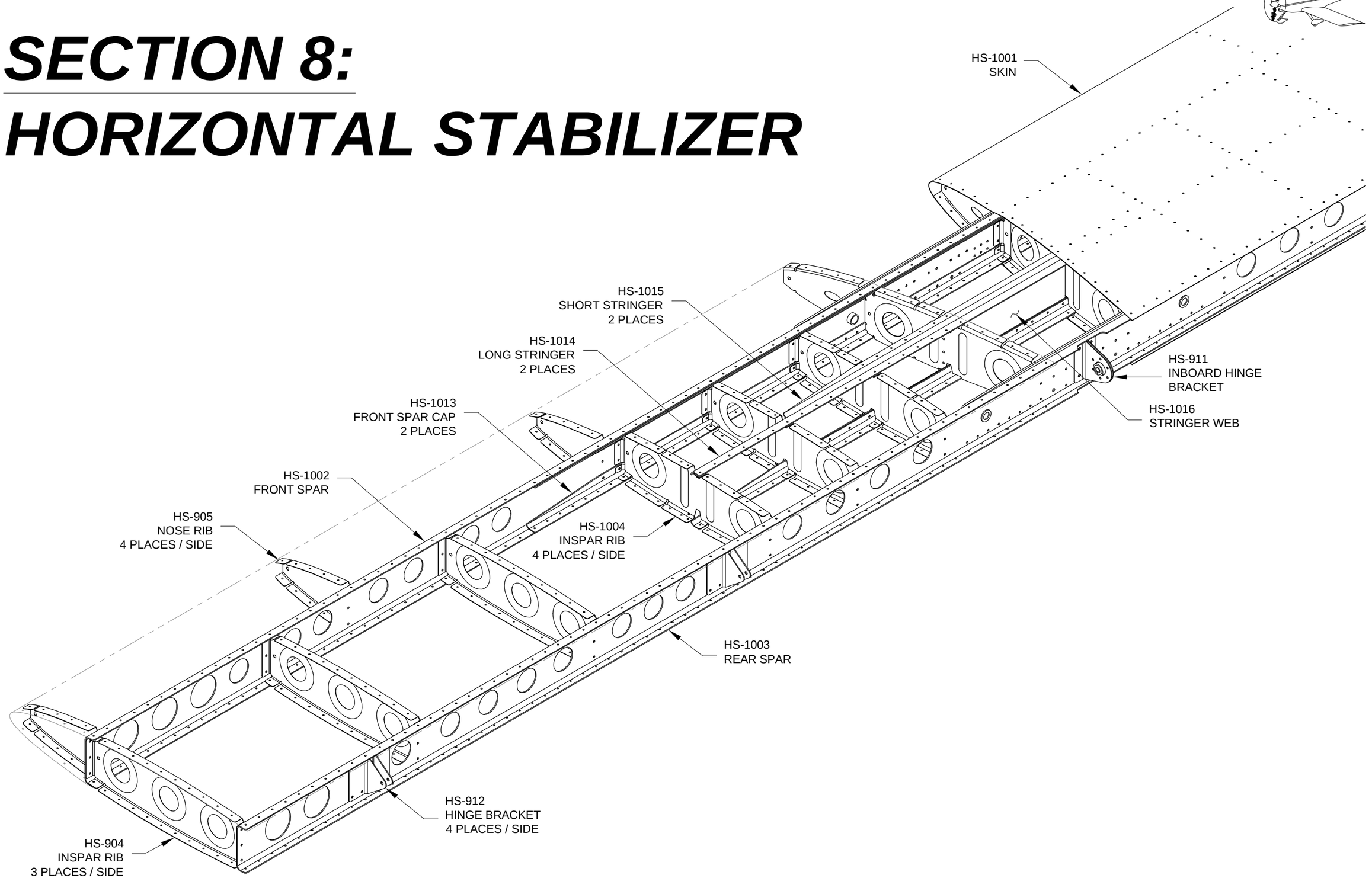
SECTION 8:
HORIZONTAL STABILIZER



Step 1: Deburr the edges (including lightening holes) of all aluminum parts shown in Figure 1.

Step 2: Cleco the HS-906 Rear Spar Doubler to the HS-1003 Rear Spar as shown in the right blowup of Figure 1.

There are four holes in the spar web not present in the doubler. Match-Drill these holes (shown in the blowup) into the doubler with a #30 drill. Be sure to drill perpendicular to the web. Except for the holes indicated in the blowup, final-drill all other 1/8" holes common to the doubler and spar using a #30 drill.

Machine countersink the two indicated holes for 1/8" flush rivets. Final-Drill the four 3/16" holes (two above and two below the holes just countersunk) with a #12 drill. Drill from the spar into the doubler.

Step 3: Final-Drill the 3/16" hole in each of the eight HS-912 Hinge Brackets using a #12 drill.

Cleco the hinge brackets to the HS-1003 Rear Spar as shown in the figure. Final-Drill the holes of the brackets and spar with a #30 drill.

Step 4: Remove all the parts from the spar (marking them as they are removed), deburr the holes, then prime the aluminum parts if desired. Scuff the powder coating on the hinge brackets if you plan on painting them when the completed airplane is painted.

Step 5: Rivet the HS-906 Rear Spar Doubler to the spar using the rivets called out in the right blowup. Make sure not to put any rivets in the holes indicated (tape over the holes as a reminder).

Step 6: Rivet the HS-912 Hinge Brackets to the spar using the rivets shown in the left blowup. Place the manufactured head of the rivets on the bracket.

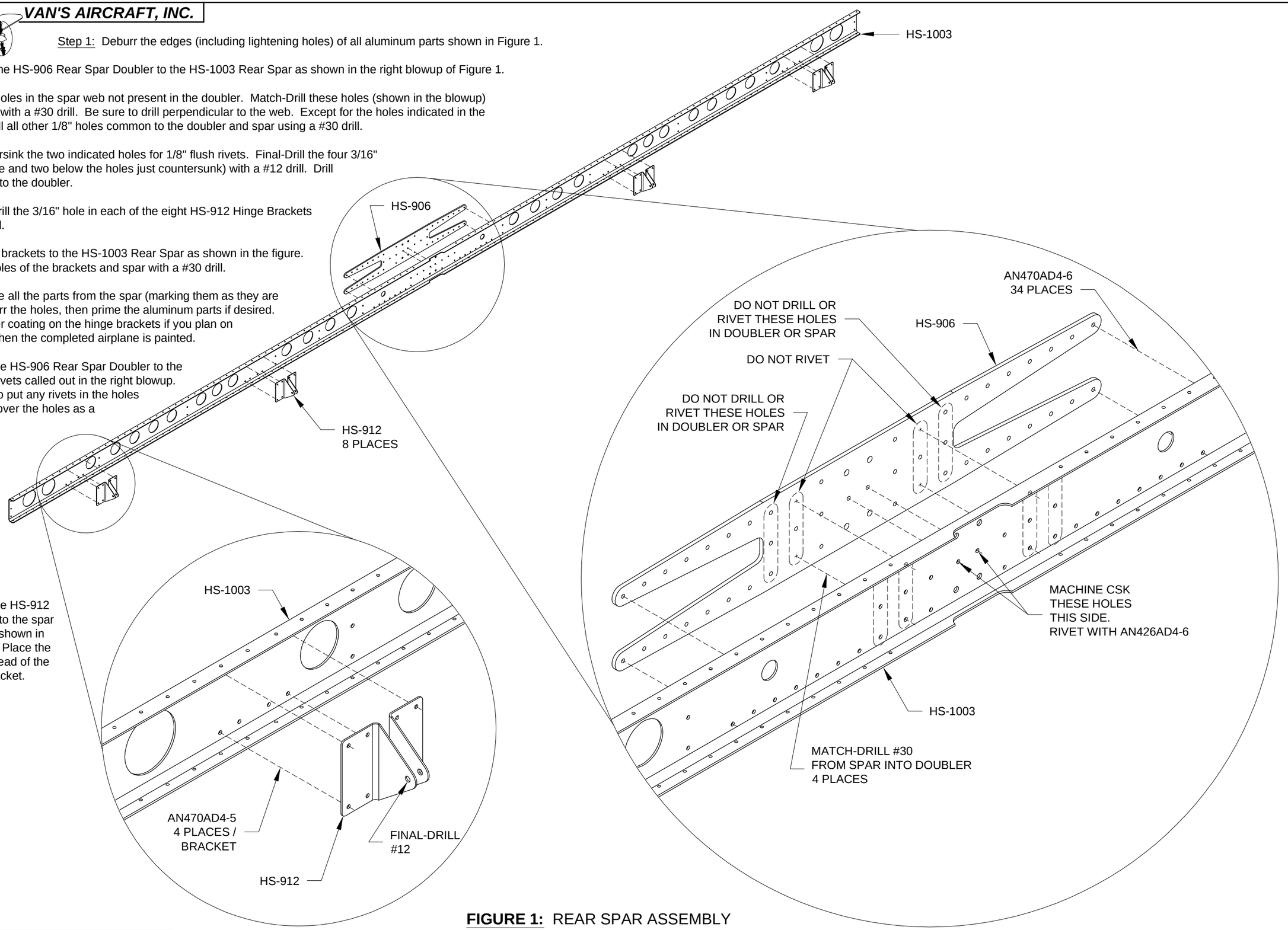


FIGURE 1: REAR SPAR ASSEMBLY

Step 1: Cleco the VA-146 Flange Bearing between the two HS-911 Inboard Hinge Brackets as shown in Figure 1. Final-Drill the six holes common to all the parts with a #30 drill and the two 3/16" holes in the flange of the hinge brackets with a #12 drill .

Disassemble, deburr, scuff the powder coating of the hinge brackets if desired, and reassemble.

Rivet the assembly together with the rivets shown in the figure. Clamp the flanges of the two hinge brackets to something flat to make sure that they remain square to each other while riveting.

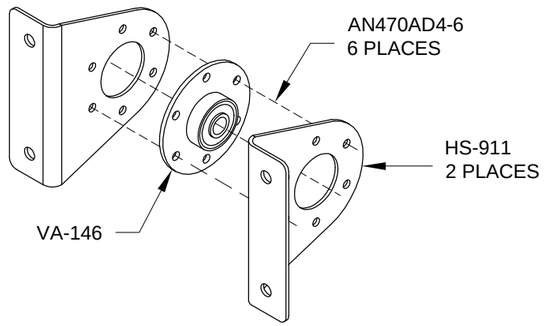


FIGURE 1: INBOARD HINGE BRACKET ASSEMBLY RIVETS

Step 2: Bolt the inboard hinge bracket assembly to the rear spar assembly using the hardware shown in Figure 2. Use the correct torque on the nuts per the chart in Section 5V.

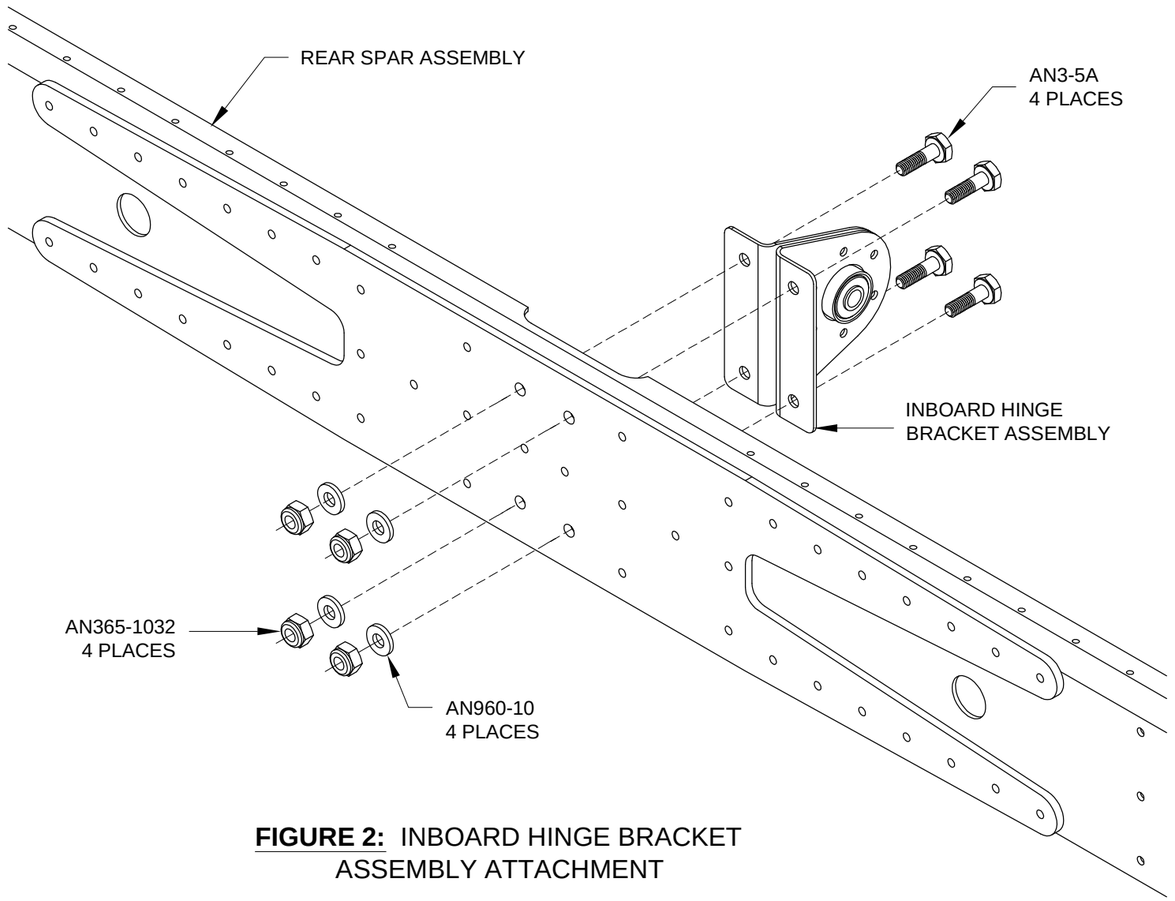


FIGURE 2: INBOARD HINGE BRACKET ASSEMBLY ATTACHMENT

Step 3: Using the dimensions in Figure 3, make the HS-1008-L Left Front Spar Attachment Bracket from the length of AA6-187x2x2-1/2 angle provided in the kit. Be very accurate in drilling the 1/8" hole which will be used to locate the bracket on the front spar assembly.

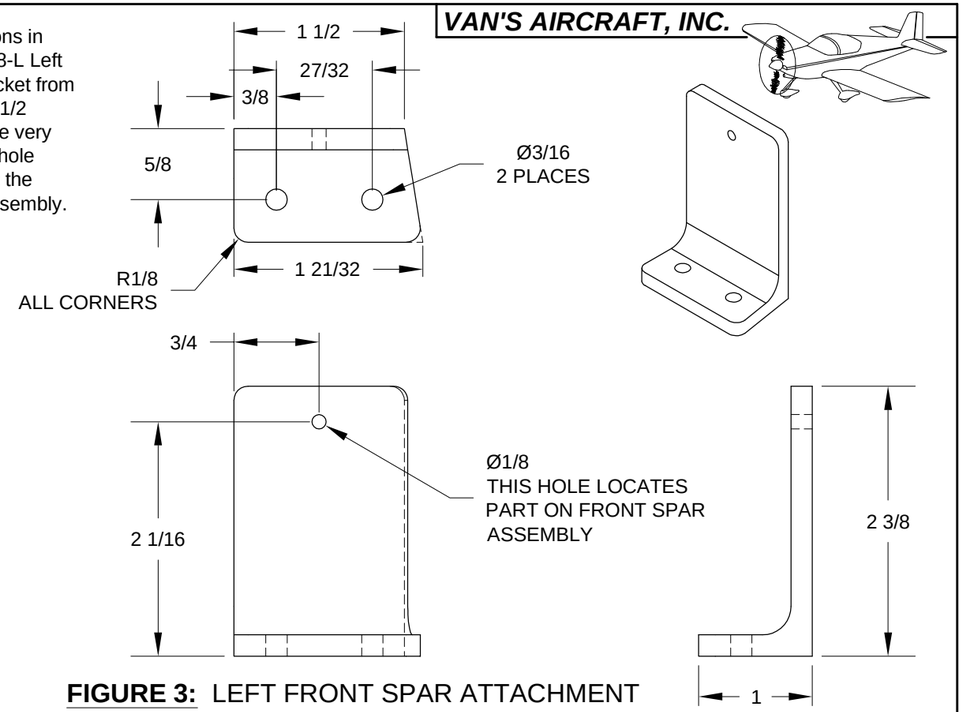


FIGURE 3: LEFT FRONT SPAR ATTACHMENT BRACKET

Step 4: Repeat Step 3, but use the dimensions in Figure 4, to make the HS-1008-R Right Front Spar Attachment Bracket.

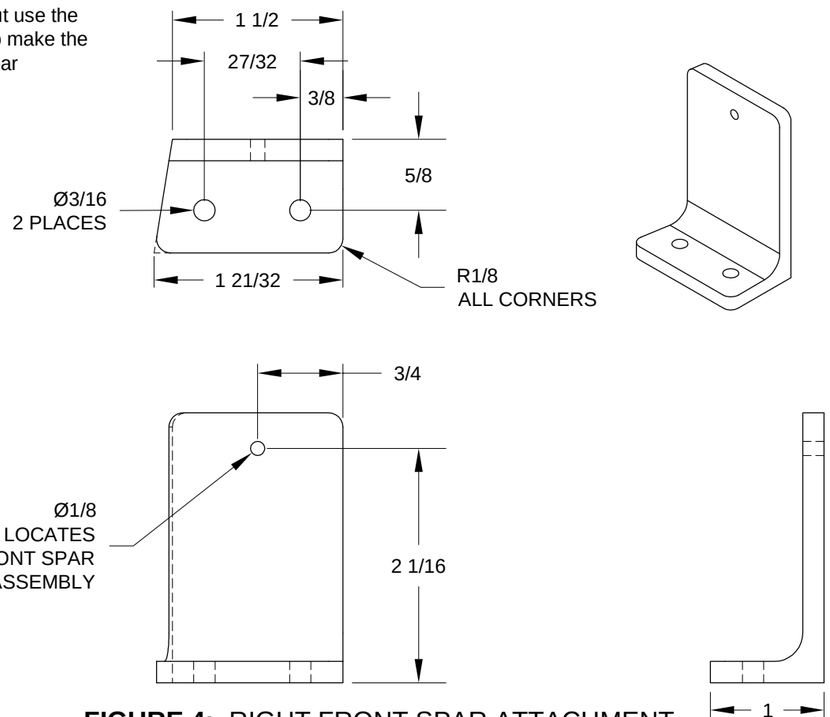


FIGURE 4: RIGHT FRONT SPAR ATTACHMENT BRACKET

Step 1: Trim material (shaded areas) from both ends of the two HS-1013 Front Spar Caps, the HS-1014 Long Stringer, and the HS-1015 Short Stringer as shown in Figure 1. The parts are shown unbent in the figure for clarity. Use the notches in the parts to determine the trim line and note in the figure that the trim line completely removes the notches.

Deburr and smooth all edges of the spar caps and stringers.

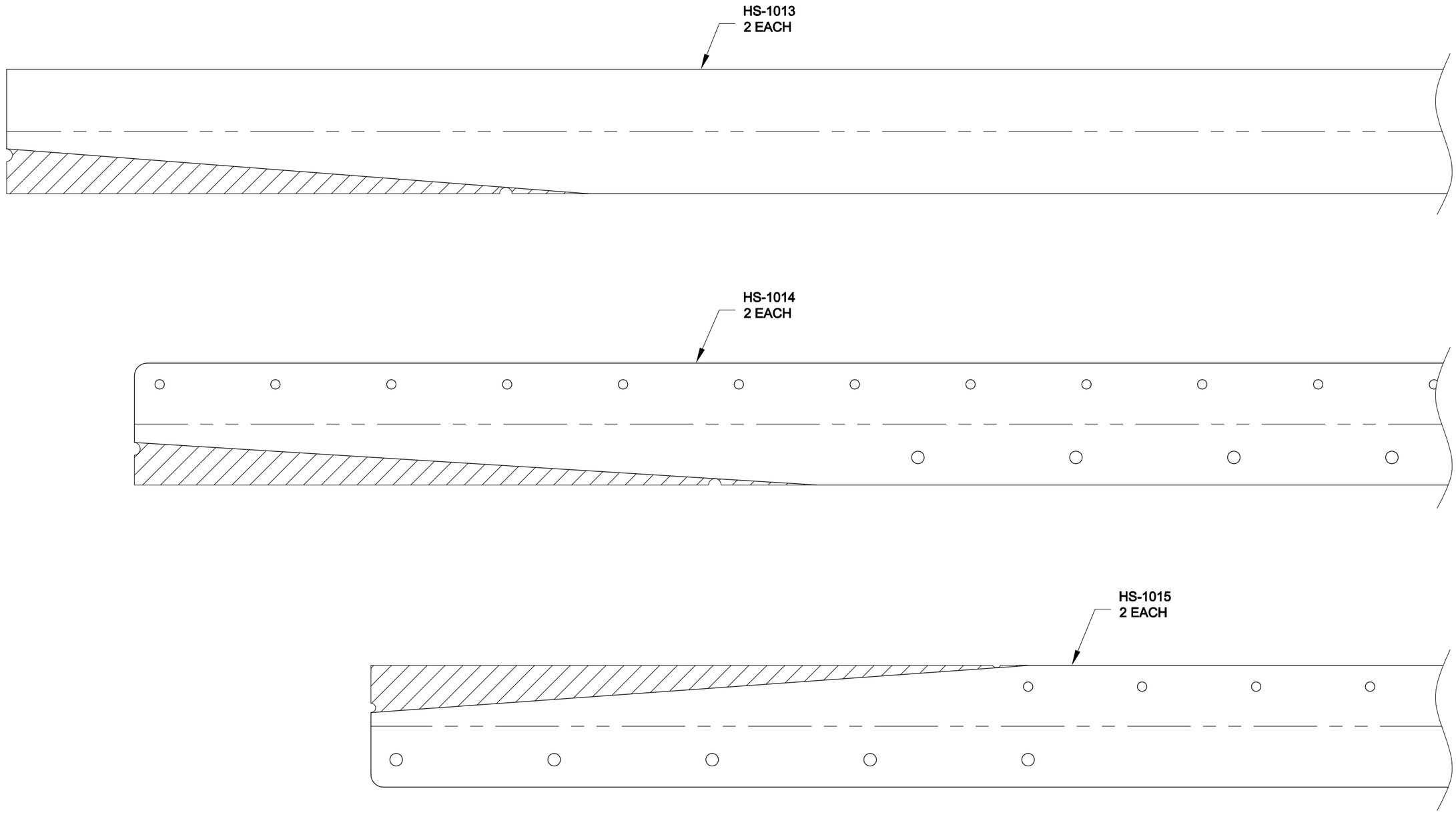


FIGURE 1: SPAR CAP AND STRINGER TRIM

Step 1: Deburr the edges (including the lightening holes) of the HS-1002 Front Spar.

Step 2: The HS-1013 Front Spar Caps are nested in the corners of the HS-1002 Front Spar with the trimmed flange of the spar cap resting against the spar web. On one of the spar caps, make a mark on the flange (the one that rests against the flange of the spar) a quarter of an inch from either end. Nest the spar cap in the spar, then, from the corresponding end of the spar, center the mark in the thirty-third flange hole. (Just for a check, make sure the other end of the spar cap covers the thirty-third hole in the other end of the spar flange.)

Clamp the spar cap in place, then match-drill the 1/8" holes of the spar web into the entire length of the spar cap with a #30 drill. The spar cap is somewhat bowed as supplied, so use plenty of clamps to make sure the spar cap is tight against the spar web and flange while drilling. Remove the spar cap, deburr the holes of the spar and spar cap, then cleco the spar cap back in place. It's important to deburr and clean out any chips, otherwise the spar cap won't fit tight against the spar web when match-drilling the spar flange holes.

Clamp the spar cap to the flange of the spar, then match-drill the 3/32" holes of the spar flange into the spar cap with a 3/32" drill.

Repeat this step for the second spar cap.

Step 3: Deburr and smooth the edges of the HS-1007 Front Spar Doubler and the HS-1008-L and -R Front Spar Attachment Brackets, then cleco them to the HS-1002 Front Spar as shown in the figure.

Step 4: Clamp something flat to the bottom of the HS-1008-L and -R Front Spar Attachment Brackets to keep them square to each other, then match-drill the eight holes of the spar and spar doubler into the attachment brackets with a #30 drill. Cleco a few of these holes, remove the original, single cleco, and final-drill the hole with the same drill.

Step 5: Except for those indicated in the figure, final-drill the 1/8" holes common to the HS-1002 Front Spar and the HS-1007 Front Spar Doubler using a #30 drill.

Match-drill the four 3/16" holes common to the spar and spar doubler into the HS-1013 Front Spar Caps with a 3/16" drill, then final-drill the holes with a #12 drill.

Step 6: Machine countersink the eight holes of the HS-1007 Front Spar Doubler (see figure) for 1/8" flush rivets.

Step 7: Final-Drill the middle nine holes (see figure) in both flanges of the HS-1002 Front Spar using a #40 drill, then machine countersink them for 3/32" flush rivets.

Step 8: Mark the parts, disassemble, deburr, prime if desired, then reassemble the parts in their original position.

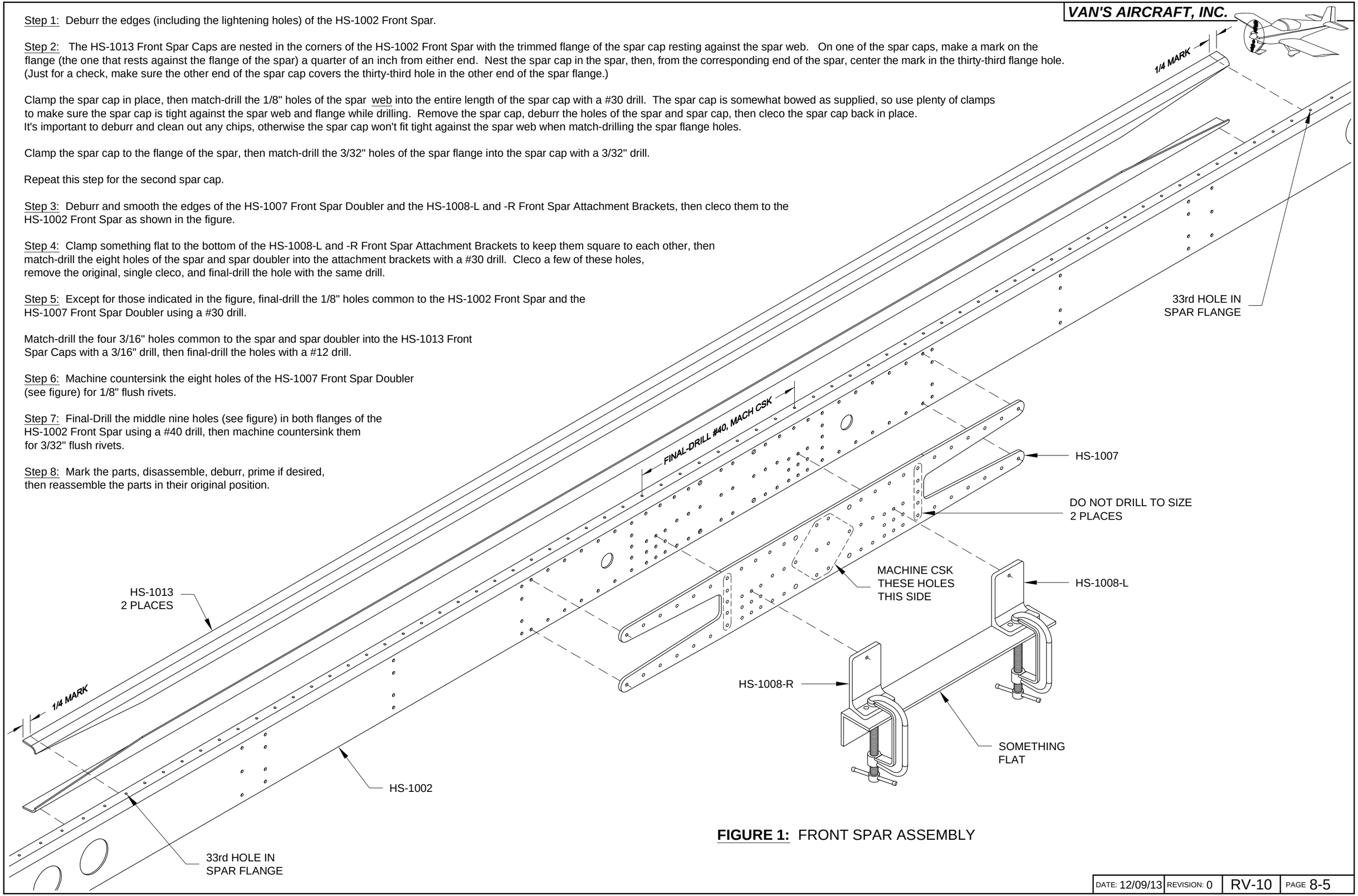


FIGURE 1: FRONT SPAR ASSEMBLY

Step 1: Rivet together the HS-1002 Front Spar, the HS-1007 Front Spar Doubler, the HS-1013 Front Spar Caps, and the HS-1008-L and -R Front Spar Attachment Brackets using the rivets shown in Figure 1. Install only the rivets shown in the figure. Tape over the open holes to keep yourself from accidentally riveting them.

Step 2: Install AN426AD3-4.5 rivets into the nine holes in both flanges of the HS-1002 Front Spar and the HS-1013 Spar Caps. These are the holes which were machine countersunk in the spar flanges on Page 8-5, Step 7.

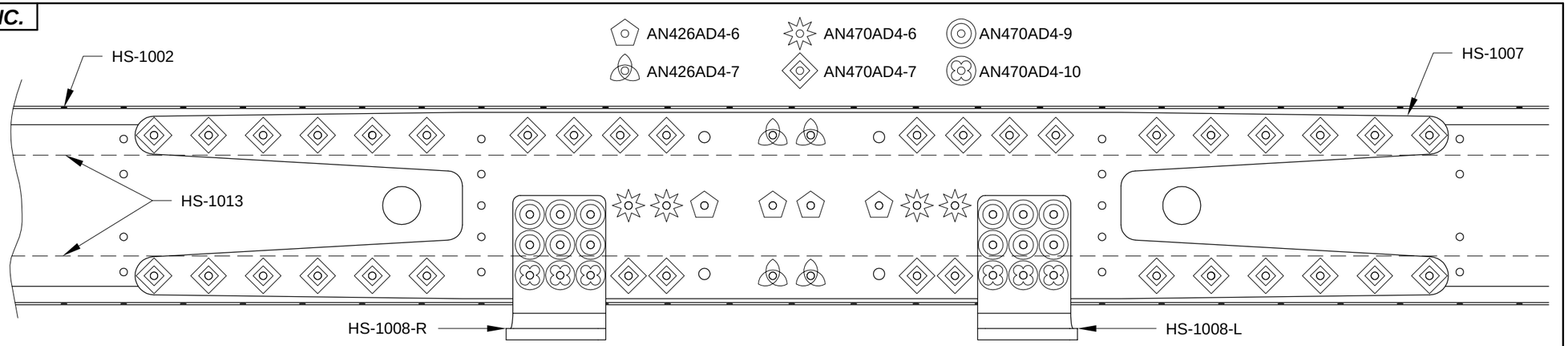


FIGURE 1: FRONT SPAR DOUBLER RIVETS

Step 3: Locate four of the HS-1004 Inspar Ribs. Remove the portion of the top and bottom flange, shown in the upper rib drawing of Figure 2, from all four ribs.

Step 4: Set two of the ribs from step 3 aside, then remove the small flange, shown in the lower rib drawing of Figure 2, from the remaining two ribs.

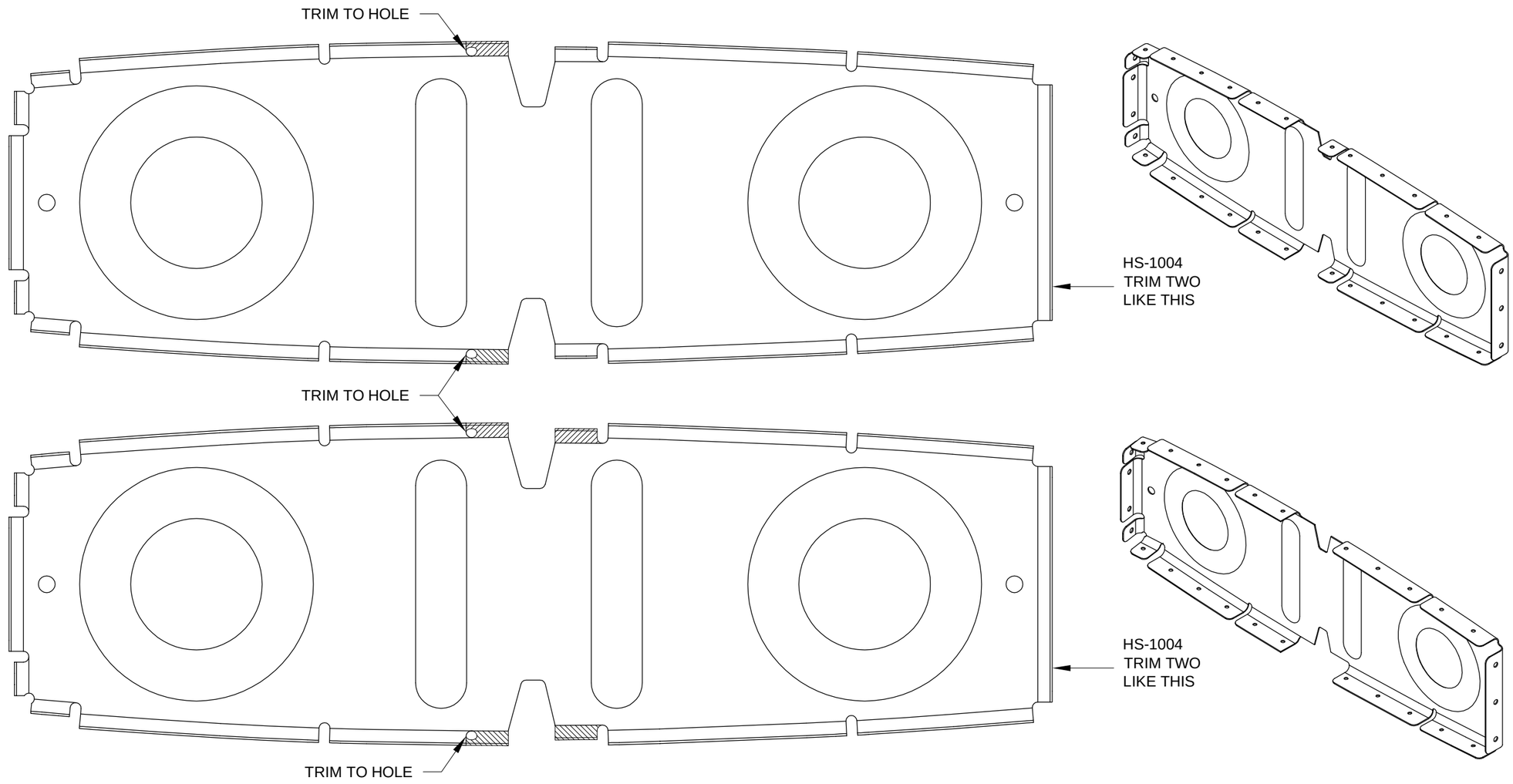


FIGURE 2: TRIMMING RIB FLANGES

Step 1: Deburr the edges of all HS-1004 Inspar Ribs. Flute (Section 5N), if necessary, the curved flanges of the ribs until the holes in the flanges are in a straight line.

Step 2: The two HS-1004 Inspar Ribs which had the four flanges trimmed on Page 8-6, Step 4, need to be modified further. Use a hand seamer to bend the aft flange of the ribs open by 9° as shown at the bottom of Figure 1. The forward portion of the rib must also be bent by 9° as shown at the top of the figure. This bend can be accomplished by holding the forward portion of the rib against a solid surface and pressing down along the bend-line with your fingers. The part will bend along the bend-line, between the two notches shown in the figure.

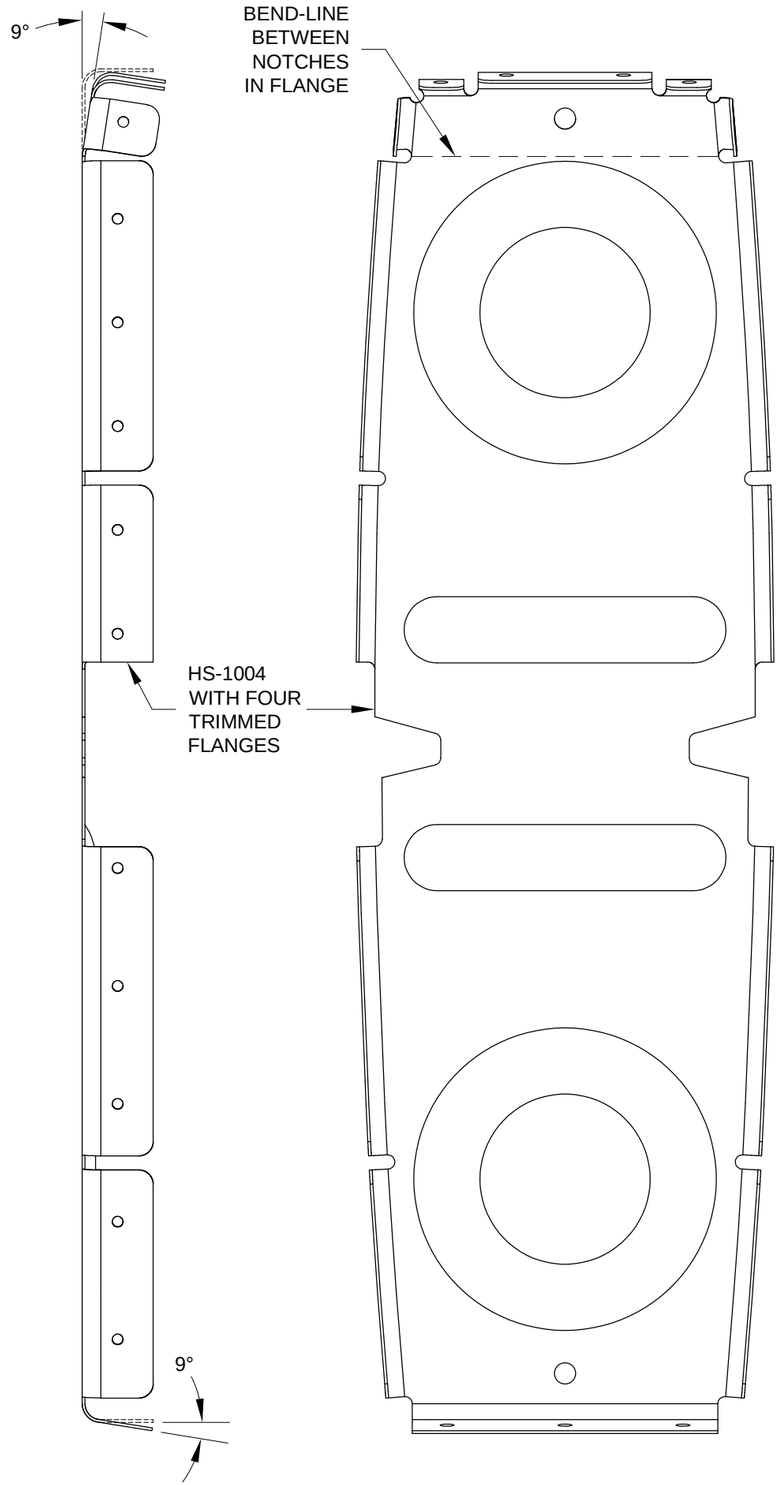


FIGURE 1: MODIFY TRIMMED INSPAR RIBS

Step 3: Deburr the edges of all the HS-905 Nose Ribs. Flute, if necessary, the curved flanges of the ribs until the holes in the flanges are in a straight line.

Radius the corners at the forward end of the nose rib flanges (see Figure 2) to prevent them from making small dents in the skins when the ribs are installed.

Step 4: Put aside all but two of the HS-905 Nose Ribs. Open the bend in the aft flange of these two nose ribs by 9°.

Cut a hole in the web of both nose ribs using the dimensions in the figure. The hole is used for routing the trim cables.

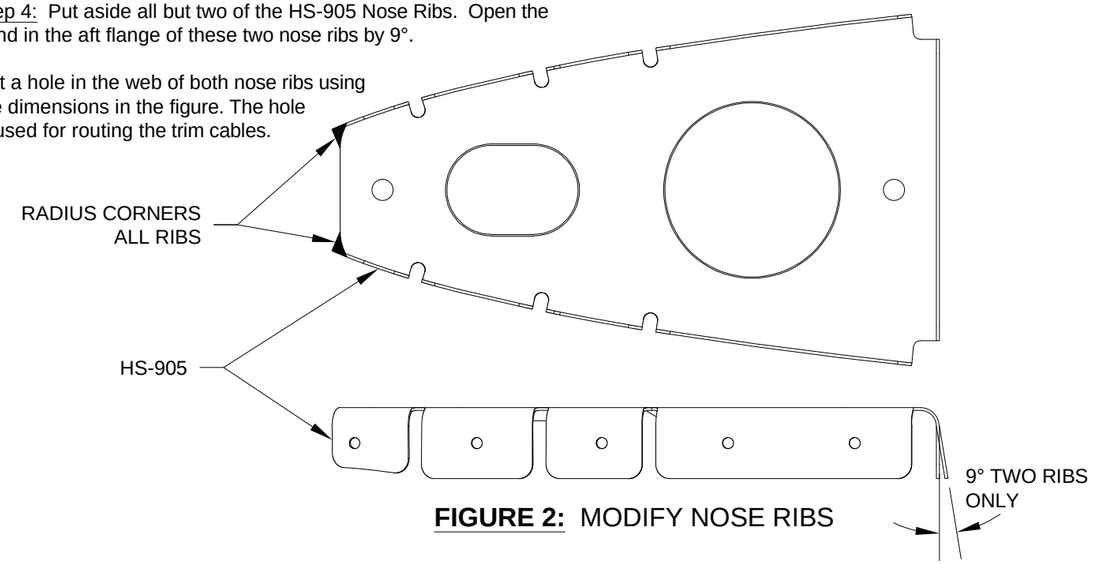


FIGURE 2: MODIFY NOSE RIBS

Step 5: Fabricate four cradles out of 3/8" (min) plywood to hold the horizontal stabilizer during construction. Make a template, used to trace the stabilizer's cross-section, by clecoing together a nose and inspar rib. The 3/16" tooling holes in the ribs can be used to square the ribs with the plywood. Offset the trace about an eighth inch to allow for the thickness of the skins and a duct tape liner. Don't waste time making the cradles perfect; they have no bearing on the alignment of the stabilizer.

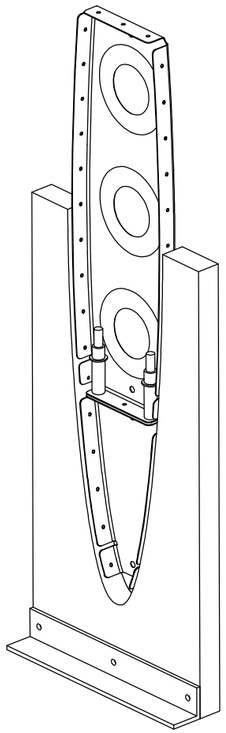


FIGURE 3: FABRICATE CRADLES

NOTE: Only the left side of the horizontal stabilizer is fully depicted in the rest of the manual. The right side is simply a mirror image of the left.

Step 1: Cleco the two modified inboard HS-905 Nose Ribs (the ribs with the hole cut in the web) to the front spar assembly as shown in Figure 1. (Ignore the cradles and skins for now, they are introduced in a later step.) Notice that there are five holes in the spar at these two rib locations, but only three holes in the aft flange of the nose rib. Using a 1/8" drill, match-drill the two extra holes of the spar into the nose rib.

Cleco into position the two inboard HS-1004 Inspar Ribs (the ribs with four trimmed flanges) and, using the same drill, match-drill the center hole of the nose rib and spar into the inspar rib flange.

Step 2: Cleco the rest of the HS-905 Nose Ribs to the front spar assembly as shown in the figure. Note that except for the two inboard ribs, the flanges of the nose ribs are all pointed outboard. Use a #30 drill to final-drill all of the holes common to the nose ribs, spar web, and the two inboard inspar ribs.

Step 3: Cleco the rest of the HS-904 and -1004 Inspar Ribs to the front spar assembly. Once again, except for the two inboard inspar ribs, the flanges of all the ribs point outboard. Notice in the figure that the inspar ribs with two trimmed flanges are located just outboard of the inspar ribs with four trimmed flanges.

Final-Drill the holes common to the inspar ribs and the web of the front spar assembly using a #30 drill.

Step 4: Mark the nose and inspar ribs so that, once removed, they can be reassembled in the same position on the spar.

Step 5: Deburr the edges of the HS-1001 Skins. Remove the vinyl from the inside surface of the skins; the added thickness makes it difficult to install the HS-905 Nose Ribs.

Step 6: Set up the four cradles to support the HS-1001 Skins as shown in Figure 1, then clamp them to the work bench. Adjust the position of the cradles, if necessary, while the stabilizer is being clecoed together so that they don't interfere with it's alignment.

Step 7: Insert the HS-1001 Skins into the cradles. The skins are symmetrical: at this point there is no top or bottom, left or right. So it doesn't matter which skin goes in which cradle. Just make sure the angled end of the skins are facing inboard.

Step 8: One at a time, remove the nose ribs from the front spar assembly and cleco them to the skins. Cleco the front spar/ inspar rib assembly to the nose ribs and the flanges of the front spar to the skins. Don't cleco the inspar ribs to the rest of the skins yet.

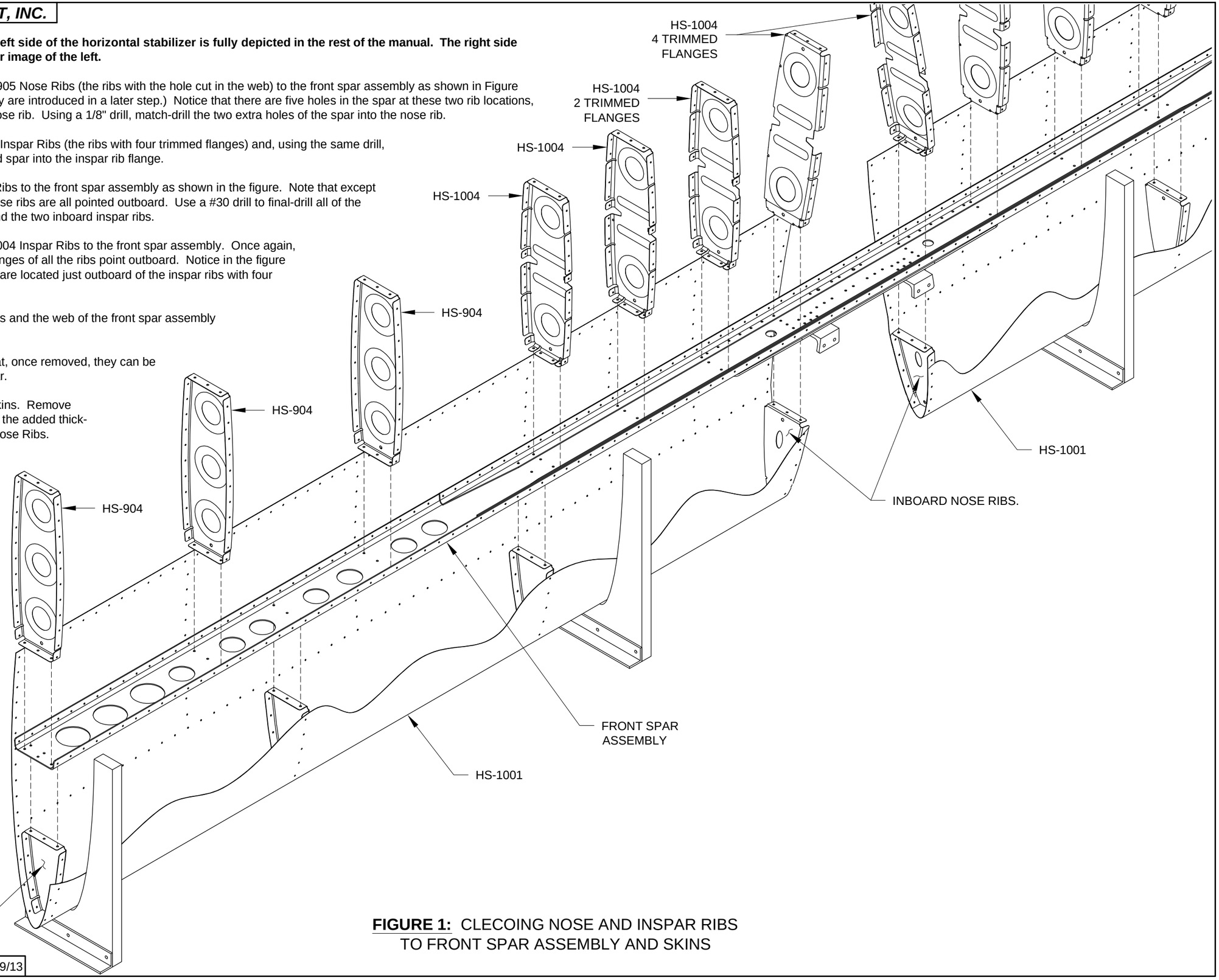


FIGURE 1: CLECOING NOSE AND INSPAR RIBS TO FRONT SPAR ASSEMBLY AND SKINS

Step 1: Cleco the HS-1014 and -1015 Long and Short Stringers together making two stringer assemblies as shown in Figure 1. With a #30 drill, final-drill the five outboard holes on each end of the stringers which are common to both stringers. Leave the eight inboard holes alone for now. Insert the two stringer assemblies into the stabilizer by pulling back the skins (not shown in the figure) and dropping them into the notches in the inspar ribs. This will require lifting the entire assembly out of the cradles slightly. Cleco the skins to all of the ribs and stringers.

Step 2: Cleco the rear spar assembly to the inspar ribs, then final-drill the holes common to the spar and ribs using a #30 drill. The rear spar assembly is symmetrical; there is no left or right.

Step 3: Cleco the HS-1016 Stringer Web to the forward side of the two stringer assemblies, then, using an angle drill, final-drill the holes common to the stringers and stringer web with a #30 drill. Match-drill the four holes in both flanges of the stringer web into the inspar ribs using the same drill.

Step 4: Final-Drill all skin holes to size with a #40 drill. Try to follow a system of drilling and moving clecos prevent missing any holes.

NOTE: The empennage fairing screw holes are indicated on Page 8-14, Figure 1 along the right side of the depicted skin. These holes correspond to holes on the top of the horizontal stabilizer (the HS-1008 Front Spar Attachment Bracket flanges are on the bottom of the horizontal).

Step 5: Mark the empennage fairing screw holes on the skins and on the inboard nose and inboard inspar ribs so that they are not dimpled or riveted later.

Step 6: Mark the parts as you disassemble the stabilizer and deburr all edges and holes.

Step 7: Dimple the skins and rib flanges for the exterior rivets. However, do not dimple the holes marked in Step 5 or the hole in each small tab of the inspar ribs.

Step 8: Machine countersink the holes in the flanges of the front and rear spars and the 3/32" holes of the stringers.

Step 9: Prime all parts, if desired, in preparation for final assembly.

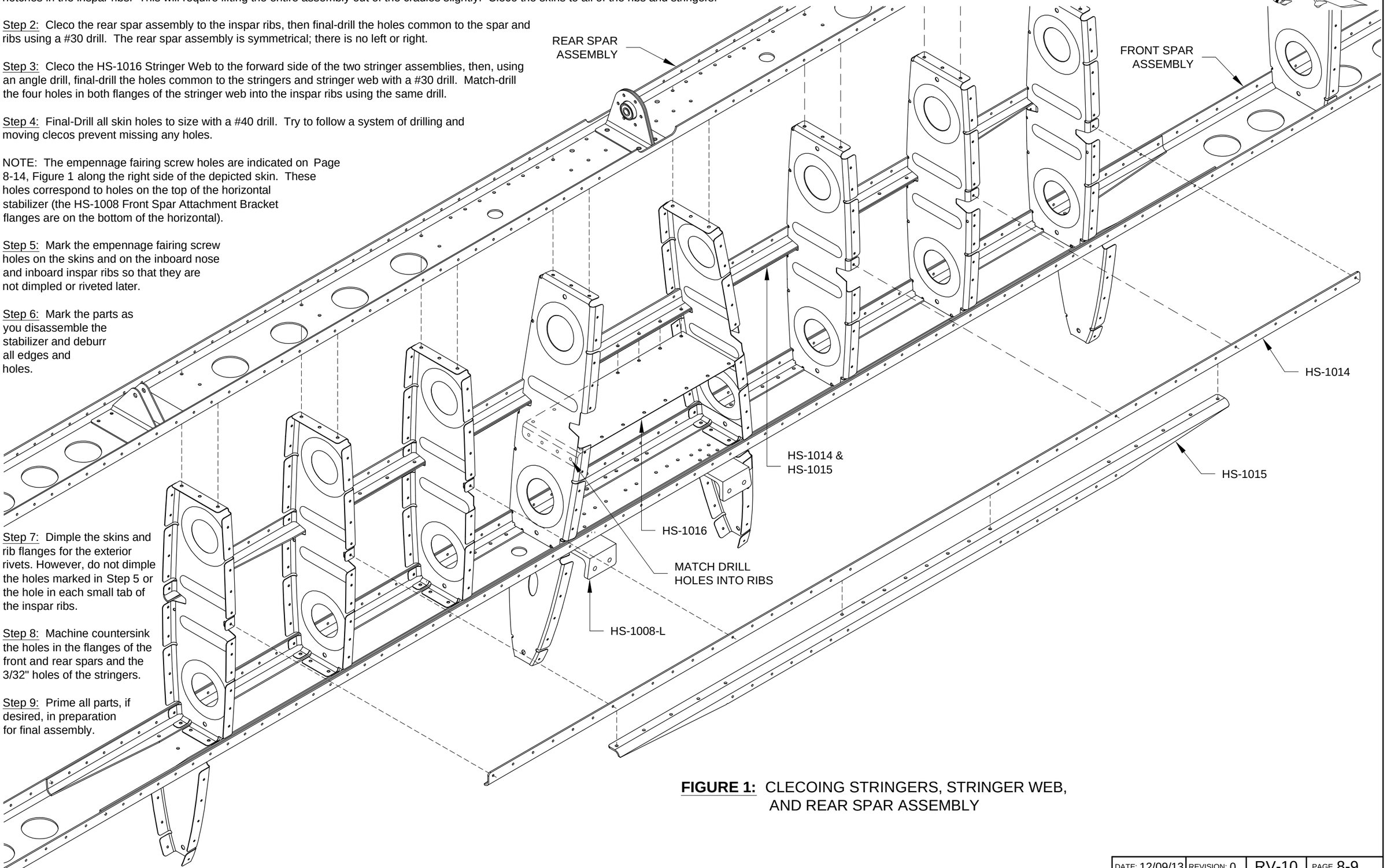


FIGURE 1: CLECOING STRINGERS, STRINGER WEB, AND REAR SPAR ASSEMBLY

Step 1: Rivet the two inboard HS-1004 Inspar Ribs to the flanges of the HS-1016 Stringer Web using the rivets in Figure 1.

Step 2: Rivet the two sets of HS-1014 and -1015 Stringers together and to the HS-1016 Stringer Web using the rivets called out in Figure 1.

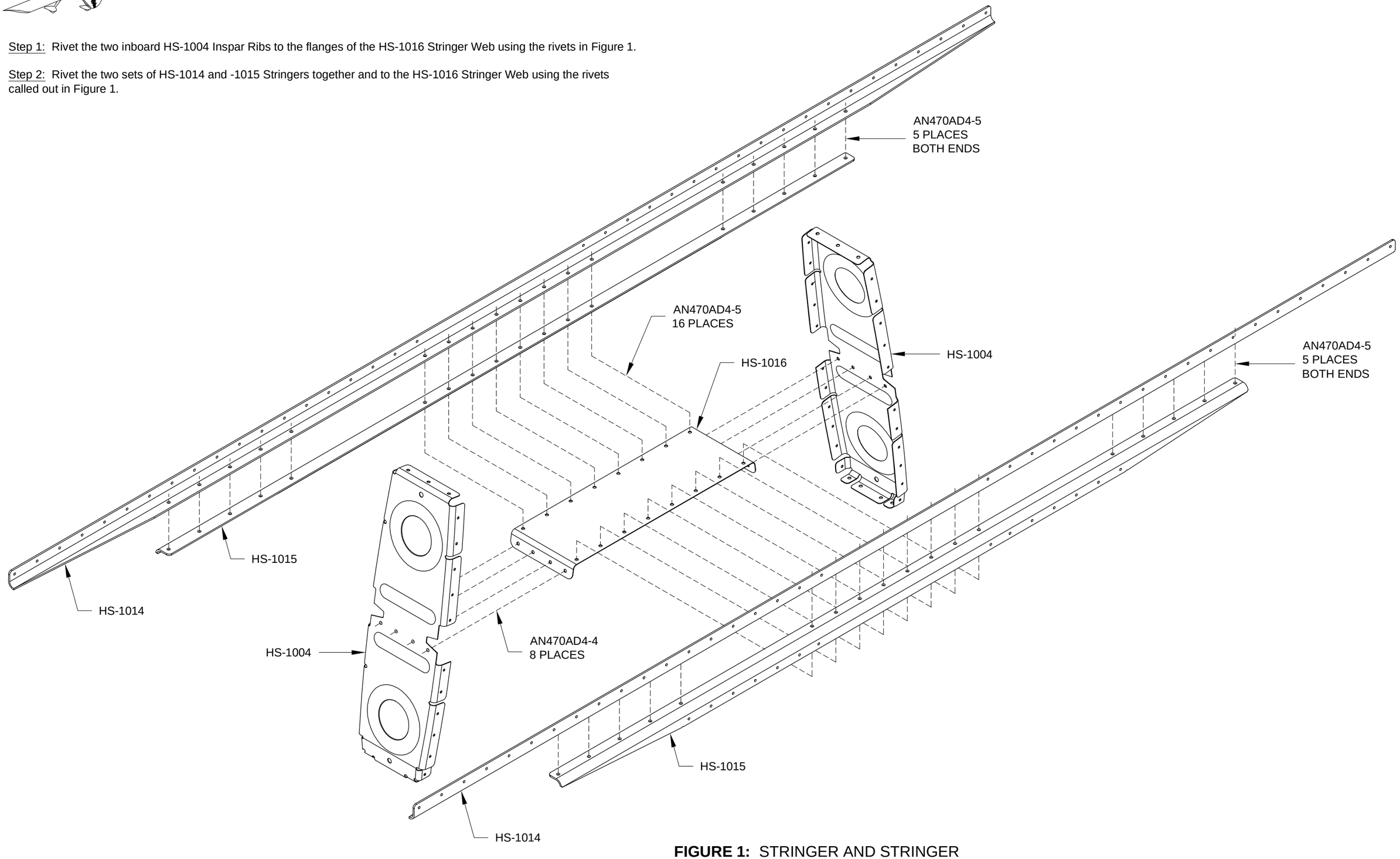


FIGURE 1: STRINGER AND STRINGER WEB RIVETS

Step 1: Press the two SB625-8 Snap Bushings into the 5/8" holes in the front spar assembly as shown in Figure 1.

Step 2: Cleco the inspar Rib, stringer, and stringer web assembly (riveted on the previous page) into position on the front spar assembly. Do not rivet the assembly in place at this time since it shares rivets with two nose ribs.

Step 3: Except for the two outboard HS-904 Inspar Ribs (see Figure 1), cleco the remaining inspar ribs to the front spar assembly. Slide the HS-1004 Inspar Ribs along the stringers to get them into position.

Rivet these ribs in place using the rivets called out in the figure. The rivets called out in the blow up apply to all the HS-1004 Inspar ribs except for the inboard two.

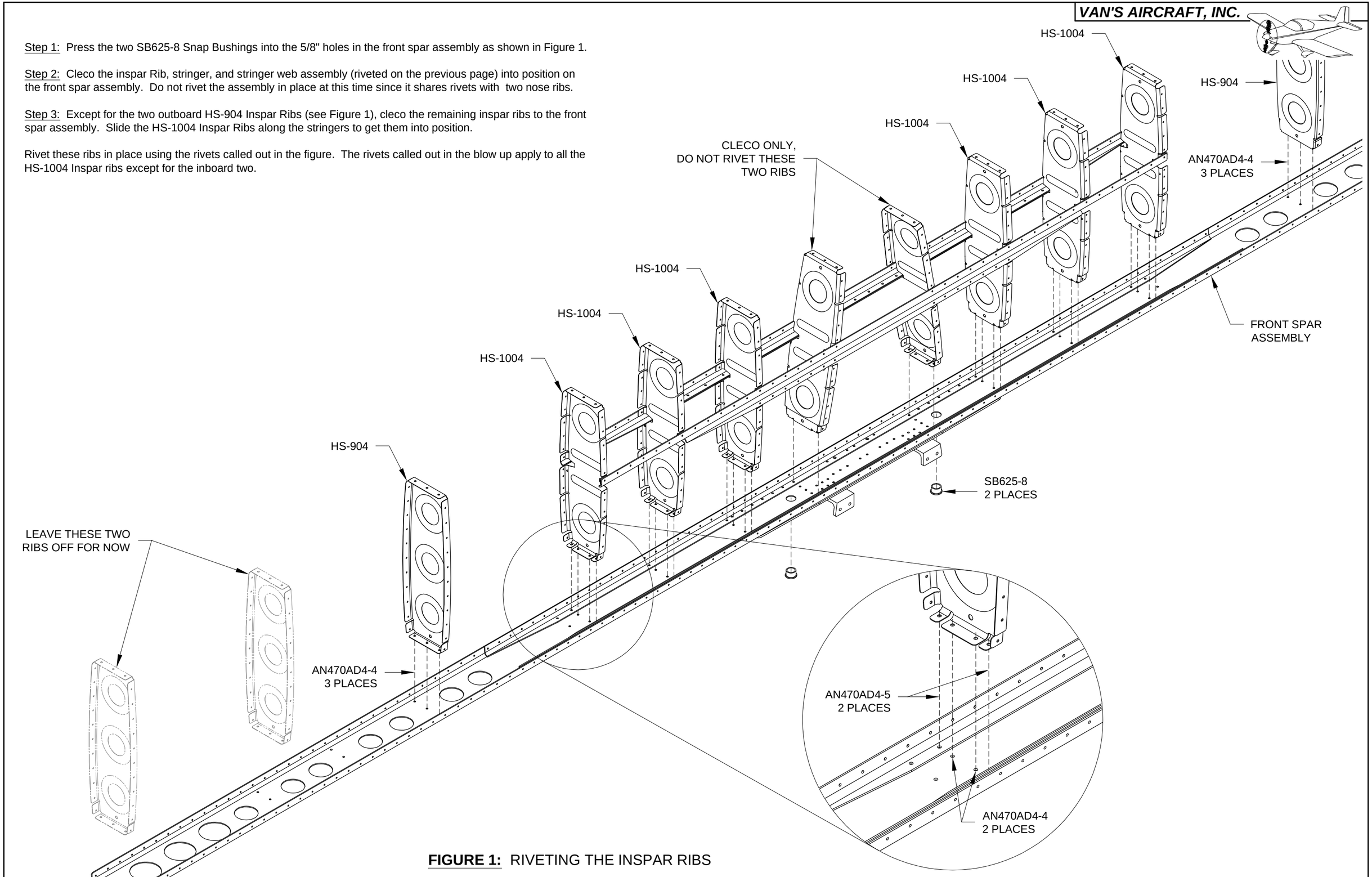


FIGURE 1: RIVETING THE INSPAR RIBS

Step 1: Put both HS-1001 Skins back in the cradles. Cleco all the HS-905 Nose Ribs in place, then rivet them to the skins using the rivets shown on Page 8-14, Figure 1.

Step 2: Insert the front spar/ inspar rib assembly into the skins and cleco it to the nose ribs and skins. Using the rivets shown in Figure 1, rivet the assembly to the nose ribs. (If access to the two inboard nose ribs is limited, making riveting difficult, they can be riveted after the rest of the horizontal's construction is completed. The horizontal can then be removed from the cradles giving better access.)

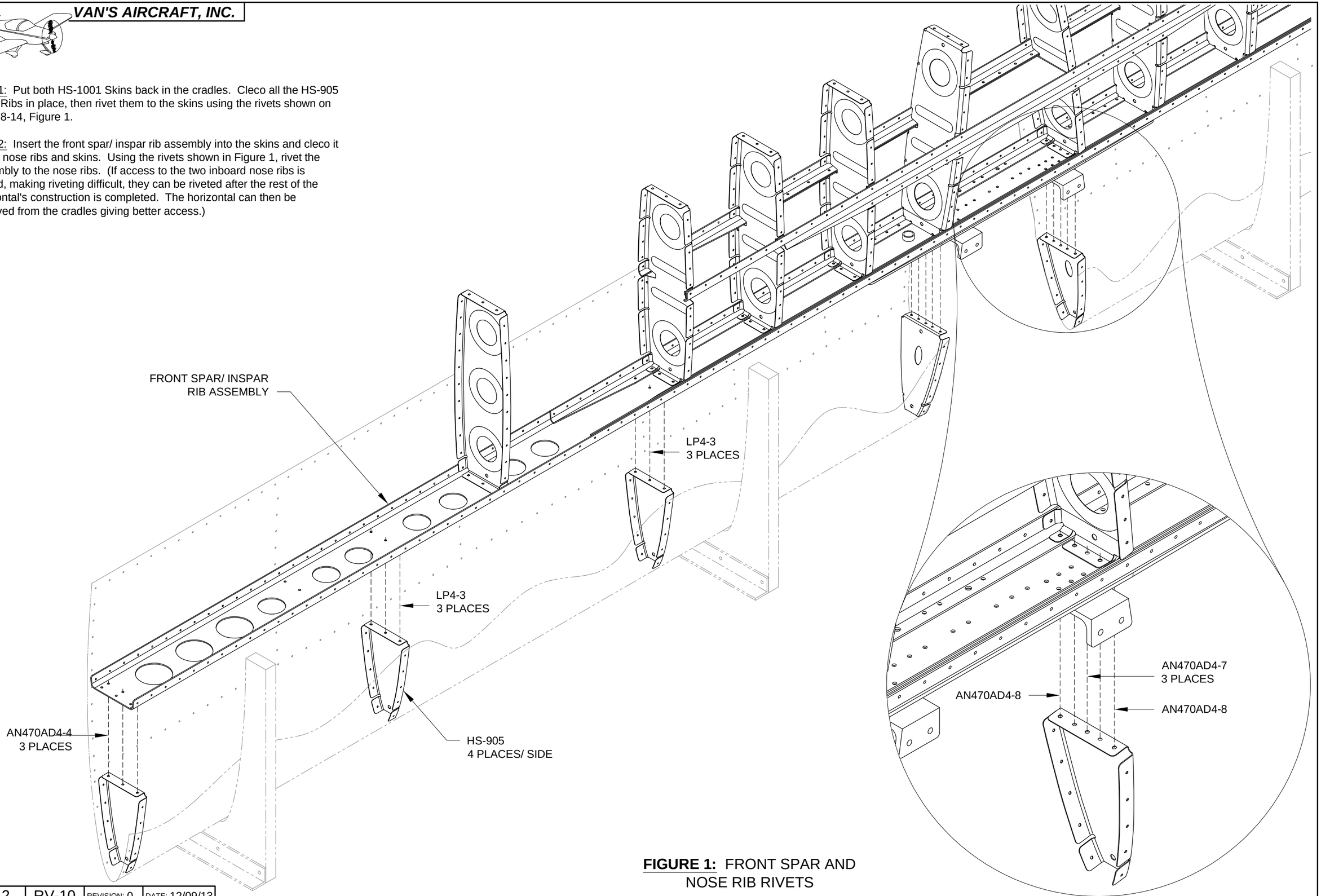


FIGURE 1: FRONT SPAR AND NOSE RIB RIVETS

Step 1: Using the rivets shown in Figure 1, rivet the last two HS-904 Inspar Ribs, on each side of the stabilizer, to the HS-1002 Front Spar web.

NOTE: The rivets used for the rest of the horizontal stabilizer can be found on Page 8-14, Figure 1.

Step 2: Rivet the HS-1001 Skins to the flanges of the front spar assembly. Make sure to capture the flanges of the inspar ribs where they joggle under the flanges of the front spar assembly.

Step 3: Starting from the front spar assembly, rivet the skins to the flanges of the HS-1004 Inspar ribs up to the HS-1014 and -1015 Stringers.

Step 4: Rivet the skins to the HS-1014 and -1015 Stringers.

Step 5: Rivet the skins to the HS-904 Inspar Ribs and the remainder of the HS-1004 Inspar Ribs.

Step 6: Cleco the rear spar assembly into position, then rivet it to the inspar ribs using the rivets shown in Figure 1. For clearance when the elevators are installed, place the manufactured head of the rivets on the spar.

Install the two snap bushings, shown in the figure, into the holes indicated.

Step 7: Finish the horizontal stabilizer by riveting the skins to the flanges of the rear spar assembly.

NOTE: The HS-910 Horizontal Stabilizer Tip Fairings are installed , along with the other empennage fairings, in Section 12.

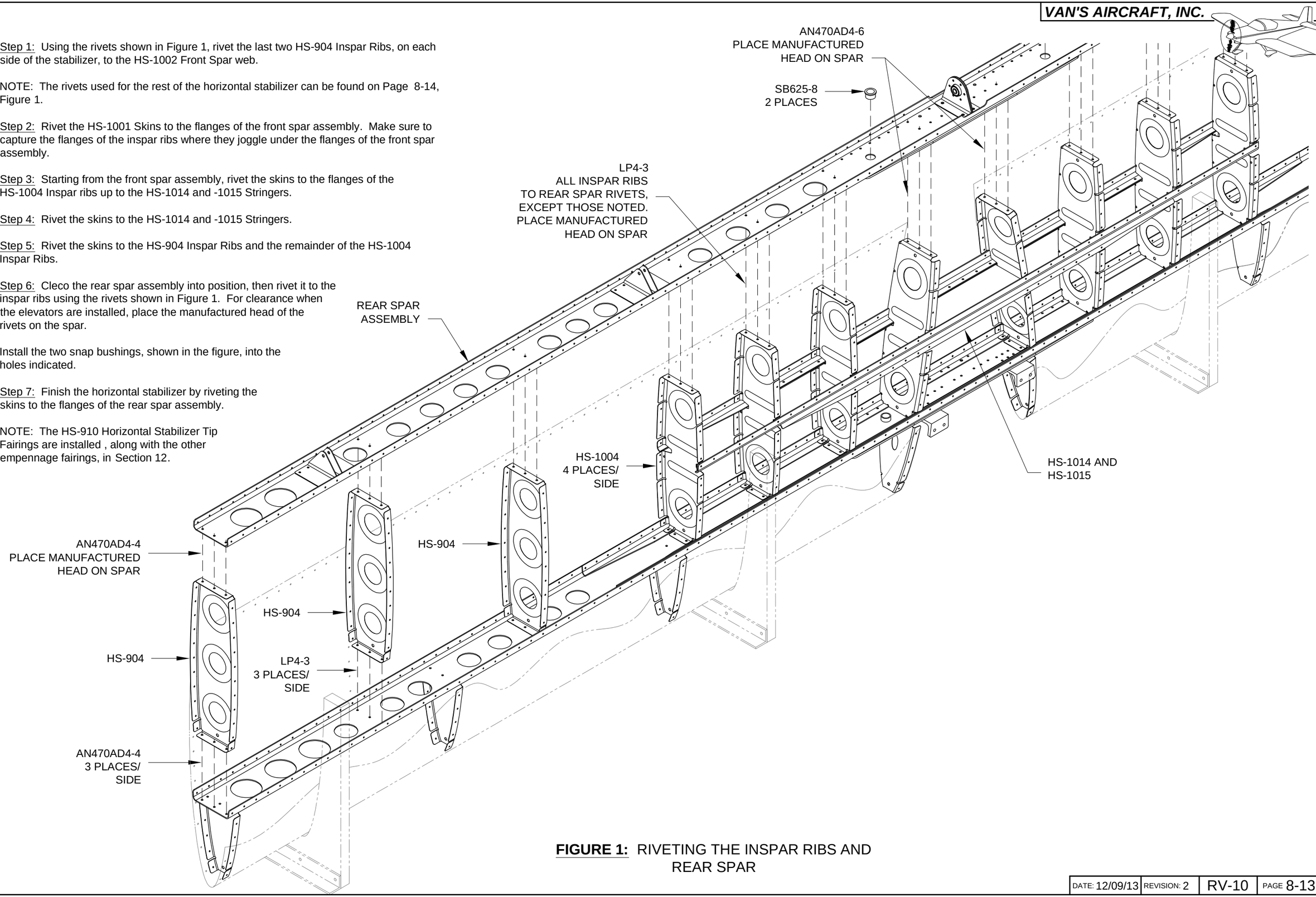


FIGURE 1: RIVETING THE INSPAR RIBS AND REAR SPAR

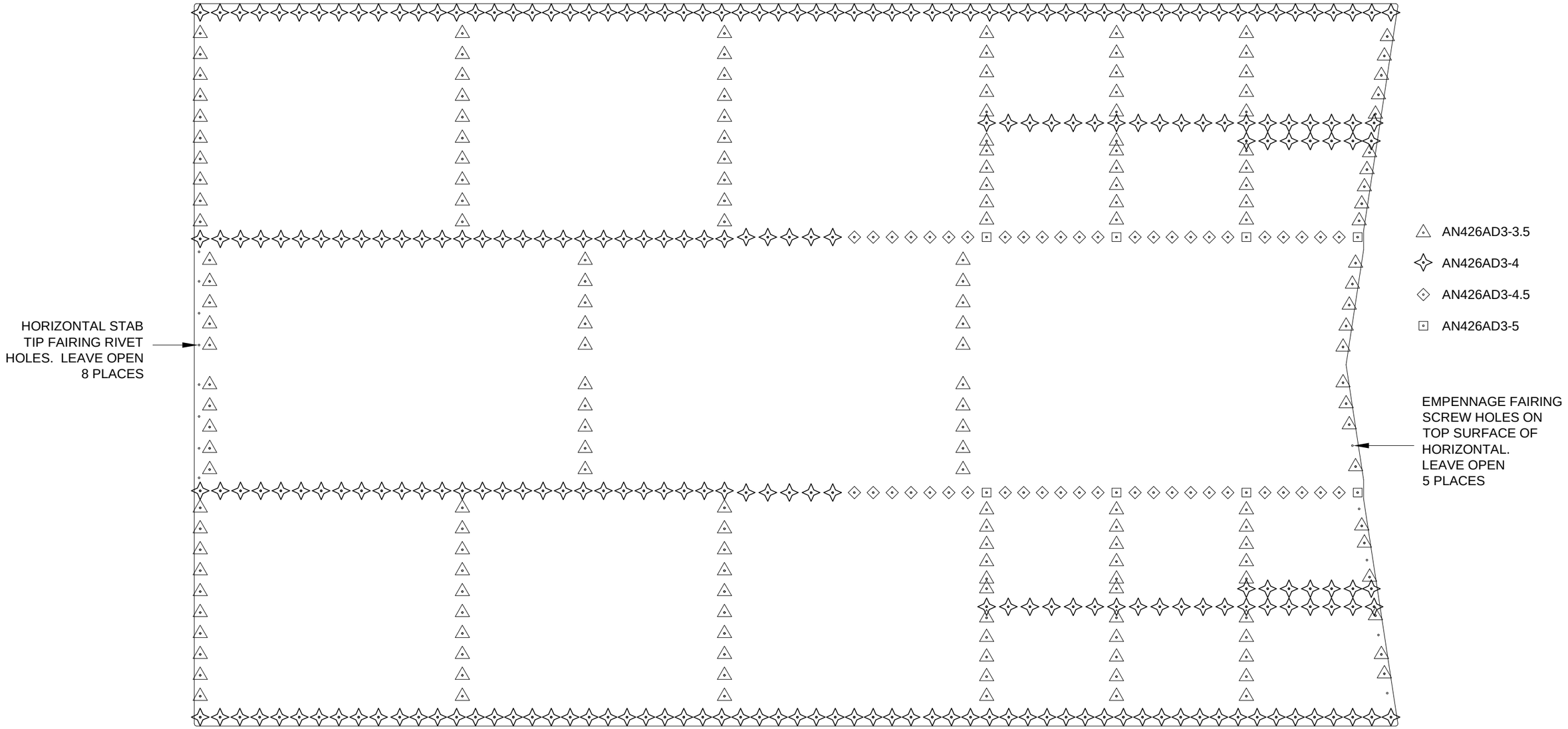


FIGURE 1: SKIN RIVETS