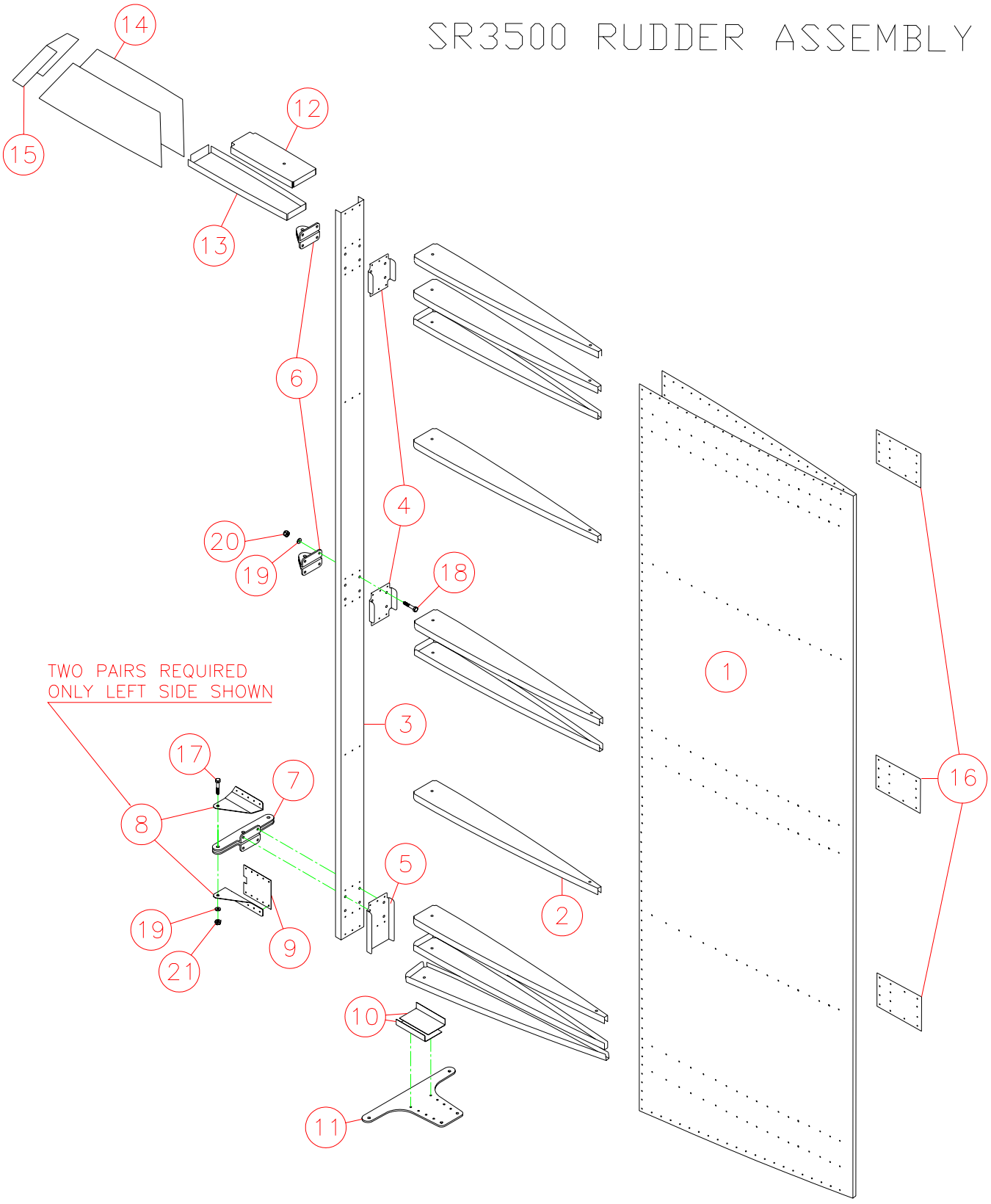
Rudder Assembly

To assemble the *SR3500* Rudder, you will need the following tools:

1. Drill
2. Tape Measure
3. Felt Marker
4. #30, 3/16” Drill Bits
5. #40, #30 and 3/16” Clecos
6. Cleco Pliers
7. Two 3/8” Wrenches
8. Aviation Snips

Riveter


SR3500 RUDDER ASSEMBLY
14
15
12
13
6
4
20
19
18
TWO PAIRS REQUIRED
ONLY LEFT SIDE SHOWN
3
17
7
8
5
19
21
9
10
11
1
2
16

Rudder Parts List

NO.	PART NAME	PART NUMBER	QTY SHIPPED
1	RUDDER SKIN	RU0104	1
2	ELEV/RUD RIB	EL0303	10
3	RUDDER SPAR	RU0103	1
4	ELEV/RUD HINGE DOUBLER	EL0307	2
5	RUDDER HORN DOUBLER	EL0318	1
6	ELEV/RUD HINGE	EL0300	4
7	ELEV/RUD HORN	EL0301	2
8	RUDDER HORN DOUBLER x 4*	RU0420	1
9	RUDDER HORN GUSSET BASE PLATE x 2*	RU0450	1
10	RUDDER RIB DOUBLER BOTTOM x 2*	RU0411	1
11	RUDDER BOTTOM HORN	RU0105	1
12	UPPER TIP RIB	RU0412	1
13	LOWER TIP RIB	RU0413	1
14	RUDDER TIP SKIN	RU0403	2
15	RUDDER TIP SKIN CAP	RU0405	1
16	ELEV/RUD INSPECTION COVER	EL0409	3
17	BOLT	AN3-11	2
18	BOLT	AN3-5A	12
19	WASHER	AN960-10	28
20	FIBER NUT	AN365-1032	12
21	CASTLE NUT	AN310-3	2

	PARTS NOT SHOWN		
	3/16” x 1/4” AVEX RIVET	RV-1613	20
	5/32" x 1/4" AVEX RIVET	RV-1512	20
	1/8” x 3/16” AVEX RIVET	RV-1410	1200

* Cut multiple pieces from the part or raw stock.

4.1 Rib Install

Note: If you are building a Tricycle gear aircraft, ignore steps 8 to 16.

1) Layout all the parts as in the exploded view. **NOTE:** Do not handle the Rudder Skin (RU0104) until it is needed during assembly.

2) Draw center lines on all the Main Rib flanges. Cleco the Elevator/Rudder Doublers (EL0307) and Rudder Horn Doubler (EL0318) to the Rudder Spar. **NOTE:** You will have to trim EL0318 to suit the bottom of the Spar.

3) Back drill #40 through the three holes at the root end of the Spar into the Rudder Horn Doubler (EL0318). Layout and drill #40 two more rows of holes between the existing #40 holes and the holes you just drilled.

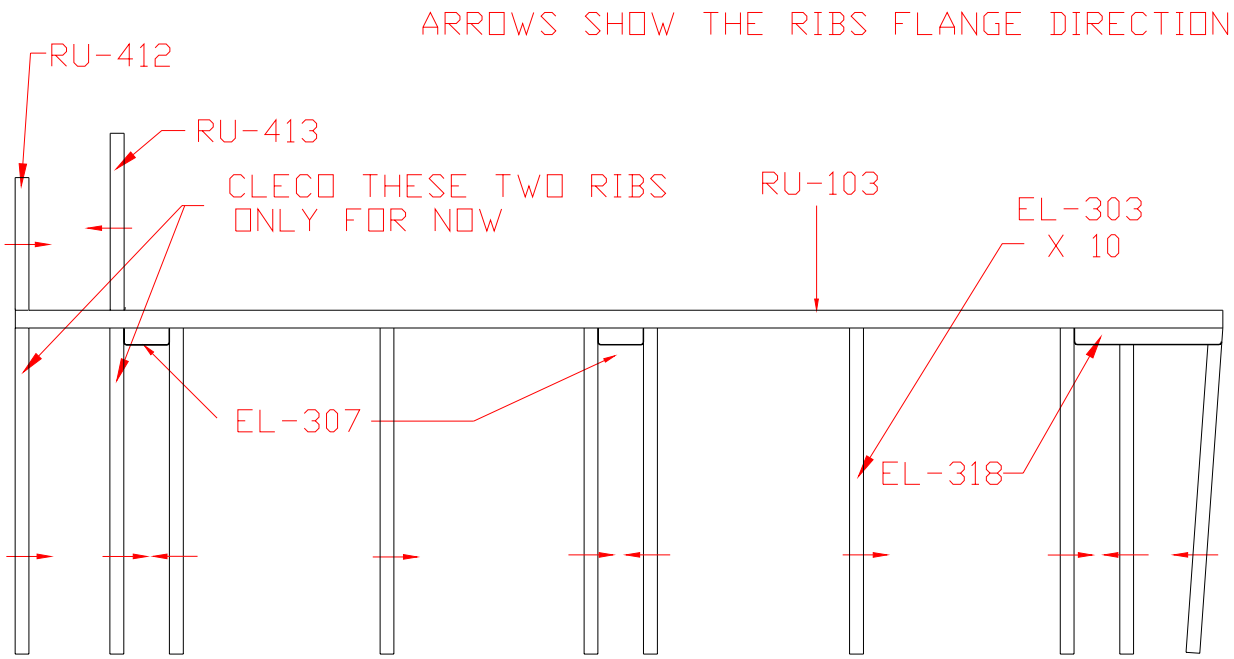


Figure 4.1.1

4) Cleco the Elevator/Rudder Ribs (EL0303) to the Spar assembly. Figure 4.1.1. **NOTE:** You will have to trim the flanges on the two ribs that go inside EL0318.

5) Drill all the #40 holes to #30, disassemble, debur, chromate and rivet the Spar Rib assembly together using 1/8” avex rivets (RV-1410). **NOTE:** Do not rivet the ribs that are called out for clecos in figure 4.1.1. Bolt the Elevator/Rudder Hinges to the Spar assembly using the prepunched alignment holes. Figure 4.1.2.

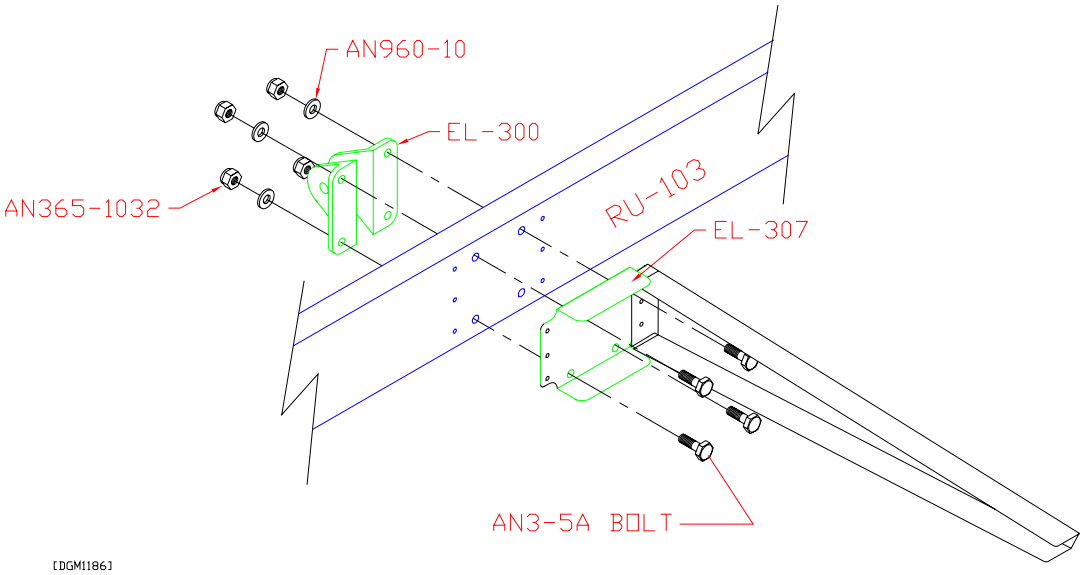


Figure 4.1.2

4.2 Skin Install

1) Position two 2 x 4s on a level work surface approx. 40” apart. Figure 4.2.1.

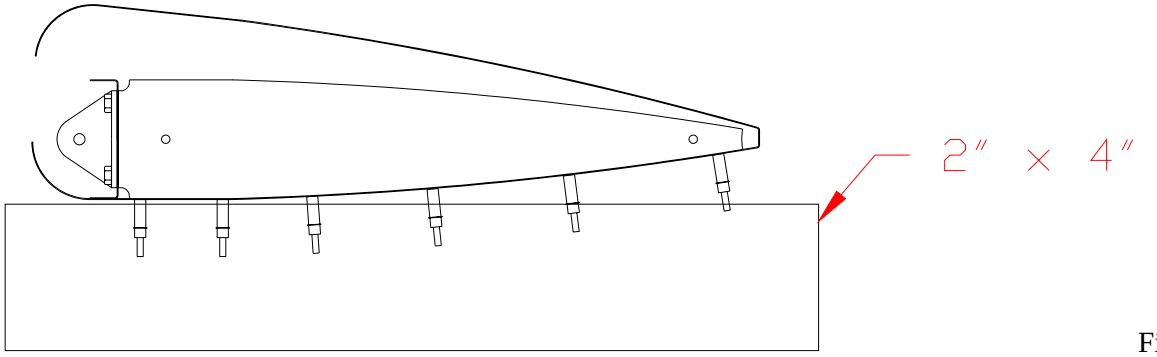


Figure 4.2.1

2) Position the Rudder Skin over the Spar/Rib assembly, cleco the Skin to the Ribs using the prepunched alignment holes. Figure 4.2.2.

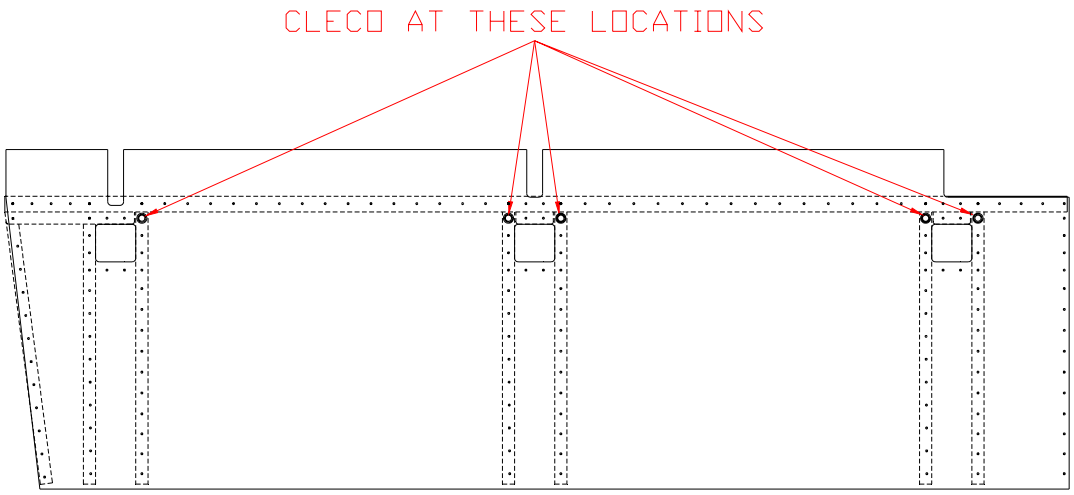


Figure 4.2.2

3) To ensure that the assembly is level, take a measurement from the bottom of the Trailing Edge to the bottom of a 24" level. It should be the same distance at both ends. If it is not you can use some small wood wedges under the Spar at each end to adjust the height. Figure 4.2.3.

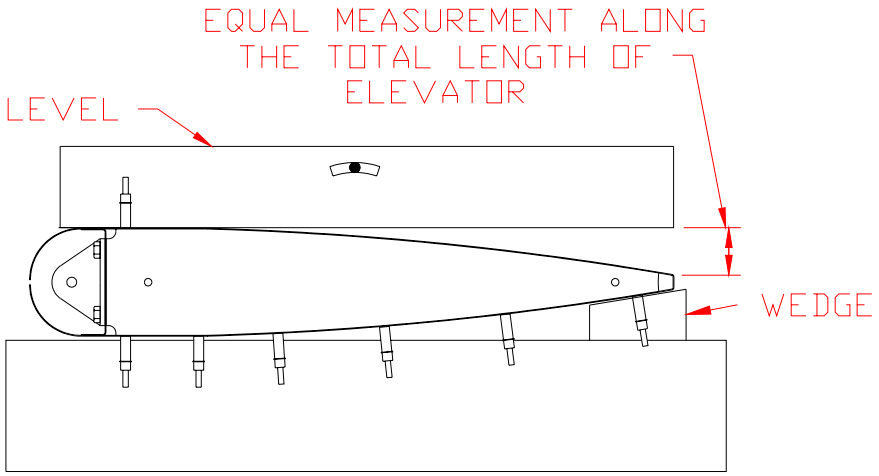


Figure 4.2.3

4) Using the Skin as a drill guide, drill and cleco the Rib/Spar assembly to the Skin. The line drawn on the ribs should be visible through the prepunched holes in the Skin. Work from the Spar to the Trailing Edge of the Skin, use plenty of clecos as you go. Layout and drill #40 three holes on the flanges of EL0318 using the existing holes on the Spar line as a guide. Figure 4.2.4.

5) Turn the Assembly over and repeat steps. **NOTE:** Check for level again at this time since once the assembly is drilled, it cannot be changed.

6) At the lower section of the Rudder Spar, trim out the area of the Rudder Spar using the Rudder Skin as a guide. Do this both sides. This is to allow clearance for the Rudder Horn. Figure 4.2.4.

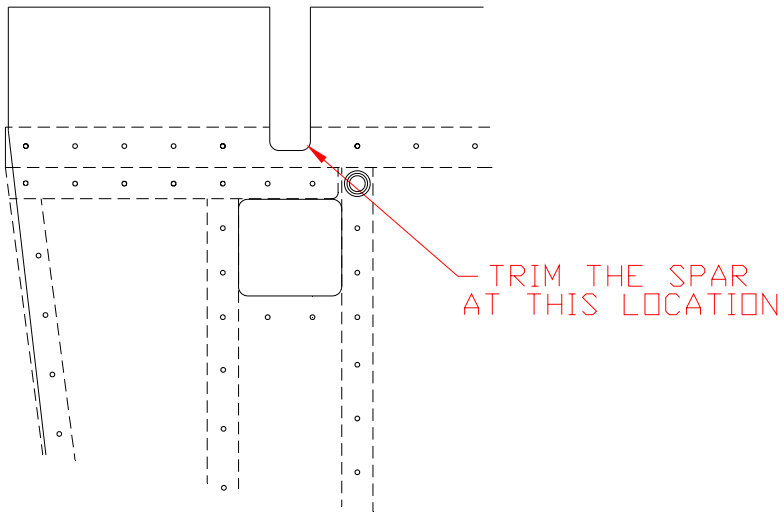


Figure 4.2.4

7) Drill all the #40 holes to #30, disassemble, debur and chromate all mating surfaces and rivet together with 1/8" rivets. Use clecos generously. **NOTE:** Do not rivet the Skin between the RU0412 and RU0413, or along bottom rudder rib (EL0303).

8) Cut the RU0411 doubler material in half. Figure 4.2.5.

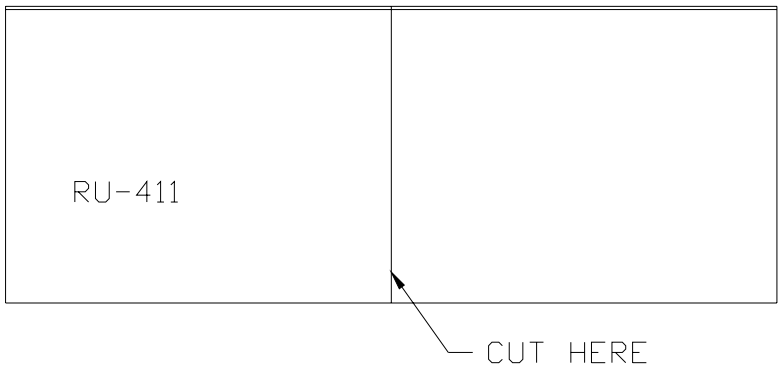


Figure 4.2.5

9) Take one RU0411 doubler and place it over the bottom Rudder rib, with its flange between the skin and the rib. The front edge of the doubler should be flush with the Rudder Spar.

10) Mark the doubler for trimming in two places. First, mark the outline of the rib opposite the flange onto the doubler. Second, mark the flange of the doubler where the rib begins to curve. Remove, trim and file smooth. Repeat for the other doubler on the opposite side of the rib. Figure 4.2.6.

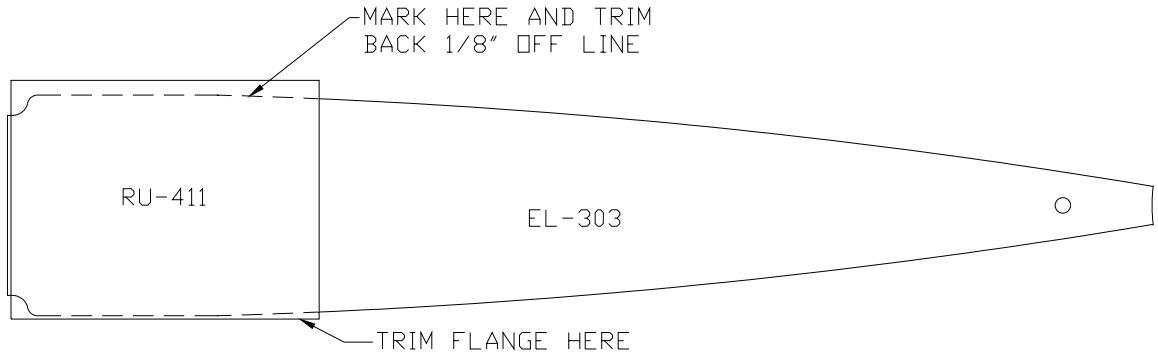


Figure 4.2.6

11) Tuck one of the doublers into place (flange between the rib and the skin). Press the doubler tight against the bottom of the rib. Drill #30 holes using the skin as a drill guide. Cleco.

12) Repeat for the other side.

13) Draw a line on the Rudder Horn (RU0105) 3 3/4" from the back edge. Figure 4.2.7.

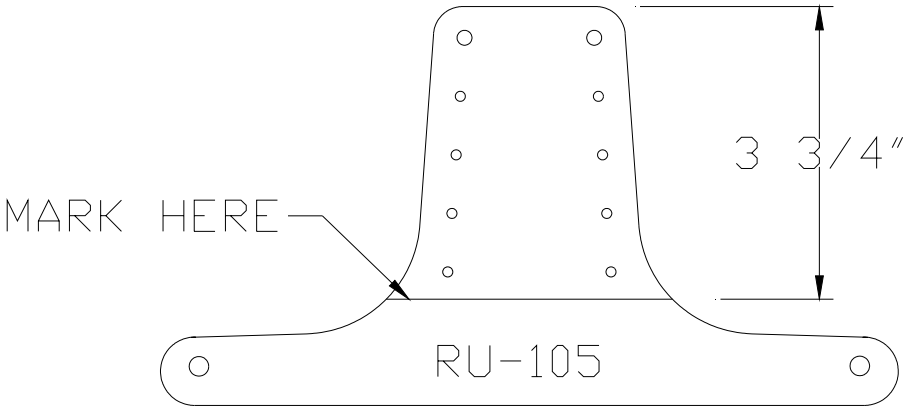


Figure 4.2.7

14) Center the horn on the doublers lining up the mark you made on the horn even with the Rudder Spar. Drill all the #30 holes through the doublers and the rib. Cleco as you go.

15) Drill the #30 holes out to #11. Drill the remaining two #11 holes through the doublers and the rib.

16) Remove the parts, debur, chromate, re-assemble and rivet with RV-1613 rivets. Also rivet the flanges to the skin using RV-1410 rivets.

4.3 Tip Ribs

1) Cleco the top Rudder Tip Rib (RU0412) into place if it is not already there. Keep the Rudder and the rib in place with a straight edge. (Use a 1" x 1" piece of wood. Clamp or tape the wood in place). Figure 4.3.1.

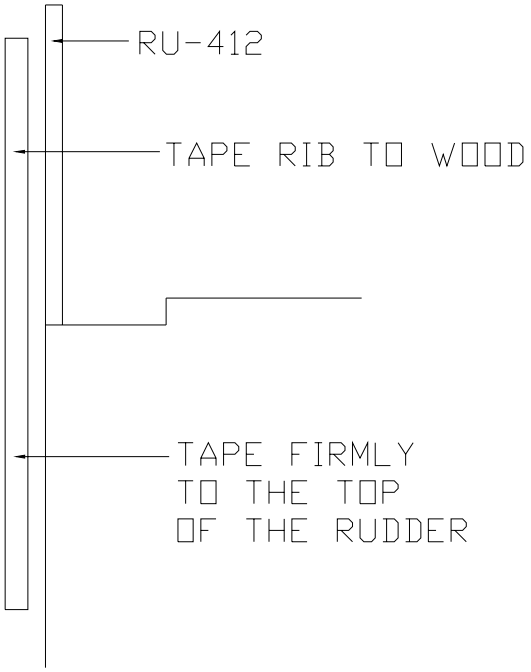


Figure 4.3.1

2) Cleco the Lower Tip Rib (RU0413) into place. Use a piece of scrap clamped to the nose of the ribs to keep them parallel. Figure 4.3.2. At this point you should drill a ½" hole in this lower rib, in line with the top hinge bolt hole, so the hinge bolt can be inserted. You will need to pass the head of the bolt into this hole to allow insertion into the hinge.

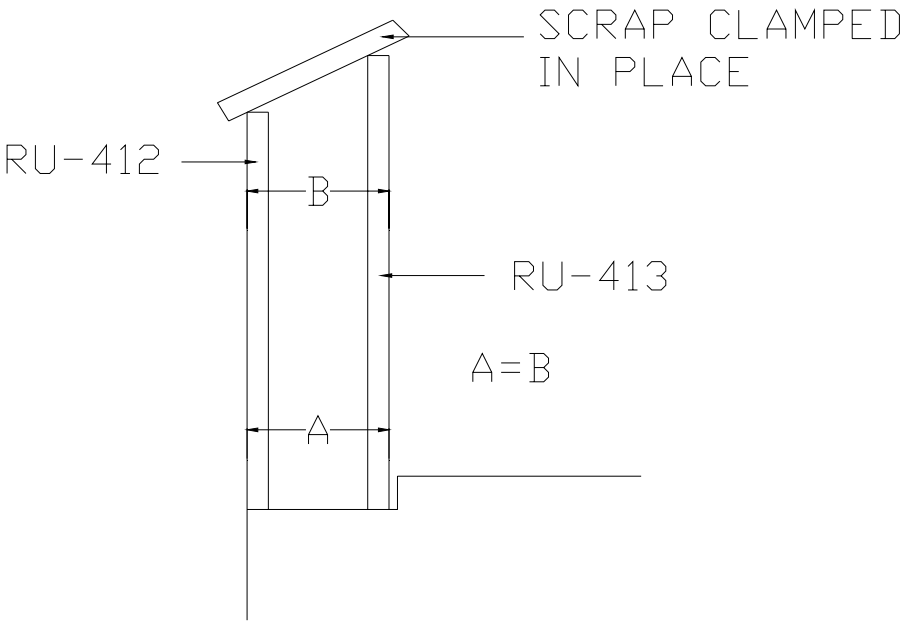


Figure 4.3.2

3) Layout and drill #40 rivets lines on the two RU0403 Tip Skins. Refer to figure 4.3.3 for locations and dimensions. **NOTE:** You will draw a line 1 5/16" across the part from one end. Do not drill holes on this line at this time.

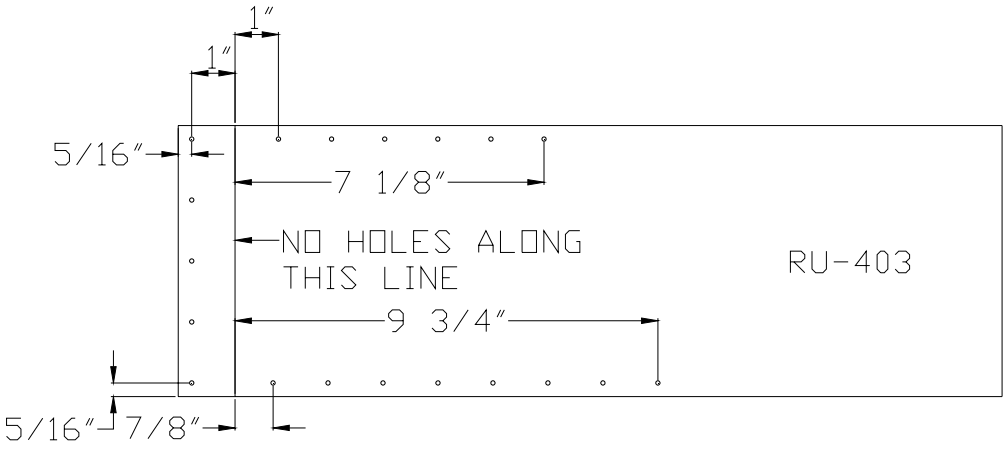


Figure 4.3.3

4) Slide one RU0403 between the Rudder Skin and the Spar. The line drawn in the previous step should be visible through the Spar rivet line on the Rudder Skin. Flush the edge of the skin with the top Tip Rib. Tape into position.

5) Drill #40 holes through the Tip Ribs and Rudder Spar using the Skin as a guide.

6) Remove the skin. Cleco it back in place <u>overlapping</u> the Rudder Skin this time. Drill #40 holes through the rivet line behind the spar using the skin as a guide. Mark the skin for trimming and remove and trim. **NOTE:** Trim the skin flush with the end of the side flanges on RU0412 and RU0413, not the end of the ribs. Make sure there is 5/16” clearance from the last two outboard rivet holes. Figure 4.3.4.

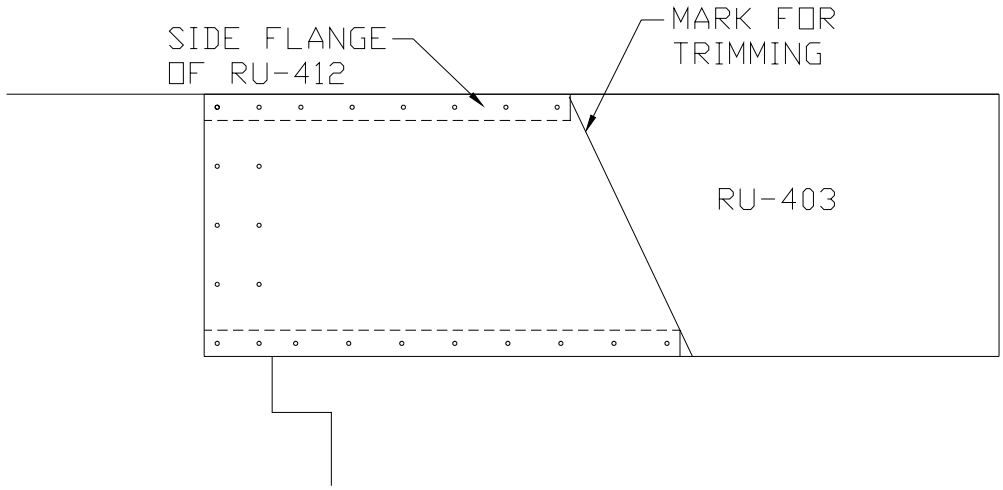


Figure 4.3.4

7) Repeat the previous steps for the opposite side RU0403 skin.

8) Remove the two skins and layout and drill a #40 rivet line along the leading edge. Figure 4.3.5.

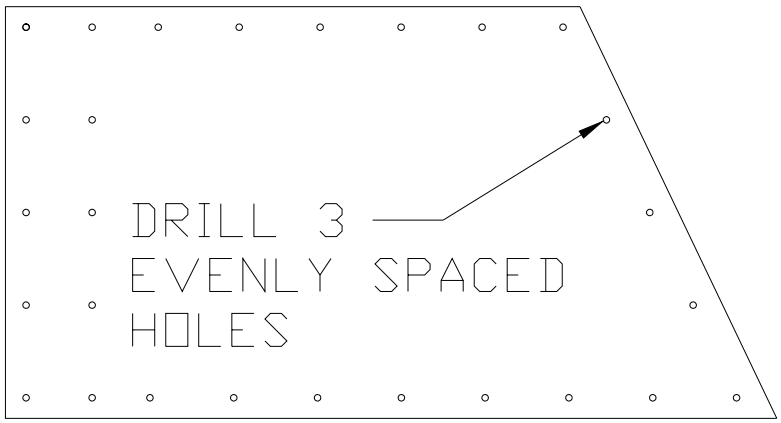


Figure 4.3.5

9) Re-install the skins. Slide the RU0405 Leading Edge Skin so that it overlaps the tip skins. Tape it securely. Using the tip skins as a drill guide drill #40 holes through the Leading Edge Skin. Cleco. Figure 4.3.6.

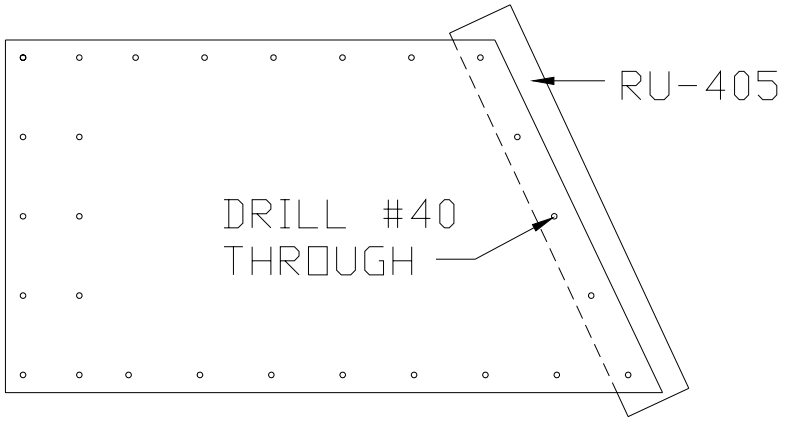


Figure 4.3.6

10) Mark the Leading Edge Skin for trimming (use the tip ribs for a guide). Remove the skin and trim. Use a circle template to mark out for the corner radius. Figure 4.3.7.

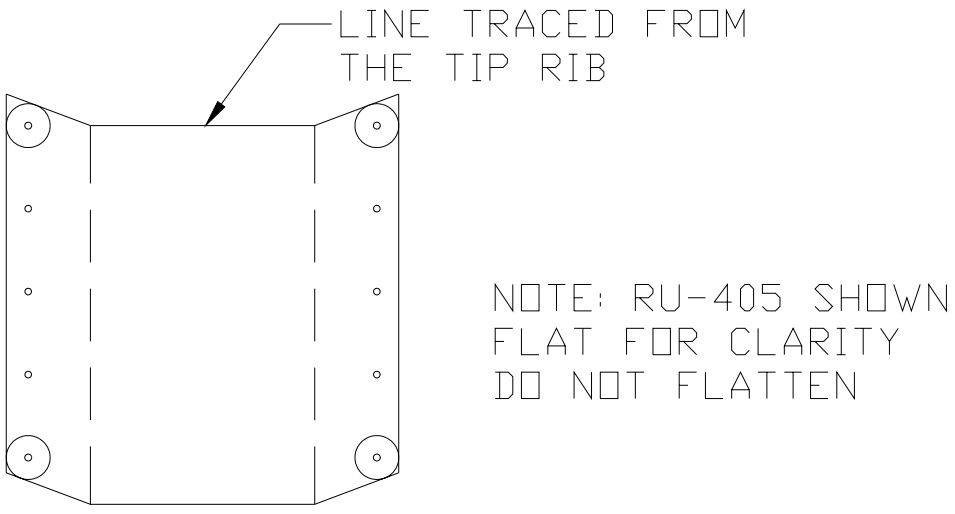


Figure 4.3.7

11) Layout and drill #40 two new rivet lines on the RU0405 as per figure 4.3.8.

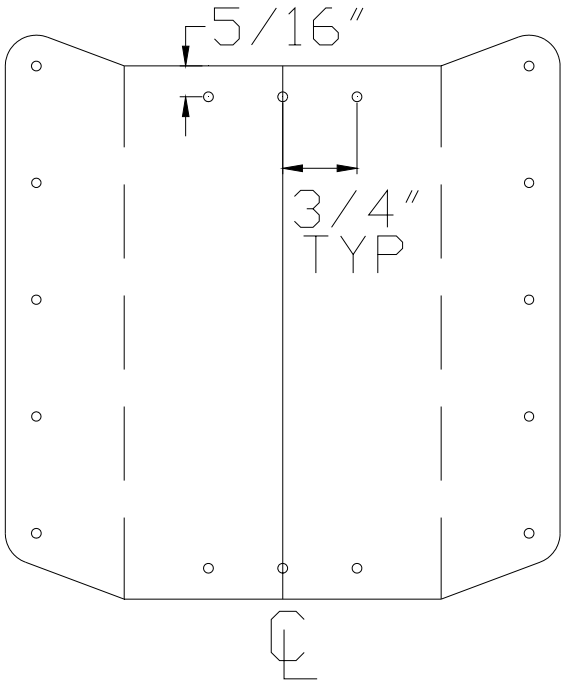


Figure 4.3.8

12) Re-install the Leading Edge Skin. Drill the new holes through the flanges of the RU0412 and RU0413 ribs. Drill all the holes out to #30.

13) Disassemble, debur, chromate all mating surfaces, re-assemble and rivet together using RV-1410 avex rivets.

4.4 Elev/Rud Horn

1) Install the Elevator/Rudder Horn (EL0301) to the bottom of the Rudder as in Figure 4.4.1.

The following procedure is done to both sides of the rudder.

2/ From Raw Stock 0.040, cut a doubler to cover the existing inspection hole area.

3/ Using transfer plastic, cut to the same dimensions as your doubler, transfer holes into plastic.

4/ Lay plastic on your doubler, and drill holes into doubler. Cleco in place.

5/ From RU0420, cut your gussets as shown in Fig. 2. Position against horn, trace around flange onto doubler.

6/ Remove doubler and reposition gusset on doubler using the lines you traced. Clamp and back drill holes into gusset flange.

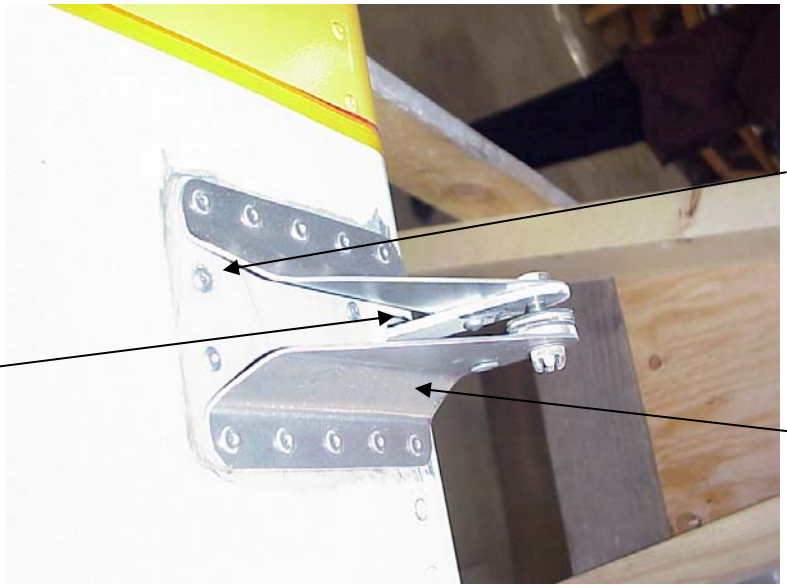
7/ Drill a #11 hole 1” down from the center of the ¼ cable bolt hole.

8/ Cleco gusset and doubler assembly back in position, and back drill into gusset ¼ cable bolt hole and #11 hole from horn.

9/ Drill all holes out #21. Remove assembly, file smooth, deburr, and rivet in place:

Gusset to horn with RV-1613; gusset to doubler, rudder skin, and ribs with RV-1512's.

ig. 1



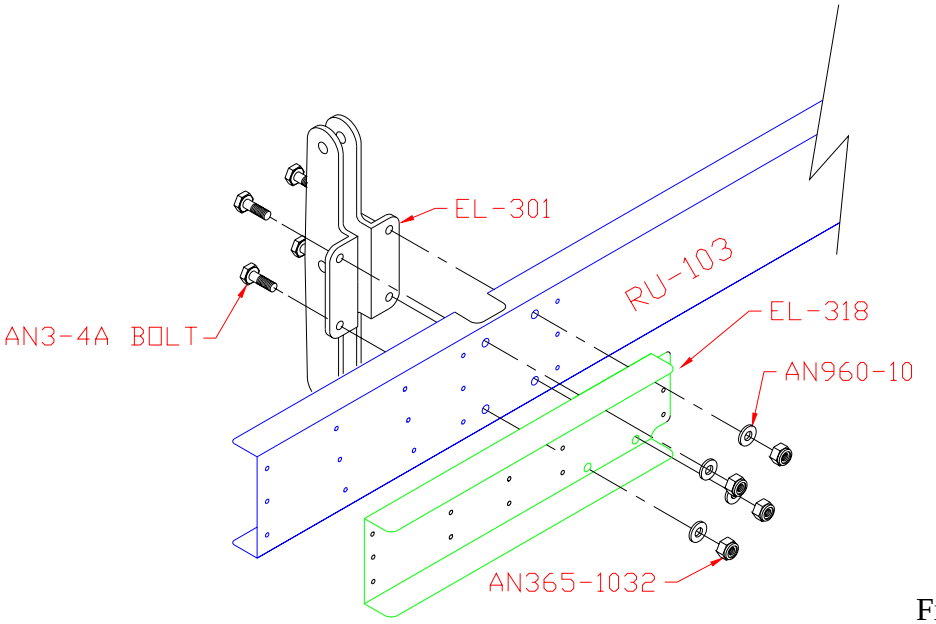
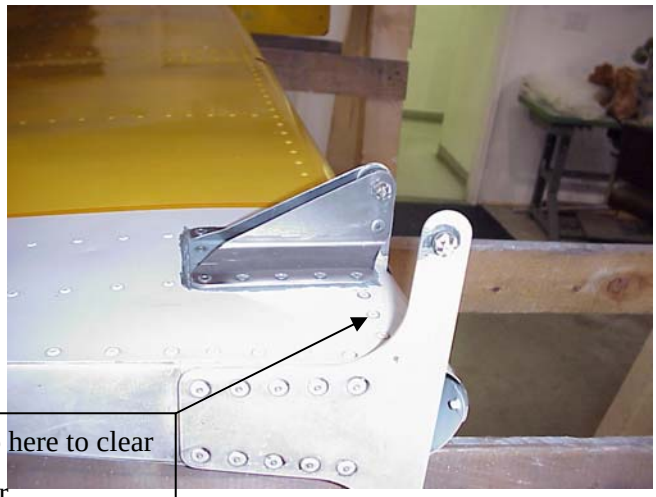


Figure 4.4.1



4.5 Final Install

1) Cleco the Elev/Rudder Inspection Covers (EL0409) into position. Drill to #30. Remove, debur and chromate mating surfaces and rivet in place using RV-1410 avex rivets.

2) Draw a line ½" up from one edge of the Rudder Leading Edge (the curled edge). Pull the leading edge halves together so the overlap touches the line you just drew. Tape secure. Figure 4.5.1.

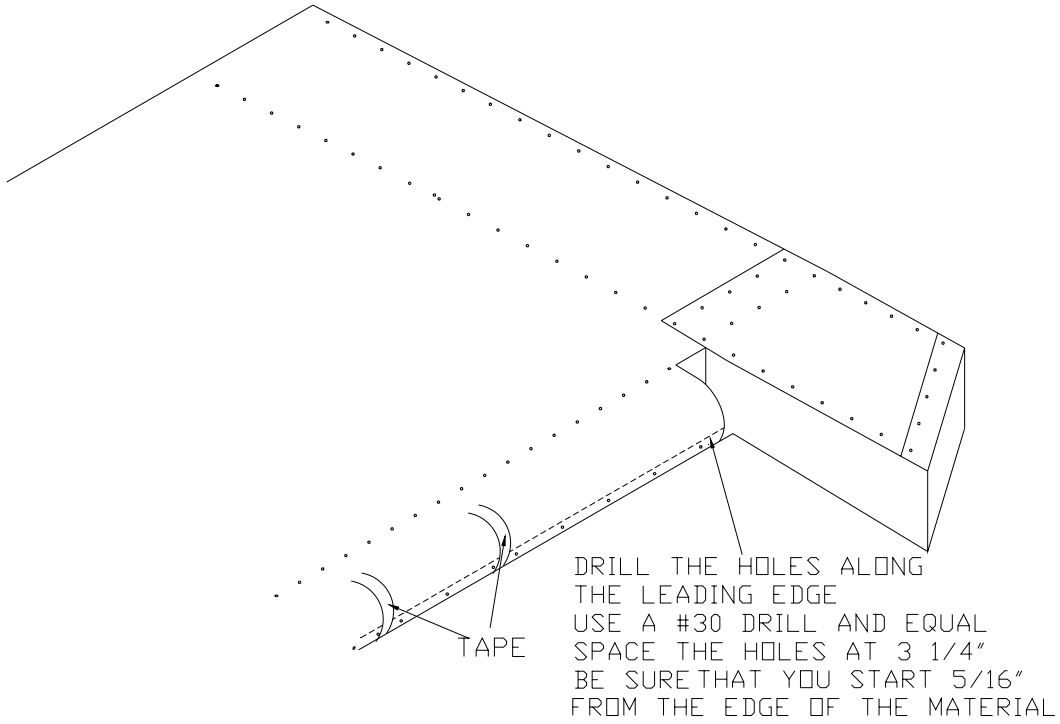


Figure 4.5.1

3) Drill holes along the Rudder Leading Edge to #30 as per the drawing. Debur, chromate and rivet together using 1/8" (RV-1410) avex Rivets.