Revision #	Date	Detail of changes
1	4-9-2009	Original
2	4-23-2012	Addition of Revision page and document number/name
3	1/1/2025	Updated for aircraft with carbon spar

Section Objective: To fabricate and install the mid elevator bell-crank. Cut all access and clearance holes needed in the seat back bulkhead
Required parts: ALE-0031 mid elevator bell-crank, 1" aluminum angle stock 12"-0.125", 2 bronze bushings.
Required hardware: 1 AN4-32A, 4 AN960-416A washers, 1 AN365-428A elastic stop nut, 4 AN365-1032A elastic stop nuts, 4 AN960-1032A washers, 10-32 1.25 long countersunk screws, #10 timmerman washers.
**Required tools**: Cutting wheel, 1" hole saw, #10 drill bit, 1/4" drill bit, electric drill.
Required Conditions: None
Required skills or training: Simple knowledge of hand tools and use. Ability to read CAD drawing.
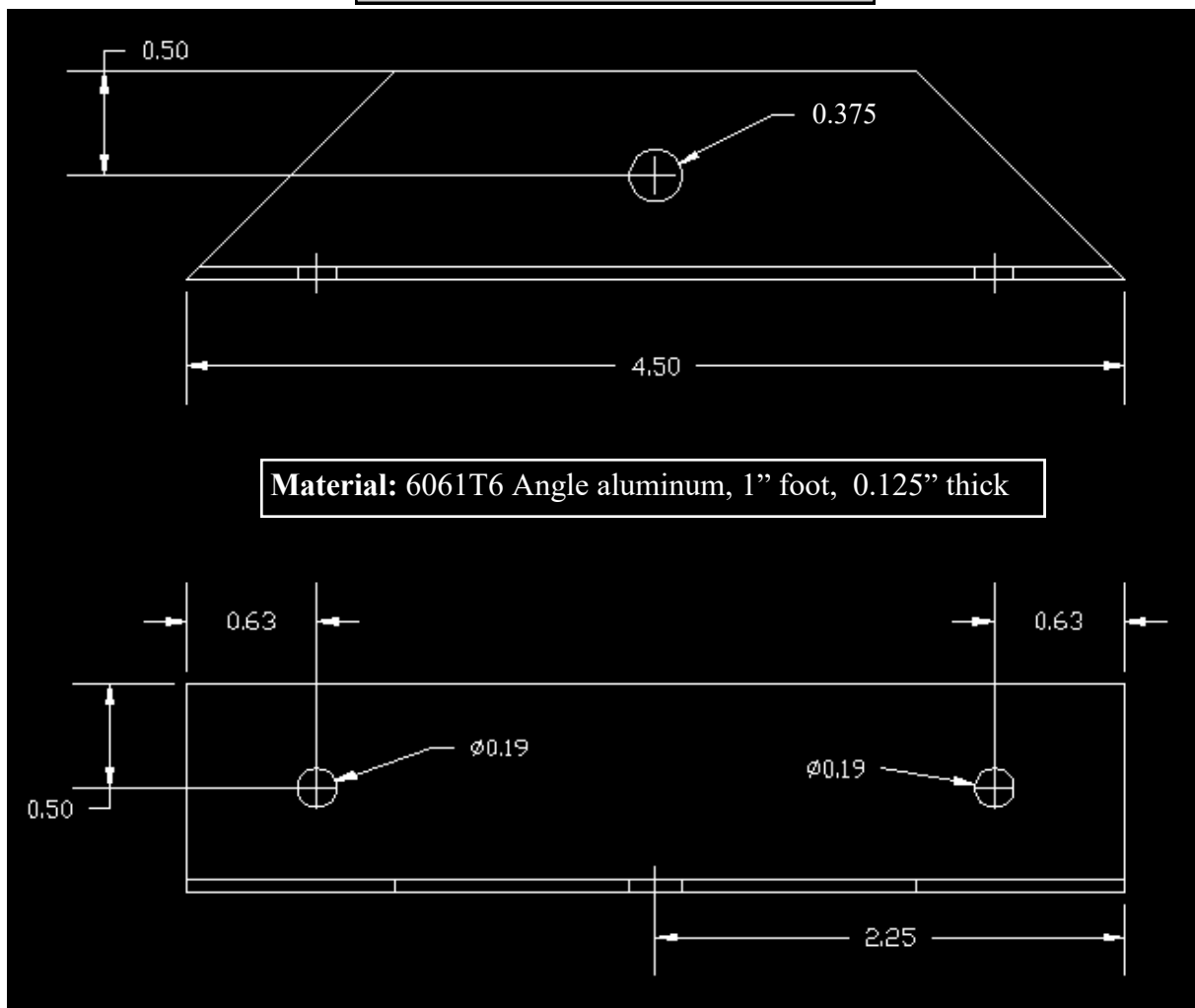
Date
Completed:

Seat Back: elevator mid-bellcrank. Aircraft with fiberglass spars

1. Locate The center line of the aircraft on the seat back bulk-head and mark.
2. Measure over to the co-pilots side 0.5" and mark. The bell-crank will be located here.
3. Measure down from the break in the seat back 1.5" and 5.5" on the bell-crank center line.
4. Using the 1" hole saw drill 1" holes at both of these locations.
5. Use a cut-off wheel to connect the 2 holes to create a bell-crank slot in the seat.
6. Sand the edges of the slot smooth.
7. Use the drawing on the next page to fabricate the mid bell-crank mounts. 2

Labels on image: Aircraft Center Line; Break in seat back; 1.5"; 4"; 5.5"; Bell-crank Center line
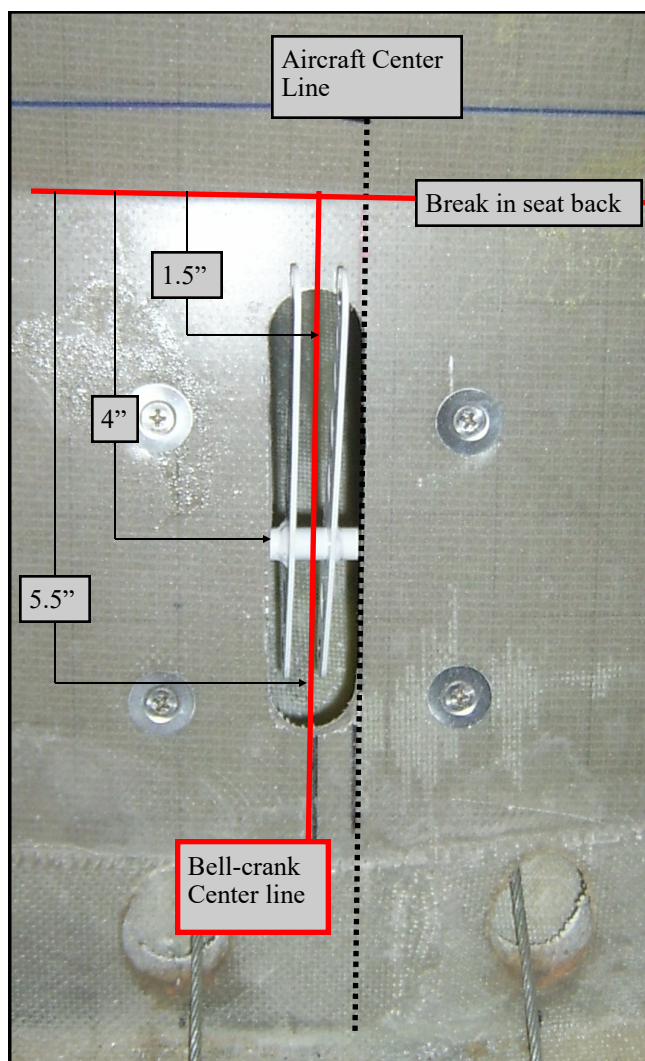
are required.
8. Make sure to de-burr all holes and use a fine file or buffing wheel to clean all edges.

Mid elevator bell-crank Mount

0.50

0.375

4.50

Material: 6061T6 Angle aluminum, 1" foot, 0.125" thick

0.63   0.63

Ø0.19   Ø0.19

0.50

2.25

Date Completed:

9. Insert a bronze bushing into each of the brackets.
10. File the side of the bushing protruding thru the bracket as shown in the picture to the right.
11. Assemble the bell-crank and brackets as shown in the diagram on the next using a AN4-32A and hardware shown.
12. Be sure to capture the bushing with a washer which is slightly larger than it when assembling.
13. Once the bell-crank   assembly

Bell-crank mount-bushing install
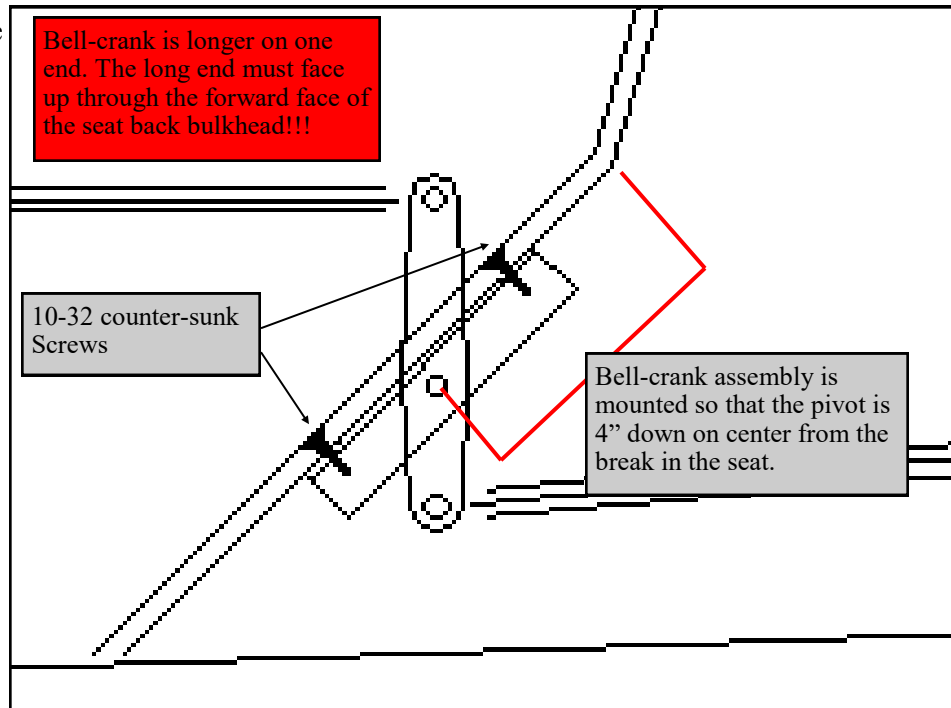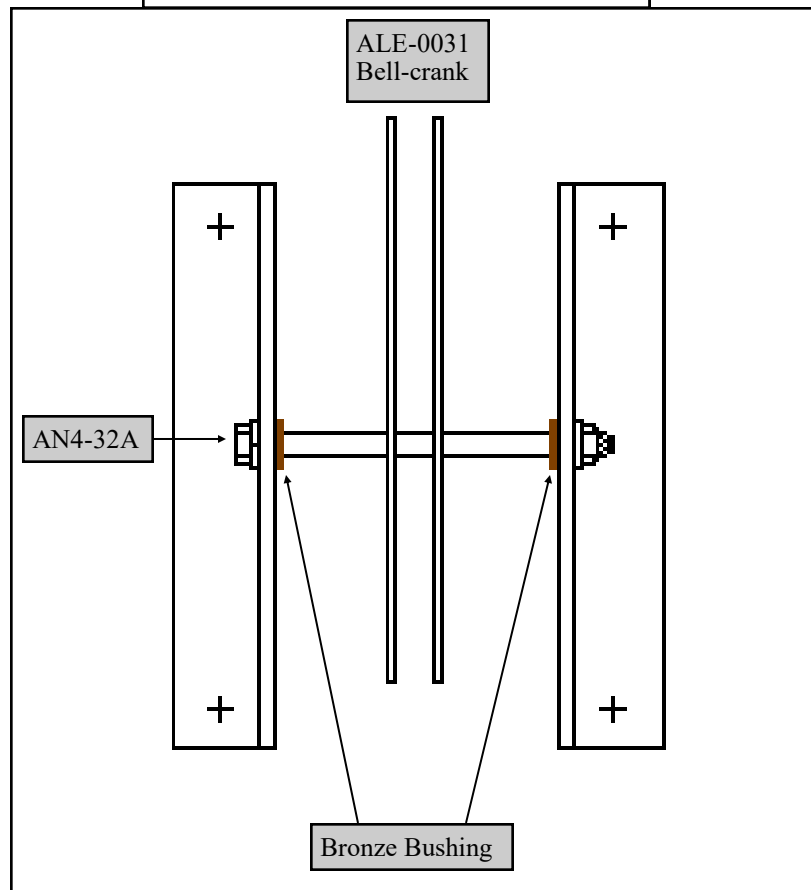

File bushing flush and Capture with a washer
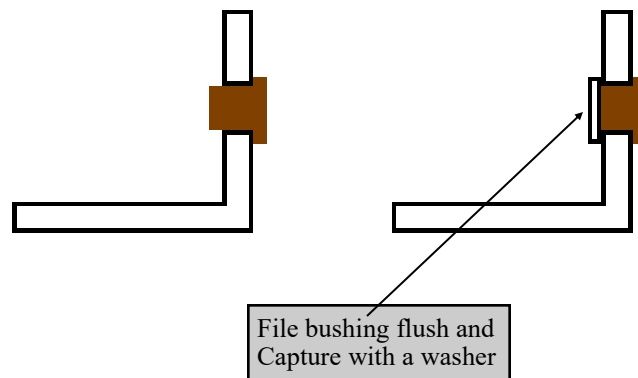
is complete, it is help full to make a drill jig for the seat back bulkhead.

14. Place the completed assembly on a stiff surface you can use for the jig, thin plywood or scrap aluminum will work well.

15. Match drill the base plate holes in the jig material. Be sure to reference up and the front of the jig.

16. Cut out a slot for the bell crank and note the bell crank pivot point.

17. As shown in the picture below, the pivot should be mounted 4" down on the seat from the break in the seat back.

18. Put the drill jig in place with the pivot point 4" down.

19. Make sure the side marked front is facing you so the holes match properly.

20. Match drill the holes with a #10 drill bit.

21. Attach the bell crank to the bulkhead as shown with #10 screws tinnerman washers and nyloc nuts.

Intermediate bell-crank Assembly

ALE-0031 Bell-crank

AN4-32A

Bronze Bushing

Bell-crank is longer on one end. The long end must face up through the forward face of the seat back bulkhead!!!

10-32 counter-sunk Screws

Bell-crank assembly is mounted so that the pivot is 4" down on center from the break in the seat.

Completed Bell crank assembly installed from reverse side of bulk-head
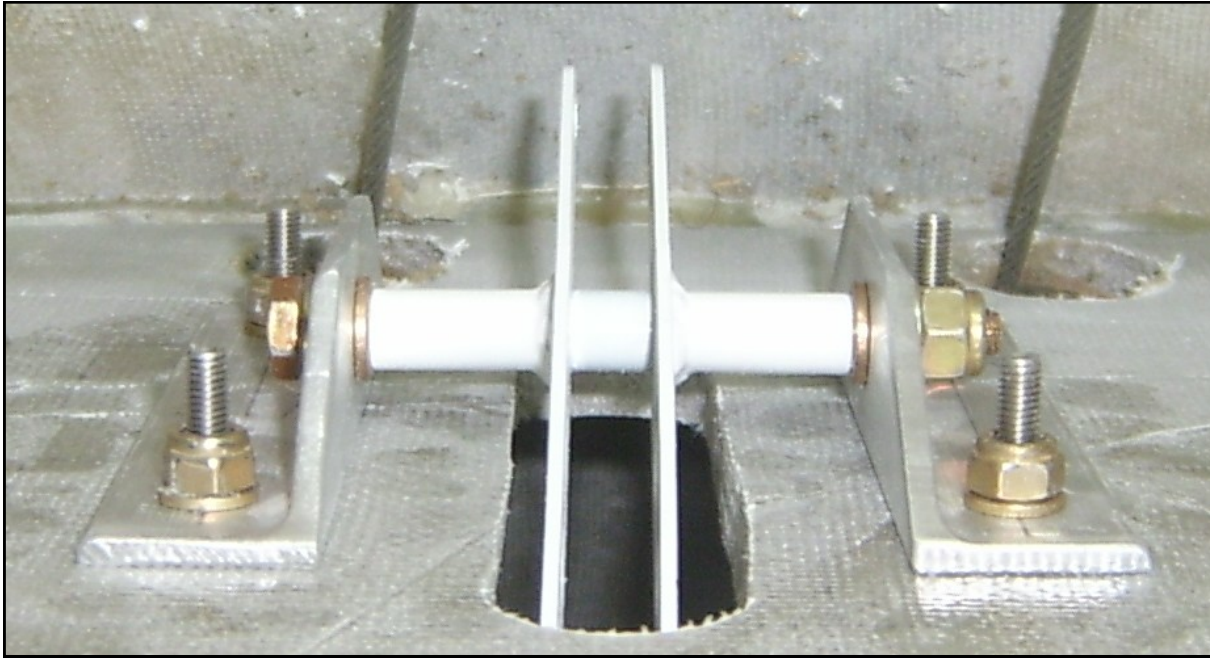
Date
Completed:

Flap Drive Clearance Cut

1. Start by marking the left and right sides of the bulk head as shown in the picture below.
2. Your mark should extend straight down to with in 1" of the floor.
3. Use the 1" hole saw in the lower corner to create a nice radius.
4. Next use a cutting wheel to cut the line you drew and from the 1" hole upward to the side of the fuselage. Remove the cut out section.
5. This cut out area allows clearance for the flap drive rod to operate and wiring harness to run back behind the seat.
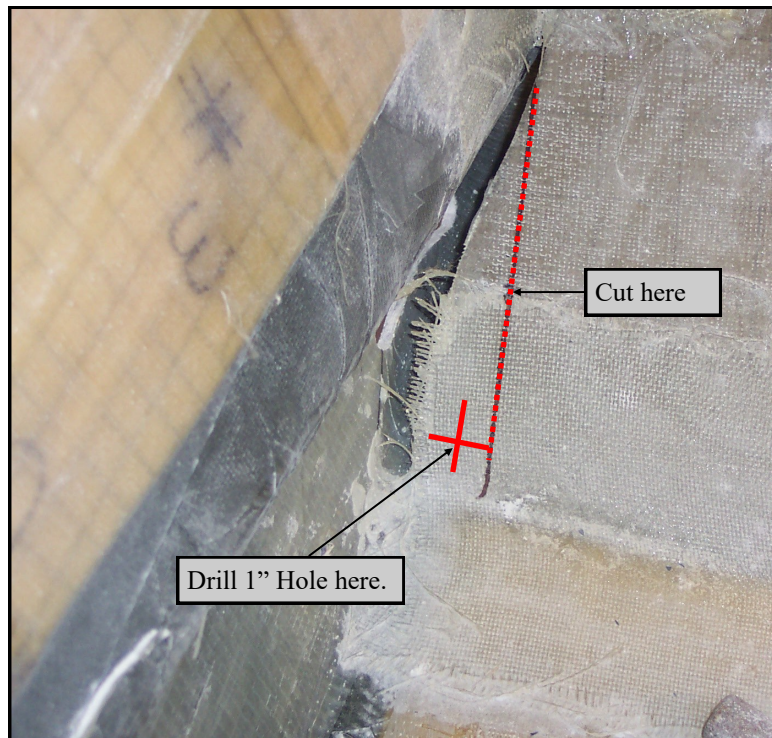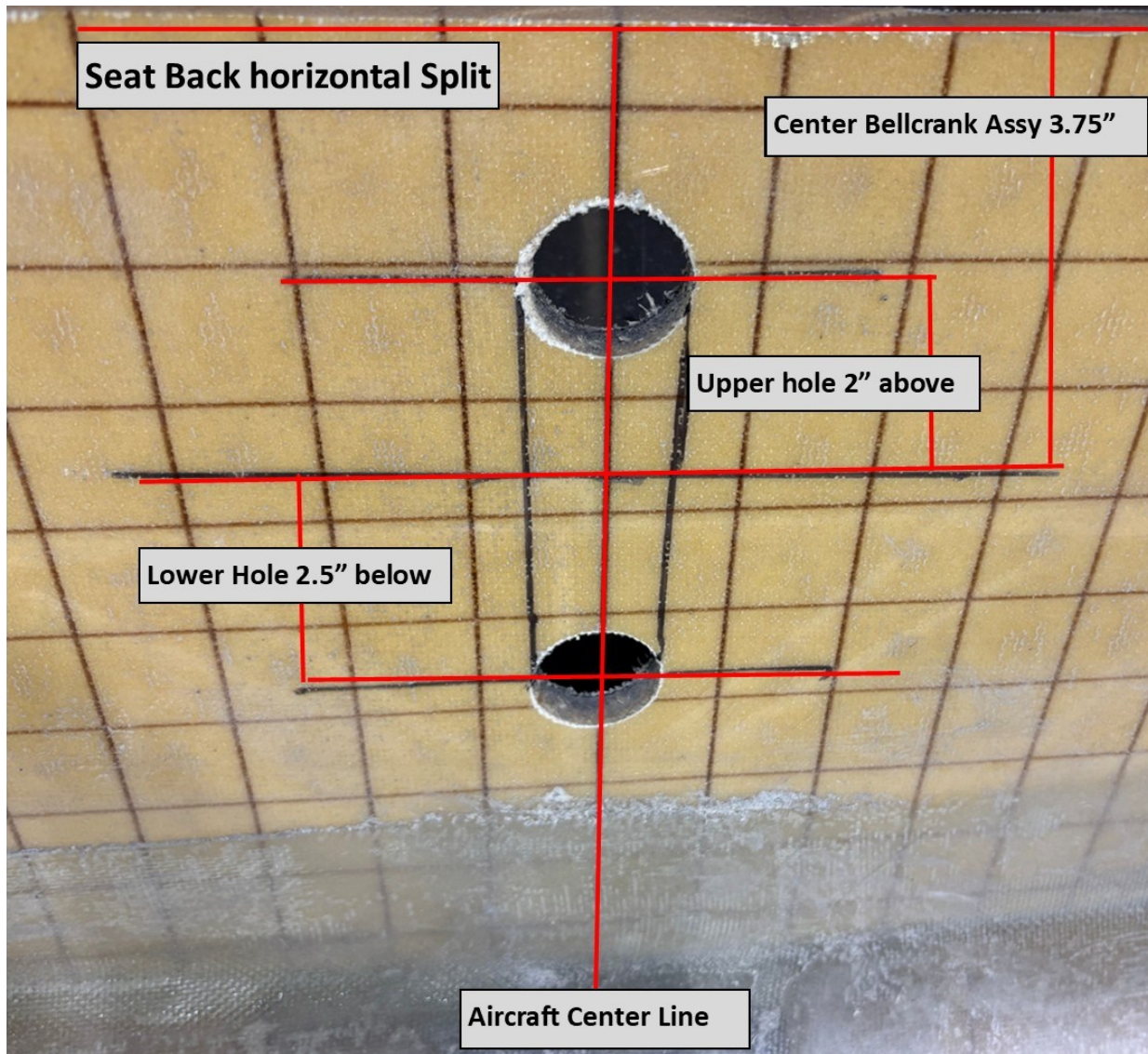
Bellcrank mount Fabrication and installation for aircraft with Carbon Fiber Spars

1. For aircraft with the carbon fiber spars, the bellcrank in the seat must be mounted on the front side of the seat back bulkhead. This is so the intermediate pushrod clears the top of the spar and provides the updated mount position for the flap motor.
2. Fabricate 2 angle brackets as shown below from 0.125" thick 1" by 1" 6061T aluminum angle.
3. These are identical to the previous brackets except for the additional holes shown in red for the flap motor bracket.
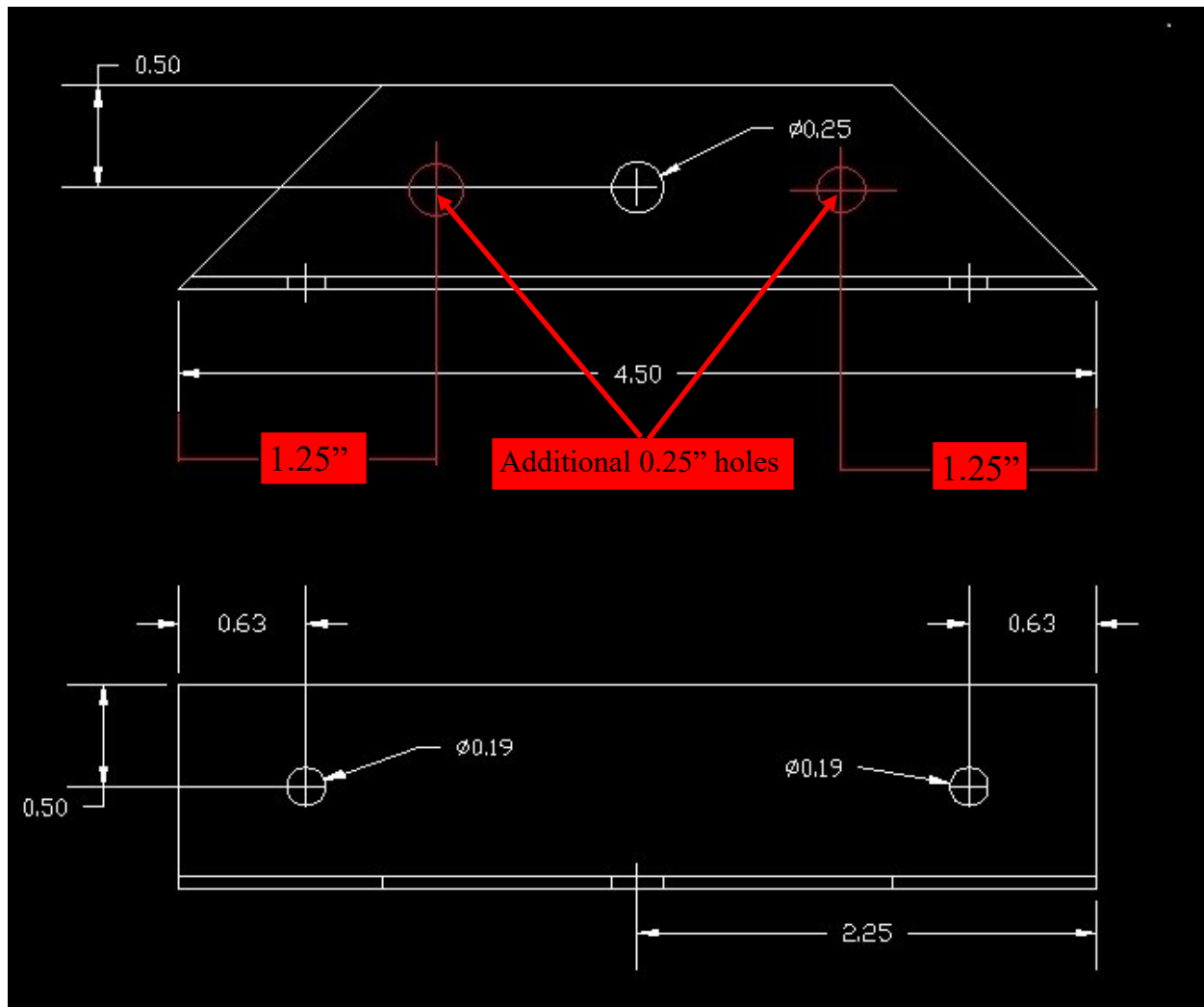
4. The new bellcrank mounts will also have the flap motor brackets bolted to them . Because of this we will need fabricate another set of angles to use as backers.
5. That set of angles backers are identical to the ones show above, however you do not need to drill the holes in the leg with has the 45 degree cuts in them. Only the base mounting holes.

6. Next cut the slot in the seat back bulkhead for the bellcrank assembly.
7. Follow the picture below for the measurements.
8. The upper and lower holes to create the slot are drilled with a 1.25" hole saw.

Seat Back horizontal Split

Center Bellcrank Assy 3.75"

Upper hole 2" above

Lower Hole 2.5" below

Aircraft Center Line

9. Once the upper and lower 1.25" holes are cut in the seat back. Use a cutting wheel or body saw to connect those as shown in the picture to the right.

Bell-crank mount-bushing install

10. Locate 2 of the oilite bronze bushing from your kit.
11. Press these into the angle brackets with the additional holes in one leg, specifically the center, which will be the bellcrank pivot.
12. The picture shows only one bracket, repeat for the other side.

File bushing flush and Capture with a washer

ALE-0031
Bell-crank
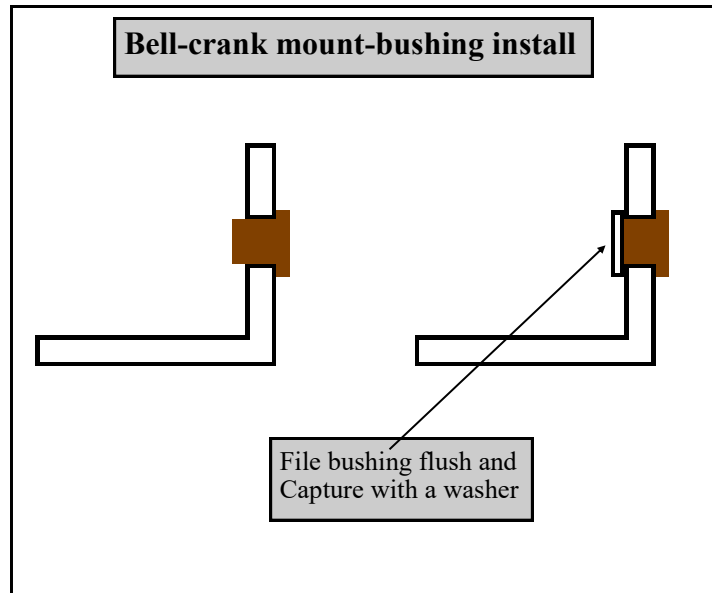
13. Assemble the bellcrank to the angle brackets as shown in the associated picture.
14. The AN4-32A bolt should not be tightened all the way the bellcrank must rotate.
15. Tighten the nut until all slop is removed but the bellcrank rotates freely.

AN4-32A

Bronze Bushing
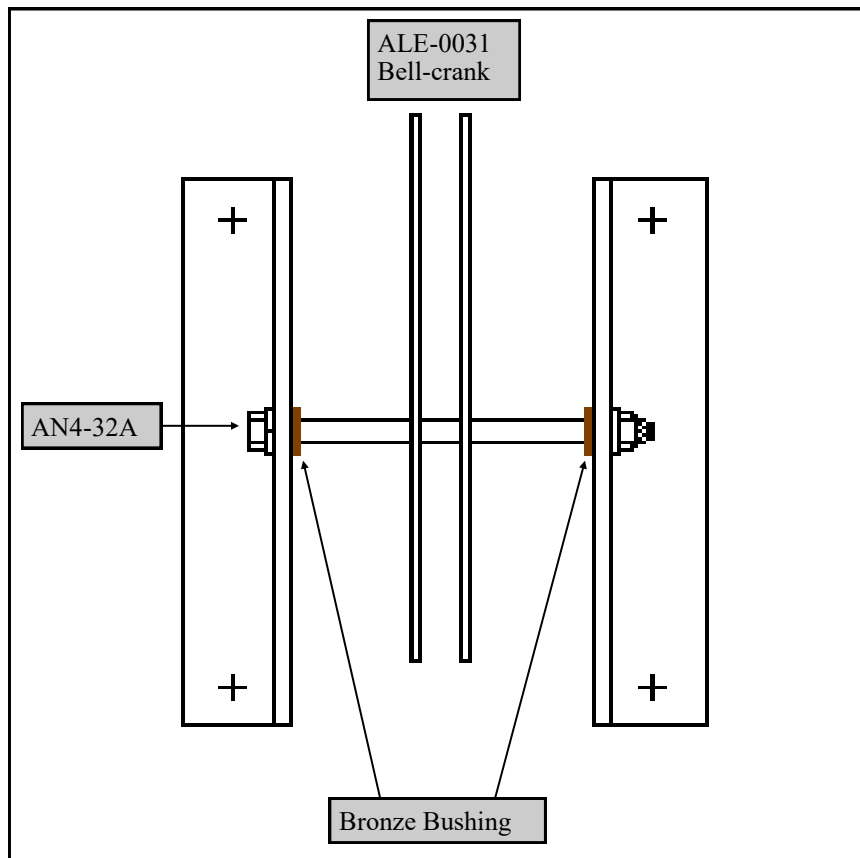
16. Place the bellcrank assembly over the slot with the pivot over the previously marked line used for cut out.
17. Match drill the holes to the seat back.
18. When you are happy with the placement, all 4 holes thru the seat back can be upsized to 0.25" including the backer angles.
19. Bolt the assembly to the seat back with the backing angle on the rear side with AN4-11a bolts, AN365-428 nuts and washers to suit.
20. Additional photo below finished install for reference.