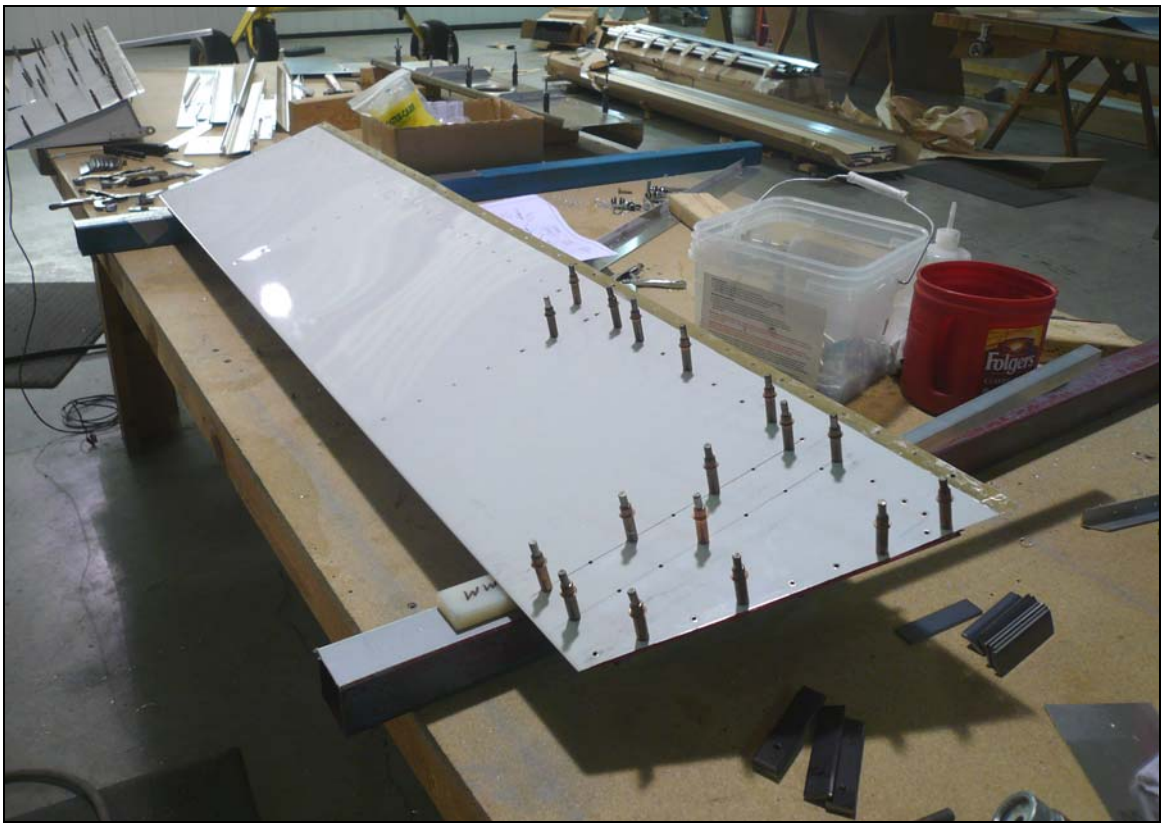
Section 6-ZU-4
Zodiac CH 601 XL Upgrade Package

Control Stops – Servo L Angles



This Photo Assembly Guide was prepared by Zenith Aircraft Co. to guide builders through the process of installing the Upgrade Package kit to an existing (completed) Zodiac CH 601 XL aircraft.
For details and background information on the Upgrade Package kit,
See http://www.zenithair.com/news/ntsb-astm-4-09a.html

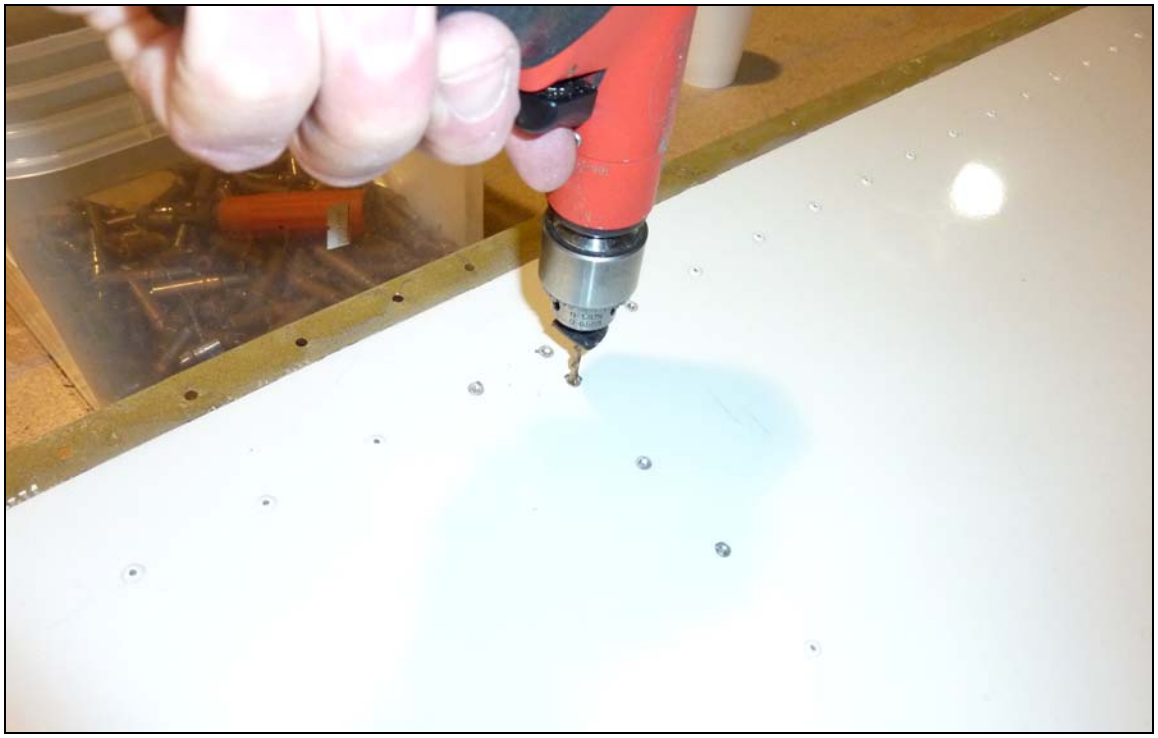
This photo assembly manual is a supplement to the issued Drawings (6-ZU-1 to 6-ZU-4).
If there is any discrepancy between this manual and the drawings, the drawings supersede this manual.
For more information on building standards and allowable tolerances see “Construction Standards for Zenair Light Aircraft” available from Zenith Aircraft Co.

Drill out the first four rivets at the inboard end of the Aileron in the Aileron Rib and front rivet line.

P/N: 65W2-6
Aileron Rib #1
Gusset

Draw lines 10mm from the front edge and the inboard edge on the Gusset.

Position the Gusset under the top skin of the Aileron. With the lines centered on the holes, use a #30 drill bit to back drill through the Skin into the Gusset and Cleco.

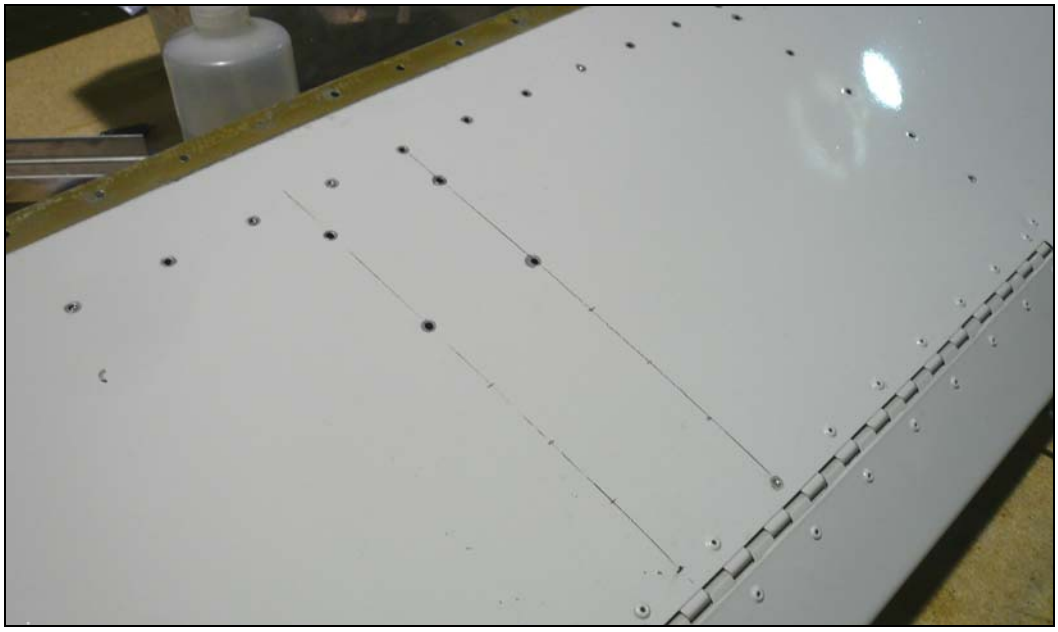


Drill out the rivets for Aileron Rib #2 and along the front for the second Gusset.

P/N: 65W2-5
Aileron Rib #2
Gusset

Center the Gusset between the outer rivet holes on the front rivet line. Mark the center rivet position on the Gusset and then mark the rivet line position at the aft end of the Gusset. Draw a line connecting the two marks. Then mark a line 10mm from the front edge of the Gusset.

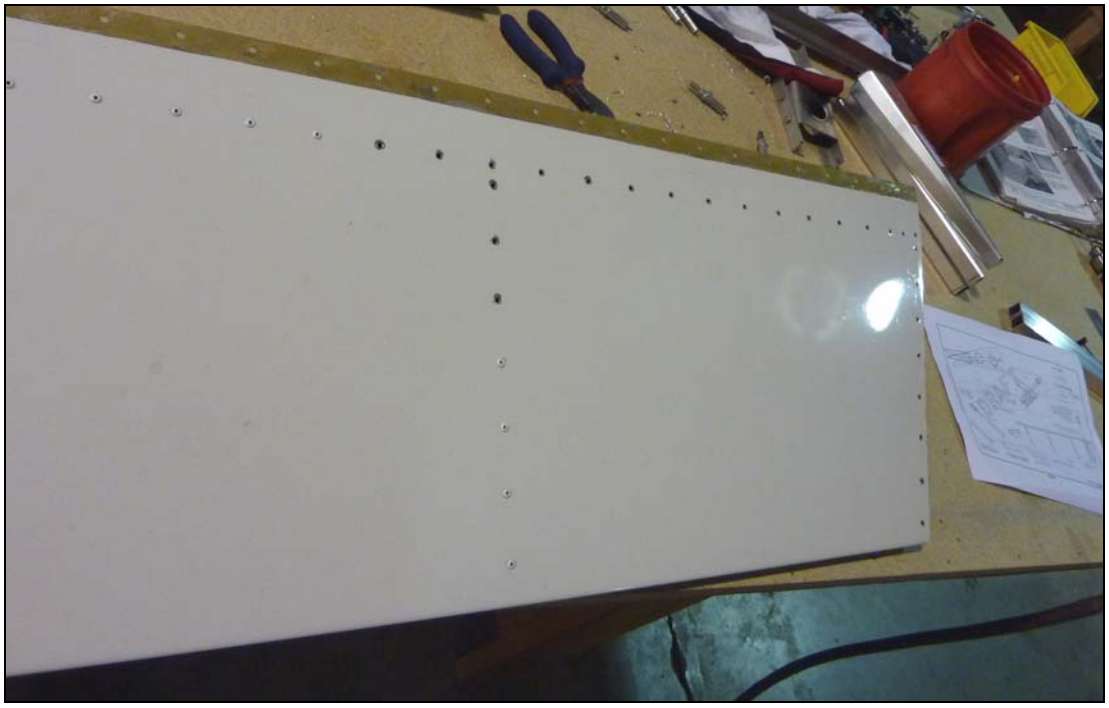
Position the Gusset under the Aileron Skin with the lines centered in the rivet holes. Use a #30 drill bit to back drill through the Aileron Skin into the Gusset and Cleco.



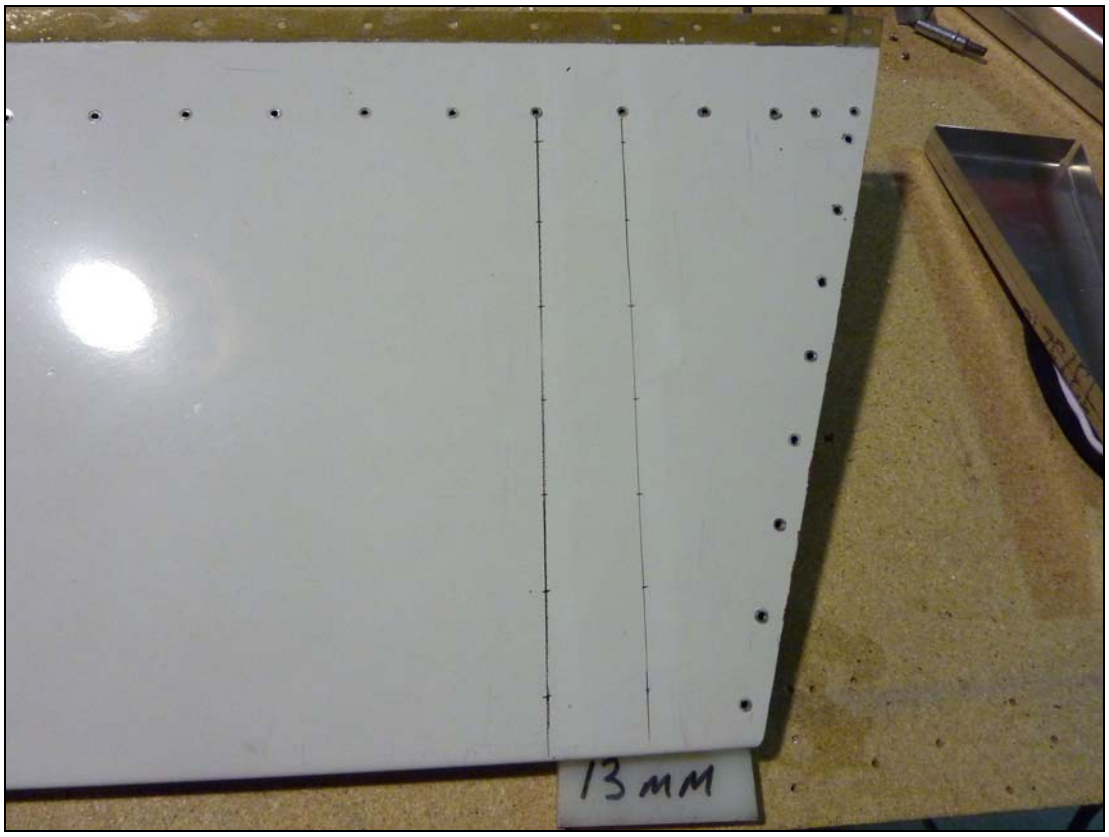
If the Aileron Trim Option is installed L Angles will be installed on the Skin under the Servo. If the Trim Option hasn't been installed, skip to the steps to install the Mass Balance.

Drill out the rivets attaching the Trim Servo to the Aileron Skin. Draw a line going through the center of the rivet holes from the front of the Aileron Skin to the Trim Channel. Layout rivet locations along the line, pitch 30mm.

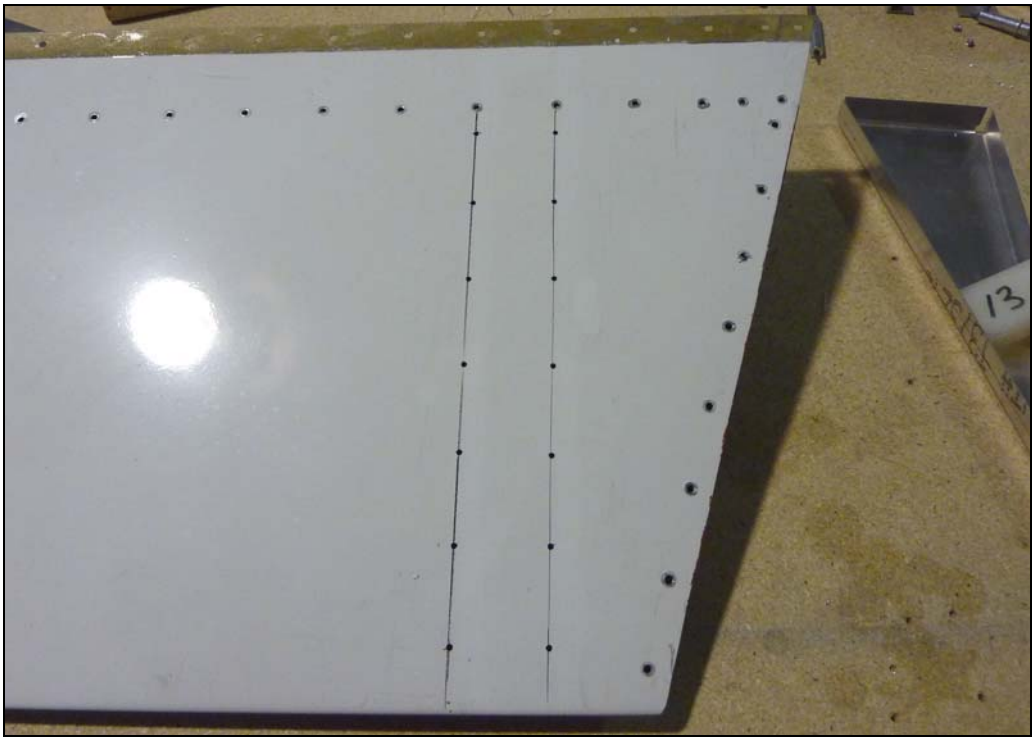
Cut two L Angles to fit in the Aileron. Mark a center line on a flange of the L Angle. Drill a hole 10mm from the aft end of the L Angle with a #30 drill bit. Cleco the L Angle in the Aileron. With the L Angle center line visible through the holes in the Skin, back drill through the Skin into the L Angle with a #30 drill bit and Cleco.



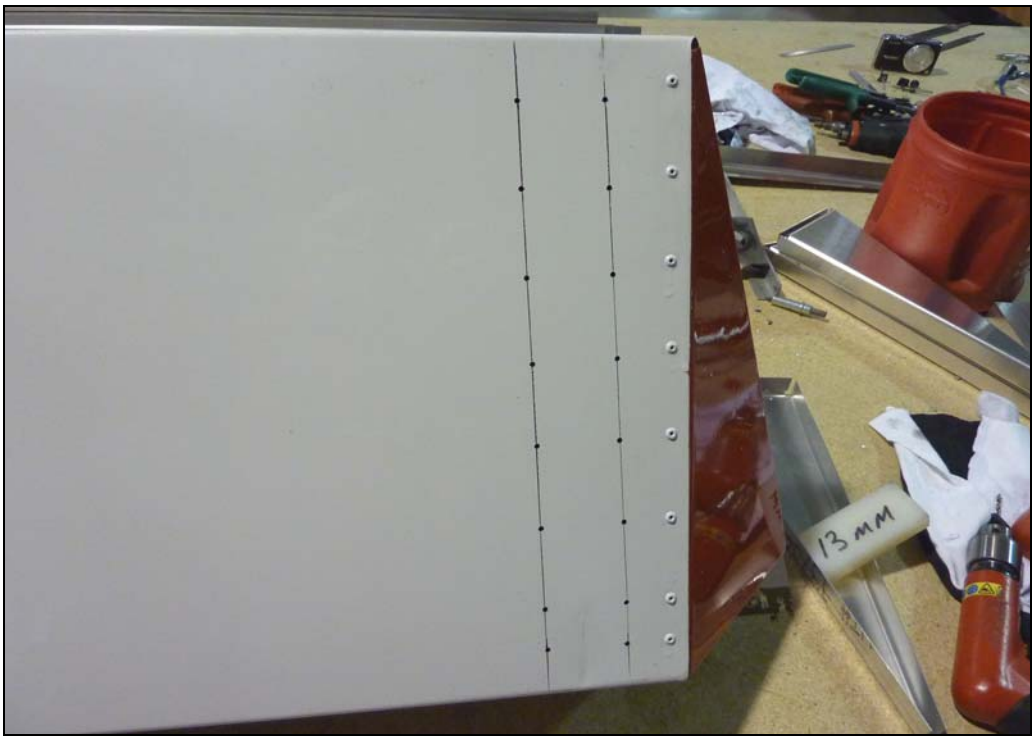
Drill out the rivets in the Aileron Tip, the front rivet line, and the third Aileron Rib as shown in the photo above.



Place a 13mm block under the outboard trailing edge corner to maintain the proper washout angle. Mark a line at the nearest rivet in the front rivet line 327.3mm from the third Aileron Rib parallel to the third Aileron Rib. Then mark a parallel line 40mm outboard from the first line.



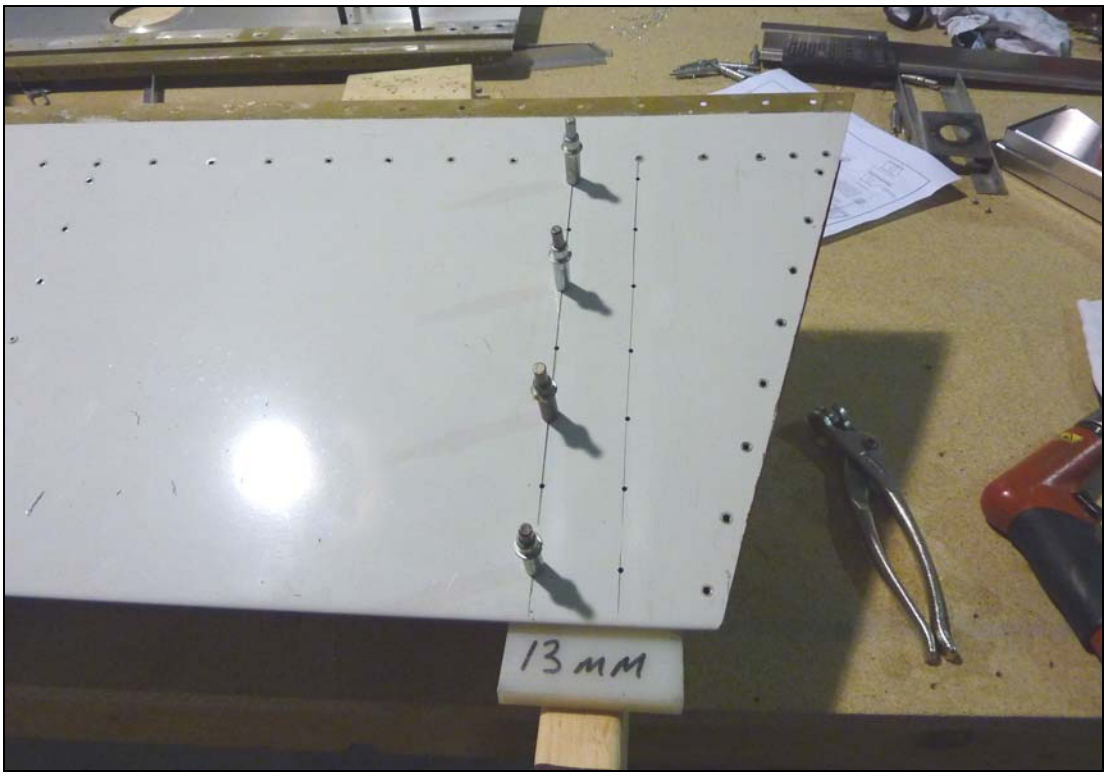
Mark a rivet location 20mm aft of the front rivet line. Measure aft of this mark 260mm and place another mark for the final rivet location. Layout 5 rivet locations between the first and last rivet location, approximately pitch 40mm. With a #40 drill bit, drill the rivet locations in the Skin.



Flip the Aileron over. Mark the first rivet line the same distance from the third rivet line as on top, then mark a line 40mm outboard of the first line. Mark the first rivet location 15mm from the front edge and the last rivet 30mm from the trailing edge. Layout an even rivet pitch, approximately 40mm, between. With a #40 drill bit, drill the rivet locations in the Skin.

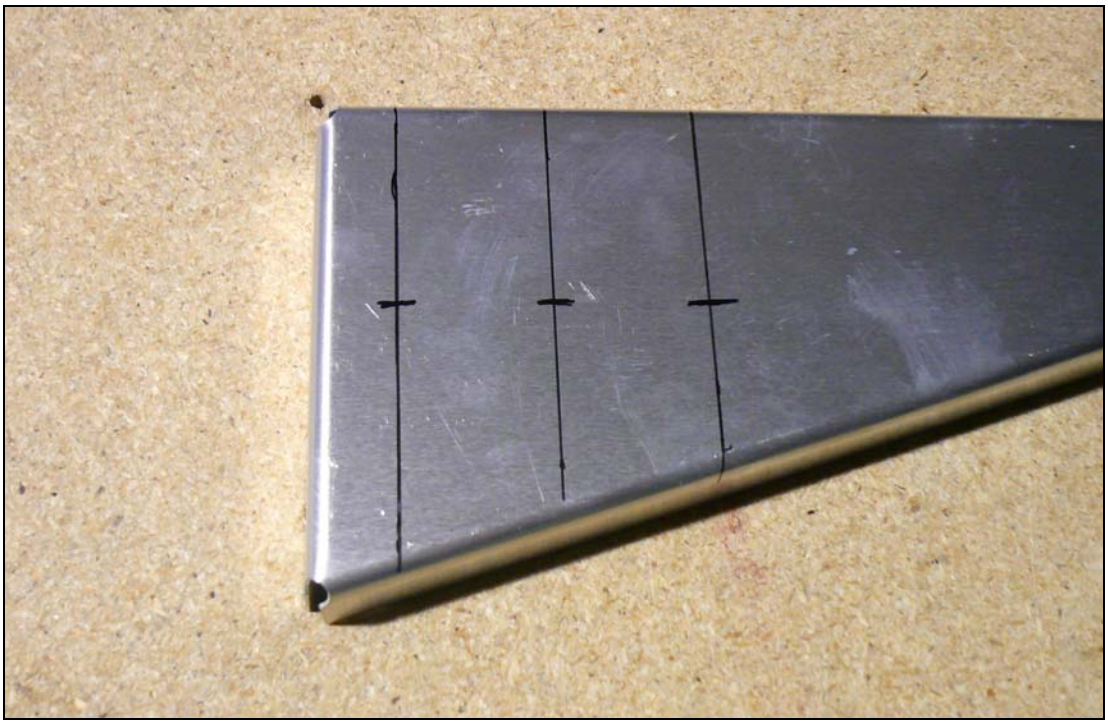
P/N: 6W2-2
Aileron Rib

Draw a center line on the flanges of the Aileron Rib. Open the Aileron Skin and position the Aileron Rib in the Aileron. The inboard Aileron Rib is positioned with the flanges pointing inboard, the outboard Rib's flanges point outboard. Only install one of the Aileron Ribs at this time.



With the center line visible through the holes in the Skin, use a #40 drill bit to back drill through the Skin into the Aileron Rib and Cleco. Use a #30 drill bit to expand the holes and Cleco.

Flip the Aileron over, back drill through the Aileron Skin into the Aileron Rib, and Cleco. Use a #30 drill bit to expand the holes and Cleco. Layout three rivets and drill them through the Aileron Skin into the Aileron Rib in the front according to drawing 6-W-2.

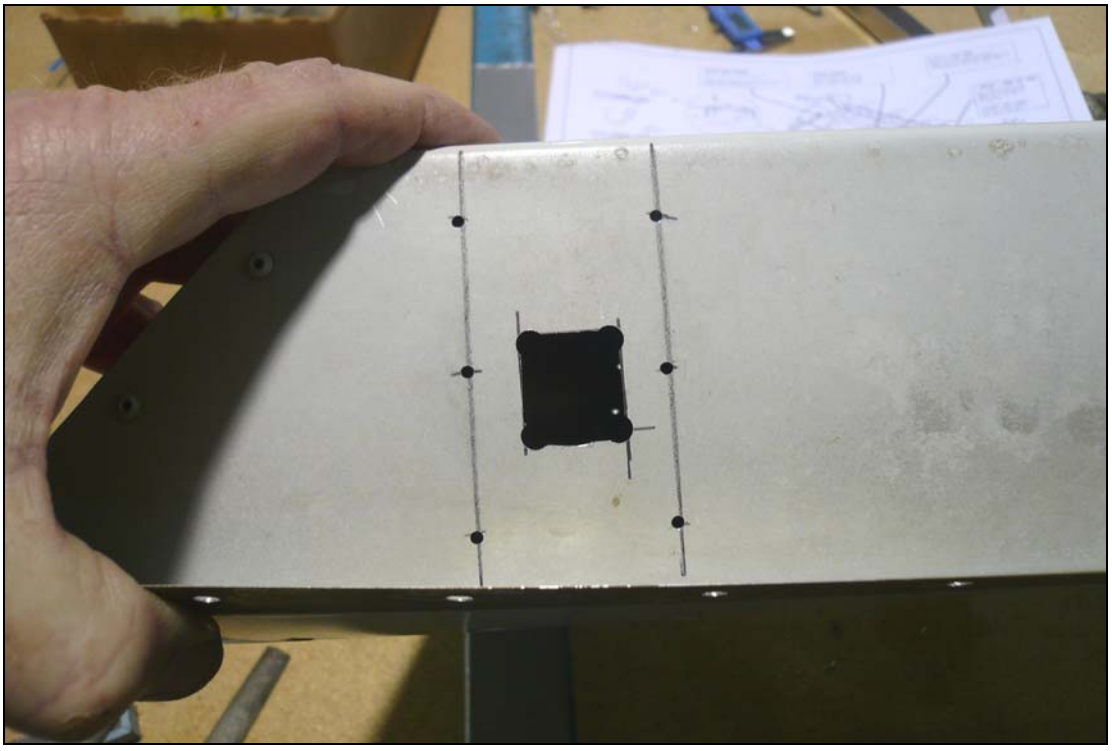


Remove the Aileron Rib from the Aileron. Mark lines at 15mm, 42mm, and 70mm from the front and parallel to the front of the Aileron Rib. Measure down from the top 42mm and mark a bolt hole location on each line. Use a #40 drill bit to drill the holes in the Aileron Rib.

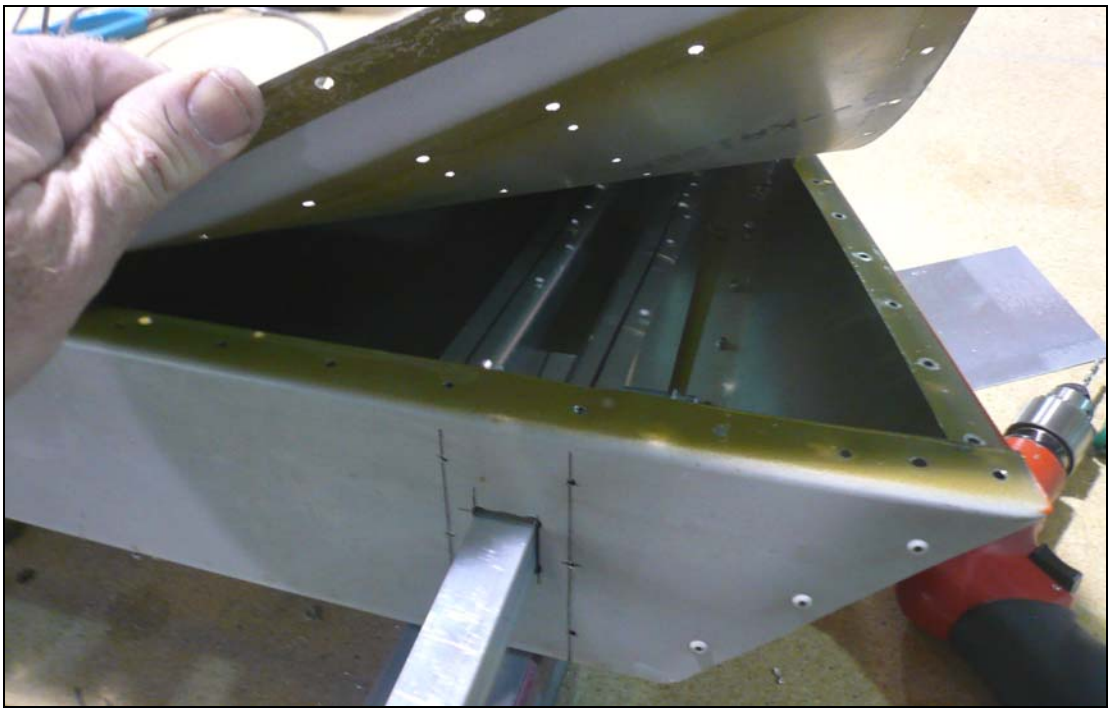
P/N: 6LAA-1
Balance Arm

Draw a center line on the Balance Arm. Position the Balance Arm on the Aileron Rib with the center line visible through the center hole in the Aileron Rib. Check the Arm is Set 97degrees from the front face of the Aileron Rib. Clamp the Arm to the Rib and back drill through the Rib into the Arm and Cleco.

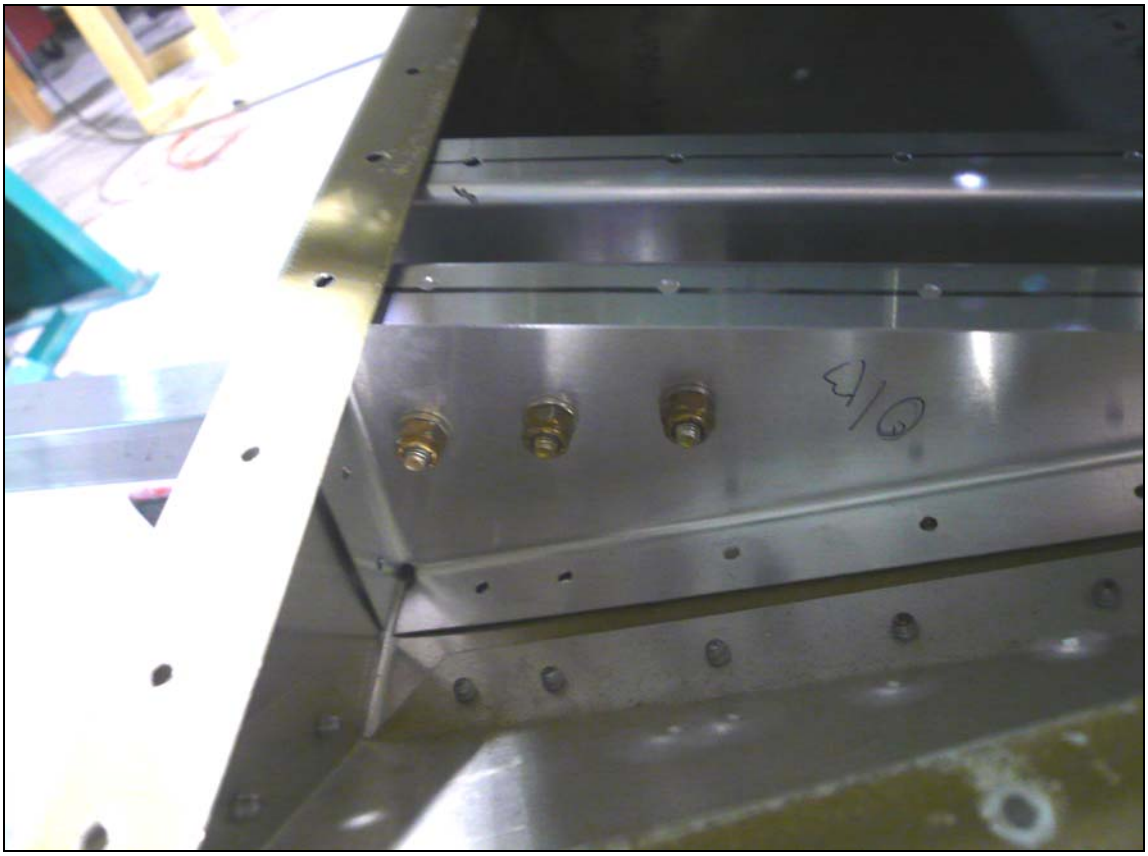
Use the work bench and a square to position the other Aileron Rib on the Balance Arm. With the top and front flanges flush, clamp the Aileron Ribs and Balance Arm together. Use a Drill Press with a #40 drill bit to back drill through the Aileron Rib into the Balance Arm and opposite Aileron Rib and Cleco. Use a #12 drill bit to expand the holes and Cleco.



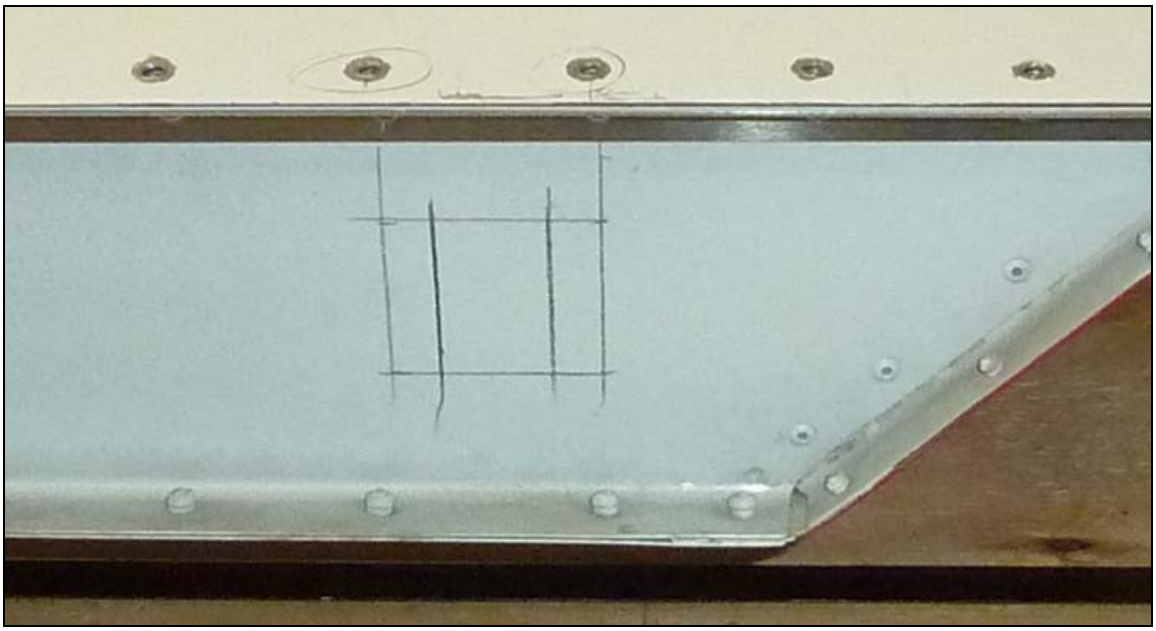
Measure the distance between the front rivet lines for the Aileron Ribs and mark a line half way between. Mark the front of the Aileron Skin to match the position of the Balance Arm on the Aileron Ribs. Drill a large hole in the center of the cutout. Use Snips or a file to open the cutout to the lines. Use a small round file to file a radius in the corners of the cutout.



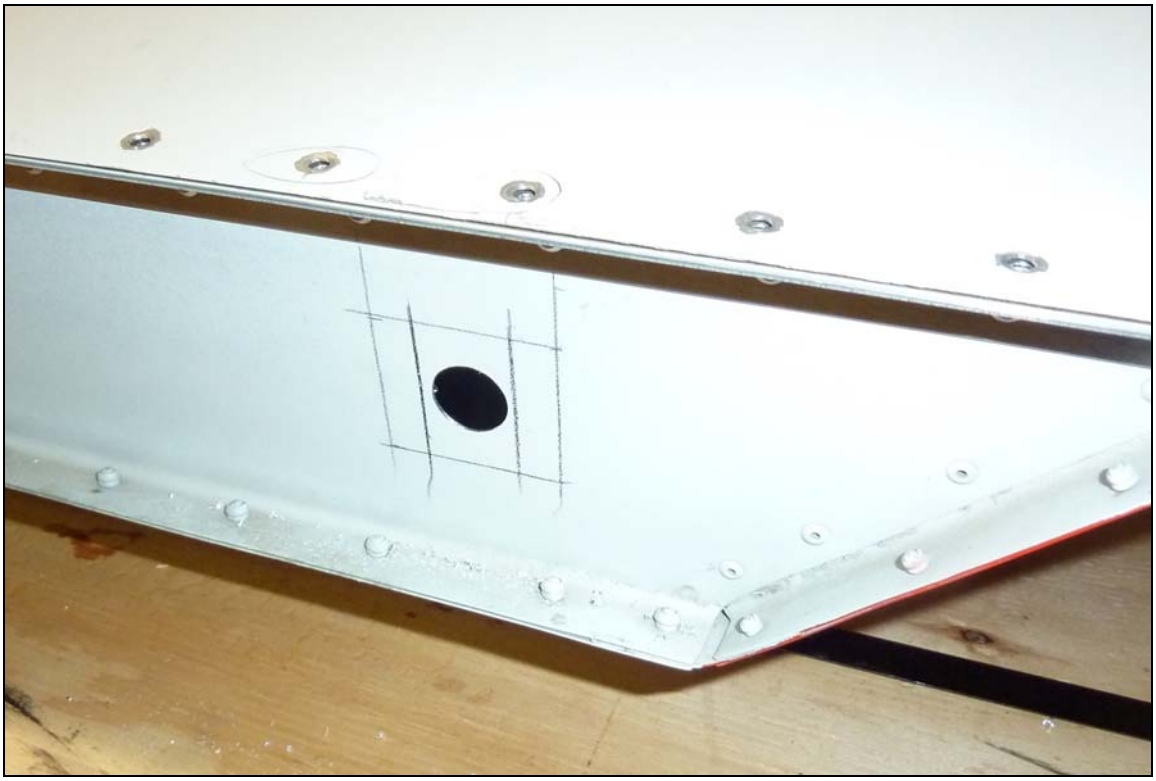
Remove the Balance Arm from the Aileron Ribs. Cleco the previously drilled Aileron Rib in the Aileron. Cleco the Balance Arm and opposite Aileron Rib to the drilled Aileron Rib. With a #40 drill bit, back drill through the Aileron Skin into the Aileron Rib and Cleco. Using a #30 drill bit expand the holes and Cleco.



Deburr the Aileron Skin, Ribs, Balance Arm, and Gussets. Reinstall the deburred parts. Bolt the Balance Arm to the Aileron Ribs with AN3 bolts and rivet the Aileron back together.



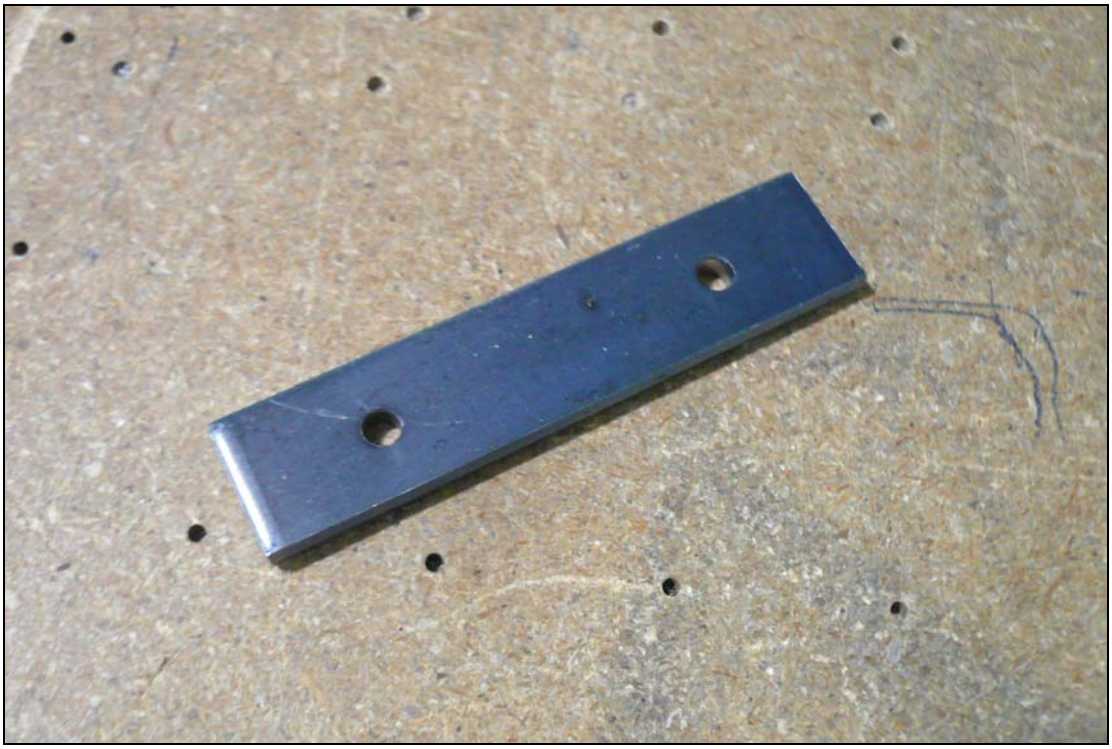
Measure the distance on the Aileron from the outboard end to the new Rib rivet lines. Mark the Rib rivet line locations on the Rear Channel. Mark the cutout 22mm wide, centered between the Rib rivet line marks. Mark the top of the cutout 25mm from the rivet line in the Channel Angle and the bottom 45mm below the top.



Drill a large hole in the center of the cutout. Use snips to open the hole up to the lines and then file the edges smooth. Use a small round file to radius the inside corners of the cutout.

Cleco the Aileron back in place on the Wing. Gently move the Aileron up and down to the maximum deflections from neutral to check clearance between the Balance Arm and the Rear Channel. If required open the cutout further to provide clearance.

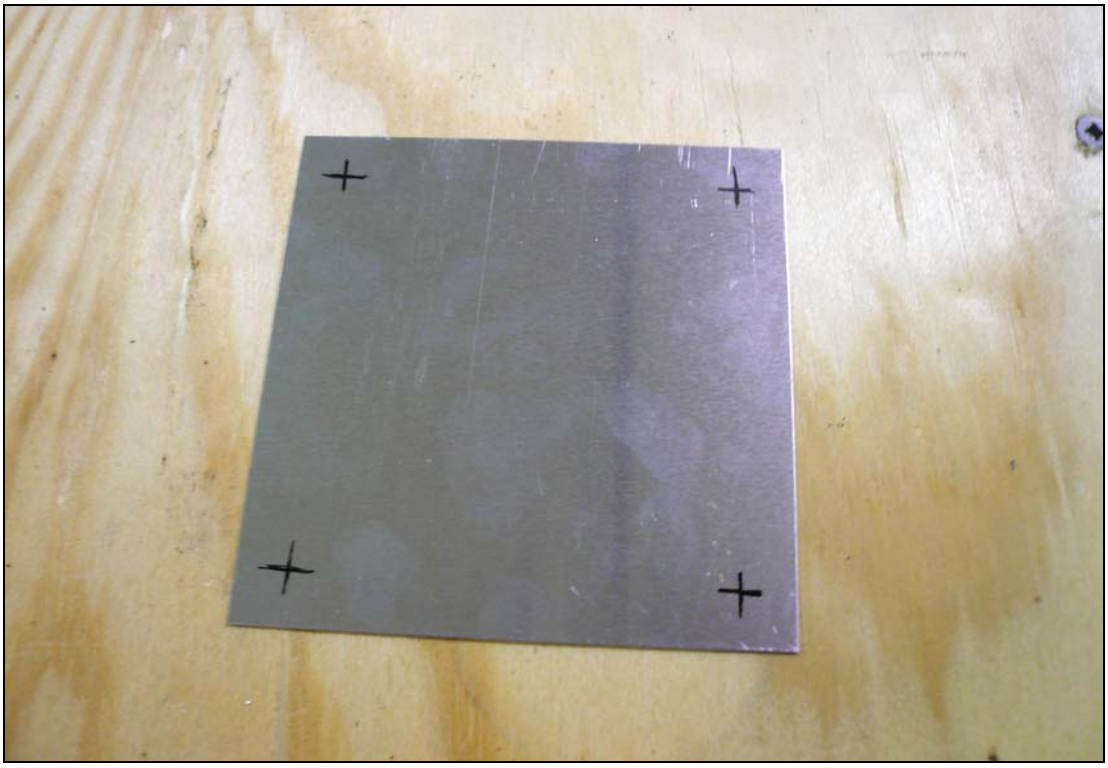
Set the Wing at 81degrees, shim the trailing edge until 81degrees is attained. Check the Wing Spar and Rear Channel is level in the span direction.



P/N: 6LAA-3
Balance Weight
(t=3/16")

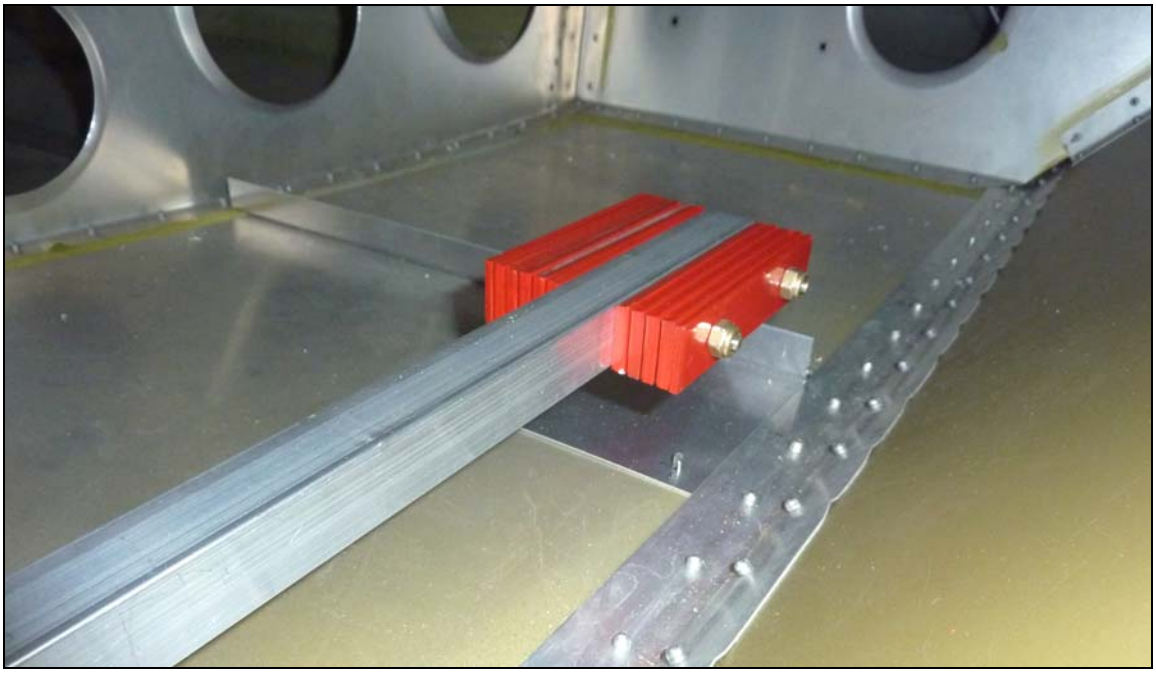
P/N: 6LAA-2
Balance Shim
(t=1/8")

Set a straight edge on the Wing at the inboard end of the Aileron. Add Balance Weights and Shims to the end of the Balance Arm until the Aileron's trailing edge is at the straight edge (neutral position, 100% balanced).



P/N: 6LAA-4
Protection Plate

Mark four rivet locations in the corners 10mm from each edge. Use a #40 drill bit to drill the rivet holes.

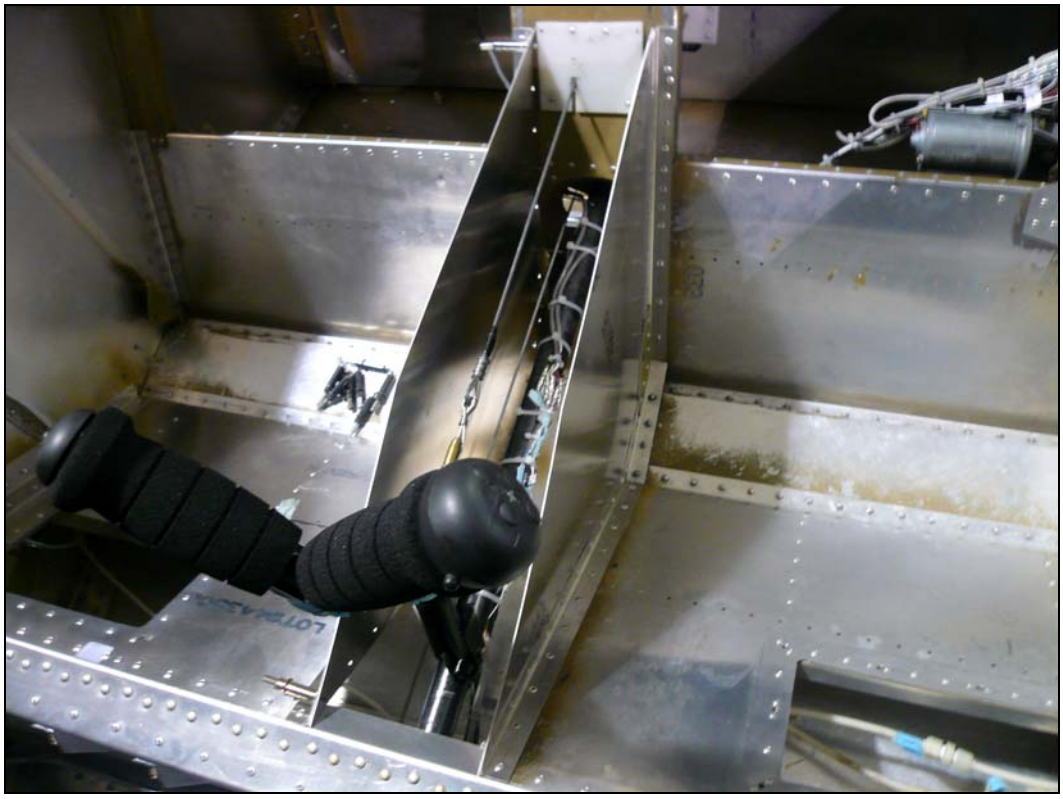


Position the Protection Plate on the Top Rear Skin and Bottom Rear Skin at the Balance Weights inside the Wing. With a #40 drill bit, back drill through the Plate into the Skin and Cleco. Use a #30 drill bit to expand the holes.

Deburr the Wings and rivet them. Prepare the Wings and Fuselage to reinstall them on the aircraft. Run Fuel Lines, wire, ect into the Fuselage from the Wing.

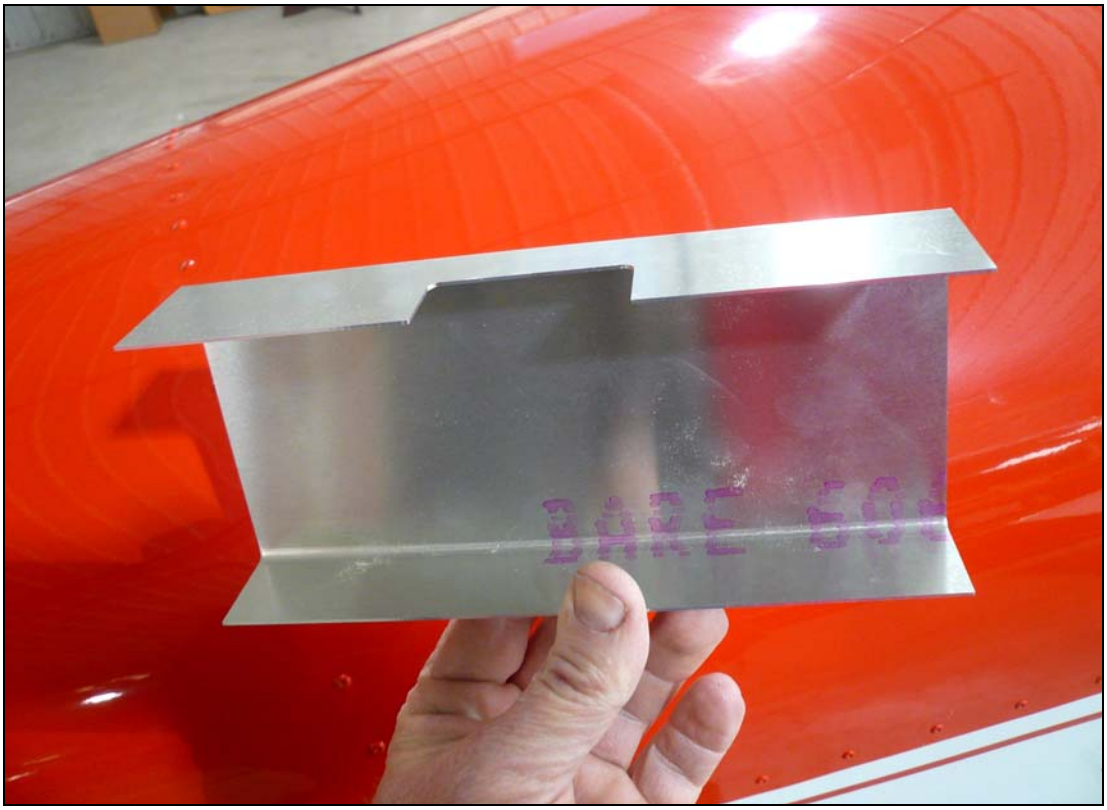
Use Tapered Pins to align the holes in the Outboard Spar to the Center Spar. In the photo above, long AN5 bolts were ground down to make tapered pins.

Slide the Outboard Wing Spar into the Center Section. With the holes in alignment, push the tapered pins through the holes. A repairman's mirror is handy to check the hole alignment. **DO NOT** force the pins through the holes, this can elongate the holes. A little grease on the pins and bolts will make installation easier. **ONLY PUT GREASE ON THE SHANK OF THE BOLT,** grease on the threads will give inaccurate torque values. One at a time replace the tapered pins with NAS bolts; a light tap from a plastic hammer may be necessary to push them through. **NAS6605 or NAS6205 torque value = 120 to 145 in*lbs.**



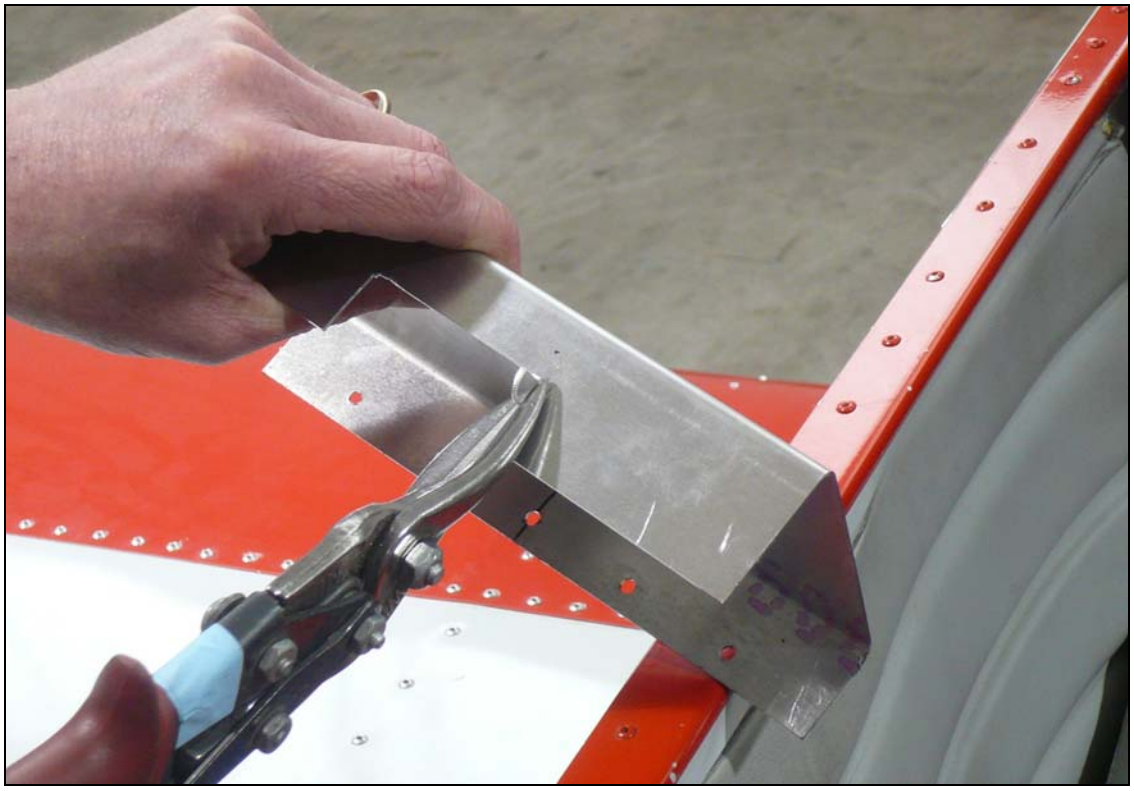
Reinstall the Controls in the Fuselage. After hooking up the Control Cables, be sure to check and set the cable tension to be within tolerance. Check the Aileron deflection to be sure the Mass Balance doesn't make contact with the Wing Skins.

Drill out the rivets on the underside of the Fuselage for 6B1-7 in the center. Only drill out enough rivets to position the Aileron Control Stop between 6B1-7 and the Bottom Skin.



P/N: 6ZU4-1
Aileron Control Stop Support

Position the Aileron Control Stop Support between the Fuselage Bottom Skin and 6B1-7. Center the cutout with the aircraft center line and Torque Tube. With a #20 drill bit, back drill through the Bottom Skin into the Aileron Control Stop Support and Cleco.

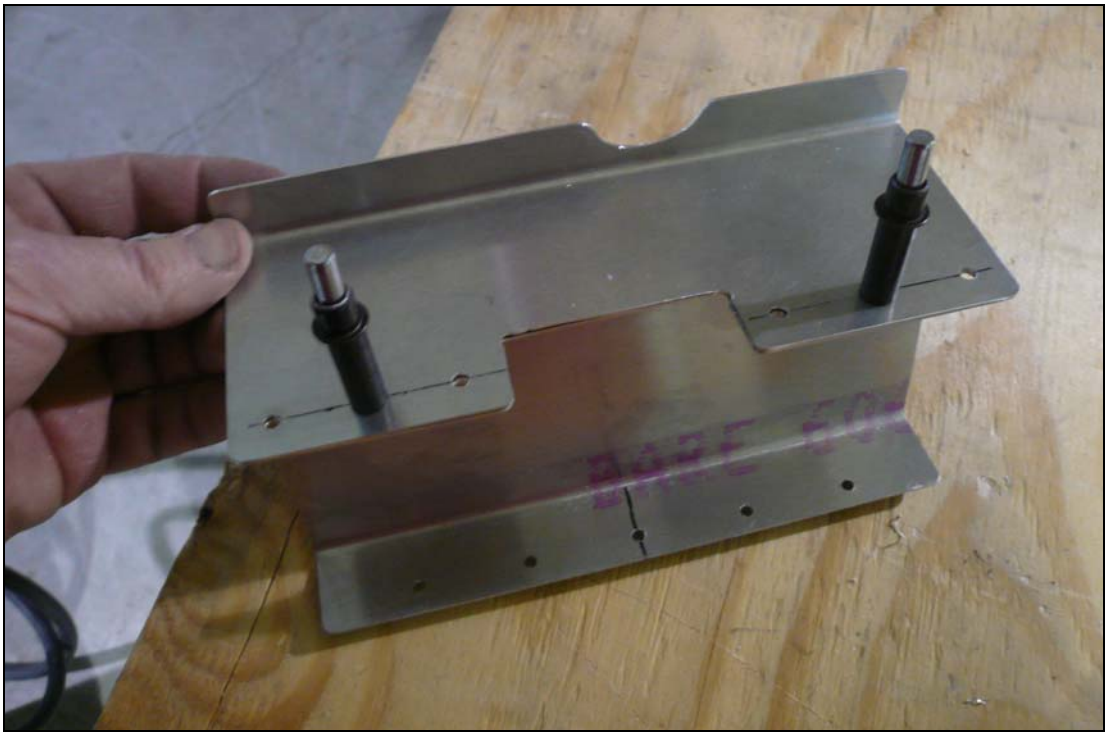


Check the Aileron deflection. It is likely that the cutout will need to be enlarged. Trim and file the cutout until proper Aileron deflection is achieved.

Once the cutout is properly sized to allow for the correct Aileron deflection, use a round file to file a radius into the corners of the cutout.

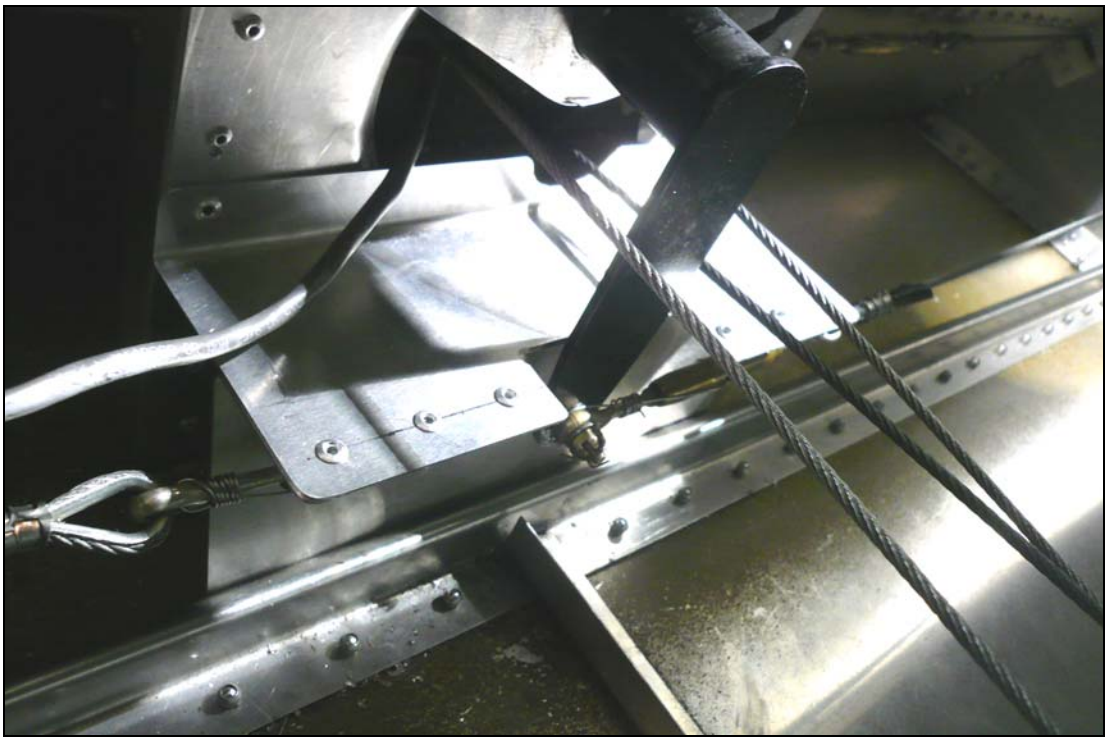
P/N: 6ZU4-2
Aileron Control Stop

Set the Control Stop on top of the Control Stop Support. Trace the cutout on the Support to the Stop and trim the Stop to match the Support. (Ignore the cutout on the smaller flange in the photo above).

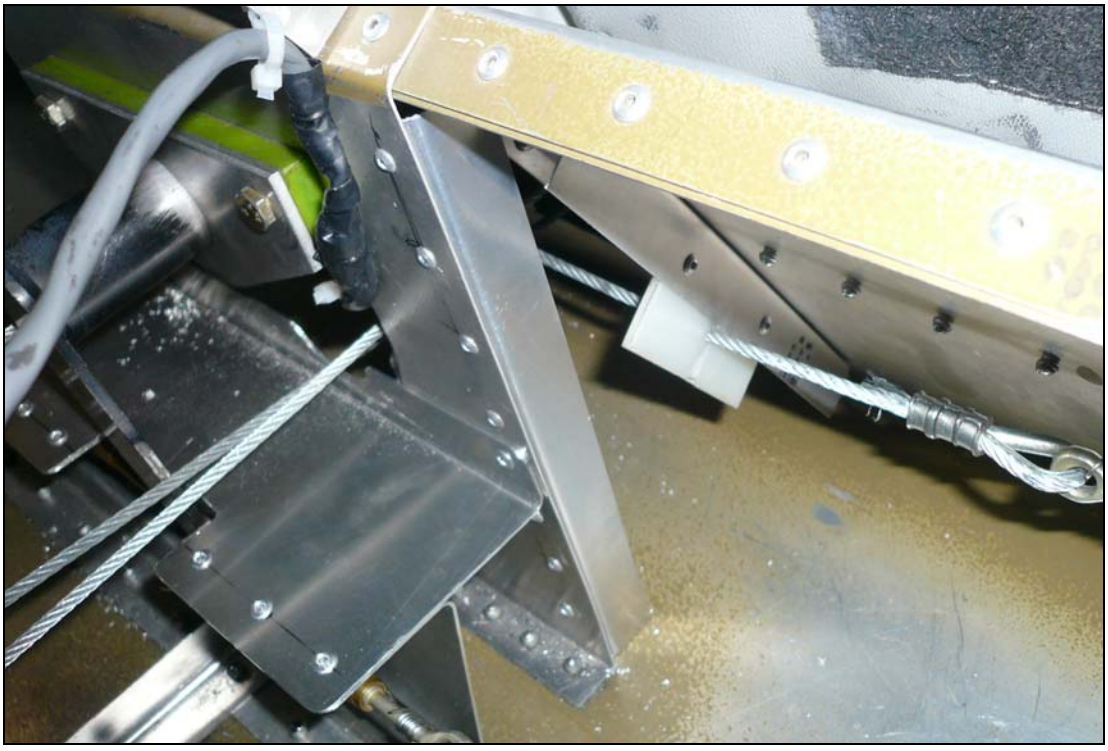


Draw a line 10mm from the edge of the Stop. Layout three rivet locations on each side of the cutout. Set the Stop on the Support with the edges flush and clamp the Stop and Support together. With a #40 drill bit drill through the Stop into the Support and Cleco. With a #20 drill bit expand the holes and Cleco.

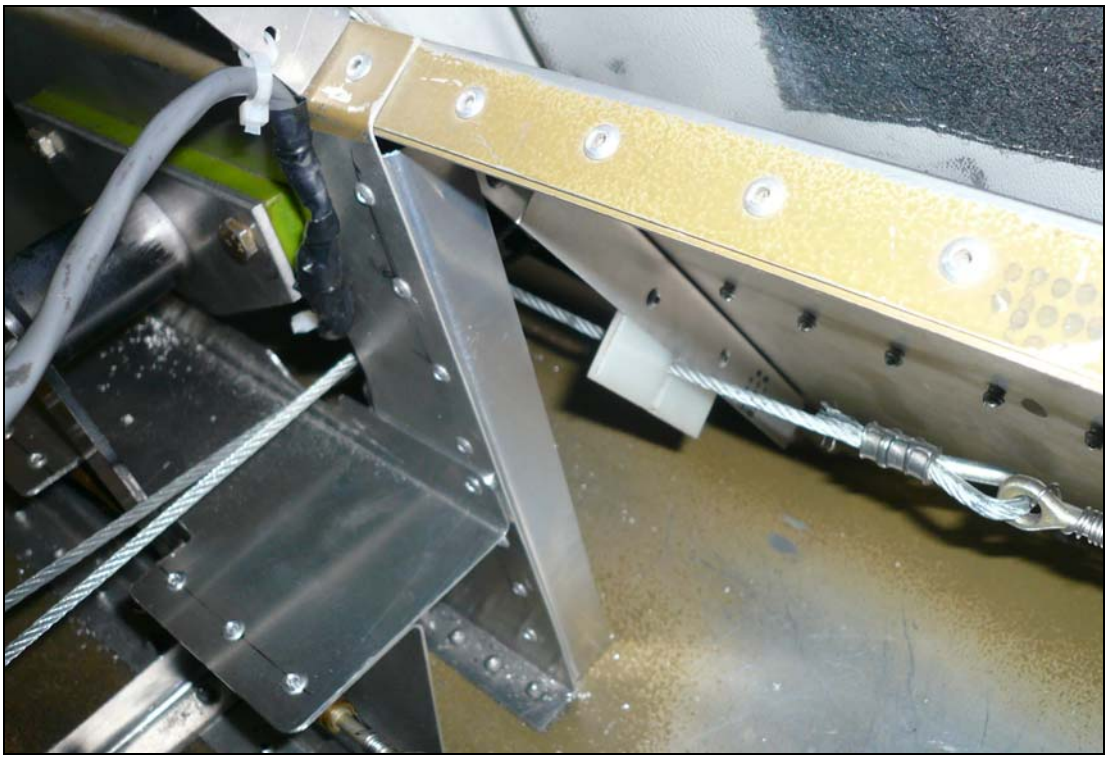
Mark a rivet location 10mm from the ends of the Stop, centered on the flange. With a #40 drill bit, drill the rivet locations in the flange. Reposition the Stop and Support in the Fuselage. With a #40 drill bit, back drill through the Stop into 6B17-1 and Cleco.



A cutout may be required in the flange to allow clearance around the cables. Trim the flange as necessary.



Cut two L Angles to fit on 6B17-1. Layout rivet locations for the L Angles 10mm from the edge of 6B17-1 at pitch 30mm. With a #40 drill bit, drill the rivet locations in 6B17-1. Draw a center line on one flange of the L Angle. Position the L Angle on 6B17-1 so the center line is visible through the holes. With a #40 drill bit, back drill through 6B17-1 in the L Angle and Cleco.



Disassemble the Control Stop, Support, and L Angles. Deburr the holes, reassembly, and rivet the Control Stop, Support and L Angles.