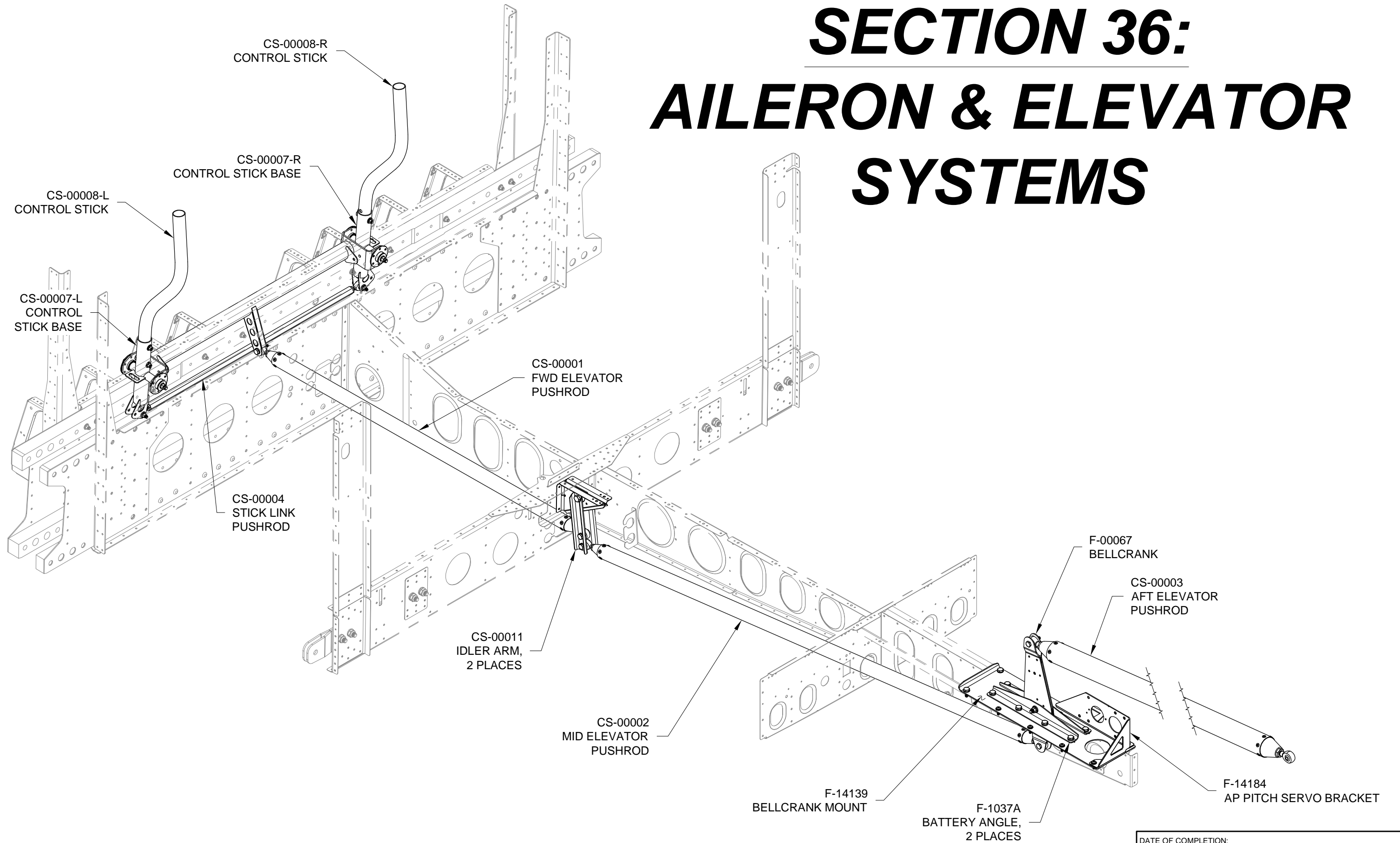
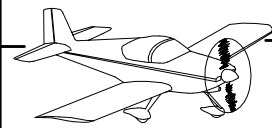
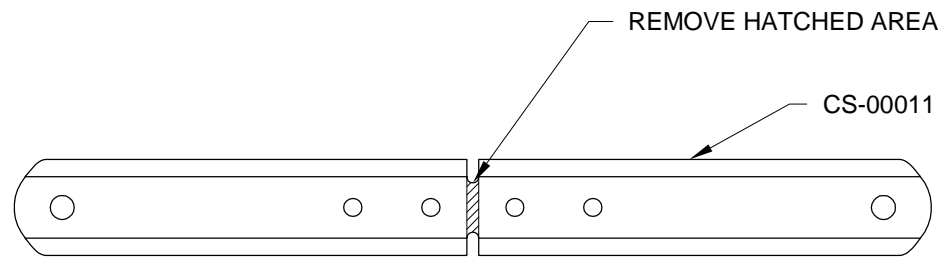


# SECTION 36: AILERON & ELEVATOR SYSTEMS



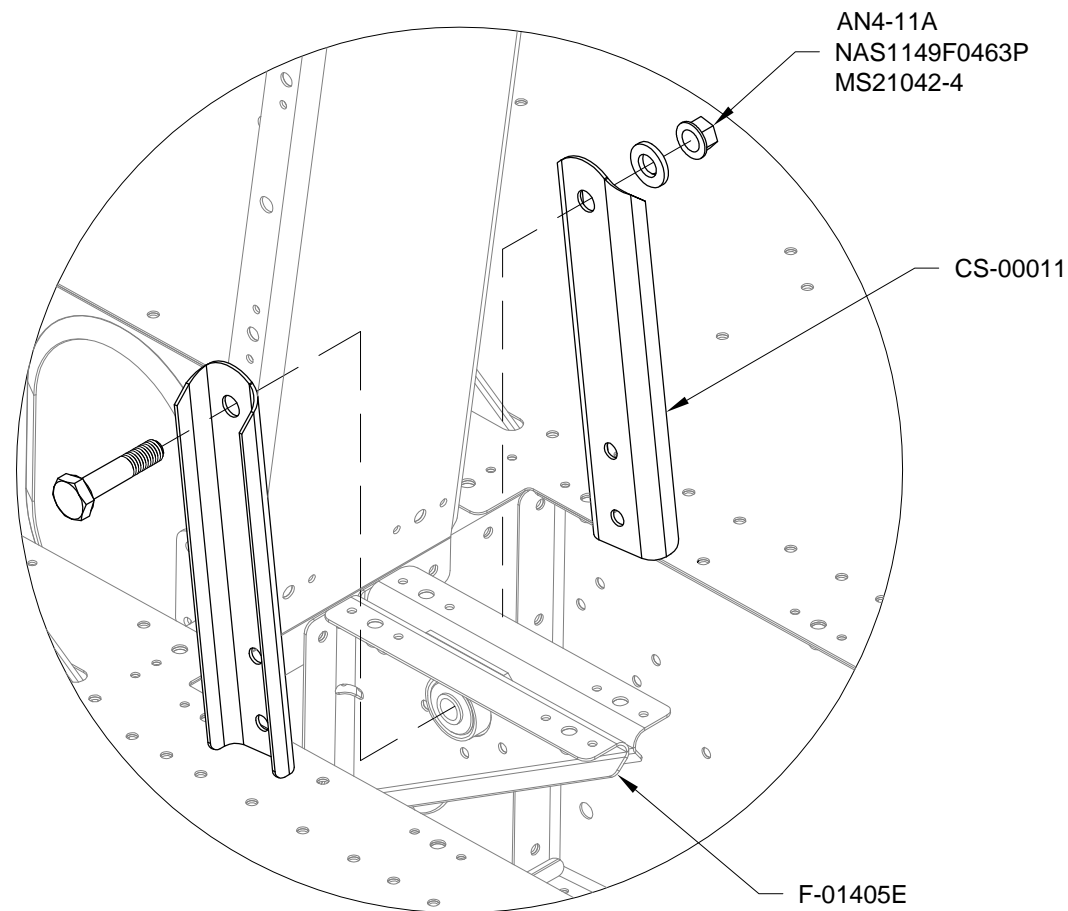


Step 1: Separate the CS-00011 Idler Arms by removing the hatched area as shown in Figure 1. Deburr parts.



**FIGURE 1: SEPARATE IDLER ARMS**

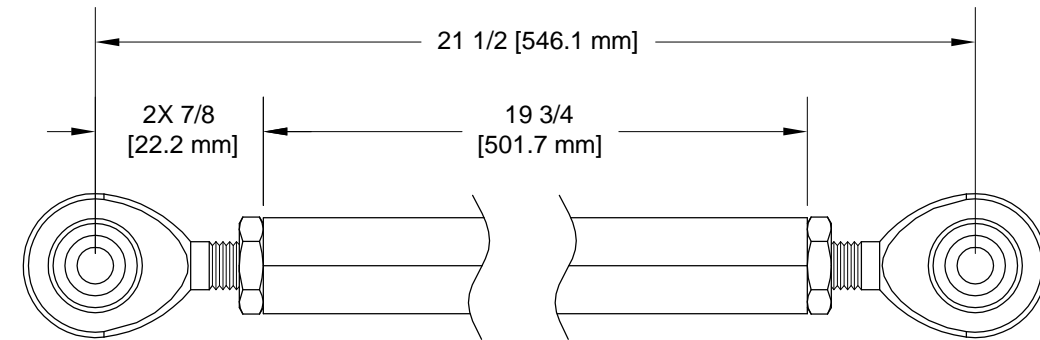
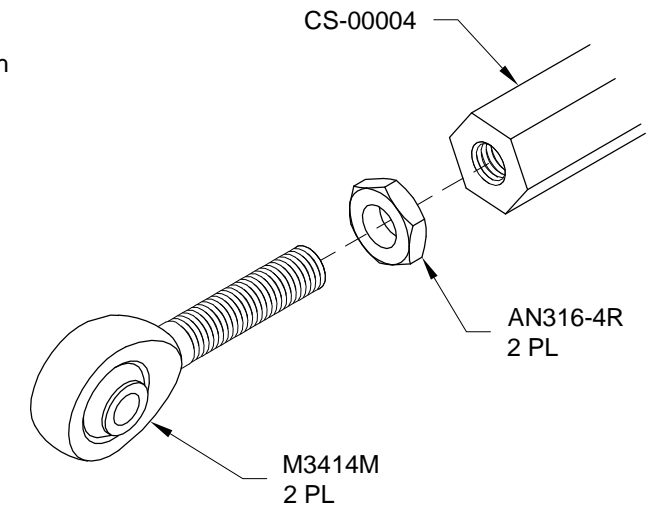
Step 2: Install the CS-00011 Idler Arms using Figure 2 hardware call-outs. Check that there is clearance between the idler arms and the lower flanges of the F-01405E Idler Bracket. If there is less than a .003 gap (a typical piece of paper) either sand down interfering edge of idler bracket, or remove arms and file edges until adequate clearance is obtained.



**FIGURE 2: INSTALL IDLER ARMS**

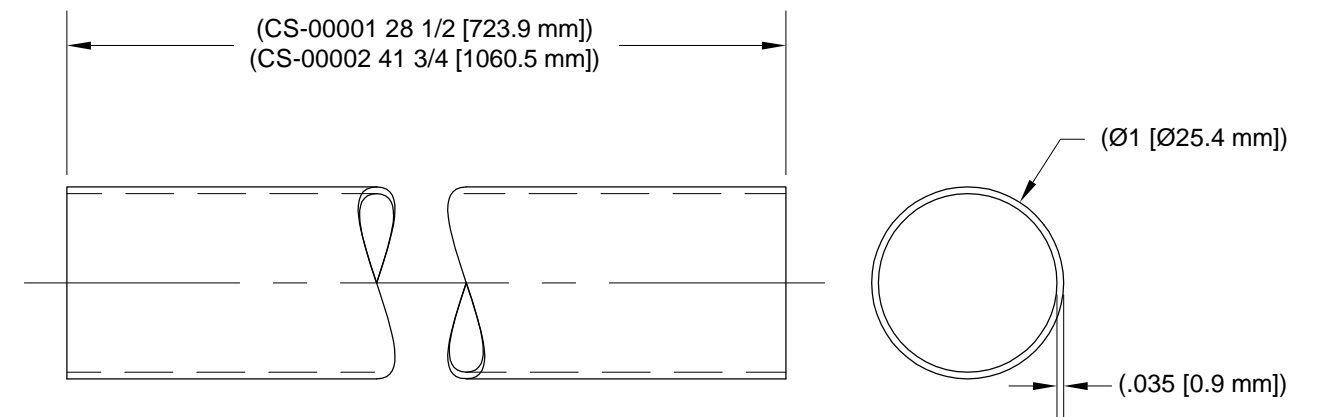
Step 3: Prime the CS-00004 Stick Link Pushrod.

Step 4: Assemble the CS-00004 Stick Link Pushrod Assembly with the hardware called out in Figure 3. Use dimensions shown in Figure 3 to position the rod end bearings properly.

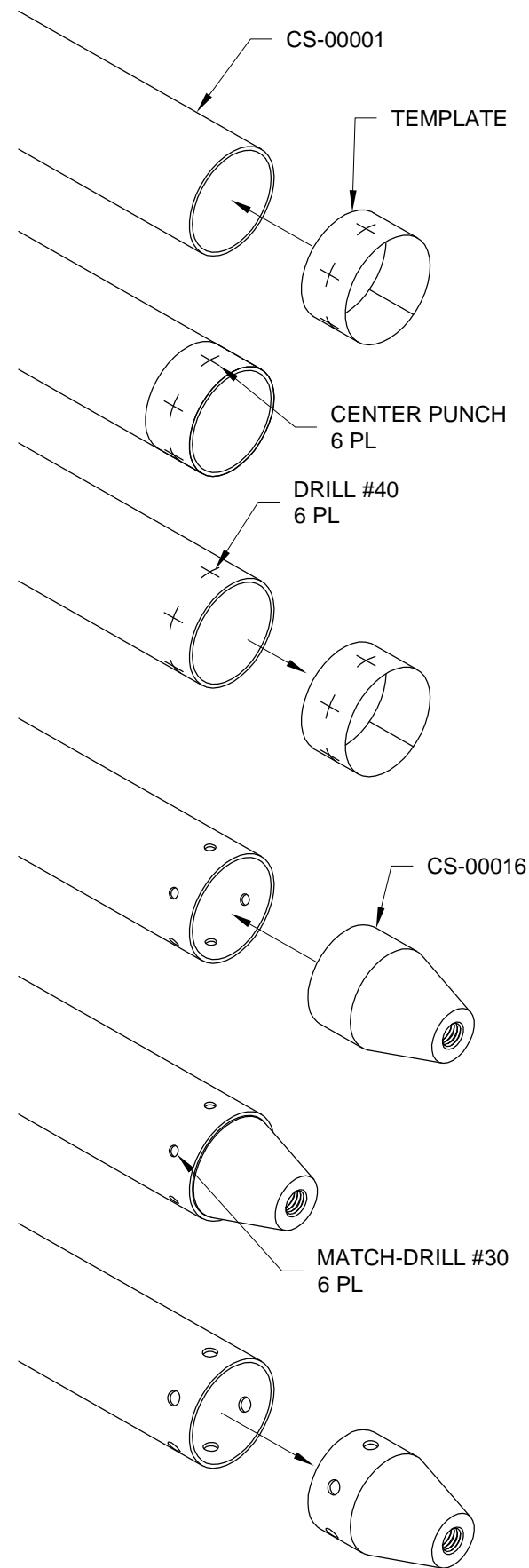
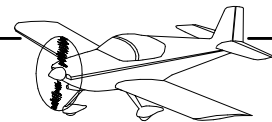


**FIGURE 3: ASSEMBLE STICK LINK PUSHROD**

Step 5: Locate the CS-00001 Fwd & CS-00002 Mid Elevator Pushrods shown in Figure 4. Deburr the elevator pushrod ends.



**FIGURE 4: ELEVATOR PUSHRODS**



**FIGURE 1: MATCH-DRILL ROD END FITTING**

**NOTE:** Fabrication processes for the CS-00001 Fwd, CS-00002 Mid, and CS-00003 Aft (shown Page 36-04) Elevator Pushrods are similar and may be completed at the same time if desired.

Reference Figure 1 for Steps 1-5.

Step 1: Cutout the fwd/mid pushrod drill template provided at the end of this section.

Form the template into a ring around the end of the pushrod using clear tape to secure the ends together.

Align the template with the end of pushrod.

Center punch the "cross hairs" in the template onto the pushrod.

Remove the template.

Step 2: Drill #40 six pilot holes into each end of the pushrod.

Deburr the hole edges on the inside of the pushrod.

Step 3: Insert a CS-00016 Rod End Fitting into the end of the CS-00001 Fwd Elevator Pushrod. Proper engagement is when the end of the pushrod coincides with the edge of the taper in the rod end fitting. See Figure 2.

Match-Drill #30 the rod end fitting using the pilot holes in the elevator pushrod as drill guides.

Insert the clecos in the holes as the match-drilling progresses around the circumference of the elevator pushrod.

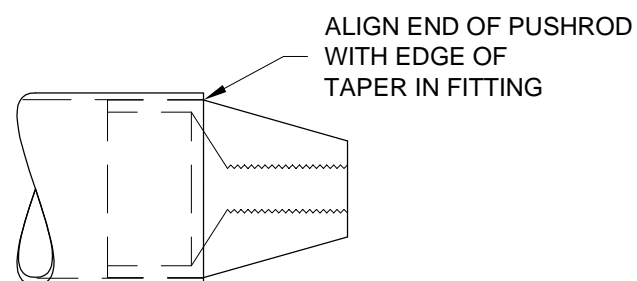
Step 4: Repeat the installation of the rod end fitting on the opposite end of the pushrod.

Mark the ends of the pushrods and rod end fittings for later reassembly in the same position and clocking.

Disassemble and deburr the parts.

Step 5: Repeat steps 2 through 5 for the CS-00002 Mid Elevator Pushrod.

Step 6: Prime the inside and outside surfaces of the pushrod tubes and Rod End Fittings. See Section 5.1 for information on priming pushrod tubes.



**FIGURE 2: ROD END FITTING POSITION**

**WARNING:** Allow the primer to dry completely before assembling the pushrods. Seized bearings have resulted from wet primer finding its way to the rod ends.

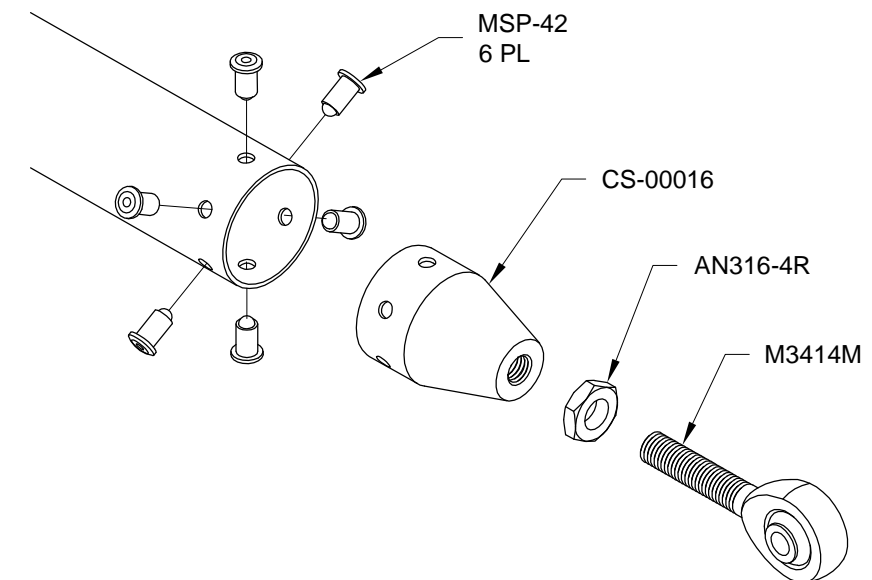
**WARNING:** In the final installation both pushrod ends must have over half the thread engaged making it impossible for a bearing to back off the pushrod if both ends are pinned.

Step 7: Assemble the CS-00001 Fwd Elevator Pushrod Assembly using the hardware shown in Figure 3.

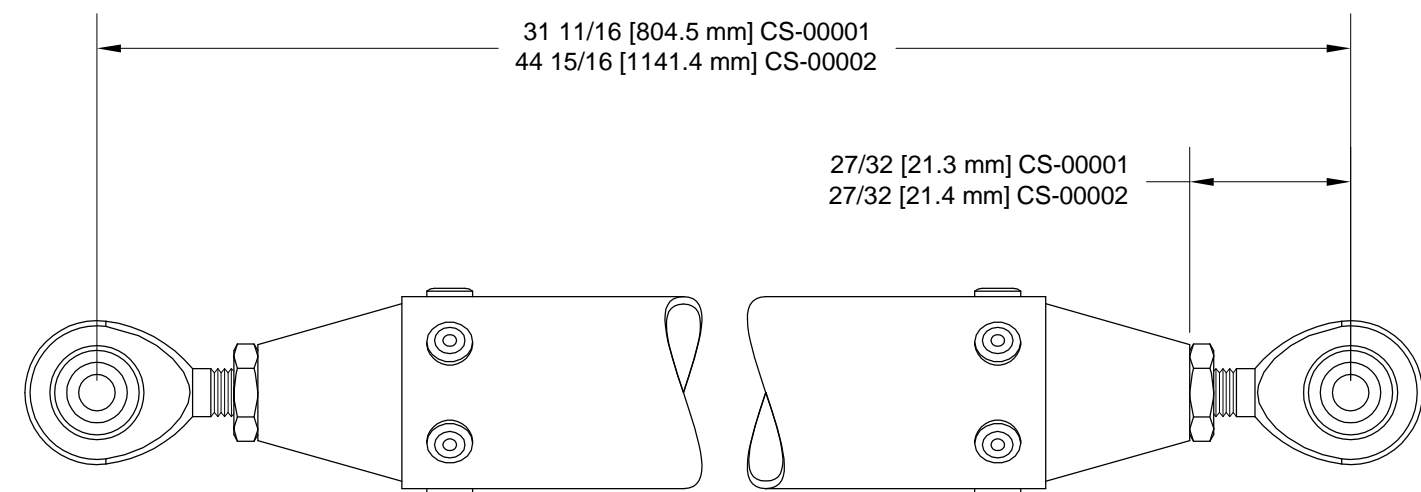
Step 8: Adjust the length of the CS-00001 Fwd Elevator Pushrod Assembly per the dimension in Figure 4 and tighten jamb nuts.

Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length as shown in Figure 4. The rod end bearing engagement may need to be adjusted during the installation of the CS-00003 Aft Elevator Pushrod Assembly.

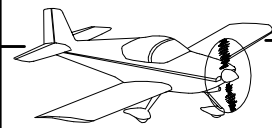
Step 9: Repeat steps 7 and 8 for the CS-00002 Mid Elevator Pushrod Assembly.



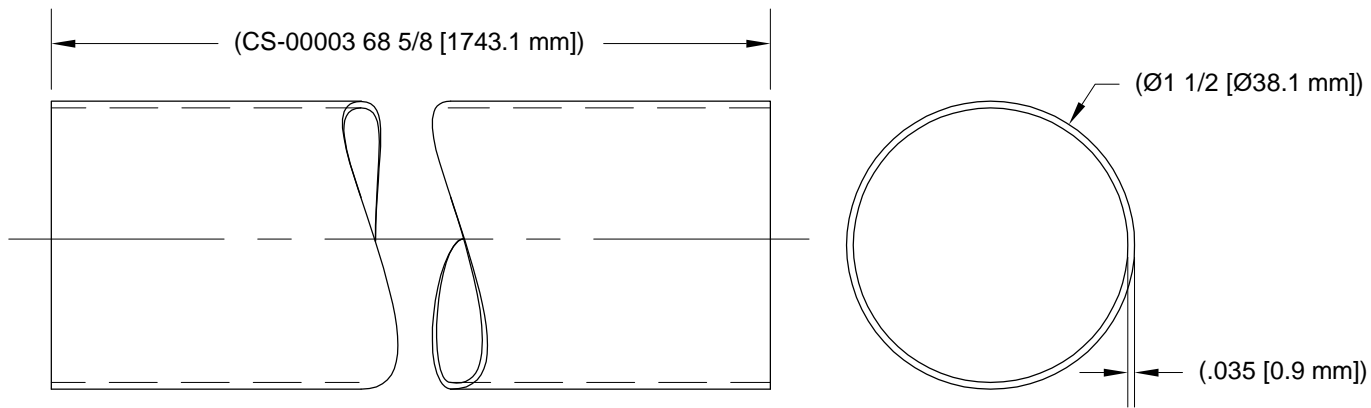
**FIGURE 3: ASSEMBLE PUSHROD**



**FIGURE 4: SET OVERALL LENGTH**



Step 1: Locate the CS-00003 Aft Elevator Pushrod shown in Figure 1. Deburr the elevator pushrod ends.



**FIGURE 1: AFT ELEVATOR PUSHROD**

**NOTE:** Reference Page 36-03, Figure 1 for Steps 2-5.

Step 2: Cutout the pushrod drill template provided at end of the section.

Form the template into a ring around the CS-00003 Aft Elevator Pushrod and secure the ends using clear tape.

Align the template with the end of the pushrod.

Center punch the "cross hairs" in the template onto the pushrod.

Remove the template.

Step 3: Drill #40 six pilot holes in each end of the pushrod.

Deburr the hole edges on the inside of the pushrod.

Step 4: Insert a VA-101 Rod End Fitting into the end of the CS-00003 Aft Elevator Pushrod. Proper engagement is when the end of the pushrod coincides with the edge of the taper in the rod end fitting. See Figure 2.

Match-Drill #30 the rod end fitting using the pilot holes in the elevator pushrod as drill guides.

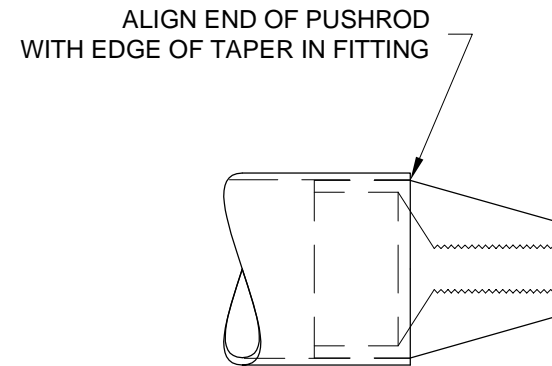
Insert clecos into the holes as the match-drilling progresses around the circumference of the elevator pushrod.

Step 5: Repeat Step 2-4 on the opposite end of the CS-00003 Pushrod with the second VA-101 Rod End Fitting.

Mark the ends of the pushrod and rod end fittings for later reassembly in the same position and clocking.

Disassemble and deburr.

Step 6: Prime the inside and outside surfaces of the CS-00003 Aft Elevator Pushrod and the VA-101 Rod End Fittings. See Section 5.1 for details on priming pushrods.



**FIGURE 2: ROD END FITTING POSITION**

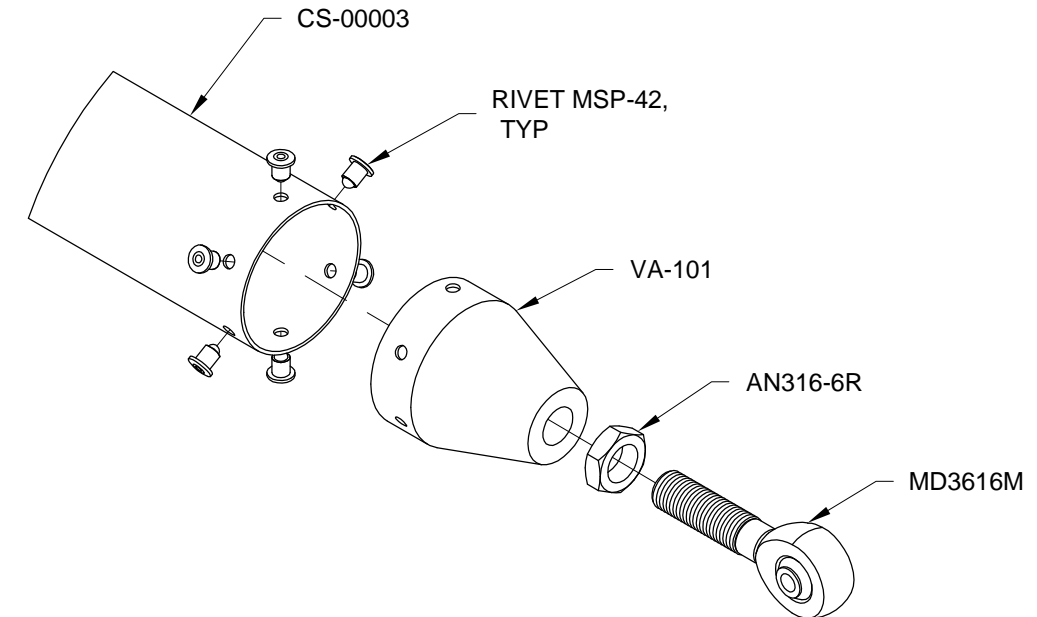
**WARNING:** Allow the primer to dry completely before assembling pushrods. Seized bearings have resulted from wet primer finding its way to the rod ends.

**WARNING:** In the final installation both pushrod ends must have over half the thread engaged making it impossible for a bearing to back off the pushrod if both ends are pinned.

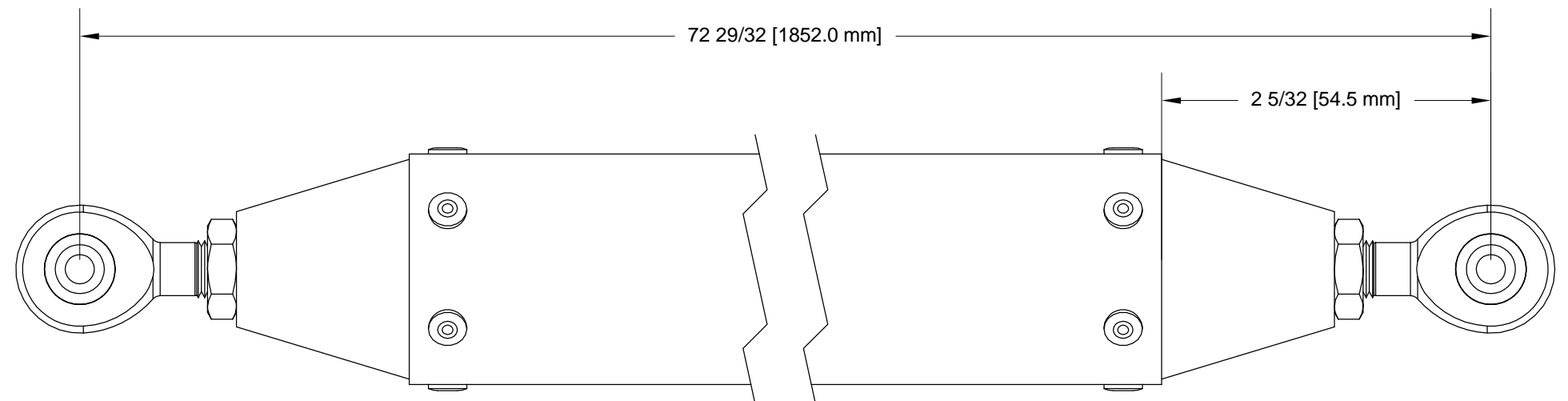
Step 7: Assemble the CS-00003 Aft Elevator Pushrod Assembly using the rivets called out in Figure 3.

Step 8: Adjust the CS-00003 Aft Elevator Pushrod Assembly per the dimensions in Figure 4.

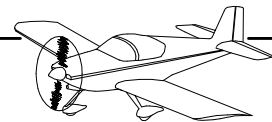
Theoretically the correct engagement of the rod end bearings yields a bearing center-to-bearing center length as shown in Figure 4. The rod end bearing engagement may need to be adjusted during the installation of the CS-00003 Aft Elevator Pushrod Assembly.



**FIGURE 3: ASSEMBLE PUSHROD**

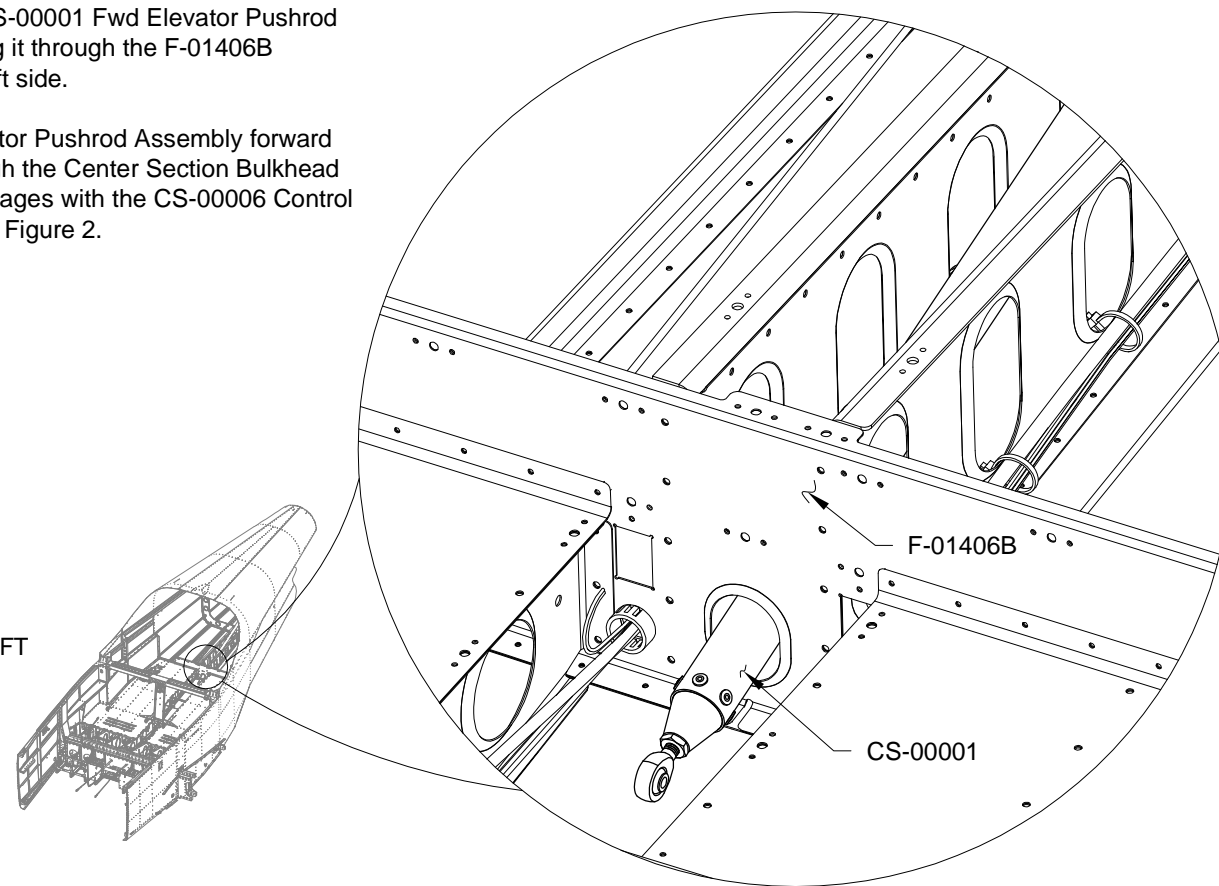
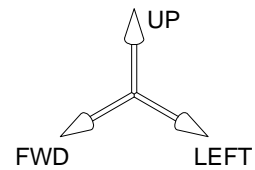


**FIGURE 4: AFT PUSHROD BEARING AND JAM NUT INSTALLATION**



Step 1: Install the CS-00001 Fwd Elevator Pushrod Assembly by feeding it through the F-01406B Bulkhead from the aft side.

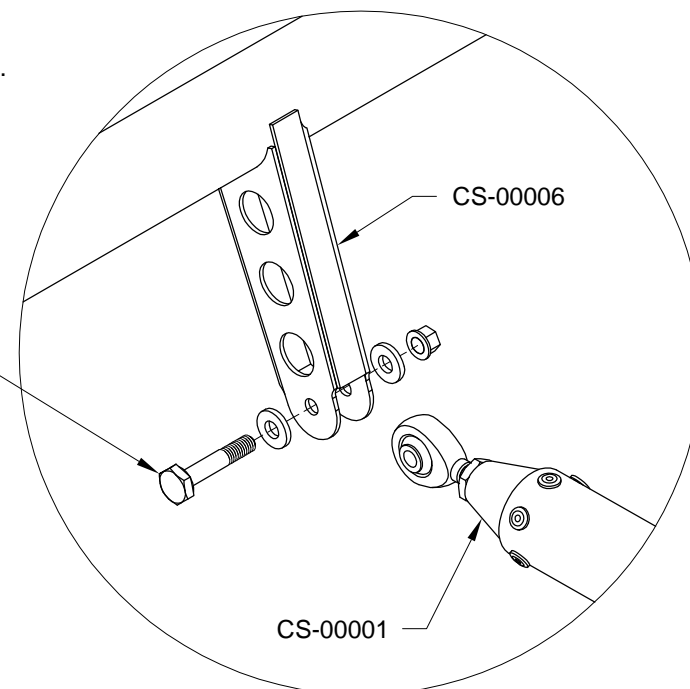
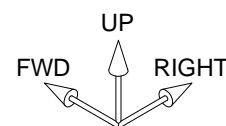
Move the Fwd Elevator Pushrod Assembly forward until it passes through the Center Section Bulkhead Assemblies and engages with the CS-00006 Control Column as shown in Figure 2.



**FIGURE 1: INSERT FWD ELEVATOR PUSHROD ASSEMBLY**

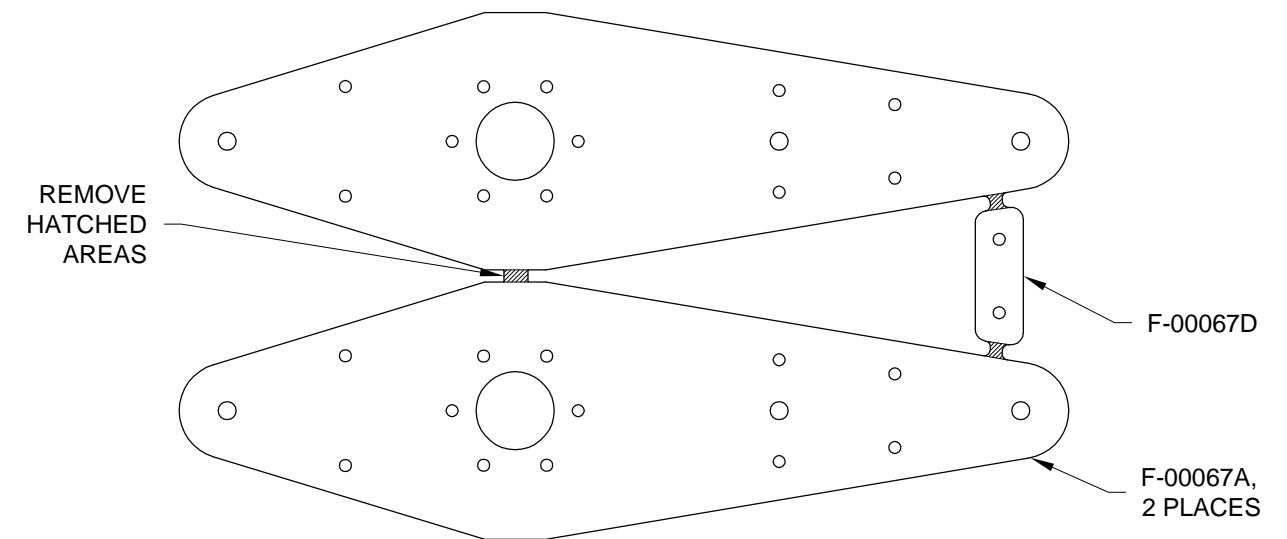
Step 2: Bolt the CS-00001 Fwd Elevator Pushrod Assembly to the CS-00006 Control Column using Figure 2 hardware call-outs.

AN3-10A  
2X NAS1149F0363P  
MS21042-3



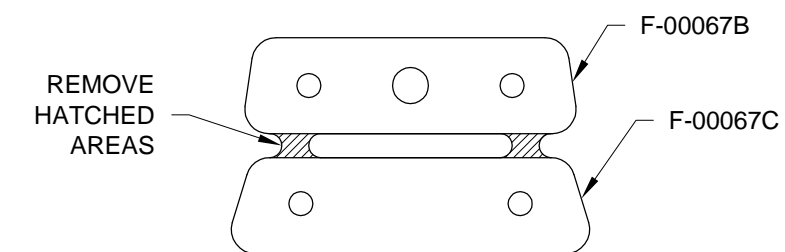
**FIGURE 2: ATTACH FWD ELEVATOR PUSHROD ASSEMBLY**

Step 3: Separate the F-00067 Bellcrank into individual parts by removing shaded areas. See Figure 3.



**FIGURE 3: SEPARATING BELLCRANK**

Step 4: Separate the F-00067BC Bellcrank Spacers into individual parts by removing shaded areas shown in Figure 4.



**FIGURE 4: SEPARATING BELLCRANK SPACERS**

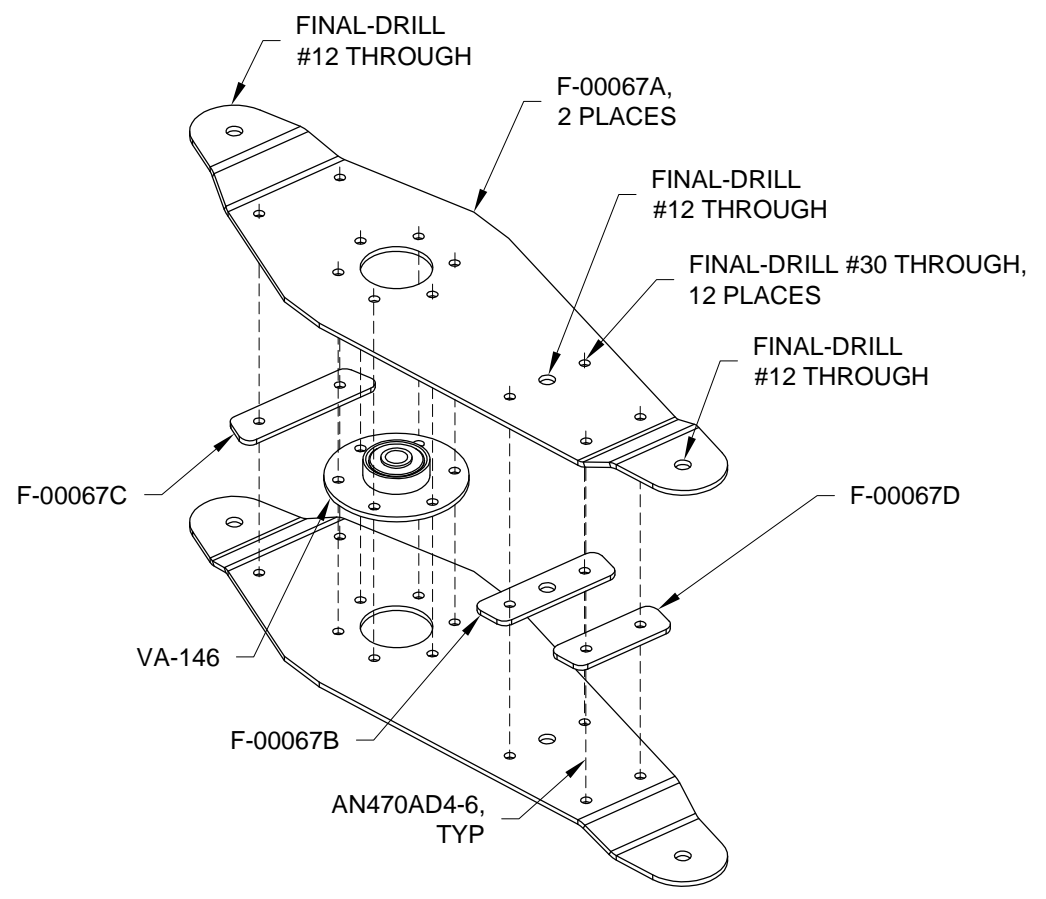
**Step 1:** Cleco together the F-00067A, F-00067B, F-00067C & F-00067D Bellcrank parts together with the VA-146 Bearing to make the Elevator Bellcrank Assembly as shown in Figure 1.

Final-Drill #30 and #12 through the Elevator Bellcrank Assembly as shown in Figure 1.

Disassemble, then deburr the holes and edges.

**Step 2:** Prime the F-00067A, F-00067B, F-00067C & F-00067D Bellcrank parts, if desired, in preparation for final assembly.

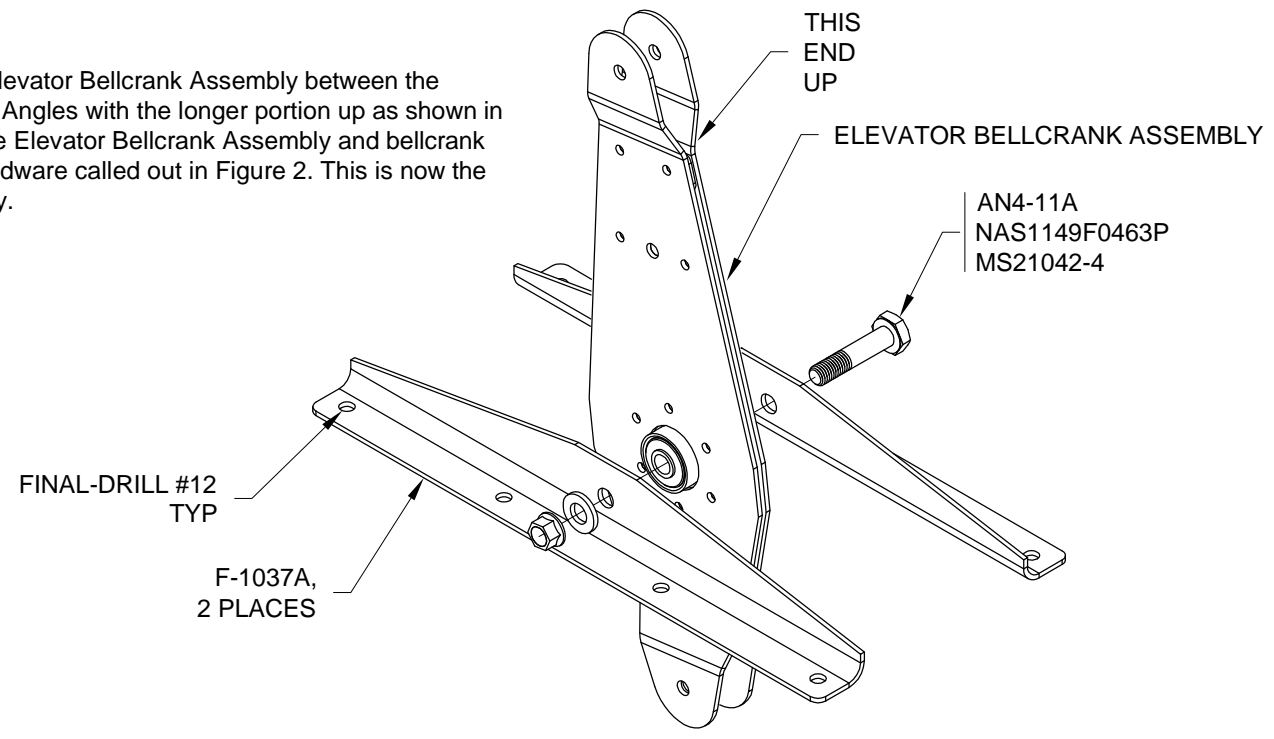
**Step 3:** Cleco together and then rivet the F-00067A, F-00067B, F-00067C & F-00067D Bellcrank parts and the VA-146 Flange Bearing to make the Elevator Bellcrank Assembly. See Figure 1 for rivet callouts.



**FIGURE 1: ELEVATOR BELLCRANK ASSEMBLY**

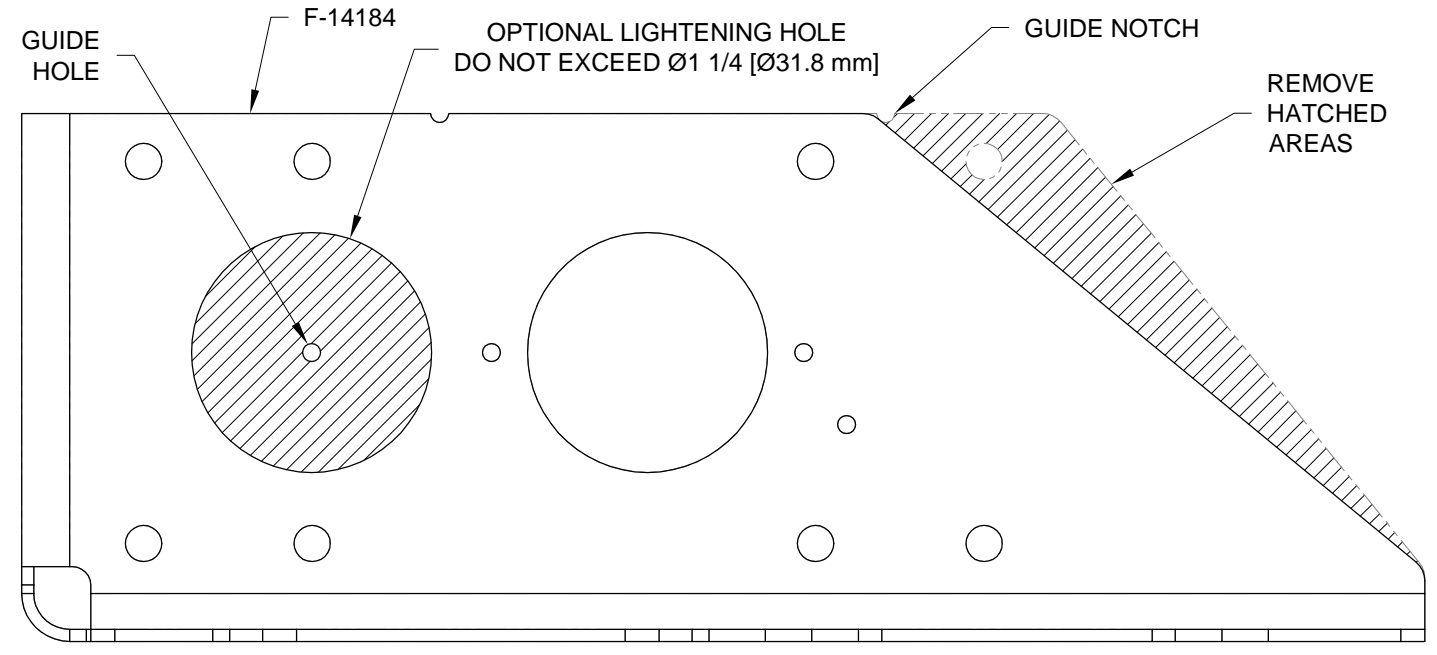
**Step 4:** Locate the two F-1037A Bellcrank Angles which were separated in an earlier section and final-drill #12 the holes as shown in Figure 2.

**Step 5:** Align the Elevator Bellcrank Assembly between the F-1037A Bellcrank Angles with the longer portion up as shown in Figure 2. Attach the Elevator Bellcrank Assembly and bellcrank angles with the hardware called out in Figure 2. This is now the Bellcrank Assembly.



**FIGURE 2: BELLCRANK ASSEMBLY**

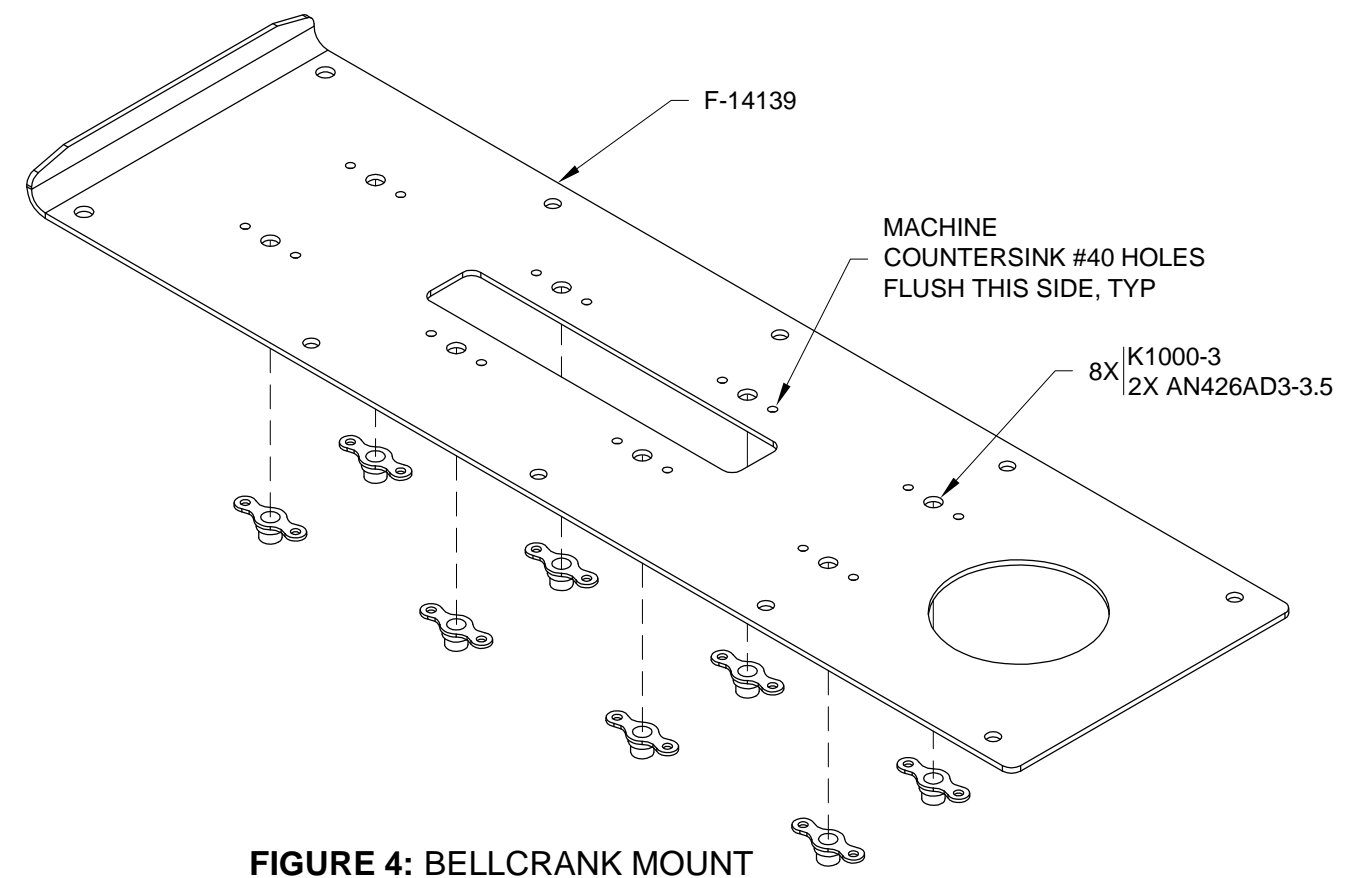
**Step 6:** Modify the F-14184 AP Pitch Servo Bracket by removing the material called out in Figure 3.



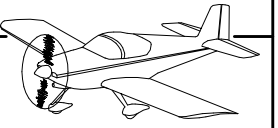
**FIGURE 3: AP PITCH SERVO BRACKET TRIM**

**Step 7:** Machine countersink the #40 holes flush on the top side of the F-14139 Bellcrank Mount for nutplates as shown in Figure 4. Deburr.

Install the nutplates on the bellcrank mount with the rivets called out in Figure 4 .

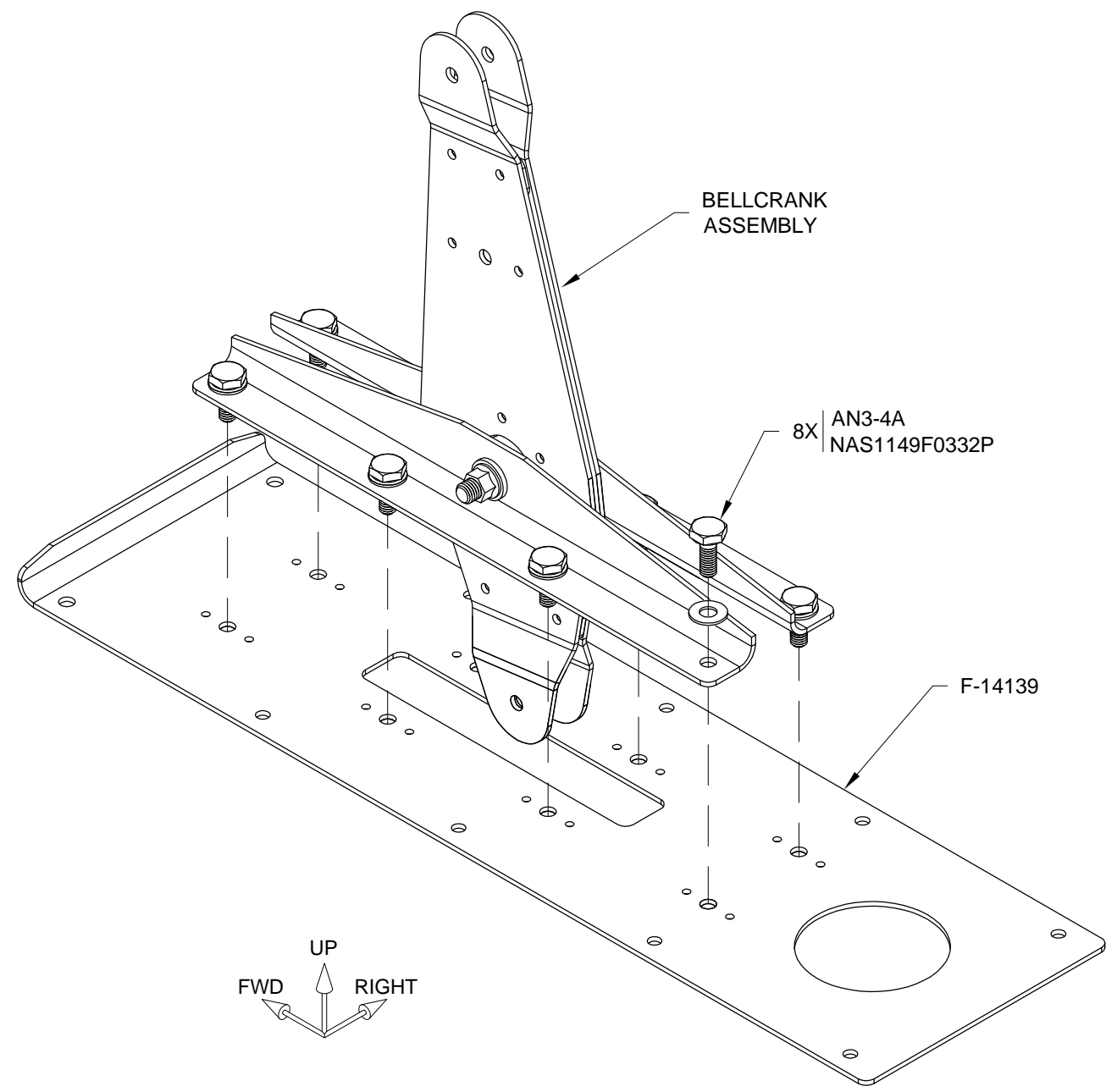


**FIGURE 4: BELLCRANK MOUNT**

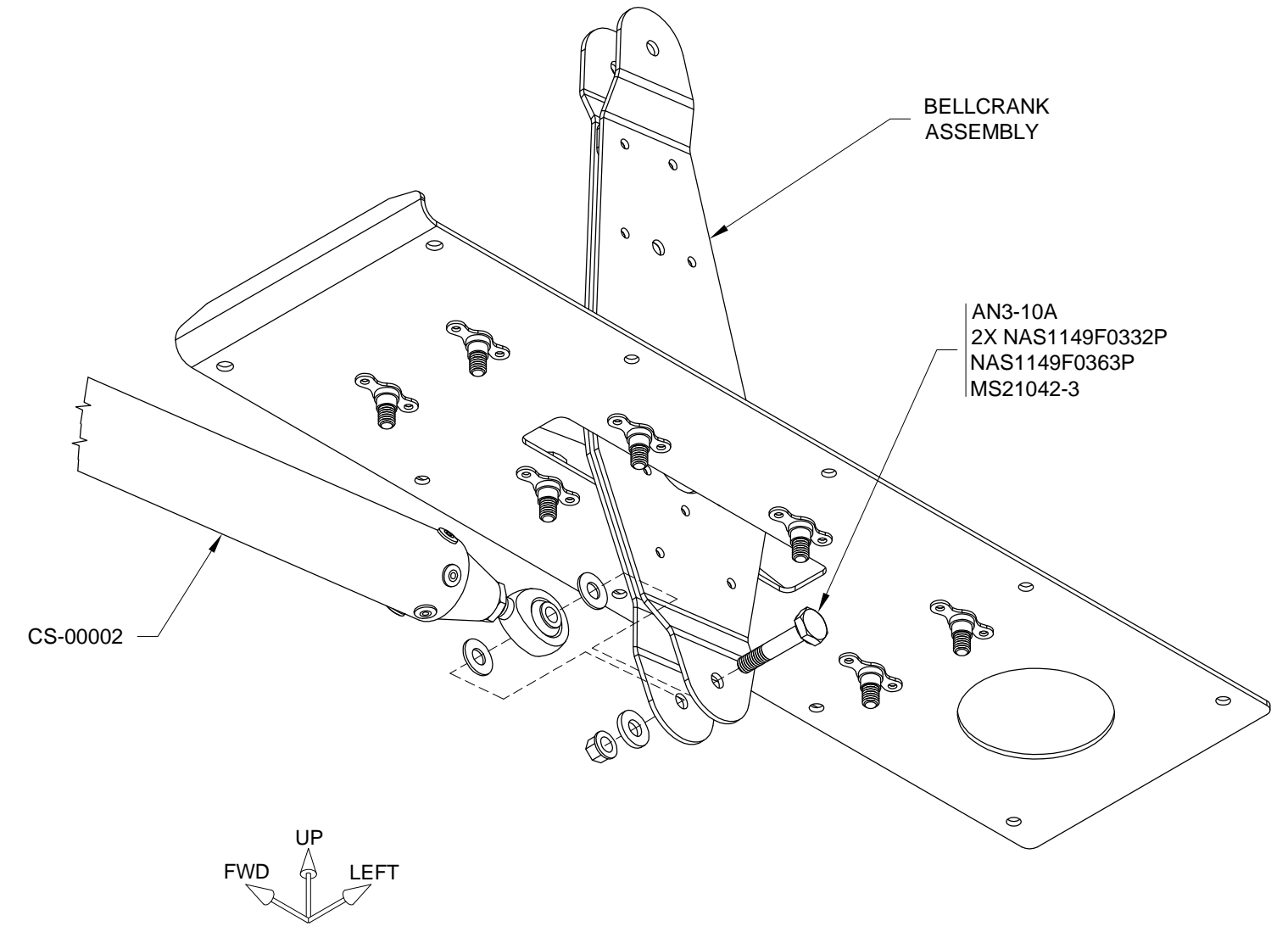


Step 1: Use the hardware called out in Figure 1 to attach the Bellcrank Assembly to the F-14139 Bellcrank Mount.

Step 2: Bolt the CS-00002 Mid Elevator Pushrod Assembly to the Bellcrank Assembly using Figure 2 hardware call-outs.



**FIGURE 1: BELLCRANK ASSEMBLY INSTALLATION**

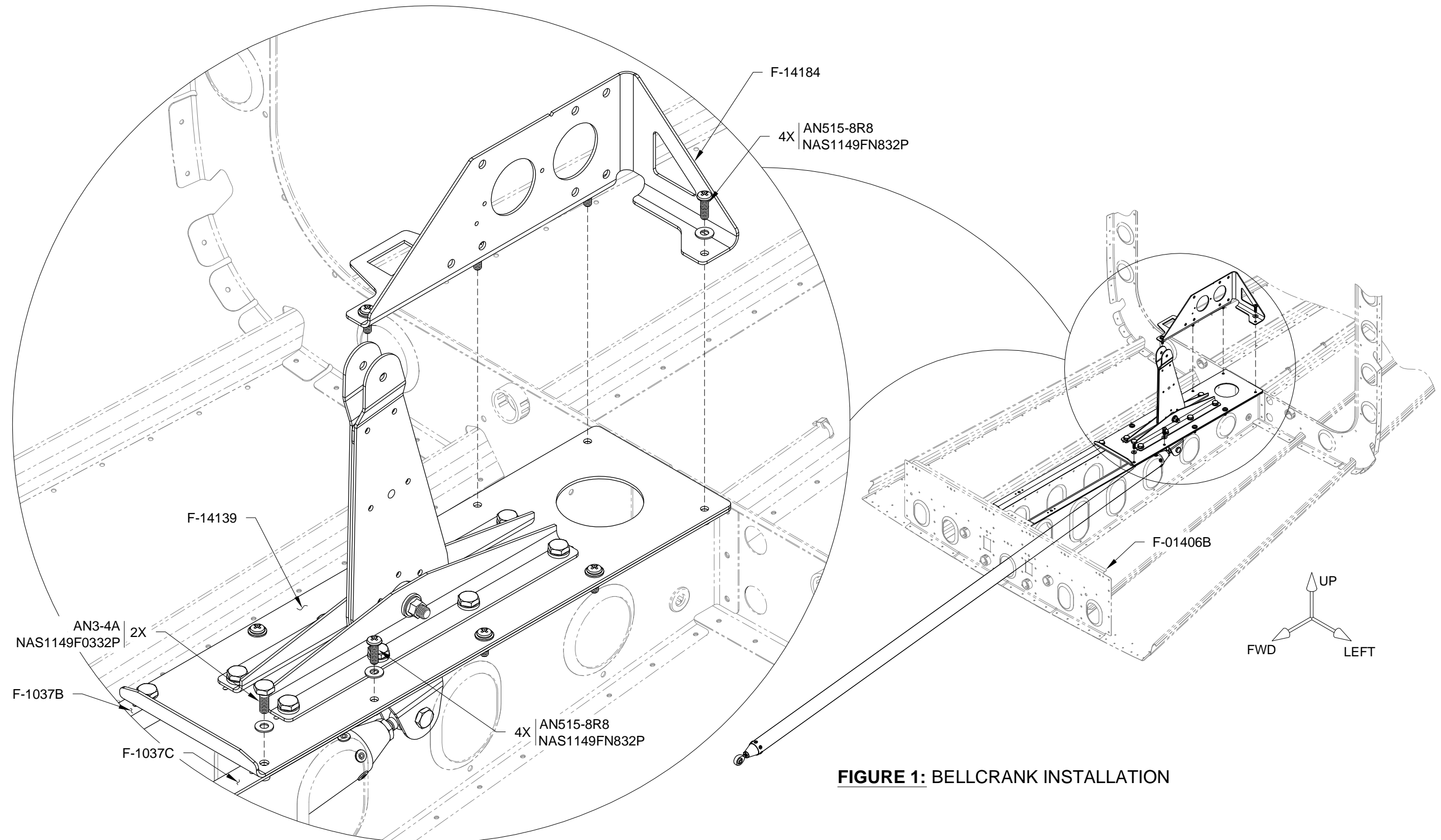


**FIGURE 2: MID ELEVATOR PUSHROD AND BELLCRANK ASSEMBLY**



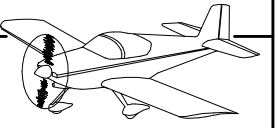
**Step 1:** Insert the CS-00002 Mid Elevator Pushrod Assembly from the back moving forward through the routing hole in the F-01406B Bulkhead until the F-14139 Bellcrank Mount can be aligned on top of the F-1037B & F-1037C Battery Angles as shown in Figure 1.

**Step 2:** Use the hardware shown in Figure 1 to attach the F-14139 Bellcrank Mount and the F-14184 AP Pitch Servo Bracket to the F-1037B & F-1037C Battery Angles.



**FIGURE 1: BELLCRANK INSTALLATION**

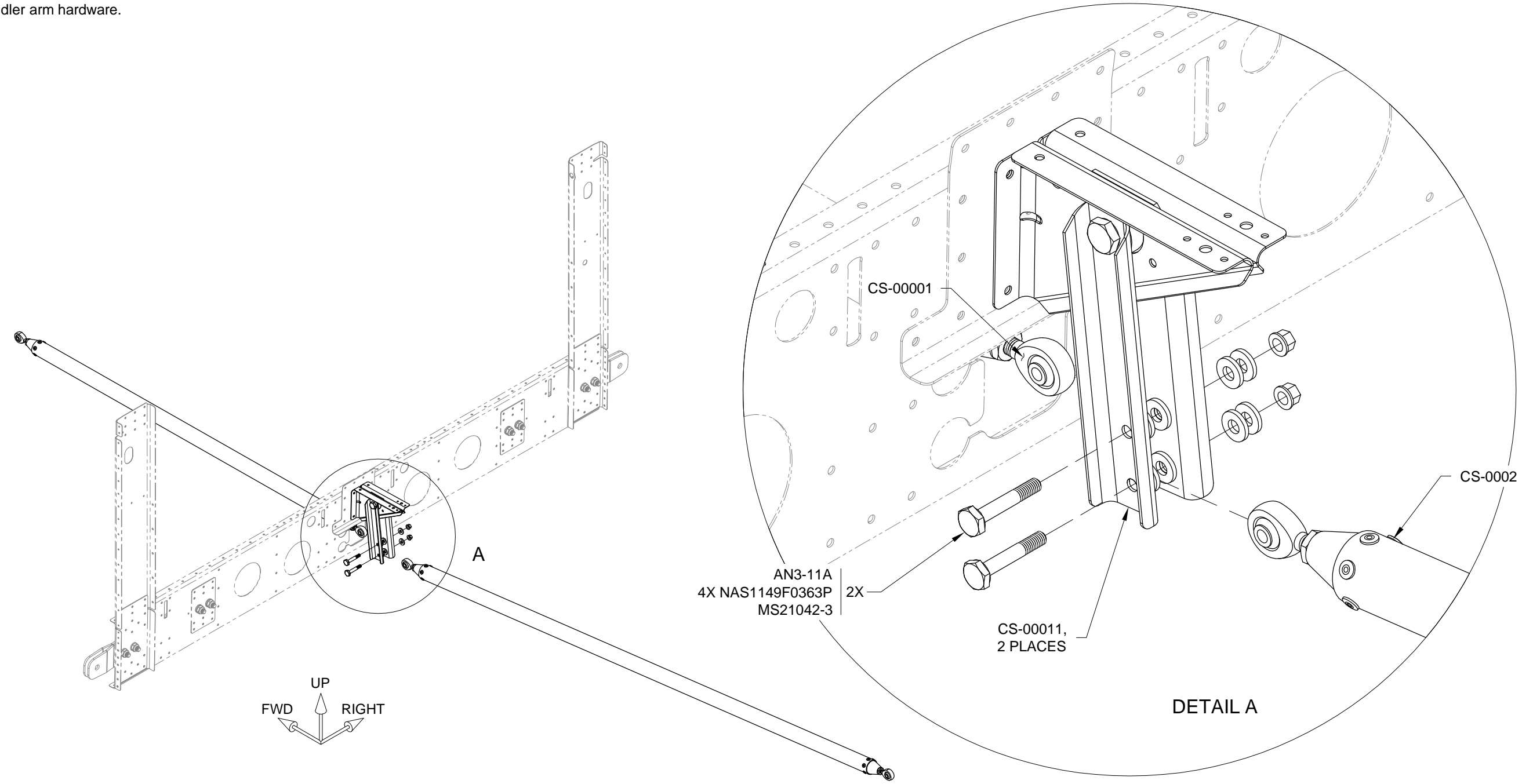




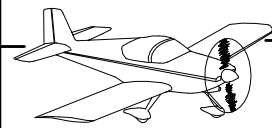
Step 1: Bolt the CS-00001 Fwd Elevator Pushrod Assembly and the CS-00002 Aft Elevator Pushrod Assembly to the CS-00011 Idler Arm using Figure 1 hardware call-outs. The right side idler arm may be swung out of the way while adding the bolts, middle washers, and pushrods. Swing the idler arm back into alignment and push bolts through before adding the remaining hardware.

Step 2: Check the clearance between the CS-00011 Idler Arms and the flanges of the F-01405E Idler Bracket by swinging idler arms forward and aft through their range of motion. Squeeze or bend flanges slightly to add clearance if required.

Torque idler arm hardware.



**FIGURE 1: ATTACH ELEVATOR PUSHROD ASSEMBLIES TO IDLER ARMS**



**NOTE:** The CS-00008 Control Sticks may vary slightly from drawing, make measurements from the lower end.

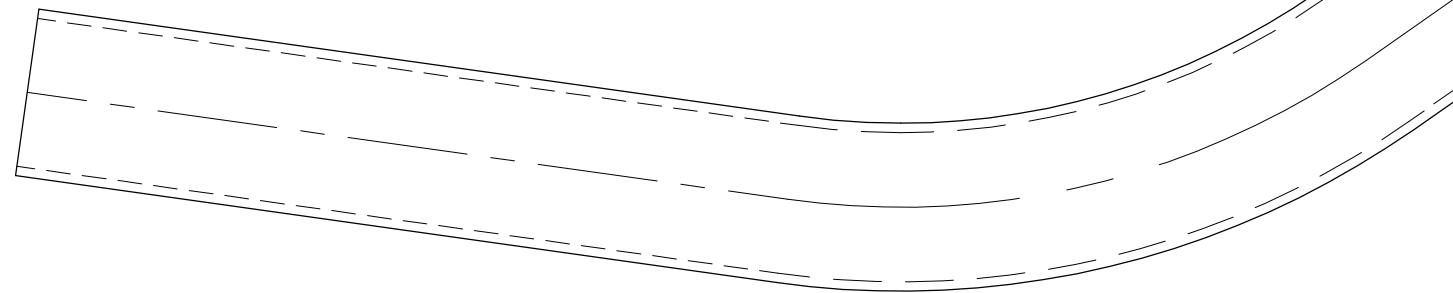
**Step 1:** Identify the lower end of the CS-00008 Control Stick (the end without powder coat) and mark insertion point and hole location as shown in Figure 1.

**Step 2:** Drill 1/4 through only one side of the CS-00008 Control Stick and deburr inside and out. See Figure 1.

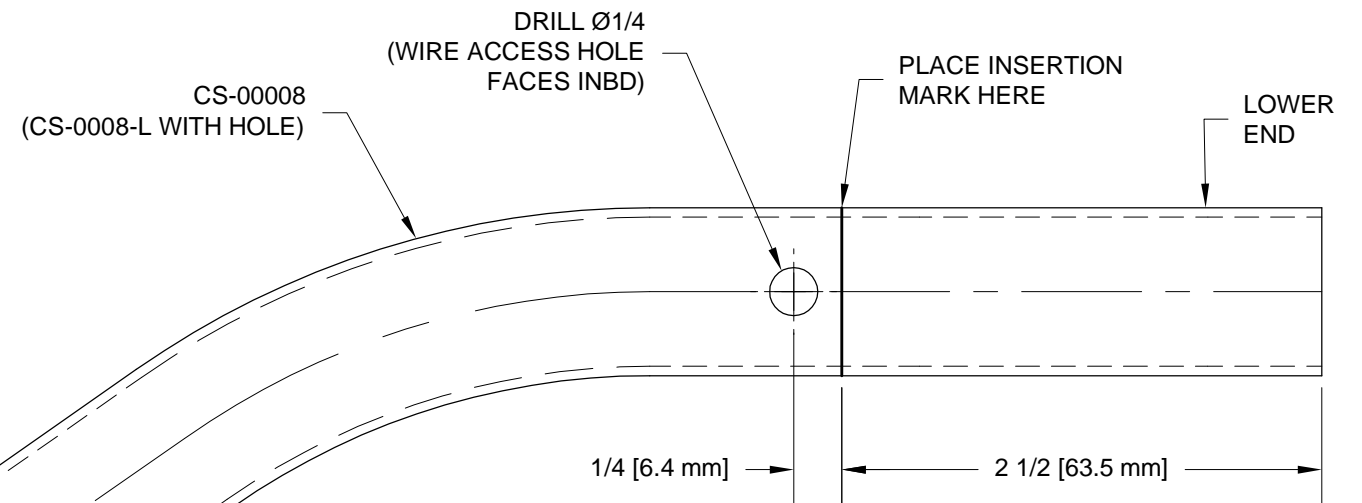
This is now the CS-00008-L Left Control Stick.

**NOTE:** The CS-00008-R Right Control Stick is a mirror of the CS-00008-L Left Control Stick.

**Step 3:** Fabricate the CS-00008-R Right Control Stick by repeating steps 1 and 2 on the opposite side of the remaining control stick. See Figures 1 and 2.



**FIGURE 1: MARK AND DRILL LEFT CONTROL STICK (FULL SCALE)**



**FIGURE 2: MARK AND DRILL RIGHT CONTROL STICK**

**Step 4:** Insert the CS-00008-L Left Control Stick into the CS-00007-L Control Stick Base up to insertion mark as shown in Figure 3.

**Step 5:** Lay the CS-00008-L Control Stick on a level surface with the CS-00007-L Control Stick Base beyond edge of surface. Rotate the control stick base until the bracket is level. See Figure 3. A small dab of super glue can be applied to the top of the socket after initial alignment is achieved to hold the parts for match-drill.

**Step 6:** Match-Drill #19 one of the holes in the CS-00007-L Control Stick Base to the CS-00008-L Left Control Stick. Insert a #8 screw into the drilled hole to hold parts in alignment.

**Step 7:** Match-Drill #19 the three remaining holes between the CS-00007-L Control Stick Base and the CS-00008-L Left Control Stick.

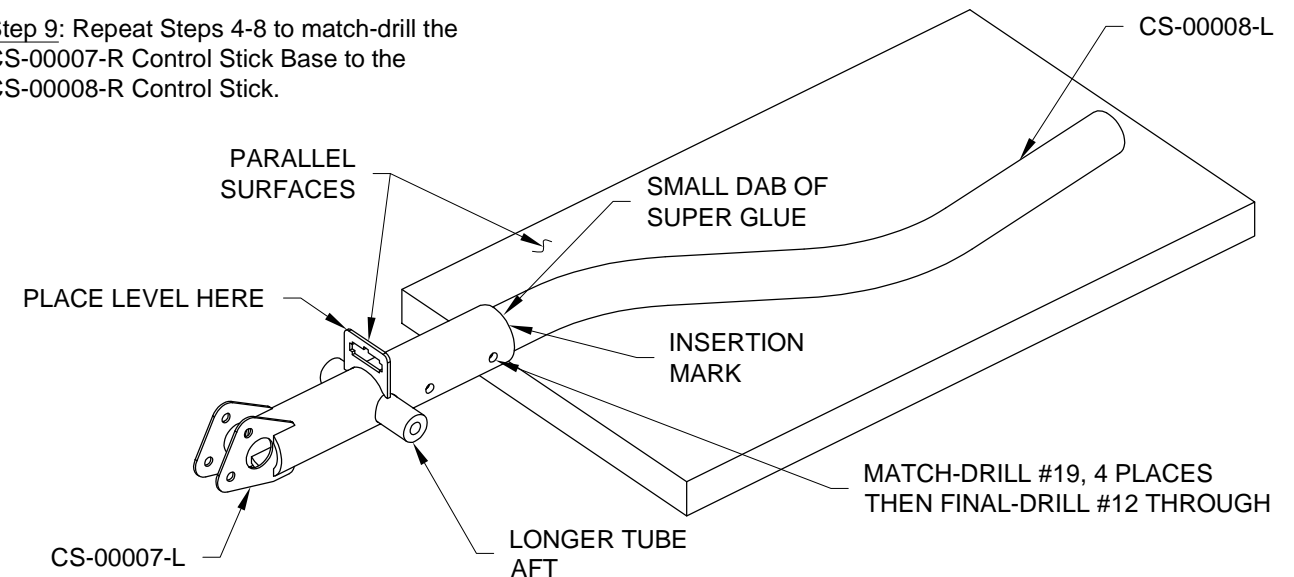
**Step 8:** In one operation final-drill #12 all the way through both sides of the set of holes in the CS-00007-L Control Stick Base and the CS-00008-L Left Control Stick that do not have the #8 alignment screw. See Figure 3.

Insert a 3/16 bolt in the #12 final-drilled hole and remove the #8 screw.

Final-Drill #12 the second set of holes.

**NOTE:** The CS-00008-R Control Stick is installed with only the top bolt. This makes removal easier for passenger comfort if desired. Both top and bottom bolts may be installed if desired, but hardware is only supplied for the upper attachment point.

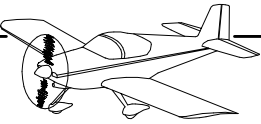
**Step 9:** Repeat Steps 4-8 to match-drill the CS-00007-R Control Stick Base to the CS-00008-R Control Stick.



**FIGURE 3: ALIGN AND DRILL LEFT CONTROL STICK**

10 9/16  
[268.3 mm]

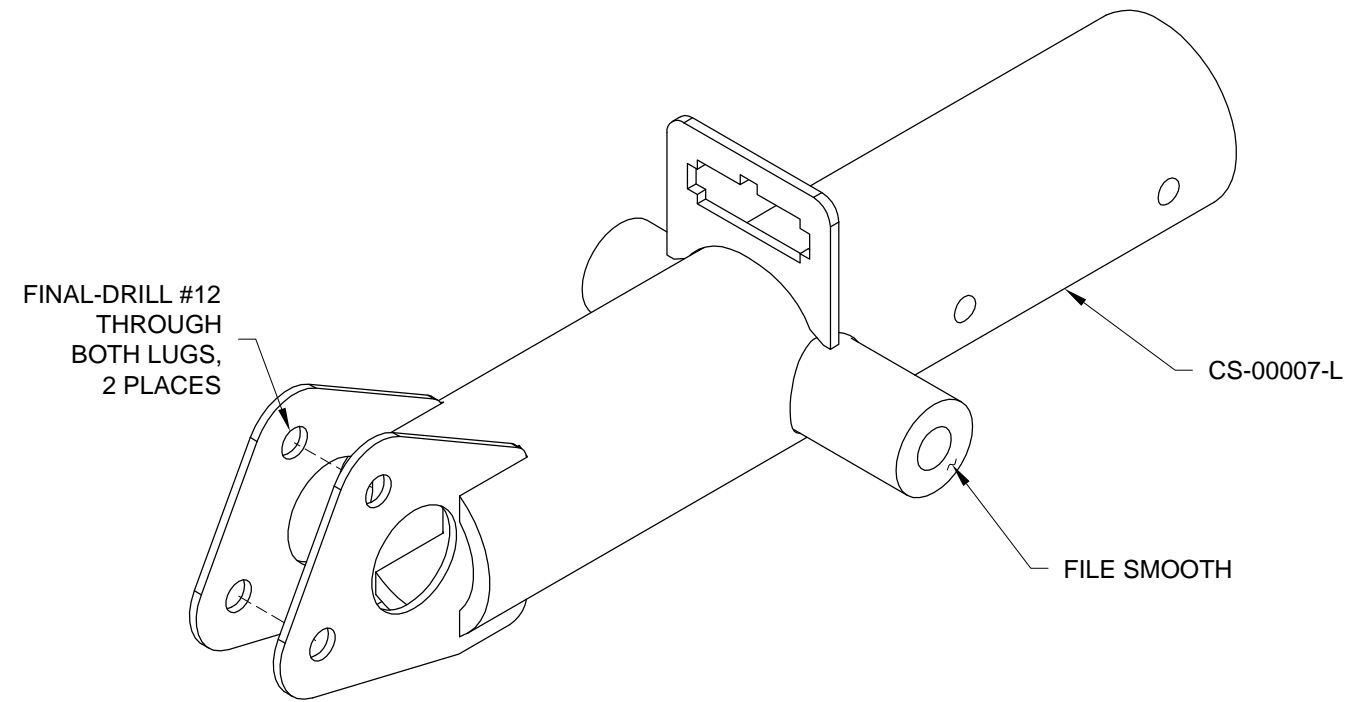
16 [406.4 mm]



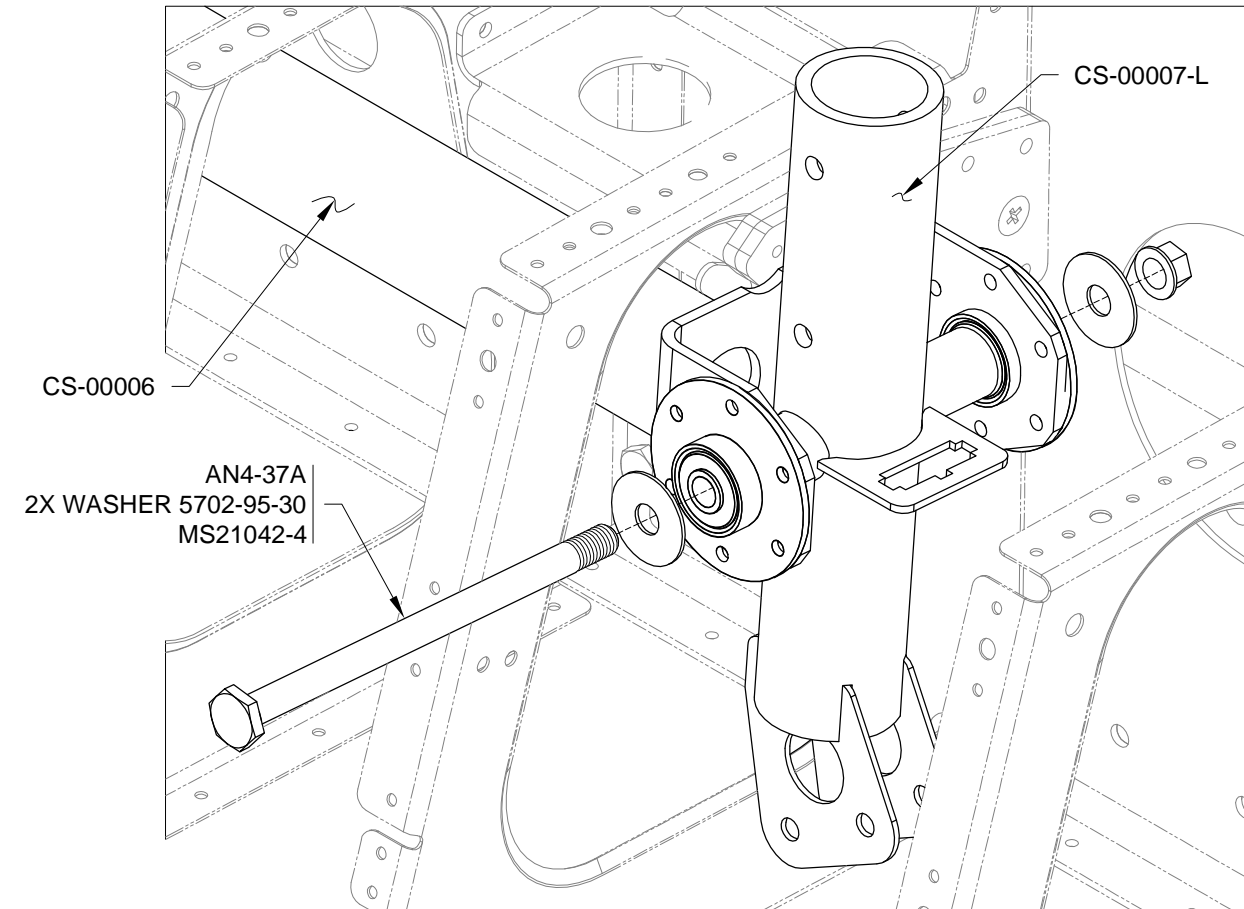
Step 1: Final-Drill #12 all the way through both lugs on bottom of the CS-00007-L&-R Control Stick Bases as called out in Figure 1.

Step 2: File the ends of the pivot tube on the CS-00007-L &-R as required to smooth any powder coat roughness. See Figure 1.

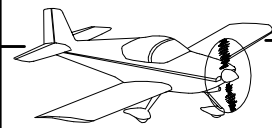
Step 3: Bolt the CS-00007-L & -R Control Stick Bases to the CS-00006 Control Column ends using Figure 2 hardware call-outs.



**FIGURE 1:** CONTROL STICK BASE

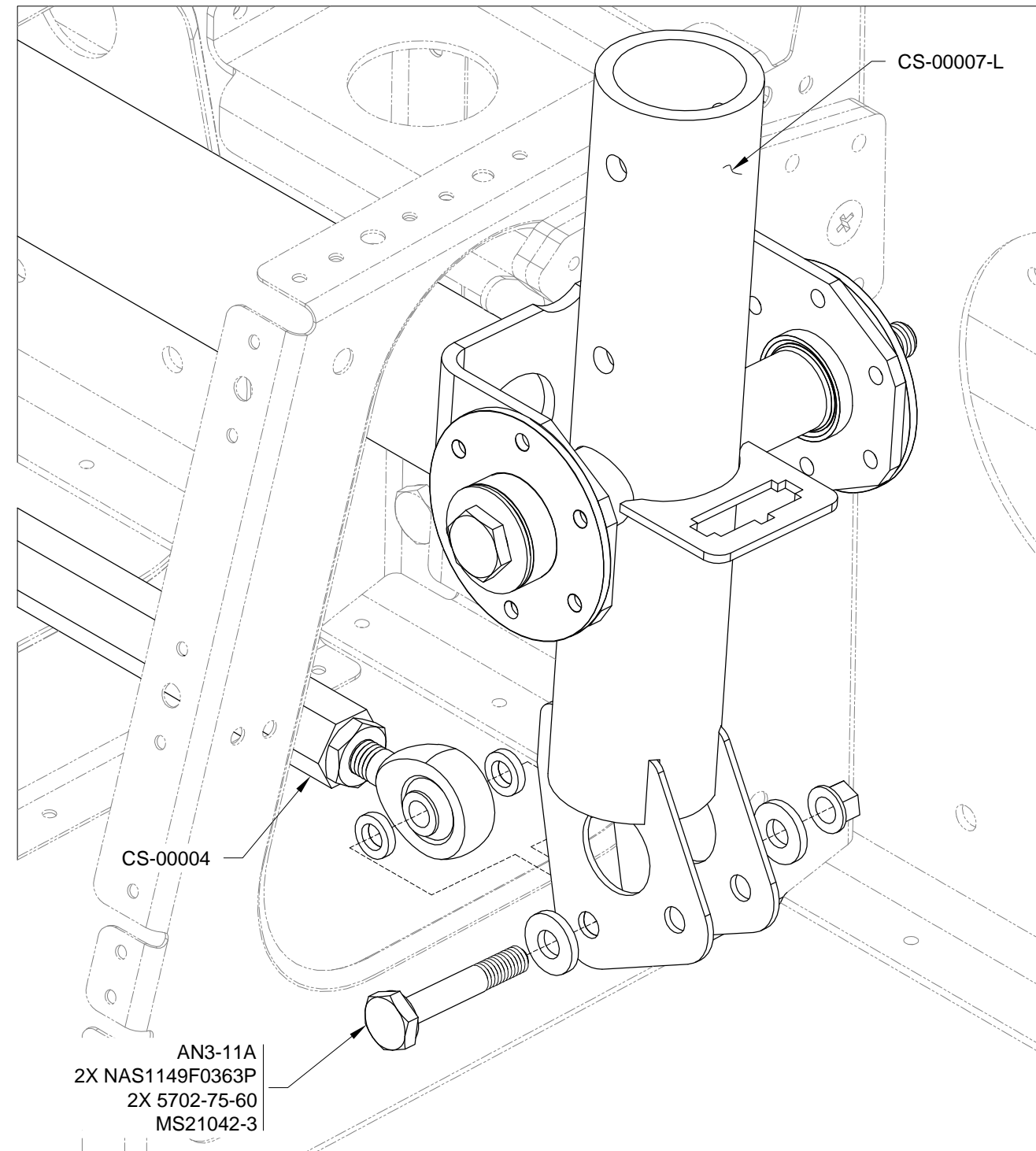


**FIGURE 2:** ATTACHING CONTROL STICK BASES  
(LEFT SIDE SHOWN)

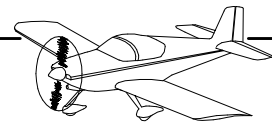


Step 1: Attach the CS-00004 Stick Link Pushrod to the CS-00007-L & R Control Stick Bases using the hardware shown in Figure 1. On one side use only the bolt called out in Figure 1.

Install the remaining hardware after checking alignment as described in 36-14 Step 2.



**FIGURE 1: ATTACH CONTROL STICK BASES TO STICK LINK PUSHROD**  
(LEFT SIDE SHOWN, SOME PARTS OMITTED FOR CLARITY)



**NOTE:** It is probable that the CS-00006 Control Column is contacting the control stops on only one of the Bearing Bracket Assemblies in each direction, or that full deflection is not possible due to interference from the control stops. Check and adjust the control stops for simultaneous stop contact and full deflection by following Steps 1 and 2.

**Step 1:** Check the travel of the CS-00006 Control Column with a digital level. Place the level flat against the top flange of the F-01438 Cover Rib and zero the level. Push the CS-00007 Control Stick Base to the full forward position and place the level across the top of the control stick base. The indicated angle should match the angle shown in Figure 1.

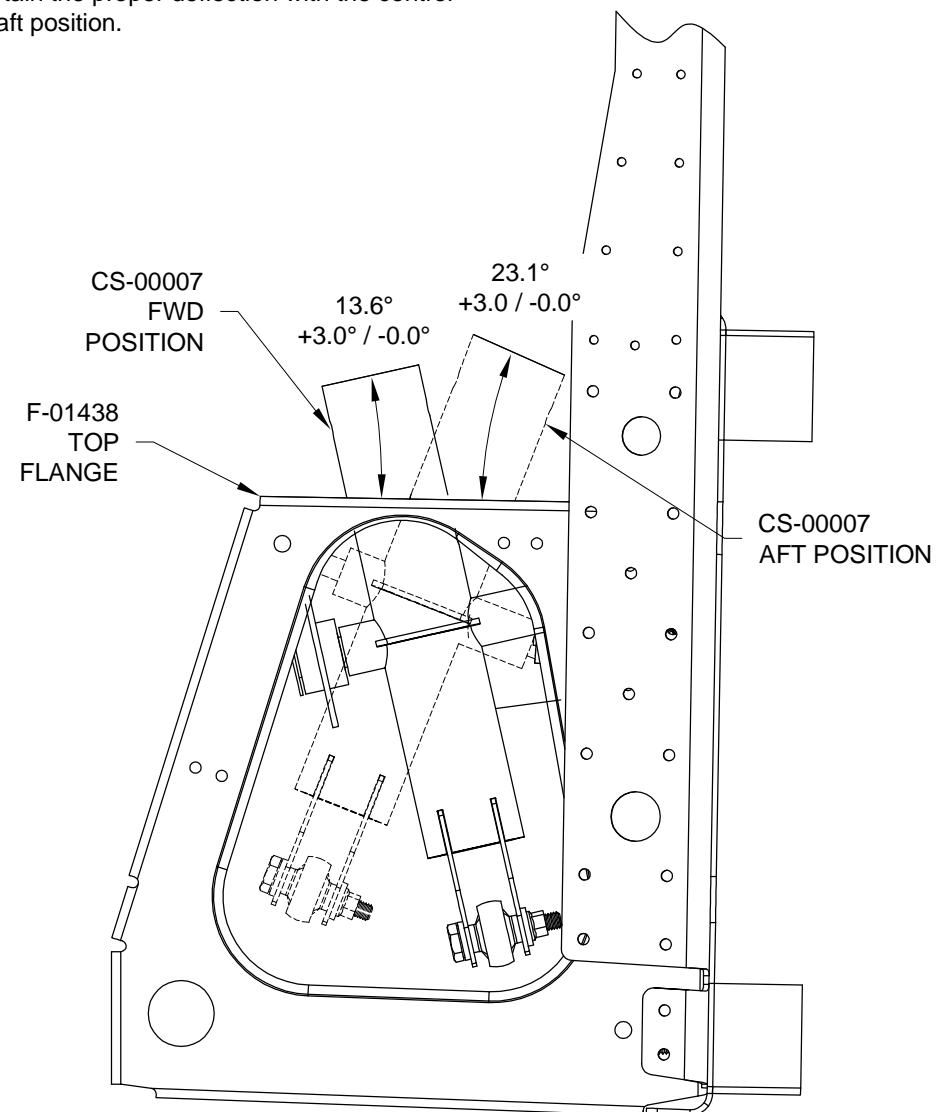
If the stops do not contact simultaneously or if more deflection is required, determine which stop needs to be adjusted by using a thin strip of paper as a feeler gauge inserted between the stop and the control column. See Figure 2.

File or sand the control stop until the control column contacts both stops simultaneously.

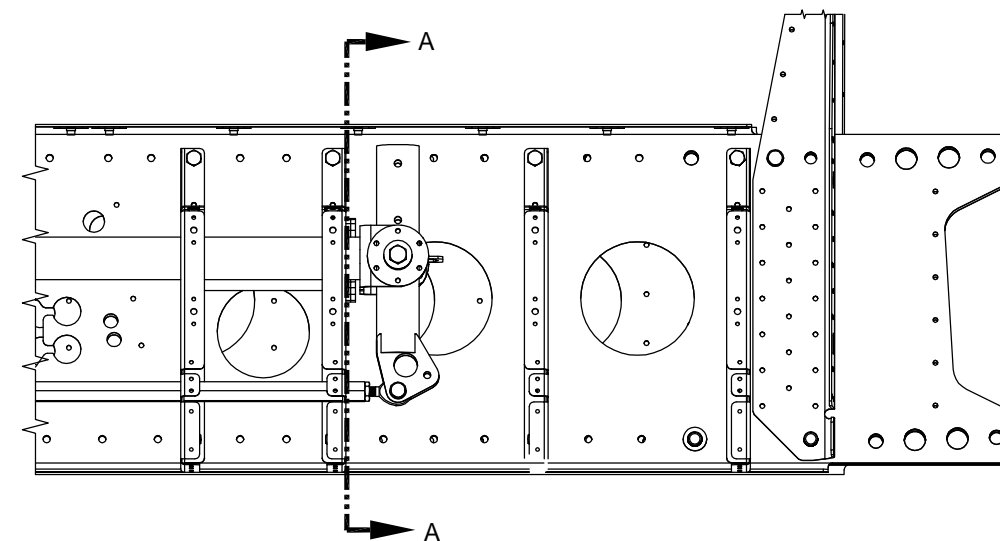
Again check for the required deflection.

If necessary, file or sand both control stops by the same amount until the correct deflection is achieved.

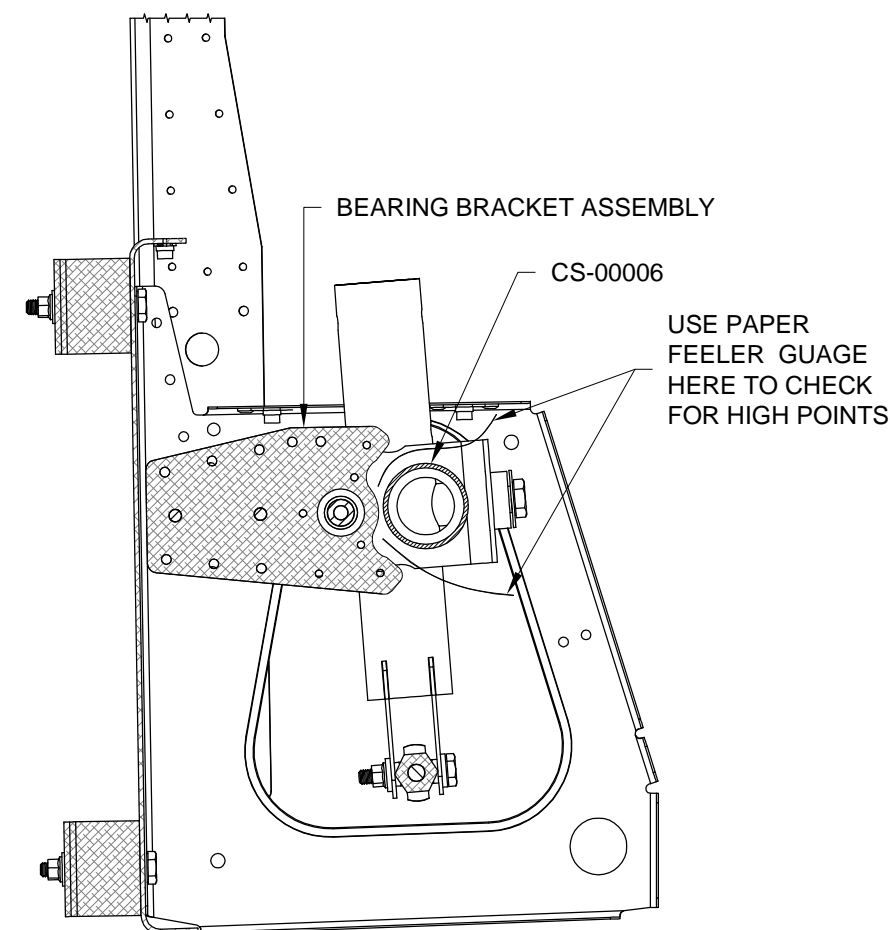
**Step 2:** Repeat Step 1 to obtain the proper deflection with the control stick base pulled to the full aft position.



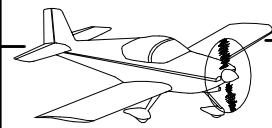
**FIGURE 1: CONTROL COLUMN TRAVEL**  
(SOME PARTS NOT SHOWN FOR CLARITY)



**FIGURE 2: ADJUST BEARING BRACKETS**



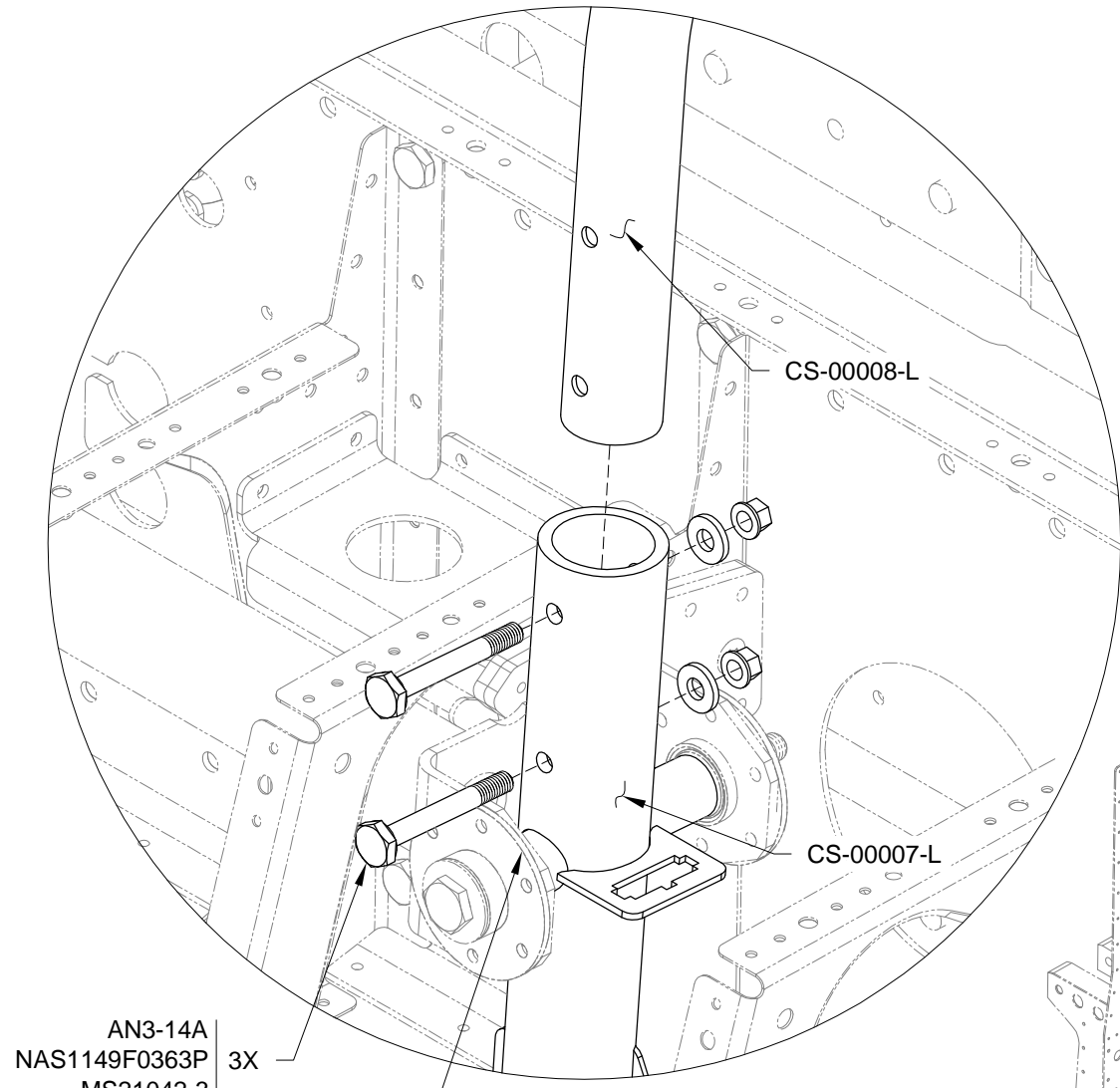
**SECTION A-A**



Step 1: Bolt the CS-00008-L &-R Control Sticks to the CS-00007-L &-R Control Stick Bases using Figure 1 hardware call-outs. Note that only the top bolt is installed in the right side as shown in Figure 2. If necessary the flange of the VA-146 Bearing and CS-00006 Control Column may be filed to allow bolt head clearance as shown in Figure 1.

Step 2: Check that the CS-00008 Control Sticks are parallel by measuring from the inside to inside at the top of the control sticks and the inside to inside at the bottom of the control sticks. When the two measurements are equal the control sticks are parallel. If the control sticks are not parallel, adjust the length of the CS-00004 Stick Link Pushrod until the sticks are parallel. Note that the dimensions shown in Figure 2 are for reference only and need not match the actual measurements.

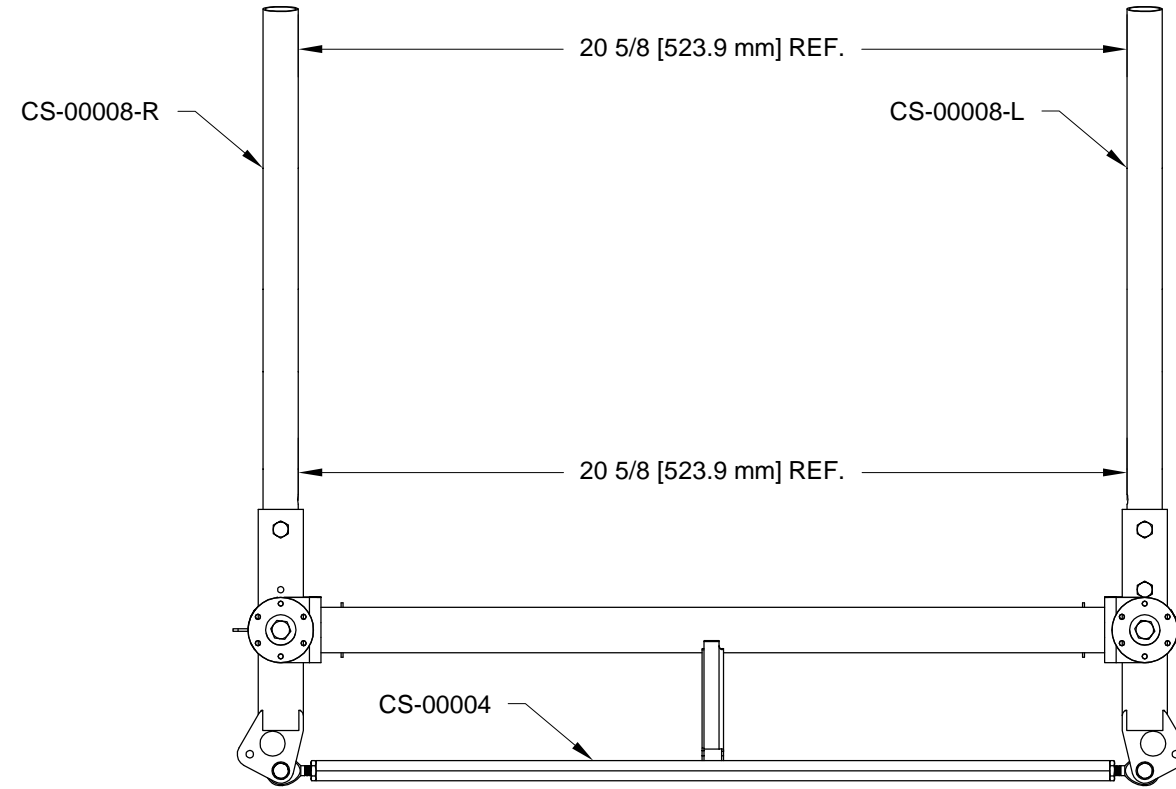
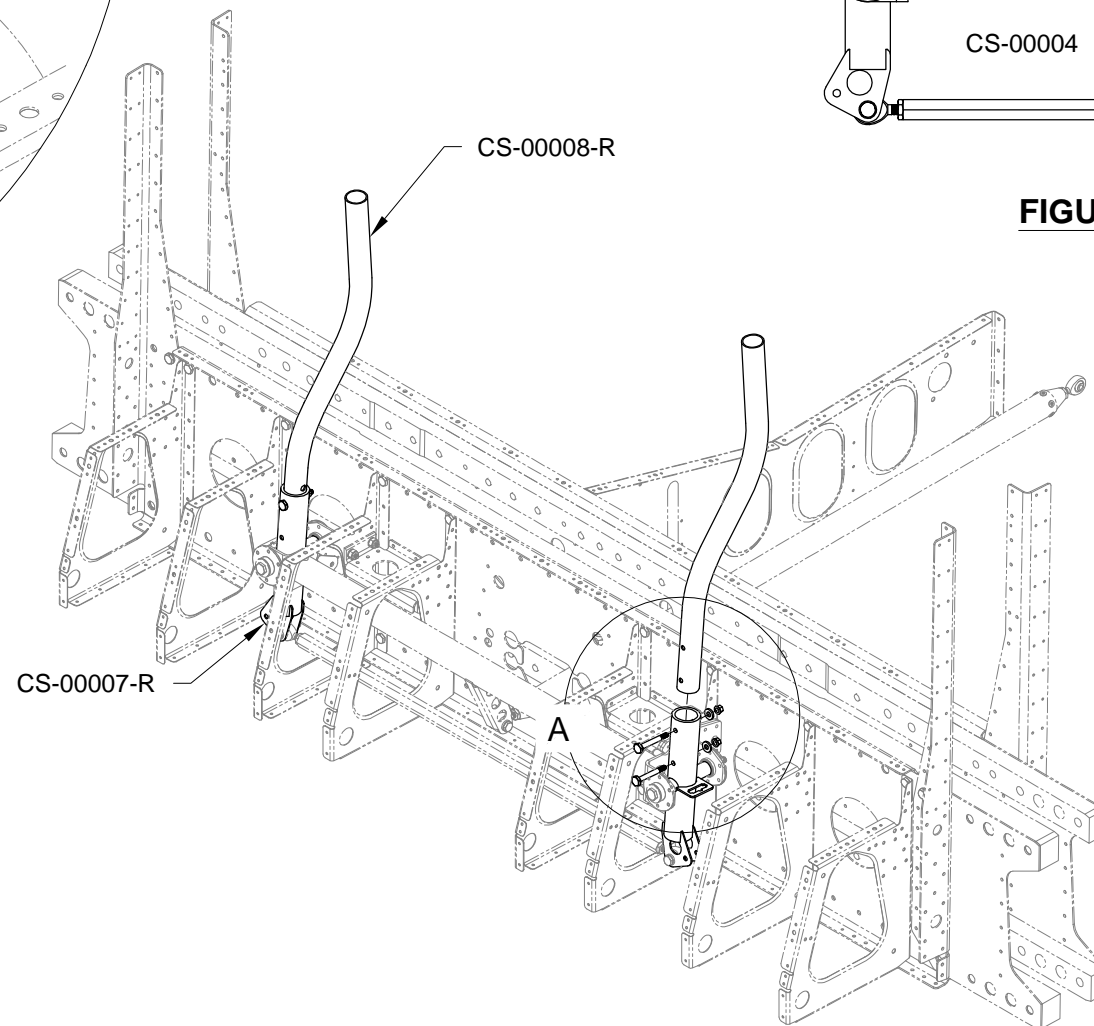
Ensure that all hardware called out on Page 36-12 Figure 1 is installed and torqued.



AN3-14A  
NAS1149F0363P 3X  
MS21042-3

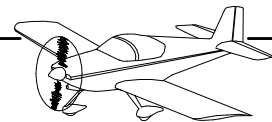
FILE HERE  
AS REQUIRED  
TO CLEAR  
BOLT HEAD

DETAIL A



**FIGURE 2: ALIGN CONTROL STICKS**

**FIGURE 1: ATTACHING CONTROL STICKS**  
(SOME PARTS OMITTED FOR CLARITY)



Step 1: Attach the Horizontal Stab and Elevators to the Aft Fuselage as described in Section 11.

Step 2: Bolt the WD-605-1 Elevator Horns together using the drill guide block as described on Page 11-04.

Step 3: The F-01411E Deck Doubler and the F-01412C Deck Angle act as down and up elevator stops. File the deck doubler and deck angle just enough to allow the WD-605-L/R-1 Elevator Horns to rotate to the required elevator deflections shown on Page 11-02, Figure 3. If necessary, file the lower flange of the HS-00903-1 Rear Spar to just clear the elevator horns. See Figure 2.

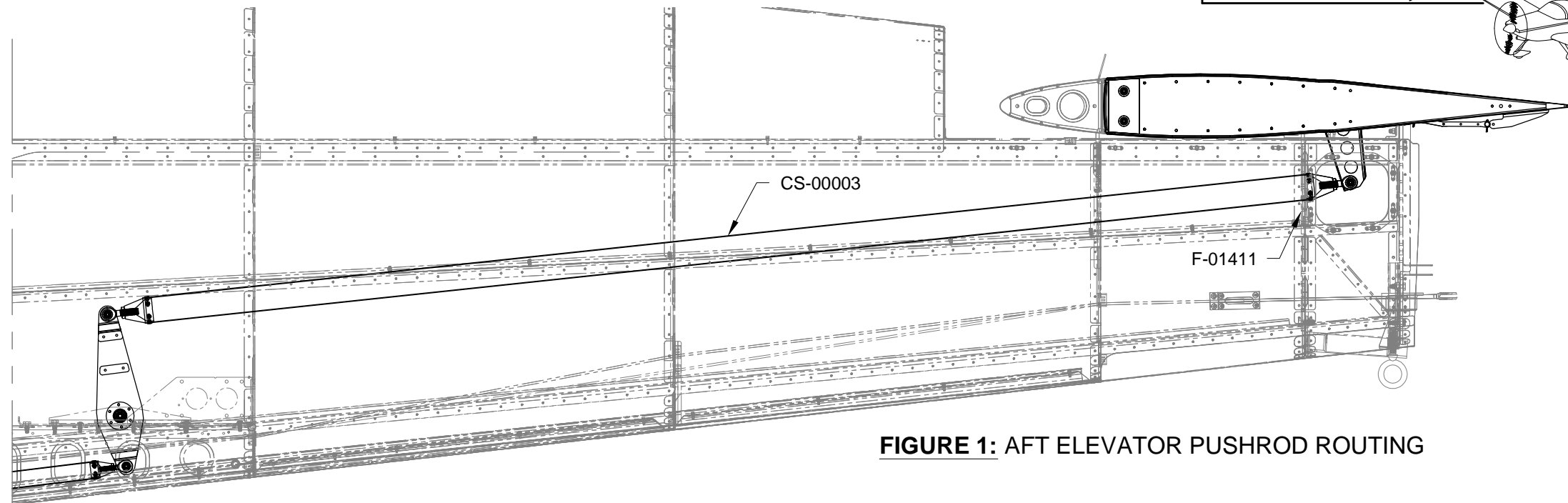
Since it is common for one horn to be further forward than the other, it is only necessary for one of the horns to make contact with the deck doubler and deck angle.

Step 4: Route the CS-00003 Aft Elevator Pushrod aft through the opening in the F-01411 Bulkhead as shown in Figure 1.

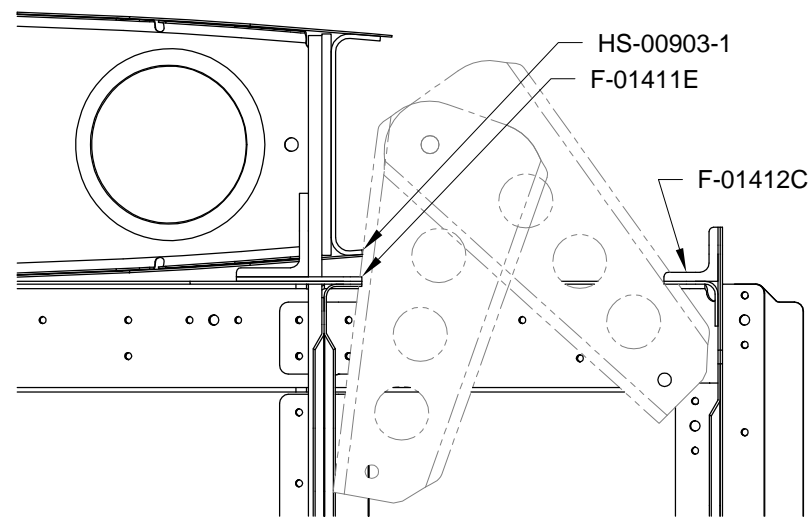
Step 5: Attach the CS-00003 Aft Elevator Pushrod to the WD-605-1 Elevator Horns using the hardware shown in Figure 3. Because parts vary due to manufacturing tolerances, make certain the bolt grip length, as noted in the figure, is correct. If a gap still exists after using the maximum number of washers, tighten the nut and bolt to eliminate the gap.

**WARNING: Do not exceed the maximum number of washers shown in Figure 3.**

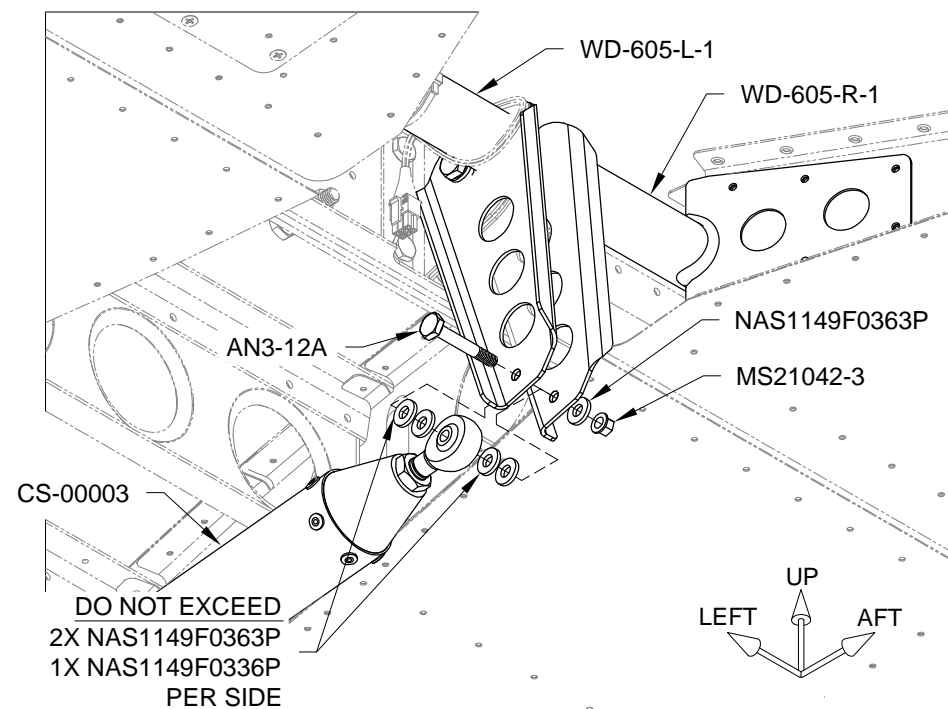
Step 6: Attach the CS-00003 Aft Elevator Pushrod to the Bellcrank Assembly using the hardware shown in Figure 4.



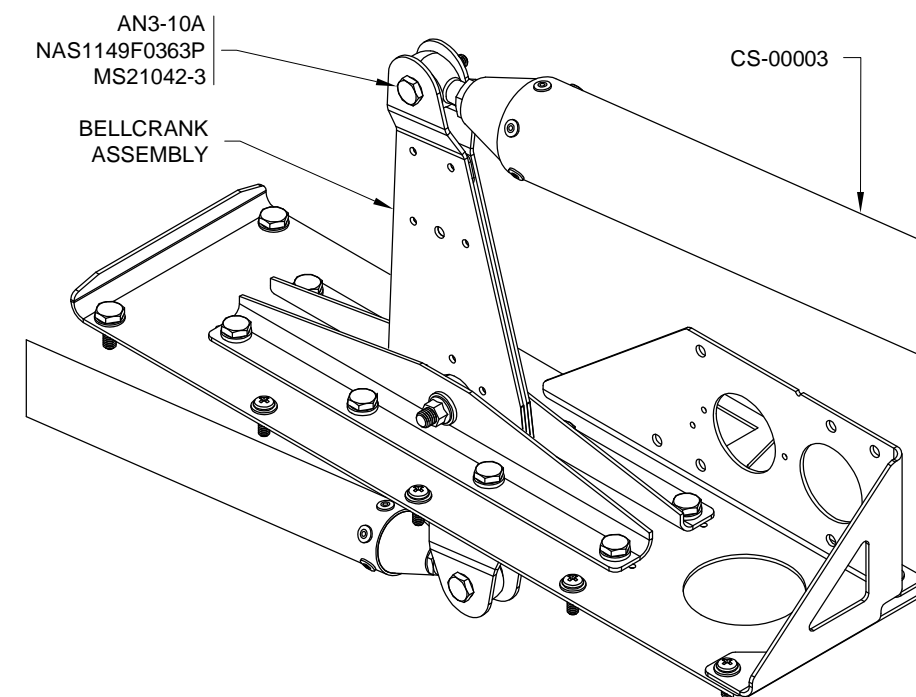
**FIGURE 1: AFT ELEVATOR PUSHROD ROUTING**



**FIGURE 2: ELEVATOR HORN CLEARANCE**



**FIGURE 3: PUSHROD TO ELEVATOR HORN CONNECTION**  
(SOME PARTS OMITTED FOR CLARITY)



**FIGURE 4: PUSHROD TO BELLCRANK CONNECTION**  
(SOME PARTS OMITTED FOR CLARITY)

Step 1: Secure the elevator in the "trail" position by placing strips of duct tape over the gap between the elevator counterbalance arm and the horizontal stabilizer.

Step 2: Transfer the Elevator Bellcrank Template shown on Page 36-17, Figure 3 to a piece of stiff cardboard or wood.

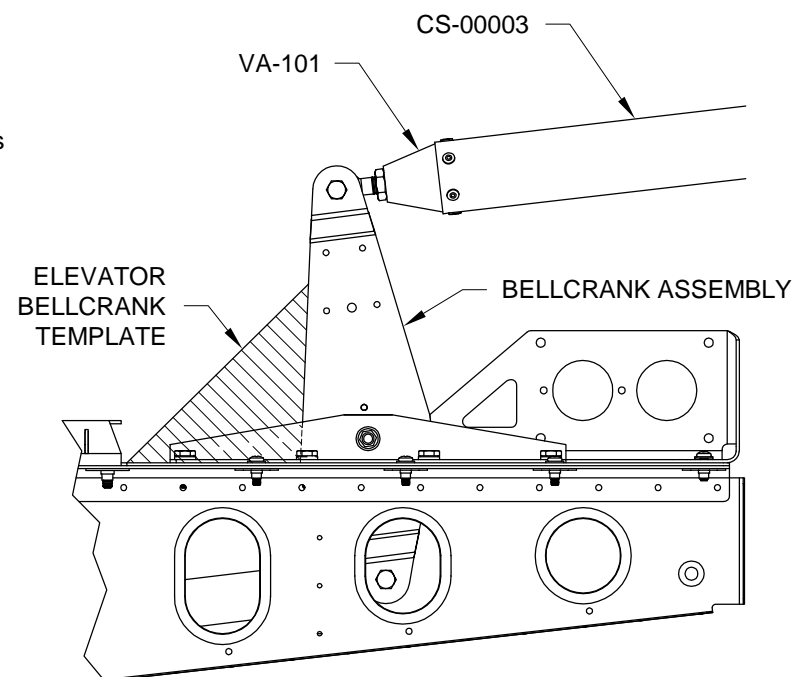
Step 3: If necessary, adjust the rod end bearings in the CS-00003 Aft Elevator Pushrod equally until the angle of the Bellcrank Assembly matches that of the template as shown in Figure 1, then tighten the jam nuts against the VA-101 Threaded Rod Ends.

**WARNING: In the final installation both rod end bearings must have over half the thread engaged making it impossible for a bearing to back off the pushrod if both ends are pinned. See Figure 2.**

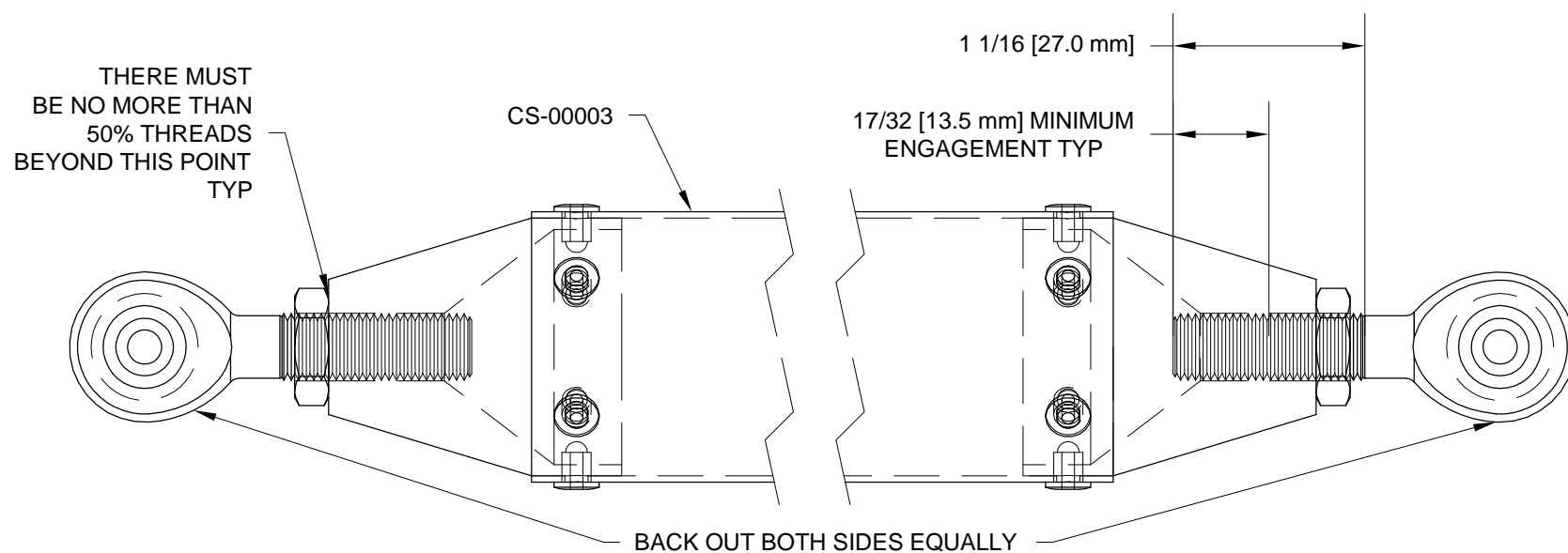
Step 4: Verify that the elevator is able achieve full up deflection before the CS-00006 Control Column contacts the stops on the Bearing Bracket Assembly.

If necessary, file the stops at the control stick to achieve full elevator deflection. See Figure 3.

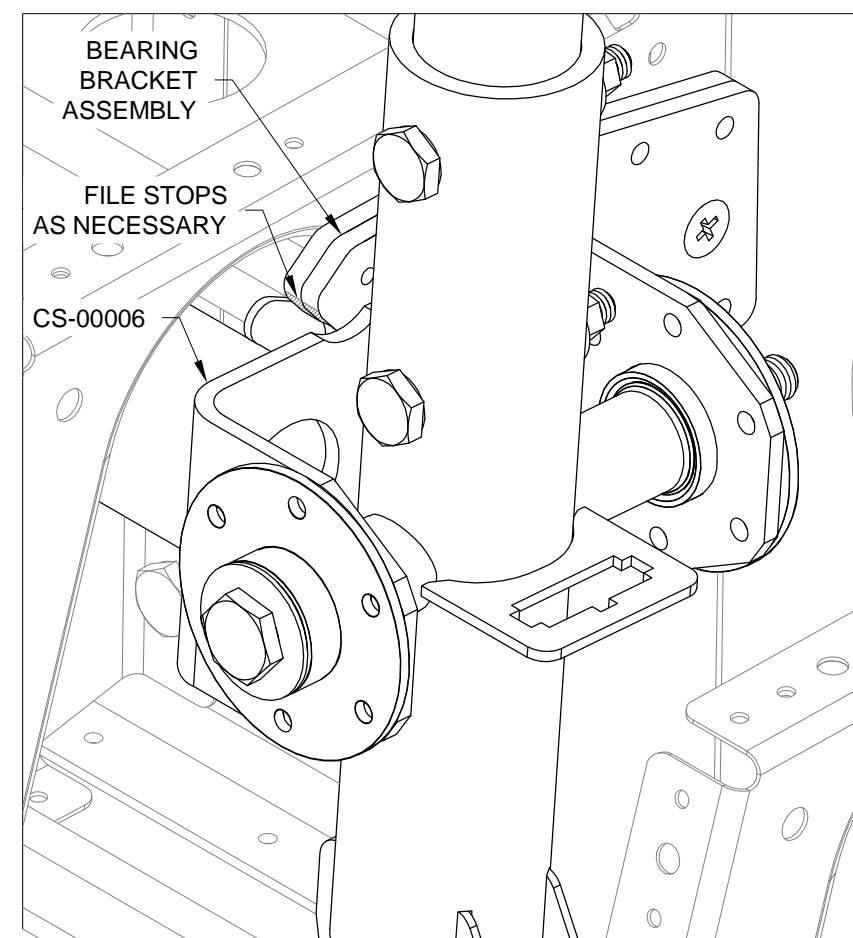
The elevator horns should contact the elevator stops before the control stick make any contact. See Page 11-02 for the required elevator deflections.



**FIGURE 1: TEMPLATE PLACEMENT**

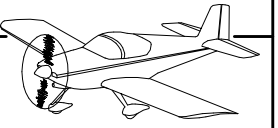


**FIGURE 2: ADJUST AFT PUSHROD LENGTH**

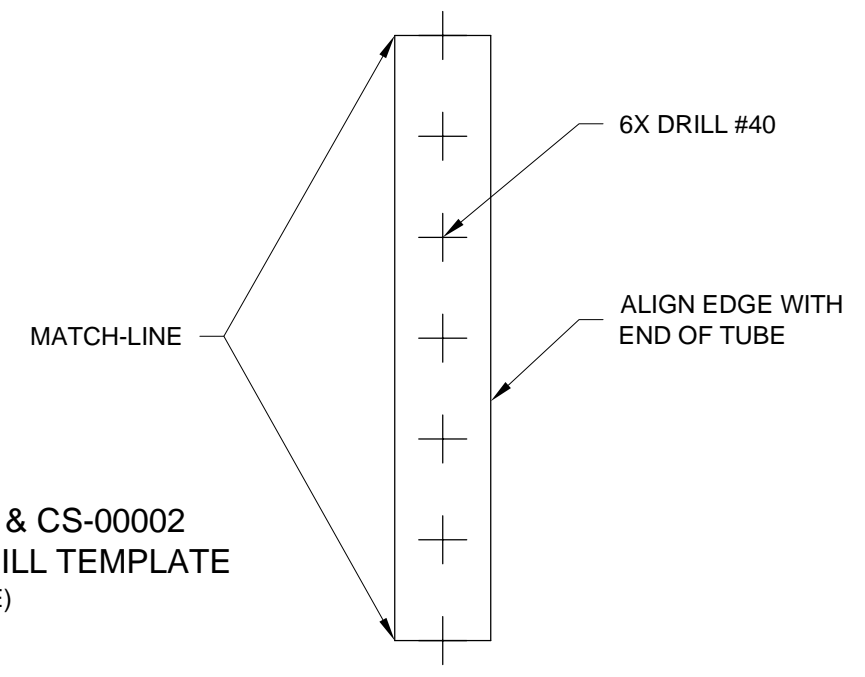


**FIGURE 3: ADJUST BEARING BRACKETS**

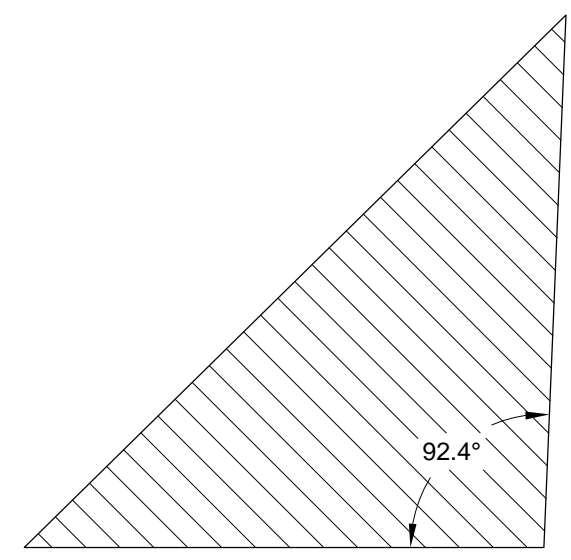
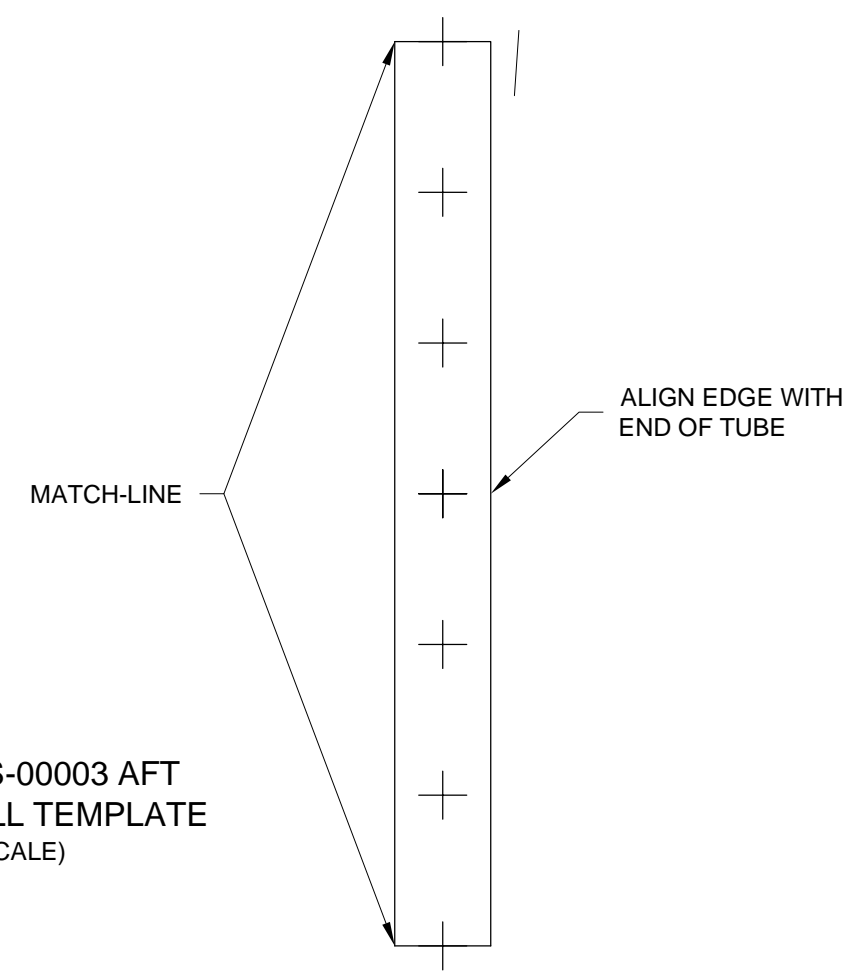




**FIGURE 1: CS-00001 & CS-00002  
FWD/MID PUSHROD DRILL TEMPLATE  
(FULL SCALE)**



**FIGURE 2: CS-00003 AFT  
PUSHROD DRILL TEMPLATE  
(FULL SCALE)**



**FIGURE 3: ELEVATOR BELLCRANK  
TEMPLATE  
(FULL SCALE)**

10 9/16  
[268.3 mm]

16 [406.4 mm]

**NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!**



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