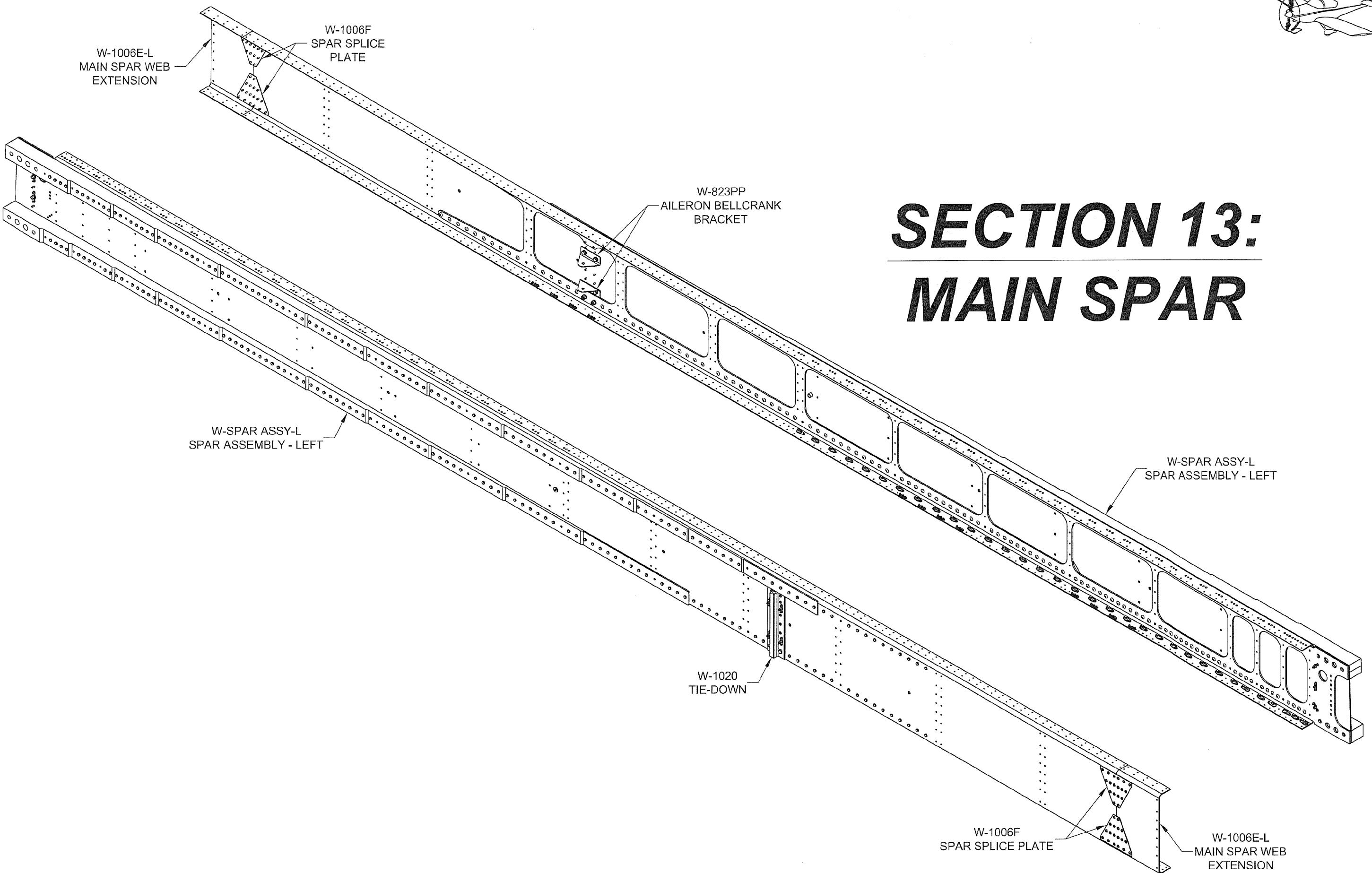


SECTION 13:

MAIN SPAR



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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.

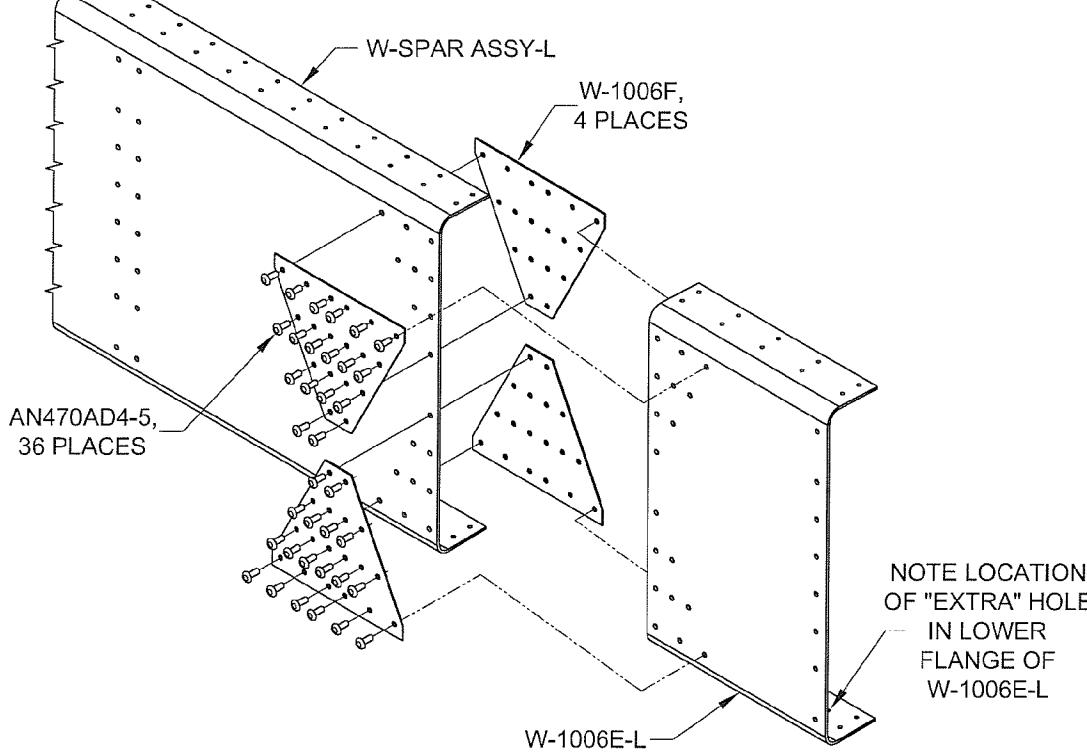


FIGURE 1:
MAIN SPAR WEB EXTENSION
INSTALLATION

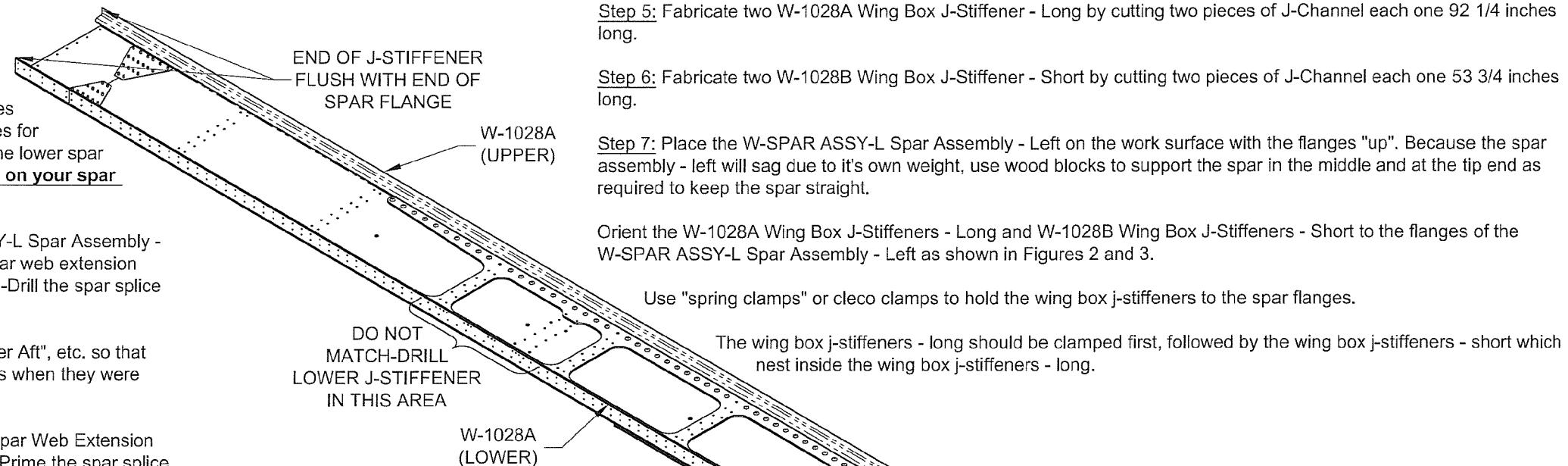


FIGURE 2:
WING BOX J-STIFFENER
ORIENTATION TO SPAR ASSEMBLY
ISOMETRIC VIEW

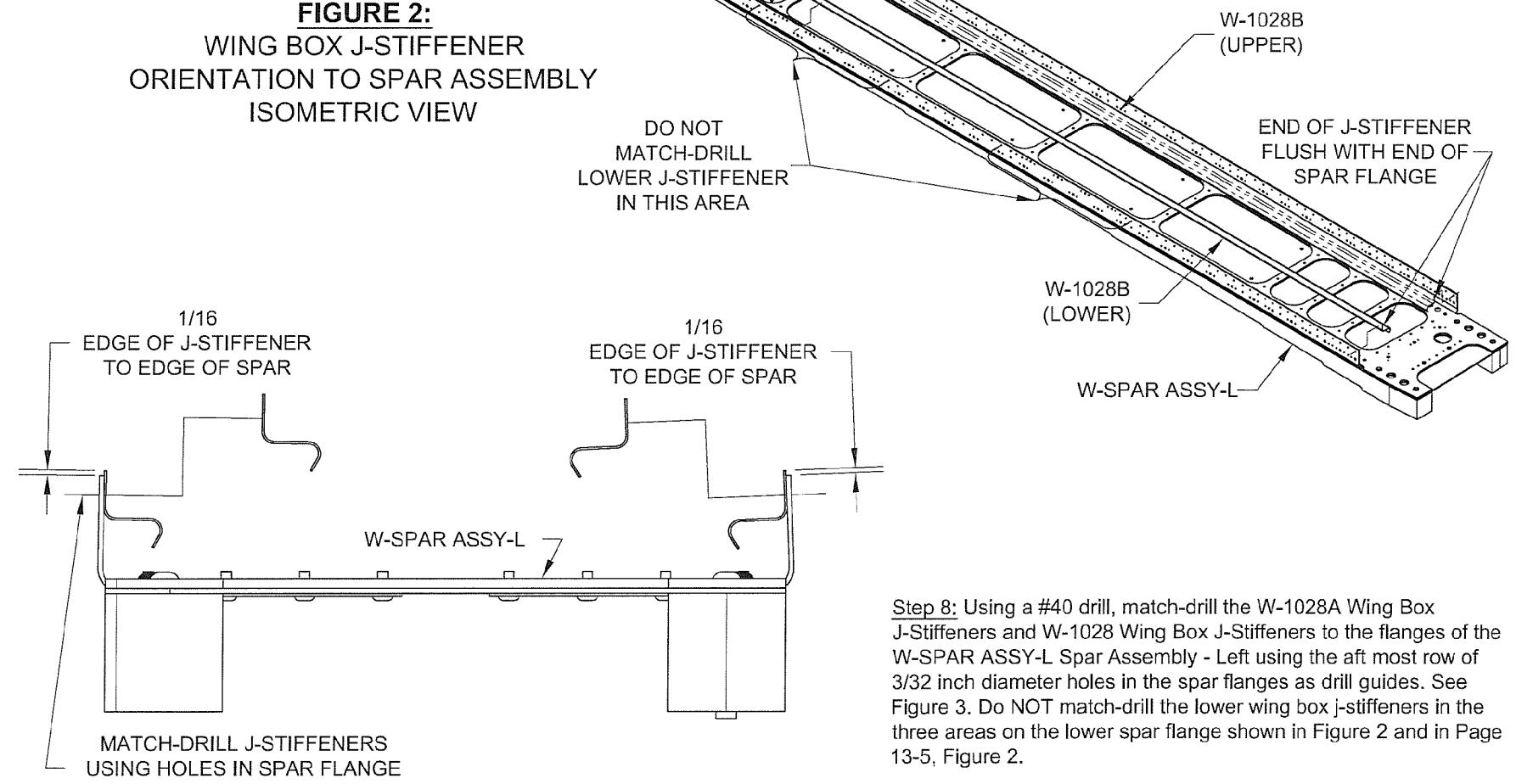


FIGURE 3:
WING BOX J-STIFFENER
ORIENTATION TO SPAR ASSEMBLY
END VIEW

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.

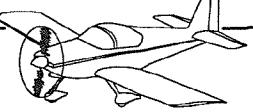
Use "spring clamps" or cleco clamps to hold the wing box j-stiffeners to the spar flanges.

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 and W-1028B Wing Box J-Stiffeners 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.

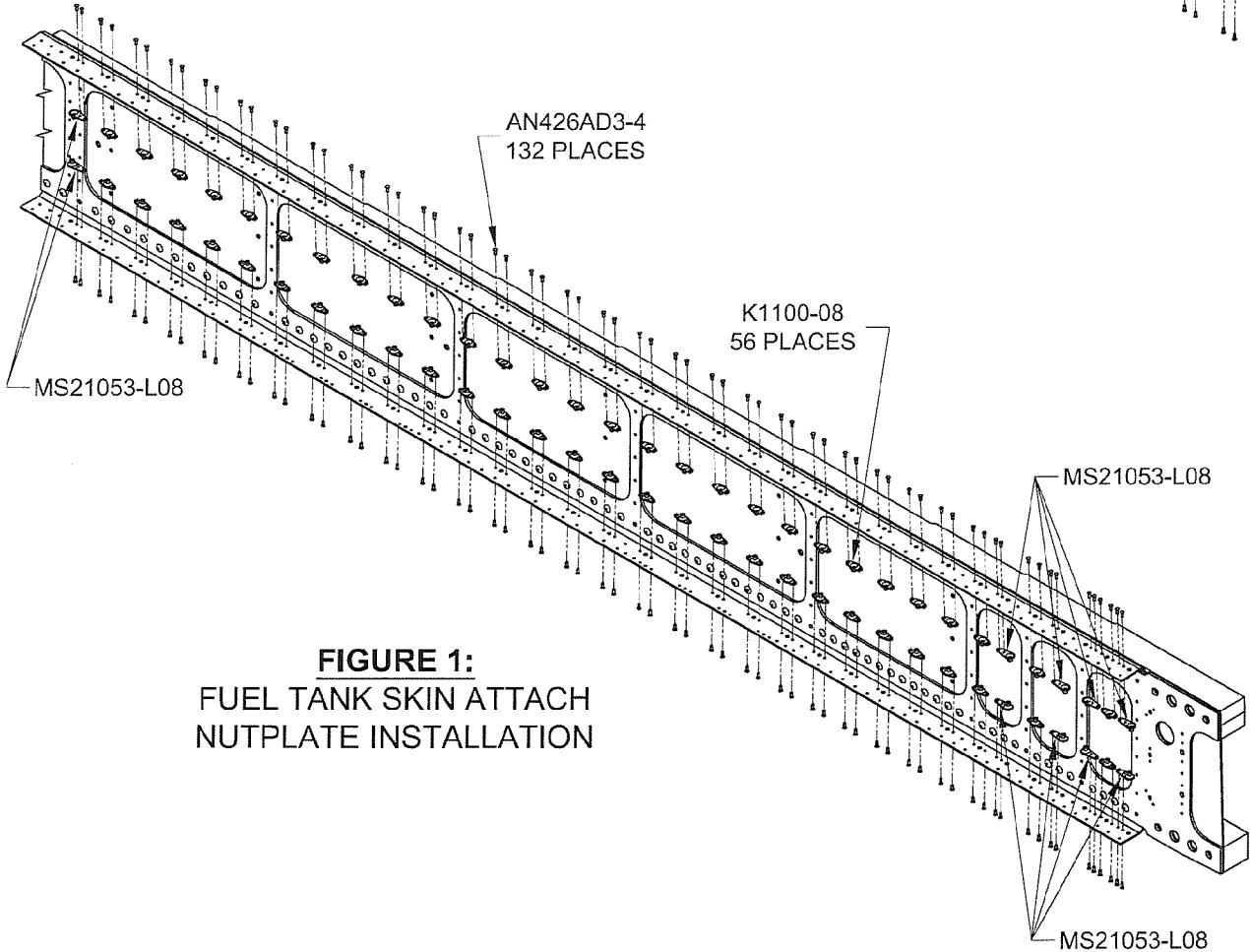


FIGURE 1:
FUEL TANK SKIN ATTACH
NUTPLATE INSTALLATION

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.

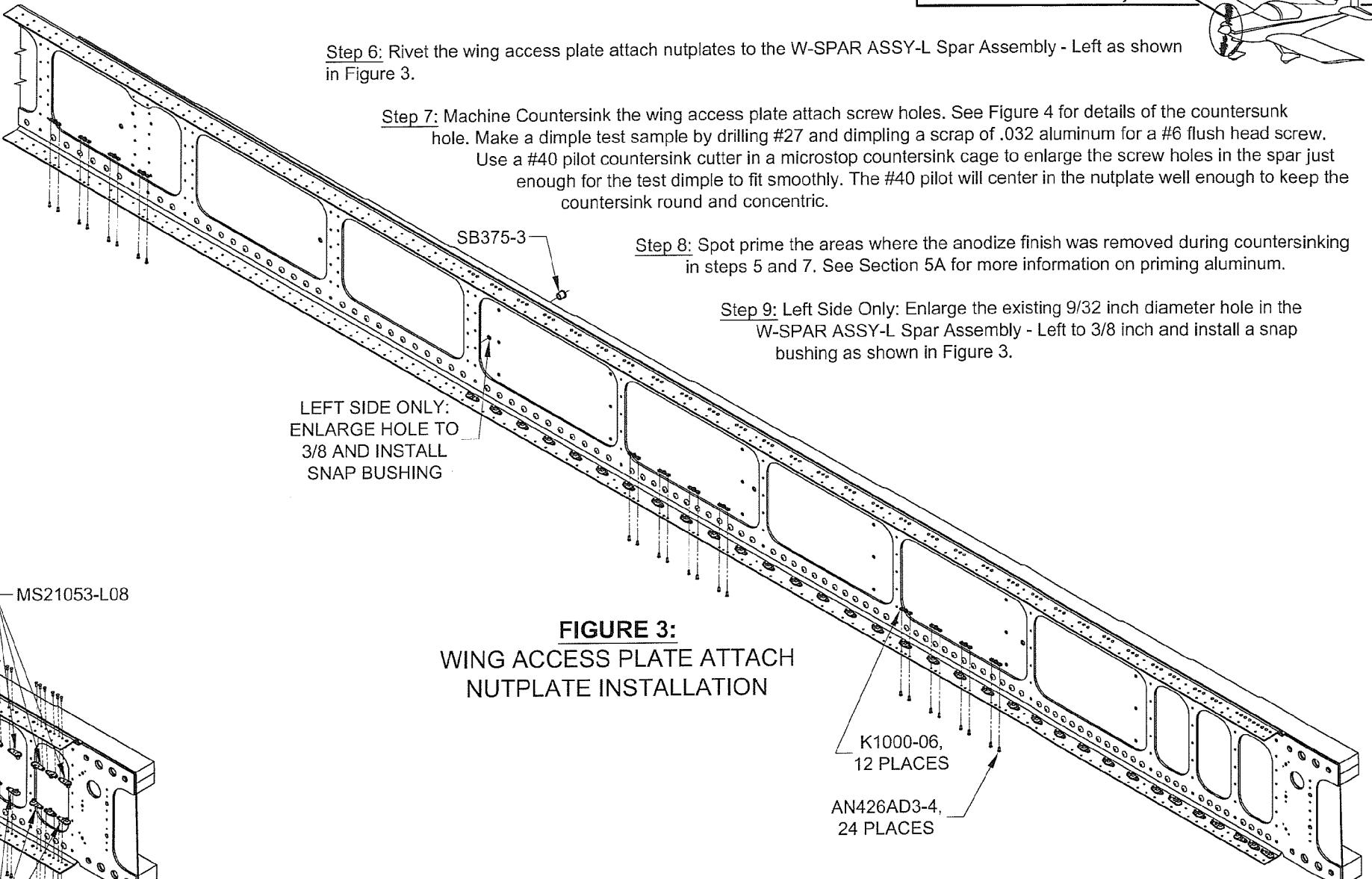


FIGURE 3:
WING ACCESS PLATE ATTACH
NUTPLATE INSTALLATION

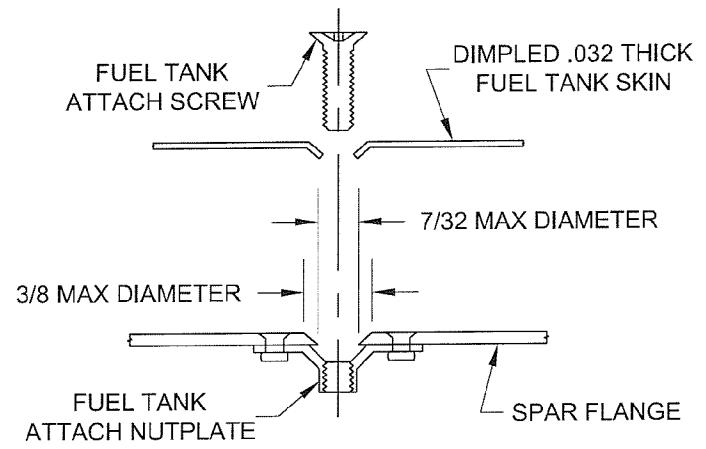


FIGURE 2:
FUEL TANK ATTACH
COUNTERSINK DETAIL

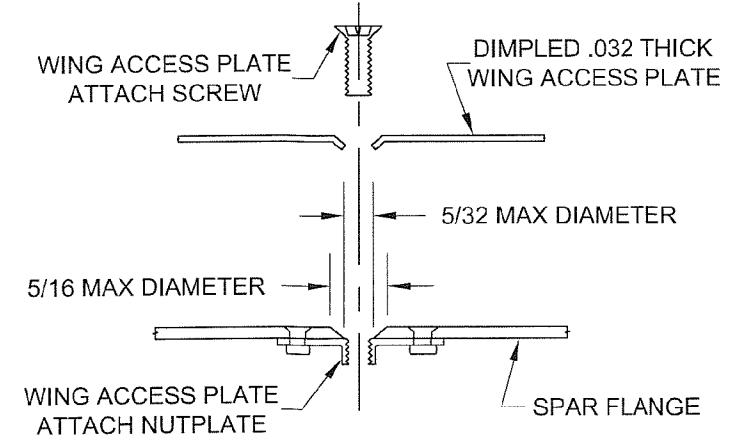
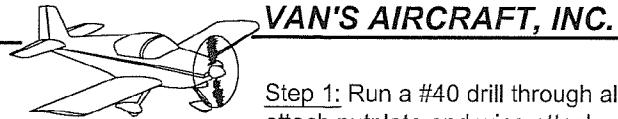


FIGURE 4:
WING ACCESS PLATE ATTACH
COUNTERSINK DETAIL



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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.

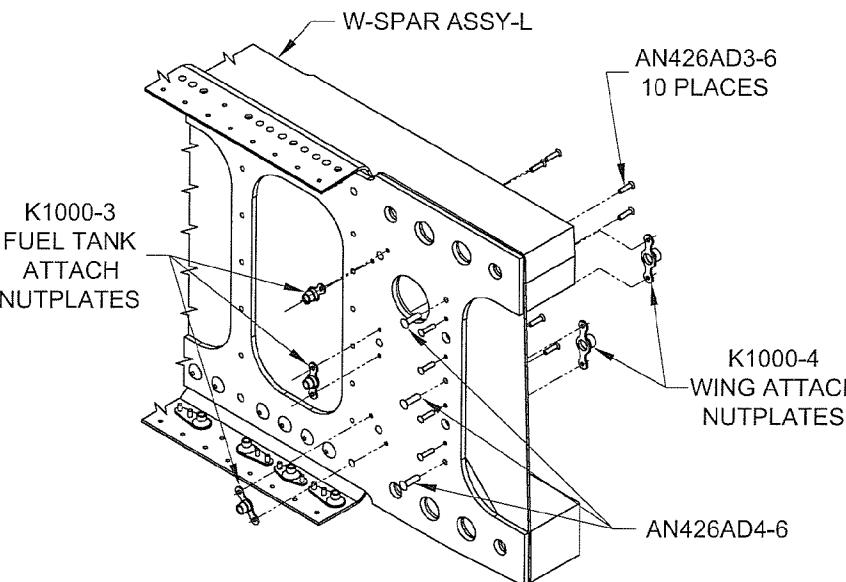


FIGURE 1:
FUEL TANK AND WING ATTACH
NUTPLATE INSTALLATION

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.

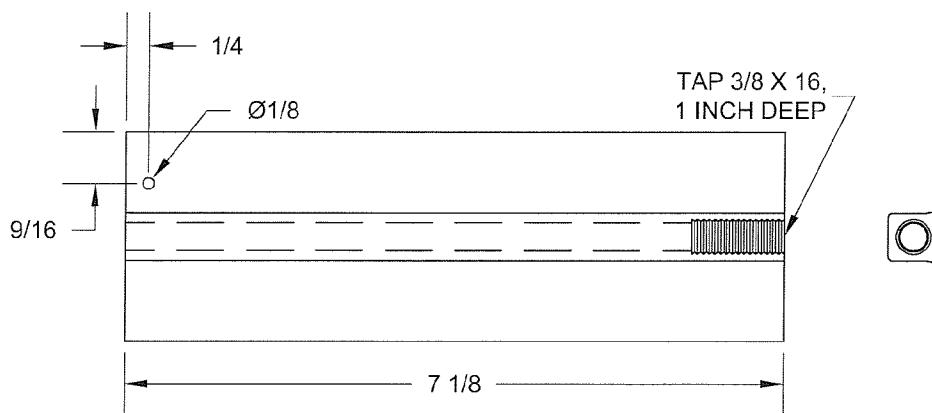


FIGURE 2:
TIE DOWN BRACKET FABRICATION

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.

Step 7: Cleco the W-1020 Tie-Down Bracket to the W-SPAR ASSY-L Spar Assembly - Left as shown in Figure 3. The upper edge of the tie-down bracket rests against the bottom surface of the upper spar step-bar. Using a #30 bit, match-drill holes in the tie-down bracket using the pre-punched #30 holes in the spar assembly as drill guides. Insert clecos in the holes as they are drilled. Using a #12 bit, match-drill holes in the tie-down bracket using the pre-punched 3/16 holes in the spar assembly as drill guides. See Figure 3.

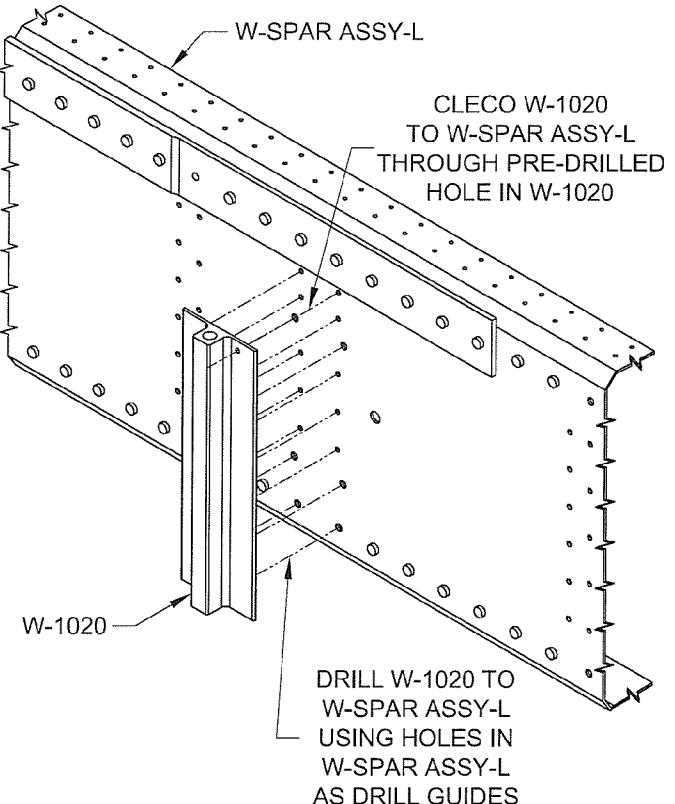


FIGURE 3:
FITTING TIE DOWN BRACKET
TO SPAR ASSEMBLY

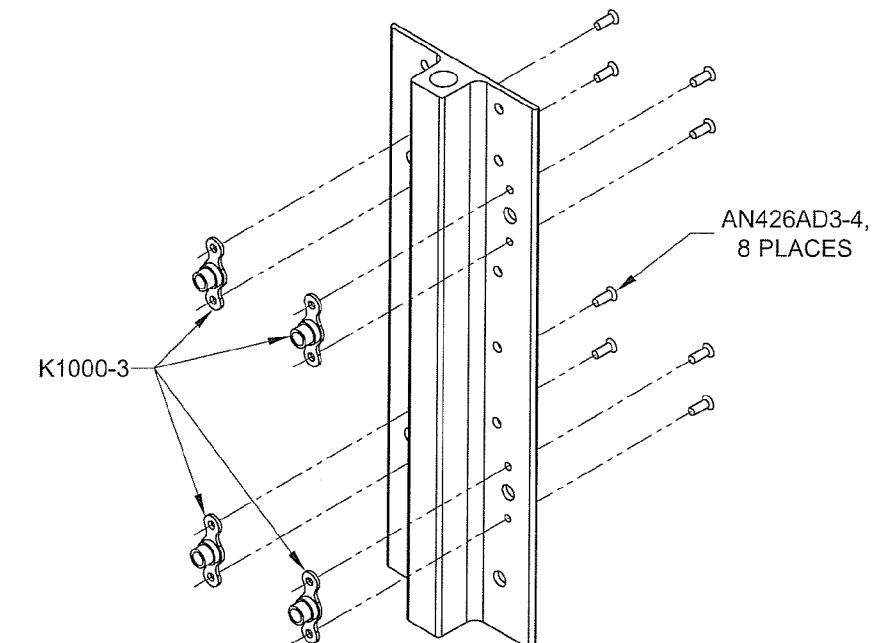
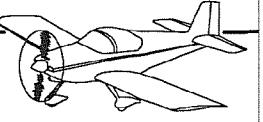


FIGURE 4:
TIE-DOWN BRACKET
NUTPLATE INSTALLATION



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.

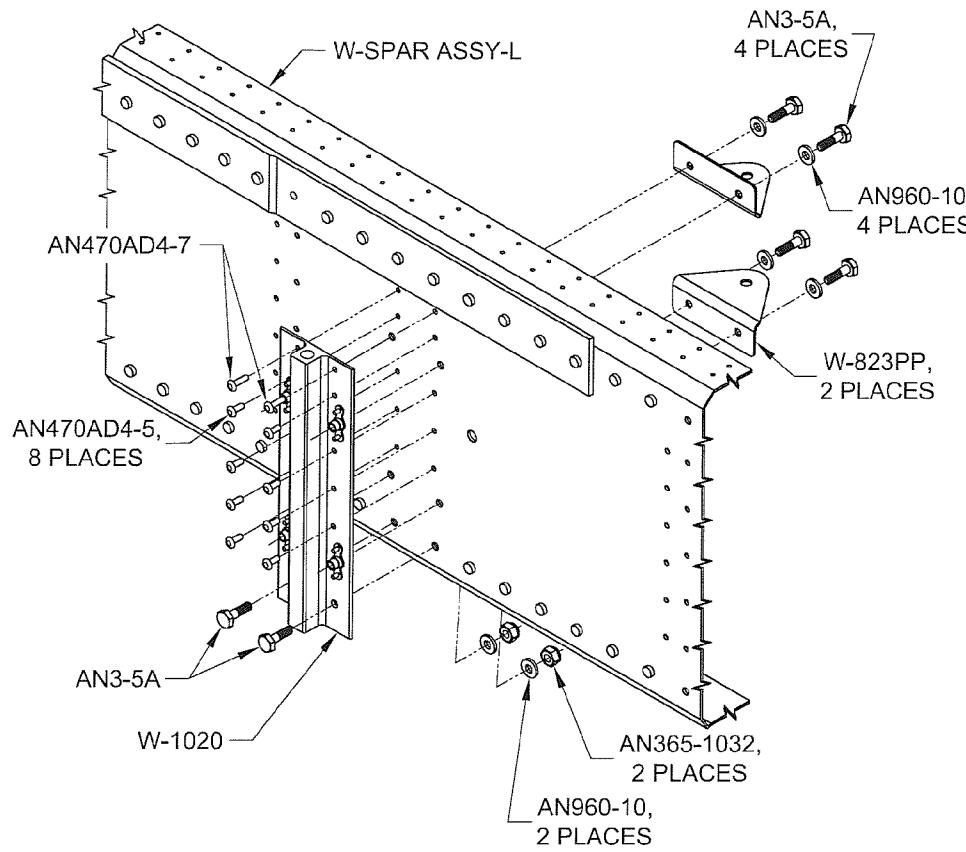


FIGURE 1:
TIE-DOWN BRACKET AND
AILERON BELLCRANK BRACKET
INSTALLATION

- ▽ 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

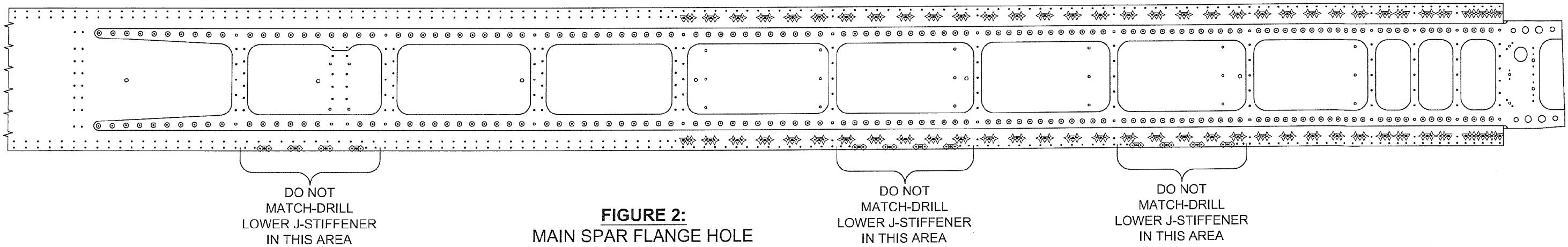
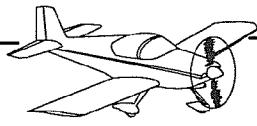
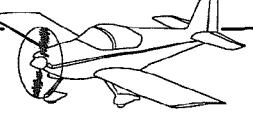


FIGURE 2:
MAIN SPAR FLANGE HOLE
IDENTIFICATION DIAGRAM



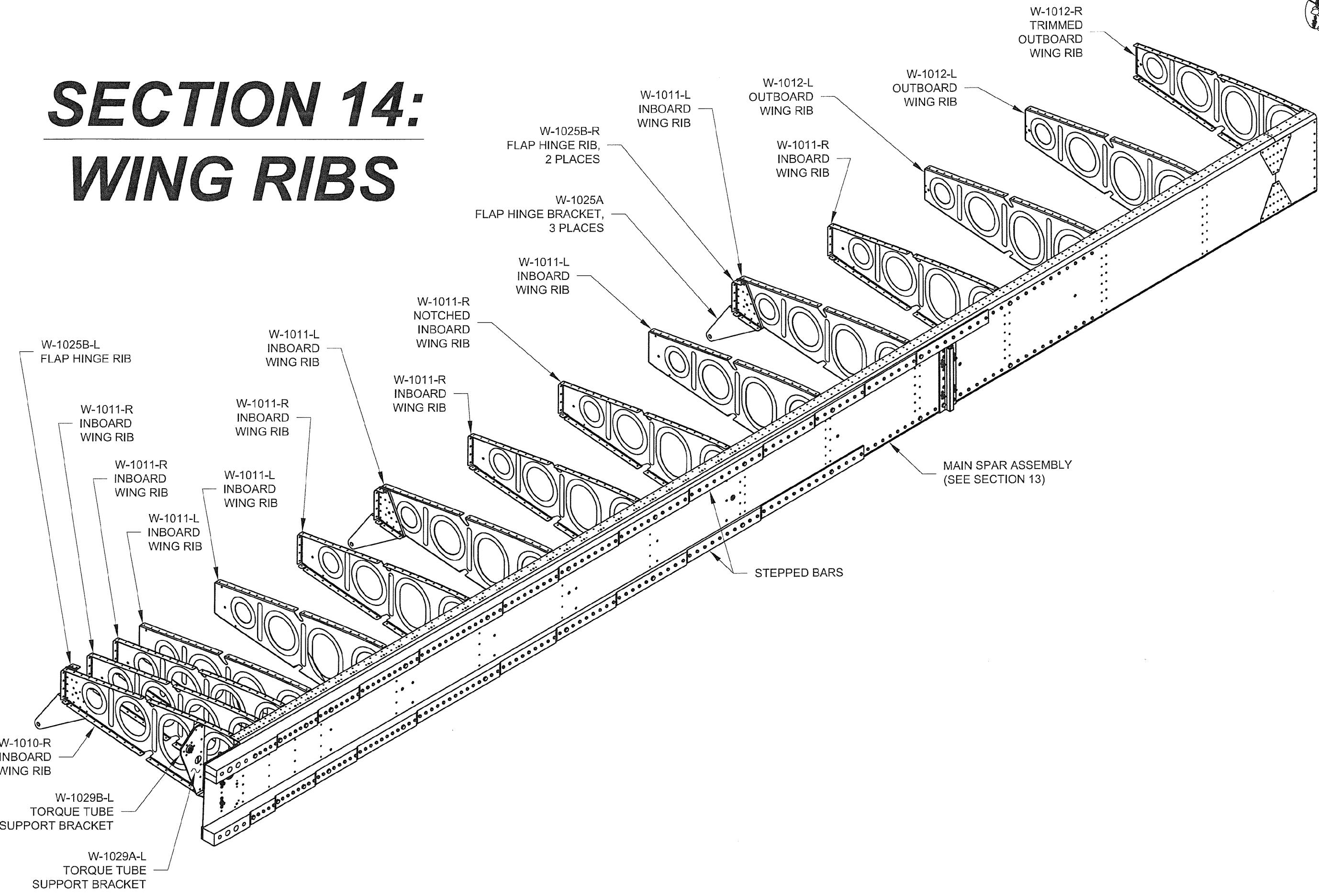
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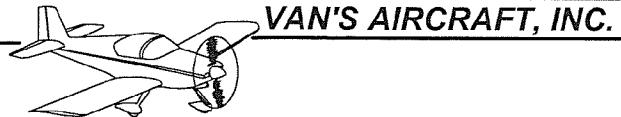
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SECTION 14:

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.

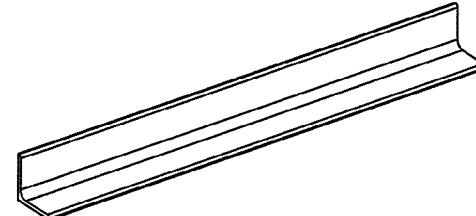


FIGURE 1: CUTTING THE W-1029C ANGLE

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

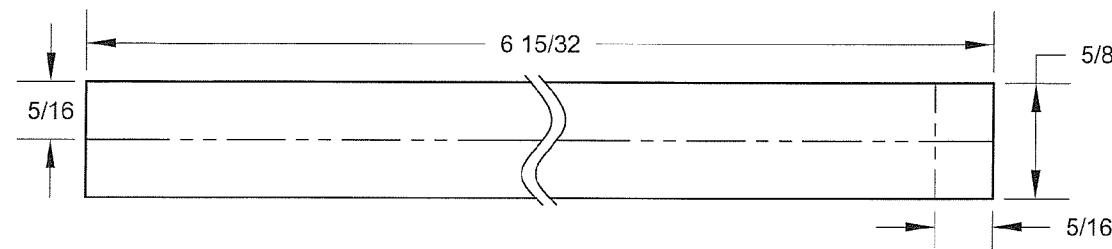


FIGURE 2: CUTTING AND MARKING THE W-1029D SPACER

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

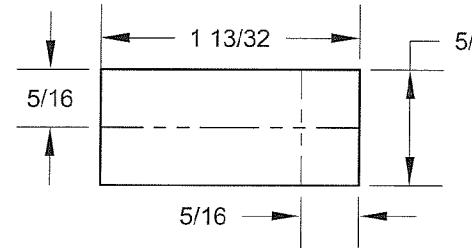


FIGURE 3: CUTTING AND MARKING THE W-1029E SPACER

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.

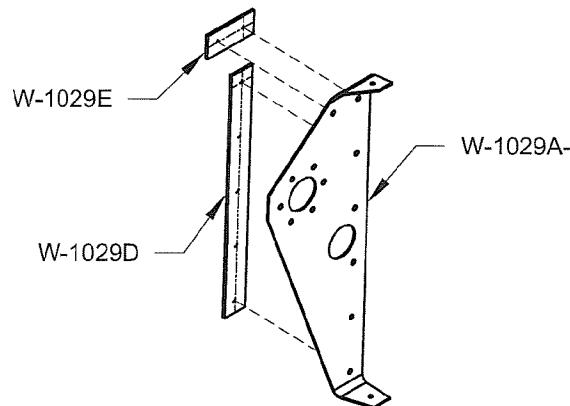


FIGURE 4: MATCH-DRILLING THE SPACERS

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 forth 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.

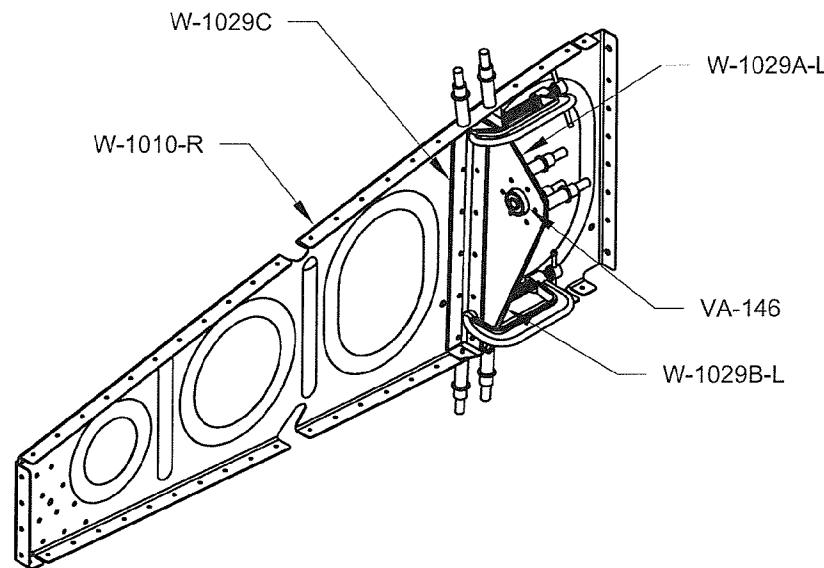


FIGURE 5: MATCH-DRILLING W-1029C ANGLE

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.

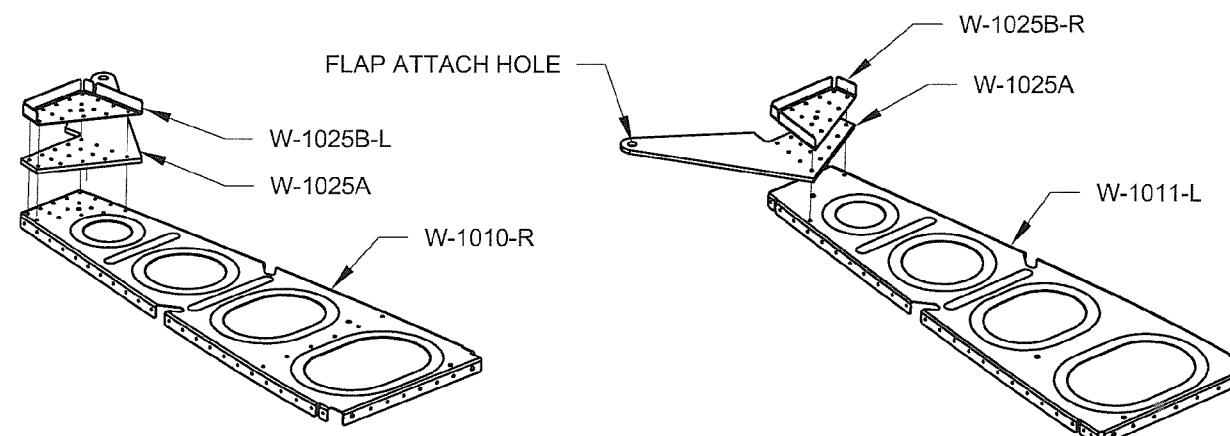
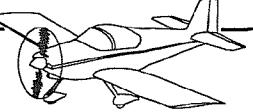


FIGURE 7: INBOARD FLAP HINGE ASSEMBLY

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-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.

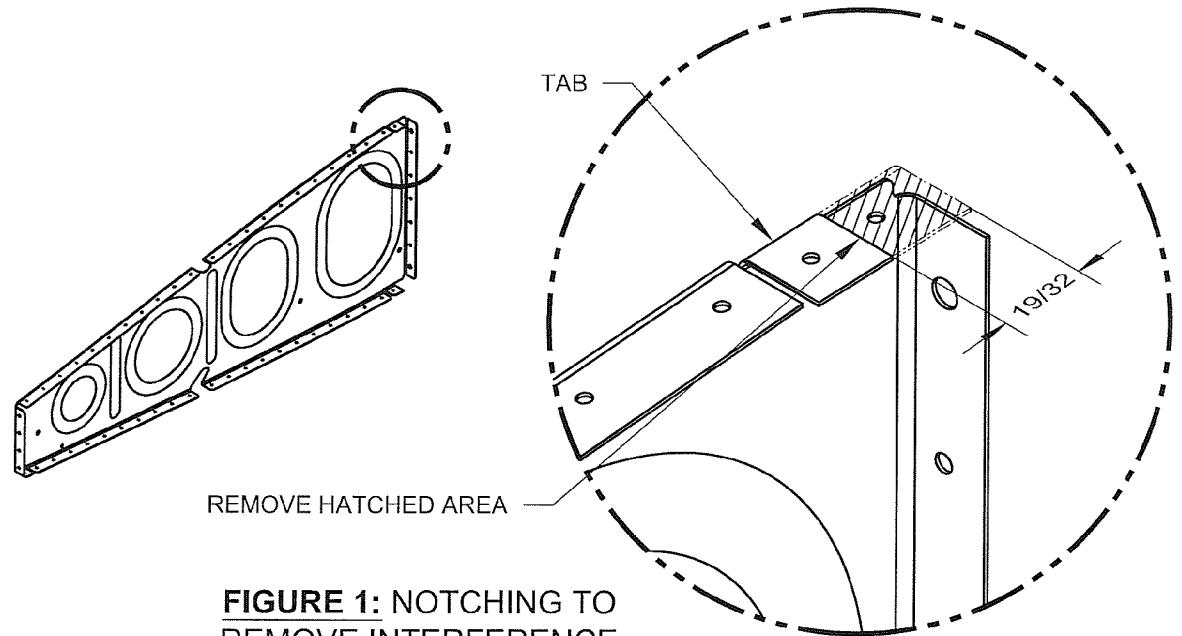


FIGURE 1: NOTCHING TO REMOVE INTERFERENCE

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

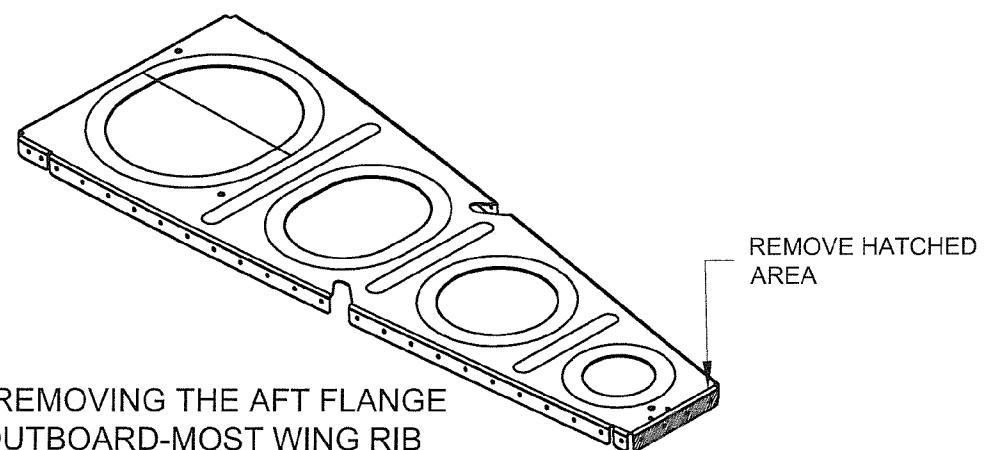


FIGURE 2: REMOVING THE AFT FLANGE OF THE OUTBOARD-MOST WING RIB

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-L Inboard Wing Rib.

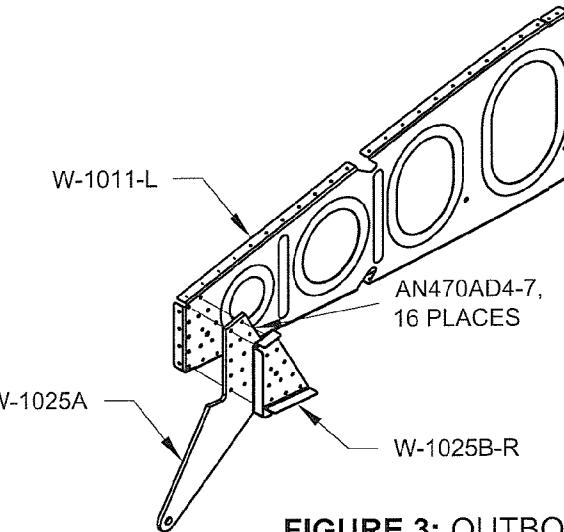


FIGURE 3: OUTBOARD FLAP HINGE ASSEMBLY

Step 6: Cleco and rivet the VA-146 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.

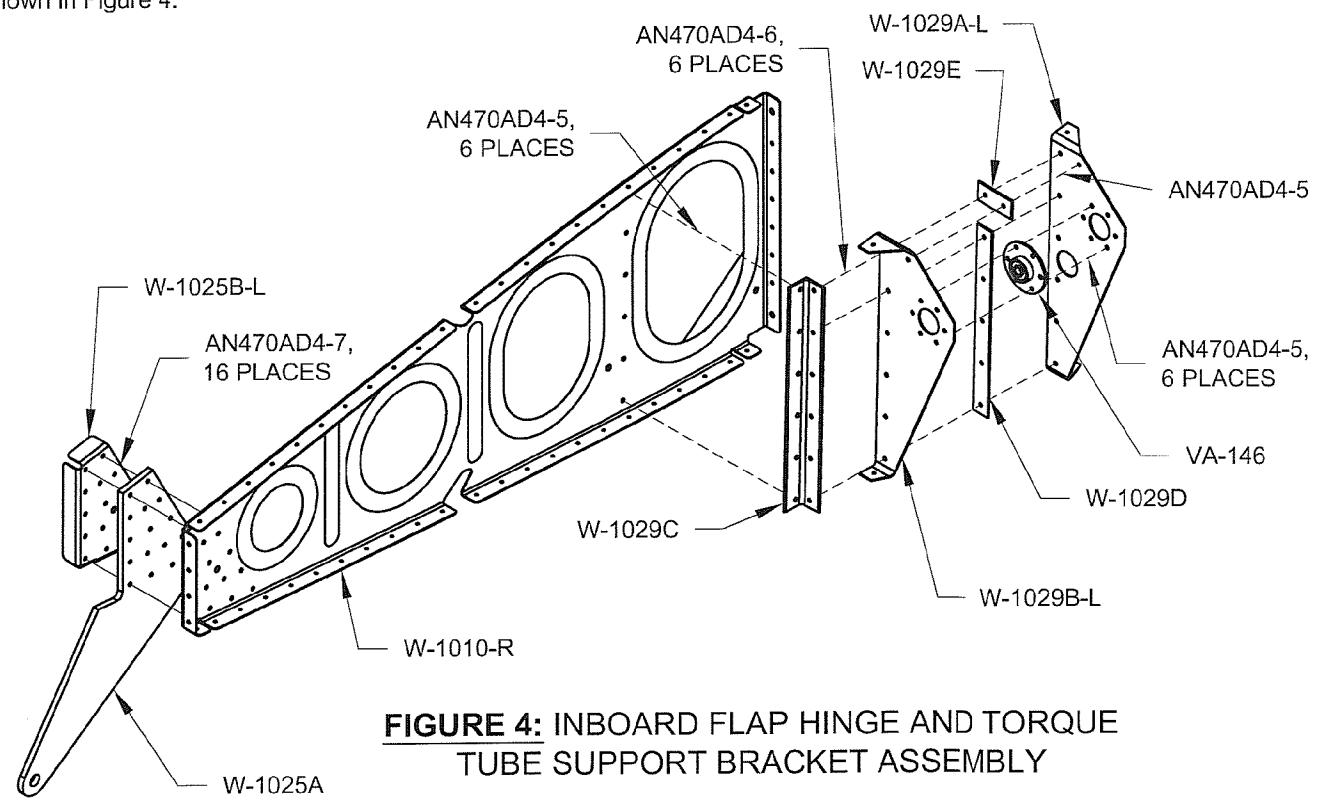
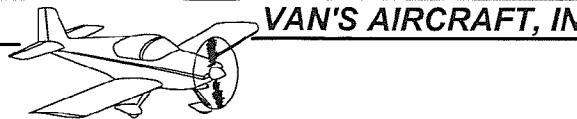


FIGURE 4: INBOARD FLAP HINGE AND TORQUE TUBE SUPPORT BRACKET ASSEMBLY

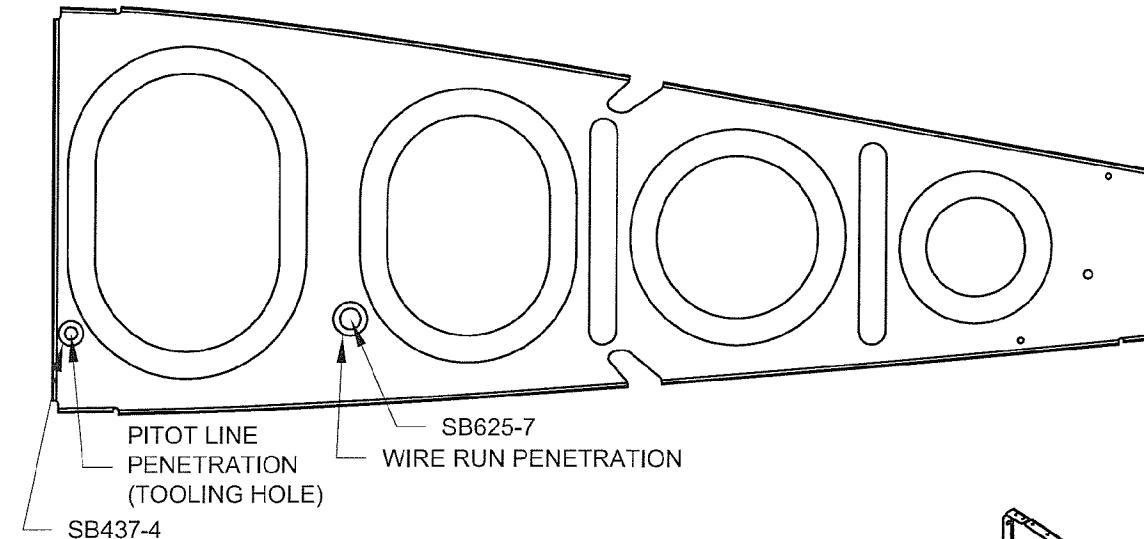


NOTE: Before enlarging holes and installing snap bushings, check the snap bushing size by inserting the anticipated wires and AOA lines etc. (see Page 20-3) through a SB625-7 Snap Bushing. If the snap bushing is too big order and install a smaller snap bushing from VAN'S ACCESSORY CATALOG to prevent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

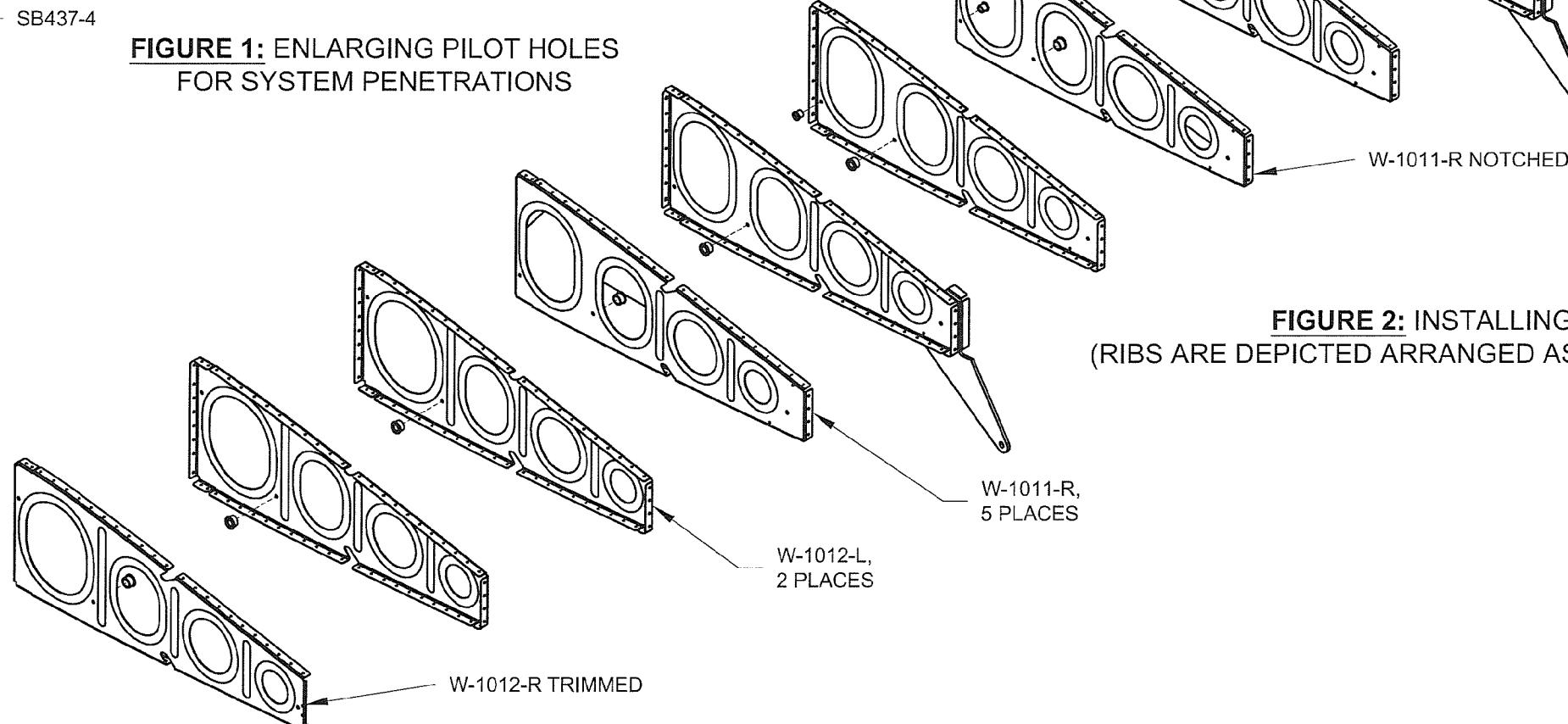
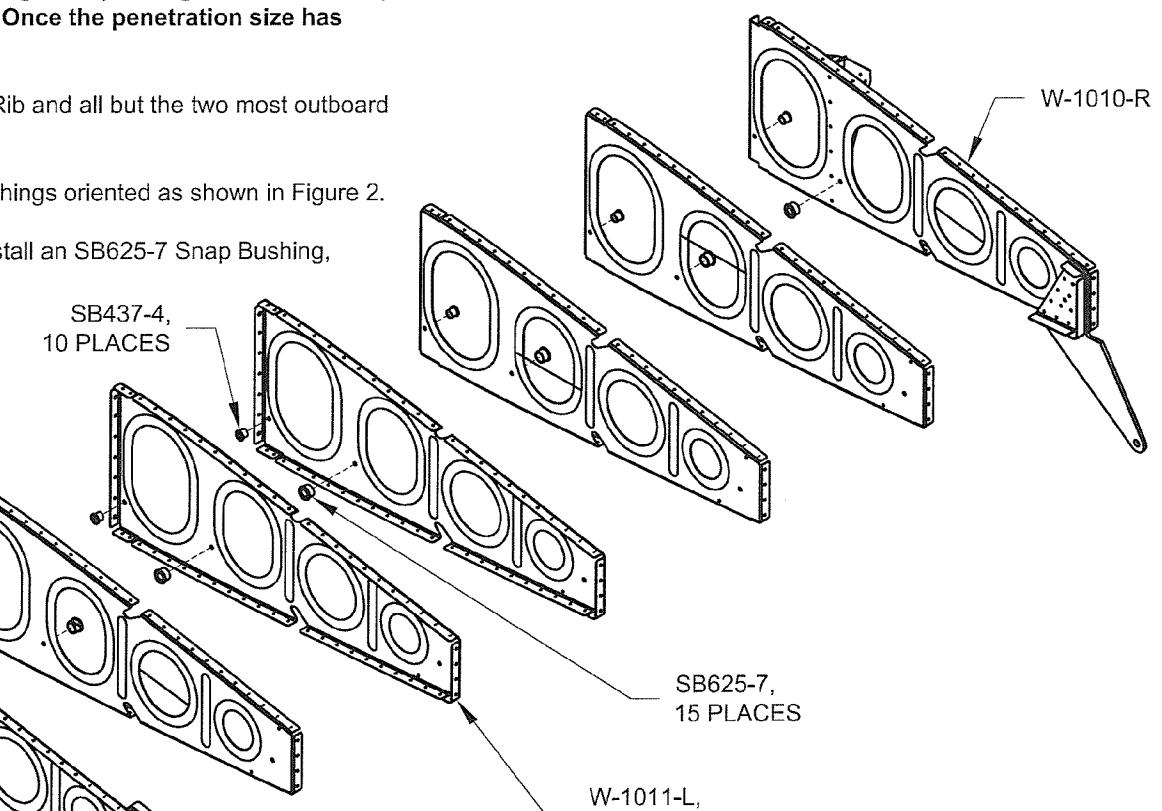
Step 1: This step is for the left wing only. Enlarge the forward tooling hole to 7/16 diameter and install a SB437-4 Snap Bushing in the W-1010-R Inboard Wing Rib and all but the two most outboard instances of the W-1011-L/R Inboard Wing Ribs, see Figure 1 and Figure 2.

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.

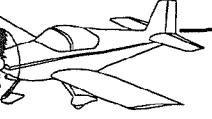
Enlarge the wire run pilot hole to 5/8 diameter in the W-1010-L/R Inboard Wing Rib (this will make a small notch in the W-1029C Angle, which is acceptable). Install an SB625-7 Snap Bushing, inserted from the inboard side of the rib as shown in Figure 2.



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



**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.

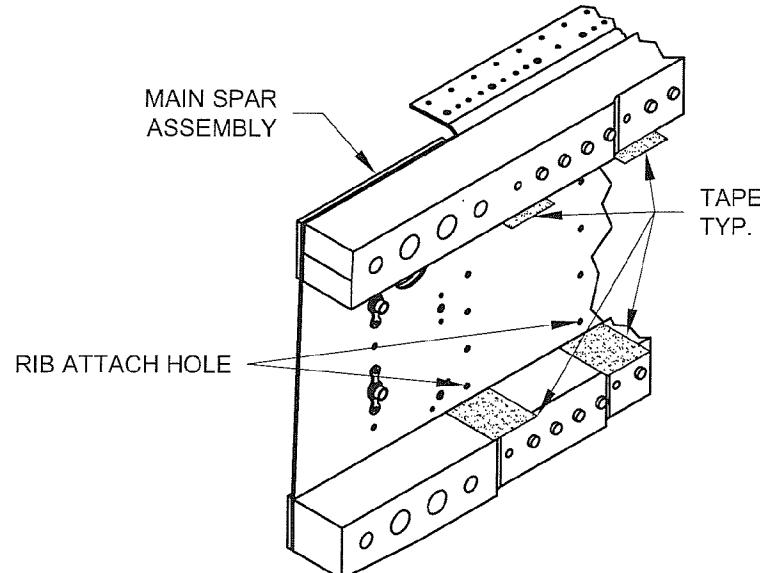


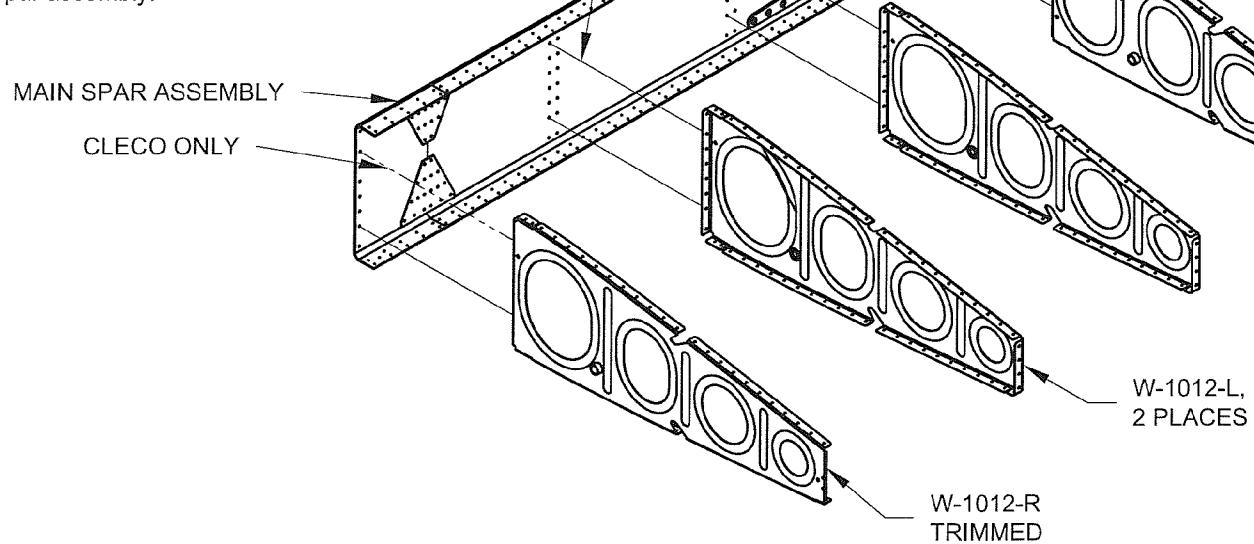
FIGURE 1: PROTECTIVE TAPE

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. Final-Drill #40 the forward most hole in the forward tabs of the seven inboard most W-1011-L/R Inboard Wing Ribs. AN4

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. AN470A

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.



This technical drawing illustrates the assembly of an aircraft interior panel. The main structure consists of two parallel longitudinal beams connected by transverse panels. The top beam features several circular cutouts. Labels indicate specific locations for hardware installation:

- AN470AD4-7, 5 PLACES
- AN470AD4-7, 5 PLACES
- AN426AD3-4, 2 PLACES
- AN470AD4-7, 5 PLACES
- AN426AD3-4, 2 PLACES
- AN470AD4-7, 5 PLACES
- AN426AD3-4, 2 PLACES
- AN470AD4-7, 5 PLACES

Two additional labels point to specific components:

- W-1010-R
- W-1011-L

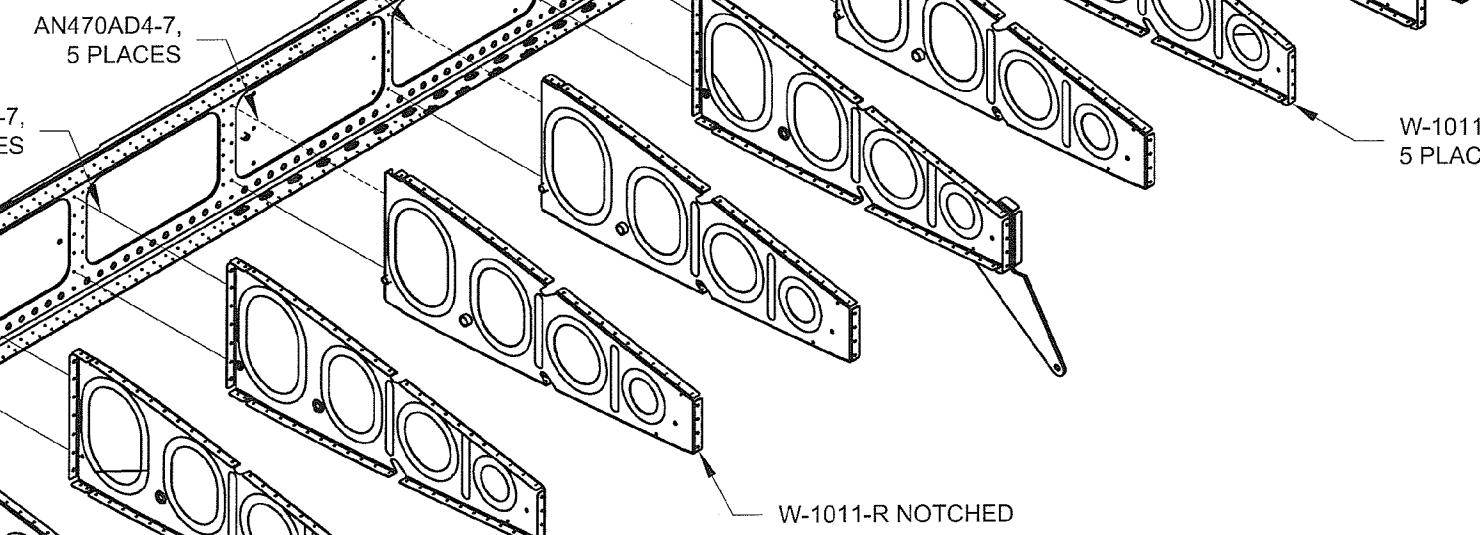
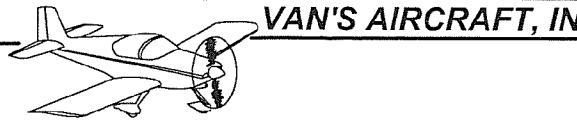
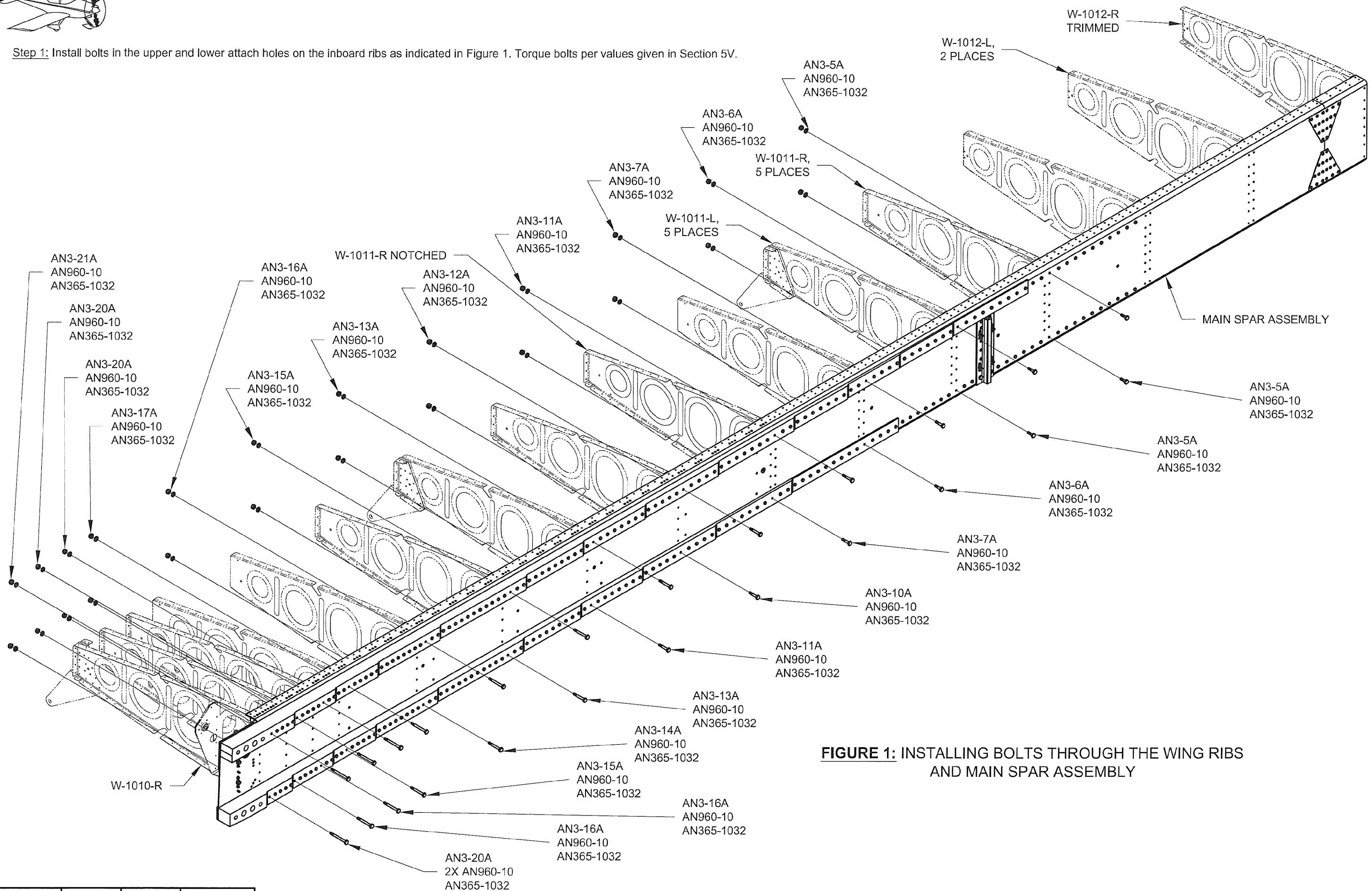


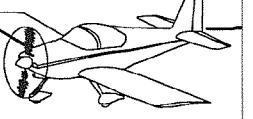
FIGURE 2: RIVETING THE WING RIBS TO THE MAIN SPAR ASSEMBLY



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.

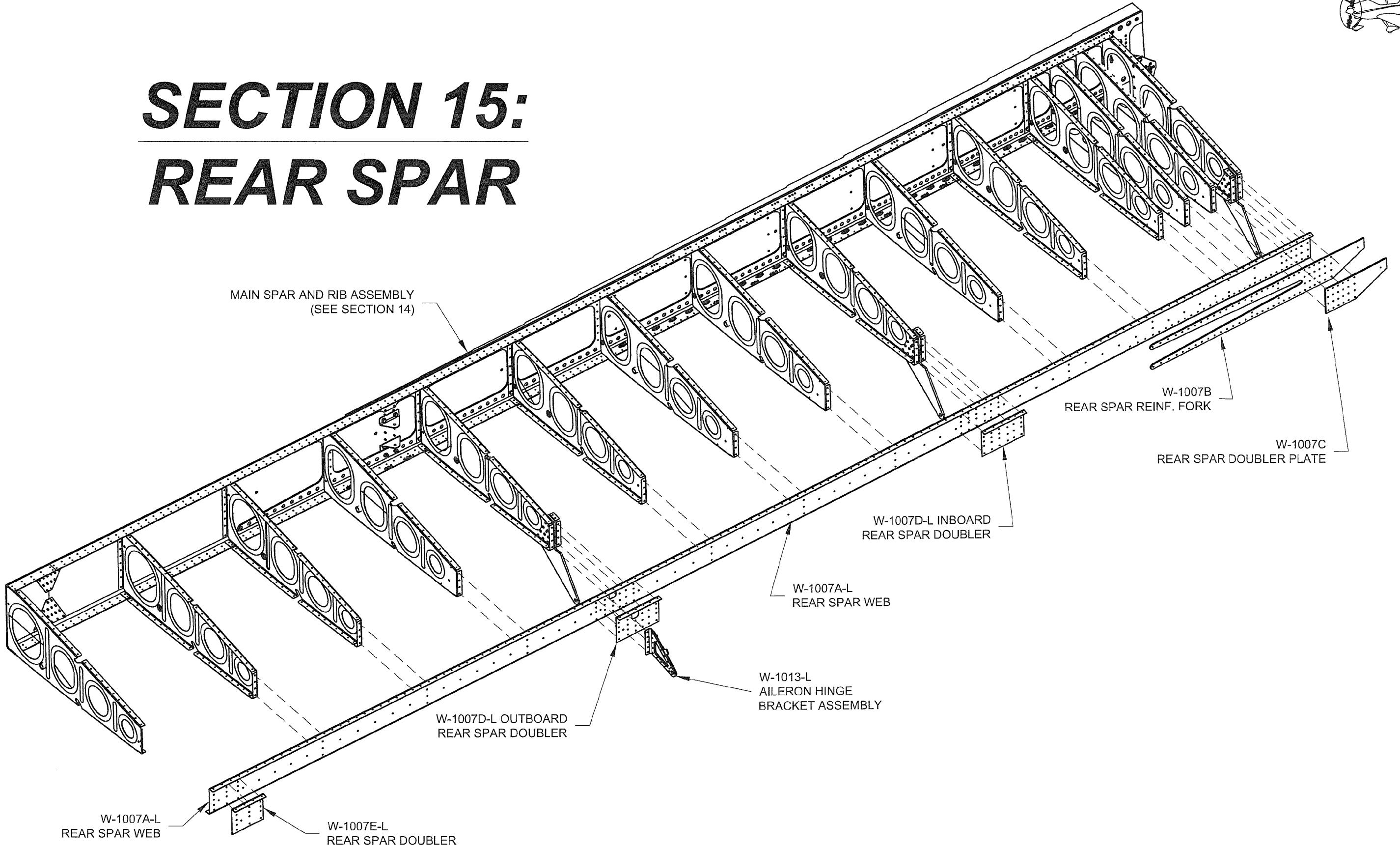


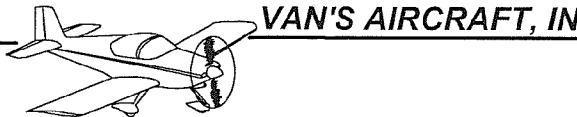
**FIGURE 1: INSTALLING BOLTS THROUGH THE WING RIBS
AND MAIN SPAR ASSEMBLY**



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: Of the four W-1013A Aileron Hinge Bracket Spacers supplied in the kit two will be used in the W-1014-L/R Aileron Hinge Bracket Assemblies and will need the aileron stop tab trimmed off as shown in Figure 1.

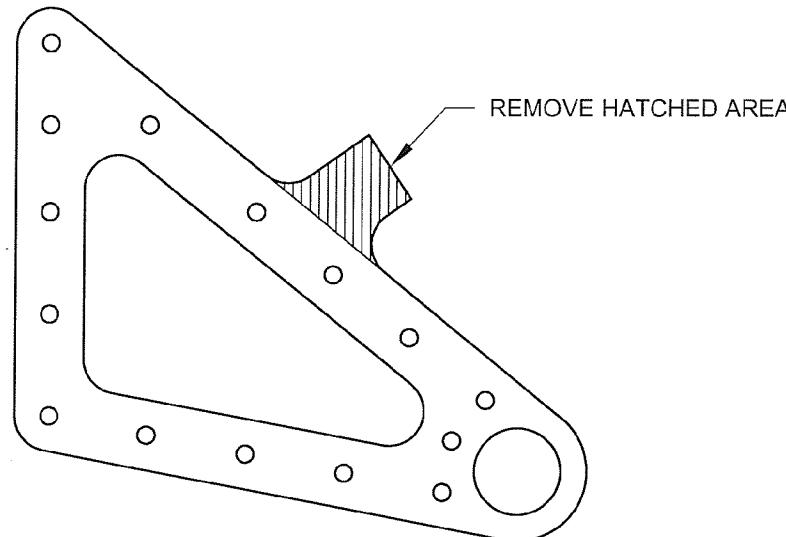


FIGURE 1: HINGE BRACKET SPACER TRIM FOR OUTBOARD AILERON HINGE BRACKET ASSEMBLIES

Step 2: Cleco the W-1013A Aileron Hinge Bracket Spacer, W-1013B-L and W-1013C-L Aileron Hinge Bracket Sides together as shown in Figure 2. Final-Drill #30 all common attach holes. Machine countersink the aft holes as indicated in Figure 2 on the **outboard** face of the W-1013C-L Aileron Hinge Bracket Side for the head of an AN426AD4 rivet. See Section 5E for more information on countersinking. Repeat this process for the right inboard aileron bracket assembly.

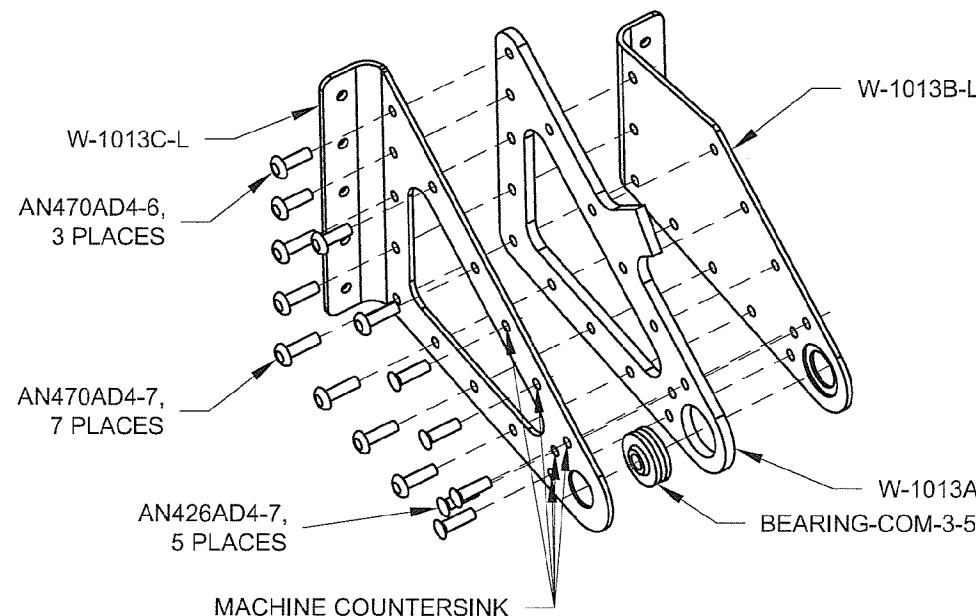


FIGURE 2: INBOARD AILERON BRACKET ASSEMBLY

Step 3: Cleco the W-1013A TRIMMED Aileron Hinge Bracket Spacer, W-1013C-LX and W-1013C-R Aileron Hinge Bracket Sides together as shown in Figure 3. Match-Drill #30 all common attach holes. Machine countersink the aft holes (as indicated in Figure 3) 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.

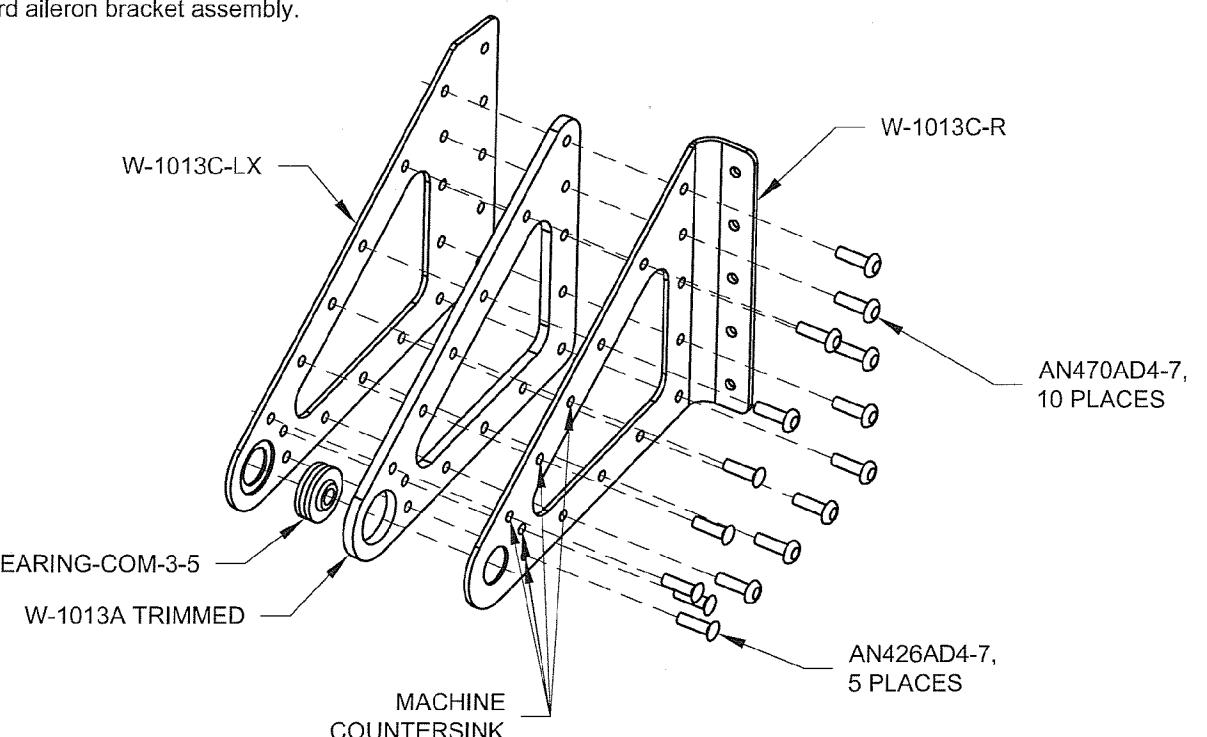


FIGURE 3: OUTBOARD AILERON BRACKET ASSEMBLY

Step 4: Disassemble all parts.

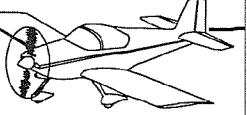
Thoroughly deburr the edges and holes in all parts.

Prime all parts if/as required.

Step 5: Press a BEARING-COM-3-5 into all W-1013A and W-1013A TRIMMED Aileron Hinge Bracket Spacers as shown in Figure 2 and Figure 3. 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 6: Cleco the assemblies back together per Step 2 and Step 3. 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 7: Rivet the assemblies together using the rivet callouts shown in Figure 2 and Figure 3. Set the rivets in a random pattern to inhibit warping in the final assemblies. Set the W-1013-R assembly aside for use in the right wing rear spar assembly. 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.



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.

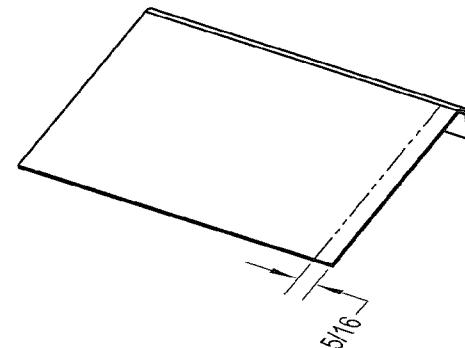


FIGURE 1: MARKING W-1007D

Step 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.

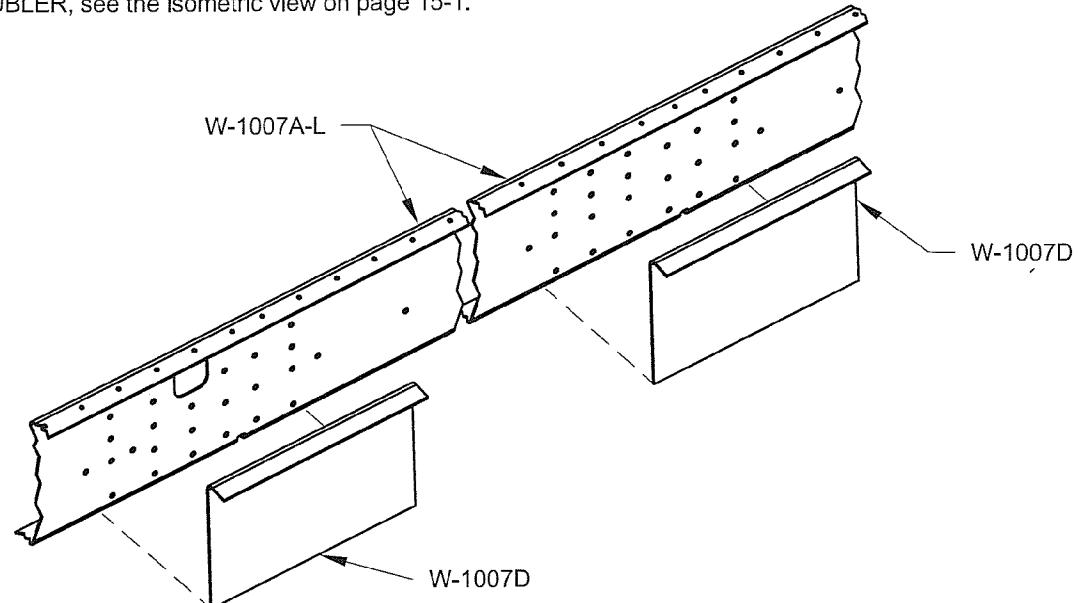


FIGURE 2: MATCH-DRILL THE W-1007D REAR SPAR DOUBLER PLATES

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.

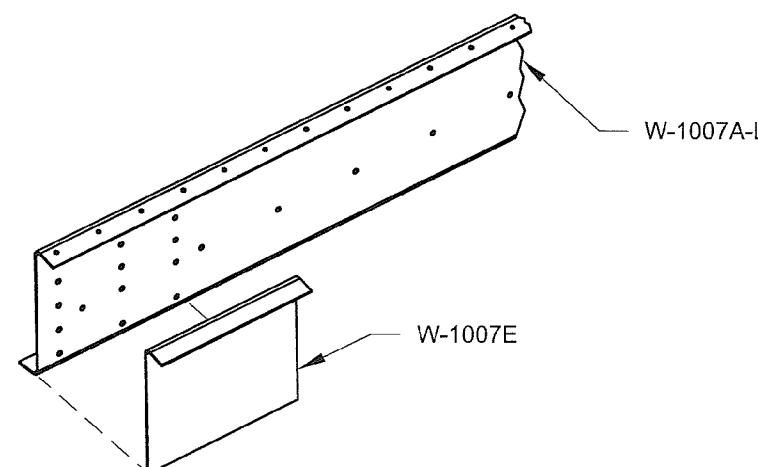


FIGURE 2: MATCH-DRILLING THE REAR SPAR DOUBLER PLATE

Step 4: With the the W-1007D Outboard Rear Spar Doubler Plate 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 corner radii as shown in Figure 3. Enlarge the pilot holes with a unibit to the full corner radius size. Cut in between the quadrants of the holes to remove the remaining material. Smooth the edges of the hole as required.

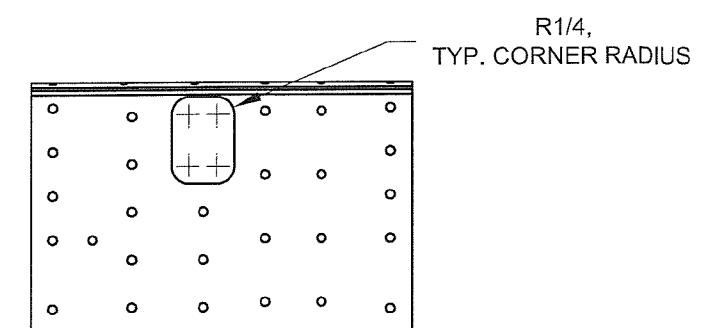
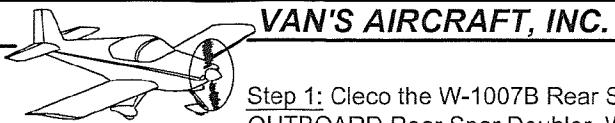


FIGURE 3: COPYING THE AILERON PUSHROD HOLE INTO W-1007D-L OUTBOARD REAR SPAR DOUBLER



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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.

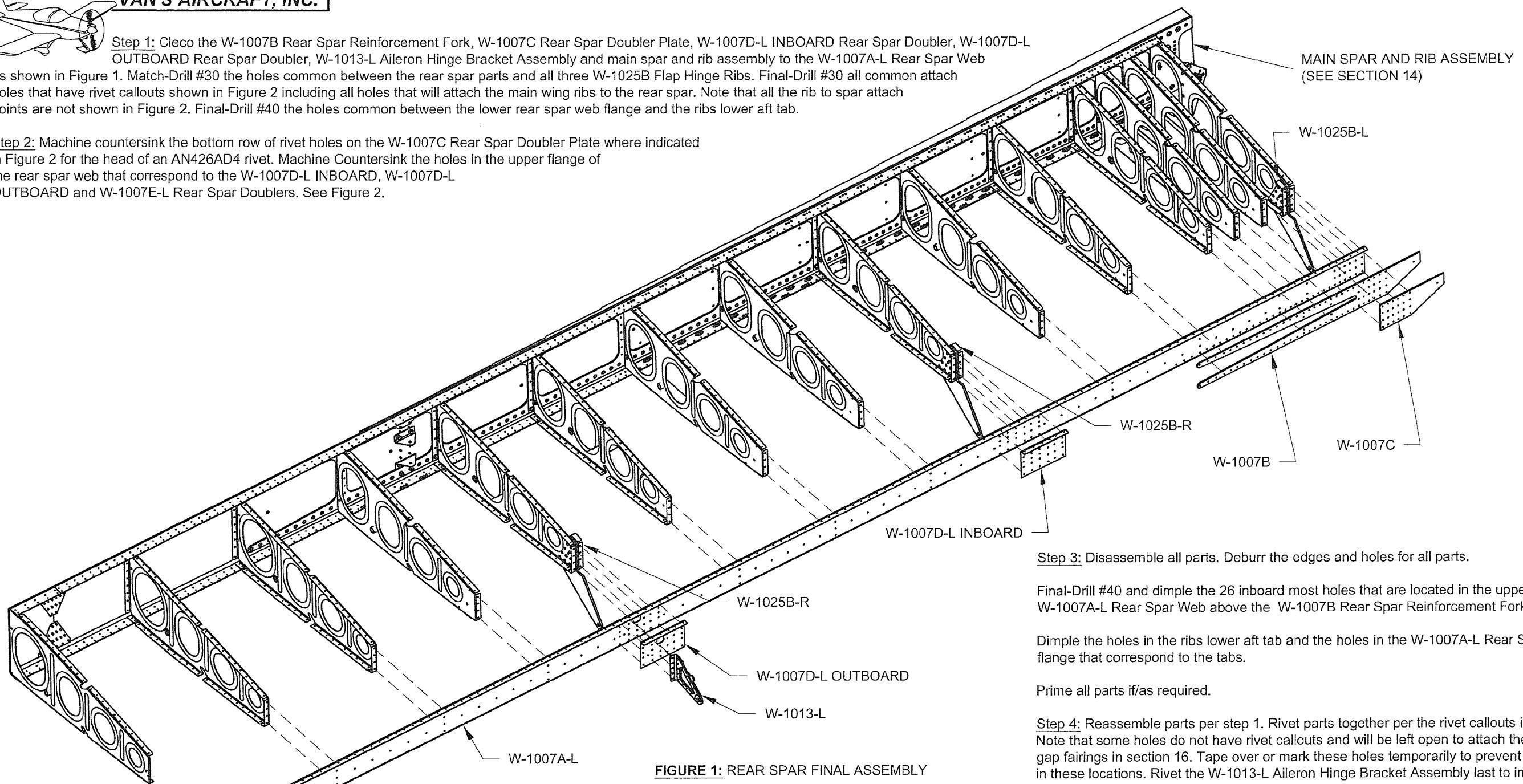


FIGURE 1: REAR SPAR FINAL ASSEMBLY

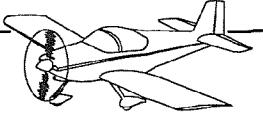
- ❖ AN470AD4-4
- ❖ AN470AD4-5
- ❖ AN470AD4-6
- ❖ AN470AD4-7
- ❖ AN470AD4-8
- ❖ AN426AD4-8

W-1007E-L

MACHINE COUNTERSINK

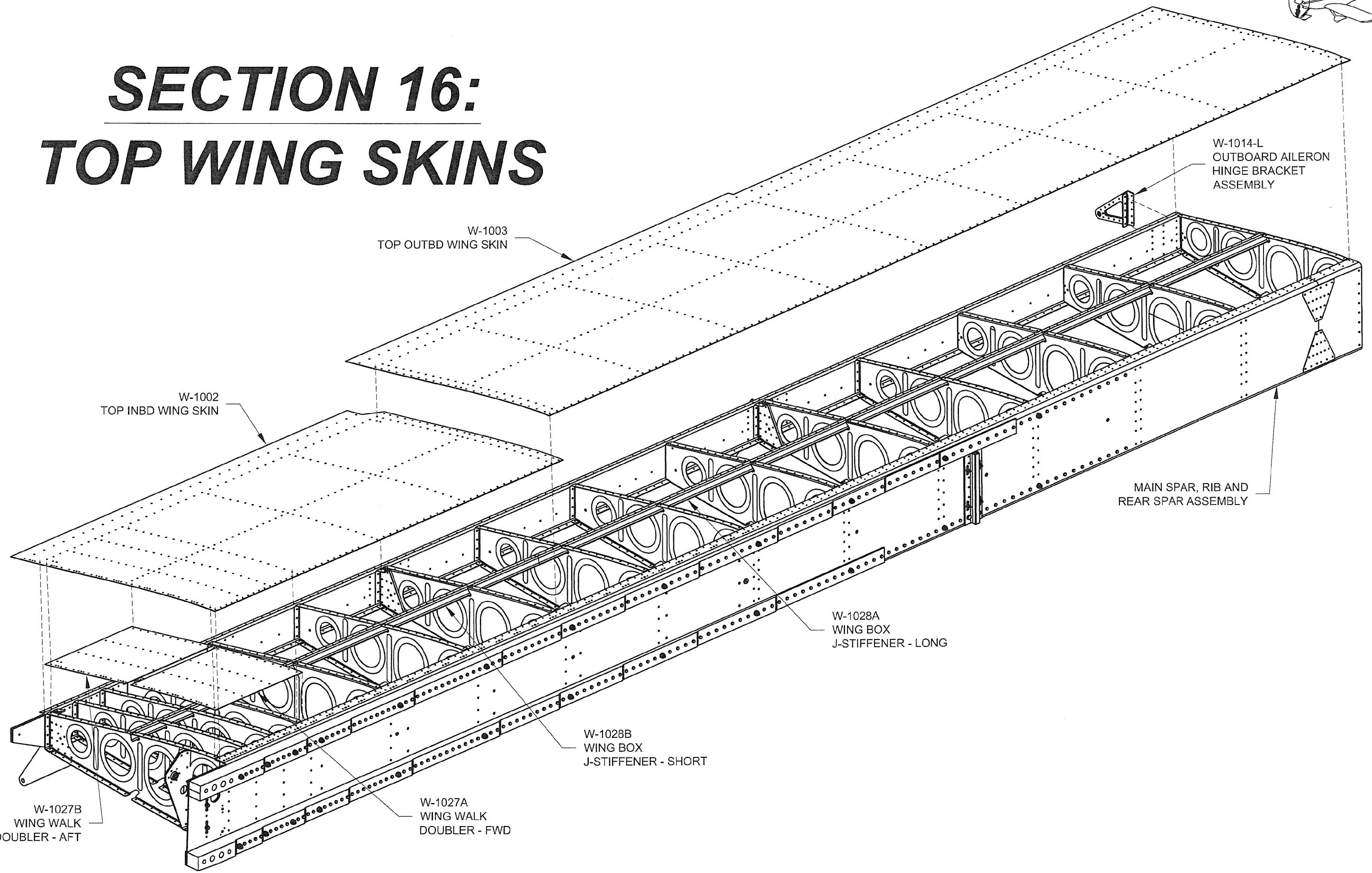
W-1007E-L

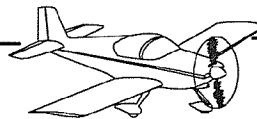
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SECTION 16:

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.

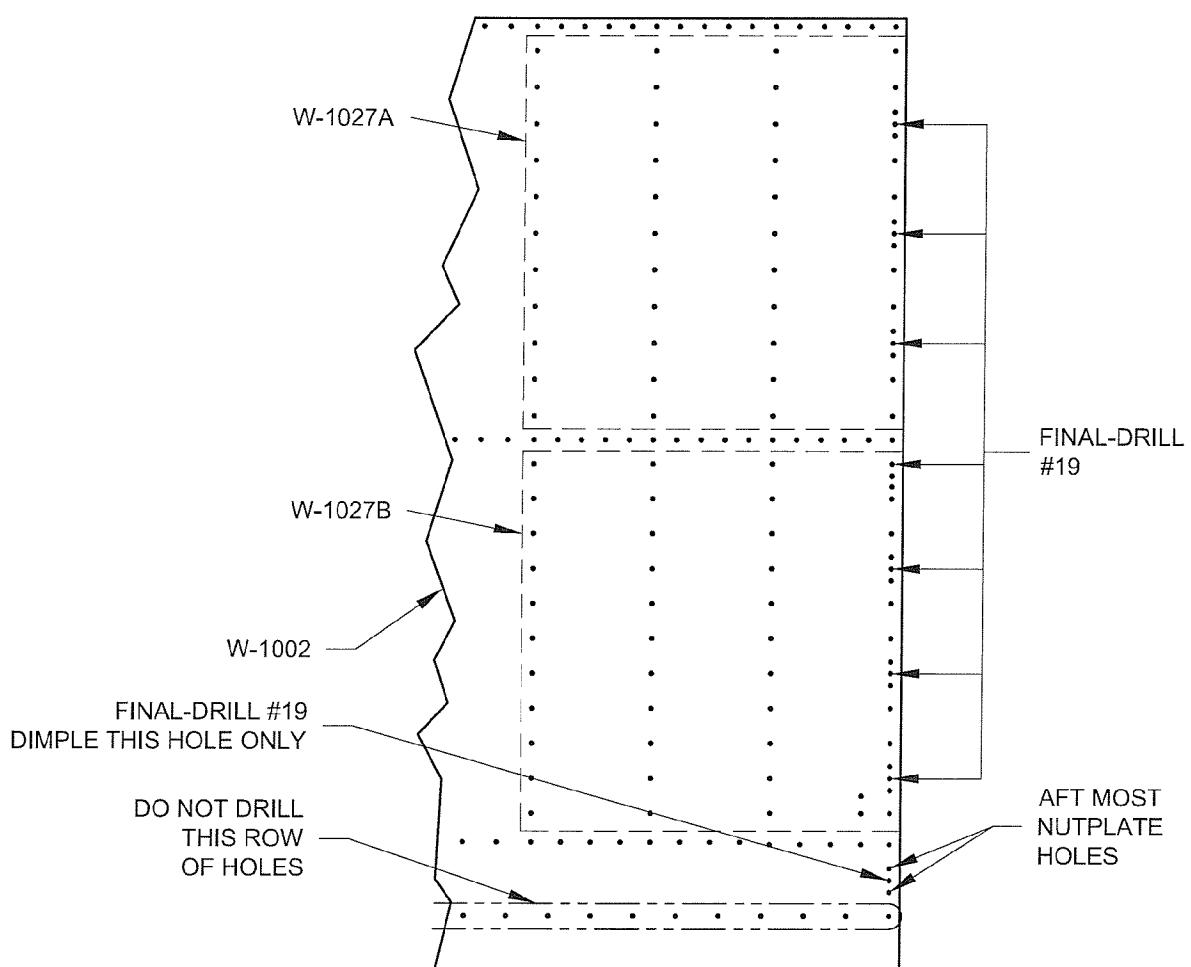
Step 2: Final-Drill #40 all the holes common to the top wing skins and the spars, J-stiffeners, wing walk doublers and ribs.

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.

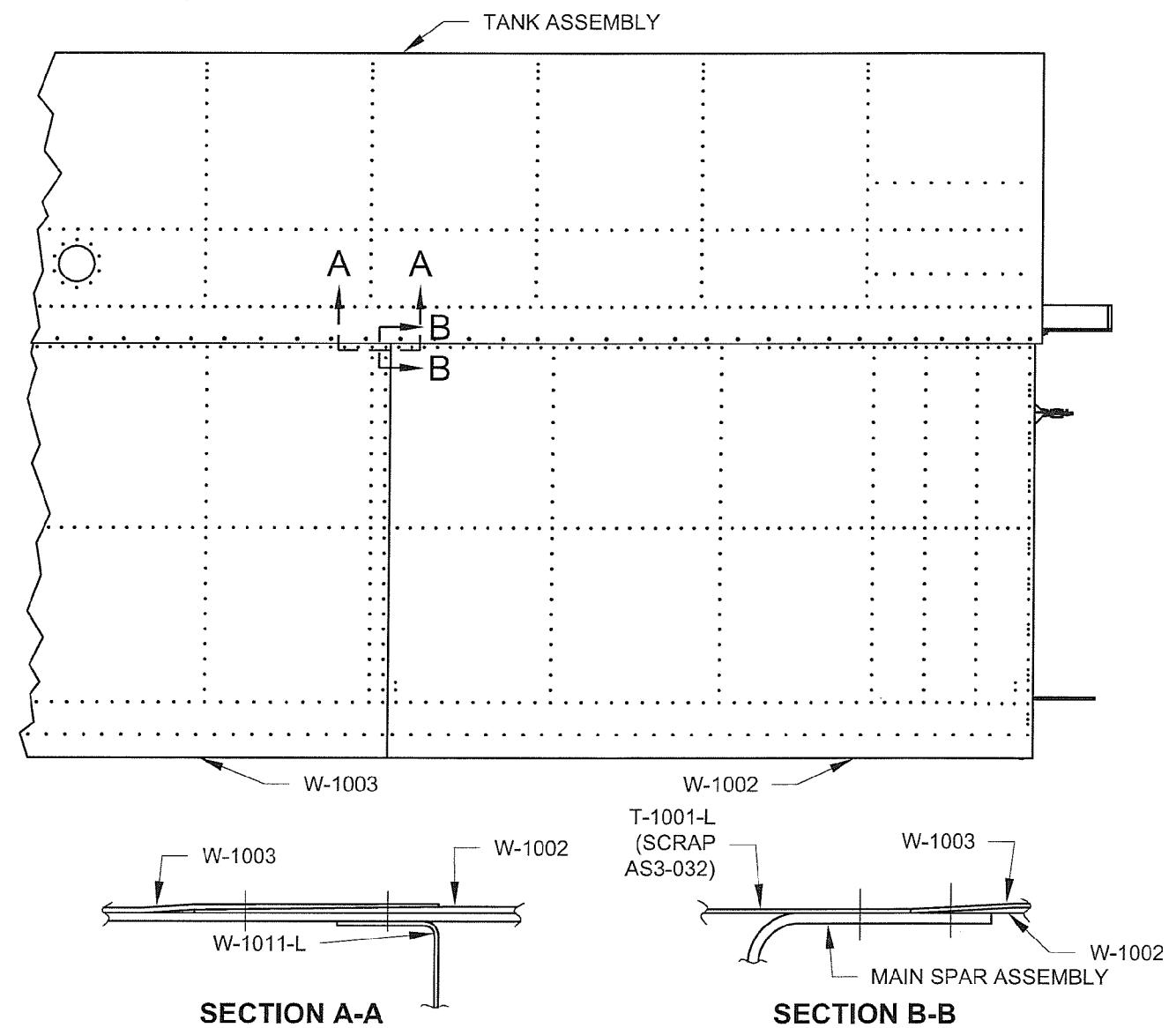
Dimple the aft most screw hole for a #8 flush head screw (see Figure 1), then machine countersink the rest of the screw holes for a #8 flush head screw dimple. Machine countersink all the rivet holes that correspond to the W-1027A and W-1027B Wing Walk Doublers for the head of an AN426AD3 rivet.

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



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

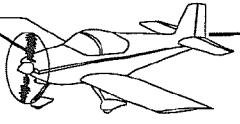
Step 5: To make a more aesthetically pleasing joint between the top wing skins it is permissible to remove material from the edges of the skins as shown in Figure 2. Remove material as shown in Figure 2, Section A-A from the top outboard side of W-1002 Top Inbd Wing Skin and the lower inboard side of 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.

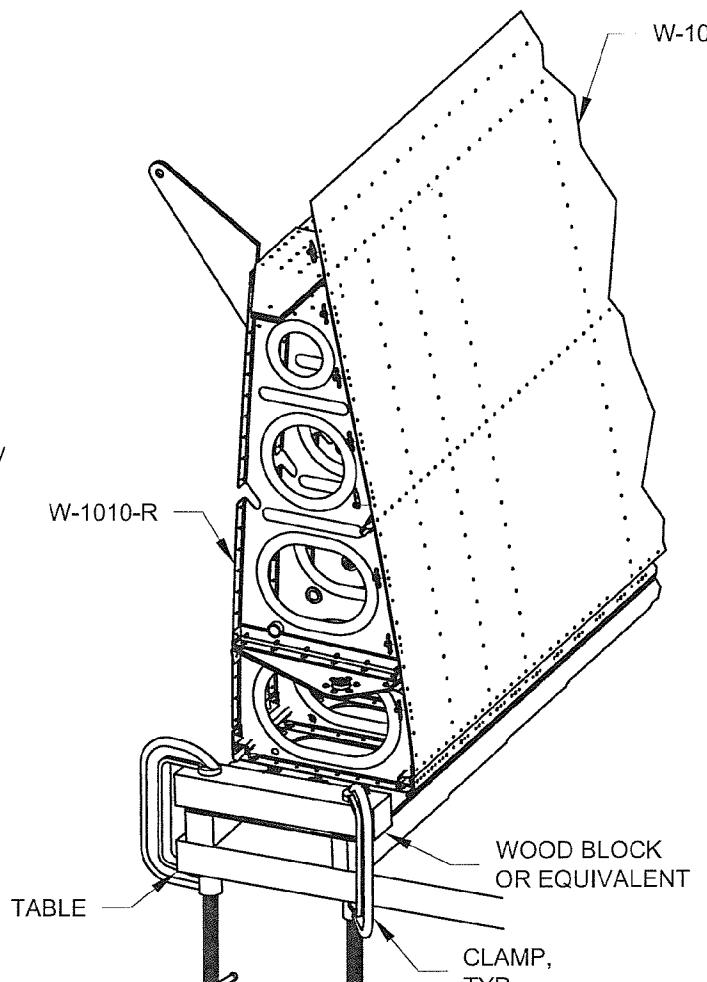


FIGURE 1: NUTPLATE INSTALL

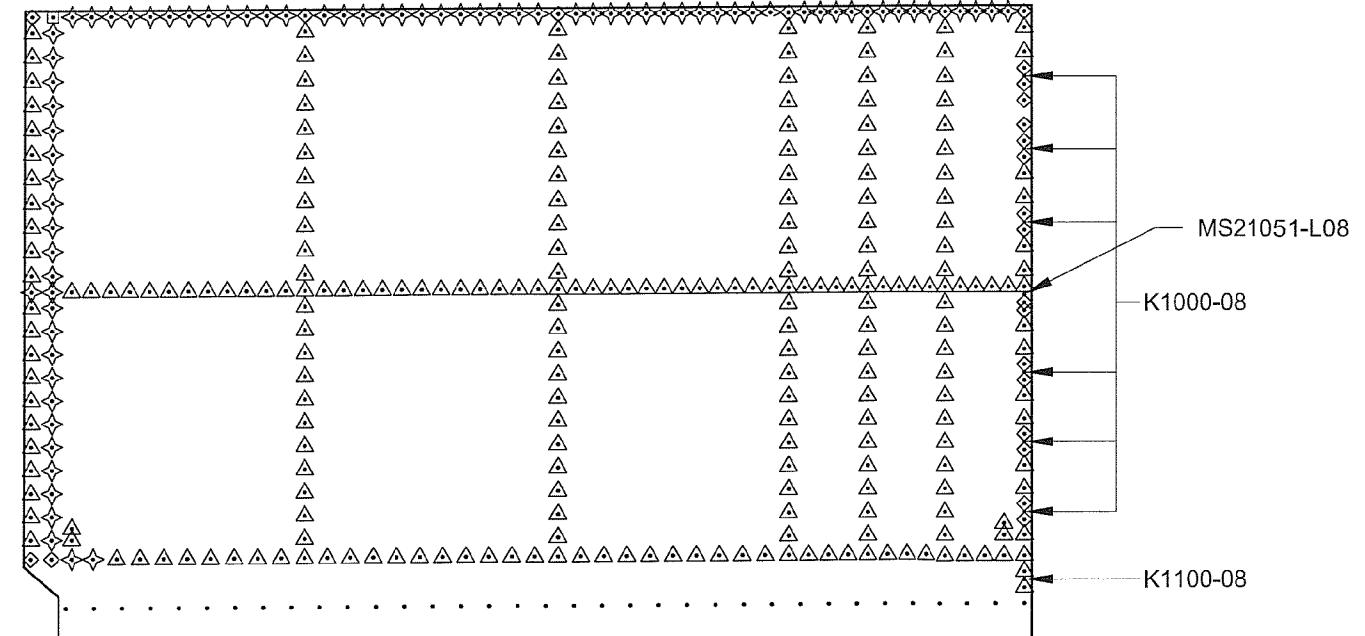


FIGURE 2: TOP INBD WING SKIN RIVET CALLOUT

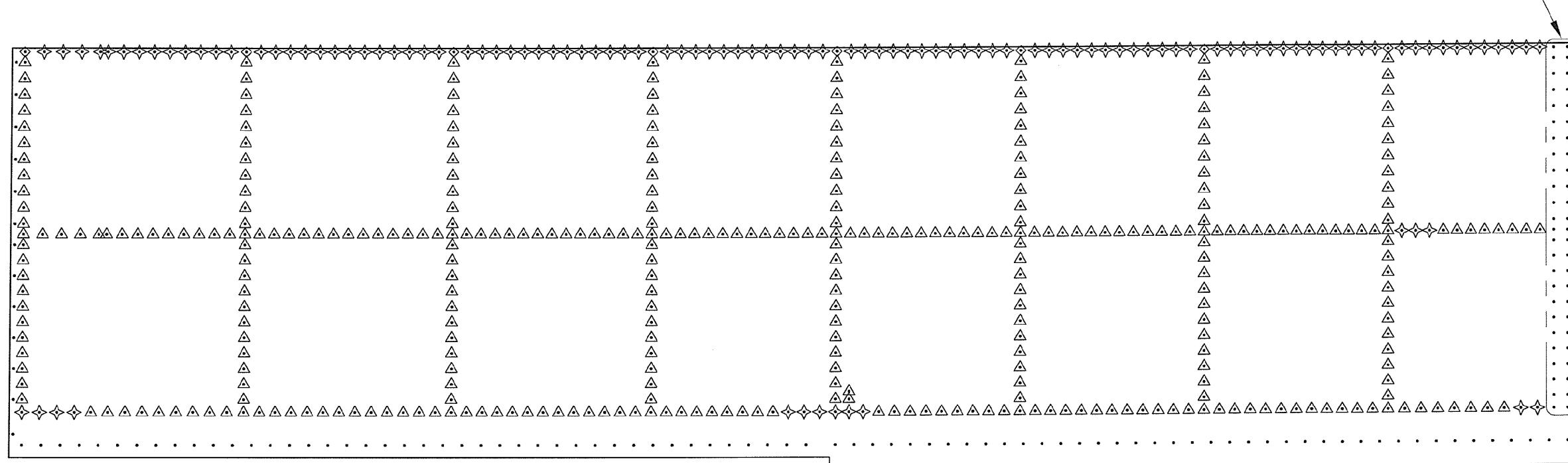
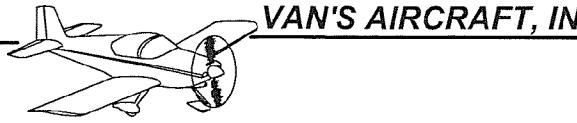


FIGURE 3: TOP OUTBD WING SKIN RIVET CALLOUT



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.

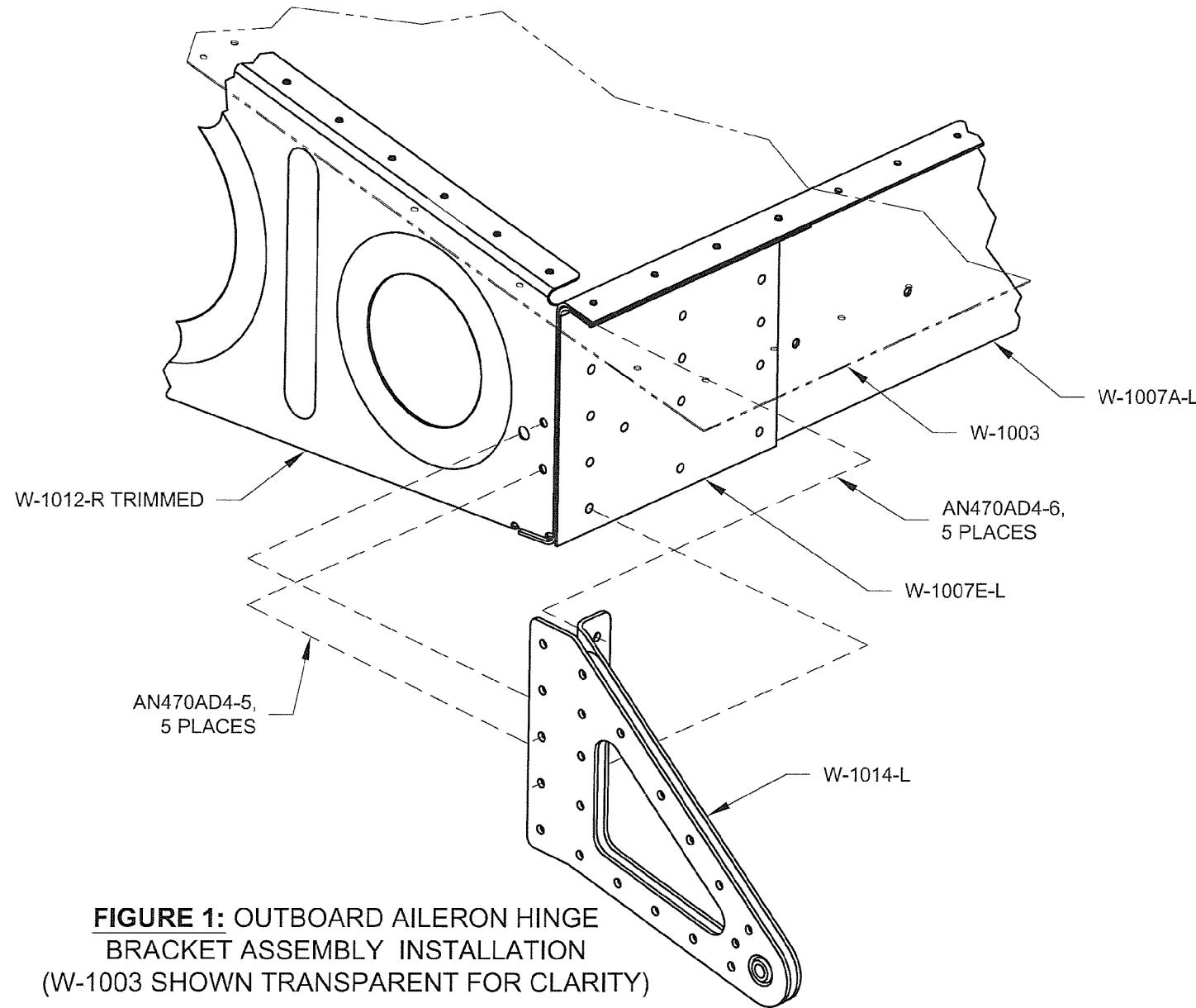
Step 1: Cleco the W-1014-L Outboard Aileron Hinge Bracket Assembly to the W-1012-R TRIMMED Outboard Wing Rib, two places as shown in Figure 1. Cleco the outboard aileron hinge bracket assembly to the W-1007A-L Rear Spar Web and W-1007E-L Rear Spar Doubler Plate as shown in Figure 1.

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.

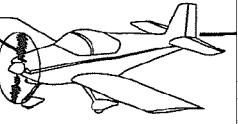
Step 3: Un-cleco the W-1014-L Outboard Aileron Hinge Bracket from the wing assembly.

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.



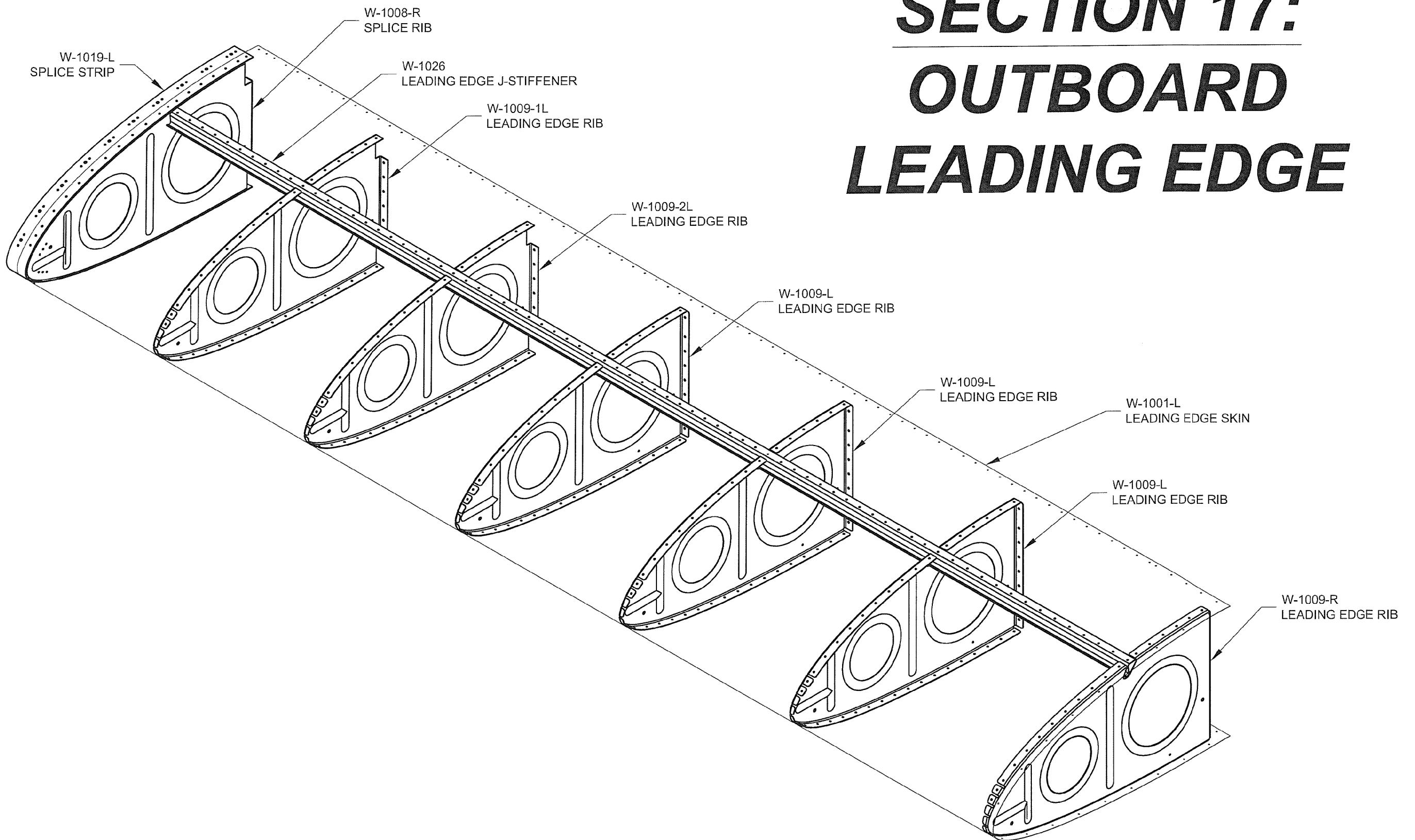
**FIGURE 1: OUTBOARD AILERON HINGE
BRACKET ASSEMBLY INSTALLATION
(W-1003 SHOWN TRANSPARENT FOR CLARITY)**

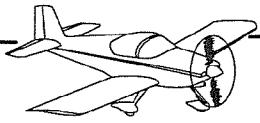


SECTION 17:

OUTBOARD

LEADING EDGE





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

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.

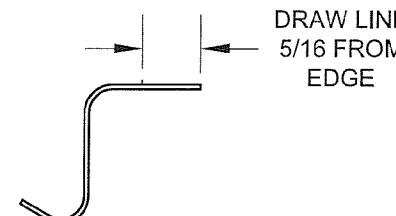


FIGURE 1: J-STIFFENER END VIEW

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

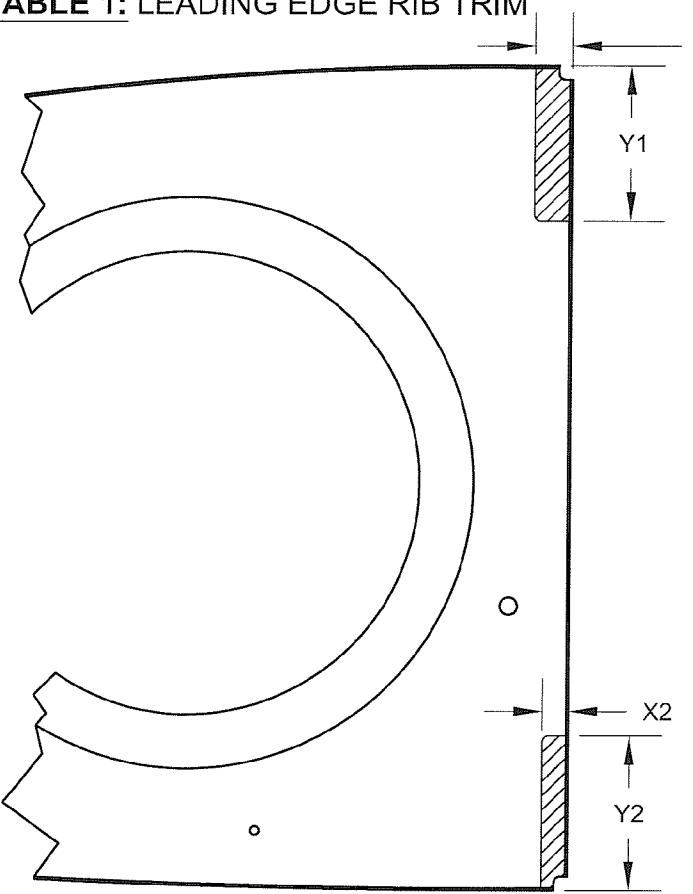


FIGURE 2: LEADING EDGE RIB TRIM

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.

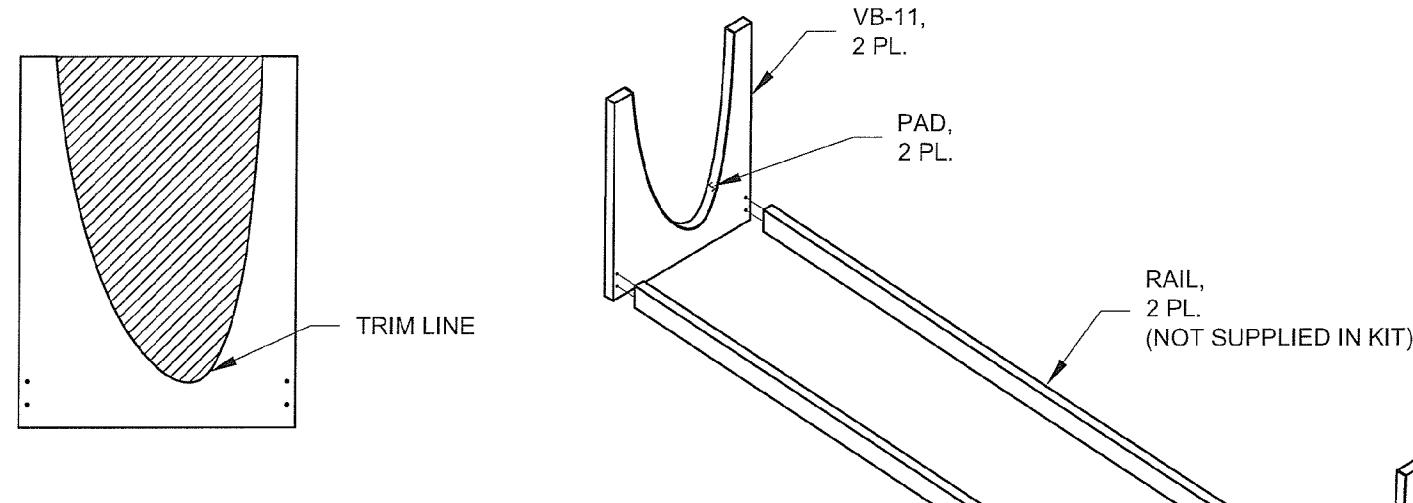


FIGURE 4: WING LEADING EDGE VEE BLOCK

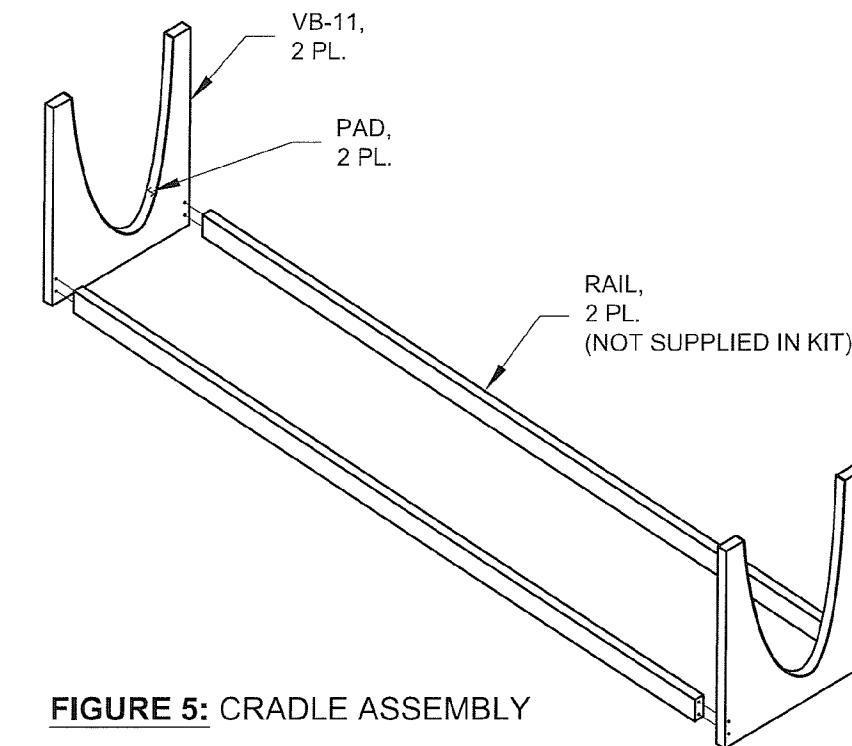


FIGURE 5: CRADLE ASSEMBLY

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.

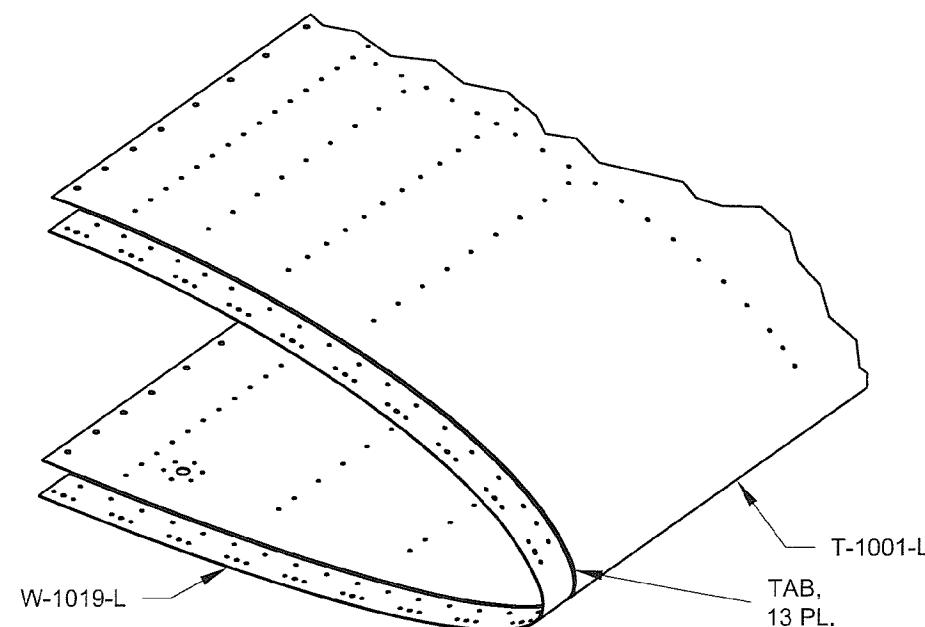
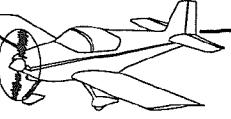


FIGURE 3: REMOVING SPLICE STRIP FROM FUEL TANK SKIN



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-L/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-L 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.

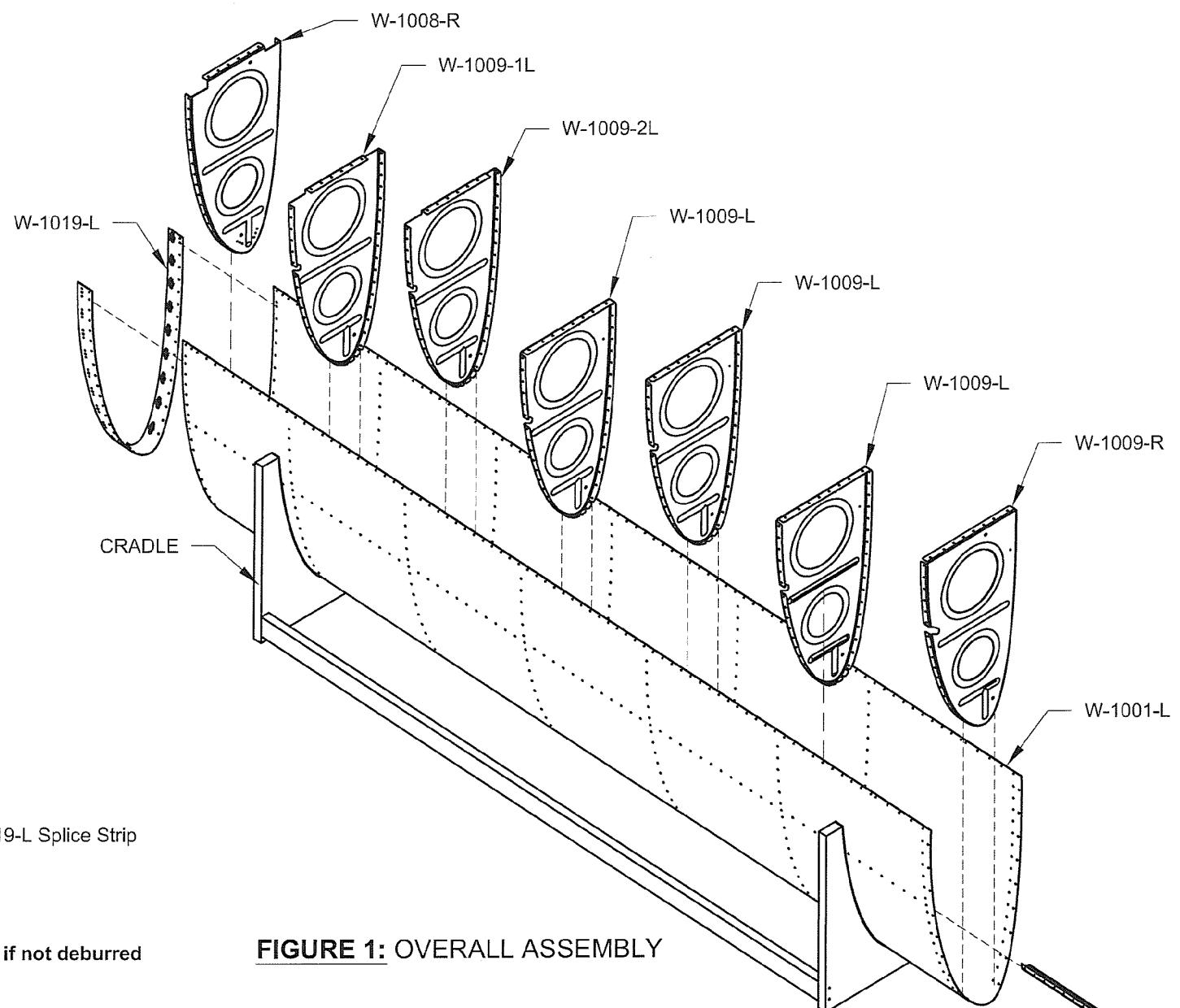


FIGURE 1: OVERALL ASSEMBLY

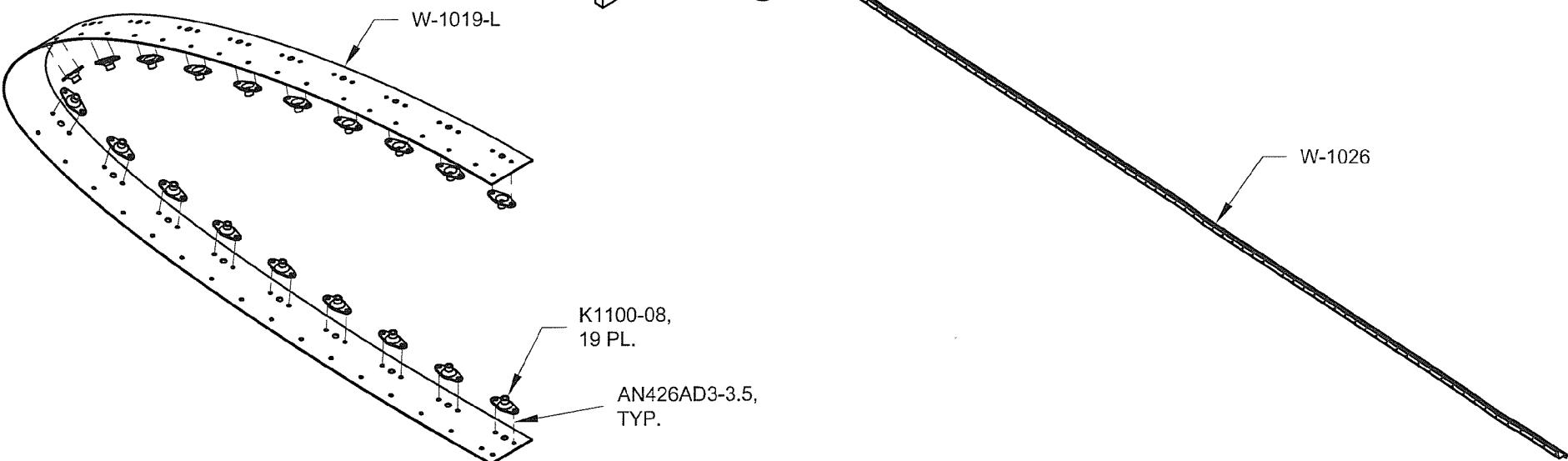


FIGURE 2: NUTPLATE TO SPLICE STRIP ATTACH



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. 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.

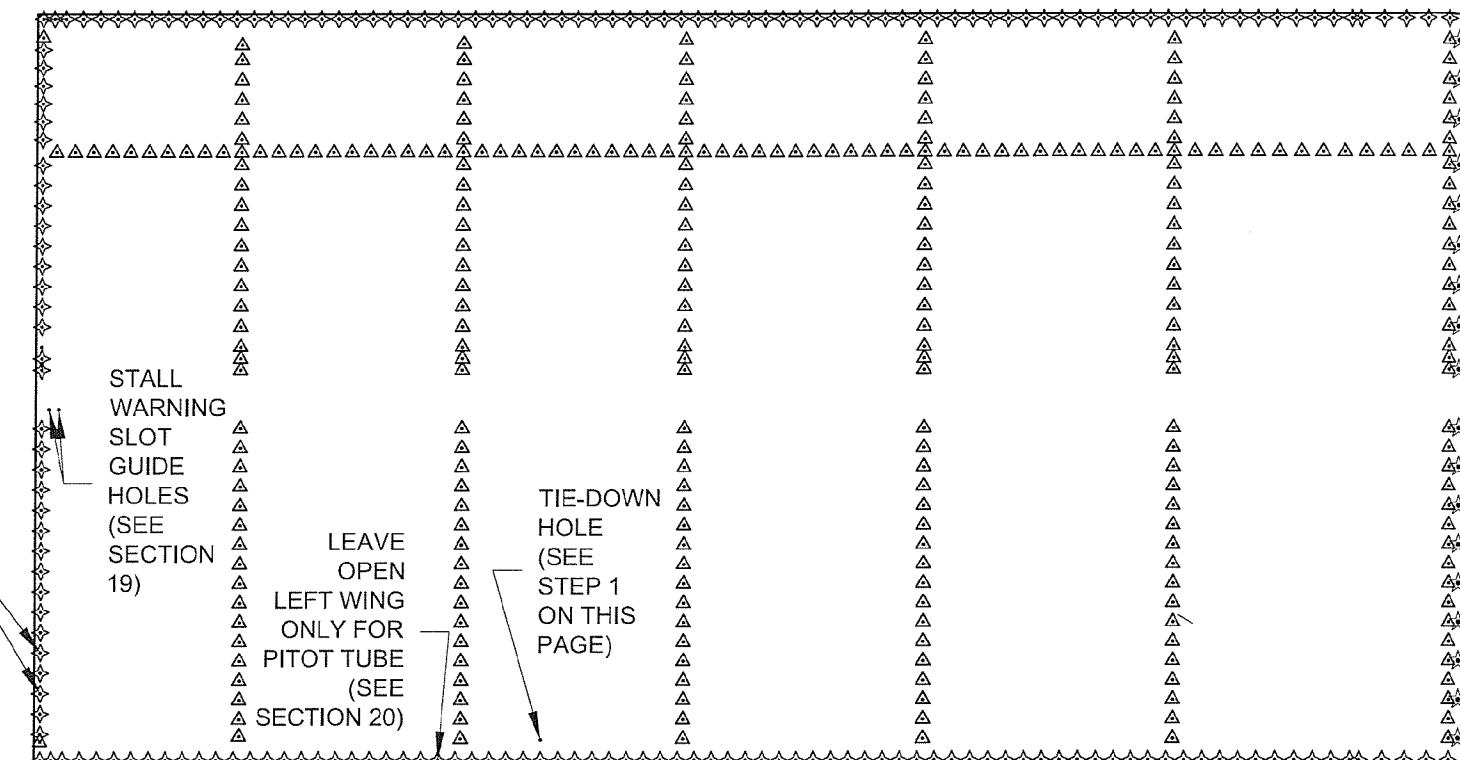
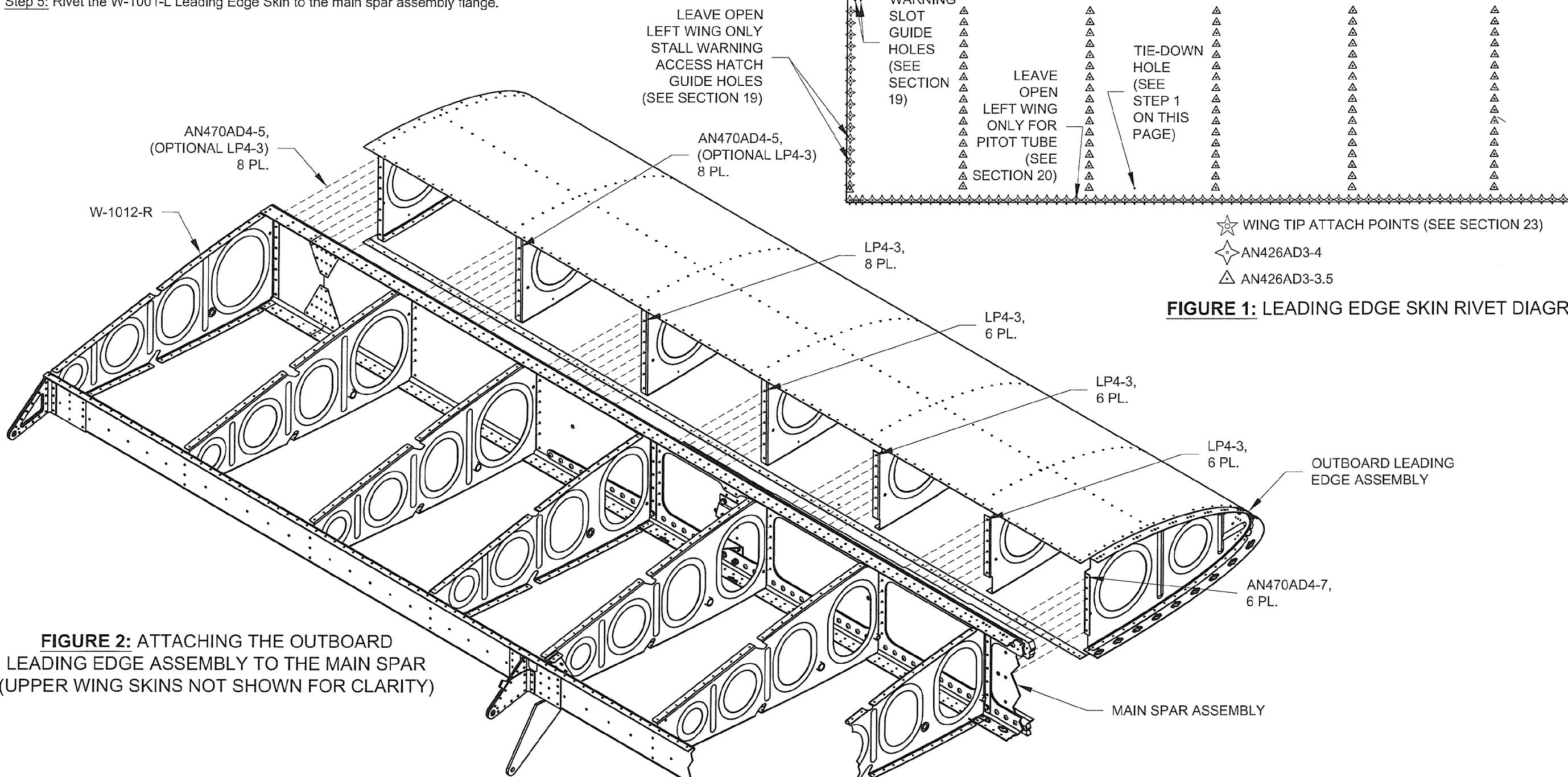
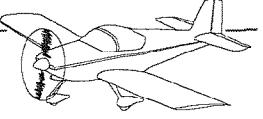
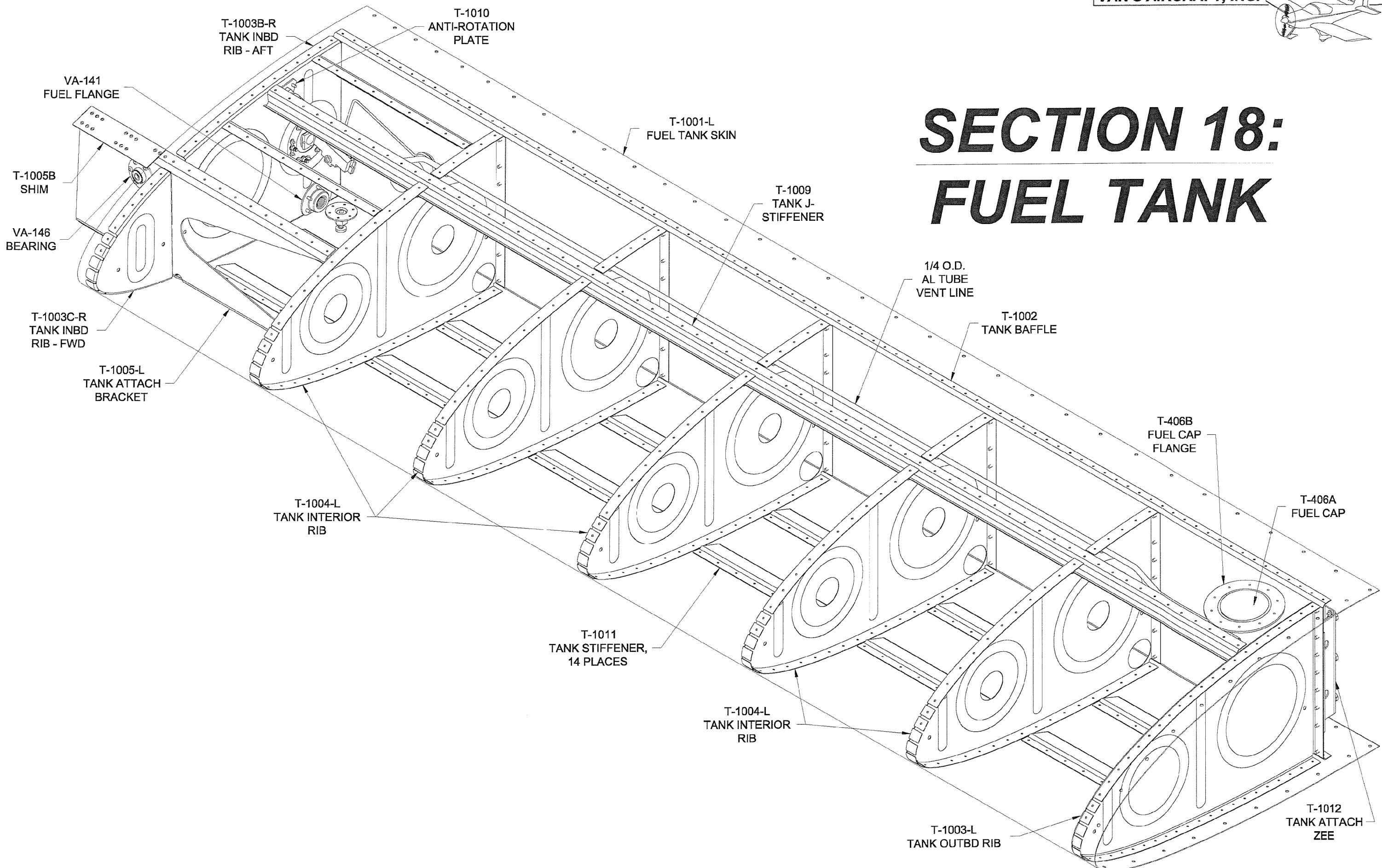
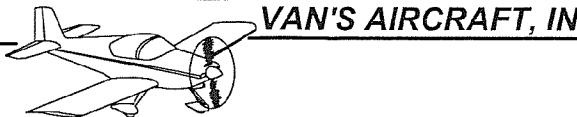


FIGURE 1: LEADING EDGE SKIN RIVET DIAGRAM



SECTION 18: FUEL TANK





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

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.

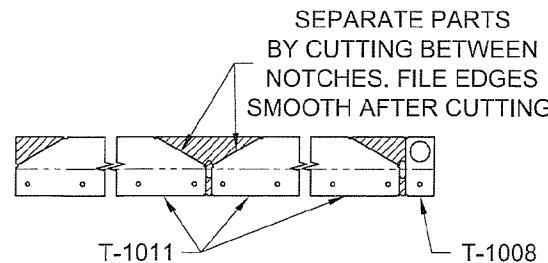


FIGURE 1: TANK STIFFENER TRIM DIAGRAM

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.

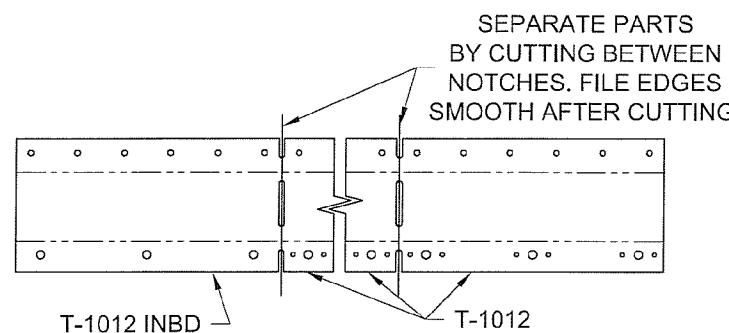


FIGURE 2: TANK ATTACH ZEE TRIM DIAGRAM

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.

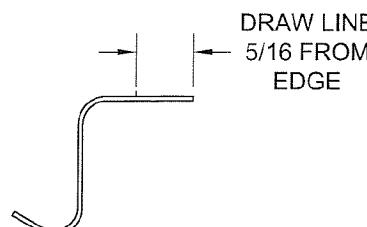


FIGURE 3: TANK J-STIFFENER END VIEW

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.

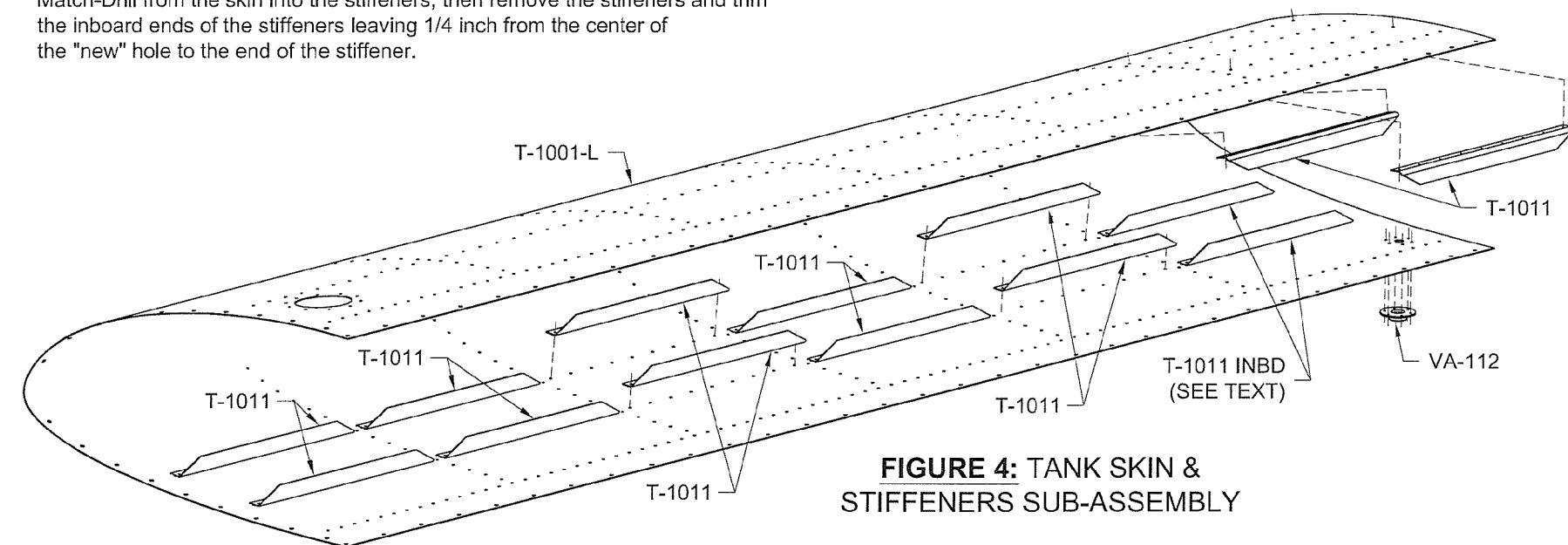


FIGURE 4: TANK SKIN & STIFFENERS SUB-ASSEMBLY

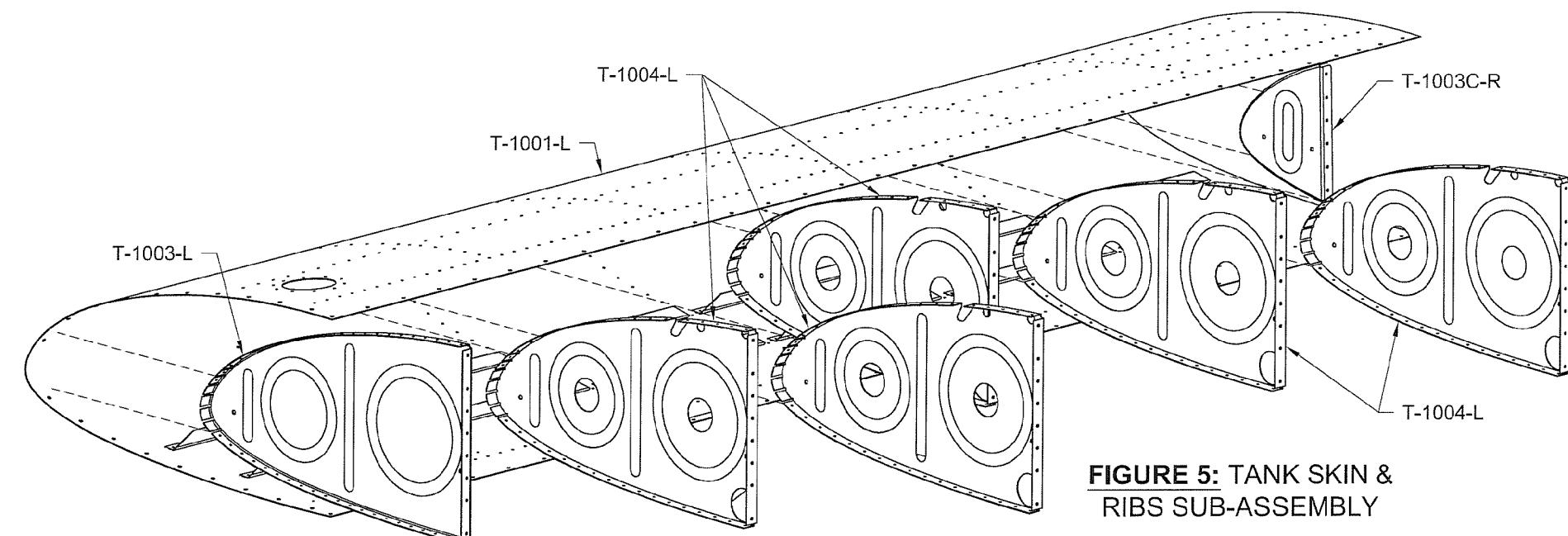
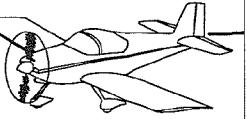


FIGURE 5: TANK SKIN & RIBS SUB-ASSEMBLY

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.

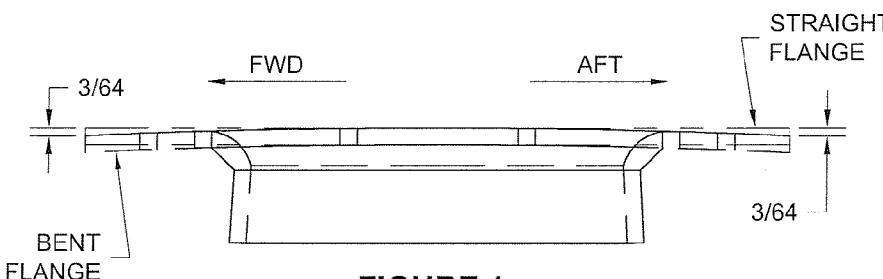


FIGURE 1:
FUEL CAP FLANGE
EDGE VIEW
(FULL SCALE)

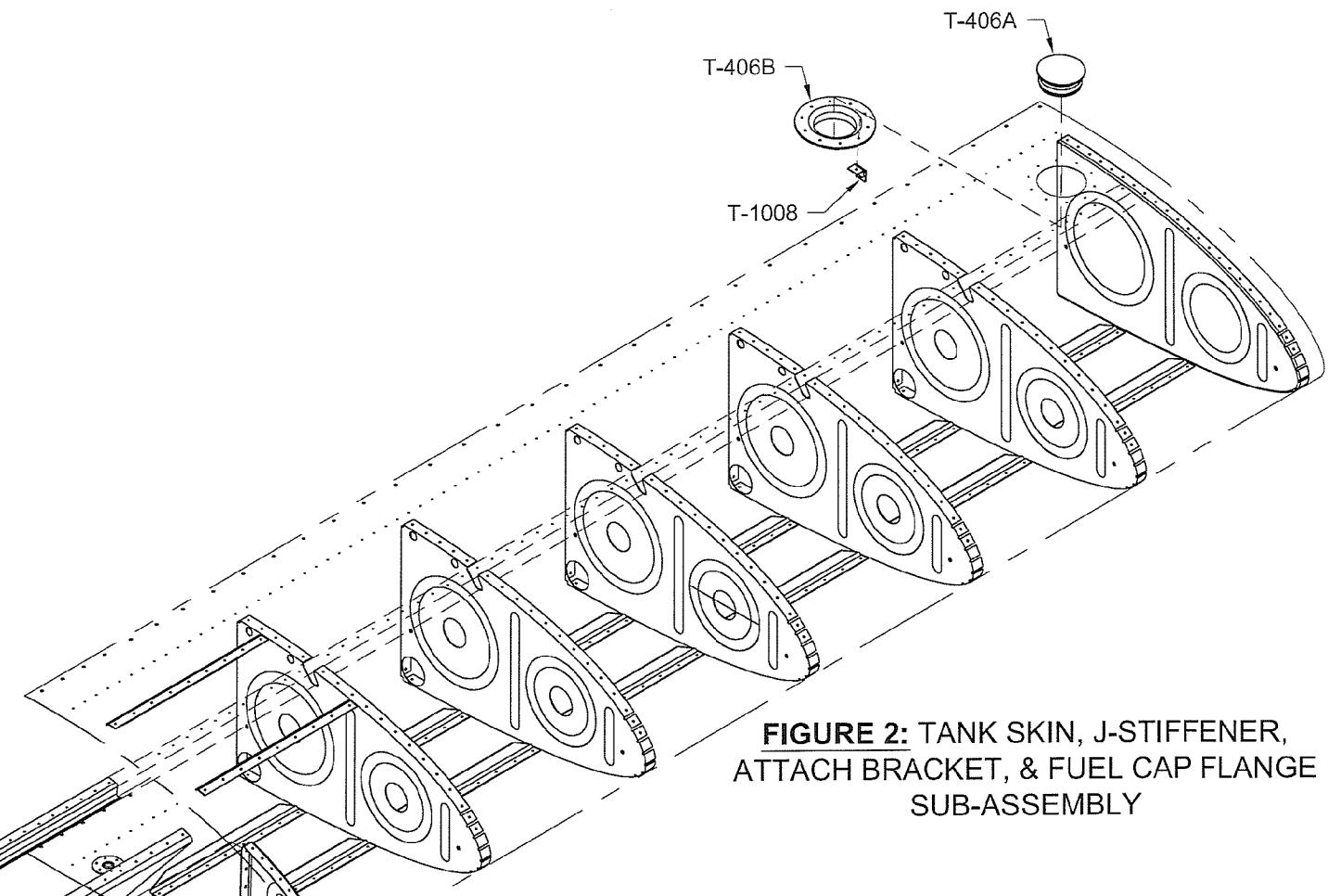
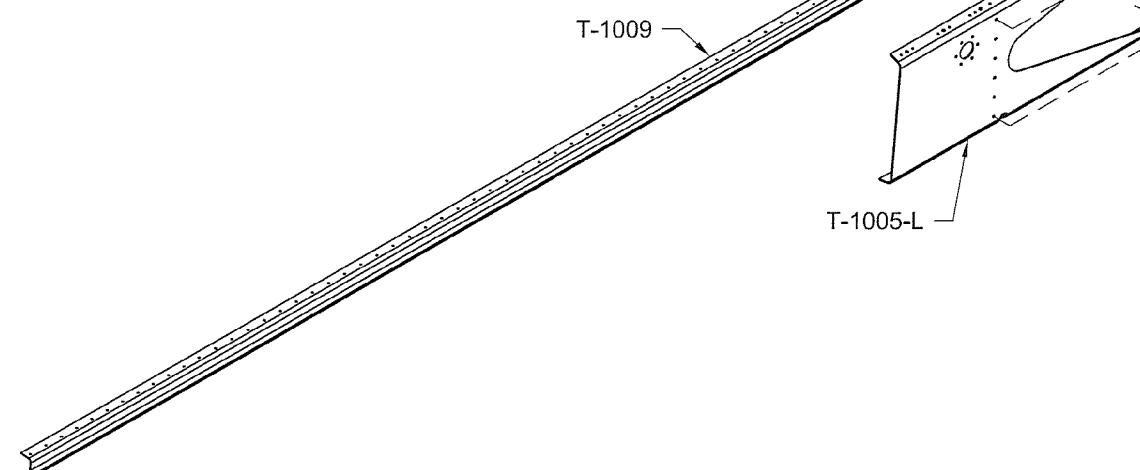
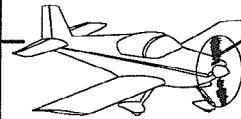


FIGURE 2: TANK SKIN, J-STIFFENER,
ATTACH BRACKET, & FUEL CAP FLANGE
SUB-ASSEMBLY



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.

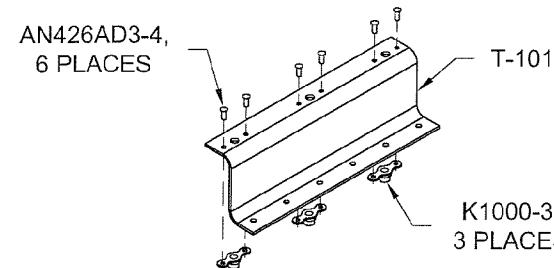


FIGURE 1: T-1012 NUTPLATE ATTACH

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.

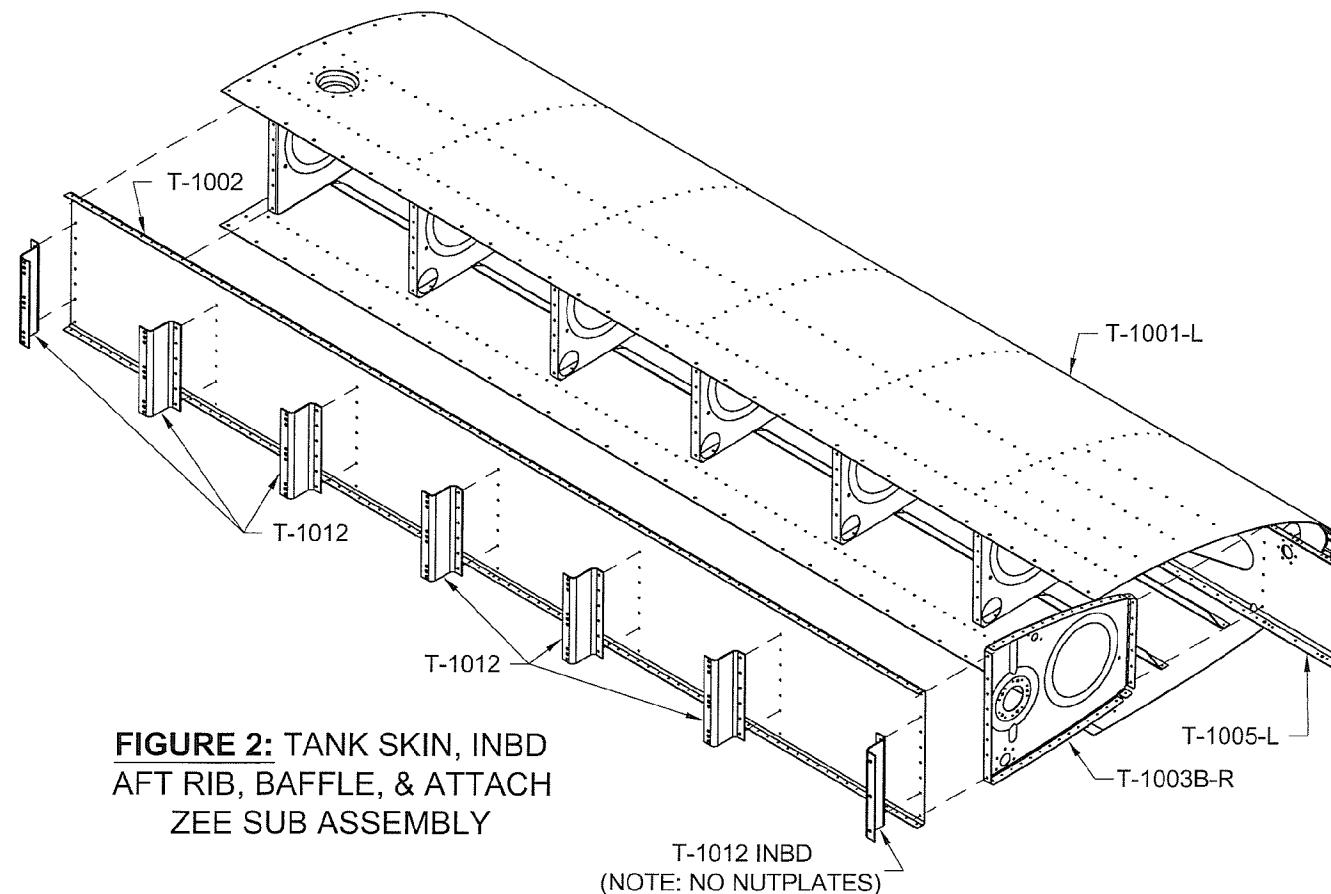


FIGURE 2: TANK SKIN, INBD AFT RIB, BAFFLE, & ATTACH ZEE SUB ASSEMBLY

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: 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.

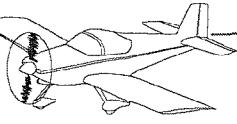
Step 8: Disassemble the tank.

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-1005B 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 MS21051-L08 Nutplates, and T-1005B & C Shims to the T-1005-L Tank Attach Bracket as shown in Figure 1.

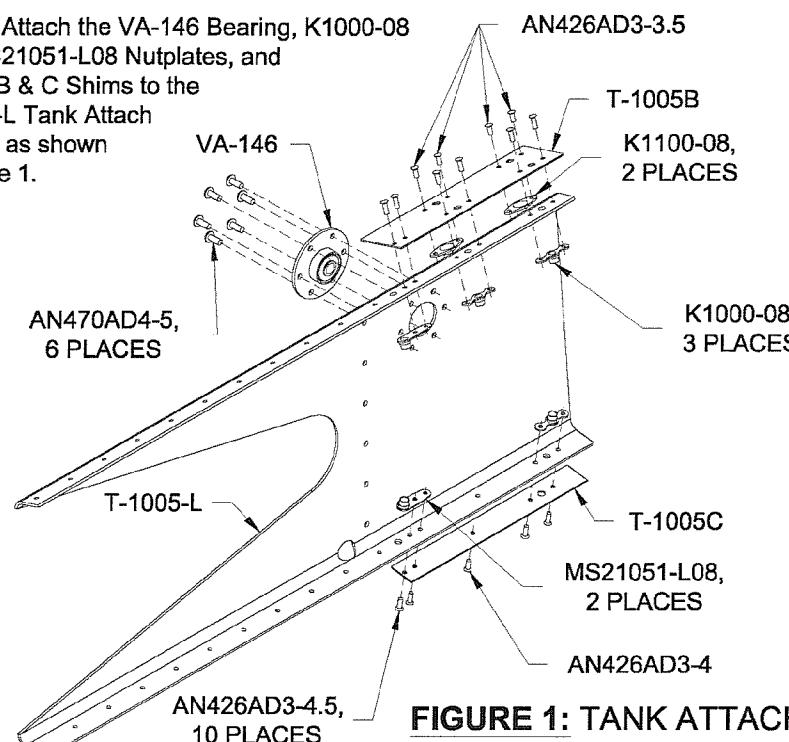


FIGURE 1: TANK ATTACH BRACKET SUB-ASSEMBLY

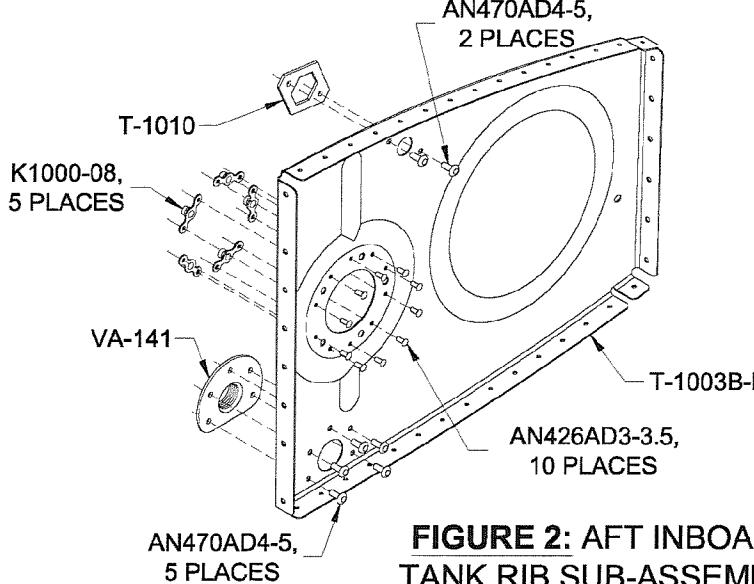


FIGURE 2: AFT INBOARD TANK RIB SUB-ASSEMBLY

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

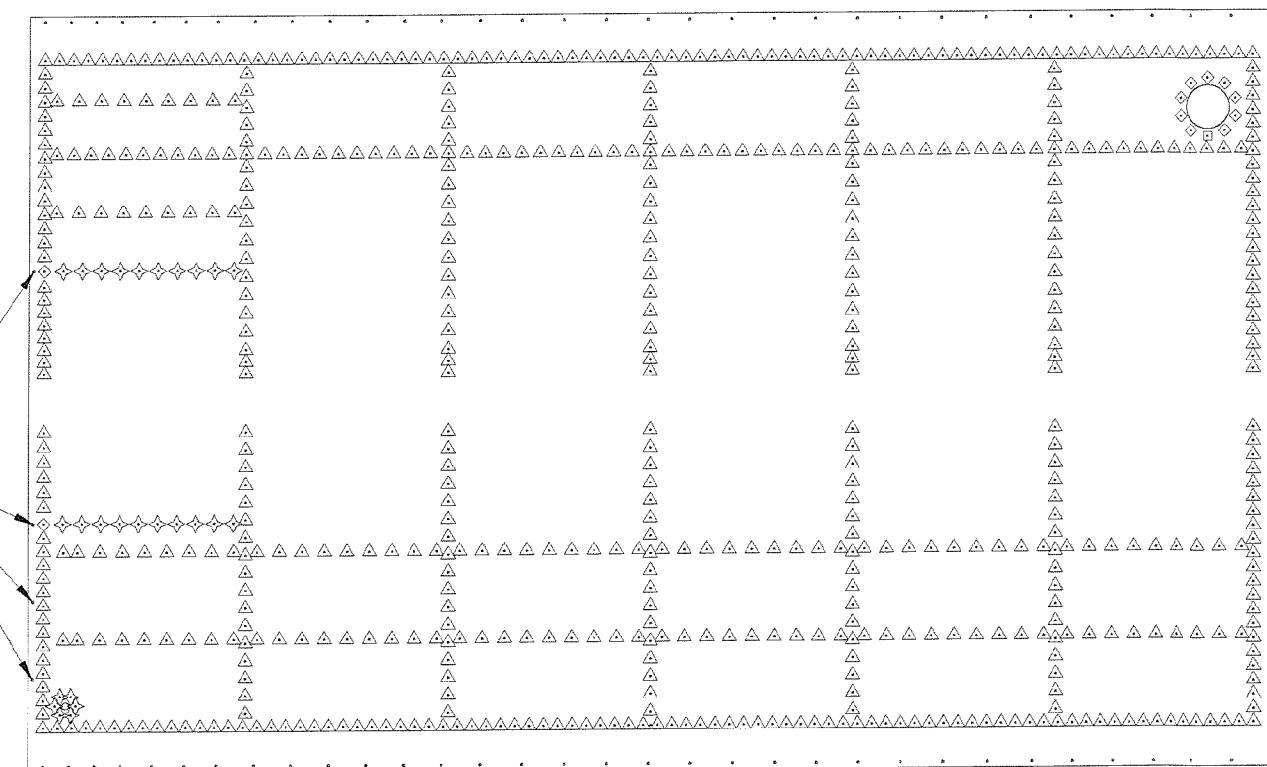
Step 7: Attach the VA-141 Fuel Flange, T-1010 Anti-Rotation Plate, and nutplates to the T-1003B-L Tank Inbd Rib - Aft as shown in Figure 2.

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.

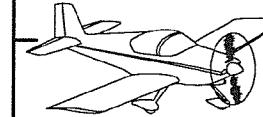
Begin with the tank inbd rib - fwd and progress from inboard to outboard, finishing with the tank outboard rib.

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.

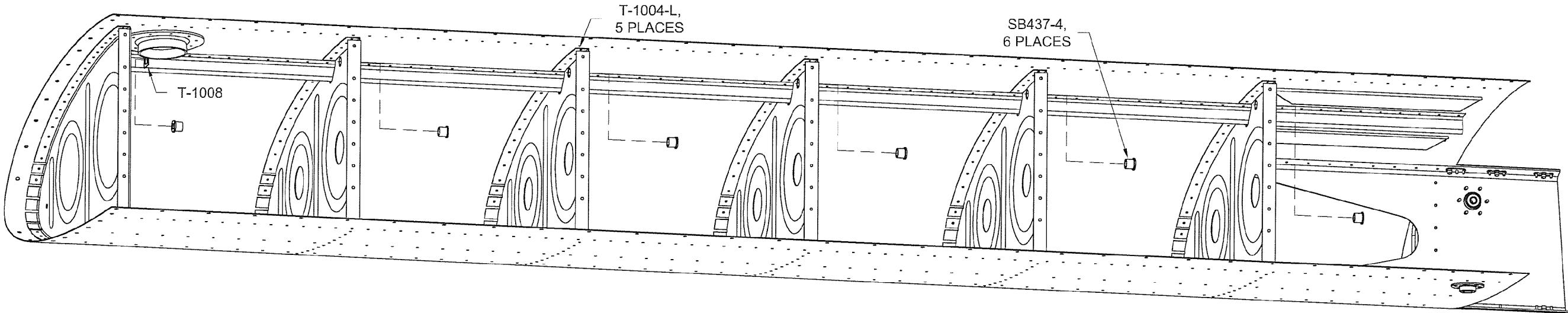


FIGURE 1: TANK VENT SNAP BUSHING INSTALLATION

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.

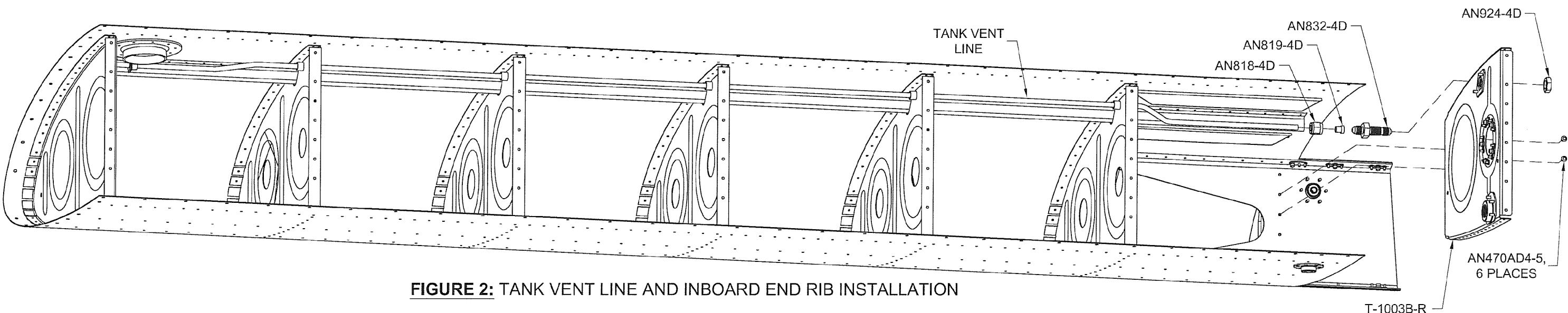
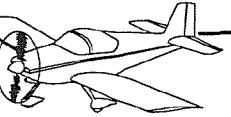


FIGURE 2: TANK VENT LINE AND INBOARD END RIB INSTALLATION



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.

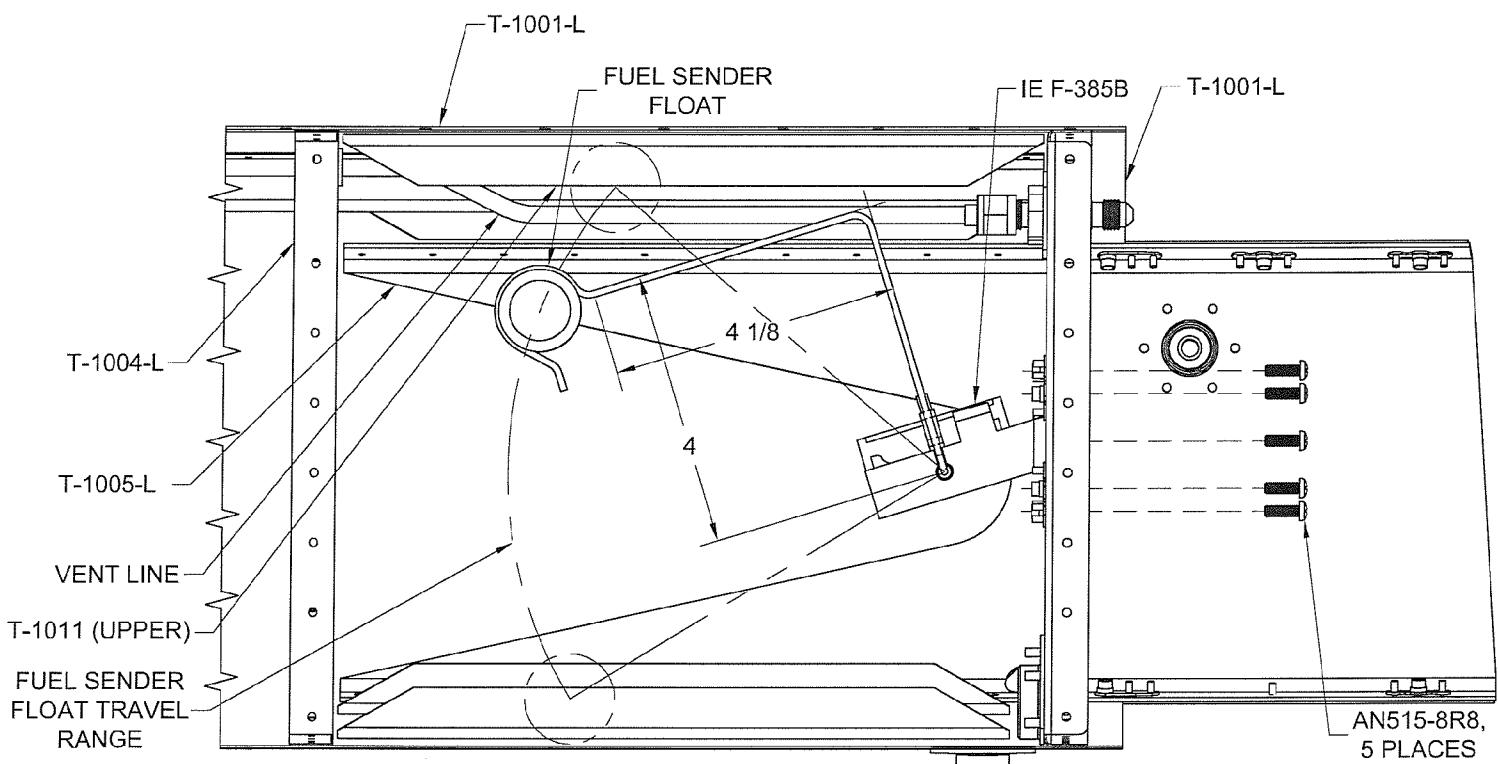
Step 1: Bend the sender unit float wire to fit the fuel tank as shown in Figure 1 and as shown in the Float Wire Bending Diagram supplied with the sender unit. Install the bent wire to the sender.

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.

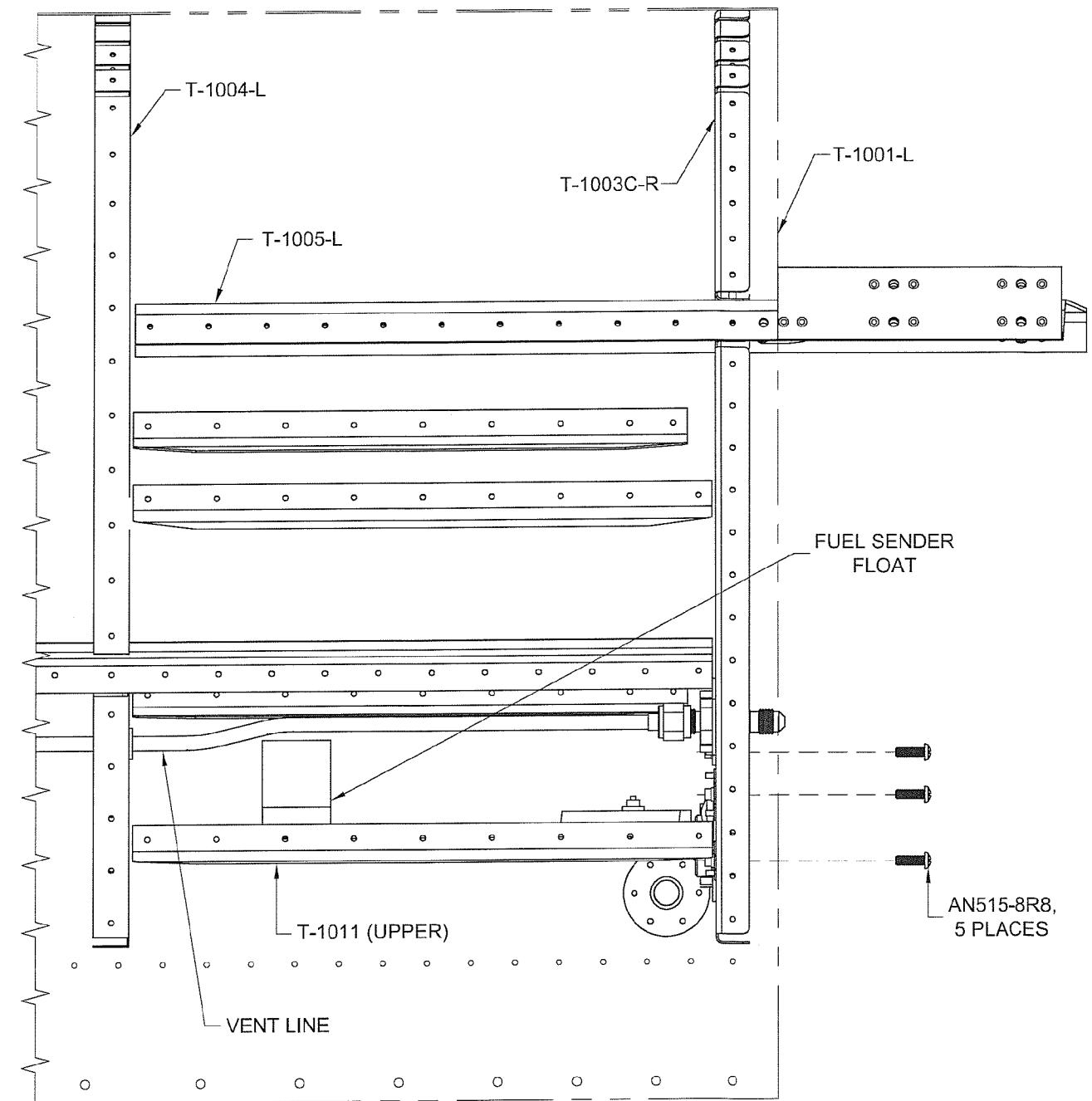
Adjust the float wire bends if/as required to match the full travel of the float arm to the full height of the tank.

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.

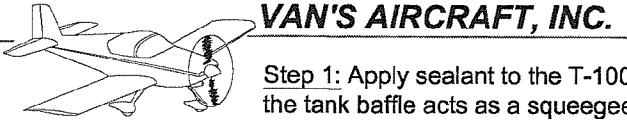
Step 3: Final install the IE F-385B Fuel Level Sender as shown in Figure 1 and Figure 2. Use tank sealant for this final installation.



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



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



VAN'S AIRCRAFT, INC.

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.

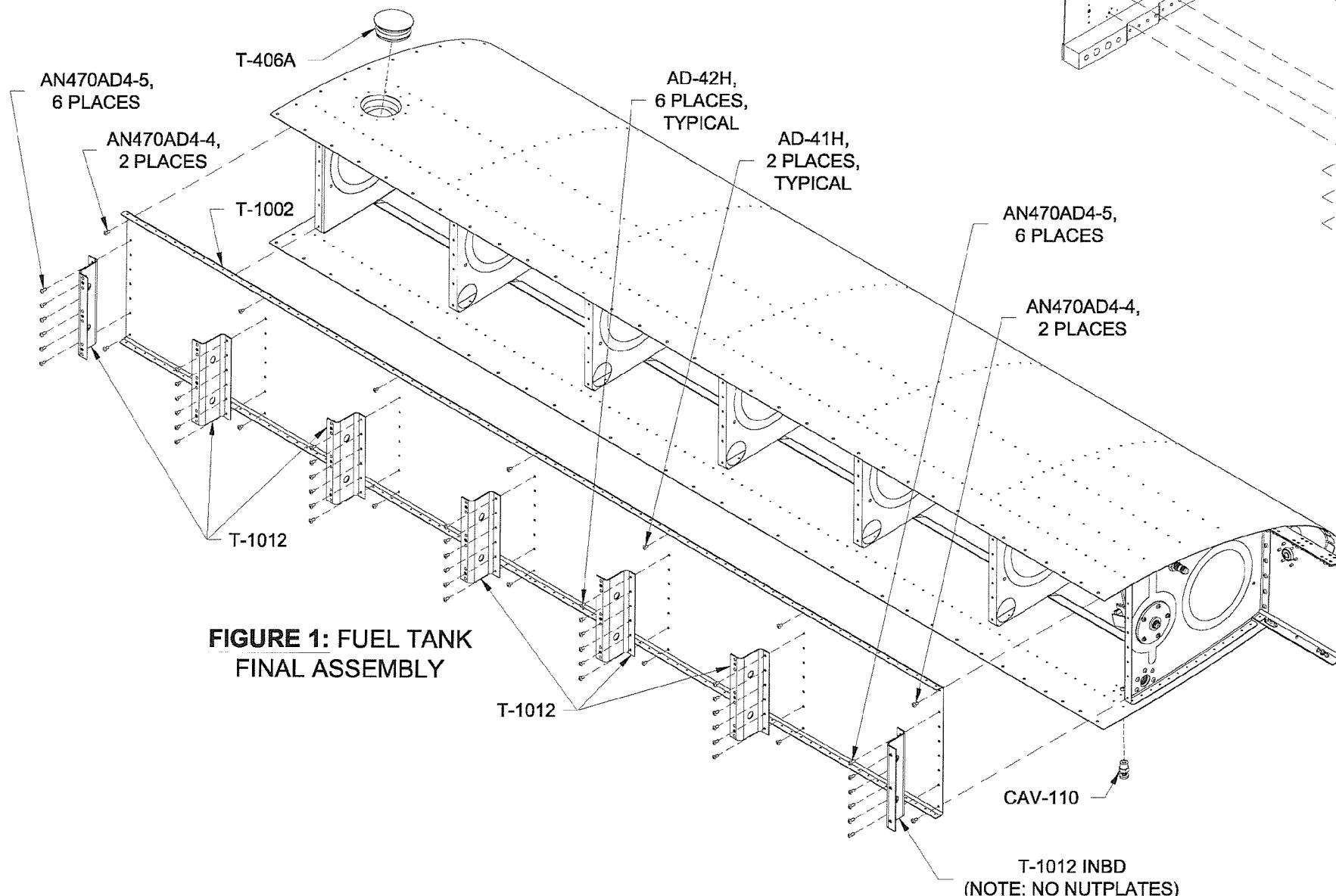


FIGURE 1: FUEL TANK FINAL ASSEMBLY

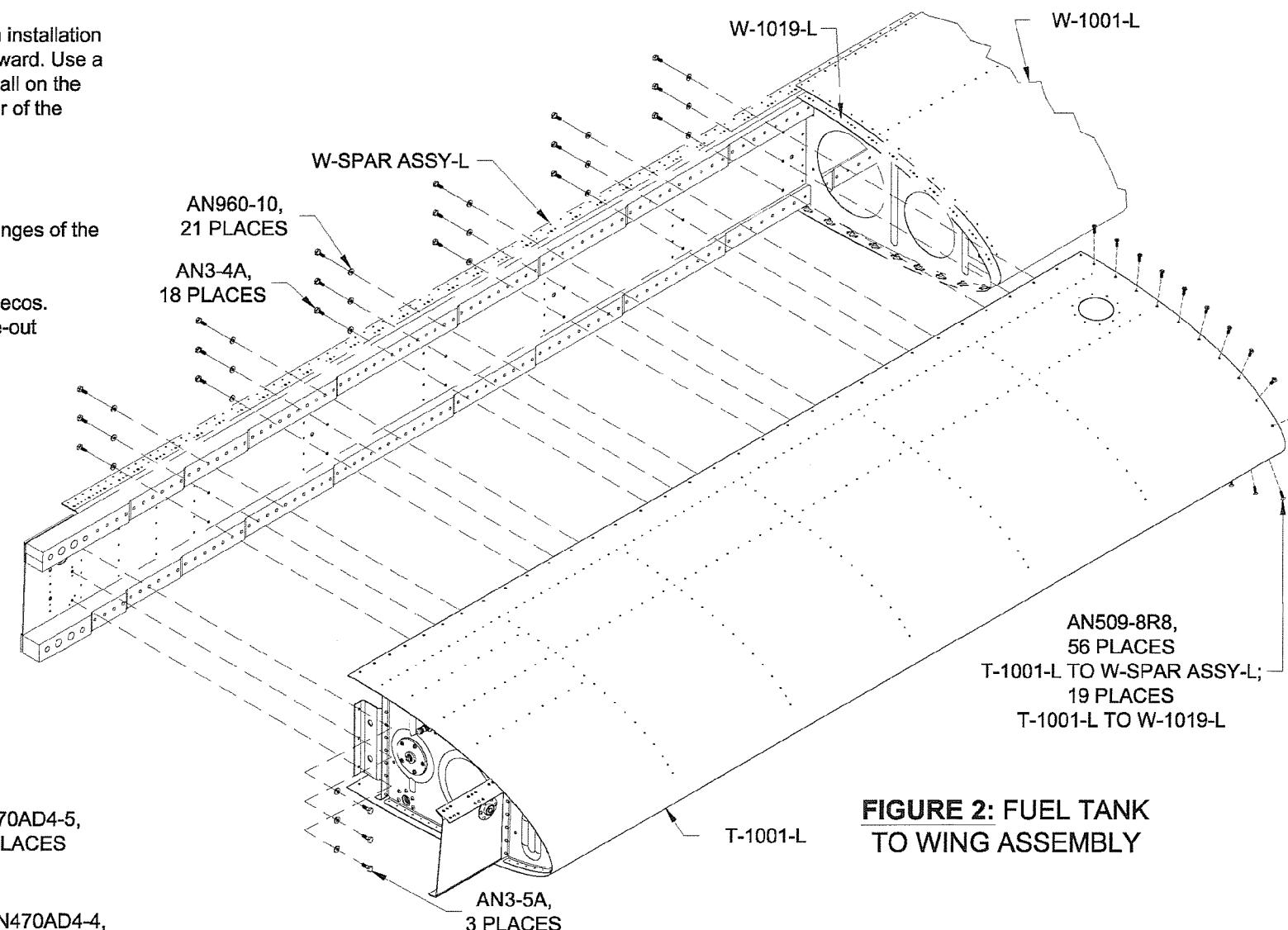


FIGURE 2: FUEL TANK TO WING ASSEMBLY

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.

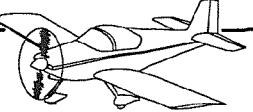
Install the tank attach zee to tank baffle to rib flange rivets as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

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.

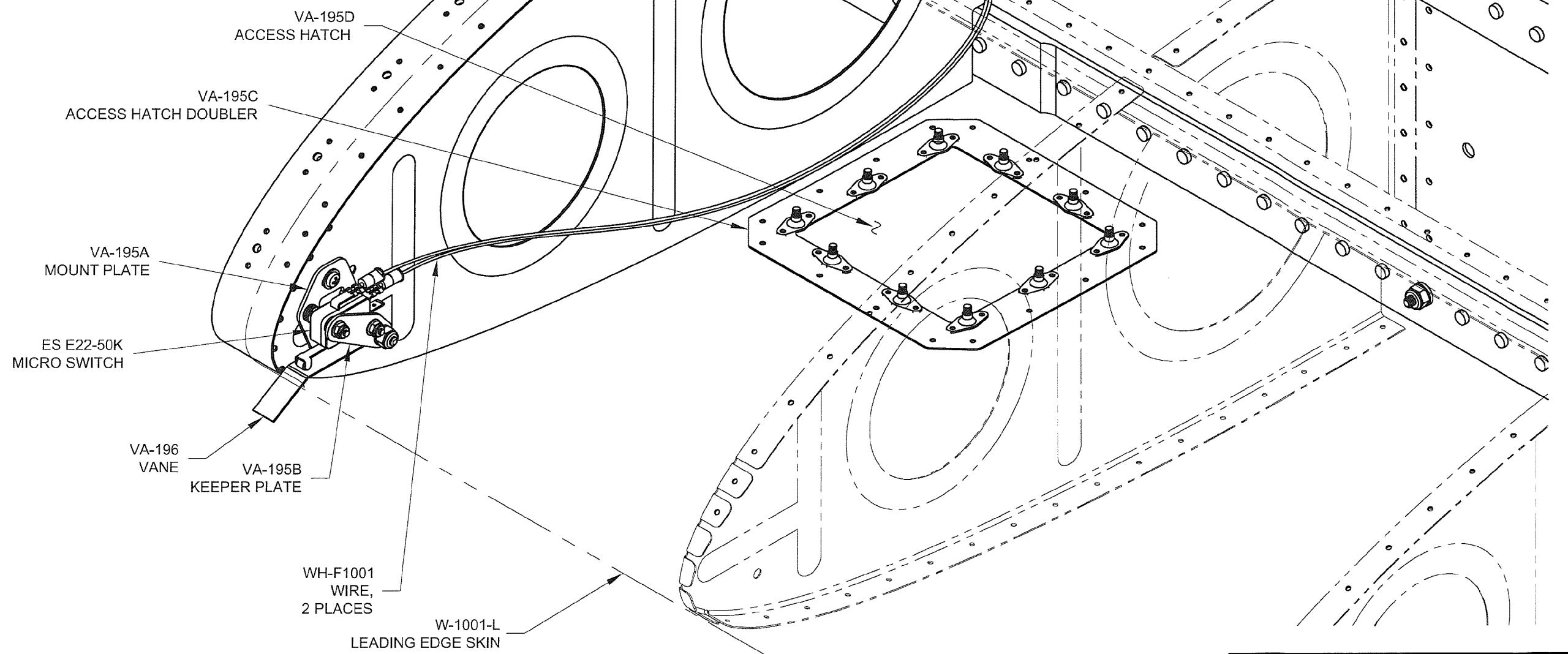
Step 5: Install the T-406A Fuel Cap and CAV-110 Drain Fitting as shown in Figure 1.

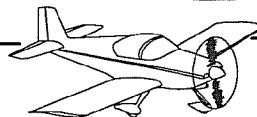
It is recommended to use a cut-off rubber glove finger or similar cover over the open end of the vent line. This is to keep debris and/or nesting insects from blocking the vent line.

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



SECTION 19: STALL WARNING SYSTEM





VAN'S AIRCRAFT, INC.

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.

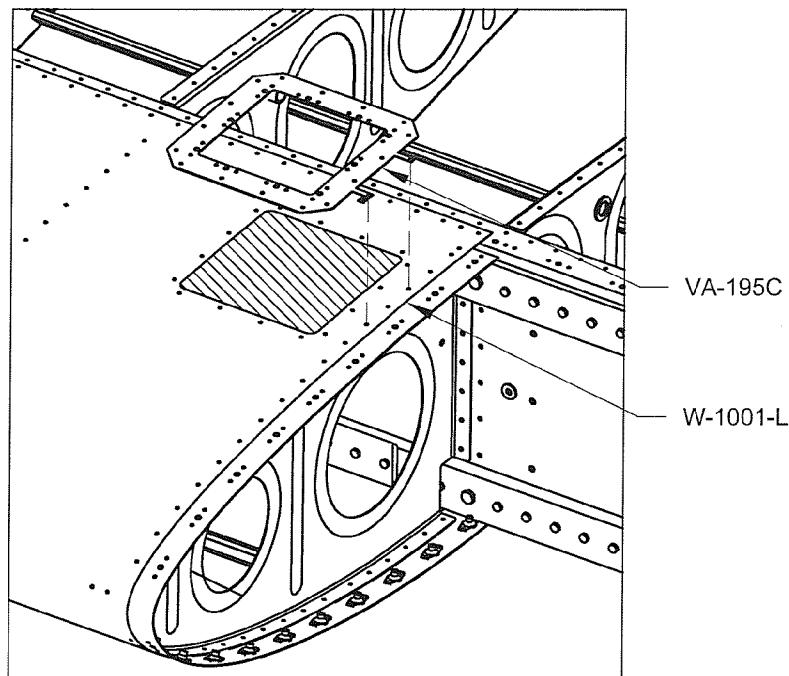
Final-Drill #40 the nutplate attach holes along the inside edge of the access hatch doubler.

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.

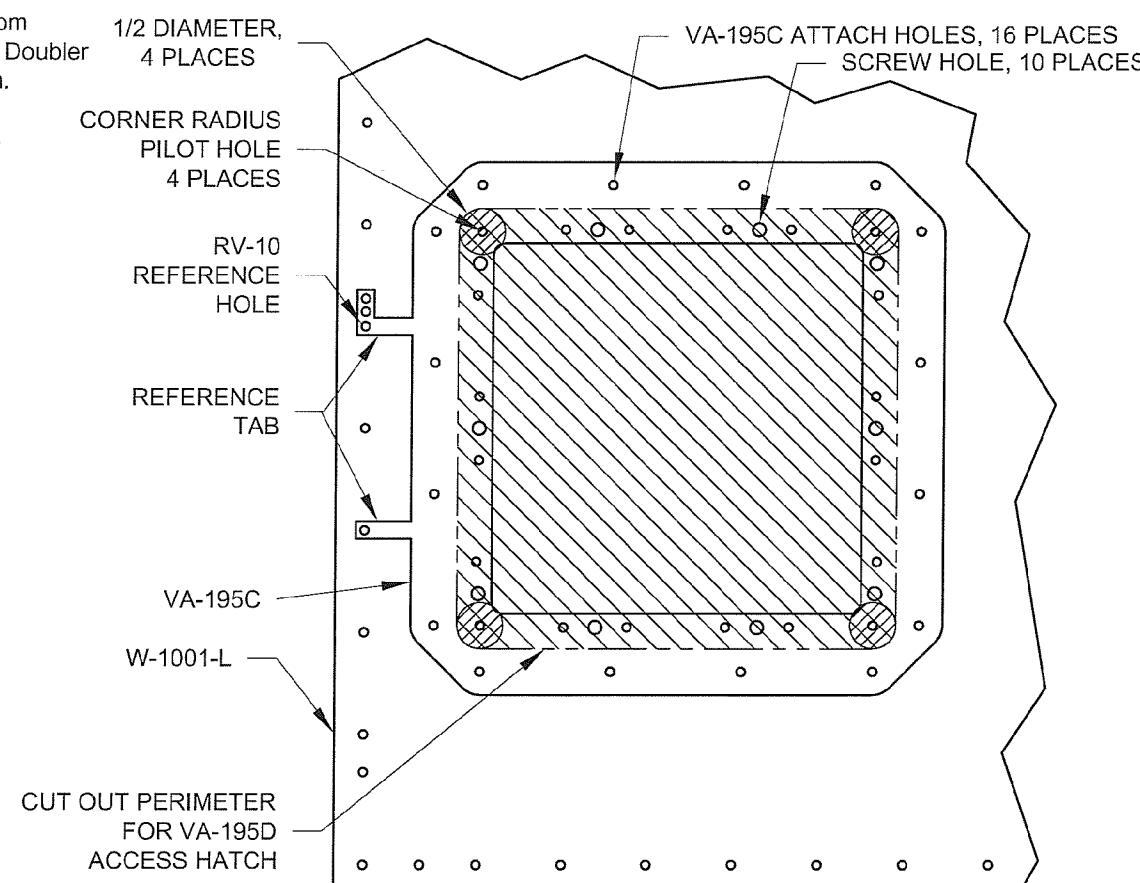
Step 5: Remove the reference tabs indicated in Figure 2 from the VA-195C Access Hatch Doubler.

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.

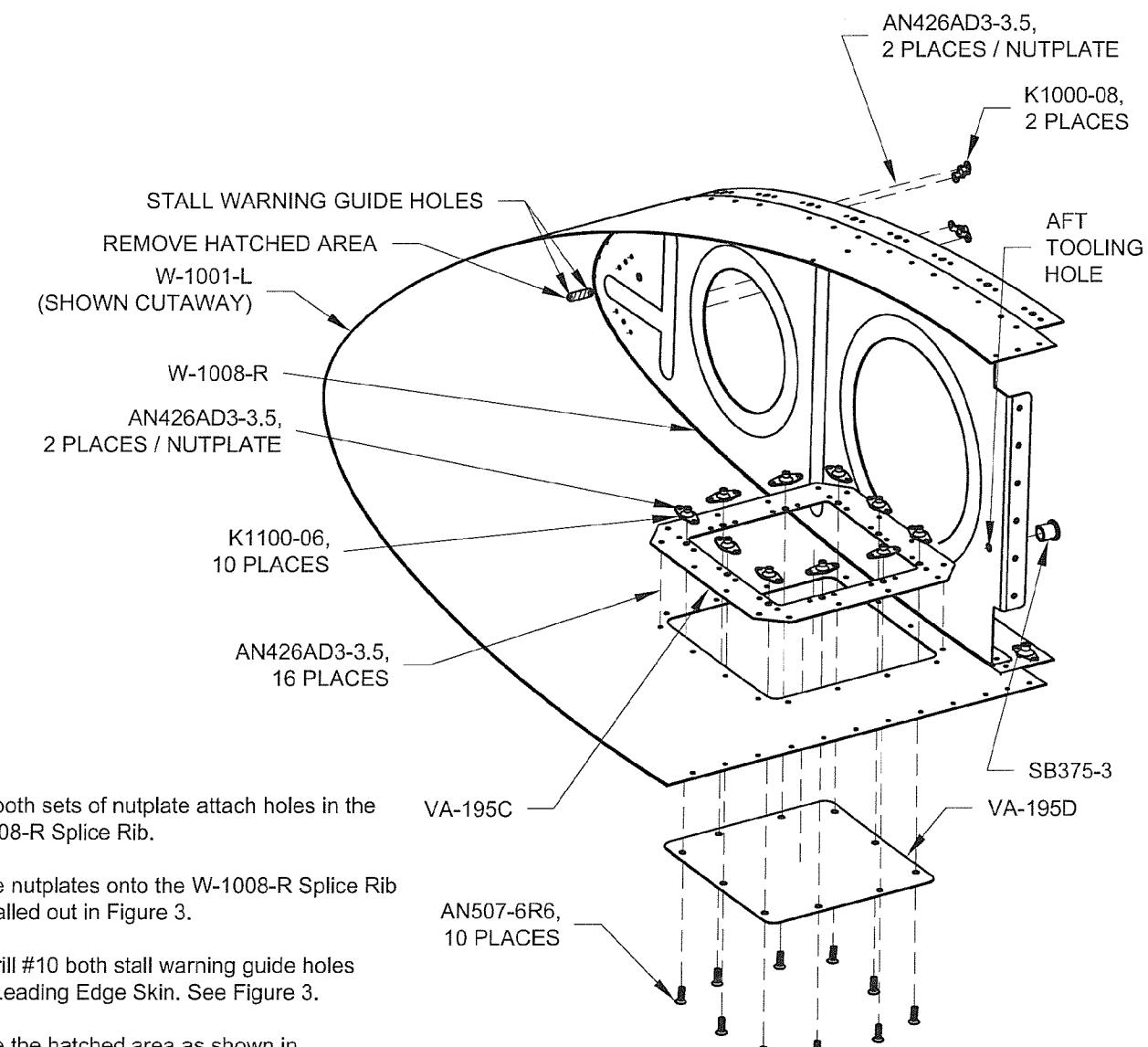
Rivet the access hatch doubler onto the W-1001-L Leading Edge Skin. See Figure 3.

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.

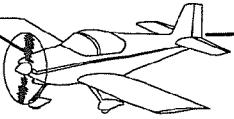
Step 8: Install the VA-195D Access Hatch using the hardware called out in Figure 3.

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.



**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.

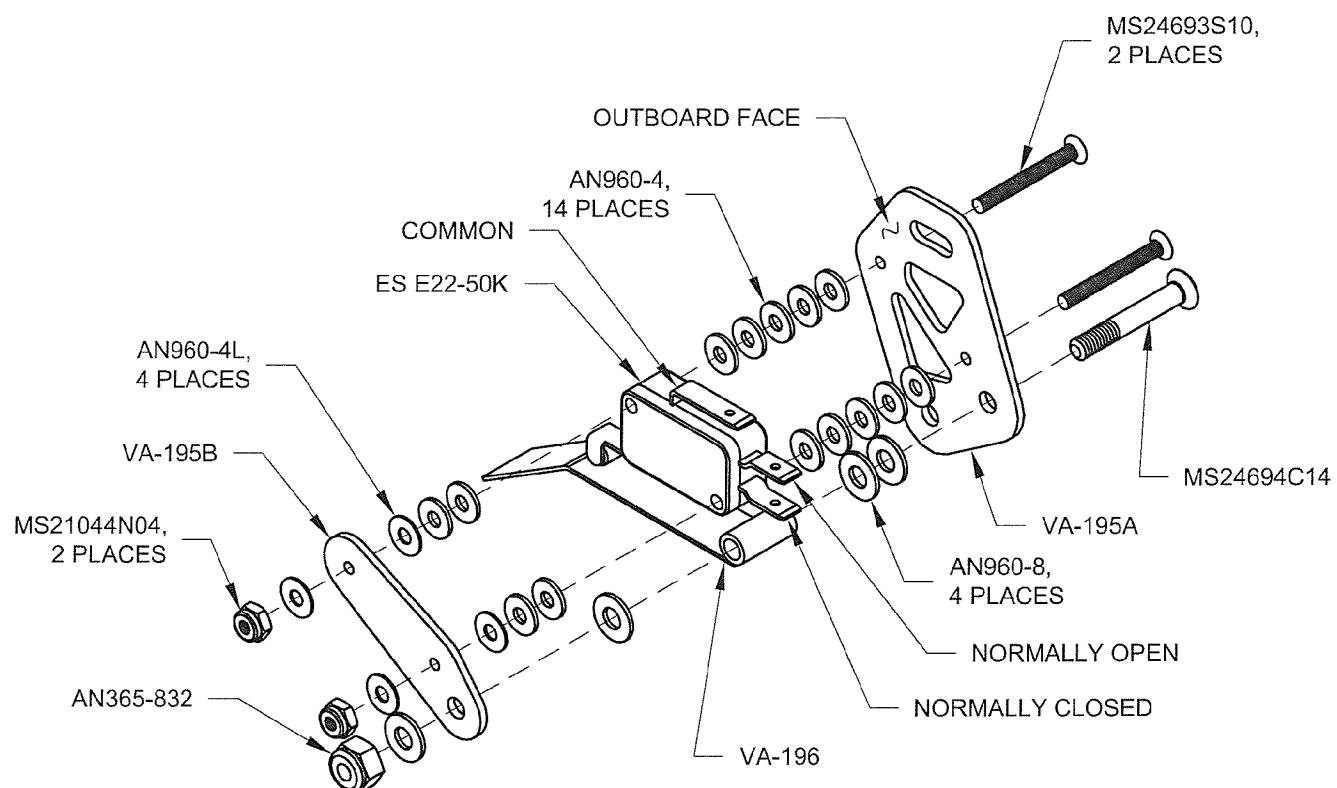


FIGURE 1: STALL WARNING SUBASSEMBLY

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.

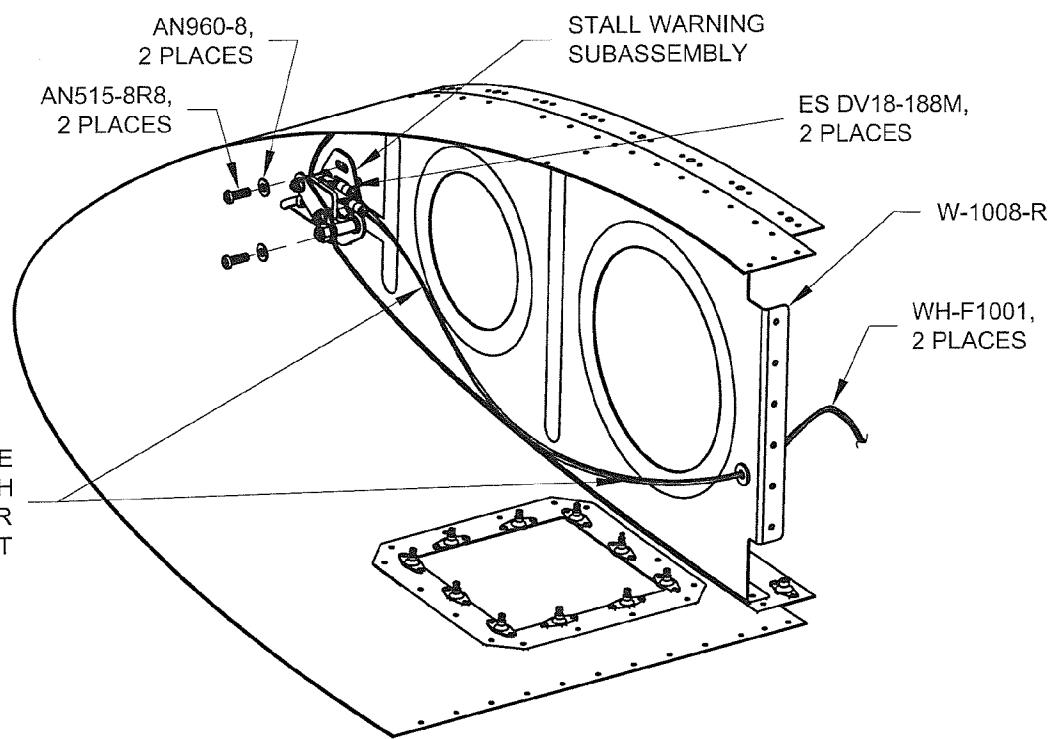


FIGURE 2: INSTALLING THE STALL WARNING SUBASSEMBLY

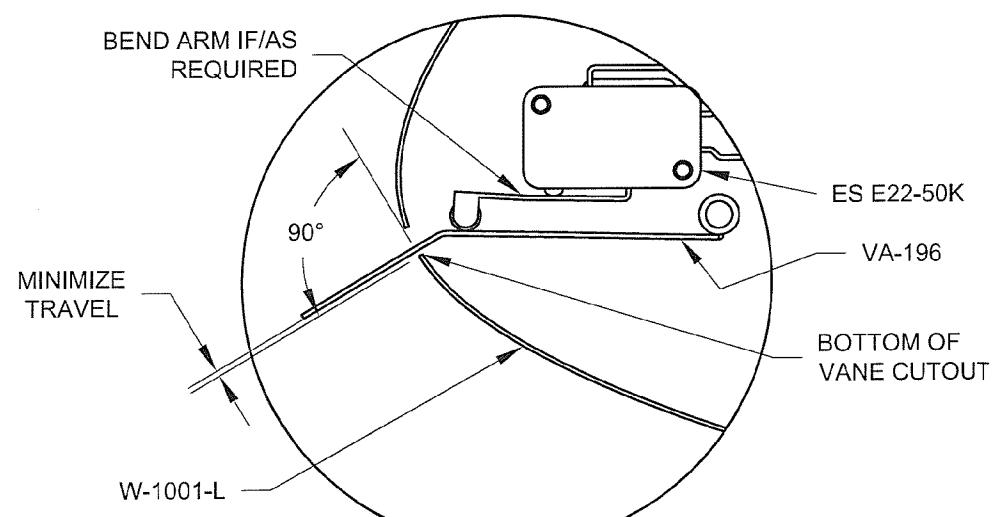
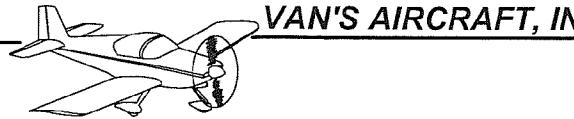


FIGURE 3: ACTIVATING THE MICRO SWITCH



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.

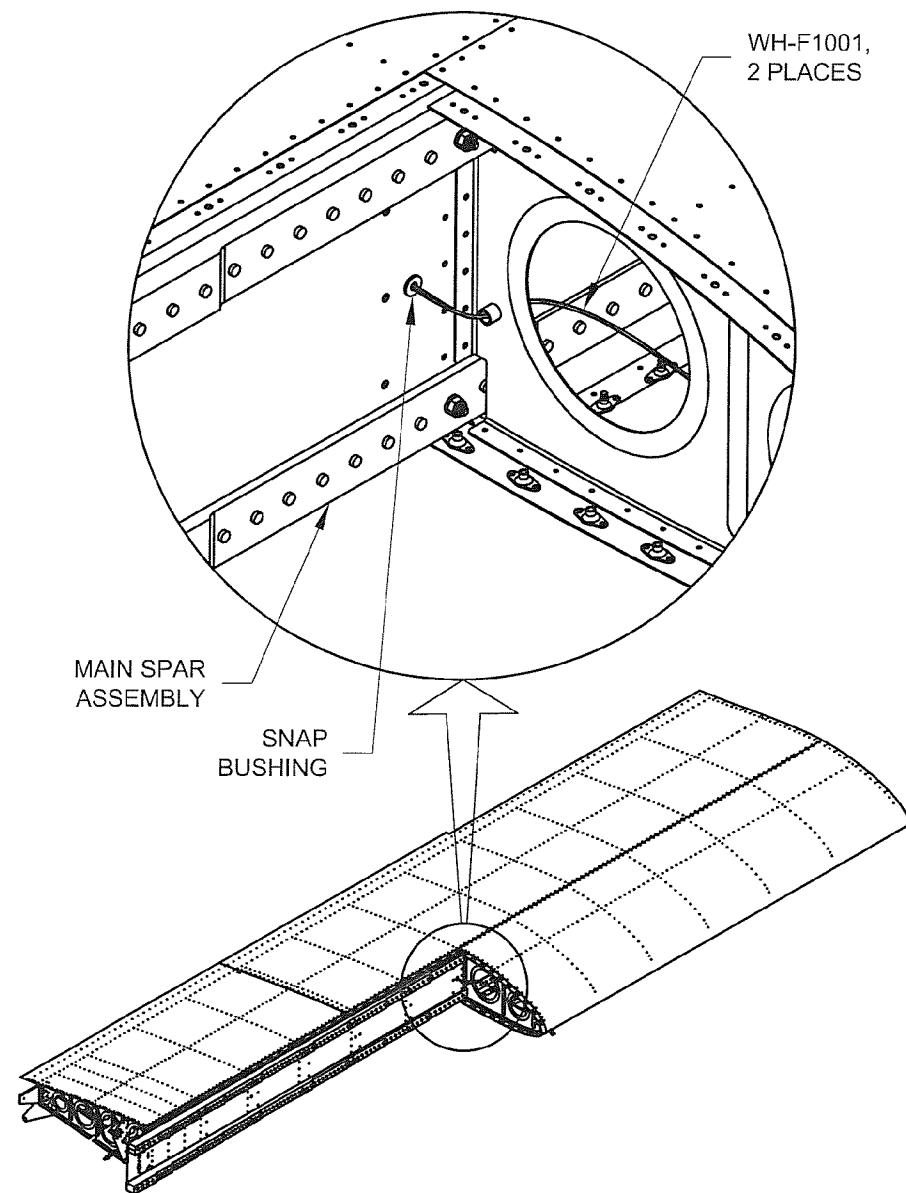


FIGURE 1: ROUTING WIRES THROUGH THE MAIN SPAR



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.

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.

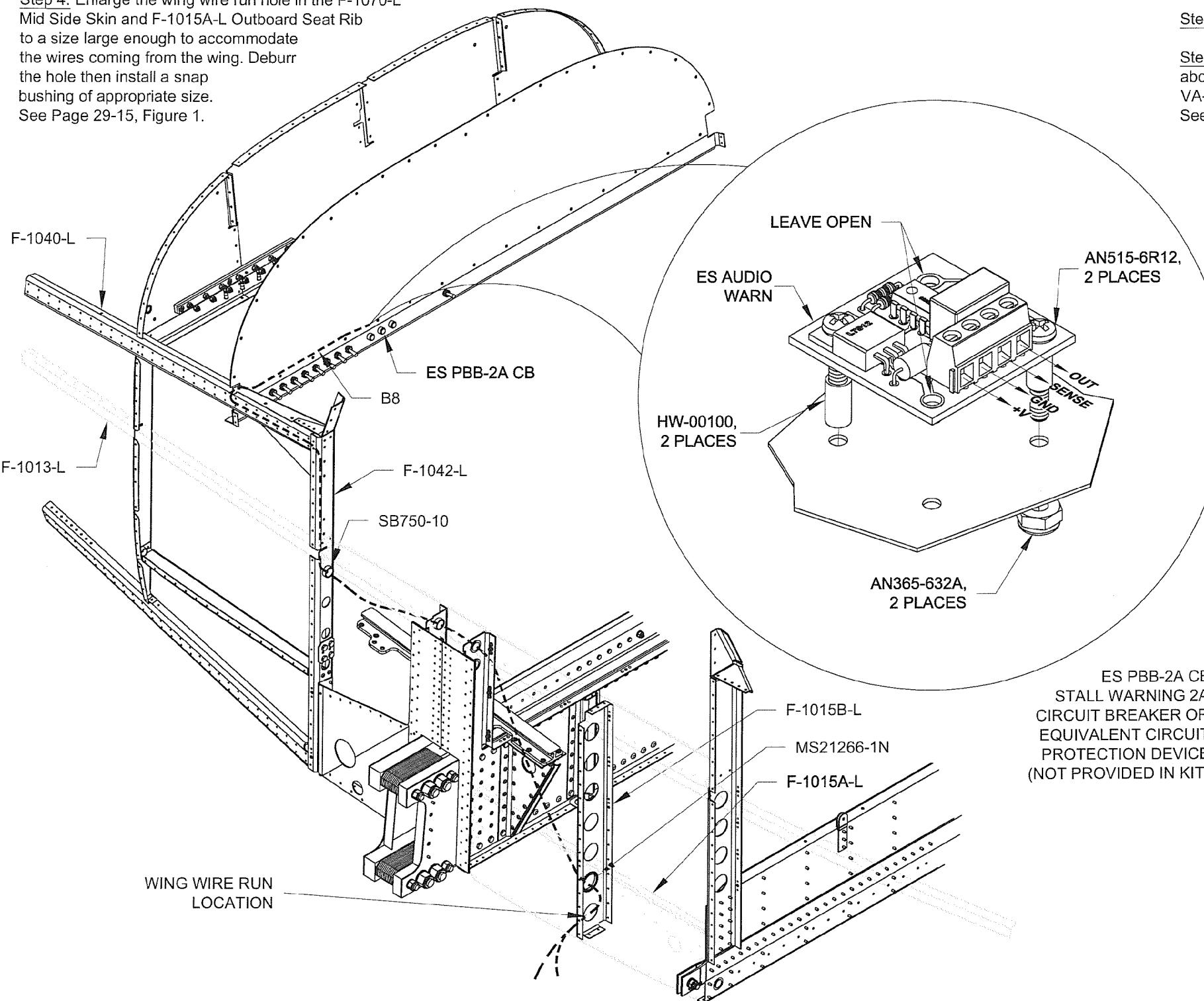


FIGURE 1: WIRE ROUTING AND BUZZER INSTALLATION

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.

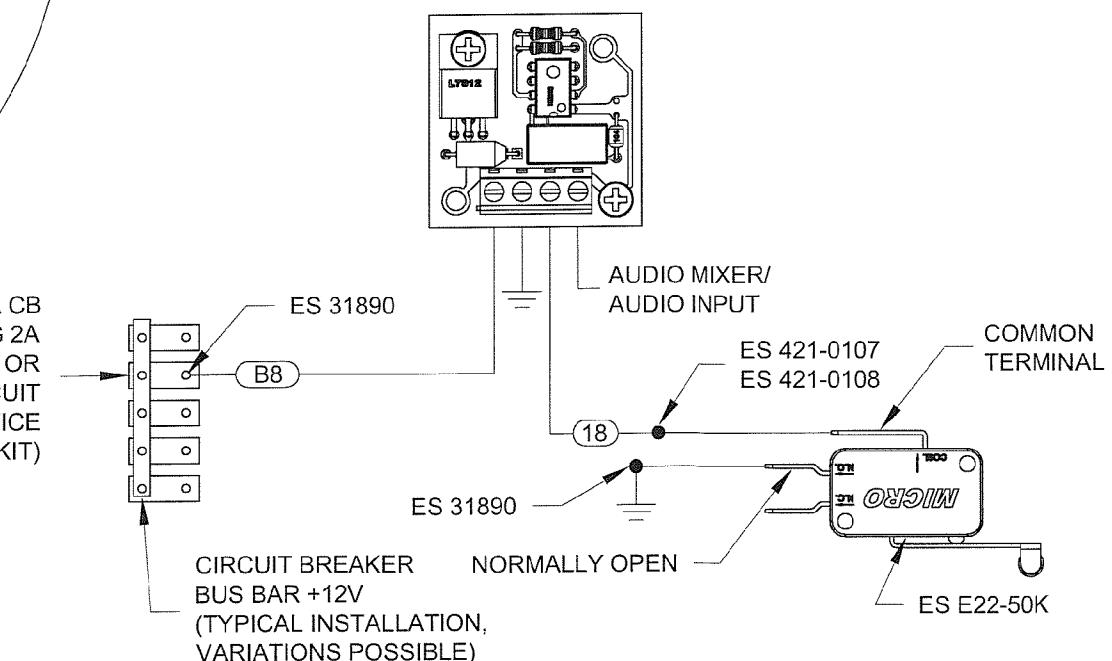
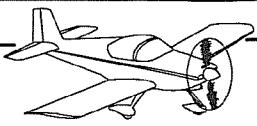
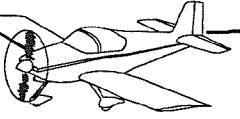


FIGURE 2: STALL WARNING SYSTEM WIRING SCHEMATIC



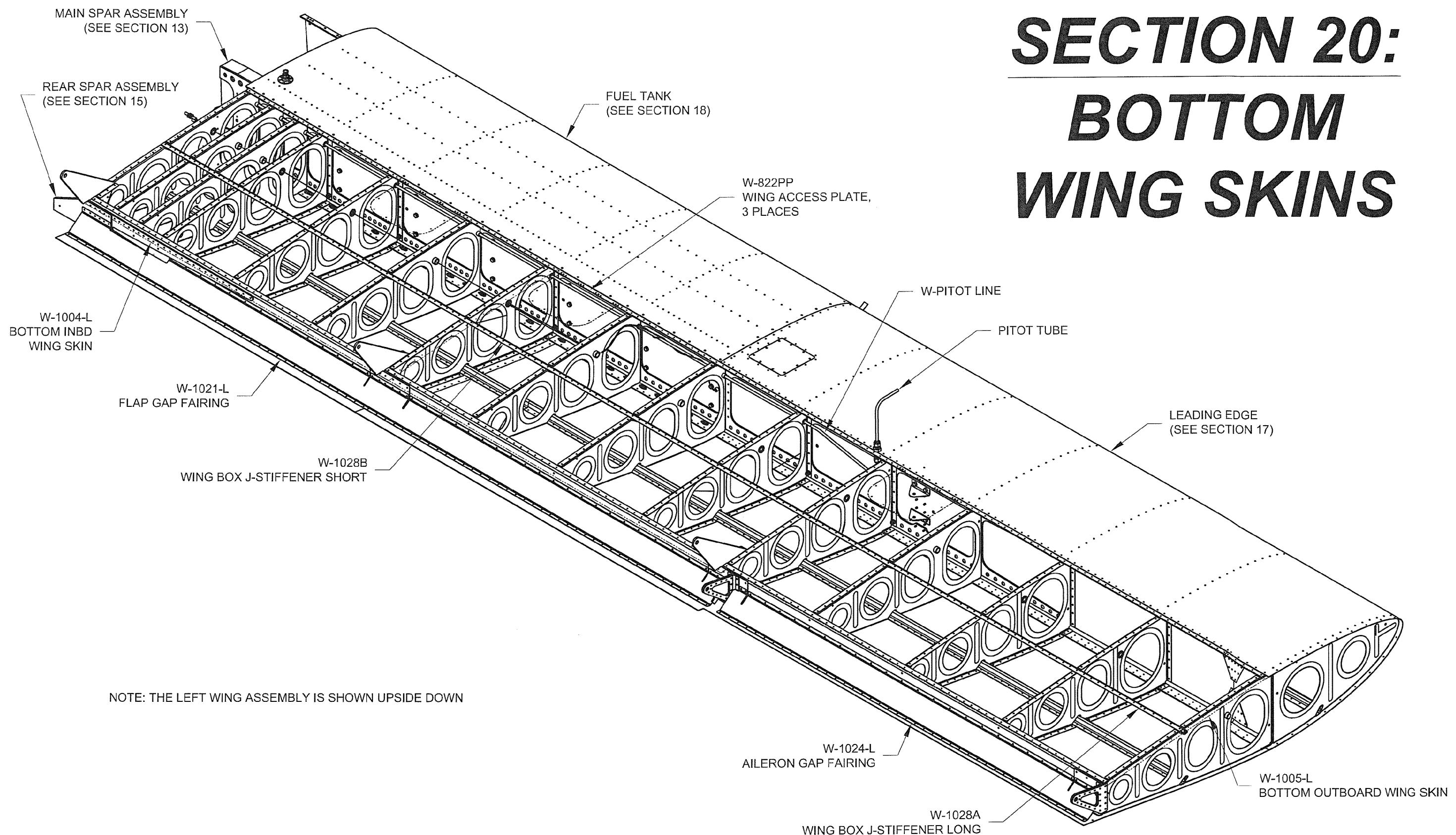
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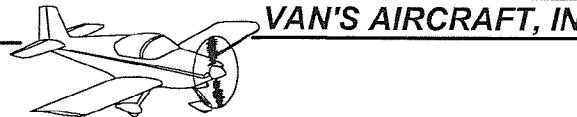
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SECTION 20:

BOTTOM WING SKINS





VAN'S AIRCRAFT, INC.

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!

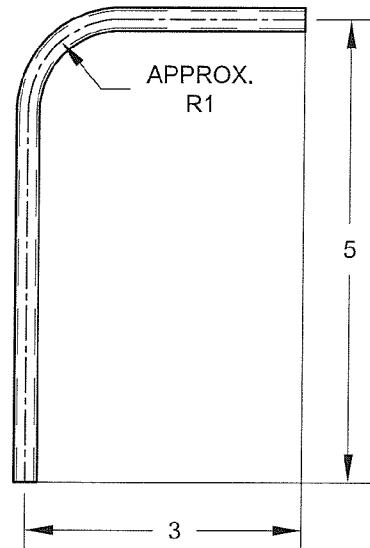


FIGURE 1: PITOT TUBE

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 too 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.

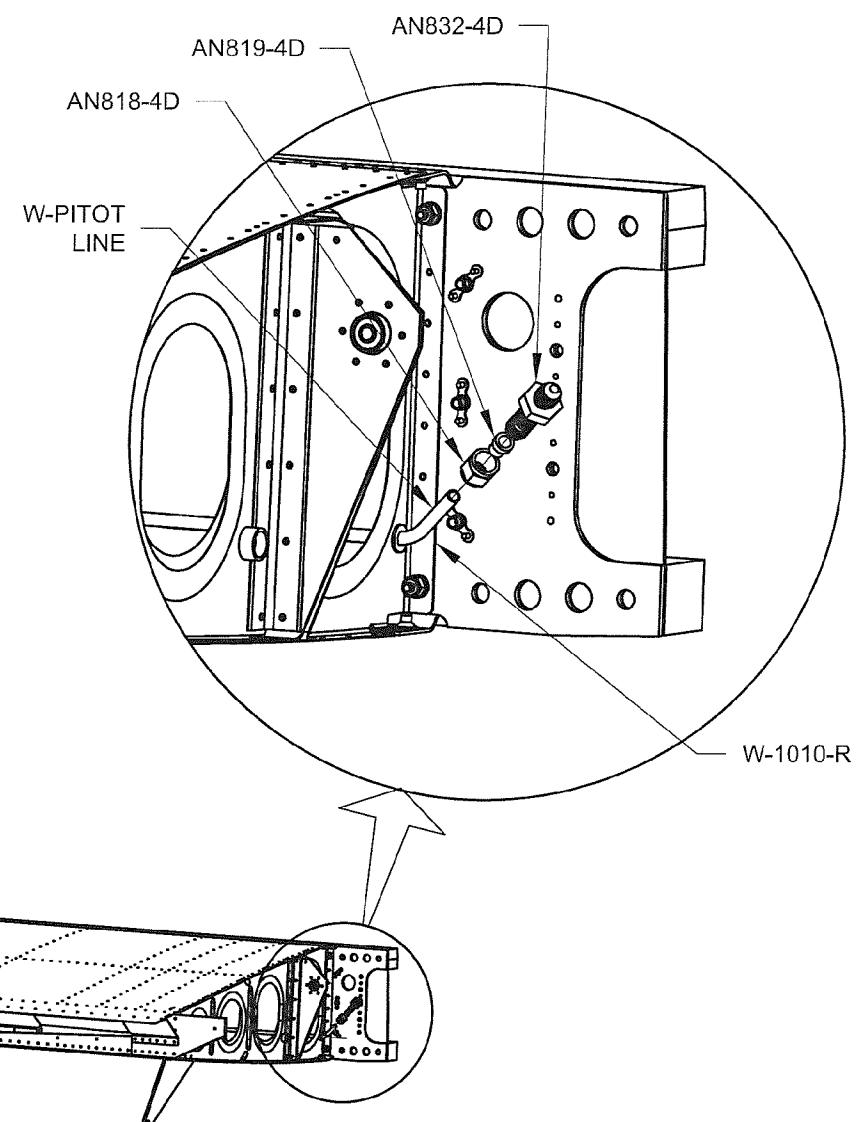


FIGURE 2: INBOARD PITOT LINE INSTALLATION

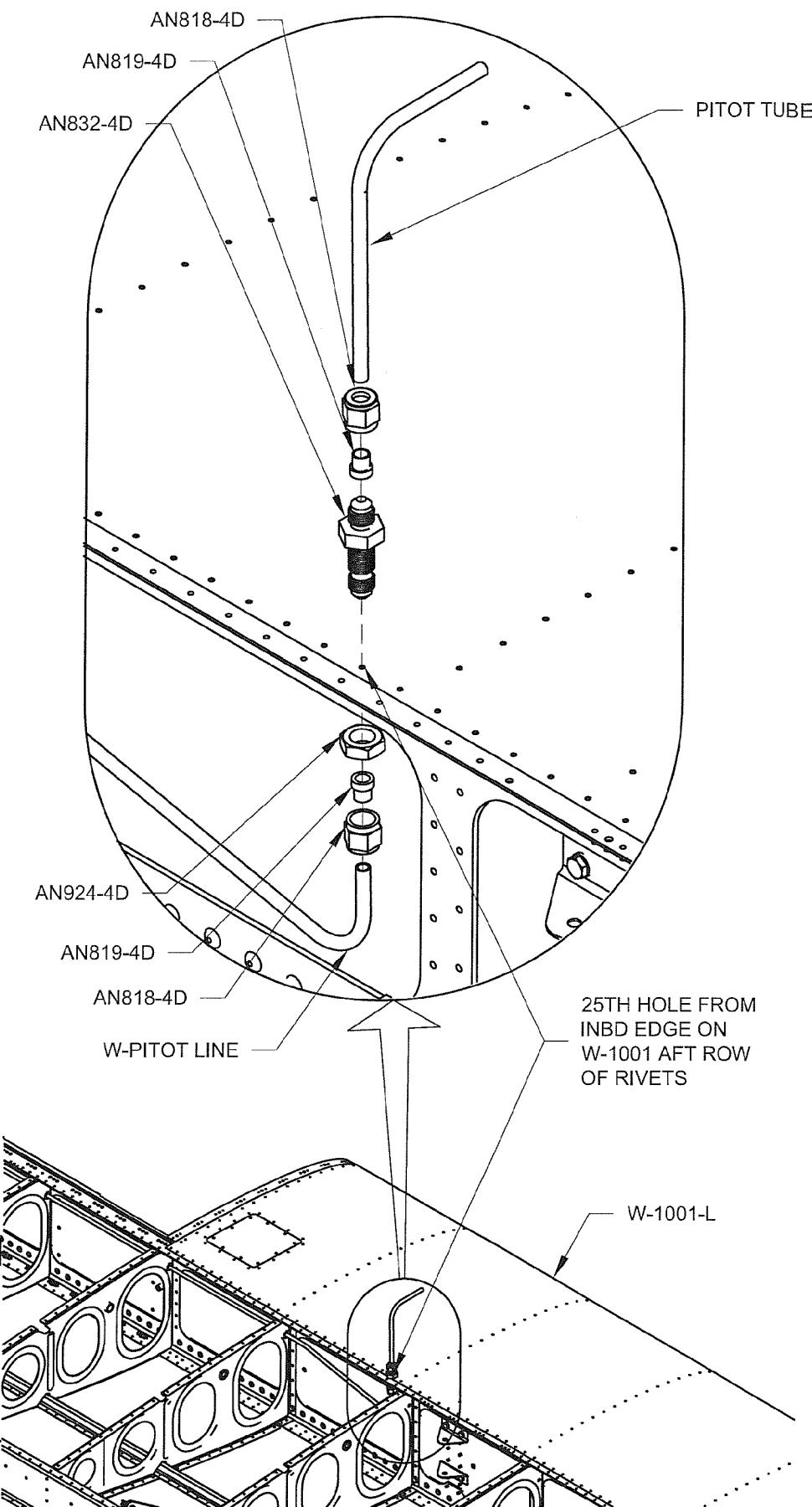
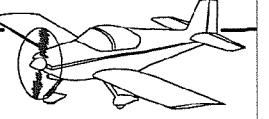


FIGURE 3: OUTBOARD PITOT LINE AND PITOT TUBE INSTALLATION



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.

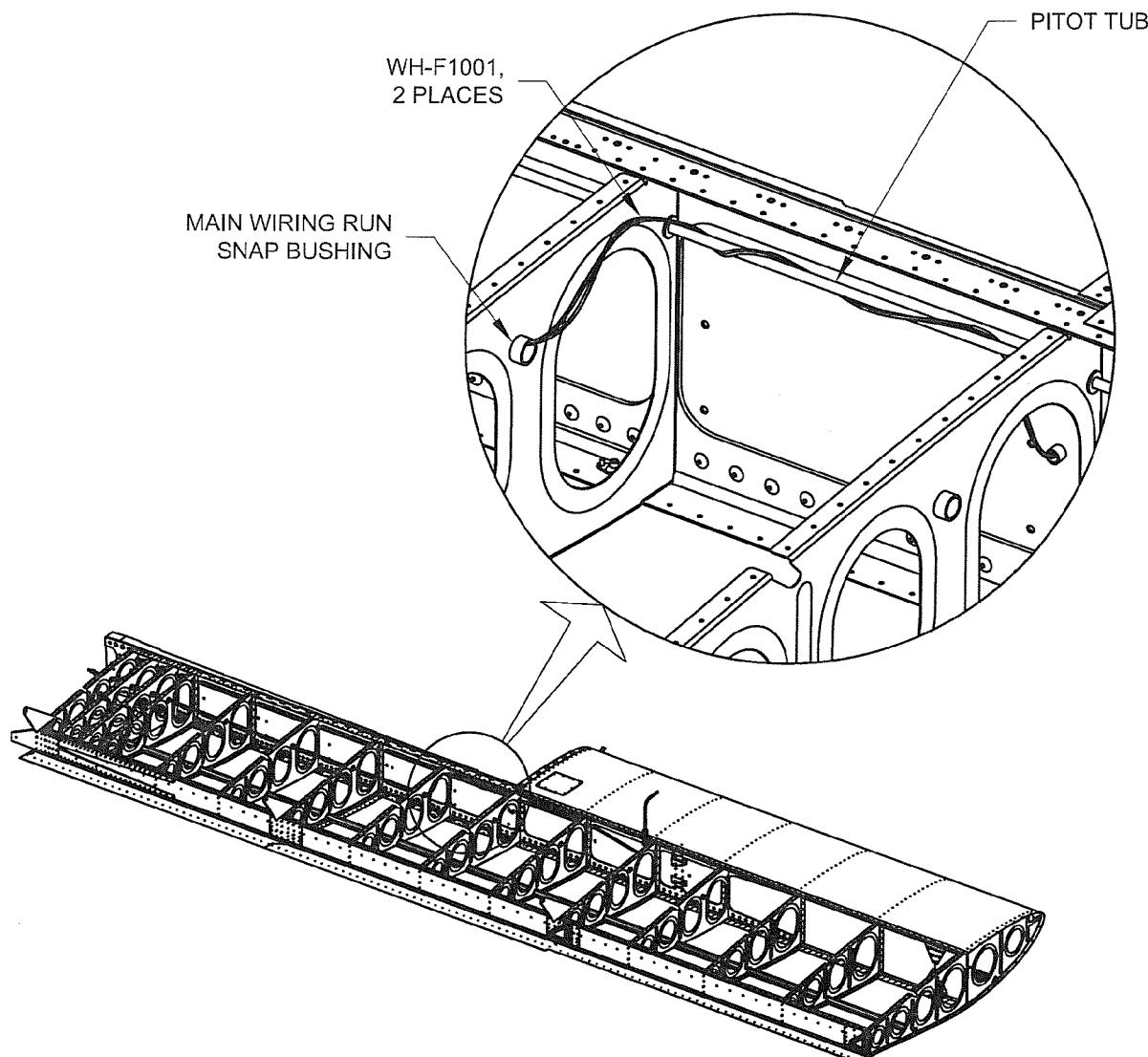


FIGURE 1: ROUTING WIRES INTO THE MAIN WING WIRE RUN

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.

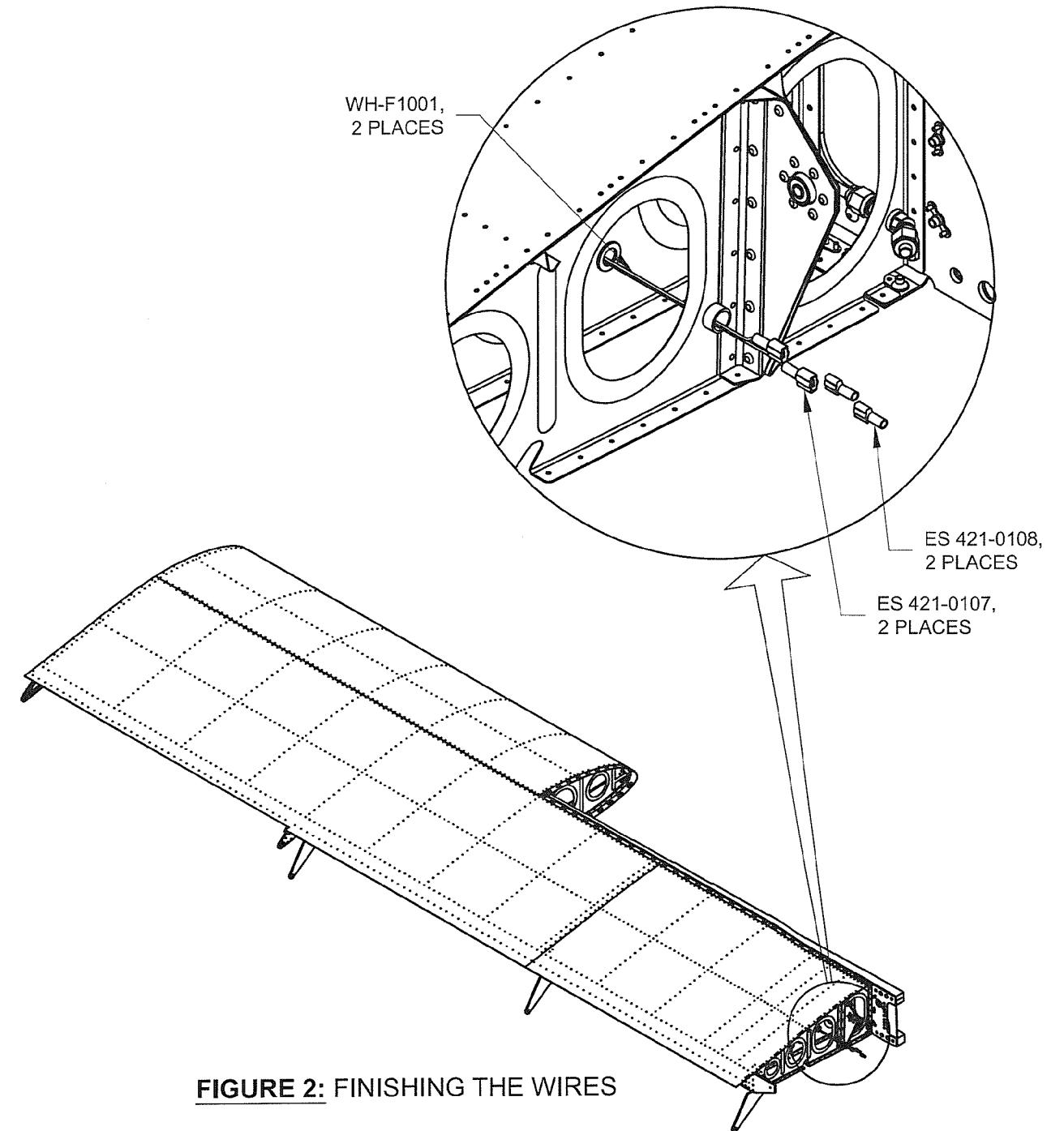
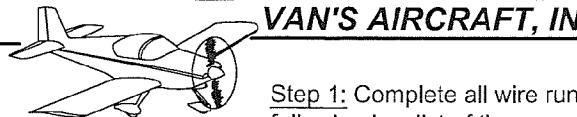


FIGURE 2: FINISHING THE WIRES



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.

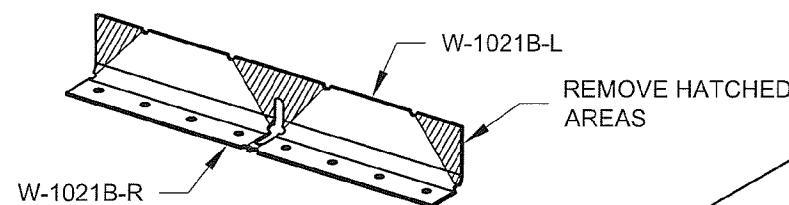


FIGURE 1: STIFFENERS

Step 3: Cleco the W-1021B-L Flap Gap Stiffener to the W-1021-L Flap Gap Fairing. Cleco the flap gap fairing and W-1024-L 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-1021-L Flap Gap Fairing, W-1024-L 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-1021-L Flap Gap Fairing as shown in Figure 2 and per the callouts in Figure 4.

Step 6: Cleco the W-1021-L Flap Gap Fairing and W-1024-L 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.

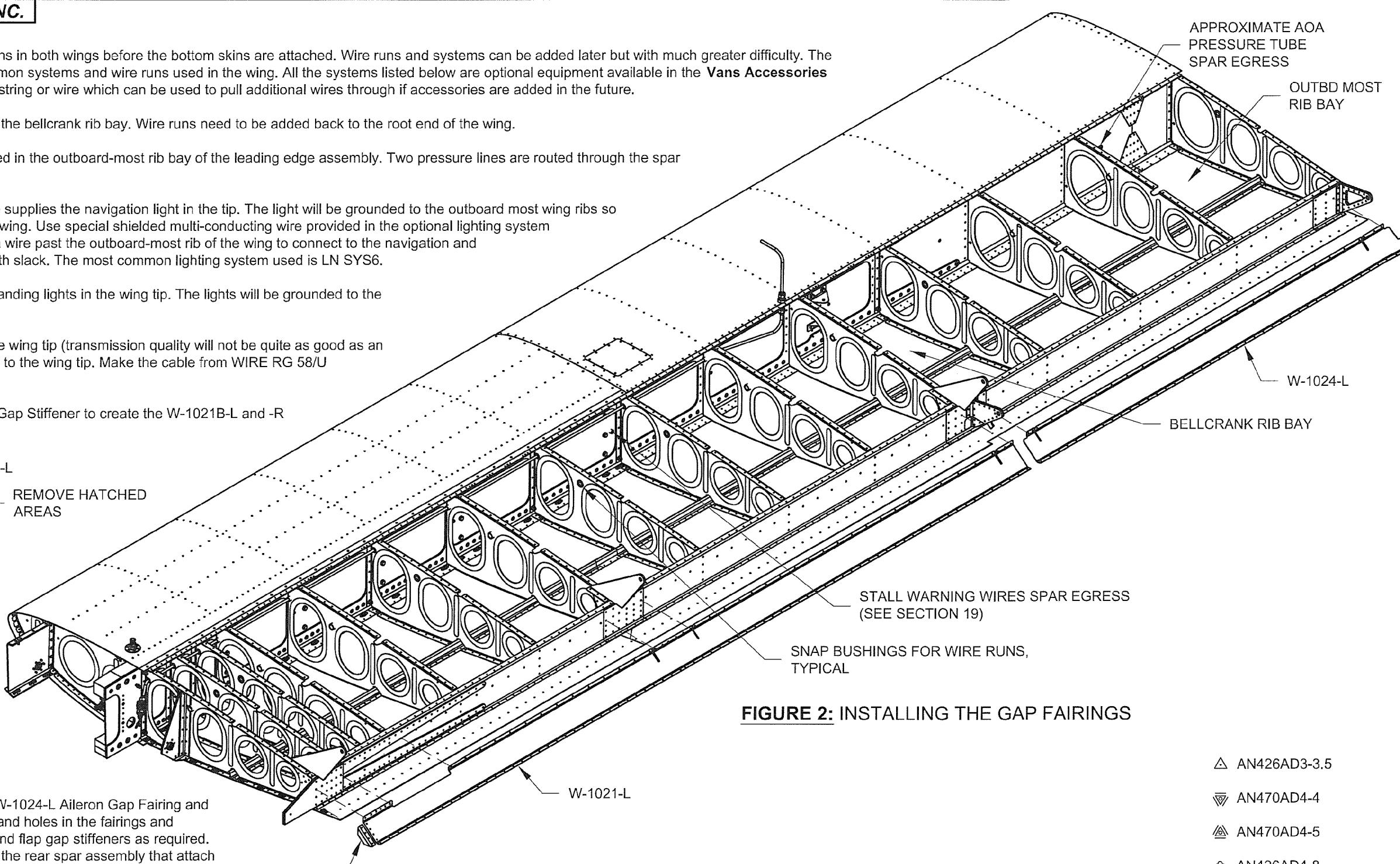


FIGURE 2: INSTALLING THE GAP FAIRINGS

- △ AN426AD3-3.5
- ▽ AN470AD4-4
- ▲ AN470AD4-5
- ◊ AN426AD4-8

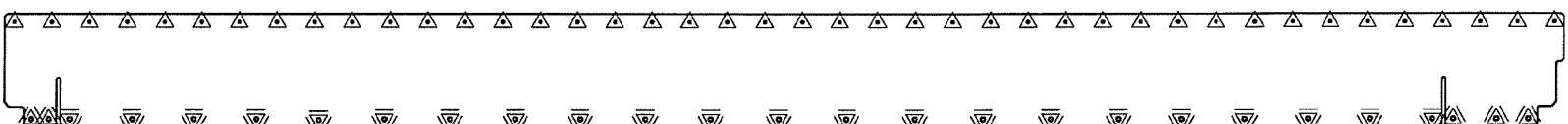


FIGURE 3: AILERON GAP FAIRING RIVET CALLOUTS

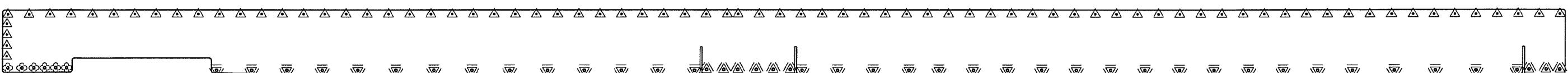
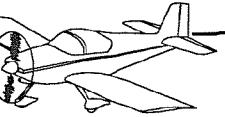


FIGURE 4: FLAP GAP FAIRING RIVET CALLOUTS



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.

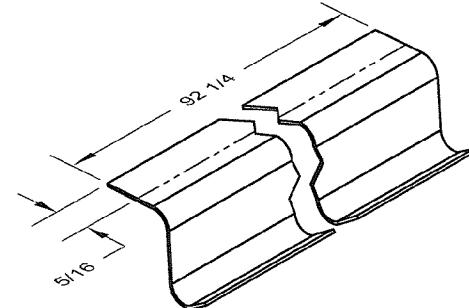


FIGURE 1: J-STIFFENER DETAIL

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.

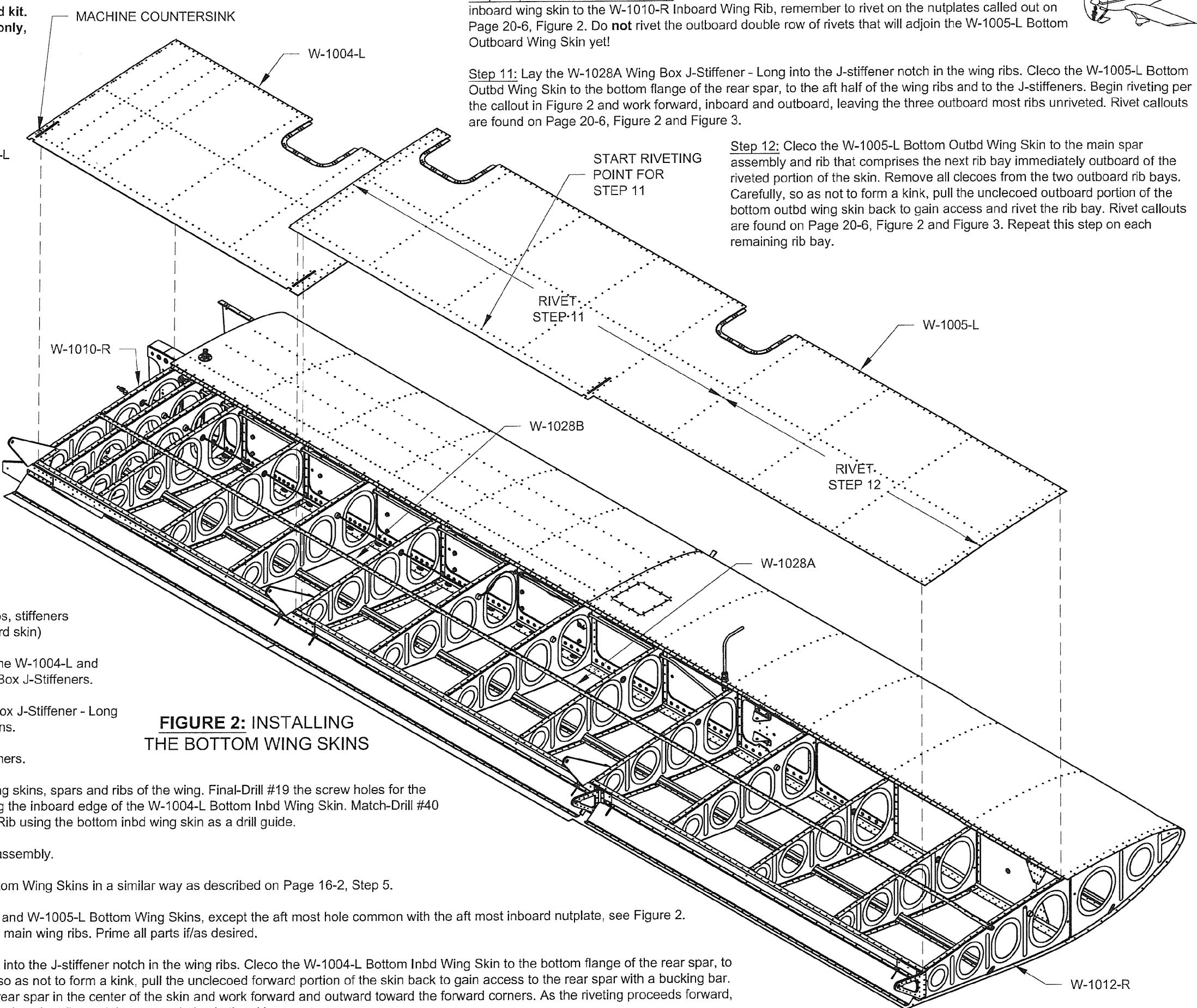
Step 9: Deburr the edges and holes of all parts. Dimple the W-1004-L and W-1005-L Bottom Wing Skins, except the aft most hole common with the aft most inboard nutplate, see Figure 2. Dimple the W-1028A and W-1028B Wing Box J-Stiffeners. Dimple the main wing ribs. Prime all parts if/as desired.

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.

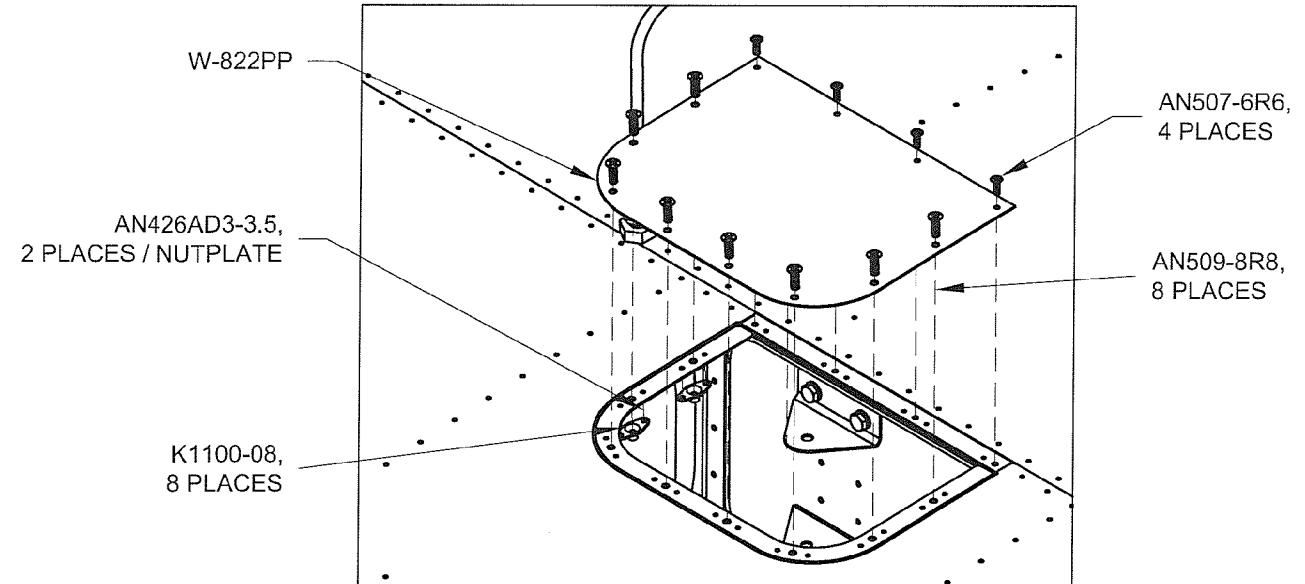


FIGURE 1: TYPICAL WING ACCESS PLATE ATTACH

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).

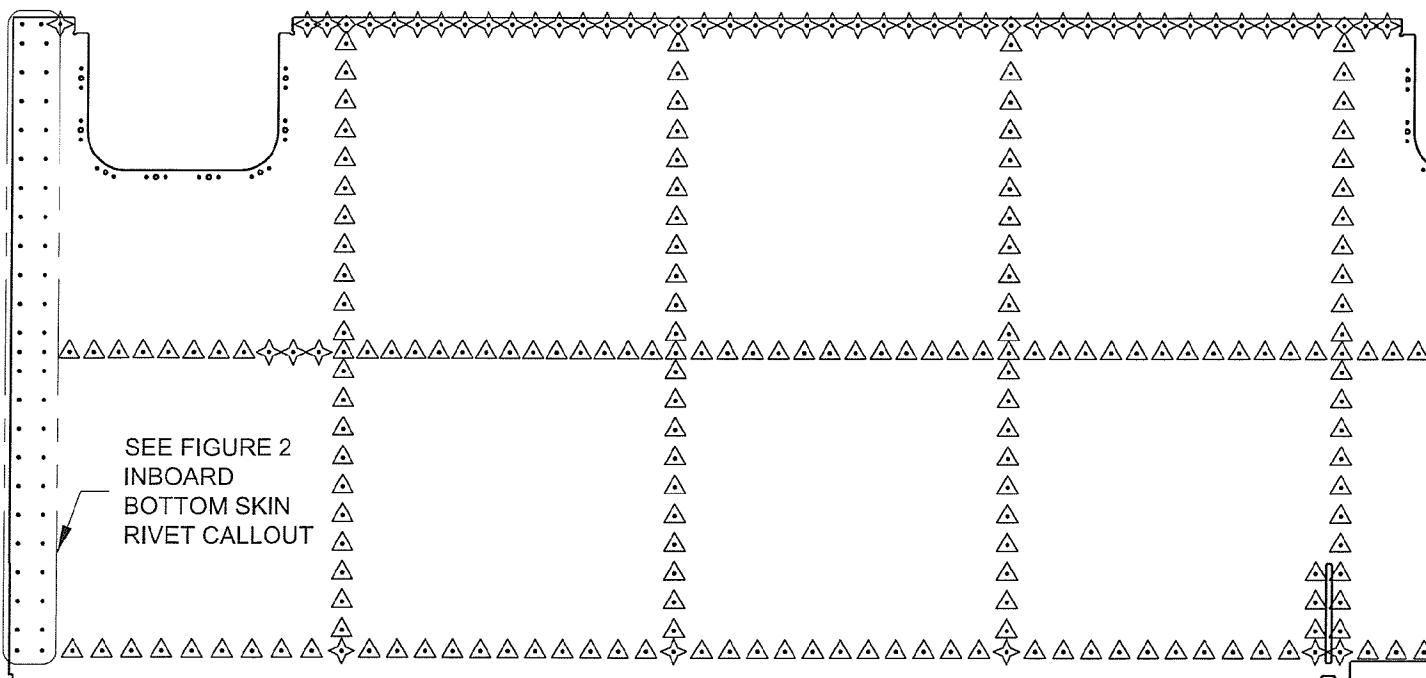


FIGURE 2: BOTTOM INBOARD SKIN RIVET CALLOUTS

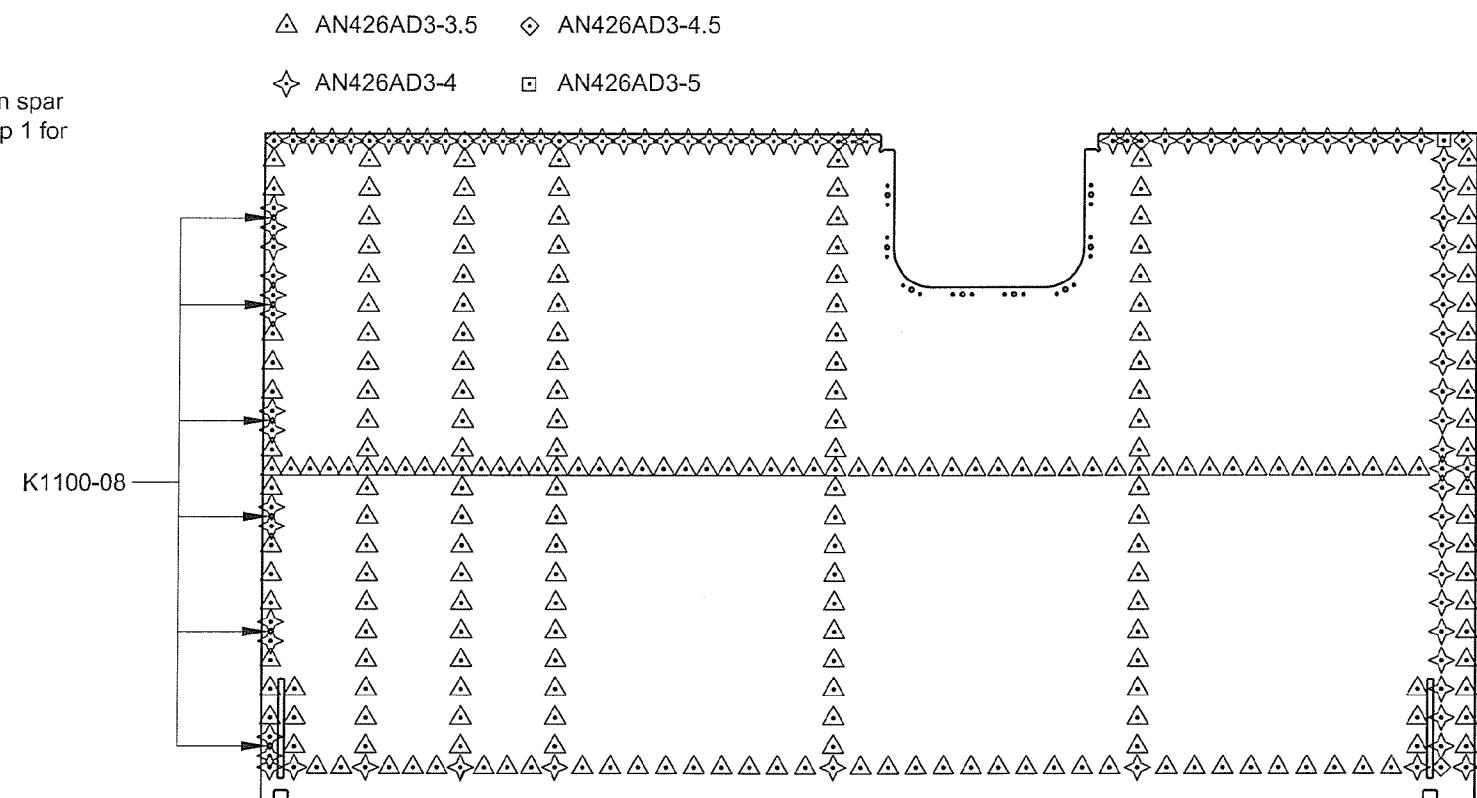
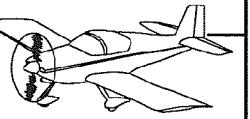
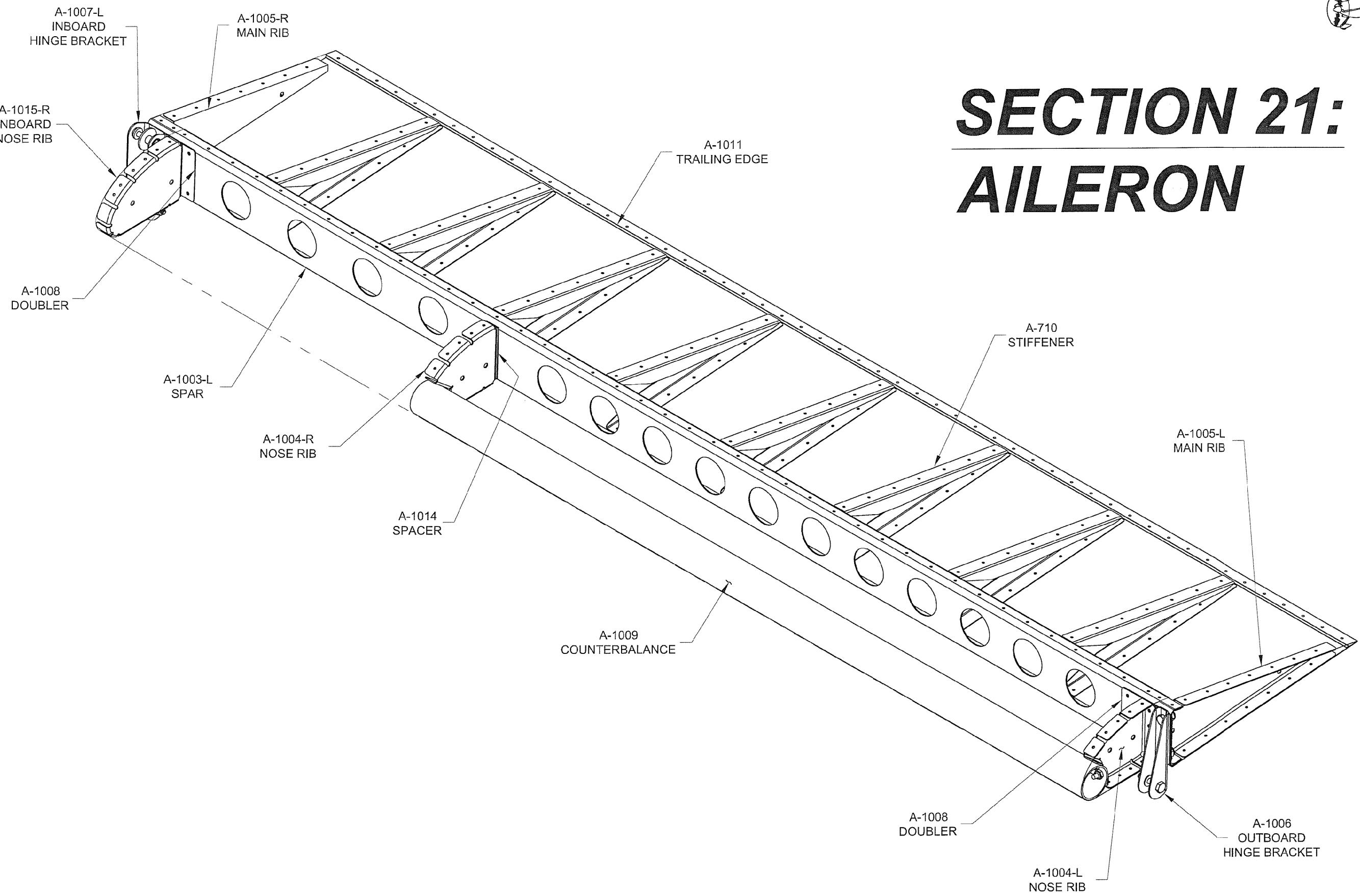


FIGURE 3: OUTBOARD BOTTOM SKIN RIVET CALLOUTS



SECTION 21: AILERON





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-L Flap Nose Rib as shown on Page 22-2, 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.

Step 1: Identify the aileron parts on Page 21-1. Bend all rib flanges to 90°.

Step 2: Cleco the A-1004-L Nose Rib and A-1008 Doubler to the A-1003-L Spar as shown in Figure 1.

Cleco the A-1004-R Nose Rib and A-1014 Spacer to the spar.

Cleco the A-1015-R Inboard Nose Rib and A-1008 Doubler to the spar.

Final-Drill #30 nine holes (three holes per nose rib) through spar, doubler or spacer, and nose rib as shown in Figure 1.

Final-Drill #30 four holes through spar and doublers as shown in Figure 1.

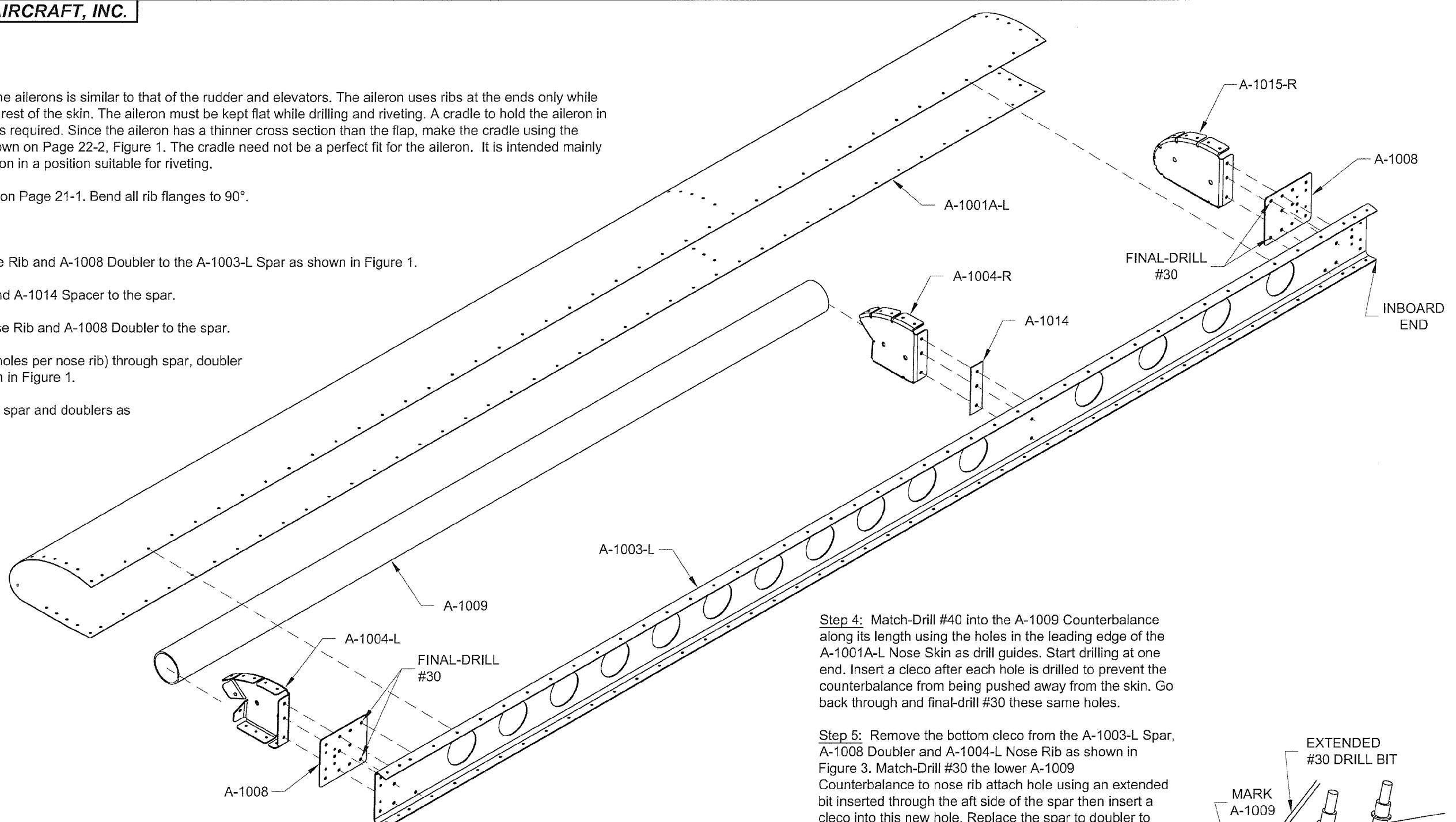


FIGURE 1: ASSEMBLE THE 'D' CELL

Step 3: Cleco the A-1001A-L Nose Skin to the lower flange of the A-1003-L 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 A-1004-L and -R Nose Ribs and to the A-1015-R 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. 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.

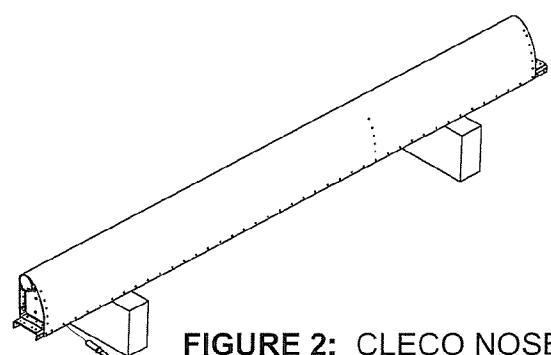


FIGURE 2: CLECO NOSE SKIN

Step 4: Match-Drill #40 into the A-1009 Counterbalance along its length using the holes in the leading edge of the A-1001A-L 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.

Step 5: Remove the bottom cleco from the A-1003-L Spar, A-1008 Doubler and A-1004-L Nose Rib as shown in Figure 3. Match-Drill #30 the lower A-1009 Counterbalance to nose rib attach hole using an extended bit inserted through the aft side of the spar then insert a cleco into this new hole. Replace the spar to doubler to nose rib cleco.

Repeat the process (except for cleco insertion) for the lower hole in the A-1004-R Nose Rib.

Use an extended drill bit to mark the upper counterbalance to nose rib attach hole at the outboard end of the spar by leaning the drill in alongside the rib as shown in Figure 3.

Remove the A-1001A-L Nose Skin and counterbalance. Final-Drill #27 the marked hole and the two #30 holes in the counterbalance. Final-Drill #27 the three corresponding holes in the A-1004-L and -R Nose Ribs.

Remove the nose ribs and A-1015-R Inboard Nose Rib from the spar.

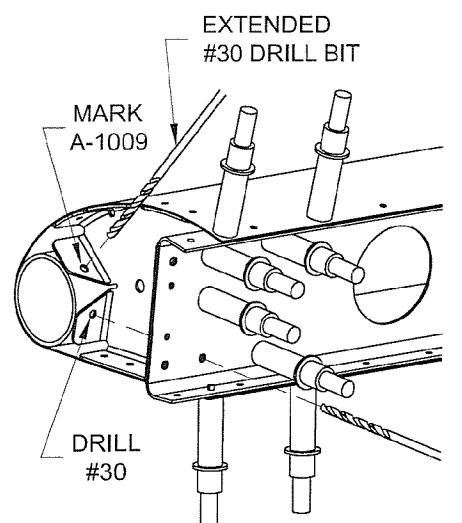
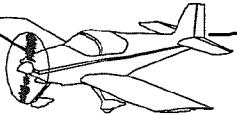


FIGURE 3: MARK/DRILL COUNTERBALANCE



Step 1: Cleco the A-1005-L Main Rib to the spar assembly. Final-Drill #40 the holes to be countersunk as shown in Figure 1. Cleco the A-1006 Outboard Hinge Bracket to the spar assembly leaving the middle hole open.

CAUTION: The middle 1/8 hole in the outboard hinge bracket is intended for alignment use only. Do not drill this hole to 3/16.

Match-Drill #30 through the A-1006 Outbd. Hinge Bracket, A-1008 Doubler, A-1003-L Spar and main rib spar attach flange using the middle hole in the outboard hinge bracket as a drill guide. Install a cleco. Remove the cleco from the upper hole in the outboard hinge bracket.

Step 2: Final-Drill 3/16 through the hinge bracket, doubler, spar, and main rib spar attach flange using the upper 1/8 pilot hole in the hinge bracket as a drill guide. Insert the hardware called-out on Page 21-8, Figure 4 for the top hole.

Remove the cleco from the lower 1/8 hole. Final-Drill 3/16 through the hinge bracket, doubler, spar, and main rib spar attach flange using the lower 1/8 pilot hole in the hinge bracket as a drill guide.

Step 3: Remove the outboard hinge bracket and deburr. Countersink the two #40 holes in the doubler as shown in Figure 1.

Step 4: Cleco the A-1005-R Main Rib to the spar assembly. Final-Drill #40 the four holes to be countersunk as shown in Figure 2. Cleco the A-1007-L Inboard Hinge Bracket to the spar assembly but leave the middle hole in the bracket open.

Final-Drill 3/16 through the hinge bracket, A-1008 Doubler, and A-1003-L Spar using the middle 1/8 hole in the hinge bracket as a drill guide. Insert an AN3 bolt without a nut just to maintain the hinge bracket's alignment.

Remove the cleco from the upper 1/8 hole. Final-Drill 3/16 through the hinge bracket, doubler, spar, and main rib using the lower 1/8 pilot hole in the hinge bracket as a drill guide. Insert the hardware called-out on Page 21-8, Figure 3.

Remove the cleco from the lower hole in the inboard hinge bracket. Final-Drill 3/16 through the hinge bracket, doubler, spar, and main rib using the hole in the hinge bracket as a drill guide.

Remove the hinge bracket and deburr. Countersink the four #40 holes in the doubler as shown in Figure 2.

Lay the clecoed together spar, doublers, and main ribs aside for now.

Step 5: Cut the A-710 Stiffeners from the angle strip provided and trim as shown in Figure 3. The angle strip is shown unbent for clarity.

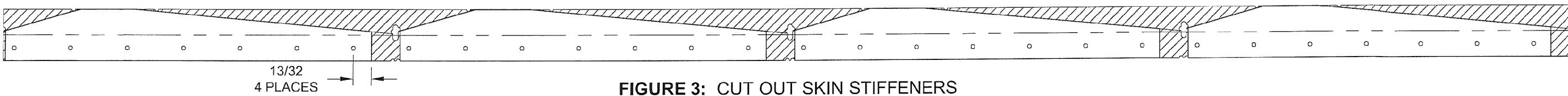


FIGURE 3: CUT OUT SKIN STIFFENERS

Step 6: Since the A-1001B Top Skin is not symmetrical. Find its proper orientation by clecoing it and the A-1002 Bottom Skin to the A-1003-L Spar as shown in Figure 4. Each column of top skin stiffener attach holes should fall to the right of the corresponding column of holes in the bottom skin.

The top skin does not mirror for the right aileron so this same information applies to both ailerons.

Before disassembly, identify each skin and its correct orientation making it easier to dimple the correct side when the time comes.

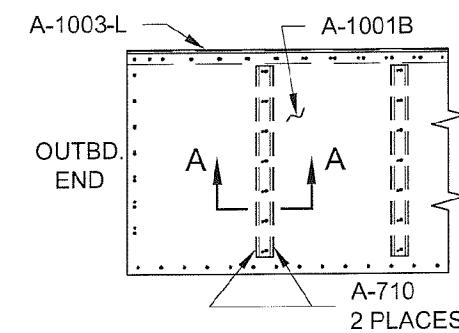
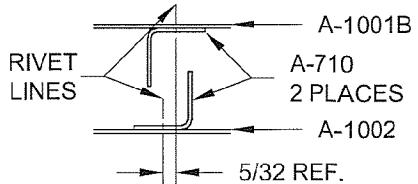


FIGURE 4:
IDENTIFY TOP SKIN
(TOP VIEW)



SECTION A-A

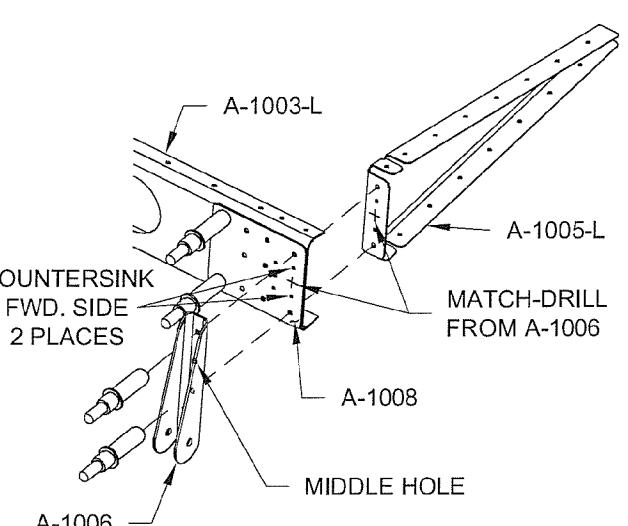


FIGURE 1:
FINAL-DRILL OUTBOARD HINGE BRACKET

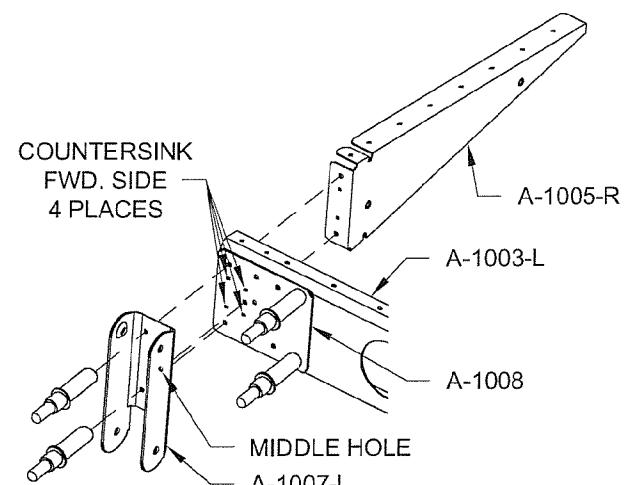


FIGURE 2:
FINAL-DRILL INBOARD HINGE BRACKET

Step 7: Locate the A-710 Stiffeners on the A-1001B Top Skin as shown in Figure 5. Final-Drill #40 all holes common to the stiffeners and the top skin.

Step 8: Repeat Step 5 for the A-1002 Bottom Skin (not shown) which is symmetrical about its short axis so there is no incorrect side. Final-Drill #40 all holes common to the stiffeners and the bottom skin.

Disassemble, deburr and dimple the holes common to the stiffeners and top/ bottom skins. **CAUTION: Be careful to dimple the correct side of the top skin.**

Prime skins and stiffeners as desired.

NOTE: Leave the skins unprimed in the area where they will contact the A-1011 Trailing Edge because tank sealant will be applied.

Rivet the stiffeners onto the top and bottom skin using the back-riveting method described in section 5F. See Page 21-8, Figures 5 and 6 for rivet call outs.

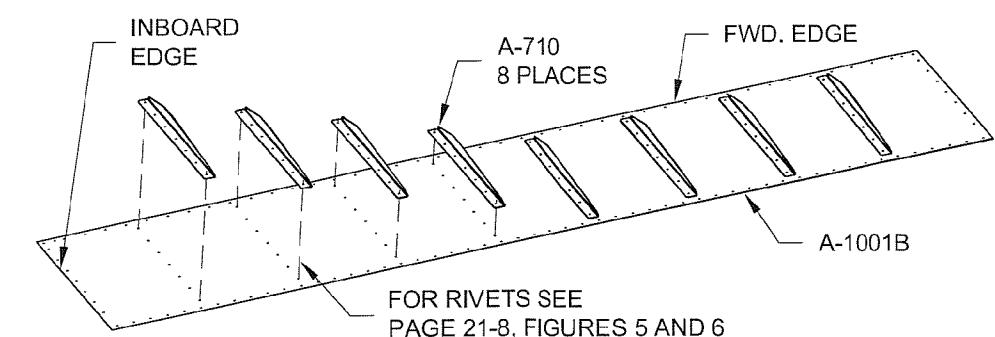
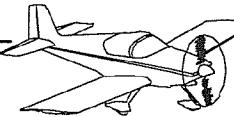


FIGURE 5: ATTACH STIFFENERS TO TOP SKIN



Step 1: Cleco the bottom skin assembly to the spar/ main rib assembly as shown in Figure 1. Final-Drill #40 the holes common to the bottom skin assembly and the A-1005-L and -R Main Ribs. Remove the bottom skin assembly. Deburr and dimple the main ribs and A-1002 Bottom Skin. A low profile dimple die is necessary for reaching the aft most rivets in the main rib to skin attach flanges. Fabricate a female die by drilling and countersinking a thin steel bar such as a splitting wedge.

Step 2: Rivet the bottom skin assembly to both A-1005-L and -R Main Ribs with only two "keeper" (temporary) rivets per rib as shown in Figure 1. Do this at the second and fifth holes from the forward edge of the A-1002 Bottom Skin. Just partially set these rivets since they will be drilled out later. The keeper rivets will eliminate the need for clecos and allow the aileron to lie flat while the upper surface is being drilled.

Remove the clecos from the ribs and turn the assembly over bottom side down.

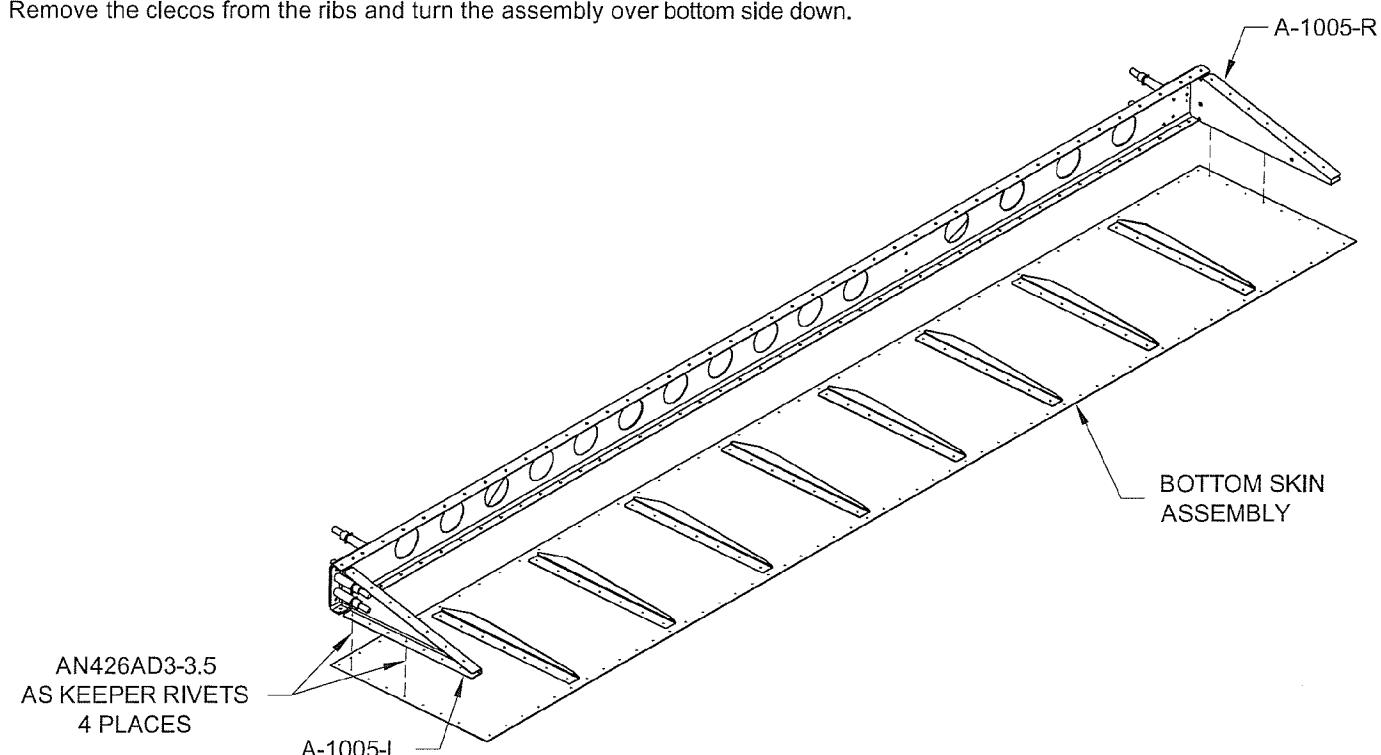


FIGURE 1: TEMPORARY ATTACHMENT OF THE BOTTOM SKIN ASSEMBLY

Step 3: Buff the edges of the A-1015 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.

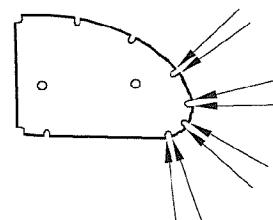


FIGURE 2: BUFF FLANGE EDGES

Step 4: Cleco the A-1004-L and A-1004-R Nose Ribs to the A-1009 Counterbalance as shown in Figure 3.

Cleco through the aft side of the spar to attach the nose rib/counterbalance subassembly and A-1014 Spacer to the spar assembly.

Step 5: Cleco the A-1015-R Inboard Nose Rib to the spar assembly.

Cleco the A-1001A-L Nose Skin to the bottom flange of the A-1003-L Spar and to the A-1004-L, A-1004-R, and A-1015-R Nose Ribs. Bring in the top skin assembly and cleco it along with the nose skin to the top flange of the spar at every other hole.

Cleco the top skin assembly to the A-1005-L and -R Main Ribs. Allow for some empty space along the main ribs so that a board can be positioned over them to weight down the aileron.

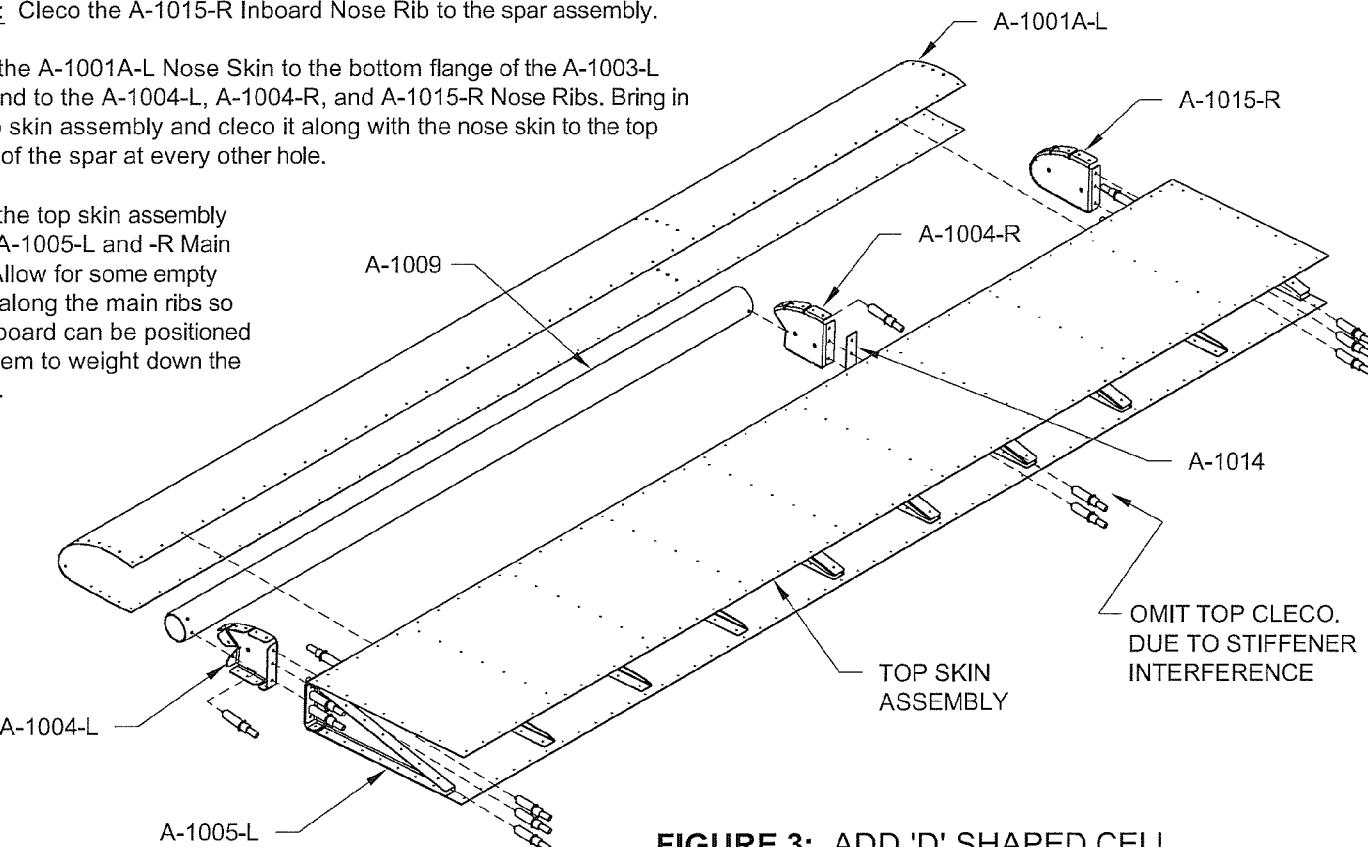


FIGURE 3: ADD 'D' SHAPED CELL

Step 6: Lay the assembly flat on the table top hanging the clecos which are holding the A-1001A-L Nose Skin to the A-1002 Bottom Skin and A-1003-L 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 as shown in Figure 4. Also the flanges of the A-1005 Main Ribs may be clamped to the table top to ensure they stay flat.

Step 7: Check the A-1001A Nose Skin for bowing with a straight edge held span wise midway between the leading edge and spar. About 1/16 inch of rise is acceptable. If necessary the skin can be squeezed down by hand to minimize the bow.

Final-Drill #40 every other hole in the A-1003-L Spar. Move the clecos and final-drill the remaining holes. Final-Drill #40 the holes common to the nose skin, A-1002 Bottom Skin, and spar from below. Use an extended drill bit.

Final-Drill #40 the holes common to the A-1004-L and -R Nose Ribs and A-1001A-L Nose Skin. Final-Drill 7/64 the two A-1004-R Nose Rib to A-1001A-L Nose Skin holes that receive blind rivets. See Page 21-6, Figure 5 and Page 21-5, Figure 4.

Final-Drill #40 the holes common to the A-1015-R Inbd. Nose Rib and to the nose skin.

Final-Drill #40 the A-1001B Top Skin to A-1005-L and -R Main Rib holes. Reposition the weight as required.

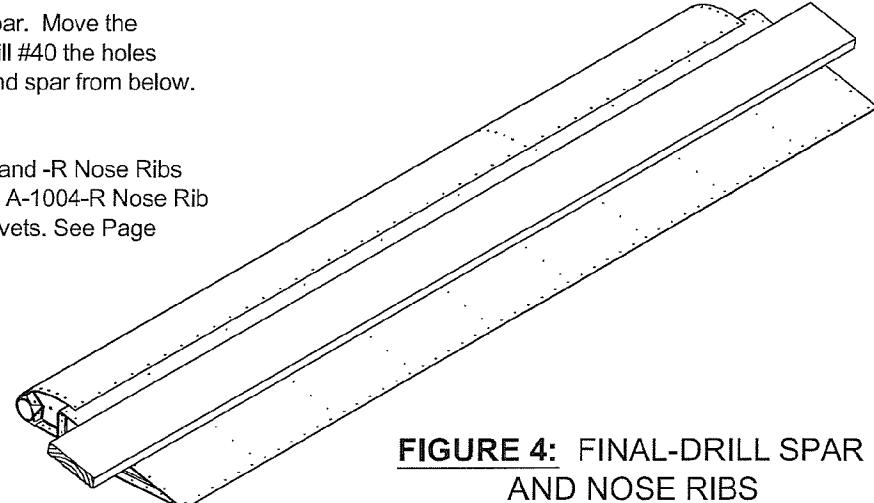
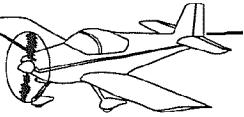


FIGURE 4: FINAL-DRILL SPAR AND NOSE RIBS



Step 1: Cleco the A-1011 Trailing Edge, made from VA-140 Trailing Edge extrusion, into the aileron's trailing edge and trim as shown in Figure 1.

Drill #40 the holes common to the top skin assembly, trailing edge and bottom skin assembly.

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.

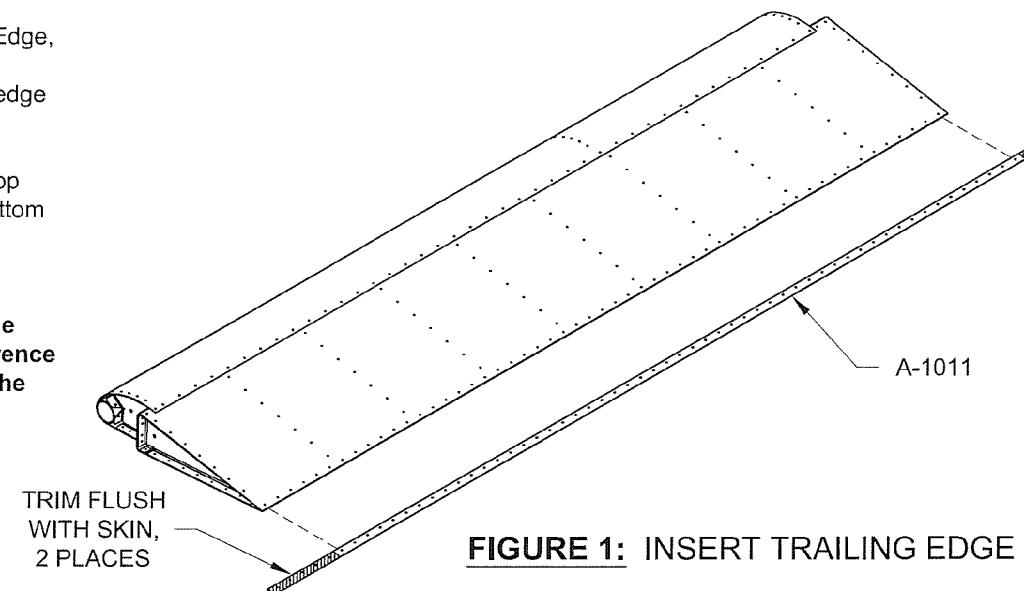


FIGURE 1: INSERT TRAILING EDGE

Step 2: Disassemble the aileron. Drill #40 to remove the keeper rivets installed earlier. For the technique on drilling out rivets see the illustration near the end of Section 5 titled, "Working with Flush Rivets". Deburr all the parts including the insides of the lightening holes in the A-1003-L Spar. 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 A-1011 Trailing Edge with the tool perpendicular to the surface of the part.

Dimple all remaining holes in the skins.

Prime as desired. The A-1009 Counterbalance is stainless steel and need not be primed.

Step 3: Rivet the two A-1008 Doublers to the A-1003-L Spar as shown in Figure 2.

Rivet the K1000-3 Nutplate to the spar with the rivet heads flush on the doubler's forward side.

Cleco the A-1014 Spacer to the spar.

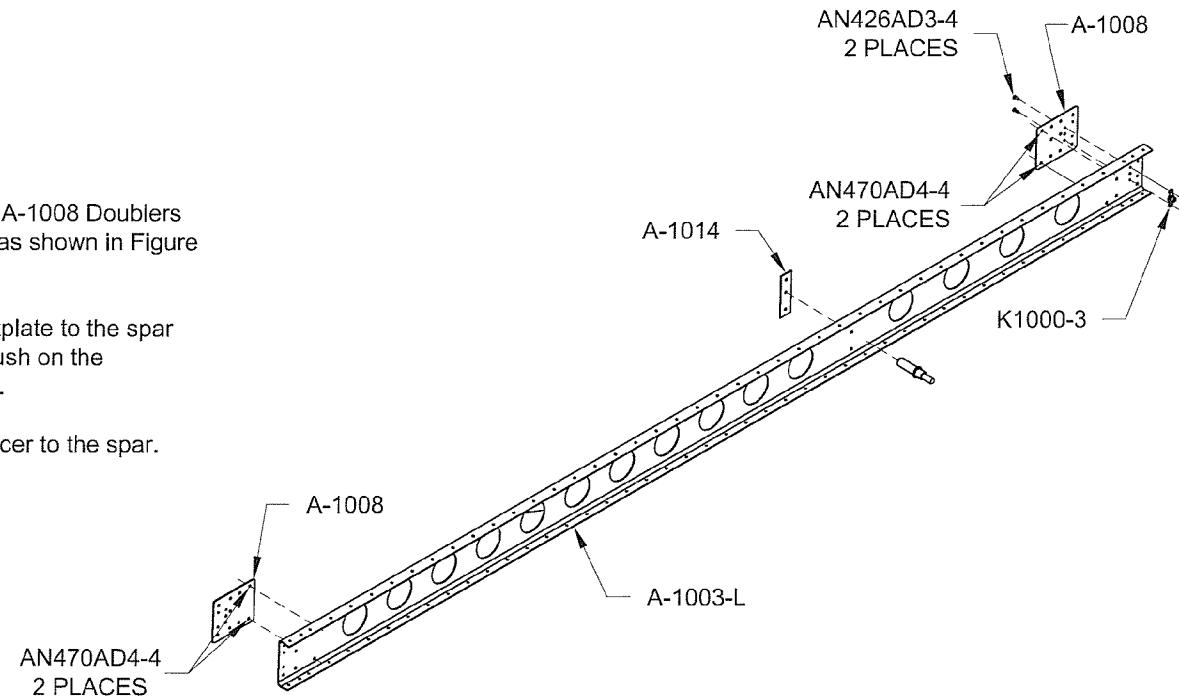


FIGURE 2: ATTACH DOUBLERS

Step 4: Attach the A-1004-L and A-1004-R Nose Ribs onto the A-1009 Counterbalance using the hardware shown in Figure 3. 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°.

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

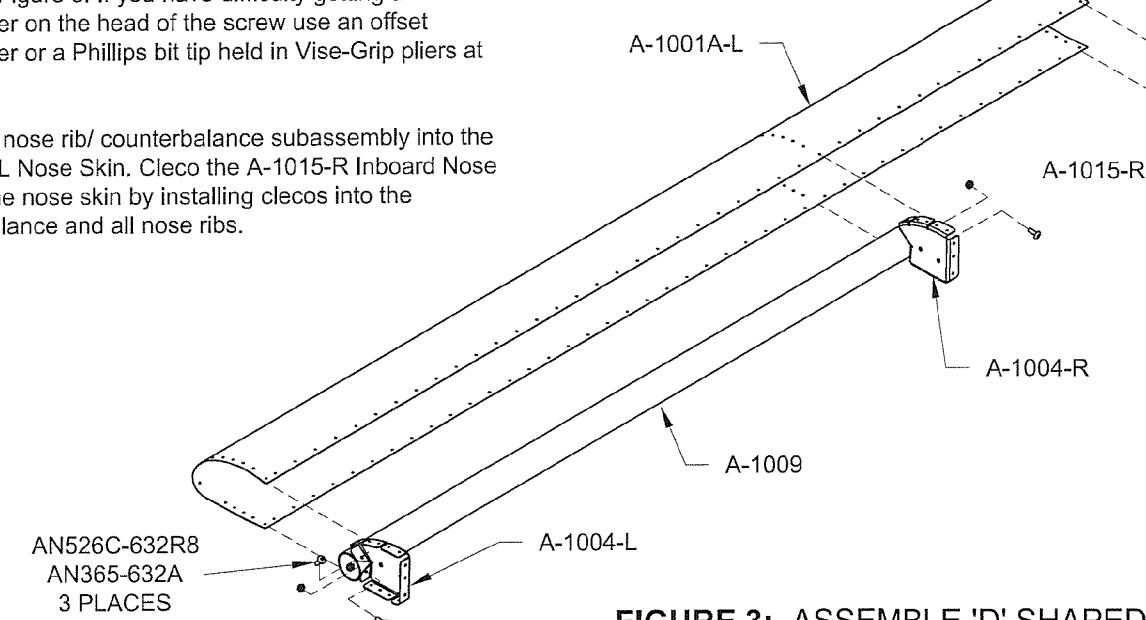


FIGURE 3: ASSEMBLE 'D' SHAPED CELL

Step 5: Rivet the A-1004-R Nose Rib to the A-1001A-L Nose Skin as shown in Figure 4. For rivet call outs see Page 21-6, Figure 5. The solid rivets can be set with a hand squeezer.

Blind rivet the two nose skin to nose rib holes as shown in Figure 4.

CAUTION: Damage to the nose skin may result if solid rivets are substituted for the blind rivets shown in Figure 4.

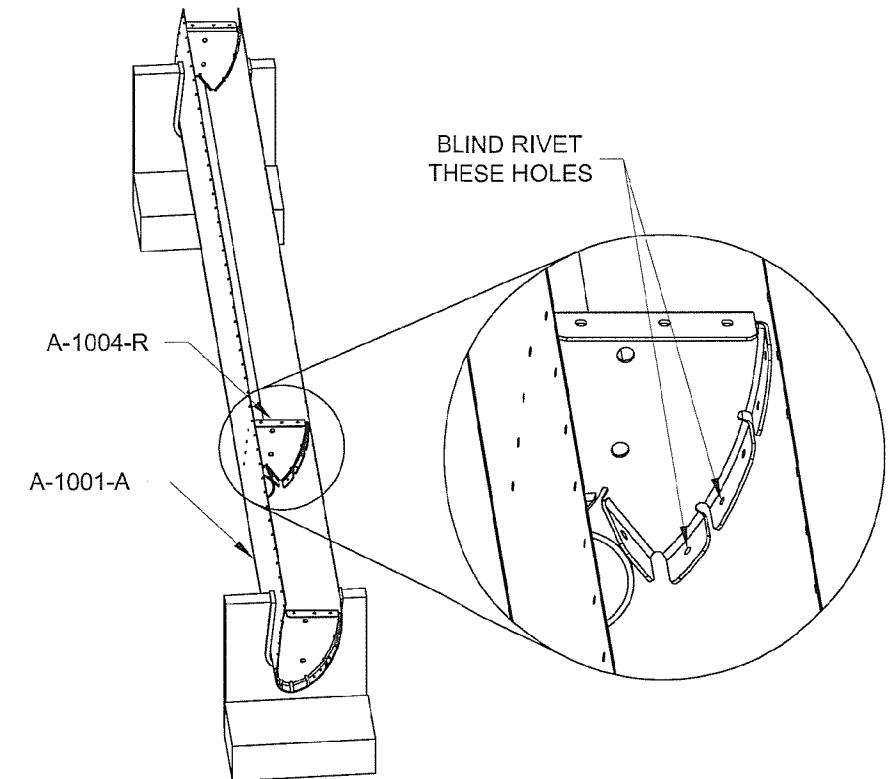
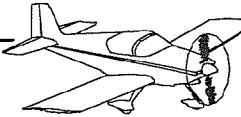


FIGURE 4: RIVET A-1004-R NOSE RIB



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

Blind rivet the A-1004-R Nose Rib to the A-1003-L Spar.

Rivet the A-1004-L Nose Rib and the A-1015 Inboard Nose Rib to the spar.

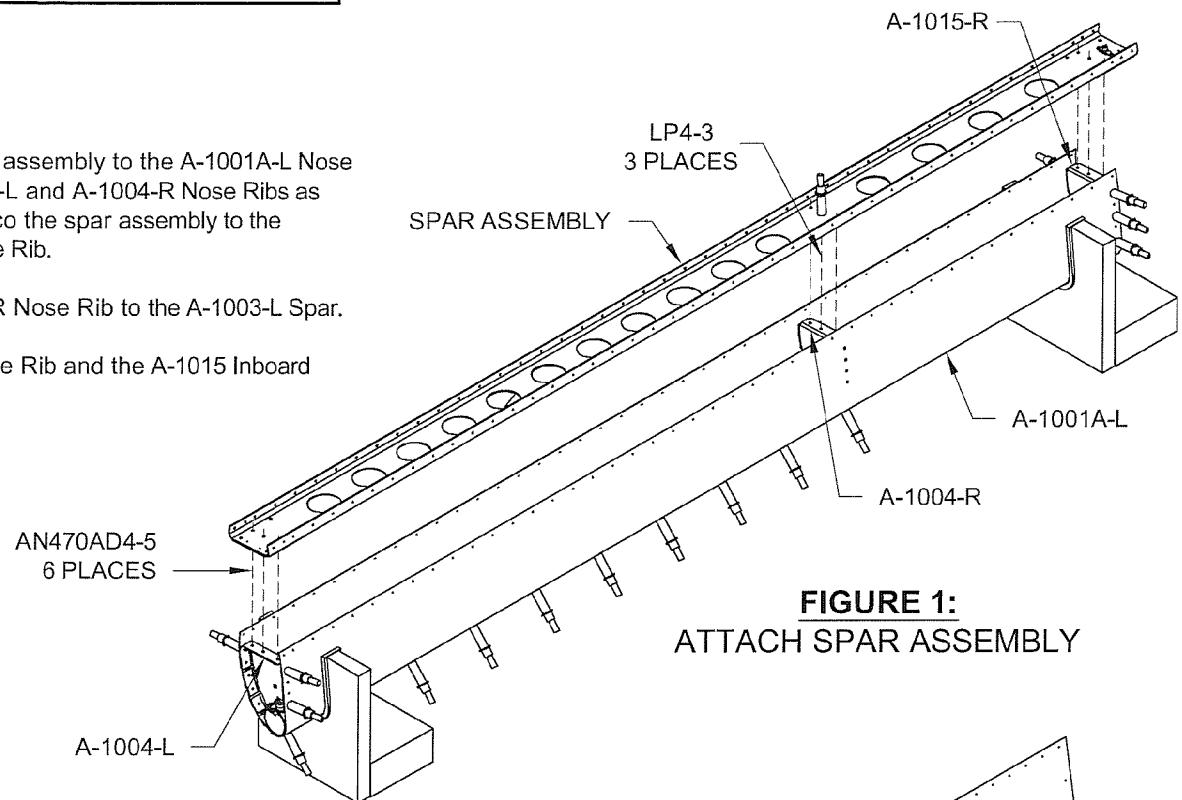


FIGURE 1:
ATTACH SPAR ASSEMBLY

Step 2: 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.

Rivet the top skin assembly to the spar (see Figure 5 for all A-1001-L Nose Skin rivets).

Repeat this step for the bottom skin assembly.

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.

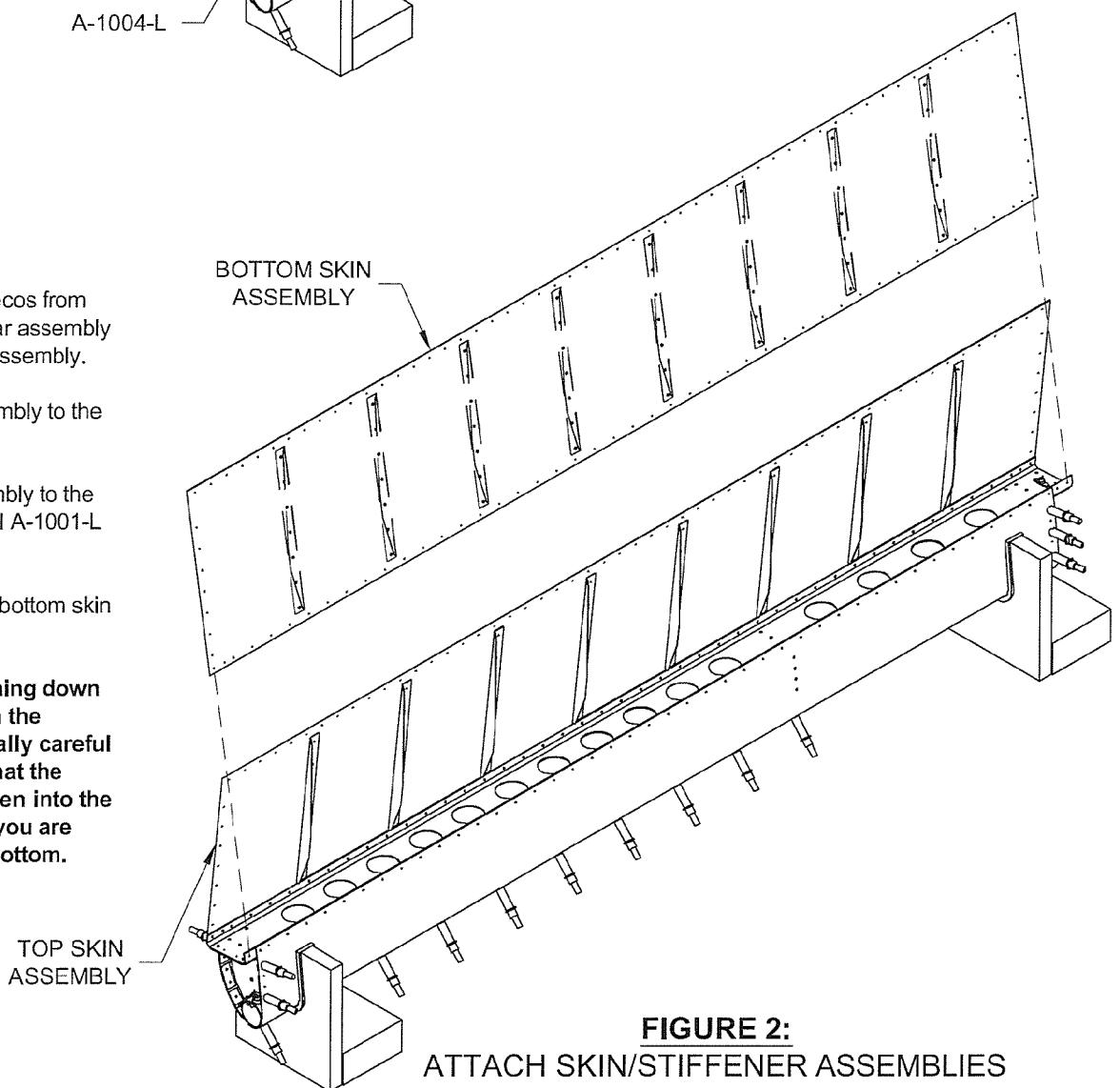


FIGURE 2:
ATTACH SKIN/STIFFENER ASSEMBLIES

Step 3: Cleco the A-1005-L and A-1005-R Main Ribs to the structure as shown in Figure 3.

Rivet the main ribs to the A-1003-L Spar and A-1008 Doublers using a rivet squeezer.

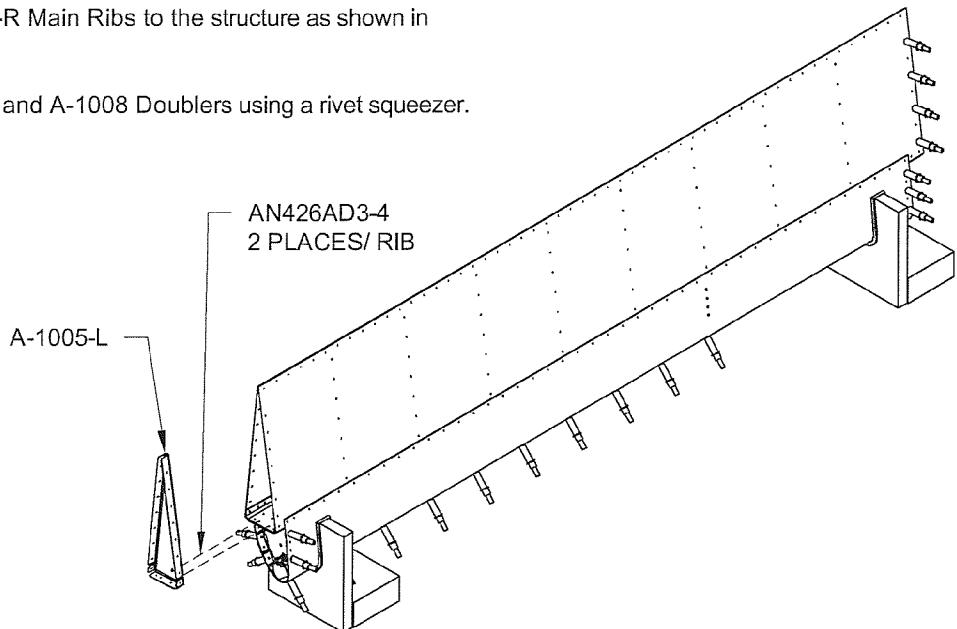


FIGURE 3: ATTACH MAIN RIBS

Step 4: Cleco the A-1011 Trailing Edge to the aileron assembly as shown in Figure 4. Install the clecos from the A-1001B Top Skin side.

Remove the clecos from the upper flanges of the A-1005-L and -R Main Ribs, the A-1004-L Nose Rib, and the A-1015-R Inboard Nose Rib.

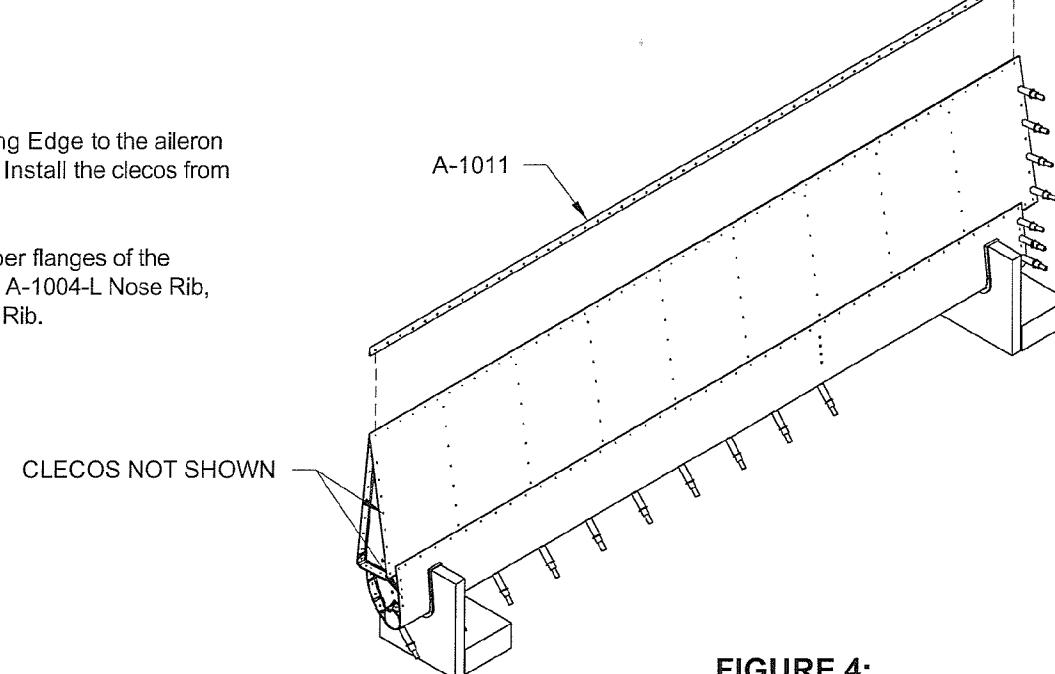


FIGURE 4:
INSERT TRAILING EDGE

- ▽ AN426AD3-3
- △ AN426AD3-3.5
- ⊗ LP4-3
- ⊗ MK-319-BS

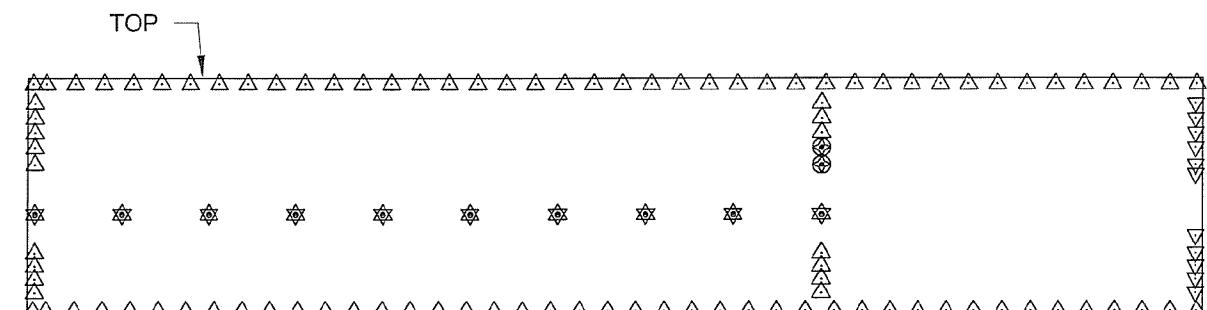
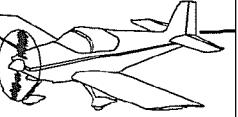


FIGURE 5: NOSE SKIN RIVETS



Step 1: 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 1. Weight the aileron down to keep it flat.

Set two rivets in the lower flanges of the A-1015-R Inboard Nose Rib and the A-1005-R Main Rib as shown in Figure 1 using a rivet squeezer. See Page 21-6, Figure 5 for call-outs for rivets through A-1015-R. See Page 21-8, Figure 6 for call-outs for rivets through A-1005-R.

Set two rivets in the lower flanges of the A-1004-L Nose Rib and the A-1005-L Main Rib using a rivet squeezer. See Page 21-6, Figure 5 for call-outs for rivets through A-1004-L. See Page 21-8, Figure 6 for rivet call outs for rivets through A-1005-L.

Step 2: Blind rivet the A-1009 Counterbalance to the A-1001A-L Nose Skin (see Page 21-6, Figure 5 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.

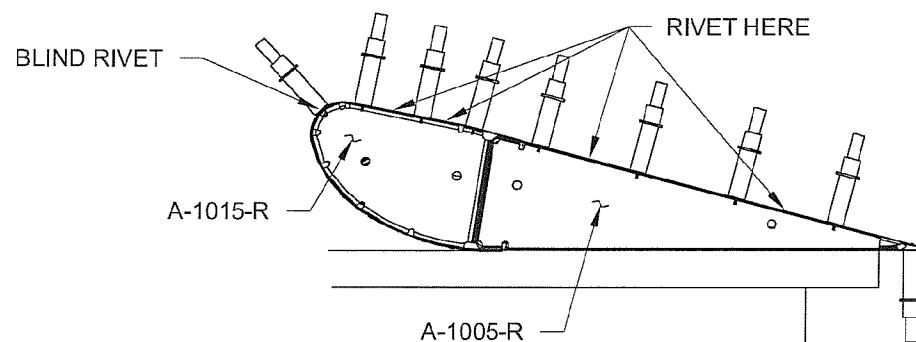


FIGURE 1: PARTIALLY RIVET END RIBS

Step 3: Turn the aileron over top side up with the tips of the trailing edge clecos hanging over the edge of the table and weight it down to hold it flat.

Set all the A-1004-L Nose Rib to A-1001A-L Nose Skin rivets as shown in Figure 2, using a rivet squeezer. Set all the A-1015-R Inboard Nose Rib to nose skin rivets. See Page 21-6, Figure 5 for rivet call-outs.

Set all the A-1005-L Main Rib to A-1001B Top Skin rivets as shown in Figure 2 using a rivet squeezer. Set all the A-1005-R Main Rib to top skin rivets. See Page 21-8, Figure 5 for rivet call-outs.

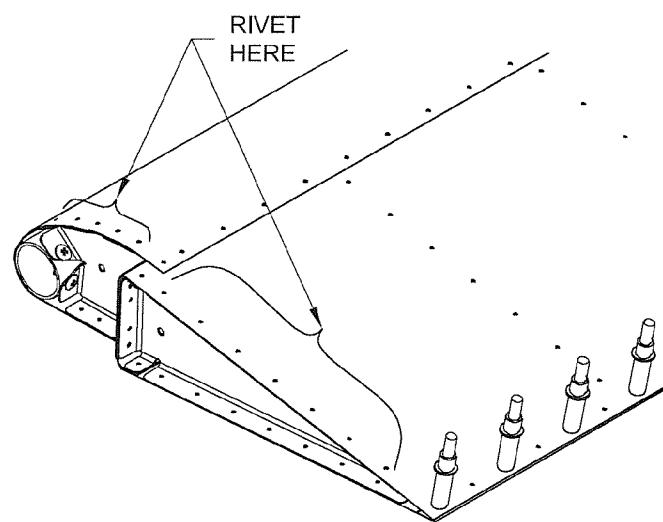


FIGURE 2: RIVET END RIB UPPER FLANGES

Step 4: Turn the aileron over on it's now completed top. Install the remaining A-1015-R Inboard Nose Rib to A-1001A-L Nose Skin rivets as shown in Figure 3. Install the remaining A-1005-L Main Rib to A-1002 Bottom Skin rivets.

Repeat for the other end of the aileron.

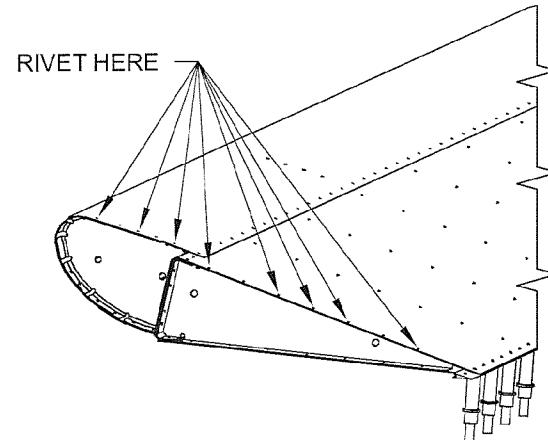


FIGURE 3: RIVET END RIB LOWER FLANGES

Step 5: Turn the aileron over top side up.

Remove the A-1011 Trailing Edge as shown in Figure 4.

Refer to Section 5H to complete the riveting of the aileron. See Page 21-8, Figure 5 for trailing edge rivet call-outs.

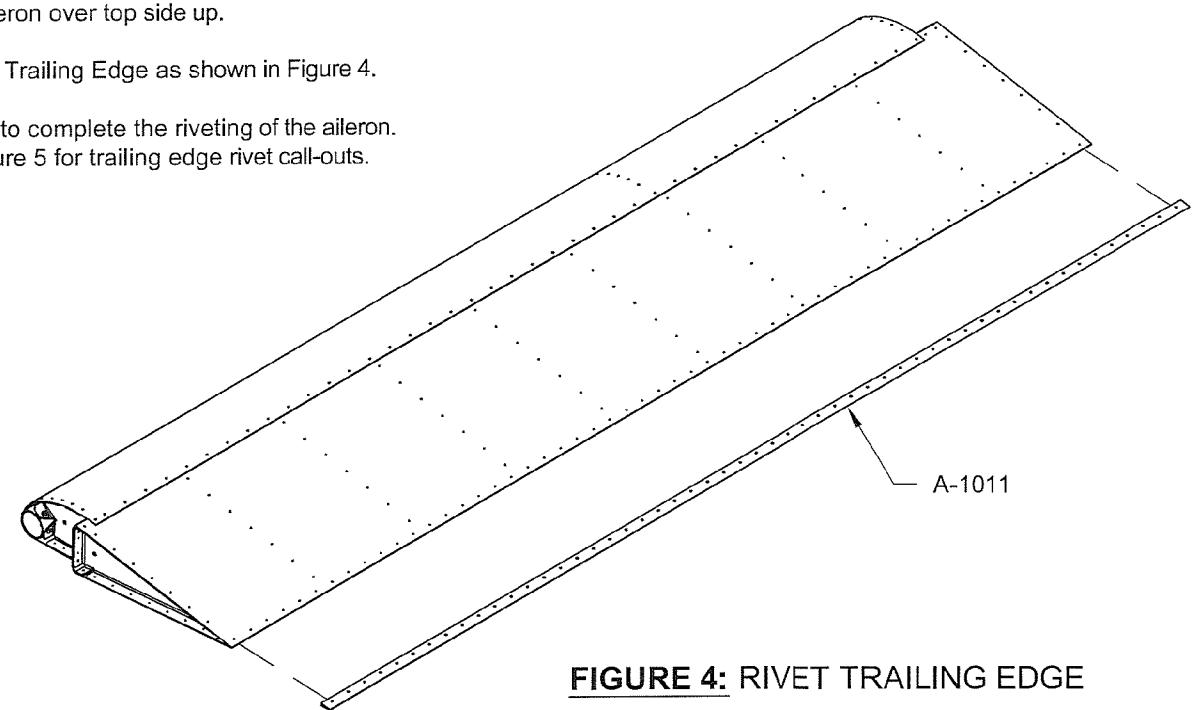


FIGURE 4: RIVET TRAILING EDGE



VAN'S AIRCRAFT, INC.

Step 1: Fabricate A-1012 and A-1013 Spacers from AT6-058 x 5/16 material as shown in Figures 1 & 2.

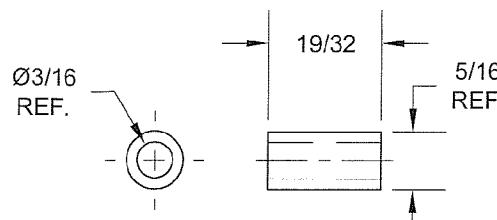


FIGURE 1:
CUT A-1012 SPACER

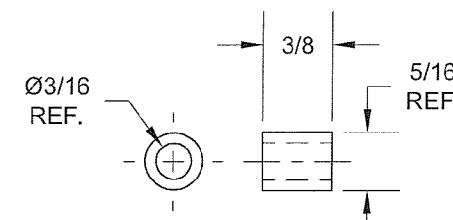


FIGURE 2:
CUT A-1013 SPACER

Step 2: Install the A-1007-L Inboard Hinge Bracket as shown in Figure 3.

The hardware called-out in Figure 3 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.

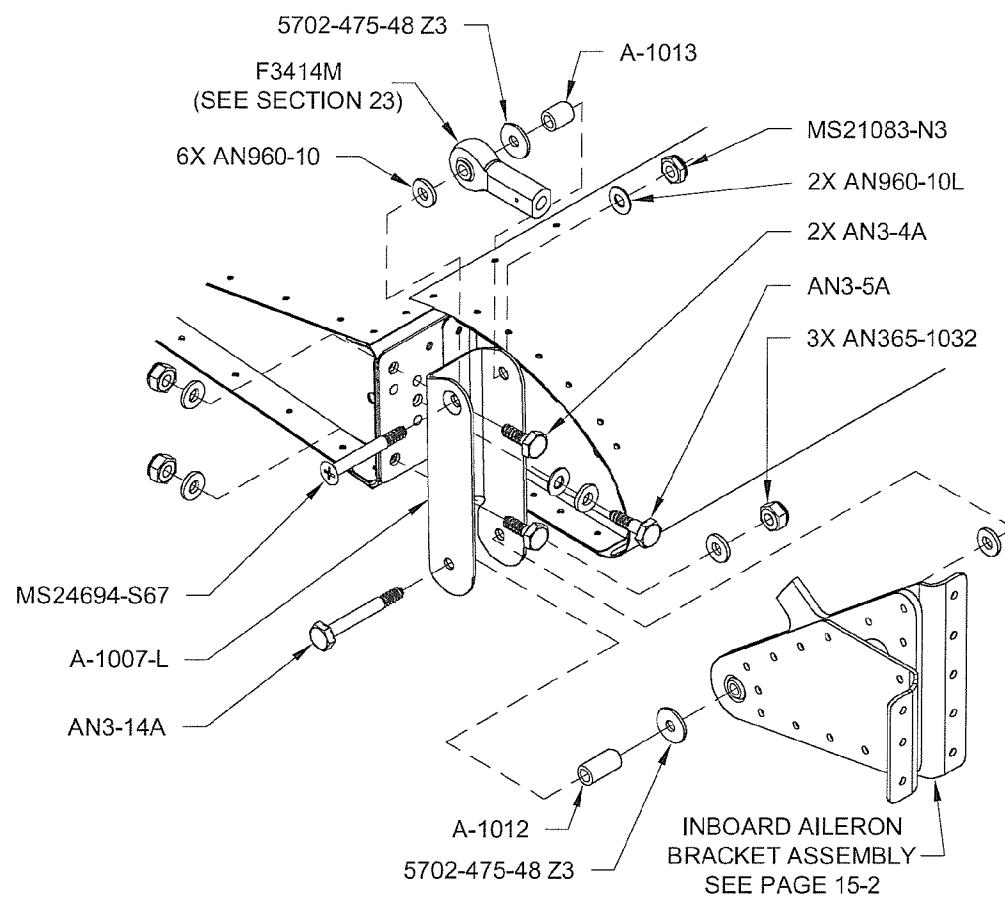


FIGURE 3: ATTACH INBOARD HINGE BRACKET

Step 3: Install the A-1006 Outboard Hinge Bracket as shown in Figure 4.

The hardware called-out in Figure 4 for attachment of the outboard hinge bracket to the wing will be used during completion of the aileron actuation system as covered in Section 23.

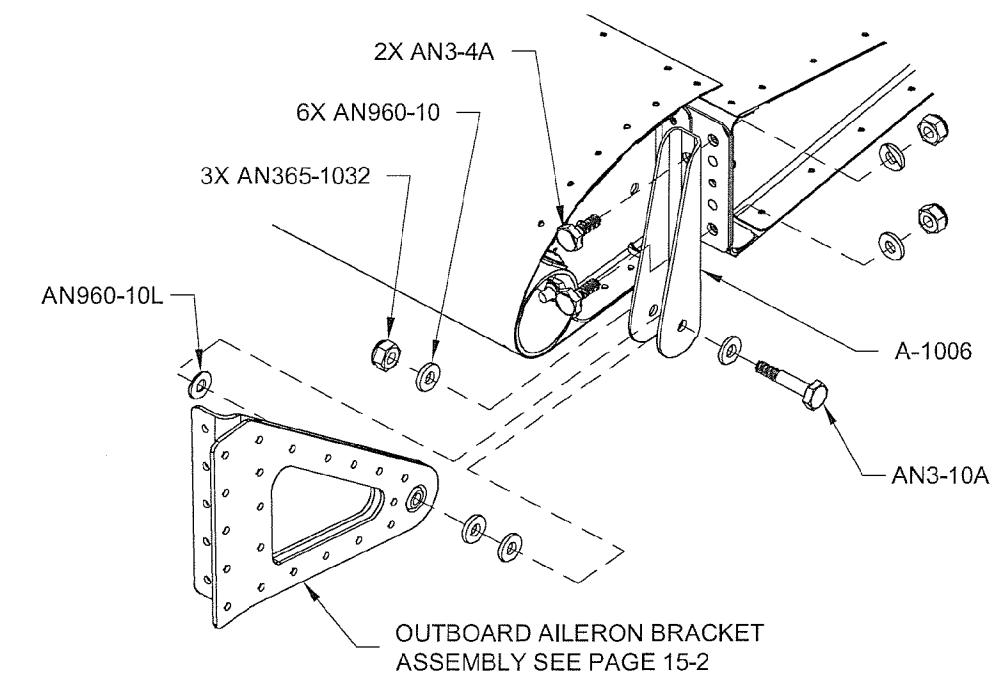


FIGURE 4: ATTACH OUTBOARD HINGE BRACKET

KEY: ▽ AN426AD3-3
△ AN426AD3-3.5

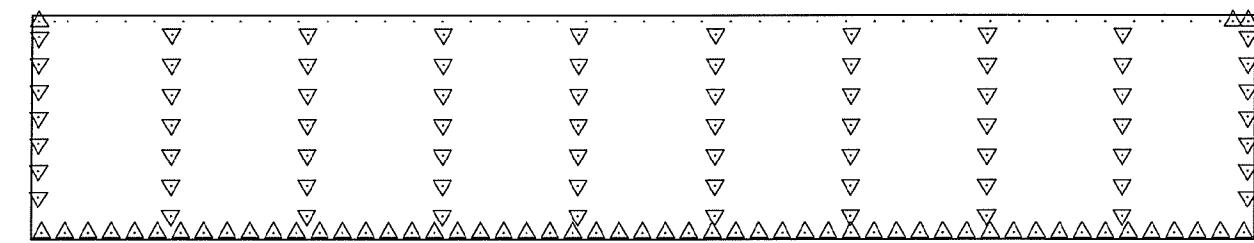


FIGURE 5: A-1001B TOP SKIN RIVETS

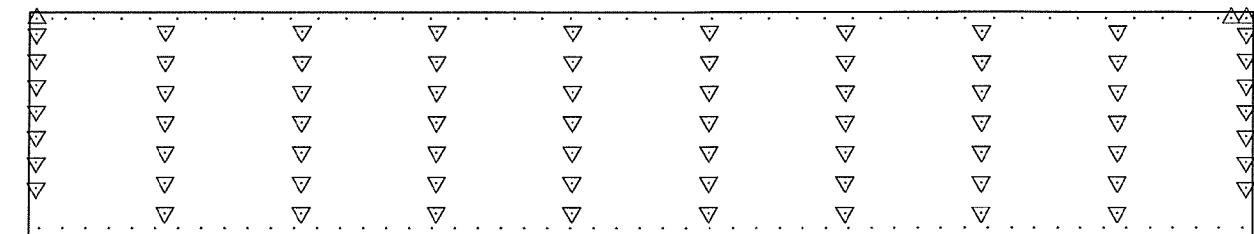
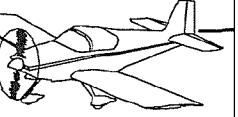
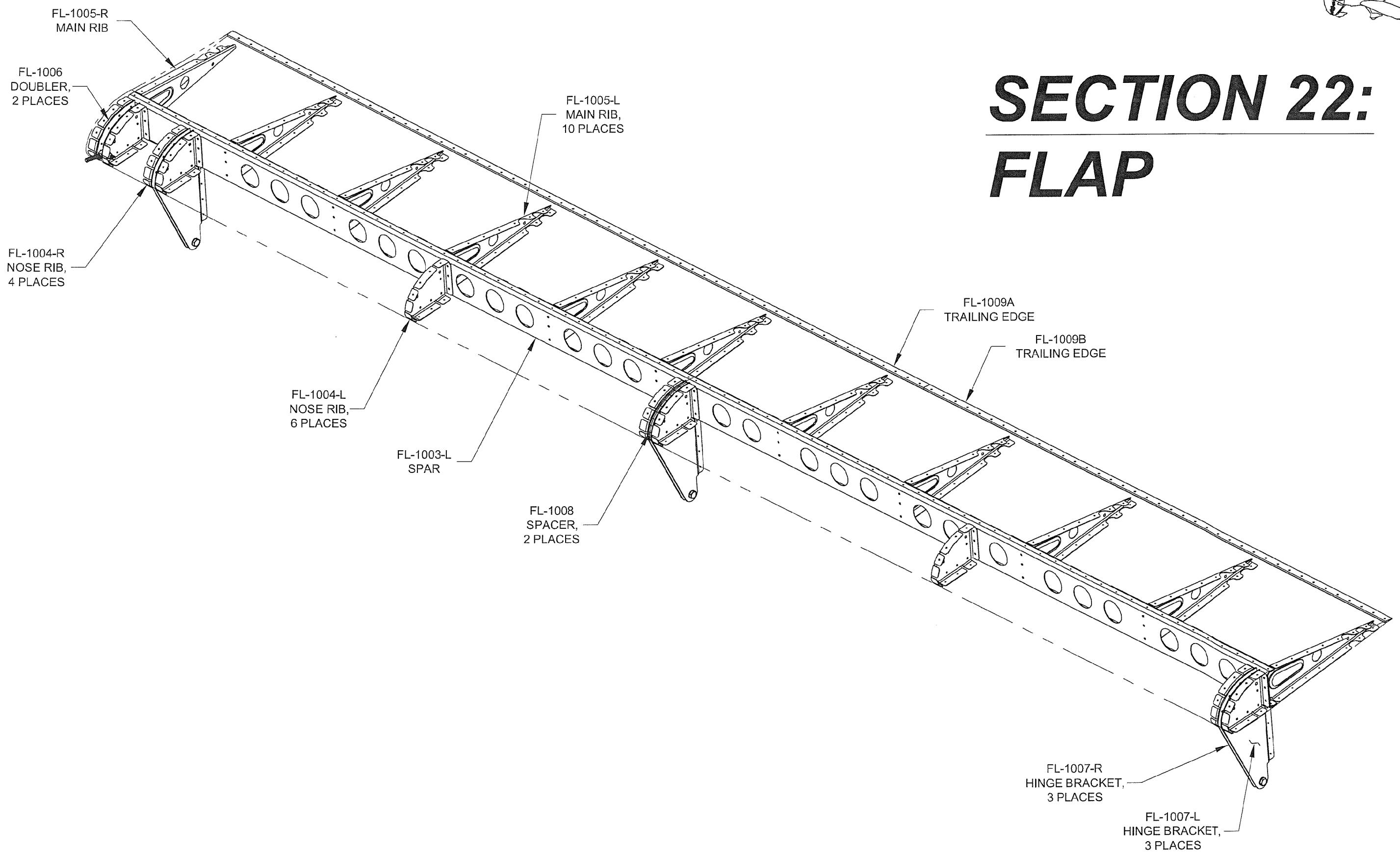


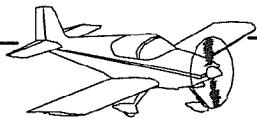
FIGURE 6: A-1002 BOTTOM SKIN RIVETS



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.

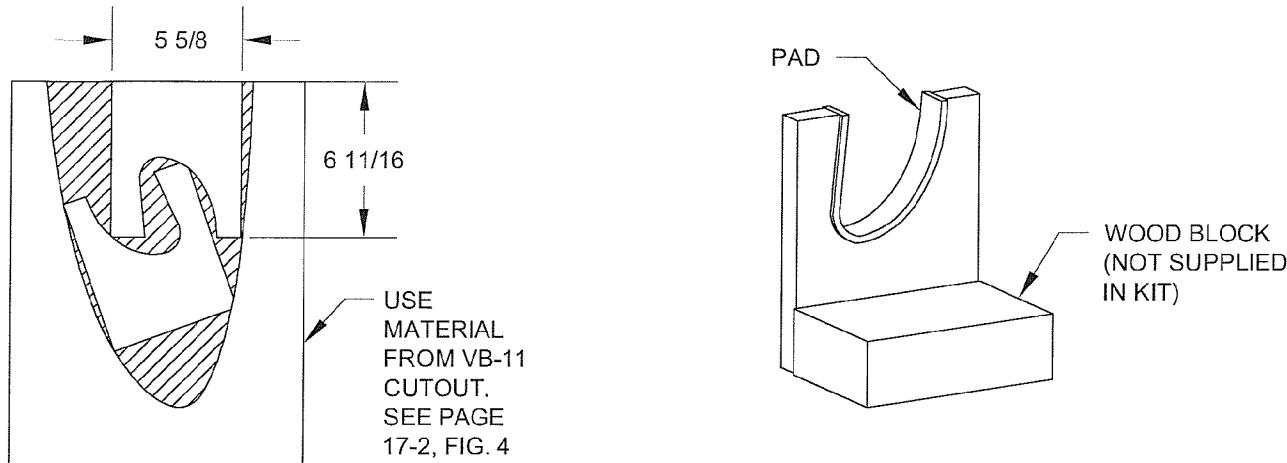


FIGURE 2: CRADLE

FIGURE 1: CRADLE MATERIAL

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.

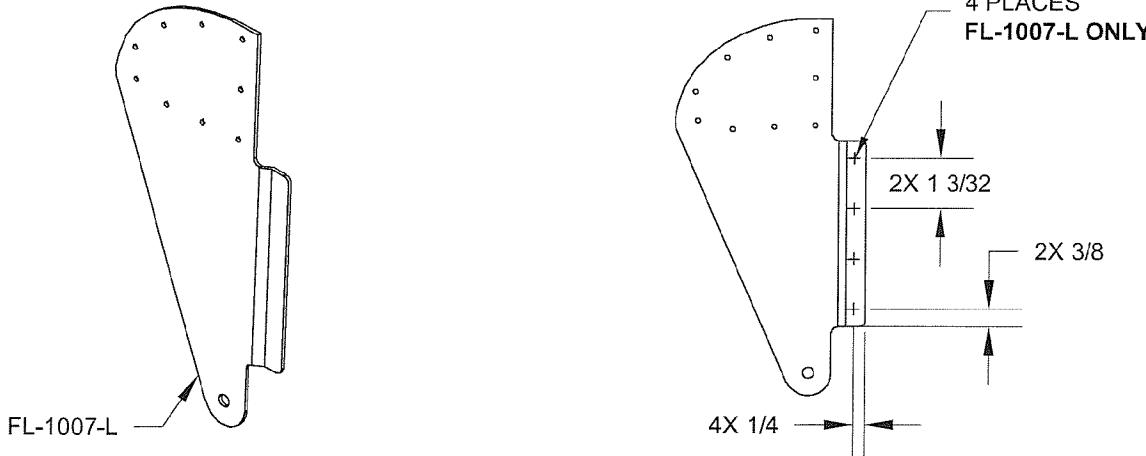


FIGURE 3: DRILL LEFT HINGE BRACKETS ONLY

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.

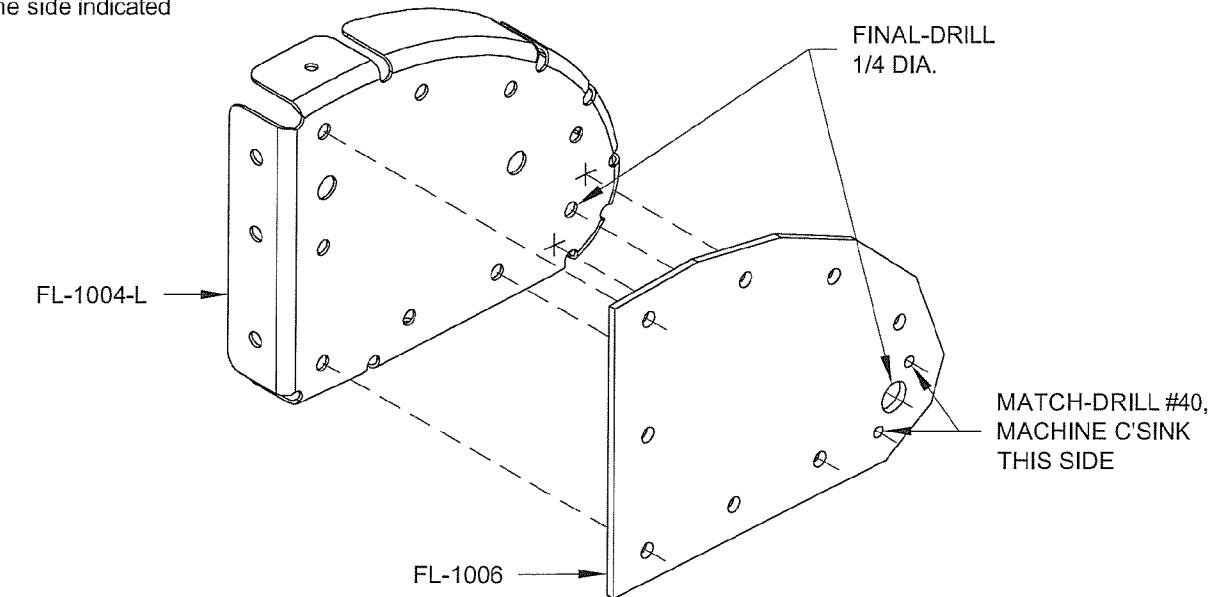


FIGURE 4: OUTBOARD ROD END RIB SUBASSEMBLY

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.

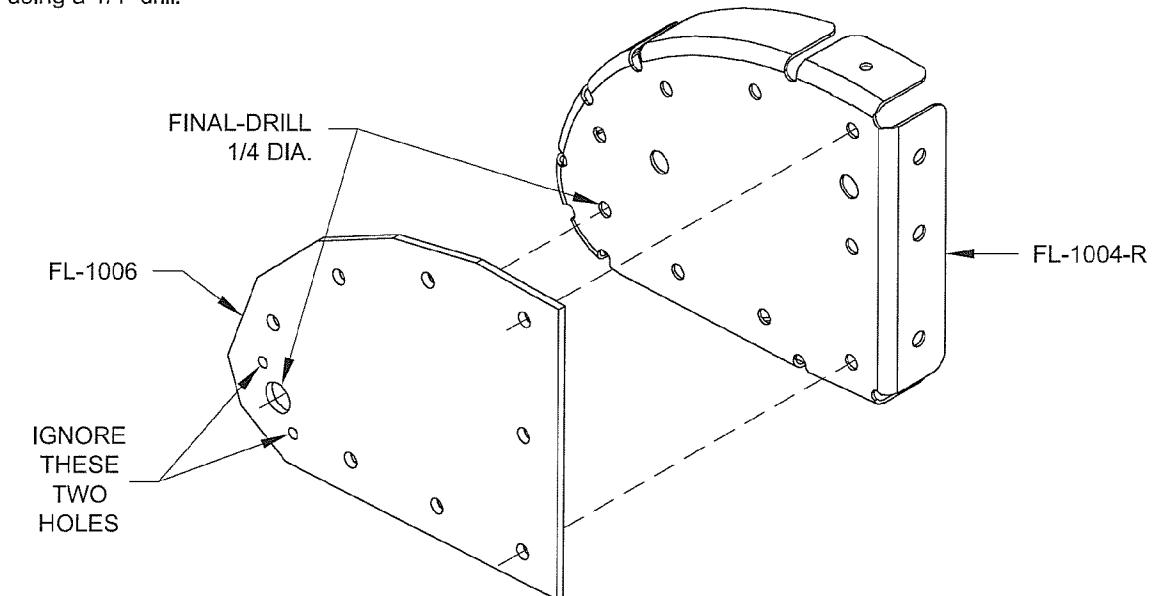
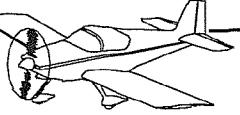


FIGURE 5: INBOARD ROD END RIB SUBASSEMBLY



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.

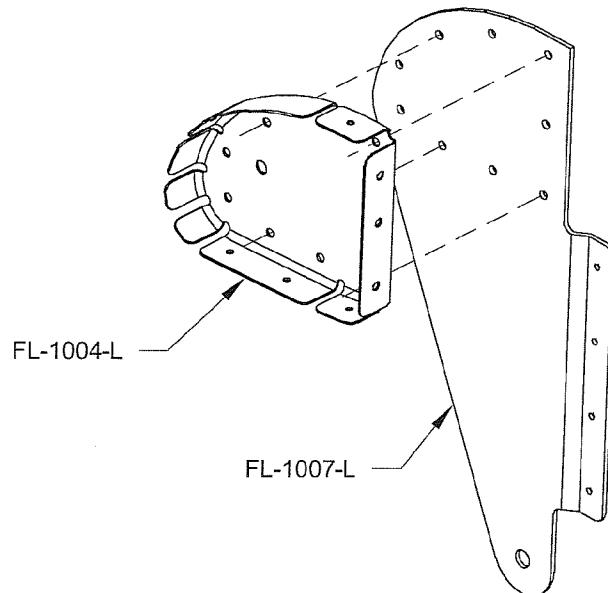


FIGURE 1: LEFT HINGE PAIR RIB SUBASSEMBLY

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.

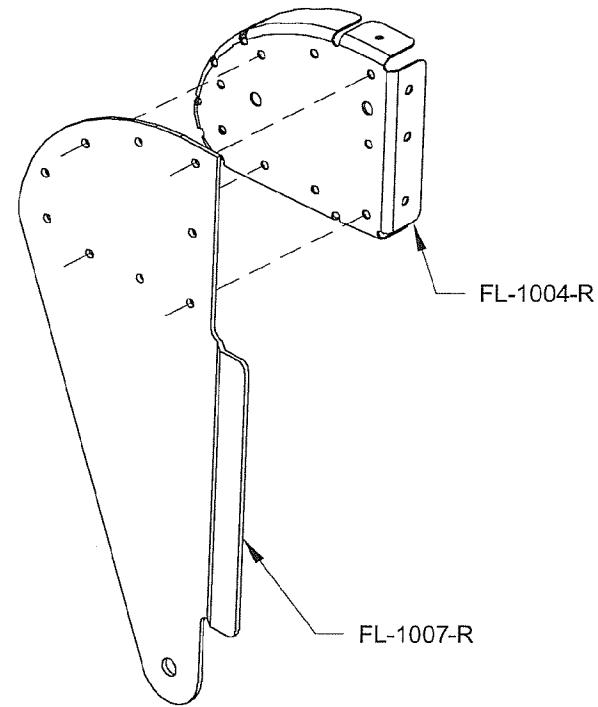


FIGURE 2: RIGHT HINGE PAIR RIB SUBASSEMBLY

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.

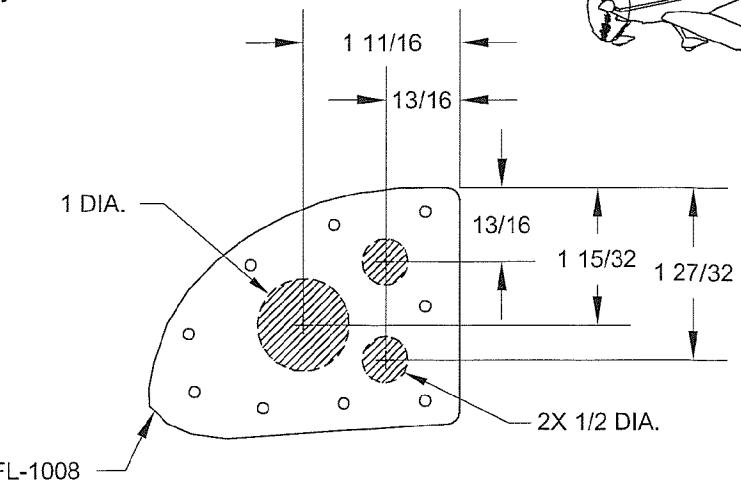


FIGURE 3: SPACER

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.

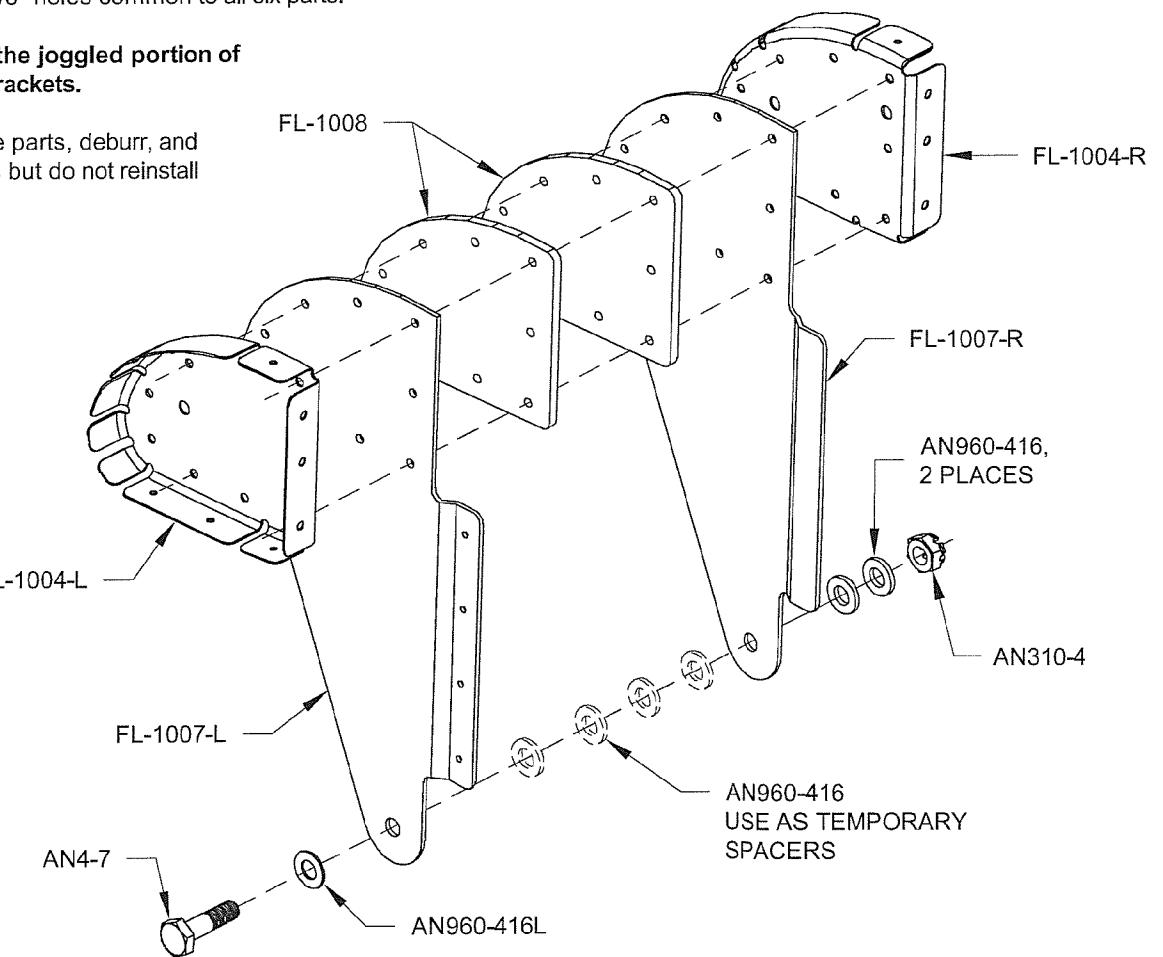
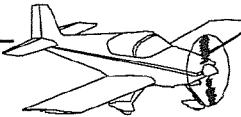


FIGURE 4: CENTER HINGE SUBASSEMBLY



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.

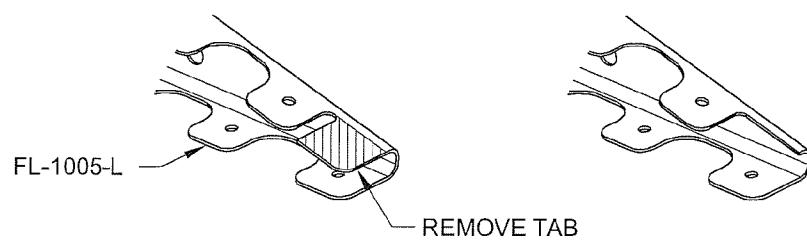


FIGURE 1: TRIM MAIN RIBS

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.

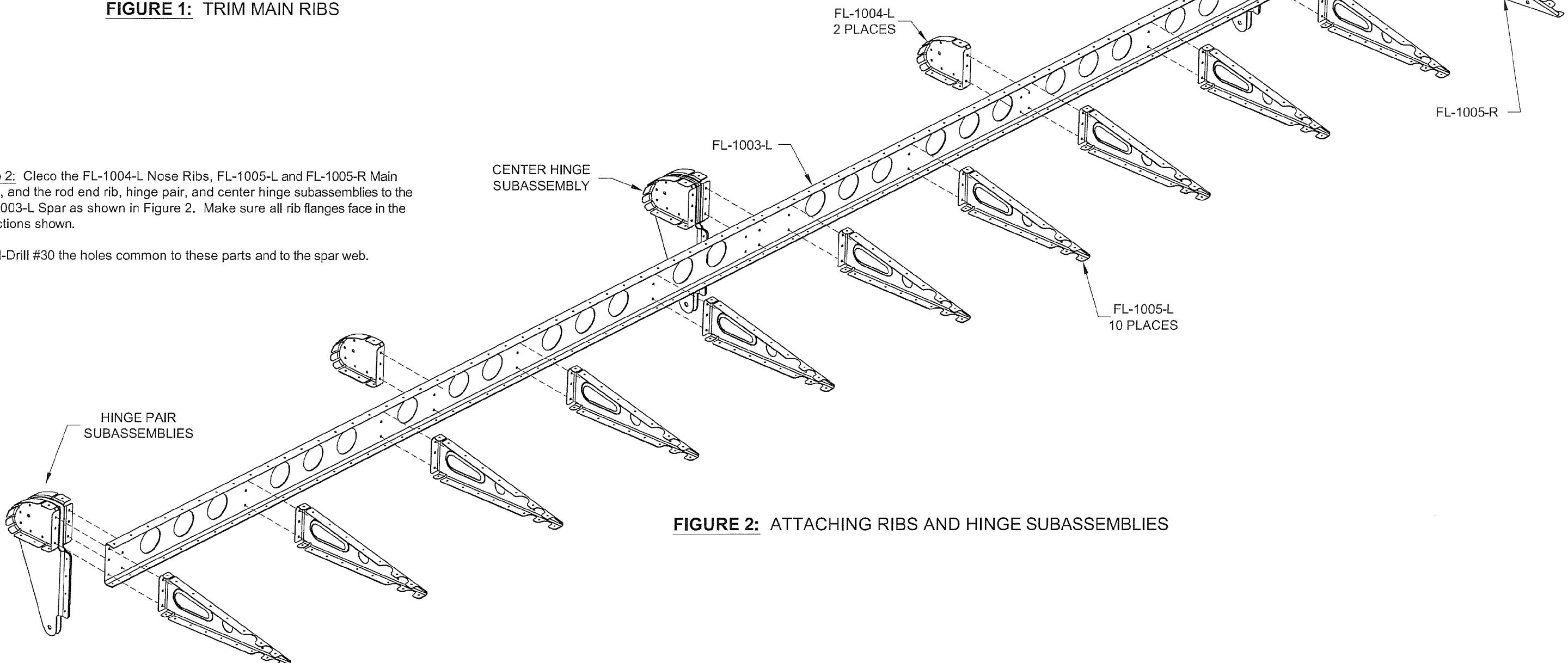
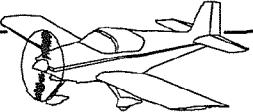


FIGURE 2: ATTACHING RIBS AND HINGE SUBASSEMBLIES



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.

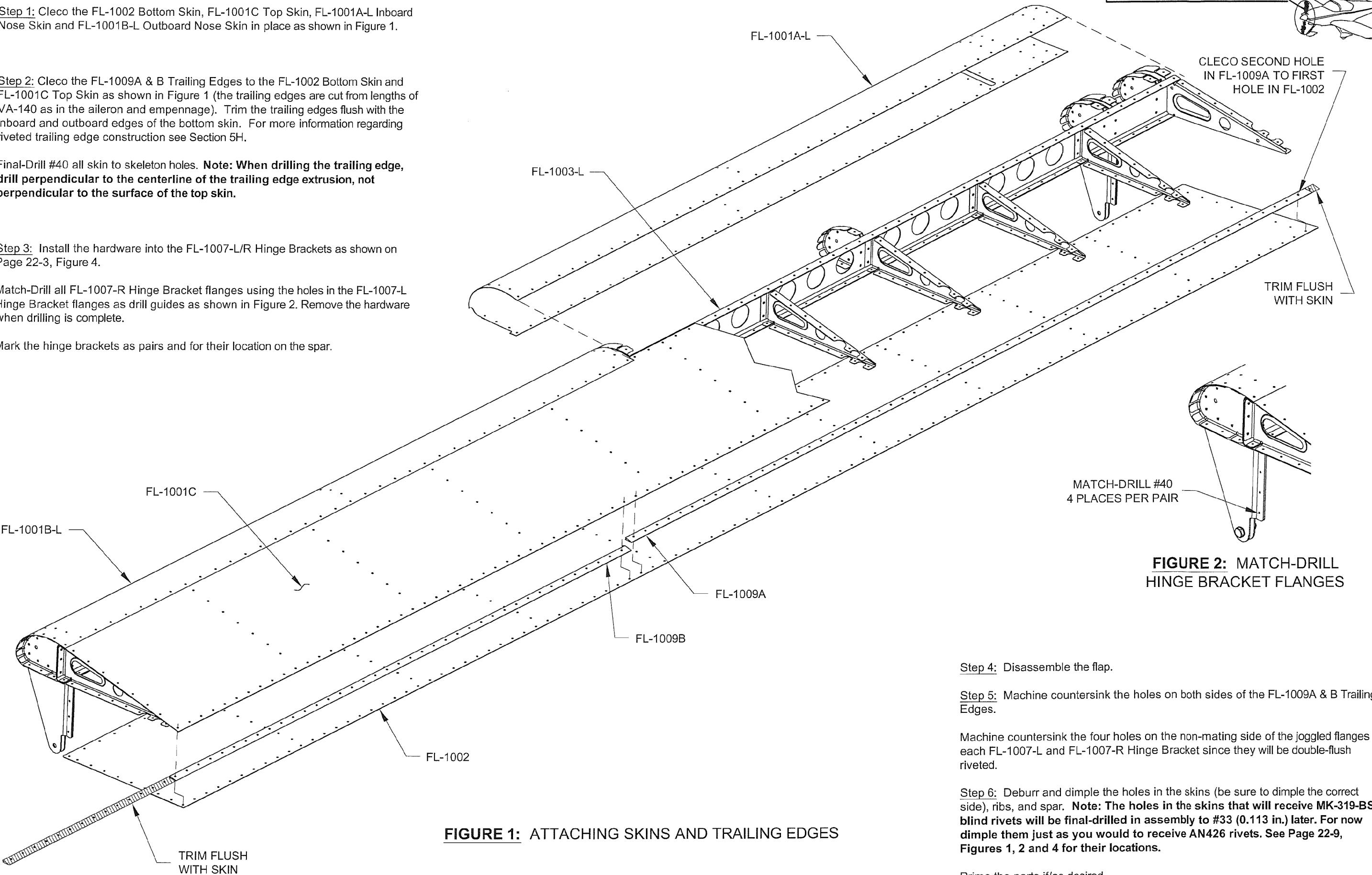
Step 2: Cleco the FL-1009A & B Trailing Edges to the FL-1002 Bottom Skin and FL-1001C Top Skin as shown in Figure 1 (the trailing edges are cut from lengths of VA-140 as in the aileron and empennage). Trim the trailing edges flush with the inboard and outboard edges of the bottom skin. For more information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



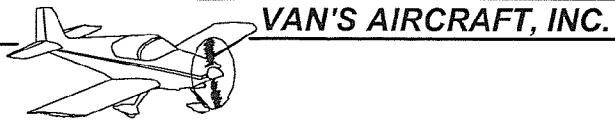
Step 4: Disassemble the flap.

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.



VAN'S AIRCRAFT, INC.

Now begins final assembly and riveting.

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

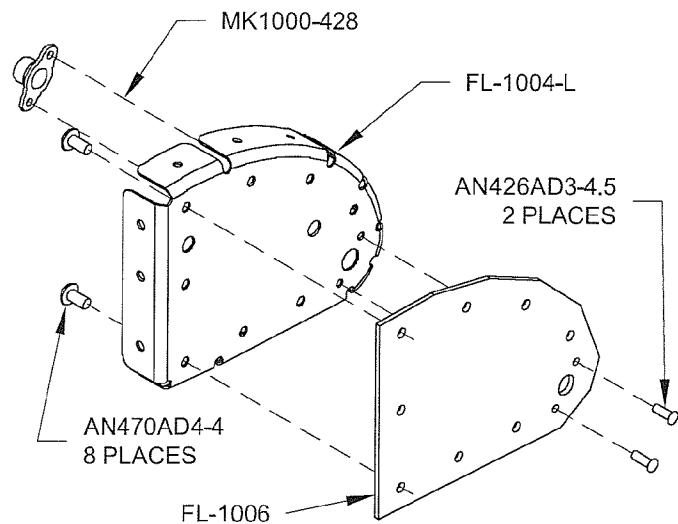


FIGURE 1: OUTBOARD ROD END RIB SUBASSEMBLY

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.

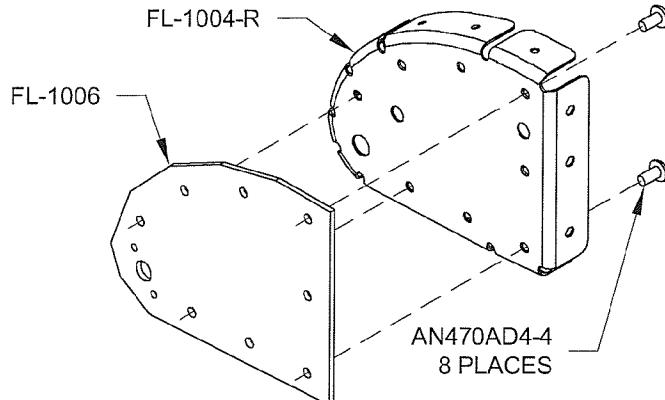


FIGURE 2: INBOARD ROD END RIB SUBASSEMBLY

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

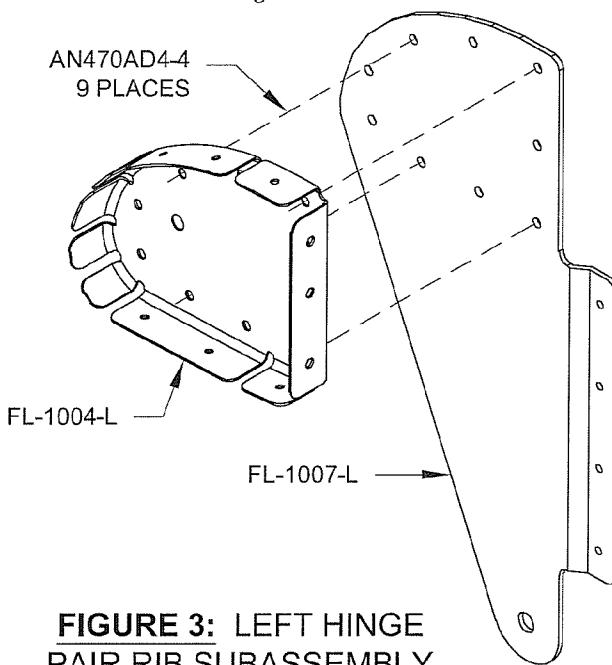


FIGURE 3: LEFT HINGE PAIR RIB SUBASSEMBLY

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.

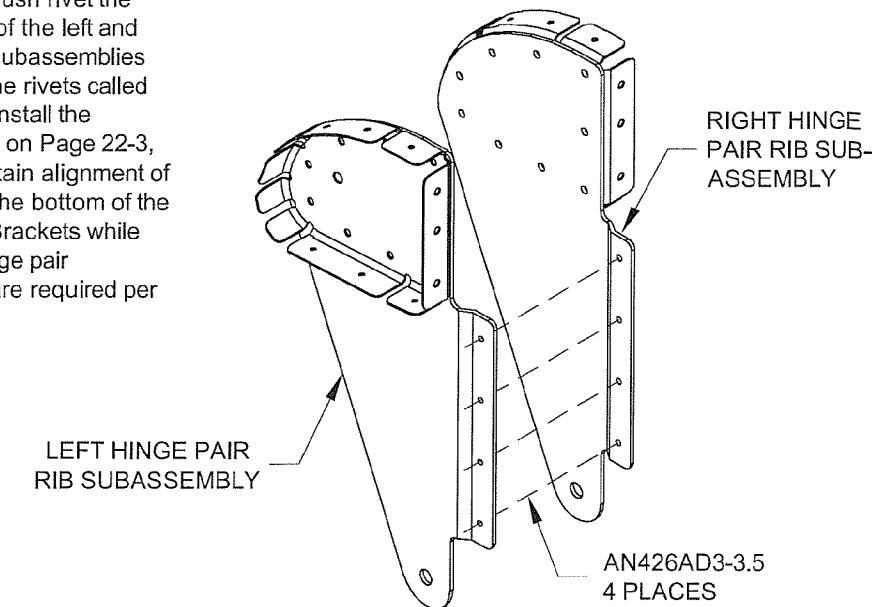


FIGURE 5: HINGE PAIR SUBASSEMBLY

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

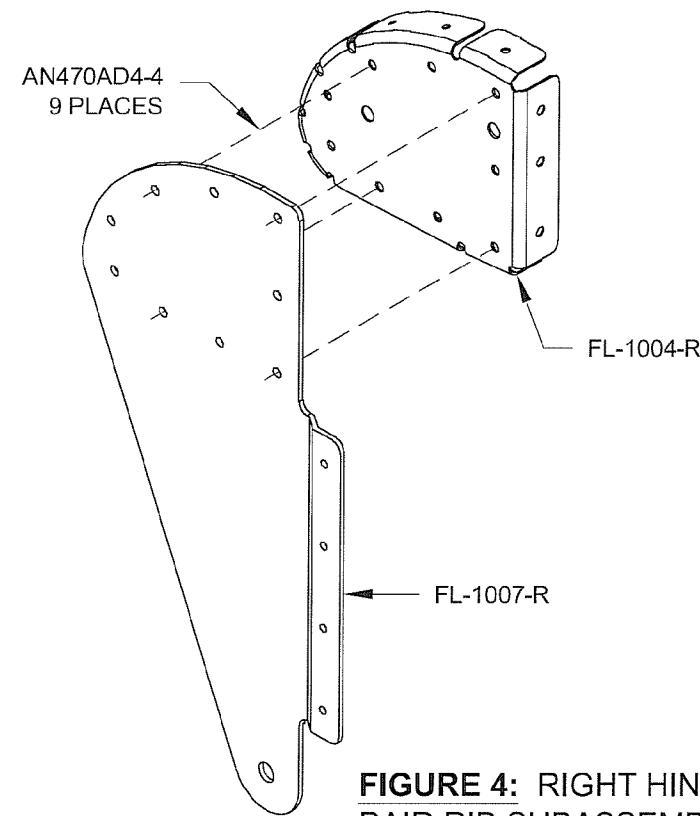


FIGURE 4: RIGHT HINGE PAIR RIB SUBASSEMBLY

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.

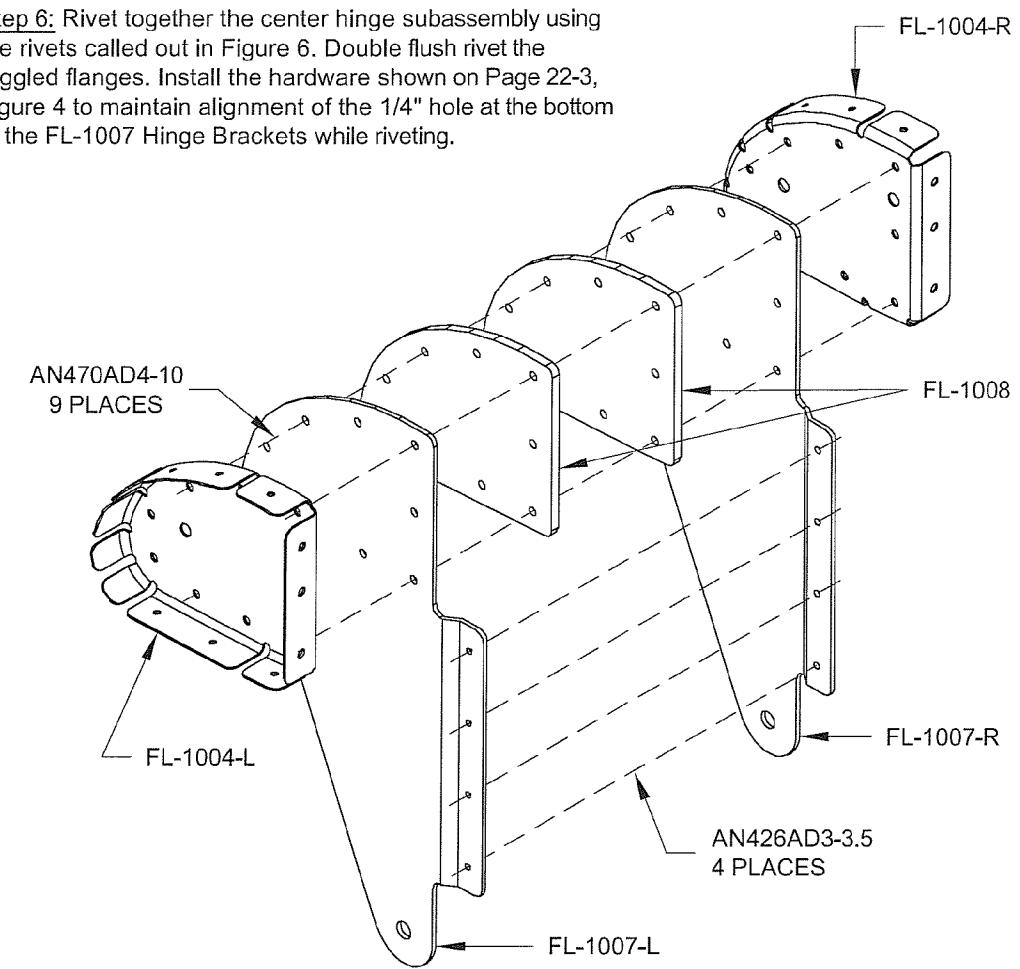
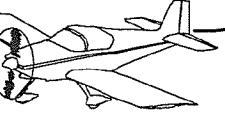


FIGURE 6: CENTER HINGE SUBASSEMBLY



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.

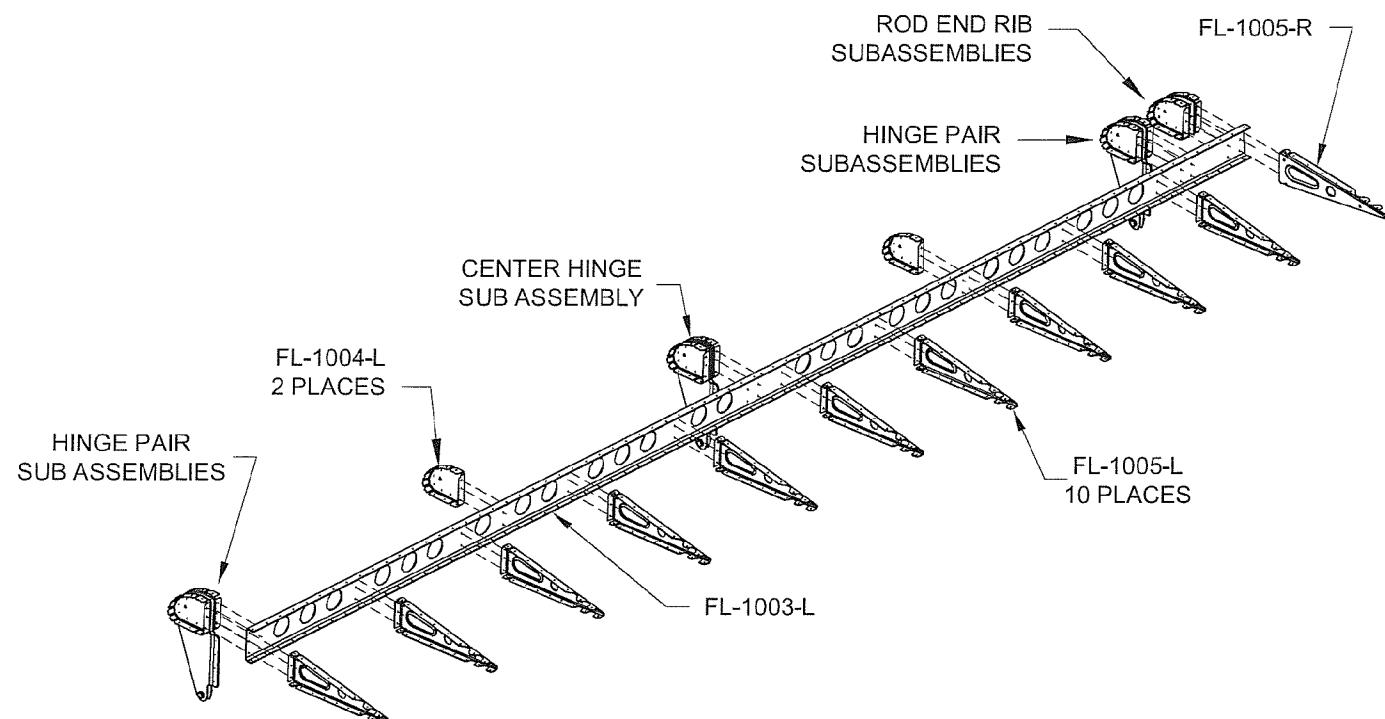


FIGURE 1: RIVETING RIBS AND SUB ASSEMBLIES

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.

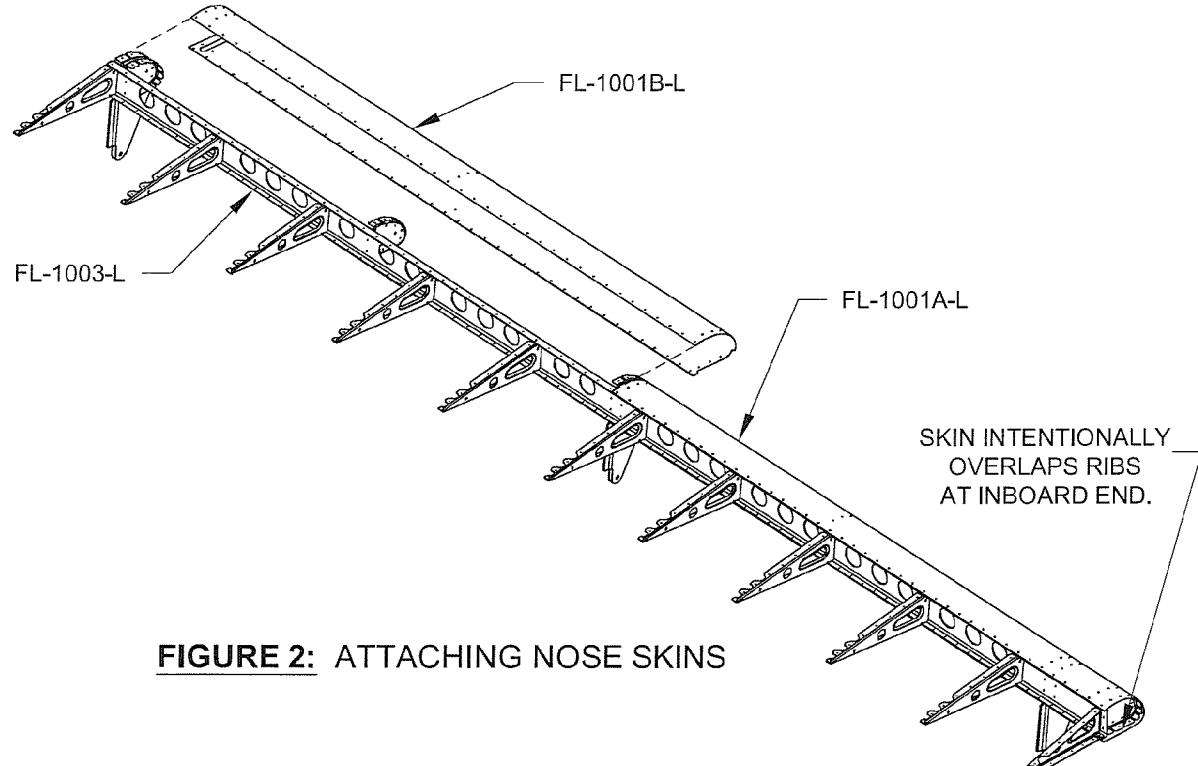


FIGURE 2: ATTACHING NOSE SKINS

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.

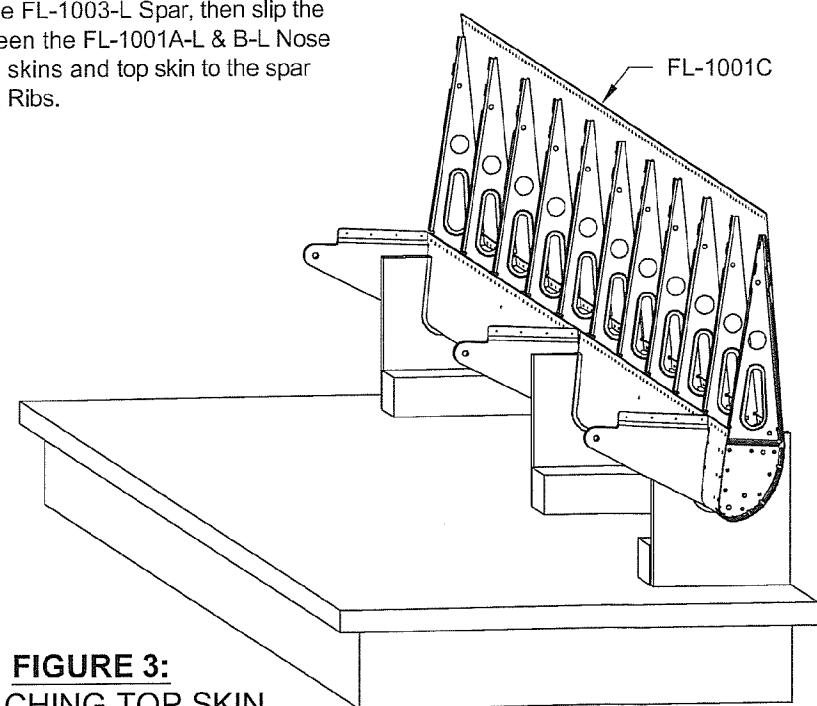


FIGURE 3:
ATTACHING TOP SKIN

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.

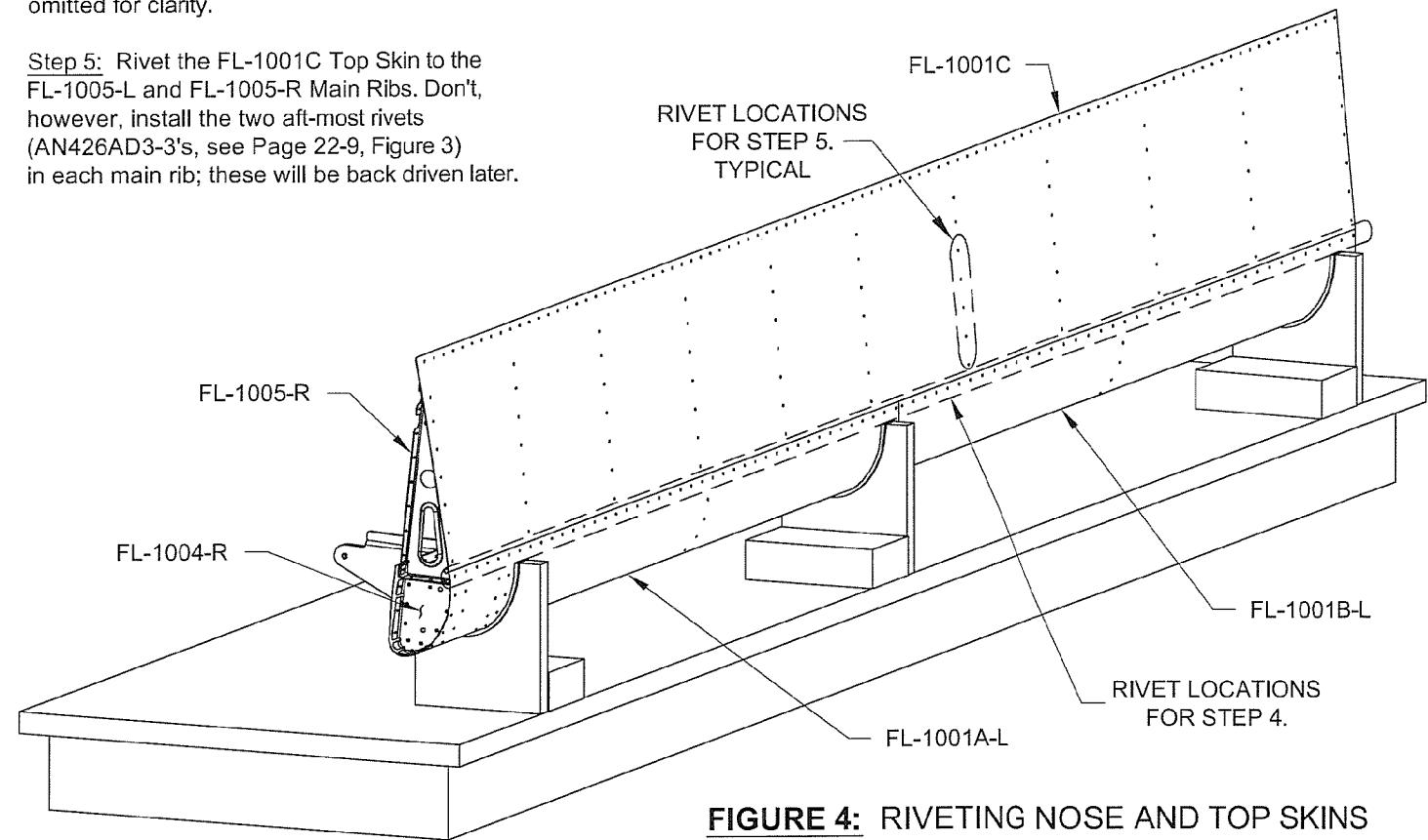
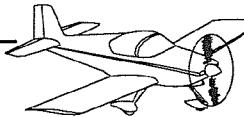


FIGURE 4: RIVETING NOSE AND TOP SKINS



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.)

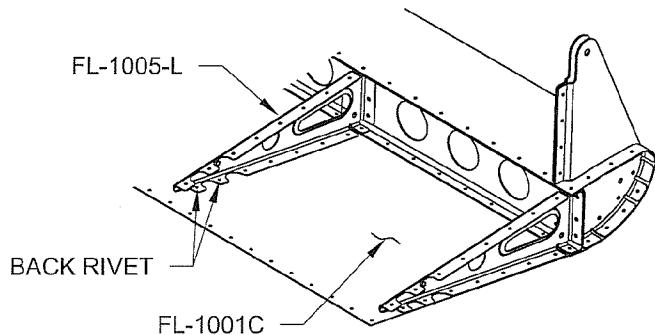


FIGURE 1: BACK RIVETING TOP SKIN

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.

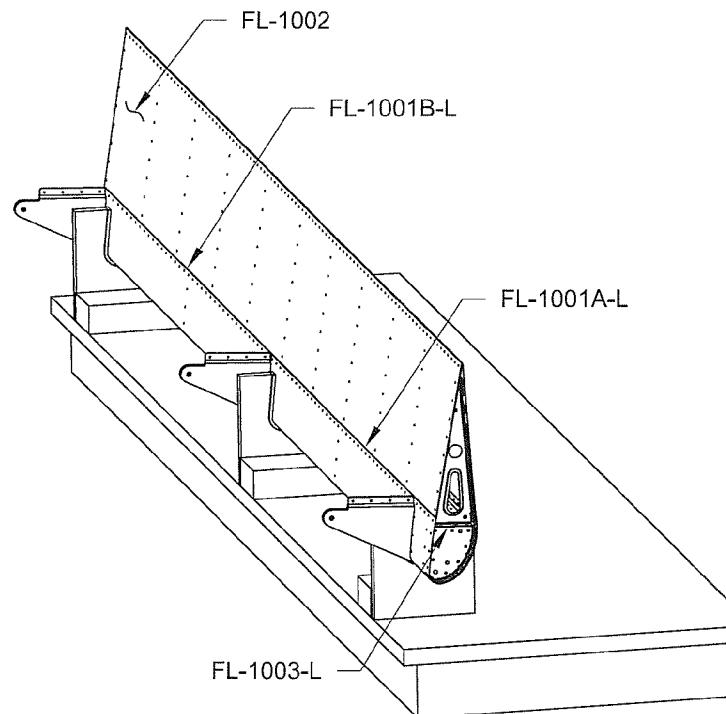


FIGURE 2: BOTTOM SKIN INSTALLATION

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.

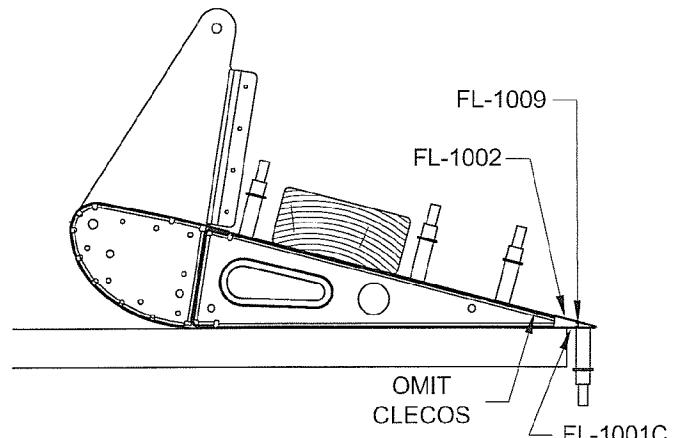


FIGURE 3: RIVETING BOTTOM SKIN

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.

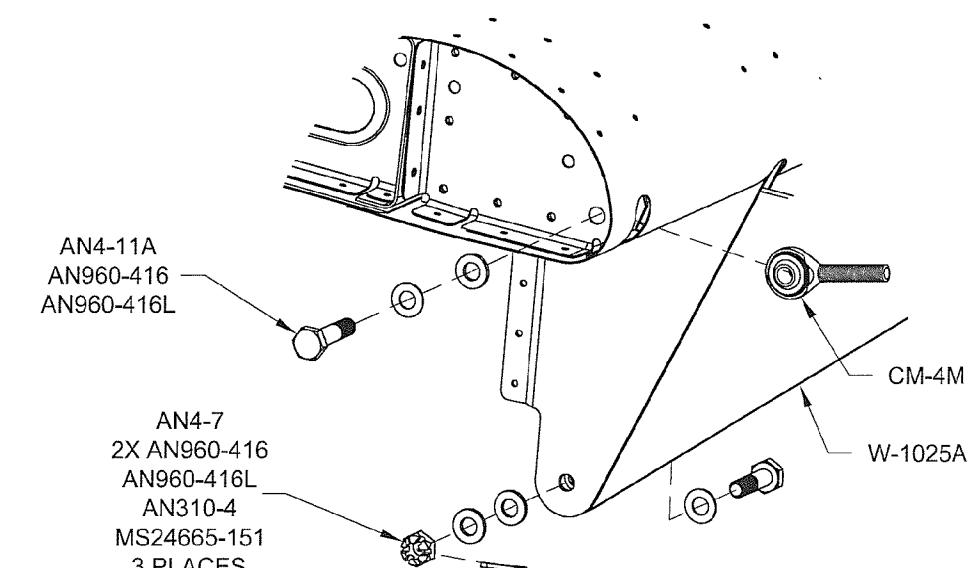
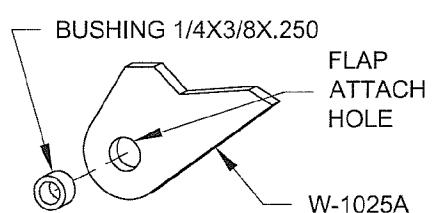
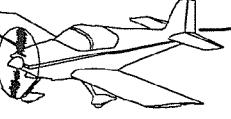


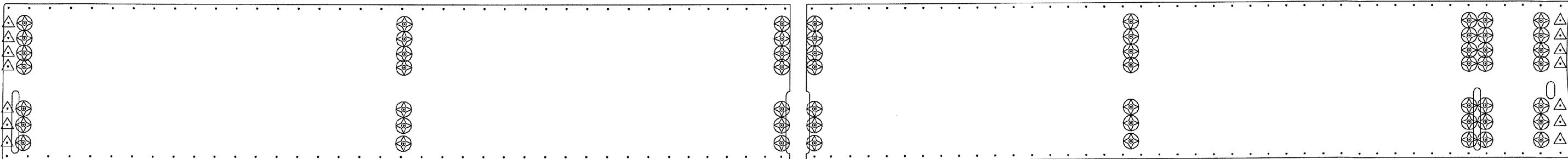
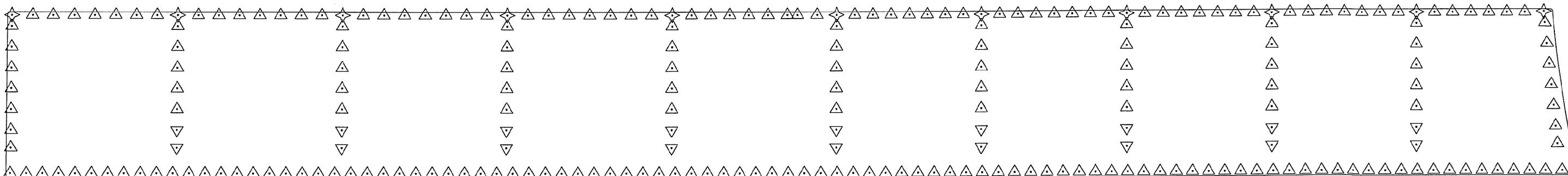
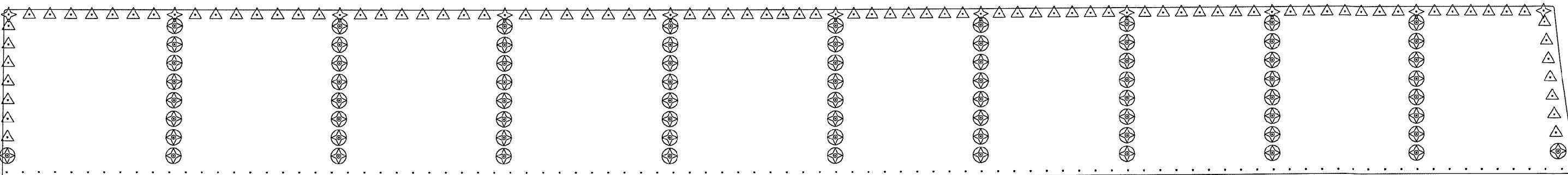
FIGURE 4: BUSHING PRESS FIT

FIGURE 5: ATTACHING ROD END

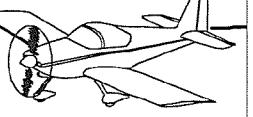


RIVET LEGEND

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

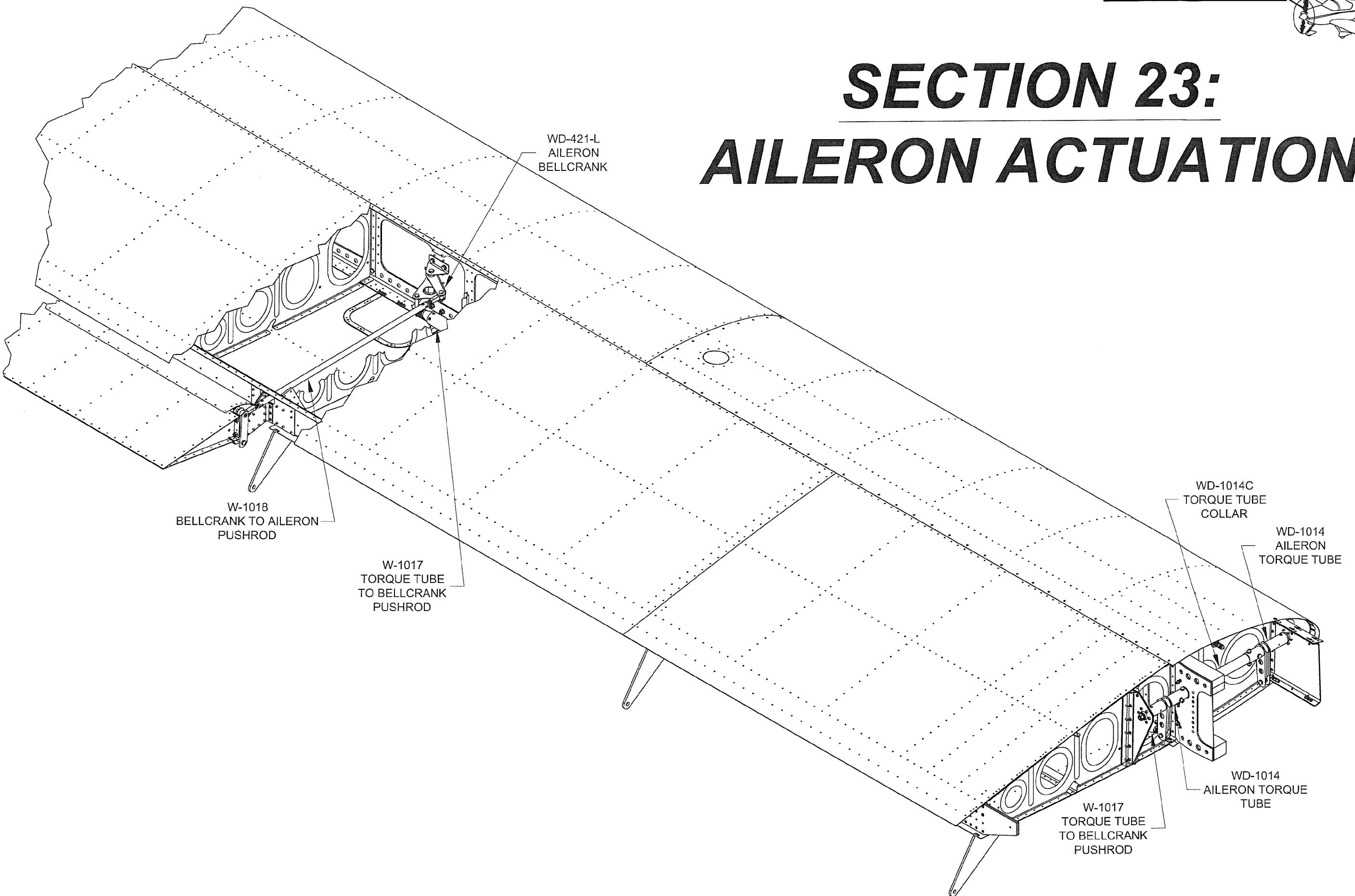
**FIGURE 1:** FL-1001B-L OUTBOARD NOSE SKIN RIVETS**FIGURE 3:** FL-1001C TOP SKIN RIVETS**FIGURE 4:** FL-1002 BOTTOM SKIN RIVETS

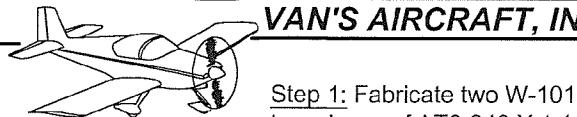
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SECTION 23:

AILERON ACTUATION





VAN'S AIRCRAFT, INC.

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.

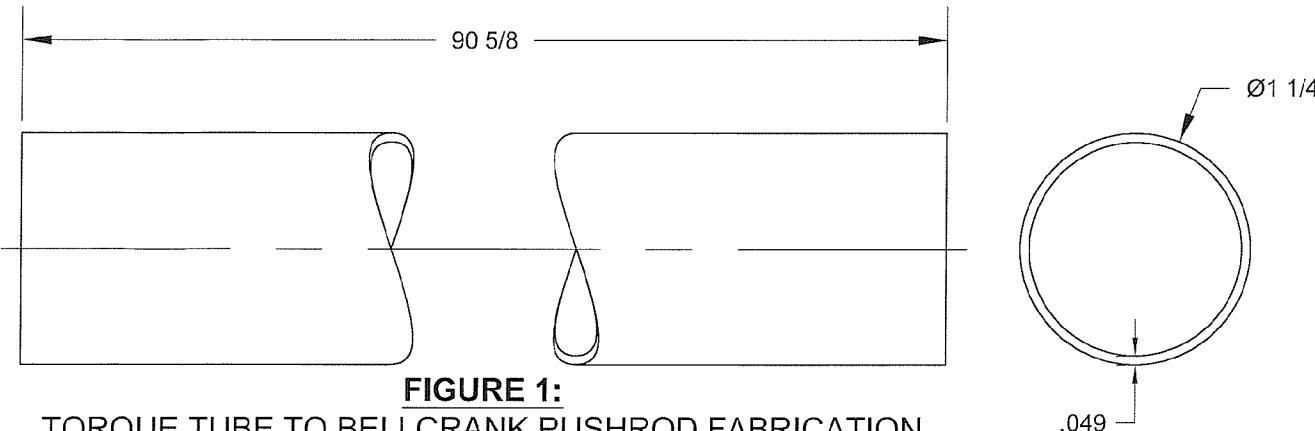


FIGURE 1:
TORQUE TUBE TO BELLCRANK PUSHROD FABRICATION

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.

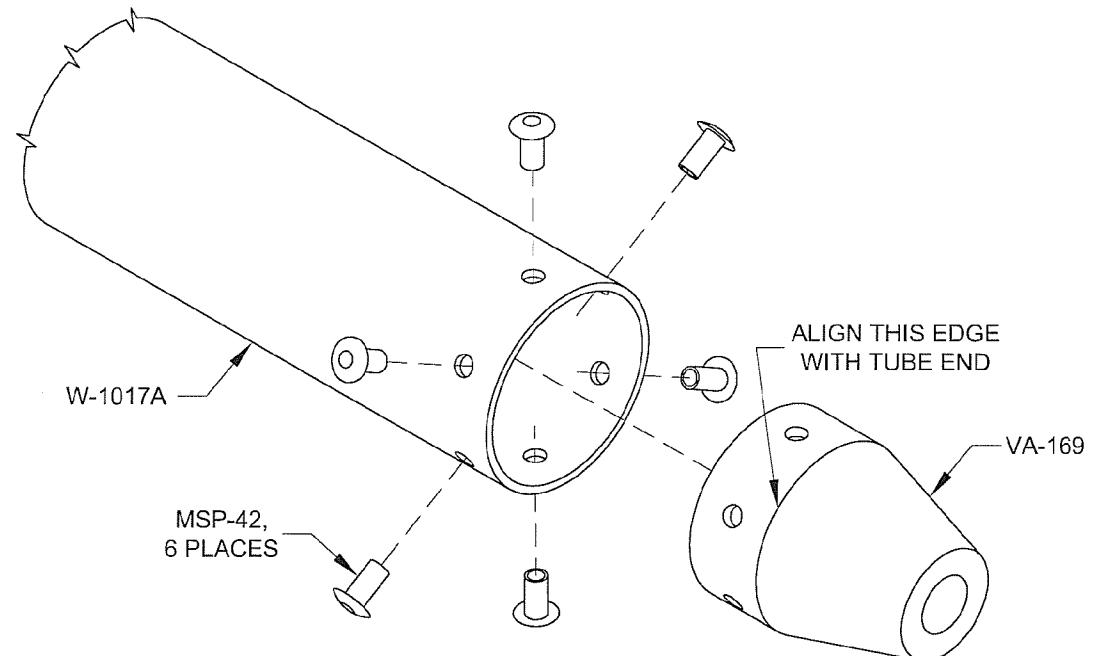


FIGURE 2:
THREADED ROD END INSTALLATION

Step 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.

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.

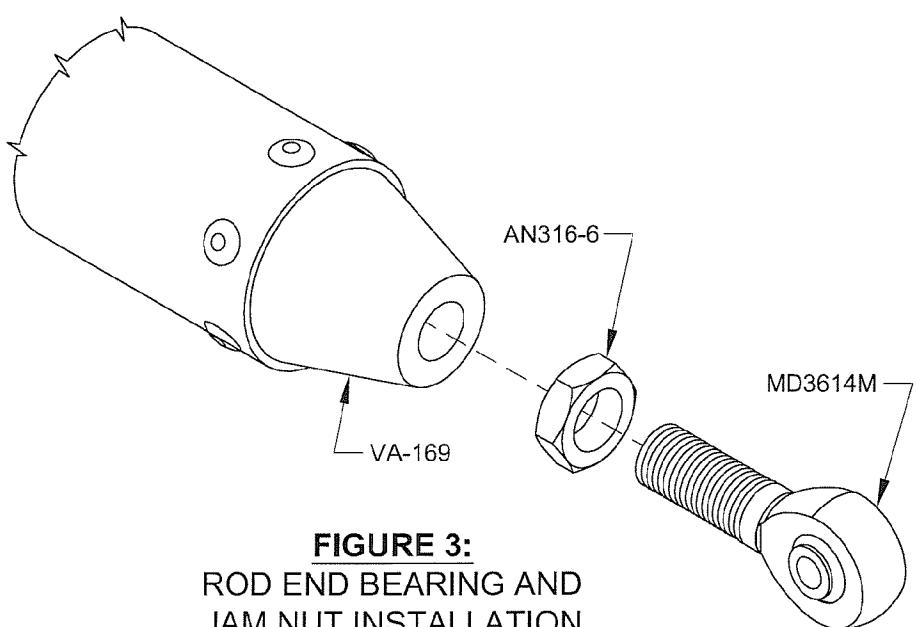
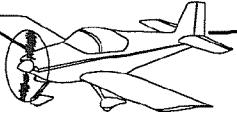


FIGURE 3:
ROD END BEARING AND JAM NUT INSTALLATION



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.

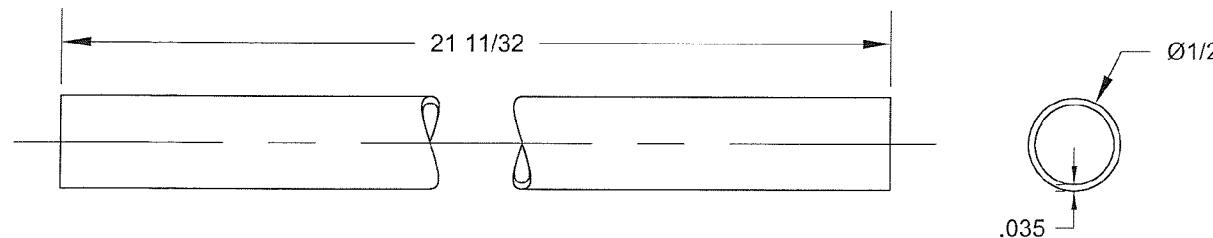


FIGURE 1:
BELLCRANK TO AILERON PUSHROD FABRICATION

Step 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.

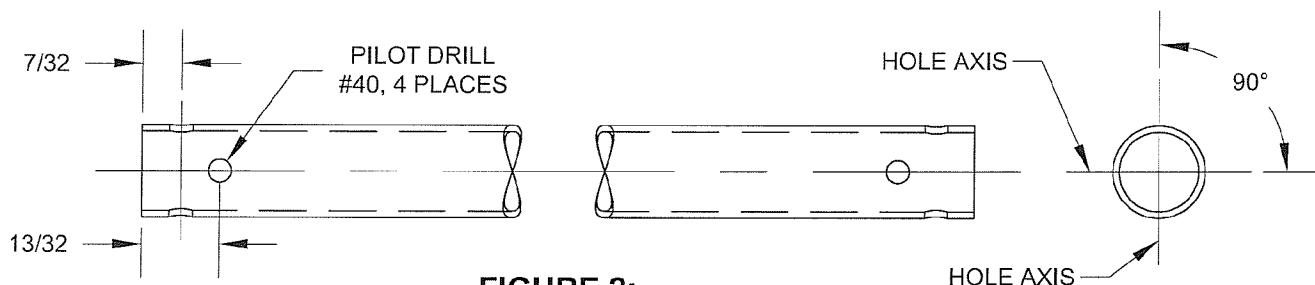


FIGURE 2:
PILOT-DRILL BELLCRANK TO AILERON PUSHROD

Step 3: Insert an AN490-HT8P 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.

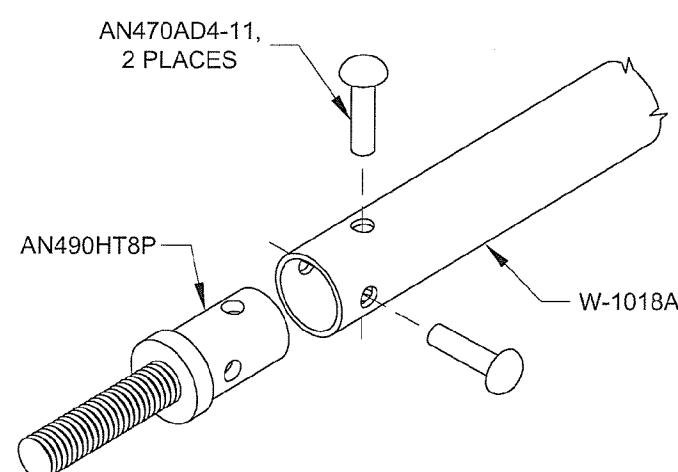


FIGURE 3:
THREADED ROD END INSTALLATION

Step 4: Install rod end bearings and jam nuts into the AN490-HT8P 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.

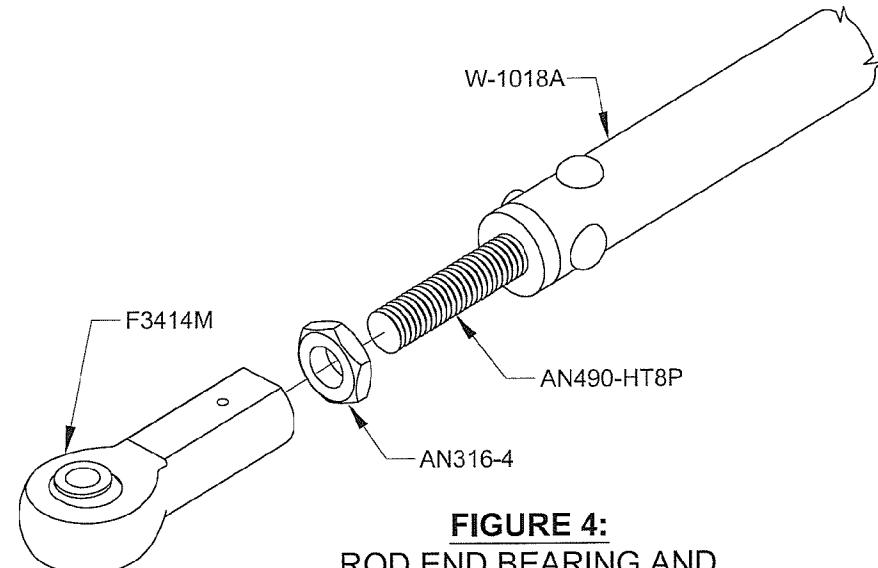


FIGURE 4:
ROD END BEARING AND JAM NUT INSTALLATION

Step 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.

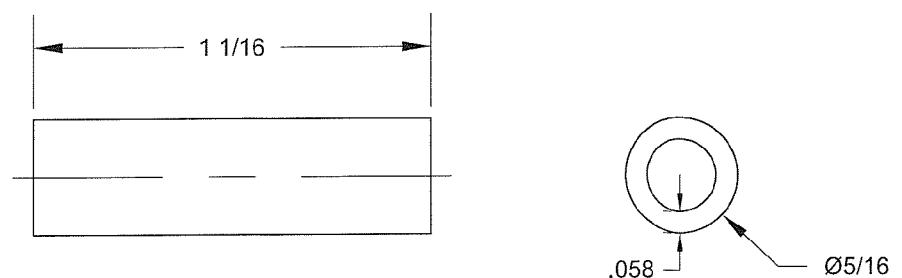
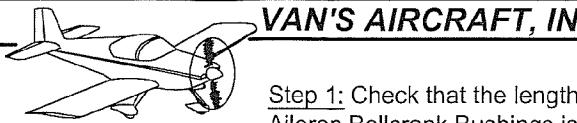


FIGURE 5:
AILERON BELLCRANK SPACER FABRICATION



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Step 1: Check that the length of both of the BUSH BR-065 X .375 X 2.781 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.

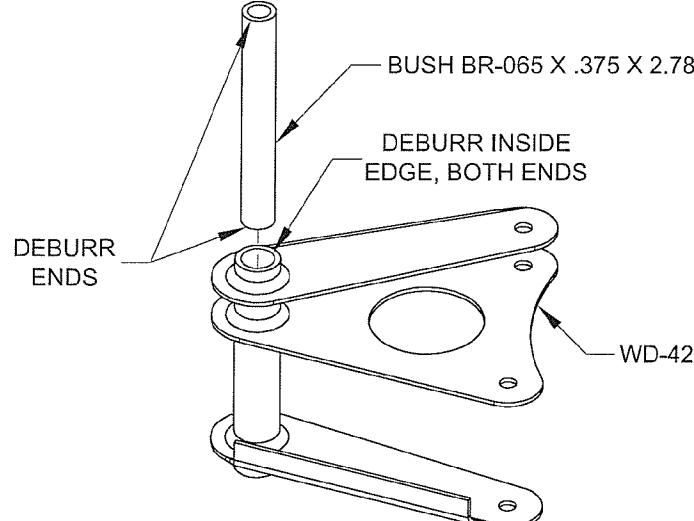


FIGURE 1:
AILERON BELLCRANK BUSHING INSTALLATION

Step 2: Install the WD-421-L Aileron Bellcrank/BUSH BR-065 X .375 X 2.781 Aileron Bellcrank Bushing subassembly into the left wing as shown in Figure 2.

Install the WD-421-R Aileron Bellcrank/BUSH BR-065 X .375 X 2.781 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.

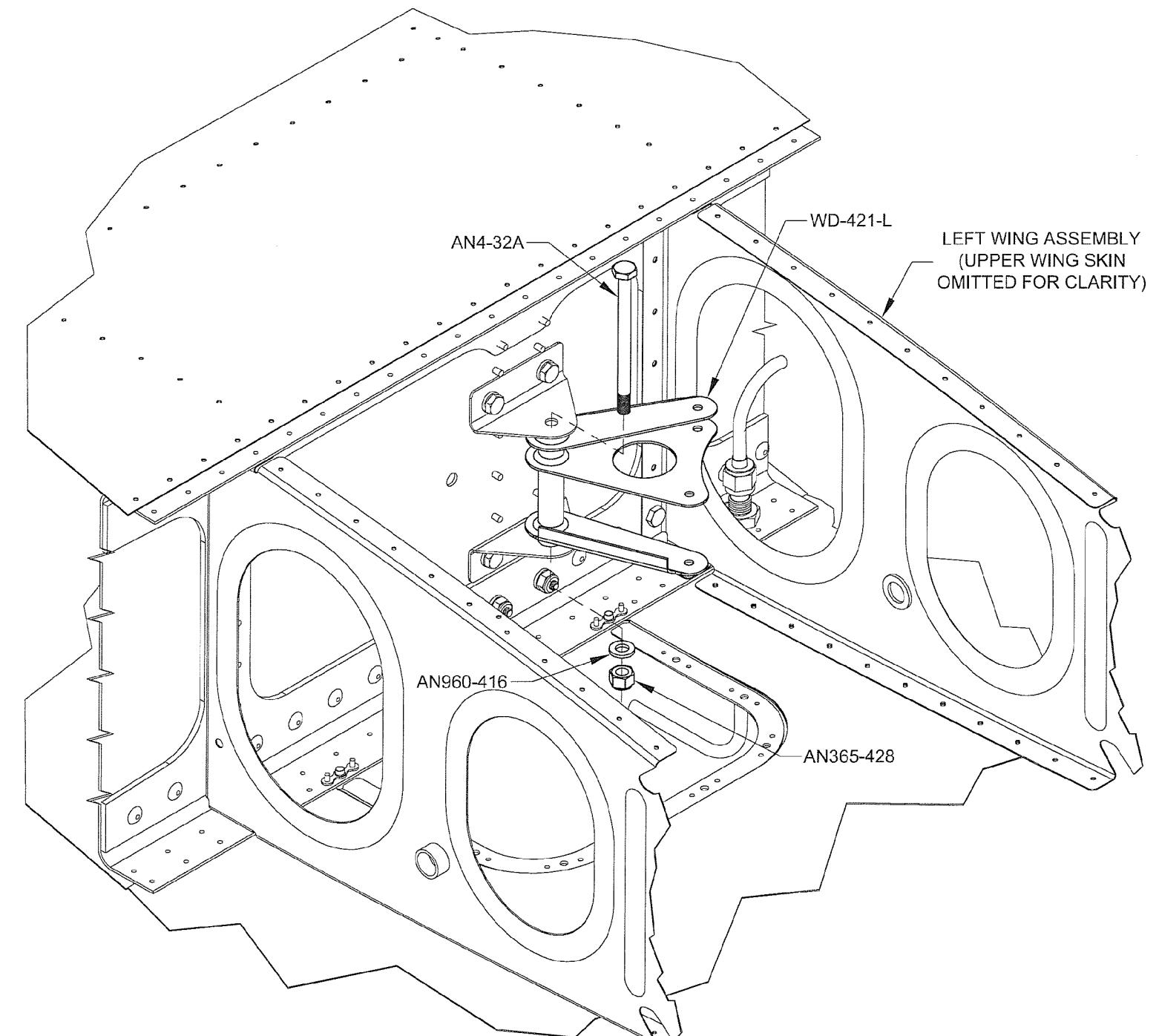
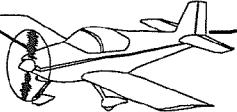


FIGURE 2:
AILERON BELLCRANK INSTALLATION



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.

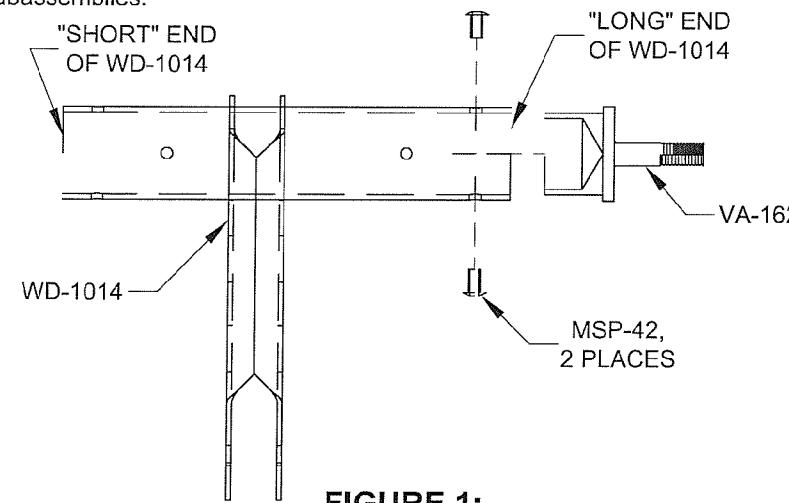


FIGURE 1:
FORWARD TORQUE TUBE SUBASSEMBLY

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.

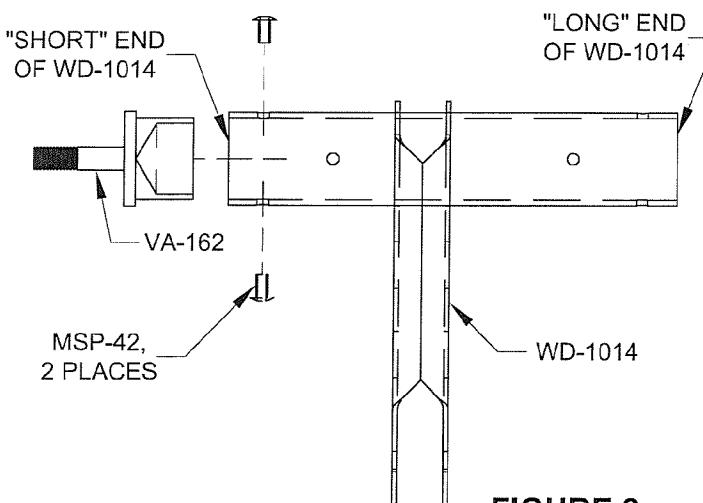


FIGURE 2:
AFT TORQUE TUBE SUBASSEMBLY

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.

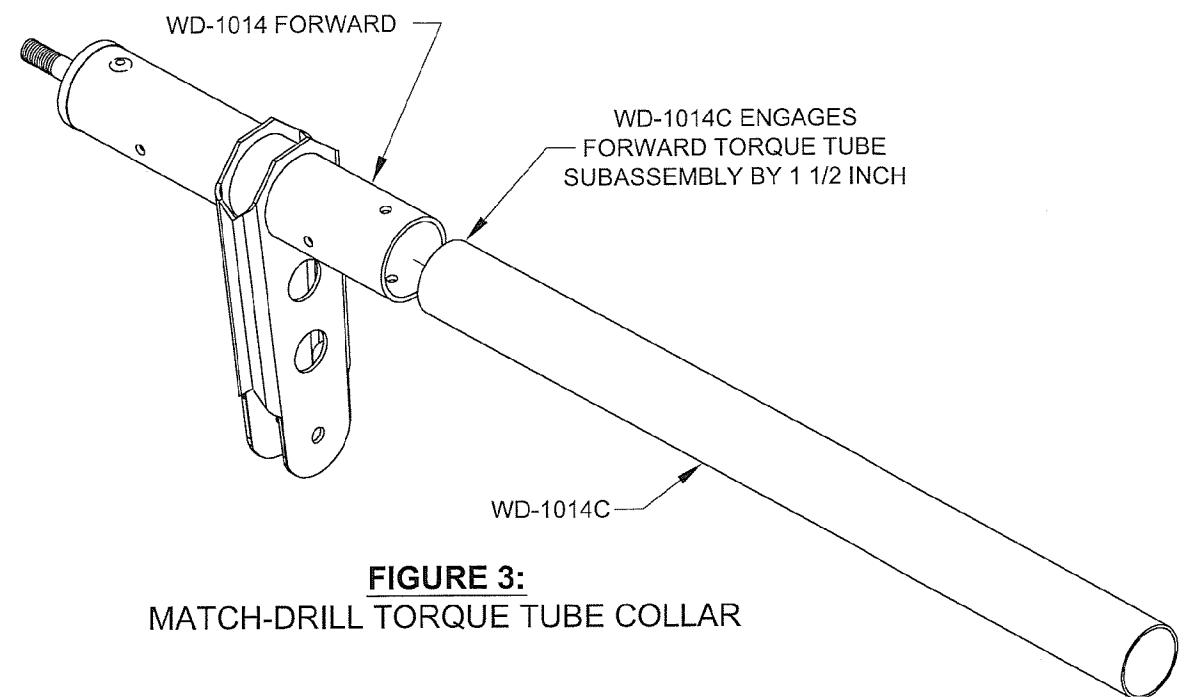


FIGURE 3:
MATCH-DRILL TORQUE TUBE COLLAR

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.

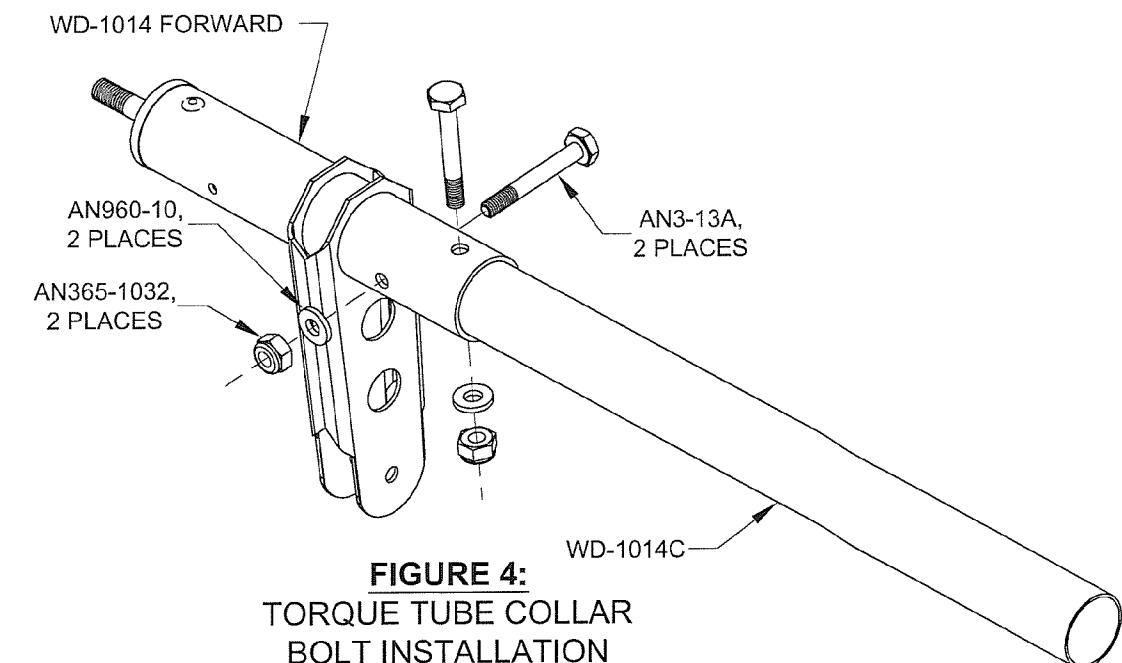
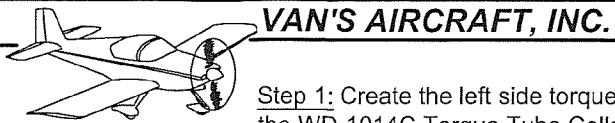


FIGURE 4:
TORQUE TUBE COLLAR
BOLT INSTALLATION



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.

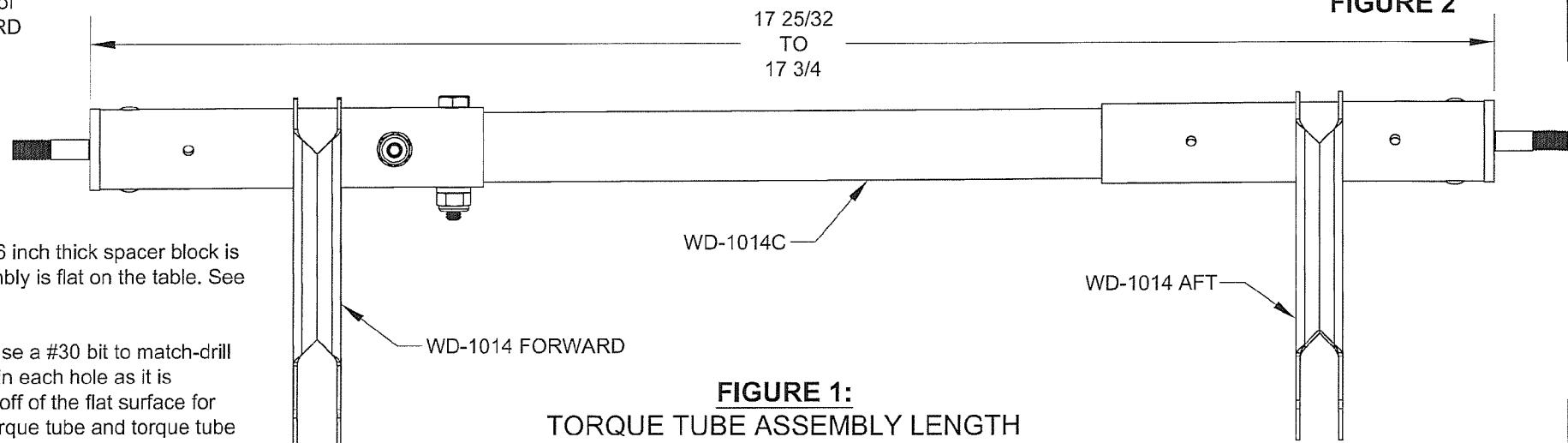


FIGURE 1:
TORQUE TUBE ASSEMBLY LENGTH

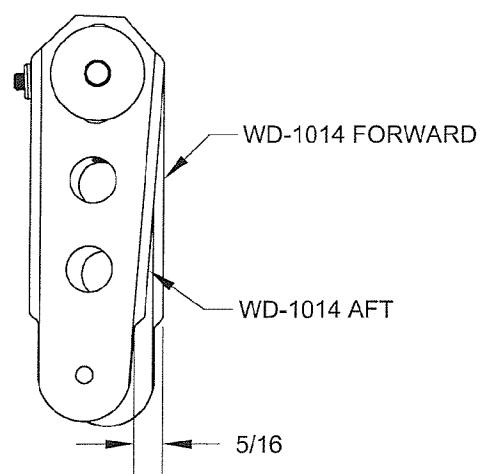


FIGURE 2:
TORQUE TUBE ASSEMBLY CLOCKING
(LEFT SIDE SHOWN)

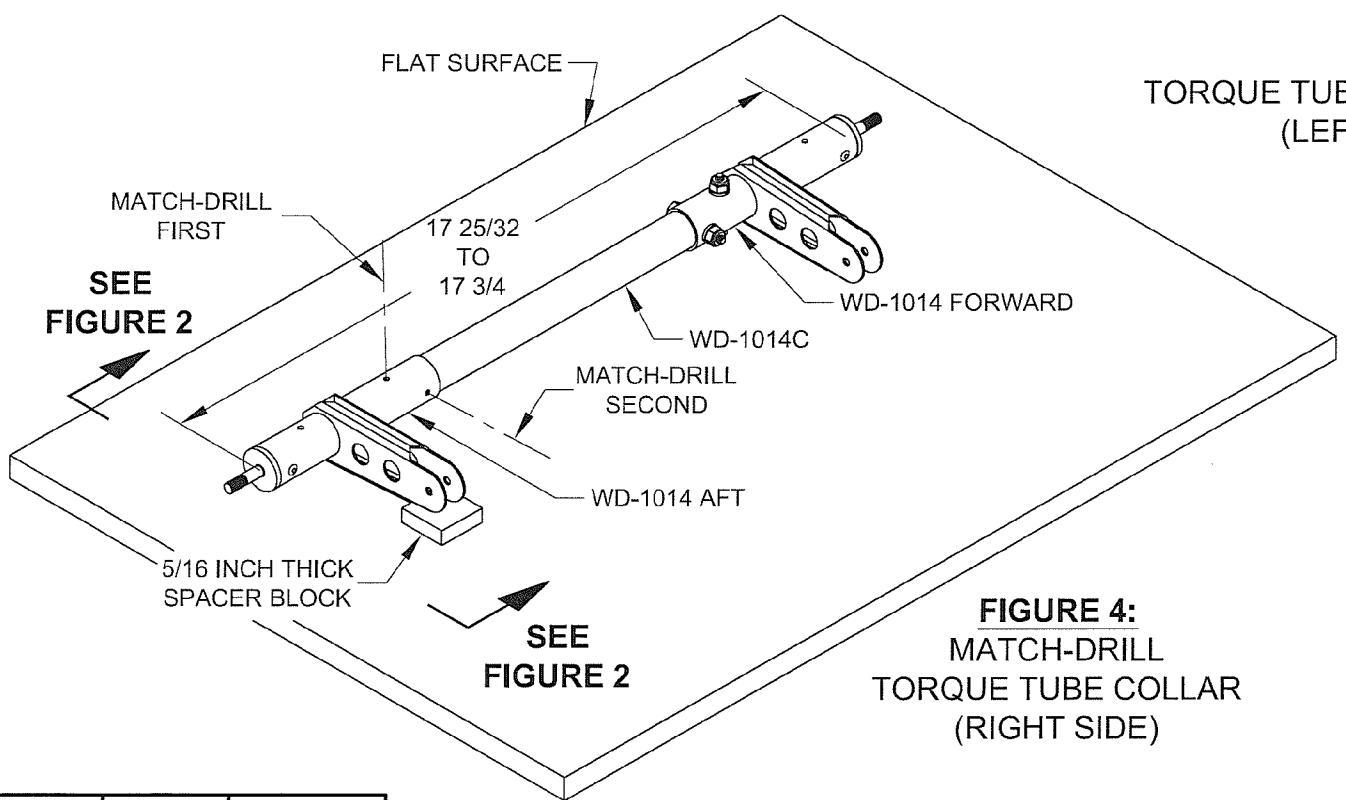
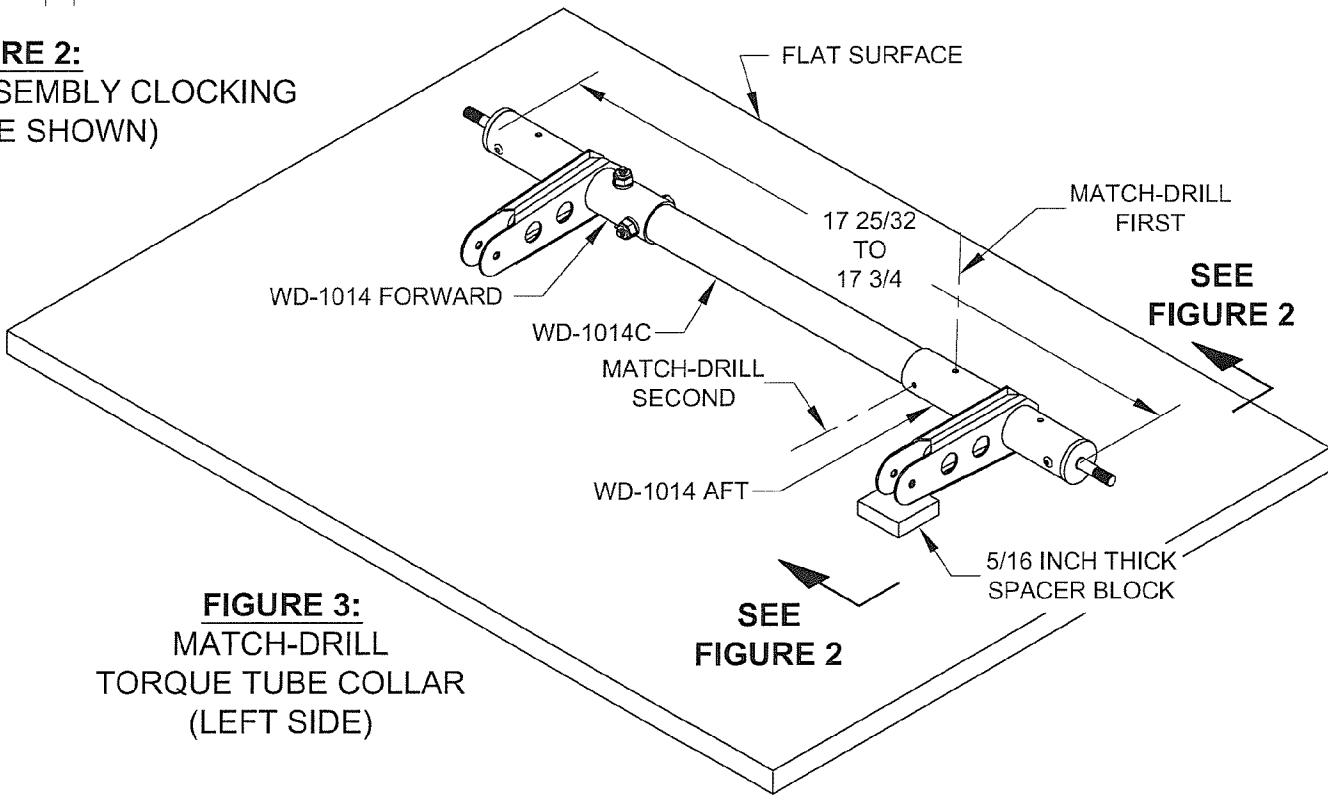


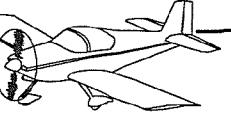
FIGURE 4:
MATCH-DRILL
TORQUE TUBE COLLAR
(RIGHT SIDE)



**SEE
FIGURE 2**

**SEE
FIGURE 2**

**SEE
FIGURE 2**



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.

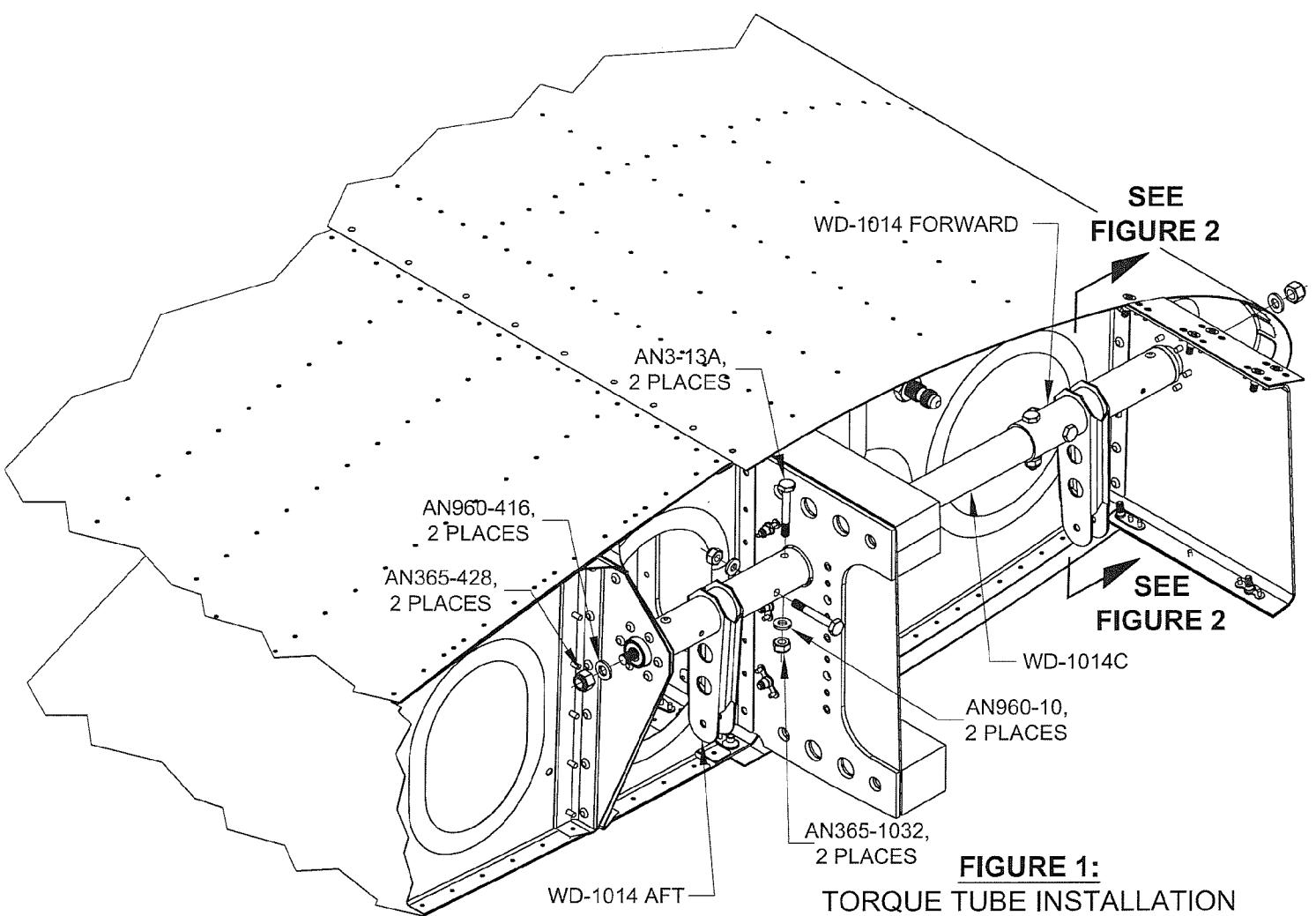


FIGURE 1:
TORQUE TUBE INSTALLATION

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.

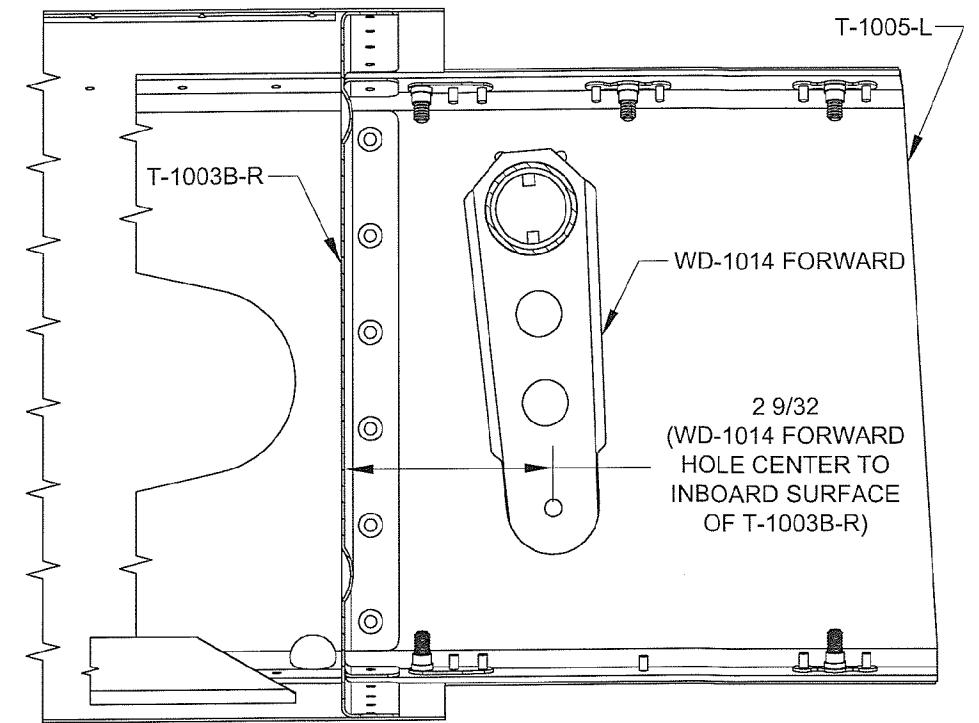
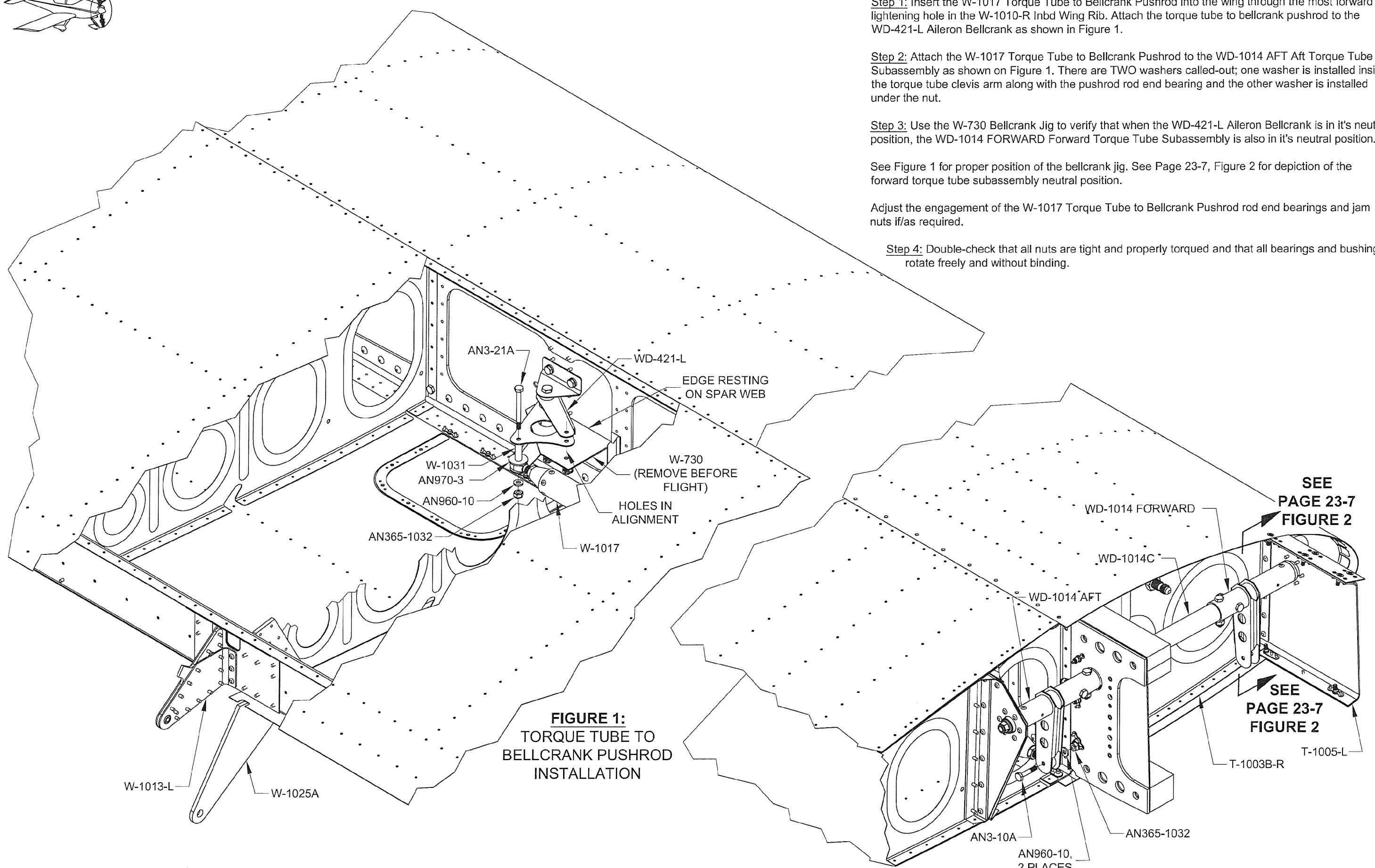
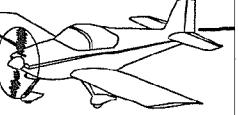


FIGURE 2:
FORWARD TORQUE TUBE
SUBASSEMBLY NEUTRAL POSITION



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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.

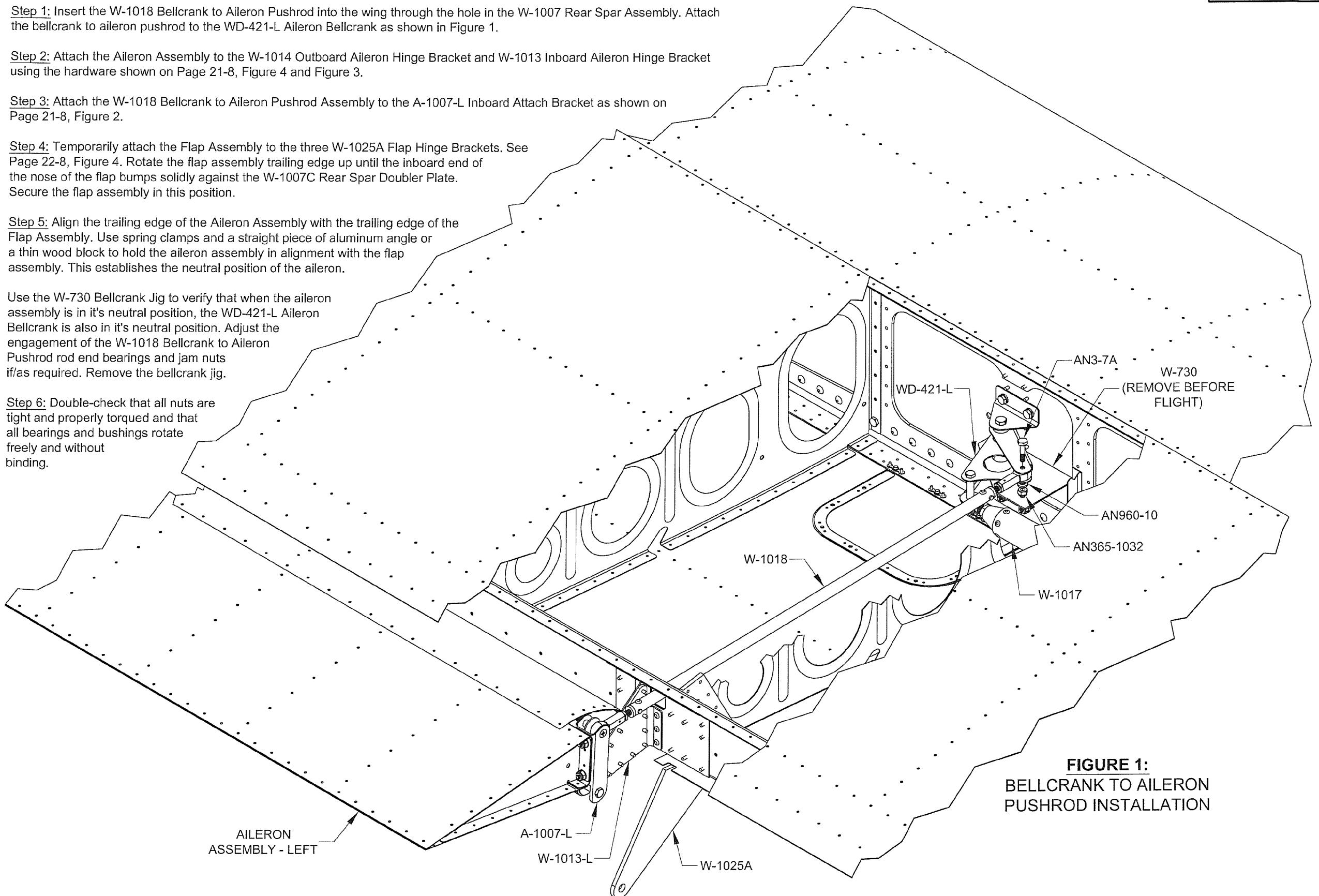
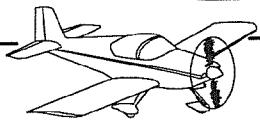


FIGURE 1:
BELLCRANK TO AILERON
PUSHROD INSTALLATION



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ALIGN THIS EDGE WITH
THE END OF TUBE

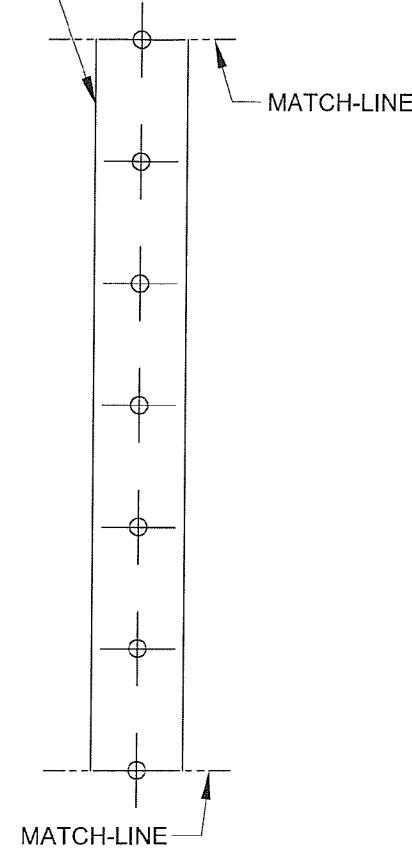
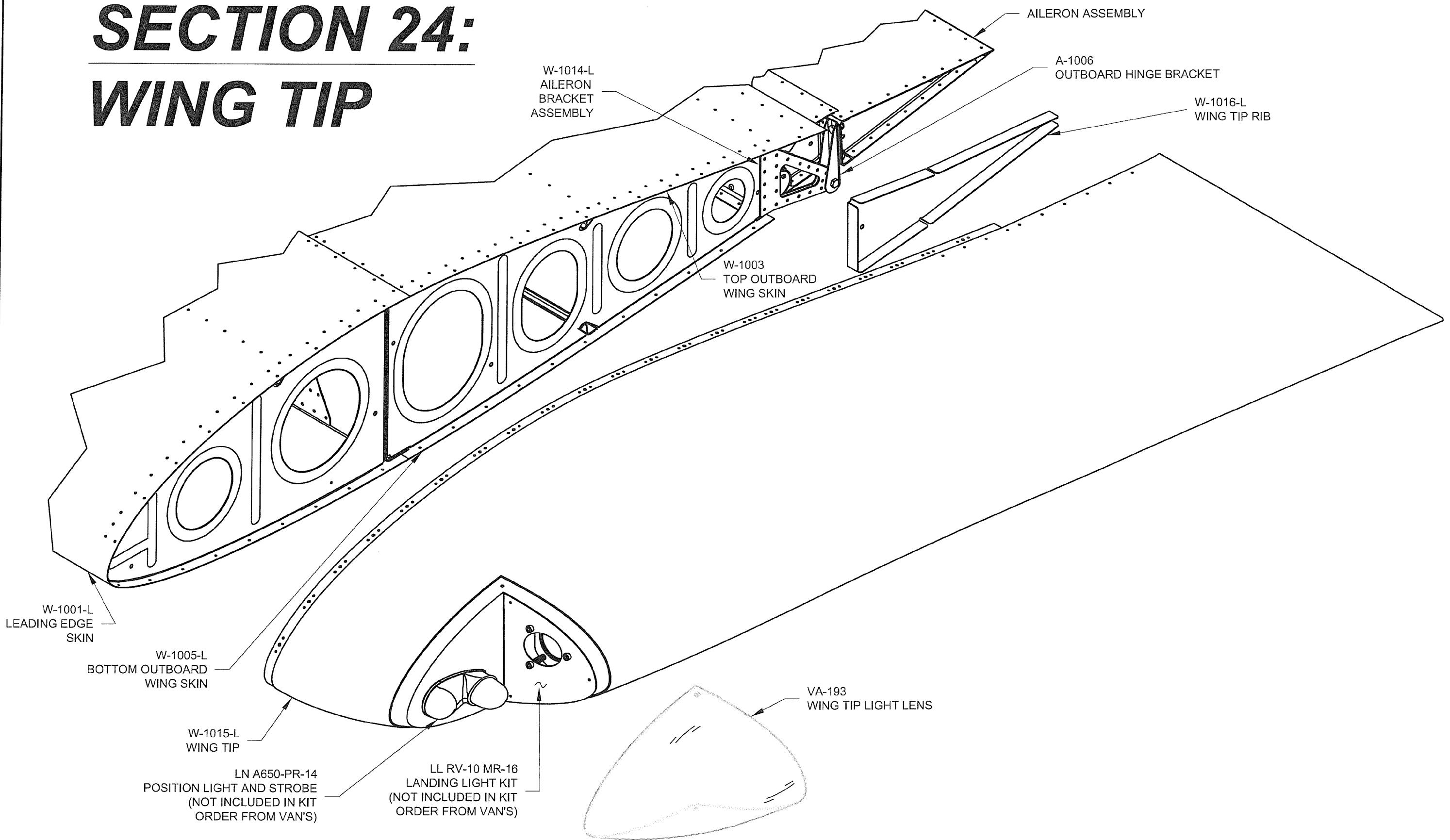
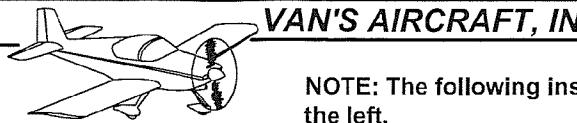


FIGURE 1:
PUSHROD RIVET
HOLE LOCATION
TEMPLATE



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.

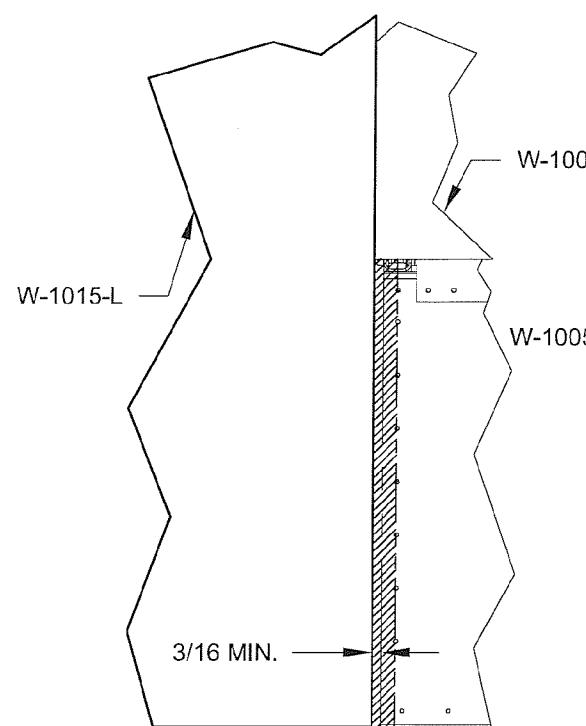


FIGURE 1: WING TIP TOP TRIM

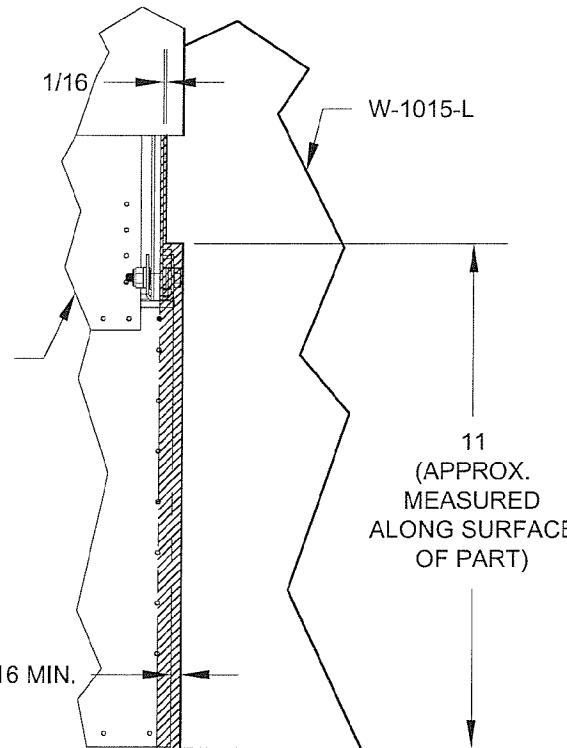


FIGURE 2: WING TIP BOTTOM TRIM

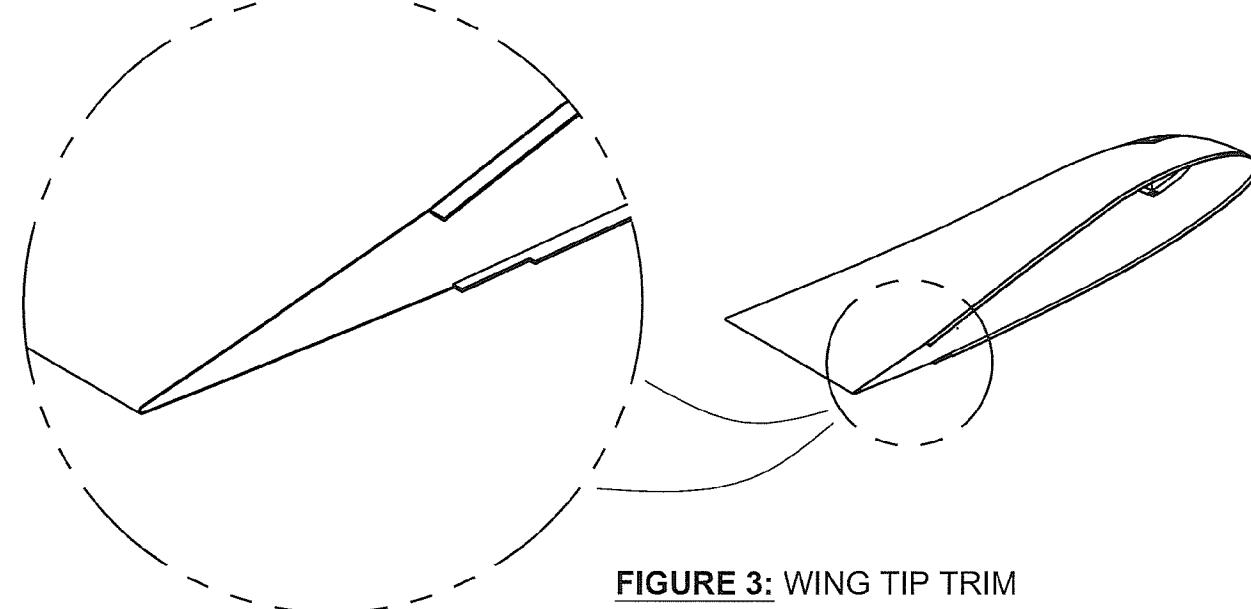


FIGURE 3: WING TIP TRIM

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.

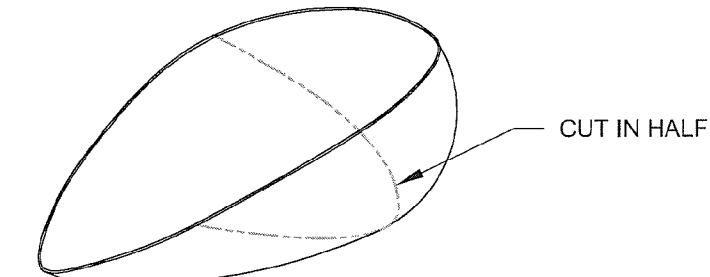


FIGURE 4: LENS MODIFICATION

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.

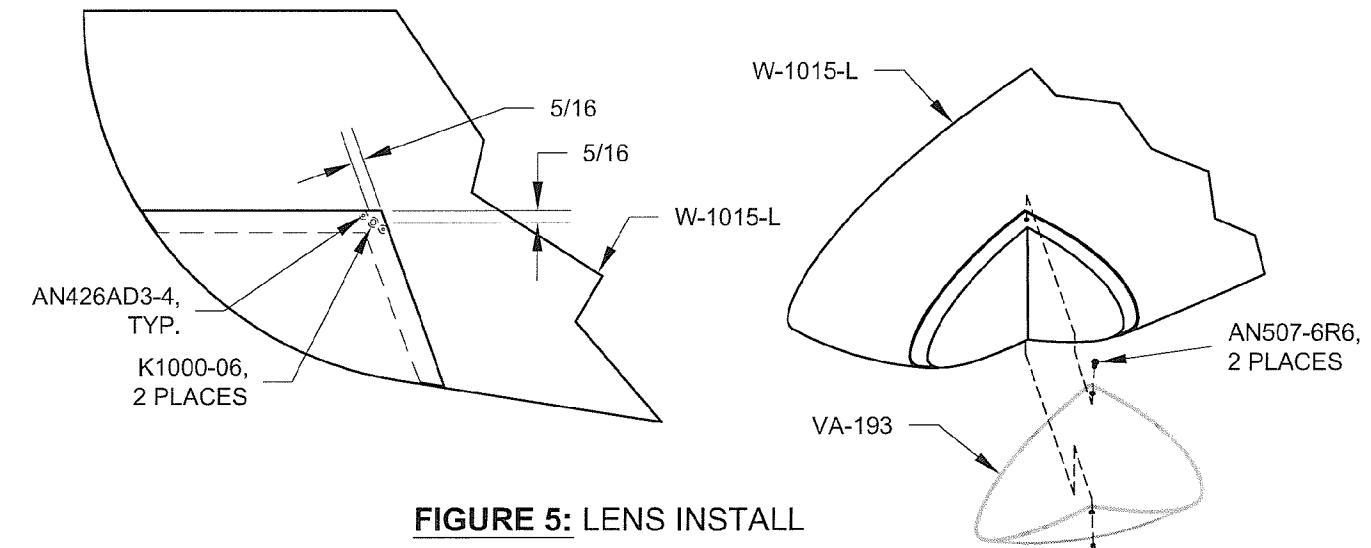
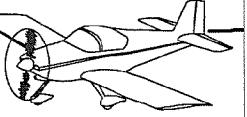


FIGURE 5: LENS INSTALL



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.

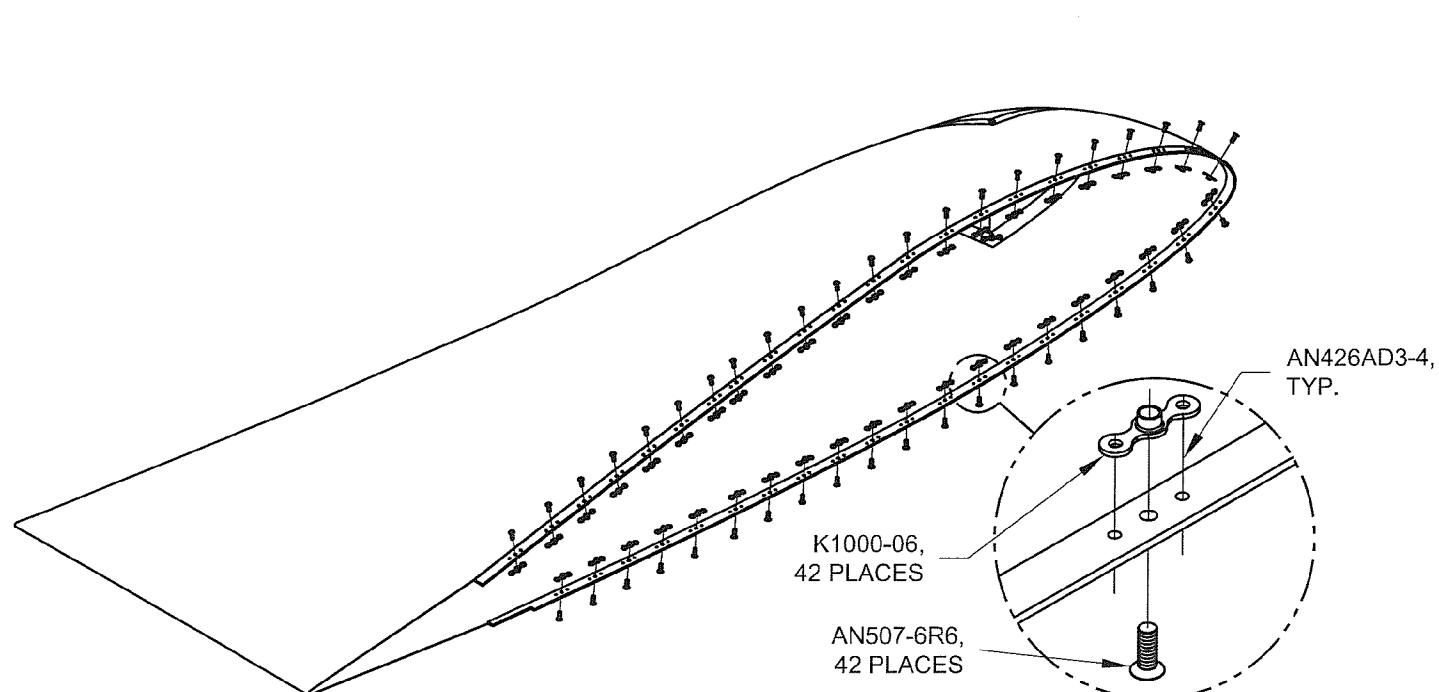


FIGURE 1: NUTPLATE ATTACH

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.

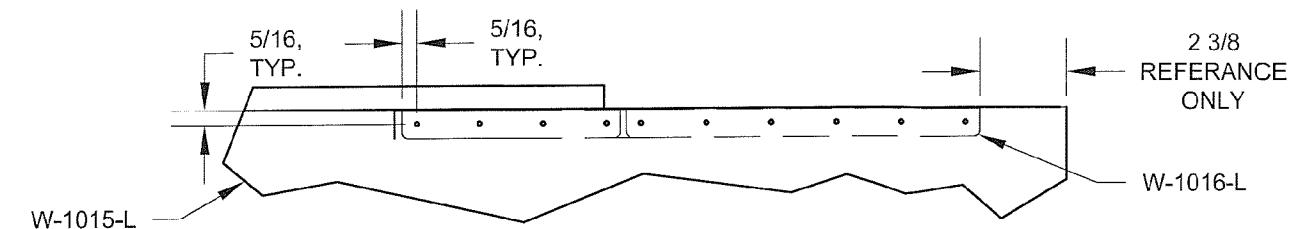
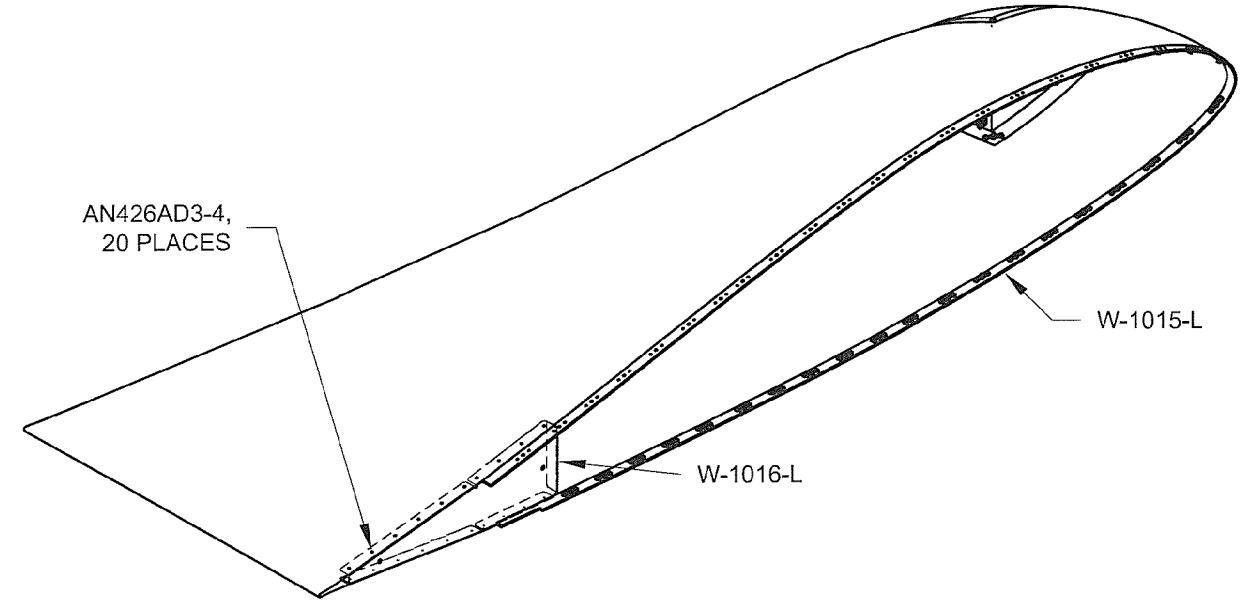
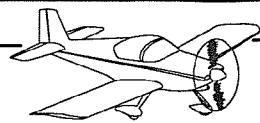


FIGURE 2: LAYING OUT THE TIP RIB RIVET PATTERN



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



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