

Section 6

Tail Boom Installation

Procedures covered in this section:

Install inspection covers; mount tail boom; fit and install winglets; install horizontal trim fins; install vertical trim fin.

Cards used in this section:

HARDWARE CARD	E09 CARD 3	E17 CARD 2
E09 CARD 1	E09 CARD 4	E17 CARD 3
E09 CARD 2	E17 CARD 1	

Prints used in this section:

E09-2000	E17-2000
E09-2001	E17-2001

Templates used in this section:

E09-1	E17-1	E17-3
E09-2	E17-2	

Tools required for this section:

Air or electric drill	Dzus tool	Plumb bob	String or twine
Band saw or hacksaw	Files	Pop rivet gun	Tape measure
"C" clamps	Framing square	Protractor level	Vise
Chalk line	Grinder	Ruler	90 degree drill (or equivalent)
Cleco	Grease pencil	Scotchbrite	
Cleco Pliers	Hammer	Screwdriver	
Countersink	Mallet	Snap ring pliers	
Drift punch	Metal cutting snips	Straight edge	

Drill bits of the following sizes: 1/8", 3/16", 1/4", 1/2", #40, #19, Letter "D"

Ratchet with sockets of the following sizes: 3/8", 1/2", 9/16"

Wrenches of the following sizes: 3/8", 7/16", 1/2", 9/16"

Notes:

1. **MOUNTING TAIL BOOM TO AIRFRAME:** When mounting the tail boom to the airframe, be sure to hold the correct measurement to the square drive tube and also hold the correct tail boom angle. Try to use the same level for all the angles that are to be checked. The quality of level or protractor used during the construction process can greatly affect the results. Care should be taken to utilize the most accurate tools available for positioning.
2. **PAINTING:** Prior to painting the surface of the tail boom, a light sanding is required for good paint adhesion. Scotchbrite works well for this. When possible, sand the area around rivet holes before installing the rivets. (The tail boom will be painted at the same time as the body - see Section 9.)

4. TAIL BOOM SUPPORT: A wooden support can be fabricated to hold the tail boom safely during installation. Use foam padding between the wood and the tail boom to prevent dents and scratches. See photo below.



Photo #1

Referring to print E09-2000, locate, drill, and install Dzus fasteners for the inspection covers, avoiding existing rivets in tail boom. Dzus location can be adjusted for best fit. Install Dzus fasteners when satisfied with fit.

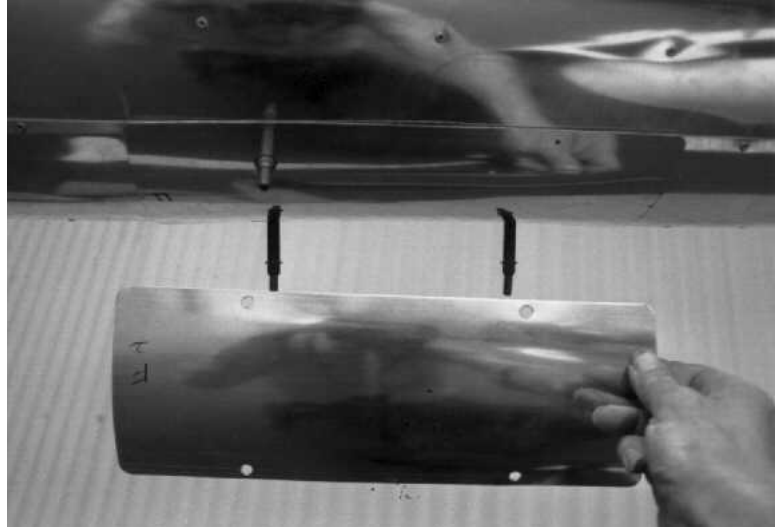


Photo #2

Aircraft centerline can be found by using the forward cross tube and the cross tube at the rear of the airframe where the tail boom support tubes are attached. Pull a string tight just above the floor. Use plumbs to place the aircraft centerline on the string.

Grind a radius on the aft ends of the tail boom brackets, then install them in the airframe. (The two with the greater angle are the upper brackets.) Install the tail boom to the airframe with the end of the boom centered over the string. Use "C" clamps to hold the boom in place until the desired angle is achieved. Check vertical alignment by aligning the two small holes drilled in the #1 bulkhead with a straight edge, using a level to confirm it is vertical. Using the same method, check the #4 bulkhead. If #4 is not vertical, rotate the tail boom to achieve vertical alignment. The intent is to have the best vertical positioning of the tail boom brackets over the ears of the #1 bulkhead.

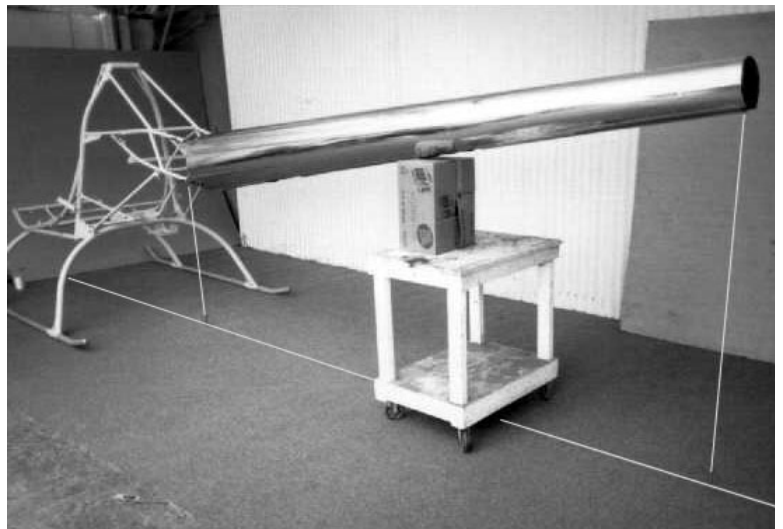


Photo #3

Level the square drive tube laterally, and check the angle fore and aft.



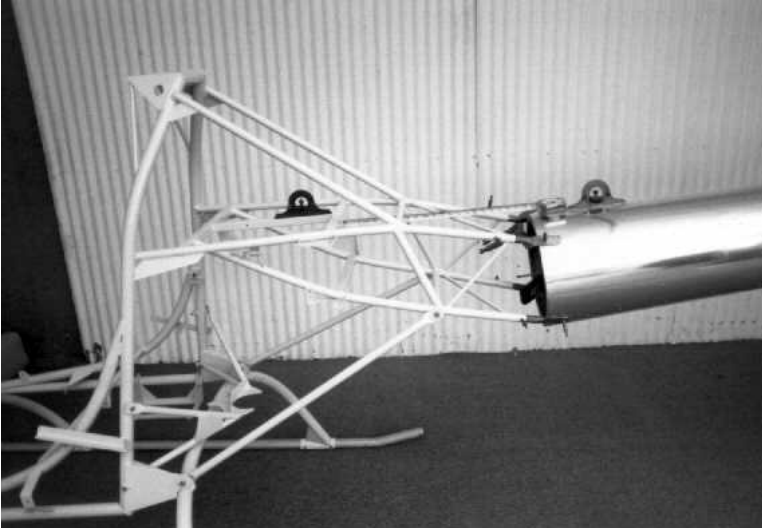


Photo #4

Measure the angle of the square tubes fore and aft and add 2-1/2 degrees. This is the angle that the top of the tail boom should be. The distance from the back of the square drive tube (where the top of the secondary drive mounts) to the front of the #1 bulkhead should be 23".

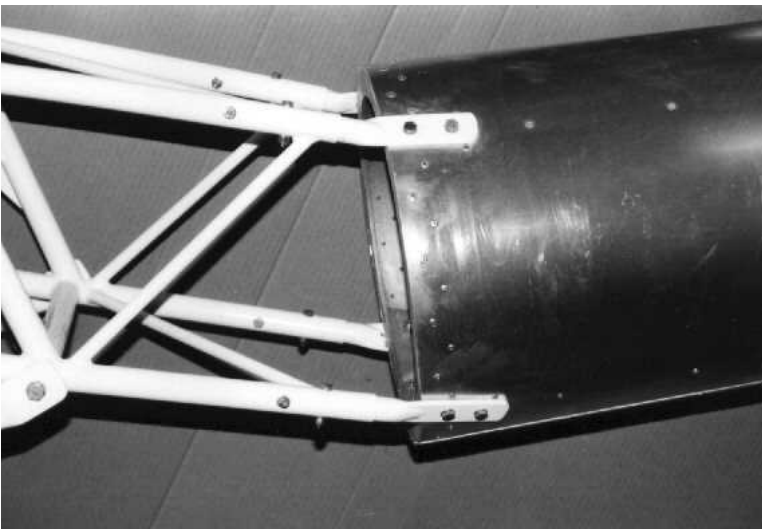


Photo #5

Make sure that the flat part of the tail boom brackets are over the ears in the #1 bulkhead, and the flats extend beyond the front of the bulkhead. Locate, drill, and install the bolts. The forward bolts on the lower brackets should go through the 1" airframe tubes horizontally, because they will also be used for radiator mounting. Refer to prints E09-2000 and E30-2000.

Note: If a gap of 1/4" or less exists between a bracket and the tail boom, use the bolts to draw the bracket to the boom. If the gap is more than 1/4", bend the bracket slightly to fit. Use no heat when bending.

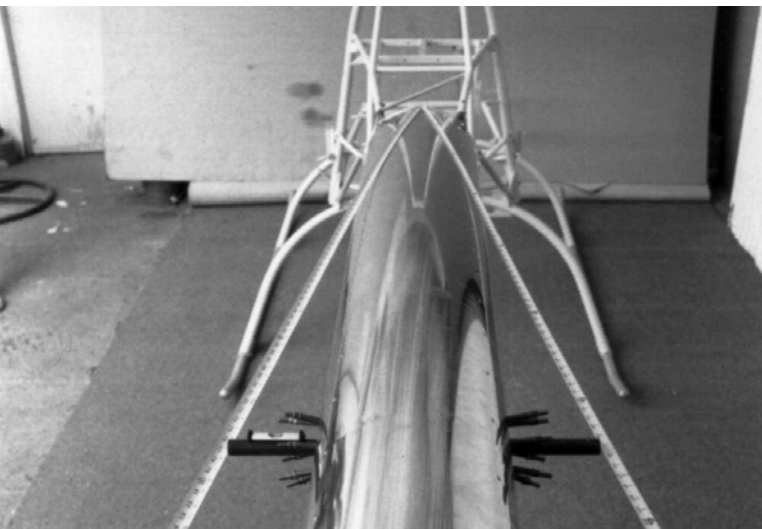


Photo #6

A small hole is pre-drilled where the horizontal trim fin mounts (1/4" below tail boom centerline). Install a small straight rod with equal amounts extending from each side of the boom. It must be level. The distance from the top center of the #1 bulkhead to each end of the rod must be equal. Using this method will ensure the Horizontal fin is level and 90 degrees to the aircraft's centerline.

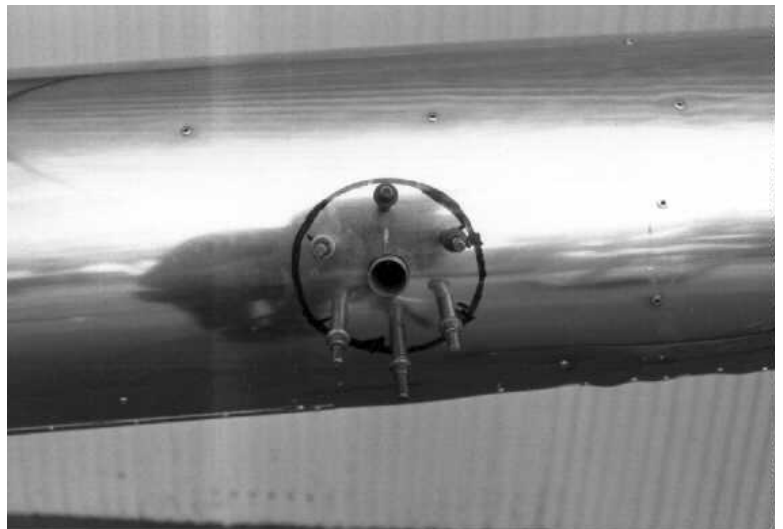
Photo #7

Enlarge the hole to fit the trim fin spar, making sure that the spar will be level when installed. Make two 4" diameter doublers from .025 aluminum, and drill a 7/8" diameter hole in the center of each.



Photo #8

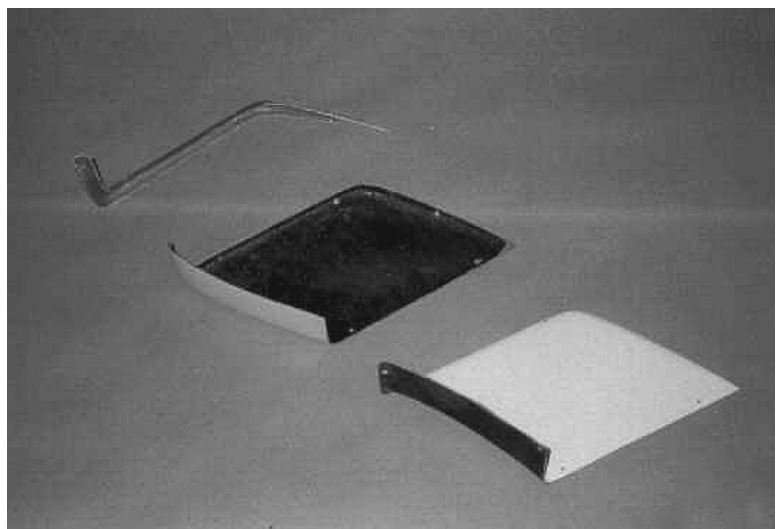
Open the holes in the doublers to match the holes in the tail boom. Install the doublers on the inside of the tail boom skin.



WINGLETS AND HORIZONTAL TRIM FINS

Photo #9

Winglets as supplied: doubler, outside, and inside.



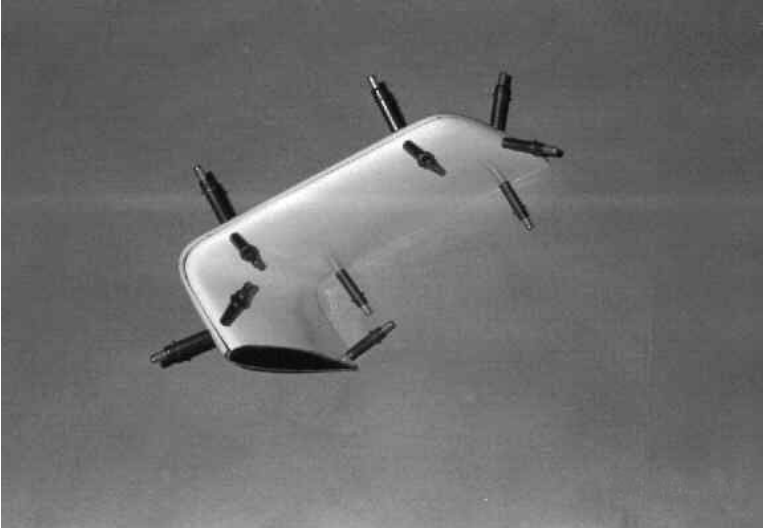


Photo #10

Use clecos to hold the three pieces together while fitting. Trim and sand as necessary.



Photo #11

Lay a strip of fiberglass mat saturated with resin all around the inside edges of the winglet half.



Photo #12

Place the doubler in position on the fiberglass and install clecos to hold. Work quickly to complete the assembly before the resin hardens.

Photo #13

Install the other winglet half. When assembly is complete and resin is dry, remove clecos. Fill holes and low spots with bondo, then finish with sandpaper.

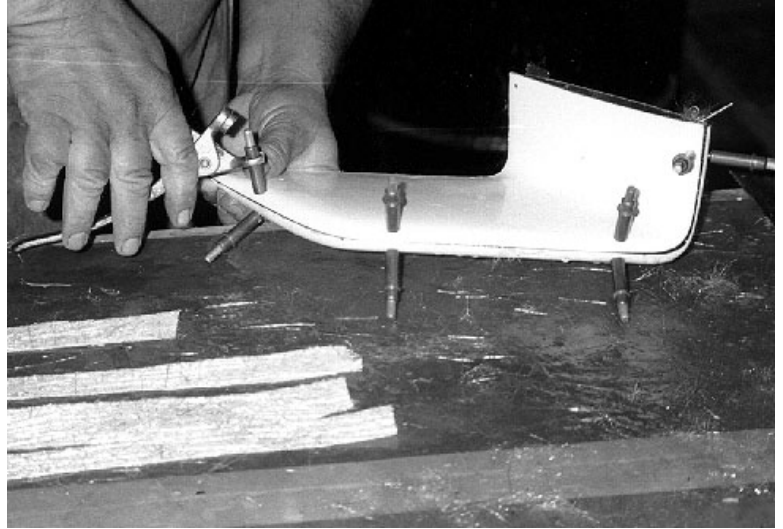


Photo #14

Insert a short piece of 7/8" diameter tubing in the end of the fin, in line with the spar. Clamp the airfoil against the tube. This will ensure that the fin is the same shape here as it is on the other end. Place the wooden end plug material against the end of the fin and mark the outline of the airfoil.

Note: The width of the end plugs should be the full thickness of the material, about 1-5/8" wide.

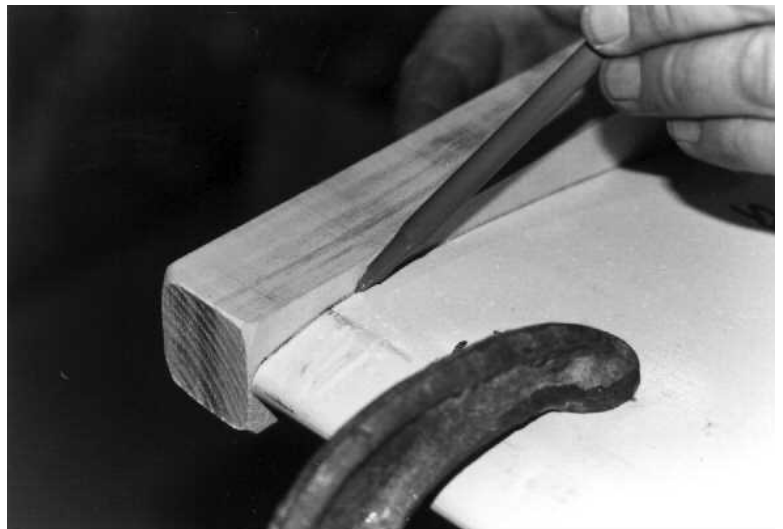


Photo #15

The end plugs will be used to splice the winglets to the fins. Cut out and shape each end plug so that half fits into the fin and half fits into the winglet.



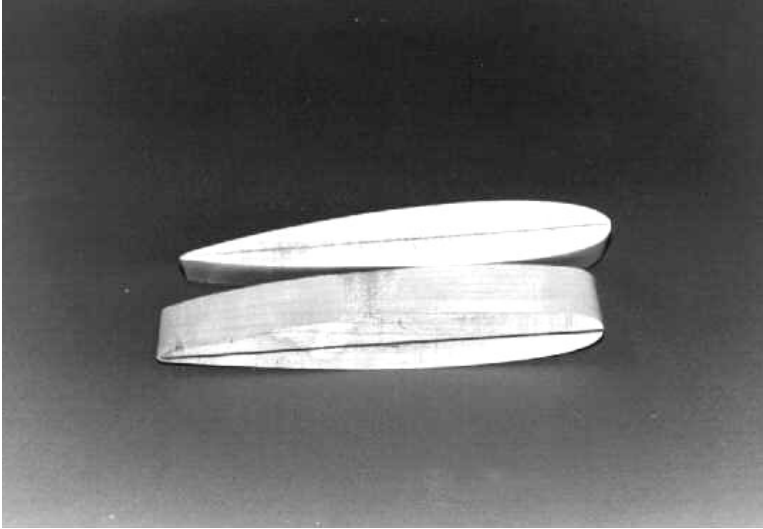


Photo #16

Mark the chord line on each plug.

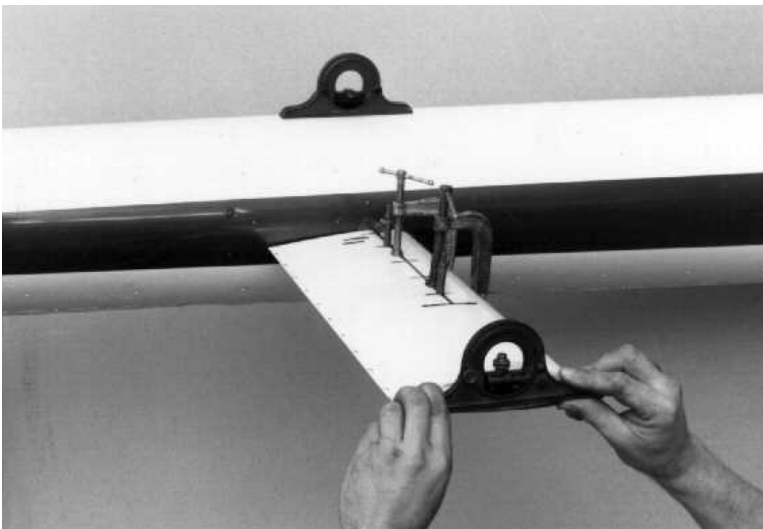


Photo #17

Insert the end plugs half way into the fins. Install the fin assembly on the tail boom. Align the chord line on the end plugs to be parallel with the top of the tail boom. While holding this position, drill through the holes in the trim fin brackets to mark the location on the tail boom. Then remove the fin assembly.

Note: The trim fin brackets should just make contact with the tail boom skin. If they do not, trim the splice tube until the correct fit is achieved.

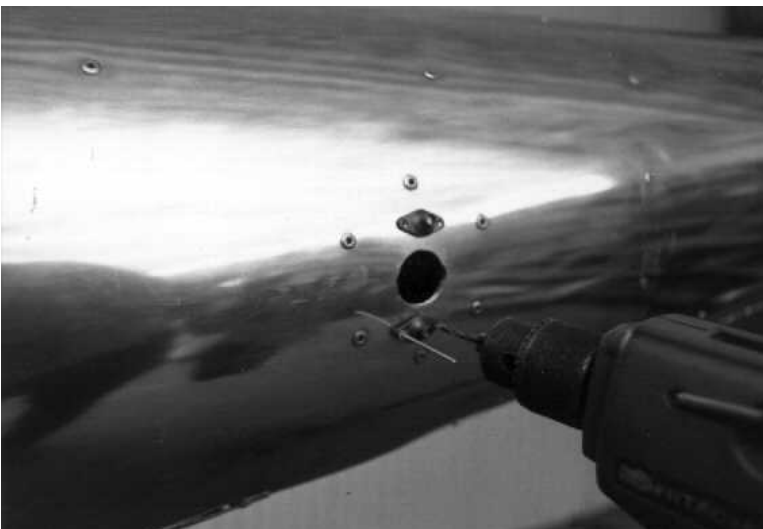


Photo #18

Locate the nut plates for the horizontal trim fin according to the previously drilled holes. Install the nut plates inside the tail boom.

Note: The nut plates are shown on the outside in this photo to clarify their position.

Photo #19

Attach the winglet to the fin, using blade glue to bond the wood end plug inside both pieces. Secure with 16 countersunk wood screws.

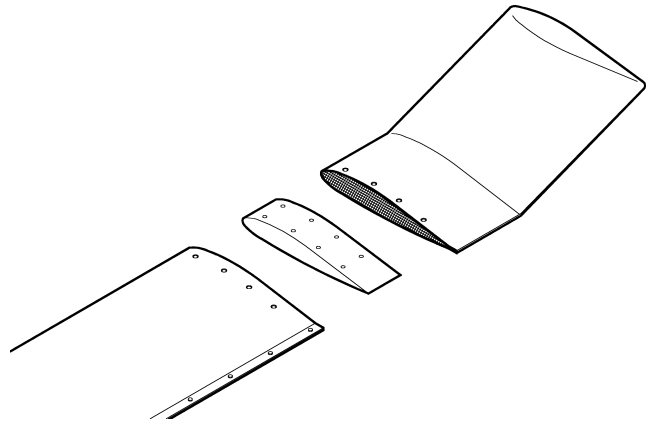


Photo #20

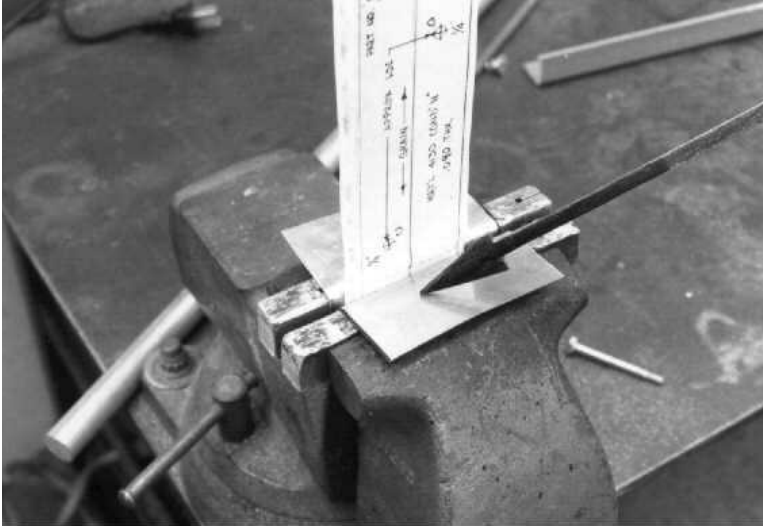
Peel back the protective film from the aluminum and sand the fin in the area to be bonded. Apply two layers of fiberglass cloth and resin over the seam. (The first strip should be about 3/4" wide, the second about 1-1/2".) When dry, sand the fiberglassed area. Fill any low spots with bondo and sand smooth.



Photo #21

Overall view of the completed horizontal trim fin with winglets installed. Mount the assembly on the tail boom.





VERTICAL TRIM FIN

Photo #22

Cut out and bend the front bracket for the vertical trim fin and fit it to the tail boom. It must be level vertically (90 degrees to the ground). When bending, be sure to make a radius in the bends. One way to do this is to bend the part over a piece of scrap material.



Photo #23

Use a protractor level to verify that the bracket is level vertically before drilling. Attach the bracket to the tail boom at bulkhead #4. (Refer to print E09-2001).

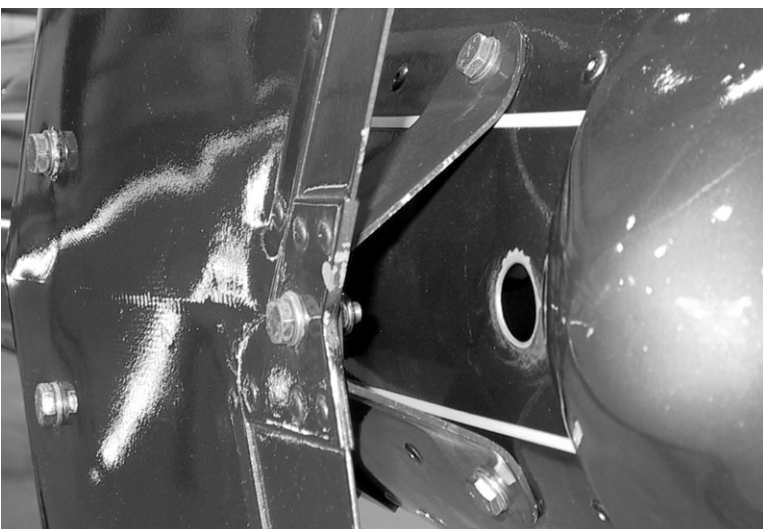


Photo #24

Cut out, bend and fit the rear bracket for the vertical trim fin. The 3/16" bolts should go through the tail boom skin and stringers.

Photo #25

Cut out and fit the end plugs on the bottom and top of the vertical trim fin. Install wood screws to hold them in place.

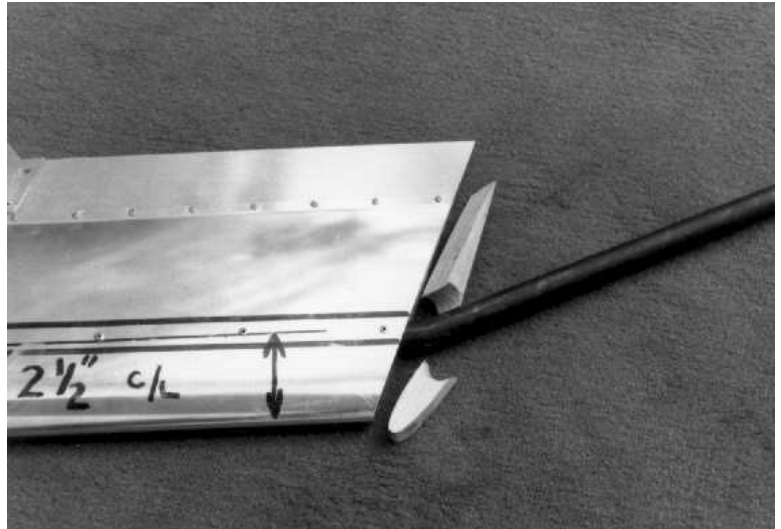


Photo #26

Contour the edges of the end plugs. A piece of sandpaper wrapped around a wood block works well for this.
Install the vertical trim fin on the tail boom according to print E09-2001.

