

Flap Assembly

The following instructions describe the assembly of the flaps for the Murphy Elite. The parts list on the pervious page is all the parts required to assemble **one** flap. This list should be compared to the parts received in the Elite kit.

To assemble the *Elite* Flaps you will require the following tools:

- 1) Variable speed Hand Drill
- 2) #40 and #30 & #11 Drill Bits
- 3) Quantity of 3/32", 1/8", & 3/16" Clecos
- 4) Cleco Pliers
- 5) Deburring Tools
- 6) Felt Marker
- 7) Riveter
- 8) 1/2" Drill Bit or 1/2" Template and Round File
- 9) Approximately 8 Spring Clamps
- 10) Dimple Tool

One left and one right flap are required for the Elite. The right flap will be built first according to the following instructions. Layout all the parts in a similar manner to the Iso-view. The left flap will be built the same way except the Horns and Rib flanges will be reversed. **NOTE:** The Flap Skin was left out for clarity.

6.1 Bushing Install

- 1) Drill and countersink the four #30 holes in each of the supplied Brass Bushings (AIL-27). **NOTE:** A 1/2" drill bit ground to the proper angle works well for countersinking the holes. Figure 6.1.1.

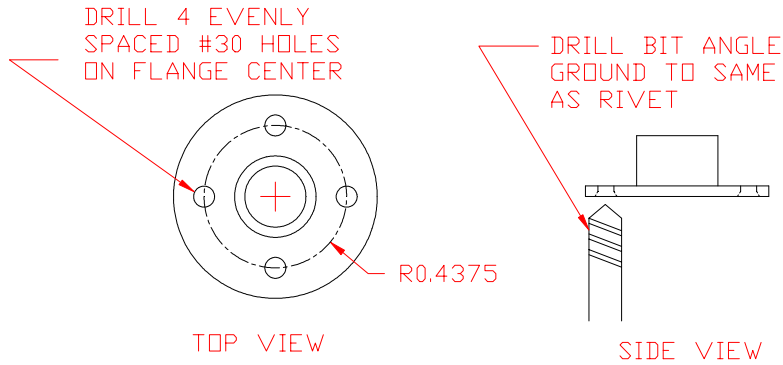


Figure 6.1.1

- 2) Prepare a Leading Edge Rib (AIL-22L) for bolt access to the Center Hinge. Cut a 1" hole centered on the pivot tooling hole in the rib in the location shown in figure 6.1.2. This can be done with a hole saw or a series of #30 holes and a half round file. This rib will be used at rib station #5.

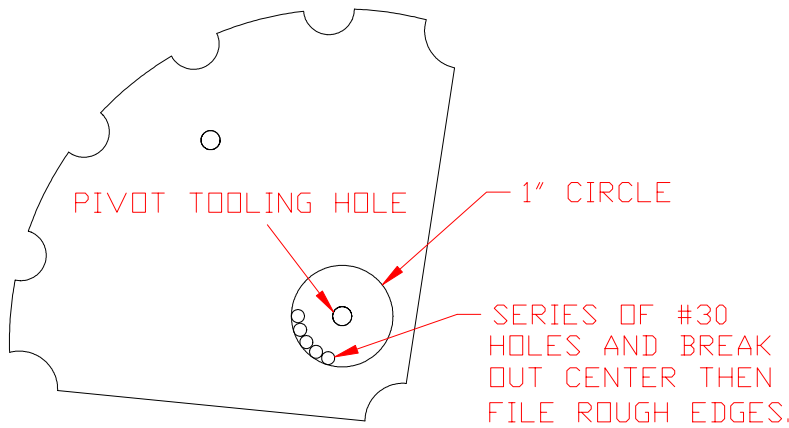
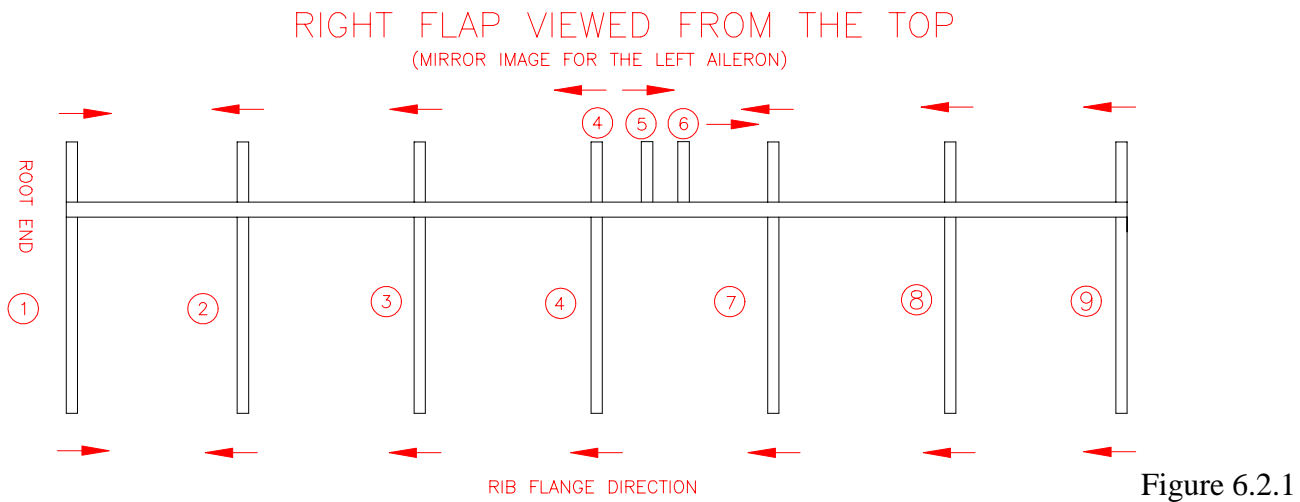


Figure 6.1.2

- 3) Prepare a Leading Edge Rib (AIL-22R) for the center Bushing assembly (rib station #4). Cut a 5/8" hole centered on the "pivot" tooling hole in the rib. The tooling hole is in the same location as the tooling hole shown in figure 6.1.2. This can be accomplished with a 5/8" drill or a 5/8" circle template and a round file. **NOTE:** The oversize hole in this rib will allow the Hinge Doubler/ Bushing to move around for final adjustment.

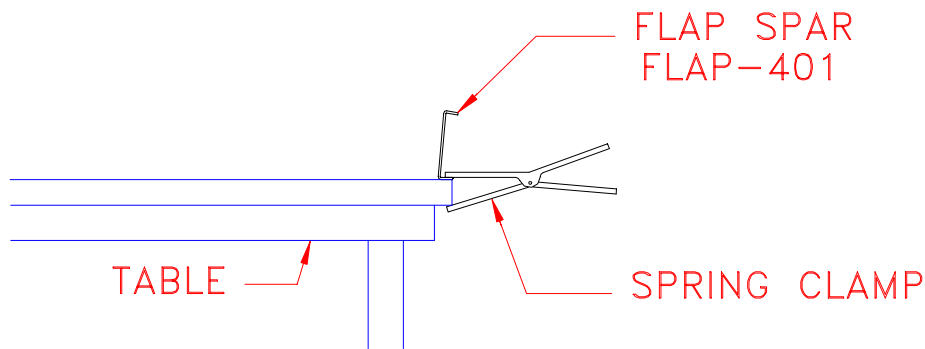
6.2 Rib Install

1) Lay out all parts for Flap as in Figure 6.2.1. Make sure the rib flanges are facing the correct direction. The Main Aileron Ribs (AIL-23) are symmetrical and therefore there are no lefts and rights. The Leading Edge Ribs (AIL-22L & AIL-22R) are not symmetrical so make sure you have the correct rib facing the correct direction. Rib stations 1, 5 and 6 use AIL-22L and rib stations 2, 3, 4, 7, 8 and 9 use AIL-22R. See Figure 3 for rib locations. The long flange of the rib goes against the spar.



2) With a felt pen label the main ribs and rib locations on the Spar from one to nine. Mark a line down the center of each rib flange.

3) Clamp the Spar to the edge of your table as in Figure 6.2.2.



4) Place a Leading Edge Rib (AIL-22L or AIL-22R) in front of the spar as shown in figure 6.2.3. End ribs must be flush with the ends of the spar. Make sure you can see the line you drew on the rib when looking through the factory punched holes in the spar.

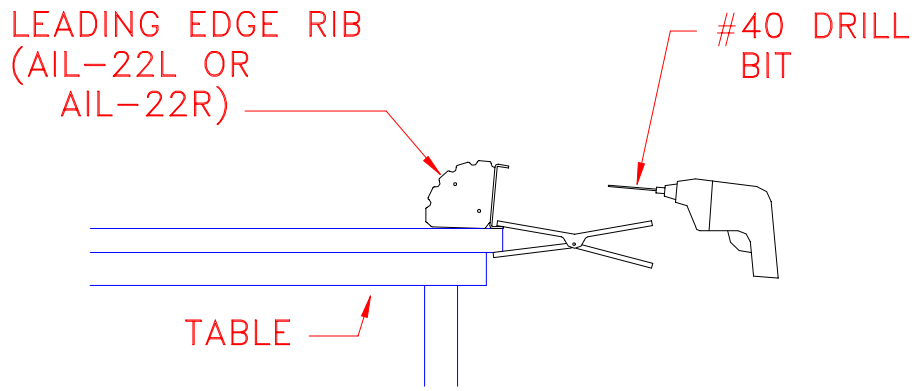
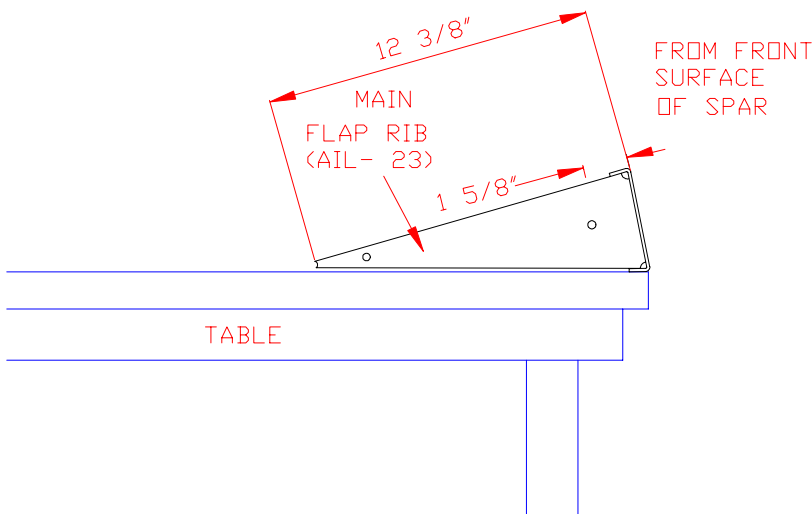


Figure 6.2.3

- 5) When you can see the line through the holes, drill the top hole with a #40 drill. Cleco, then drill the bottom hole and again cleco. Drill remaining holes in rib. You may wish to use a small block of wood to hold the flange of the rib in place while drilling to protect your fingers.
- 6) Repeat steps until all the Leading Edge Ribs are drilled.
- 7) Remove the Leading Edge Ribs and remove the spar from the table.

Figure 6.2.4



- 8) Now we will start drilling the main flap rib. Trim the main flap ribs to $12 \frac{3}{8}$ in. as shown in figure 6.2.4.
- 9) Turn the spar around and position the Main Flap Ribs (AIL-23) in place. See Figure 6.2.1 for flange direction.
- 10) Check that you can see the lines on the ribs. Then drill and cleco as you did with the Leading Edge Ribs.
- 11) Cleco the Leading Edge Ribs, the Spar and the Main Flap Ribs together and drill out all the #40 holes to #30 holes. It helps if you have an extra long #30 drill bit.
- 12) Disassemble and debur all parts.

13) Chromate all mating surfaces and rivet together the Leading Edge Ribs, the Spar and the Main Aileron Ribs with 1/8" avex rivets (RV-1410). **NOTE:** Do not rivet the Leading Edge Rib to the Flap Spar at rib location #5 at this time.

14) Once done, repeat steps for the left flap.

15) Drill a #40 hole in the bottom flange of all the Main Flap Ribs. This hole should be 1-5/8" from the front surface of the Spar and centered on the bottom flange. See Figure 6.2.4.

6.3 Center Hinge

1) Before the flap skin can be installed, the AIL-403 Center Hinge cover must be prepared. Position it firmly over the center hinge cut out on the outside of the flap skin as shown in figure 6.3.1. Using the flap skin as a drill guide, back drill through the AIL-403 . Drill #40, cleco as you go.

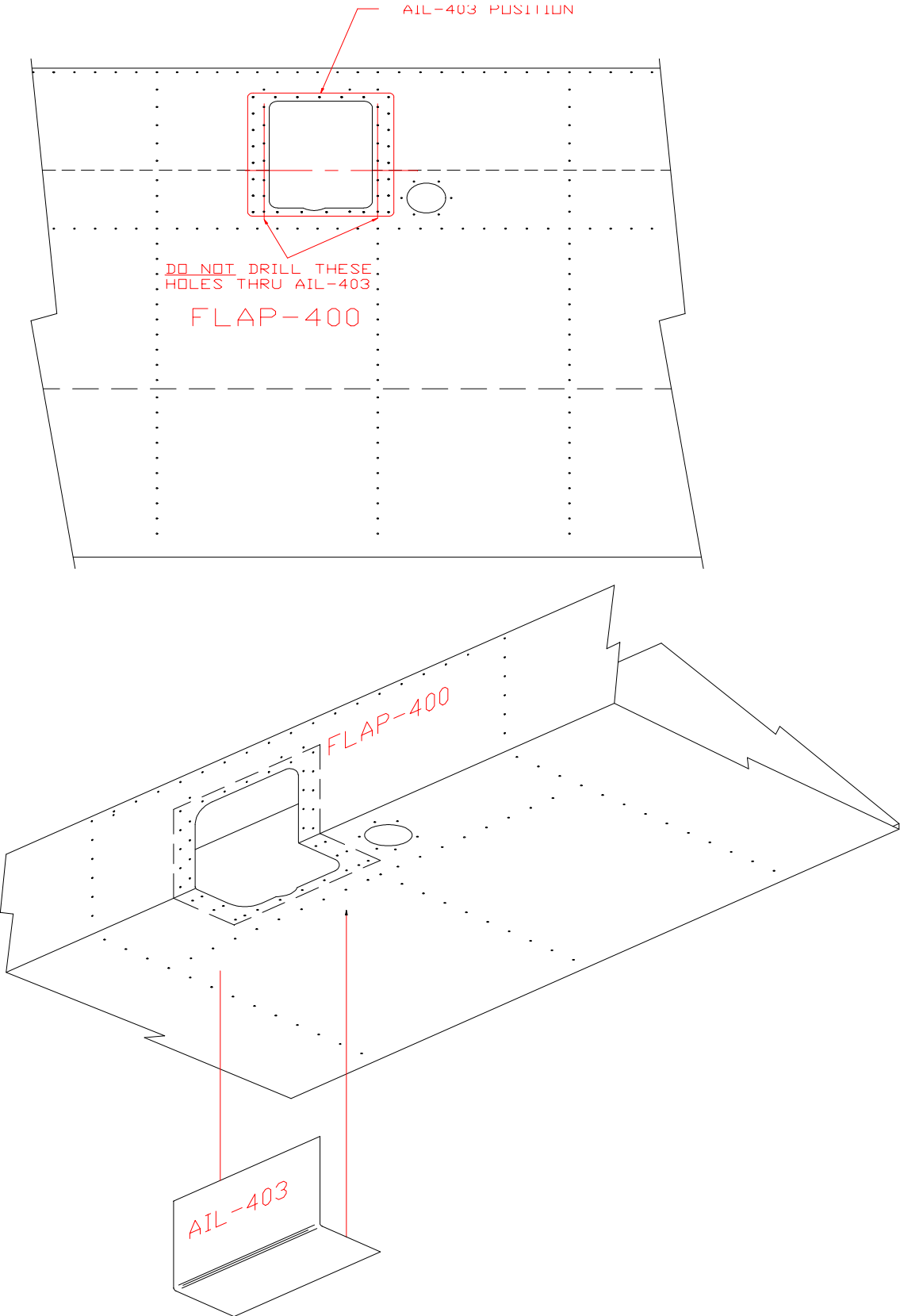


Figure 6.3.1

2) Remove the center hinge cover and trim. See figure 6.3.2.

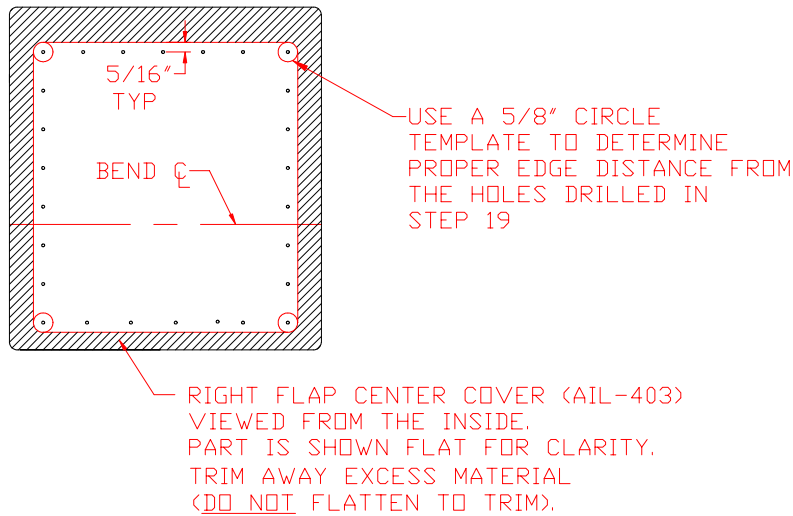


Figure 6.3.2

6.4 Skin Install

1) Lay the Flap on the table as shown in figure 6.4.1. Slip the spar/ rib assembly into the Flap Skin and cleco the #1 Main Flap Rib hole in the skin into the hole drilled in step #19. Be certain the center lines on the rib flanges are visible through the pre-punched holes in the flap skin.

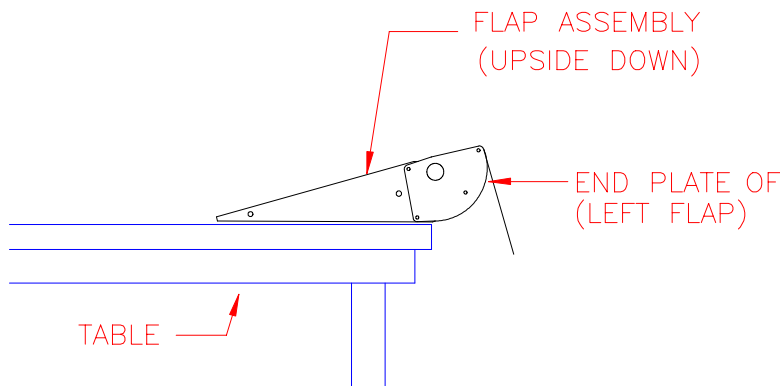


Figure 6.4.1

- 2) Working from the center of the Flap to each end, and from the #1 rib hole (Drilled earlier) to the Trailing Edge, drill #40 holes and cleco the Skin to the Main Flap Rib through the pre-punched holes in the skin.
- 3) Through the pre-punched holes in the skin drill the spar rivet line after the flap has been leveled. Work from the center to each end, drilling every sixth rivet hole, cleco as you go. Then drill the remaining holes with a #40 drill.
- 4) Position the Leading Edge Ribs by locating the rib center line through the pre-punched holes in the skin. From the center, work towards the ends, and from the spar to the Leading Edge drill and cleco the skin to the Leading Edge Ribs.
- 5) Prepare the work surface for the remainder of the assembly by positioning 2 x 4s to support the Flap. Figure 6.4.2.

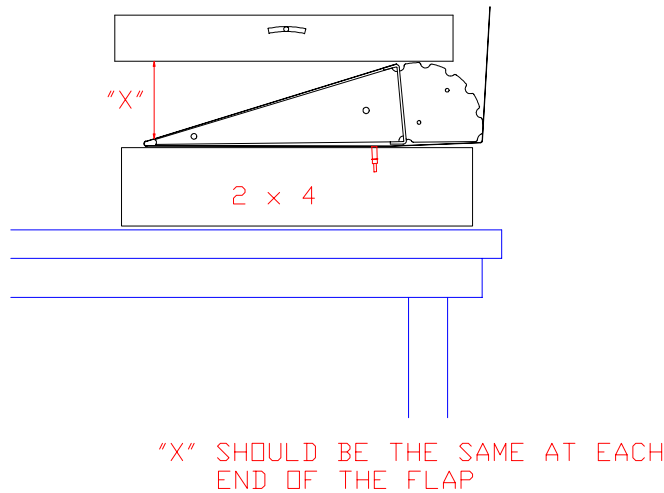


Figure 6.4.2

6) Lay the Flap right side up on the 2 x 4 supports. Make sure there are no clecos where the Flap is supported. Weigh the flap down at the support locations (paint cans work well) and level the structure. "X" should be the same at each end of the Flap. Figure 6.4.2.

7) Through the pre-punched holes in the Skin, drill and cleco the Spar/ Main Rib assembly to the Skin. Make sure the center line on the rib flanges are visible through the holes in the Skin. Work from the center of the Flap out to each end. From the Trailing Edge to the Flap Spar, drill #40 and cleco.

8) Attach the Leading Edge Ribs to the Flap Skin, working from the center toward each end, and from the bottom of the nose to the Flap Spar. Drill and cleco as you go. Masking tape or packing tape may be used to assist in pulling the skin around the Leading Edge Ribs. The center lines on the ribs should be visible through the holes in the skin. Use a sharp #40 drill bit and press lightly. The rib tabs bend easily. Figure 6.4.3.

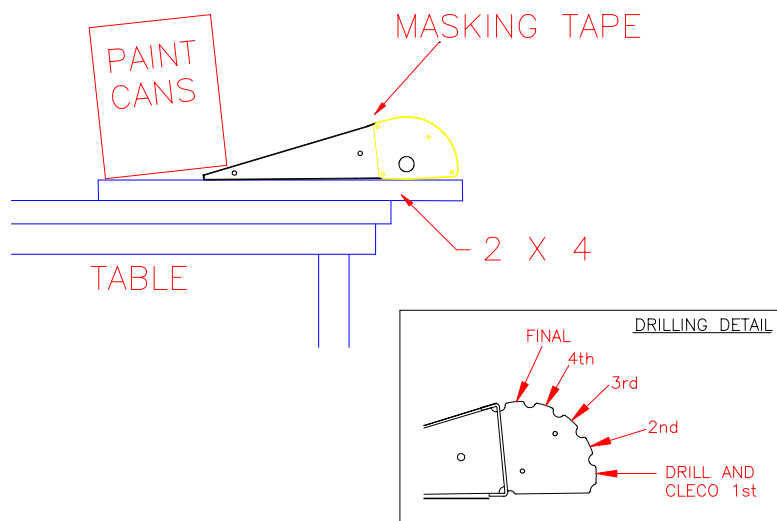


Figure 6.4.3

- 9) Now we will drill the spar holes. Double check the Flap for any twist. Make sure to weigh down the flap. Working from the center out to each end of the Flap, drill the top flange of the Spar through the pre-punched holes in the skin. Drill #40 in every sixth hole and cleco as you go. Drill #40 through the rest of the holes.
- 10) Cleco the AIL-403 Center Cover into position and then drill all #40 holes to #30.
- 11) Remove the Center Cover (AIL-403) and drill the hidden #40 holes to #30.
- 12) Disassemble and debur. Dimple the top three holes (marked final, 4th and 3rd in figure 11) closest to the spar line on every leading edge rib. Rib stations 4, 5 and 6 must have all the leading edge holes dimpled. Figure 6.4.4.

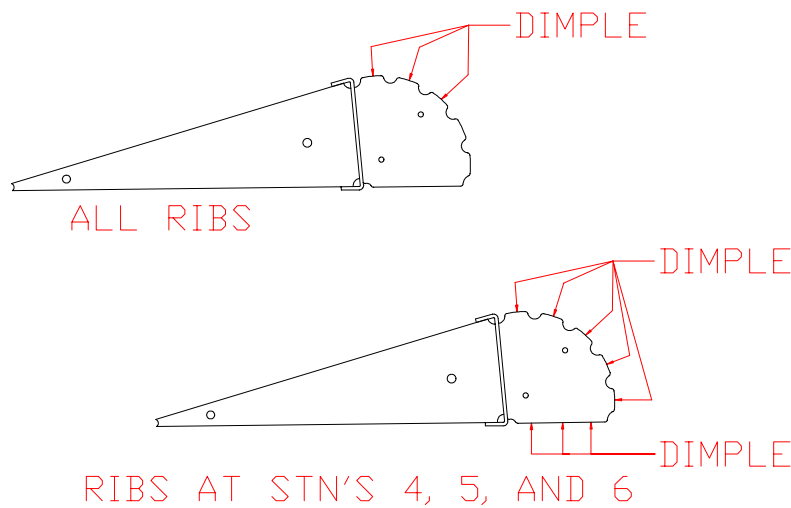
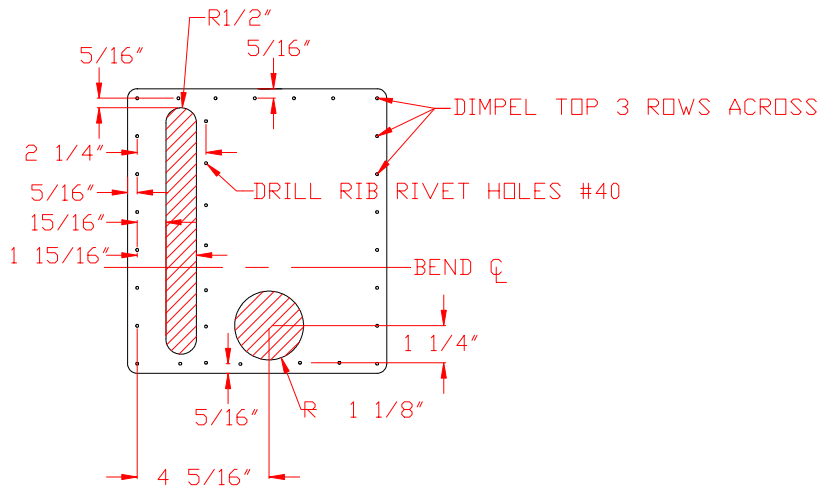


Figure 6.4.4

- 13) Chromate all mating surfaces and reassemble the flap and rivet together using RV-1410 & RV-4412 avex rivets. **NOTE:** Do not rivet the holes at the midpoint hinge cover area. Do not rivet the station #4 rib to the skin at this time.

6.5 Horn & End Plates

- 1) Cut a hinge slot and an access hole into the AIL-403 hinge center cover. See figure 6.5.1 for dimension details.

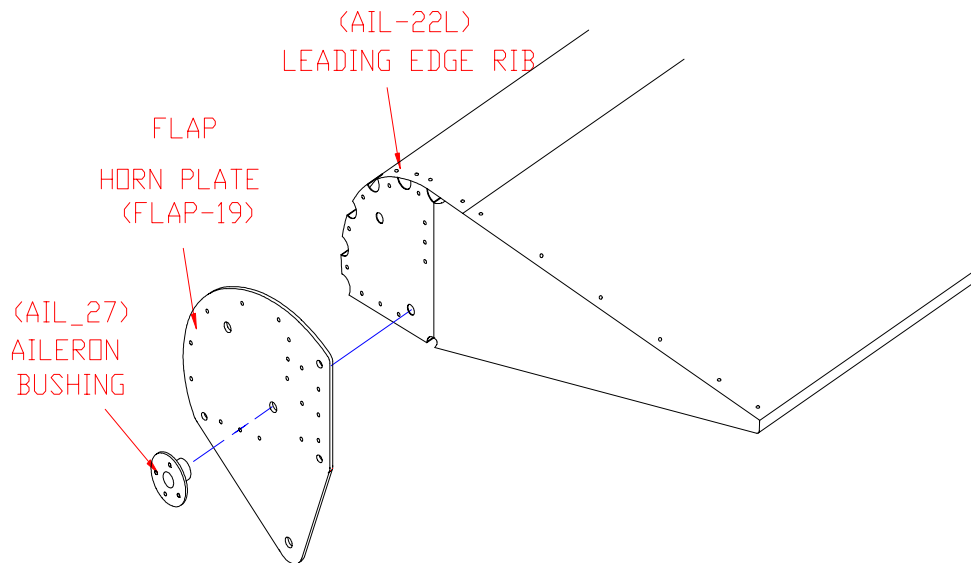


VIEW OF RIGHT AILERON/FLAP CENTER COVER
 (AIL-403) FROM THE INSIDE
 PART IS SHOWN FLAT FOR CLARITY
DO NOT FLATTEN
 CUT OUT AS SHOWN

Figure 6.5.1

NOTE: The center hinge cover will not be installed at this time. It will be installed after the flap has been fitted to the wing.

- 2) Cleco a horn plate (FLAP-19) to the root leading edge rib, use the #11 tooling holes (rib station #1). Figure 6.5.2.

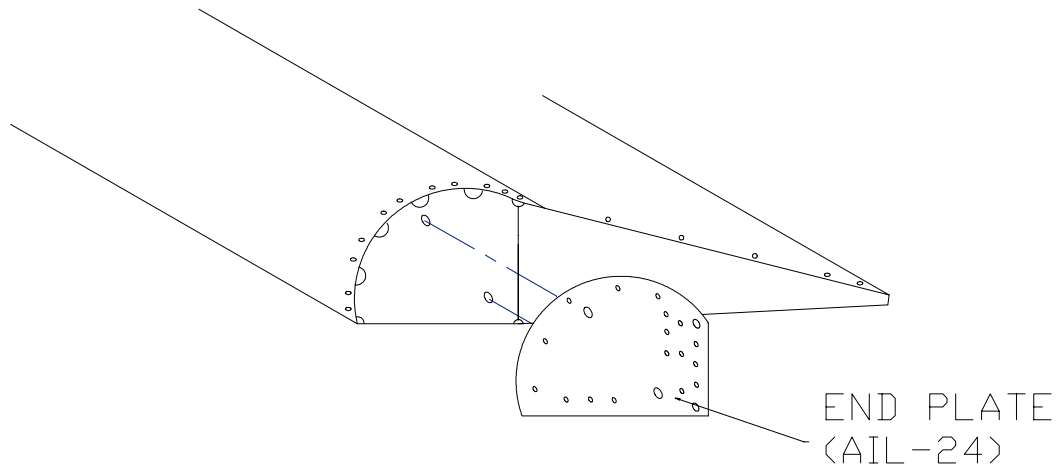


FINAL HORN PLATE/RIB/BUSHING ASSEMBLY

Figure 6.5.2

- 3) Using the horn plate as a drill guide, drill the #30 rivet holes into the rib. With a #11 drill bit, drill through the two tooling holes near the rear of the plate and cleco solidly in place.
- 4) Remove the cleco from the pivot position hole. Drill this hole out to 1/2”.
- 5) Insert a brass bushing (previously drilled and countersunk) into the 1/2” hole. Using the countersunk holes in the bushing, drill four #30 holes through the horn and rib.

- 6) Disassemble, debur, and chromate the mating surfaces and rivet together with 1/8" avex rivets (RV-1410). In the three #11 holes use 3/16" avex rivets (RV-1613). In the brass bushing use four 1/8" CS rivets (RV-4412).
- 7) Cleco an end plate to the tip leading edge rib using the #11 tooling hole (Rib station #9). Figure 6.5.3.



Figure

6.5.3

- 8) Using the end plate as a drill guide, drill all the #30 holes into the rib. Use a #11 drill bit and drill through the tooling holes in the end plate.
- 9) Remove the cleco from the pivot hole and drill out to 1/2".
- 10) Insert a brass bushing (previously drilled and countersunk) into the 1/2" hole. Using the countersunk holes in the brass bushing as a guide, drill the 4 holes into the end plate and rib.
- 11) Disassemble, debur and chromate the mating surfaces and rivet the bushing to the flap and endplate using 1/8" (RV-1410) rivets and 1/8" (RV-4412) rivets. Figure 6.5.4.

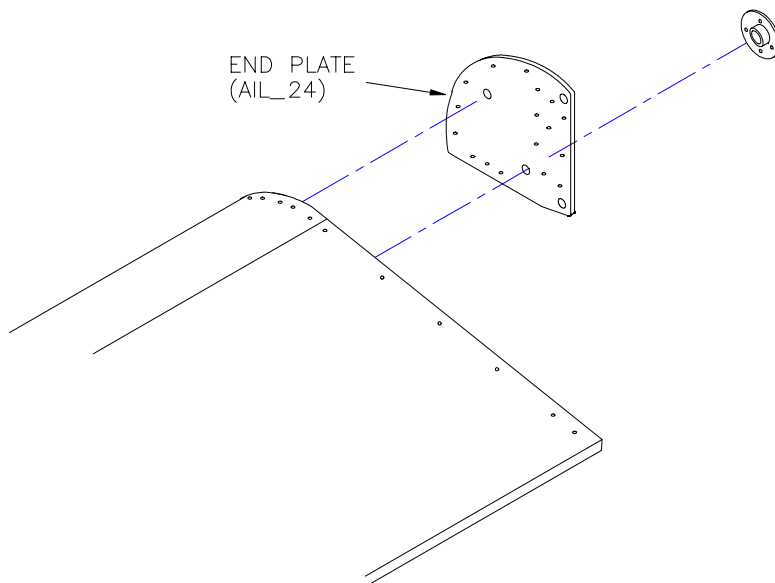


Figure 6.5.4

- 12) Remove the leading edge rib from station #5.

- 13) Mount the flap assembly to the wing. Using AN4-21 bolts and AIL-26 bushings at the horn plate and outboard hinge plate. **NOTE:** The wing is upside down on the table.
- 14) Prepare a End Plate for the mid point hinge by drilling the #11 pivot hole to 1/2". This endplate must be trimmed to fit. Use the AIL-22 leading edge rib to mark the end plate for trimming. Trim 1/8" back from the mark made using the rib. Figure 6.5.5.

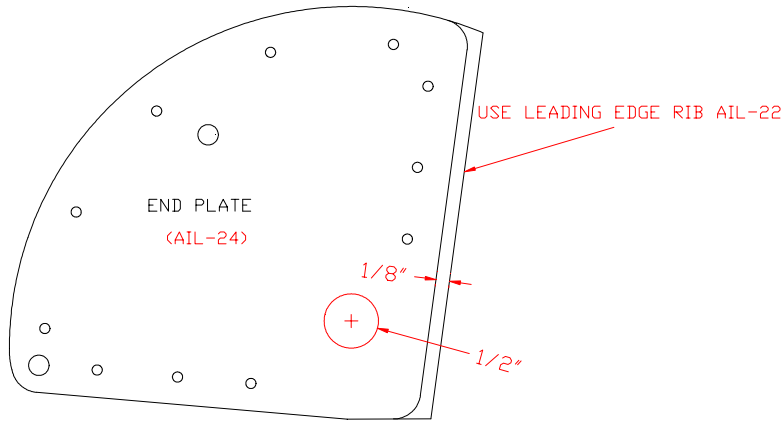


Figure 6.5.5

- 15) Fit the End Plate, brass bushing and the AIL-26 bushing to the center hinge leading edge rib. The hinge backing plate will find its own center. Figure 6.5.6.

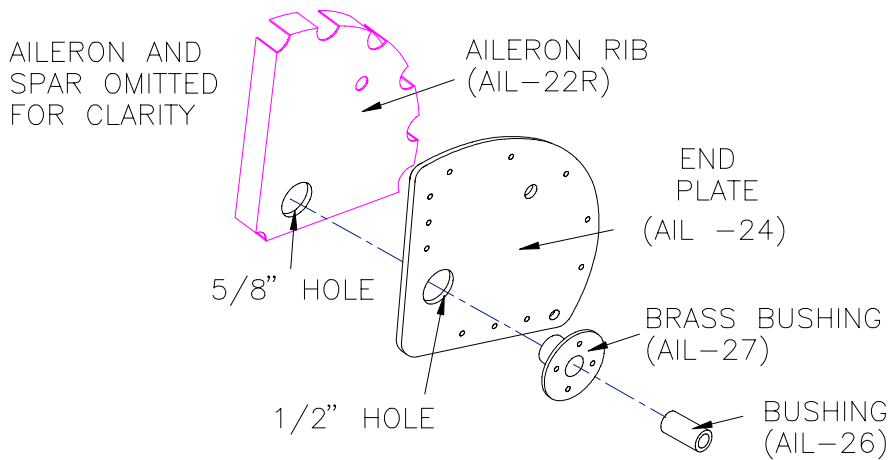
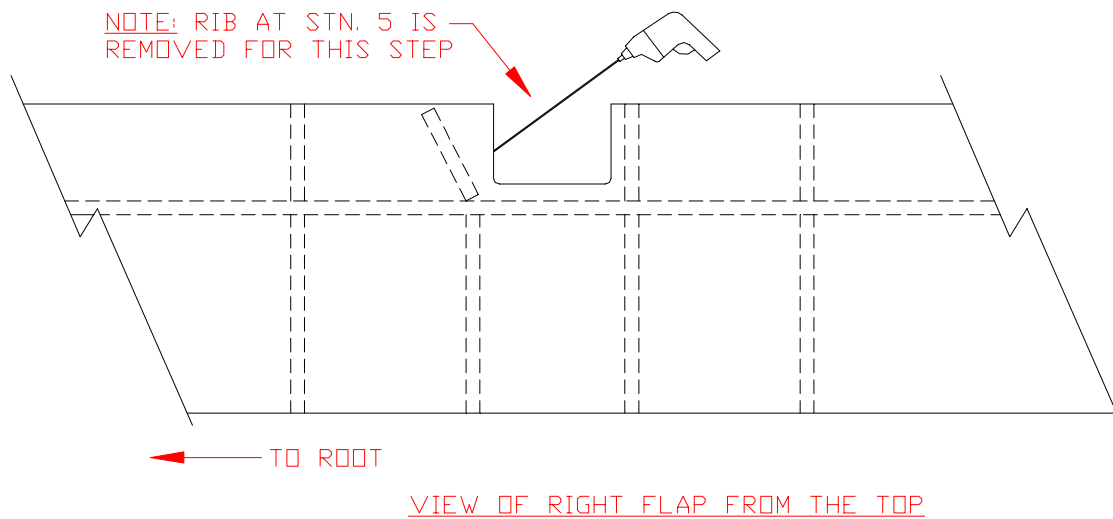


Figure 6.5.6

- 16) Fit a bolt through the flap center hinge and End Plate assembly and the wing mounted hinge.
- 17) Drill and cleco as many of the holes in the AIL-24 Plate as you can reach (2 or 3 is O.K.). Use a long #40 drill bit.
- 18) Remove the flap from the wing, bend the bushing/ end plate/ rib assembly into the flap far enough to allow drilling and riveting of the end plate and bushing. Drill the remaining holes to #40. Drill the bushing holes to #30, then drill all the remaining holes to #30. Figure 6.5.7.



Figure

6.5.7

- 19) Disassemble and debur parts. Chromate and then rivet together using 1/8" (RV-1410) rivets in the doubler and rib and 1/8" (RV-4412) CS rivets through the brass bushing.
- 20) Pull the rib/bushing back into position and rivet to the skin using RV-4412.
- 21) Re-install the station #5 rib and rivet it to the spar.
- 22) Rivet the center hinge cover plate to the flap using 1/8" (RV-4412) CS rivets.

