

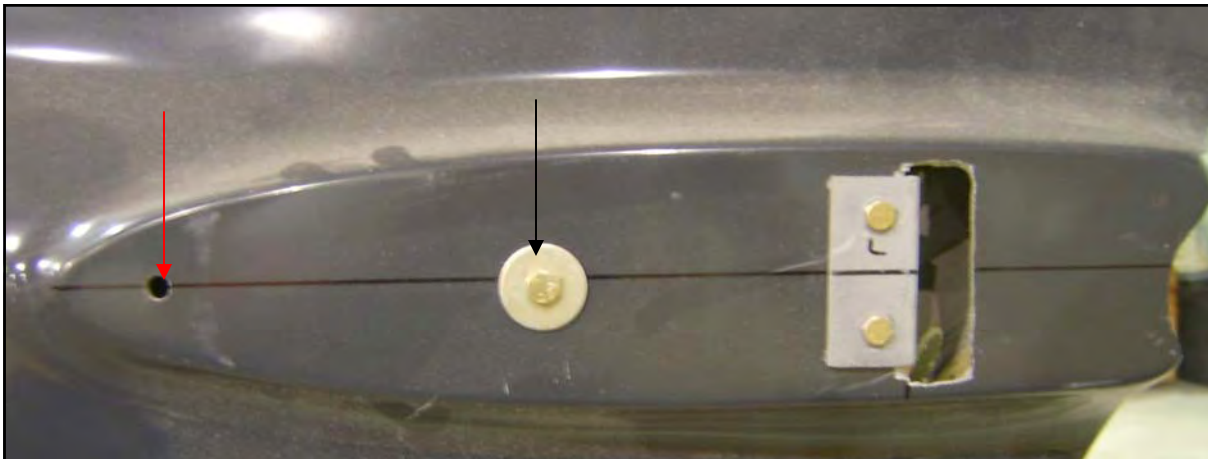
## 20. Horizontal Tail Installation



### Horizontal Tail installation

**Items Required:** Horizontal tails, HT attach brackets ALT-0030, AN3, AN4, AN5 hardware, AN6-16A, 1/8" bit, 3/16" bit, 1/4" bit, 5/16" bit cutting wheel, drum sander.

1. Drill the angle of incidence bolt hole at the pre marked location in the leading edge to 5/16".
2. The next hole aft is for the seat belt cable attach, drill this to 1/4"
3. Bolt the cable to the inside with a large area washer on the out side and the inside surfaces of the glass with a AN4-6A bolt and AN428 nyloc nut.
4. Repeat for the right side.



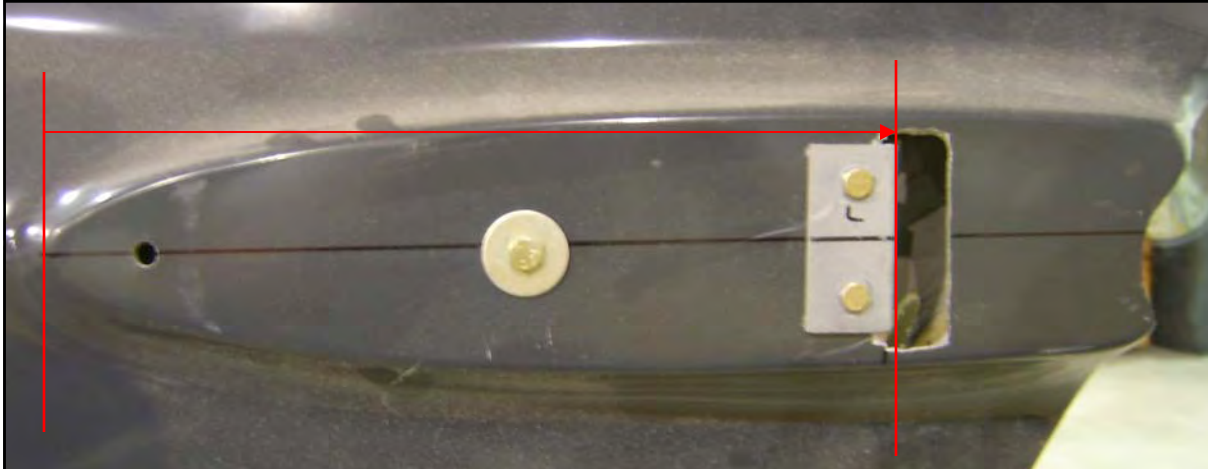
5. To determine the cut out for the horizontal tail: Measure from the leading edge of the right horizontal tail to the front face of the spar. Should be 11 7/16" .



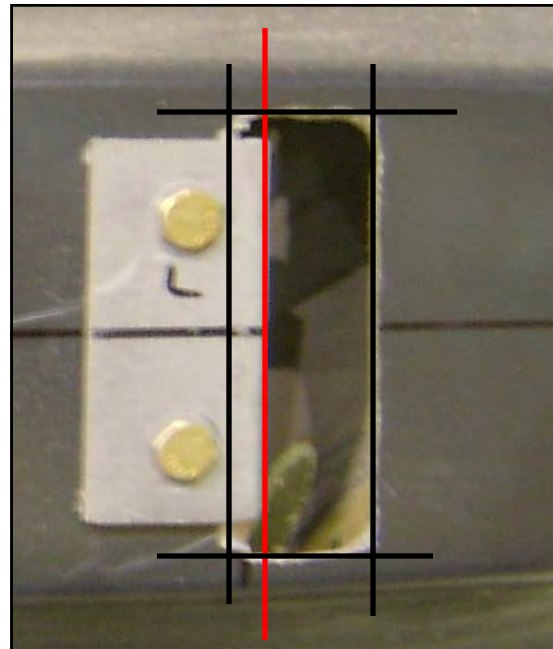
## 20. Horizontal Tail Installation



6. Use the picture below as a reference. **This is for the left side tail root**
7. Measure back from the leading edge  $11 \frac{7}{16}$ ". At this point measure the middle of the root thickness. Draw a line from the leading edge thru this mark to the back. This will mark the cord line of the horizontal tail



8. Mark a perpendicular line to the cord line at  $11 \frac{7}{16}$ ". Shown in RED
9. From this line mark forward  $\frac{1}{8}$ " to allow the thickness of the bracket. Shown in black.
10. Make another line  $\frac{9}{16}$ " back from the red line for the back cut.
11. Measure above the cord line  $1 \frac{3}{8}$ " and draw a parallel line to the cord, this is the top cut.
12. Repeat the same for the bottom cut.
13. Double check the measurements and cut on the black lines.
14. Find the center of the horizontal tail bracket P/N ALT-0030.
15. Set this on the cord line, the face which attaches to the spar must be perpendicular to the cord line.
16. Match drill the  $\frac{3}{16}$ " holes in the bracket and install the bracket with AN3-5A bolts, large area washers on the inside against the glass and a nyloc nut.

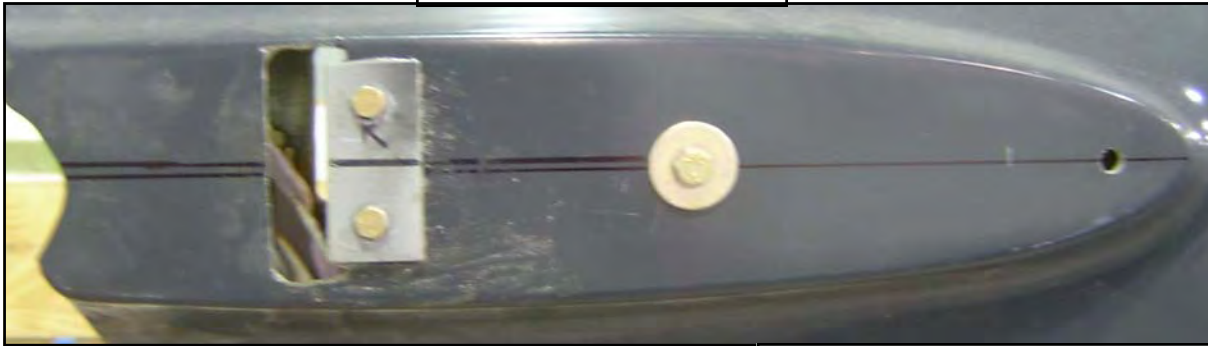


17. **Right Horizontal tail Root** is started in the same manner as above.
18. Follow numbers 1– 13. Use the measurement of  $11\text{-}7/16$  as the starting point for the right side also, although the spars are offset the brackets must be in the same place. Do not measure the right horizontal tail for this.

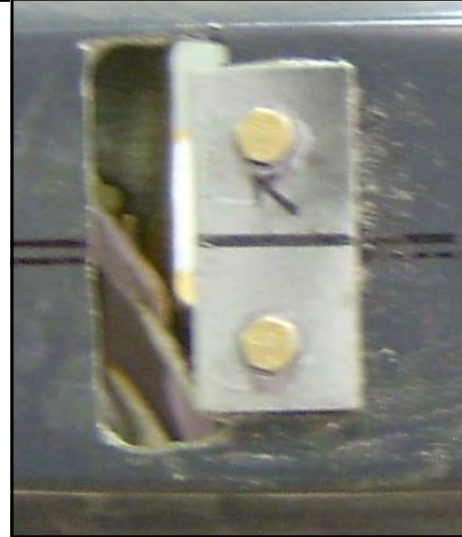
## 20. Horizontal Tail Installation



### Right Horizontal tail root



- 19. The right horizontal tail root is off slightly in the mould. Therefore the installation of the bracket must be different.
- 20. Once the cord line has been drawn and the 11 7/16" measurement made, measure up from the cord at this spot by 1/8".
- 21. Draw a new cord line between here and the leading edge determined earlier.
- 22. The forward edge of the cut out may be angled slightly to match the other bracket. This angle for the horizontal tail is correct, the leading edges are correct but the aft edge of the tail root is down slightly.



- 23. Slide the **Right horizontal tail** in first, slide the AN6 bolts thru the brackets and than only the tail spar.
- 24. Slide the **Left horizontal tail** in behind the right. Push the bolts all the way thru both spars, put temporary nuts on the bolts and snug the spar up against one another and the brackets.
- 25. Have a helper hold the nose of the left tail so that it matches the root on the fuselage.
- 26. Mark the AOI hole with a sharpie.
- 27. Repeat for the right tail.
- 28. Remove and drill the holes.
- 29. If you have an angle drill the holes can be back drilled while on the plane.



## 20. Horizontal Tail Installation



- 30. Reinstall the horizontal tail. Bolts the spars in temporarily again and also slide bolts in to the AOI holes, you do not need to tighten this is just to pin the leading edge.
- 31. To check if the tail is square and that your brackets are in the correct place, measure from the corners of the horizontal tail to the corners of the vertical tail, not the rudder.



- 32. When satisfied with the fit of the tail you continue with final installation.
- 33. Install AN5-10A bolts in the AOI holes. The bolt must have a large area washer under the head than installed thru the fuselage out into the tail.
- 34. If there is a gap where the AOI bolt passes thru of 1/16 or less it is acceptable to draw the tail down tight, if more than 1/16" gap use a large area washer between the tail and fuse to take up the gap.
- 35. Install a washer and a nyloc nut inside the inspection hole on the bottom side of the tail, it is acceptable to use 2 washers if needed, if more are needed use shorter bolts, if none are needed and you can not get 3 threads of the bolt thru the nut use the next longest bolt.

- 36. There are several ways to finish the gap between the fuse and tail.
- 37. You can tape the gap over with vinyl tape.
- 38. We choose to put to 2 layers of 8oz glass over the gap than finish with filler. Do not try to with one piece but a top and a bottom that overlap in the front, about 2" by 18" will do. Sand all gelcoat off of both surfaces first.
- 39. One last method make tail removal easy.
- 40. Do the same as in #38 but do not sand the gelcoat off the fuse but put down a layer of packing tape, this will create a return flange over the gap, remove the tail and finish the flange.



## 20. Horizontal Tail Installation



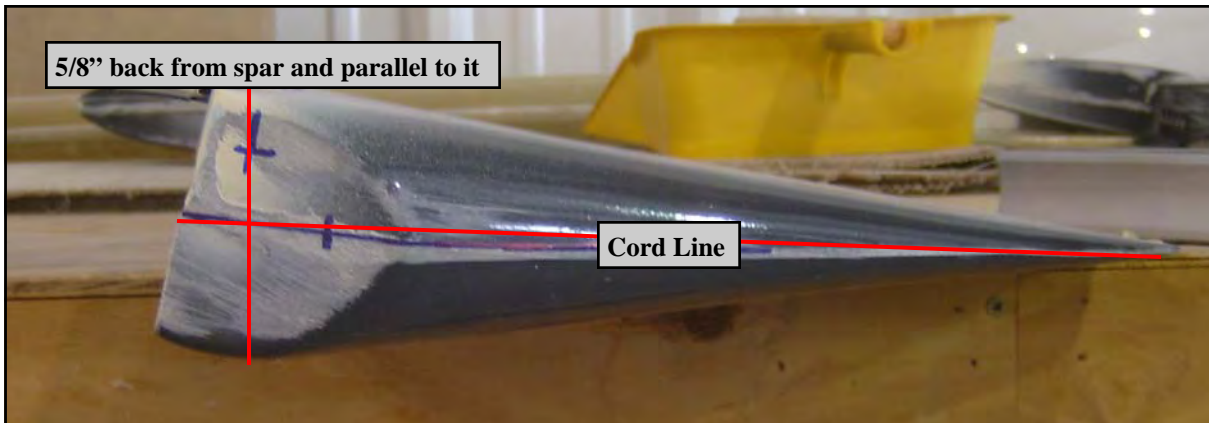
### Rear elevator bell crank installation

**Required items:** left and right elevator, rear elevator bell-crank ALE-0030, AN4 hardware, Aeropoxy , flox, 1/4" drill bit, molly grease, 1" hole saw.

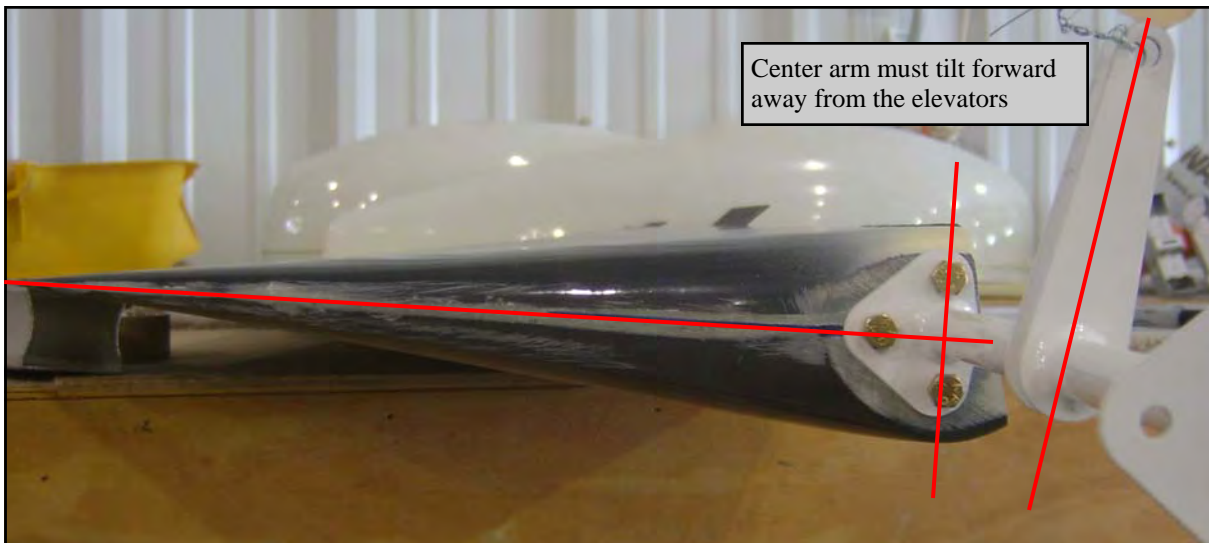
Date  
Completed

**Note:** All of sections: 17, 18, 19, and prior steps in this section must be complete before proceeding.

1. Mark the cord line of the elevator.
2. Measure back from the elevator forward spar , front face, 5/8".
3. Mark a Line parallel to it from top and bottom. This will not be even with the edge and the photo is correct. Do this for both elevators.



4. Place the 2 vertical mounting holes in the end plate of ALE-0030 on the line drawn parallel to the front face, and place the rear hole in the plate on the cord line. The center part should tip forward away from the elevators.
5. Match drill the holes to the elevator with a 1/4" drill bit. **Only drill one elevator for now!!!**



6. Temporarily install both elevators on to the horizontal tails, the **horizontal tails must be installed on the aircraft.**

Date  
Completed

## 20. Horizontal Tail Installation



7. Clamp a piece of 1/8" thick angle aluminum to the trailing edge, this will insure that the elevators are at the same angle. Do not use a flat piece to do this it will not be stiff enough to hold them the same.
8. Install the bell crank to the elevator which has been drilled.



9. Line up the bell crank with the other elevator as done with the first.
10. Match drill this side the same way.

11. Depending on the way the elevator were fit to the tail there may or may not be space between the bell -crank and elevator end plate
12. Determine how many washers may be needed to center the bell crank between the elevators and more importantly that the center arm is on the center line of the aircraft.
13. Sand the gel-coat off of the end of the elevator where the bell-crank will mount.
14. Use some moly grease to coat the part of the end plate which contacts the elevator, also coat the bolts to be use for temp install.
15. Mix up 2 oz total 24 hour epoxy, coat the end of the elevator with epoxy , mix the rest with flox.
16. Install the bell-crank.
17. Pack as much epoxy flox mixture between the bell-crank and the elevator.
18. Let dry over night.
19. This will give a flat spot for the bell crank to firmly bolt to.



20. If the last few steps sound like a lot of work, spacers from the correct thickness aluminum can be fabricated to take up the space. **DO NOT ATTEMPT TO BOLT SIMPLY TO THE SIDE AND FORCE THE FIBERGLASS TO COMPLY IT WILL FRACTURE AND BE A REAL PROBLEM!!!**