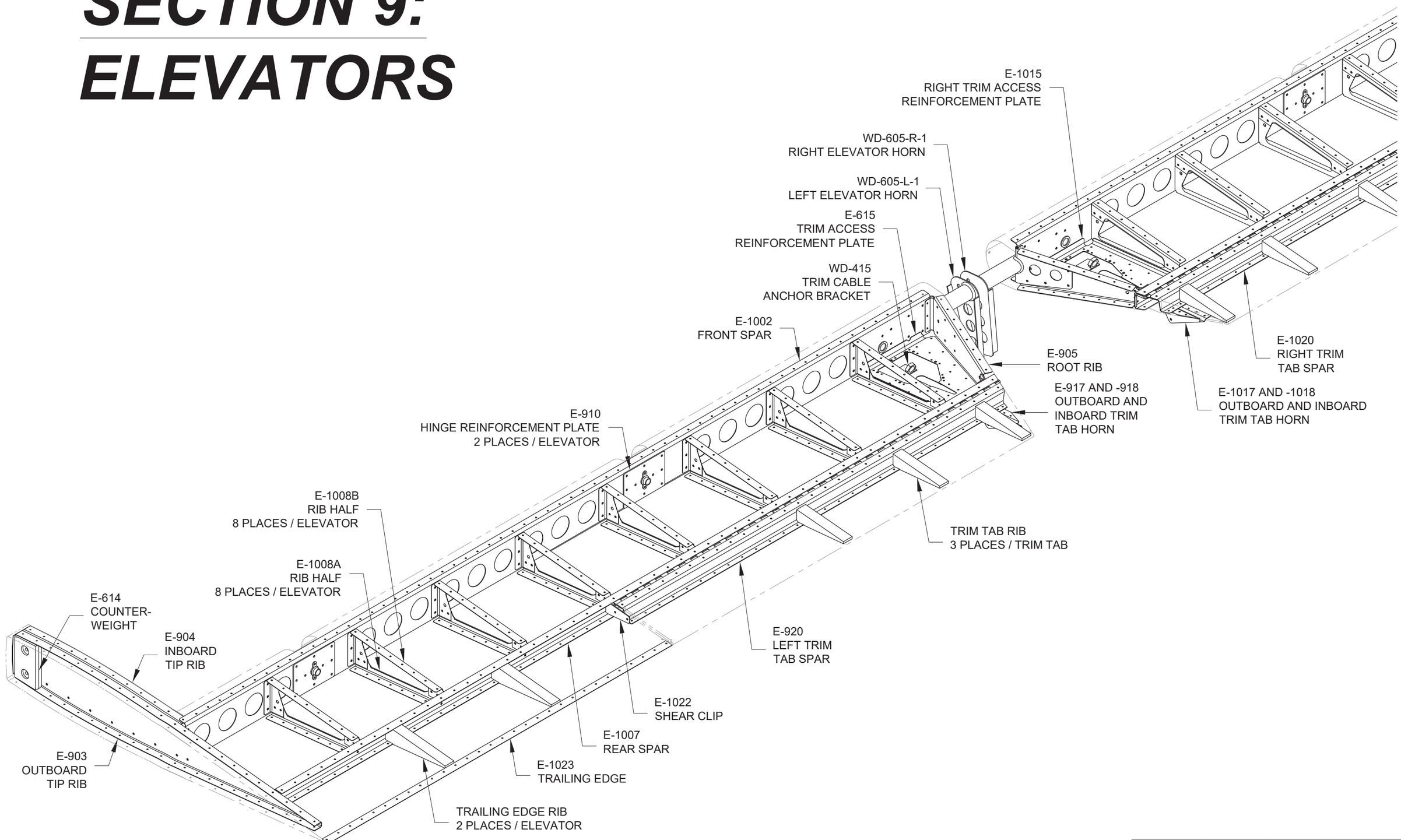
SECTION 9:
ELEVATORS



Step 1: Separate the sixteen E-1008 Elevator Ribs into individual parts by removing the material shown in Figure 1. Deburr all edges.

Step 2: Deburr the edges of all elevator parts.

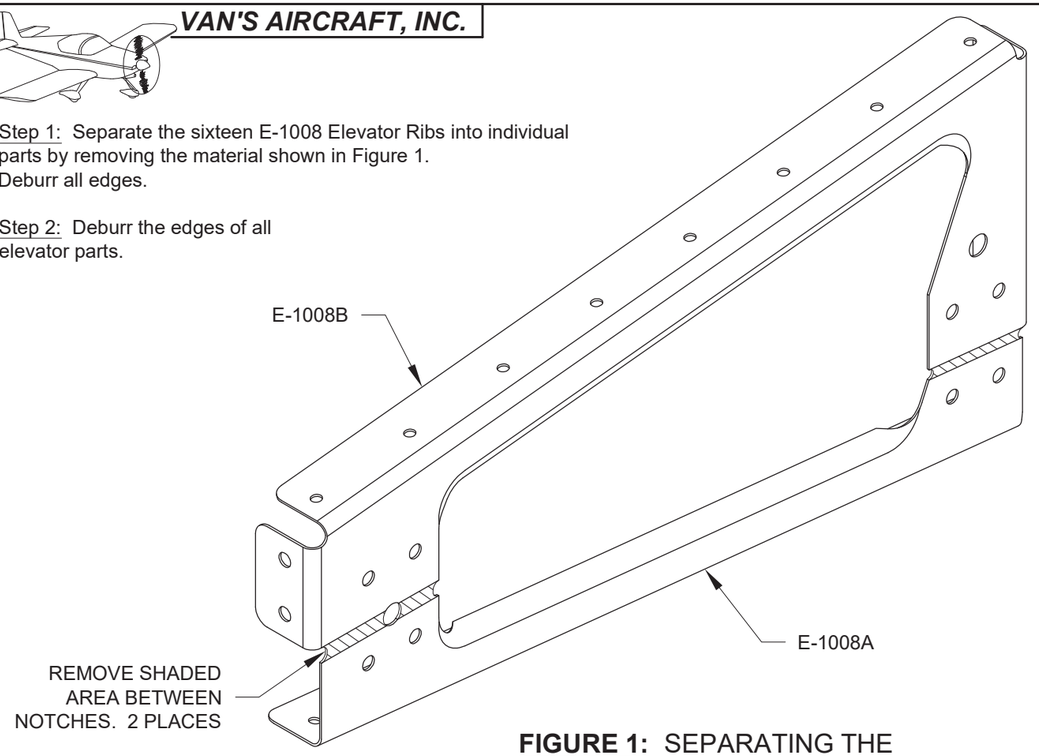


FIGURE 1: SEPARATING THE ELEVATOR RIBS

Step 3: Cleco all the E-1008A & B Rib Halves together as shown in Figure 2. This is the correct orientation of the rib halves, and will ensure proper hole alignment when they are attached to the skins.

Using a #30 drill, final-drill the four common holes of the rib halves. Label each half so that they will remain paired together throughout the construction of the elevators.

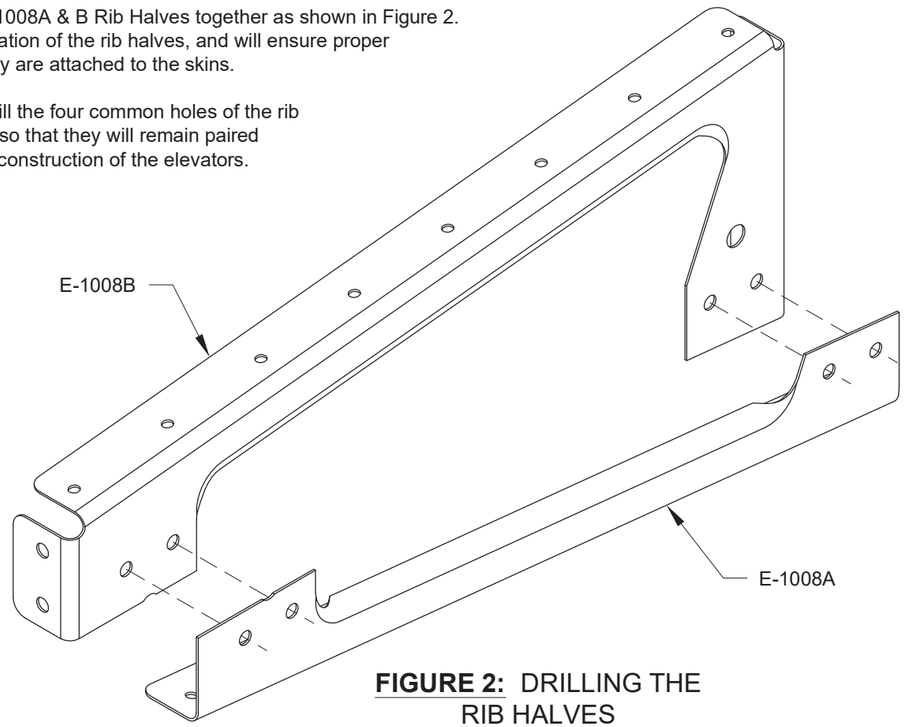


FIGURE 2: DRILLING THE RIB HALVES

Step 4: Make sure the flanges of the E-903 Outboard and E-904 Inboard Tip Ribs, shown in Figure 3, are bent 90°. Adjust them with a hand seamer if necessary.

Step 5: Straighten the E-904 and E-903 Tip Ribs by fluting between the pre-punched holes in the flanges. Check for straightness using the matching holes in the E-913 Counterbalance Skin.

Step 6: Make two Tip Rib Assemblies (one for each elevator) by clecoing together the E-903 and E-904 Tip ribs and the E-913 Counterbalance Skin as shown in Figure 3. Remove any vinyl from mating surfaces before clecoing.

Final-Drill the common 1/8" holes in the rib webs using a #30 drill and the common 3/32" holes in the rib flanges and counterbalance skin using a #40 drill. Do not drill the line of holes around the counterbalance skin which do not match-up with a rib, or the holes in the top and bottom of the counterbalance skin indicated by the circle in the figure.

Final-Drill the three 3/16" holes at the front of the ribs with a #12 drill.

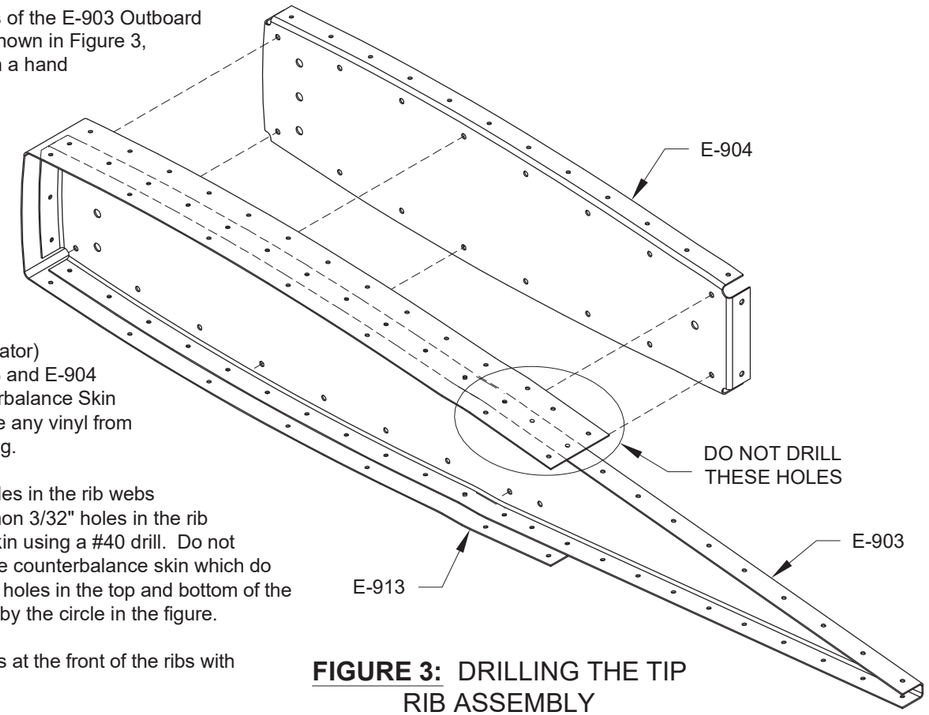


FIGURE 3: DRILLING THE TIP RIB ASSEMBLY

Step 7: Separate the four E-1022 Shear Clips by removing the material show in Figure 4.

Final-Drill all the holes in the shorter flange of the shear clips with a #30 drill, then deburr the holes and any unfinished edges.

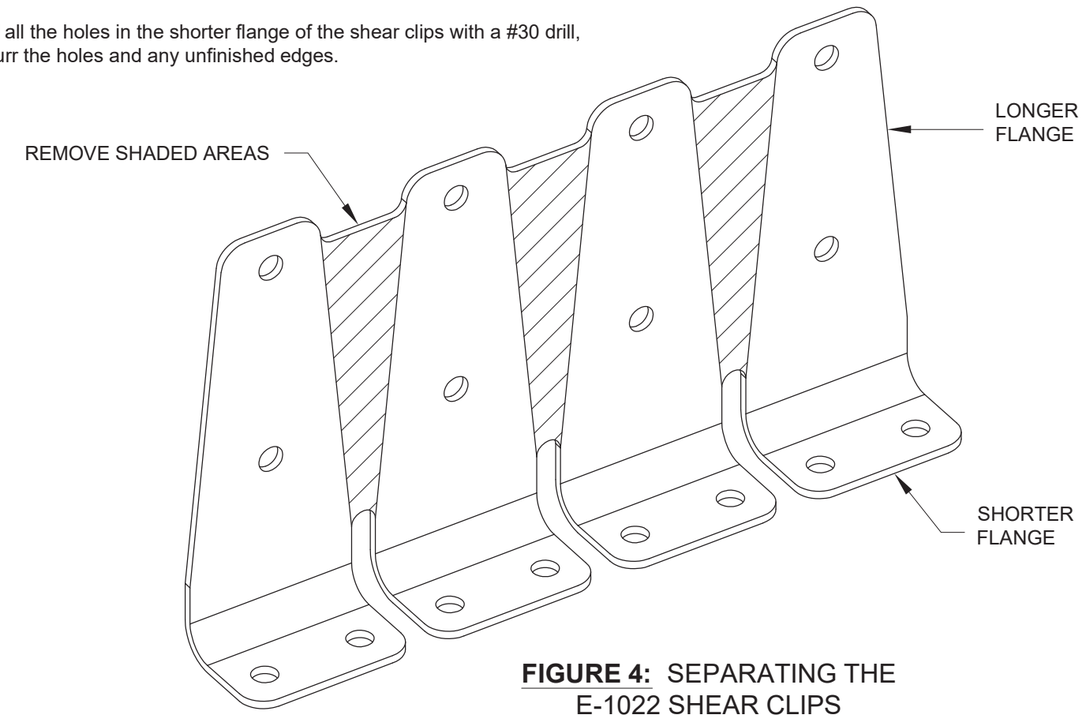


FIGURE 4: SEPARATING THE E-1022 SHEAR CLIPS

NOTE: There is a close out tab on the two E-1001A Top Skins and the two E-1001B Bottom Skins that must be bent prior to assembling the elevators. At this point, the top skins are identical and the bottom skins are identical. However, once the tabs are bent in the direction shown in Figure 1, the skins become dedicated left or right. The tabs will make it easier to identify the inside surface of the skins throughout the building process; they are directed toward the inside of the elevators.

Follow the steps on this page to bend the tabs on all four skins.

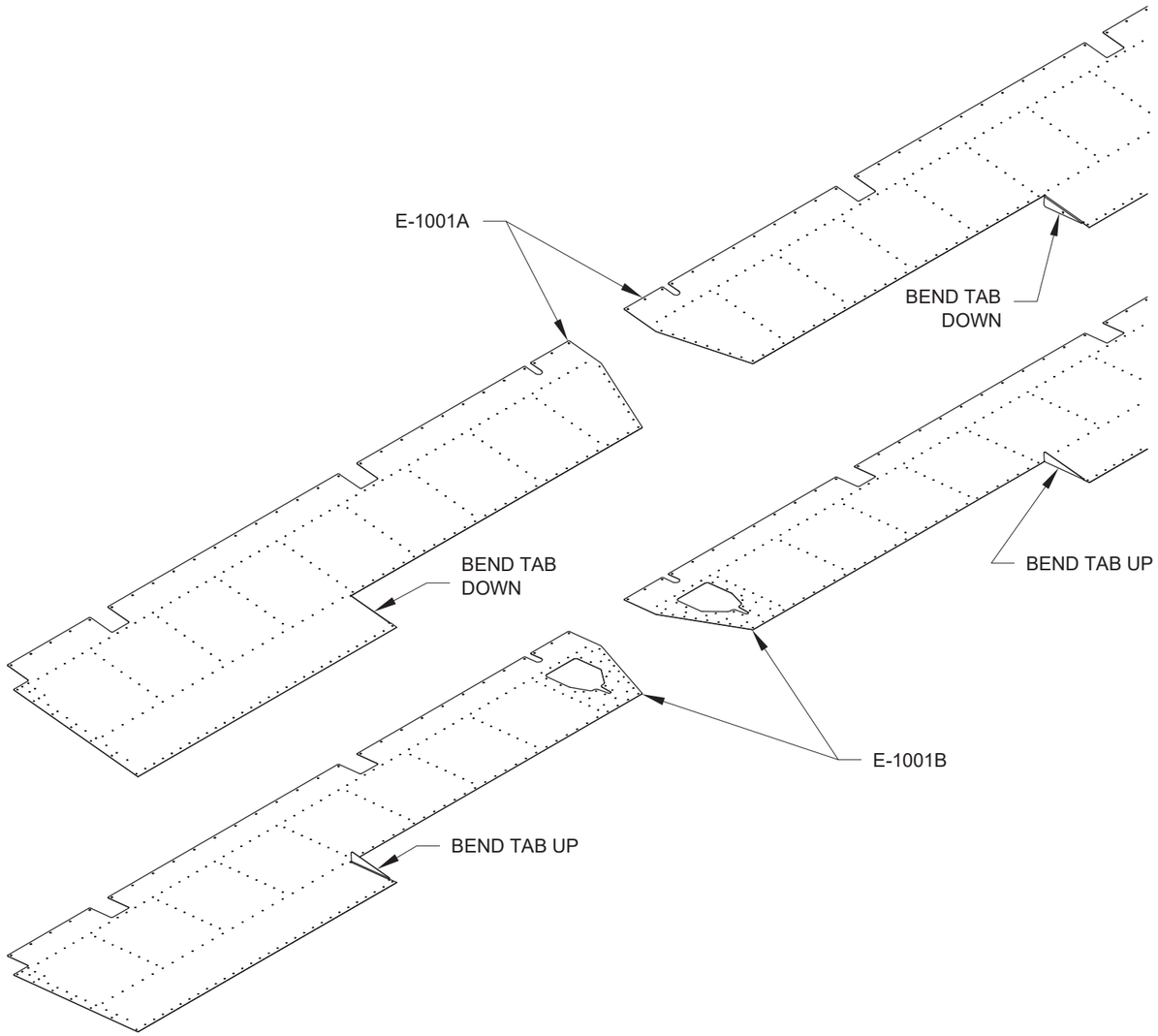


FIGURE 1: CLOSE OUT TAB BEND DIRECTIONS

Step 1: Remove the vinyl from the skins in the area of the tab. Mark the bend line on the skins as shown in Figure 2.

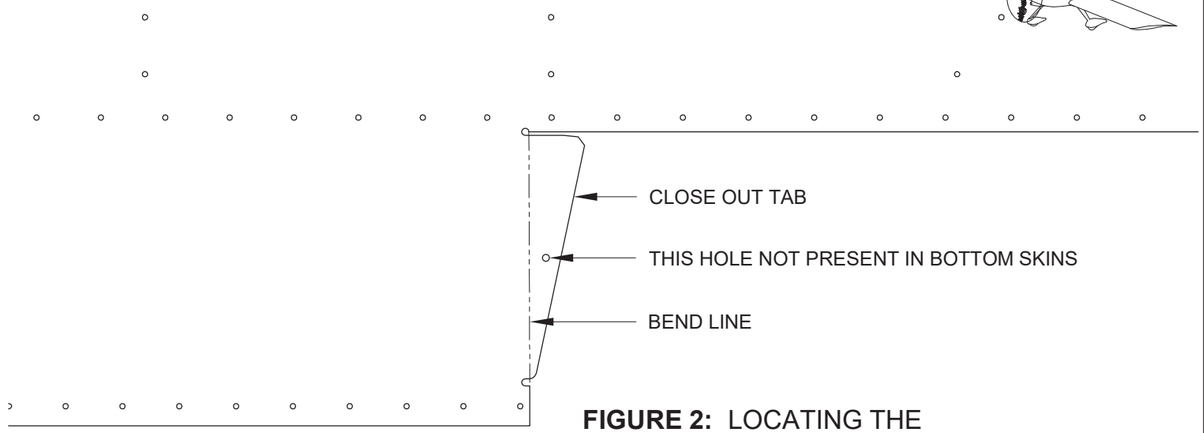


FIGURE 2: LOCATING THE BEND LINE

Step 2: Clamp a skin between the surface of a work bench and a piece of wood with the bend line at the edge of the workbench as shown in Figure 3.

Step 3: Begin forming the bend by hand using a small, wood block, then finish the bend by tapping back and fourth along the tab with a flush rivet set in a rivet gun that has been turned down low. Finish the bend to 90° with a hand seamer.

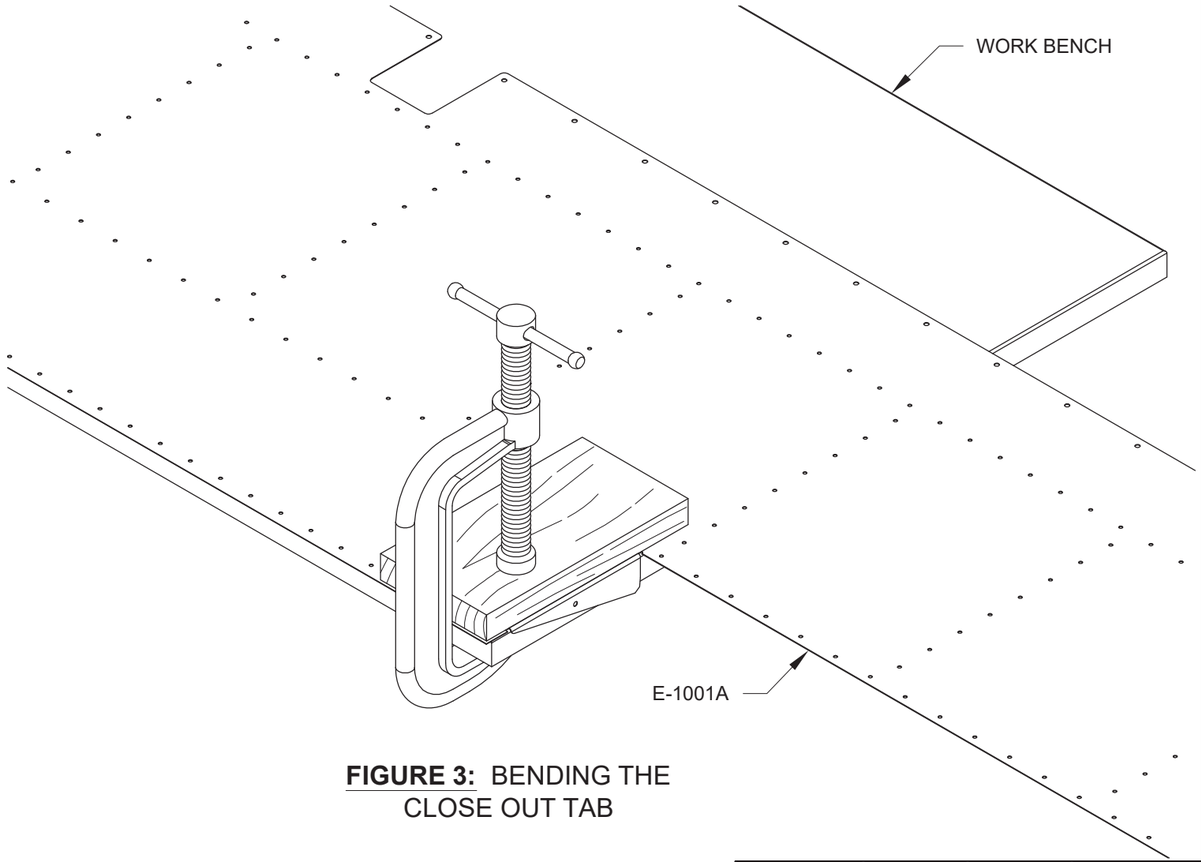


FIGURE 3: BENDING THE CLOSE OUT TAB

NOTE: Only the left elevator is fully depicted in the rest of the manual; the right elevator is simply the mirror image of the left. Unless otherwise specified, any instructions given for the left elevator applies to the right as well. Assemble both elevators at the same time. This will help to prevent mistakes and speed up the construction process.

Step 1: Cleco the E-910 Hinge Reinforcement Plates to both E-1002 Front Spars, as shown in Figure 1, then final-drill all the 1/8" holes common to the spars and plates using a #30 drill.

Mark the plates so that they can be reinstalled in the same position. Remove the plates from the spars and set them aside.

Step 2: Final-Drill the trim cable routing hole, indicated in Figure 1, in both E-1002 Front Spars to 5/8 using a Unibit step drill. Make sure to drill the bottom of the two holes. Drilling these holes dedicates the spars as left and right, so mark them accordingly.

Step 3: Cleco the E-1002 Front Spars to the E-1001B Bottom Skins as shown in Figure 1 (be sure the tabs in the skins are directed as shown). Install the clecos from the skins into the spars.

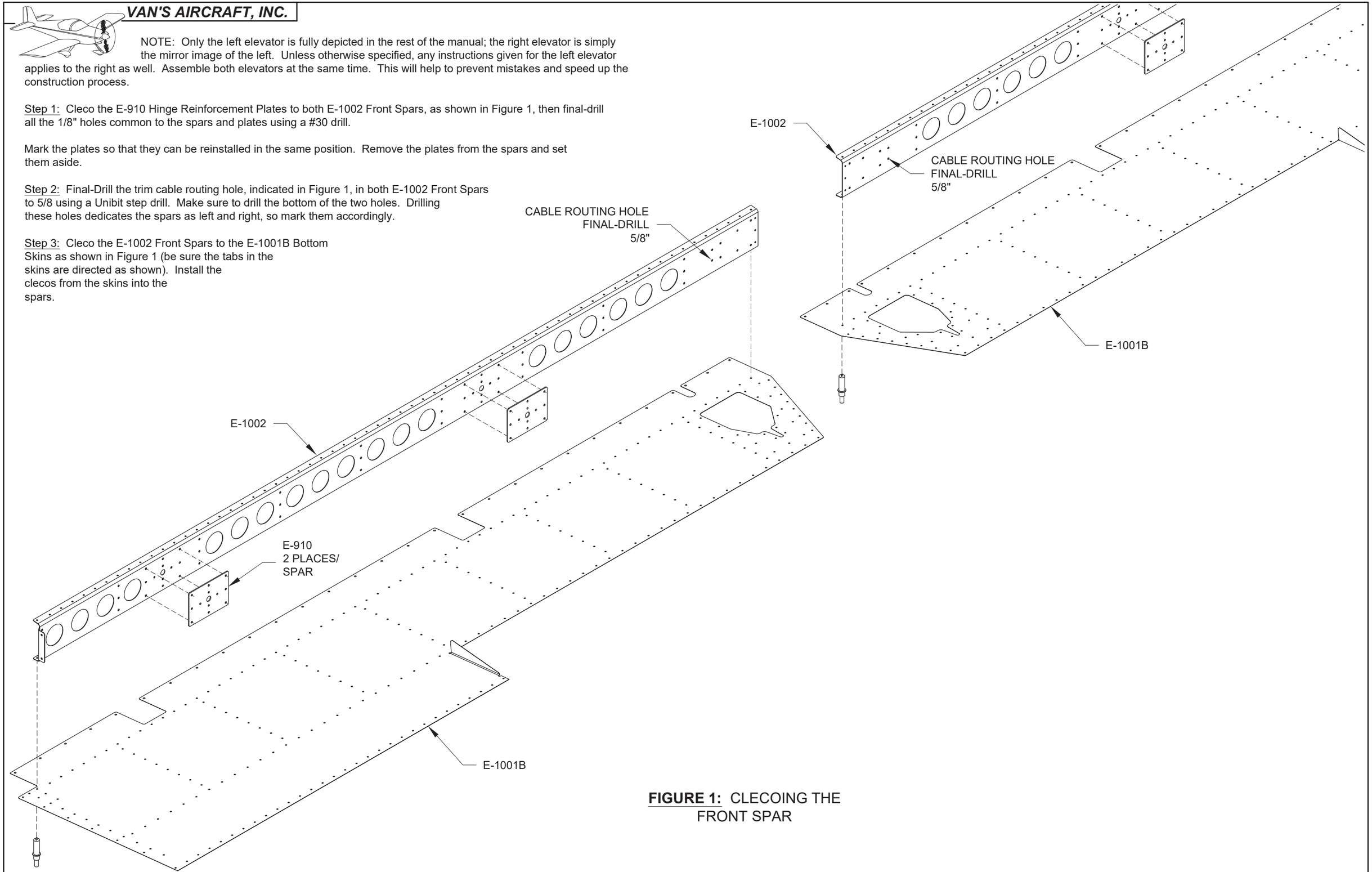


FIGURE 1: CLECOING THE FRONT SPAR

Step 1: Cleco the E-1008 Ribs (the rib halves should still be clecoed together) and the E-905 Root Rib to the E-1002 Front Spar and to the E-1001B Bottom Skin as shown in Figure 1. Note that, except for the root ribs, the flanges of all the ribs are directed outboard on both elevators. The holes in the front spar used to attach the root ribs are 3/32" while the holes for the other ribs are 1/8". This is intentional, so don't be tempted to drill them to match the rest.

Step 2: Cleco the E-1007 Rear Spar to the E-1008 and E-905 Ribs and E-1001B Bottom Skin.

Step 3: Final-Drill the two holes at the outboard end of the E-1007 Rear Spar (the holes that don't match with a rib) using a #30 drill. Final-Drill the holes common to the E-1008 Ribs and the E-1002 and E-1007 Spars using a #30 drill. Final-Drill the holes common to the root rib and spars using a #40 drill.

Step 4: Cleco an E-1022 Shear Clip to the E-1007 Rear Spar and to the E-1008 Rib shown in Figure 1. The longer flange of the shear clip is positioned inboard of the tab in the E-1001B Skin (see Page 9-7, Figure 1). The clecos attaching the shear clip to the rib and spar need to be installed from the inside of the elevator to keep the holes in the longer flange of the shear clip accessible for drilling later. (Remember to do this to the right elevator as well.)

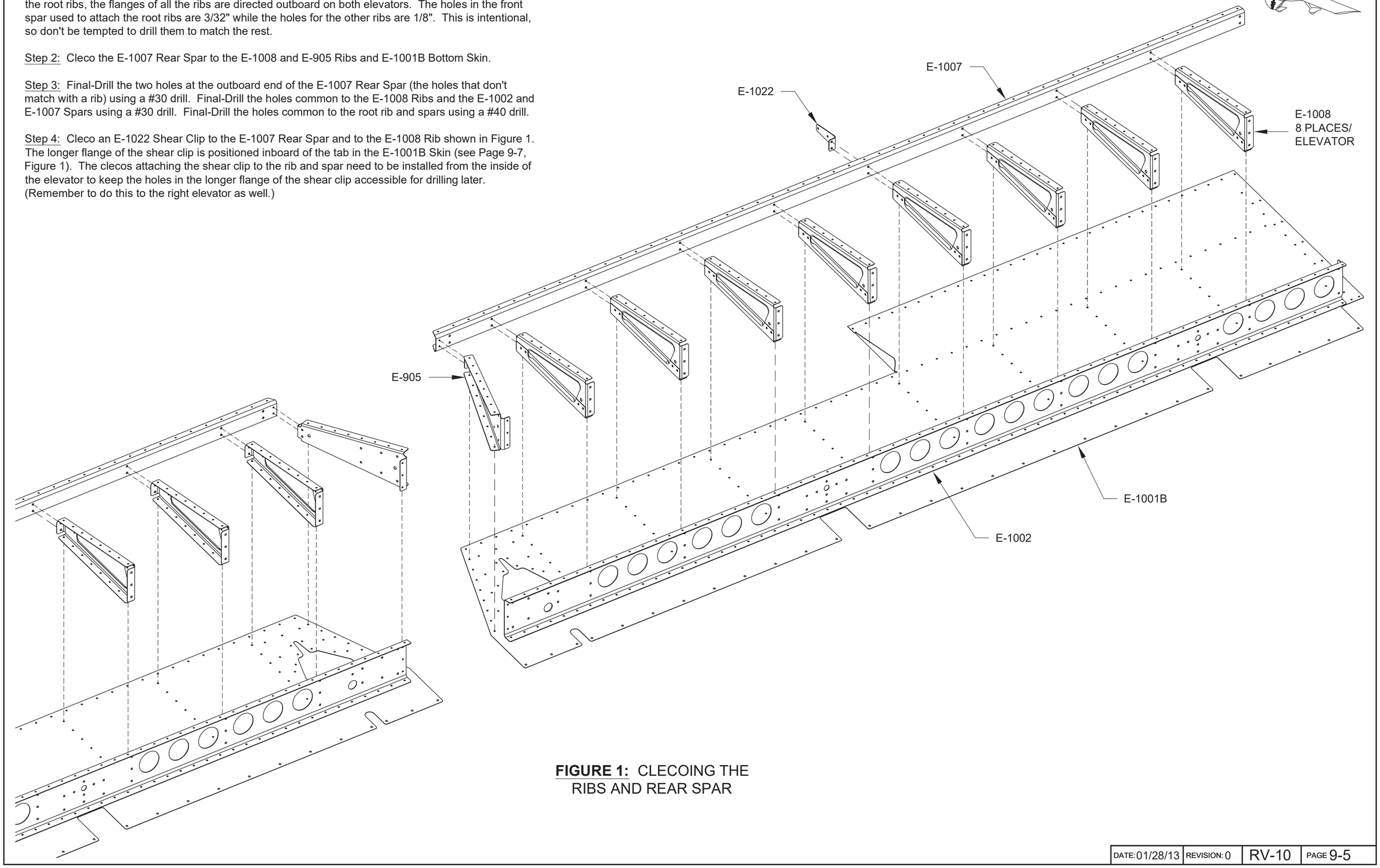


FIGURE 1: CLECOING THE RIBS AND REAR SPAR

Step 1: Cleco the E-615 Trim Access Reinforcement Plate to the E-1001B Bottom Skin on the left elevator and the E-1015 Trim Access Reinforcement Plate to the bottom skin on the right elevator as shown in Figure 1.

Step 2: Final-Drill the holes common to the reinforcement plates and skins, and the nutplate attachment rivet holes around the opening in the reinforcement plates, using a #40 drill.

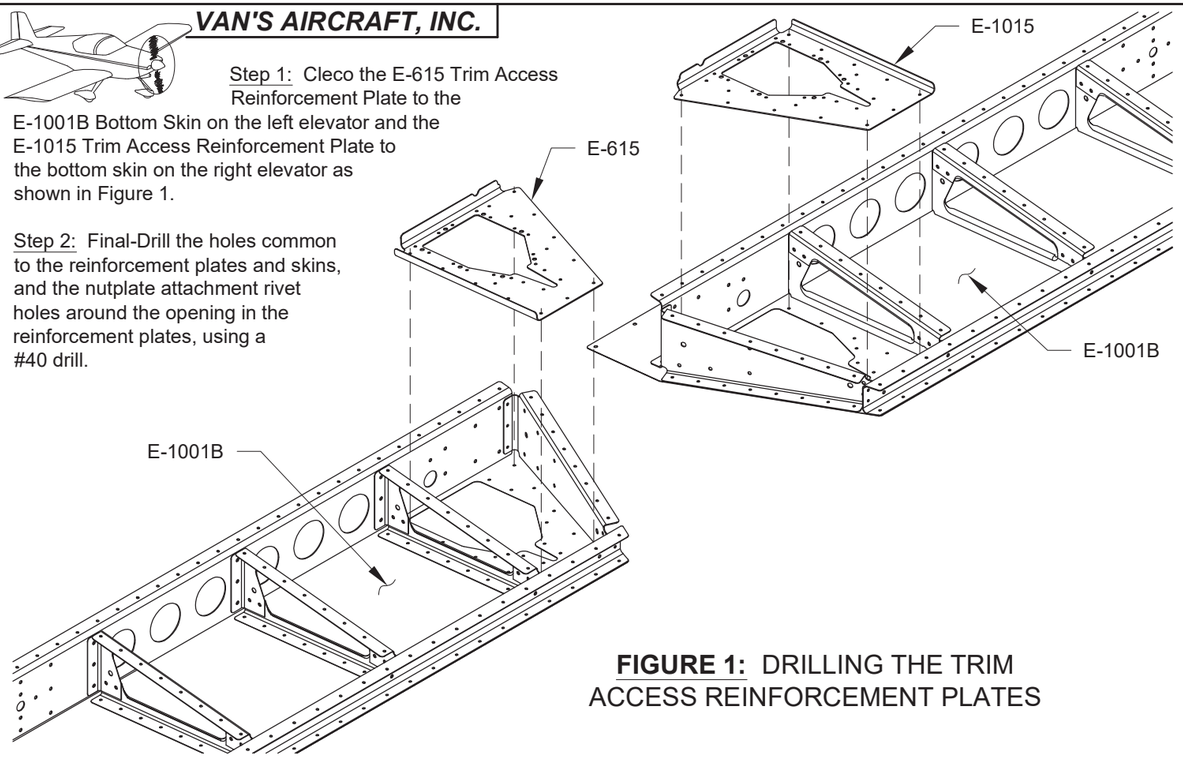


FIGURE 1: DRILLING THE TRIM ACCESS REINFORCEMENT PLATES

Step 3: Cleco the E-921 Elevator Gusset to the E-905 Root Rib and the E-1007 Rear Spar as shown in Figure 2. Adjust the angle of the gusset, if necessary, to fit the angle made by the rib and spar.

Step 4: Remove one of the clecos attaching the gusset to the rib, then final-drill the hole with a #30 drill. Install a cleco in this hole, final-drill the second hole with the same drill, and cleco.

Repeat the procedure for the attachment holes to the rear spar.

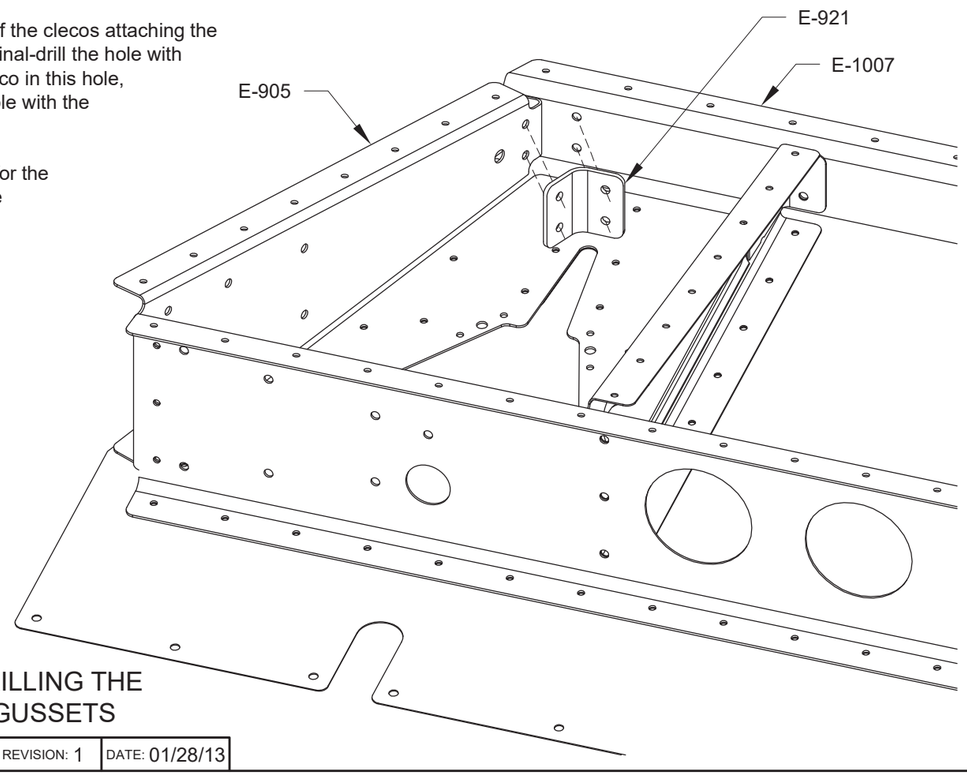


FIGURE 2: DRILLING THE ELEVATOR GUSSETS

Step 5: Cleco an E-1022 Shear Clip to the E-1007 Rear Spar as shown in Figure 3.

Step 6: Cleco the tip rib assembly (made up of the E-903 Outboard Tip Rib, the E-904 Inboard Tip Rib, and the E-913 Counterbalance Skin) to the E-1022 Shear Clip, the E-1002 Front Spar, and the E-1001B Bottom Skin. There are four holes which are used to attach the tip rib assembly to the front spar; two on the web of the outboard tip rib and two on the aft flange of the inboard tip rib.

Final-Drill the holes common to the tip rib assembly and shear clip, and the tip rib assembly and front spar using a #30 drill.

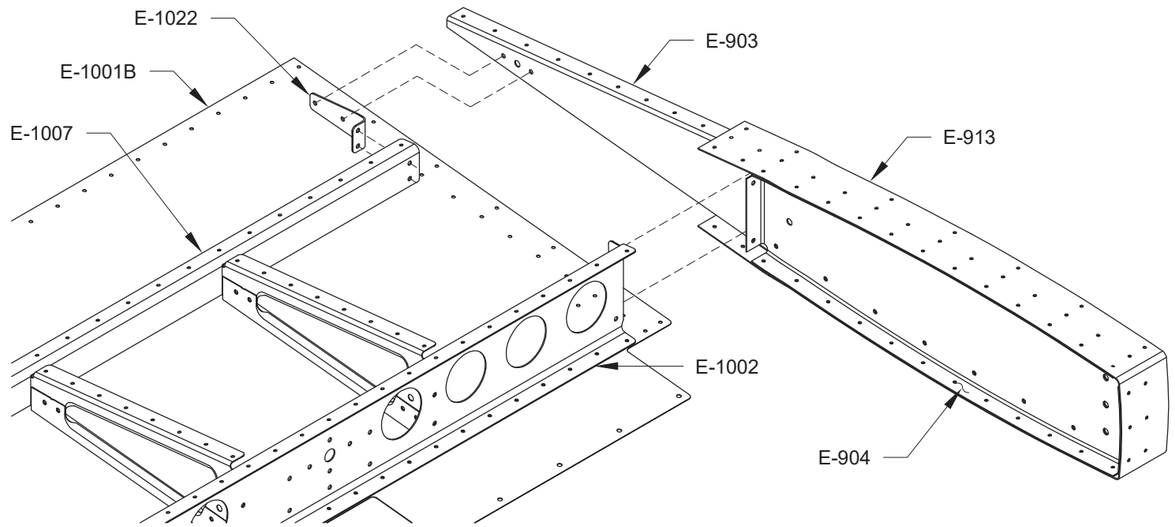


FIGURE 3: CLECOING THE TIP RIB ASSEMBLY

Step 7: Cleco the E-1001A Top Skin to the structure of the elevator as shown in Figure 4. The close out tab in the top skin is positioned between the E-1022 Shear Clip and the tab in the E-1001B Bottom Skin.

Step 8: Insert a VA-140 Trailing Edge wedge between the E-1001A Top Skin and E-1001B Bottom Skin. Align the end hole of the trailing edge wedge with the outboard hole in the trailing edge of the skins. Cleco in place, then mark the edges of one of the skins on the trailing edge wedge. Remove the trailing edge wedge, trim at the marks (it's now an E-1023), then cleco it back in place. The remaining, trimmed portion of the trailing edge wedge is used on the right elevator.

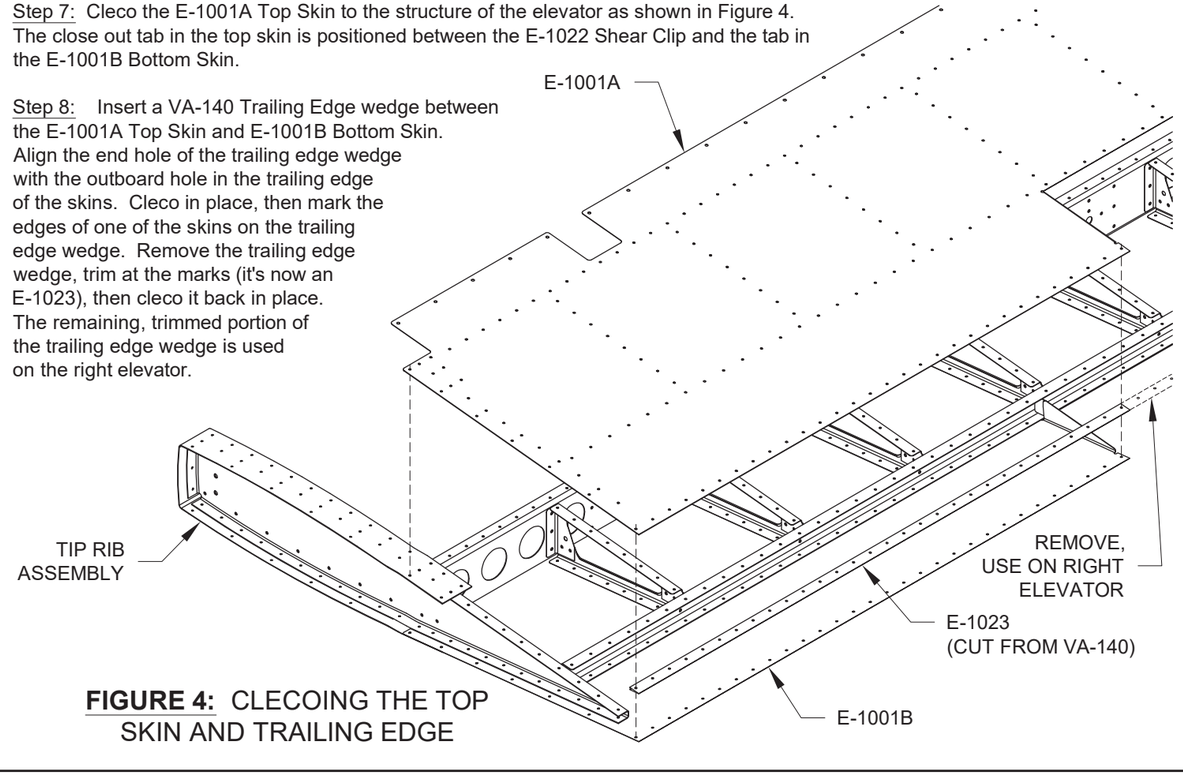


FIGURE 4: CLECOING THE TOP SKIN AND TRAILING EDGE

Step 1: Match-Drill the 1/8" hole in the close out tab of the E-1001A Top Skin into the tab of the E-1001B Bottom Skin using a #30 drill. Cleco this hole, then match-drill the two holes of the E-1022 Shear Clip into both skin tabs using the same drill.

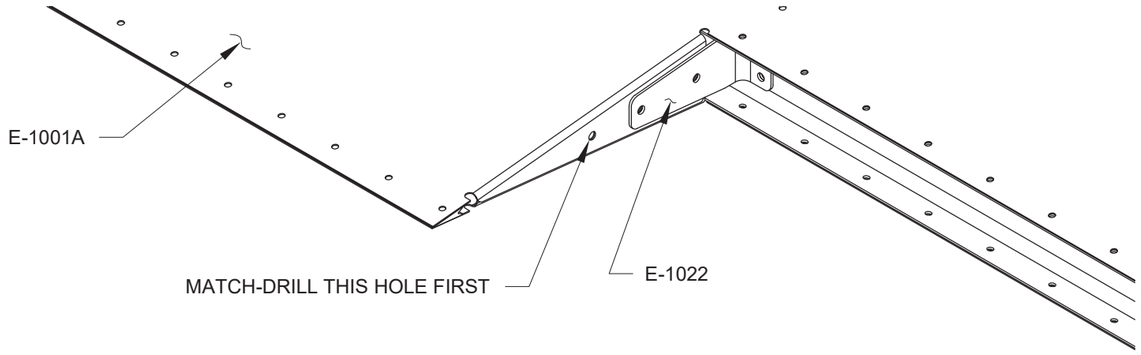


FIGURE 1: MATCH-DRILLING THE SKIN CLOSE OUT TABS

Step 2: Remove the clecos securing the E-905 Root Ribs to the E-1002 Front Spars. Cleco the WD-605-L-1 Left Elevator Horn and the WD-605-R-1 Right Elevator Horn to the root ribs and front spars of their respective elevators as shown in Figure 2.

Final-Drill the six holes common to the horns and front spars, and the six holes common to the horns and root ribs using a #30 drill.

Step 3: Final-Drill all the holes of the E-1001A & B Skins and the underlying structure using a #40 drill. When drilling the E-1002 Front and E-1007 Rear Spars, start drilling mid span and work toward the root and tip. Cleco each hole.

Final-Drill the holes for the F-1023 Trailing edge perpendicular to the chord line of the elevator, not perpendicular to the skins.

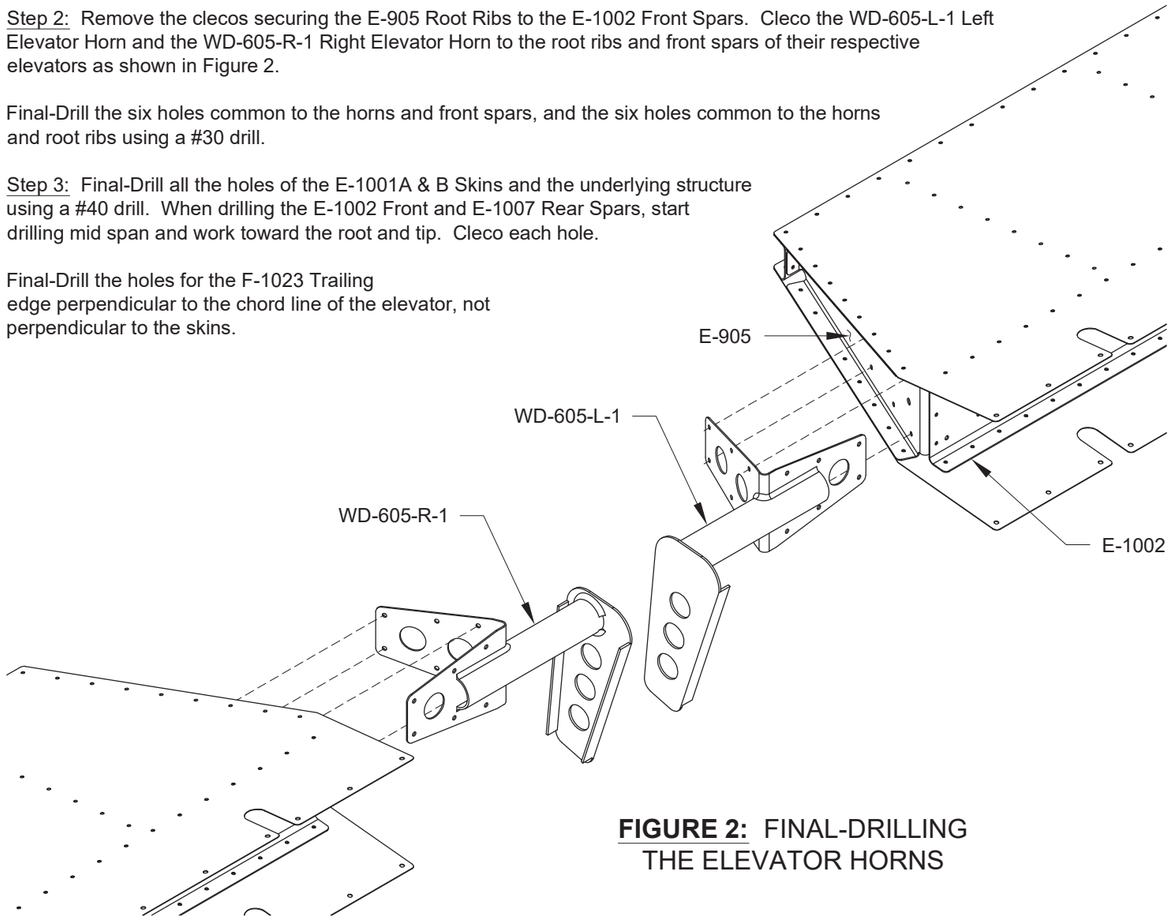


FIGURE 2: FINAL-DRILLING THE ELEVATOR HORNS

Step 4: Position the WD-415 Trim Cable Anchor Brackets on the two E-616 Cover Plates as shown in Figure 3. The brackets are located on opposite sides of the cover plates for the left and right elevators.

Drill four #30 holes, located approximately as shown, through the brackets and cover plates.

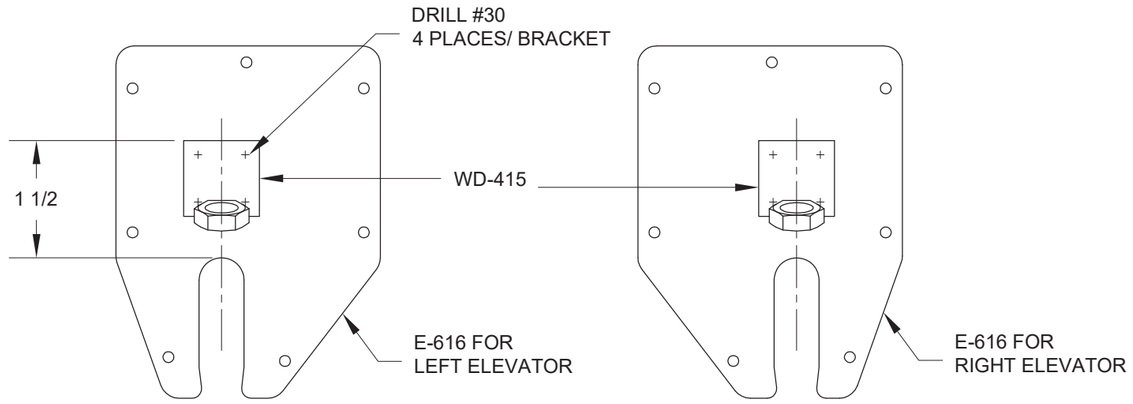


FIGURE 3: LOCATING AND DRILLING THE TRIM CABLE ANCHOR BRACKETS

Step 5: The attachment hardware for the E-616 Cover Plate is shown in Figure 4 for reference purposes. Dimple the cover plate for the screws and the E-615 Reinforcement Plate to accept the dimple in the cover plate.

Dimple all the #40 holes in the reinforcement plate for the dimples in the skin and for the 3/32" flush rivets used to attach the nutplates. The K1100 nutplates will accommodate the dimple for the screws in the reinforcement plate, but will have to be dimpled for the nutplate attachment rivets (see Section 5R).

Step 6: Repeat Step 5 for the E-1015 Reinforcement Plate and E-616 Cover Plate on the right elevator. (The dimple is on the opposite side of the cover plate on the right elevator.)

Step 7: Completely disassemble both elevators. Mark all the parts so that they can be reassembled in the same position. Make sure to mark the inside surface of the skins to prevent dimpling the holes in the wrong direction.

Step 8: Deburr all holes and any unfinished edges.

Step 9: Dimple the holes in the E-1001A & B Skins (don't forget the three holes in the close out tabs), and the E-913 Counterbalance Skin.

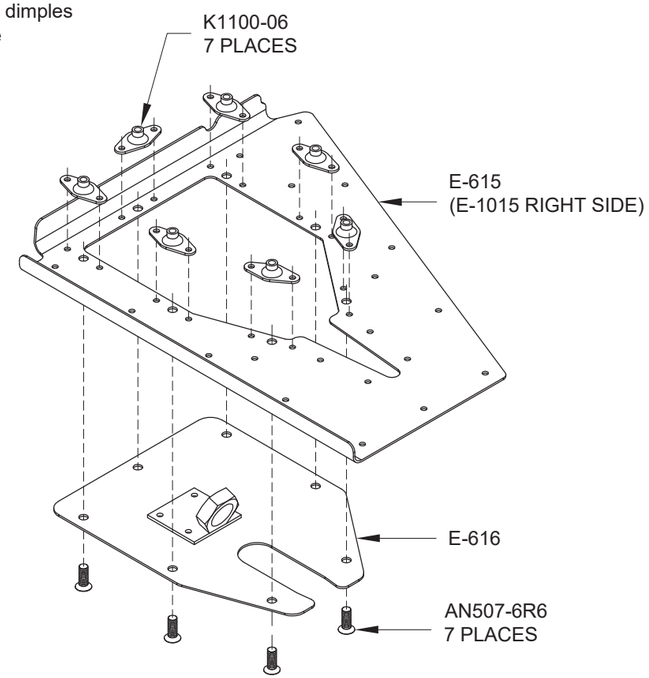


FIGURE 4: DIMPLING THE COVER AND REINFORCEMENT PLATES

Step 1: Dimple the holes in both flanges of the E-1002 Front Spars to accept the skin dimples.

Step 2: Machine countersink the inboard twenty-nine holes in the top flange (THE TOP FLANGE ONLY!) of the E-1007 Rear Spars to accept the skin dimples. See Figure 1. Machine countersinking these holes provides a flat surface on the underside of the flange to attach the trim tab hinge.

Dimple the remaining holes in both flanges of the rear spar.

Step 3: Dimple the three holes in the front spars and the two holes in the rear spars, which are used to attach the root ribs, for 3/32" flush rivets. Dimple flush the side of the spars indicated in Figure 1.

Step 4: Dimple the forward and aft flanges of the E-905 Root Ribs to accept the dimples made in the webs of the spars. Dimple the top and bottom flanges to accept the skin dimples.

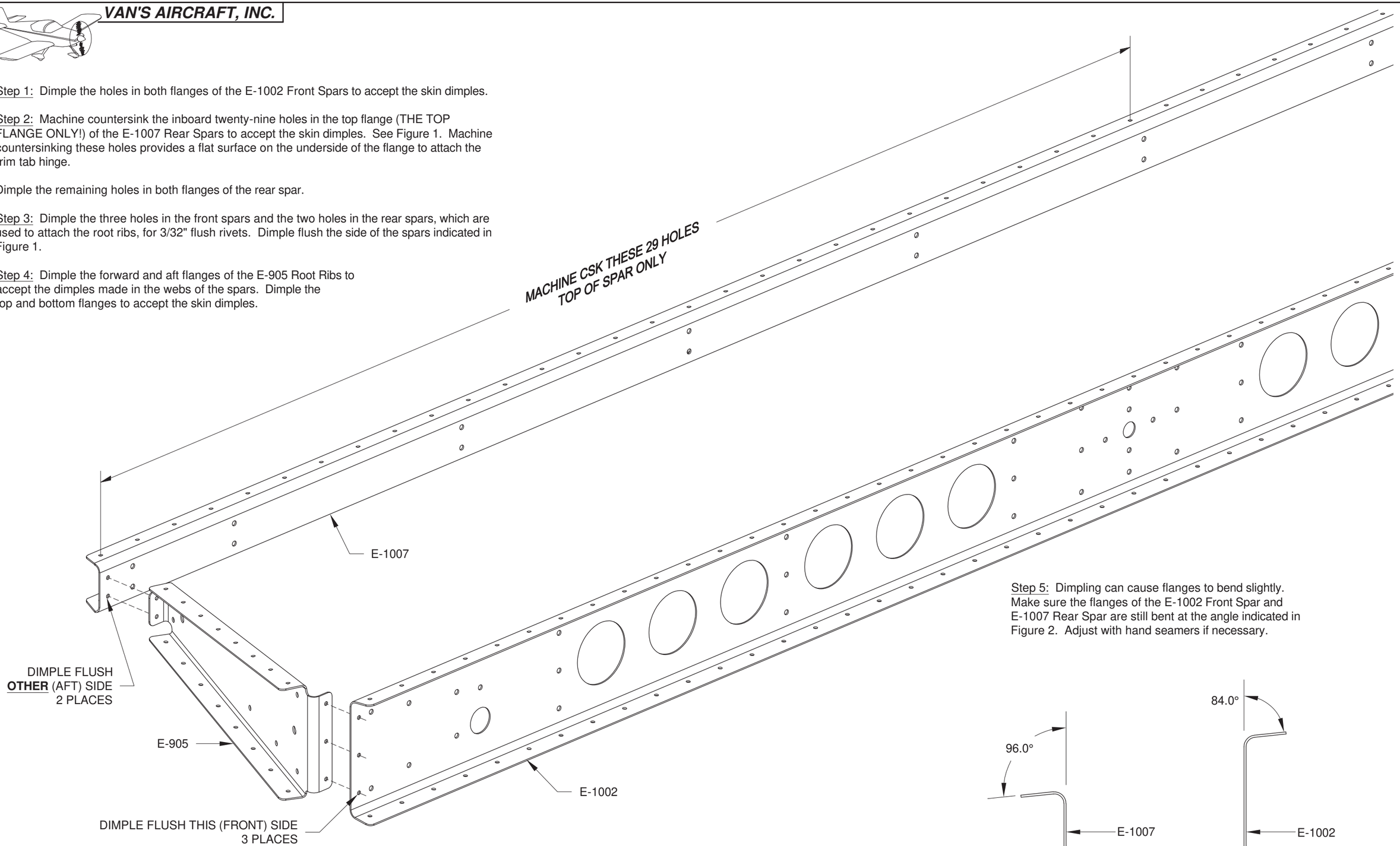


FIGURE 1: DIMPLING THE FRONT AND REAR SPARS

Step 5: Dimpling can cause flanges to bend slightly. Make sure the flanges of the E-1002 Front Spar and E-1007 Rear Spar are still bent at the angle indicated in Figure 2. Adjust with hand seamers if necessary.

FIGURE 2: CHECKING THE FLANGE ANGLES OF THE FRONT AND REAR SPARS

Step 1: Dimple the holes in the long flange of the inboard E-1022 Shear Clip for 1/8" flush rivets, flush on the side shown in Figure 1. (The shear clip attached to the E-903 Outboard Tip Rib does not need to be dimpled.)

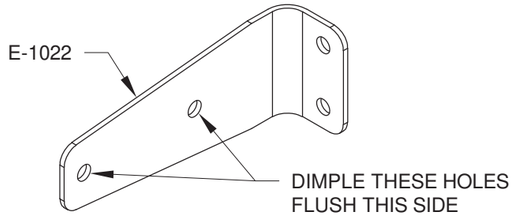


FIGURE 1: DIMPLING THE SHEAR CLIP

Step 2: Dimple the flanges of the E-1008A & B Rib halves, shown in Figure 2, to accept the dimples in the skins.

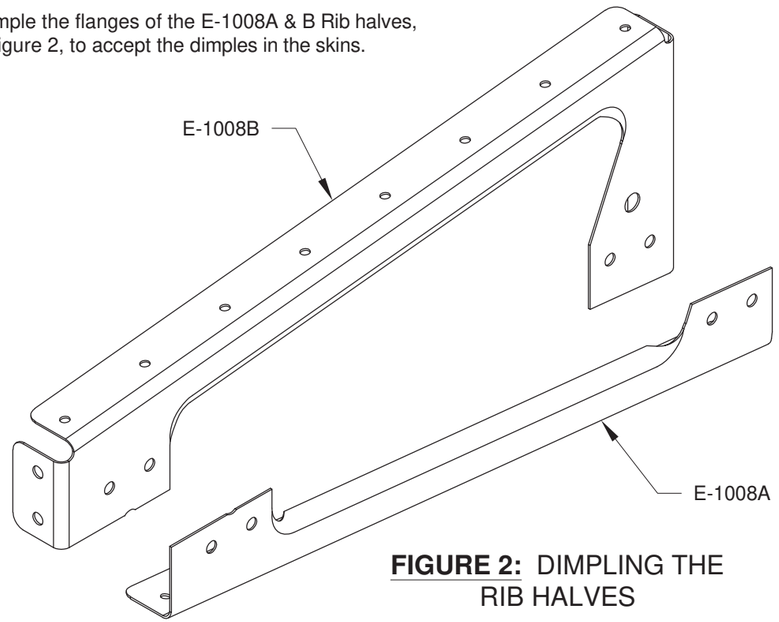


FIGURE 2: DIMPLING THE RIB HALVES

Step 3: Dimple the two holes, indicated in Figure 3, in the web of the E-904 Inboard Tip Rib for 1/8" flush rivets.

Dimple the corresponding holes in the E-903 Outboard Tip Rib for the dimples in the inboard tip rib.

Step 4: Dimple the top and bottom flanges of the E-903 and E-904 Tip Ribs for the skin dimples.

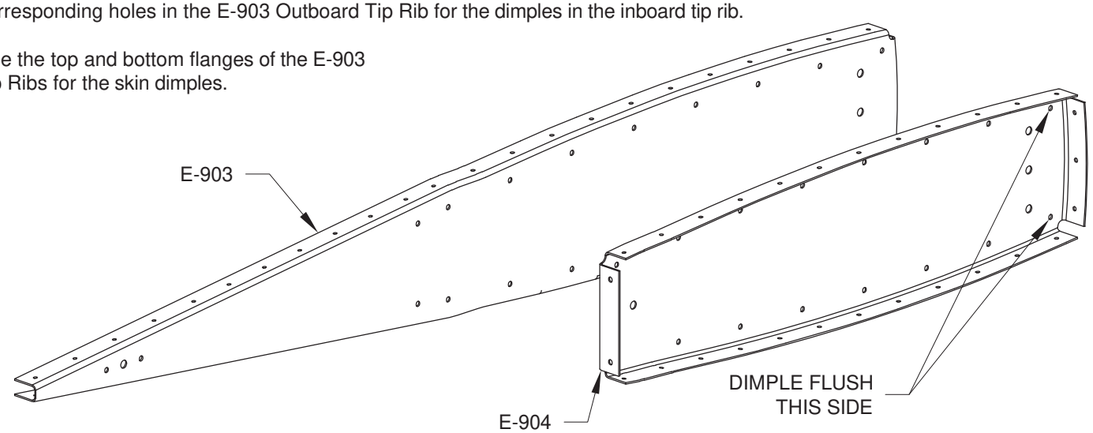


FIGURE 3: DIMPLING THE TIP RIBS

Step 5: Machine countersink the holes on both sides of the E-1023 Trailing Edge, shown in Figure 4, for the 3/32" dimples in the skins. Countersink perpendicular to the trailing edge face.

Step 6: Put a slight bend in the trailing edge of the E-1001A & B Skins so that they will lay down flat and tight on the E-1023 Trailing Edge after riveting (see Section 5).

Step 7: Foam ribs are bonded to the trailing edge of the E-1001A & B Skins in a later step. Fuel tank sealant is the bonding agent. A fillet of fuel tank sealant is also added where the bend radii of the E-1007 Rear Spar meets the E-1001A & B Skins.

Fuel tank sealant requires a clean, scuffed surface for proper adhesion. To accomplish this, mask the inside surfaces of the E-1001A & B Skins around the locations for the trailing edge ribs (the rib locations can be found on Page 9-15, Figure 4) and half an inch forward of the rows of rivet holes where the E-1007 Rear Spar will be attached.

Scuff the skins using 150 grit aluminum oxide sandpaper where the foam ribs will contact the skins. Scuff the skins just forward of the rear spar. Scuff the rear spar webs. See Figure 5. Clean the scuffed area with acetone until all sanding residue is removed. Remove the masking.

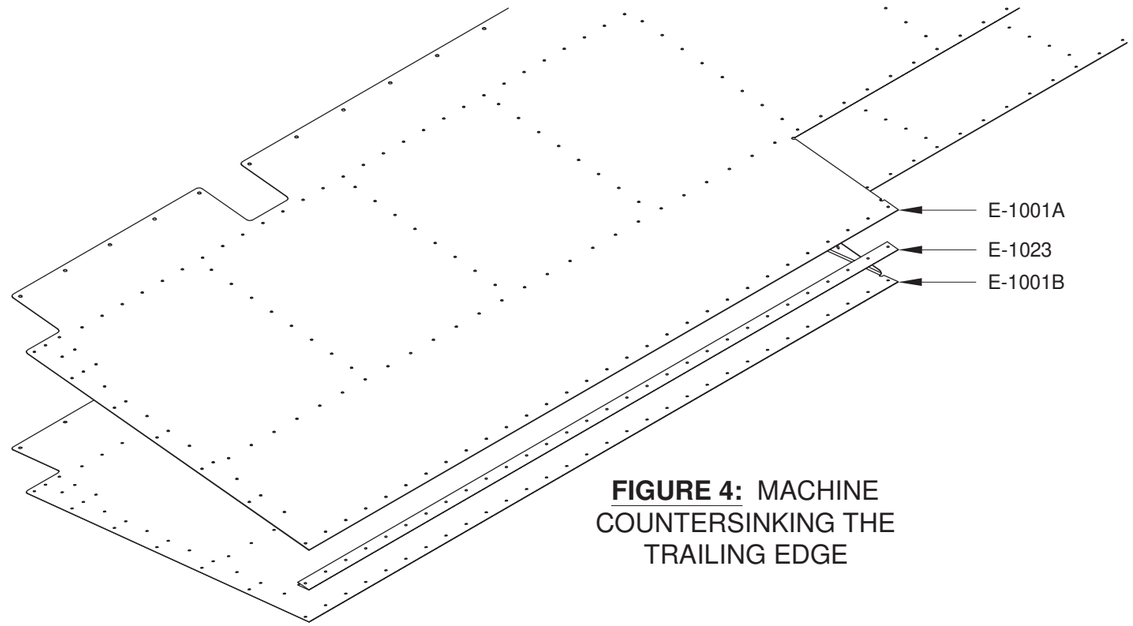


FIGURE 4: MACHINE COUNTERSINKING THE TRAILING EDGE

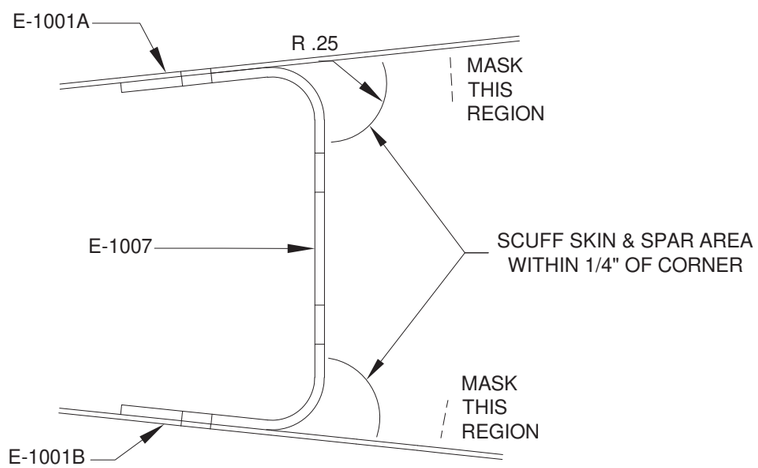


FIGURE 5: REAR SPAR SCUFFING LOCATIONS

Step 1: Clean and prime all parts as desired. If priming the interior surface of the elevator skins, first mask off the locations of the trailing edge foam ribs so that they will be bonded to bare aluminum.

Step 2: Rivet all the common 1/8" holes of the E-903 and E-904 Tip Ribs using the rivets called out in Figure 1.

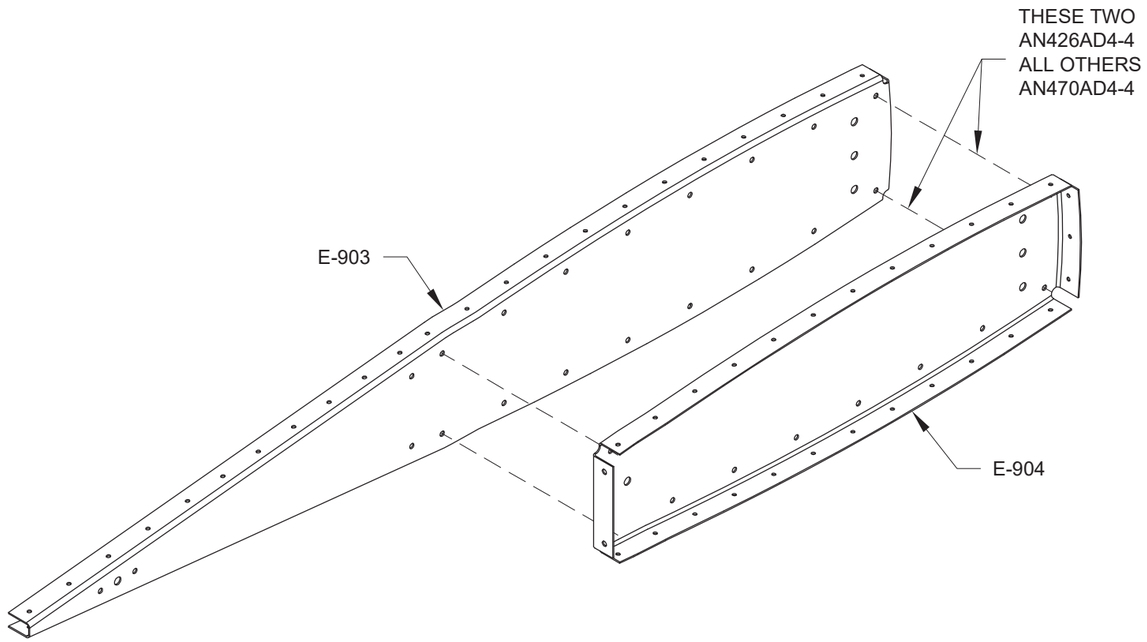


FIGURE 1: RIVETING THE TIP RIBS

Step 3: Rivet the E-913 Counterbalance Skin to the E-903 and E-904 Tip Ribs using AN426AD3-3.5 rivets. Start riveting with the center holes at the front of the skin and work your way back, around the top and bottom. Don't rivet the six holes at the ends of the counterbalance skin which are common to the E-1001A & B Elevator Skins.

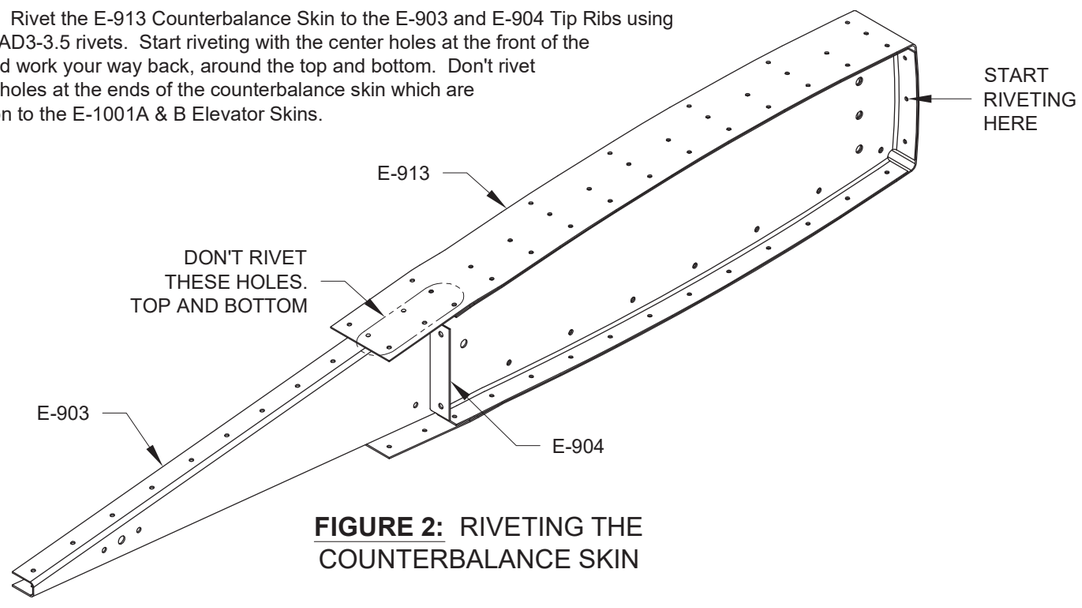


FIGURE 2: RIVETING THE COUNTERBALANCE SKIN

Step 4: Rivet the two E-910 Hinge Reinforcement Plates, and the associated nutplate, to both E-1002 Front Spars using the rivets called out in Figure 3.

Step 5: Rivet the E-905 Root Ribs to the E-1002 Front Spars with the rivets shown in the figure.

Step 6: Install the snap bushing, called out in Figure 3, into the hole indicated.

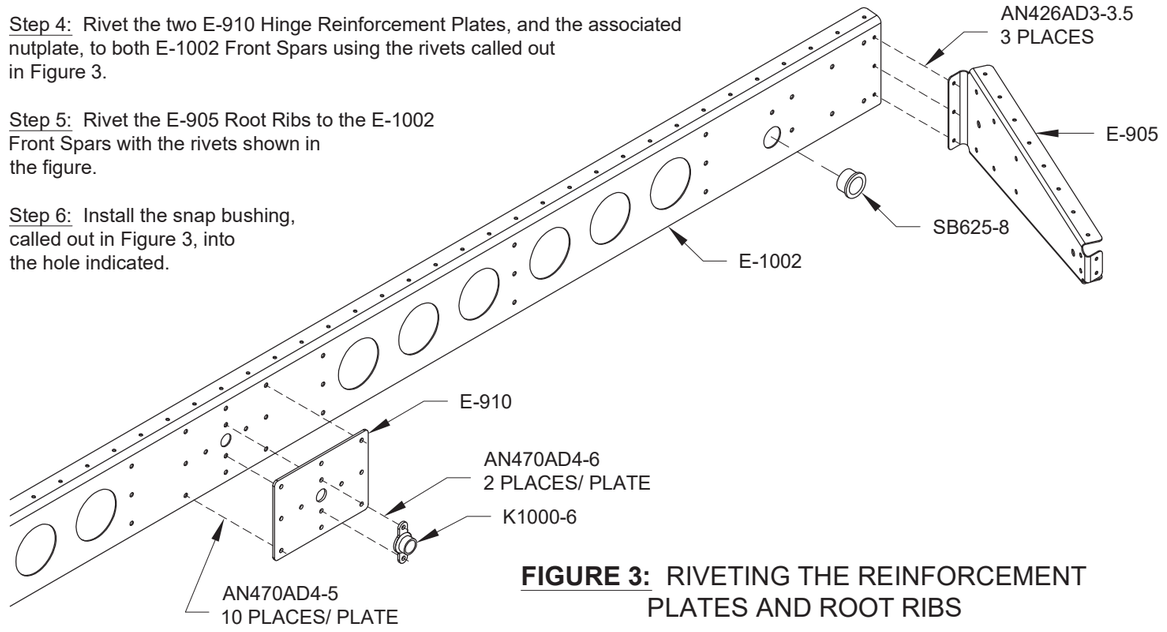


FIGURE 3: RIVETING THE REINFORCEMENT PLATES AND ROOT RIBS

Step 7: Rivet the WD-605-L-1 and WD-605-R-1 Elevator Horns to their respective E-1002 Front Spars and E-905 Root Ribs using the rivets shown in Figure 4.

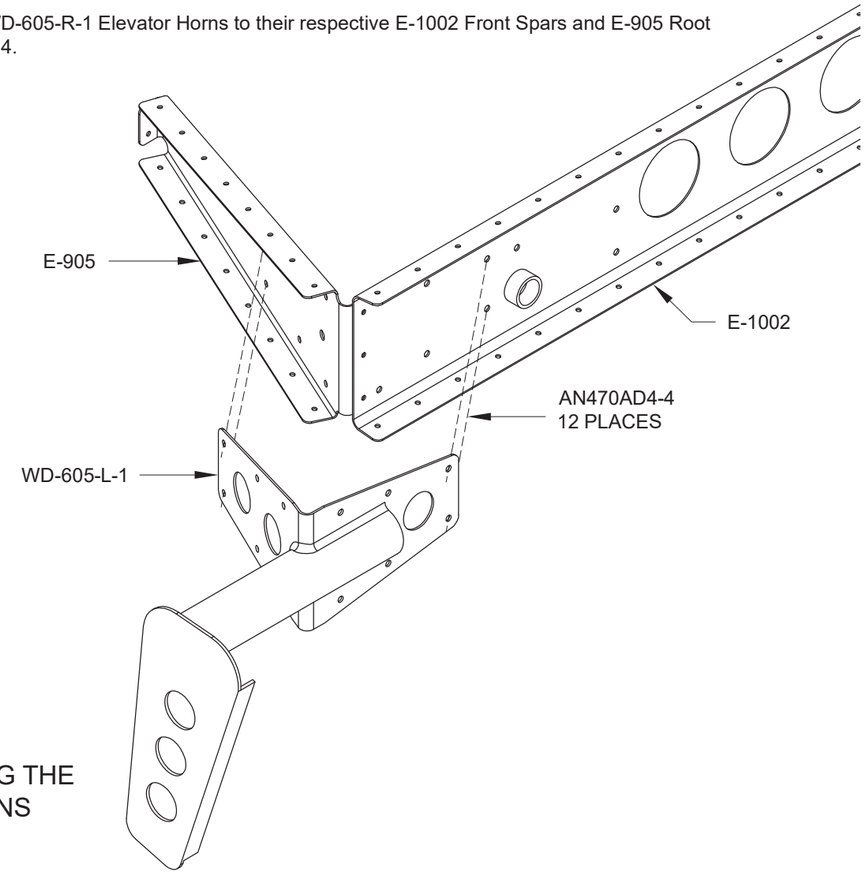


FIGURE 4: RIVETING THE ELEVATOR HORNS

Step 1: Rivet the nutplates to the E-615 and E-1015 Reinforcement Plates using the rivets called out on Page 9-21, Figure 2.

Step 2: Back rivet the E-615 and E-1015 Reinforcement Plates to the E-1001B Skins using the rivets called out in the blowup of Figure 1.

Step 3: Back rivet all the E-1008 Rib halves to the E-1001 Skins using the rivets called out on Page 9-21, Figures 1 & 2. The correct position of the rib halves on the skins is shown in Figure 1.

Step 4: Rivet the E-1007 Rear Spars to the aft flanges of the E-1008B Rib halves using the rivets shown in the figure. Include the two E-1022 Shear Clips, which share holes with the aft flange of the ribs, when riveting the spars. The spars are riveted to the skins on the next page.

Step 5: Rivet the remaining E-1022 Shear Clips to the outboard end of the E-1007 Rear Spars.

Step 6: Rivet the E-921 Elevator Gussets to the inboard end of the E-1007 Rear Spars.

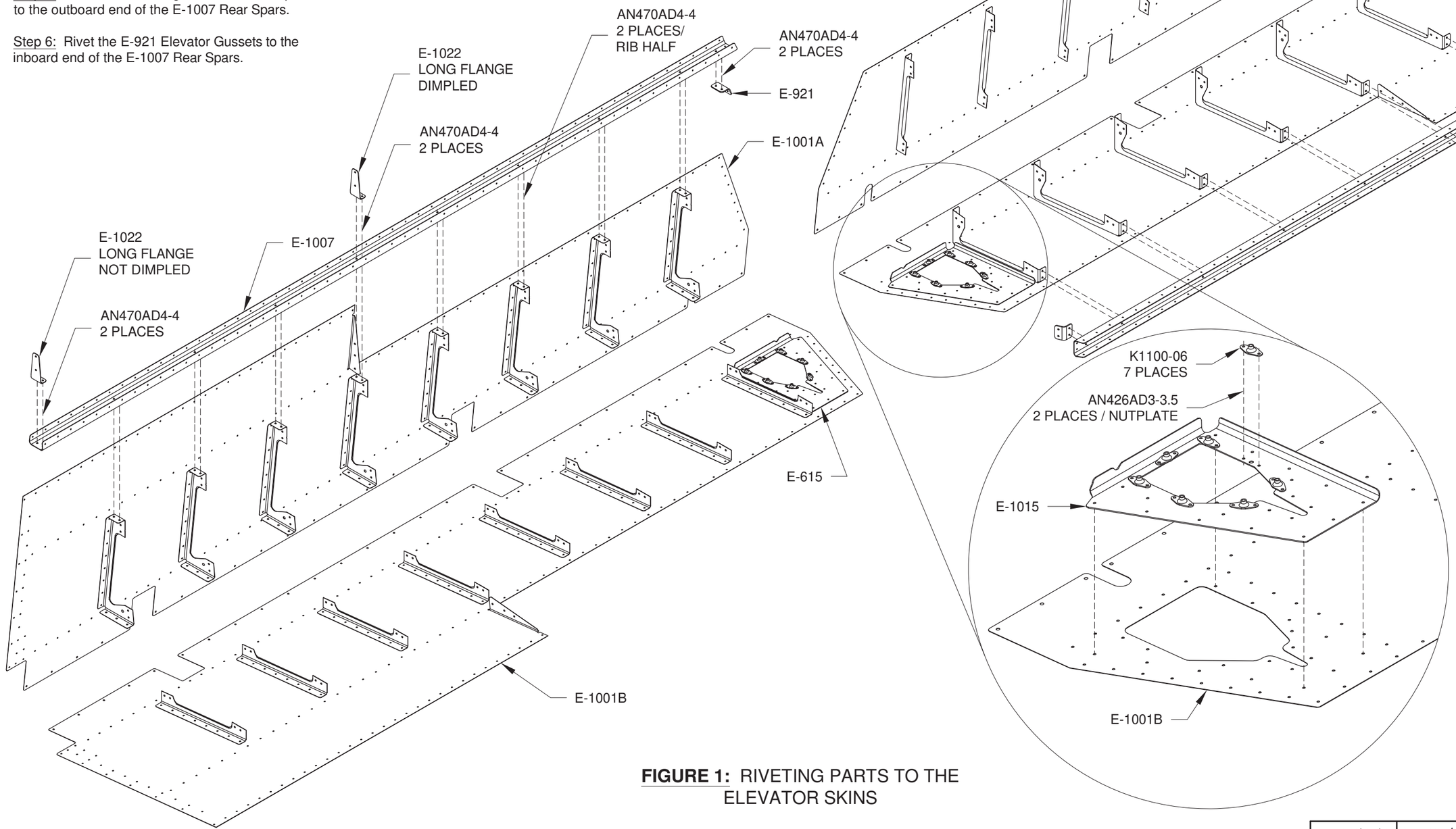


FIGURE 1: RIVETING PARTS TO THE ELEVATOR SKINS

Step 1: Rivet the E-1007 Rear Spar to the E-1001B Bottom Skin on the right elevator (see Page 9-11 for part reference) using the rivets called out on Page 9-21, Figure 2. The portion of the rear spar along the trim tab cut-out (the area that doesn't have the skin hanging beyond the spar) can easily be riveted with a rivet squeezer. Riveting the rest of the spar requires some set-up work. Turn the elevator over on a work bench, align the edge of the rear spar flange with the edge of the bench, then spring clamp the spar flange to the work bench (see Figure 1). You can then reach under the skin with a bucking bar and rivet the spar.

Step 2: Similarly, on the left elevator, rivet the E-1007 Rear Spar to the E-1001A Top Skin using the rivets called out on Page 9-21, Figure 1. Here, however, don't install the squeezed rivets along the spar in the area of the trim tab cut-out. This is the portion of the spar to which the trim tab hinge is attached later.

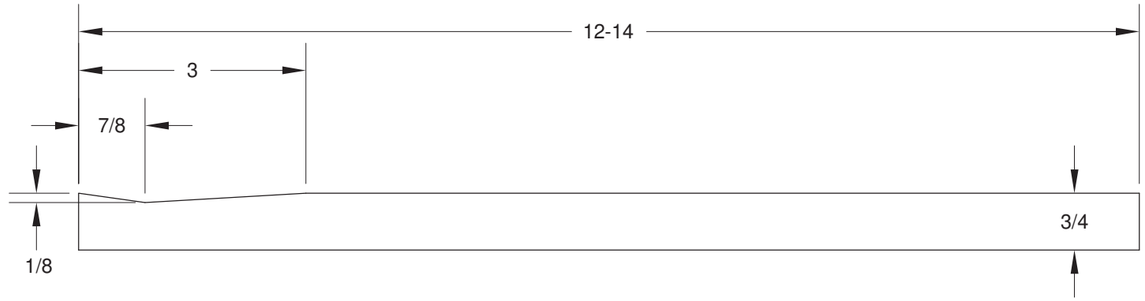


FIGURE 2: BUCKING BAR DIMENSIONS

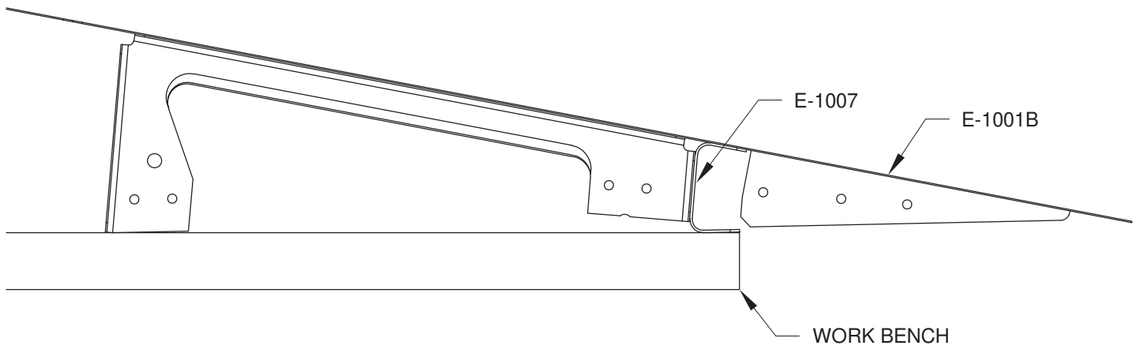


FIGURE 1: RIVETING THE RIGHT ELEVATOR REAR SPAR TO SKIN

NOTE: Riveting the second skin to the elevator rear spar (Steps 3-5) requires making a special bucking bar. If you prefer not to make the bucking bar, it is acceptable to substitute MK-319 blind rivets for the solid rivets. The blind rivets are not supplied in the kit, but can be purchased through Van's Aircraft.

Step 3: Make the bucking bar shown in Figure 2. It should be at least one inch wide.

Step 4: Position the second E-1001 Skin in place on both elevators. Make sure the E-1008 Rib halves are positioned as shown in Page 9-13 Figure 3, then cleco the skin to the E-1007 Rear Spar and cleco the rib halves to each other.

Step 5: Rivet the second flange of the E-1007 Rear Spar to the E-1001B Bottom Skin of the left elevator. (Rivet the skin of the left elevator first to give you some practice before riveting the more visible top skin on the right elevator.) Position the elevator on the work bench, as shown in Figure 3, with the edge of the work bench extending slightly beyond the elevator trailing edge. Insert the bucking bar made in Step 3 between the skins, and, with the bar resting on the edge of the work bench, rivet the spar to the skin using the rivets called out on Page 9-21, Figure 2.

Repeat Step 5 (using the rivets called out on Page 9-21, Figure 1) for the second flange of the rear spar and the E-1001A Top Skin of the right elevator.

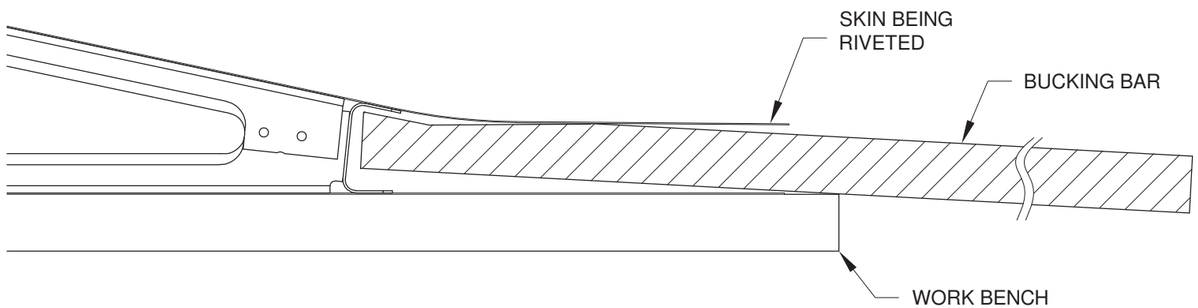


FIGURE 3: RIVETING THE REAR SPARS TO THE SKINS

Step 1: Cut a 12 inch segment of AT0-035X3/8 (or similar) aluminum tube. On one end of the tube, bend the last 1" to 2" to 45°. Attach the long end of the tube to a fuel tank sealant container/dispenser, such as the nozzle of an MC-236-B1/2 Flamemaster Integral Fuel Tank Sealant injection kit, using a strong tape and/or adhesive.

Deburr and radius the outer edge of the opening on the bent end of the aluminum tube, to minimize the chance of the tube edge scratching the surfaces during Step 2.

Step 2: Apply fuel tank sealant to the upper and lower corners where the E-1007-1 Rear Spar meets the E-1001A Top Skin and E-1001B Bottom Skin using the 3/8" aluminum tube.

Use the bend at the tip to keep the end of the tube approximately parallel to the surface of the skins and to the rear spar.

As sealant is released from the end of the tube, slide the dispenser and tube so as to push the tube towards its opening, towards the bead of sealant being released. This causes the edge of the tube opening to form a radius fillet of sealant in the corner between the rear spar and the skin. See Figure 1.

It is recommended that sealant be applied to one half of a rib bay while pushing the tube from one direction, then applied to the other half while pushing the tube from the other direction. See Figure 2.

It is not necessary to apply sealant in the area within 1/2" of the E-1008A&B rib halves.

NOTE: Minimize the application of excess fuel tank sealant. Squeeze out sealant slowly, so that the bead ahead of the tube is only slightly wider than the tube itself. See Figure 1.

Step 3: Trim the end of a wooden rod to a sharp, flat, spatula-like wedge. Use it to scrape off excess sealant which might have been applied beyond the fillet. See Figure 1.

NOTE: Wait for the sealant to cure before performing Step 4.

Step 4: Rivet the E-1008A&B Rib halves together, with blind rivets, through the four holes common to each rib set as shown in Figure 3. If you have very large hands you may find installing the aft two rivets in each rib set challenging. You can either enlist a helper that has smaller hands, or use tubes or pipes slipped on the rivet tool's handles to extend them. Occasionally the rivet doesn't fully set with one stroke of the handles. Because it is very difficult to reposition the tool when setting the aft two rivets, you can use a small tool made from .063 scrap, shown in Figure 4, as a spacer. To finish setting the rivet, release the handles, slip the tool between the rivet puller and the rivet's head, and finish squeezing.

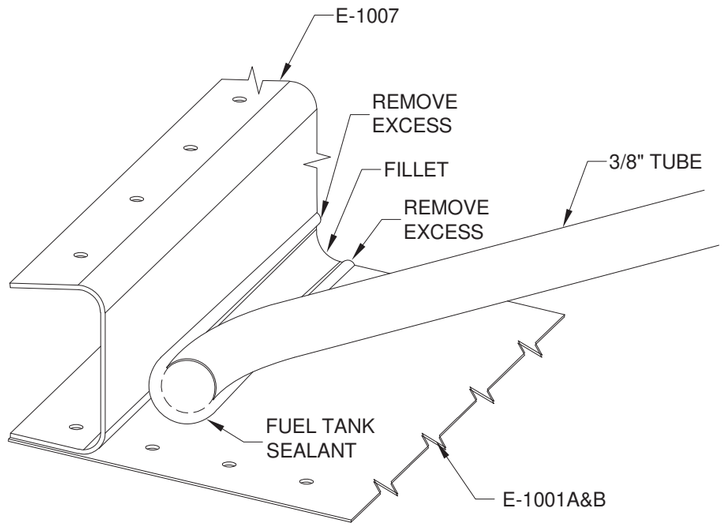


FIGURE 1: SEALANT FILLET

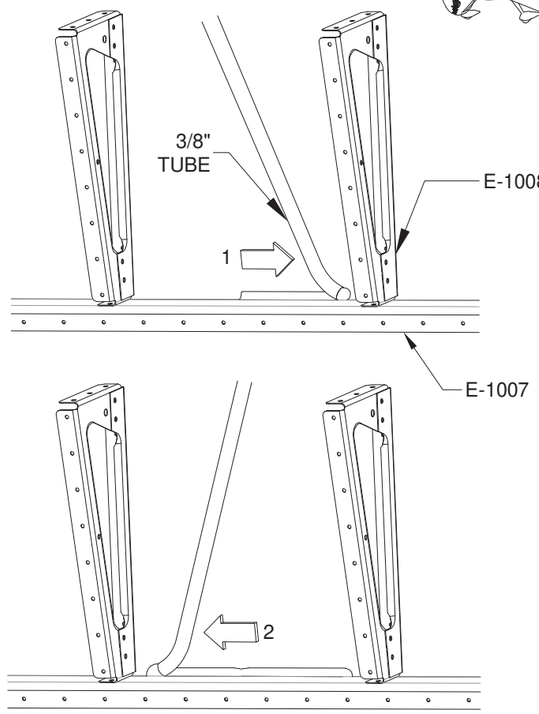


FIGURE 2: SEALANT APPLICATION

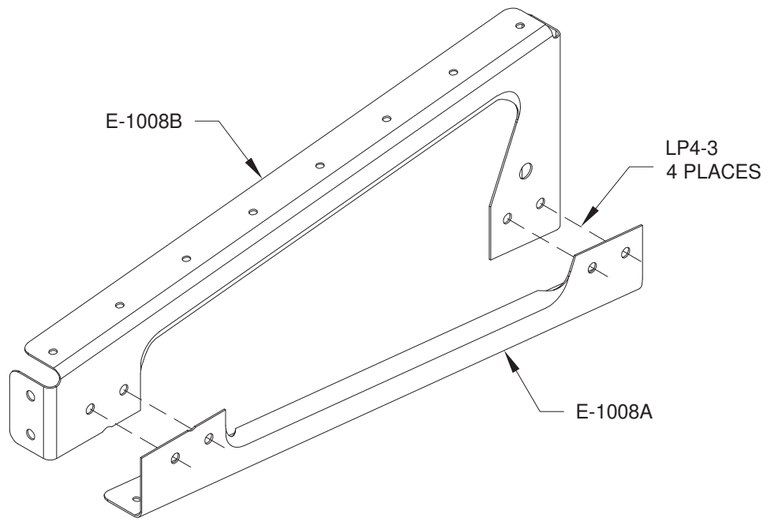


FIGURE 3: RIVETING THE RIB HALVES

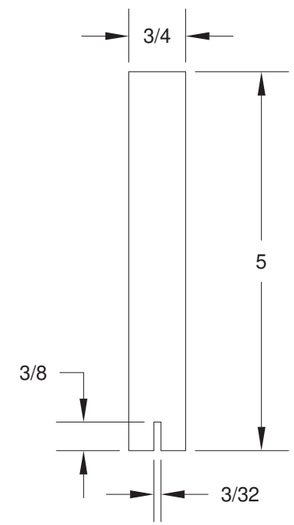


FIGURE 4: SPACING TOOL

Step 1: Cleco the left and right front spar assemblies to the E-1008 Ribs and E-1001 Skins as shown in Figure 1.

Step 2: Rivet the E-1002 Front Spar to the forward E-1008 Rib flanges using the rivets called out in the figure.

Step 3: Place the elevators on a flat work surface with the clecos securing the E-1001 Skins to the E-1002 Front Spars hanging over the edge. Rivet the skins to the spars using the rivets shown on Page 9-21, Figures 1 & 2. For the time being, however, leave out the rivets in the spar flanges outboard of the outboard most E-1008 Rib and inboard of the inboard most rib. Not installing these rivets leaves the outboard and inboard sections of the elevators accessible for riveting the E-903 and E-904 Tip Ribs and the E-921 Elevator Gusset.

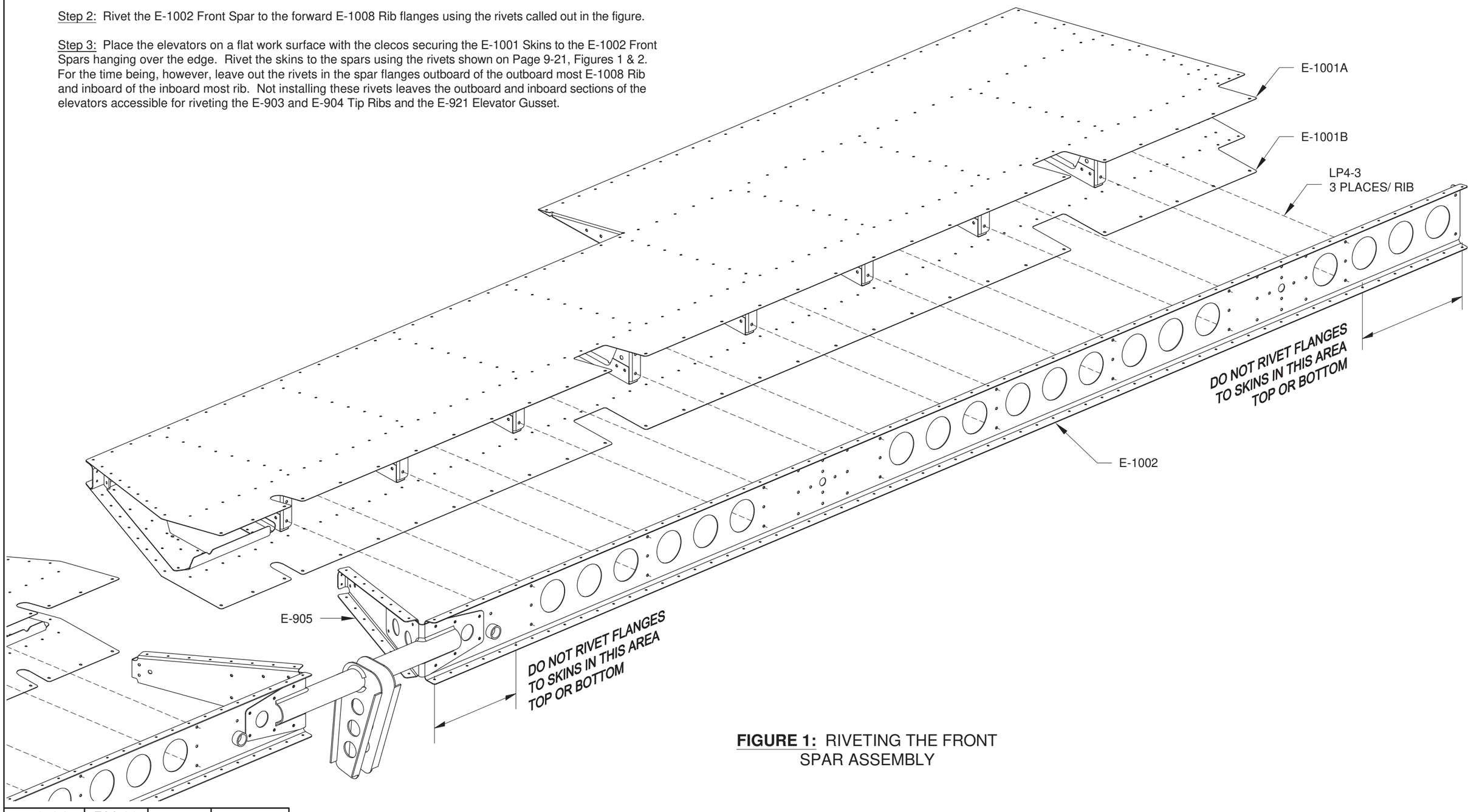


FIGURE 1: RIVETING THE FRONT SPAR ASSEMBLY

Step 1: Rivet the aft flange of the E-905 Root Rib to the E-1007 Rear Spar using the rivets shown in Figure 1.

Step 2: Remove clecos and lift the corner of one of the E-1001 Skins to gain access to the E-921 Elevator Gusset (not visible in the figure). Using the rivets shown, rivet the gusset to the root rib web.

Step 3: On this end of the elevator, rivet the E-1001 Skins to the flanges of the E-905 Root Rib and E-1002 Front Spar using the rivets shown on Page 9-21, Figures 1 & 2.

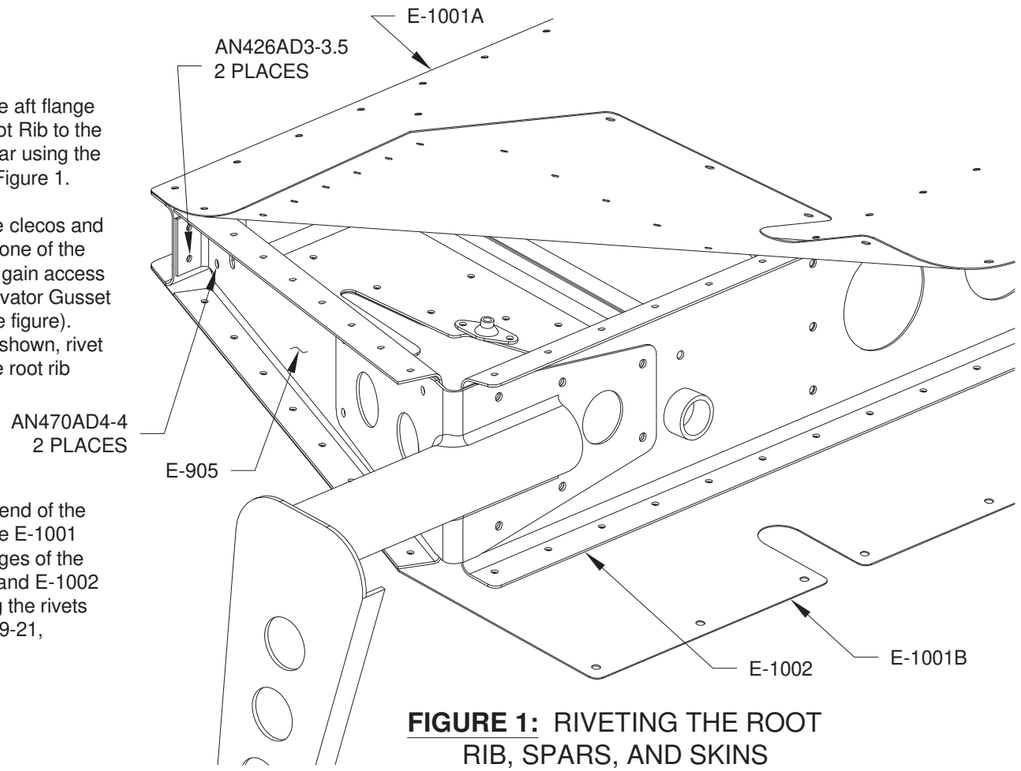


FIGURE 1: RIVETING THE ROOT RIB, SPARS, AND SKINS

Step 4: The elevator is shown upside down in Figure 2. Cleco the tip rib assembly to the elevator, then rivet the assembly to the E-1022 Shear Clip using the rivets called out in the figure. Access to the clip can be gained from between the skins at the trailing edge.

Step 5: Remove the clecos required to lift the corner of the E-1001B Bottom Skin to gain access to the back of the E-1002 Front Spar. Rivet the tip rib assembly to the front spar using the rivets shown in the figure.

Step 6: The rivets used in this step can be found on Page 9-21, Figures 1 & 2. Rivet the E-1001A Top Skin to the flange of the E-1002 Front Spar. Rivet the skin to the E-913 Counterbalance Skin and the flange of the E-903 Outboard Tip rib. Don't rivet to the flange of the tip rib aft of the rear spar; the E-1023 Trailing Edge still needs to be inserted. The two holes common only to the counterbalance skin and elevator skin (the same holes that blind rivets are called for in the figure for the E-1001B Bottom Skin) can be accessed in the E-1001 Top Skin for solid riveting at this point.

Repeat this step for riveting the E-1001B Bottom Skin to the front spar and tip rib assembly. Remember not to rivet the skin to the outboard tip rib aft of the rear spar. The two holes which call for blind rivets in the figure, will need to be final-drilled with a 7/64" drill.

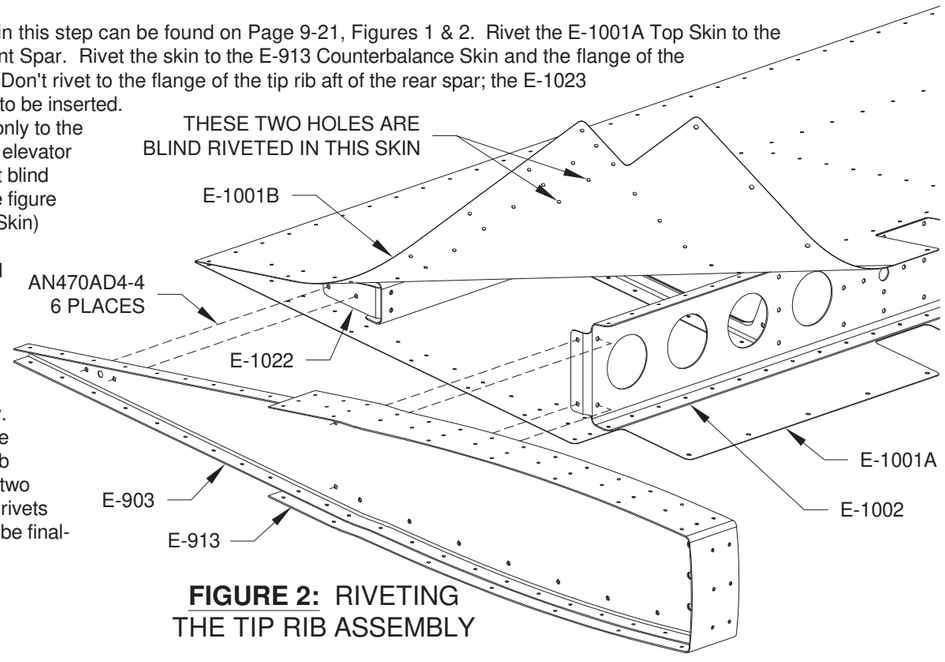


FIGURE 2: RIVETING THE TIP RIB ASSEMBLY

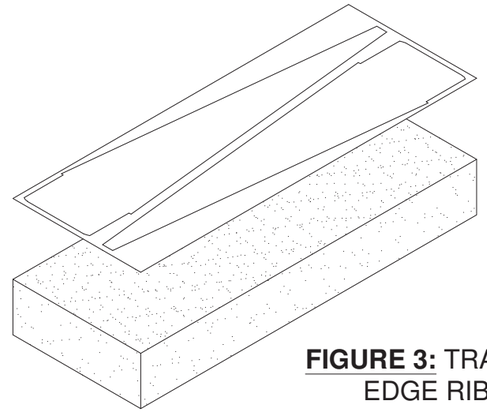


FIGURE 3: TRAILING EDGE RIBS

NOTE: The trailing edge of the elevators will be bonded and riveted like the rudder trailing edge in Section 7, except that the two foam ribs are bonded in place as well.

Step 7: Cut four trailing edge ribs from the two PVC-750 X 2 X 5.25 blocks supplied in the kit. Glue the templates, found on the last page of this section, onto the foam blocks using a spray adhesive. Cut the ribs from the blocks (a band saw works well here), then use a sanding block to finish the edges exactly to the template lines.

Step 8: Apply a thin (no more than 1/32") coat of tank sealant (mix by follow the directions on the can) to the surfaces of the trailing edge ribs that contact the skins and rear spar. Insert the ribs in place between the skins.

The skins will no longer be separated, so make sure the close out tab on the top skin is "sandwiched" between the close out tab on the bottom skin and the E-1022 Shear Clip.

Step 9: Apply a thin coat of tank sealant to both surfaces of the E-1023 Trailing Edge, then cleco it in position between the skins as shown in Figure 4.

Step 10: Place the elevators on a flat workbench with the trailing edge clecos hanging just over the edge. Place a 5" - 6" wide board on top of the elevators, with the edge of the board resting against the clecos. Place weights over the trailing edge ribs to ensure a good bond, and distribute enough weights along the board to hold the trailing edge flat against the workbench. Allow the sealant to cure for a couple of days before continuing.

Step 11: After curing, remove the clecos from the trailing edge and clear the holes of any sealant with a drill spun with your fingers.

Step 12: Use the instructions for riveting the rudder trailing edge in Section 7, Page 7-11, Step 1 as a guide for riveting the elevator trailing edge. The rivets for the trailing edge are called out on Page 9-21, Figure 1.

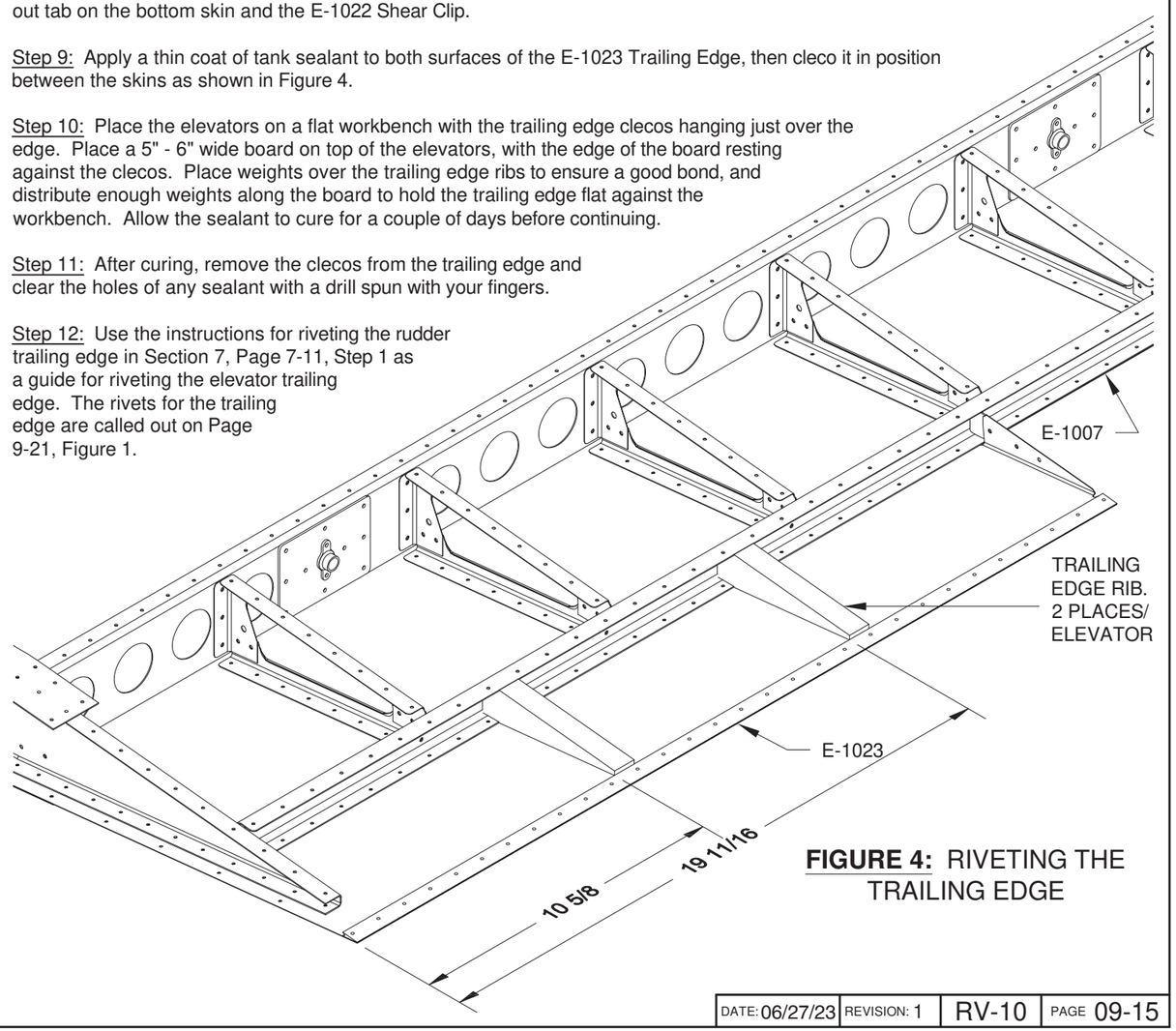


FIGURE 4: RIVETING THE TRAILING EDGE

Step 1: Finish riveting the E-1001 Skins to the flanges of the E-903 Outboard Tip Rib, aft of the rear spar, using the rivets called out on Page 9-21, Figure 1 & 2.

Step 2: Rivet the E-1022 Shear Clip to the close out tabs in the E-1001 Skins using the rivets shown in Figure 1. Install a blind rivet in the remaining hole in the close out tabs aft of the shear clip.

Step 3: Make a slight bend along the leading edge of the E-1001A Top Skin so it lays flush on the E-1001B Bottom Skin after rolling and riveting.

Step 4: Roll the leading edge of the E-1001 Skins in the same way as the rudder. Again, use a 1-1/4" diameter pipe, and begin by rolling the section of the leading edge closest to the tip ribs.

Step 5: Cleco the leading edge together with the E-1001A Top Skin on top of the E-1001B Bottom Skin, then final-drill the holes along the leading edge with a #30 drill.

Step 6: Secure the leading edge with the rivets shown on Page 9-21, Figure 1.

NOTE: The portion of the rear spar's top flange along the trim tab cutout (on both elevators) is riveted when the trim tab is attached.

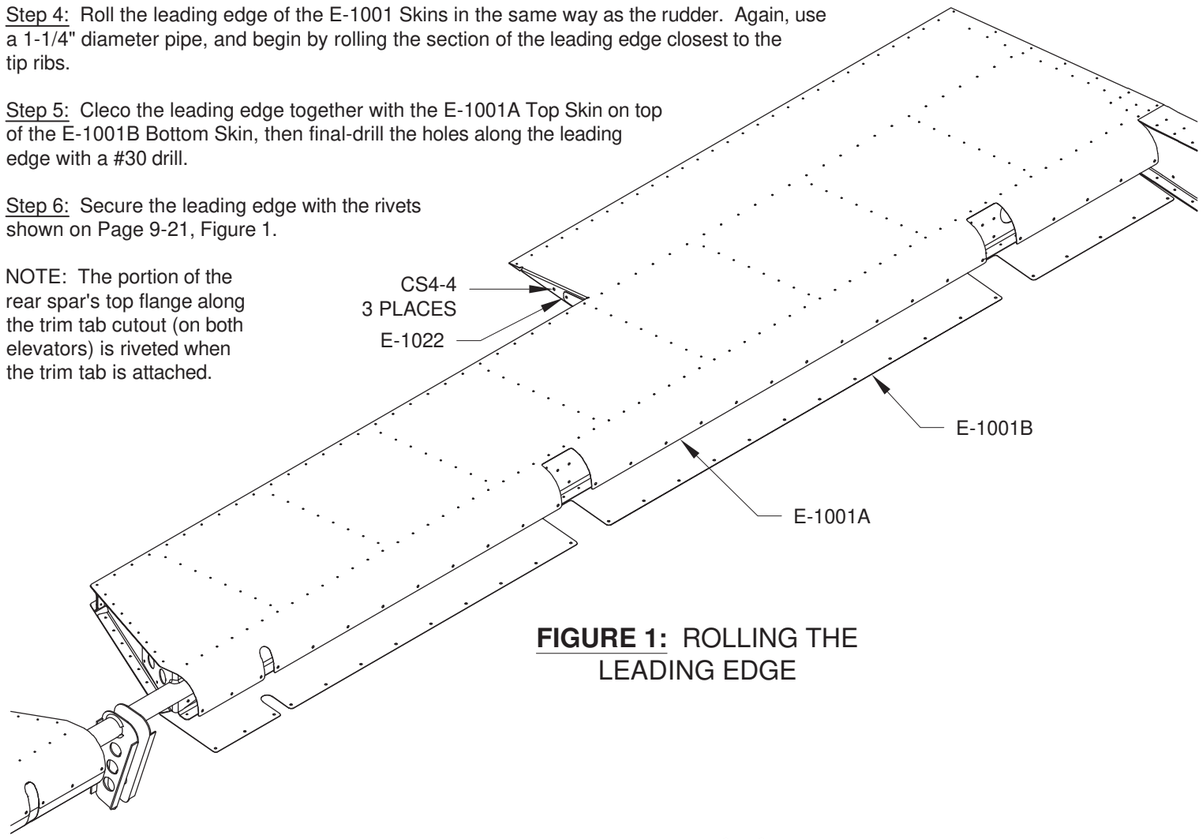


FIGURE 1: ROLLING THE LEADING EDGE

Step 7: Rivet the two WD-415 Trim Cable Attachment Brackets to their corresponding E-616 Cover Plates using the blind rivets called out in Figure 2. Place the head of the rivet on the cover plate.

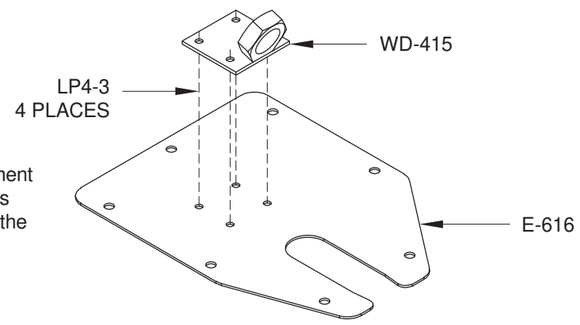


FIGURE 2: RIVETING THE TRIM CABLE ANCHOR BRACKETS

Step 8: Remove the material indicated by the shaded areas in Figure 3 from all four E-614 Counterweights. Notice that the two holes are closer to the bottom edge in the drawing, so be sure to trim the weight accordingly.

On two of the counterweights (one per elevator), remove the shaded area as shown in Figure 4, which consists of 75% of the raised thickness. This will leave 1/32" of raised material.

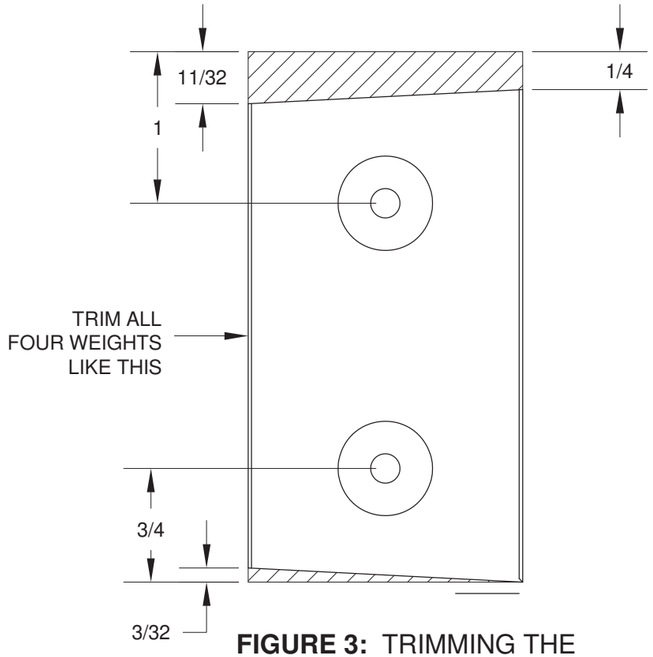


FIGURE 3: TRIMMING THE E-614 COUNTER WEIGHTS

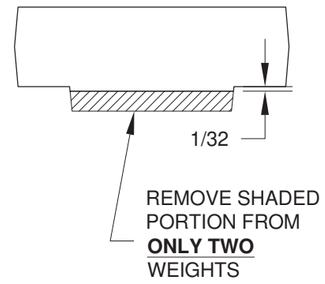


FIGURE 4: REMOVING PART OF THE RAISED MATERIAL

Step 9: Attach the E-614 Counter Weights to the tip ribs using the hardware in Figure 5. Notice that the counter weight without the raised portion is attached to the inboard side of the ribs. This weight is thin enough to completely nest within the overhanging E-913 Counterbalance Skin, thereby maintaining the required clearance with the horizontal stabilizer when the elevator is attached to it.

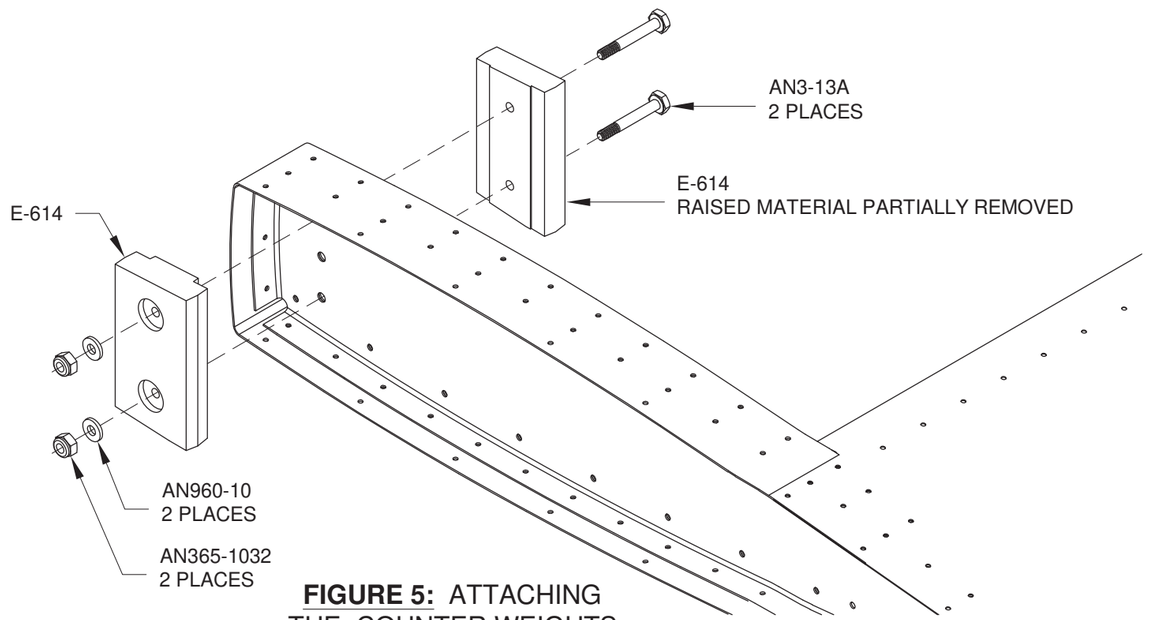


FIGURE 5: ATTACHING THE COUNTER WEIGHTS

Step 1: Make six trim tab clamping blocks out of a 3/4" thick wood board using the dimensions in Figure 1.

Step 2: Make six trim tab ribs from the three PVC-750 x 2 x 4.5 foam blocks supplied in the kit. Using the templates found on the last page of this section, cut out the ribs as you did with the trailing edge ribs earlier. See Figure 2.

NOTE: Only the left trim tab is shown and described in the rest of this section. Make the right tab (the mirror image of the left) at the same time.

Step 3: Mask the inside surface of the E-919 Trim Tab Skin around the locations for the trim tab ribs. The rib locations can be found on Page 9-18, Figure 3. Scuff the skin in the location of the ribs with 150 grit aluminum oxide sandpaper, clean the scuffed area with acetone until all sanding residue is removed, then remove the masking.

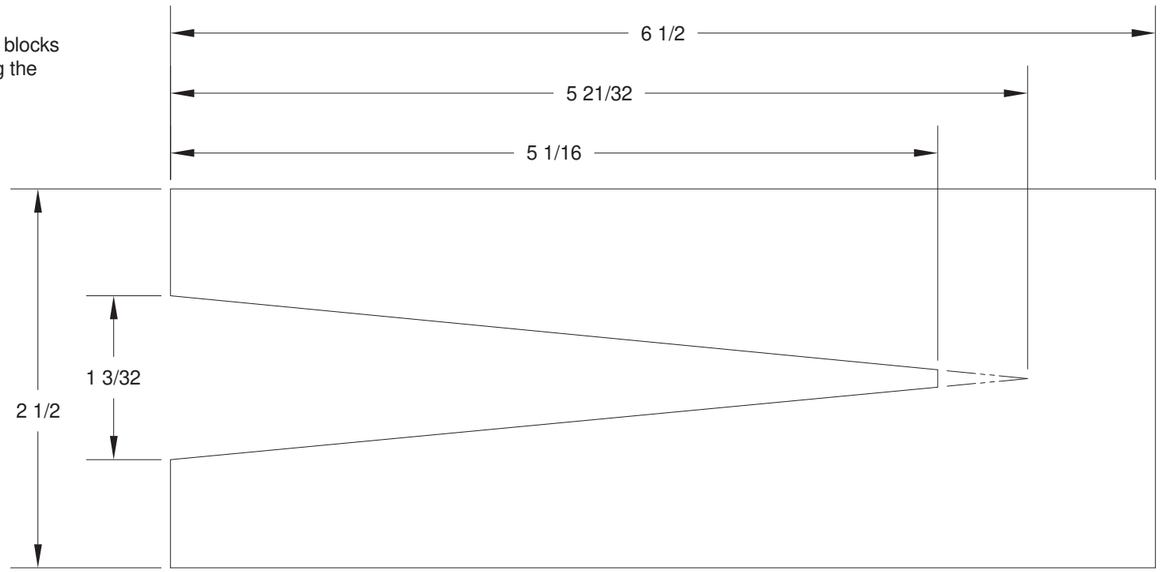


FIGURE 1: TRIM TAB CLAMP BLOCKS

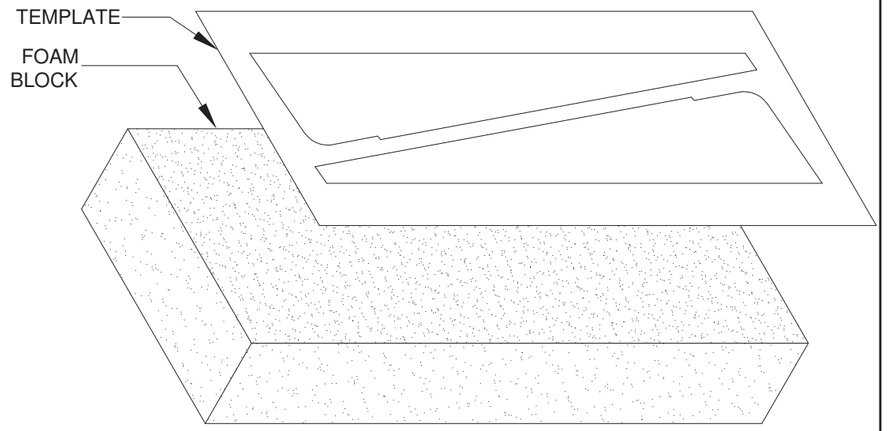


FIGURE 2: TRIM TAB RIBS

Step 4: Complete the trailing edge bend on the E-919 Trim Tab Skin using the home-made brake shown in Section 5, Figures 5-5 & 5-7. Cleco the E-920 Trim Tab Spar to the skin as shown in Figure 3, then, using one of the trim tab clamp blocks made in Step 1, check that the entire length of the skin is bent fully and uniformly with no ballooning or puckering.

Step 5: Bend the two tabs on both ends of the E-919 (E-1019 right side) Trim Tab Skins. To accomplish this, make two wood wedges having the same geometry as the cutout in the trim tab clamp blocks made in Step 1 (you may be able to use the wedges cut from the clamp blocks if they are in good shape). Radius the edges a 1/32" to prevent cracking the skin.

As shown in Figure 4, position the wedges parallel to, but offset 1/32" from, the straight portion of the skin forward and aft of the tab. Place double sticky-back tape between the wedges and skin, to prevent the wedges from sliding, then clamp the trim tab skin and the two wedges to a workbench as shown in Figure 5.

Begin bending the tab around the wedge by hand using a small, wood block, then finish the bend by tapping back and fourth along the tab with a flush rivet set in a rivet gun that has been turned down low. The tab with the two holes lays on top of the other.

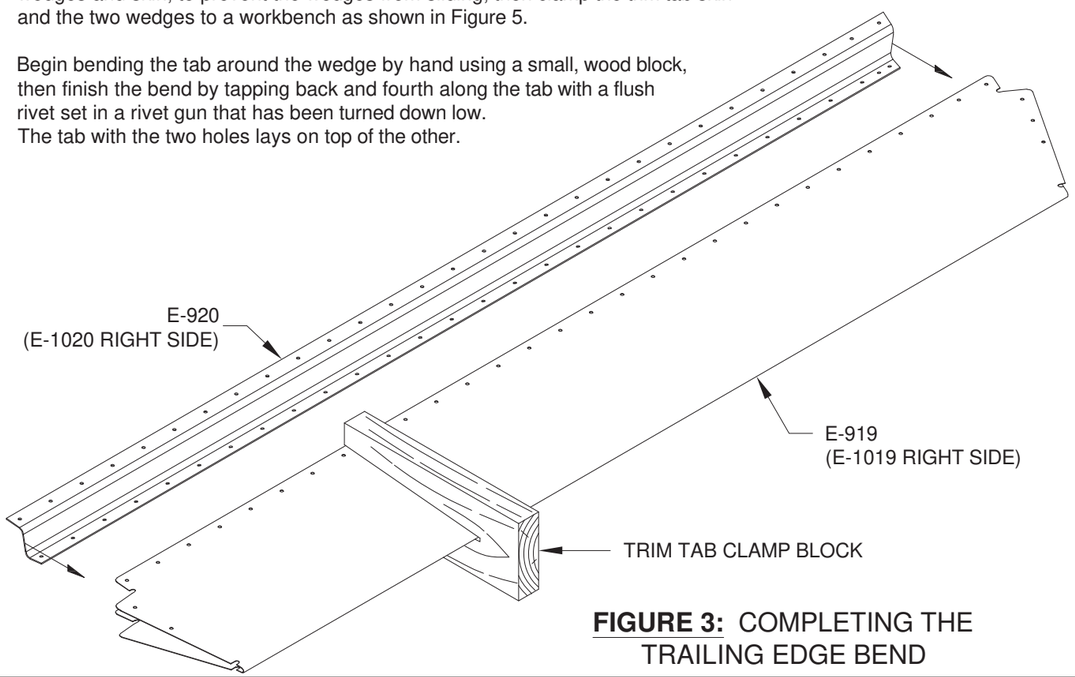


FIGURE 3: COMPLETING THE TRAILING EDGE BEND

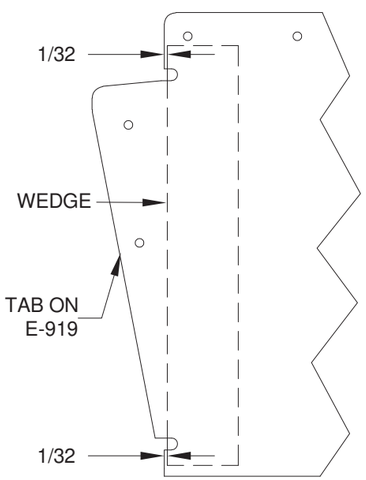


FIGURE 4: LOCATING THE WEDGES

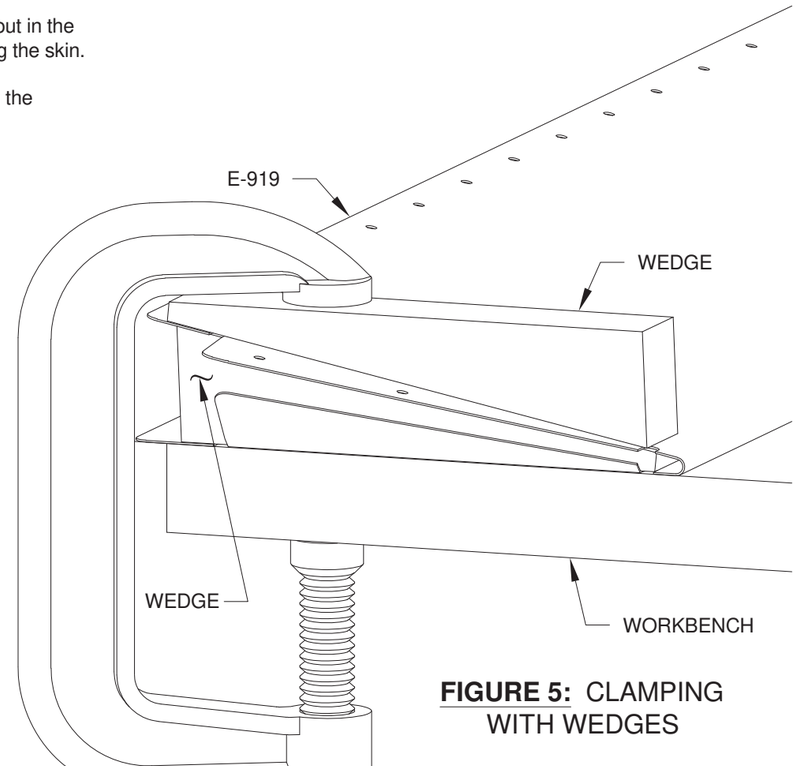


FIGURE 5: CLAMPING WITH WEDGES

Step 1: Once again, cleco the E-920 Trim Tab Spar to the E-919 Trim Tab Skin. Slip the clamp blocks over both ends of the skin to hold the skin in the proper shape as shown in Figure 1. Match-Drill the holes of the outer tabs into the inner tabs using a #30 drill.

Step 2: Remove the clamp blocks, then mark the lower surface of the skin at the web of the E-920 Trim Tab Spar for the 15° bend shown in Figure 1. Remove the spar, make the bend, then replace the spar.

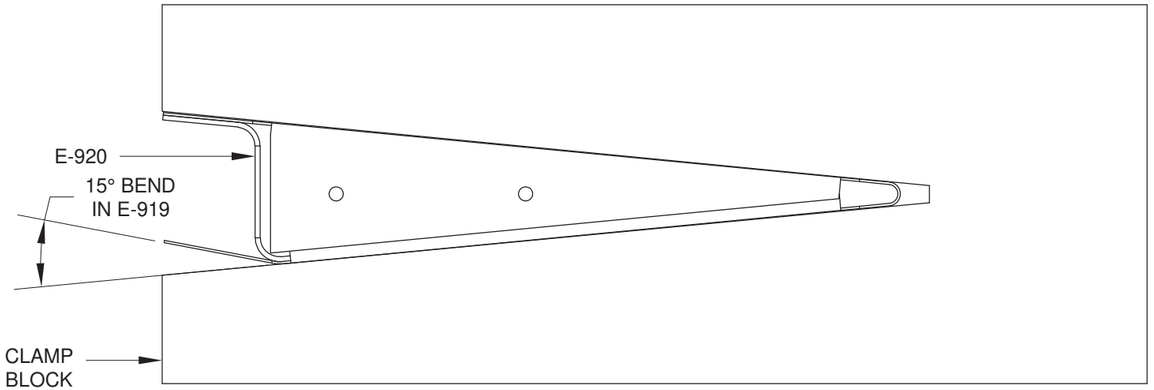


FIGURE 1: DRILLING AND BENDING THE SKIN

Step 3: Remove the shaded area, shown in Figure 2, from the E-917 & -918 Trim Tab Horns. Make sure to keep the edge distance of the remaining hole when trimming.

Step 4: Cleco the E-917 & -918 Trim Tab Horns to the E-919 Trim Tab Skin and to the bottom flange of the E-920 Trim Tab Spar as shown in Figure 2. Final-Drill the holes common to the horns, skin, and spar using a #40 drill.

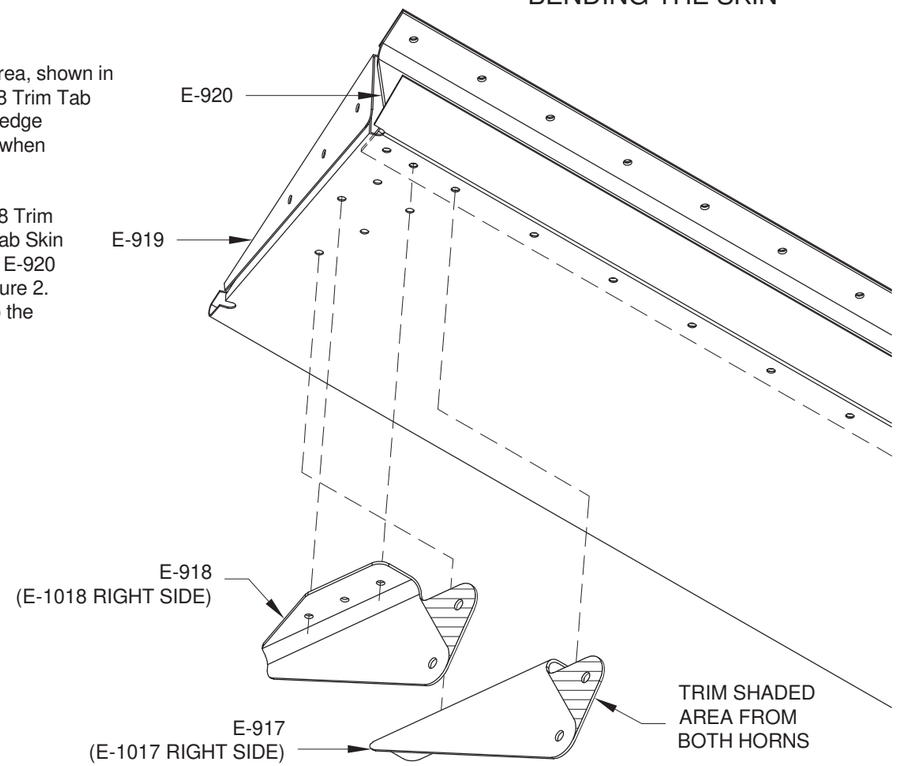


FIGURE 2: TRIMMING AND DRILLING THE TRIM TAB HORNS

Step 5: Disassemble and deburr all parts.

Step 6: Dimple all the holes in the E-919 Trim Tab Skin and the #40 holes (which were drilled in Step 3) in the E-917 & -918 Trim Tab Horns.

Dimple the holes in the bottom flange of the E-920 Trim Tab Spar. Machine countersink the holes in the top flange to leave a smooth surface for mounting the trim tab hinge.

Step 7: Mask the inside of the skin for the foam ribs at the locations shown in Figure 3, then prime all the parts in preparation for final assembly.

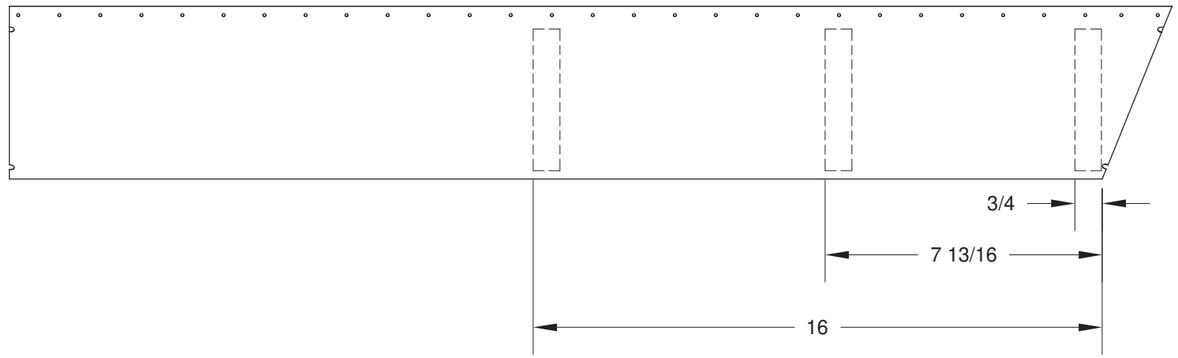


FIGURE 3: TRIM TAB RIB LOCATIONS

Step 8: Rivet the E-917 & -918 Trim Tab Horns and the bottom flange (bottom flange only!) of the E-920 Trim Tab Spar to the E-919 Trim Tab Skin with the rivets called out on Page 9-20, Figure 2.

Step 9: Apply tank sealant to all of the mating surfaces of each foam, trim tab rib (no more than 1/32" thick) and put them in place inside the trim tab.

Slip the three clamp blocks onto the trim tab, directly over the ribs, and push them tight.

Cleco the top flange of the E-920 Trim Tab Spar to the E-919 Trim Tab Skin.

Step 10: Rivet the bent tabs on the sides of the trim tabs using the blind rivets shown on Page 9-20, Figure 2.

Set the trim tabs aside for a few days to allow the sealant to cure.

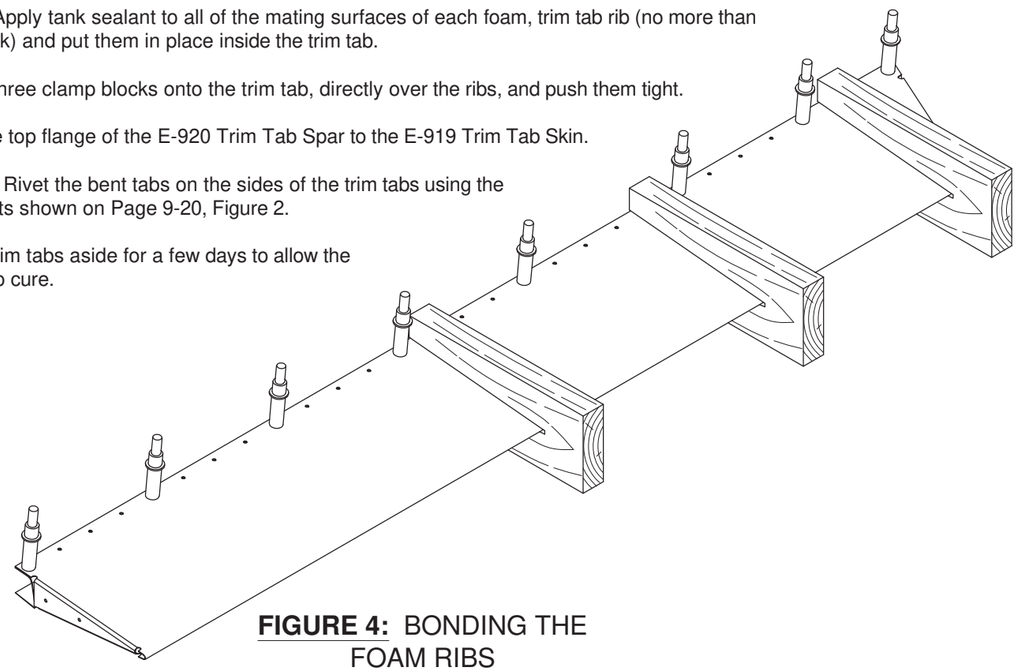


FIGURE 4: BONDING THE FOAM RIBS

Step 1: Cut two 35 inch long trim tab hinges (one left and one right) from the length of AN257-P3 piano hinge provided in the kit.

Step 2: Drill the holes in the end of the hinge according to the dimensions in Figure 1.

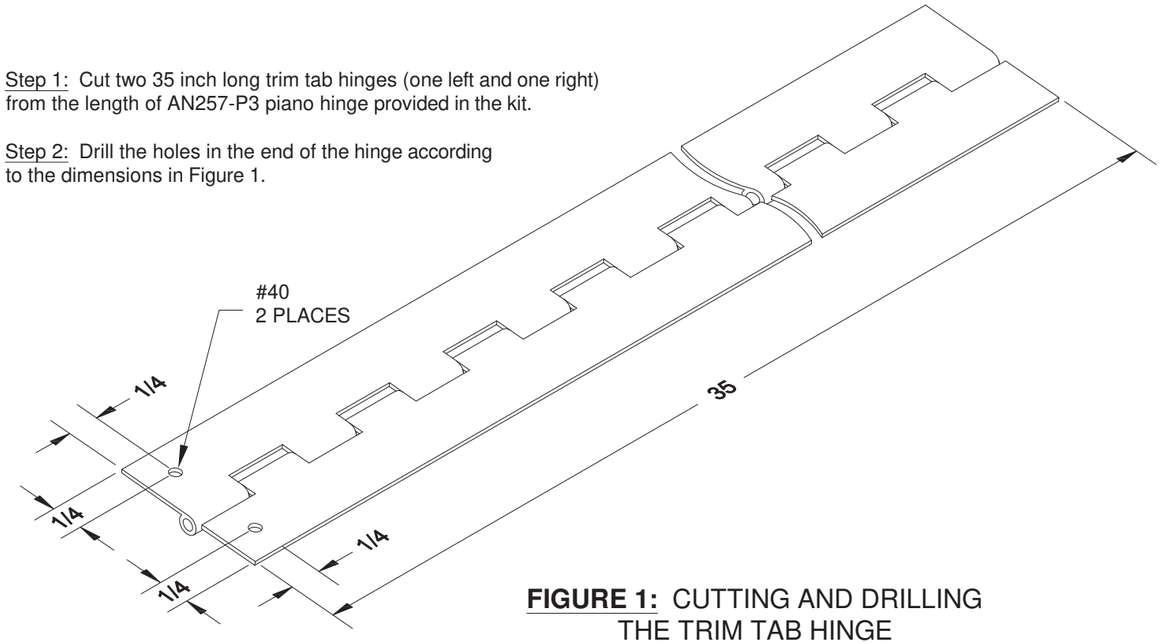


FIGURE 1: CUTTING AND DRILLING THE TRIM TAB HINGE

Step 3: Using one of the holes just drilled in the trim tab hinge, cleco the hinge to the elevator as shown in Figure 2.

Adjust the rest of the hinge so that it's even with the edge of the E-1001A Top Elevator Skin and the top flange of the E-1007 Rear Spar. Using a #40 drill, match-drill the inboard most hole in the elevator and rear spar into the hinge, cleco the hole, then match-drill and cleco one of the holes near the middle of the hinge. Now match-drill the remaining holes.

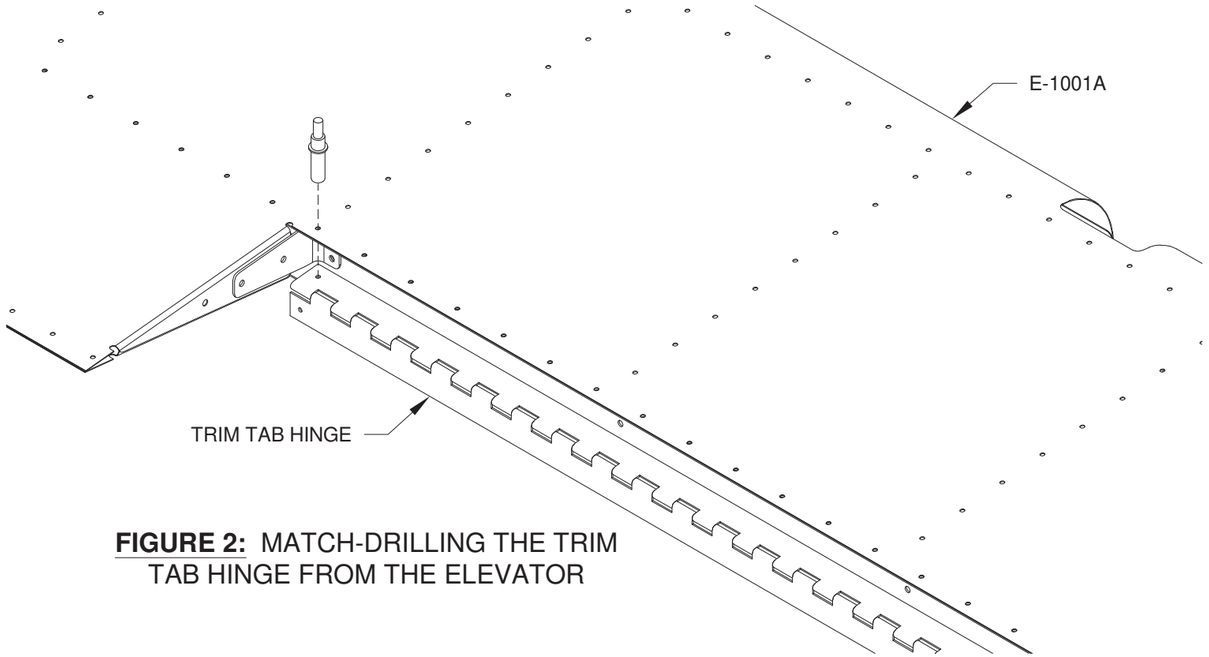


FIGURE 2: MATCH-DRILLING THE TRIM TAB HINGE FROM THE ELEVATOR

Step 4: Using the single hole in the trim tab hinge drilled in Step 2, cleco the trim tab on top of the hinge as shown in Figure 3.

Adjust the trim tab so that it's even with the rest of the hinge, then match-drill the holes of the trim tab into the hinge in the same way the hinge was drilled from the elevator.

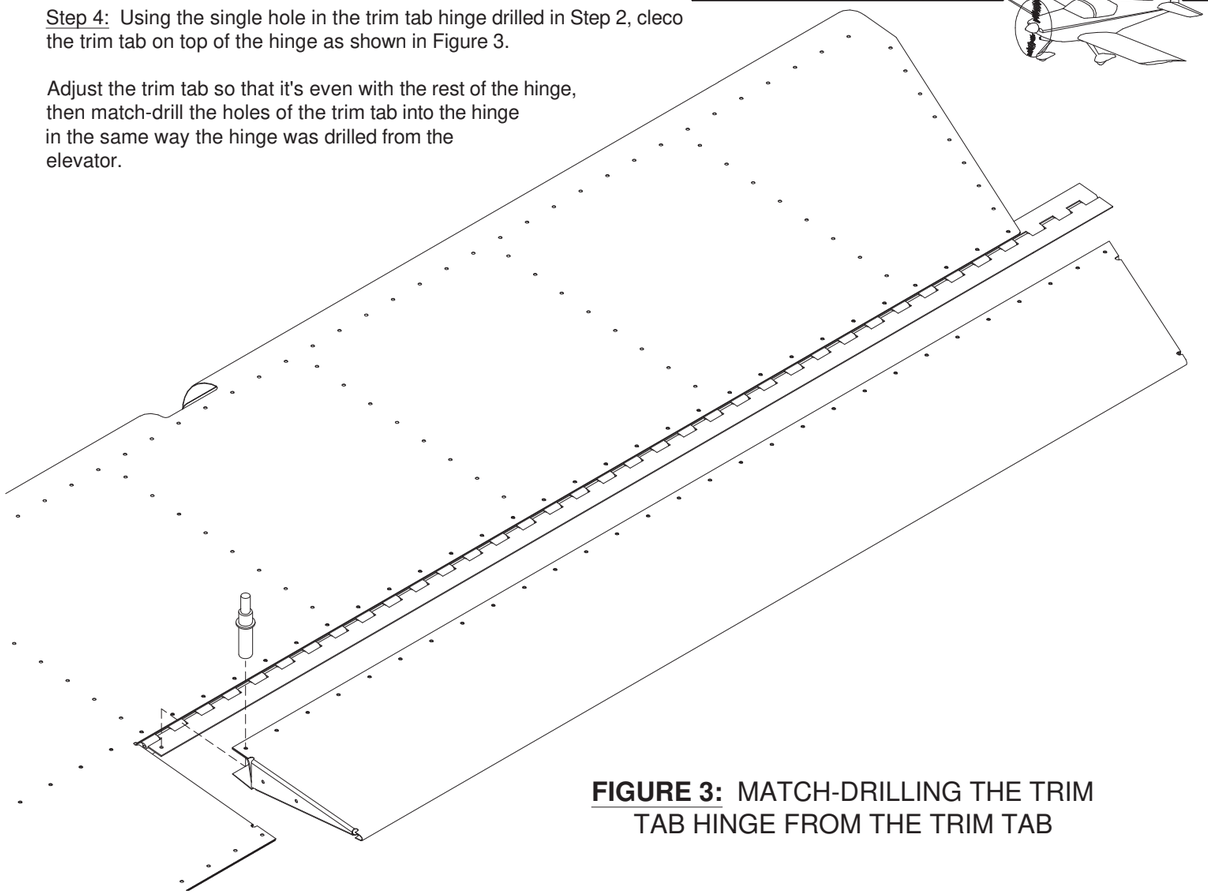


FIGURE 3: MATCH-DRILLING THE TRIM TAB HINGE FROM THE TRIM TAB

Step 5: Mark the inboard end of the hinge so that it can be trimmed even with the elevator and trim tab.

Step 6: Remove the hinge from the elevator and trim tab, then remove the pin from the hinge. Trim the hinge halves at the marks made in Step 5. (The pin is left long so that it can be bent and secured to the elevator. This prevents the pin from sliding out of the hinge in service.)

Step 7: Rivet the hinge halves to the elevator using the rivets called out on Page 9-21, Figure 1, and to the trim tab using the rivets called out on Page 9-20, Figure 2.

Step 8: Attach the trim tab to the elevator by sliding the hinge pin back into the hinge halves.

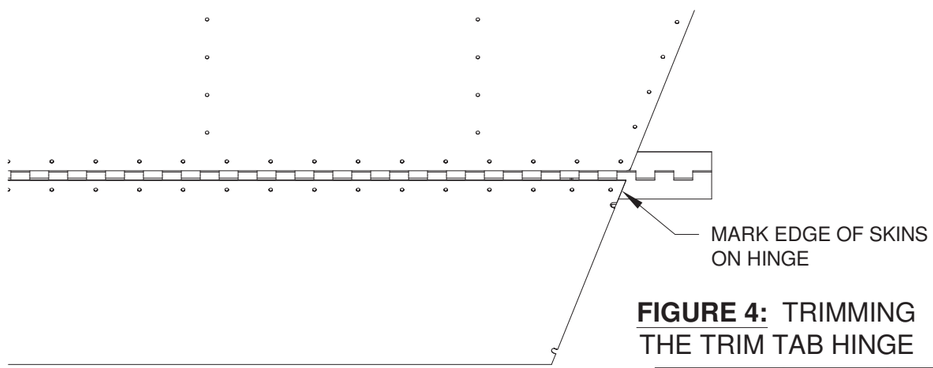


FIGURE 4: TRIMMING THE TRIM TAB HINGE

Step 1: Drill a 1/16" diameter hole in the E-1007 Rear Spar and the aft flange of the E-905 Root Rib located approximately as shown in Figure 1.

Step 2: Bend the hinge pin as shown in the figure, trim off any excess, then secure it with safety wire to the hole just drilled.

This completes the construction of the elevators. The E-616 Cover Plates and the trim tab control cables are attached in Section 11. The E-912 Elevator Tip Fairings are attached in Section 12.

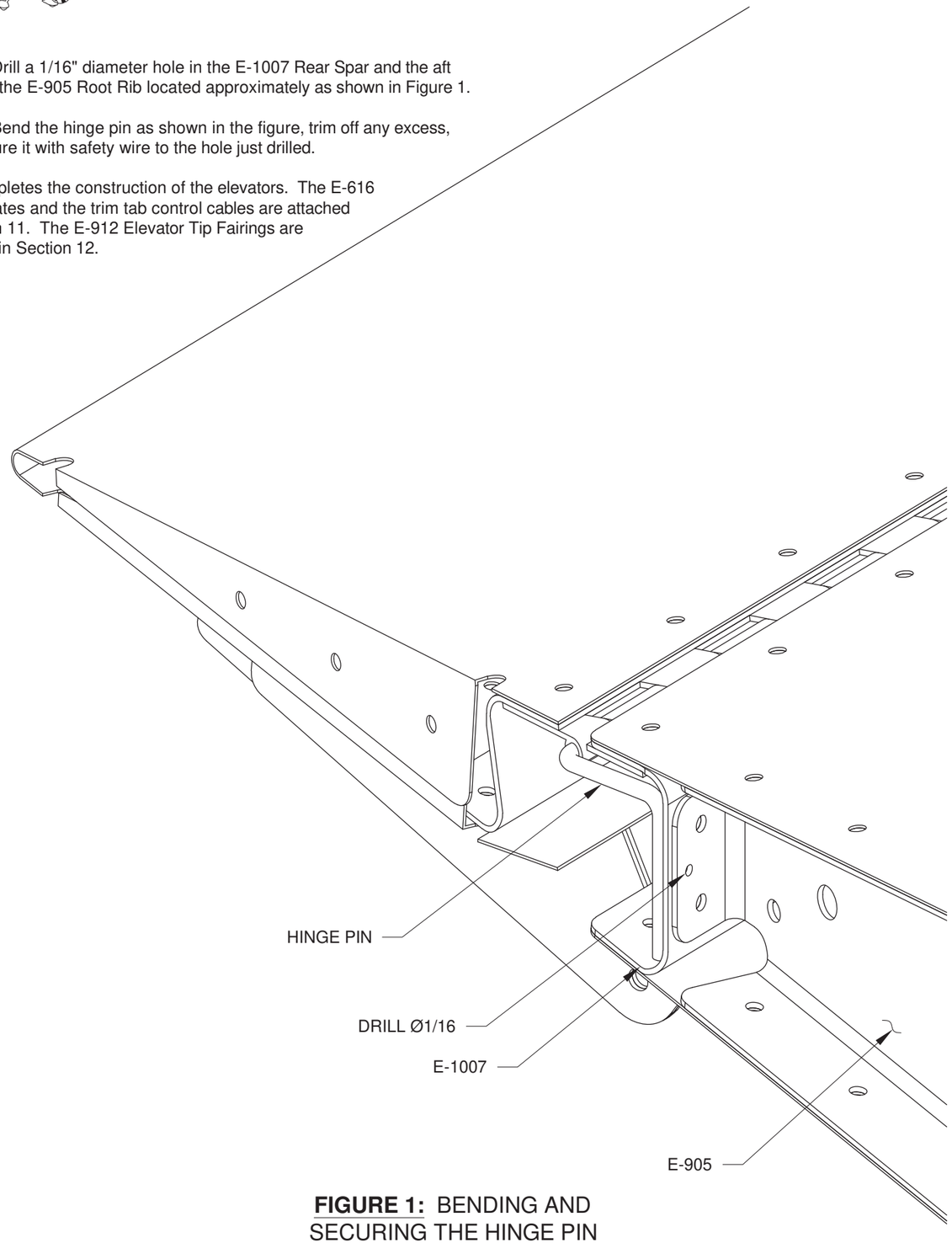
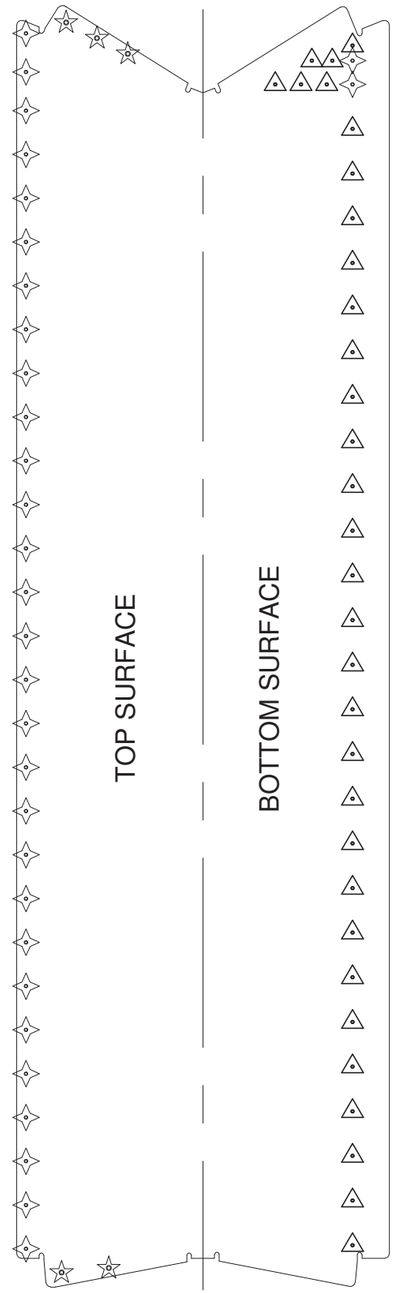


FIGURE 1: BENDING AND SECURING THE HINGE PIN



△ AN426AD3-3.5
✧ AN426AD3-4
☆ CS4-4

FIGURE 2: TRIM TAB SKIN RIVETS

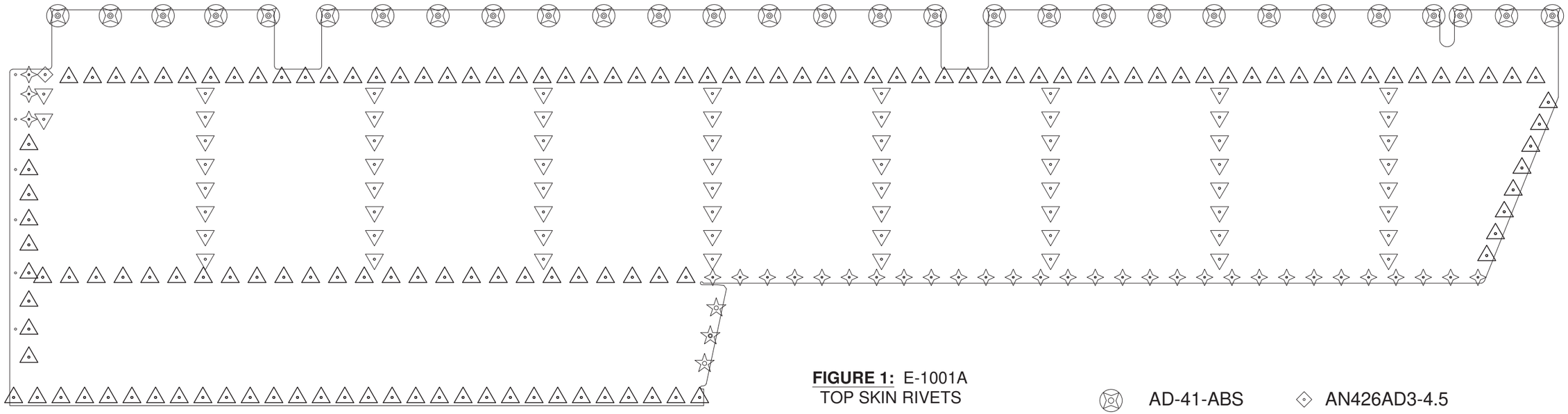


FIGURE 1: E-1001A
TOP SKIN RIVETS

- AD-41-ABS
- AN426AD3-3
- AN426AD3-3.5
- AN426AD3-4
- AN426AD3-4.5
- CS4-4
- MK-319-BS

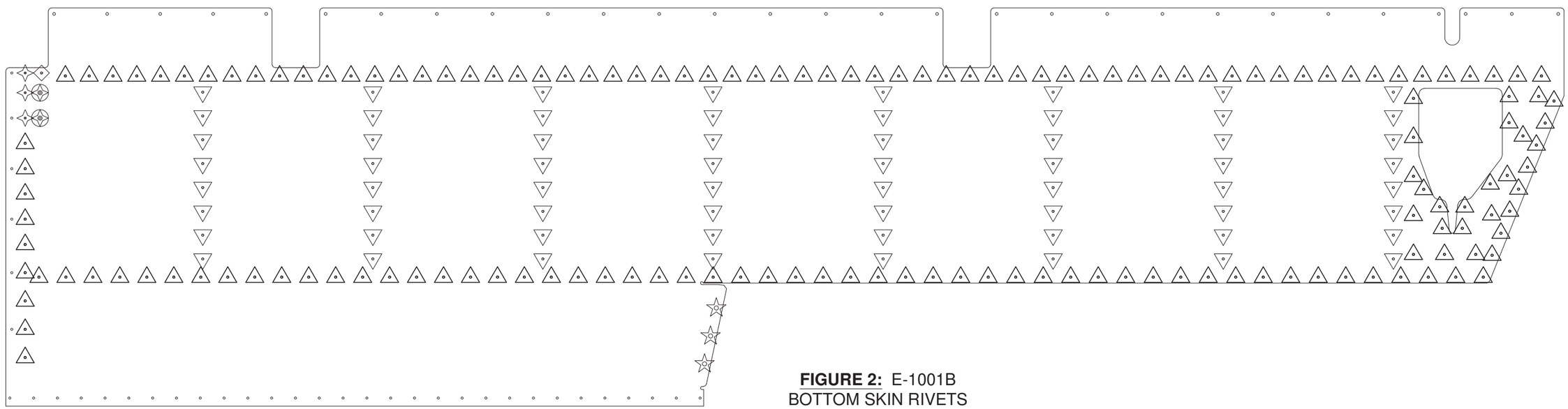
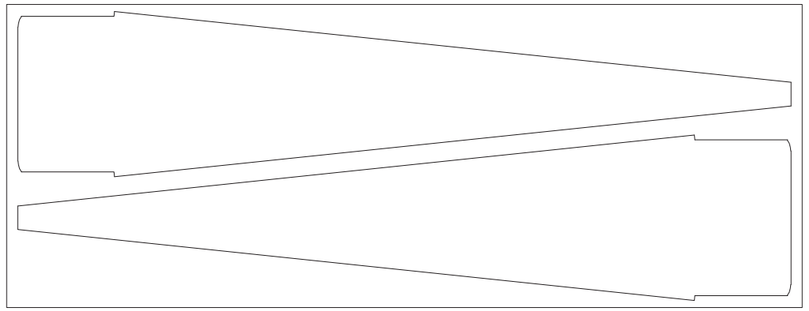
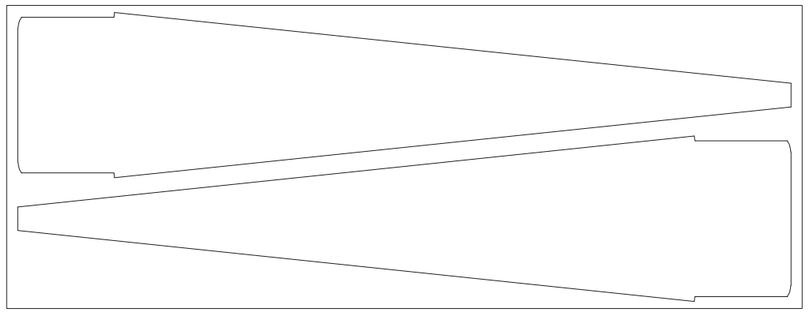
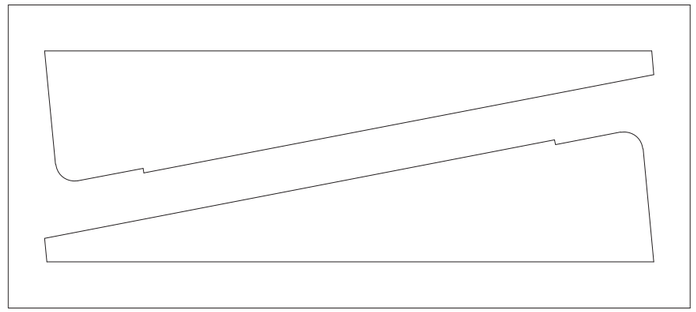


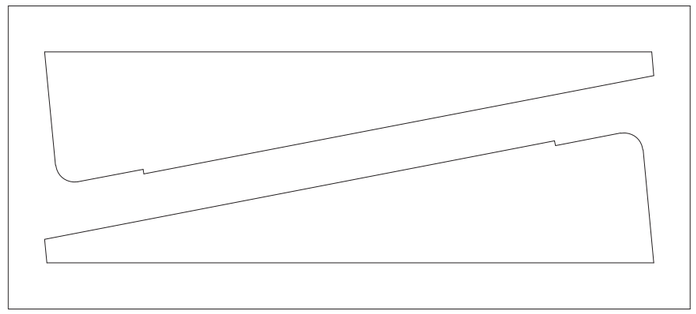
FIGURE 2: E-1001B
BOTTOM SKIN RIVETS

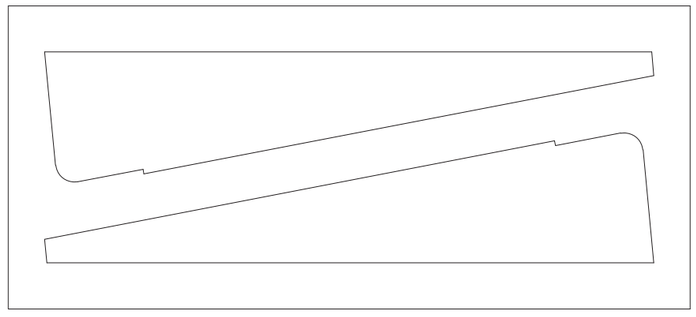




TRAILING EDGE RIB TEMPLATES







TRIM TAB RIB TEMPLATES

10 9/16
[268.29 mm]

16
[406.40 mm]

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