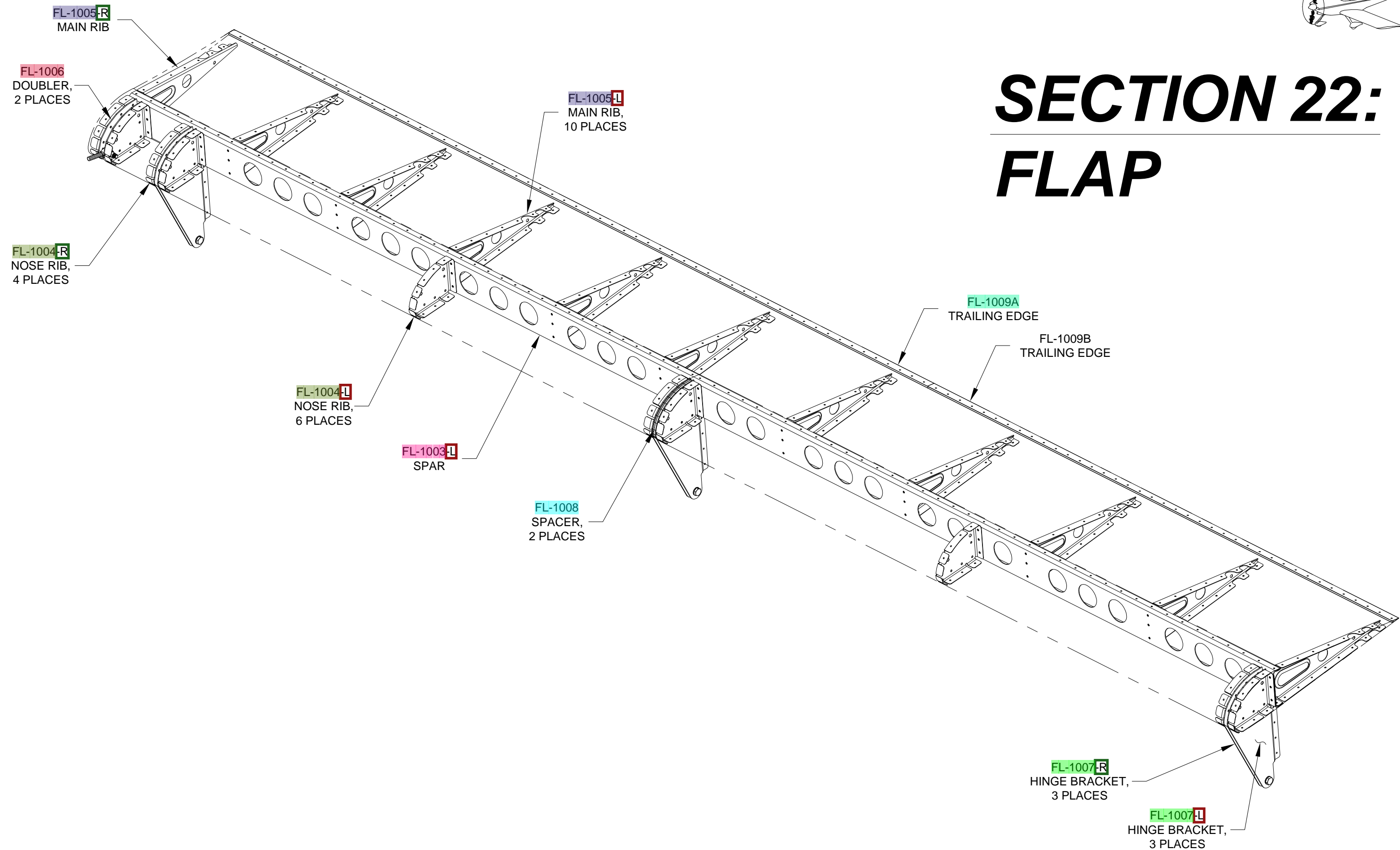
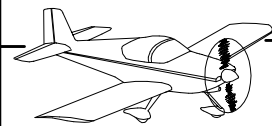




SECTION 22: FLAP





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.

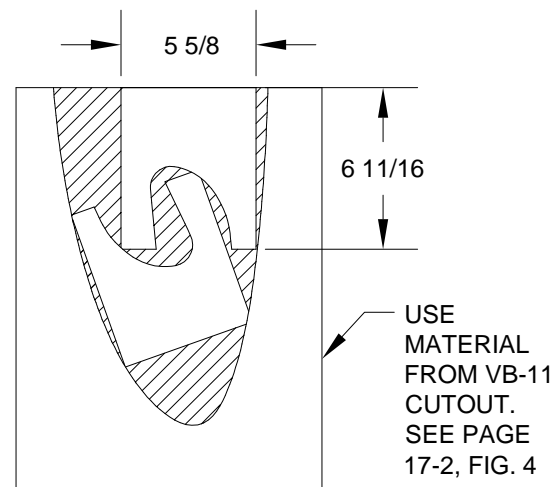


FIGURE 1: CRADLE MATERIAL

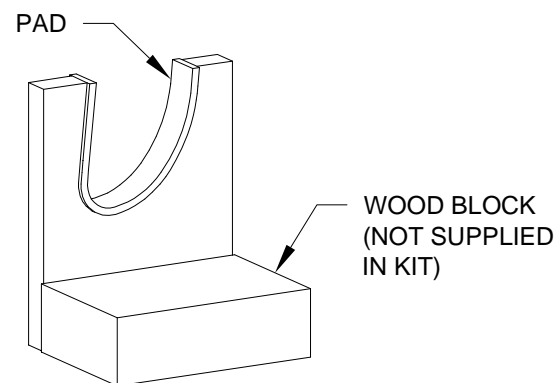


FIGURE 2: CRADLE

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.

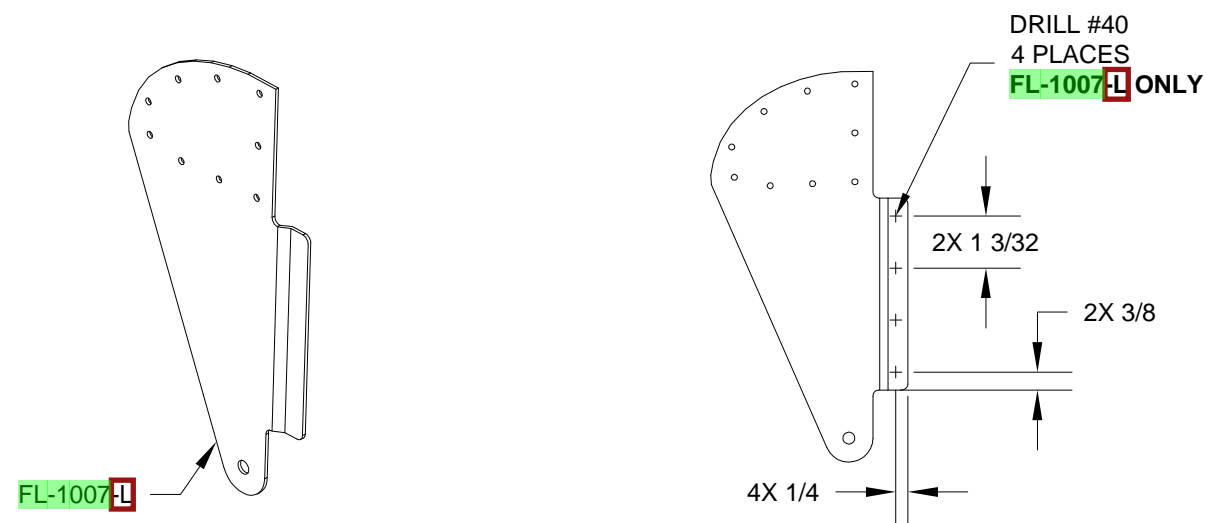


FIGURE 3: DRILL LEFT HINGE BRACKETS ONLY

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.

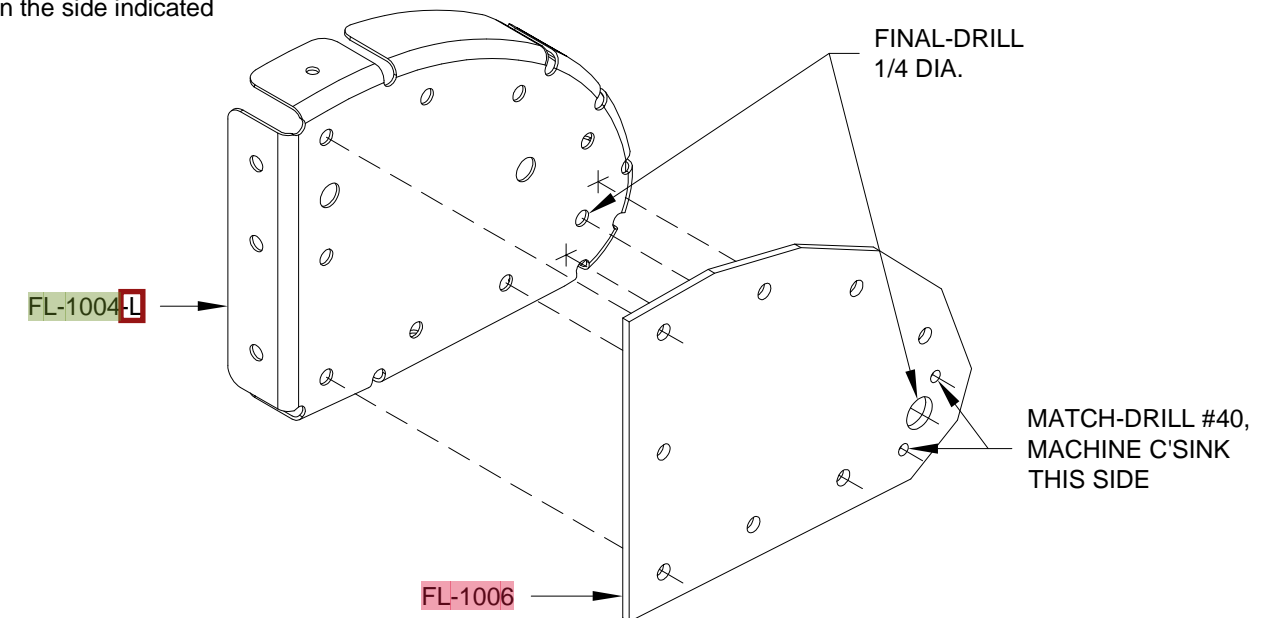


FIGURE 4: OUTBOARD ROD END RIB SUBASSEMBLY

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.

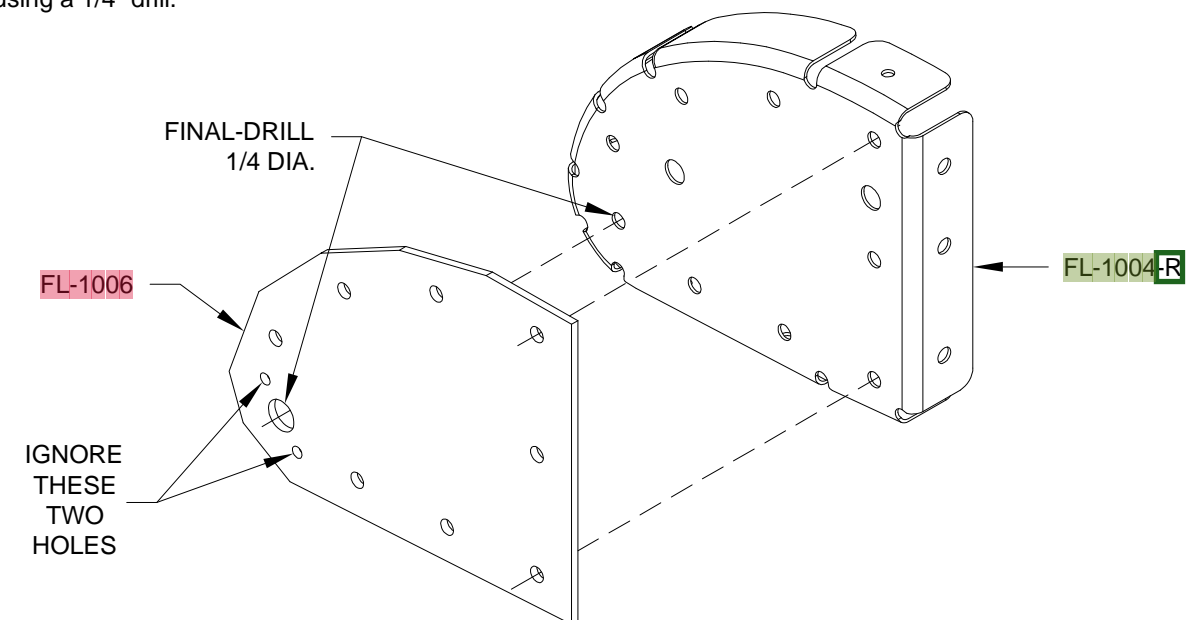


FIGURE 5: INBOARD ROD END RIB SUBASSEMBLY

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.

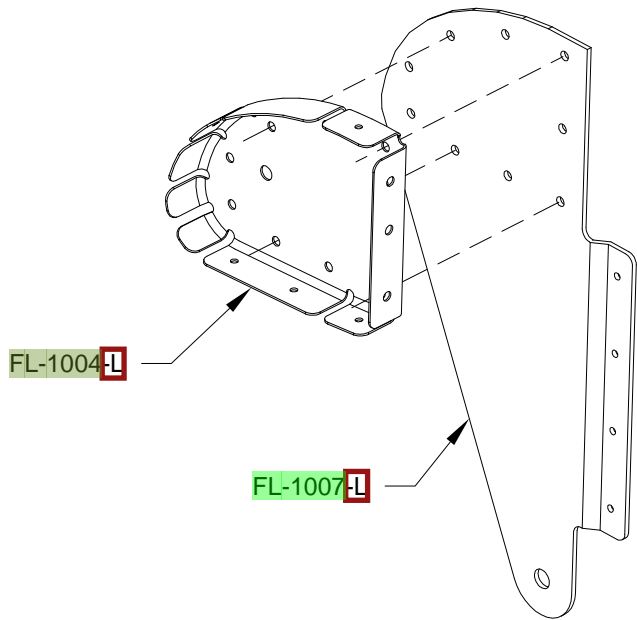


FIGURE 1: LEFT HINGE PAIR RIB SUBASSEMBLY

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.

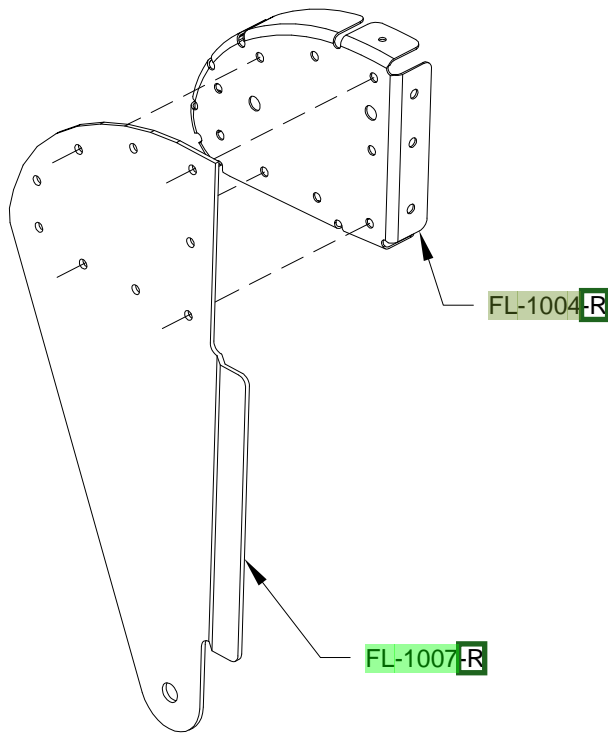


FIGURE 2: RIGHT HINGE PAIR RIB SUBASSEMBLY

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.

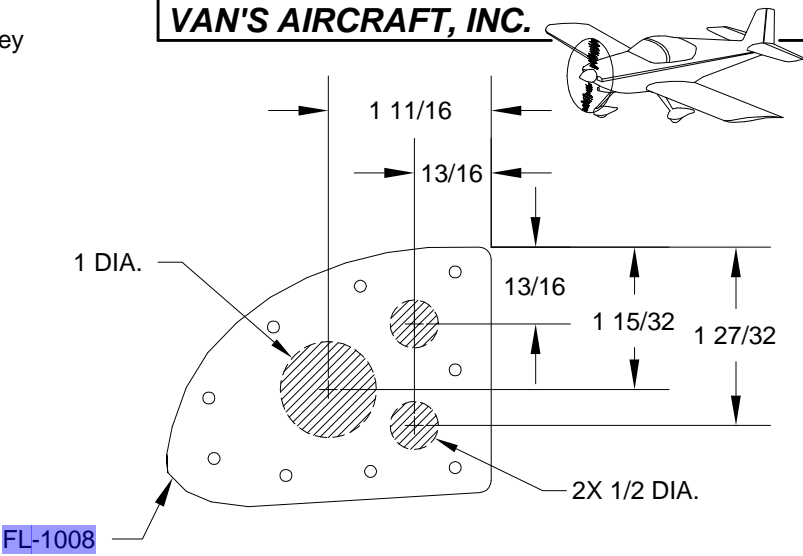


FIGURE 3: SPACER

Step 4: Cleco together the center hinge subassembly using the parts shown in Figure 4. Space the FL-1007-L & FL-1007-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.

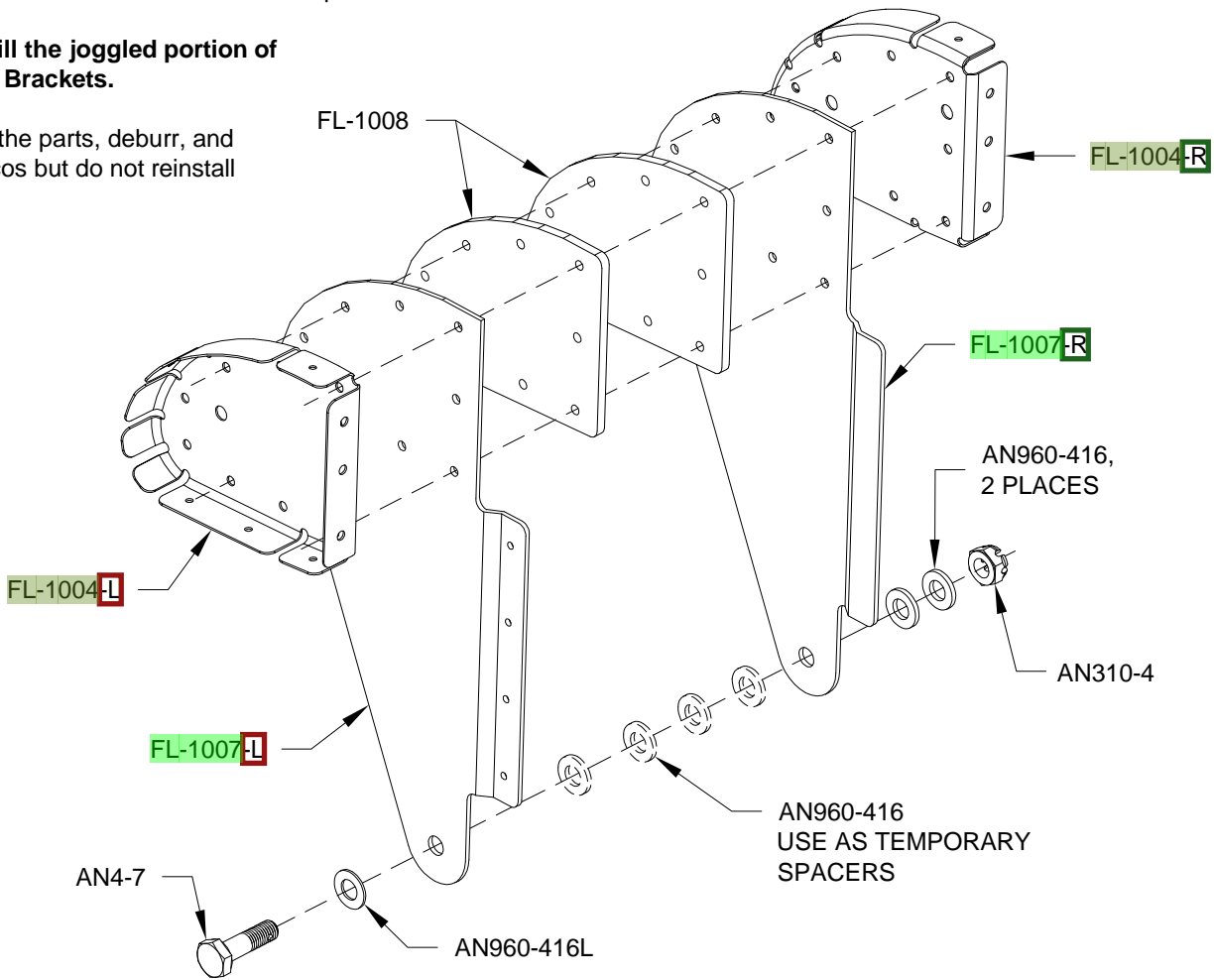
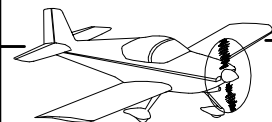


FIGURE 4: CENTER HINGE SUBASSEMBLY



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.

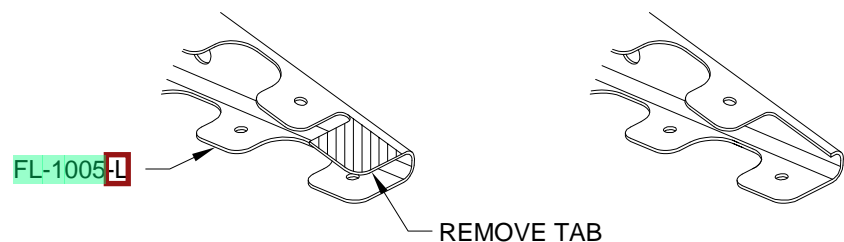


FIGURE 1: TRIM MAIN RIBS

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.

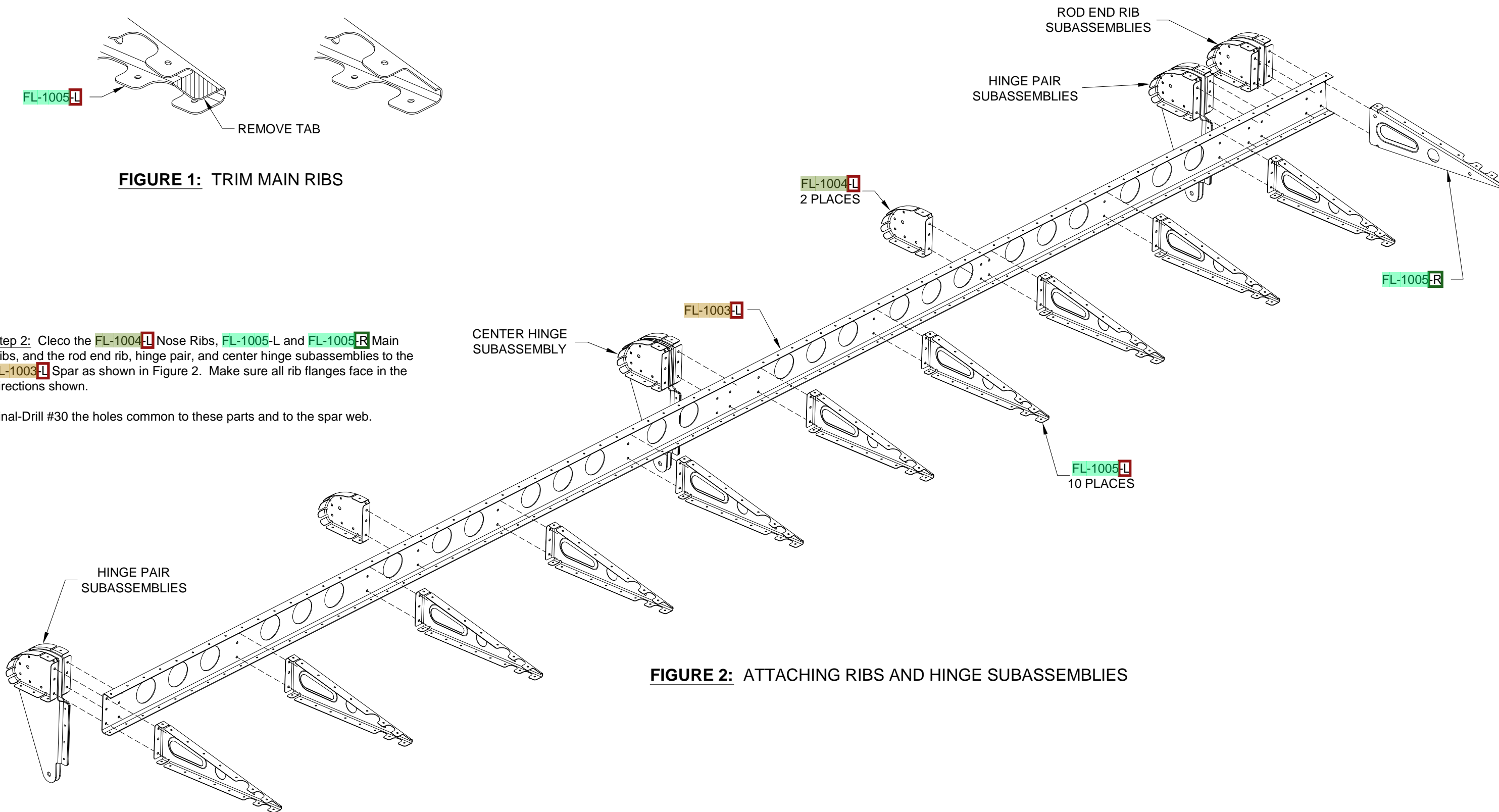
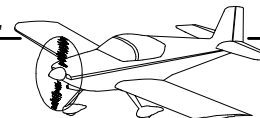


FIGURE 2: ATTACHING RIBS AND HINGE SUBASSEMBLIES



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.

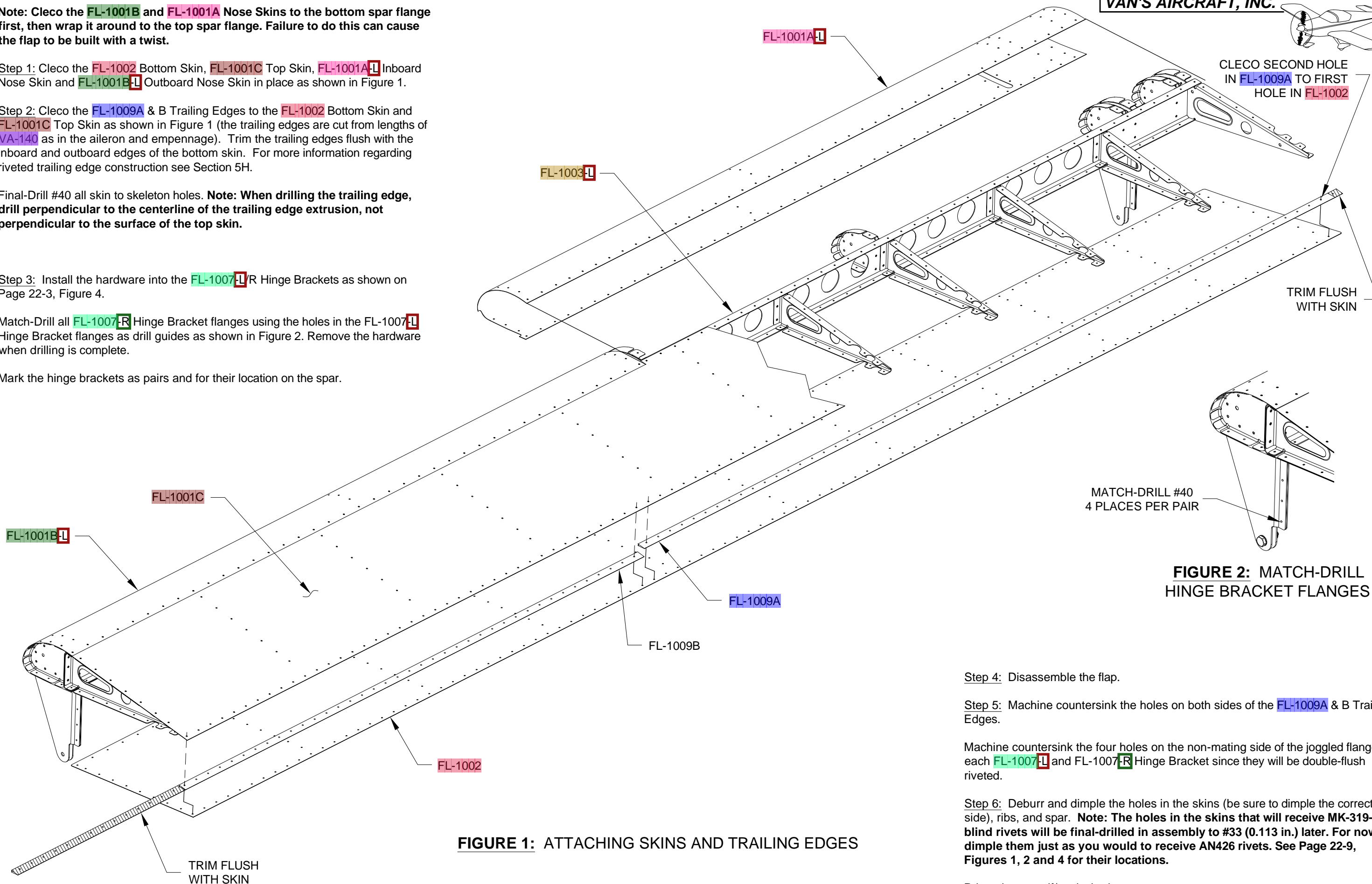


FIGURE 1: ATTACHING SKINS AND TRAILING EDGES

FIGURE 2: MATCH-DRILL HINGE BRACKET FLANGES

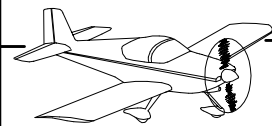
Step 4: Disassemble the flap.

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.

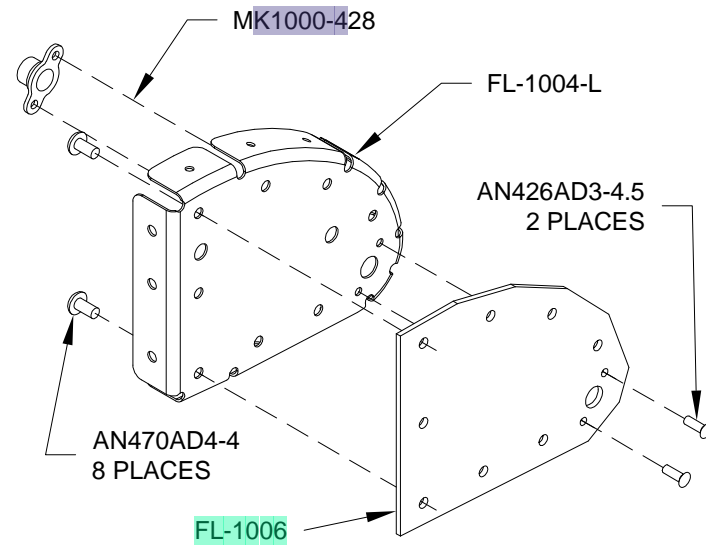


FIGURE 1: OUTBOARD ROD END RIB SUBASSEMBLY

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.

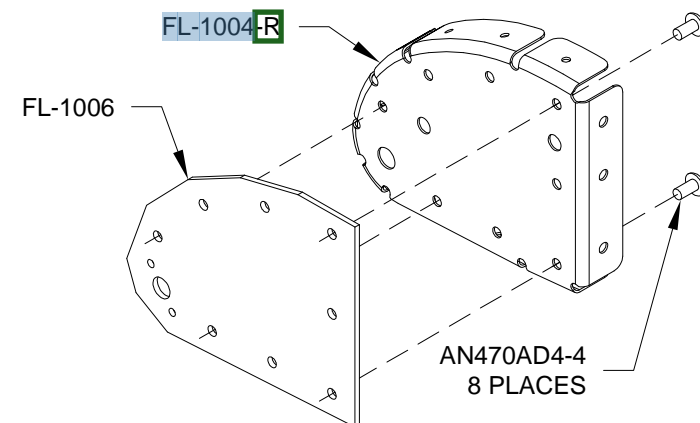


FIGURE 2: INBOARD ROD END RIB SUBASSEMBLY

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

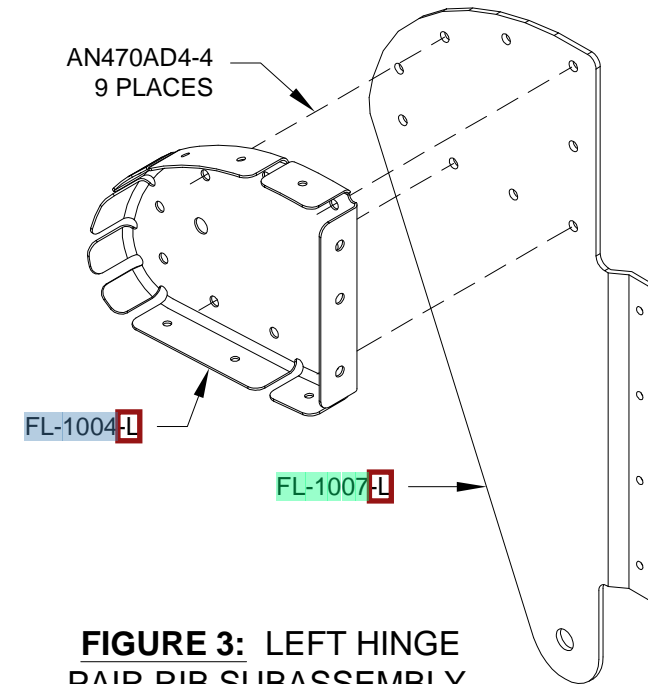


FIGURE 3: LEFT HINGE PAIR RIB SUBASSEMBLY

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

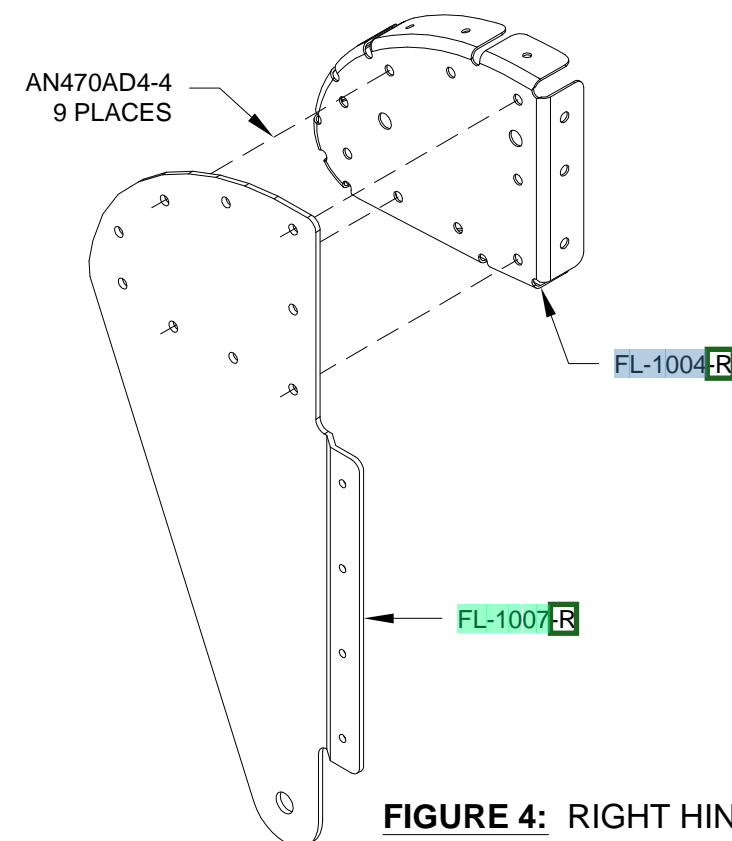


FIGURE 4: RIGHT HINGE PAIR RIB SUBASSEMBLY

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.

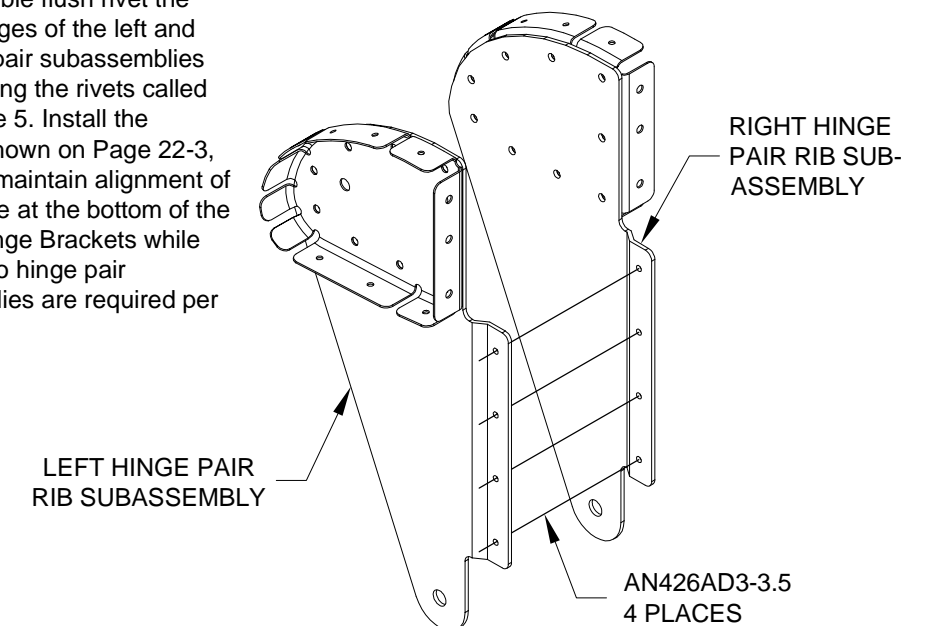


FIGURE 5: HINGE PAIR SUBASSEMBLY

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.

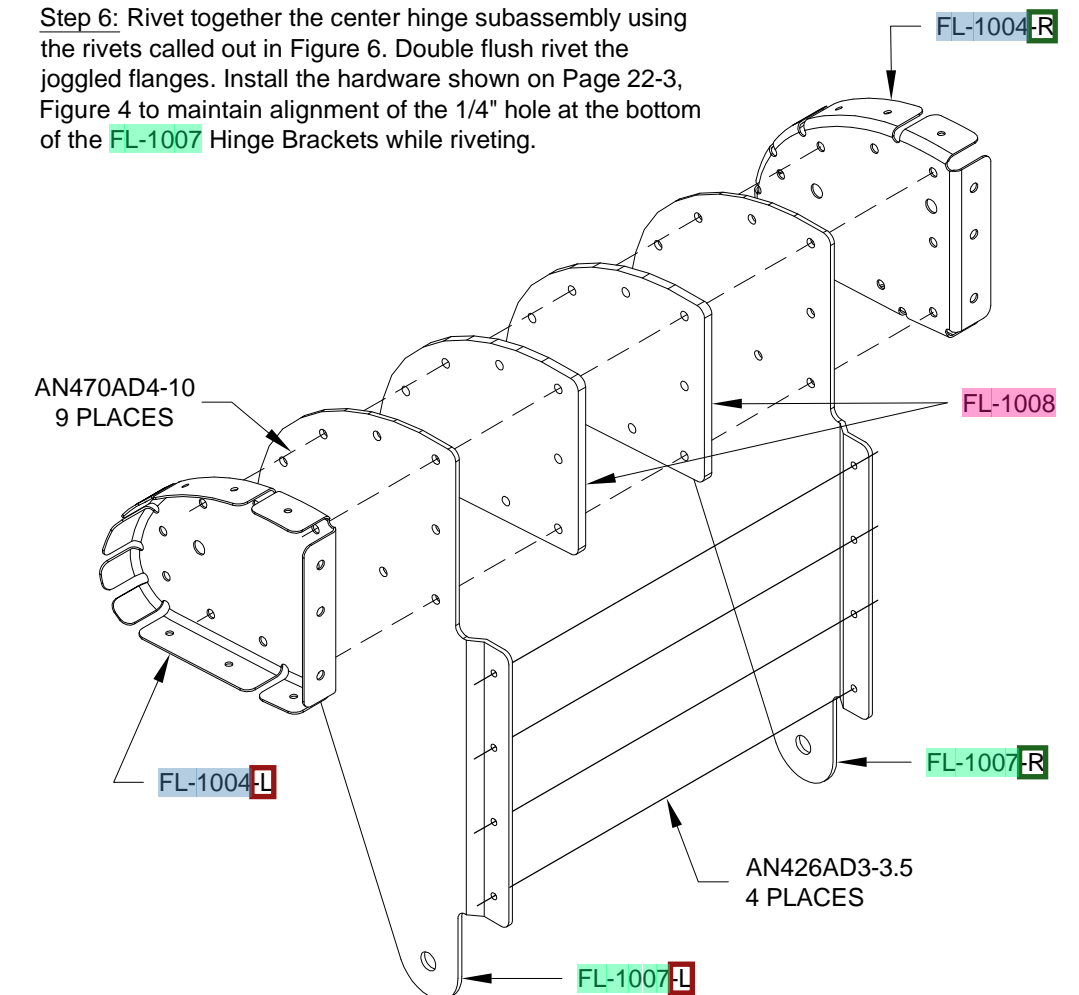


FIGURE 6: CENTER HINGE SUBASSEMBLY

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.

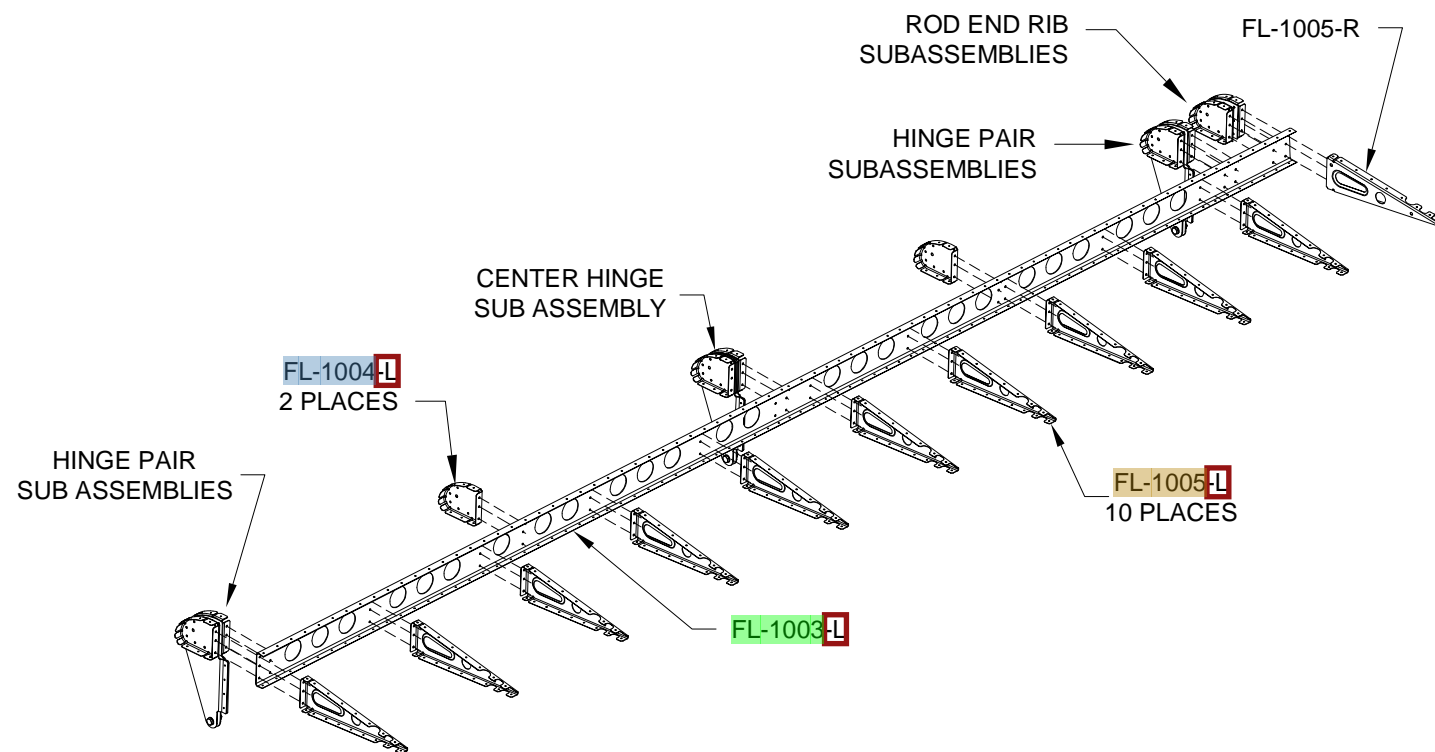


FIGURE 1: RIVETING RIBS AND SUB ASSEMBLIES

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.

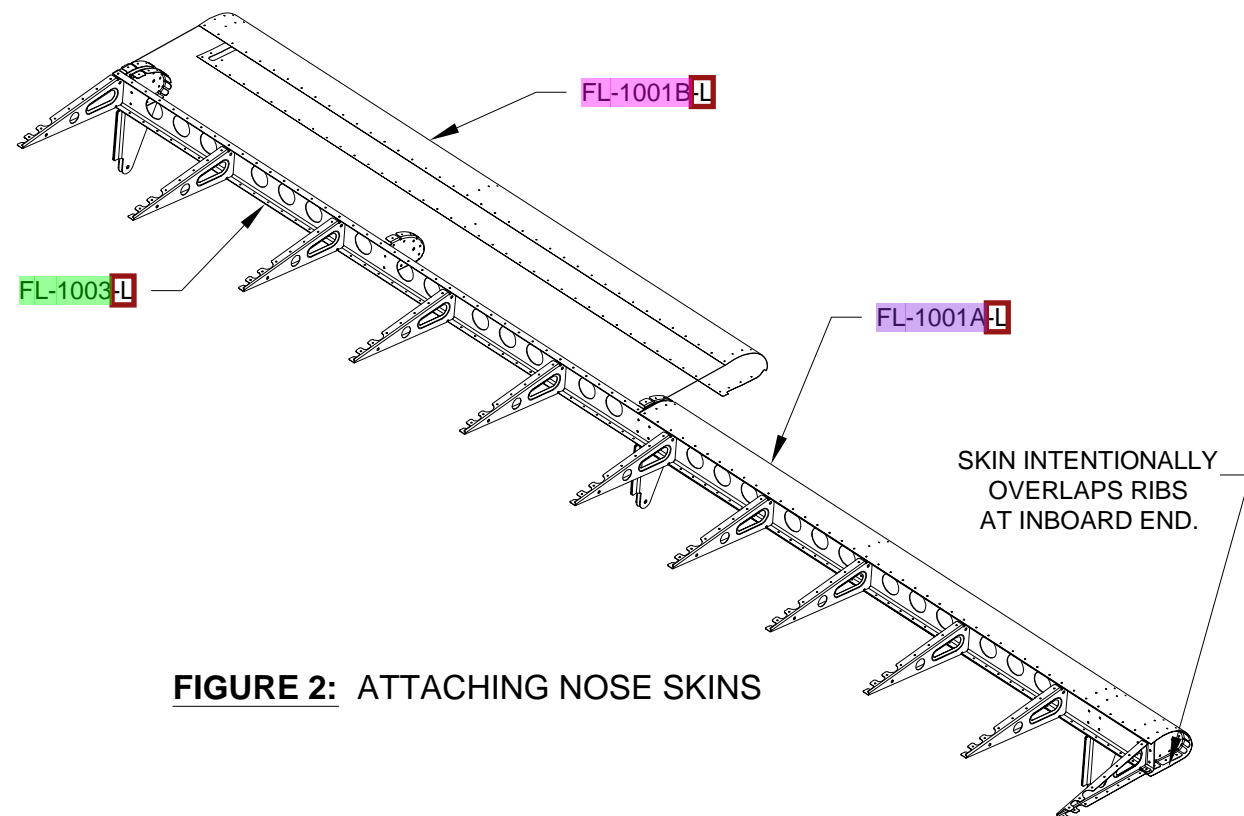


FIGURE 2: ATTACHING NOSE SKINS

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.

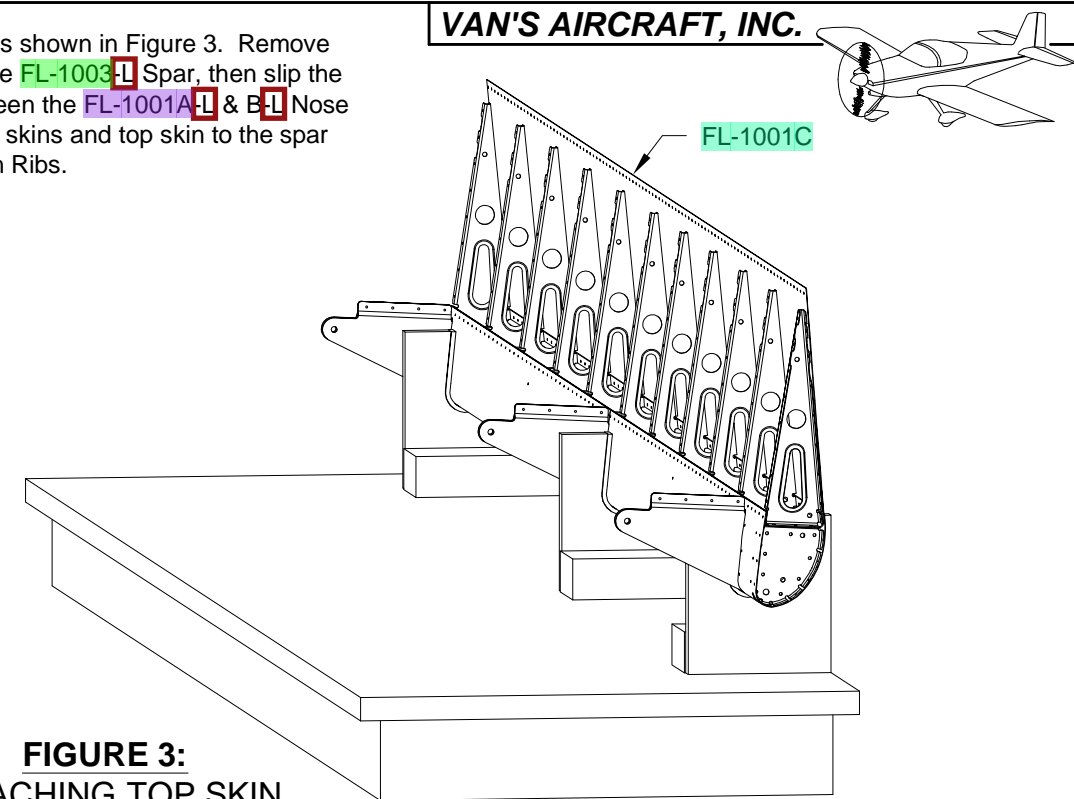


FIGURE 3: ATTACHING TOP SKIN

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.

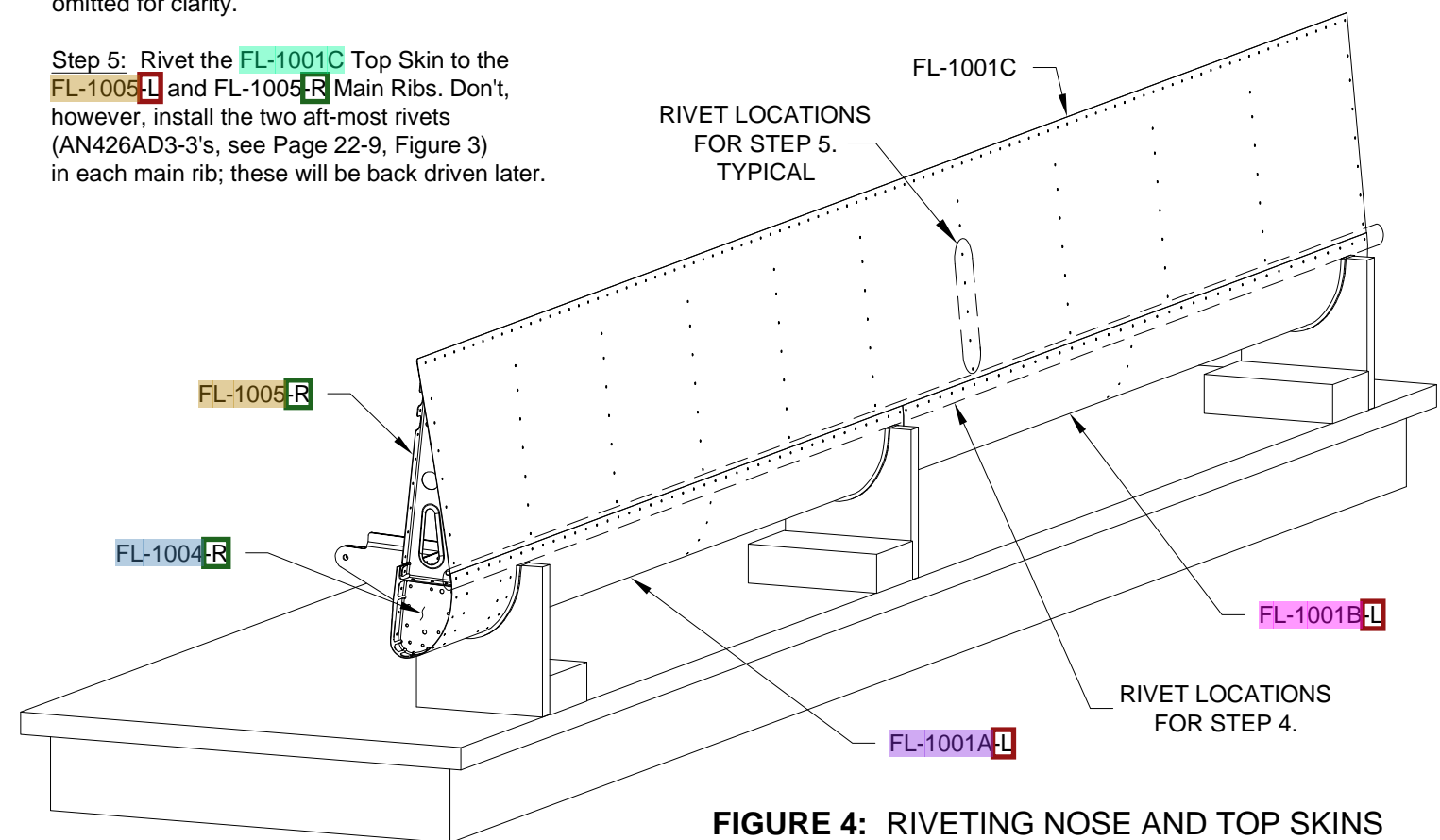
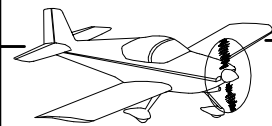


FIGURE 4: RIVETING NOSE AND TOP SKINS



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.)

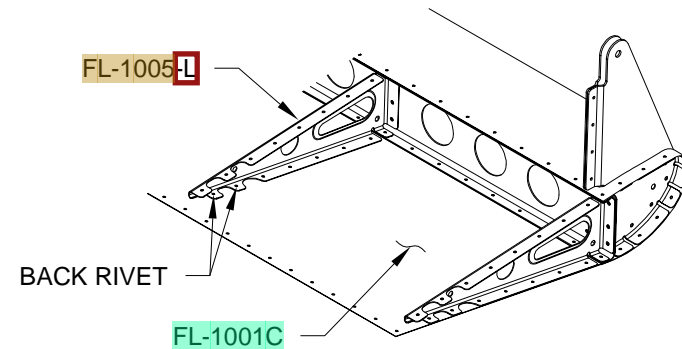


FIGURE 1: BACK RIVETING TOP SKIN

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.

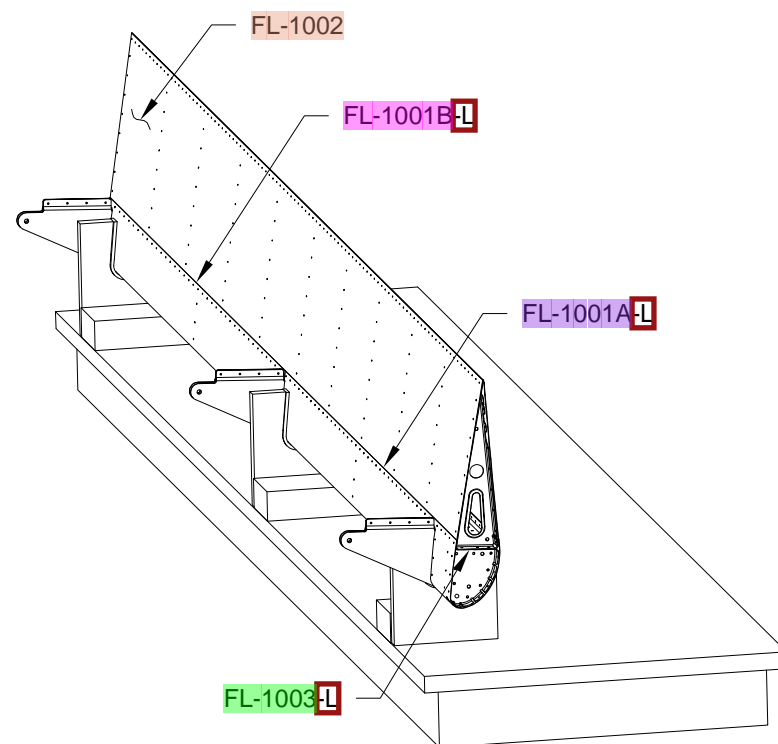


FIGURE 2: BOTTOM SKIN INSTALLATION

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.

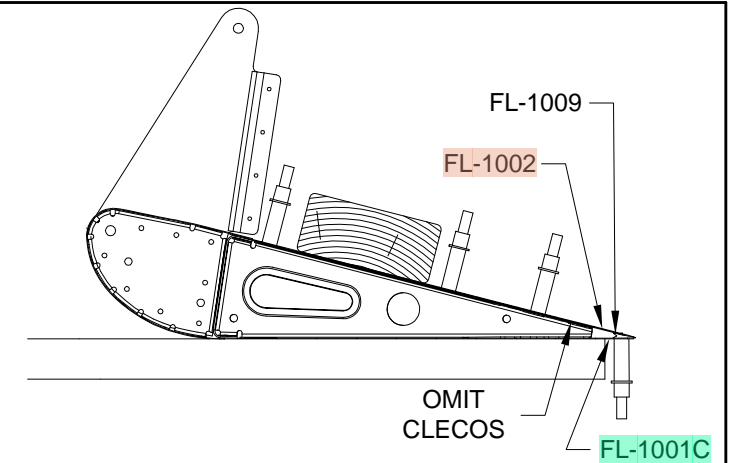


FIGURE 3: RIVETING BOTTOM SKIN

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 **FL-1005-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.

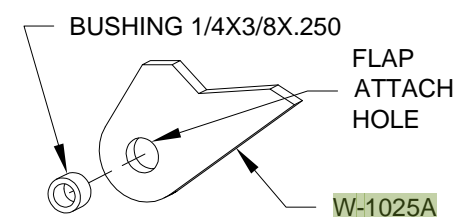


FIGURE 4: BUSHING PRESS FIT

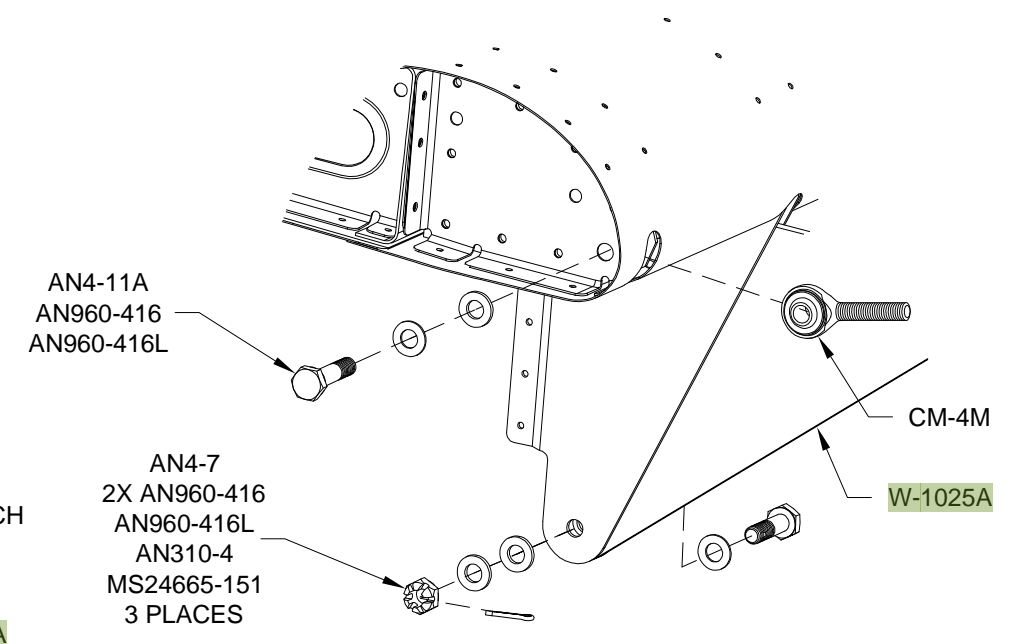


FIGURE 5: ATTACHING ROD END

RIVET LEGEND

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

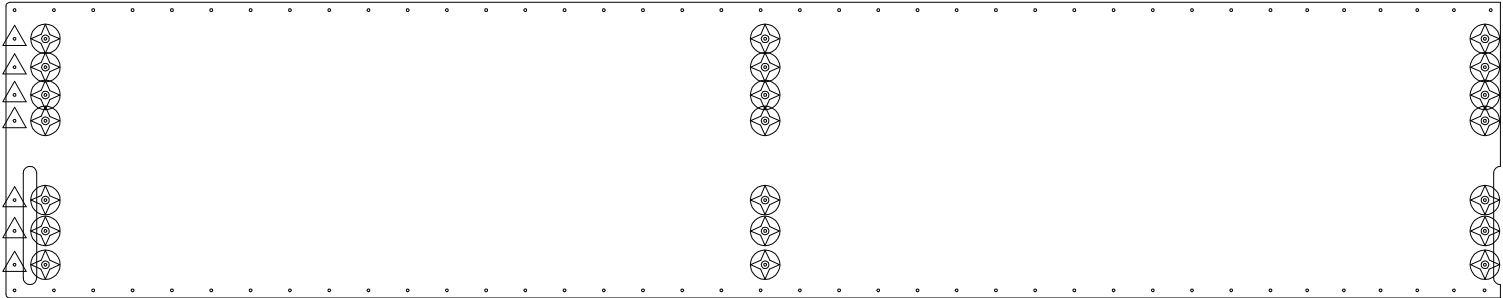


FIGURE 1: FL-1001B-L OUTBOARD NOSE SKIN RIVETS

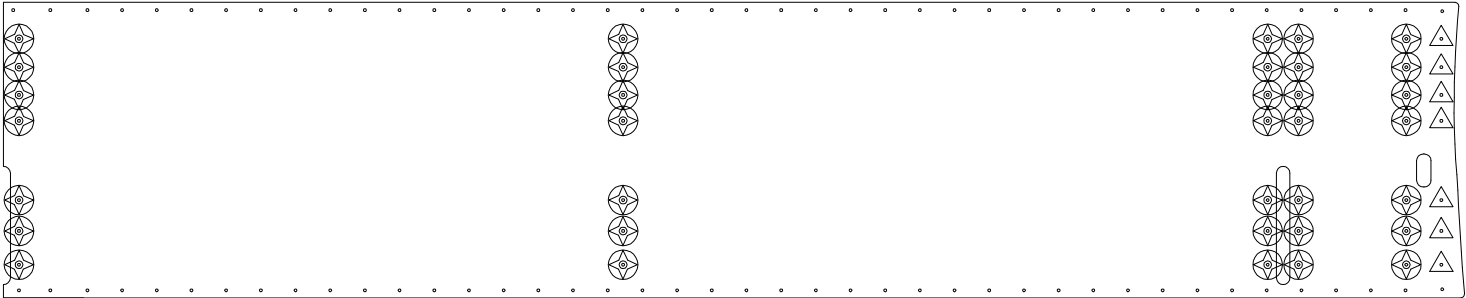


FIGURE 2: FL-1001A-L INBOARD NOSE SKIN RIVETS

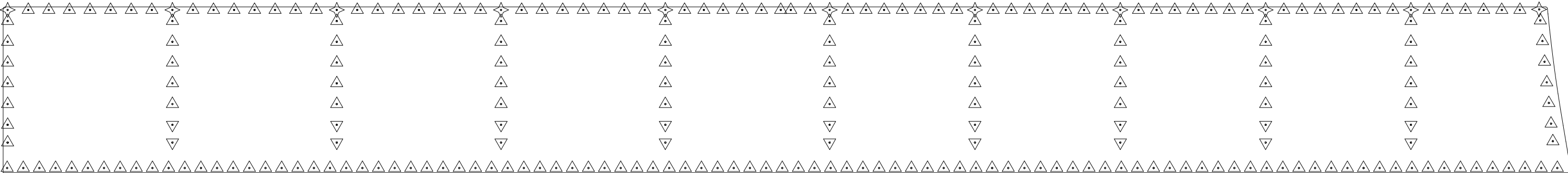


FIGURE 3: FL-1001C TOP SKIN RIVETS

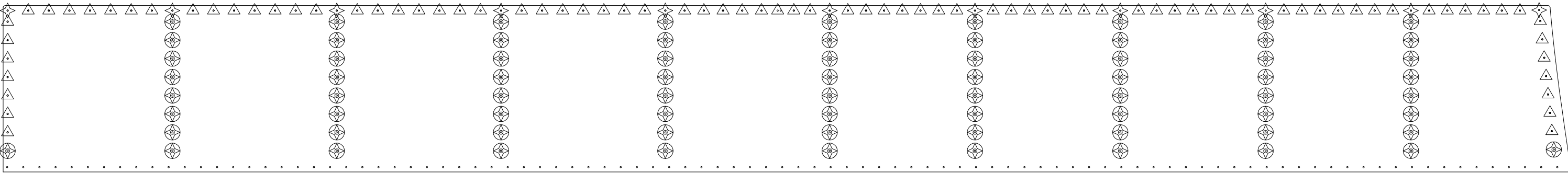


FIGURE 4: FL-1002 BOTTOM SKIN RIVETS



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