

## Control Assembly

### 15.1 Inner Floor

**NOTE:** Before you can start on the Control installation you must first install the inner floor.

- 1) Draw center lines down the inside flanges of the Cabin Floor Bulkheads.
- 2) Lay the FUS-423 Cabin Floor in place. Cleco it to the FUS-429 Doubler (use the existing #40 holes).
- 3) Check that the floor is centered at the back of the Cabin.
- 4) Drill #40 holes through the Cabin Floor Bulkheads using the pre-punched holes in the Floor Skin. **NOTE:** You will notice there are only two holes per bulkhead. This is enough to hold the Floor in place while you work on the Controls. You won't drill the bulkhead rivet lines until after the Seat Rails have been located. See figure 15.1.1 for layout and locations of parts. Next, install FUS-33 Corner Wraps the same way you did for the Tailcone inner wraps.

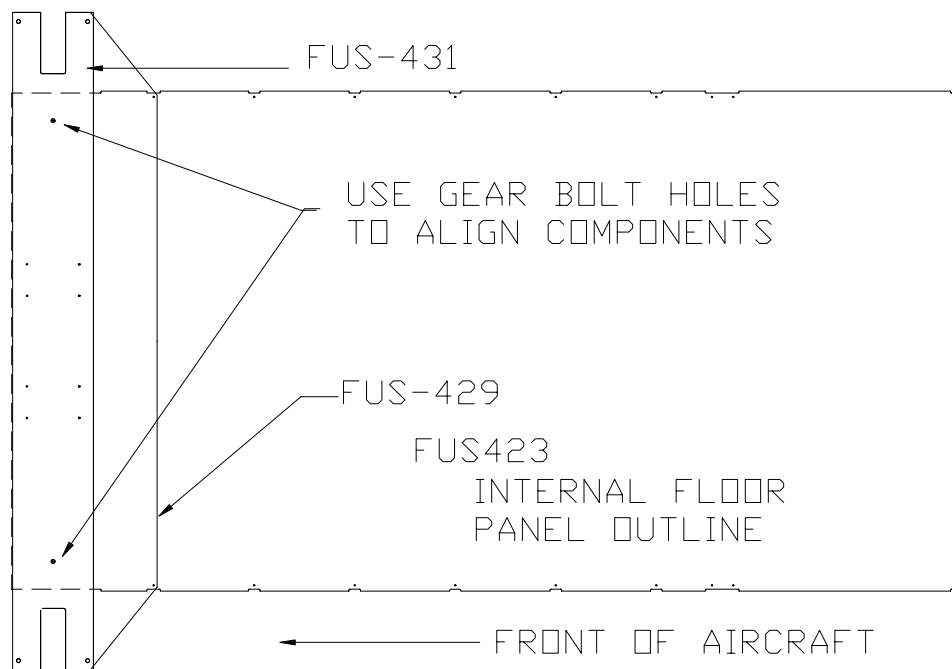


Figure 15.1.1

### 15.2 Control Sticks

- 1) Bolt Delrin Bearing (CC-37) inside the bearing plates (CC-38) similar to what is done in the wing assembly.
- 2) Install the control sticks (CC-5-1) in the control stick bases (CC-36). Make one left and one right stick.

Figure 15.2.1.

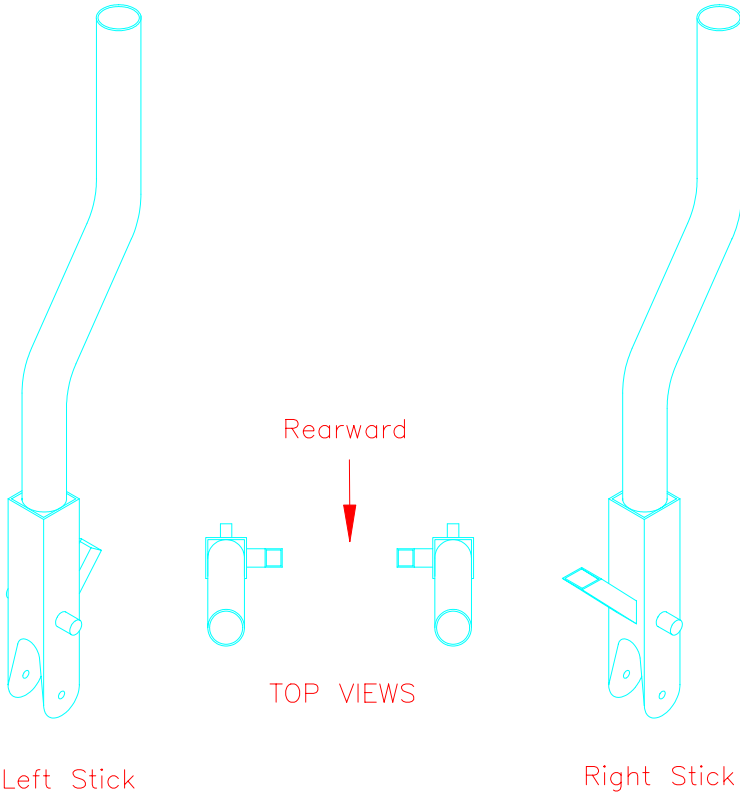


Figure 15.2.1

3) Drill a #11 hole through the control stick base and control stick. Bolt together with AN3-13A bolts, AN960-10 washers, AN365-1032 fiber nuts. Figure 15.2.2.

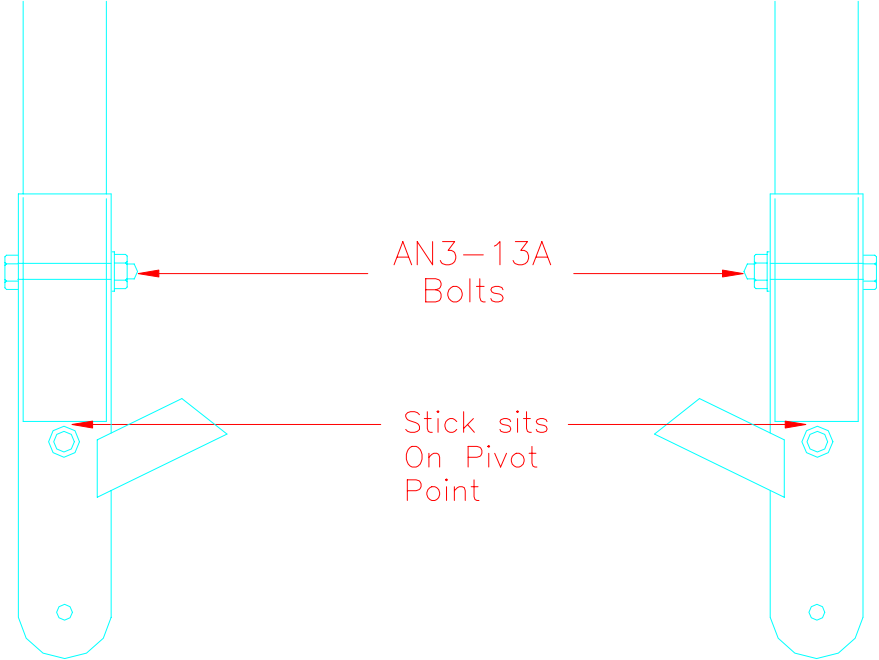


Figure 15.2.2

### 15.3 Control Column

- 1) Drill two 3/4" holes through the control column (CC-35). Figure 15.3.1. Use a grinder to do this or a series of small holes and file out the hole.

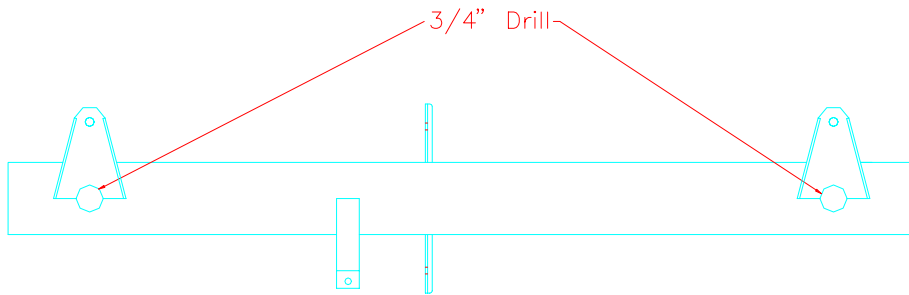


Figure 15.3.1

- 2) Attach the Control Sticks to the Torque Tube (CC-35) with AN4-25 bolts, AN960-416 washers, AN310-4 castle nuts and MS24665-132 cotter pins. Figure 15.3.2.

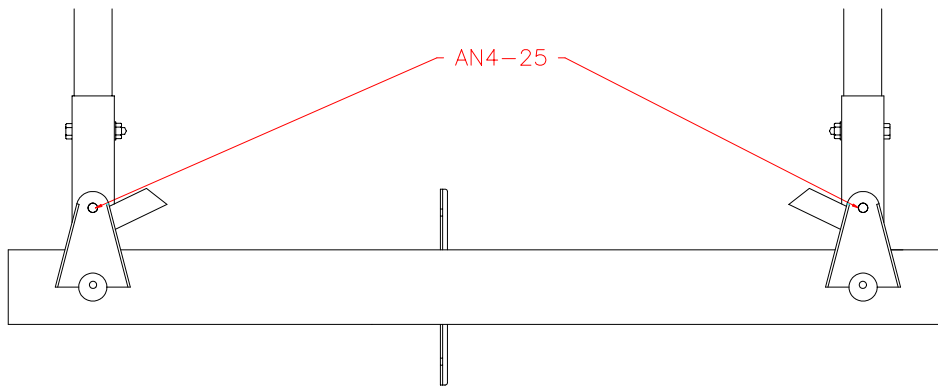


Figure 15.3.2

### 15.4 Connector Tube

- 1) Make the Control Stick Connector Tube (CC-39) from 3/4" x .035" tube (RAWST-22). Figure 15.4.1.

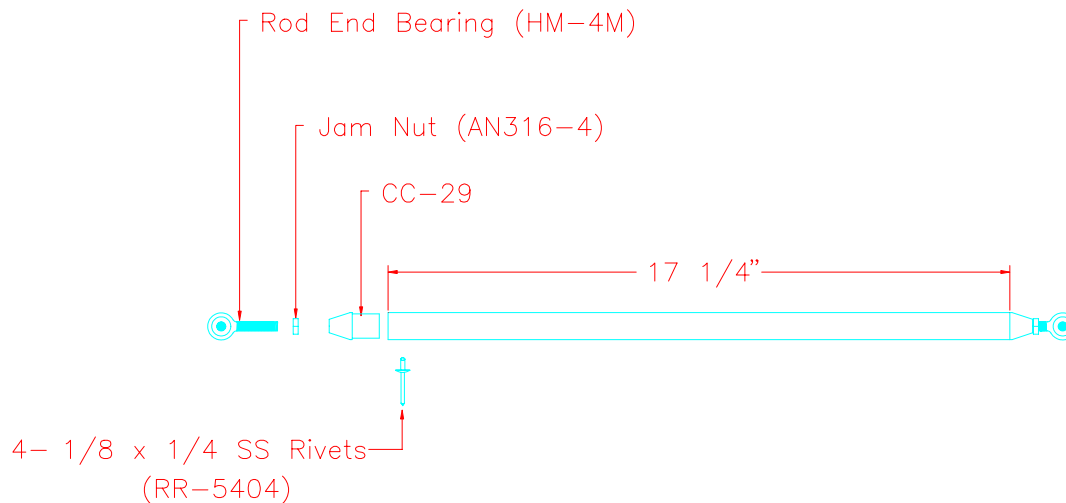


Figure 15.4.1

2) Adjust the connector tube to fit between the Control Sticks. Make sure to keep the sticks vertical. Figure 15.4.2.

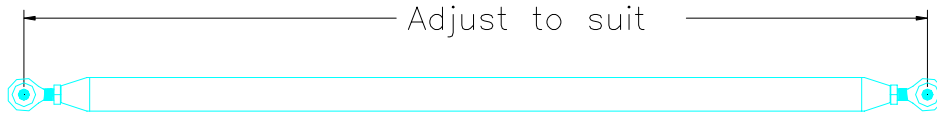


Figure 15.4.2

3) Attach one end of the connector tube to the passenger stick assembly. Use AN960-416 washers to take up the excess space. Figure 15.4.3.

**IMPORTANT:** Use a washer under the head and the nut and tighten until the sides of the Stick Base angle in slightly. Otherwise the end of the bolt can stick out too far and catch on the sides of the control column! Be sure to test for smooth operation without interference.

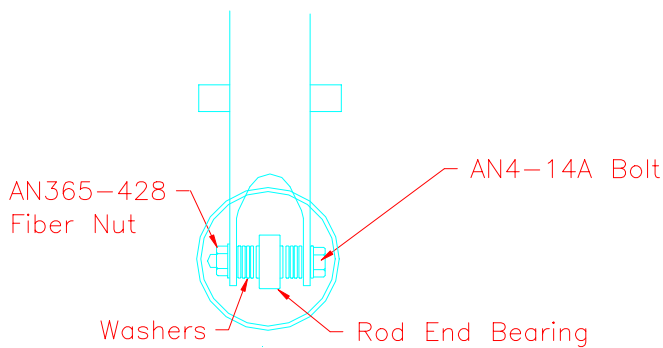


Figure 15.4.3

4) Slide the doubler rings (CC-54) onto the Control Torque Tube (CC-35). One on each end. Drill four #11 holes through each doubler ring. Figure 15.4.4.

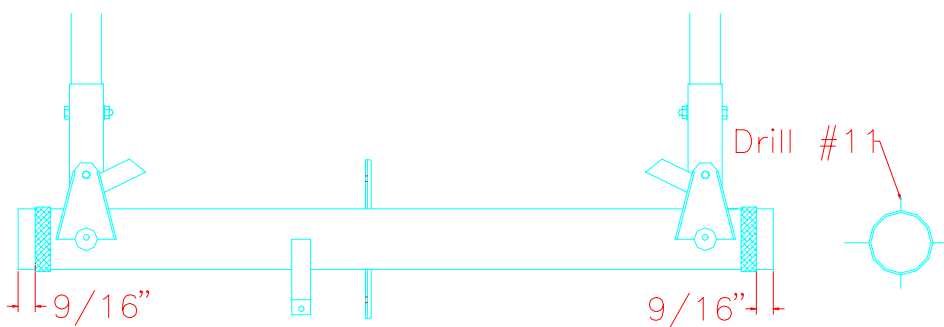


Figure 15.4.4

5) Remove the doubler rings. Debur. Rivet the rings on with 3/16" S.S. rivets (RR-5604).

6) Slide 2" washers (A-M2W) on the torque tube pressed up against the doubler rings.

7) Place the bearing base assembly on the control torque tube assembly. Figure 15.4.5.

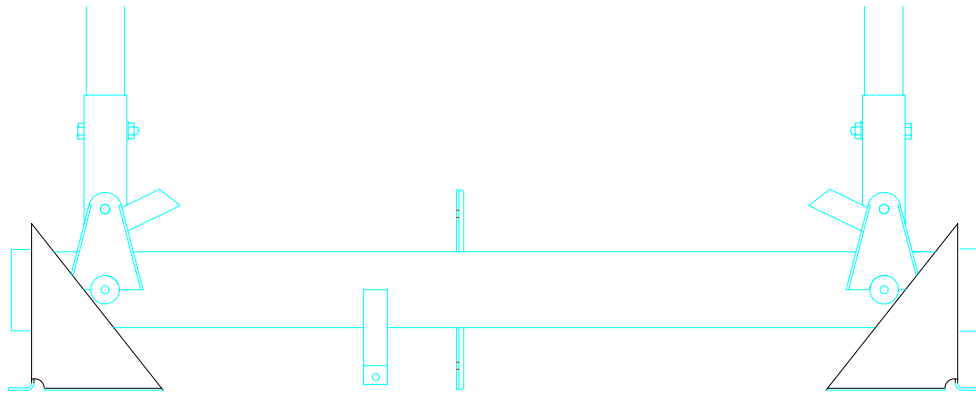


Figure 15.4.5

### 15.5 Mounting the Column

- 1) Center assembly on the Carrythroughs (FUS-5). Figure 15.5.1.

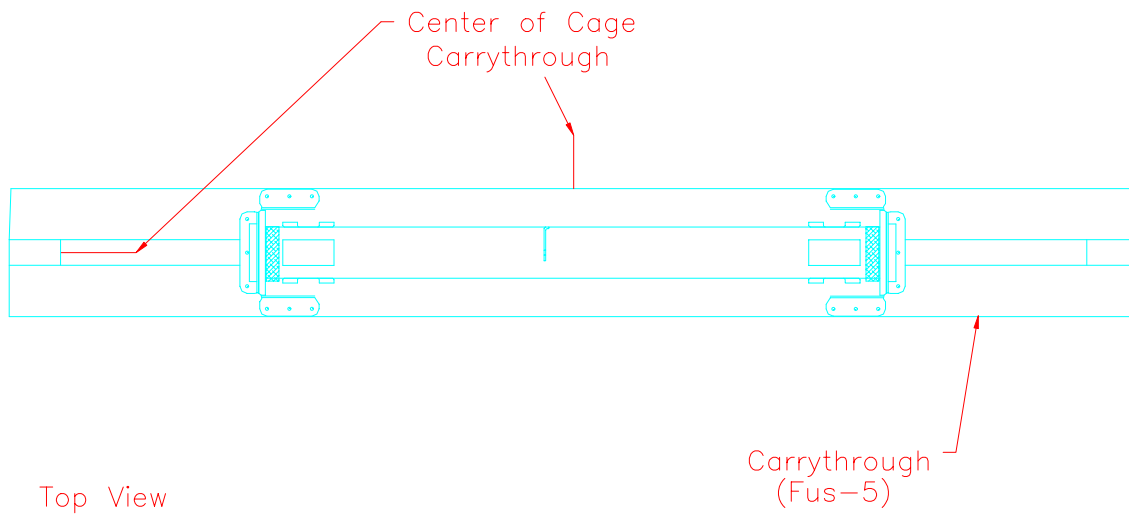


Figure 15.5.1

- 2) Drill #11 holes and cleco the bearing bases to the floor. Figure 15.5.2.

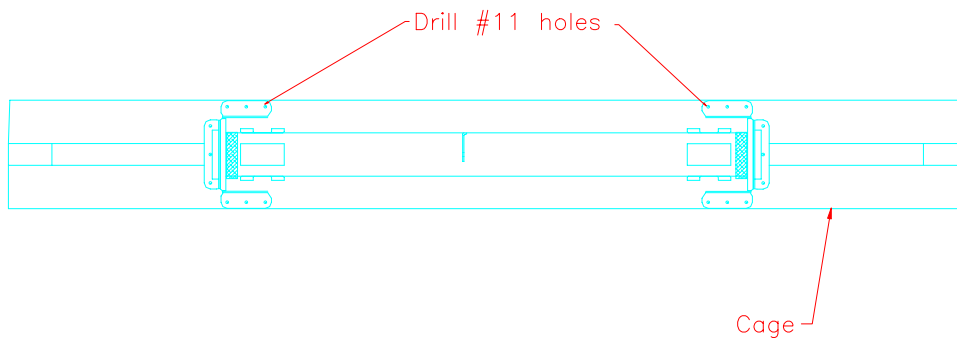


Figure 15.5.2

- 3) Locate and mark the position of the elevator stop (CC-67). **NOTE:** Make sure the stop is centered on the two tabs welded on the Torque Tube. Figure 15.5.3.

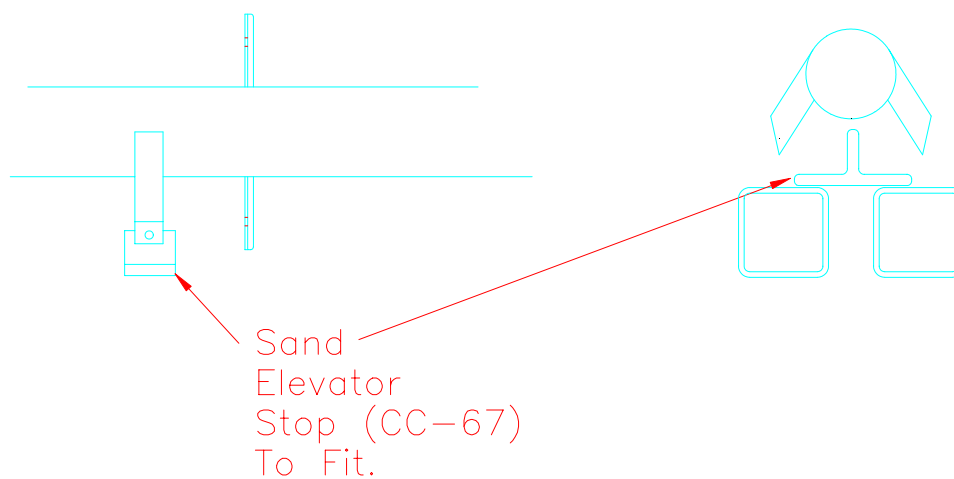


Figure 15.5.3

- 4) Remove control column assembly.
- 5) Drill four #11 holes through the elevator stop (CC-67) into the carrythroughs (FUS-5). Figure 15.5.4.

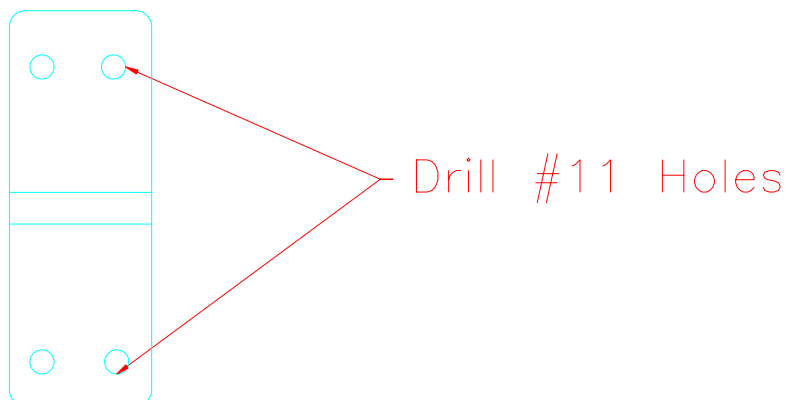


Figure 15.5.4

- 6) Deburr the elevator stop. Cleco back into place. The stop will be riveted with RV-1621 Avex rivets.
- 7) Cleco the Control Column assembly back into place. Install AN3-6A bolts with washers under the heads into the stop tubes on the column for both elevator and ailerons. Adjust with washers so bolt head contacts stop or torque tube to give desired deflections during rigging.

## 15.6 Bell Crank Install

- 1) Position the bell crank holder (CC-42). Figure 15.6.1.

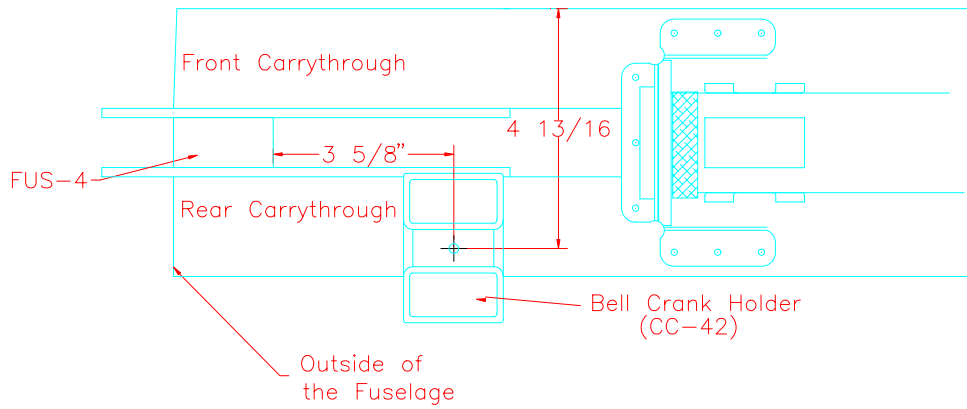


Figure 15.6.1

2) Drill three #30 holes through the bell crank holder into the rear Carrythrough. Figure 15.6.2.

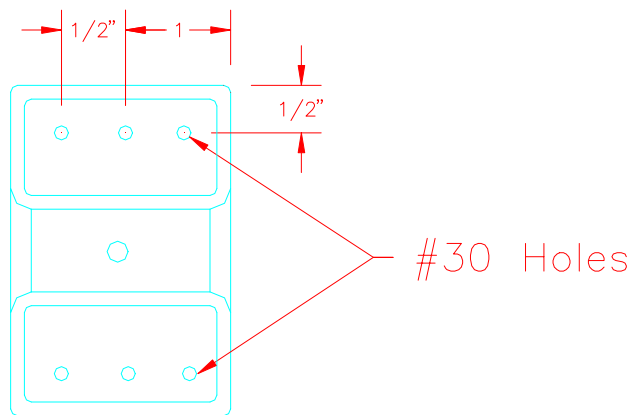
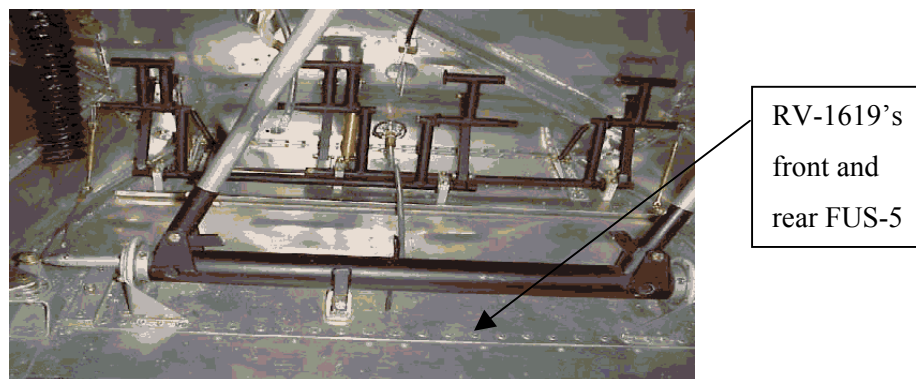


Figure 15.6.2

3) Debur all holes and cleco back in place. The CC-42 will be riveted with RR-5408 (forward row) and RR-5406 (rear row) stainless rivets. With the Bell Crank Holder, Stop and Control Column cleco'd in place, lay out a rivet pattern similar to that of the outside skin (FUS-432) across the cabin along the inner doublers, between these fittings. Center the rivets lines on the FUS-5's. Drill holes out to #11. Rivet with RV-1619's.



4) Use the Bell Crank Bearing (MI-25) as a drill guide to drill twelve #30 holes into the mixer (CC-47-2). Figure 15.6.3.

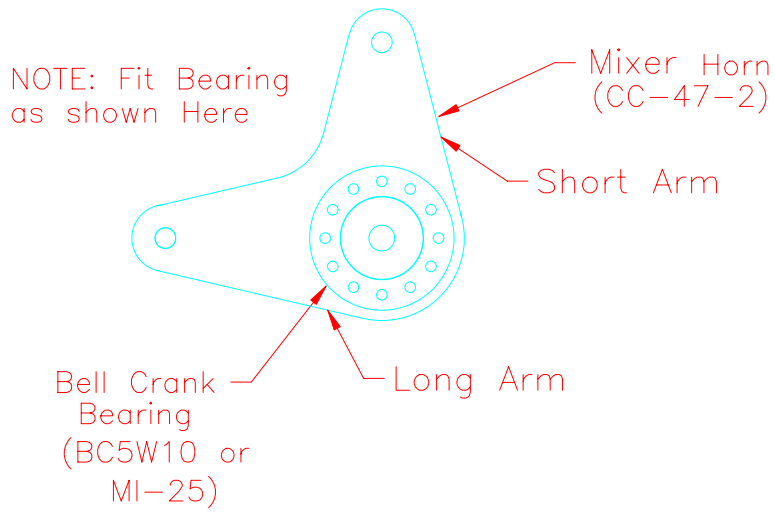


Figure 15.6.3

- 5) Debur mixer.
- 6) Attach bell crank bearing to the mixer with 1/8" (RR-5404) S.S. rivets. Insert rivets in a one up, one down pattern. Figure 15.6.4.

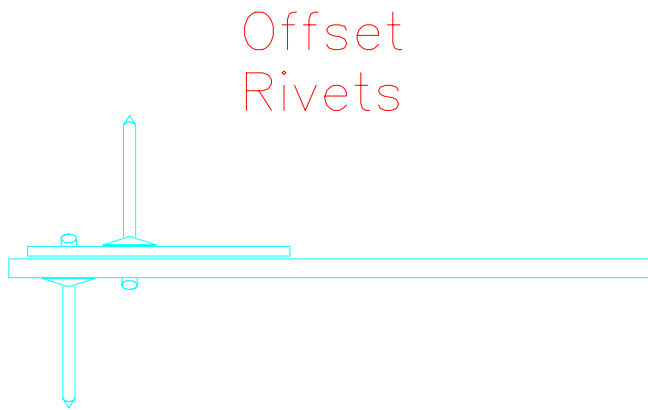


Figure 15.6.4

- 7) Drill out the hole in W-62-1 to a 5/16" drill size. Cut W-62-1 in half so that you have two equal parts of approximately 3/8" long. Figure 15.6.5.

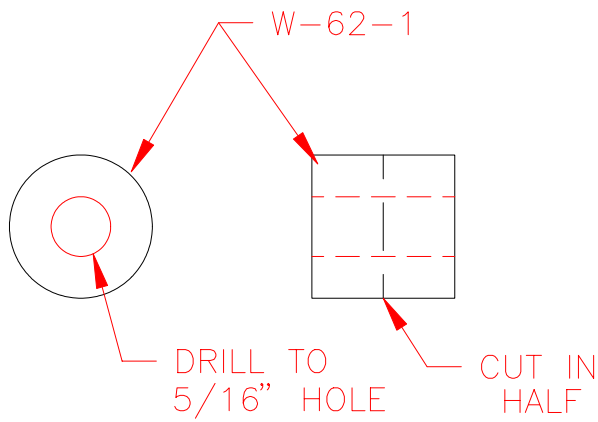


Figure 15.6.5

8) Position the Bell Crank Brace (CC-41). Layout and drill seven #30 holes through the Bell Crank Brace end flange. Figure 15.6.6.

9) draw a center line down the middle of CC-41. Figure 15.6.6.

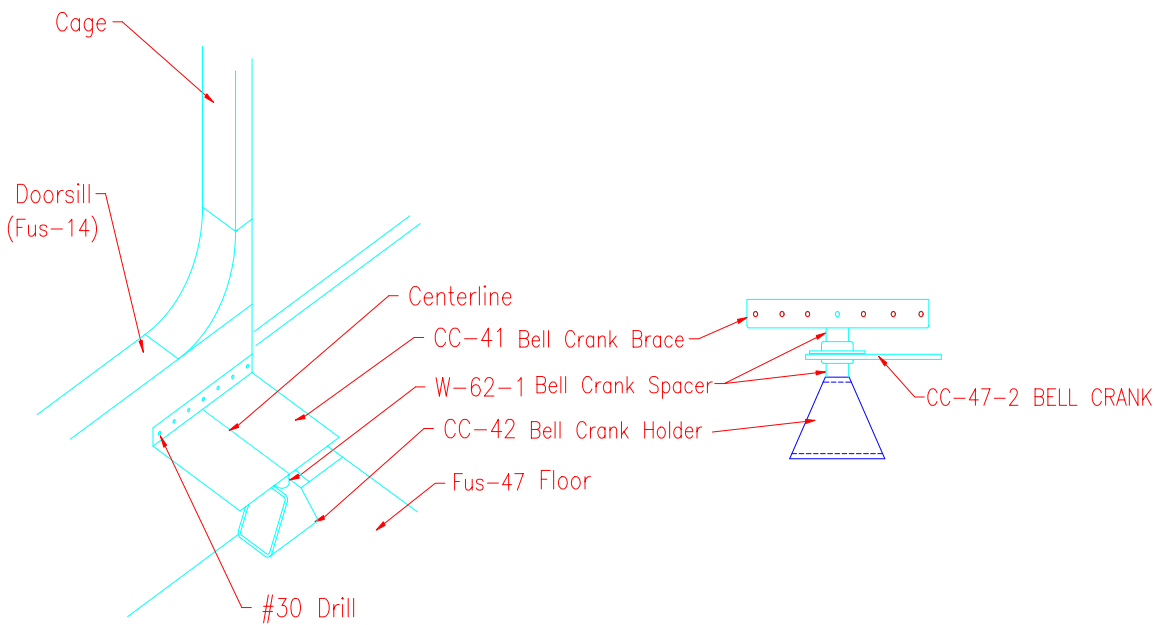


Figure 15.6.6

**NOTE:** Slide the CC-41 along the Door Sill (FUS-406) until you can see the center line in the CC-42 Bell Crank Holder. Mark a line and join it with the center line you just drew. Drill a 5/16” hole at the intersection. Figure 15.6.7.

10) Temporarily assemble the Bell crank assembly as per figure 15.6.6. Drill through the seven #40 flange holes on CC-41 into the FUS-406 Door Sill. Figure 15.6.7.

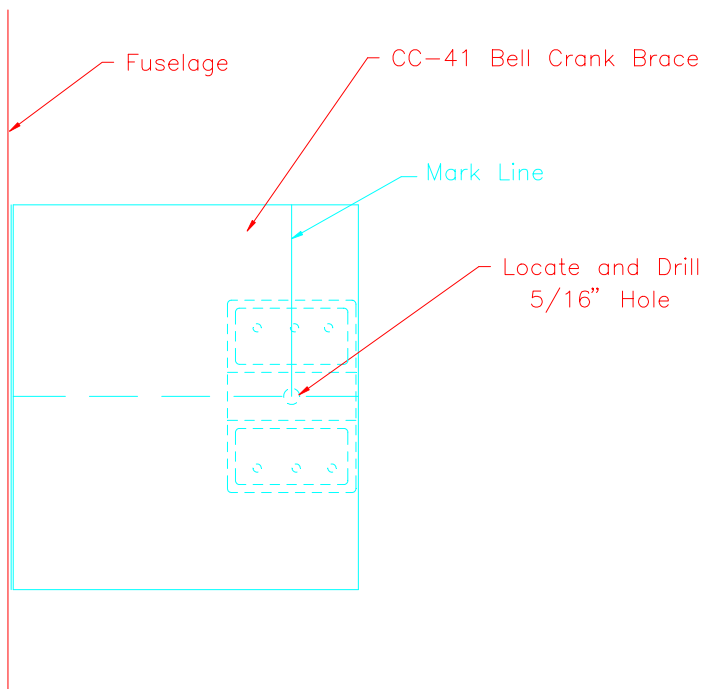


Figure 15.6.7

11) Remove the assembly and trim the Bell Crank Brace (CC-41). Figure 15.6.8.

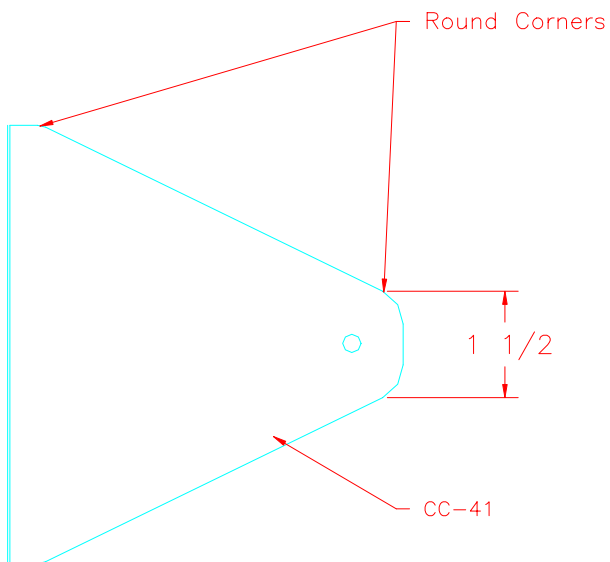


Figure 15.6.8

12) Apply a break along two edges of the Bell Crank Brace. Figure 15.6.9.

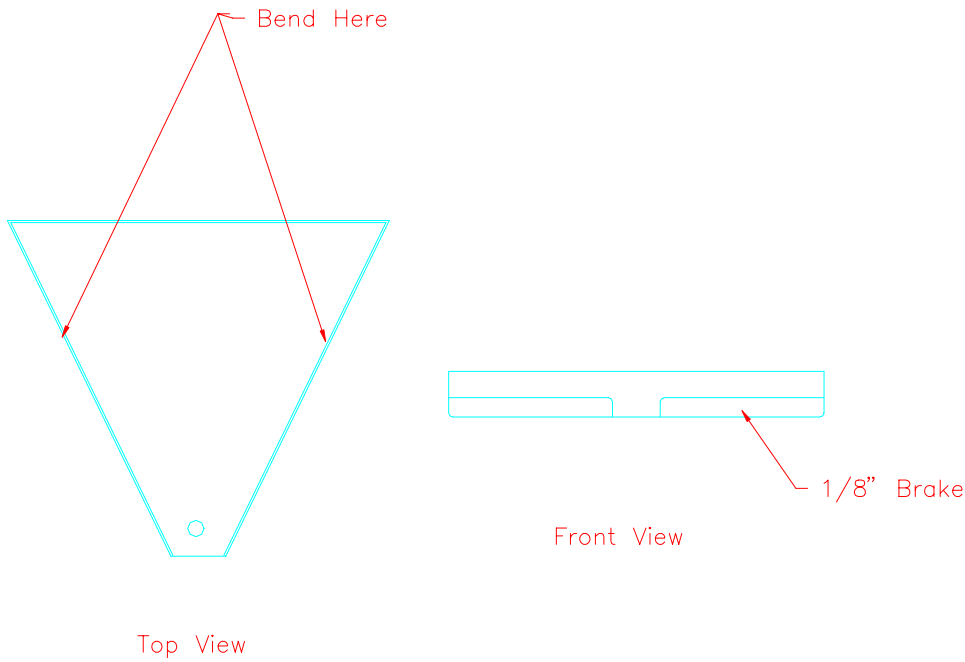


Figure 15.6.9

13) Debur all holes and edges.

14) Bolt the Mixer Bell Crank and Bell Crank Spacers into place with a AN5-20A bolt. Figure 15.6.10.

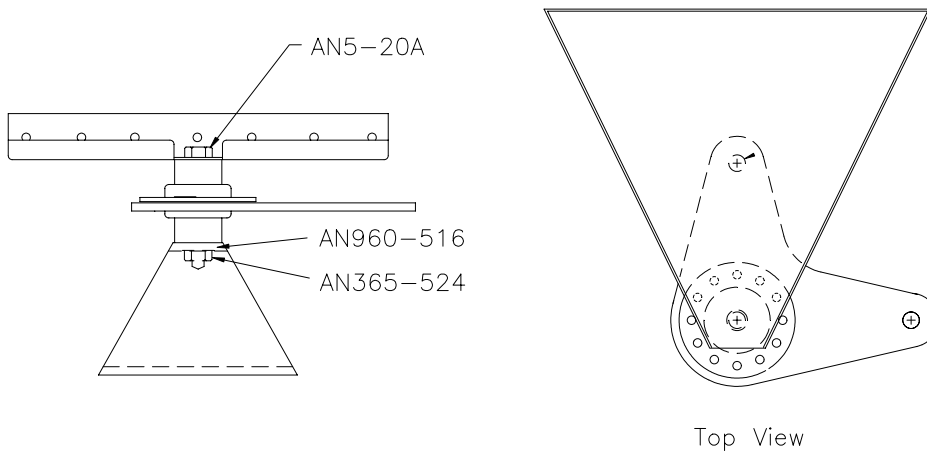


Figure 15.6.10

15) Cleco the assembly to the Floor and the Door Sill.

16) Make a push-pull tube (CC-40) from 3/4" x .035 tubing (RAWST-22). Adjust to length by turning the rod end bearings then lock in place with a jam nut (AN316-4) on the outboard end only. Figure 15.6.11.

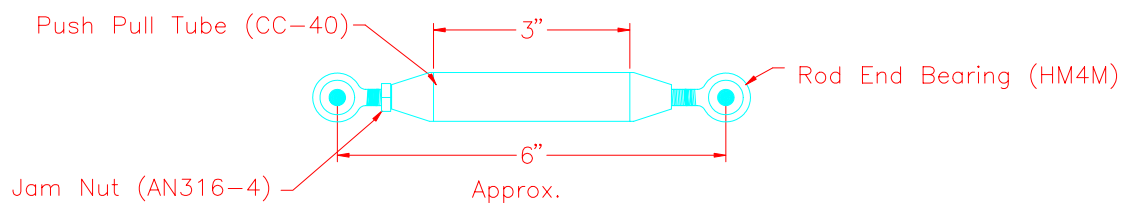


Figure 15.6.11

17) Attach one end of the push-pull tube to the pilots stick along with the connector tube. Use a couple of washers (AN960-416) if necessary to take up some space. Figure 15.6.12.

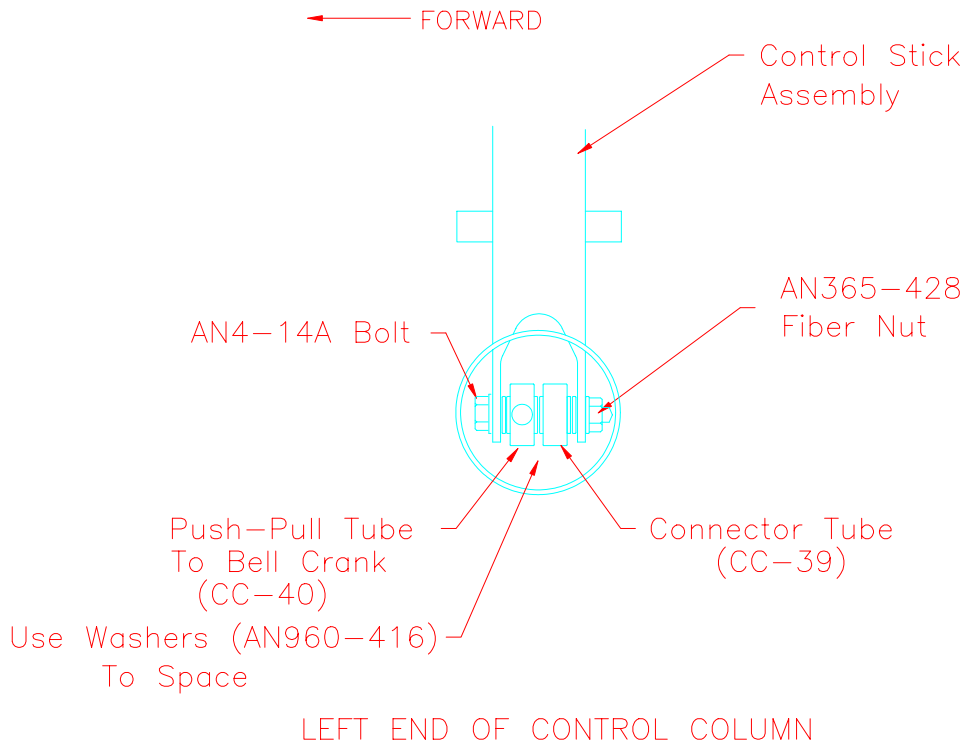


Figure 15.6.12

18) Adjust the push-pull tube until CC-47-2 is 90° to the control column. Figure 15.6.13.

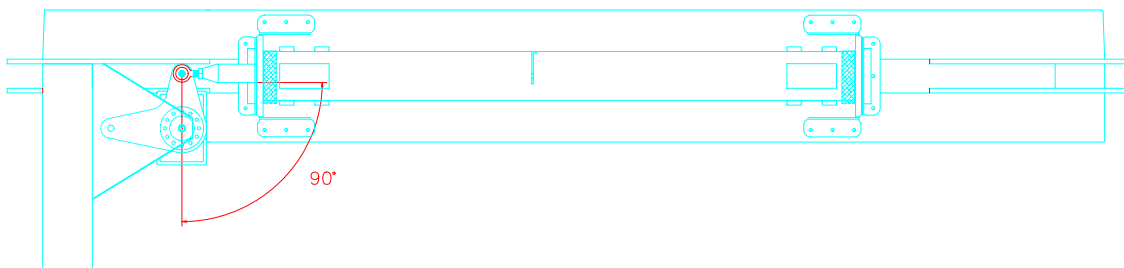


Figure 15.6.13

19) Attach the other end of the push-pull tube to the bell crank with an AN4-11A bolt, AN970-3 washer (drilled out to 1/4”), 2 AN960-416 washers, AN365-428 fiber nut. Figure 15.6.14.

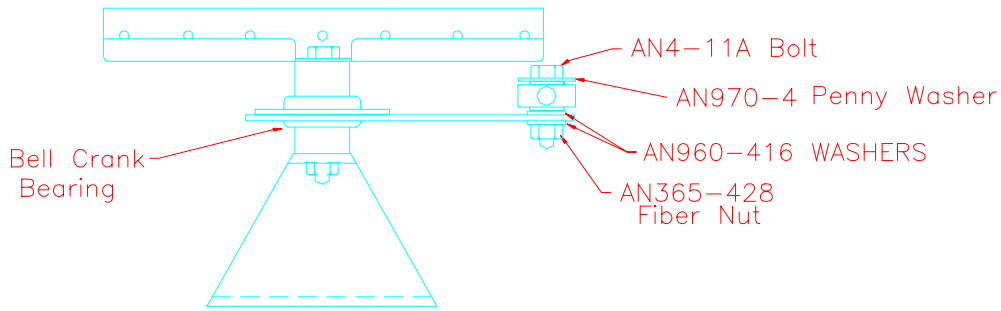


Figure 15.6.14

15.7 Mixer Arm

- 1) Layout and drill a 1/4" in the CC-76 mixer arm. Trim the mixer arm as per Figure 15.7.1.

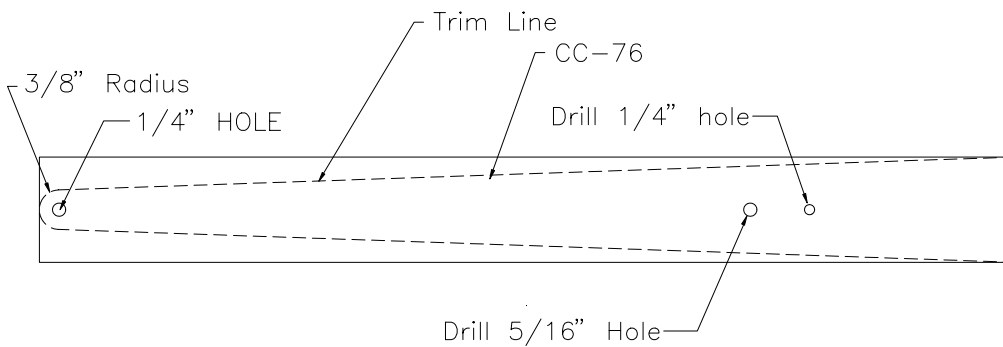


Figure 15.7.1

- 2) Using the full size drawings, cut out the doublers for the mixer arm assembly. Drill holes as shown. Figure 15.7.2 and Figure 17.7.3. (Cut from FUS-57)
- 3) Put the doublers in, on the inside of the pilots door and drill #30 holes for attachment to the fuselage. See Figure 15.7.4 for locations of the gussets.

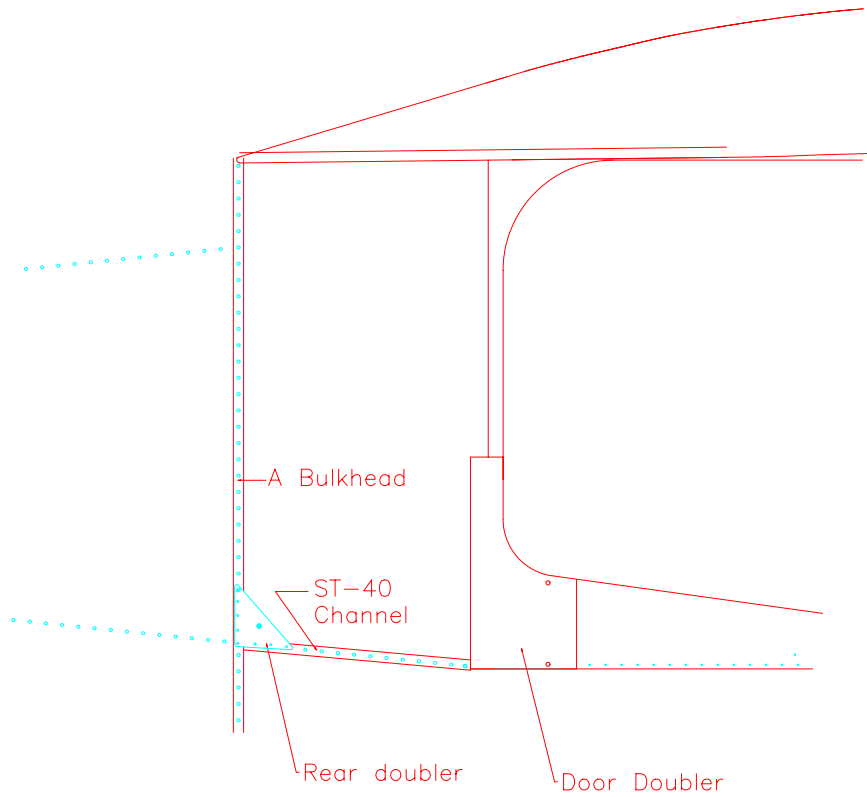


Figure 15.7.4

- 4) Use a felt marker to mark the location of the #11 holes on the inside.
- 5) Remove the door doubler and position a floating anchor nut (F5000-3) on the back side of each #11 hole.

Figure 15.7.5.

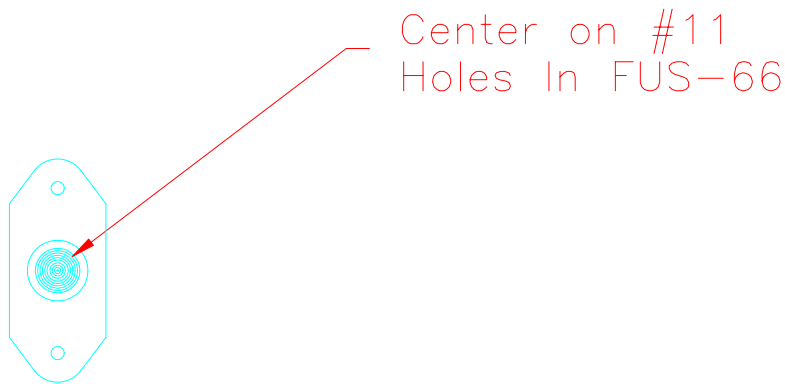


Figure 15.7.5

- 6) Drill the two #30 attachment holes through each floating anchor nut. Figure 15.7.6.

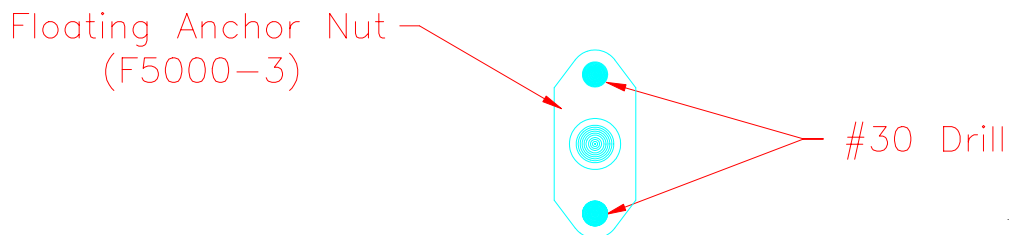


Figure 15.7.6

- 7) Countersink the four holes on the doubler to allow 1/8" CS rivets (RV-4412) to sit flush. Figure 15.7.7.

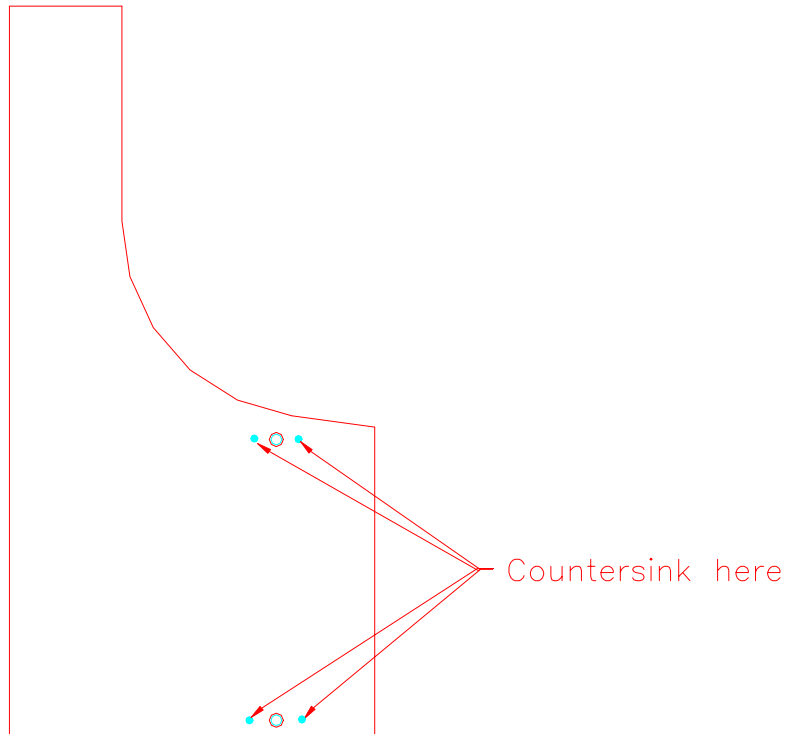


Figure 15.7.7

- 8) Debur all holes and edges.
- 9) Attach the floating anchor nuts to the doubler (FUS-66) with the thread barrel facing out. Rivet from the front side of the doubler.
- 10) Using the marks made earlier as a guide, drill holes large enough to allow the floating anchor nuts thread barrels to nest inside.
- 11) Debur doublers and mating surfaces. Cleco for now.
- 12) Cut two mixer arm retainers from raw stock (CC-77) at 6" long.
- 13) Cut two spacers at 1" length from the same material.
- 14) Sand and round corners of the parts. Figure 15.7.8.

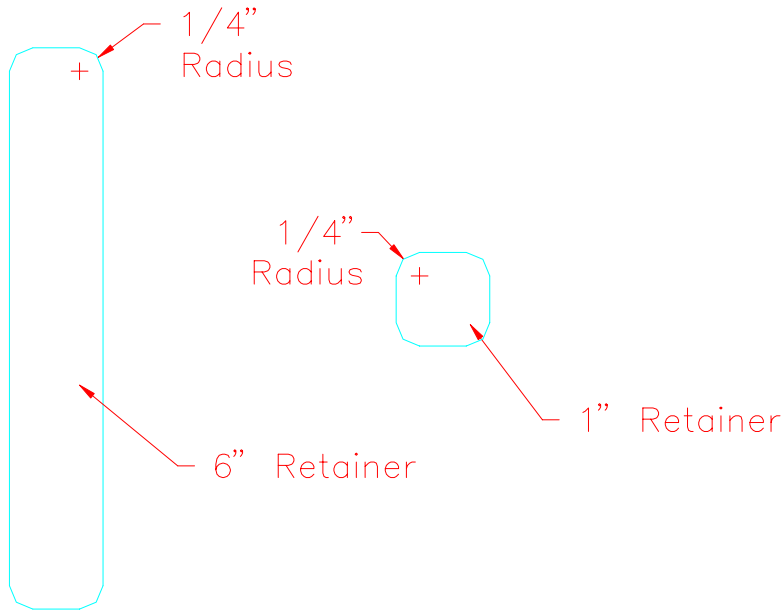


Figure 15.7.8

15) Drill two #11 holes into one 6" retainer. Figure 15.7.9.

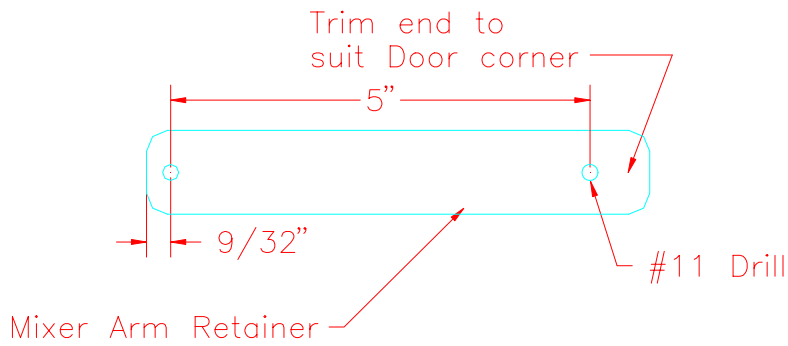


Figure 15.7.9

16) Use 6" retainer as a guide to drill the holes in the other 6" retainer and 1" spacers.

17) Bolt the retainers into position with AN3-13A bolts. AN970-3 penny washers may be needed to space the retainers away from the door post doubler, to prevent the fork end of the teleflex cable binding against the doubler. Figure 15.7.10.

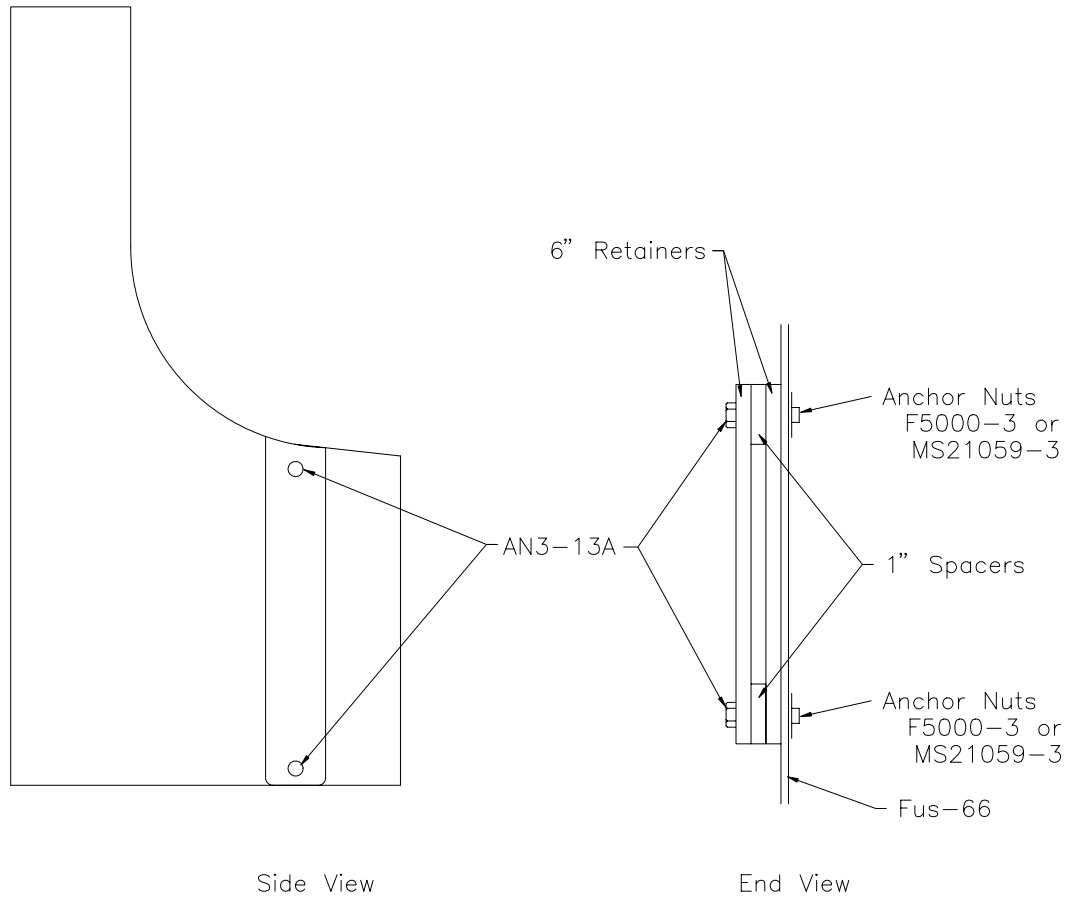


Figure 15.7.10

- 18) Install a Bell Crank Bearing (MI-25) in the mixer horn (CC-48-2) as done earlier.
- 19) Attach the mixer assembly to the mixer arm with an AN5-14A bolt, 4 AN960-516 washers, one AN970-5 penny washer and one AN365-524 fibernut. Figure 15.7.11.

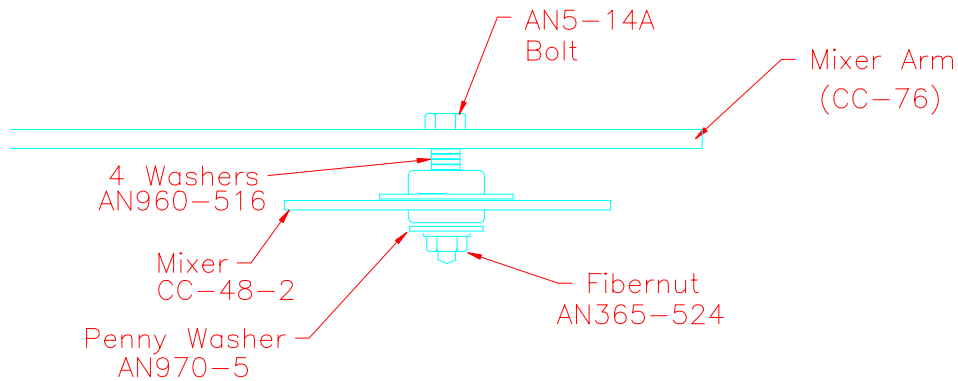


Figure 15.7.11

- 20) Drill the 1/4" hole in the rear doubler to 1/2" diameter.
- 21) Center a brass bushing (AIL-27) in the 1/4" hole on the rear doubler. Figure 15.7.12.

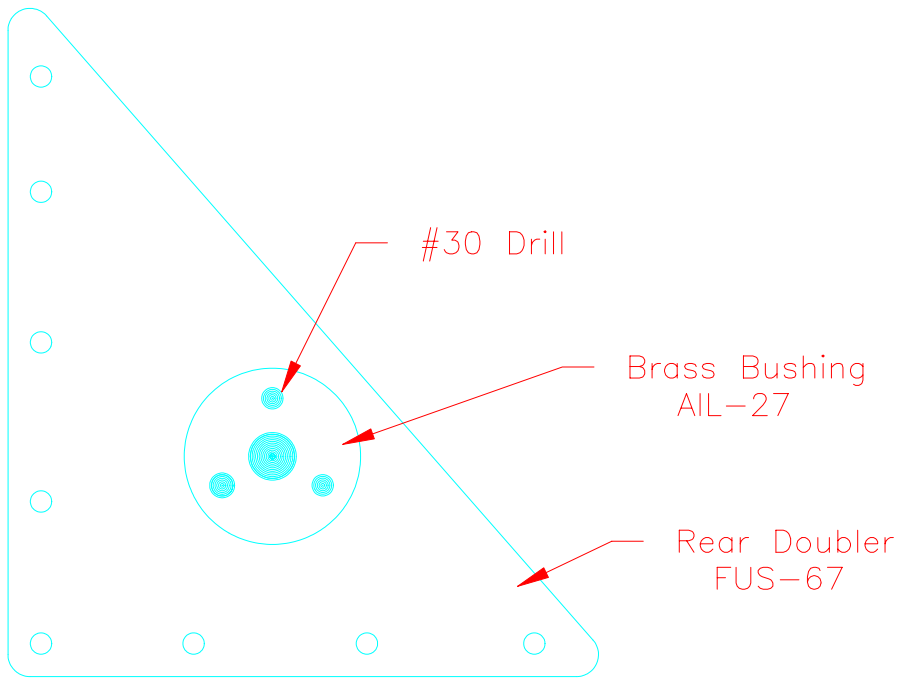


Figure 15.7.12

- 22) Drill three #30 attachment holes (counter sunk) and rivet in place with 1/8" CS (RV-4412) avex rivets.
- 23) Slide the wide end of the mixer arm between the retainers and attach mixer arm to the rear doubler. The arm should move freely within the retainers. Sanding of the arm may be required. Figure 15.7.13.

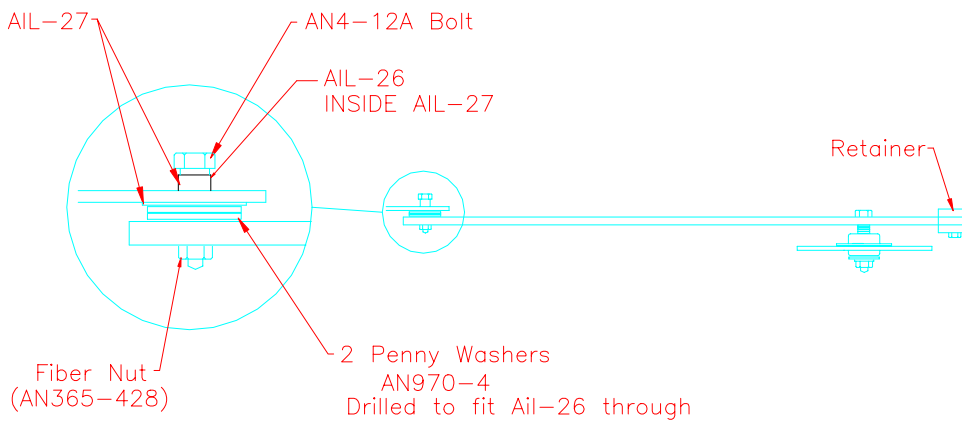


Figure 15.7.13

### 15.8 Torque Tubes

- 1) With the wings attached to the fuselage, locate the position where the torque tube enters the fuselage. Mark and cut a 3" hole in each Fuselage Root Rib (FUS-27) to allow the tube to enter.
- 2) Cut a piece of ST-31 channel to fit between bulkhead 9A and the aft roof bulkhead along the roof line. Figure 15.8.1.

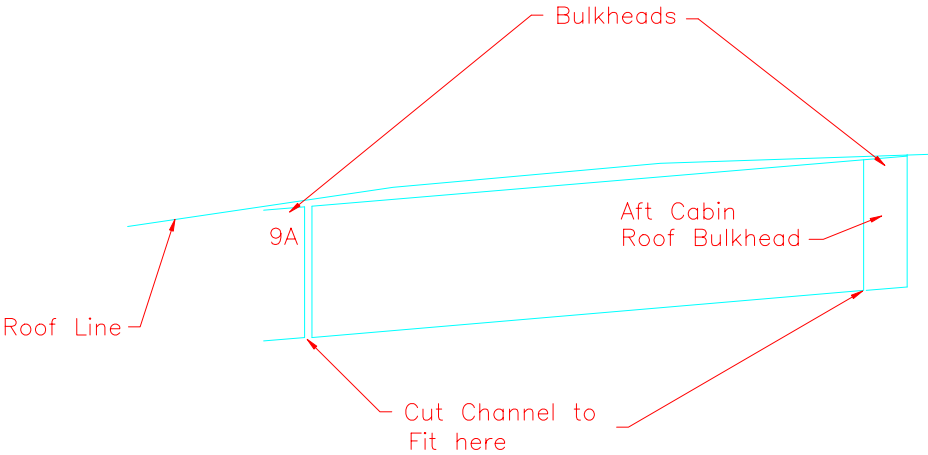


Figure 15.8.1

3) Cut two angles from (ST-31) for attachment and attach channel into position. Rivet angles similar to the floor channels using 1/8" x 3/16" avex rivets (RV-1410). Figure 15.8.2.

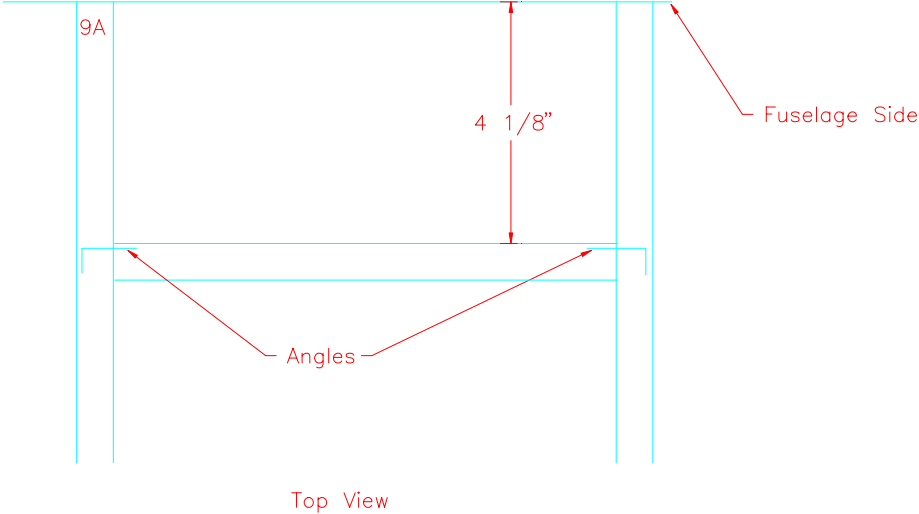


Figure 15.8.2

4) Cut out Torque Tube Hanger (CC-78) from .125 material (FUS-57). Figure 15.8.3.

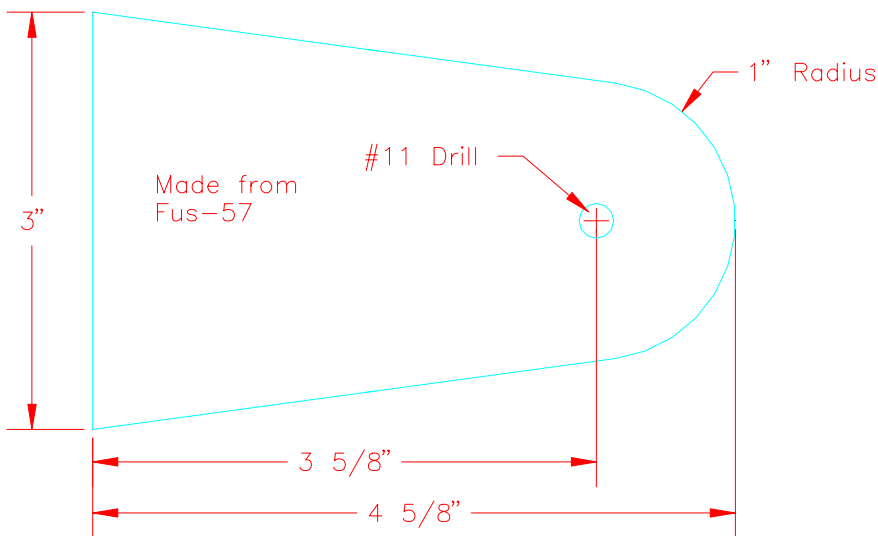


Figure 15.8.3

5) Make a hanger support bracket (FUS-69) from .032 material (W-143). Figure 15.8.4.

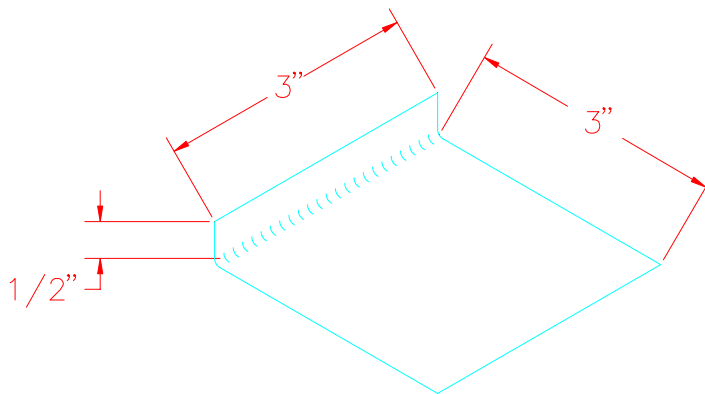


Figure 15.8.4

- 6) Make two torque tubes for the inside the fuselage from 2" x .035" tube material (RAWST-23). Cut one tube 5 3/8" long and the other 40 1/4" long.
- 7) Make two right and two left control horn assemblies (CC-43&EL-31), the same way you did in the wing assembly section. Use the two CC-43s you set aside earlier in the wing assembly section to make the matching left and right assembly that will bolt to the wing control horn later. Figure 15.8.7.
- 8) On the other right and left assembly, install an anchor nut on the EL-31 as shown in Figure 15.8.5.
- 9) Drill horn, debur, chromate and rivet horn with 3/16" S.S. rivets (RR-5604).
- 10) Install AN4-16A bolt into the two nutplates with a thread locking compound. Tighten snugly.
- 11) Grind or cut off the head of the bolt.

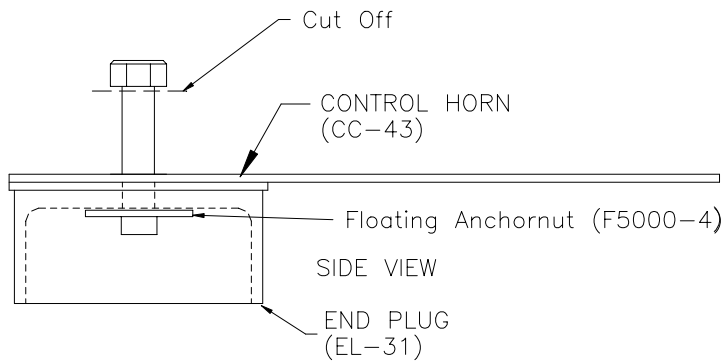


Figure 15.8.5

- 12) For the in-board end of each fuselage torque tube use the two without the floating anchor nuts.
- 13) Drill the center hole of the left and right end plug assemblies to 3/8" so that an Ail-26 bushing will slide through.
- 14) Bolt them together as in figure 15.8.6 with an AN4-16A bolt, two AIL-26 metal bushings and an AN310-428 castle nut. The hanger bracket should be between the two Ail-26 bushings. The control horns should move freely on the bushings.

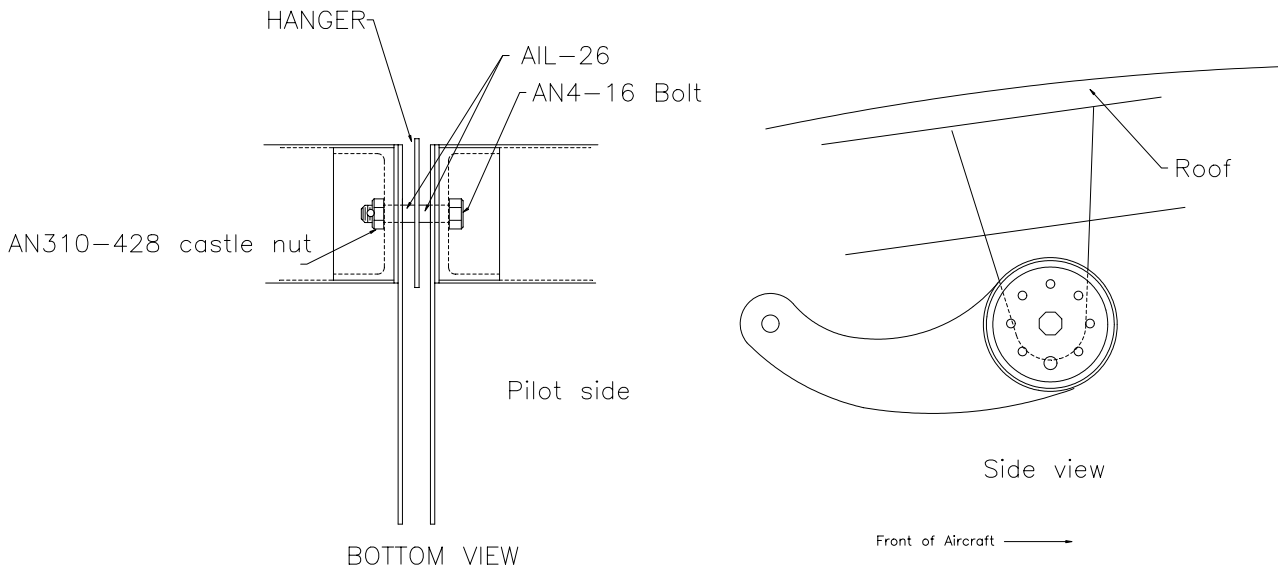


Figure 15.8.6

- 15) Slide the torque tubes through the holes in the fuselage and onto their corresponding end plugs.
  - 16) Attach the wings. Ensure the bolt in the fuselage torque tube slides into the end plug of the wing torque tube.
- Figure 15.8.7.

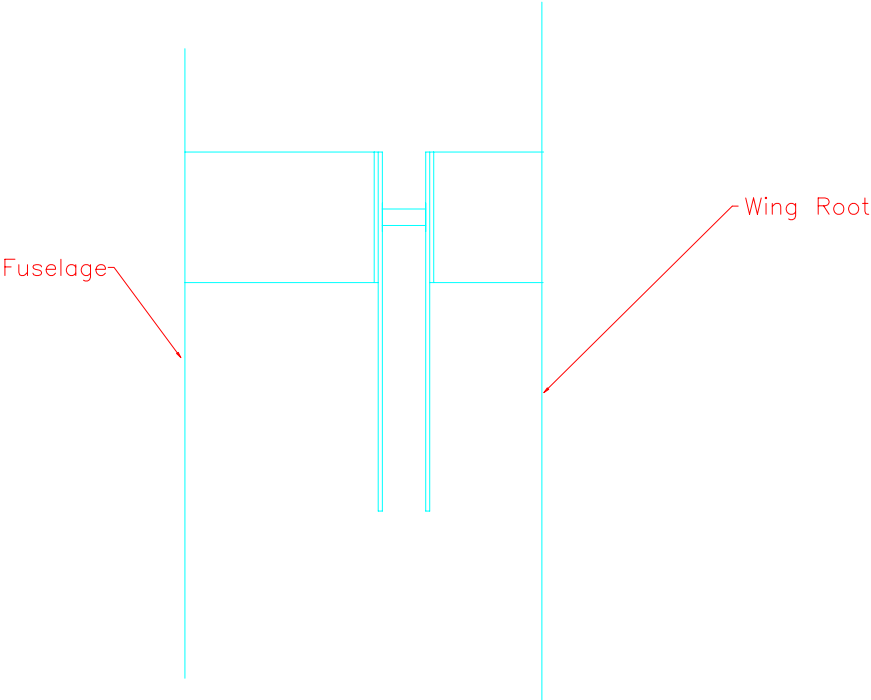


Figure 15.8.7

17) Align all torque tubes so that there is no binding at the pivot points. Locate the hanger (CC-78). Position it on the channel on the roof. Clamp the hanger onto the channel. Figure 15.8.8.

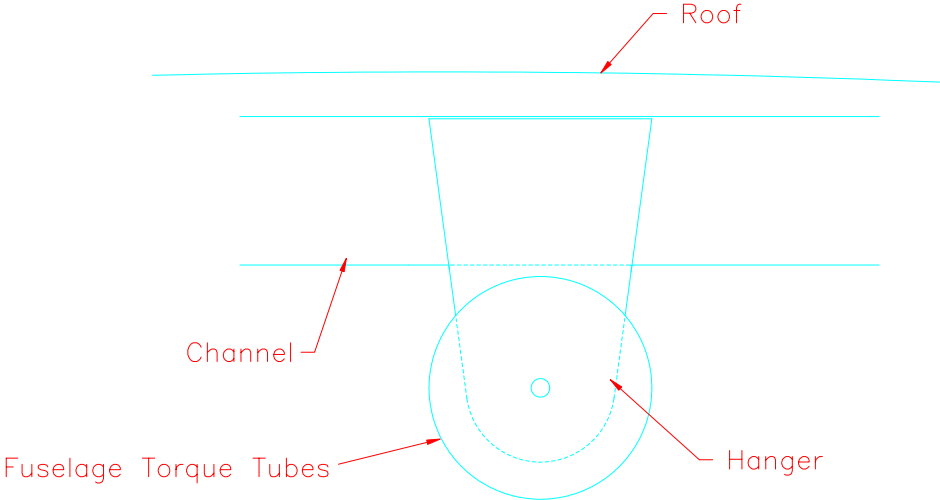


Figure 15.8.8

18) Trace the position of the hanger onto the channel. Figure 15.8.9.

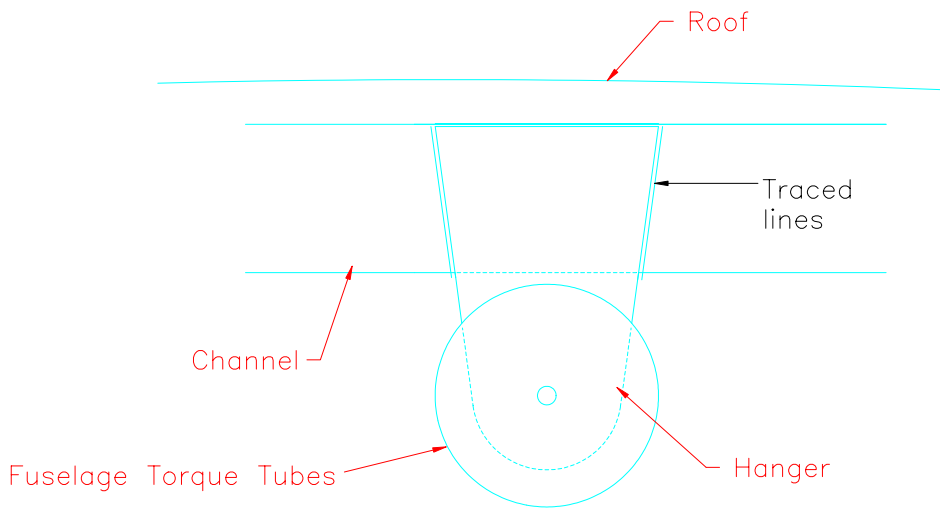


Figure 15.8.9

- 19) Remove wings and fuselage torque tubes
- 20) Disconnect the horn assembly from the hanger.
- 21) Replace the hanger in it's location on the channel and drill six #11 holes through hanger and channel.

Figure 15.8.10.

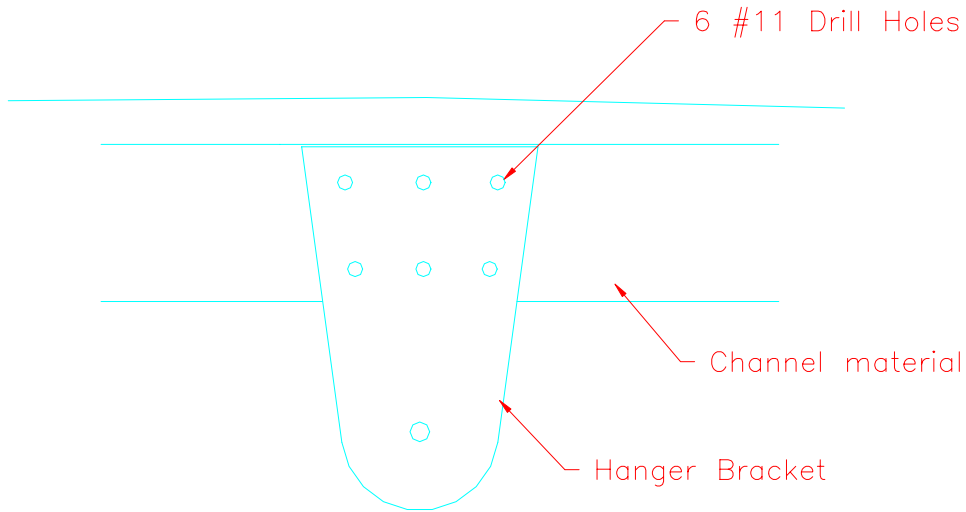


Figure 15.8.10

22) Out of .032 material make a bracket to fit over the side of the hanger and has a 1/2" flange to tie into the roof. Layout and drill 5 #30 holes on the bracket flange. Figure 15.8.12.

23) Sandwich the hanger between the channel and the .032 bracket. Figure 15.8.11.

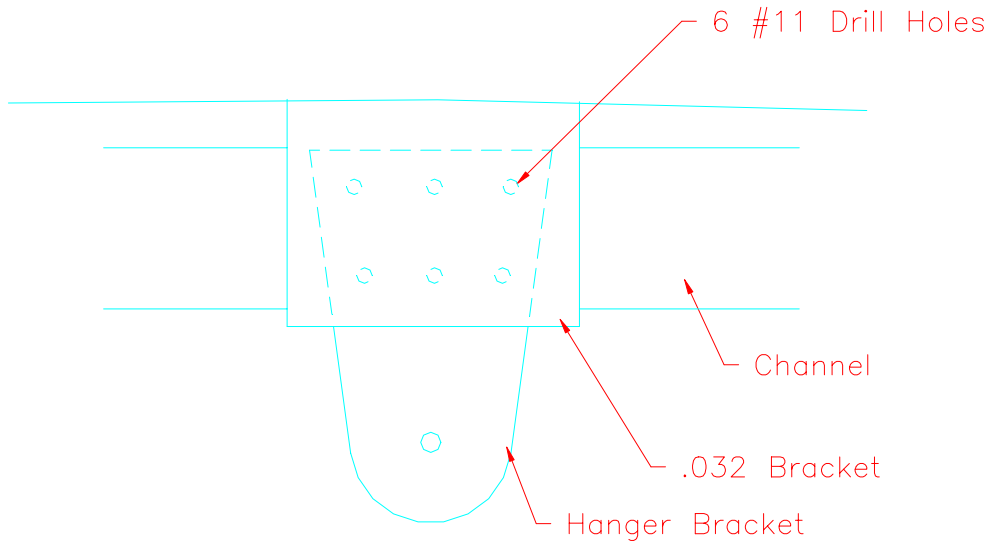


Figure 15.8.11

24) Keeping the .032 bracket tight to the fuselage roof and hanger, back drill the six #11 holes through the .032 bracket. Cleco in place.

25) Drill the five #30 holes through the bracket and roof. Figure 15.8.12.

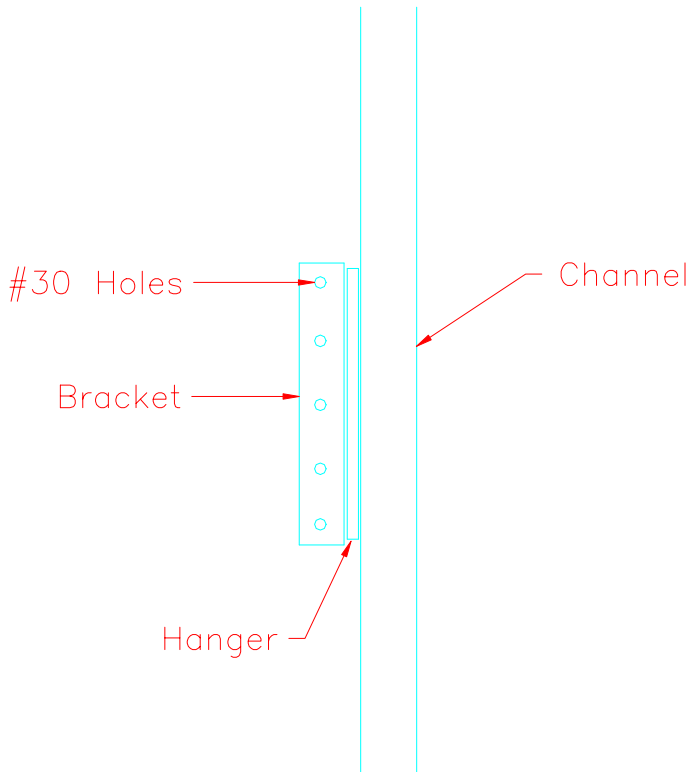


Figure 15.8.12

26) Remove and debur parts.

27) Chromate mating surfaces and rivet .032 bracket, hanger and channel together with 3/16" avex rivets (RV-1613). Figure 15.8.13.

28) Rivet the bracket to the roof with 1/8" avex rivets (RV-1410). Rivet from outside the roof. Figure 15.8.13.

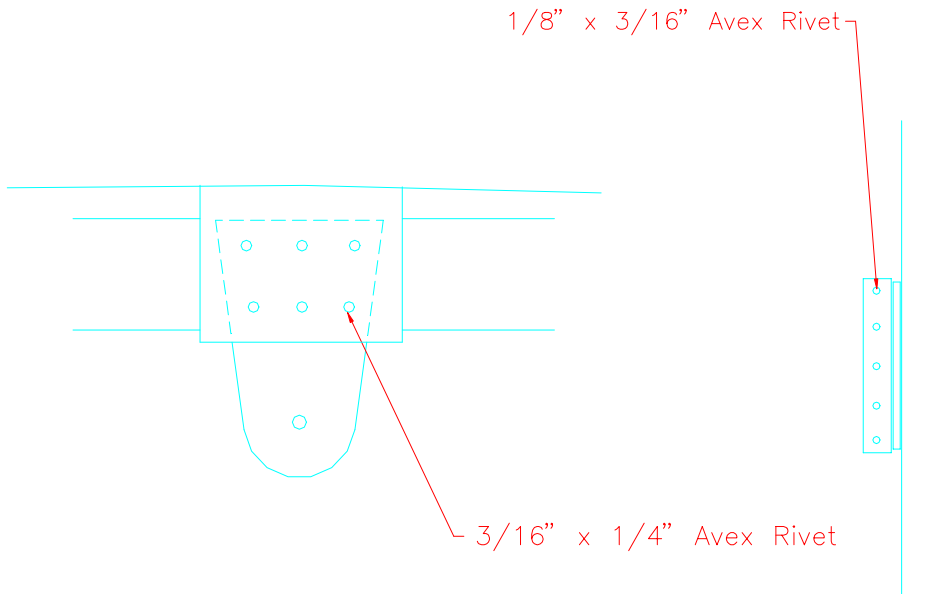


Figure 15.8.13

29) Bolt the end plugs back on the hanger.

30) Slide the torque tubes through the holes in the fuselage and onto the horns.

31) Attach the wings to the fuselage.

32) With torque tubes tightly on the inside end plugs, install spacers (W-62-1) between the wing horn and the fuselage horn. It may be necessary to sand the spacers. Figure 15.8.14.

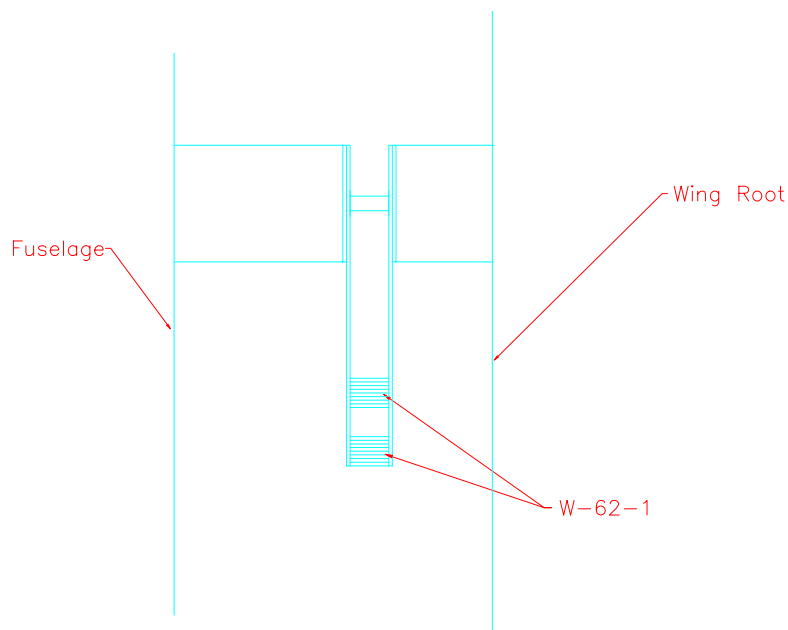


Figure 15.8.14

- 33) Bolt the W-62-1 spacers in with AN4-11A bolts, AN960-416 washers and AN365-428 fiber nuts.
- 34) Place the right wing Aileron in the full up from neutral position. Figure 15.8.15.

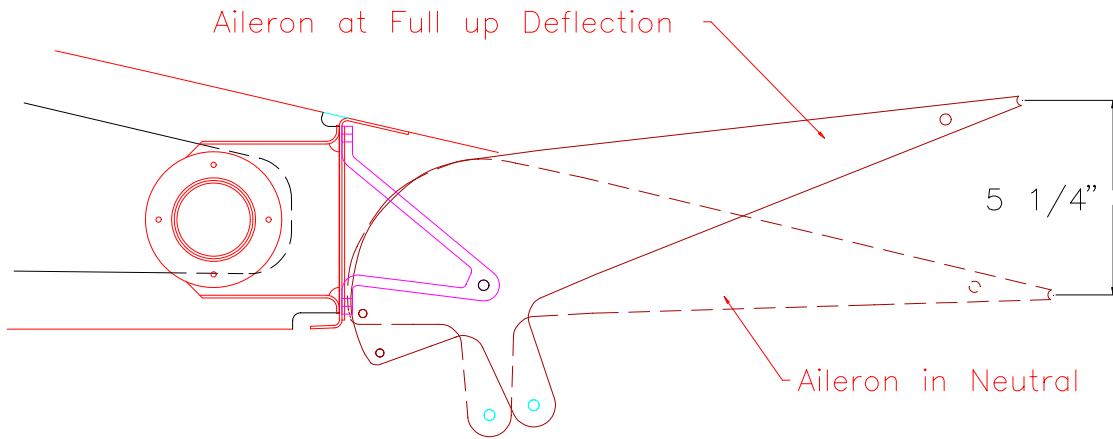


Figure 15.8.15

- 35) Adjust the corresponding horn in the fuselage so that it just clears the bulkhead 9A.
- 36) Drill a #40 hole through the torque tube and end plug. Cleco to hold in place.
- 37) Return Aileron to neutral.
- 38) Adjust the mixer arm (CC-76) so that there is 1/2" clearance between the mixer and the top spacer block.

Figure 15.8.16.

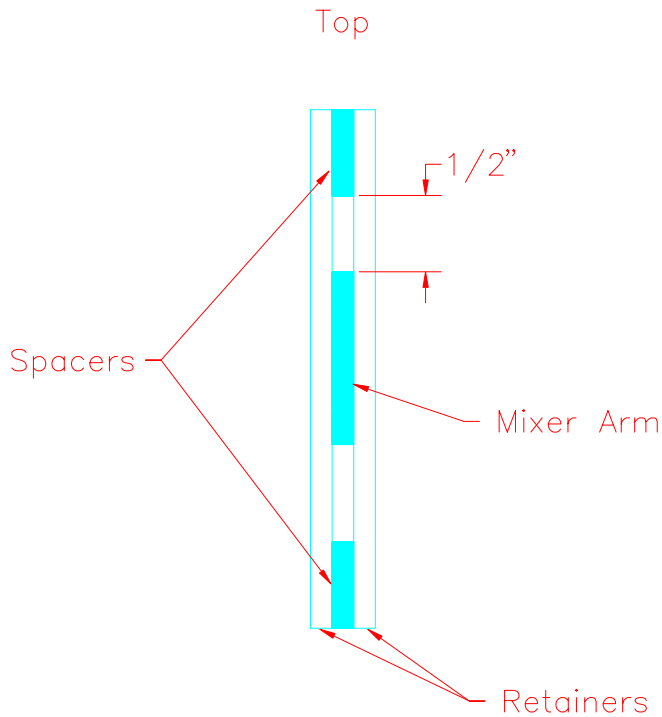


Figure 15.8.16

15.9 Push Pull Tubes

- 1) Cut a push-pull tube from 1" x .058" tube (CC-50) to fit between the bell crank (CC-47-2) and mixer (CC-48-2). Figure 15.9.1.

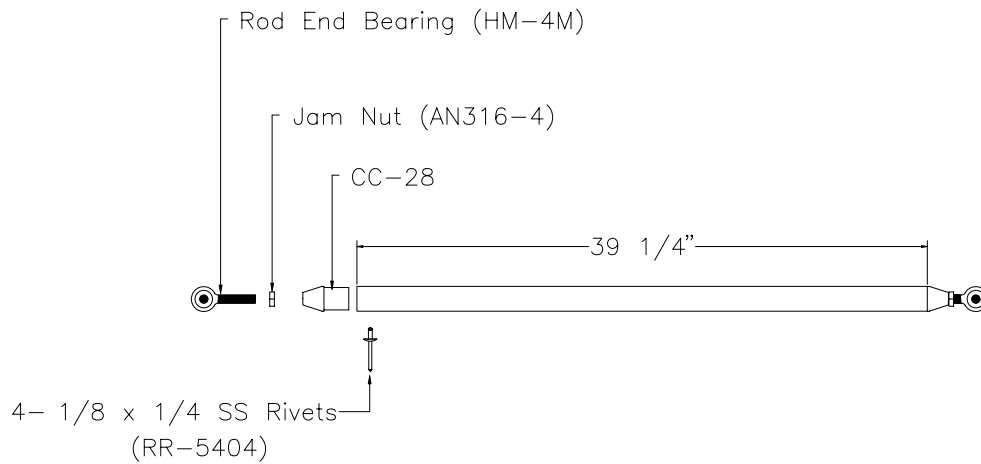


Figure 15.9.1

- 2) Attach Push-Pull tube to the bell crank (CC-47-2) with a AN4-10A bolt, AN970-4 penny washers and AN365-428 Fiber nut.
- 3) Adjust push-pull tube so that a 90° angle is achieved between Mixer Horn (CC-48-2) and the tube when the controls are neutral.
- 4) Attach push-pull tube to the bell crank (CC-48-2) with a AN4-10A bolt, AN970-4 penny washer and AN365-428 fiber nut.
- 5) Countersink the two inside fuselage torque tube horns to allow a 1/4" countersunk bolt (AN509-416-R16).

Figure 15.9.2.

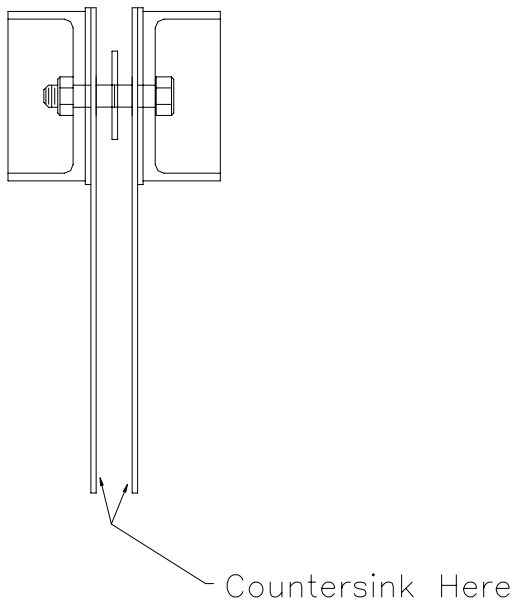


Figure 15.9.2

- 6) Adjust the aileron to the neutral position. Adjust the mixer horn (CC-48-2) to neutral.
- 7) Cut a  $\frac{3}{4}$ " x .035" push-pull tube 29" long.
- 8) Assemble the push-pull tube as you did previously in this section.
- 9) Adjust the rod-end bearings to fit between the mixer and horn on the torque tube. Figure 15.9.3. Bolt the push-pull tube to the torque tube horn with AN509-416-R-16 countersunk bolts, AN970-4 penny washer and AN365-428 fibernut.

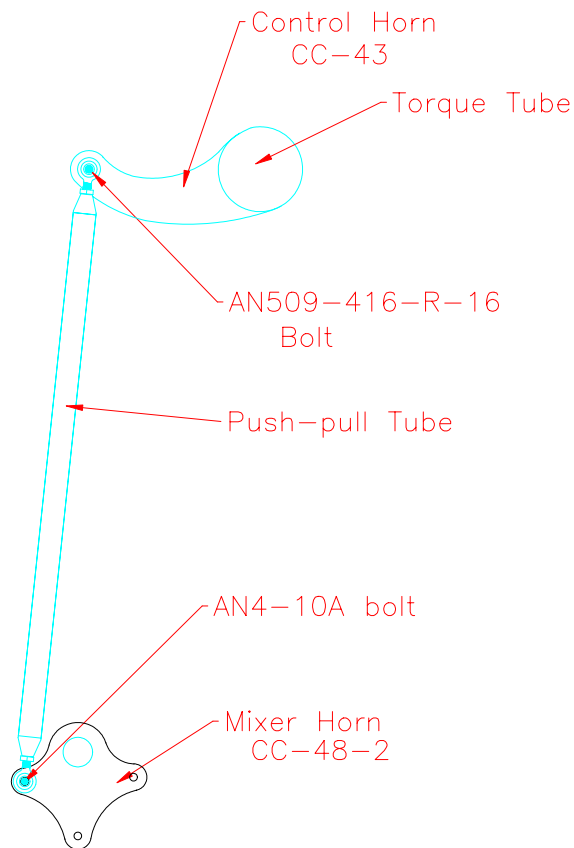


Figure 15.9.3

- 10) Bolt the push-pull tube to the mixer horn (CC-48-2) with AN4-10A bolts, AN970-4 penny washers and AN365-428 fiber nuts.
- 11) Cut second tube at 29  $\frac{1}{4}$ " and assemble.
- 12) Bolt the tube to the other hole in the Mixer and bolt the top of the tube to the other control horn.
  - 3) Re-adjust the push-pull tube so that the angle at the left horn is the same as the right horn. Figure 15.9.4.

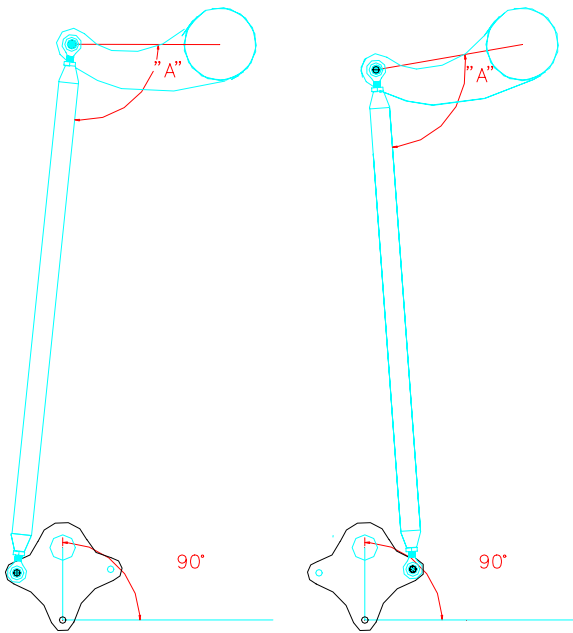


Figure 15.9.4

- 14) Drill a #40 hole through torque tube and end plug. Cleco.
- 15) Remove wings and fuselage torque tubes.
- 16) Disconnect the horn assembly from the hanger.
- 17) Place the end plugs into the matching torque tubes. Line up the #40 holes and cleco. Layout and drill a total of eight #11 holes through torque tube and end plug. Figure 15.9.5.

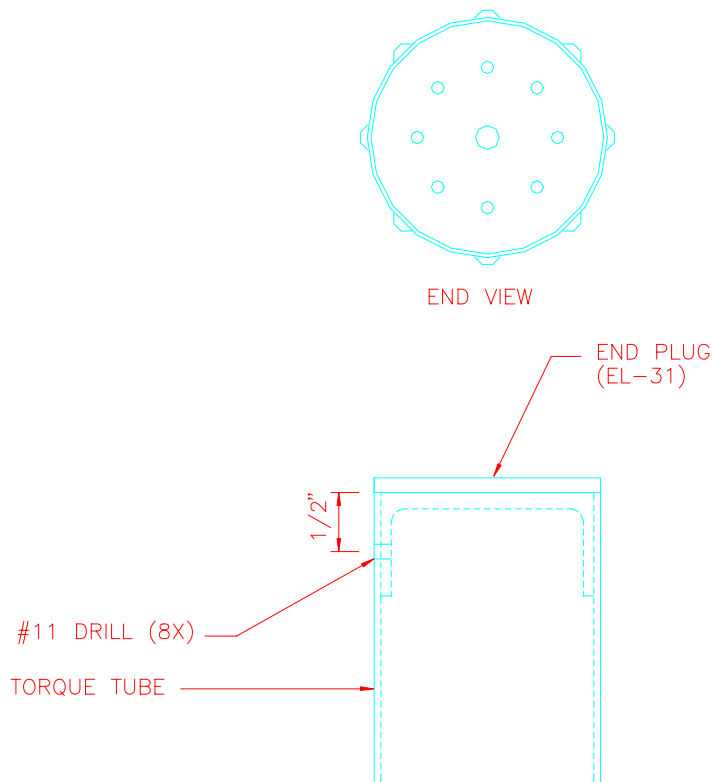


Figure 15.9.5

- 18) Bolt the inside end plugs back onto the hanger.

- 19) Slide the torque tubes through the holes in the fuselage and onto the horns. Rivet together with 3/16" S.S. rivets (RV-5604).
- 20) Bolt the push-pull tubes onto the inside horns.
- 21) Attach the wings.
- 22) Install the spacers and bolts between the fuselage torque tubes and the wing torque tubes.

### 15.10 Teleflex Cable

- 1) Attach the teleflex cable to the mixer arm with the clevis fork assembly (06-1500-01). Figure 15.10.1.
- 2) You may have to trim the retainer slightly to get free movement of the mixer arm.

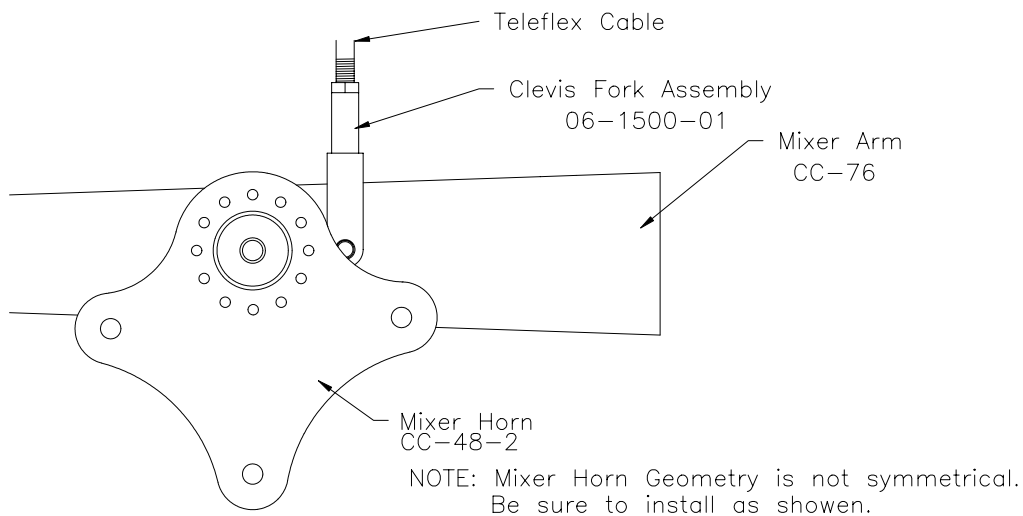


Figure 15.10.1

- 3) Slide the cable through its full travel and set the cable to that a ¼ of the full cable travel is showing at the mixer arm (CC-76).
- 4) Position the teleflex clamp over the cable and use it as a guide to drill the two #11 holes into door doubler. Figure 15.10.2.

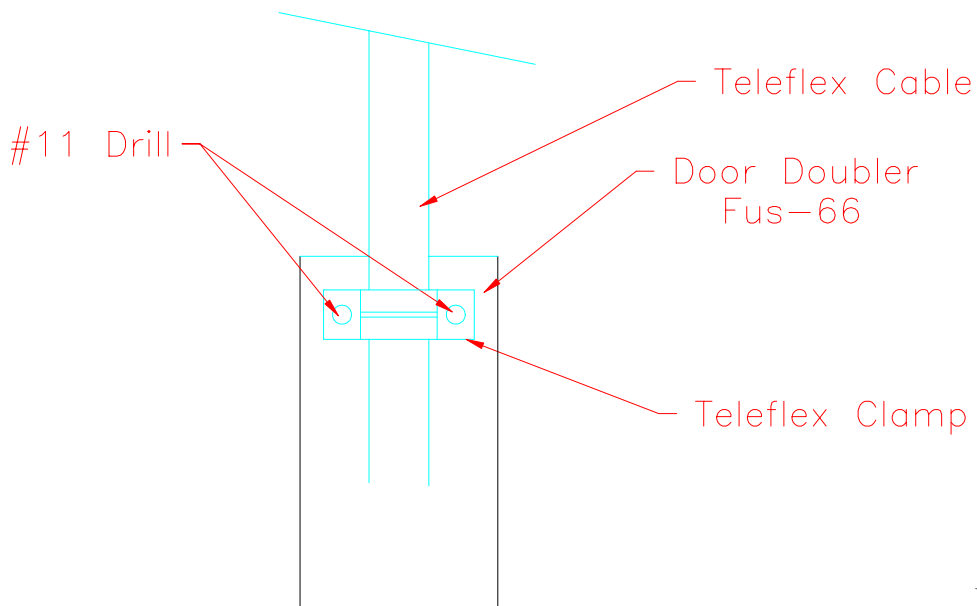


Figure 15.10.2

5) Bolt the teleflex clamp to the door doubler with AN3-5A bolts, AN960-10 washers and AN365-1032 fiber nuts.

### 15.11 Cable Guides

1) Position elevator cable guides (RG-1) in a straight line from the tabs on the control column to the pulleys at the end of the floor in the rear of the aircraft. Ensure that the cable will not interfere with the seatbelt bracket.

Figure 15.11.1.

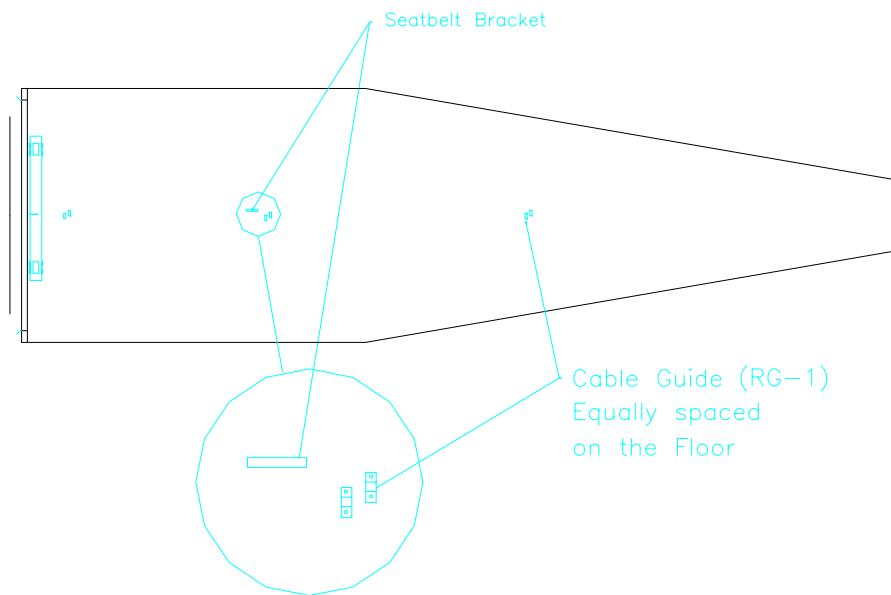


Figure 15.11.1

2) Drill #30 mounting holes for each guide and rivet using 1/8" aluminum rivets (RR-7408).

15.12 Cable Install

1) Assemble 1/8" cable and bolt to the elevator horn. Figure 15.12.1.

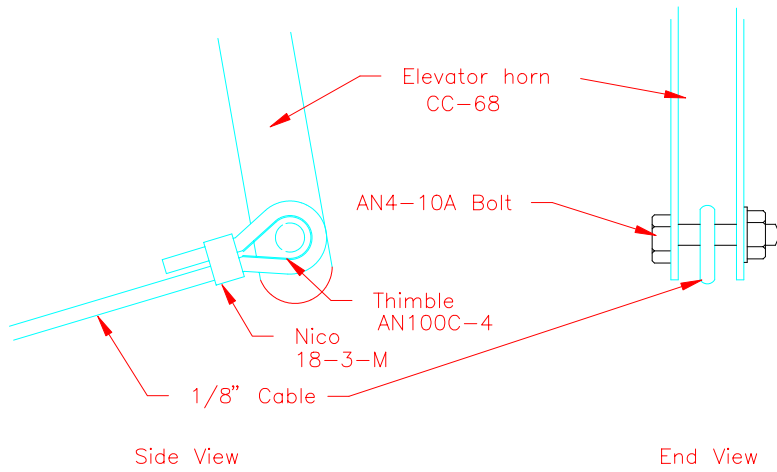


Figure 15.12.1

2) Run the cable through the FUS-405 solid bulkhead, the Upper Elevator Pulleys, Lower Elevator Pulleys and the cable guides.

3) Attach turnbuckles (AN130-22S) to the control column. Attach cable to turnbuckles. Figure 15.12.2.

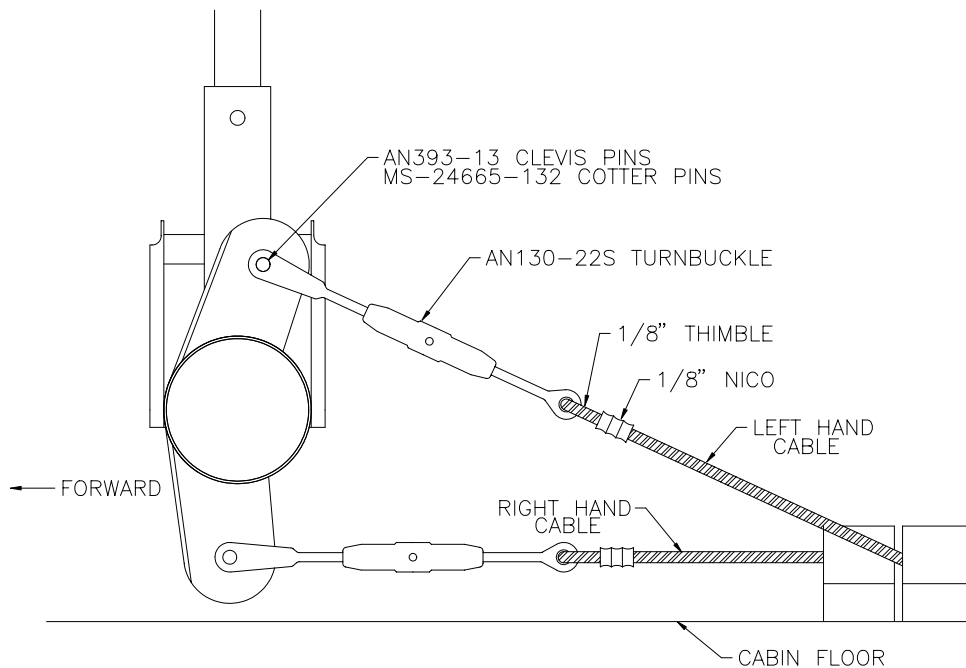


Figure 15.12.2

4) Position the cable cover (FUS-64) over the cable between the first and last cable guides. Then drill through each flange #30 holes at 1" spacing.

- 5) Rivet the cable cover to the floor using 1/8" avex rivets (RV-1410).
- 6) Locate and install cable guides for the rudder cable along the inside walls of the fuselage. Ensure cable clears the mixer controls. Keep cable as straight as possible. Figure 15.12.3.

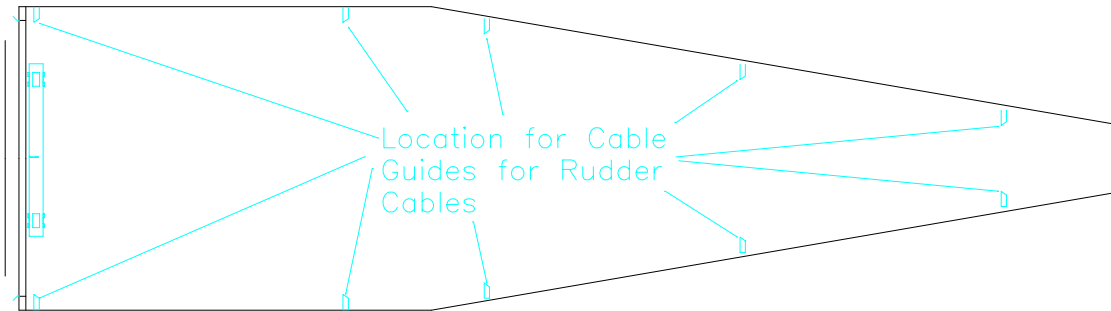


Figure 15.12.3

- 7) Run 1/8" cable along the guides from the rudder pedals to the back through the guides.
- 8) Locate the approximate location of the exit point for the cable. Drill two holes and cut out between as in Figure 15.12.4.

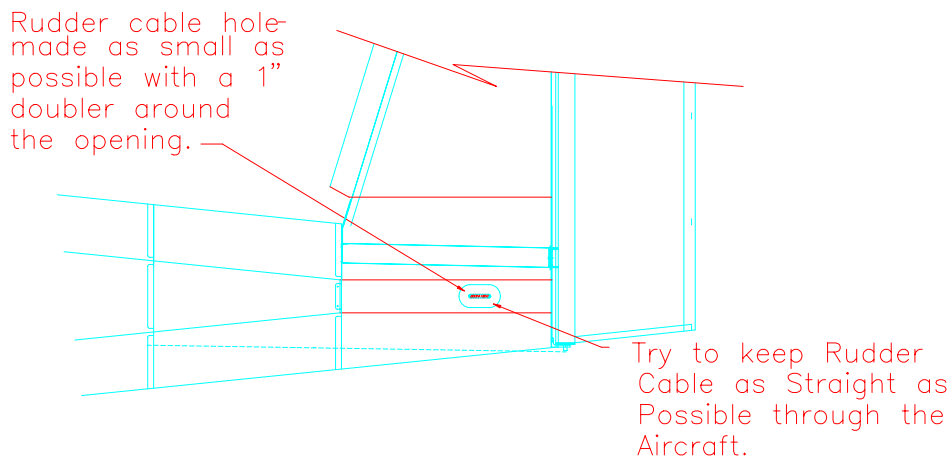


Figure 15.12.4

- 9) Run the cable through the slot to the rudder. File the hole if necessary to allow the cable free movement with adequate clearance.
- 10) Assemble cable and attach to the outermost holes in the rudder horn. See figure 15.12.1 for assembly.
- 11) Repeat for the other side.

## 15.13 Flap Controls

- 1) Cut the left and right Flap Stiffener Ribs (FLAP-65 and FUS-65) to fit between the cage and the first bulkhead and between the first and second bulkhead. FUS-65 also goes between the 2<sup>nd</sup> bulkhead and the 3<sup>rd</sup> bulkhead Figure 15.13.1.

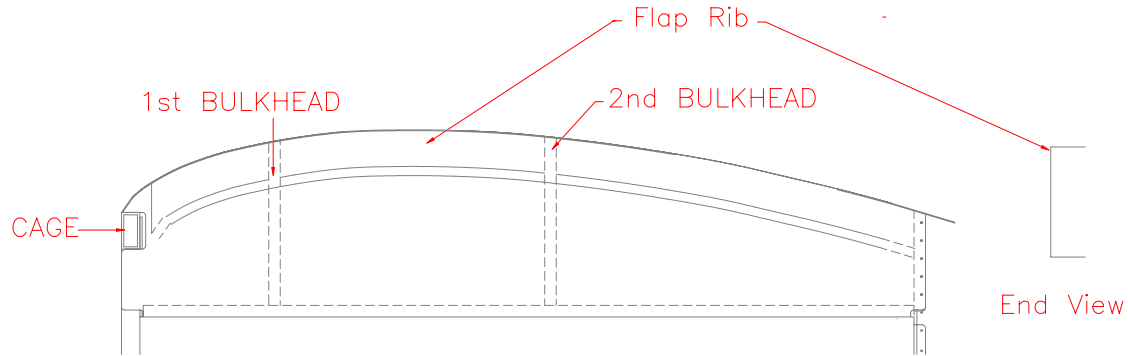


Figure 15.13.1

- 2) Mark a line down the inside of the roof, showing the center of the roof from the cage to bulkhead #2.
- 3) On the top flanges of the forward two sets of bulkheads draw a line down the center, then mark a line on both ends 5/16" in from the end. Figure 15.13.2.

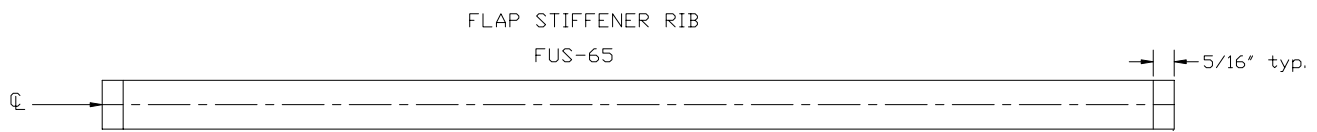


Figure 15.13.2

- 4) Where the two lines intersect drill a #40 hole. Do this to the four bulkheads.
- 5) Mark a line along the roof 1 5/16" each side of the center line.
- 6) Position the right front Flap Stiffener Rib so that the line on the roof is visible through the #40 holes that you previously drilled. Keeping the bulkhead against the cage, drill the two #40 holes into the roof and cleco.
- 7) On the top of the roof, draw a line connecting the two #40 holes.
- 8) Along the line mark out evenly spaced holes about 1 1/4" apart and drill to #40.
- 9) Repeat steps for the other three ribs.
- 10) On the back two ribs, build an angle bracket so that the ends are tied into the bulkheads. **NOTE:** Try to build the angles so they use existing rivets in the bulkheads.
- 11) Using the Interior Delrin Pivot Block (FLAP-11) locate the area that will need to be cut out to clear the Flap Handle Torque Tube. Figure 15.13.3.

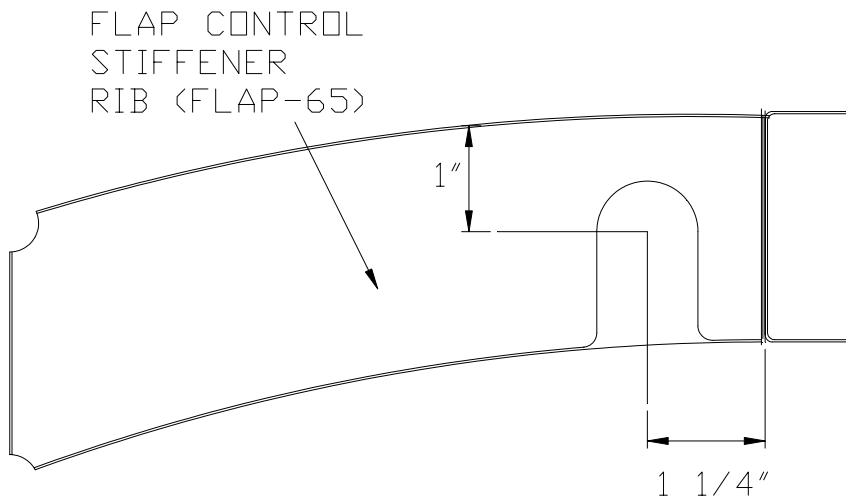


Figure 15.13.3

- 12) Position an Interior Flap Pivot Block over the cut out you just made and drill three bolt holes through the Stiffener Rib using the Block as a drill guide. Figure 15.13.4.

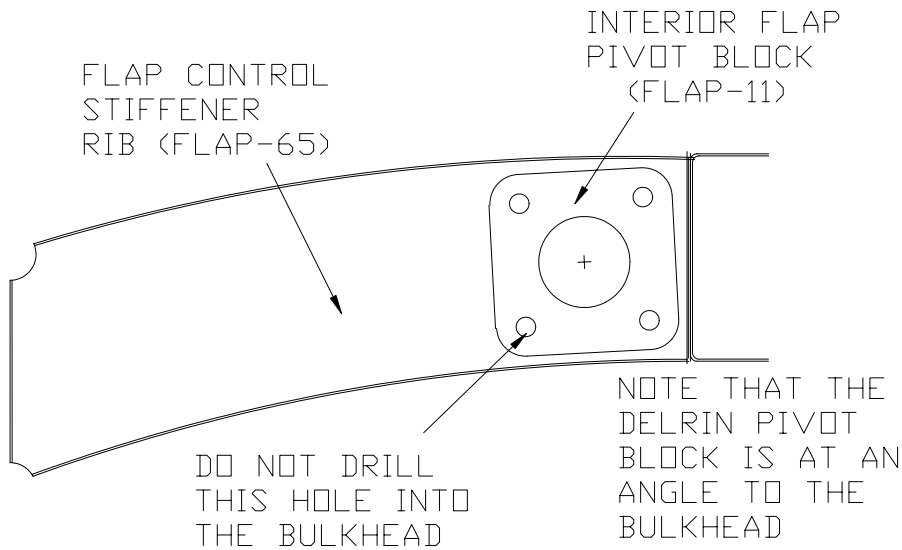


Figure 15.13.4

- 13) Clamp both Stiffener Ribs back to back and mark the second rib for cutting and drilling.  
 14) Drill and trim the second rib.  
 15) Make a cardboard template of the Stiffener Rib. (This will be used for locating holes later on. Use the FLAP-11 Pivot Block to eyeball a center point). Figure 15.13.5.

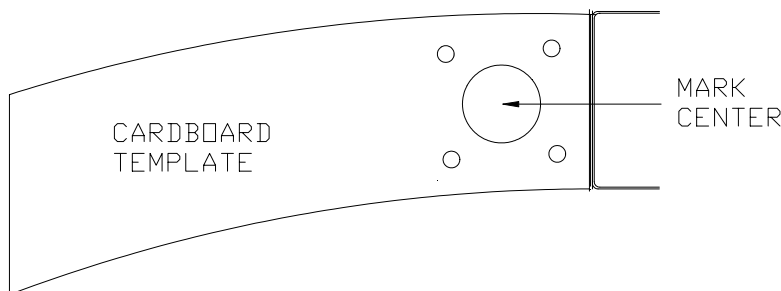


Figure 15.13.5

- 16) from ST-40 angle stock, build two angle pieces that will tie the front ribs to the bulkhead. Try to incorporate the two 3/16" holes in the Pivot Block to attach the angle bracket to the rib.



- 21) Slip the Interior Delrin Pivot Block (FLAP-11) on each end of the Flap Pivot Handle. Position the assembly into place.
- 22) Cut three compression tubes from FLAP-20 (3/8" x .058 6061-T6 tube) at 1 7/16" long.
- 23) With the angle material riveted to the bulkhead, bolt the Interior Delrin Pivot Block to the front Flap ribs.

Figure 15.13.9

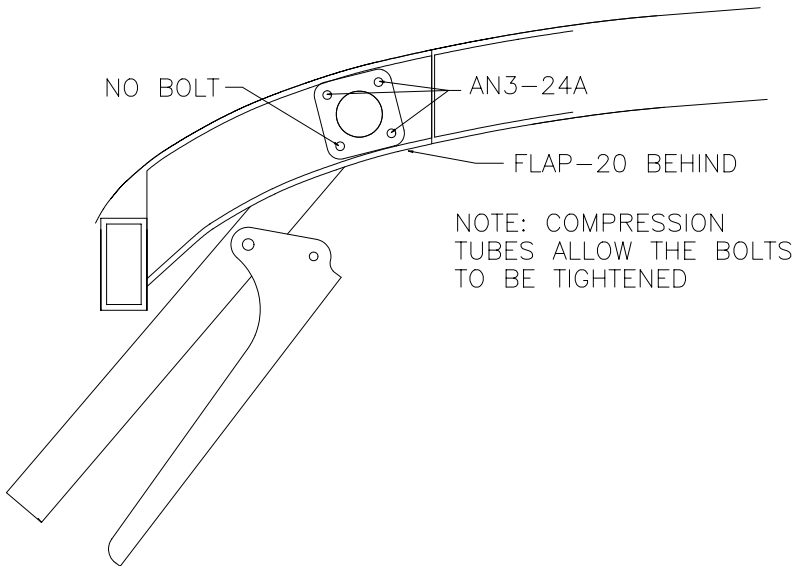


Figure 15.13.9

- 24) Slide the Flap Handle Lock Plate into the slot in the Flap Pivot Handle. Position the Flap Handle Lock Plate in the forward position. Keep the Flap handle Lock Plate toward the center of the slot.
- 25) Move the assembly forward until the Flap Pivot Handle touches the cage. Position the front hole in the Flap Handle Lock Plate so that it is near the center of the rib. Figure 15.13.10

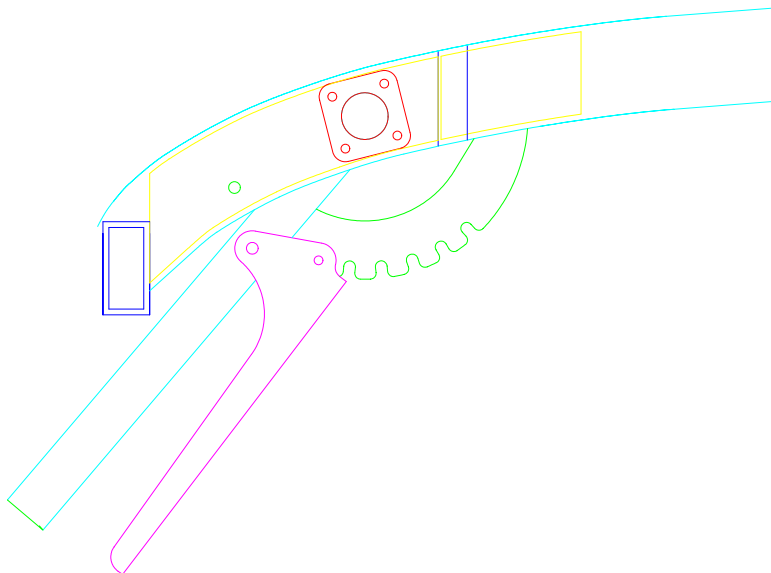
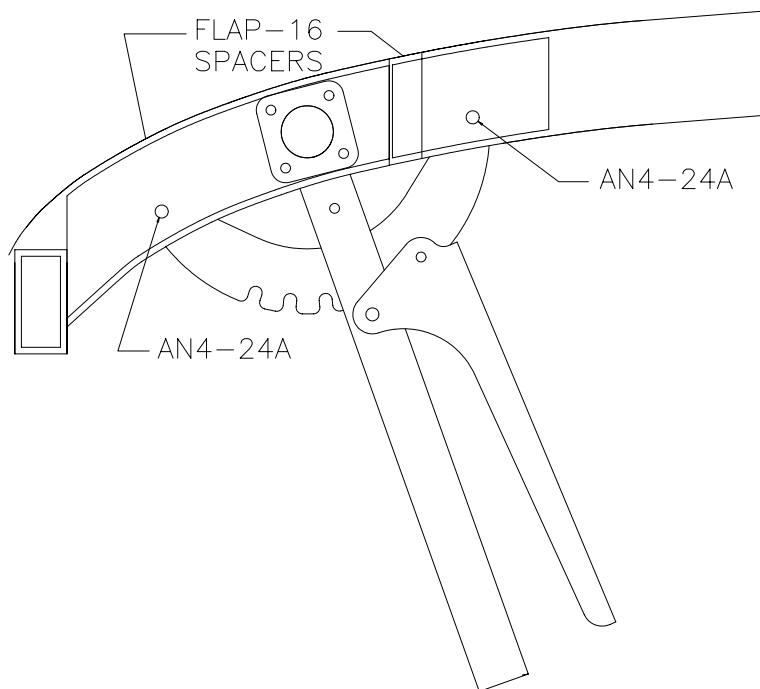


Figure 15.13.10

- 26) Mark to location of this hole.
- 27) Remove the assembly. Remove the front Flap ribs.

- 28) Drill a 1/4" hole in the marked location. Transfer this hole to the other front Flap Rib.
- 29) Replace the Flap Ribs back onto the roof.
- 30) Remount the Flap Handle onto the roof.
- 31) Slip a 1/4" bolt through the holes in the Flap Ribs and the Flap Handle Lock Plate. Locate the rear hole of the Flap Handle Lock Plate onto the rear bulkhead.
- 32) Repeat steps 170 - 174 for the rear two ribs.
- 33) Drill the #40 holes out to #30.
- 34) Remove the Flap Ribs and debur all the holes.
- 35) Chromate all mating surfaces and re-assemble. Rivet the ribs to the roof and bulkheads with RV-1410 avex rivets.



- 36) Assemble the Flap Handle onto the Flap Ribs as in figure 15.13.11.

Figure 15.13.11

- 37) Using the cardboard template you made earlier, mark the FUS-27 Root Ribs for Torque Tube exit holes. Cut a 1" hole at these locations. Figure 15.13.12

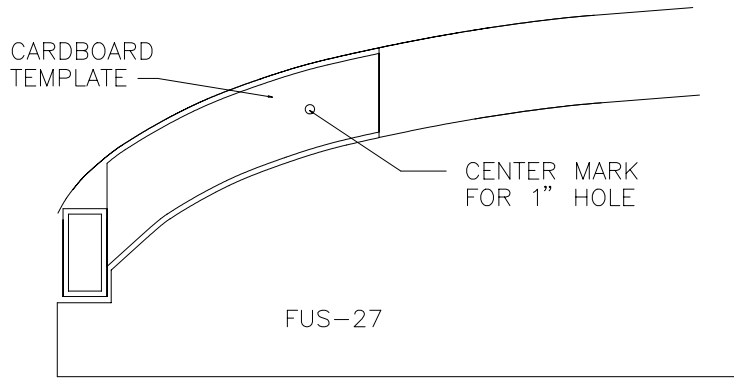


Figure 15.13.12

- 38) Scotchbrite the Interior/Exterior Tube (FLAP-2).
- 39) Slide an Exterior Delrin Pivot Block (FLAP-12) onto the Interior/Exterior Tube.
- 40) Slide the tube through the hole in the Root Rib and into the Pivot Tube.
- 41) Hold the Exterior Delrin Pivot Block up against the Root Rib and drill each of the four 3/16” holes from the Block into the Root Rib.
- 42) Bolt the Exterior Delrin Pivot Block to the Root Rib with AN509-1032-10R2 screws, AN960-10 washers and AN365-1032 fibernuts.

15.14 Bell Cranks

- 1) Measure back from the back surface of the main forward carrythrough on the FUS-27 21 3/4”. Draw a line 90° to the bottom edge of the FUS-27 at this point.
- 2) Measure down 3 3/8” on this line and mark for drilling. Drill a 5/16” hole. Repeat for the other side of the Cabin. Figure 15.14.1

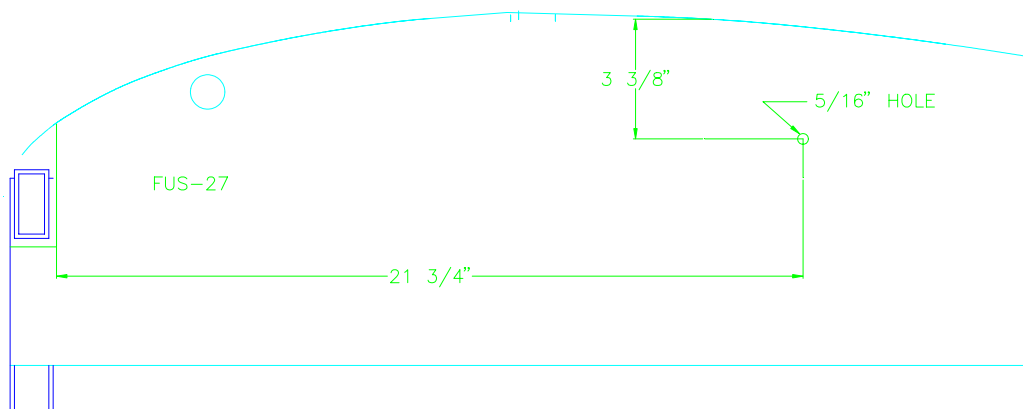


Figure 15.14.1

- 3) Prepare two FLAP-14 Bellcranks (1 left and 1 right). Figure 15.14.2.

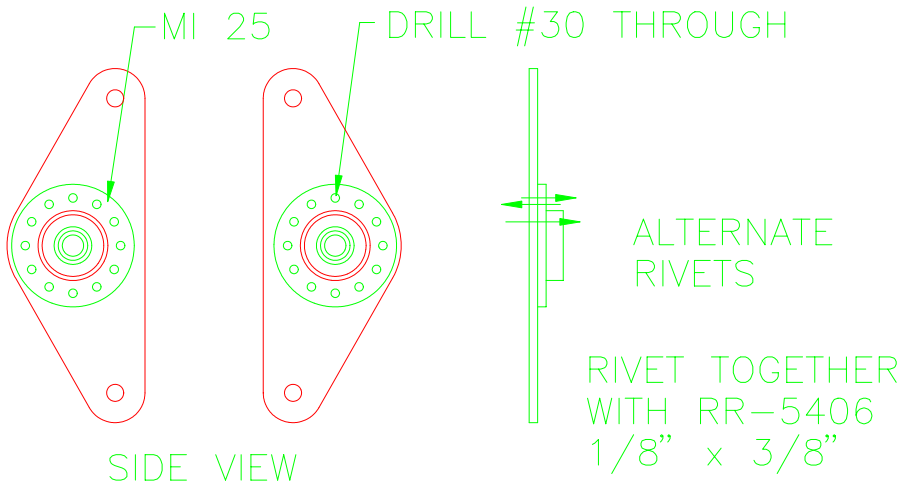


Figure 15.14.2

4) Insert an AN5-13A through the 5/16" hole you drilled in the FUS-27. Insert it from the inside.

5) Assemble a Bellcrank and Horn Retainer (FLAP-17) on the FUS-27. Position the Horn Retainer 90° to the vertical line. Drill through the FUS-27 with a #11 drill using the Retainer as a guide. **NOTE:** You will have to fabricate spacers out of FLAP-18 material. Figure 15.14.3

**NOTE:** Fabricate two stiffeners for each side of the aircraft to stiffen the FUS-27 rib. Run the channels from the top of the roof to the top of the Door, and add clips at each end to tie them in to the roof and fuselage rib channel. See figure 15.14.3 for locations. You may want to refer to step 15.15.16 and add the 9/16" holes for the Teleflex in the stiffeners at this point.

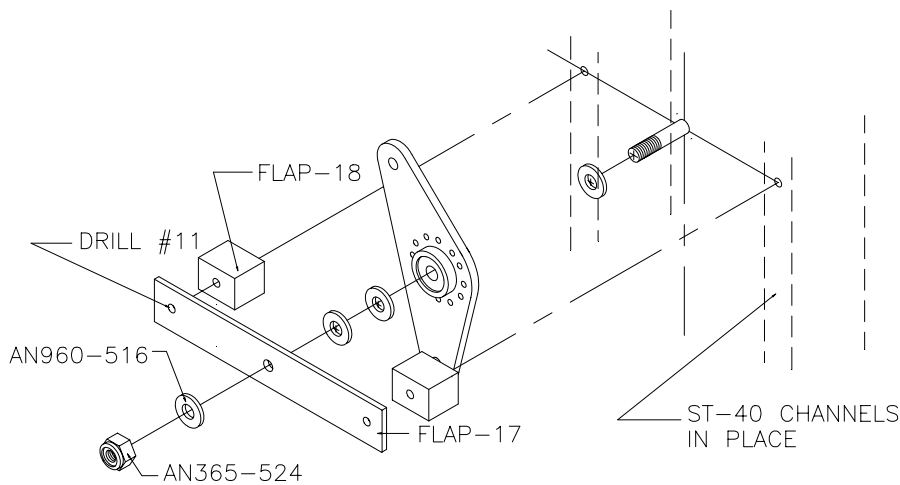


Figure 15.14.3

6) Disassemble, debur and bolt the FLAP-17 Retainer in place. Use AN3-13A bolts. **NOTE:** Just finger tight.

## 15.15 Pushrods

- 1) Two sets of pushrods will have to be fabricated. Start with the forward set. Locate four (CC-29) End Fittings, four (HM-4M) Rod End Bearings and four (AN316-4) Jam Nuts. Thread them together. **NOTE:** With the jam nut tight against the CC-29 fitting 7 threads should be visible. Figure 15.151.

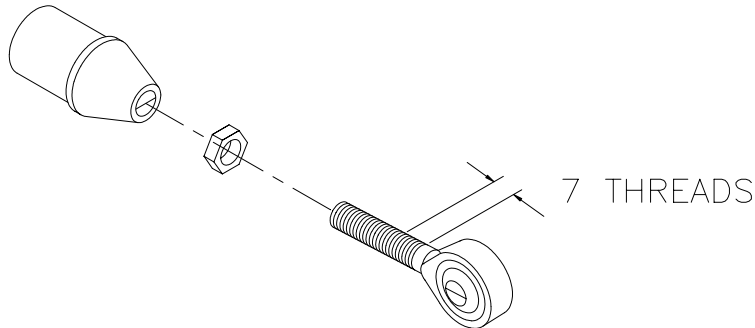


Figure 15.15.1

- 2) Cut two lengths of  $\frac{3}{4}$ " x .035 tubing to  $11 \frac{3}{4}$ " long. Insert a Rod End assembly into each of the tube ends.
- 3) Drill four #30 holes in each end of the pushrods. Keep each hole  $90^\circ$  to each other. Deburr the holes and rivet with  $\frac{1}{8}$ " x  $\frac{1}{4}$ " SS rivets (RR-5404). Adjust the length of the pushrod to  $14 \frac{3}{4}$ ". Figure 15.15.2.

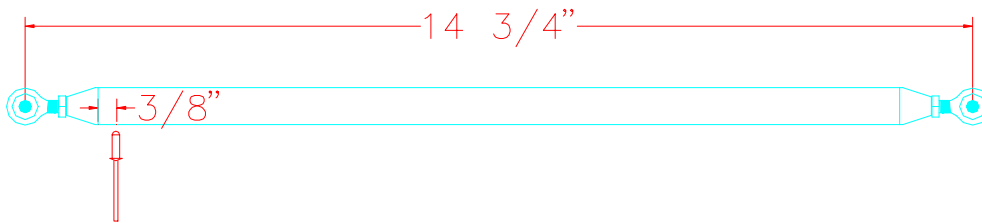


Figure 15.15.2.

- 4) Fabricate the aft set of pushrods in exactly the same manner as the forward set with the exception of the length.
- 5) Cut the pushrod stock to  $21 \frac{1}{8}$ ". Once assembled adjust to over all length to  $24 \frac{1}{8}$ " (hole center to hole center).
- 6) Draw a vertical line ( $90^\circ$  to the bottom of FUS-27). Center it on the 1" hole cut earlier in the part. Mark the bottom of FUS-27  $3 \frac{1}{4}$ " aft of the vertical line (eye ball is close enough). Extend a line down to the mark. Figure 15.15.3.

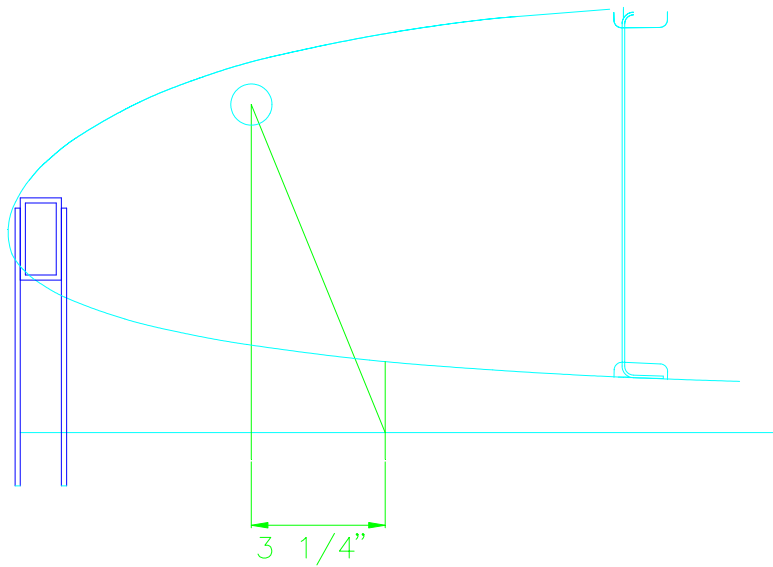


Figure 15.15.3

- 7) Bolt the forward pushrods to the control arms of the forward Torque Tubes and the top arm of the reversal Bellcrank. See figure 15.15.4 for details. **NOTE:** Tighten the bolts finger tight.

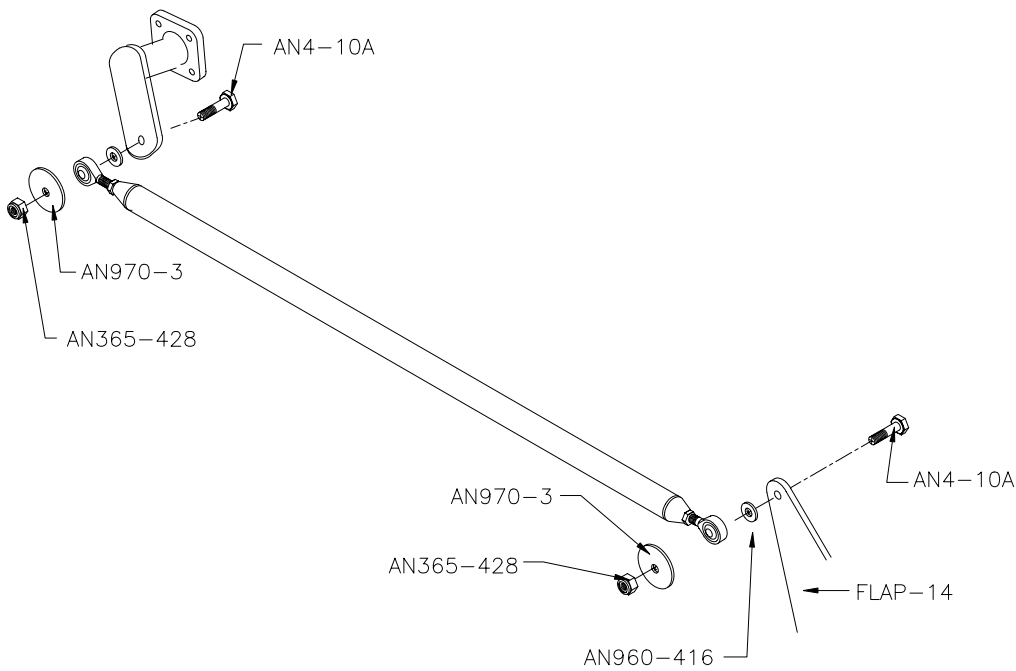


Figure 15.15.4

- 8) Bolt the aft pushrods (finger tight) between the reversal Horn and the Flap Horn. Use an AN4-10A on the reversal horn, and an AN4-16A on the flap horn. **NOTE:** Tighten the reversal assembly now.
- 9) Set the forward Horn on the same line as the diagonal line drawn earlier. Figure 15.15.5.

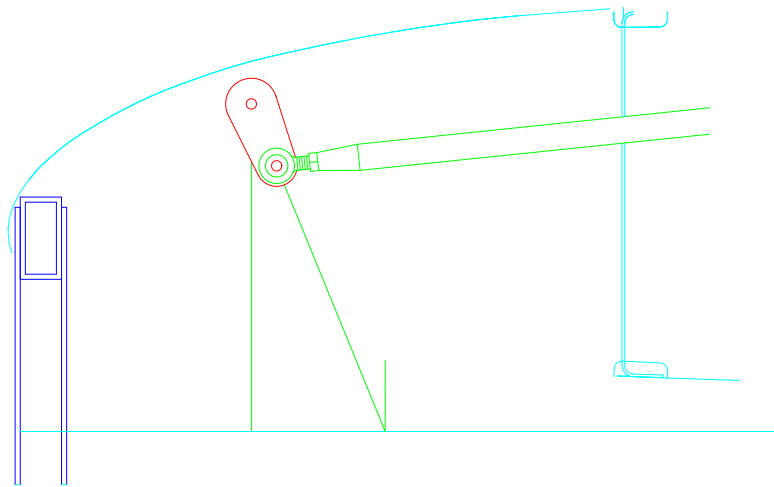


Figure 15.15.5

10) Set the Flap Handle in the retracted position. (Full forward).

**NOTE:** If you can't use the first notch do not worry.

11) Adjust the pushrods until the reversal Bellcrank and the forward Horn are at the same angle and the Flap is in the full retracted position. Figure 15.15.6.

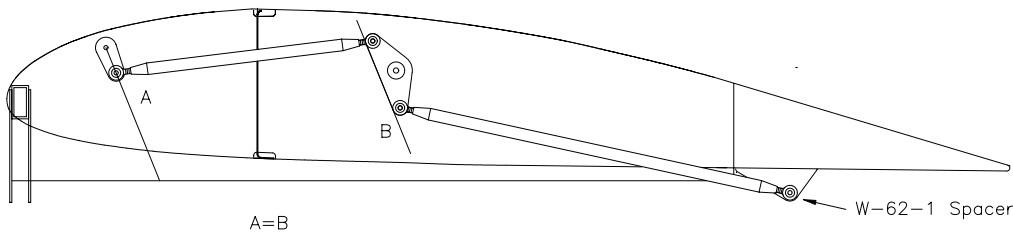


Figure 15.15.6

12) Tighten the jam nuts against the CC-29 Rod Ends. Tighten the Rod Ends to the Horns.

13) Drill and rivet the Torque Tubes together using 3/16" x 1/4" SS rivets (RR-5604). Use 4 rivets per joint (2 in front and 2 in back). Figure 15.15.7.

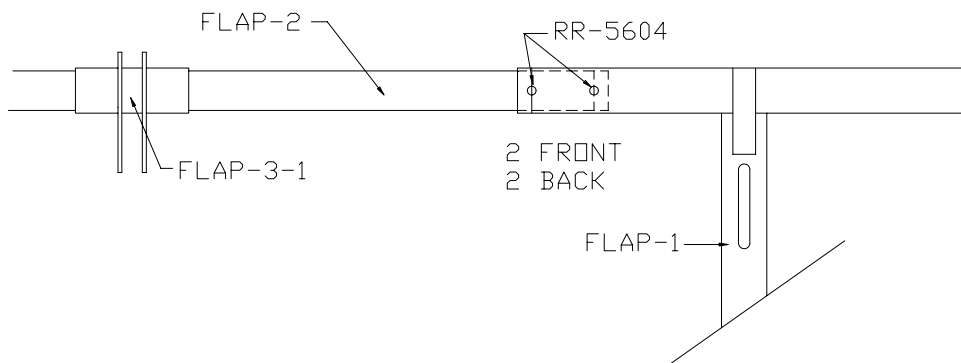


Figure 15.15.7

Now you will support the Teleflex cable on the FUS-27 Cabin Rib.

14) Layout and drill #40 rivet lines on the left side FUS-27 Cabin Rib. Figure 15.15.8.

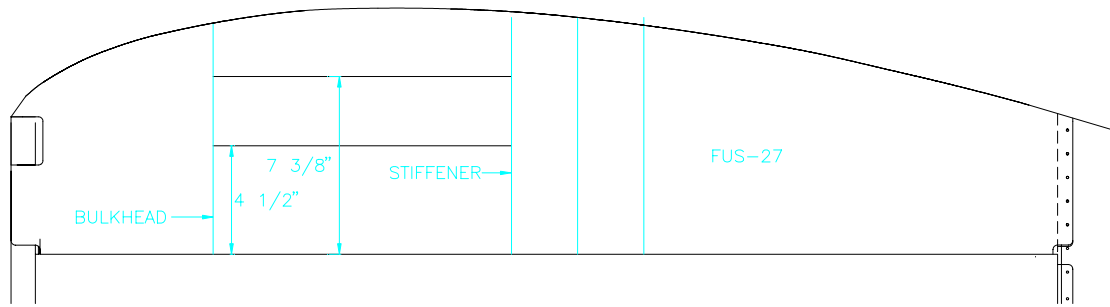


Figure 15.15.8

- 15) Find the FUS-462 Cable Anchor and position it between the first Cabin Roof bulkhead and the forward Bellcrank stiffener channel. Mark for trimming and trim the part. Figure 15.15.9.

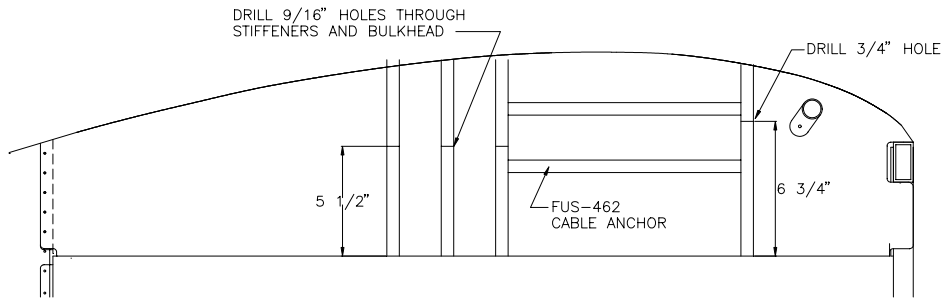


Figure 15.15.9

- 16) Center the FUS-462 Cable Anchor over the two rivet lines previously drilled. Clamp the Cable Anchor in position and drill #40 holes through the Cable Anchor using the FUS-27 as a drill guide. Cleco as you go. Layout and drill 9/16" holes through each of the web surfaces of the bulkheads and stiffener channels. Also layout and drill a 3/4" hole on the bulkhead closest to the Flap controls. See figure 15.15.9 for hole locations.
- 17) Thread the Teleflex Cable through the 9/16" holes you just drilled in the bulkhead and channels.
- 18) Place both the Flap Handle and the Flap in the retracted position. Rotate the FLAP-3-1 Control Horn to the same angle as the Flap Handle. Figure 15.15.10.

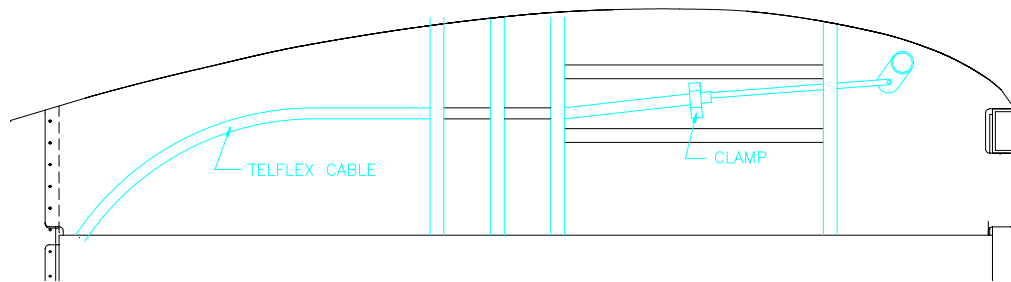


Figure 15.15.10

- 19) Adjust the cable to the correct length and bolt it to the FLAP-3-1 Horn. Refer to Fig. 15.8.16, and have the ailerons and flaps at neutral. The Elite aerofoil is in the 5 degree reflex position at neutral aileron.
- 20) Locate the Cable Clamp 08-0009-02 and position it on the FUS-462 Cable Channel. Mark for mounting holes and drill #11. **NOTE:** Try to keep the cable from having too sharp a bend from the stiffener up to the rod end bearing on the Flap.

- 21) Drill all the #40 holes to #30. Dis-assemble, debur and chromate. Rivet two F-3000 Floating Anchor Nuts for the Cable Clamp. Re-assemble and rivet.
- 22) Bolt the Clamp back in place. Check that the Flaps and Flap Handle are still in the retracted position. Drill and rivet the FLAP-3-1 Horn into place. Use 4 3/16” stainless steel rivets.

**NOTE:** You will now install the Rudder Pedal Assembly.

The Rudder Pedals in the *Elite* are composed of two identical \* assemblies. One assembly is shown in the exploded view. (\* **NOTE:** The eyebolt locations are not the same on both assemblies).

- 1) Lay out all the parts for one assembly using the exploded 3-D drawing as a guide.
- 2) Slide the Master Brake Pedal (RP-15) into position on the Rudder Pedal assembly (RP-20). Slide the washer (AN960-1016) into place. Mark the washer position on the Rudder Pedal assembly. Remove the washer and Master Pedal. Measure 1/8” outboard from the mark you just made and drill a #30 hole vertically through the Rudder Pedal Tube.
- 3) Debur, re-assemble and install a cotter pin (MS24665-357).
- 4) Slide the Slave Brake Pedal (RP-16) into position on the Rudder Pedal assembly. Mark its position on the Rudder Pedal Tube.
- 5) Remove the Slave Brake Pedal, drill a #30 hole 1/8” outboard from your mark, vertically through the tube.
- 6) Debur, re-assemble and fasten with a MS24665-357 cotter pin.
- 7) Slide the two Rudder Blocks (RP-13) into place on the Rudder Pedal assembly.
- 8) Slide the Slave Torque Tube (RP-18) through the Rudder Pedal base tube from the Slave Pedal side. Install the RP-19 Master Torque Fitting over the Slave Torque Tube. (The washer side goes against the Rudder Pedal Base Tube).
- 9) Bolt a Pushrod (RP-17) between the double horn on the Master Brake Pedal and the double horn on the Master Torque Fitting. Use AN3-12 bolts, AN960-10 washers and AN310-3 castle nuts. Lock the nuts with MS24665-132 cotter pins.
- 10) Install the other Pushrod (RP-17) between the Slave Brake Pedal and the Slave Torque Tube using the same method employed on the Master Pedal Side.
- 11) Align the Brake Pedals with the Rudder Pedals. (The vertical tubes on the Rudder Pedal assembly are in line with the vertical tubes on both the Master and Slave Brake Pedals).
- 12) Drill a #11 hole through the Master Torque Fitting 3/8” inboard from its outboard edge. Drill the hole 90° to the double horns. Make sure nothing shifts as you drill.

- 13) Bolt together with AN3-11A bolts, AN960-10 washers and AN365-1032 fiber nuts.
- 14) Adjust the Master Cylinder so that when installed between the single horn on the Master Brake Pedal and the double horn on the Rudder Pedal assembly the Rudder Pedals and the Brake Pedals are in line.
- 15) Bolt the Master Cylinder to the single horn with and AN3-10 bolt, AN960-10 washer and an AN310-3 castle nut. Lock the nut with a MS24665-132 cotter pin.
- 16) Bolt the base of the Master Cylinder to the double horns on the Rudder pedal assembly with an AN3-11 bolt, AN960-10 washer and a AN310-3 castle nut. Lock nut with a MS24665-132 cotter pin.
- 17) Drill a #11 hole 3/8" inboard from the outside edge of the Slave Side Rudder Pedal Tube. Drill this hole 90° to the vertical Rudder pedal Tube.
- 18) Install an AN42B-10A eyebolt, AN960-10 washer and an AN365-1032 fiber nut.
- 19) Repeat steps 1-18 for the second Rudder Pedal assembly. (Both assemblies are identical except for the location of the eyebolt. On the second assembly the eyebolt hole is located on the Master side of the Rudder Pedal Tube.
- 20) On the inside floor of the Cabin, measure the distance from the firewall to the bottom carrythrough.
- 21) Cut a Floor Stiffener from 5/8" x 5/8" square tubing (FUS-14) to the measurement taken in step 20.
- 22) Position the 5/8" tube on the floor center and back drill #30 holes through the floor into the tube at 1" spacing. Figure 1.

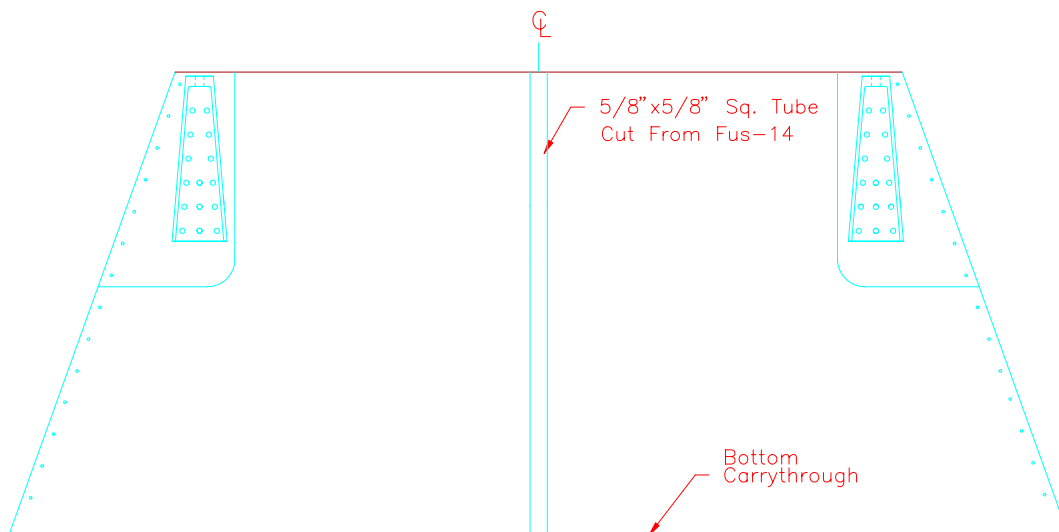


Figure 1

- 23) Remove, debur and chromate mating surfaces. Rivet to the floor with 1/8" x 3/16" (RV-1410) avex rivets.
- 24) Position both pedal assemblies on the floor as in figure 2. Position pedals so that they are behind the engine mount brackets. Ensure that the Rudder Pedals clear the engine mounts. Also try to keep the center to center distance of the Rudder Pedals to 2 3/4".

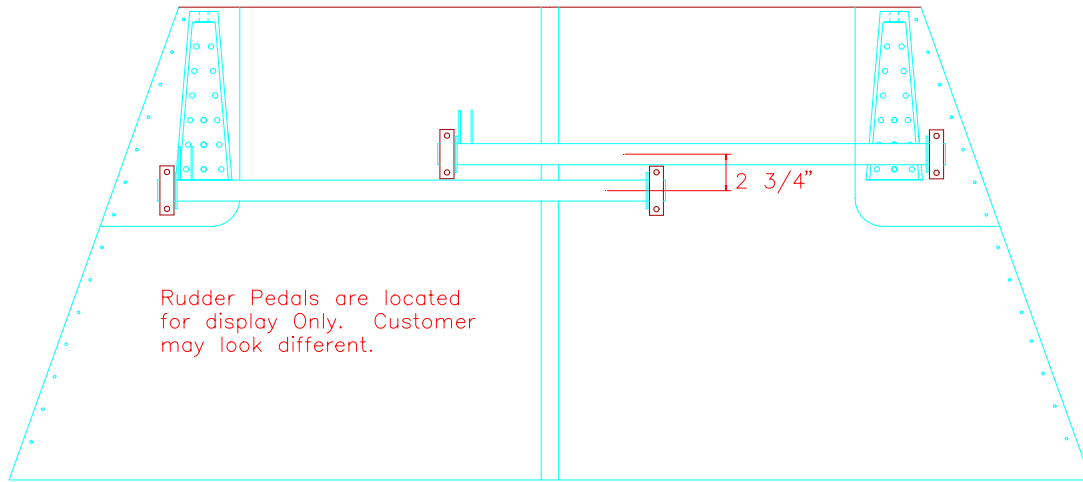


Figure 2

25) Back drill through the bearing blocks into the floor with a #11 drill

26) Next, make two doublers from .032 raw stock (W-143). Figure 3.

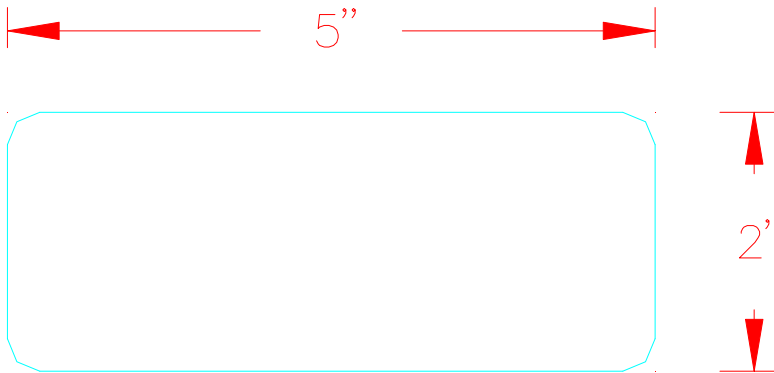


Figure 3

27) Center the doublers over the holes you just drilled into the floor for the bearing blocks. Layout and drill a #30 rivet pattern around the outer edge of each of the doublers. Cleco the doublers to the floor. Figure 4.

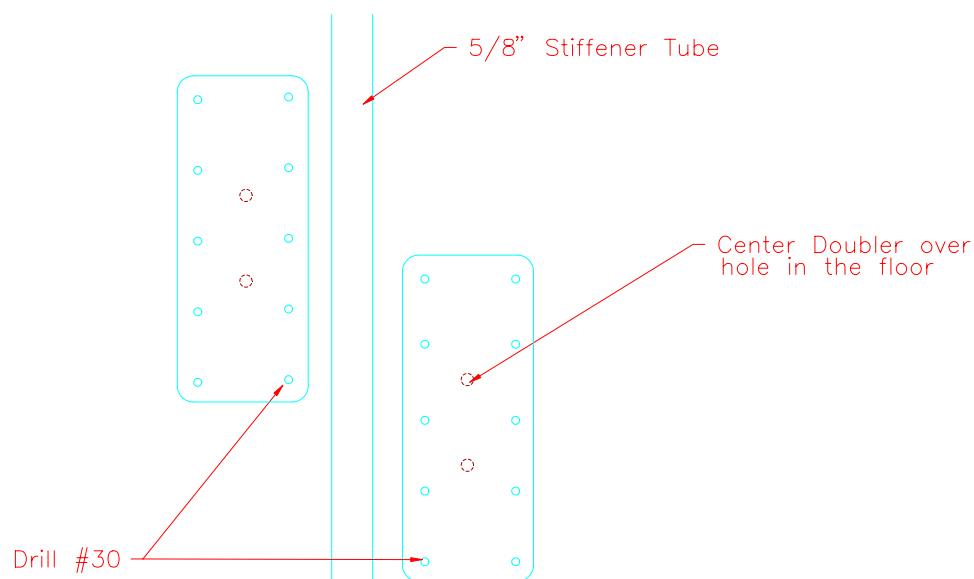


Figure 4

28) Back drill through the doublers for the bearing blocks. Figure 5.

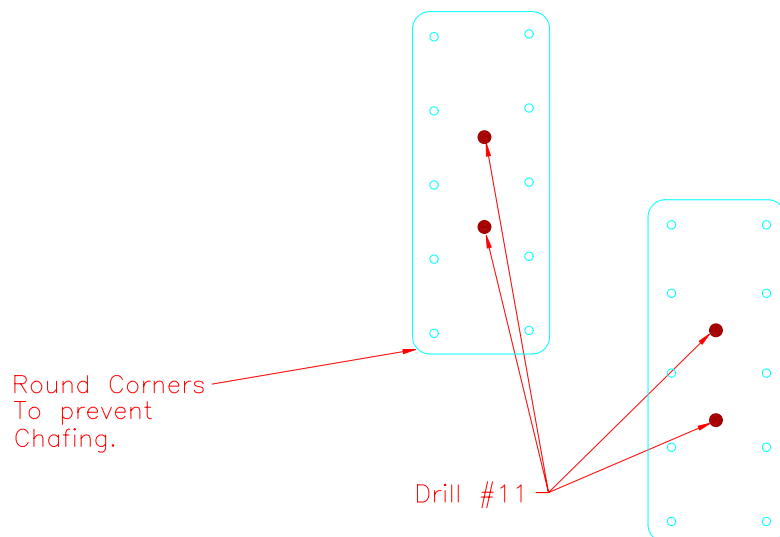


Figure 5

29) Remove the doublers. Debur the floor and the doublers.

30) Chromate and rivet the doublers to the floor using RV-1410 avex rivets from outside of the fuselage inward.

31) Attach the Rudder Pedal assemblies and bearing blocks to the floor with AN3-23A bolts, AN960-10 washers and AN365-1032 fiber nuts.

32) Drill a #40 hole part way through each outside tube of the Rudder Pedals. Drill a #40 hole into the side of the Bottom Engine Mount Bracket (FUS-85). Attach a Rudder Return Spring (311-606). Repeat for the other Rudder Pedal. Figure 6.

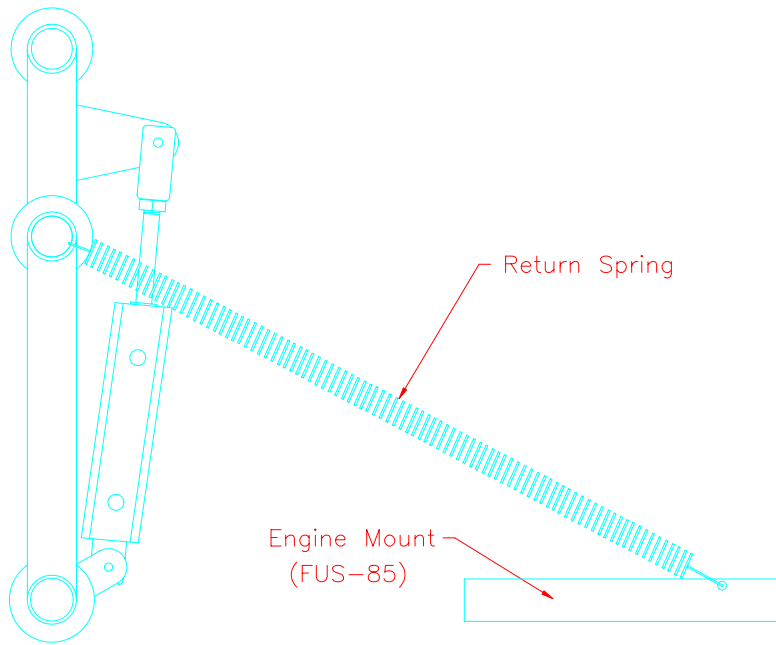


Figure 6

Now you will install the Elevator and Rudder stops. They are a two part assembly.

- 33) Drill #11 holes through four EL-410 Stop Blocks. Countersink for AN509-1032-19R machine screws. Figure 7.

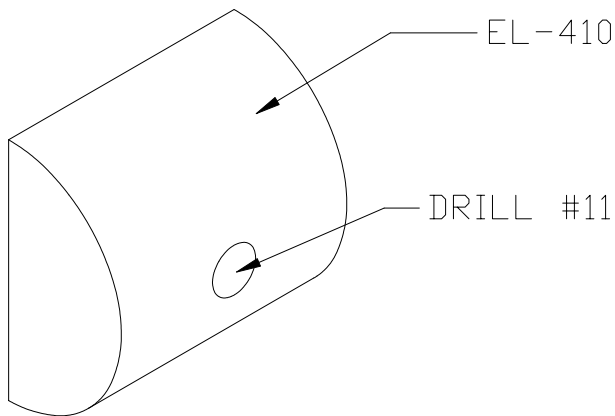


Figure 7

- 34) Drill and trim four RU-404 Stop Attach angles. Use the Stop Blocks as drill and trim guides. Figure 8.

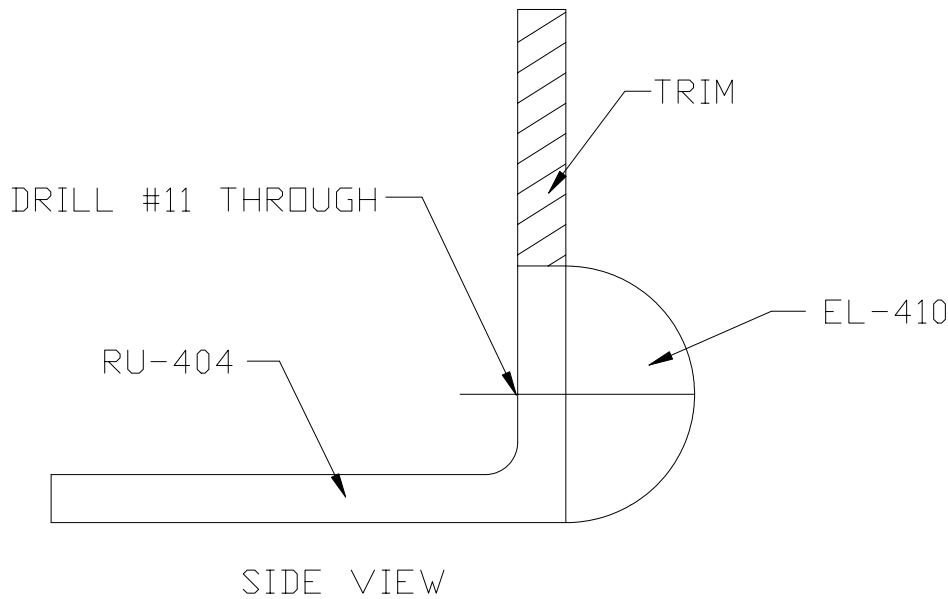


Figure 8

- 35) Assemble the Stops with AN509-1032-19R Countersunk Machine screws, AN960-10 washers and AN365-1032 fiber nuts. **NOTE:** Two of the assemblies will be used on the Stabilizer and two of the assemblies will be used on the Rudders.
- 36) Working on the Stabilizer, deflect the attached Elevator up to 25° from neutral.
- 37) Slide a Stop up against the Elevator Horn. You will notice that a 1/16" packer strip must be made. At this point you can determine: How big the packer must be and a convenient hole placement for mounting the Stop. Use RV-1619 avex rivets to install. Figure 9.

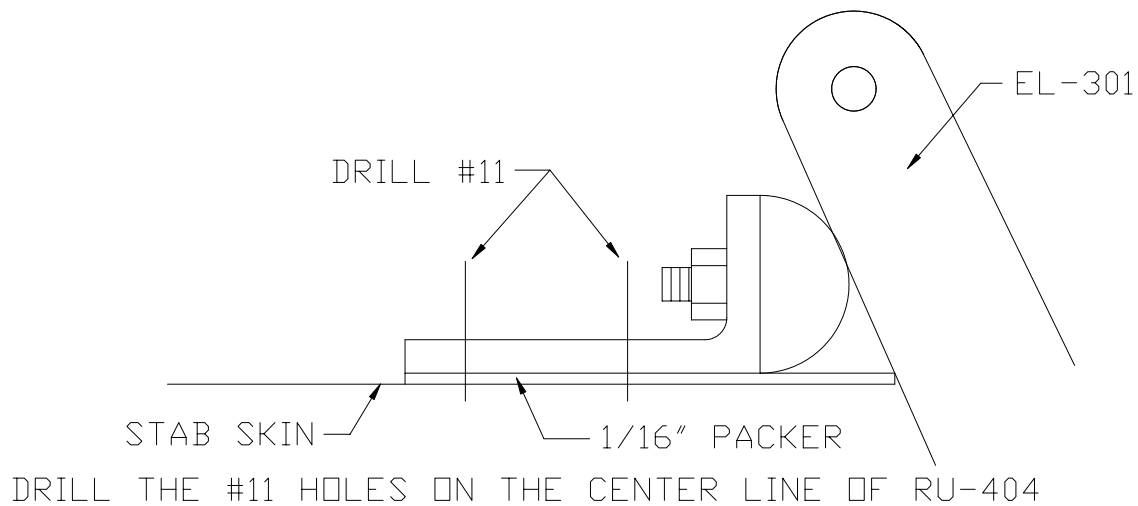


Figure 9

- 38) Debur, chromate and rivet to the Stabilizer with RV-1619 rivets.
- 39) Working on the bottom of the Stabilizer repeat the proceeding steps to install the second Stop. Place the Elevator 25° down from neutral. (8" each side of neutral at the Elevator Trailing Edge).
- 40) Repeat the procedures for the Rudder Stops. (The Stops will go on the Fuselage). Again you want 25° deflection in each direction. **NOTE:** The Stops can be adjusted by adding shims between the RU-404 and EL-410.

- 41) With rudder pedals in neutral (centered), attach the rudder cables to the T12-HT4 tangs on the rudder pedal eye bolts using an AN100C-4 thimble and 18-3-M nico.