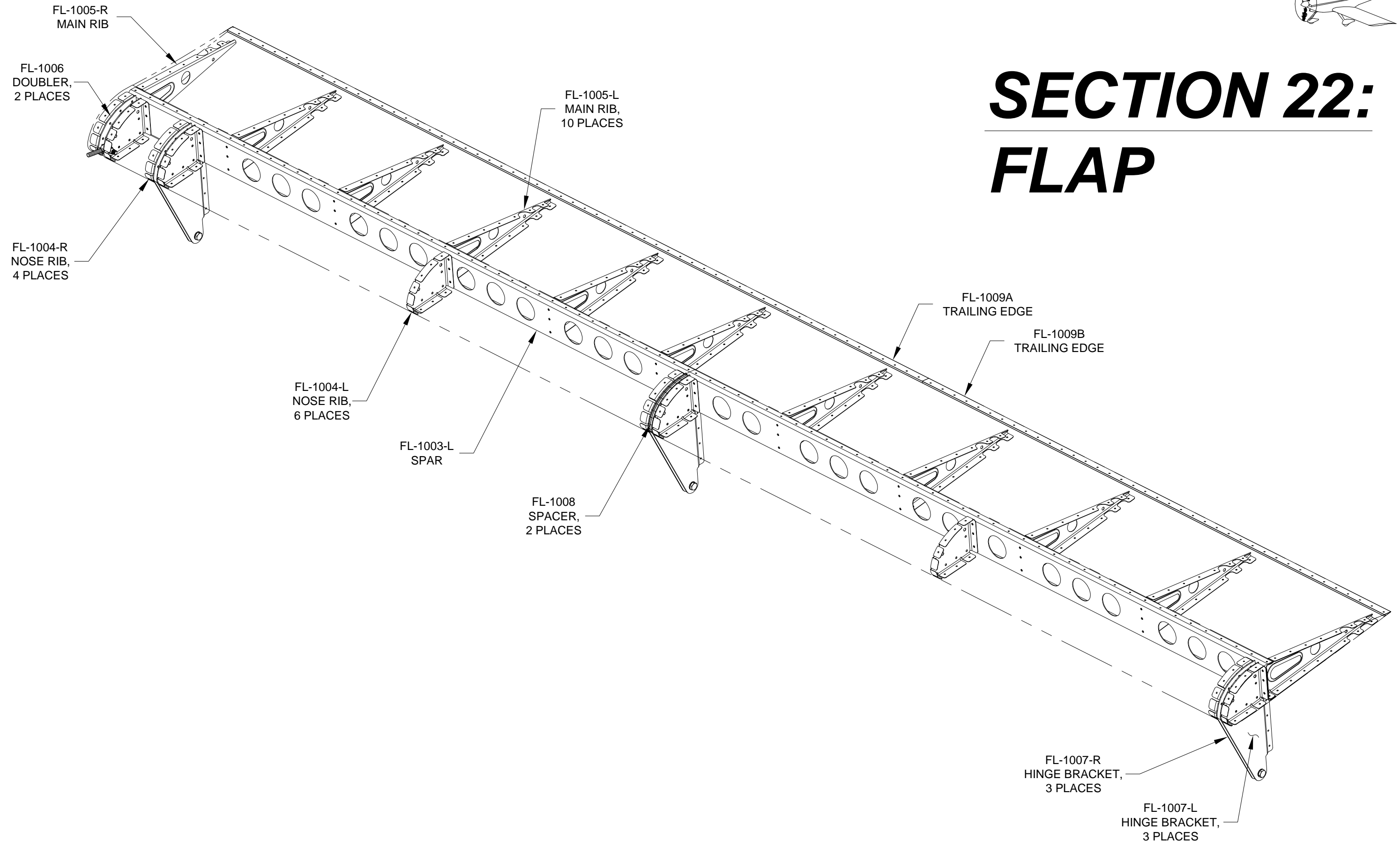
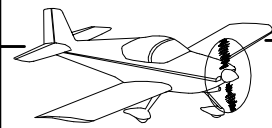


SECTION 22: FLAP





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.

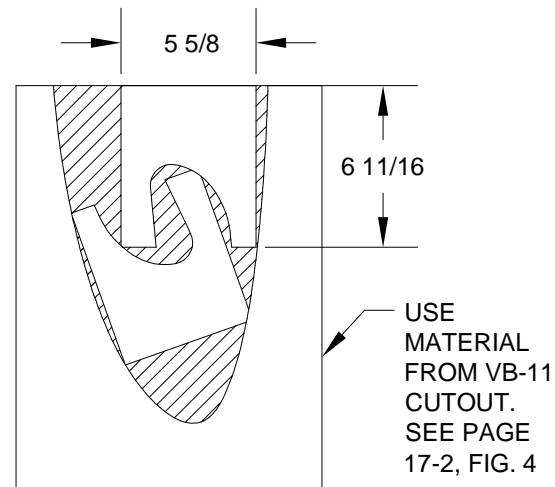


FIGURE 1: CRADLE MATERIAL

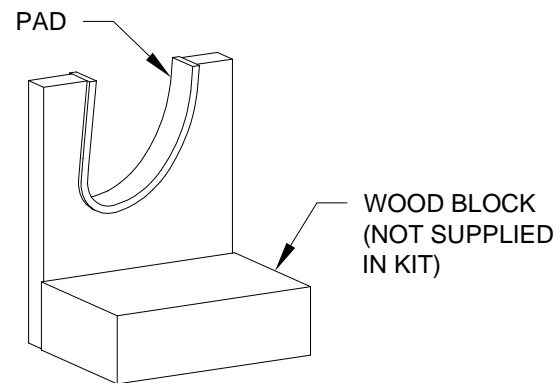


FIGURE 2: CRADLE

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.

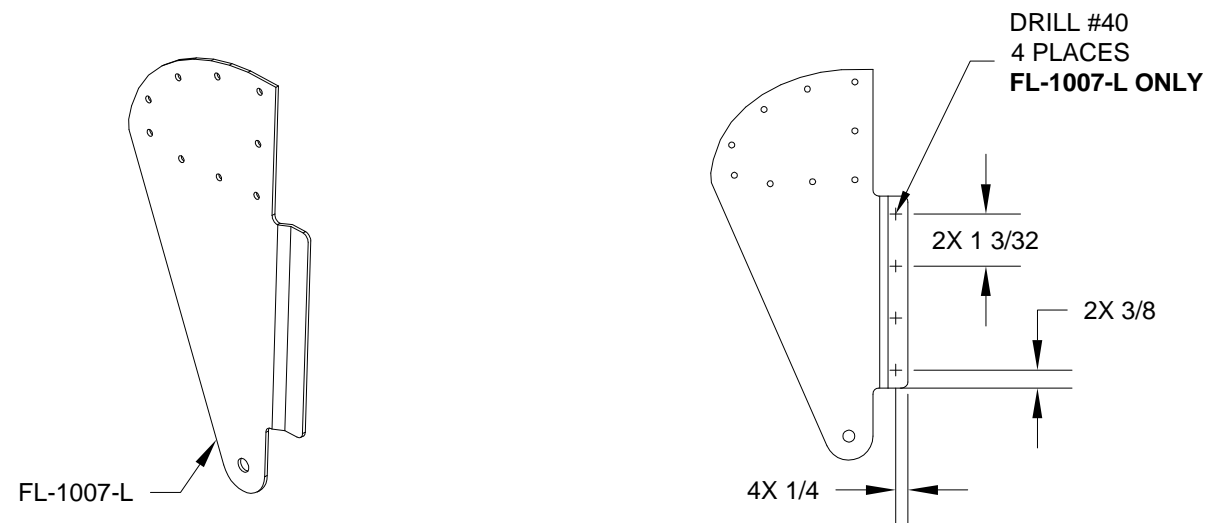


FIGURE 3: DRILL LEFT HINGE BRACKETS ONLY

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.

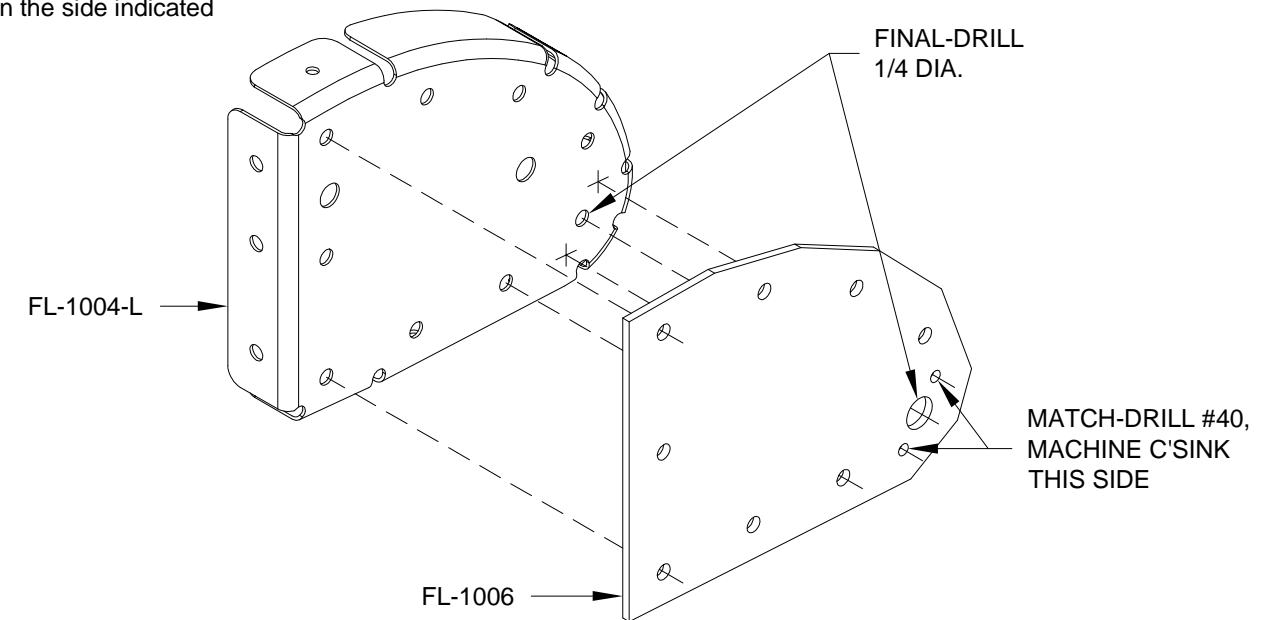


FIGURE 4: OUTBOARD ROD END RIB SUBASSEMBLY

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.

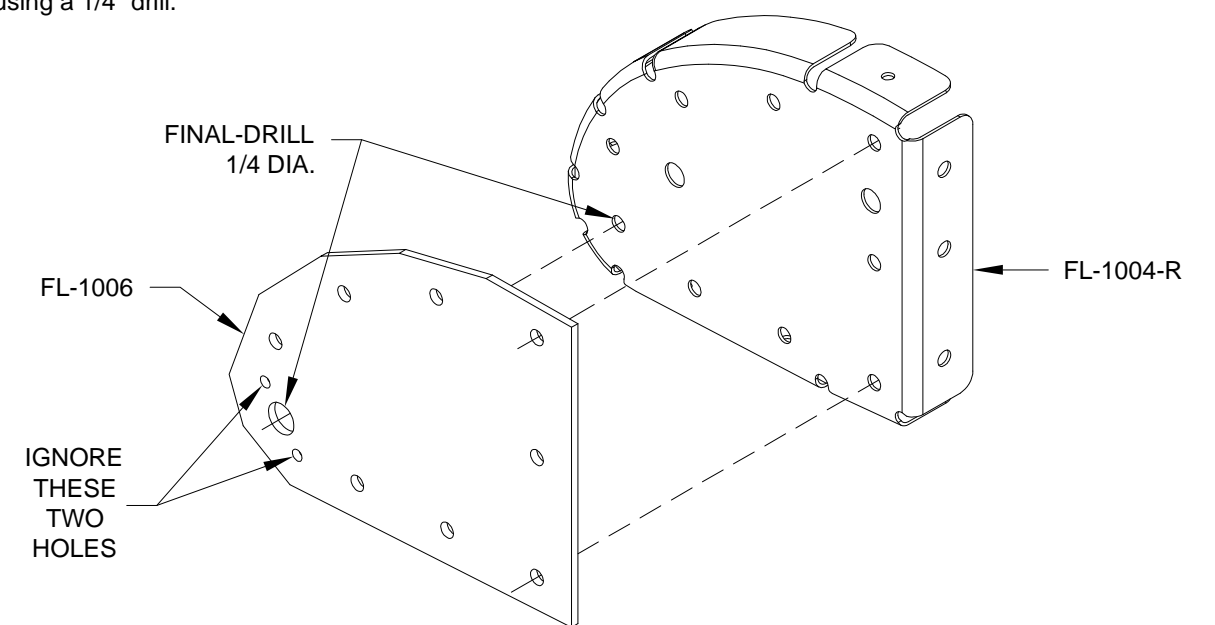
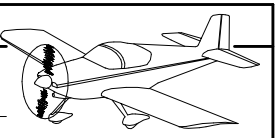


FIGURE 5: INBOARD ROD END RIB SUBASSEMBLY



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.

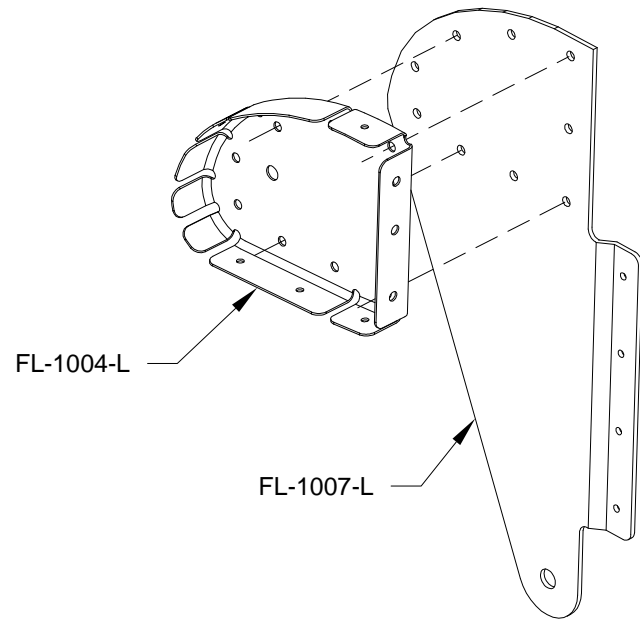


FIGURE 1: LEFT HINGE PAIR RIB SUBASSEMBLY

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.

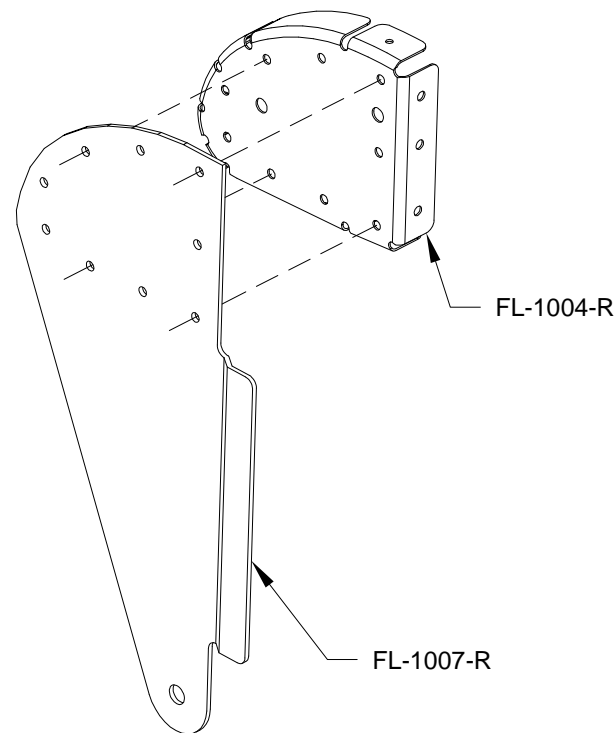


FIGURE 2: RIGHT HINGE PAIR RIB SUBASSEMBLY

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.

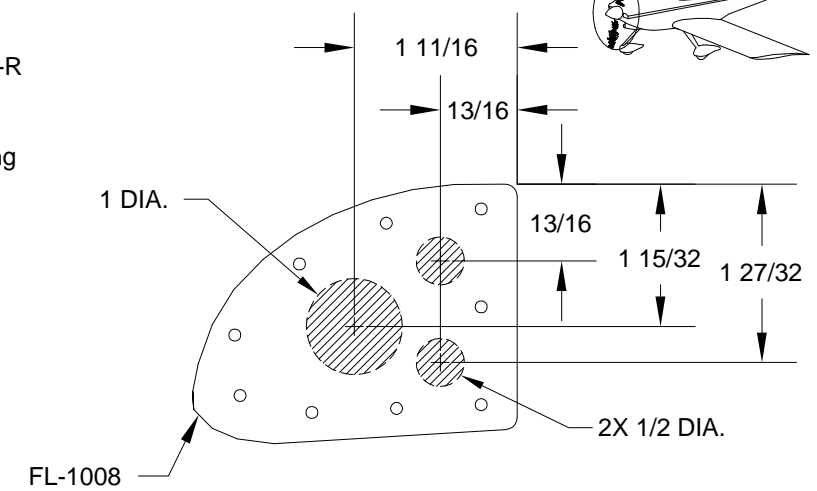


FIGURE 3: SPACER

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 joggled portion of the FL-1007-R Hinge Brackets.

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

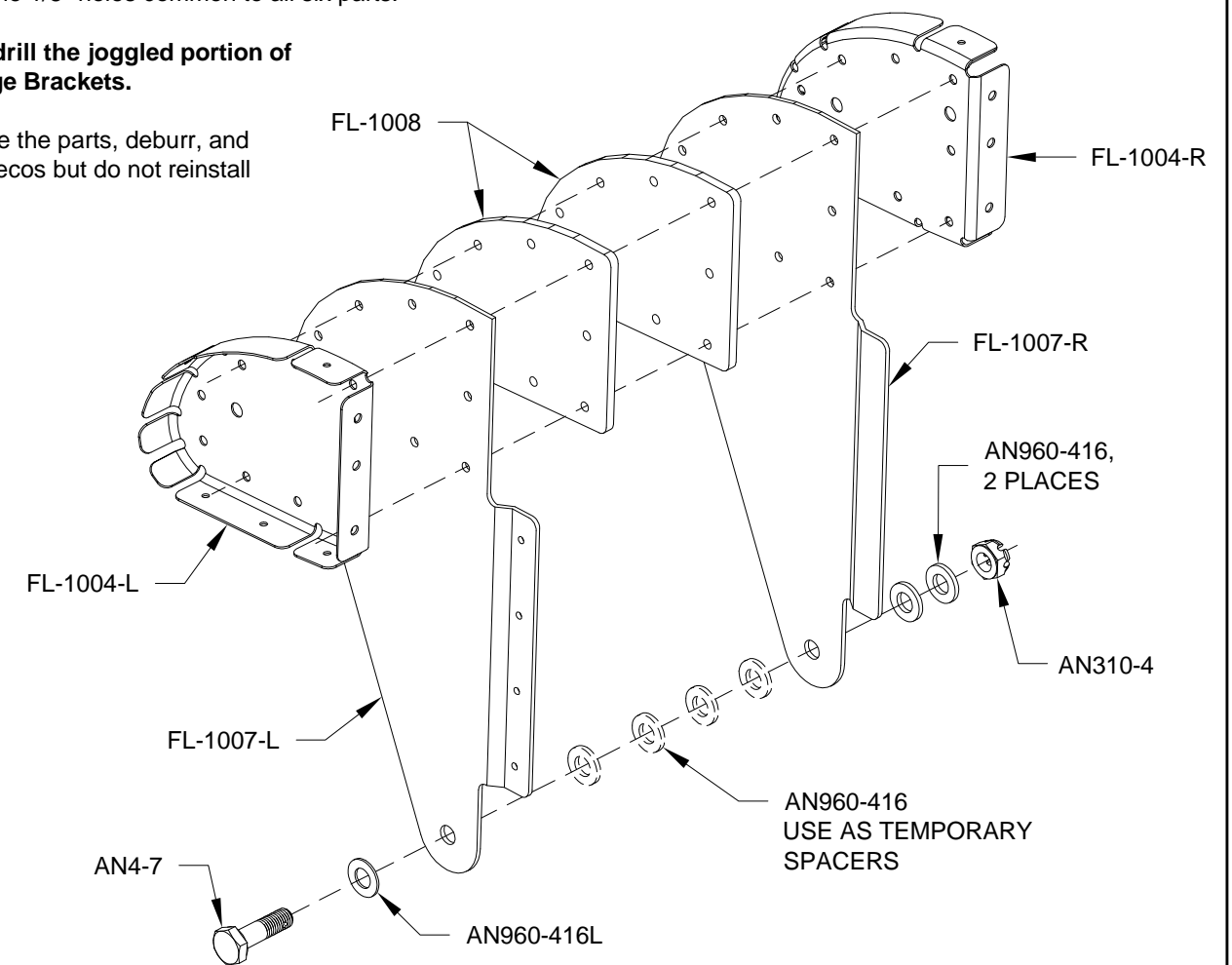


FIGURE 4: CENTER HINGE SUBASSEMBLY



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.

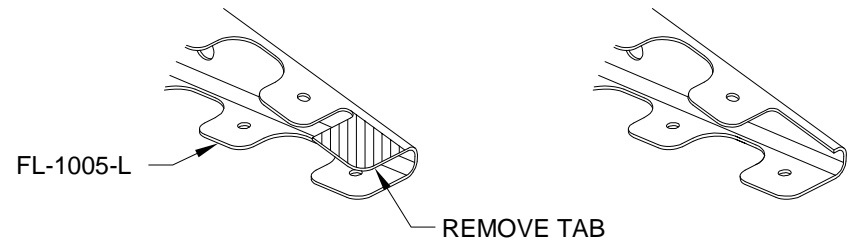


FIGURE 1: TRIM MAIN RIBS

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.

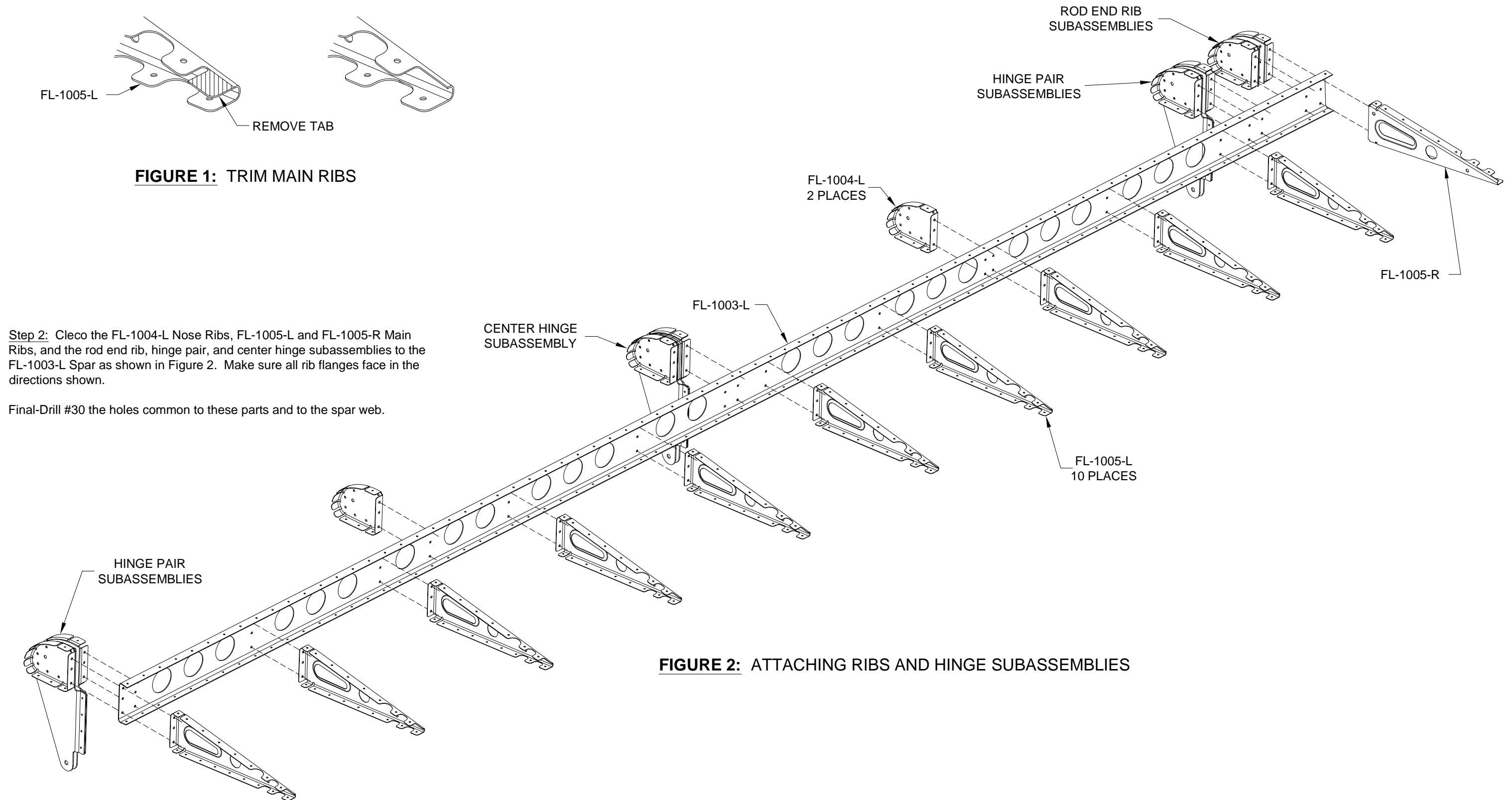
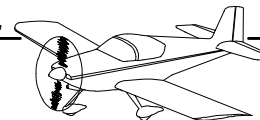


FIGURE 2: ATTACHING RIBS AND HINGE SUBASSEMBLIES



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-L 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.

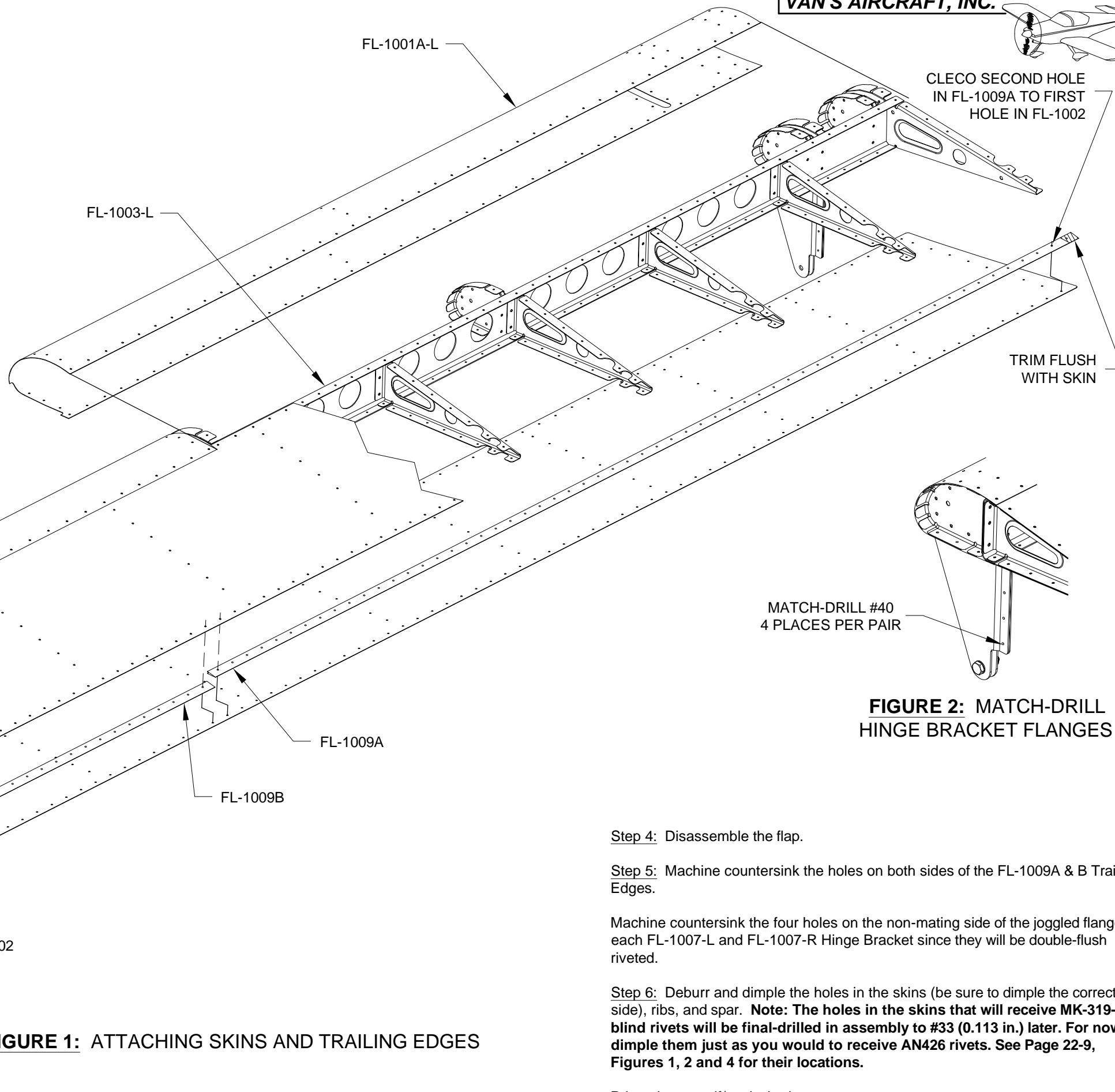


FIGURE 1: ATTACHING SKINS AND TRAILING EDGES

FIGURE 2: MATCH-DRILL HINGE BRACKET FLANGES

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.

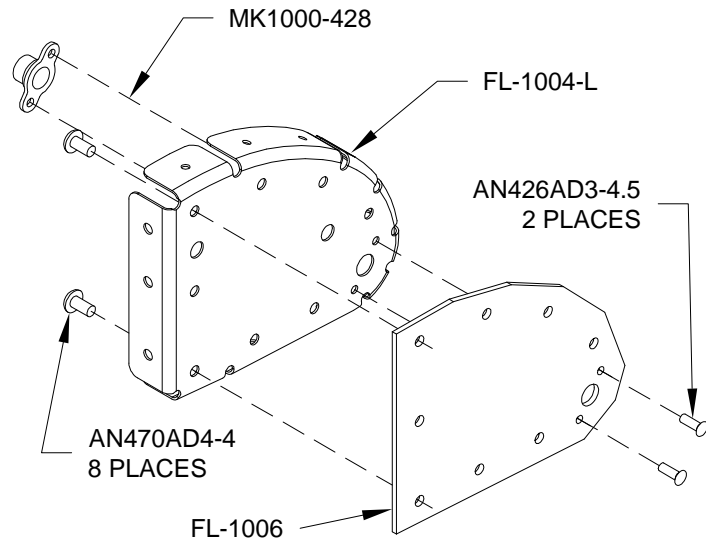


FIGURE 1: OUTBOARD ROD END RIB SUBASSEMBLY

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.

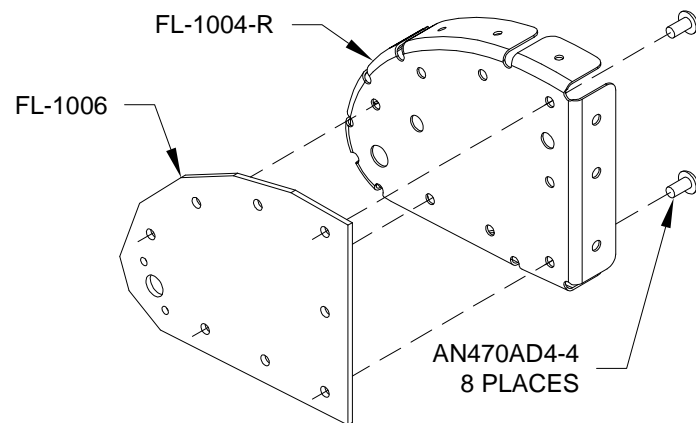


FIGURE 2: INBOARD ROD END RIB SUBASSEMBLY

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

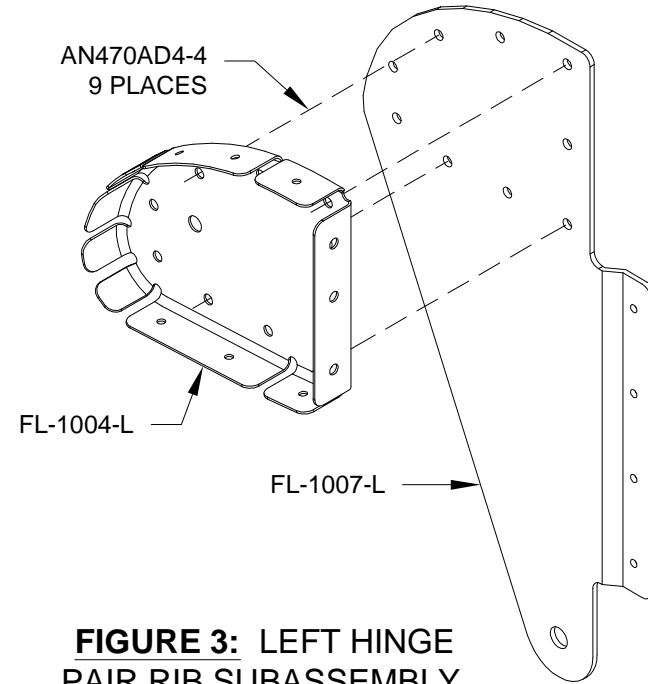


FIGURE 3: LEFT HINGE PAIR RIB SUBASSEMBLY

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

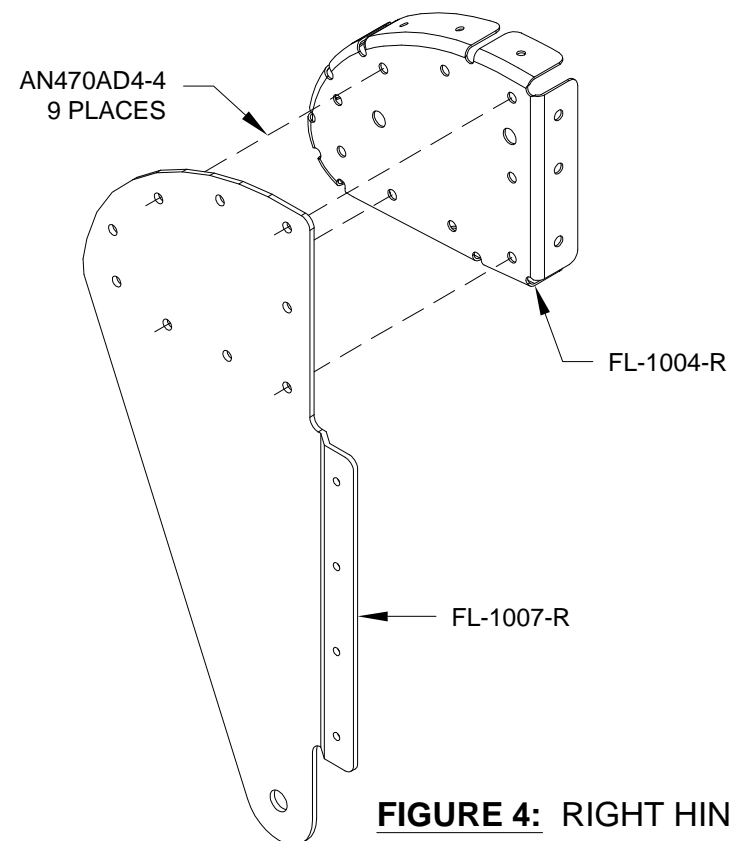


FIGURE 4: RIGHT HINGE PAIR RIB SUBASSEMBLY

Step 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.

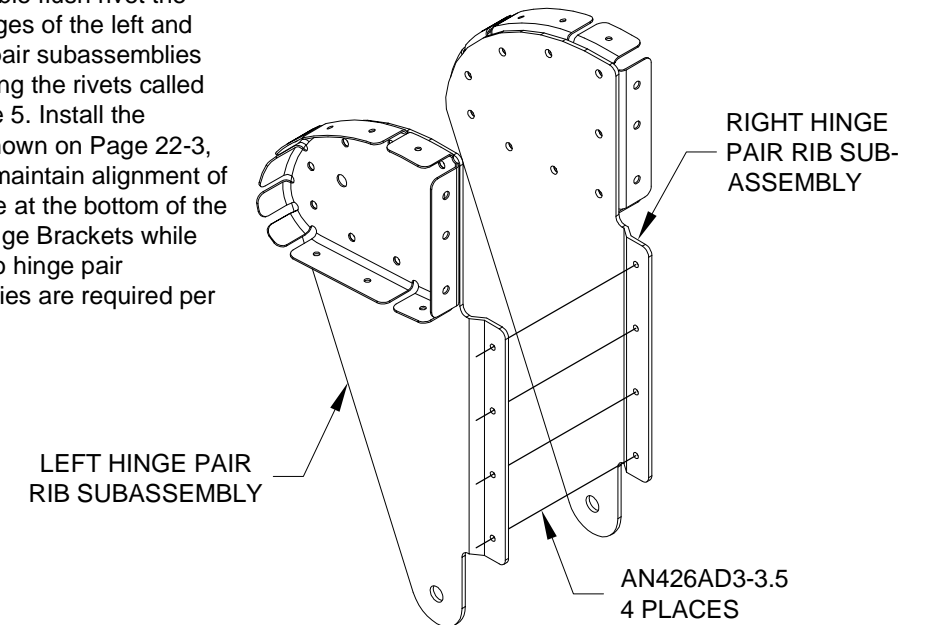


FIGURE 5: HINGE PAIR SUBASSEMBLY

Step 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.

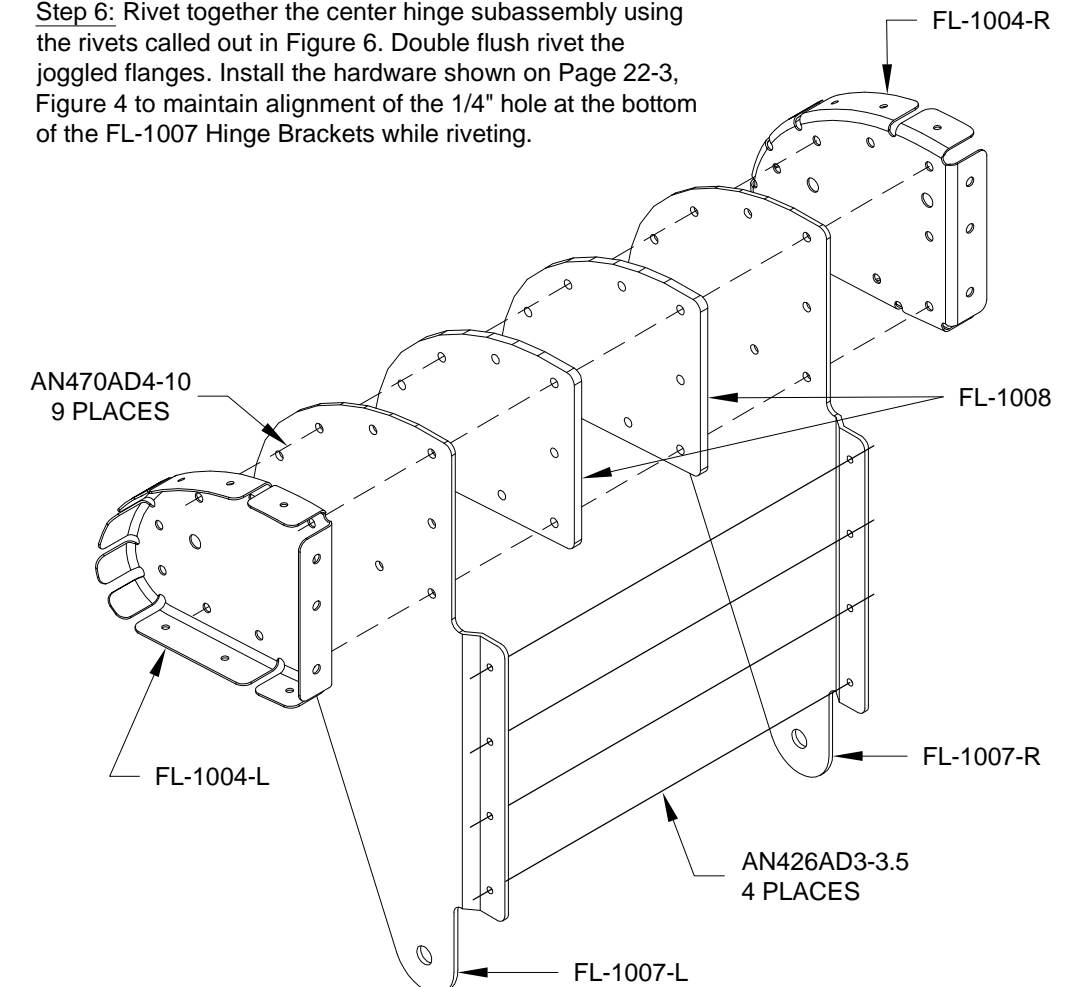
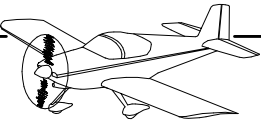


FIGURE 6: CENTER HINGE SUBASSEMBLY



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.

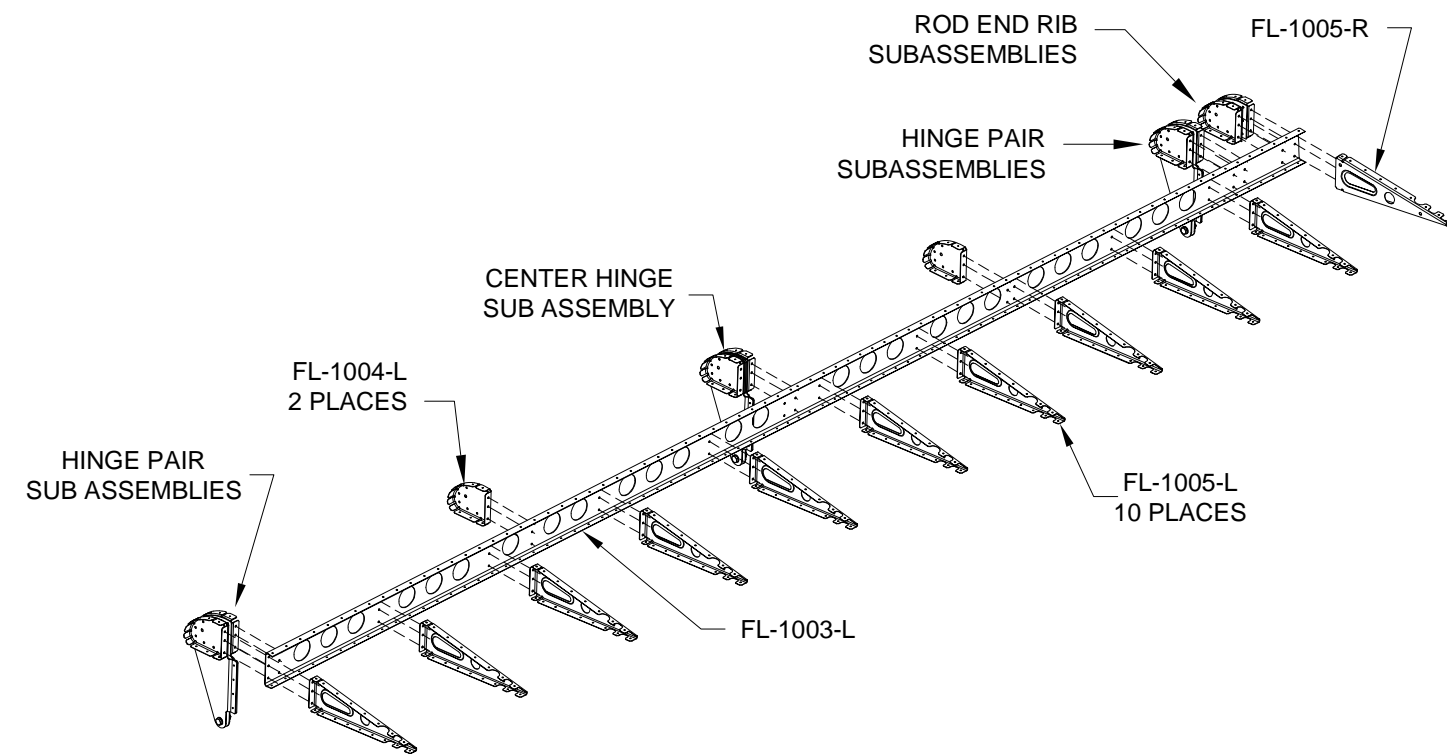


FIGURE 1: RIVETING RIBS AND SUB ASSEMBLIES

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.

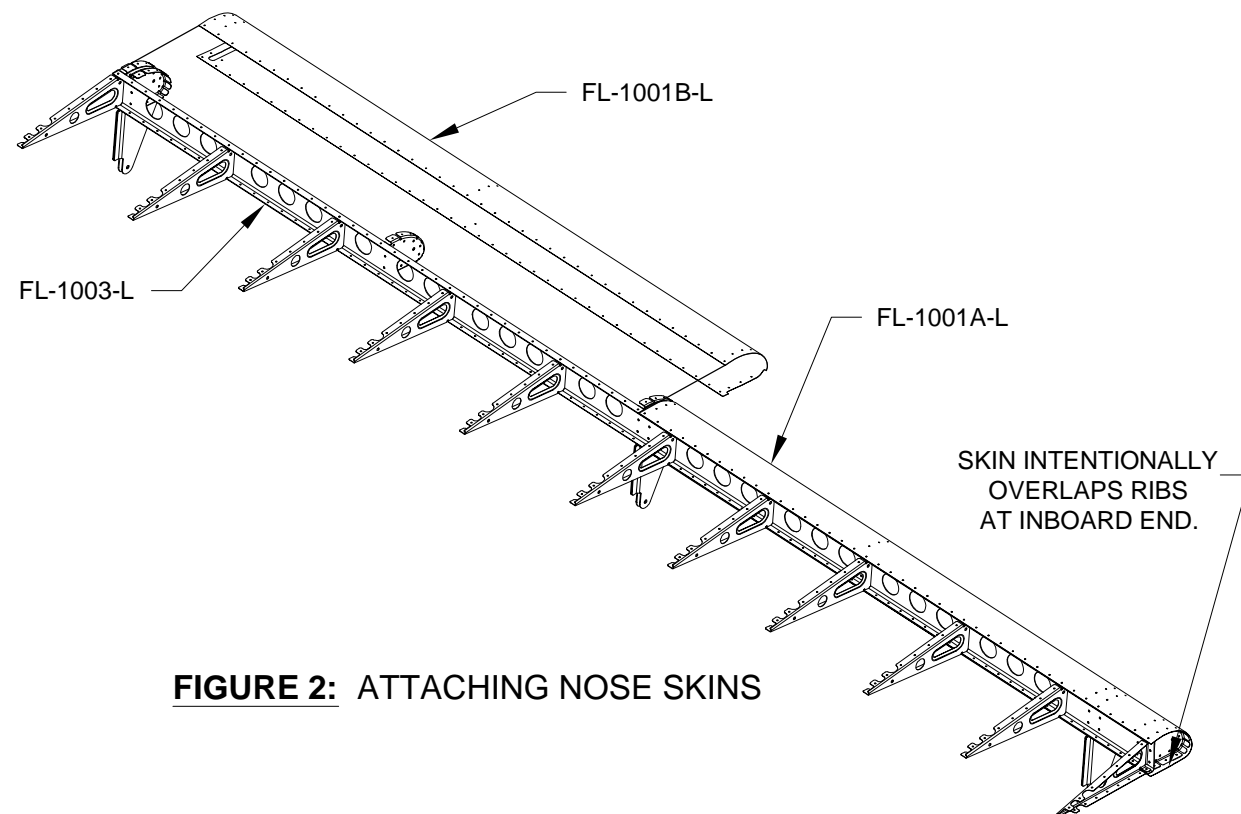


FIGURE 2: ATTACHING NOSE SKINS

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.

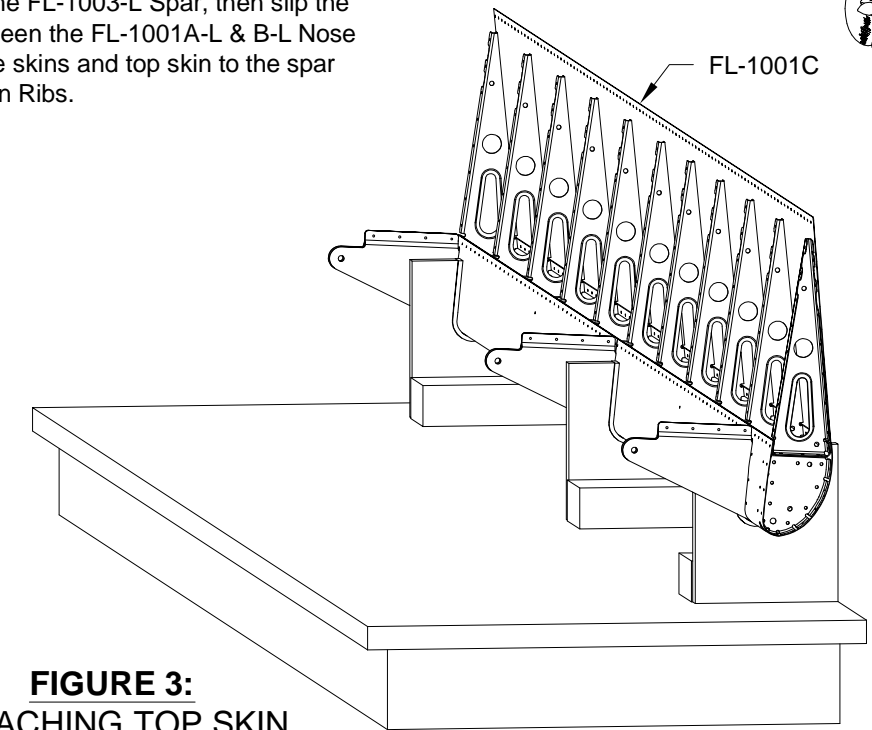


FIGURE 3: ATTACHING TOP SKIN

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.

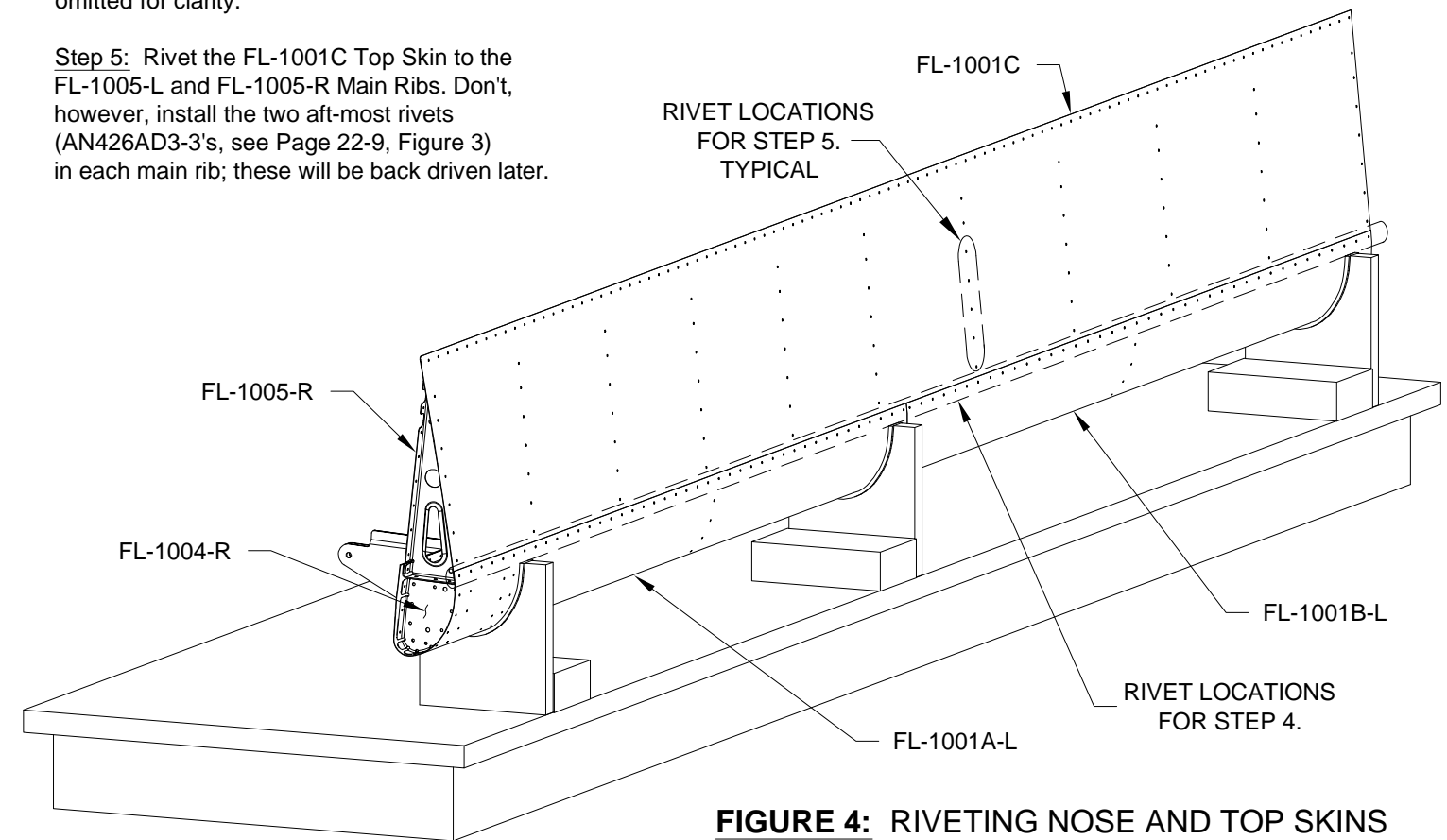


FIGURE 4: RIVETING NOSE AND TOP SKINS



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.)

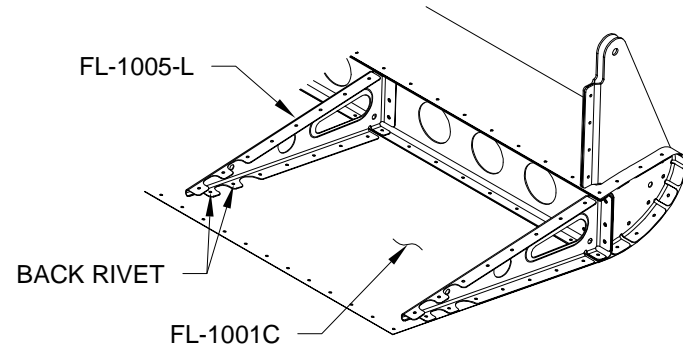


FIGURE 1: BACK RIVETING TOP SKIN

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.

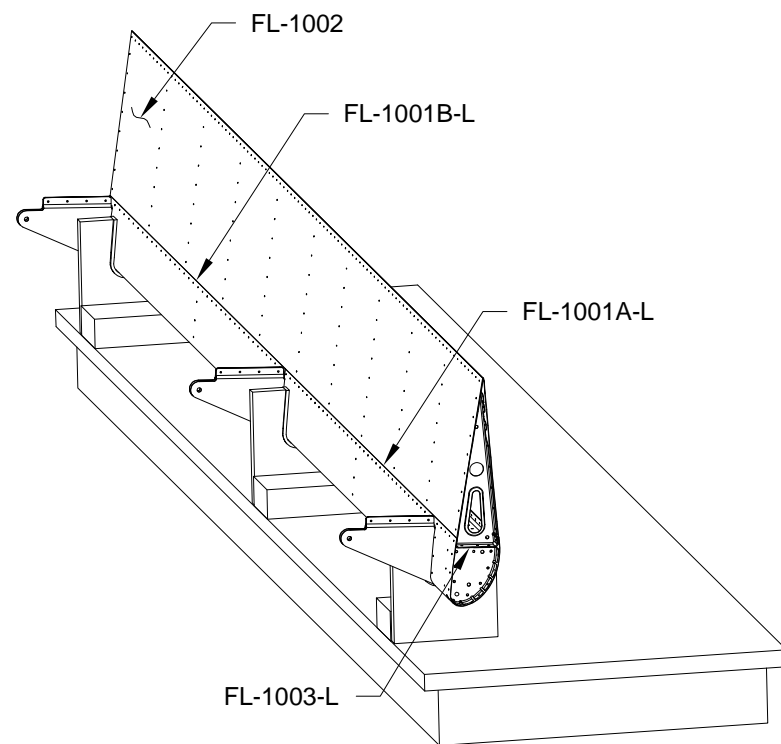


FIGURE 2: BOTTOM SKIN INSTALLATION

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.

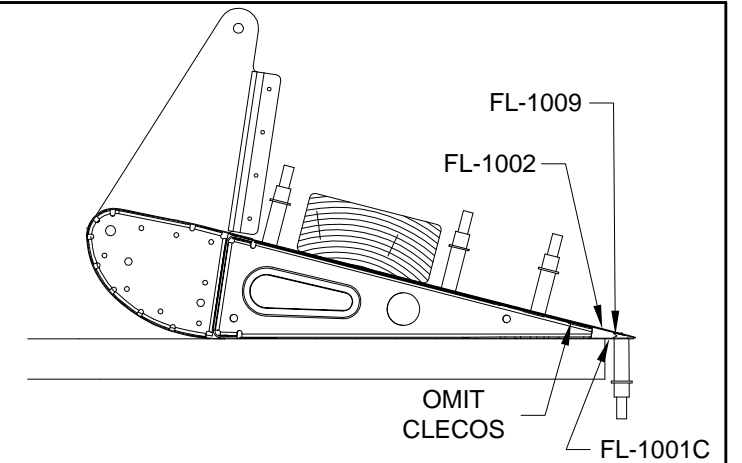


FIGURE 3: RIVETING BOTTOM SKIN

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.

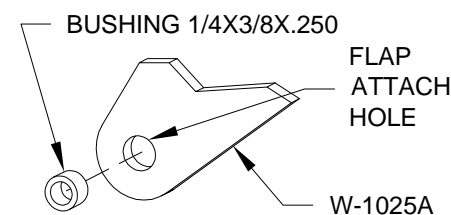


FIGURE 4: BUSHING PRESS FIT

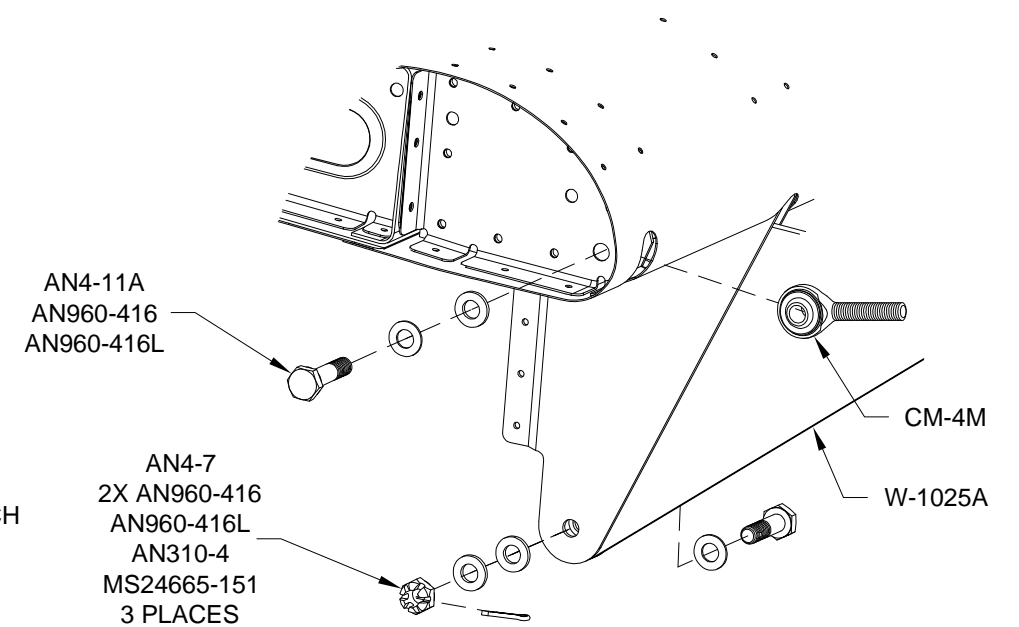
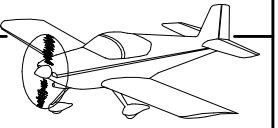


FIGURE 5: ATTACHING ROD END



RIVET LEGEND

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



FIGURE 1: FL-1001B-L OUTBOARD NOSE SKIN RIVETS

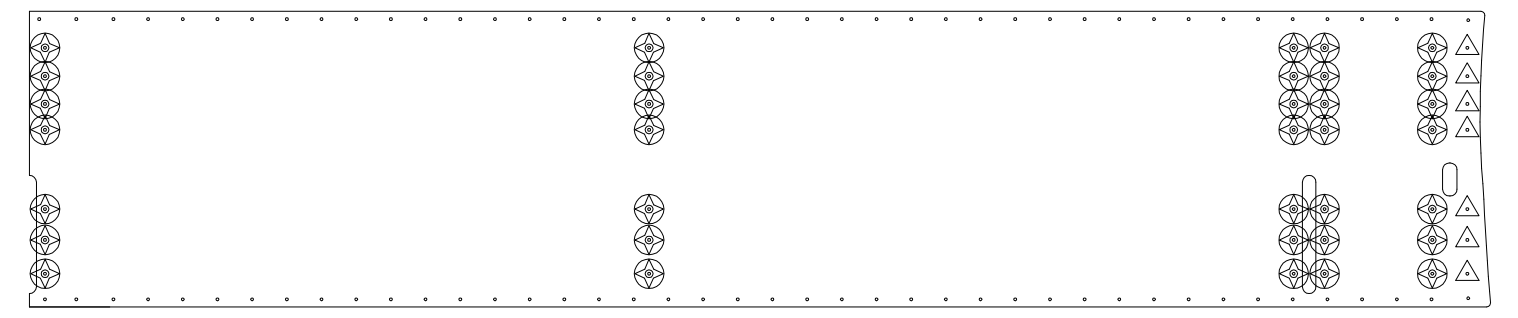


FIGURE 2: FL-1001A-L INBOARD NOSE SKIN RIVETS

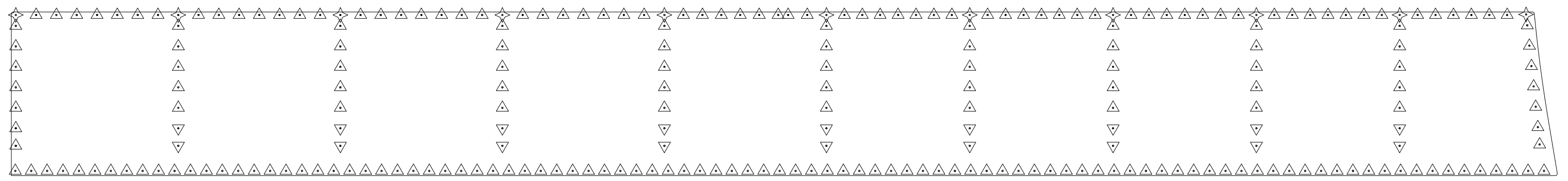


FIGURE 3: FL-1001C TOP SKIN RIVETS

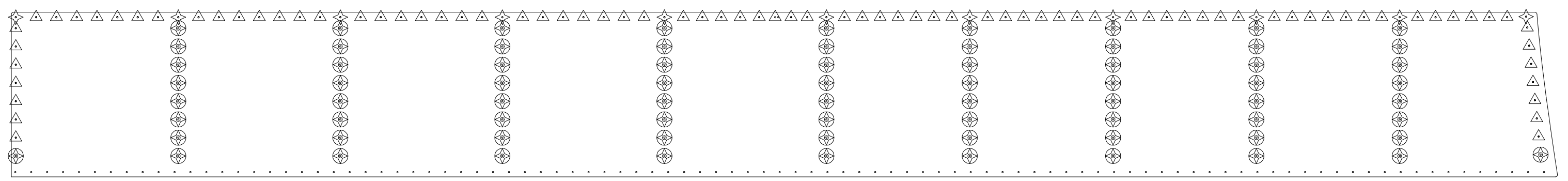


FIGURE 4: FL-1002 BOTTOM SKIN RIVETS



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