

SUBJECT: ELEVATOR COUNTERWEIGHT REINFORCEMENT

APPLICATION: Service Bulletin 69 is mandatory for all Glasair II's and III's shipped prior to 8-18-89.

DESCRIPTION: In-service experience has shown that the sharp inside corner of the elevator counterweight arm creates high stresses which lead to structural fatigue. Field reports of cracks in this area have prompted us to issue this mandatory service bulletin.

We have noticed and repaired small stress cracks radiating from the upper corner on the elevator counterweight arm of our Glasair III prototype. It should be noted that the prototype has four fewer laminates in the counterweight arm than the production models, yet withstood three years of intense aerobatics before stress cracks were noticed.

SOLUTION:

\*\*\*\*\* WARNING: Compliance with this service bulletin is mandatory. \*\*\*\*\*

Summary

A small prebuilt foam core shearweb and some unidirectional roving reinforcements are laminated into the counterweight arm. The goal of the retro-fit is to install the shearweb without disturbing the cosmetic appearance of the elevator. Only a portion of the inboard cap of the elevator arm will need to be removed.

STEP 1 REMOVAL OF END CAP AND PREPARATION

Remove the elevators from the aircraft, and then remove the outboard elevator hinge brackets to make access easier during rework. Locate the aft side of the lead inside the counterweight arm by tapping the surface. Mark the lead's location on the outer skin and the counterweight arm's end cap. Remove the entire portion of the end cap aft of the lead containment rib, being careful not to cut the rib. Sand out any cabosil mixture flush with the edges of the top and bottom skin panels. (See FIGURE 1) You will need all the room that can be relieved to aid in the installation of the counterweight arm shearweb.

Inspect the area. Notice where the elevator shearweb ends, the position of the lead containment rib, and the distance from the edge of the beveled foam core to the edge of the skin panel. This is the space you have to work in.



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## STEP 2 REINFORCEMENT LAMINATES

This step covers the reinforcement of the skins between the edge of the beveled foam core and the skin panel edges. Cut four pieces of unidirectional reinforcement roving, two layers for the top and two for the bottom, so that they fit between the elevator shearweb and the lead containment rib. The fibers will run fore and aft. If there is space between the end of the elevator shear web and beveled foam core edge, extend the roving as far past the elevator shearweb as possible and still be able to laminate successfully. The width of the cloth is determined by the distance from the beveled foam core to the edge of the skins, approximately 3/8" to 3/4". Also cut two 2" x 3" pieces of bidirectional cloth on a 45° bias. The bidirectional cloth will be laminated over the unidirectional roving and will extend onto the foam core, lead containment rib, and as far behind the elevator shearweb as possible. (See FIGURE 1) Once the cloth is ready, laminate into place.

## STEP 3 COUNTERWEIGHT SHEARWEB CONSTRUCTION

The new counterweight shearweb will be made of 1/4" 4.5 lb. foam with two layers of bidirectional cloth on each side. Cut a 6" x 6" piece of 1/4" foam. Seal both sides of the foam with a thin Q-cell mixture and let cure. Lay up two layers of 45° bidirectional cloth on each side of the foam. The counterweight arm shearwebs and the replacement pieces for the counterweight arm inboard end caps will be cut from this panel.

Once the reinforcement laminates on the elevator have cured, a template can be made. The counterweight arm shearweb will extend from the lead containment rib to as far aft of the elevator shearweb as possible. (If the existing elevator shearweb continues all the way to the beveled foam core, the new counterweight shearweb will butt up against the forward side of the existing elevator shearweb) Use a piece of poster board, or the equivalent, to make a template for the counterweight arm shearweb. The inboard face of the shearweb will be flush with the beveled foam core and butt up against the outboard end of the existing elevator shearweb. (See FIGURE 1, View A-A)

Use the template to cut the counterweight arm shearweb out of the pre-made panel. Trim the outboard laminates of the counterweight arm shearweb so that the inboard face of the shearweb will be flush with the beveled foam core. Adjust the fit of the new shearweb; when the fit is satisfactory, carve out a small trough in the foam to apply a mill fiber/cabosil mixture bead around its edge. Bond the counterweight shearweb in place. Some of the mill fiber/cabosil mixture should squeeze out around the inboard surface which indicates a good bond; remove the excess before it cures.

  
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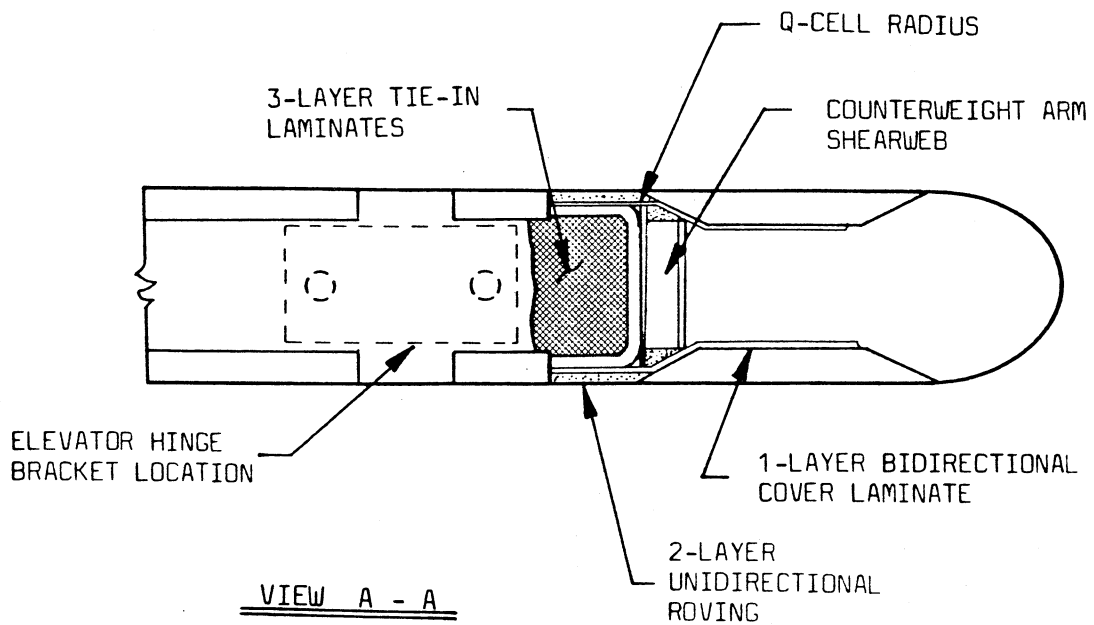
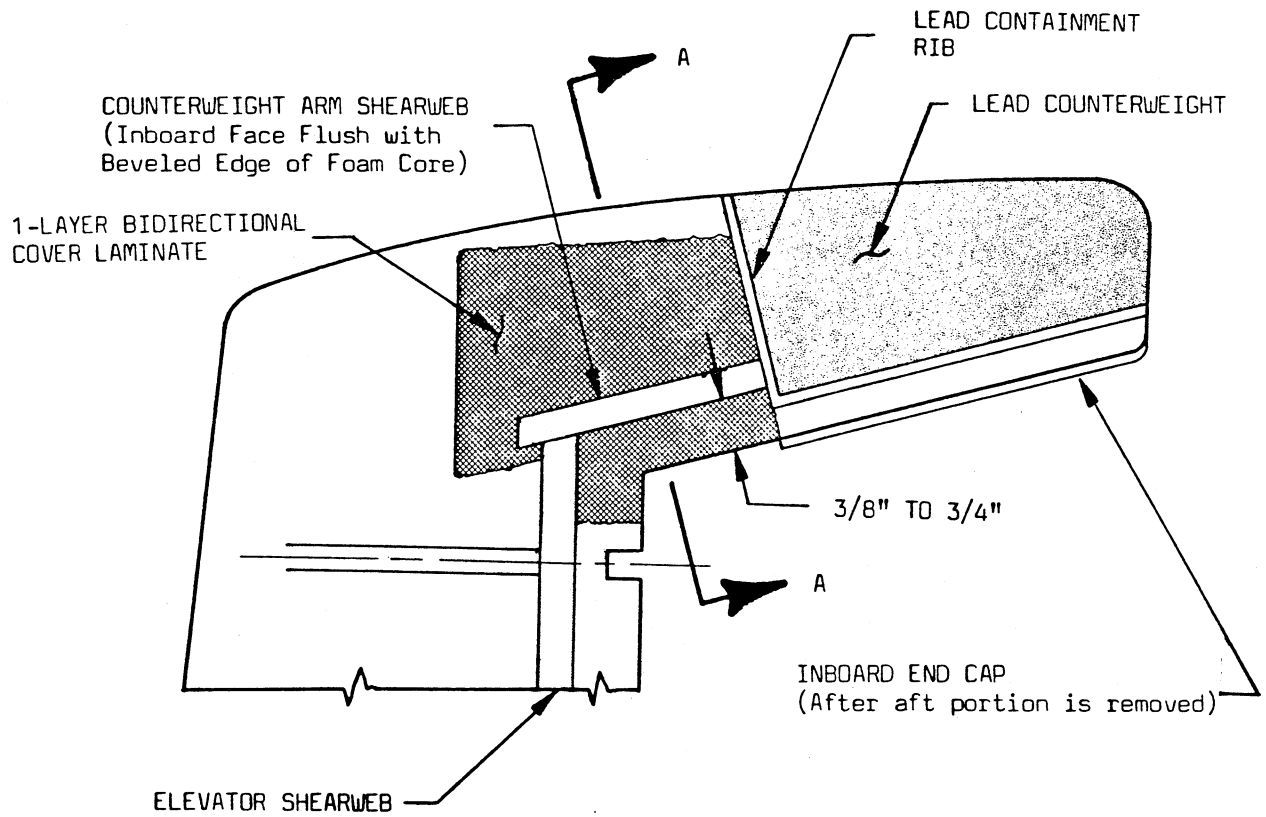


FIGURE (1)

**H**  
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STEP 4 COUNTERWEIGHT ARM TIE-IN LAMINATES

Once the mill fiber/cabosil mixture has cured, apply a 1/16" radius of Q-cell in the corners of the counterweight shearweb. Once the Q-cell has cured, laminate three layers of bidirectional cloth to the counterweight shearweb to tie it into the existing structure. Lap the laminates onto the lead containment rib, the elevator shearweb, and the upper and lower skin panels. Avoid laminating on the surface where the hinge bracket mounts. Trim the laminates flush with the skin panels while in the green cure state. At this point, reinstall the elevator hinge bracket and check the balance of the elevator. If any lead needs to be added, a small lead disc can be formed and bonded into the forward portion of the existing foam composite cap on the inboard side of the counterweight.

STEP 5 INBOARD END CAP

Finally, cap the remaining portion on the inboard side of the elevator counterweight arm, using a piece of the pre-cured panel made for the shearweb. Refer to the cap fabrication procedures in steps M-3 and M-4 of the Stabilizer-Elevator Assembly Section of your Instruction Manuals.

NOTE: During the installation of the counterweight shearweb and inboard end caps, make sure all openings between the end cap and the elevator shearweb are sealed. This will prevent rain water or debris from entering the elevator. Eliminating these openings was not mentioned in the Manuals; the oversight will be corrected in future revisions.

Install the elevators onto the stabilizer, re-attach the actuator assembly, and confirm that the elevators move freely throughout their required range.

COMPLETED [   ]

Please contact the Stoddard Hamilton shipping department for any materials which you may need.

1' x 2 3/4" Unidirectional Roving

Stock No. 270-0110-001  
Cost \$0.15 per ft

12" x 12" piece of 1/4" 5lb. foam

Stock No. 270-0123-107  
Cost \$1.00

Please specify if other materials are needed.



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