-01067A-1 Seat Floor as shown in Figure 1.

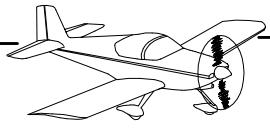
Rivet nutplates to the seat floors and seat floor attach strips as shown in Figure 1.

Step 6: The two subassemblies created on this page will subsequently be referred to as Seat Floor Assembly - Left and Seat Floor Assembly - Right.

The Seat Floor Assembly - Left, Seat Floor Assembly - Right, and F-1067B Seat Floor Covers will not be installed at this time. Set them aside until called for during later sections.



**FIGURE 1: SEAT FLOOR ASSEMBLY - LEFT**  
(SEAT FLOOR ASSEMBLY - RIGHT IS A MIRROR IMAGE OF WHAT IS SHOWN)



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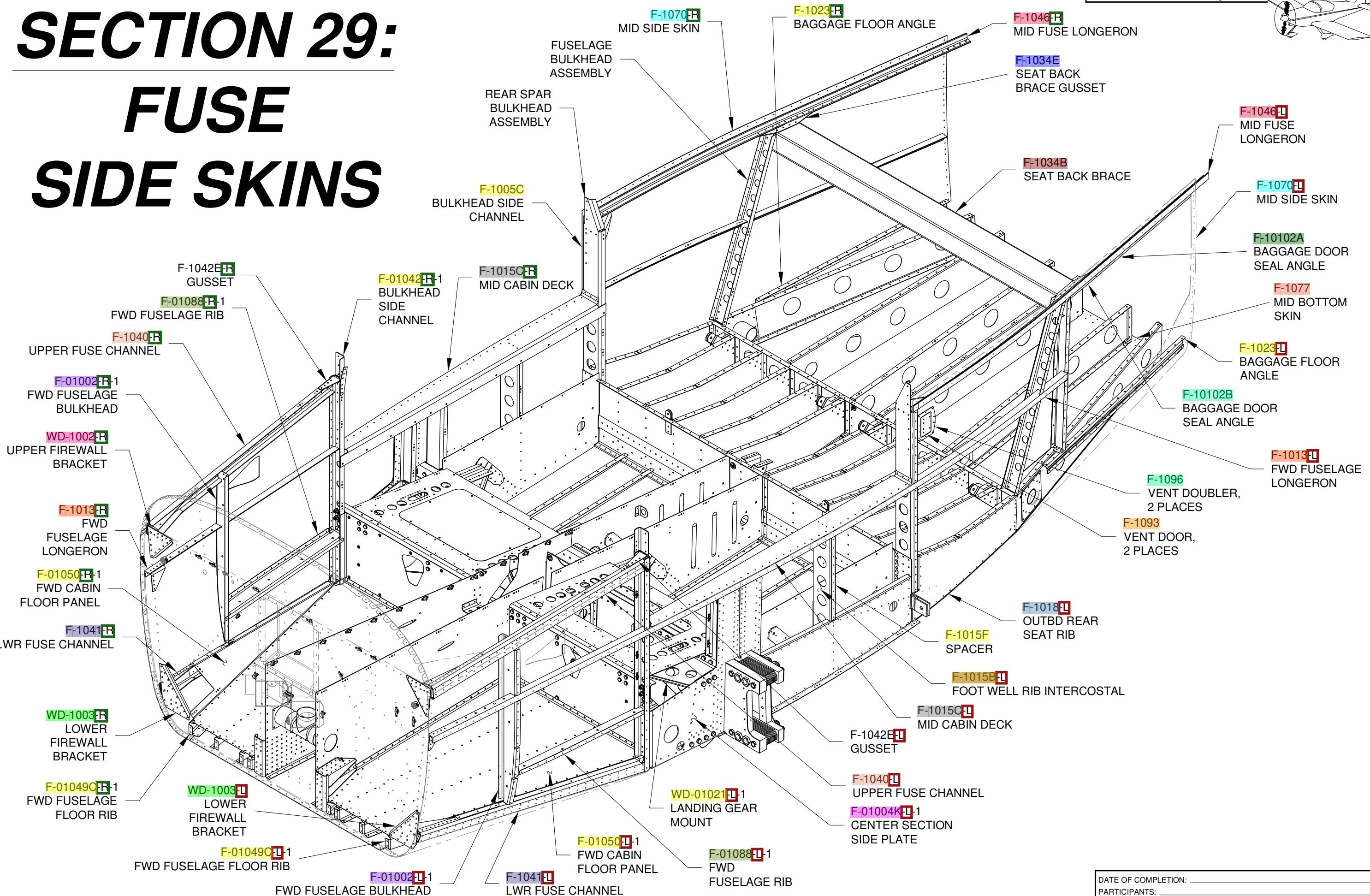
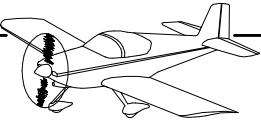
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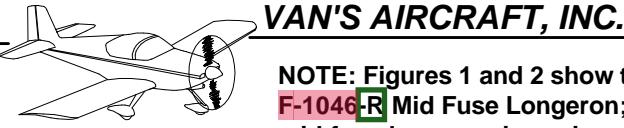
# **SECTION 29:**

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## **FUSE**

## **SIDE SKINS**





**NOTE:** Figures 1 and 2 show the F-1046-L Mid Fuse Longeron; the left mid fuse longeron is a mirror of the right.

Step 1: Cut the F-1046-L and F-1046-R Mid Fuse Longerons from AA6-125X3/4X3/4 per the dimensions in Figure 1.

Step 2: Mark the skin rivet line on both the F-1046-L and F-1046-R Mid Fuse Longerons as shown in Figure 1.

**NOTE:** The F-1046B Longeron Bending Template is used for both the F-1046 Mid Fuse and F-1013 Fwd Fuselage Longerons. Mark it as shown in Figure 2 to eliminate future confusion. The markings on the other side of the template are shown on Page 29-3, Figure 1.

Step 3: Place one of the ends of the F-1046-R Mid Fuse Longeron in a padded vise and prelude the free end. Using a rubber mallet, firmly strike it adjacent to the vise to produce a bend. Repeat this process at one inch intervals to produce a curve that matches the F-1046B Longeron Bending Template within a sixteenth of an inch. See Figure 3.

Check the curve often to prevent overbending. The mid fuse longeron can be placed in a six-inch vise without removing any of the bend, so it is easy to add more curve later. Remove curve by clamping the mid fuse longeron at the required point and pulling back slightly.

Check that the mid fuse longeron does not bend out of plane vertically as it is being bent in the horizontal direction. If this occurs, rotate the mid fuse longeron 90°, clamp it in a vise, bend it back straight with your hands, then recheck the curve with the template.

Repeat this step to curve the F-1046-L Mid Fuse Longeron.

Step 4: Flush the side edge of the F-1046B Longeron Bending Template with the vertex of the F-1046-R Mid Fuse Longeron (see Figure 2 for the proper orientation of both parts), flush the aft edge of the longeron bending template with the aft end of the mid fuse longeron, then clamp the parts together. Match-Drill #30 the mid fuse longeron using the longeron bending template as a drill guide (do not match-drill the holes marked "F-1046-L only" in Figure 3). Take care when drilling to ensure that the drill is perpendicular to the longeron bending template. Trim the forward end of the mid fuse longeron flush with the edge of the longeron bending template. Flip the longeron bending template over and repeat this step to match-drill the F-1046-L Mid Fuse Longeron.

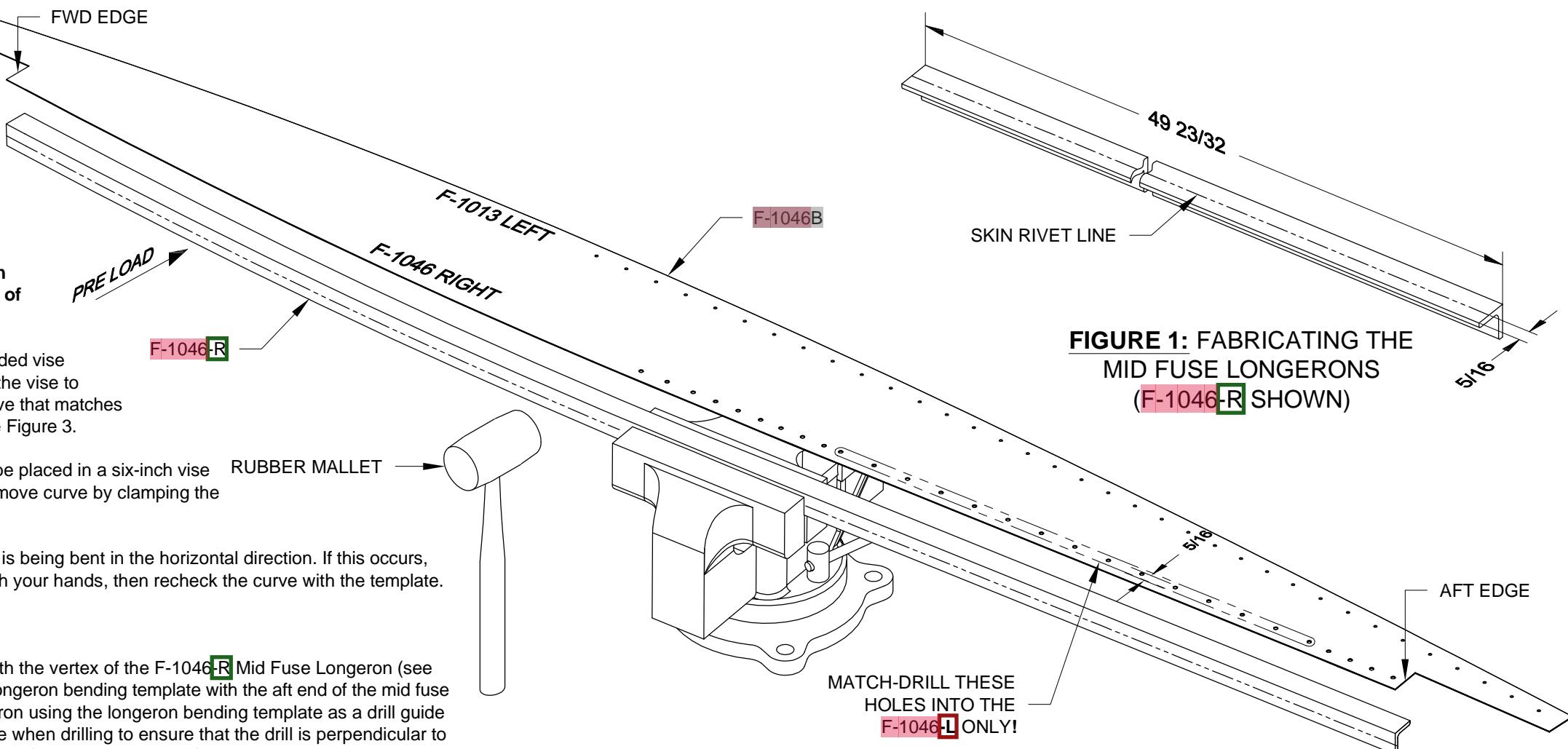
Step 5: Deburr the F-1046-L and F-1046-R Mid Fuse Longerons.

Step 6: Cut the F-1013-L and F-1013-R Fwd Fuselage Longerons from AA6-125X3/4X3/4 per the overall length dimensions in Figure 3.

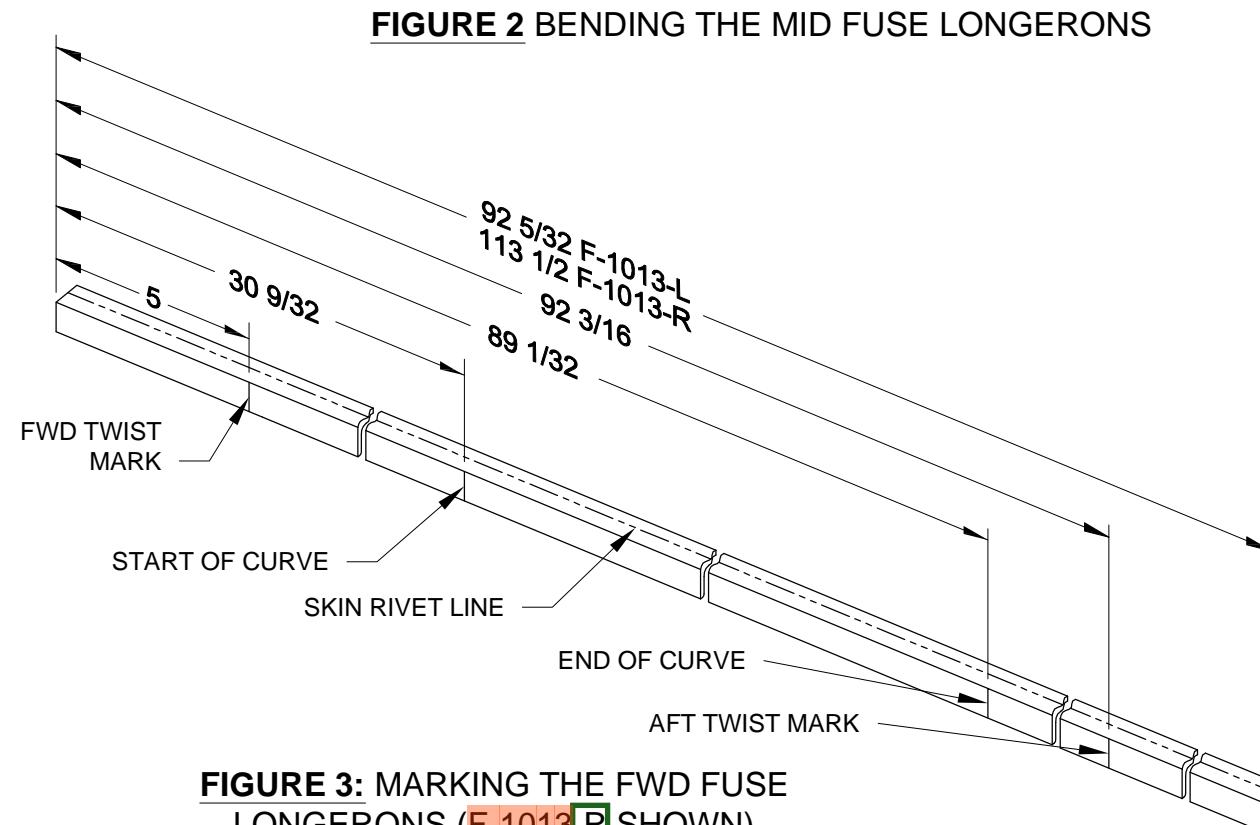
**NOTE:** Figures 3 shows marks on the flanges of the F-1013-R Fwd Fuselage Longeron which are made in Step 7. The marks on the F-1013-L Fwd Fuselage Longeron are made on the opposite flanges.

Step 7: Mark the F-1013-L and F-1013-R Fwd Fuselage Longerons at the four locations shown in Figure 3.

Mark the skin rivet line, shown in Figure 3, on both fwd fuselage longerons.



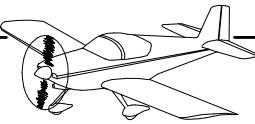
**FIGURE 1: FABRICATING THE MID FUSE LONGERONS (F-1046-R SHOWN)**



**FIGURE 2 BENDING THE MID FUSE LONGERONS**



**FIGURE 3: MARKING THE FWD FUSE LONGERONS (F-1013-R SHOWN)**



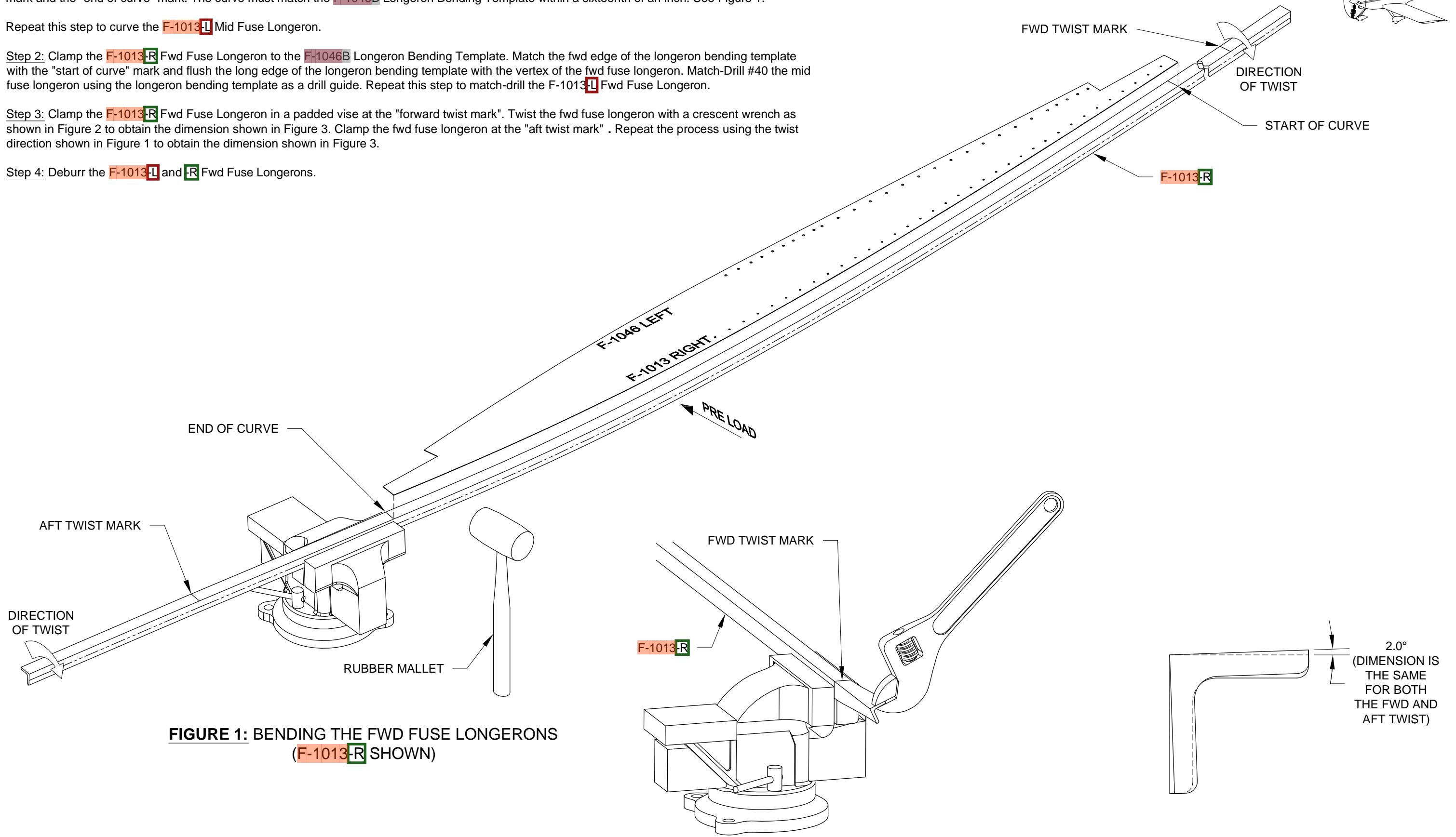
Step 1: Using the technique employed to curve the F-1046 Mid Fuse Longerons, curve the F-1013-R Fwd Fuse Longeron between the "start of curve" mark and the "end of curve" mark. The curve must match the F-1046B Longeron Bending Template within a sixteenth of an inch. See Figure 1.

Repeat this step to curve the F-1013-L Mid Fuse Longeron.

Step 2: Clamp the F-1013-R Fwd Fuse Longeron to the F-1046B Longeron Bending Template. Match the fwd edge of the longeron bending template with the "start of curve" mark and flush the long edge of the longeron bending template with the vertex of the fwd fuse longeron. Match-Drill #40 the mid fuse longeron using the longeron bending template as a drill guide. Repeat this step to match-drill the F-1013-L Fwd Fuse Longeron.

Step 3: Clamp the F-1013-R Fwd Fuse Longeron in a padded vise at the "forward twist mark". Twist the fwd fuse longeron with a crescent wrench as shown in Figure 2 to obtain the dimension shown in Figure 3. Clamp the fwd fuse longeron at the "aft twist mark" . Repeat the process using the twist direction shown in Figure 1 to obtain the dimension shown in Figure 3.

Step 4: Deburr the F-1013-L and F-1013-R Fwd Fuse Longerons.



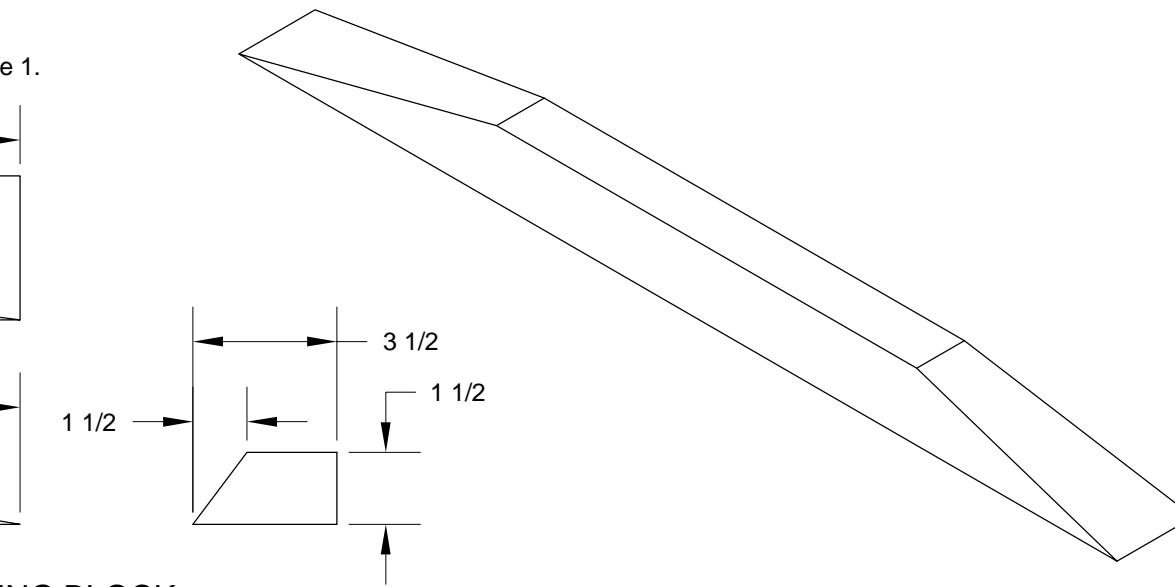
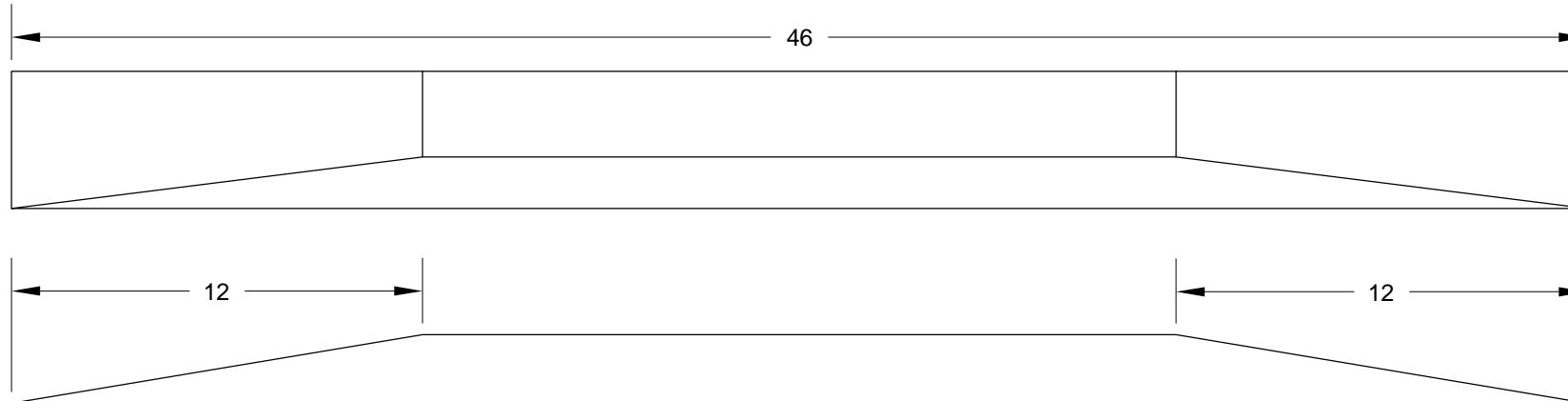
**FIGURE 1: BENDING THE FWD FUSE LONGERONS  
(F-1013-R SHOWN)**

**FIGURE 2: TWISTING THE FWD FUSE LONGERONS  
(FORWARD END OF F-1013-R SHOWN)**

**FIGURE 3: FINAL TWIST  
(FORWARD END OF F-1013-R SHOWN)**



Step 1: Make a Clamping Block from hardwood or tightly grained equivalent per the dimensions given in the three view in Figure 1.

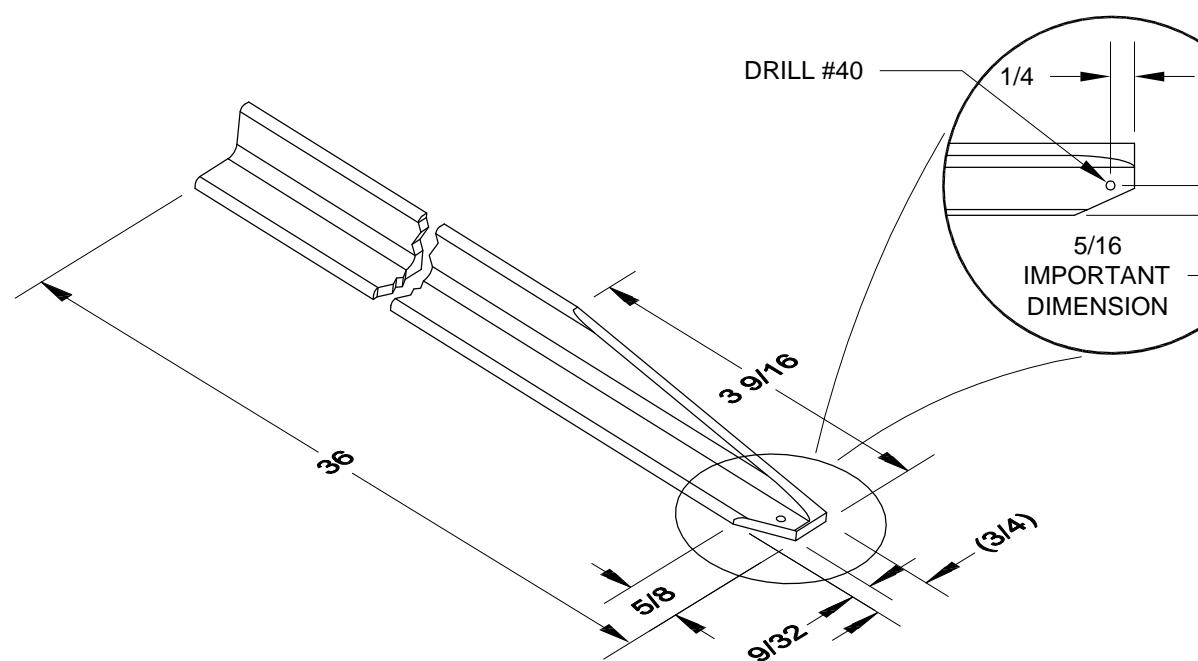


**FIGURE 1: FABRICATING THE CLAMPING BLOCK**

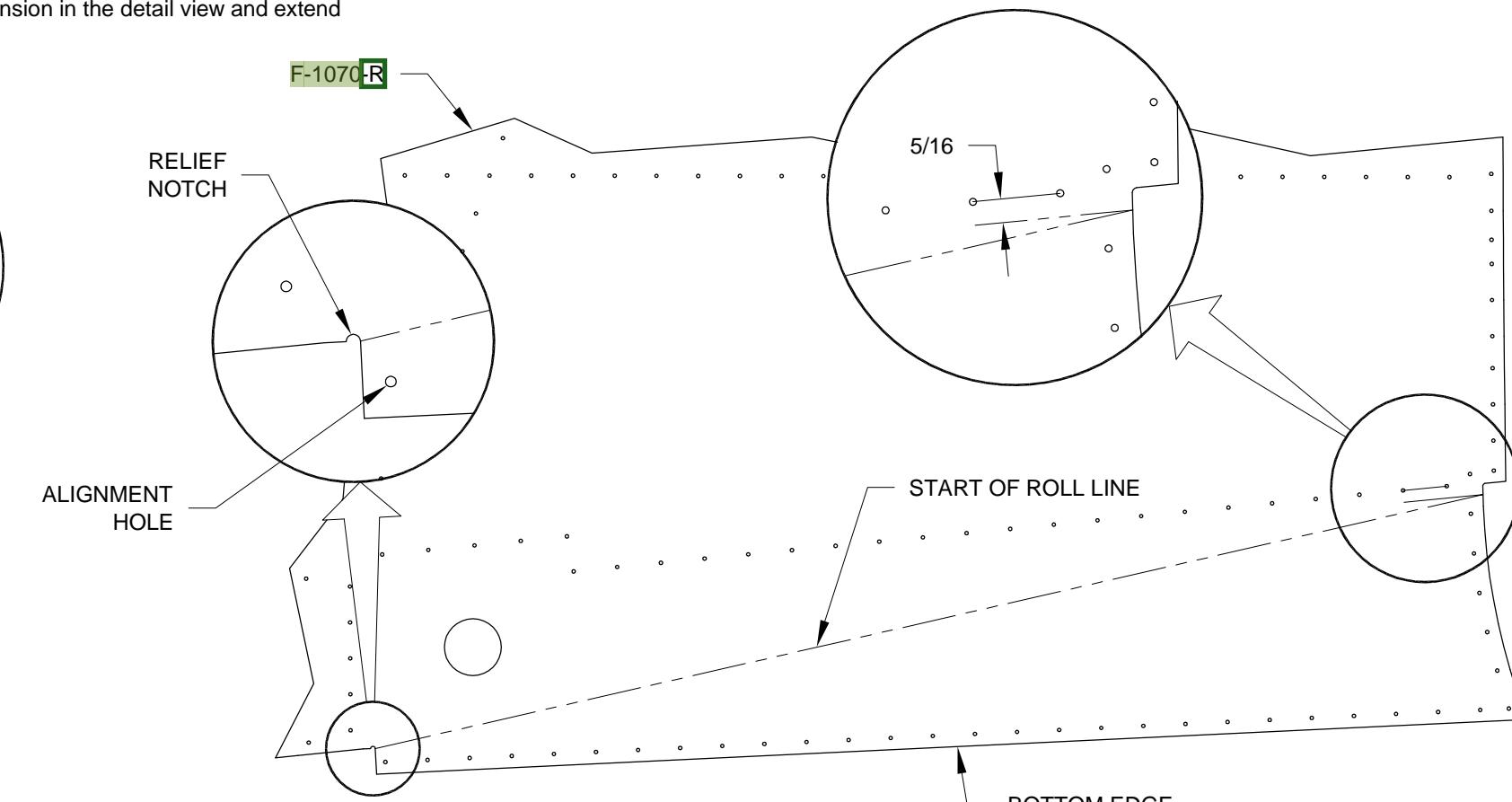
Step 2: Fabricate the F-1070A and B Roll Construction Angles per the dimensions in Figure 2 (the F-1070A is shown, and the F-1070B is its mirror image). Drill a #40 hole in the end of both roll construction angles per the dimensions in Figure 2.

Step 3: Cleco the #40 hole in the F-1070A Roll Construction Angle to the alignment hole (called out in Figure 3) in the F-1070-R Mid Side Skin. With the roll construction angle parallel to the bottom edge (indicated in Figure 3) of the mid side skin, match-drill #40 all of the holes along the bottom edge of the mid side skin into the roll construction angle. Separate the two parts. Cleco the original #40 hole in the F-1070A Roll Construction Angle to the #40 hole in the F-1070B Roll Construction Angle, and clamp the remaining portions together (see Page 29-5, Figure 1 for their orientation). Match-Drill #40 all of the holes in the F-1070A Roll Construction Angle into the F-1070B Roll Construction Angle. Separate the two parts and set them aside.

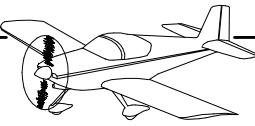
Step 4: Draw a line between the two rivets holes shown in the detail view in Figure 3. Offset this line per the dimension in the detail view and extend the line to intersect the trailing edge. Draw the "Start of Roll Line" between this intersection and the center of the relief notch as shown in Figure 3.



**FIGURE 2: FABRICATING THE ROLL CONSTRUCTION ANGLE**



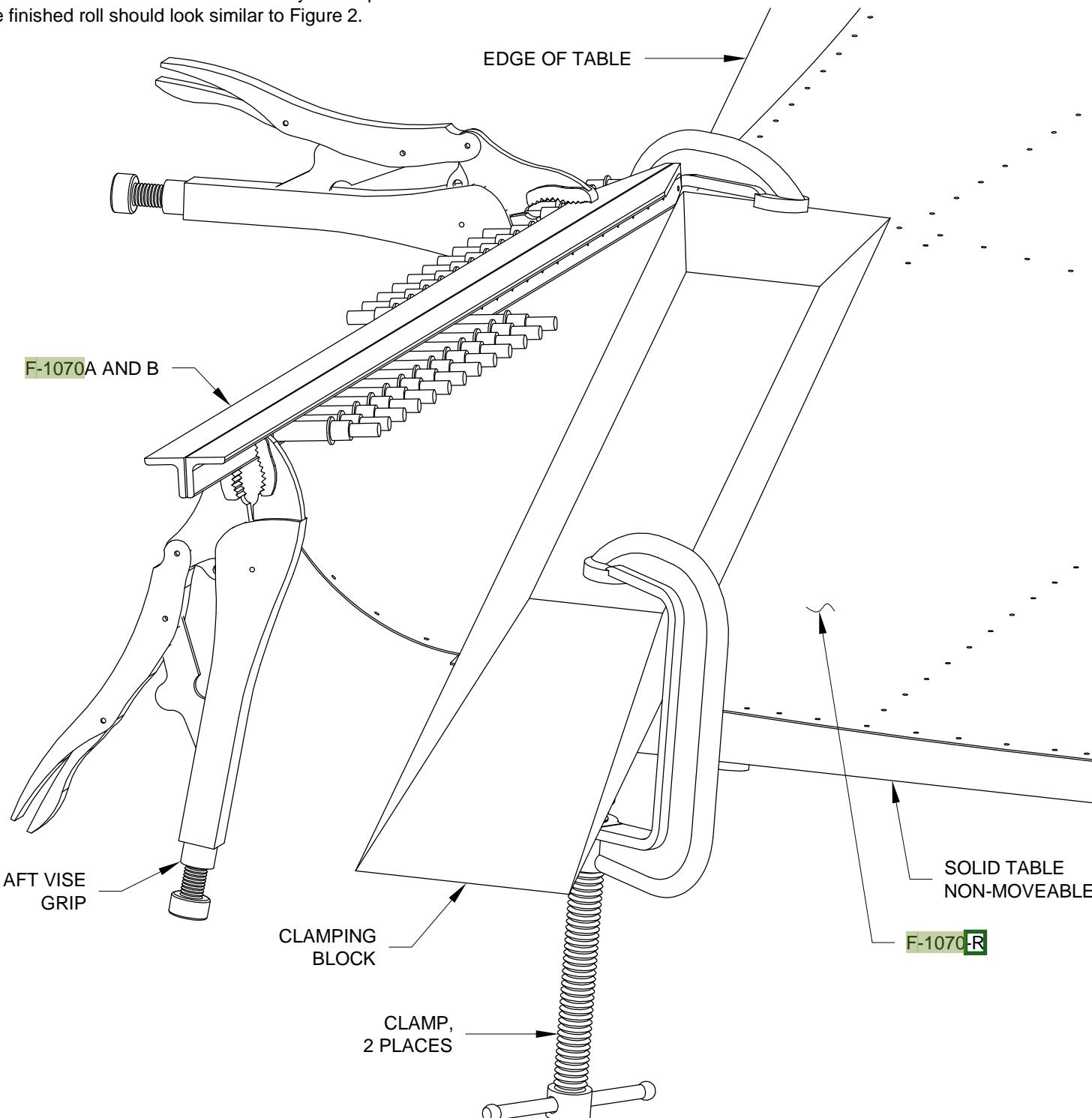
**FIGURE 3: MARKING THE ROLL LINE**



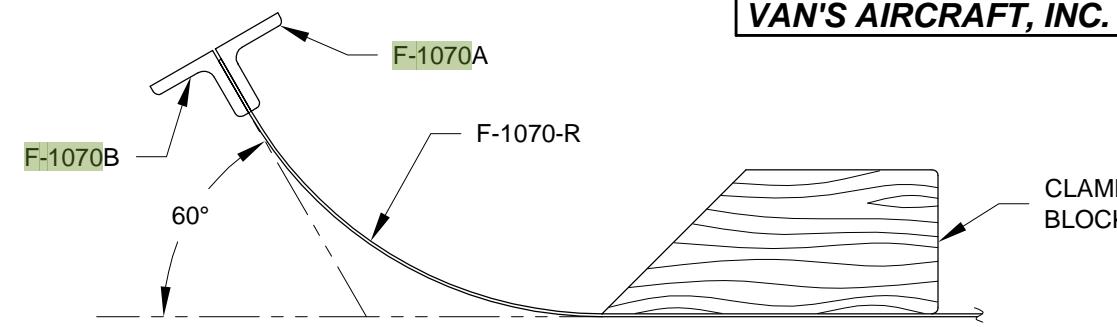
Step 1: Align the "Start of Roll Line" (see Page 29-4, Figure 3) on the F-1070-R Mid Side Skin with the edge of a table. Align the Clamping Block with the "Start of Roll Line", then clamp it and the mid side skin to the table. As shown in Figure 1, cleco the F-1070A and B Roll Construction Angles to the mid side skin, and clamp two vise grips onto either end of the roll construction angles. Double check that you are about to bend the skin in the correct direction; the outboard face of the skin should be down against the table with the inboard face up.

Step 2: Roll the skin into a cone that terminates in a sharp bend at the forward end. The roll is created with the aft vice grip handle, and the sharp bend is naturally formed at the forward end (the sharp bend is finished in Step 3). Twist the F-1070A and B roll construction angles with the aft vise grip and at the same time push the aft end down and inwards towards the table. Use the extra roll construction angle which extends aft of the vise grip as a handle for your other hand. The twisting and pushing motion must be balanced. Twisting too much will create a crease along the edge of the roll construction angles; pushing too hard will create a sharp bend in the middle of the roll. Do not try to complete the roll in one iteration.

The finished roll should look similar to Figure 2.

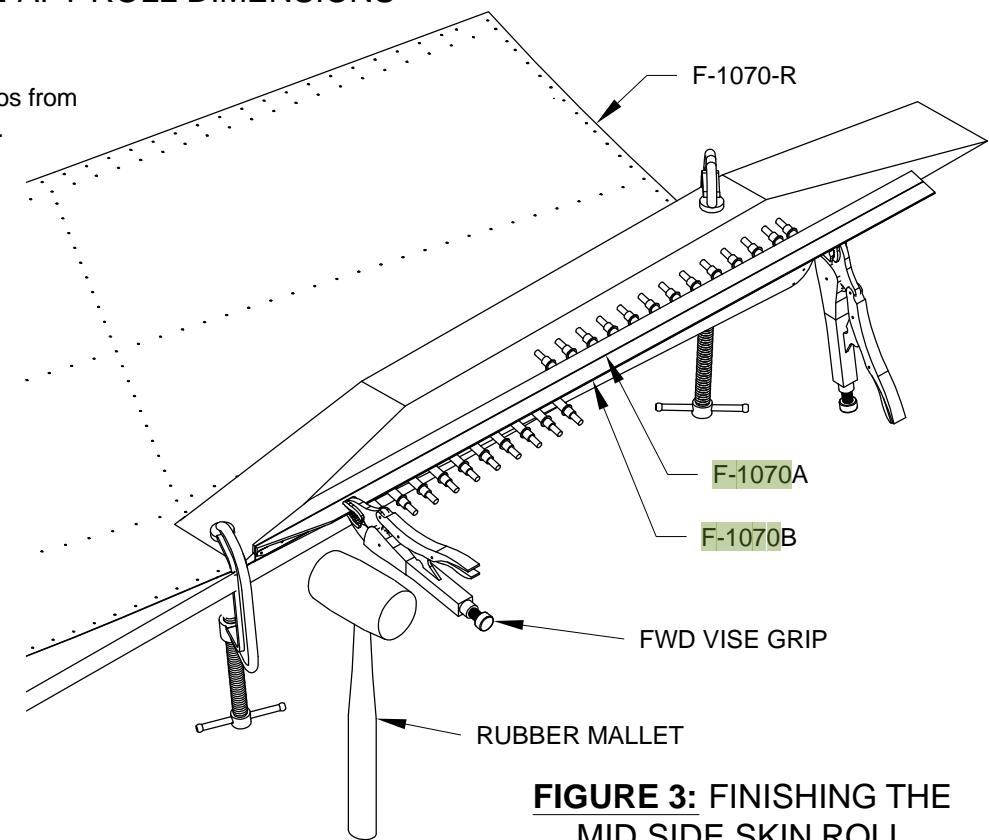


**FIGURE 1: ROLLING THE MID SIDE SKIN**



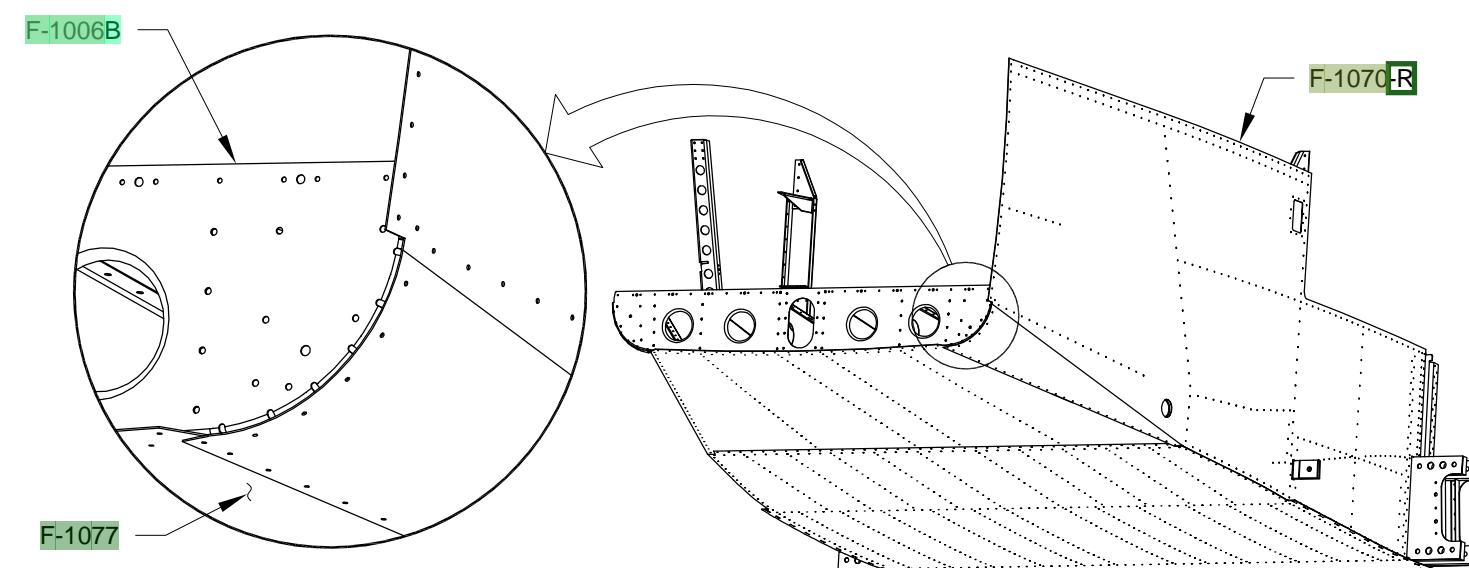
**FIGURE 2: THE AFT ROLL DIMENSIONS**

Step 3: Remove the four, forward most clecos from the F-1070A and B Roll Construction Angles. Twist the roll construction angles with the forward vise grip, then strike the roll construction angles with a rubber mallet to finish forming the sharp radius at the front of the roll.

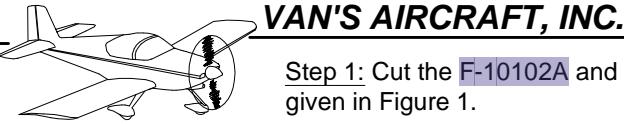


**FIGURE 3: FINISHING THE MID SIDE SKIN ROLL**

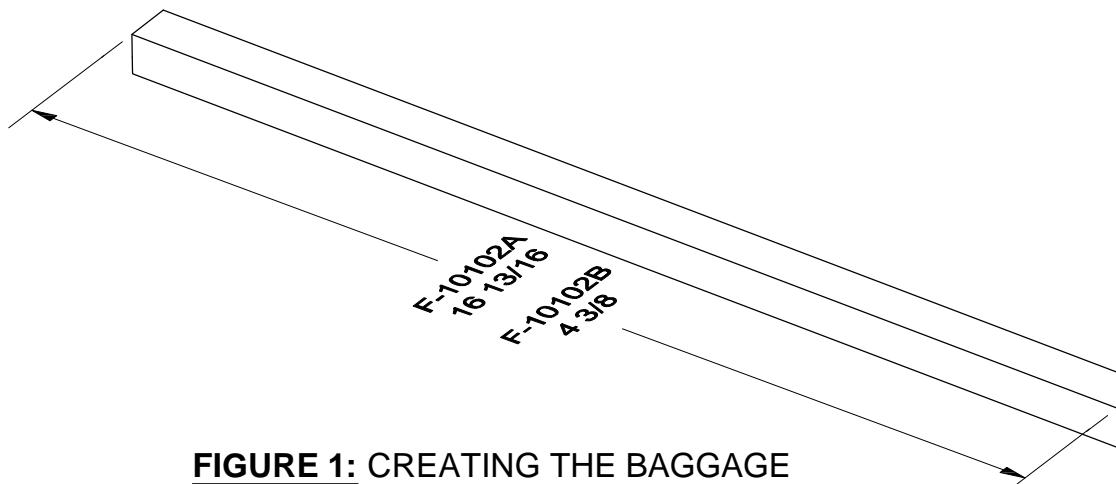
Step 4: Remove the F-1006B Bulkhead from the Tailcone Assembly. Cleco the F-1070-R Mid Side Skin and the bulkhead to the underlying structure and check that the mid side skin is properly formed. See Figure 4.



**FIGURE 4: TEST FITTING THE MID SIDE SKIN**



Step 1: Cut the F-10102A and B Baggage Door Seal Angle from AA6-063 X 3/4 X 3/4. Use the dimensions given in Figure 1.



**FIGURE 1: CREATING THE BAGGAGE DOOR SEAL ANGLES**

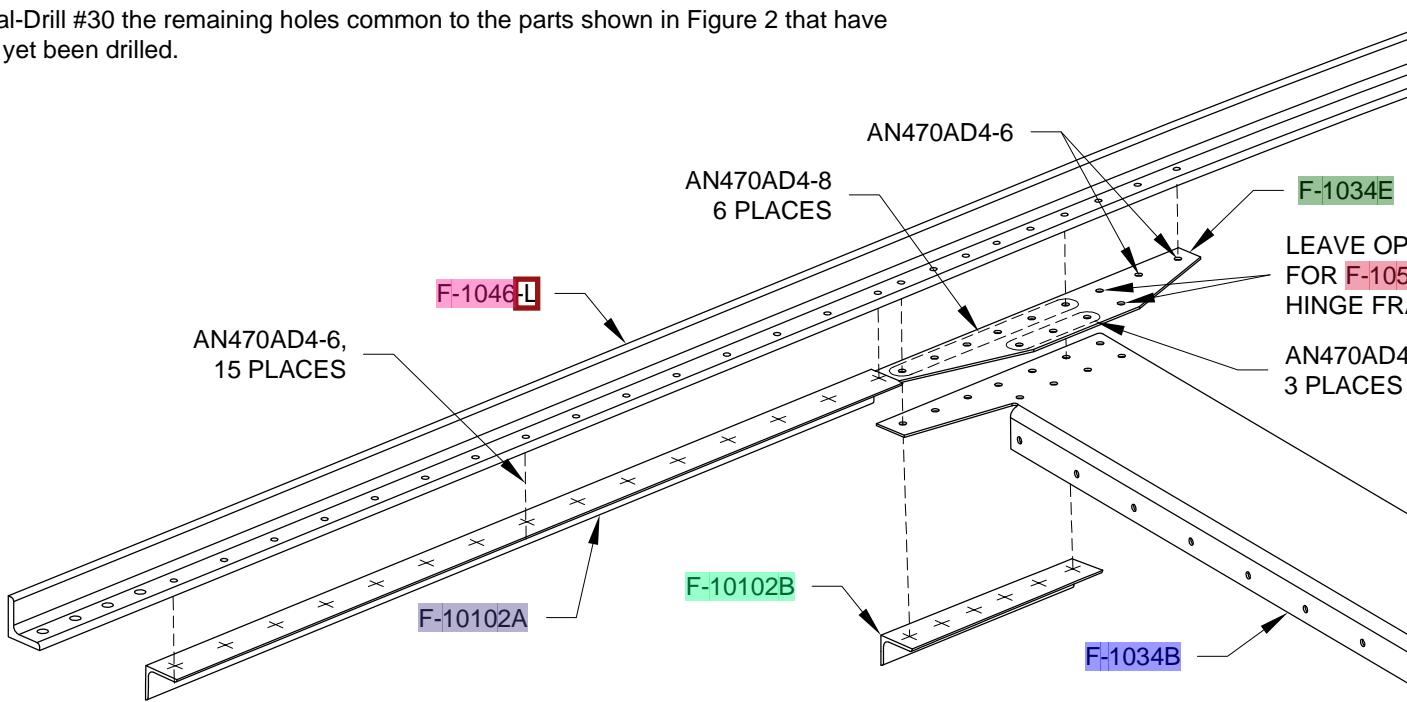
Step 2: Cleco the F-1034B Seat Back Brace and the F-1034E Seat Back Brace Gusset to the F-1046L Mid Fuse Longeron as shown in Figure 2. Butt the forward end of the F-10102A Baggage Door Seal Angle against the aft edge of the seat back brace gusset. Offset the entire length of the baggage door seal angle a 1/16" inboard of the mid fuse longeron as shown in Figure 3, then clamp the baggage door seal angle to the mid fuse longeron.

Step 3: Match-Drill #30 and cleco the holes in the F-1046L Mid Fuse Longeron into the F-10102A Baggage Door Seal Angle.

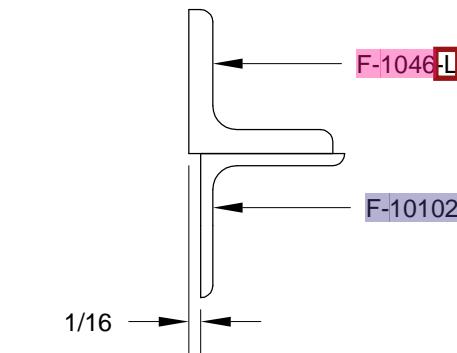
Step 4: Butt the aft end of the F-10102B Baggage Door Seal Angle against the forward end of the F-10102A Baggage Door Seal Angle (see Figures 2 and 4). Offset the F-10102B Baggage Door Seal Angle a 1/16" inboard of the mid fuse longeron and clamp it in position.

Step 5: Match-Drill #30 and cleco the six holes common to the F-1046L Mid Fuse Longeron, F-1034B Seat Back Brace, and F-1034E Seat Back Brace Gusset into the F-10102B Baggage Door Seal Angle.

Final-Drill #30 the remaining holes common to the parts shown in Figure 2 that have not yet been drilled.

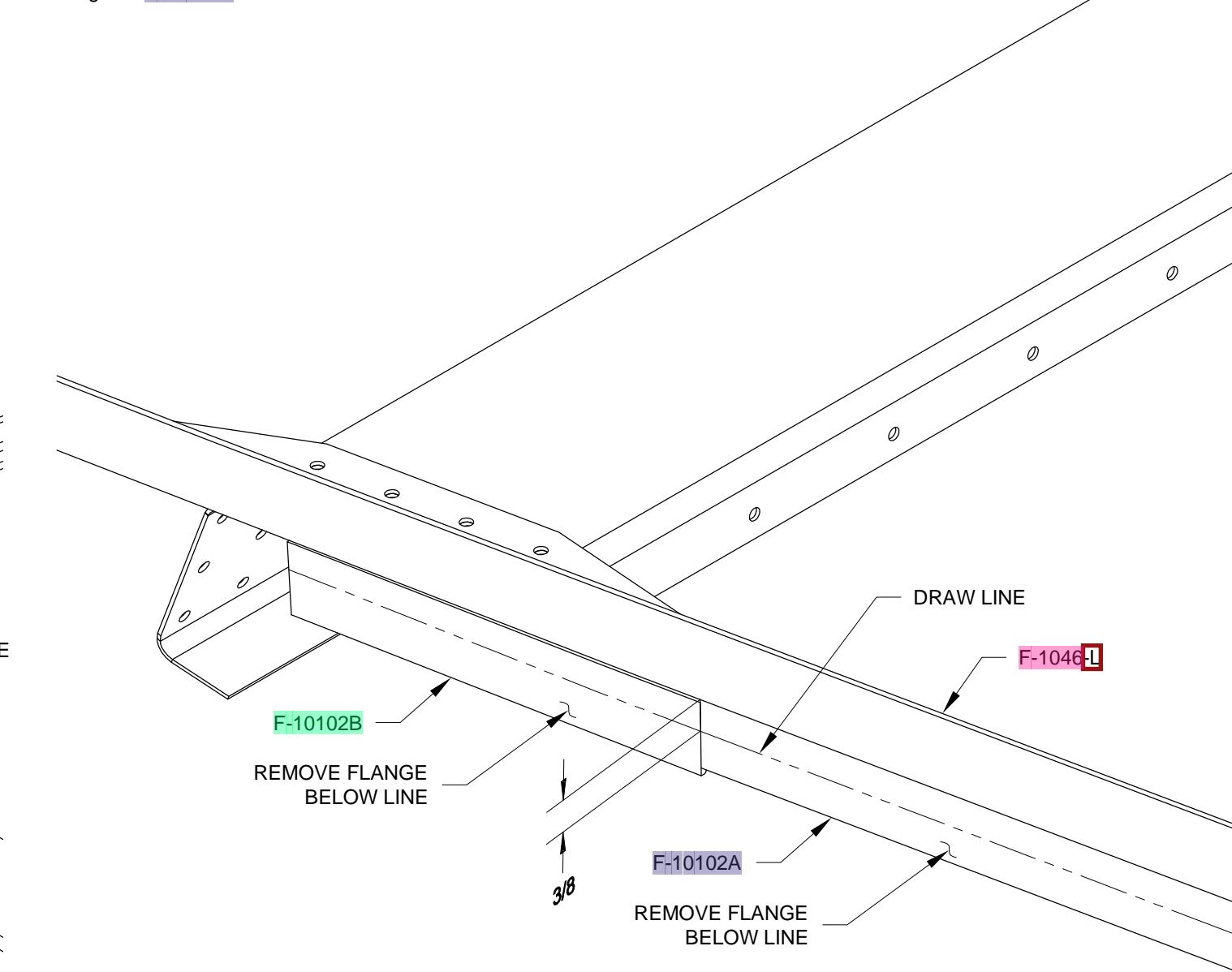


**FIGURE 2: ISO VIEW OF BAGGAGE DOOR SEAL ANGLE INSTALL**

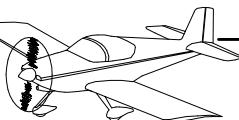


**FIGURE 3: BAGGAGE DOOR SEAL ANGLE OFFSET**

Step 6: Draw a line on the flange of the F-10102A and B Baggage Door Seal Angles 3/8" from the lower face of the F-1046L Mid Fuse Longeron as shown in Figure 4. Remove the baggage door seal angles and trim off the portion of the flange below this line. Note that once trimmed, the flange on F-10102B will be shorter than the flange on F-10102A.

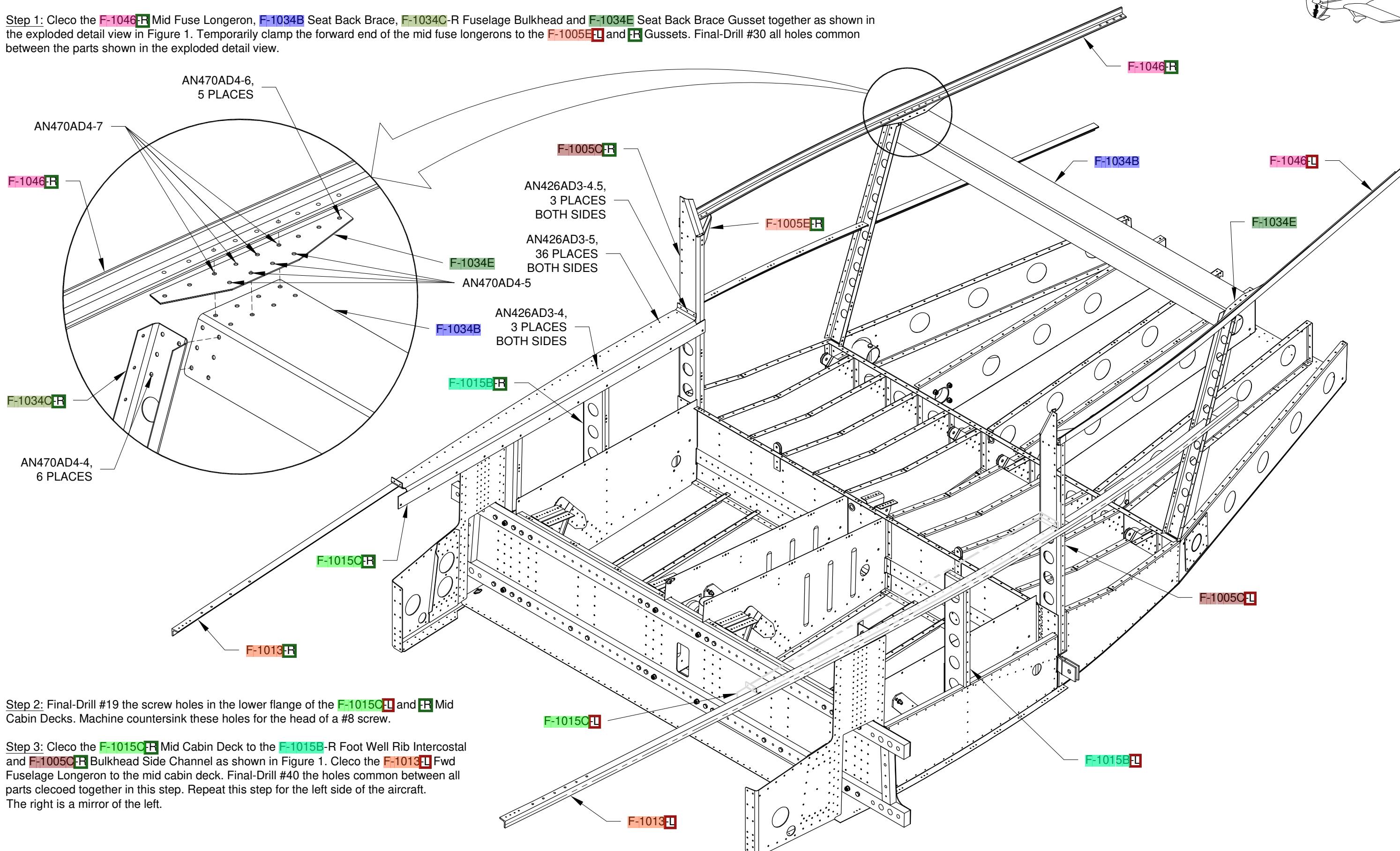


**FIGURE 4: TRIM BAGGAGE DOOR SEAL ANGLES**

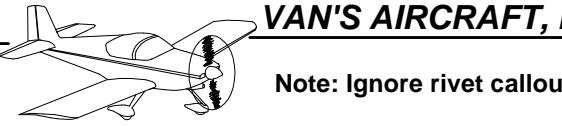


**NOTE:** Ignore rivet callouts on this page until Page 29-16.

Step 1: Cleco the F-1046-R Mid Fuse Longeron, F-1034B Seat Back Brace, F-1034C-R Fuselage Bulkhead and F-1034E Seat Back Brace Gusset together as shown in the exploded detail view in Figure 1. Temporarily clamp the forward end of the mid fuse longerons to the F-1005E-L and F-1005E-R Gusssets. Final-Drill #30 all holes common between the parts shown in the exploded detail view.

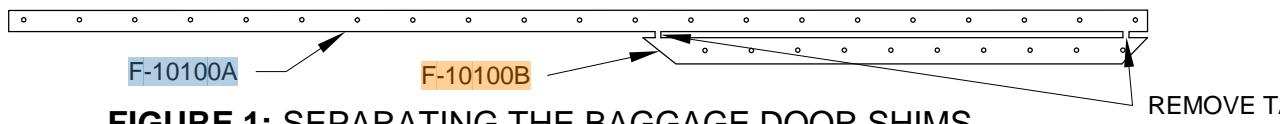


**FIGURE 1: DRILLING THE LONGERONS TO THE SUBSTRUCTURE**  
(MOST OF THE FORWARD FUSELAGE ASSEMBLY IS NOT SHOWN FOR CLARITY)



Note: Ignore rivet callouts on this page until Page 29-16.

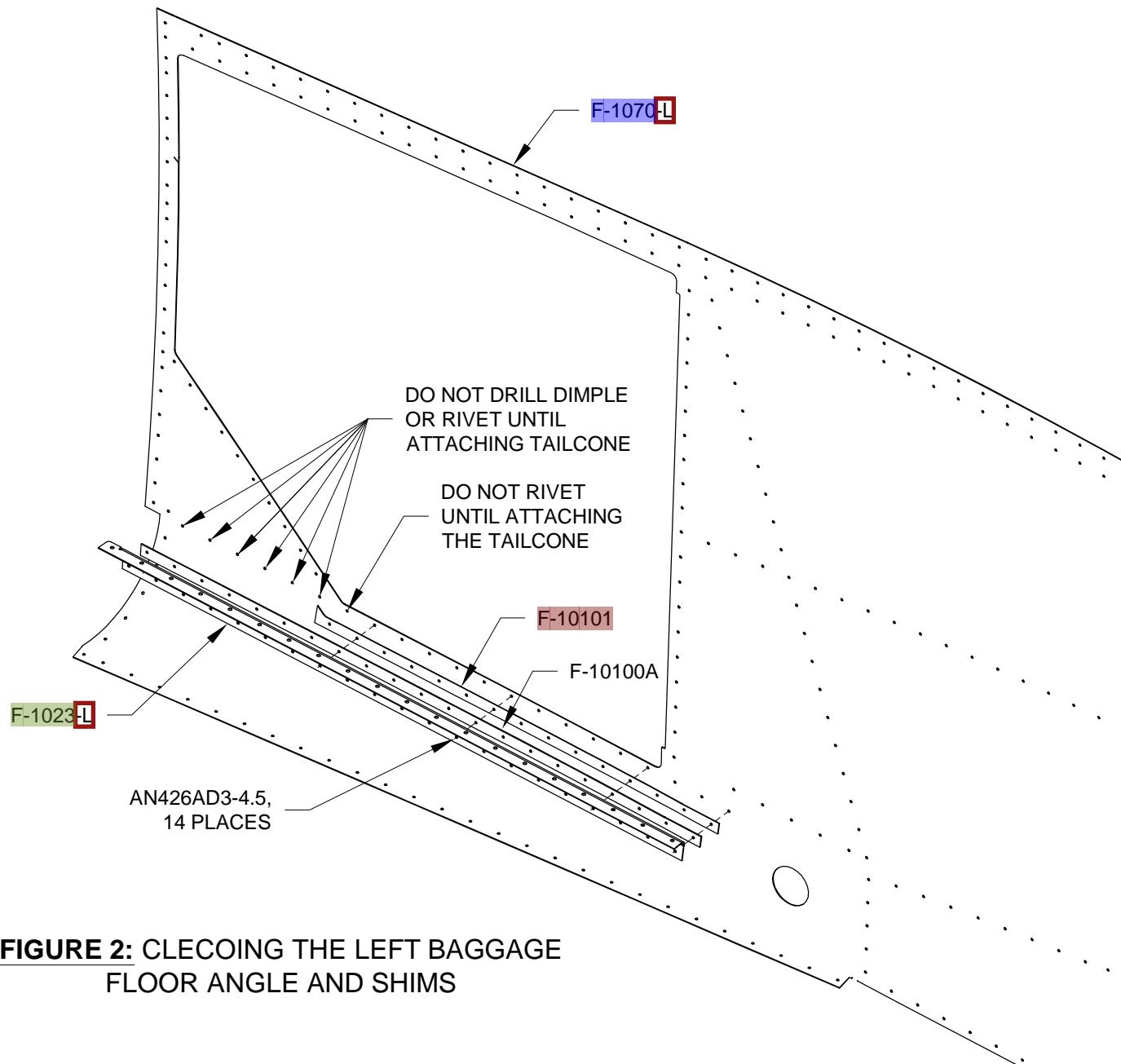
Step 1: Cut the F-10100 Baggage Door Shim into F-10100A and B Baggage Door Shims as shown in Figure 1. Remove the tabs and deburr the edges of both parts. Set the F-10100B Baggage Door Shim aside until attaching the tailcone.



**FIGURE 1: SEPARATING THE BAGGAGE DOOR SHIMS**

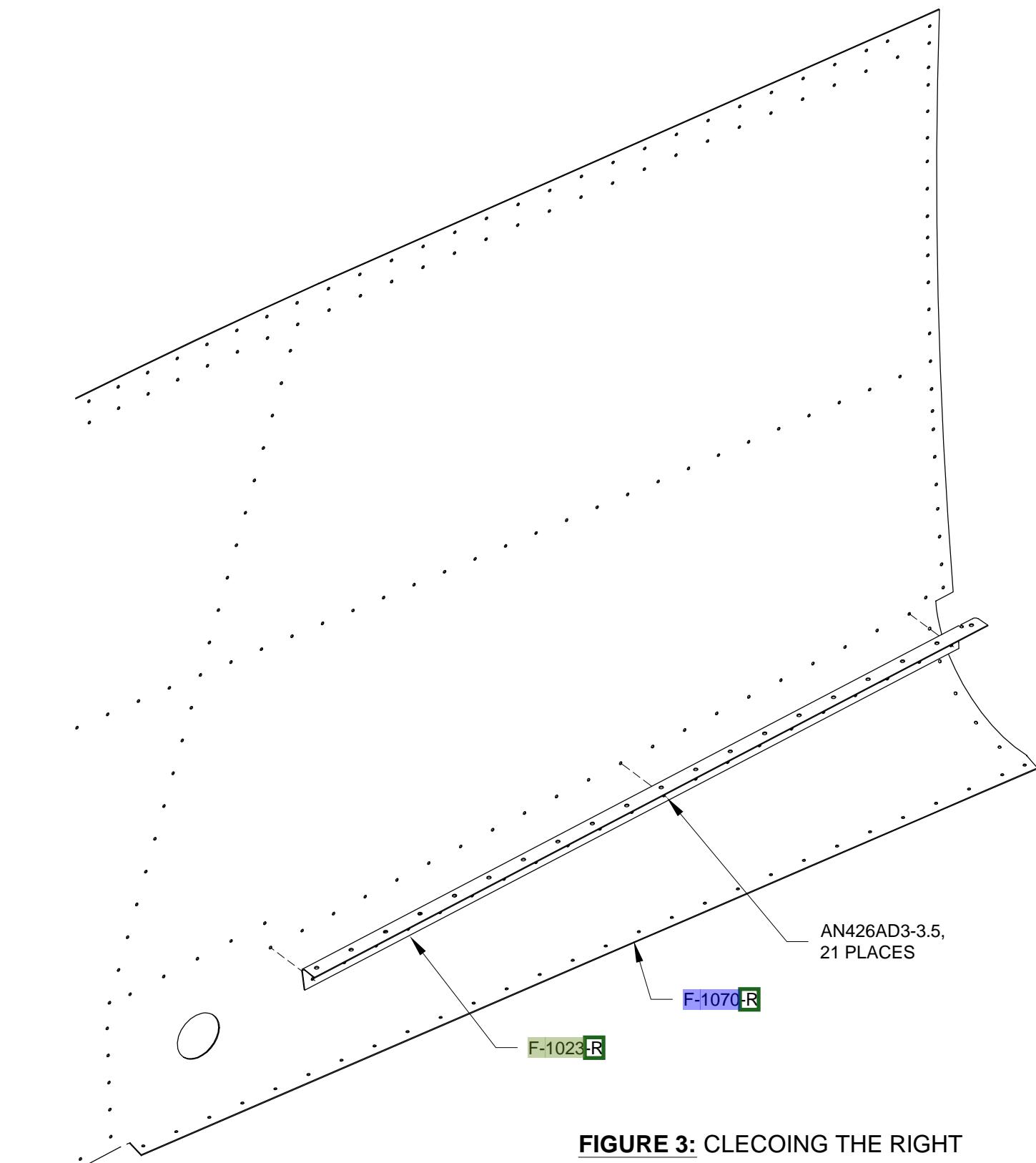
Step 2: Final-Drill #30 all the holes in the upper flange (flange not common to skin) of the F-1023-L and F-1023-R Baggage Floor Angles. Deburr and dimple (for a flush head on upper side) these holes now.

Step 3: Cleco the F-1023-L Baggage Floor Angle and F-10100A and F-10101 Baggage Door Shims to the F-1070-L Mid Side Skin as shown in Figure 2. Final-Drill #40 the holes common between these parts except the holes marked in Figure 2 do not drill.

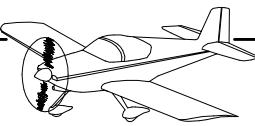


**FIGURE 2: CLECOING THE LEFT BAGGAGE FLOOR ANGLE AND SHIMS**

Step 4: Cleco the F-1023-R Baggage Floor Angle to the F-1070-R Mid Side Skin as shown in Figure 3. Final-Drill #40 all the holes common between these parts.



**FIGURE 3: CLECOING THE RIGHT BAGGAGE FLOOR ANGLE**



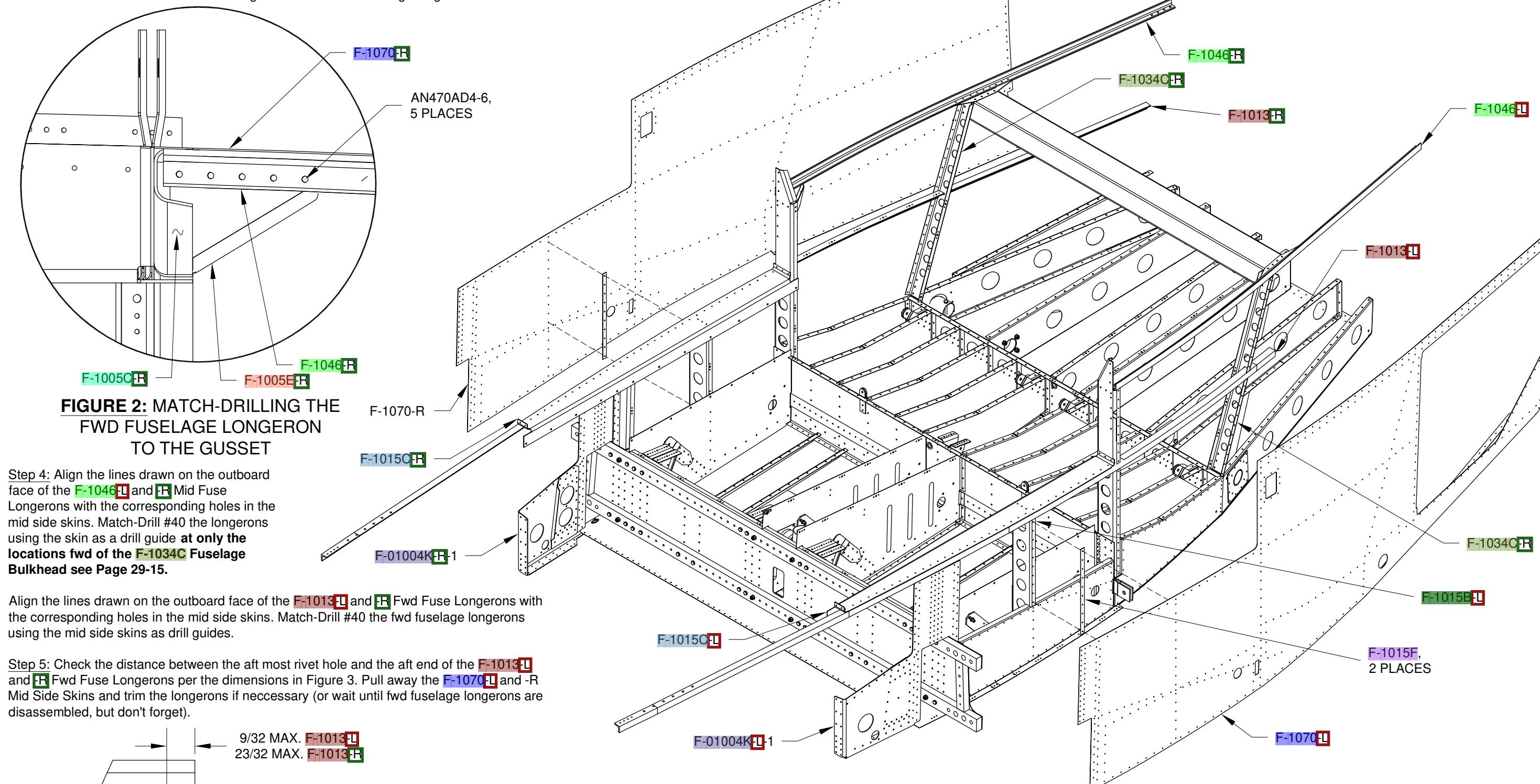
**NOTE:** Ignore rivet callouts on this page until Page 29-16.

**Step 1:** Cleco the F-1070-L and F-1070-R Mid Side Skins and the two F-1015F Spacers to the under structure as shown in Figure 1.

**Step 2:** Using the callouts on Page 29-15, Figure 1 mark the holes that are **not** drilled in this section. Final-Drill #40 all the remaining 3/32 inch holes common to the the F-1070-L and F-1070-R Mid Side Skins and pre-punched under structure. Final-Drill #30 all the 1/8 inch holes in the wingroot area, indicated on Page 29-15, Figure 1.

**Step 3:** Position the F-1046-R Mid Fuselage Longeron on the F-1005E-R Gusset as shown in Figure 2. Clamp the parts together.

Match-drill #30 and cleco the holes in the gusset into the mid fuselage longeron.

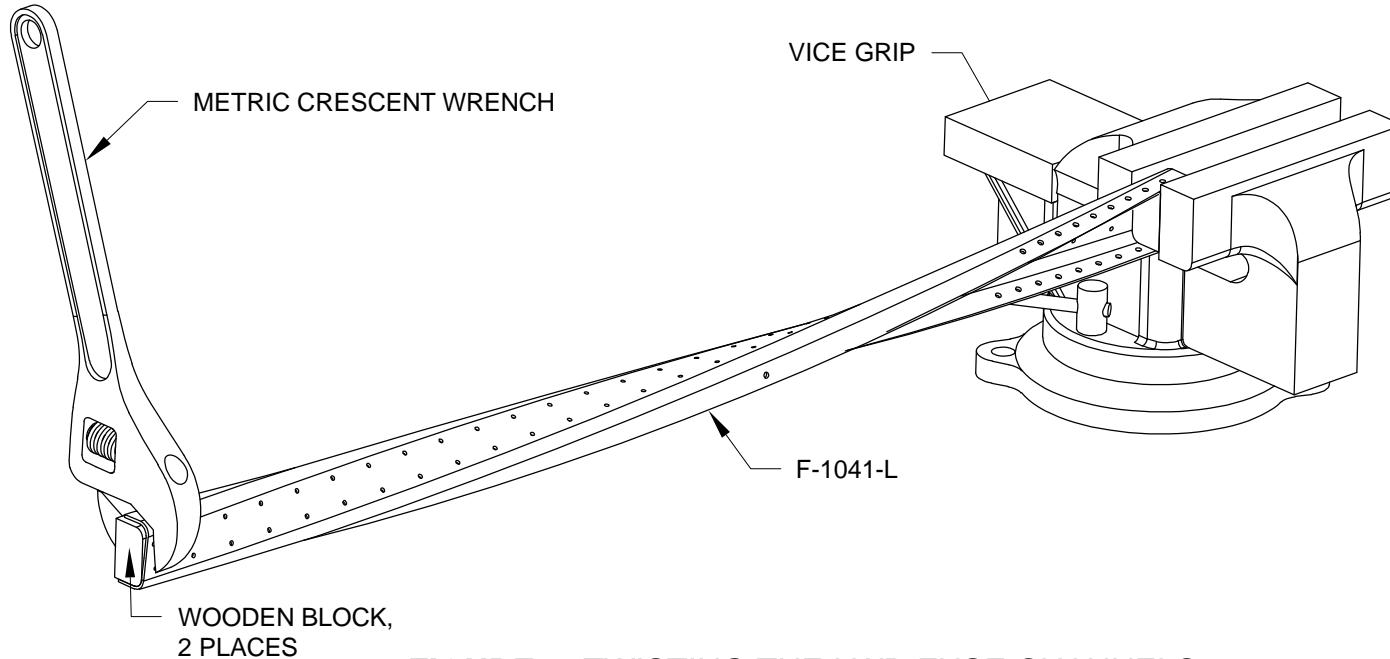


**FIGURE 3: FWD FUSELAGE LONGERON LENGTH**

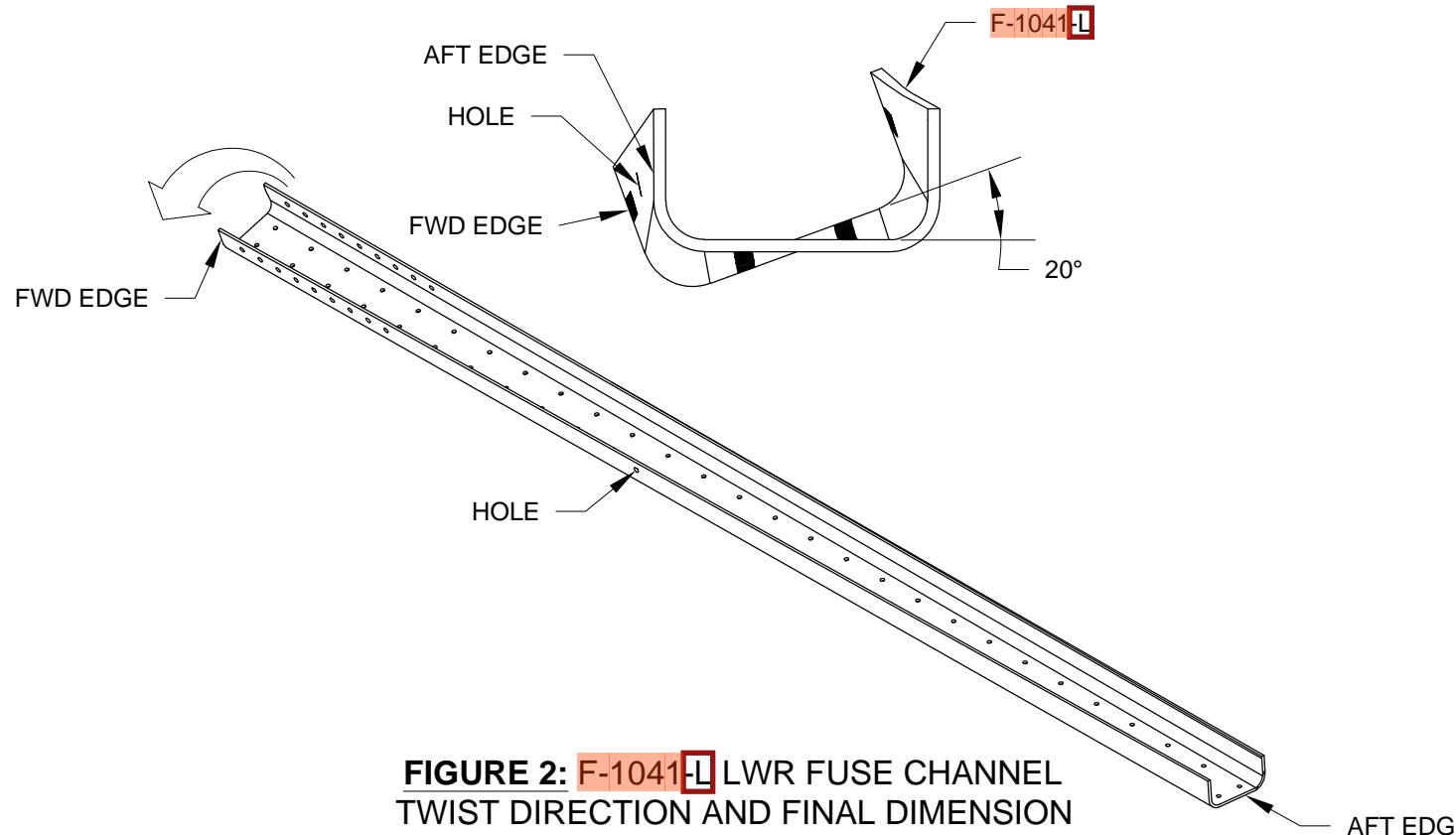
**FIGURE 1: CLECOING THE MID SIDE SKINS**  
(MOST OF THE FORWARD FUSELAGE ASSEMBLY NOT SHOWN FOR CLARITY)



**Step 1:** Create two wooden spacer blocks about an inch in length, similar to those shown in Figure 1. Insert the spacer blocks into the ends of the F-1041-L Lwr Fuse Channel. Clamp the forward end of the channel into a vise and the aft end with a crescent wrench. After double checking the twist direction, use the crescent wrench to twist the lwr fuselage channel to match the dimensions given in Figure 2. Repeat this step to modify the F-1041-R Lwr Fuse Channel. The right channel is a mirror of the left.



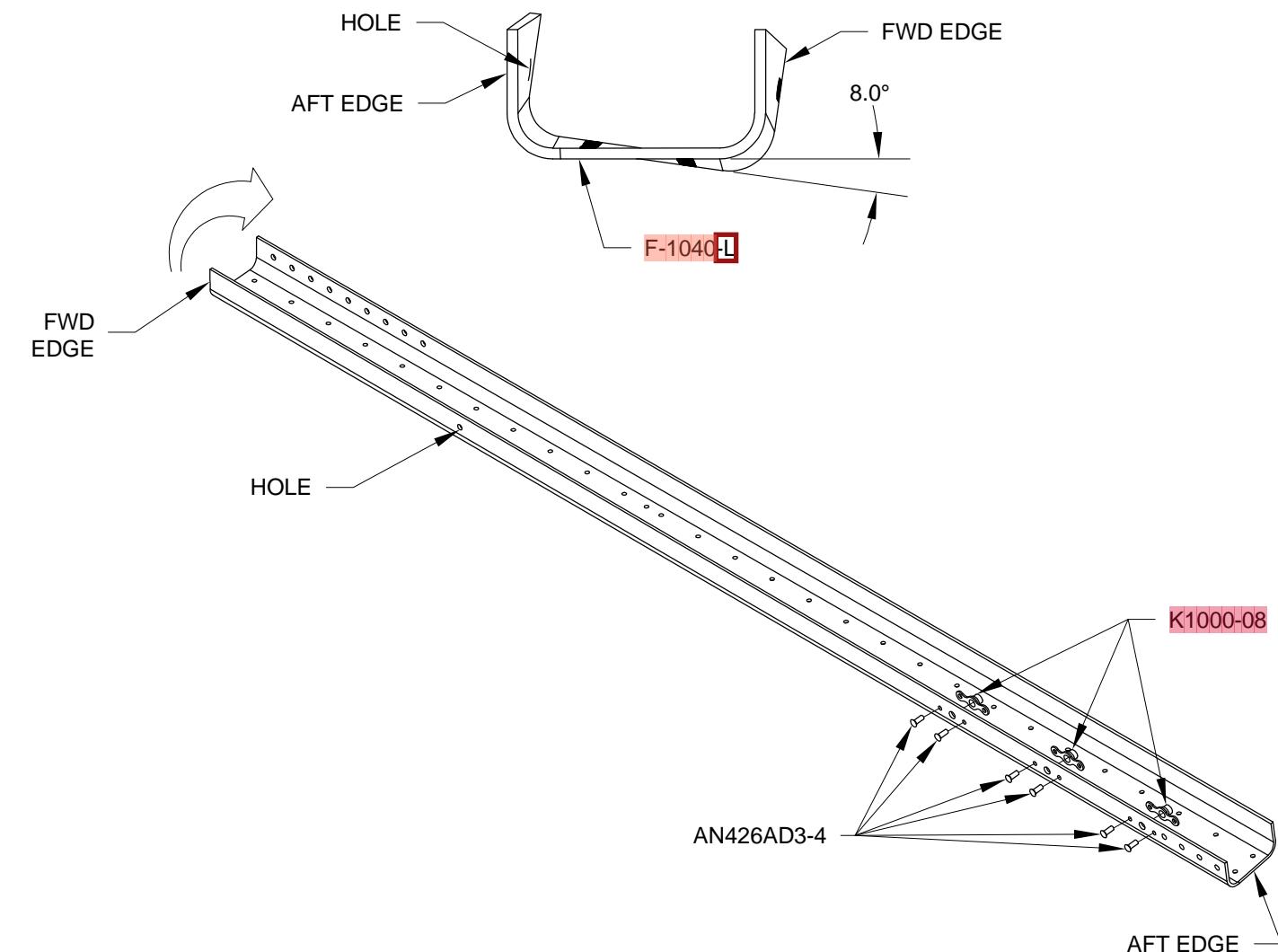
**FIGURE 1: TWISTING THE LWR FUSE CHANNELS**  
(SWEATY GRUNTING HUMAN NOT SHOWN FOR CLARITY)



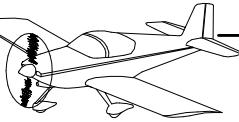
**FIGURE 2: F-1041-L LWR FUSE CHANNEL**  
TWIST DIRECTION AND FINAL DIMENSION

**Step 2:** After double checking the twist direction, use the same method as Step 1 to twist the F-1040-L Upper Fuse Channel to match the dimensions given in Figure 3. Repeat this step to modify the F-1040-R Upper Fuse Channel. The right upper fuse channel is a mirror of the left.

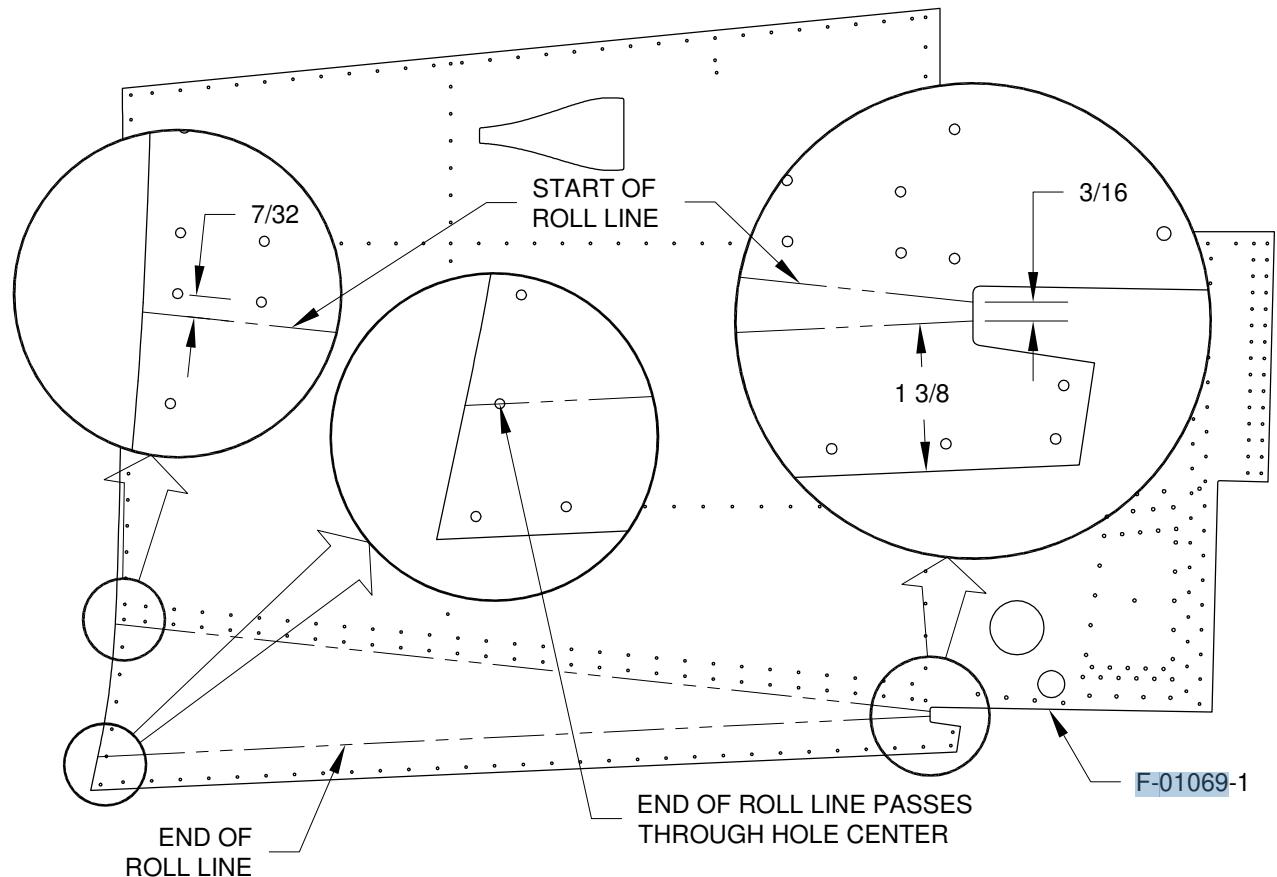
**Step 3:** Machine countersink the nutplate attach holes and rivet the nutplates in F-1040-L and F-1040-R as shown in Figure 3.



**FIGURE 3: F-1040-L UPPER FUSE CHANNEL TWIST DIRECTION AND FINAL DIMENSIONS**

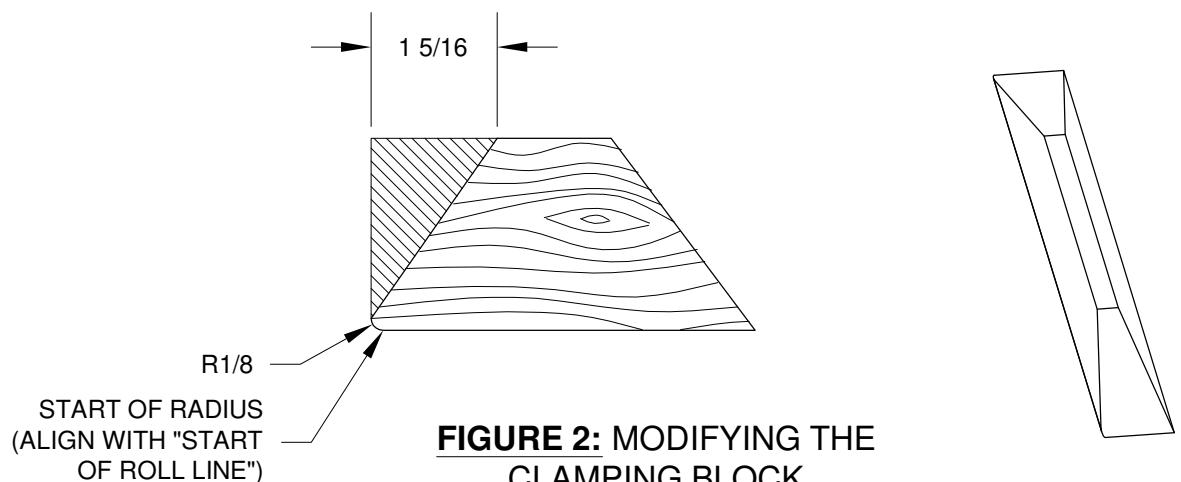


Step 1: Remove the vinyl from the inside face of both F-01069-1 Fwd Side Skins. Using the dimensions given in Figure 1, draw the "Start of Roll Line" and the "End of Roll Line" on the F-01069-R-1 Fwd Side Skin. Repeat this step for the F-01069-L-1 Fwd Side Skin. The left fwd side skin is a mirror of the right.



**FIGURE 1: MARKING THE CURVE LINES**

Step 2: Modify the Clamping Block to match the dimensions given in Figure 2. Note the radius along the bottom edge of the clamping block. If using a normal 2x4 it is permissible to use the manufactured radius even though it may be slightly larger than 1/8 inch.



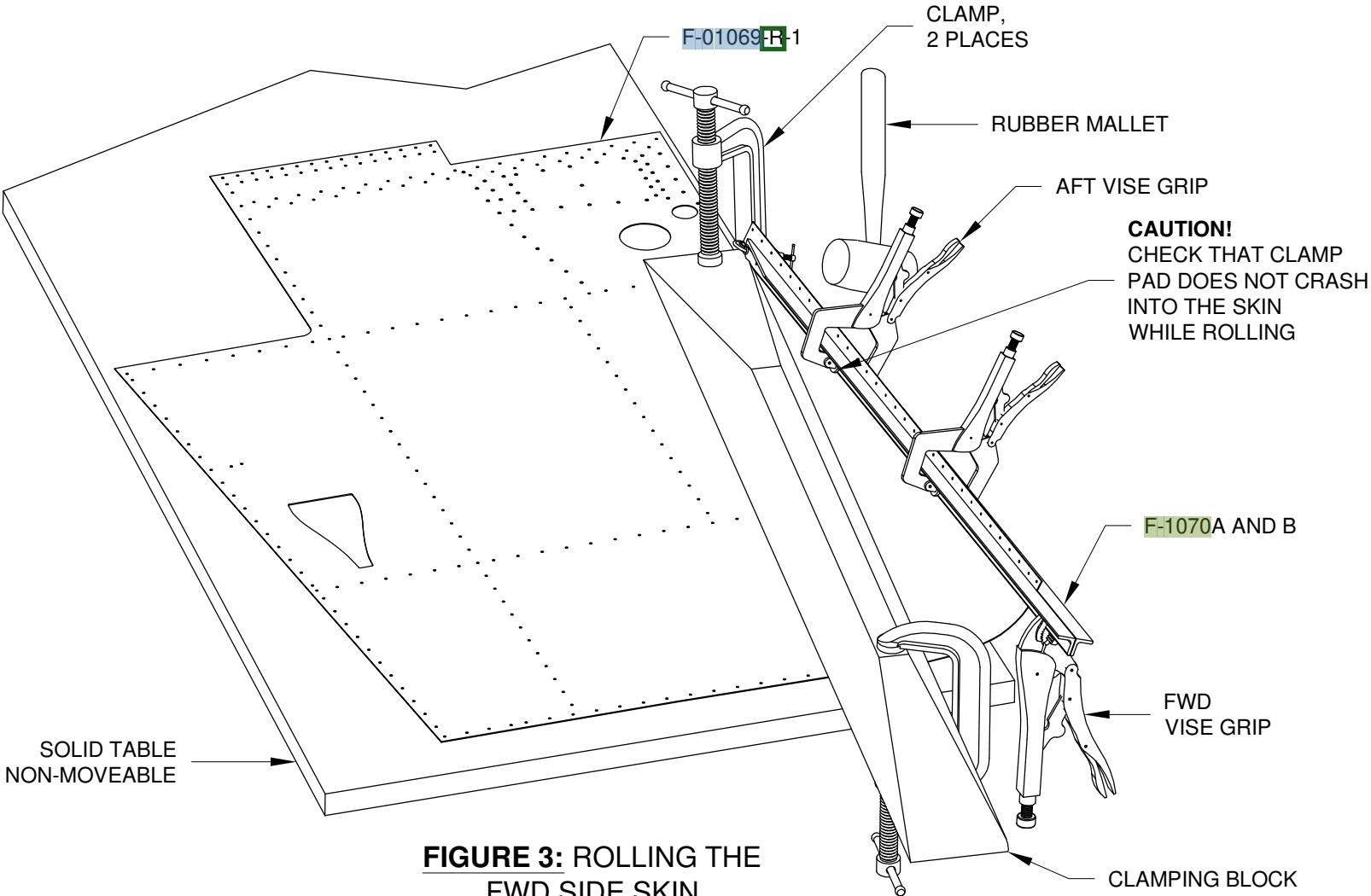
**FIGURE 2: MODIFYING THE CLAMPING BLOCK**

Step 3: Clamp the F-01069-R-1 Fwd Side Skin to a table, as shown in Figure 3, using the Clamping Block. Align the "Start of Radius" (see Figure 2) with the "Start of Roll Line" (see Figure 1). Be sure to align the "Start of Radius" not the edge of the block with the "Start of Roll Line"! Double check that you are about to bend the fwd side skin in the correct direction, the outboard face of the skin should be down against the table with the inboard face up.

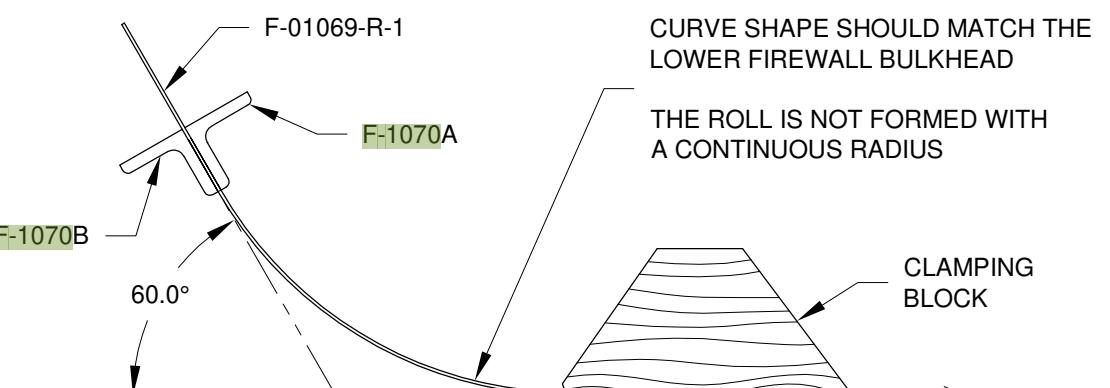
Align the flange edges of the F-1070A and B Roll Construction Angles with the "End of Roll Line" on the F-01069-R-1 Fwd Side Skin, then clamp them in place as shown in Figure 3.

Step 4: Roll the F-01069-R-1 Fwd Side Skin into a cone that terminates in a sharp bend at the aft end of the "Roll Lines". The roll is created with the forward vice grip, and the sharp bend is naturally formed at the aft end (the sharp bend is finished in Step 5). Twist the F-1070A and B Roll Construction Angles with the forward vise grip and at the same time push the forward end down and inwards towards the table. Use the extra roll construction angle which extends forward of the vise grip as a handle for your other hand. The twisting and pushing motion must be balanced. Twisting too much will create a crease along the edge of the roll construction angles; pushing too hard will create a sharp bend in the middle of the roll. Do not try to complete the roll in one iteration. The finished roll should look similar to Figure 4.

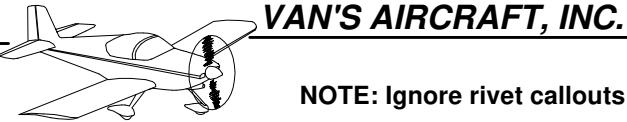
Step 5: Twist the F-1070A and B Roll Construction Angles with the aft vise grip, then strike the roll construction angles with a rubber mallet to finish forming the sharp radius at the aft end of the roll.



**FIGURE 3: ROLLING THE FWD SIDE SKIN**

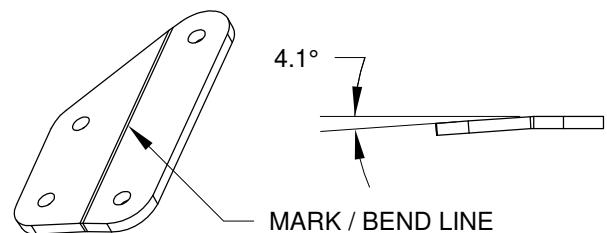


**FIGURE 4: FWD ROLL DIMENSIONS**



**NOTE: Ignore rivet callouts on this page until Page 29-16.**

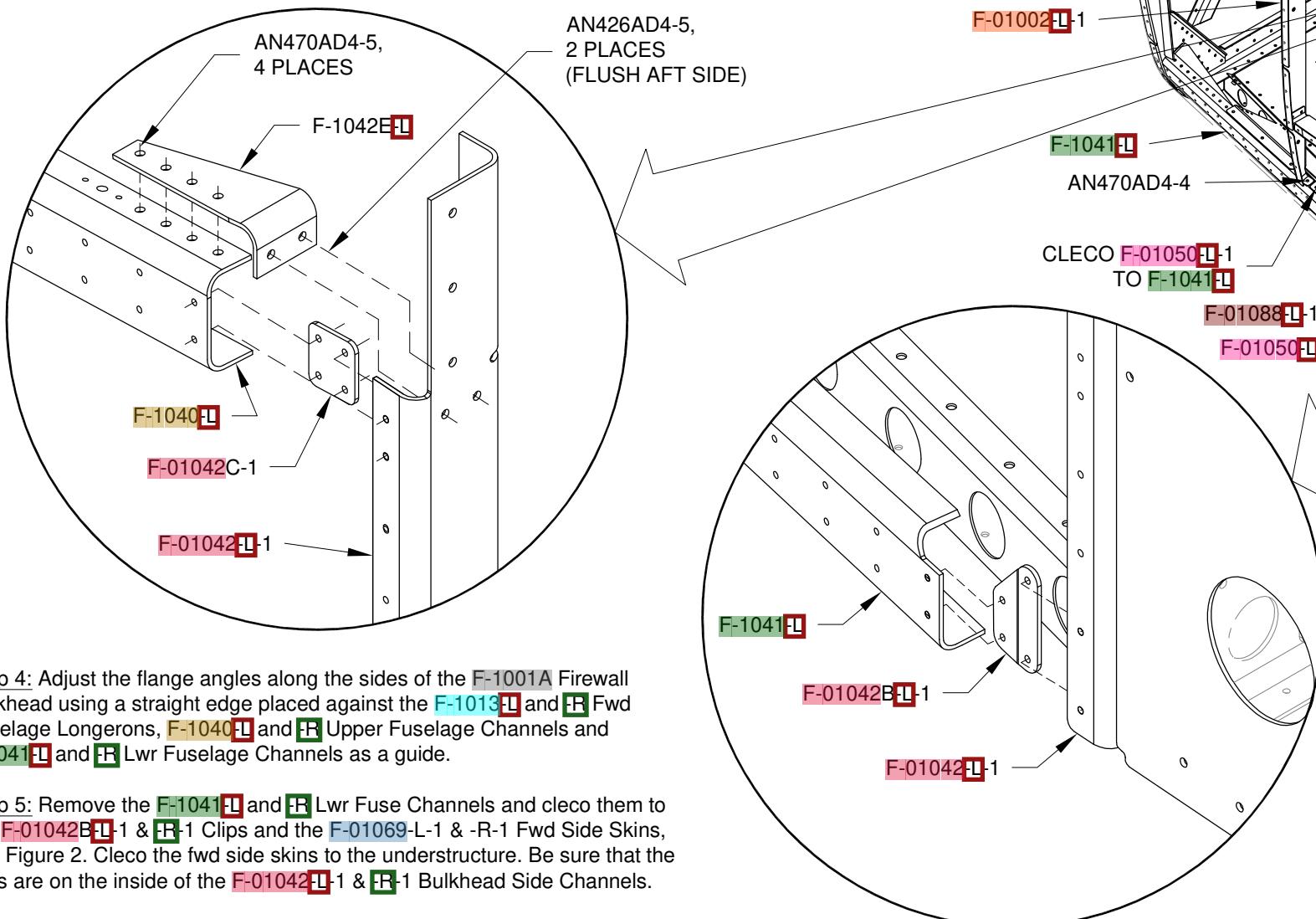
Step 1: Cleco the F-01042B-1 Clip to the F-01042-L-1 Bulkhead Side Channel as shown in the lower blow up detail in Figure 2. Mark the location of the forward edge of the bulkhead side channel flange onto the clip. Remove the clip from the bulkhead side channel. Using the mark as a bend line, clamp the clip in padded vice jaws, then bend the clip to match the dimensions given in Figure 1. Mark as F-01042B-L-1. Bend the F-01042B-R-1 Clip, a mirror of the F-01042B-L-1 Clip, for the other side of the aircraft.



**FIGURE 1: BENDING THE F-01042B-L-1 CLIP**

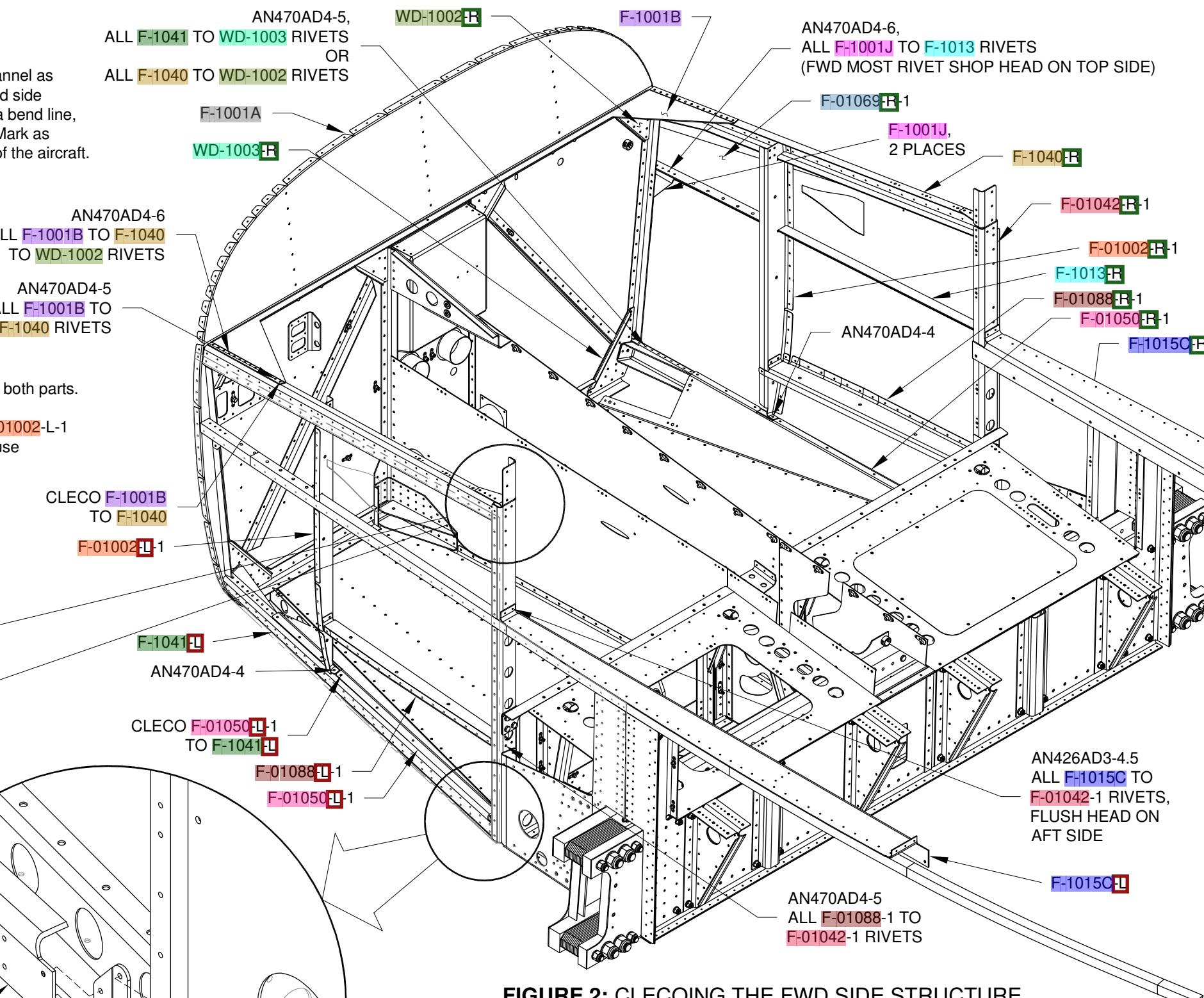
Step 2: Break the F-1042E into a F-1042E-L Gusset and F-1042E-R Gusset. Deburr the edges on both parts.

Step 3: Cleco the F-01050-L-1 & -R-1 Fwd Cabin Floor Panels to the understructure. Cleco the F-01002-L-1 & -R-1 Fwd Fuselage Bulkheads, F-1040-L and -R Upper Fuse Channels, F-1041-L and -R Lwr Fuse Channels, F-01042B-L-1 & -R-1 Clips, F-01042C-1 Clips, F-1042E-L and -R Gussets and F-01088-L-1 & -R-1 Fwd Fuselage Ribs to the fwd fuselage understructure see Figure 2. Note the special cleco callouts for the upper and lwr fuse channels.

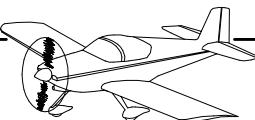


Step 4: Adjust the flange angles along the sides of the F-1001A Firewall Bulkhead using a straight edge placed against the F-1013-L and -R Fwd Fuselage Longerons, F-1040-L and -R Upper Fuselage Channels and F-1041-L and -R Lwr Fuselage Channels as a guide.

Step 5: Remove the F-1041-L and -R Lwr Fuse Channels and cleco them to the F-01042B-L-1 & -R-1 Clips and the F-01069-L-1 & -R-1 Fwd Side Skins, see Figure 2. Cleco the fwd side skins to the understructure. Be sure that the clips are on the inside of the F-01042B-L-1 & -R-1 Bulkhead Side Channels.



**FIGURE 2: CLECOING THE FWD SIDE STRUCTURE  
(FWD SIDE SKIN SHOWN TRANSPARENT)**



**Step 1:** Match-Drill #40 the holes in the F-01069-L-1 & F-01069-R-1 Fwd Side Skins and the F-1040-L and -R Upper Fuse Channels common to the WD-1002-L and R Upper Firewall Brackets. Use a small block of wood to hold the flange on the firewall brackets tight against the channels. Match-Drill #40 the holes in the fwd side skins and the F-1041-L and F-1041-R Lower Fuse Channels common to the WD-1003-L and R Lower Firewall Brackets. Final-Drill #40 the remaining holes in the webs of the upper and lower fuse channels including the upper most row of holes in the upper channel not common to the fwd side skin. See Figure 1 and Figure 2.

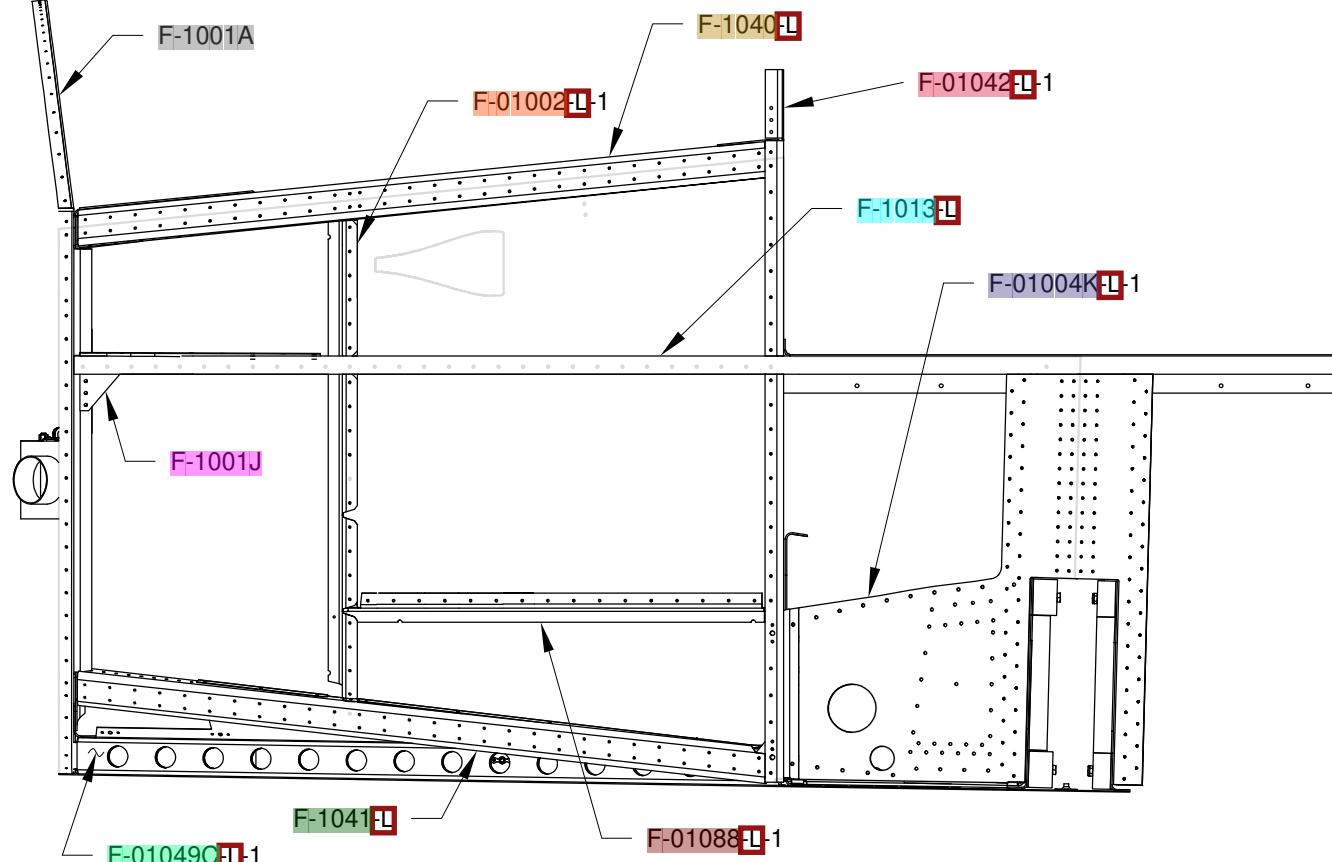
**Step 2:** Final-Drill #40 the holes common between the F-1001A Firewall Bulkhead and the F-01069-L-1 & F-01069-R-1 Fwd Side Skin. See Figure 1.

**Step 3:** Flush the forward ends of the F-1013-L and F-1013-R Fwd Fuselage Longerons against the inside face of the F-01069-L-1 & -R-1 Fwd Side Skins, then clamp them to the F-1001J-L and F-1001J-R Longeron Gussets. Match-Drill #40 the holes common between the fwd side skins and the fwd fuselage longerons. With the clamps still in place, match-drill #30 as many of the holes as possible in the upper flange of the longeron gussets into the fwd fuselage longerons. Cleco, remove the clamps, and finish match-drilling the remaining holes.

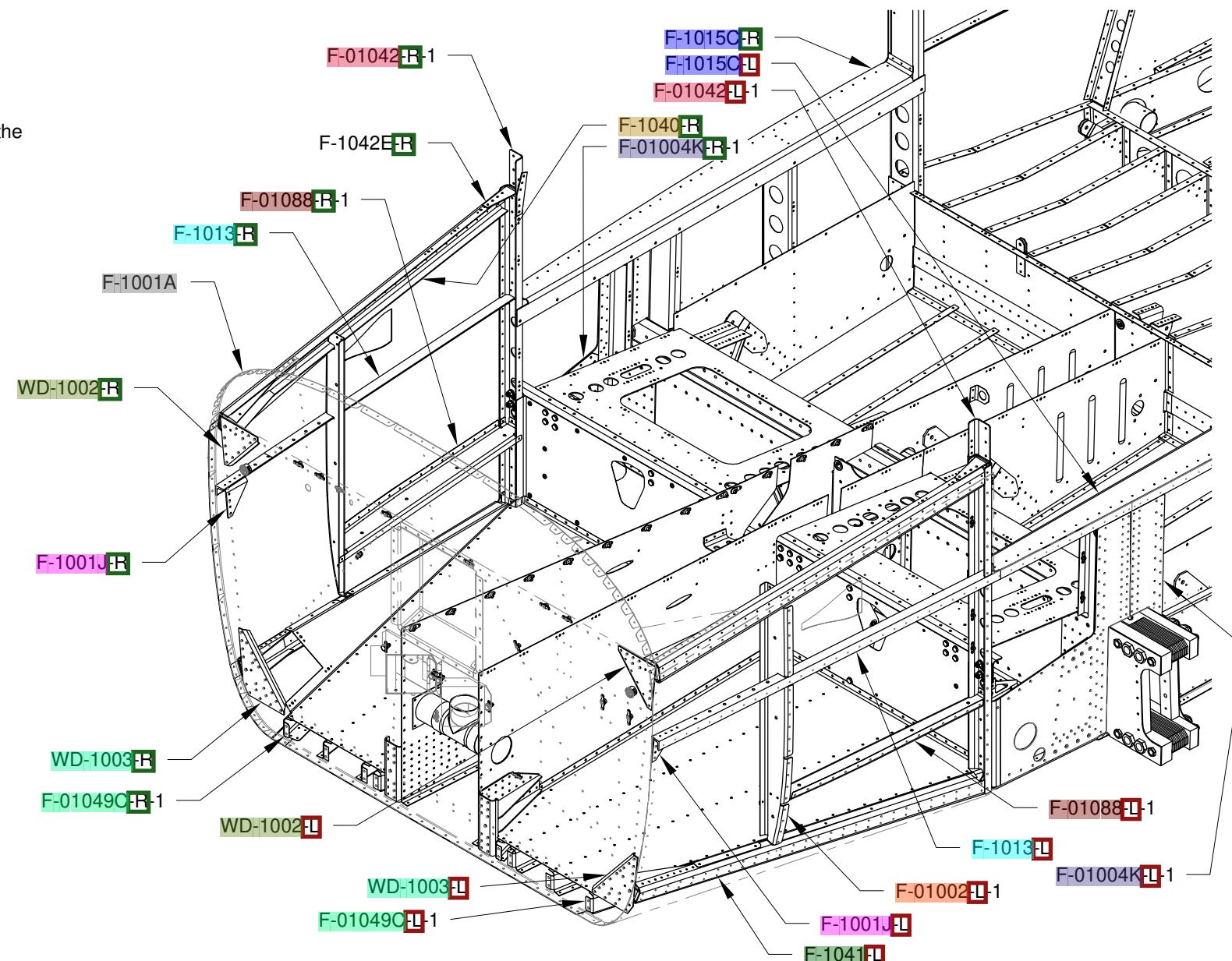
**Step 4:** Final-Drill #30 the holes common between the F-01042-L-1 & F-01042-R-1 Bulkhead Side Channels and the F-1042E-L and -R Gussets. Final-Drill #30 the holes in the gussets into the upper flange of the F-1040-L and F-1040-R Upper Fuse Channels. See Page 29-12, Figure 2.

**Step 5:** Final-Drill #40 the holes common between the forward flange of the F-1015C-L and F-1015C-R Mid Cabin Decks and the F-01042-L-1 & F-01042-R-1 Bulkhead Side Channels. See Figure 2.

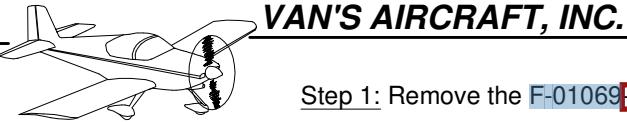
**Step 6:** Match-Drill #30 the hole in the lower tab of the F-01002-L-1 & F-01002-R-1 Fwd Fuselage Bulkheads into the upper flange of the F-1041-L and F-1041-R Lwr Fuselage Channels. See Figure 2.



**FIGURE 1: DRILLING THE F-01069-L-1 & F-01069-R-1 FWD SIDE SKINS  
(FWD SIDE SKIN SHOWN TRANSPARENT)**

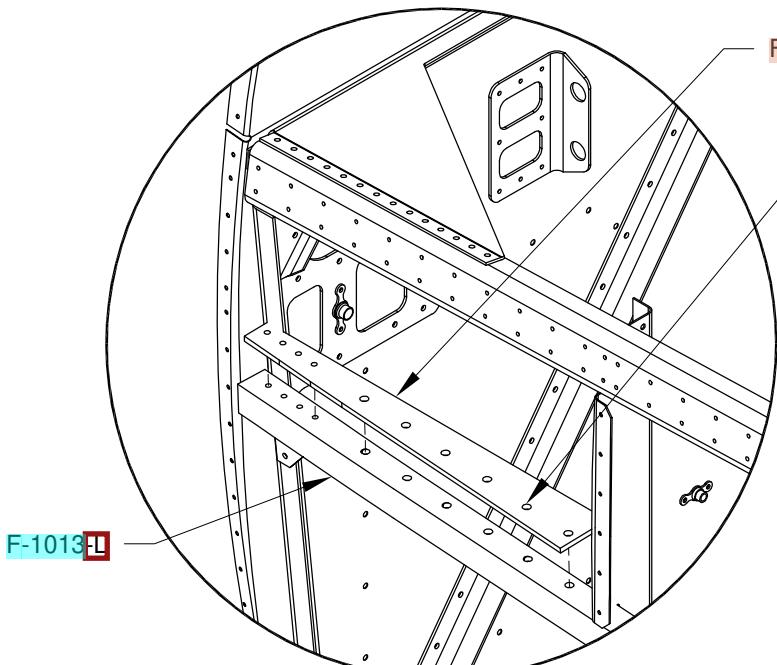


**FIGURE 2: DRILLING THE UNDERSTRUCTURE  
(FWD SIDE SKIN SHOWN TRANSPARENT)**



Step 1: Remove the F-01069-R-1 & F-1 Fwd Side Skins.

Step 2: Cleco the F-1039J Rudder Pedal Drill Jig to the F-1013-L Fwd Fuse Longeron as shown in Figure 1. Double check that the rudder pedal drill jig is not upside-down! Match-Drill #12 the six aft most holes in the rudder pedal drill jig into the fwd fuse longeron. Repeat this step for the right side of the aircraft.



**FIGURE 1: DRILLING THE RUDDER PEDAL ATTACH HOLES**

Step 3: Uncleco and pull back the F-1040 and F-1041 Upper and Lwr Fuselage Channels, clear out all chips then recleco them in place.

**NOTE:** It is acceptable to trim the flange of the F-1001D and F-1001M Side Angles if required for drill access.

Step 4: Match-Drill #30 the holes in the lower flange of the F-1040-L and F-1041-L Upper Fuse Channels into the WD-1002-L and -R Upper Firewall Brackets.

Step 5: Match-Drill #30 the holes in the F-1001B Firewall Upper Angle into the F-1040-L and F-1041-L Upper Fuse Channels and WD-1002-L and -R Upper Firewall Brackets. Match-Drill #30 the remaining holes aft of the firewall brackets common to the firewall upper angle and the upper fuse channels. Remove the cleco from the aft most hole common to these two parts and final-drill the hole #30 on both sides of the aircraft.

Step 6: Match-Drill #30 the holes along the upper and lower flanges of the F-1041-L and F-1041-R Lwr Fuse Channels into the WD-1003-L-PC and F-1004K-L-1 Lower Firewall Brackets.

Step 7: Match-Drill #30 the holes along the outboard flange of the F-1050-L-1 & F-1050-R-1 Fwd Cabin Floor Panels into the upper flanges of the F-1041-L and F-1041-R Lwr Fuse Channels.

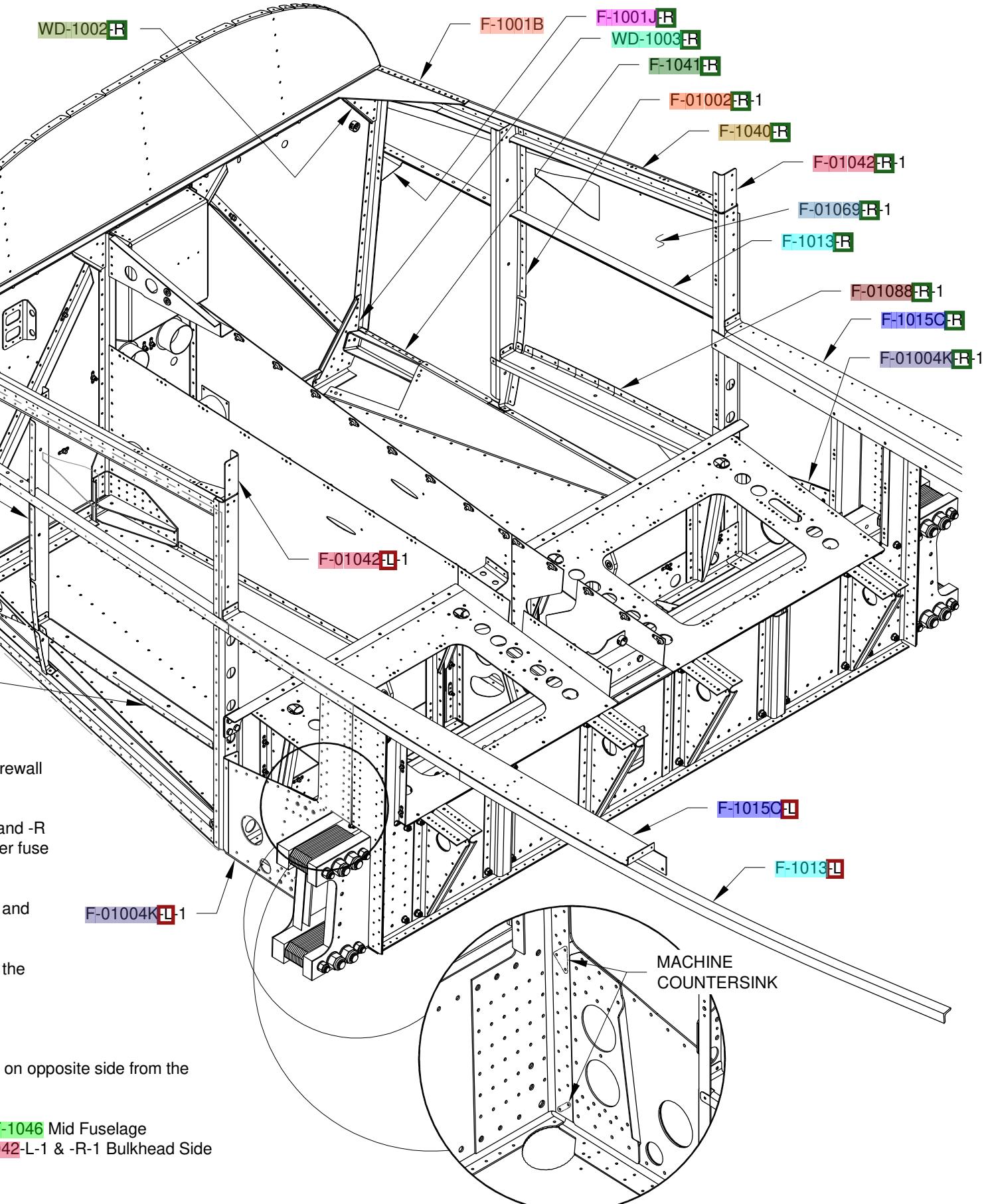
Step 8: Disassemble all the parts used in this section from the understructure. Deburr the parts and the understructure.

Step 9: Machine countersink all the #40 holes in the F-1015C-L and F-1015C-R Mid Cabin Decks for the head of an AN426AD3 rivet (flush head on opposite side from the understructure).

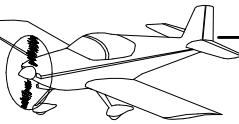
Machine countersink the holes that are common with the F-01069-R-1 & F-1 Fwd Side Skins in the F-1013 Fwd Fuselage Longerons, F-1046 Mid Fuselage Longerons, F-01004K-L-1 & F-1 Center Section Side Plates, F-1040 Upper Fuse Channels, F-1041-L Lower Fuse Channels and F-01042-L-1 & -R-1 Bulkhead Side Channels (see Page 29-1, isometric view and Figure 2).

Machine countersink the holes in the F-1005C-L and F-1005C-R Bulkhead Side Channels that are common to the F-1070 Mid Side Skins.

Step 10: Machine countersink for double flush rivets the five holes in each F-01004C-L-1 & F-1 Center Section Bulkhead as shown in the detail view of Figure 2.



**FIGURE 2: DRILLING THE UNDERSTRUCTURE  
(SIDE SKIN SHOWN TRANSPARENT)**



Step 1: Dimple the holes in the F-1001A Firewall Bulkhead, F-01002-L-1 & R-1 Fwd Fuselage Bulkheads and F-01088-L-1 & -R-1 Fwd Fuselage Ribs that are common to the F-01069-L-1 & R-1 Fwd Side Skins.

Dimple the single hole in the forward tab of the F-01088-L-1 & R-1 Fwd Fuselage Ribs.

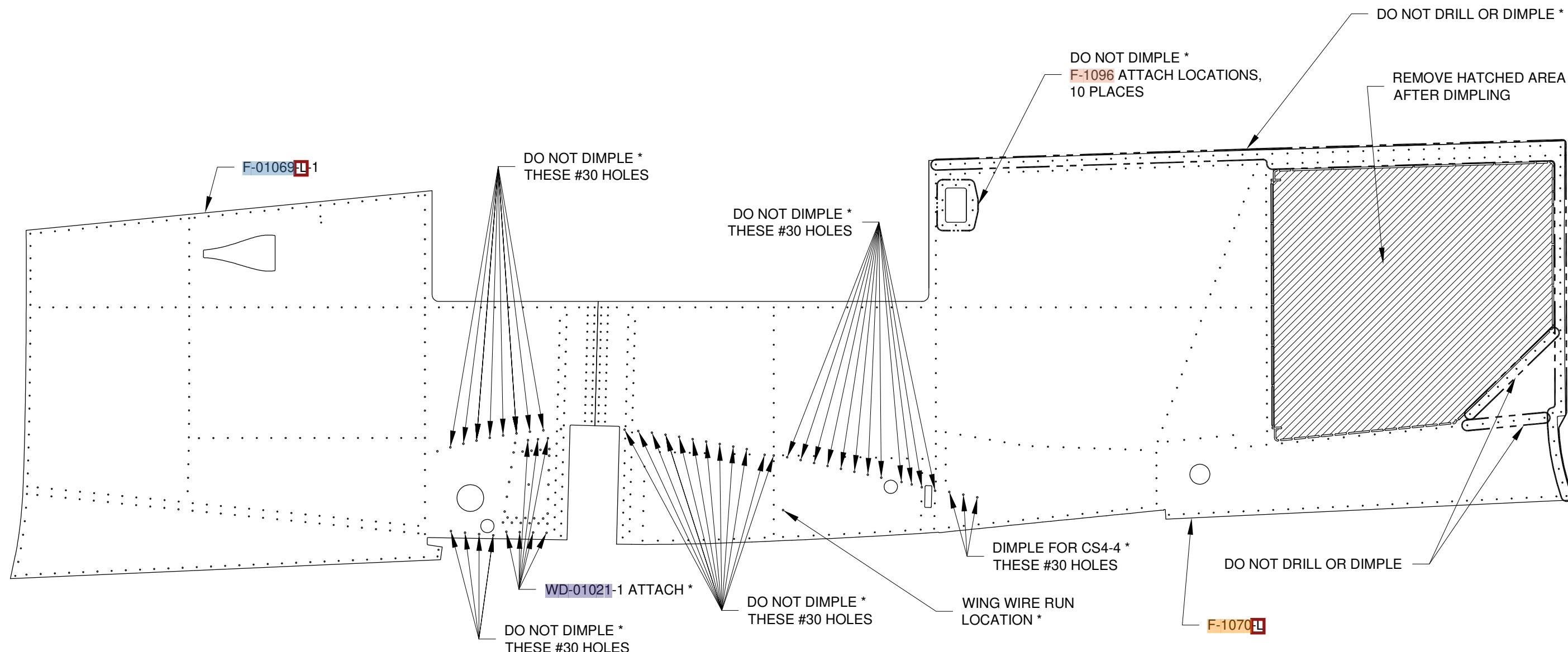
Dimple the holes in the F-1015B Foot Well Rib Intercostals, F-1015F Spacers, F-1034C Fuselage Bulkheads, F-1023 Baggage Floor Angles and F-10100A and F-10101 Baggage Door Shims (note the shims orientation and the holes **not** to be dimpled on Page 29-8, Figure 2) holes that are common to the F-1070 Mid Side Skins.

Step 2: Using the callouts in Figure 1 dimple the F-01069-L-1 & R-1 Fwd Side Skins and the F-1070 Mid Side Skins.

Step 3: Remove the hatched area from the baggage door area on the F-1070-L Mid Side Skin as shown in Figure 1.

Step 4: Enlarge the wing wire run location in the F-1070-L and R Mid Side Skins (see Figure 1) for a snap bushing that will accommodate the wires and pressure lines coming from the wing. Deburr, then install a snap bushing in the wing wire run hole. Because of its custom size the snap bushing is not provided in the kit but can be purchased through Van's Aircraft Accessory Catalog. If this hole is not utilized leave it open.

Step 5: Check that all parts worked with in this section have been deburred. Prime the F-1013-L and R Fwd Fuse Longerons and the F-1046-L and R Mid Fuse Longerons. Prime the remaining parts if desired.



**FIGURE 1: DIMPLING THE SIDE SKINS**

(\* CALL-OUTS REFER TO LEFT AND RIGHT SIDE SKINS)



Step 1: Modify the empennage bucking bar created on Page 9-12, Step 3 for use in the rest of this section. See Figure 1.

Step 2: Rivet the F-1034B Seat Back Brace to the F-1034C-L and F-1034C-R Fuselage Bulkheads per the callouts on Page 29-7, Figure 1. Rivet the seat back brace, F-1034E Seat Back Brace Gusset, F-1046-L Mid Fuse Longerons and F-10102B Baggage Door Seal Angle together per the callouts on Page 29-6, Figure 2. Rivet the F-10102A Baggage Door Seal Angle to the mid fuse longeron per the callouts on Page 29-6, Figure 2.

Rivet the seat back brace and seat back brace gusset to the F-1046-L Mid Fuse Longerons together per the callouts on Page 29-7, Figure 1.

Step 3: Rivet the F-1046-L Mid Fuse Longeron to the F-1005E-L Gusset. Rivet the F-1046-R Mid Fuse Longeron to the F-1005E-R Gusset. Rivet callouts are on Page 29-9, Figure 2.

Step 4: Cleco the F-01002-L-1 & F-01002-R-1 Fwd Fuselage Bulkheads, F-1040 Upper Fuse Channels, F-1041 Lwr Fuse Channels and F-1042E Gussets together and to the understructure.

Step 5: Rivet the upper flange of the F-1040 Upper Fuse Channels to the F-1001B Firewall Upper Angle and WD-1002 Upper Firewall Brackets. Rivet the lower flange of the upper fuse channels to the upper firewall brackets. Rivet both the upper and lower flanges of the F-1041 Lwr Fuse Channels to the WD-1003 Lower Firewall Brackets. Rivet callouts are on Page 29-12, Figure 2.

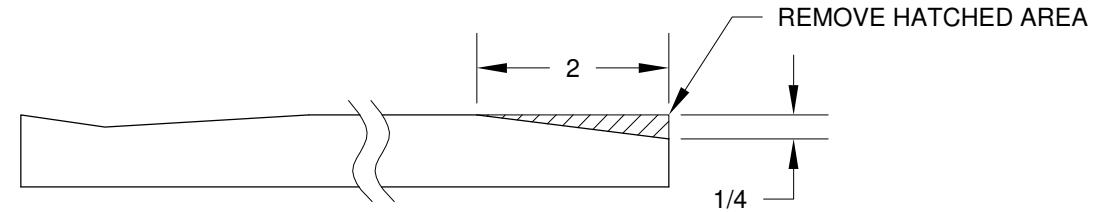
Step 6: Slip the F-1013 Fwd Fuse Longerons into place, then cleco them to the F-1001J Longeron Gussets. Rivet the fwd fuselage longerons to the longeron gussets. See Page 29-12, Figure 2.

Step 7: Rivet the F-1042E Gussets to the F-1042 Bulkhead Side Channels and F-1040 Upper Fuse Channels per the callouts on Page 29-12, Figure 2.

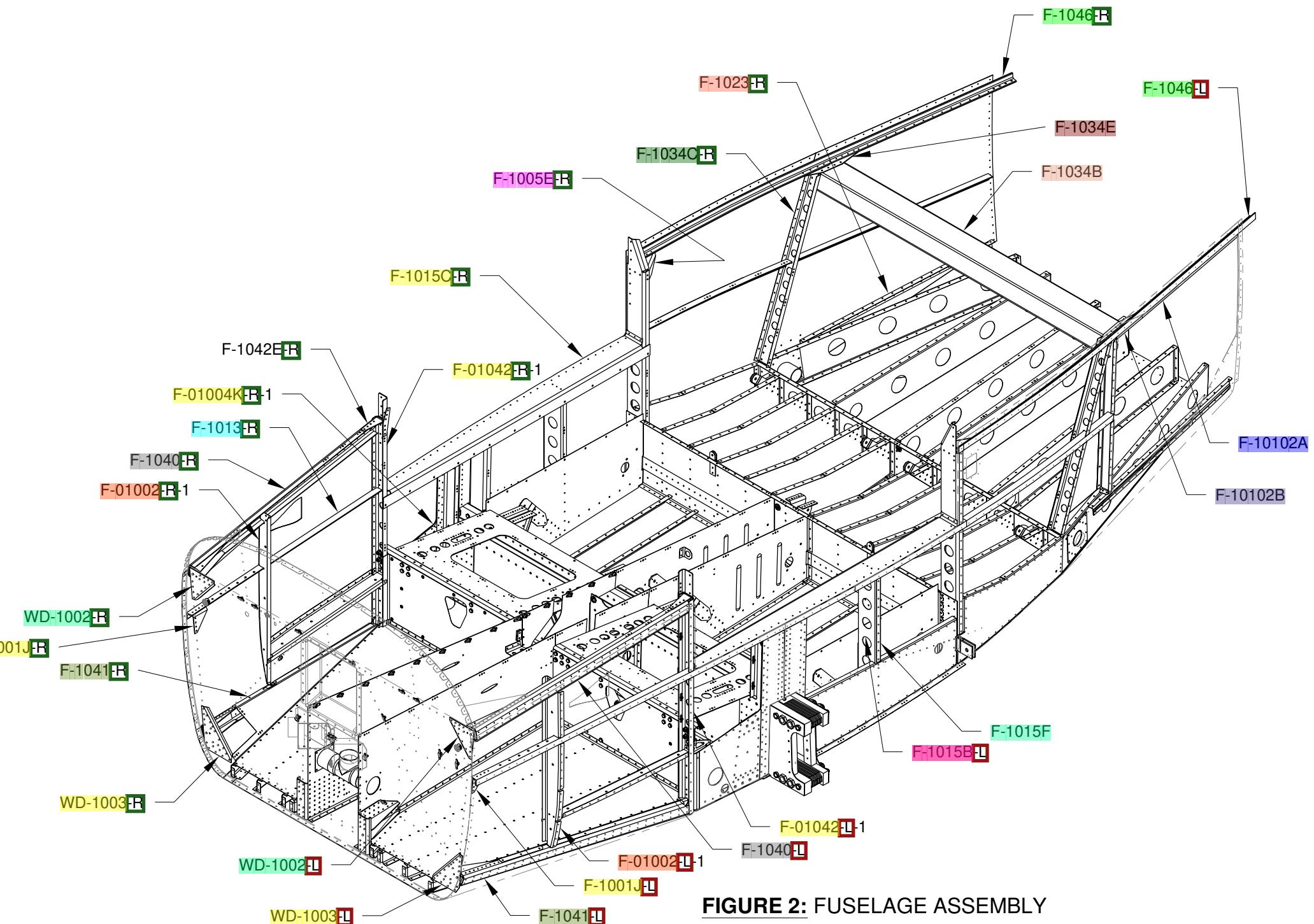
Step 8: Rivet the lower tab on the F-01002-L-1 & F-01002-R-1 Fwd Fuselage Bulkheads to the upper flange of the F-1041 Lwr Fuse Channels. Rivet callouts are on Page 29-12, Figure 2.

Step 9: Rivet the F-1023-L Baggage Floor Angle and the F-10100A and F-10101 Baggage Door Shims to the F-1070-L Mid Side Skin per the rivet callouts on Page 29-8, Figure 2 (do not rivet the seven aft most holes marked **do not rivet**). Rivet the F-1023-R Baggage Floor Angle to the F-1070-R Mid Side Skin per the callouts on Page 29-8, Figure 3. Back riveting on a plate works well for this step.

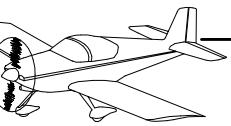
Step 10: Cleco the F-01069-L-1 & F-01069-R-1 Fwd Side Skins, F-01042B-1 and C-1 Clips, F-1015F Spacers, F-1070 Mid Side Skins to the fuselage assembly understructure. Check that the forward and mid side skins butt against one another properly.



**FIGURE 1: MODIFYING THE EMPENNAGE BUCKING BAR**



**FIGURE 2: FUSELAGE ASSEMBLY**



Step 1: Start by riveting the double row of rivets on either side of the joint between the F-01069L-1 & F-1 Fwd Side Skins and the F-1070 Mid Side Skins. Rivet callouts are in Figure 1, Figure 2 and Page 29-18, Figure 1.

Rivet the F-1070R Mid Side Skins to the fuselage assembly understructure using the callouts in Figure 1 and Figure 2 (Only rivet the locations that have callouts).

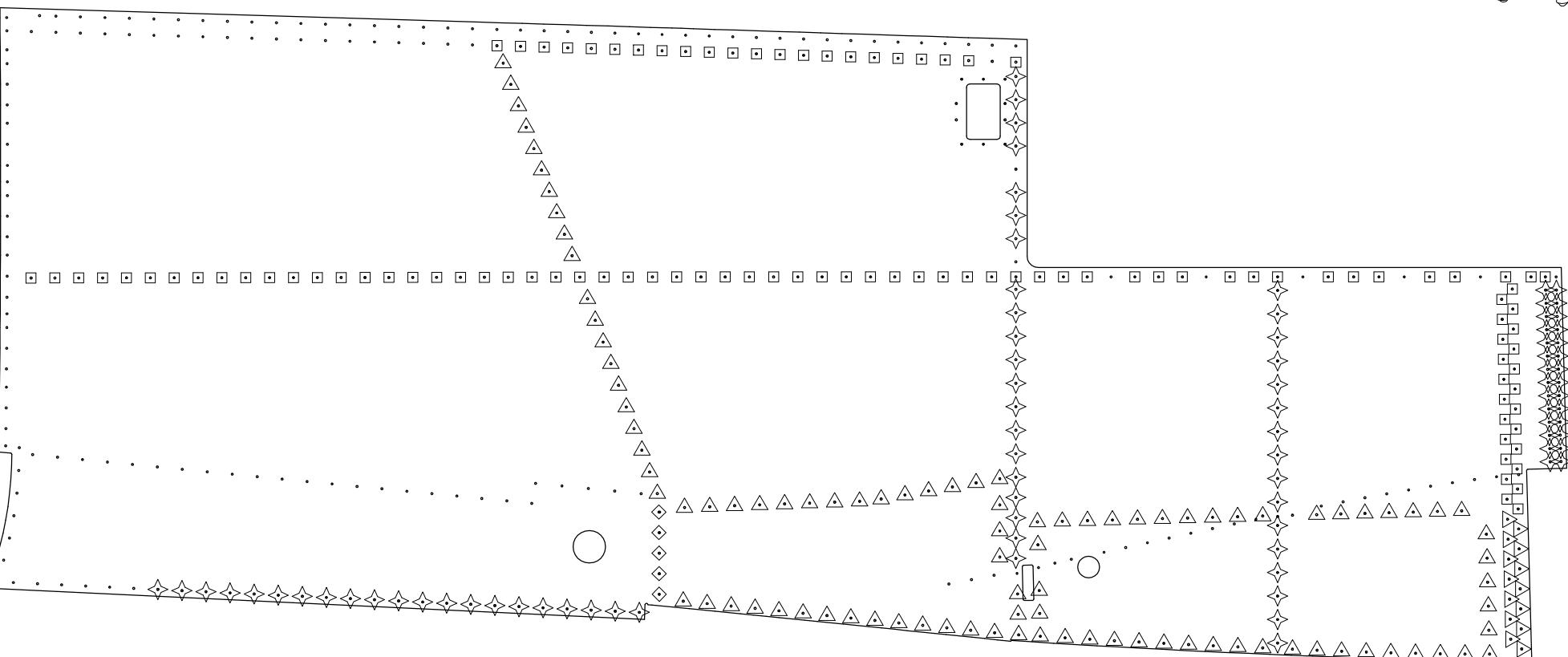
Step 2: Cleco the F-1015C Mid Cabin Decks to the understructure.

Step 3: Rivet the F-1015C Mid Cabin Decks to the F-1005C Bulkhead Side Channels per the callouts on Page 29-7, Figure 1.

Rivet the mid cabin decks to the F-1015B Foot Well Rib Intercostals per the callouts on Page 29-7, Figure 1.

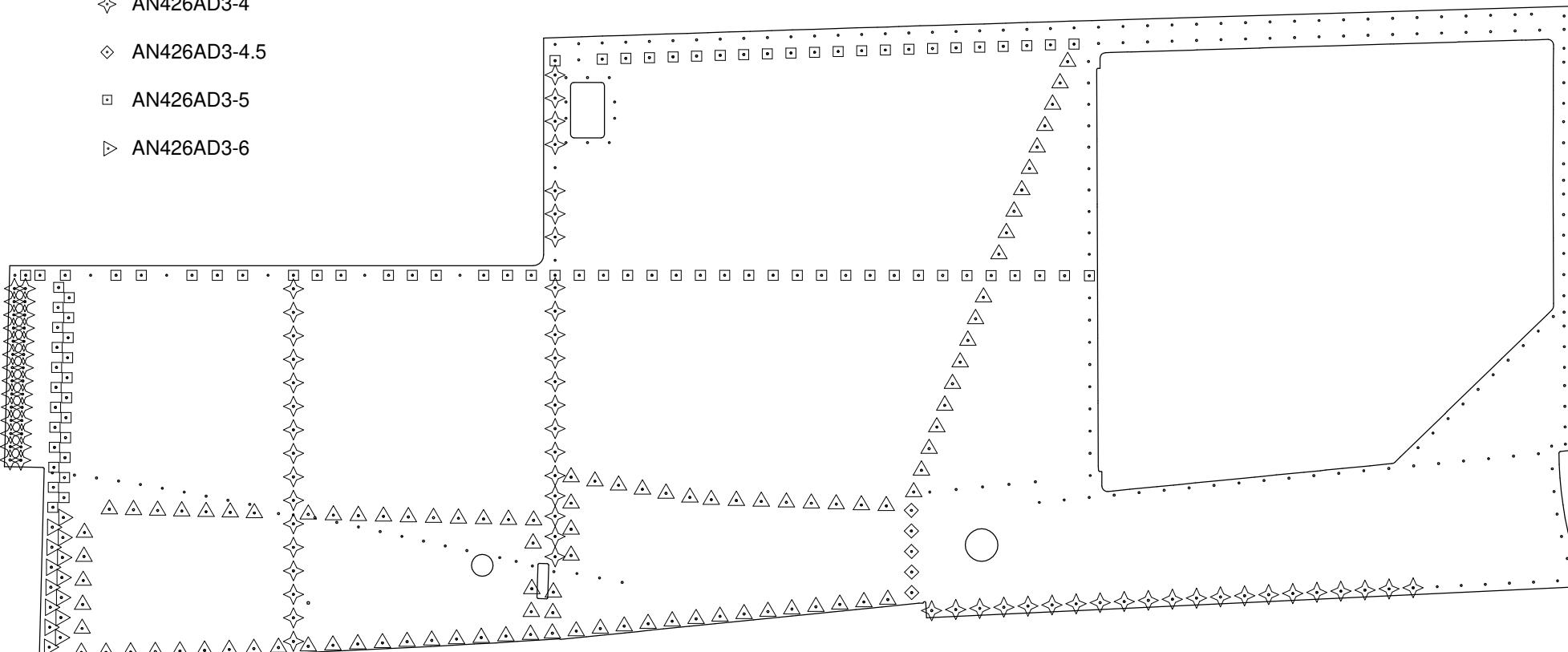
Rivet the mid cabin decks to the F-01042L-1 & F-1 Bulkhead Side Channels per the rivet callouts on Page 29-12, Figure 2

Rivet the mid cabin decks to the F-1013 Fwd Fuse Longerons per the callouts on Page 29-7, Figure 1.

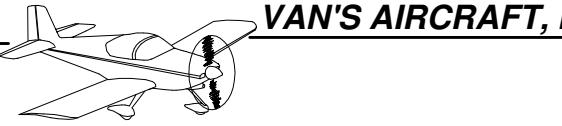


**FIGURE 1: F-1070R RIVET CALLOUTS**

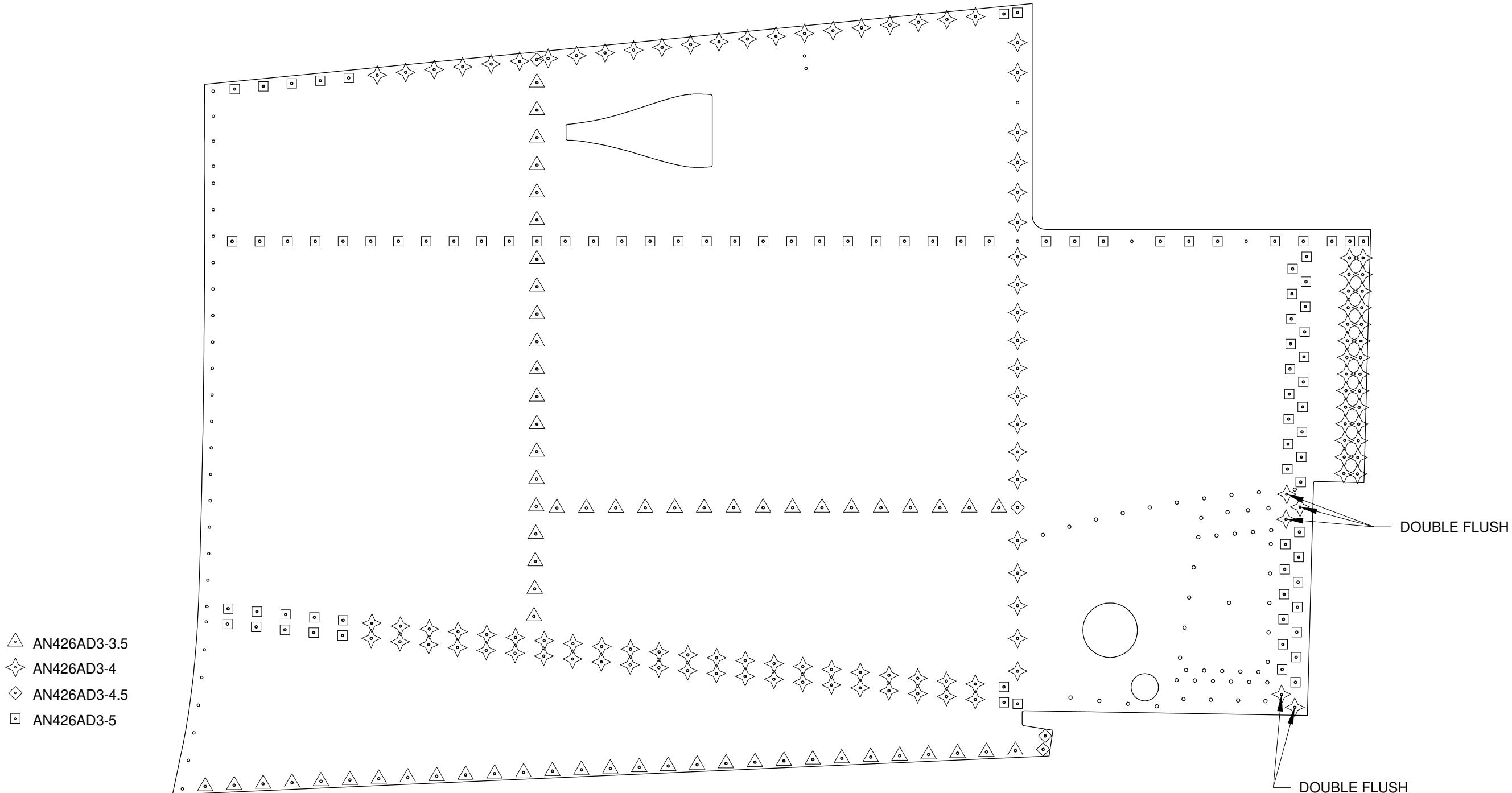
- △ AN426AD3-3.5
- ◊ AN426AD3-4
- ◊ AN426AD3-4.5
- AN426AD3-5
- ▷ AN426AD3-6



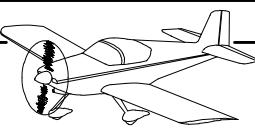
**FIGURE 2: F-1070L RIVET CALLOUTS**



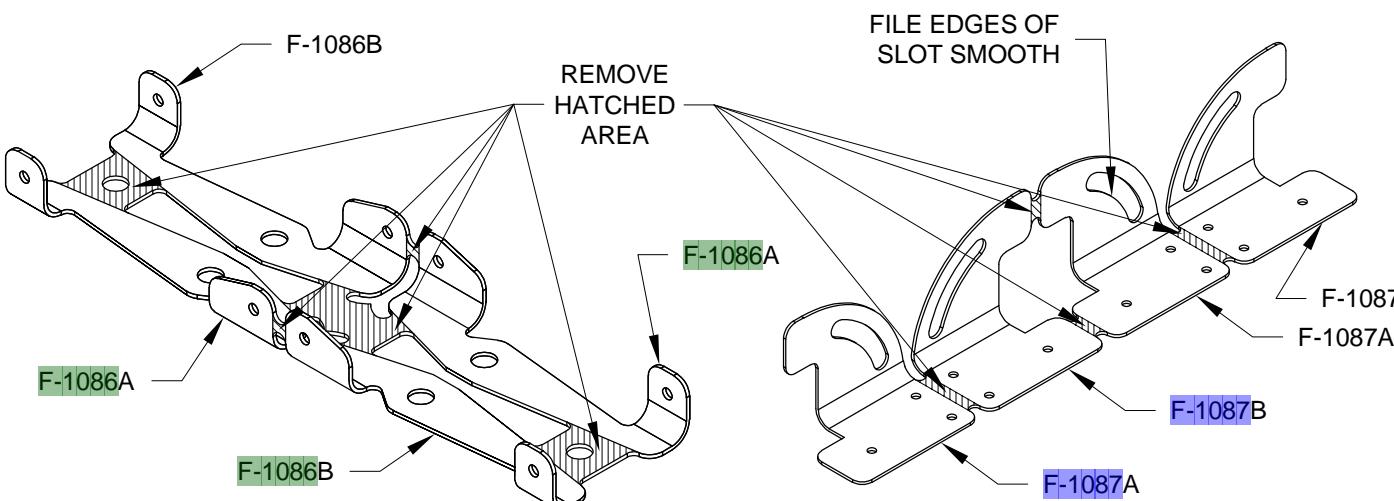
Step 1: Rivet the F-01069-L-1 & R-1 Fwd Side Skins to the fuselage assembly understructure per the callouts in Figure 1. Begin riveting at the bottom and work upwards. Note the double flush rivets. **Only rivet the locations that have rivet callouts!**



**FIGURE 1: RIVET CALLOUTS FOR THE FWD SIDE SKINS**



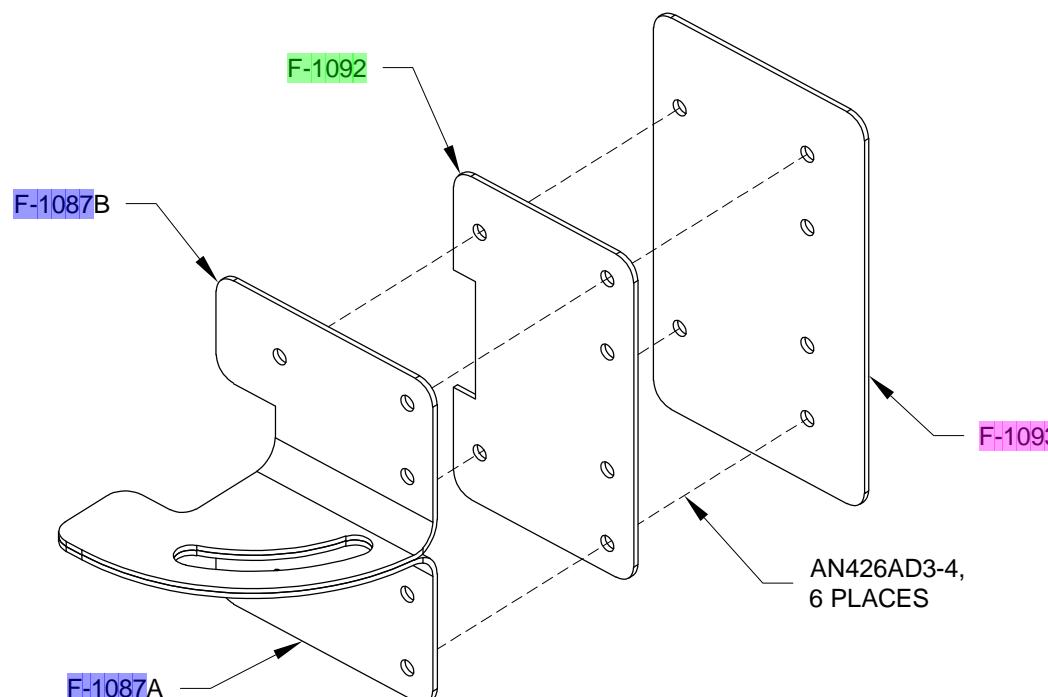
Step 1: Cut apart the F-1086 Vent Bracket into two F-1086A and two F-1086B Vent Brackets as shown in Figure 1. Cut apart the F-1087 Vent Slide into two F-1087A and two F-1087B Vent Slides as shown in Figure 2.



**FIGURE 1: CUTTING APART THE VENT BRACKETS**

**FIGURE 2: CUTTING APART THE VENT SLIDES**

Step 2: Cleco the F-1087A Vent Slide, F-1087B Vent Slide, F-1092 Vent Door Doubler and F-1093 Vent Door together as shown in Figure 3. Final-Drill #40 the holes common between these parts. This creates the Vent Door Subassembly. Repeat this step to create a second vent door subassembly.



**FIGURE 3: ASSEMBLING THE VENT DOOR**

Step 3: File the edges of the slot smooth in the F-1087A and F-1087B Vent Slides. Check that an AN525-10R7 Screw smoothly slides along the entire length of the slot.

Step 4: Cleco the F-1086A and F-1086B Vent Brackets and the F-1096 Vent Doubler to the F-1070-L Mid Side Skin as shown in Figure 4. Final-Drill #40 the holes common between these parts. Repeat this step for the right side of the aircraft.

Step 5: Machine countersink the holes in the F-1093 Vent Doors and F-1070-L Mid Side Skins to place the flush face on the outboard side of the aircraft. Disassemble the F-1086A and F-1086B Vent Brackets and F-1096 Vent Doublers from the F-1070 Mid Side Skins. Disassemble the Vent Door Subassemblies. Deburr and prime all parts if/as desired.

**NOTE:** A small block of wood is helpful to keep the tabs of F-1086A and F-1086B separated.

Step 6: Rivet the F-1096 Vent Doubler to the F-1070-L Mid Side Skin as shown in Figure 4 leaving open the four holes that attach the F-1086A and F-1086B Vent Brackets. Rivet the vent brackets using these four holes. Repeat this step for the right side of the aircraft.

Step 7: Machine countersink one side of the VENT-00004 VENT KNOB for the set screw.

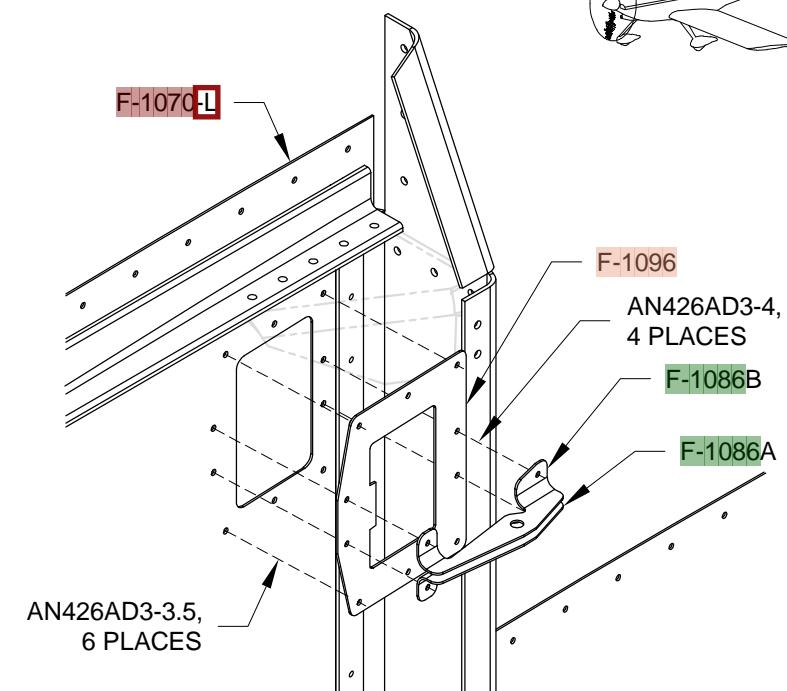
Step 8: Insert the tab portion of the Vent Door Subassembly fully into the slot of the VENT-00004 centered on the tab, orient the previously countersunk hole towards the bottom of the vent door as shown in Figure 4.

Step 9: Match Drill #43 the Vent Door Subassembly using the hole in the VENT-00004.

Step 10: Tap 4-40, the VENT-00004 and Vent Door Assembly.

Step 11: Remove the VENT-00004 from the Vent Door Assembly.

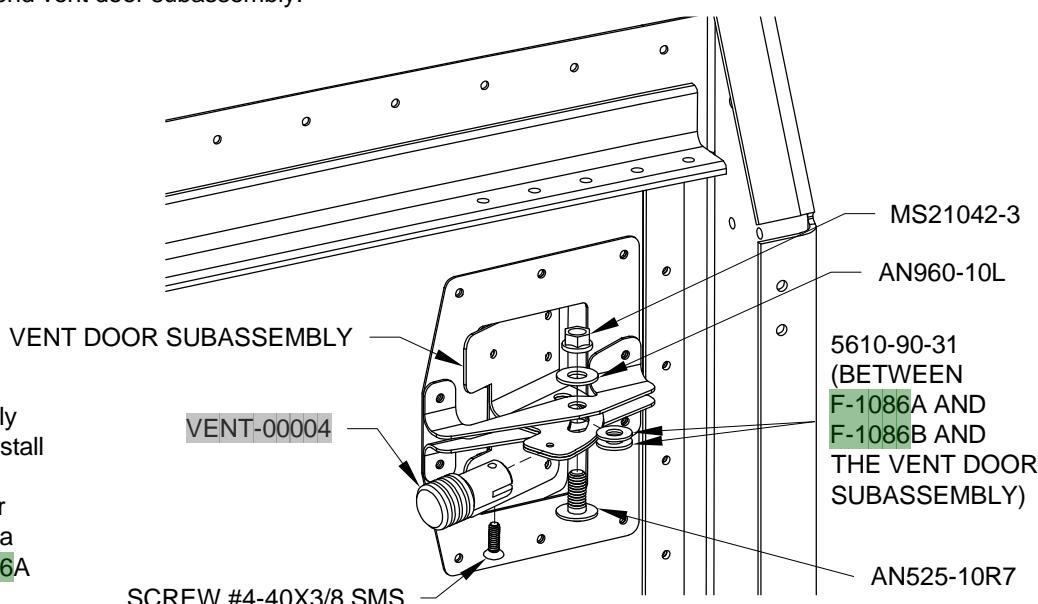
Step 12: Rivet the F-1087A Vent Slide, F-1087B Vent Slide, F-1092 Vent Door Doubler and F-1093 Vent Door together as shown in Figure 3. Repeat this step to create a second vent door subassembly.



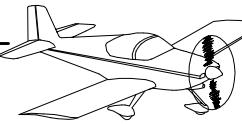
**FIGURE 4: ASSEMBLING THE VENT DOUBLER AND BRACKETS**

Step 13: Install the Vent Door Subassembly and VENT-00004 as shown in Figure 5. Install the hardware through the F-1086A and B Vent Brackets and the slot in the vent door subassembly as shown in Figure 5 (place a 5610-90-31 Nylon Washer between F-1086A and F-1086B and the Vent Door Subassembly).

Repeat this step for the right side of the aircraft.



**FIGURE 5: INSTALLING THE VENT DOOR SUBASSEMBLY  
(F-1005E-L NOT SHOWN FOR CLARITY)**



Step 1: Install the F-01050-R-1 Fwd Cabin Floor Panel into the fuselage by inserting its forward inboard corner beneath the WD-1004 Nose Gear Tension Fitting, then slide its forward edge beneath the F-1001C Firewall Lower Channel as shown in Figure 1.

Lower the aft end of the fwd cabin floor panel into place and cleco the fwd cabin floor panel to the mating structures. Blind rivet the fwd cabin floor panel into place using the rivets shown in Figure 2.

Install the F-01050-L-1 Fwd Cabin Floor Panel in the same way.

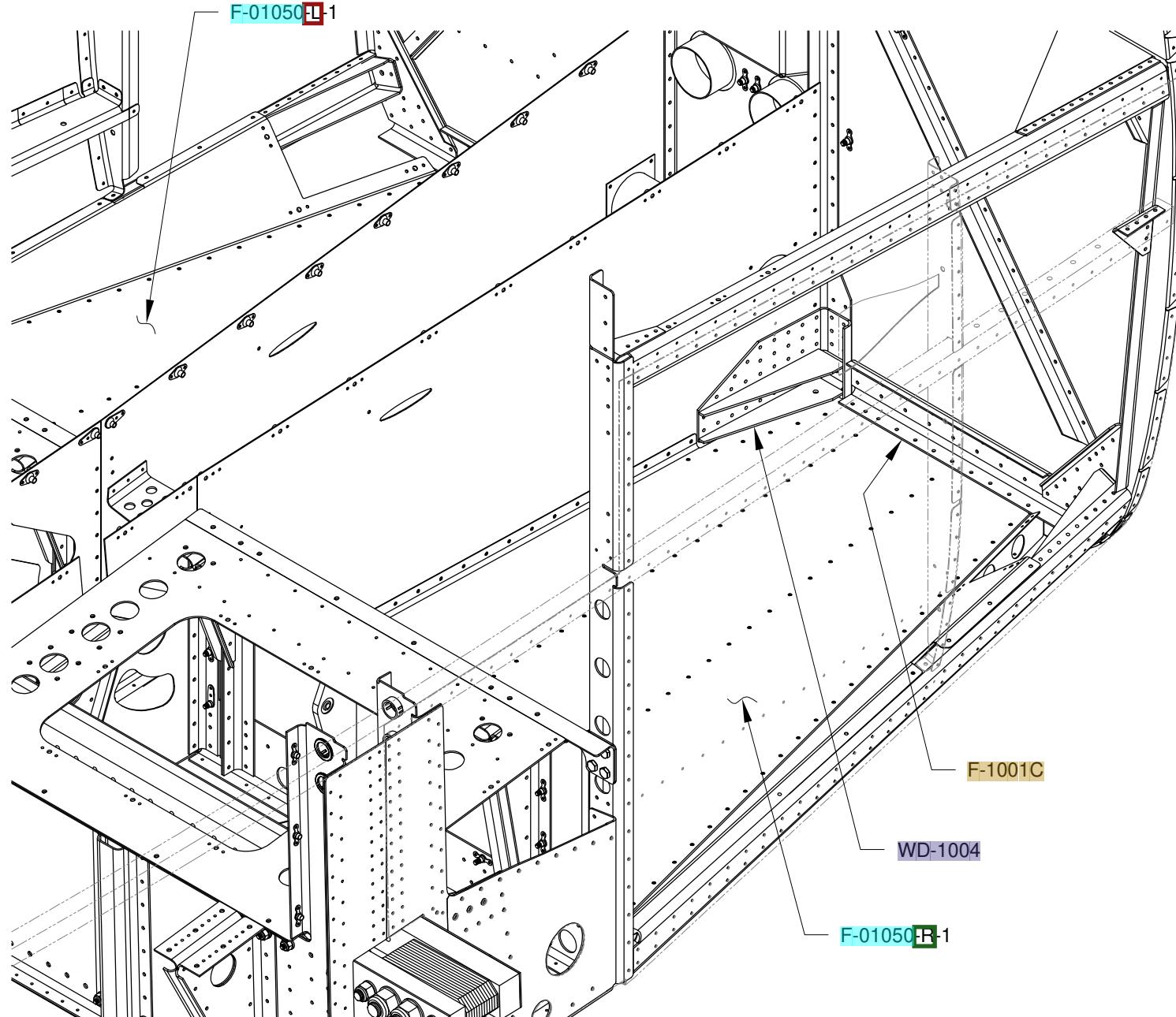


FIGURE 1: FWD CABIN FLOOR PANEL INSTALLATION

CS4-4  
LP4-3

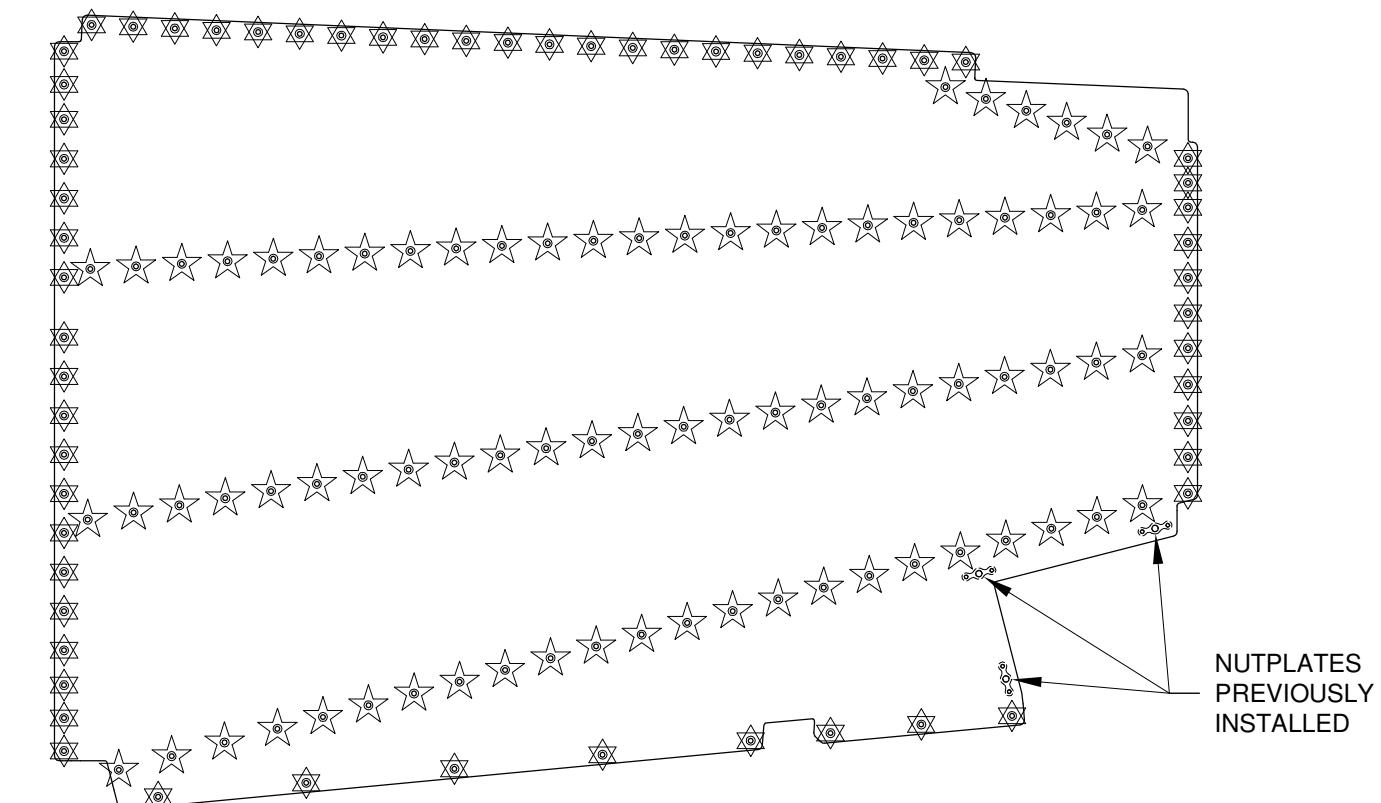
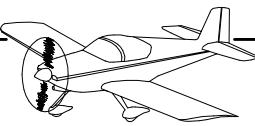


FIGURE 2: F-01050-1 RIVET CALLOUT



Step 1: Cleco the F-01004T-L Side Plate Doubler as well as the VA-00277 and VA-00278 Top and Bottom Drill Templates in place as shown in Figure 1.

For correct orientation, notice on the bottom drill template that the aft Ø.250 hole is closer to the edge than the forward Ø.250 hole. Cleco all the holes except the holes that correspond to the flanges of the landing gear mount (the holes within the Ø.250 holes in the drill templates).

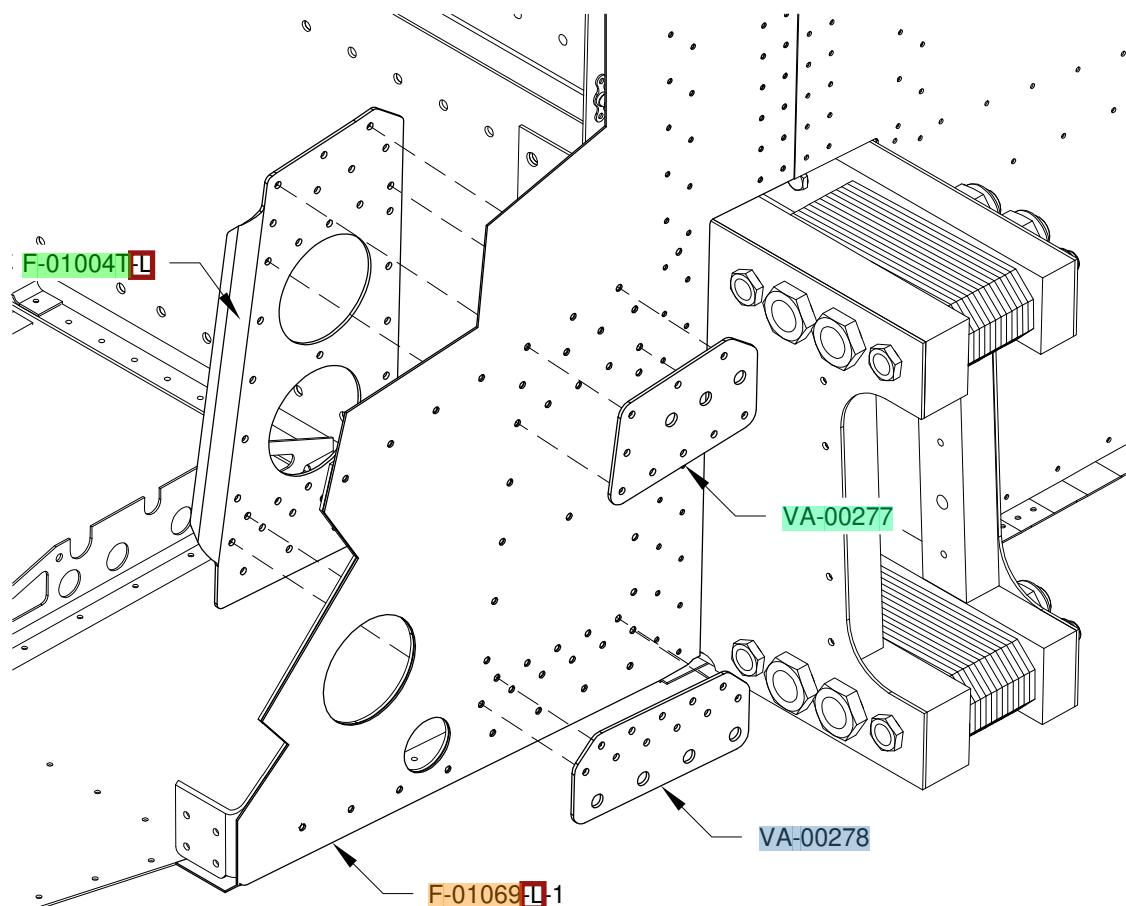
Step 2: Enlarge the cutouts in the F-01004A-1 Center Section Bulkhead, F-01004K-L-1 & R-1 Center Section Side Plates, F-01072-1 Fwd Fuse Bottom Skin, and F-1076 Mid Bottom Skin as required to clear the lower end of each WD-01021-L-1 & R-1 Landing Gear Mount socket.

Step 3: Temporarily bolt the landing gear mount in place on the center section using the four bolts shown in Figure 2. Use a drilling lubricant such as "Boelube" on the shank of the bolts to ease installation, but be sure not to get any on the threads. Tighten the nuts to the correct installation torque.

**NOTE: To enhance reflectivity, a piece of aluminum foil tape can be applied over the drill templates. The reflection of the drill bit will assist in keeping it perpendicular to the skin while drilling.**

Step 4: Match-Drill #30 the three #30 holes of the F-01069-L-1 Fwd Fuse Side Skin (visible within the Ø.250 holes in the top drill template) into the upper side flange of the WD-01021-L-1 Landing Gear Mount. Be sure to keep the bit perpendicular to the side of the fuselage while drilling, and use a drilling lubricant such as 'Boelube' when drilling steel.

Step 5: Match-Drill #30 the four #30 holes of the F-01069-L-1 Fwd Fuse Side Skin (visible within the Ø.250 holes in the bottom drill template) into the lower side flange of the landing gear mount. Again, be sure to keep the bit perpendicular to the side of the fuselage while drilling, and use a drilling lubricant.



**FIGURE 1: DRILL TEMPLATES**

Step 6: Final-Drill 1/4 one of the #30 holes (made in the previous step) in the lower side flange of the landing gear mount using the hole in the bottom drill template as a guide. Be sure to keep the bit perpendicular to the side of the fuselage while drilling. Insert an AN4 bolt to maintain alignment.

Step 7: Repeat the above step for the remaining three holes.

Step 8: Final-Drill 1/4 one of the #30 holes in the upper flange of the landing gear mount using the hole in the top drill template as a guide. Insert an AN4 bolt to maintain alignment.

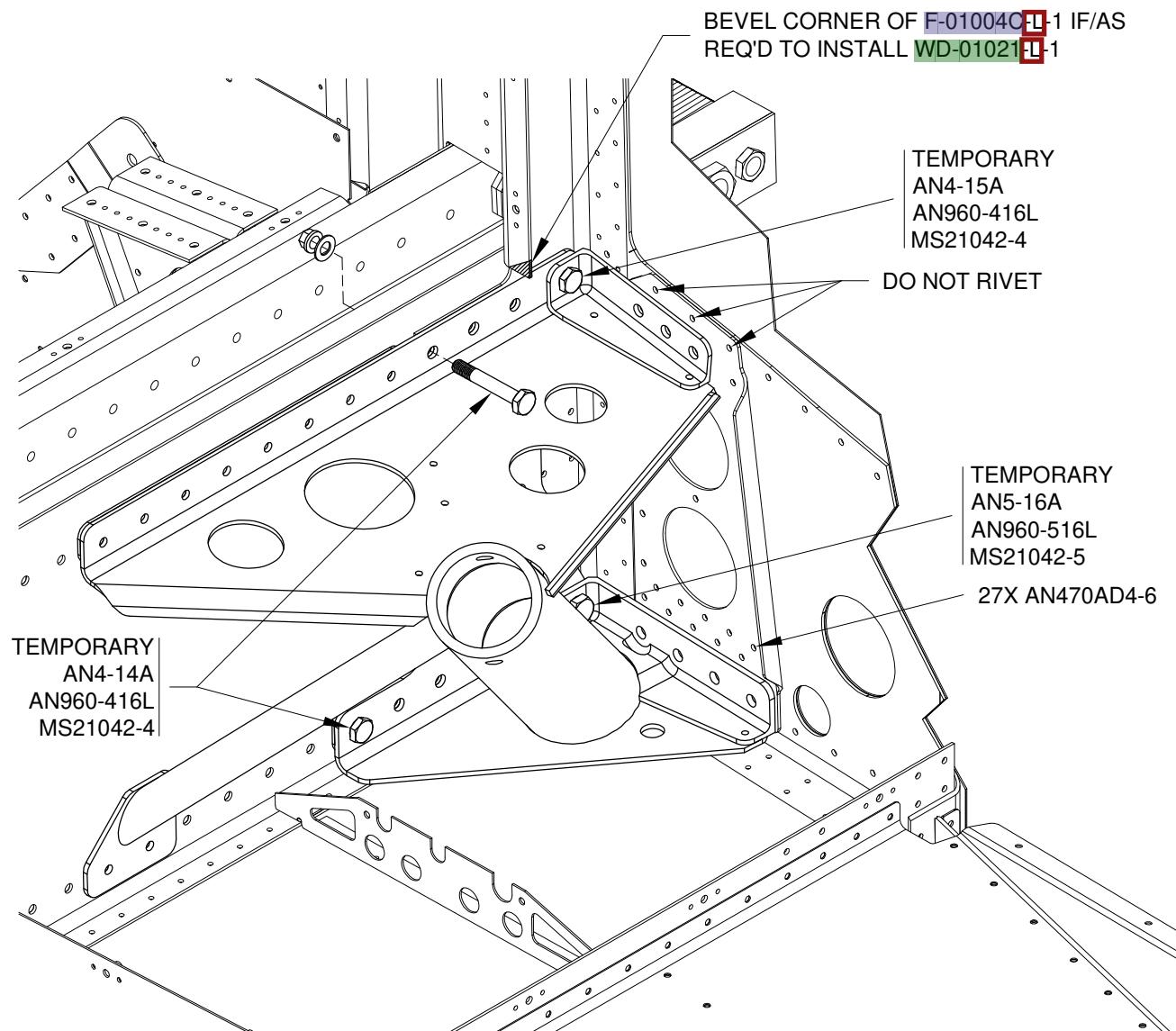
Step 9: Repeat the above step for the remaining two holes.

Step 10: Remove the drill templates.

Step 11: Remove the landing gear mount and side plate doubler. Deburr all of the drilled holes and prime the parts if desired.

Step 12: Cleco, then rivet all of the holes in the side plate doubler except for the upper row of three holes as shown in Figure 2.

Step 13: Repeat all of the above steps for the right side of the aircraft.



**FIGURE 2: TEMP INSTALL LANDING GEAR MOUNT**



AN3-14A  
AN960-10L  
MS21042-3

AN3-15A  
AN960-10L  
MS21042-3

AN4-15A  
AN960-416L  
MS21042-4

ADD SHIM AS REQ'D  
(STEP 2)

BUSH AL.197X.313X1.688

F-01057-L-1

AN4-6A  
AN960-416  
MS21042-4

AN4-14A  
AN960-416L  
MS21042-4

AN4-6A  
2X AN960-416  
(UNDER HEAD AND NUT)  
MS21042-4

AN5-16A  
AN960-516L  
MS21042-5

AN4-6A  
AN960-416L  
MS21042-4

F-01004T-L  
ADD SHIM  
AS REQ'D  
(STEP 2)

Step 1: Bolt the WD-01021-L-1 & FR-1 Landing Gear Mounts in place along with the F-01057-L-1 & FR-1 Mid Seat Rail Supports as shown in Figure 1.

Apply 'Boelube' to the shanks of the bolts (do not get any on the threads) and do not tighten any of the nuts until all of the bolts have been started in the carry through bars.

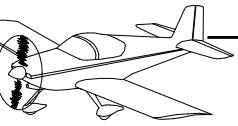
Step 2: Add a shim between the flanges of the landing gear mount(s) and the F-01004T-L & FR Side Plate Doublers if a gap of .040 inches or more exists (use the VA-00277 and VA-00278 Drill Templates to drill the Ø.250 holes in the shim).

AN3-41A  
AN960-10  
MS21042-3

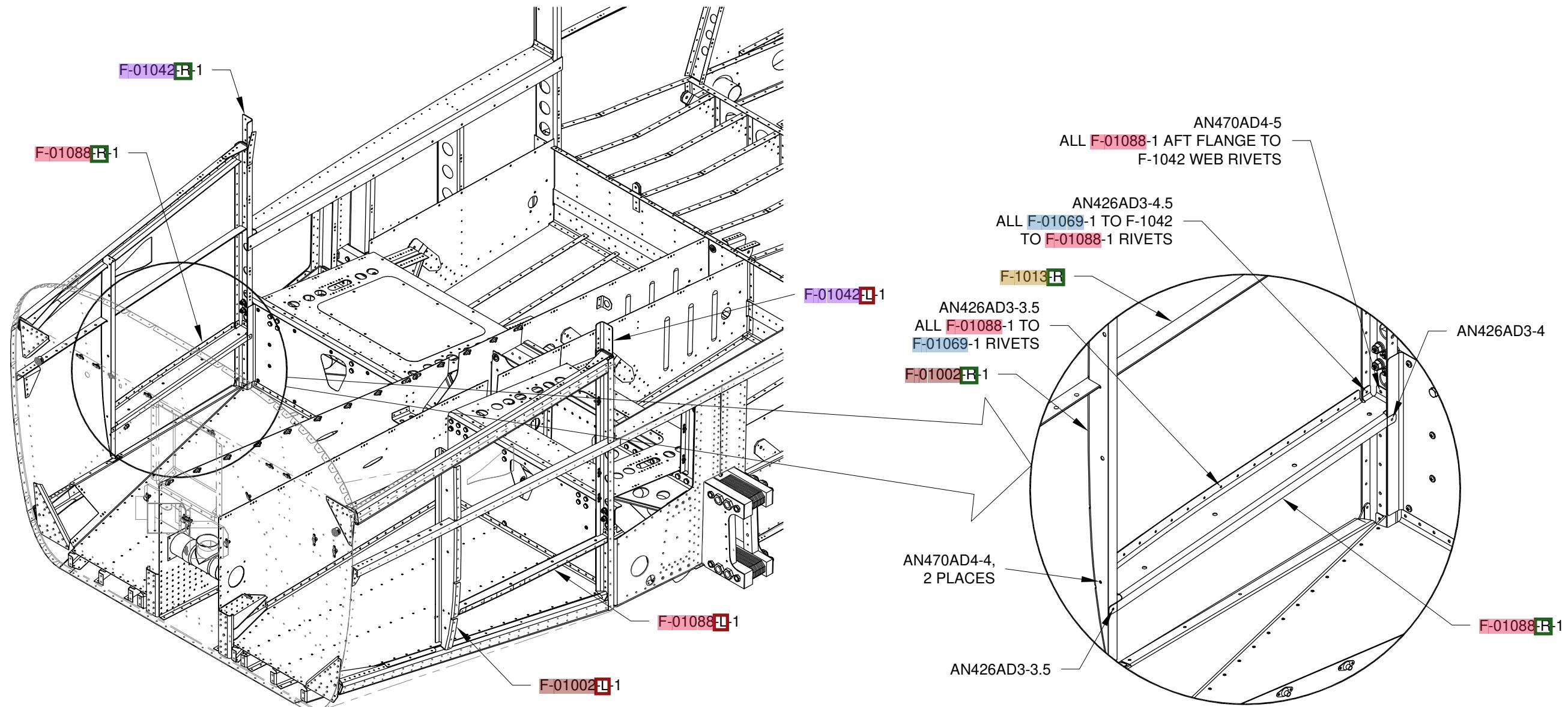
AN4-14A  
AN960-416L  
MS21042-4

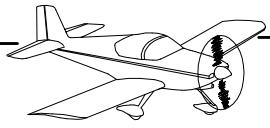
AN3-14A  
AN960-10L  
MS21042-3

**FIGURE 1: LANDING GEAR MOUNT INSTALLATION HARDWARE**  
(SOME PARTS OMITTED FOR CLARITY)



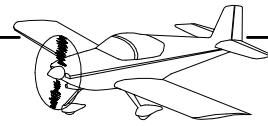
Step 1: Cleco then rivet the F-01088-L-1 & R-1 Fwd Fuselage Ribs to the F-01002-L-1 & -R-1 Fwd Fuselage Bulkheads, F-01042-L-1 & R-1 Bulkhead Side Channels, and F-01069-L-1 & -R-1 Fwd Side Skins per the rivet callouts in Figure 1.





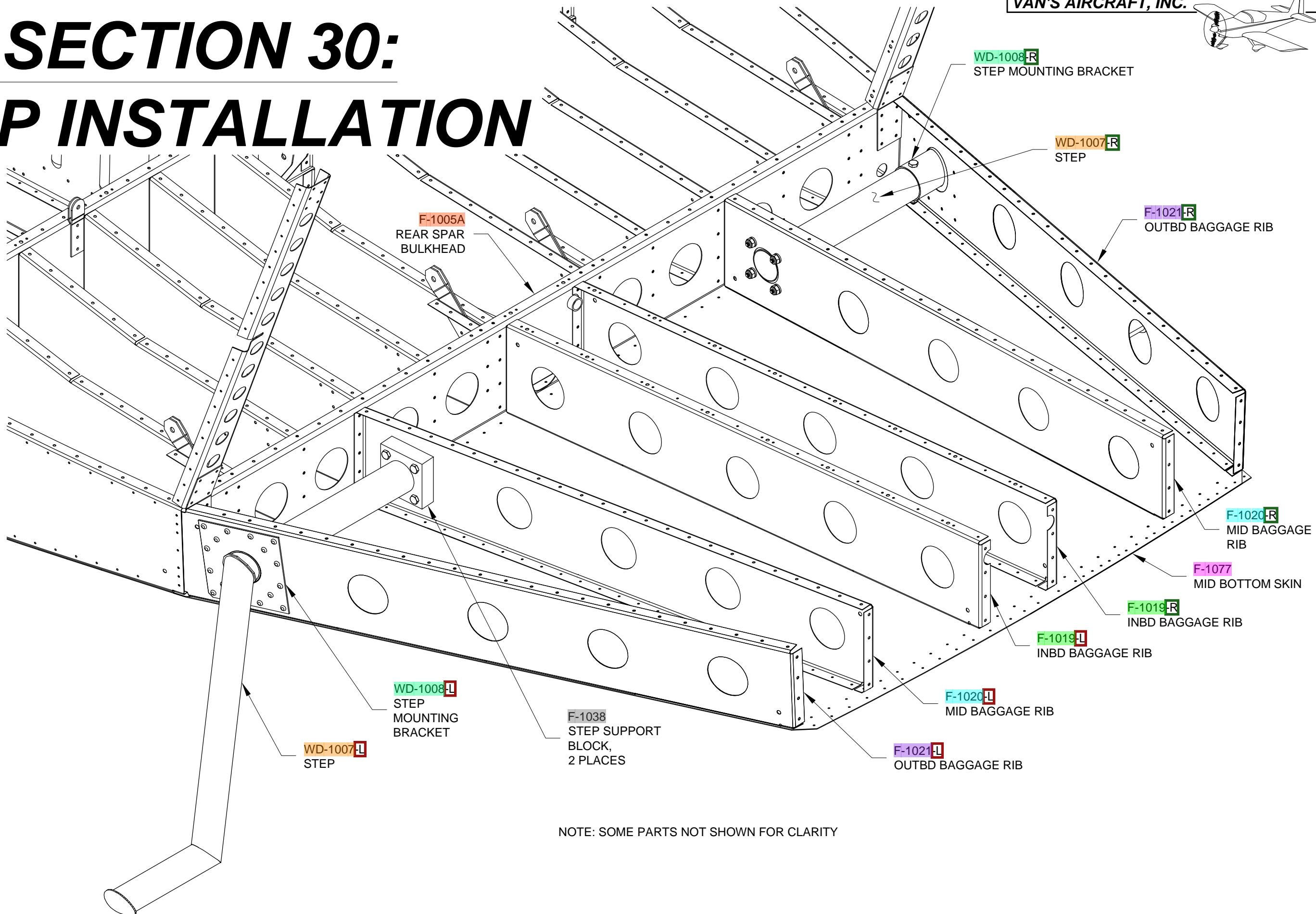
VAN'S AIRCRAFT, INC.

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# SECTION 30:

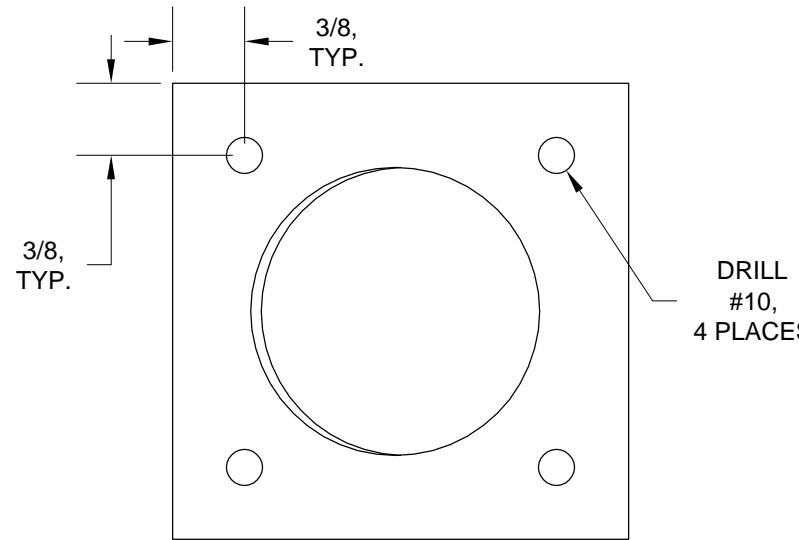
# STEP INSTALLATION





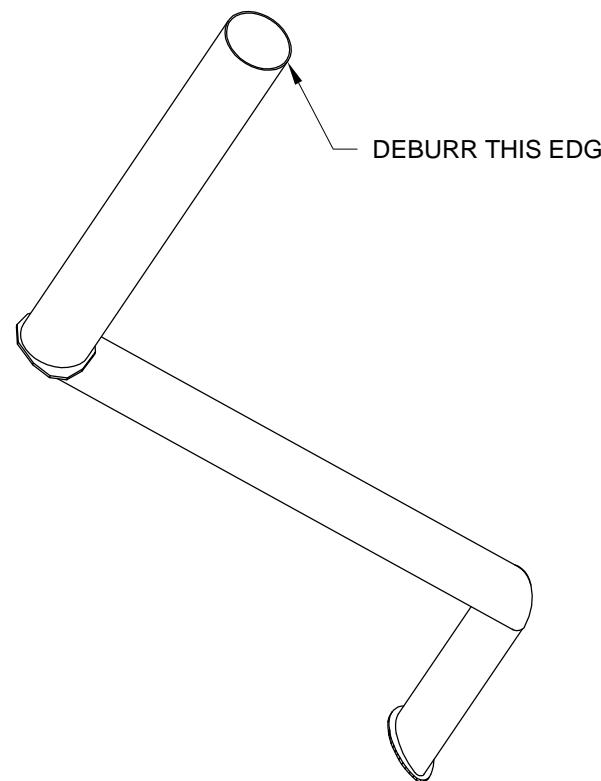
Note: This entire section depicts the installation of the left step only. The right step installation is a mirror of the left.

Step 1: Drill the F-1038 Step Support Block per the callouts in Figure 1.



**FIGURE 1: DRILLING THE STEP SUPPORT BLOCK**

Step 2: Deburr the edge of the WD-1007-L Step as shown in Figure 2.

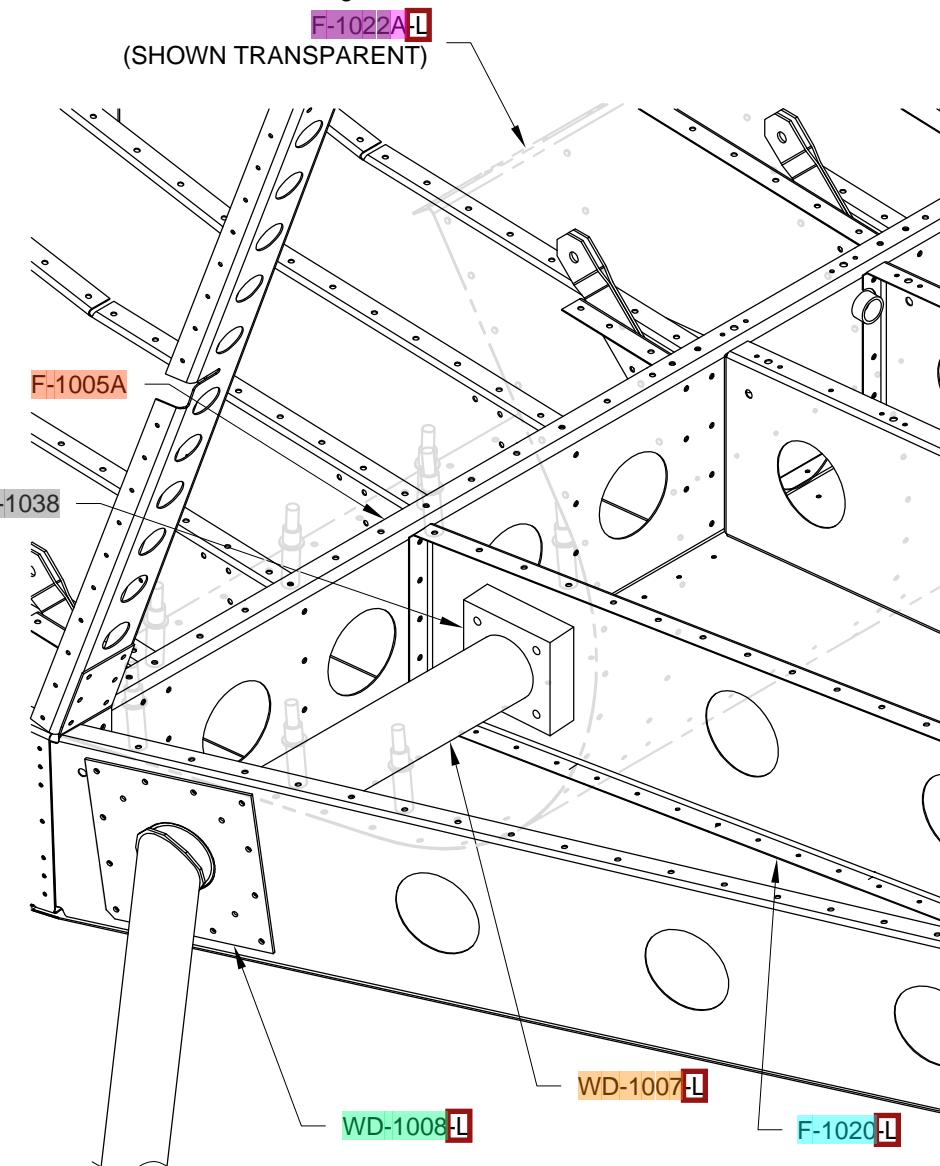


**FIGURE 2: DEBURRING THE STEP**

Step 3: Insert the round portion of the WD-1007-L Step into the WD-1008-L Step Mounting Bracket then slip the F-1038 Support Block over the end of the tube. Slide the support block inboard and rotate as required to flush the support block against the web of the F-1020-L Mid Baggage Rib.

Step 4: Cleco the forward portion of the F-1022A-L Baggage Floor to the fuselage as shown in Figure 3. To keep the free end the baggage floor out of the way cleco the aft flange to the holes along the lower edge of the F-1034B Seat Back Brace, see Section 29.

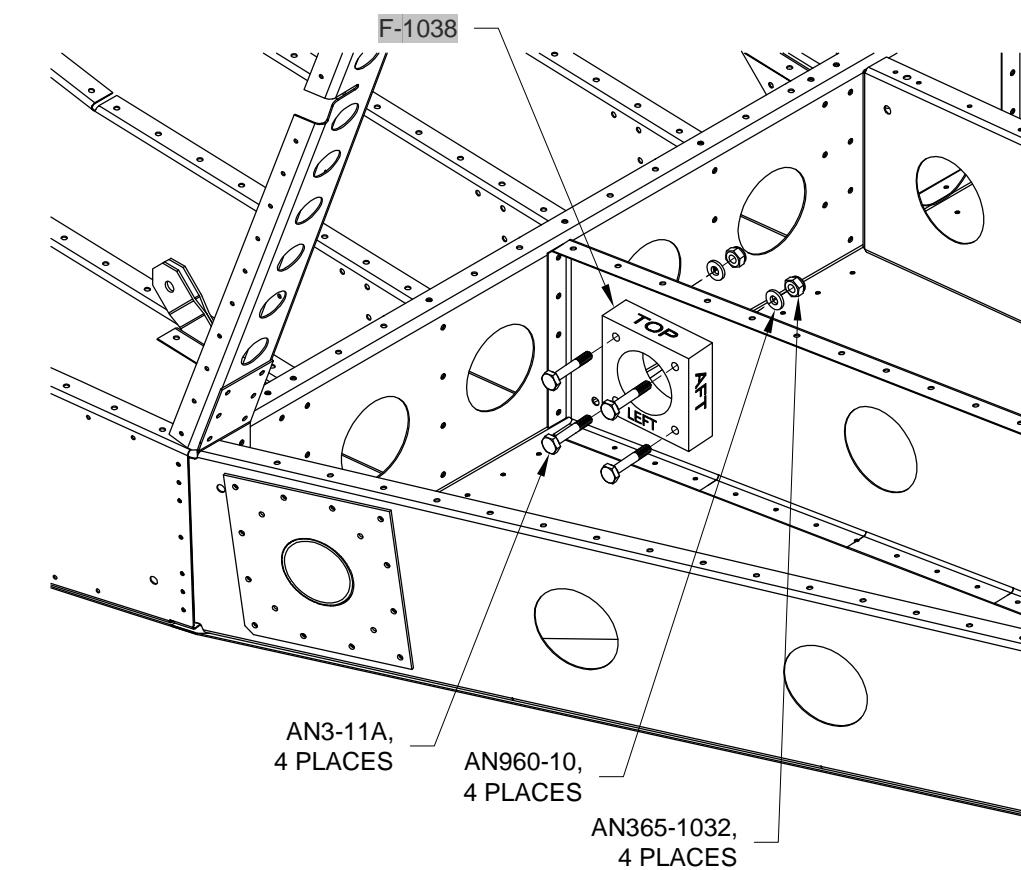
Step 5: Adjust the position of the F-1038 Support Block to make the round portion of the WD-1007-L Step parallel to both the upper edge and web of the F-1005A Rear Spar Bulkhead. Match-Drill #12 at least two of the holes drilled in Step 1 into the F-1020-L Mid Baggage Rib. Temporally bolt these holes to the mid baggage rib. Remove the step and match-drill #12 the remaining holes.



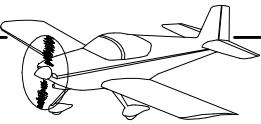
**FIGURE 3: DRILLING THE SUPPORT BLOCK ATTACH HOLES**

Step 6: Remove the F-1022A-L Baggage Floor. Mark the top, aft and outboard face of the F-1038 Support Block as shown in Figure 4. Remove the support block. Deburr the holes in the F-1020-L Mid Baggage Rib.

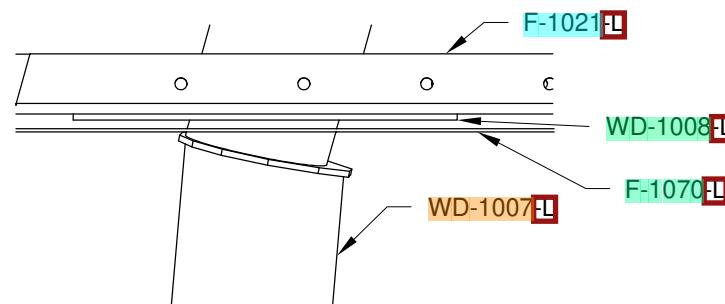
Step 7: Remove the WD-1007-L Step and set it aside. Bolt the F-1038 Support Block to the F-1020-L Mid Baggage Rib as shown in Figure 4.



**FIGURE 4: ATTACHING THE SUPPORT BLOCK**



Step 1: Adjust the spanwise position of the **WD-1007-L** Step so the weld at the top of the step is flush with the **F-1070-L** Mid Side Skin as shown in Figure 1.



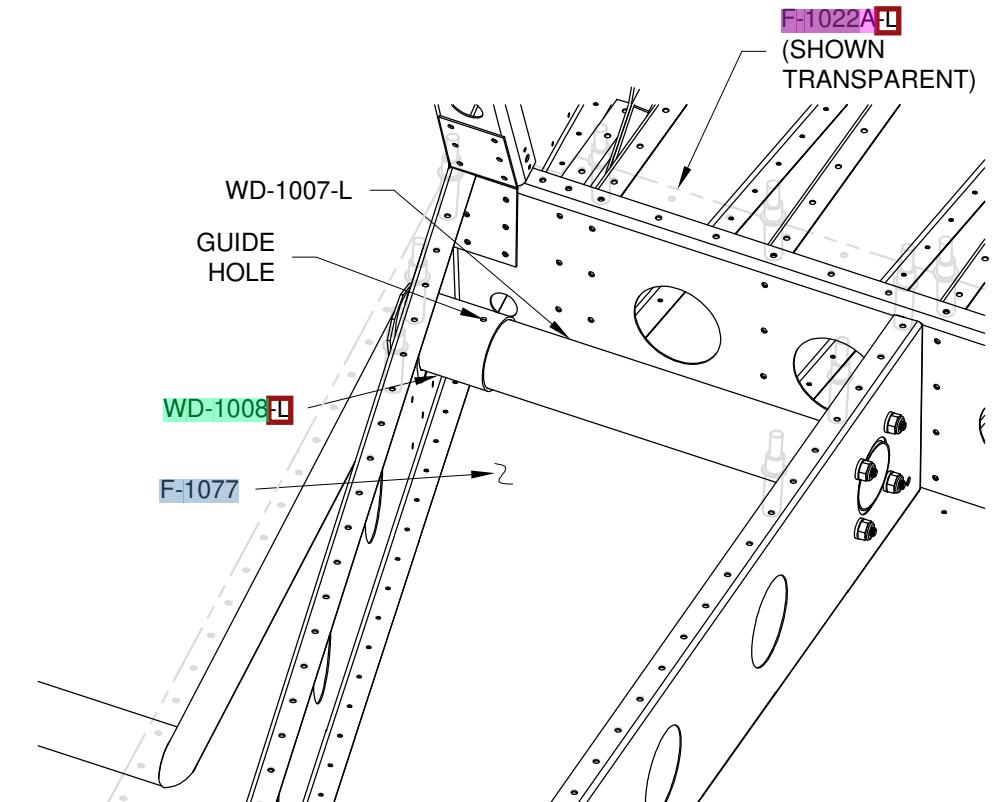
**FIGURE 1: SETTING THE STEP SPANWISE POSITION**

Step 3: Once the sweep back angle of the **WD-1007-L** Step has been set, use the guide hole shown in Figure 3 to match-drill #30 through the step, **WD-1008-L** Step Mounting Bracket and **F-1077** Mid Bottom Skin.

Step 4: Cleco the **F-1022A-L** Baggage Floor to the fuselage as shown in Figure 3. Match-Drill #30 from the bottom side of the aircraft through the baggage floor using the hole drilled in Step 3 as a guide. Step 3 and this step provide pilot holes that can be enlarged to gain access to the step attach hardware in the future if the **WD-1007-L** Step needs to be replaced. It is ok to leave the #30 hole in the bottom of the aircraft as a drain hole.

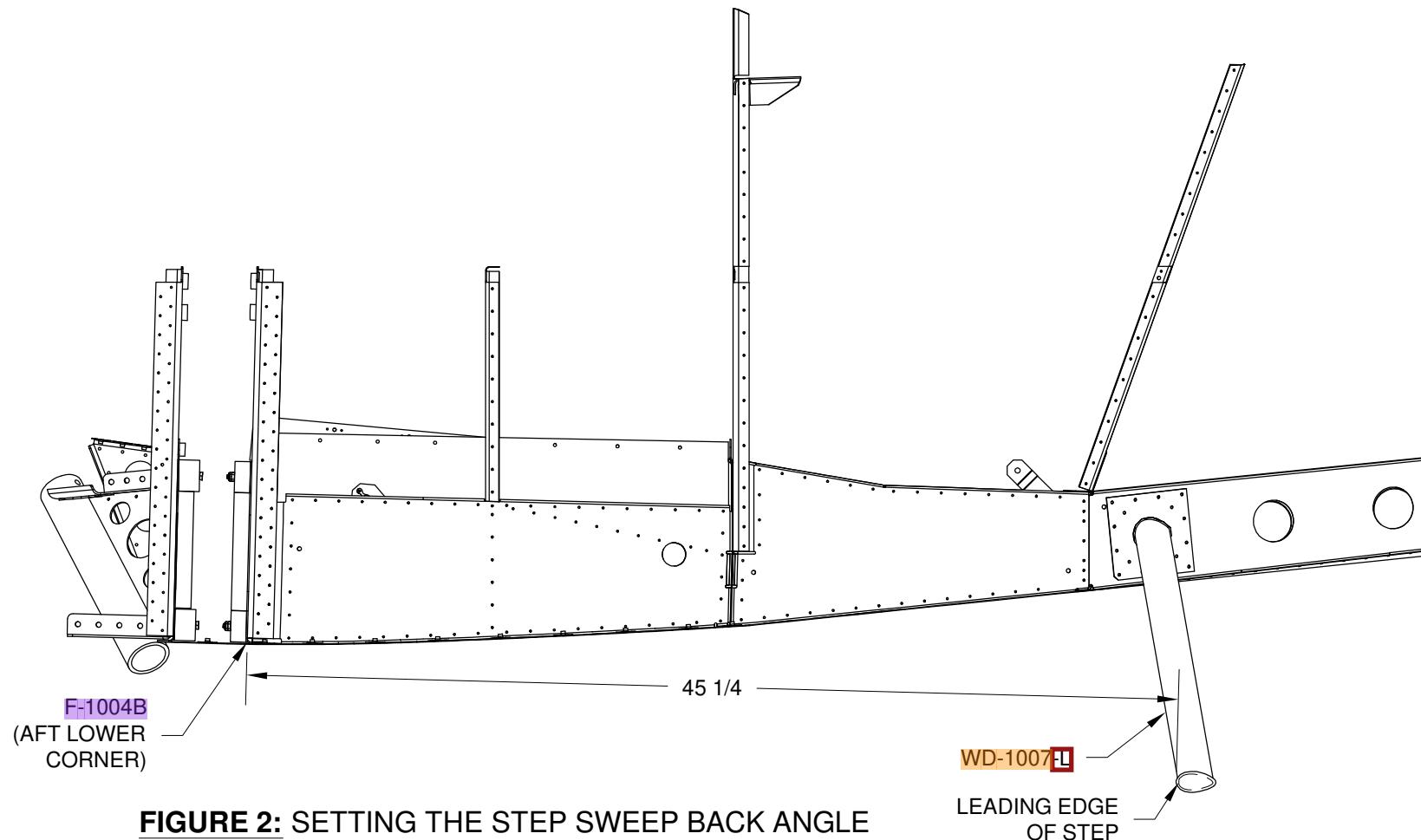
Step 5: Remove the **F-1022A-L** Baggage Floor and final-drill #12 the hole drilled in Step 3 through **just** the **WD-1008-L** Mounting Bracket and **WD-1007-L** Step.

Step 6: Remove the **WD-1007-L** Step and deburr all holes drilled in Step 3 through Step 5. Prime the step. Paint the step if desired.

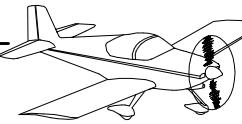


**FIGURE 3: DRILLING THE STEP**

Step 2: Use the dimension given in Figure 2 to set the proper sweep angle of the **WD-1007-L** Step. The dimension given is from the lower aft edge of the **F-1004B** Center Section Bulkhead stub to the leading edge of the step (not the leading edge of the step end plate).

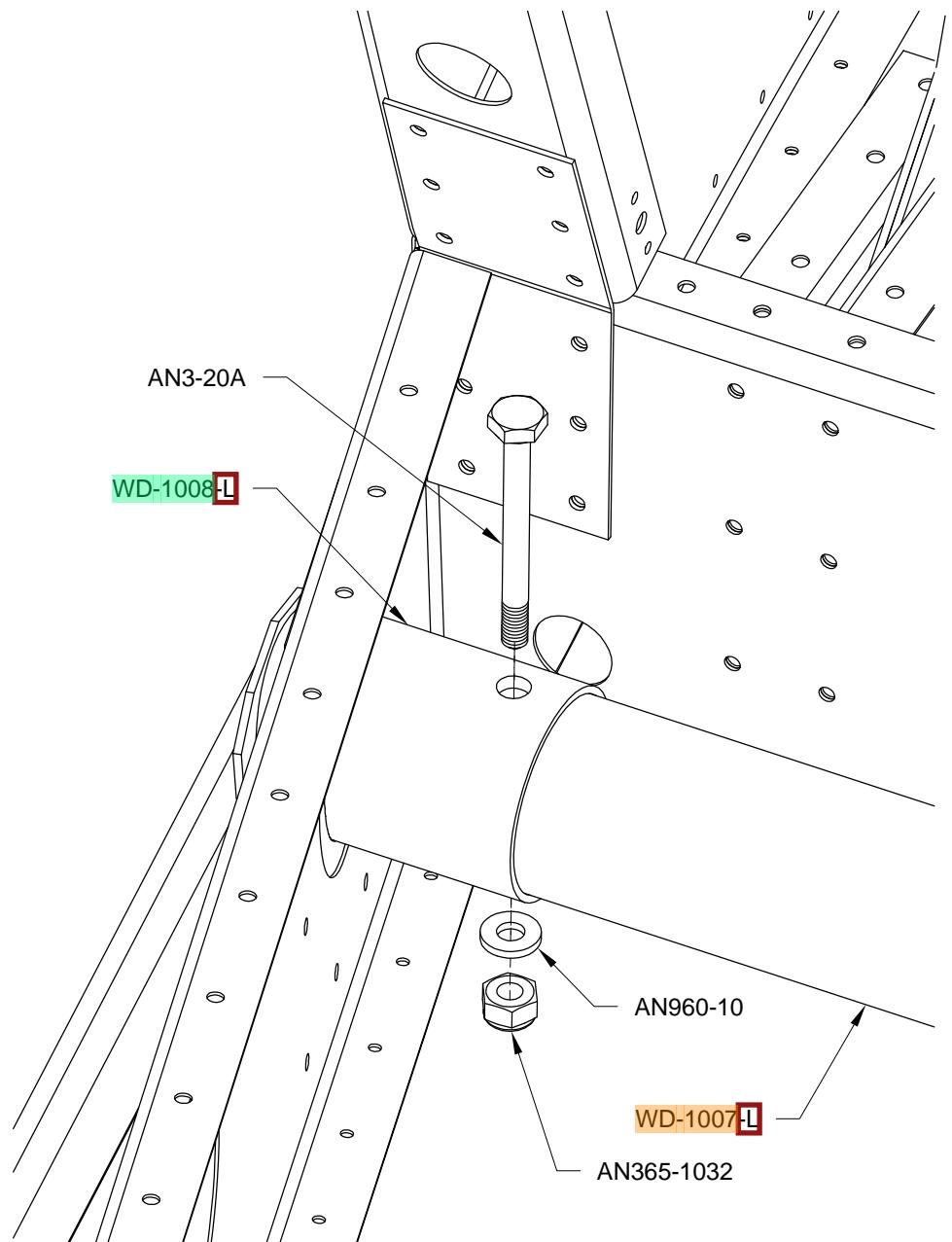


**FIGURE 2: SETTING THE STEP SWEEP BACK ANGLE**

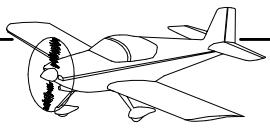


Step 1: Bolt the **WD-1007-L** Step to the **WD-1008-L** Mounting Bracket as shown in Figure 1.

Step 2: Touch-up any primer that may have been scraped off the **WD-1007-L** Step.

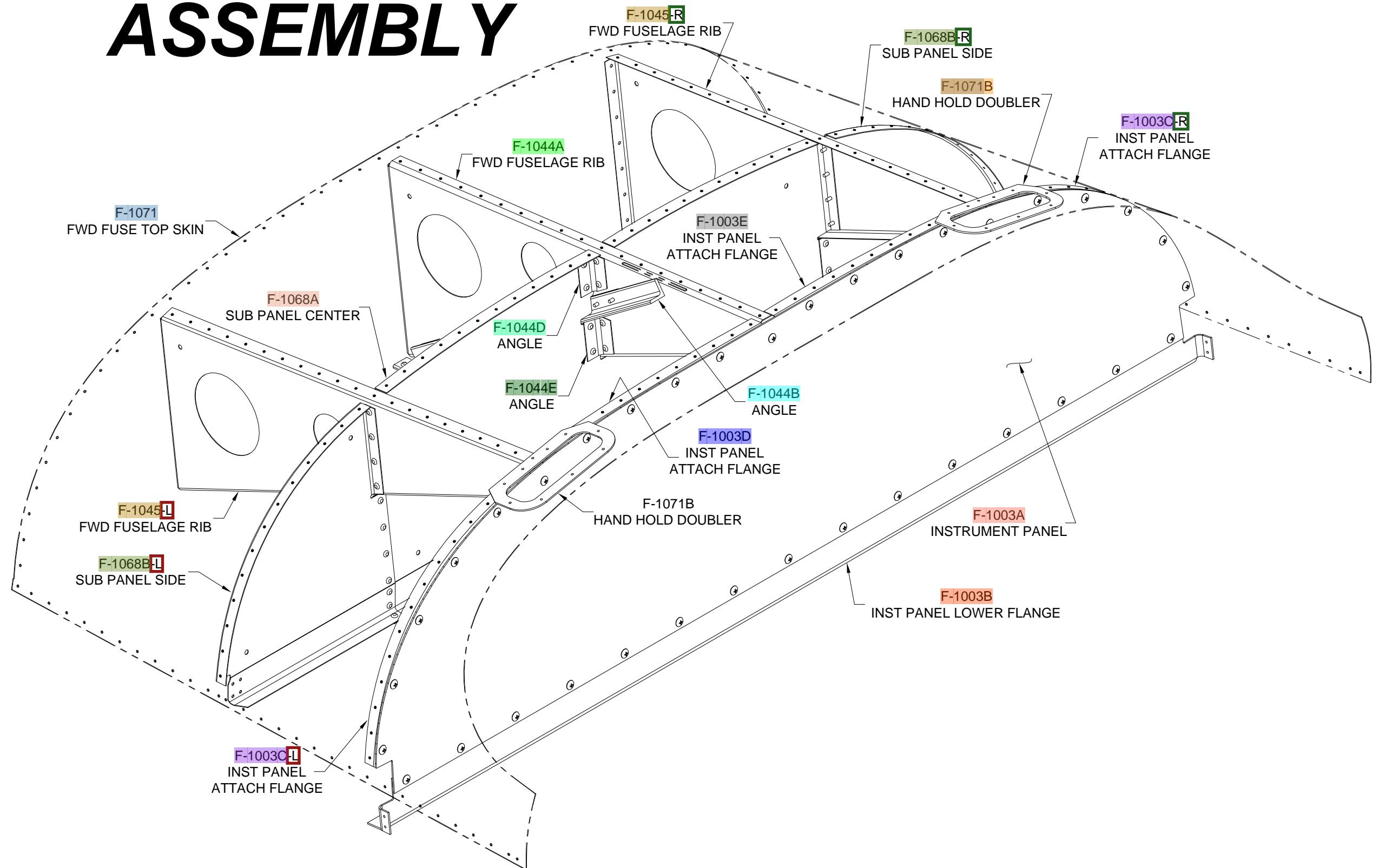


**FIGURE 1: BOLTING THE STEP IN PLACE**



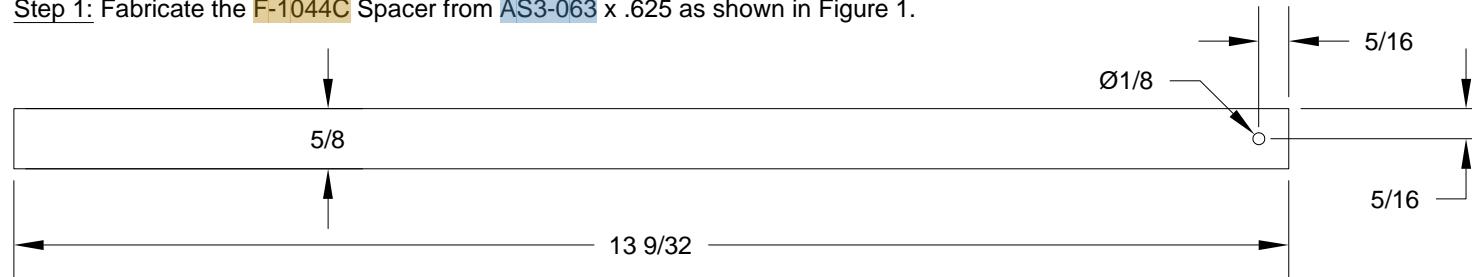
# SECTION 31:

## UPPER FORWARD FUSELAGE ASSEMBLY



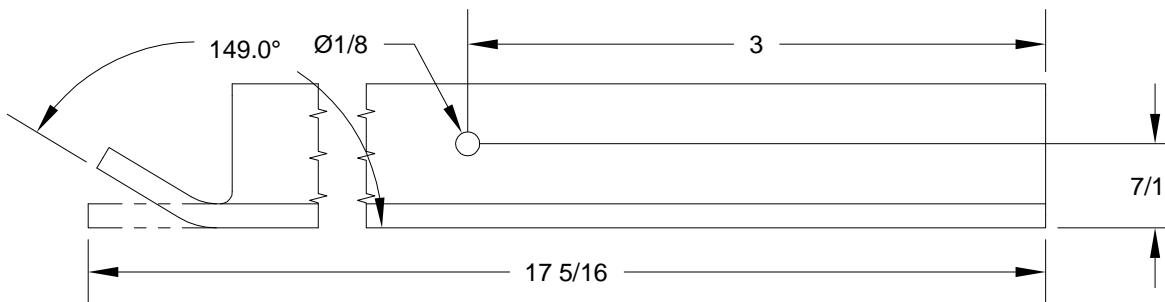


Step 1: Fabricate the F-1044C Spacer from AS3-063 x .625 as shown in Figure 1.



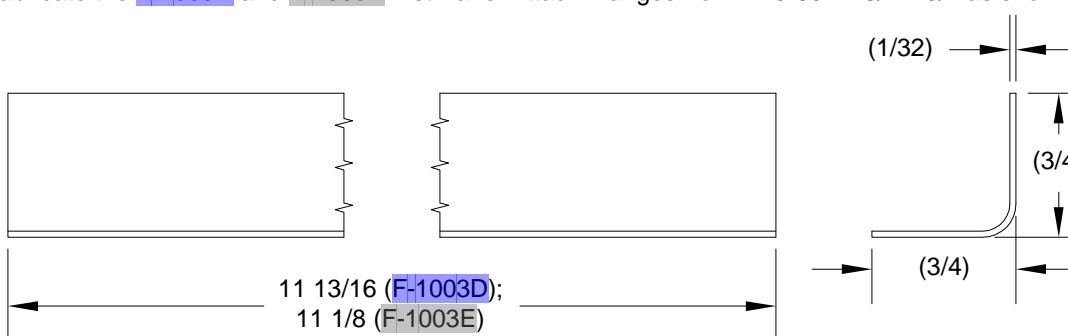
**FIGURE 1: FABRICATE SPACER**

Step 2: Fabricate the F-1044B Angle from AA6-125 x 3/4 x 3/4 as shown in Figure 2.



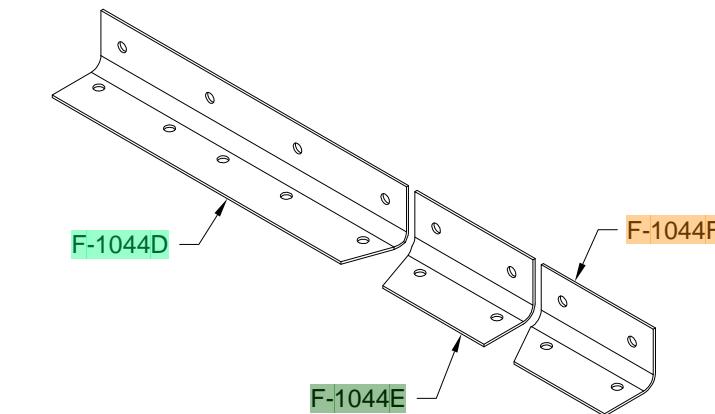
**FIGURE 2: FABRICATE ANGLE**

Step 3: Fabricate the F-1003D and F-1003E Inst Panel Attach Flanges from AA3-032 x 3/4 x 3/4 as shown in Figure 3.



**FIGURE 3: FABRICATE INST PANEL ATTACH FLANGES**

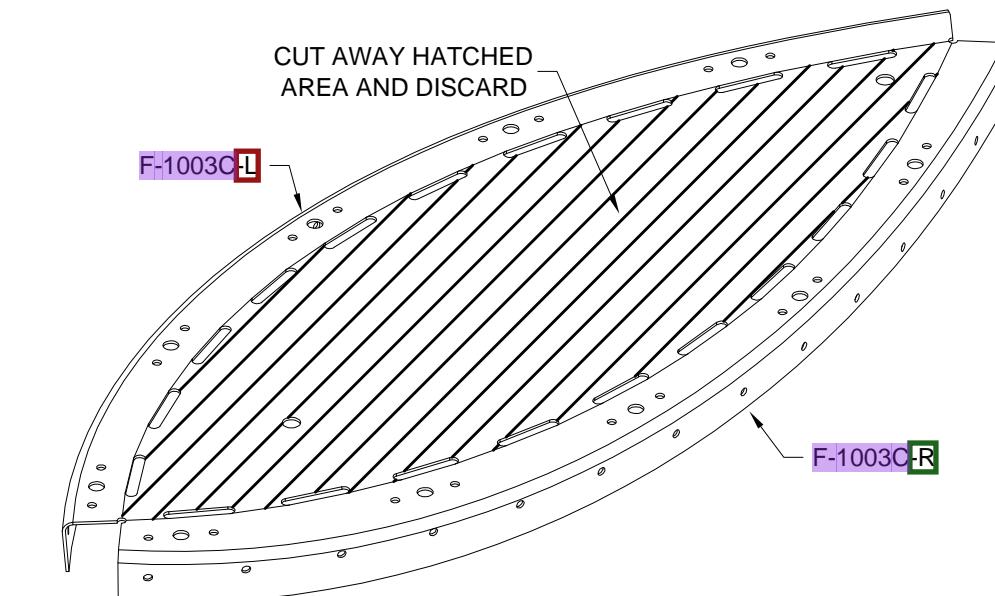
Step 4: Break apart the F-1044DEF Angle into individual F-1044D, F-1044E, and F-1044F Angles as shown in Figure 4.



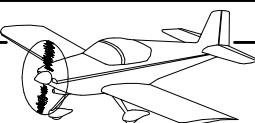
**FIGURE 4: BREAK APART ANGLES**

Step 5: Flute and straighten the flanges of the F-1003C Inst Panel Attach Flange per Section 5N.

Cut apart the inst panel attach flange into individual F-1003C-L and F-1003C-R Inst Panel Attach Flanges as shown in Figure 5.



**FIGURE 5: BREAK APART INST PANEL ATTACH FLANGES**



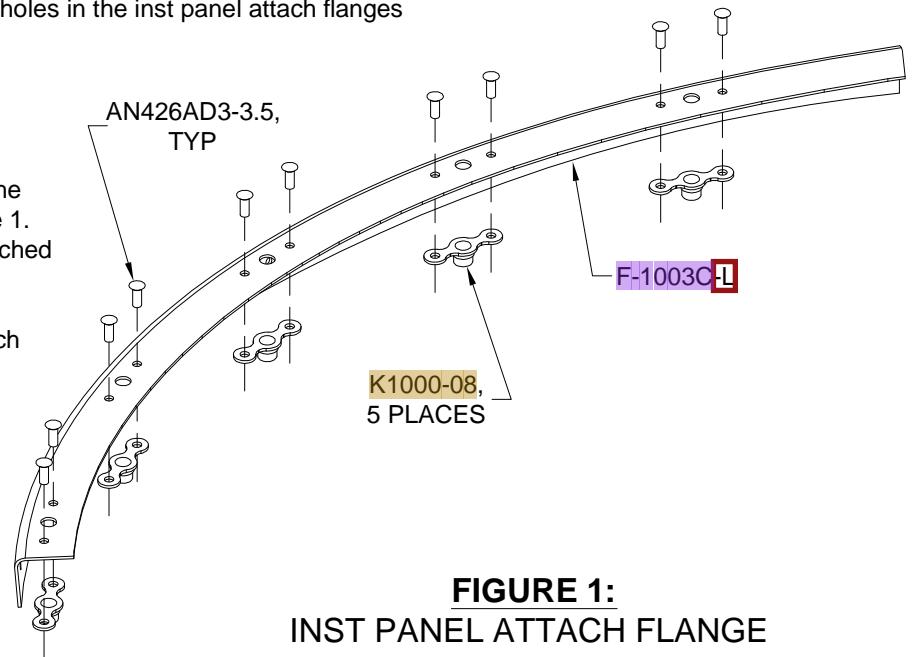
Step 1: Final-Drill #40 all the nutplate attach holes in the F-1003C-L & R Inst Panel Attach Flanges as shown in Figure 1.

Final-Drill #19 all the nutplate screw holes in the inst panel attach flanges as shown in Figure 1.

Deburr all final-drilled holes in the inst panel attach flanges.

Dimple the nutplate attach holes in the inst panel attach flanges. See Figure 1. Dimple the nutplates that will be attached to the inst panel attach flanges.

Rivet nutplates to the inst panel attach flanges as shown in Figure 1.



**FIGURE 1:**  
INST PANEL ATTACH FLANGE  
NUTPLATE INSTALLATION

Step 3: Final-Drill #40 the nutplate attach holes in the F-1045-L & R Fwd Fuselage Ribs as shown in Figure 3.

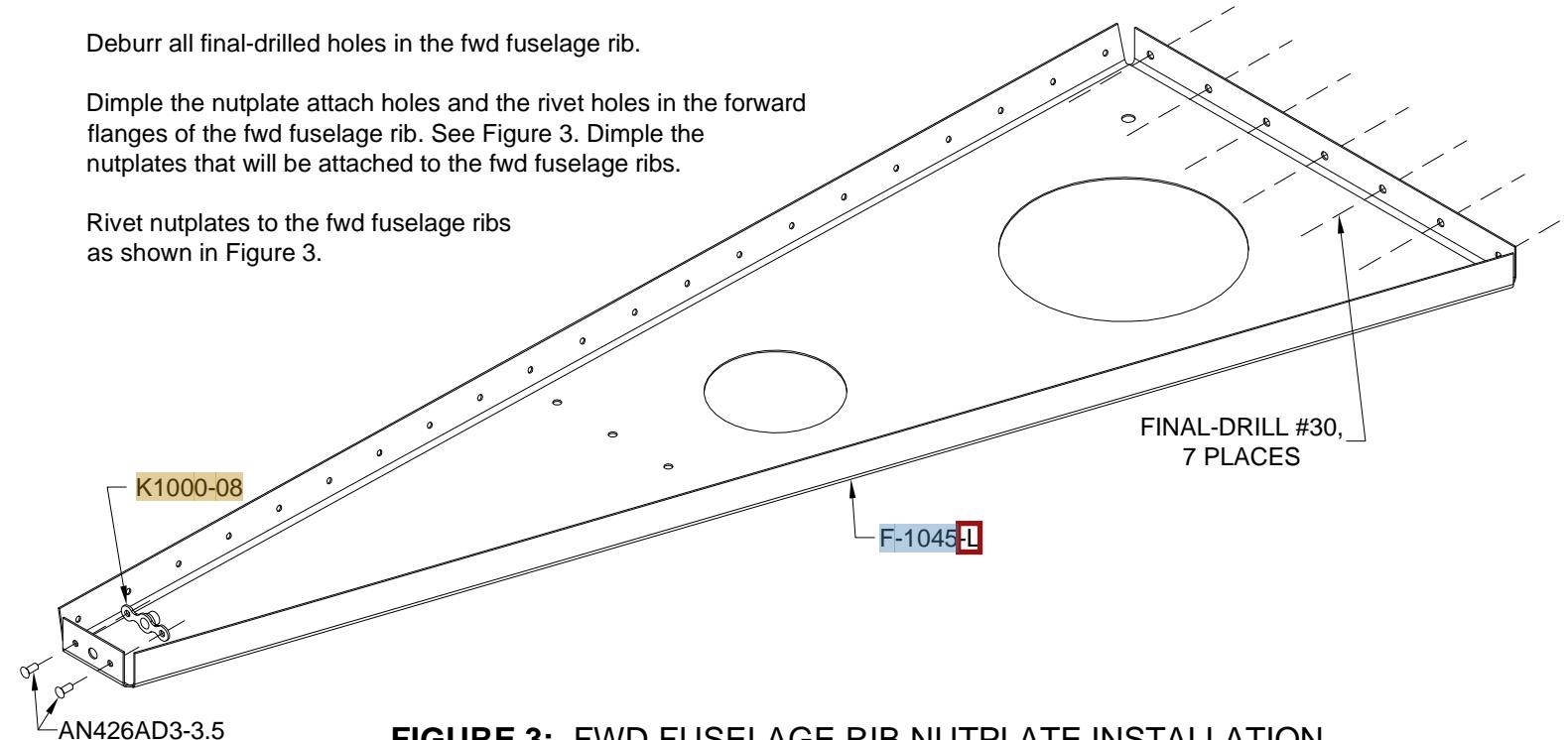
Final-Drill #19 the nutplate screw holes in the fwd fuselage ribs as shown in Figure 3.

Final-Drill #30 the rivet holes in the forward flanges of the fwd fuselage rib as shown in Figure 3.

Deburr all final-drilled holes in the fwd fuselage rib.

Dimple the nutplate attach holes and the rivet holes in the forward flanges of the fwd fuselage rib. See Figure 3. Dimple the nutplates that will be attached to the fwd fuselage ribs.

Rivet nutplates to the fwd fuselage ribs as shown in Figure 3.



**FIGURE 3:** FWD FUSELAGE RIB NUTPLATE INSTALLATION

Step 2: Final-Drill #40 the nutplate attach holes in the F-1044A Fwd Fuselage Rib as shown in Figure 2.

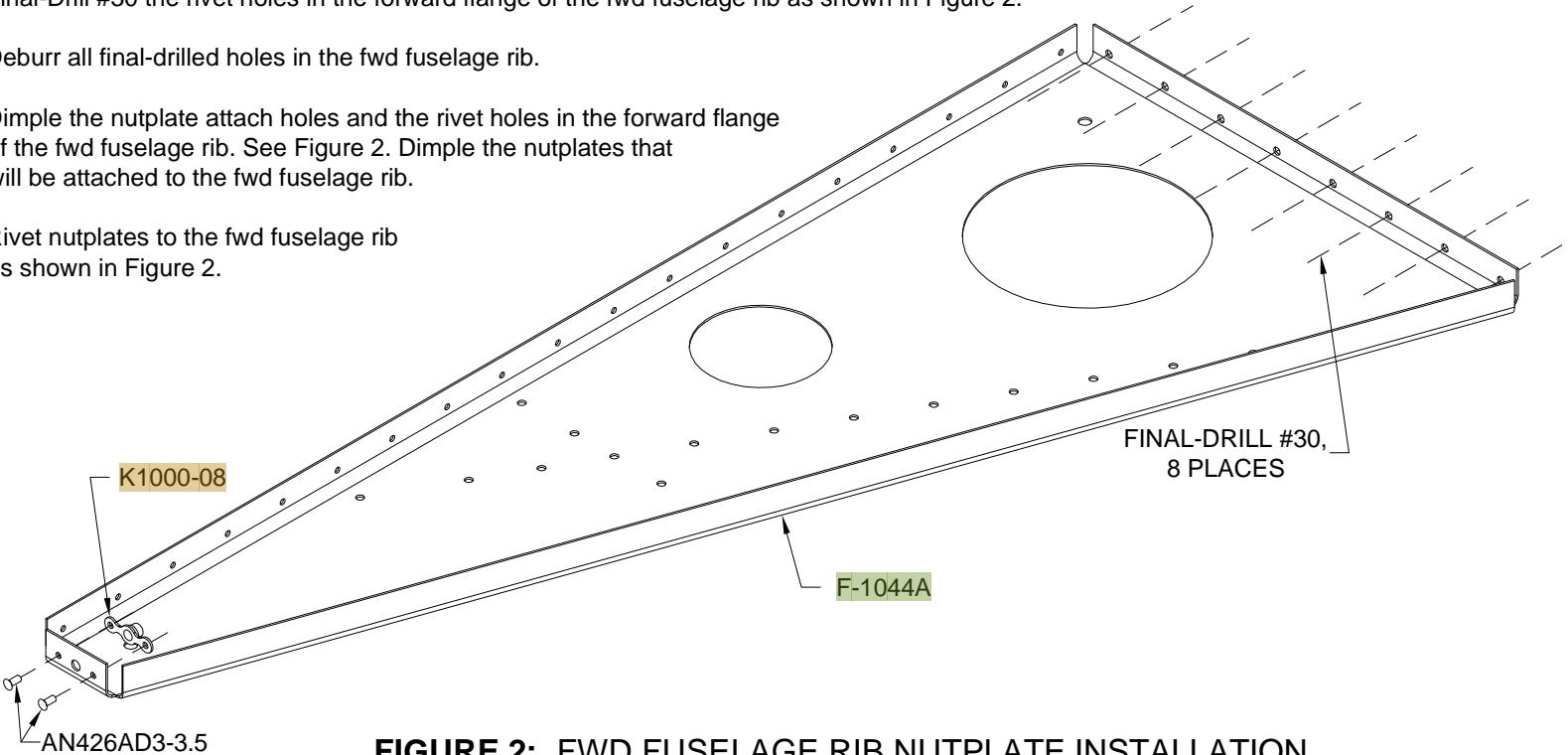
Final-Drill #19 the nutplate screw hole in the fwd fuselage rib as shown in Figure 2.

Final-Drill #30 the rivet holes in the forward flange of the fwd fuselage rib as shown in Figure 2.

Deburr all final-drilled holes in the fwd fuselage rib.

Dimple the nutplate attach holes and the rivet holes in the forward flange of the fwd fuselage rib. See Figure 2. Dimple the nutplates that will be attached to the fwd fuselage rib.

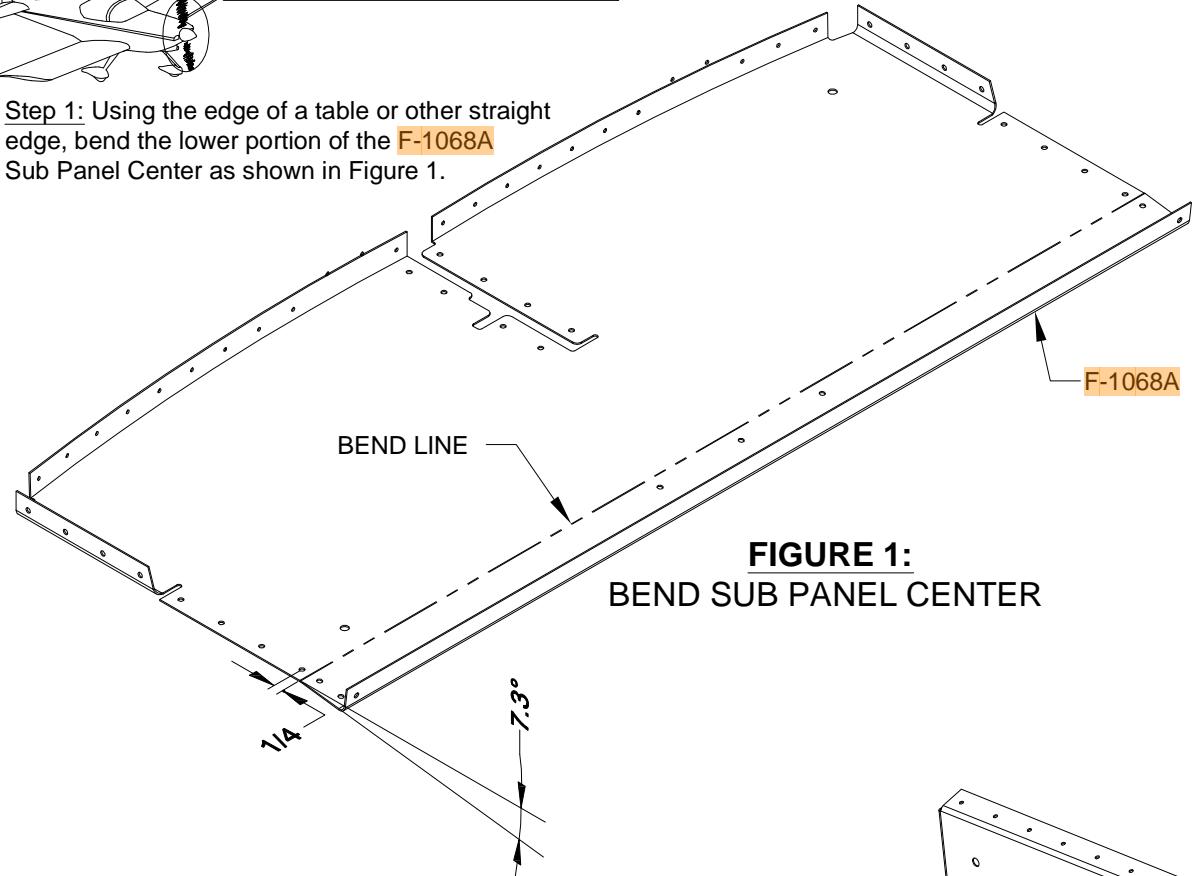
Rivet nutplates to the fwd fuselage rib as shown in Figure 2.



**FIGURE 2:** FWD FUSELAGE RIB NUTPLATE INSTALLATION

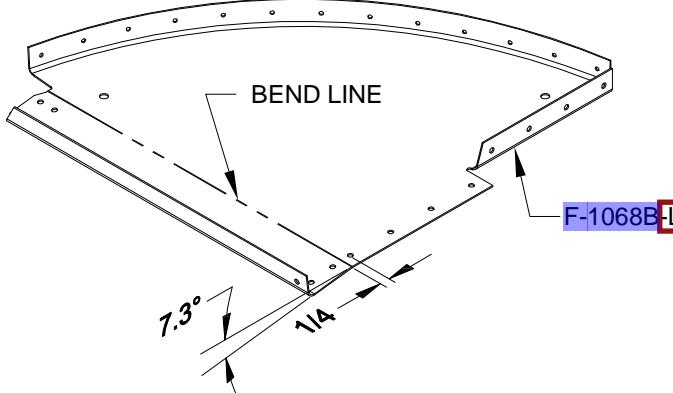


Step 1: Using the edge of a table or other straight edge, bend the lower portion of the F-1068A Sub Panel Center as shown in Figure 1.



**FIGURE 1:**  
BEND SUB PANEL CENTER

Step 2: Using the edge of a table or other straight edge, bend the lower portions of the F-1068B-L and F-1068B-R Sub Panel Sides as shown in Figure 2.

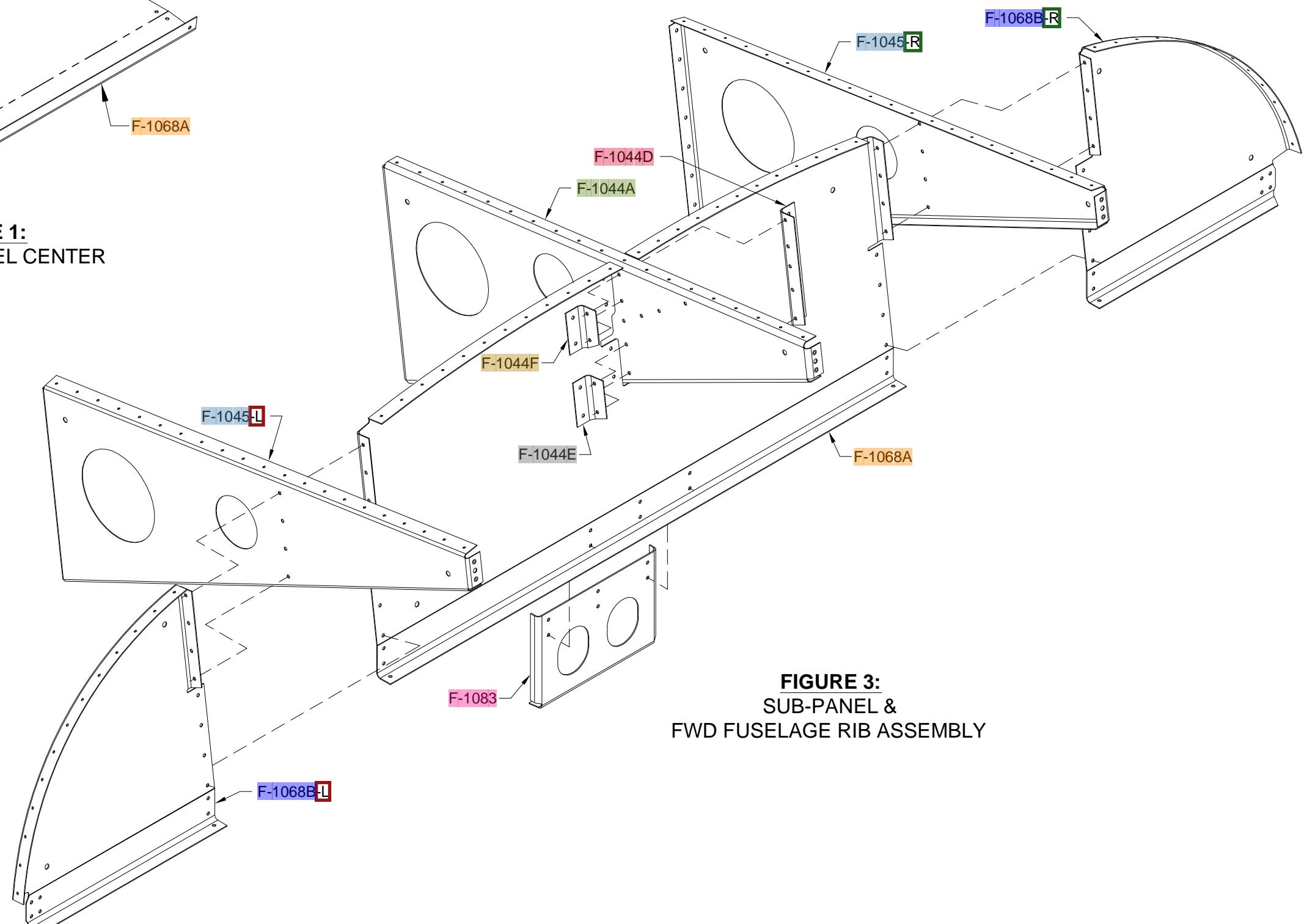


**FIGURE 2:** BEND SUB PANEL SIDE

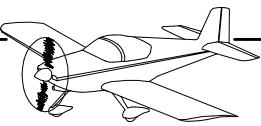
Step 3: Flute and straighten the curved flanges of the F-1068B-L and F-1068B-R Sub Panel Sides per Section 5N.

Step 4: Cleco the F-1044A Fwd Fuselage Rib, F-1044D, E, & F Angles, F-1045-L & R Fwd Fuselage Ribs, F-1068A Sub Panel Center, F-1068B-L & R Sub Panel Sides, and F-1083 Control Cable Bracket as shown in Figure 3.

Final-Drill #30 all holes common to the parts clecoed together.

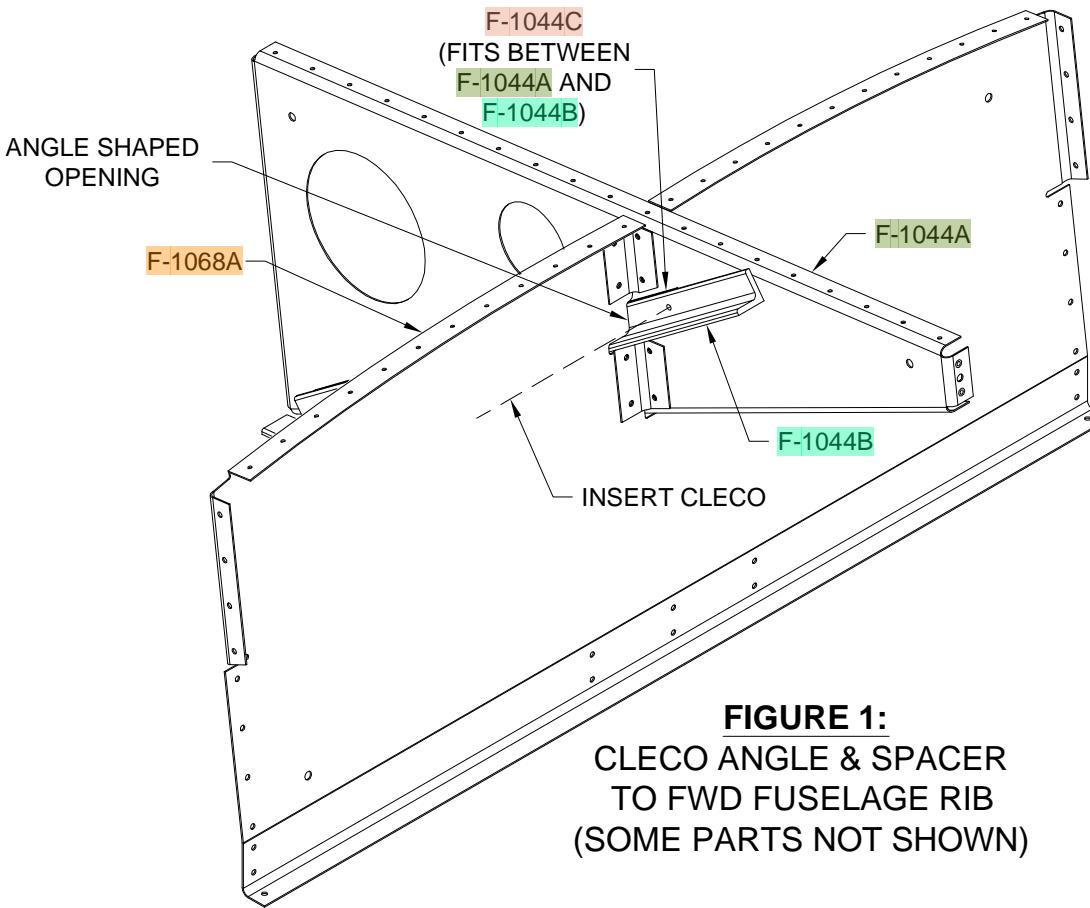


**FIGURE 3:**  
SUB-PANEL &  
FWD FUSELAGE RIB ASSEMBLY



Step 1: Insert the F-1044B Angle and F-1044C Spacer through the angle shaped opening in the F-1068A Sub Panel Center.

Cleco the angle and spacer to the F-1044A Fwd Fuselage Rib as shown in Figure 1.



**FIGURE 1:**  
CLECO ANGLE & SPACER  
TO FWD FUSELAGE RIB  
(SOME PARTS NOT SHOWN)

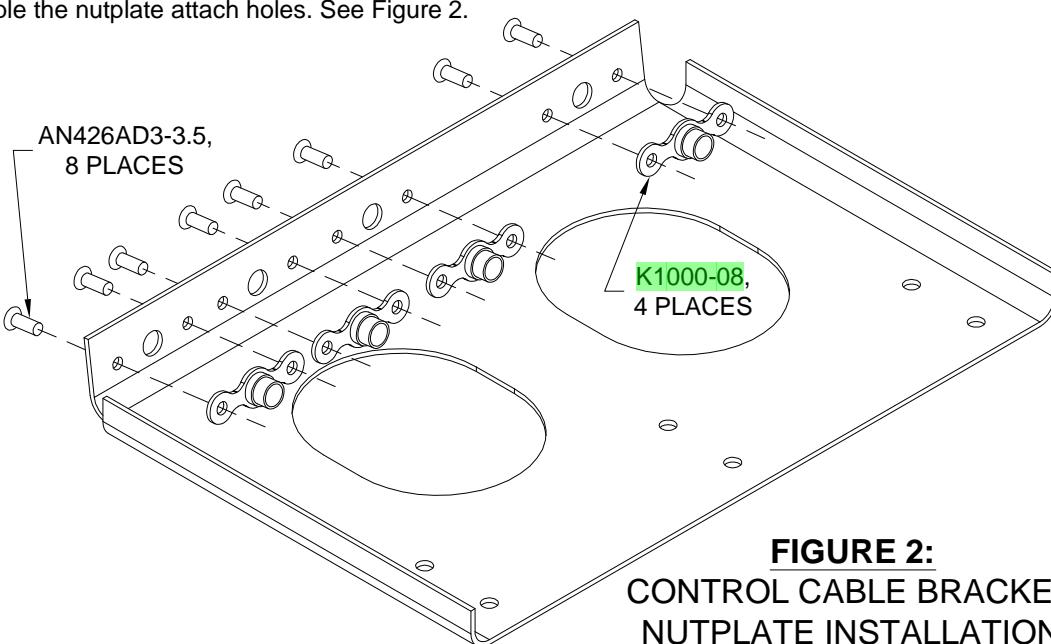
Step 2: Remove the F-1083 Control Cable Bracket from the F-1068A Sub Panel Center.

Final-Drill #19 the nutplate screw holes in the control cable bracket. See Figure 2.

Final-Drill #40 the nutplate attach holes in the control cable bracket. See Figure 2.

Deburr the holes and edges of the control cable bracket.

Dimple the nutplate attach holes. See Figure 2.

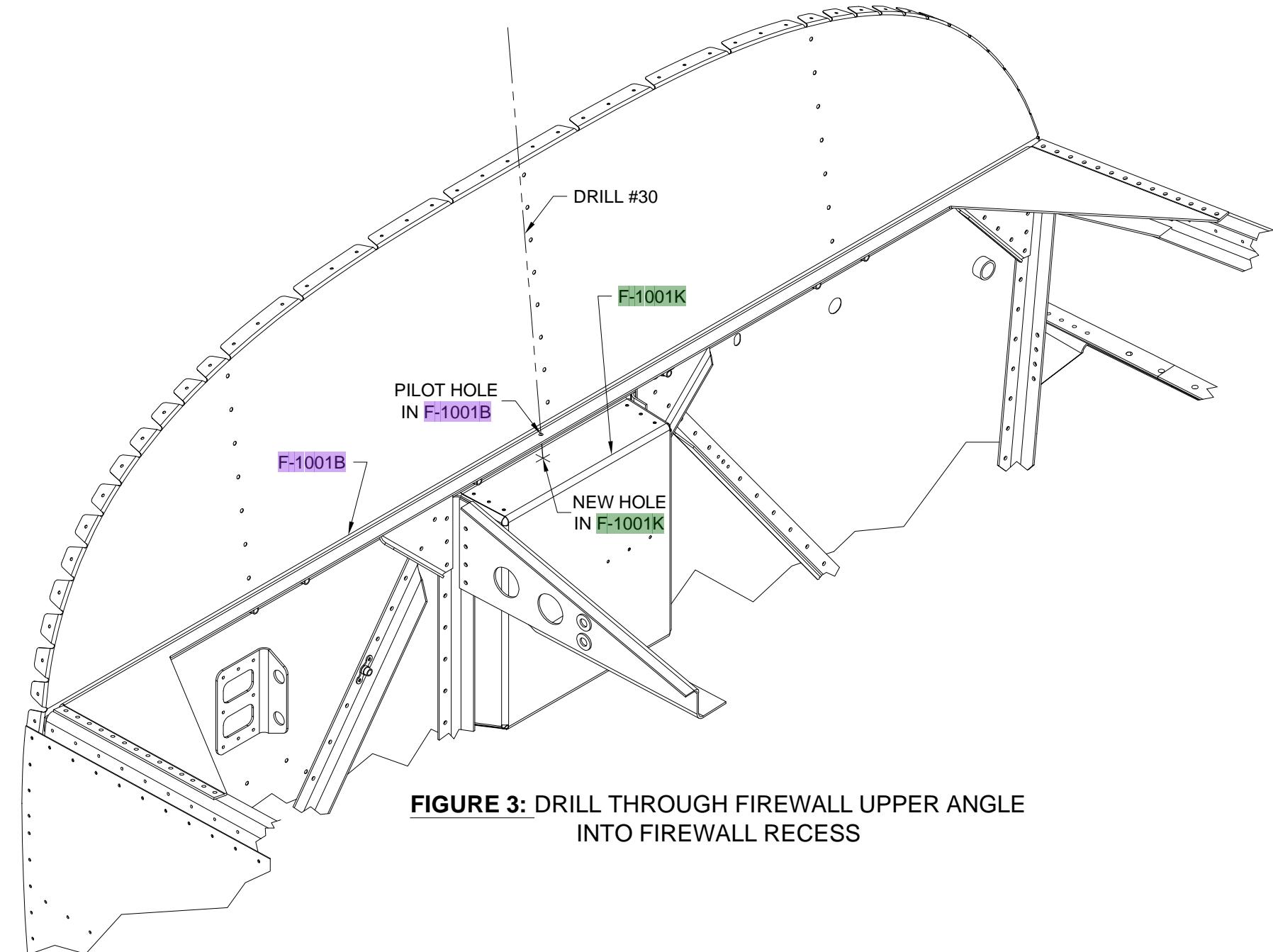


**FIGURE 2:**  
CONTROL CABLE BRACKET  
NUTPLATE INSTALLATION

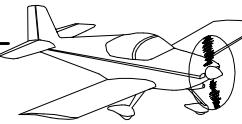
Step 3: Using a long #30 drill bit, drill downward through the pilot hole near the middle of the F-1001B Upper Firewall Angle and through the upper surface of the F-1001K Firewall Recess. See Figure 3.

The new hole in the firewall recess will allow for drilling back up into the F-1044B Angle.

Use care when drilling so as not to enlarge the pilot hole in the upper firewall angle.



**FIGURE 3:** DRILL THROUGH FIREWALL UPPER ANGLE  
INTO FIREWALL RECESS



Step 1: Cleco the Sub Panel/Fwd Fuselage Rib Subassembly to the forward fuselage as shown in Figure 1. It is permissible to slightly spread the F-1040-L & R Upper Fuse Channels to allow clearance for installation.

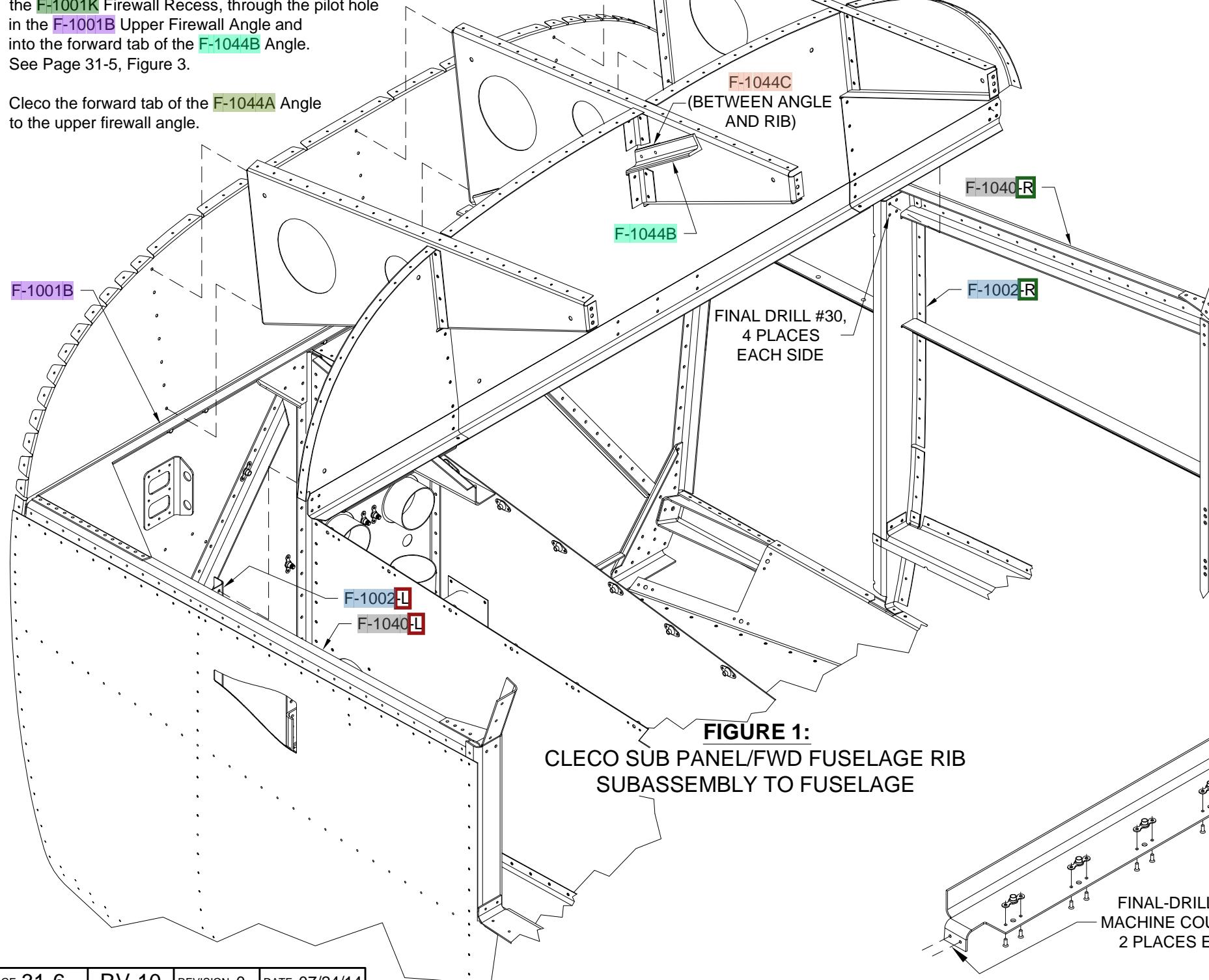
Final-Drill #30 four places F-1068B-L to F-1002-L and four places F-1068B-R to F-1002-R as shown in Figure 1.

Rotate the F-1044B Angle on the cleco holding it and the F-1044C Spacer to the F-1044A Fwd Fuse Rib until the forward tab of the angle rests on the upper surface of the F-1001B Firewall Upper Angle. Adjust the bend angle of the tab on the angle if/as required to rest flat on the firewall upper angle.

Match-Drill #30 and cleco the angle and spacer to the fwd fuselage rib in two places (once in the middle of the angle and once in the forward end of the angle) using the holes in the fwd fuselage rib as drill guides.

Step 2: Match-Drill #30 upward through the pilot hole in the upper surface of the F-1001K Firewall Recess, through the pilot hole in the F-1001B Upper Firewall Angle and into the forward tab of the F-1044B Angle. See Page 31-5, Figure 3.

Cleco the forward tab of the F-1044A Angle to the upper firewall angle.



Step 3: Final-Drill #19 all holes in the F-1003A Instrument Panel.

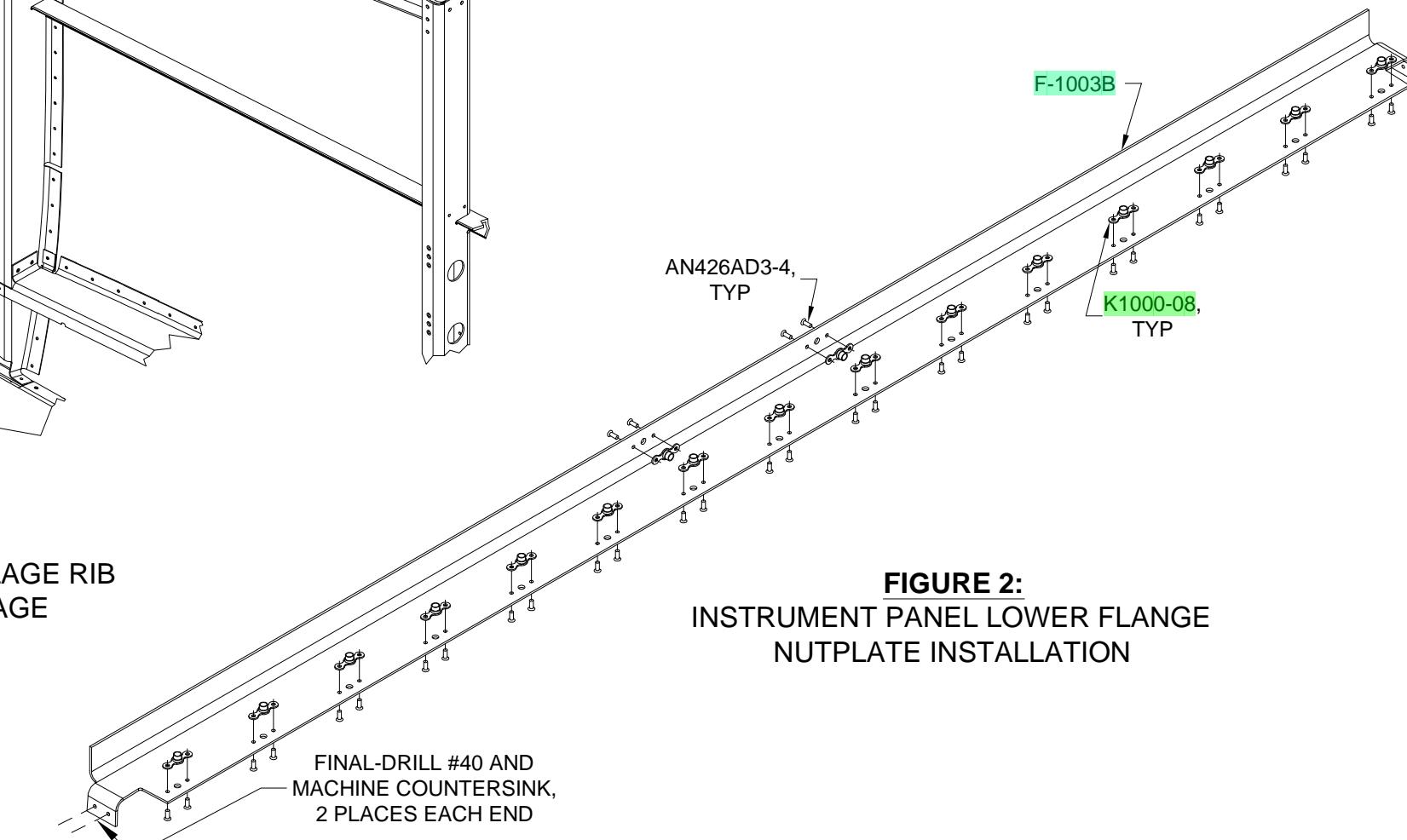
Step 4: Final-Drill #19 all nutplate screw holes in the F-1003B Inst Panel Lower Flange.

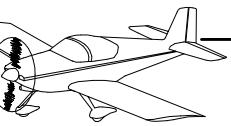
Final-Drill #40 the rivet holes in the end tabs and nutplate attach holes in the inst panel lower flange. See Figure 2.

Machine countersink the nutplate attach holes to fit the head of an AN426AD3 rivet. See Figure 2.

Machine countersink the rivet holes in the end tabs to fit the dimples in the fuselage side skin. Make a dimple test sample by drilling and dimpling a scrap of .032 aluminum for an AN426AD3 rivet. See Figure 2. See Section 5E.

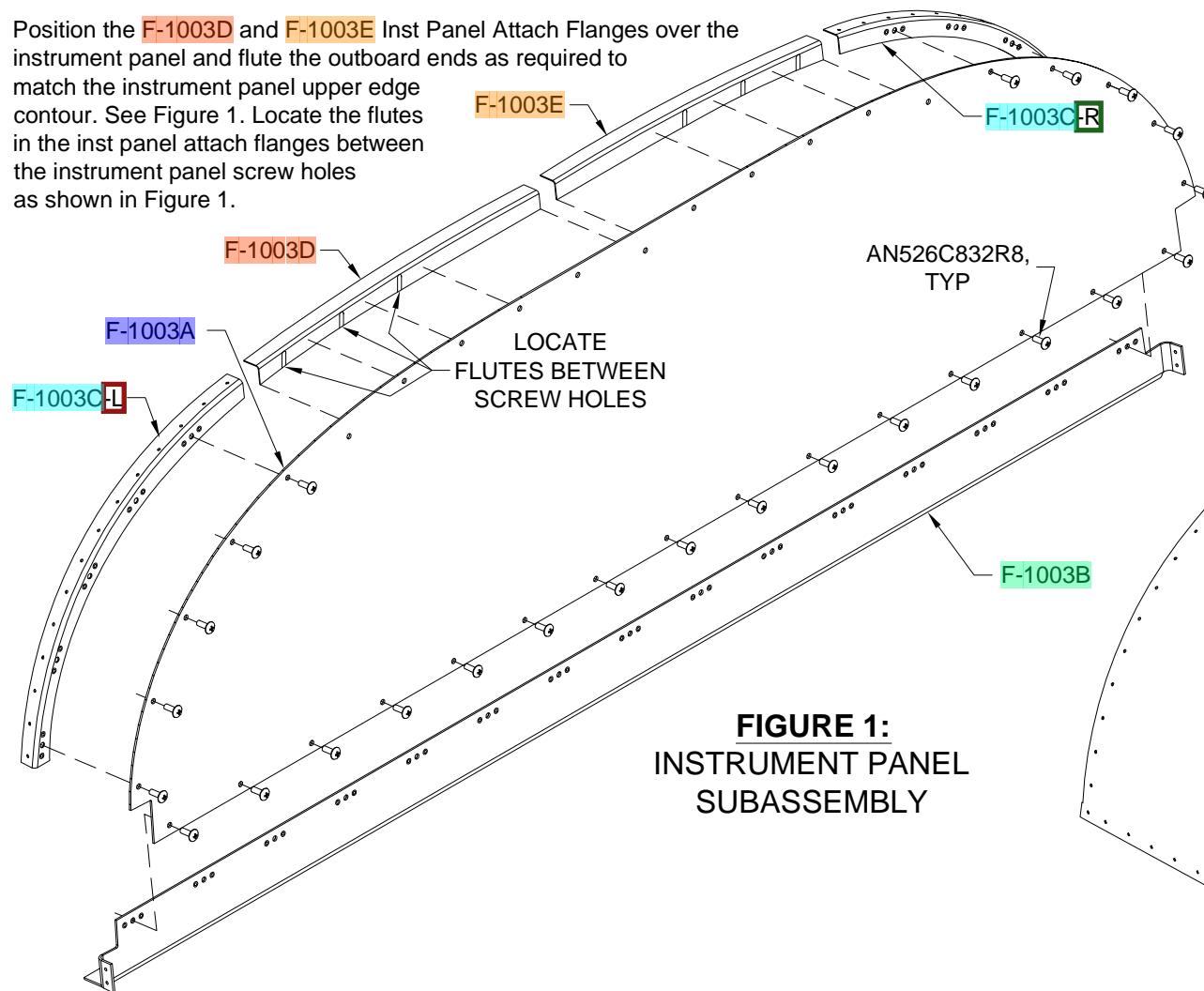
Rivet nutplates to the inst panel lower flange as shown in Figure 2.





Step 1: Attach the F-1003B Inst Panel Lower Flange and F-1003C-L & R Inst Panel Attach Flanges to the F-1003A Instrument Panel as shown in Figure 1.

Position the F-1003D and F-1003E Inst Panel Attach Flanges over the instrument panel and flute the outboard ends as required to match the instrument panel upper edge contour. See Figure 1. Locate the flutes in the inst panel attach flanges between the instrument panel screw holes as shown in Figure 1.



**FIGURE 1:**  
INSTRUMENT PANEL  
SUBASSEMBLY

Step 2: Attach the subassembly of F-1003A Instrument Panel, F-1003B Inst Panel Lower Flange, and the F-1003C-L & R Inst Panel Attach Flanges to the F-1044A, F-1045-L & F-1045-R Fwd Fuselage Ribs as shown in Figure 2.

Step 3: Cleco the F-1071 Fwd Fuse Top Skin to the flanges of F-1001A, F-1003C-L & R, F-1044A, F-1045-L & R, F-1068A, F-1068B-L & R, and to the F-1040-L & R Fwd Fuselage Channels as shown in Figure 2.

Note that the fwd fuse top skin is NOT symmetrical and that it must be installed such that the "slot" is on the leftside of the F-1044A Fwd Fuselage Rib. See Figure 2.

Step 4: Form the F-1071B Hand Hold Doublers to match the countour of the F-1071 Fwd Fuse Top Skin as it is clecoed in place. The forming process will create one "Left" hand hold doubler and one "Right" hand hold doubler.

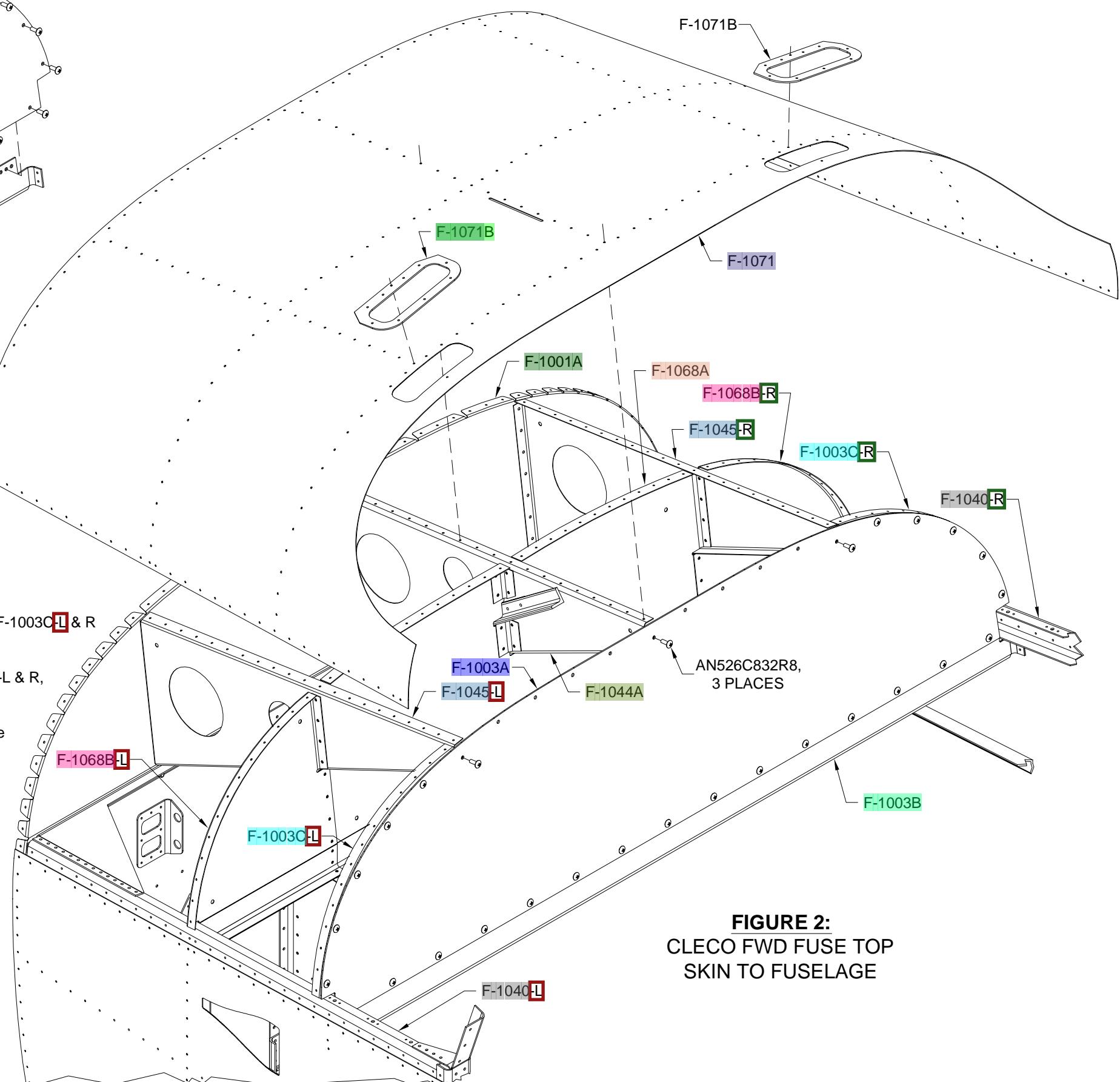
Cleco the hand hold doublers to the fwd fuse top skin as shown in Figure 2.

Match-Drill #40 each of the hand hold doublers to the fwd fuse top skin in the four places where there is no hole pre-punched in the fwd fuse top skin.

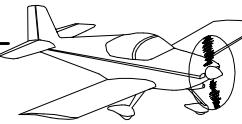
Final-Drill #40 each of the hand hold doublers to the fwd fuse top skin and the sub-structure in all the places where there are matching pre-punched holes.

Trace around the perimeter of each of the hand hold doublers with a sharpie pen. This will show where the fwd fuse skin is NOT to be dimpled.

Step 5: Final-Drill #40 the F-1071 Fwd Fuse Top Skin to the sub-structure through all holes not yet final-drilled.



**FIGURE 2:**  
CLECO FWD FUSE TOP  
SKIN TO FUSELAGE



Step 1: Position the F-1003D Inst Panel Attach Flange simultaneously against the F-1071 Fwd Fuse Top Skin and the forward side of the F-1003A Instrument Panel (See Page 31-7, Figure 1). Match-Drill #40 and cleco the inst panel attach flange using the holes in the fwd fuse top skin as drill guides. Be sure that the inst panel attach flange is in contact with the forward surface of the instrument panel when match-drilling.

Step 2: Position the F-1003E Inst Panel Attach Flange simultaneously against the F-1071 Fwd Fuse Top Skin and the forward side of the F-1003A Instrument Panel (See Page 31-7, Figure 1). Match-Drill #40 and cleco the inst panel attach flange using the holes in the fwd fuse top skin as drill guides. Be sure that the inst panel attach flange is in contact with the forward surface of the instrument panel when match-drilling.

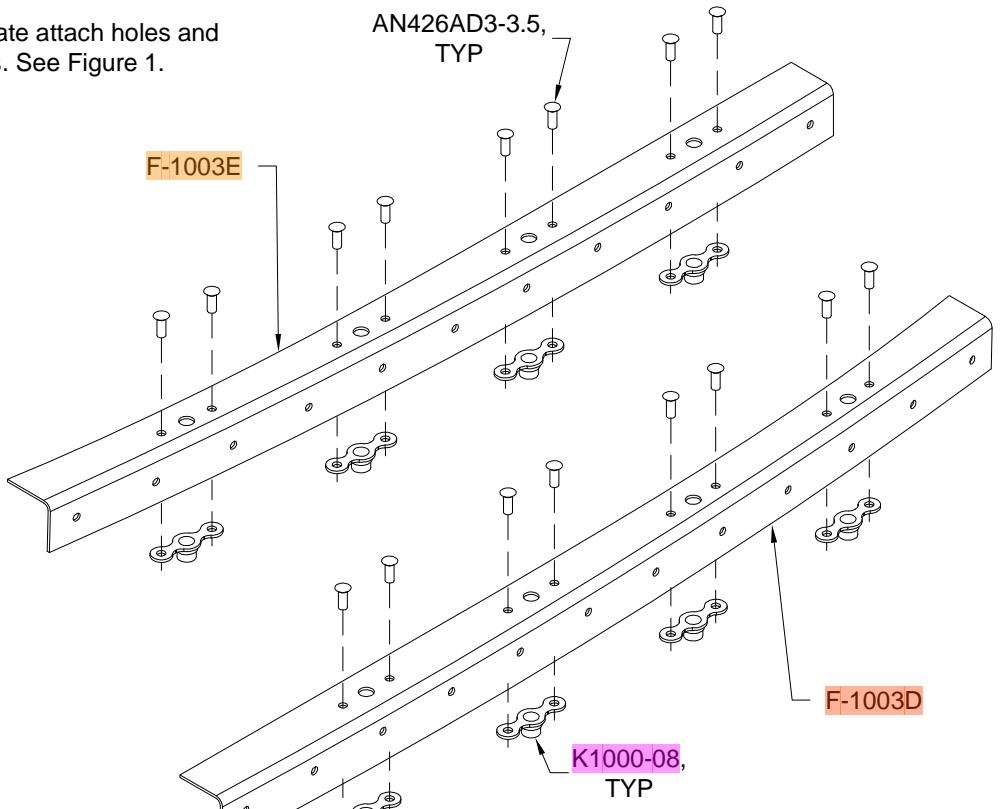
Step 3: Match-Drill #19 through the screw holes in the F-1003A Instrument Panel and into the F-1003D and F-1003E Inst Panel Attach Flanges.

Step 4: Final-Drill #40 the F-1071 Fwd Fuse Top Skin to the sub-structure through all holes not yet match-drilled or final-drilled.

Step 5: Remove the F-1003D and F-1003E Inst Panel Attach Flanges. Using a nutplate as a drill guide, match-drill #40 two nutplate attach holes for each screw hole. See Figure 1.

Deburr the holes and edges of the inst panel attach flanges.

Dimple the nutplate attach holes and skin attach holes. See Figure 1.



**FIGURE 1:**  
INST PANEL ATTACH FLANGE  
NUTPLATE INSTALLATION

Step 6: Machine countersink the rivet holes in the F-1071B Hand Hold Doublers to fit the head of an AN426AD3 rivet. See Page 31-7, Figure 2.

Uncleco the hand hold doublers from the F-1071 Fwd Fuse Top Skin and deburr holes and edges.

Step 7: Uncleco the F-1071 Fwd Fuse Top Skin from the sub-structure. When unclecoing, mark the holes in the sub-structure that lie under the F-1071B Hand Hold Doublers with a sharpie pen so that they will not be dimpled later.

Deburr the holes and edges of the fwd fuse top skin then dimple all holes EXCEPT those that are under the F-1071B Hand Hold Doublers.

Step 8: Dimple the holes in the flanges of the F-1001A Firewall Bulkhead that are common to the F-1071 Fwd Fuse Top Skin. See Page 31-7, Figure 2.

Step 9: Machine countersink the holes in the F-1040-L & R Upper Fuse Channels and F-1042-L & R Bulkhead Side Channels that are common to the F-1071 Fwd Fuse Top Skin. Countersink deep enough to fit the dimples in the fwd fuse top skin. Make a dimple test sample by drilling and dimpling a scrap of .032 aluminum for an AN426AD3 rivet. See Page 31-7, Figure 2. See Section 5E.

Most "micro-stop" countersink cages will interfere with the upper edge of the F-1069 Fwd Side Skins. In this case, the countersinking is best done "free-hand" with a countersink cutter in a drill motor.

Step 10: Remove the subassembly of F-1003A Instrument Panel, F-1003B Inst Panel Lower Flange, and the F-1003C-L & R Inst Panel Attach Flanges from the F-1044A, F-1045-L, & F-1045-R Fwd Fuselage Ribs. See Page 31-7, Figures 1 and 2.

Remove the inst panel attach flanges and inst panel lower flange from the instrument panel.

Deburr all open rivet holes and edges of the inst panel attach flanges then dimple all rivet holes EXCEPT the two most inboard rivet holes which lie under the F-1071B Hand Hold Doublers. See Page 31-7, Figure 2.

Step 11: Remove the Sub-Panel/Fwd Fuselage Rib Subassembly from the forward fuselage. See Page 31-6, Figure 1.

Disassemble the Sub-Panel/Fwd Fuselage Rib Subassembly into its individual components. See Page 31-4, Figure 3.

Deburr the holes and edges of all parts.

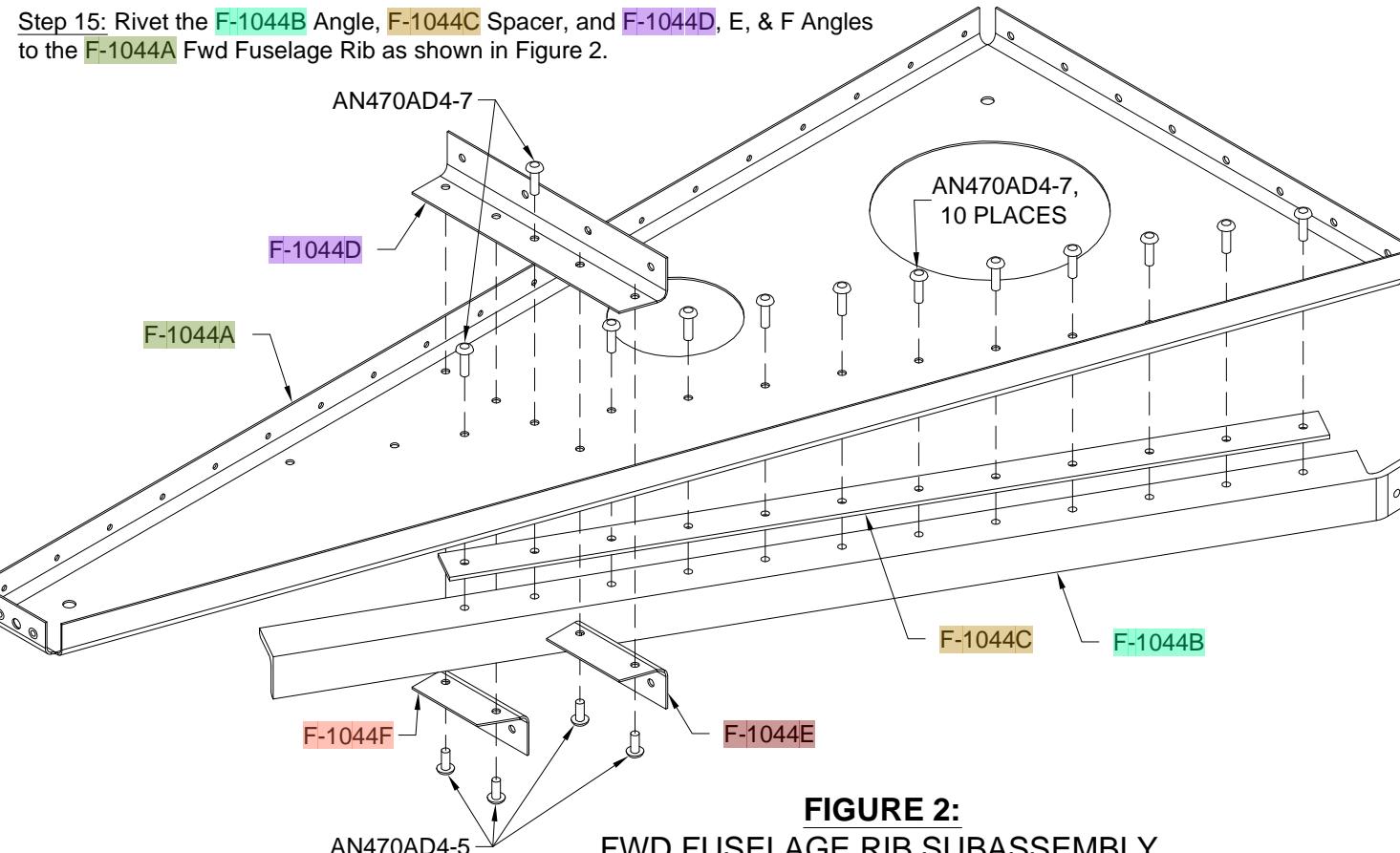
Dimple the skin attach rivet holes in the F-1044A and F-1045-L & R Fwd Fuselage Ribs, F-1068A Sub Panel Center, and F-1068B-L & R Sub Panel Sides.

Step 12: Prime the F-1044B Angle. Prime all other parts if/as desired.

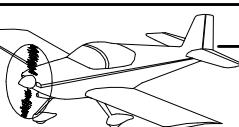
Step 13: Dimple the nutplates that will be attached to the F-1003D & E Inst Panel Attach Flanges and F-1083 Control Cable Bracket. See Figure 1 and Page 31-5, Figure 2.

Step 14: Rivet nutplates to the F-1003D & E Inst Panel Attach Flanges and F-1083 Control Cable Bracket as shown in Figure 1 and Page 31-5, Figure 2.

Step 15: Rivet the F-1044B Angle, F-1044C Spacer, and F-1044D, E, & F Angles to the F-1044A Fwd Fuselage Rib as shown in Figure 2.



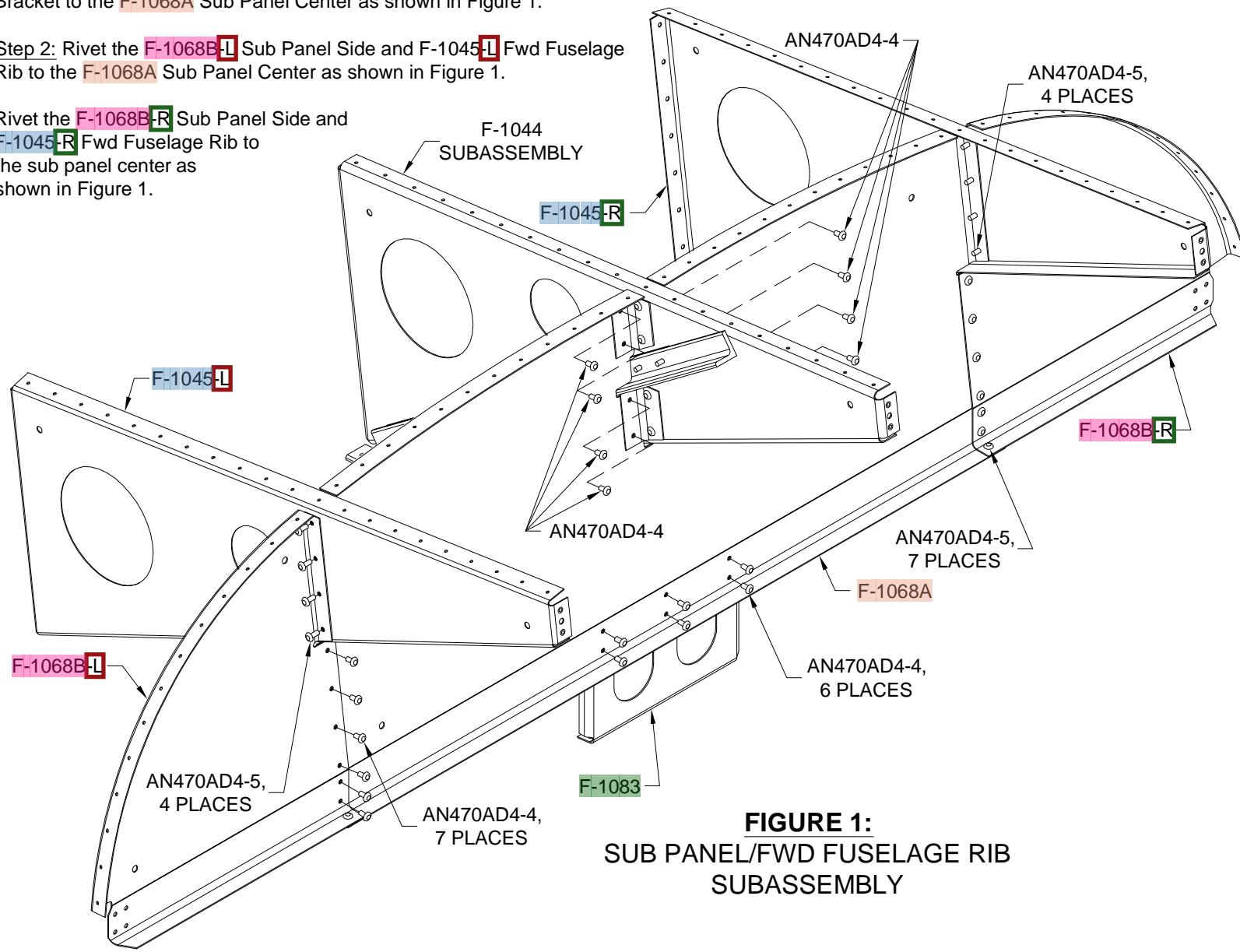
**FIGURE 2:**  
FWD FUSELAGE RIB SUBASSEMBLY



Step 1: Rivet the F-1044 Fwd Fuselage Rib Subassembly and F-1083 Control Cable Bracket to the F-1068A Sub Panel Center as shown in Figure 1.

Step 2: Rivet the F-1068B-L Sub Panel Side and F-1045-L Fwd Fuselage Rib to the F-1068A Sub Panel Center as shown in Figure 1.

Rivet the F-1068B-R Sub Panel Side and F-1045-R Fwd Fuselage Rib to the sub panel center as shown in Figure 1.

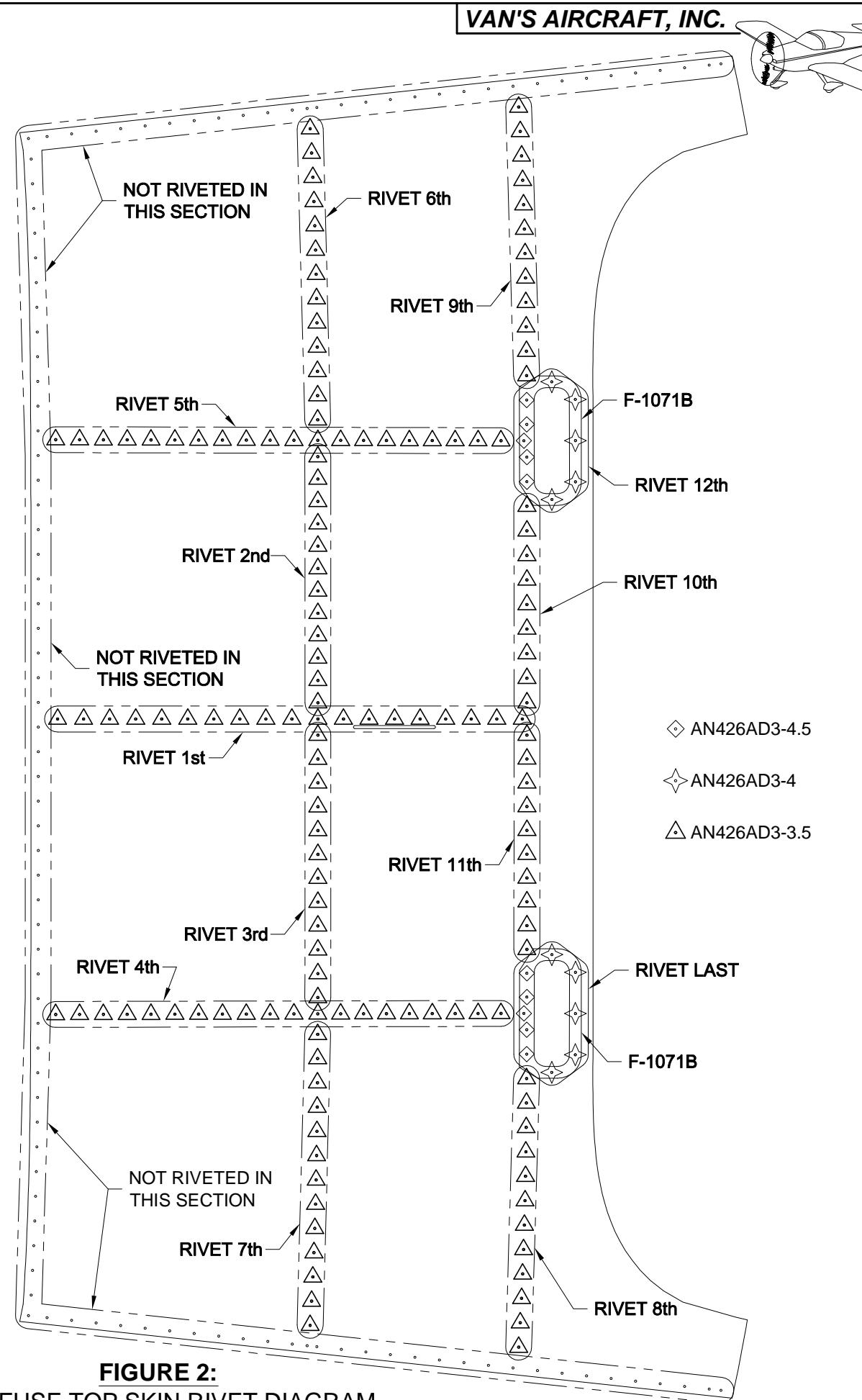


**FIGURE 1:**  
SUB PANEL/FWD FUSELAGE RIB  
SUBASSEMBLY

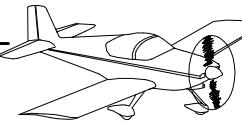
Step 3: Rivet the F-1071 Fwd Fuse Top Skin to the Sub Panel/Fwd Fuselage Rib Subassembly using the rivets and riveting sequence shown in Figure 2.

Install the rivets sequentially beginning with the rivet row labeled "RIVET 1st" through the rivet row labeled "RIVET 5th" only. See Figure 2.

Install the rivets in the rivet rows labeled "RIVET 6th" and "RIVET 7th" beginning each row with the most inboard rivet and progressing outboard. See Figure 2.



**FIGURE 2:**  
FWD FUSE TOP SKIN RIVET DIAGRAM



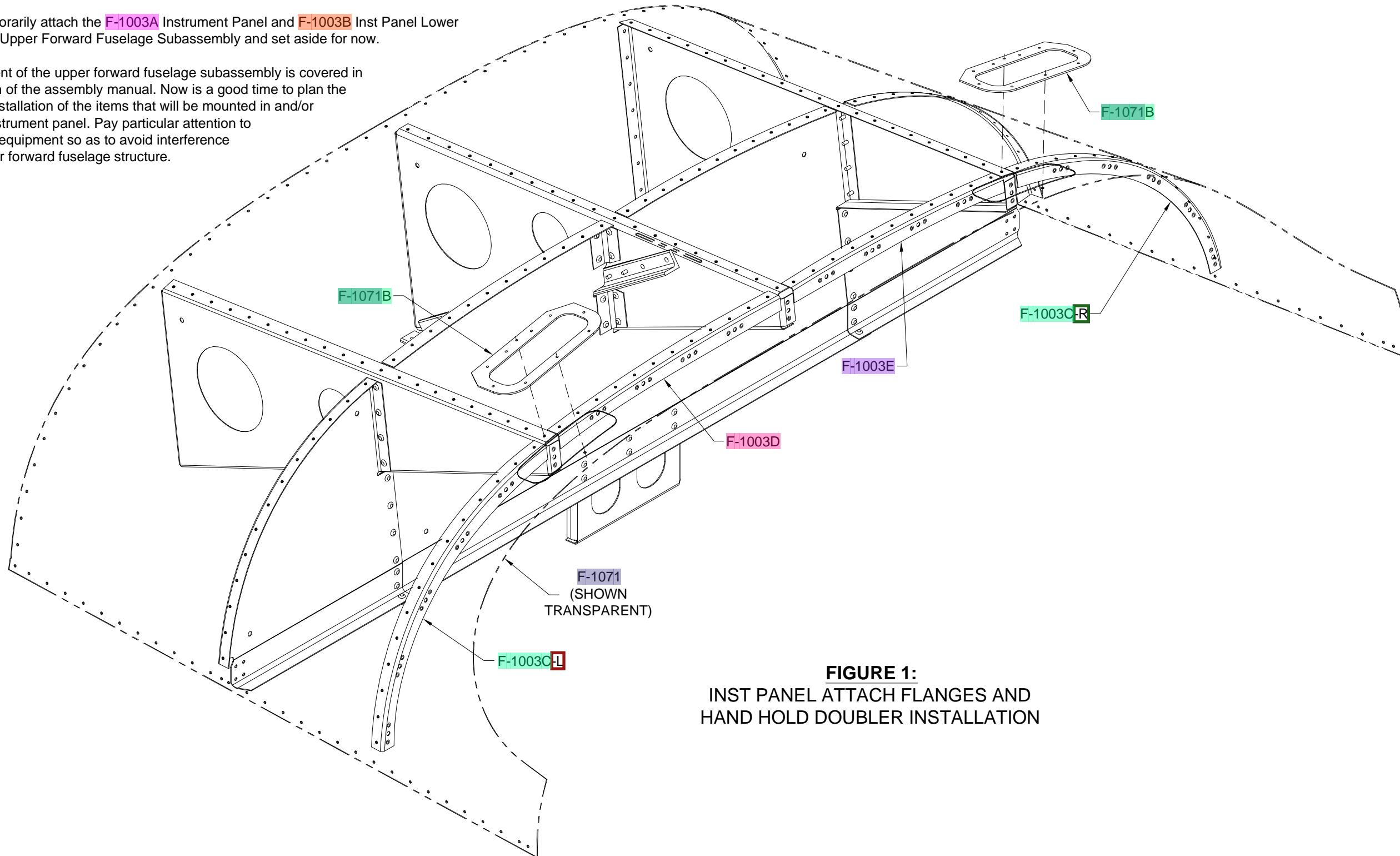
Step 1: Rivet the F-1003C L & R Inst Panel Attach Flanges to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets and riveting sequence shown in Page 31-9, Figure 2.

Step 2: Rivet the F-1003D and F-1003E Inst Panel Attach Flanges to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets and riveting sequence shown in Page 31-9, Figure 2.

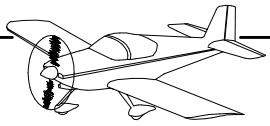
Step 3: Rivet the two F-1071B Hand Hold Doublers to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets shown in Page 31-9, Figure 2.

Step 4: Temporarily attach the F-1003A Instrument Panel and F-1003B Inst Panel Lower Flange to the Upper Forward Fuselage Subassembly and set aside for now.

The attachment of the upper forward fuselage subassembly is covered in a later section of the assembly manual. Now is a good time to plan the lay-out and installation of the items that will be mounted in and/or behind the instrument panel. Pay particular attention to placement of equipment so as to avoid interference with the upper forward fuselage structure.



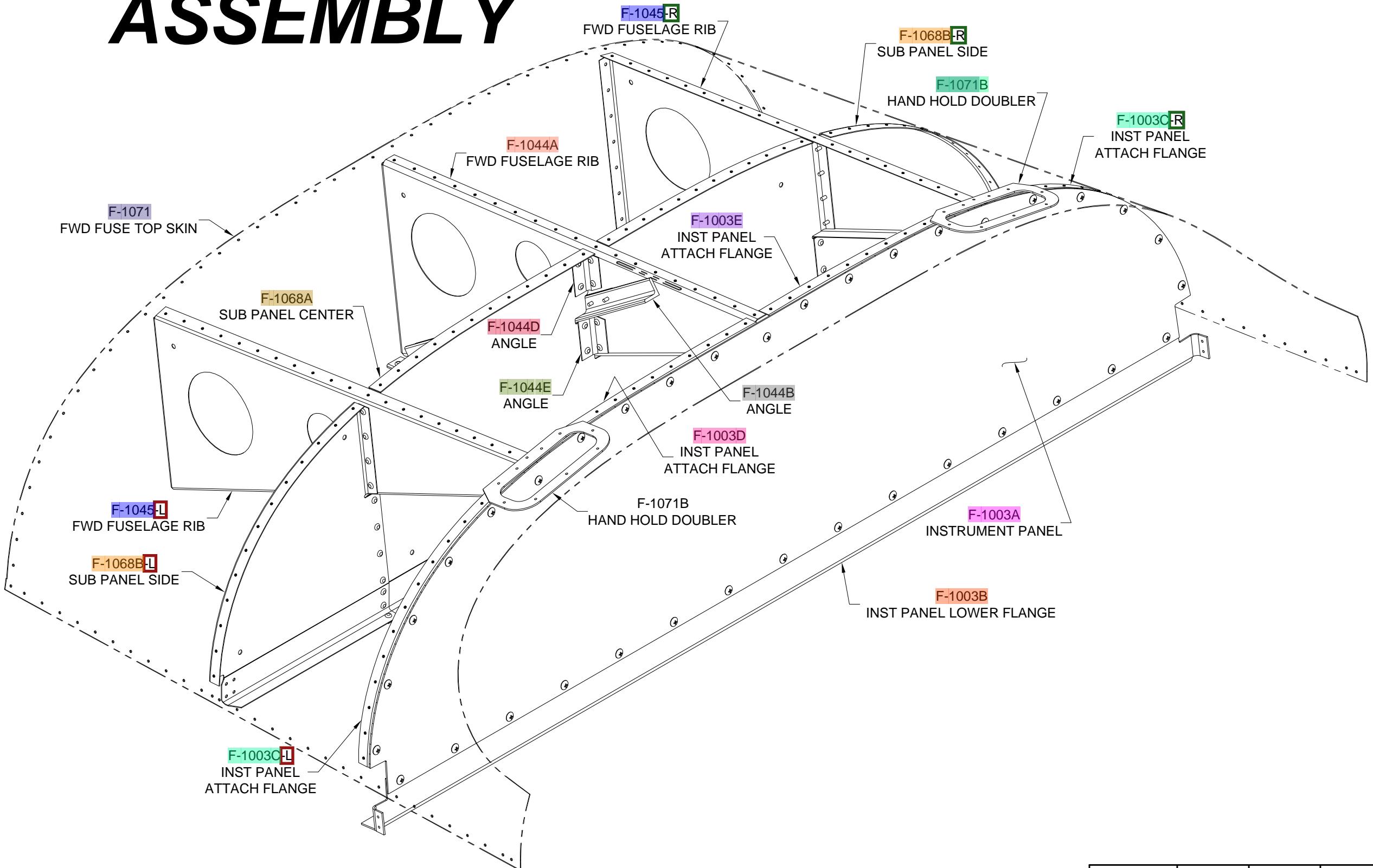
**FIGURE 1:**  
INST PANEL ATTACH FLANGES AND  
HAND HOLD DOUBLER INSTALLATION



# SECTION 31Q:

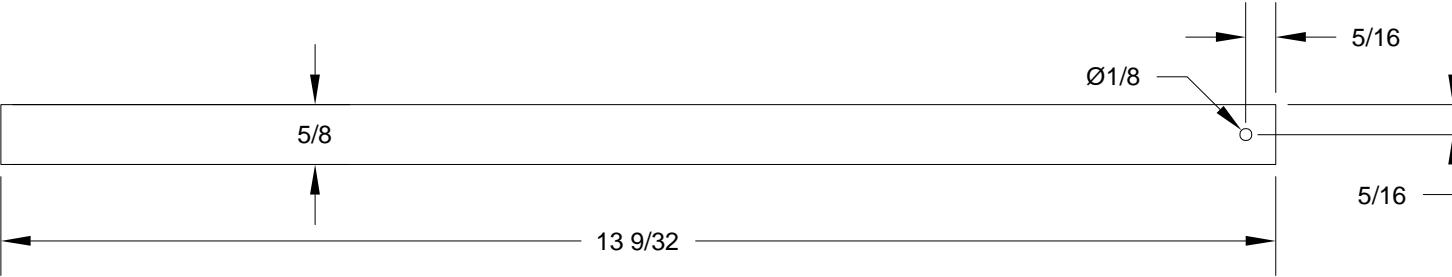
## UPPER FORWARD FUSELAGE

## ASSEMBLY



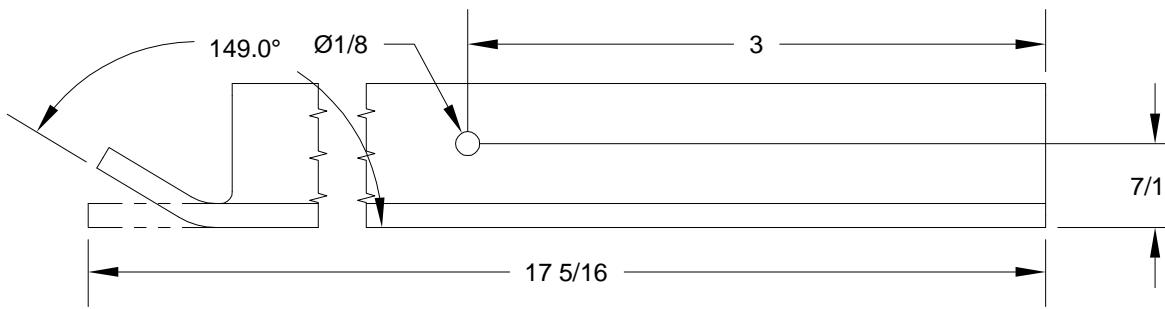


Step 1: Fabricate the F-1044C Spacer from AS3-063 x .625 as shown in Figure 1.



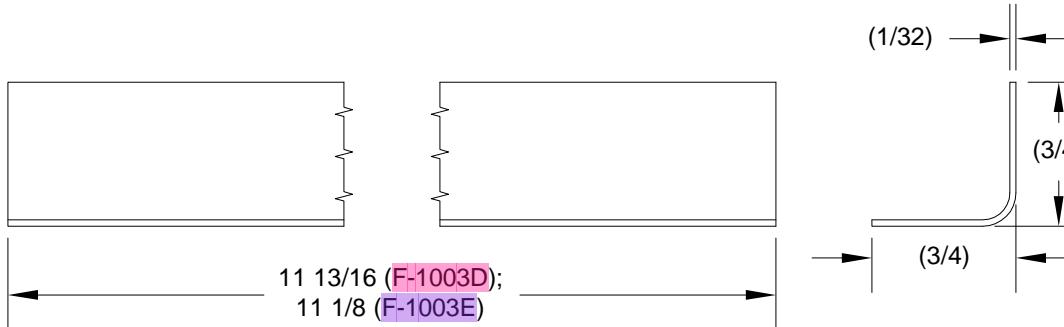
**FIGURE 1: FABRICATE SPACER**

Step 2: Fabricate the F-1044B Angle from AA6-125 x 3/4 x 3/4 as shown in Figure 2.



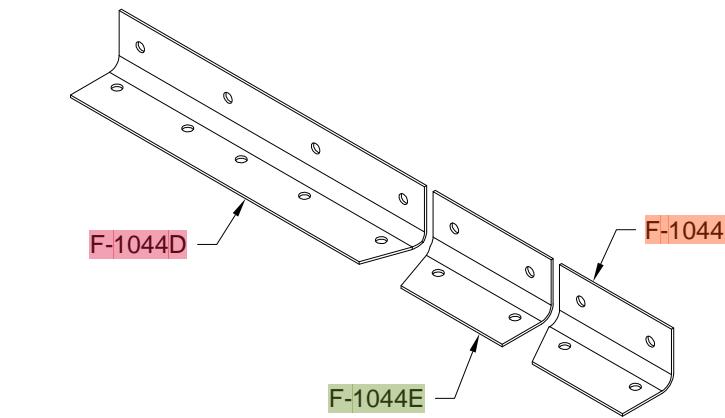
**FIGURE 2: FABRICATE ANGLE**

Step 3: Fabricate the F-1003D and F-1003E Inst Panel Attach Flanges from AA3-032 x 3/4 x 3/4 as shown in Figure 3.



**FIGURE 3: FABRICATE INST PANEL ATTACH FLANGES**

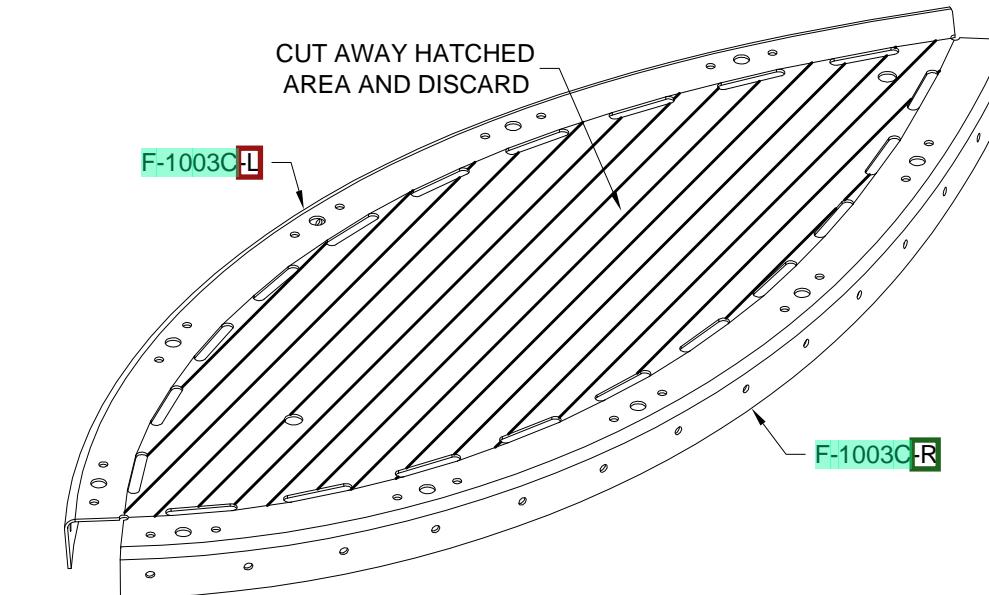
Step 4: Break apart the F-1044DEF Angle into individual F-1044D, F-1044E, and F-1044F Angles as shown in Figure 4.



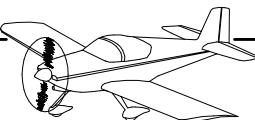
**FIGURE 4: BREAK APART ANGLES**

Step 5: Flute and straighten the flanges of the F-1003C Inst Panel Attach Flange per Section 5N.

Cut apart the inst panel attach flange into individual F-1003C-L and F-1003C-R Inst Panel Attach Flanges as shown in Figure 5.



**FIGURE 5: BREAK APART INST PANEL ATTACH FLANGES**



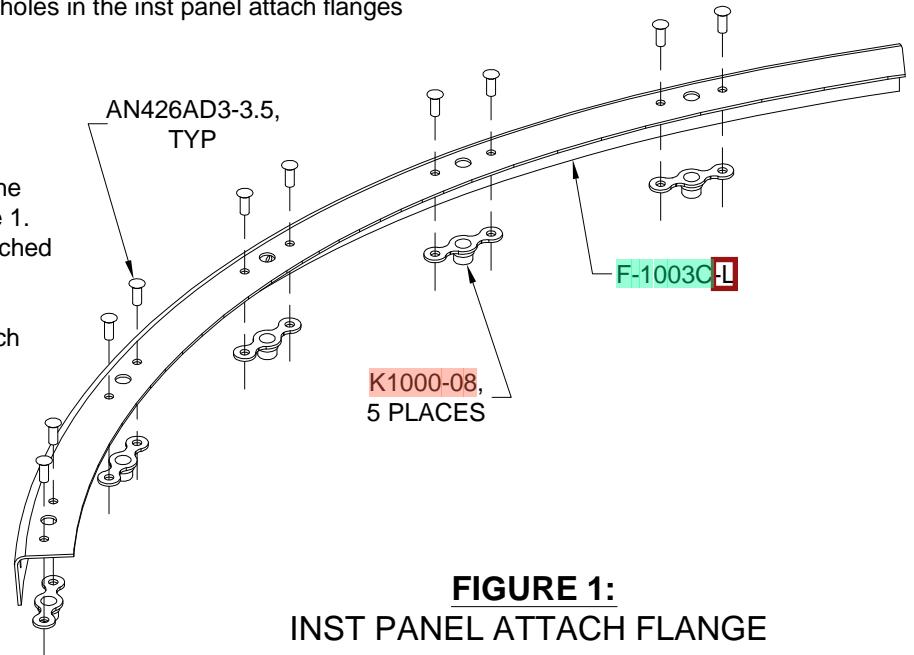
Step 1: Final-Drill #40 all the nutplate attach holes in the F-1003C-L & R Inst Panel Attach Flanges as shown in Figure 1.

Final-Drill #19 all the nutplate screw holes in the inst panel attach flanges as shown in Figure 1.

Deburr all final-drilled holes in the inst panel attach flanges.

Dimple the nutplate attach holes in the inst panel attach flanges. See Figure 1. Dimple the nutplates that will be attached to the inst panel attach flanges.

Rivet nutplates to the inst panel attach flanges as shown in Figure 1.



**FIGURE 1:**  
INST PANEL ATTACH FLANGE  
NUTPLATE INSTALLATION

Step 3: Final-Drill #40 the nutplate attach holes in the F-1045-L & R Fwd Fuselage Ribs as shown in Figure 3.

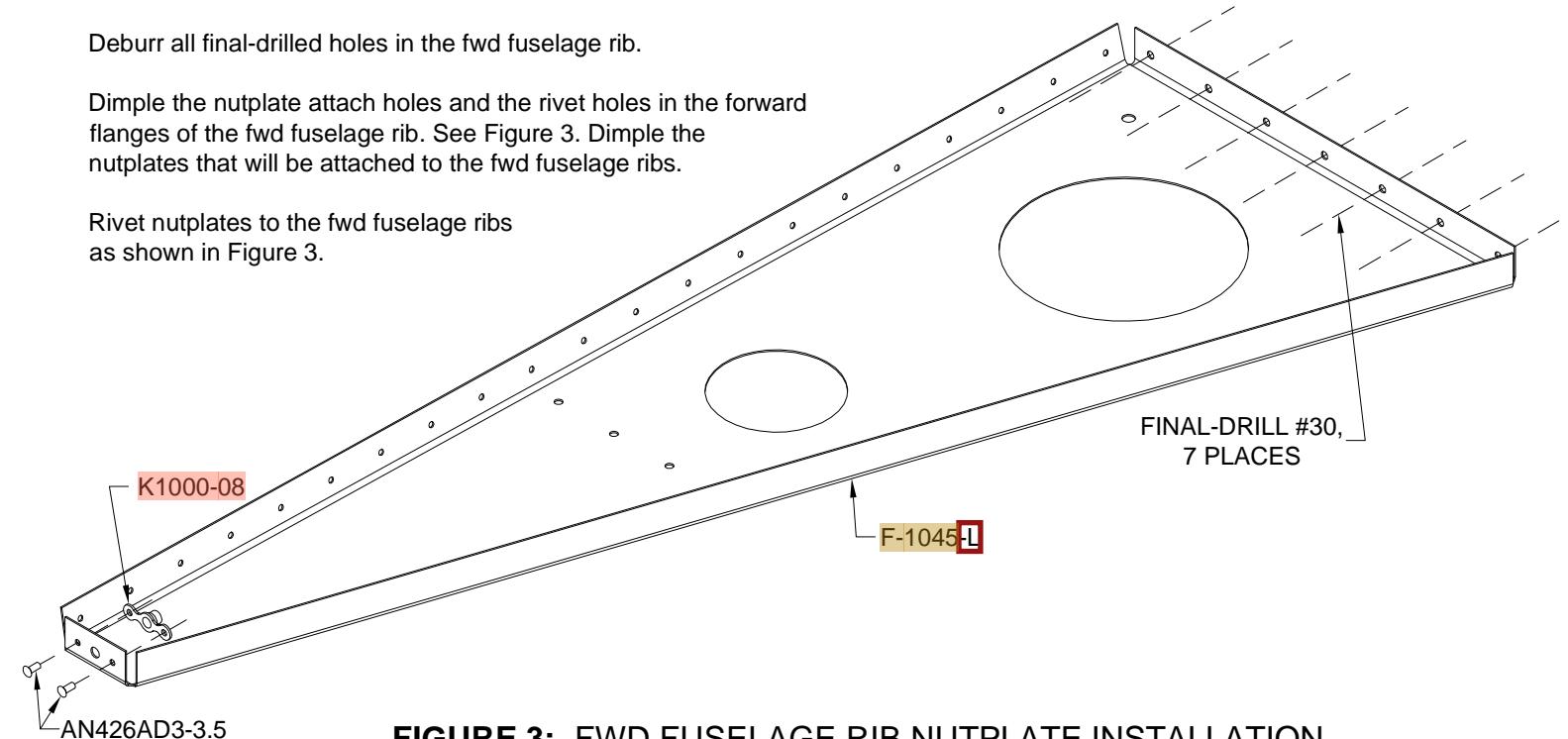
Final-Drill #19 the nutplate screw holes in the fwd fuselage ribs as shown in Figure 3.

Final-Drill #30 the rivet holes in the forward flanges of the fwd fuselage rib as shown in Figure 3.

Deburr all final-drilled holes in the fwd fuselage rib.

Dimple the nutplate attach holes and the rivet holes in the forward flanges of the fwd fuselage rib. See Figure 3. Dimple the nutplates that will be attached to the fwd fuselage ribs.

Rivet nutplates to the fwd fuselage ribs as shown in Figure 3.



**FIGURE 3:** FWD FUSELAGE RIB NUTPLATE INSTALLATION

Step 2: Final-Drill #40 the nutplate attach holes in the F-1044A Fwd Fuselage Rib as shown in Figure 2.

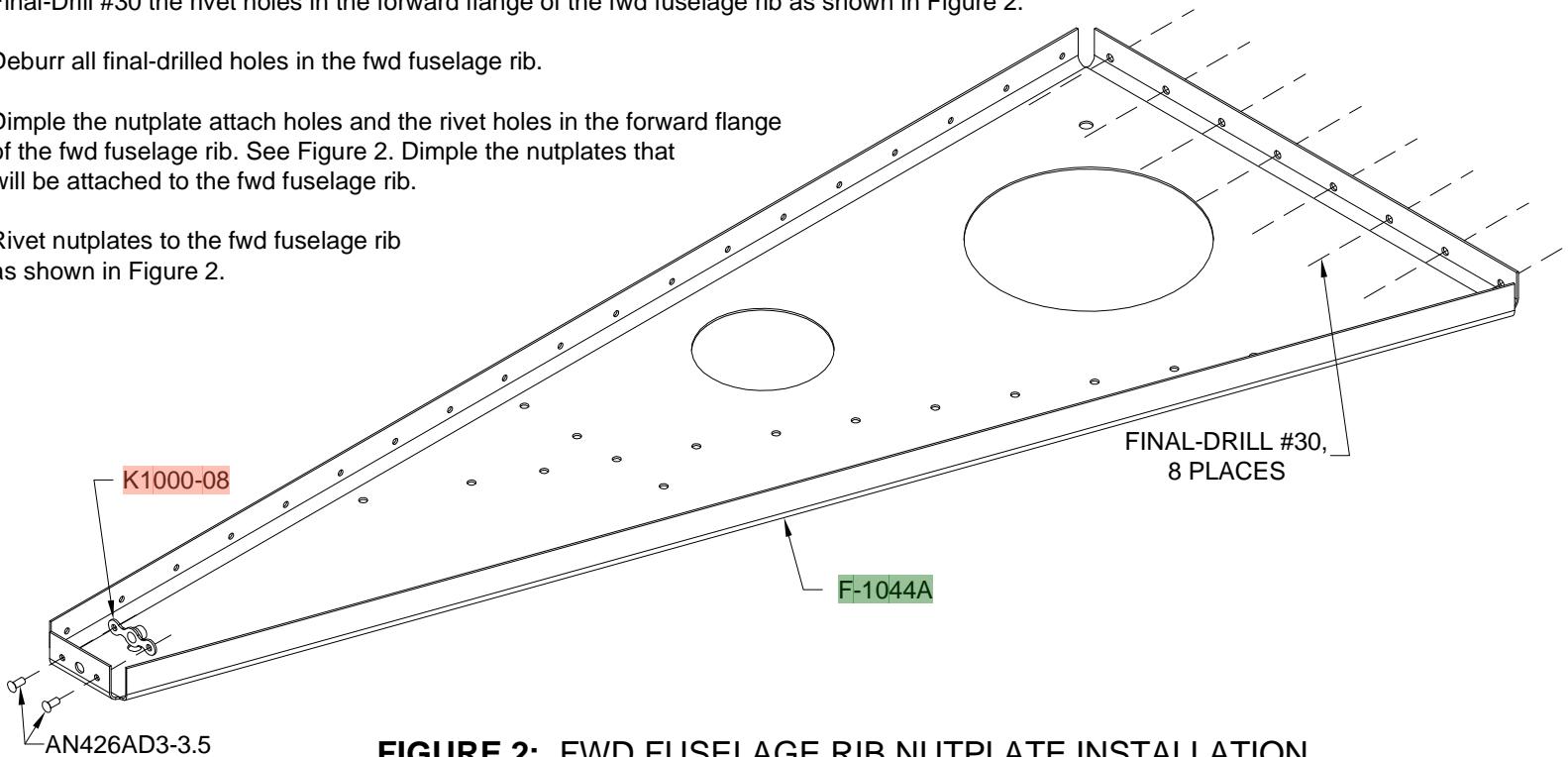
Final-Drill #19 the nutplate screw hole in the fwd fuselage rib as shown in Figure 2.

Final-Drill #30 the rivet holes in the forward flange of the fwd fuselage rib as shown in Figure 2.

Deburr all final-drilled holes in the fwd fuselage rib.

Dimple the nutplate attach holes and the rivet holes in the forward flange of the fwd fuselage rib. See Figure 2. Dimple the nutplates that will be attached to the fwd fuselage rib.

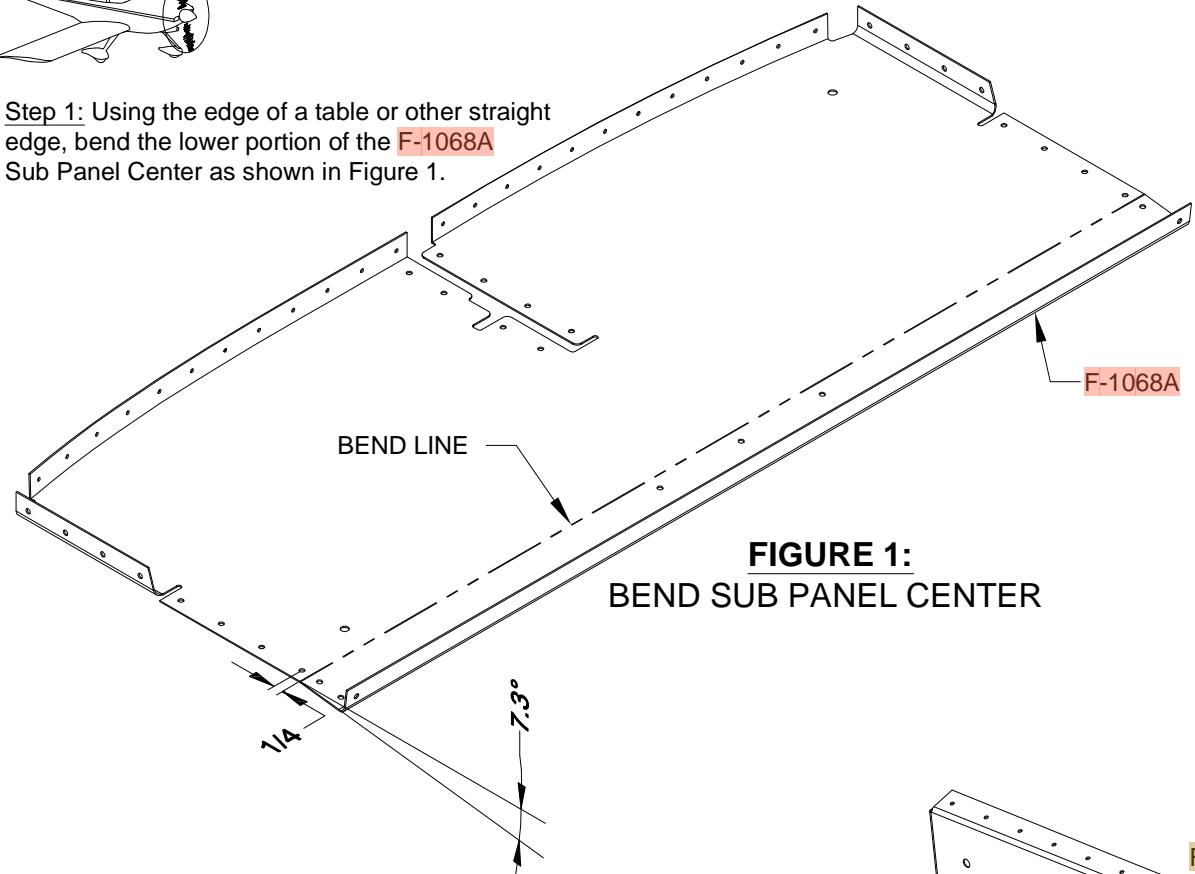
Rivet nutplates to the fwd fuselage rib as shown in Figure 2.



**FIGURE 2:** FWD FUSELAGE RIB NUTPLATE INSTALLATION

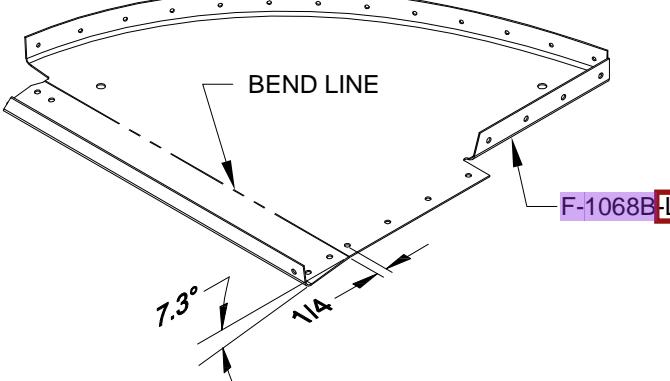


Step 1: Using the edge of a table or other straight edge, bend the lower portion of the F-1068A Sub Panel Center as shown in Figure 1.



**FIGURE 1:**  
BEND SUB PANEL CENTER

Step 2: Using the edge of a table or other straight edge, bend the lower portions of the F-1068B-L and F-1068B-R Sub Panel Sides as shown in Figure 2.

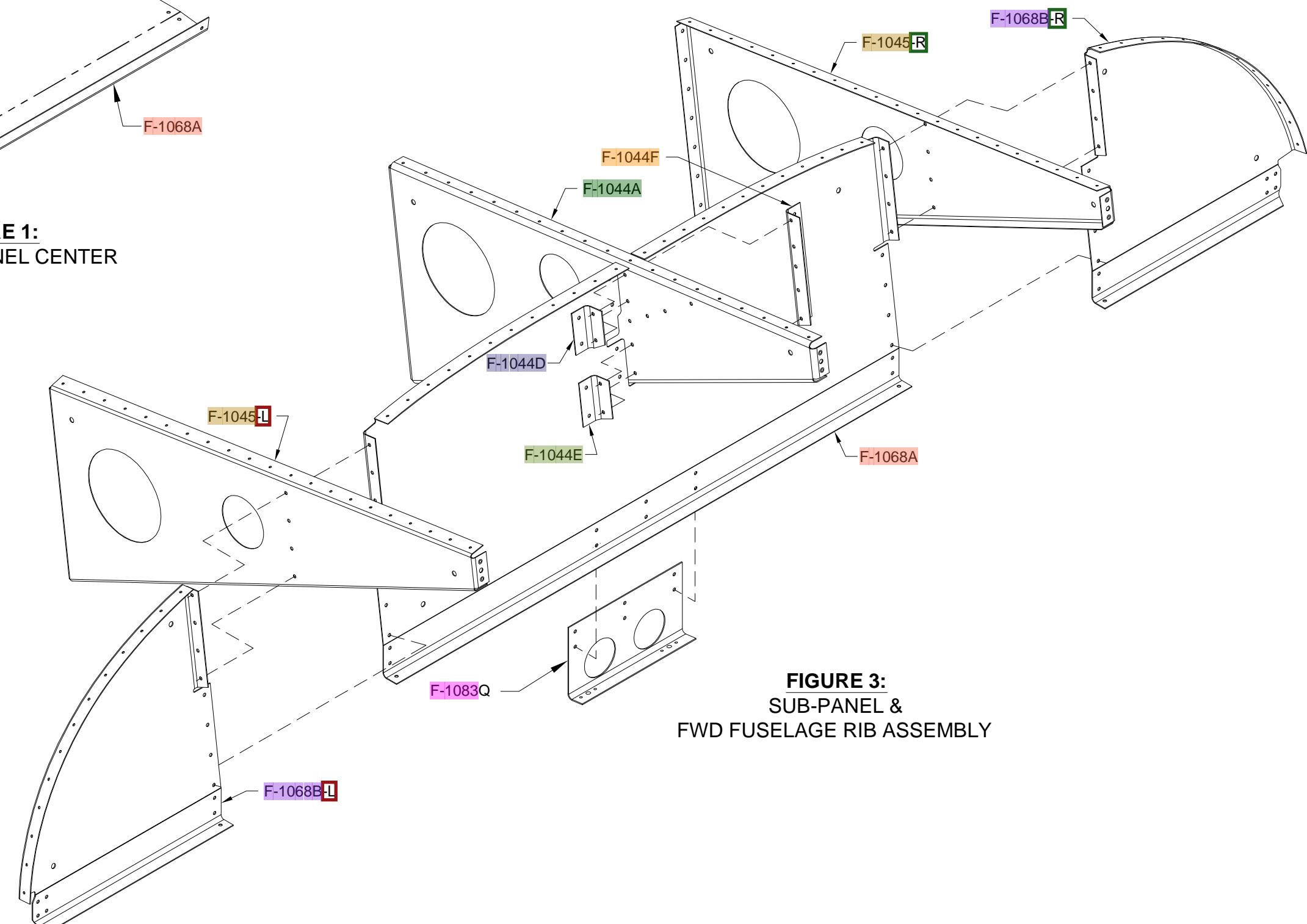


**FIGURE 2:** BEND SUB PANEL SIDE

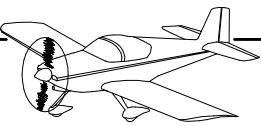
Step 3: Flute and straighten the curved flanges of the F-1068B-L and F-1068B-R Sub Panel Sides per Section 5N.

Step 4: Cleco the F-1044A Fwd Fuselage Rib, F-1044D, E, & F Angles, F-1045-L & R Fwd Fuselage Ribs, F-1068A Sub Panel Center, F-1068B-L & R Sub Panel Sides, and F-1083Q Quadrant Mount Bracket as shown in Figure 3.

Final-Drill #30 all holes common to the parts clecoed together.

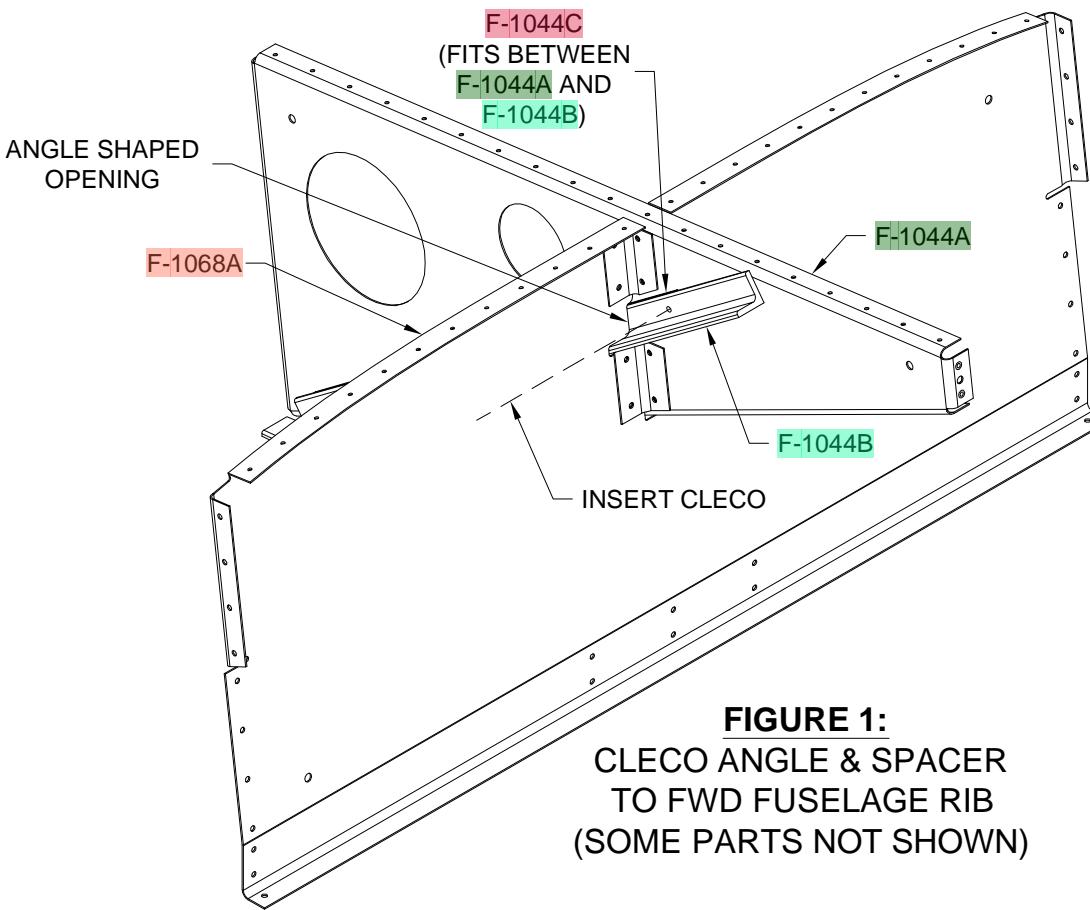


**FIGURE 3:**  
SUB-PANEL &  
FWD FUSELAGE RIB ASSEMBLY



Step 1: Insert the F-1044B Angle and F-1044C Spacer through the angle shaped opening in the F-1068A Sub Panel Center.

Cleco the angle and spacer to the F-1044A Fwd Fuselage Rib as shown in Figure 1.



**FIGURE 1:**  
CLECO ANGLE & SPACER  
TO FWD FUSELAGE RIB  
(SOME PARTS NOT SHOWN)

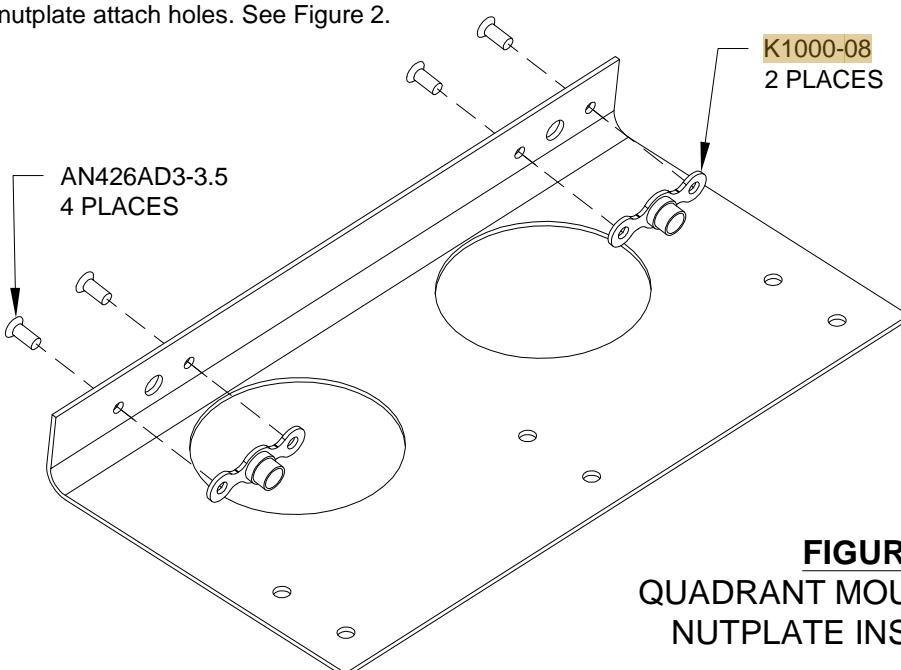
Step 2: Remove the F-1083Q Quadrant Mount Bracket from the F-1068A Sub Panel Center.

Final-Drill #19 the nutplate screw holes in the quadrant mount bracket. See Figure 2.

Final-Drill #40 the nutplate attach holes in the quadrant mount bracket. See Figure 2.

Deburr the holes and edges of the quadrant mount bracket.

Dimple the nutplate attach holes. See Figure 2.

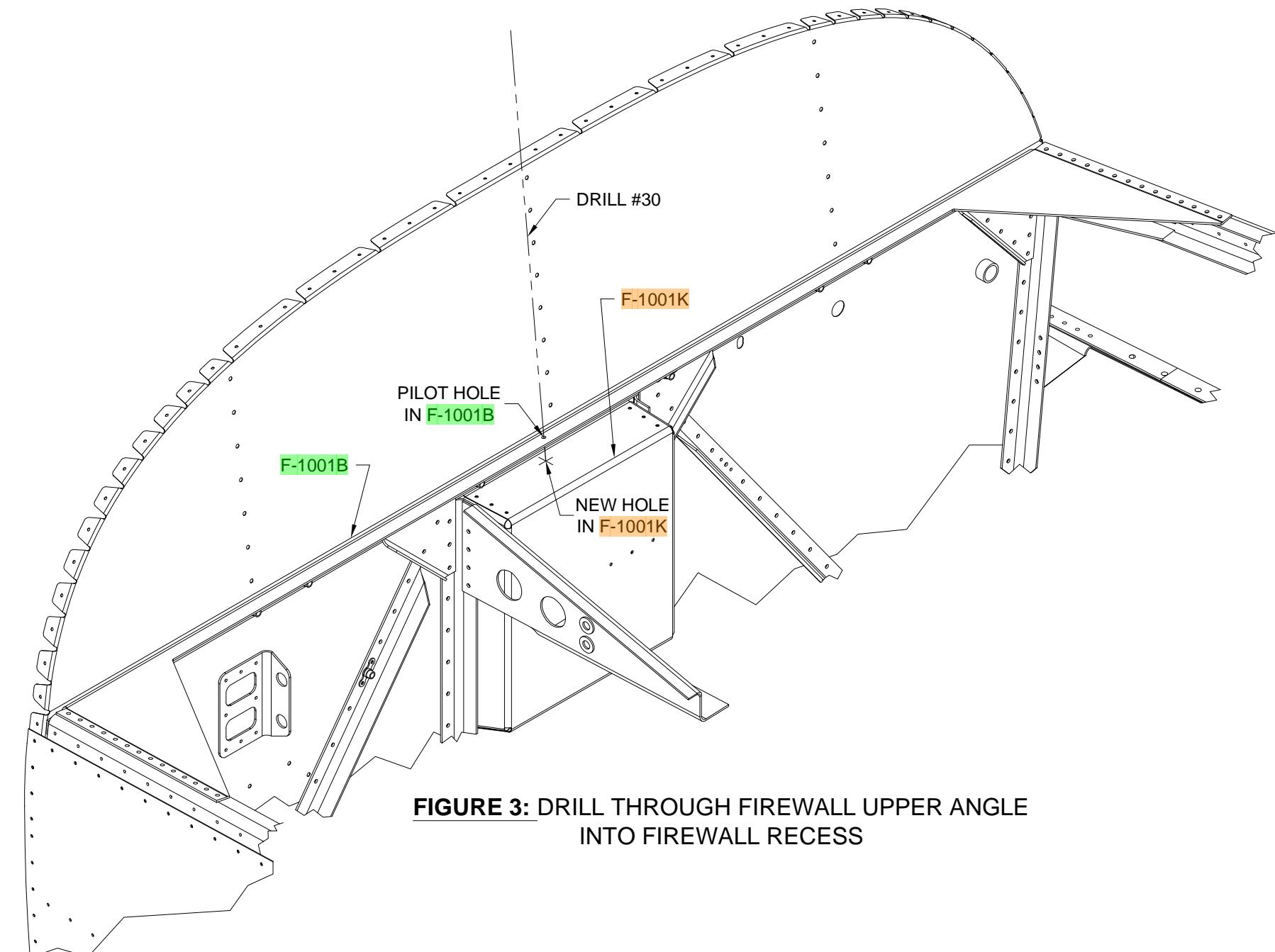


**FIGURE 2:**  
QUADRANT MOUNT BRACKET  
NUTPLATE INSTALLATION

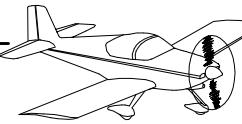
Step 3: Using a long #30 drill bit, drill downward through the pilot hole near the middle of the F-1001B Upper Firewall Angle and through the upper surface of the F-1001K Firewall Recess. See Figure 3.

The new hole in the firewall recess will allow for drilling back up into the F-1044B Angle.

Use care when drilling so as not to enlarge the pilot hole in the upper firewall angle.



**FIGURE 3:** DRILL THROUGH FIREWALL UPPER ANGLE  
INTO FIREWALL RECESS



Step 1: Cleco the Sub Panel/Fwd Fuselage Rib Subassembly to the forward fuselage as shown in Figure 1.  
It is permissible to slightly spread the F-1040 L & R Upper Fuse Channels to allow clearance for installation.

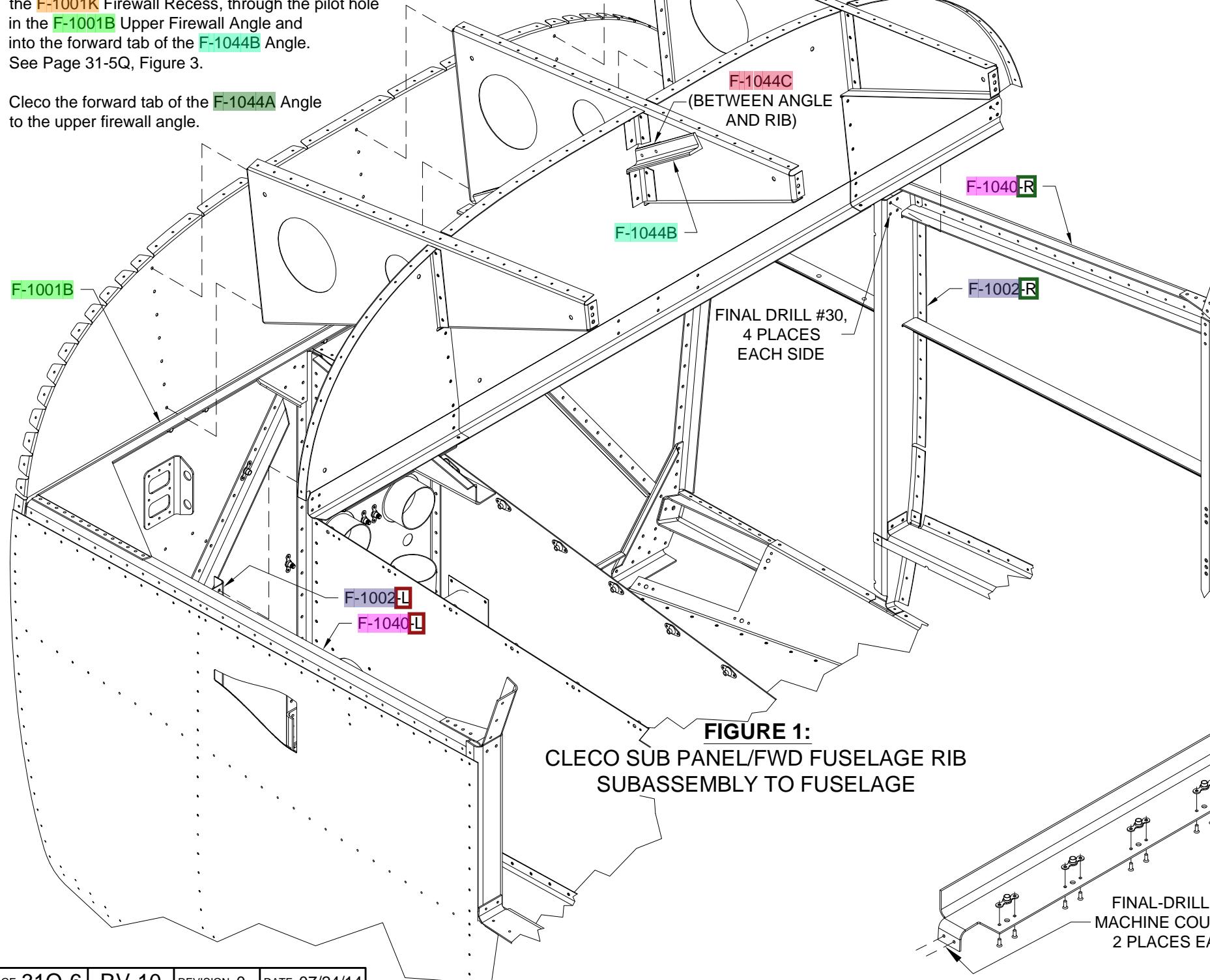
Final-Drill #30 four places F-1068B-L to F-1002-L and four places F-1068B-R to F-1002-R as shown in Figure 1.

Rotate the F-1044B Angle on the cleco holding it and the F-1044C Spacer to the F-1044A Fwd Fuse Rib until the forward tab of the angle rests on the upper surface of the F-1001B Firewall Upper Angle. Adjust the bend angle of the tab on the angle if/as required to rest flat on the firewall upper angle.

Match-Drill #30 and cleco the angle and spacer to the fwd fuselage rib in two places (once in the middle of the angle and once in the forward end of the angle) using the holes in the fwd fuselage rib as drill guides.

Step 2: Match-Drill #30 upward through the pilot hole in the upper surface of the F-1001K Firewall Recess, through the pilot hole in the F-1001B Upper Firewall Angle and into the forward tab of the F-1044B Angle. See Page 31-5Q, Figure 3.

Cleco the forward tab of the F-1044A Angle to the upper firewall angle.



Step 3: Final-Drill #19 all holes in the F-1003A Instrument Panel.

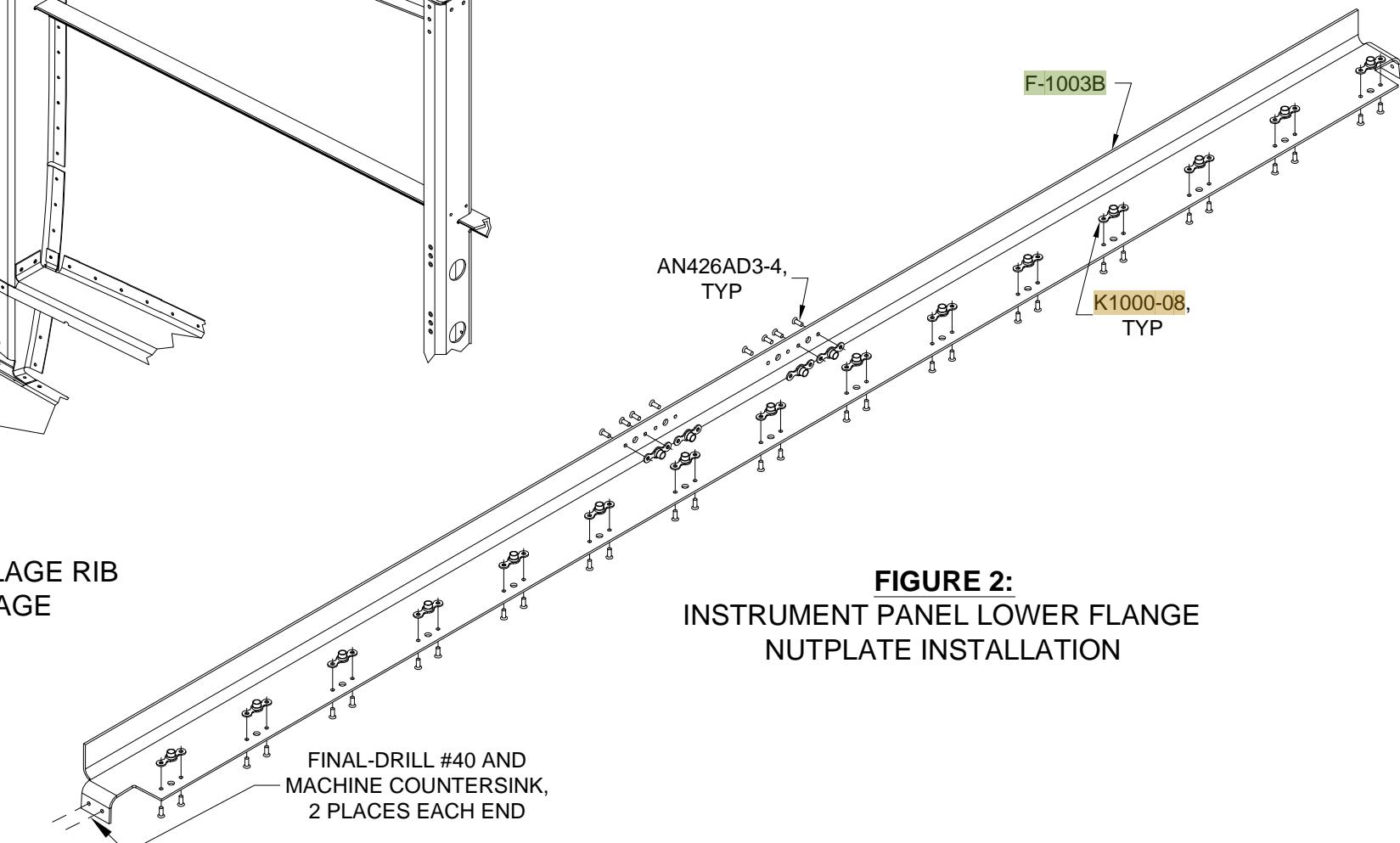
Step 4: Final-Drill #19 all nutplate screw holes in the F-1003B Inst Panel Lower Flange.

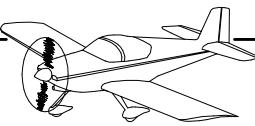
Final-Drill #40 the rivet holes in the end tabs and nutplate attach holes in the inst panel lower flange. See Figure 2.

Machine countersink the nutplate attach holes to fit the head of an AN426AD3 rivet. See Figure 2.

Machine countersink the rivet holes in the end tabs to fit the dimples in the fuselage side skin. Make a dimple test sample by drilling and dimpling a scrap of .032 aluminum for an AN426AD3 rivet. See Figure 2. See Section 5E.

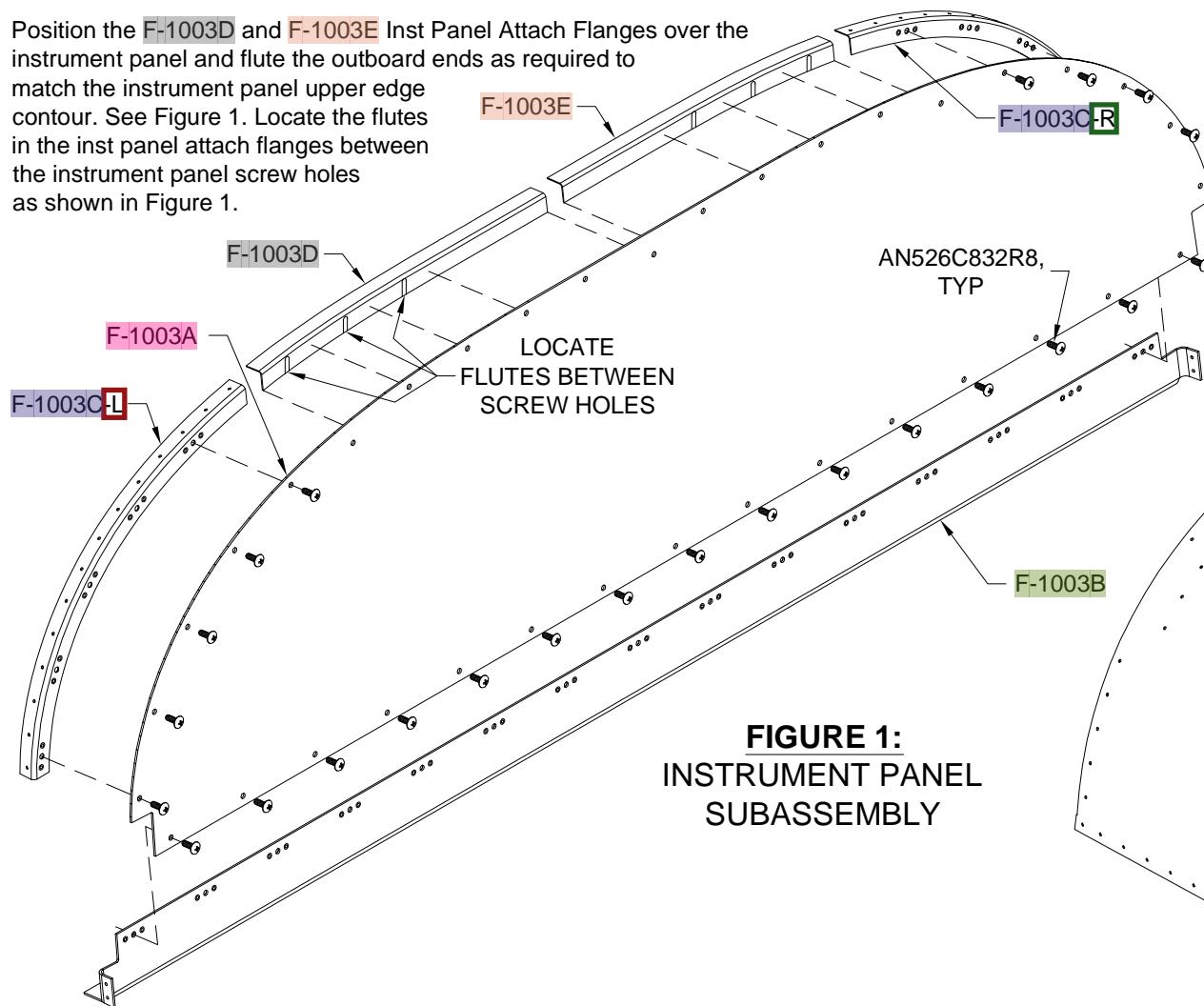
Rivet nutplates to the inst panel lower flange as shown in Figure 2.





Step 1: Attach the F-1003B Inst Panel Lower Flange and F-1003C-L & R Inst Panel Attach Flanges to the F-1003A Instrument Panel as shown in Figure 1.

Position the F-1003D and F-1003E Inst Panel Attach Flanges over the instrument panel and flute the outboard ends as required to match the instrument panel upper edge contour. See Figure 1. Locate the flutes in the inst panel attach flanges between the instrument panel screw holes as shown in Figure 1.



**FIGURE 1:**  
INSTRUMENT PANEL  
SUBASSEMBLY

Step 2: Attach the subassembly of F-1003A Instrument Panel, F-1003B Inst Panel Lower Flange, and the F-1003C-L & R Inst Panel Attach Flanges to the F-1044A, F-1045-L & F-1045-R Fwd Fuselage Ribs as shown in Figure 2.

Step 3: Cleco the F-1071 Fwd Fuse Top Skin to the flanges of F-1001A, F-1003C-L & R, F-1044A, F-1045-L & R, F-1068A, F-1068B-L & R, and to the F-1040-L & R Fwd Fuselage Channels as shown in Figure 2.

Note that the fwd fuse top skin is NOT symmetrical and that it must be installed such that the "slot" is on the left side of the F-1044A Fwd Fuselage Rib. See Figure 2.

Step 4: Form the F-1071B Hand Hold Doublers to match the countour of the F-1071 Fwd Fuse Top Skin as it is clecoed in place. The forming process will create one "Left" hand hold doubler and one "Right" hand hold doubler.

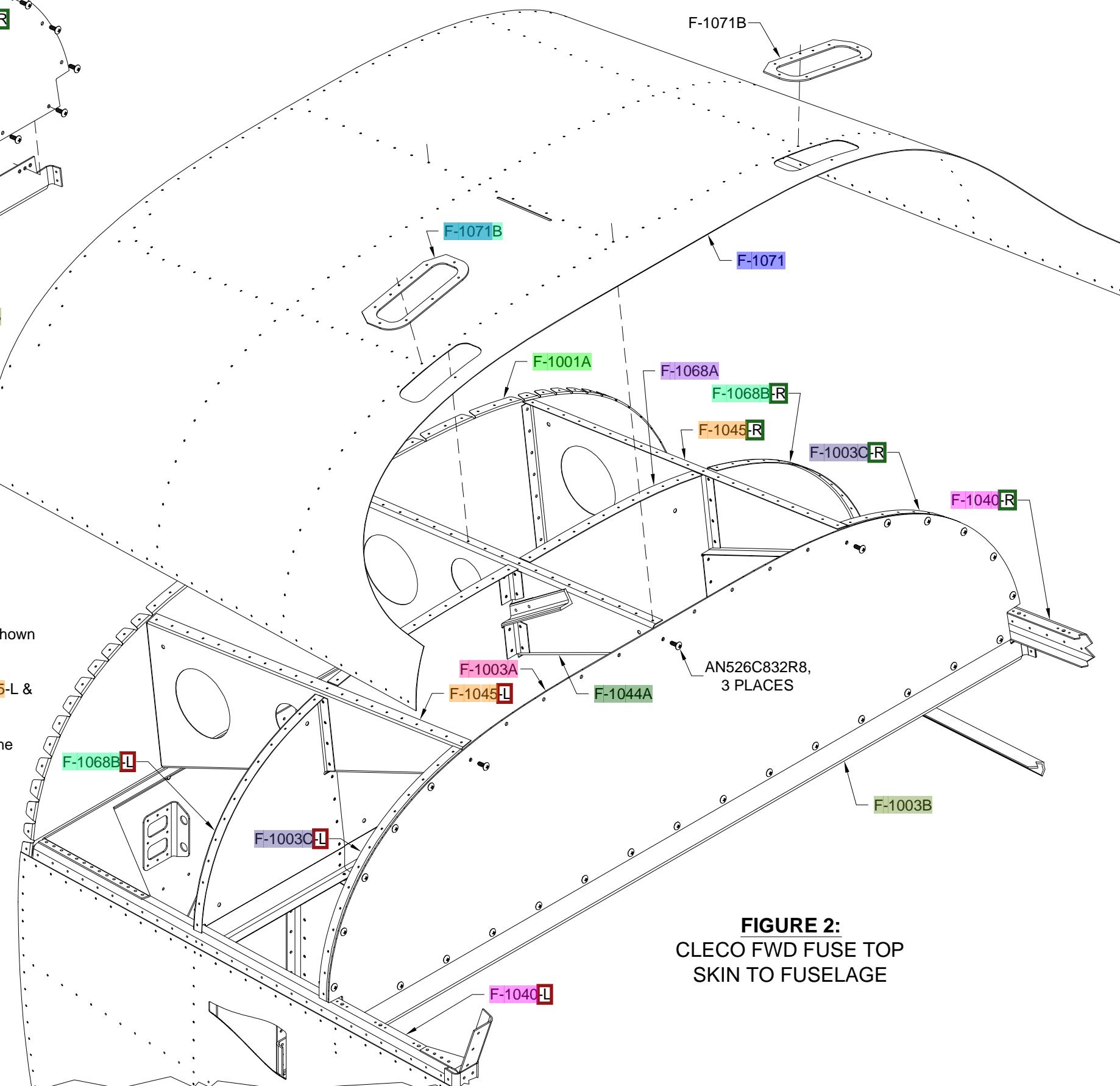
Cleco the hand hold doublers to the fwd fuse top skin as shown in Figure 2.

Match-Drill #40 each of the hand hold doublers to the fwd fuse top skin in the four places where there is no hole pre-punched in the fwd fuse top skin.

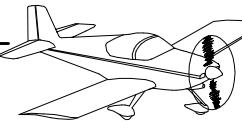
Final-Drill #40 each of the hand hold doublers to the fwd fuse top skin and the sub-structure in all the places where there are matching pre-punched holes.

Trace around the perimeter of each of the hand hold doublers with a sharpie pen. This will show where the fwd fuse skin is NOT to be dimpled.

Step 5: Final-Drill #40 the F-1071 Fwd Fuse Top Skin to the sub-structure through all holes not yet final-drilled.



**FIGURE 2:**  
CLECO FWD FUSE TOP  
SKIN TO FUSELAGE



Step 1: Position the F-1003D Inst Panel Attach Flange simultaneously against the F-1071 Fwd Fuse Top Skin and the forward side of the F-1003A Instrument Panel (See Page 31-7Q, Figure 1). Match-Drill #40 and cleco the inst panel attach flange using the holes in the fwd fuse top skin as drill guides. Be sure that the inst panel attach flange is in contact with the forward surface of the instrument panel when match-drilling.

Step 2: Position the F-1003E Inst Panel Attach Flange simultaneously against the F-1071 Fwd Fuse Top Skin and the forward side of the F-1003A Instrument Panel (See Page 31-7Q, Figure 1). Match-Drill #40 and cleco the inst panel attach flange using the holes in the fwd fuse top skin as drill guides. Be sure that the inst panel attach flange is in contact with the forward surface of the instrument panel when match-drilling.

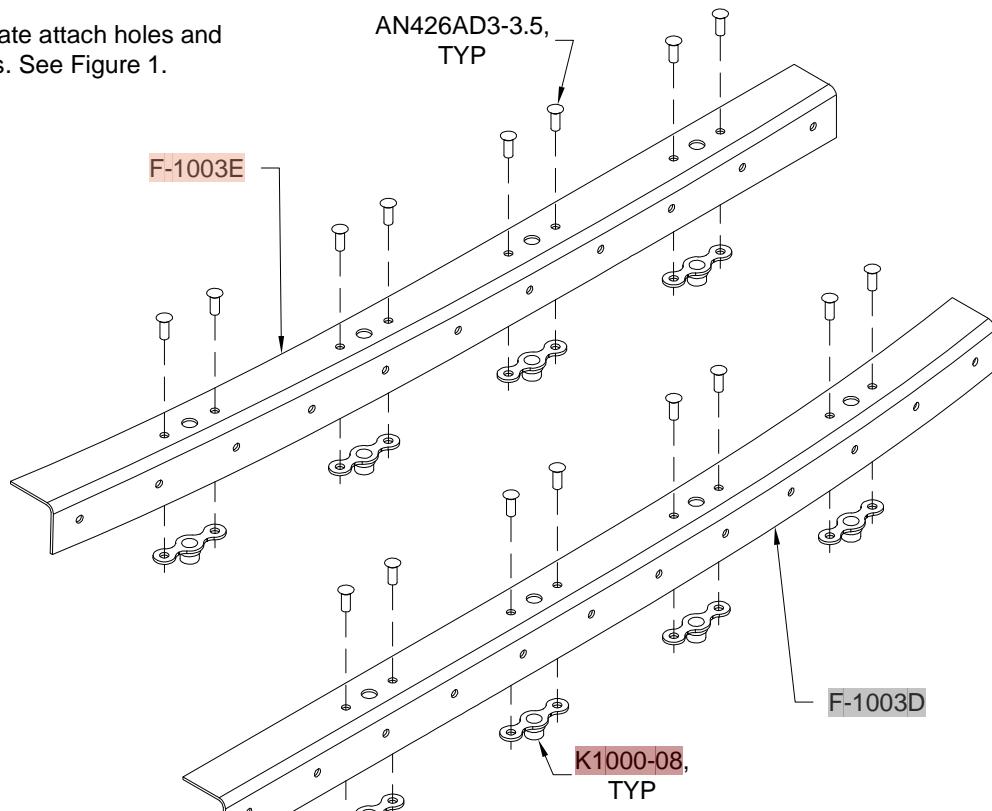
Step 3: Match-Drill #19 through the screw holes in the F-1003A Instrument Panel and into the F-1003D and F-1003E Inst Panel Attach Flanges.

Step 4: Final-Drill #40 the F-1071 Fwd Fuse Top Skin to the sub-structure through all holes not yet match-drilled or final-drilled.

Step 5: Remove the F-1003D and F-1003E Inst Panel Attach Flanges. Using a nutplate as a drill guide, match-drill #40 two nutplate attach holes for each screw hole. See Figure 1.

Deburr the holes and edges of the inst panel attach flanges.

Dimple the nutplate attach holes and skin attach holes. See Figure 1.



**FIGURE 1:**  
INST PANEL ATTACH FLANGE  
NUTPLATE INSTALLATION

Step 6: Machine countersink the rivet holes in the F-1071B Hand Hold Doublers to fit the head of an AN426AD3 rivet. See Page 31-7Q, Figure 2.

Uncleco the hand hold doublers from the F-1071 Fwd Fuse Top Skin and deburr holes and edges.

Step 7: Uncleco the F-1071 Fwd Fuse Top Skin from the sub-structure. When unclecoing, mark the holes in the sub-structure that lie under the F-1071B Hand Hold Doublers with a sharpie pen so that they will not be dimpled later.

Deburr the holes and edges of the fwd fuse top skin then dimple all holes EXCEPT those that are under the F-1071B Hand Hold Doublers.

Step 8: Dimple the holes in the flanges of the F-1001A Firewall Bulkhead that are common to the F-1071 Fwd Fuse Top Skin. See Page 31-7Q, Figure 2.

Step 9: Machine countersink the holes in the F-1040-L & R Upper Fuse Channels and F-1042-L & R Bulkhead Side Channels that are common to the F-1071 Fwd Fuse Top Skin. Countersink deep enough to fit the dimples in the fwd fuse top skin. Make a dimple test sample by drilling and dimpling a scrap of .032 aluminum for an AN426AD3 rivet. See Page 31-7Q, Figure 2. See Section 5E.

Most "micro-stop" countersink cages will interfere with the upper edge of the F-1069 Fwd Side Skins. In this case, the countersinking is best done "free-hand" with a countersink cutter in a drill motor.

Step 10: Remove the subassembly of F-1003A Instrument Panel, F-1003B Inst Panel Lower Flange, and the F-1003C-L & R Inst Panel Attach Flanges from the F-1044A, F-1045L, & F-1045R Fwd Fuselage Ribs. See Page 31-7Q, Figures 1 and 2.

Remove the inst panel attach flanges and inst panel lower flange from the instrument panel.

Deburr all open rivet holes and edges of the inst panel attach flanges then dimple all rivet holes EXCEPT the two most inboard rivet holes which lie under the F-1071B Hand Hold Doublers. See Page 31-7Q, Figure 2.

Step 11: Remove the Sub-Panel/Fwd Fuselage Rib Subassembly from the forward fuselage. See Page 31-6Q, Figure 1.

Disassemble the Sub-Panel/Fwd Fuselage Rib Subassembly into its individual components. See Page 31-4Q, Figure 3.

Deburr the holes and edges of all parts.

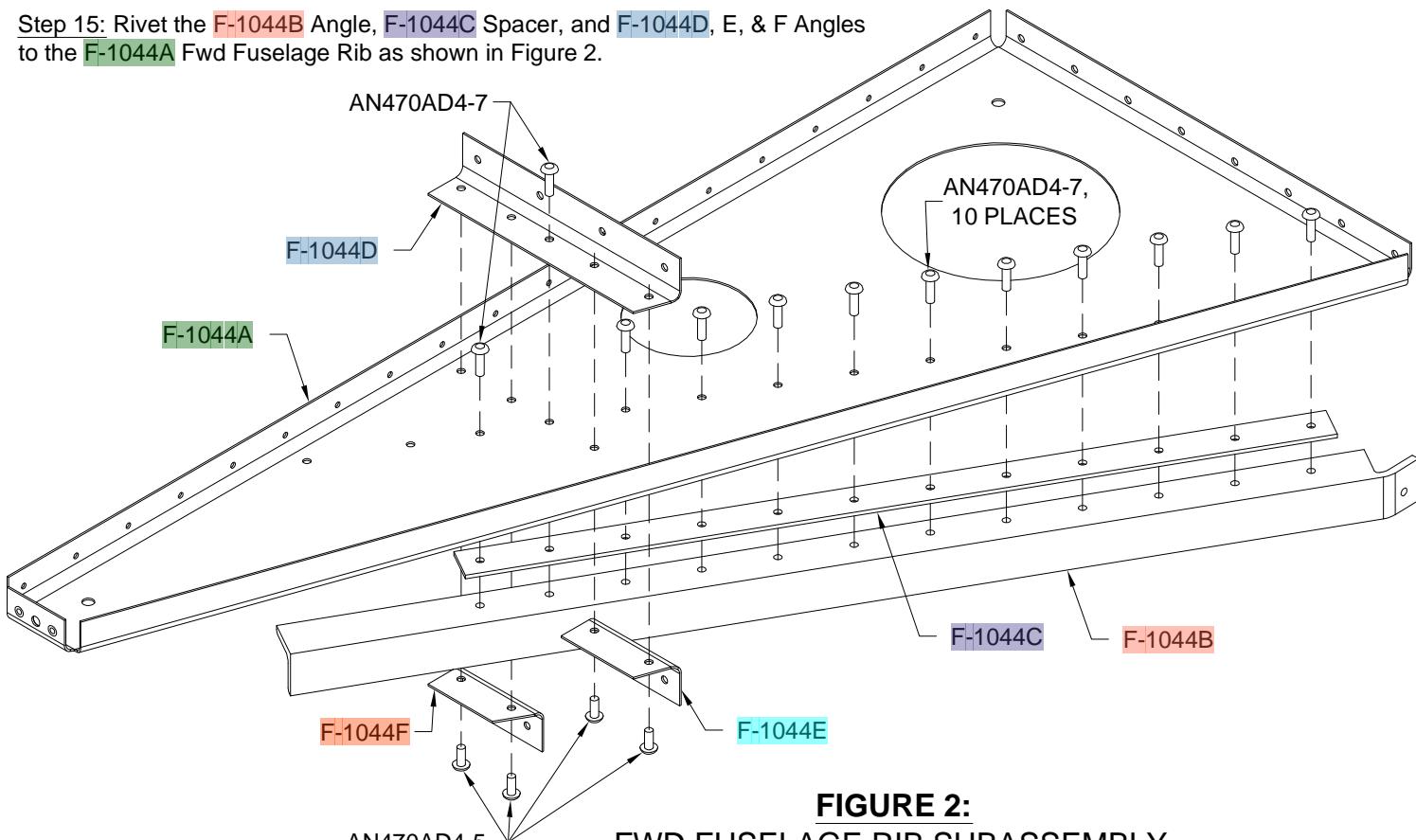
Dimple the skin attach rivet holes in the F-1044A and F-1045L & R Fwd Fuselage Ribs, F-1068A Sub Panel Center, and F-1068B-L & R Sub Panel Sides.

Step 12: Prime the F-1044B Angle. Prime all other parts if/as desired.

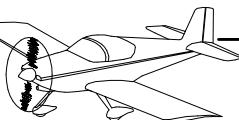
Step 13: Dimple the nutplates that will be attached to the F-1003D & E Inst Panel Attach Flanges and F-1083Q Quadrant Mount Bracket. See Figure 1 and Page 31-5Q, Figure 2.

Step 14: Rivet nutplates to the F-1003D & E Inst Panel Attach Flanges and F-1083Q Quadrant Mount Bracket as shown in Figure 1 and Page 31-5Q, Figure 2.

Step 15: Rivet the F-1044B Angle, F-1044C Spacer, and F-1044D, E, & F Angles to the F-1044A Fwd Fuselage Rib as shown in Figure 2.



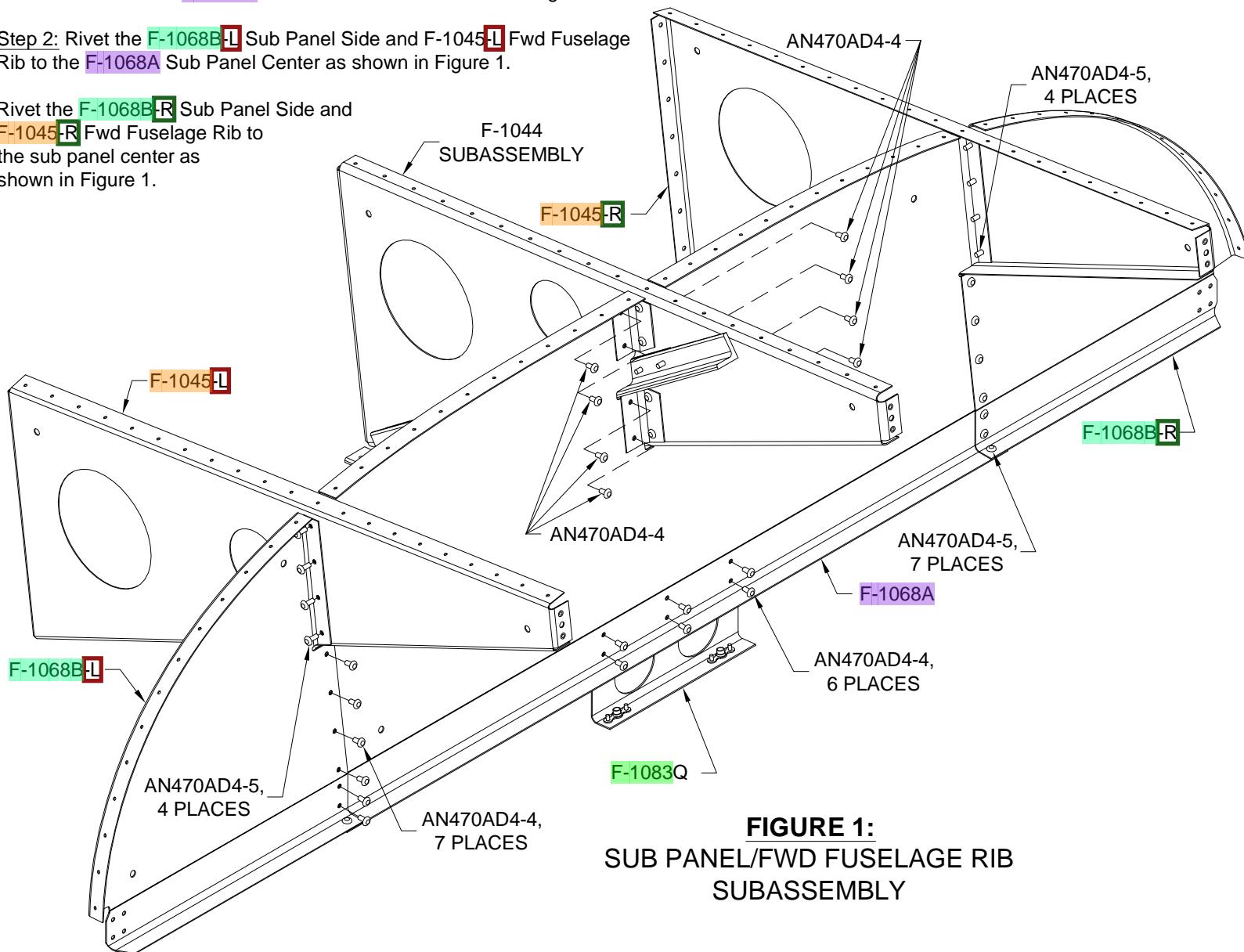
**FIGURE 2:**  
FWD FUSELAGE RIB SUBASSEMBLY



Step 1: Rivet the F-1044 Fwd Fuselage Rib Subassembly and F-1083Q Quadrant Mount Bracket to the F-1068A Sub Panel Center as shown in Figure 1.

Step 2: Rivet the F-1068B-L Sub Panel Side and F-1045-L Fwd Fuselage Rib to the F-1068A Sub Panel Center as shown in Figure 1.

Rivet the F-1068B-R Sub Panel Side and F-1045-R Fwd Fuselage Rib to the sub panel center as shown in Figure 1.

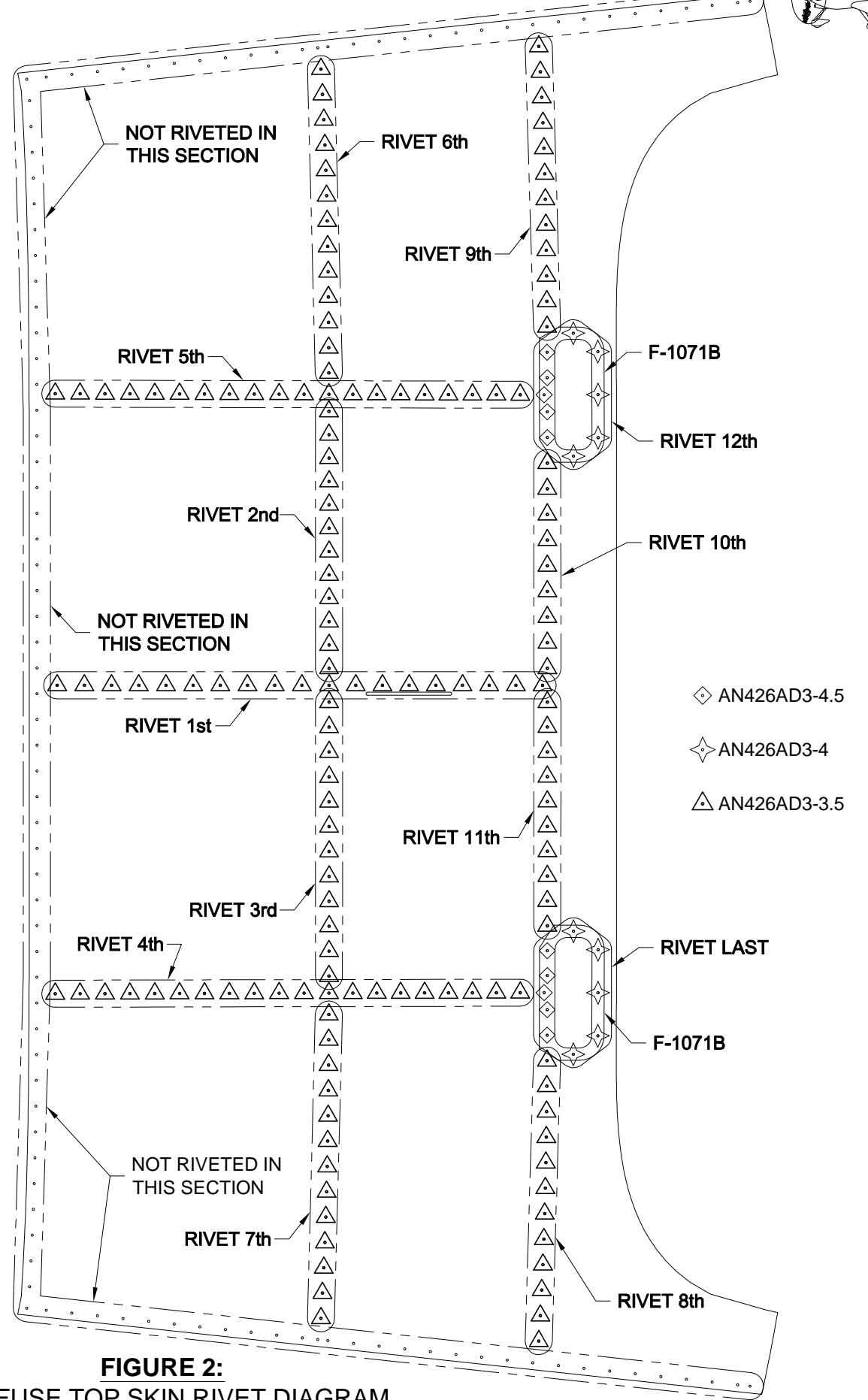


**FIGURE 1:**  
SUB PANEL/FWD FUSELAGE RIB  
SUBASSEMBLY

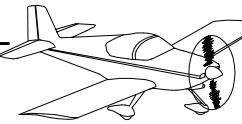
Step 3: Rivet the F-1071 Fwd Fuse Top Skin to the Sub Panel/Fwd Fuselage Rib Subassembly using the rivets and riveting sequence shown in Figure 2.

Install the rivets sequentially beginning with the rivet row labeled "RIVET 1st" through the rivet row labeled "RIVET 5th" only. See Figure 2.

Install the rivets in the rivet rows labeled "RIVET 6th" and "RIVET 7th" beginning each row with the most inboard rivet and progressing outboard. See Figure 2.



**FIGURE 2:**  
FWD FUSE TOP SKIN RIVET DIAGRAM



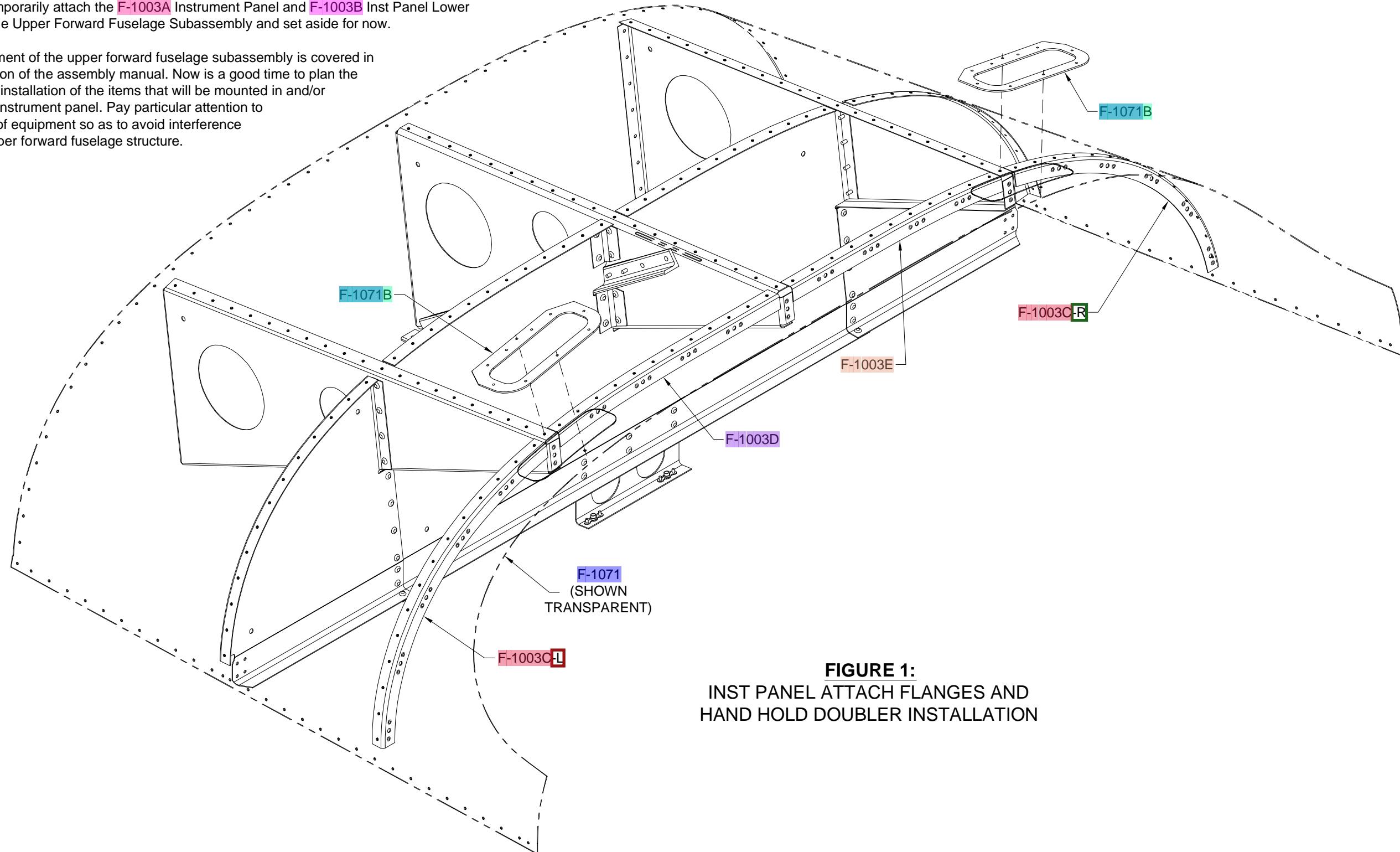
Step 1: Rivet the F-1003C-L & R Inst Panel Attach Flanges to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets and riveting sequence shown in Page 31-9Q, Figure 2.

Step 2: Rivet the F-1003D and F-1003E Inst Panel Attach Flanges to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets and riveting sequence shown in Page 31-9Q, Figure 2.

Step 3: Rivet the two F-1071B Hand Hold Doublers to the F-1071 Fwd Fuse Top Skin as shown in Figure 1. Use the rivets shown in Page 31-9Q, Figure 2.

Step 4: Temporarily attach the F-1003A Instrument Panel and F-1003B Inst Panel Lower Flange to the Upper Forward Fuselage Subassembly and set aside for now.

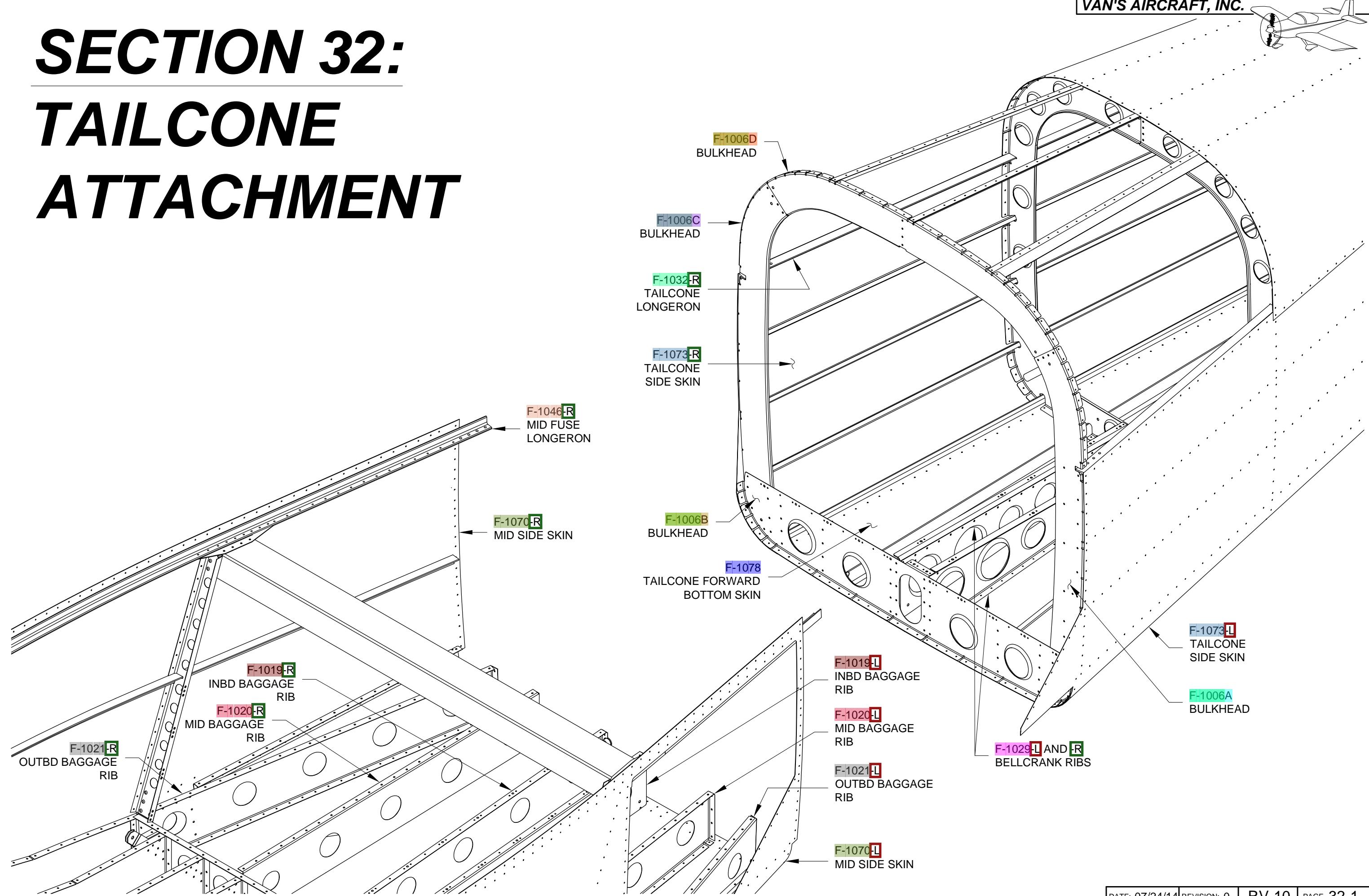
The attachment of the upper forward fuselage subassembly is covered in a later section of the assembly manual. Now is a good time to plan the lay-out and installation of the items that will be mounted in and/or behind the instrument panel. Pay particular attention to placement of equipment so as to avoid interference with the upper forward fuselage structure.

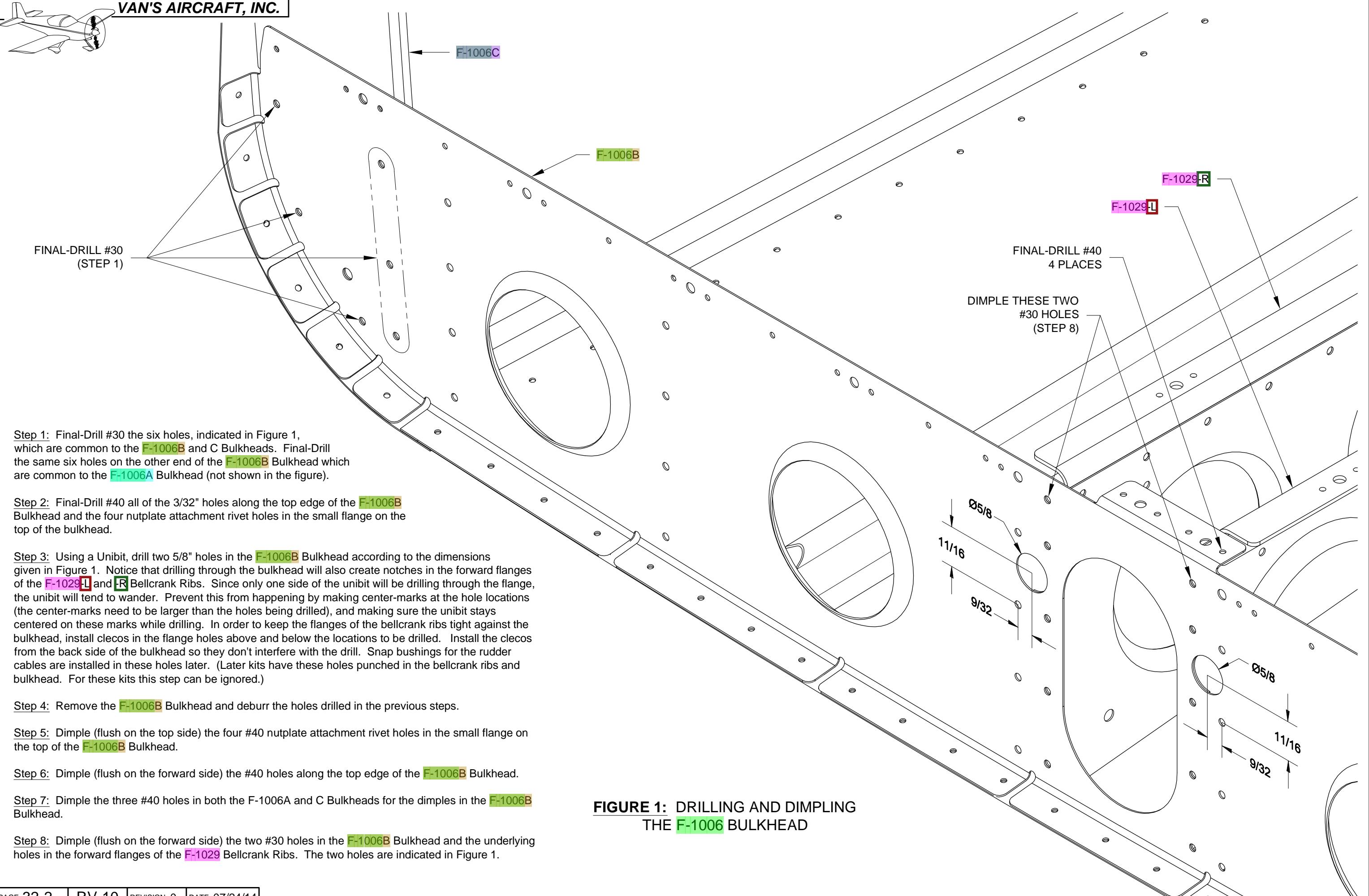


**FIGURE 1:**  
INST PANEL ATTACH FLANGES AND  
HAND HOLD DOUBLER INSTALLATION

# SECTION 32:

## TAILCONE ATTACHMENT





**FIGURE 1: DRILLING AND DIMPLING THE F-1006 BULKHEAD**

Step 1: Remove the F-1006B Bulkhead from the tailcone and cleco it to the aft flanges of the F-1019, F-1020, and F-1021 Baggage Ribs. Do not cleco the bulkhead flange to the mid fuse skins.

Step 2: Cleco the tailcone skins to the mid fuse skins as shown in Figure 1. All of the mid fuse skins are clecoed to the outside of the tailcone skins. Notice the following:

In the bottom blow-up, the triangular portion of the F-1073-R Tailcone Side Skin slips between the F-1070-R Mid Side Skin and the F-10100A Baggage Door Shim. The holes in the mid side skin which are common to the baggage door shim are match-drilled into the tailcone side skin in a later step.

In the middle blow-up, the F-1006B Bulkhead and the F-1078 Tailcone Forward Bottom Skin are captured between the F-1019, -1020, and -1021 Baggage Ribs and the F-1077 Mid Bottom Skin.

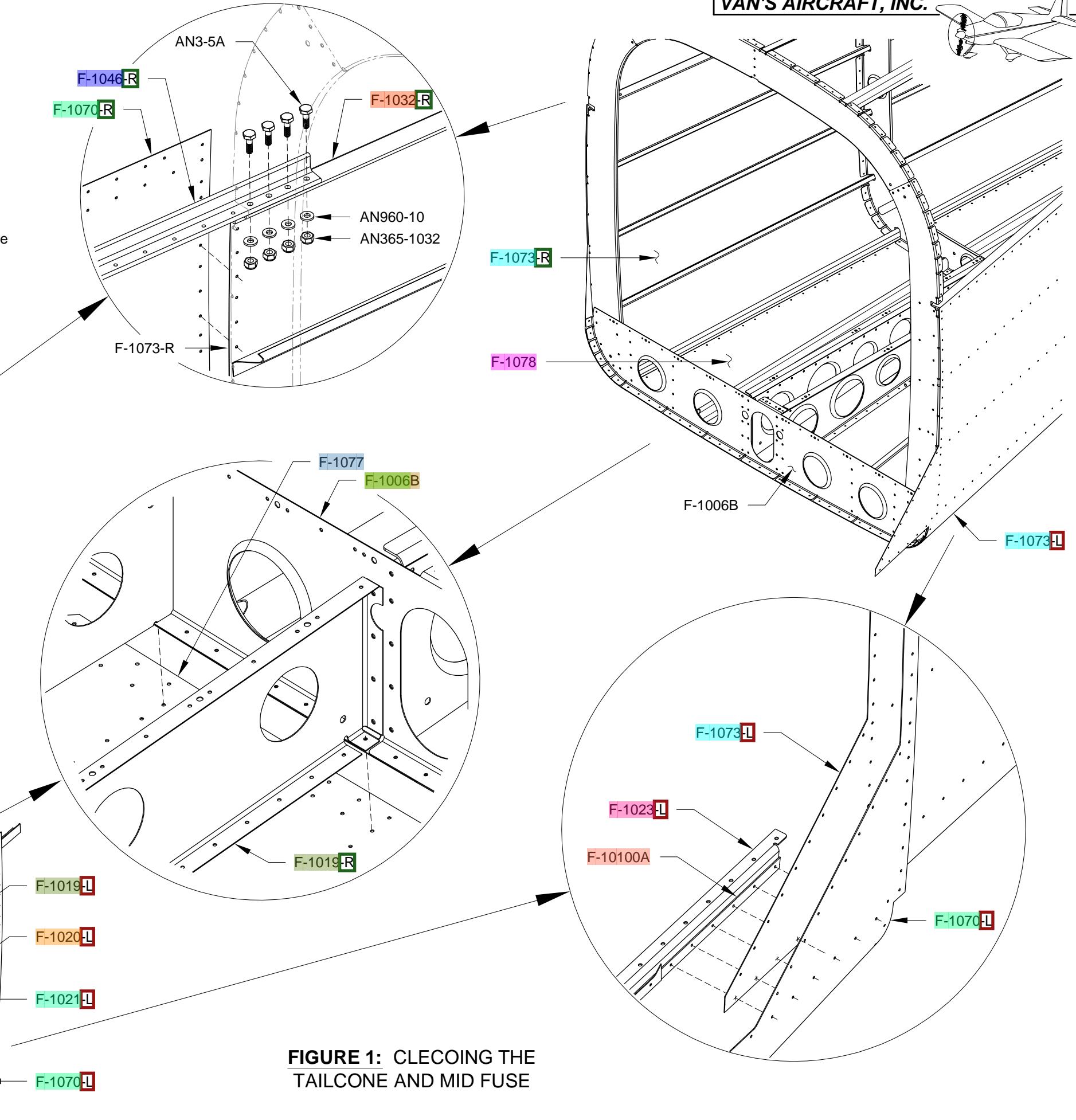
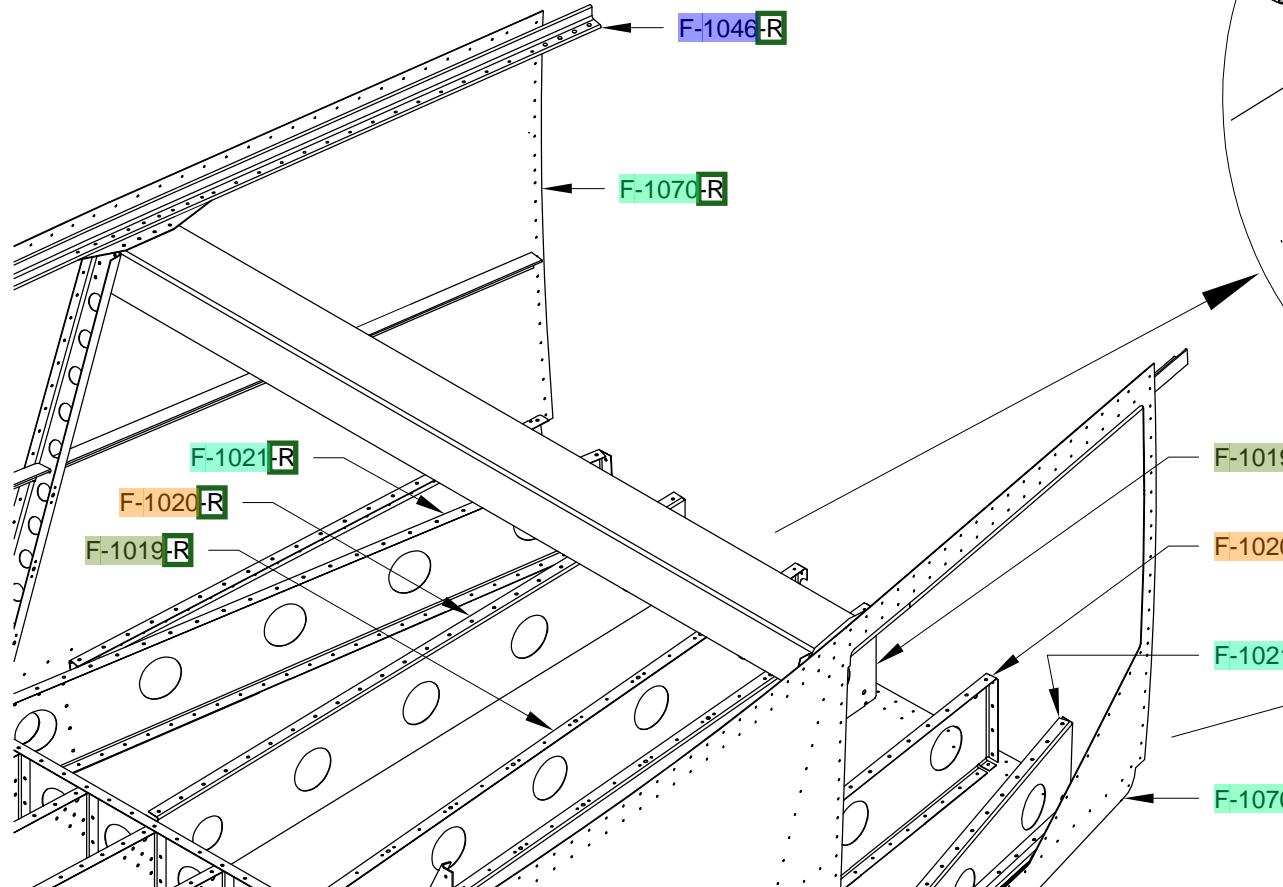
Step 3: Final-Drill #30 the holes common to the aft flange of the F-1019, F-1020, and F-1021 Baggage Ribs and the F-1006B Bulkhead.

Step 4: The F-1046-R Mid Fuse Longeron fits on top of the F-1032-R Tailcone Longeron as shown in the top blow-up of Figure 1. Make sure the vertex of the two longerons are aligned, then clamp them together.

Match-Drill the four #30 holes in the aft end of the mid fuse longeron into the tailcone longeron using a #30 drill, then final-drill with a #12 drill. Drill and bolt the two aft most holes first, then uncleco the upper portion of the F-1006C Bulkhead to gain access for drilling and bolting the two forward holes. Be careful to drill perpendicular to the longerons.

Repeat this step for the left longerons.

The hardware bolting the longerons together will, at times, have to be removed and reinstalled to gain access when riveting the skins.

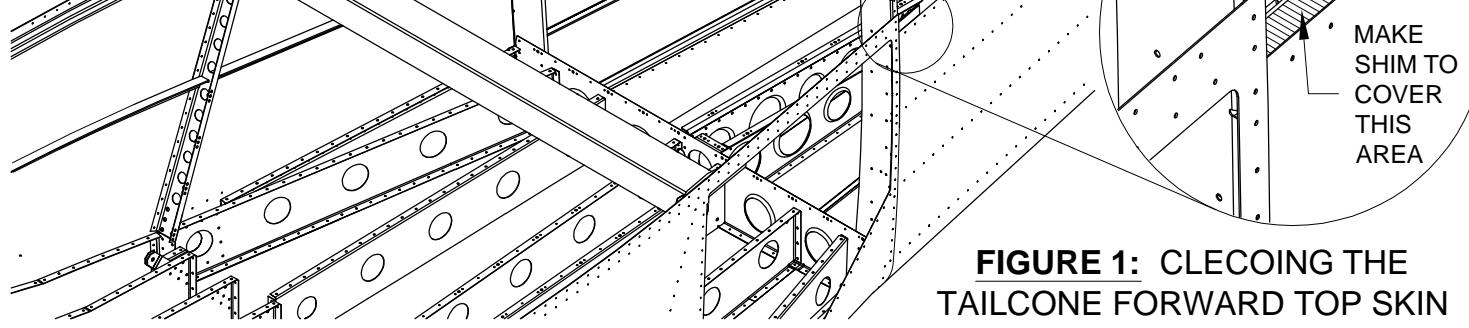


**FIGURE 1: CLECOING THE TAILCONE AND MID FUSE**



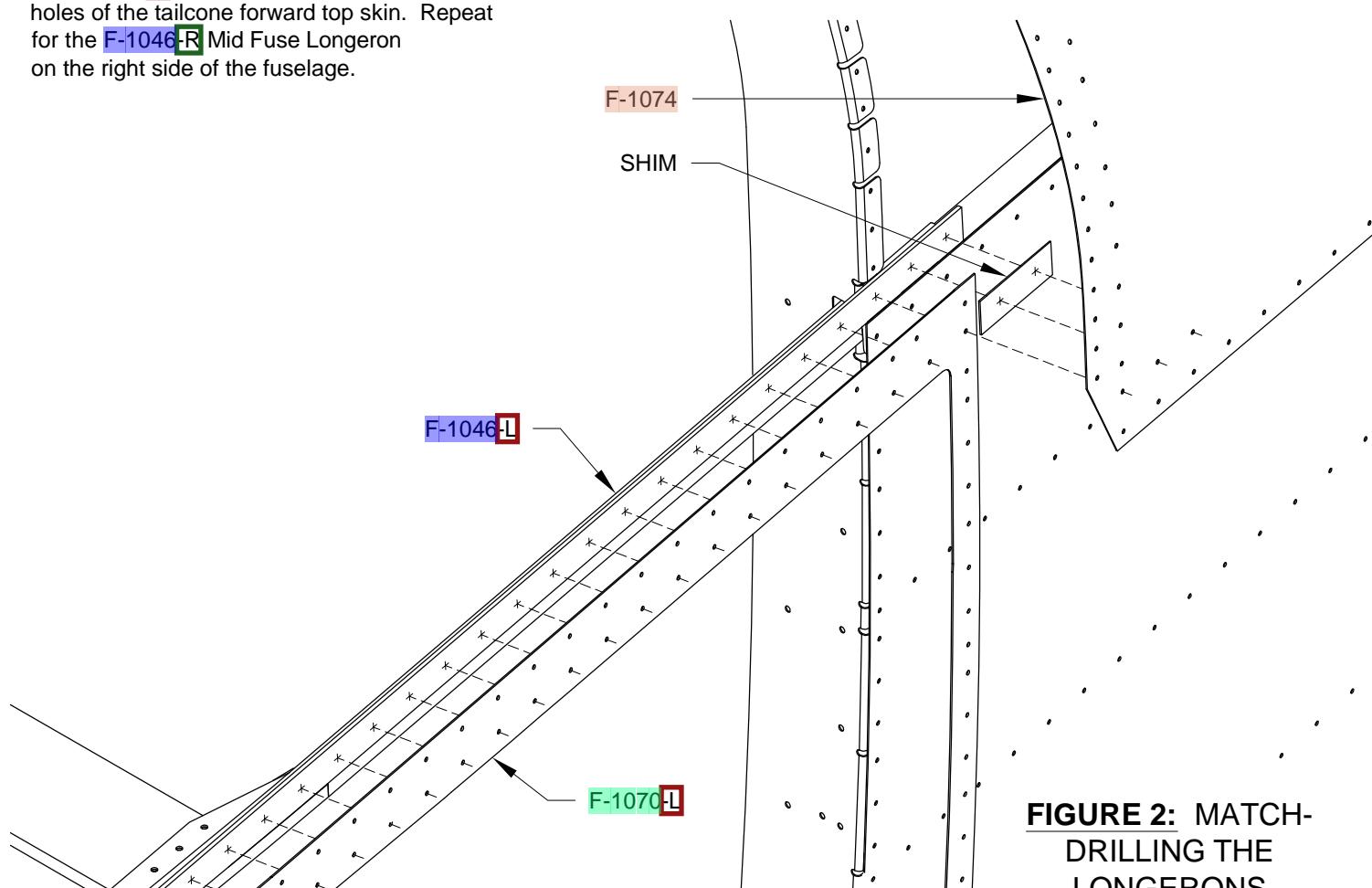
Step 1: Make shims from some scrap .025" or .032" aluminum sheet to fit between the F-1074 Tailcone Forward Top Skin and the aft ends of the F-1046 Mid Fuse Longerons as shown in the blow-up of Figure 1.

Step 2: Cleco the F-1074 Tailcone Forward Top Skin to the tailcone as shown in Figure 1.



**FIGURE 1: CLECOING THE TAILCONE FORWARD TOP SKIN**

Step 3: Match-Drill #40 the holes of the F-1070-L Mid Side Skin and the three holes of the F-1074 Tailcone Forward Top Skin into the F-1046-L Mid Fuse Longeron as shown in Figure 2. Have the shim, made in step 1, in place when match-drilling the three holes of the tailcone forward top skin. Repeat for the F-1046-R Mid Fuse Longeron on the right side of the fuselage.



**FIGURE 2: MATCH-DRILLING THE LONGERONS**

Step 4: As indicated in Figure 3, match-drill #40 the six holes in the F-1070-L Mid Side Skin (aft of the bottom edge of the baggage door cut-out) into the F-1073-L Tailcone Side Skin. Be sure to drill perpendicular to the skin since these holes are common to the preexisting holes in the F-1023-L Baggage Floor Angle and the F-10100A Baggage Door Shim.

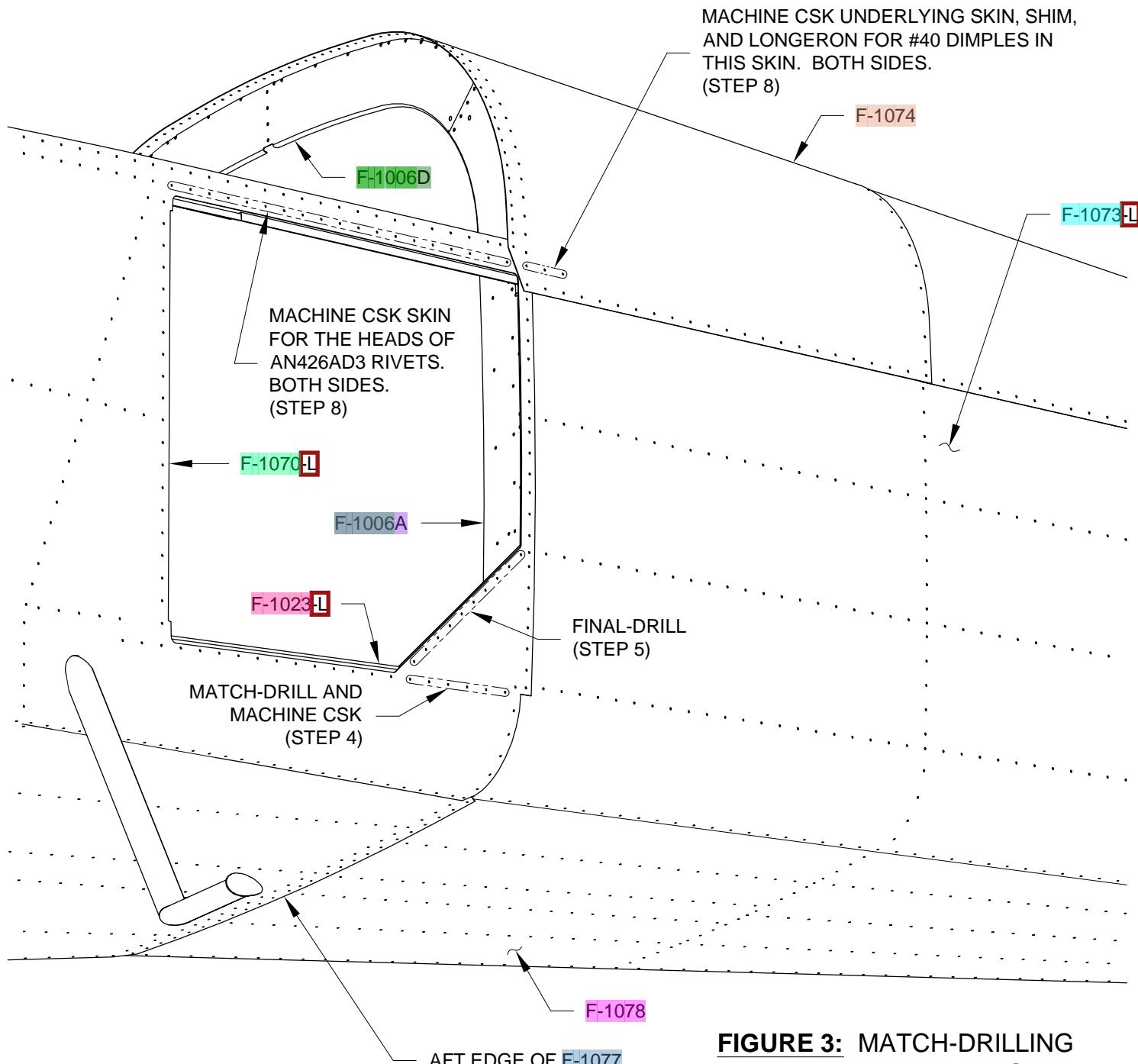
Machine countersink these six holes in the mid side skin for the heads of AN426AD3 rivets.

Step 5: Final-Drill #40 the holes along the angled edge of the baggage door cut-out (see Figure 3) common to the F-1070-L Mid Side Skin and F-1073-L Tailcone Side Skin.

Step 6: Final-Drill #40 the holes common to all of the skins and the F-1006A, B, C, and D Bulkheads (the F-1006B and C Bulkheads are not shown in Figure 3).

Step 7: Match-Drill #40 the row of holes along the aft edge of the F-1077 Mid Bottom Skin into the F-1078 Tailcone Forward Bottom Skin.

Step 8: Remove the F-1074 Tailcone Forward Top Skin. Machine countersink the holes in the F-1070-L and F-1070-R Mid Side Skins and the F-1046-L and F-1046-R Mid Fuse Longerons as instructed in Figure 3.



**FIGURE 3: MATCH-DRILLING AND FINAL-DRILLING**

**Step 1:** Remove the tailcone from the mid fuselage and the F-1006 Bulkhead from the tailcone. Deburr all holes that have been drilled according to this section, and remove any chips from between the F-1070 Mid Side Skins and the F-1046 Mid Fuse Longerons.

Step 2: Dimple the holes in the skin flanges of the F-1006A, B, C, and D Bulkheads. Do not dimple the holes in the two tabs on both F-1006A and C Bulkheads which back-up the F-1032 and F-1046 Longerons.

**Step 3:** In all of the skins, dimple the holes which are common to the flanges of the F-1006A, B, C, and D Bulkheads.

**Step 4:** Dimple the aft most row of holes in the F-1077 Mid Bottom Skin (see Figure 2) and the corresponding holes in the F-1078 Tailcone Forward Bottom Skin.

Step 5: Dimple the ten holes along the top edge of the triangular, projected portion of the F-1073-L Tailcone Side Skin (see Figure 1). Dimple the corresponding holes in the F-1070-L Mid Side Skin.

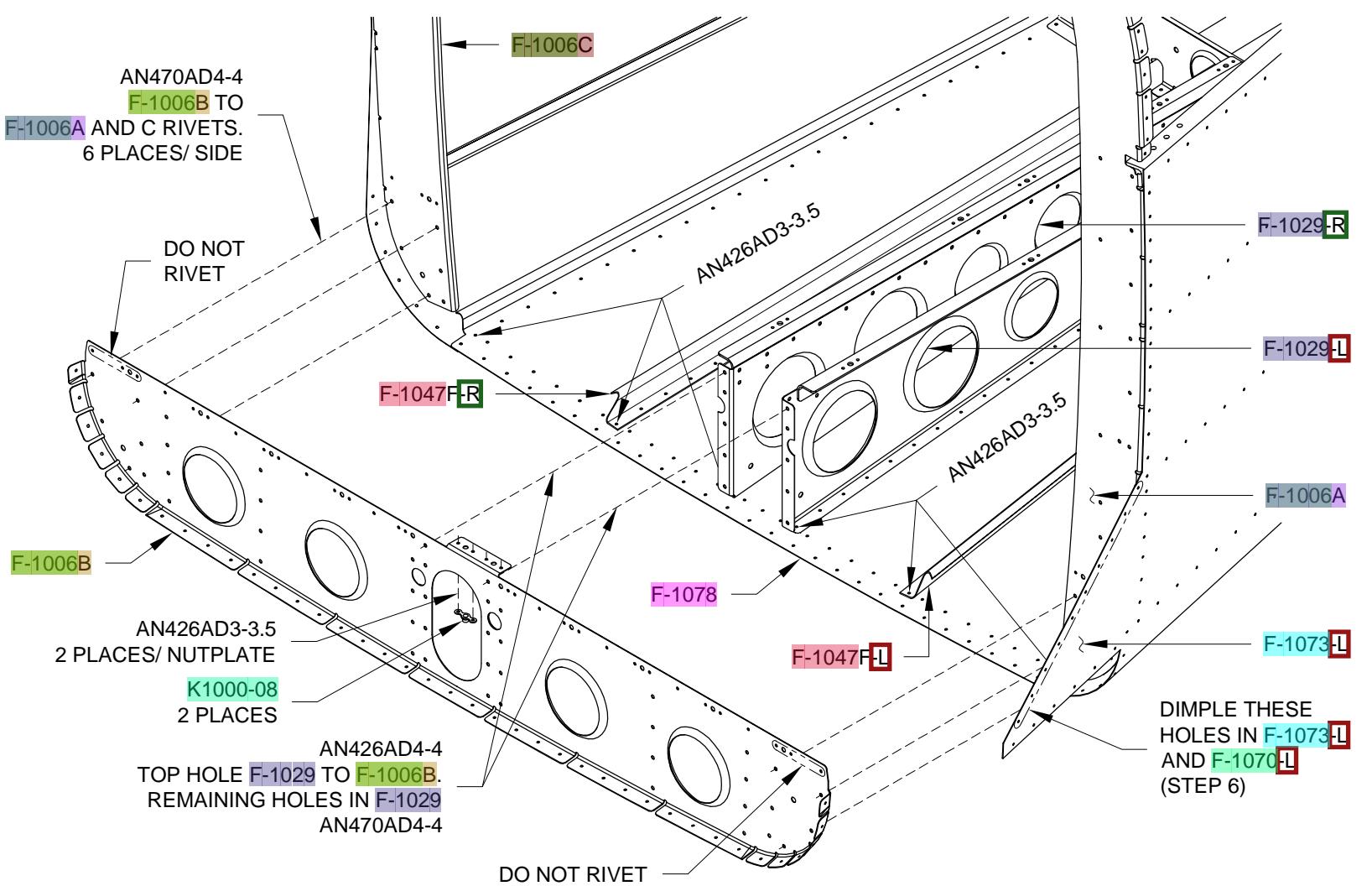
Step 6: Dimple the three holes in both sides of the F-1074 Tailcone Forward Top Skin (see Page 33-4, Figure 3) which are common to the F-1046 Mid Fuse Longerons.

**Step 7:** If not already done, set rivets in the six indicated holes (see Figure 1) in the F-1078 Tailcone Forward Bottom Skin, the F-1029 Bellcrank Ribs, and the F-1047 Stiffeners using the rivets called-out.

Step 8: Rivet the two nutplates to the small flange of the F-1006B Bulkhead using the rivets called-out in Figure 1.

**Step 9:** Rivet the F-1006B Bulkhead to the F-1006A and C Bulkheads using the rivets called-out in Figure 1. DO NOT set any rivets in the holes indicated in the figure.

Step 10: Rivet the F-1006B Bulkhead to the F-1029 Bellcrank Ribs using the rivets called-out in Figure 1.



## **FIGURE 1: RIVETING THE F-1006B BULKHEAD**

**Step 11:** Cleco the tailcone to the mid fuselage, then bolt the F-1046 Mid Fuse Longerons to the F-1032 Tailcone Longerons using the same hardware as before.

**NOTE:** The **F-1074** Tailcone Forward Top Skin is riveted after the upper cabin is installed in a later section. Rivet call-outs for the other skins are found on Page 33-6.

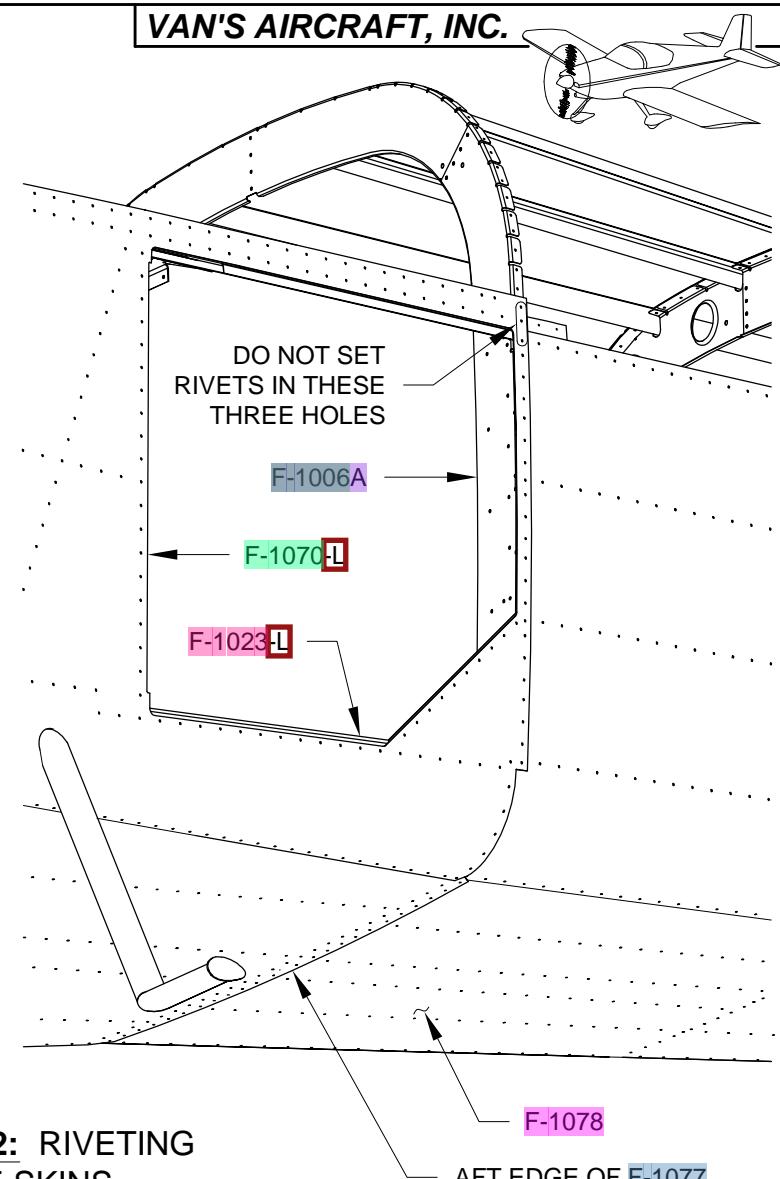
Step 12: Rivet the skins to the F-1006A, B, and C Bulkheads. As indicated in Figure 2, do not set the three rivets at the top of the F-1070-L and F-1074-R Mid Side Skins which are common to the F-1074 Tailcone Forward Top Skin.

Step 13: Set the rivets in the row of holes along the aft edge of the F-1077 Mid Bottom Skin.

Step 14: Finish riveting the aft portion of the F-1077 Mid Bottom Skin to the F-1019, -1020, and -1021 Baggage Ribs.

**Step 15:** Rivet the F-1070-L Mid Side Skin to the F-10100A Baggage Door Shim and F-1023-L Baggage Floor Angle.

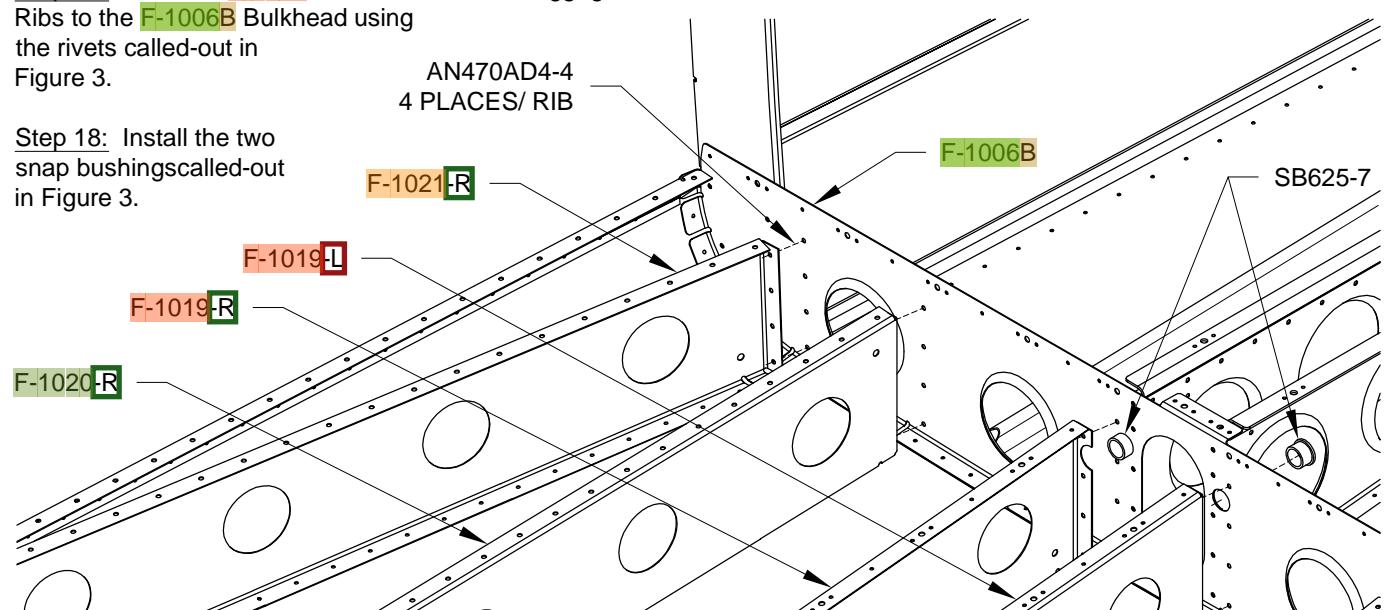
**Step 16:** Rivet the F-1070-L and F-1070-R Mid Side Skins to the F-1046-L and F-1046-R Mid Fuse Longerons respectively. Again, as indicated in the Figure 2, do not set any rivets in the holes which are common to the F-1074 Tailcone Forward Top Skin.



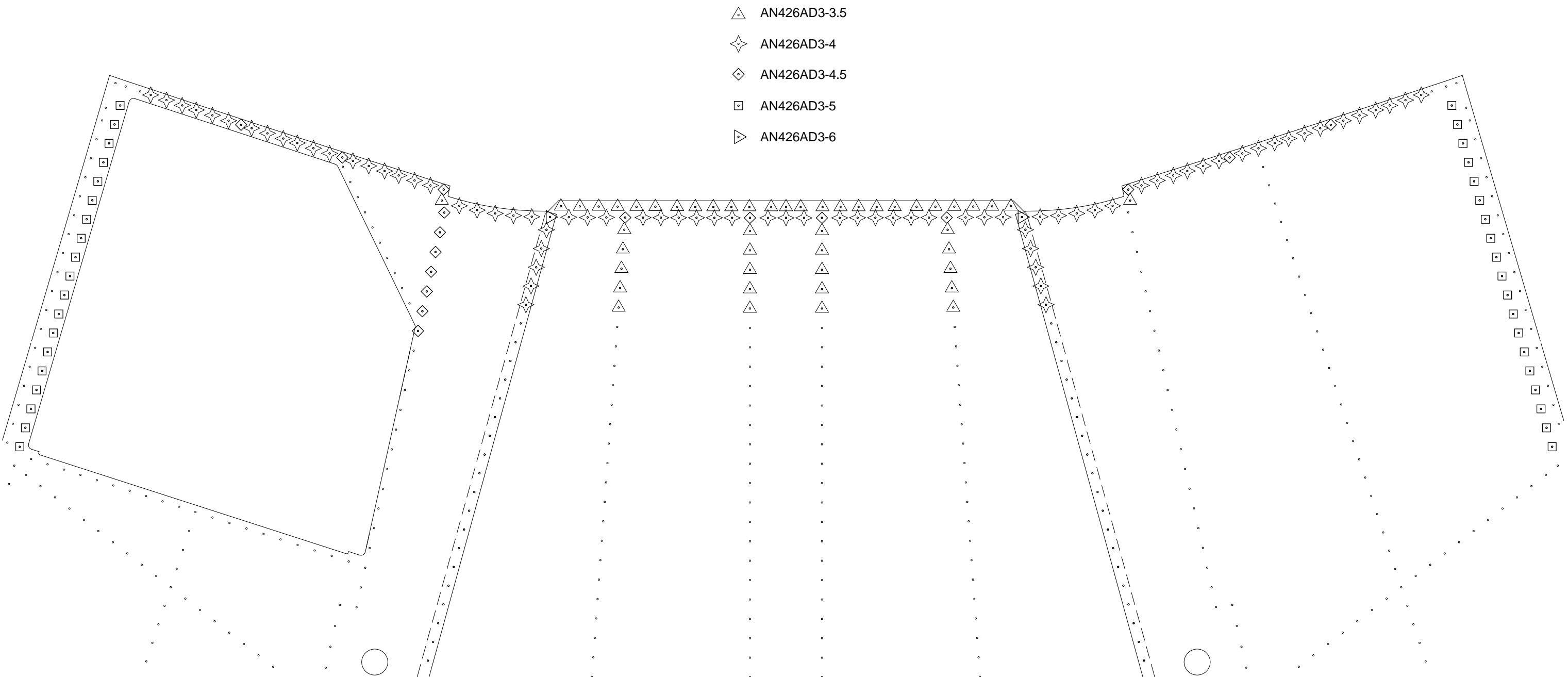
## **FIGURE 2: RIVETING THE SKINS**

**Step 17:** Rivet the F-1019, -1020, and -1021 Baggage Ribs to the F-1006B Bulkhead using the rivets called-out in Figure 3.

Step 18: Install the two snap bushings called-out in Figure 3.



## **FIGURE 3:** RIVETING THE BAGGAGE RIBS

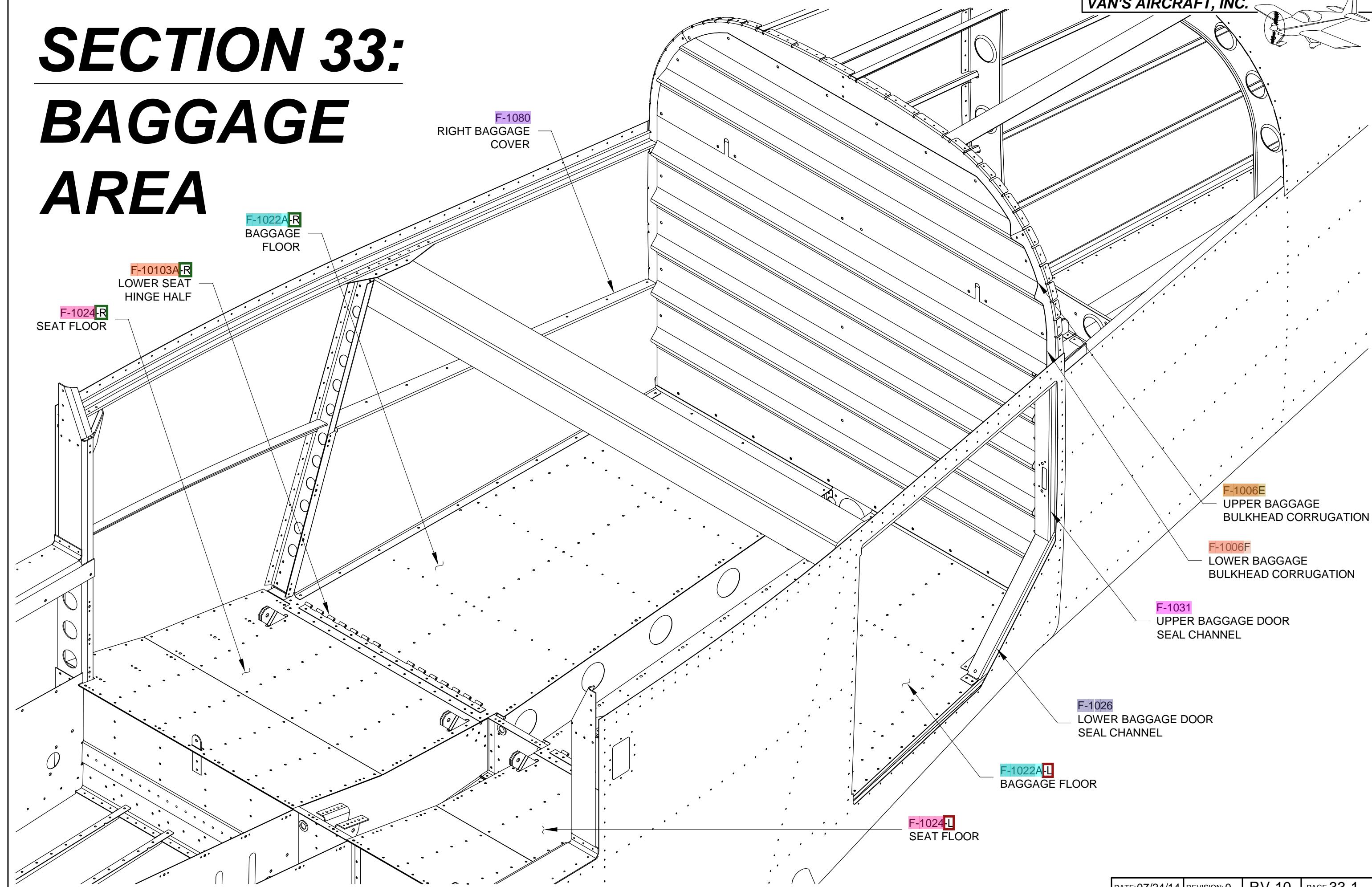


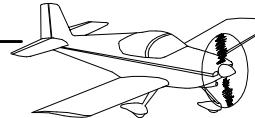
**FIGURE 1: MID SIDE AND BOTTOM SKIN RIVETS**

# SECTION 33:

# BAGGAGE

# AREA





NOTE: Complete this page for the Standard Kit only.

Step 1: Cleco the F-1024-R Seat Floor to the F-1005A Rear Spar Bulkhead, the five F-1017A-R Rear Seat Ribs, and the F-1018-R Outboard Rear Seat Rib, as shown in Figure 1.

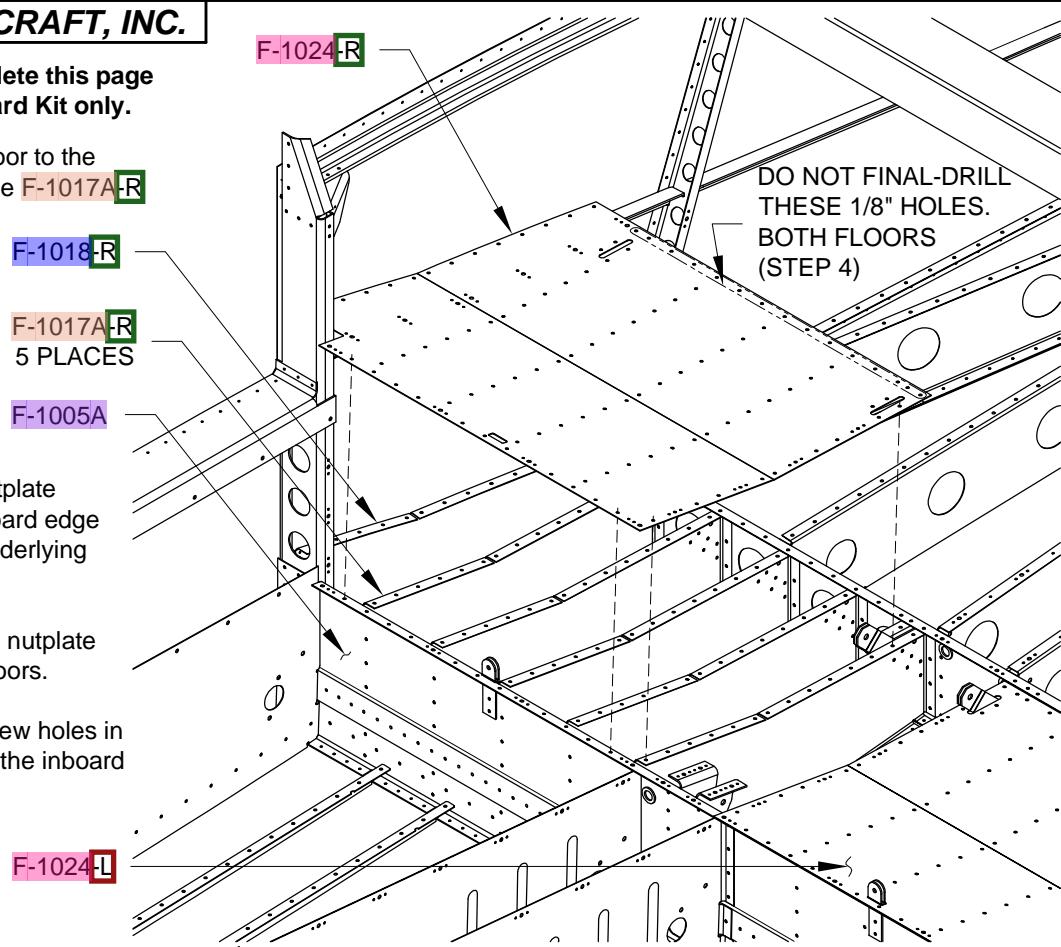
Similarly, cleco the F-1024-L Seat Floor to the rear spar bulkhead and rear seat ribs on the left side.

Step 2: Match-Drill #40 the 3/32" nutplate attachment rivet holes along the inboard edge of the F-1024 Seat Floors into the underlying F-1017A Rear Seat Ribs.

Final-Drill #40 all the remaining 3/32" nutplate attachment rivet holes in both seat floors.

Step 3: Final-Drill #19 the center screw holes in the four nutplate hole patterns along the inboard edge of both F-1024 Seat Floors.

Step 4: Except for the holes indicated in Figure 1, final-drill #30 all the 1/8" holes in both seat floors.



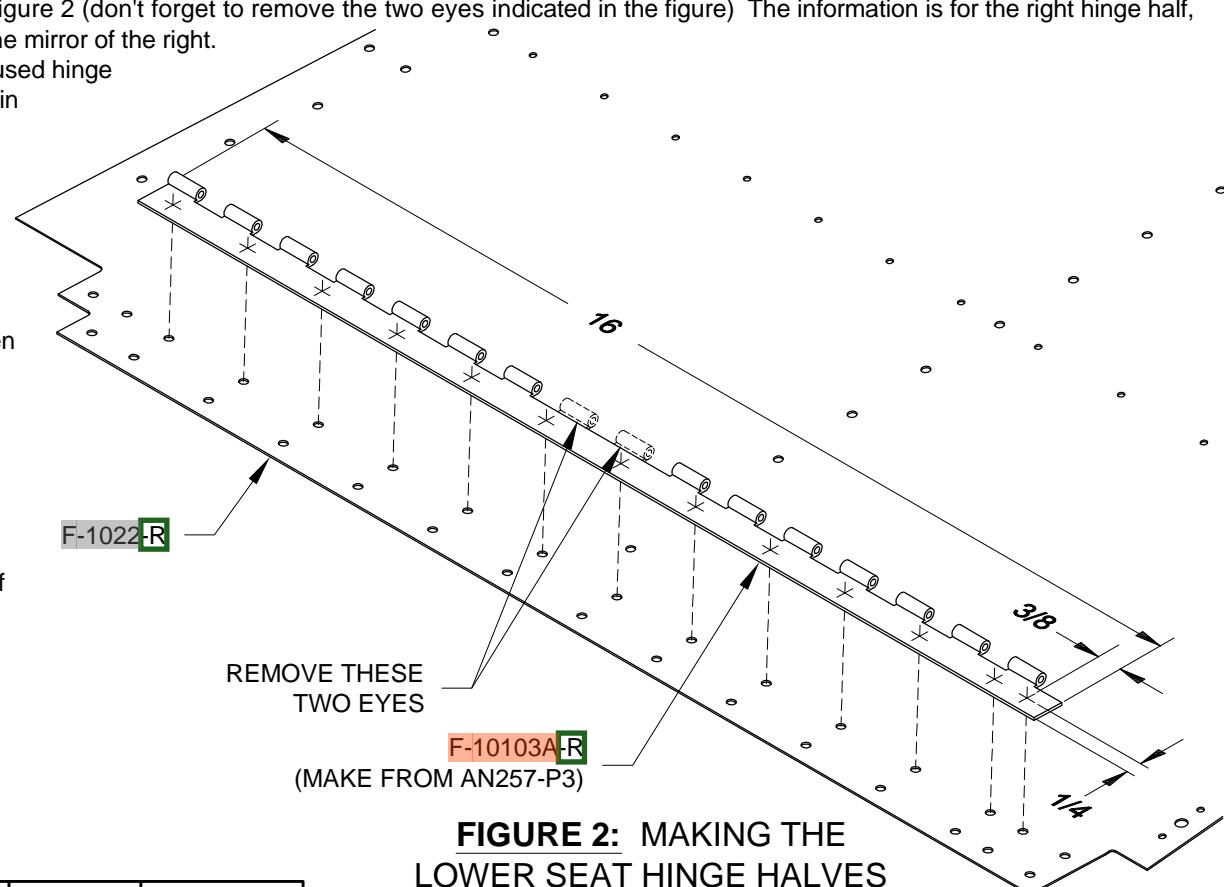
**FIGURE 1: CLECOING THE SEAT FLOORS**

Step 5: Cut two 16" lengths of AN257-P3 and remove the pins. Make the F-10103A-L and -R Lower Seat Hinge Halves using the information given in Figure 2 (don't forget to remove the two eyes indicated in the figure) The information is for the right hinge half, the left hinge half is the mirror of the right.

Save the pins and unused hinge halves, they are used in Section 42.

Step 6: Locate the F-10103A-R Right Lower Seat Hinge Half on the F-1022-R Baggage Floor as shown in Figure 2, then Match-Drill the holes of the seat floor into the hinge half using an 1/8" drill.

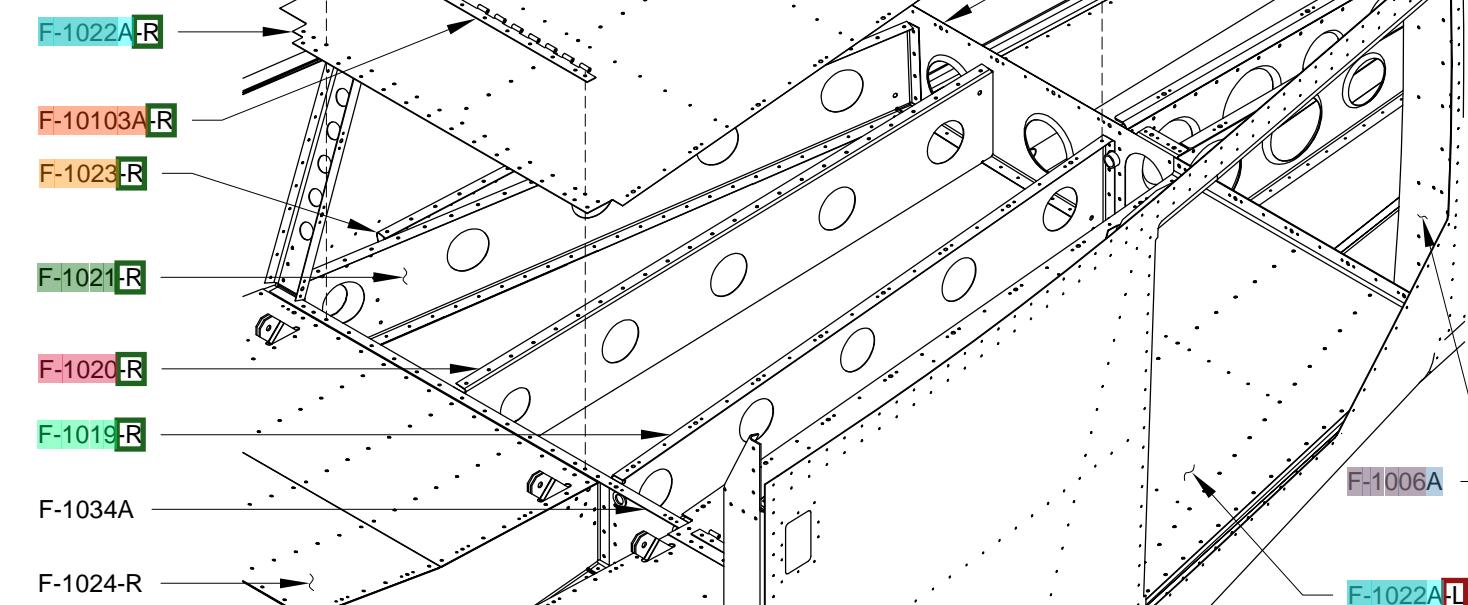
Repeat this step for the F-10103A-L Left Lower Seat Hinge Half and the F-1022-L Baggage Floor.



**FIGURE 2: MAKING THE LOWER SEAT HINGE HALVES**

Step 7: Cleco the F-1022A-L and -R Baggage Floors to the F-1006B Bulkhead, the F-1023-L and -R Baggage Floor Angles, the F-1019,-1020, and -1021 Baggage Ribs, and the F-1024-L and -R Seat Floors as shown in Figure 3.

Cleco the F-10103A Lower Seat Hinge Halves to the baggage floors and the F-1034A Bulkhead.



**FIGURE 3: CLECOING THE BAGGAGE FLOORS**

Step 8: Final-Drill #40, deburr, and dimple the holes in the vertical flange of the two F-1023B Baggage Floor Angles which are common to the F-1070 Mid Side Skins.

Cleco the baggage floor angles to the mid side skins and F-1022A Baggage Floors as shown in Figure 4 (only the F-1023B-R Baggage Floor Angle is shown).

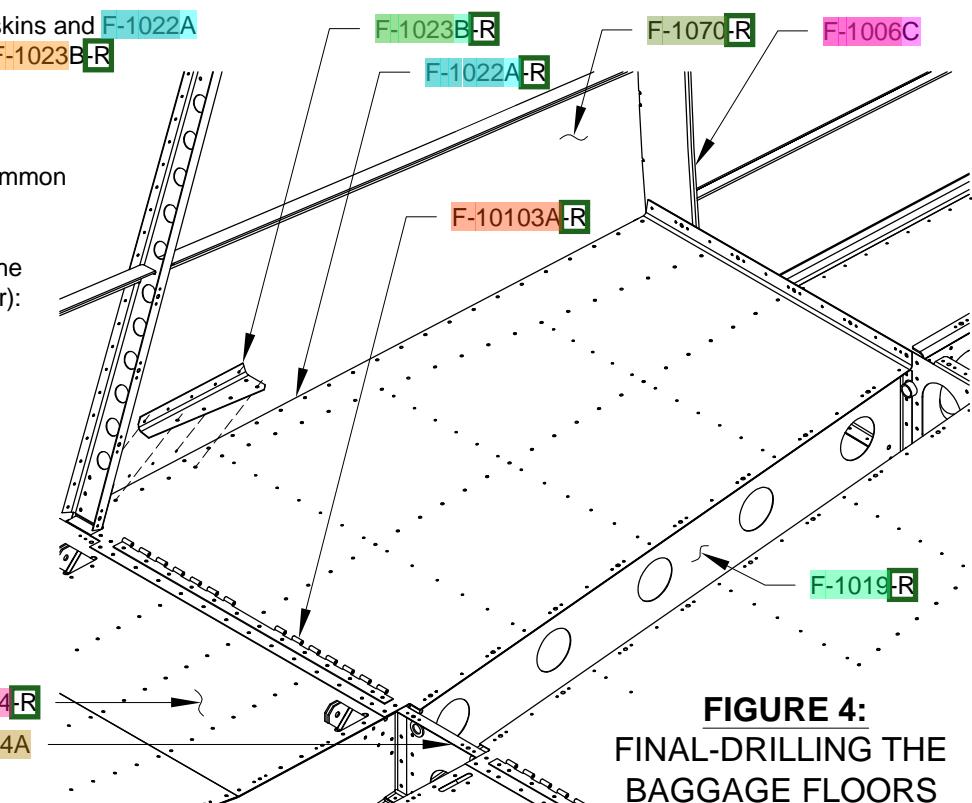
Step 9: Final-Drill #40 all of the 3/32" holes along the inboard edge of the baggage floors common to the F-1019 Inbd Baggage Ribs.

Step 10: Final-Drill #30 the following (only drill the holes specified, all other holes will be drilled later):

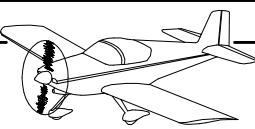
- The holes common to the F-1023B Baggage Floor Angles and the F-1022A Baggage Floors.

The row of holes common to both baggage floors and the F-1034A Bulkhead (including the F-10103A Lower Seat Hinge Halves).

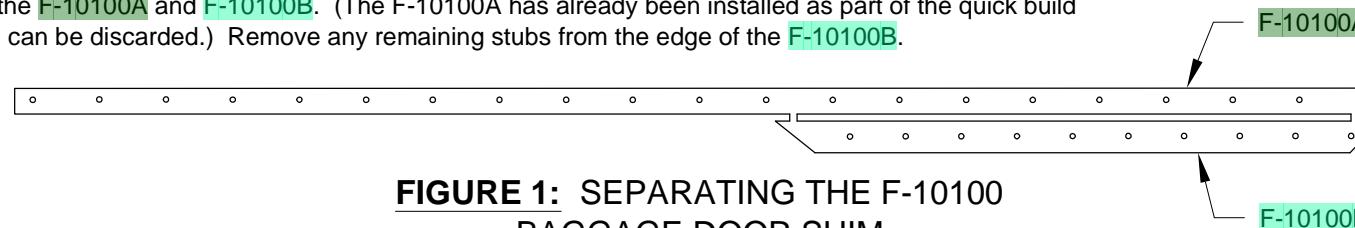
The row of holes along the forward edge of the F-1022A Baggage Floors common to the F-1024 Seat Floors.



**FIGURE 4:  
FINAL-DRILLING THE BAGGAGE FLOORS**



Step 1 (Quick Build): Separate the F-10100 Baggage Door Shim, shown in Figure 1, into its component parts; the F-10100A and F-10100B. (The F-10100A has already been installed as part of the quick build kit and can be discarded.) Remove any remaining stubs from the edge of the F-10100B.



**FIGURE 1: SEPARATING THE F-10100 BAGGAGE DOOR SHIM**

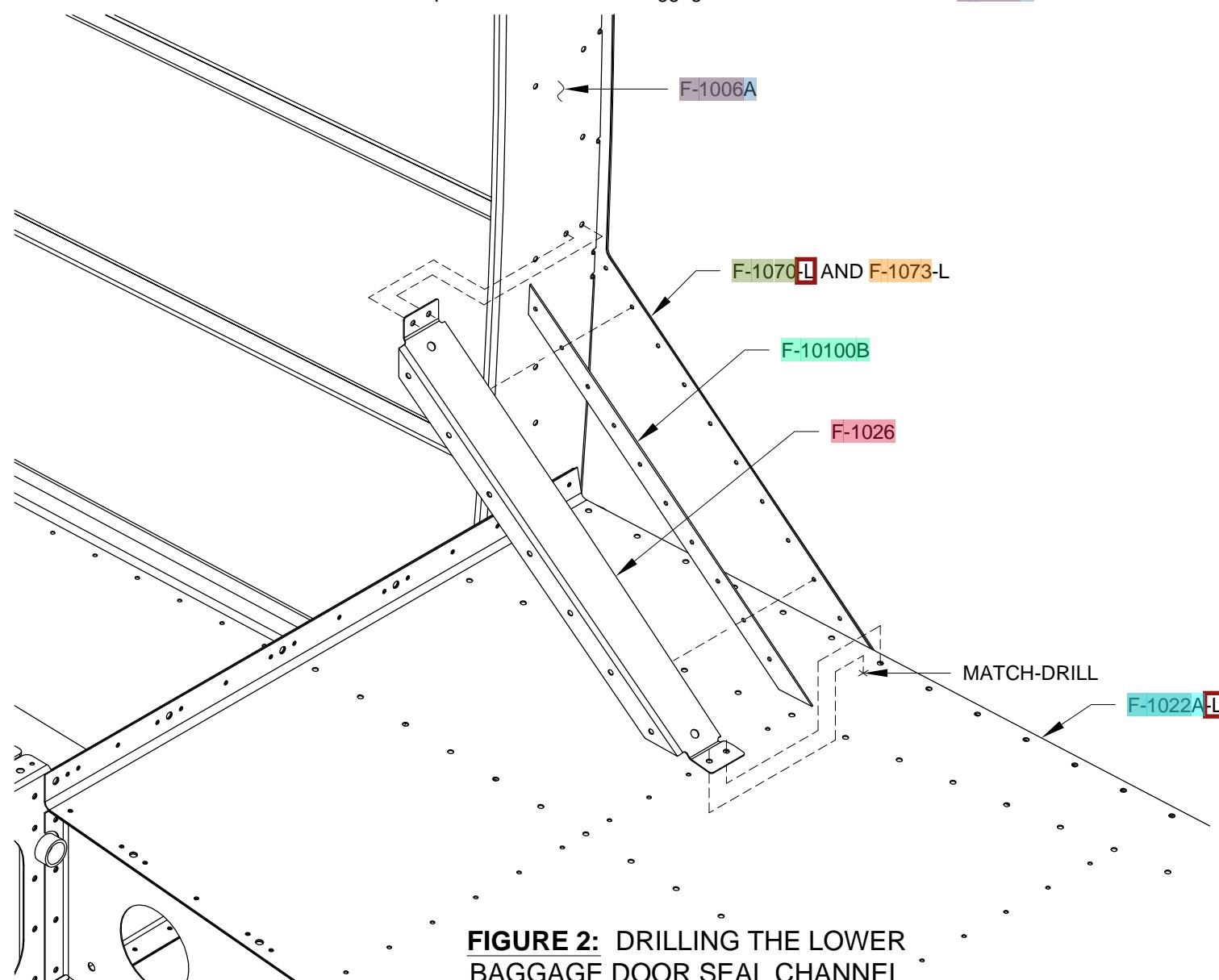
**NOTE:** Complete the rest of this page for both the Standard and Quickbuild Kits.

Step 2: Final-Drill #40 and dimple the holes in the F-10100B Baggage Door Shim and F-1026 Lower Baggage Door Seal Channel which are common to the F-1070-L and F-1073-L Side Skins. See Figure 2. The baggage door shim is not symmetrical, be sure to dimple in the correct direction.

Step 3: Cleco the F-1026 Lower Baggage Door Seal Channel and the F-10100B Baggage Door Shim to the F-1070-L and F-1073-L Side Skins as shown in Figure 2. Cleco the two end-tabs of the lower baggage door seal channel to the F-1006A Bulkhead and the F-1022A-L Baggage Floor.

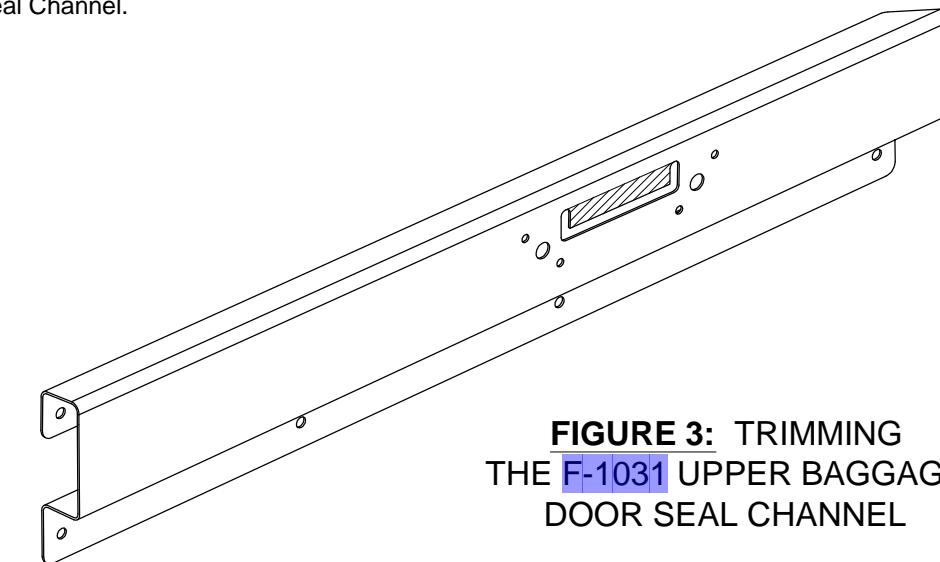
Step 4: There are two holes in the bottom end-tab of the F-1026 Lower Baggage Door Seal Channel. Match-Drill #30 the inboard hole into the F-1022A-L Baggage Floor and final-drill the outboard hole.

Final-Drill #30 the two holes common to the top end-tab of the lower baggage door seal channel and the F-1006A Bulkhead.



**FIGURE 2: DRILLING THE LOWER BAGGAGE DOOR SEAL CHANNEL**

Step 5: Trim the shaded area shown in Figure 3 from the F-1031 Upper Baggage Door Seal Channel.



**FIGURE 3: TRIMMING THE F-1031 UPPER BAGGAGE DOOR SEAL CHANNEL**

Step 6: Final-Drill #30 the hole in the outboard flange of the F-1031 Upper Baggage Door Seal Channel which is common to the outboard hole in the end tab of the F-1026 Lower Baggage Door Seal Channel. See Figure 4.

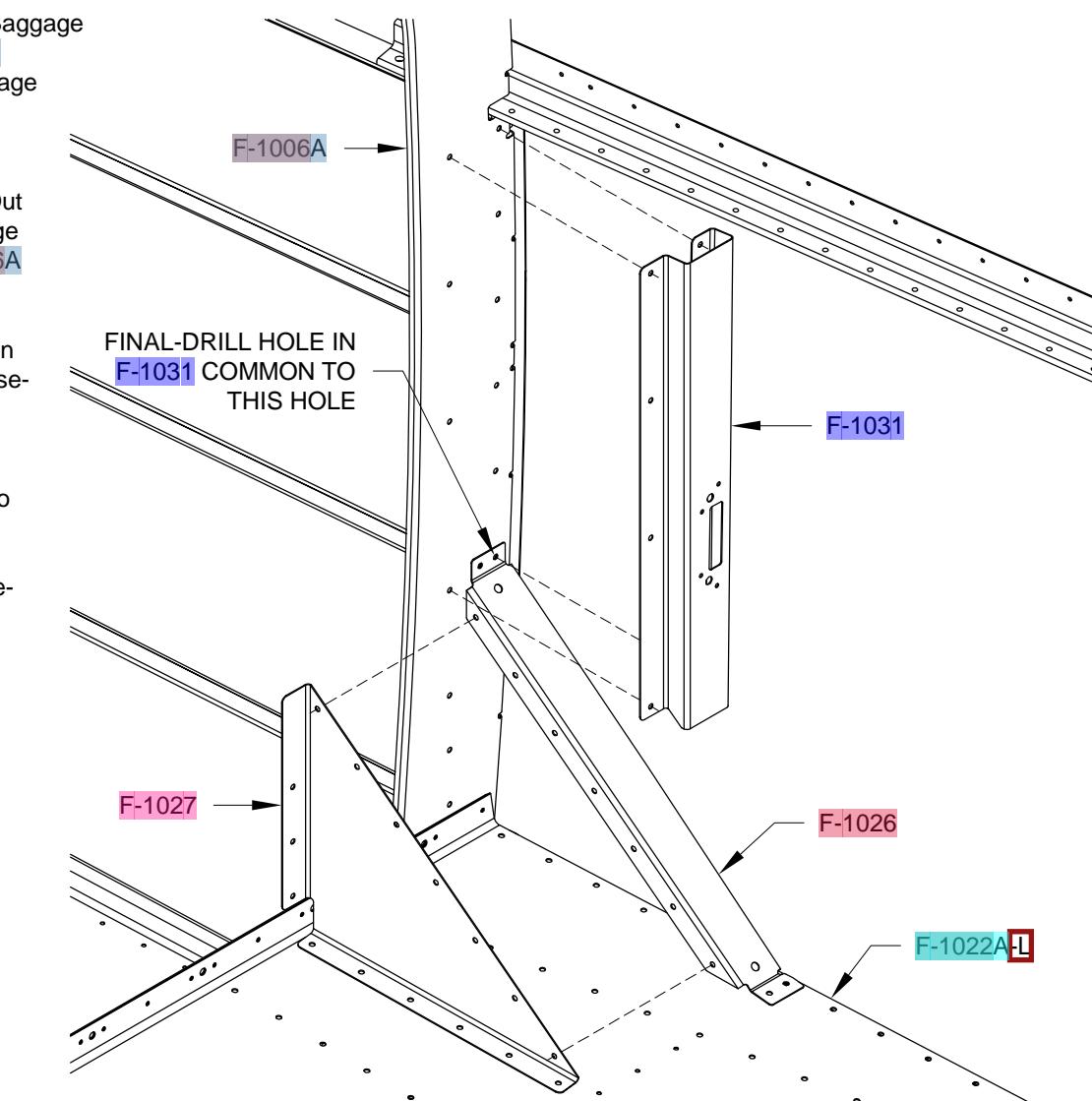
Step 7: Cleco the F-1031 Upper Baggage Door Seal Channel to the F-1006A Bulkhead and F-1026 Lower Baggage Door Seal Channel as shown in Figure 4.

Step 8: Cleco the F-1027 Close-Out Panel to the F-1026 Lower Baggage Door Seal Channel and the F-1006A Bulkhead.

Step 9: Match-Drill #30 the holes in the lower flange of the F-1027 Close-Out Panel into the F-1022A-L Baggage Floor.

Final-Drill #30 the holes common to the vertical flange of the close-out panel and the F-1006A Bulkhead, and the holes common to the close-out panel and the F-1026 Lower Baggage Door Seal Channel.

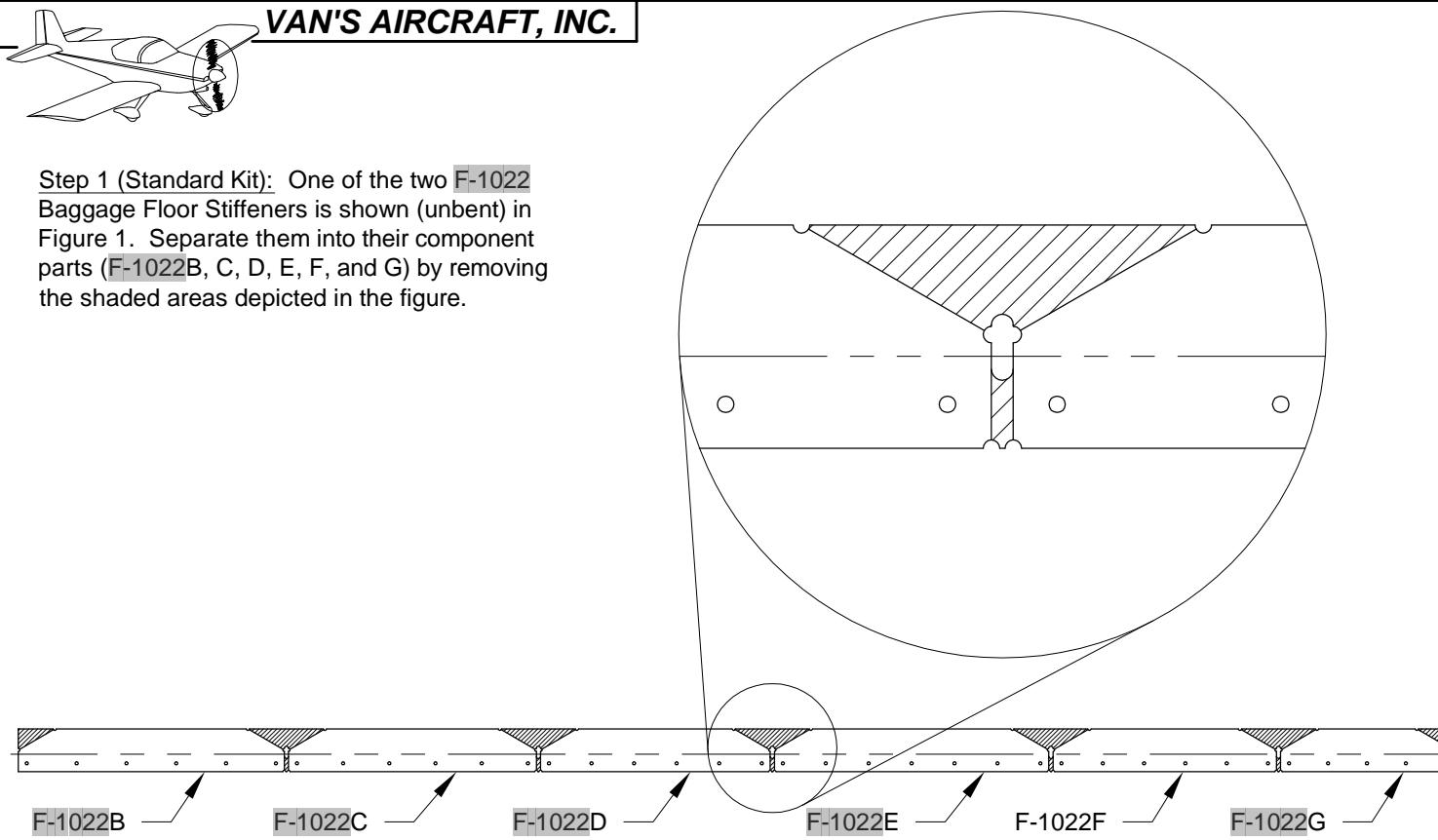
Step 10: Final-Drill #30 the holes common to the F-1031 Upper Baggage Door Seal Channel and the F-1006A Bulkhead.



**FIGURE 4: UPPER BAGGAGE DOOR SEAL CHANNEL AND CLOSE-OUT PANEL**



Step 1 (Standard Kit): One of the two F-1022 Baggage Floor Stiffeners is shown (unbent) in Figure 1. Separate them into their component parts (F-1022B, C, D, E, F, and G) by removing the shaded areas depicted in the figure.

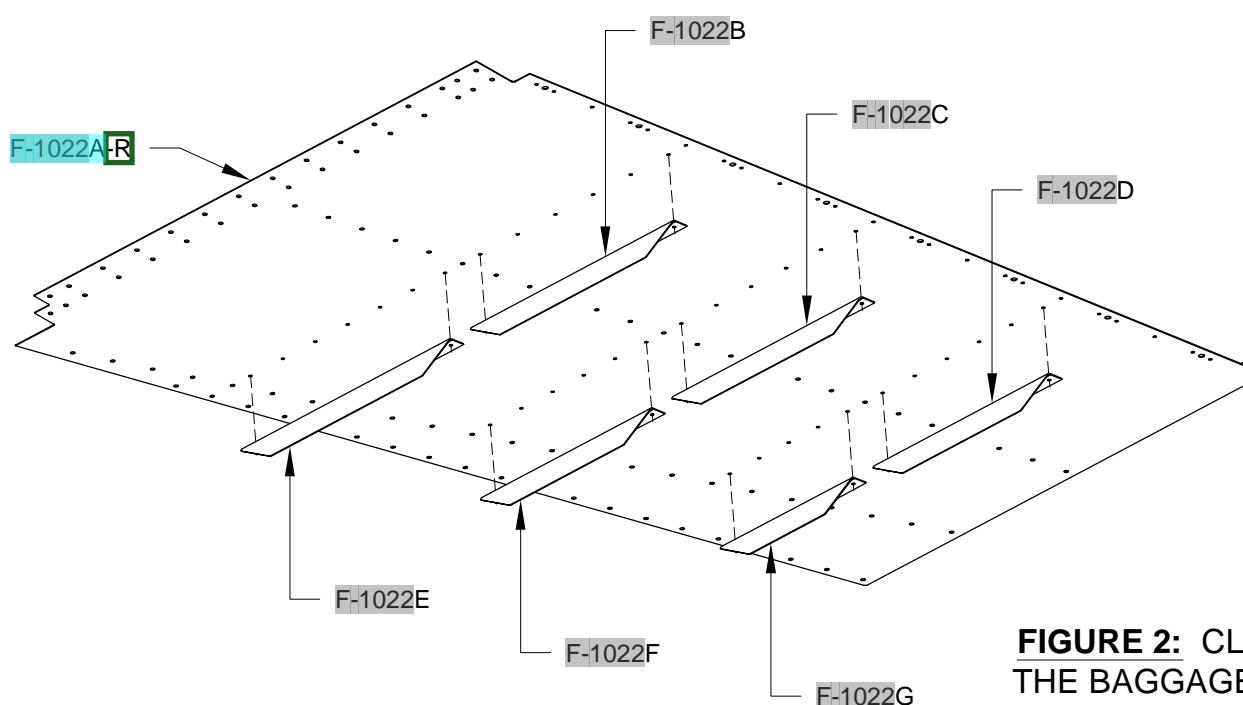


**FIGURE 1: SEPARATING THE F-1022 BAGGAGE FLOOR STIFFENERS**

Step 2 (Standard and Quickbuild Kit): Remove from the fuselage all of the parts clecoed in this section.

**NOTE: Complete the rest of this page for the Standard Kit only.**

Step 3: As shown in Figure 2, cleco the F-1022 Baggage Floor Stiffeners to the bottom of the F-1022A<sup>L</sup> and F-1022A<sup>R</sup> Baggage Floors (only the right baggage floor is shown in the figure), then final-drill #40 the holes common to the parts.

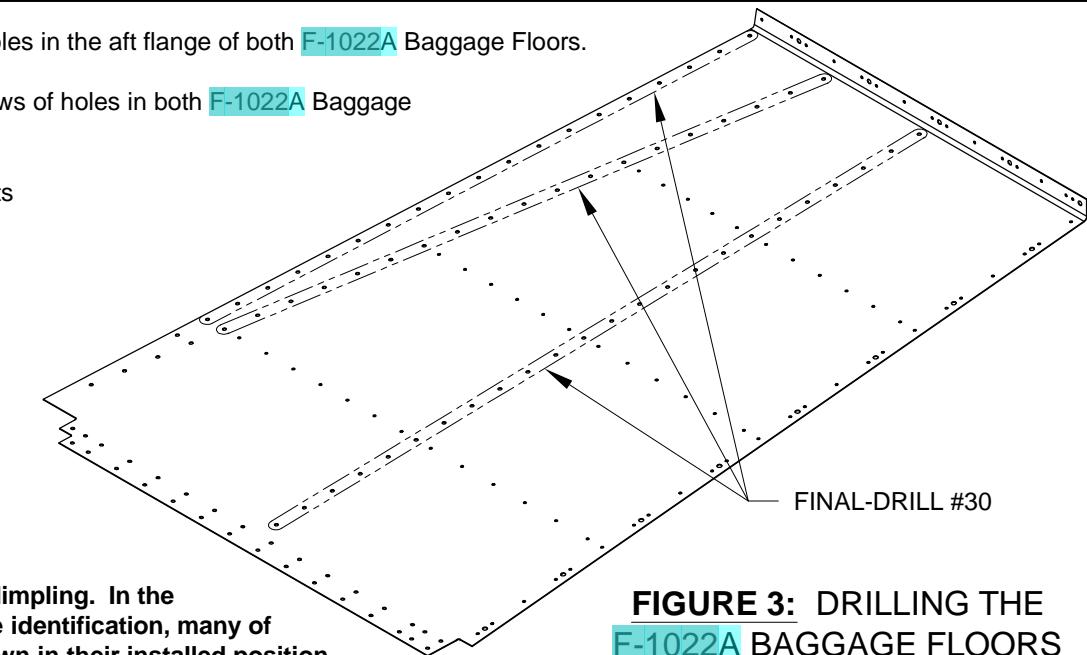


**FIGURE 2: CLECOING THE BAGGAGE FLOOR STIFFENERS**

Step 4: Final-Drill #40 the 3/32" holes in the aft flange of both F-1022A Baggage Floors.

Step 5: Final-Drill #30 the three rows of holes in both F-1022A Baggage Floors indicated in Figure 3.

Step 6: Deburr the holes of all parts drilled in this section.



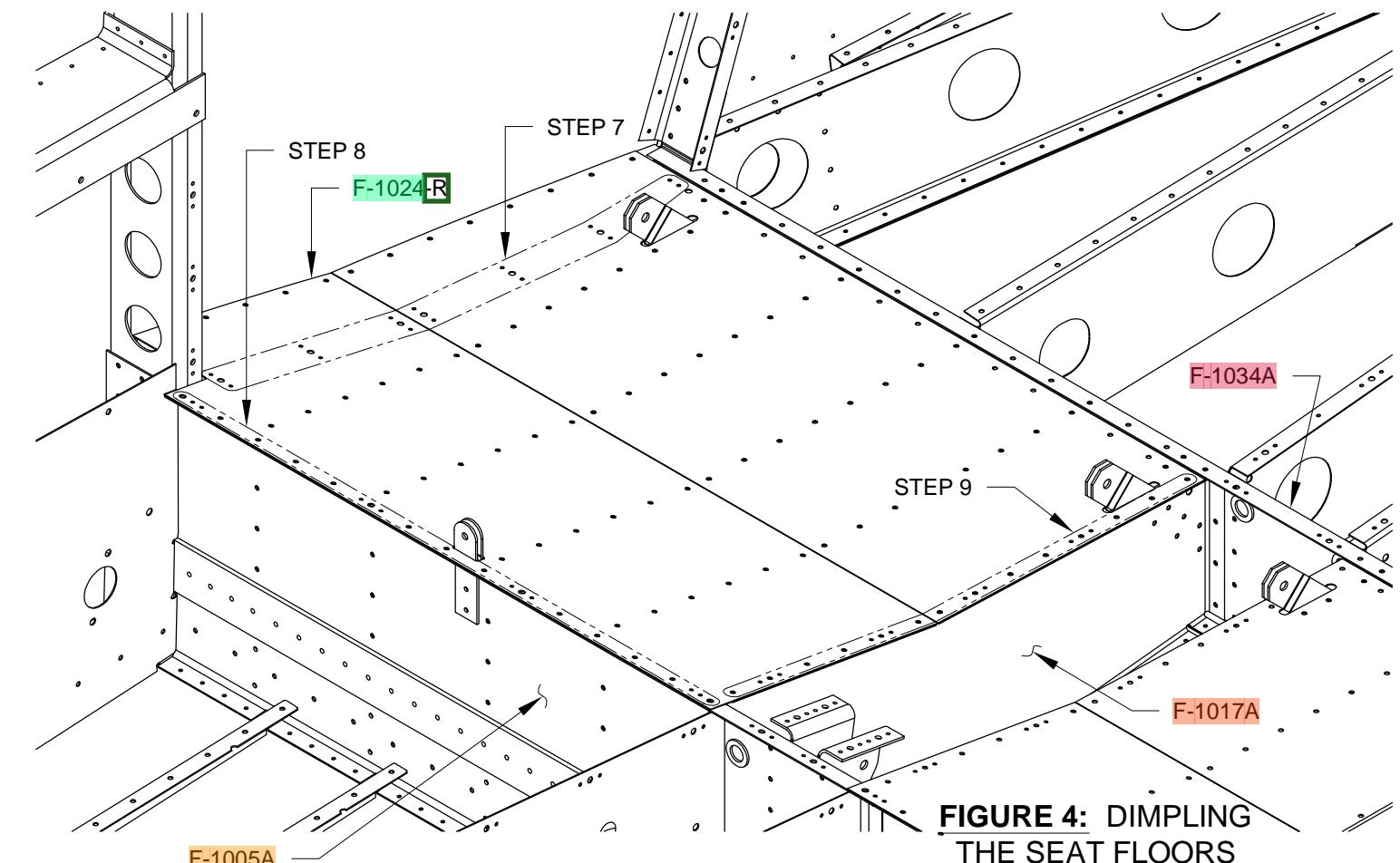
**NOTE:** Now begins the task of dimpling. In the following steps, to facilitate hole identification, many of the parts being dimpled are shown in their installed position.

Step 7: Dimple the #40 nutplate attachment rivet holes near the outboard edge of both F-1024 Seat Floors (see Figure 4). Do not dimple the #19 holes.

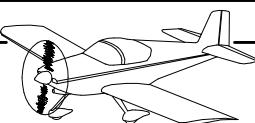
Step 8: Dimple the holes along the forward edge of both F-1024 Seat Floors (see Figure 4) and the common holes in the underlying flange of the F-1005A Rear Spar Bulkhead. The #19 holes are dimpled for AN509 flush head screws.

Step 9: Dimple the #30 and #40 holes along the inboard edge of both F-1024 Seat Floors (see Figure 4) and the common holes in the underlying flange of the F-1017A Rear Seat Ribs. Do not dimple the #19 holes.

Step 10: There are nutplate hole patterns punched in the top flange of the F-1005A and F-1034A Bulkheads between the F-1024 Seat Floors. Of these holes, dimple the #40 holes in the F-1034A Bulkhead and the #40 and #19 holes in the F-1005A bulkhead.



**FIGURE 4: DIMPLING THE SEAT FLOORS**



Step 1 (Standard Kit): Dimple the #30 and #40 holes in both baggage floors (including the holes in the aft flange) except for the following:

Do not dimple the holes in the F-1022A-L Baggage Floor which are common to the bottom flange of the F-1027 Close-Out Panel (see Figure 2 below), or the single hole indicated on the bottom of Page 33-6, Figure 2.

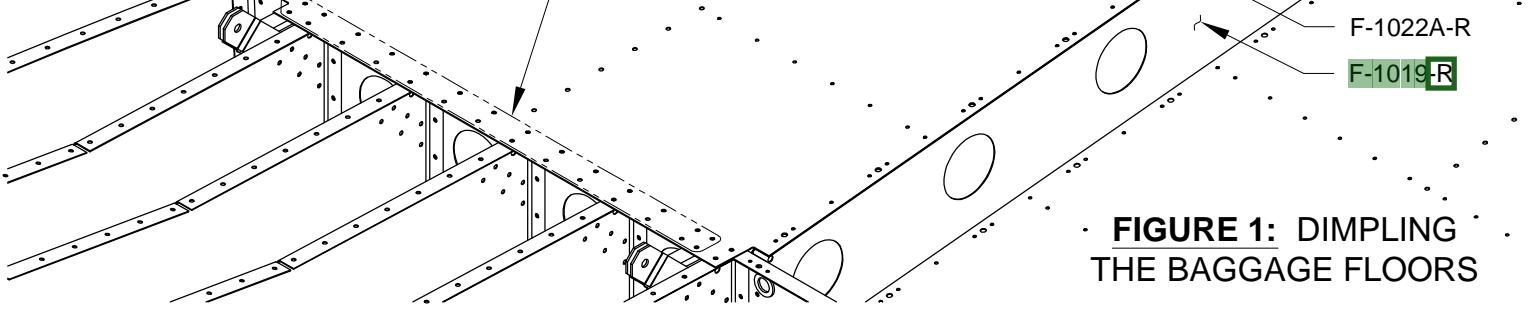
Do not dimple the holes in both baggage floors indicated in Figure 1.

Step 2 (Standard Kit): Dimple the #19 holes along the inboard edge of both F-1022A Baggage Floors (common to the F-1019 Inbd Baggage Ribs) for AN509 flush head screws.

Step 3 (Standard Kit): Dimple all of the holes in the top flange of the F-1019 Inbd Baggage Ribs for the dimples in the F-1022A Baggage Floors.

Step 4 (Standard Kit):  
Dimple the #30 holes in the F-1023B Baggage Floor Angles which are common to the F-1022A Baggage Floor.

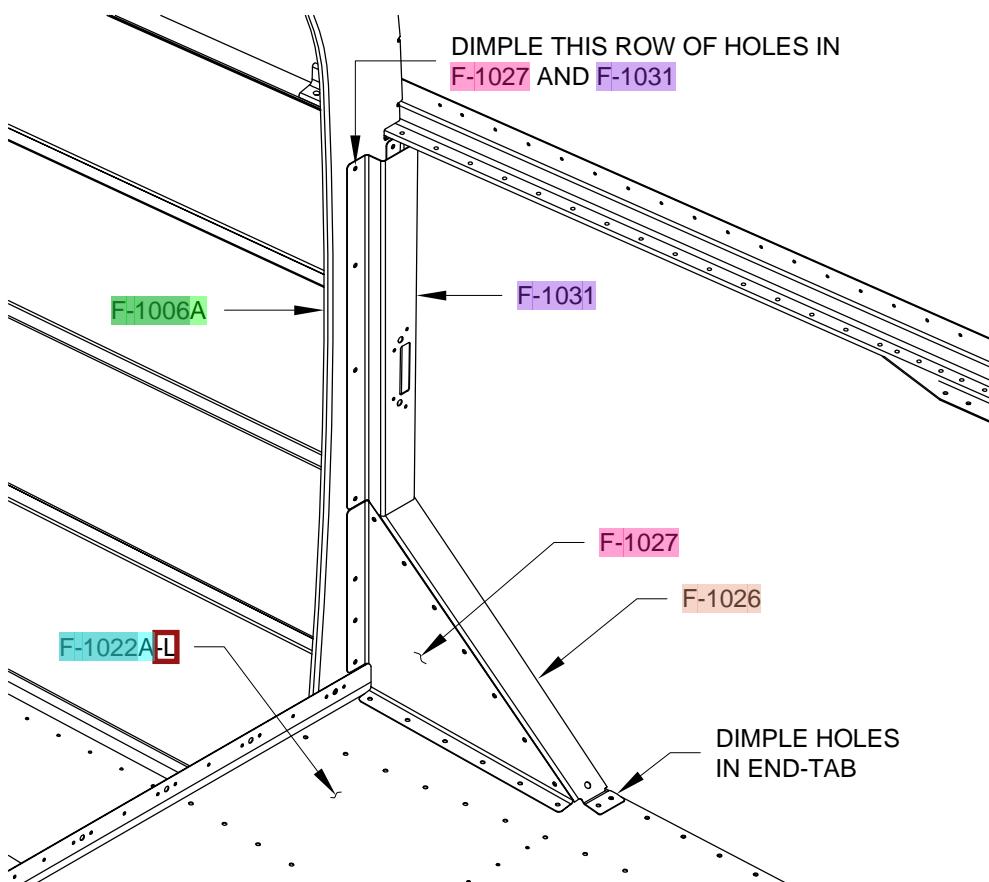
DO NOT DIMPLE THESE HOLES



Step 5 (Standard and Quickbuild Kit): Dimple (flush on the forward side) the three holes in the vertical flange of the F-1027 Close-Out Panel, the four holes in the inboard vertical flange of the F-1031 Upper Baggage Door Seal Channel, and the holes in the F-1006A Bulkhead which are common to these holes.

Step 6 (Standard and Quickbuild Kit): Final-Drill #40 and machine countersink (flush on the forward side for AN426AD3 rivets) the four 3/32" nutplate attachment rivet holes in the F-1031 Upper Baggage Door Seal Channel.

Step 7 (Standard and Quickbuild Kit): Dimple the two holes in the lower end-tab of the F-1026 Lower Baggage Door Seal Channel.

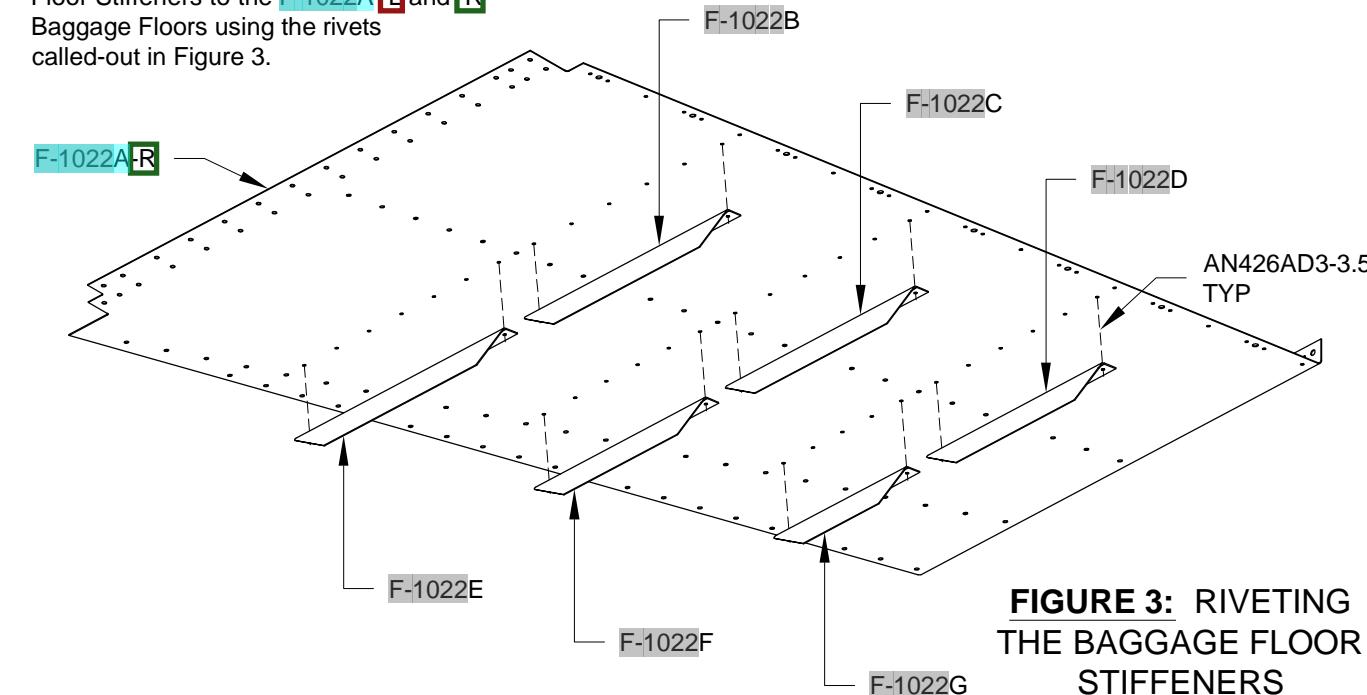


Step 8 (Standard Kit): Dimple the holes in the F-1022 Baggage Floor Stiffeners.

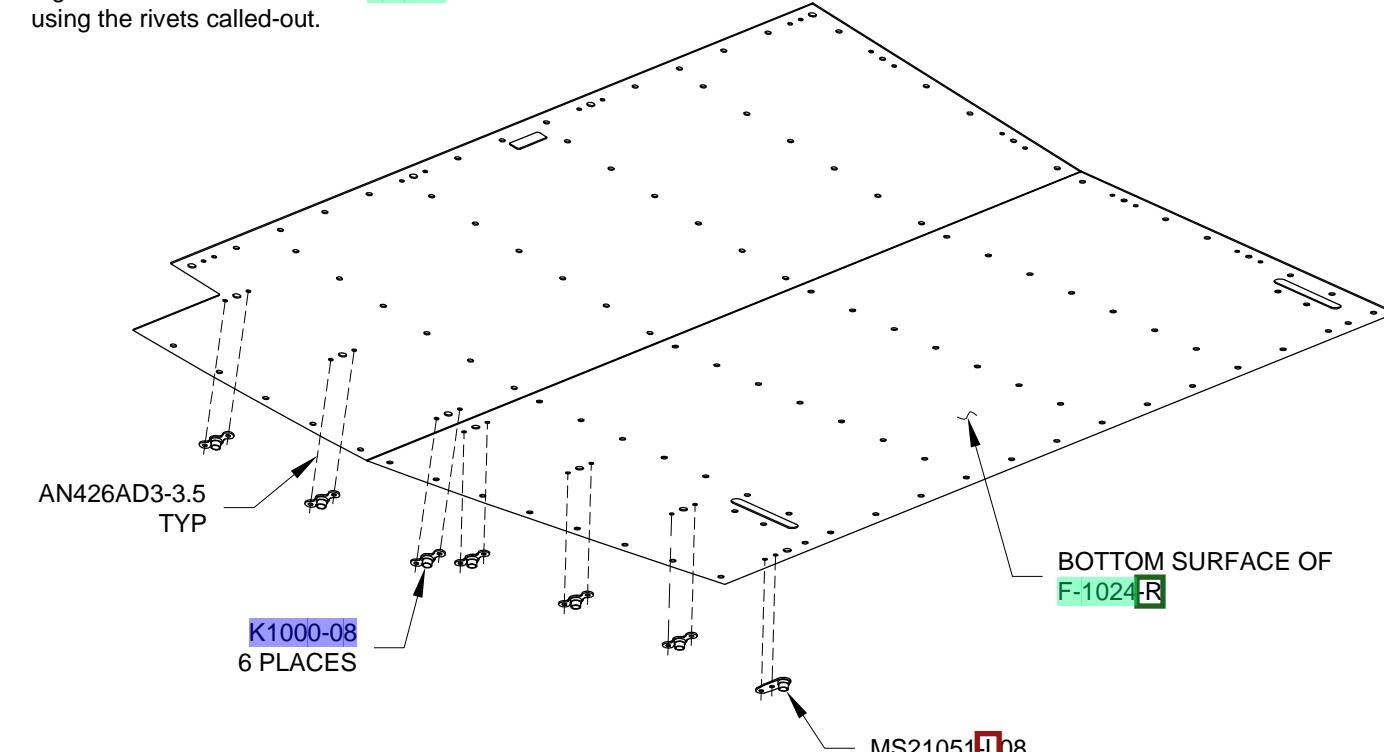
Step 9 (Standard and Quickbuild Kit): Prime all of the parts that have been drilled and dimpled up to this point if/ as desired.

**NOTE: The seat and baggage floors will now be riveted. Although possible later, now is a good time to run any cables or wires that need to pass under the seat and baggage floors.**

Step 10 (Standard Kit): Rivet the F-1022 Baggage Floor Stiffeners to the F-1022A-L and F-1022A-R Baggage Floors using the rivets called-out in Figure 3.



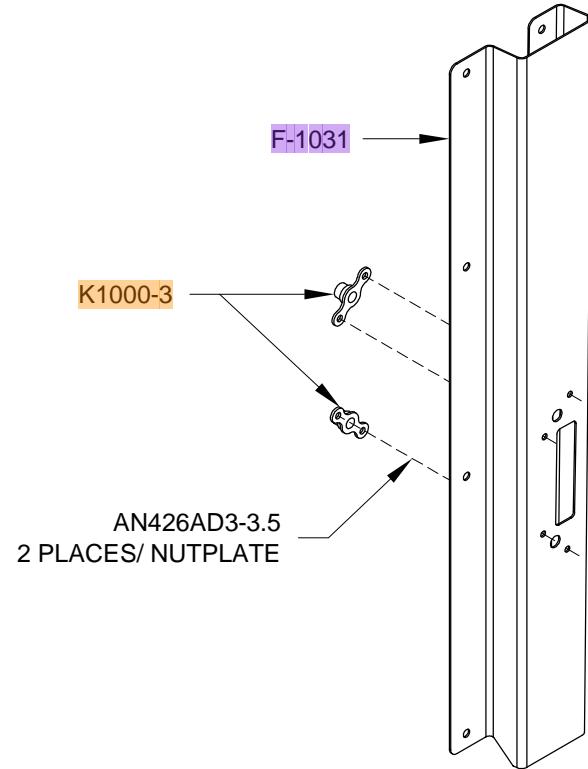
Step 11 (Standard Kit): Rivet the nutplates shown in Figure 4 to the bottom of both F-1024 Seat Floors using the rivets called-out.





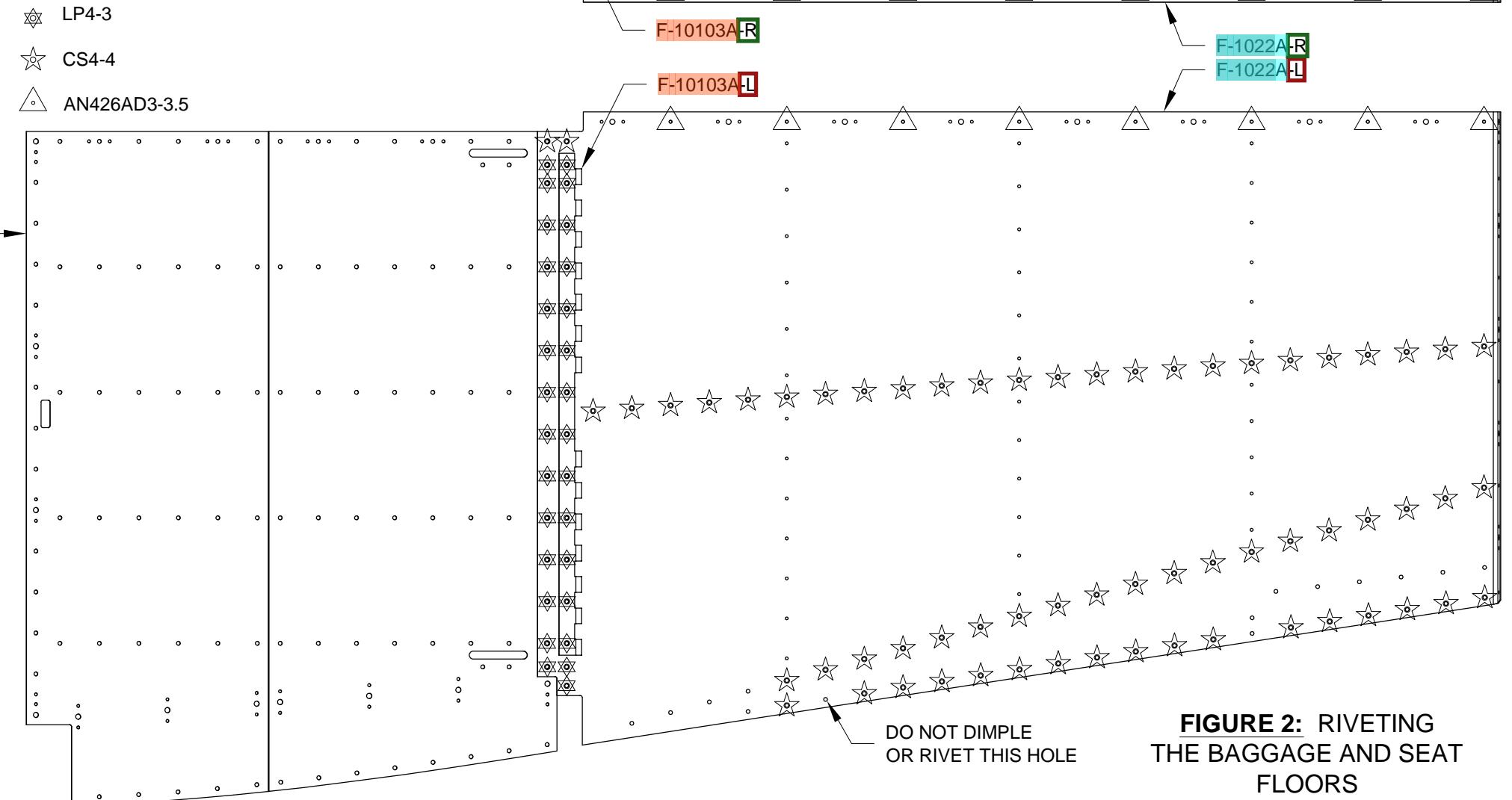
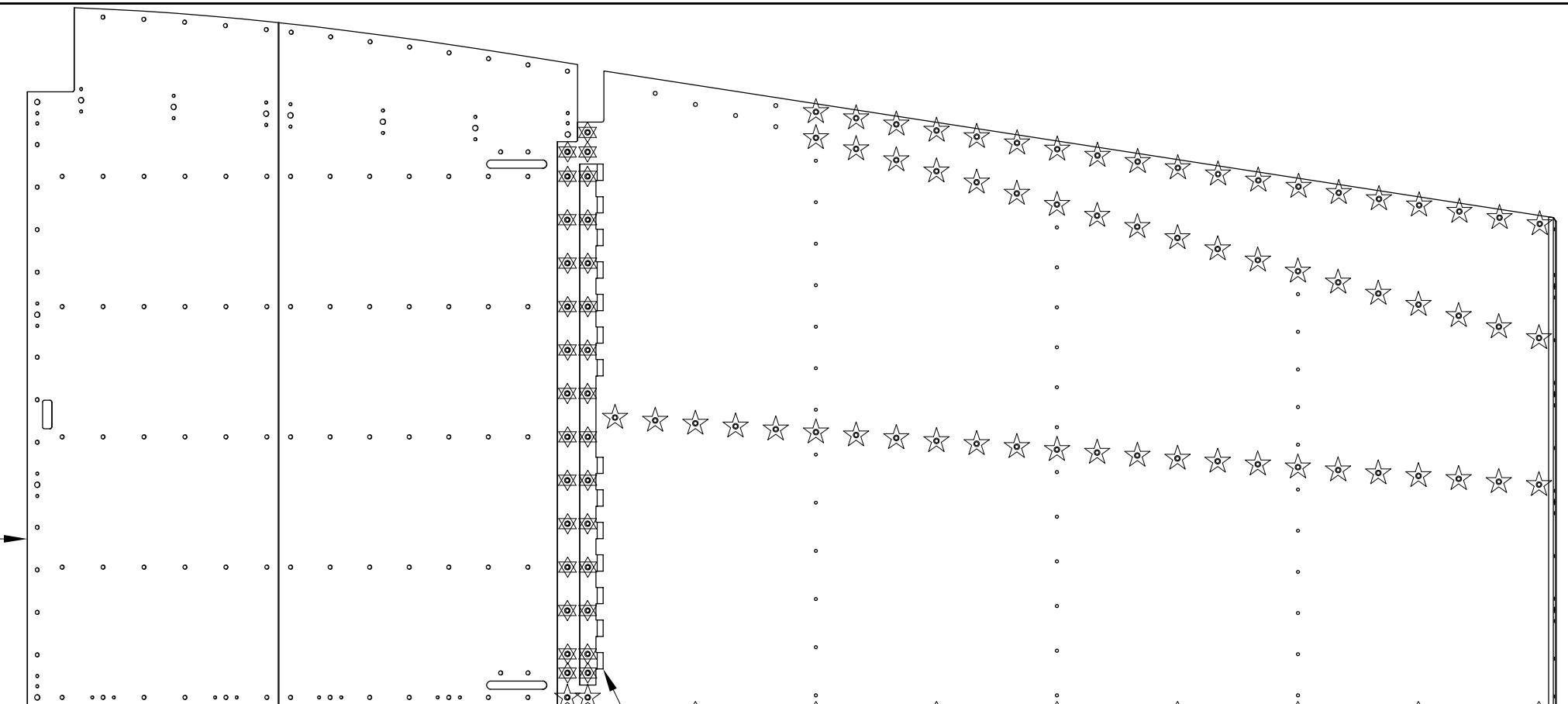
**NOTE: The remainder of this section is to be completed for both the Standard and Quickbuild Kits.**

Step 1: Rivet the two nutplates to the F-1031 Upper Baggage Door Seal Channel using the rivets called-out in Figure 4.

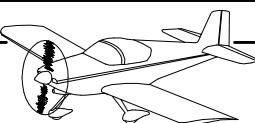


**FIGURE 1: RIVETING NUTPLATES TO THE UPPER BAGGAGE DOOR SEAL CHANNEL**

Step 2: Rivet in place the F-1024 Seat Floors, the F-1022A Baggage Floors, and the F-10103A Lower Seat Hinge Halves using only the rivets called-out in Figure 1. The remainder of the seat floors are riveted in a later section.



**FIGURE 2: RIVETING THE BAGGAGE AND SEAT FLOORS**



Step 1: Install the nutplates shown in Figure 1 using the rivets called-out.

Step 2: Set the five rivets in the aft flange of both F-1022A Baggage Floors using the rivets called-out in Figure 1.

AN426AD3-4.5  
BOTH ENDS OF F-1006B.  
ALL OTHER NUTPLATE ATTACH RIVETS  
AN426AD3-4

AN426AD3-3.5  
5 PLACES/ FLOOR

F-1022A-R

K1100-08  
ALONG INBOARD EDGES OF BOTH  
F-1022A

K1000-08  
8 PLACES ALONG  
F-1006B

MS21051-L08

AN426AD3-4.5  
BOTH ENDS OF F-1006B.  
ALL OTHER NUTPLATE ATTACH RIVETS  
AN426AD3-4

AN426AD3-3.5  
5 PLACES/ FLOOR

AN426AD3-4.5  
BOTH ENDS OF F-1006B.  
ALL OTHER NUTPLATE ATTACH RIVETS  
AN426AD3-4

Step 2: Rivet the two F-1023B Baggage Floor Angles to the F-1022A Baggage Floors and F-1070 Mid Side Skins using the rivets called-out in Figure 2.

F-1023B-R  
F-1022A-R  
F-1070-R  
CS4-4  
ALL F-1023B TO F-1070 RIVETS  
AN426AD3-3.5

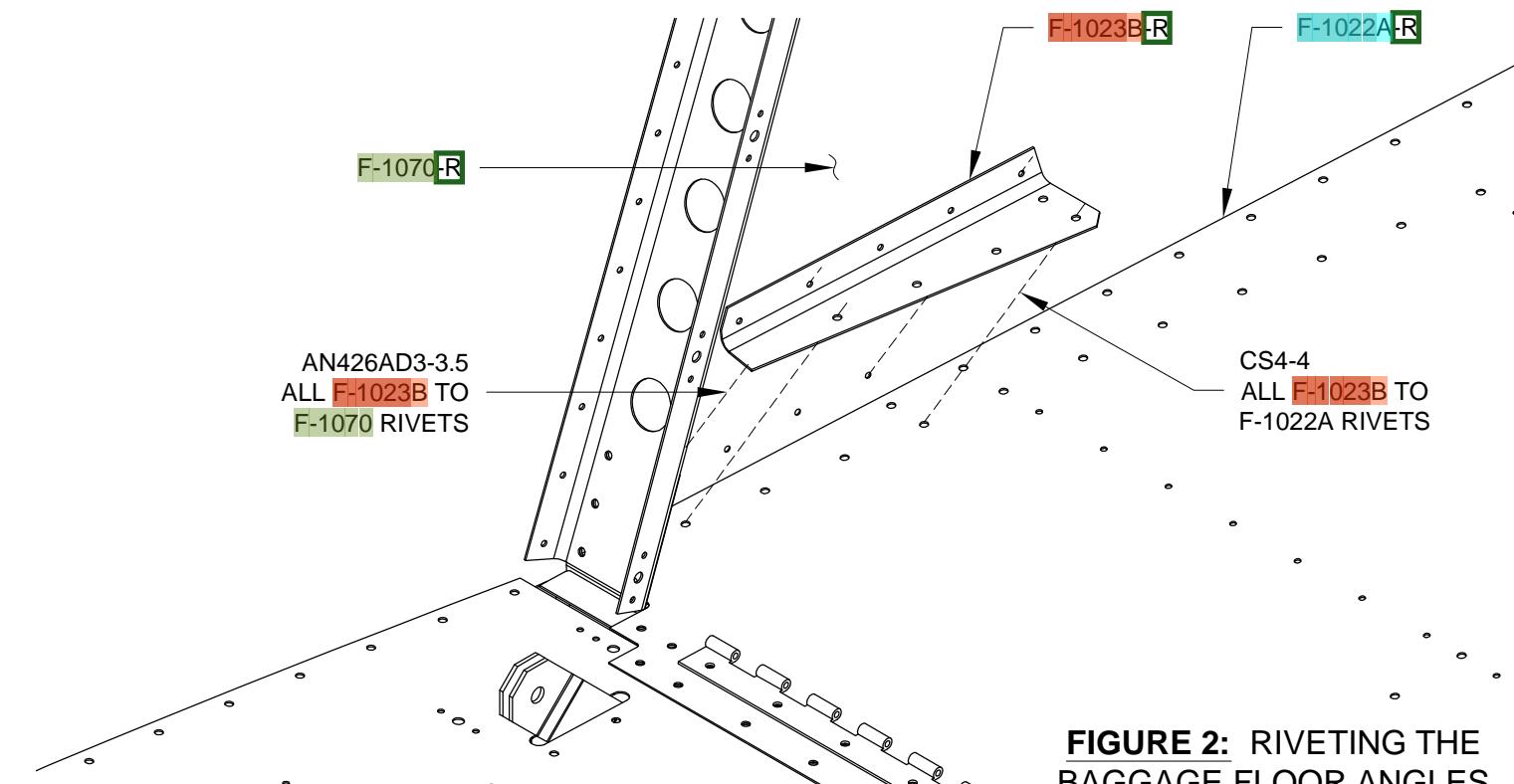


FIGURE 2: RIVETING THE  
BAGGAGE FLOOR ANGLES

Step 3: Rivet the F-1026 Lower Baggage Door Seal Channel and the F-10100B Baggage Door Shim to the F-1070-L and F-1073-L Side Skins using the rivets called-out in Figure 3.

Rivet the bottom end-tab of the lower baggage door seal channel to the F-1022A-L Baggage Floor and the top end-tab to the F-1006A Bulkhead using the rivets called-out in the figure. Do not set a rivet in the outboard hole of the top end-tab.

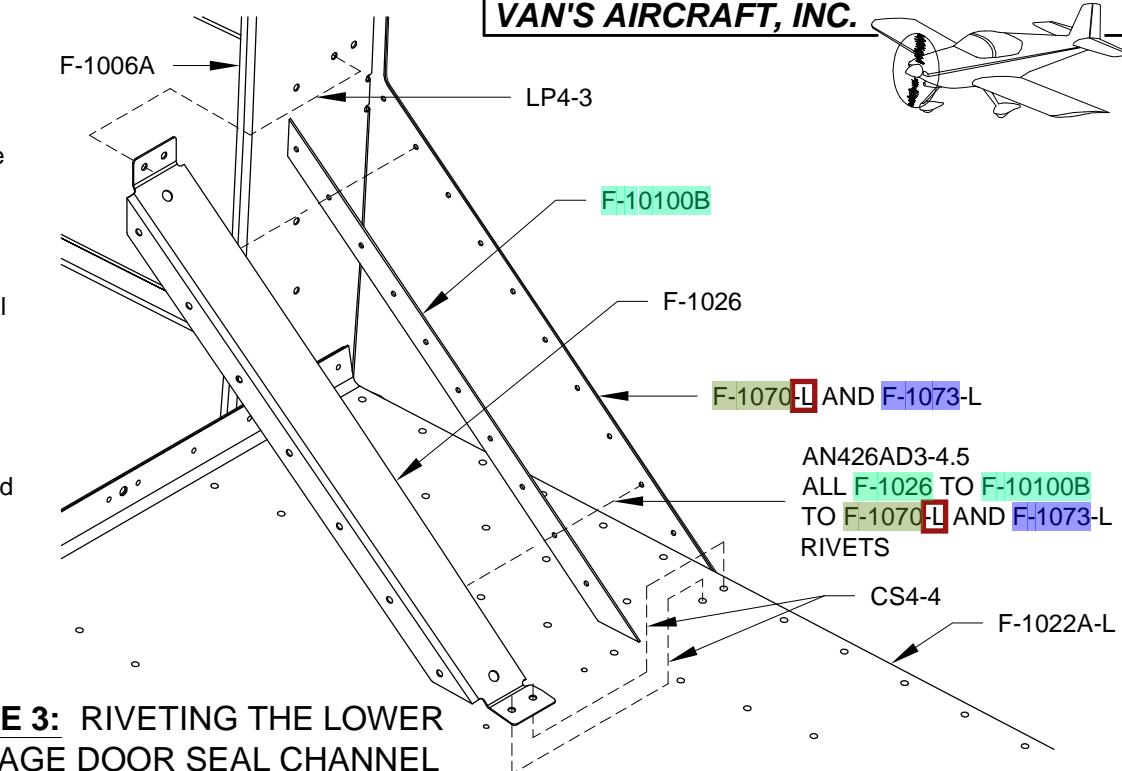


FIGURE 3: RIVETING THE LOWER  
BAGGAGE DOOR SEAL CHANNEL

Step 4: Rivet the F-1031 Upper Baggage Door Seal Channel to the F-1006B Bulkhead and to the top end-tab of the F-1026 Lower Baggage Door Seal Channel using the rivets called-out in Figure 4.

Step 5: Rivet the F-1027 Close-Out Panel to the F-1026 Lower Baggage Door Seal Channel, to the F-1022A-L Baggage Floor, and to the F-1006A Bulkhead using the rivets called-out in Figure 4.

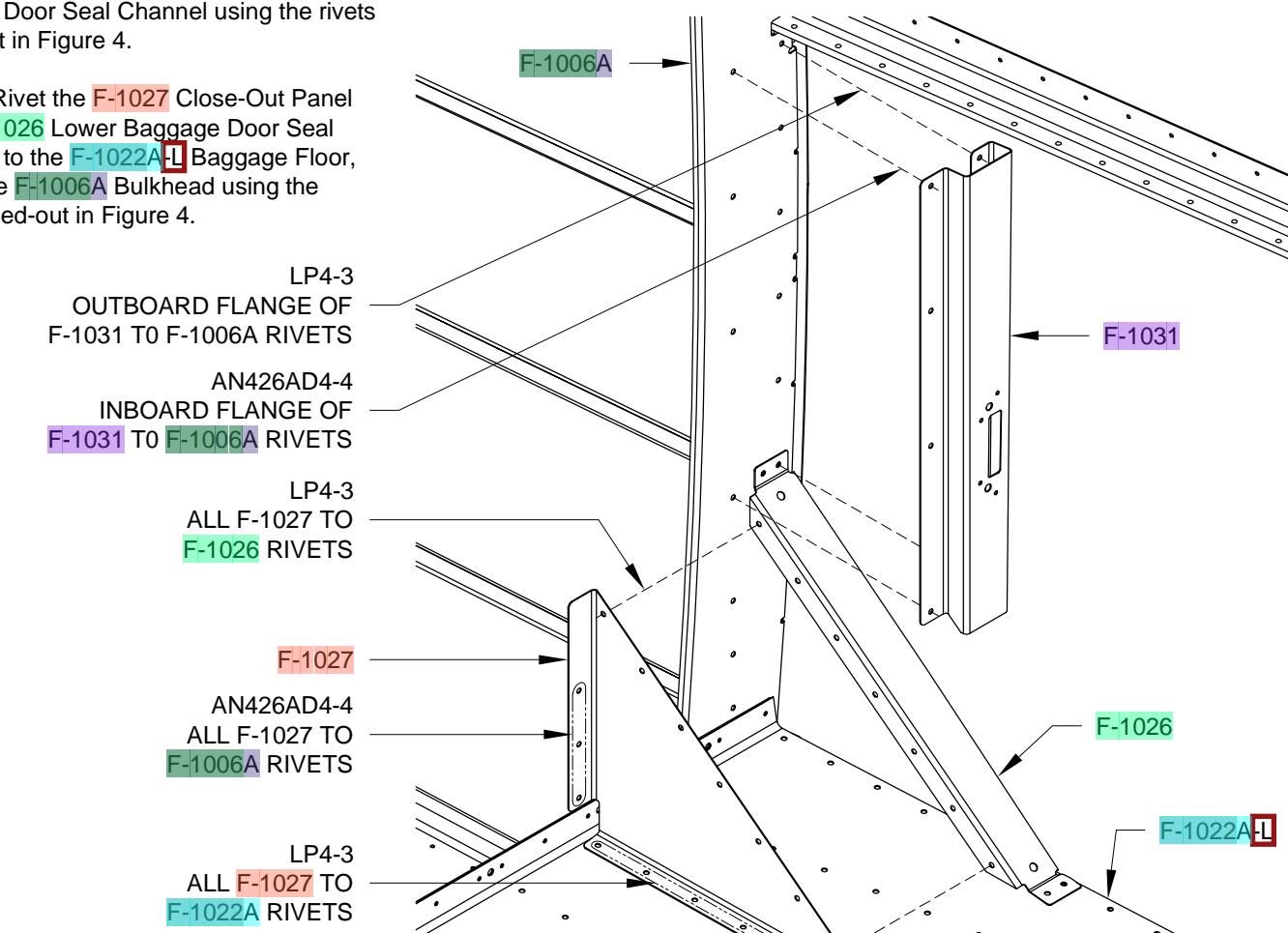
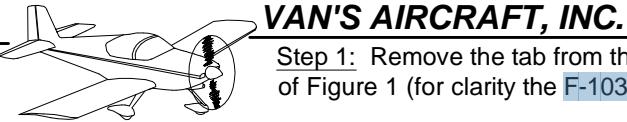


FIGURE 4: UPPER BAGGAGE DOOR SEAL  
CHANNEL AND CLOSE-OUT PANEL



## VAN'S AIRCRAFT, INC.

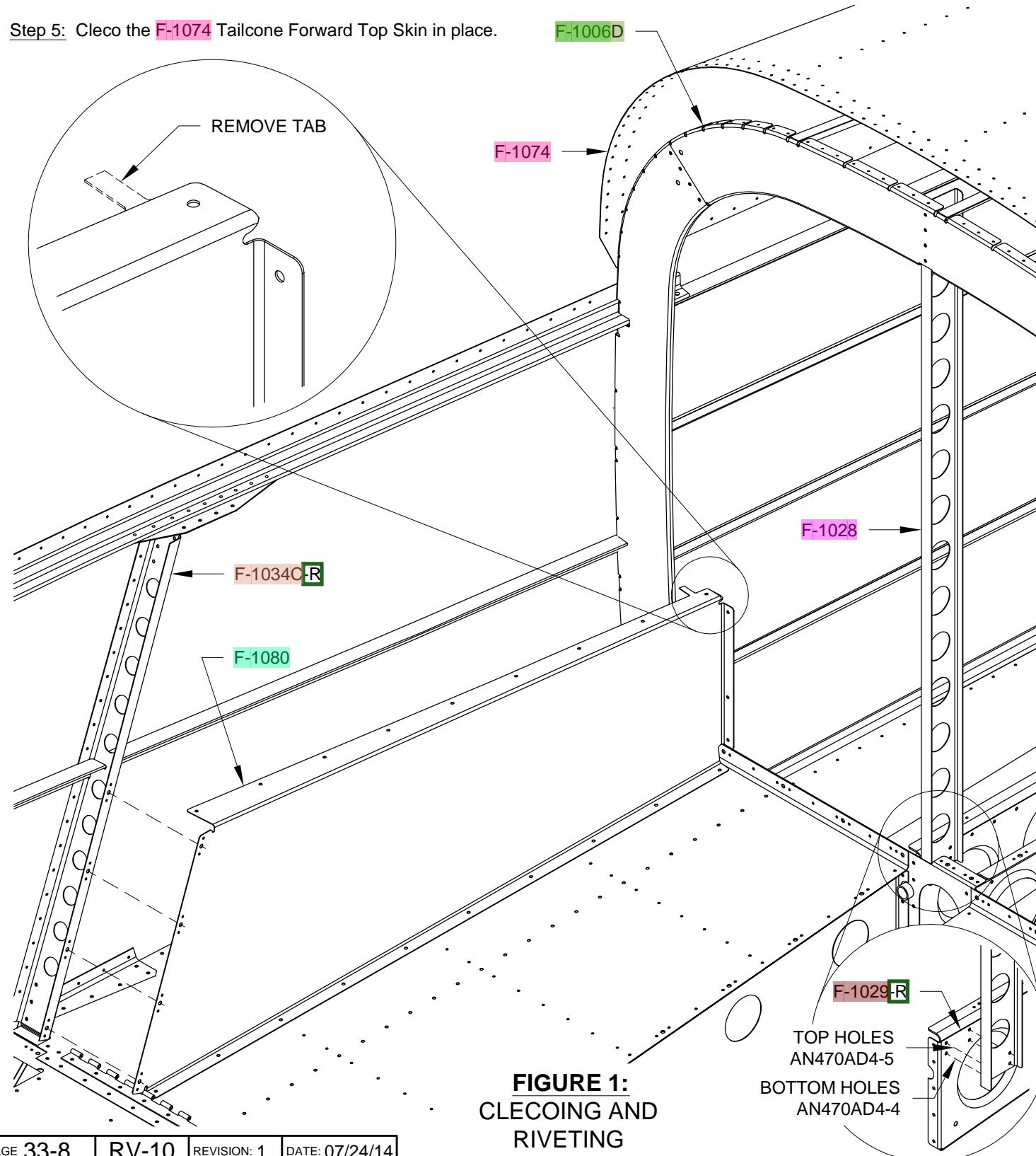
Step 1: Remove the tab from the top flange of the F-1080 Right Baggage Cover as indicated in the blowup of Figure 1 (for clarity the F-1034B Seatback Brace is not shown).

Step 2: Cleco the forward end of the F-1080 Right Baggage Cover to the F-1034C-R Fuselage Bulkhead.

Step 3: There are four holes in the forward flange of the F-1028 Baggage Bulkhead Channel. Draw a line down the entire flange centered on these holes, then dimple the holes for the dimples in the F-1006D Bulkhead.

Step 4: Using only the top two holes in the forward flange of the F-1028 Baggage Bulkhead Channel, cleco the flange to the F-1006D Bulkhead. Rivet the bottom end of the baggage bulkhead channel to the F-1029-R Bellcrank Rib using the rivets called-out in the blow-up of Figure 1. (The top end is riveted after the Cabin Cover is installed in a later section.)

Step 5: Cleco the F-1074 Tailcone Forward Top Skin in place.

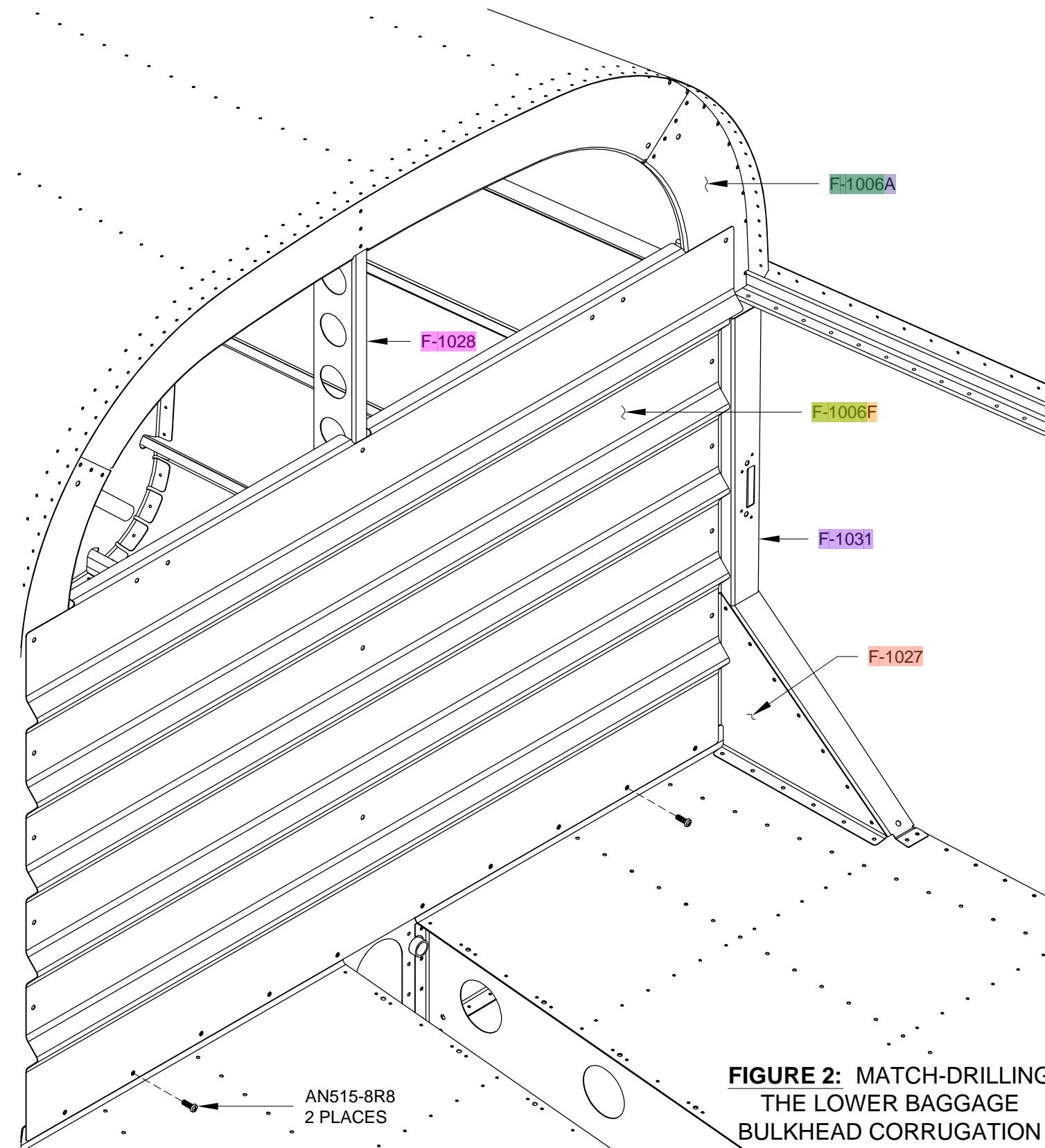


**FIGURE 1:**  
CLECOING AND  
RIVETING

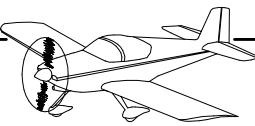
Step 6: Temporarily secure the bottom of the F-1006F Lower Baggage Bulkhead Corrugation to the aft flange of the F-1022A Baggage Floors using the screws called-out in Figure 2.

Step 7: Match-Drill #19 the holes along the left side of the F-1006F Lower Baggage Bulkhead Corrugation (the right side is drilled later) into the F-1027 Close-Out Panel, the F-1031 Upper Baggage Door Seal Channel, and the F-1006A Bulkhead. Cleco a few of these holes to secure the lower baggage bulkhead corrugation to the bulkhead.

Match-Drill #19 the three holes of the lower baggage bulkhead corrugation into the F-1028 Baggage Bulkhead Channel. Be sure the line which was drawn on the forward flange of the baggage bulkhead channel remains centered in the holes of the lower baggage bulkhead corrugation while drilling.



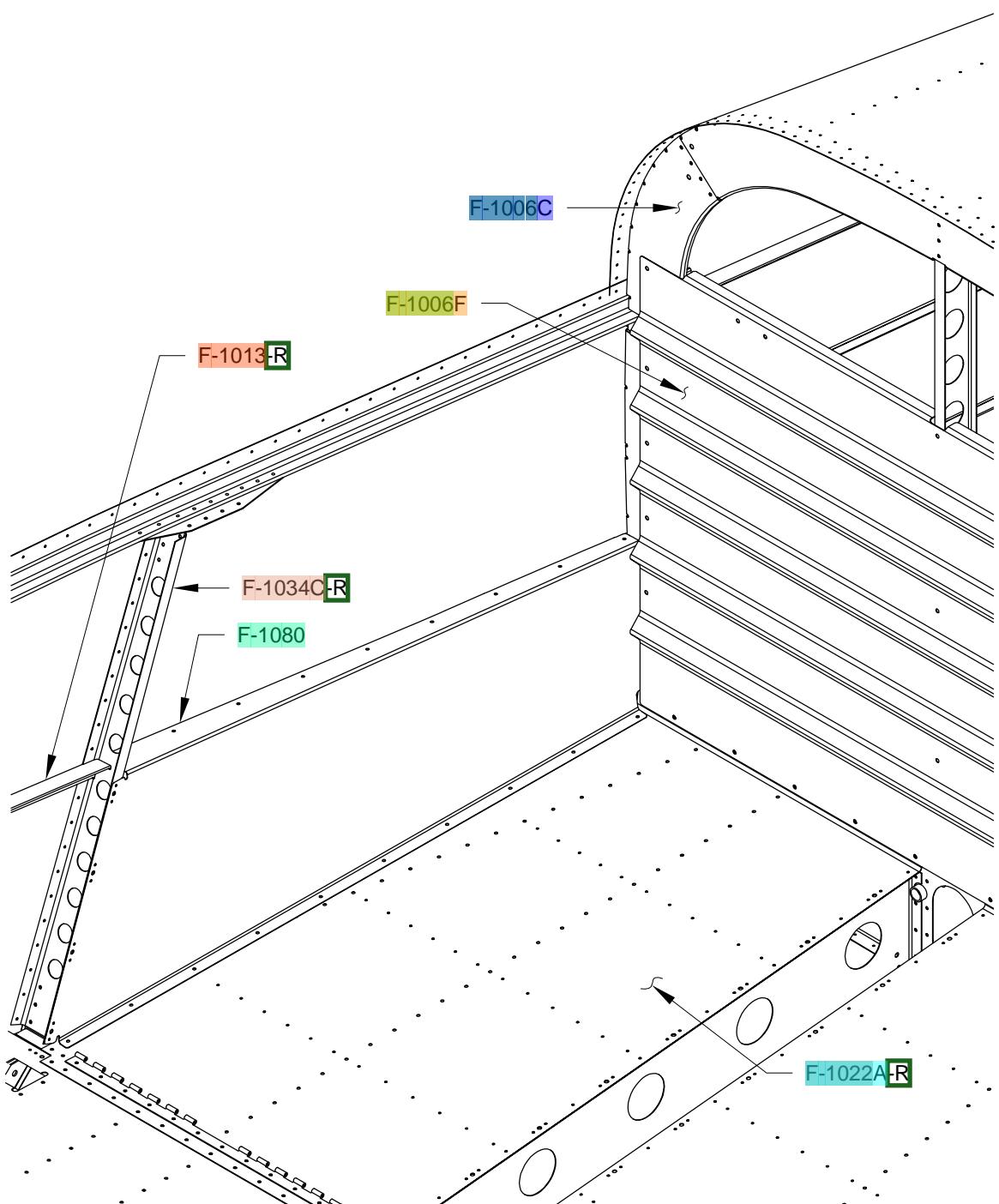
**FIGURE 2:** MATCH-DRILLING  
THE LOWER BAGGAGE  
BULKHEAD CORRUGATION



**Step 1:** If necessary, adjust the aft end of the F-1080 Right Baggage Cover so that it is aligned with the edge of the F-1006F Lower Baggage Bulkhead Corrugation. Match-Drill #30 the holes in the bottom flange of the right baggage cover into the F-1022A-R Baggage Floor, then match-drill #30 the holes in the top flange into the F-1013-R Fwd Fuse Longeron.

**Step 2:** Match-Drill #19 the holes along the right edge of the F-1006F Lower Baggage Bulkhead Corrugation into the aft flange of the F-1080 Right Baggage Cover and into the F-1006C Bulkhead.

**Step 3:** Final-Drill #40 the nutplate attachment rivet holes common to the F-1080 Right Baggage Cover and the F-1034C-R Fuselage Bulkhead.

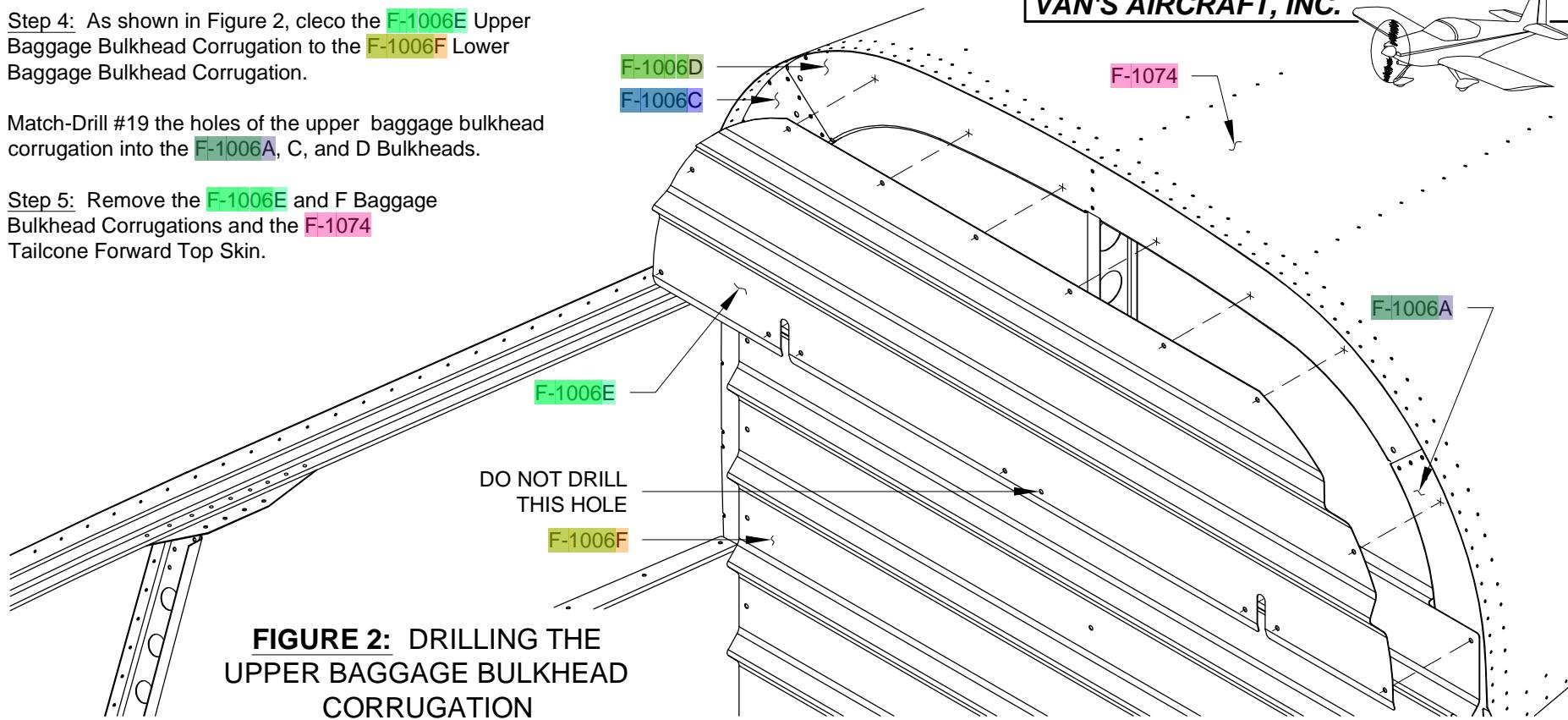


**FIGURE 1: DRILLING THE RIGHT BAGGAGE COVER**

**Step 4:** As shown in Figure 2, cleco the F-1006E Upper Baggage Bulkhead Corrugation to the F-1006F Lower Baggage Bulkhead Corrugation.

Match-Drill #19 the holes of the upper baggage bulkhead corrugation into the F-1006A, C, and D Bulkheads.

**Step 5:** Remove the F-1006E and F Baggage Bulkhead Corrugations and the F-1074 Tailcone Forward Top Skin.



**FIGURE 2: DRILLING THE UPPER BAGGAGE BULKHEAD CORRUGATION**

**Step 6:** As shown in Figure 3, cleco the #19 hole in the aft flange of the F-1080 Right Baggage Cover. With the top and bottom flanges clecoed in place, match-drill #30 the three remaining 1/8" holes in the aft flange into the F-1006C Bulkhead.

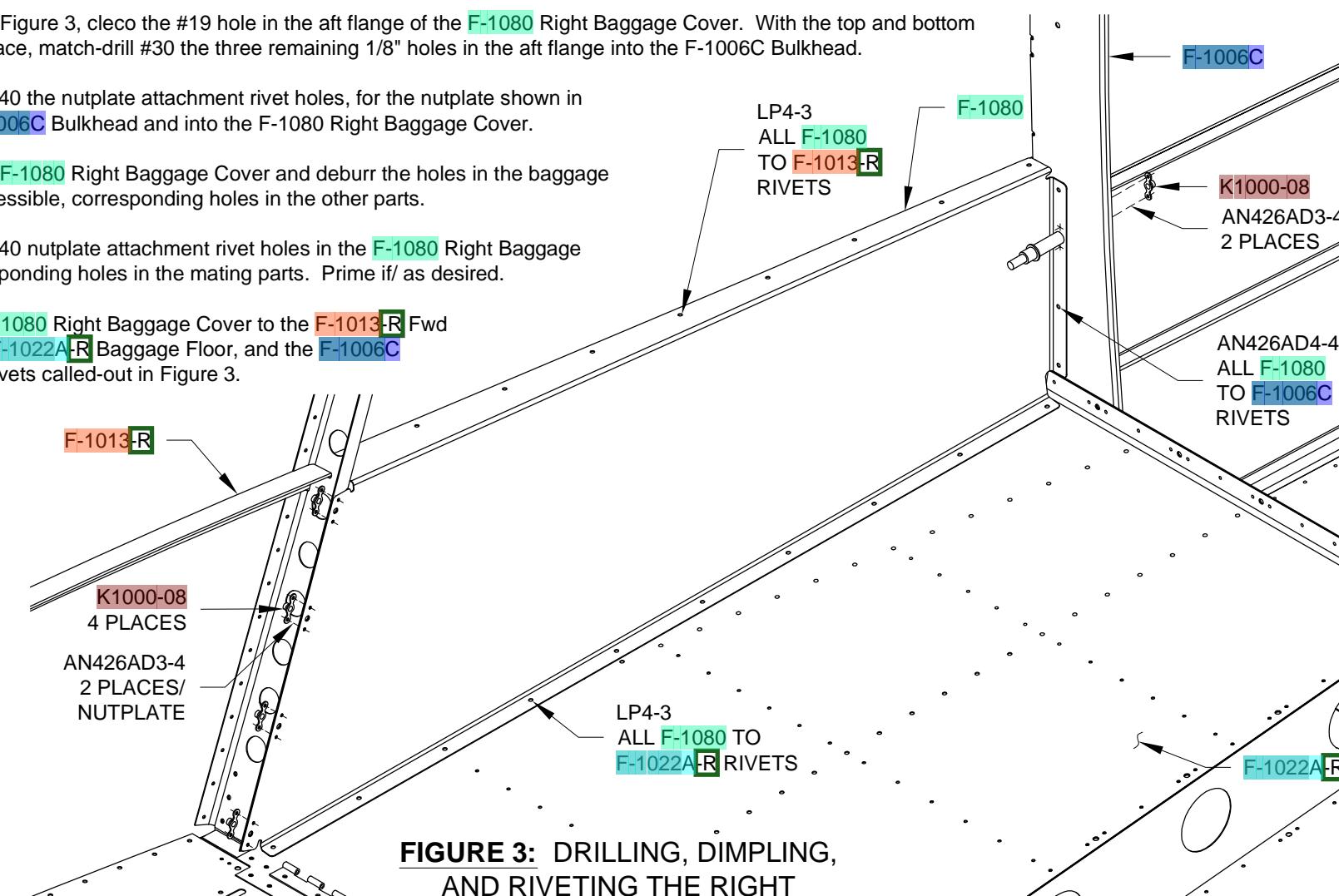
**Step 7:** Match-Drill #40 the nutplate attachment rivet holes, for the nutplate shown in Figure 3, into the F-1006C Bulkhead and into the F-1080 Right Baggage Cover.

**Step 8:** Remove the F-1080 Right Baggage Cover and deburr the holes in the baggage cover and all the accessible, corresponding holes in the other parts.

**Step 9:** Dimple the #40 nutplate attachment rivet holes in the F-1080 Right Baggage Cover and the corresponding holes in the mating parts. Prime if/ as desired.

**Step 10:** Rivet the F-1080 Right Baggage Cover to the F-1013-R Fwd Fuse Longeron, the F-1022A-R Baggage Floor, and the F-1006C Bulkhead using the rivets called-out in Figure 3.

**Step 11:** Install all of the nutplates shown in Figure 3 using the rivets called-out.



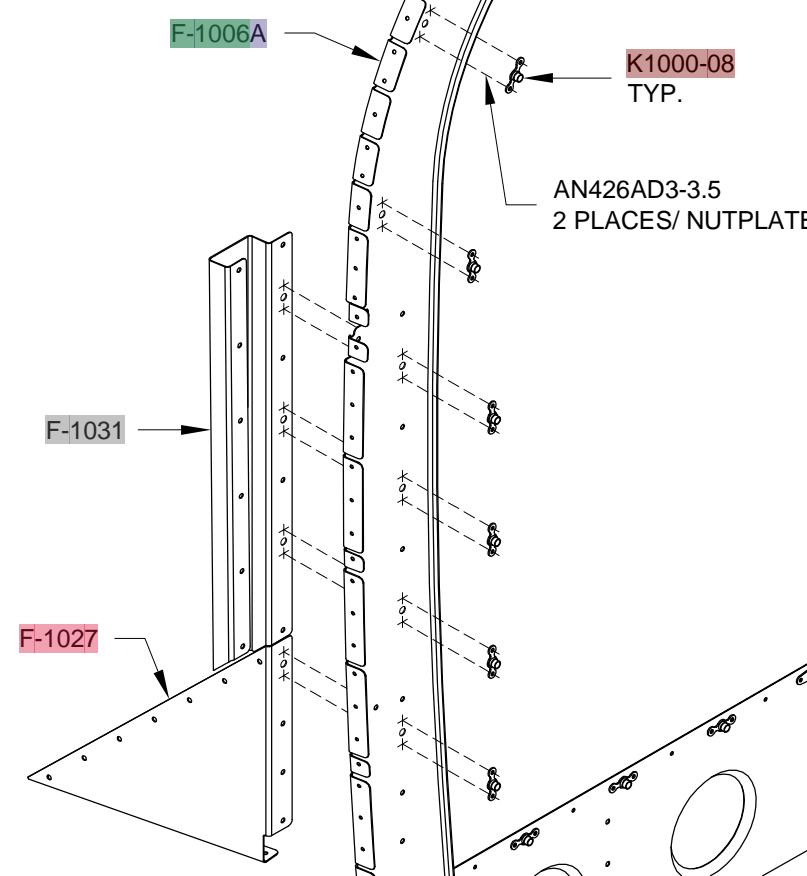
**FIGURE 3: DRILLING, DIMPLING, AND RIVETING THE RIGHT BAGGAGE COVER**



Step 1: Match-Drill #40 the nutplate attachment rivet holes for all the nutplates shown in Figure 1 into the F-1006A, C, and D Bulkheads and into the F-1028 Baggage Bulkhead Channel. Deburr the holes.

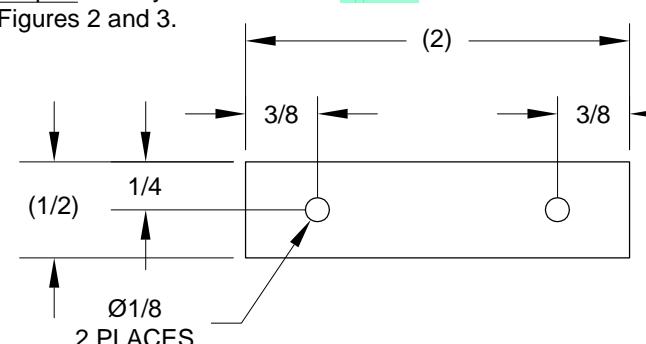
Step 2: Dimple all of the nutplate attachment rivet holes drilled in Step 1 except for those associated with the F-1027 Close-Out Panel and the F-1031 Upper Baggage Door Seal Channel. Machine countersink the holes in these parts.

Step 3: Rivet the nutplates shown in Figure 1 to the F-1006A, C, and D Bulkheads and to the F-1028 Baggage Bulkhead Channel using the rivets called out.

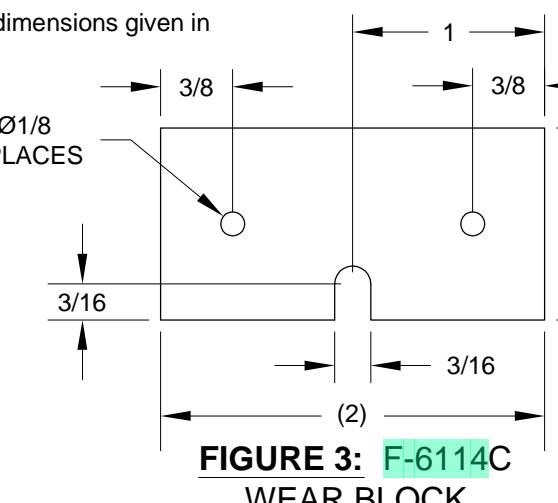


**FIGURE 1:** ATTACHING NUTPLATES TO THE F-1006 BULKHEAD AND BAGGAGE BULKHEAD CHANNEL

Step 4: Modify the two sets of F-6114B and C Wear Blocks using the dimensions given in Figures 2 and 3.



**FIGURE 2:** F-6114B WEAR BLOCK



**FIGURE 3:** F-6114C WEAR BLOCK

Step 5: Cleco together the F-1006E and F Baggage Bulkhead Corrugations.

Step 6: Center the F-6114B and C Wear Blocks on the shoulder harness cable notches in both sides of the F-1006E Baggage Bulkhead Corrugation.

Step 7: Match-Drill #30 the 1/8" holes of the F-6114B and C Wear Blocks into the F-1006F and E Baggage Bulkhead Corrugations respectively. Separate the baggage bulkhead corrugations.

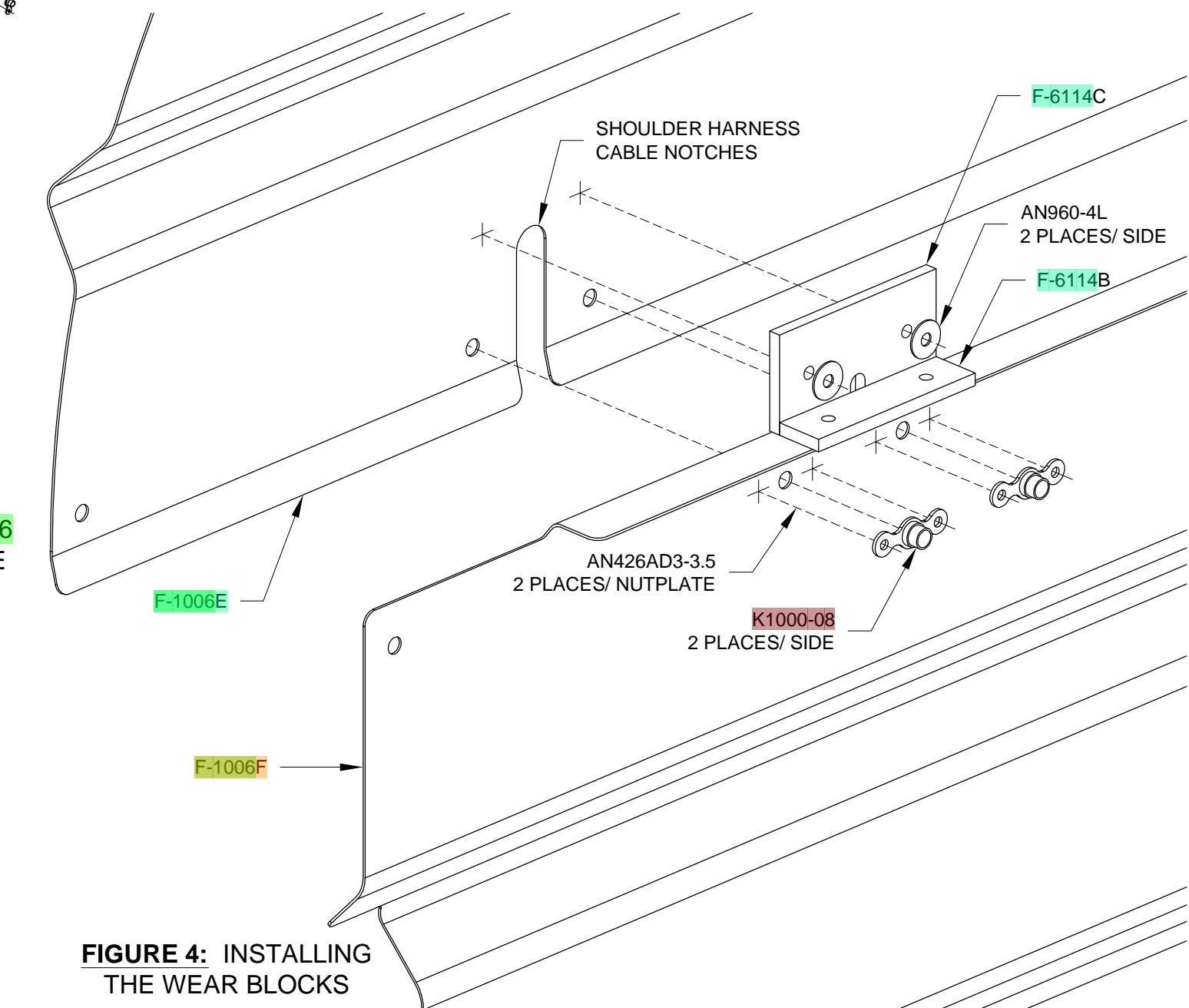
Step 8: Match-Drill #40 the nutplate attachment rivet holes, shown below the F-6114 Wear Blocks in Figure 4, into the F-1006F Lower Baggage Bulkhead Corrugation.

Step 9: Deburr the holes in the F-1006E and F Baggage Bulkhead Corrugations, dimple the #40 holes drilled in the previous step, and prime the parts if/ as desired.

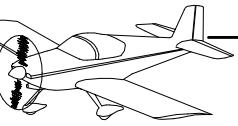
Step 10: Rivet the nutplates shown in Figure 4 to both ends of the F-1006F Baggage Bulkhead Corrugation using the rivets called-out.

Step 11: Rivet the F-6114B Wear Block to the F-1006F Lower Baggage Bulkhead Corrugation using LP4-3 blind rivets. Install the rivets from the top of the wear block.

Step 12: Rivet the F-6114C Wear Block to the F-1006E Upper Baggage Bulkhead Corrugation using LP4-3 blind rivets. Install the rivets from the front of the baggage bulkhead corrugation, and back-up of the wear block with the washers shown.

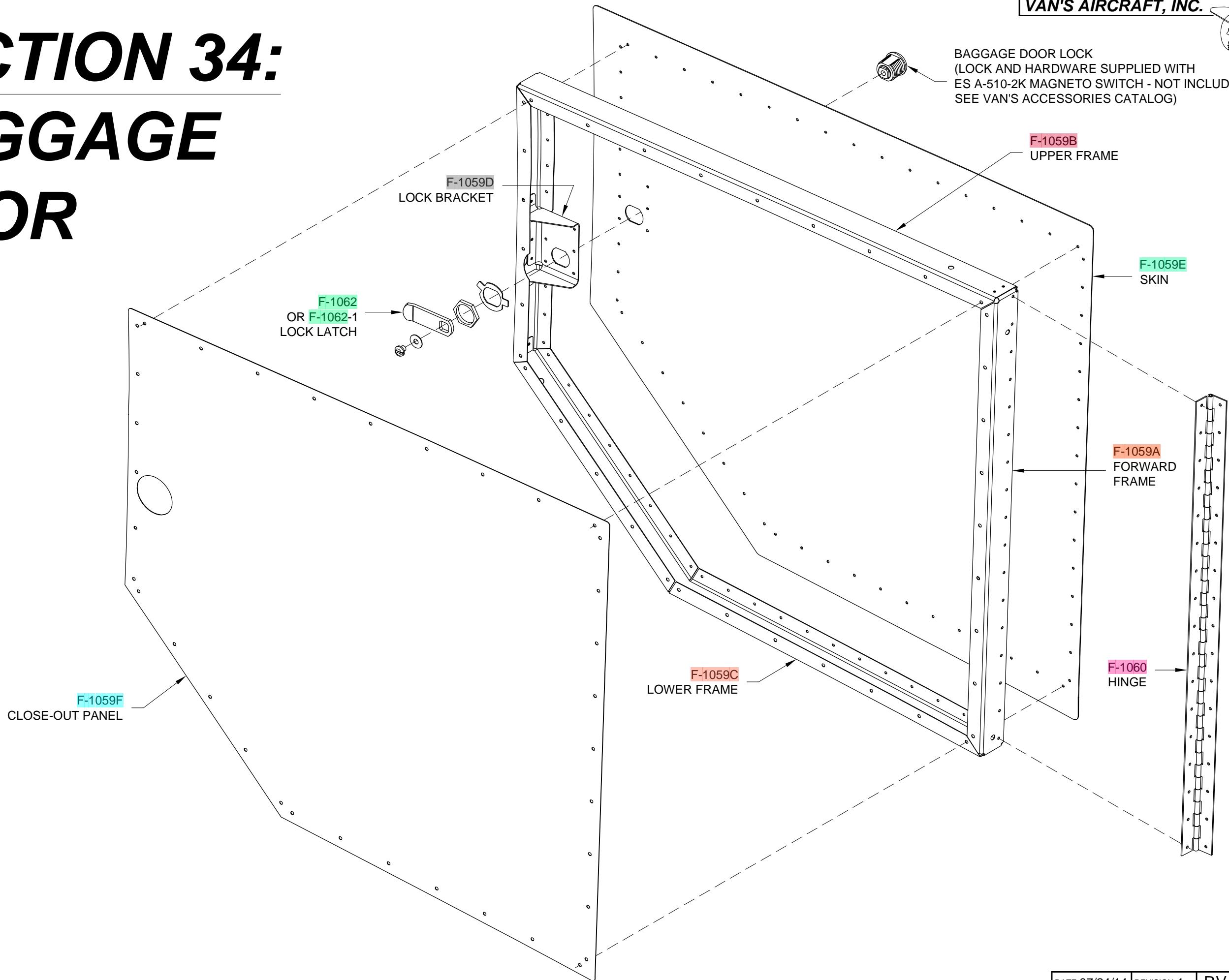


**FIGURE 4:** INSTALLING THE WEAR BLOCKS



# SECTION 34:

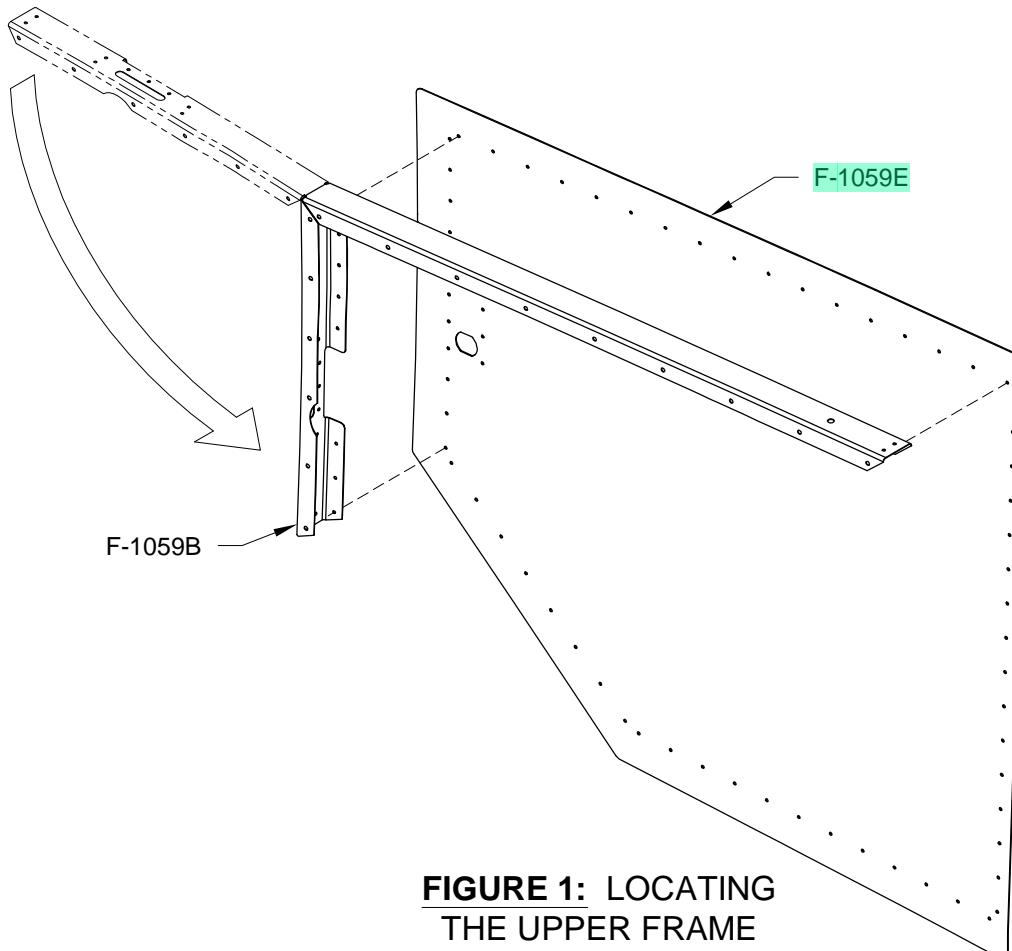
# BAGGAGE DOOR





Step 1: Bend the F-1059B Upper Frame by hand as shown in Figure 1. The bend will form naturally between the notches.

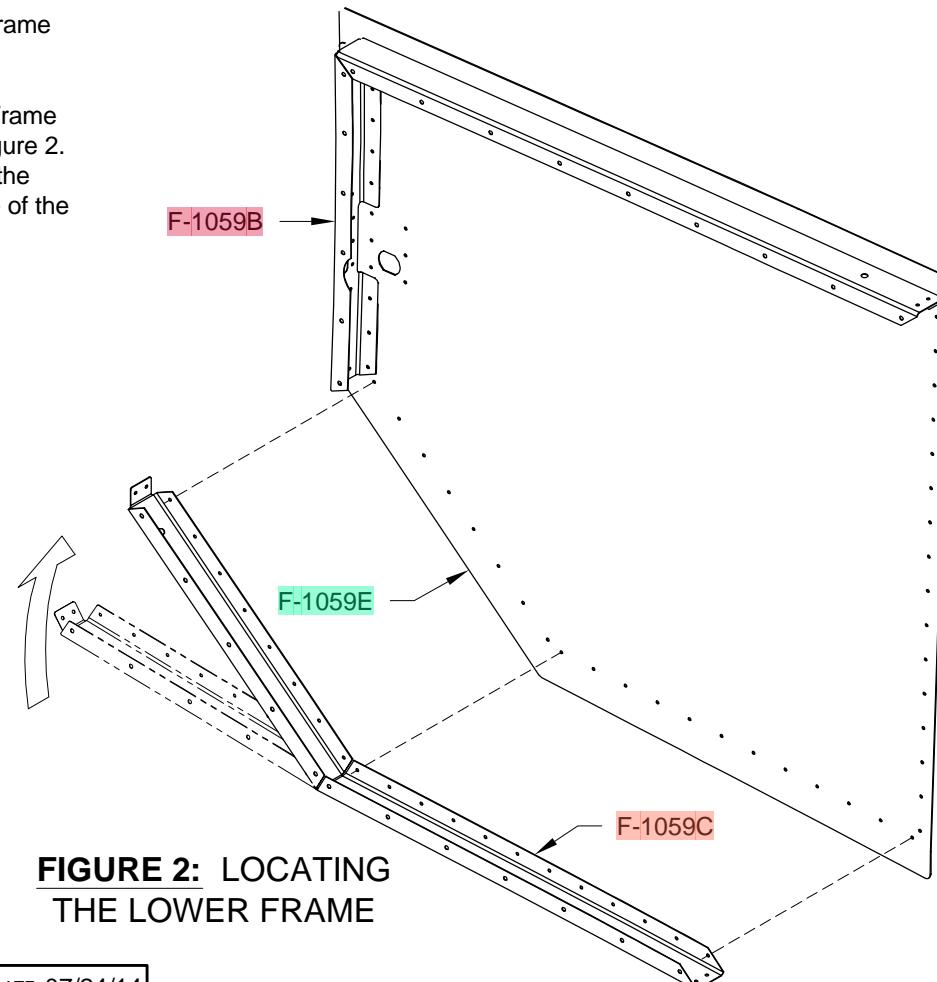
Step 2: Cleco the F-1059B Upper Frame to the F-1059E Skin as shown in Figure 1.



**FIGURE 1: LOCATING THE UPPER FRAME**

Step 3: Bend the F-1059C Lower Frame by hand as shown in Figure 2.

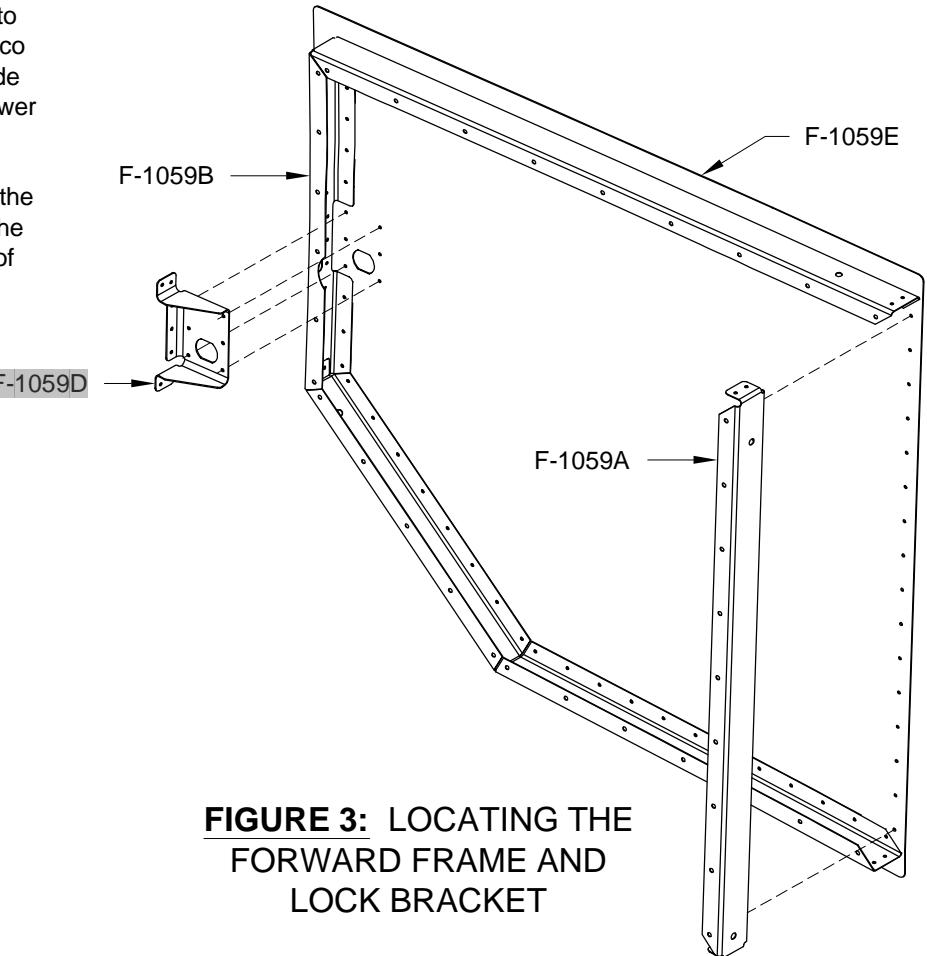
Step 4: Cleco the F-1059C Lower Frame to the F-1059E Skin as shown in Figure 2. Cleco the tab on the lower frame to the inside (between the flanges) surface of the F-1059B Upper Frame web.



**FIGURE 2: LOCATING THE LOWER FRAME**

Step 5: Cleco the F-1059A Forward Frame to the F-1059E Skin as shown in Figure 3. Cleco the end tabs of the forward frame to the inside surface of the F-1059B and C Upper and Lower Frame webs.

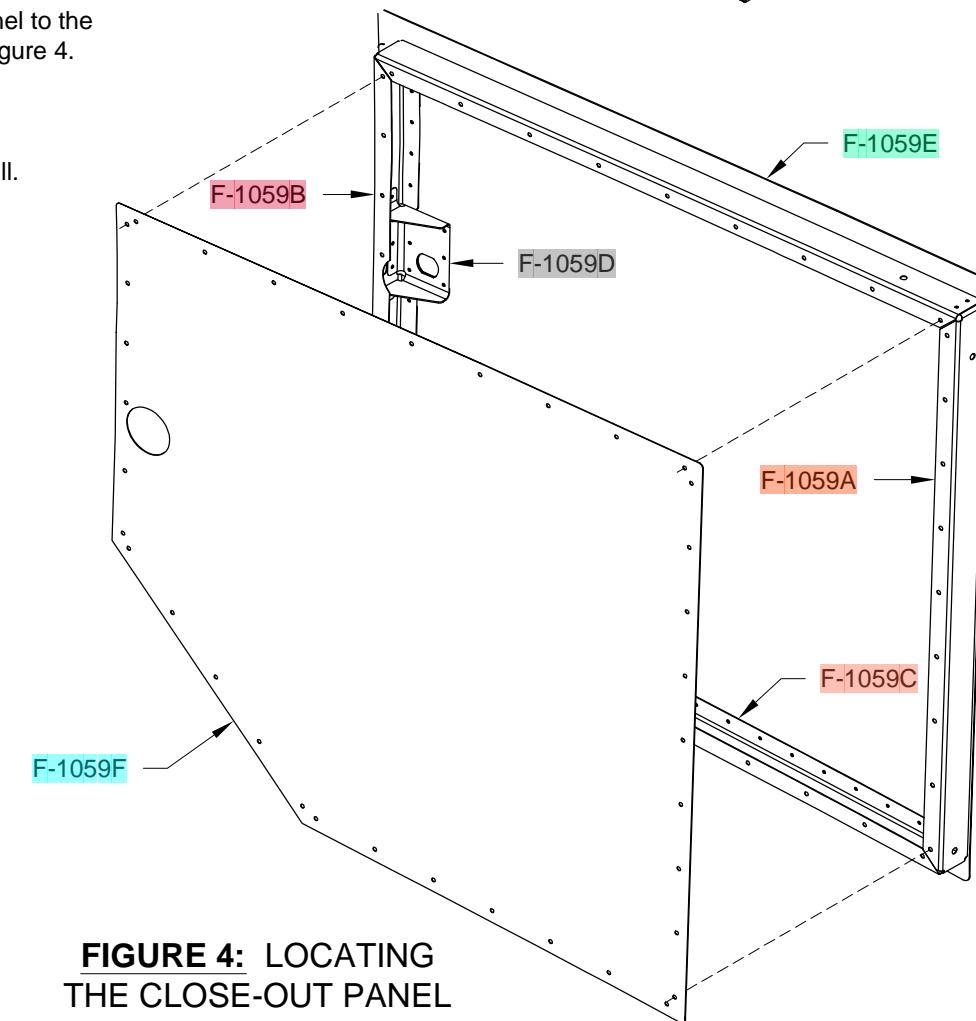
Step 6: Cleco the F-1059D Lock Bracket to the F-1059E Skin as shown in Figure 3. Cleco the three flanges of the lock bracket to the web of the F-1059B Upper Frame.



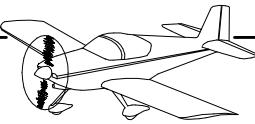
**FIGURE 3: LOCATING THE FORWARD FRAME AND LOCK BRACKET**

Step 7: Cleco the F-1059F Close-Out Panel to the F-1059A, B, and C Frames as shown in Figure 4.

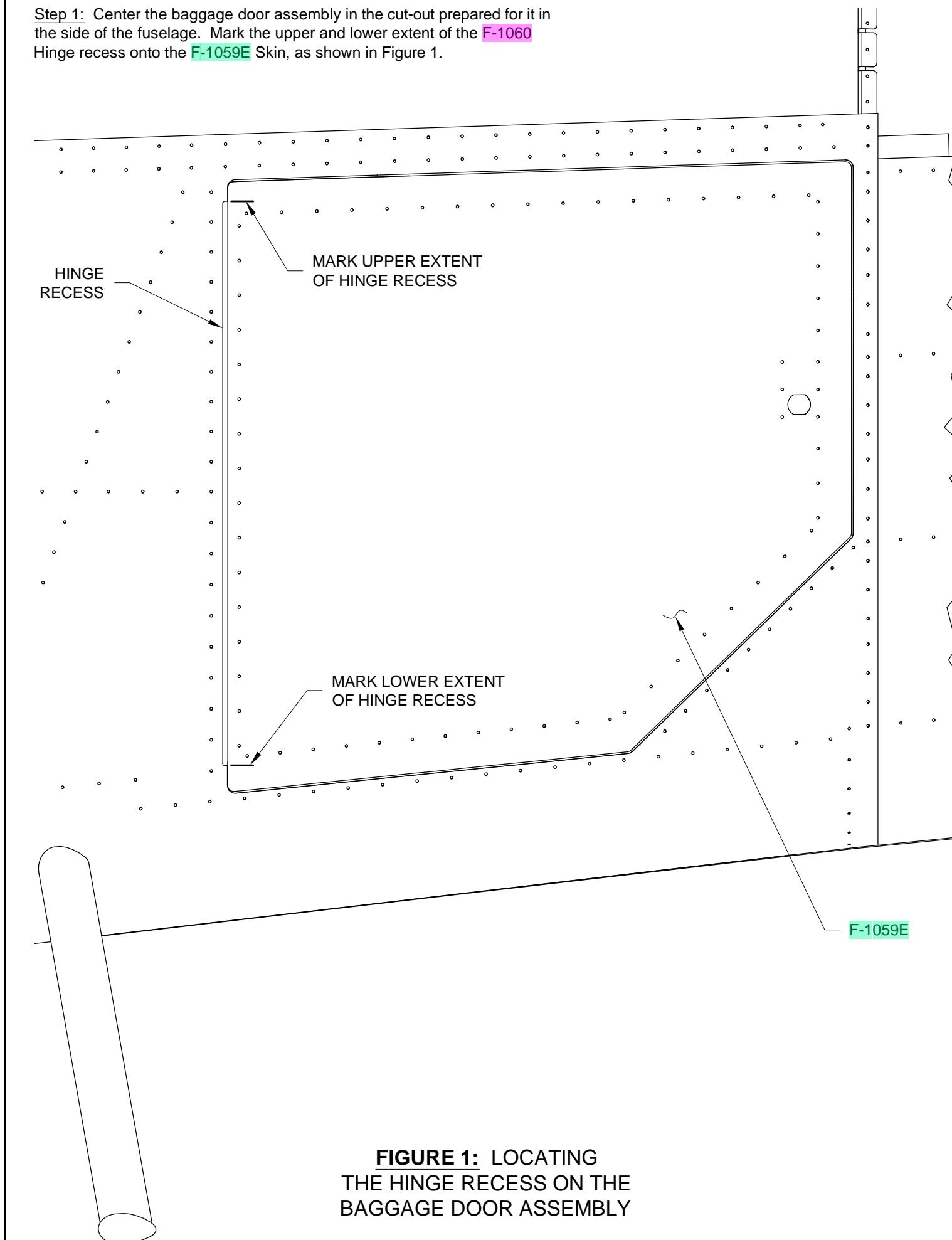
Step 8: Final-Drill the 1/8" holes common to the F-1059F Close-Out Panel and the F-1059A, B, and C Frames using a #30 drill. Final-Drill the remaining 3/32" holes of all the parts using a #40 drill.



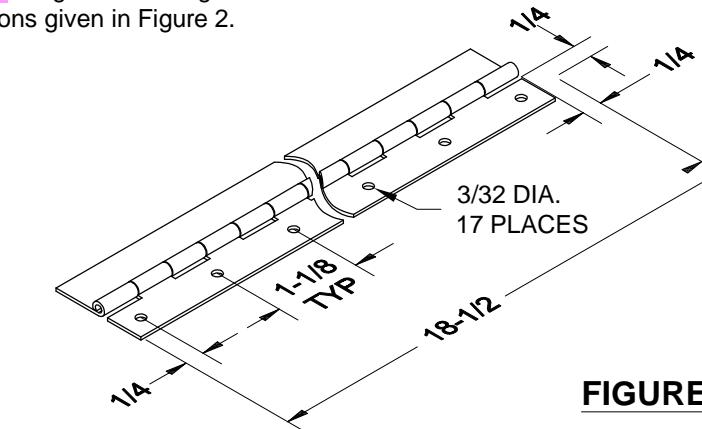
**FIGURE 4: LOCATING THE CLOSE-OUT PANEL**



Step 1: Center the baggage door assembly in the cut-out prepared for it in the side of the fuselage. Mark the upper and lower extent of the F-1060 Hinge recess onto the F-1059E Skin, as shown in Figure 1.



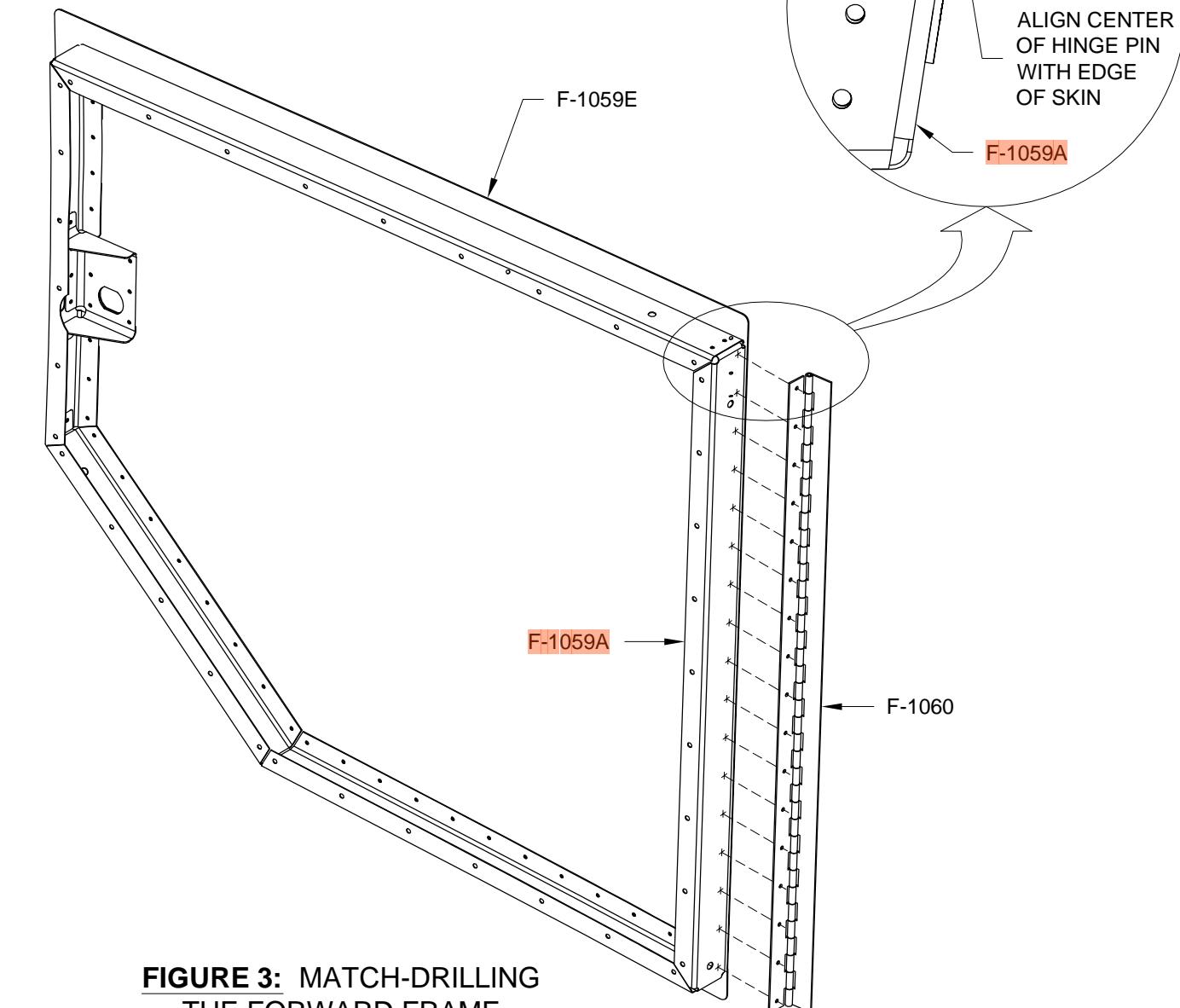
Step 2: Make the F-1060 Hinge from a length of AN257-P3 according to the dimensions given in Figure 2.

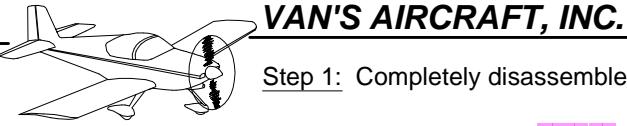


**FIGURE 2: F-1060 HINGE**

Step 3: Remove the F-1059F Close-Out Panel from the baggage door assembly.

Step 4: Place the F-1060 Hinge on the F-1059A Forward Frame, not more than 1/16" above the lower mark made in Step 1. With the center of the hinge-pin aligned with the edge of the F-1059E Skin, as shown in the blow-up of Figure 3, match-drill all the 3/32" holes of the hinge into the forward frame using a #40 drill. (Make sure there is at least a 0.025" gap between the hinge and the forward edge of the skin as shown in the blow-up. Trim the skin if necessary. The gap will prevent the skin from scraping paint off the hinge when the baggage door is opened and closed.)





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Step 1: Completely disassemble the baggage door assembly, and then deburr the holes in all of the parts.

Step 2: Machine countersink the holes in the F-1060 Hinge for the heads of AN426AD3 rivets.

Step 3: Dimple the #30 holes in the F-1059F Close-Out Panel and the corresponding holes in the underlying structure. Except for the #40 holes in the F-1059A Forward Frame which are common to the F-1060 Hinge, dimple all #40 holes in the remaining parts.

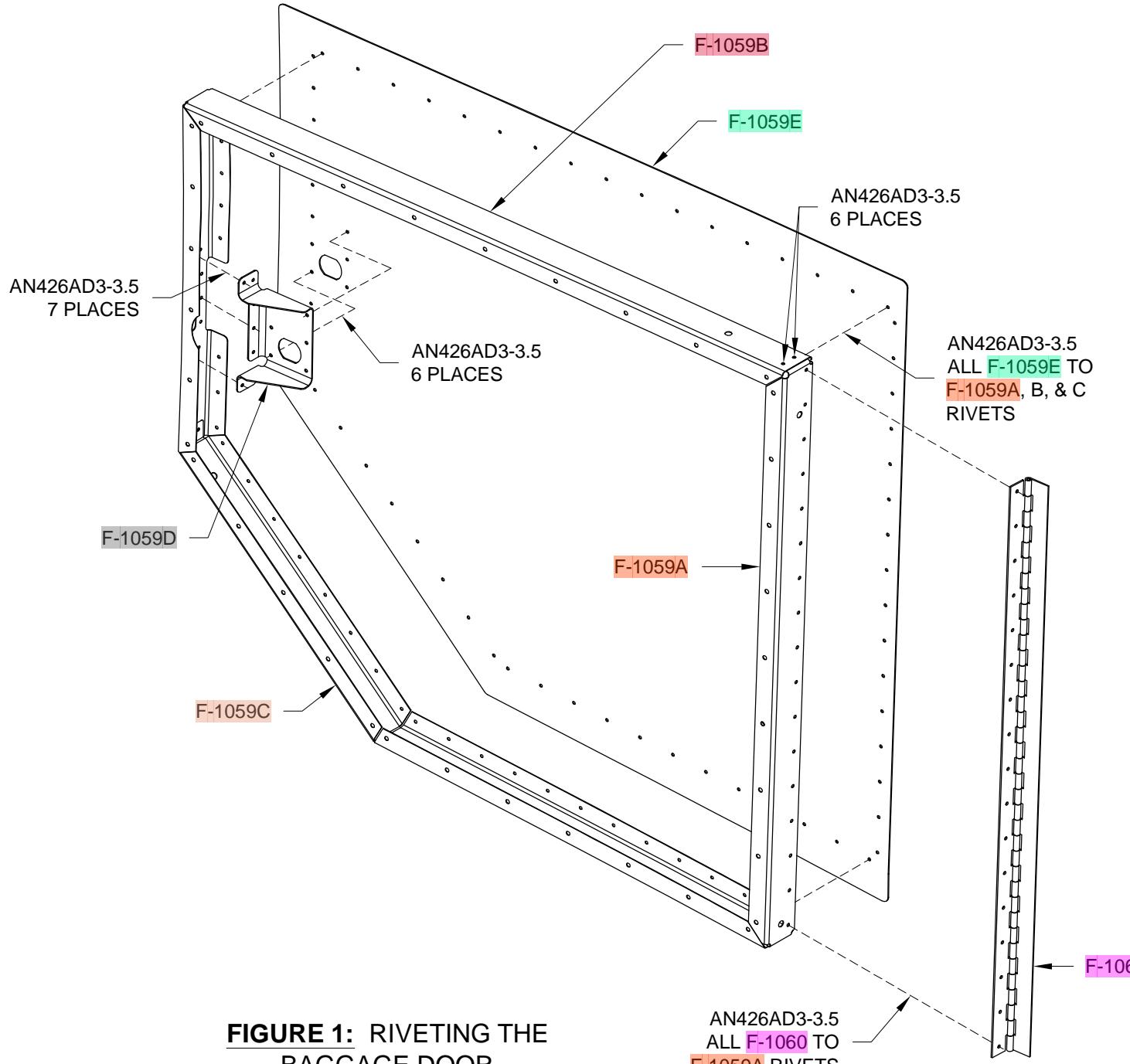
Step 4: Prime the parts if/as desired.

**NOTE:** Refer to Figure 1 for part number references and rivet call-outs required for Steps 5-7.

Step 5: Rivet the F-1060 Hinge to the F-1059A Forward Frame.

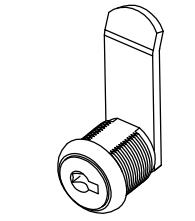
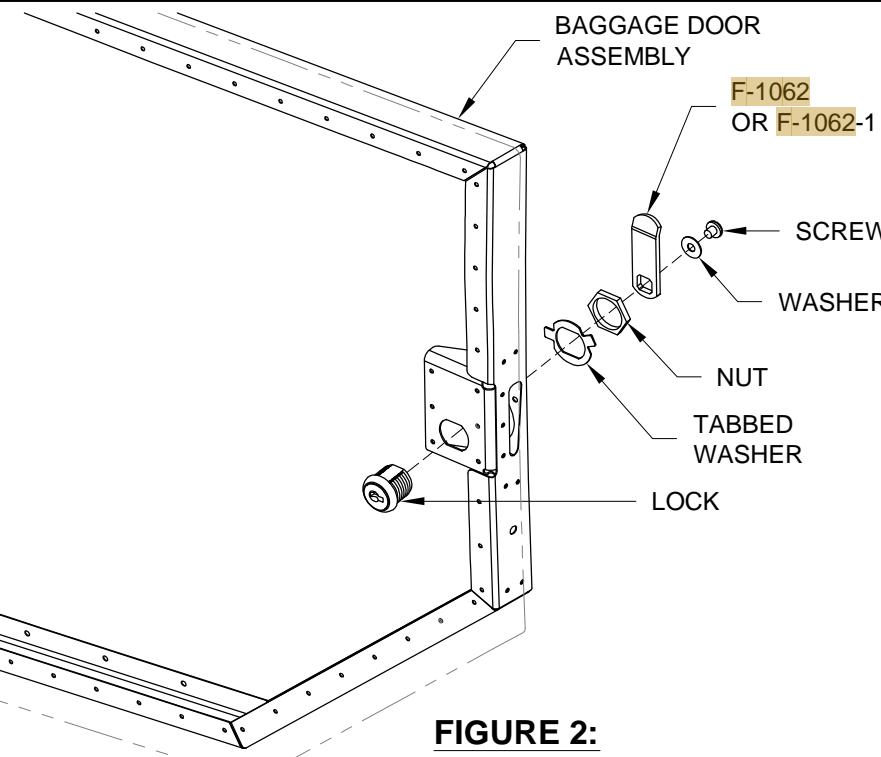
Step 6: Rivet the F-1059A, B, and C Frames to the F-1059E Skin and to each other.

Step 7: Rivet the F-1059D Lock Bracket to the F-1059E Skin and to the F-1059B Upper Frame.

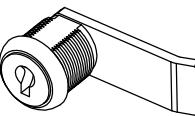


**FIGURE 1:** RIVETING THE  
BAGGAGE DOOR

Step 8: Install the Lock and the F-1062 Lock Latch as shown in Figure 2. (The lock and hardware, which is included with the ES A-510-2K Magneto Switch, is not supplied in the kit. They can be ordered from the Van's Accessories Catalog.) Be sure to install the lock in the Baggage Door Assembly so that a clockwise rotation of the key will lock the door as shown in Figures 3 and 4. Once the nut for the lock is tightened, bend up one of the tabs on the tabbed washer to prevent the nut from rotating. To prevent the screw from backing out, apply Locktite to the threads.



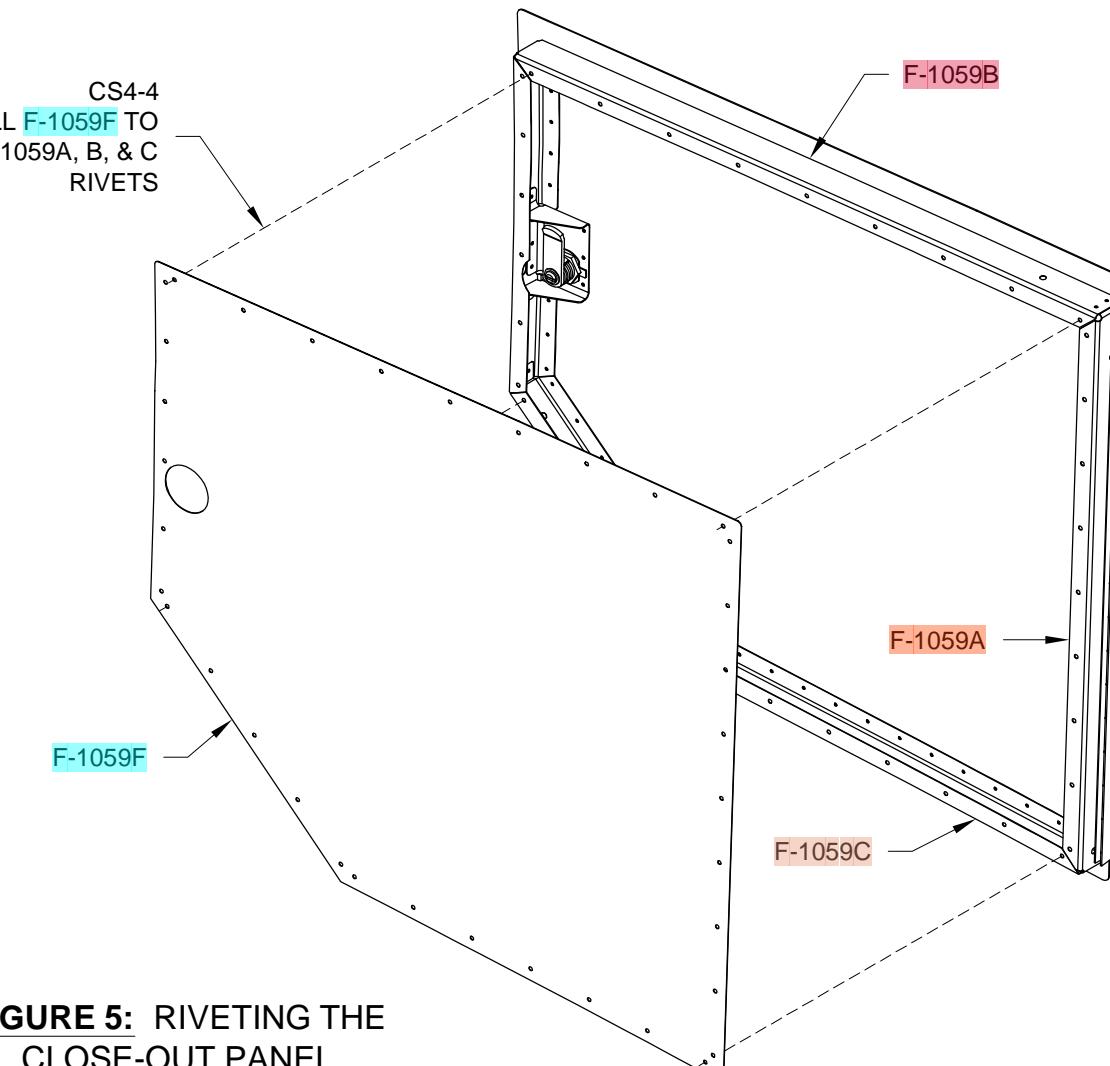
**FIGURE 3:**  
UNLOCKED  
POSITION



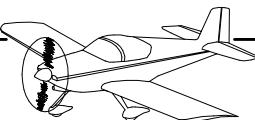
**FIGURE 4:**  
LOCKED  
POSITION

**FIGURE 2:**  
INSTALLING THE LOCK

Step 9: Rivet the F-1059F Close-Out Panel to the F-1059A, B, and C Frames using the rivets called-out in Figure 5.



**FIGURE 5:** RIVETING THE  
CLOSE-OUT PANEL

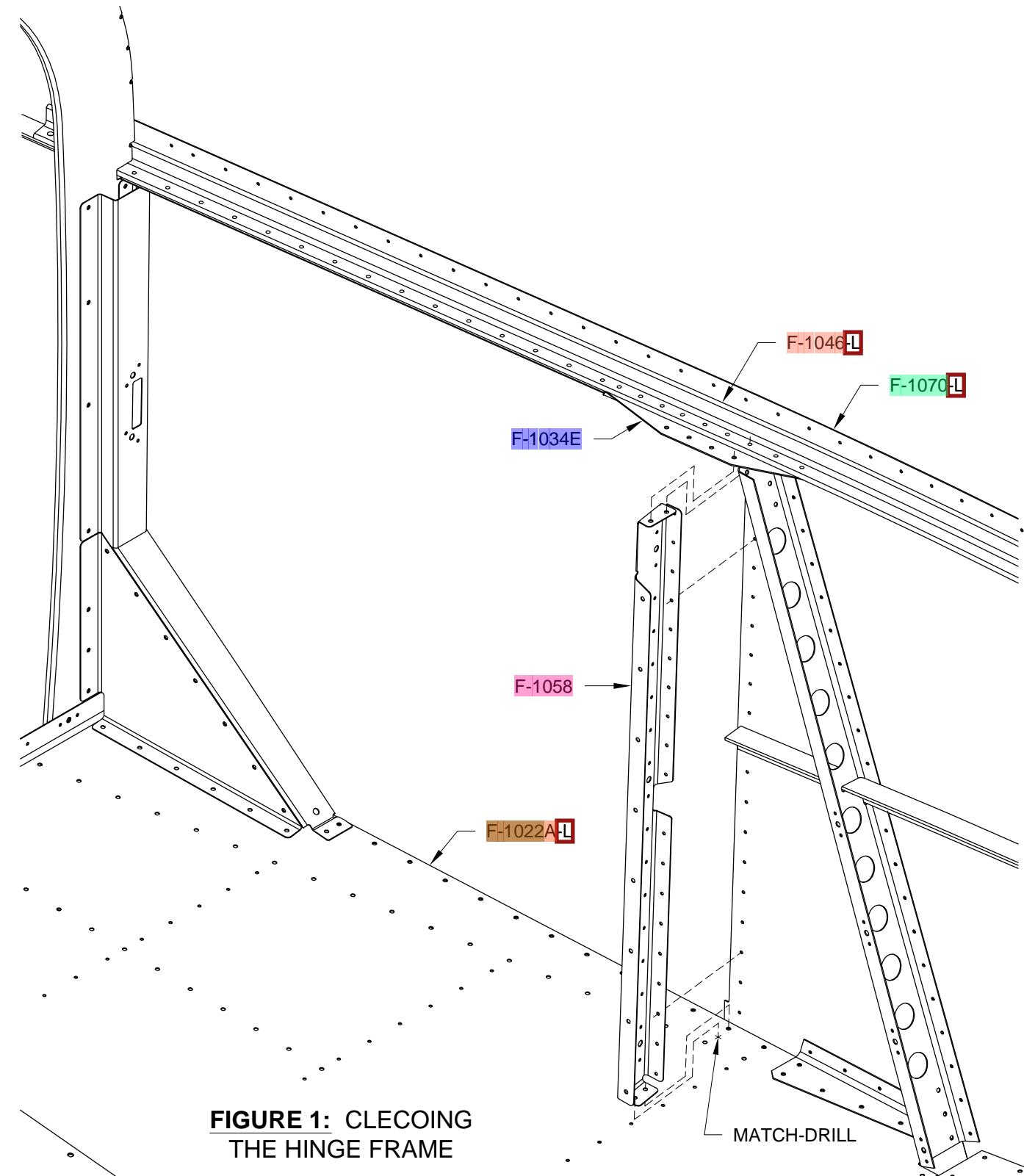


Step 1: Final-Drill #40 the holes in the F-1058 Hinge Frame which are common to the F-1070-L Mid Side Skin. Dimple these holes.

Step 2: As shown in Figure 1, cleco the side flange of the F-1058 Hinge Frame to the F-1070-L Mid Side Skin. Cleco the top flange to the F-1034E Seatback Brace Gusset, the F-1034B Seatback Brace (not shown), and the F-1046-L Mid Fuse Longeron. Cleco the outboard hole in the bottom flange to the F-1022A-L Baggage Floor.

Step 3: Match-Drill #30 the inboard hole in the bottom flange of the F-1058 Hinge Frame into the F-1022A-L Baggage Floor, cleco this hole, then final-drill #30 the outboard hole.

Step 4: Final-Drill #30 the holes in all the parts common to the two holes in the top flange of the F-1058 Hinge bracket.



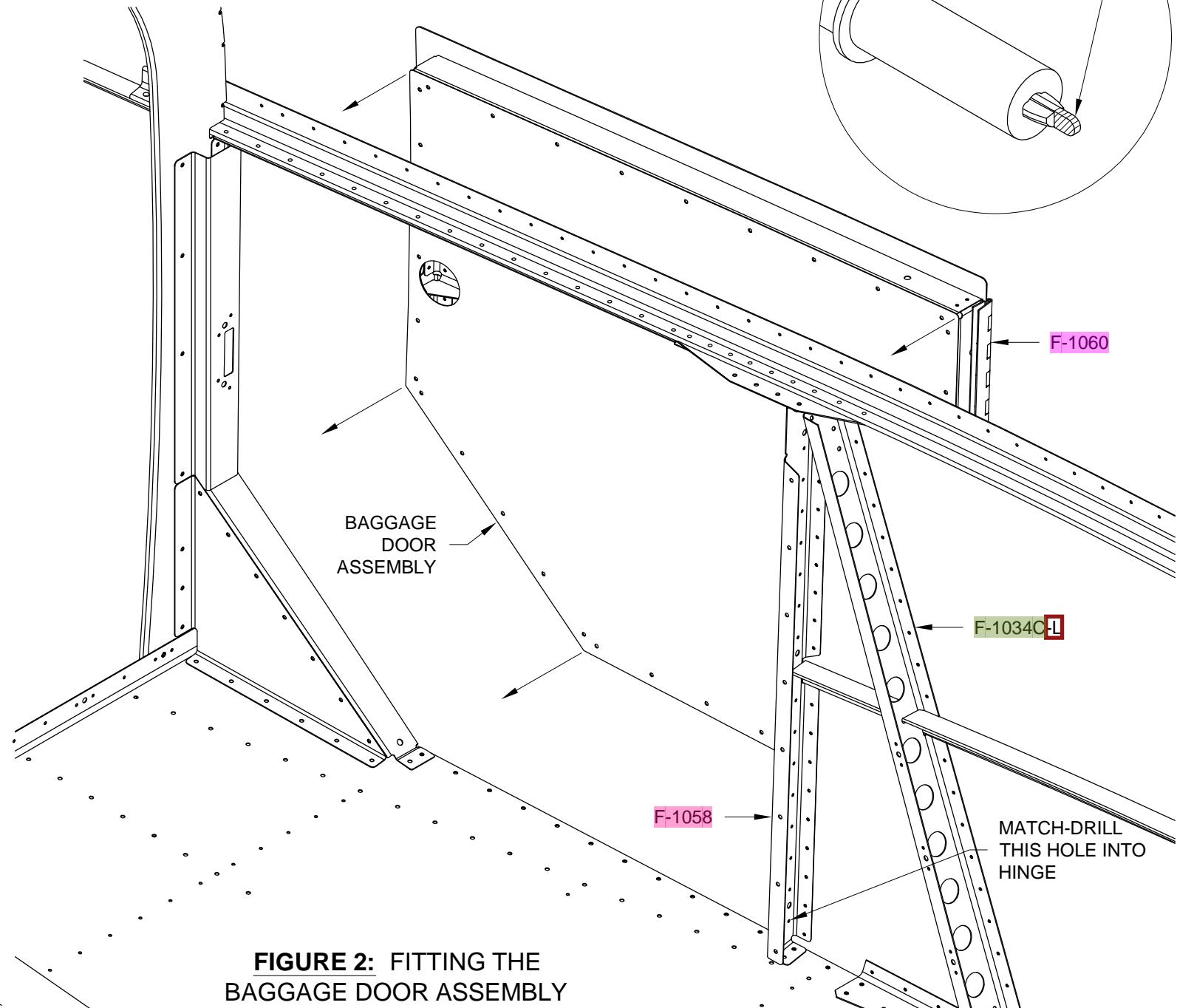
Step 5: Place the Baggage Door Assembly in the fuselage cut-out as shown in Figure 2 (for clarity, the F-1034B Seatback Brace is not shown).

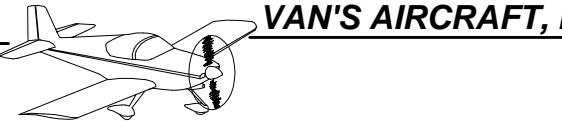
With the F-1060 Hinge against the F-1058 Hinge Frame, center the baggage door vertically in the fuselage cut-out. If the hinge interferes with the F-1070-L Mid Side Skin, the ends of the hinge can be filed until it clears.

Flush the baggage door with the outside of the fuselage. Duct tape can be used to hold the door in position, and use .063" shims to fill the gap between the door skin and underlying structure. There is a .035" gap between the eyelets of the two hinge-halves. Slide the forward (free) hinge-half up the hinge pin to remove the gap, then tape it in place. This will prevent a .035" drop in the position of the baggage door when it is riveted in place.

Step 6: With a grinder or belt sander, remove the excess blade from two clecos as shown in the cleco detail of Figure 2.

Step 7: Using an angle drill, match-drill #40 the bottom most hole of the F-1058 Hinge Frame into the F-1060 Hinge. (Use a wedge between the two legs of the hinge to keep the forward leg against the hinge frame while drilling.) Cleco this hole, using one of the modified clecos from Step 6, then match-drill a second hole as close as possible to the other end of the hinge while keeping the angle drill clear of the F-1034C-L Fuselage Bulkhead. Cleco this hole with the second modified cleco, and recheck the alignment of the door.



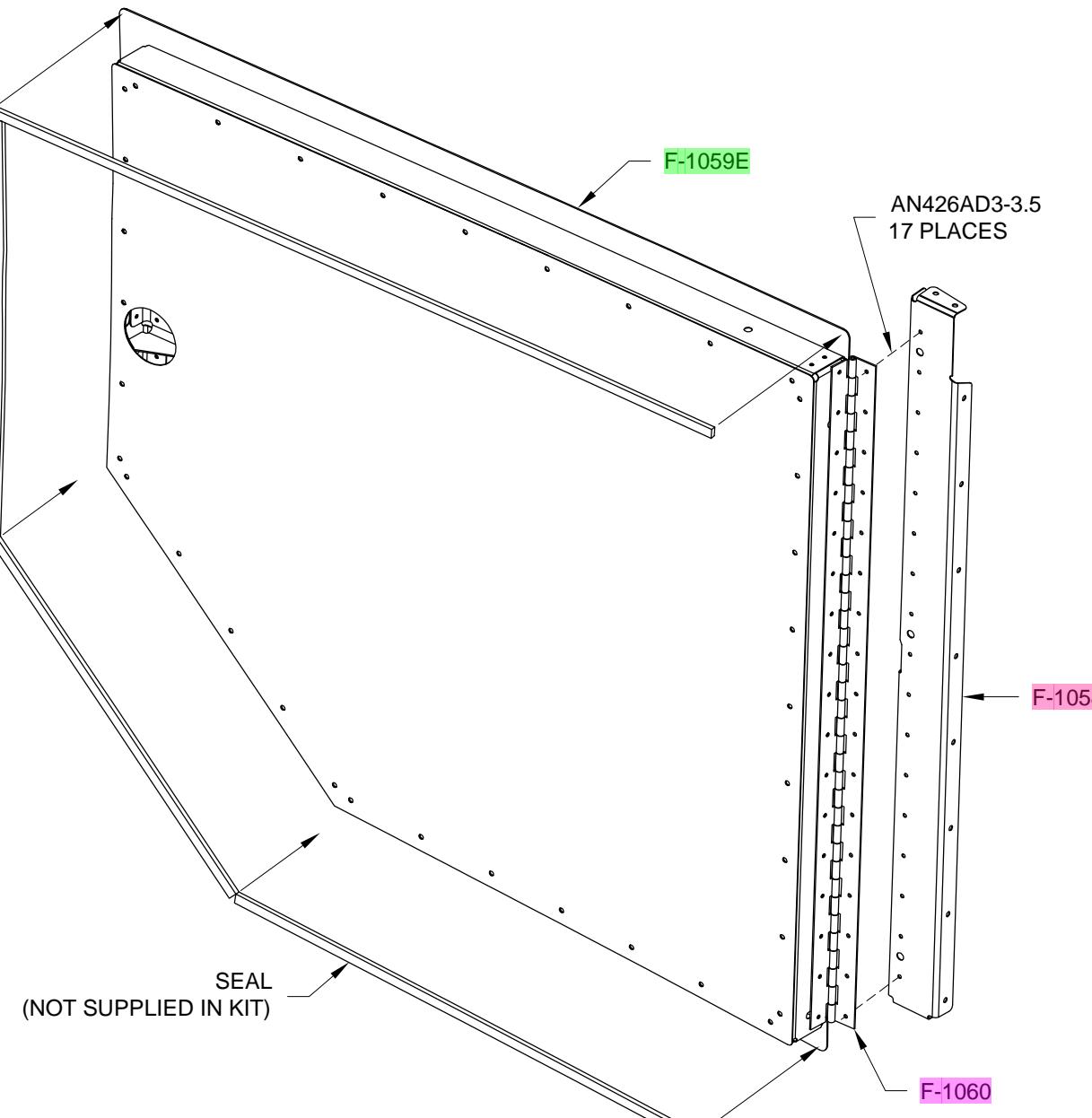


Step 1: Remove the Baggage Door Assembly and the F-1058 Hinge Frame from the fuselage. Cleco the hinge frame to the F-1060 Hinge using the two holes drilled on Page 34-5, Step 7, then match-drill #40 the remaining holes of the hinge frame into the hinge. Deburr the holes of both parts.

Step 2: Machine countersink the hinge for the heads of AN426AD3 rivets.

Step 3: Rivet the F-1060 Hinge to the F-1058 Hinge Frame using the rivets called-out in Figure 1.

Step 4: Attach 1/8" thick x 1/4" wide seal material (door and window weather strip tape can be used) to the F-1059E Skin about an 1/8" from the edges of the skin as shown in Figure 1.

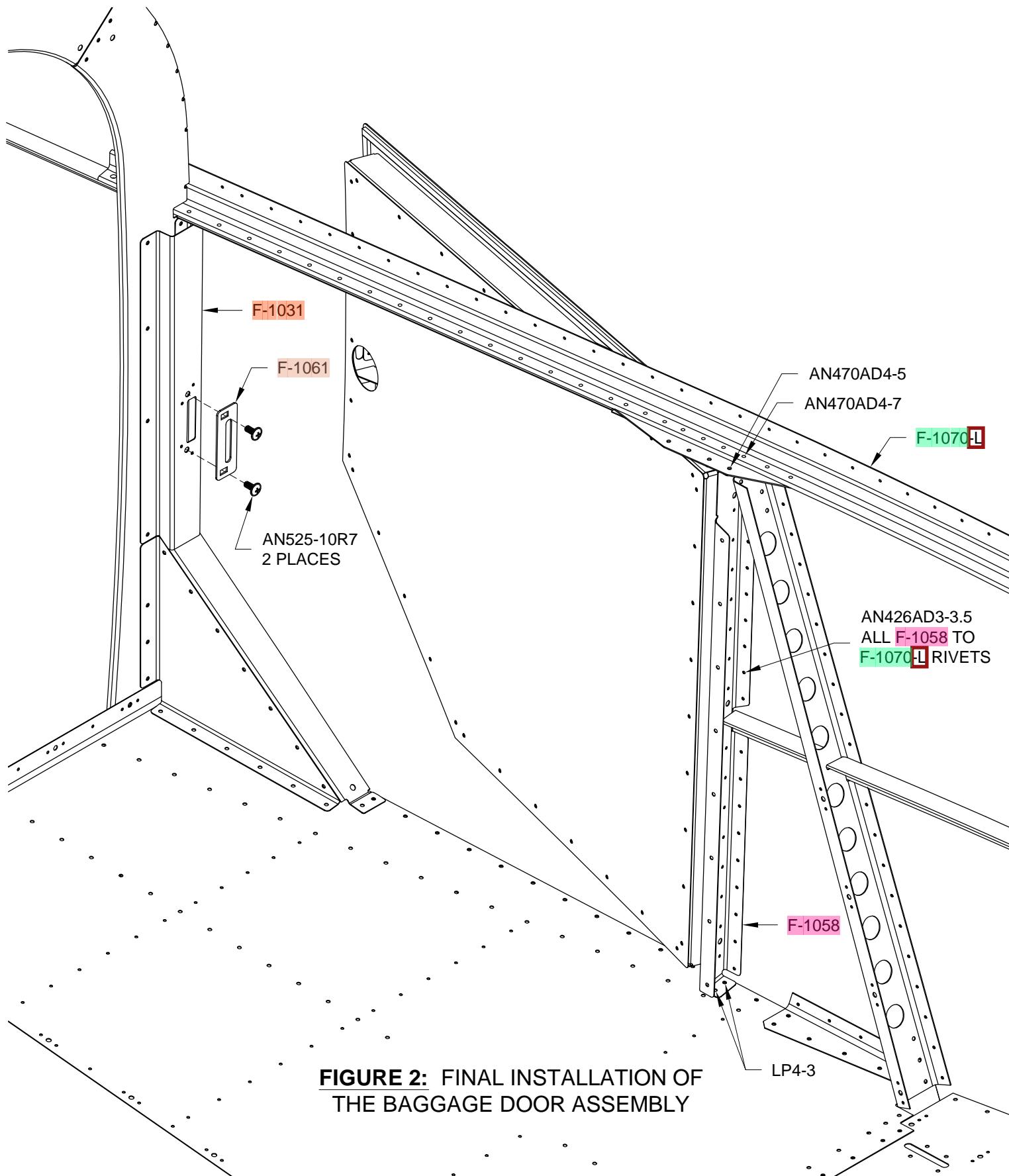


**FIGURE 1: ATTACHING THE HINGE FRAME AND SEAL**

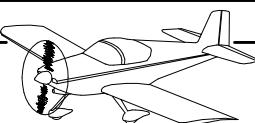
Step 5: Separate the F-1058 Hinge Frame from the baggage door assembly by removing the hinge pin, then rivet the hinge frame to the fuselage using the rivets called-out in Figure 2 (the F-1034B Seatback Brace is not shown).

Step 6: Attach the Baggage Door Assembly to the F-1058 Hinge Frame by reinstalling the hinge pin.

Step 7: Attach the F-1061 Striker Plate to the F-1031 Upper Baggage Door Seal Channel using the hardware shown in Figure 2. Adjust the striker plate as needed to flush the aft end of the Baggage Door Assembly with the fuselage when the door is closed and locked.



**FIGURE 2: FINAL INSTALLATION OF THE BAGGAGE DOOR ASSEMBLY**



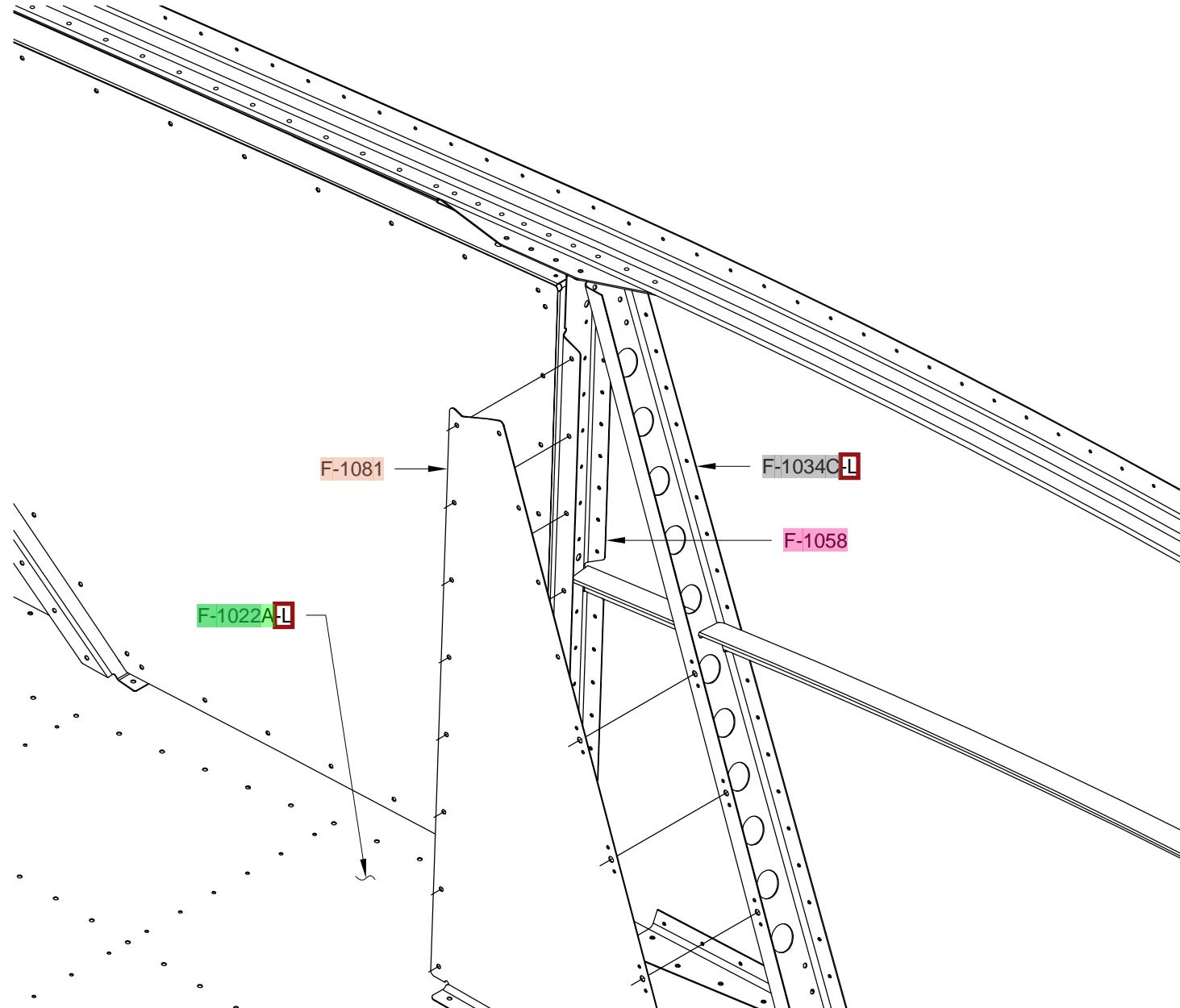
Step 1: Cleco the F-1081 Left Baggage Cover to the F-1034C-L Fuselage Bulkhead and the F-1058 Hinge Frame as shown in Figure 1.

Step 2: Match-Drill #30 the four 1/8" holes in the top of the F-1081 Left Baggage Cover into the F-1034C-L Fuselage Bulkhead, and the three 1/8" holes in the flange of the left baggage cover into the F-1022A-L Baggage Floor.

Final-Drill #30 the holes common to the left baggage cover and the F-1058 Hinge Frame.

Final-Drill #40 the nutplate attachment rivet holes common to the left baggage cover and the fuselage bulkhead.

Step 3: Remove the F-1081 Left Baggage Cover, deburr the holes in all associated parts, then dimple the #40 holes in the left baggage cover and the F-1034C-L Fuselage Bulkhead.

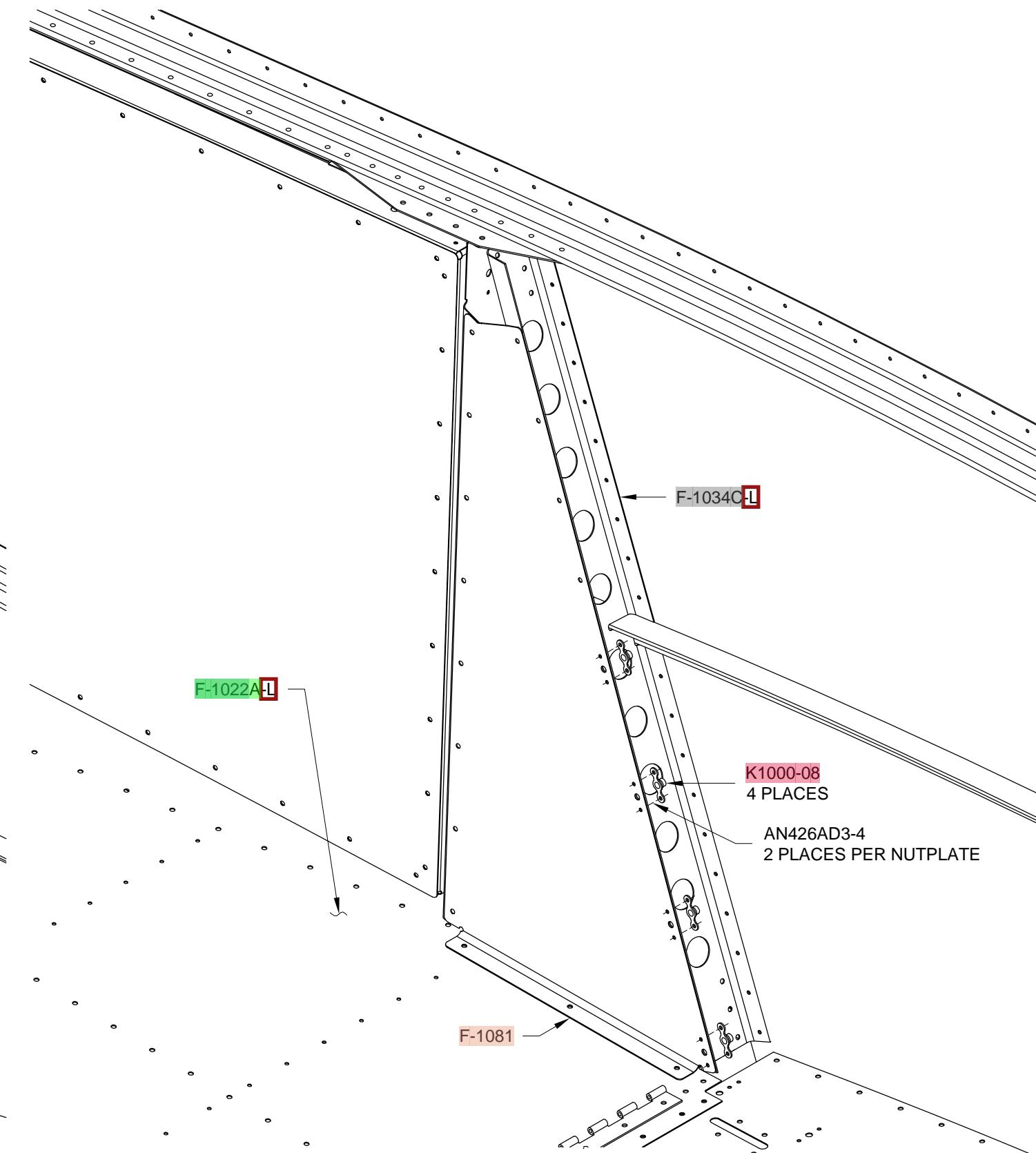


**FIGURE 1: CLECOING THE LEFT  
BAGGAGE COVER**

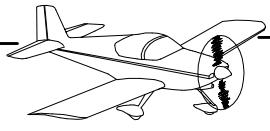
Step 4: Rivet the F-1081 Left Baggage Cover to the F-1058 Hinge Frame and F-1022A-L Baggage Floor using LP4-3 blind rivets.

Rivet the top half of the left baggage cover to the F-1034C-L Fuselage Bulkhead using AN470AD4-4 rivets.

Step 5: Rivet the nutplates called-out in Figure 2 to the F-1034C-L Fuselage Bulkhead and the F-1081 Left Baggage Cover.

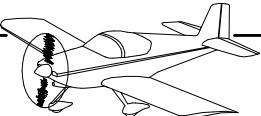


**FIGURE 2: RIVETING THE LEFT  
BAGGAGE COVER**

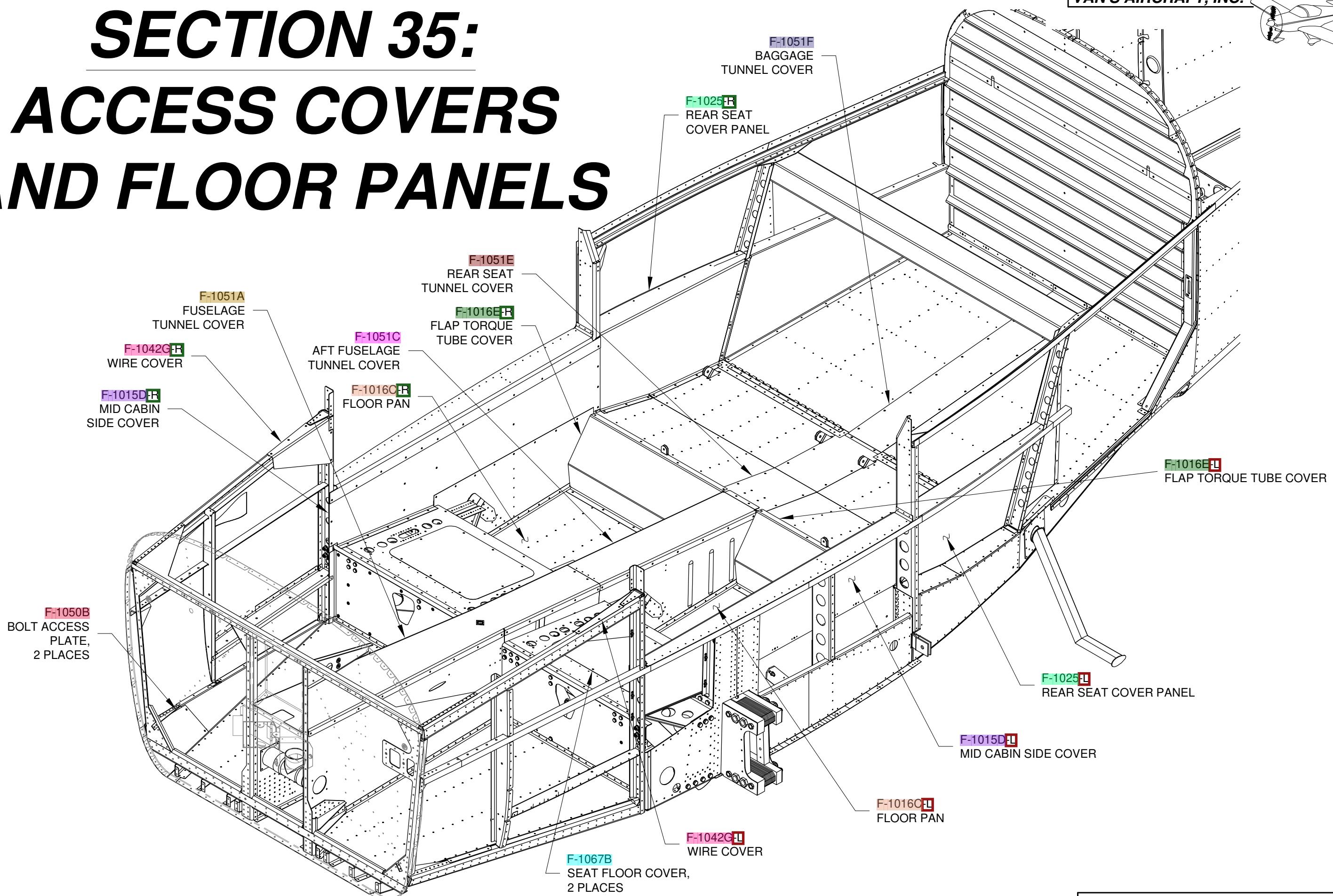


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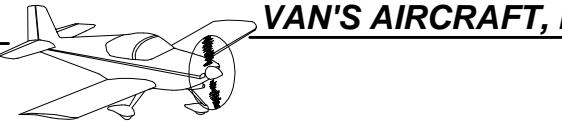
# SECTION 35: ACCESS COVERS AND FLOOR PANELS



DATE OF COMPLETION: \_\_\_\_\_

PARTICIPANTS: \_\_\_\_\_

DATE 01/07/21 REVISION: 2 RV-10 PAGE: 35-1

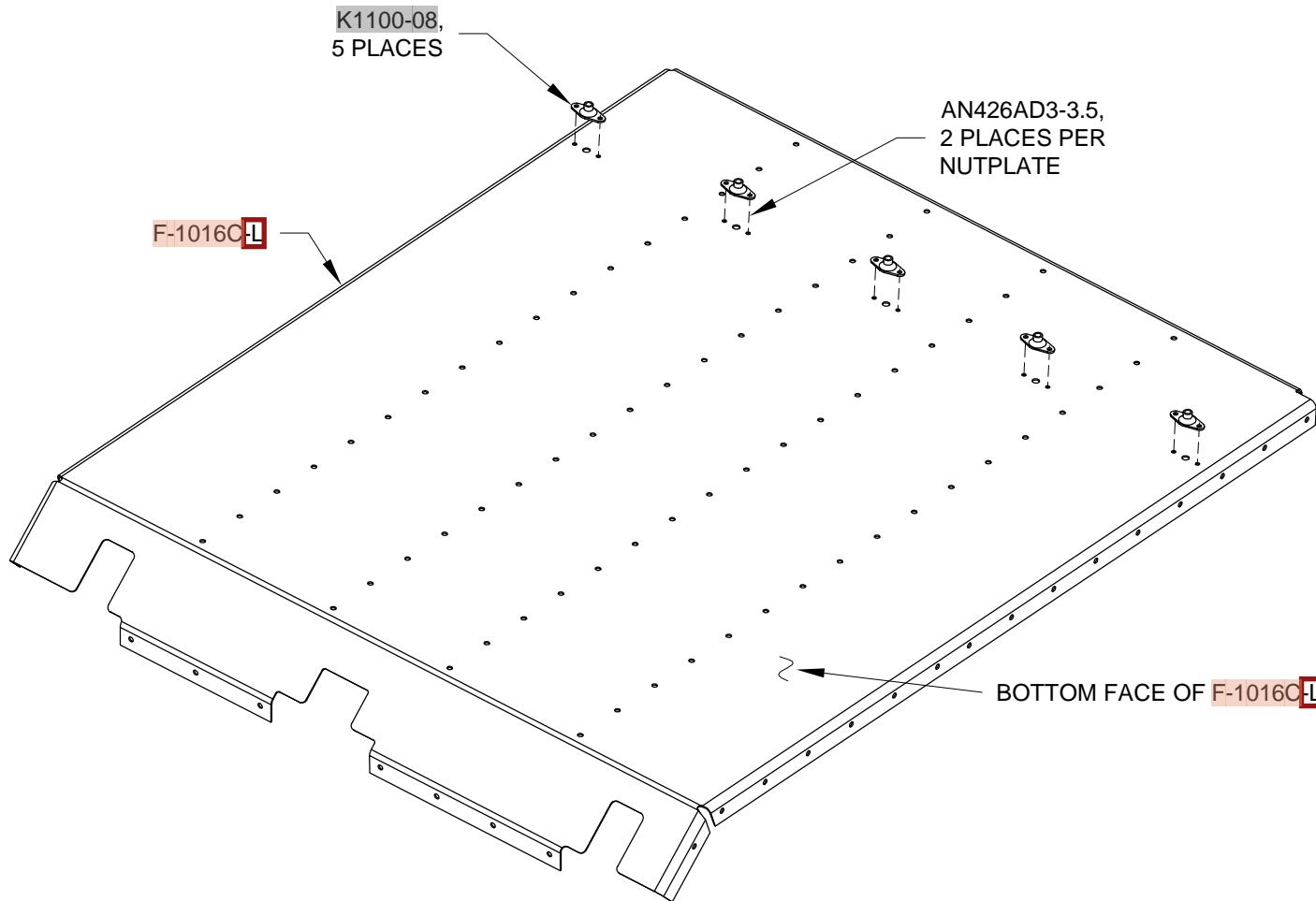


**NOTE:** The instructions on this page show how to install the F-1016C-L Floor Pan. The right installation is a mirror of the left.

**Step 1 (Standard Kit):** Force the F-1016-L Outbd Foot Well Rib and the F-1016F-L Inbd Foot Well Rib apart slightly then insert and cleco the F-1016C-L Floor Pan in place. See Figure 2. Final-Drill #30 the holes common between the outbd and inbd foot well ribs and the floor pan. Final-Drill #30 the holes common between the F-1005A Rear Spar Bulkhead and the floor pan. Match-Drill #30 the holes in the forward flanges of the floor pan into the F-1004B Center Section Bulkhead.

**Step 2 (Standard Kit):** Final-Drill #19 the screw holes and Final-Drill #40 the corresponding nutplate attach holes in the bottom face of the F-1016C-L Floor Pan. Final-Drill #30 the remaining holes in the bottom face of the floor pan. See Figure 1.

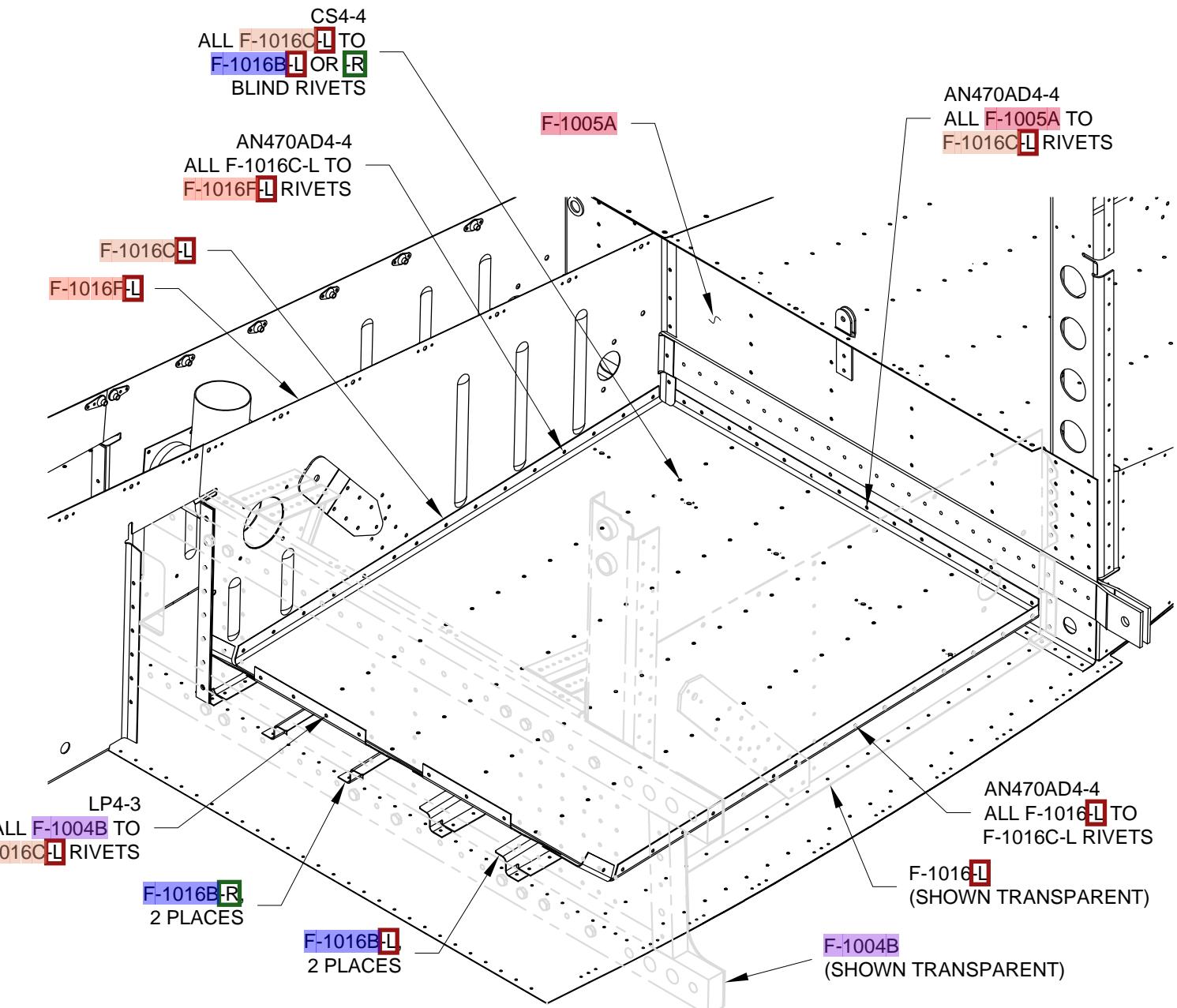
**Step 3 (Standard Kit):** Remove the F-1016C-L Floor Pan. Deburr the holes and edges of the floor pan and the holes drilled in the under structure in Step 2. Dimple all the rivet holes in the bottom face of the floor pan, see Figure 1. Dimple the screw holes in the bottom face of the floor pan for the head of an #8 screw (flush face on top side). Prime the floor pan if desired. Dimple the nutplates.



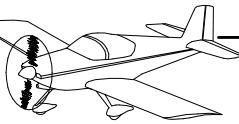
**FIGURE 1: FLOOR PAN NUTPLATE INSTALLATION**

**Step 4 (Standard Kit):** Rivet the five nutplates to the bottom side of the F-1016-L Floor Pan per the callouts in Figure 1.

**Step 5 (Standard & Quick Build Kit):** Cleco the F-1016C-L Floor Pan in place then rivet the floor pan to the F-1016-L Outbd Foot Well Rib, F-1016F-L Inbd Foot Well Rib, F-1005A Rear Spar Bulkhead, and F-1004B Center Section Bulkhead per the callouts in Figure 2. Blind Rivet the floor pan to the F-1016B-L and F-R Floor Stiffeners per the callouts in Figure 2.



**FIGURE 2: FLOOR PAN INSTALLATION**

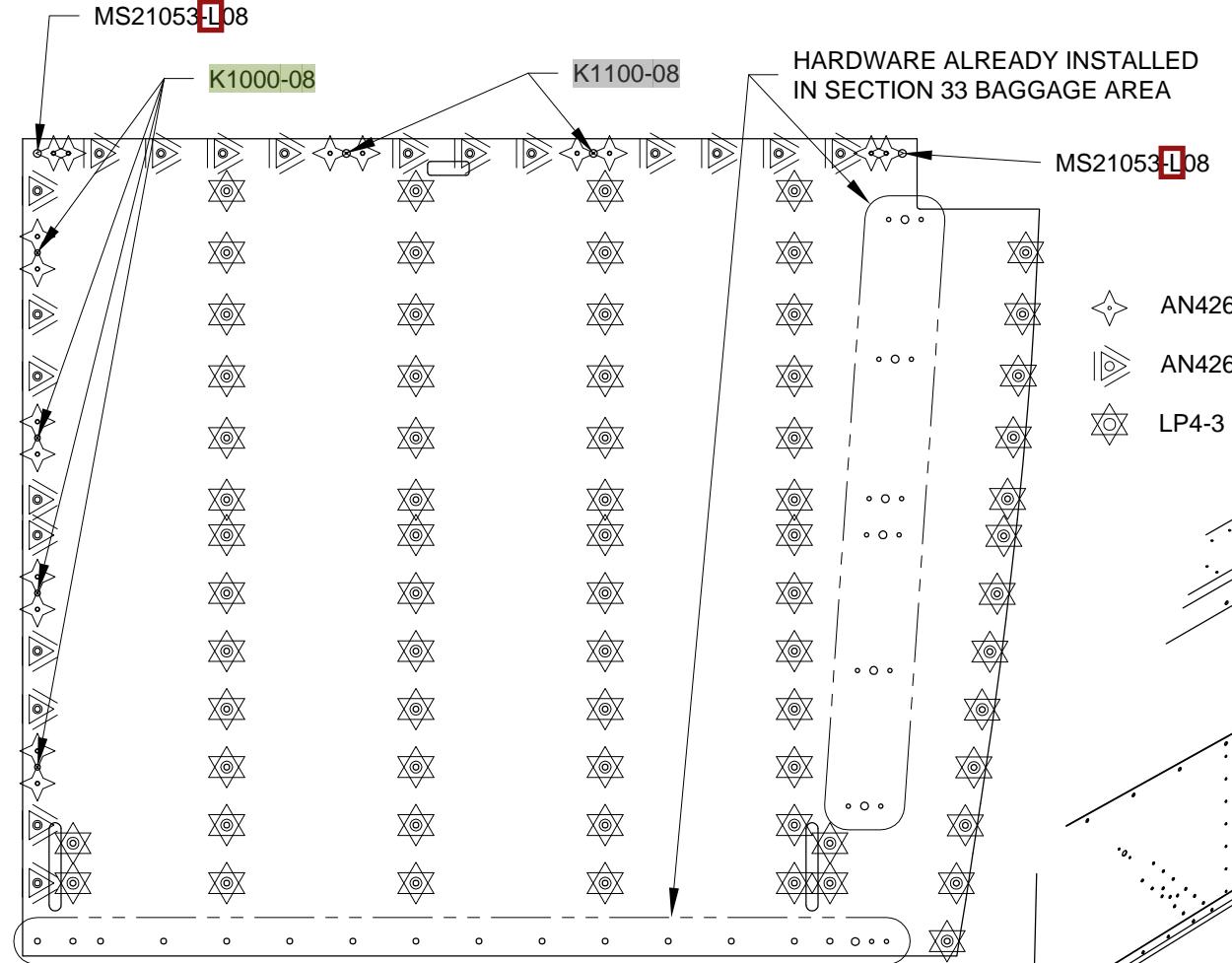


**NOTE:** Even though callouts in this section show how to completely install various access covers throughout the fuselage, none should be permanently installed at this time to allow access for systems installations. The access covers are fitted at this time so that upon completion of this section the interior of the fuselage will be ready to paint.

**NOTE:** Before starting this section determine the rear seat head phone jack location, finish all wiring runs and antenna installations; **THIS MAY BE YOUR LAST CHANCE** to have access to several areas closed out in this section!!

Step 1 (Standard & Quickbuid Kits): Rivet the F-1024-L and F-1024-R Seat Floors and nutplates to the under structure using the rivet callouts given in Figure 1.

Step 2 (Standard Kit): Dimple two K1100-08 nutplates. Rivet these nutplates to the center upper flange of the F-1005A Rear Spar Bulkhead and two K1000-08 nutplates to the center upper flange of the F-1034A Fuselage Bulkhead as shown in the detail views in Figure 2.



**FIGURE 1: SEAT FLOOR RIVET KEY**

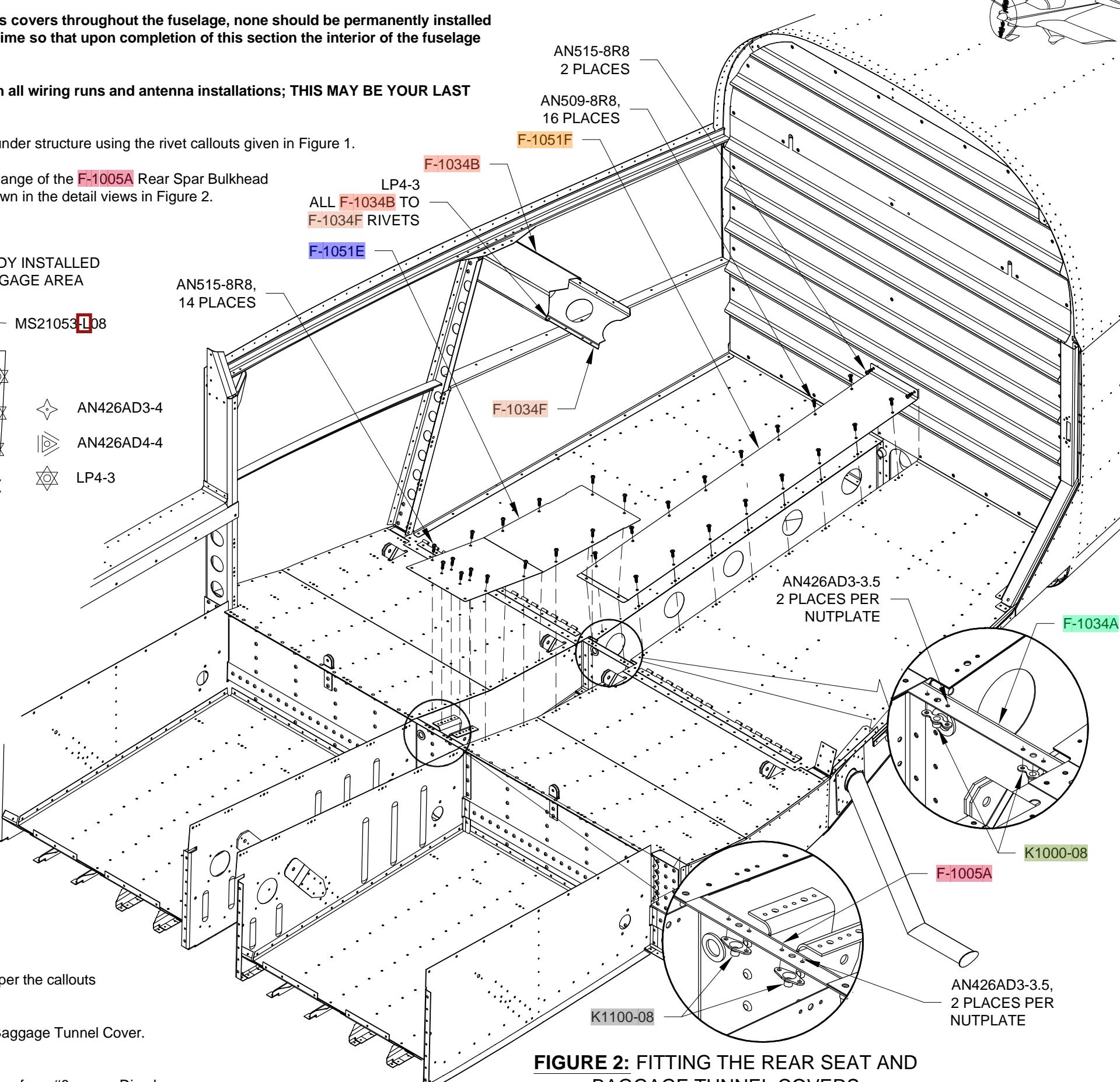
Step 3 (Standard Kit): Cleco the F-1034F Seat Back Brace Closeout to the F-1034B Seat Back Brace as shown in Figure 2. Final-Drill #30 the holes common between these two parts. Un-cleco, then deburr the holes and edges in the seat back brace closeout and the holes in the seat back brace. Prime the seat back brace closeout if desired.

**NOTE: Steps 4-6 are for both Standard and Quickbuid Kits.**

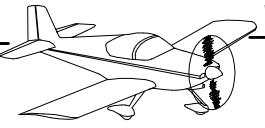
Step 4: Cleco then rivet the F-1034F Seat Back Brace Closeout to the F-1034B Seat Back Brace per the callouts in Figure 2.

Step 5: Final-Drill #19 all the screw holes in the F-1051E Rear Seat Tunnel Cover and F-1051F Baggage Tunnel Cover. Deburr the holes and edges in these covers. See Figure 2.

Step 6: Dimple the four screw holes along the forward edge of the F-1051E Rear Seat Tunnel Cover for a #8 screw. Dimple all the screw holes in the F-1051F Baggage Tunnel Cover for the head of an #8 screw except the two holes along the forward edge and the two holes in the aft flange. Prime covers if desired. See Figure 2.



**FIGURE 2: FITTING THE REAR SEAT AND BAGGAGE TUNNEL COVERS**



NOTE: This page is for the Standard Kit only! This page describes how to install the F-1025-R Rear Seat Cover Panel. The left installation is a mirror of the right.

Step 1: Final-Drill #19 all the screw holes in the lower flanges, forward flange, and aft flange of the F-1025-R Rear Seat Cover Panel.

Step 2: Deburr then dimple the lower three screw holes in the forward flange of the F-1025-R Rear Seat Cover Panel for the head of an #8 screw. See Figure 1.

Step 3: Install the F-1025-R Rear Seat Cover Panel using the hardware (except the upper flange hardware) called out in Figure 2.

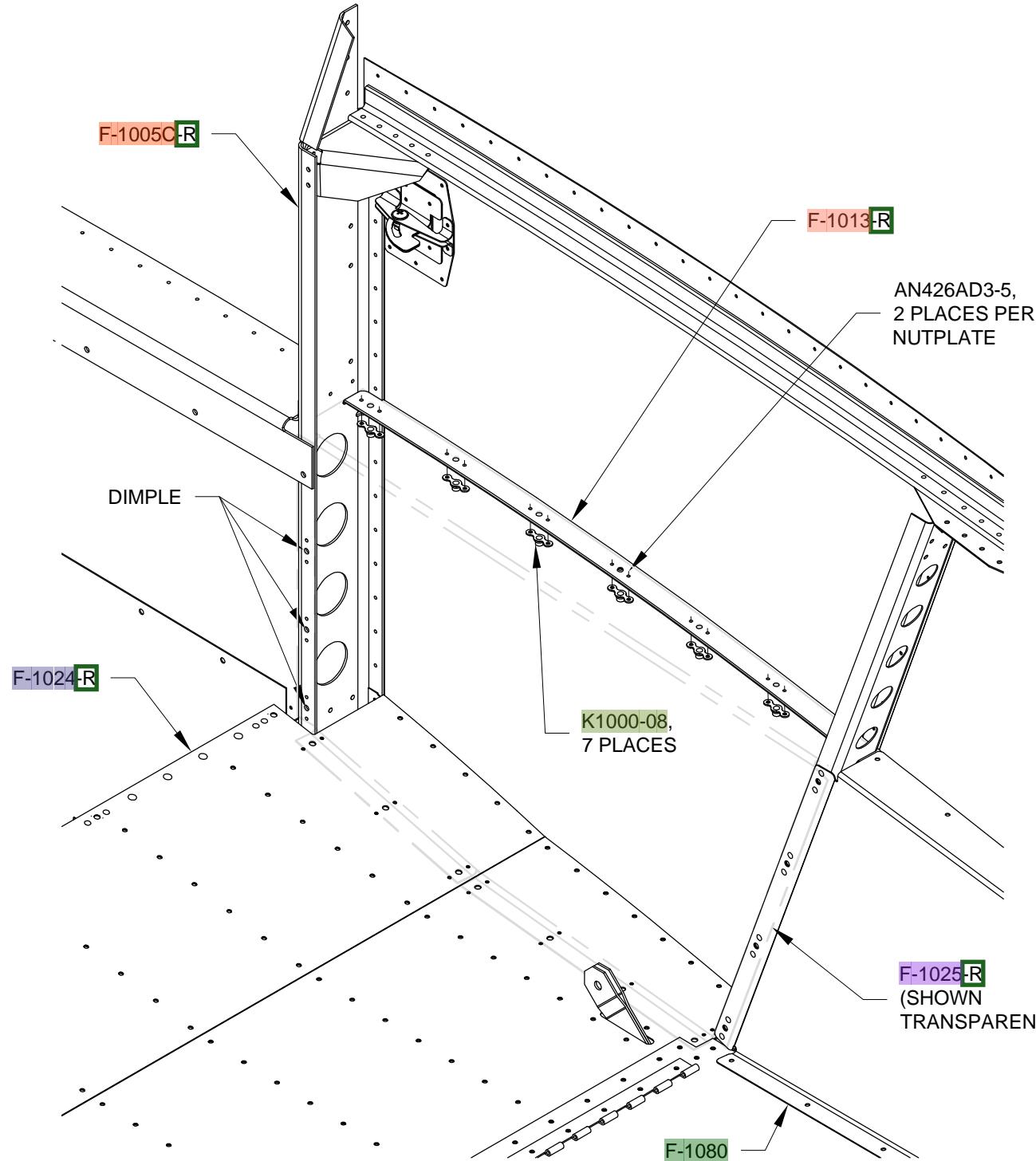
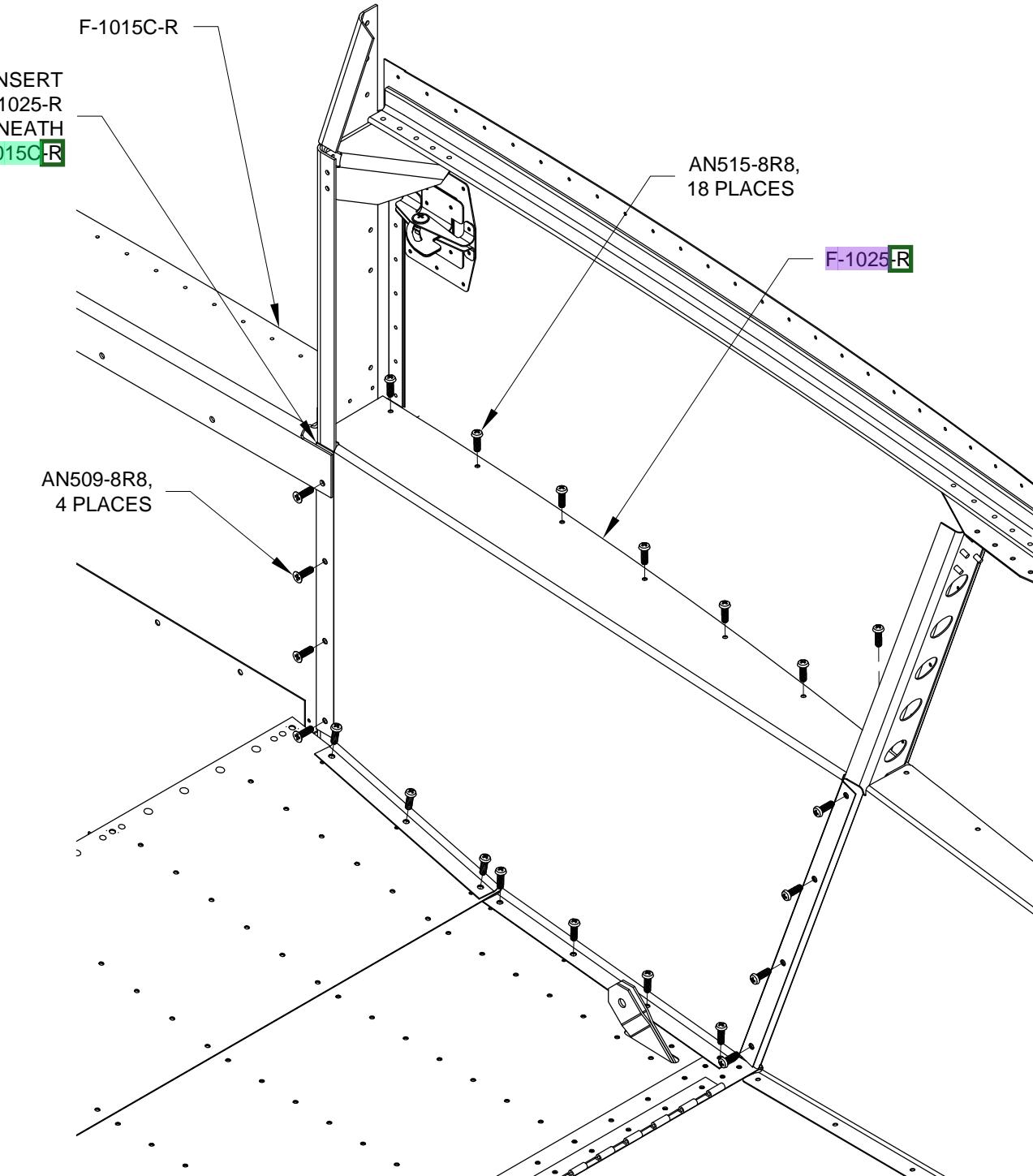


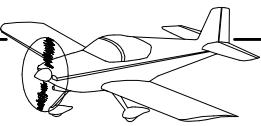
FIGURE 1: MATCH-DRILLING THE REAR SEAT COVER PANEL TO THE LONGERON

Step 4: Match-Drill #19 the screw holes in the upper flange of the F-1025-R Rear Seat Cover Panel into the F-1013-R Fwd Fuselage Longeron.

Step 5: Remove then deburr the holes and edges of the F-1025-R Rear Seat Cover Panel. Prime the rear seat cover panel if desired.

Step 6: Using a nutplate as a drill guide match-drill #40 the nutplate attach pattern into the F-1013-R Fwd Fuselage Longeron at each of the seven locations match-drilled in Step 4. Machine countersink these holes for the head of an AN426AD3 rivet on the upper side of the longeron. Deburr all the holes in the longeron drilled in this step and Step 4. Install nutplates to the longeron per the callouts in Figure 1.





**NOTE: Complete this page for both the Standard and Quickbuild Kits.**

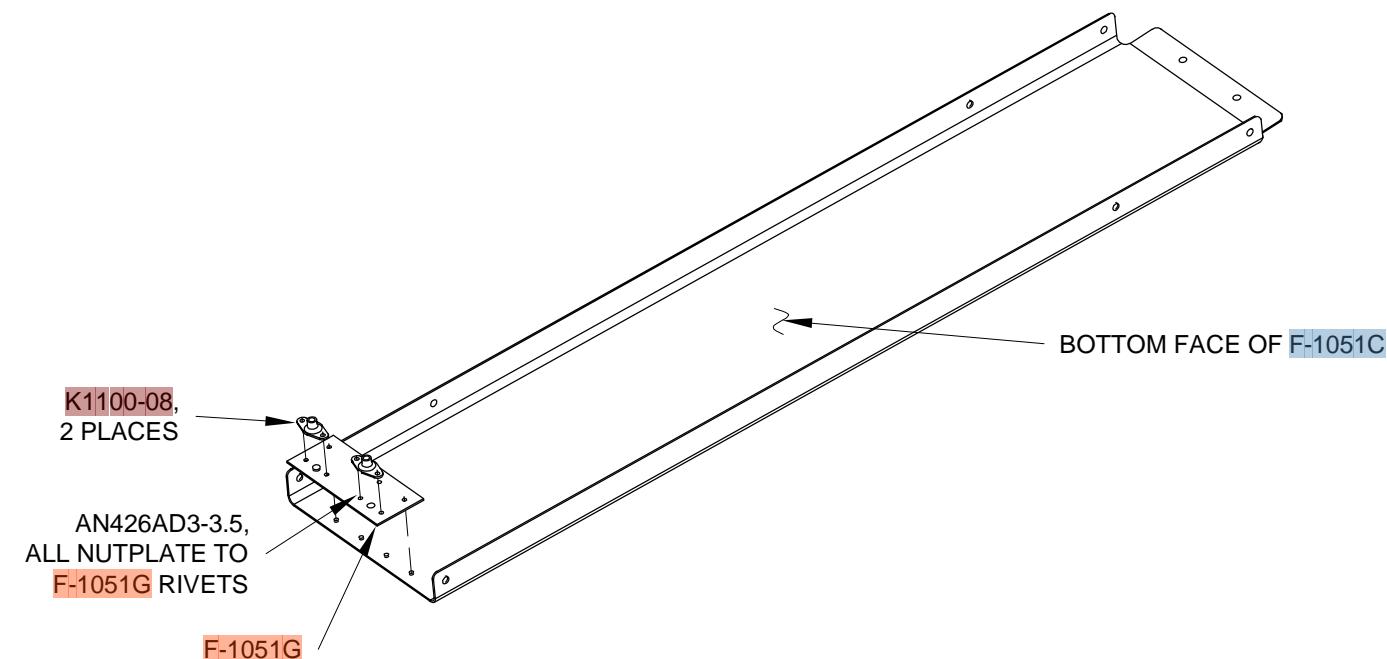
**Step 1:** Cleco the F-1051C Aft Fuselage Tunnel Cover and F-1051G Splice Plate together as shown in Figure 1.

**Step 2:** Final-Drill #40 the holes common between the parts clecoed together in Step 1 and both sets of nutplate attach holes along the forward edge of the F-1051G Splice Plate.

Final-Drill #19 both screw holes along the forward edge of the splice plate. Final-Drill #19 all the screw holes along the side and aft flanges of the F-1051C Aft Fuselage Tunnel Cover.

**Step 3:** Disassemble and deburr all parts. Dimple (flush head on top side) the rivet holes in all the parts. Dimple the screw holes in the F-1051C Aft Fuselage Tunnel Cover and the F-1051G Splice Plate for the head of an #8 screw. Dimple the nutplates. Prime parts if desired.

**Step 4:** Repeat Step 1 then rivet the parts clecoed together in Step 1, and the two nutplates common to the F-1051G Splice Plate per the callouts in Figure 1. This will create the Aft Tunnel Cover Assembly.

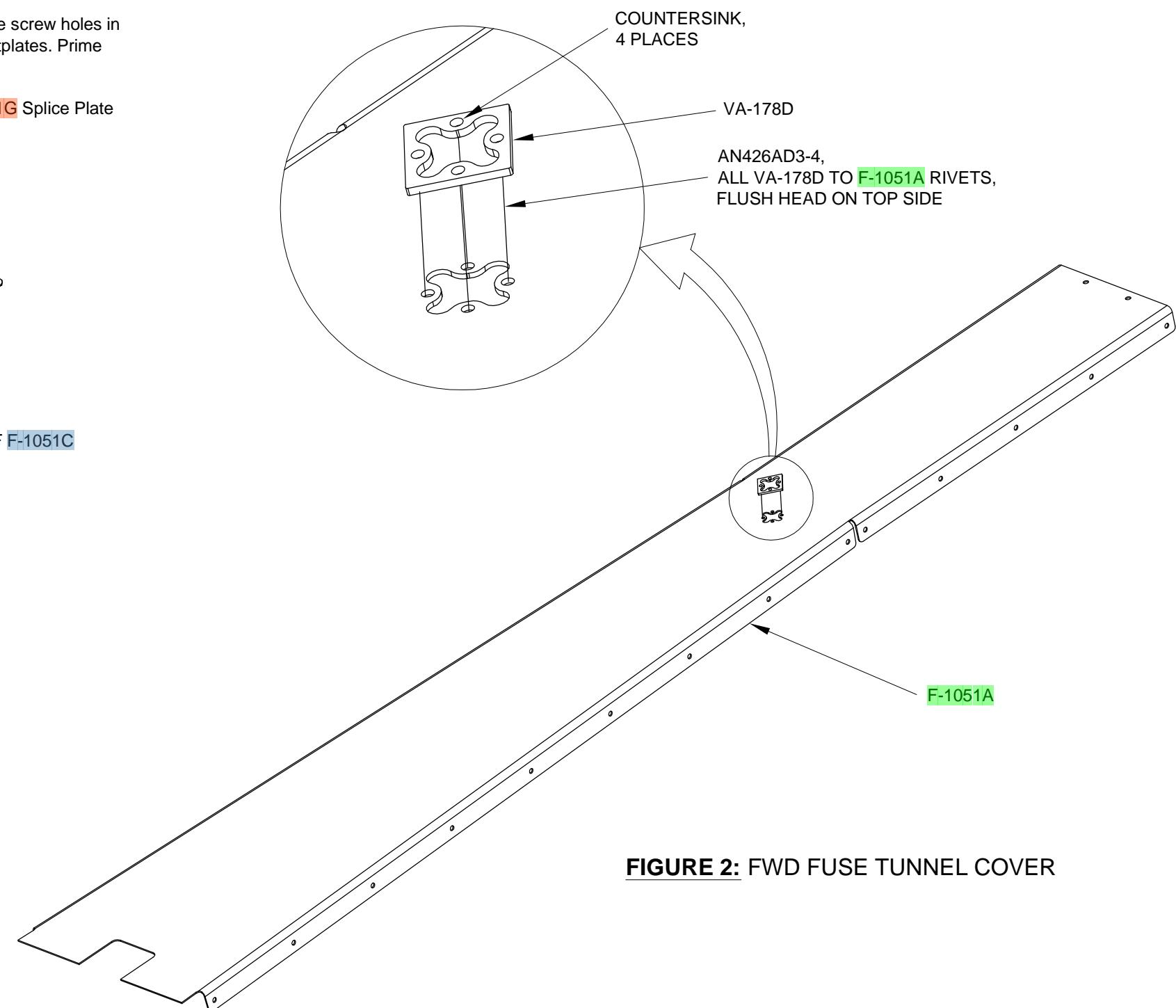


**FIGURE 1: AFT FUSE TUNNEL COVER ASSEMBLY**

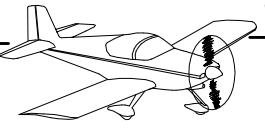
**Step 5:** Final-Drill #19 the screw holes along the aft edge and side flanges of the F-1051A Fwd Fuselage Tunnel Cover.

**Step 6:** Deburr the F-1051A Fwd Fuselage Tunnel Cover. Dimple the screw holes in the F-1051A Fwd Fuselage Tunnel Cover for the head of an #8 screw. Prime the Fwd Fuselage Tunnel Cover if desired.

**Step 7:** Final-Drill #40 and deburr the holes common between the F-1051A Fwd Fuselage Tunnel Cover and VA-178D Detent Plate. Countersink the top side of the Detent Plate, then rivet the Detent Plate to the Fwd Fuselage Tunnel Cover per the callouts in Figure 2.

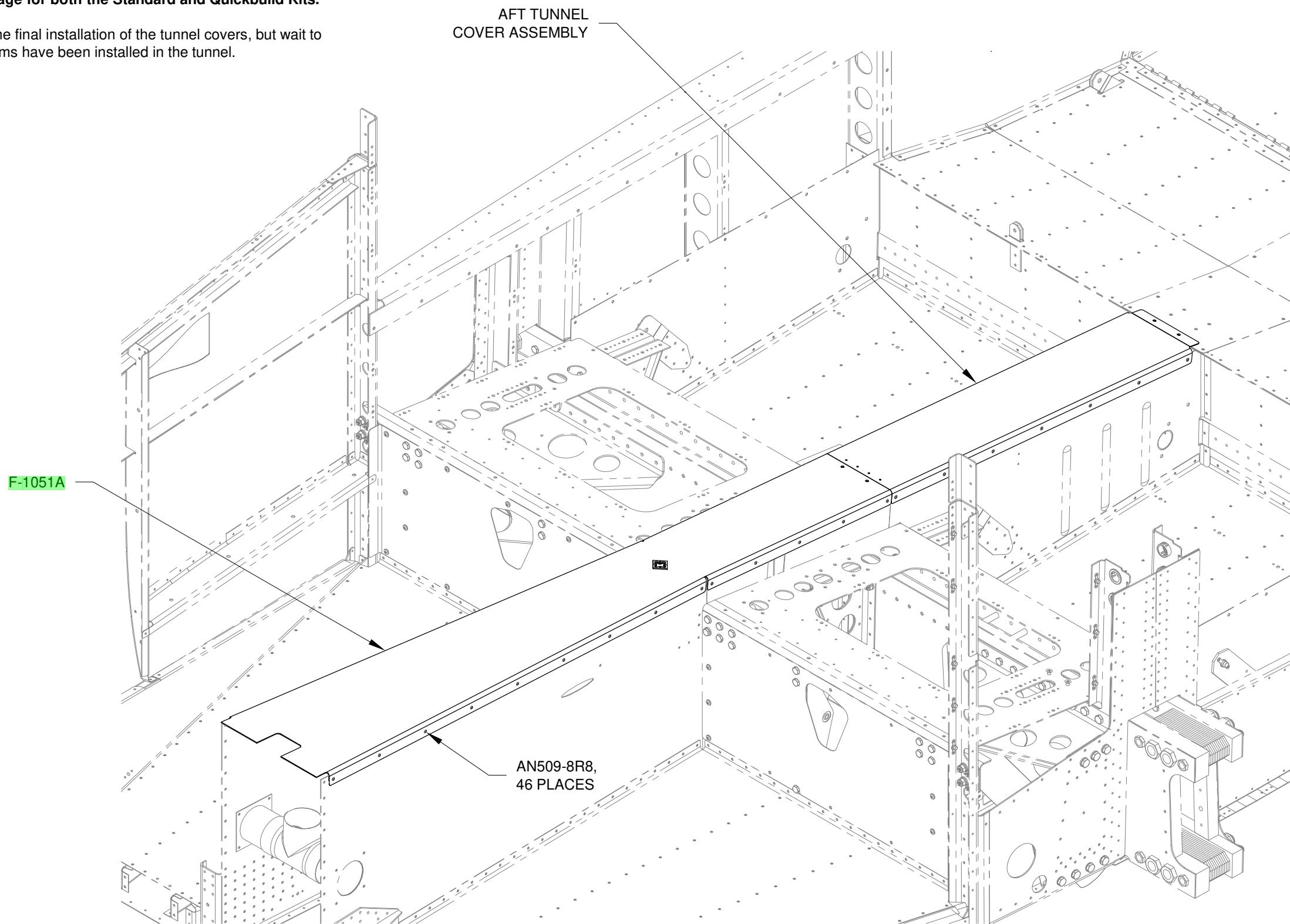


**FIGURE 2: FWD FUSE TUNNEL COVER**

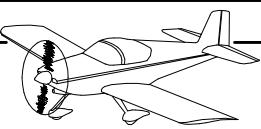


**NOTE: Complete this page for both the Standard and Quickbuild Kits.**

Step 1: Figure 1 shows the final installation of the tunnel covers, but wait to install them until all systems have been installed in the tunnel.



**FIGURE 1: INSTALLING THE TUNNEL COVERS**

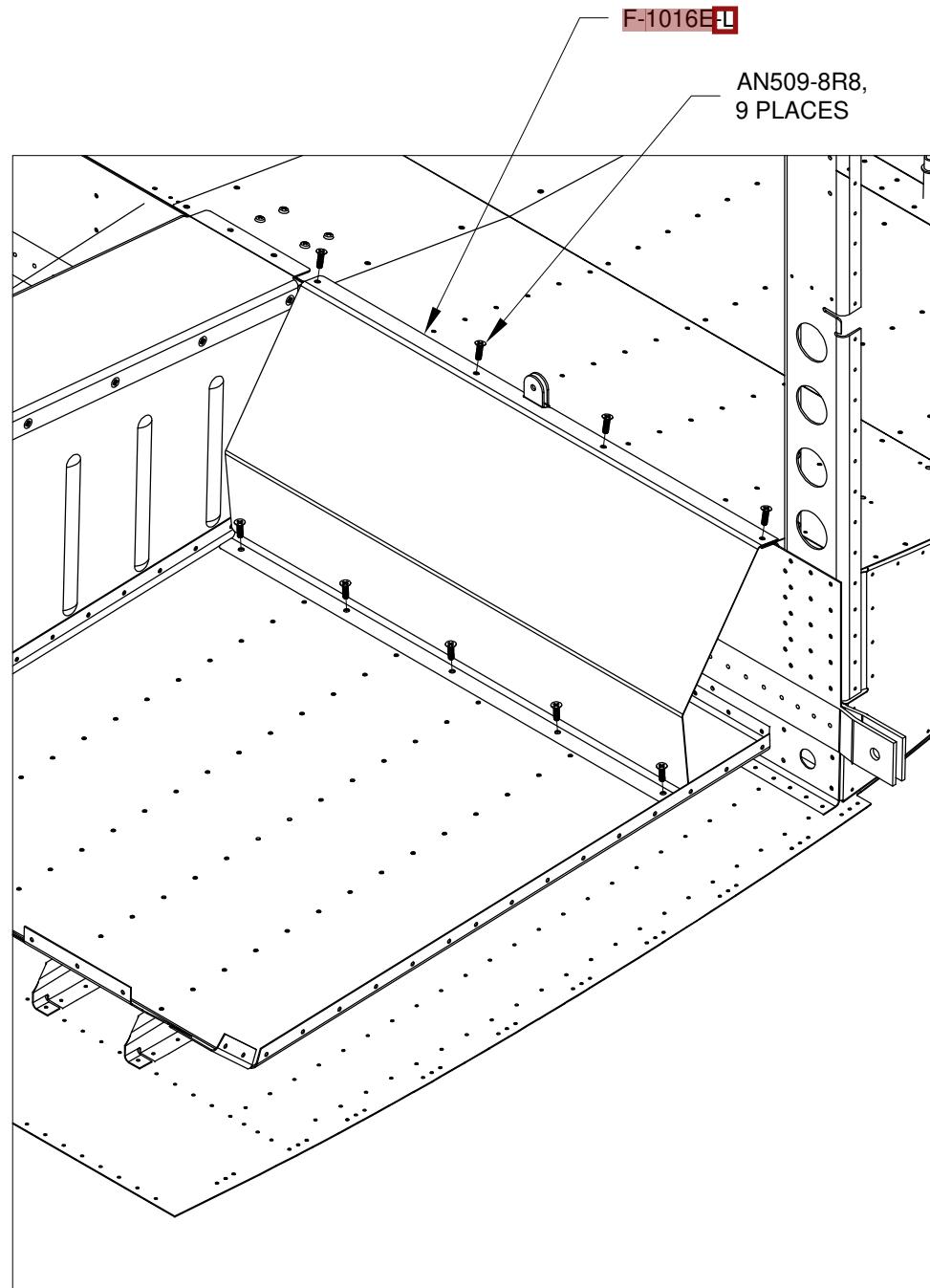


**NOTE:** Complete this page for both Standard and Quickbuild Kits.

**NOTE:** Step 1 and Step 2 describe how to install the F-1016E-L Flap Torque Tube Cover. The right cover installation is a mirror of the left.

Step 1: Final-Drill #19 the screw holes in the F-1016E-L Flap Torque Tube Cover.

Step 2: Deburr the holes and edges of the F-1016E-L Flap Torque Tube Cover. Dimple the screw holes in the flap torque tube cover for the head of an #8 screw. See Figure 1.

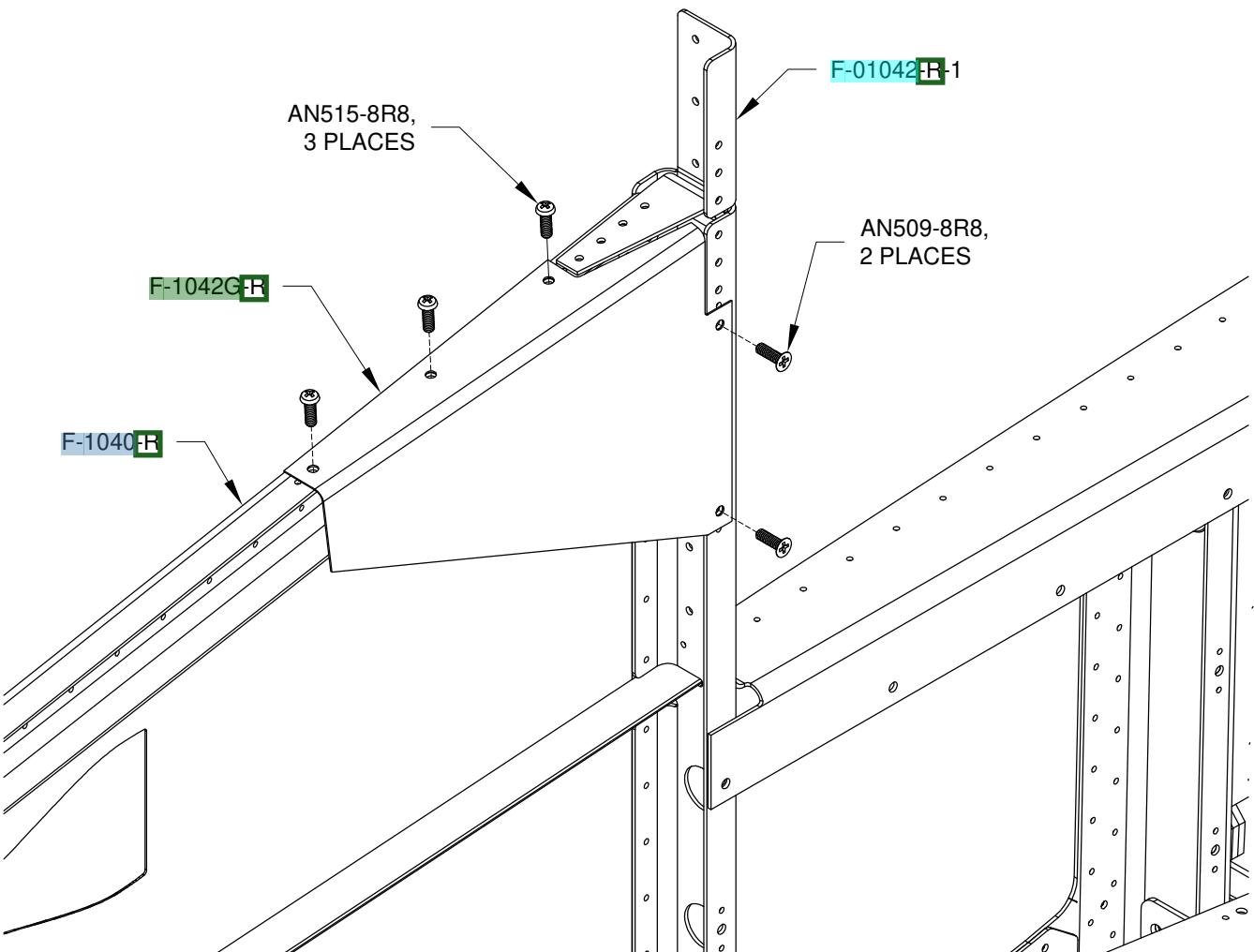


**FIGURE 1: INSTALLING THE FLAP TORQUE TUBE COVER**

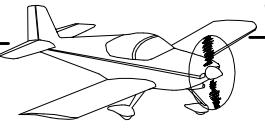
**NOTE:** The remainder of this page shows the installation of the F-1042G-R Wire Cover. The installation of the left cover is a mirror of the right.

Step 3: Final-Drill #19 the holes in the F-1042G-R Wire Cover. See Figure 2.

Step 4: Deburr the holes and edges of the F-1042G-R Wire Cover. Prime the cover if desired.



**FIGURE 2: INSTALLING THE WIRE COVER**

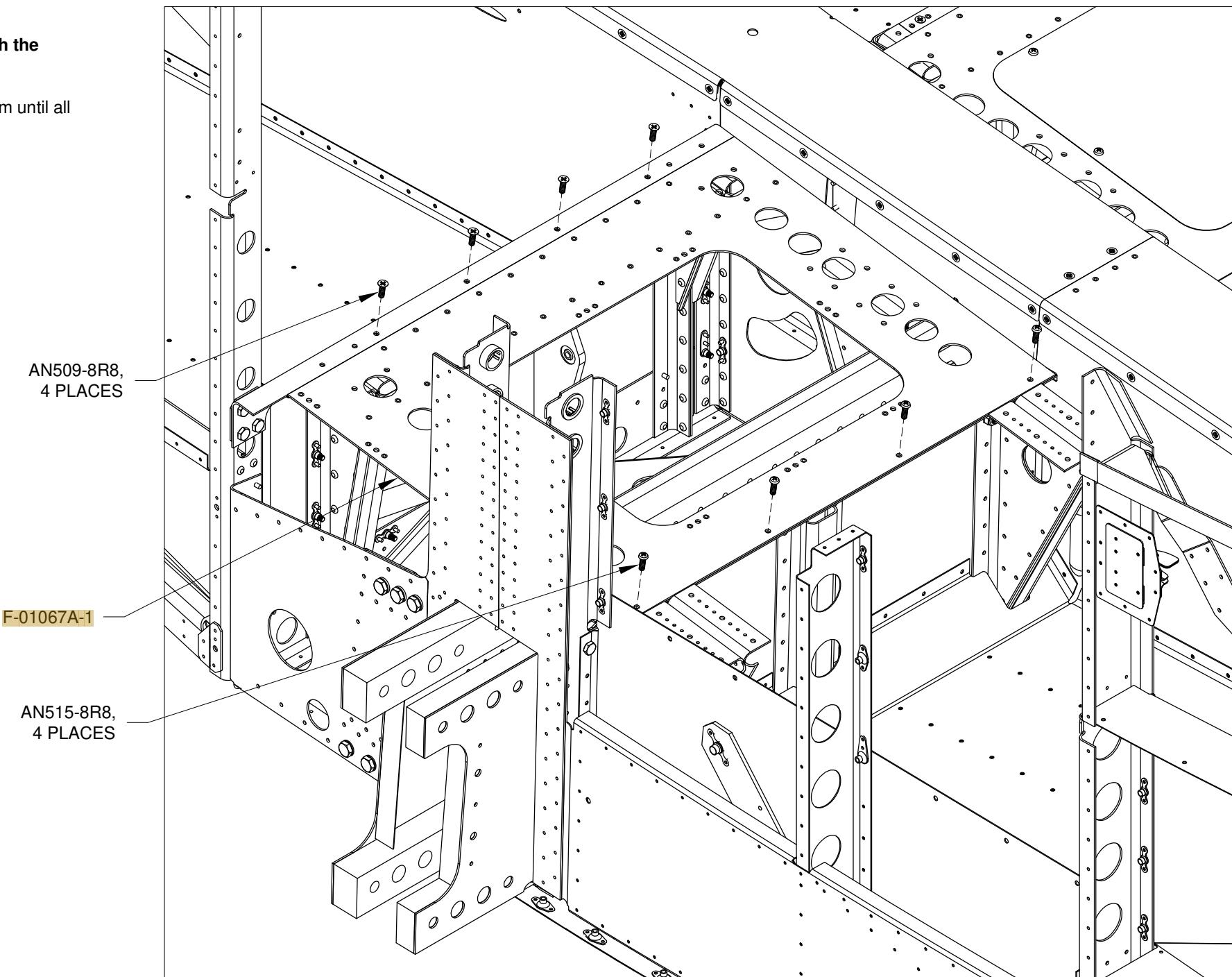


NOTE: Complete this page for both the Standard and Quickbuild Kits.

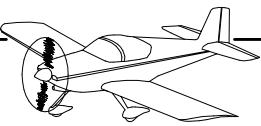
NOTE: This page describes the installation of the F-01067A-1 Seat Floor on the left hand side of the aircraft. The right side installation is a mirror of the left.

NOTE: When installing the F-01067A-1 Seat Floors, first slide the cover up underneath the F-01043B-1 Forward Fuselage Bulkhead.

Step 1: Figure 1 shows the final install of the F-01067A-1 Seat Floors, but wait to install them until all systems installations and wiring runs have been completed.



**FIGURE 1: INSTALLING THE SEAT FLOORS**



**NOTE:** Complete this page for the Standard Kit Only.

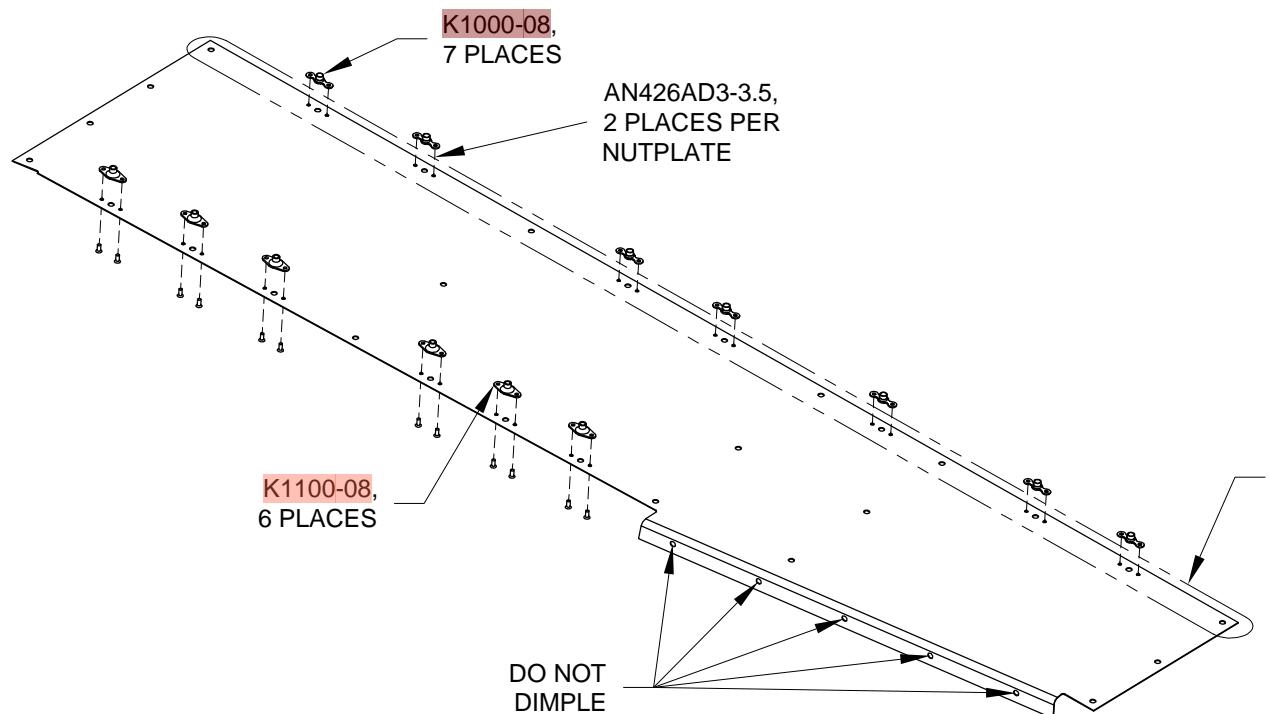
**NOTE:** This page describes the installation of the F-1015D-R Mid Cabin Side Cover and the right side F-1067B Seat Floor Cover. The installation of the left covers is a mirror of the right.

Step 1: Final-Drill #19 the screw holes in the F-1015D-R Mid Cabin Side Cover and F-1067B Seat Floor Cover. Final-Drill #40 the nutplate attach holes in the mid cabin side cover.

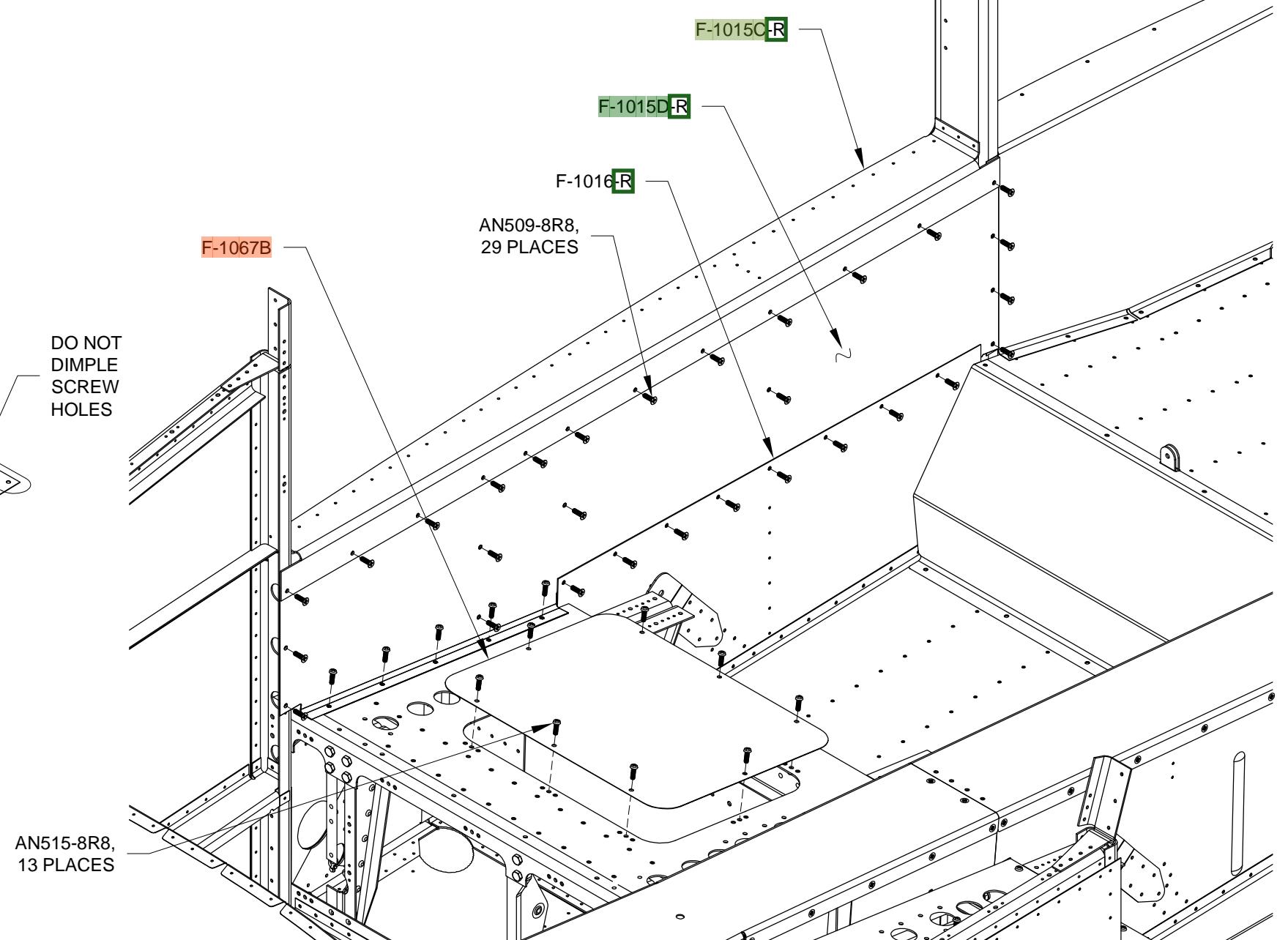
Step 2: Duburr the holes and edges of both the F-1015D-R Mid Cabin Side Cover and F-1067B Seat Floor Cover. Dimple all the screw holes in the mid cabin side cover except the top row of holes and the holes in the forward lower flange (See Figure 1). Dimple the platenut attach holes in the mid cabin side cover. Dimple the platenuts. Machine countersink the screw holes on the inboard face of the F-1015C Mid Cabin Decks. Machinge countersink the locations for the four AN509-8R8 screws shown on Page 35-8, Figure 1. Prime the parts if desired.

Step 3: Rivet the platenuts to the F-1015D-R Mid Cabin Side Cover per the callouts in Figure 1.

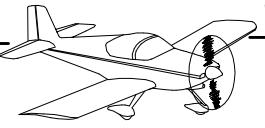
**NOTE:** When installing the F-1015D Mid Cabin Covers, first slide the cover up underneath the F-1015C Mid Cabin Decks then slide the cover down underneath the F-1016 Outbd Foot Well Rib.



**FIGURE 1: INSTALLING NUTPLATES ON THE MID CABIN SIDE COVER**



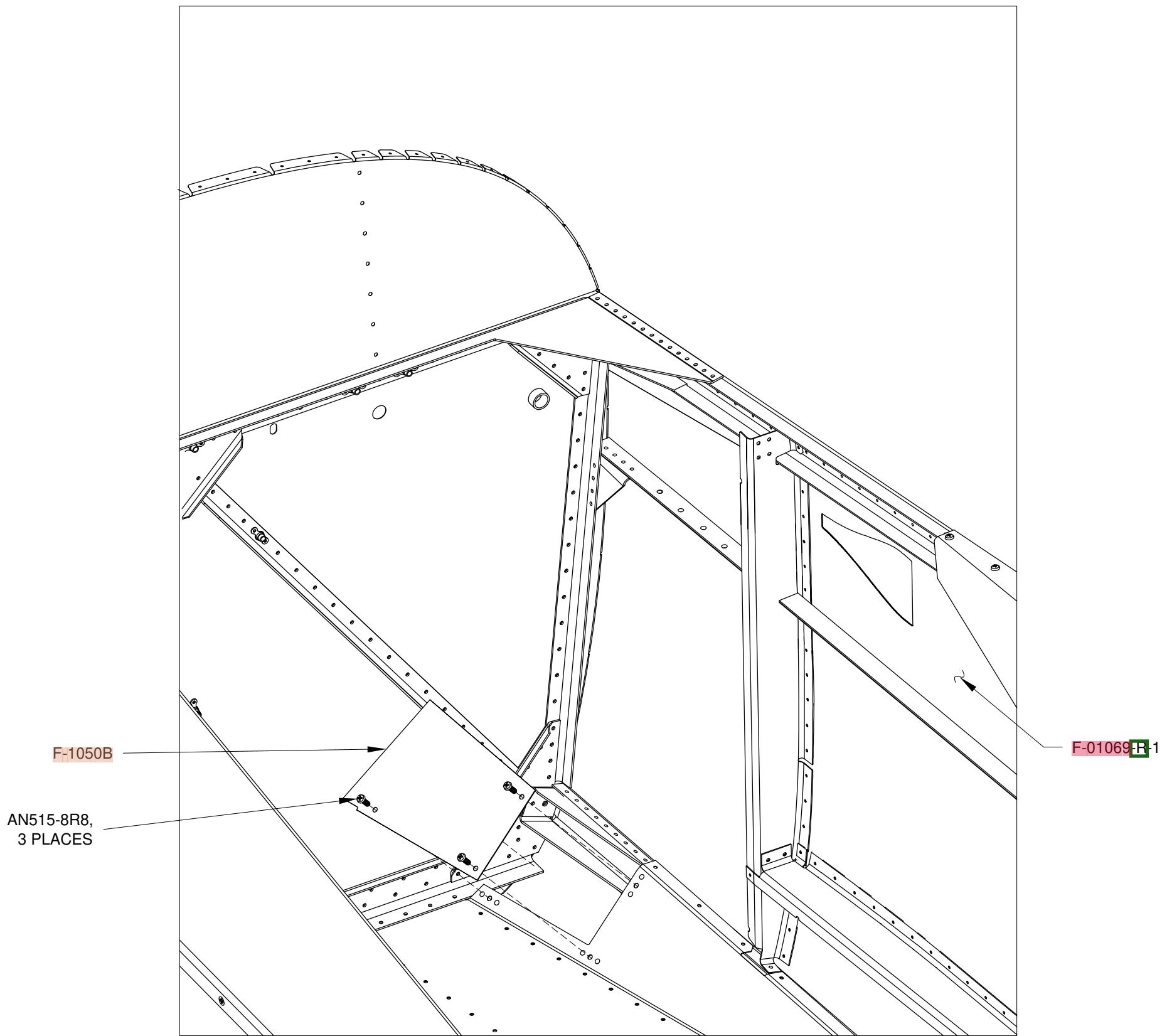
**FIGURE 2: INSTALLING THE MID CABIN SIDE COVER AND THE SEAT FLOOR COVER**



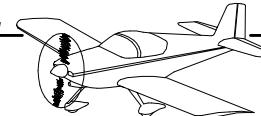
**NOTE: This page describes the installation of a F-1050B Bolt Access Plate to the right side of the aircraft. The left installation is a mirror of the right.**

Step 1: Final-Drill #19 the screw holes in the F-1050B Bolt Access Plate.

Step 2: Deburr the edges of the F-1050B Bolt Access Plate. Prime the plate if desired. See Figure 1 for installation of the bolt access plate.

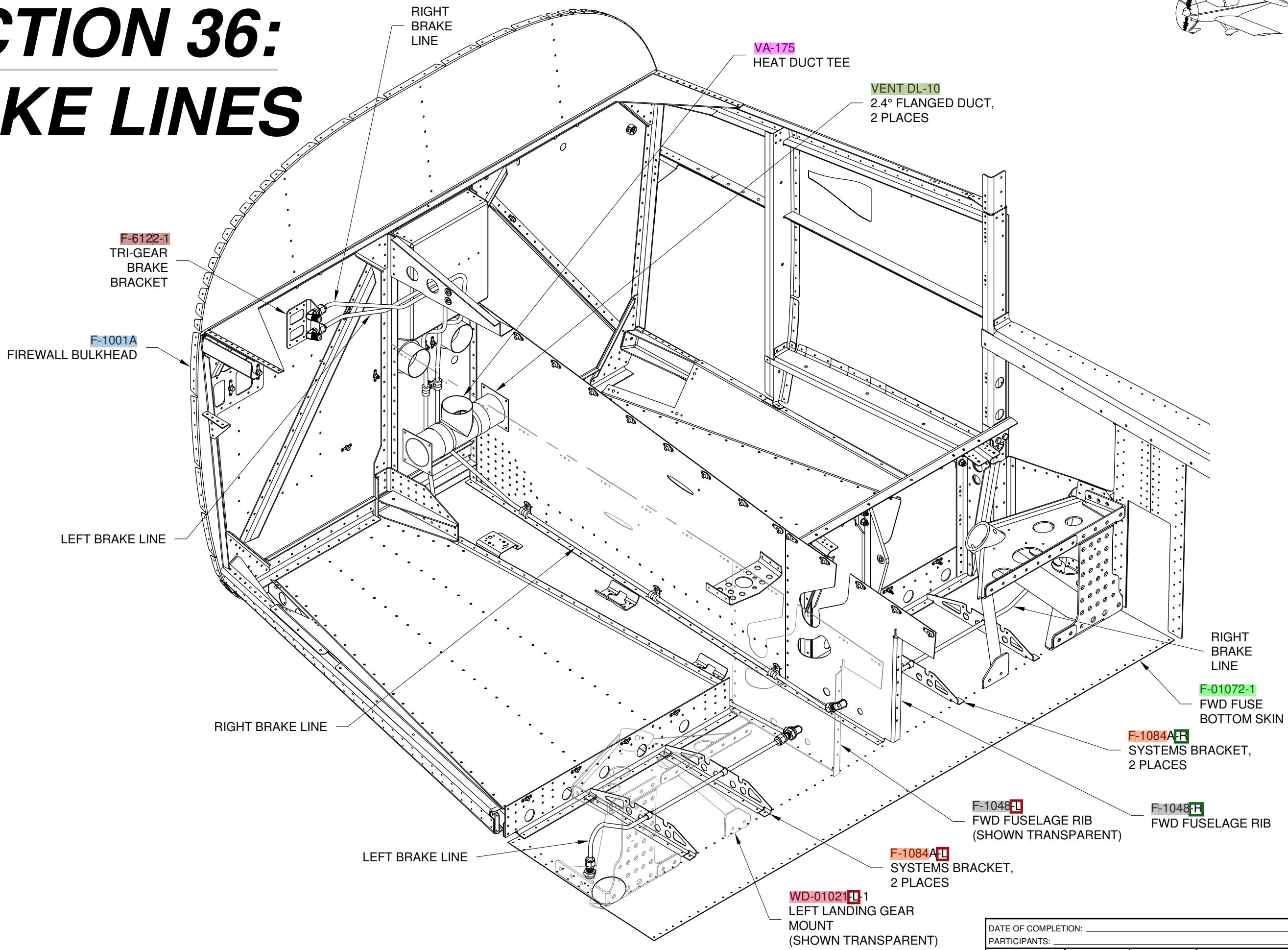


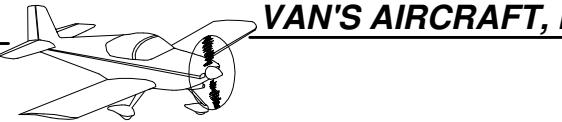
**FIGURE 1: BOLT ACCESS PLATE INSTALLATION**



# SECTION 36:

## BRAKE LINES

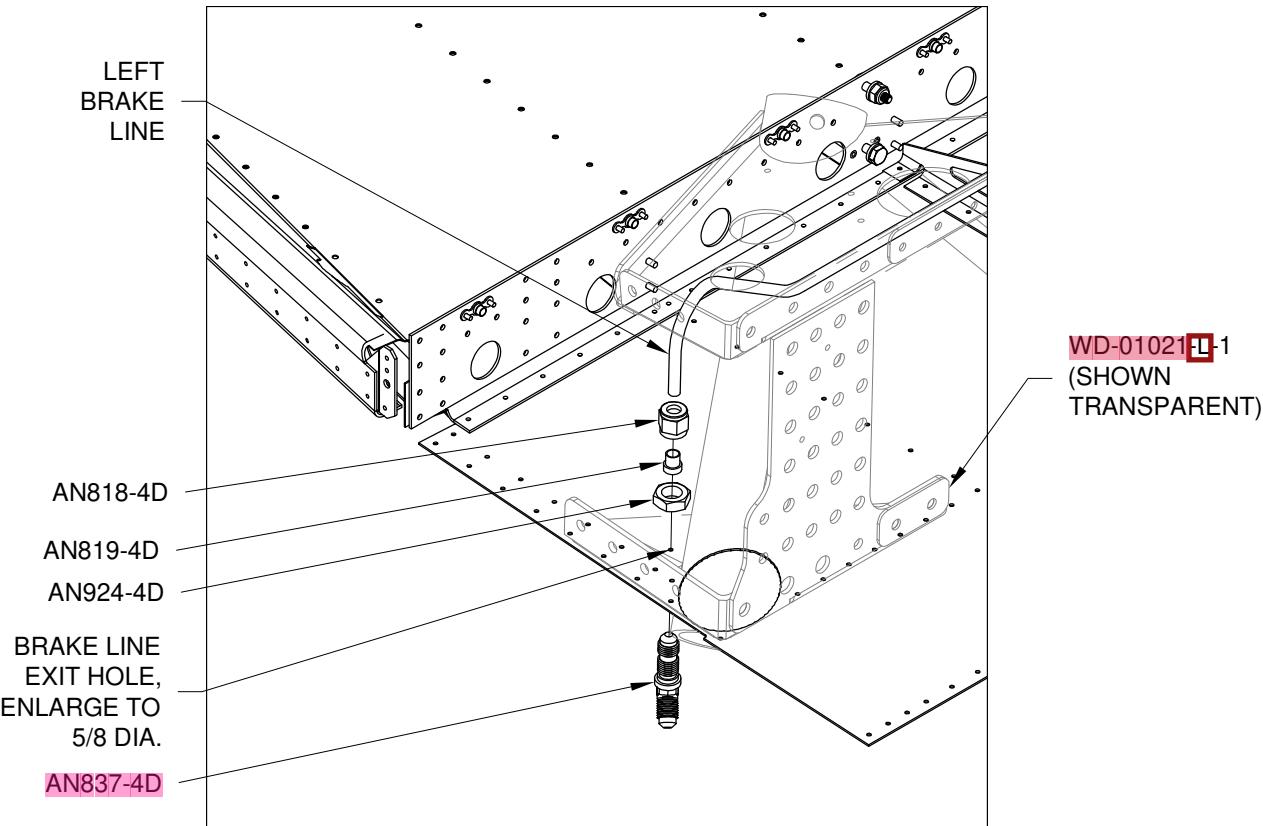




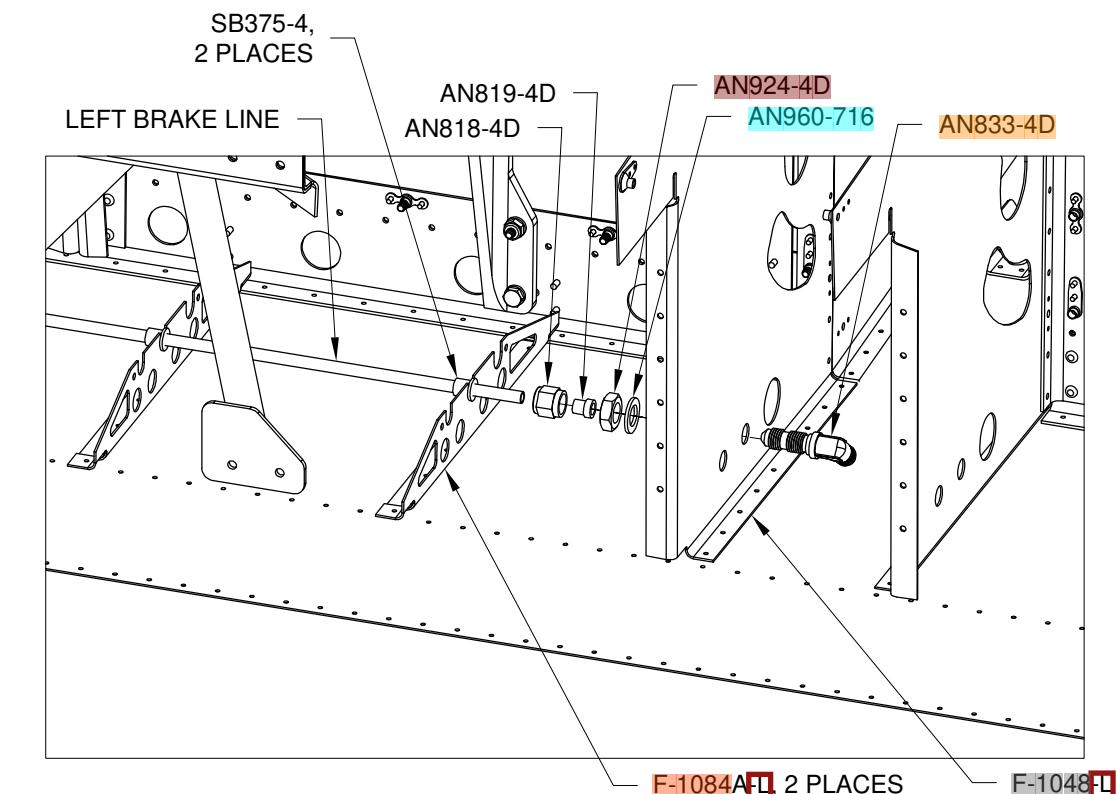
**NOTE: This page describes the installation of the left brake line between the tunnel and the brake line exit location on the left side of the aircraft. Repeat the steps on this page for the right side of the aircraft. The right installation is a mirror of the left.**

Step 1: Using a Unibit enlarge the brake line exit hole in the **F-01072-1** Fwd Fuse Bottom Skin to 5/8 diameter as called out in Figure 1.

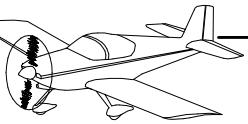
Step 2: Install the **AN837-4D** 45° Elbow and **AN924-4D** Nut onto the **WD-01021L-1** Landing Gear Mount - Left as shown in Figure 1. Using the gear leg socket as reference, orient the fitting to aim down the gear leg.



**FIGURE 1: INSTALLING THE OUTBOARD BULKHEAD FITTING**



**FIGURE 2: INSTALLING THE INBD BULKHEAD FITTING**

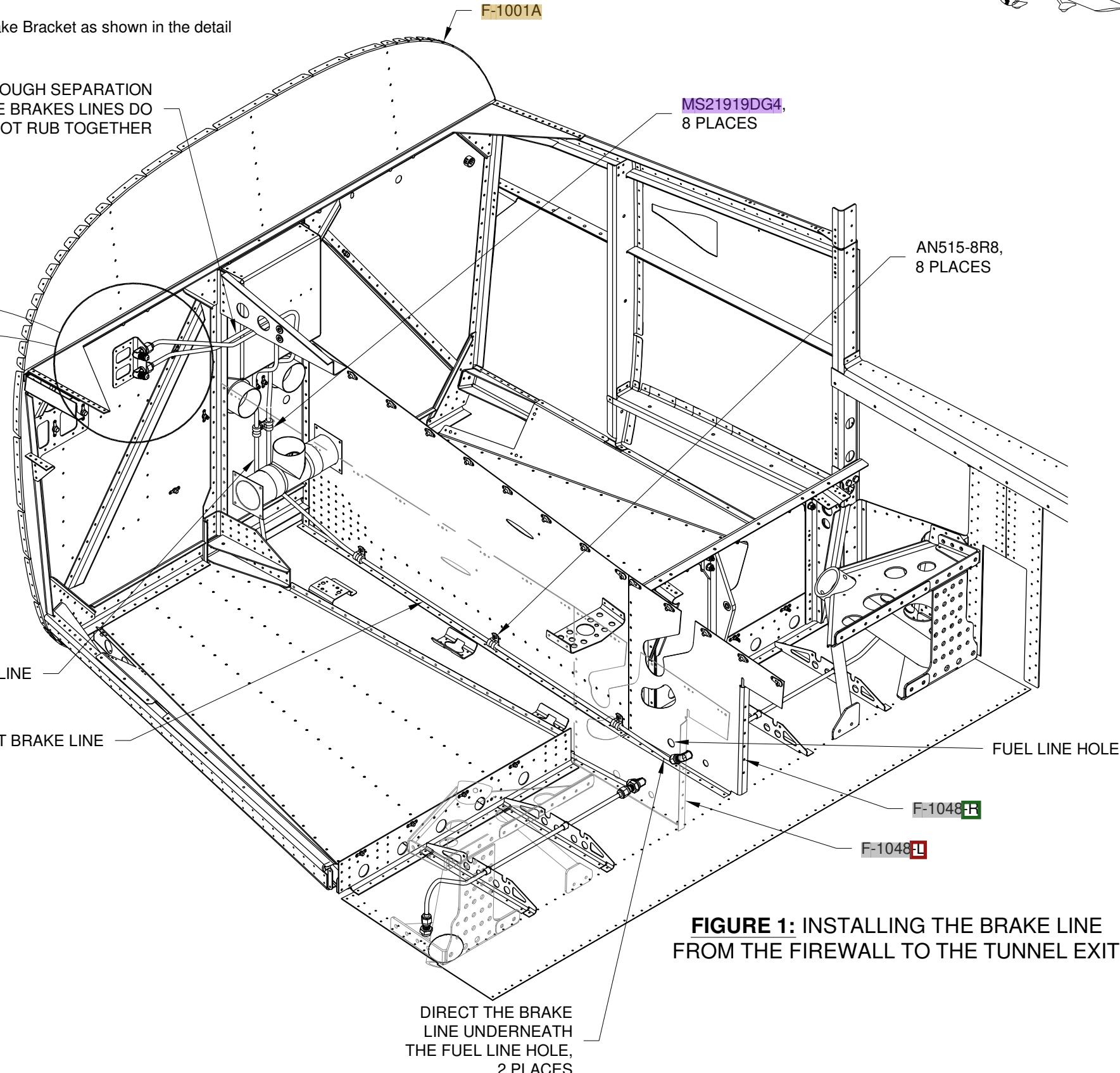
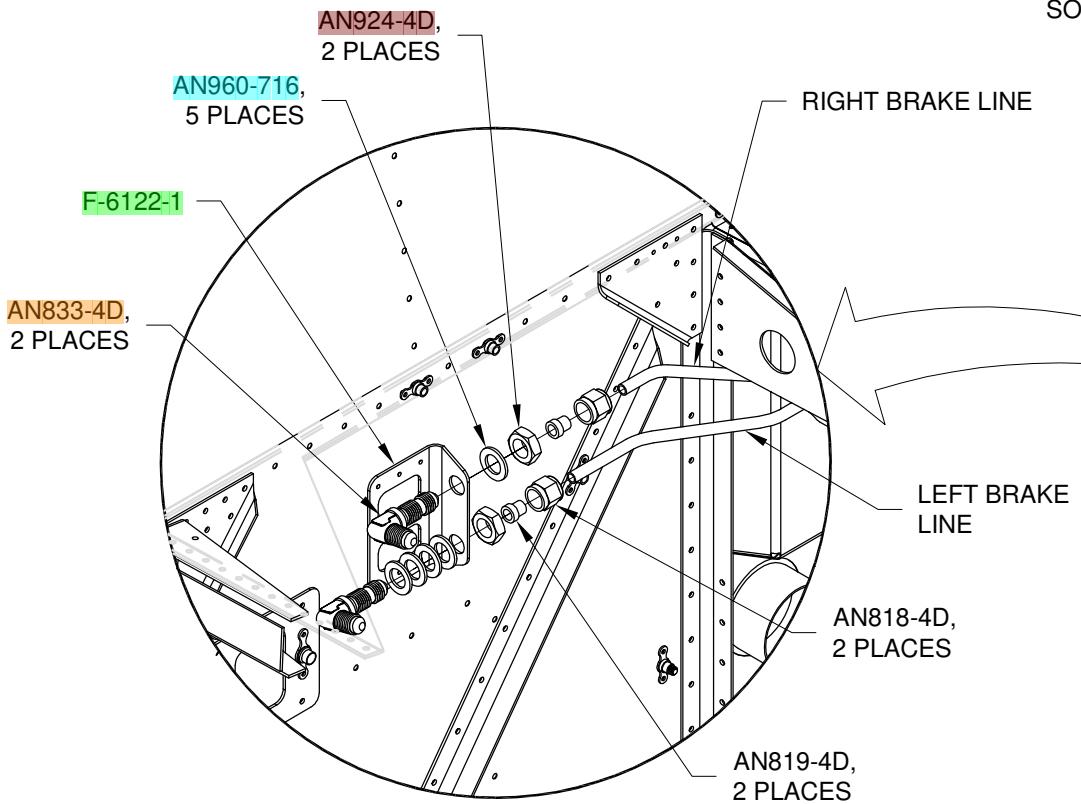


Step 1: Uncleco the VENT DL-10 2.4° Flanged Ducts and the VA-175 Heat Duct Tee from the F-1048L and F-1048R Fwd Fuselage Ribs and set them aside. See Page 36-1.

Step 2: Install the AN833-4D Elbows, AN924-4D Nuts and AN960-716 Washers to the F-6122-1 Tri-Gear Brake Bracket as shown in the detail view in Figure 1.

Step 3: Using ATO-032X1/4 create both the left and right brake lines as shown in Figure 1.

PROVIDE ENOUGH SEPARATION  
SO THE BRAKES LINES DO  
NOT RUB TOGETHER



Step 4: Slide four MS21919DG4 Cushion Clamps onto each brake line. Slide a AN818-4D Nut and the a AN819-4D Sleeve onto each end of both brake lines. Orient the hardware as shown in Figure 1.

Step 5: Double check that Step 4 has been completed correctly, then flare both ends of each tube (see Section 5P).

Step 6: Attach the brake lines to the fittings at the aft end of the F-1048 Fwd Fuselage Ribs and the fittings on the F-6122-1 Tri-Gear Brake Bracket. Screw the cushion clamps to the nutplates using the hardware shown in Figure 1.

**FIGURE 1: INSTALLING THE BRAKE LINE FROM THE FIREWALL TO THE TUNNEL EXIT**

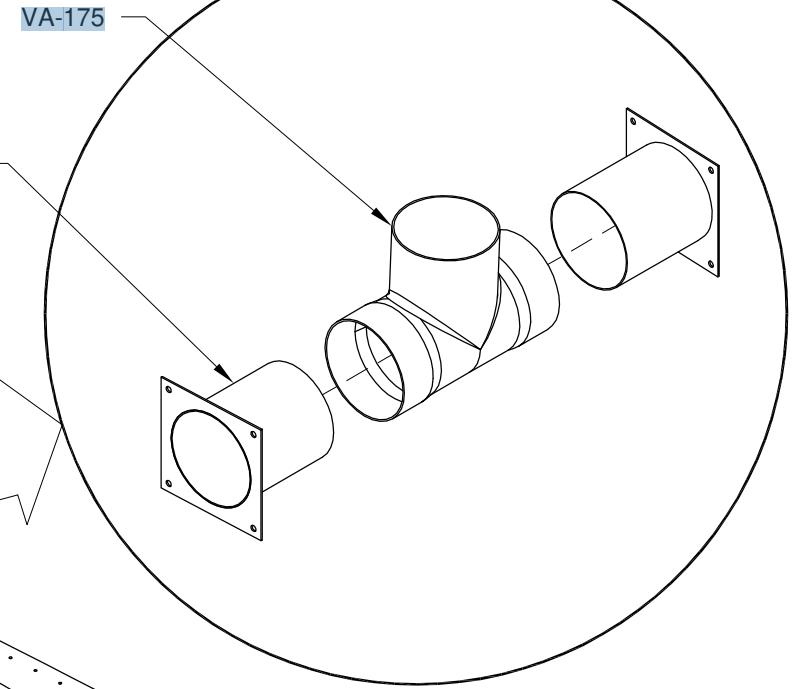


Step 1: Insert the VENT DL-10 2.4° Flanged Ducts into the ends of the VA-175 Heat Duct Tee as shown in the detail view in Figure 1. Cleco this assembly to the F-1048L and Fwd Fuselage Ribs as shown in Figure 1.

Step 2: Rivet the VENT DL-10 2.4° Flanged Ducts to the F-1048L and Fwd Fuselage Ribs per the callouts in Figure 1.

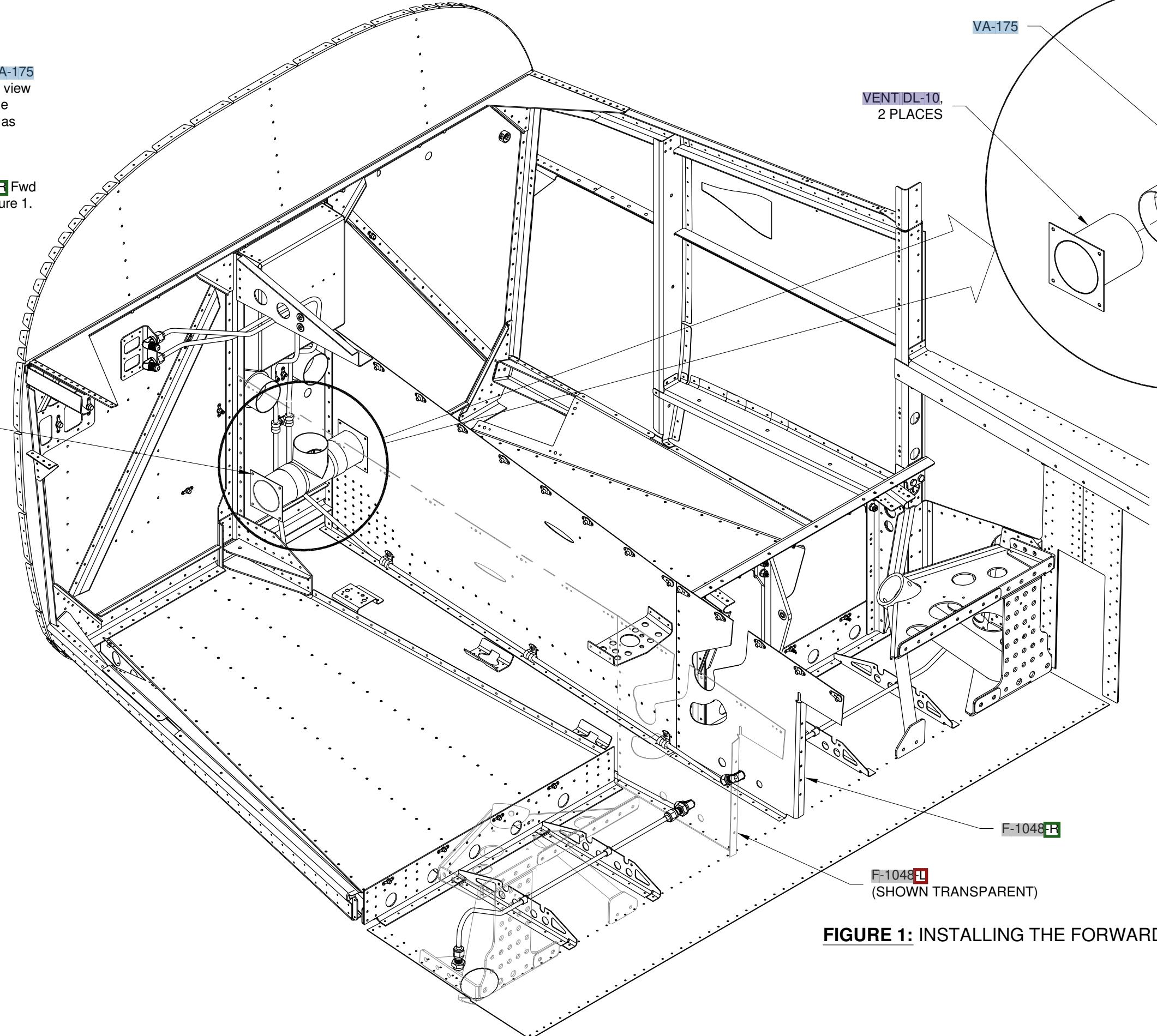
CS4-4,  
8 PLACES

VENT DL-10,  
2 PLACES

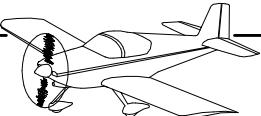


F-1048R

F-1048L  
(SHOWN TRANSPARENT)

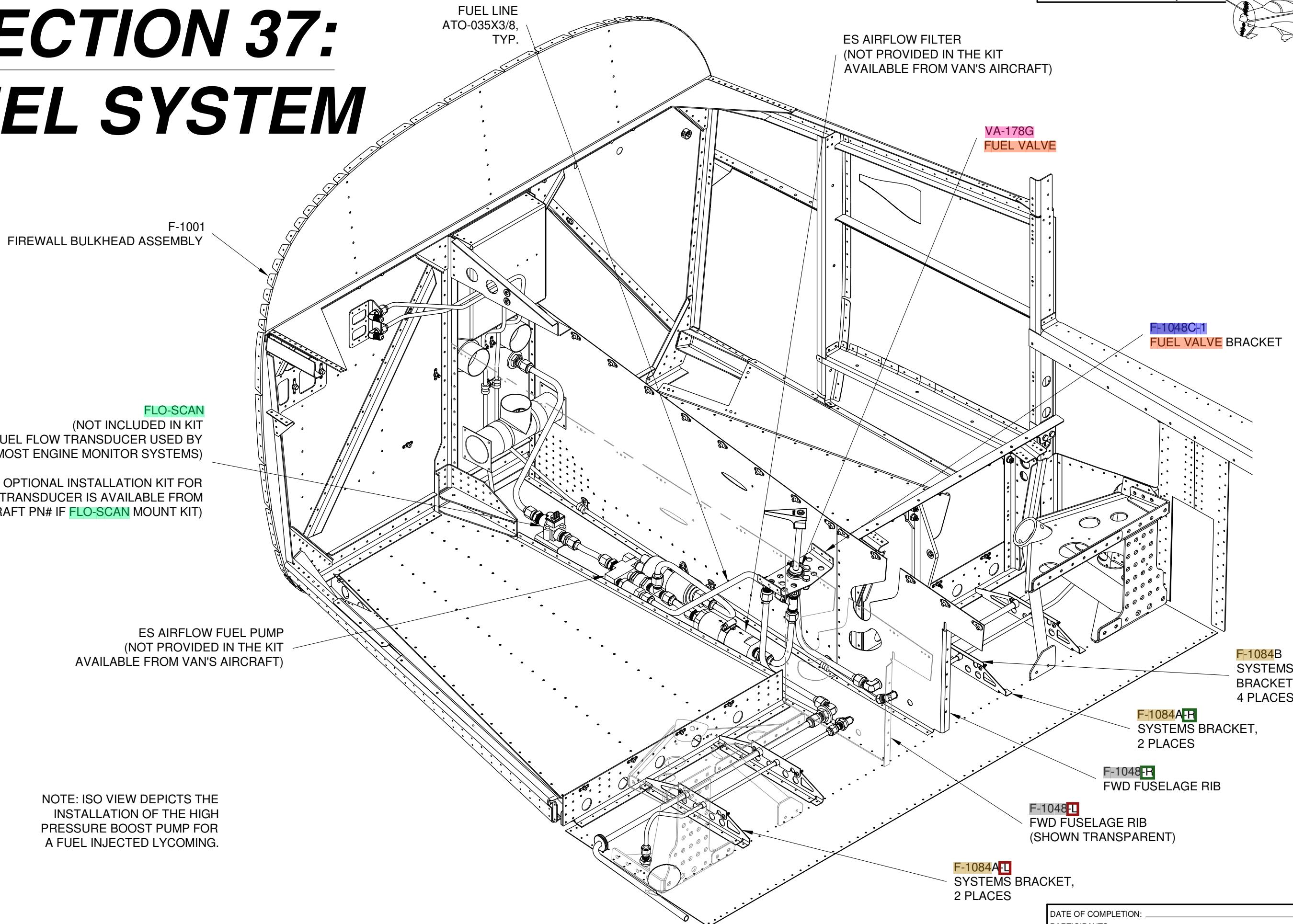


**FIGURE 1: INSTALLING THE FORWARD HEAT DUCT TEE**



# SECTION 37:

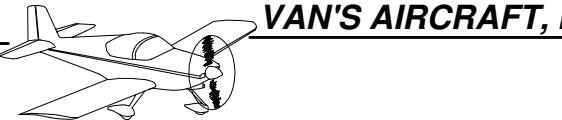
# FUEL SYSTEM



DATE OF COMPLETION: \_\_\_\_\_

PARTICIPANTS: \_\_\_\_\_

DATE 01/07/21 REVISION: 2 RV-10 PAGE: 37-1

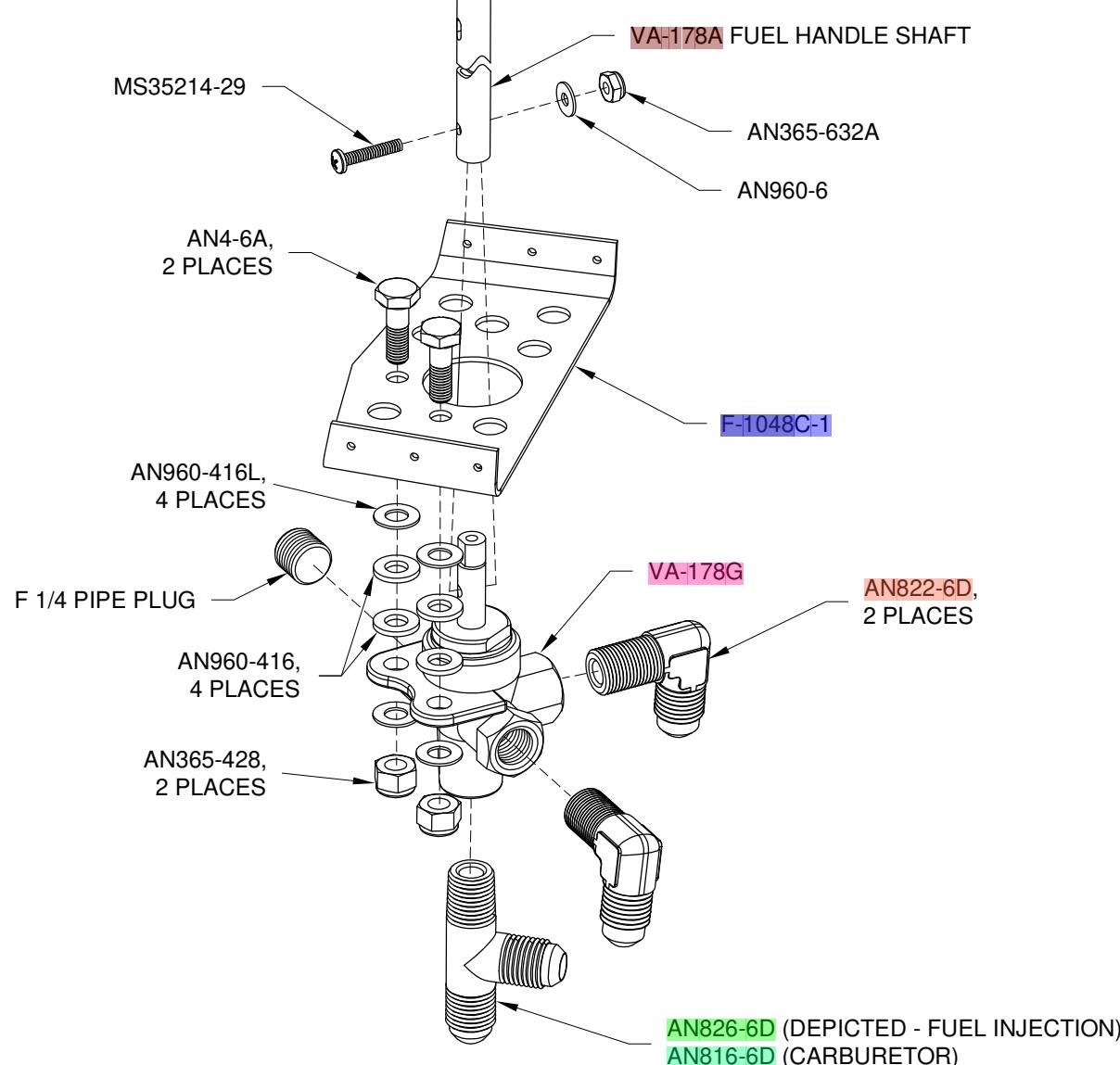


**NOTE:** When installing fluid fittings in this section note the clocking (direction that the fluid fitting is aimed). Reference both the isometric view on Page 37-1 and the figure relevant to the step being completed.

Step 1: If using a fuel injected engine install a AN826-6D Tee into the lower port of the VA-178G Fuel Valve (aim the horizontal leg of the tee forward). If using a carbureted engine, insert a AN816-6D Nipple into the bottom of the fuel valve. With the fuel valve oriented as shown in Figure 1, install a F 1/4 Pipe Plug and two AN822-6D 90° Elbows.

Step 2: Bolt the body of the VA-178G Fuel Valve to the F-1048C-1 Fuel Valve Bracket using the hardware called out in Figure 1.

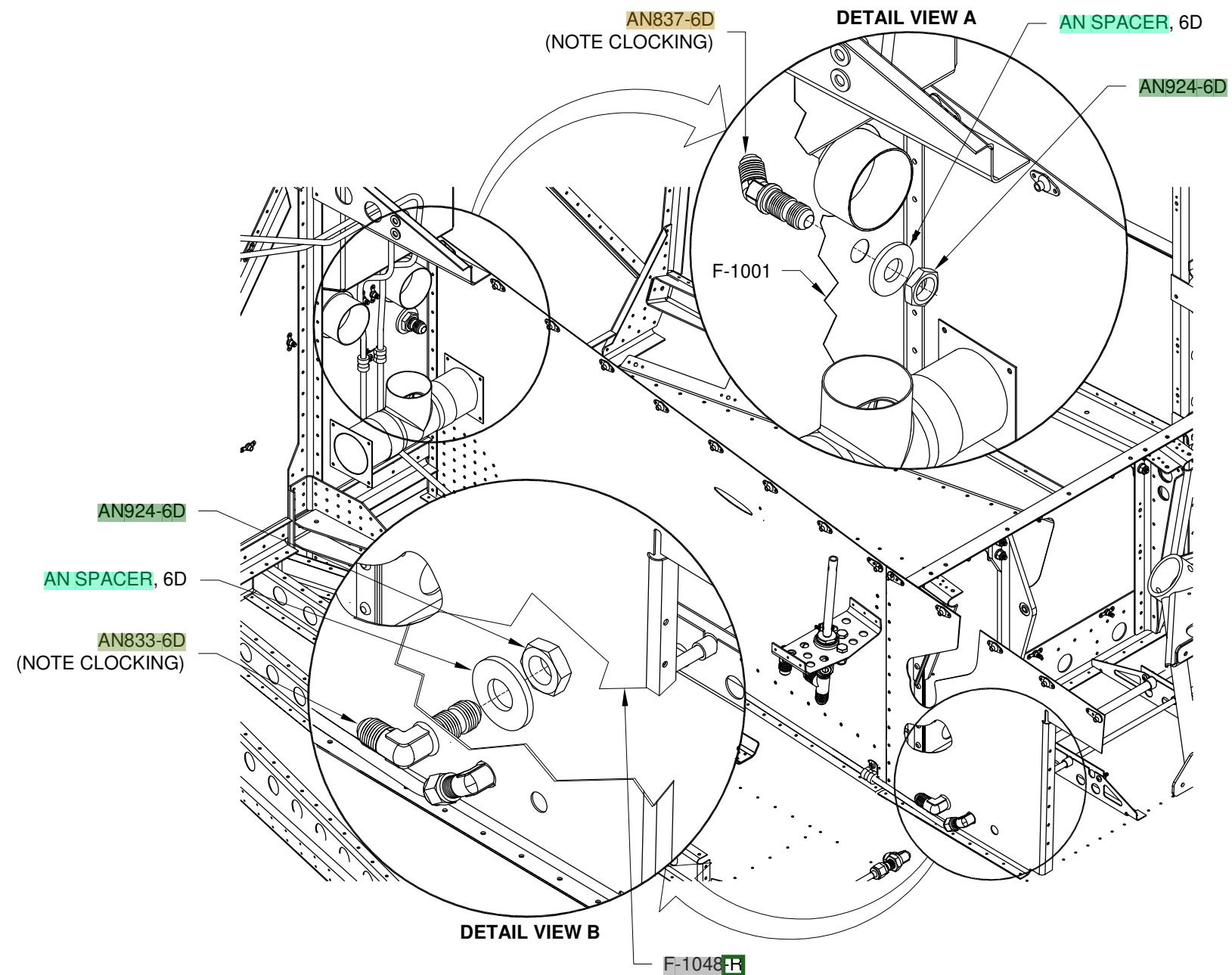
Step 3: Install the VA-178A Fuel Handle Shaft to the VA-178G Fuel Valve using the hardware called out in Figure 1.



**FIGURE 1: FUEL VALVE INSTALLATION**  
(STRUCTURE ATTACHED TO THE FUEL VALVE BRACKET NOT SHOWN FOR CLARITY)

Step 4: Attach the AN837-6D 45° Elbow Bulkhead Fitting, AN SPACER, 6D Washer, and AN924-6D Nut to the F-1001 Firewall Bulkhead Assembly as shown in the Detail View A in Figure 2. Note the clocking (up and right).

Step 5: Attach the AN833-6D 90° Elbow Bulkhead Fitting, AN SPACER, 6D Washer, and AN924-6D Nut to the F-1048-R and F-1048-L Fwd Fuselage Ribs as shown in the Detail View B in Figure 2. Note the clocking (forward and parallel to F-01072-1 Fwd Fuse Bottom Skin).

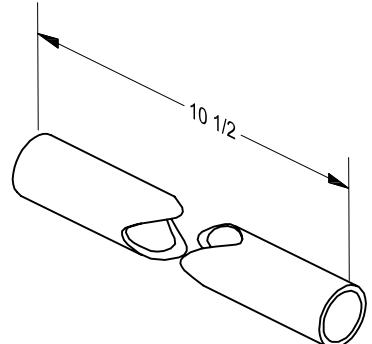


**FIGURE 2: BULKHEAD FITTING INSTALLATION**



**NOTE:** All fuel lines created in this section are made from ATO-035X3/8. See Section 5P for information on flaring the ends of the fuel line. When installing fluid fittings with pipe threads do not use Teflon tape. Use instead, fuel lube or equivalent pipe thread sealing paste.

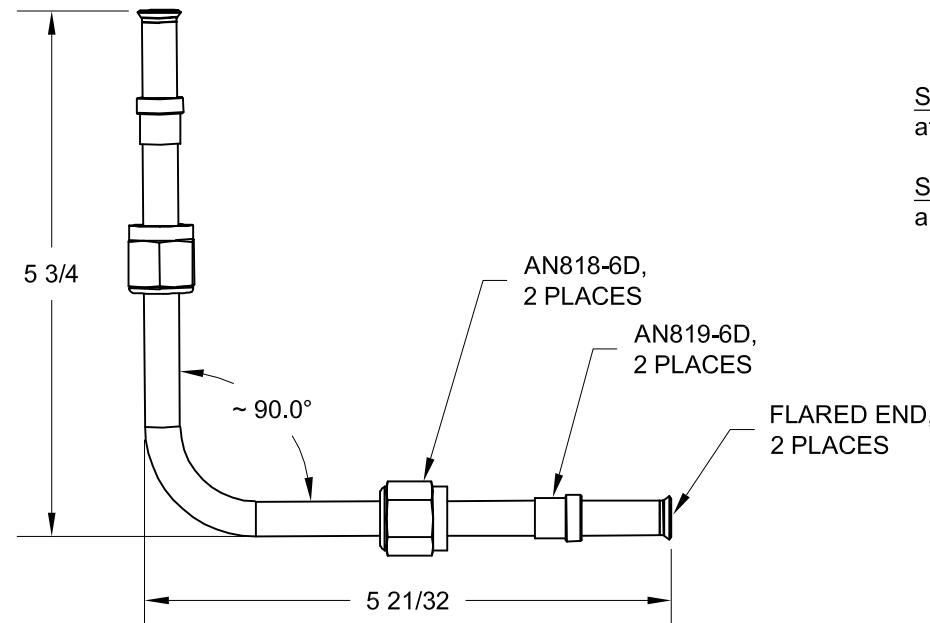
Step 1: Cut two fuel lines per the dimensions in Figure 1. Straighten out the lines at this time.



**FIGURE 1: CUTTING TUNNEL FUEL LINES**

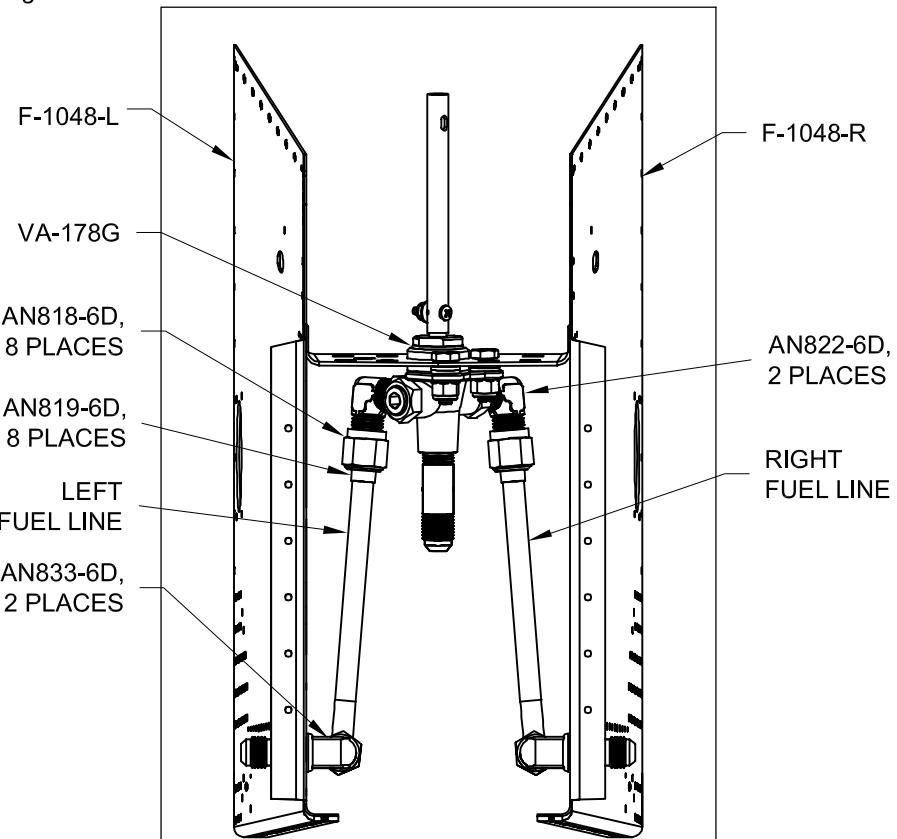
Step 2: Select one of the fuel lines made in Step 1, then slide an AN818-6D Nut and a AN819-6D Sleeve onto one end. At the same end flare the tube (see Section 5P).

Step 3: Bend the tube to obtain the approximate dimensions shown in Figure 2. Then slide an AN818-6D Nut and a AN819-6D Sleeve onto the unfinished end. At that same end flare the tube and repeat Step 2 and Step 3 on the remaining fuel line.



**FIGURE 2: THE UPPER BEND**

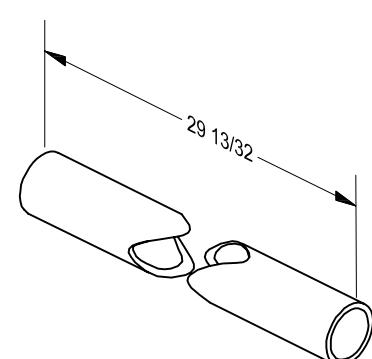
Step 4: Install the two 10.5 inch fuel lines in the tunnel (between the F-1048-L and -R Fwd Fuselage Ribs) from the AN822-6D 90.0° pipe fittings on the VA-178G Fuel Valve to the AN833-6D 90.0° bulkhead fittings on the Fwd Fuselage Ribs, as shown in Figure 3.



**FIGURE 3: TUNNEL FUEL LINES AFT VIEW**

Step 5: Cut two fuel lines per the dimensions in Figure 4. Straighten out the lines at this time.

Step 6: Select one of the fuel lines made in Step 5, then slide an AN818-6D Nut and a AN819-6D Sleeve onto one end. At the same end flare the tube.

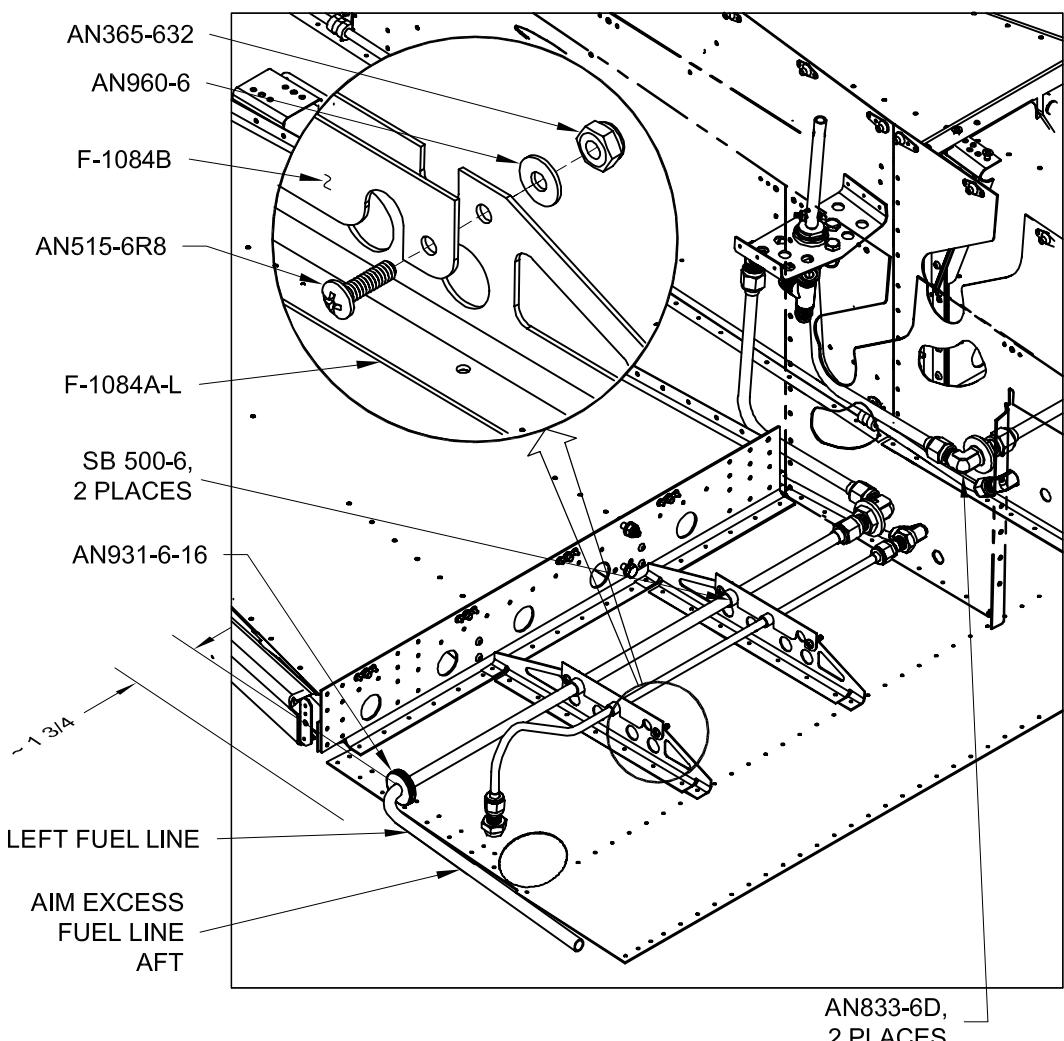


**FIGURE 4: CUTTING TANK FUEL LINES**

Step 7: From the other end of the fuel line slide on two snap bushings and a grommet, as shown in Figure 5. Feed the fuel line out the hole in the F-1004K-L Center Section Side Plate and F-1069 Fwd Side Skin. Attach the left fuel line to the AN833-6D 90° Elbow on the F-1048-L Fwd Fuselage Rib. Repeat this step for the right fuel line. The right fuel line installation is a mirror of the left.

Step 8: Insert the grommet into the F-1069 Fwd Side Skin. Insert the snap bushings into the F-1084A-L and -R Systems Brackets. Install the F-1084B Systems Bracket Clips to the systems brackets. See the detail view in Figure 5.

Step 9: Bend each Fuel Line 90° aft, approximately 1 3/4 inches outboard from the side of the fuselage. See Figure 5.

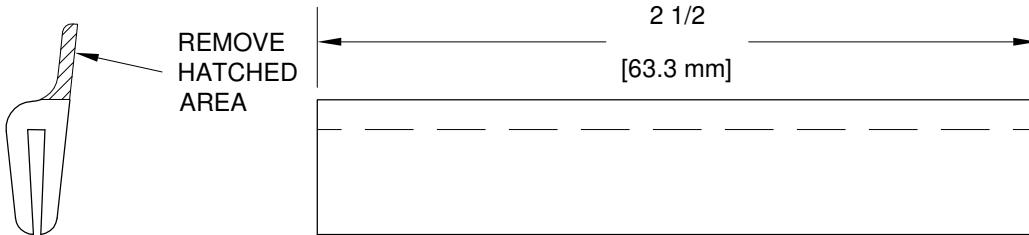


**FIGURE 5: FUEL LINE ROUTING  
(CENTER SECTION SIDE PLATE AND  
FWD SIDE SKIN NOT SHOWN FOR CLARITY)**



**NOTE: This page depicts the installation of a fuel injected system for a Lycoming between the VA-178G Fuel Valve and the firewall. The ES AIRFLOW PUMP & FILTER are not included in the kit but can be purchased through Van's Accessory Catalog. If using a carbureted engine skip to Page 37-5.**

Step 1: Make four F-1048E Fuel Cradle Pads out of rubber channel as shown in Figure 1.

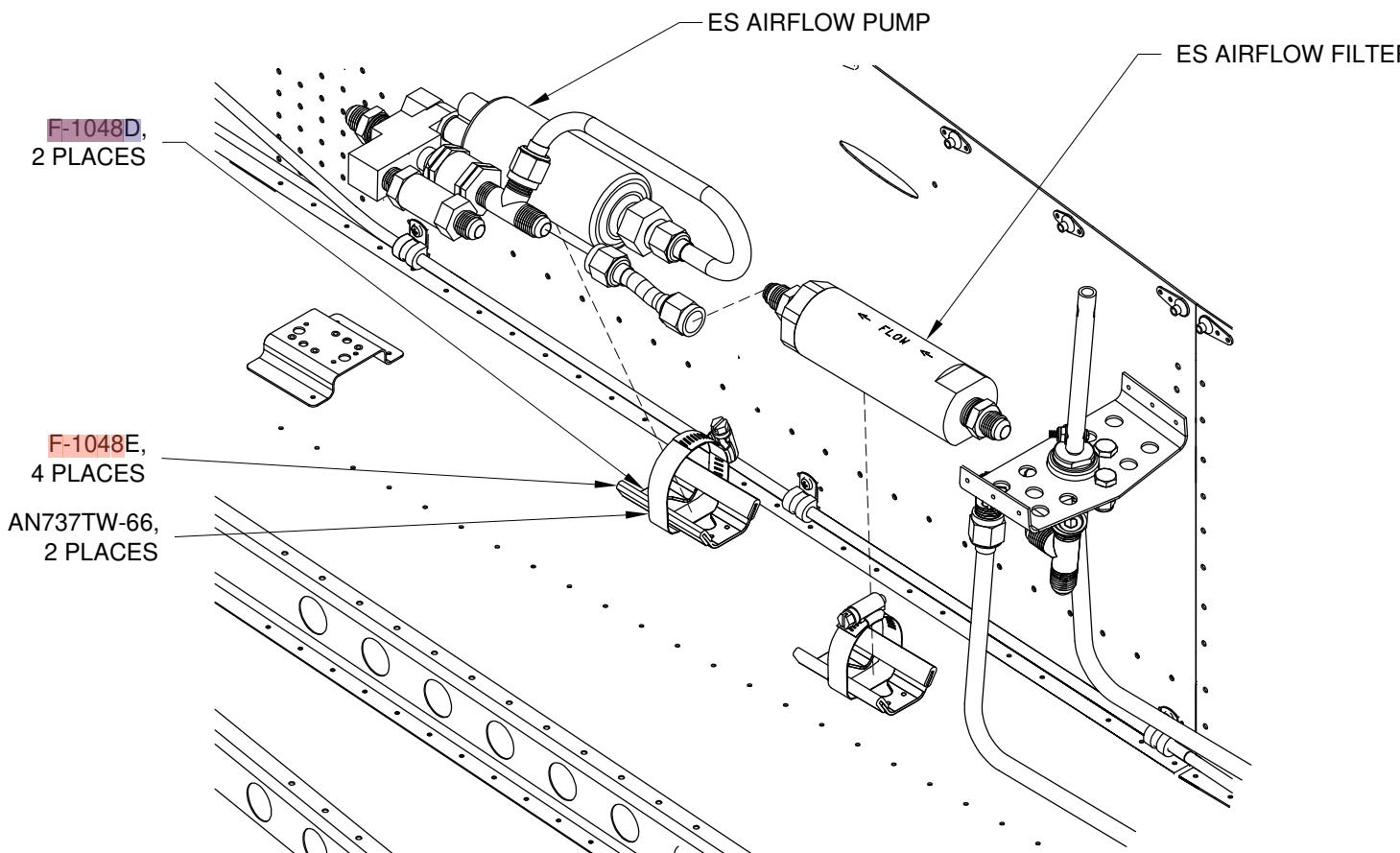


**FIGURE 1: FUEL CRADLE PADS**

Step 2: Place the F-1048E Fuel Cradle Pads over the flanges of both F-1048D Fuel Filter Brackets. See Figure 2.

Step 3: Temporarily center the cylindrical portion of the ES AIRFLOW FUEL PUMP and the ES AIRFLOW FILTER on their respective F-1048D Fuel Filter Brackets. Create a fuel line from ATO-035X3/8 that will connect the filter to the pump. Place a AN818-6D Nut and AN819-6D Sleeve on each end of the fuel line then flare the ends (see Section 5P). Connect the fuel line to both the filter and the pump (check that the filter flow direction arrow is pointing away from the VA-178G Fuel Valve and towards the pump). See Figure 2.

Step 4: Insert AN737TW-66 Hose Clamps trough the slots in the F-1048D Fuel Filter Brackets. Insert the fuel line, ES AIRFLOW FUEL PUMP and FILTER subassembly into the fuel filter brackets as shown in Figure 2. Tighten the hose clamps.



**FIGURE 2: FILTER AND PUMP INSTALLATION**

Step 5: Most engine monitors use the Flo-Scan or FT-60 fuel flow transducer. An optional installation kit, PN# IE FLO-SCAN MOUNT KIT for the Flo-Scan is available through VAN'S ACCESSORY CATALOG. Install the flo-scan now using the instructions and hardware provided in the optional kit or skip to Step 6 if not using the flo-scan.

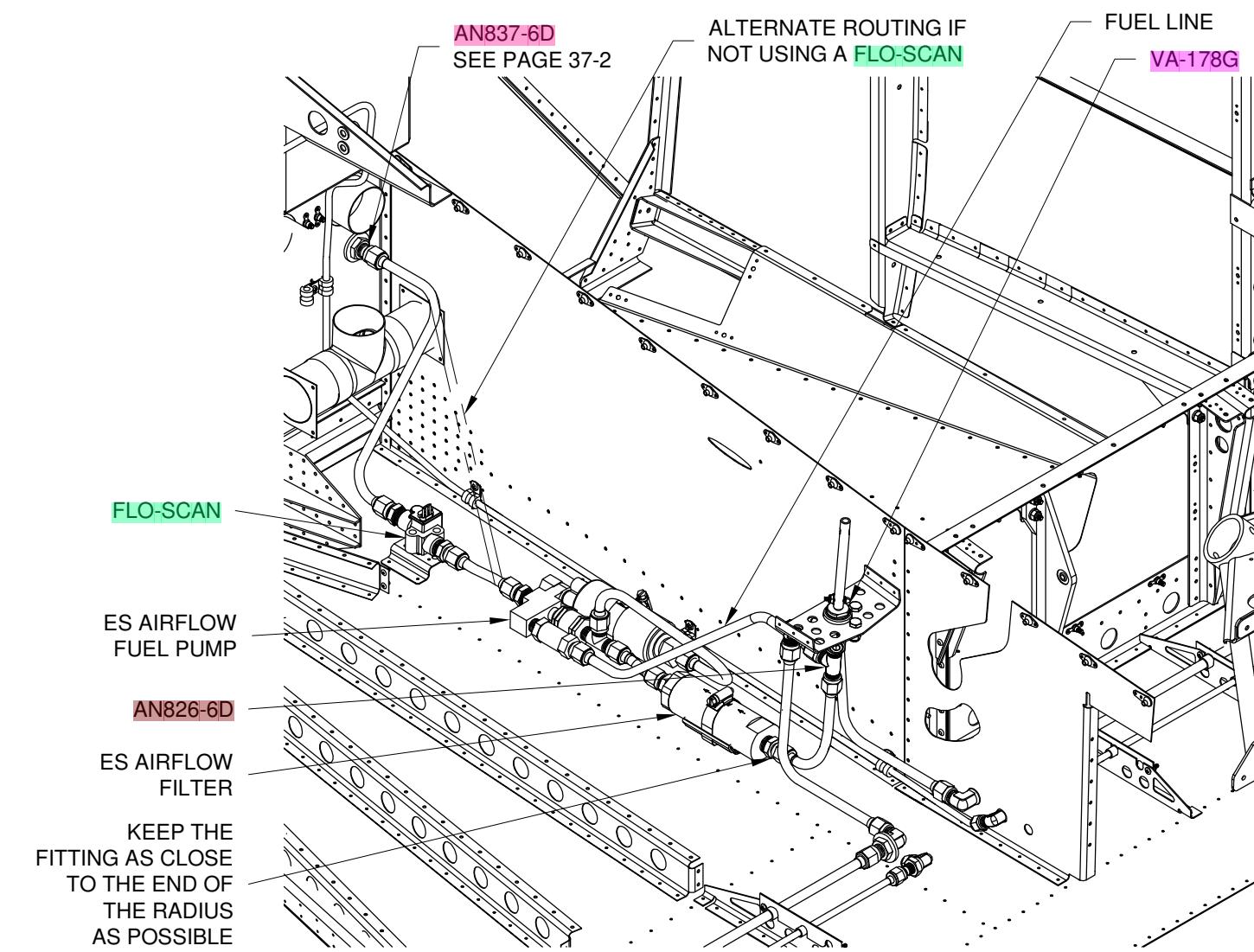
Make a fuel line that connects the ES AIRFLOW FUEL PUMP to the flo-scan FT-60. Install AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare the ends.

Make a fuel line that connects the flo-scan to the AN837-6D 45° Elbow Bulkhead Fitting attached to the F-1001 Firewall Bulkhead Assembly. Install AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare the ends.

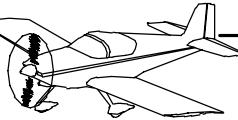
Check that the fuel lines have adequate clearance from all aircraft structure then install them. See Figure 3.

Step 6: If not using the Flo-Scan or FT-60 make a fuel line that directly connects from the ES AIRFLOW FUEL PUMP to the AN837-6D 45° Elbow Bulkhead Fitting attached to the F-1001 Firewall Bulkhead Assembly. This fuel line should follow the alternate fuel line depiction shown with phantom lines in Figure 3 and have adequate clearance from all parts of the aircraft structure.

Step 7: Make a fuel line that connects the bottom of the AN826-6D Tee Fitting (on the bottom of the VA-178G Fuel Valve) to the inlet side of the ES AIRFLOW FILTER. Keep this line as far forward as possible to provide clearance for the control system. Make a fuel line that connects the check valve on the ES AIRFLOW FUEL PUMP to the horizontal leg of the tee fitting on the bottom of the fuel valve. See Figure 3.



**FIGURE 3: FINISHING THE TUNNEL FUEL LINES**



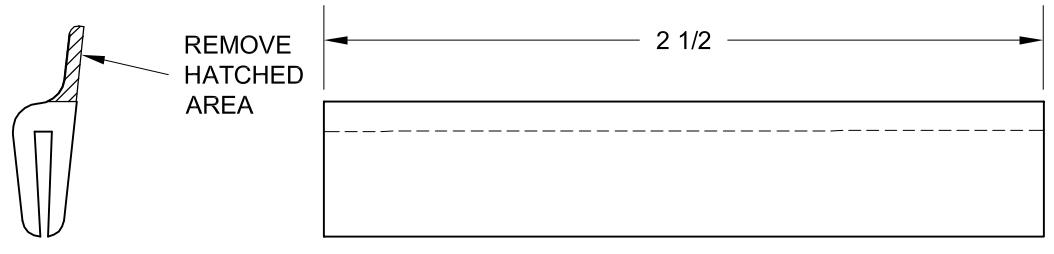
**NOTE:** The next two pages depict the installation of a carbureted system between the VA-178G Fuel Valve and the F-1001 Firewall Bulkhead Assembly. The ES AIRFLOW FILTER and ES 40108 Facet Pump are not included in the kit but can be purchased through Van's Accessory Catalog.

Step 1: Create two F-1048E Fuel Cradle Pads out of rubber channel as shown in Figure 1.

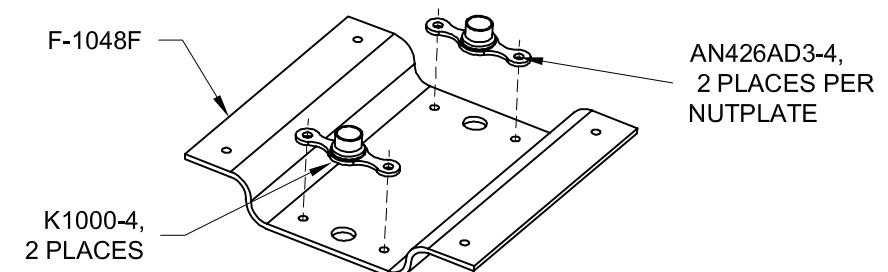
Step 2: Place the F-1048E Fuel Cradle Pads over the flanges of the F-1048D Fuel Filter Brackets. See Figure 4.

Step 6: Final-Drill #40 the nutplate attach holes in the F-1048F Facet Pump Bracket. Deburr all the holes and edges then prime if desired.

Step 7: Rivet two nutplates to the F-1048F Facet Pump Bracket as shown in Figure 3. Rivet the facet pump bracket to the F-1072 Fwd Fuse Bottom Skin per the callouts in Figure 2.



**FIGURE 1: FUEL CRADLE PADS**

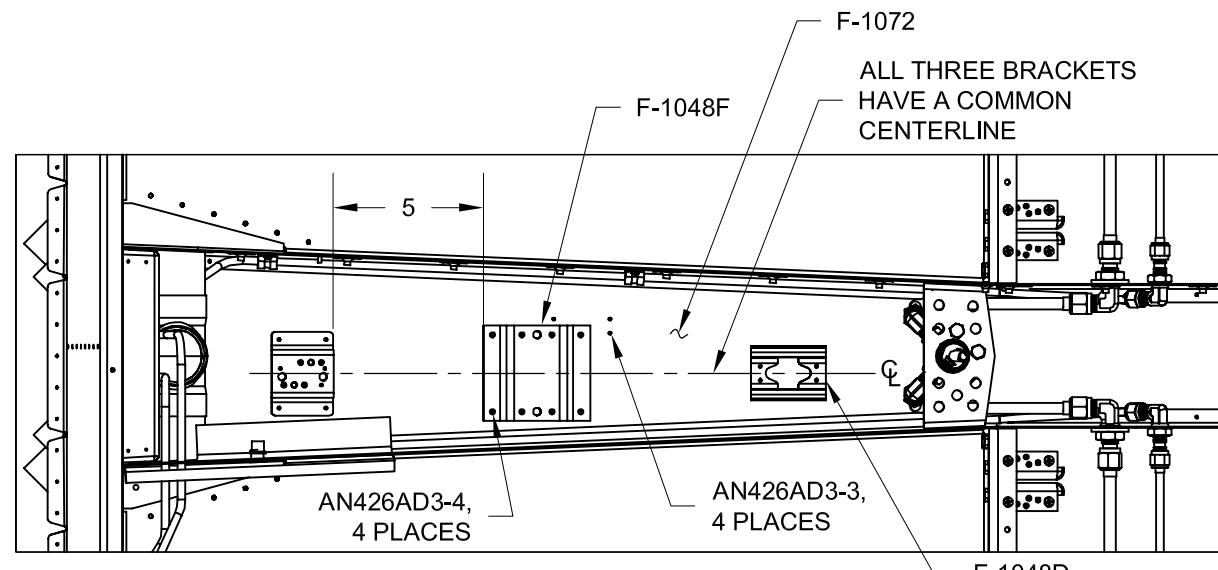


**FIGURE 3: INSTALLING NUTPLATES**

Step 3: Remove the forward most F-1048D Fuel Filter Bracket. Position the F-1048F Facet Pump Bracket as shown in Figure 2, then match-drill #40 the four attach holes in the flanges of the facet pump bracket into the F-1072 Fwd Fuse Bottom Skin. Remove the facet pump bracket.

Step 4: Machine countersink (flush on the bottom surface) the four holes in the F-1072 Fwd Fuse Bottom Skin that attach the forward most F-1048D Fuel Filter Bracket and the four holes that attach the F-1048F Facet Pump Bracket. Machine countersink for the head of an AN426AD3 rivet then deburr the top side of all eight holes.

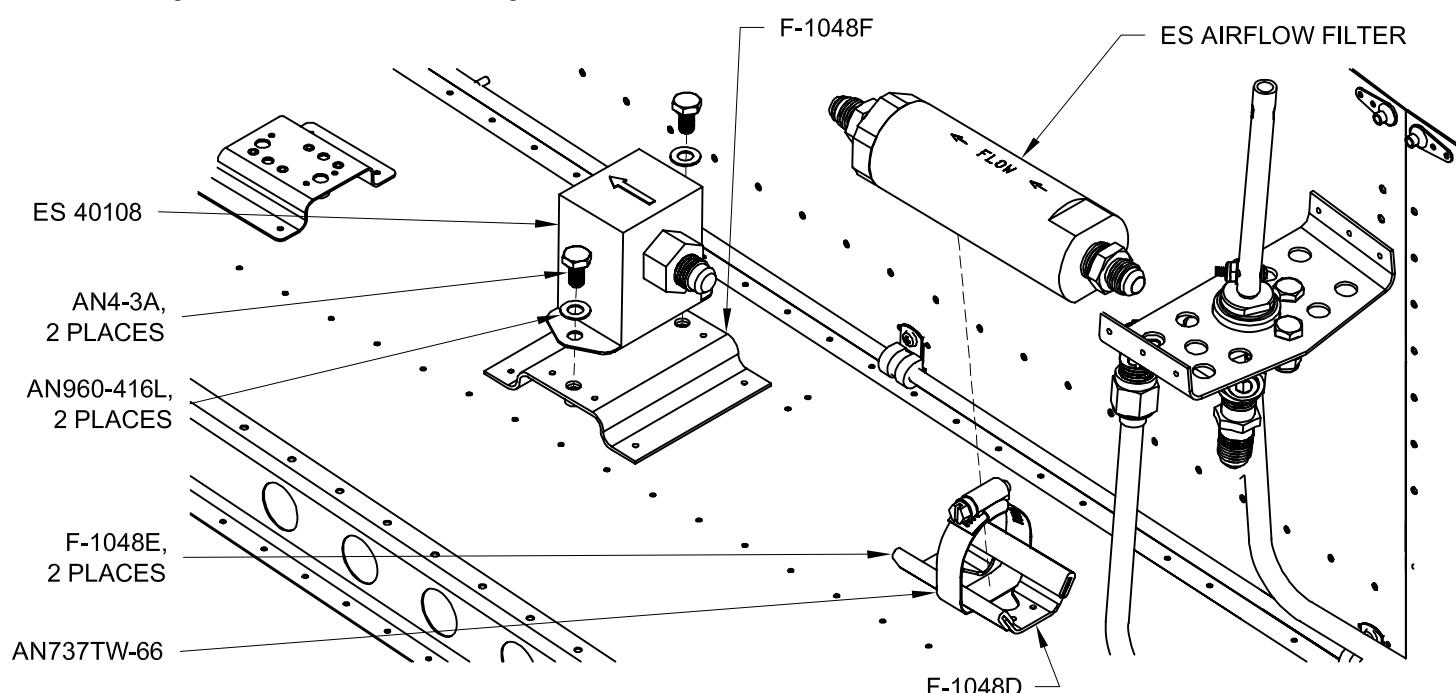
Step 5: Fill the four holes that attached the forward most F-1048D Fuel Filter Bracket with rivets as called out in Figure 2.



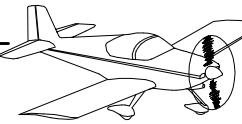
**FIGURE 2: MATCH-DRILLING THE FACET FUEL PUMP BRACKET**

Step 8: Insert a AN737TW-66 Hose Clamp through the slots in the remaining F-1048D Fuel Filter Bracket. Center the ES AIRFLOW FILTER in the F-1048D Fuel Filter Bracket then tighten the hose clamp. See Figure 4.

Step 9: Temporarily place the ES 40108 Facet Pump on the F-1048F Facet Pump Bracket as shown in Figure 4. Refer to Page 37-6, Figure 1 to make the fuel line that connects the ES AIRFLOW FILTER to the facet pump. Insert AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line, then flare the ends (see Section 5P). Attach the fuel line to the filter and the facet pump (check that both the pump and the filter have the proper flow direction). Attach the facet pump to the facet pump bracket using the hardware called out in Figure 4.



**FIGURE 4: FILTER AND PUMP INSTALLATION**



Step 1: Most engine monitors use the Flo-Scan or FT-60 fuel flow transducer. An optional installation kit PN# IE FLO-SCAN MOUNT KIT for the Flo-Scan is available through VAN'S ACCESSORY CATALOG. If not using the Flo-Scan or FT-60 skip to Step 2.

Place the flo-scan or FT-60 in the installed position. Make a fuel line that connects the ES 40108 Facet Pump to the flo-scan or FT-60. Slide AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare each end. Attach the fuel line to the facet pump and the flo-scan or FT-60. Install the flo-scan or FT-60 using the instructions and hardware provided in the optional kit.

Make a fuel line that connects the flo-scan or FT-60 to the AN837-6D 45° Elbow Bulkhead fitting attached to the firewall. The fuel line should have adequate clearance from all aircraft structure. Slide AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare each end. Attach the fuel line to the 45° elbow bulkhead fitting and the flo-scan or FT-60. See Figure 1.

Step 2: If not using the flo-scan or FT-60 make a fuel line that directly connects from the ES 40108 Facet Pump to the AN837-6D 45° Elbow Bulkhead Fitting attached to the F-1001 Firewall Bulkhead Assembly. This fuel line should follow the alternate depiction shown with phantom lines in Figure 1 and have adequate clearance from all the aircraft structure. Slide AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare each end. Attach the fuel line to the 45° elbow bulkhead fitting and the facet pump.

Step 3: Make a fuel line that connects the AN816-6D Nipple (on the bottom of the VA-178G Fuel Valve) to the inlet side of the ES AIRFLOW FILTER. Keep this line as far forward as possible to provide clearance for the control system. Slide AN818-6D Nuts and AN819-6D Sleeves over each end of the fuel line then flare each end. Install the fuel line between the nipple and the filter.

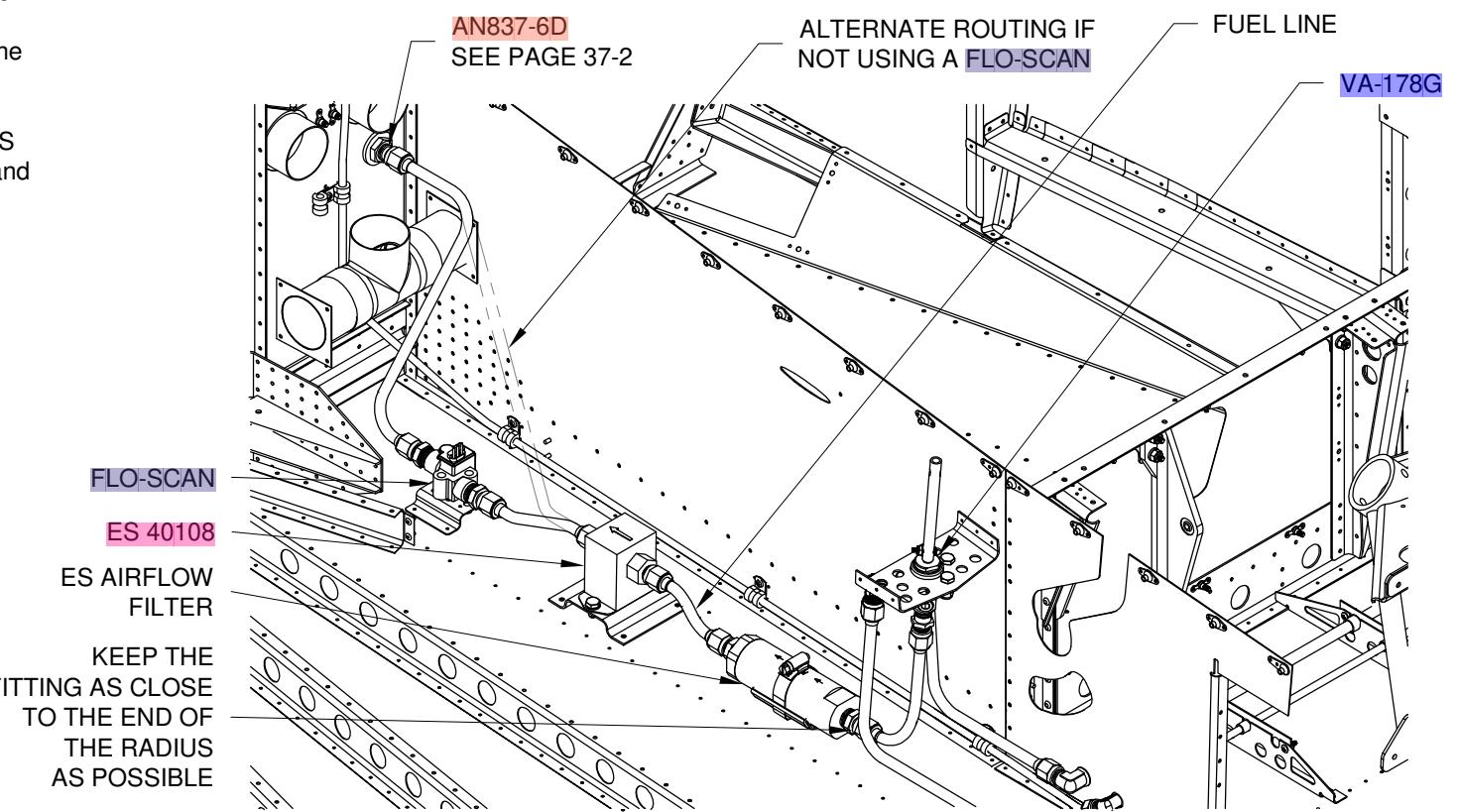
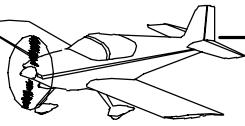
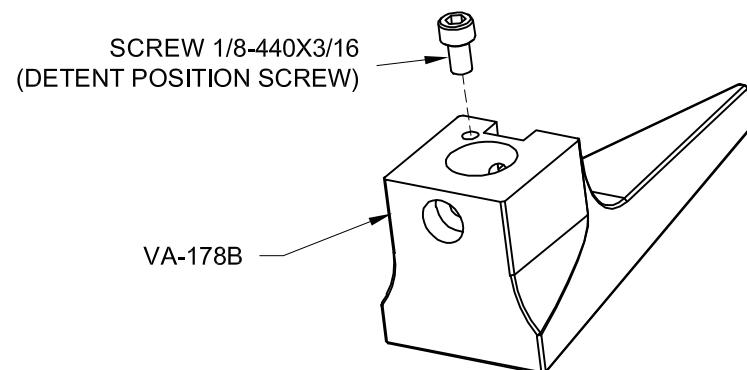


FIGURE 1: FINISHING THE TUNNEL FUEL LINES



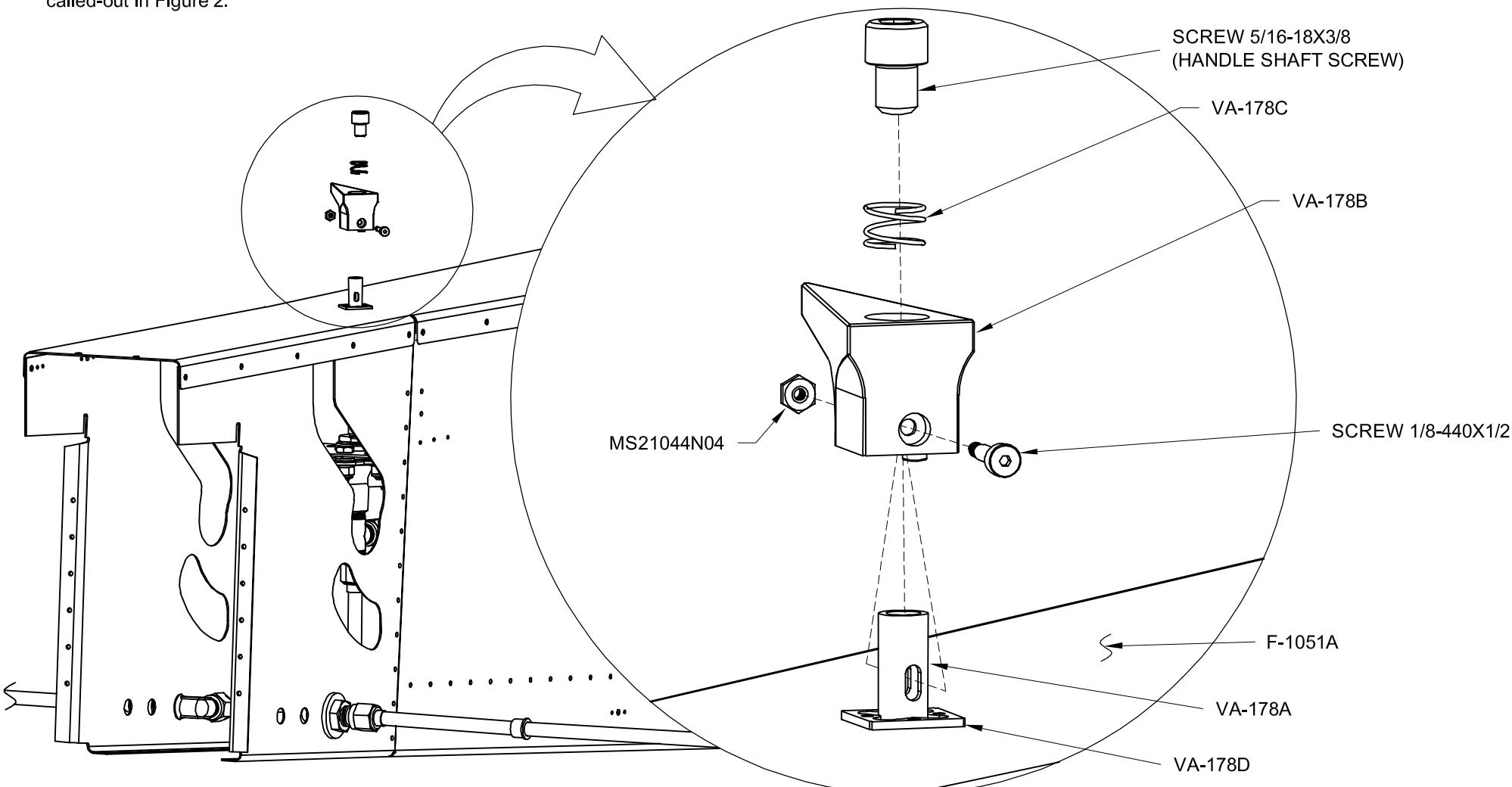
Step 1: Install the Detent Position Screw in the bottom face of the VA-178B Detent Fuel Handle, as shown in Figure 1.



**FIGURE 1: DETENT POSITION SCREW INSTALLATION**

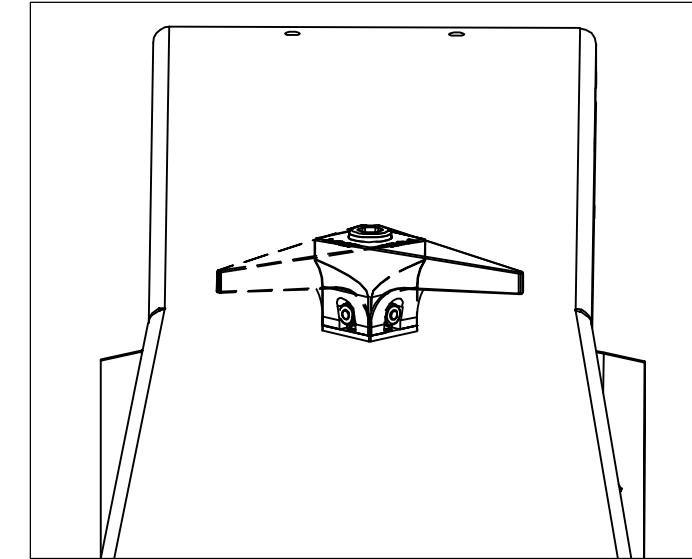
Step 2: Place the VA-178B Detent Fuel Handle onto the VA-178A Fuel Handle Shaft, then install the VA-178C Fuel Valve Spring using the Handle Shaft Screw, as shown in Figure 2.

Step 3: Align the VA-178B Detent Fuel Handle with the slot in the VA-178A Fuel Handle Shaft, then install the handle using the screw and nut called-out in Figure 2.

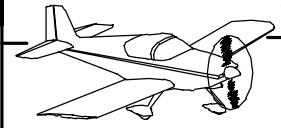


**FIGURE 2: DETENT FUEL HANDLE INSTALLATION**

Step 4: After installation, ensure the handle lifts, rotates and seats correctly. For vertical position adjustment refer to Page 37-2, Figure 1. Add or remove the AN960-416 Washers, between the Fuel Valve and the F-1048C-1 Fuel Valve Bracket, until the Detent Fuel Handle contacts the Detent Plate when seated. Fuel Handle shown seated in Figure 3.

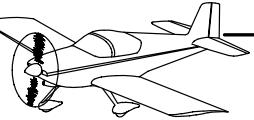


**FIGURE 3: CHECK DETENT FUEL HANDLE MOVEMENT**



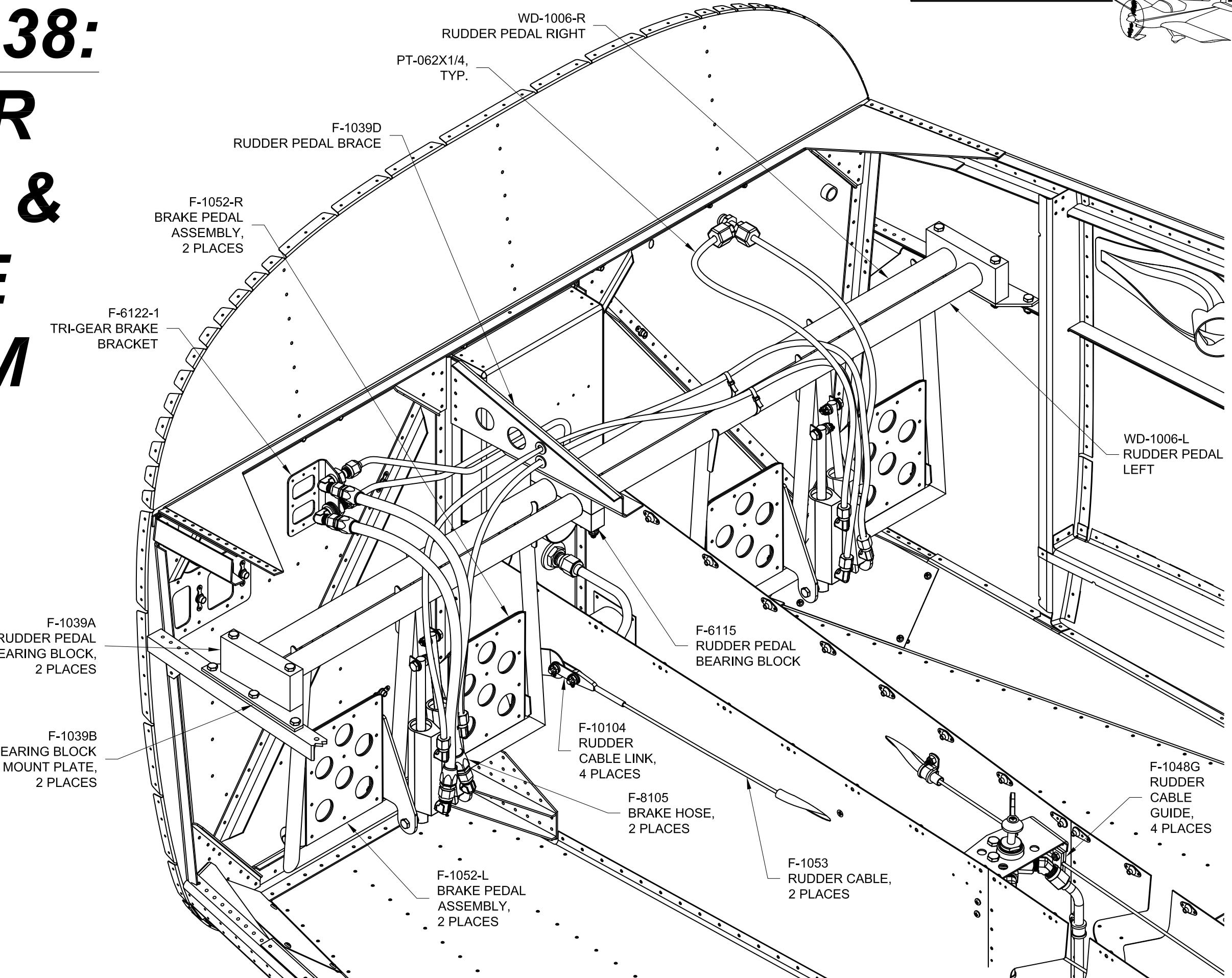
VAN'S AIRCRAFT, INC.

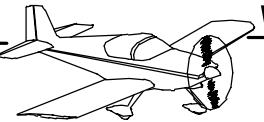
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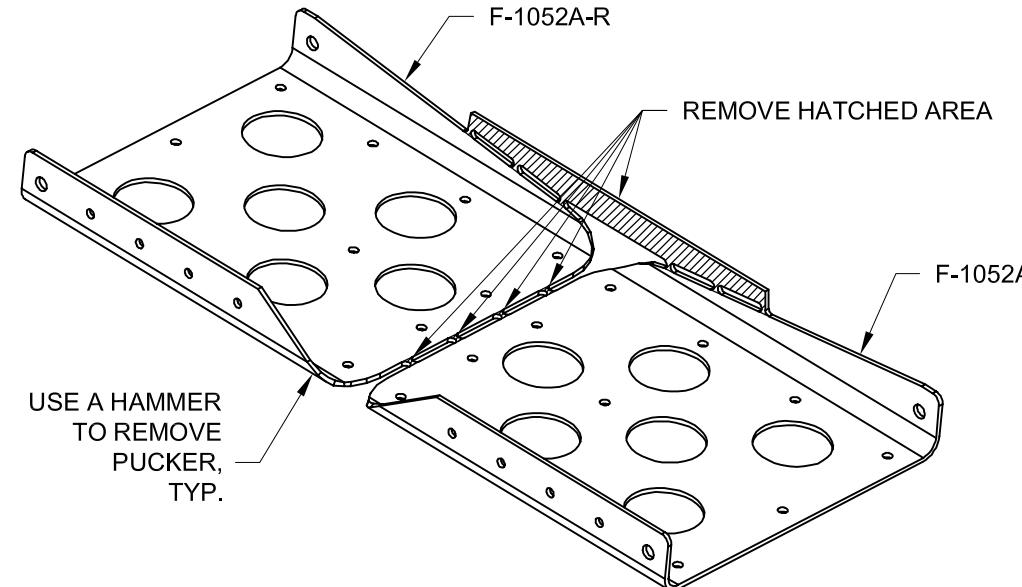
# SECTION 38:

## RUDDER PEDALS & BRAKE SYSTEM



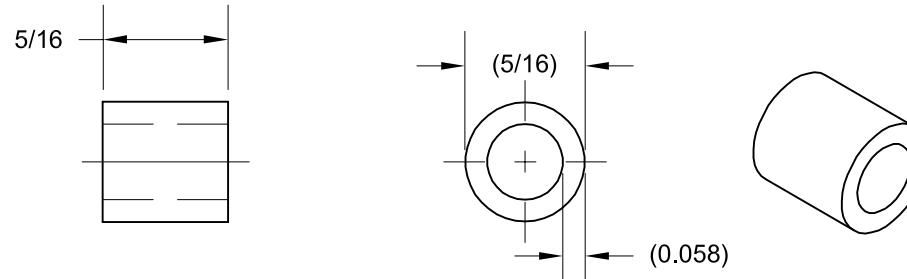


Step 1: Remove the hatched area as shown in Figure 1 from both F-1052 Brake Pedal Sets to create two F-1052A-L and -R Brake Pedals. Remove the tabs and deburr the edges on all the brake pedals.



**FIGURE 1: CREATING THE BRAKE PEDALS**

Step 2: Create four F-1097 Spacers from AT6-058X5/16 per the dimensions in Figure 2.



**FIGURE 2: SPACER DIMENSIONS**

**NOTE: The following steps on this page are for a right brake pedal. Repeat these steps for the other right and two left brake pedals. The left brake pedal is a mirror of the right.**

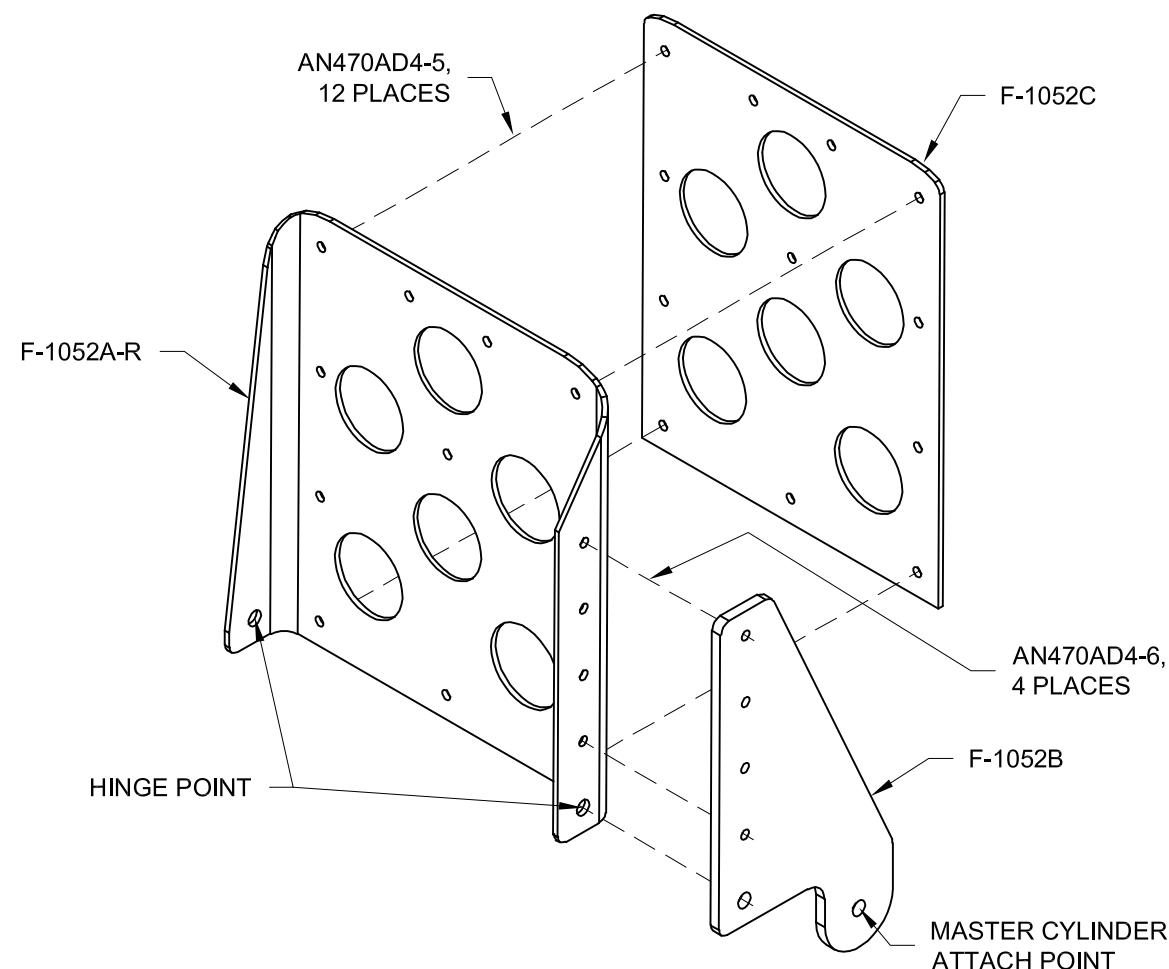
Step 3: Cleco the F-1052A-R Brake Pedal, F-1052B Brake Pedal Side Plate, and F-1052C Brake Pedal Doubler Plate together as shown in Figure 3.

Step 4: Final Drill #30 all the holes common between the F-1052A-R Brake Pedal and the F-1052C Brake Pedal Doubler Plate. Final-Drill #30 the upper four holes common to the brake pedal and the F-1052B Brake Pedal Side Plate. Final-Drill #12 both hinge points and the master cylinder attach point (see Figure 3).

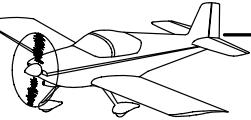
Step 5: Disassemble the brake pedal and deburr all parts.

Prime and paint parts if desired.

Step 6: Rivet the F-1052B Brake Pedal Side Plate and F-1052C Brake Pedal Doubler Plate to the F-1052A-R Brake Pedal per the callouts in Figure 3. This will create the F-1052-R Brake Pedal Subassembly.



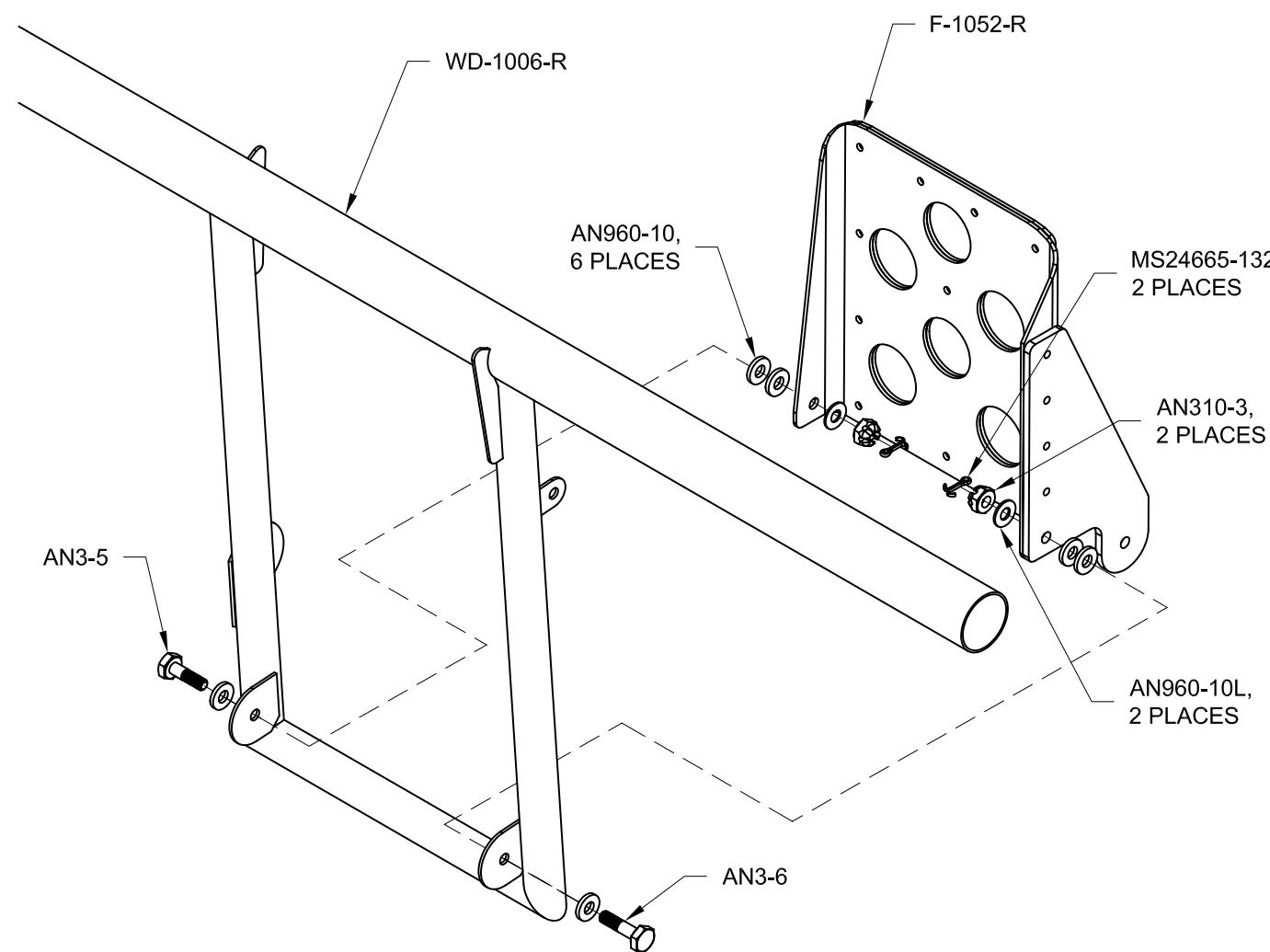
**FIGURE 3: CREATING THE BRAKE PEDAL SUBASSEMBLY**



Step 1: Final-Drill #12 all the bolt holes in the WD-1006-L and -R Rudder Pedals.

**NOTE:** It may be necessary to use a different mix of AN960-10 and AN960-10L washers than shown in the hardware callouts given in Figure 1. It is important that the brake pedals move freely with no friction to prevent a dragging brake. Use a plastic hammer to "slightly" adjust the brake pedal mounting ears if required.

Step 2: Attach the F-1052-R Brake Pedal Subassembly to the WD-1006-R Rudder Pedal Right using the hardware called out in Figure 1.



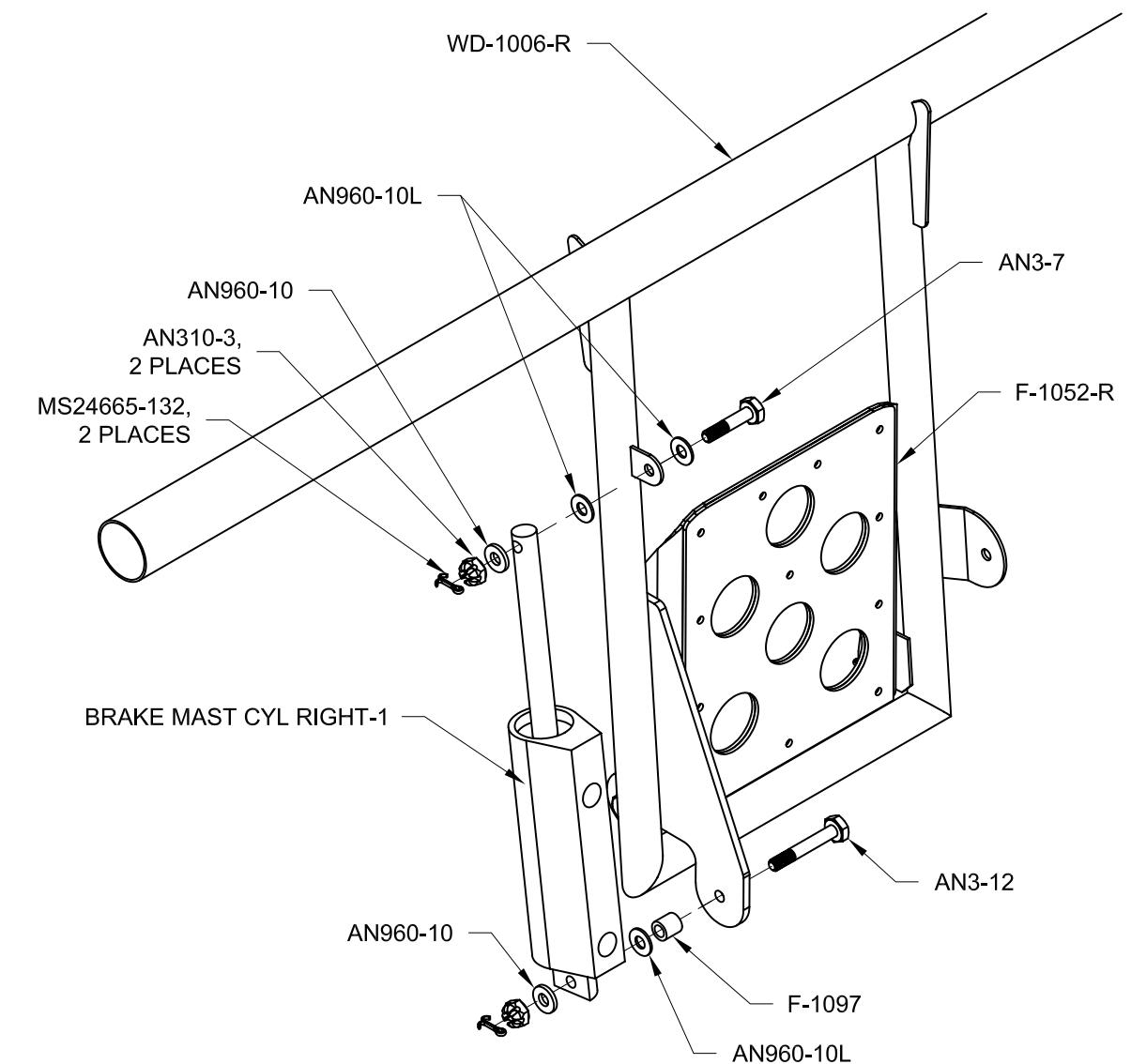
**FIGURE 1: BRAKE PEDAL INSTALLATION**

Step 3: Attach the BRAKE MAST CYL RIGHT-1 Right Brake Master Cylinder to the WD-1006-R Rudder Pedal Right and the F-1052-R Brake Pedal. Repeat Steps 1-3 to install the remaining F-1052-L and -R Brake Pedal Subassemblies. The left brake pedal subassembly installation is a mirror of the right.

**NOTE:** When installing fluid fittings with pipe threads do not use Teflon tape. Use instead Fuel Lube or equivalent pipe thread sealing paste.

Step 4: Refer to the isometric view on Page 38-1 and Page 38-6, Figure 1. Install an AN822-4D Elbow into the lower ports on both brake master cylinders on the pilot side of the aircraft. Note the clocking of the elbows in Page 38-6, Figure 1 which routes the F-8105 Brake Hoses between the upper ports of the brake master cylinders and away from the brake pedal area.

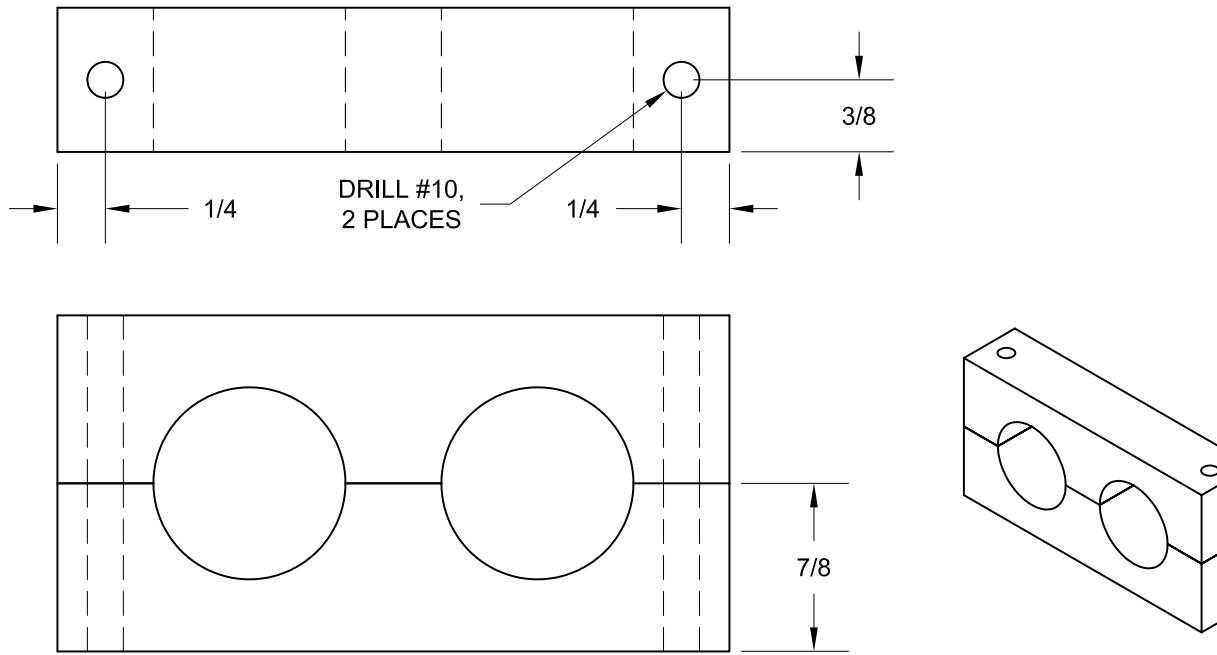
Step 5: Refer again to the isometric view on Page 38-1 and Page 38-6, Figure 1 and install F 69-F-04X02 Brass Elbows in the six remaining ports on both the pilot and co-pilot brake master cylinders. Again note the clocking of the lower elbows on the co-pilot side of the aircraft in Page 38-6, Figure 1.



**FIGURE 2: ATTACHING THE MASTER CYLINDER**

Step 1: Locate the F-6115 Rudder Pedal Bearing Block. Unlike the other bearing blocks the holes for the rudder pedals pass all the way through the part. Using a drill press, drill #10 two holes through the rudder pedal bearing block as shown in Figure 1.

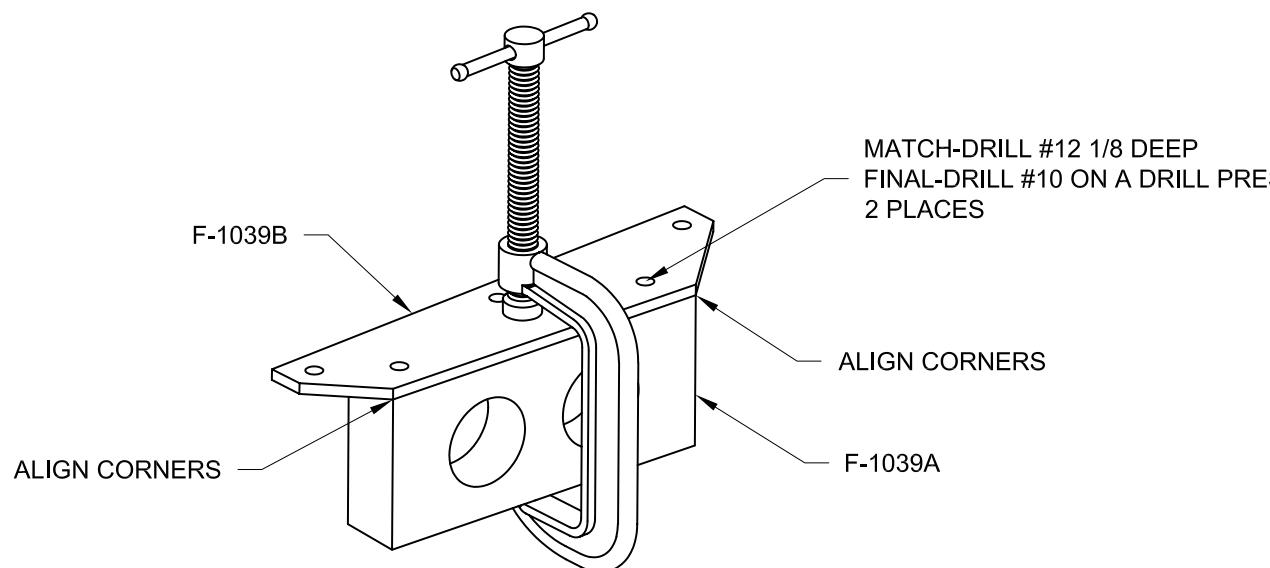
Step 2: Cut the F-6115 Rudder Pedal Bearing Block in half as shown in Figure 1.



**FIGURE 1: MODIFYING THE F-1039B BEARING BLOCK**

Step 3: Clamp the F-1039B Bearing Block Mount Plate to the F-1039A Rudder Pedal Bearing Block as shown in Figure 2. Match-Drill #12 the holes indicated in Figure 2 approximately 1/8 deep into the bearing block. Unclamp the parts, then use a drill press to finish drilling both holes #10 in the bearing block. Repeat this step with the remaining mount plate and bearing block.

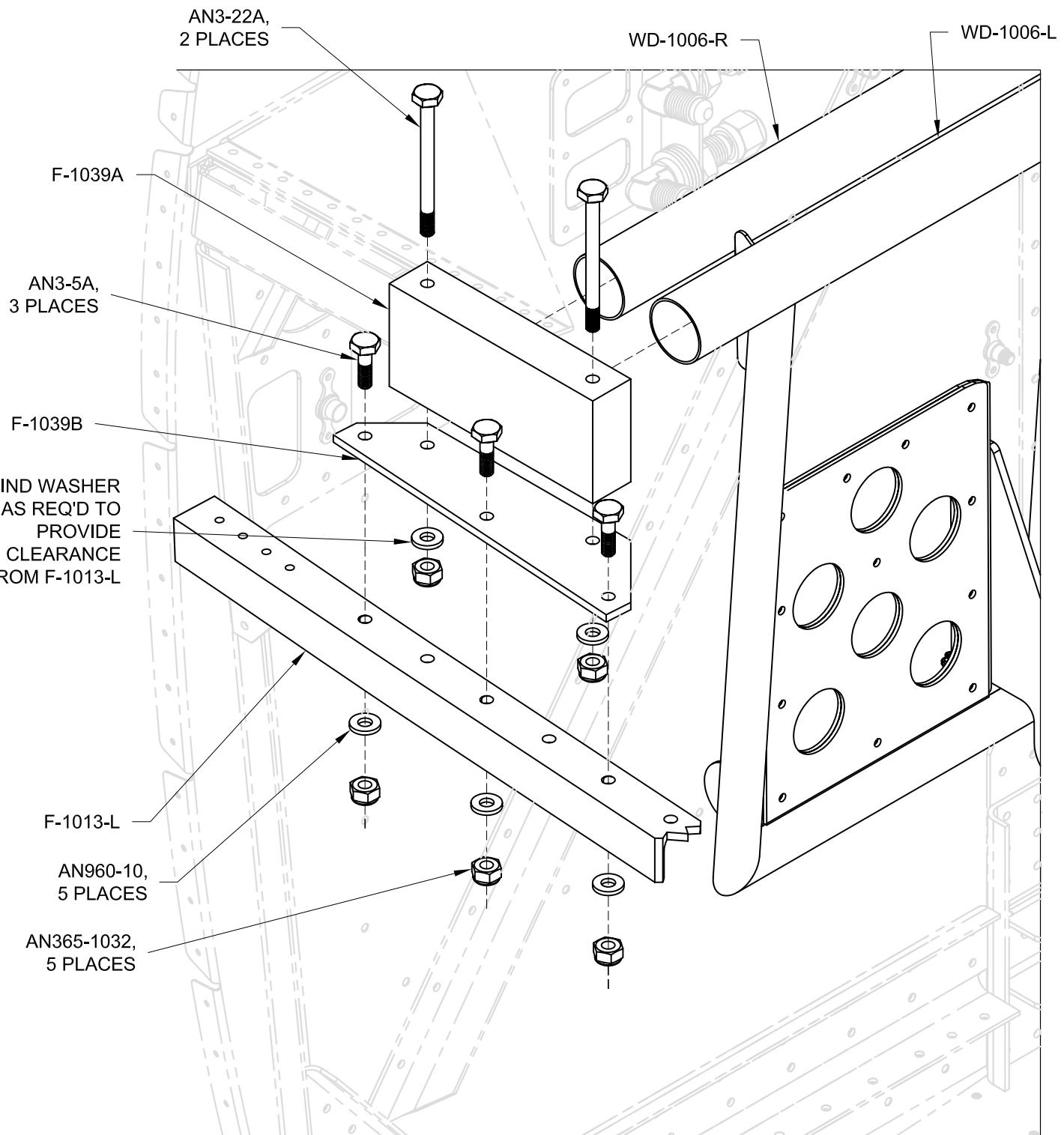
Step 4: Final-Drill #12 the remaining holes in the F-1039B Bearing Block Mount Plate. Deburr the holes and edges of the bearing block mount plate. Prime the bearing block mount plate if desired.



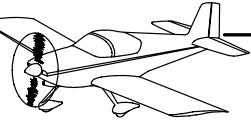
**FIGURE 2: MATCH-DRILLING THE F-1039A BEARING BLOCK**

Step 5: Bolt the F-1039B Bearing Block Mount Plate to the F-1013-L Fwd Fuselage Longeron using the hardware called out in Figure 3. Bolt the remaining mount plate to the F-1013-R Fwd Fuselage Longeron.

Step 6: Slip a F-1039A Rudder Pedal Bearing Block onto either end of the WD-1006-L and -R Rudder Pedals. Bolt the bearing blocks to the F-1039B Bearing Block Mount Plates using the hardware called out in Figure 3.



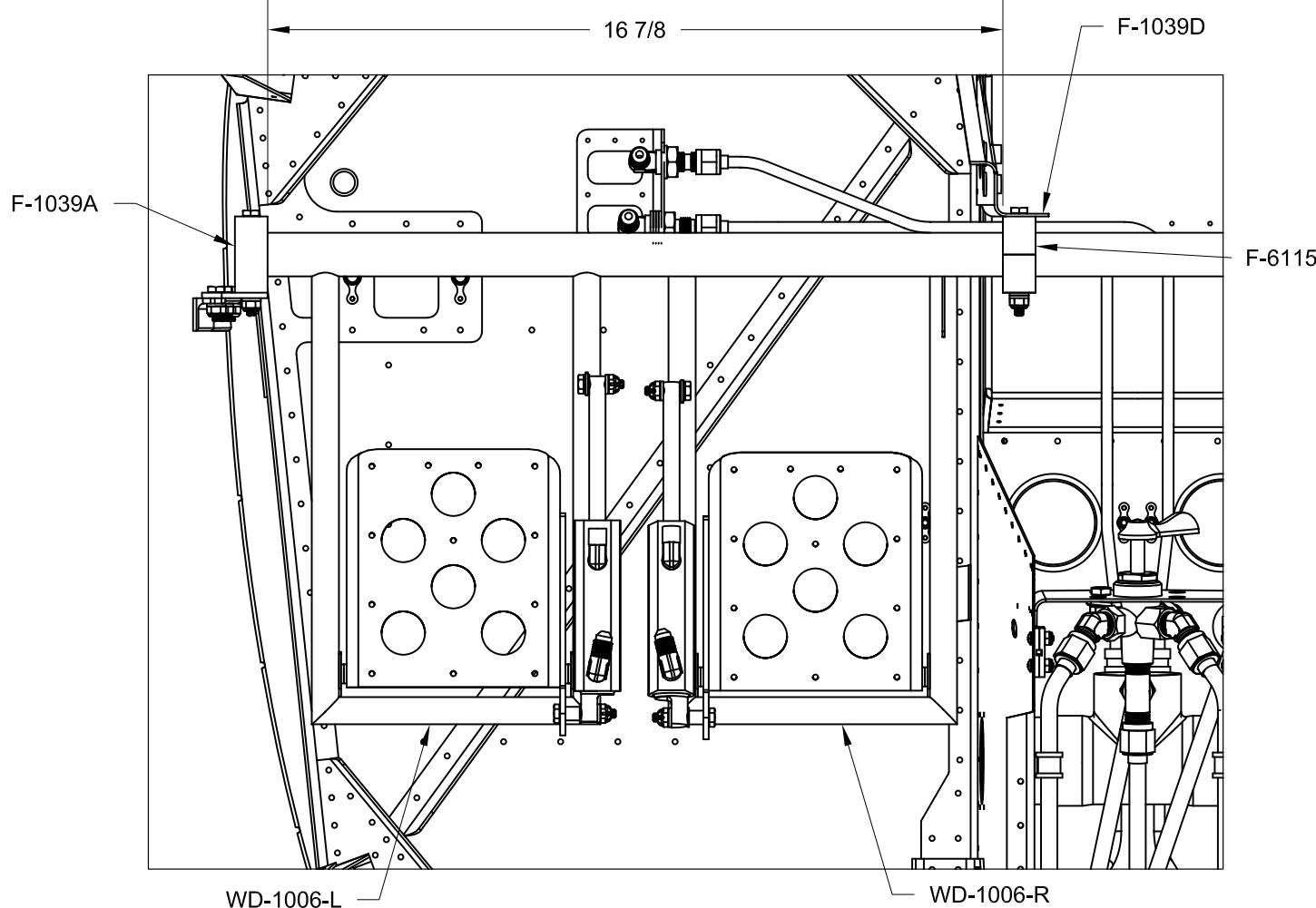
**FIGURE 3: INSTALLING THE RUDDER PEDALS AND BEARING BLOCKS  
(LEFT SIDE SHOWN - RIGHT SIDE IS A MIRROR OF THE LEFT)**



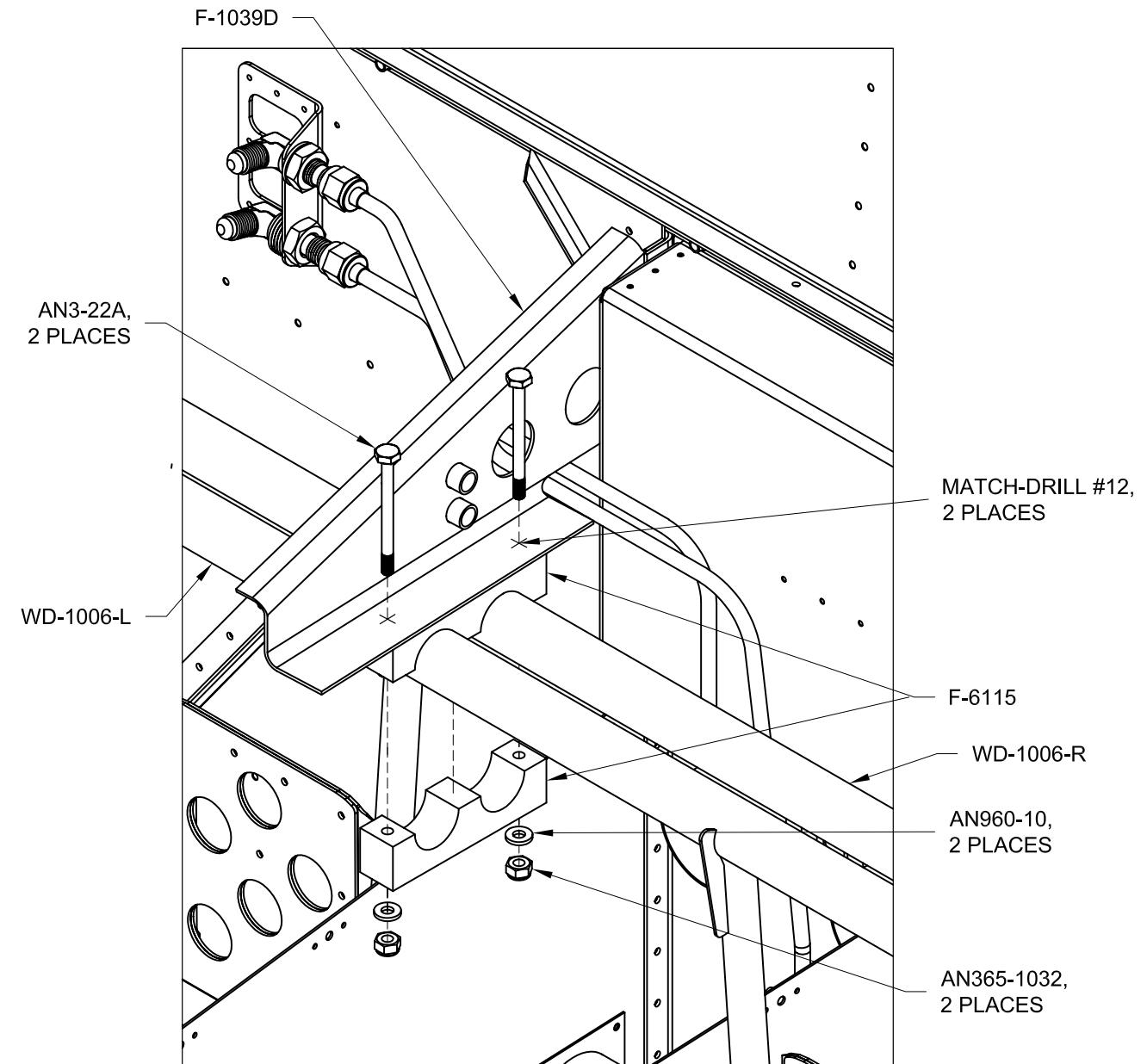
Step 1: Insert upper half of the F-6115 Rudder Pedal Bearing Block under the F-1039D Rudder Pedal Brace and over the WD-1006-L and -R Rudder Pedals as shown in Figure 2. Horizontally space the upper half of the bearing block away from the left F-1039A Rudder Pedal Bearing Block per the dimension in Figure 1.

Step 2: Clamp the upper half of the F-6115 Rudder Pedal Bearing Block to the F-1039D Rudder Pedal Brace. Match-Drill #12 the two vertical holes in the bearing block into the brace. Remove the upper half of the bearing block and deburr the holes in the brace.

Step 3: Bolt both the upper and lower halves of the F-6115 Rudder Pedal Bearing Block to the F-1039D Rudder Pedal Brace as shown in Figure 2.



**FIGURE 1: BEARING BLOCK POSITION**



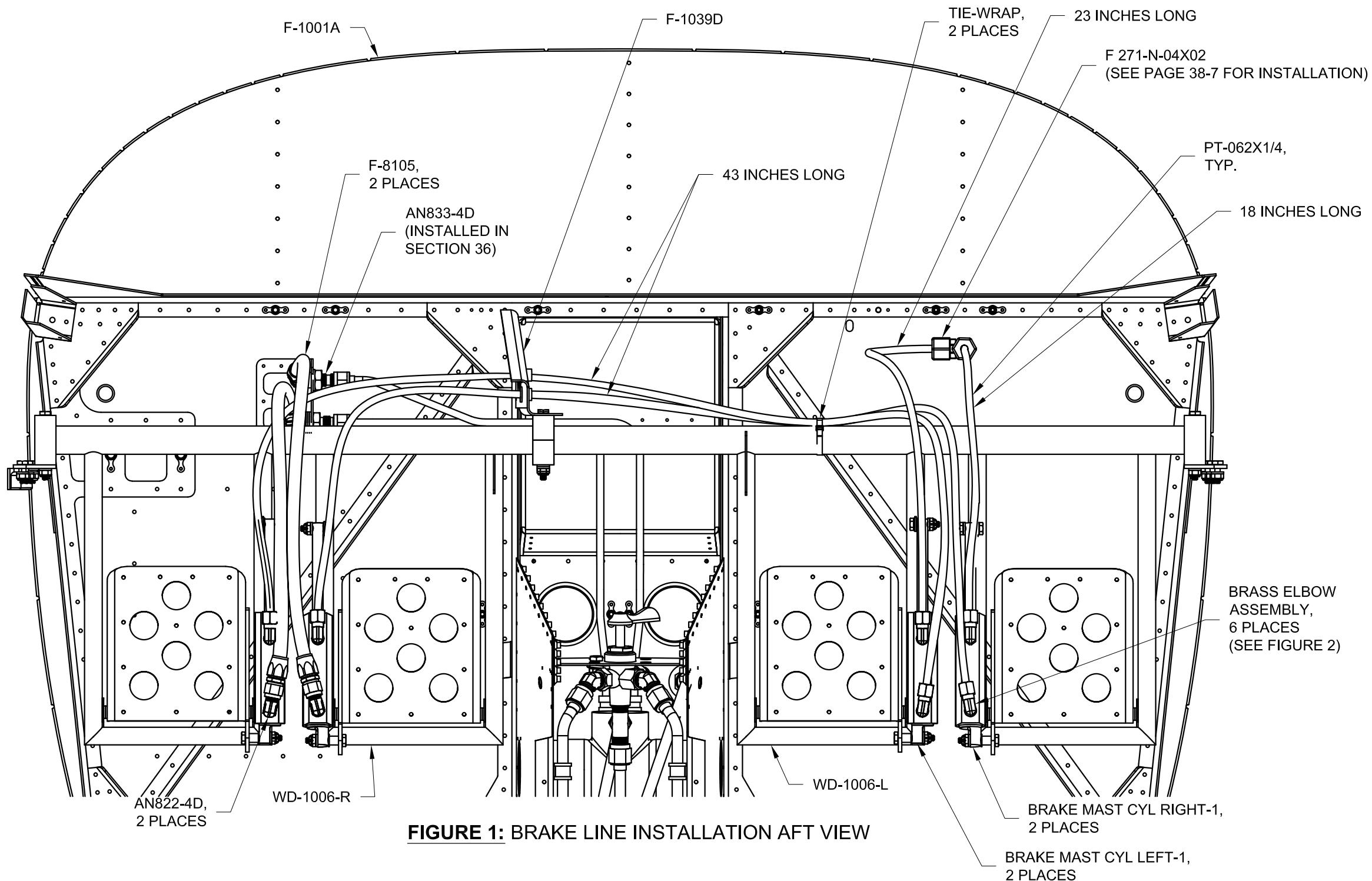
**FIGURE 2: INSTALLING THE BEARING BLOCK TO THE RUDDER PEDAL BRACE**

**NOTE:** Use the isometric view on Page 38-1 and Figure 1 as a reference for installations on this page.

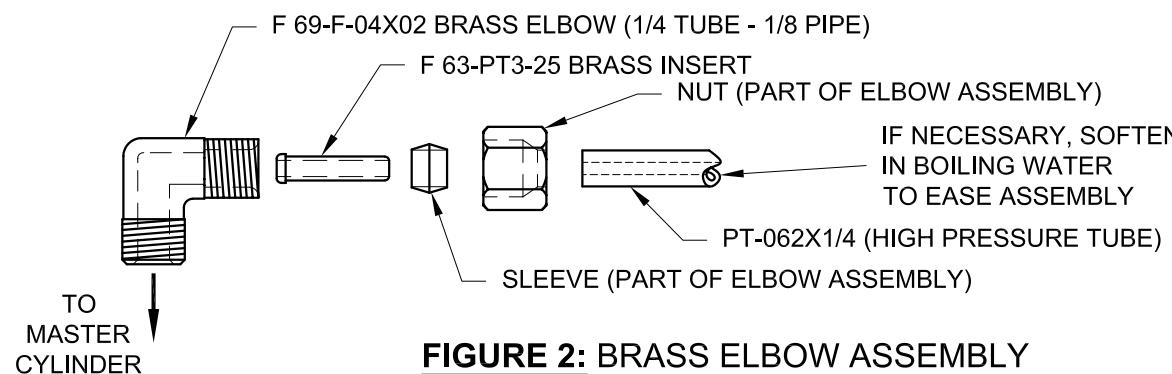
**Step 1:** Connect the F-8105 Brake Hoses from the AN833-4D Elbow Bulkhead Fittings (installed in Section 36 Brake Lines) located on the F-6122-1 Tri-gear Brake Bracket to the AN822-4D Elbows installed in the lower ports of the pilot master cylinders. The brake hoses should be installed so they do not chafe on one another. If hoses are rubbing protect one hose with spiral wrap or equivalent.

**Step 2:** Create the soft brake lines that interconnect the pilot and co-pilot brake master cylinders from PT-062X1/4 (the lengths of these lines are called out in Figure 1). The brake lines interconnect the upper ports of the pilot side brake master cylinders to the lower ports on the co-pilot side brake master cylinders. The lines pass through SB437-4 Snap Bushings in the F-1039D Rudder Pedal Brace and are tie-wrapped to the WD-1006-L and -R Rudder Pedals on the co-pilot side of the aircraft. Connect the soft brake lines to the brass elbows as shown in Figure 2.

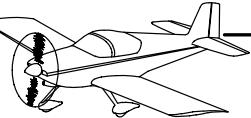
**Step 3:** Create soft brake lines from PT-062X1/4 that are long enough to interconnect the upper ports on the co-pilot brake master cylinders to the F 271-N-04X02 Nylon Male Tee. Connect these lines to the brass elbows in the upper ports of the co-pilot brake master cylinders as shown in Figure 2. The nylon male fitting will be installed and the soft brake lines connected on the next page.



**FIGURE 1: BRAKE LINE INSTALLATION AFT VIEW**



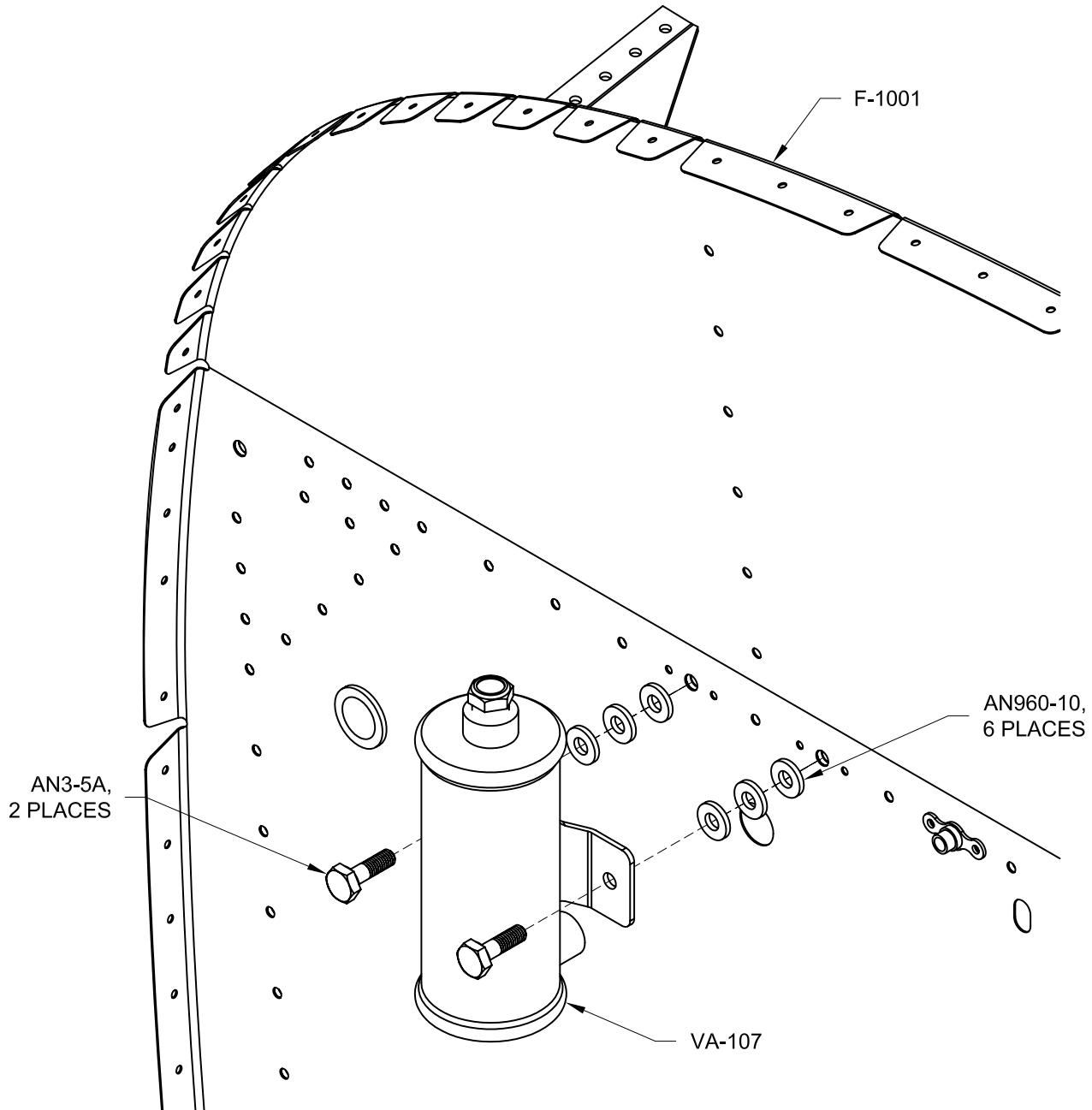
**FIGURE 2: BRASS ELBOW ASSEMBLY**



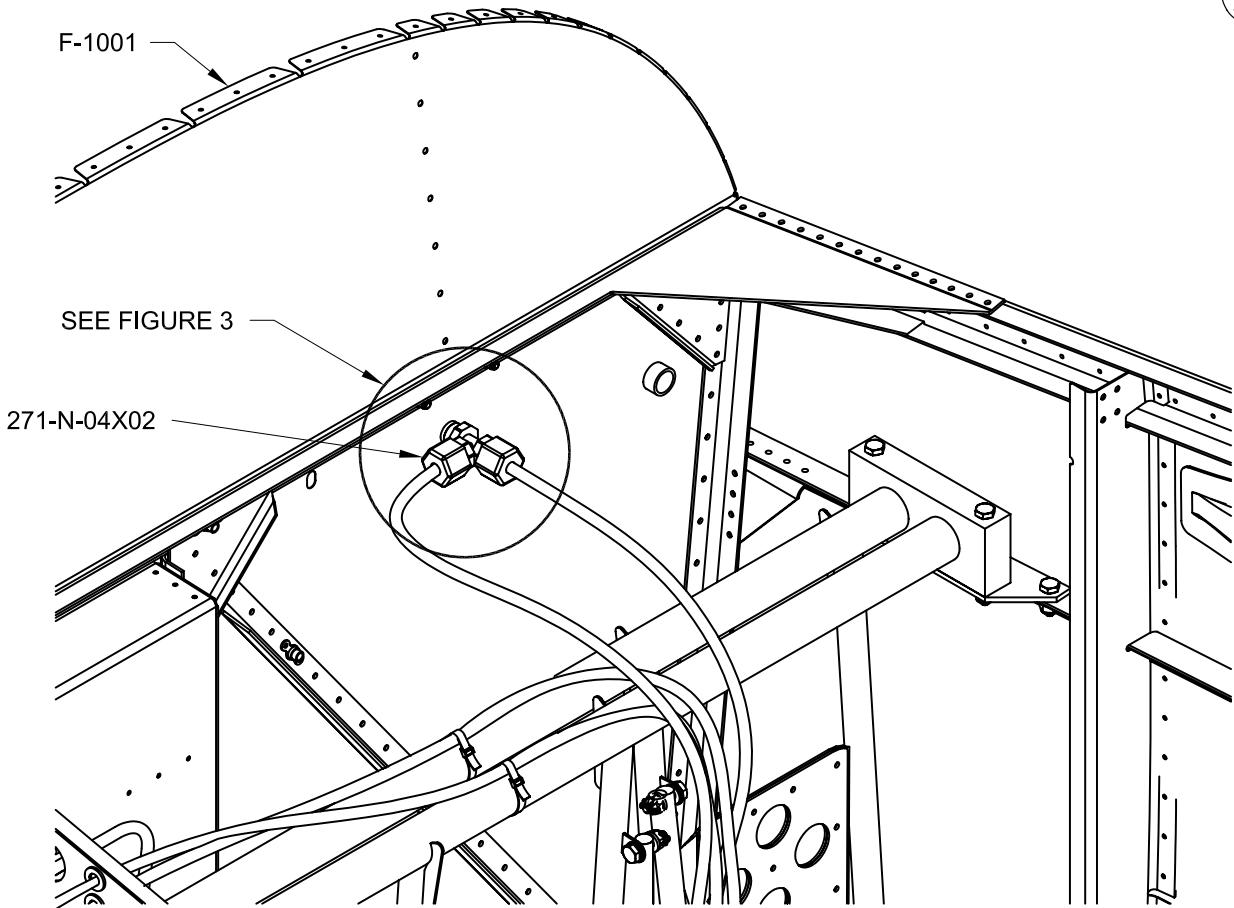
Step 1: Bolt the VA-107 Brake Reservoir to the F-1001 Firewall Bulkhead Assembly as shown in Figure 1.

Step 2: Install the F 271-N-04X02 Male Nylon Tee to the VA-107 Brake Reservoir as shown in Figure 2.

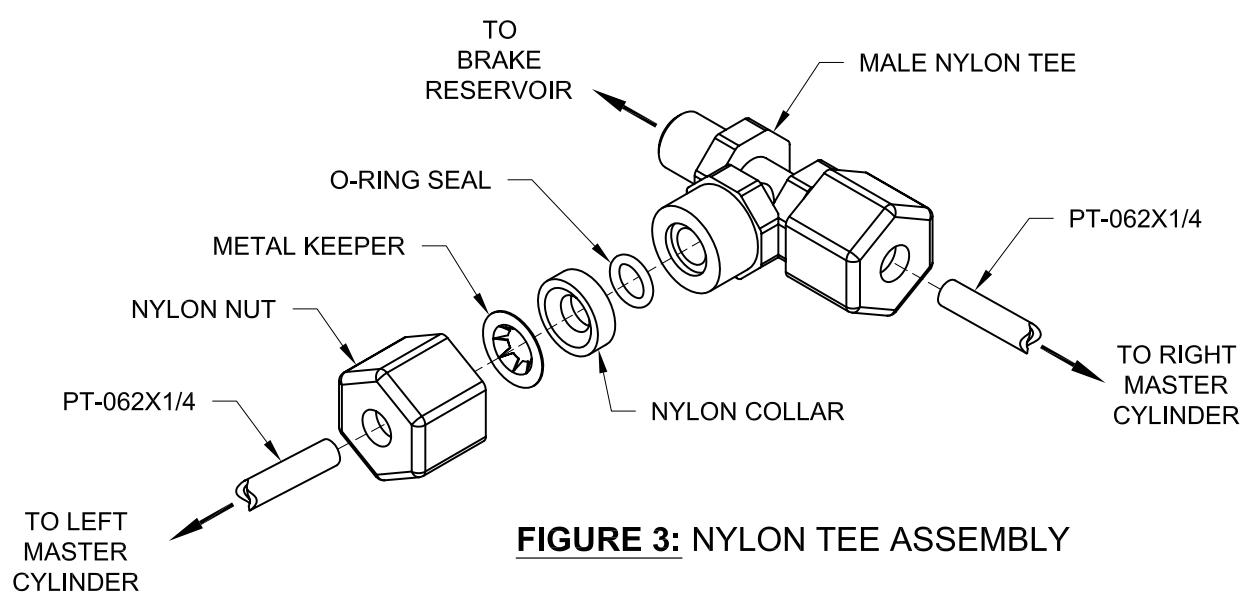
Step 3: Connect the brake lines created on Page 38-6 to the F 271-N-04X02 Male Nylon Tee as shown in Figure 2 and Figure 3.



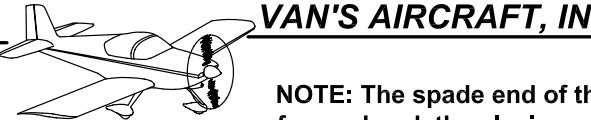
**FIGURE 1: INSTALLING THE BRAKE RESERVOIR**



**FIGURE 2: NYLON TEE INSTALLATION**



**FIGURE 3: NYLON TEE ASSEMBLY**



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**NOTE:** The spade end of the F-1053 Rudder Cable is the forward end, the clevis end is the aft end.

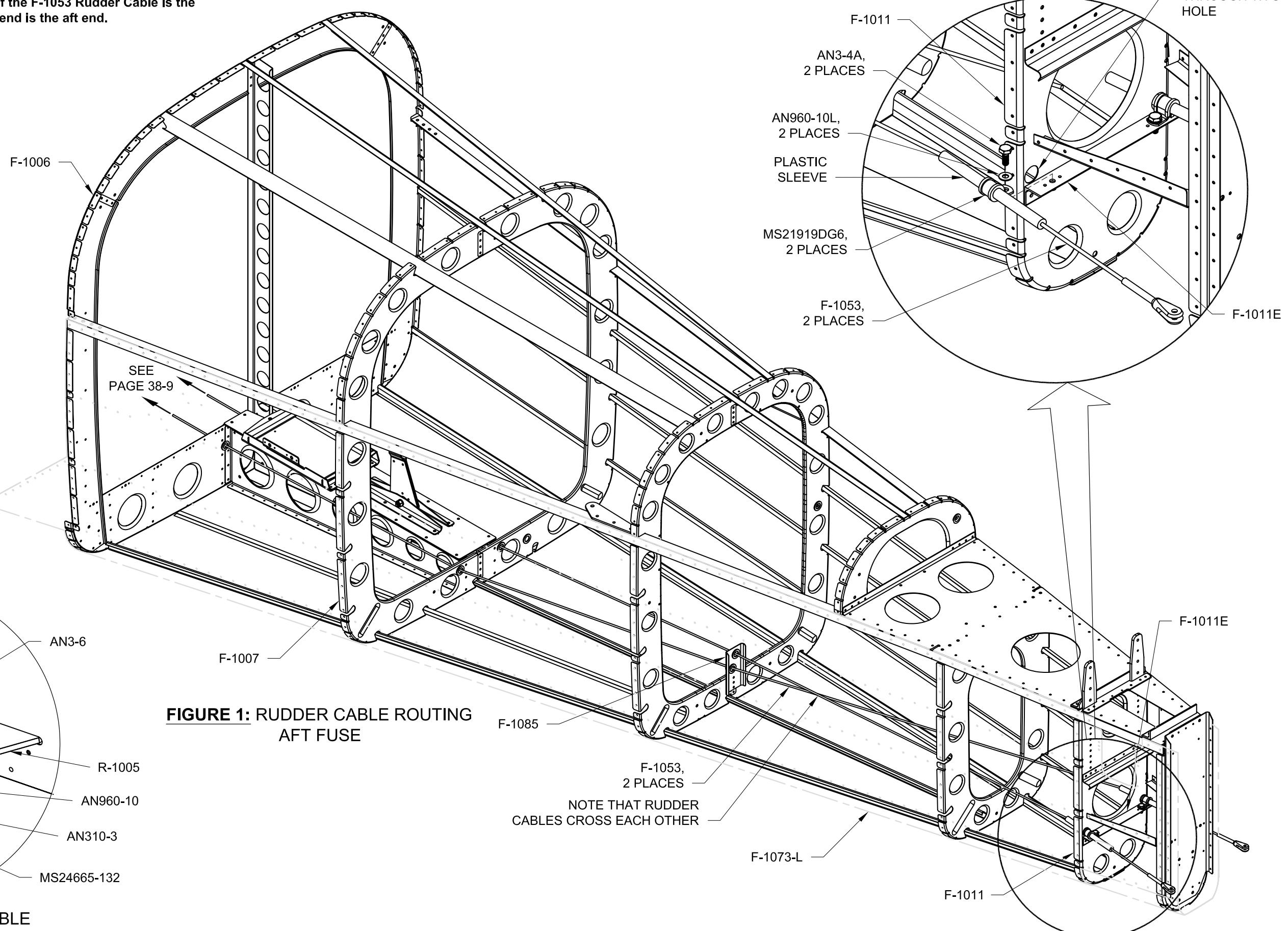
Step 1: Insert the spade end of the F-1053 Rudder Cable through the oval shaped slot in the aft end of the F-1073-L Tailcone Side Skin Left.

Step 2: Clamp the aft plastic sleeve on the F-1053 Rudder Cable to the F-1011E Rudder Cable Angle using the hardware called out in the detail view in Figure 1. Position the plastic sleeve so that both the oval slot in the F-1073-L Tailcone Side Skin Left and the hole for the cable in the F-1011 Fuselage Bulkhead are protected from the rudder cable.

Step 3: Repeat Steps 1 and 2 to install the remaining rudder cable to the right side of the aircraft.

Step 4: Cross the F-1053 Rudder Cables over each other and insert them through the snap bushings in the F-1085 Rudder Cable Bracket, F-1007 Bulkhead and F-1006 Bulkhead (see Figure 1).

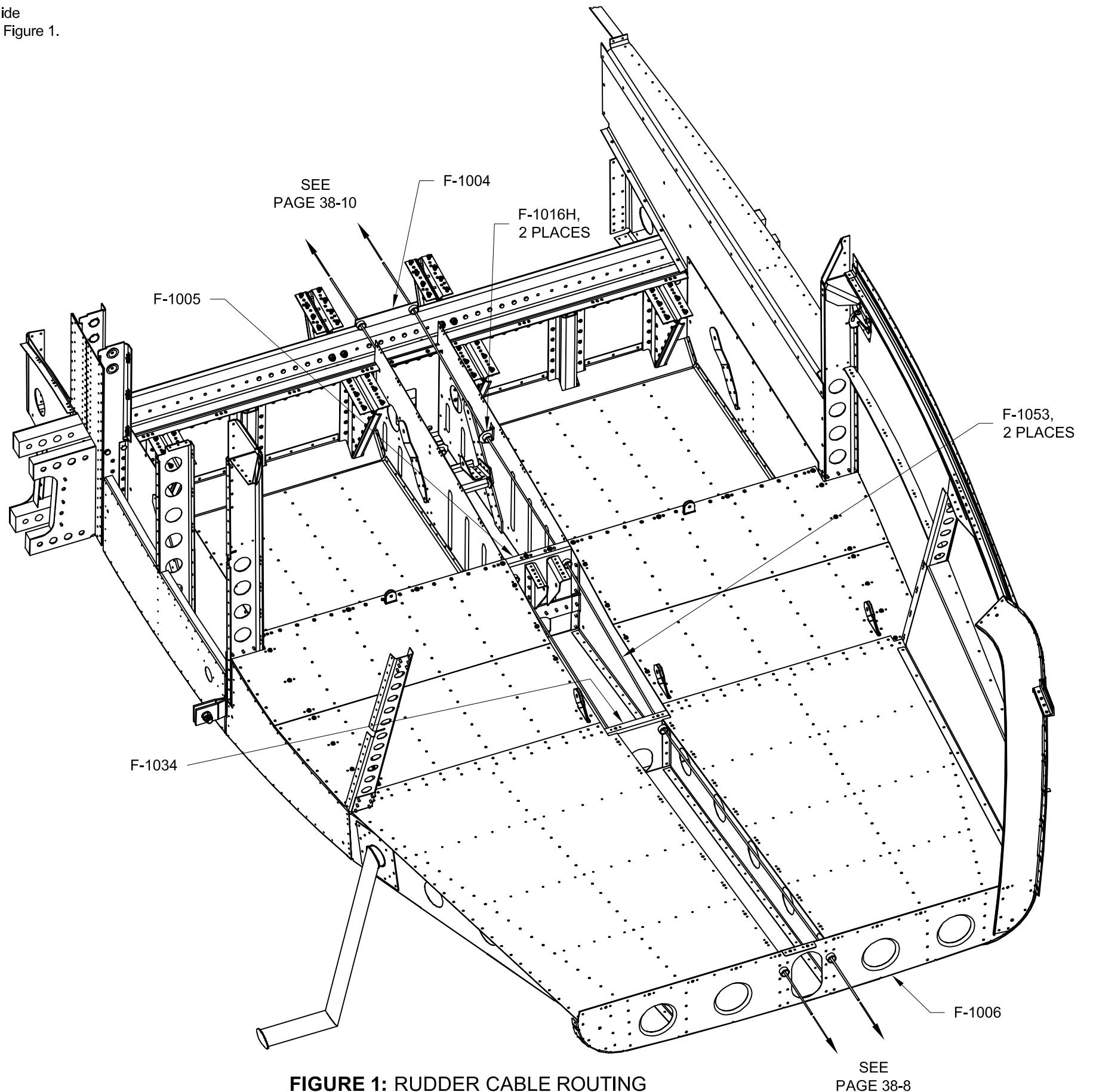
Step 5: Figure 2 shows the hardware that will eventually be used to attach the F-1053 Rudder Cables to the R-1005 Rudder Horn. Refer back to Figure 2 when final assembling the empennage to the fuselage.



**FIGURE 2: RUDDER CABLE TO RUDDER ATTACH**



Step 1: Route the F-1053 Rudder Cables through the snap bushings in the F-1034 Fuselage Bulkhead, F-1005 Rear Spar Bulkhead, F-1016H Guide Brackets and F-1004 Center Section Bulkhead Assembly as shown in Figure 1.

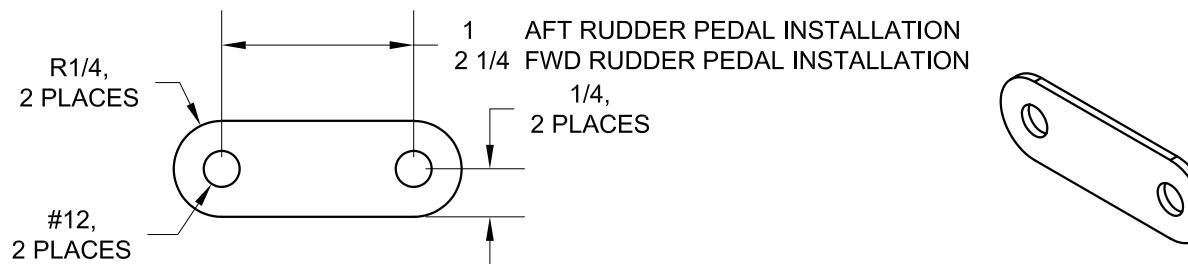


**FIGURE 1: RUDDER CABLE ROUTING  
THROUGH THE MID FUSELAGE**



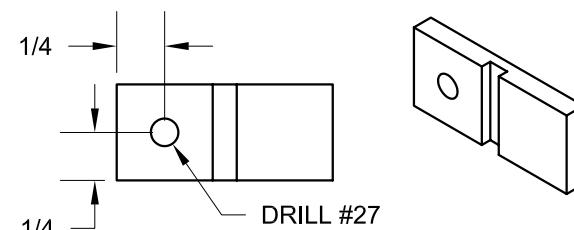
**VAN'S AIRCRAFT, INC.**

Step 1: Make four F-10104 Rudder Cable Links from 1/2 inch wide, .050 thick 4130 steel. The overall length will vary depending on the position that the rudder pedals were installed in. See Figure 1.

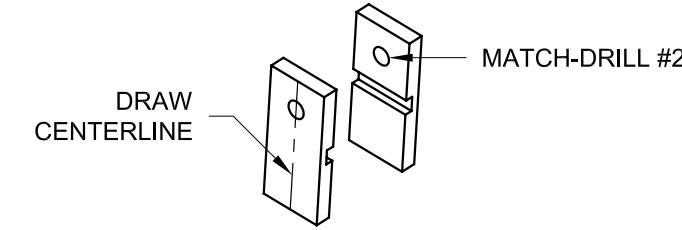


**FIGURE 1: MAKING THE RUDDER CABLE LINKS**

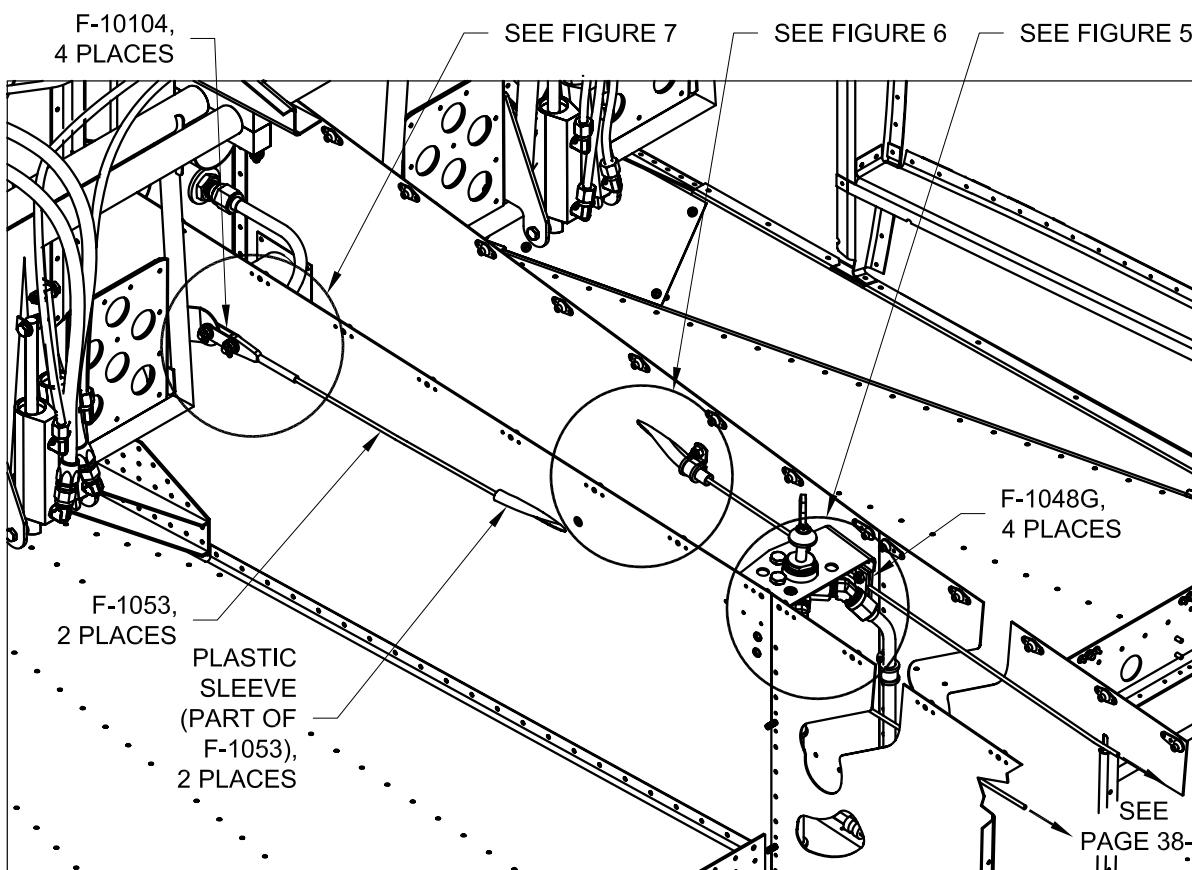
Step 2: Drill #27 a hole in one end of the F-1048G Rudder Cable Guide per the dimensions in Figure 2. Clamp the drilled guide to an un-drilled guide and match-drill #27 the hole into both parts. Mark a centerline on the non-slotted face of one of the guides. See Figure 3. Mark this pair of guides as a set then repeat this step for the remaining two guides.



**FIGURE 2: DRILLING THE GUIDE**



**FIGURE 3: MATCH-DRILLING THE GUIDE**



**FIGURE 4: ROUTING THE RUDDER CABLES THROUGH THE FORWARD FUSELAGE**

Step 3: Final-Drill #27 both F-1048G Rudder Cable Guide attach holes in the F-1048-L and -R Fwd Fuselage Ribs.

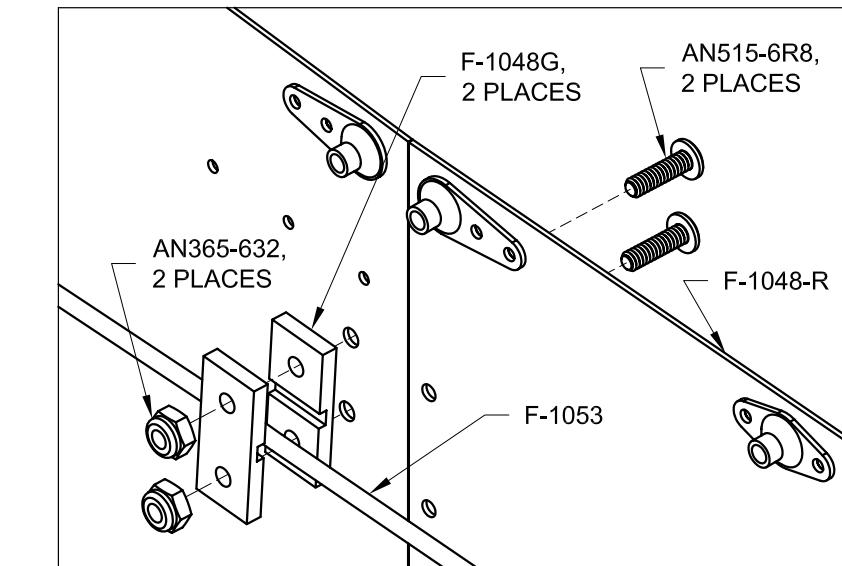
Step 4: Assemble both F-1048G Rudder Cable Guides to the F-1048-R Fwd Fuselage Rib as shown in Figure 5 using the hole match-drilled in Step 2 (place the side with the centerline drawn in Step 2 against the fwd fuselage rib). Align the centerline with the center of the remaining hole in the fwd fuselage rib then match-drill #27 this hole into both rudder cable guides.

Step 5: Remove the F-1048G Rudder Cable Guides and deburr the holes drilled in Step 3.

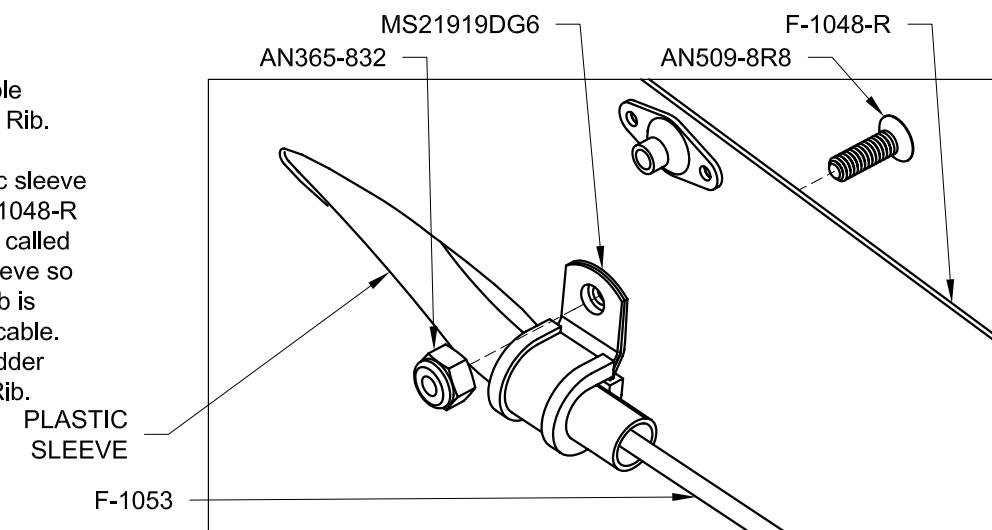
Step 6: Place the F-1053 Rudder Cable in the slot in-between the F-1048G Rudder Cable Guides and install the guides to the F-1048-R Fwd Fuselage Rib using the hardware called out in Figure 5.

Step 7: Repeat Steps 3-6 to install the remaining set of F-1048G Rudder Cable Guides to the F-1048-L Fwd Fuselage Rib.

Step 8: Clamp the forward most plastic sleeve on the F-1053 Rudder Cable to the F-1048-R Fwd Fuselage Rib using the hardware called out in Figure 6. Position the plastic sleeve so that the oval slot in the fwd fuselage rib is completely protected from the rudder cable. Repeat this step to clamp the other rudder cable to the F-1048-L Fwd Fuselage Rib.



**FIGURE 5: INSTALLING THE RUDDER CABLE GUIDES**

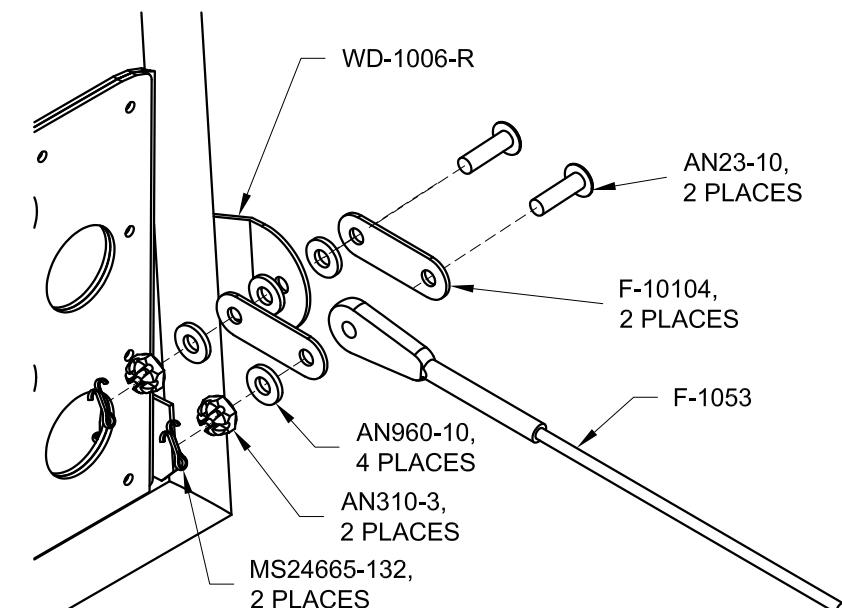


**FIGURE 6: RETAINING THE PLASTIC SLEEVE**

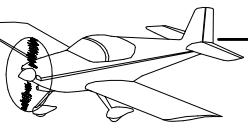
Step 9: Prime or paint the F-10104 Rudder Cable Links.

Step 10: Install the F-10104 Rudder Cable Links between the WD-1006-L and -R Rudder Pedals and the F-1053 Rudder Cables. See Figure 7.

**NOTE:** Bend the ends of the cotter pin into the slots in the castle nut to prevent them from catching on a shoe and un-bending.

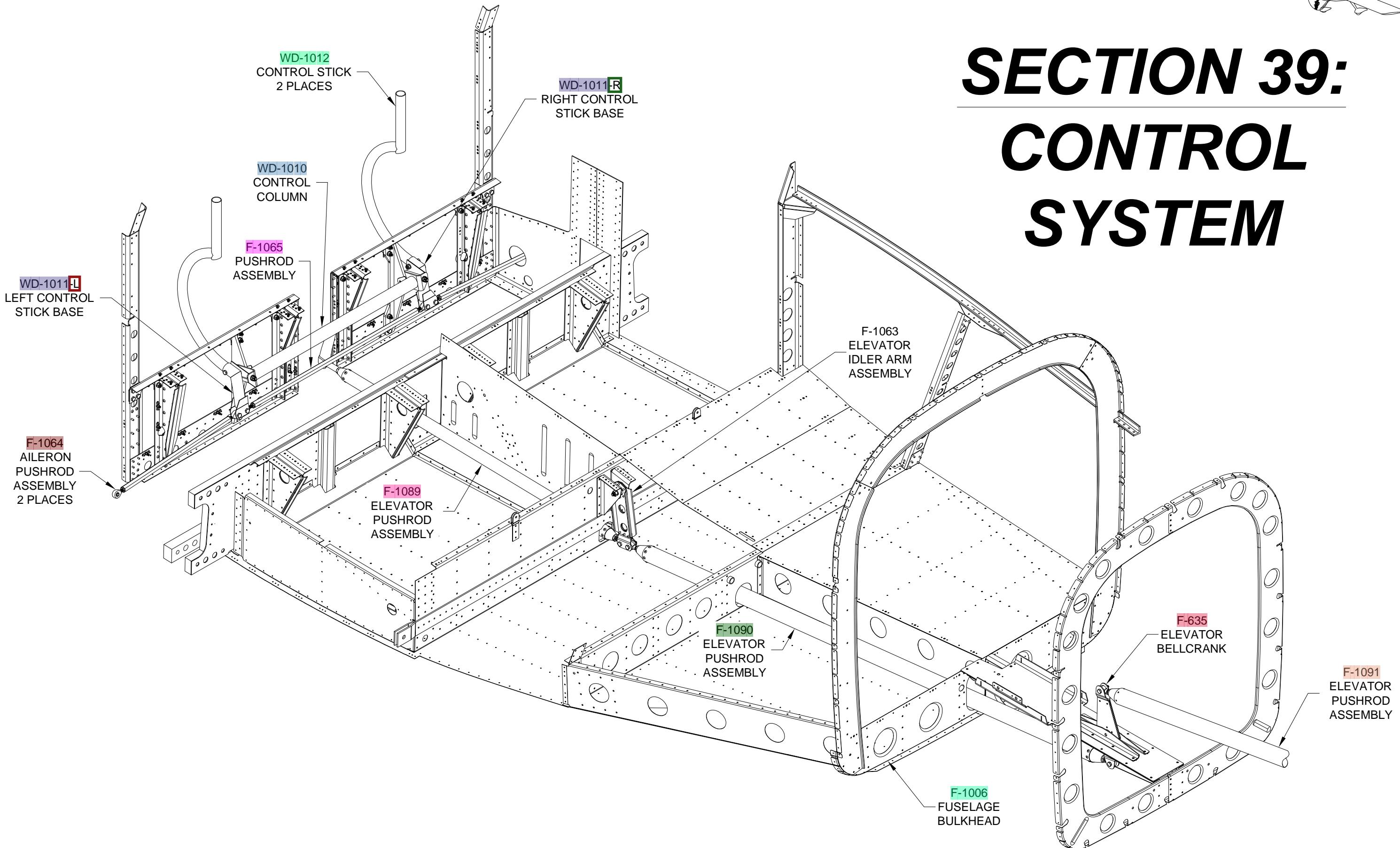


**FIGURE 7: INSTALLING THE RUDDER CABLE LINKS**



# SECTION 39:

# CONTROL SYSTEM



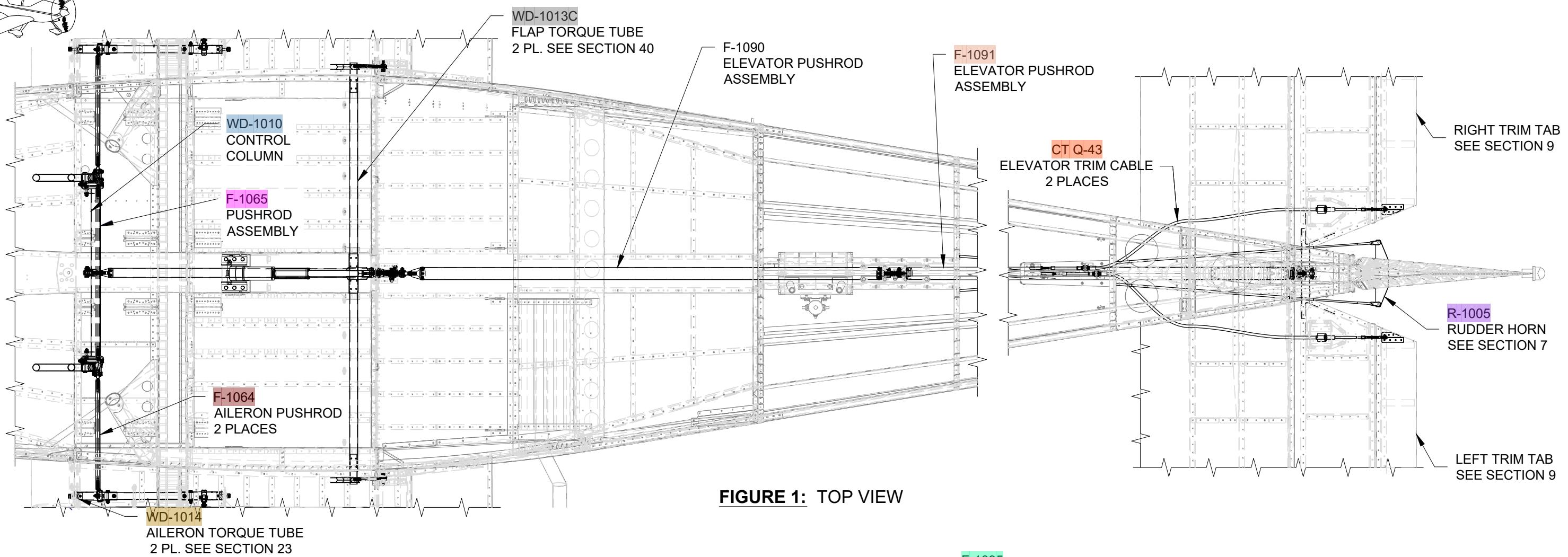


FIGURE 1: TOP VIEW

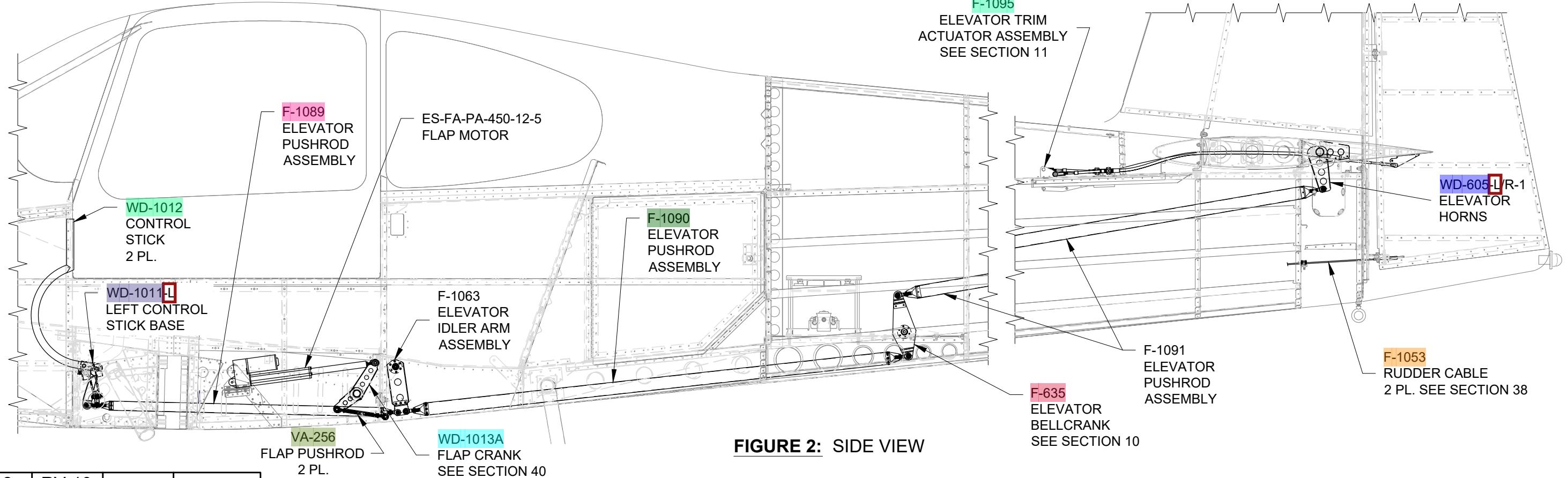
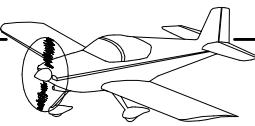
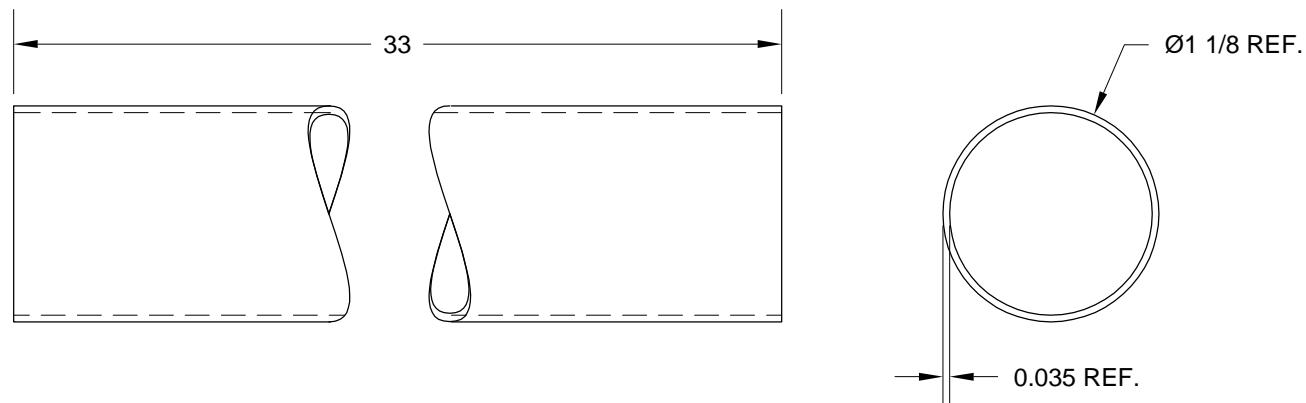


FIGURE 2: SIDE VIEW

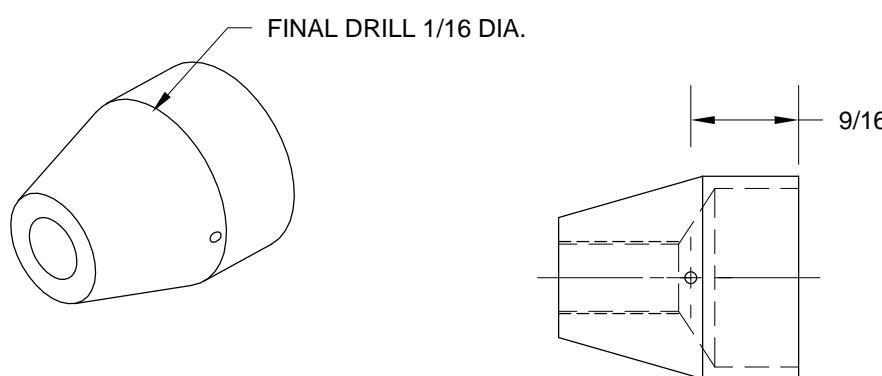


Step 1: Fabricate the F-1089 Elevator Pushrod (Fwd) by cutting one piece of AT6-035 X 1 1/8 to the length shown in Figure 1.



**FIGURE 1: ELEVATOR PUSHROD (FWD) FABRICATION**

Step 2: Final-Drill the VA-111 threaded rod end for safety wire as shown in Figure 2.



**FIGURE 2: DRILL THREADED ROD END**

Step 3: Cut out Page 39-11, Figure 1 and use it as a wraparound template for locating the rivet holes in both ends of the F-1089 Elevator Pushrod (Fwd). Use clear tape to make the template into a ring and align it with the end of the pushrod. Center-punch the "cross hairs" in the wraparound template. Remove the template and use a #40 drill to make six pilot holes in each end of the pushrod. Deburr the hole edges on the inside of the pushrod tube.

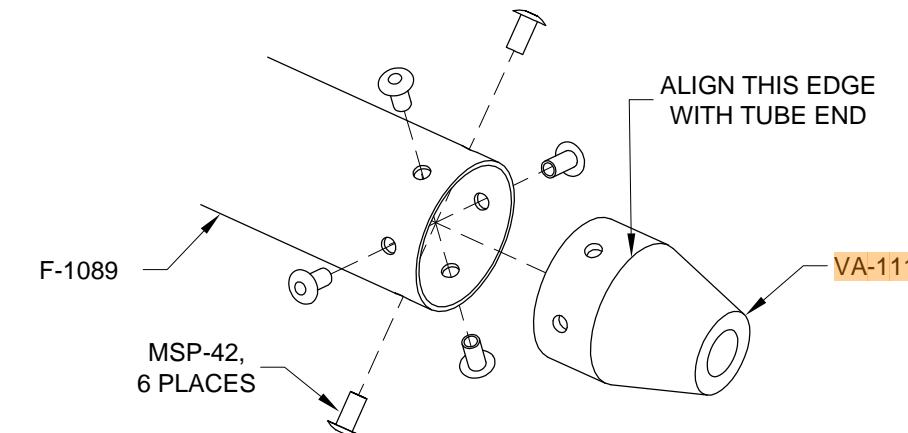
Step 4: Insert a VA-111 Threaded Rod End into the end of the F-1089 Elevator Pushrod (Fwd). Proper engagement of the threaded rod end in the elevator pushrod is when the end of the tube coincides with the edge of the taper in the threaded rod end. See Figure 3.

Match-Drill #30 the threaded rod end using the pilot holes in the elevator pushrod as drill guides. Insert clecos in the holes as match-drilling progresses around the circumference of the elevator pushrod.

Repeat until threaded rod ends have been match-drilled to both ends of the elevator pushrod.

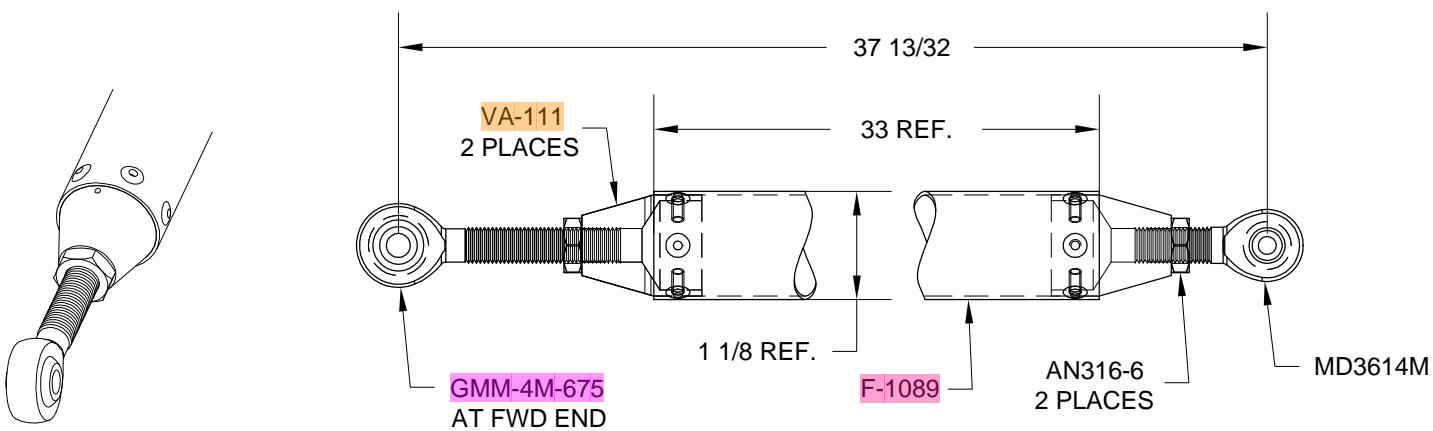
Mark the threaded rod ends so that they can be reinstalled in the same position as when they were match-drilled. Remove the threaded rod ends from the elevator pushrod and deburr all holes in all parts and prime all parts inside and out. Allow primer to fully cure before permanently installing the rod ends. **CAUTION: Seized bearings have resulted from wet primer finding its way to the rod ends.**

Permanently install the threaded rod ends to the elevator pushrod using the rivets called-out in Figure 3.

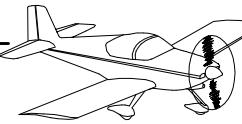


**FIGURE 3: THREADED ROD END INSTALLATION**

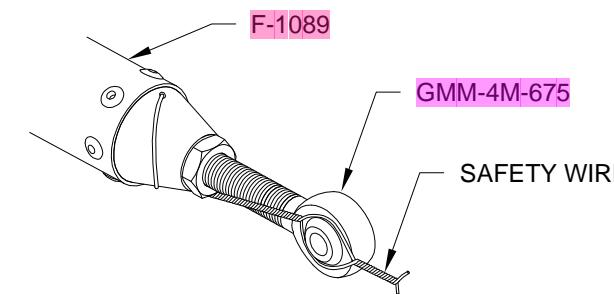
Step 5: Install the rod end bearings and jam nuts into the VA-111 Threaded Rod Ends as shown in Figure 4. Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length of 37 13/32 inches. The rod end bearing engagement may need to be adjusted during installation of the F-1089 Elevator Pushrod Assembly.



**FIGURE 4: ROD END BEARING AND JAM NUT INSTALLATION**

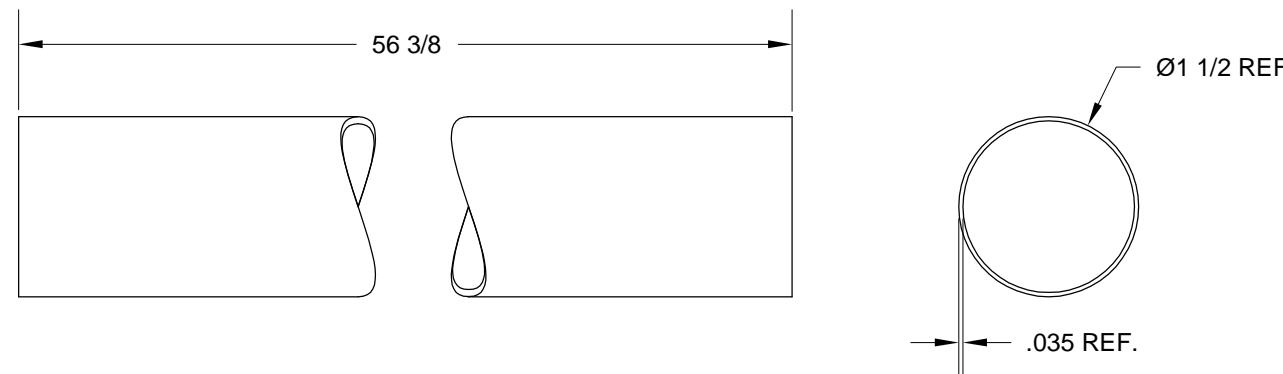


Step 1: Safety wire the forward end of the F-1089 Elevator Pushrod Assembly which has the GMM-4M-675 rod end bearing installed as shown in Figure 1. Form a loop that loosely encircles the bearing to the right side of the rod end. This loop will be pinned by the attach bolt.



**FIGURE 1:**  
SAFETY WIRE ELEVATOR PUSHROD ASSEMBLY

Step 2: Fabricate one F-1090 Elevator Pushrod (Mid) by cutting one piece of AT6-035 X 1 1/2 to the length shown in Figure 2.



**FIGURE 2:**  
ELEVATOR PUSHROD (MID) FABRICATION

Step 3: Cut-out Page 39-11, Figure 2 and use it as a wraparound template for locating the rivet holes in both ends of the F-1090 Elevator Pushrod (Mid). Use clear tape to make the template into a ring and align it with the end of the pushrod. Center-punch the "cross hairs" in the wraparound template. Remove the template and use a #40 drill to make six pilot holes in each end of the pushrod. Deburr the hole edges on the inside of the pushrod tube.

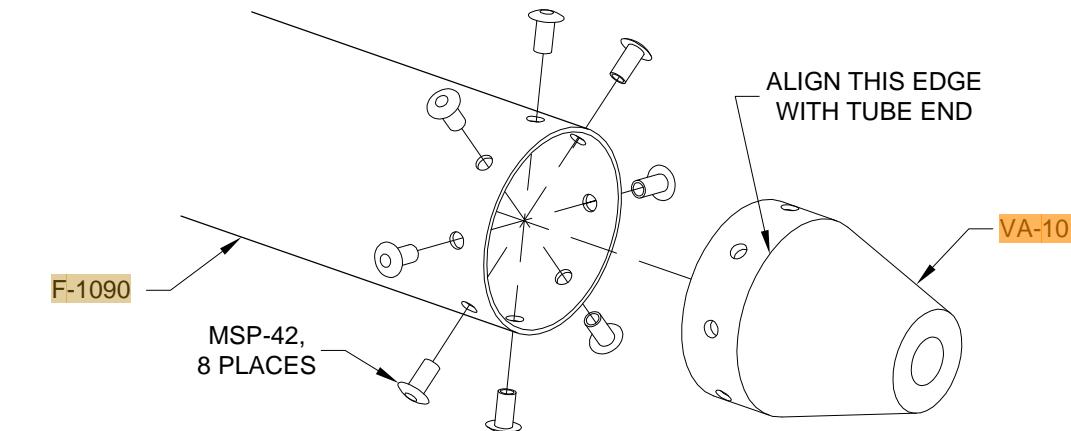
Step 4: Insert a VA-101 Threaded Rod End into the end of the F-1090 Elevator Pushrod (Mid). Proper engagement of the threaded rod end in the elevator pushrod is when the end of the tube coincides with the edge of the taper in the threaded rod end. See Figure 3.

Match-Drill #30 the threaded rod end using the pilot holes in the elevator pushrod as drill guides. Insert clecos in the holes as match-drilling progresses around the circumference of the elevator pushrod.

Repeat until threaded rod ends have been match-drilled to both ends of the elevator pushrod.

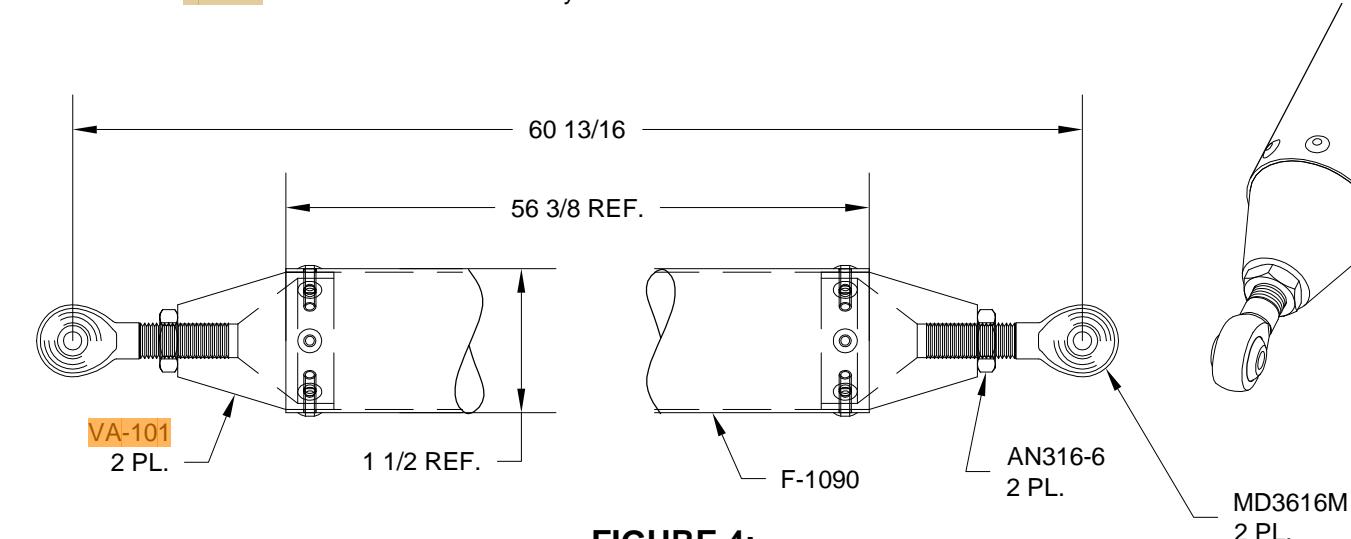
Step 4 (continued): Mark the threaded rod ends so that they can be re-installed in the same position as when they were match-drilled. Remove the threaded rod ends from the elevator pushrod and deburr all holes in all parts and prime all parts inside and out. Allow primer to fully cure before permanently installing the rod ends. **CAUTION: Seized bearings have resulted from wet primer finding its way to the rod ends.**

Permanently install the threaded rod ends to the elevator pushrod using the rivets called-out in Figure 3.



**FIGURE 3:**  
THREADED ROD END INSTALLATION

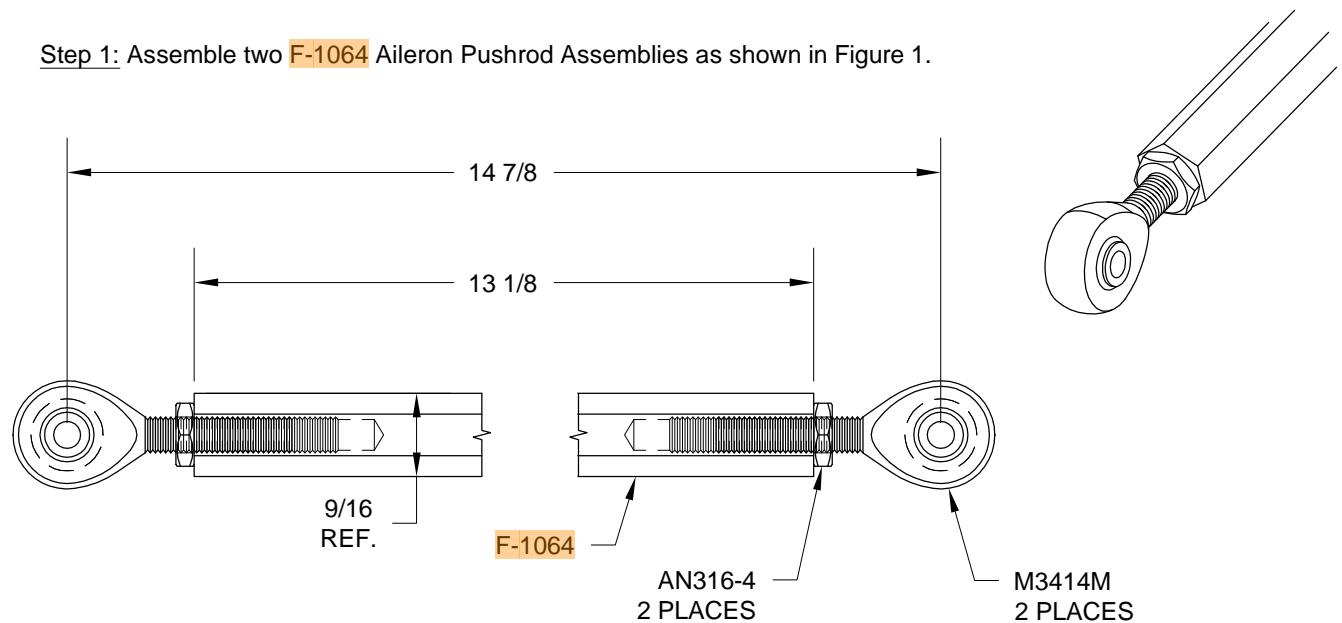
Step 5: Install rod end bearings and jam nuts into the VA-101 Threaded Rod Ends as shown in Figure 4. Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length of 60 13/16 inches. The rod end bearing engagement may need to be adjusted during installation of the F-1090 Elevator Pushrod Assembly.



**FIGURE 4:**  
ROD END BEARING AND JAM NUT INSTALLATION

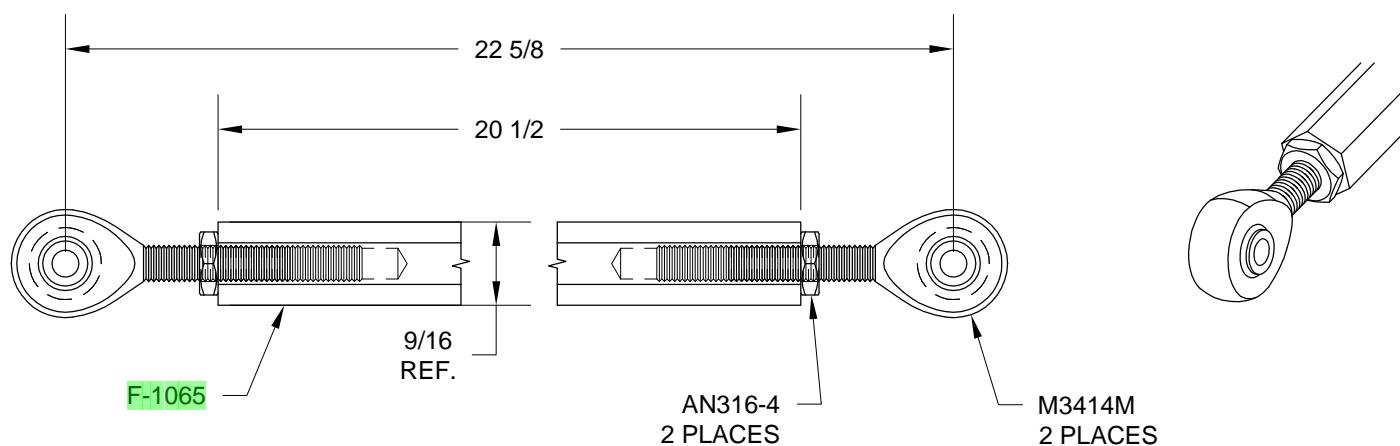


Step 1: Assemble two F-1064 Aileron Pushrod Assemblies as shown in Figure 1.



**FIGURE 1: ASSEMBLING THE AILERON PUSHROD**

Step 2: Assemble the F-1065 Pushrod Assembly as shown in Figure 2.



**FIGURE 2: ASSEMBLING THE F-1065 PUSHROD**

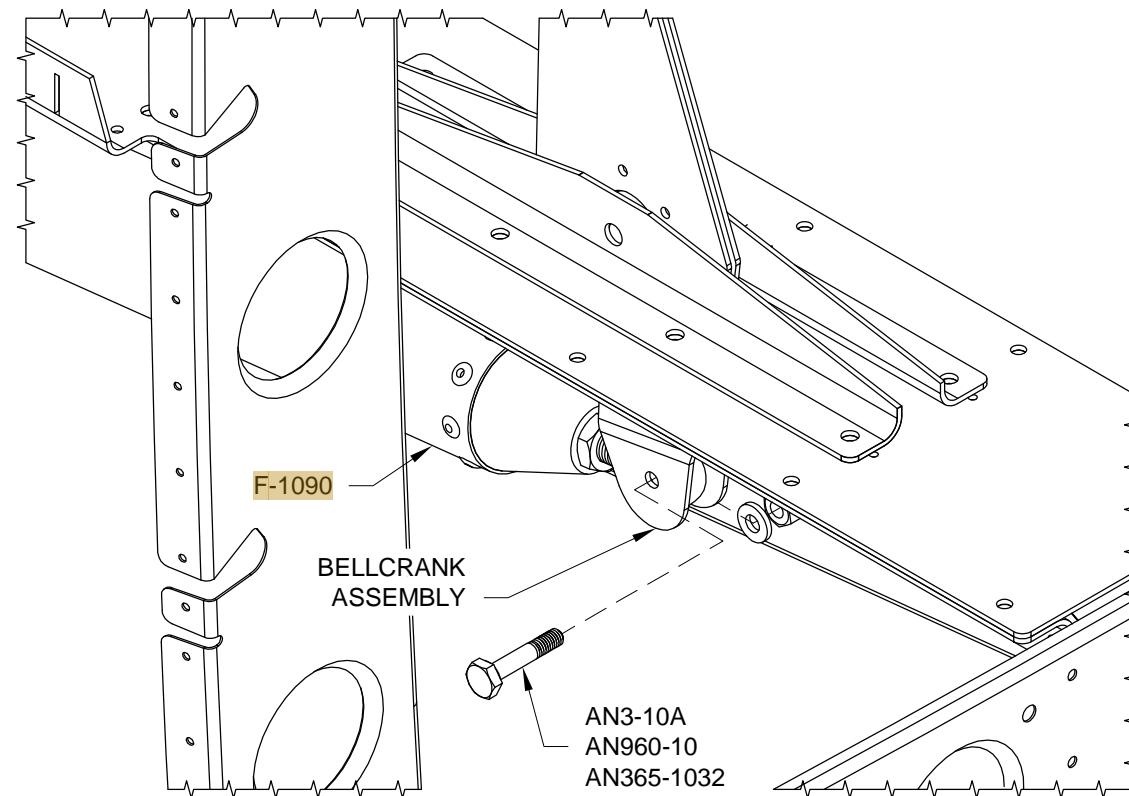
Step 3: Remove the F-1035 Battery/ Bellcrank Mount, see Page 10-23.

Install the F-1089 Elevator Pushrod Assembly by feeding it forward through the aft side of the F-1006 Fuselage Bulkhead and into the position shown on Page 39-1. Make sure the forward end is forward.

Install the F-1090 Elevator Pushrod Assembly by feeding it forward through the aft side of the F-1006 Fuselage Bulkhead and into the position shown on Page 39-1.

Reinstall the battery/ bellcrank mount.

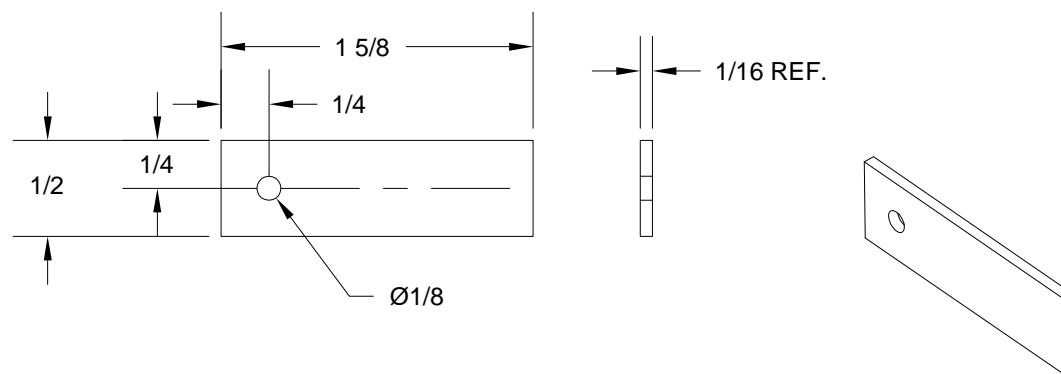
Step 4: Attach the F-1090 Elevator Pushrod Assembly to the Bellcrank Assembly using the hardware called out in Figure 3.



**FIGURE 3: PUSHROD TO BELLCRANK ASSEMBLY**

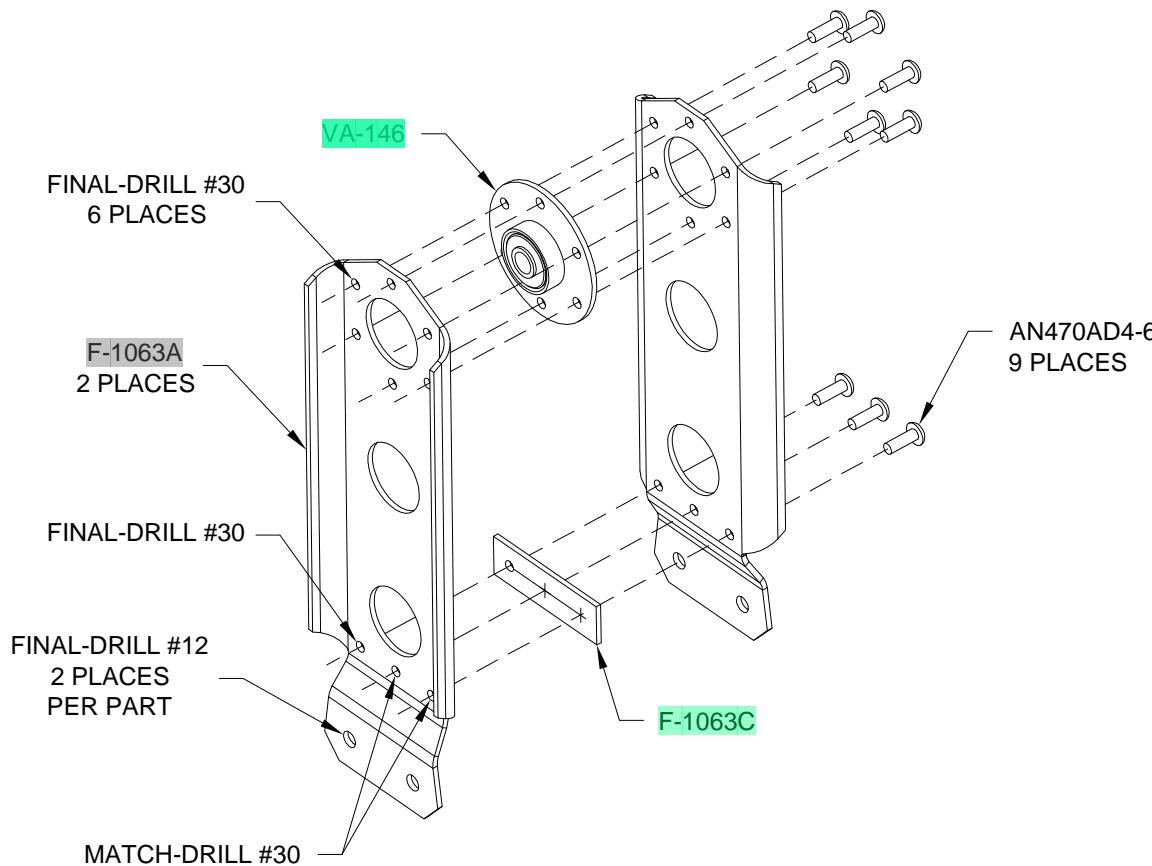


Step 1: Fabricate the F-1063C Spacer from AS3-063 as shown in Figure 1. Draw a horizontal centerline to use as a guide when match-drilling the part in the next step.



**FIGURE 1: FABRICATE SPACER**

Step 2: Cleco the two F-1063A Elevator Idler Arms, the F-1063C Spacer, and the VA-146 Flange Bearing together as shown in Figure 2. Adjust the spacer so that the centerline intersects the centers of the two pre-punched holes in the elevator idler arm. Match-Drill and final-drill as per the callouts. Disassemble and deburr all holes and edges. Prime if/as desired. Rivet the assembly together using the hardware shown in Figure 2.

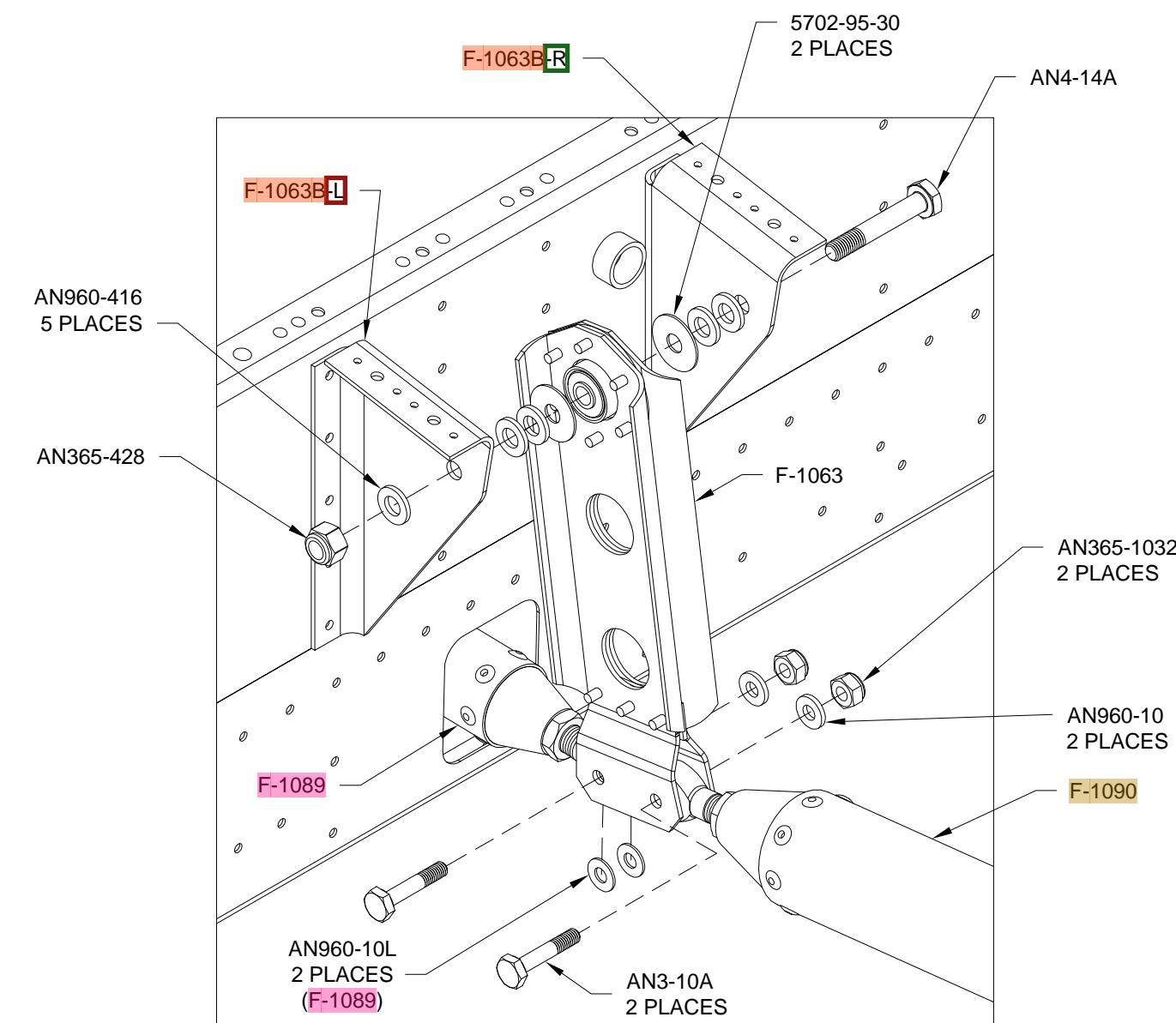


**FIGURE 2: DRILL AND RIVET ELEVATOR IDLER ARM**

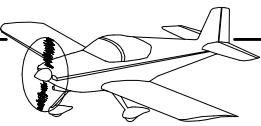
Step 3: Bolt the F-1063 Elevator Idler Arm Assembly to the F-1063B Idler Arm Brackets using the hardware shown in Figure 3.

Bolt the F-1089 Elevator Pushrod Assembly to the elevator idler arm assembly using the hardware shown in Figure 3.

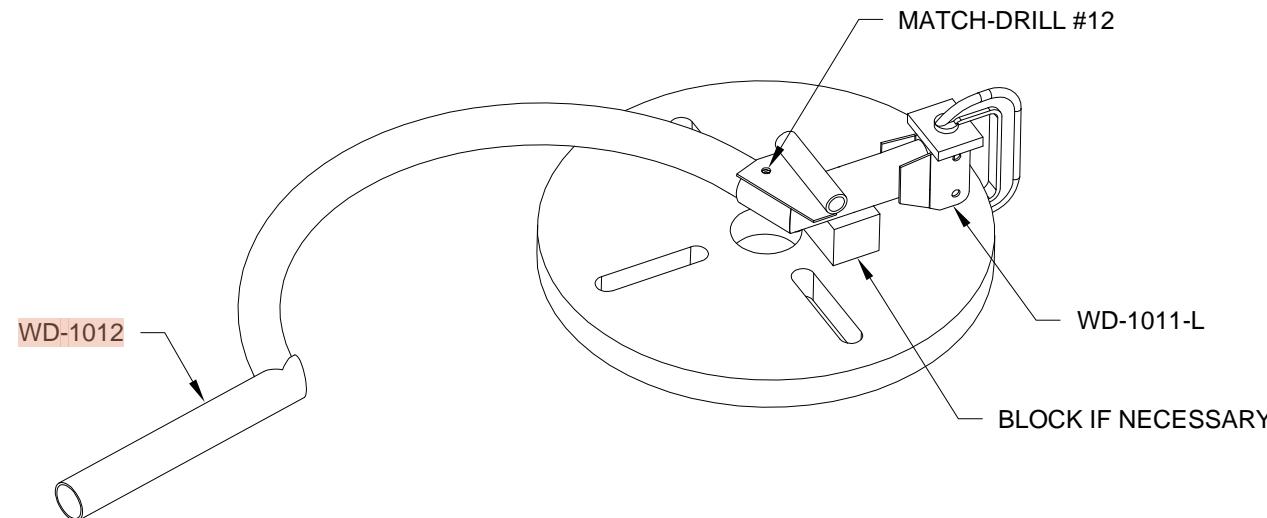
Bolt the F-1090 Elevator Pushrod Assembly to the elevator idler arm assembly using the hardware shown in Figure 3.



**FIGURE 3:**  
ATTACH THE ELEVATOR IDLER ARM ASSEMBLY AND  
ELEVATOR PUSHRODS (F-1063B-L/R SHOWN EXPLODED)

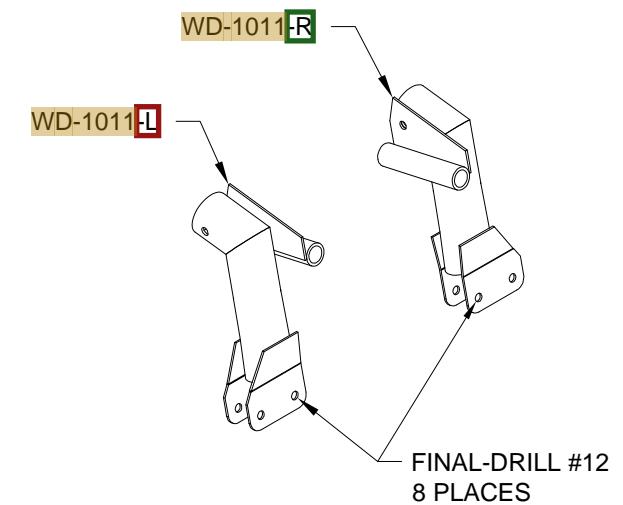


Step 1: Clamp the **WD-1011-L** Left Control Stick Base to a drill press table as shown in Figure 1. Insert a **WD-1012** Control Stick into the control stick base as far as it will go. Rotate the control stick until it is planar with the surface of the table. Match-Drill #12 through the assembly using the hole in the control stick base as a guide. Support the control stick base with a block if necessary. Disassemble the parts and deburr. Repeat this step for the **WD-1011-R** Right Control Stick Base and the other control stick.



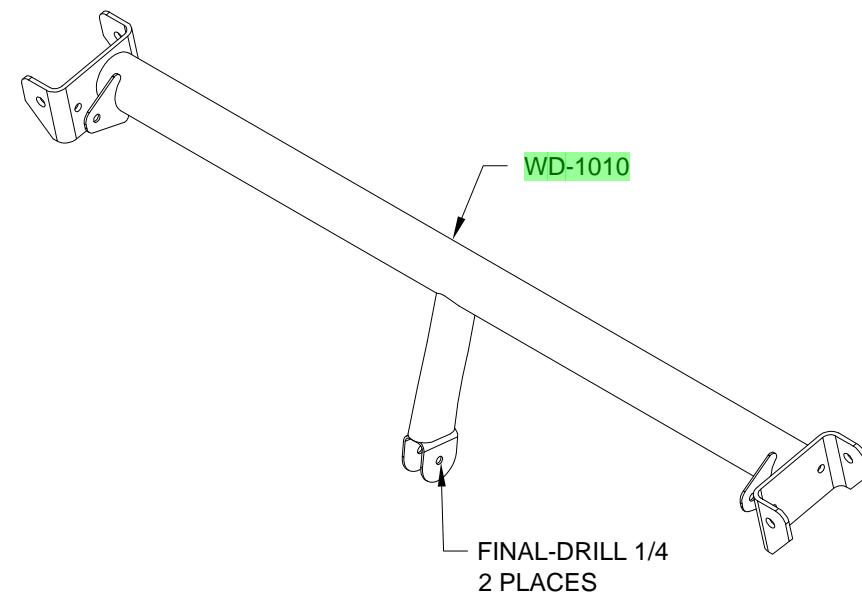
**FIGURE 1:** MATCH-DRILL CONTROL STICKS WITH CONTROL STICK BASES

Step 3: Final-Drill the **WD-1011-L** Left Control Stick Base and the **WD-1011-R** Right Control Stick Base as shown in Figure 3.



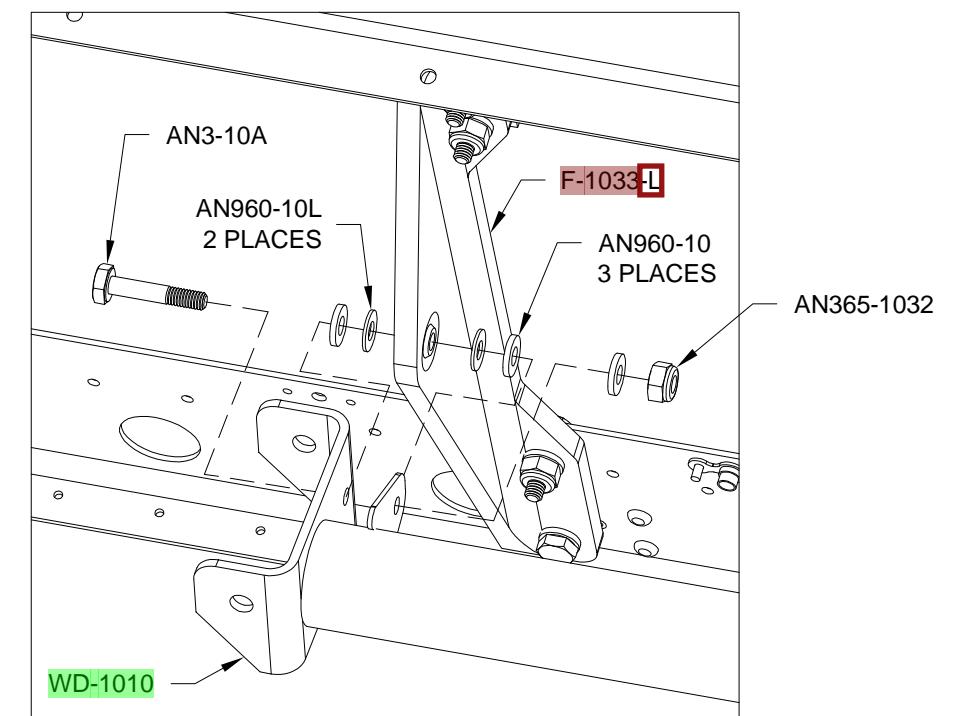
**FIGURE 3:** FINAL-DRILL CONTROL STICK BASES

Step 2: Final-Drill the **WD-1010** Control Column as shown in Figure 2.

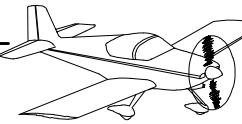


**FIGURE 2:** FINAL-DRILL CONTROL COLUMN

Step 4: Install the **WD-1010** Control Column onto the **F-1033-L** and **F-1033-R** (not shown) Control Column Mounts using the hardware shown in Figure 4. The right side is a mirror image of the left. The control column should rotate freely on the control column mounts.



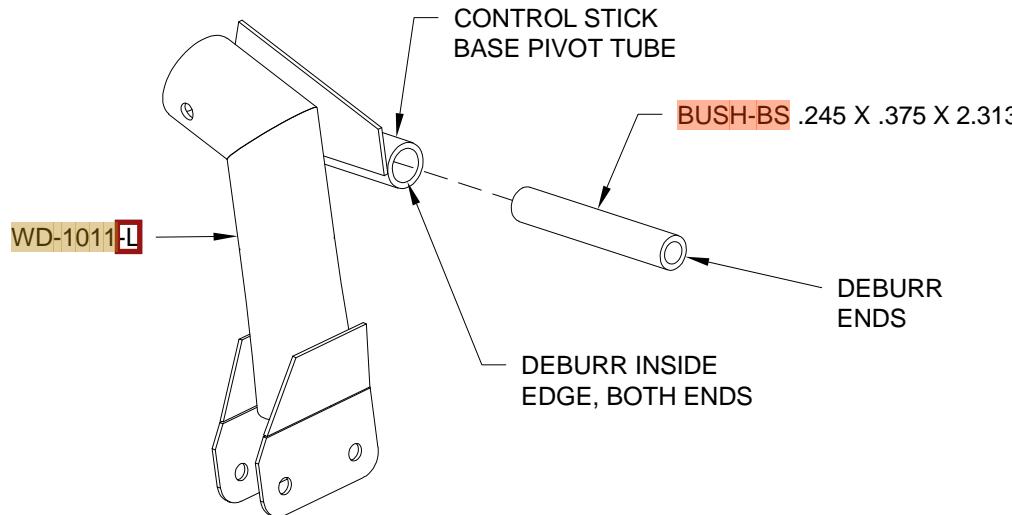
**FIGURE 4:** CONTROL COLUMN INSTALLATION (LEFT SIDE SHOWN)



Step 1: Check that the length of both of the **BUSH-BS .245 X .375 X 2.313** Control Stick Base Bushings is between 2 1/4 inches and 2 5/16 inches. Check that an AN4 bolt will fit the inside diameter of the control stick base bushings and ream if required. Deburr the ends of the control stick base bushings so that they slide easily inside the **WD-1011** Control Stick Bases. See Figure 1.

The pivot tube of the control stick base must be about .010" shorter than the control stick base bushing. File the ends of the control stick base pivot tubes if/as required to achieve the correct length. Deburr the inside edges of the control stick base pivot tubes. See Figure 1.

Insert a control stick base bushing into each control stick base as shown in Figure 1.

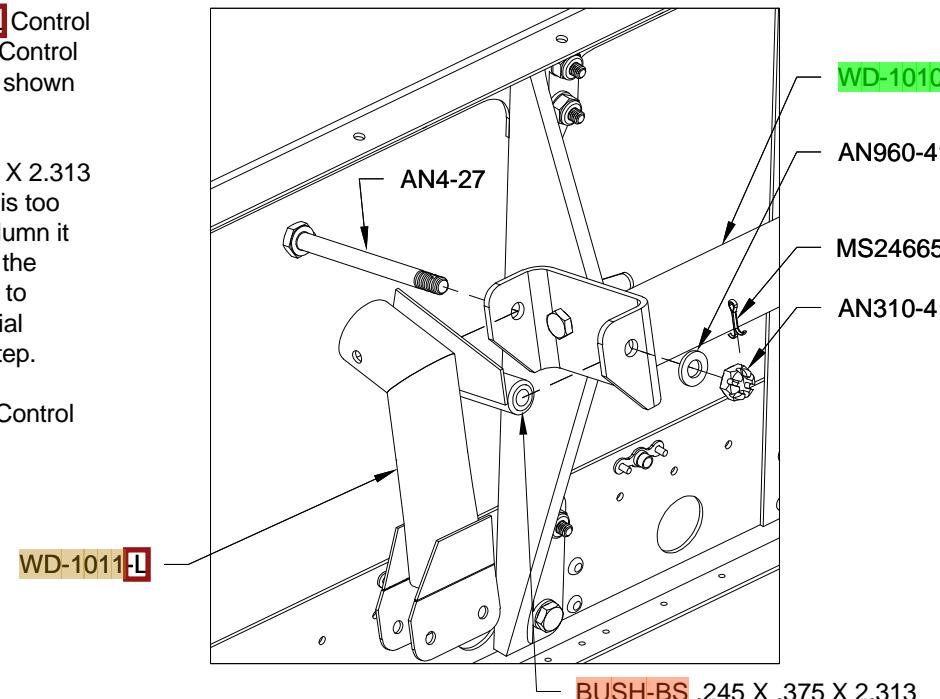


**FIGURE 1: CONTROL STICK BASE BUSHING INSTALLATION**

Step 2: Bolt the **WD-1011-L** Control Stick Base to the **WD-1010** Control Column using the hardware shown in Figure 2.

If the **BUSH-BS .245 X .375 X 2.313** Control Stick Base Bushing is too long to fit into the control column it must be trimmed along with the control stick base pivot tube to maintain the length differential described in the previous step.

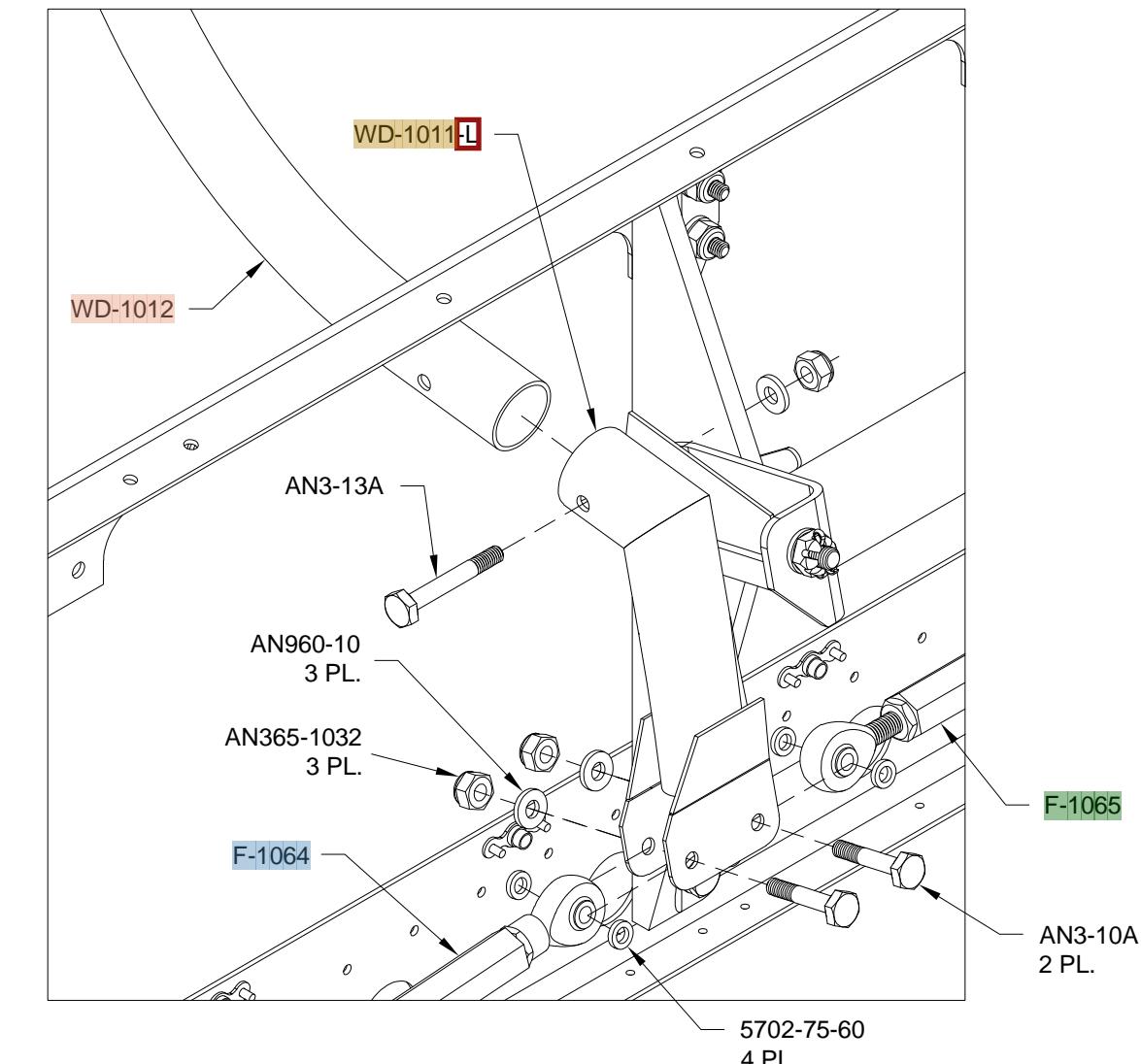
Repeat for the **WD-1011-R** Control Stick Base.



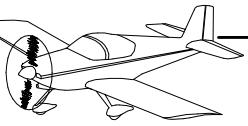
**FIGURE 2: CONTROL STICK BASE INSTALLATION**

Step 3: Install the **F-1065** Pushrod Assembly into the **WD-1011-L** and the **WD-1011-R** (not shown) Control Stick Bases using just the bolts and nuts shown in Figure 3 for now. Leave the nuts finger tight.

Install the **WD-1012** Control Sticks into the control stick bases using the hardware shown in Figure 3. Move the control sticks through their full range of motion and check for interference. **NOTE: When F-1043D-L/R Cover Panels are later installed check for interference with control sticks and trim the cover panels if/as necessary for clearance.**



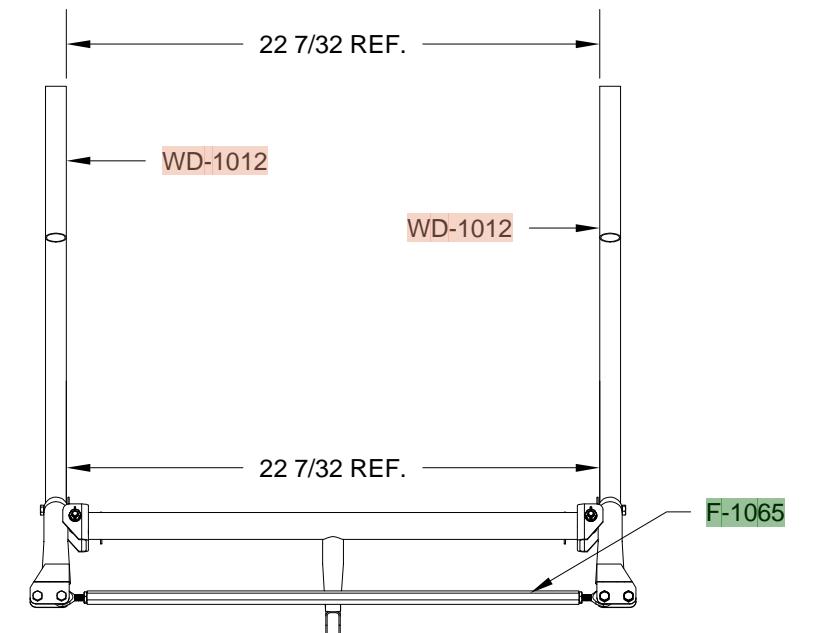
**FIGURE 3: CONTROL STICK AND PUSHROD INSTALLATION**



Step 1: Adjust the length of the F-1065 Pushrod Assembly until the WD-1012 Control Sticks are parallel as shown in Figure 1. Measure from inside to inside at the top of the control sticks and compare to same at the bottom of the control sticks. When the two measurements are equal the control sticks are parallel. **NOTE: The dimensions shown in Figure 1 are for reference purposes only and need not match the builders actual measurements.**

Tighten the jam nuts. Bolt the pushrod assembly into the WD-1011-L and F-1065 Control Stick Bases using the hardware shown on Page 39-8, Figure 3.

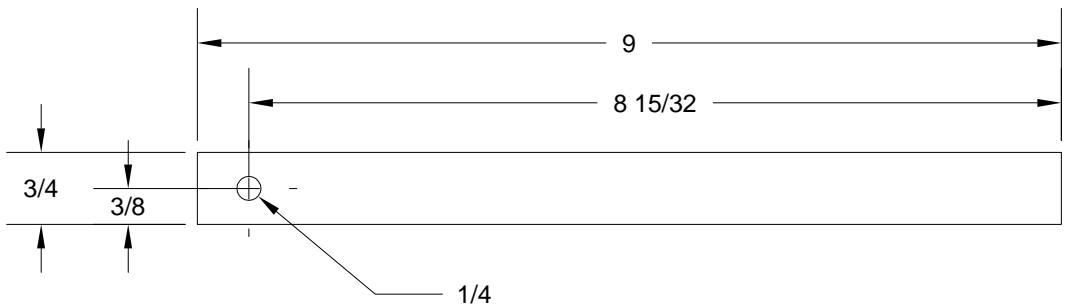
Step 2: Bolt the F-1064 Aileron Pushrod Assemblies into the WD-1011-L and F-1065 Control Stick Bases using the hardware shown on Page 39-8, Figure 3.



**FIGURE 1: MAKE CONTROL STICKS PARALLEL**



Step 1: Fabricate a simple gauge from the dimensions given in Figure 1. Material is not provided in the kit.



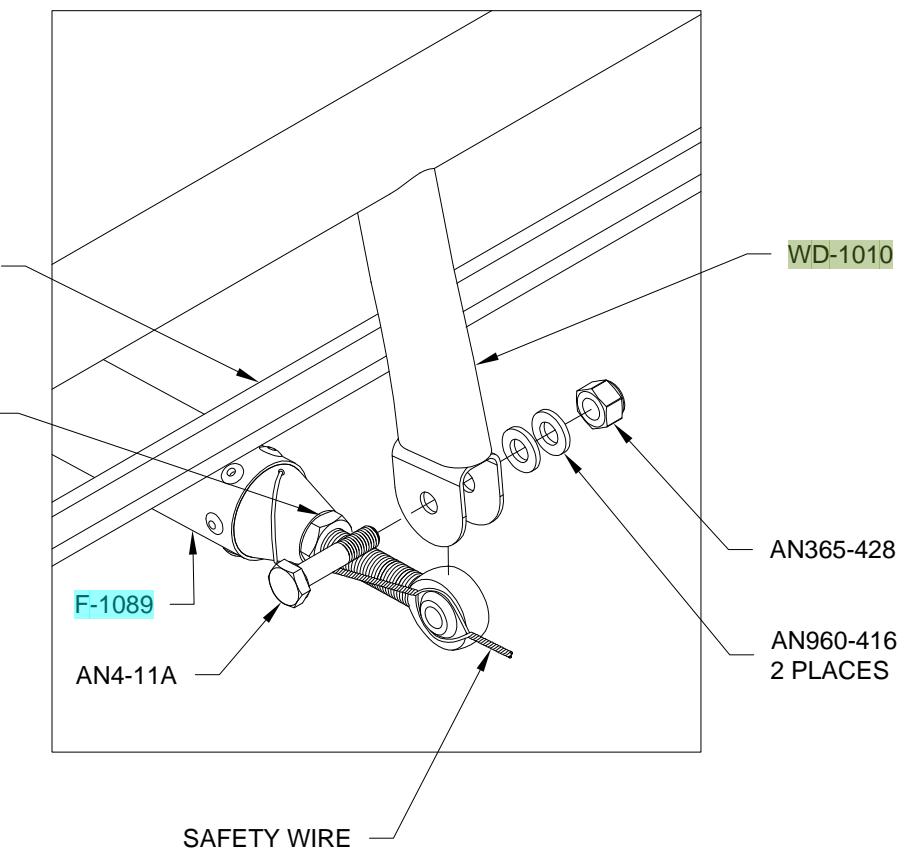
**FIGURE 1: FABRICATE MEASURING JIG**

Step 2: Check the neutral position of the **WD-1010** Control Column. Clamp the **F-635** Elevator Bellcrank in its neutral position. See Page 11-7. Insert an AN4 bolt through the gauge. Lower the gauge and bolt into the tunnel and slip the bolt through the control column center clevis pinning the **F-1089** Elevator Pushrod (Fwd) as shown in Figure 2. When the aft end of the gauge is butted up against the **F-1004A** Center Section Bulkhead the control column is in its neutral position. Adjust the **F-1089** and/or **F-1090** Elevator Pushrod lengths if/as required to move the control column to its neutral position.

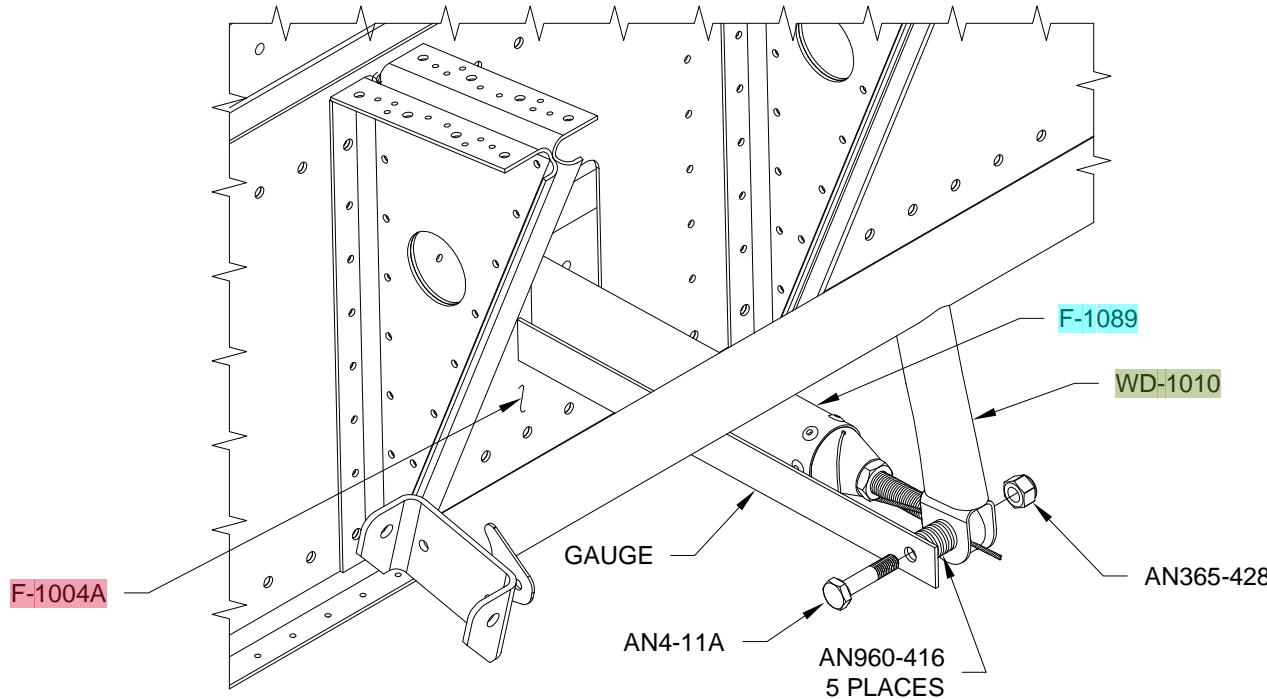
**WARNING:** In the final installation both pushrod ends must have over half the thread engaged (except where safety wire is used) making it impossible for a bearing to back off the pushrod if both ends are pinned.

Perform a final check of the control system once the elevators are installed. Move the control sticks through their full range of motion. The **WD-605-L/R-1** Elevator Horns should contact the elevator stops before the control sticks make contact with any other structure.

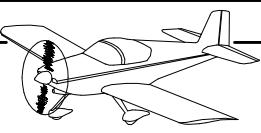
Step 3: Bolt the **F-1089** Elevator Pushrod Assembly to the **WD-1010** Control Column using the hardware shown in Figure 3. The loop in the safety wire goes around the bearing, passing between the rod end housing and the **WD-1010** Control Column clevis and is captured by the AN4 bolt as shown in Figure 3. The safety wire should not interfere with anything at this connection.



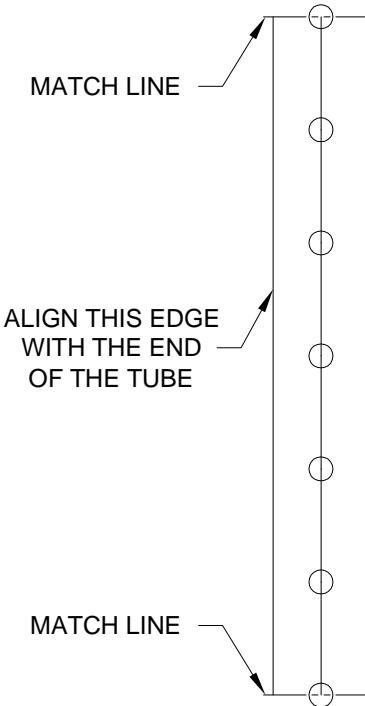
**FIGURE 3: ELEVATOR PUSHROD (FWD) INSTALLATION**



**FIGURE 2: CONTROL COLUMN NEUTRAL POSITION**

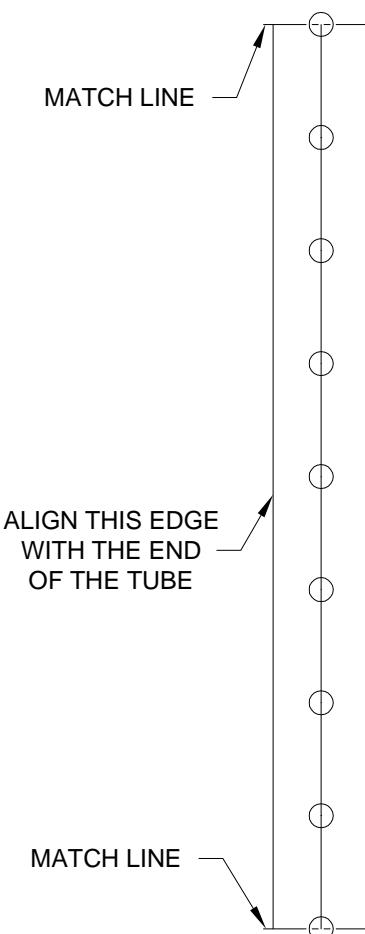


**FIGURE 1:**  
**F-1089** PUSHROD  
RIVET HOLE  
LOCATION TEMPLATE



10 9/16  
[268.3 mm]

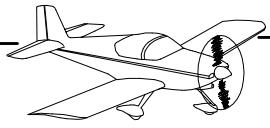
**FIGURE 2:**  
**F-1090** PUSHROD  
RIVET HOLE  
LOCATION TEMPLATE



16

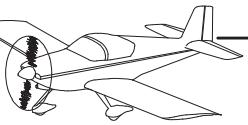
[406.4 mm]

NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!"



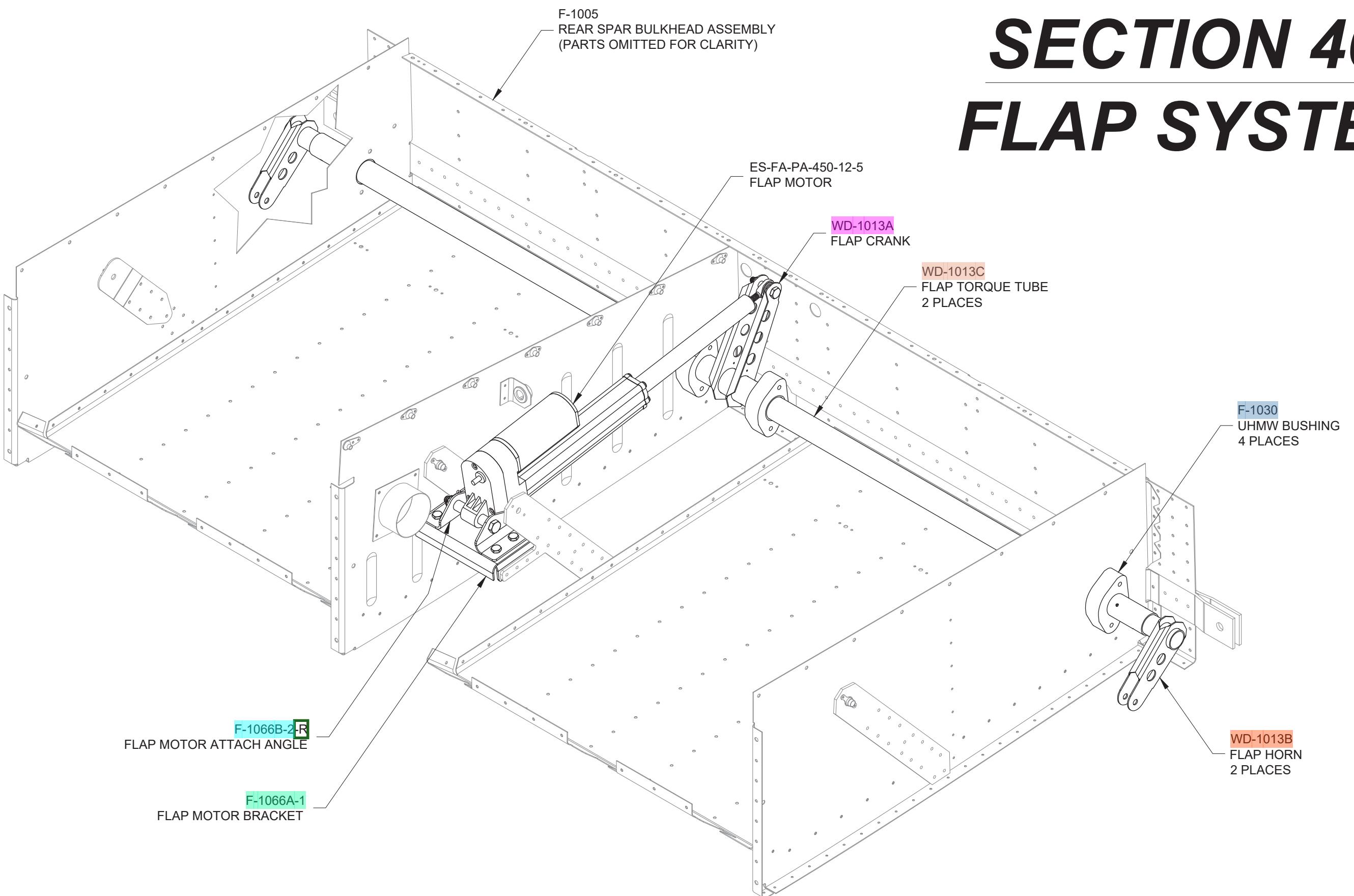
VAN'S AIRCRAFT, INC.

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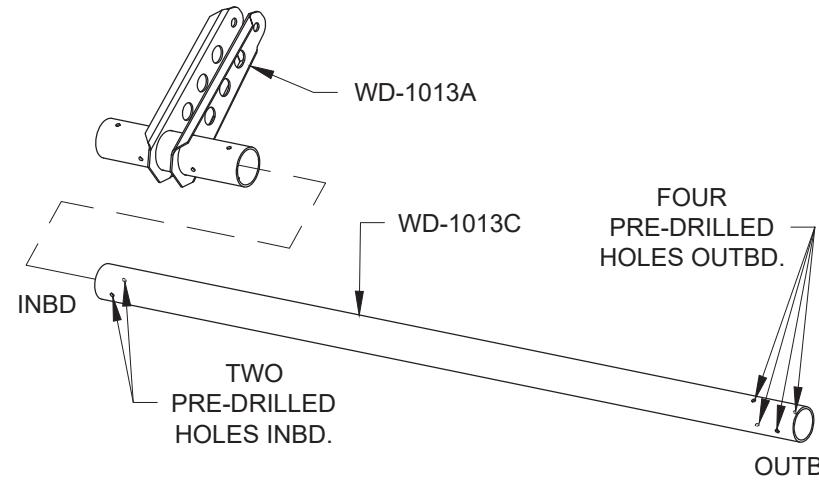
# SECTION 40:

# FLAP SYSTEM



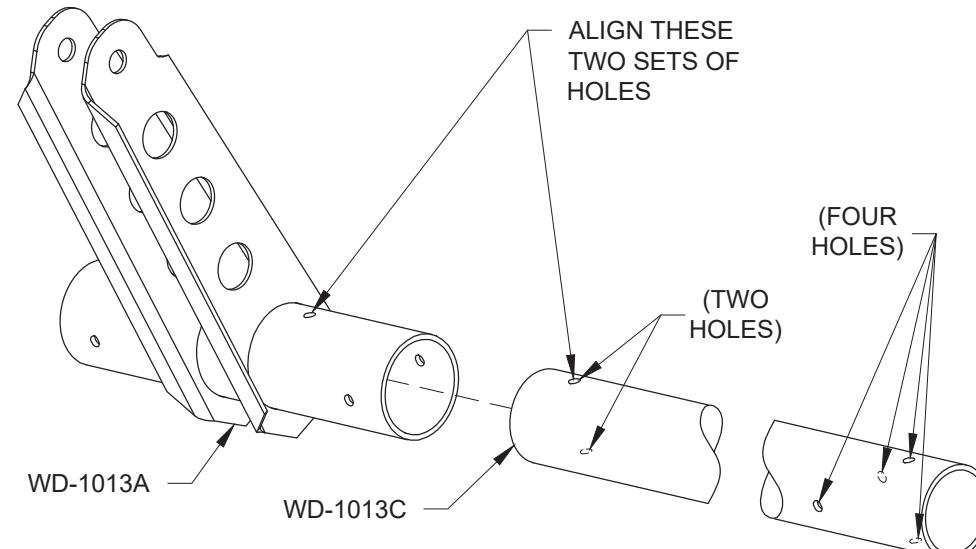
**NOTE:** There are only two pre drilled holes at the inboard end of **WD-1013C** Flap Torque Tube and four pre drilled holes at the outboard end.

Step 1: Study Figure 1 carefully.



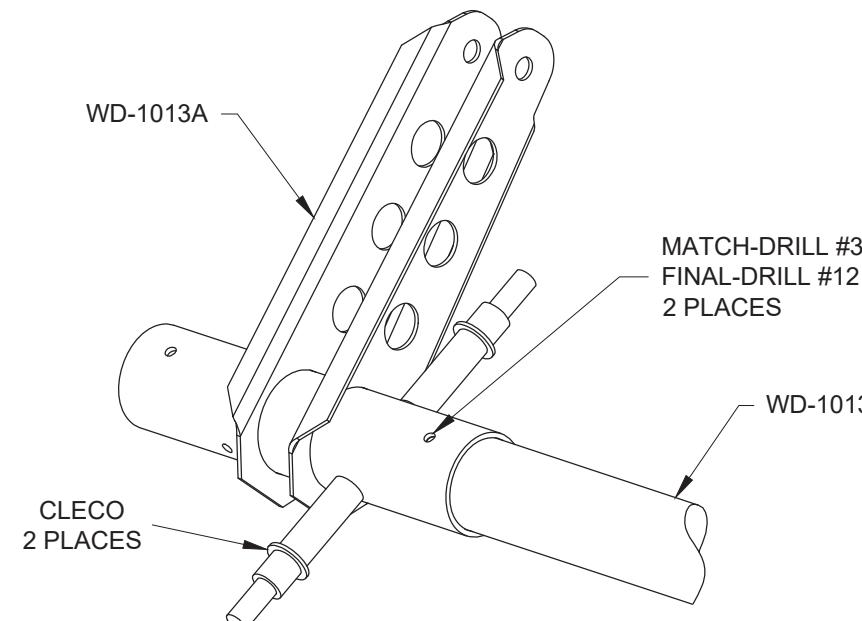
**FIGURE 1:**  
FLAP TORQUE TUBE ORIENTATION

Step 2: Slide a **WD-1013C** Flap Torque Tube into the **WD-1013A** Flap Crank and align them by using the pre-drilled holes as shown in Figure 2.



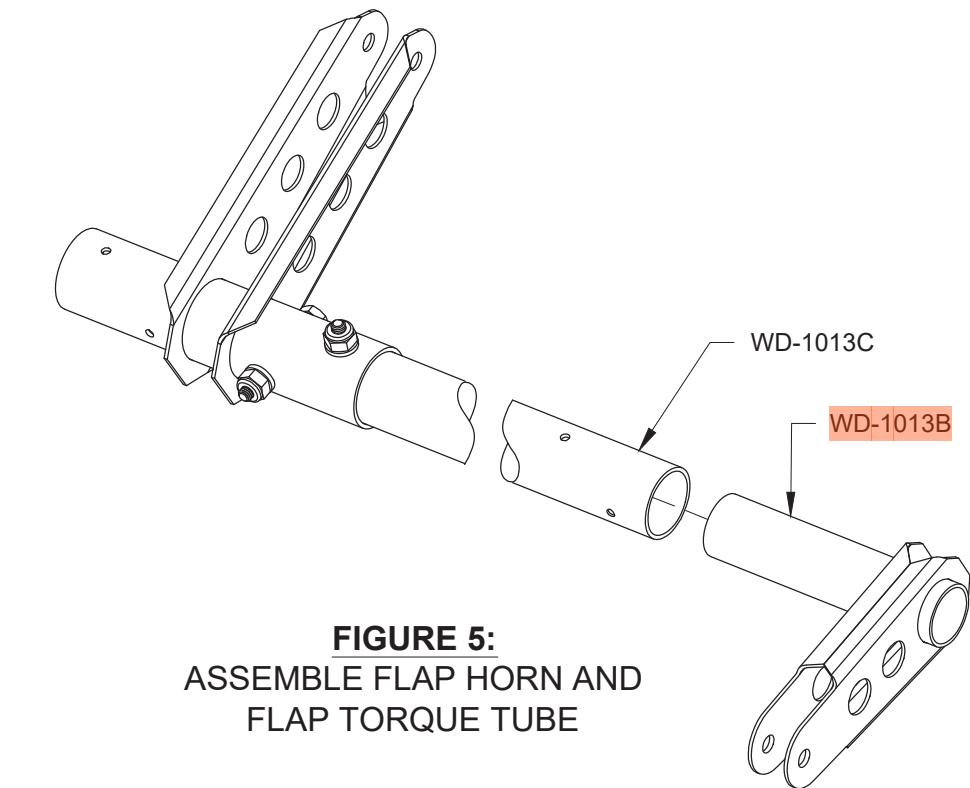
**FIGURE 2:** ASSEMBLE FLAP CRANK  
AND FLAP TORQUE TUBE

Step 3: Cleco the **WD-1013C** Flap Torque Tube to the inboard most set of holes in the **WD-1013A** Flap Crank as shown in Figure 3. Match-Drill the flap torque tube as per the call-out. Match-Drill both 1/8 diameter holes from the outside in, using the pre-drilled holes in the flap crank as guides.



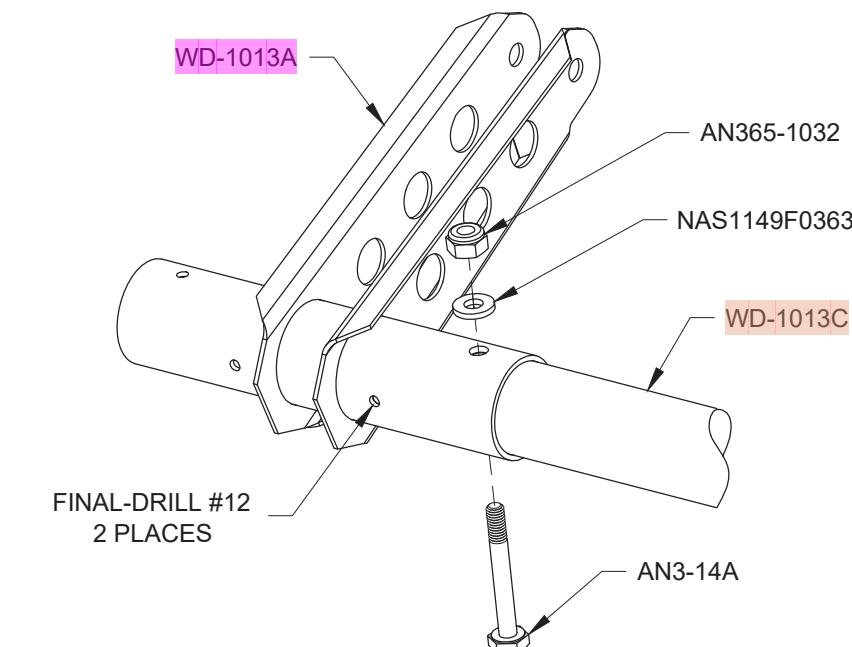
**FIGURE 3:**  
MATCH AND FINAL-DRILL FLAP CRANK  
AND FLAP TORQUE TUBE

Step 5: Slide a **WD-1013B** Flap Horn into the **WD-1013C** Flap Torque Tube as shown in Figure 5.



**FIGURE 5:**  
ASSEMBLE FLAP HORN AND  
FLAP TORQUE TUBE

Step 4: Bolt the **WD-1013A** Flap Crank to the **WD-1013C** Flap Torque Tube as shown in Figure 4. Remove the clecos. Drill as per the call-out. Install a second set of hardware like the first in this hole.



**FIGURE 4:**  
BOLT AND DRILL FLAP CRANK AND FLAP TORQUE TUBE



**NOTE:** The center portion of the flap crank (along welded seam) may not be flush with the table due to the weld. This has been taken into account. Do not modify the weldment!

Step 1: Clamp the **WD-1013A** Flap Crank to a flat surface as shown in Figure 1.

Step 2: Find the **W-730** Bellcrank Jig (see Figure 2) and bolt it to the **WD-1013B** Flap Horn using the hardware shown. This will set the angle of the flap horn relative to the flap crank.

Step 3: Set the lateral position of the flap horn as shown in Figure 3.

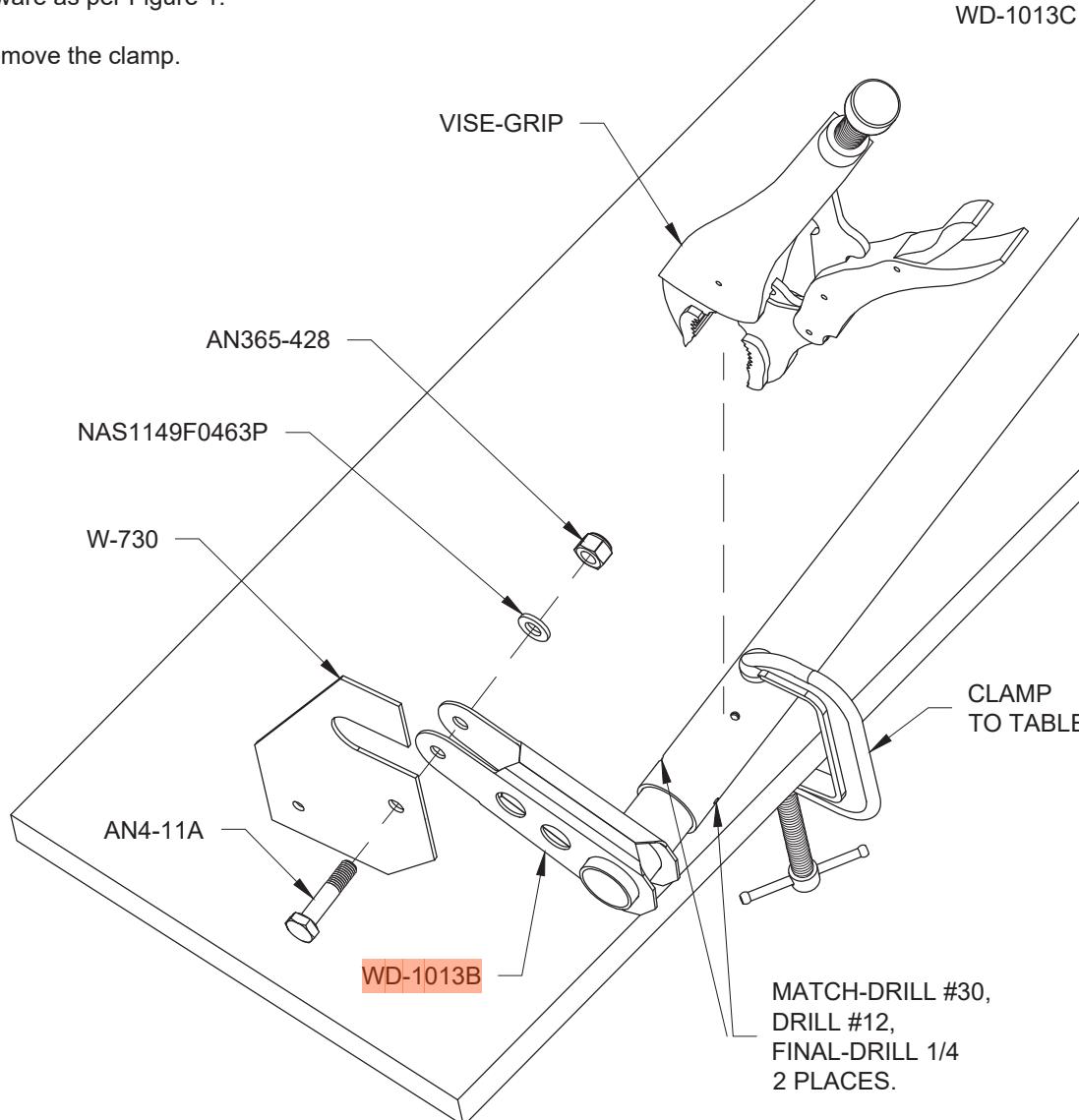
Step 4: Clamp the flap horn into this position using a vise-grip (with padded jaws) placed over the inboard set of 1/8 diameter holes.

Step 5: Leave this vise-grip in place while removing the other clamps holding the assembly to the table.

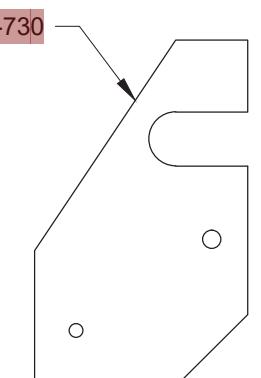
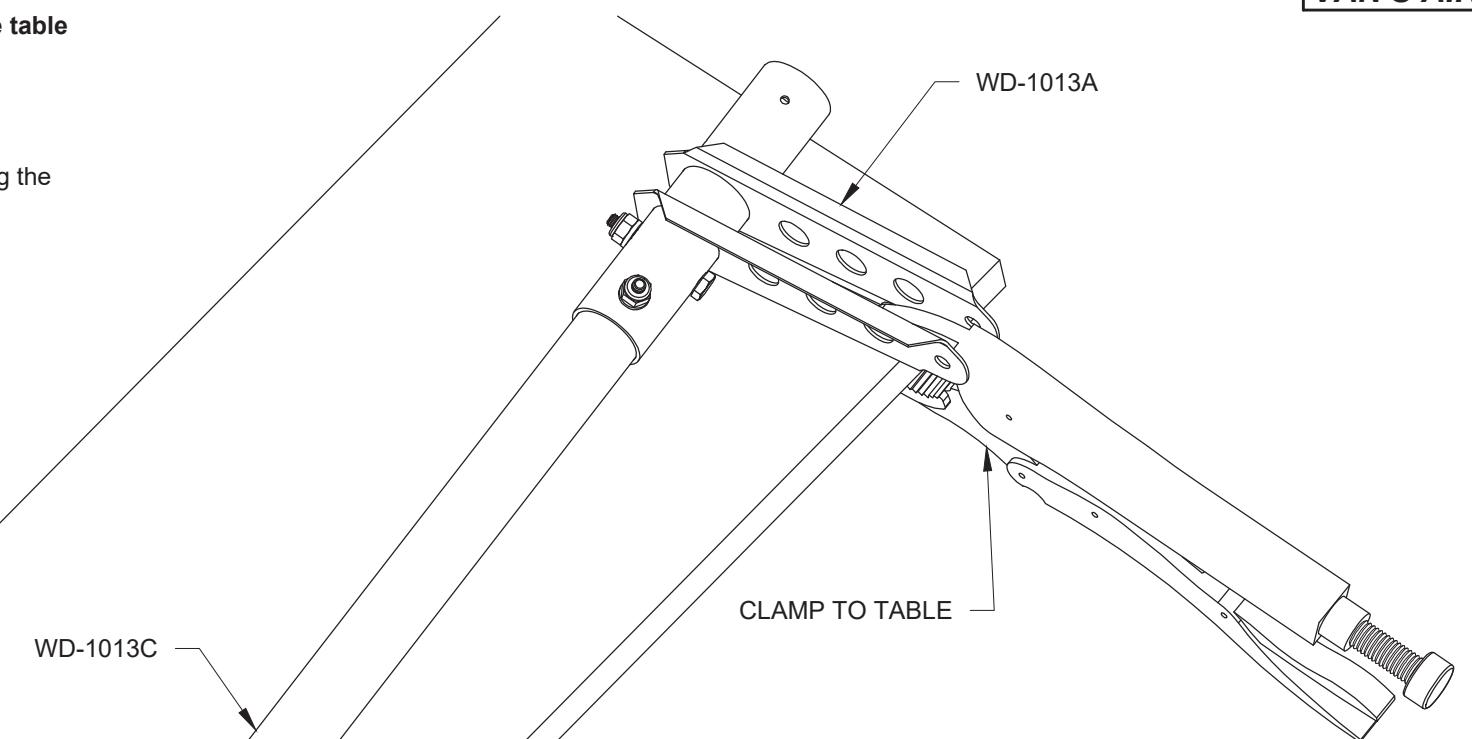
Step 6: Match-Drill #30 the flap horn using the outboard set of 1/8 diameter holes in the **WD-1013C** Flap Torque Tube as guides.

Step 7: Continue drilling to final size as per the call-out.  
Insert hardware as per Figure 1.

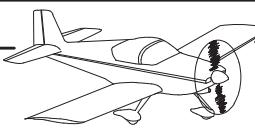
Step 8: Remove the clamp.



**FIGURE 1:**  
DRILLING FLAP TORQUE TUBE AND FLAP HORN



**FIGURE 3:**  
LATERAL POSITION OF FLAP HORN

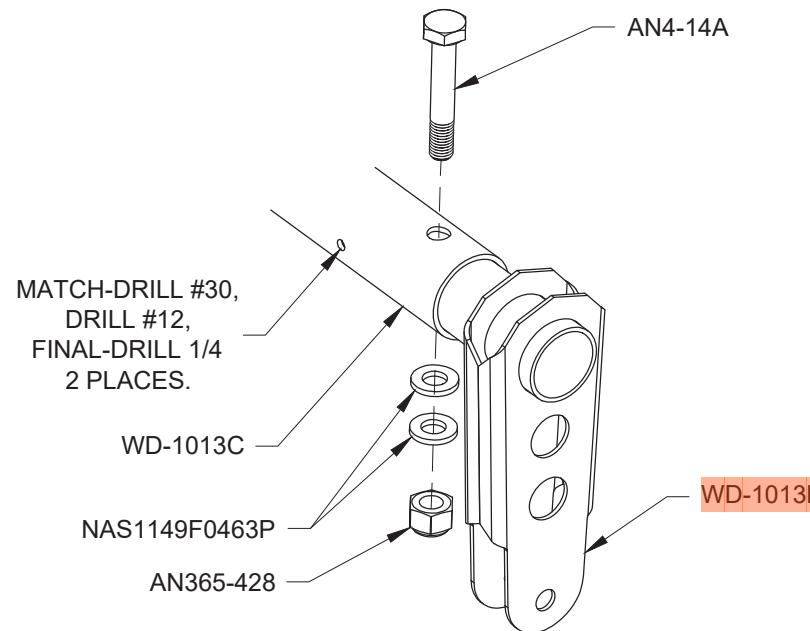


Step 1: Bolt the **WD-1013B** Flap Horn to the **WD-1013C** Flap Torque Tube as per Figure 1.

Match-Drill #30 the flap horn at two places using the torque tube as a guide. Drill #12 then final-drill 1/4.

Mark the parts so they can be reassembled as drilled and identified as the parts to be used on the left side of the aircraft.

Step 2: Disassemble and deburr all parts.

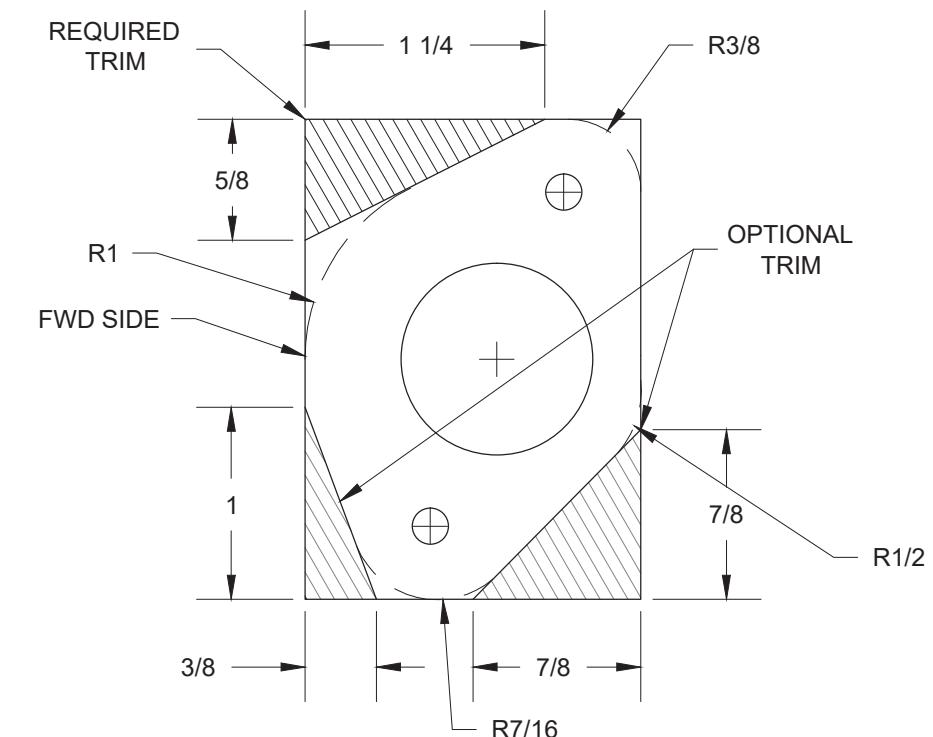


**FIGURE 1:**  
BOLT AND DRILL FLAP TORQUE TUBE AND FLAP HORN

Step 3: Repeat Step 1, Page 40-2 through Step 1 on this page for the flap torque tube and flap horn on the right side of the plane. The right side is the mirror of the left.

Prime the inside of the tubes.

Step 4: Trim the four **F-1030** UHMW Bushings as per the callouts in Figure 2. Only one area **must** be trimmed for clearance while the other two areas are optional for a small weight reduction. It is acceptable to radius the corners of the UHMW bushings approximately as shown in Figure 2.

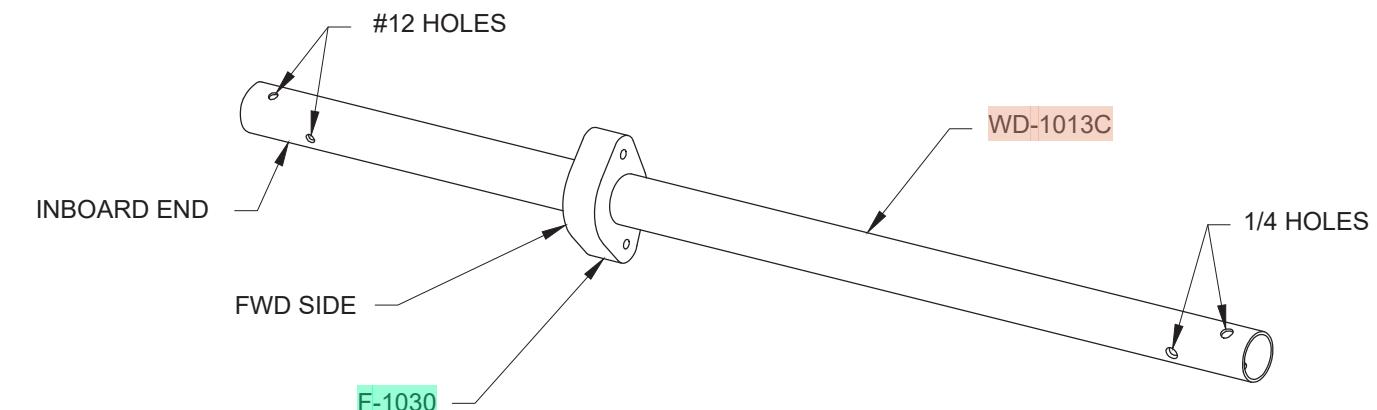


**FIGURE 2:** OPTIONAL TRIM OF UHMW BUSHING

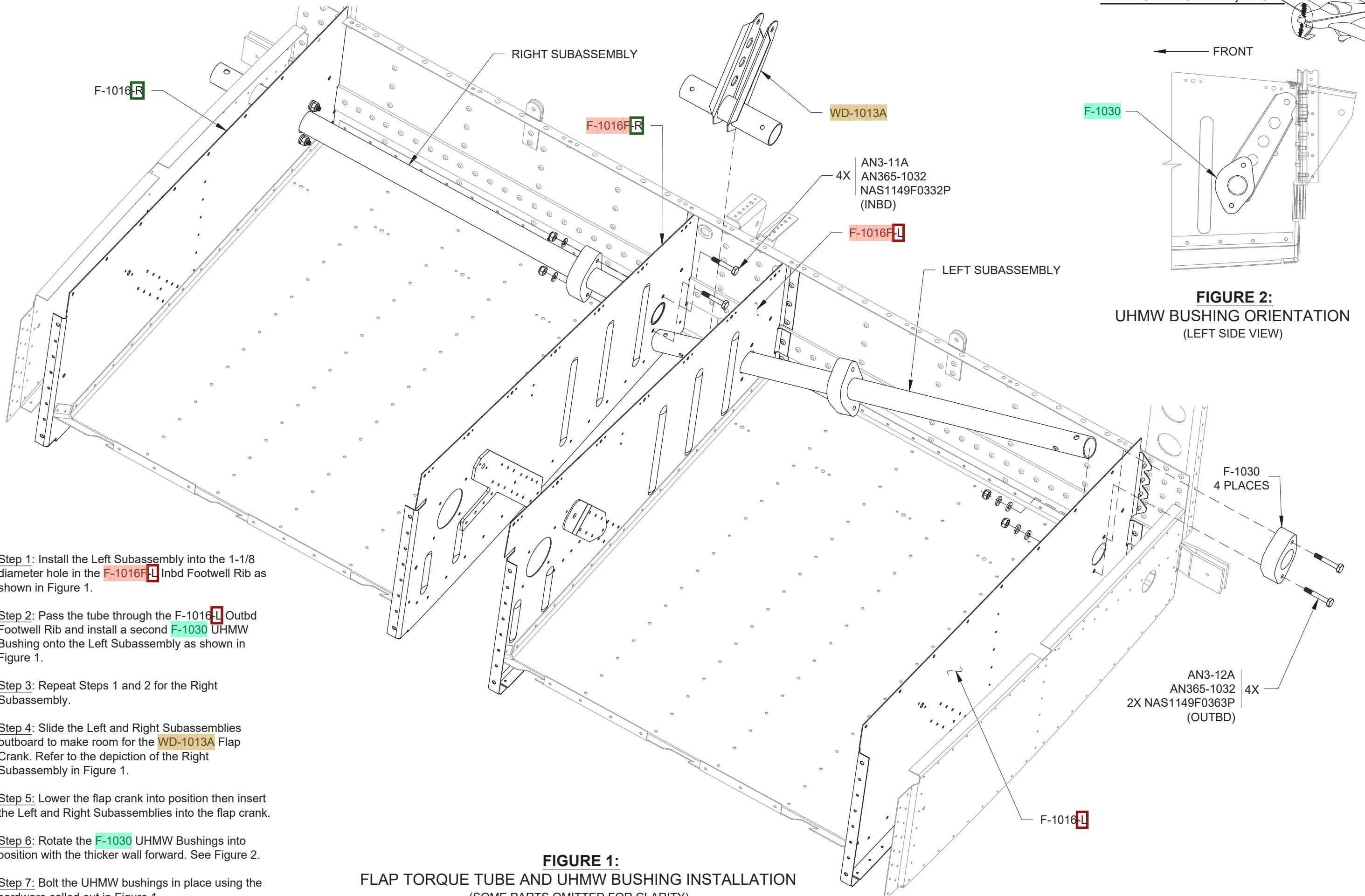
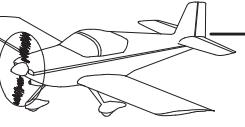
Step 5: Slide one **F-1030** UHMW Bushing onto each **WD-1013C** Flap Torque Tube as shown in Figure 3. This UHMW bushing will eventually be positioned to the inboard side of the system.

This will form the Right and Left Subassemblies. The Left Subassembly is shown in Figure 3.

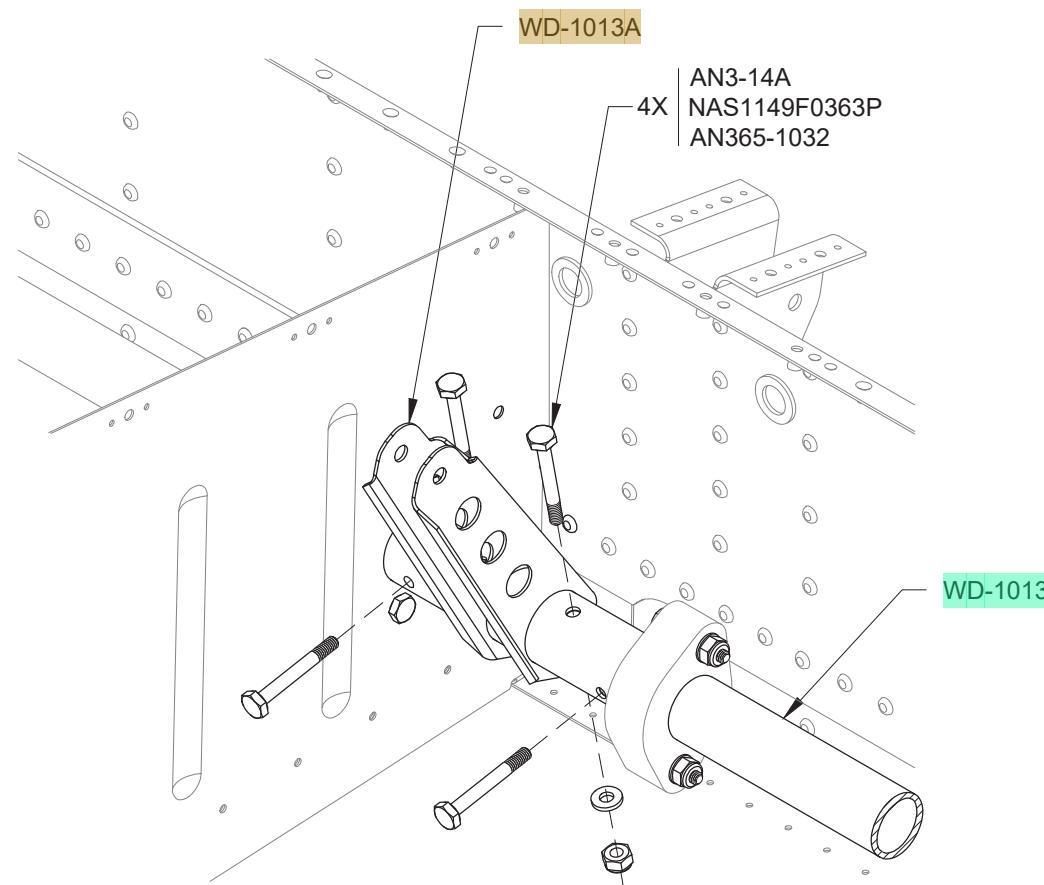
**NOTE:** Remaining depictions of the UHMW bushing show optional rounded corners.



**FIGURE 3:** PRE-INSTALL UHMW BUSHING

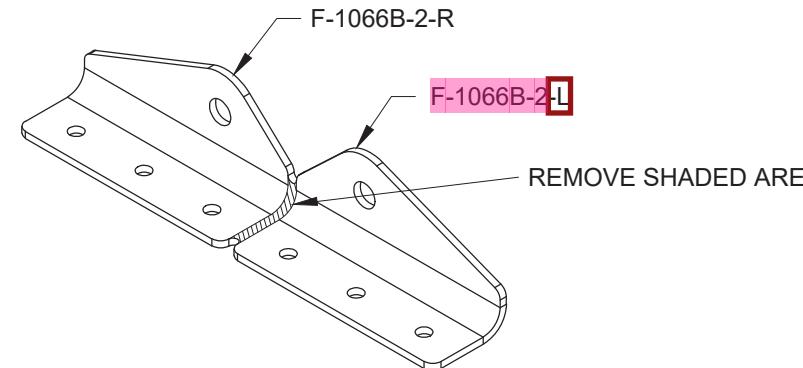


Step 1: Bolt the **WD-1013A** Flap Crank to the **WD-1013C** Flap Torque Tubes per the call-outs in Figure 1.



**FIGURE 1:**  
FLAP CRANK & FLAP MOTOR ROD END INSTALLATION  
(SOME PARTS NOT SHOWN FOR CLARITY)

Step 2: Separate the **F-1066B-2** Angle into the **F-1066B-2-L** and **F-1066B-2-R** as shown in Figure 2.



**FIGURE 2:** SEPARATE FLAP MOTOR ATTACH ANGLES

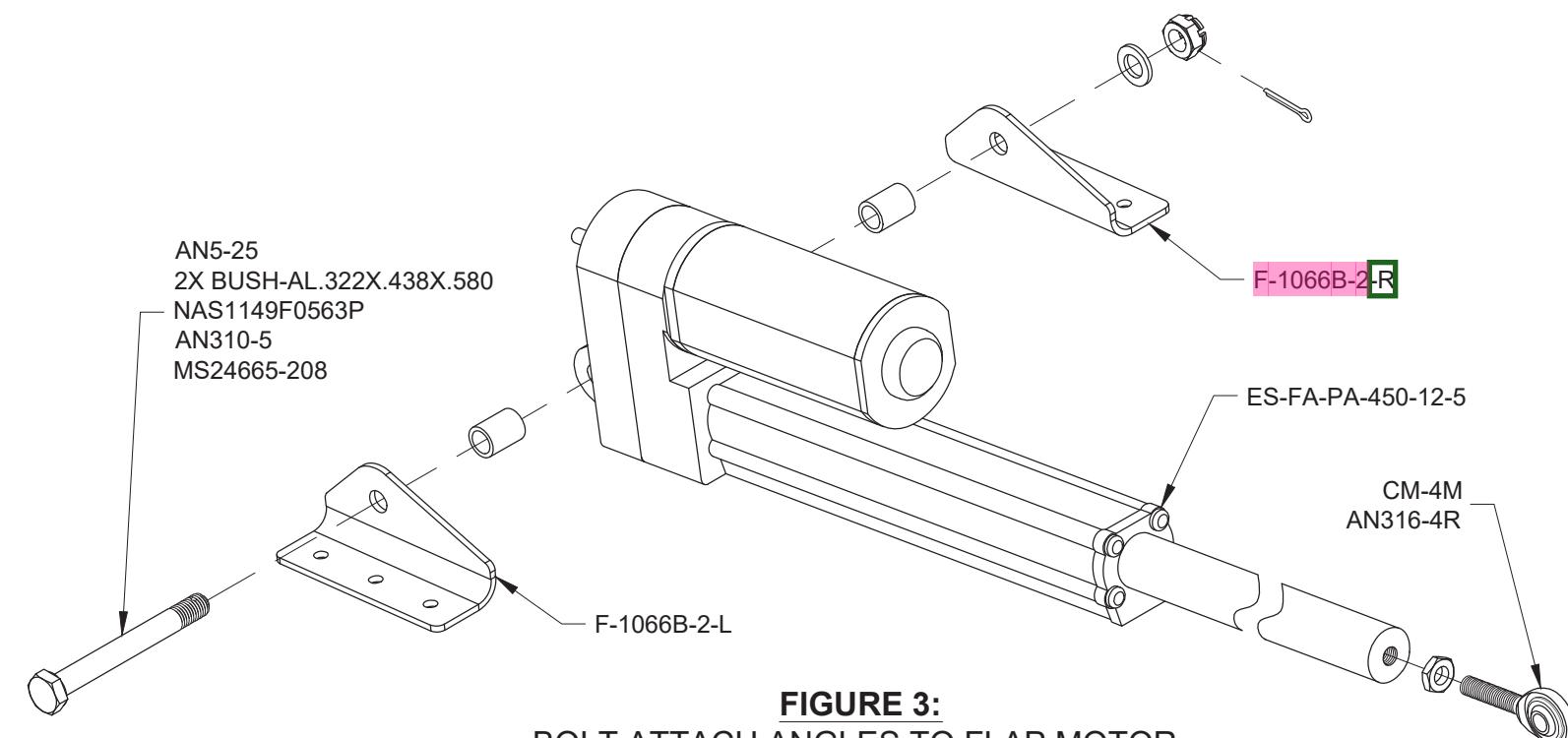
Step 3: Install the jam nut and rod end bearing into the shaft of the ES-FA-PA-450-12-5 flap motor as shown in Figure 3.

**WARNING: At least seven rod end bearing threads must engage the flap motor shaft.**

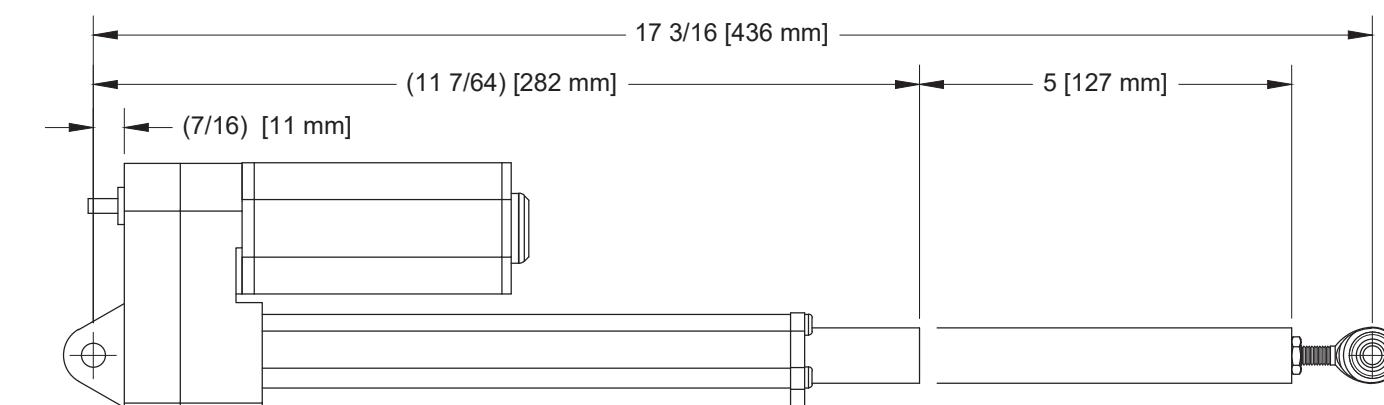
Step 4: With the flap motor shaft extended to its maximum length, adjust the rod end bearing to match the center to center distance shown in Figure 4. Add a drop of Blue Loctite to the rod end threads and tighten the jam nut against the face of the actuator shaft, keeping the rod end bearing face vertical as shown in Figure 4.

Step 5: Assemble the ES-FA-PA-450-12-5 Flap Motor, **F-1066B-2-L** and **F-1066B-2-R** using the hardware and bushings called out in Figure 3. Tighten the castle nut just enough to remove end play but not enough to add excessive friction. The cotter pin will be installed later.

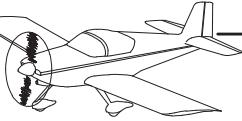
Refer to this assembly hereafter as the Flap Motor Assembly.



**FIGURE 3:**  
BOLT ATTACH ANGLES TO FLAP MOTOR



**FIGURE 4:** FLAP MOTOR EXTENDED & RETRACTED LENGTHS



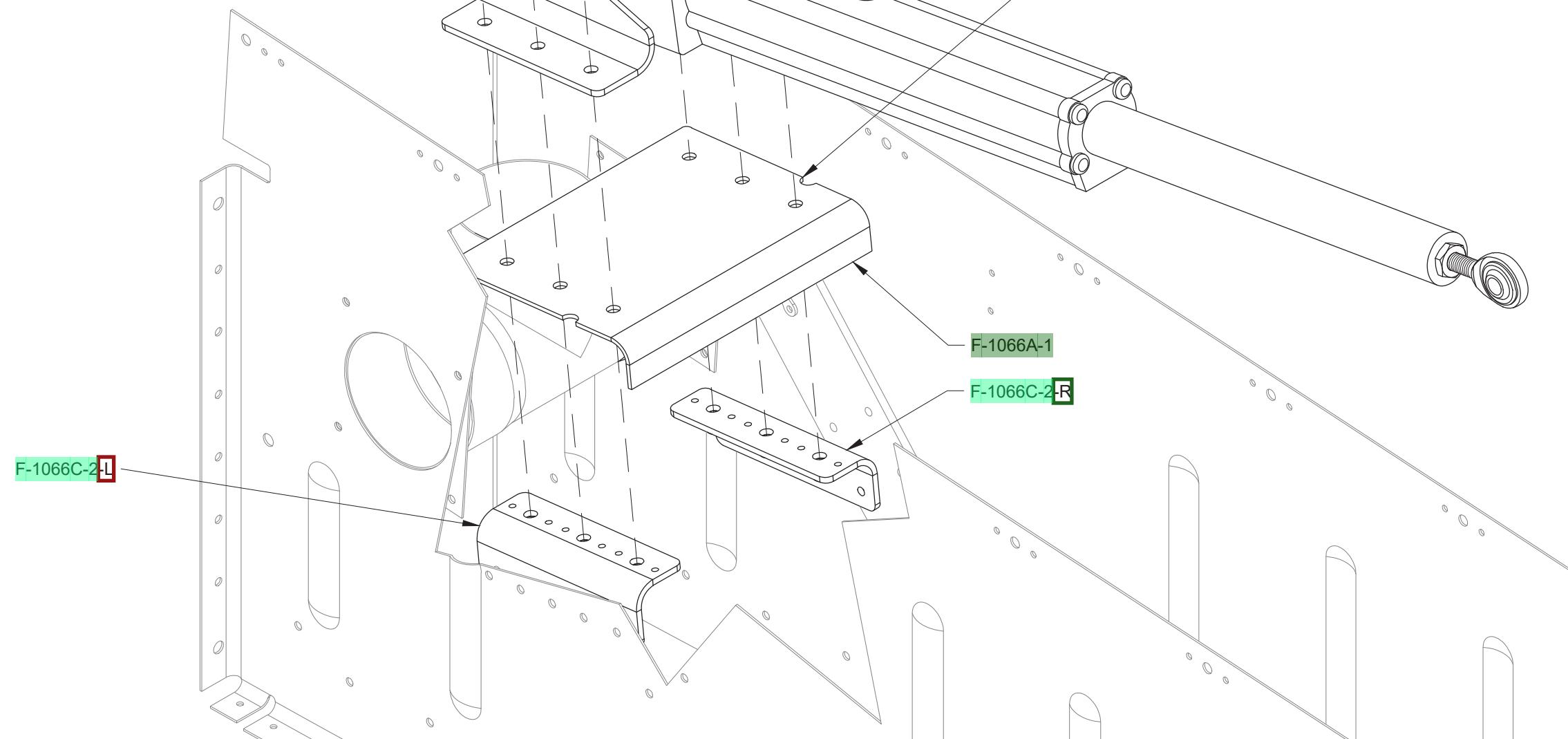
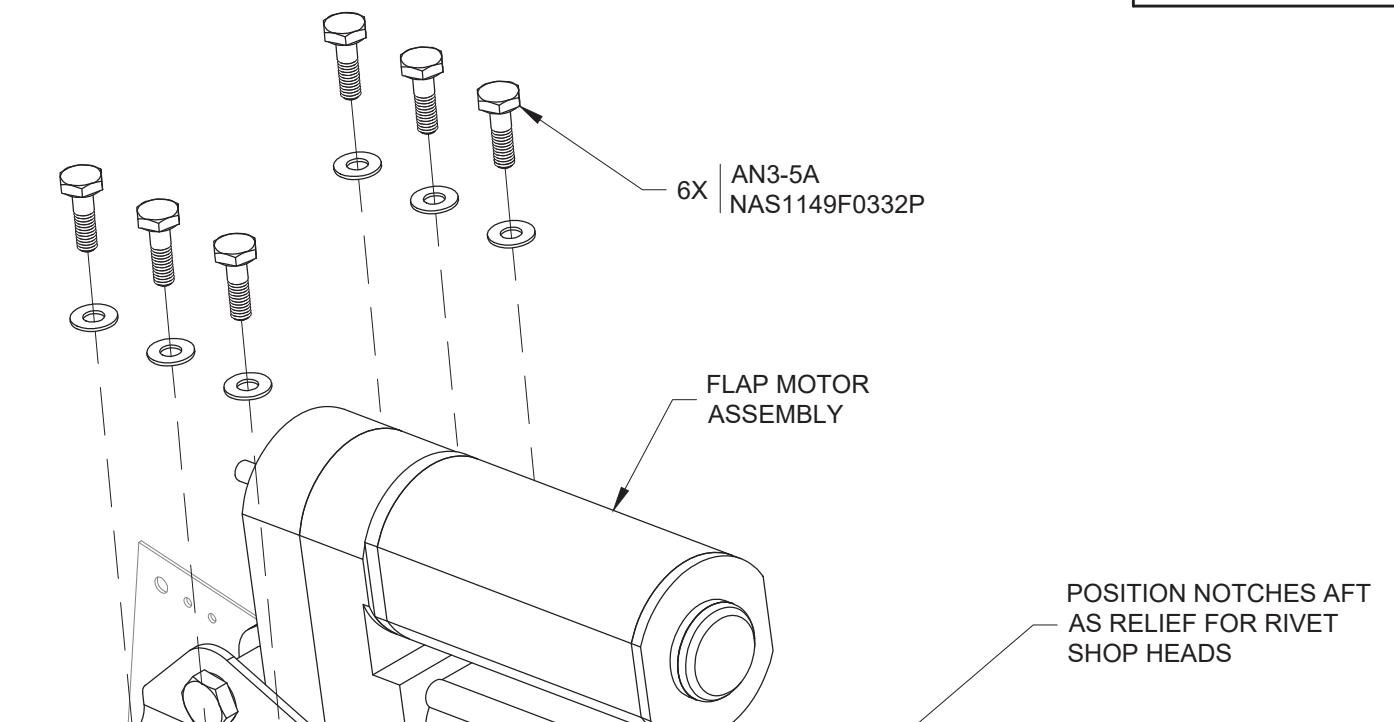
Step 1: Lower the F-1066A-1 Flap Motor Bracket into position on top of the F-1066C-2-L and F-1066C-2-R Reinforcing Angles and align the six 3/16 holes.

Step 2: Lower the Flap Motor Assembly onto the F-1066A-1 and bolt in place using the hardware called out in Figure 2.

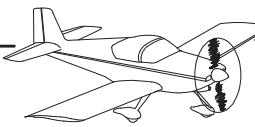
Step 3: Check for excessive friction and/or play. When satisfied install the cotter pin from Page 40-6, Figure 3.

ES-FA-PA-450-12-5	
Extend	BLU (18)
Retract	BRN (18)
POT 5VDC	YLW (24)
POT GND	WHT (24)
POT Wiper	RED (24)

**FIGURE 1: FLAP MOTOR WIRING**

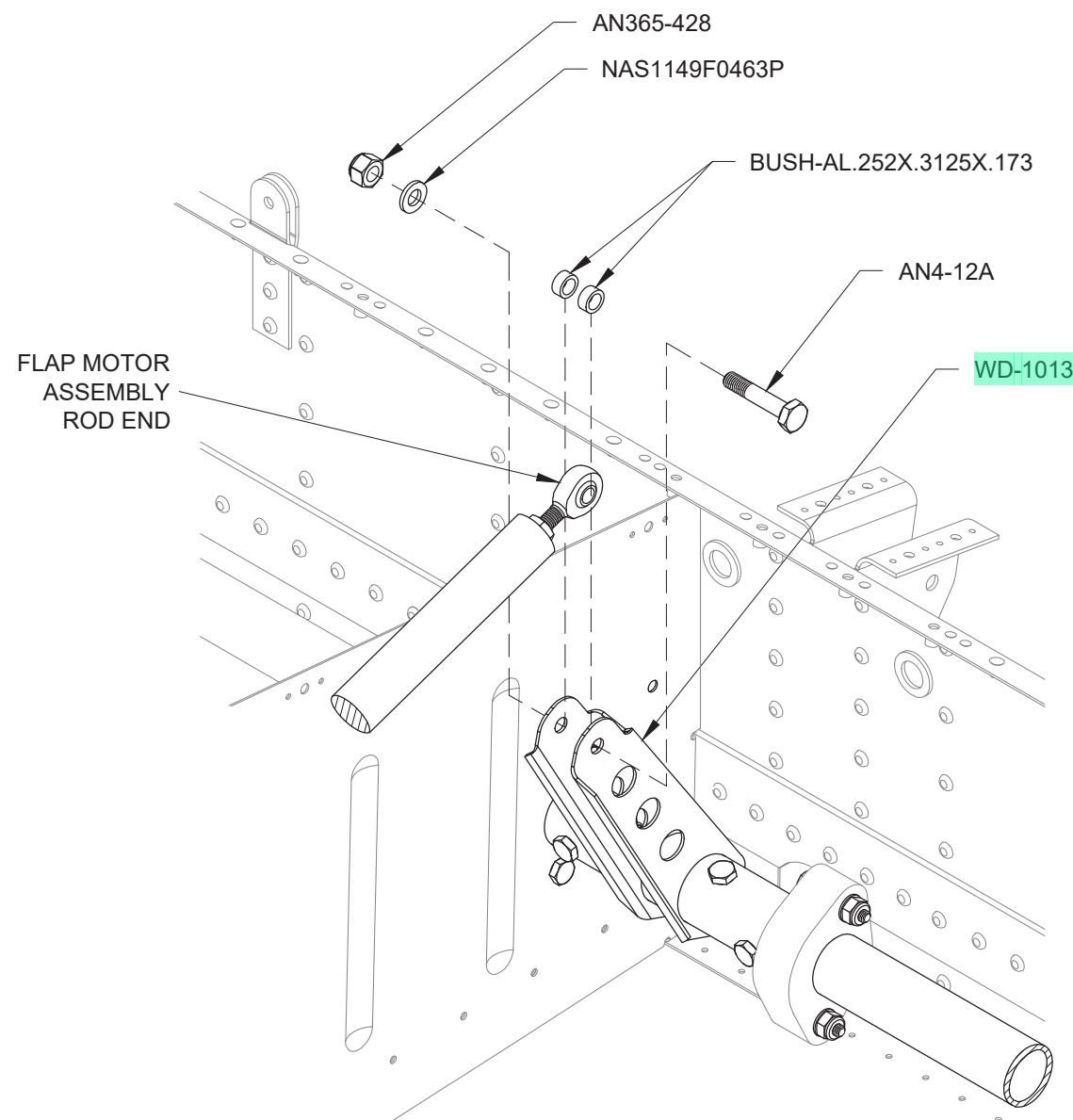


**FIGURE 2: FLAP MOTOR ASSEMBLY INSTALLATION**  
(SOME PARTS NOT SHOWN FOR CLARITY)



**NOTE: It is not necessary to safety-wire the flap motor shaft to the rod end attach bolt because the motor design prevents shaft rotation.**

Step 1: Bolt the rod end bearing into the **WD-1013A** Flap Crank using the hardware shown in Figure 1.

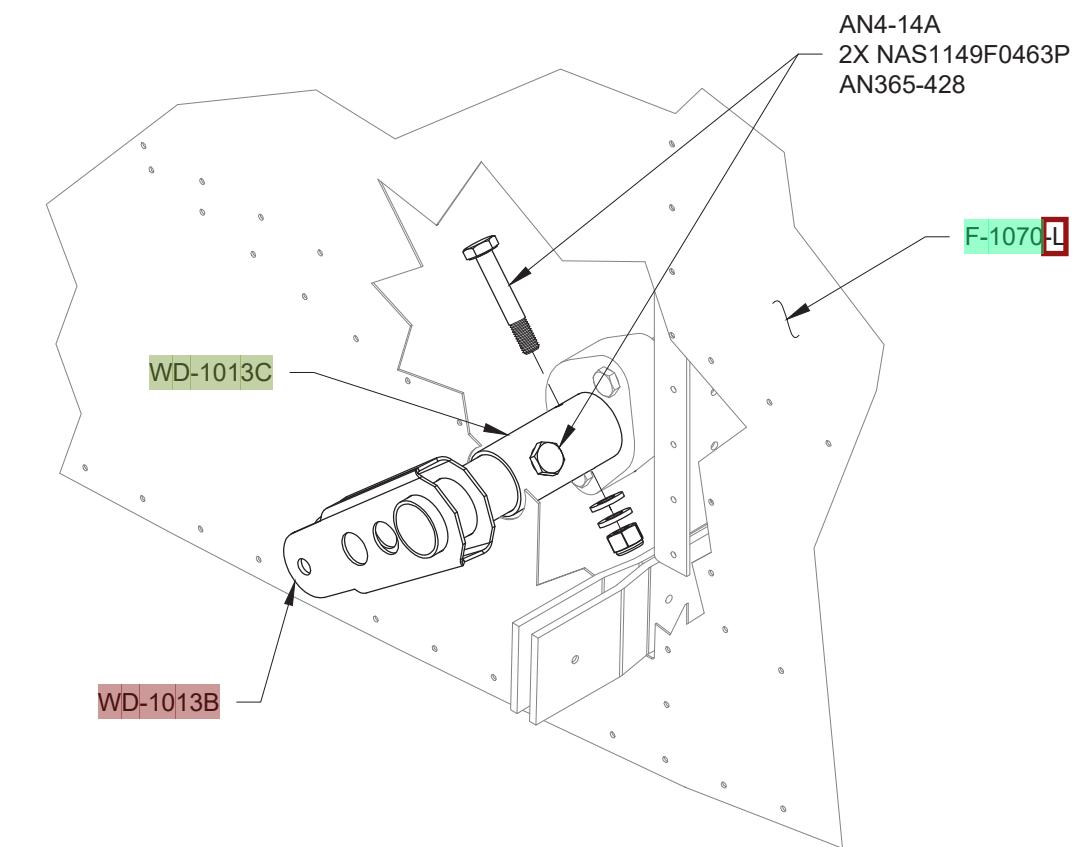


**FIGURE 1:**  
ROD END TO FLAP CRANK INSTALLATION  
(SOME PARTS NOT SHOWN FOR CLARITY)

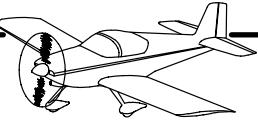
Step 2: Bolt the **WD-1013B** Flap Horn to the **WD-1013C** Flap Torque Tube using the hardware called out in Figure 2.

Step 3: Repeat Step 2 for the right side of the aircraft.

End of section.

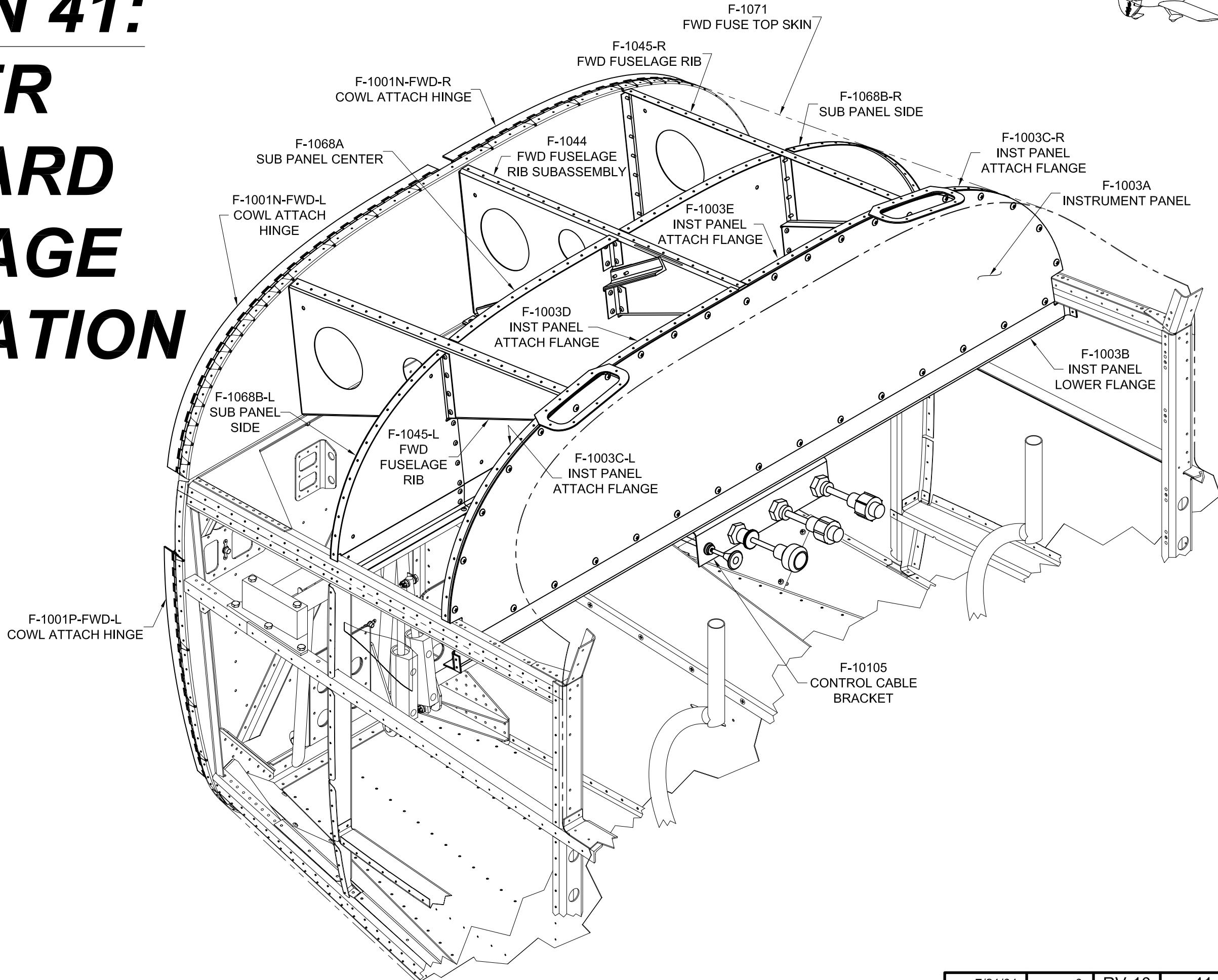


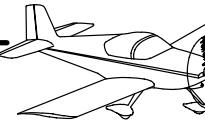
**FIGURE 2:**  
ATTACHING THE LEFT SIDE FLAP HORN  
(SOME PARTS OMITTED FOR CLARITY)



# SECTION 41:

# UPPER FORWARD FUSELAGE INSTALLATION





NOTE: The RV-10 Upper Forward Fuselage has been designed for subassembly off of the fuselage. This means that much of the installation of equipment mounted to the F-1003 Instrument Panel and F-1068 Sub Panel can be accomplished with the subassembly resting on a workbench or other convenient spot where accessibility is greatly enhanced compared to having to complete this work while sitting or laying inside the forward fuselage.

The instrument panel has been designed without bends so that a builder can design a custom layout and then have it fabricated at any local shop with CNC cutting capabilities. In addition to being removable, the instrument panel is designed to be split into separately removable modules. Removal of an instrument panel module allows any work on that module to be done out of the aircraft where more comfortable working conditions prevail. Furthermore, removal of an instrument panel module allows for easy access to any equipment mounted in adjacent instrument panel modules or to the sub-panels.

The non-removable F-1003B Instrument Panel Lower Flange is designed with adequate depth so that electrical switches and breakers can be mounted to it.

Key Information for planning the instrument panel mounted equipment installation:

RV-10 Instrument Panel Tilt Angle = 7.3°

RV-10 Instrument Panel to Sub Panel Distance = 9 1/2 inches

Removal of material from the F-1044 Fwd Fuselage Rib Subassembly OR F-1045-L/R Fwd Fuselage Ribs is not allowed.

Guidelines for cut-outs in the F-1068A and F-1068B-L/R Sub Panels:

Removal of any part of the sub panel lower flange is not allowed.

2 inch maximum diameter for any un-reinforced hole. See Page 41-3, Figure 1.

Cut-Outs measuring larger than 2 inches in height or width must be reinforced with:

.032 doubler ring as shown on Page 41-4, Figure 1.

OR

3/4 x 3/4 Angle .063 thick 6061-T6 or .032 thick 2024-T3 as shown on Page 41-3, Figure 1.

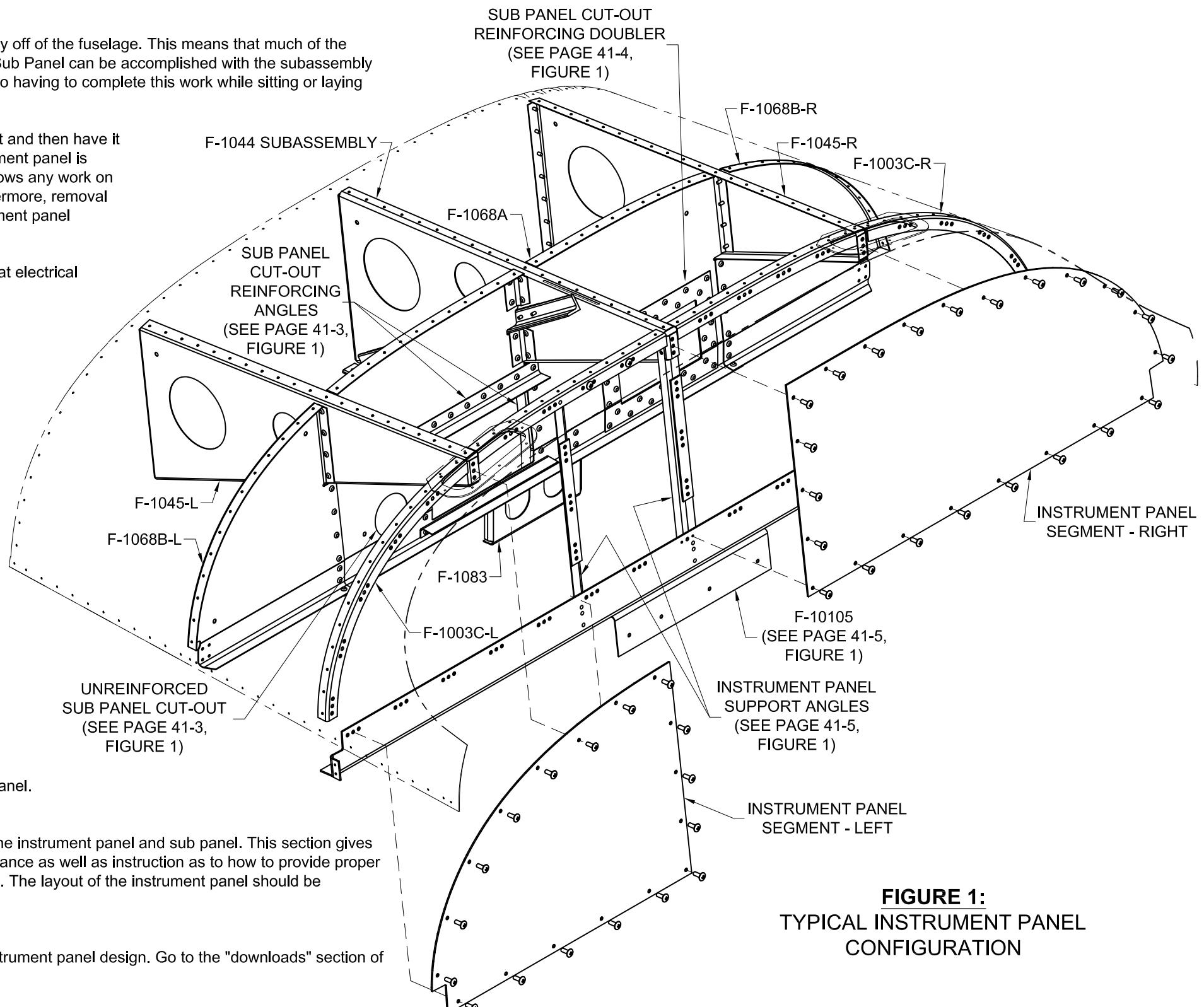
Trimming of the F-1083 Control Cable Bracket to clear a cut-out in the sub panel is acceptable so long as at least three of the fastener locations remain. See Page 41-3, Figure 1.

The "free-leg" of the F-1003C-L/R, F-1003D, and F-1003E Instrument Panel Attach Flanges may be relieved between nutplates if/as required to provide clearance for items mounted to the instrument panel. See Page 41-4, Figure 1.

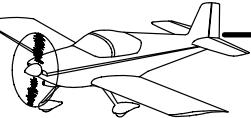
The builder should read this section in its entirety before selecting the equipment to be installed in the instrument panel and sub panel. This section gives instruction as to how to divide the instrument panel into modules for ease of installation and maintenance as well as instruction as to how to provide proper support for avionics trays without compromising the structural integrity of the upper forward fuselage. The layout of the instrument panel should be established before beginning work.

The F-1003A Instrument Panel dataset is available for builders to use as a starting point for their instrument panel design. Go to the "downloads" section of the Van's Aircraft website to obtain a .dxf format dataset of the instrument panel.

Step 1: Figure 1 depicts a typical instrument panel configuration and gives references for where to find detail views of particular features of the installation.



**FIGURE 1:**  
TYPICAL INSTRUMENT PANEL  
CONFIGURATION



NOTE: Details shown on this page for cut-outs in the F-1068A Sub Panel are also applicable to the F-1068B-L/R Sub Panels.

Step 1: Figure 1 shows the maximum size and minimum spacing for unreinforced sub panel cut-outs.

Figure 1 also shows a sub panel cut out that has been reinforced with angles that intersect at the corners. This type of reinforcement is best suited to a cut-out for tray mounted avionics with length greater than 9 1/2 inches as the trays can be attached to the free flanges of the vertical reinforcing angles.

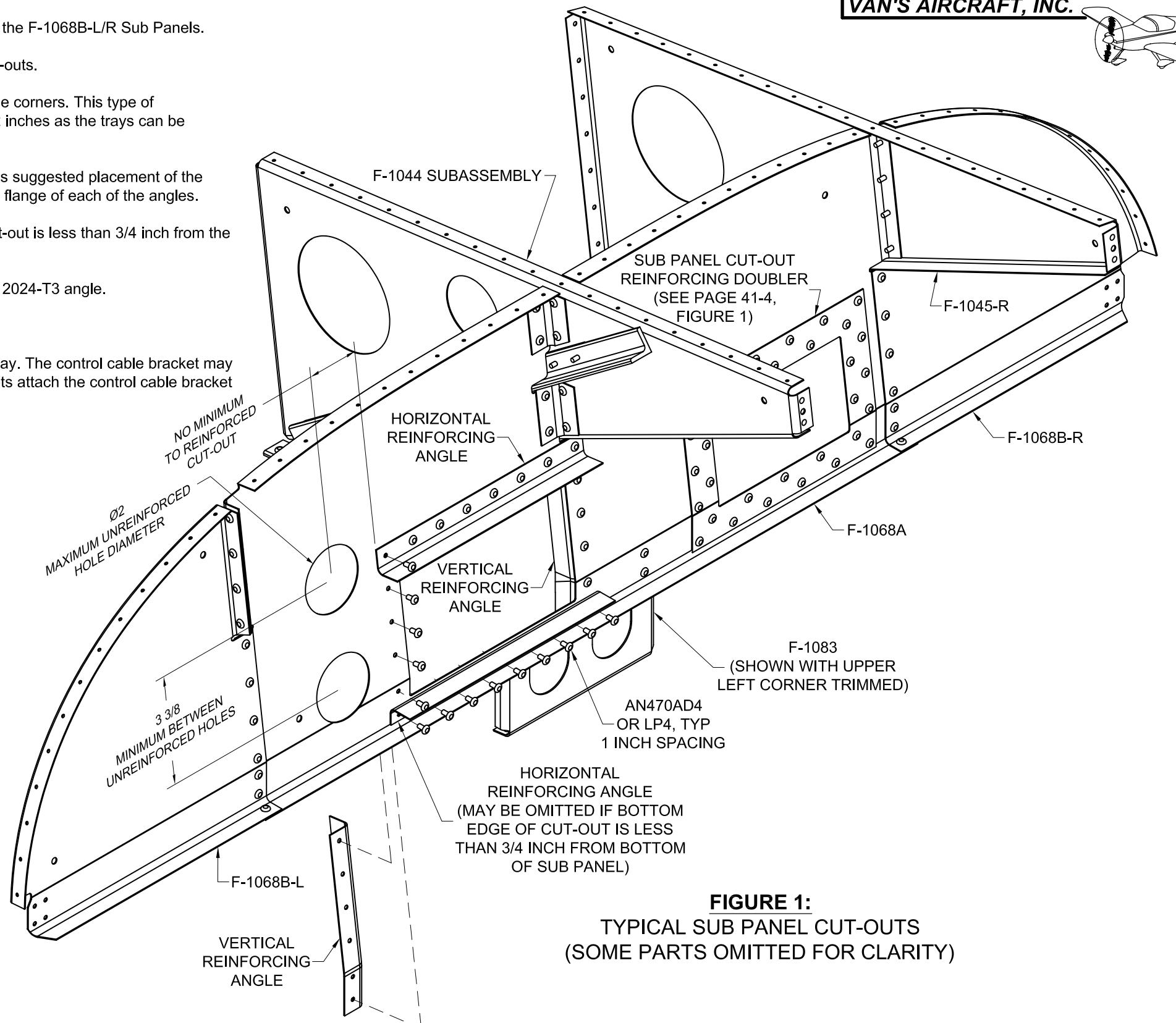
Note that the vertical reinforcing angles are shown on the FORWARD side of the sub panel. This suggested placement of the vertical angles allows them to be bent to match the sub panel bend by placing a flute in the free flange of each of the angles.

Note also that the lower horizontal reinforcing angle may be omitted IF the lower edge of the cut-out is less than 3/4 inch from the bottom of the sub-panel.

The reinforcing angles are fabricated from .063 thick extruded 6061-T6 angle or .032 thick bent 2024-T3 angle.

Material for fabrication of reinforcing angles is not provided in the kit.

Step 2: Figure 1 shows the F-1083 Control Cable Bracket with the upper left corner trimmed away. The control cable bracket may be trimmed as required to clear cut-outs in the F-1068A Sub Panel so long as at least three rivets attach the control cable bracket to the sub panel.



**FIGURE 1:**  
TYPICAL SUB PANEL CUT-OUTS  
(SOME PARTS OMITTED FOR CLARITY)



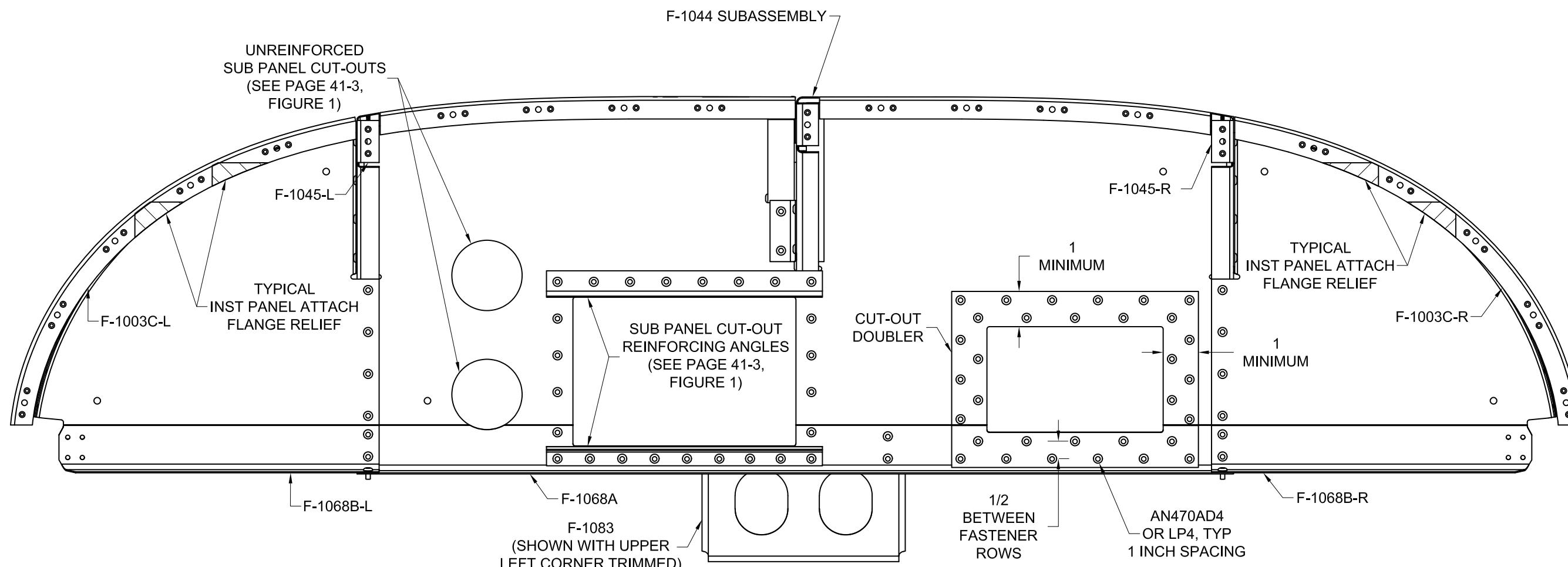
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NOTE: Details shown on this page for cut-outs in the F-1068A Sub Panel are also applicable to the F-1068B-L/R Sub Panels.

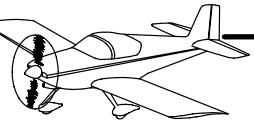
Step 1: Figure 1 shows the F-1068A Sub Panel with a generic cut-out and reinforcing doubler installation.

The doubler is fabricated from .032" thick 2024-T3 material. Material for fabrication of doublers is not provided in the kit.

Step 2: Figure 1 shows the F-1003C-L & R Inst Panel Attach Flanges with generic relief notches between nutplates. All the inst panel attach flanges may be notched-out between nutplate locations as required for mounting of equipment in the instrument panel.



**FIGURE 1:**  
TYPICAL SUB PANEL CUT-OUTS  
(SOME PARTS OMITTED FOR CLARITY)



Step 1: Figure 1 shows the installation of two instrument panel support angles. One leg of each angle supports the edge of the instrument panel segments while the other leg of each angle supports the avionics trays.

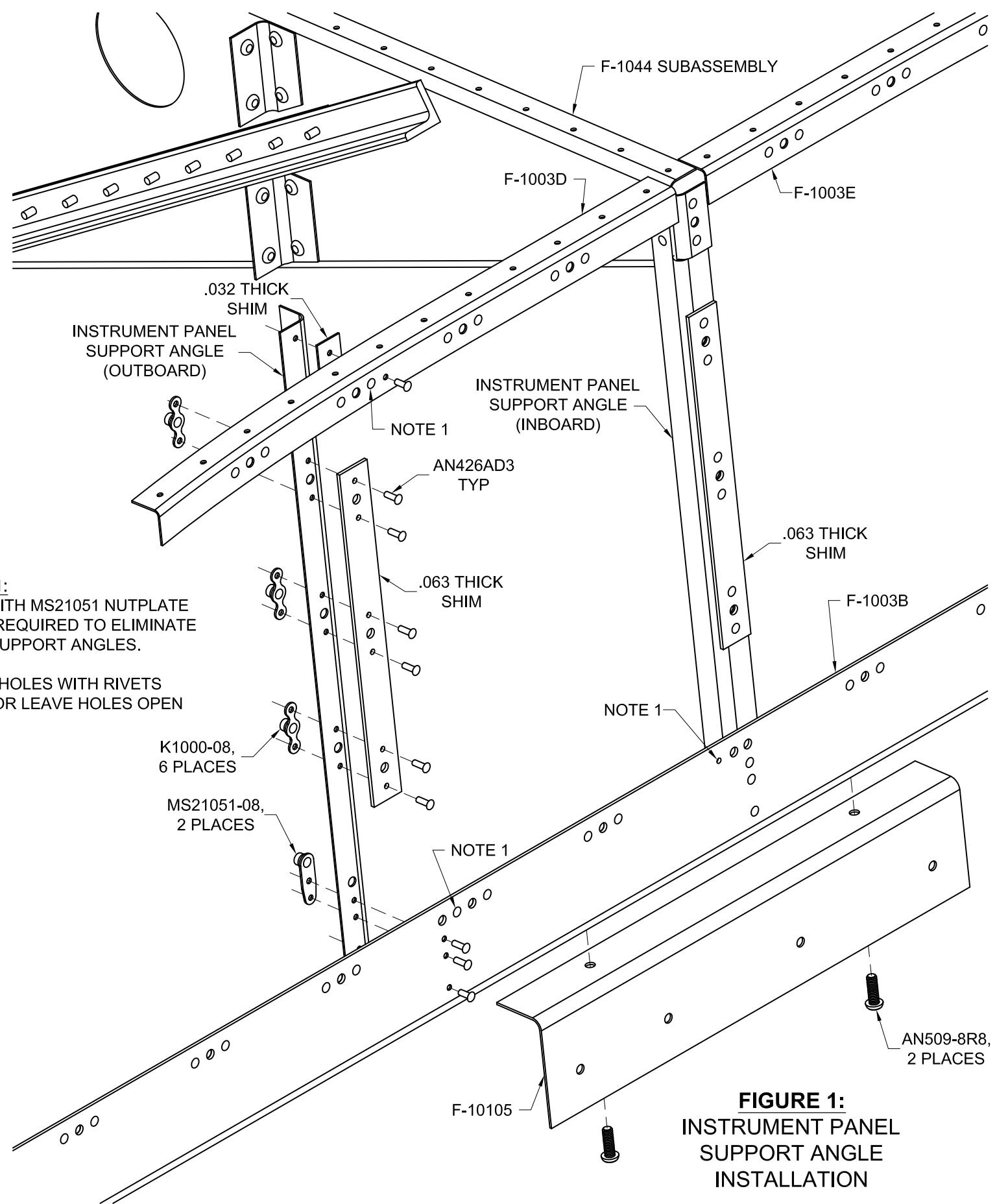
The outboard instrument panel support angle is installed between the F-1003D Inst Panel Attach Flange and the F-1003B Inst Panel Lower Flange.

The inboard instrument panel support angle is installed between the F-1044 Fwd Fuselage Rib Subassembly and the F-1003B Inst Panel Lower Flange.

Both instrument panel support angles are fabricated from 3/4 x 3/4 x .032 thick 2024-T3 Angle. The support angle shims are fabricated from aluminum sheet .032 or .063 thick as called-out in Figure 1.

Material for fabrication of the support angles and support angle shims is not provided in the kit.

Step 2: Figure 1 shows the attachment of the F-10105 Control Cable Bracket to the F-1003B Inst Panel Lower Flange.





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Step 1: Cleco the Upper Forward Fuselage Subassembly to the forward fuselage structure as shown in Figure 1.

Rivet the F-1068B-L & R Sub Panel Sides to the F-1002-L & R Fwd Fuselage Bulkheads as shown in Figure 1.

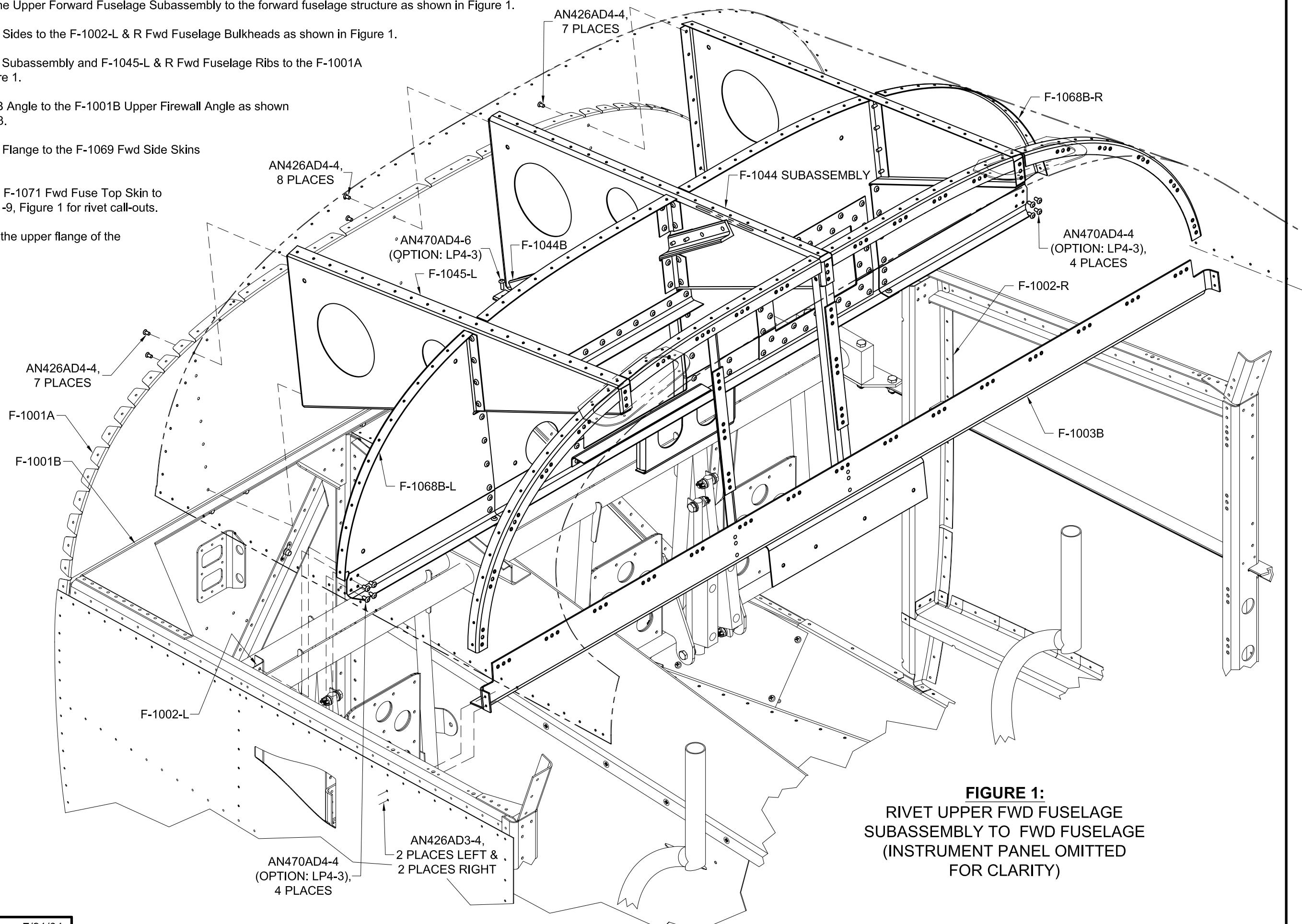
Rivet the F-1044 Fwd Fuselage Rib Subassembly and F-1045-L & R Fwd Fuselage Ribs to the F-1001A Firewall Bulkhead as shown in Figure 1.

Rivet the forward tab of the F-1044B Angle to the F-1001B Upper Firewall Angle as shown in Figure 1. See Page 31-5, Figure 3.

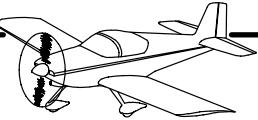
Rivet the F-1003B Inst Panel Lower Flange to the F-1069 Fwd Side Skins as shown in Figure 1.

Step 2: Rivet the lower edges of the F-1071 Fwd Fuse Top Skin to the fuselage structure. See Page 41-9, Figure 1 for rivet call-outs.

Do not rivet the fwd fuse top skin to the upper flange of the F-1001A Firewall Bulkhead.



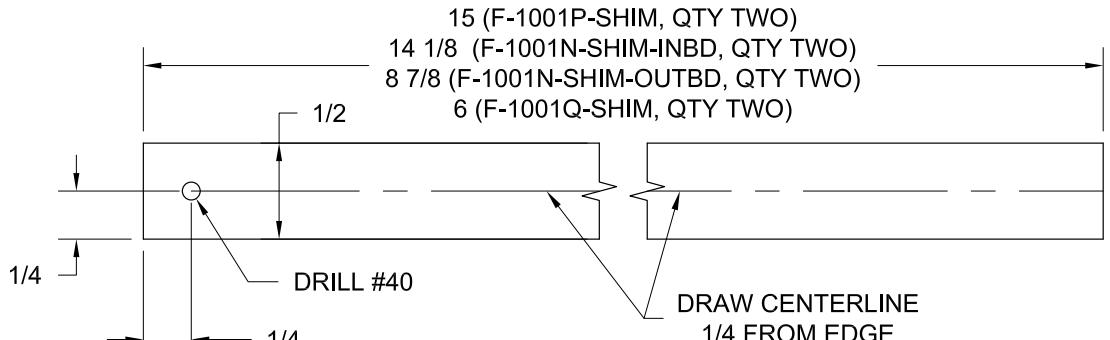
**FIGURE 1:**  
RIVET UPPER FWD FUSELAGE  
SUBASSEMBLY TO FWD FUSELAGE  
(INSTRUMENT PANEL OMITTED  
FOR CLARITY)



Step 1: Fabricate eight Cowl Attach Shims from .020 thick 2024-T3 Aluminum as shown in Figure 1.

Locate a #40 hole in each shim as shown in Figure 1.

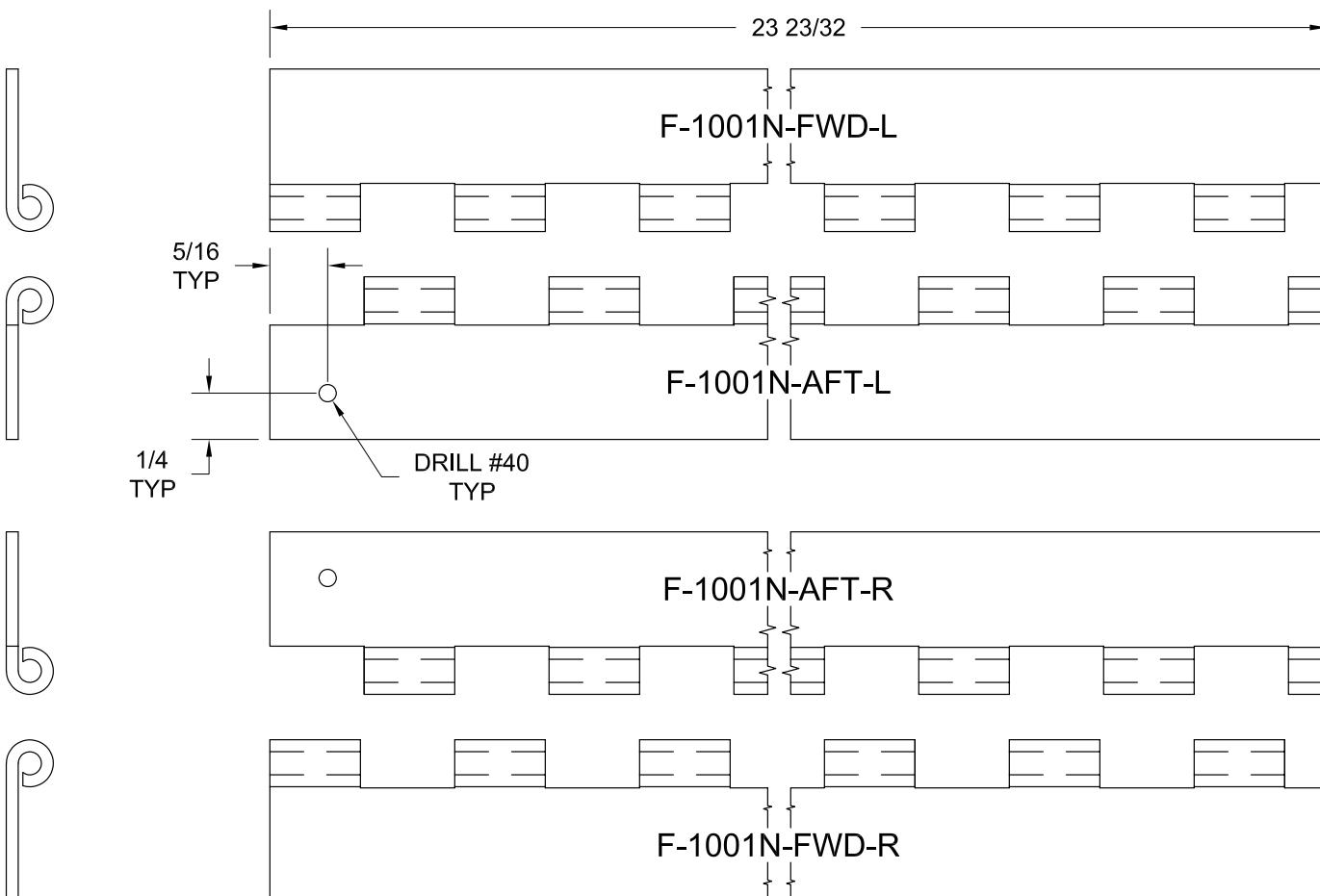
Use a sharpie pen to draw a centerline on each shim.



**FIGURE 1:**  
FABRICATE COWL ATTACH SHIMS

Step 2: Fabricate F-1001N Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 2.

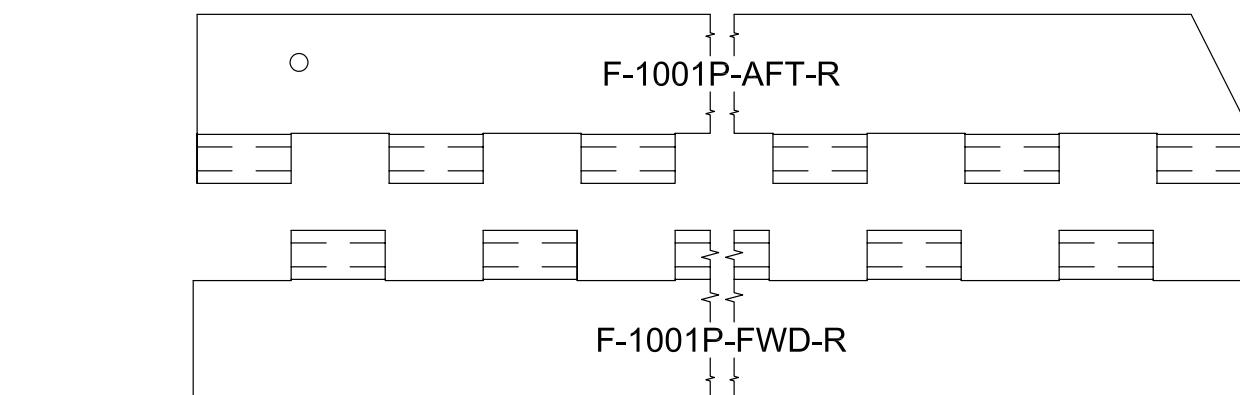
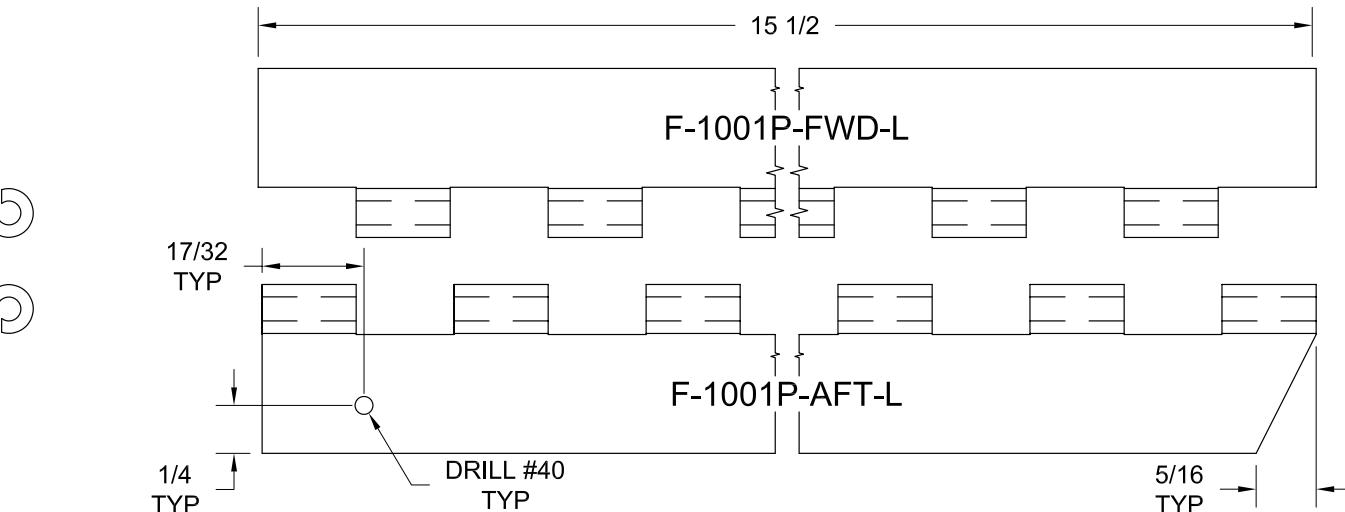
Drill a #40 hole in the F-1001N-AFT-L & R Cowl Attach Hinges as shown in Figure 2.



**FIGURE 2:**  
FABRICATE COWL ATTACH HINGES

Step 3: Fabricate F-1001P Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 3.

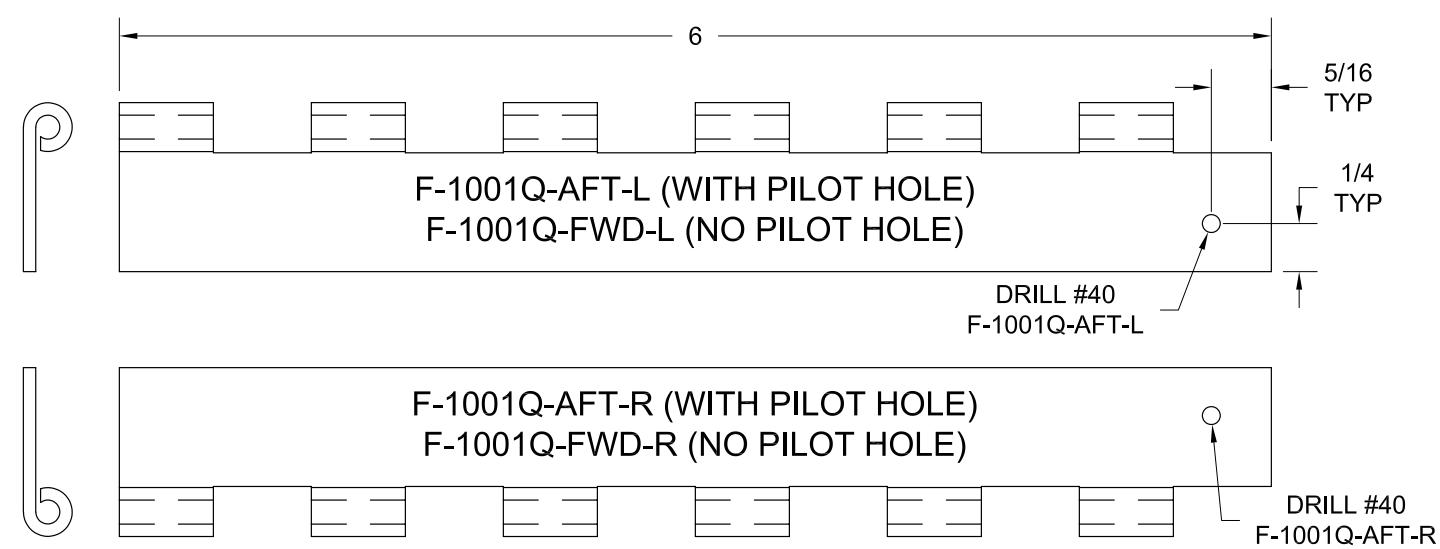
Drill a #40 hole in the F-1001P-AFT-L & R Cowl Attach Hinges as shown in Figure 3.



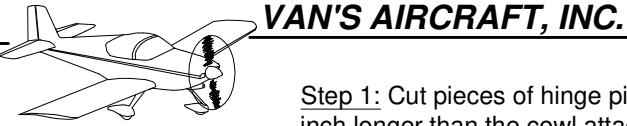
**FIGURE 3:**  
FABRICATE COWL ATTACH HINGES

Step 4: Fabricate F-1001Q Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 4.

Drill a #40 hole in the F-1001Q-AFT-L & R Cowl Attach Hinges as shown in Figure 4.



**FIGURE 4:**  
FABRICATE COWL ATTACH HINGES



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Step 1: Cut pieces of hinge pin material to be approximately 1 inch longer than the cowl attach hinges and slightly round the ends.

Step 2: Join the forward and aft hinge segments by mating the hinges and inserting the hinge pins. The hinge segments are kept joined during the fitting process to be sure that they do not become distorted and will fit together properly after installation.

Step 3: Cleco the cowl attach hinges and shims to the fuselage as shown in Figure 1. Orient each of the shims such that the surface with the centerline mates to the firewall flange, not to the hinge. Do not cleco the F-1001N-SHIM-OUTBD in place at this time.

While clecoed in place, align each hinge and shim so that they are parallel to the forward edge of the fuselage skin and that the shim edge does not protrude forward of the skin edge. The centerlines drawn on the shims should be visible through the holes in the skins and firewall flange. The centerlines will deviate slightly from the hole centers in the middle of the shims when properly aligned at the ends. Use spring clamps to hold the hinges and shims aligned.

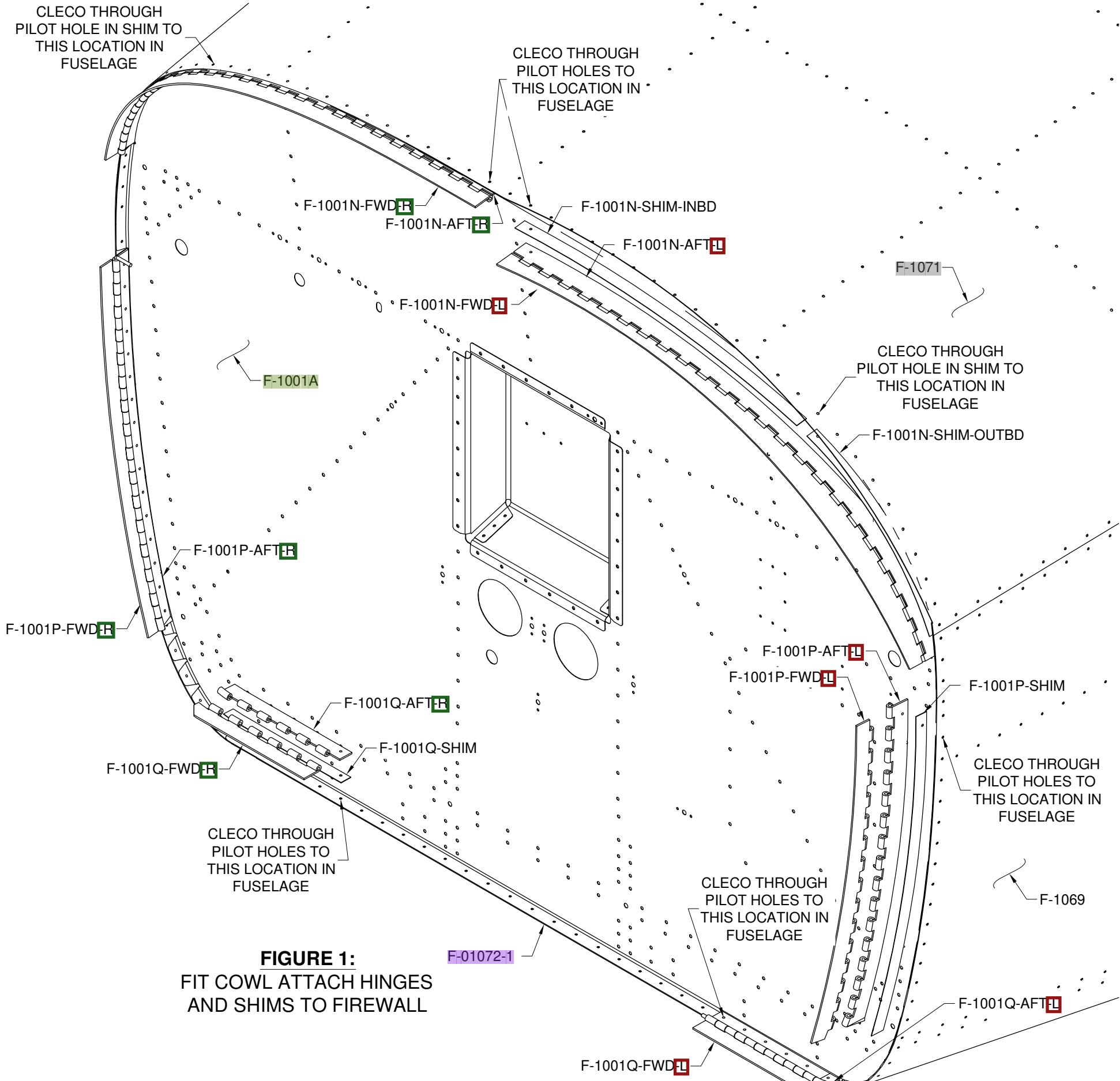
Step 4: Match Drill #40 the shims and hinges to the fuselage using the holes in the skins and firewall flanges as drill guides.

Begin match-drilling at the pilot-drilled ends of the shims/hinges and progress to the other end re-checking alignment every few holes. For the F-1001N-AFTL & R Cowl Attach Hinges match-drill one hole past the end of the F-1001N-SHIM-INBD Cowl Attach Shim, cleco the F-1001N-SHIM-OUTBD Cowl Attach Shim in place, then align the centerline and continue match-drilling.

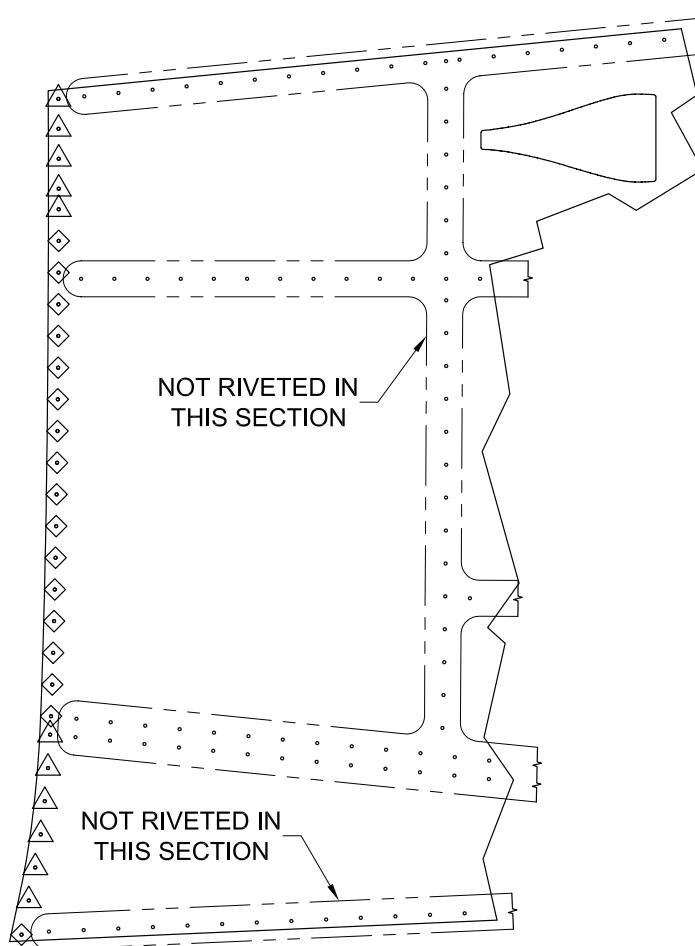
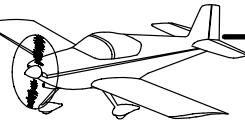
Step 5: Remove the shims and hinges and mark them for orientation and location. Machine countersink the hinges to fit a piece of .020 thick material that has been dimpled for an AN426AD3 rivet. Deburr holes and edges of the shims and hinges. Dimple the shims. Prime if-as desired.

Step 6: Cleco the shims and aft hinge segments to the fuselage. See Figure 1. Insert the hinge pins into the aft hinge segments as this will keep the hinge eyelets in their proper shape if a mistake is made while riveting.

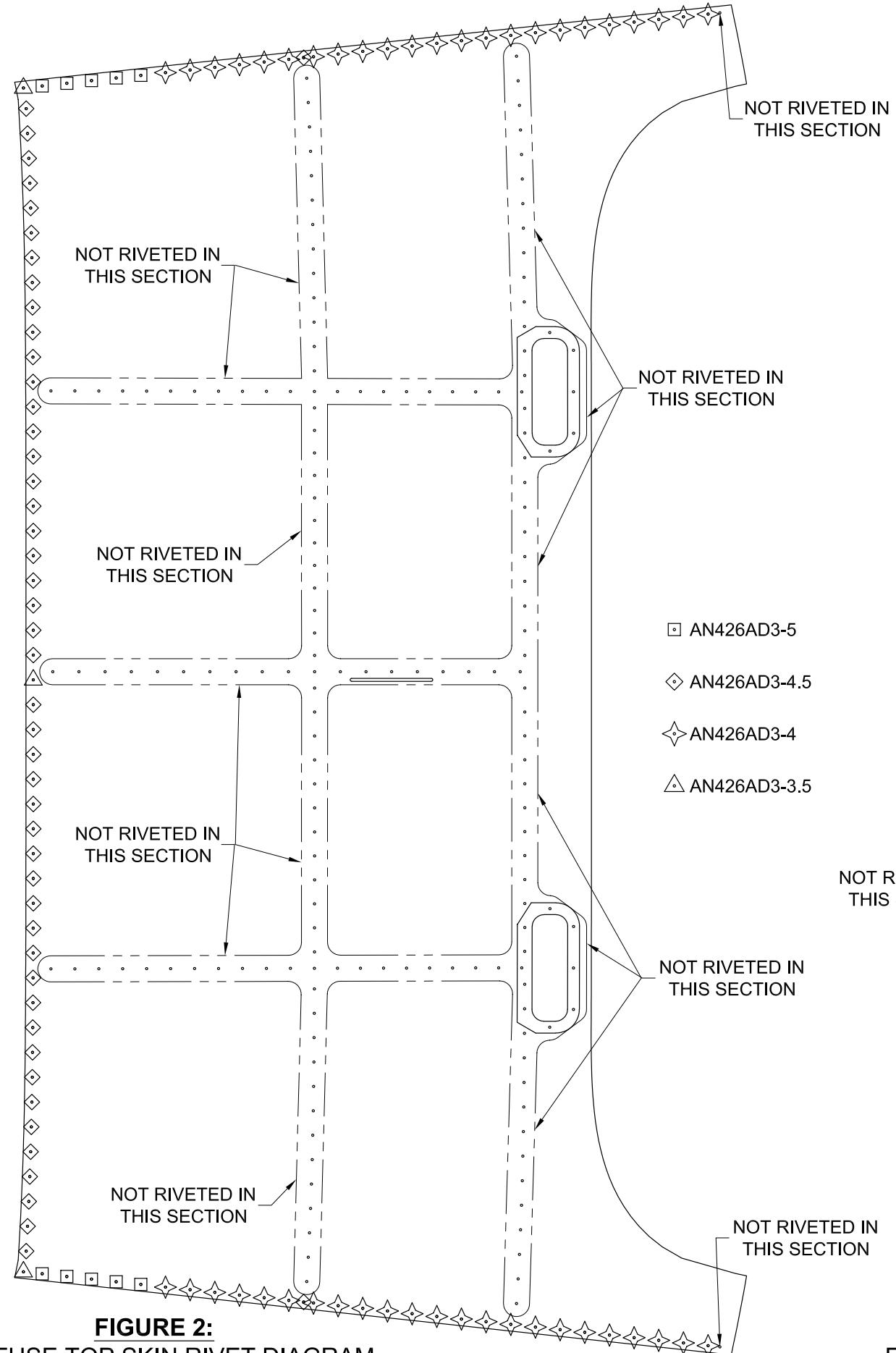
Install rivets around the perimeter of the firewall. See Page 41-9, Figures 1, 2 and 3 for rivet call-outs.



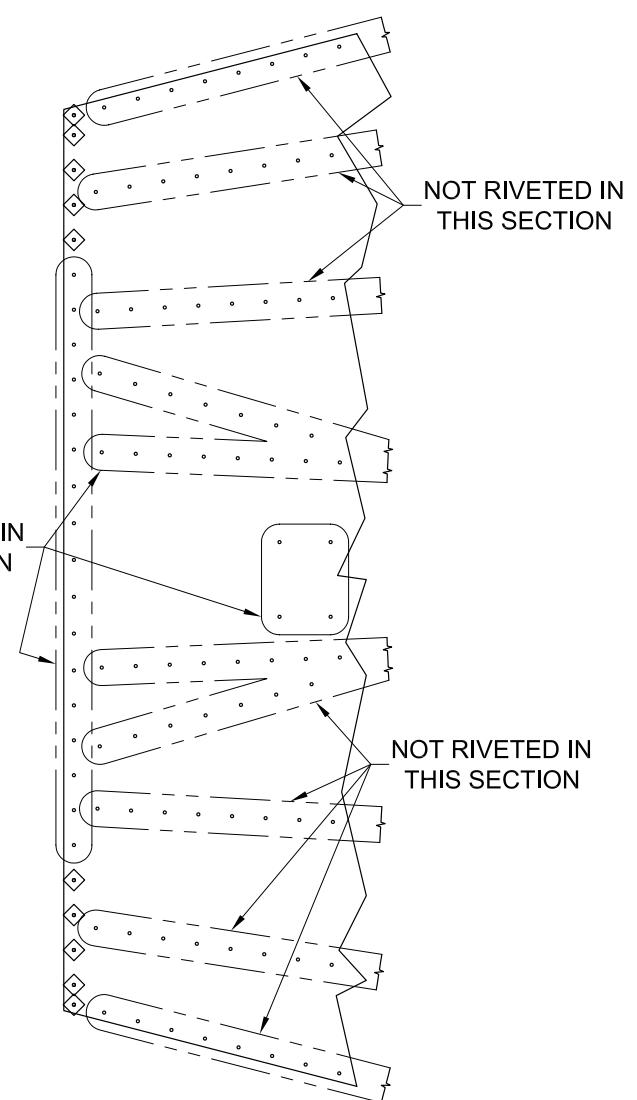
**FIGURE 1:**  
FIT COWL ATTACH HINGES  
AND SHIMS TO FIREWALL



**FIGURE 1:**  
FWD SIDE SKIN RIVET DIAGRAM



**FIGURE 2:**  
FWD FUSE TOP SKIN RIVET DIAGRAM



**FIGURE 3:**  
FWD FUSE BOTTOM SKIN RIVET DIAGRAM

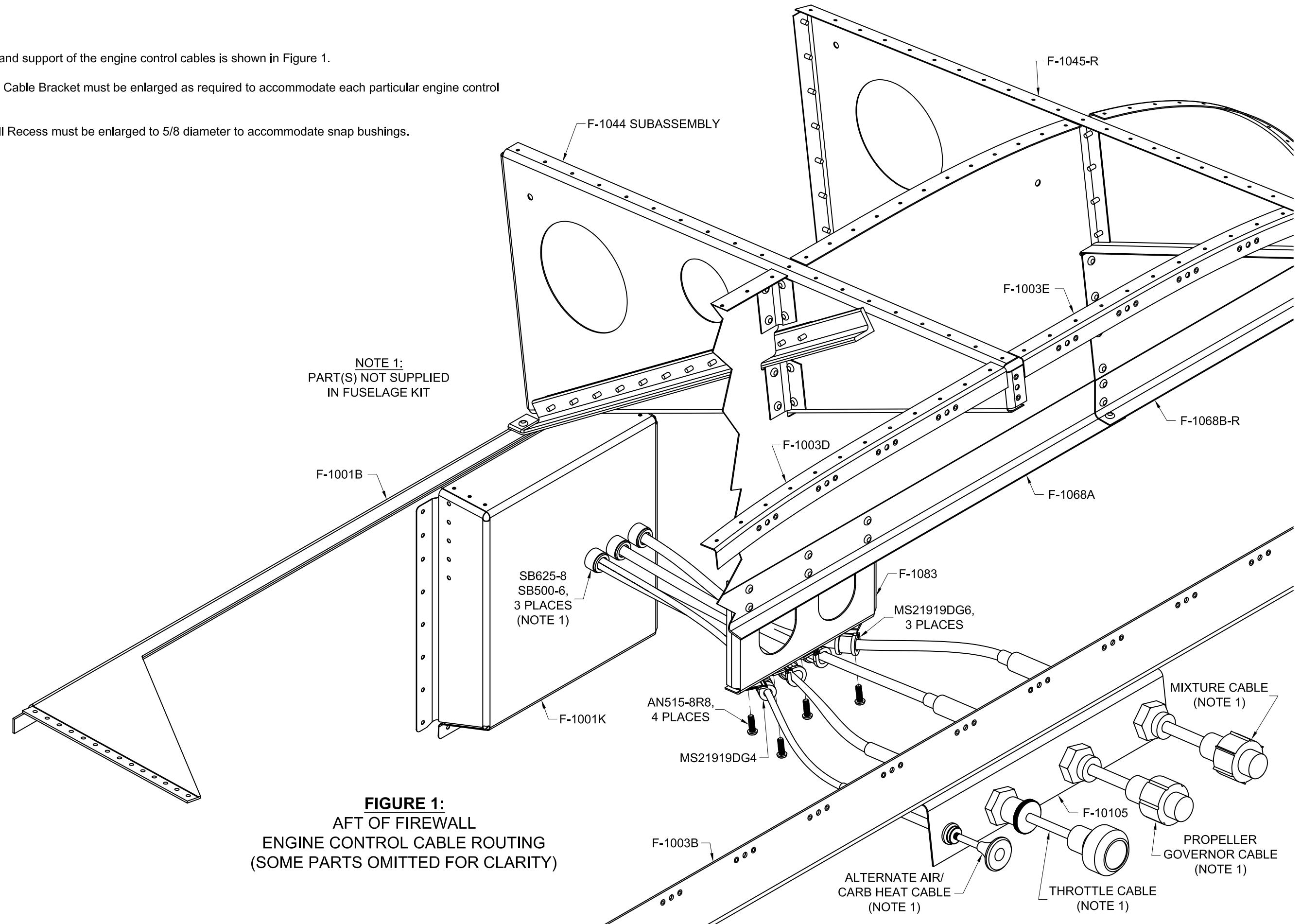


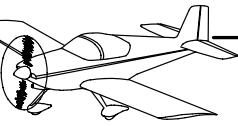
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Step 1: The aft of firewall routing and support of the engine control cables is shown in Figure 1.

Pilot holes in the F-10105 Control Cable Bracket must be enlarged as required to accommodate each particular engine control cable.

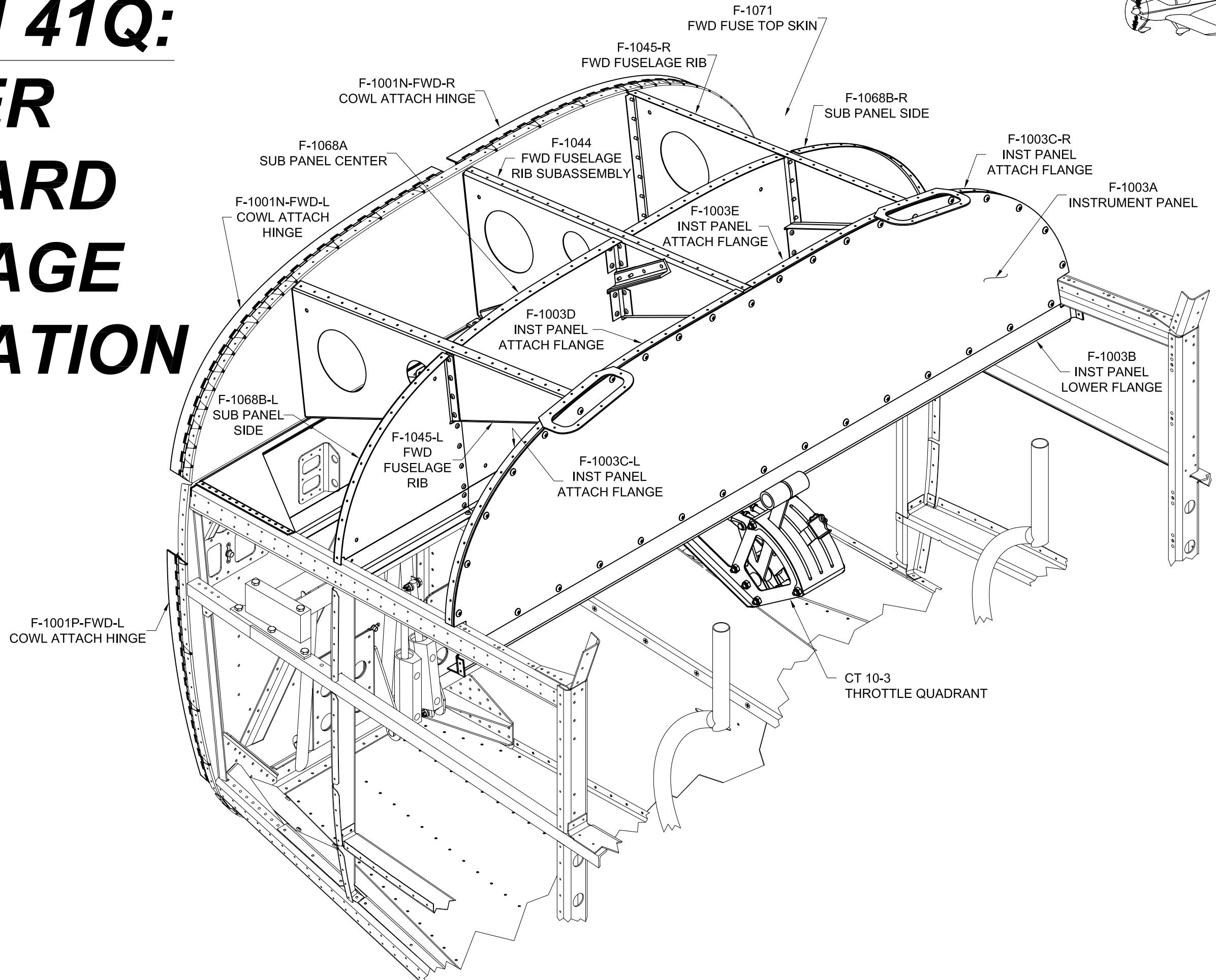
Pilot holes in the F-1001K Firewall Recess must be enlarged to 5/8 diameter to accommodate snap bushings.

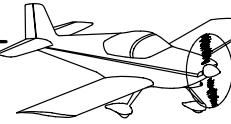




# SECTION 41Q:

## UPPER FORWARD FUSELAGE INSTALLATION





NOTE: The RV-10 Upper Forward Fuselage has been designed for subassembly off of the fuselage. This means that much of the installation of equipment mounted to the F-1003 Instrument Panel and F-1068 Sub Panel can be accomplished with the subassembly resting on a workbench or other convenient spot where accessibility is greatly enhanced compared to having to complete this work while sitting or laying inside the forward fuselage.

The instrument panel has been designed without bends so that a builder can design a custom layout and then have it fabricated at any local shop with CNC cutting capabilities. In addition to being removable, the instrument panel is designed to be split into separately removable modules. Removal of an instrument panel module allows any work on that module to be done out of the aircraft where more comfortable working conditions prevail. Furthermore, removal of an instrument panel module allows for easy access to any equipment mounted in adjacent instrument panel modules or to the sub-panels.

The non-removable F-1003B Instrument Panel Lower Flange is designed with adequate depth so that electrical switches and breakers can be mounted to it.

Key Information for planning the instrument panel mounted equipment installation:

RV-10 Instrument Panel Tilt Angle = 7.3°

RV-10 Instrument Panel to Sub Panel Distance = 9 1/2 inches

Removal of material from the F-1044 Fwd Fuselage Rib Subassembly OR F-1045-L/R Fwd Fuselage Ribs is not allowed.

Guidelines for cut-outs in the F-1068A and F-1068B-L/R Sub Panels:

Removal of any part of the sub panel lower flange is not allowed.

2 inch maximum diameter for any un-reinforced hole. See Page 41-3Q, Figure 1.

Cut-Outs measuring larger than 2 inches in height or width must be reinforced with:  
.032 doubler ring as shown on Page 41-4Q, Figure 1.

OR

3/4 x 3/4 Angle .063 thick 6061-T6 or .032 thick 2024-T3 as shown on Page 41-3Q, Figure 1.

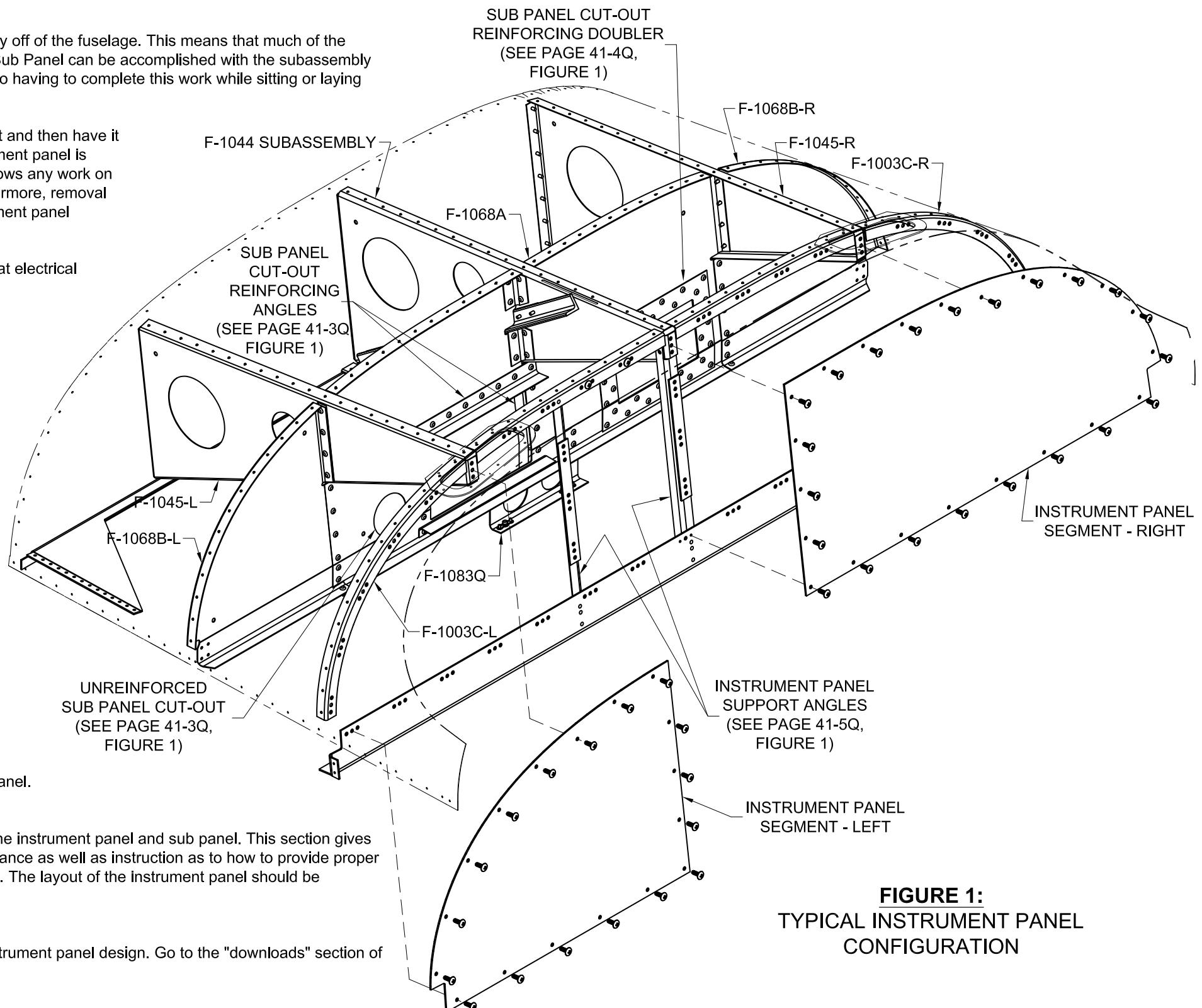
Trimming of the F-1083Q Quadrant Mount Bracket to clear a cut-out in the sub panel is acceptable so long as at least three of the fastener locations remain. See Page 41-3Q, Figure 1.

The "free-leg" of the F-1003C-L/R, F-1003D, and F-1003E Instrument Panel Attach Flanges may be relieved between nutplates if/as required to provide clearance for items mounted to the instrument panel. See Page 41-4Q, Figure 1.

The builder should read this section in its entirety before selecting the equipment to be installed in the instrument panel and sub panel. This section gives instruction as to how to divide the instrument panel into modules for ease of installation and maintenance as well as instruction as to how to provide proper support for avionics trays without compromising the structural integrity of the upper forward fuselage. The layout of the instrument panel should be established before beginning work.

The F-1003A Instrument Panel dataset is available for builders to use as a starting point for their instrument panel design. Go to the "downloads" section of the Van's Aircraft website to obtain a .dxf format dataset of the instrument panel.

Step 1: Figure 1 depicts a typical instrument panel configuration and gives references for where to find detail views of particular features of the installation.



**FIGURE 1:**  
**TYPICAL INSTRUMENT PANEL**  
**CONFIGURATION**



NOTE: Details shown on this page for cut-outs in the F-1068A Sub Panel are also applicable to the F-1068B-L/R Sub Panels.

Step 1: Figure 1 shows the maximum size and minimum spacing for unreinforced sub panel cut-outs.

Figure 1 also shows a sub panel cut out that has been reinforced with angles that intersect at the corners. This type of reinforcement is best suited to a cut-out for tray mounted avionics with length greater than 9 1/2 inches as the trays can be attached to the free flanges of the vertical reinforcing angles.

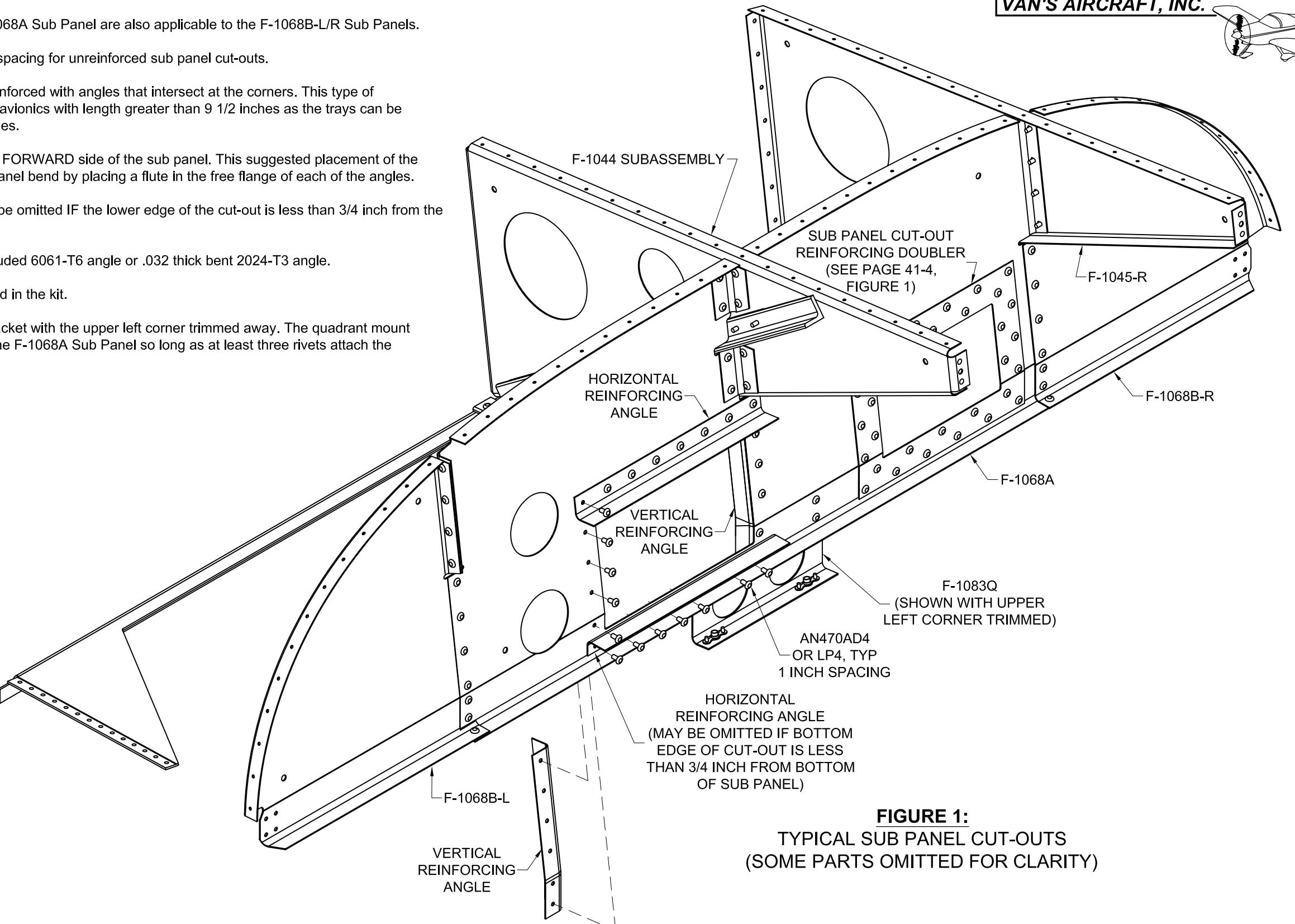
Note that the vertical reinforcing angles are shown on the FORWARD side of the sub panel. This suggested placement of the vertical angles allows them to be bent to match the sub panel bend by placing a flute in the free flange of each of the angles.

Note also that the lower horizontal reinforcing angle may be omitted IF the lower edge of the cut-out is less than 3/4 inch from the bottom of the sub-panel.

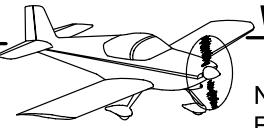
The reinforcing angles are fabricated from .063 thick extruded 6061-T6 angle or .032 thick bent 2024-T3 angle.

Material for fabrication of reinforcing angles is not provided in the kit.

Step 2: Figure 1 shows the F-1083Q Quadrant Mount Bracket with the upper left corner trimmed away. The quadrant mount bracket may be trimmed as required to clear cut-outs in the F-1068A Sub Panel so long as at least three rivets attach the quadrant mount bracket to the sub panel.



**FIGURE 1:**  
TYPICAL SUB PANEL CUT-OUTS  
(SOME PARTS OMITTED FOR CLARITY)

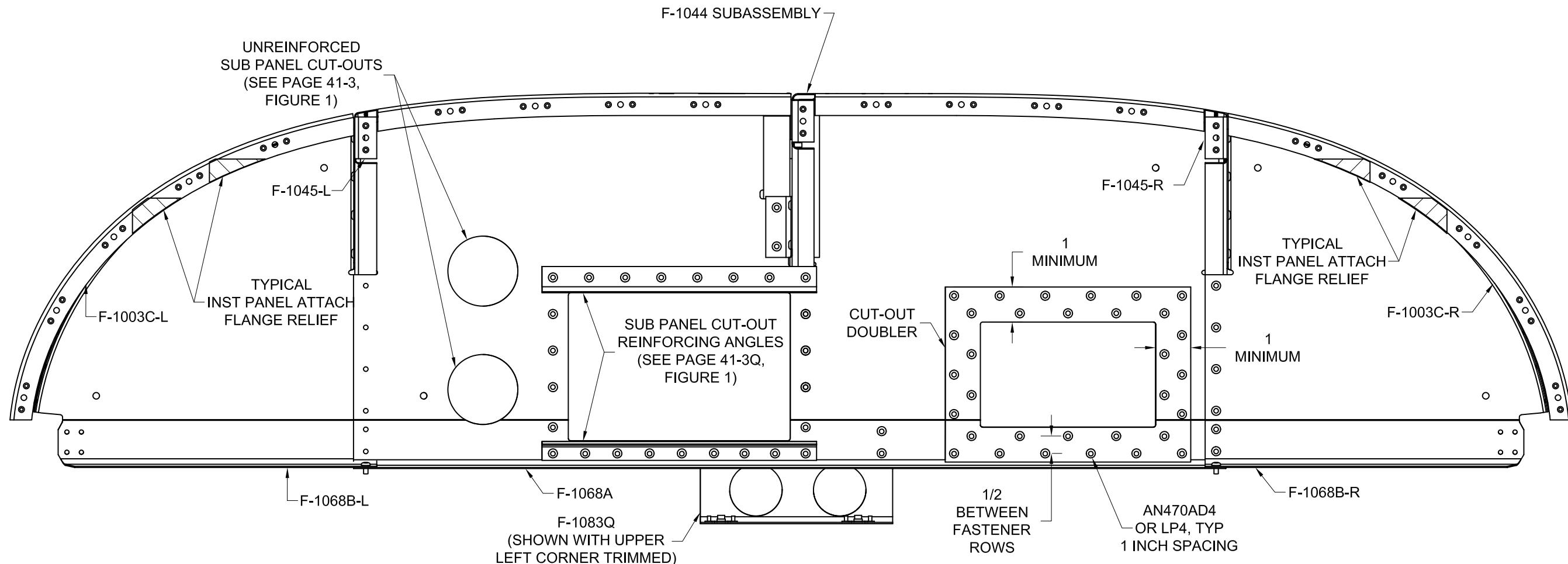


NOTE: Details shown on this page for cut-outs in the F-1068A Sub Panel are also applicable to the F-1068B-L/R Sub Panels.

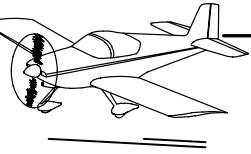
Step 1: Figure 1 shows the F-1068A Sub Panel with a generic cut-out and reinforcing doubler installation.

The doubler is fabricated from .032" thick 2024-T3 material. Material for fabrication of doublers is not provided in the kit.

Step 2: Figure 1 shows the F-1003C-L & R Inst Panel Attach Flanges with generic relief notches between nutplates. All the inst panel attach flanges may be notched-out between nutplate locations as required for mounting of equipment in the instrument panel.



**FIGURE 1:**  
TYPICAL SUB PANEL CUT-OUTS  
(SOME PARTS OMITTED FOR CLARITY)



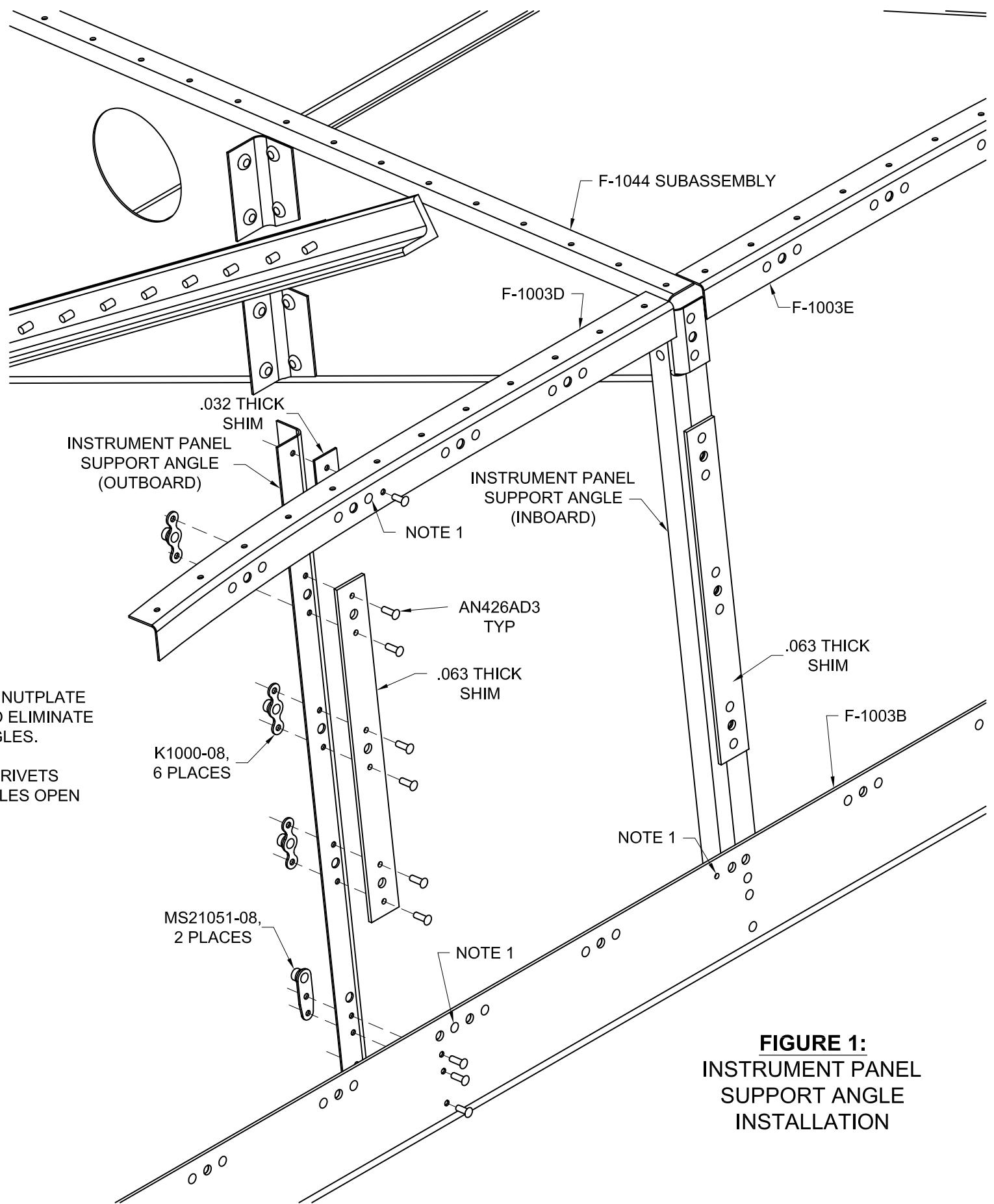
Step 1: Figure 1 shows the installation of two instrument panel support angles. One leg of each angle supports the edge of the instrument panel segments while the other leg of each angle supports the avionics trays.

The outboard instrument panel support angle is installed between the F-1003D Inst Panel Attach Flange and the F-1003B Inst Panel Lower Flange.

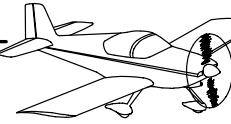
The inboard instrument panel support angle is installed between the F-1044 Fwd Fuselage Rib Subassembly and the F-1003B Inst Panel Lower Flange.

Both instrument panel support angles are fabricated from 3/4 x 3/4 x .032 thick 2024-T3 Angle. The support angle shims are fabricated from aluminum sheet .032 or .063 thick as called-out in Figure 1.

Material for fabrication of the support angles and support angle shims is not provided in the kit.



**FIGURE 1:**  
INSTRUMENT PANEL  
SUPPORT ANGLE  
INSTALLATION



Step 1: Cleco the Upper Forward Fuselage Subassembly to the forward fuselage structure as shown in Figure 1.

Rivet the F-1068B-L & R Sub Panel Sides to the F-1002-L & R Fwd Fuselage Bulkheads as shown in Figure 1.

Rivet the F-1044 Fwd Fuselage Rib Subassembly and F-1045-L & R Fwd Fuselage Ribs to the F-1001A Firewall Bulkhead as shown in Figure 1.

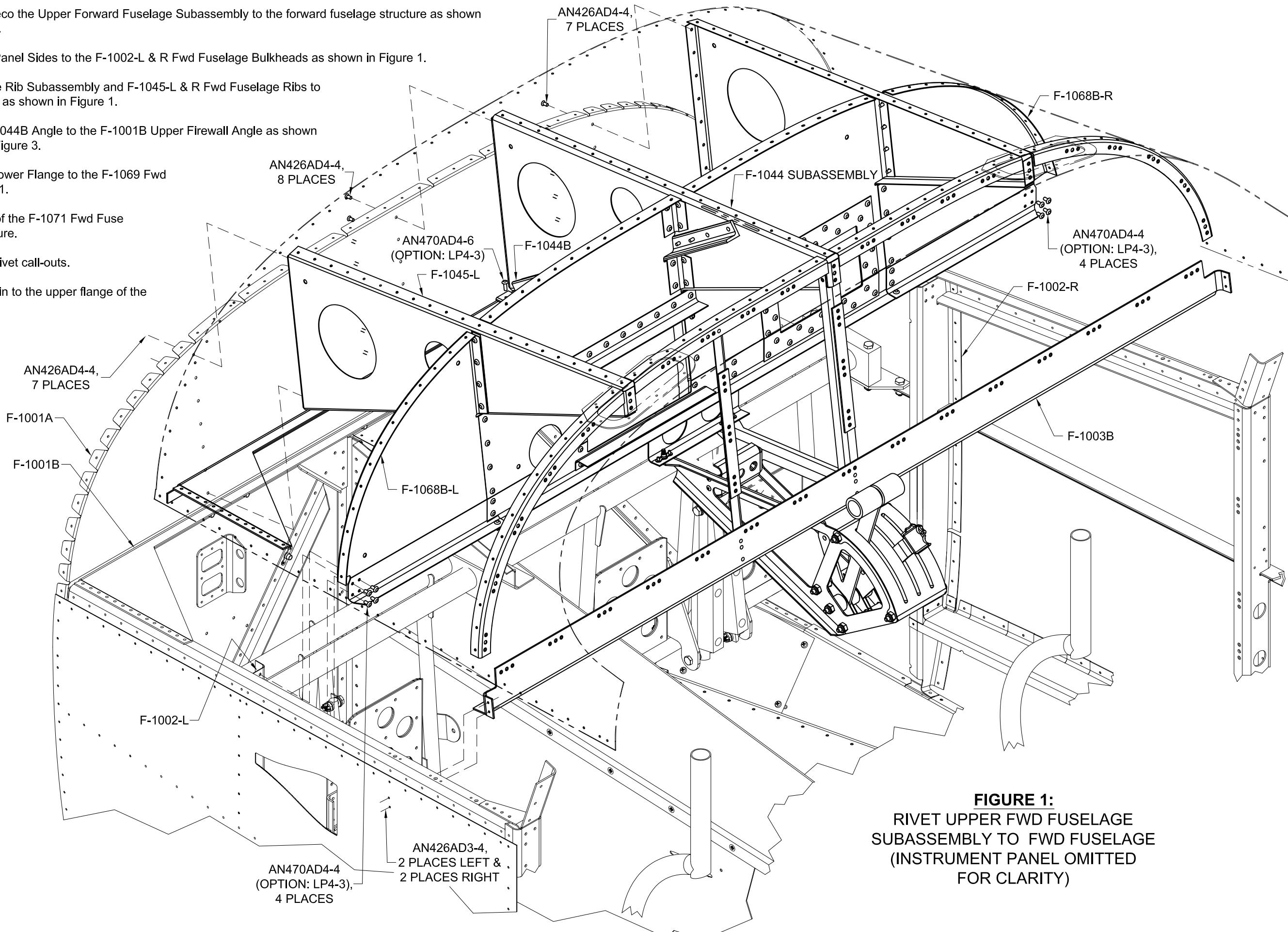
Rivet the forward tab of the F-1044B Angle to the F-1001B Upper Firewall Angle as shown in Figure 1. See Page 31-5Q, Figure 3.

Rivet the F-1003B Inst Panel Lower Flange to the F-1069 Fwd Side Skins as shown in Figure 1.

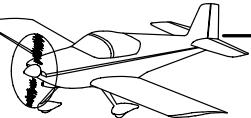
Step 2: Rivet the lower edges of the F-1071 Fwd Fuse Top Skin to the fuselage structure.

See Page 41-9Q, Figure 1 for rivet call-outs.

Do not rivet the fwd fuse top skin to the upper flange of the F-1001A Firewall Bulkhead.



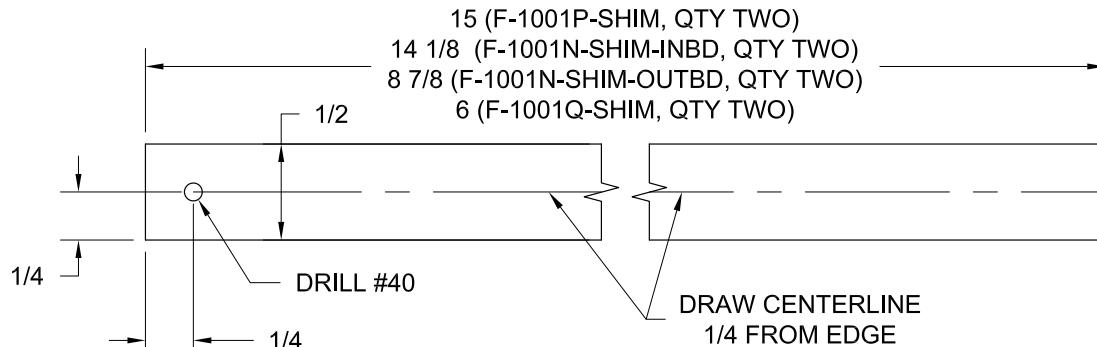
**FIGURE 1:**  
RIVET UPPER FWD FUSELAGE  
SUBASSEMBLY TO FWD FUSELAGE  
(INSTRUMENT PANEL OMITTED  
FOR CLARITY)



Step 1: Fabricate eight Cowl Attach Shims from .020 thick 2024-T3 Aluminum as shown in Figure 1.

Locate a #40 hole in each shim as shown in Figure 1.

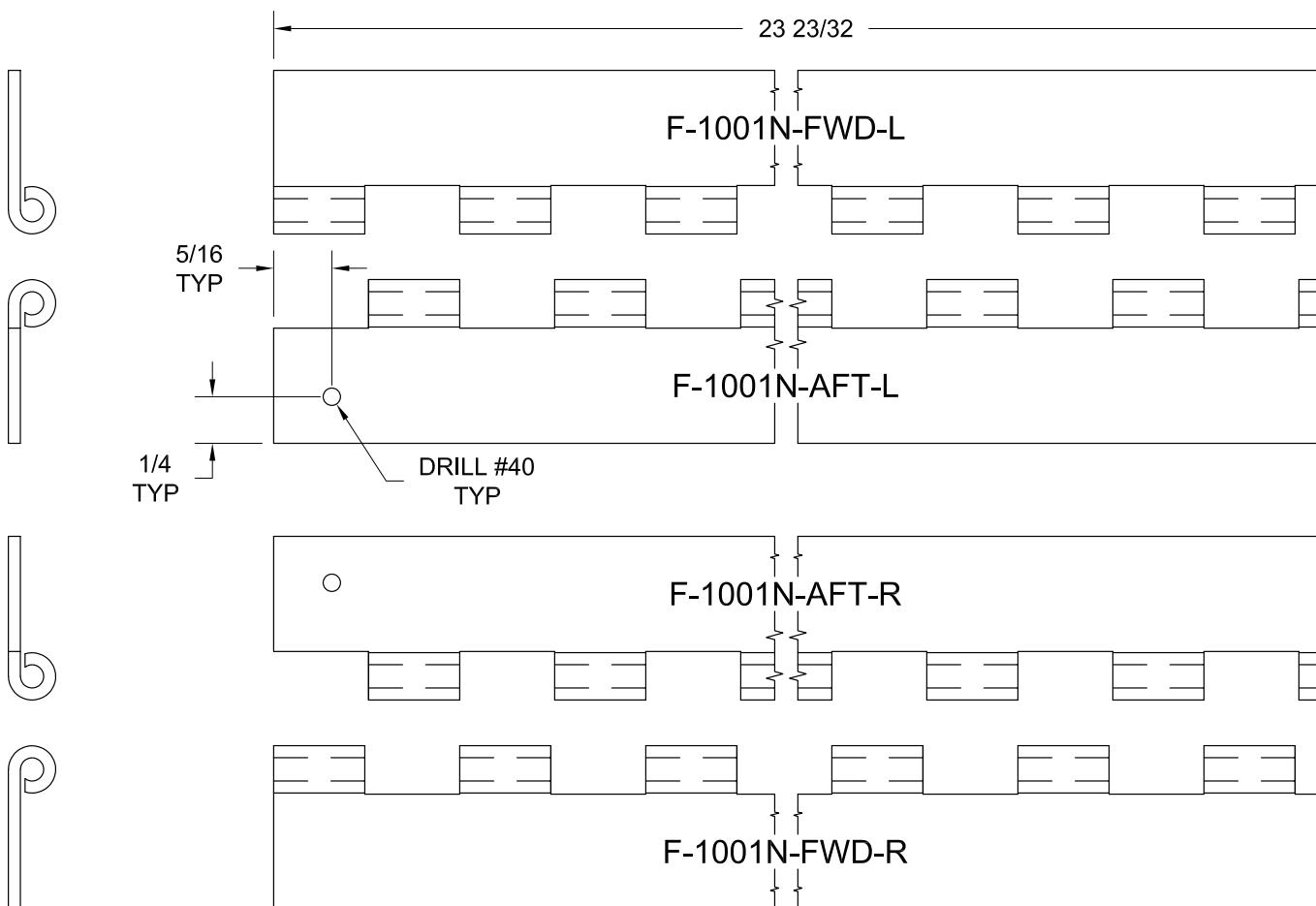
Use a sharpie pen to draw a centerline on each shim.



**FIGURE 1:**  
FABRICATE COWL ATTACH SHIMS

Step 2: Fabricate F-1001N Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 2.

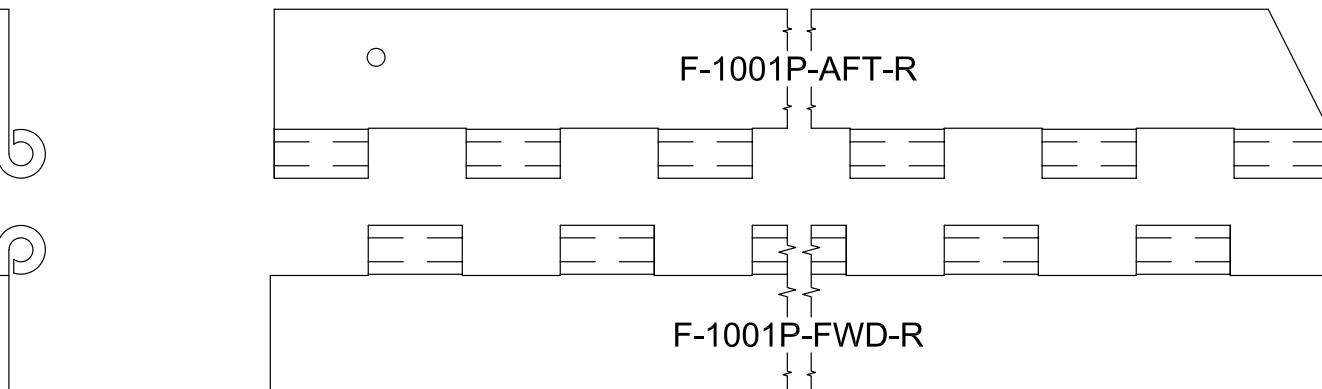
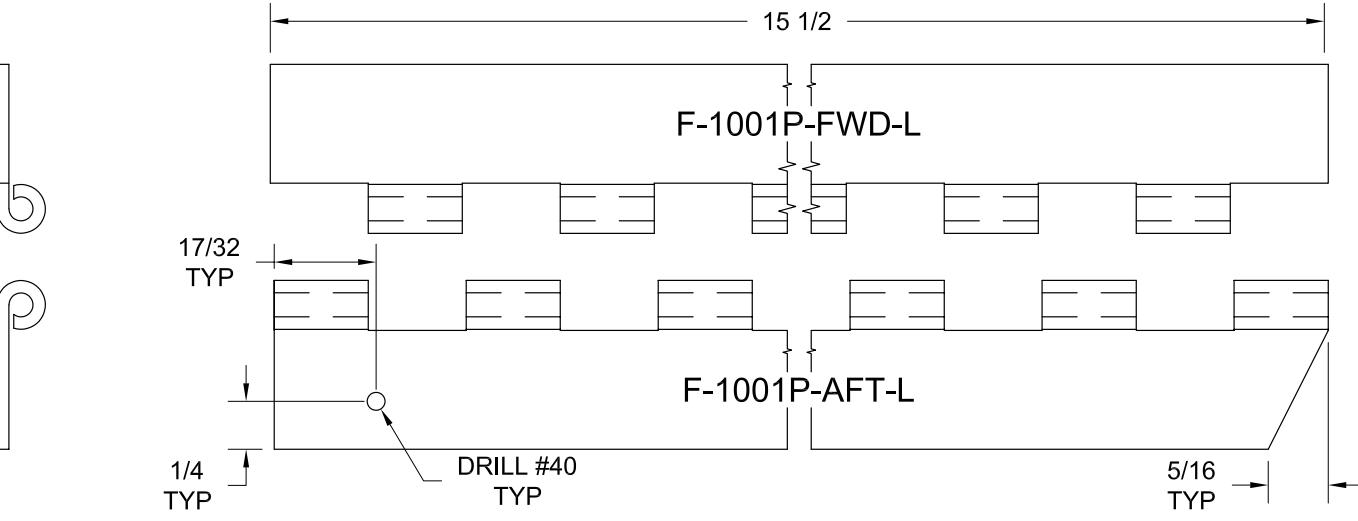
Drill a #40 hole in the F-1001N-AFT-L & R Cowl Attach Hinges as shown in Figure 2.



**FIGURE 2:**  
FABRICATE COWL ATTACH HINGES

Step 3: Fabricate F-1001P Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 3.

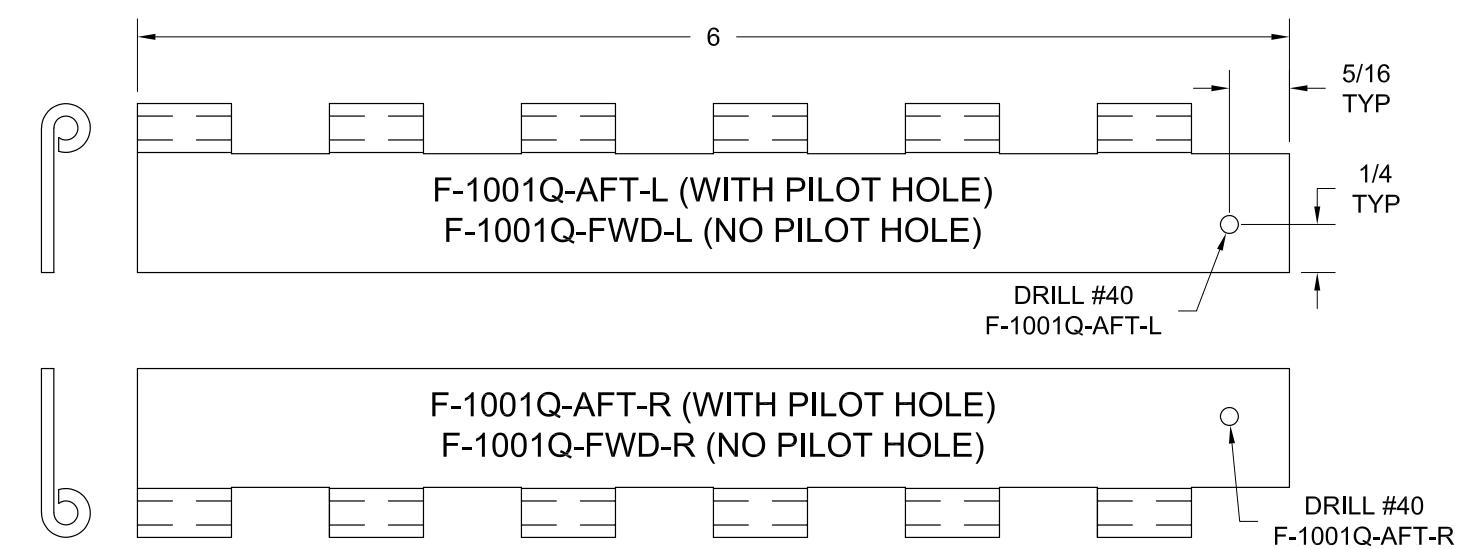
Drill a #40 hole in the F-1001P-AFT-L & R Cowl Attach Hinges as shown in Figure 3.



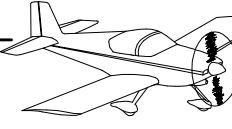
**FIGURE 3:**  
FABRICATE COWL ATTACH HINGES

Step 4: Fabricate F-1001Q Cowl Attach Hinges from HINGE PIANO 1/8 as shown in Figure 4.

Drill a #40 hole in the F-1001Q-AFT-L & R Cowl Attach Hinges as shown in Figure 4.



**FIGURE 4:**  
FABRICATE COWL ATTACH HINGES



**Step 1:** Cut pieces of hinge pin material to be approximately 1 inch longer than the cowl attach hinges and slightly round the ends.

**Step 2:** Join the forward and aft hinge segments by mating the hinges and inserting the hinge pins. The hinge segments are kept joined during the fitting process to be sure that they do not become distorted and will fit together properly after installation.

Step 3: Cleco the cowl attach hinges and shims to the fuselage as shown in Figure 1. Orient each of the shims such that the surface with the centerline mates to the firewall flange, not to the hinge. Do not cleco the F-1001N-SHIM-OUTBD in place at this time.

While clecoed in place, align each hinge and shim so that they are parallel to the forward edge of the fuselage skin and that the shim edge does not protrude forward of the skin edge. The centerlines drawn on the shims should be visible through the holes in the skins and firewall flange. The centerlines will deviate slightly from the hole centers in the middle of the shims when properly aligned at the ends. Use spring clamps to hold the hinges and shims aligned.

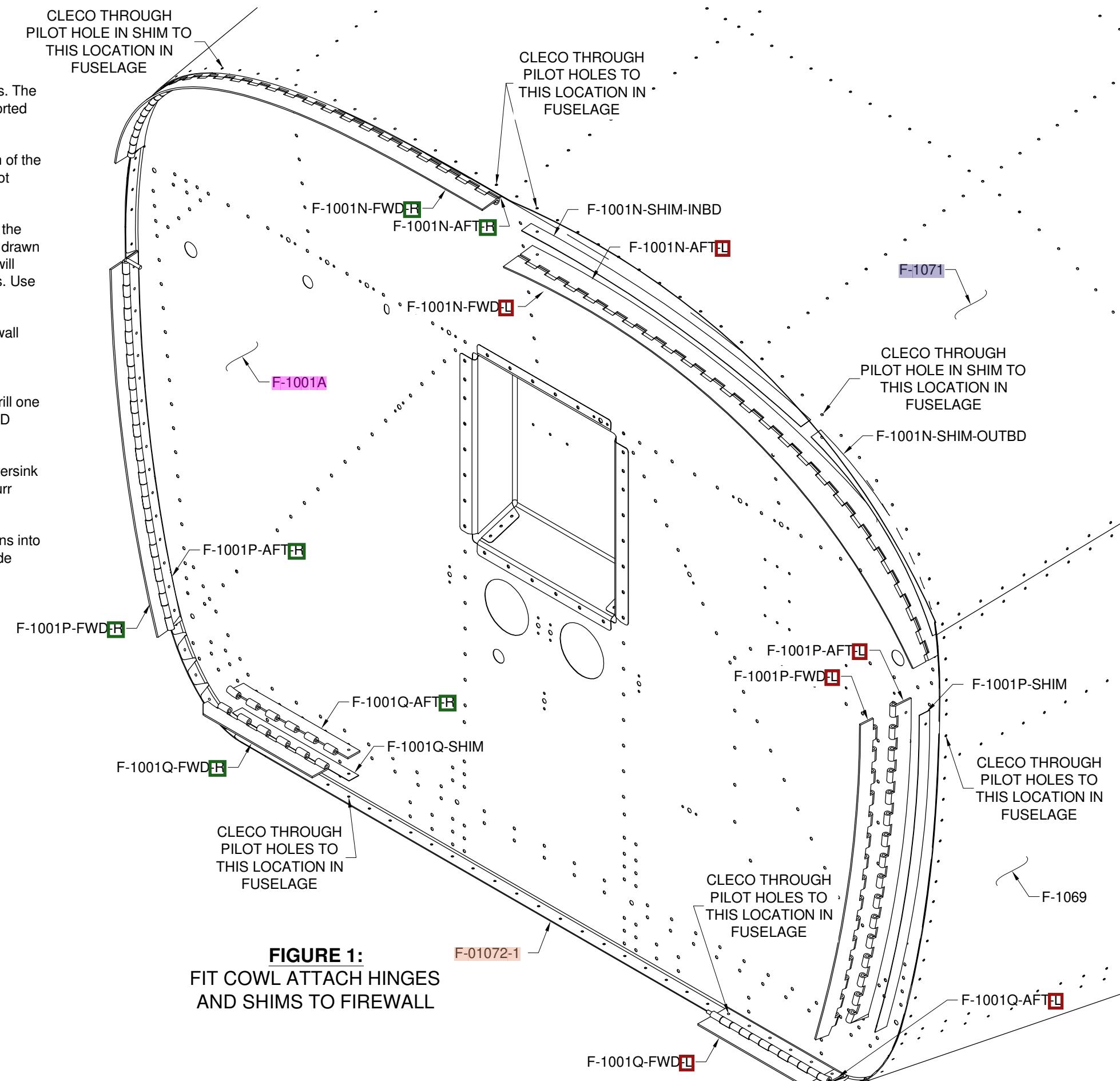
Step 4: Match Drill #40 the shims and hinges to the fuselage using the holes in the skins and firewall flanges as drill guides.

Begin match-drilling at the pilot-drilled ends of the shims/hinges and progress to the other end re-checking alignment every few holes. For the F-1001N-AFTL & R Cowl Attach Hinges match-drill one hole past the end of the F-1001N-SHIM-INBD Cowl Attach Shim, cleco the F-1001N-SHIM-OUTBD Cowl Attach Shim in place, then align the centerline and continue match-drilling.

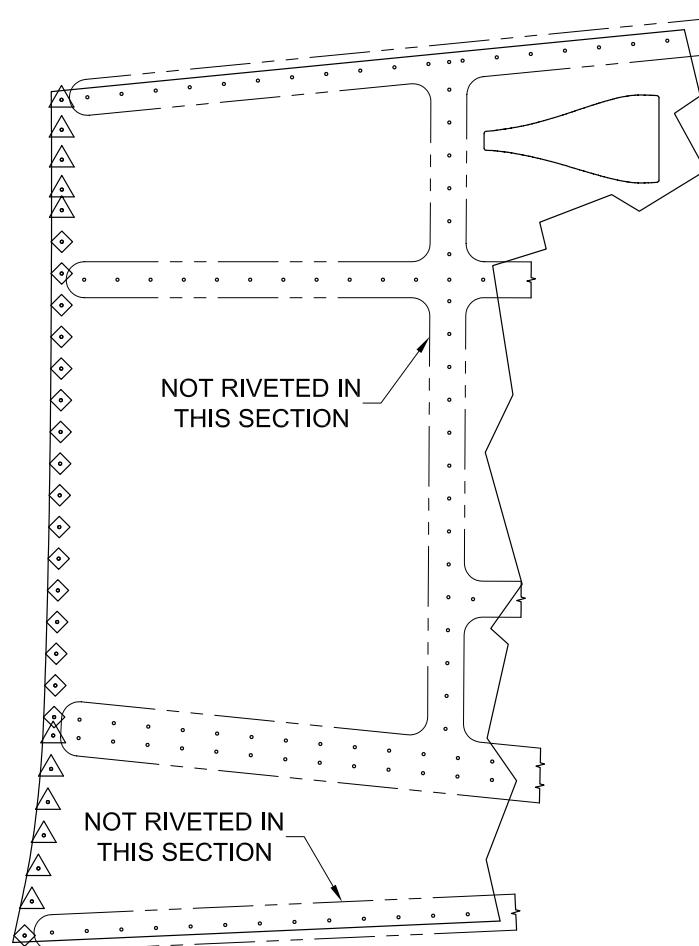
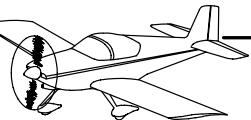
Step 5: Remove the shims and hinges and mark them for orientation and location. Machine countersink the hinges to fit a piece of .020 thick material that has been dimpled for an AN426AD3 rivet. Deburr holes and edges of the shims and hinges. Dimple the shims. Prime if-as desired.

Step 6: Cleco the shims and aft hinge segments to the fuselage. See Figure 1. Insert the hinge pins into the aft hinge segments as this will keep the hinge eyelets in their proper shape if a mistake is made while riveting.

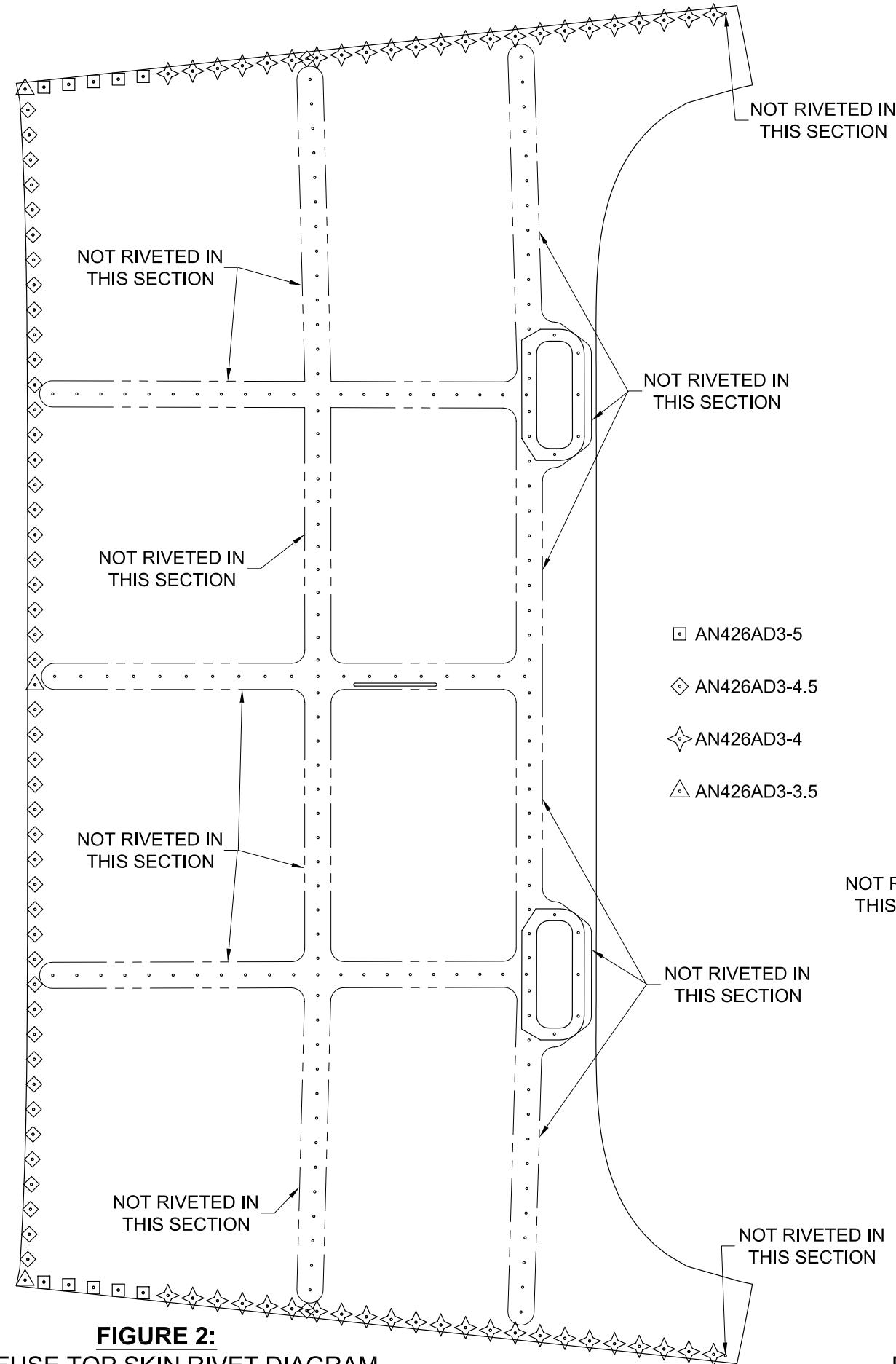
Install rivets around the perimeter of the firewall. See Page 41-9, Figures 1, 2 and 3 for rivet call-outs.



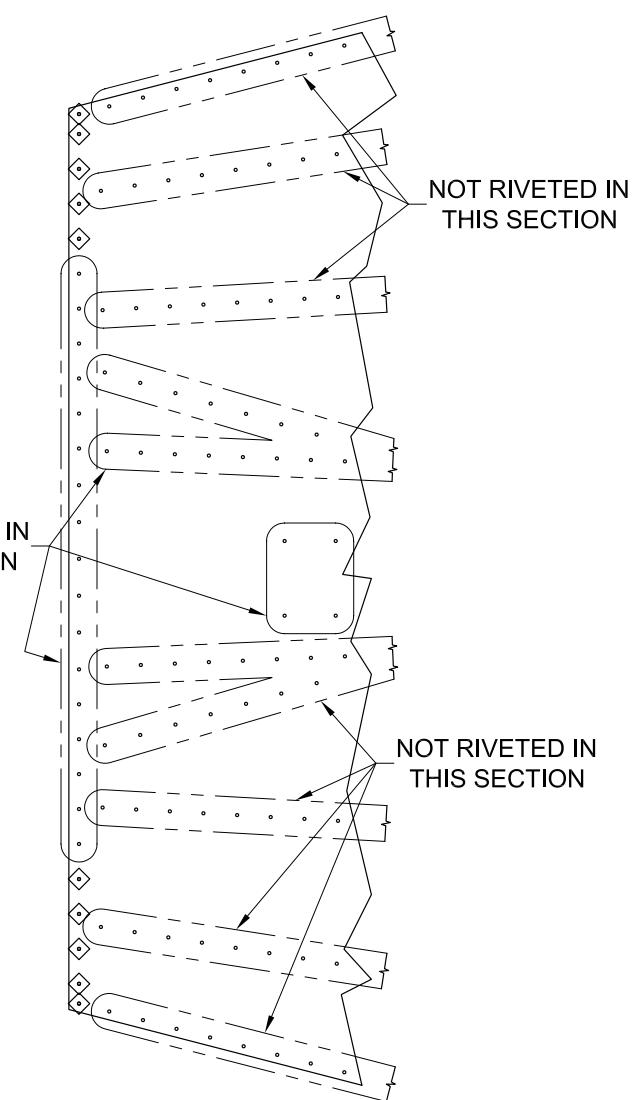
**FIGURE 1:**  
FIT COWL ATTACH HINGE  
AND SHIMS TO FIREWALL



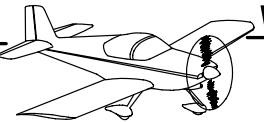
**FIGURE 1:**  
FWD SIDE SKIN RIVET DIAGRAM



**FIGURE 2:**  
FWD FUSE TOP SKIN RIVET DIAGRAM

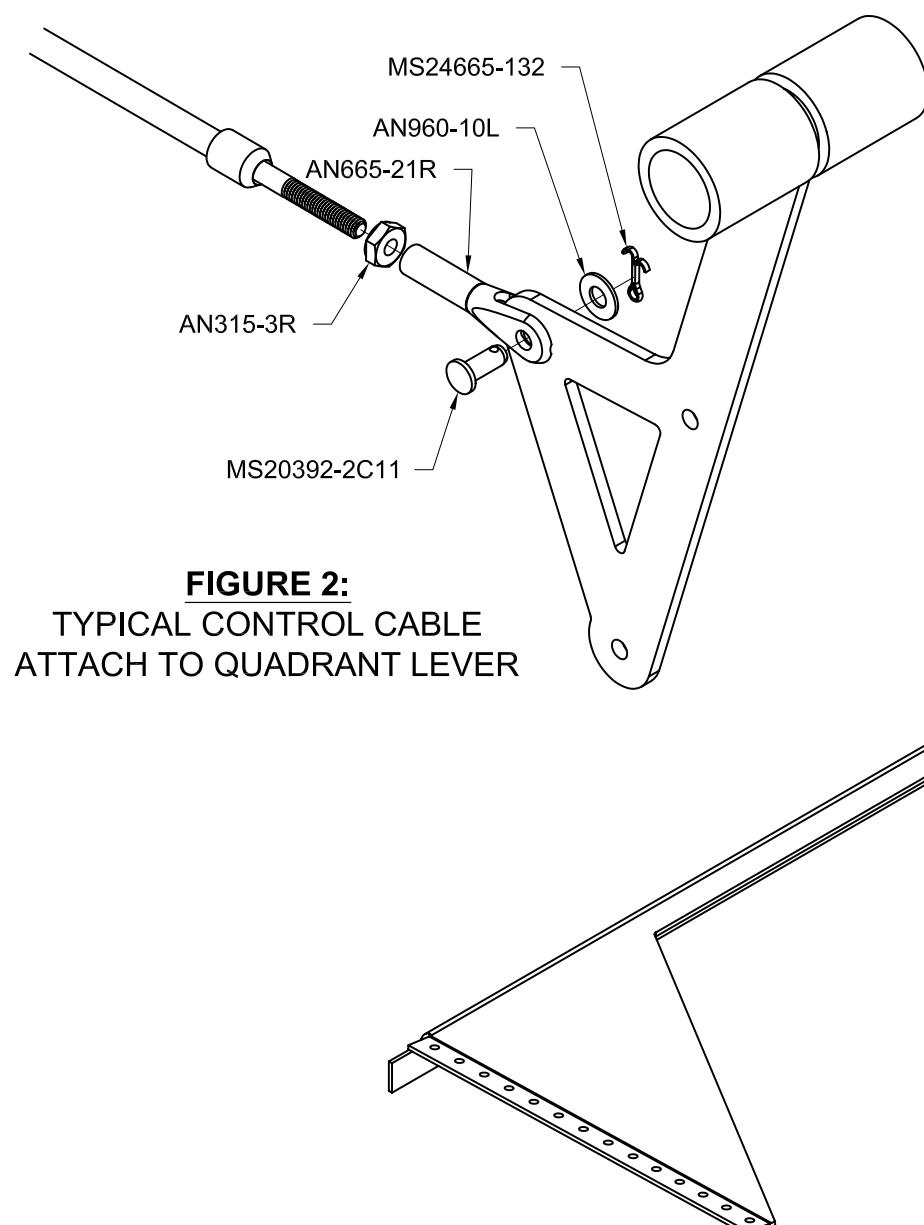


**FIGURE 3:**  
FWD FUSE BOTTOM SKIN RIVET DIAGRAM



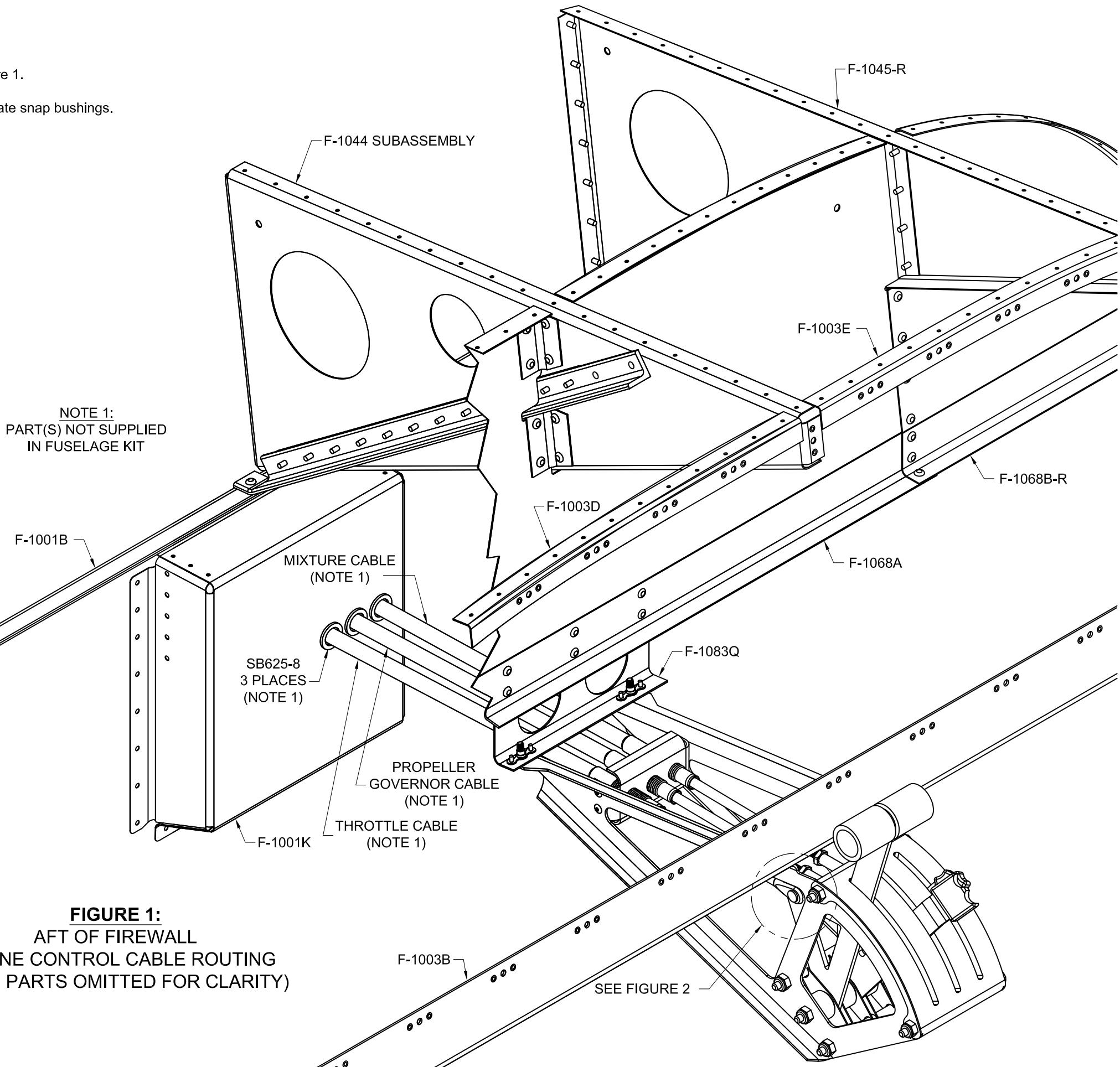
Step 1: The aft of firewall routing and support of the engine control cables is shown in Figure 1.

Pilot holes in the F-1001K Firewall Recess must be enlarged to 5/8 diameter to accommodate snap bushings.

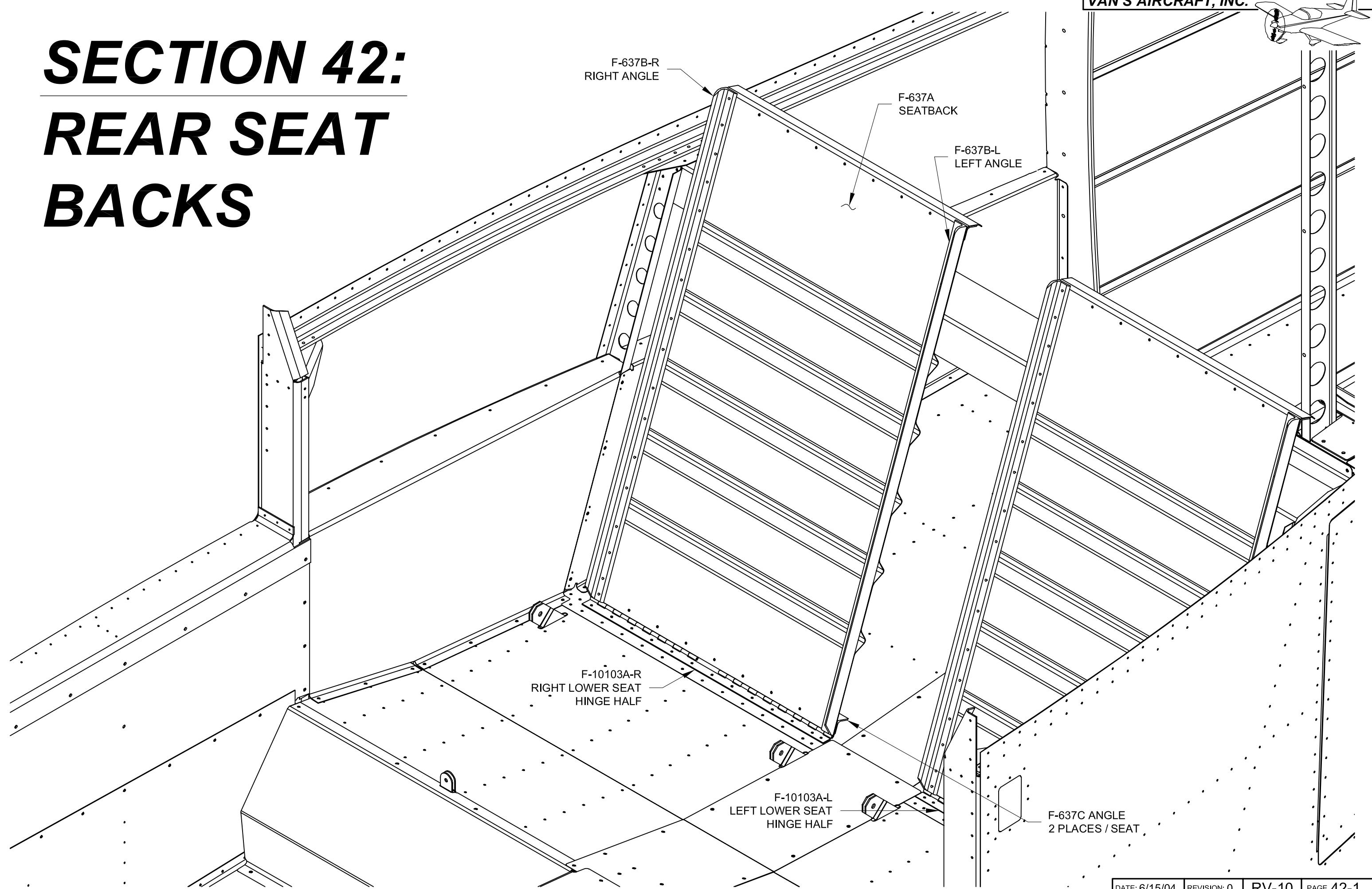


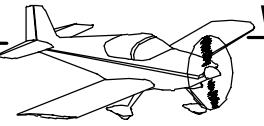
**FIGURE 2:**  
TYPICAL CONTROL CABLE  
ATTACH TO QUADRANT LEVER

**FIGURE 1:**  
AFT OF FIREWALL  
ENGINE CONTROL CABLE ROUTING  
(SOME PARTS OMITTED FOR CLARITY)



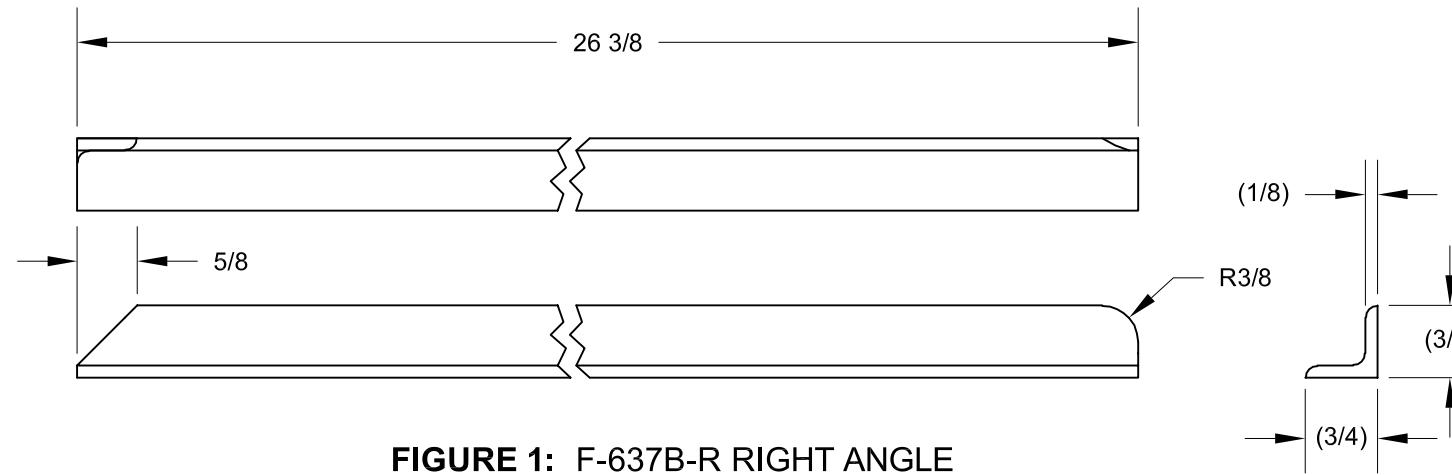
# SECTION 42: REAR SEAT BACKS



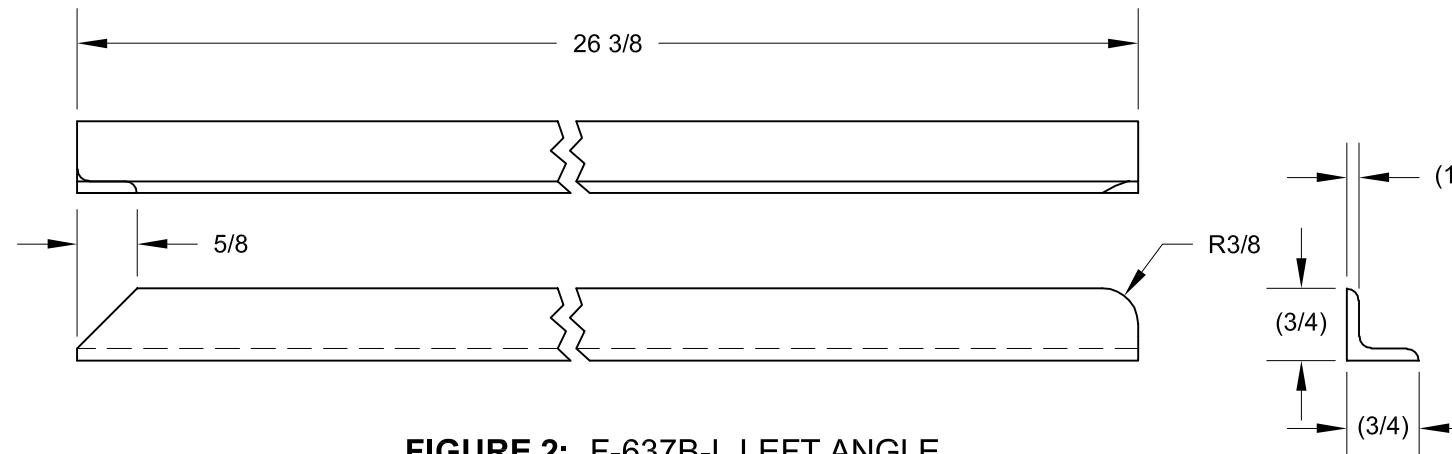


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Step 1: Fabricate two F-637B-R Right Angles and two F-637B-L Left Angles using AA6-125X3/4X3/4 and the information given in Figures 1 and 2.

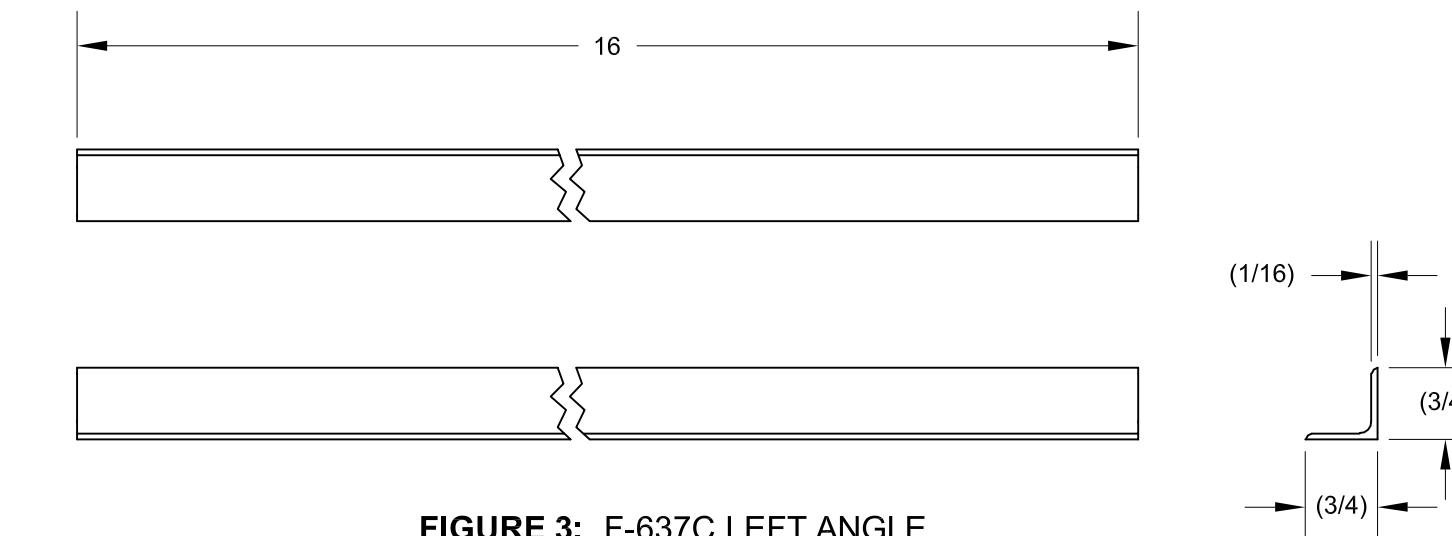


**FIGURE 1:** F-637B-R RIGHT ANGLE



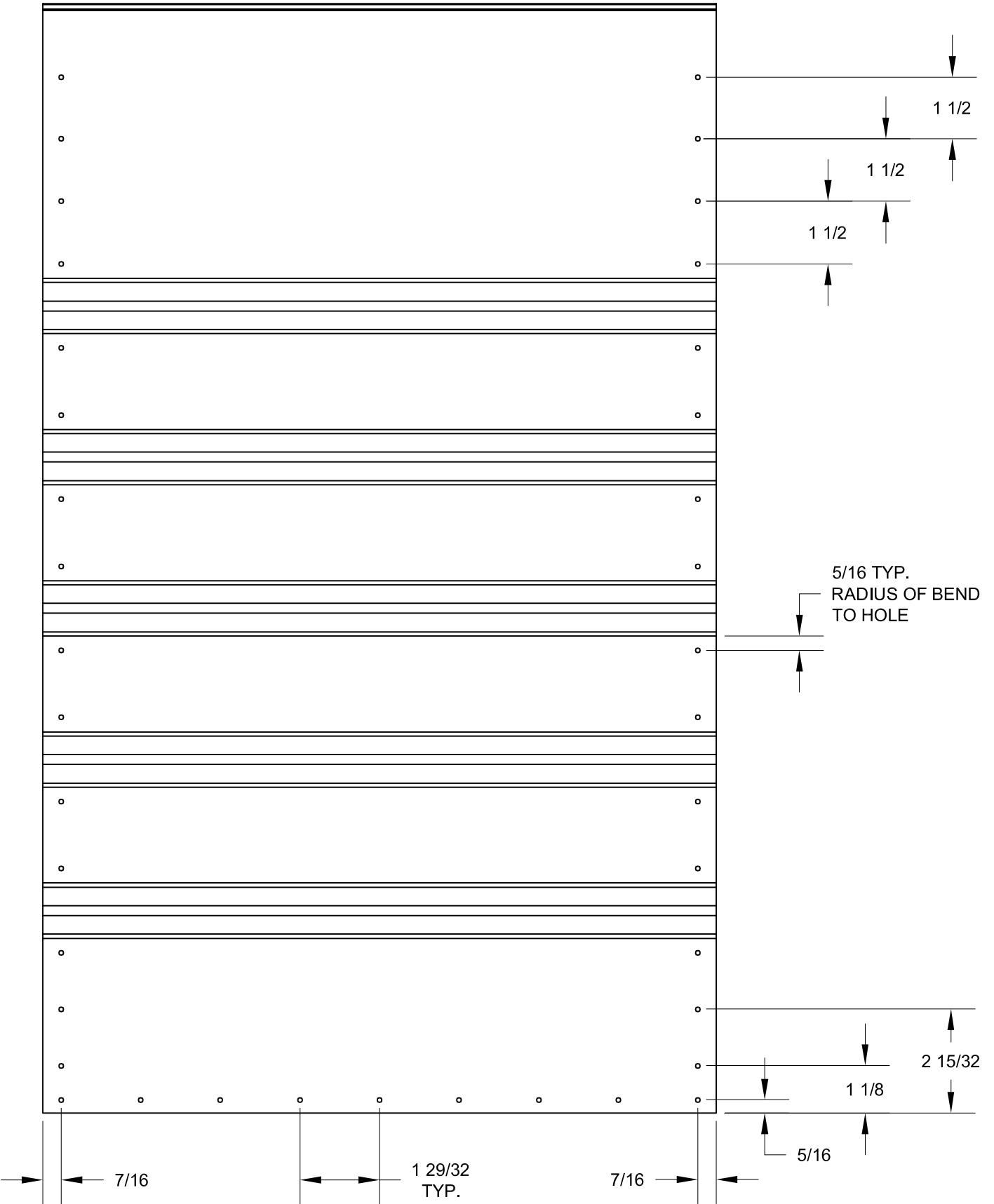
**FIGURE 2:** F-637B-L LEFT ANGLE

Step 2: Fabricate four F-637C Angles using AA6-063X3/4X3/4 and the information given in Figure 3.

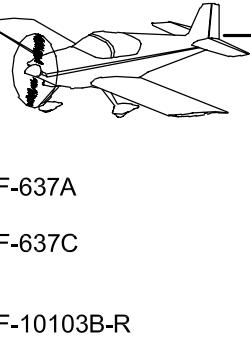


**FIGURE 3:** F-637C LEFT ANGLE

Step 3: Drill 1/8" holes into both F-637A Seat Backs using the dimensions given in Figure 4.



**FIGURE 4:** DRILLING THE F-637A SEAT BACKS

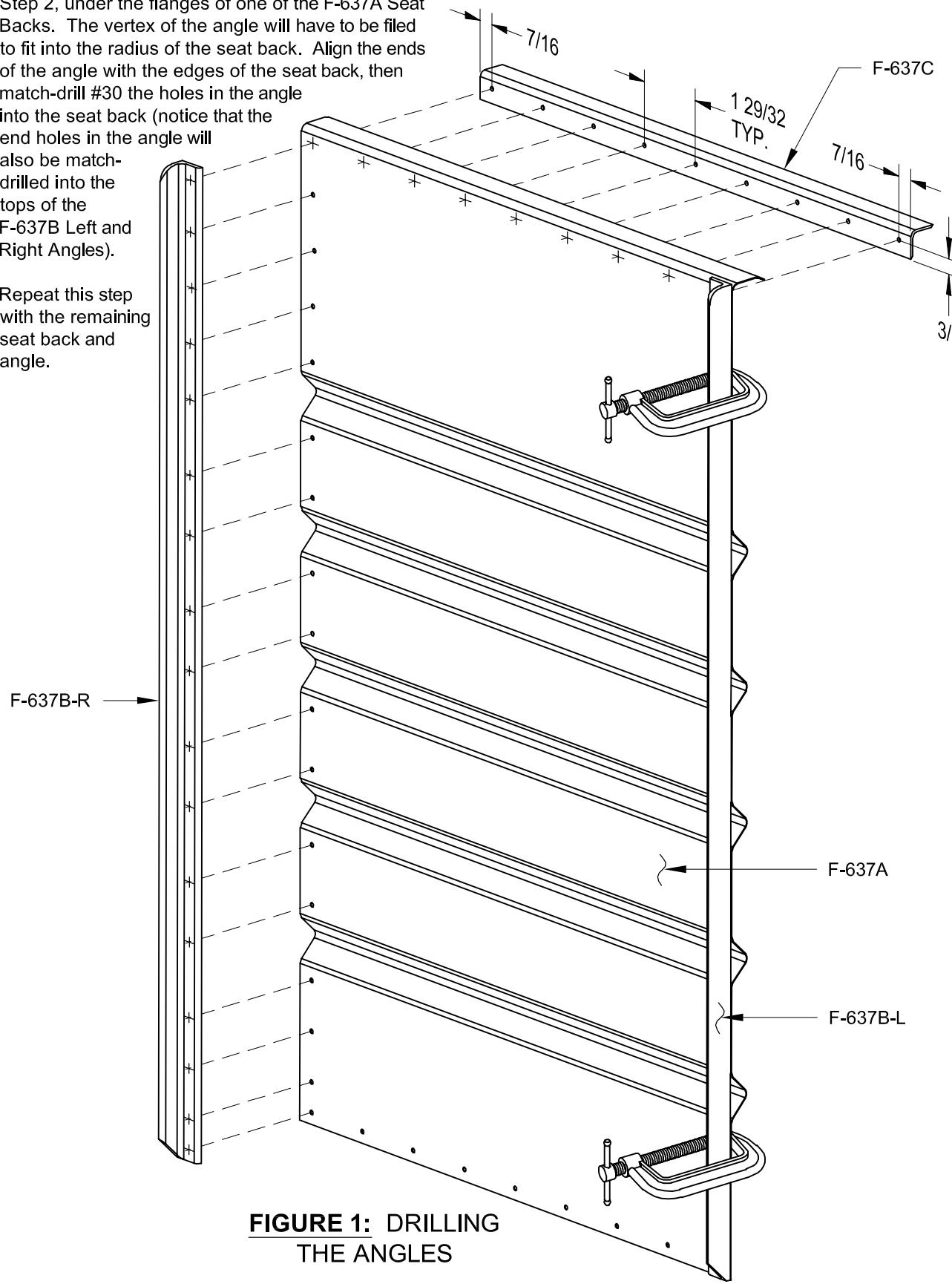


**Step 1:** As shown in Figure 1, align the bottom edge of the F-637B Left and Right Angles with the bottom edge of one of the F-637A Seat Backs. Align the vertex of the left and right angles with the side edges of the seat backs. Clamp the parts in position, then match-drill #30 the holes along the sides of the seat backs into the left and right angles. Repeat this step with the remaining seat back and the remaining left and right angles.

**Step 2:** Drill 1/8" holes into two of the F-637C Angles using the dimensions given in Figure 1.

**Step 3:** Nest one of the F-637C Angles, drilled in Step 2, under the flanges of one of the F-637A Seat Backs. The vertex of the angle will have to be filed to fit into the radius of the seat back. Align the ends of the angle with the edges of the seat back, then match-drill #30 the holes in the angle into the seat back (notice that the end holes in the angle will also be match-drilled into the tops of the F-637B Left and Right Angles).

Repeat this step with the remaining seat back and angle.

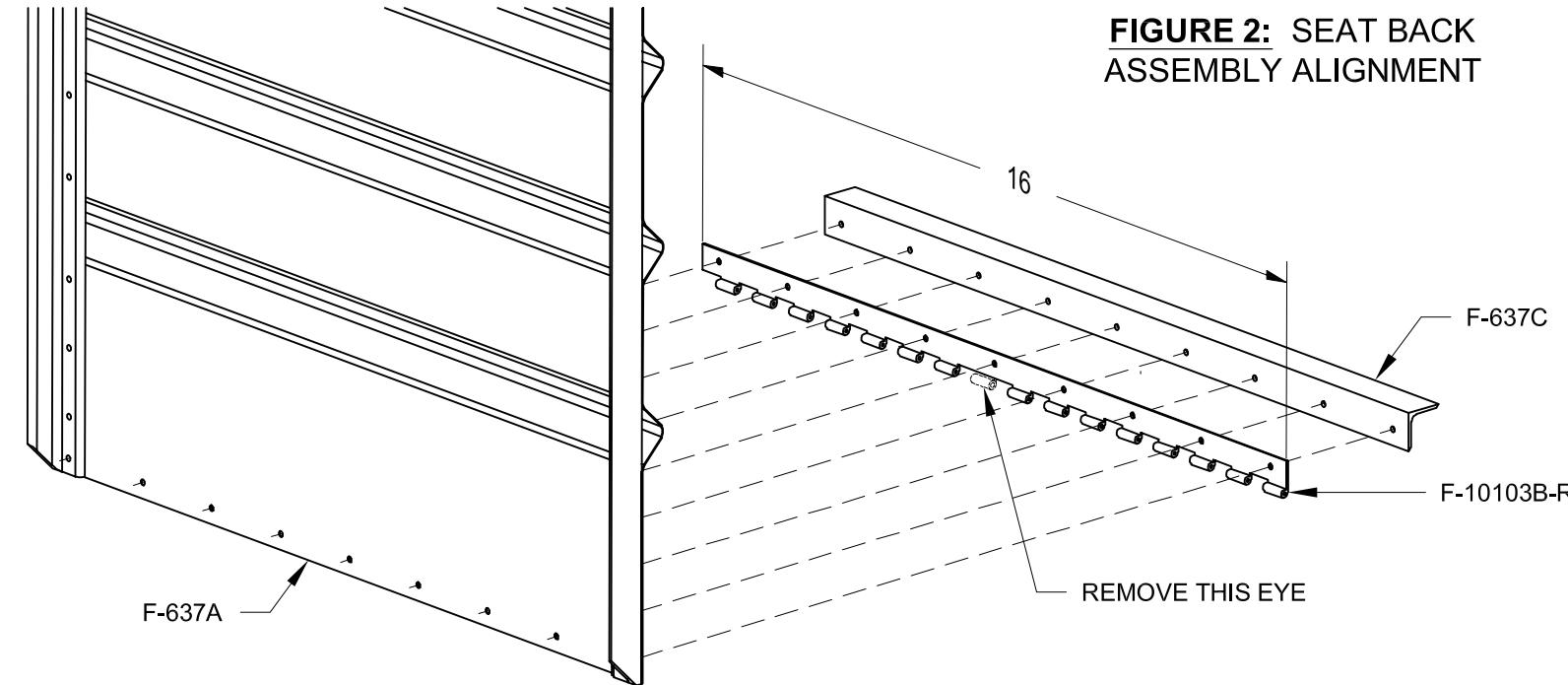


**FIGURE 1:** DRILLING THE ANGLES

**Step 4:** Remove the eyes indicated in Figures 3 and 4 from the F-10103B-R Right Upper Seat Hinge Half and the F-10103B-L Left Upper Seat Hinge Half. These are the hinge halves that were set aside on Page 33-2, Step 5.

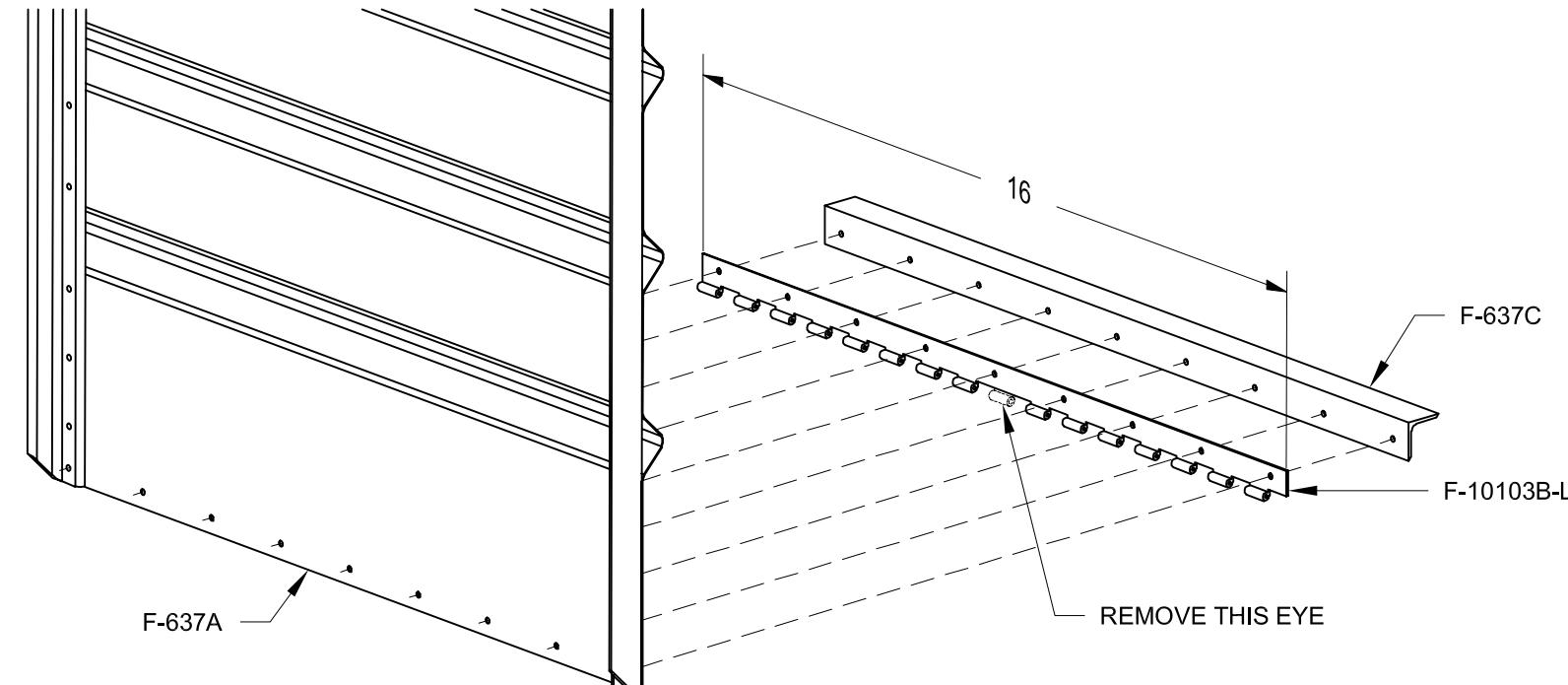
**Step 5:** Make the Right Seat Back Assembly by aligning the bottom edge of one of the F-637A Seat Backs with the F-10103B-R Right Upper Seat Hinge Half and one of the remaining F-637C Angles. See Figures 2 and 3.

Clamp the parts in position, then match-drill #30 the holes shown in Figure 3 into the right upper seat hinge half and the angle.

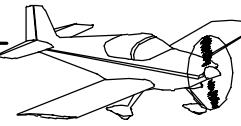


**FIGURE 2:** SEAT BACK ASSEMBLY ALIGNMENT

**Step 6:** Make the Left Seat Back Assembly (shown in Figure 4) by repeating Step 5 with the remaining F-637A Seat Back, the remaining F-637C Angle, and the F-10103B-L Left Upper Seat Hinge Half.



**FIGURE 4:** MATCH-DRILLING THE LEFT SEAT BACK ASSEMBLY



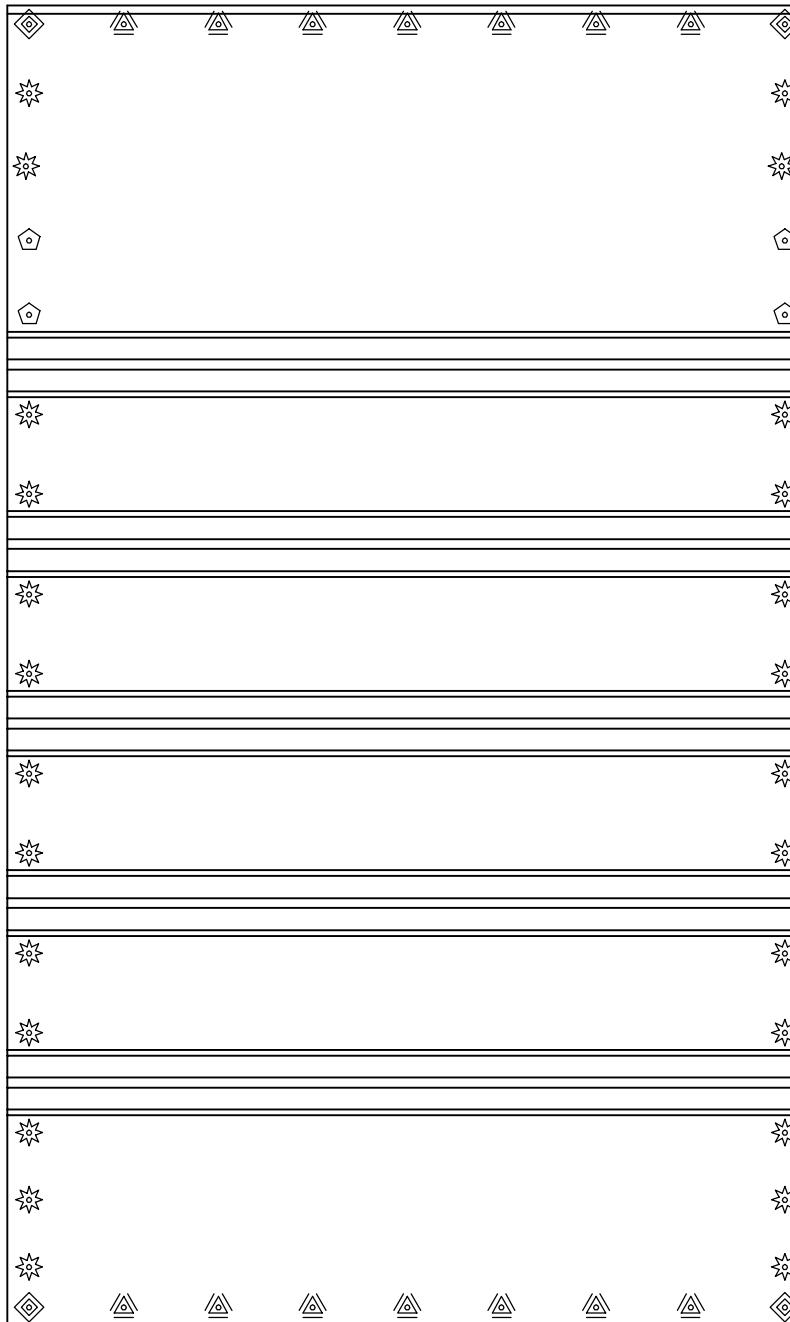
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Step 1: Remove the parts from the Seat Back Assemblies and deburr all the holes.

Step 2: Dimple the holes in the F-637A Seat Back (flush on the back side) and machine countersink the corresponding holes in the F-637B Angles for the four flush rivets called out in Figure 1.

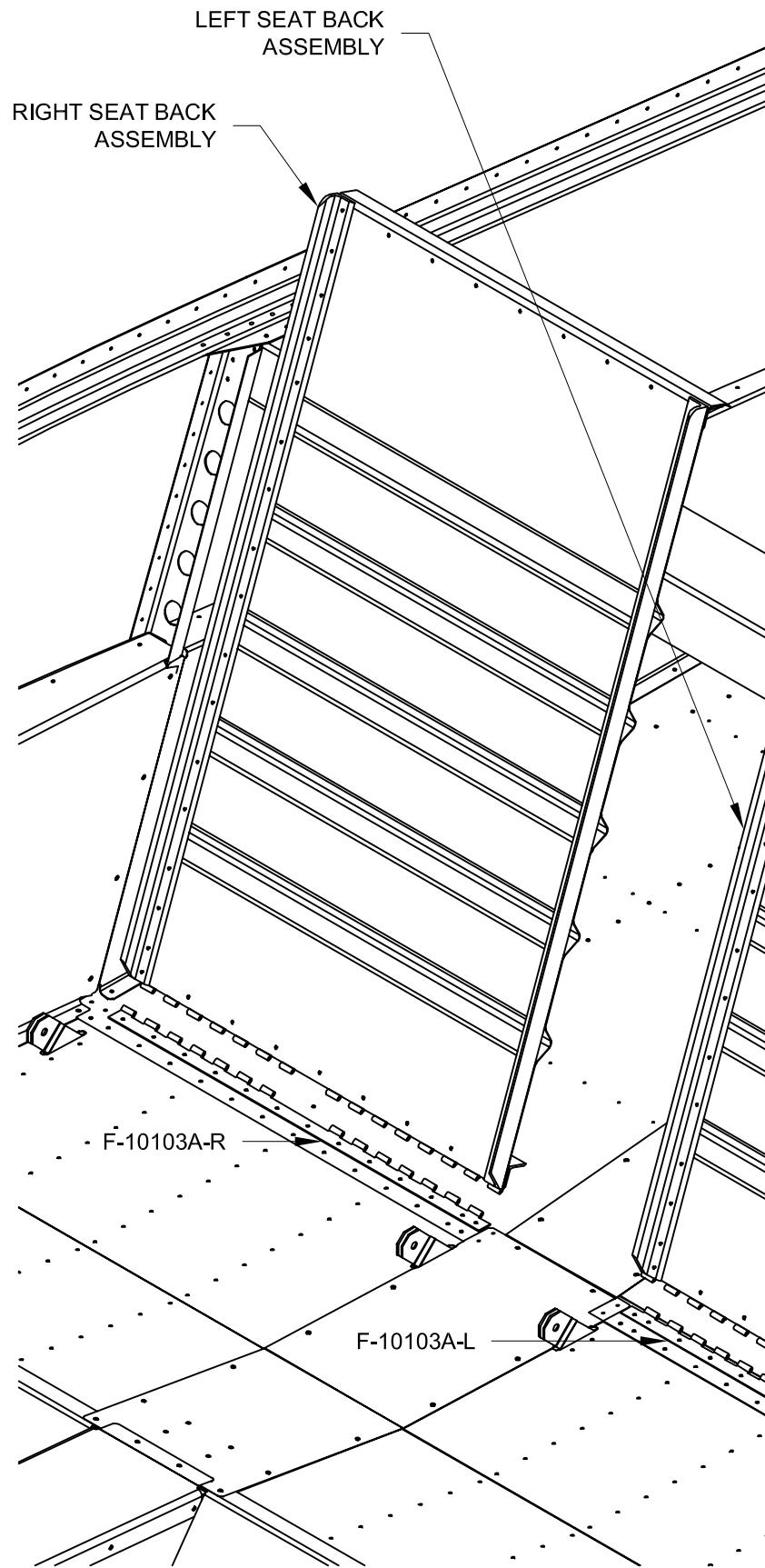
Step 3: Prime the parts if/as desired, then reassemble the Left and Right Seat Back Assemblies. Rivet them using the rivets called-out in Figure 1.

- ◊ AN426AD4-6
- ▲ AN470AD4-5
- \* AN470AD4-6
- ◆ AN470AD4-7



**FIGURE 1:** SEAT BACK ASSEMBLY RIVET CALL-OUT

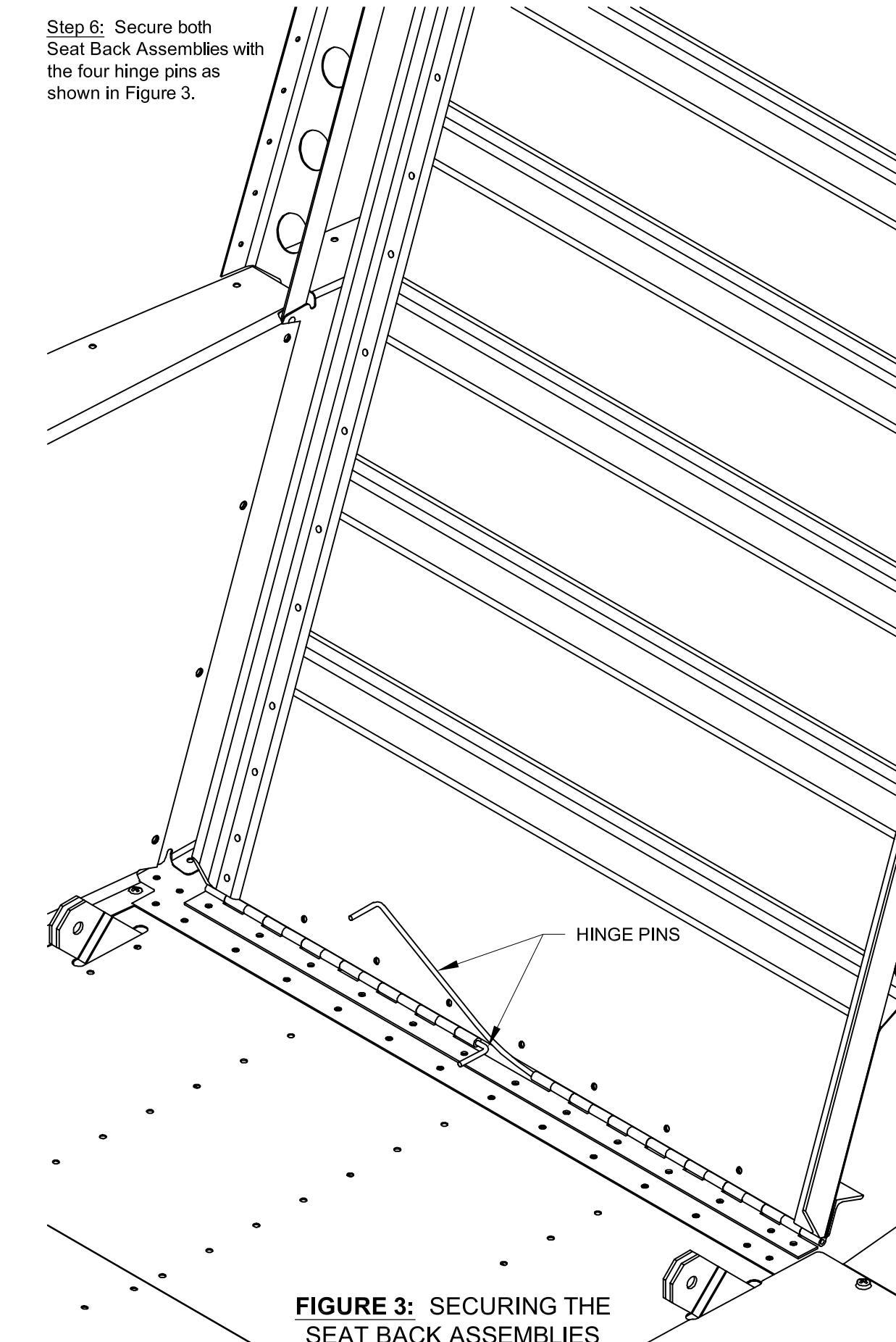
Step 4: Place the Left and Right Seat Back Assemblies into position on the F-10103A Lower Seat Hinge Halves as shown in Figure 2.



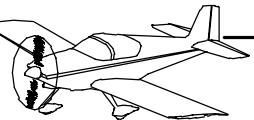
**FIGURE 2:** POSITIONING THE SEAT BACK ASSEMBLIES

Step 5: Locate the two hinge pins set aside on Page 33-2, Step 5, and cut them both in half. (This should result in four 8" long hinge pins. If the pins are not at least this long, you will have to make new ones). Make a 90° bend in all four pins 5/8" from one end. Grind the other end to a dull point.

Step 6: Secure both Seat Back Assemblies with the four hinge pins as shown in Figure 3.

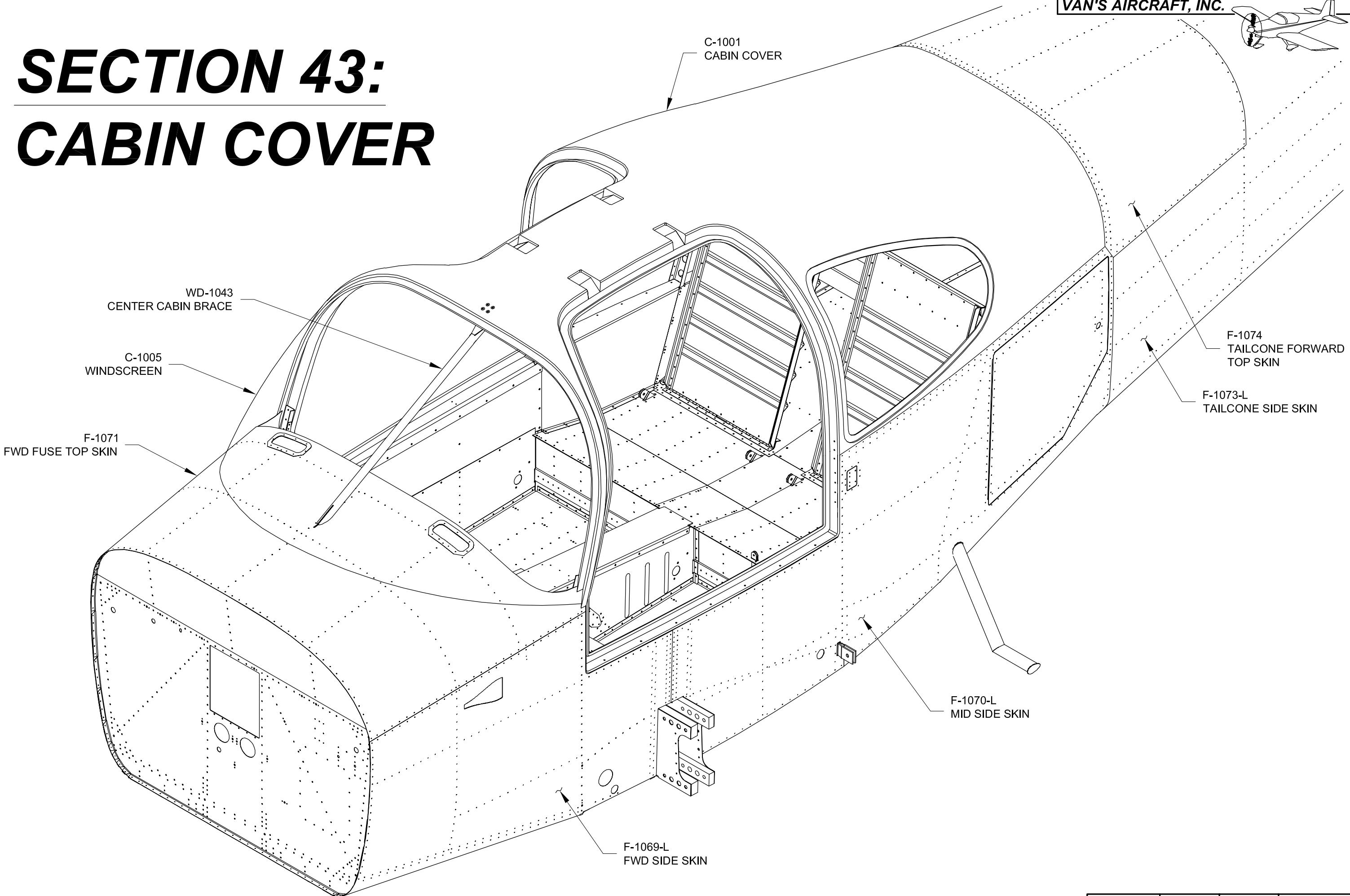


**FIGURE 3:** SECURING THE SEAT BACK ASSEMBLIES



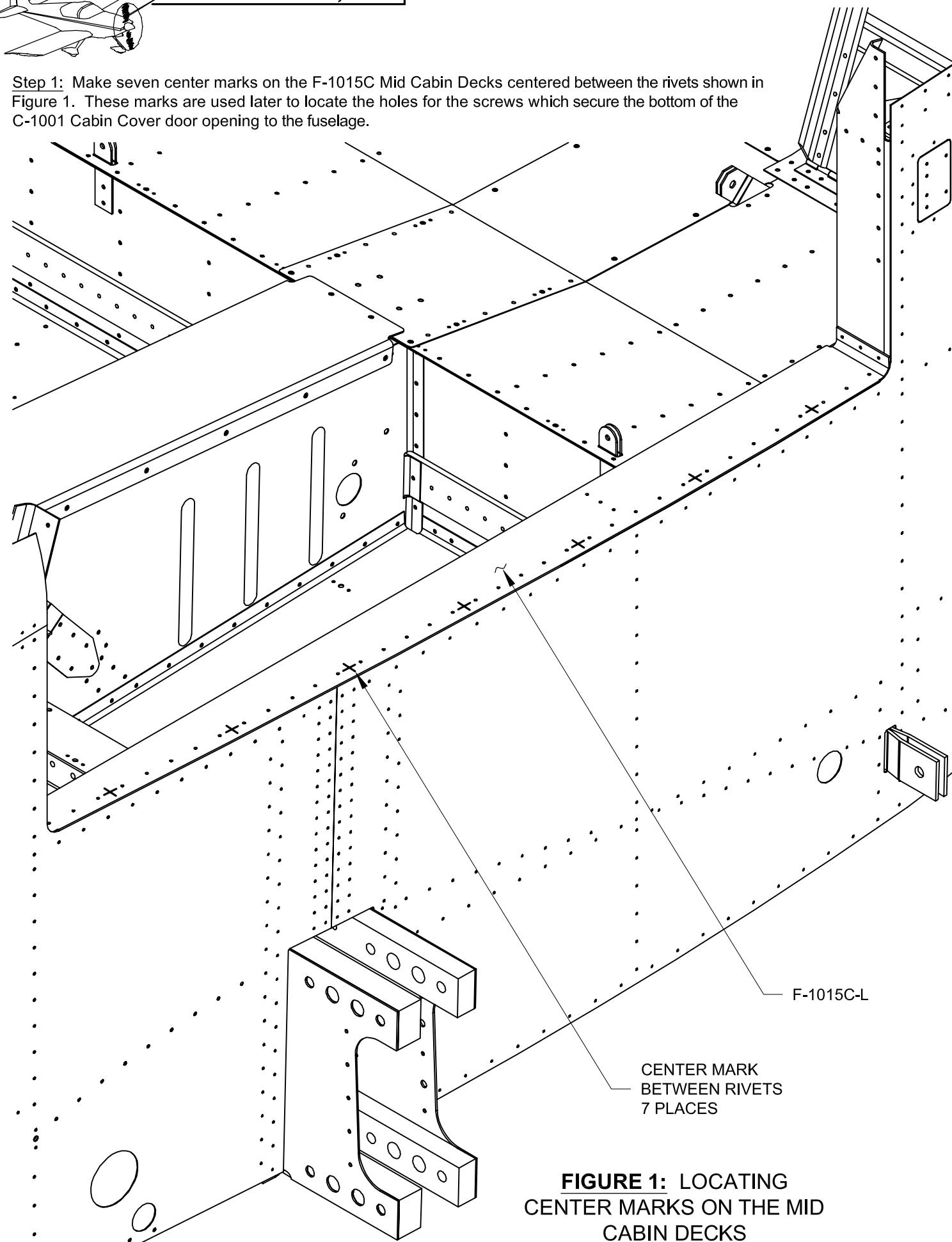
# SECTION 43:

## CABIN COVER



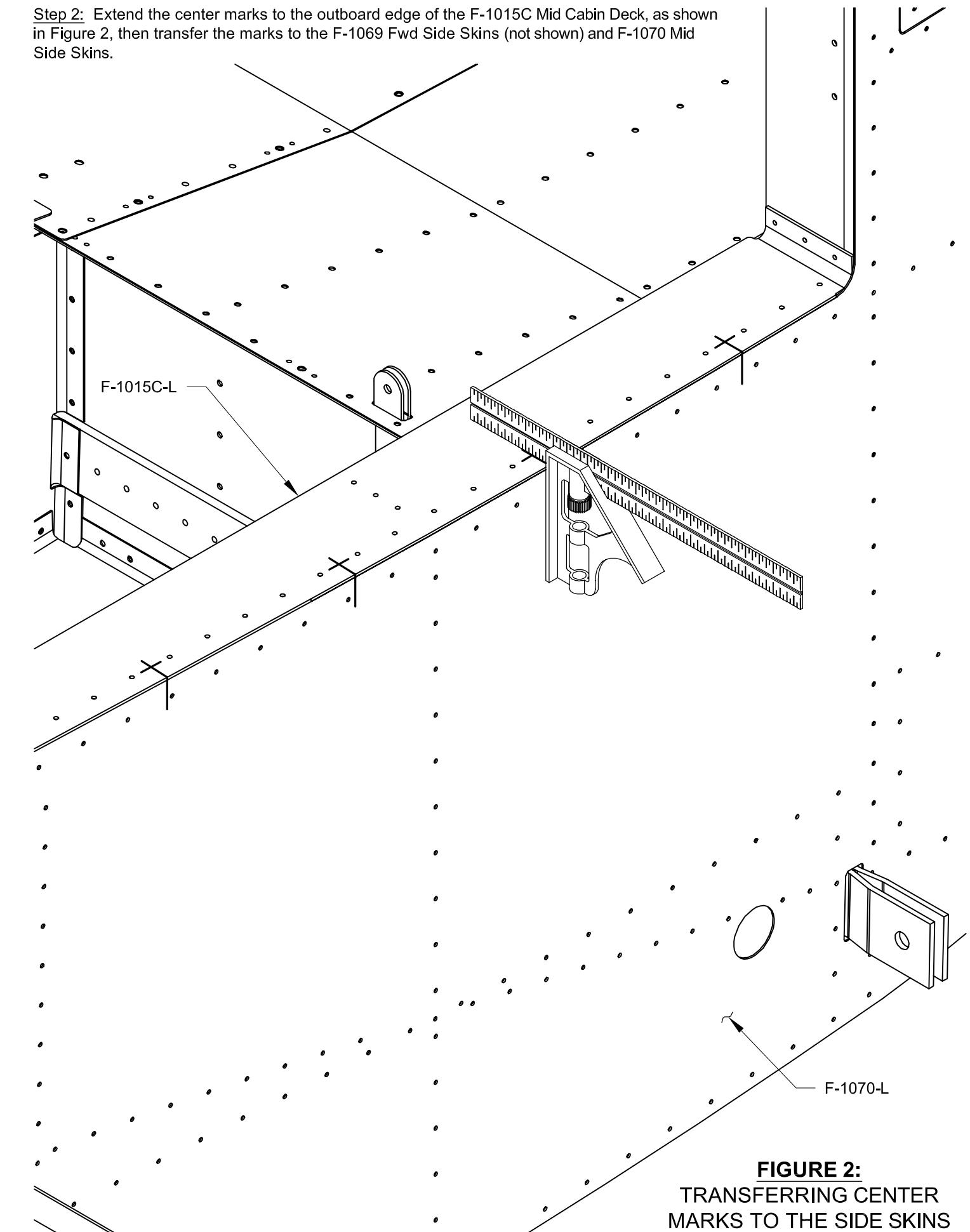


Step 1: Make seven center marks on the F-1015C Mid Cabin Decks centered between the rivets shown in Figure 1. These marks are used later to locate the holes for the screws which secure the bottom of the C-1001 Cabin Cover door opening to the fuselage.



**FIGURE 1:** LOCATING  
CENTER MARKS ON THE MID  
CABIN DECKS

Step 2: Extend the center marks to the outboard edge of the F-1015C Mid Cabin Deck, as shown in Figure 2, then transfer the marks to the F-1069 Fwd Side Skins (not shown) and F-1070 Mid Side Skins.



**FIGURE 2:**  
TRANSFERRING CENTER  
MARKS TO THE SIDE SKINS

**NOTE:** General instructions for working with and finishing fiberglass are found in Section 5T.

Step 1: The C-1001 Cabin Cover needs to be trimmed in order to fit on the fuselage. It is shown trimmed at the top of Figure 1. The portions of the cabin cover in the blow-ups are shown untrimmed.

Scribe lines around the perimeter, the window openings, and door openings indicate the extent to which the cabin cover needs to be trimmed. Since these scribe lines are faint, trace over them with a fine point pen to improve their visibility. The information in the blow-ups can be used to find the scribe lines or draw new ones if necessary.

The windscreens flange, the flange around the window opening, the mid side skin flange, and the tailcone forward top skin flange (not shown in the blow-ups) are all  $\frac{3}{4}$ " wide.

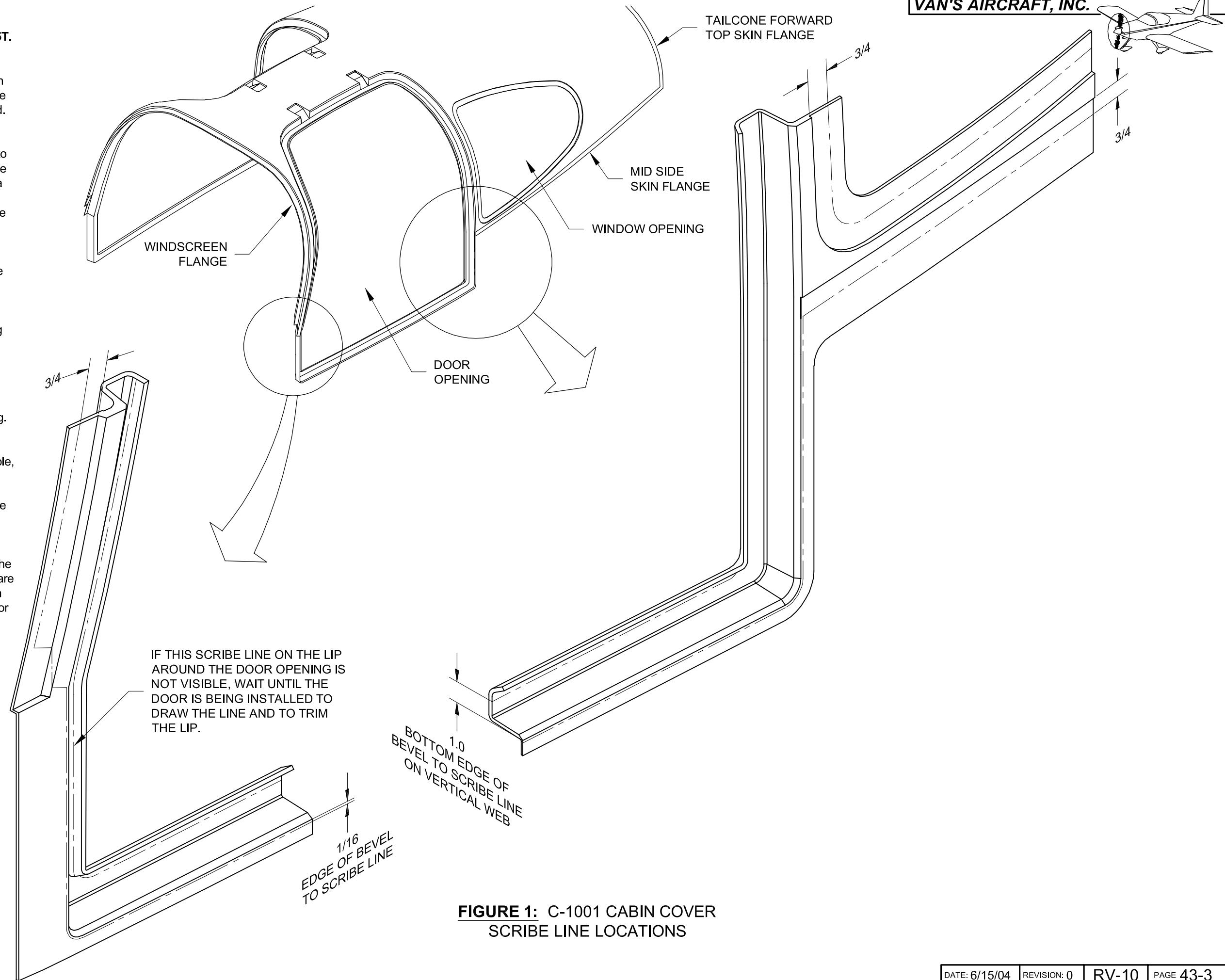
The scribe line on the lip around the door opening transitions from the lip to the vertical web along bottom portion of the door opening.

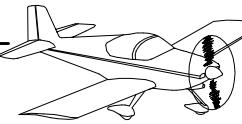
Step 2: Trim and sand to the scribe lines the tailcone forward top skin flange, the mid side skin flange, and the flange around the window opening.

Step 3: Trim and sand the lip around the door opening if the scribe line is visible. If it is not visible, wait until the door is fitted in a later section.

Step 4: Trim the windscreens flange and the flange around the lower, outside perimeter of the door opening.

If the scribe lines which are shown jogging onto the windscreens flange in the left blow-up of Figure 1 are not visible, this area will have to be trimmed when fitting the F-1001 Cabin Cover to the fuselage. For now, trim with a margin around the area.



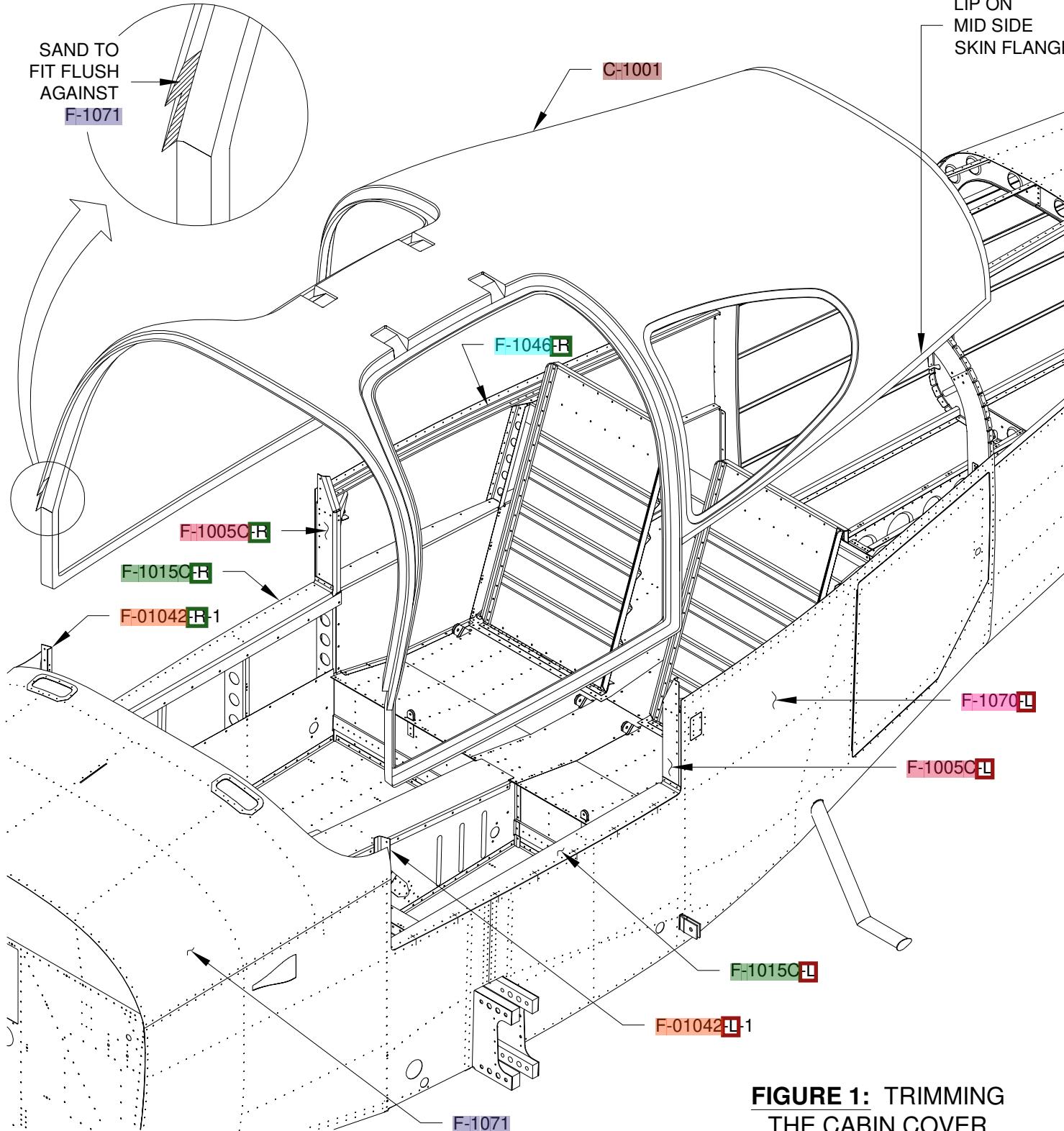


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Step 1: Test fit the C-1001 Cabin Cover on the fuselage. (If the F-1074 Tailcone Forward Top Skin is clecoed to the tailcone, it will have to be removed.) Note any areas of interference between the lower portion of the door opening and the fuselage structure to which it mates.

Step 2: Remove the C-1001 Cabin Cover from the fuselage, then trim and sand the part to remove the areas of interference.

**NOTE:** While trimming and sanding the lower portion of the door openings, make sure they remain "in plane" with the fuselage structure to which they mate (the F-1005C and F-01042-1 Bulkhead Side Channels and the F-1015C Mid Cabin Decks shown in Figure 1). This can be accomplished by spanning the two door openings with square tubing or a straight length of lumber and taping sandpaper to the ends as shown in Figure 2. Don't worry if the door openings are not perfectly "in plane" with the fuselage, structural filler will ultimately be applied to the interface areas, filling any gaps.



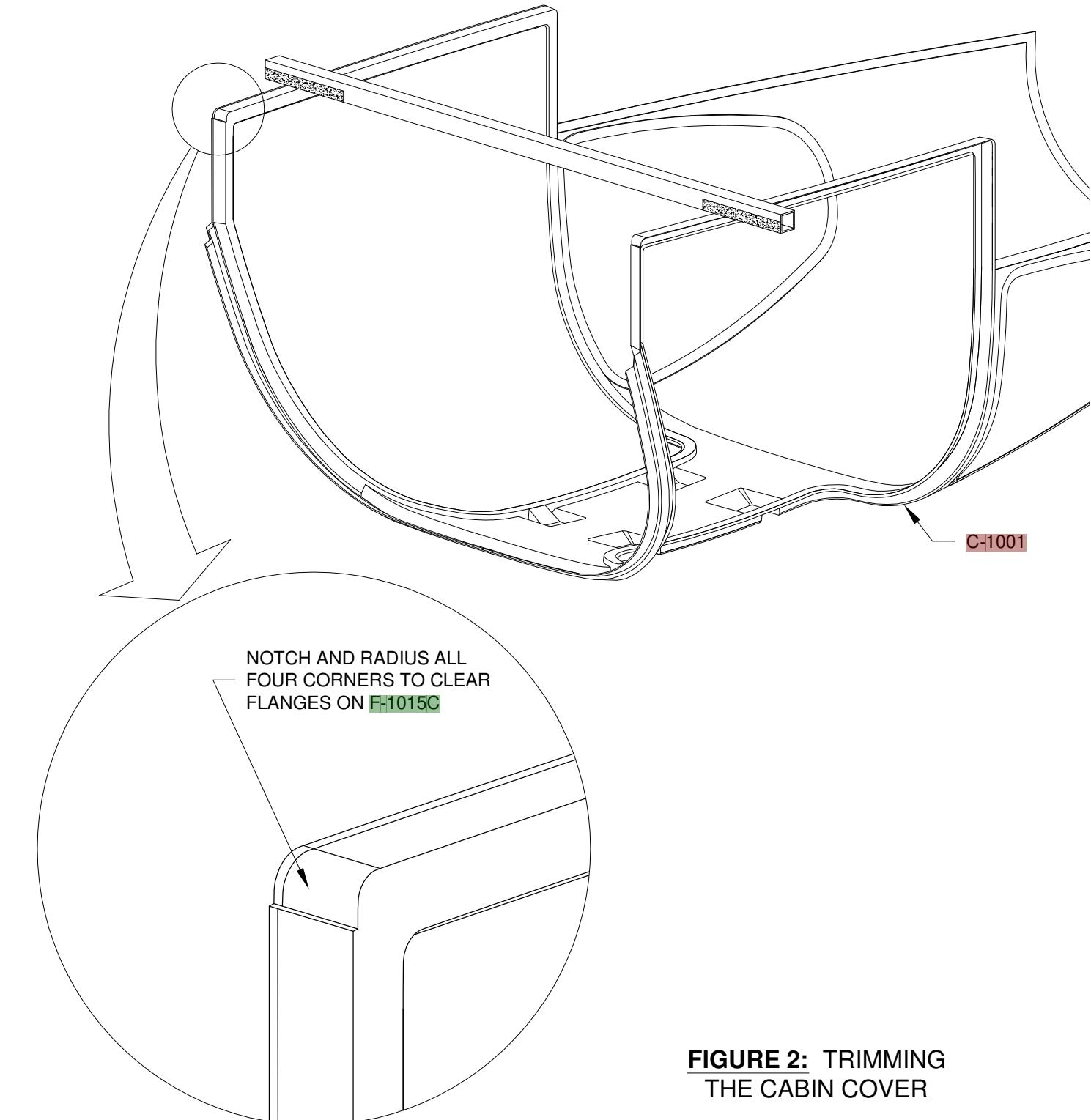
**FIGURE 1: TRIMMING  
THE CABIN COVER**

Step 2 (continued): The portion of the cabin cover door openings which mate to the F-1015C Mid Cabin Deck will have to be sanded (which will lower the cabin cover) until the lips along the mid side skin flanges rest on the top edge of the F-1070 Mid Side Skins. (Make sure the mid side skin flanges are not longer than 3/4", otherwise they will "bottom out" on the F-1046 Mid Fuse Longerons before the lips on the mid side skin flanges reach the mid side skins.)

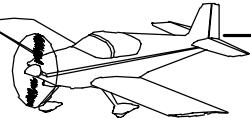
As shown in the blow-up of Figure 2, the four lower corners of the door opening will have to have a slight radius and a relief notch sanded into them to prevent interference with the flanges at the ends of the F-1015C Mid Cabin Decks.

Sand the lower ends of the windscreen flange so that they fit flush against the F-1071 Fwd Fuse Top Skin as shown in the blow-up of Figure 1.

Step 3: Repeat Step 2 until the C-1001 Cabin Cover fits properly on the fuselage. The lower portion of the cabin cover door opening should have a good fit in the fuselage, but should not be so tight that it is difficult to get in place.

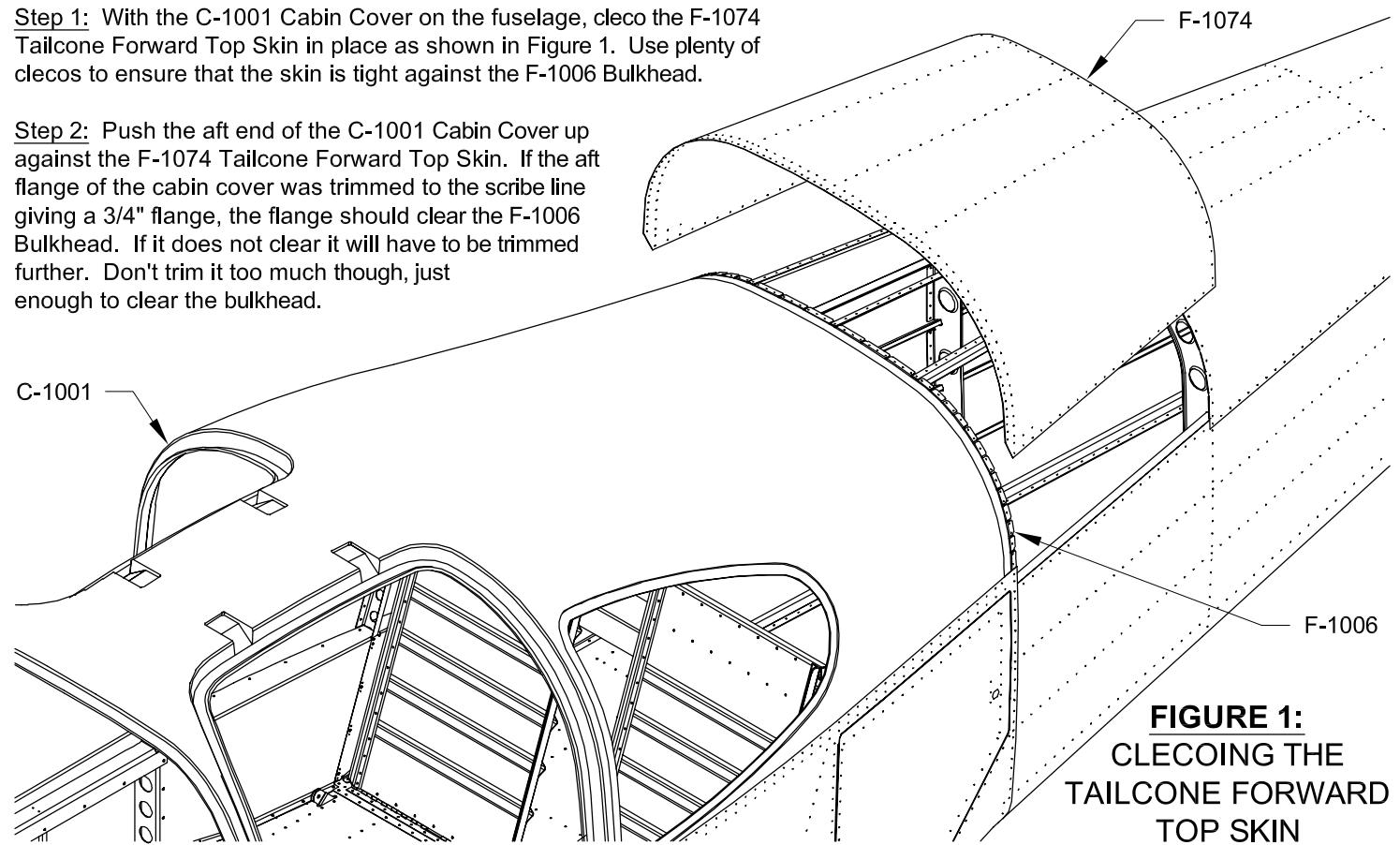


**FIGURE 2: TRIMMING  
THE CABIN COVER**



**Step 1:** With the C-1001 Cabin Cover on the fuselage, cleco the F-1074 Tailcone Forward Top Skin in place as shown in Figure 1. Use plenty of clecos to ensure that the skin is tight against the F-1006 Bulkhead.

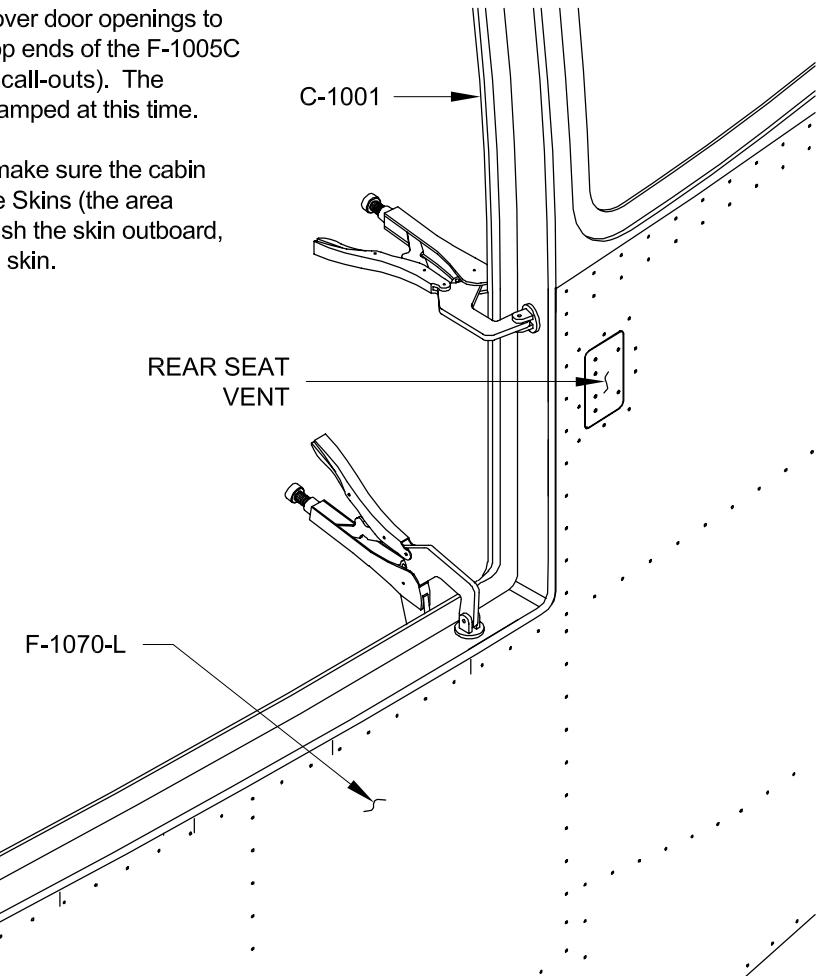
**Step 2:** Push the aft end of the C-1001 Cabin Cover up against the F-1074 Tailcone Forward Top Skin. If the aft flange of the cabin cover was trimmed to the scribe line giving a 3/4" flange, the flange should clear the F-1006 Bulkhead. If it does not clear it will have to be trimmed further. Don't trim it too much though, just enough to clear the bulkhead.



**FIGURE 1:  
CLECOING THE  
TAILCONE FORWARD  
TOP SKIN**

**Step 3:** As shown in Figure 2, clamp the C-1001 Cabin Cover door openings to the aft ends of the F-1015C Mid Cabin Decks and to the top ends of the F-1005C Bulkhead Side Channels (see Page 43-4, Figure 1 for part call-outs). The forward portions of the door openings do not need to be clamped at this time.

When clamping to the top of the bulkhead side channels, make sure the cabin cover fits flush against the top edge of the F-1070 Mid Side Skins (the area above the rear seat vents). The cabin cover should not push the skin outboard, nor should there be a gap between the cabin cover and the skin.



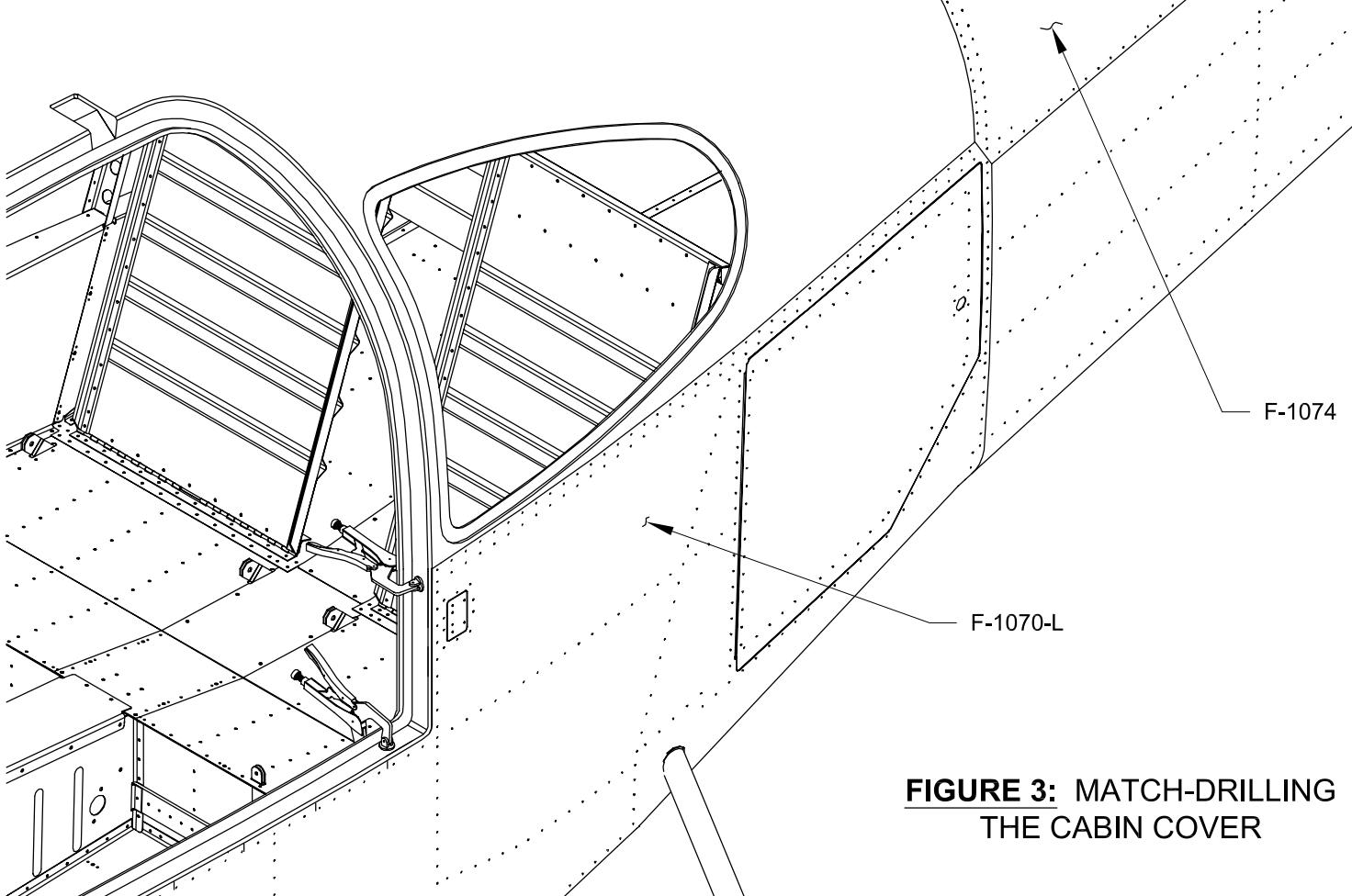
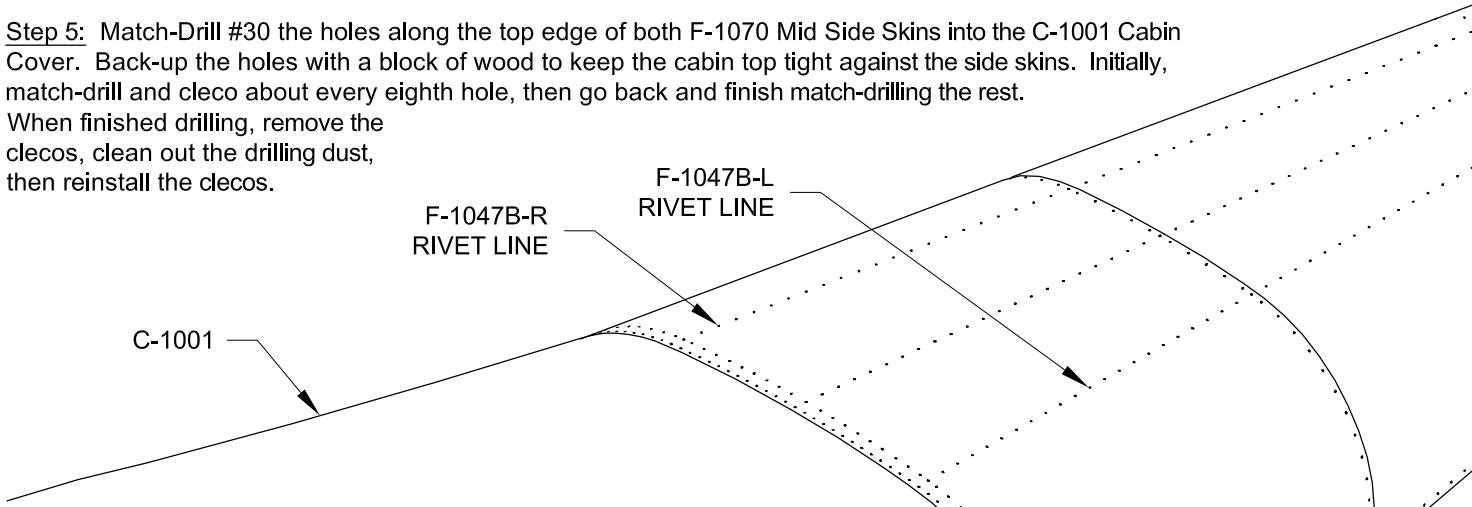
**FIGURE 2: CLAMPING  
THE CABIN COVER**

**Step 4:** Push the aft end of the C-1001 Cabin Cover up against the F-1074 Tailcone Forward Top Skin. Match-Drill #30 the twenty-five holes, which are along the forward edge of the skin and between the rivet lines of the F-1047B Stiffeners (see Figure 3), into the cabin cover. Start at the center of the cabin cover and work outboard. Make sure to keep the drill perpendicular to the skin, and, to keep the cabin cover tight against the skin, cleco each hole as you drill.

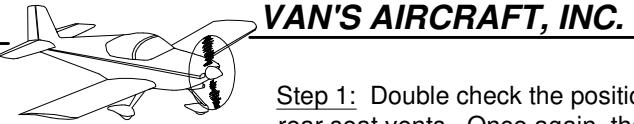
Remove the clecos securing the cabin cover to the skin, push the cabin cover away from the skin, clean out any drilling dust from between the two parts, then reinstall the clecos.

Now, match-drill #30 and cleco the rest of the holes down both sides. If gapping occurs between the cabin cover and skin, remove as many clecos as necessary, and clean out any trapped drilling dust.

**Step 5:** Match-Drill #30 the holes along the top edge of both F-1070 Mid Side Skins into the C-1001 Cabin Cover. Back-up the holes with a block of wood to keep the cabin top tight against the side skins. Initially, match-drill and cleco about every eighth hole, then go back and finish match-drilling the rest. When finished drilling, remove the clecos, clean out the drilling dust, then reinstall the clecos.



**FIGURE 3: MATCH-DRILLING  
THE CABIN COVER**

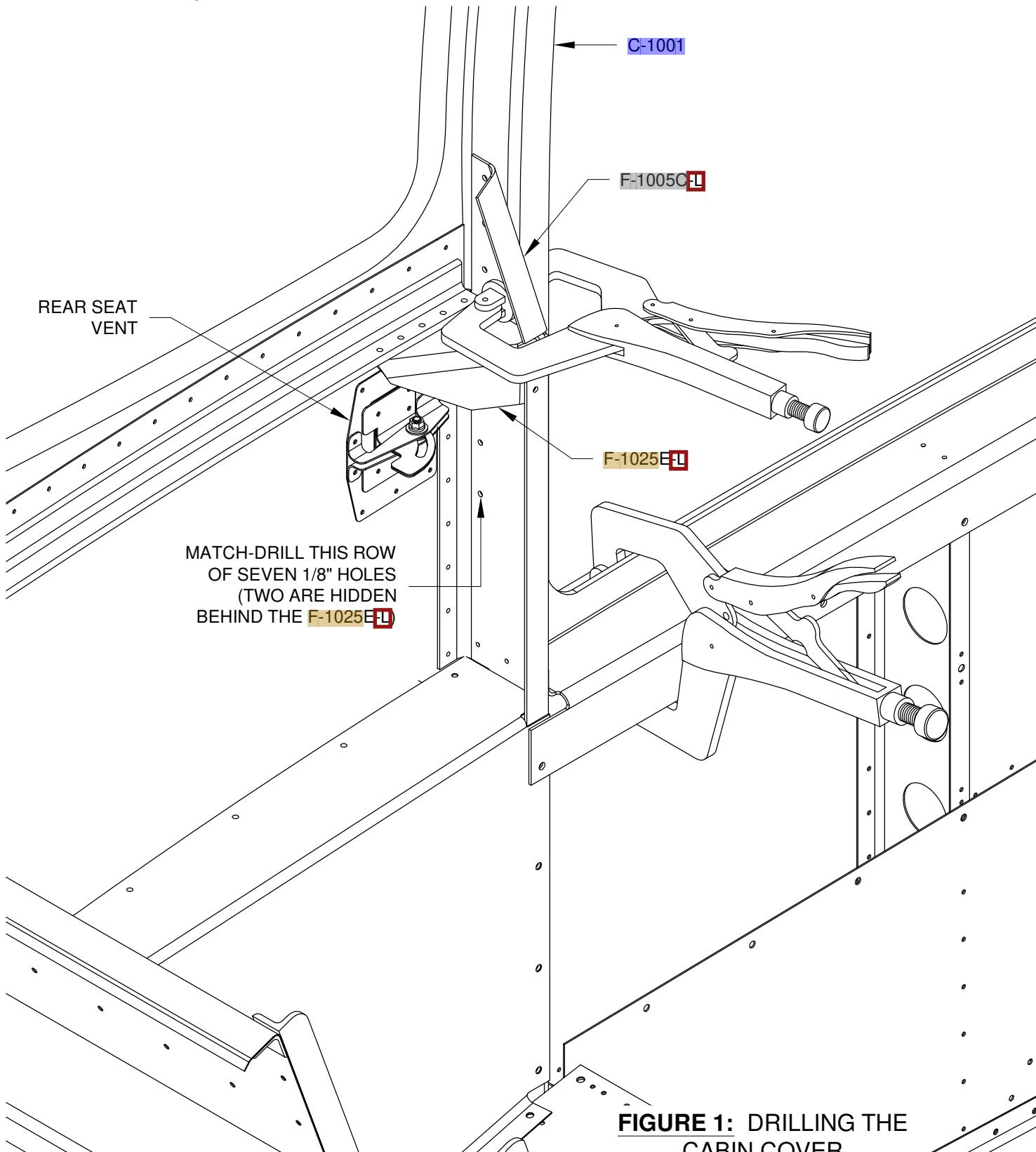


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Step 1: Double check the position of the **C-1001** Cabin Cover relative to the **F-1070** Mid Side Skins above the rear seat vents. Once again, the cabin cover should not be pushing the skin outboard, nor should there be a gap between the cabin cover and the skin. Unclamp and readjust if necessary.

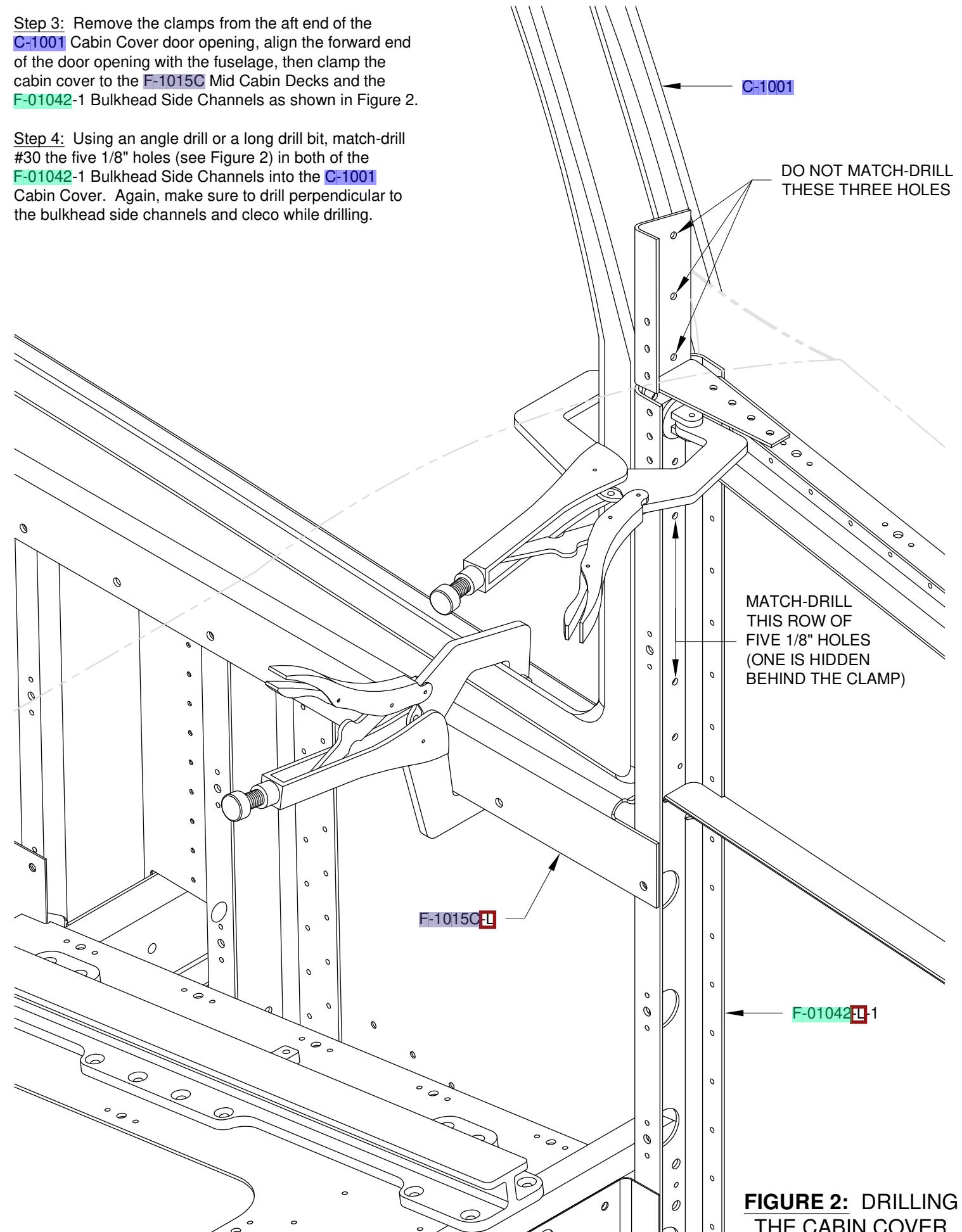
Step 2: Using an angle drill or a long drill bit, match-drill #30 the seven 1/8" holes (see Figure 1) in both of the **F-1005C** Bulkhead Side Channels into the **C-1001** Cabin Cover. Drill perpendicular to the bulkhead side channels and cleco while drilling.

Final-Drill the holes using a #12 drill.



Step 3: Remove the clamps from the aft end of the **C-1001** Cabin Cover door opening, align the forward end of the door opening with the fuselage, then clamp the cabin cover to the **F-1015C** Mid Cabin Decks and the **F-01042-1** Bulkhead Side Channels as shown in Figure 2.

Step 4: Using an angle drill or a long drill bit, match-drill #30 the five 1/8" holes (see Figure 2) in both of the **F-01042-1** Bulkhead Side Channels into the **C-1001** Cabin Cover. Again, make sure to drill perpendicular to the bulkhead side channels and cleco while drilling.

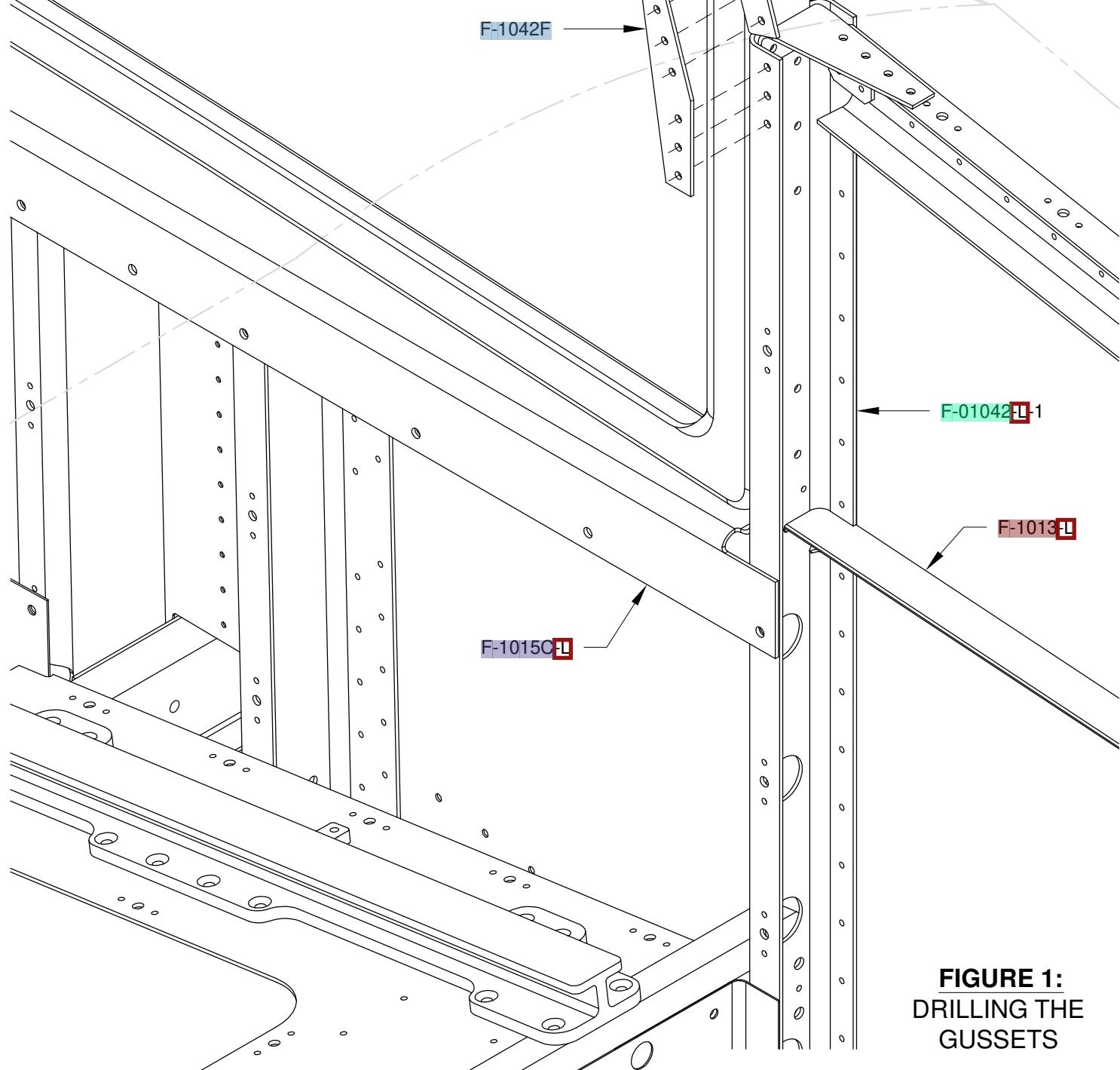


Step 1: Bend the top portion of the F-01042-1 Bulkhead Side Channels until the F-1042F Gussets can be clecoed in place as shown in Figure 1. If the top, outboard edge of the bulkhead side channels interfere with the C-1001 Cabin Cover, trim the channels to clear. Trim only as much as is necessary to get the gussets clecoed in place. Do not be concerned with the gap between the top portion of the channels and the cabin cover, the gap will be filled with structural filler later.

Step 2: With the F-1042F Gussets clecoed it place, final-drill #30 the holes common to the gussets and the F-01042-1 Bulkhead Side Channels.

Step 3: Match-Drill #30 the three holes in the web of the F-01042-1 Bulkhead Side Channels into the cabin cover.

Step 4: Final-Drill #12 all of the #30 holes common to the cabin cover and the F-01042-1 Bulkhead Side Channels.

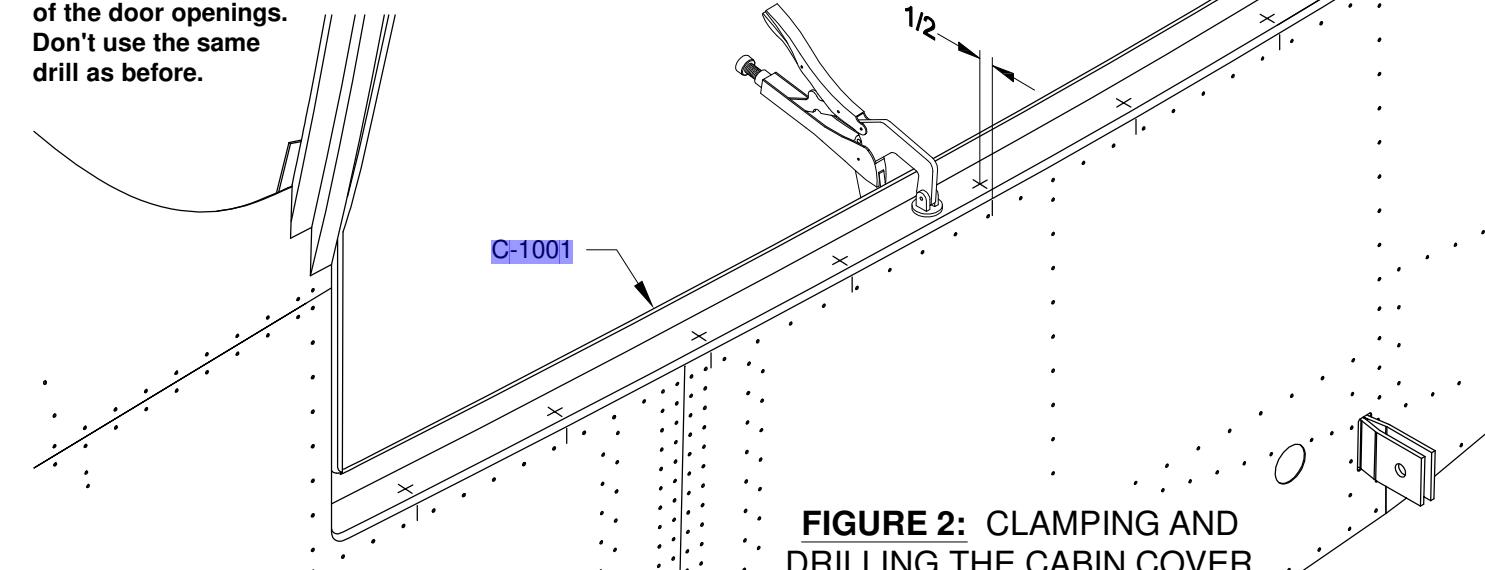


Step 5: Clamp the middle, bottom portion of the C-1001 Cabin Cover door openings to the underlying F-1015C Mid Cabin Decks as shown in Figure 2.

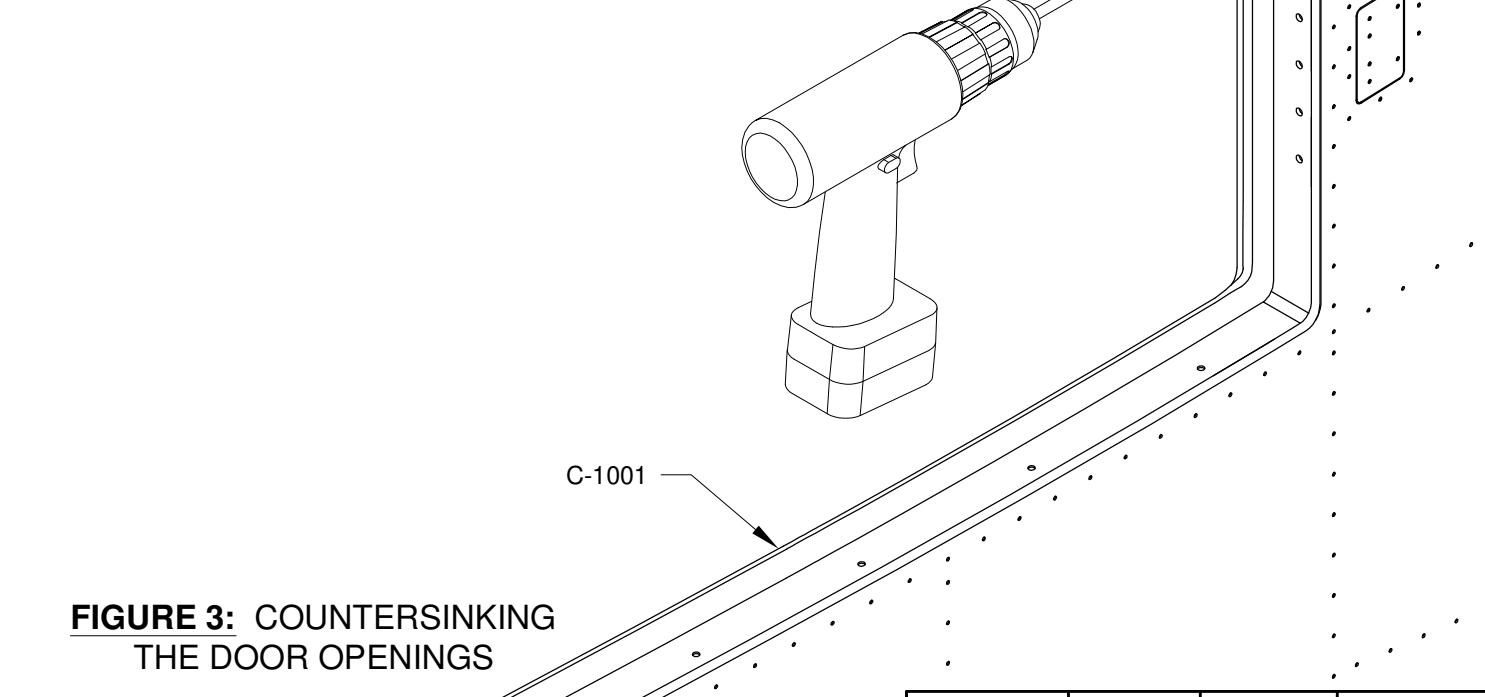
Step 6: Transfer the hole location marks made on Page 43-2, Step 1 to the bottom portion of the cabin cover door openings. The hole location marks are placed a half inch from the outer skin surface as shown in the figure.

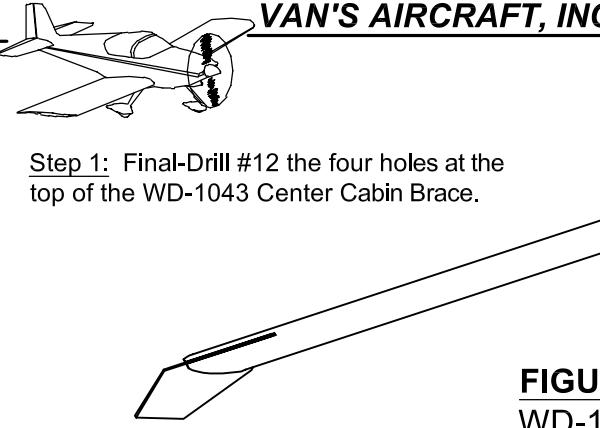
Step 7: At the marks made in Step 6, drill #30 the bottom portion of the cabin cover door openings, through the underlying F-1015C Mid Cabin Decks, and into the F-1013 Fwd Fuse Longerons (see Figure 1 for part call-outs). Drill perpendicular to the mid cabin decks.

Final-Drill the holes using a #19 drill. **CAUTION: These holes are smaller than the holes in the forward and aft portion of the door openings.**  
**Don't use the same drill as before.**



Step 8: Machine countersink all of the #12 holes in the forward and aft portions of the C-1001 Cabin Cover door openings for the heads of AN509-10 screws, and all of the #19 holes in the bottom portion of the door openings for AN509-8 screws. There is not enough room for a countersink cage, so you will need to use a deburring tool extension in a drill as shown in Figure 3. Countersink in line with the hole, not perpendicular to the tapered surface of the cabin cover. This will produce a countersink that is deeper on the inboard side of the hole than on the outboard side. Countersink just deep enough so that the screw is flush with the outboard side.





Step 1: Final-Drill #12 the four holes at the top of the WD-1043 Center Cabin Brace.

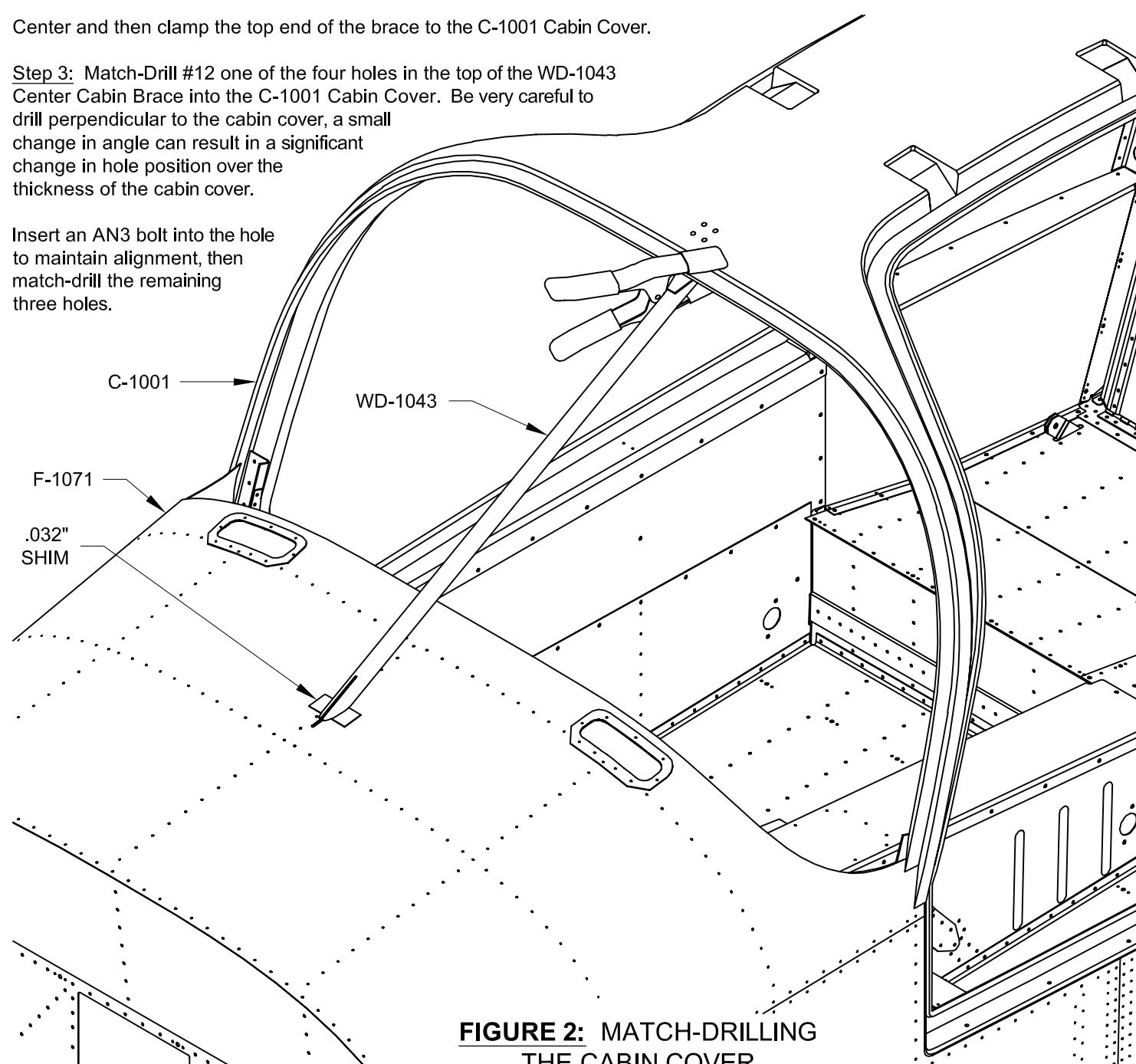
**FIGURE 1: FINAL-DRILLING THE WD-1043 CENTER CABIN BRACE**

Step 2: Insert the tab at the bottom of the WD-1043 Center Cabin Brace into the slot in the F-1071 Fwd Top Skin. Slide the brace as far forward as it will go, then space the bottom end of the tube off the fwd top skin using a 0.032" scrap aluminum shim.

Center and then clamp the top end of the brace to the C-1001 Cabin Cover.

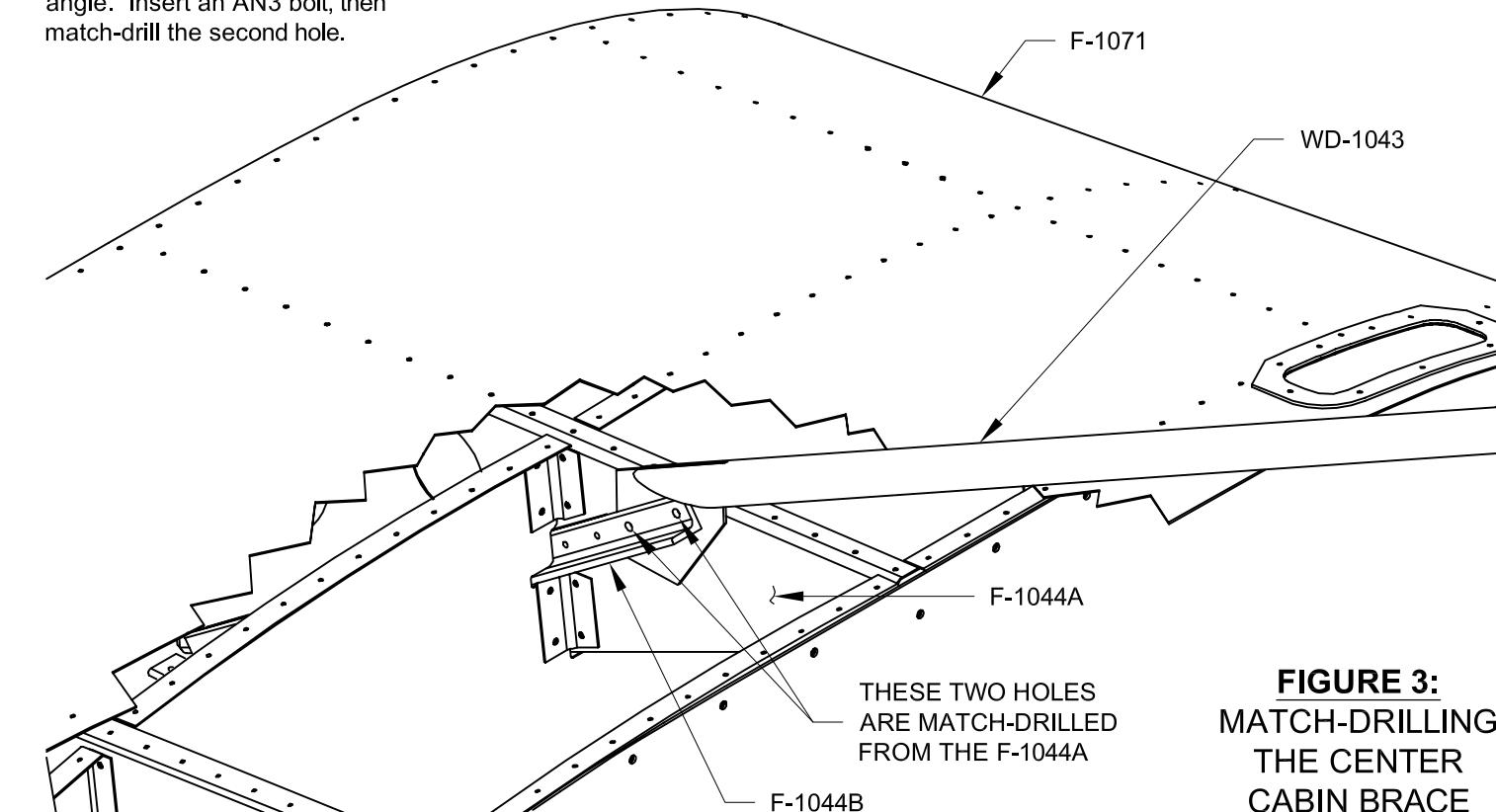
Step 3: Match-Drill #12 one of the four holes in the top of the WD-1043 Center Cabin Brace into the C-1001 Cabin Cover. Be very careful to drill perpendicular to the cabin cover, a small change in angle can result in a significant change in hole position over the thickness of the cabin cover.

Insert an AN3 bolt into the hole to maintain alignment, then match-drill the remaining three holes.



**FIGURE 2: MATCH-DRILLING THE CABIN COVER**

Step 4: Two bolts are used to secure the WD-1043 Center Cabin Brace to the F-1044A Fwd Cabin Rib and the F-1044B Angle. Match-Drill #12 one of these two bolt holes in the fwd cabin rib into the tab at the bottom end of the center cabin brace and the angle. Insert an AN3 bolt, then match-drill the second hole.



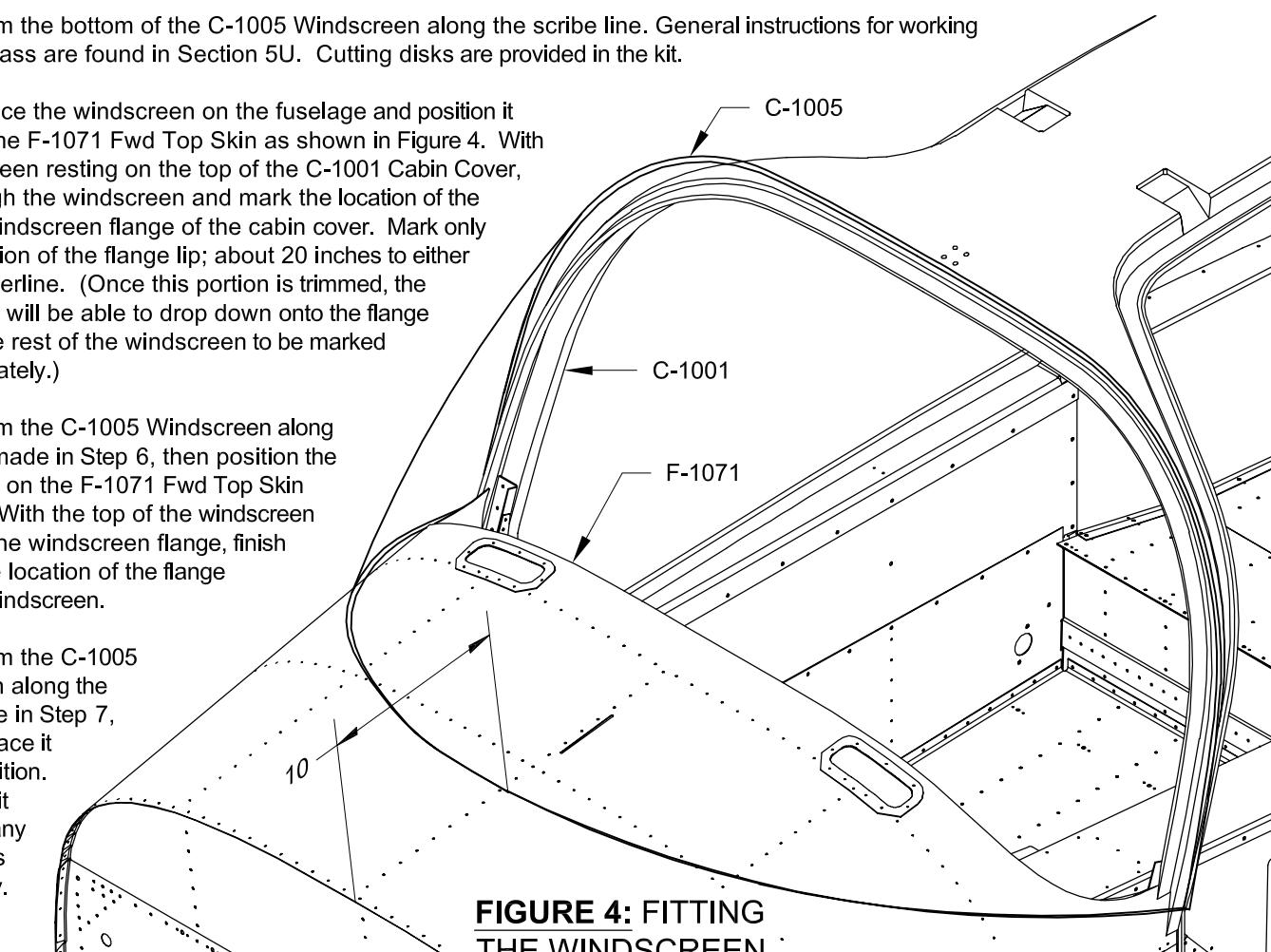
**FIGURE 3:  
MATCH-DRILLING  
THE CENTER  
CABIN BRACE**

Step 5: Trim the bottom of the C-1005 Windscreen along the scribe line. General instructions for working with Plexiglass are found in Section 5U. Cutting disks are provided in the kit.

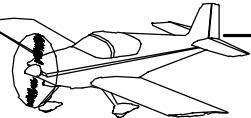
Step 6: Place the windscreen on the fuselage and position it relative to the F-1071 Fwd Top Skin as shown in Figure 4. With the windscreen resting on the top of the C-1001 Cabin Cover, sight through the windscreen and mark the location of the lip on the windscreen flange of the cabin cover. Mark only the top portion of the flange lip; about 20 inches to either side of centerline. (Once this portion is trimmed, the windscreen will be able to drop down onto the flange allowing the rest of the windscreen to be marked more accurately.)

Step 7: Trim the C-1005 Windscreen along the marks made in Step 6, then position the windscreen on the F-1071 Fwd Top Skin as before. With the top of the windscreen resting on the windscreen flange, finish marking the location of the flange lip on the windscreen.

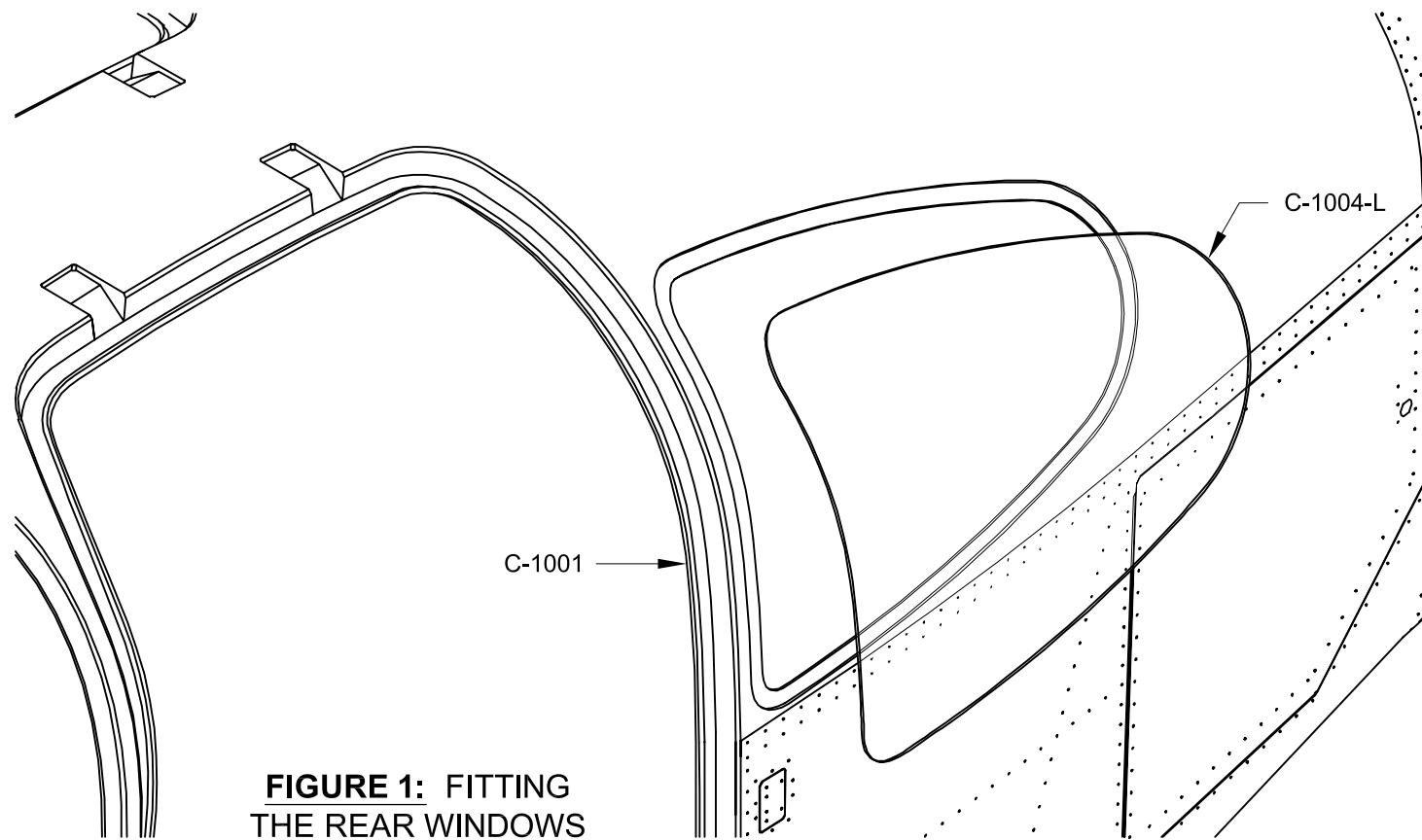
Step 8: Trim the C-1005 Windscreen along the marks made in Step 7, and then place it back in position. Check the fit and make any adjustments if necessary.



**FIGURE 4: FITTING  
THE WINDSCREEN**



Step 1: Trim the C-1004-L Rear Window to the scribe line, then test fit it on the C-1001 Cabin Cover as shown in Figure 1. Press the window securely to the cabin cover so that it contacts the entire flange around the window opening. Note any interference of the window with the lip around the flange, and trim if necessary. Repeat this step for the right rear window.



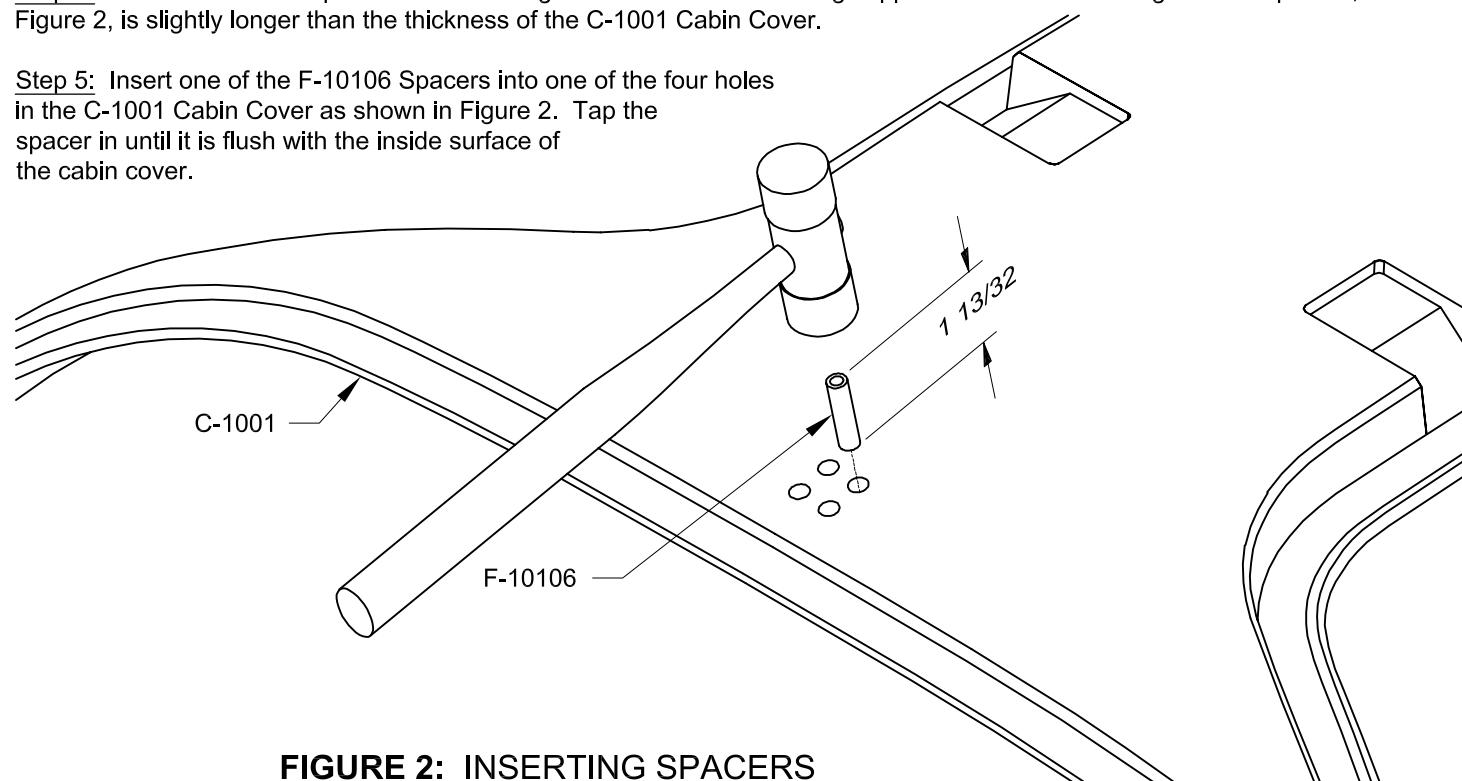
**FIGURE 1: FITTING THE REAR WINDOWS**

Step 2: Remove the C-1001 Cabin Cover from the fuselage and deburr all of the holes in the fuselage drilled in this section.

Step 3: Final-Drill the four #12 holes in the top of the cabin cover using a 5/16" drill. Drill from the inside to the outside surface.

Step 4: Cut four F-10106 Spacers from the length of AT6-058X5/16 tubing supplied in the kit. The length of the spacers, shown in Figure 2, is slightly longer than the thickness of the C-1001 Cabin Cover.

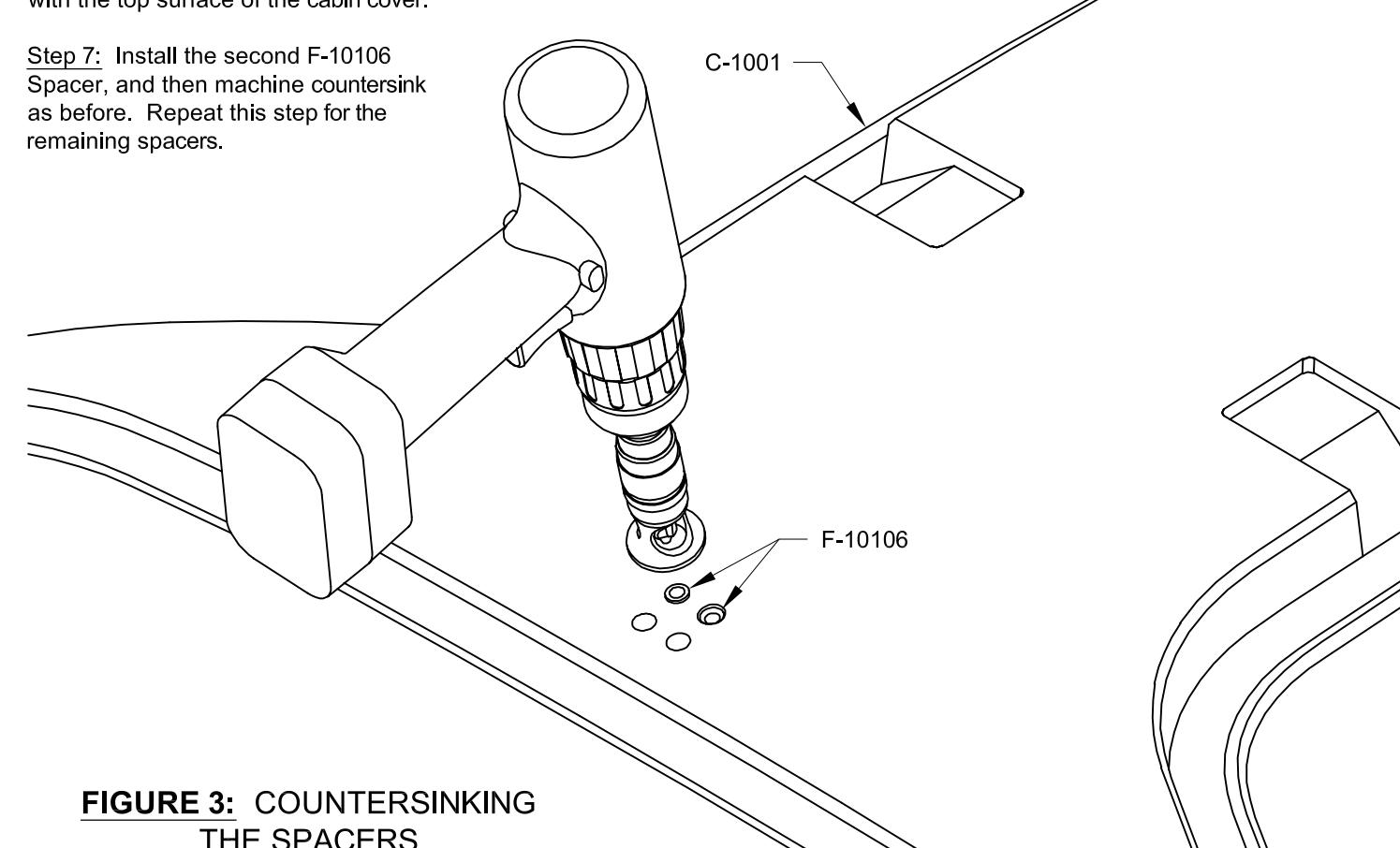
Step 5: Insert one of the F-10106 Spacers into one of the four holes in the C-1001 Cabin Cover as shown in Figure 2. Tap the spacer in until it is flush with the inside surface of the cabin cover.



**FIGURE 2: INSERTING SPACERS**

Step 6: Machine countersink the F-10106 Spacer and the C-1001 Cabin Cover as shown in Figure 3. The countersink must be deep enough to flush the head of an MS24694S72 screw with the top surface of the cabin cover.

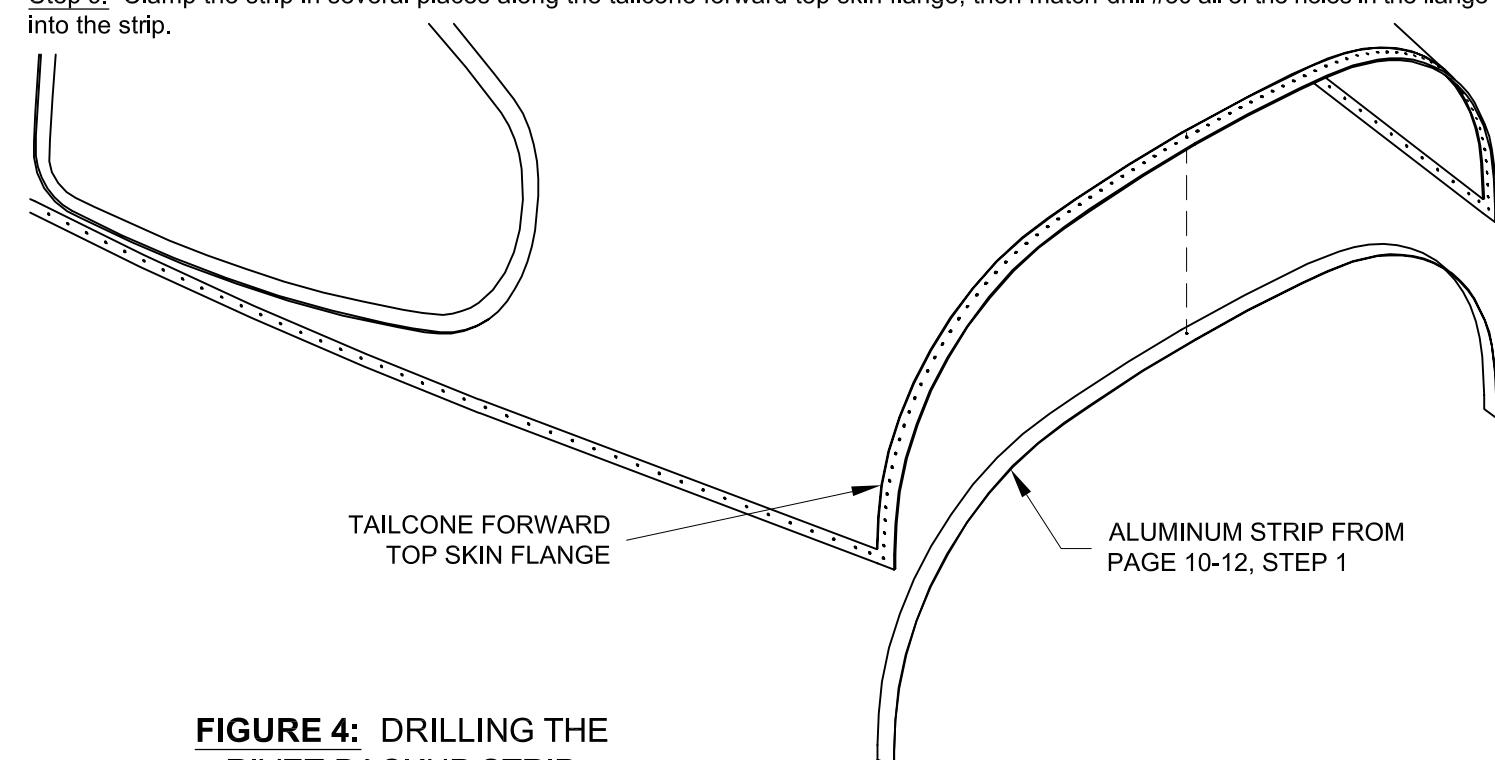
Step 7: Install the second F-10106 Spacer, and then machine countersink as before. Repeat this step for the remaining spacers.



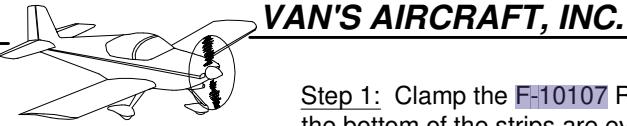
**FIGURE 3: COUNTERSINKING THE SPACERS**

Step 8: Locate the aluminum strip that was set aside on Page 10-12, Step 1. Final-Drill #30 the single hole in the middle of the strip, then cleco it to the inside of the C-1001 Cabin Cover as shown in Figure 4.

Step 9: Clamp the strip in several places along the tailcone forward top skin flange, then match-drill #30 all of the holes in the flange into the strip.

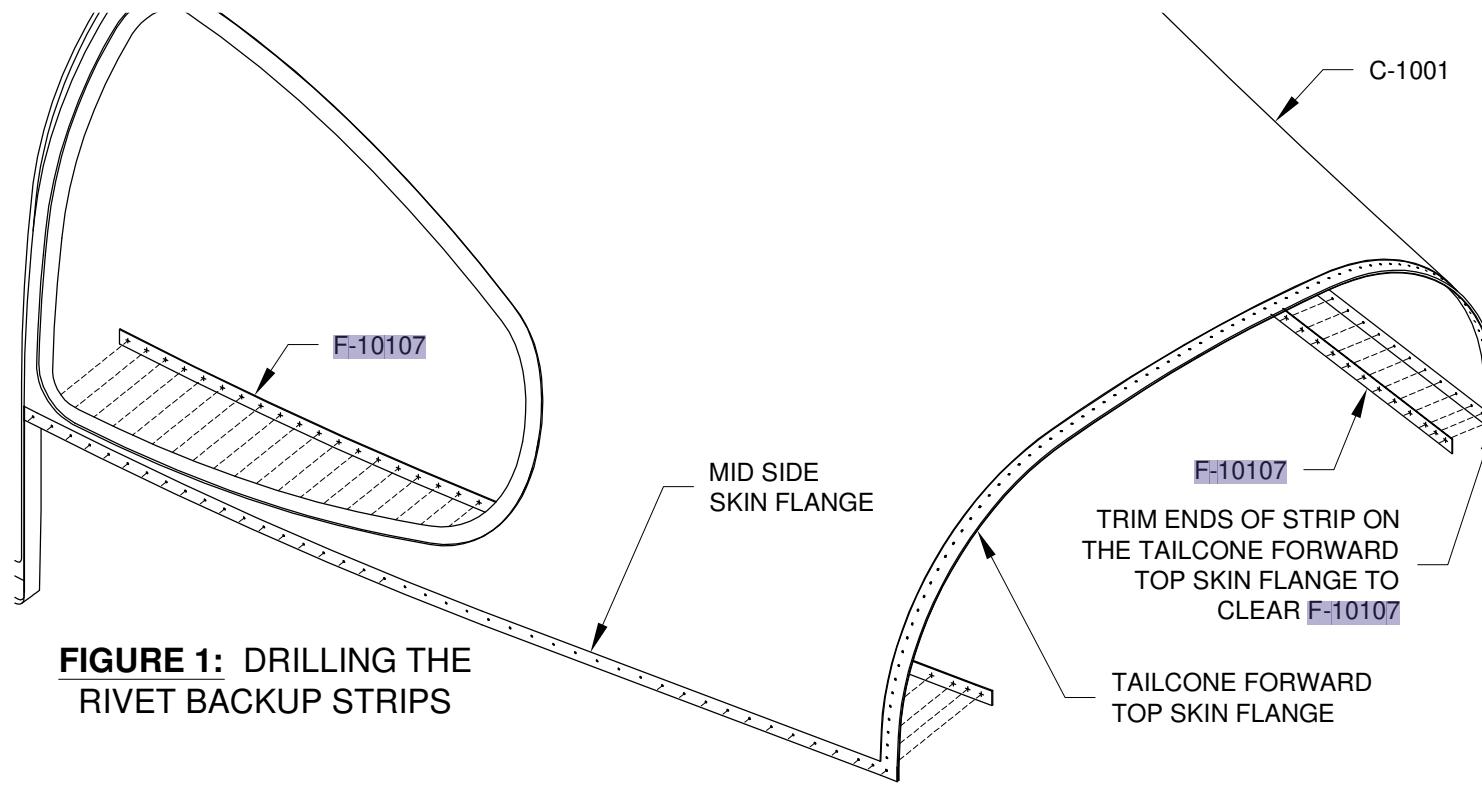


**FIGURE 4: DRILLING THE RIVET BACKUP STRIP**



Step 1: Clamp the F-10107 Rivet Backup Strips, shown in Figure 1, to the mid side skin flanges so that the bottom of the strips are even with the bottom of the flanges. Trim the ends of the strip which is on the tailcone forward top skin flange to clear the rivet backup strips (see Figure 1).

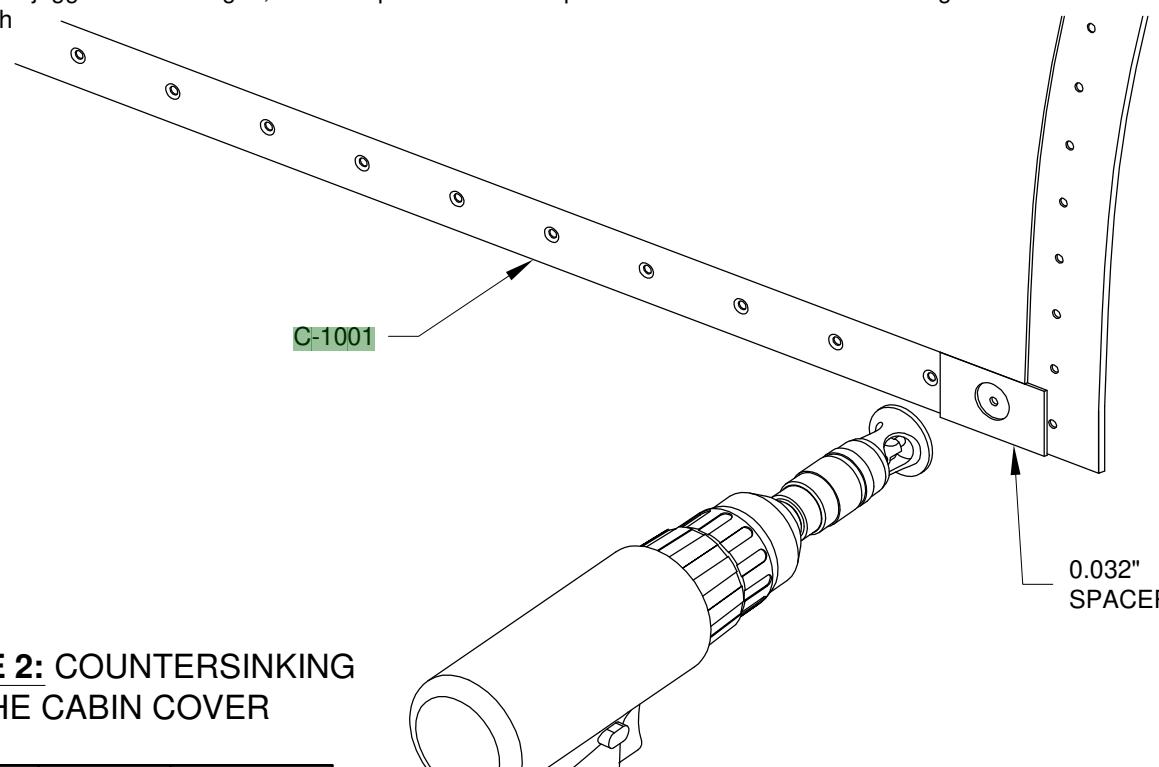
Step 2: Match-Drill # 30 the holes in the mid side skin flanges into the F-10107 Rivet Backup Strips, then remove and deburr the holes in all three rivet backup strips.



**FIGURE 1: DRILLING THE RIVET BACKUP STRIPS**

Step 3: Deburr, then dimple the #30 holes along the top edge of both F-1070 Mid Side Skins and along the forward edge of the F-1074 Tailcone Forward Top Skin which are common to the C-1001 Cabin Cover flanges.

Machine countersink the holes in the cabin cover flanges deep enough for the dimples in the skins. If your countersink cage is too big and interferes with the joggle on the flanges, make a spacer out of scrap 0.032" aluminum as shown in Figure 2. Drill a hole in the spacer big enough to clear the cutter, then adjust the countersink cage for the correct depth accounting for the thickness of the spacer.

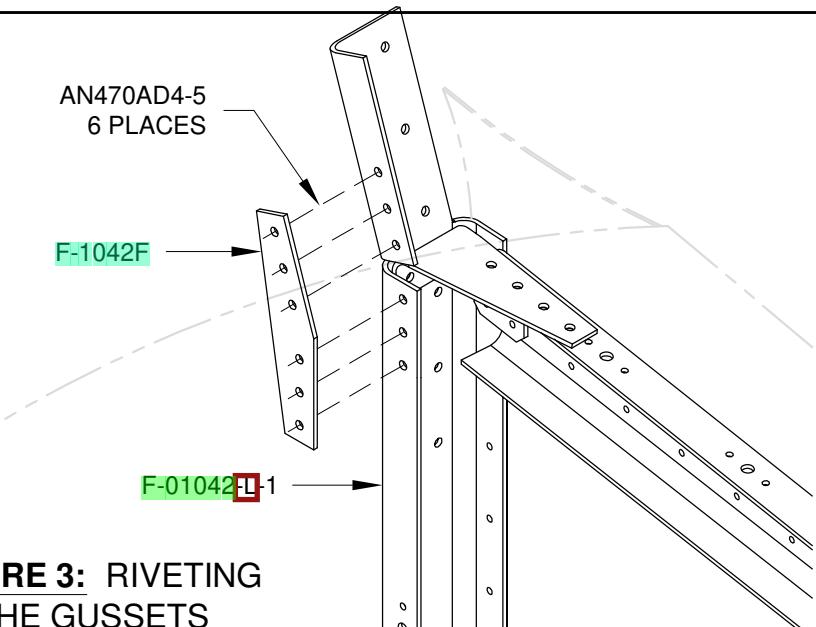


**FIGURE 2: COUNTERSINKING THE CABIN COVER**

Step 4: Rivet the F-1042F Gussets to the F-01042-1 Bulkhead Side Channels using the rivets called out in Figure 3.

**NOTE: The cabin cover will now be permanently installed. If you intend to paint or otherwise cover the interior, this is a good time to do it.**

Step 5: Place the C-1001 Cabin Cover back on the fuselage (the bottom portion of the cabin cover door openings will have to be spread apart to get them past the bent portion of the F-01042-1 Bulkhead Side Channels).



**FIGURE 3: RIVETING THE GUSSETS**

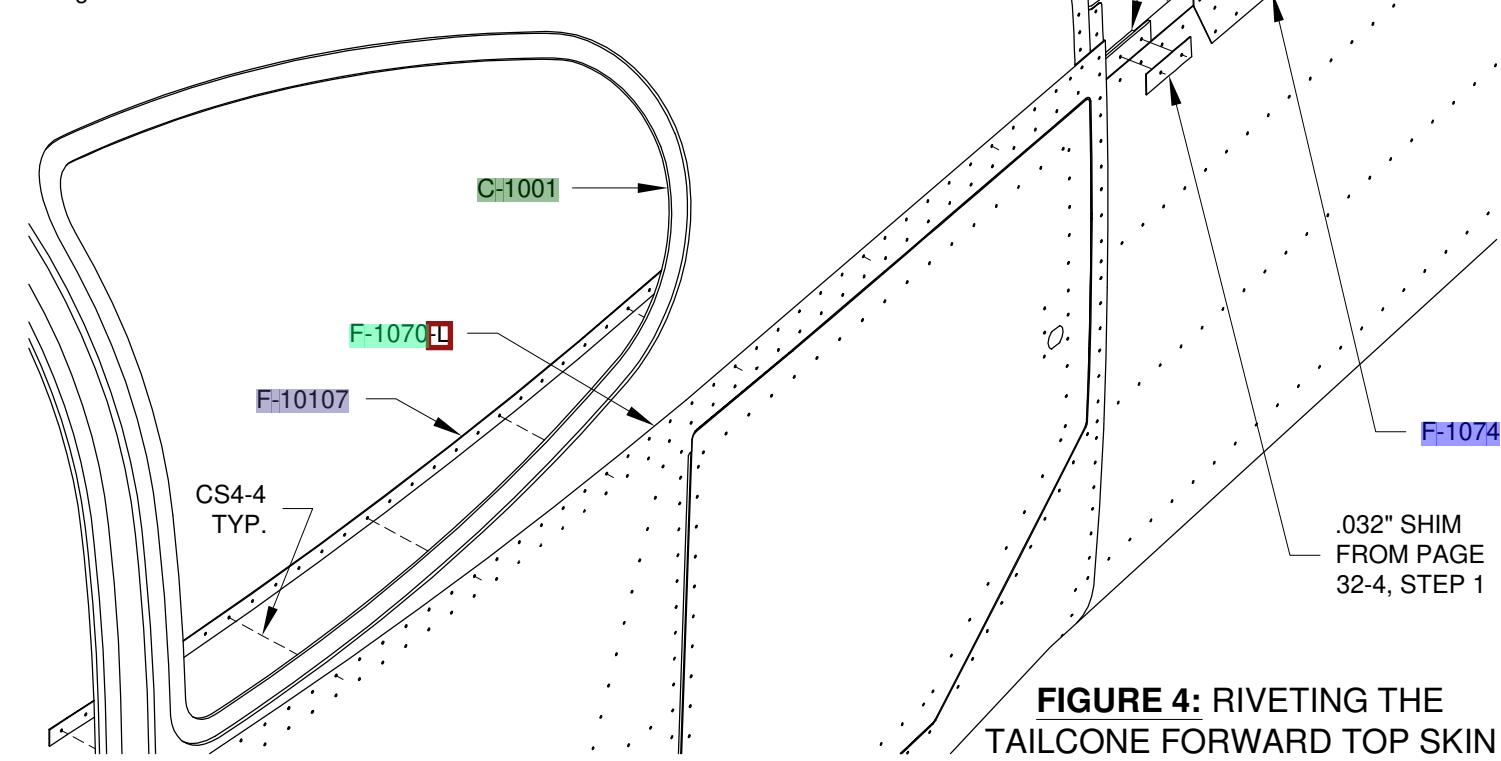
Step 6: Cleco the F-10107 Rivet Backup Strips and the sides of the C-1001 Cabin Cover to the F-1070 Mid Side Skins. See Figure 4.

Step 7: Temporarily remove the four bolts which splice together the two sets of F-1032 and F-1046 Longerons.

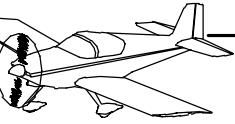
Step 8: Apply a small bead (no more than 1/16" in diameter) of tank sealant to the tailcone forward top skin flange. This will prevent water from seeping between the flange and the F-1074 Tailcone Forward Top Skin. Apply the bead (a plastic bag with a corner cut off can be used) just aft of the #30 holes in the flange.

Step 9: Cleco the F-1074 Tailcone Forward Top Skin to the tailcone and, with the remaining rivet backup strip (not shown), to the C-1001 Cabin Cover. Start clecoing from the center and work down both sides. When clecoing the skin to the F-1046 Mid Fuselage Longerons, slip in the 0.032" shim that was made on Page 32-4, Step 1.

Step 10: Rivet the F-1070 Mid Side Skins, the C-1001 Cabin Cover, and the F-10107 Rivet Backup Strips using the rivets called-out in Figure 4.



**FIGURE 4: RIVETING THE TAILCONE FORWARD TOP SKIN**

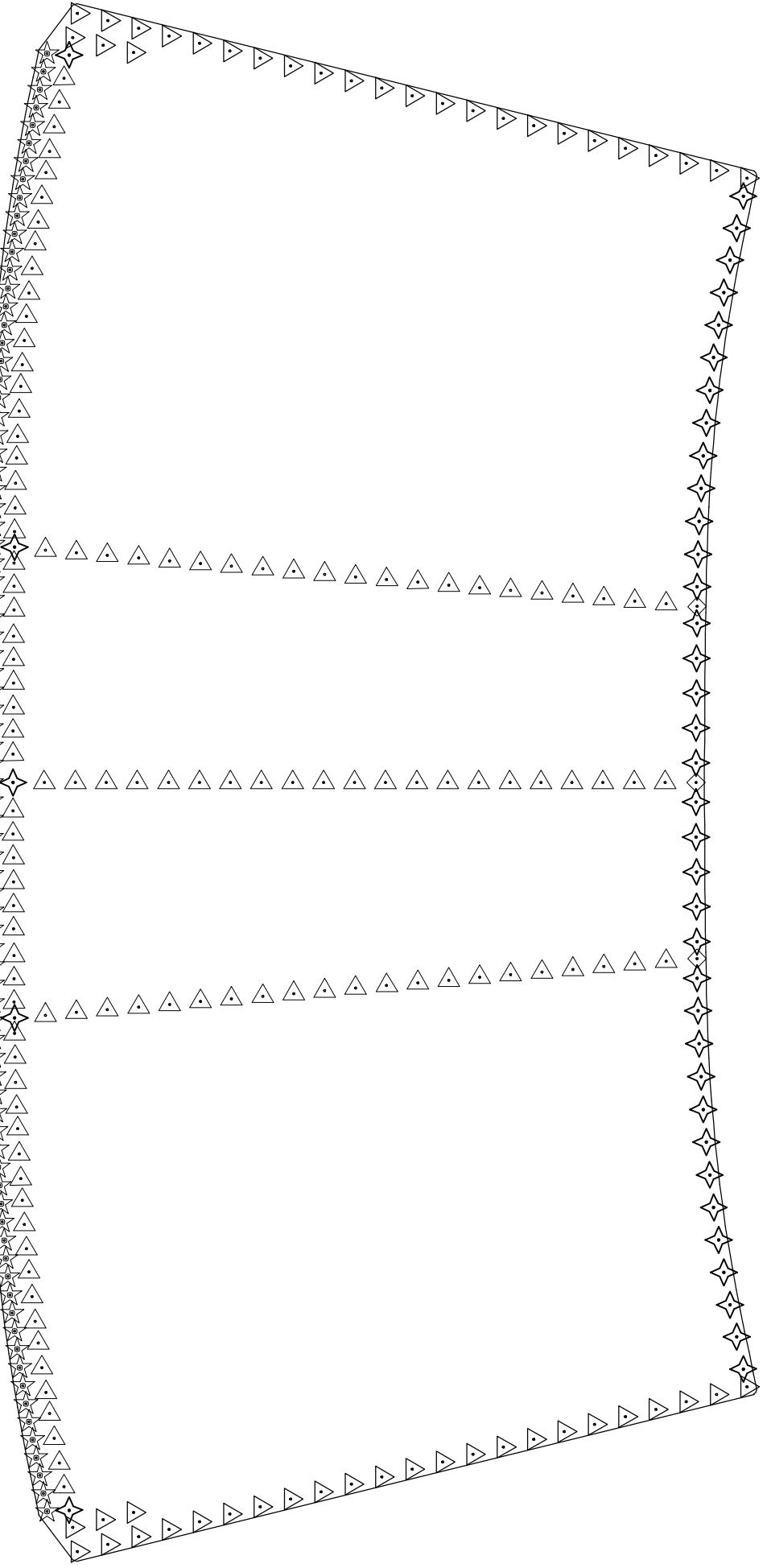


**Step 1:** Rivet the F-1074 Tailcone Forward Top Skin to the tailcone and to the C-1001 Cabin Cover using the rivets called-out in Figure 1. Don't forget to include the backup strip when riveting the skin to the cabin cover.

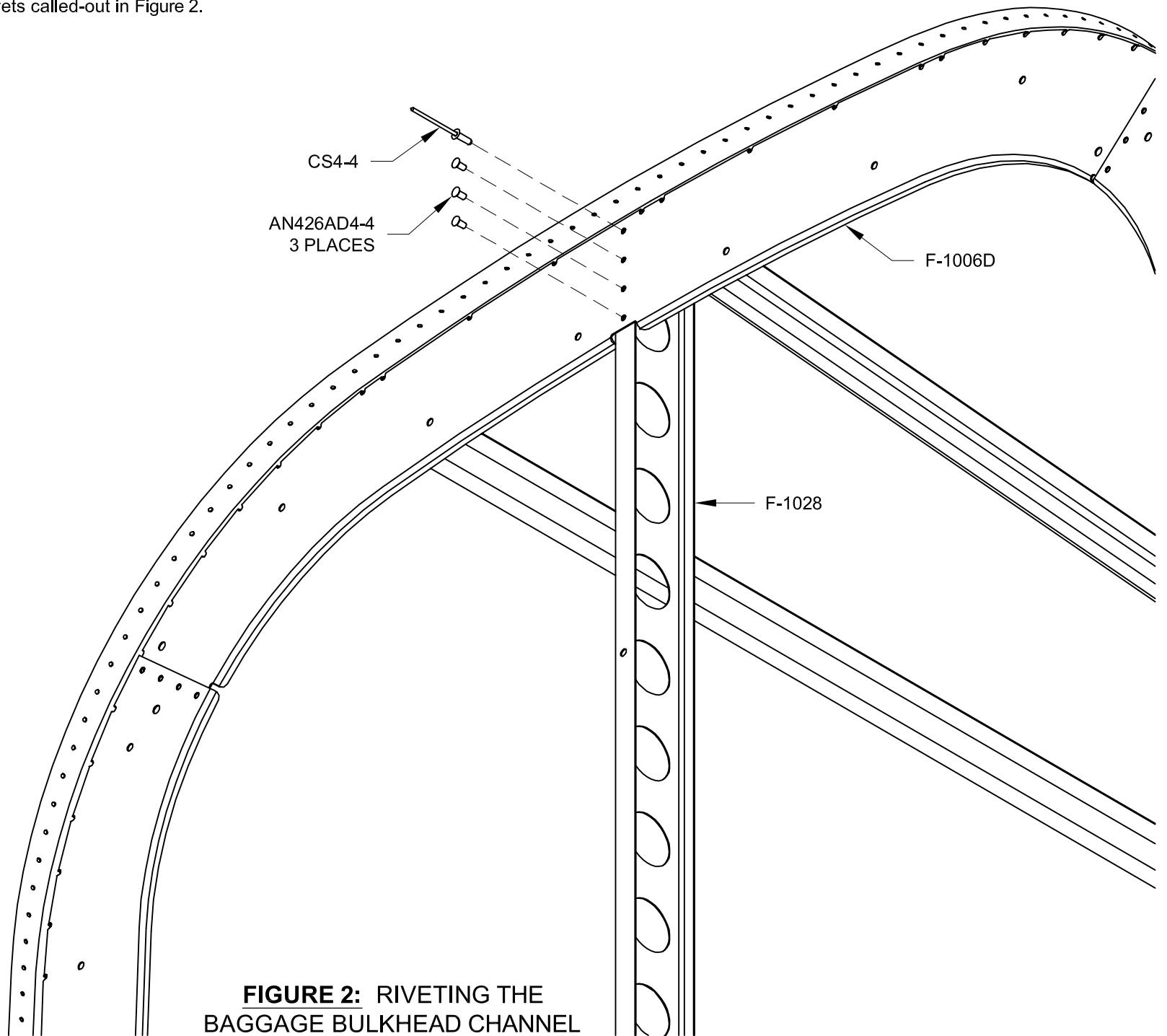
**Step 2:** Reinstall the four bolts, removed on Page 43-10, Step 7, that splice together the two sets of F-1032 and F-1046 Longerons.

- △ AN426AD3-3.5
- ◇ AN426AD3-4
- ◊ AN426AD3-4.5
- ▷ AN426AD3-6
- ☆ CS4-4

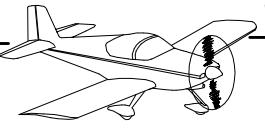
**FIGURE 1: TAILCONE FORWARD TOP SKIN RIVET CALL-OUT**



**Step 3:** Secure the top end of the F-1028 Baggage Bulkhead Channel to the F-1006D Bulkhead using the rivets called-out in Figure 2.



**FIGURE 2: RIVETING THE BAGGAGE BULKHEAD CHANNEL**



Step 1: Secure the C-1001 Cabin Cover to the fuselage using the hardware called-out in Figures 1 and 2. Thread the nuts on, but do not tighten them yet.

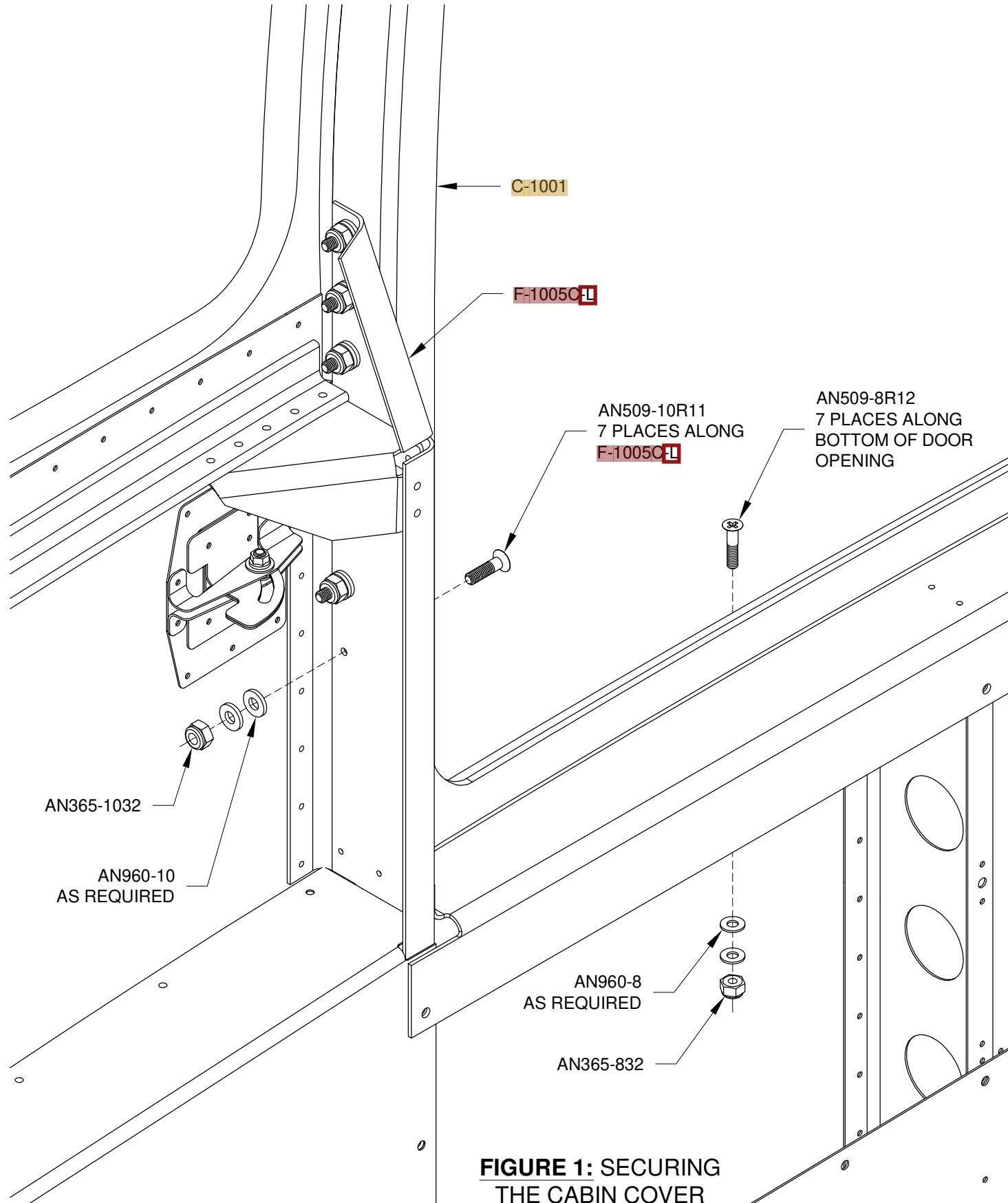
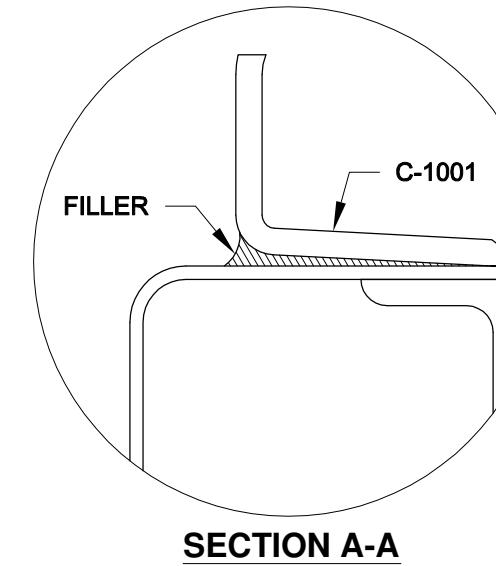


FIGURE 1: SECURING  
THE CABIN COVER

Step 2: Using a structural filler such as epoxy mixed with flocked cotton fiber or milled glass fiber (make it just thick enough that it doesn't move when the mixing cup is tipped), fill any gaps around the inside of the door opening (between the cabin cover and the underlying fuselage structure as shown in Section A-A). Once again, a heavy plastic bag with a corner cut off can be used to apply the filler. Be sure to entirely fill the gap between the top, bent portion of the F-01042-1 Bulkhead Side Channels and the cabin cover.

Step 3: Tighten all of the nuts on the screws which are securing the cabin cover to the fuselage. Using structural filler, make a smooth fillet around the door opening as shown in Section A-A, then wipe away any excess filler.



SECTION A-A

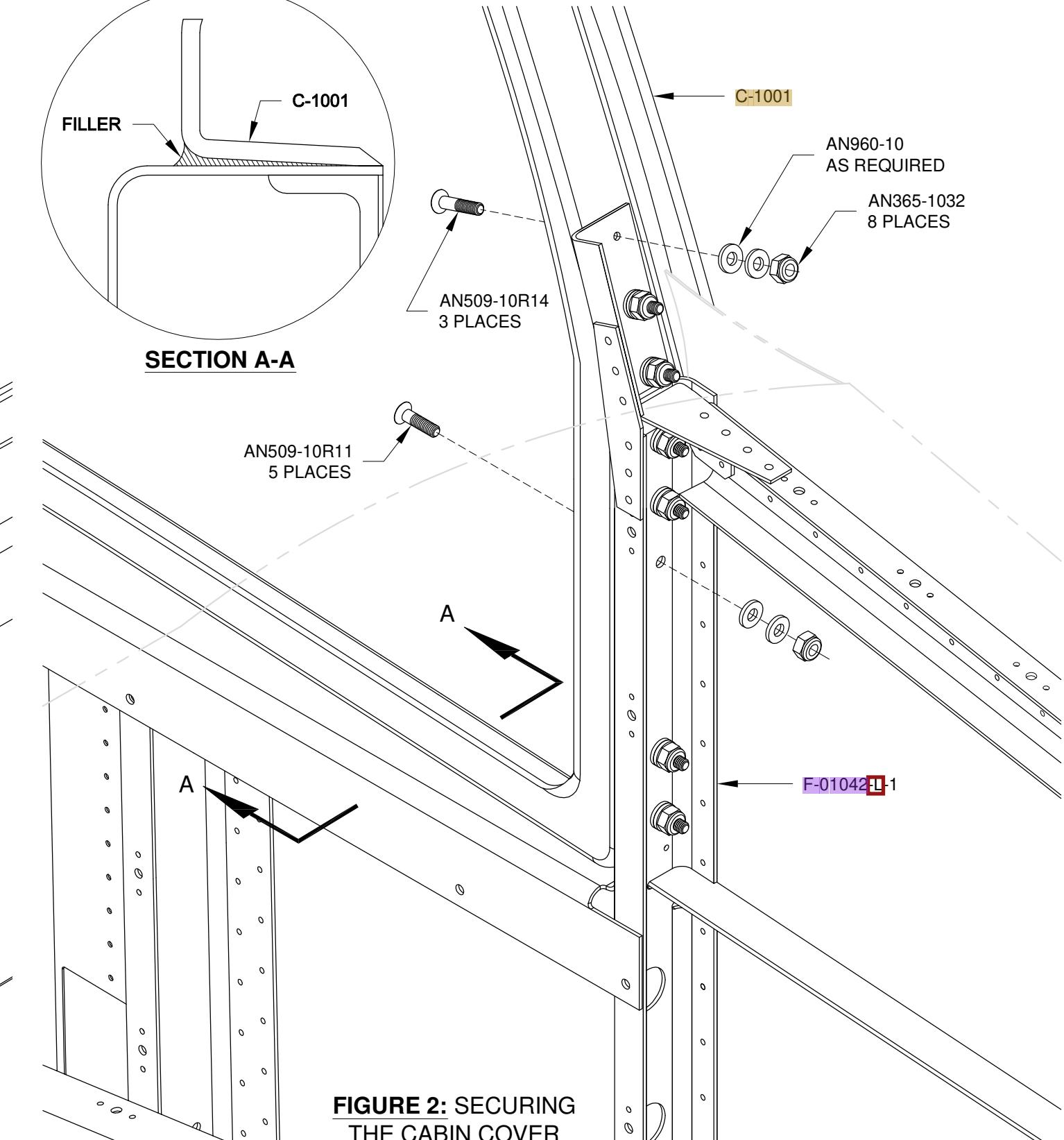
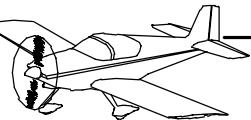
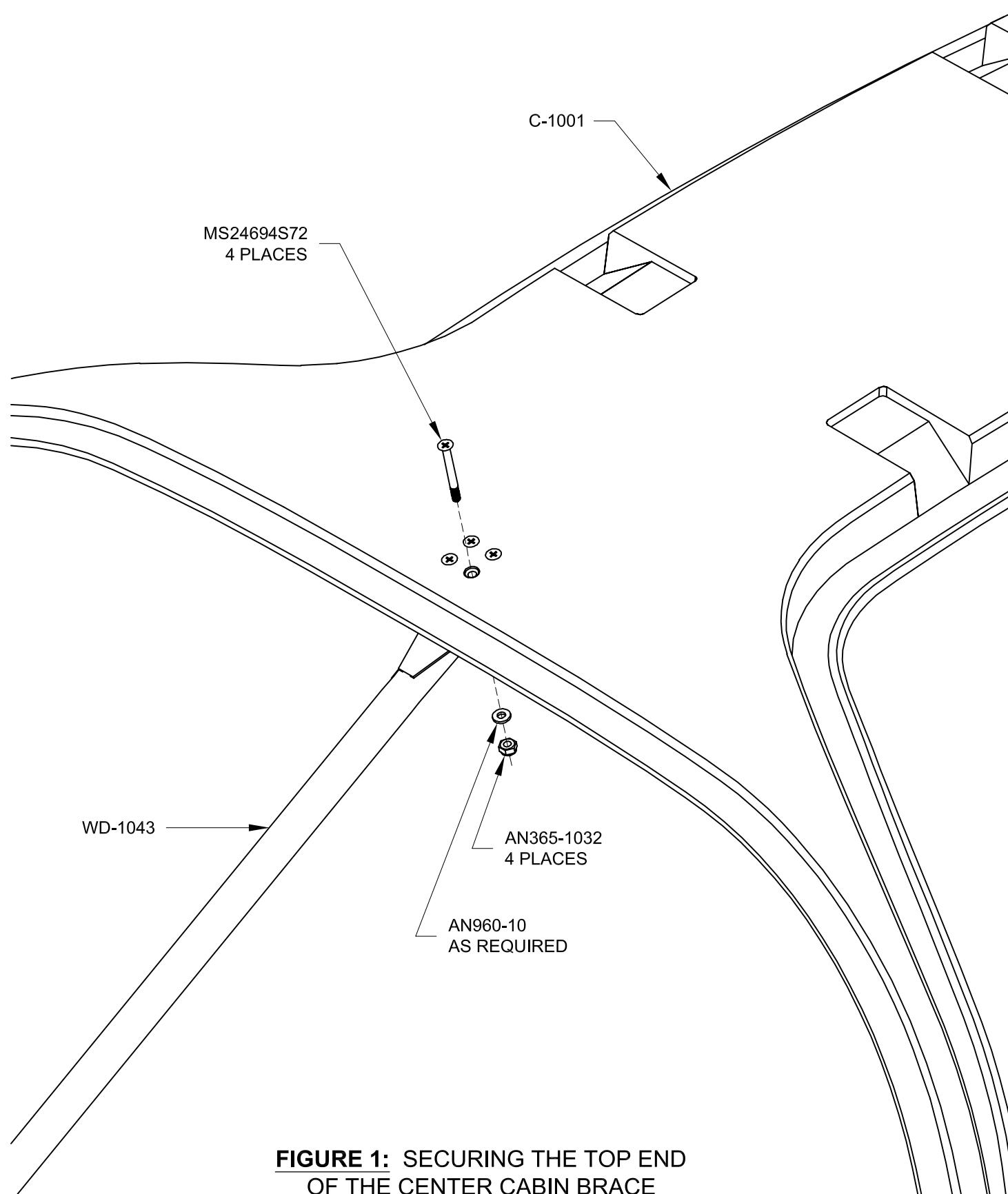


FIGURE 2: SECURING  
THE CABIN COVER



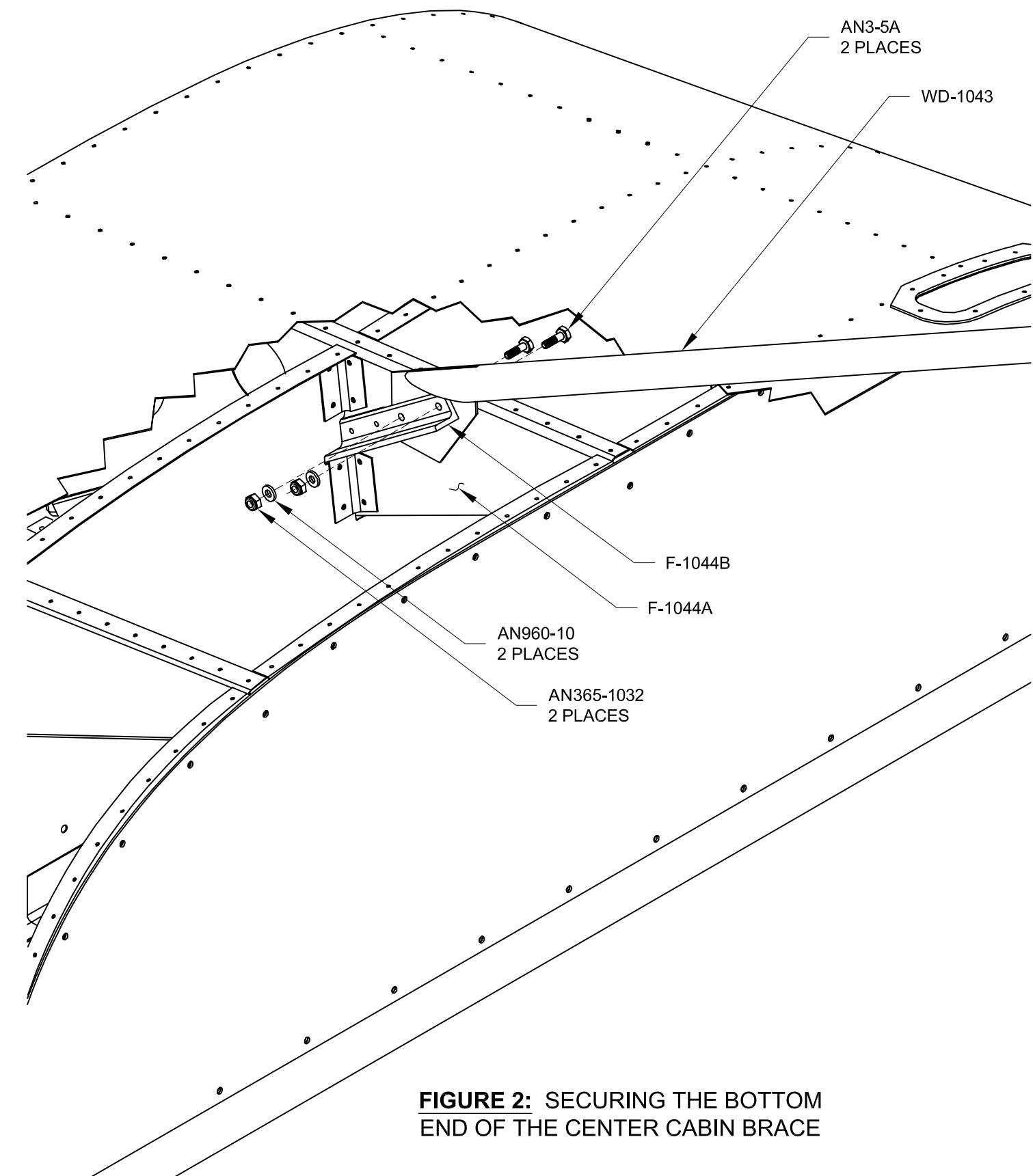
Step 1: Deburr the holes drilled in the WD-1043 Center Cabin Brace, then secure the top end of it to the C-1001 Cabin Cover using the hardware shown in Figure 1.



**FIGURE 1: SECURING THE TOP END  
OF THE CENTER CABIN BRACE**

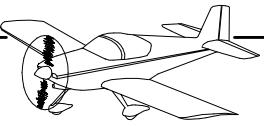
Step 2: Secure the bottom end of the WD-1043 Center Cabin Brace to the F-1044A Fwd Cabin Rib and the F-1044B Angle using the hardware shown in Figure 2.

**NOTE:** The C-1005 Windscreen and the C-1004 Rear Windows are permanently installed after the doors have been fitted in a later section.



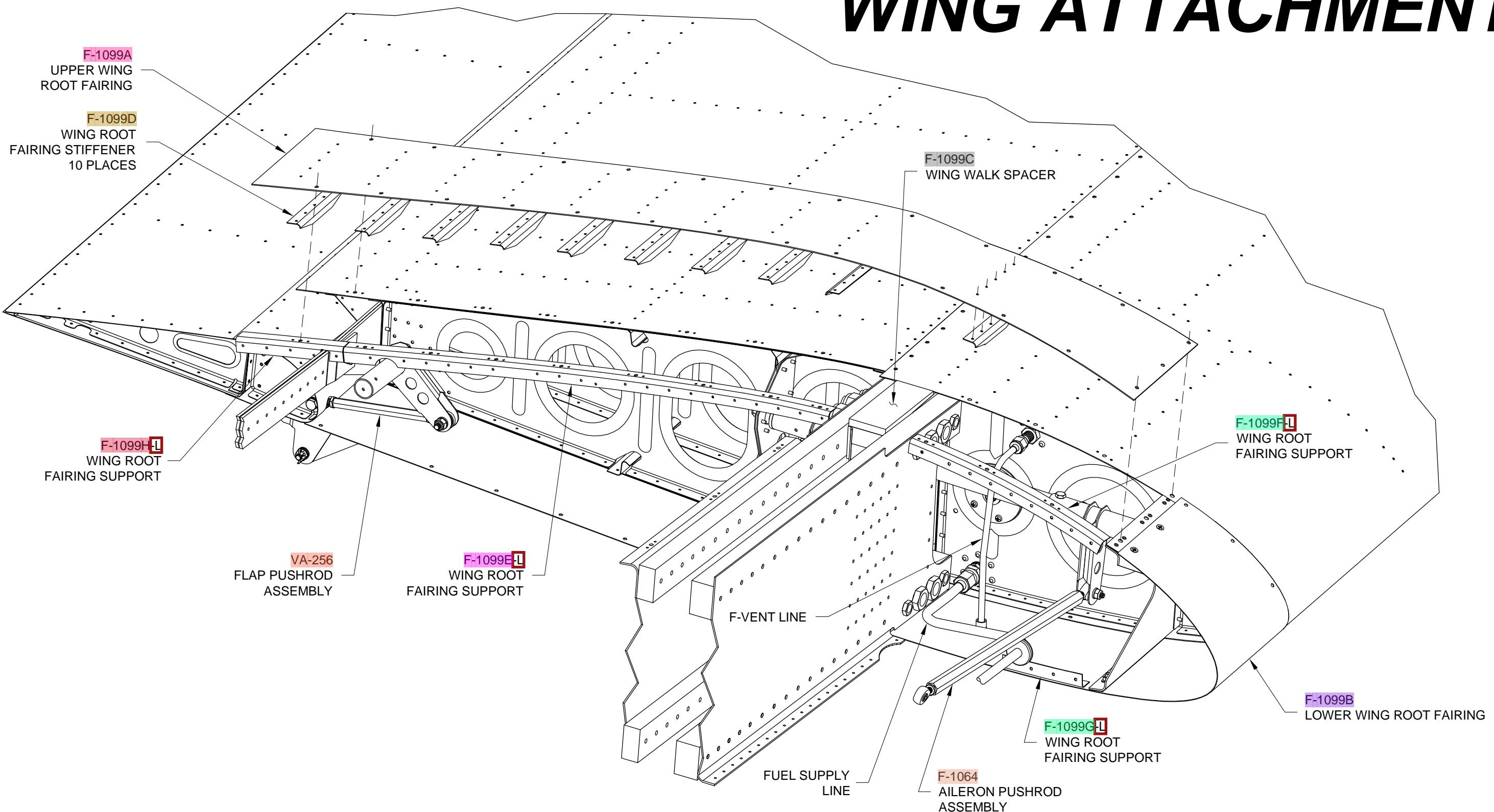
**FIGURE 2: SECURING THE BOTTOM  
END OF THE CENTER CABIN BRACE**

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# SECTION 44:

# WING ATTACHMENT

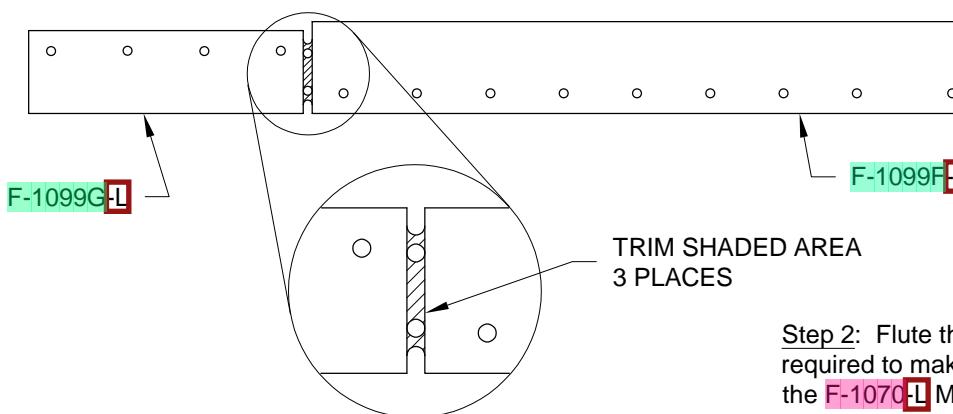




VAN'S AIRCRAFT, INC.

**NOTE:** This section describes the left wing installation. Repeat the steps on pages 2 through 11 for the right wing.

Step 1: Cut apart the F-1099EFG-L Wing Root Fairing Support to make the F-1099E-L, F-1099F-L, F-1099G-L, and F-1099H-L Wing Root Fairing Supports as shown in Figure 1. Parts are shown flat prior to bending.



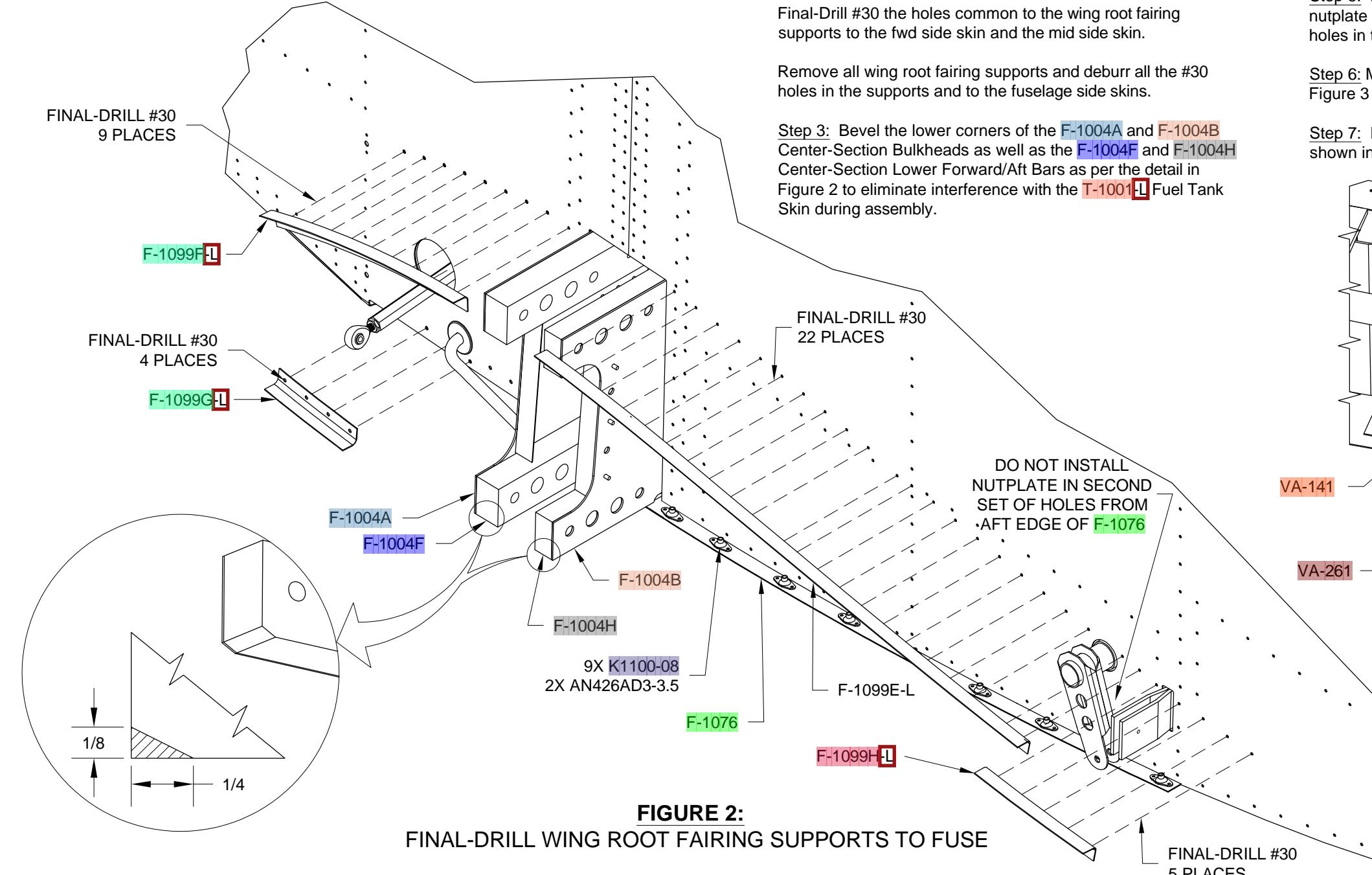
**FIGURE 1: SEPARATE WING ROOT FAIRING SUPPORTS**

Step 2: Flute the vertical flanges of the F-1099E/F/G and H-L Wing Root Fairing Supports if/as required to make them follow the pattern of pre punched holes in the F-1069-L Fwd Side Skin and the F-1070-L Mid Side Skin as shown in Figure 2. Cleco them to the fuselage as shown in Figure 2.

Final-Drill #30 the holes common to the wing root fairing supports to the fwd side skin and the mid side skin.

Remove all wing root fairing supports and deburr all the #30 holes in the supports and to the fuselage side skins.

Step 3: Bevel the lower corners of the F-1004A and F-1004B Center-Section Bulkheads as well as the F-1004F and F-1004H Center-Section Lower Forward/Aft Bars as per the detail in Figure 2 to eliminate interference with the T-1001-L Fuel Tank Skin during assembly.



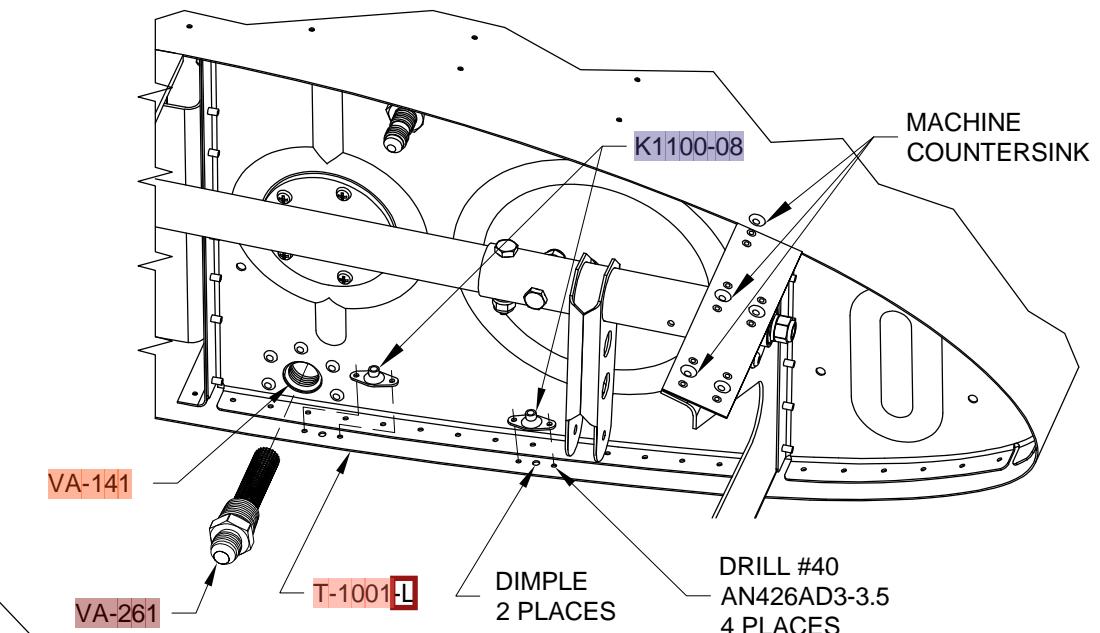
**FIGURE 2:  
FINAL-DRILL WING ROOT FAIRING SUPPORTS TO FUSE**

Step 4: Install nine K1100-08 nutplates to the F-1076 Center Bottom Skin as shown in Figure 2. Final-Drill #40, deburr and dimple the nutplate rivet holes and the nutplates. Final-Drill #19, deburr and dimple the 3/32 center screw holes to receive the F-1099B Lower Wing Root Fairing dimpled for an AN509-8R8 screw. Rivet the nutplates to the fuselage bottom skin as per the callouts.

Step 5: Final-Drill #40 and machine countersink the T-1001-L Fuel Tank Skin for the nutplate rivets as shown in Figure 3. Final-Drill #19, deburr and dimple the two #8 screw holes in the tank skin. Rivet the nutplates depicted to the tank skin as per the callouts.

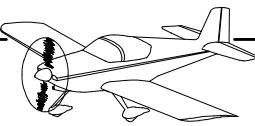
Step 6: Machine countersink the top three #19 holes on the tank attach flange shown in Figure 3 as well as the two #19 holes on the bottom of the tank attach flange not shown.

Step 7: Install the VA-261 Fuel Strainer into the VA-141 Fuel Flange and tighten as shown in Figure 3.



**FIGURE 3: ATTACHING TANK SKIN NUTPLATES**

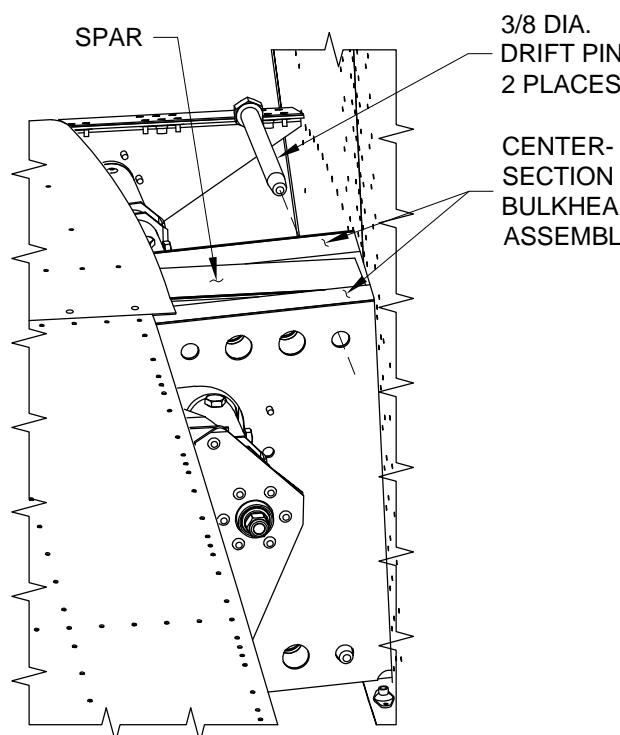
Step 8: Fit the F-1099B Lower Wing Root Fairing to the wing bending it by hand a little at a time to conform it to the shape of the tank leading edge. This will be easier to do while the wings are off the aircraft.



Step 1: Slide the wing spar (left shown) into the fuselage and temporarily pin as shown in Figure 1.

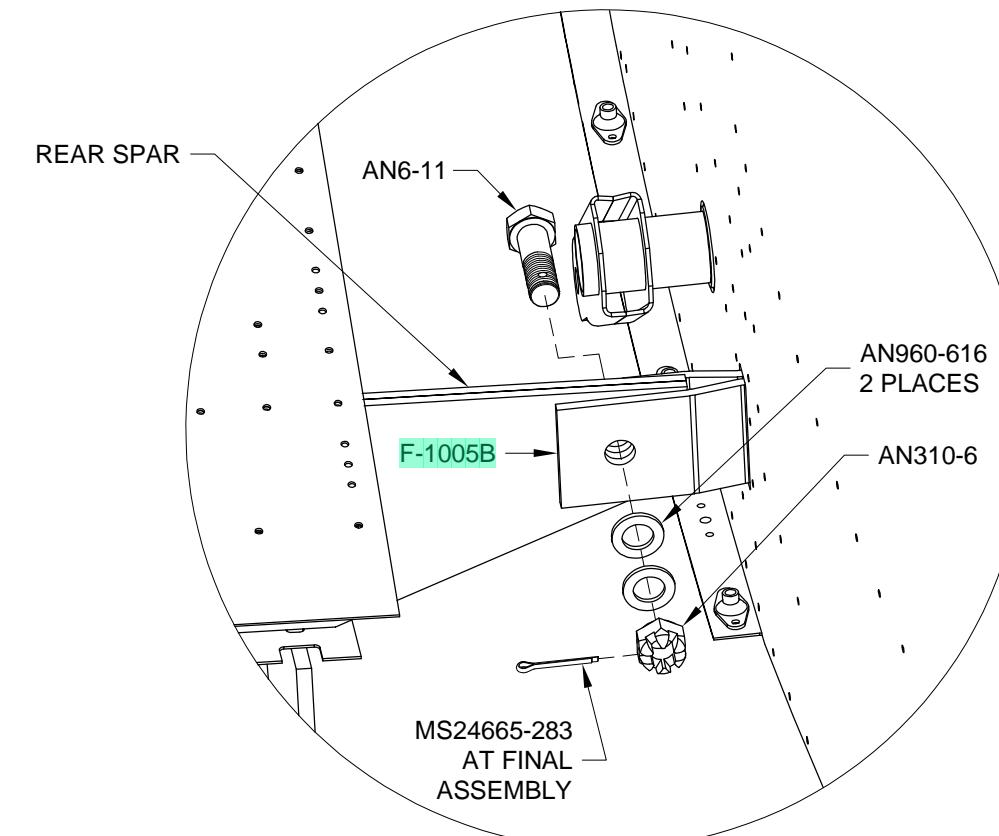
When bringing the spar into its exact position, lining up the bolt holes in the bulkhead and spar, it is often helpful to use drift pins. This could be a disposable hardware store bolt with the end rounded or tapered on a grinder. GENTLY driving this lubricated pin into a nearly aligned hole will center the bulkhead/spar hole so that the bolts can be installed without excessive force.

It is recommended that 3/8 dia. hardware store bolts be used for test fitting to prevent damage to the holes and NAS bolts. For fitting, it is only necessary to install four 3/8 bolts(pins), one top and one bottom per wing.



**FIGURE 1: ATTACH WING**

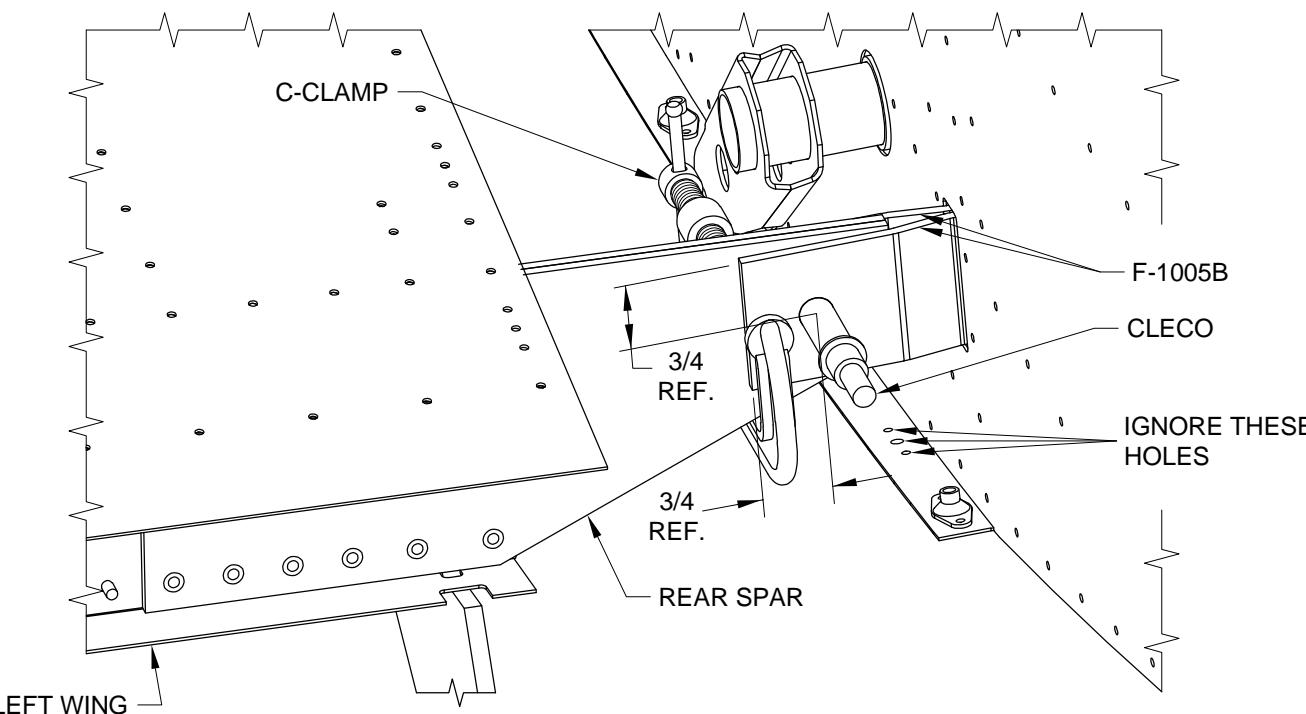
Step 3: Remove the clamp. Bolt the rear spar to the F-1005B Rear Spar Attach Bars using the hardware shown in Figure 3.



**FIGURE 3: BOLT REAR SPAR ATTACH**

Step 2: Cleco together the rear spar and F-1005B Rear Spar Attach Bars as shown in Figure 2. Clamp them in place. Remove the cleco and carefully pilot-drill to 3/16, 1/4, 5/16 and finally 3/8.

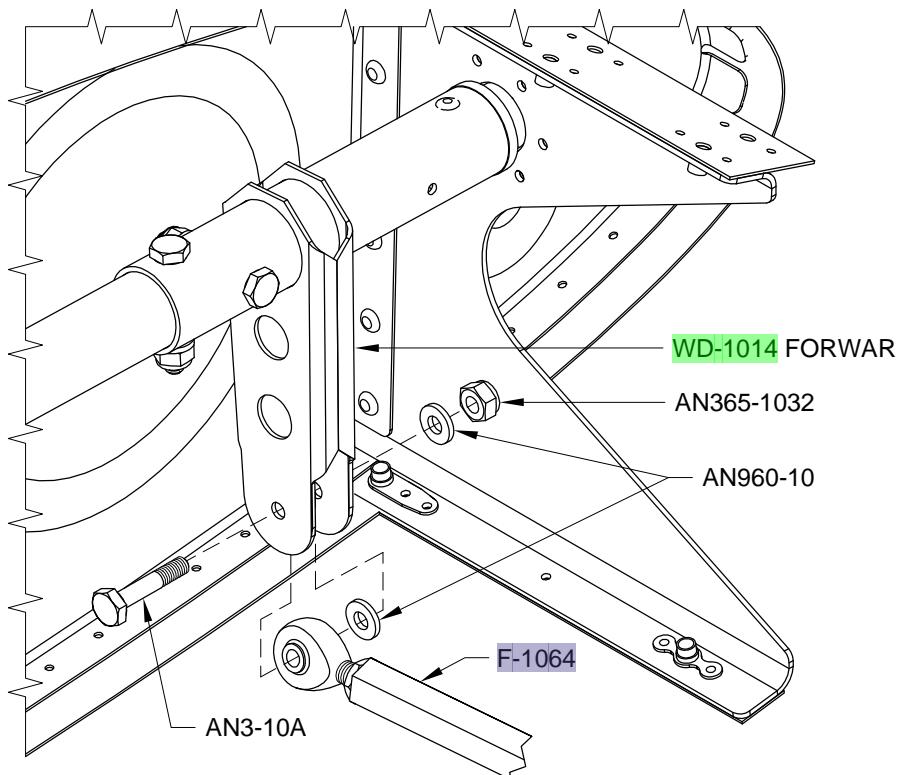
**WARNING:** Use great care when drilling to avoid a hole that is oversize or out of round.



**FIGURE 2: MATCH-DRILL REAR SPAR AND REAR SPAR ATTACH BARS**

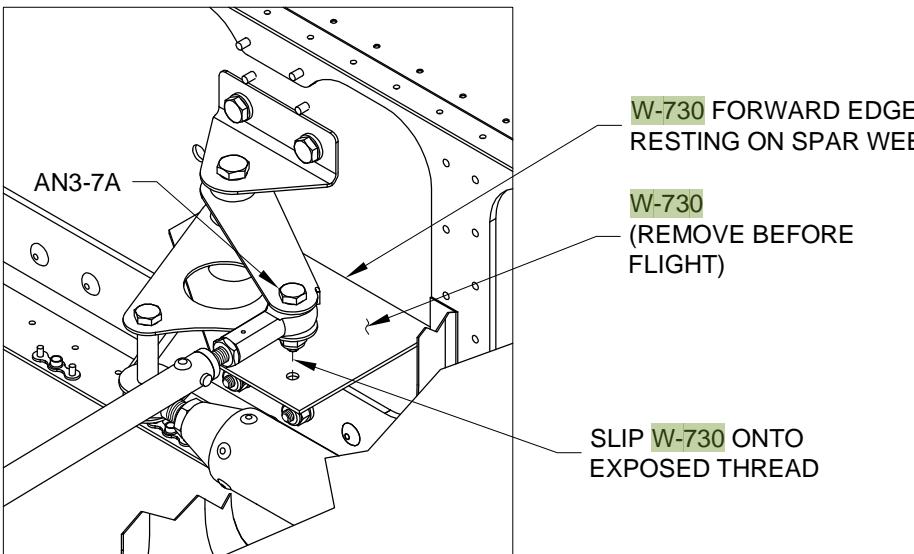


Step 1: Bolt the F-1064 Aileron Pushrod Assembly to the WD-1014 Torque Tube Assembly as shown in Figure 1. There are two washers called-out; one washer is installed inside the torque tube clevis arm along with the pushrod rod end bearing and the other washer is installed under the nut.



**FIGURE 1: ATTACH AILERON PUSHROD**

Step 2: Rig the ailerons. Use the W-730 Bellcrank Jig to set the aileron actuation system (left wing shown) to its neutral position as shown in Figure 2. **NOTE: It may not be necessary to remove the bellcrank to aileron pushrod bolt. There should be enough thread protruding from the nut to allow the use of the bellcrank jig.**



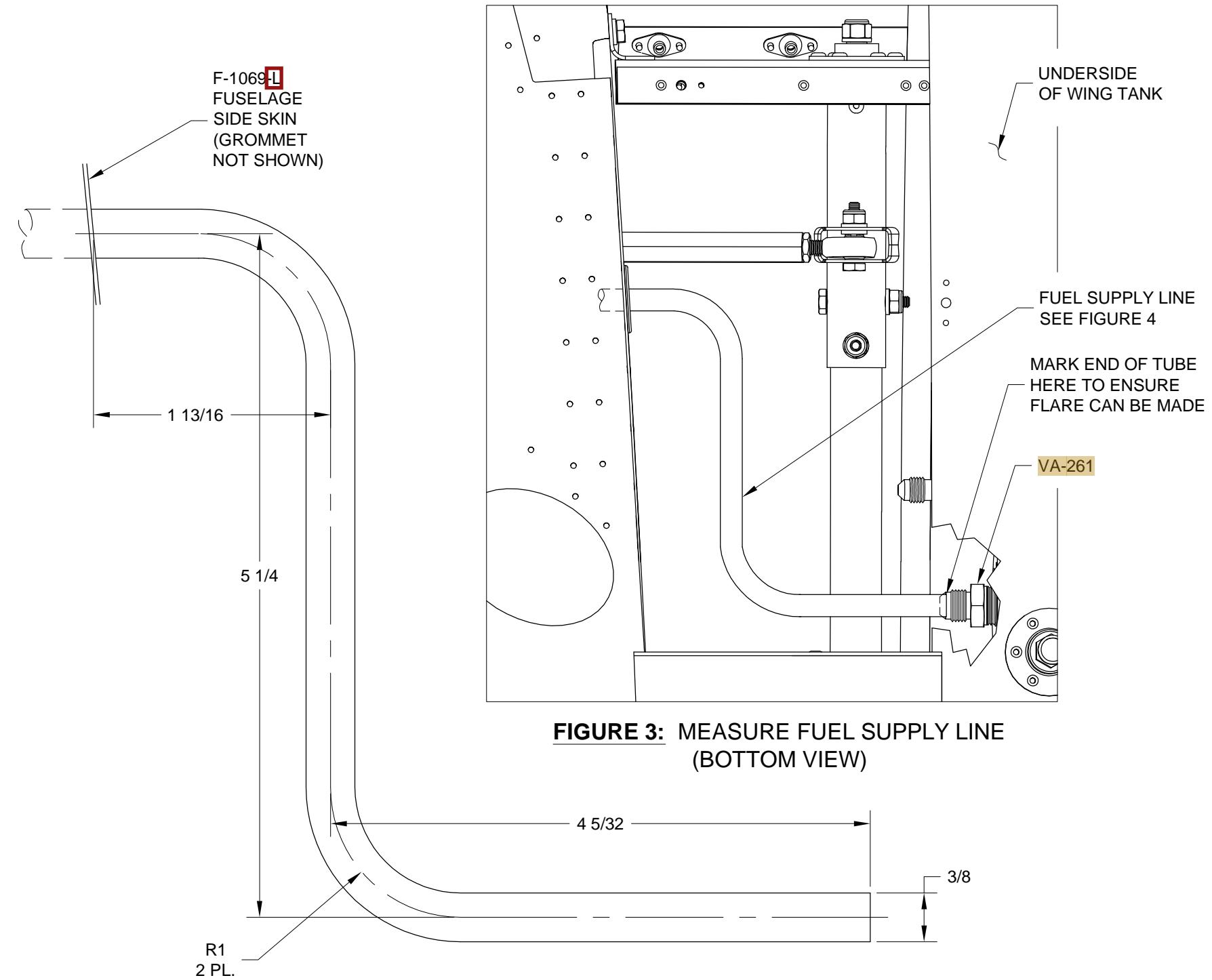
**FIGURE 2: INSTALL BELLCRANK JIG**

Step 3: Insert a WD-1012 Control Stick into the WD-1011-L Left Control Stick Base. Adjust the length of the F-1064 Aileron Pushrod Assembly to obtain a neutral (vertical) control stick position. Tighten the jam nuts when adjustment is complete.

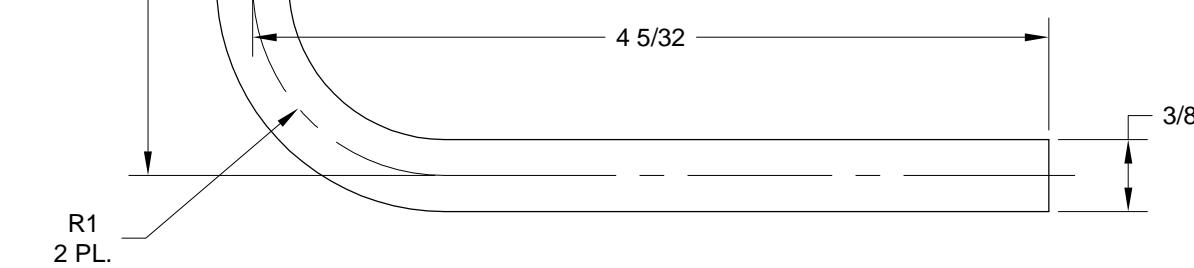
Step 4: Install the W-730 Bellcrank Jig in the right wing while leaving the first bellcrank jig in the left wing. Install the right side F-1064 Aileron Pushrod Assembly by adjusting its length as required to fit between the WD-1011-R Right Control Stick Base and the WD-1014 Torque Tube Assembly. Since the neutral control stick position was already determined for the left control stick the right side control stick should already be vertical.

Sweep the control sticks through their full range of motion and check for interference.

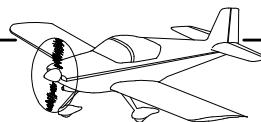
Step 5: Position the fuel supply line near to the VA-261 Fuel Strainer fitting as shown in Figure 3. Mark the tube for cutting. Leave enough material so that it will not be pre loaded when attached and remember to account for the flare.



**FIGURE 3: MEASURE FUEL SUPPLY LINE (BOTTOM VIEW)**

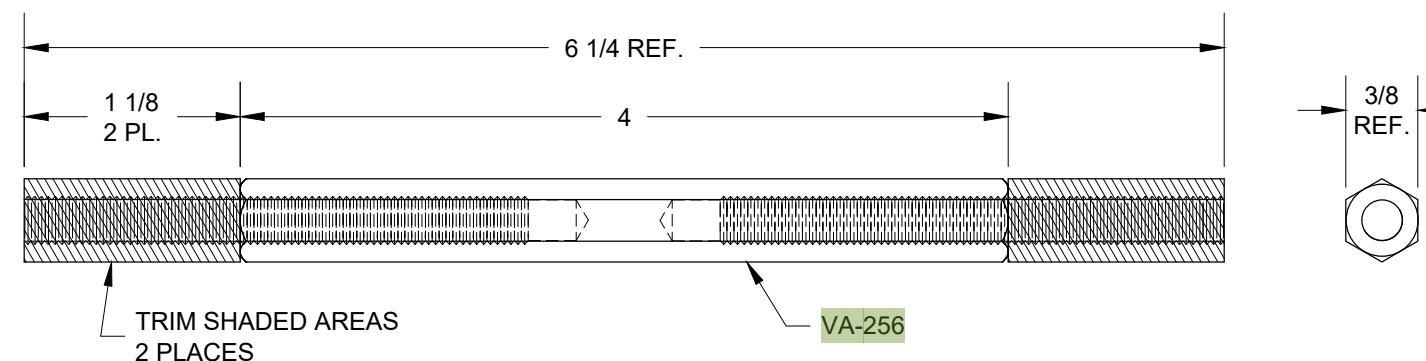


**FIGURE 4: FUEL SUPPLY LINE TEMPLATE**



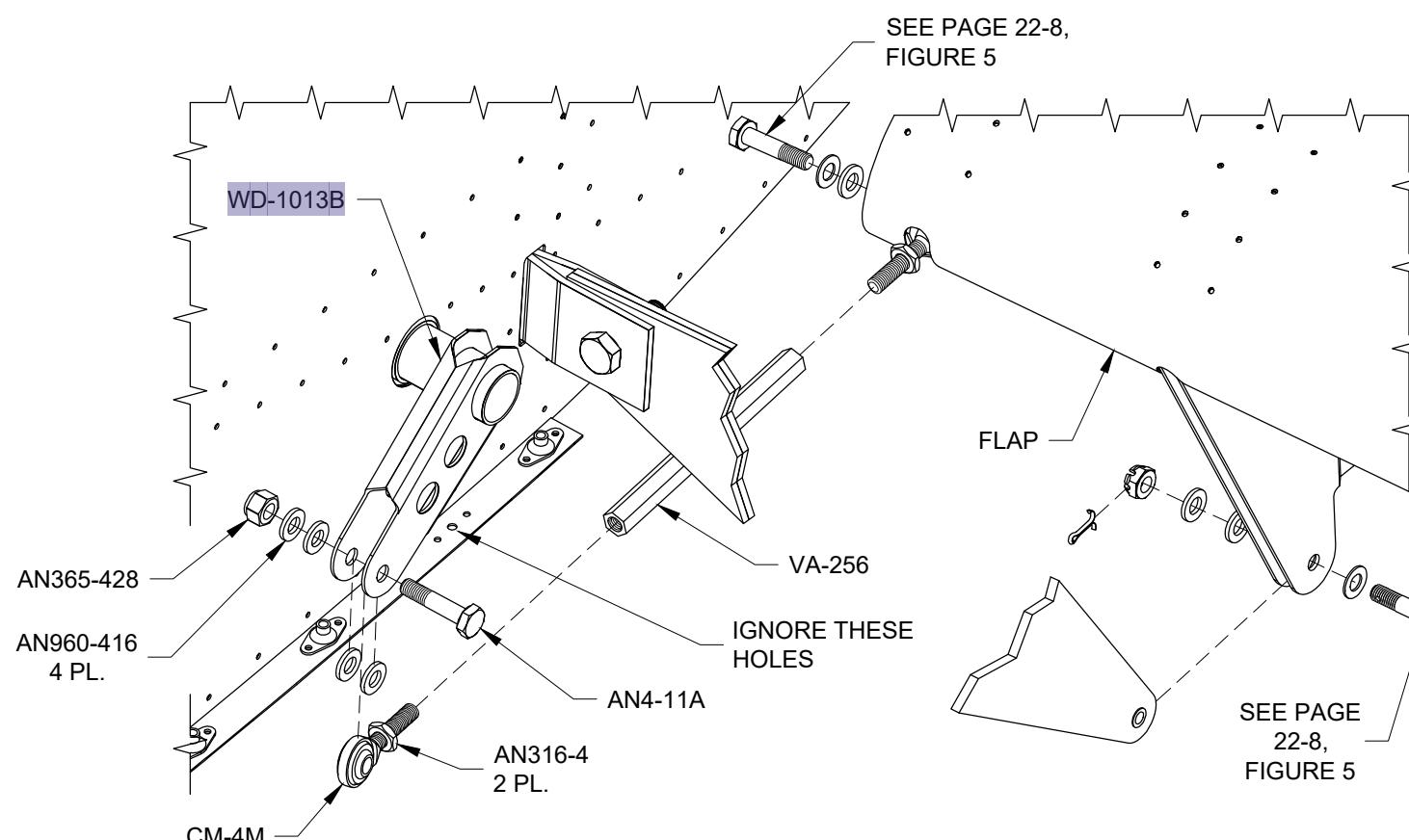
Step 1: Mark an entry point of your choice on the F-1070-L Mid Fuselage Side Skin for the pitot line. See Figure 2. This hole will be drilled after wing removal but prior to final assembly. Generic system routing holes have been provided in the fuselage bulkheads so that a line may be routed to the instrument panel. Due to the various possibilities and configurations the actual routing is left to the builder.

Step 2: Trim each end of the VA-256 Flap Pushrod per Figure 1 dimensions. Deburr and if necessary clean up the threads with a 1/4-28 UNF tap.



**FIGURE 1: CUT FLAP PUSHROD TO LENGTH**

Step 3: With the flaps not yet installed on the wing, fully extend (flaps up position) the flap motor shaft. If not already in place install the CM-4M rod end bearing into the flap as shown in Figure 2 and as per Page 22-8, Figure 5.



**FIGURE 2: EXPLODED VIEW**

Step 3 (continued): Install a jam nut onto the rod end bearing mounted in the flap as shown in Figure 3.

Install the VA-256 Flap Pushrod onto the rod end bearing mounted in the flap as shown in Figures 2 and 3.

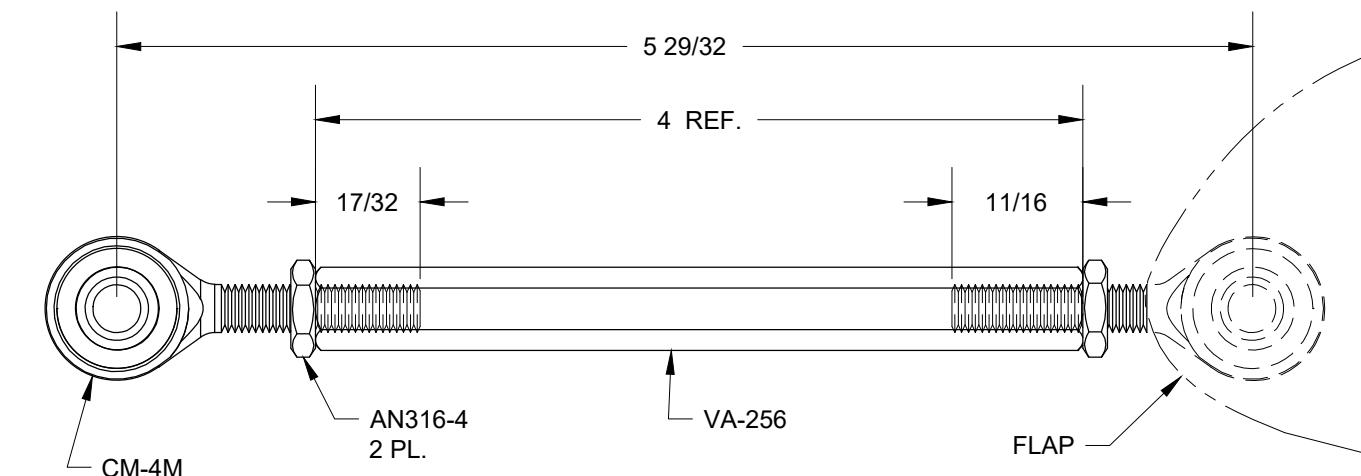
Install a jam nut onto the rod end bearing that will eventually mount in the WD-1013B Flap Horn then install them into the other end of the flap pushrod as shown in Figure 3.

Step 4: Install the flap onto the wing as per Figure 2. Trim the inboard edges of the flap skins if/as req'd to allow the flap to rotate into position and to create a 1/16 minimum gap between flap and fuselage.

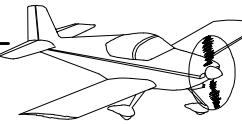
Rotate the flap upward until its inboard leading edge makes solid contact with the W-1007C Rear Spar Doubler Plate (not shown) and temporarily support the flap in this position.

Rotate the Flap Pushrod Assembly up into the WD-1013B Flap Horn clevis and check for fit. Adjust if/as req'd the length of the flap pushrod assembly until it can be bolted to the flap horn using the hardware shown in Figure 2. Don't forget the two washers that straddle the rod end bearing inside the flap horn clevis. To optimize flap pushrod/WD-1013B clearance it may be necessary to place both washers to one side of the rod end bearing. Operate the flap and check for interference. Tighten the jam nuts.

**WARNING:** After final adjustment each rod end bearing must have at least HALF of its threads engaged in the VA-256 Flap Pushrod so that it will be impossible for the flap pushrod to back off the rod ends.



**FIGURE 3: THEORETICAL FLAP PUSHROD ASSEMBLY LENGTH**



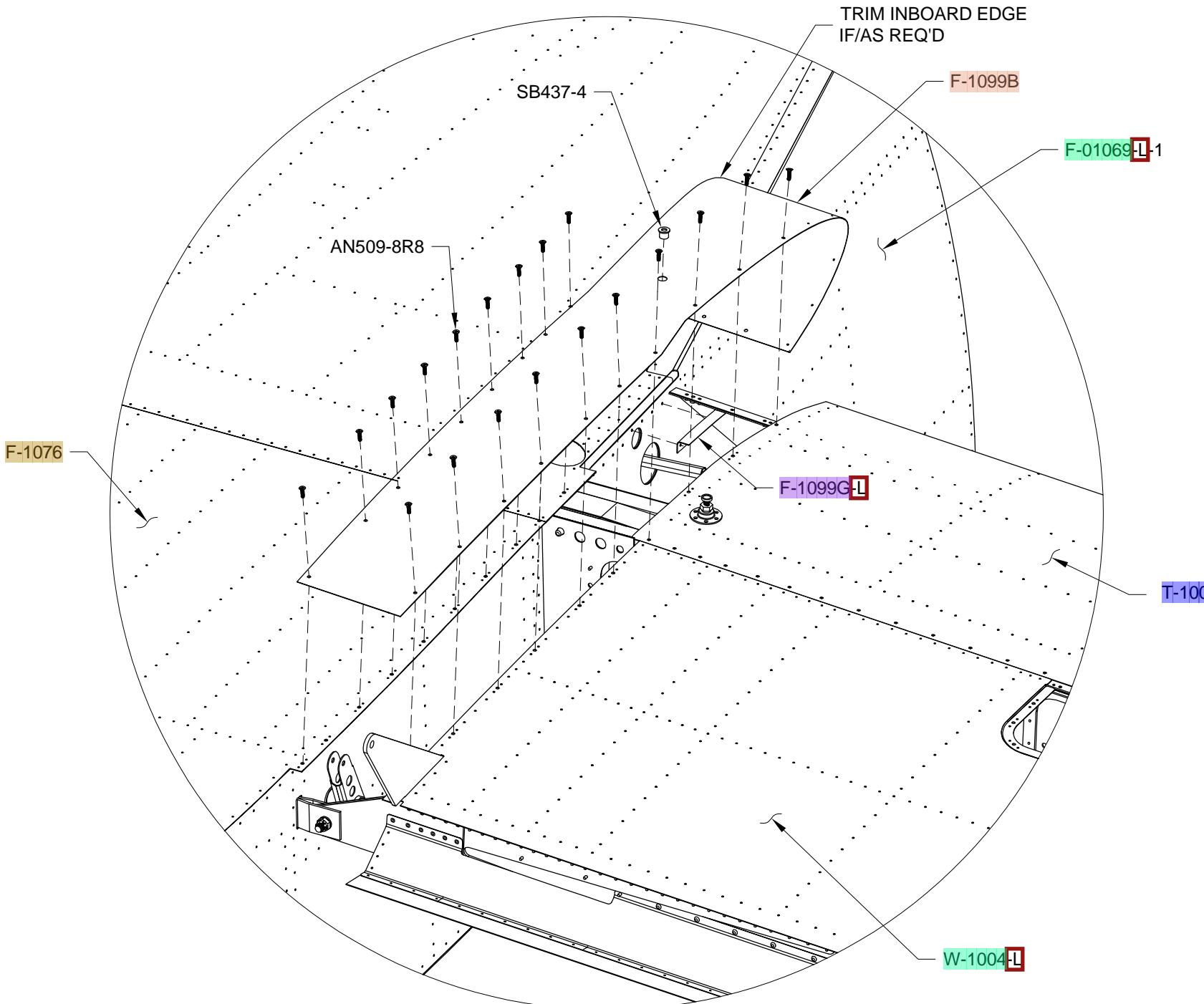
Step 1: Cleco the F-1099G-L Wing Root Fairing Support to the F-01069-L-1 Fwd Side Skin as shown in Figure 1.

Step 2: Final-Drill #19 then deburr and dimple all 5/32 diameter holes in F-1099B Lower Wing Root Fairing. These holes are depicted in Figure 1 wherever screws are shown.

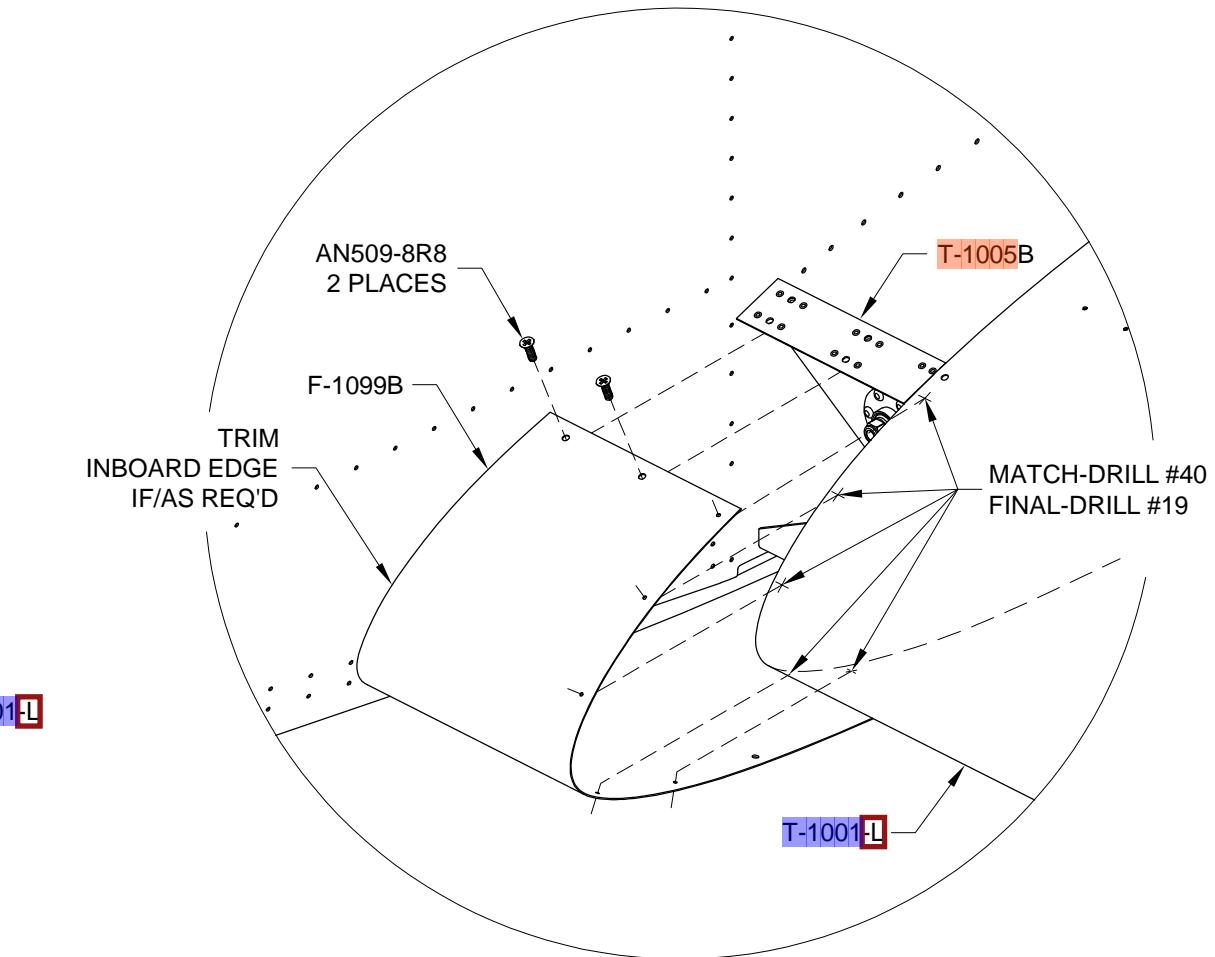
Install a snap bushing into the lower wing root fairing as shown in Figure 1.

Step 3: Attach the F-1099B Lower Wing Root Fairing to the T-1005B Shim, T-1001-L Fuel Tank Skin, F-1076 Center Bottom Skin, and to the W-1004-L Bottom Inbd. Wing Skin with the hardware shown in Figures 1 and 2.

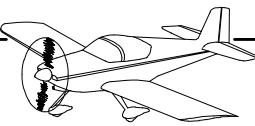
Match-Drill #40 and cleco the tank skin at the five locations shown in Figure 2 using the 3/32 holes in the lower wing root fairing as guides. Final-Drill #19 the same holes.



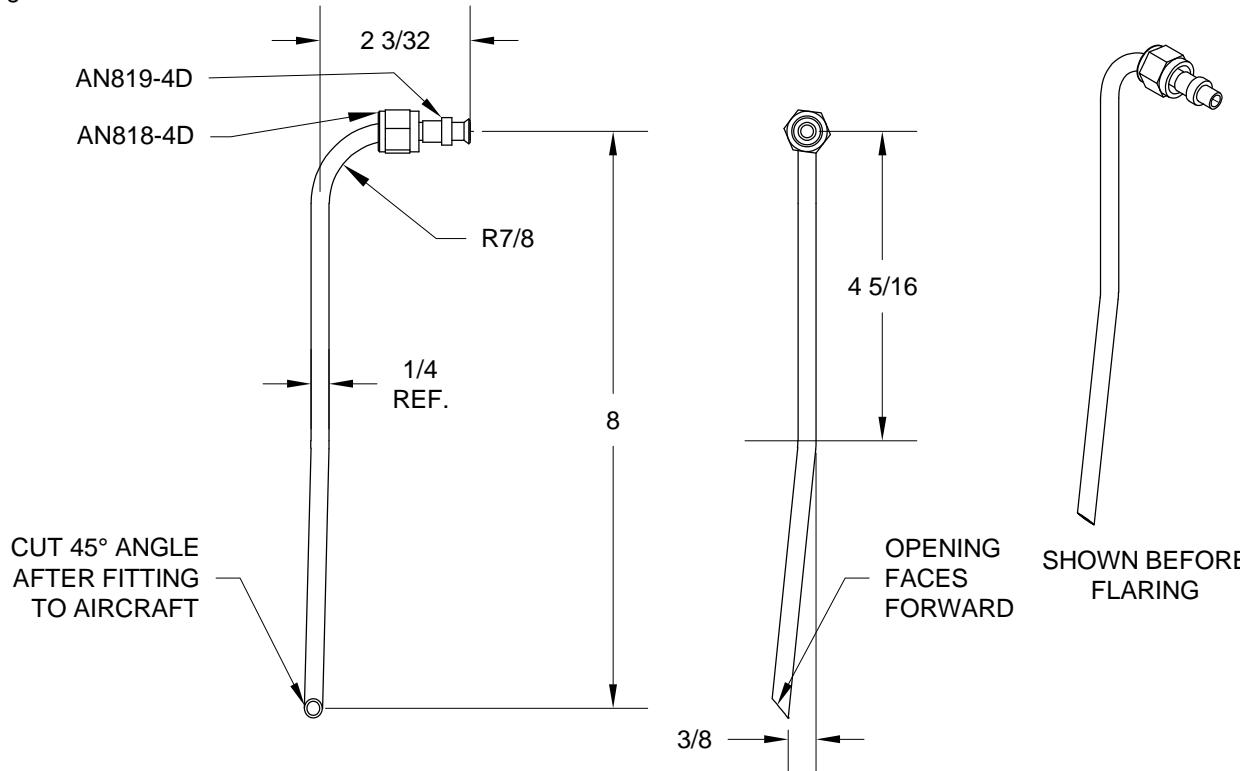
**FIGURE 1:**  
ATTACHING THE LOWER WING ROOT FAIRING  
(SOME PARTS OMITTED FOR CLARITY)  
(AIRCRAFT VIEWED AS IF INVERTED)



**FIGURE 2:**  
MATCH-DRILL FUEL TANK SKIN

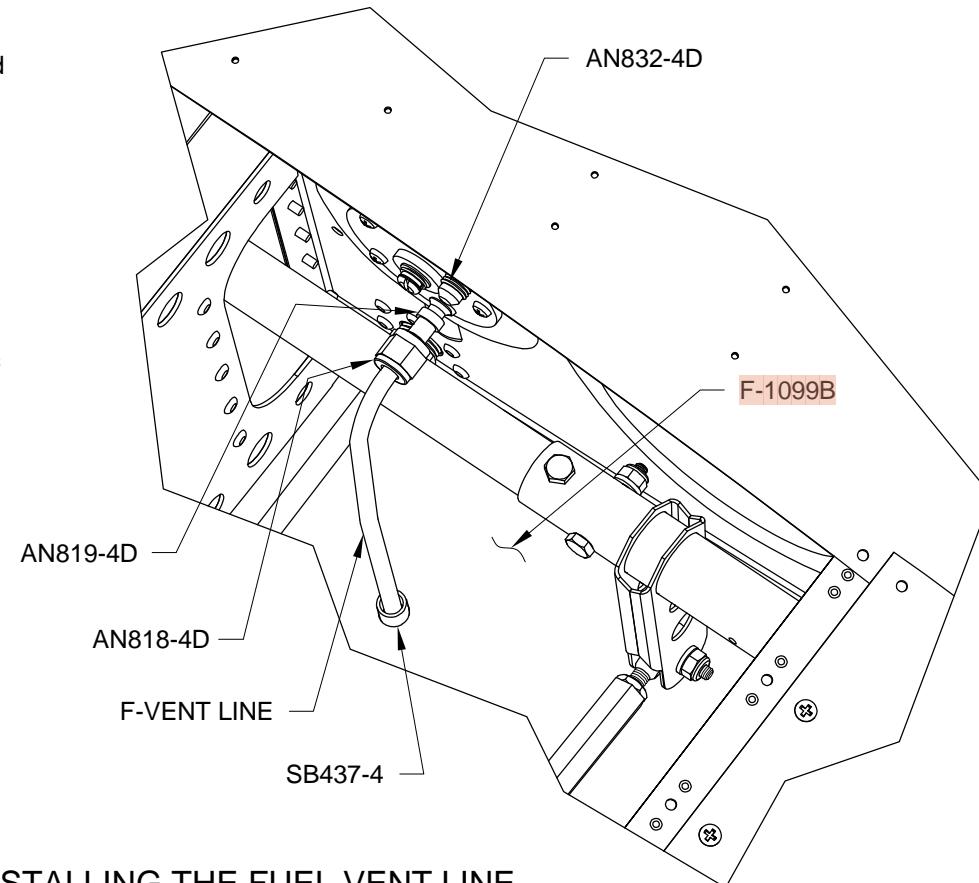


**Step 1:** Make from material AT0-032x1/4 soft aluminum tubing the left F-Vent Line Fuselage Vent Line as shown in Figure 1. After bending to the radius shown slide the coupling sleeve onto the short leg before flaring as it cannot be slid around the radius afterward. Flare the end of the tube as shown in Figure 1.



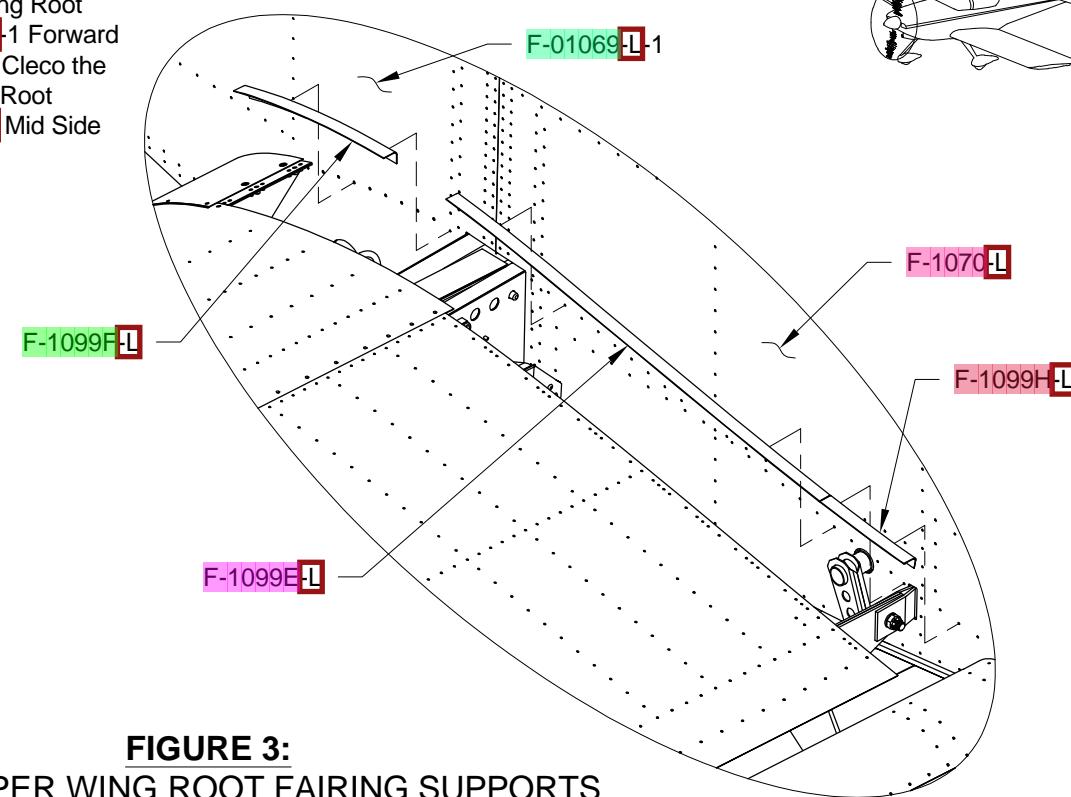
**FIGURE 1: FABRICATING THE FUEL VENT LINE**

**Step 2:** Install the F-Vent Line Fuselage Vent Line. Slip the non flared end into the snap bushing and mate the flared end to the union bulkhead, tube/tube fitting at the tank root rib as shown in Figure 2. Slide the coupling sleeve up to the flared end then tighten the coupling nut finger tight. Since the wing will be removed later do not fully tighten the nut for now. Check for fit. Adjust the tubing if req'd to minimize preload. About one inch of tubing should protrude from the F-1099B Lower Wing Root Fairing. Mark the exit end of the tube so that it may be cut to length after disassembly.



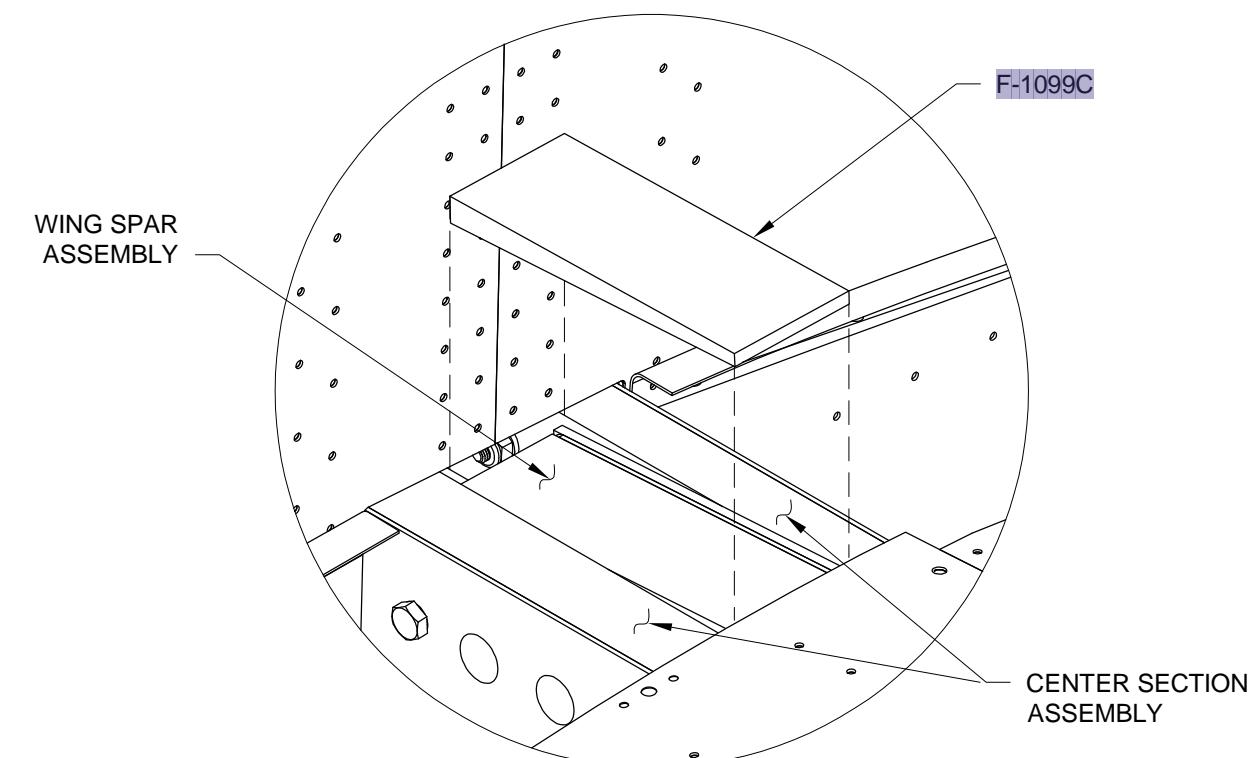
**FIGURE 2: INSTALLING THE FUEL VENT LINE**

**Step 3:** Cleco the F-1099F-L Wing Root Fairing Support to the F-01069-L-1 Forward Side Skin as shown in Figure 3. Cleco the F-1099E-L and F-1099H-L Wing Root Fairing Supports to the F-1070-L Mid Side Skin as shown in Figure 3.



**FIGURE 3:  
CLECO UPPER WING ROOT FAIRING SUPPORTS**

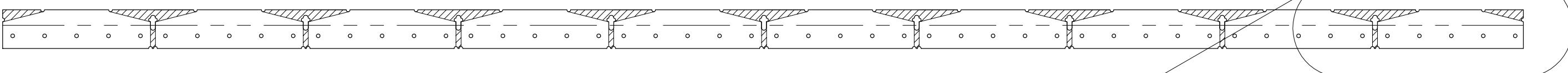
**Step 4:** Fit the F-1099C Wing Walk Spacer on top of the wing spar assembly and into the gap between the center section assembly as shown in Figure 4. Check for fit and trim as req'd. Do not glue the spacer until the F-1099A Upper Wing Root Fairing has been positioned and match-drilled. This will provide an opportunity to check for the correct elevation of the spacer before final installation.



**FIGURE 4: FITTING THE WING WALK SPACER**



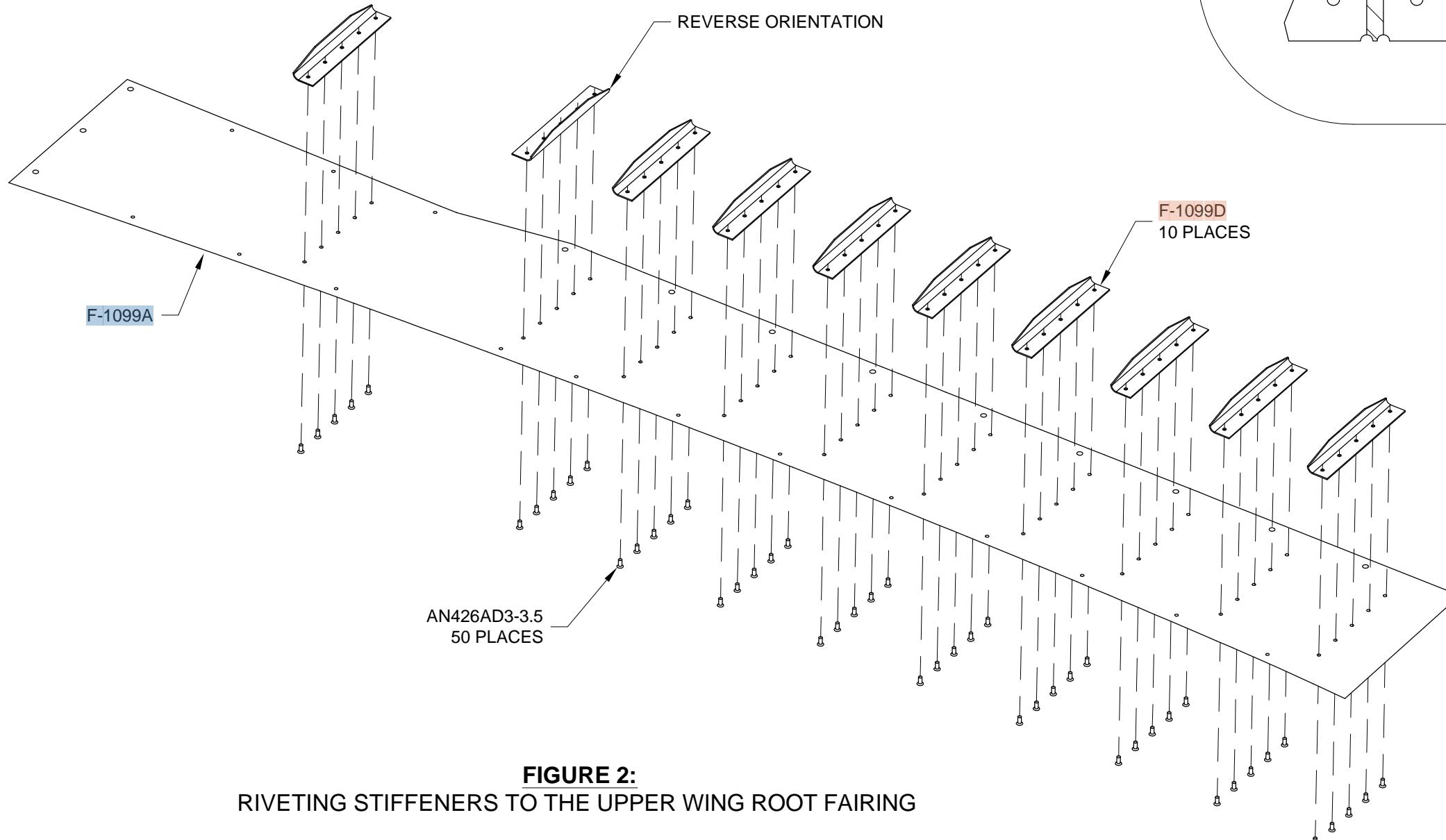
Step 1: Cut apart the F-1099D Wing Root Fairing Stiffeners as shown in Figure 1. Parts are shown unbent.



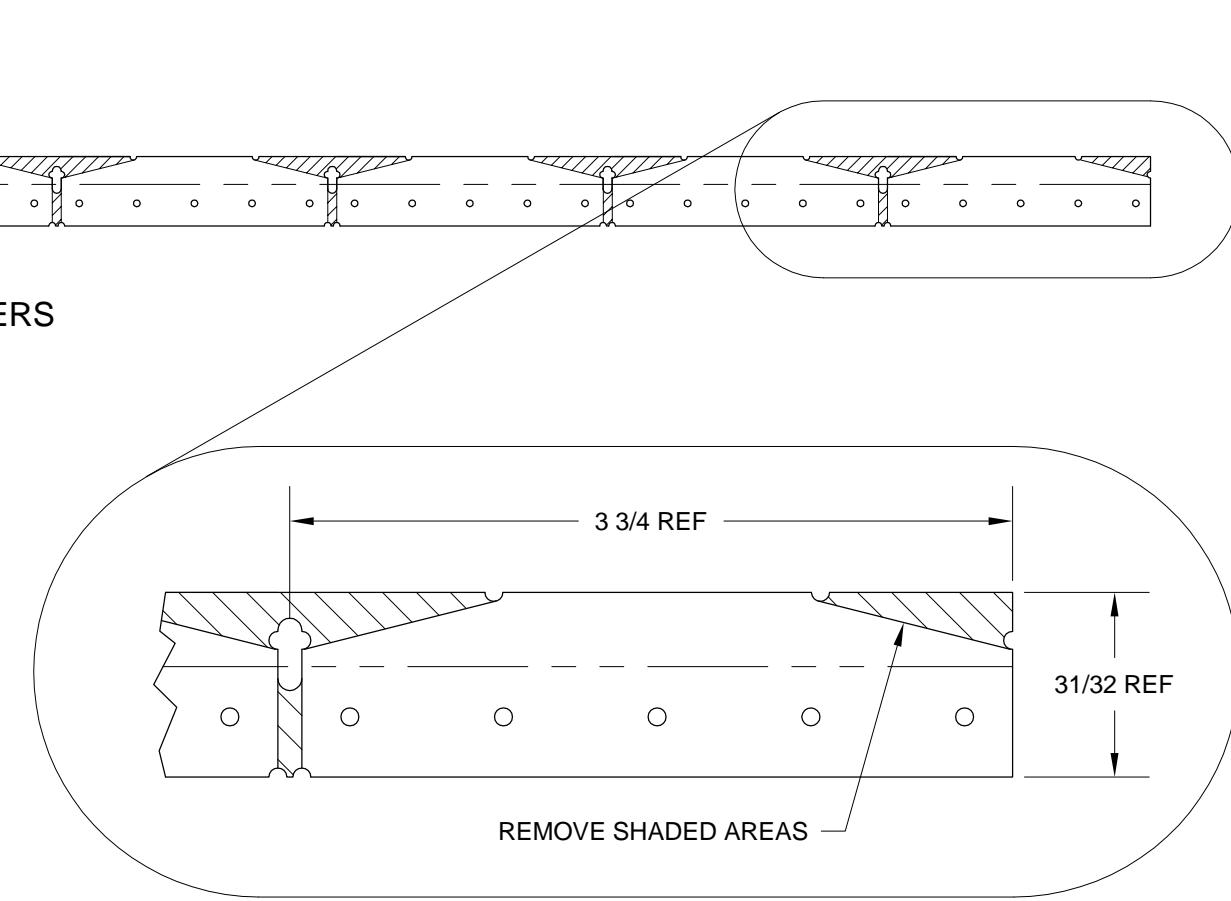
**FIGURE 1: CUTTING APART THE STIFFENERS**

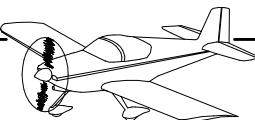
Step 2: Cleco the F-1099D Wing Root Fairing Stiffeners to the F-1099A Upper Wing Root Fairing as shown in Figure 2. Final-Drill #40 the rivet attach holes. Disassemble, deburr, and dimple the parts. Prime as desired. Attach the stiffeners with the rivets called out.

**NOTE:** One wing root fairing stiffener faces the opposite direction.



**FIGURE 2:**  
RIVETING STIFFENERS TO THE UPPER WING ROOT FAIRING

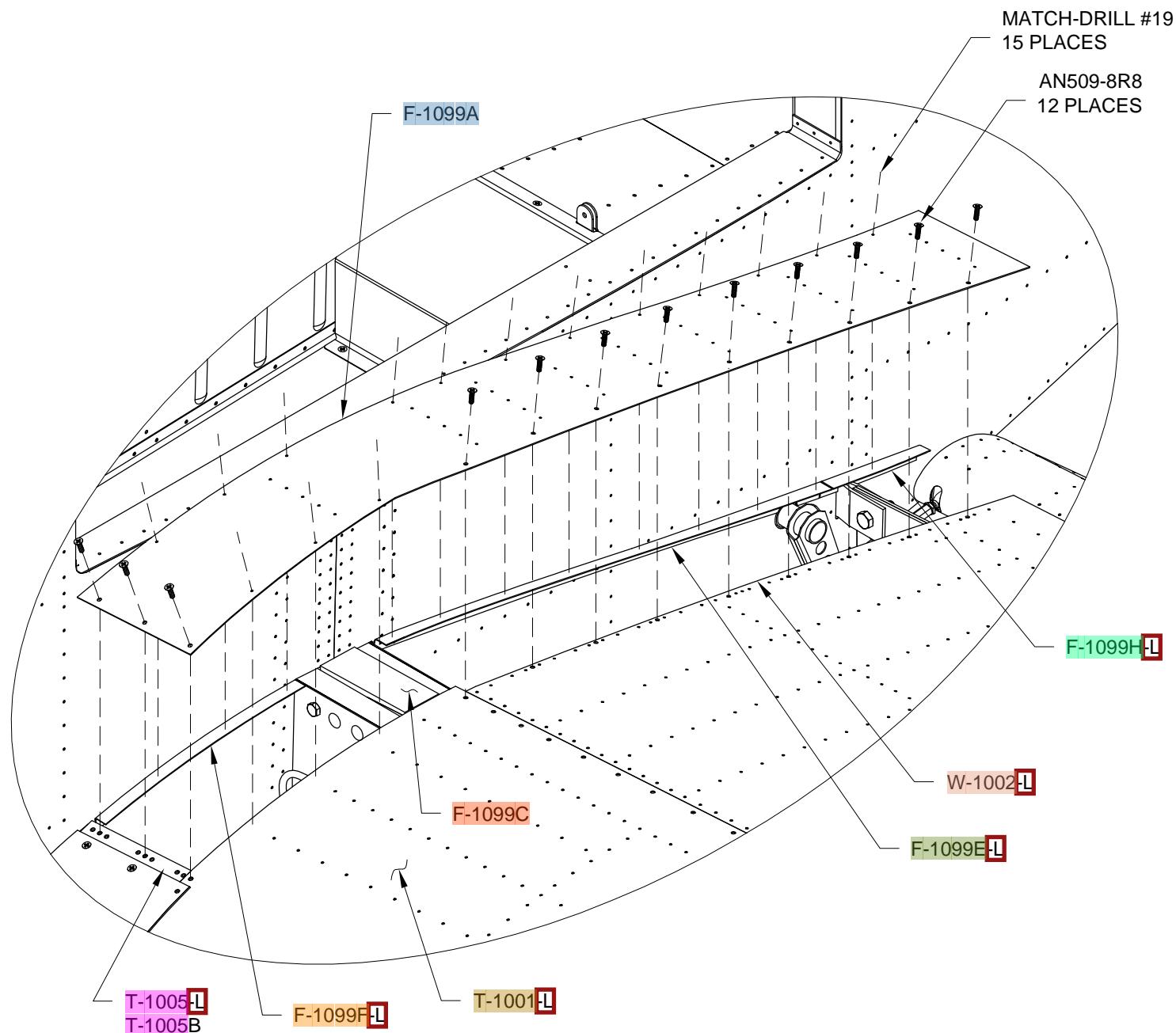




Step 1: Align the F-1099A Upper Wing Root Fairing to the inboard edge of the W-1002-L Top Inboard Wing Skin, to the T-1001-L Fuel Tank Skin and to the T-1005-L/T-1005B Tank Attach Bracket and Shim. Inspect the upper wing root fairing in the area of the F-1099C Wing Walk Spacer and adjust the spacer if/as req'd. When satisfied attach the upper wing root fairing with the hardware called out in Figure 1.

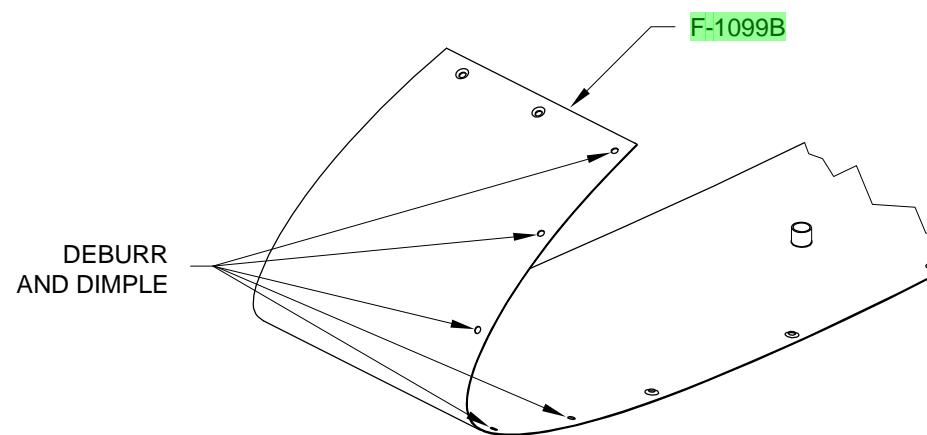
Match-Drill #40 and cleco the F-1099E-L, F-1099F-L, and F-1099H-L Wing Root Fairing Supports and the fuel tank skin using the holes in the upper wing root fairing as guides. Final-Drill #19 the same holes.

Remove the upper wing root fairing and the wing walk spacer. Deburr and dimple all of the #19 holes in the upper wing root fairing.



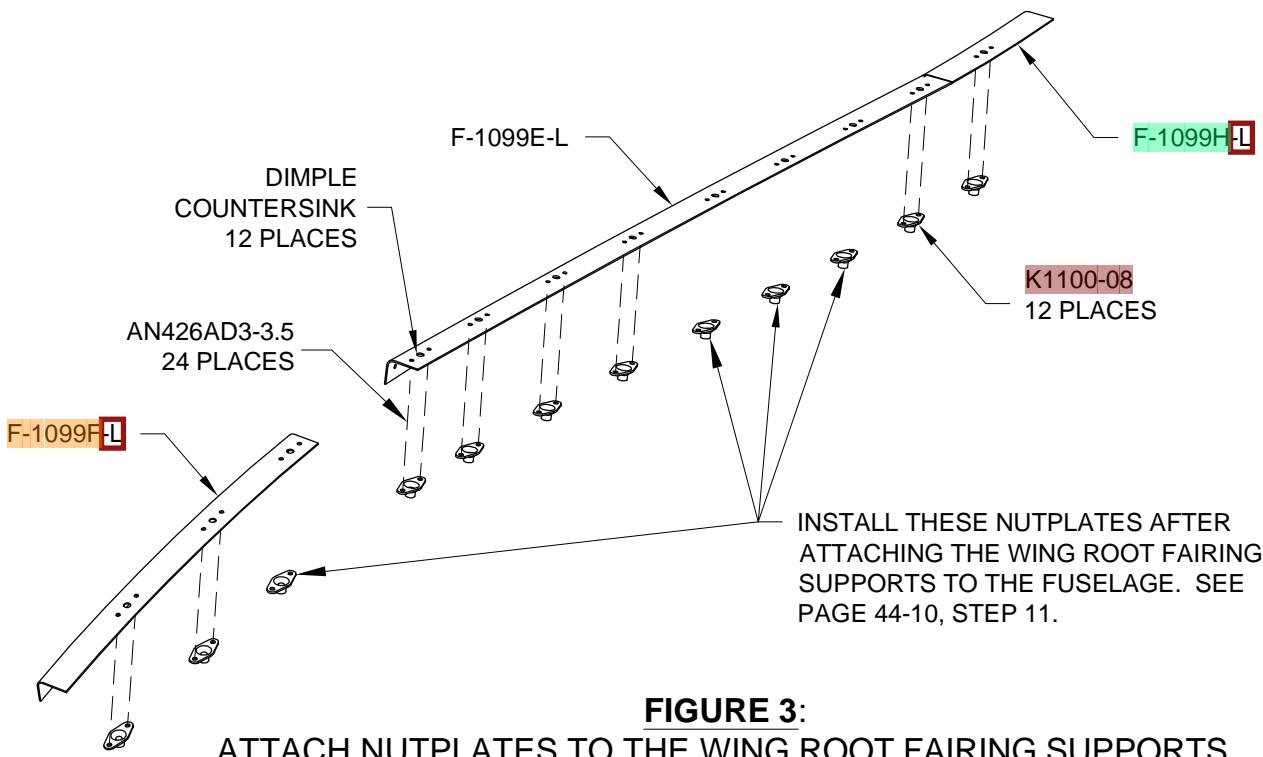
**FIGURE 1:**  
MATCH-DRILLING WING ROOT FAIRING SUPPORTS

Step 2: Remove the F-1099B Lower Wing Root Fairing. Deburr and dimple the five #19 holes used as drill guides earlier as shown in Figure 2.



**FIGURE 2:**  
DEBURR AND DIMPLE THE LOWER WING ROOT FAIRING

Step 3: Remove all wing root fairing supports. Final-Drill #40 F-1099E-L, F-1099F-L and F-1099H-L Wing Root Fairing Supports for the nutplate rivet holes using a K1100-08 nutplate as a guide. Deburr these holes. Dimple the #40 holes for AN426AD3 rivets. Dimple the nutplates to receive the dimple in the angle for the nutplate attach rivets. Deburr the #19 holes then dimple them to receive the dimpled F-1099A Wing Root Fairing. Prime if/as desired. Except for the four to be attached later, rivet the nutplates in place using the hardware callouts in Figure 3.



**FIGURE 3:**  
ATTACH NUTPLATES TO THE WING ROOT FAIRING SUPPORTS



Step 1: Remove the F-Vent Line Fuselage Vent Line.

Disconnect the VA-256 Flap Pushrod.

Disconnect the F-1064 Aileron Pushrod.

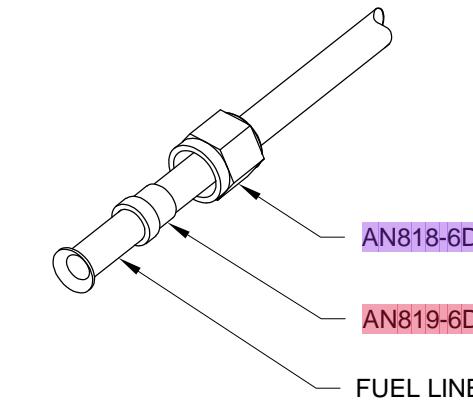
Step 2: Unbolt the rear spar from the F-1005B Rear Spar Attach Bars.

Step 3: Support the wing. Remove the drift pins from the wing spar/center section and remove the wing.

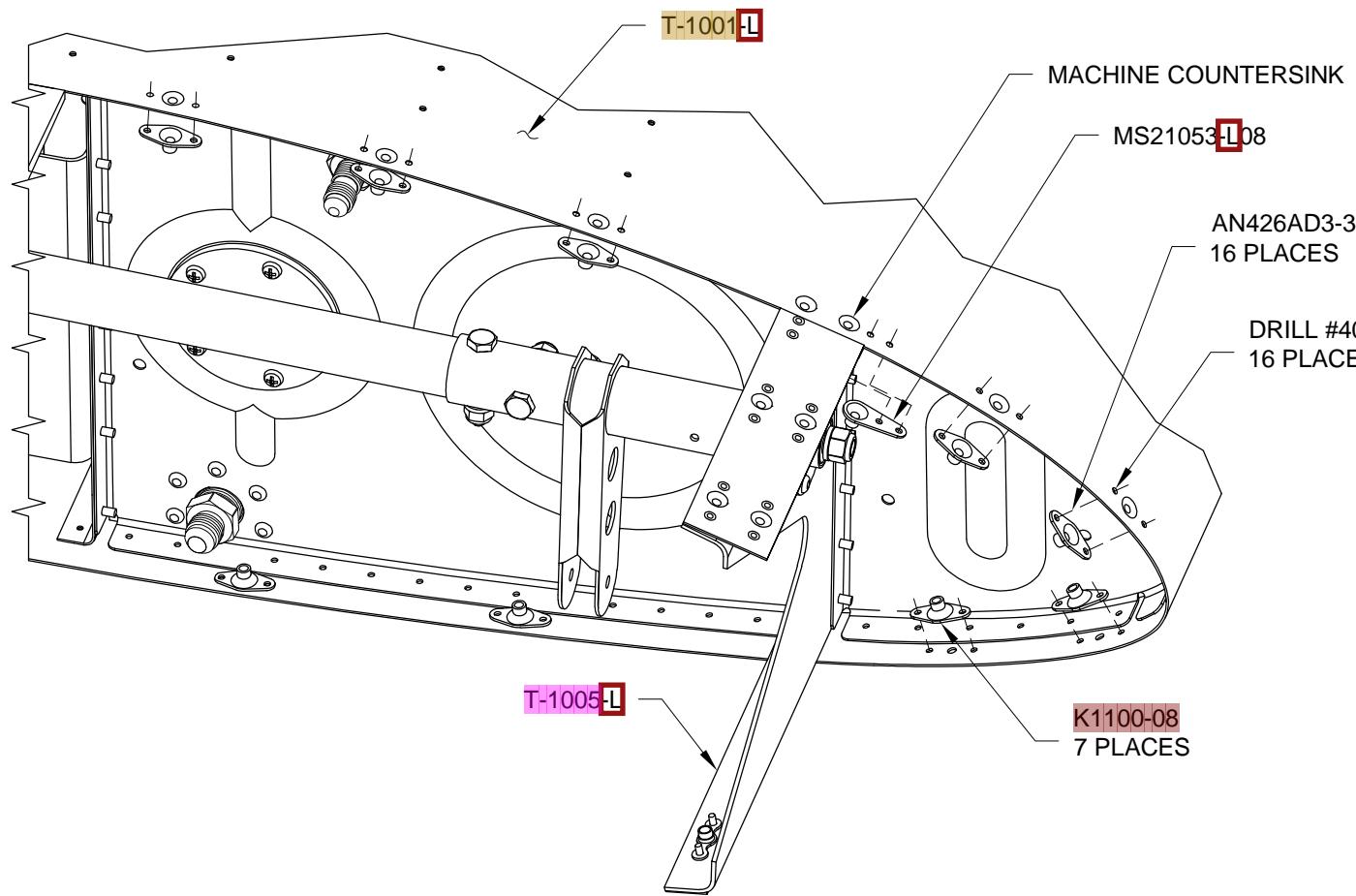
Step 4: Deburr the hole in the rear spar and the holes F-1005B Rear Spar Attach Bars.

Step 5: Final-Drill #40 and machine countersink the T-1001-L Fuel Tank Skin for the nutplate rivet attach holes as shown in Figure 1. Deburr and dimple the #19 screw holes in the tank skin. Rivet the nutplates to the fuel tank skin as per the callouts in Figure 1.

Step 6: Cut the fuel supply line to the length marked earlier. Slide a coupling nut over the end of the tube followed by a coupling sleeve and flare the end of the tube as shown in Figure 2.



**FIGURE 2: ASSEMBLE FUEL SUPPLY LINE**

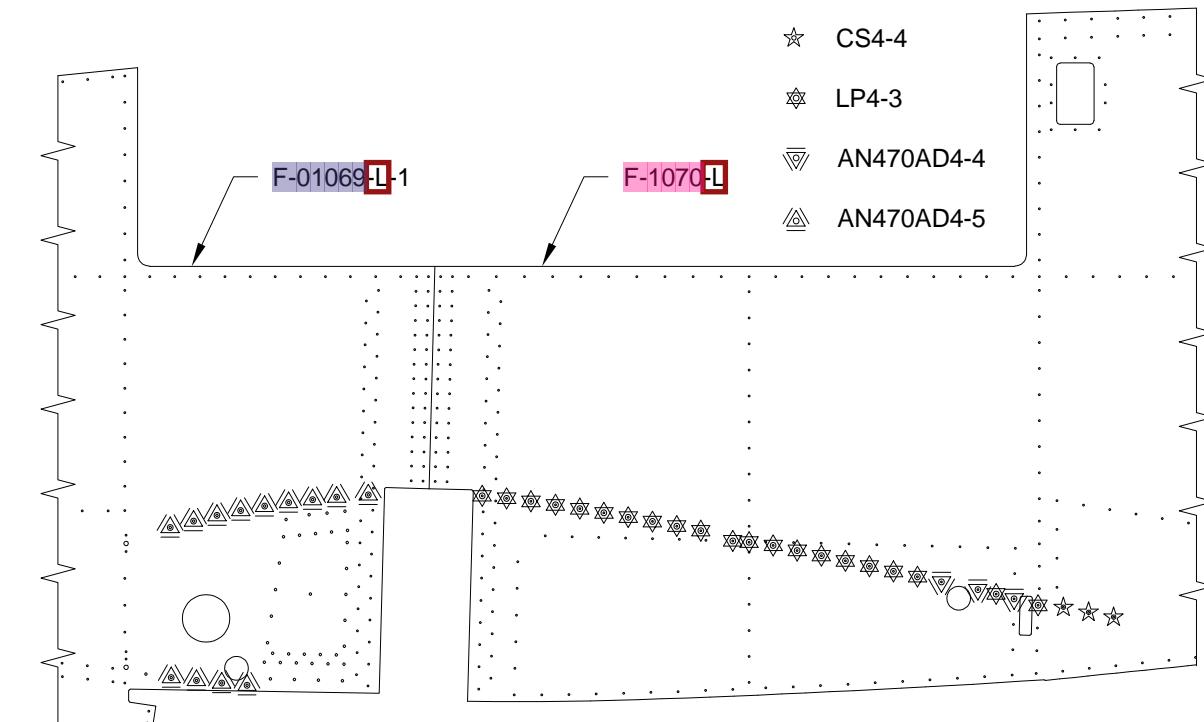


**FIGURE 1:  
ATTACH TANK SKIN NUTPLATES**

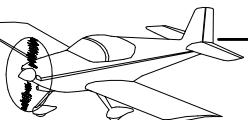
Step 7: Install snap-bushings or equivalent for the pitot system entry points into the fuselage. These positions are to be determined by the builder.

Step 8: Rivet the F-1099F-L and the F-1099G-L Wing Root Fairing Supports to the F-01069-L-1 Forward Side Skin and rivet the F-1099E-L and the F-1099H-L Wing Root Fairing Supports to the F-1070-L Mid Side Skin using the rivets shown in the callouts in Figure 3.

Step 9: Rivet the three nutplates omitted on Page 44-9, Step 3 to the F-1099E-L Wing Root Fairing Support Angle as well as the one nutplate for the F-1099F-L Wing Root Fairing Support Angle.



**FIGURE 3: ATTACH WING ROOT FAIRING SUPPORTS**



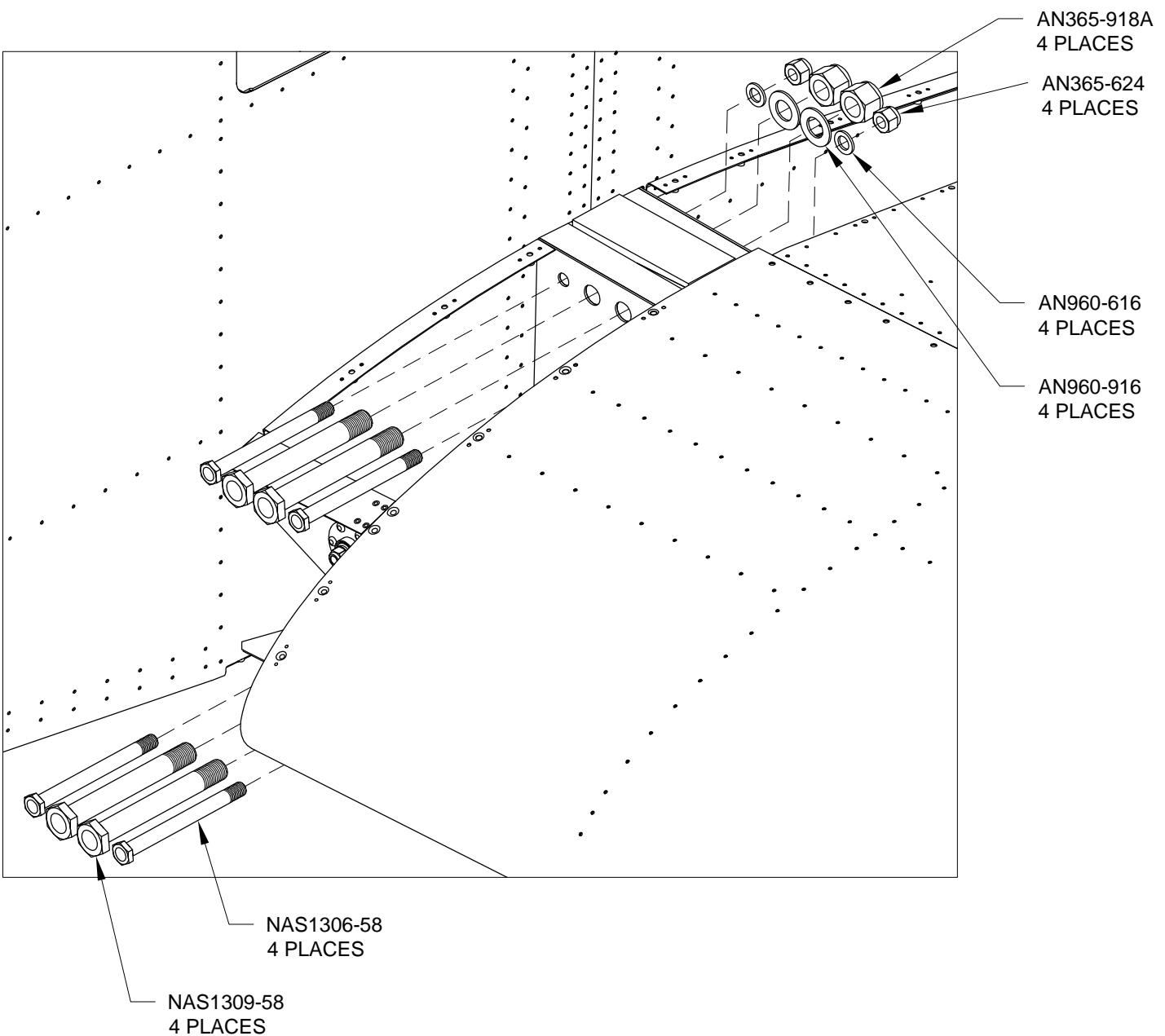
The following steps may be performed at the builders convenience.

Step 1: Pin the wing to the fuselage using the same drift pins from Page 44-3, Step 1.

**NOTE:** When installing the wing lubricate the NAS bolts with LPS #1,2 or 3 (available in a spray can). In lieu of that a light coat of ordinary motor oil will do.

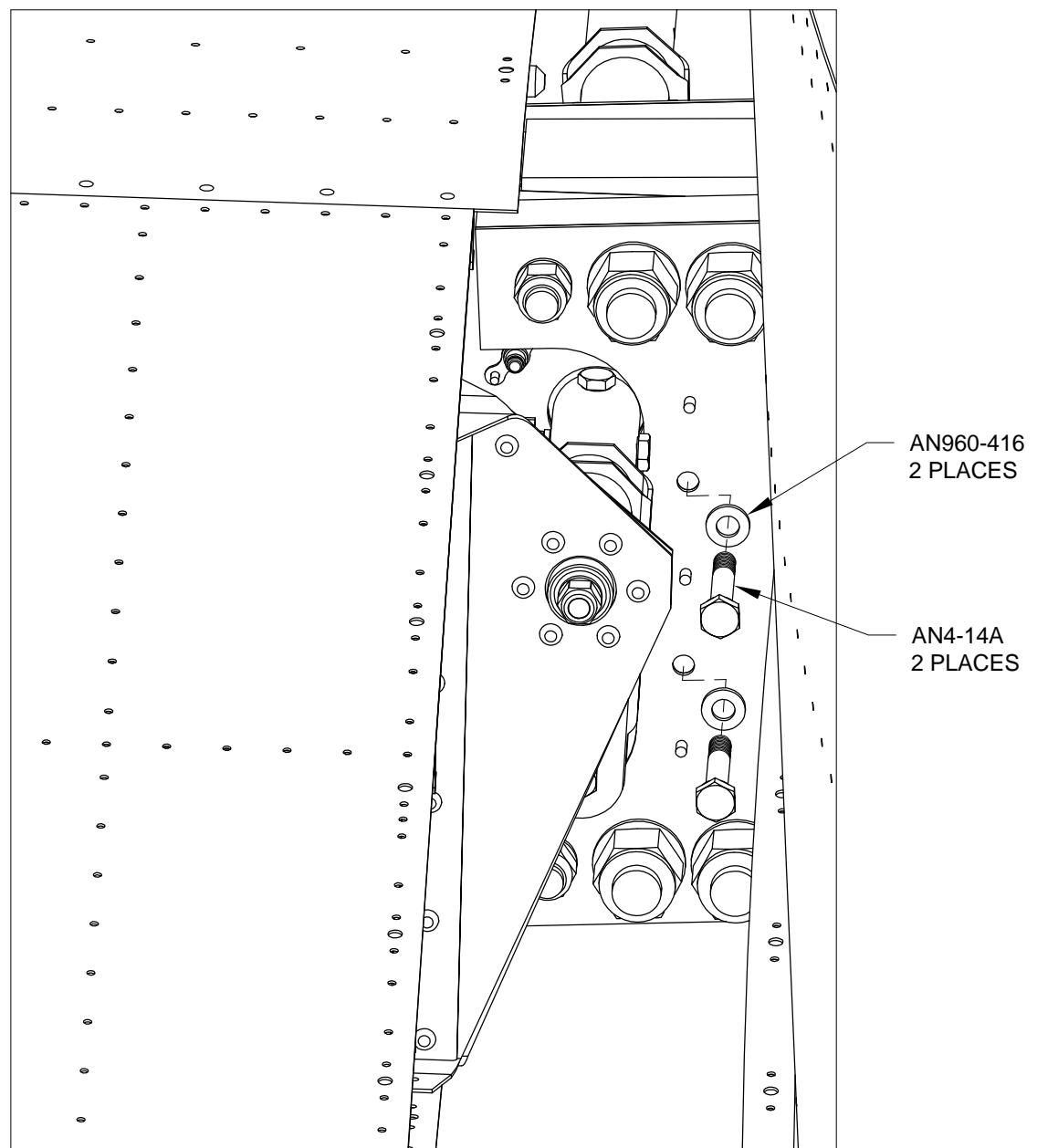
**CAUTION:** Do not lubricate the threaded portion of the bolt as this will cause the bolts to be incorrectly torqued.

Install the bolts called out in Figure 1 in the remaining six holes. Replace the two drift pins with the hardware called out in Figure 1. See Section 5 under the heading 'Nut and Bolt Torques' for the appropriate torque values.



**FIGURE 1: FINAL WING ATTACHMENT**

Step 2: Install the F-1004J Center Section Upright Bar (not shown) hardware as called out in Figure 2.



**FIGURE 2: INSTALLING CENTER SECTION UPRIGHT BAR HARDWARE  
REAR VIEW**

Step 1: Reinstall the rear spar attach hardware. See Page 44-3, Figure 3. Don't forget the cotter pin.

Step 2: Reinstall the F-1054-L Tank Attach Angle hardware. See Page 44-3, Figure 4.

Step 3: Reinstall the F-1064 Aileron Pushrod Assembly attach hardware. See Page 44-4, Figure 1.

Step 4: Connect the fuel supply line to the VA-261 Fuel Strainer fitting using the hardware shown in Figure 1.

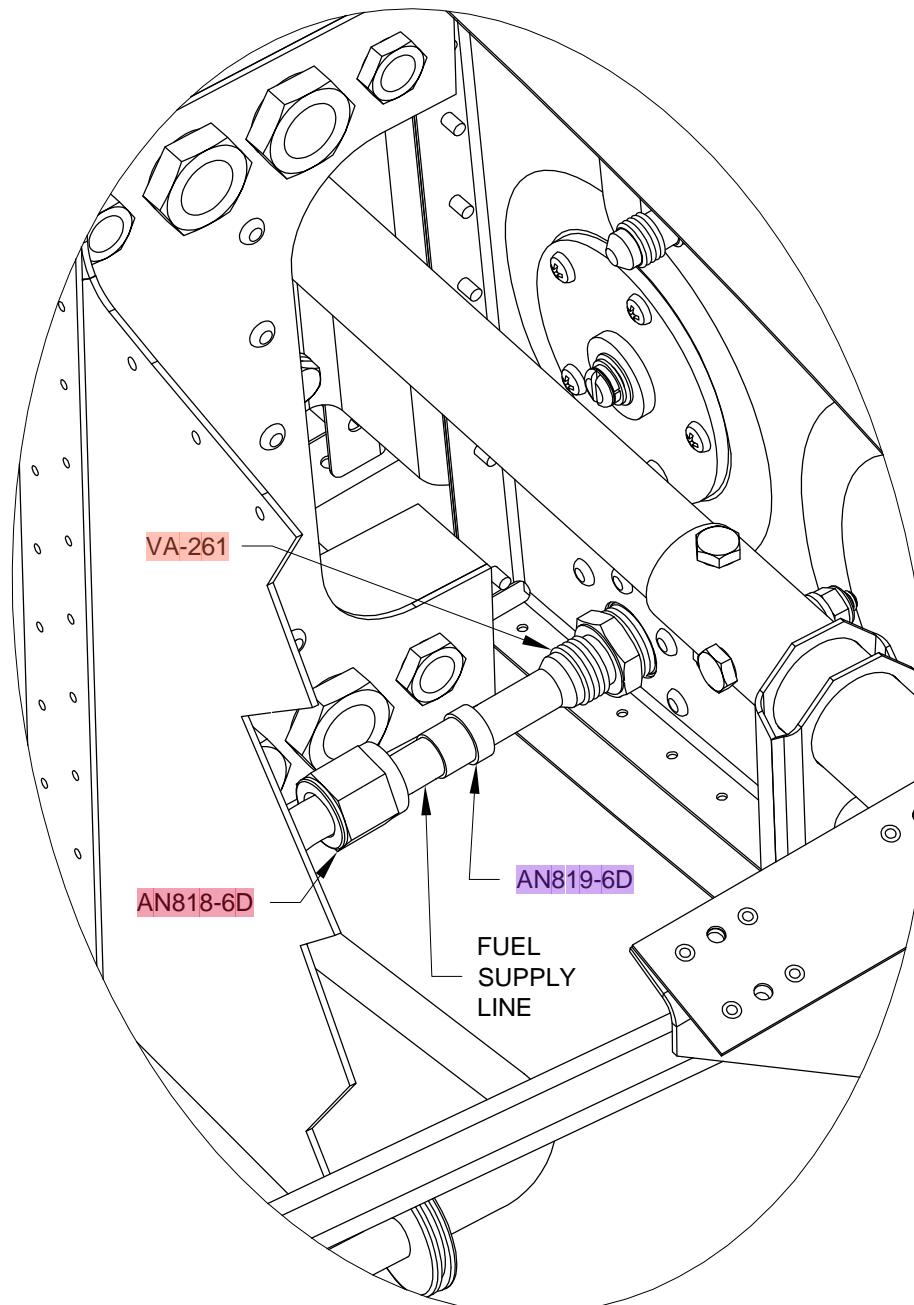
Step 5: Reinstall the VA-256 Flap Pushrod Assembly. See Page 44-5, Figure 2.

Step 6: Reinstall the F-1099B Lower Wing Root Fairing. Five additional AN509-8R8 screws are required beyond those depicted on Page 44-6, Figures 1 and 2.

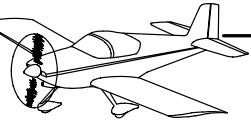
Step 7: Reinstall the F-Fuel Vent Fuselage Fuel Vent line. See Page 44-7, Figure 2.

Step 8: Permanently install the F-1099C Wing Walk Spacer, gluing it to the top of the spar with RTV or Proseal. See Page 44-7, Figure 4.

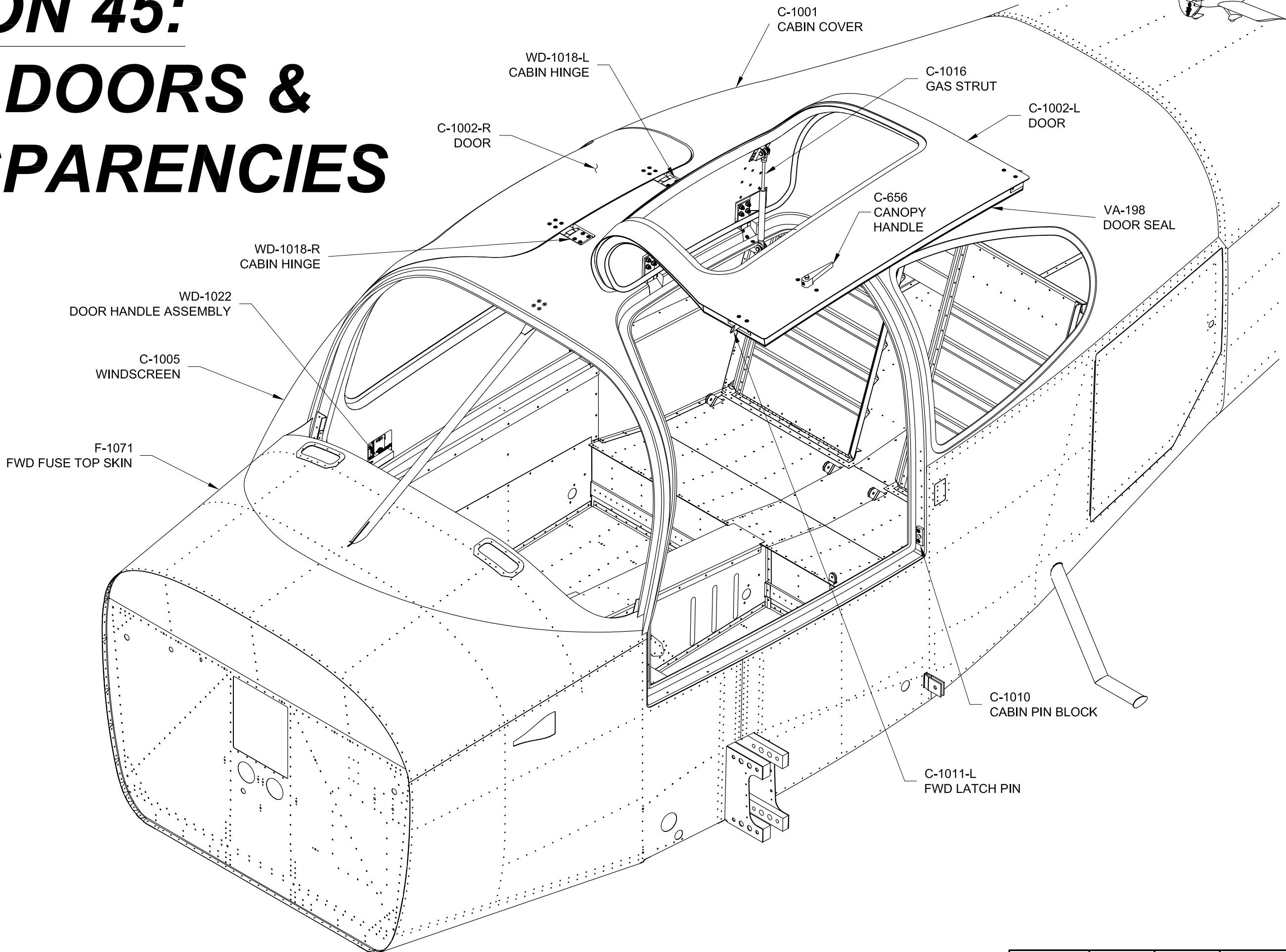
Step 9: Reinstall the F-1099A Upper Wing Root Fairing. Fifteen additional AN509-8R8 screws are required beyond those depicted on Page 44-9, Figure 1.

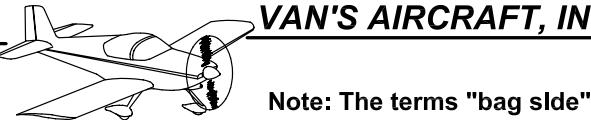


**FIGURE 1: CONNECTING THE FUEL SUPPLY LINE**



# SECTION 45: CABIN DOORS & TRANSPARENCIES





## VAN'S AIRCRAFT, INC.

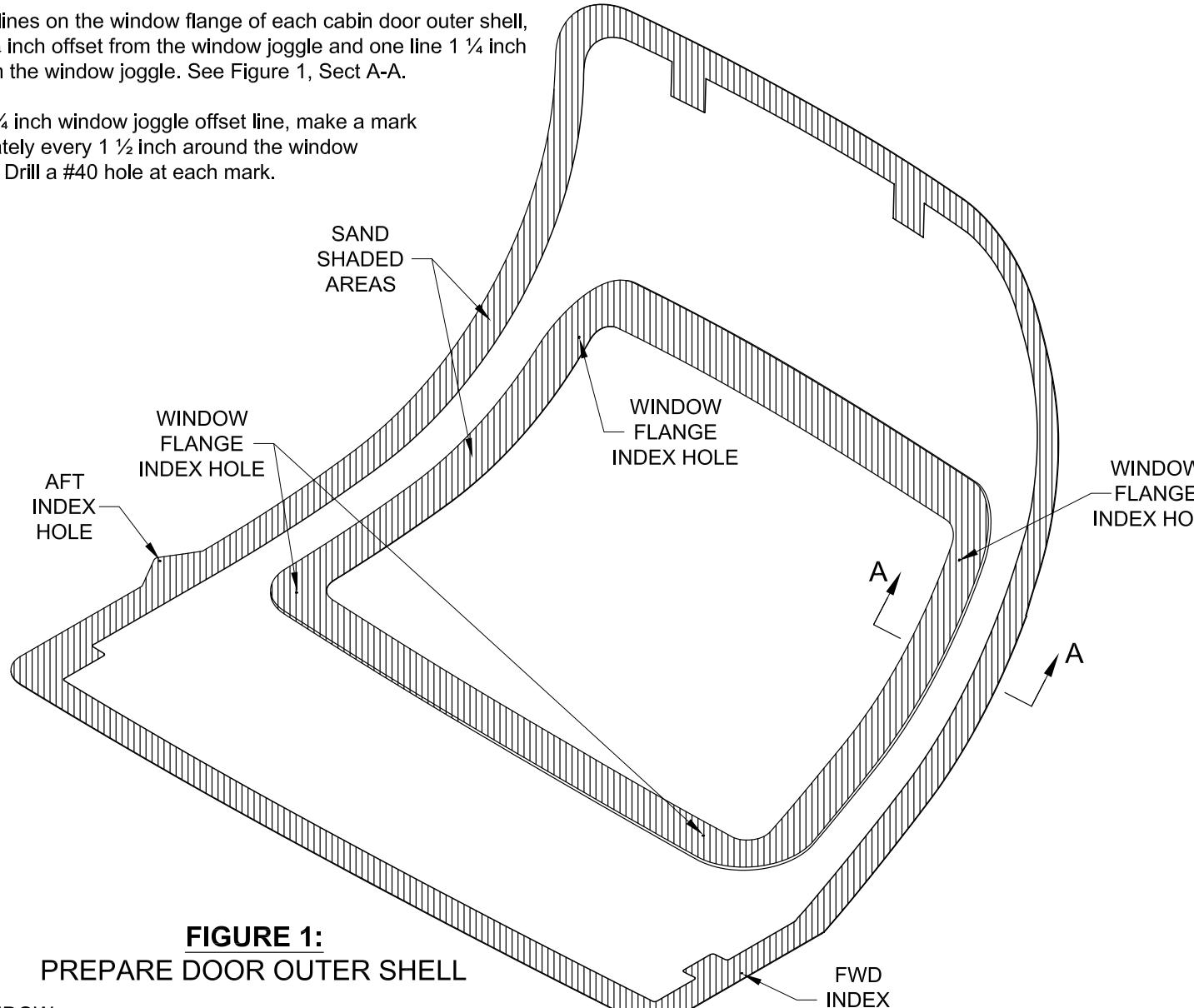
Note: The terms "bag side" and "tool side" are used in this section. "Bag side" refers to the "rough" side of the part which shows the weave of the fabric and may have wrinkles and other surface irregularities. "Tool Side" refers to the "smooth" side of the part which is an exact mirror of the mold upon which the part was layed-up and cured.

Step 1: Trim the outside perimeter and window flange of the C-1002A-L and -R Cabin Door Outer Shells as shown in Figure 1.

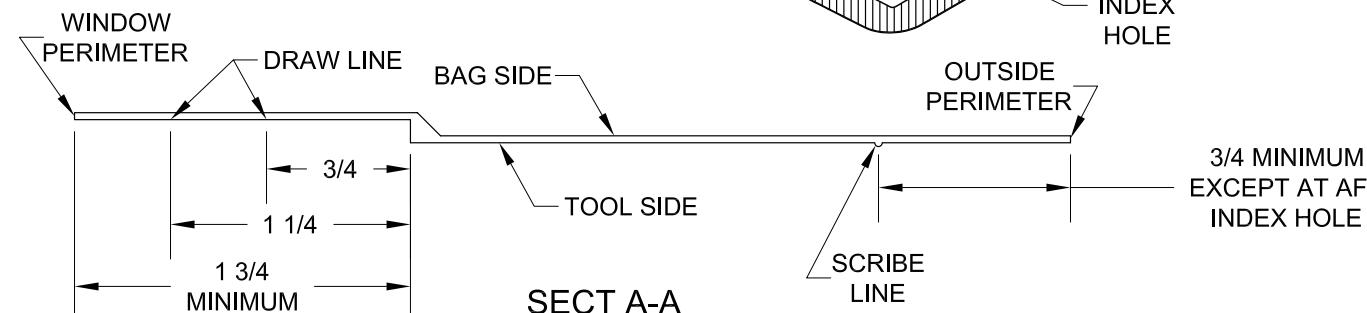
There are six "dimples" molded into the tool side of each cabin door outer shell; one near the lower door forward edge, one near the lower door aft edge, and one in the window flange near each of the four corners of the window. Drill a #40 hole through the cabin door outer shell at the center of each of the six dimples. These holes are "index holes" used to locate the door shells to each other and to the fuselage.

Draw two lines on the window flange of each cabin door outer shell, one line  $\frac{3}{4}$  inch offset from the window joggle and one line  $1\frac{1}{4}$  inch offset from the window joggle. See Figure 1, Sect A-A.

On the  $1\frac{1}{4}$  inch window joggle offset line, make a mark approximately every  $1\frac{1}{2}$  inch around the window perimeter. Drill a #40 hole at each mark.



**FIGURE 1:**  
PREPARE DOOR OUTER SHELL

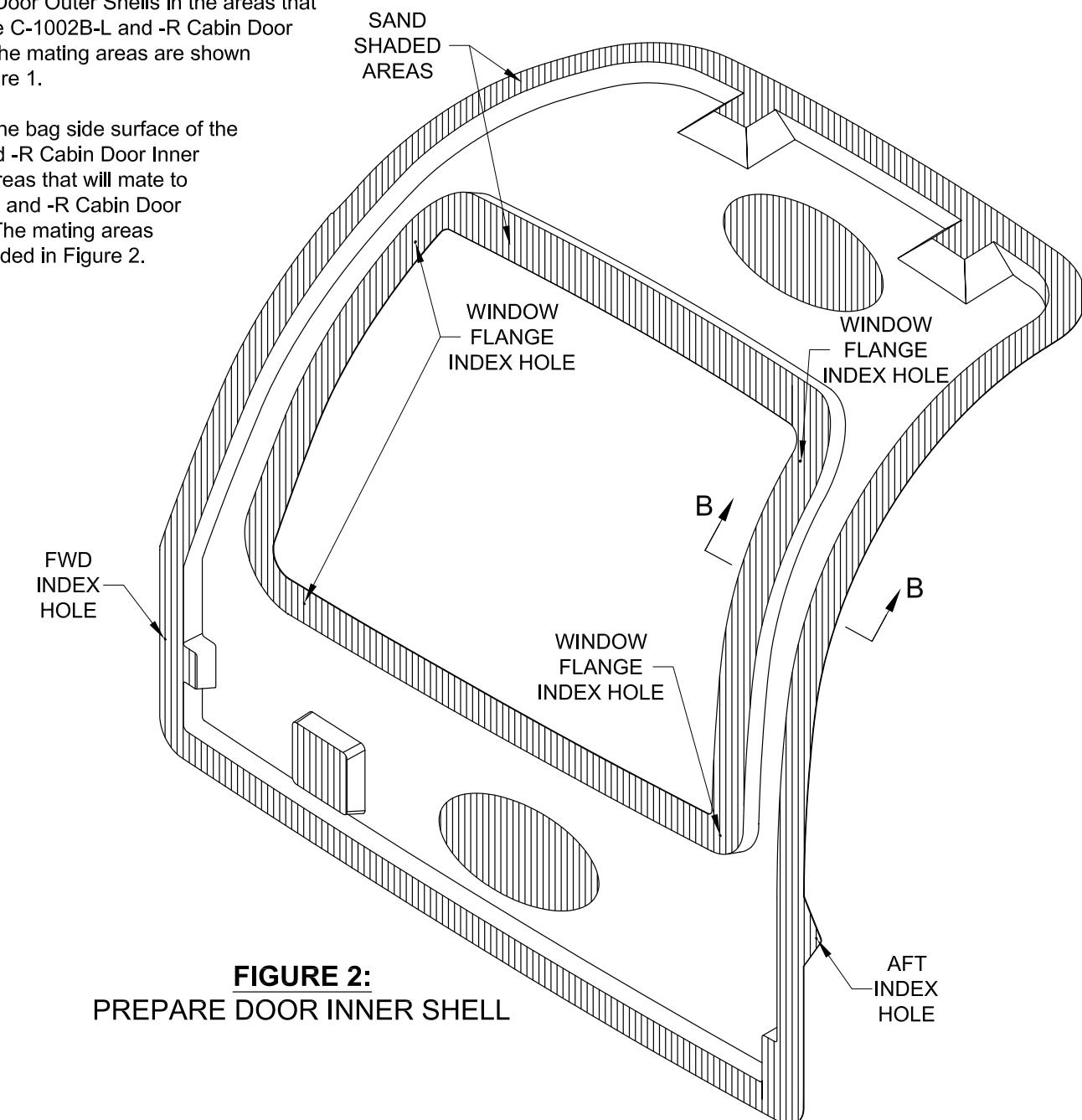


Step 2: Trim the outside perimeter and window flange of the C-1002B-L and -R Cabin Door Inner Shells as shown in Figure 2.

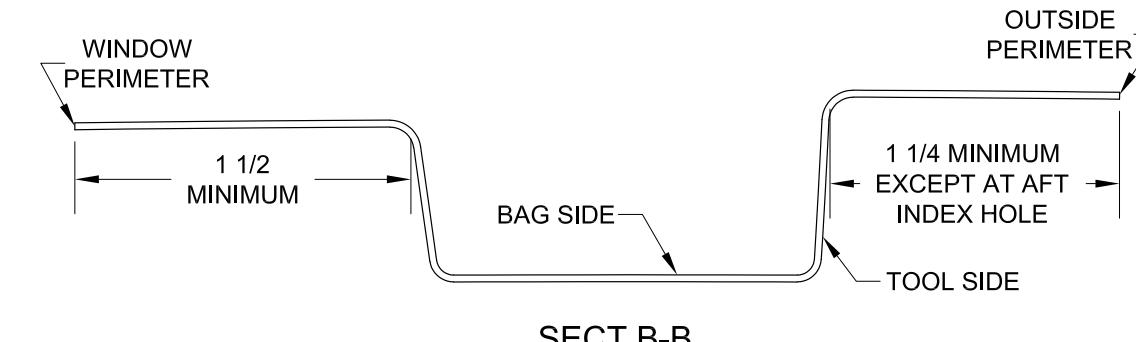
The tool side of each cabin door inner shell has molded-in dimples that correspond to the dimples molded into the C-1002A-L and R Cabin Door Outer Shells. Drill a #40 hole through the cabin door inner shell at the center of each of the six dimples.

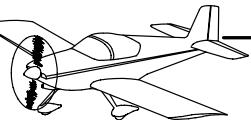
Step 3: Sand the bag side surface of the C-1002A-L and -R Cabin Door Outer Shells in the areas that will mate to the C-1002B-L and -R Cabin Door Inner Shells. The mating areas are shown shaded in Figure 1.

Step 4: Sand the bag side surface of the C-1002B-L and -R Cabin Door Inner Shells in the areas that will mate to the C-1002A-L and -R Cabin Door Outer Shells. The mating areas are shown shaded in Figure 2.



**FIGURE 2:**  
PREPARE DOOR INNER SHELL





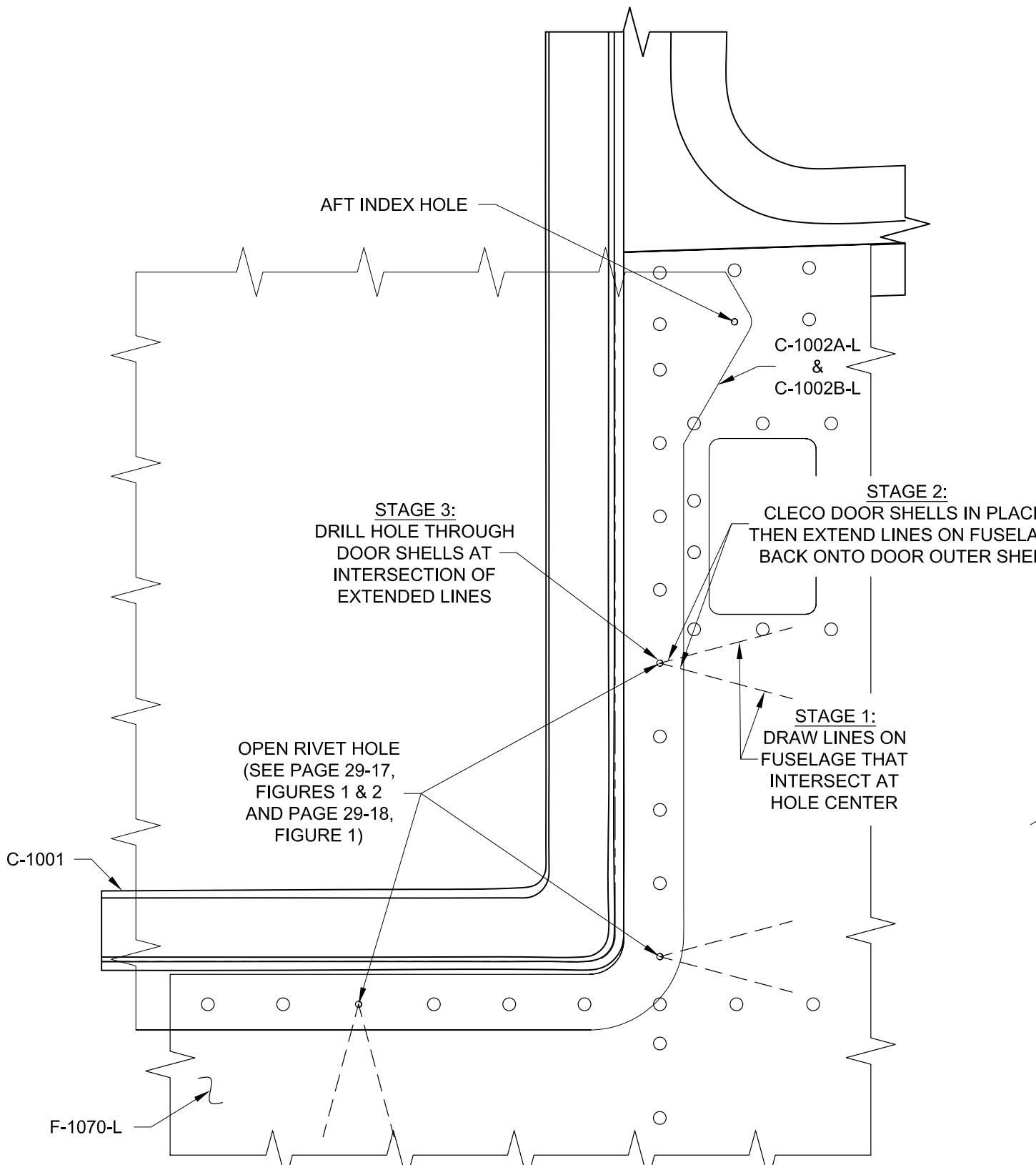
Step 1: There are several rivet holes in the fuselage that were deliberately left open to facilitate gluing the C-1002A Door Outer Shells to the C-1002B Door Inner Shells. See Page 29-17, Figures 1 & 2, and Page 29-18, Figure 1. At each of the open holes, draw reference lines on the fuselage side so that the hole centers can be located when covered. See Figure 1.

If you have a hole finder, you can skip this step.

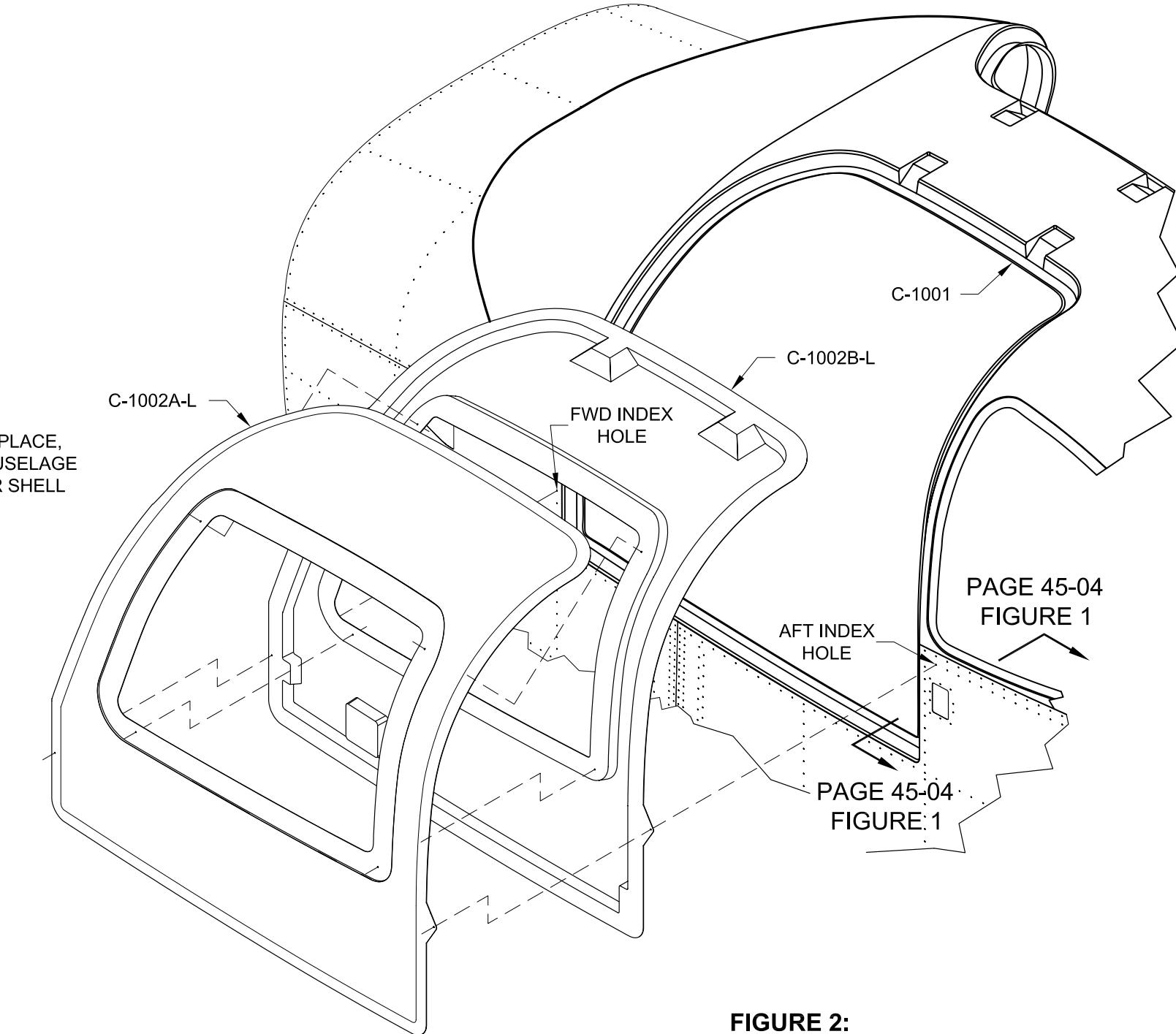
Step 2: Cleco the C-1002A-L Door Outer Shell to the C-1002B-L Door Inner Shell using the four #40 holes in the window flange of the door inner shell. See Figure 2.

Step 3: Cleco the C-1002A-L Door Outer Shell/C-1002B-L Door Inner Shell to the fuselage using the forward and aft index holes. See Figure 2.

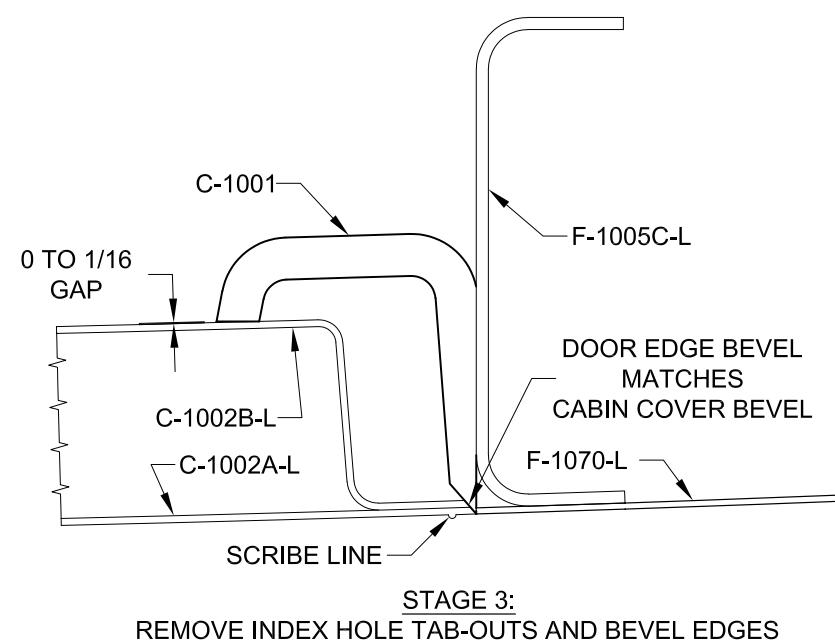
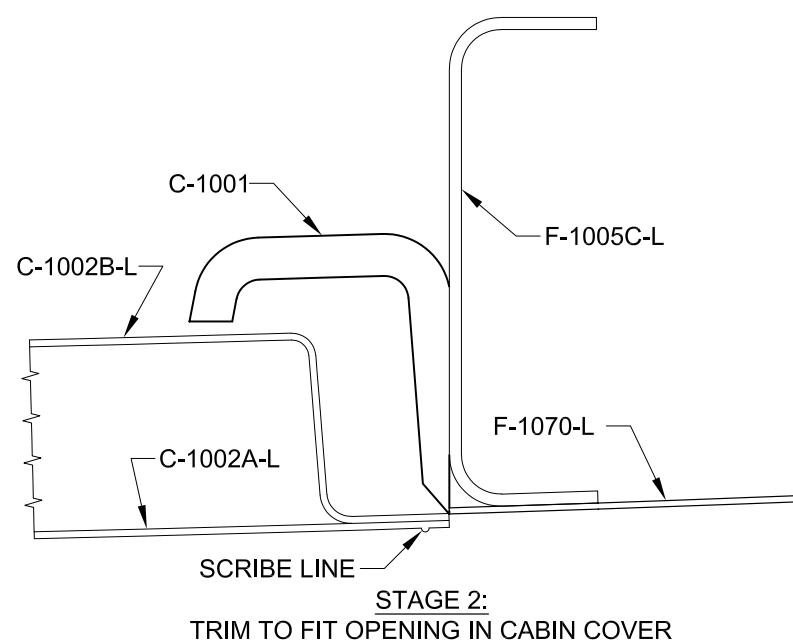
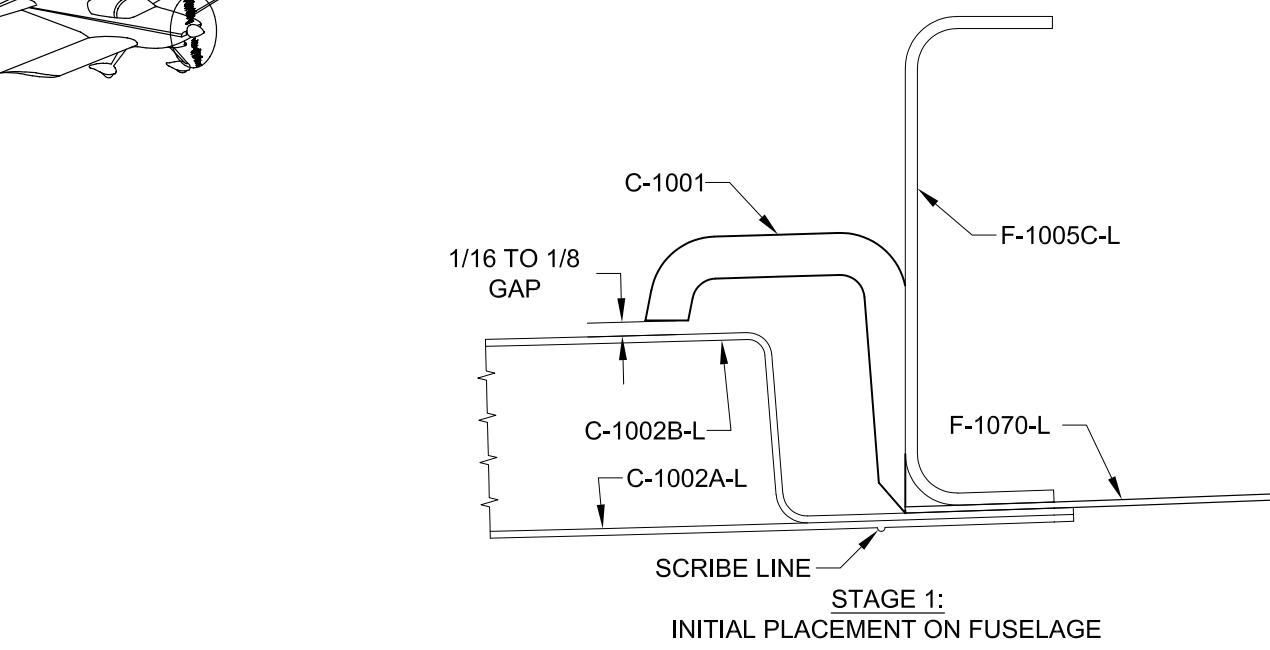
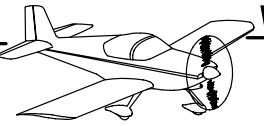
Verify that there is a constant 1/16 to 1/8 inch gap between the C-1002B-L Door Inner Shell and the return flange of the C-1001 Cabin Cover. Trim or sand the cabin cover return flange if/as required to achieve the required gap. See Page 45-04, Figure 1, "Stage 1: Initial Placement on Fuselage".



**FIGURE 1:**  
LOCATING BLIND HOLES



**FIGURE 2:**  
CLECO DOOR SHELLS TO FUSELAGE



**FIGURE 1: PROGRESSION OF DOOR TRIM AND FIT**

Step 1: Using the open hole reference lines (or hole finder) drill #40 through the C-1002A-L Door Outer Shell/C-1002B-L Door Inner Shell into the open rivet holes in the fuselage. See Page 45-03, Figure 1. Install a cleco in each hole as it is drilled. If any mismatch occurs, the hole in the door inner/outer shells should be elongated rather than the hole in the fuselage. The clecos are used to hold the door inner/outer shells tightly to the side of the fuselage.

Step 2: Duct tape the upper part of the C-1002A-L Door Outer Shell/C-1002B-L Door Inner Shell to the C-1001 Cabin Cover. The duct tape should hold the door inner/outer shells to the upper cabin cover as tightly as possible.

Step 3: Match-Drill #40 the holes in the window flange of the C-1002A-L Door Outer Shell into the window flange of the C-1002B-L Door Inner Shell. Install a cleco in each hole as it is drilled.

Step 4: Remove the C-1002A-L Door Outer Shell/C-1002B-L Door Inner Shell from the fuselage and separate the door outer shell from the door inner shell.

Step 5: Repeat all preceding steps for the right side door.

**Step 6:** Position one of the C-1002C Gas Strut Attach Doublers on the bag side surface of the C-1002B-L Door Inner Shell as shown in Figure 2.

The gas strut attach doubler centers on the width of the aft hinge pocket molded into the door inner shell.

The shape of the gas strut attach doubler can be adjusted as required to achieve a good fit to the door inner shell. The fit need not be perfect because the glue used to attach the gas strut attach doubler to the door inner shell will easily fill any gaps of up to 1/16 inch.

Match-Drill #30 and cleco the gas strut attach doubler to the door inner shell. Remove the gas strut attach doubler and deburr holes.

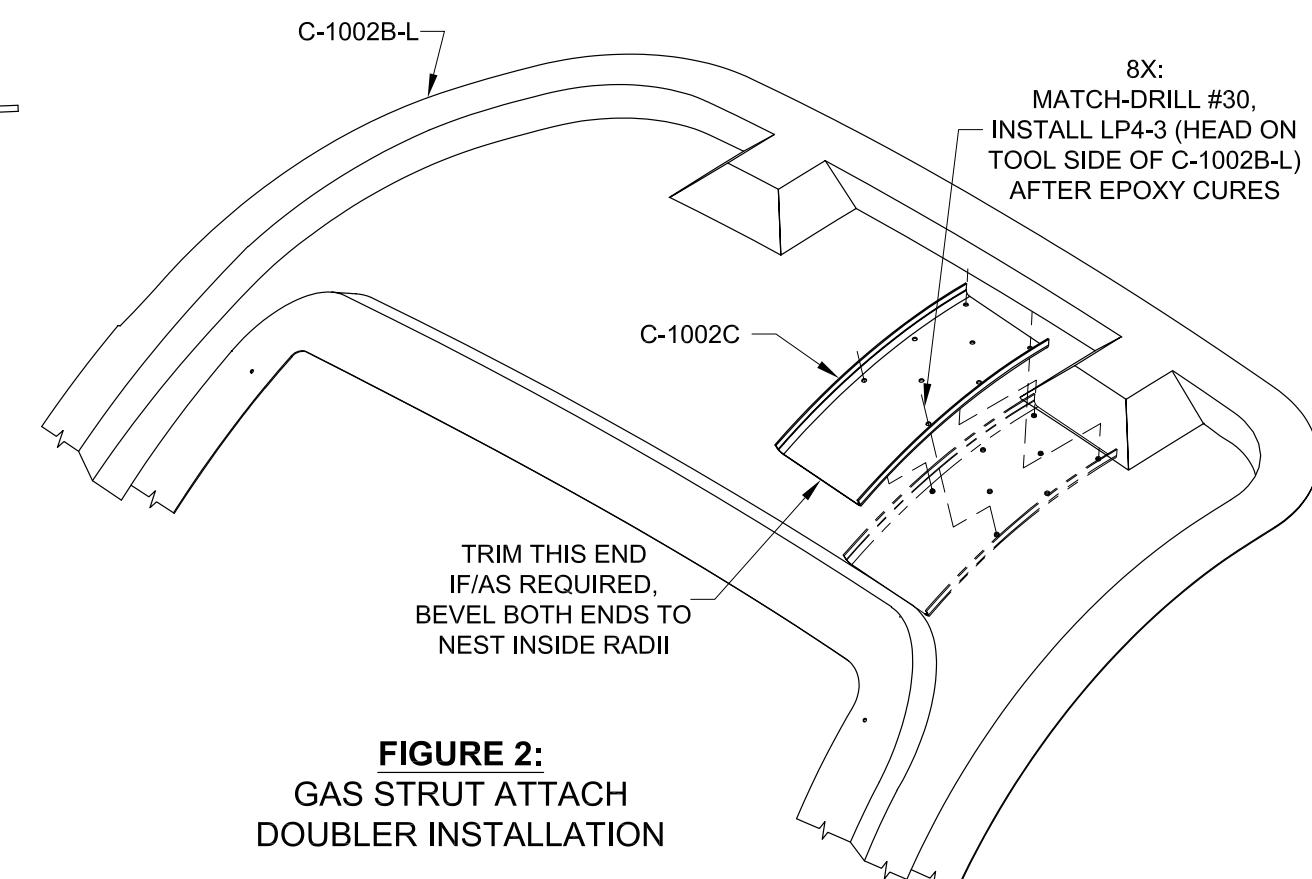
Repeat this step for the right side door.

**Step 7:** Mix some epoxy and thicken it with cab-o-sil to the point that it will not pour out of the mixing cup. A total mixture quantity of about 2 fluid ounces will be required.

Use 80 grit sandpaper to roughen the mating surfaces of the C-1002B-L & R Door Inner Shells and C-1002C gas strut attach doublers.

Apply a 1/16 inch thick layer of thickened epoxy to each gas strut attach doubler and cleco each one to the appropriate door inner shell. Use two clecos for each gas strut attach doubler inserted through the two holes on the part centerline. Install the clecos from the tool side of the door inner shells. Use hand pressure to seat the gas strut attach doublers to the door inner shells and to squeeze out any excess epoxy which should be removed.

After the epoxy has cured re-drill the holes to #30 and install rivets as shown in Figure 2.

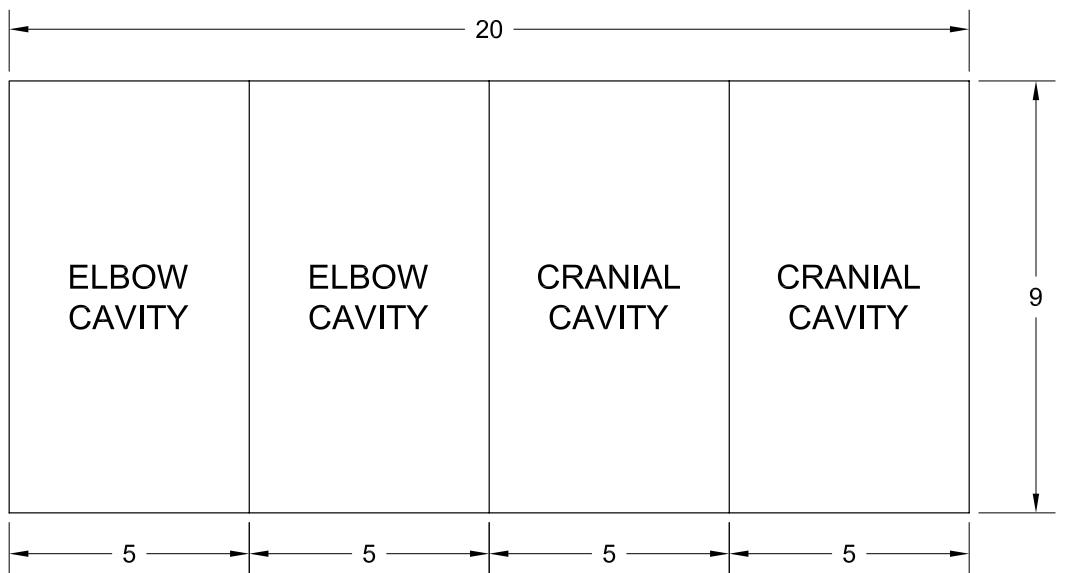




Step 1: There are three locations on each door where the bag sides of the C-1002A Door Outer Shell and C-1002B Door Inner Shell are locally bonded together. The three locations are as follows: The "cranial cavity" in the upper door above the window, the "latch pocket" in the lower door, and the "elbow cavity" in the lower door aft of the latch pocket. At the cranial cavity and elbow cavity the door shells require a "bridge" of structural filler material between them.

The material used for the structural filler is a 3 dimensional weave glass fiber fabric called ParaBeam.

Cut four pieces of parabeam (two for each door) to the dimensions shown in Figure 1.



Step 2: Mask-off the fuselage in anticipation of joining the C-1002A Door Outer Shell and C-1002B Door Inner Shell in place on the fuselage.

**NOTE: Steps 3 through 8 must be done in a single work session. This will require use of an epoxy with a 30 minute (minimum) pot life.**

Step 3: Brush a light coat of epoxy to the bag sides of the C-1002A-L Door Outer Shell and C-1002B-L Door Inner Shell at the three places where they are bonded together.

Step 4: Wet-out with epoxy each of the two pieces of parabeam for the left door then place it at the appropriate spot on the C-1002B-L Door Inner Shell.

Step 5: Mix some epoxy and thicken it with cab-o-sil to the point that it will not pour out of the mixing cup. A total mixture quantity of about 10 fluid ounces will be required.

Apply a 1/32 to 1/16 inch layer of thickened epoxy to all the mating surfaces around the door outside perimeter and window inside perimeter of the C-1002B-L Door Inner Shell. These areas are shown shaded on Page 45-02, Figure 2.

Step 6: Put one cleco at the lower forward corner and one cleco at the lower aft corner of the C-1002A-L Door Outer Shell.

Allowing contact only along the lower edge, use the two clecos to join the door outer shell to the C-1002B-L Door Inner Shell. Lay the remainder of the door outer shell in place on the door inner shell and cleco them together at only the upper forward and upper rear corners of the window.

Step 7: Place the C-1002A-L door inner shell/C-1002B-L door outer shell subassembly on the fuselage and cleco it to the fuselage at the two index holes.

Insert clecos through the door inner shell/door outer shell and into all the open holes in the fuselage

Insert clecos through all the holes around the perimeter of the window.

Use C-clamps, small weights, duct tape, or whatever works to hold the door inner shell and door outer shell tightly to each other AND to the fuselage while the epoxy cures. Apply hand pressure to push-out any excess thickened epoxy between the parts. Use only light pressure if you use C-clamps or other mechanical clamps so as not to locally distort the door shells. Any irregularities will be permanent after the epoxy has cured.

Step 8: After the door is fully cured remove all clecos, clamps, weights, duct tape then remove the door from the fuselage.

Step 9: Repeat Steps 3 through 8 for the right side door. The doors will subsequently be referred to as the C-1002-L Door and C-1002-R Door.

Step 10: Trim the window openings in the C-1002-L and R Doors such that a  $\frac{3}{4}$  inch wide flange remains. This trim line was drawn per Page 45-02, Step 1.

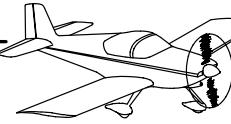
Step 11: Trim the outside perimeter of the C-1002-L and R Doors to within 1/8 inch of the molded-in scribe line except leave a small tab-out at the front and rear indexing holes. See Page 45-04, Figure 1, "Stage 2: Trim to Fit Opening in Cabin Cover".

Cleco the doors back onto the fuselage. Mark any areas of the door outside perimeter which require further trimming in order to fit to the fuselage. Small amounts of material are best removed with 80 to 100 grit sandpaper on a long (approximately 12 inches) sanding block.

Step 12: Trim the indexing hole tab-outs from the C-1002 Doors. Sand a 45 degree bevel into the outside perimeter of the doors as shown on Page 45-04, Figure 1, "

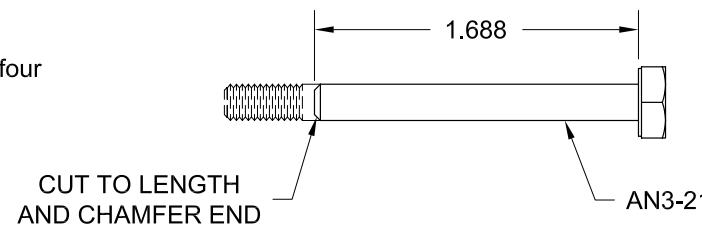
**Stage 3: Remove Index Hole Tab-Outs and Bevel Edges.** Trim/sand the door as required for it to just fit the opening in the fuselage.

**FIGURE 1: PARABEAM CUT DIMENSIONS**

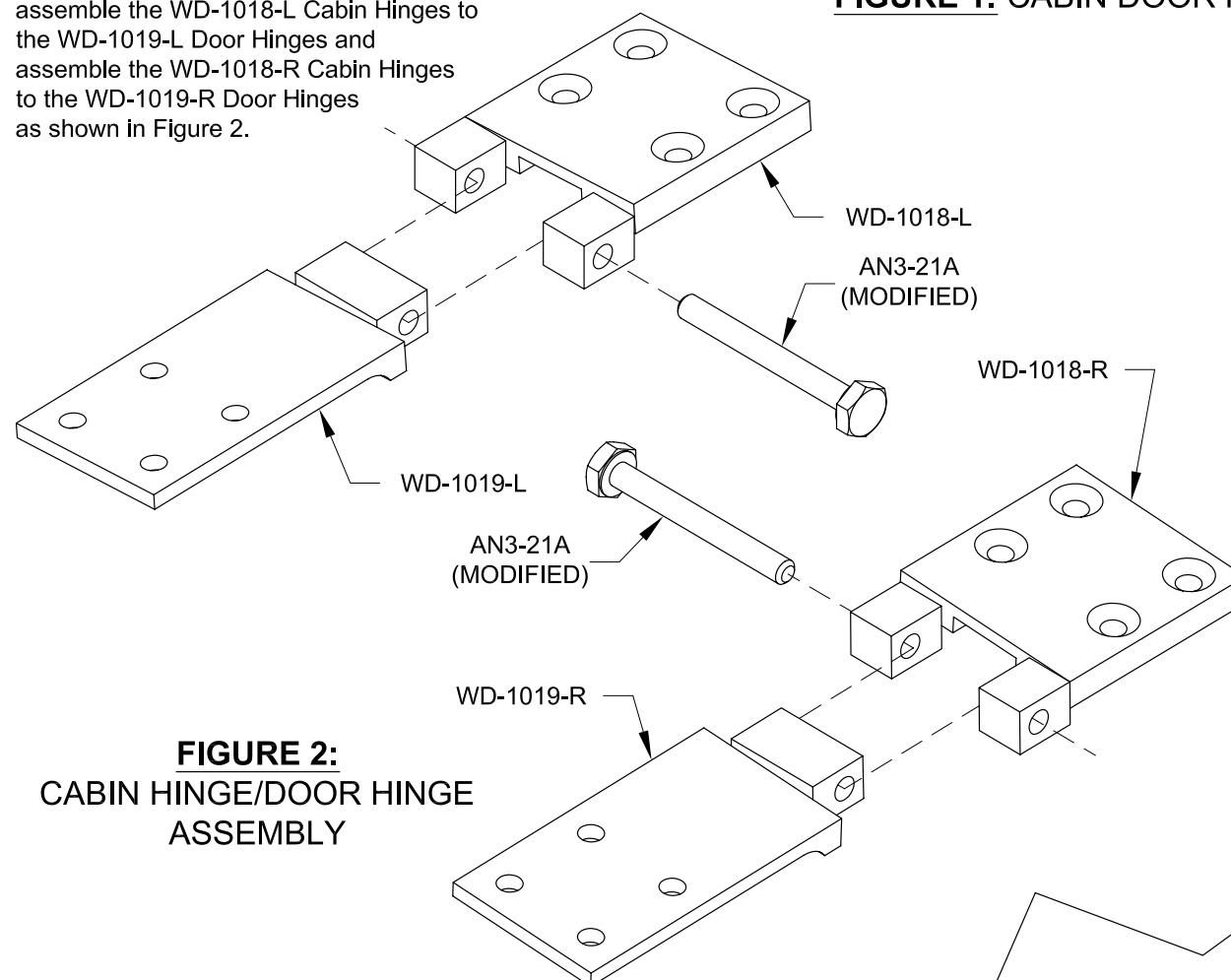


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Step 1: Cut-off the threaded ends of four AN3-21A bolts as shown in Figure 1.



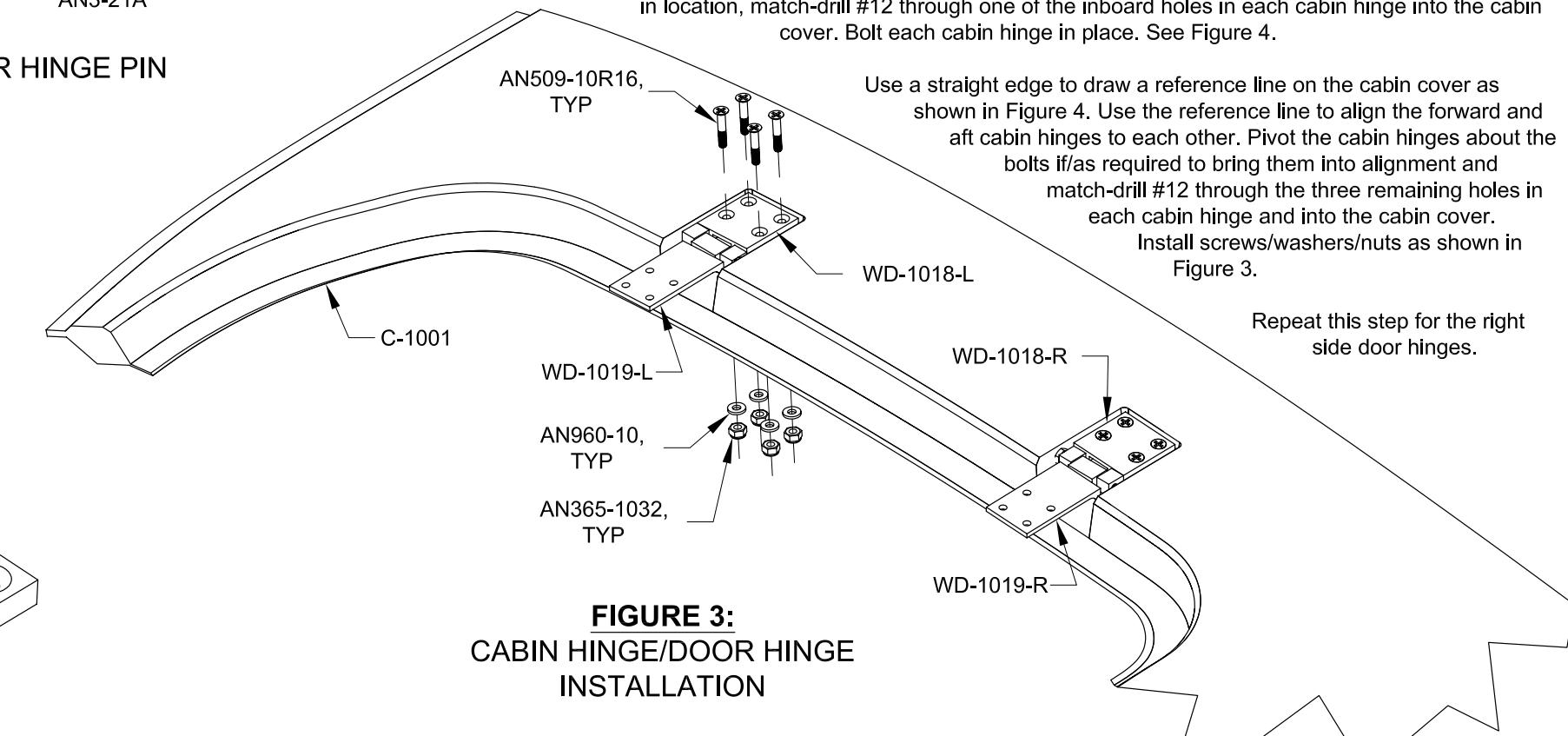
Step 2: Using the cut-off bolts as hinge pins, assemble the WD-1018-L Cabin Hinges to the WD-1019-L Door Hinges and assemble the WD-1018-R Cabin Hinges to the WD-1019-R Door Hinges as shown in Figure 2.



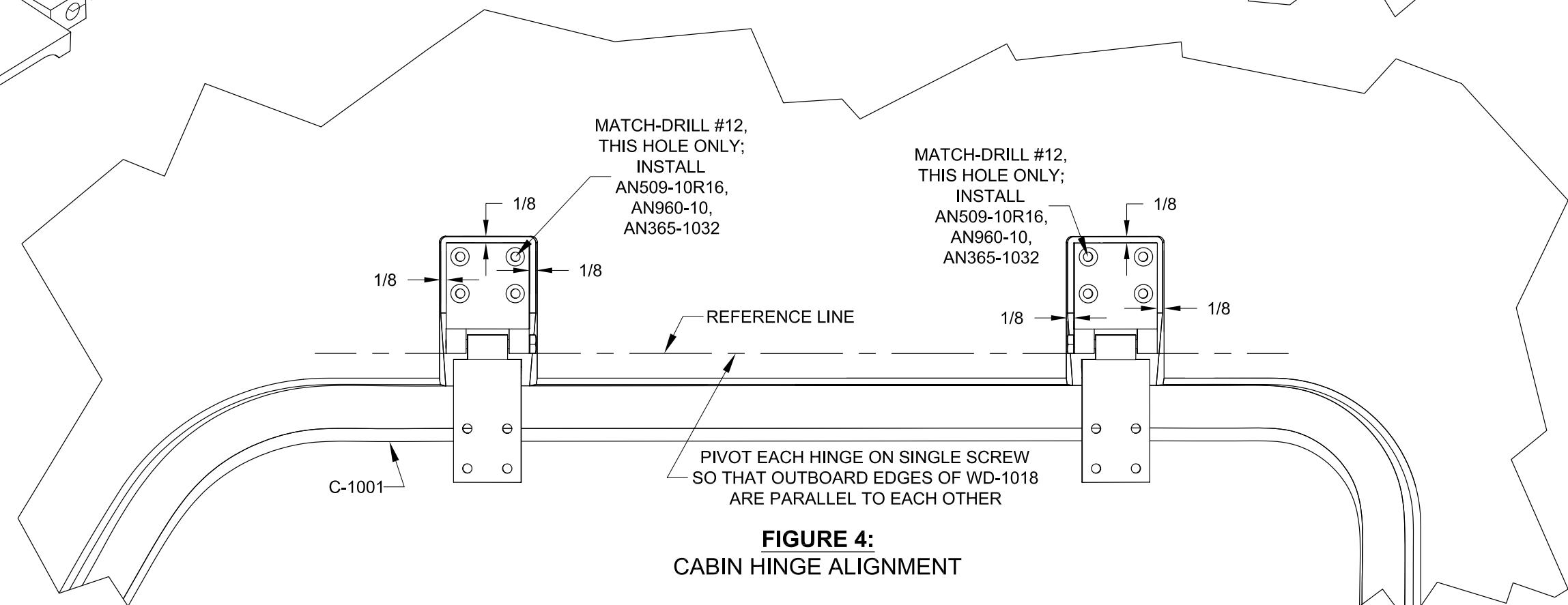
**FIGURE 1: CABIN DOOR HINGE PIN**

Step 3: Position the WD-1018-L Cabin Hinge/WD-1019-L Door Hinge subassembly in the forward pocket in the C-1001 Cabin Cover. Position the WD-1018-R Cabin Hinge/WD-1019-R Door Hinge subassembly in the aft pocket in the cabin cover. See Figure 3.

The WD-1018-L and -R Cabin Hinges are located on the cabin cover as shown in Figures 3 and 4. Use three .125 thick scrap aluminum spacers to locate each cabin hinge to the "walls" of the hinge pockets. With the cabin hinges held in location, match-drill #12 through one of the inboard holes in each cabin hinge into the cabin cover. Bolt each cabin hinge in place. See Figure 4.



**FIGURE 3:  
CABIN HINGE/DOOR HINGE  
INSTALLATION**



**FIGURE 4:  
CABIN HINGE ALIGNMENT**



Step 1: Place the C-1002-L Door on the fuselage and hold it in place with duct tape.

Step 2: Working from inside the cabin, match-drill #12 one of the outboard holes in each of the WD-1019 Door Hinges. Temporarily install a screw/washer/nut through the door hinge and C-1002-L Door as shown in Figure 1. Match-Drill #12 the remaining outboard hole in each door hinge and install screw/washer/nut.

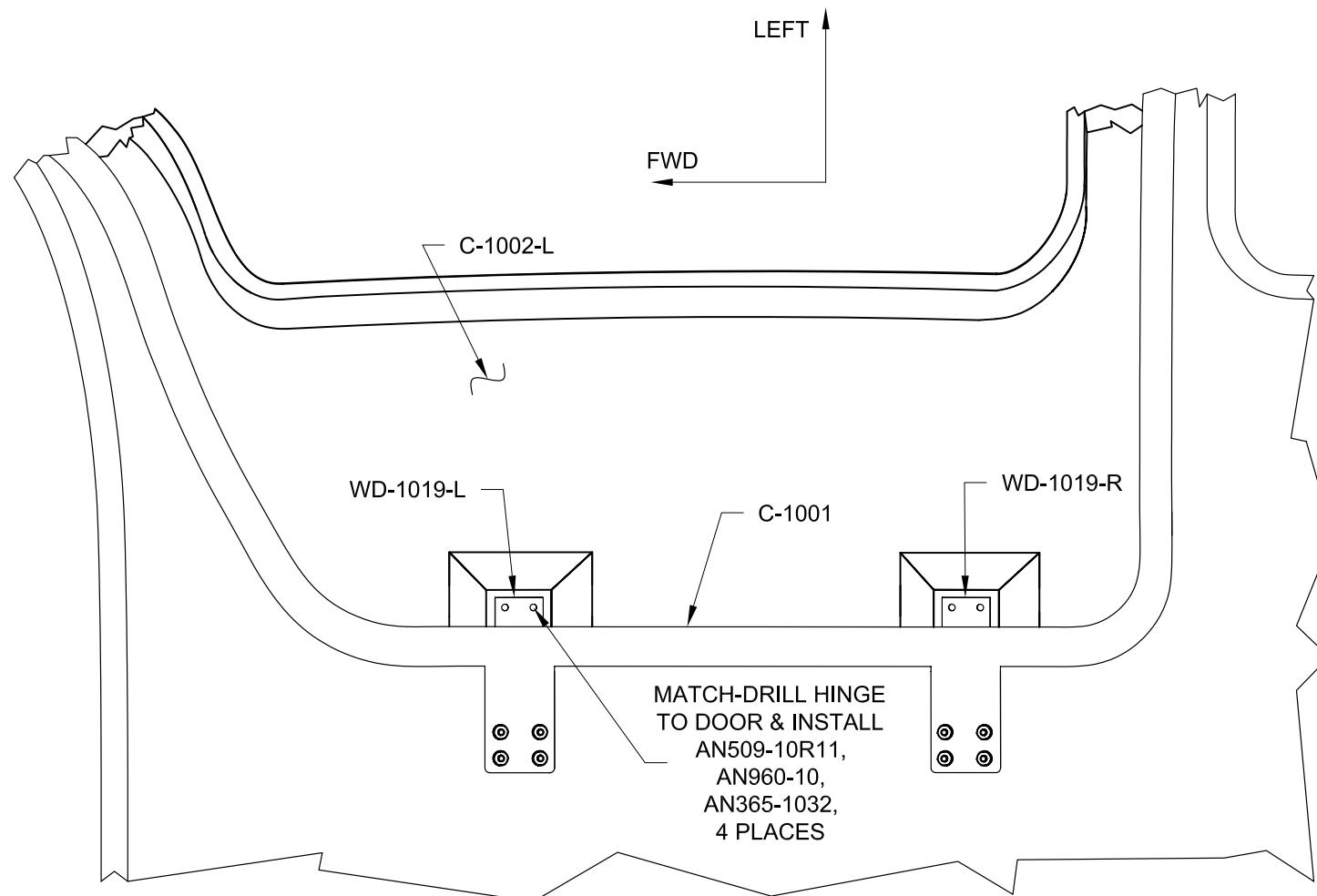
Step 3: Un-tape the C-1002-L Door, swing it open and match-drill #12 the remaining 2 holes in each WD-1019 Door Hinge as shown in Figure 2.

Machine countersink the outside surface of the door at the four open holes. Install screw/washer/nuts in countersunk holes. Remove screw/washer/nuts from the holes not yet countersunk and countersink the holes. Install screw/washer/nuts in the holes.

Close the door and see if it distorts. If the door wants to ride too low relative to the cabin cover shim between the inside surface of the door and WD-1019 Door Hinges.

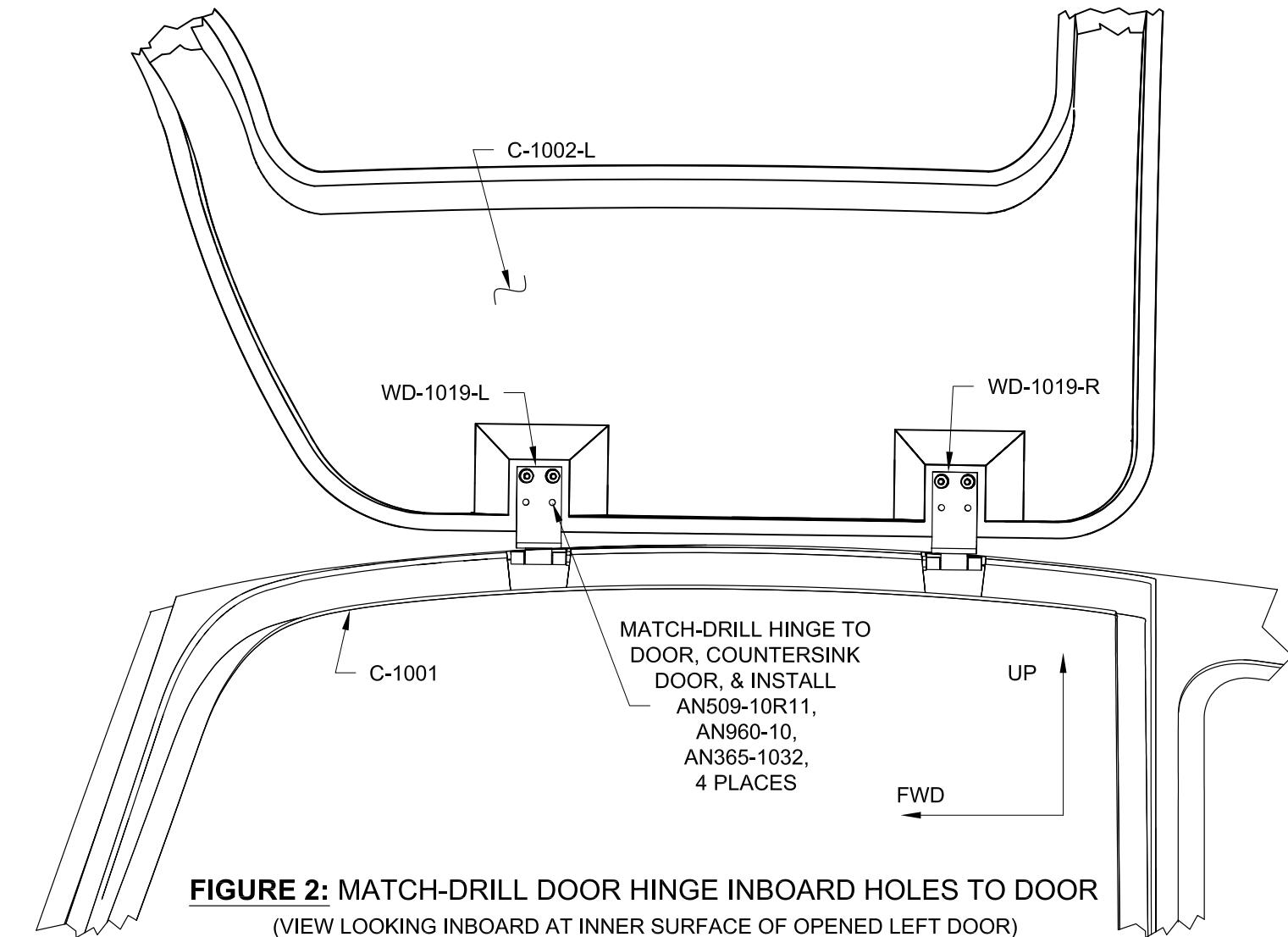
Step 4: Repeat Steps 1 through 3 for the C-1002-R Door.

Step 5: Remove the C-1002-L and C-1002-R Doors from the WD-1019-L/R Door Hinges.



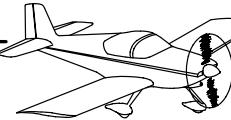
**FIGURE 1: MATCH-DRILL DOOR HINGE OUTBOARD HOLES TO DOOR**

(VIEW LOOKING UP AT INNER SURFACE OF CLOSED LEFT DOOR AND CABIN COVER)



**FIGURE 2: MATCH-DRILL DOOR HINGE INBOARD HOLES TO DOOR**

(VIEW LOOKING INBOARD AT INNER SURFACE OF OPENED LEFT DOOR)



Step 1: Initial trim the perimeter of the C-1003-L and C-1003-R Front Windows to the line marked on the windows. See Section 5U for guidelines on handling and trimming plexiglass.

Step 2: Test fit the C-1003-L Front Window to the C-1002-L Door as shown in Figures 1 and 2. Mark any areas of the front window outside perimeter which require further trimming in order to fit to the recess in the door. Final-Trim the perimeter of the front window as required to allow it to fit into the recess in the door. Small amounts of material are best removed with 80 to 100 grit sandpaper on a long (approximately 12 inches) sanding block.

Use the same process to fit the C-1003-R Front Window to the C-1002-R Door.

Step 3: Smooth the edges of the C-1003-L and C-1003-R Front Windows with 220 grit sandpaper to remove any scratches that could cause a crack to begin.

Step 4: Mask the inner and outer surfaces of the C-1003-L/R Front Windows except for a 3/4 inch wide strip around the perimeter where they overlap the C-1002-L/R Door window recesses. Scuff the mating surface of the windows and door recesses with 220 grit sandpaper.

Step 5: Re-fit the C-1003-L/R Front Windows to the recesses in the C-1002-L/R Doors. The thickness of the plexiglass will vary around the perimeter of each window. Shims can be used between the window and the door recess where required to raise the outer surface of the window to more closely match the outer surface of the door.

See Figure 2.

AN960-6 washers make very convenient shims.

The distance between adjacent shims need not be less than approximately 4 inches.

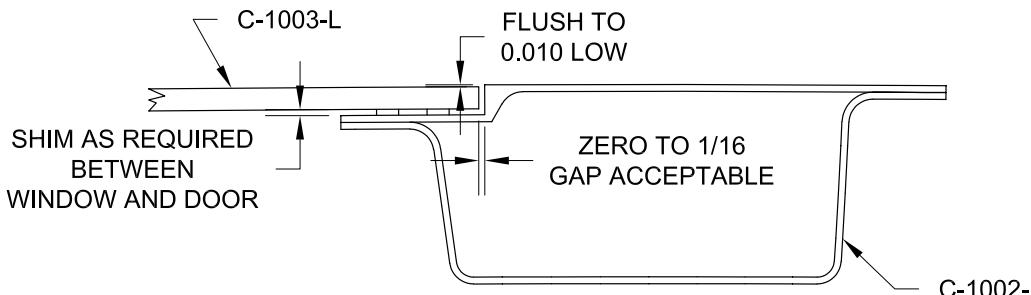
Use epoxy to glue the shims to the surface of the door recess.

**NOTE:** Van's Aircraft recommends the use of Weld-On 10 to attach all transparencies to the C-1001 Cabin Cover. Weld-On 10 is available from Van's Aircraft in 4 oz. kits. One 4 oz kit is required for each transparency.

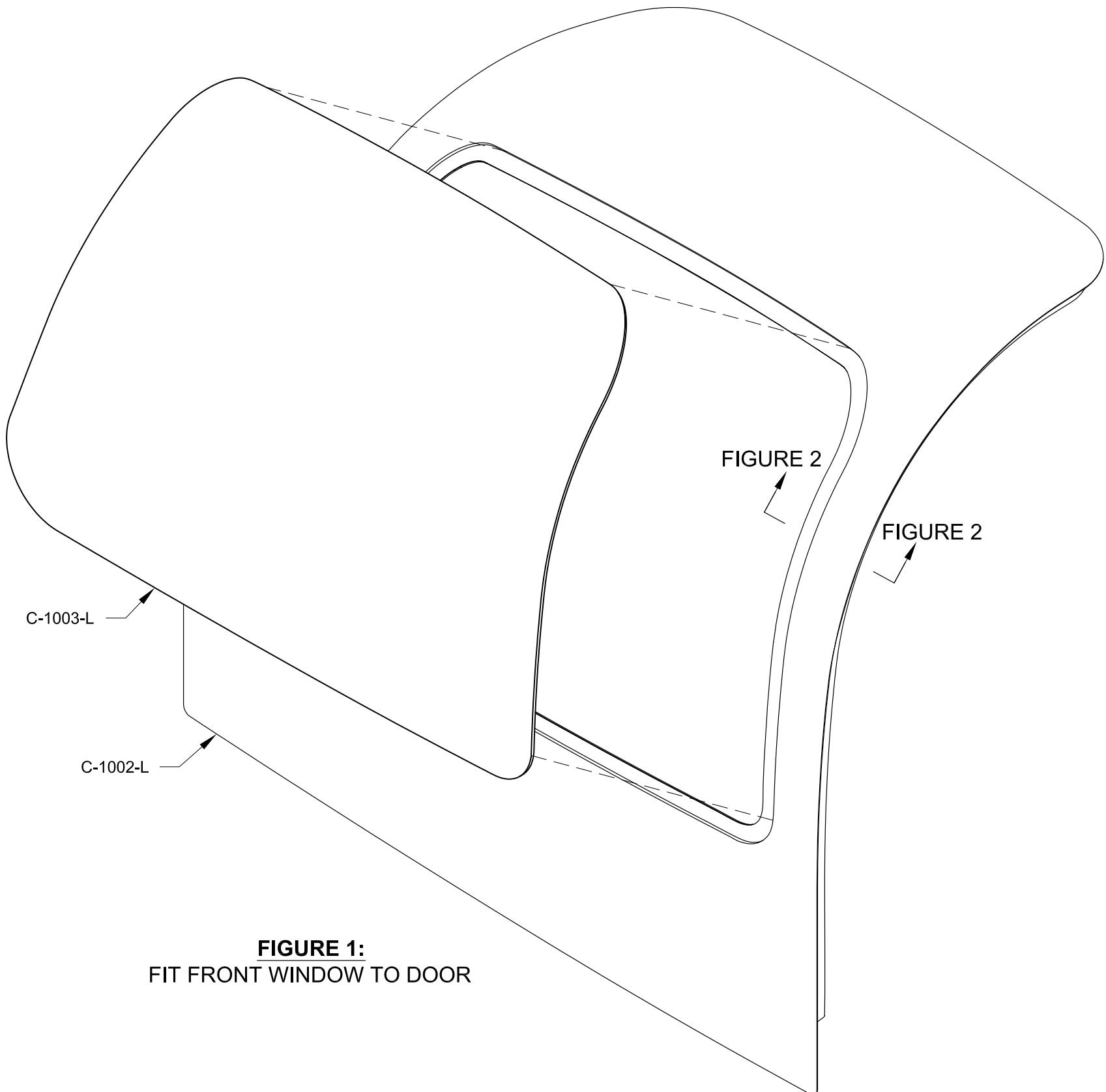
Step 6: Place the C-1002-L Door on a table or other flat surface with the window recess facing up.

Apply a thin layer of Weld-On 10 to the window recess portion of the door and remove any excess. Immediately place the C-1003-L Front Window in the window recess and seat it down onto the window recess and/or shims. Remove any excess glue that has squeezed-out and use a finger or popsickle stick to create a fillet of glue between the inside edge of the door recess and the inside surface of the front window. (Cured Weld-On 10 is very hard; any drips or sags will be difficult to remove later.) Use small weights or duct tape to hold the front window in place while the Weld-On 10 cures.

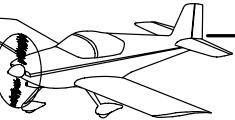
Repeat for the opposite side door and front window.



**FIGURE 2: SHIM WINDOW TO FIT DOOR RECESS**



**FIGURE 1:  
FIT FRONT WINDOW TO DOOR**



**Step 1:** Use a 1/2 inch diameter drill to make a center mark at the bottom of the hole in the C-656 Canopy Handle.

Using the center mark to keep the bit that is called-out in Figure 1 concentric to the existing hole, drill through the canopy handle as shown in Figure 1.

Drill a pilot hole located as shown in Figure 1.

Round the corners of the canopy handle as shown in Figure 1.

**Step 2:** Insert the WD-1022 Door Handle Assembly all the way into the C-656 Canopy Handle as shown in Figure 2.

Check that the surfaces of the door handle assembly and canopy handle are aligned as shown in Figure 2, then match-drill #29 through the door handle assembly using the hole in the canopy handle as a drill guide. Drill 1 inch deep as measured from the outside surface of the canopy handle.

**Step 3:** Remove the C-656 Canopy Handle from the WD-1022 Door Handle Assembly.

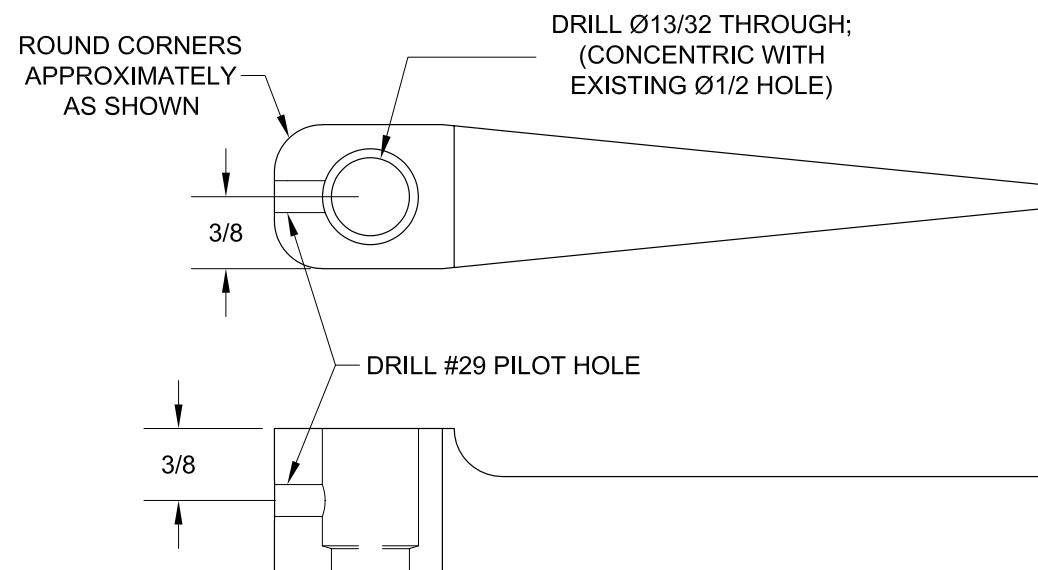
Final-Drill #19 the #29 holes through the door handle assembly then deburr the holes.

**Step 4:** Final-Drill #19 the #29 hole through the near side only of the canopy handle.

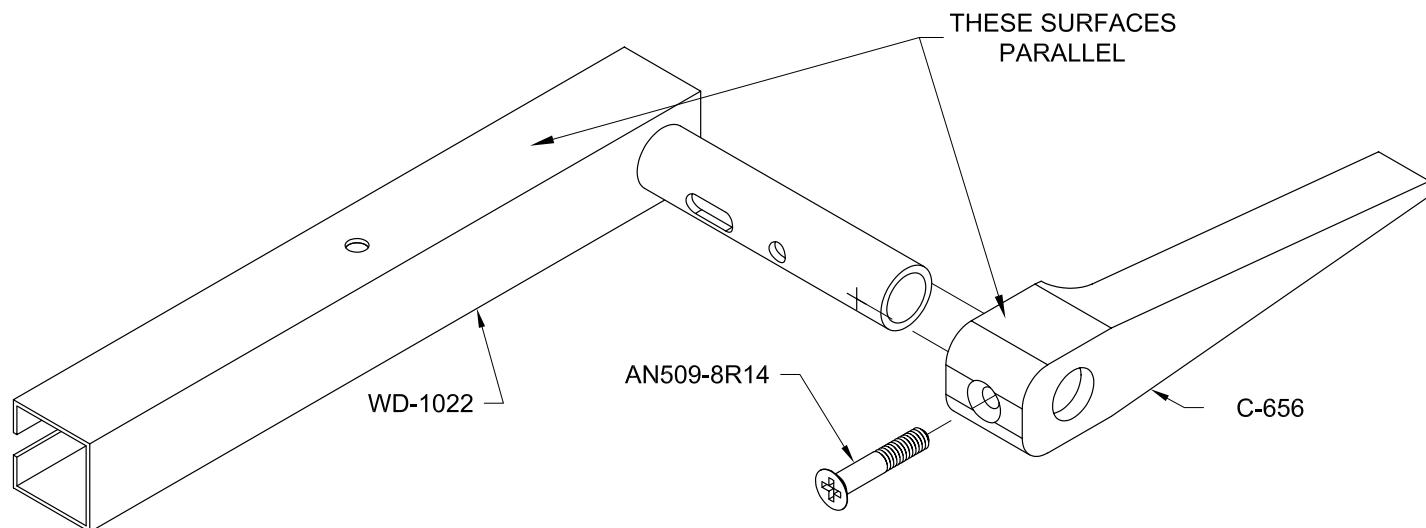
Tap the far side #29 hole using an 8-32 tap.

Countersink the canopy handle to fit the head of an AN509-8 screw. See Figure 2.

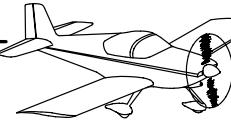
Test fit the AN509-8 screw into the canopy handle as shown in Figure 2. Drill and tap deeper if/as required for the screw to fully thread into the canopy handle.



**FIGURE 1: PREPARE CANOPY HANDLE**



**FIGURE 2:**  
MATCH-DRILL CANOPY HANDLE TO DOOR HANDLE ASSEMBLY



Step 1: Temporarily assemble the C-1006A Handle Plate, C-1006B & C-1006C Handle Pivots, C-1006D Handle Face Plate, C-1014 Handle Spur Gear, and WD-1022 Door Handle Assembly as shown in Figure 1. Align the edges of the handle plate, handle pivots, and handle face plate and match-drill #10 two places as shown in Figure 1. Remove the C-1006C Handle Pivot and the handle spur gear. Match-Drill #40 through the C-1006D Handle Face Plate, C-1006A Handle Plate, and C-1006B Handle Pivot four places as shown in Figure 1.

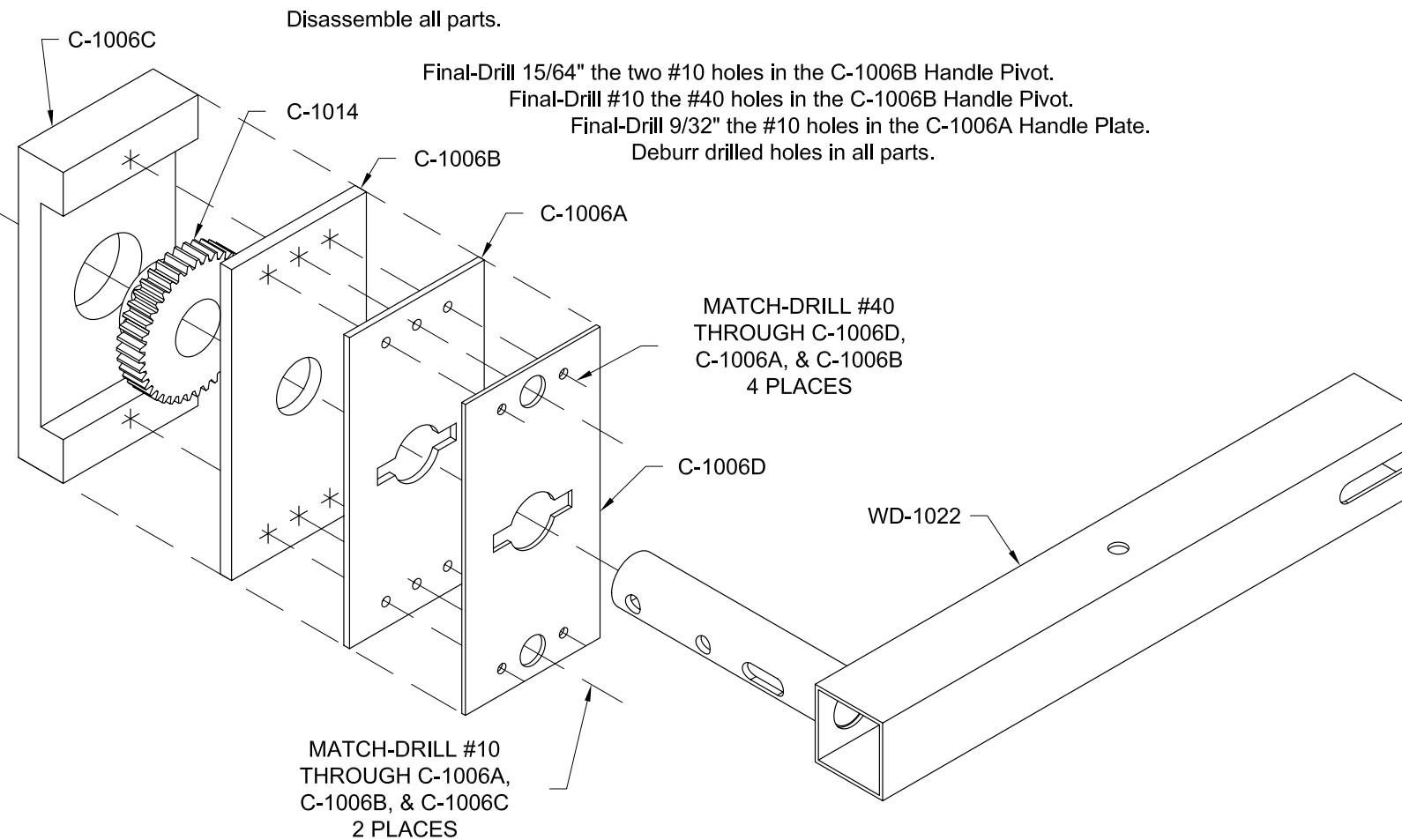
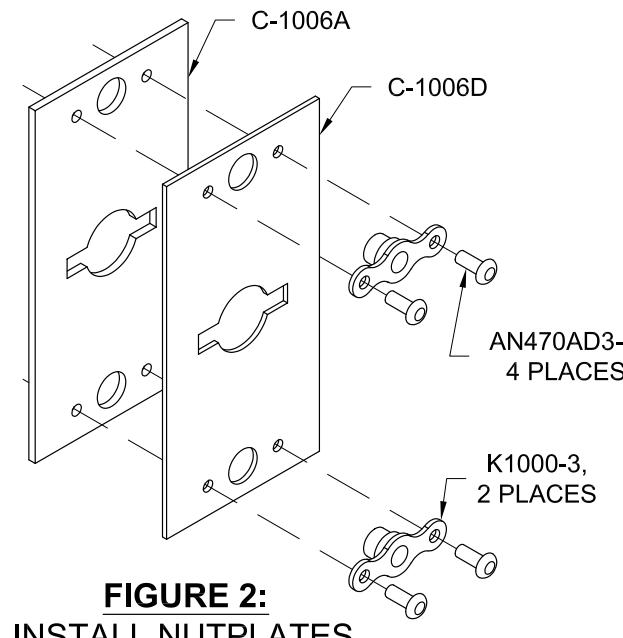


FIGURE 1: MATCH-DRILL HANDLE PLATES

Step 2: Rivet the C-1006A Handle Plate and C-1006D Handle Face Plate to each other and install nutplates as shown in Figure 2.

FIGURE 2:  
INSTALL NUTPLATES

Step 3: Final-Drill and round the corners of the narrow end of each C-1008 Handle Lever as shown in Figure 3. Smooth all edges of the handle levers.

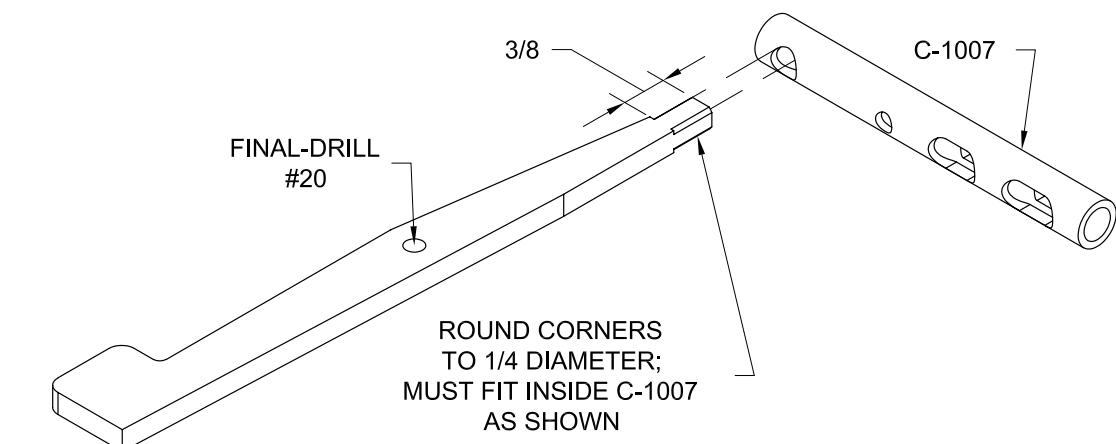
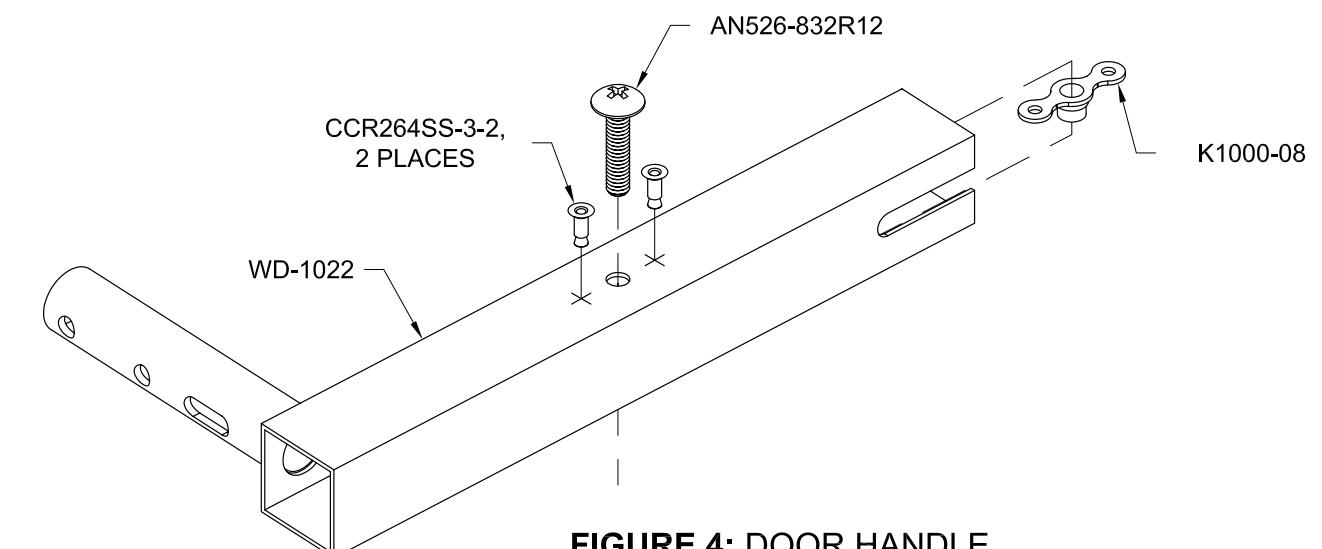
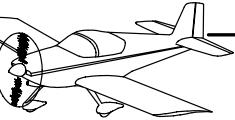


FIGURE 3: PREPARE HANDLE LEVER

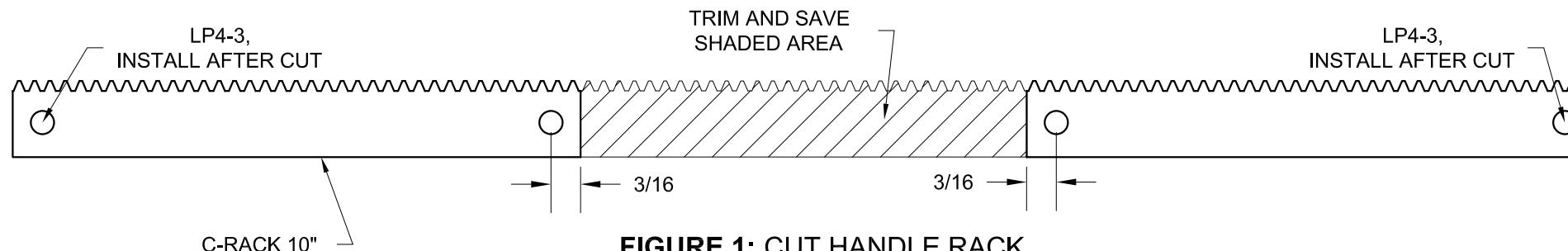
Step 4: Install a nutplate on the WD-1022 Door Handle Assembly as shown in Figure 4. Install a nutplate on the remaining door handle assembly on the side opposite that shown in Figure 4.

FIGURE 4: DOOR HANDLE  
NUTPLATE INSTALLATION



Step 1: Cut each C-RACK 10" Handle Rack into two pieces as shown in Figure 1.

Install a blind rivet into one end of each handle rack piece.

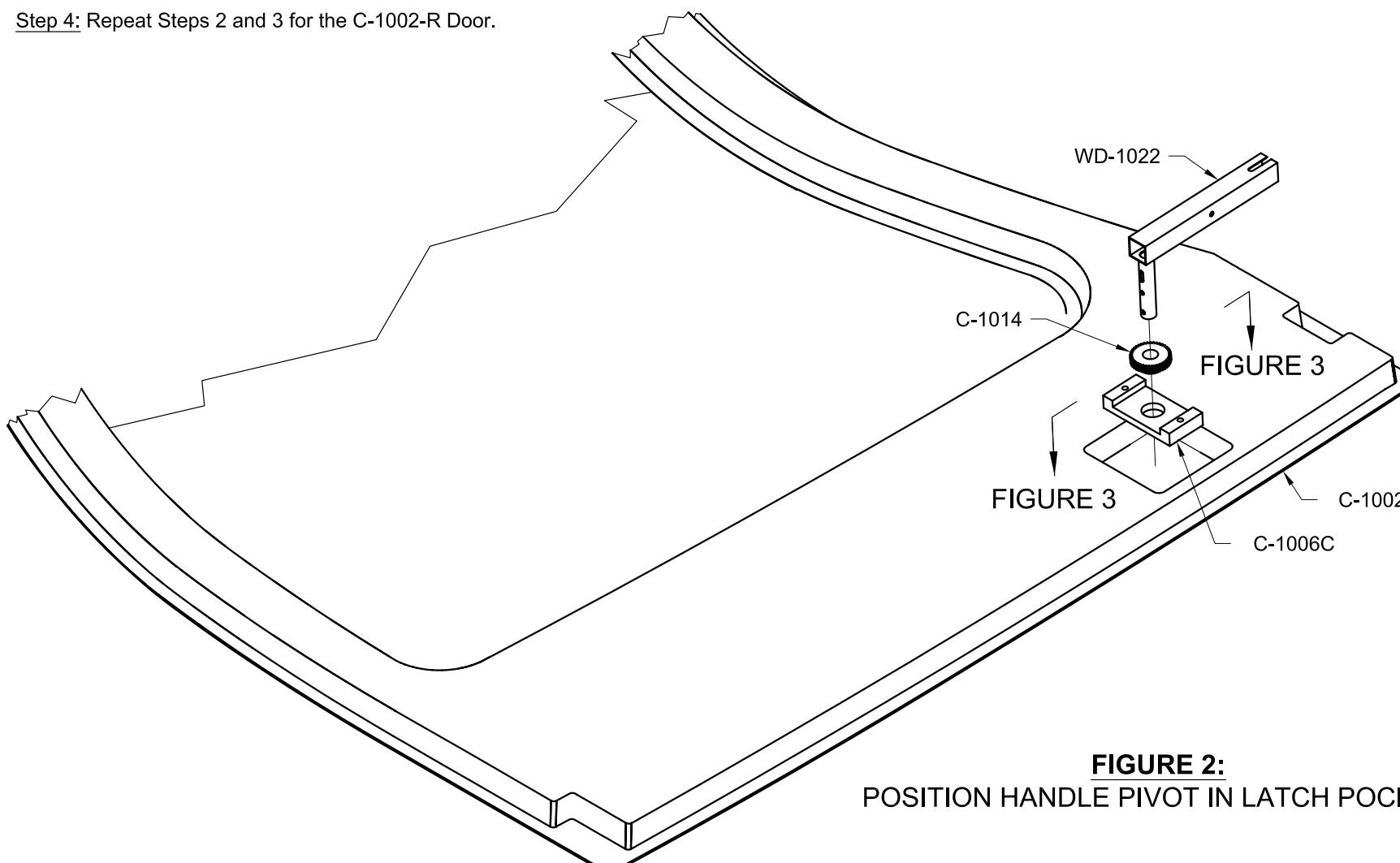


**FIGURE 1: CUT HANDLE RACK**

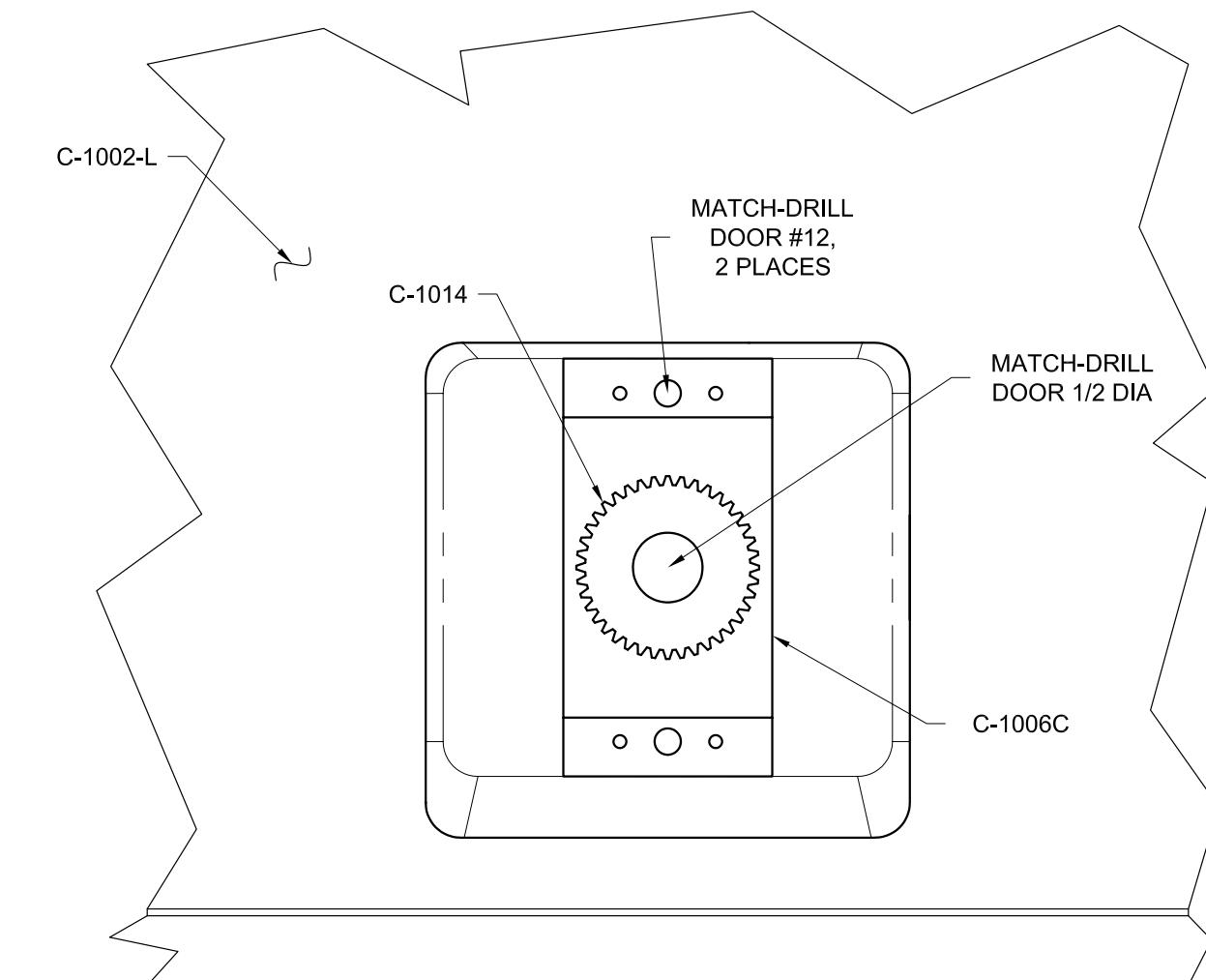
Step 2: Insert the C-1014 Handle Spur Gear into the C-1006C Handle pivot. Position the handle pivot/spur gear in the latch pocket of the C-1002-L Door as shown in Figure 2. Center the handle pivot in the latch pocket both vertically and fore/aft as shown in Figure 3. With the handle pivot held in position, match-drill a  $\frac{1}{2}$  inch diameter hole through the door using the handle spur gear as a drill guide. See Figure 3.

Step 3: Insert the WD-1022 Door Handle Assembly through the C-1014 Handle Spur Gear and through the hole just drilled through the C-1002-L Door. See Figure 2. This will hold the C-1006C Handle Pivot centered on the hole in the door. Re-check that the edges of the handle pivot are aligned with the edges of the latch pocket and match-drill #12 through the door using the holes in the handle pivot as drill guides. See Figure 3.

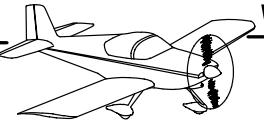
Step 4: Repeat Steps 2 and 3 for the C-1002-R Door.



**FIGURE 2:**  
POSITION HANDLE PIVOT IN LATCH POCKET



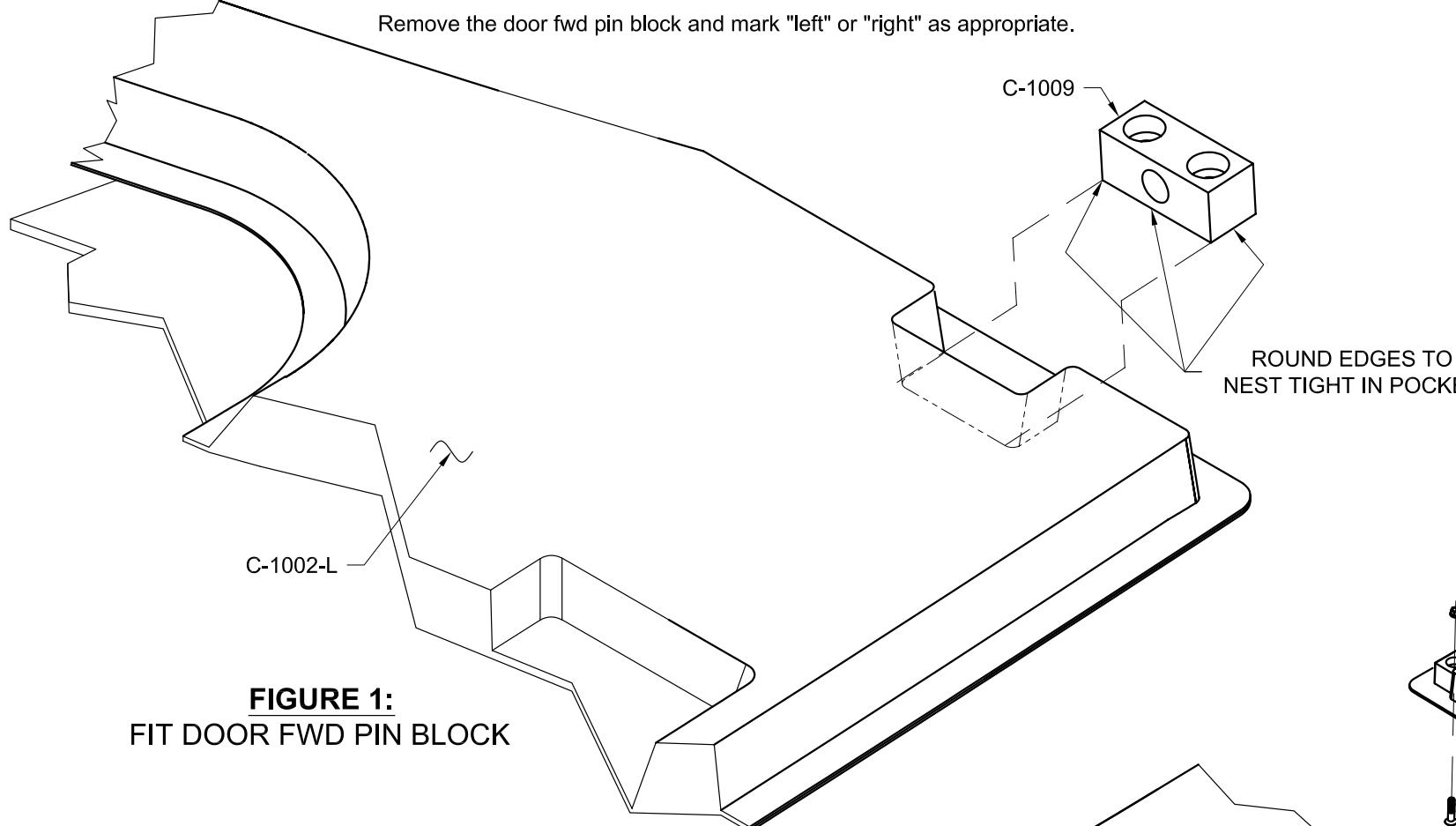
**FIGURE 3:**  
MATCH-DRILL HANDLE PIVOT TO DOOR



Step 1: Position the C-1009 Door Fwd Pin Block in the pocket in the C-1002-L Door as shown in Figures 1 and 3. Round the upper, aft, and lower outboard edges as required for the door fwd pin block to nest tightly against the door. The door forward pin block must not protrude beyond the forward "wall" of the door.

With the door fwd pin block held in place, match-drill #12 through the door using the holes in the door fwd pin block as drill guides.

Remove the door fwd pin block and mark "left" or "right" as appropriate.

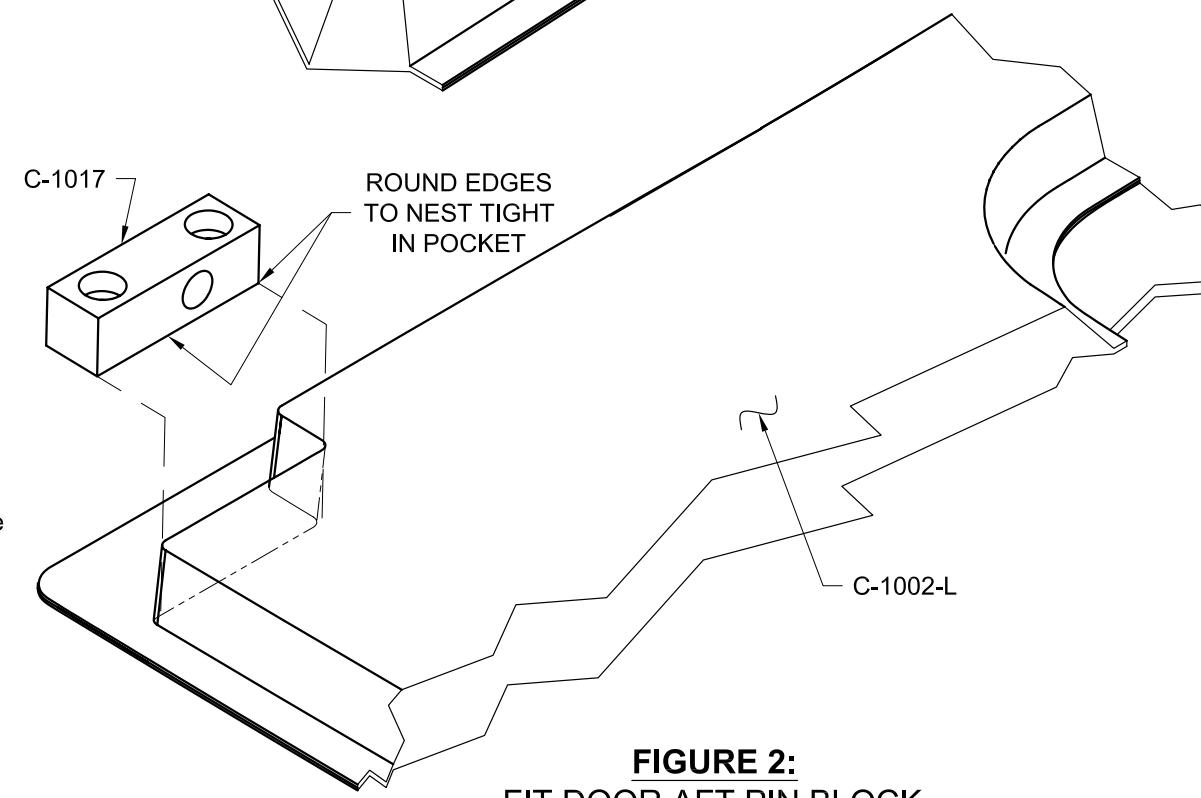


**FIGURE 1:**  
FIT DOOR FWD PIN BLOCK

Step 2: Position the C-1017 Door Aft Pin Block in the pocket in the C-1002-L Door as shown in Figures 2 and 3. Round the upper and fwd outboard edges as required for the door aft pin block to nest tightly against the door. The aft pin block must not protrude beyond the aft "wall" of the door.

With the door aft pin block held in place, match-drill #12 through the door using the holes in the door aft pin block as drill guides.

Remove the door aft pin block and mark "left" or "right" as appropriate.



**FIGURE 2:**  
FIT DOOR AFT PIN BLOCK

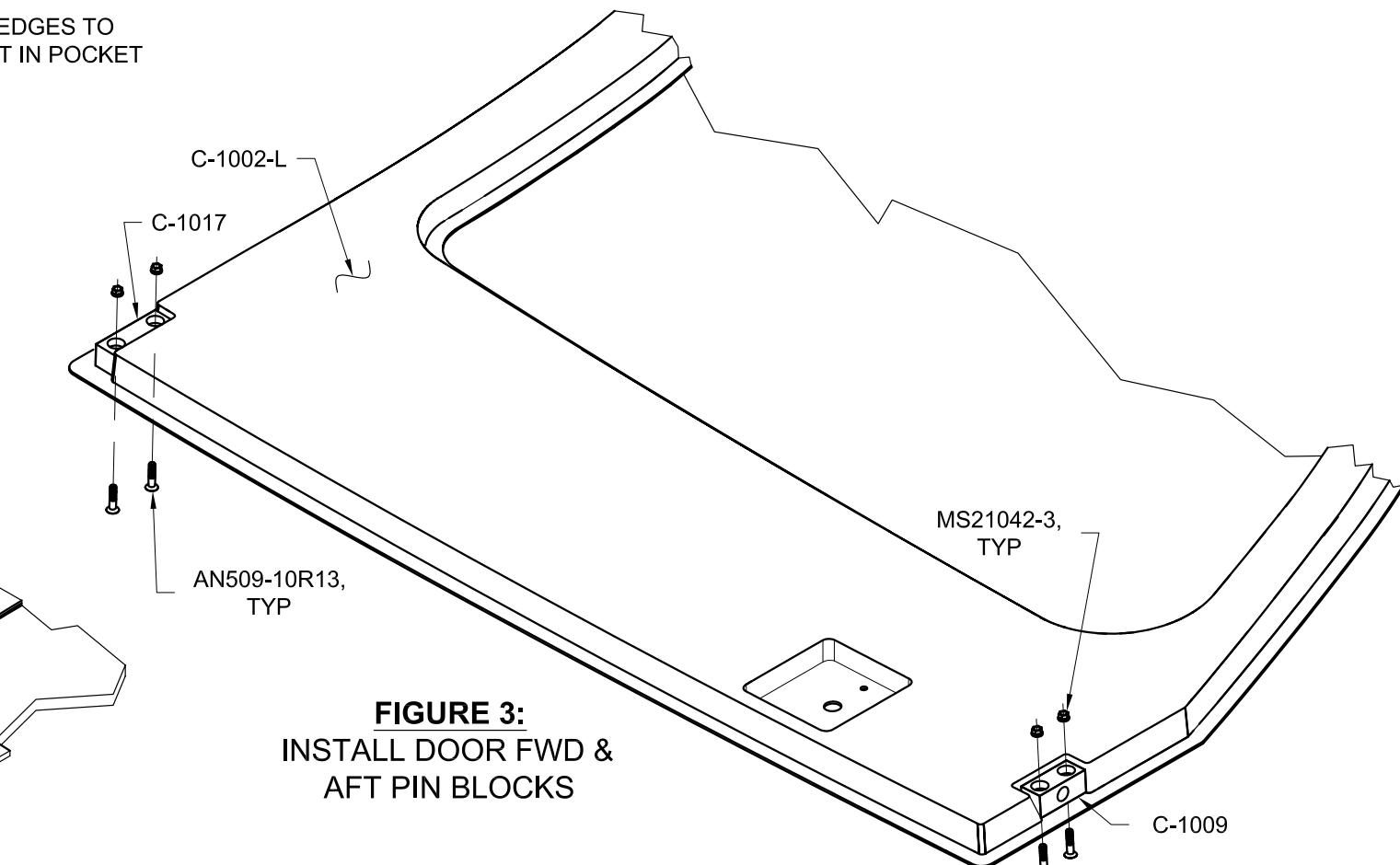
Step 3: Machine countersink the outer surfaces of the C-1002-L Door at all #12 holes (six places per door) to fit the head of an AN509-10 screw. It is better to under-countersink by .010 to .015 depth at this point in construction.

Step 4: Attach the C-1009 Door Fwd Pin Block and C-1017 Door Aft Pin Block to the C-1002-L Door as shown in Figure 3.

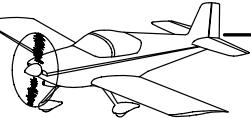
Match-Drill 7/16 into the "walls" of the door using the holes in the pin blocks as drill guides. Remove the fwd and aft pin blocks. Enlarge the 7/16 holes to 15/32 or 1/2.

Re-install the fwd and aft pin blocks.

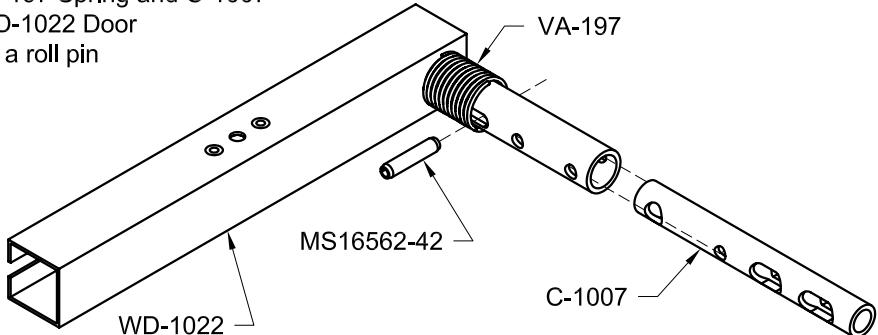
Step 5: Repeat Steps 1 through 4 for the right side door.



**FIGURE 3:**  
INSTALL DOOR FWD &  
AFT PIN BLOCKS



Step 1: Secure the VA-197 Spring and C-1007 Handle Slide to the WD-1022 Door Handle Assembly with a roll pin as shown in Figure 1.

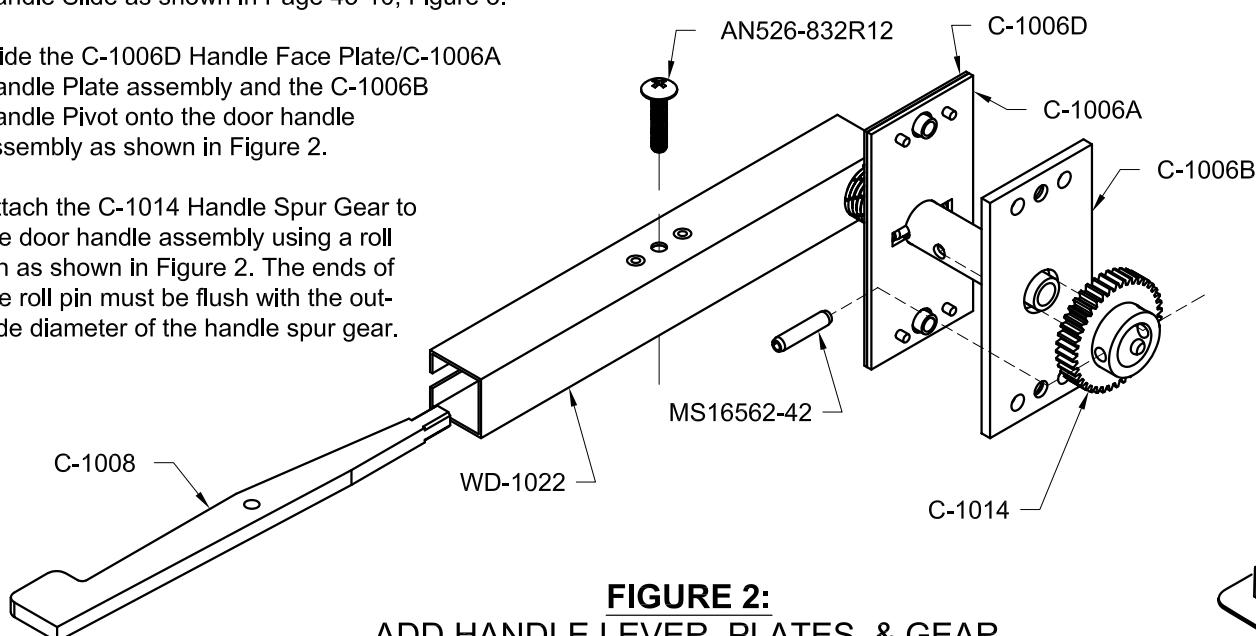


**FIGURE 1: BEGIN LATCH MECHANISM ASSEMBLY**

Step 2: Secure the C-1008 Handle Lever to the WD-1022 Door Handle Assembly with a screw as shown in Figure 2. When the handle lever is secured in place, the narrow end must engage the opening in the C-1007 Handle Slide as shown in Page 45-10, Figure 3.

Slide the C-1006D Handle Face Plate/C-1006A Handle Plate assembly and the C-1006B Handle Pivot onto the door handle assembly as shown in Figure 2.

Attach the C-1014 Handle Spur Gear to the door handle assembly using a roll pin as shown in Figure 2. The ends of the roll pin must be flush with the outside diameter of the handle spur gear.



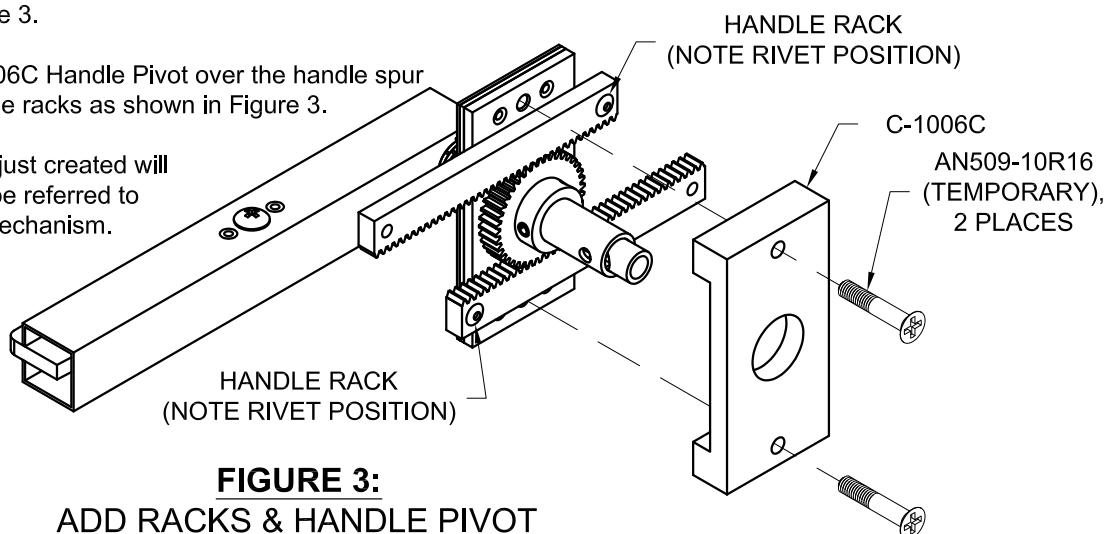
**FIGURE 2:**  
ADD HANDLE LEVER, PLATES, & GEAR

**NOTE:** For the Initial assembly of the Latch Mechanism shown in Figure 3 temporarily install the Rack Trimmings (see Page 45-11, Figure 1) rather than the handle racks.

Step 3: Place two Handle Racks on the C-1014 Handle Spur Gear as shown in Figure 3.

Slide the C-1006C Handle Pivot over the handle spur gear and handle racks as shown in Figure 3.

The assembly just created will subsequently be referred to as the Latch Mechanism.



**FIGURE 3:**  
ADD RACKS & HANDLE PIVOT

Step 4: Attach the Latch Mechanism to the C-1002-L Door as shown in Figure 4.

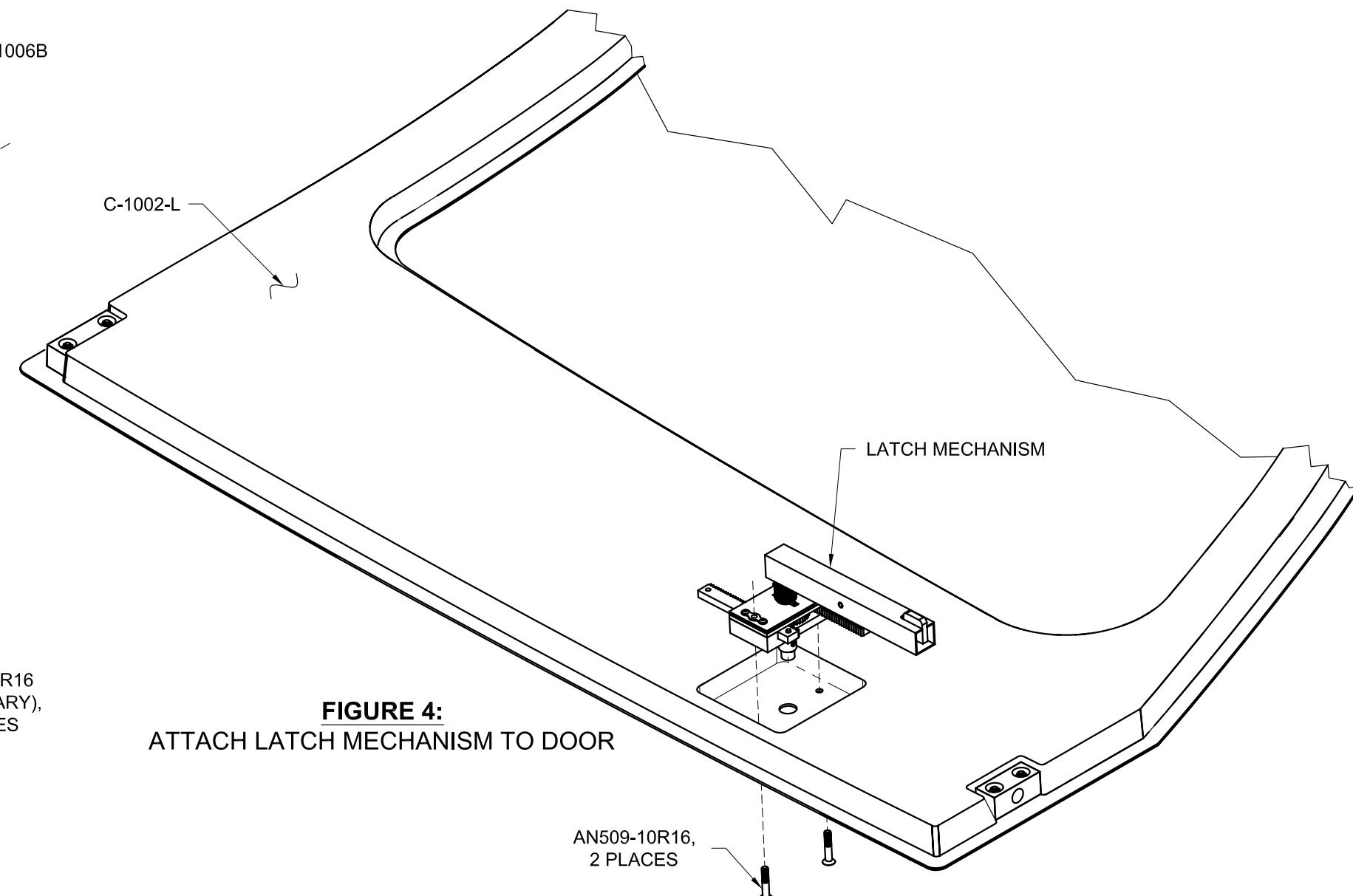
Operate the latch mechanism so as to cause the Rack Trimmings to extend fore and aft from the latch mechanism and lightly contact the walls of the latch pocket.

Mark the walls of the latch pocket around the ends of the rack trimmings. Retract the rack trimmings and remove the latch mechanism from the door.

Drill 1/2 inch diameter (minimum) holes in the walls of the latch pocket. Temporarily re-attach the latch mechanism to the door and operate the latch mechanism. Check that the holes in the walls of the latch pocket will clear the ends of the rack trimmings. Enlarge the holes in the walls of the latch pocket if/as required to allow the ends of the rack trimmings to pass through with clearance of 1/16 to 1/8.

Remove the latch mechanism and replace the rack trimmings with the Handle Racks (created per Page 45-11, Step 1) as shown in Figure 3. Because of the size of the latch pocket in the door and the length of the handle racks, the latch mechanism must be assembled "in-position" in the latch pocket.

Step 5: Repeat the Latch Mechanism assembly (Steps 1 through 3) and installation (Step 4) for the right side door.

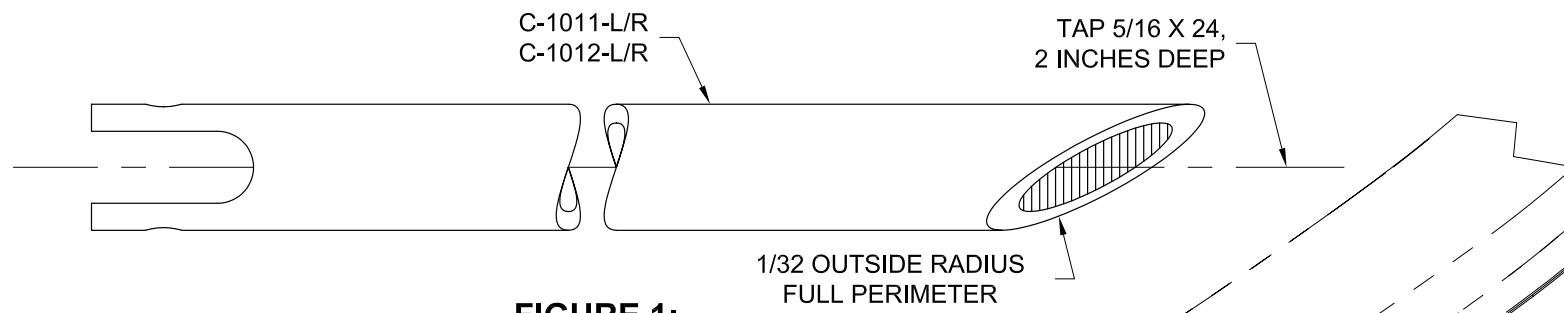


**FIGURE 4:**  
ATTACH LATCH MECHANISM TO DOOR

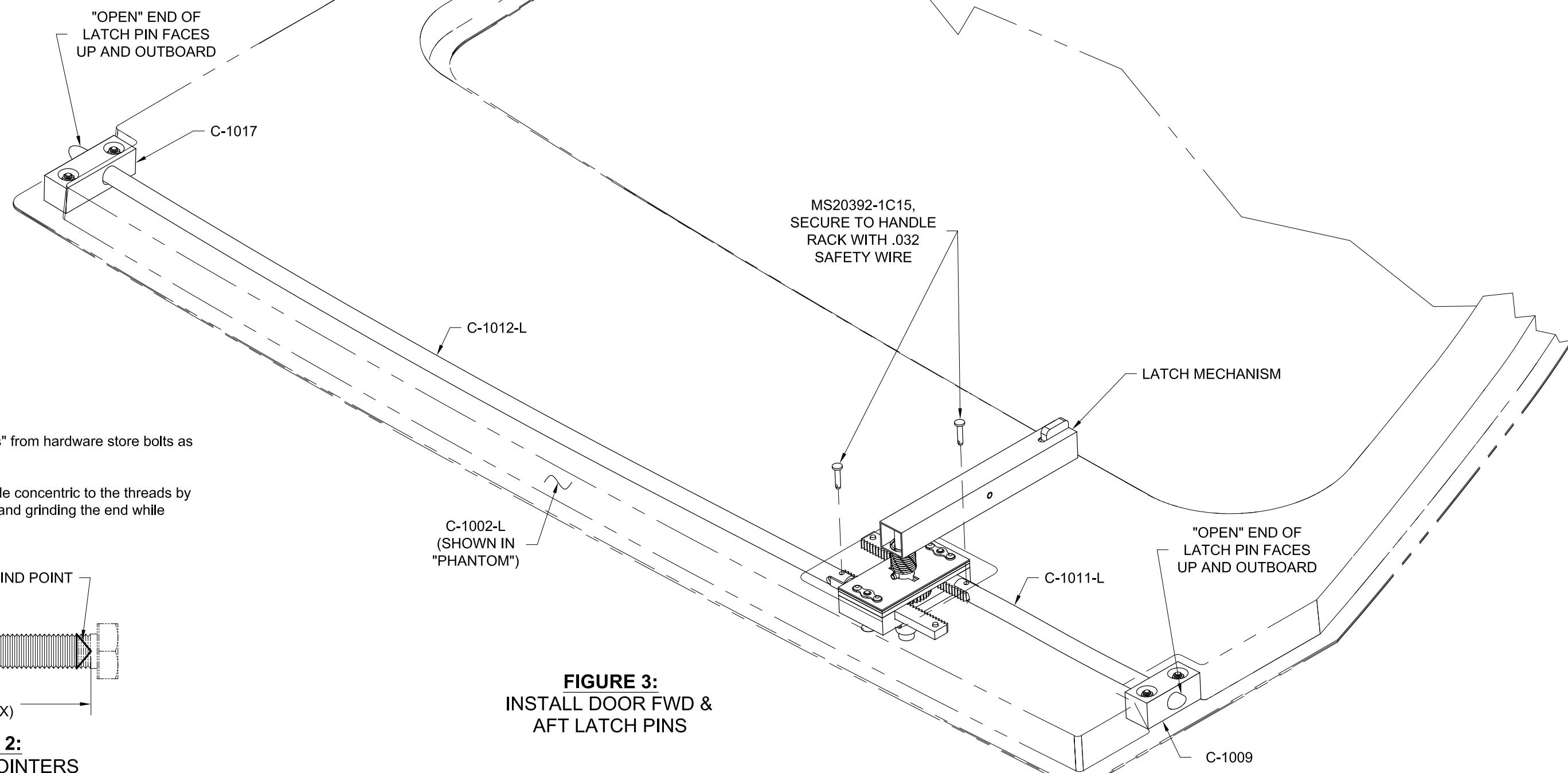


## VAN'S AIRCRAFT, INC.

Step 1: Tap the inside diameter of the beveled end of the C-1011-L/R Forward Latch Pins and C-1012-L/R Aft Latch Pins as shown in Figure 1. Radius the full perimeter of the outside edge of the beveled end of the forward and aft latch pins as shown in Figure 1.



**FIGURE 1:**  
TAP LATCH PINS



Step 2: Create two "pointers" from hardware store bolts as shown in Figure 2.

The point can easily be made concentric to the threads by using an electric drill motor and grinding the end while turning the bolt in the drill.

**FIGURE 3:**  
INSTALL DOOR FWD &  
AFT LATCH PINS

Step 3: Establish proper orientation of the C-1012-L Aft Latch Pin. See Figure 3.

Bend the aft latch pin to match the contour of the door lower edge. The goal of the bending is to have the forward end of the aft latch pin parallel to the lower Handle Rack while the aft end of the aft latch pin is parallel to the hole in the C-1017 Door Aft Pin Block.

Insert the aft latch pin into the door through the door aft pin block and attach it to the lower handle rack using the hardware shown in Figure 3.

Step 4: Establish proper orientation of the C-1011-L Fwd Latch Pin. See Figure 3.

Bend the fwd latch pin to match the contour of the door lower edge. The goal of the bending is to have the aft end of the fwd latch pin parallel to the upper Handle Rack while the forward end of the fwd latch pin is parallel to the hole in the C-1009 Door Fwd Pin Block.

Insert the fwd latch pin into the door through the door fwd pin block and attach it to the upper handle rack using the hardware shown in Figure 3.

Step 5: Attach the door to the fuselage.



Step 1: Attach each C-656 Canopy Handle to its Latch Mechanism. See Page 45-09, Figure 2.

Step 2: Thread the pointers into the ends of the C-1011-L and C-1012-L latch pins.

Close the C-1002-L Door and hold closed such that the surface of the door is flush with the surface of the fuselage. With the door held closed, operate the latch mechanism to run the pointers into the door jambs with sufficient force to make definite marks in the composite door jambs of the C-1001 Cabin Cover.

Open the door and hold open.

Drill 7/16 holes through the fuselage structure using the pointer marks as a drill guide. The axis of each hole should be parallel to the outer surface of the fuselage. A straight edge held against the fuselage skin adjacent to the pointer mark in the door jamb can provide a parallelism reference when drilling.

Deburr the holes in the fuselage structure.

Repeat this step for the right side door.

Step 3: Drill holes in and center punch all four C-1010 Cabin Pin Blocks as shown in Figure 1.

Hold each cabin pin block in the door jamb by using a 3 to 6 inch long piece of 7/16 tubing inserted through the cabin pin block and into the hole in the fuselage structure. Align the long edges of the cabin pin blocks to be parallel to the door jamb. See Figure 2. Each cabin pin block is oriented properly when the center punch marks are INBOARD of the 7/16 diameter hole.

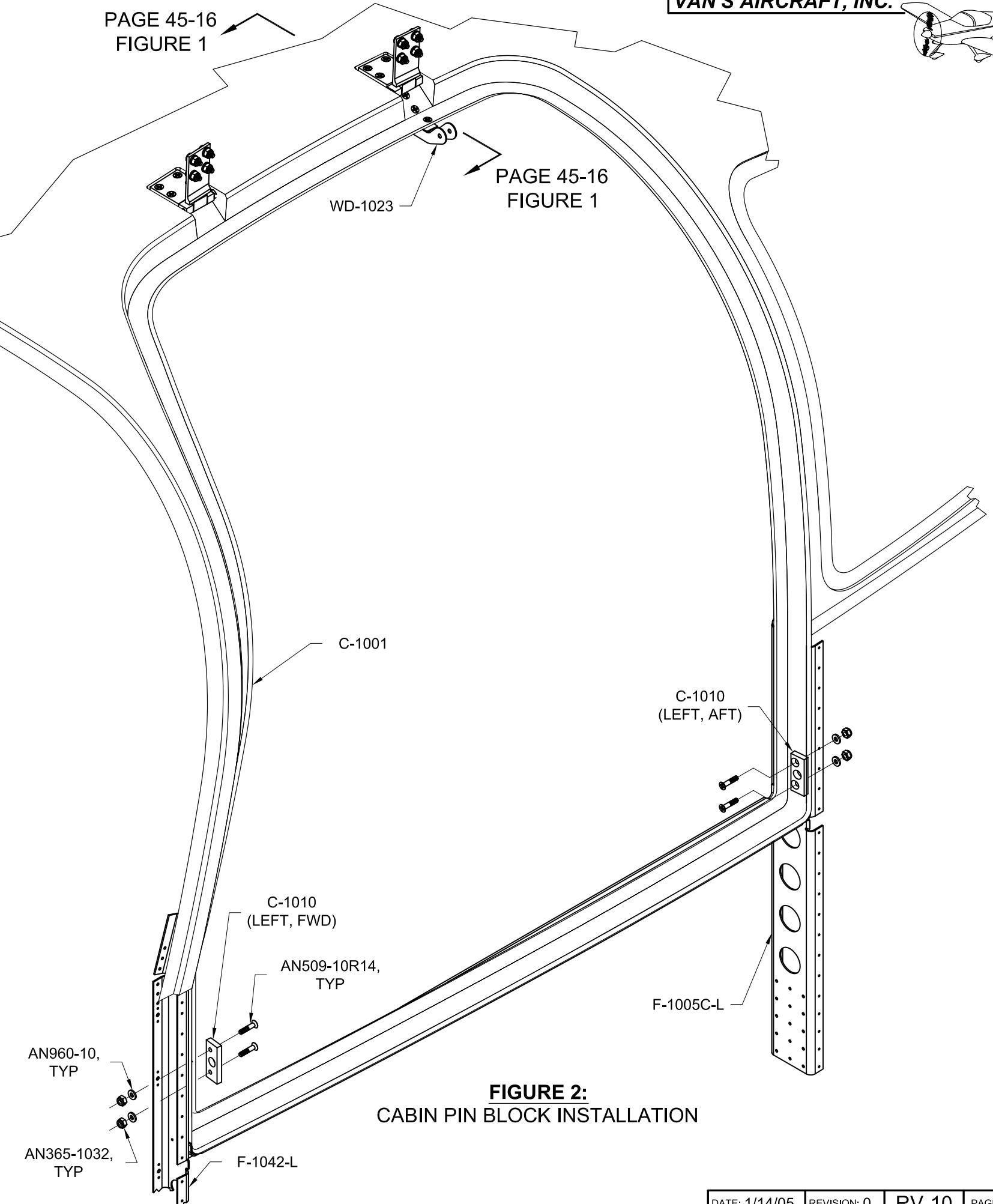
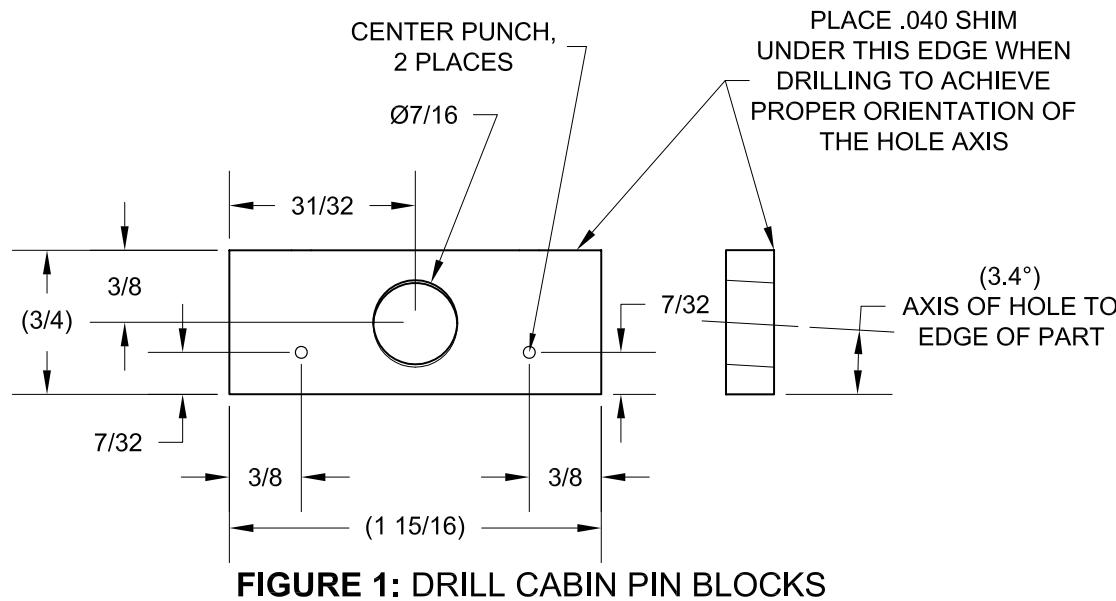
With each cabin pin block held in position, drill #12 two places through the cabin pin block and fuselage structure. The holes are located at the center punch marks in the cabin pin block. The axis of the holes must be parallel to the fore/aft axis of the airplane, not perpendicular to the door jamb surface. Mark each cabin pin block "right" or "left", and "fwd" or "aft" so that they are installed in the same location and orientation as when they were drilled. Set each cabin pin block aside after drilling.

Deburr the holes in the fuselage structure.

Run a #10 drill through the holes in the cabin pin blocks. Machine countersink each cabin pin block for the head of a #10 flush screw.

Attach the cabin pin blocks to the fuselage structure as shown in Figure 2.

Check for proper operation of each door latching mechanism.





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Step 1: Position the WD-1023 Gas Strut Attach Bracket on the C-1001 Cabin Cover as shown on Page 45-15, Figure 2, and as shown in Figures 1 and 2. The gas strut attach bracket inboard/outboard position is determined by the point of "best-fit" to the cabin cover. The gas strut attach bracket is centered fwd/aft on the door hinge.

With the gas strut attach bracket held in place, match-drill #12 through the cabin cover using the holes in the gas strut attach bracket as drill guides. Install a temporary screw/washer/nut in each hole as it is drilled to hold the gas strut attach bracket in position while the remaining holes are match-drilled.

Remove the gas strut attach bracket and deburr the holes that were just match-drilled.

Machine countersink the holes in the cabin cover to fit the head of an AN509-10 screw as shown in Figure 1.

Final install the gas strut attach bracket using the hardware called-out in Figure 1.

**Step 2:** Fabricate a Bracket Locating Bar out of 1/8 to 1/2 inch thick metal/plastic/wood as shown in Figure 3. Material is not provided in the kit. The bar simulates the compressed C-1016 Gas Strut and is used instead of the gas strut to locate the C-1013 Gas Strut Attach Brackets on the inner surface of the C-1002-L/R Door.

**Step 3:** Fabricate four C-1016B Bushings from AT6-058 x 5/16 as shown in Figure 4.

**Step 4:** Break apart the C-1013 Gas Strut Attach Bracket into its two halves and smooth the edges.

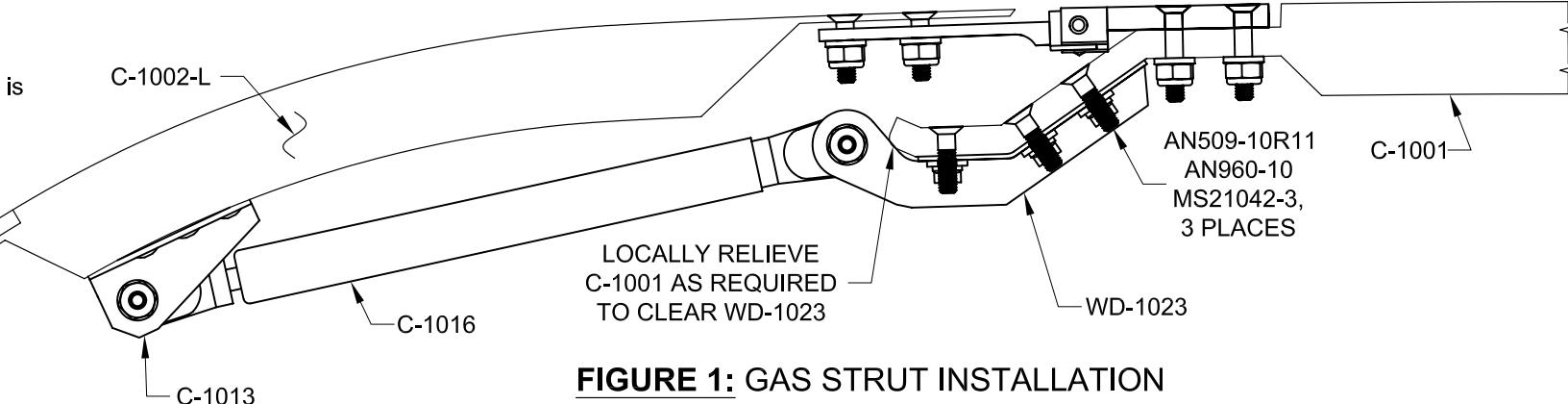
Insert a C-1016B Bushing in each end of the Bracket Locating Bar and attach the gas strut attach brackets to the bar using the AN3 bolt/washer/nut called-out in Figure 2.

Attach the bracket locating bar to the WD-1023 Gas Strut Attach Bracket using the AN3 bolt/washer/nut called-out in Figure 2.

Close the C-1002-L/R Door and latch it closed. Rotate the bracket locating bar up until the gas strut attach brackets rest against the inner surface of the door. With the gas strut attach brackets held in place as shown in Figures 1 and 2, match-drill #30 and cleco to the door using the holes in the gas strut attach brackets as drill guides.

Remove the bracket locating bar and remove the gas strut attach brackets and bushings

Deburr the holes of the C-1013 Gas Strut Attach Brackets. Prime if/as desired.



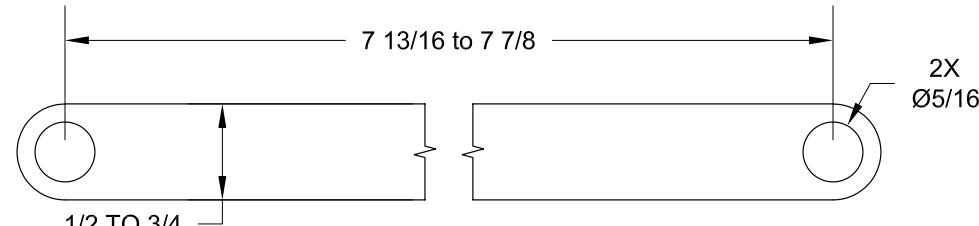
**FIGURE 1: GAS STRUT INSTALLATION**

(SECTION THROUGH CLOSED LEFT DOOR AND CABIN COVER AT CENTER OF AFT DOOR HINGE)

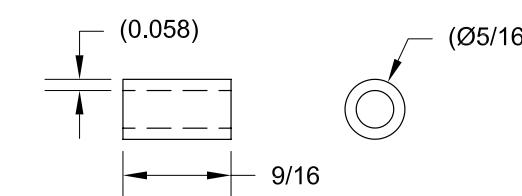
Close the C-1002-L/R Door and latch it closed. Rotate the bracket locating bar up until the gas strut attach brackets rest against the inner surface of the door. With the gas strut attach brackets held in place as shown in Figures 1 and 2, match-drill #30 and cleco to the door using the holes in the gas strut attach brackets as drill guides.

Remove the bracket locating bar and remove the gas strut attach brackets and bushings

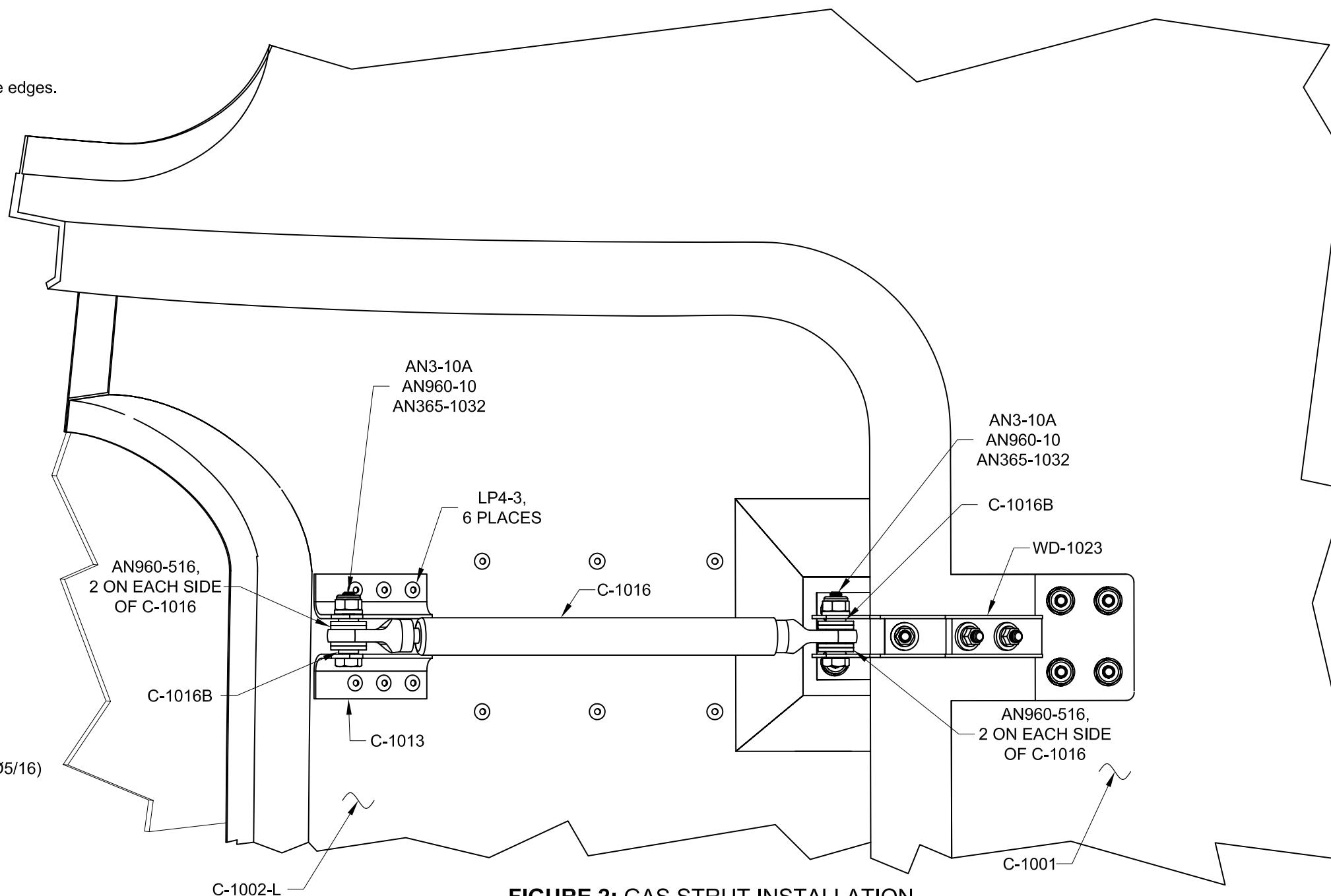
Deburr the holes of the C-1013 Gas Strut Attach Brackets. Prime if/as desired.



**FIGURE 3:**  
BRACKET LOCATING BAR

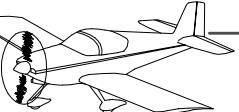


**FIGURE 4: BUSHING**



**FIGURE 2: GAS STRUT INSTALLATION**

(VIEW LOOKING UP AT INNER SURFACE OF CLOSED LEFT DOOR AND CABIN COVER)



Step 1: Remove the C-1002-L/R Doors from the fuselage. Complete the tasks described on Page 45A-02, Step 1 through Page 45A-07, Step 5.

Step 2: Remove all latch mechanism parts from the doors.

Finish-out the fiberglass surfaces of the doors that are on the interior of the cabin. See Section 5T, Fiberglass.

Blind rivet the C-1013 Gas Strut Attach Brackets to the C-1002-L/R Door as shown on Page 45-16, Figure 2.

Final paint the inner surface of the door.

Re-install all latch mechanism parts to the doors.

Step 3: The VA-198 Door Seal is installed as one continuous length of extruded rubber that begins/ends anywhere on the bottom edge of the C-1002-L/R Door, but not closer than 6 inches to either the forward or aft corner. The door seal is attached to the door as shown in Figures 1 and 2.

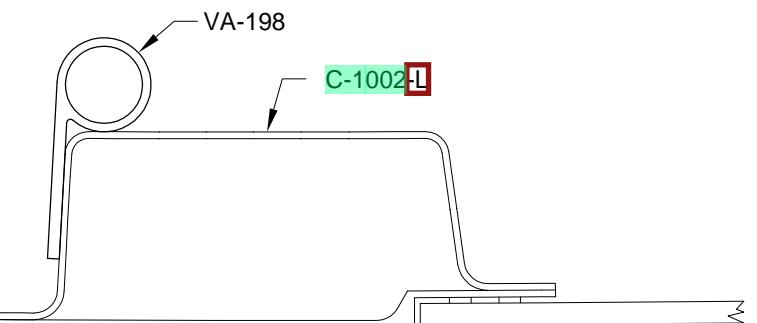
The door seal is glued to the door with a clear silicone sealant. (Van's aircraft used 3M "Super Silicone Sealant, Clear" supplied in semi-rigid tube form for use with a caulking gun.) Clecos are used every two to three inches to hold the door seal in place while the glue cures. Strips of scrap .025 or .032 aluminum 1 inch wide by 2 1/2 to 3 1/2 inches long are used to spread the cleco clamping pressure more evenly over the door seal.

Step 4: Fabricate the Fwd Latch Pin Plate and Aft Latch Pin Plate from pieces of scrap .032 aluminum as shown in Figures 3, and 4.

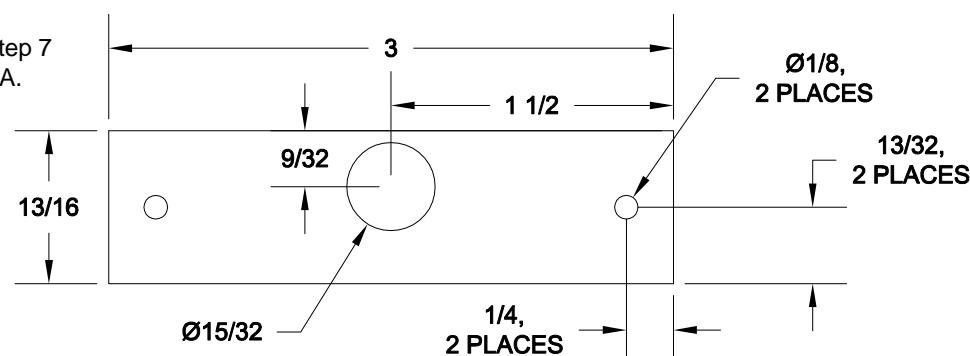
Attach both latch pin plates with blind rivets as shown in Figure 1.

Step 5: Attach the C-1002-L/R Doors to the fuselage.

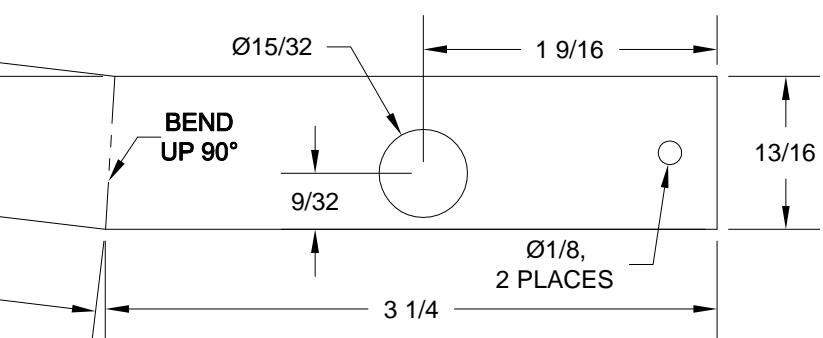
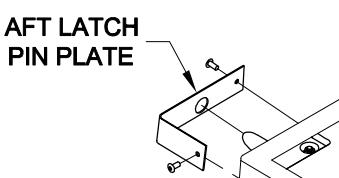
Step 6: Install the C-1016 Gas Struts as shown on Page 45-16, Figures 1 and 2.



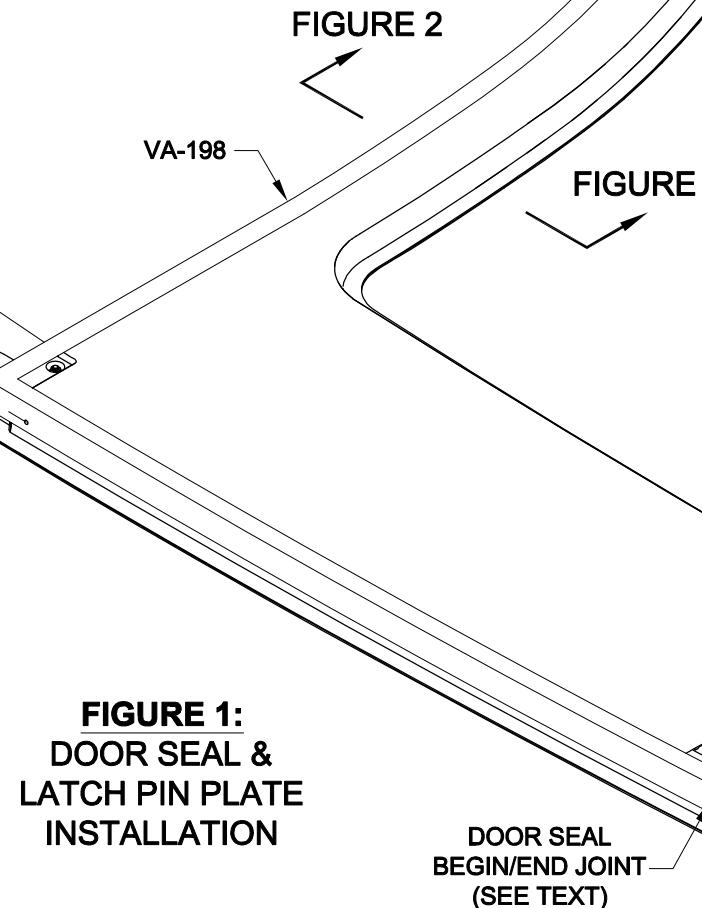
**FIGURE 2: DOOR SEAL INSTALLATION**



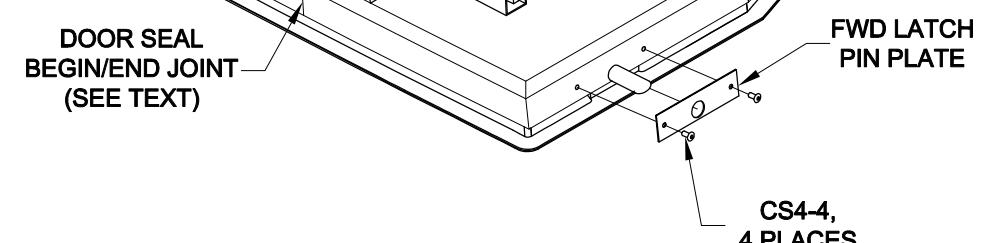
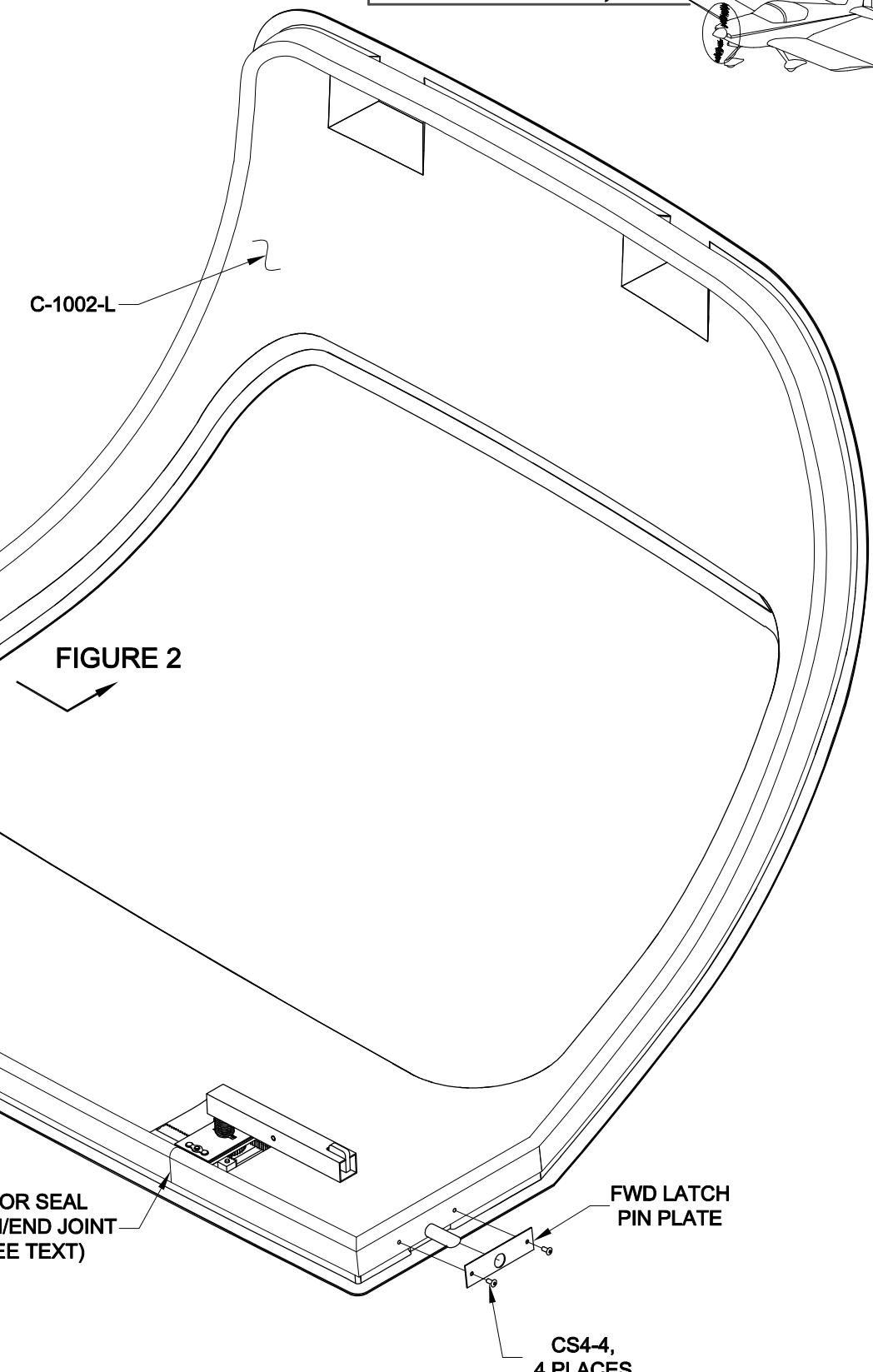
**FIGURE 3: FWD LATCH PIN PLATE**

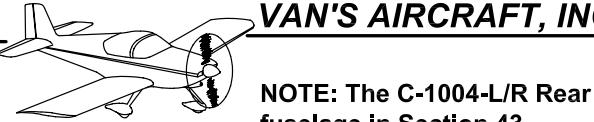


**FIGURE 4: AFT LATCH PIN PLATE**



**FIGURE 1:  
DOOR SEAL &  
LATCH PIN PLATE  
INSTALLATION**





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**NOTE: The C-1004-L/R Rear Windows and C-1005 Windscreen have already been fitted to the fuselage in Section 43.**

Step 1: Place the C-1004-L Rear Window in place on the C-1001 Cabin Cover. Because the thickness of the plexiglass will vary around the perimeter, it may be necessary to use shims to locally raise the outer surface of each rear window to more closely match that of the cabin cover. See Page 45-08, Step 5 and Figure 2 for details of shim installation.

Step 2: Install the C-1004-L Rear Window using the same procedure described for installation of the C-1003-L/R Front Windows on Page 45-08, Step 6.

Repeat the shimming and installation process for the C-1004-R Rear Window.

Step 3: Place the C-1005 Windscreen in place on the fuselage. Determine the need for and (if necessary) install shims using the same procedure as for all the other transparencies.

Step 4: Install the C-1005 Windscreen using the same procedure as that of the other windows (see Page 45-08, Step 6) but with the following caveats:

- One 4 oz. kit of Weld-On 10 provides an adequate quantity of glue, but leaves no extra.
- The large size of the windscreen bonding area requires that installation be well planned and rehearsed so that work can be done quickly so as to keep the "skinning-over" of the glue to a minimum.

Step 5: Fabricate five clips from pieces of scrap .032 aluminum as shown in Figure 3.

The clips are blind riveted to the F-1071 Fwd Fuse Top Skin as shown in Figure 2 to hold the base of the C-1005 Windscreen against the fwd fuse top skin. The clips are installed every 12 inches along the lower edge of the windscreen.

Step 6: Fabricate a Windscreen Base Fairing as shown in Figure 1. The windscreen base fairing provides a smooth transition between the base of the C-1005 Windscreen and the F-1071 Fwd Fuse Top Skin. The windscreen base fairing is fabricated directly on the fuselage and consists of a lay-up of E-glass fabric and epoxy resin as subsequently described. Polyester or vinyl ester resins are not compatible with the plexiglass transparencies and must not be used.

Use a 7 inch radius circle gauge to determine where the edges of your finished windscreen base fairing will be on the plexi. Find the contact points at the front of the windscreen and bring it around the sides as shown in Figure 1.

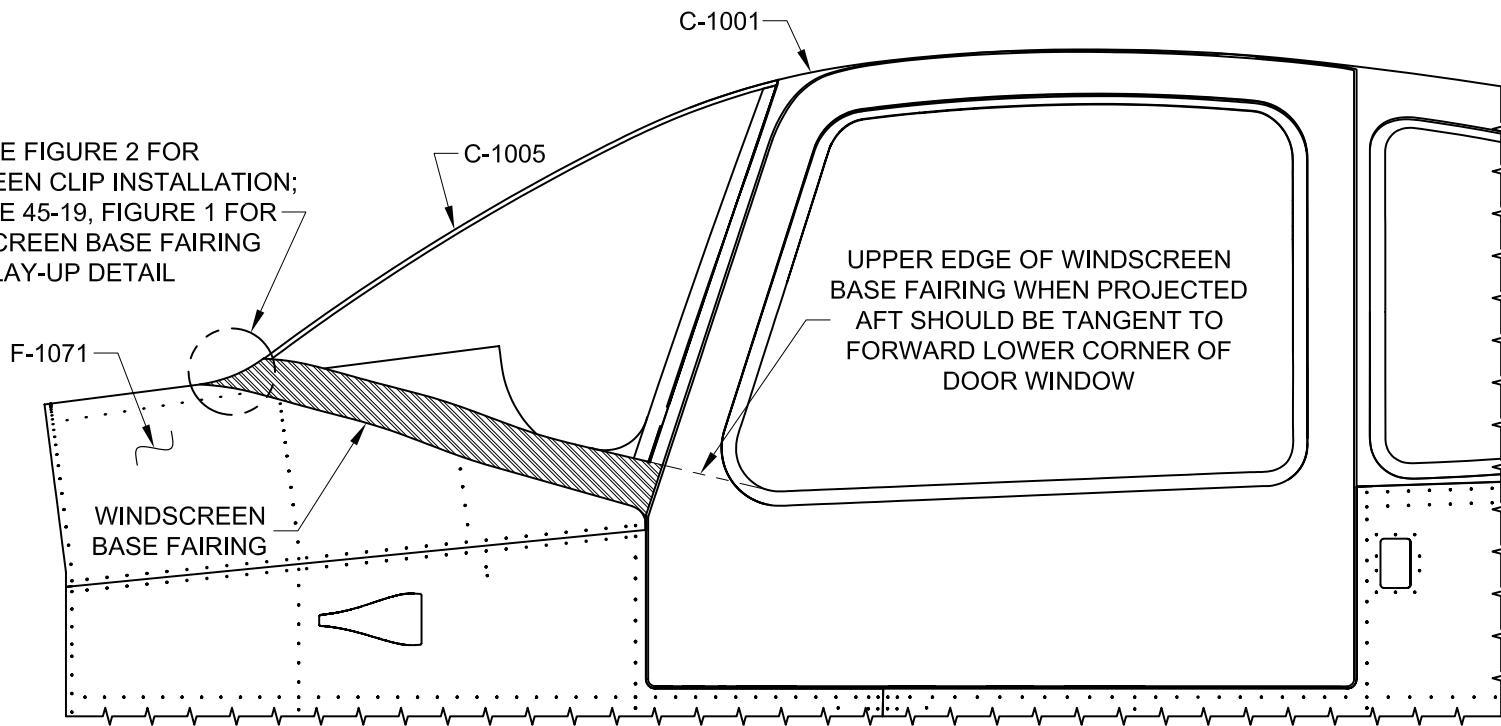
Define the extent of the fairing on the windscreen by placing two layers of good quality electrical tape on the windscreen. Mask-off the entire windscreen EXCEPT for the perimeter areas that will be covered by the windscreen base fairing or paint.

Step 7: Sand the exposed windscreen with 60 to 80 grit sandpaper.

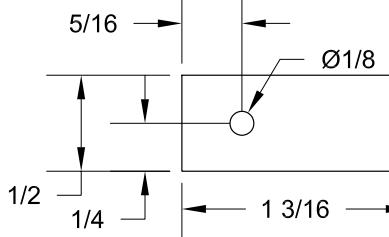
Step 8: Sand an area on the F-1071 Fwd Fuse Top Skin extending from the base of the C-1005 Windscreen forward approximately 4 inches. Do this along the entire base of the windscreen.

Step 9: Phosphoric acid etch the sanded areas of the F-1071 Fwd Fuse Top Skin.

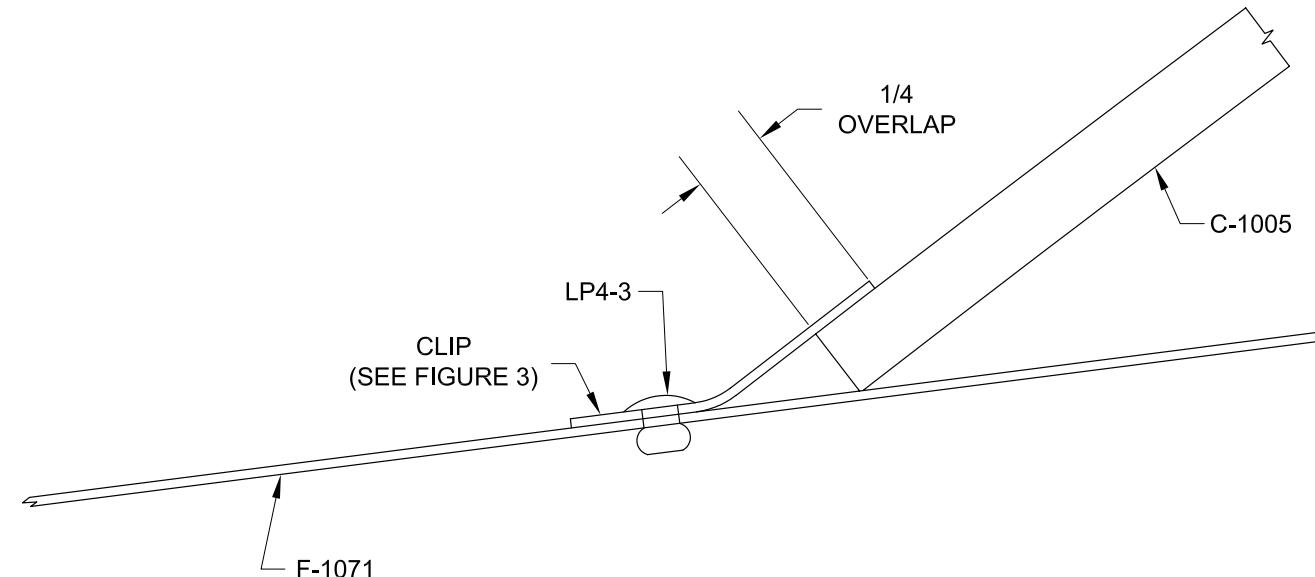
SEE FIGURE 2 FOR  
WINDSCREEN CLIP INSTALLATION;  
SEE PAGE 45-19, FIGURE 1 FOR  
WINDSCREEN BASE FAIRING  
LAY-UP DETAIL



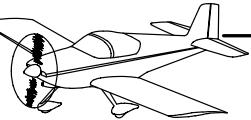
**FIGURE 1: WINDSCREEN BASE FAIRING**



**FIGURE 3: CLIP FABRICATION DETAIL**



**FIGURE 2: CLIP INSTALLATION DETAIL**



Step 1: Apply a fillet of microballoons and epoxy to fill the gap between the edge of the C-1005 Windscreen and the F-1071 Fwd Fuse Top Skin. See Figure 1. This is the foundation upon which strips of glass cloth will be built-up to form the windscreens base fairing.

Step 2: Cut strips of 9 oz/sq-yd E-glass fabric 3 to 3 1/2 ft long. Cut TWO strips to each of the widths called-out in Figure 1. Cut parallel to the weave.

Step 3: Lay-Up the strips of E-glass fabric beginning with the narrowest strips and progressing to the widest. The first layer is centered on the base of the windscreens and each successive layer is centered on the layer beneath it as shown in Figure 1. The final layer should butt to, but not overlap, the edge of the electrical tape on the C-1005 Windscreen.

Each layer will consist of two strips to reach the full length of the lower edge of the windscreens. The strips should be butted to each other with the butt joint of each layer located one to two inches away from the butt joint of the previous layer.

Step 4: When the lay-up has fully cured, the surface may be shaped and sanded smooth.

Use a sanding block with the same 7 inch radius as the final lay-up. Begin with 40 to 50 grit sandpaper to get the general shape. Use caution so as to not sand the electrical tape on the C-1005 Windscreen.

When the shape is nearly correct and the thickness of the edge of the lay-up on the windscreens is nearing the thickness of the electrical tape, switch to 80 to 100 grit sandpaper and work very carefully until you are just contacting the tape on the windscreens and the aluminum skin at the edges.

Remove the second layer of electrical tape (leaving just one layer) and sand very carefully using 150 grit sandpaper until just beginning to see sanding marks in the electrical tape.

Remove all sanding dust and brush on a heavy coat of epoxy overlapping onto the electrical tape and metal at the edges. After the brush coat of epoxy cures, sand with 100 grit sandpaper initially, finishing with 150 grit sandpaper.

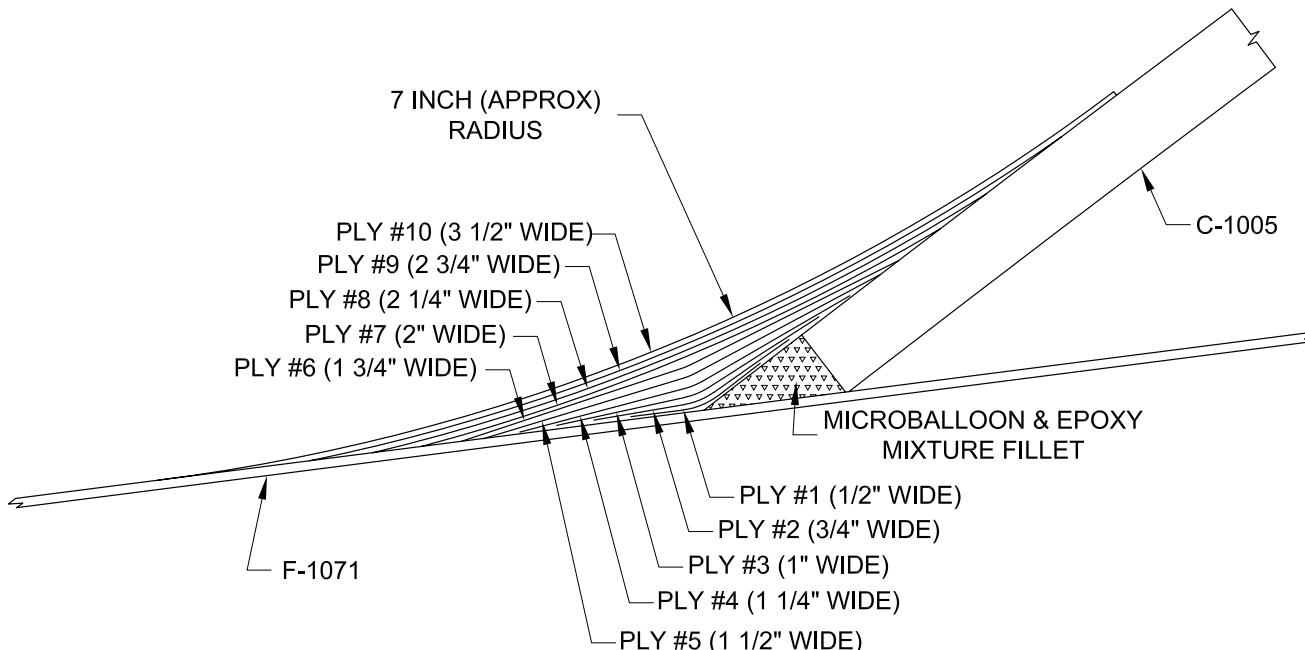
If there are any areas that need to be filled, scuff these areas with 40 to 50 grit sandpaper then fill with epoxy thickened with microballoons.

The goal is to have a layup with the outer surface being a buildup of 2 or 3 coats of epoxy that has been finish sanded to final shape with the epoxy on the windscreens blending out to the thickness of the electrical tape (or less) and the epoxy on the metal skin blending out to nothing.

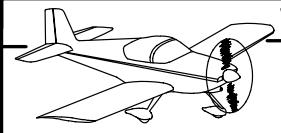
Step 5: Use a mixture of epoxy thickened with microballoons to fill the gaps between the edges of all the transparencies and the C-1001 Cabin Cover.

Sand the cured epoxy/microballoon mixture smooth and flush with the cabin cover.

Step 6: Finish the pre-preg outer surfaces of the C-1001 Cabin Cover and C-1002 Doors. See Section 5T, Fiberglass.



**FIGURE 1: WINDSCREEN BASE FAIRING LAY-UP DETAIL**



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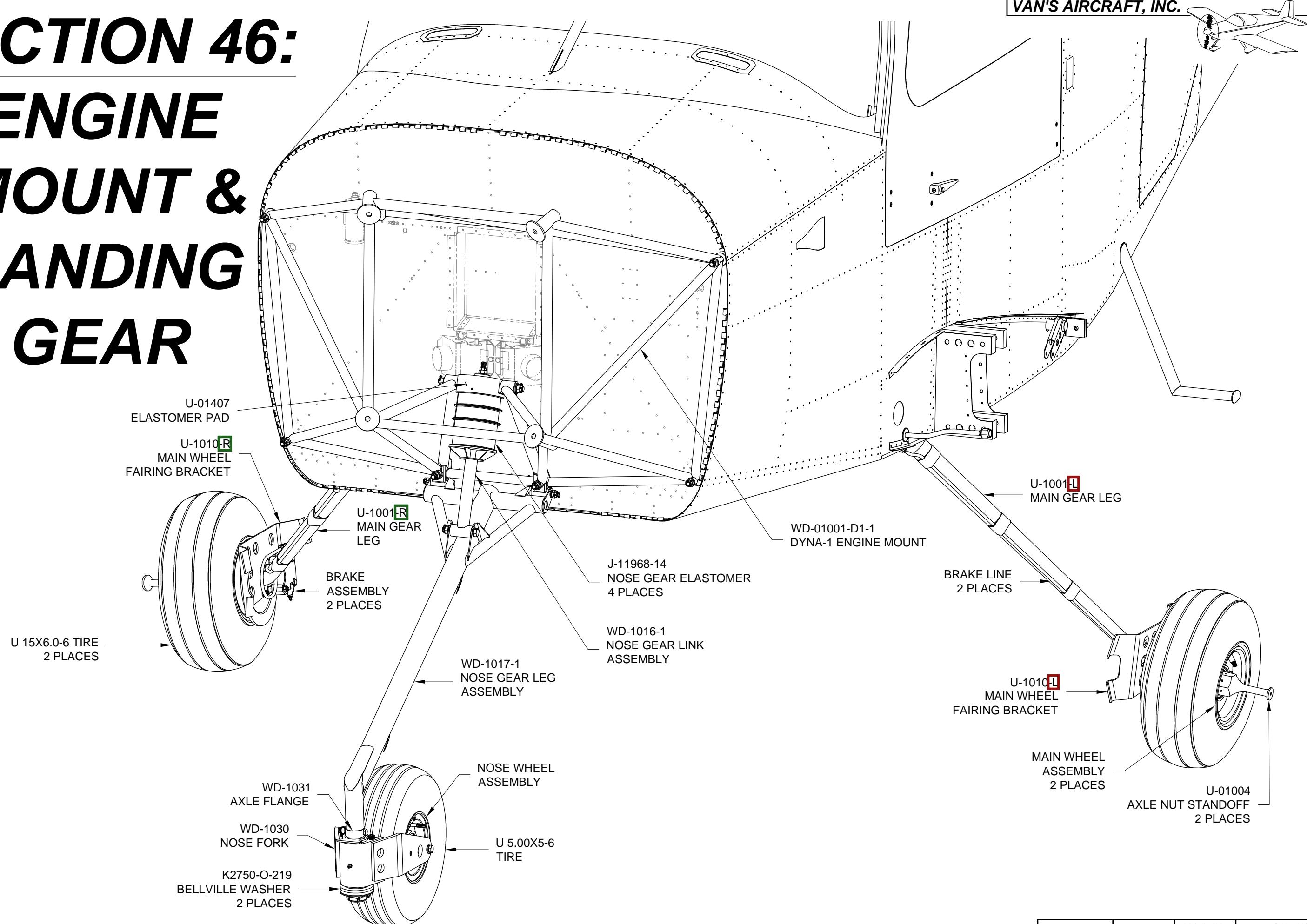
# SECTION 46:

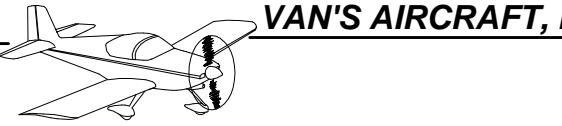
# ENGINE

# MOUNT &

# LANDING

# GEAR



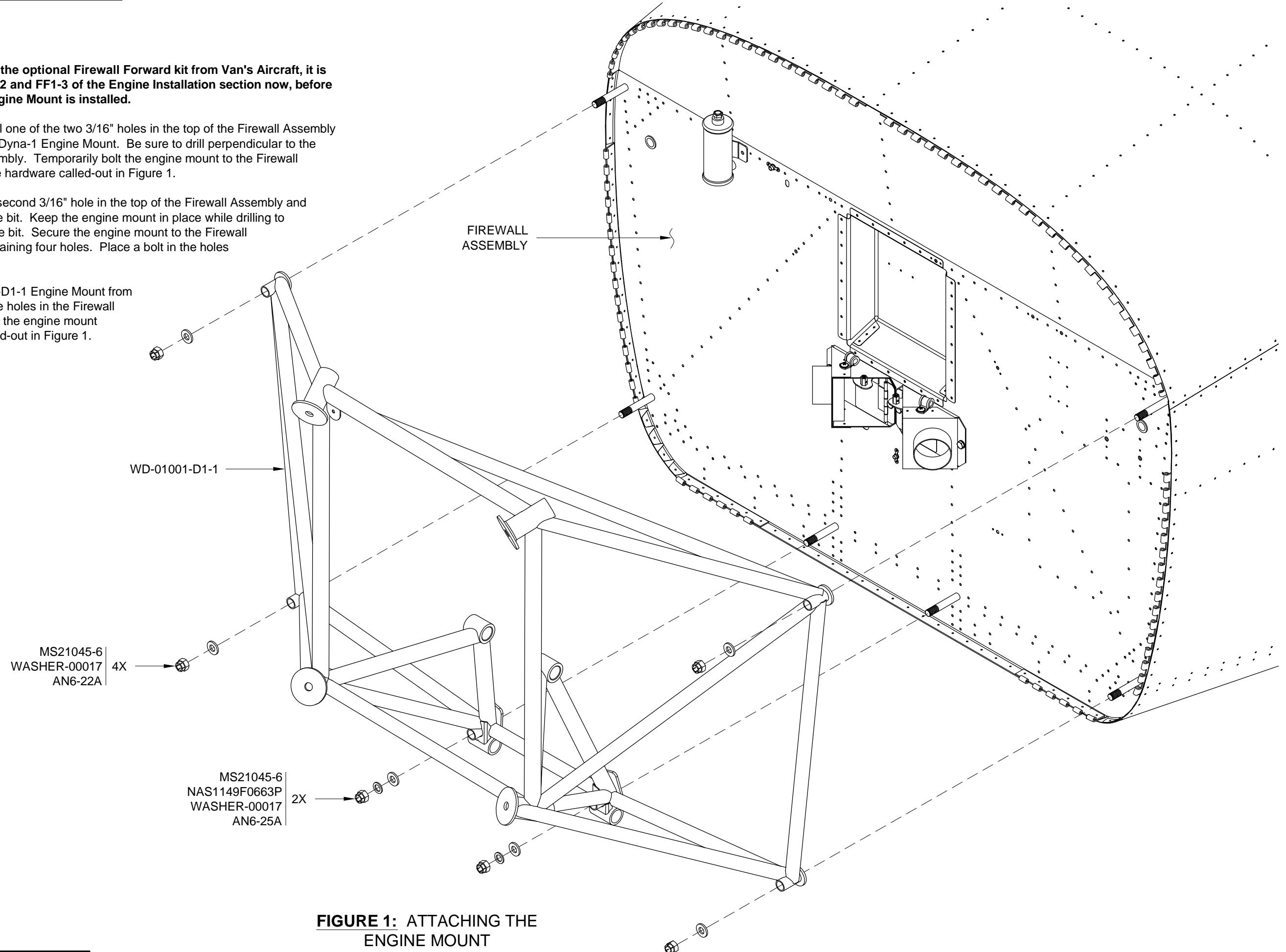


**NOTE:** If you have purchased the optional Firewall Forward kit from Van's Aircraft, it is easier to complete Pages FF1-2 and FF1-3 of the Engine Installation section now, before the WD-01001-D1-1 Dyna-1 Engine Mount is installed.

**Step 1:** Using a 3/8" bit, final-drill one of the two 3/16" holes in the top of the Firewall Assembly common to the WD-01001-D1-1 Dyna-1 Engine Mount. Be sure to drill perpendicular to the vertical face of the Firewall Assembly. Temporarily bolt the engine mount to the Firewall Assembly using this hole and the hardware called-out in Figure 1.

Align the engine mount with the second 3/16" hole in the top of the Firewall Assembly and final-drill this hole using the same bit. Keep the engine mount in place while drilling to help maintain the alignment of the bit. Secure the engine mount to the Firewall Assembly, then final-drill the remaining four holes. Place a bolt in the holes after each is drilled.

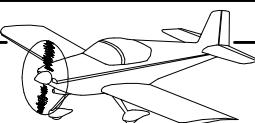
**Step 2:** Remove the WD-01001-D1-1 Engine Mount from the Firewall Assembly, deburr the holes in the Firewall Assembly, then permanently bolt the engine mount in place using the hardware called-out in Figure 1.



**FIGURE 1: ATTACHING THE  
ENGINE MOUNT**

**NOTE:** Follow the instructions in Steps 1-5 for both Main Wheel and Tire Assemblies.

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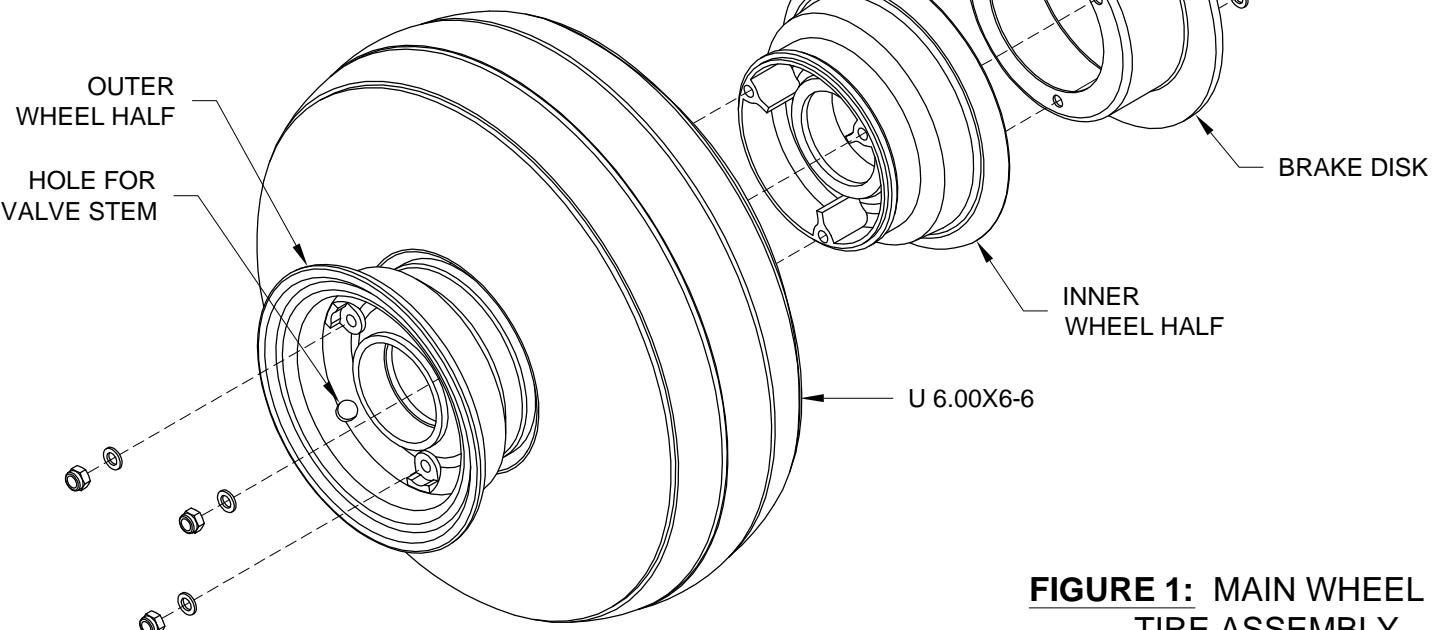


Step 1: Pull the bearings from the Main Wheel Assembly by removing the snap-rings that are retaining them. Pay close attention to how the bearings, grease seal rings, and grease seal felts are installed so that they can be reinstalled in the same way. See Figure 2.

Step 2: Split the Main Wheel Assembly by removing the bolts holding the Brake Disk and the Inner and Outer Wheel Halves together.

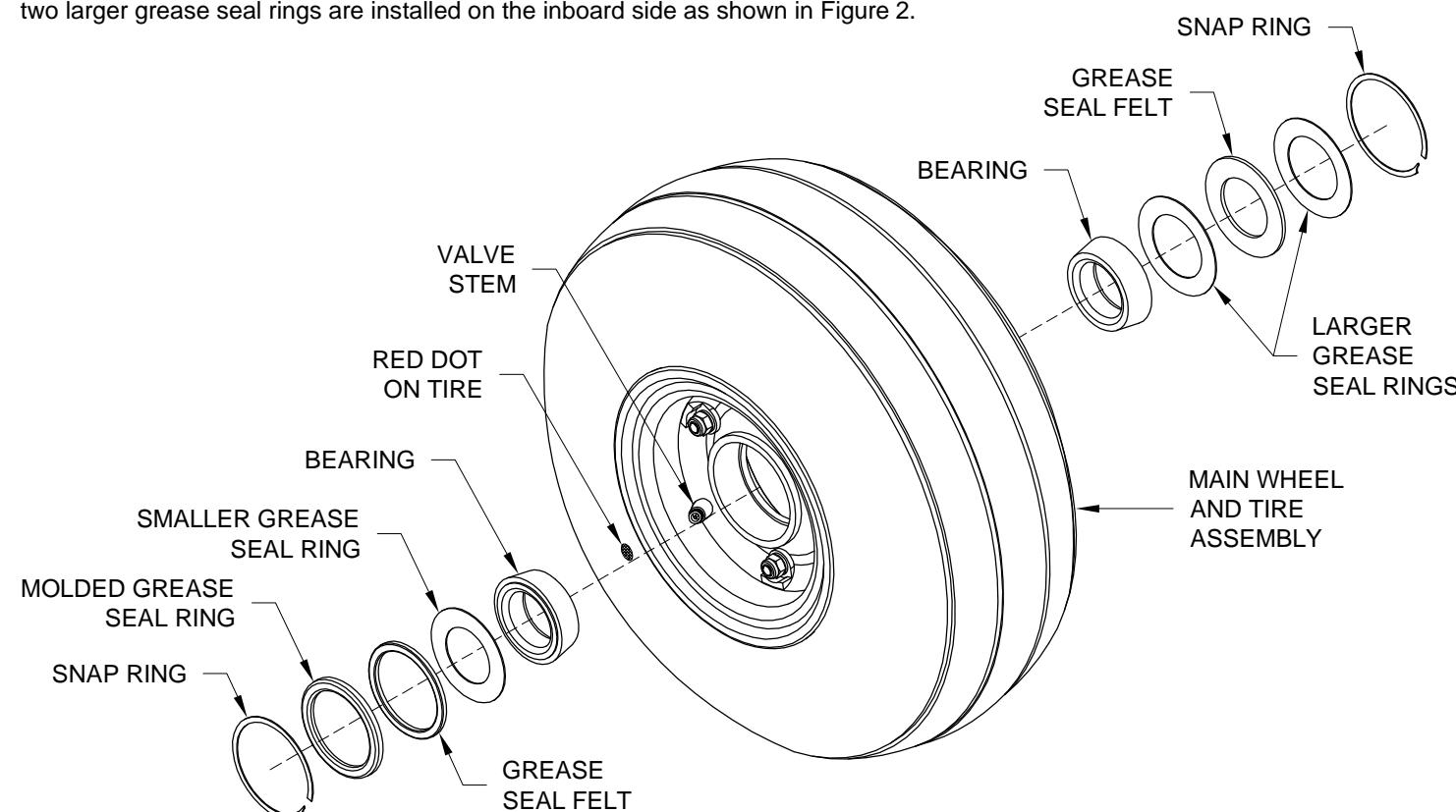
Step 3: Dust the U 15X6.0-6IT Tube (not shown in Figure 1) and the inside of the U 15X6.0-6 Tire with talcum powder, then mount the tube and tire on the Inner and Outer Wheel halves. The red dot on the tire is installed next to the valve stem of the tube (see Figure 2). Bolt the wheel halves and the brake disk together. Carefully observe the manufacturer's bolt torque specifications shown on the document in the wheel/ brake package.

Step 4: SLOWLY inflate the tire to 25 psi. Deflate it fully and re-inflate it SLOWLY a couple more times to work out any wrinkles in the tube. It's a good idea to do this with the valve core removed; in the event a finger gets pinched the tire can be quickly deflated. The final inflation pressure is 42 psi.



**FIGURE 1: MAIN WHEEL AND TIRE ASSEMBLY**

Step 5: Be sure the bearings are fully greased with Aeroshell #5 or equivalent. Reinstall the bearings, grease seal rings, and grease seal felts in the same order that they were removed. Make absolutely sure that the smaller grease seal ring is installed on the outboard side of the Main Wheel and Tire Assembly, and the two larger grease seal rings are installed on the inboard side as shown in Figure 2.

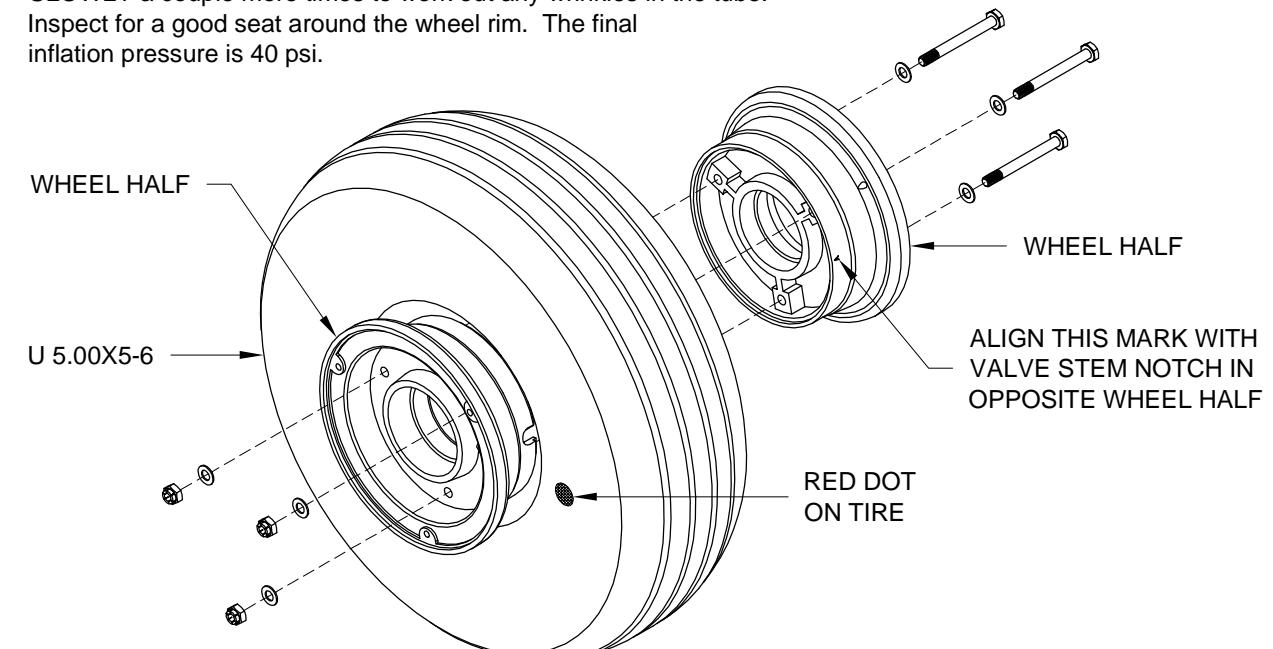


**FIGURE 2: INSTALLING BEARINGS IN THE MAIN WHEEL AND TIRE ASSEMBLY**

Step 6: Split the Nose Wheel Assembly by removing the bolts holding the two Wheel Halves together.

Step 7: Remove the nut and washers from the valve stem of the U 5.00X5-6IT Tube (not shown in Figure 3). Dust the tube and the inside of the U 5.00X5-6 Tire with talcum powder, then mount the tube and tire on the Wheel Halves. The mark indicated in Figure 3 on one of the wheel halves should be aligned with the notch for the valve stem in the opposite wheel half. As before, the red dot on the tire is installed next to the valve stem. Bolt the wheel halves together.

Step 8: SLOWLY inflate the tire to 25 psi. Deflate it fully and re-inflate it SLOWLY a couple more times to work out any wrinkles in the tube. Inspect for a good seat around the wheel rim. The final inflation pressure is 40 psi.



**FIGURE 3: NOSE WHEEL AND TIRE ASSEMBLY**

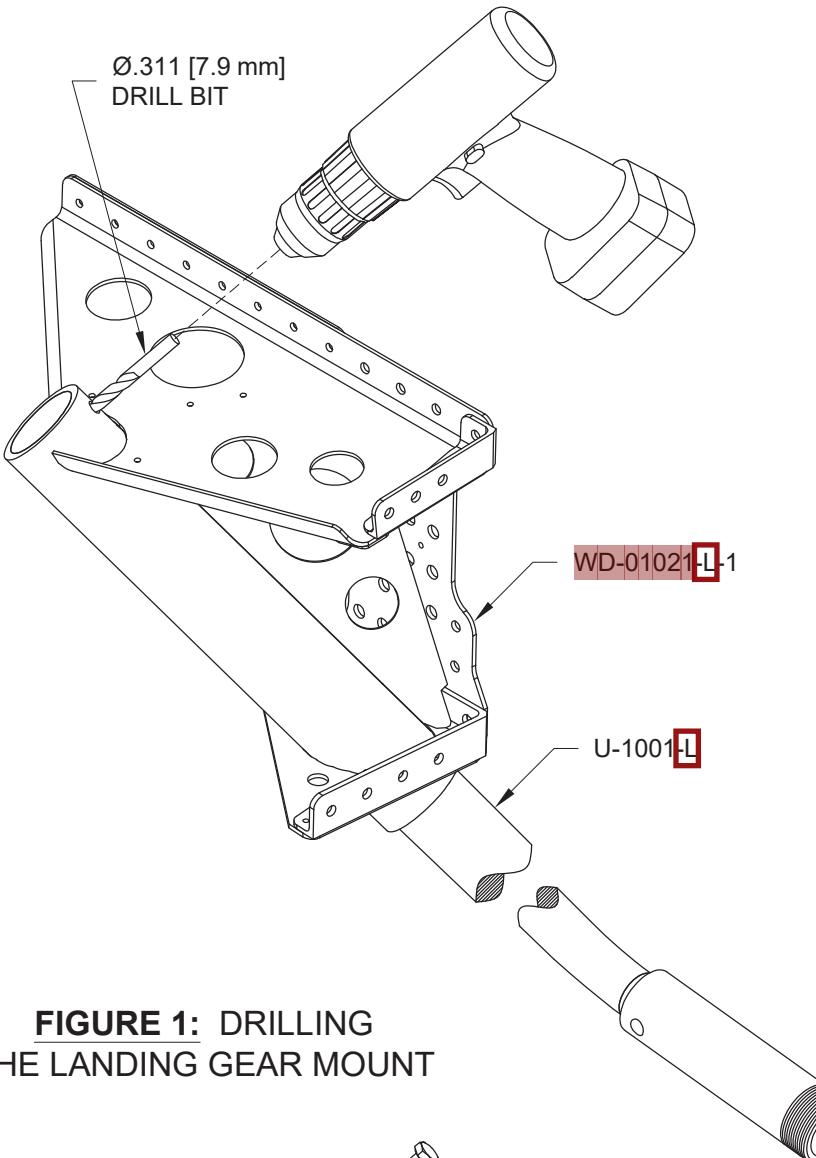


**NOTE:** The instructions for the installation of the main gear are given for the left side of the fuselage. The right side is the mirror of the left. Install both main gear at the same time.

The fuselage will have to be lifted high enough to slide in the U-1001 Main Gear Legs and mount the Main Wheel and Tire Assemblies.

Step 1: Slide the U-1001-L Main Gear Leg into the WD-01021-L-1 Left Landing Gear Mount as shown in Figure 1.

A hole is drilled through the upper end of the landing gear mount socket. The hole on the top side of the socket is drilled to final size while the corresponding hole in the bottom side is drilled undersize. Align the hole in the main gear leg with the hole in the top side of the socket. As shown in Figure 1, insert a Ø.311 (7.9mm) drill bit through the assembly until it "bottoms out" on edges of the smaller hole. (The side of the fuselage will prevent inserting the drill bit if it is already in a drill motor.) Now attach a drill motor and final-drill the smaller hole.

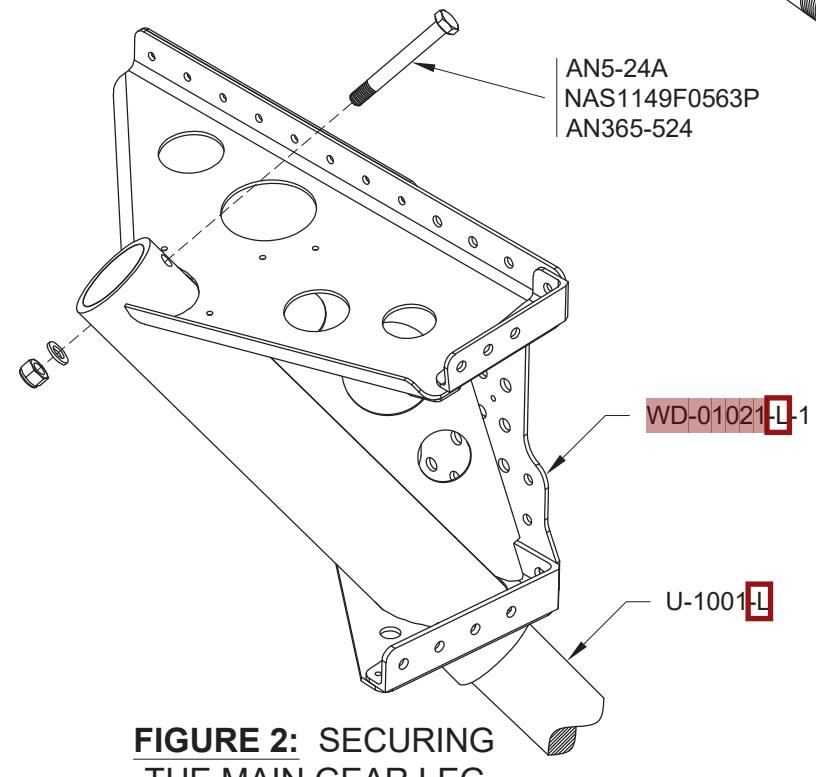


**FIGURE 1: DRILLING THE LANDING GEAR MOUNT**

Step 2: Remove the U-1001-L Main Gear Leg from the WD-01021-L-1 Left Landing Gear Mount and deburr the holes.

Step 3: Apply a film of wheel bearing grease to the surfaces of the U-1001-L Main Gear Leg that are not powder coated and that will contact the WD-01021-L-1 Left Landing Gear Mount socket.

Slide the main gear leg into the left landing gear mount socket, then secure the main gear leg using the hardware called-out in Figure 2.

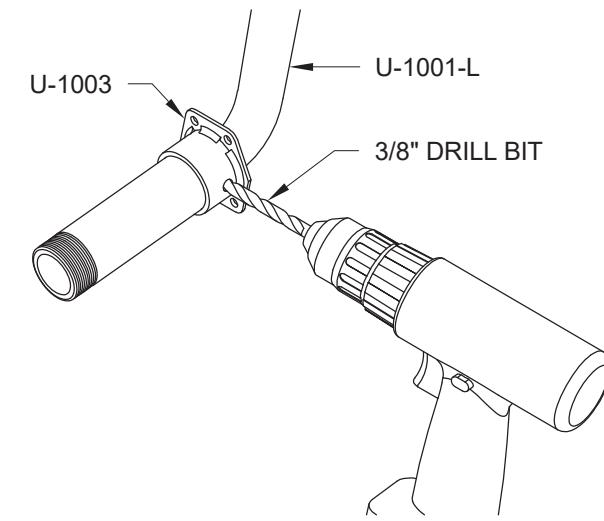


**FIGURE 2: SECURING THE MAIN GEAR LEG**

Step 4: Slide one of the U-1003 Brake Mounts onto the U-1001-L Main Gear Leg axle as shown in Figure 3.

The hole on one side of the brake mount is still undersize and needs to be final-drilled. Align the holes in the brake mount with the holes in the axle, insert a 3/8" drill bit through the assembly, and final-drill the smaller hole.

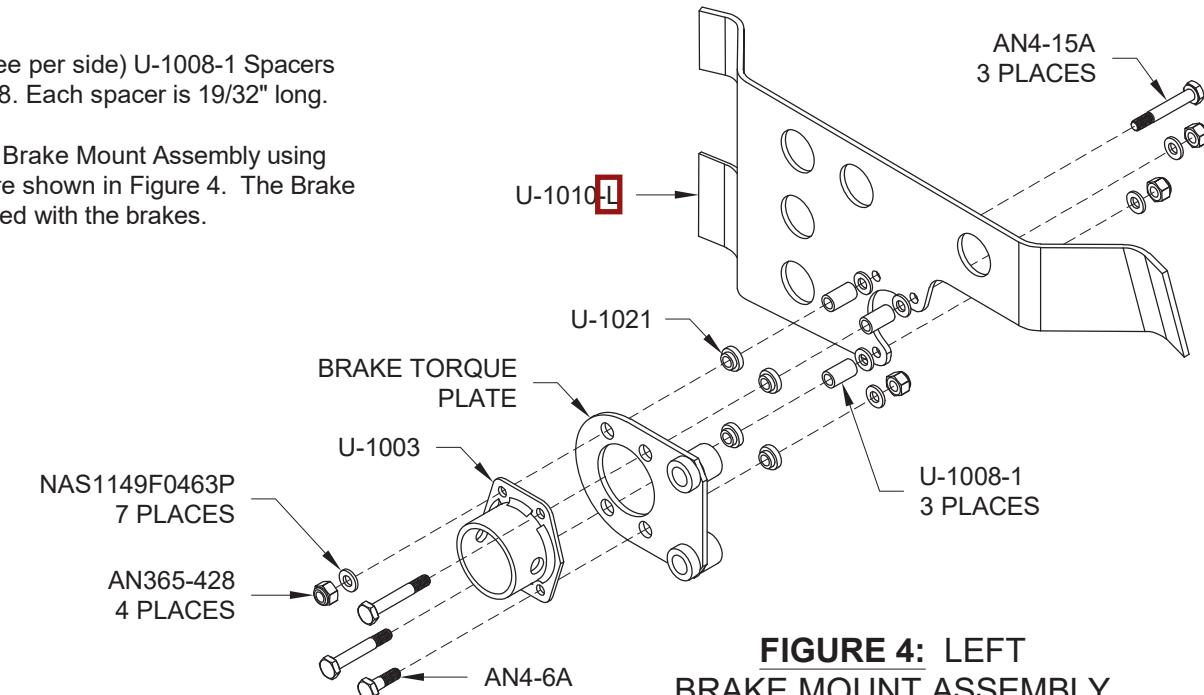
Remove the brake mount and deburr the holes.



**FIGURE 3: DRILLING THE BRAKE MOUNT**

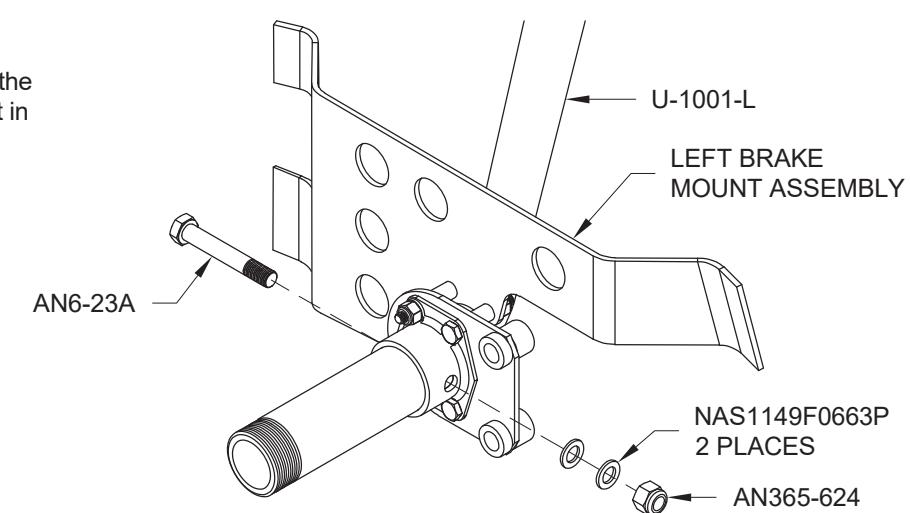
Step 5: Make six (three per side) U-1008-1 Spacers from ST4130-058X3/8. Each spacer is 19/32" long.

Step 6: Build the Left Brake Mount Assembly using the parts and hardware shown in Figure 4. The Brake Torque Plate is supplied with the brakes.



**FIGURE 4: LEFT BRAKE MOUNT ASSEMBLY**

Step 7: Slide the Left Brake Mount Assembly on the axle of the U-1001-L Main Gear Leg and secure it in place using the hardware shown in Figure 5.



**FIGURE 5: INSTALLING THE LEFT BRAKE MOUNT ASSEMBLY**

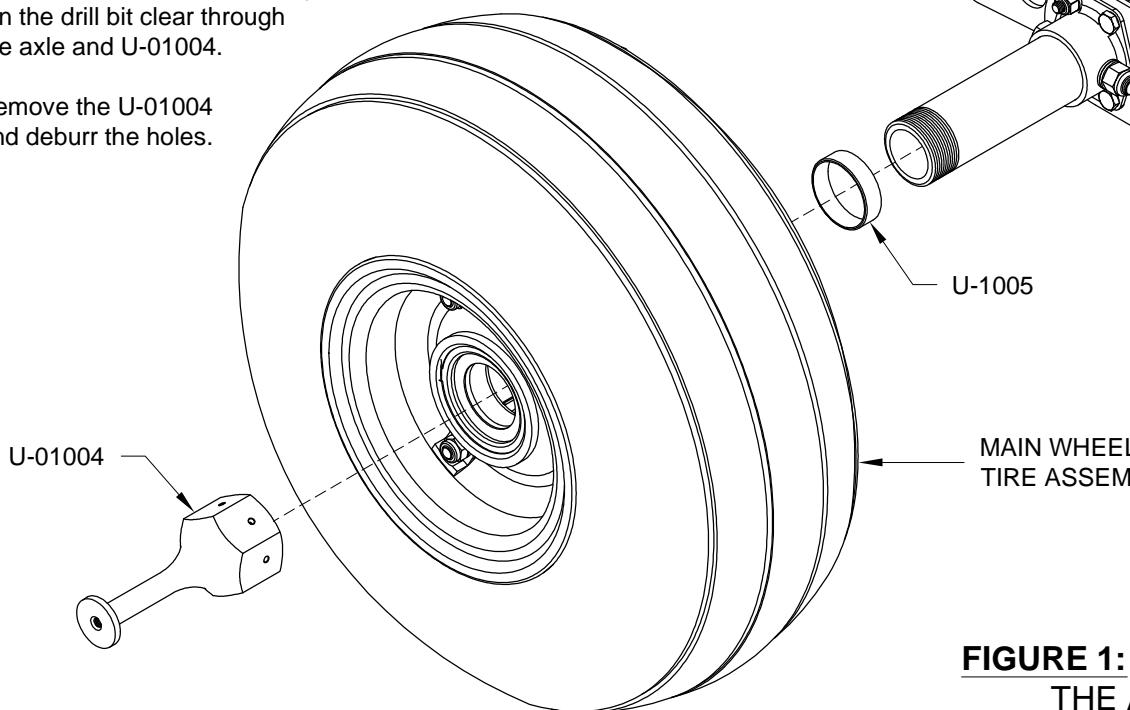
**Step 1:** Slide the U-1005 Spacer and one of the Main Wheel and Tire Assemblies onto the axle of the U-1001-L Main Gear Leg. Thread on the U-1004A Axle Nut Standoff and carefully tighten it until there is no side play in the wheel, but it still rotates smoothly.

**Step 2:** Thread the U-01004 off the axle while counting the number of full turns required to remove it (a mark on the top side of the U-01004 will make it easier to keep track of a full turn).

Remove the Wheel and Tire Assembly, then thread the U-01004 back on the same number of turns that was required to remove it.

Center-punch the axle through one of the holes around the U-01004 (the hole opposite to the one selected will also have to be accessed, so don't select the top hole). Without moving the U-01004, match-drill the selected hole into the axle using an 1/8" drill bit. Insert an 1/8" pin (or another drill bit) to hold the U-01004 in position, then center-punch and match-drill the axle from the opposite side of the U-01004. Remove the pin and run the drill bit clear through the axle and U-01004.

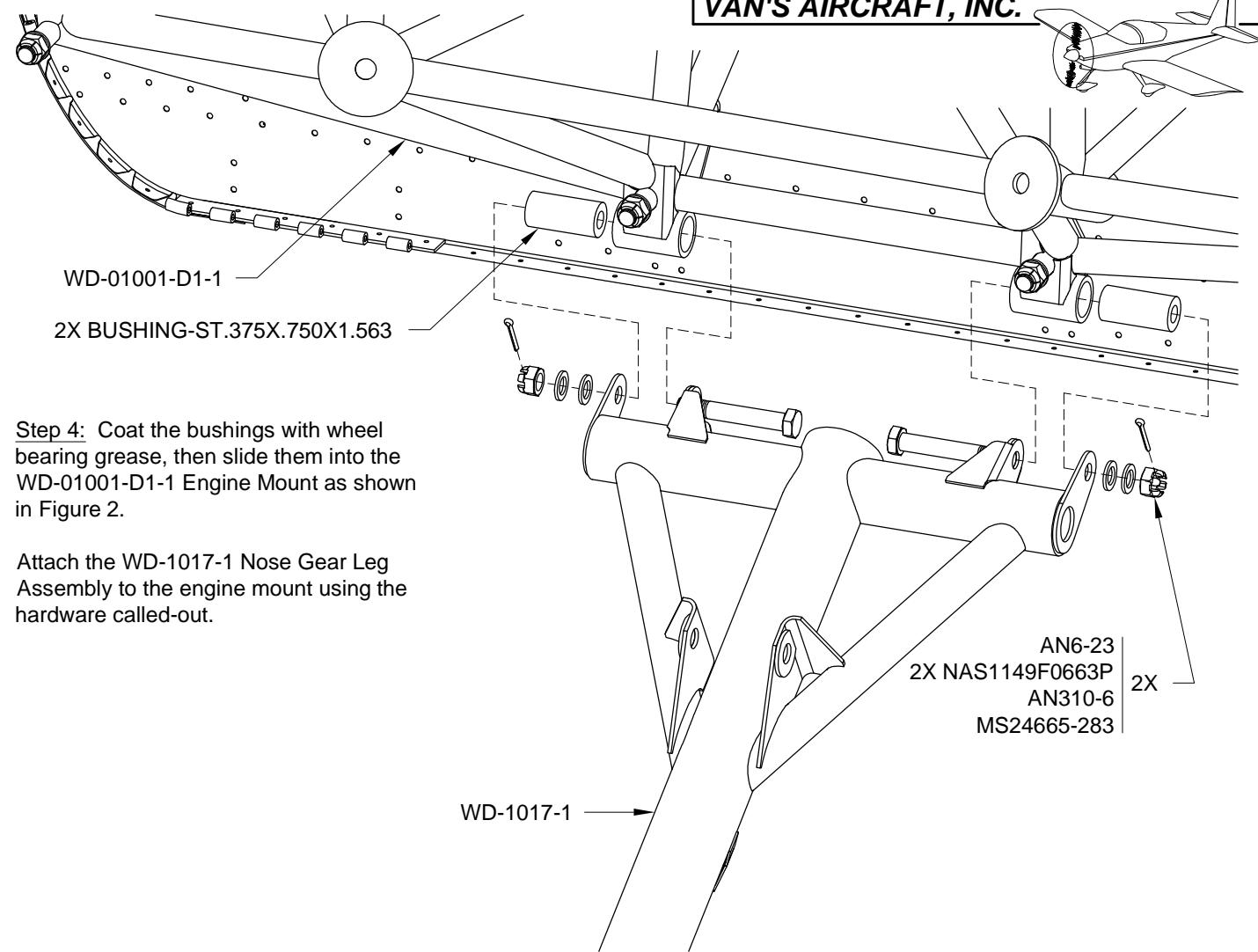
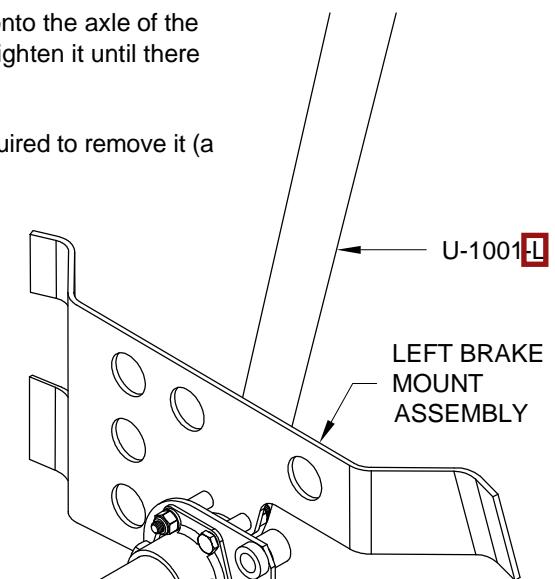
Remove the U-01004 and deburr the holes.



**FIGURE 1: DRILLING THE AXLE**

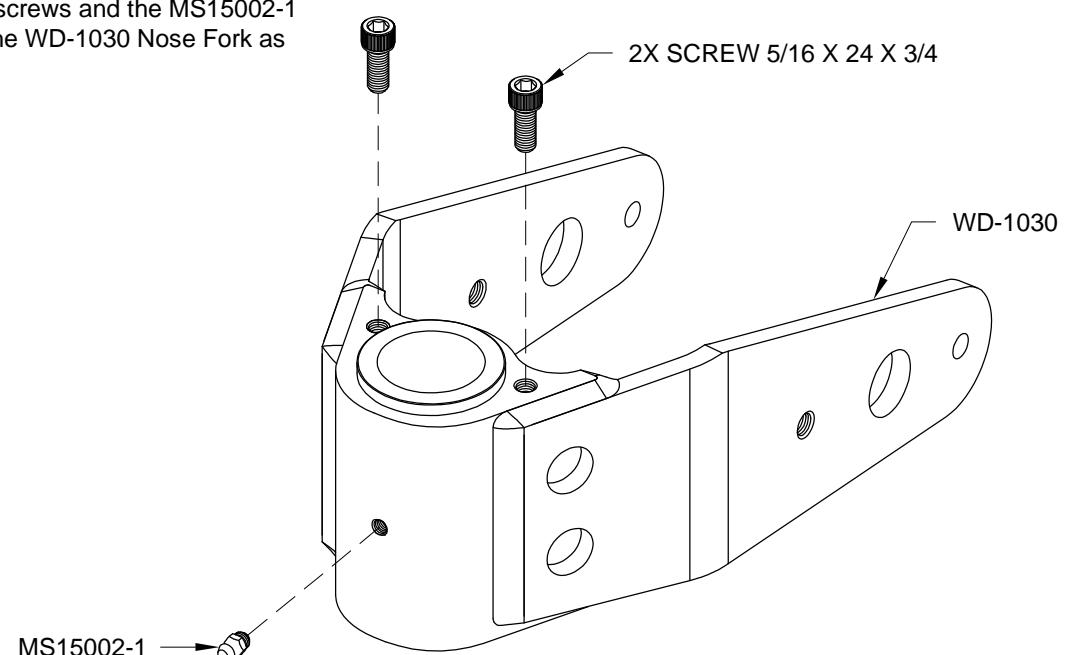
**Step 3:** Reinstall the Wheel and Tire Assembly and the U-01004 Axle Nut Standoff, then secure the axle nut with an MS24665-360 cotter pin (not shown). The cotter pin will have to be bent slightly to clear the wheel while it is being installed.

NOTE: The fuselage can now be lowered onto the main gear.

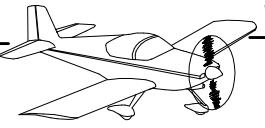


**FIGURE 2: ATTACHING THE NOSE GEAR LEG ASSEMBLY**

**Step 5:** Thread the screws and the MS15002-1 Grease Fitting into the WD-1030 Nose Fork as shown in Figure 3.



**FIGURE 3: NOSE FORK ASSEMBLY**



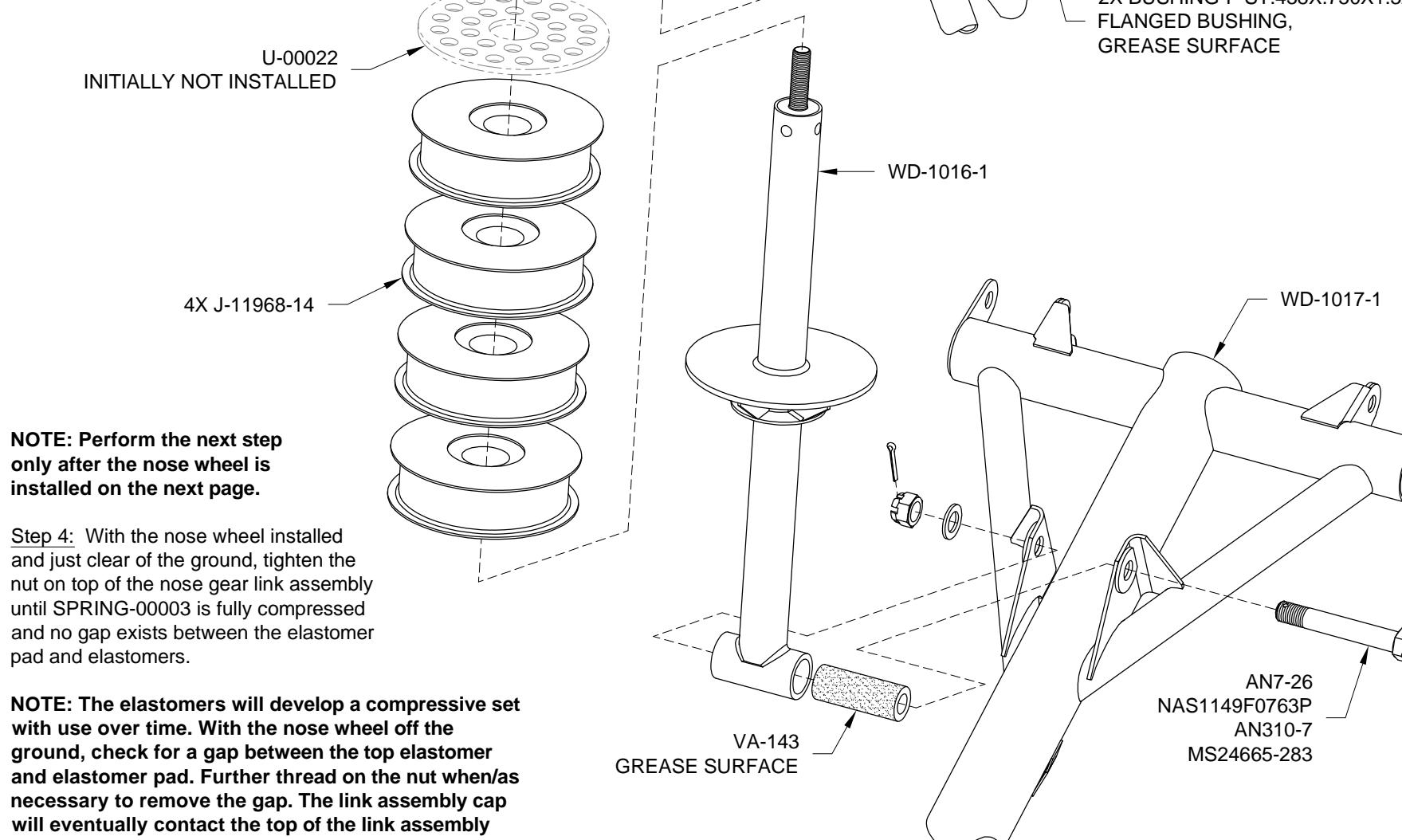
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**NOTE: Do not apply grease or other lubricant between the Elastomers and the shaft of the WD-1016-1 Nose Gear Link Assembly.**

**Step 1:** Bolt the U-01407 Elastomer Pad to the WD-01001-D1-1 Engine Mount using the hardware called out in Figure 1. If necessary, remove excess powder coat from the ends of the engine mount bushings to allow the flanged bushings and elastomer pad to swivel freely.

**Step 2:** Install the WD-1016-1 Nose Gear Link Assembly, J-11968-14 Elastomers, SPRING-00003, and U-01420 Link Assembly Cap. Slide on the washer and thread on the nut enough to compress the spring and remove any gap between the elastomers and pad. The final amount of spring compression is determined only after the nosewheel is installed.

**Step 3:** Attach the bottom of the WD-1016-1 to the WD-1017-1 Nose Gear Leg Assembly using the hardware shown in Figure 1.

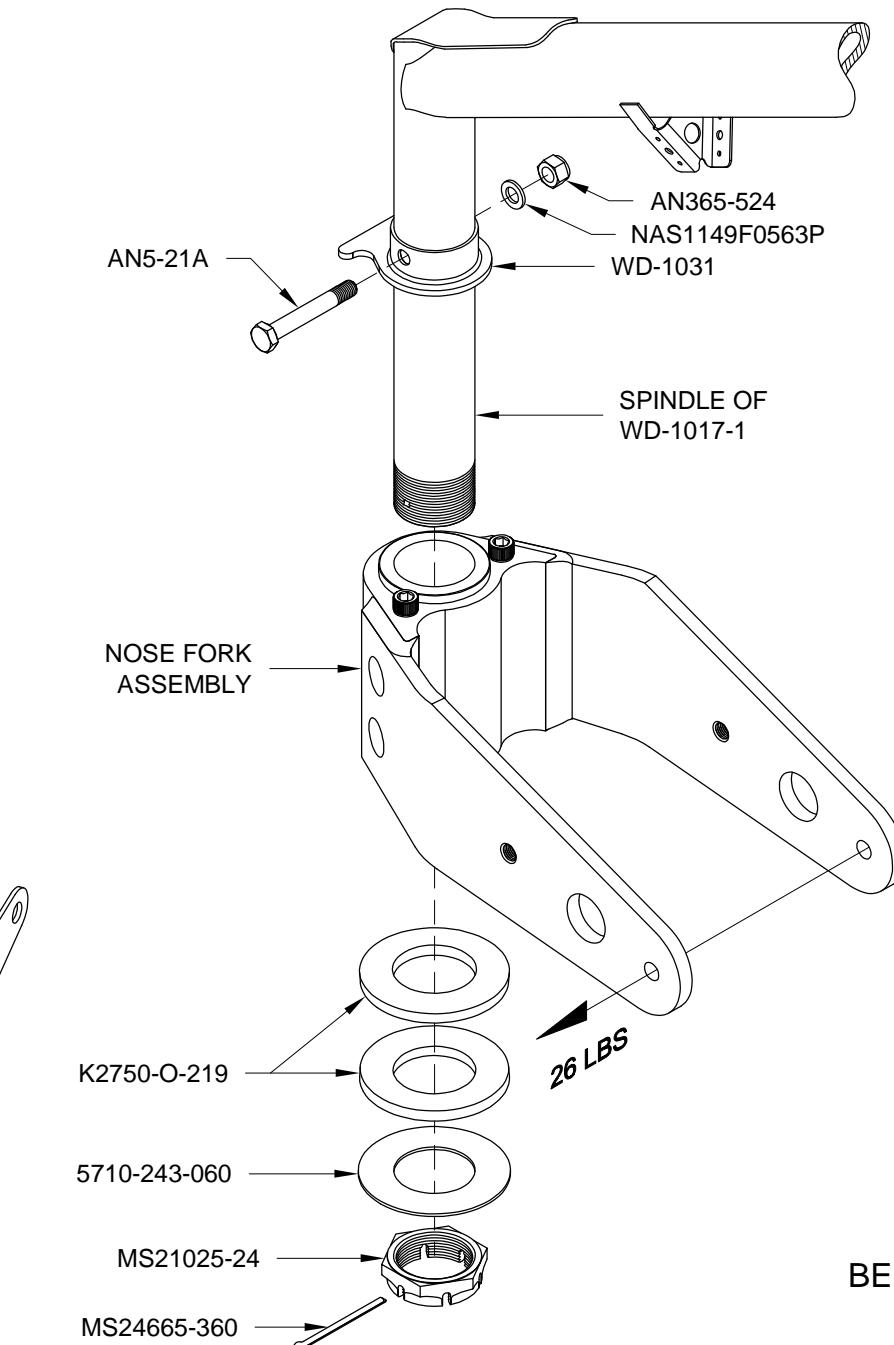


**FIGURE 1: INSTALLING THE NOSE GEAR LINK ASSEMBLY**

**Step 5:** Slide the WD-1031 Axle Flange onto the WD-1017-1 Nose Gear Leg spindle and secure it to the spindle using the hardware shown in Figure 2.

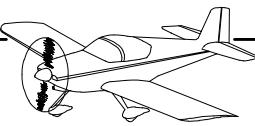
Next, slide on the Nose Fork Assembly, the two K2750-O-219 Belleville Washers (see Figure 3), and the 5710-243-060 Washer. Finally, thread on the MS21025-24 Nut.

**Step 6:** Thread safety wire through the holes used to secure the Nose Wheel and Tire Assembly to the Nose Fork Assembly, then attach a spring scale to the end of the safety wire. Tighten the MS21025-24 Nut until a force of 26 lbs begins to rotate the Nose Fork Assembly around the spindle. Secure the nut with the cotter pin called-out in Figure 2.



**FIGURE 3:**  
**BELLEVILLE WASHER ORIENTATION (NOT TO SCALE)**

**FIGURE 2: INSTALLING THE NOSE FORK ASSEMBLY**



**NOTE:** Coat only the outer perimeter of the seal with grease where it contacts the Nose Wheel Assembly. Do not apply grease to the outer seal surface face.

**Step 1:** Clean, dry and fully grease the bearings that came with the Nose Wheel Assembly with AeroShell Grease 5 or equivalent. The bearings have an integral rubber grease seal. See Figure 3. This seal MUST have a coat of grease on its perimeter where it contacts the Nose Wheel Assembly.

**Step 2:** Insert the bearings into the Nose Wheel Assembly as shown in Figure 1.

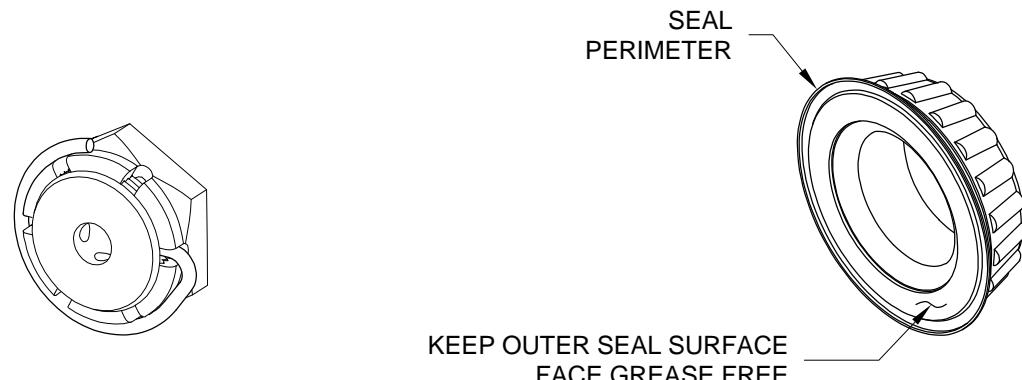
**Step 3:** Slide the U-00024 Axle through the bearings, then slide the U-00711 Axle Spacer over the end of the axle and thread on the axle nut as shown in Figure 1.

**NOTE: Integral grease seals produce some drag and make the wheel feel stiff when rotated and tend to cause the bearings to spin with the wheel rather than remain stationary with the axle. The tendency to reduce the axle nut torque until the wheel spins freely allows the grease seal and the bearing cone to improperly rotate with the wheel. The higher rolling drag is completely normal for this bearing. It is important that the axle nut torque be sufficient to keep the seal from rotating with the wheel, but no more than necessary so as not to cause excessive drag. Properly installed, the bearings will produce between 18 and 26 inch pounds of torque (drag).**

**Step 4:** Tighten the axle nut until all play is gone and the wheel rotates freely. Rotate the wheel back and forth while tightening the nut to help seat the bearings. The rubber seal on the bearing must remain stationary while the wheel rotates around it. If the seal spins with the wheel, tighten the nut until the seal stops spinning. When the bearings are fully seated and the bearings seals no longer rotate with the wheel, tighten the nut to align the next available slot/hole combination in the nut and axle.

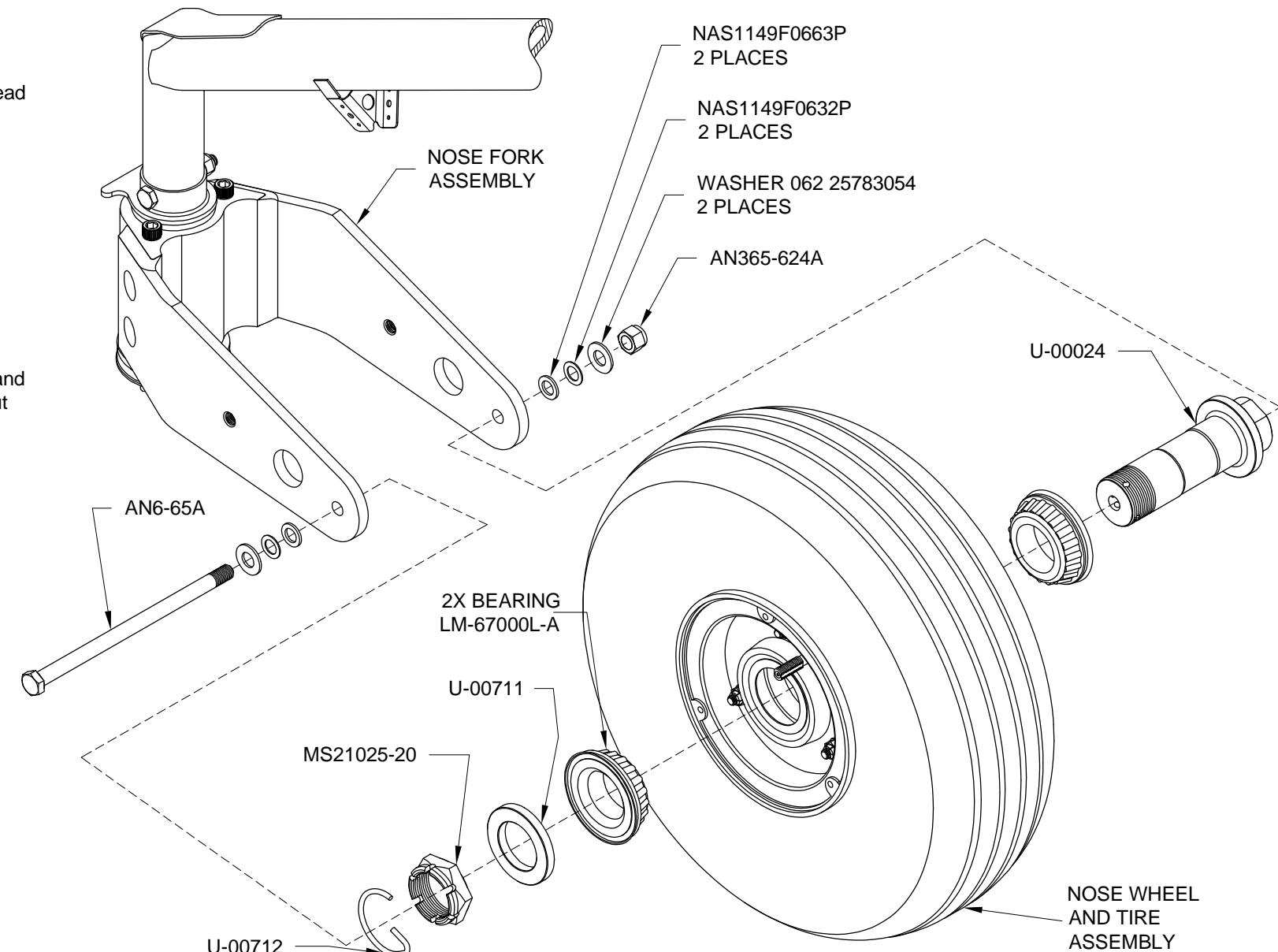
**Step 5:** Install the U-00712 Axle Nut Pin by inserting the bent end of the pin into the hole in the axle and then pulling the remainder of the pin over the circular, nonhexed portion of the nut. Refer to Figure 2.

**Step 6:** Bolt the Nose Wheel and Tire Assembly, and the axle to the Nose Fork Assembly using the hardware called-out in Figure 1.



**FIGURE 2: INSTALLED AXLE NUT PIN**

**FIGURE 3: WHEEL BEARING**



**FIGURE 1: INSTALLING THE NOSE WHEEL AND TIRE ASSEMBLY**

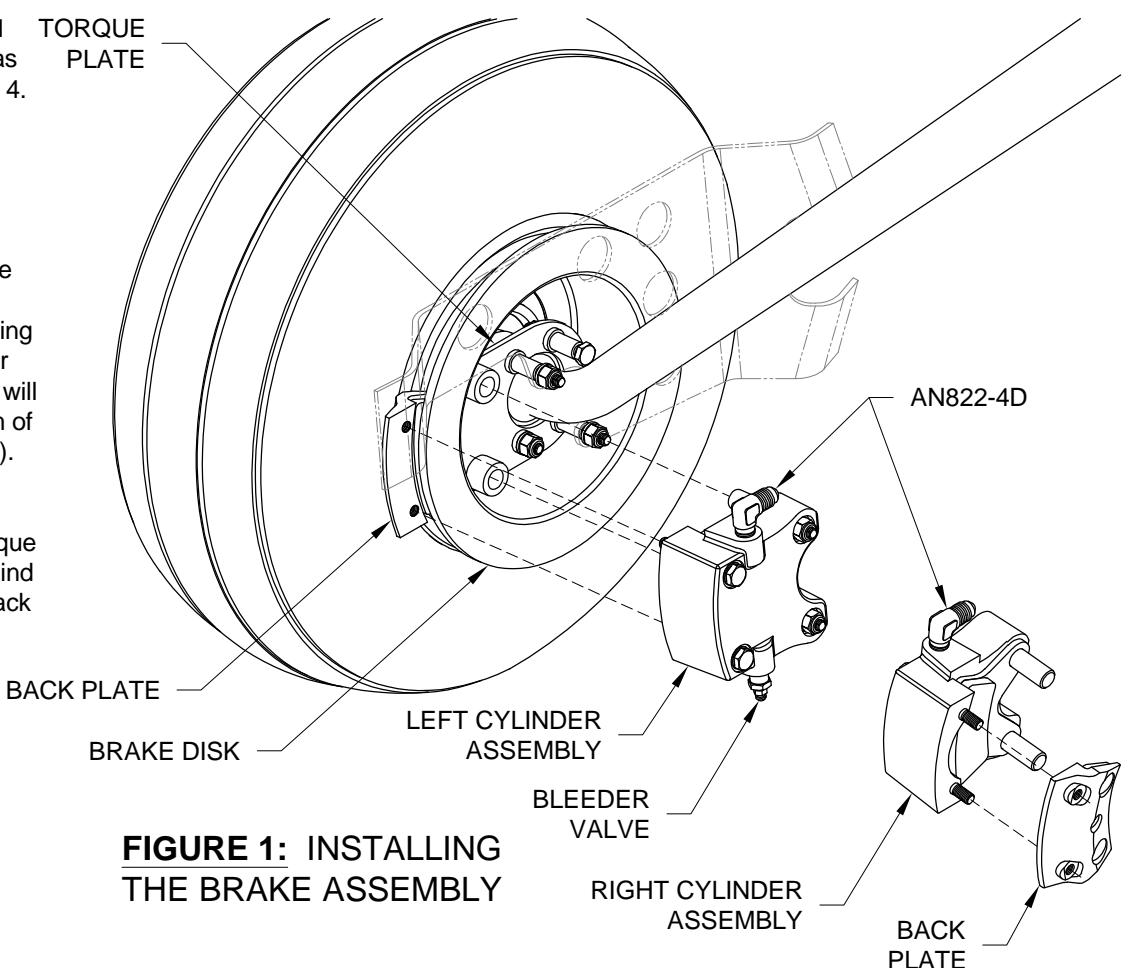


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Step 1: Tighten the WD-1016-1 Nose Gear Link Assembly nut as described on Page 46-06, Step 4.

Step 2: Setup the Left and Right Cylinder Assemblies as shown in Figure 1. Apply a thread sealant, such as Lubon #404 or equivalent, to the pipe threads of the AN822-4D Tube/Pipe Elbow before threading them into the top of the Cylinder Assemblies (the Bleeder Valve will have to be moved to the bottom of one of the Cylinder Assemblies).

Step 3: Slide the studs of the Cylinder Assembly into the Torque Plate, place the Back Plate behind the Brake Disk, then bolt the Back Plate and Cylinder Assembly together.



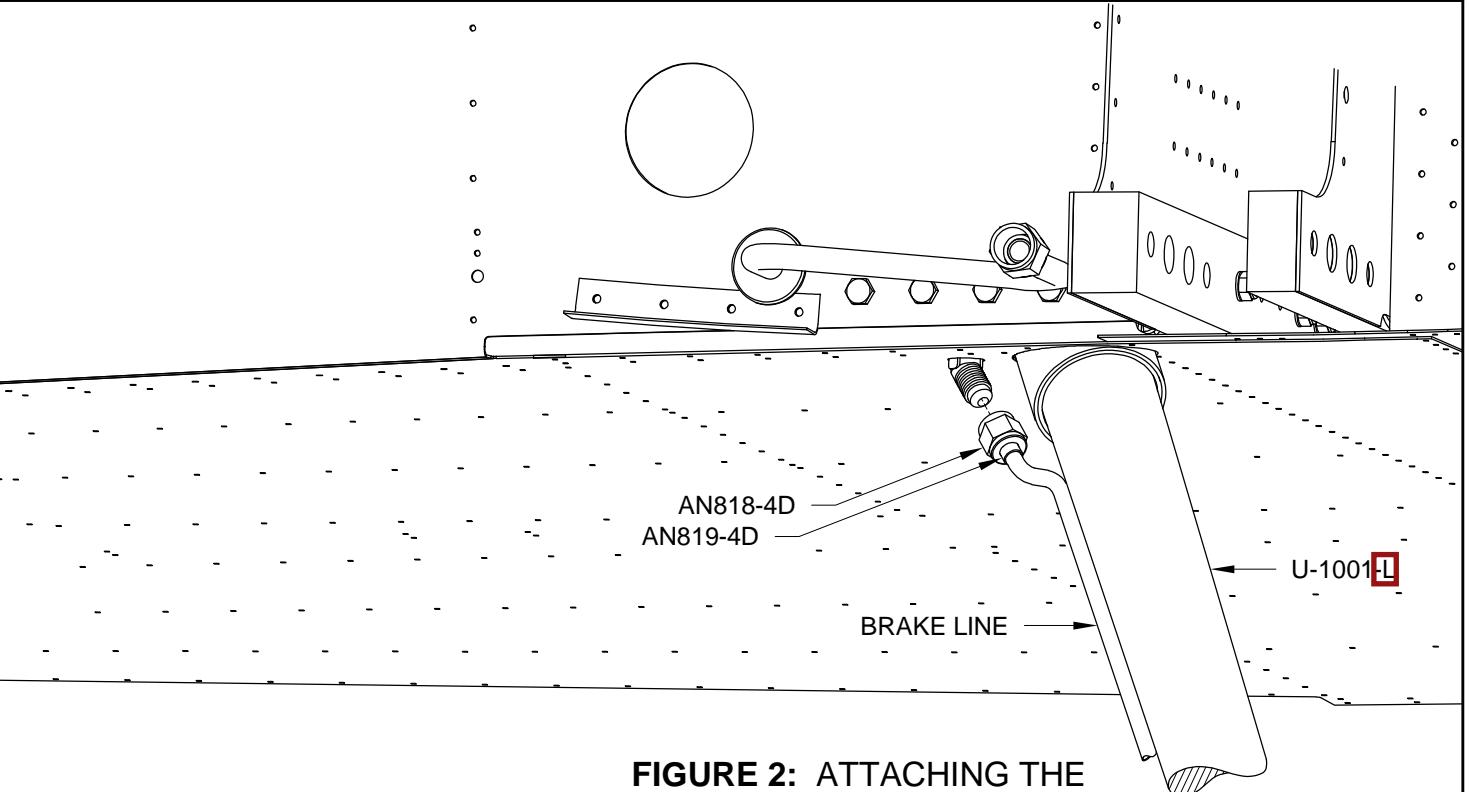
**FIGURE 1: INSTALLING THE BRAKE ASSEMBLY**

Step 4: Make a brake line (from AT0-032X1/4) to run from the fluid fitting on the bottom of the fuselage to the fluid fitting on the Left Cylinder Assembly as shown in Figures 2 and 3.

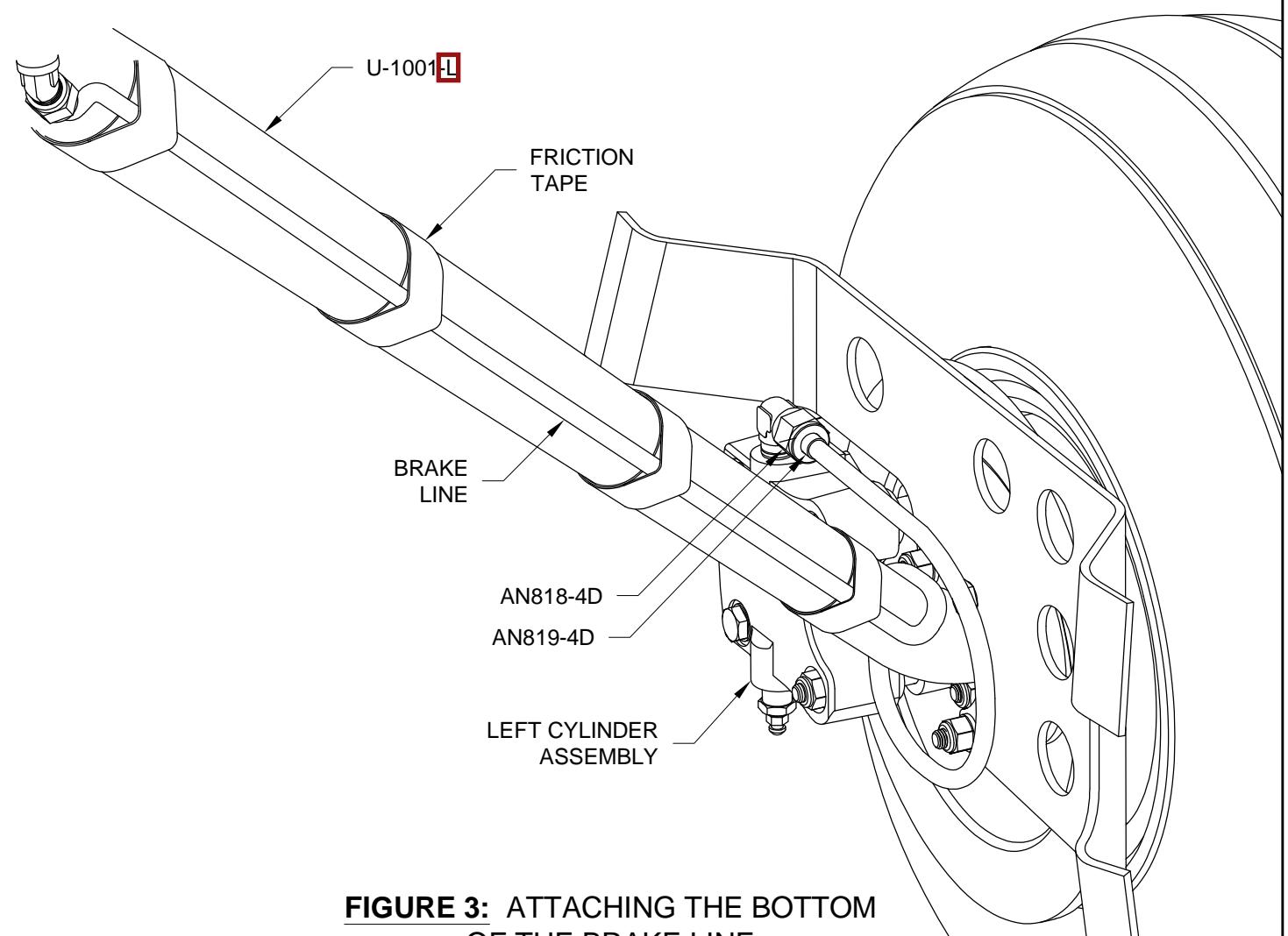
Slide an AN818-4D Nut and an AN819-4D Sleeve onto the brake line, flare the end, then secure it to the fluid fitting on the bottom of the fuselage. Bend the brake line so that it runs down the forward side of the U-1001-L Main Gear Leg as shown in Figure 2.

Step 5: As shown in Figure 3, bend the brake line around the bottom of the U-1001-L Main Gear Leg, cut the brake line to length, slide on an AN818-4D Nut and an AN819-4D Sleeve, flare the end, then secure it to the fluid fitting on the Left Cylinder Assembly.

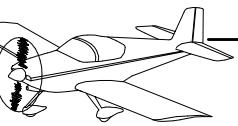
Step 6: Secure the brake line to the U-1001-L Main Gear Leg with "Friction Tape" (found at most hardware stores) in at least four places. First wrap the tape around the main gear leg alone, then wrap it around the brake line as well.



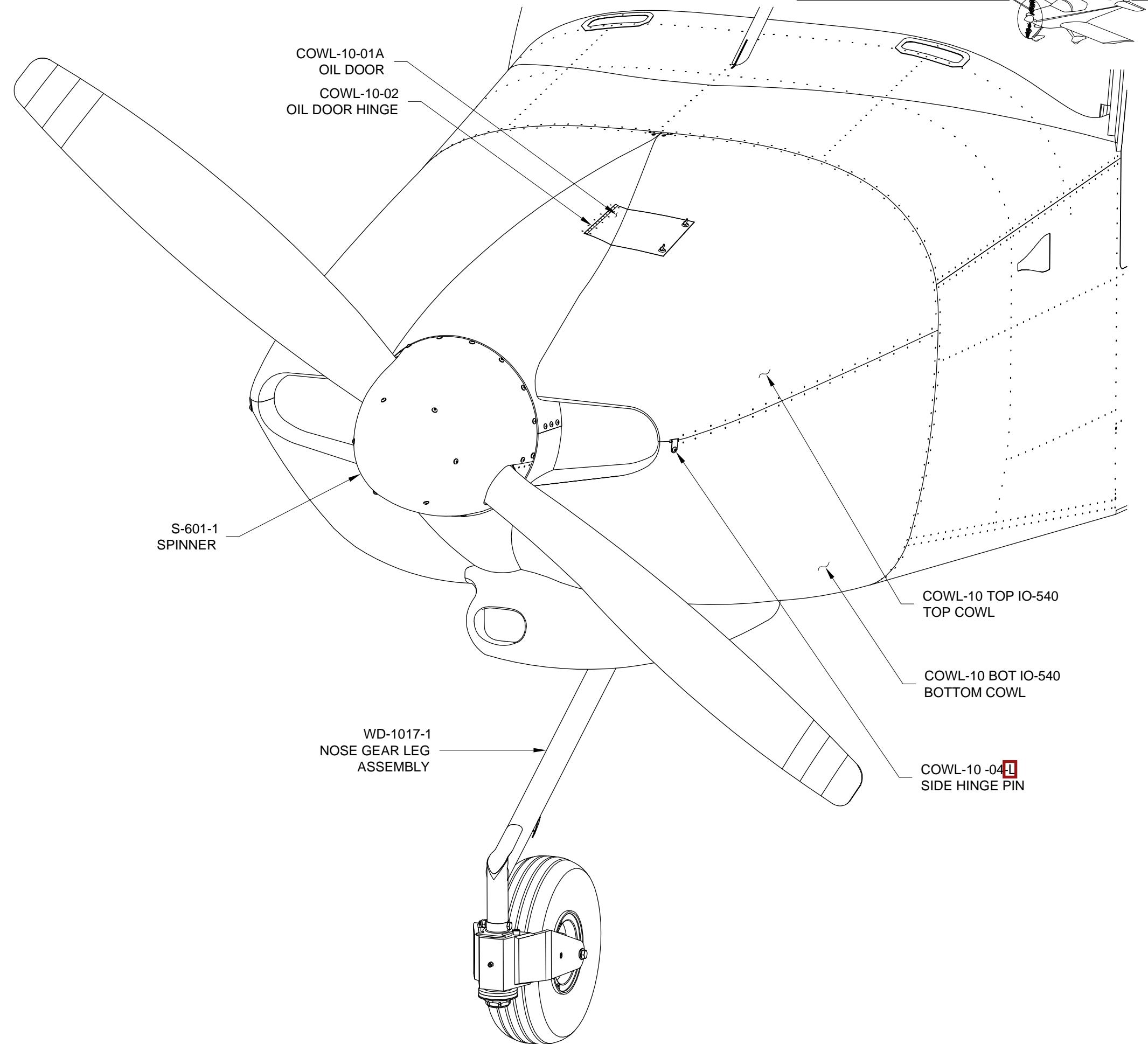
**FIGURE 2: ATTACHING THE TOP OF THE BRAKE LINE**

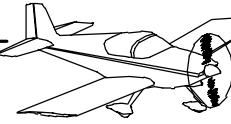


**FIGURE 3: ATTACHING THE BOTTOM OF THE BRAKE LINE**



# SECTION 47: SPINNER & COWLING





## VAN'S AIRCRAFT, INC.

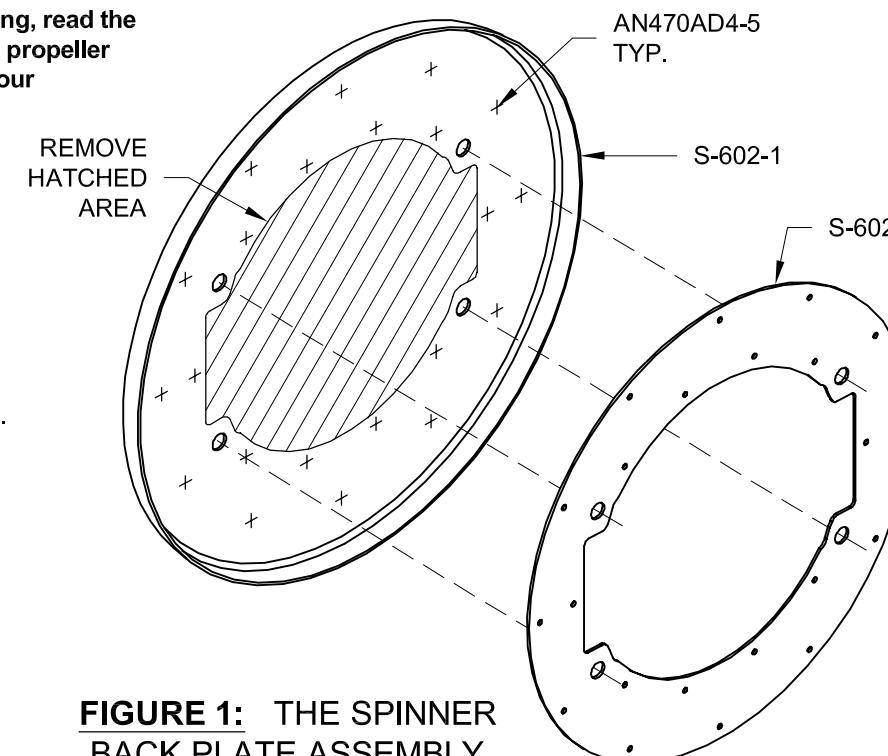
**CAUTION:** Before continuing, read the documentation concerning propeller installation included with your propeller and engine.

Step 1: As shown in Figure 1, locate the S-602B Doubler Ring on the S-602-1 Spinner Back Plate using bolts through the four holes in both parts.

Match-Drill #30 all of the 1/8" holes of the doubler ring into the spinner back plate and cleco.

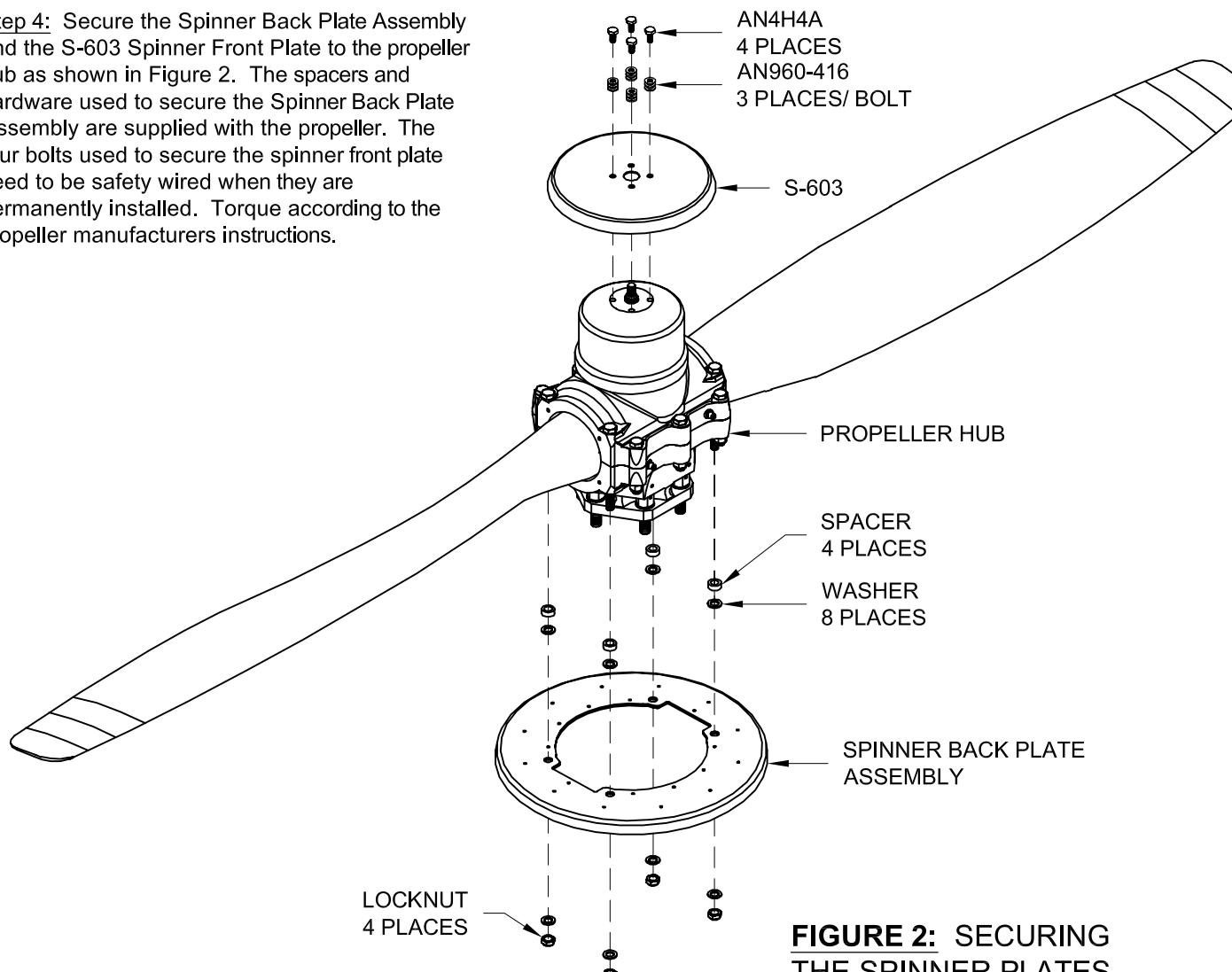
Step 2: Trace the inside perimeter of the S-602B Doubler Ring onto the S-602-1 Spinner Back Plate. Remove the doubler ring, then cut along the trace to remove the hatched area (shown in Figure 1) from the spinner back plate.

Step 3: Deburr the holes and edges of both parts, prime if/as desired, then rivet them together using the rivets called-out in Figure 1.



**FIGURE 1: THE SPINNER BACK PLATE ASSEMBLY**

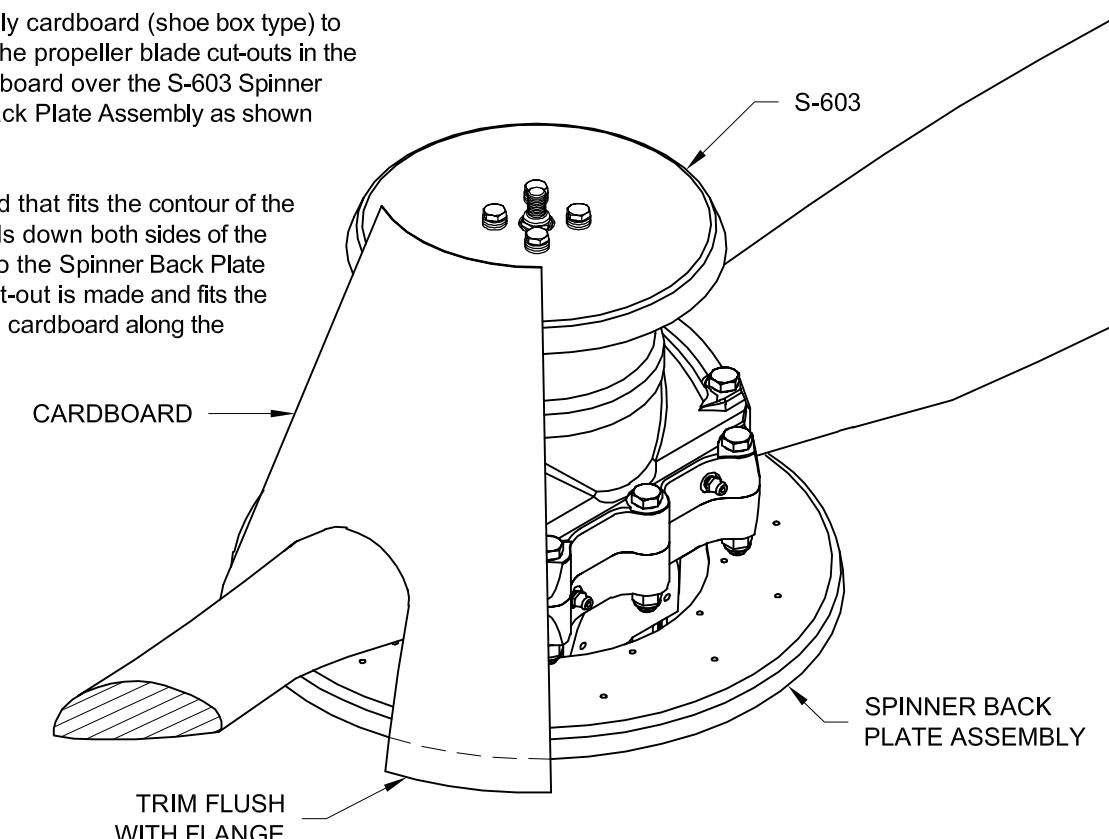
Step 4: Secure the Spinner Back Plate Assembly and the S-603 Spinner Front Plate to the propeller hub as shown in Figure 2. The spacers and hardware used to secure the Spinner Back Plate Assembly are supplied with the propeller. The four bolts used to secure the spinner front plate need to be safety wired when they are permanently installed. Torque according to the propeller manufacturers instructions.



**FIGURE 2: SECURING THE SPINNER PLATES**

Step 5: Cut a piece of single-ply cardboard (shoe box type) to use as a template for locating the propeller blade cut-outs in the S-601-1 Spinner. Lay the cardboard over the S-603 Spinner Front Plate and the Spinner Back Plate Assembly as shown in Figure 3.

Make a cut-out in the cardboard that fits the contour of the propeller blade and that extends down both sides of the propeller blade perpendicular to the Spinner Back Plate Assembly flange. Once the cut-out is made and fits the contour well, mark and trim the cardboard along the flange edge of the Spinner Back Plate Assembly as shown in Figure 3.

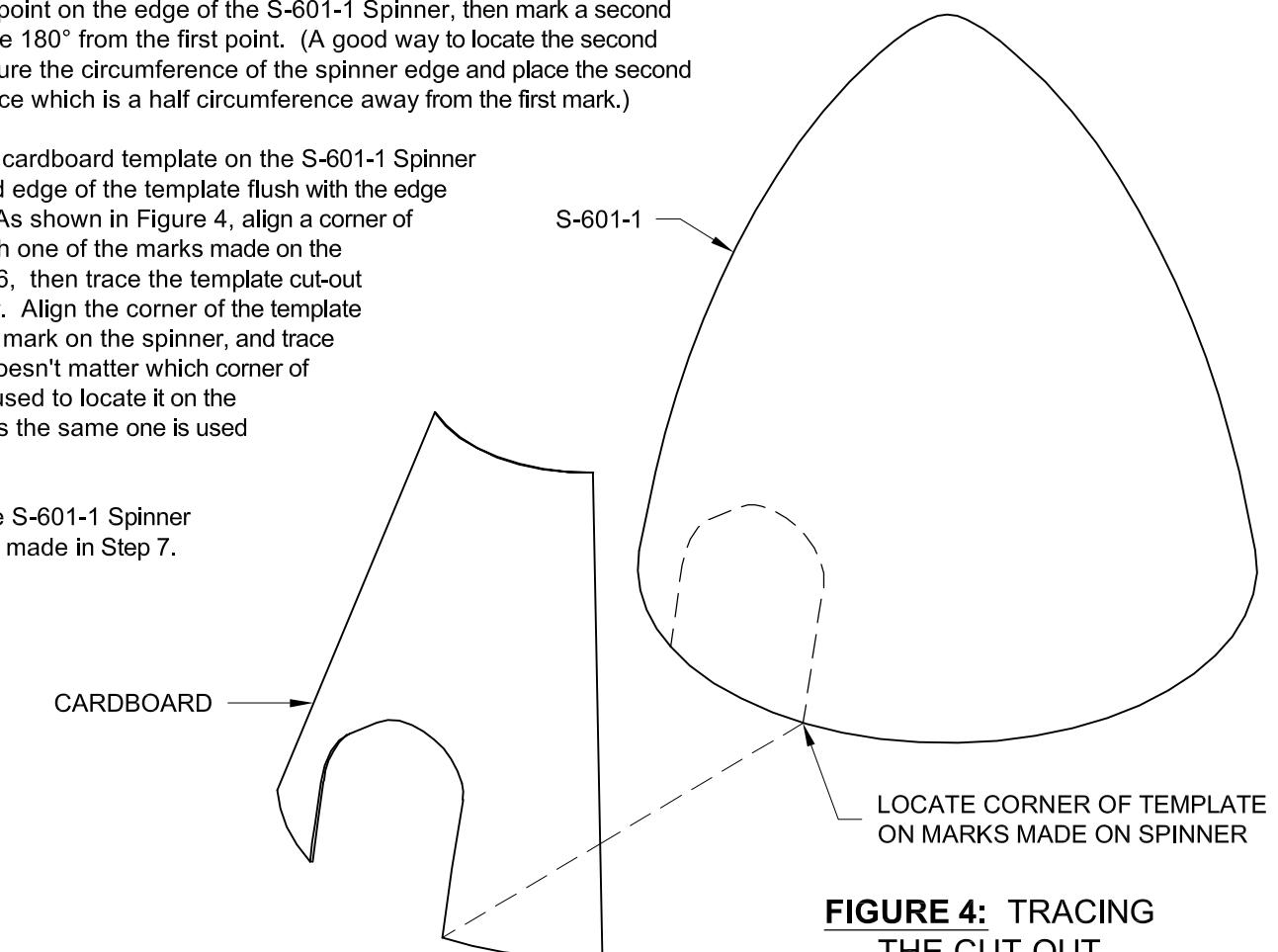


**FIGURE 3: MAKING A CARDBOARD TEMPLATE**

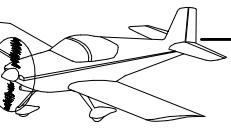
Step 6: Mark a point on the edge of the S-601-1 Spinner, then mark a second point on the edge 180° from the first point. (A good way to locate the second mark is to measure the circumference of the spinner edge and place the second mark at a distance which is a half circumference away from the first mark.)

Step 7: Lay the cardboard template on the S-601-1 Spinner with the trimmed edge of the template flush with the edge of the spinner. As shown in Figure 4, align a corner of the template with one of the marks made on the spinner in Step 6, then trace the template cut-out onto the spinner. Align the corner of the template with the second mark on the spinner, and trace the cut-out. It doesn't matter which corner of the template is used to locate it on the marks as long as the same one is used for both marks.

Step 8: Trim the S-601-1 Spinner along the traces made in Step 7.



**FIGURE 4: TRACING THE CUT-OUT**



**NOTE:** If your spinner is opaque, refer to Section 5.18  
**MATCH-DRILLING OPAQUE FIBERGLASS PARTS** for help  
with locating the spinner front plate underneath the spinner.

**Step 1:** Slide the S-601-1 Spinner onto the propeller hub (tape around the propeller blades to protect them from being scratched by the spinner). Progressively trim the cut-outs of the spinner until it clears the propeller blades, through all blade angles, by a 1/16" to 1/8" as shown in Figure 1. Be sure the spinner is seated firmly on the propeller hub. When this is the case, the spinner will be in contact with the Spinner Back Plate Assembly (any overhang of the spinner beyond the Spinner Back Plate Assembly is trimmed after the spinner is drilled and clecoed in place).

**Step 2:** Mark the locations for the six screws used to secure the S-601-1 Spinner to the S-603 Spinner Front Plate, and mark the locations for the fourteen screws used to secure the spinner to the Spinner Back Plate Assembly. Locate the screws approximately as shown in Figure 1.

**Step 3:** Hold the S-601-1 Spinner in place by clamping it to the flange of the Spinner Back Plate Assembly. Using a #30 bit, drill pilot holes for the screws that secure the spinner to the S-603 Spinner Front Plate. Cleco while drilling.

Drill pilot holes for the screws that secure the spinner to the Spinner Back Plate Assembly. To prevent "pillowing" of the spinner between the screws, start drilling midway between the propeller blade cut-outs working outward toward the cut-outs.

**Step 4:** Trim any overhang of the S-601-1 Spinner beyond the Spinner Back Plate Assembly. A file works well here.

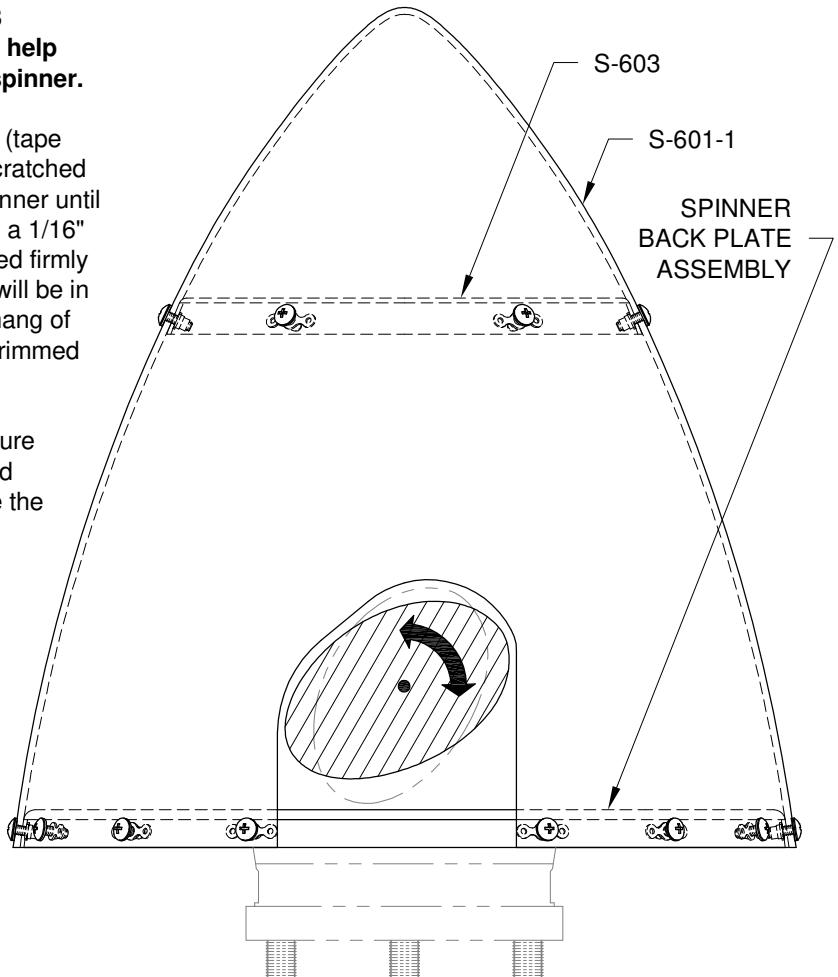
**Step 5:** From AS3-063 aluminum sheet, make two S-1001 Gap Fillers and two S-1002 Backing Plates to fit as shown in Figure 2. Once again, make sure there is a 1/16" to 1/8" clearance between the propeller blade and gap fillers.

Drill four #30 rivet holes for securing the gap filler to the Spinner Back Plate Assembly, and two #30 rivet holes for securing the gap filler to the backing plate. Locate the holes approximately as shown in Figure 2.

Cleco the backing plate to the gap filler, then cleco the gap filler to the Spinner Back Plate Assembly. Drill a #30 pilot hole in the S-601-1 Spinner and backing plate for the screw that will secure the two parts together.

**Step 6:** Final-Drill #19 all the holes common to the S-601-1 Spinner and the S-603 Spinner Front Plate, common to the spinner and Spinner Back Plate Assembly, and common to the spinner and S-1002 Backing Plate.

**Step 7:** Remove the S-601-1 Spinner. Drill #40 holes in the Spinner Back Plate Assembly, the S-603 Spinner Front Plate, and the S-1002 Backing Plate for the rivets used to attach the nutplates called-out in Figures 1 and 2.



**FIGURE 1: SECURING THE SPINNER**

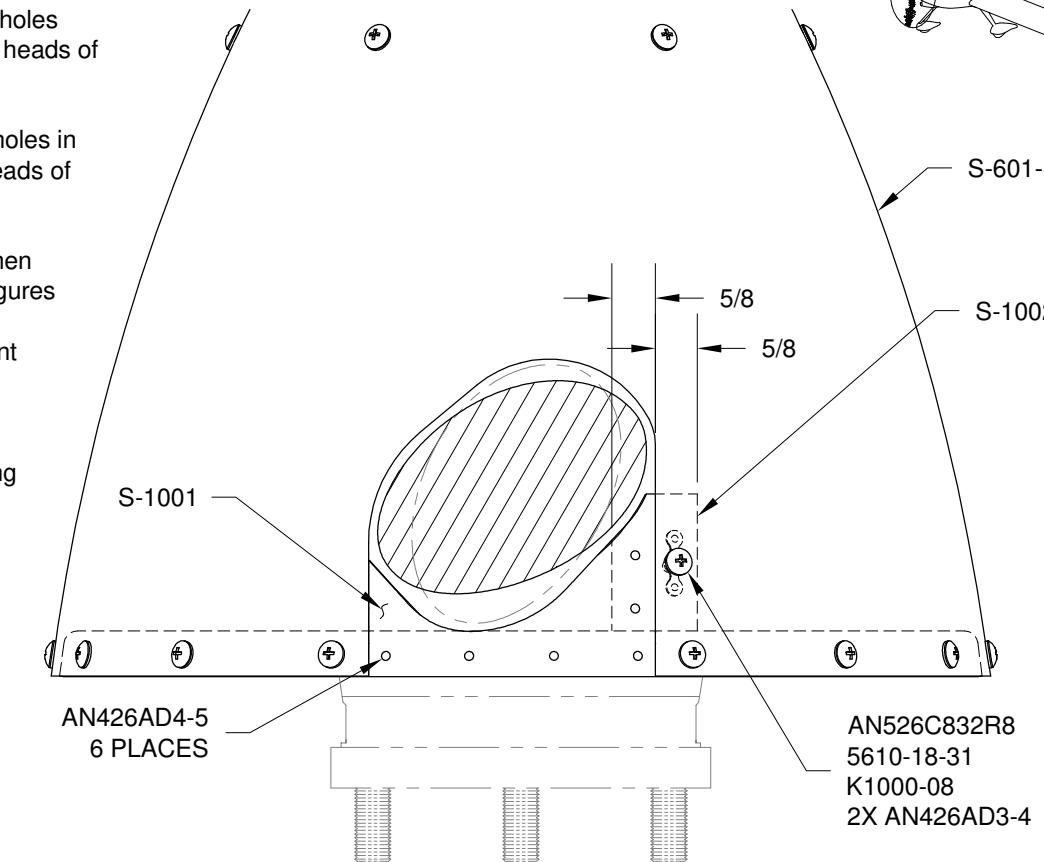
**Step 8:** Machine countersink the holes drilled in the previous step for the heads of AN426AD3 rivets.

Machine countersink the six #30 holes in both S-1001 Gap Fillers for the heads of AN426AD4 rivets.

**Step 9:** Deburr all holes drilled, then rivet the nutplates called-out in Figures 1 and 2 to the Spinner Back Plate Assembly, the S-603 Spinner Front Plate, and the S-1002 Backing Plates.

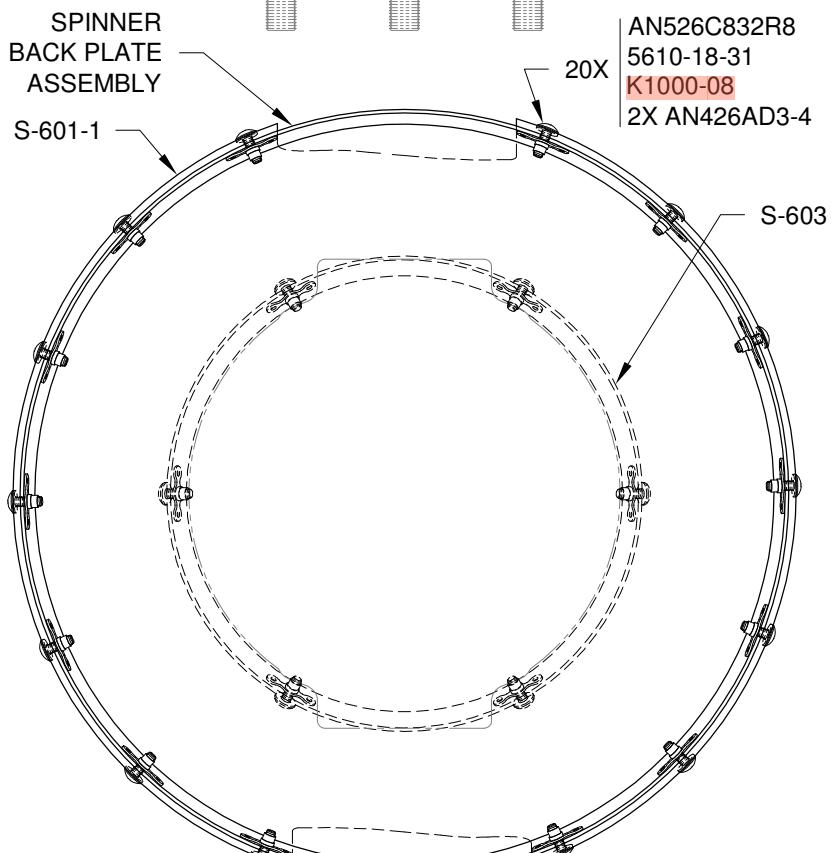
**Step 10:** Rivet the S-1002 Backing Plate to the S-1001 Gap Filler, then rivet the gap filler to the Spinner Back Plate Assembly.

**Step 11:** Secure the S-601-1 Spinner to the S-603 Spinner Front Plate, the Spinner Back Plate Assembly, and to the S-1002 Backing Plate using the screws and washers called-out in Figures 1 and 2.

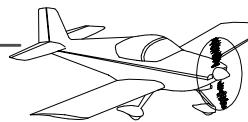


**FIGURE 2: SECURING THE GAP FILLER**

**Step 12:** As shown in Figure 3, attach the propeller to the engine according to the propeller manufacturers instructions.



**FIGURE 3: ATTACHING THE PROPELLER**



Step 1: Lay a straight edge across the spinner opening in the top cowl. Adjust the straight edge up and down until the width of the spinner opening is twice its height. Rotate the straight edge until the outboard air inlet heights match. When both of these criteria are met, mark a trim line across all forward portions of the top cowl. See Figure 1.

Step 2: Trim the excess material away from the lower edge of the top cowl spinner opening and inboard side of the air inlets.

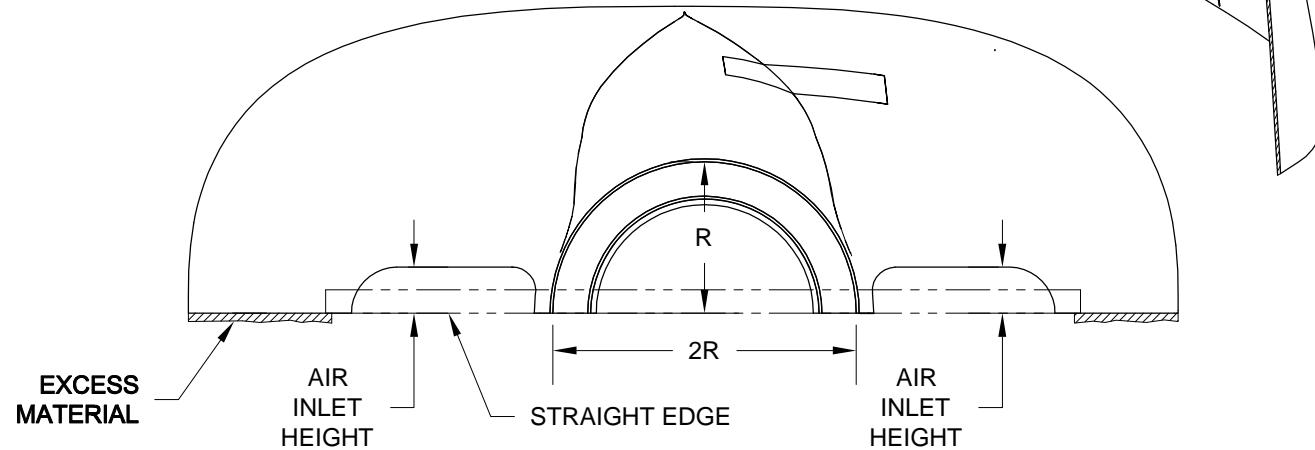


FIGURE 1: TRIMMING THE TOP COVL

Step 3: Lay a straight edge across the spinner opening in the bottom cowl, see Figure 2. Place the straight edge against the flange joggles in the spinner opening, see Figure 3. Mark a trim line across the forward outboard portions of the air inlets in the bottom cowl.

Step 4: Using the trim lines marked out in Step 1 and Step 3, trim the excess material away from both cowls near the outboard side of the air inlets **just enough** to allow the top and bottom cowl halves to be slipped together. **Do not trim** the excess material along **the sides** of the cowls (shown as hatched areas in Figure 1 and Figure 2) at this time.

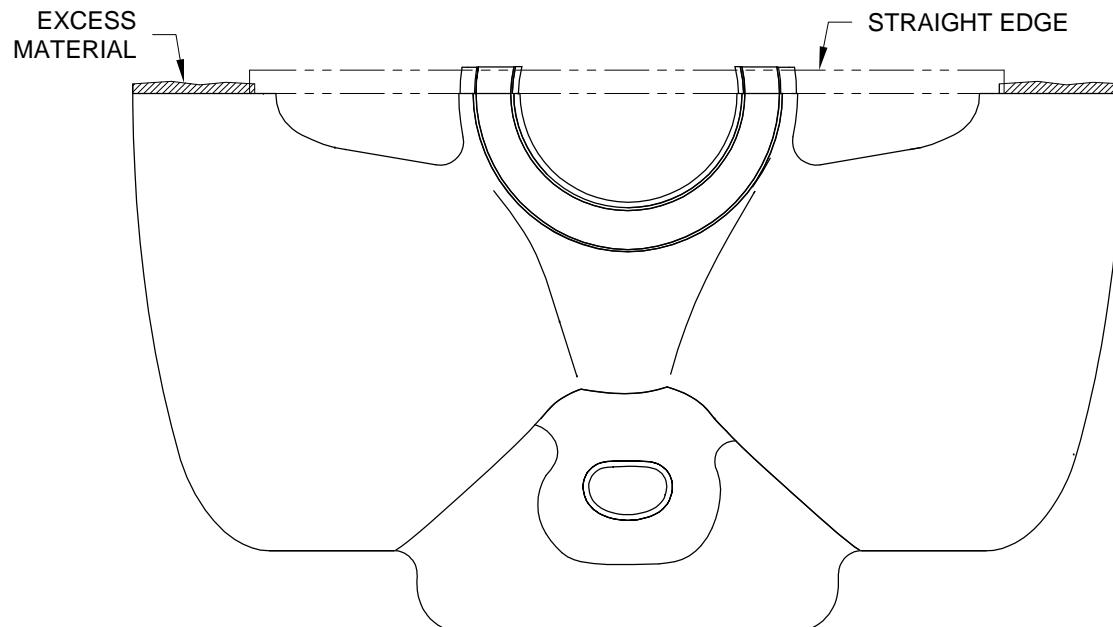
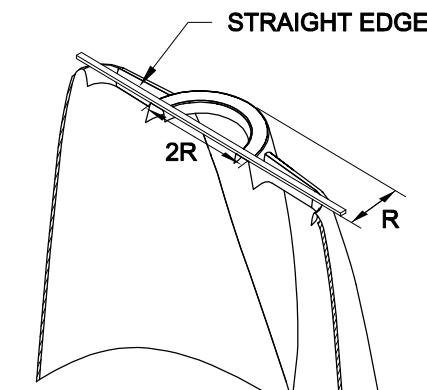


FIGURE 2: TRIMMING THE BOTTOM COVL



Step 5: Clean any excess resin that may have cured along the flange joggle on the bottom cowl. Remove abnormal glass and resin buildup from the inside surface of the top cowl (see Figure 4). Sand down the corners of the flange on the bottom cowl (see Figure 3) until the top cowl can fit into place (see Figure 5).

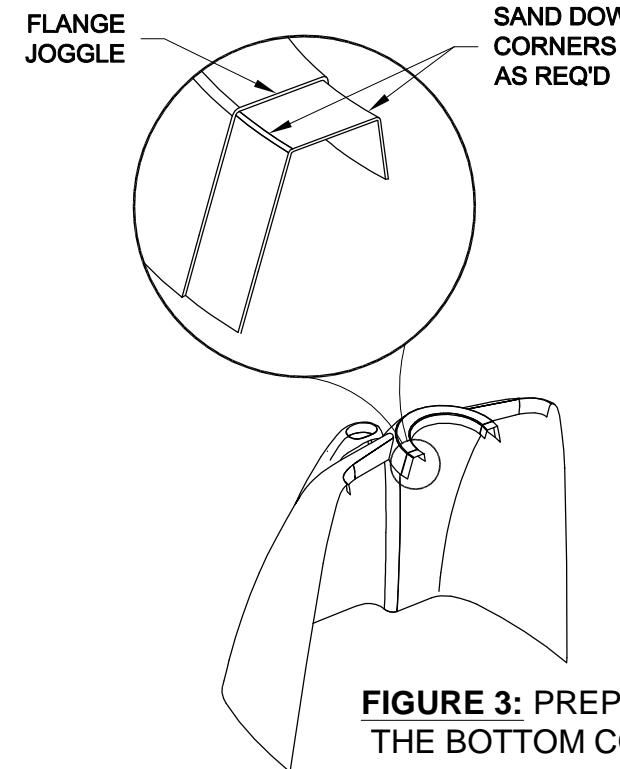


FIGURE 3: PREPPING THE BOTTOM COVL

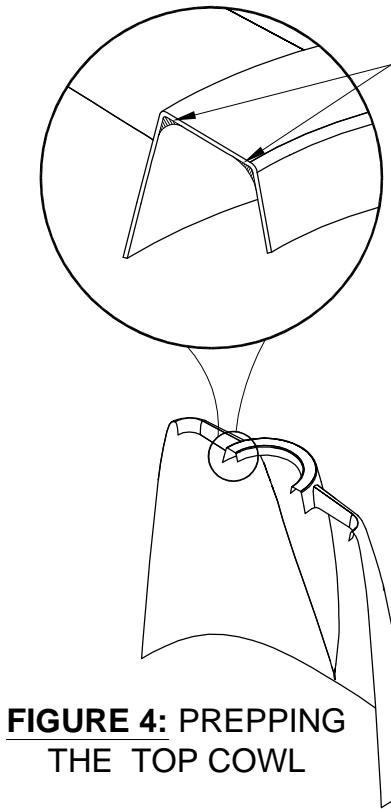


FIGURE 4: PREPPING THE TOP COVL

Step 6: Fit the top and bottom cowl halves together as shown in Figure 5. Using the dimensions in Figure 5, evenly trim the aft edge of the air inlets.

Step 7: Clamp the top and bottom cowls together as shown in Figure 5. Of the three hole pattern shown in Figure 5, mark the location of the **forward** most hole on both sides of the top cowl spinner opening. Drill #40 then cleco the forward most hole only.

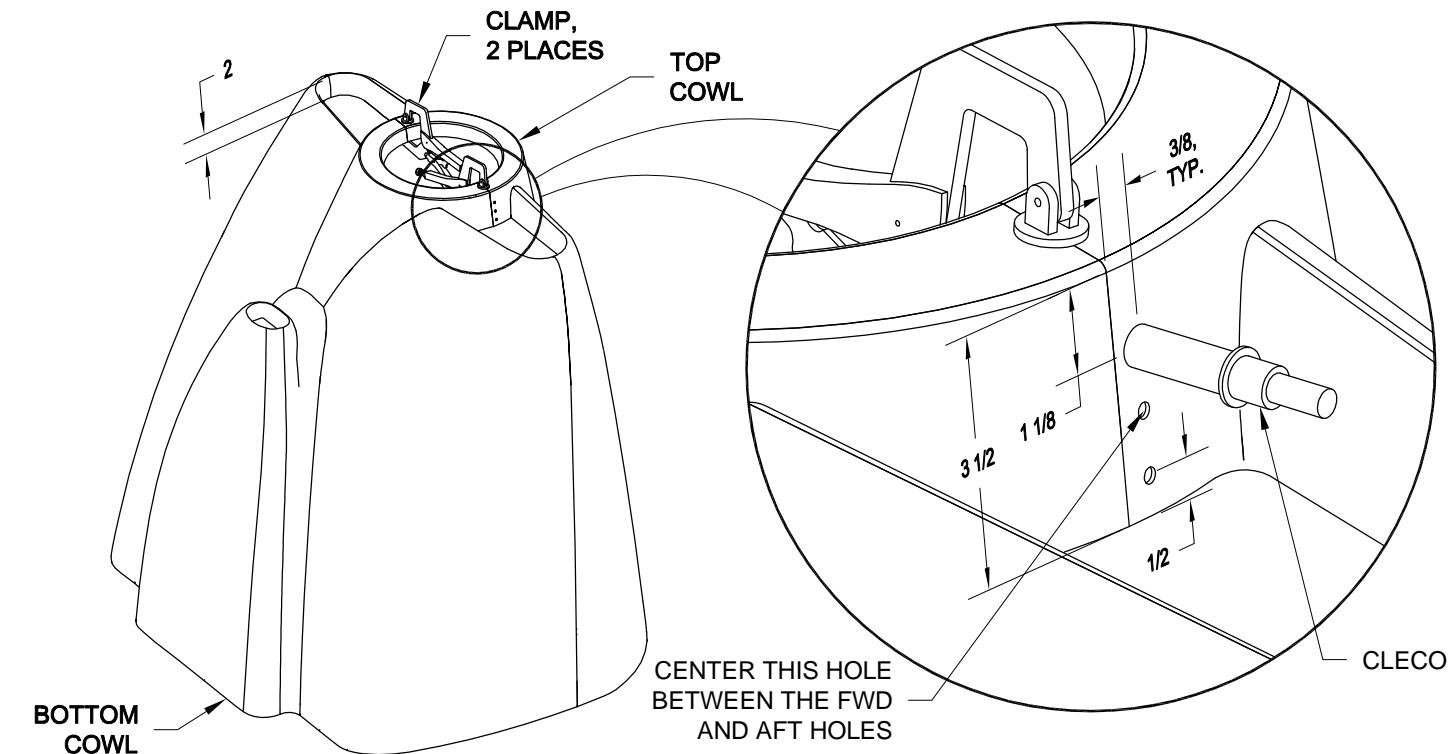


FIGURE 5: FASTENER LOCATIONS



Step 1: Carefully mark a line three inches back from the forward edge of the F-1069-L and R Fwd Side Skins, F-1071 Fwd Fuse top Skin and F-1072 Fwd Fuse bottom Skin as shown in Figure 1.

Step 2: Tape 1/8 inch thick spacers to the forward face of the top cowl in at least three locations as shown in Figure 1.

Step 3: Level the aircraft laterally. Place the top cowl on the aircraft, centering it behind the spinner. Hang plumb bobs from symmetrical points on the forward edge of the top cowl air inlets to the floor as shown in Figure 1. When the length of the plumb bobs is equal, the top cowl is level with the aircraft. Make a reference mark on the aft edge of the top cowl that extends onto the F-1071 Fwd Fuse top Skin.

Step 4: Draw a line onto the top cowl three inches forward of the line made in Step 1. This line corresponds to the the forward edge of the F-1071 Fwd Fuse top Skin. Extend this line approximately 15 inches to either side of the aircraft centerline.

Step 5: Remove the top cowl and from fifteen inches on either side of the centerline, trim the excess material aft of the line drawn in Step 4. Reinstall the cowl. The upper edge of the top cowl should drop down onto both F-1001N Cowl Attach Hinges. If further trimming is required remove the top cowl and slowly remove material with a long straight sanding block.

Step 6: Mark the forward edge of the skins onto the sides of the top cowl using the same method used in Step 4. Remove the top cowl and trim away the remaining excess material along the sides.

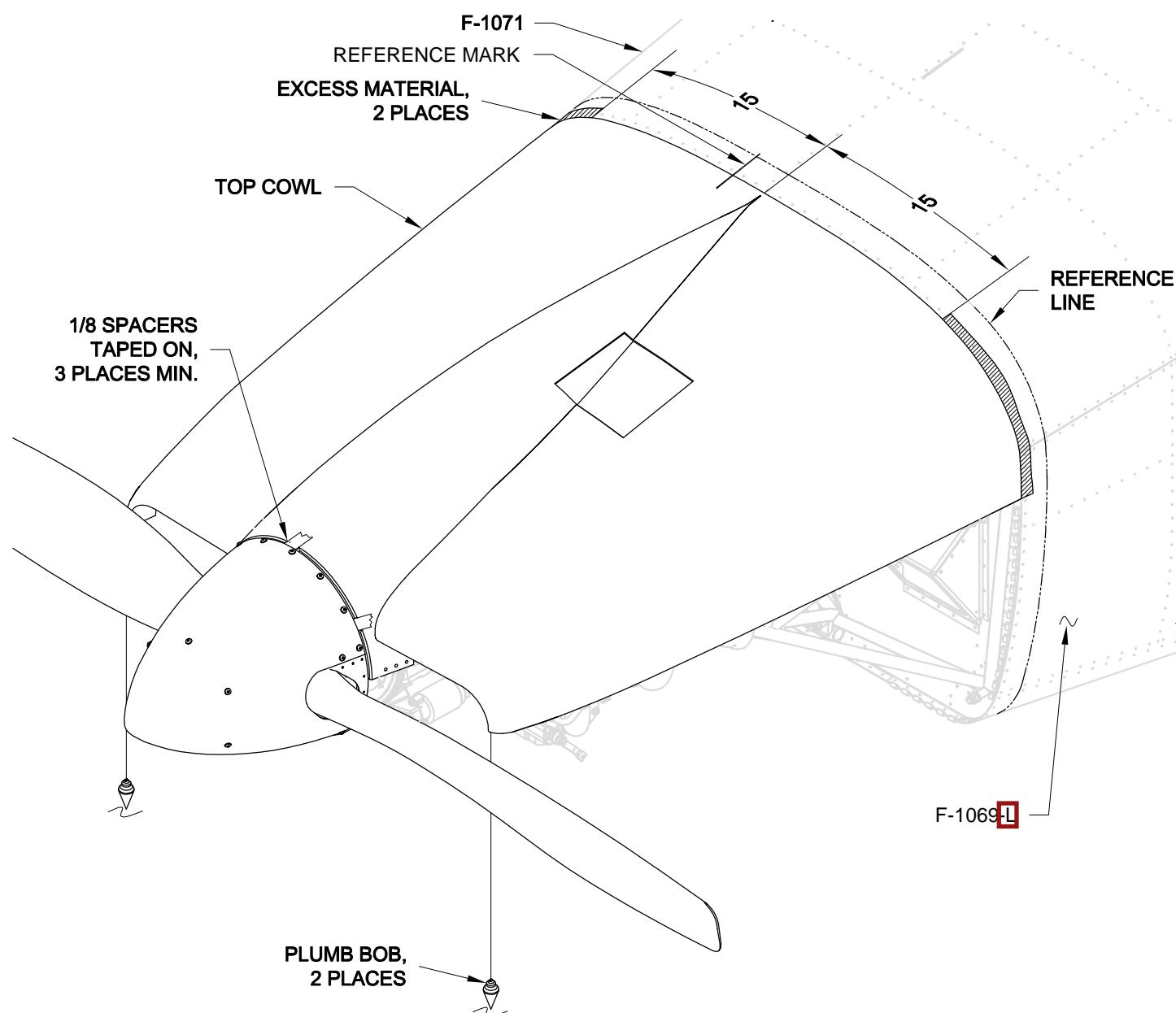


FIGURE 1: FITTING THE TOP COOL

Step 7: Cut a slot centered on the scoop of the bottom cowl per the dimensions given in Figure 2.

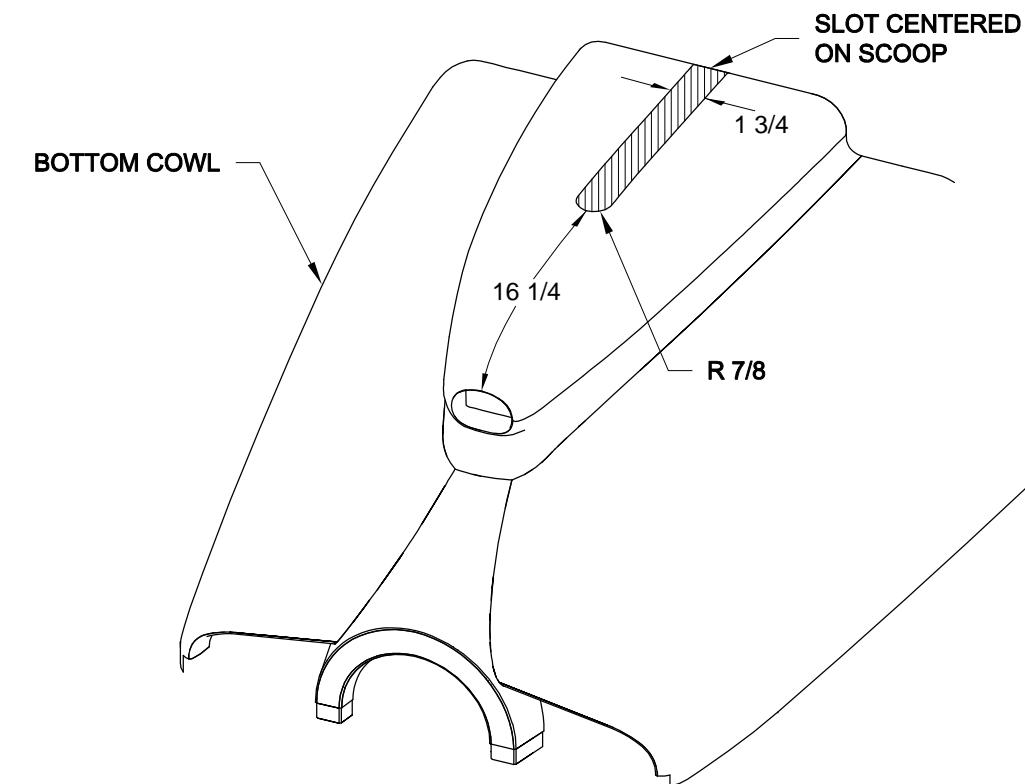


FIGURE 2: CUTTING A SLOT IN THE BOTTOM COOL SCOOP

Step 8: Fit the COWL, 10 INLET LEFT and RIGHT (called inlet ramps throughout the remainder of this section) to the top cowl, trimming and sanding as necessary for a good fit. See Figure 3.

Step 9: Drill #40 and cleco the inlet ramps in place. (The holes can be easily filled when finishing the outside surface of the cowl). See Figure 3. Remove the inlet ramps.

**NOTE:** Left inlet ramp must be trimmed to clear prop governor.

Step 10: Sand the area to be bonded on both the top cowl and the inlet ramps with 40-60 grit sandpaper. Sand away all the glossy surface of the resin on the inlet ramps.

Step 11: Use epoxy resin to bond the inlet ramps to the top cowl. Cleco the inlet ramps to the top cowl until the resin has cured. Sand away any excess resin that may have oozed out of place. Fill the joggle formed by the air inlets aft edge with body filler. Sand and fill this area until there is a smooth transition between the air inlets and the inlet ramps.

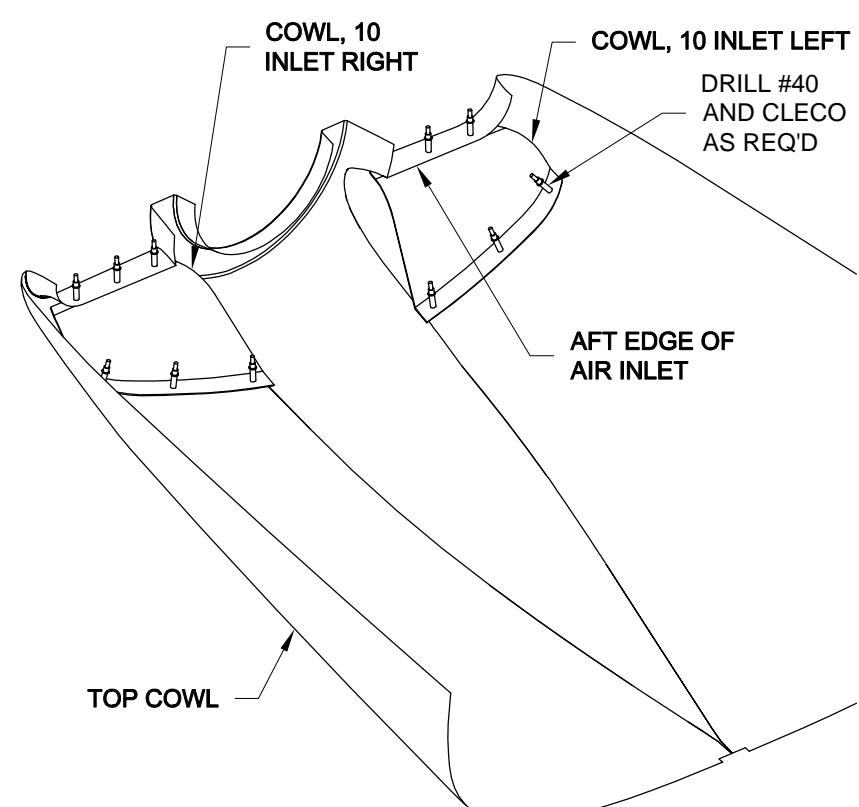


FIGURE 3: INSTALLING THE INLET RAMPS



**NOTE: For Step 1 through Step 12 refer to Figure 1.**

Step 1: Tape 1/8 inch thick spacers to the forward face of the bottom cowl in at least three locations.

Step 2: Fit the bottom cowl to the aircraft. Slip the excess material along the sides of the bottom cowl (top edge) over the excess material along the lower edge of the top cowl. If required slightly increase the width of the slot created on Page 47-5, Step 7.

Step 3: Using the reference line drawn on Page 47-5, Step 1, mark a line along the **bottom** edge of the bottom cowl three inches forward that corresponds to the forward edge of the F-1072 Fwd Fuse bottom Skin. The line need only extend far enough that when the excess material aft of the line is removed the bottom of the cowl will lay flat against the F-1001Q-L and F-1001Q-R Cowl Attach Hinges. Do **not** mark the sides of the bottom cowl yet!

Step 4: Remove the bottom cowl and trim away the excess material aft of the line drawn in Step 3. Check that the bottom cowl will lay flat against the F-1001Q-L and F-1001Q-R Cowl Attach Hinges. Do not bother to trim the excess material aft of the bottom cowl scoop at this time.

Step 5: Using the reference line drawn on Page 47-5, Step 1, mark a line along the aft sides of the bottom cowl three inches forward that corresponds to the forward edge of the F-1069-L and F-1069-R Fwd Fuse Side Skins. Remove the bottom cowl. Cut away the remaining excess material along the side aft edges of the bottom cowl.

**NOTE:** When laying out holes that attach hinges to the top and bottom cowls, offset the holes  $5/16$  from the outside edge and the ends of the hinge unless otherwise specified. Lay out the holes with approximate one inch spacing. Periodically check and clean out any debris between the hinges and the cowl while drilling!

Step 6: Lay out then drill #27 the inboard most hole common to the F-1001Q-L and F-1001Q-R Cowl Attach Hinges and the bottom cowl. Evenly space, drill #40, then cleco the four remaining rivet holes in the cowl attach hinge.

Lay out, drill #40, then cleco the holes common to the F-1001N Cowl Attach Hinges and the top cowl. Start at the inboard end and work outboard.

Lay out, drill #40, then cleco the holes common to the F-1001P Cowl Attach Hinges and the bottom cowl. Start at the bottom and work upwards.

Deburr the cowl attach hinges. Machine countersink the cowl hinge attach holes in the top and bottom cowl.

Step 7: Install the hardware in the inboard most hole common to the F-1001Q-L and F-1001Q-R Cowl Attach Hinges and the bottom cowl.

Step 8: Rivet the cowl attach hinges to the top and bottom cowl per the callout in Figure 1.

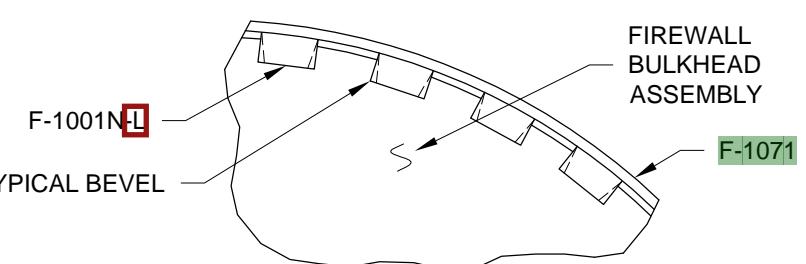
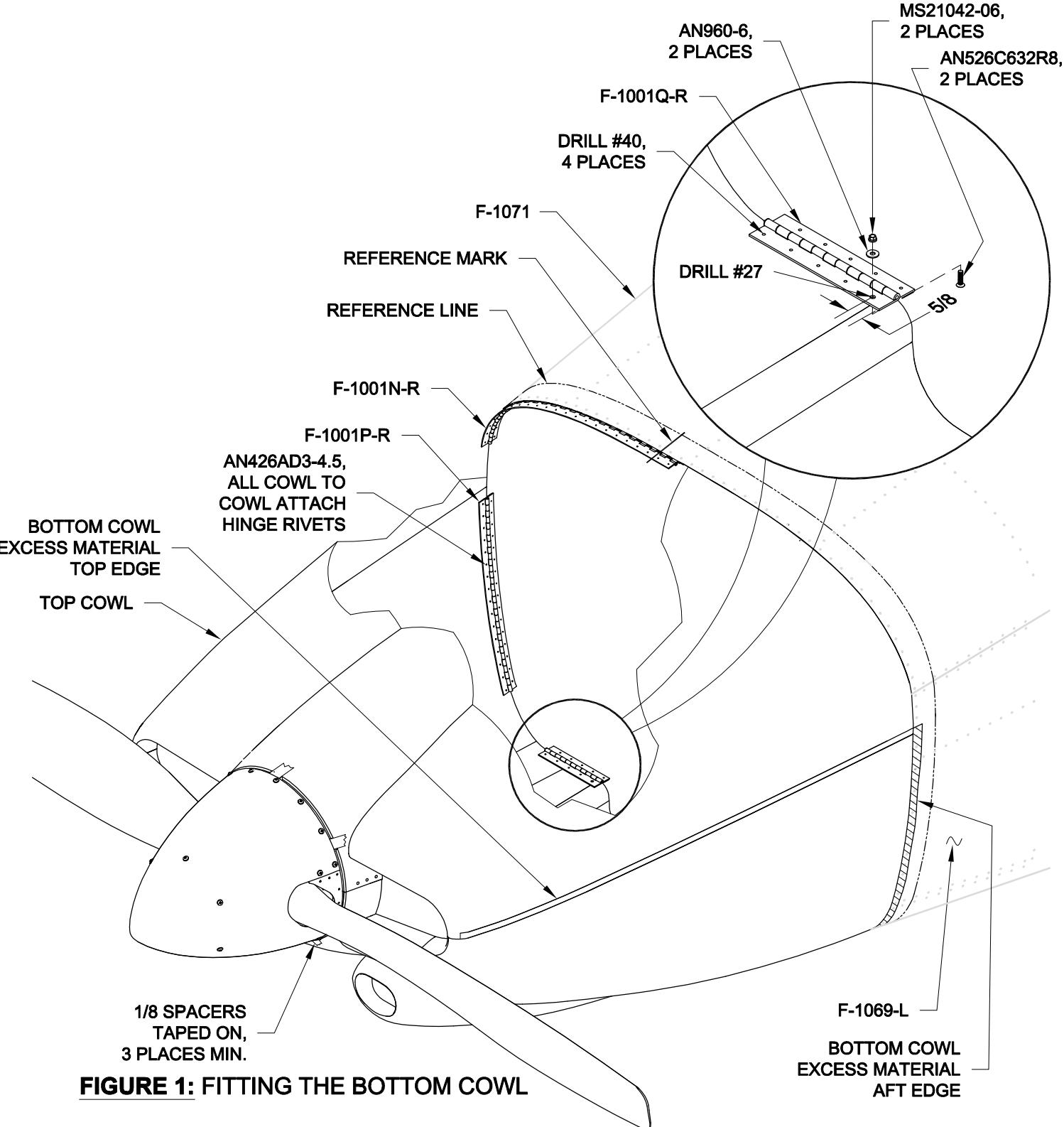
Step 9: Lay out on the top cowl the two remaining holes on either side of the spinner opening as shown on Page 47-4, Figure 5. Drill these holes #19 into the top and bottom cowl. Final-Drill the forward most hole #19.

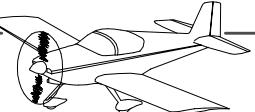
Step 10: Lay out the split line along the sides of the top and bottom cowls. This line will extend from the aft edge of the cutouts made on Page 47-4, Step 4 to the forward edge of the F-1069-L and F-1069-R Fwd Fuse Side Skins. Adjust the overall split line as necessary if there is insufficient excess material on either the top or bottom cowls.

Step 11: Remove the bottom cowl. Remove the excess material above the split line. Remove the 1/8 spacers from the front of the bottom cowl. Reinstall the bottom cowl.

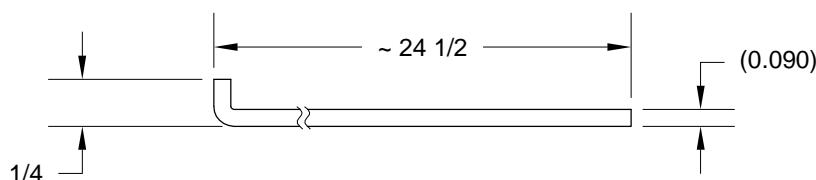
Step 12: Using the bottom cowl as a guide, mark the split line on the top cowl. Remove the top cowl and remove the material below the split line. Remove the 1/8 spacers from the front of the top cowl. Adjust the split line to obtain a .020 to .032 gap (approximately the width of a hacksaw blade) between the top and bottom cowls.

Step 13: Bevel the eyelets along the curved portion of the F-1001N Cowl Attach Hinges as shown in Figure 2.



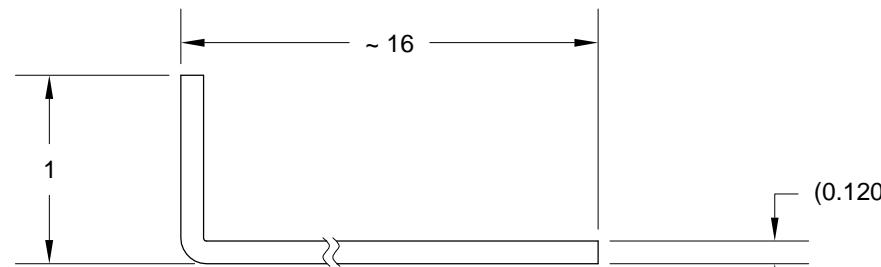


Step 1: Make two F-1001S Cowl top Hinge Pins from SSP-090 hinge pin per the dimensions in Figure 1. These pins will replace the soft aluminum pins provided for the F-1001N Cowl Attach Hinge.



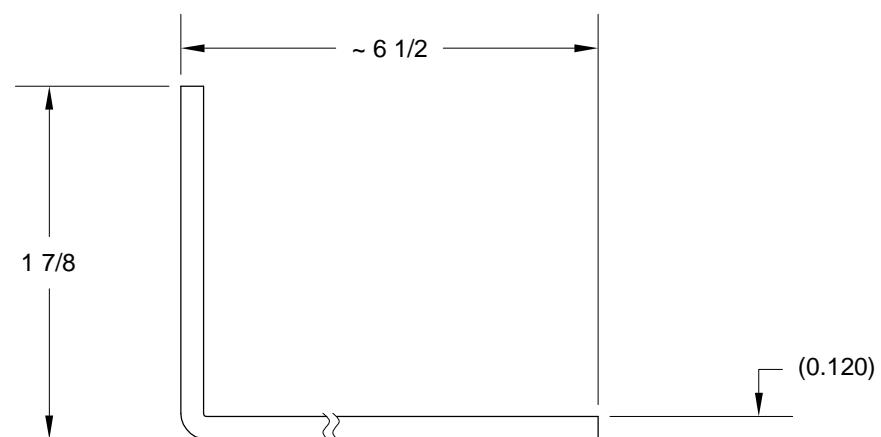
**FIGURE 1: FABRICATING THE COWL TOP HINGE PINS**

Step 2: Make two F-1001T Cowl Side Hinge Pins from SSP-120 hinge pin per the dimensions in Figure 2. These pins will replace the soft aluminum pins provided for the F-1001P Cowl Attach Hinge.



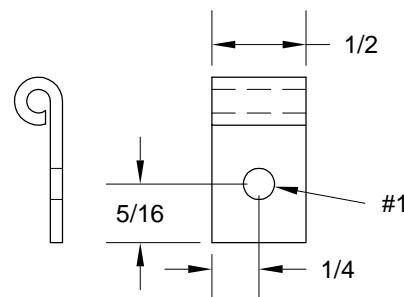
**FIGURE 2: FABRICATING THE COWL SIDE HINGE PINS**

Step 3: Make two F-1001U Cowl Both Hinge Pins from SSP-120 hinge pin per the dimensions in Figure 3. These pins will replace the soft aluminum pins provided for the F-1001Q Cowl Attach Hinge.



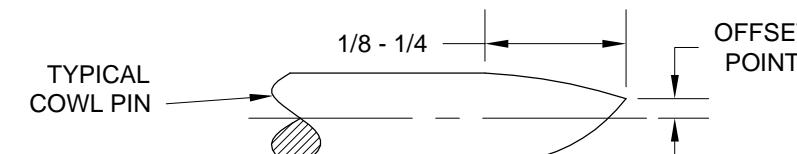
**FIGURE 3: FABRICATING THE COWL BOT HINGE PINS**

Step 4: Make two F-1001V Cowl Pin Retainers from HINGE PIANO 1/8 per the dimensions in Figure 4.



**FIGURE 4: FABRICATING THE COWL PIN RETAINERS**

Step 5: Grind the ends of the cowl pins created in Step 1, Step 2 and Step 3 as shown in Figure 5. Offset the point.

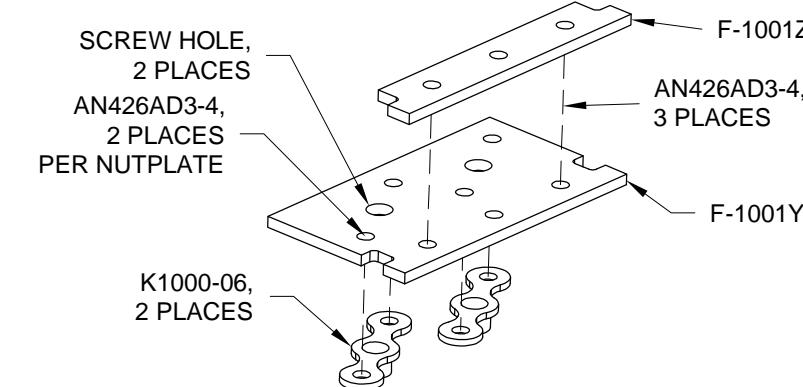


**FIGURE 5: SHAPING THE COWL PIN ENDS**

Step 6: Cleco the F-1001Y Cowl Upper Pin Retainer to the F-1001Z Filler Plate. Final-Drill #40 all the rivet holes in both parts. Final-Drill #27 the screw holes in the cowl upper pin retainer. See Figure 6.

Step 7: Dissassemble the F-1001Y Cowl Upper Pin Retainer and F-1001Z Filler Plate. Deburr both parts. Machine countersink the rivet holes in both parts.

Step 8: Rivet the F-1001Y Cowl Upper Pin Retainer to the F-1001Z Filler Plate per the callouts in Figure 6. Do not rivet the nutplates on yet!



**FIGURE 6: MAKING THE COWL UPPER PIN RETAINER ASSEMBLY**

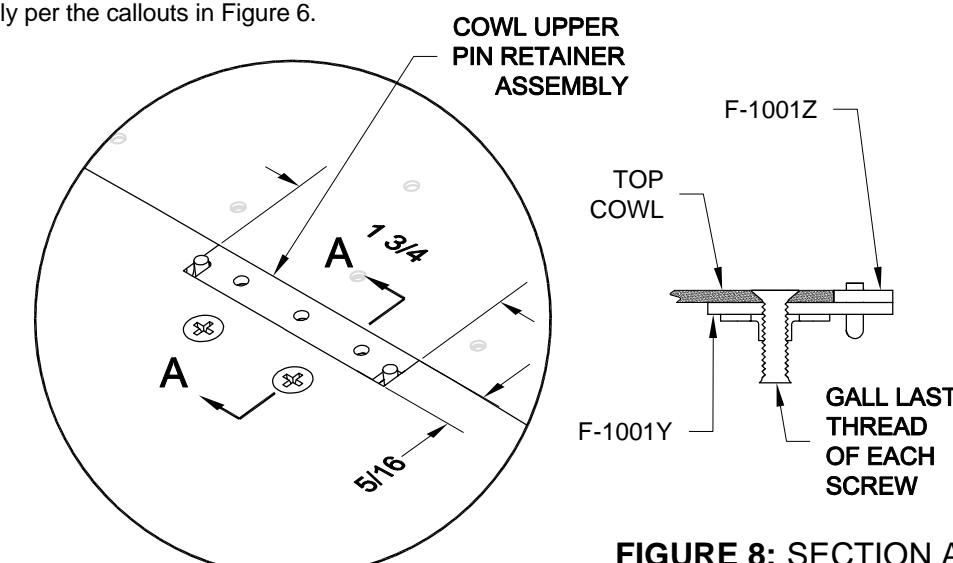
Step 9: Cut a notch in the middle aft edge of the top cowl per the dimensions shown in Figure 7.

Step 10: Fit the Cowl Upper Pin Retainer Assembly into the notch made in Step 9. Match-Drill #27 the two screw holes in the F-1001Y Cowl Upper Pin Retainer into the top cowl. Machine countersink the screw holes for the head of an #6 screw.

Step 11: Rivet the nutplates to the Cowl Upper Pin Retainer Assembly per the callouts in Figure 6.

Step 12: Fasten the Cowl Upper Pin Retainer Assembly to the top cowl with the screws called out in Figure 7.

Step 13: If painting the airplane postpone this step. Gall the last thread on the end of both screws that attach the Cowl Upper Pin Retainer Assembly. This will prevent the screw from backing out of the nutplate.



**FIGURE 8: SECTION A-A**

**FIGURE 7: MAKING THE COWL UPPER PIN RETAINER CUTOUT**



Step 1: Create two COWL-10-03 Side Hinges from AN257-P3 piano hinge per the dimensions given in Figure 1. Do not cut the pin supplied with the hinge.

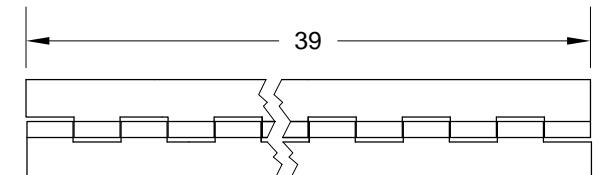


FIGURE 1: MAKING THE SIDE HINGES

Step 2: Clamp the lower half of both COWL-10-03 Side Hinges to the upper edge of the bottom cowl with a 1/64 - 1/32 inch gap between the notch bottom and the bottom cowl upper edge. See Figure 2. The aft edge of the side hinges should be flush with the aft edge of the bottom cowl. See Figure 3 and Figure 6.

Step 3: Using the shadow of the COWL-10-03 Side Hinges visible through the bottom cowl, lay out a rivet pattern with one inch spacing. Leave 5/16 edge distance at the forward and aft ends of the side hinges.

Step 4: Drill #40 the rivet pattern laid out in Step 3 into the bottom cowl and COWL-10-03 Side Hinges.

Step 5: Remove the lower half of the COWL-10-03 Side Hinges from the bottom cowl. Deburr the side hinges. Machine countersink the holes drilled in Step 4.

Step 6: Rivet the lower half of the COWL-10-03 Side Hinges to the bottom cowl per the callouts in Figure 2.

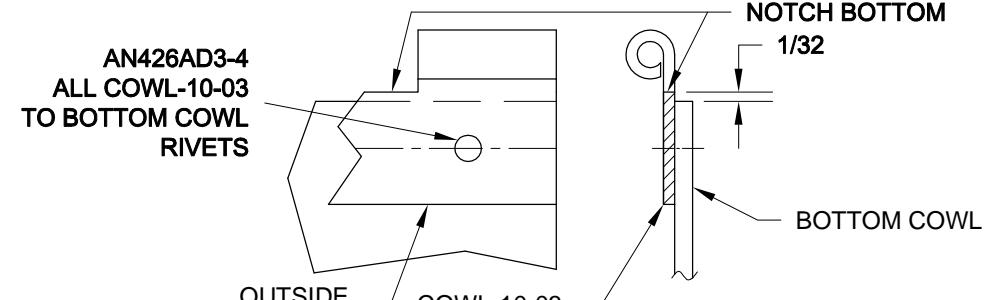


FIGURE 2: DRILLING THE BOTTOM COWL

Step 7: Using the pin supplied with the hinge, attach the upper half of the COWL-10-03 Side Hinges to the lower half already riveted to the bottom cowl. Insert the pin until it contacts the Firewall Bulkhead Assembly. See Figure 3. Mark the pin/cowl intersect point on the bottom cowl. See Figure 4.



FIGURE 3: SETTING THE PIN LENGTH

**NOTE:** The COWL HINGE PIN-LEFT and R Side Hinge Pins are an optional part available in Vans Aircraft Accessories Catalog.

Step 8: Trim the COWL HINGE PIN-LEFT and R Side Hinge Pins until the aft edge of the knuckles lines up with the pin-cowl intersect point. Bend the knuckles parallel with the side of the bottom cowl. See Figure 5. Shape the ends of the side hinge pins per Page 47-7, Step 5.

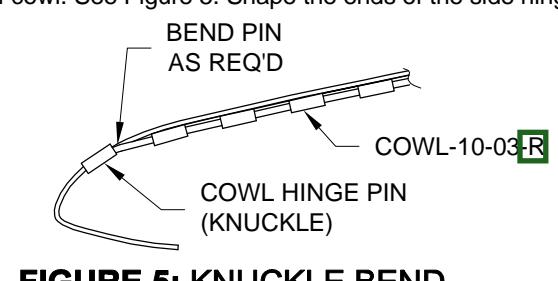
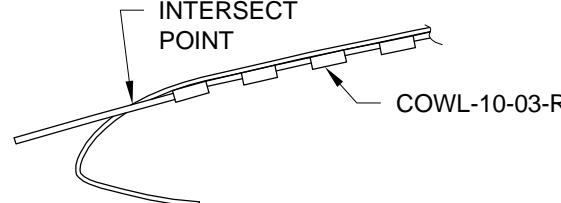


FIGURE 4: KNUCKLE LOCATION

FIGURE 5: KNUCKLE BEND

Step 9: Install the top cowl. Mark the location of the knuckle. Remove the top cowl and create a notch for the knuckle. Reinstall the top cowl.

Step 10: Using the shadow of the top half of the COWL-10-03 Side Hinges visible through the top cowl, lay out a rivet pattern with one inch spacing. Leave 5/16 edge distance at the forward and aft ends of the side hinges.

Step 11: Reach in through the air inlet and hold the forward portion of the side hinge tightly against the top cowl. Drill #40, starting at the front, the top cowl to the side hinges. Cleco each hole after it is drilled. Machine countersink the holes just drilled.

Step 12: Remove the top cowl and the upper half of the COWL-10-03 Side Hinges. Deburr the side hinges.

Step 13: Rivet the upper half of the COWL-10-03 Side Hinges to the top cowl per the callouts in Figure 2.

**NOTE:** The remaining steps reference Figure 6.

Step 14: Match-Drill #19 the hole in the knuckle flange of the COWL HINGE PIN into the bottom cowl. Remove the side hinge pin.

Step 15: Use a #8 screw to temporarily hold a K1000-08 nutplate in the knuckle attach hole. Match-Drill #40 the holes in the nutplate into the bottom cowl. Machine countersink the nutplate attach holes in the bottom cowl. Rivet the nutplate to the bottom cowl.

Step 16: Align the lower edge of a F-1001V Cowl Pin Retainer with the end of the F-1001U Cowl Bot Hinge Pin. Match-Drill #19 the hole in the cowl bot hinge pin retainer into the bottom cowl.

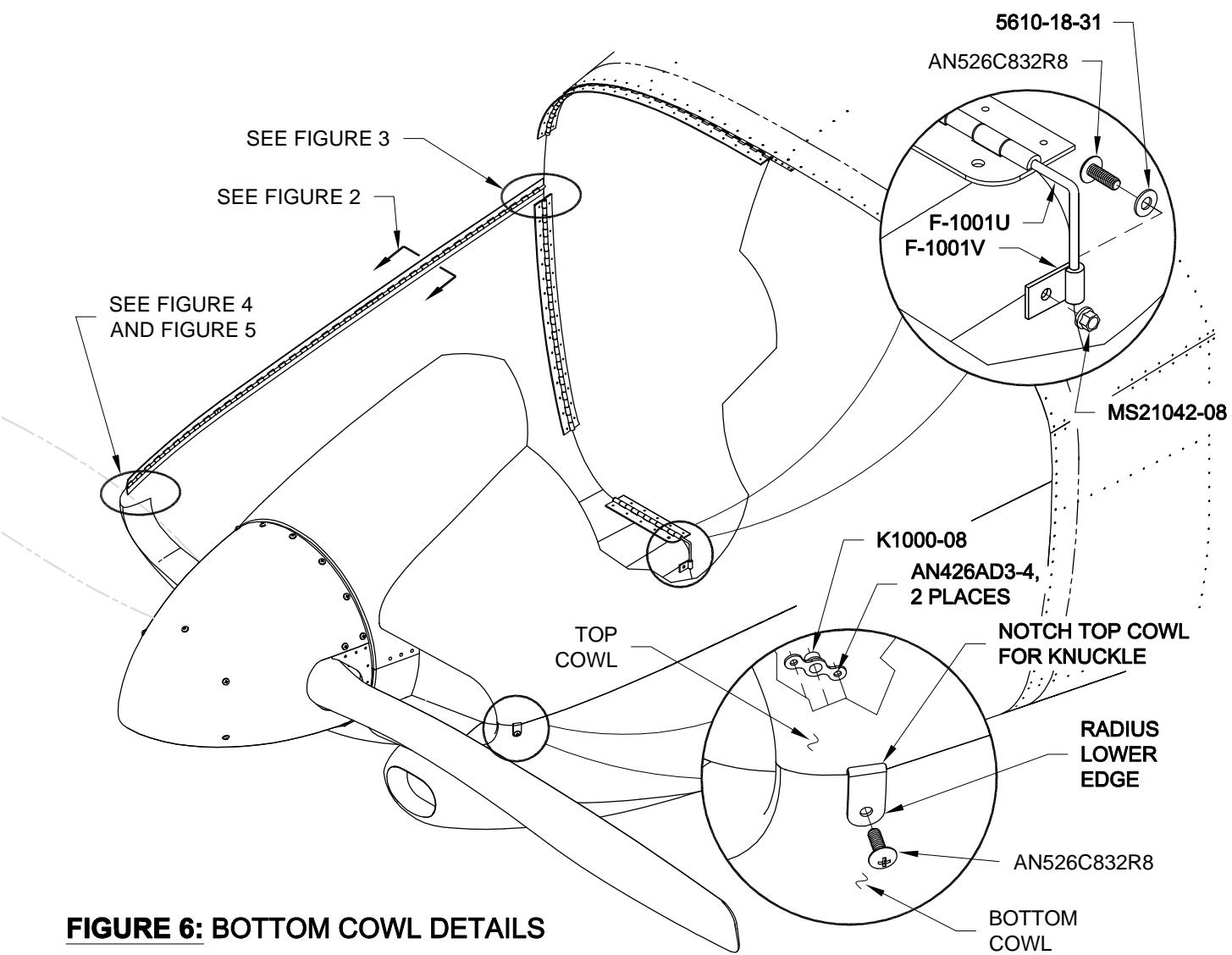


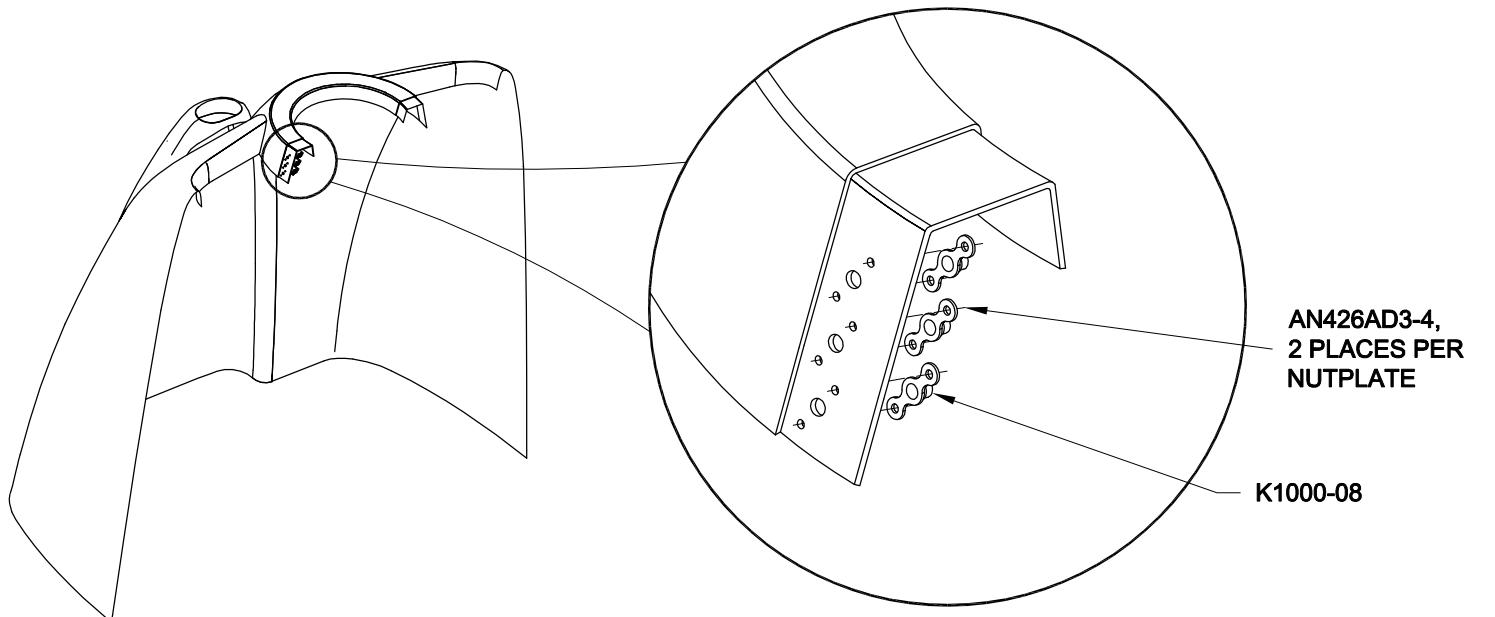
FIGURE 6: BOTTOM COWL DETAILS



Step 1: Remove the bottom cowl.

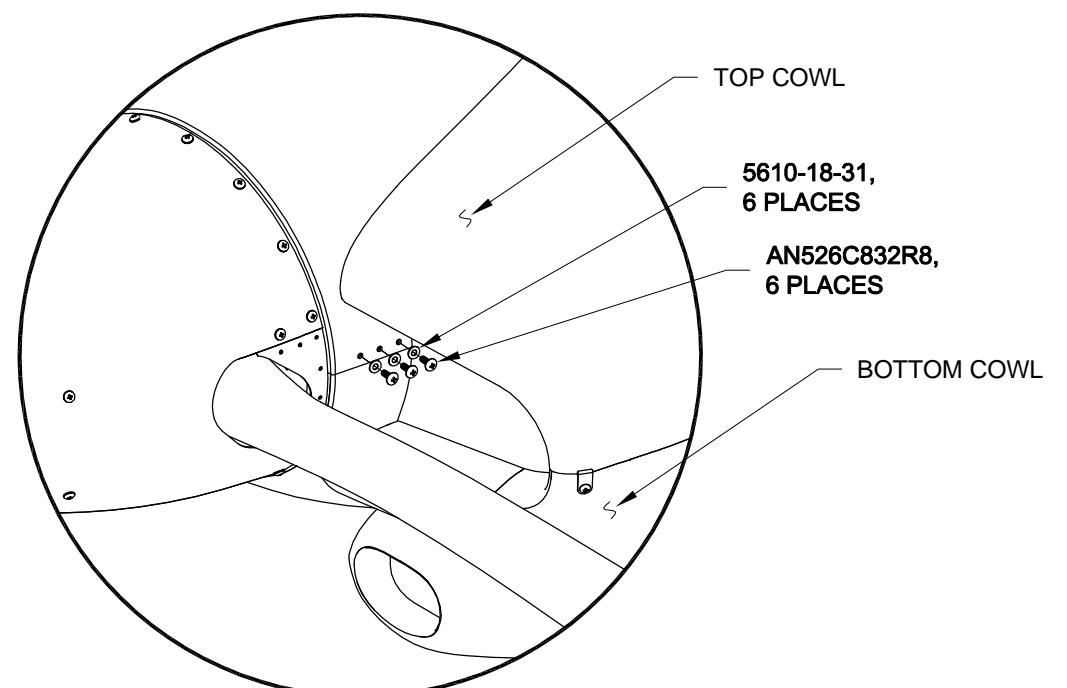
Step 2: Use a #8 screw to align a nutplate with one of the six screw holes that attach the top and bottom cowls together on either side of the spinner opening. Match-Drill #40 the nutplate attach holes into the flange on the bottom cowl. Machine countersink the holes just drilled. See Figure 1. Repeat this step for the five remaining screw holes.

Step 3: Rivet six nutplates to the bottom cowl flange per the hardware callouts given in Figure 1.

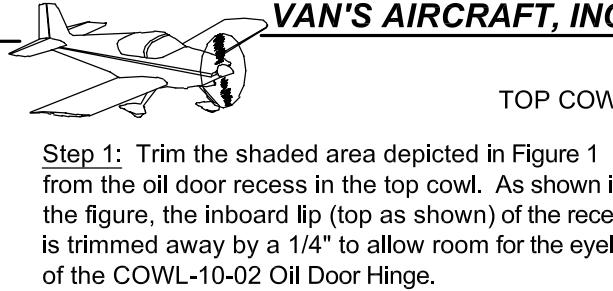


**FIGURE 1: INSTALLING NUTPLATES**

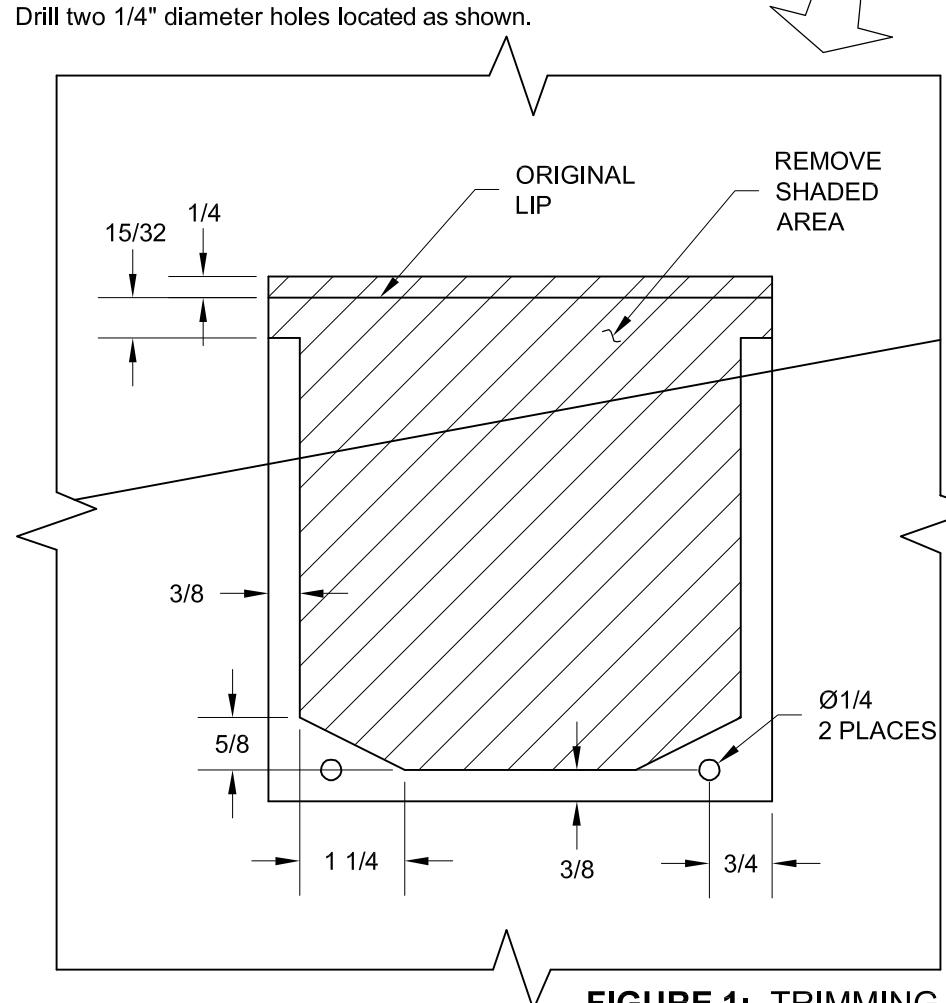
Step 4: Figure 2 shows the hardware used to attach the top cowl to the bottom cowl.



**FIGURE 2: COULD ATTACH HARDWARE**

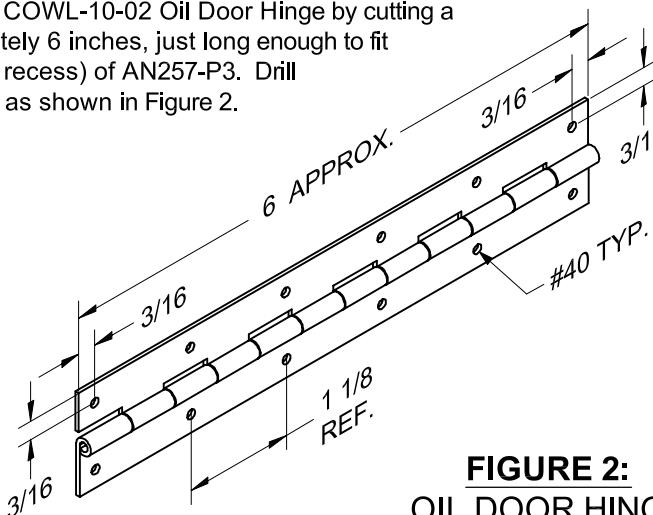


Step 1: Trim the shaded area depicted in Figure 1 from the oil door recess in the top cowl. As shown in the figure, the inboard lip (top as shown) of the recess is trimmed away by a  $\frac{1}{4}$ " to allow room for the eyelets of the COWL-10-02 Oil Door Hinge.



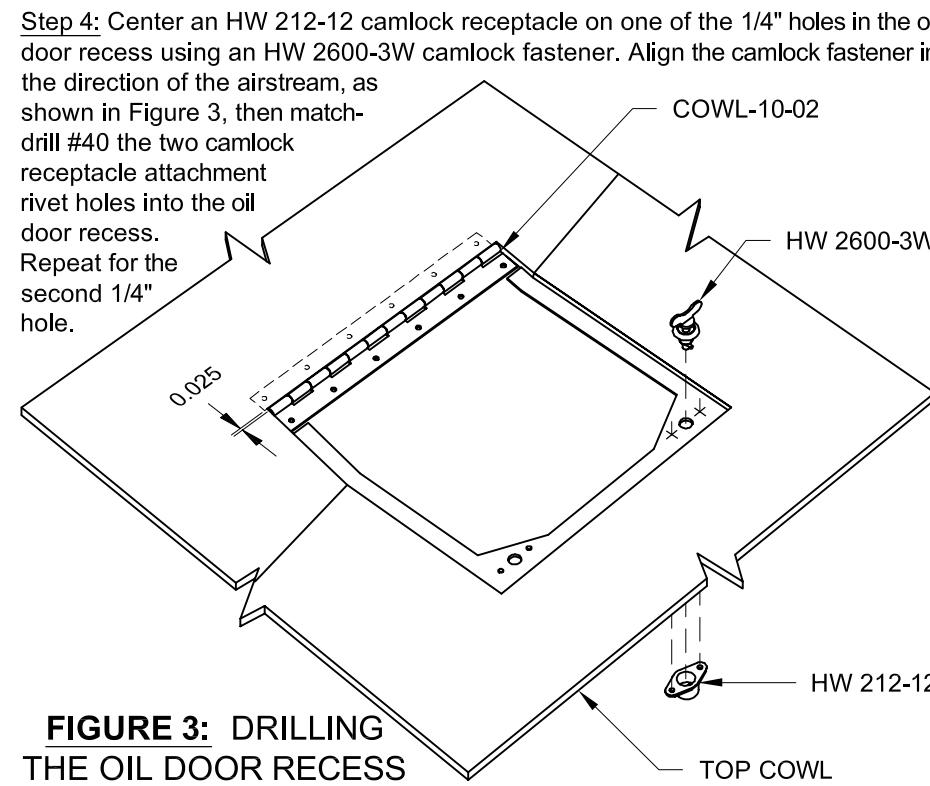
**FIGURE 1: TRIMMING THE OIL DOOR RECESS**

Step 2: Make the COWL-10-02 Oil Door Hinge by cutting a length (approximately 6 inches, just long enough to fit within the oil door recess) of AN257-P3. Drill #40 holes located as shown in Figure 2.



**FIGURE 2: OIL DOOR HINGE**

Step 3: Locate the COWL-10-02 Oil Door Hinge on the inside of the top cowl, as shown in Figure 3, with a 0.025" gap between the trimmed edge of the top cowl and the oil door hinge eyelets. Match-Drill #40 the holes of the oil door hinge into the top cowl. Cleco while drilling.

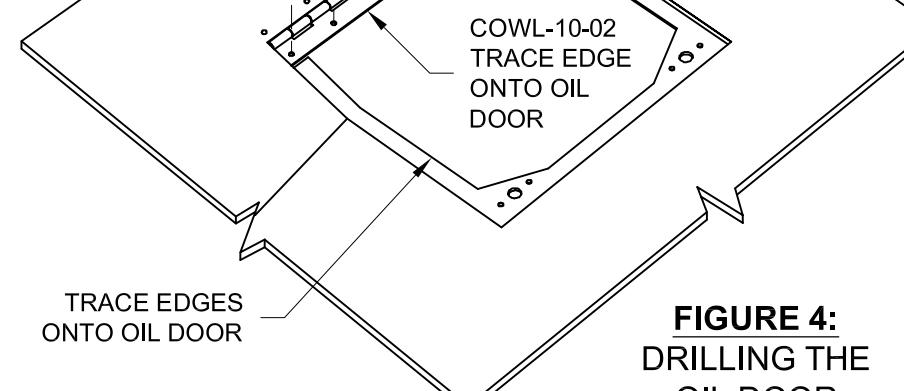


**FIGURE 3: DRILLING THE OIL DOOR RECESS**

Step 5: Trim the COWL-10-01A Oil Door to fit into the oil door recess with a .025" gap between the oil door and the eyelets of the COWL-10-02 Oil Door Hinge.

Step 6: Match-Drill #40 the holes in the COWL-10-02 Oil Door Hinge into the COWL-10-01A Oil Door.

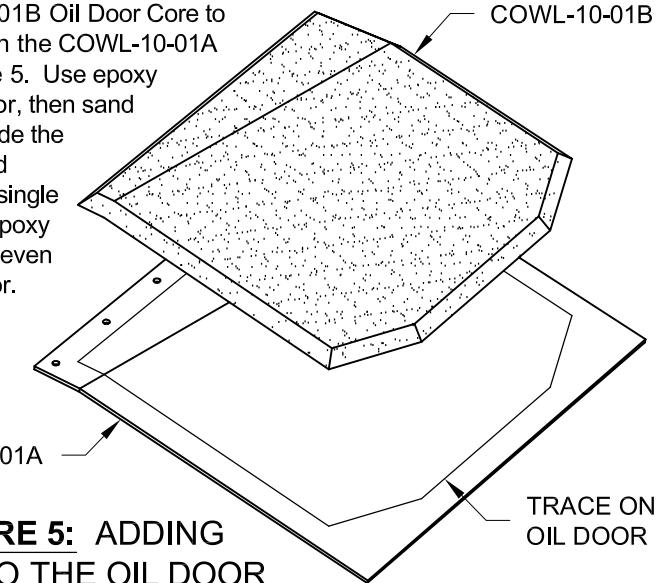
Step 7: Trace the trimmed edges of the oil door recess and the edge of the COWL-10-02 Oil Door Hinge onto the COWL-10-01A Oil Door.



**FIGURE 4: DRILLING THE OIL DOOR**

Step 8: Trim the COWL-10-01B Oil Door Core to roughly fit the trace made on the COWL-10-01A Oil Door as shown in Figure 5. Use epoxy resin to bond it to the oil door, then sand the edges until they are inside the trace by an  $\frac{1}{8}$ " and beveled approximately 45°. Apply a single ply of 8 or 9 oz. glass with epoxy resin over the oil door core, even with the edges of the oil door.

When cured, match-drill the #40 holes previously drilled in the oil door into the new lay-up.

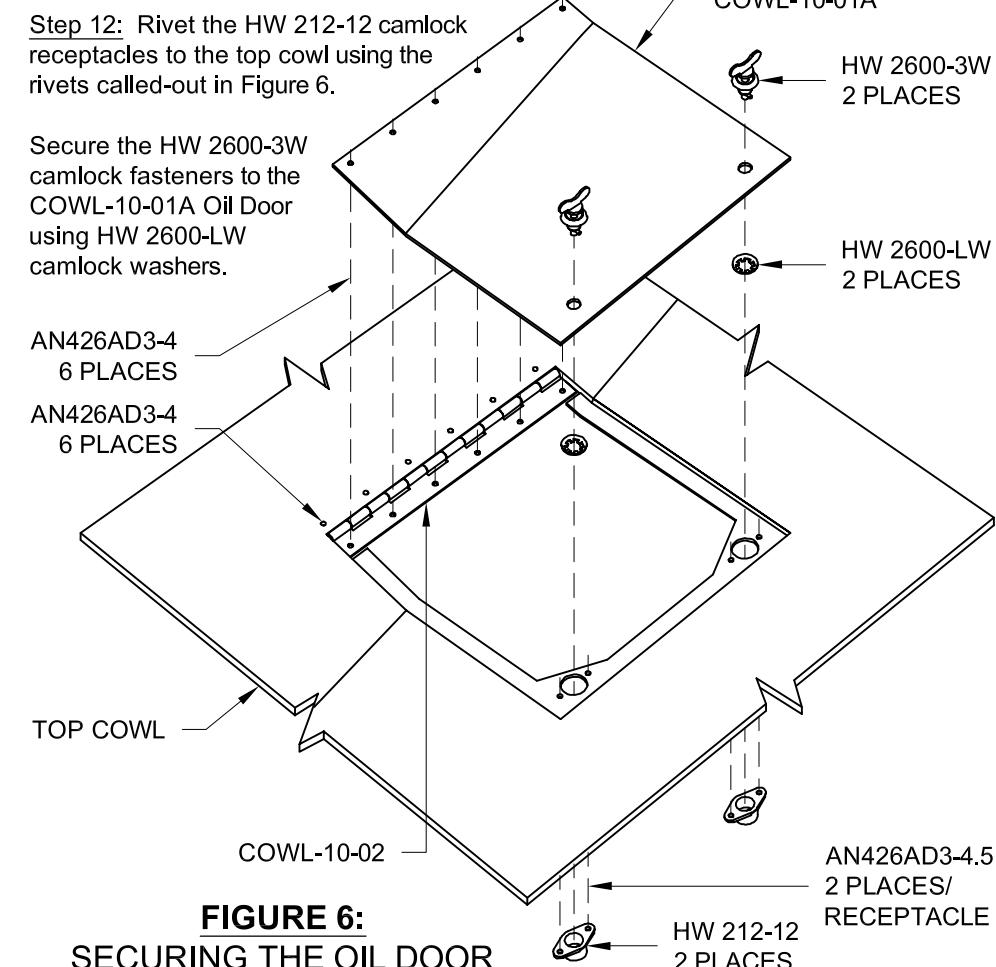


**FIGURE 5: ADDING CORE TO THE OIL DOOR**

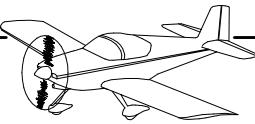
Step 9: Machine countersink all relevant holes in the top cowl and the COWL-10-01A Oil Door for the flush head rivets called-out in Figure 6.

Step 10: Using the rivets called-out in Figure 6, rivet the COWL-10-02 Oil Door Hinge to the top cowl, then rivet the COWL-10-01A Oil Door to the oil door hinge. (To minimize the projection of the oil door hinge eyelets above the top cowl, .032 to .040 shims may be inserted between the oil door hinge and the oil door and top cowl.)

Step 11: Match-Drill the two 1/4" holes in the oil door recess into the COWL-10-02 Oil Door using a 1/4" drill bit. Final-Drill the 1/4" holes of the oil door recess (only the oil door recess, NOT the oil door) using a 1/2" drill bit.



**FIGURE 6: SECURING THE OIL DOOR**



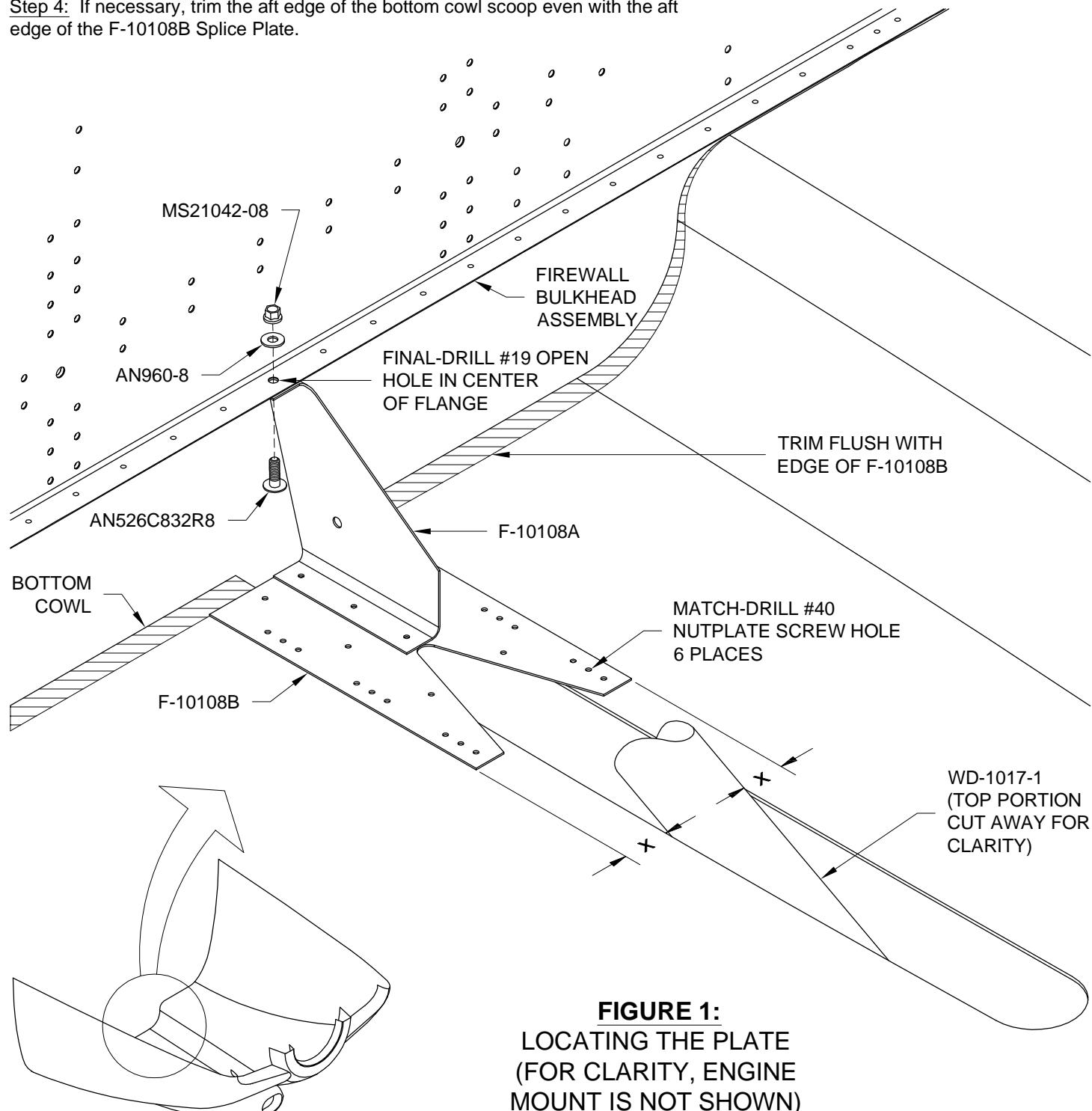
Step 1: Cleco the F-10108A Support Bracket to the F-10108B Splice Plate. Final-Drill #19 the open hole in the center of the Firewall Bulkhead Assembly bottom flange. Attach the support bracket to the bottom flange using this hole and the hardware shown in Figure 1.

Step 2: Make sure the F-10108A Support Bracket is vertical, not angled toward the left or right, then align the centerline of the F-10108B Splice Plate with the WD-1017-1 Nose Gear Leg Assembly. This can be accomplished, as shown in Figure 1, by projecting two lines off the edges of the splice plate and rotating the splice plate until there is equal distance between these lines and the Nose Gear Leg Assembly.

Clamp the splice plate in position then trace the side and aft edges of the splice plate onto the bottom cowl. Remove the bottom cowl, the F-10108A Support Bracket, and the F-10108B Splice Plate from the plane.

Step 3: Reposition the F-10108B Splice Plate on the bottom cowl using the trace made in Step 2. Match-Drill #40 the six 3/32" nutplate screw holes along the sides of the splice plate into the bottom cowl.

Step 4: If necessary, trim the aft edge of the bottom cowl scoop even with the aft edge of the F-10108B Splice Plate.



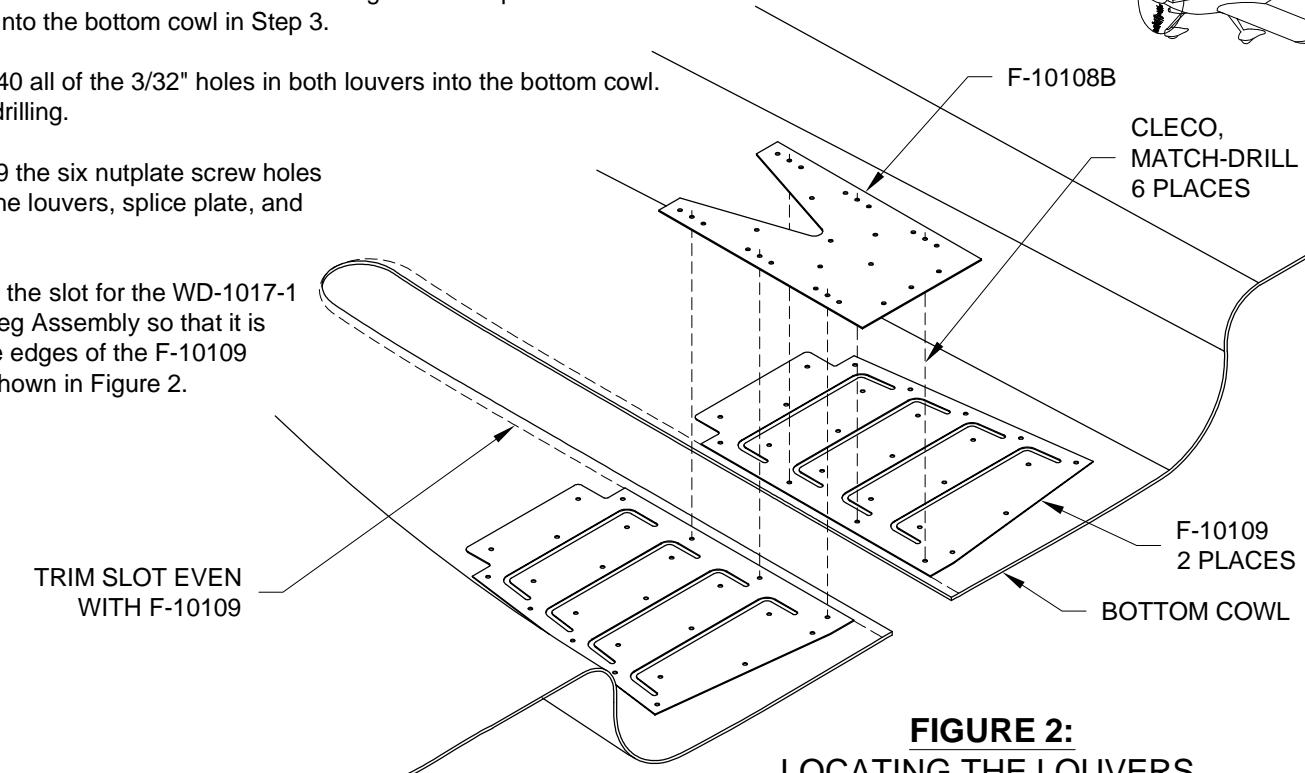
**FIGURE 1:**  
LOCATING THE PLATE  
(FOR CLARITY, ENGINE  
MOUNT IS NOT SHOWN)

Step 5: As shown in Figure 2, cleco the two F-10109 Louvers and the F-10108B Splice Plate to the bottom cowl using the six nutplate screw holes drilled into the bottom cowl in Step 3.

Match-Drill #40 all of the 3/32" holes in both louvers into the bottom cowl. Cleco while drilling.

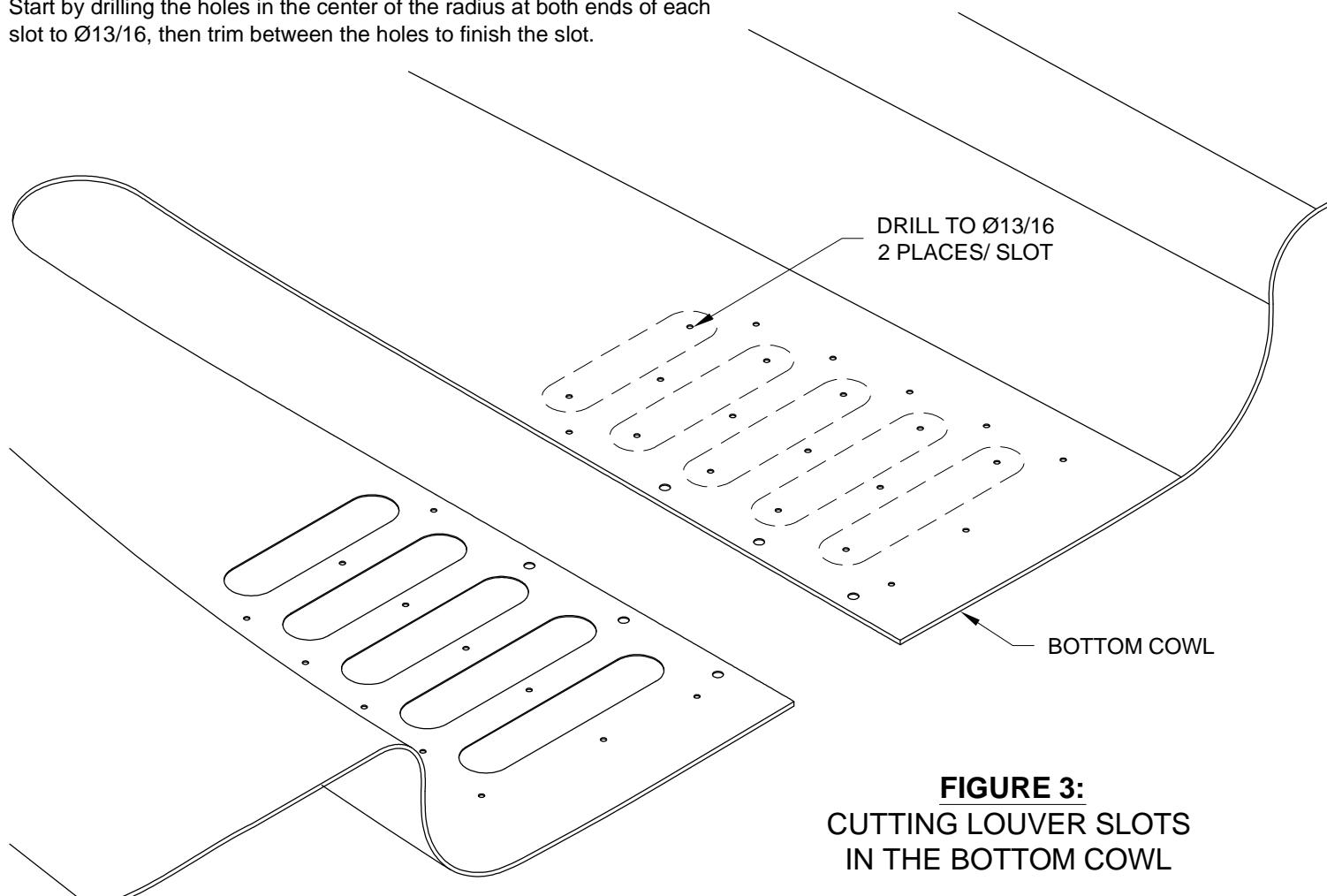
Final-Drill #19 the six nutplate screw holes common to the louvers, splice plate, and bottom cowl.

Step 6: Trim the slot for the WD-1017-1 Nose Gear Leg Assembly so that it is even with the edges of the F-10109 Louvers as shown in Figure 2.

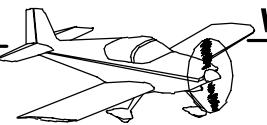


**FIGURE 2:**  
LOCATING THE LOUVERS  
ON THE BOTTOM COWL

Step 7: Cut the ten louver slots, shown in Figure 3, into the bottom cowl. Start by drilling the holes in the center of the radius at both ends of each slot to Ø13/16, then trim between the holes to finish the slot.

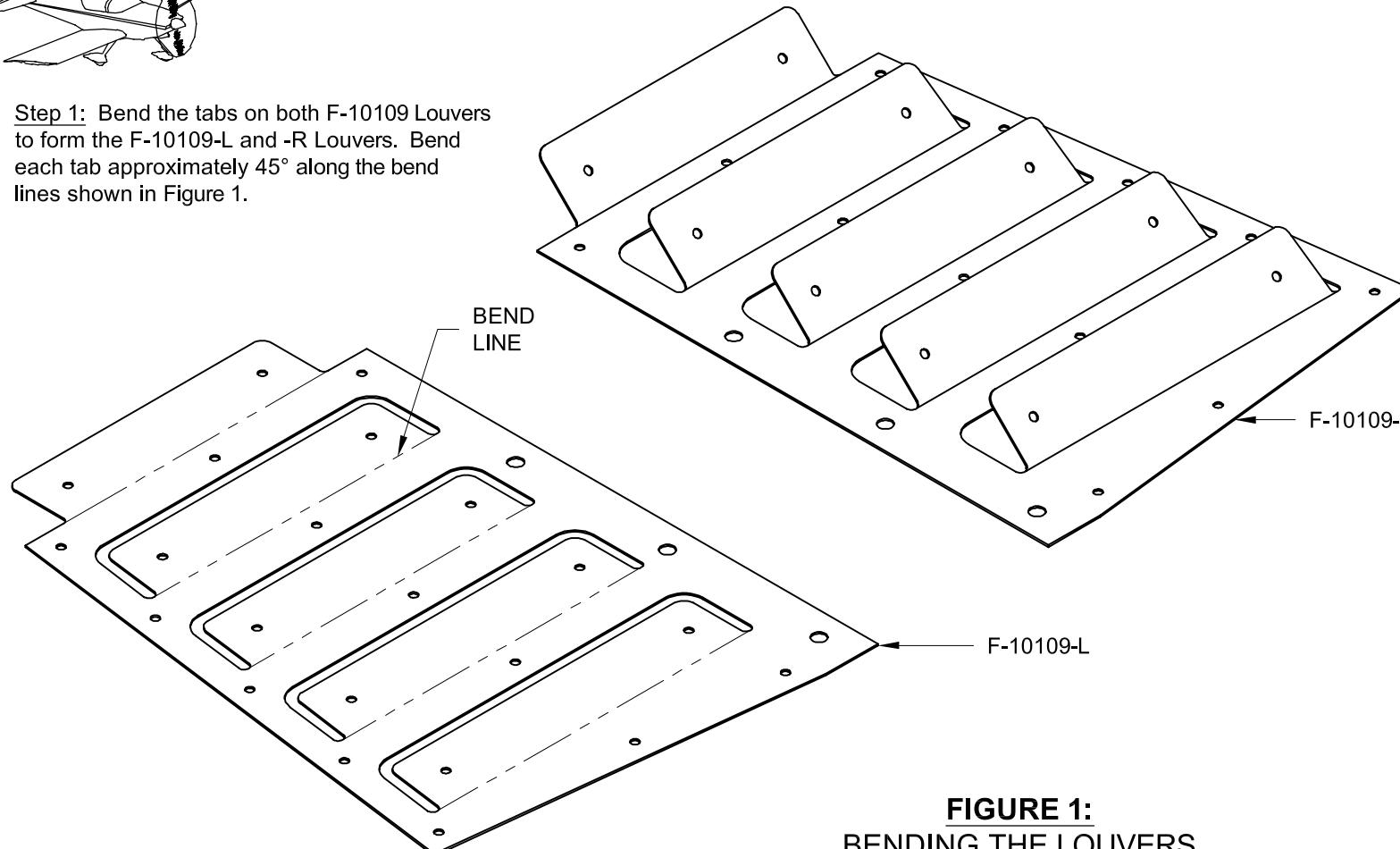


**FIGURE 3:**  
CUTTING LOUVER SLOTS  
IN THE BOTTOM COWL



VAN'S AIRCRAFT, INC.

Step 1: Bend the tabs on both F-10109 Louvers to form the F-10109-L and -R Louvers. Bend each tab approximately 45° along the bend lines shown in Figure 1.

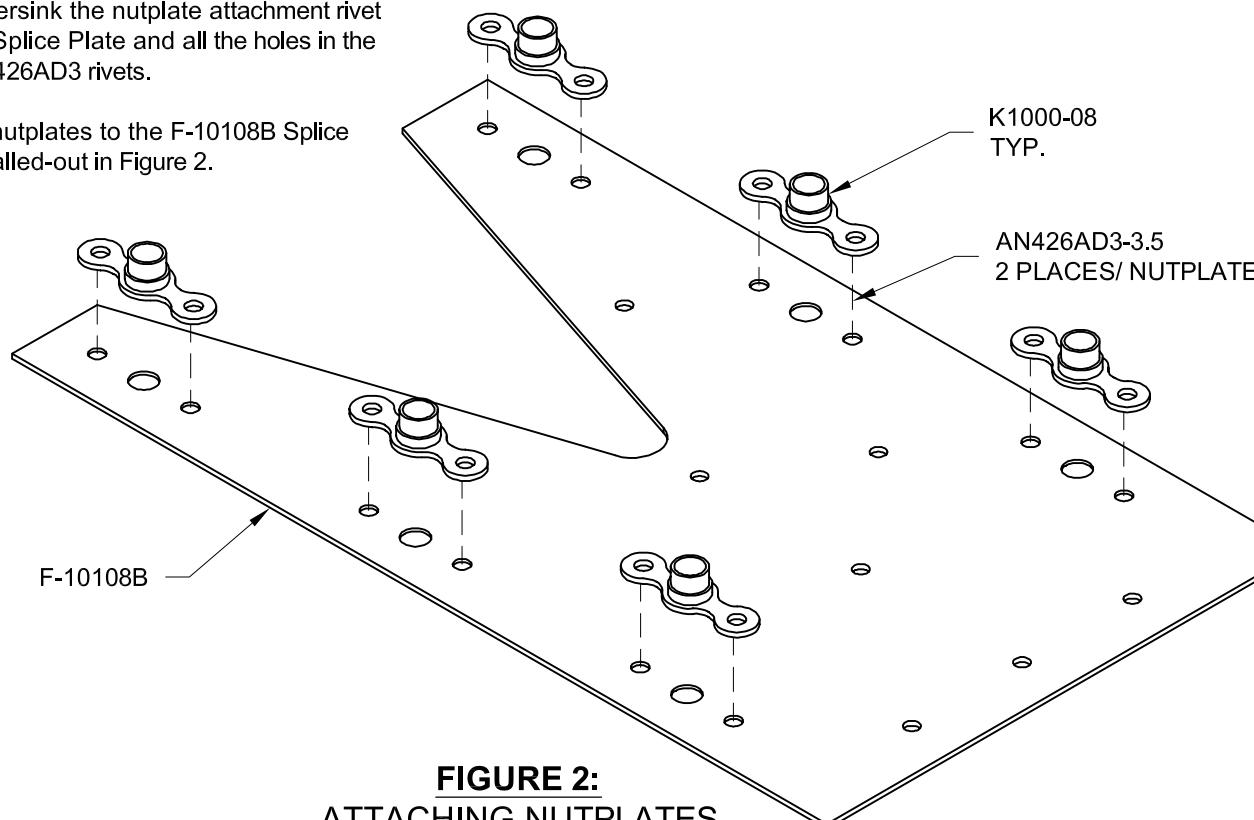


**FIGURE 1:**  
BENDING THE LOUVERS

Step 2: Cleco together the F-10108A Support Bracket, the F-10108B Splice Plate, and the F-10108C Plate as shown in Figure 3. Final-Drill #40 all of the 3/32" holes common to the three parts and the six pairs of nutplate attachment rivet holes in the splice plate.

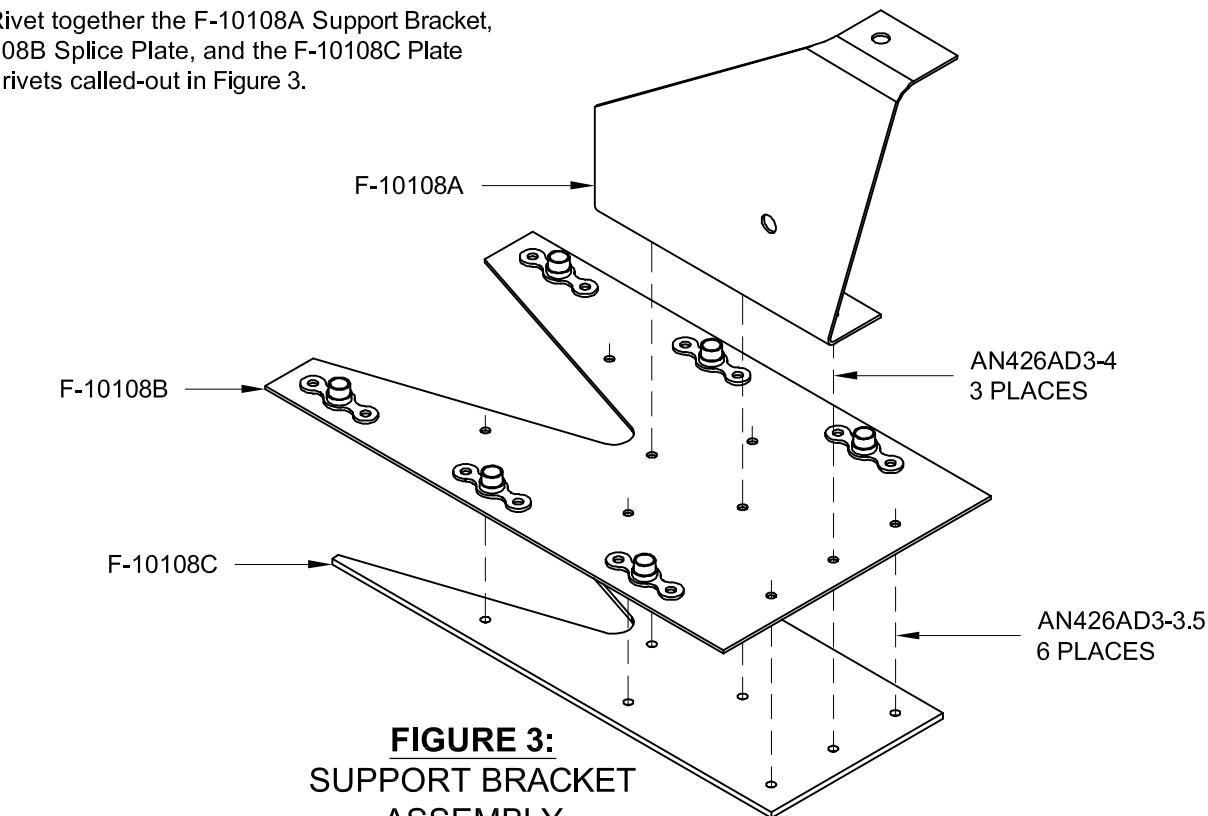
Step 3: Machine countersink the nutplate attachment rivet holes in the F-10108B Splice Plate and all the holes in the F-10108C Plate for AN426AD3 rivets.

Step 4: Attach the six nutplates to the F-10108B Splice Plate using the rivets called-out in Figure 2.



**FIGURE 2:**  
ATTACHING NUTPLATES

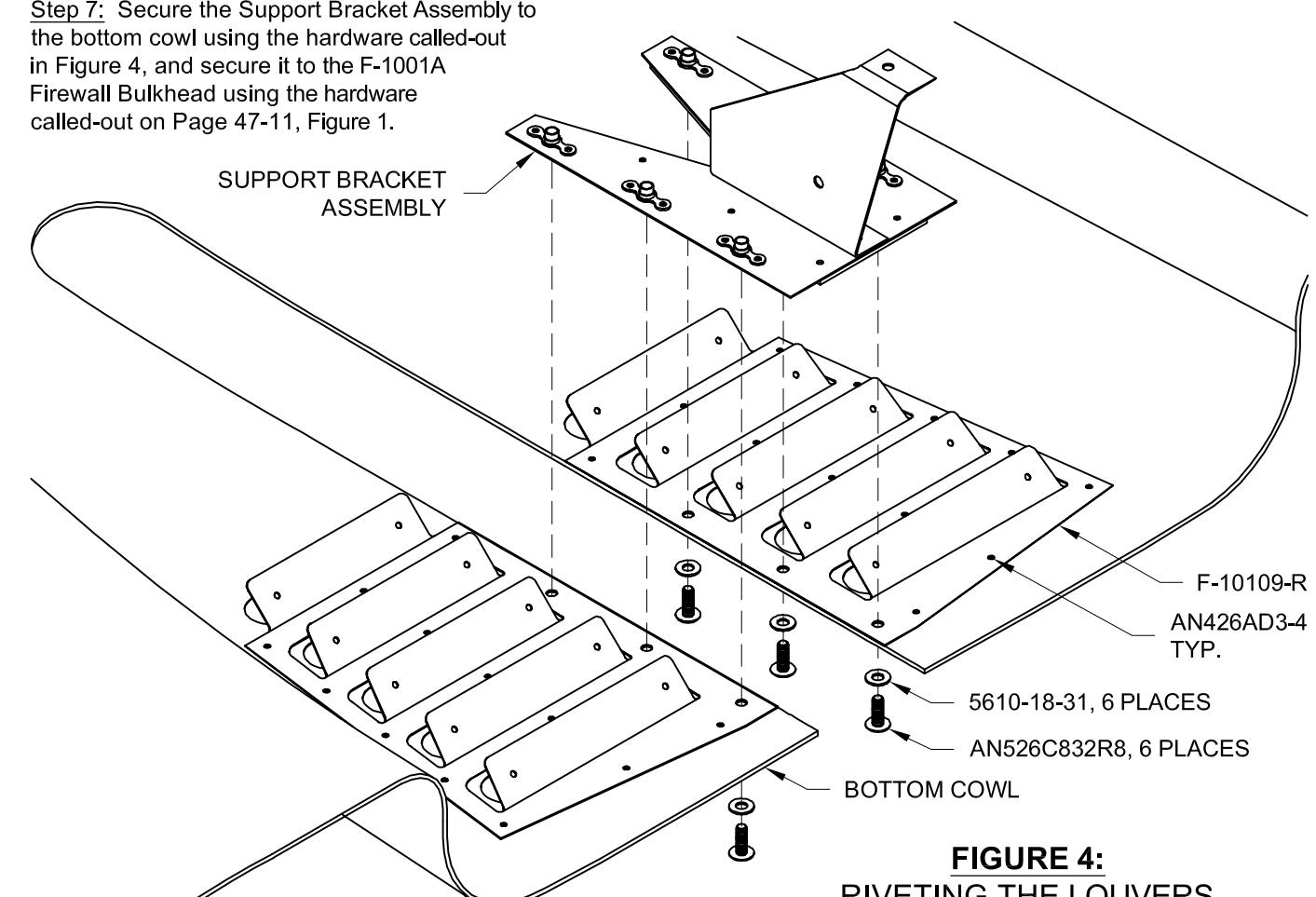
Step 5: Rivet together the F-10108A Support Bracket, the F-10108B Splice Plate, and the F-10108C Plate using the rivets called-out in Figure 3.



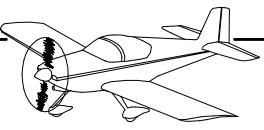
**FIGURE 3:**  
SUPPORT BRACKET  
ASSEMBLY

Step 6: Machine countersink the holes in the bottom cowl used to attach the F-10109 Louvers for the heads of AN426AD3 rivets. Rivet the louvers to the bottom cowl using the rivets called-out in Figure 4.

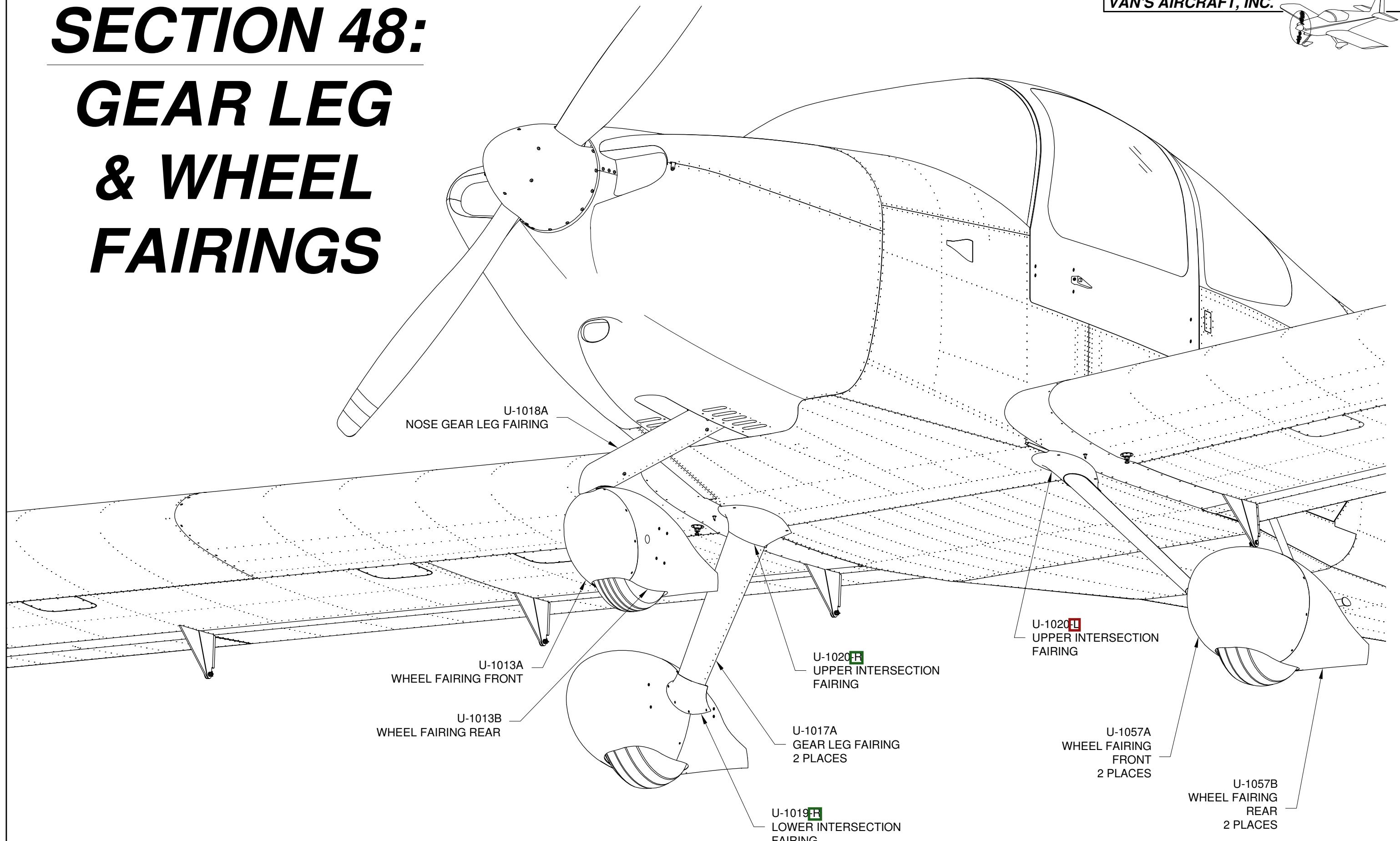
Step 7: Secure the Support Bracket Assembly to the bottom cowl using the hardware called-out in Figure 4, and secure it to the F-1001A Firewall Bulkhead using the hardware called-out on Page 47-11, Figure 1.

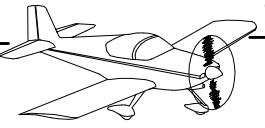


**FIGURE 4:**  
RIVETING THE LOUVERS



# SECTION 48: GEAR LEG & WHEEL FAIRINGS





VAN'S AIRCRAFT, INC.

NOTE: This section provides instruction for the installation of the left wheel only.  
The right side is a mirror of the left.

NOTE: If transparent, the fairings in this section must remain transparent to accomplish the installation.  
Do not sand or prime either side of the fairings until directed to do so or until installation is complete.

If the fairings are opaque, refer to Section 5.18 MATCH-DRILLING OPAQUE FIBERGLASS PARTS.

The U-1057-A Wheel Fairing Front and U-1057-B Wheel Fairing Rear should mate as accurately as possible.  
Due to the variations in fiberglass molds it is necessary to first make the parts fit.

Step 1: The U-1057-A Wheel Fairing Front has been laid up so that there are overlapping layers of cloth along its centerline. The area of overlap is thicker than the rest of the fairing. Sand down this thicker area so that the aft edge of the wheel fairing front is the same thickness all along its length.

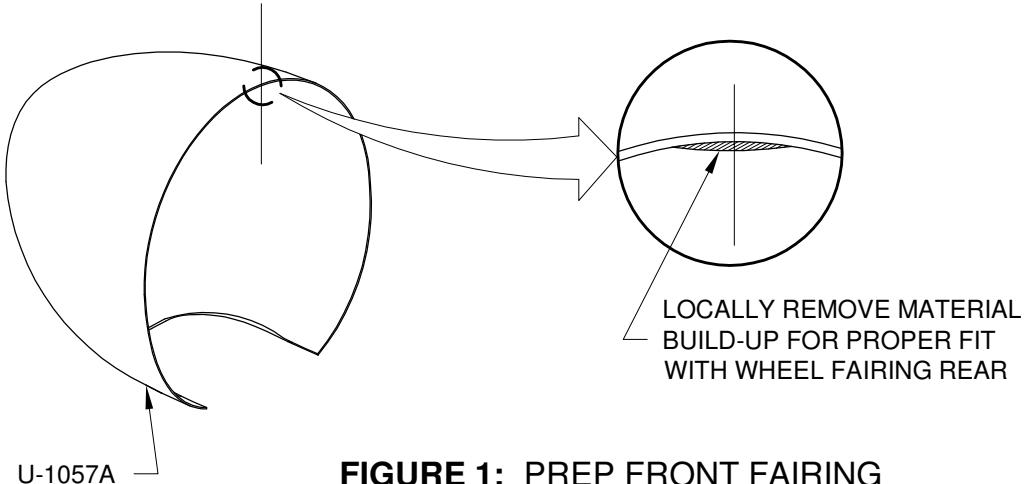


FIGURE 1: PREP FRONT FAIRING

Step 2: Square up the inside corner of molded step in the U-1057-B Wheel Fairing Rear as required to allow for a good fit of the fairing halves as shown in Figure 2. A coarse file works well.

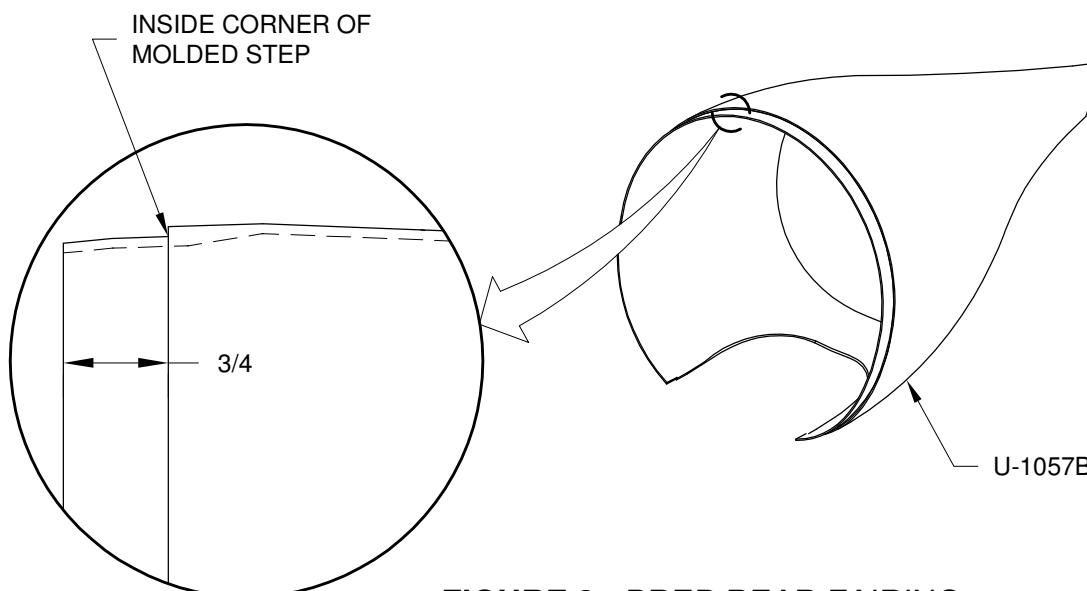


FIGURE 2: PREP REAR FAIRING

Step 3: Use coarse sandpaper glued to a straight stick as a disposable file to remove any material that prevents the halves from matching smoothly. Take the time required to precision fit the wheel fairing halves.

Assemble the U-1057-A Wheel Fairing Front and U-1057-B Wheel Fairing Rear. Tape them in this position and place a reference mark across the seam. Slit the tape on the seam with a razor blade and use this mark to realign the fairings during assembly.

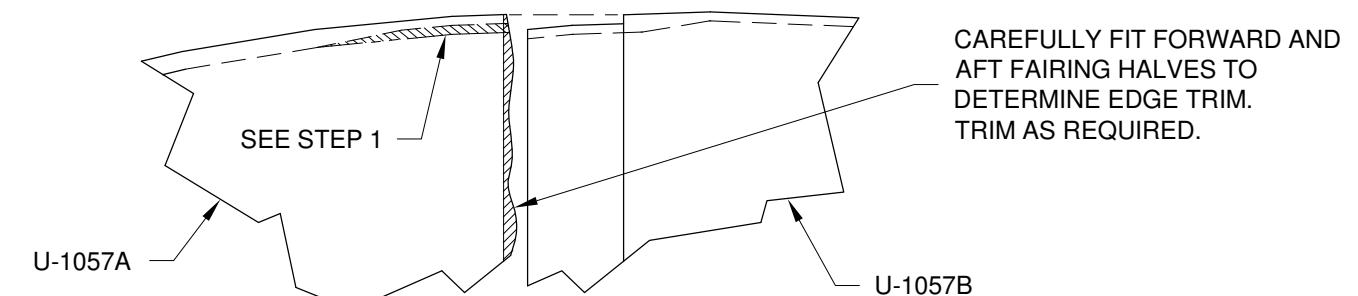


FIGURE 3: FIT AND TRIM FAIRING HALVES

Fairings greatly reduce the drag an otherwise unfaired wheel and gear leg would create. Just as important as the fairing itself is its alignment. Due to the gear leg design, once off the runway the gear leg and wheel position and orientation change. Therefore the fairings must be aligned to the aircraft while the aircraft is in a flight attitude. This is achieved by jacking and leveling the aircraft allowing the landing gear to assume their in flight position. The fairings are then aligned to the aircraft centerline, **not** the wheel.

To align the fairing several reference marks are needed. Some on the fairing and at least one on the floor representing the aircraft centerline.

Step 4: Draw a vertical centerline on the U-1057-B Wheel Fairing Rear as shown in Figure 4. Place a mark at the midpoint of the vertical centerline as shown in Figure 4.

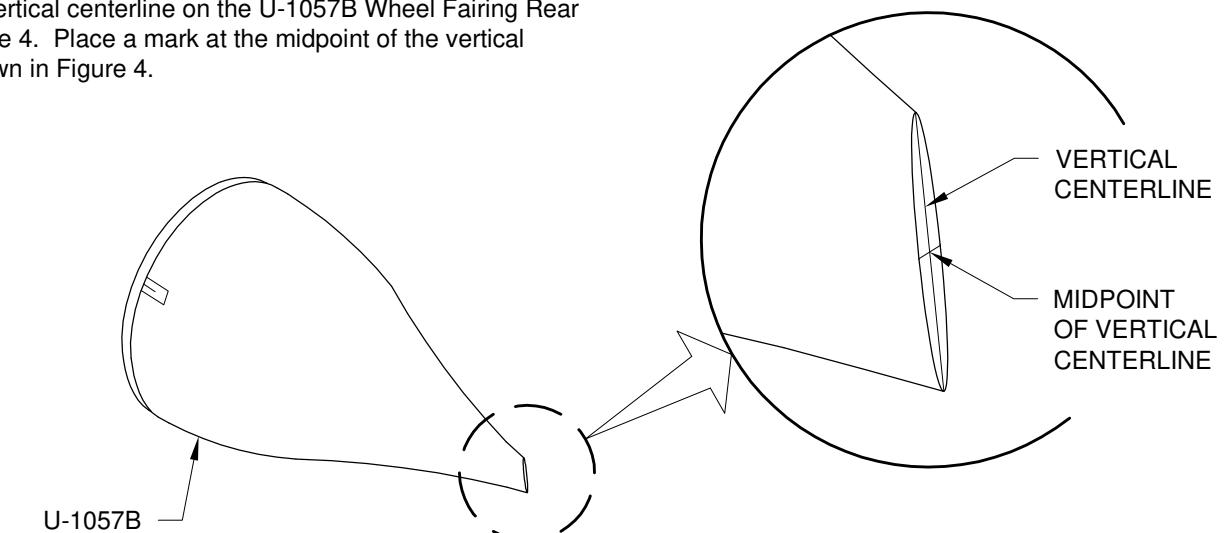
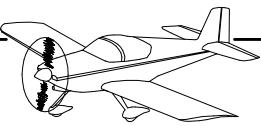
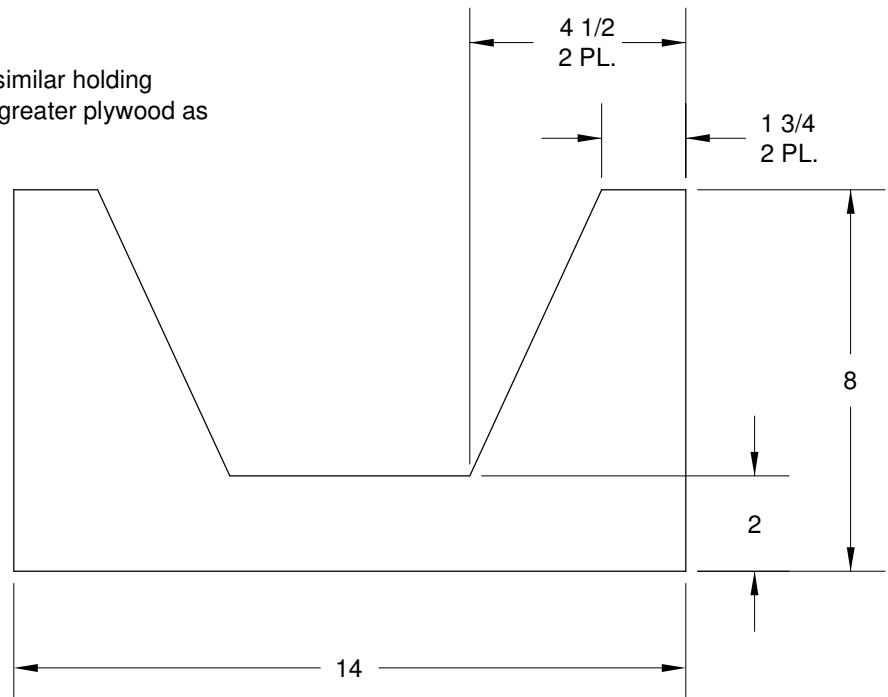


FIGURE 4: DRAW REFERENCE LINES

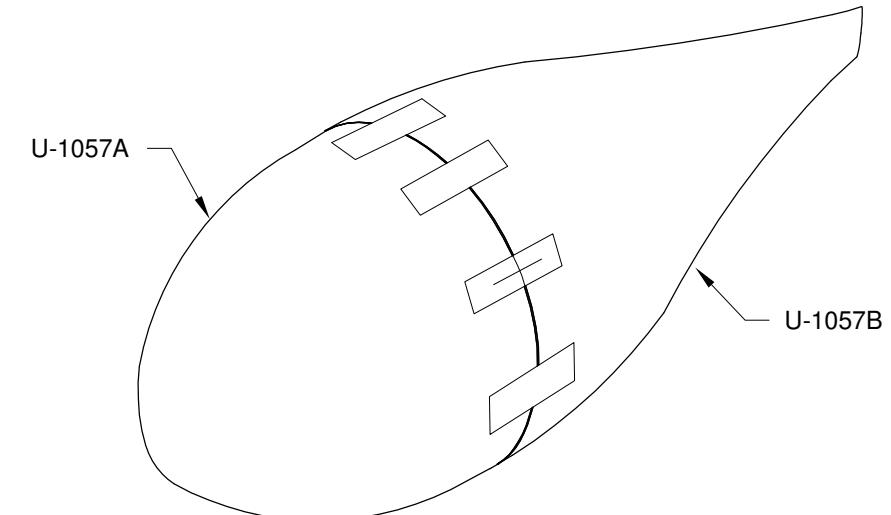


Step 1: Make a 'V' block or similar holding fixture from 1/4 inch thick or greater plywood as shown in Figure 1.



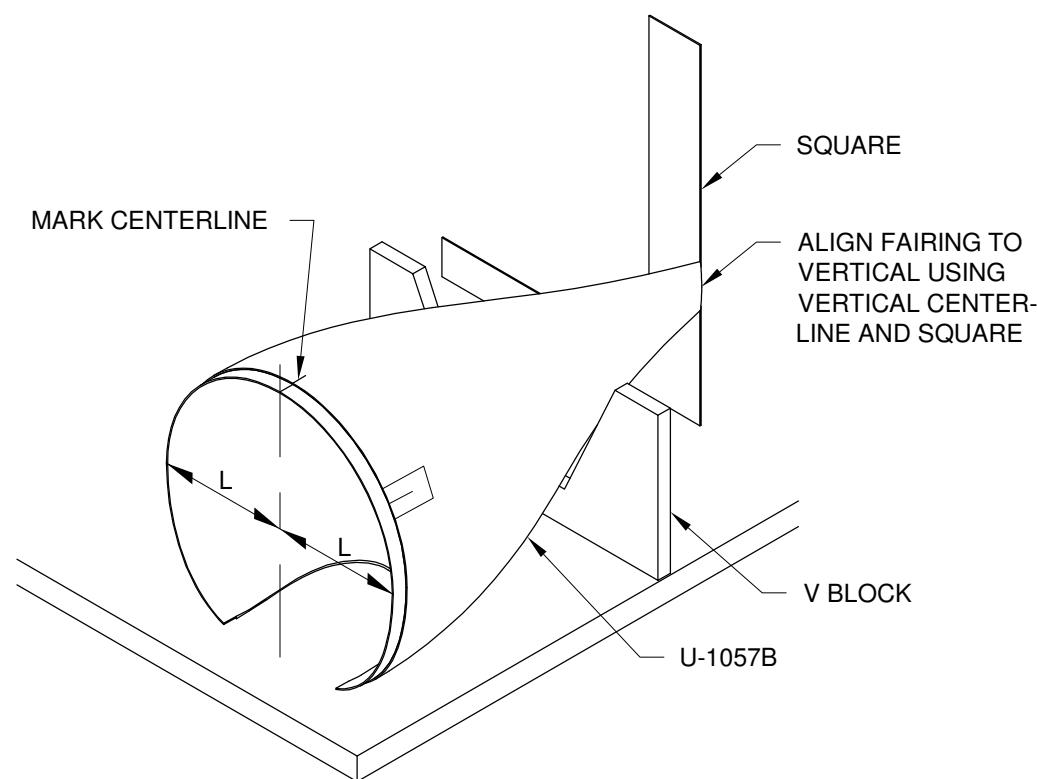
**FIGURE 1: FABRICATE 'V' BLOCK**

Step 3: Tape the U-1057A Wheel Fairing Front and U-1057B Wheel Fairing Rear halves together as per Figure 3.



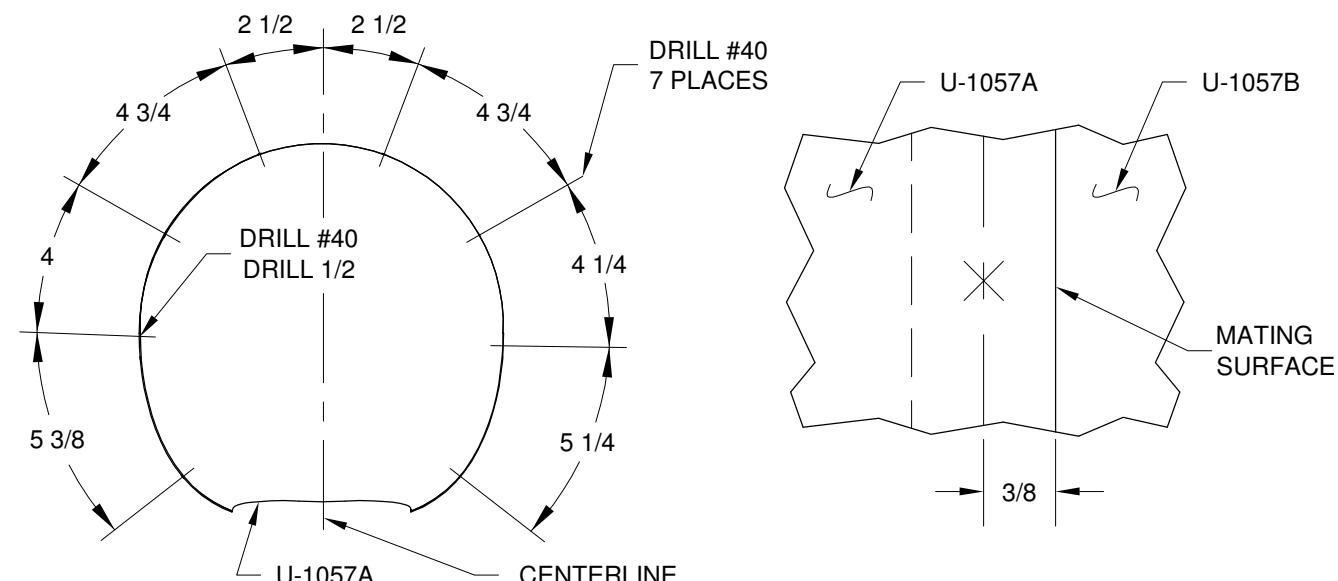
**FIGURE 3: TAPE FAIRING HALVES TOGETHER**

Step 2: Place the U-1057B Wheel Fairing Rear on the bench and make it plumb using a square so that the reference line on the fairing is vertical. Mark a centerline as shown by measuring horizontally across the forward opening of the fairing as shown in Figure 2. Position a square at the midpoint of this distance and mark the top of the wheel fairing rear. Extend the mark 1/2" aft of the molded step. This reference mark will serve to align the wheel fairing along its roll axis.



**FIGURE 2: MARK FAIRING CENTERLINE**

Step 4: Drill and cleco the U-1057A Wheel Fairing Front and U-1057B Wheel Fairing Rear halves together as per Figure 4. Measure down from the centerline marked earlier. Drill and cleco beginning at the top of the fairings. Center the holes in the middle of the flange fore and aft. Work down the sides to help minimize bulging and mismatch between the fairing halves. The fairings as supplied are symmetrical (no right or left hand fairing) but the asymmetrical fastener pattern will establish the left and right fairings. The 1/2 inch hole is a start for the U-1001 Main Gear Leg entry point and will be trimmed more later.

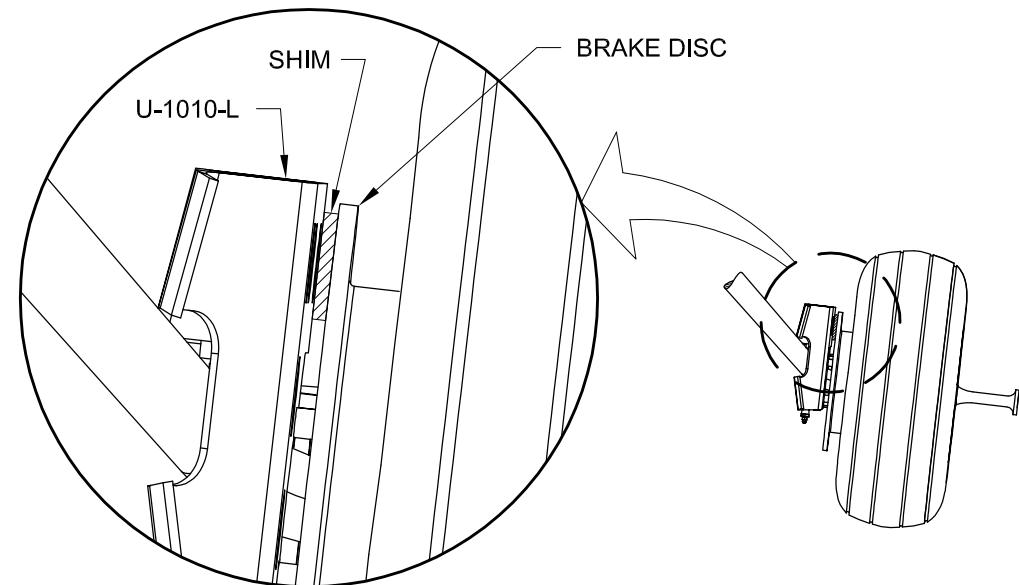


**FIGURE 4: FASTENER SPACING (FRONT VIEW - LEFT FAIRING)**



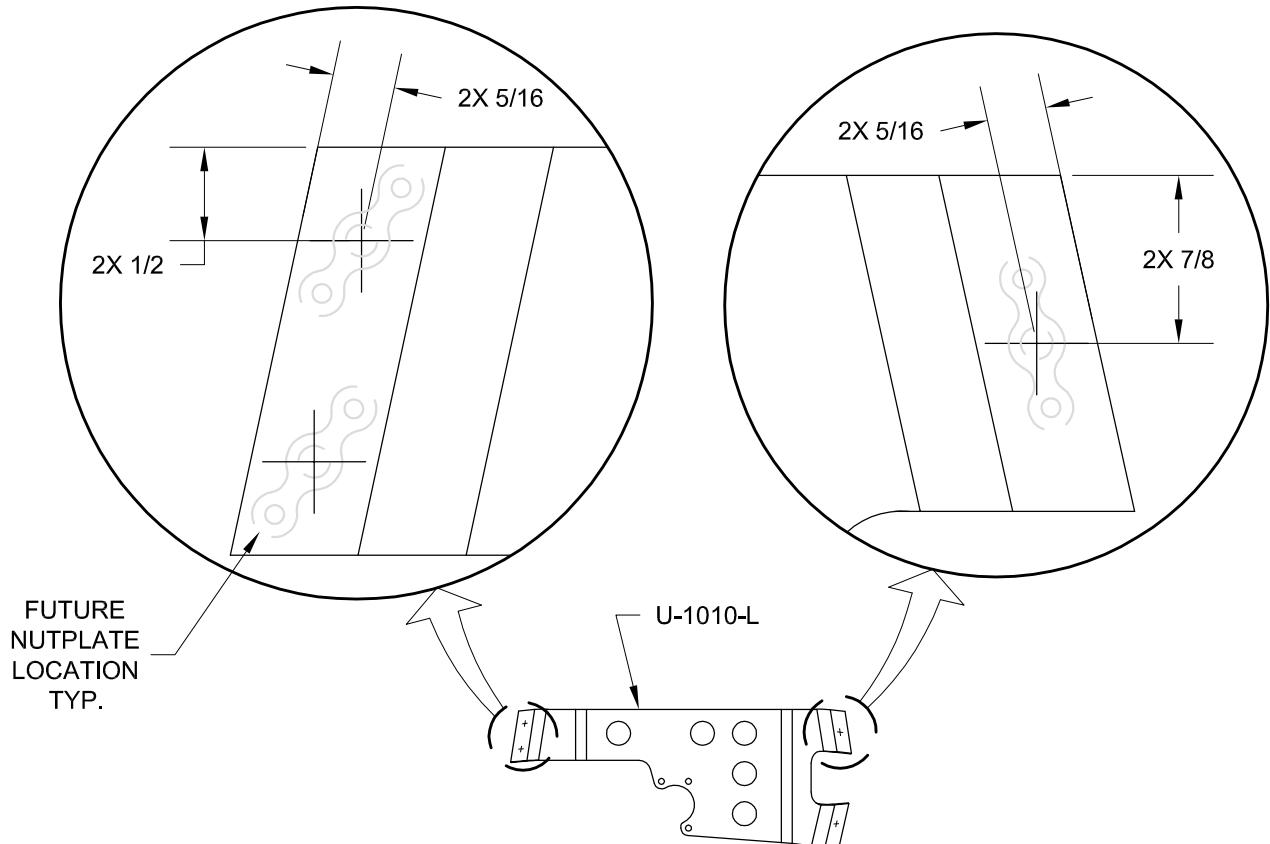
Step 1: Fabricate a 1" wide shim approximately 1/4" thick (not provided in kit) and position it temporarily between the brake disc and the U-1010-L Main Wheel Fairing Bracket to keep it from deflecting excessively when drilling through from the outside of the fairing as shown in Figure 1.

Use scrap pieces of aluminum with strips of duct tape added to achieve a snug fit.



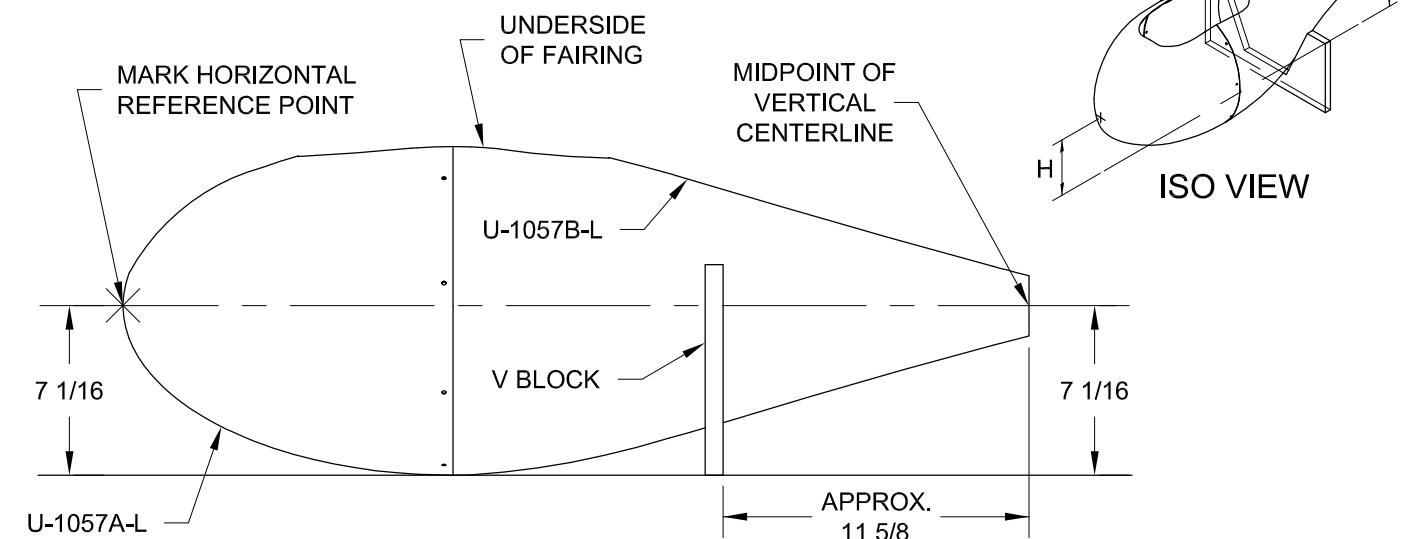
**FIGURE 1:** SHIM MAIN WHEEL FAIRING BRACKET

Step 2: Mark nutplate locations on the U-1010-L Main Wheel Fairing Bracket using a "sharpie" pen as per the dimensions shown in Figure 2. Place the marks on the side facing the fairing.



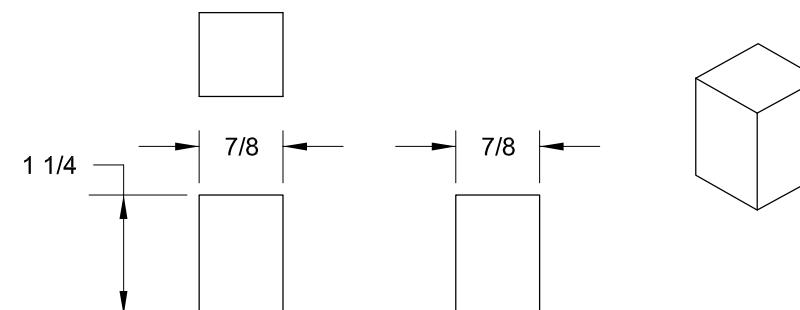
**FIGURE 2:** MARK SCREW LOCATIONS

Step 3: Place the assembled U-1057A Wheel Fairing Front and the U-1057B Wheel Fairing Rear into the 'V' block with the wheel opening facing upward as shown in the Iso View of Figure 3. Rotate the assembled fairing until the centerline drawn at the back of the wheel fairing rear is vertical. Measure up from the table as per the callouts to the midpoint of the vertical centerline at the aft end of the wheel fairing rear. This levels the assembled fairing. Measure up from the table the same amount at the forward end of the wheel fairing front and place a horizontal reference mark as shown in Figure 3. Disassemble the fairings.



**FIGURE 3:**  
MARK HORIZONTAL REFERENCE POINT ON WHEEL FAIRING FRONT

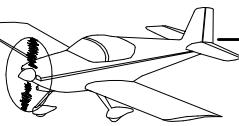
Step 4: Fabricate a spacer as per Figure 4. The dimension of the spacer is based on a 15X6.0-6 tire. If necessary adjust the height of the spacer to compensate for a different tire size, tire wear and/or inflation pressure by referring to the vertical dimension 8 7/8" on Page 48-5, Figure 1.



**FIGURE 4:** FABRICATE SPACER

Step 5: Raise the airplane on jacks so the tires are just off the ground (zero to 1/16" gap). Level the airplane longitudinally and laterally at the F-1015C Mid Cabin Deck. **NOTE: DO NOT FORGET TO LEVEL THE AIRCRAFT.**

It may be necessary to remove and reinstall the wheels several times while adjusting the fit of the U-1010-L Main Wheel Fairing Bracket to the U-1057A/B Wheel Fairing. **WARNING: Use caution while the airplane is on jacks. Don't let it tip or it will fall off the jacks.**

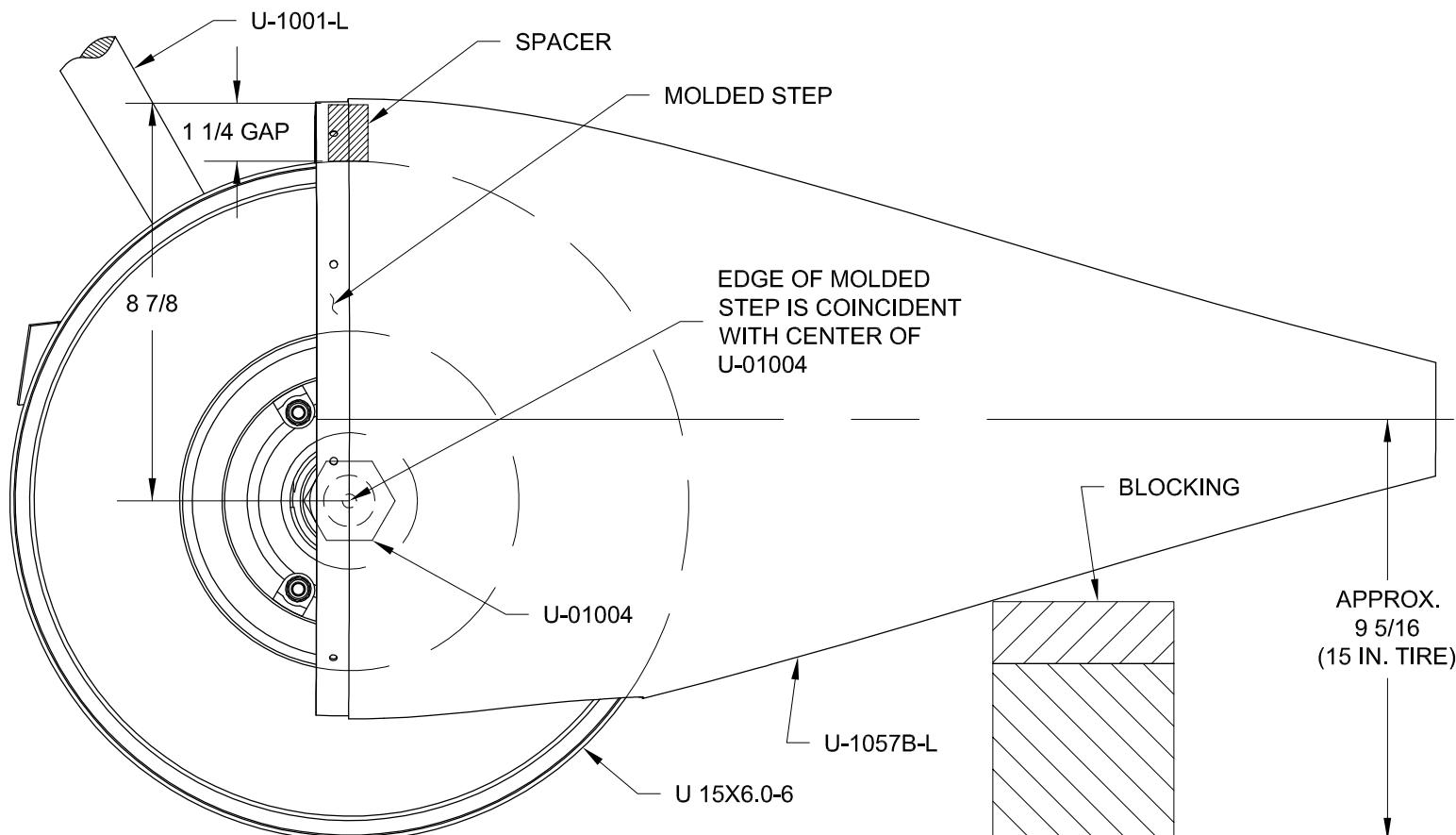


Step 1: Install the spacer by taping it to the top of the tire as shown in Figure 1. Center the U-1057B-L Wheel Fairing Rear over the tire and spacer. Trim U-1057B-L Wheel Fairing Rear as shown in Figure 2. Mark the area of interference with the U-1001-L Main Gear Leg, remove the fairing, locally trim a small amount of the fairing, reposition the fairing over the wheel, mark and trim as required to achieve the correct final position. Trim until a 1/8-1/4 in. gap exists between the gear leg and the wheel fairing rear.

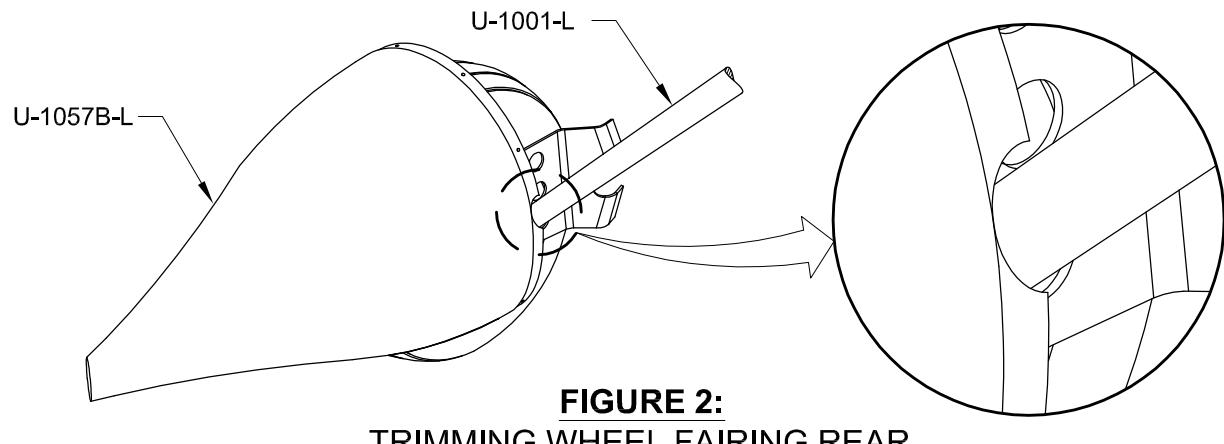
The wheel fairing rear is positioned correctly in the fore/aft direction when the center of the U-01004 Axle Nut Standoff lines up with the aft edge of the molded step as shown in Figure 1.

Block up the aft end of the wheel fairing rear to position the center of the aft edge of the fairing roughly 9 5/16" off the floor.

If necessary, adjust/bend the U-1010-L Main Wheel Fairing Bracket flanges during the next few steps to achieve a reasonably good fit with the wheel fairing as the fairing is aligned to the wheel. This may even require removing the wheel and bracket several times. The fit need not be perfect as thickened epoxy will take up some of the space between the bracket and fairing.



**FIGURE 1: POSITIONING THE WHEEL FAIRING REAR**

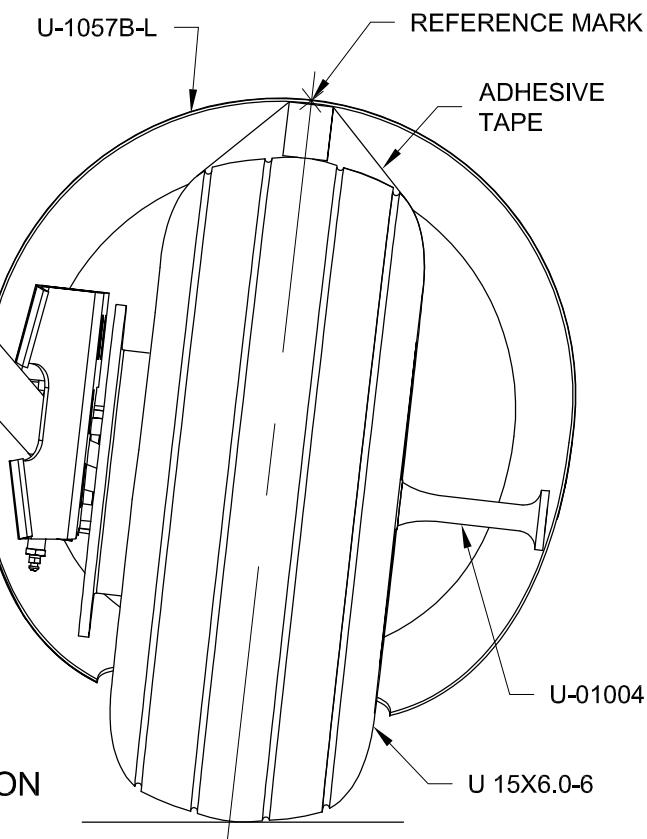


**FIGURE 2:**  
TRIMMING WHEEL FAIRING REAR

Step 3: Align the U-1057B-L Wheel Fairing Rear in rotation to the tire by using the tire tread as an alignment guide as shown in Figure 3.

In this case the vertical axis of the fairing is intended to be parallel with the vertical axis of the wheel and tire tread ... not perpendicular to the floor.

Use blocks and/or shims to hold the fairing in place.

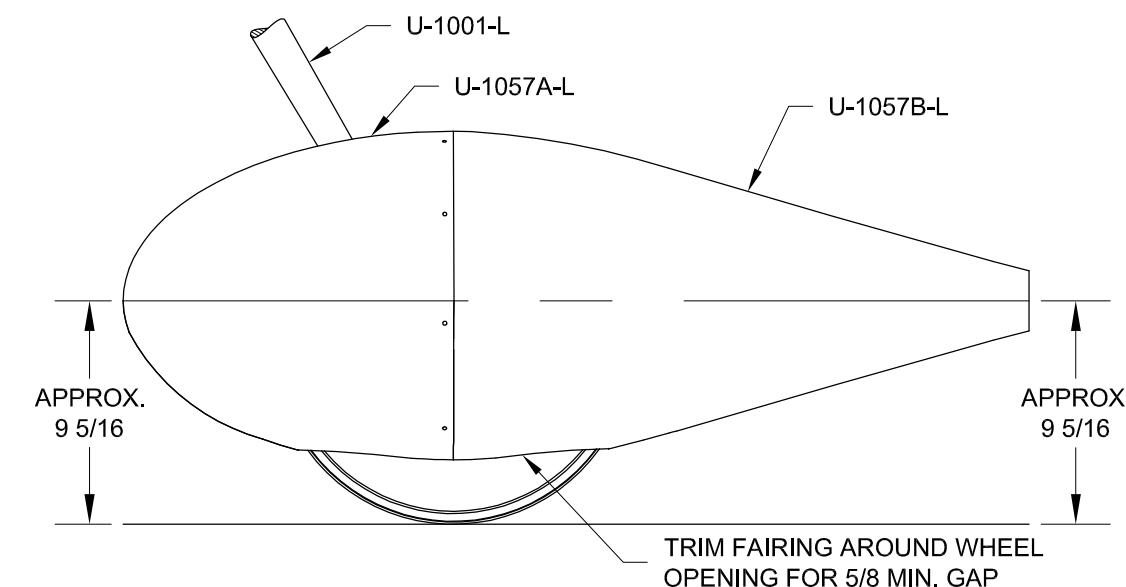


**FIGURE 3:**  
ALIGNING FAIRING IN ROTATION

Step 4: Slide the U-1057A-L Wheel Fairing Front onto the U-1057B-L Wheel Fairing Rear. Trim the wheel fairing front where it interferes with the U-1001-L Main Gear Leg and brake line (not shown) until the wheel fairing front can be clecoed to the wheel fairing rear as shown in Figure 4.

Check that the fairing is parallel to the floor and Shim as needed to make the front and rear dimensions the same. Mark wheel fairing front and rear around the wheel opening to yield clearance called for in Figure 4.

Remove the wheel fairing front. Trim around wheel opening.



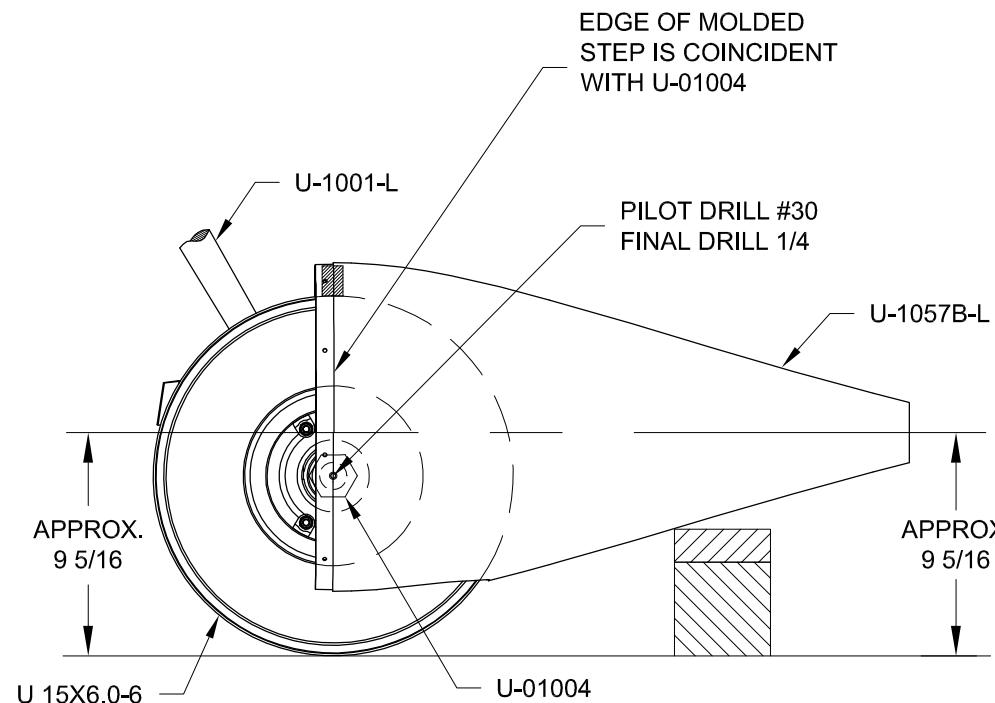
**FIGURE 4:**  
ALIGNING FAIRING IN PITCH

**NOTE: Drill parallel to the axis of the U-01004 Axle Nut Standoff, not perpendicular to the surface of the fairing.**

Step 1: Drill the U-1057B-L Wheel Fairing Rear as per the callout at the intersection of the U-01004 Axle Nut Standoff and the molded step as shown in Figure 1. Mark the hole location for drilling from the inside. Pull the fairing forward and drill with a right angle drill from the inside out, or translate the hole location to the outside surface and drill.

Recheck the location of the wheel fairing rear and make corrections if/as required.

Final-Drill as per the callout.



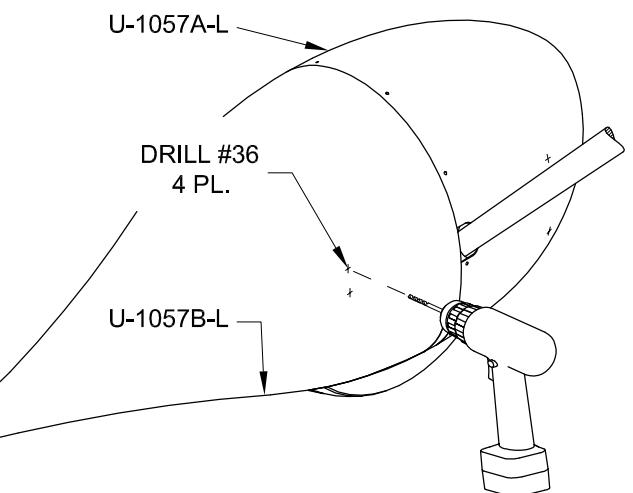
**FIGURE 1:** DRILL FAIRING

Step 3: Shim between the fairings and the tire to keep the fairing from moving while drilling. Working from the inboard side of the U-1057A Wheel Fairing Front and U-1057B Wheel Fairing Rear sight through the translucent fairing and locate the "sharpie" pen marks. Drill the fairings and bracket at the four nutplate locations as shown in Figure 3.

Remove the wheel fairings.

Roughen the inside of the wheel fairings aggressively at the #36 holes. Reinforce an area about 3" in diameter around each hole with one or two layers of fiberglass. When cured drill up to #27 the four #36 holes in the fairings.

This is also a good time to roughen the inside of the fairing at the 1/4 hole which will later prevent having to remove the rear fairing just to do so.

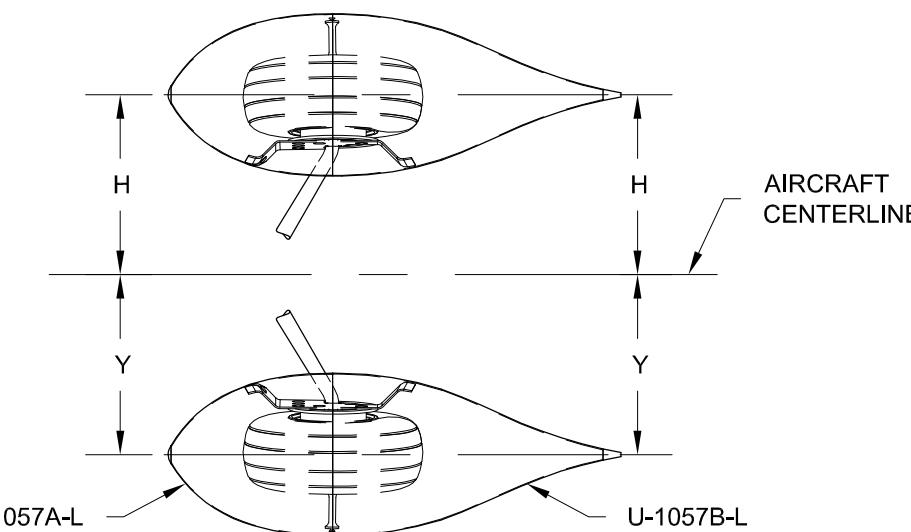


**FIGURE 3:**  
DRILLING THE FAIRINGS AND BRACKETS

**NOTE: The wheels are toed in. If the wheel fairing is made parallel to the wheel it will be misaligned.**

Step 2: Cleco the U-1057A-L Wheel Fairing Front to the U-1057B-L Wheel Fairing Rear. Insert a 1/4 bolt through the fairing and screw it into the U-01004 Axle Nut Standoff without tightening it down. Carefully adjust the wheel fairing position until it is aligned with the aircraft centerline as shown in Figure 2.

To accomplish this drop plumb bobs from the fore and aft center of the fuselage and snap a chalk line through these marks, transferring the aircraft centerline to the floor. Measure from this centerline to the points depicted in Figure 2. When all the measurements are equal the fairings are parallel to the aircraft centerline.



**FIGURE 2:** ALIGNING MAIN WHEEL FAIRINGS WITH THE AIRCRAFT CENTERLINE

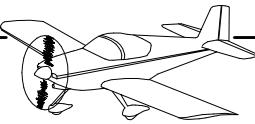
Step 4: Tap the U-1010-L Main Wheel Fairing Bracket for 6-32 screws. This will allow the temporary mounting of the fairings to the bracket (for final alignment) with 6-32 screws rather than clecoing to the bracket which tends to flatten the fairing at that location. Reattach the wheel fairings to the main wheel fairing bracket with 6-32 screws and check their alignment using Page 48-5, Steps 3 and 4, and Step 2 on this page.

Step 5: If misaligned remove the appropriate screw(s) and elongate the screw hole(s) with a small round file to correctly position the fairing. Replace the screws and recheck. Repeat until the fairings are properly aligned. Later, the epoxy/flox mixture will replace the material removed by elongating the screw holes.

Remove the fairings. Coat the 6-32 screw threads with candle wax to prevent epoxy from filling them up. Aggressively roughen the inside of the wheel fairings at the screw locations. Tape the main wheel fairing bracket tabs to prevent the epoxy/flox mixture from bonding to them. If the epoxy/flox is allowed to engulf the edges of the bracket the fairings will be difficult to remove. Prevent this by using clay or shims to add thickness to the outboard side of the bracket especially near the edges.

Mix epoxy and flox (cotton or glass) to the consistency of peanut butter and build up the areas around the two screws on both the forward and aft main wheel fairings. Attach the wheel fairings to the bracket and to each other while the mixture is wet. Use enough epoxy/flox so that when assembled a recessed area will be created that will help lock in the bracket and reduce the bearing loads on the fiberglass at the screw hole. Check the wheel fairing alignment.

Step 6: When cured remove the U-1057A-L Wheel Fairing Forward. **NOTE: The U-1057B-L Wheel Fairing Rear may remain in place for the following step.**

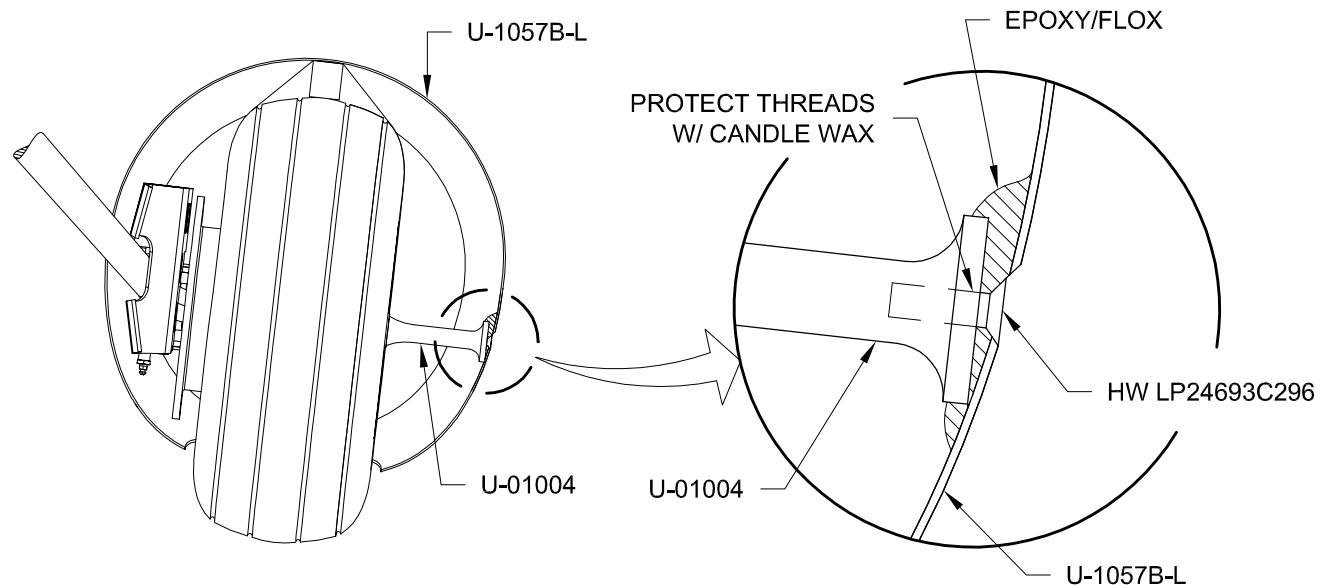


The U-01004 Axle Nut Standoff butts to the U-1057B-L Wheel Fairing Rear at a spot where the wheel fairing rear is sloped.

Step 1: Form in place a surface parallel to the outboard end of the axle nut standoff using more epoxy/flox mixture. Having already roughened the inner surface of the U-1057B-L Wheel Fairing Rear aggressively using coarse sandpaper at the 1/4" hole the epoxy mix may be applied to the fairing without having to remove it from the bracket. Apply mold release or tape to the axle nut standoff if you want to be able to remove it later.

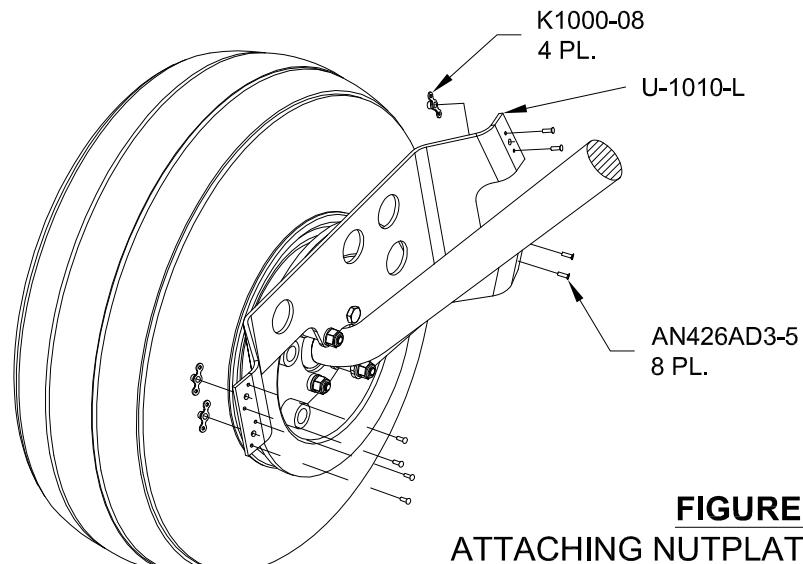
Apply an epoxy/flox mixture to the inside of both wheel fairings in the area adjacent to the nut standoff as shown in Figure 1. Cleco the wheel fairing front to the wheel fairing rear. Ideally a pocket will also be formed in which the nut standoff may seat.

Allow the mixture to harden then remove the wheel fairings.



**FIGURE 1:**  
BUILDING UP FAIRING AT AXLE NUT STANDOFF

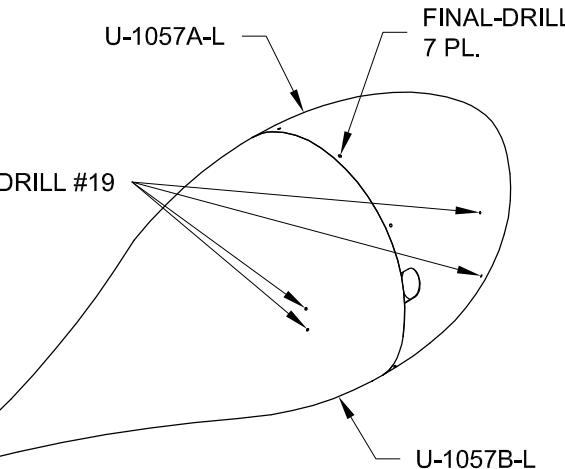
Step 2: Final-Drill #19 the four nutplate screw holes in the U-1010-L Main Wheel Fairing Bracket as shown in Figure 2. Final-Drill #40, countersink and deburr the nutplate attach holes as shown in Figure 2 and attach the hardware as per the callouts.



**FIGURE 2:**  
ATTACHING NUTPLATES TO BRACKET

Step 3: Cleco together the U-1057A-L Wheel Fairing Front and U-1057B-L Wheel Fairing Rear. Final-Drill #19 the two fairing to bracket attach holes in the wheel fairing front and wheel fairing rear as shown in Figure 3. Countersink these holes to accept AN507C832R8.

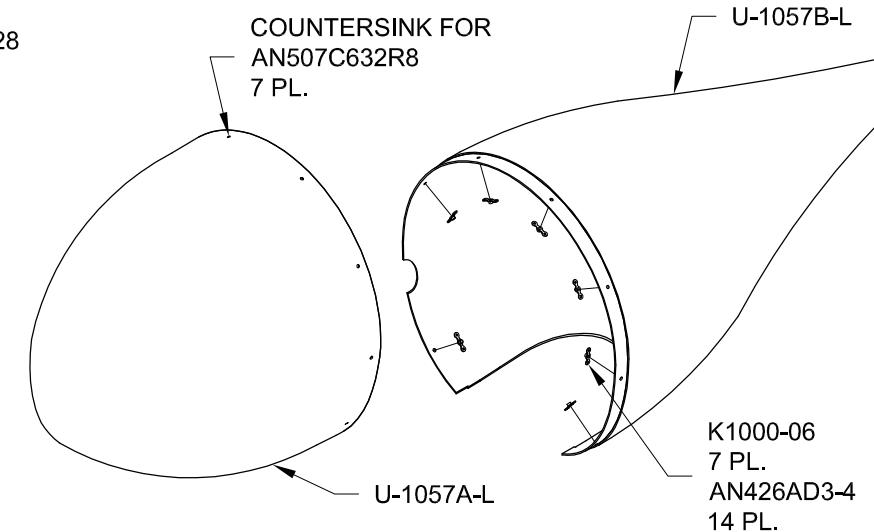
Final-Drill #28 three (of the seven) evenly spaced #40 screw attach holes. Disassemble and deburr. Install three K1000-06 nutplates at these #28 holes (see Figure 4). Final-Drill #40 and countersink for nutplate rivets as shown in Figure 4. Deburr the holes. Rivet the nutplates to the wheel fairing rear as per the callouts.



**FIGURE 3:**  
FINAL DRILLING THE FAIRINGS

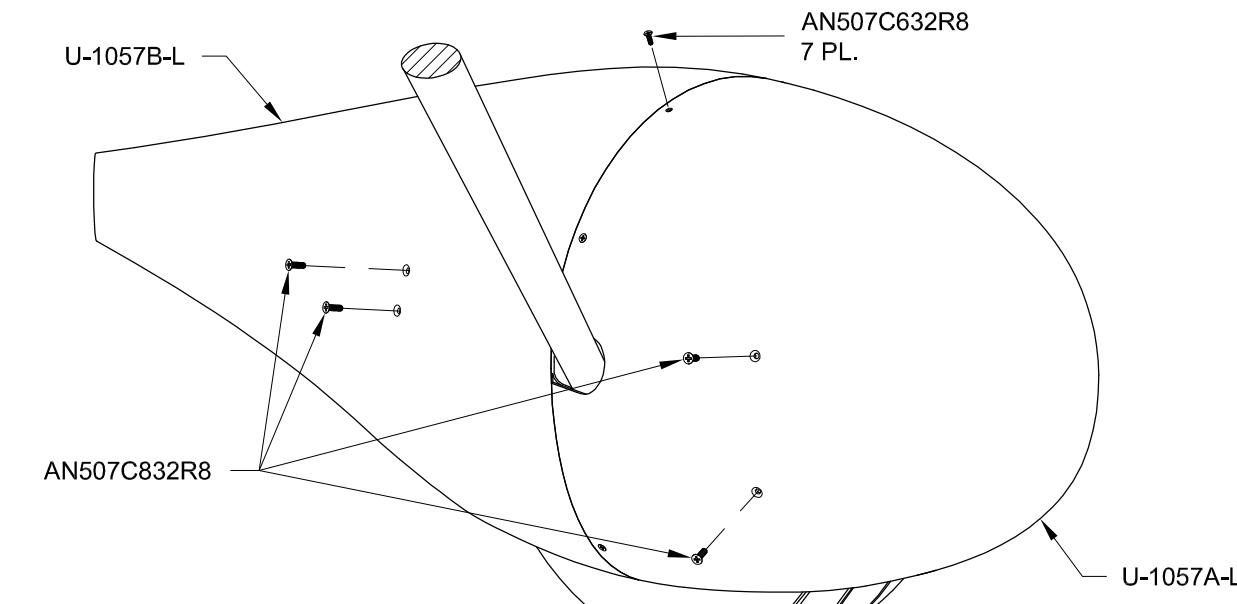
Step 4: Reassemble the fairing halves using three #6 screws and clecos at the rest of the holes. Final-Drill #28 the remainder of the #40 holes. Disassemble the fairing halves. Install the remaining nutplates. Reassemble using #6 screws.

Countersink the #28 holes in the U-1057A-L Wheel Fairing Front as per the callout in Figure 4.



**FIGURE 4:**  
RIVETING NUTPLATES TO FAIRING

Step 5: Attach the U-1057A-L Wheel Fairing Front and U-1057B-L Wheel Fairing Rear to the U-1010-L Main Wheel Fairing Bracket using the hardware as per the callouts in Figure 5.



**FIGURE 5:**  
ATTACHING MAIN WHEEL FAIRINGS



Gear leg fairings are very important for drag reduction. While it may seem that a fairing on the main wheel and tire would add more speed than one on a small round gear leg just the opposite is true. On our two place models wheel fairings add about 3-4 mph but the gear legs add at least 8 mph. The combined wheel and gear leg fairings add around 12 mph to the top speed. Looking at it another way - it would take an additional 27 horsepower to achieve the 12 mph contribute by the fairings. Obviously a good fairing installation is necessary if high speeds are to be had from an RV.

**Step 1:** Place the U-1017A Gear Leg Fairing leading edge down on a table or other flat surface and use a square at one end to position the trailing edge exactly above the leading edge. Make sure that the other end of the fairing also has the trailing edge exactly above the leading edge. This will verify that the fairing was molded without twist.

If/as required straighten the trailing edge of the gear leg fairing by sanding it with a long (12 in.) sanding block.

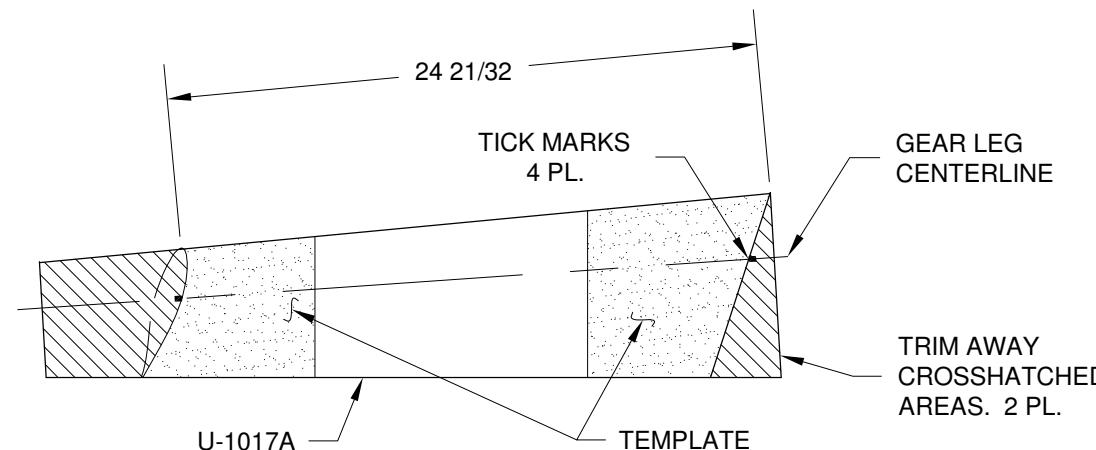
To avoid building in a twist add reference marks to the trailing edge by beginning with the fairing in the "no-twist" position. Place two or three spring clamps on the trailing edge. Wrap a short piece of tape around the trailing edge at each end then use a razor blade to split it along the trailing edge. If the fairing becomes twisted the edges of the tape will not line up. Check the alignment frequently during installation.

**Step 2:** Remove Page 48-13 and cut along the U-1017A Upper Trim Template cut line. Smooth the template over the outside of the fairing aligning it to the leading edge parting line. Use spring clamps to hold it in place. Mark the upper cut line on the fairing blank. Make two tick marks, one on each end of the fairing as per the callout in Figure 1. Remove the template and repeat for the other blank.

Cut the template along the U-1017A Lower Trim Template cut line. Use the dimension given in Figure 1 for positioning the lower template and then outline the lower end. **NOTE: When the text of the template is visible a U-1017A<sub>FL</sub> will be formed.** Make the tick marks here as well. Reverse the template so the text will not be visible and wrap it around the bottom of the other fairing blank and mark the lower cut line to form a U-1017A<sub>FR</sub>.

Extend the gear leg centerline marks about 1/4" toward the center of the part. The marks will be helpful later when positioning the fairings to the gear legs.

Trim off the top and bottom ends of the fairing. After trimming, file or saw notches approximately 1/16" deep in the ends of the fairing at the gear leg centerline marks.



**FIGURE 1:** TRIMMING THE FAIRING (LEFT SHOWN)

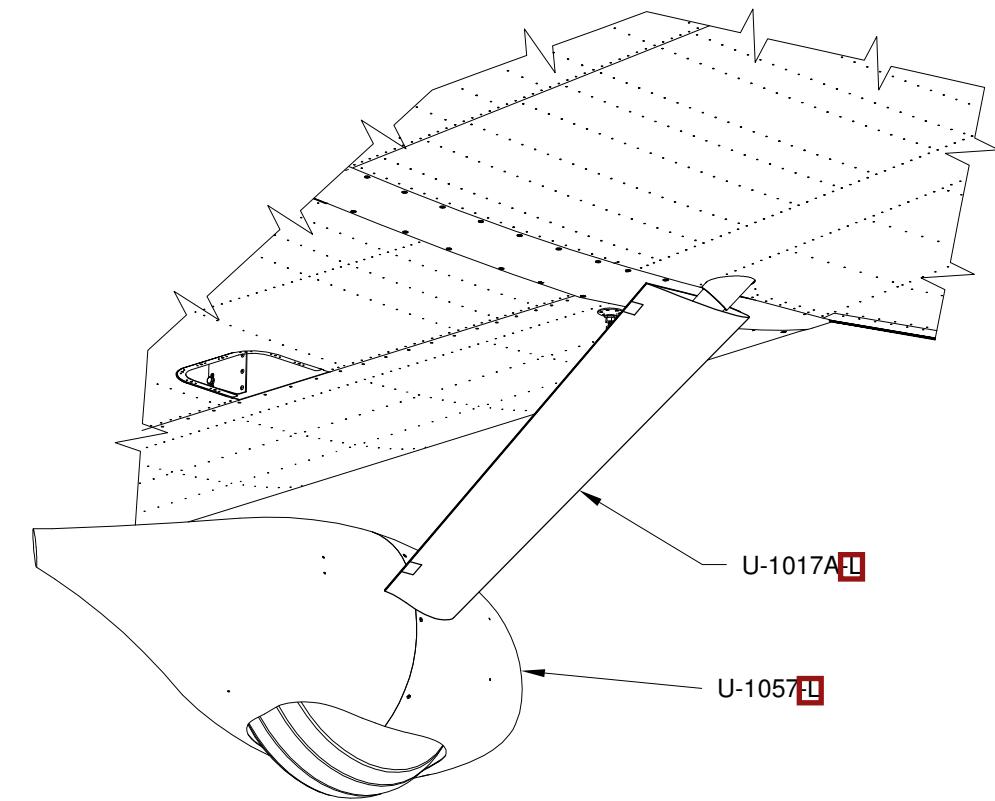
**Step 3:** Place the trimmed U-1017A<sub>FL</sub> Gear Leg Fairing on the gear leg as shown in Figure 2. Clamp the trailing edge closed with two or three spring clamps.

Check the reference tape to be sure the gear leg fairing is not twisted. Adjust the position of the fairing to align the gear leg centerline marks with the gear leg centerline.

The lower end of the gear leg fairing should sit nearly flush on the U-1057<sub>FL</sub> Wheel Fairing. Some variation may occur depending on how accurately the wheel fairing was aligned and the gear leg fairing was trimmed.

In subsequent steps the gear leg fairing will be more accurately aligned but for now trim only as needed to generally seat the gear leg fairing onto the wheel fairing.

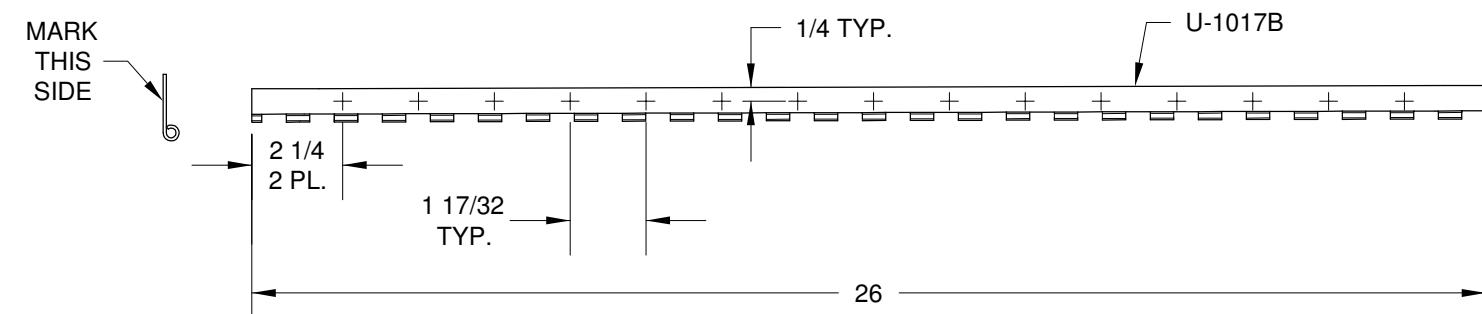
Remove the gear leg fairing from the gear leg.



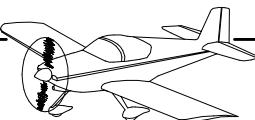
**FIGURE 2:** INSTALLING GEAR LEG FAIRINGS

**Step 4:** Remove the hinge pin from the U-1017B Gear Leg Fairing Hinge. Trim the hinge material to the length shown in Figure 3. The hinge will initially overhang each end by about 1" to help clamp the hinge to the fairing. Reinsert the hinge pin.

Mark but do not drill the rivet locations on each of the hinge segments as shown in Figure 3. Offset the rivet locations on the opposite hinge by 1/8" to prevent the clecos from interfering with one-another. When drilling the hinge to the fairing the fastener location marks will be visible through the translucent fairing.



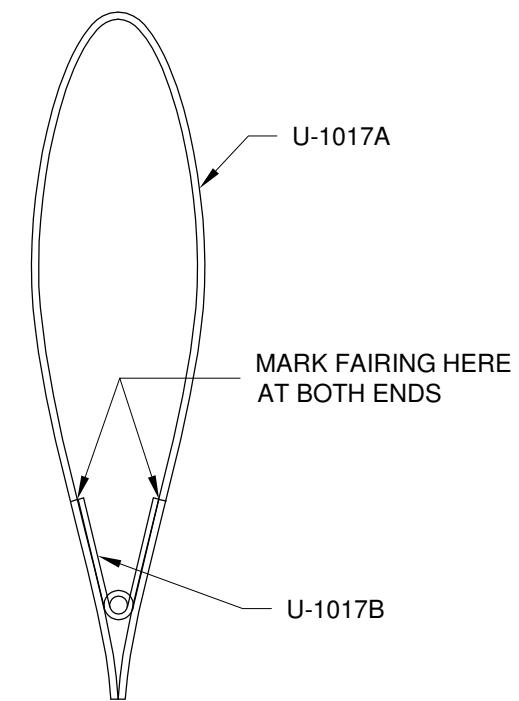
**FIGURE 3:** CUTTING HINGE HALVES



Step 1: Position the U-1017B Gear Leg Fairing Hinge and hinge pin inside the U-1017A Gear Leg Fairing as shown in Figure 1. With the trailing edge of the fairing taped closed turn the fairing trailing edge down to allow the hinge to locate itself.

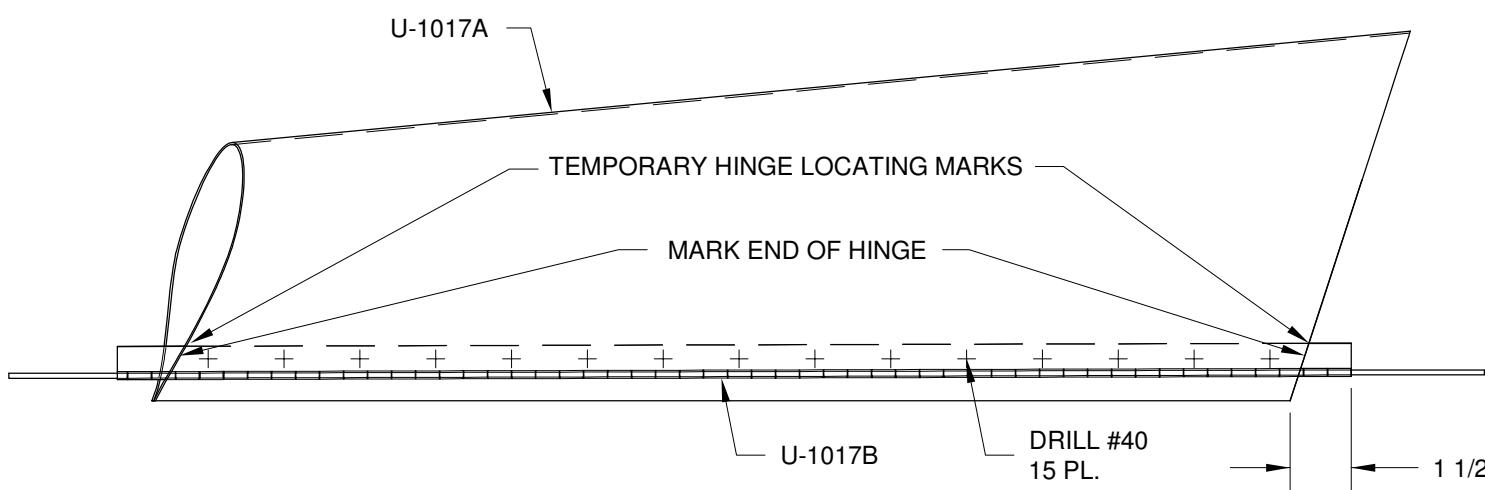
Do not force the hinge farther aft (down) into the fairing. When assembled the hinge should be holding the trailing edge closed with a slight amount of pressure. Mark the fairing as shown in Figure 1 so that the hinge can be put back in the same place later.

Remove the hinge from the fairing and remove the hinge pin from the hinge.



**FIGURE 1:**  
POSITIONING HINGE IN FAIRING

Step 2: Position the marked hinge inside the trailing edge of the fairing and clamp the ends of one hinge half in place. With the hinge ends clamped in position, begin at one end and drill #40 through the fairing and hinge using the fastener locations marked on the hinge to position the holes. Use light pressure and high drill speed allowing the bit to cut through without distorting the hinge. Work from one end of the fairing to the other, clecoing each hole before drilling the next. Mark the final trim locations on the hinge before removing it from the fairing.



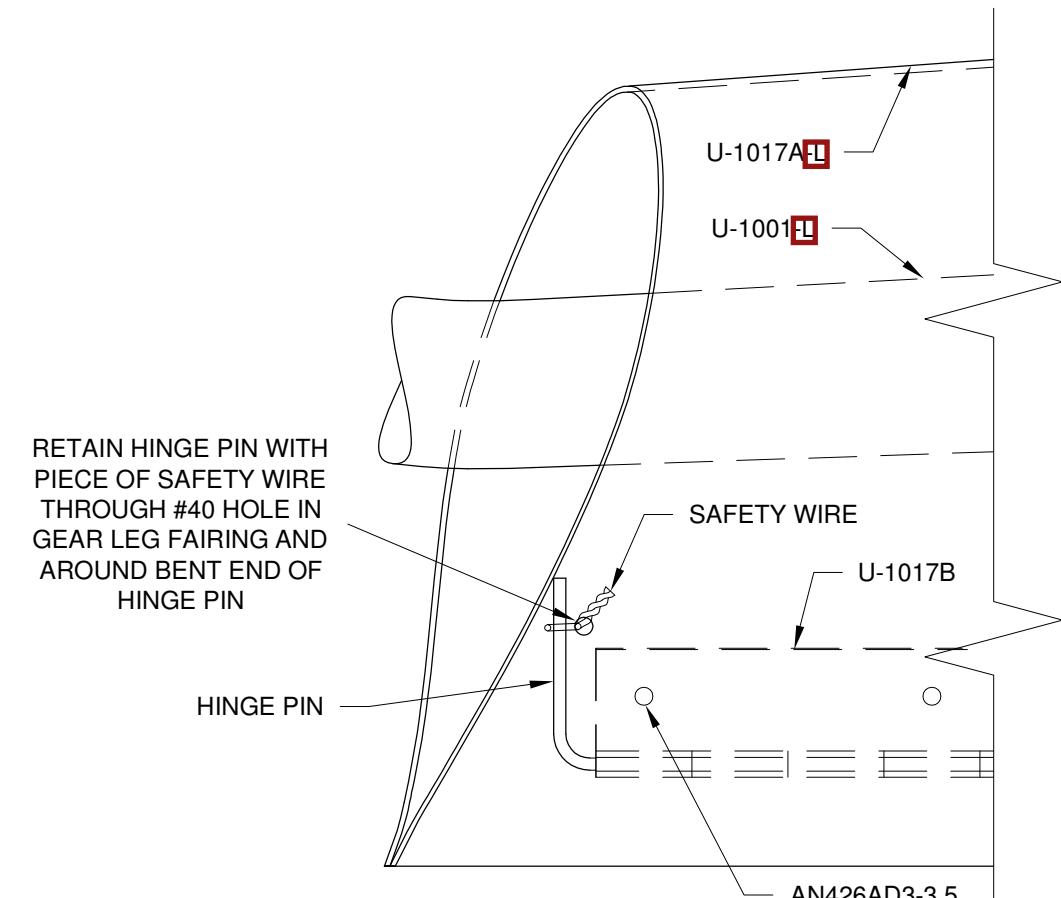
**FIGURE 2:** DRILLING FAIRING AND HINGE HALVES

Step 3: Un-cleco the hinge from the fairing and clean out any metal chips. Deburr holes and trim the 1" excess hinge from each end. Because the fairing is quite thin we recommend you keep the hinge clecoed to the fairing while countersinking. The holes in the hinge will guide the countersink cutter and keep it from elongating the holes in the fairing. Cleco the hinge to the fairing and countersink the fairing for AN426AD3 rivets. Rivet the hinge to the fairing using a hand squeezer. Do not fully set the rivets as in a metal structure. This would cause the thin composite fairing to crack around the holes. Repeat for the other hinge half.

Insert the hinge pin joining the trailing edge. Use a long sanding block to remove any excess "tail" on the fairing and even up the sides of the trailing edge.

Remove the hinge pin and bend the lower 1" to 90°. Grind the other end to an offset point (see Page 47-7). Drill a #40 hole through the upper surface of the lower end of the fairing so that the hinge can be safety wired at final assembly as shown in Figure 3.

Hereafter the U-1017A Gear Leg Fairing will be referred to as U-1017.



**FIGURE 3:** HINGE PIN RETENTION DETAIL

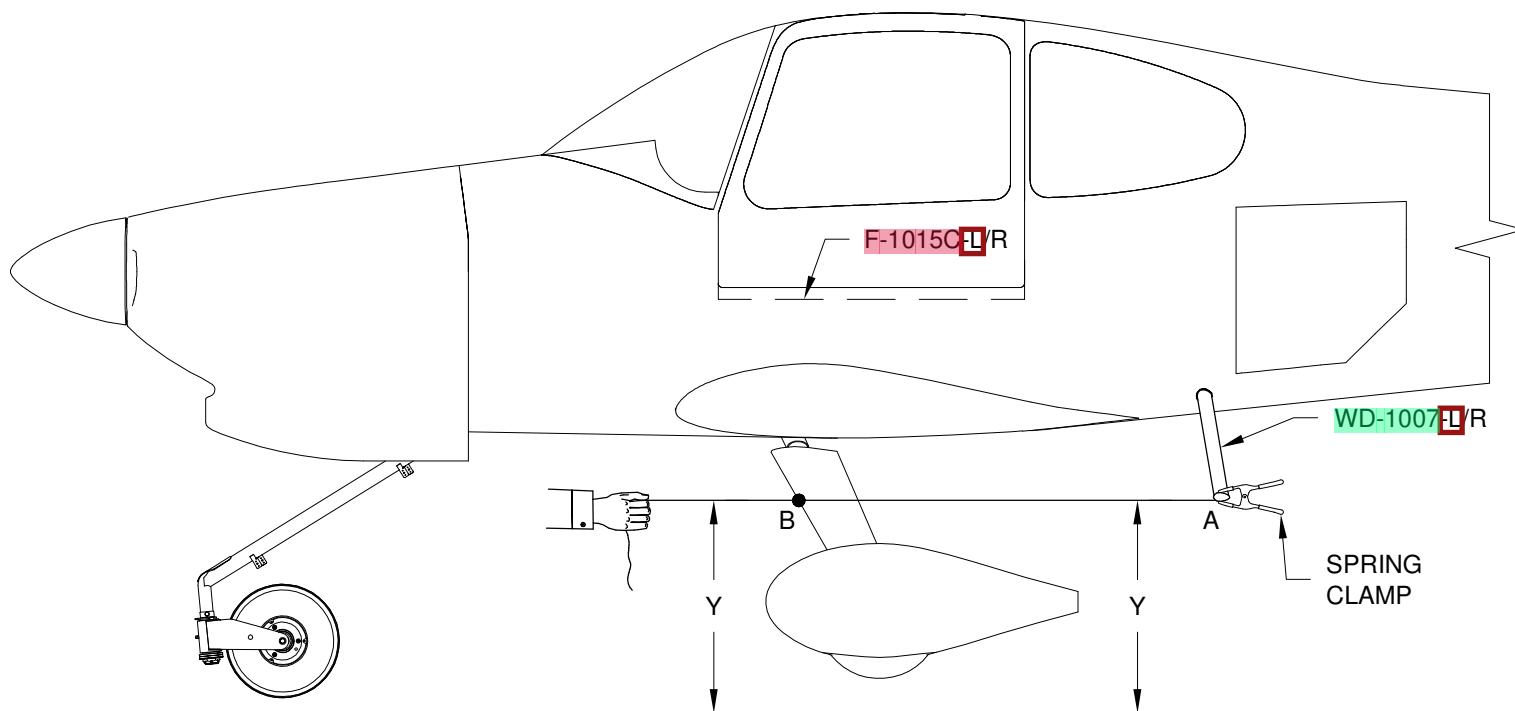


The gear leg fairing must be aligned with no load on the wheels simulating the in-flight condition of the gear legs. The following steps require the aircraft to be supported by jacks far enough off the ground that the wheels no longer touch. Level the aircraft at the F-1015C-L/R Mid Cabin Decks as shown in Figure 1. **WARNING: Use caution while the airplane is on jacks. Don't let it tip or it will fall off the jacks!**

**Step 1:** Slip the U-1017-L Gear Leg Fairing over the gear legs and brake lines and insert the hinge pin from the bottom. The hinge pin is thin enough to curve during insertion without taking excessive permanent bend.

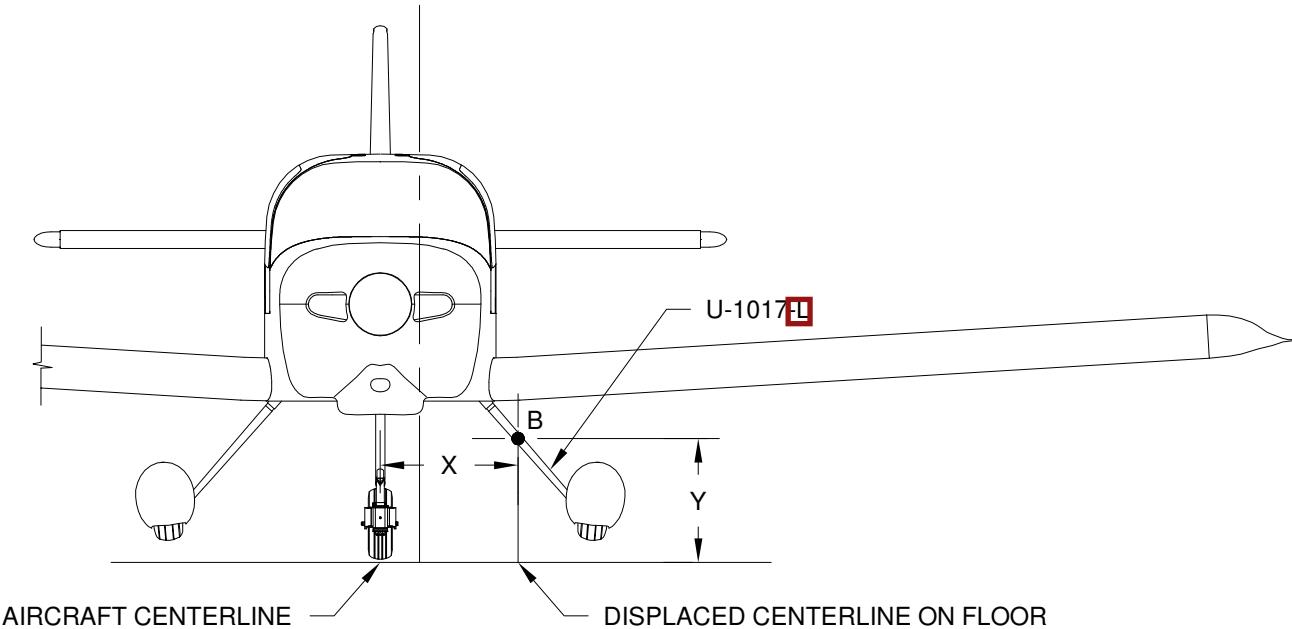
Roughly align the gear leg fairing to the airflow and the notched centerline marks with the gear leg centerline. Clamp the gear leg fairing to the gear leg to temporarily hold it in place.

The alignment of the fairings is important and can significantly affect the way the airplane flies. While a very careful "eyeball" alignment job might come close this is made difficult because of the sweep back of the gear legs.



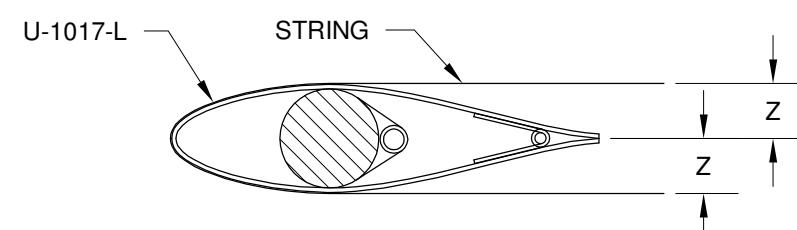
**FIGURE 1: LEVELING AIRCRAFT AND ALIGNING GEAR LEG FAIRINGS**

**Step 2:** Drop plumb bobs from the aircraft centerline to the floor and snap a line on the floor between these two points. Create a displaced centerline (parallel to the real centerline) on the floor beneath an arbitrary point "A" on the horizontal part of the WD-1007-L. Step. It could be established elsewhere but the step is very convenient spot. Drop a plumb bob from point "A" to the floor and measure the span wise distance "X" from below point "A" to the center of the fuselage. Snap a line from below the step forward past the gear leg fairing the distance "X" from and parallel to the aircraft centerline. This is the displaced centerline. Drop a plumb bob from the leading edge of the U-1017-L Gear Leg Fairing to the displaced centerline as shown in Figure 2. This locates point "B" on the leading edge of the fairing.



**FIGURE 2: MEASURING FROM AIRCRAFT CENTERLINE AND FLOOR**

**Step 3:** Wrap a string around the leading edge of the U-1017-L Gear Leg Fairing as shown in Figure 3 at point "B" (see Figure 1) and pull both ends tight to the spring clamp at "A". Be sure the string is level and parallel to the F-1015C-L Mid Cabin Deck. Measuring from the floor will be adequate here. When the leading and trailing edges of the gear leg fairing are centered between the strings as shown in Figure 3 the gear leg fairing is properly aligned.



**FIGURE 3: ALIGNING GEAR LEG FAIRINGS**



Step 1: Clamp the U-1017-L Gear Leg Fairing to the U-1001-L Gear Leg (not shown). The U-1019-L Lower and U-1020-L Upper Intersection Fairings must be aligned to the gear leg fairing and the gear leg fairing alignment must be maintained while the intersection fairings are being installed. Once permanently installed the intersection fairings will hold the gear leg fairing in place.

Apply a parting agent such as automotive wax, PVA (a special liquid parting agent) or brown mylar packaging tape on the gear leg fairing and U-1057-L Wheel Fairing surfaces to prevent adhesion since the intersection fairings must part from all adjoining surfaces.

Slip the lower intersection fairing around the gear leg fairing and fit it to the U-1057-L Wheel Fairing as shown in Figure 1. The intersection fairings are fabricated with only two layers of fiberglass so they should be flexible enough for making adjustments.

Clamp the lower intersection fairing together at its aft edge. Excess material has been added to the intersection fairings to secure them to the wheel and gear leg fairings. Do not trim them until after additional layers of fiberglass have been added.

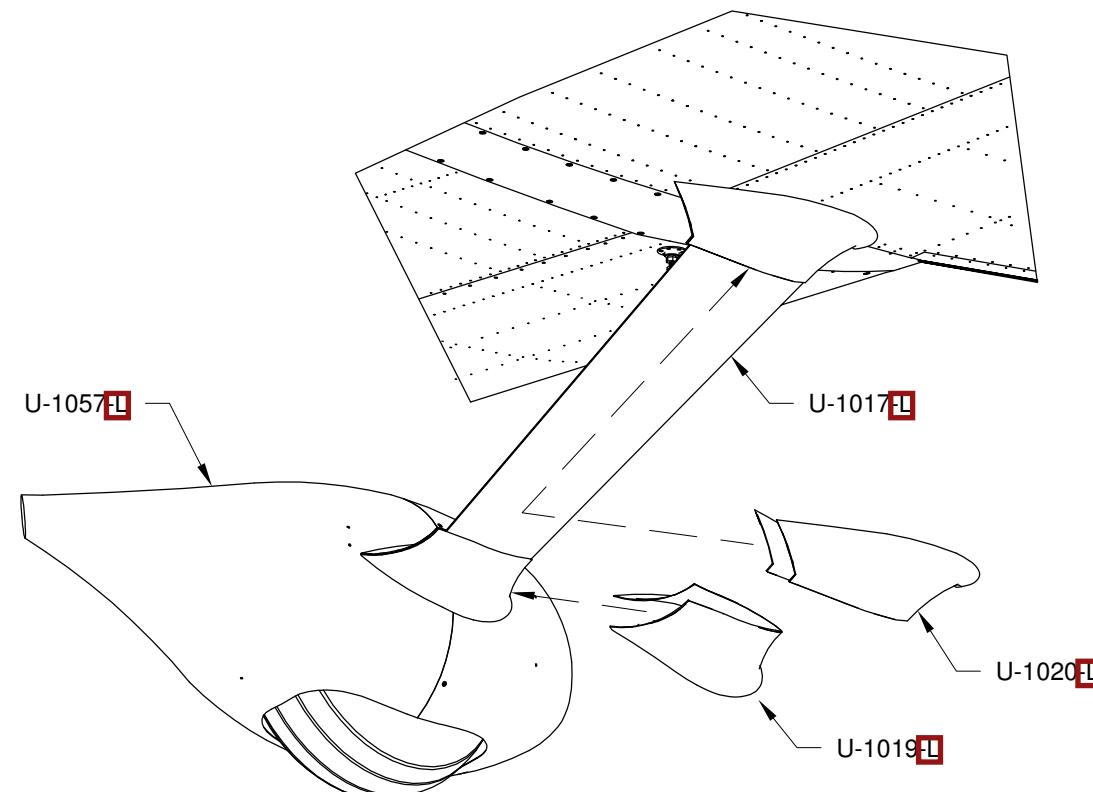
Align the lower intersection fairing to the gear leg fairing and fit it to the wheel fairing. Secure it with spring clamps and duct tape.

Add two more layers of fiberglass to reinforce and constrain the intersection fairing to its final shape. Epoxy resin **must** be used when adding layers to the epoxy intersection fairings. Two layers of 9 oz. fiberglass cloth over top of the original intersection fairings should be sufficient.

Drill and cleco the intersection fairing to the wheel fairing when cured as per Figure 2. Remove the part and trim to final size.

OPTIONAL: For a smoother transition from the lower intersection fairing to the wheel fairing see Page 48-12.

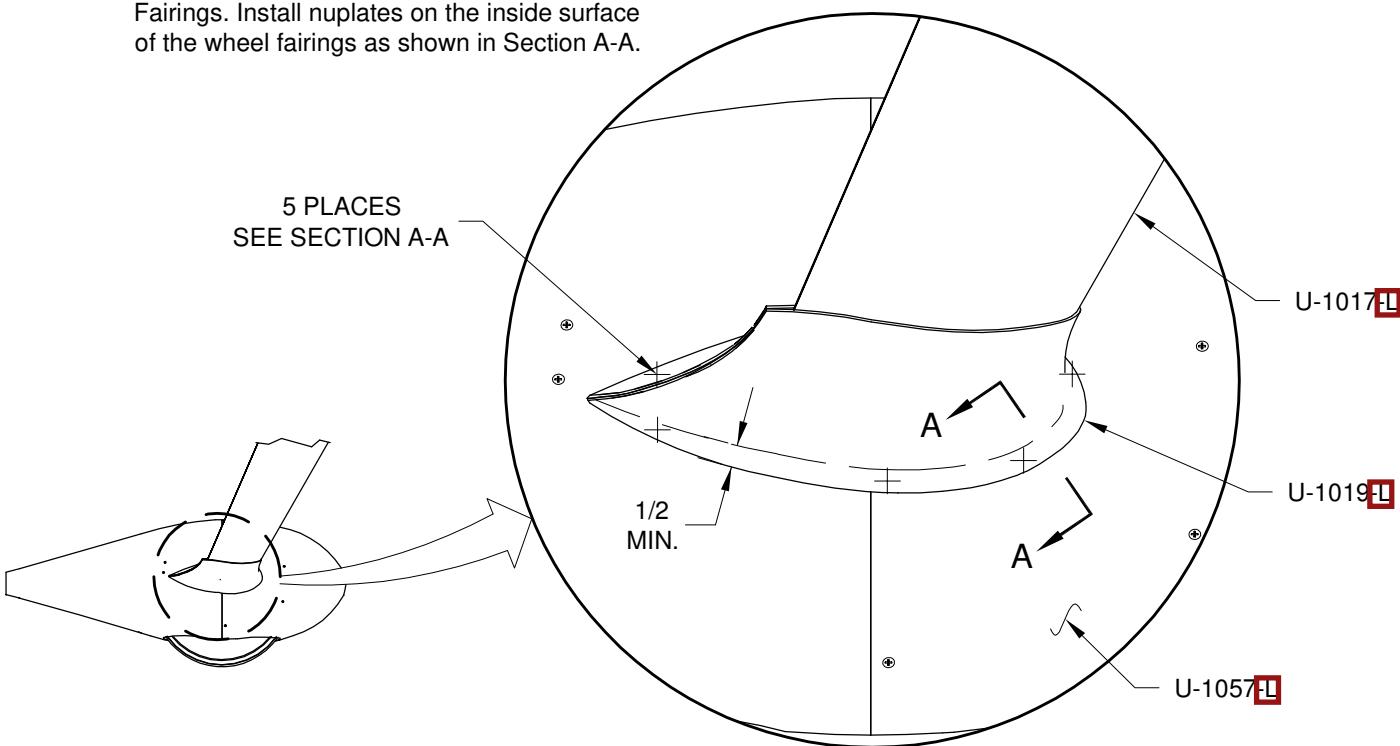
Step 2: Repeat Step 1 for the U-1020-L Upper Intersection Fairing. See Page 48-12, Figure 1.



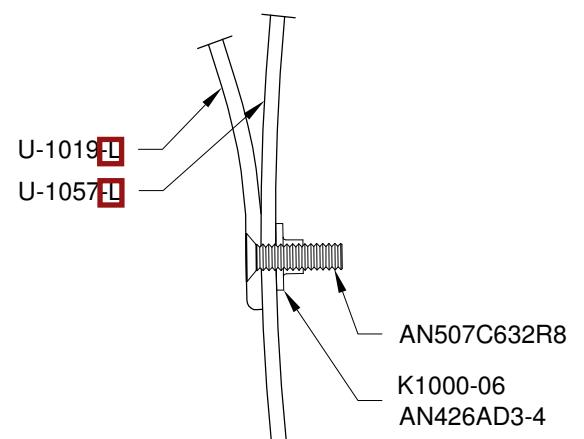
**FIGURE 1: INSTALLING INTERSECTION FAIRINGS**

Step 3: Drill #40 and cleco the U-1019-L Lower Intersection Fairing at approximately the locations shown.

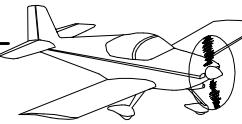
Step 4: Remove the U-1019-L AND U-1020-L Intersection Fairings and U-1057-L Wheel Fairings. Install nuplates on the inside surface of the wheel fairings as shown in Section A-A.



**FIGURE 2: ATTACHING LOWER INTERSECTION FAIRING**



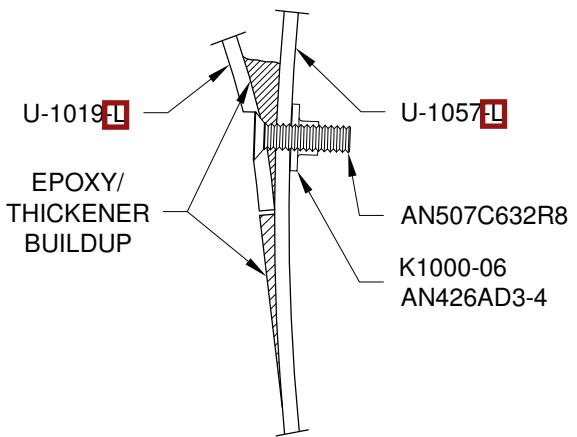
**SECTION A-A**



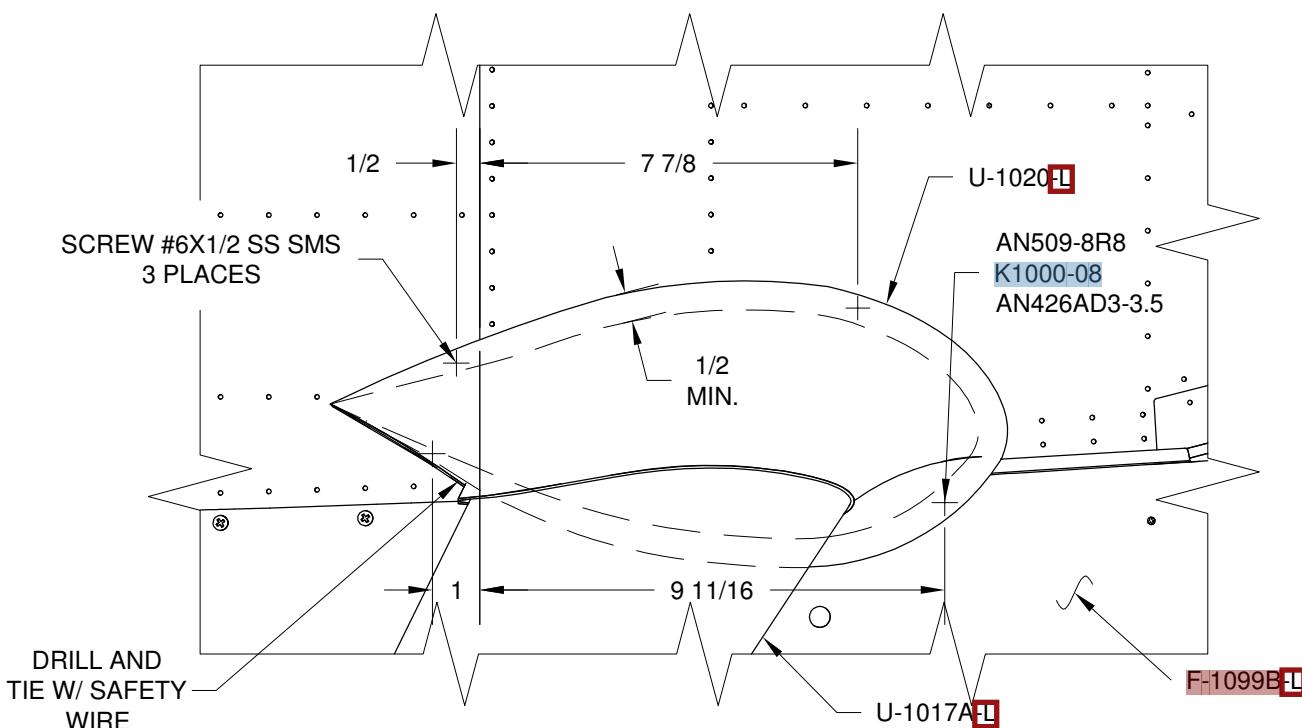
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Optional: Trim away most of the flange (mating surface) of the U-1019 Lower Intersection Fairing as shown in the Optional Section A-A. Drill the screw attach holes. Remove the int. fairing. Reinforce the intersection fairing by building up its inner surface around the screw holes with a small amount of epoxy/thickener mixture. When cured countersink the screw holes.

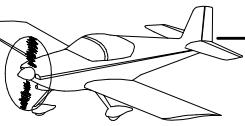
Cover the intersection fairing in release solution. Attach it to the wheel fairing and apply a slurry of epoxy resin and thickener to the sanded surface of the wheel pant. Once the slurry is hardened, sand it to a smooth surface.



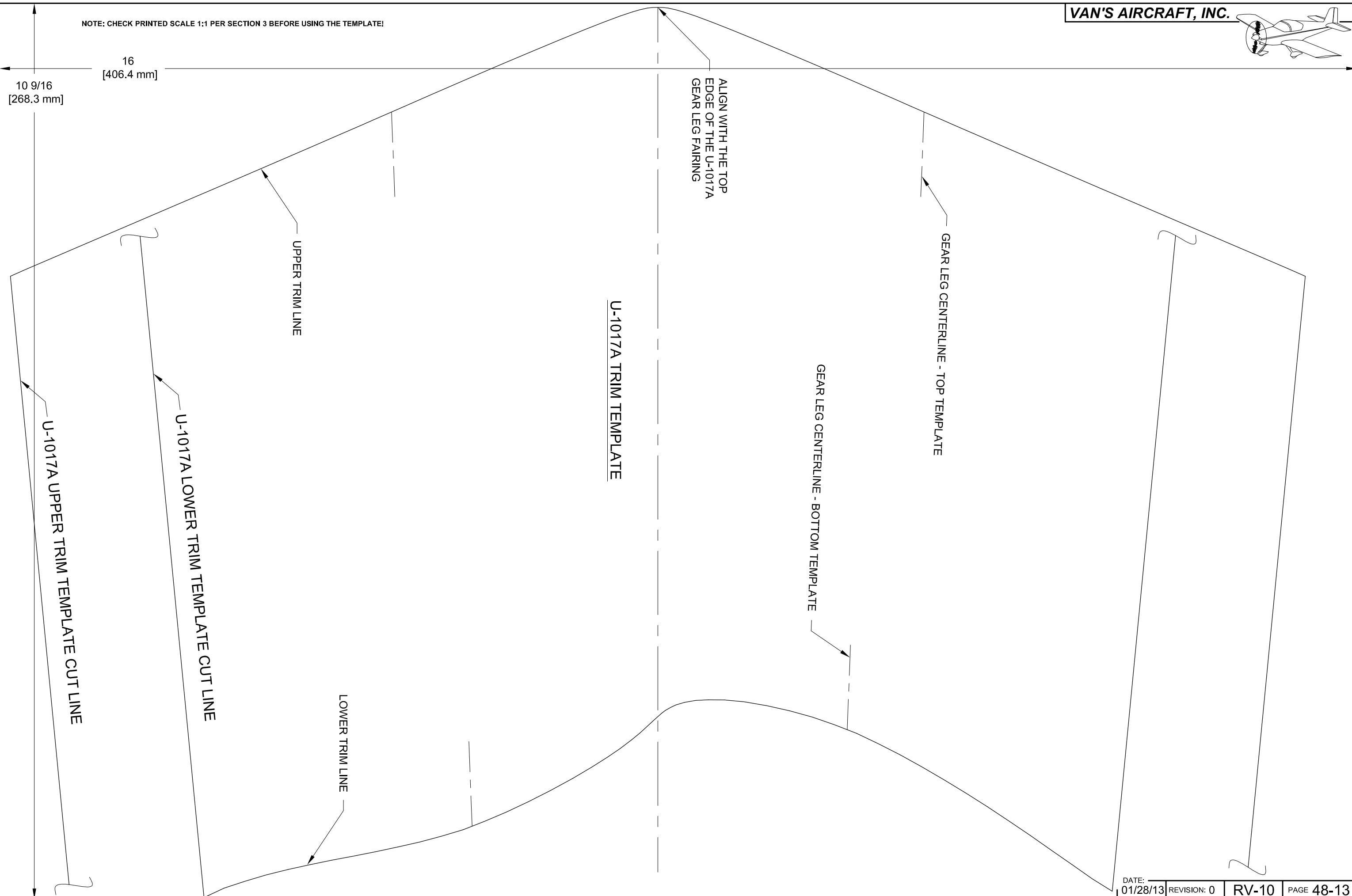
**OPTIONAL SECTION A-A**  
(SEE FIG. 2 PAGE 48-11)

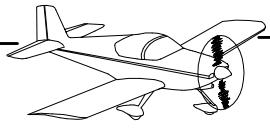


**FIGURE 1:**  
ATTACHING UPPER INTERSECTION FAIRING  
BOTTOM VIEW



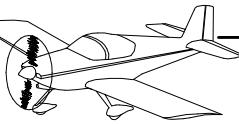
NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!





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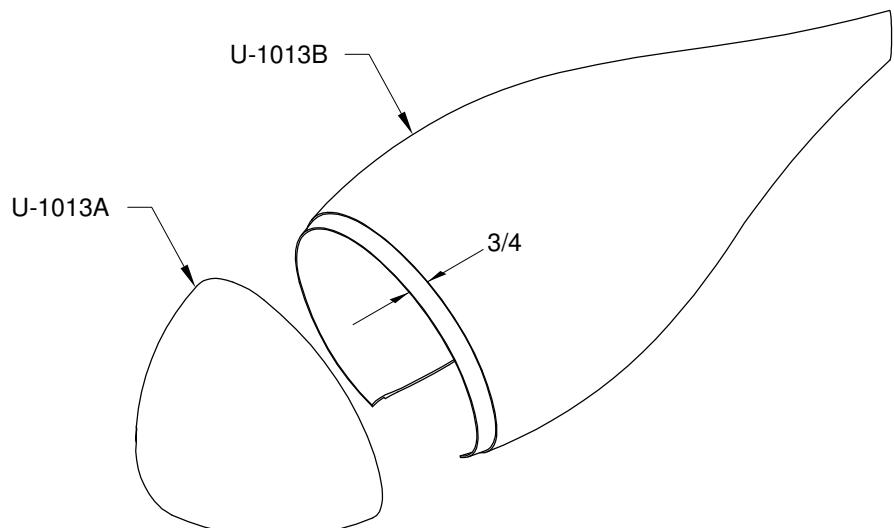
**NOTE:** The nose wheel fairing is a two piece fiberglass assembly. It attaches to the nose wheel fork with brackets riveted to the wheel fairing.

**NOTE:** If transparent, the nose wheel fairings must remain transparent to accomplish the installation. Do not sand or prime their interior or exterior surfaces until directed to or upon the completion of the installation.

If the fairings are opaque, refer to Section 5.18 MATCH-DRILLING OPAQUE FIBERGLASS FAIRINGS.

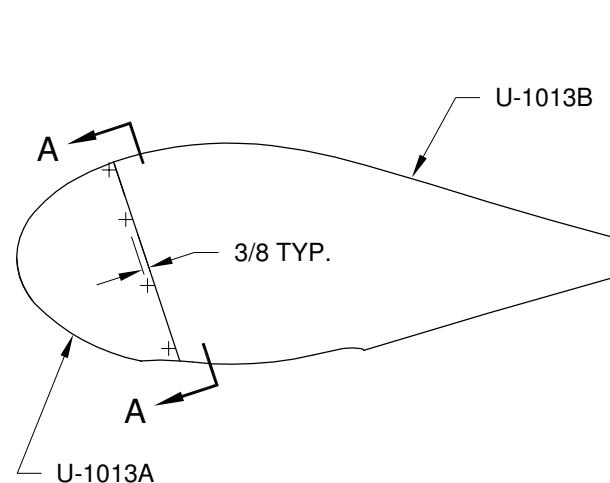
**Step 1:** Fit the U-1013A Wheel Fairing Front and U-1013B Wheel Fairing Rear together. The wheel fairing rear has a recessed lip on the front so the smaller wheel fairing front will fit flush. This lip may be uneven. Trim it to a constant width as shown in Figure 1.

**Step 2:** Fit the U-1013A Wheel Fairing Front over the lip of the U-1013B Wheel Fairing Rear and trim, grind or file either of them as needed to achieve a good fit. Do not worry about a mismatch at the top center of the fairing halves since this area will be trimmed away later to clear the WD-1017 Nose Gear Leg Assembly. Tape them into a best fit position and place a reference mark across the seam. Use this mark to realign the fairings during assembly.

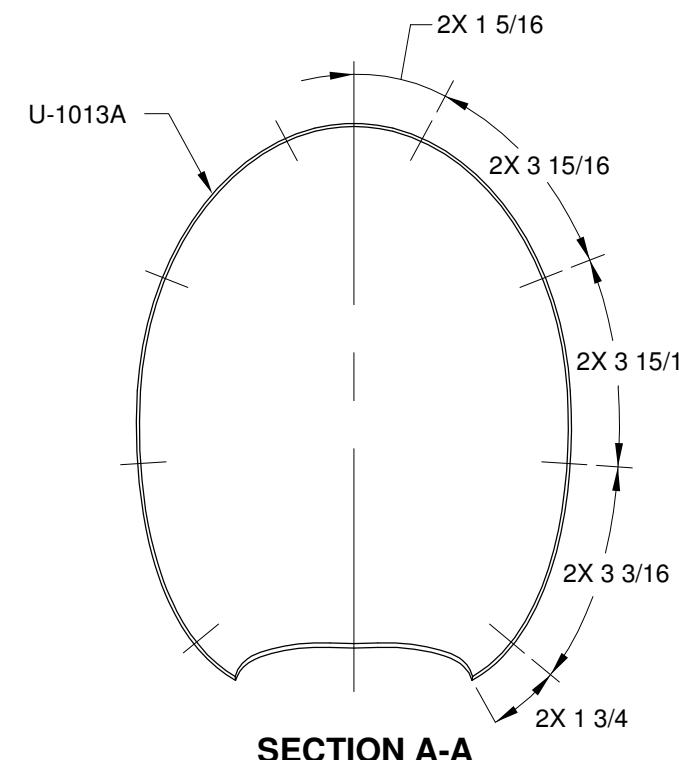


**FIGURE 1: FITTING FAIRING HALVES**

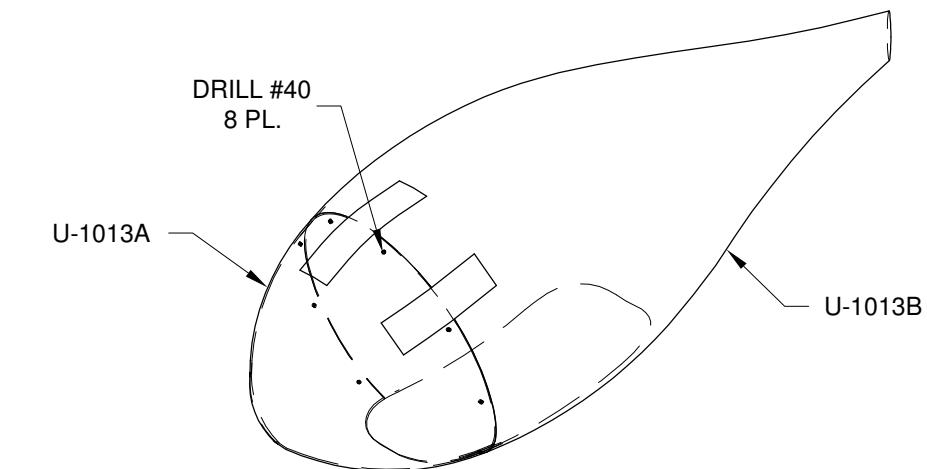
**Step 3:** Mark the screw locations that will join the U-1013A Wheel Fairing Front and the U-1013B Wheel Fairing Rear as per the dimensions shown in Figure 2 and Section A-A.



**FIGURE 2: DRILLING ATTACH HOLES**

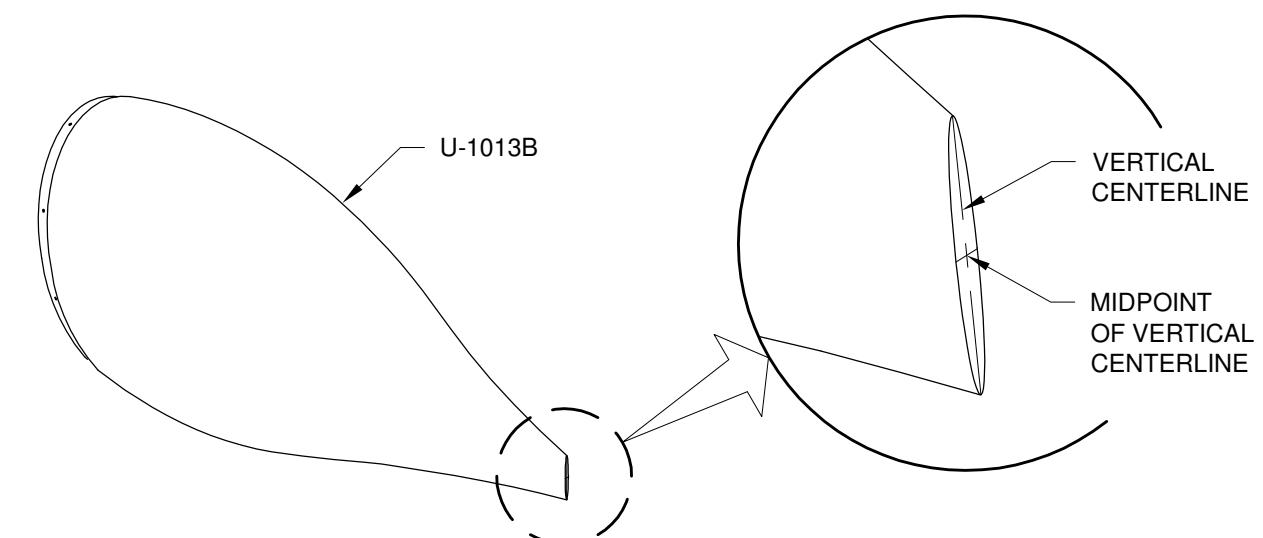


**Step 4:** Drill the U-1013A Wheel Fairing Front and the U-1013B Wheel Fairing Rear screw locations as per the callout in Figure 3 installing clecos along the way. Begin at the top and progress toward the bottom of the fairing.



**FIGURE 3: DRILLING FAIRINGS**

**Step 5:** Draw a vertical centerline on the U-1013B Wheel Fairing Rear as shown in Figure 4. Place a mark at the midpoint of the vertical centerline as shown in Figure 4.



**FIGURE 4: DRAW REFERENCE LINES AT AFT END OF FAIRING**

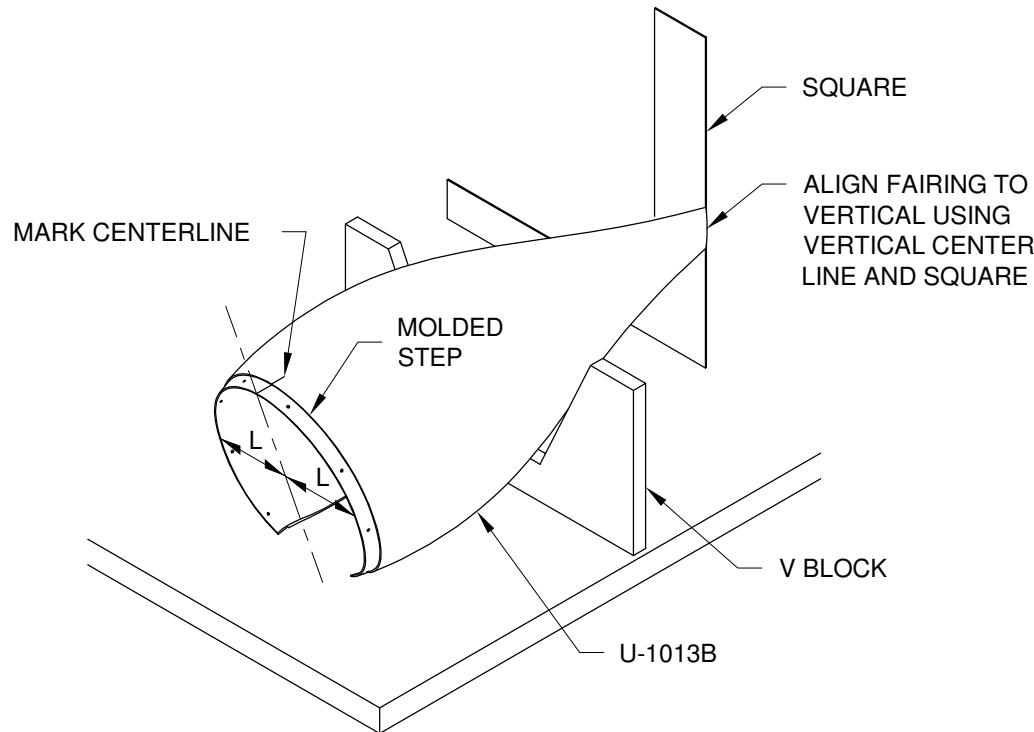


**Step 1:** Place the U-1013B Wheel Fairing Rear on the bench and make it plumb using a square so that the reference line on the fairing is vertical.

Mark a centerline as shown by measuring horizontally across the forward opening of the fairing as shown in Figure 1.

Position a square at the midpoint of this distance and mark the top of the wheel fairing rear.

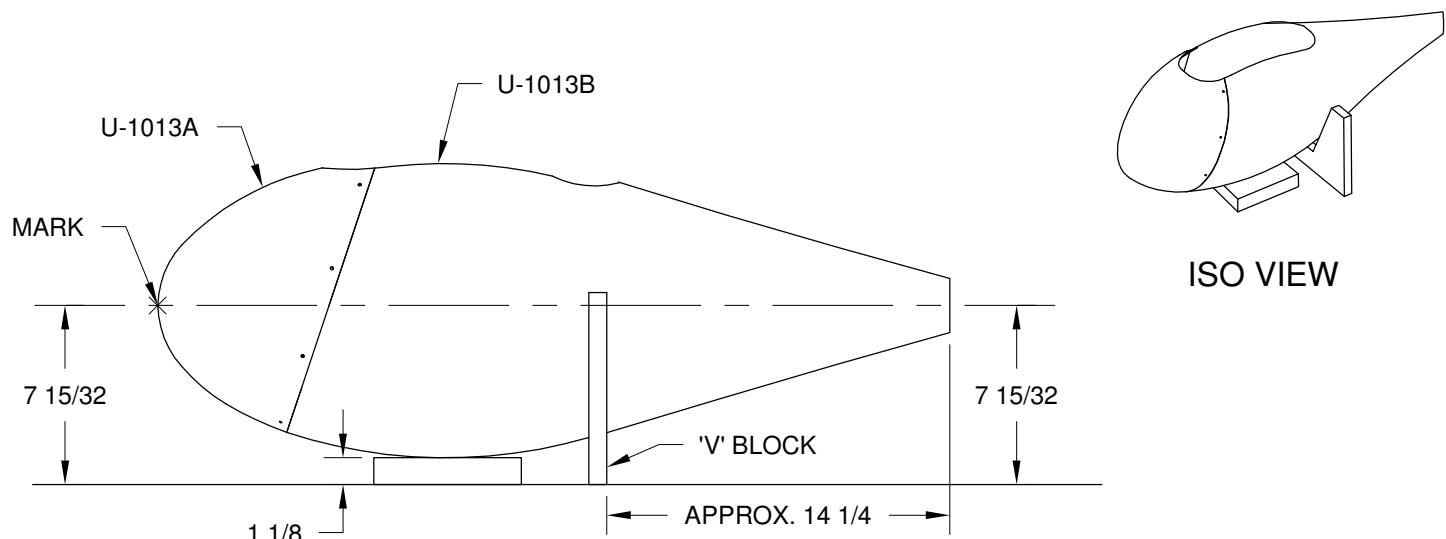
Extend the mark 1/2" aft of the molded step. This reference mark will serve to align the wheel fairing along its roll axis.



**FIGURE 1: MARK FAIRING CENTERLINE**

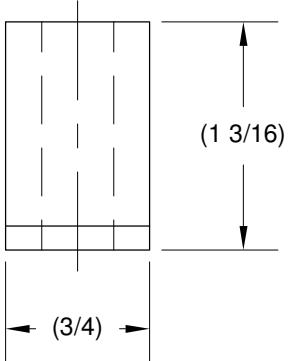
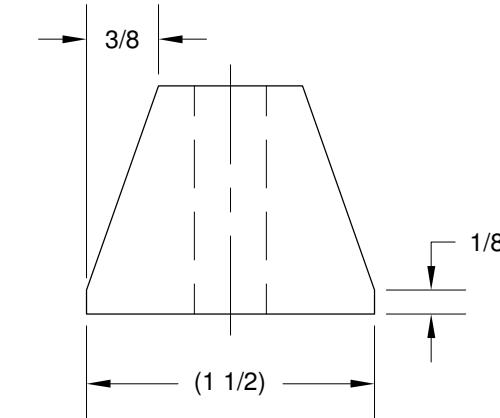
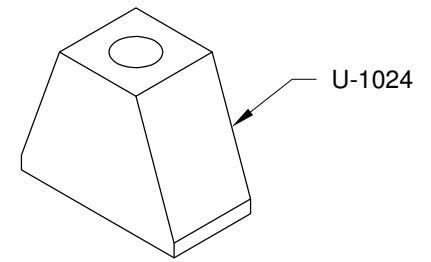
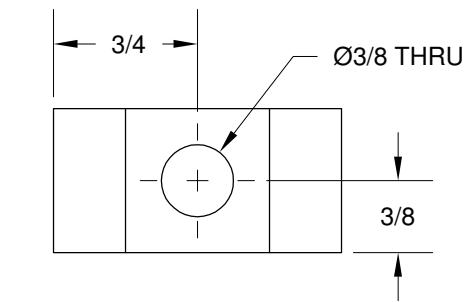
**Step 2:** Tape the U-1013A and B Wheel Fairing halves together and place them into the 'V' block with the wheel opening facing upward as shown in the Iso View of Figure 2. Rotate the assembled fairing about its long axis until the vertical centerline drawn at the back of the wheel fairing rear is vertical and check it with a square.

Level the wheel fairing by measuring from the bench to the midpoint of the vertical centerline at the aft end the distance shown. Mark the forward end of the fairing as shown.

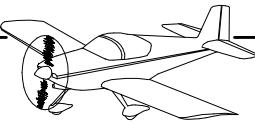


**FIGURE 2: MARK FAIRING CENTERLINE AT ITS NOSE**

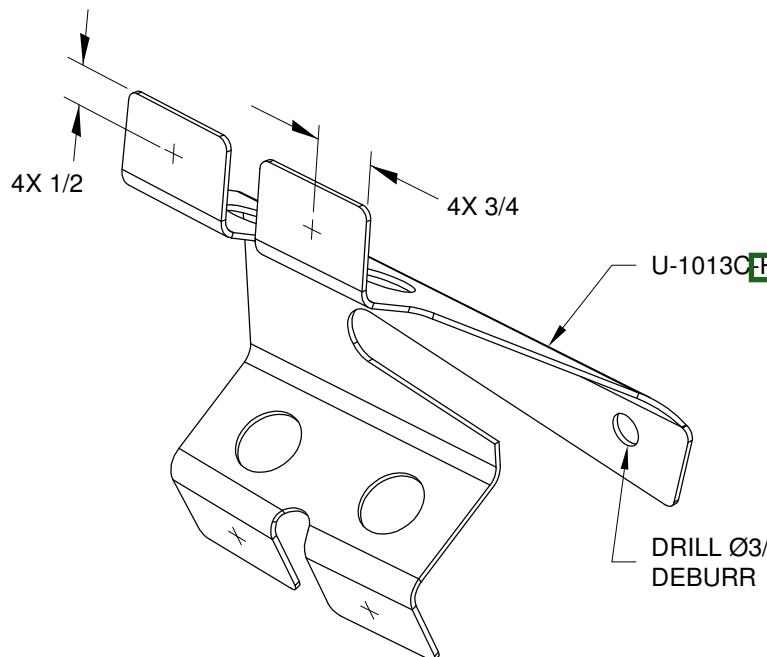
**Step 3:** Fabricate two U-1024 Standoffs from  $3/4 \times 1 1/2 \times 1 3/16$  2024-T351 aluminum block as provided. Hacksaw to the shape depicted and drill as shown in Figure 3.



**FIGURE 3: FABRICATE STANDOFF**

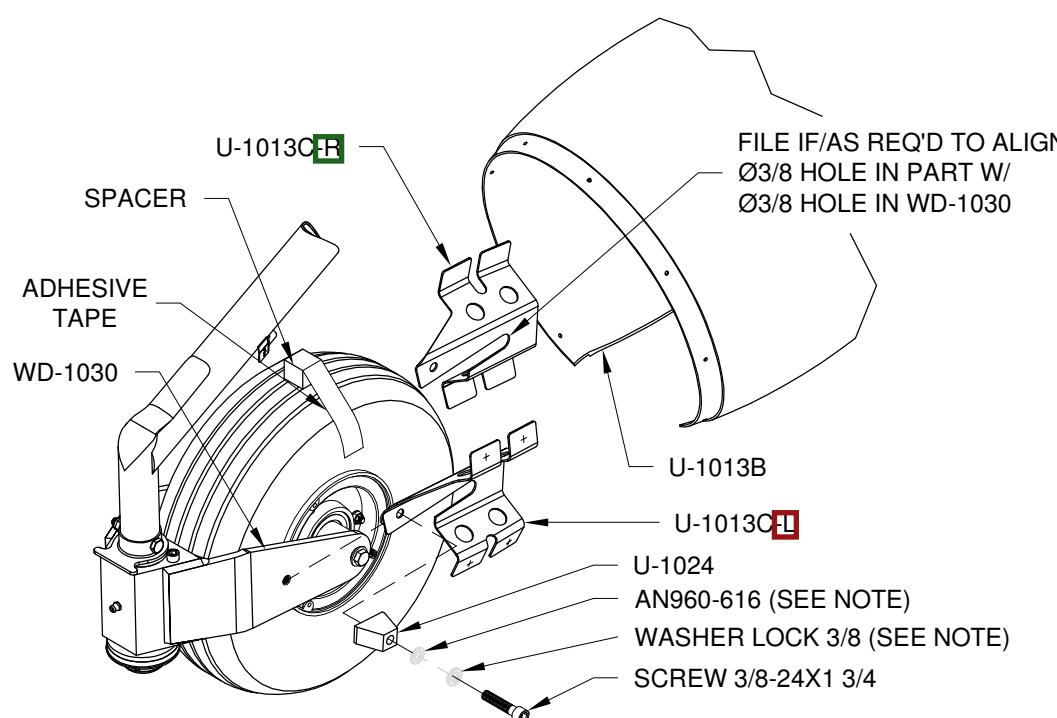


Step 1: Mark screw locations on the U-1013C<sub>L</sub> and U-1013C<sub>R</sub> Nose Wheel - Fairing Bracket flanges as per Figure 1. The marks will be visible through the wheel fairing. Drill and deburr the forward attach hole as per the callout.



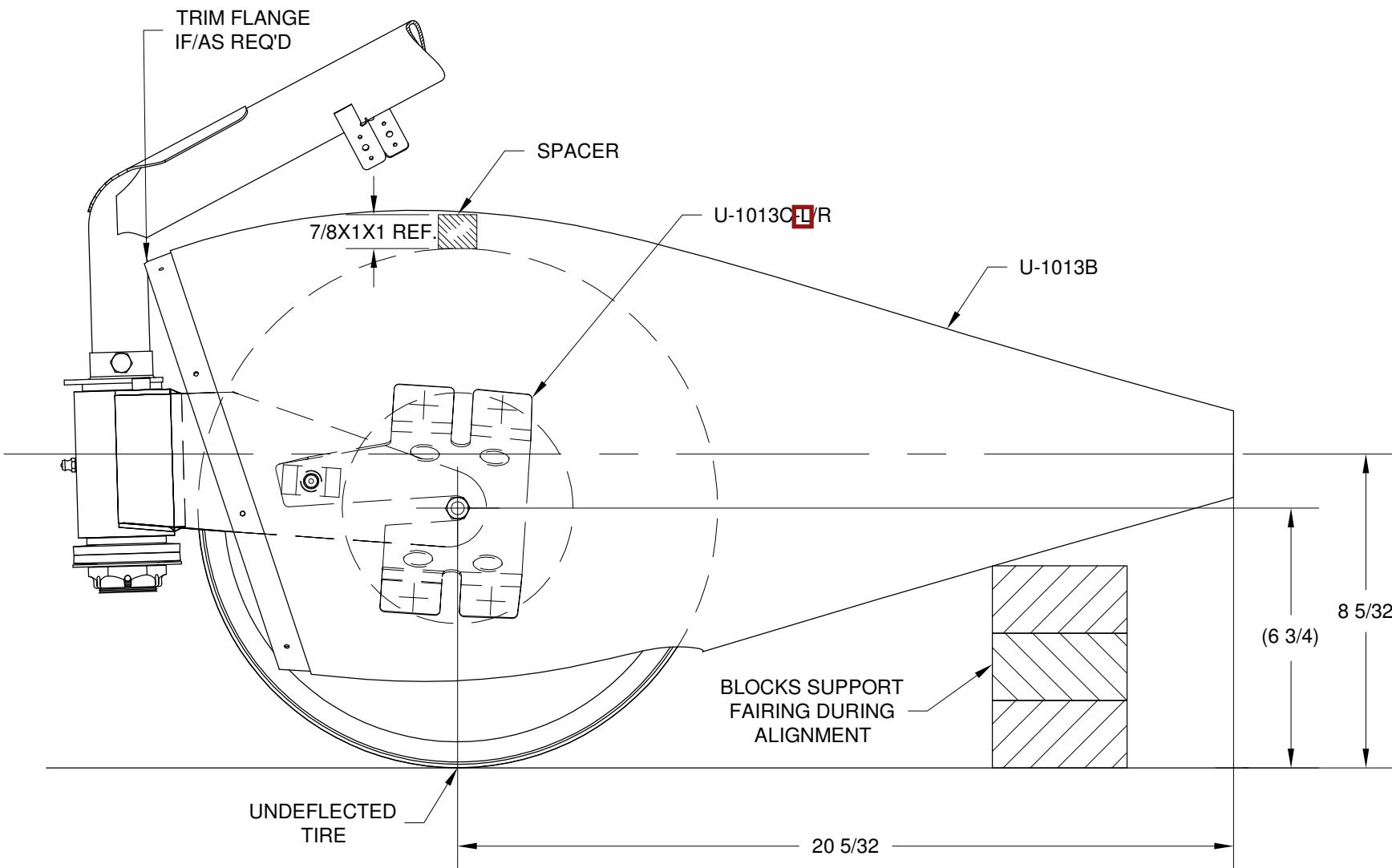
**FIGURE 1: MARKING SCREW LOCATIONS**

Step 2: Tape the spacer to the top of the tire as shown in Figure 2. Slide the U-1013C<sub>R</sub> Nose Wheel - Fairing Bracket onto the axle at the gap in the washer stack-up and then bolt it to the WD-1030 Nose Fork using the hardware shown. **NOTE: Omit the two washers until the access hole is drilled.** Slide the U-1013B Wheel Fairing Rear into place. Slide the U-1013C<sub>L</sub> Nose Wheel - Fairing Bracket into place between the wheel fairing rear and the nose fork bolting it to the nose fork as per the callouts.



**FIGURE 2: ATTACHING THE BRACKETS AND THE WHEEL FAIRING**

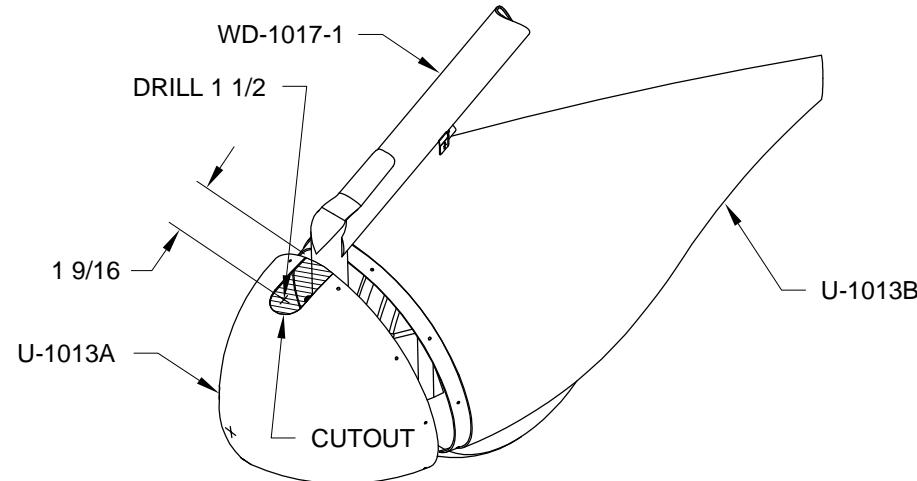
Step 3: Support the aft end of the U-1013B Wheel Fairing Rear using blocks as shown in Figure 3. Position the wheel fairing rear on the U-1013C<sub>L/R</sub> Nose Wheel - Fairing Brackets using the dimensions given. Bend the nose wheel - fairing brackets as required to fit to the inside surface of the wheel fairing rear.



**FIGURE 3: ALIGNING THE WHEEL FAIRING REAR**

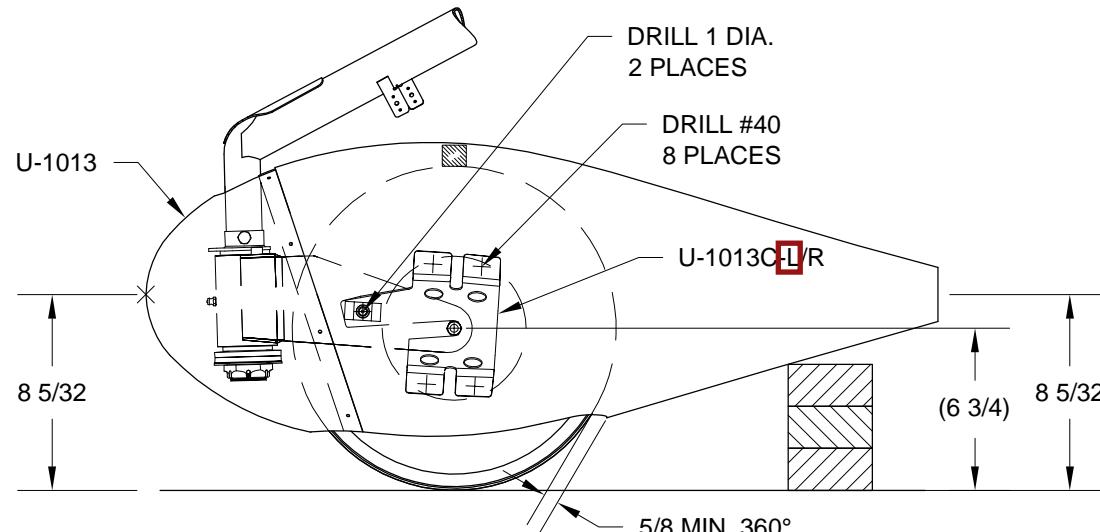


Step 1: Measure forward from the aft edge of the U-1013A Wheel Fairing Front the distance shown in Figure 1. Cut the hole with a 1 1/2 Dia. hole saw aligning the hole with the center of the wheel fairing front. Saw forward from the aft edge of the wheel fairing front to meet the tangent points of the hole. Careful work will allow reuse of the piece to fill in the gap over the flange of the wheel fairing rear. Trial fit the wheel fairing front and sand to fit allowing 1/16-3/32 clearance between the cutout edges and the WD-1017-1 Nose Gear Leg Assembly. This slot will be visible so take the time required to do a good job. Cleco the wheel fairing front to the wheel fairing rear.



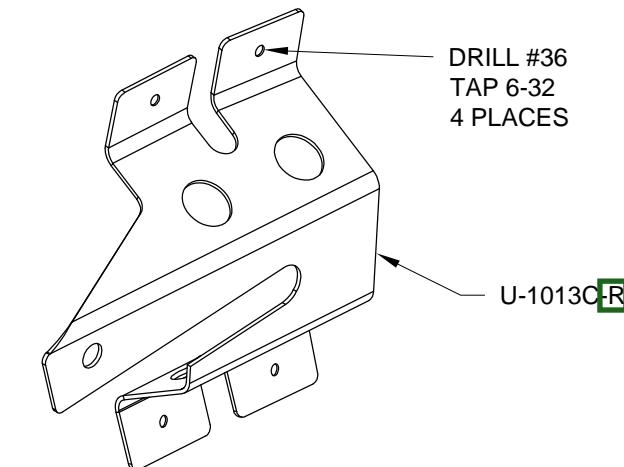
**FIGURE 1: CUTTING THE SLOT IN THE WHEEL FAIRING FRONT**

Step 2: Recheck the alignment of the U-1013 Wheel Fairing with the floor as shown in Figure 2. Sight through the U-1013B Wheel Fairing Rear and drill through the wheel fairing rear and the U-1013C-L/R Nose Wheel - Fairing Brackets. Drill the 1 in. Dia. access holes as per the callouts in Figure 2. Shim between the tire and the fairing if/as required to hold the fairing in place while drilling. Mark the wheel opening clearance as shown. Remove the fairings and trim the opening.



**FIGURE 2: ALIGNING FAIRING IN PITCH**

Step 3: Tap the U-1013C-L/R Nose Wheel - Fairing Brackets for 6-32 screws as shown in Figure 3. Reattach the wheel fairings to the main wheel fairing bracket with 6-32 screws and check their alignment.

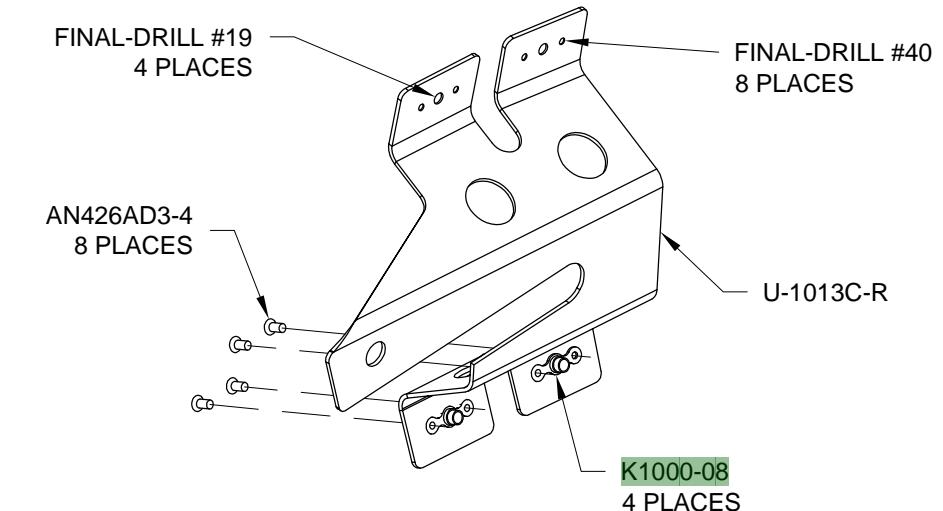


**FIGURE 3: DRILLING AND TAPPING NOSE WHEEL - FAIRING BRACKETS**

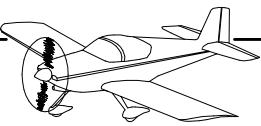
Step 4: Follow the procedures on Page 48-6 Step 5 for applying epoxy to the inside of the fairings.

Step 5: When cured remove the U-1013A Wheel Fairing Front and U-1013B Wheel Fairing Rear. Remove the U-1013C-L/R Nose Wheel - Fairing Brackets.

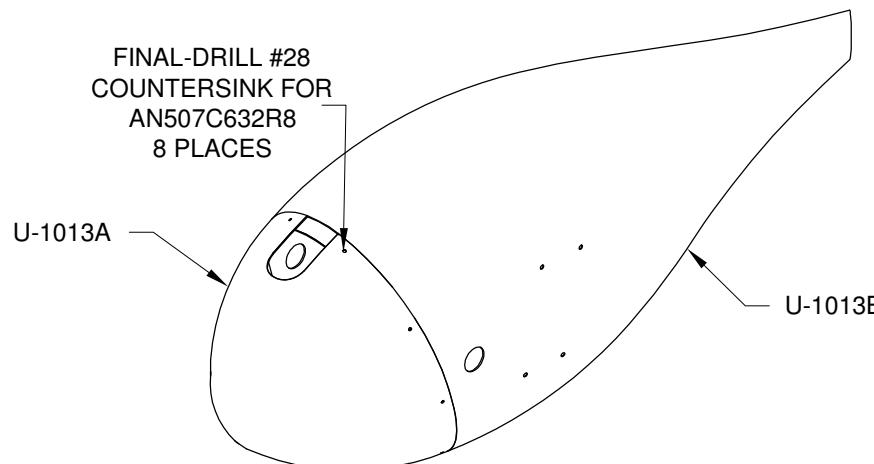
Step 6: Final-Drill the U-1013C-L/R Nose Wheel - Fairing Brackets for nutplate rivets and screws as shown in Figure 4. Deburr and countersink the nutplate attach rivet holes for flush rivets. Prime the nose wheel - fairing brackets and attach the nutplates shown.



**FIGURE 4: ATTACHING NUTPLATES TO BRACKETS**

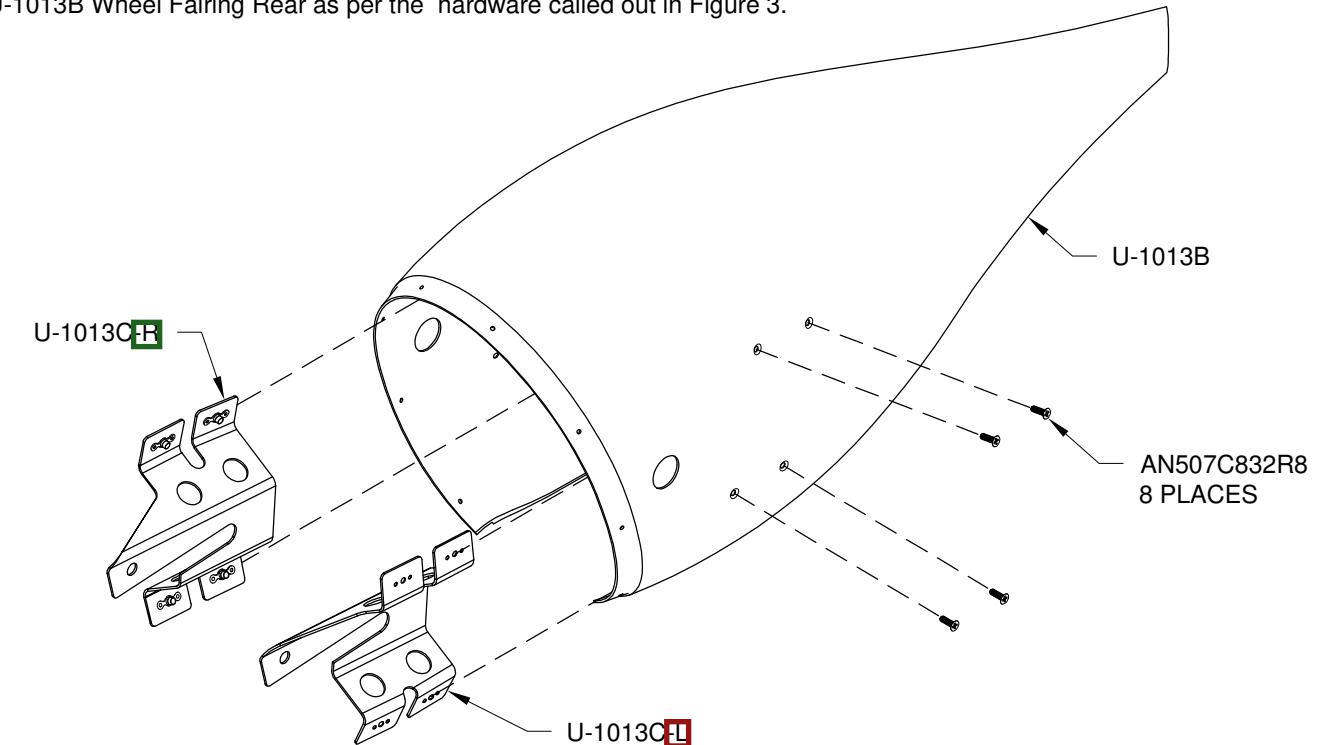


Step 1: Cleco the U-1013A Wheel Fairing Front and the U-1013B Wheel Fairing Rear together as shown in Figure 1. Refer to the callouts in Figures 1 & 2 and to the main wheel fairing instructions on Page 48-7, Steps 3 & 4 for the proper sequences.



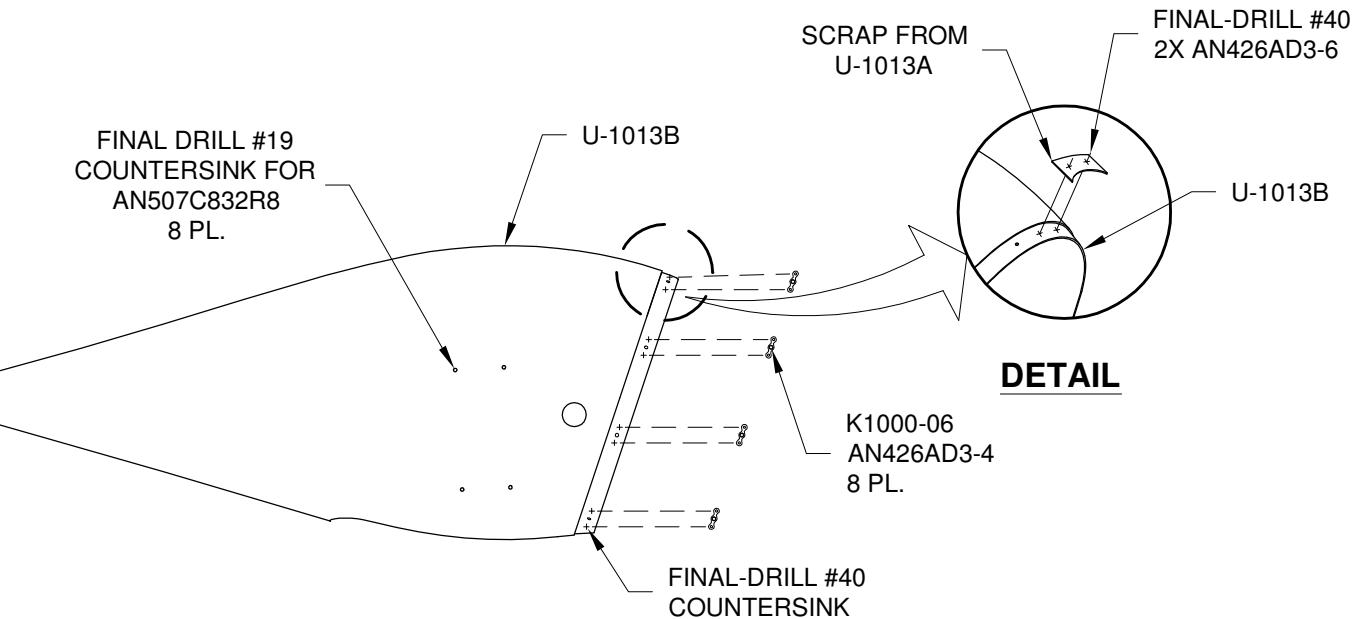
**FIGURE 1: FINAL DRILLING THE FAIRING AND COUNTERSINKING**

Step 3: Attach the U-1013C<sub>L/R</sub> Nose Wheel - Fairing Brackets to the U-1013B Wheel Fairing Rear as per the hardware called out in Figure 3.



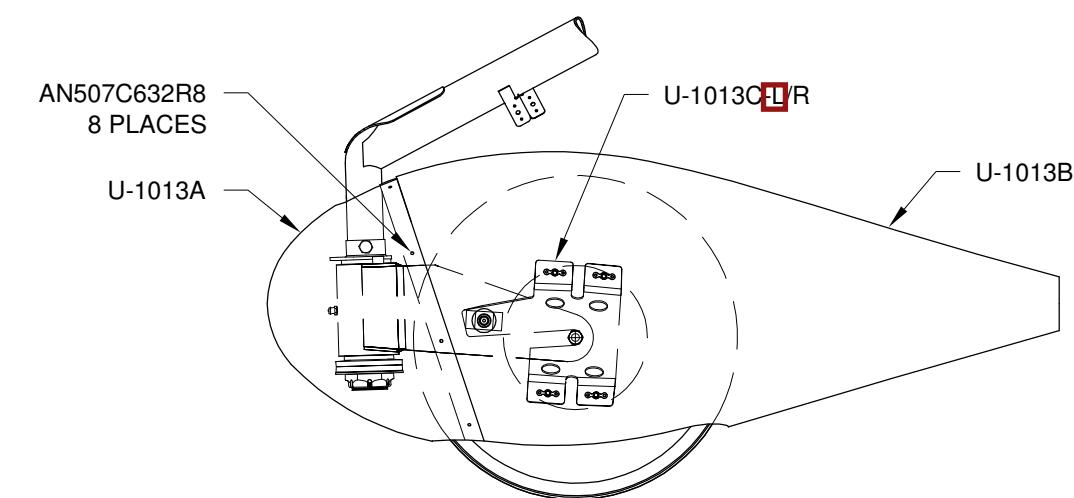
**FIGURE 3: ATTACHING NOSE WHEEL - FAIRING BRACKETS**

Step 2: Cut to fit the piece of fiberglass scrap created earlier to serve as a filler and position it on the wheel fairing rear directly behind the WD-1017 Nose Gear Leg. Final-Drill as shown in Figure 2, countersink and rivet it to the wheel fairing rear as shown in the Detail.



**FIGURE 2: RIVETING NUTPLATES TO THE WHEEL FAIRING REAR**

Step 4: Slide the U-1013B Wheel Fairing Rear onto the axle at the gap in the washer stack-up. Bolt it to the WD-1030 Nose Fork at the U-1013C<sub>L/R</sub> Nose Wheel - Fairing Brackets as shown in Figure 4 using the hardware called out on Page 48-17 Figure 2. Attach the U-1013A Wheel Fairing Front to the wheel fairing rear as shown.



**FIGURE 4: FINAL FAIRING ATTACHMENT**



**NOTE:** The nose gear leg fairing is a simple fiberglass wraparound fairing much like the main gear leg fairings and is installed in almost exactly the same way.

**NOTE:** If transparent, the nose gear leg fairing must remain transparent to accomplish the installation. Do not sand or prime its exterior until installation is complete.

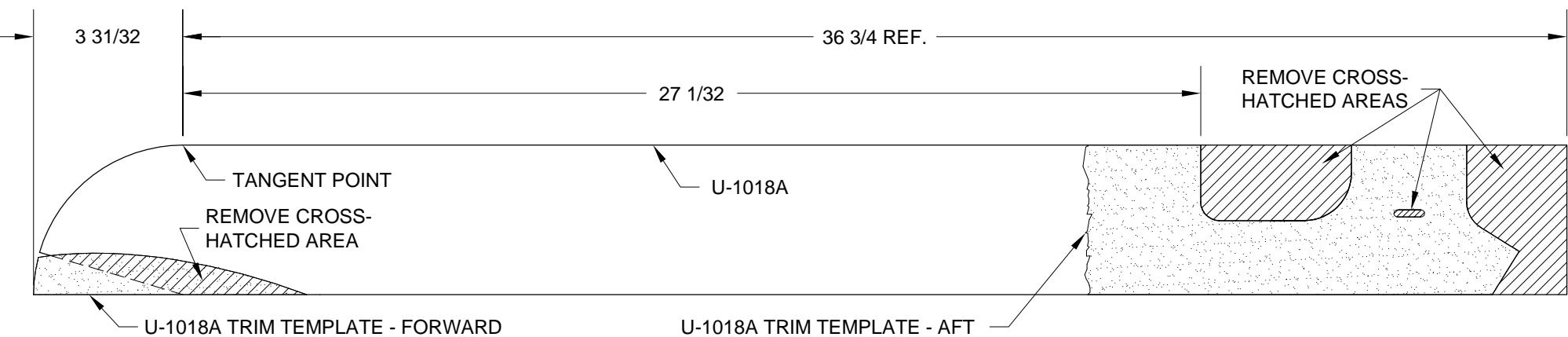
If the fairing is opaque, refer to Section 5.18 MATCH-DRILLING OPAQUE FIBERGLASS PARTS.

**Step 1:** Cut out the templates for the U-1018A Nose Gear Leg Fairing found at the end of this section.

**Step 2:** Drape the Aft Template over the U-1018A Nose Gear Leg Fairing and position it as per Figure 1. Double check that the measurement was taken to the cutout (shaded area) and **not** to the forward edge of the template. Transfer the outline to the part and trim as shown in Figure 1.

**Step 3:** Glue the Forward Template to a piece of stiff paper and position it onto the U-1018A Nose Gear Leg Fairing as per Figure 1. Transfer the outline to the part and trim accordingly. The template defines a conservative 'zero clearance' fit with the nose wheel fairing so the gear leg fairing should require additional trimming.

**Step 4:** Remove a 1 in. wide strip of fiberglass from the top center of the U-1018A Nose Gear Leg Fairing as shown in Figure 2. This will allow the aft part of the fairing to slip over and later attach to the WD-1017-1 Nose Gear Leg Assembly.

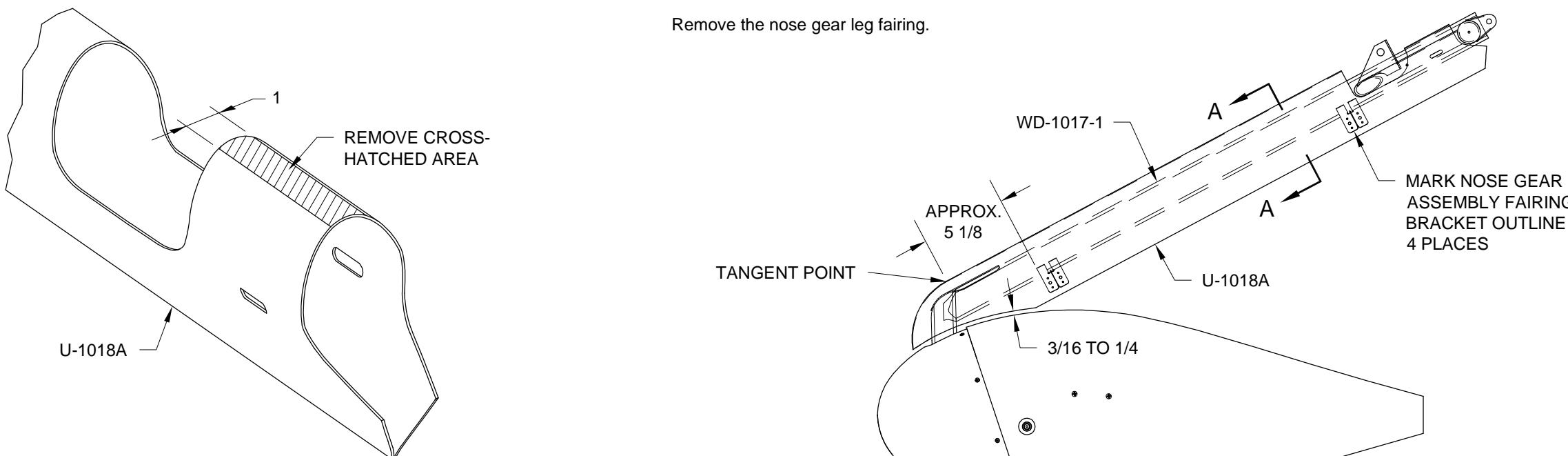


**FIGURE 1: TRIMMING THE NOSE GEAR LEG FAIRING**

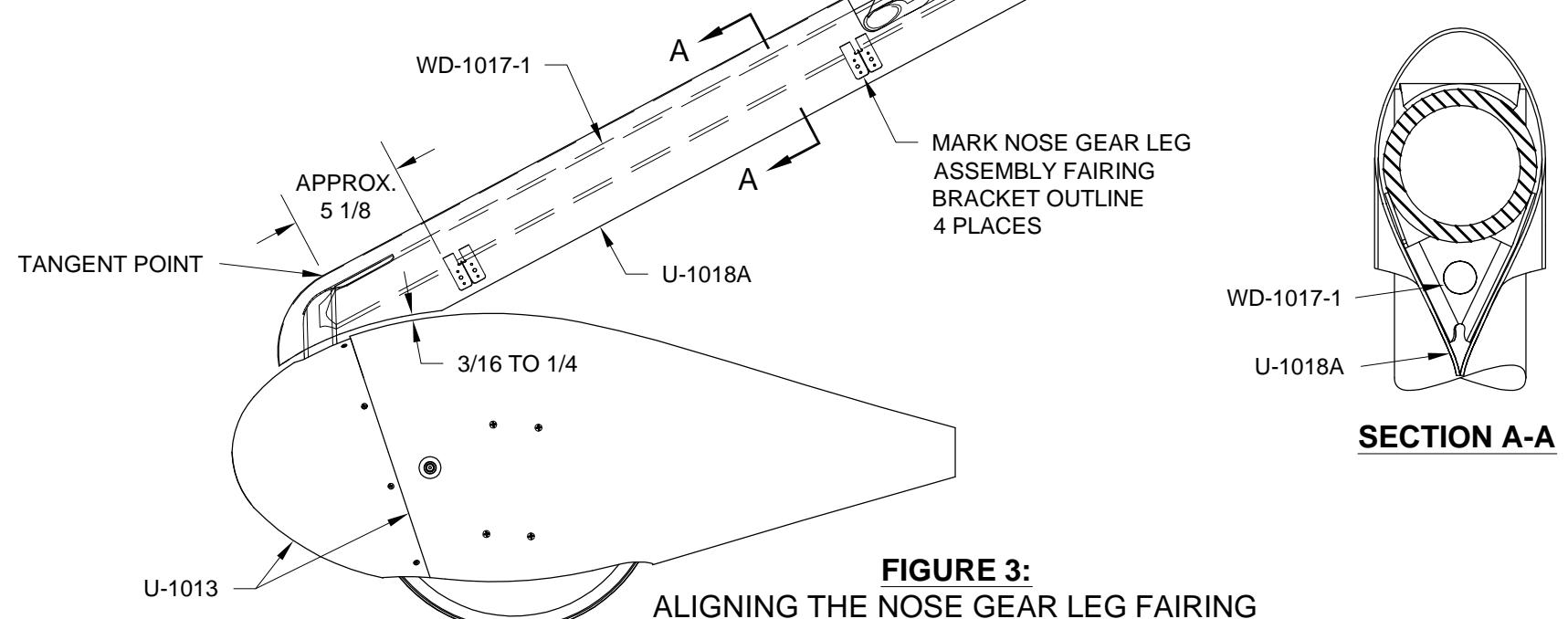
**Step 5:** With the U-1013 Wheel Fairing in place fit the U-1018A Nose Gear Leg Fairing to the WD-1017-1 Nose Gear Leg Assembly as shown in Figure 3. Align the gear leg fairing by sliding it fore and aft along the nose gear to find the best fit and by using the dimension given in Figure 3. Section A-A depicts the fairing nested onto the nose gear leg assembly. Trim the nose gear leg fairing where it interferes with the nose wheel fairing. Rotate the nose wheel from side to side to check for clearance.

**Step 6:** Mark the outline of the small WD-1017-1 Nose Gear Leg Assembly fairing brackets onto the U-1018A Nose Gear Leg Fairing by sighting through the fairing.

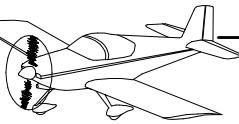
Remove the nose gear leg fairing.



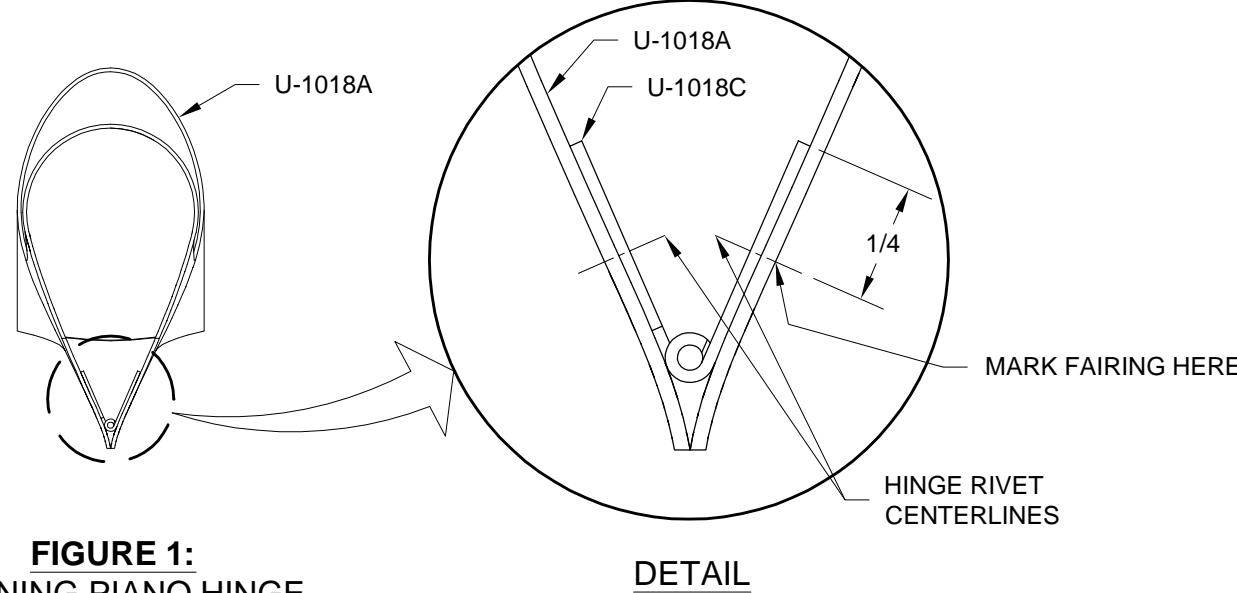
**FIGURE 2: MODIFYING THE NOSE GEAR LEG FAIRING**



**FIGURE 3:  
ALIGNING THE NOSE GEAR LEG FAIRING**



Step 1: Make the U-1018C Nose Gear Leg Hinge from "piano hinge .063." Draw a rivet centerline the full length of the outside of both halves of the nose gear leg hinge as per the dimension shown in Figure 1. Nest the hinge into the U-1018A Nose Gear Leg Fairing (referred to hereafter as "fairing") as shown allowing it to extend beyond both ends of the fairing. Transfer the centerline mark from the hinge to the fairing at the fairing ends where the hinge hangs out.



**FIGURE 1:**  
ALIGNING PIANO HINGE

Step 3: Insert the U-1018C Nose Gear Leg Hinge into the U-1018A Nose Gear Leg Fairing aligning the rivet centerline of the hinge with the holes in the fairing. Clamp it at each end. Use a new drill bit and high speed putting as little force on the hinge as possible to avoid pushing it away from the fairing while drilling. Match-Drill #40 the hinge using the #40 holes in the fairing as guides inserting clecos after drilling each hole.

Countersink the fairing to accept the rivets called out in Figure 2. Remove the hinge and deburr.

Cleco the hinge to the outside of the fairing and transfer the outline of the WD-1017-1 Nose Gear Leg assembly fairing brackets to the hinge. Remove and notch the hinge as shown in Figure 2. It is acceptable to omit the hinge altogether where it interferes with the nose gear leg assembly fairing brackets.

Remove the hinge pin from the hinge and cut the hinge halves to length. **Do not cut the hinge pin yet.**

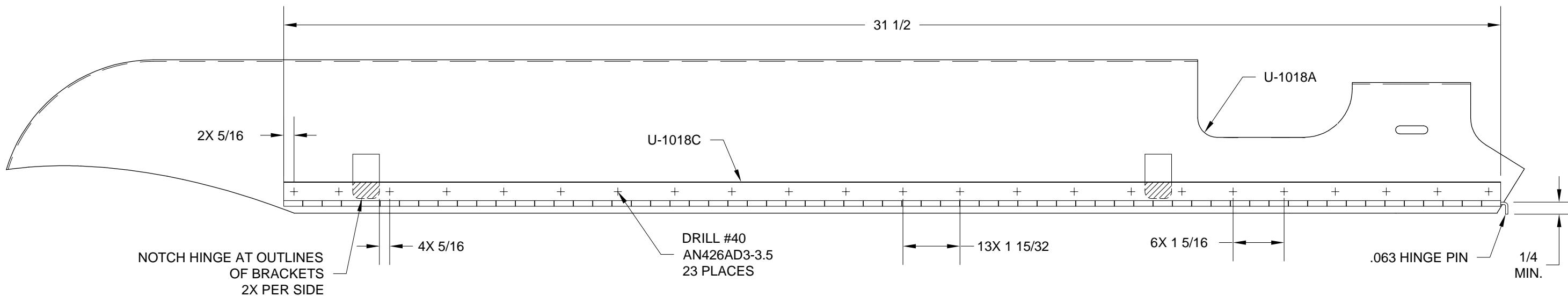
Reinstall the hinge and rivet it to the fairing as per Figure 2. Use the same riveting technique as for the main gear leg fairings, see Page 48-9 Step 3.

Step 4: Hereafter the part number "U-1018 Nose Gear Leg Fairing" shall include the U-1018A Nose Gear Leg Fairing and U-1018C Nose Gear Fairing Hinge.

To keep the hinge pin from sliding down the fairing bend a 1/4 in. by 90° leg at the top. Cut the opposite end to length and grind to an offset point (see Page 47-7).

Step 2: Remove the U-1018C Nose Gear Leg Hinge from inside the U-1018A Nose Gear Leg Fairing. Lay the fairing on its side and draw a rivet centerline the length of the fairing by connecting the two marks made in the previous step. Lay out the rivet pattern as depicted in Figure 2. Flip the fairing over and lay out the rivet pattern for the other side.

Drill #40 the fairing at the hinge attach rivet locations.

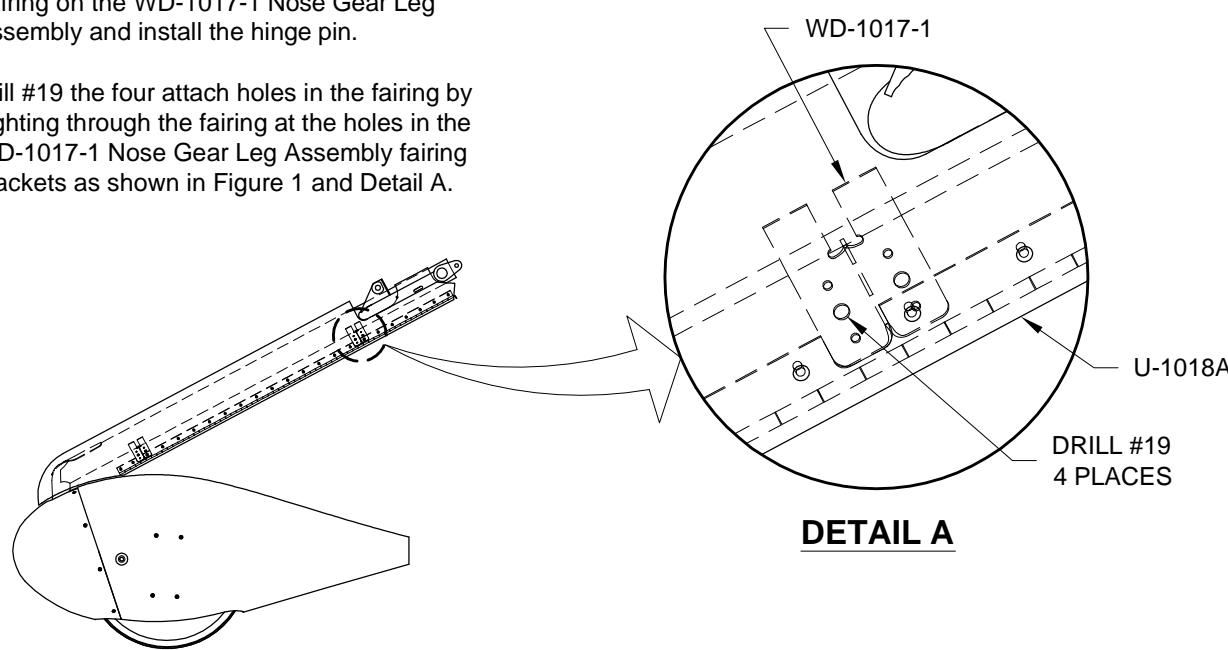


**FIGURE 2:** NOTCHING, DRILLING AND RIVETING THE PIANO HINGE  
(SOME PARTS OMITTED FOR CLARITY)



Step 1: Reinstall the U-1018A Nose Gear Leg Fairing on the WD-1017-1 Nose Gear Leg Assembly and install the hinge pin.

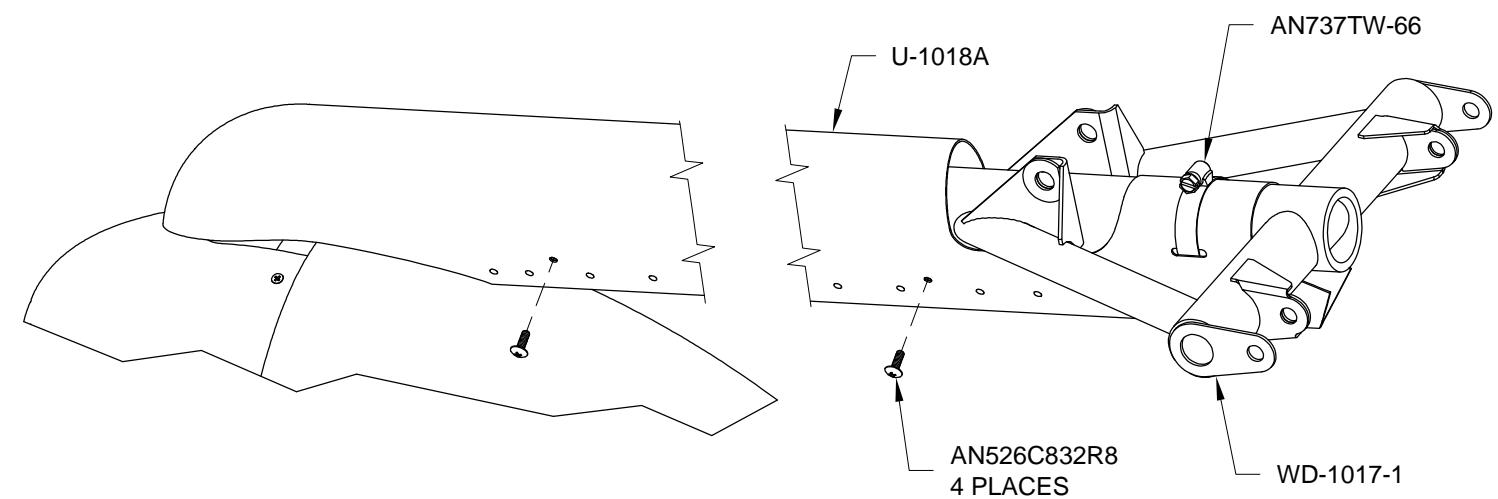
Drill #19 the four attach holes in the fairing by sighting through the fairing at the holes in the WD-1017-1 Nose Gear Leg Assembly fairing brackets as shown in Figure 1 and Detail A.



**FIGURE 1: DRILLING THE NOSE GEAR LEG FAIRING**

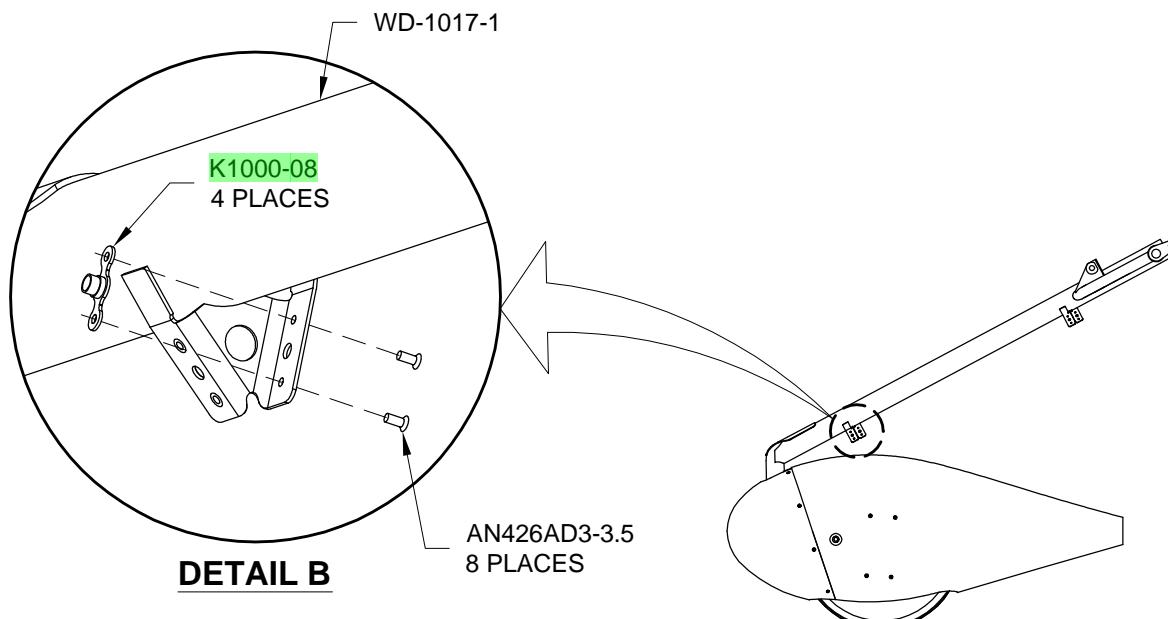
Step 3: Reinstall the U-1018A Nose Gear Leg Fairing on the WD-1017-1 Nose Gear Leg Assembly using the hardware shown in Figure 3.

Install and tighten the hose clamp at the aft end of the nose gear leg. If necessary soften the fiberglass tab with a heat gun in order to prevent it from cracking as the hose clamp is tightened.

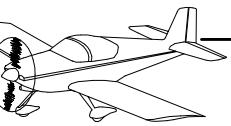


**FIGURE 3: ATTACHING NOSE GEAR LEG FAIRING TO NOSE GEAR LEG ASSEMBLY**

Step 2: Remove the U-1018A Nose Gear Leg Fairing. Final-Drill #40 the rivet holes and countersink them for the rivets called out in Figure 2. Rivet nutplates to the WD-1017-1 Nose Gear Leg Assembly as per Figure 2.



**FIGURE 2: RIVETING NUTPLATES TO THE NOSE GEAR LEG ASSEMBLY**



OUTLINE REPRESENTS NET FIT WITH U-1013C.  
PASTE TO FILE FOLDER OR CARD STOCK.

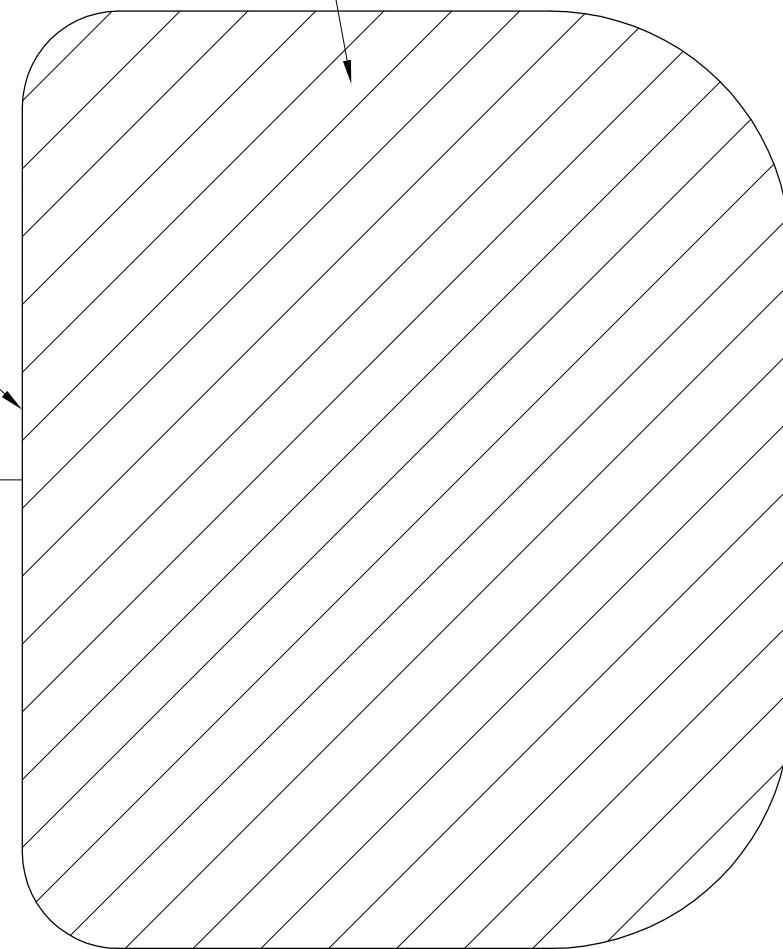
U-1018A TRIM TEMPLATE - FORWARD

10 9/16  
[268.29 mm]

DIMENSION  
REFERENCES  
THIS EDGE

REMOVE SHADED AREA

REMOVE SHADED AREA  
2 PLACES

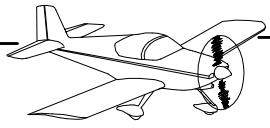


U-1018A TRIM TEMPLATE - AFT

TRIM HERE  
FOR IO-540.  
LEFT SIDE ONLY.

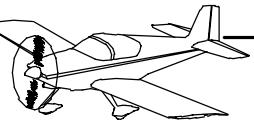
NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!

16  
[406.40 mm]



VAN'S AIRCRAFT, INC.

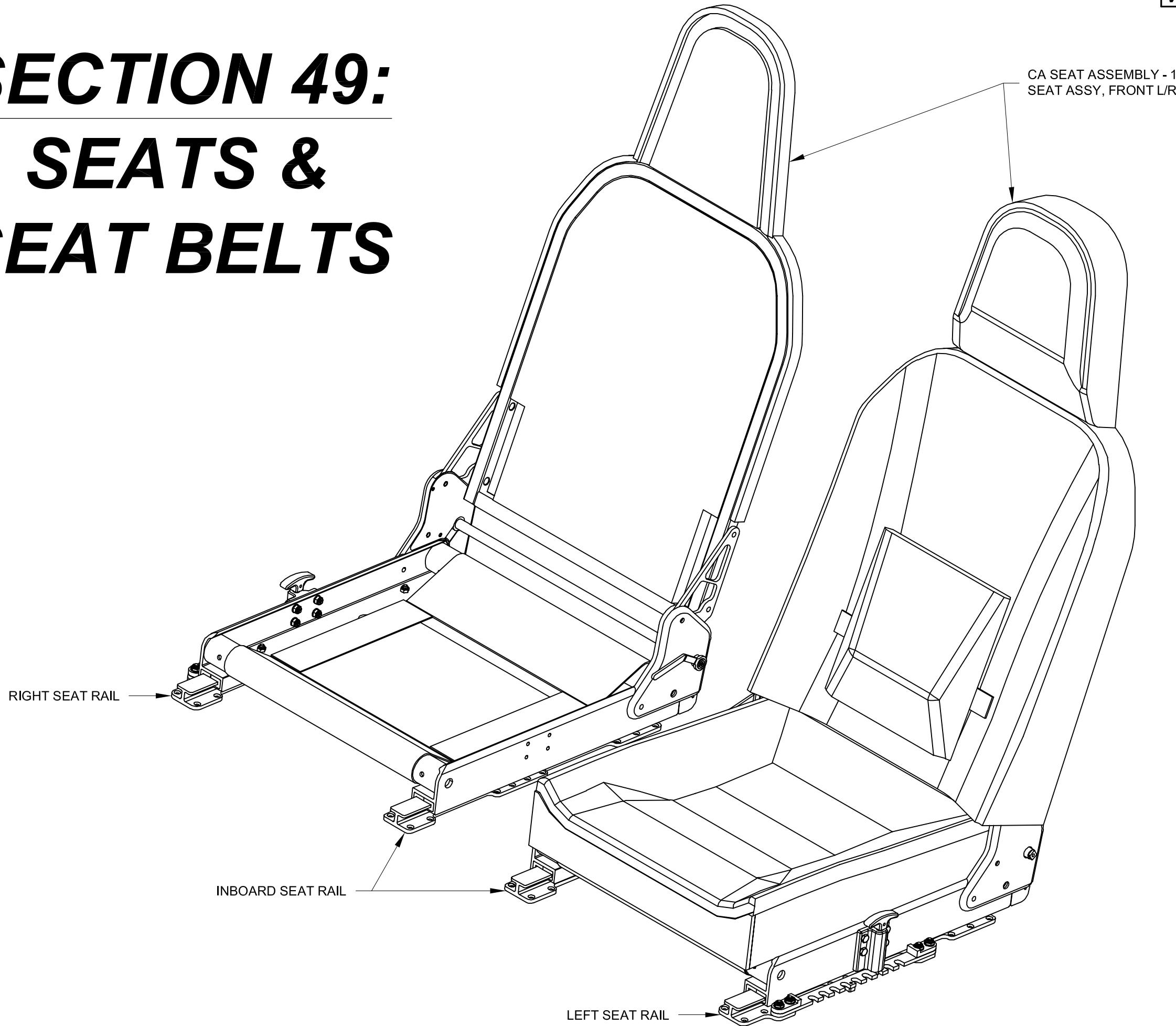
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# SECTION 49:

## SEATS &

## SEAT BELTS

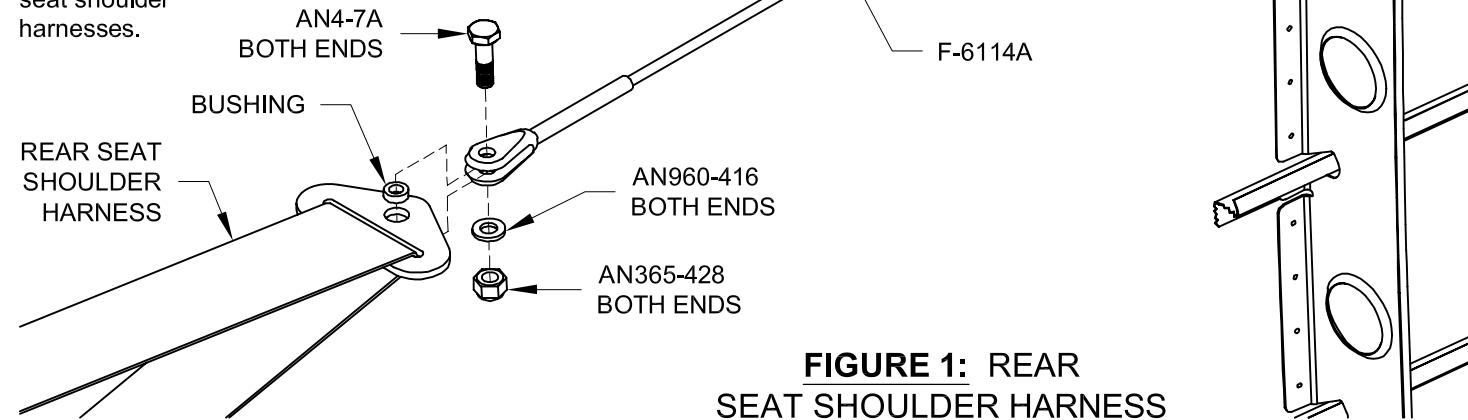




**NOTE:** All shoulder harness and seat belt end fittings require bushings. The outside diameter of the bushing depends on the type of shoulder harness or seat belt used; one type uses end fittings with a 5/16" bolt hole, another type uses end fittings with a 3/8" bolt hole. AT6-058X3/8 and AT6-058X5/16 tubing is provided in the kit from which bushings can be made that will fit either hole diameter. The inside diameter is drilled to the size of the bolt. Cut the bushings long enough to span the gap between the structure to which the end fittings are attached (the structure will clamp on the bushings enabling the end fittings to rotate freely).

**Step 1:** Attach one end of the F-6114A Shoulder Harness Cables to the F-636 Shoulder Harness Anchors using the hardware called-out in Figure 1. No bushings are needed at this end.

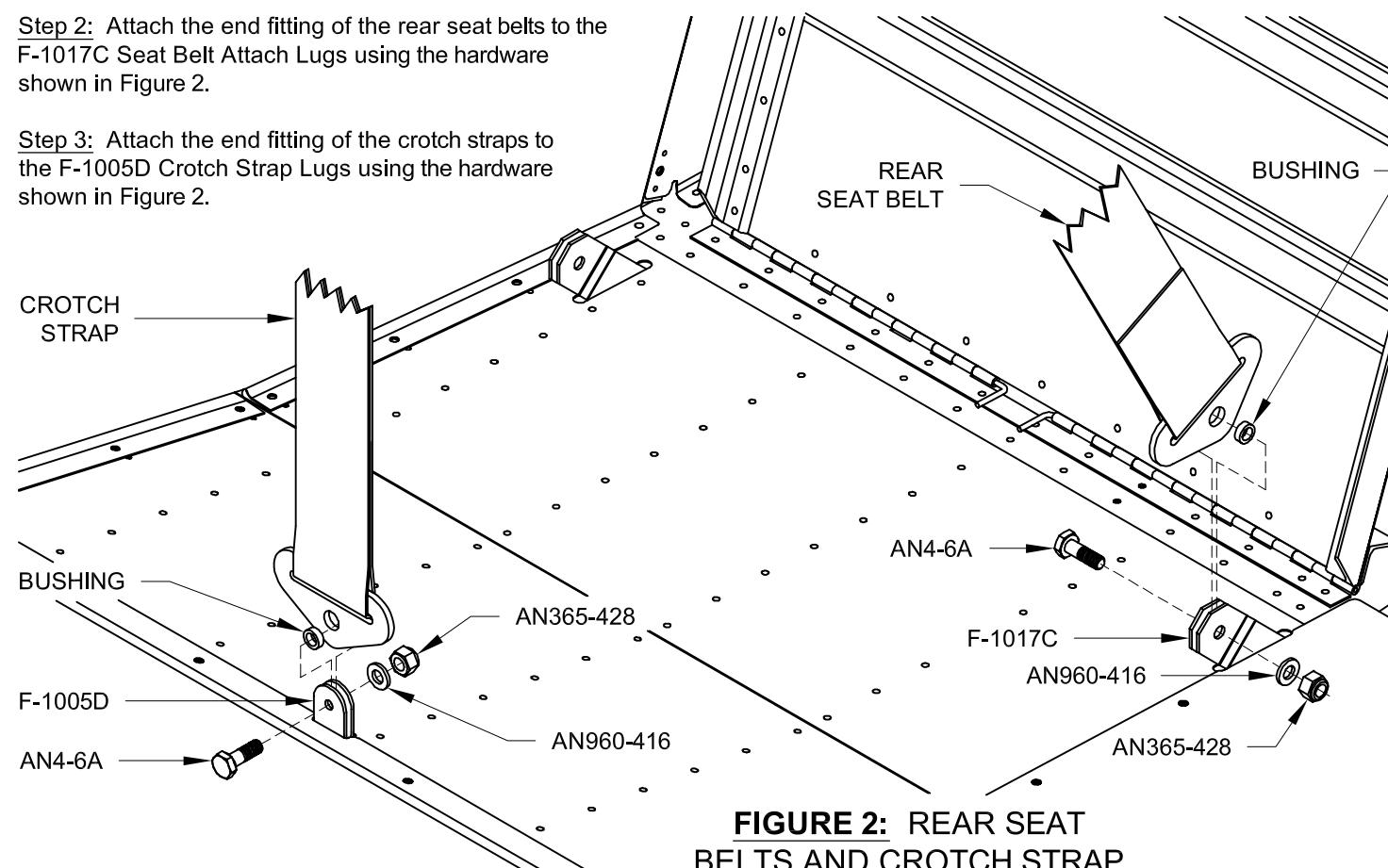
Run the shoulder harness cables through the notches in the F-1006E Upper Baggage Bulkhead Corrugation, and attach the ends to the rear seat shoulder harnesses.



**FIGURE 1: REAR SEAT SHOULDER HARNESS**

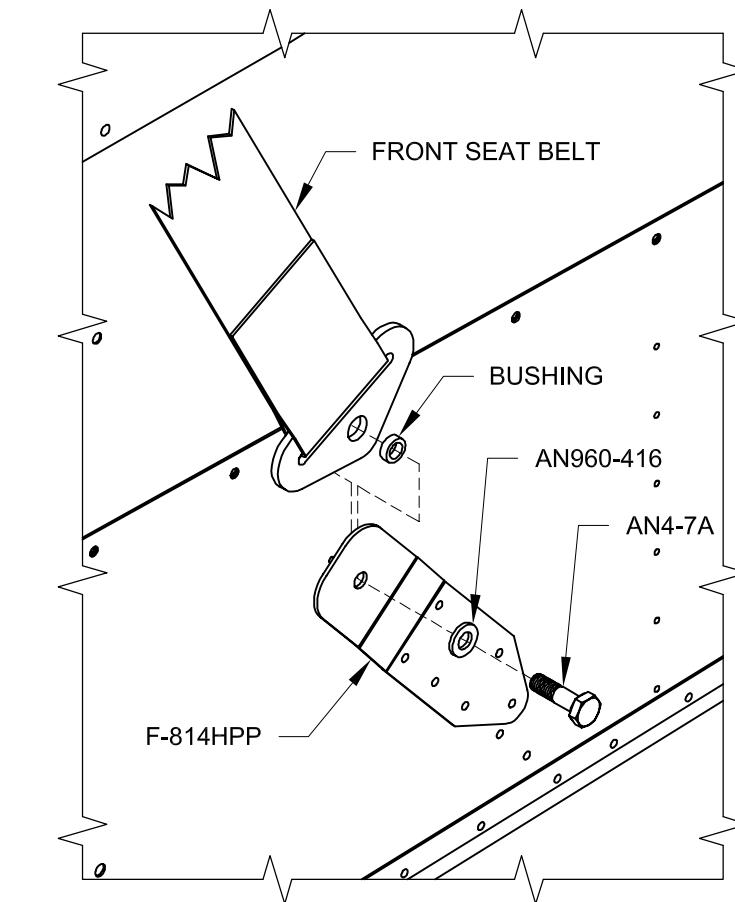
**Step 2:** Attach the end fitting of the rear seat belts to the F-1017C Seat Belt Attach Lugs using the hardware shown in Figure 2.

**Step 3:** Attach the end fitting of the crotch straps to the F-1005D Crotch Strap Lugs using the hardware shown in Figure 2.



**FIGURE 2: REAR SEAT BELTS AND CROTCH STRAP**

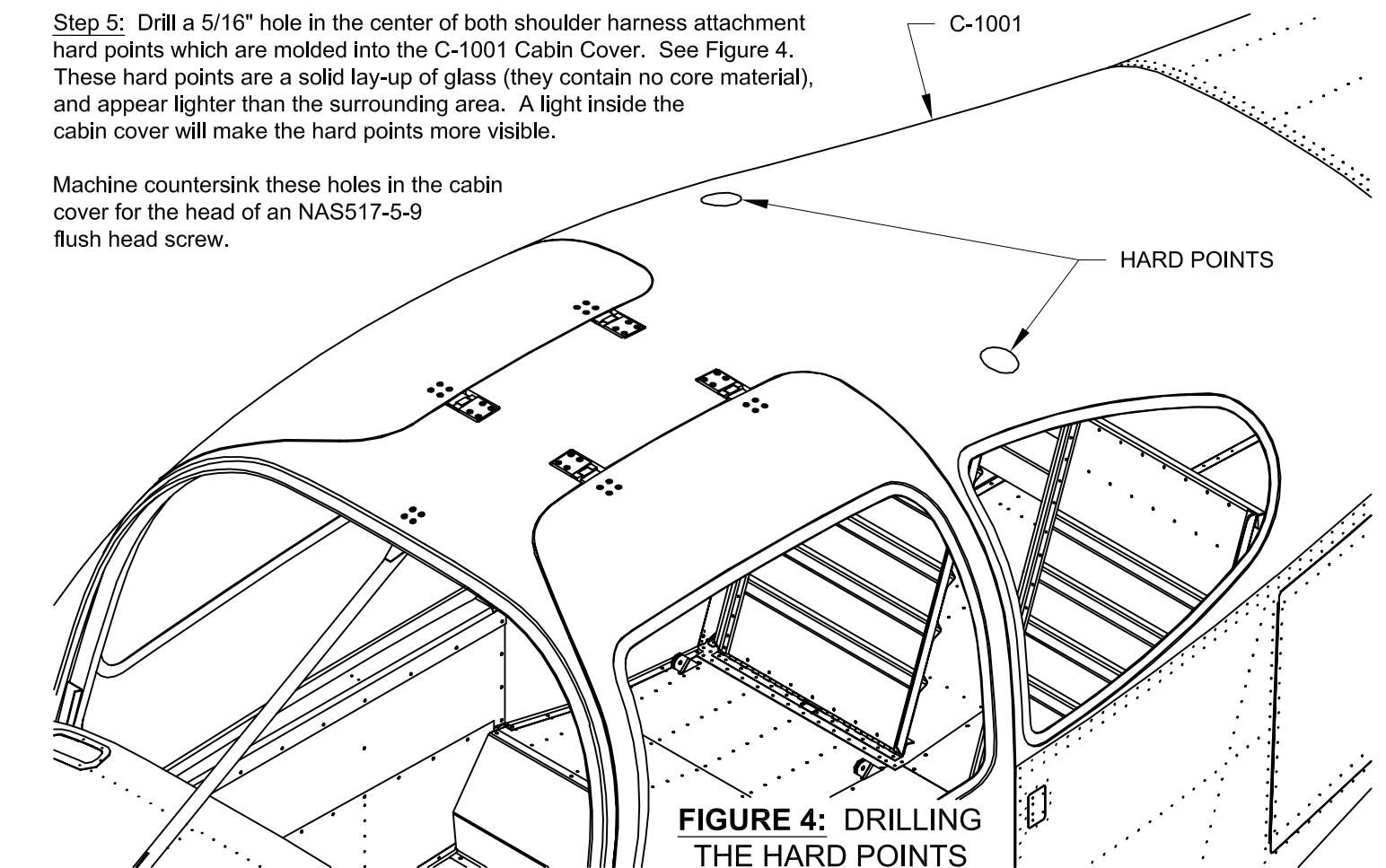
**Step 4:** Attach the end fitting of the front seat belts to the F-814HPP Fwd Seat Belt Anchors using the hardware shown in Figure 3.



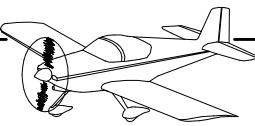
**FIGURE 3: FRONT SEAT BELTS**

**Step 5:** Drill a 5/16" hole in the center of both shoulder harness attachment hard points which are molded into the C-1001 Cabin Cover. See Figure 4. These hard points are a solid lay-up of glass (they contain no core material), and appear lighter than the surrounding area. A light inside the cabin cover will make the hard points more visible.

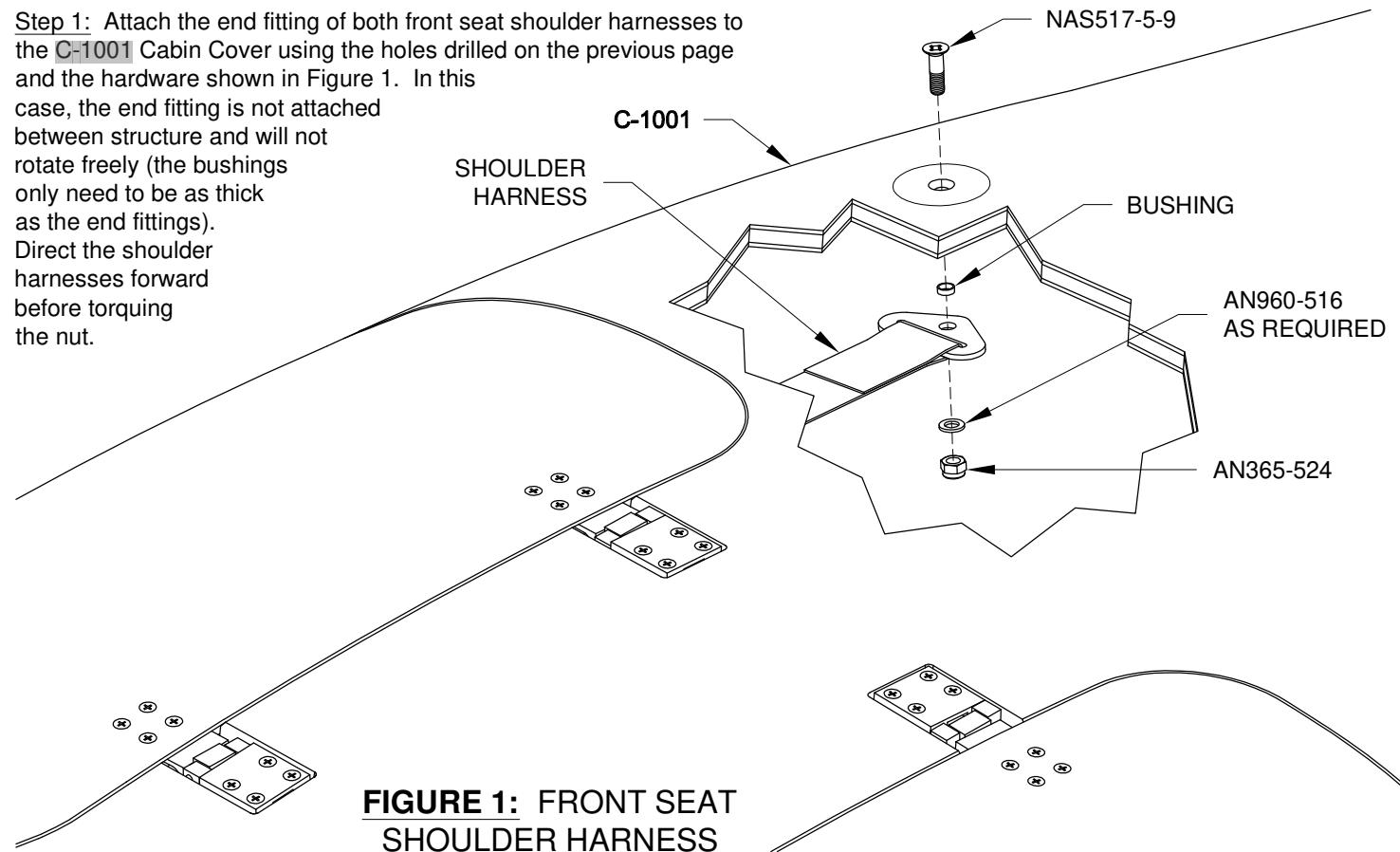
Machine countersink these holes in the cabin cover for the head of an NAS517-5-9 flush head screw.



**FIGURE 4: DRILLING THE HARD POINTS**

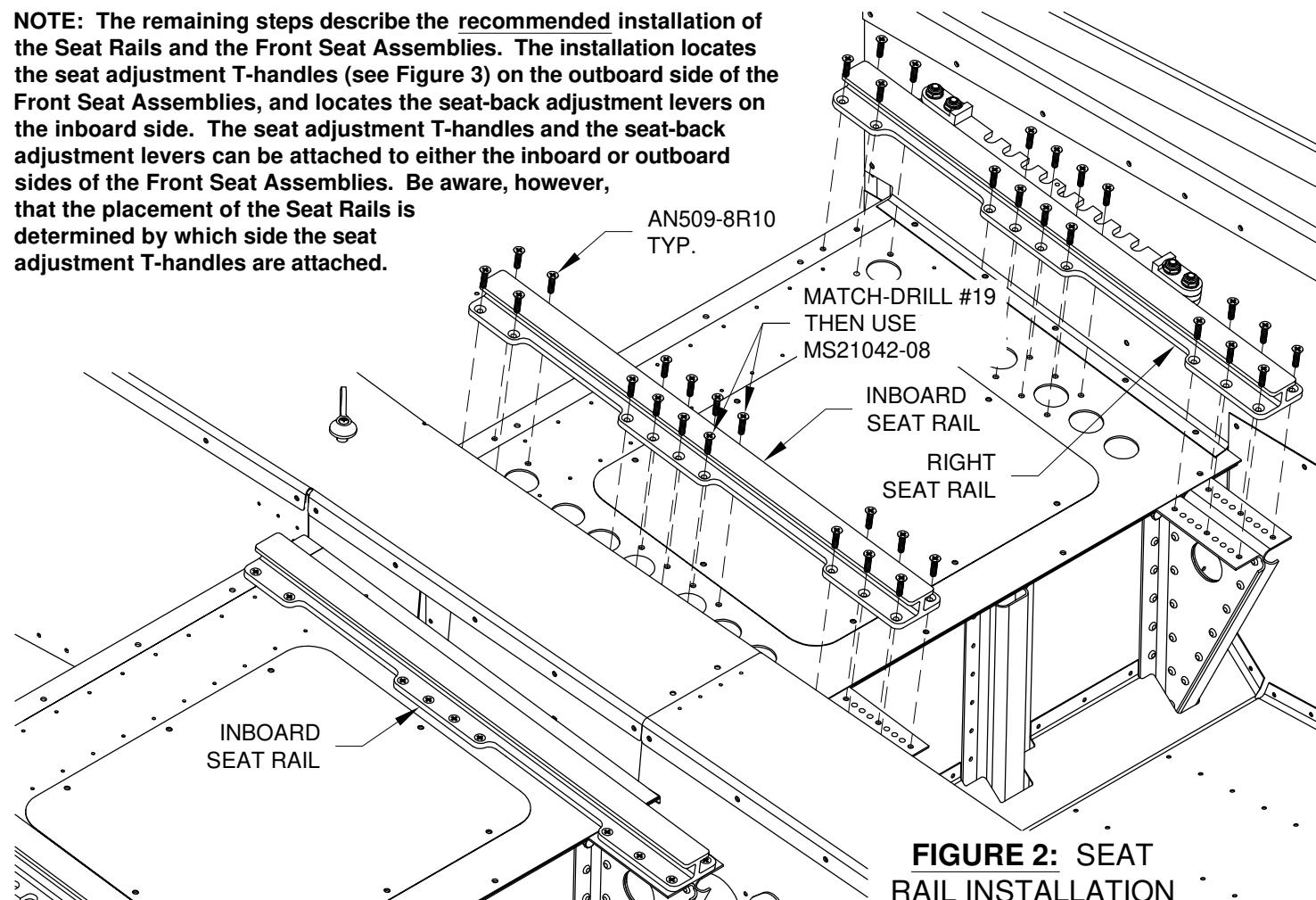


Step 1: Attach the end fitting of both front seat shoulder harnesses to the C-1001 Cabin Cover using the holes drilled on the previous page and the hardware shown in Figure 1. In this case, the end fitting is not attached between structure and will not rotate freely (the bushings only need to be as thick as the end fittings). Direct the shoulder harnesses forward before torquing the nut.



**FIGURE 1: FRONT SEAT SHOULDER HARNESS**

**NOTE:** The remaining steps describe the recommended installation of the Seat Rails and the Front Seat Assemblies. The installation locates the seat adjustment T-handles (see Figure 3) on the outboard side of the Front Seat Assemblies, and locates the seat-back adjustment levers on the inboard side. The seat adjustment T-handles and the seat-back adjustment levers can be attached to either the inboard or outboard sides of the Front Seat Assemblies. Be aware, however, that the placement of the Seat Rails is determined by which side the seat adjustment T-handles are attached.



**FIGURE 2: SEAT RAIL INSTALLATION**

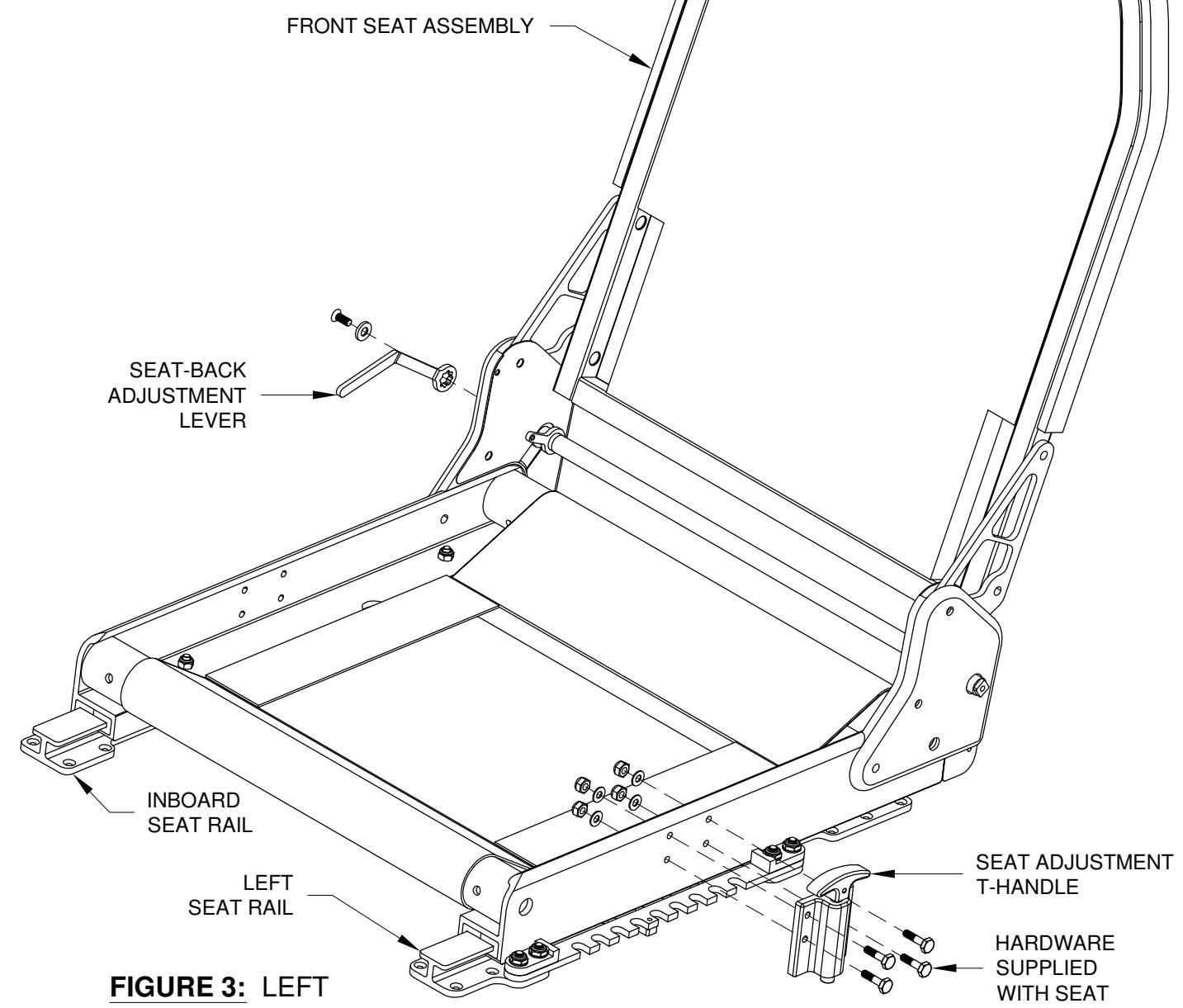
Step 2: Match-Drill #19 the F-01057-L & F-01057-R Mid Seat Rail Supports from the two indicated holes in the F-01067A-1 Seat Floors. See Figure 2. Clean out any drill chips/shavings.

Step 3: Install the Seat Rails using the hardware called-out in Figure 2.

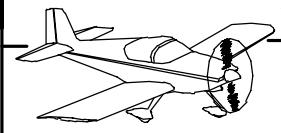
Step 4: Select the Front Seat Assembly which has the seat-back adjustment lever on the right side (or move the lever from the left side to the right) as shown in Figure 3. Remove the seat adjustment T-handle, then slide the Front Seat Assembly onto the Left Seat Rail and the corresponding Inboard Seat Rail (the F-1016E-L and F-1016E-R Flap Torque Tube Covers will have to be removed).

Step 5: Secure the seat adjustment T-handle to the left side of the Front Seat Assembly as shown in Figure 3.

Step 6: Repeat Steps 3 and 4 for the Front Seat Assembly on the right side of the aircraft. The right side is the mirror of the left.



**FIGURE 3: LEFT SEAT INSTALLATION**



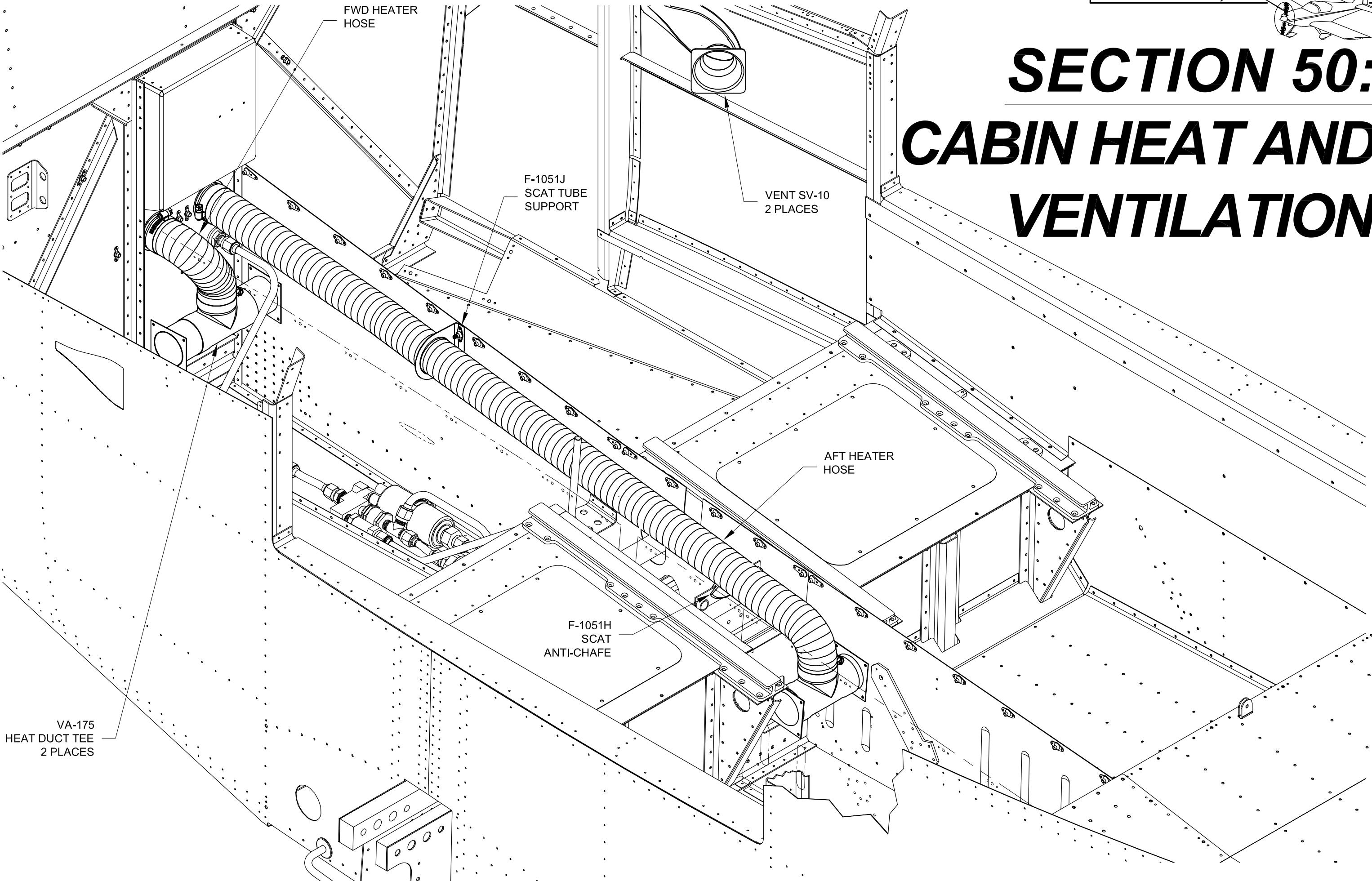
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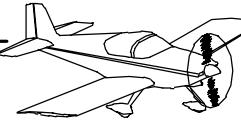


# SECTION 50:

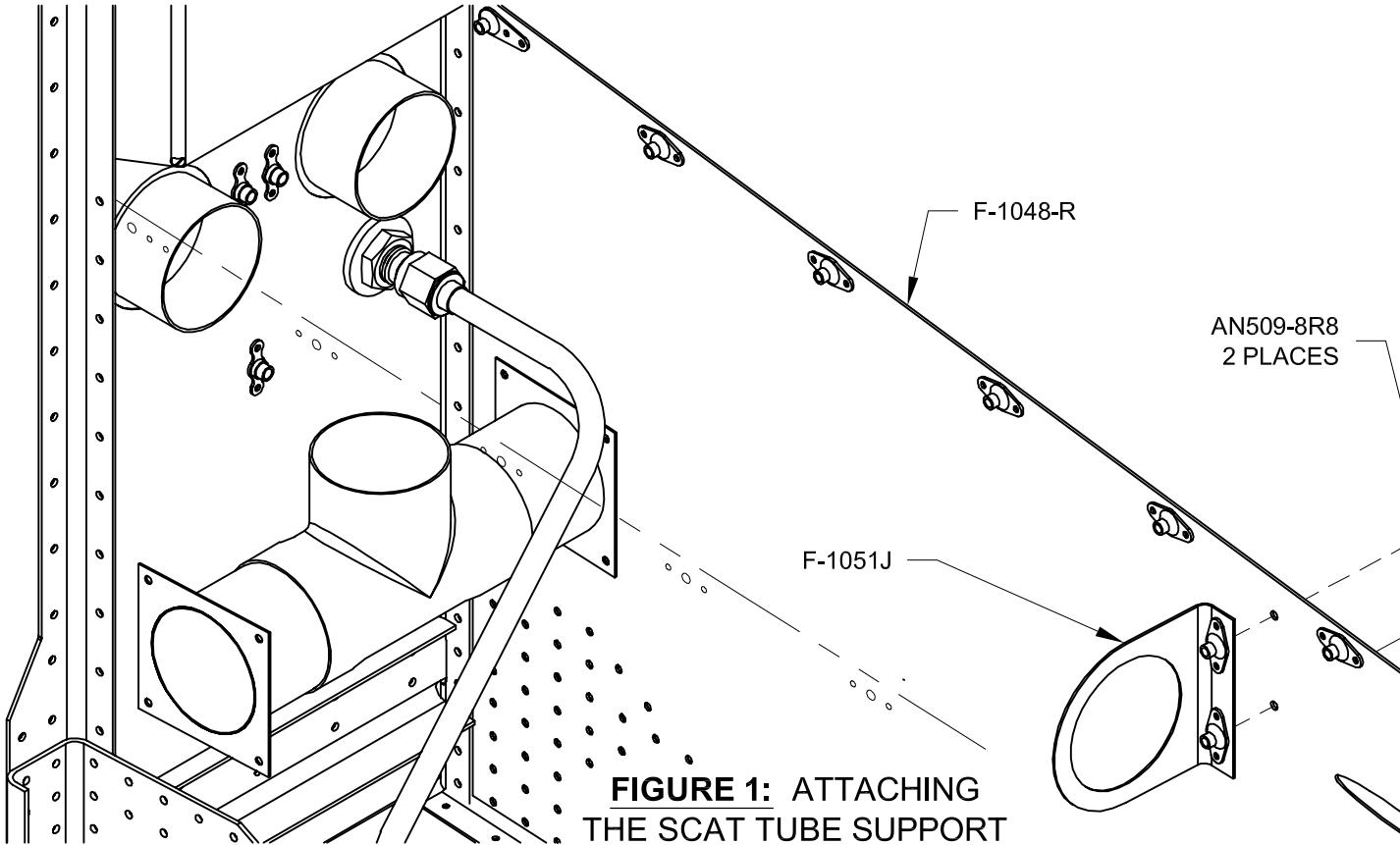
# CABIN HEAT AND

# VENTILATION



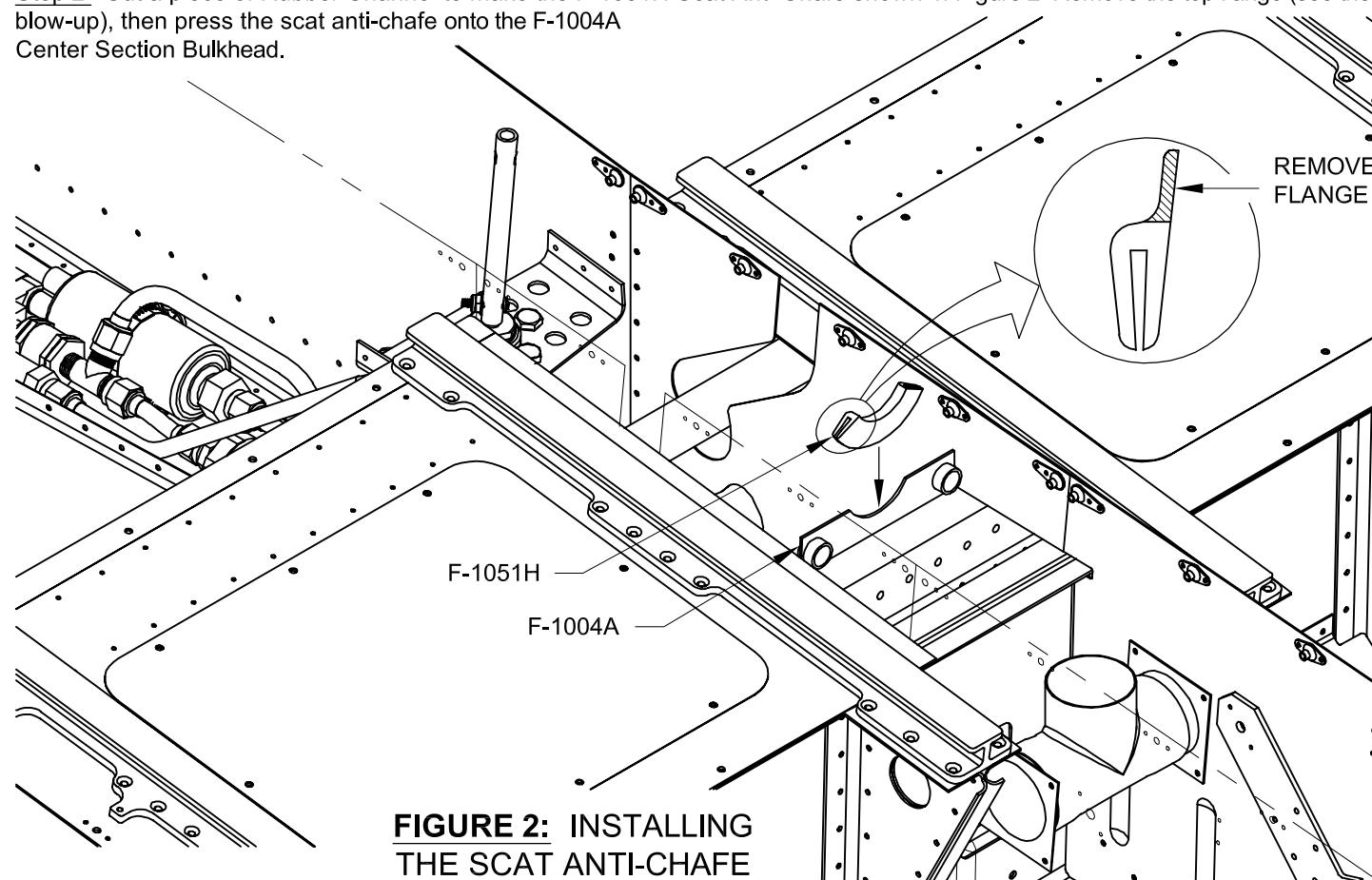


Step 1: Attach the F-1051J SCAT Tube Support to the F-1048-R Fwd Fuselage Rib using the hardware called-out in Figure 1.



**FIGURE 1: ATTACHING THE SCAT TUBE SUPPORT**

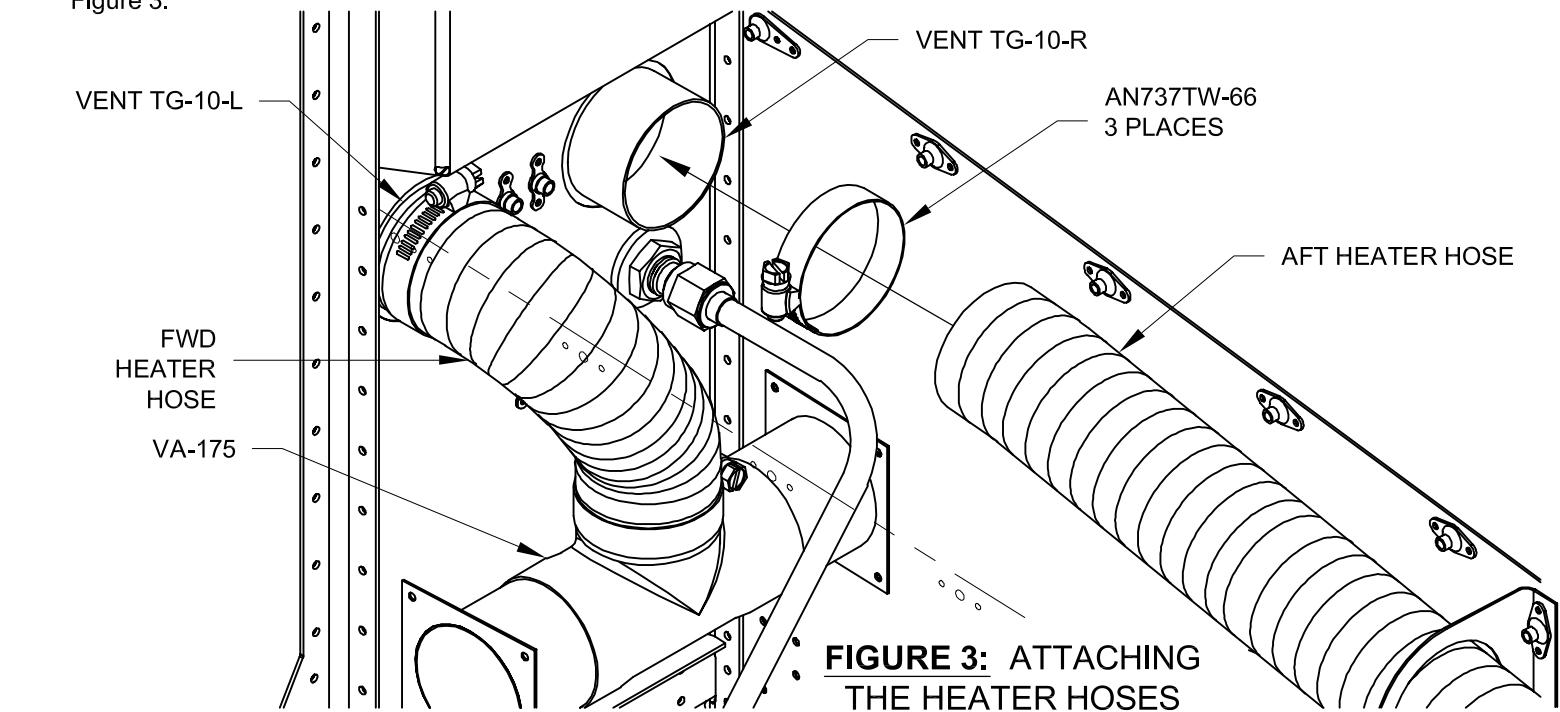
Step 2: Cut a piece of Rubber Channel to make the F-1051H Scat Anti-Chafe shown in Figure 2. Remove the top flange (see the blow-up), then press the scat anti-chafe onto the F-1004A Center Section Bulkhead.



**FIGURE 2: INSTALLING THE SCAT ANTI-CHAFE**

Step 3: Cut a 10 inch (approximately) length of SCAT tube to use as the Forward Heater Hose. Secure the forward heater hose to the VENT TG-10-L Cabin Heat Selector Box and the forward VA-175 Heat Duct Tee using the hose clamps called-out in Figure 3.

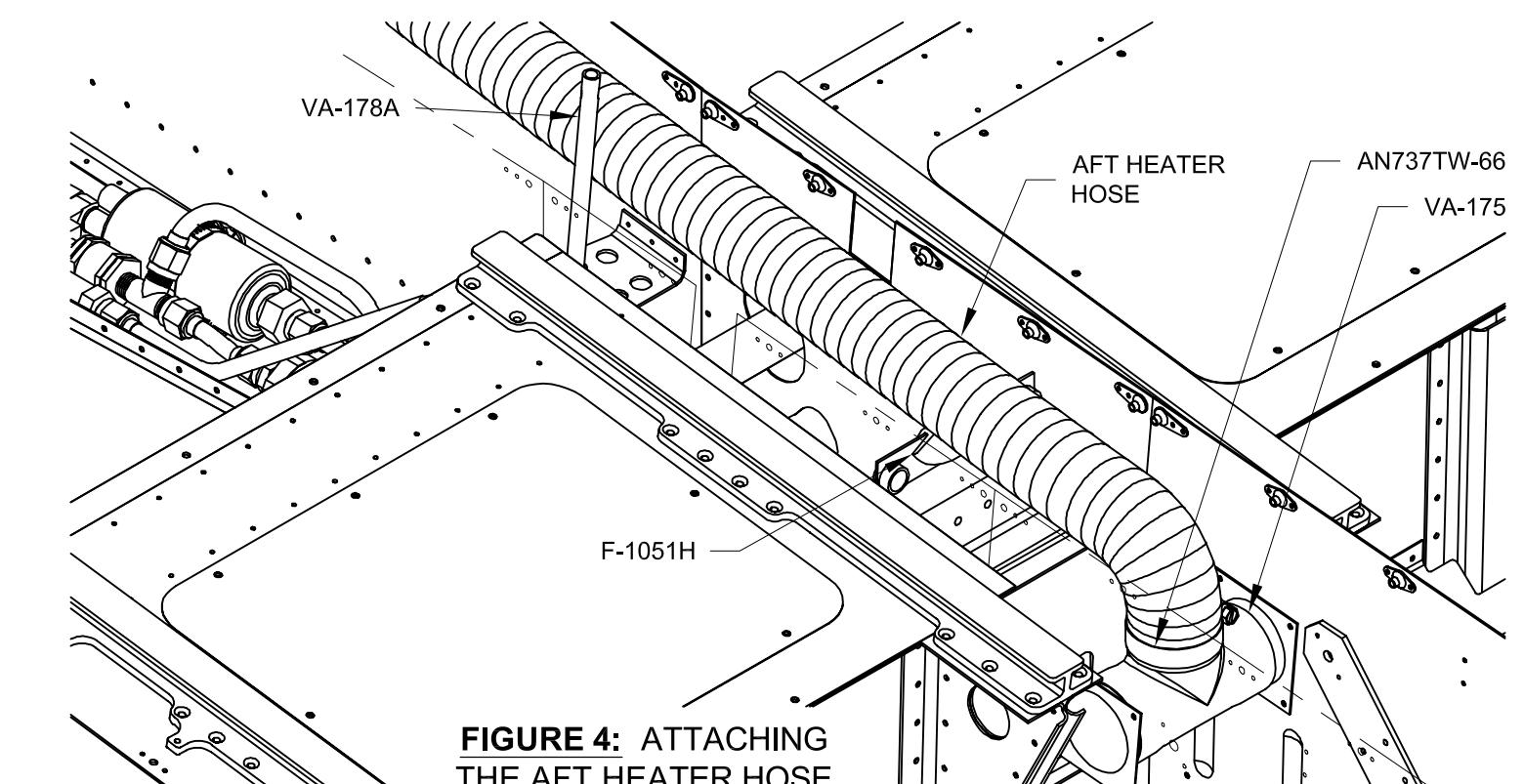
Step 4: Cut a 54 inch (approximately) length of SCAT tube to use as the Aft Heater Hose. Thread the aft heater hose through the F-1051J SCAT Tube Support, then secure it to the VENT TG-10-R Cabin Heat Selector Box using the hose clamp called-out in Figure 3.



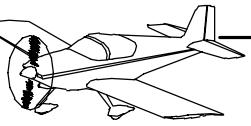
**FIGURE 3: ATTACHING THE HEATER HOSES**

Step 5: Direct the Aft Heater Hose over the F-1048C-1 Fuel Valve Bracket and to the right of the VA-178A Fuel Handle Shaft as shown in Figure 4. Direct the aft heater hose over the F-1051J SCAT Anti-Chafe, then secure the end to the aft VA-175 Heat Duct Tee using the hose clamp called-out in Figure 4.

Step 6: Apply high-temp RTV silicone around the Aft Heater Hose to protect it from the F-1051J SCAT Tube Support, and along the top to protect it from the F-1051A Fwd Tunnel Cover and Aft Tunnel Cover Assembly. Install the two tunnel covers as shown on Page 35-6, and the Fuel Valve Handle as shown on Page 37-7.

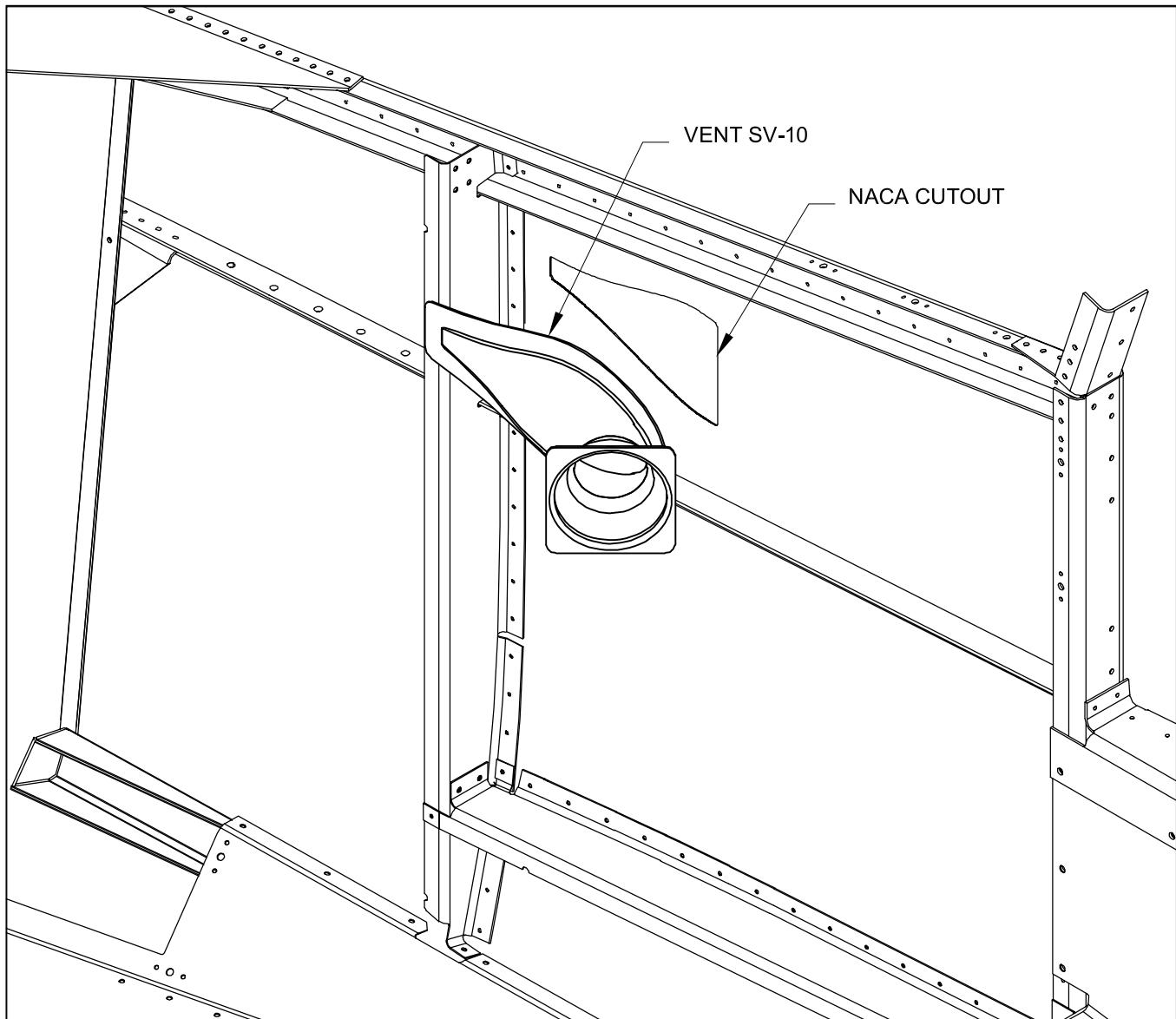


**FIGURE 4: ATTACHING THE AFT HEATER HOSE**



**NOTE:** This page describes the installation of a VENT SV-10 to the right side of the aircraft. The left installation is a mirror of the right.

**Step 1:** Mix and apply tank sealant to the flange around the VENT SV-10 Remote Vent. Center the vent around the NACA shaped cutout in the F-1069-R Forward Side Skin, then clamp the vent in place and let the tank sealant cure. See Figure 1.



**FIGURE 1: REMOTE VENT INSTALLATION**

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