


FIGURE (1)

 <p>STODDARD-HAMILTON AIRCRAFT, INCORPORATED</p>					
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GLASAIR	EXTENDED TIP FUEL TANK OPTION				1

The Glasair wing tip extensions substantially improve the performance of all models at higher altitudes, and also provide increased stability, higher climb rate, and lower stall speed. They can also be used as tip tanks if desired. Each tip will hold about 5-1/2 gallons of fuel, for a total of 11 additional gallons. The gross weight of both the Glasair FT and the Glasair RG in the Normal Category is increased by 100 lb. if wing tip extensions are installed.

These wing tip extension assembly instructions describe fabrication of the extended tips for use as fuel tanks. The instructions describe the assembly of only one side. The quantities of all materials specified are for one wing tip only. Both tips can be assembled at the same time by doubling the specified quantities.

WARNING: The wing tip extensions are not to be used for aerobatic flight. They are designed to meet the normal category flight load factors (G limits) of +3.8 and -0.5 G's.

A principle advantage of the wing tip extensions is that they are removable--if aerobatic flight is desired, simply remove them and install the standard tips.

The wing tip extension's structure consists of upper and lower composite panels, forward and aft shearwebs, and an inboard wing tip closeout rib. The tip extensions are bonded together in a similar manner as the horizontal stabilizer and are fastened to the wing using countersunk fasteners. The mounting flanges on both the wing and the wing tip extension are reinforced to take the bearing loads created by the fasteners.

The wing tip navigation and strobe lights are housed in a fuel proof box at the outboard end of each wing tip. Electric wires for the tip lights are routed through the wing tip extension fuel bay in a sealed aluminum tube secured to the forward side of the forward shearweb.

The fuel in the wing tip extensions feeds directly into the wing leading edge fuel tank. The fuel transfer fitting is located at the lowest point in the wing tip extension's inboard rib. The tip extension transfer fitting is connected by flexible hose to a second transfer fitting in the outboard end of the wing leading edge fuel tank (the outboard fuel tank end rib is rib I on the Glasair IIIs and rib H on the Glasair IIs).

Two vent fittings are installed in the upper side of the wing tip extension's inboard rib. The forward vent fitting is connected to an internal tube which runs to the highest point at the outboard end of the wing tip extension fuel cell. The aft fitting just penetrates the wing tip extension inboard rib near the upper tip extension panel. When the tip extension is installed, the check valve (installed on GIIIs, only) is removed from the existing wing leading edge fuel tank vent line at the outboard end of the wing. The section of wing vent line aft of the removed check valve is connected to the forward tip extension vent line. The aft tip extension vent fitting is connected by flexible hose to the section of wing vent line which is forward of the removed check valve. Refer to FIGURE (40) at the end of these instructions.

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The aft tip extension vent line, which connects the wing leading edge fuel cell to the wing tip extension fuel cell, allows the entire leading edge fuel cell to be filled, eliminating all fuel expansion space. A foam block covered with a two layer laminate is bonded to the lower surface of the lower wing tip extension panel (directly below the filler cap) to indicate the level to which the wing tip fuel cells may be filled while allowing sufficient space for fuel expansion.

NOTE: Since fuel is free to transfer from the main leading edge tank to the tip extension tanks, the aircraft must be level when fueling to get the maximum amount of fuel into the tank.

NOTE: Instructions are included to install navigation and strobe lights in the wing tip extension. If this is not desired, the light and wiring housing can be eliminated when fabricating the extended tips.

NOTE: Before construction is begun, thoroughly study all of the following instructions and illustrations. The wing and the ailerons should be complete before beginning fabrication of the wing tip extensions. Refer to the WING ASSEMBLY section of the Glasair Instruction Manual for wing tip installation instructions.

STEP 1 INITIAL TRIMMING AND FITTING OF WING EXTENSION PANELS

Raised scribe lines have been molded into the wing tip extension panels to indicate their approximate inboard trim lines, as shown in FIGURE (1). Trim the upper and lower tip extension panels to these lines. Due to possible variations in the wing tip attach flanges, the wing tip extensions may require additional localized trimming along the raised scribe line edges to achieve a close fit to the wing.

The upper and lower tip extension panels incorporate recessed areas at the outboard leading edge in which the navigation light lens will be installed. This recessed area has excess material which must be cut back to form a 1/2" attach flange for the nav light lens. Mark a 1/2" flange around the recessed area, as shown in FIGURE (1). Trim away the excess material in the recessed area leaving the 1/2" wide lens attach flange.

Mate the upper and lower panels of each assembly and check the fit between the panels. Sand where necessary to ensure a good match up. The cusp (upswept tip) portion of the upper panel has a little excess flange material from the mold and requires extra sanding to fit the lower panel.

Shim the wing tip attach flanges on the wing with masking tape or duct tape until the tip extension panels, when installed, are flush with the outside surfaces of the wing panels. Laminates will later be added to the inside surfaces of the tip extension inboard edges to make up the difference in thickness, to strengthen the edges, and to provide additional countersinking depth for attach screws.


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STEP 2 FITTING AND ALIGNING WING TIPS TO THE AIRCRAFT WING

Using masking tape, temporarily tape the two half panels together in order to check the fit to the existing wing tip end.

The important things to look for when checking for fit and aligning are:

- a. The leading edge of the wing tip extension should match the wing leading edge. (A straight edge placed along the leading edges of the wing tip extension and the wing should fit flush against both leading edges.)
- b. The exterior surfaces of the upper and lower wing tip extension panels should match the exterior wing surfaces. (A straight edge placed across the upper (lower) surfaces of the wing and the upper (lower) surfaces of the wing tip extension should fit flush against both surfaces.)

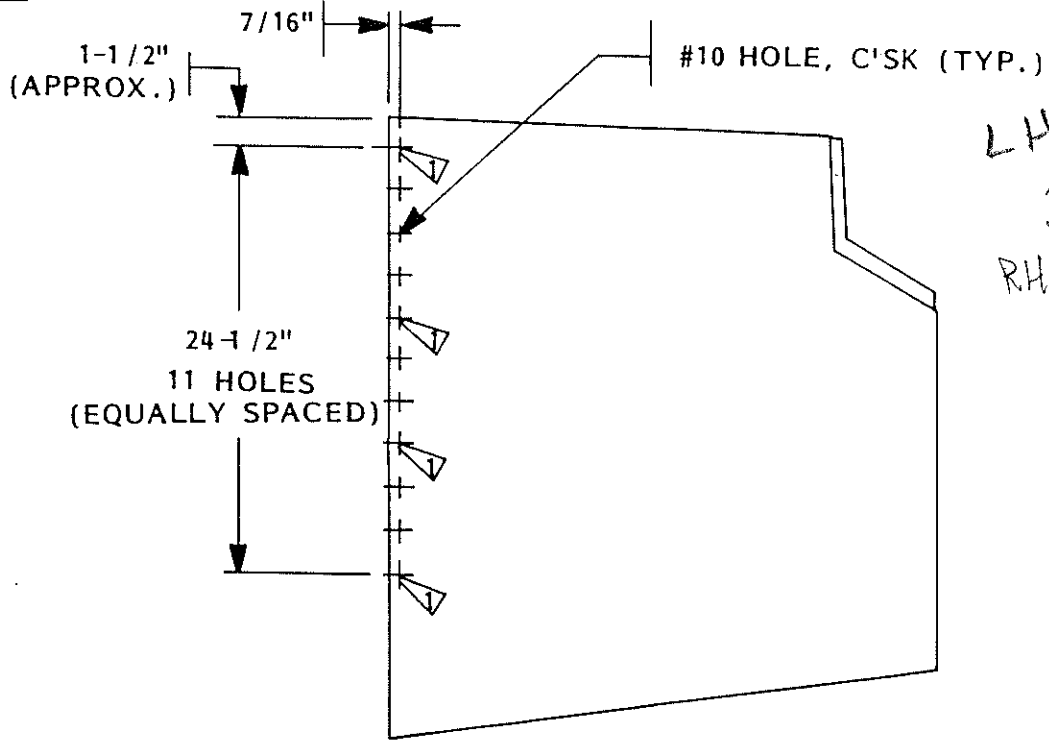
NOTE: The trailing edges of the wing tip extension can easily be lengthened or sanded to alleviate any mismatch with the ailerons. Sand the inboard mating edges of the extensions so they closely match the inboard edges (joggles) of the wing tip attach flanges.

NOTE: When fitting the tip extensions, make sure that they fit in a straight line with the existing wing, that is, that there is no dihedral "break" between the existing wing and the extension. Hold the extension in place and sight along the leading edge of the wing and the underside of the wing to check this.


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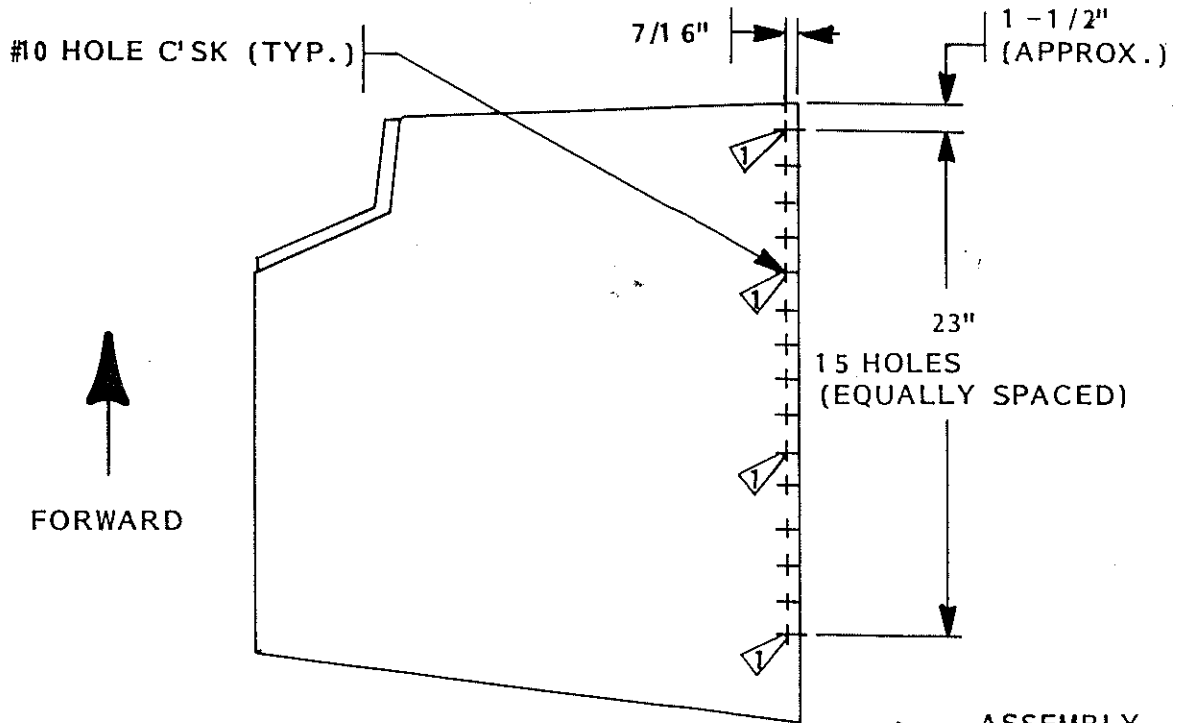
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STEP 3 WING TIP ATTACH HOLE LOCATIONS



LH 9-23
3.0
RH 10-28
2.5 hours

PLAN VIEW



1 ASSEMBLY MOUNTING HOLES

BOTTOM VIEW

FIGURE (2)

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NOTE: These instructions assume that no holes exist in the wing tip attach flange on the wing. If a standard wing tip has previously been installed, the existing holes in the wing tip attach flange must be back-located onto the wing tip extension attach flange. The extended wing tip is secured to the wing with a greater number of screws than the normal wing tip and these additional holes should be evenly spaced between the existing holes in the wing tip attach flange.

Mark the fastener hole locations onto the lower and upper panels of the tip extensions, as shown in FIGURE (2). Slide the tip extensions onto the wing tip attach flanges and support them with a sawhorse. Align the extensions as described in Step 2, and drill (4) 3/16" holes through the upper panels and (4) 3/16" holes through the lower panels in the locations indicated by Flag #1 in FIGURE (2). Install an NAS603-10P screw in each hole after drilling to keep the panels from slipping.

NOTE: For this Step, use the (4) holes called out as ASSEMBLY MOUNTING HOLES, shown by Flag #1 in FIGURE (2).

Using AN426AD3-6 rivets, install MF1000-3 nutplates on the wing tip attach flanges at the (8) assembly mounting holes drilled per side. Install the wing tip extension to the flange with NAS603-10P screws and verify that the tip extensions are still jugged properly.


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STEP 4 FORWARD SHEARWEB FABRICATION AND INSTALLATION

LH 9-23-01
 1.0
 RAS
 10-16-01
 1.5 hour

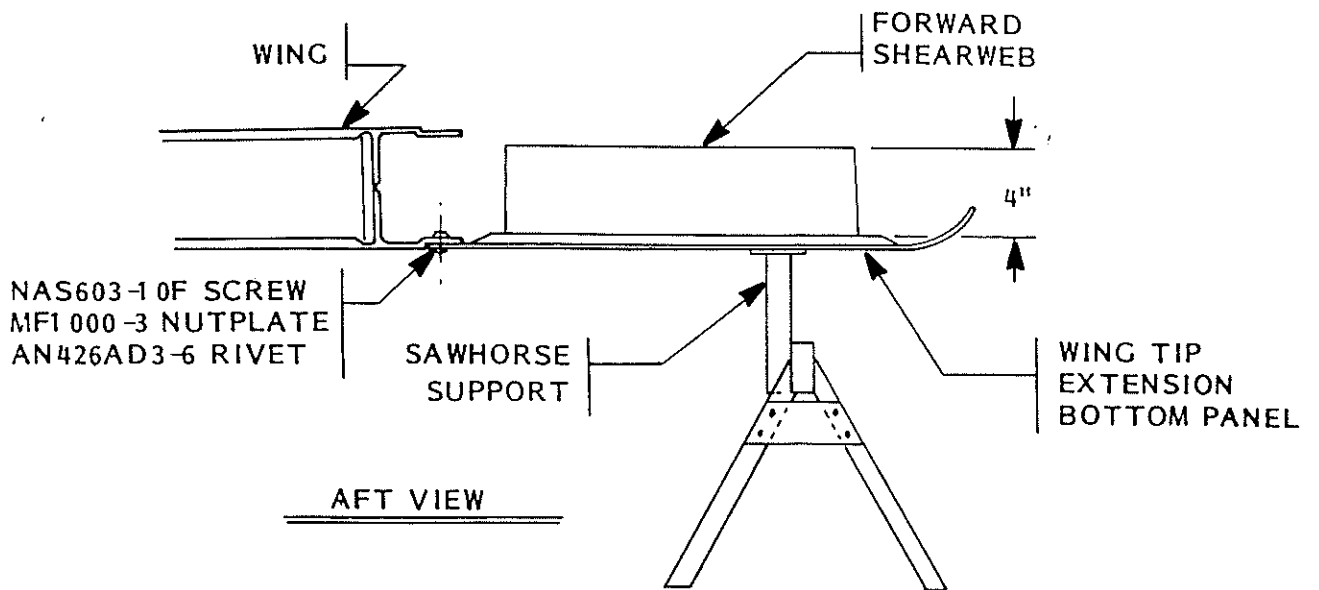
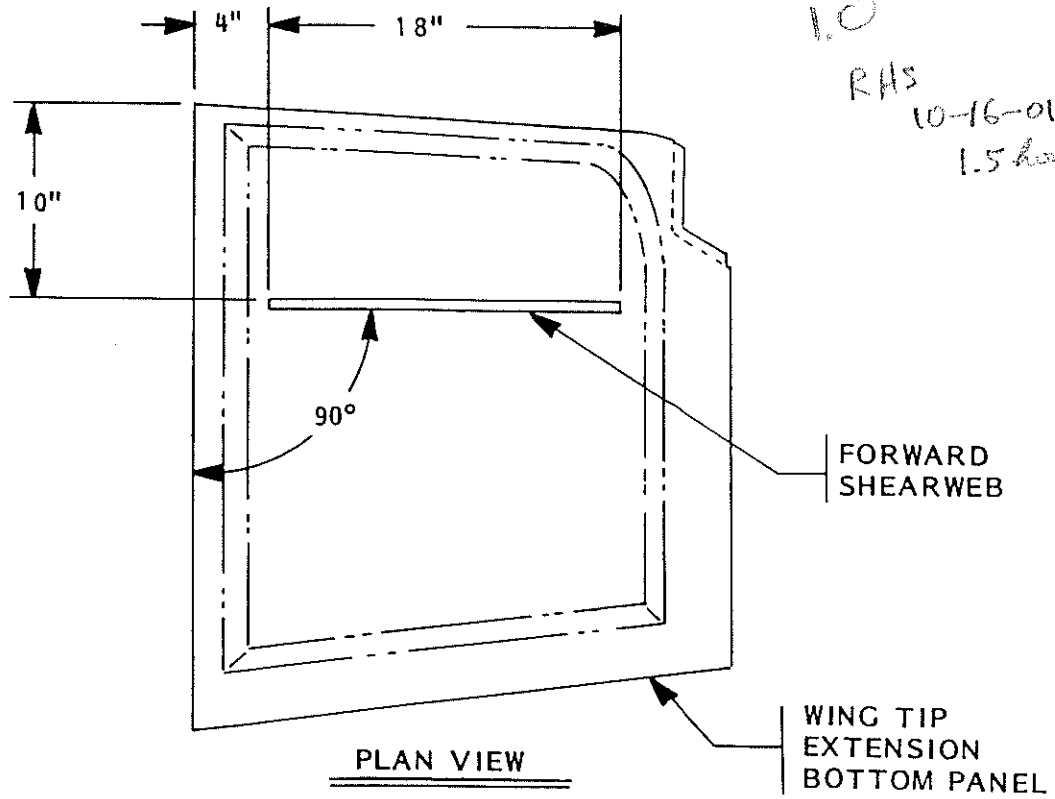


FIGURE (3)

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Remove the upper tip extension panels, leaving the lower panels fastened to the end of the wing and supported with sawhorses, as shown in FIGURE (3). Cut (2) 4-1/2" x 18" pieces of 1/2" thick foam for the forward shearwebs and fit them to the lower panels 10" aft from the leading edge, 4" from the inboard edge, and perpendicular to the inboard edge, as shown in FIGURE (3). Seal the foam pieces with Q-cell and bond them to the lower panel with Q-cell or body putty. Use the excess Q-cell or body putty material to form a 1/4" radius along the forward and aft lower edges of the forward shearweb.

Tape the upper and lower panels together in a few places and check the fit of the tip extensions to the wing. Sand the upper edge of the foam shearweb as necessary to achieve the proper thickness of the tip extension. When the fit is fairly close, proceed to the next step.

STEP 5 FORWARD SHEARWEB LAMINATES

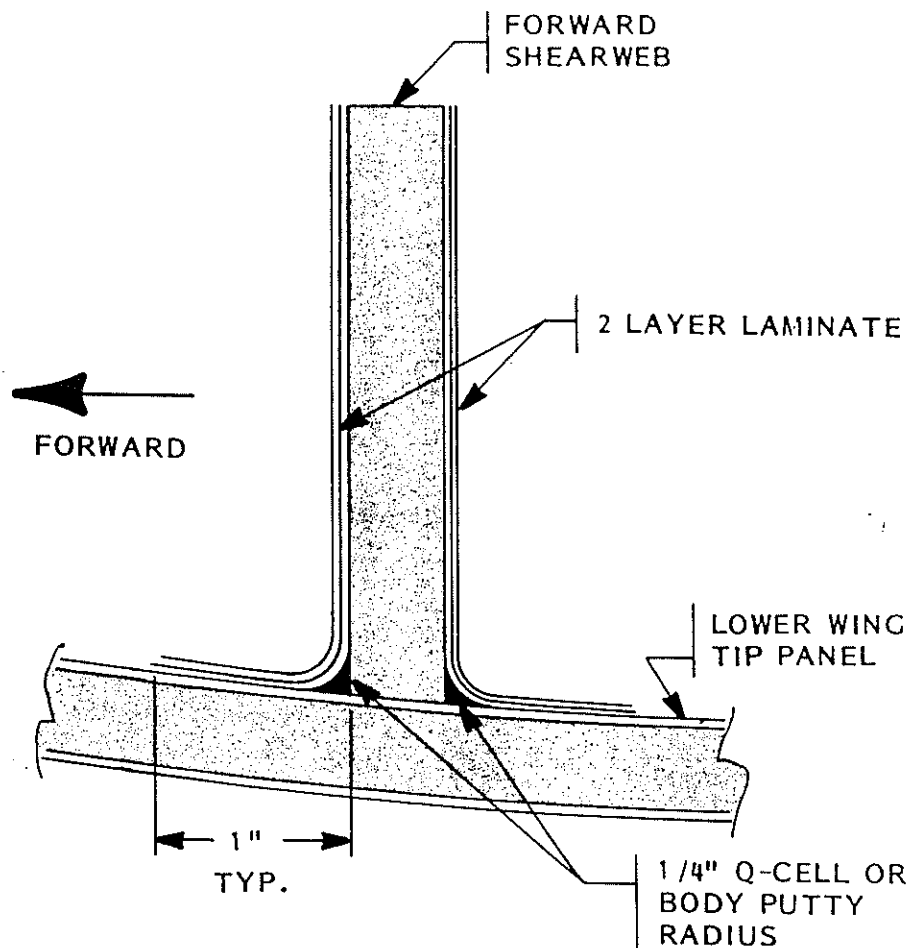


FIGURE (4)

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Remove the upper tip extension panel from the lower tip extension panel.

Laminate two 6" x 19" layers of cloth, cut on the 45° bias, onto both the forward and aft surfaces of the foam shearwebs, overlapping at least 1" onto the lower tip extension panel, as shown in FIGURE (4). When the laminates have green cured, trim them flush with the sides and upper edges of the foam cores. When the laminates have fully cured, final fit the shearwebs so that there is a 1/4" gap between the upper edge of the shearweb and the inside surface of the upper tip extension panel when the upper panel is positioned correctly relative to both the lower panel and the wing tip attach flange. Both the upper and lower panels must be removed from the wing to check the gap between the shearweb and the upper panel.

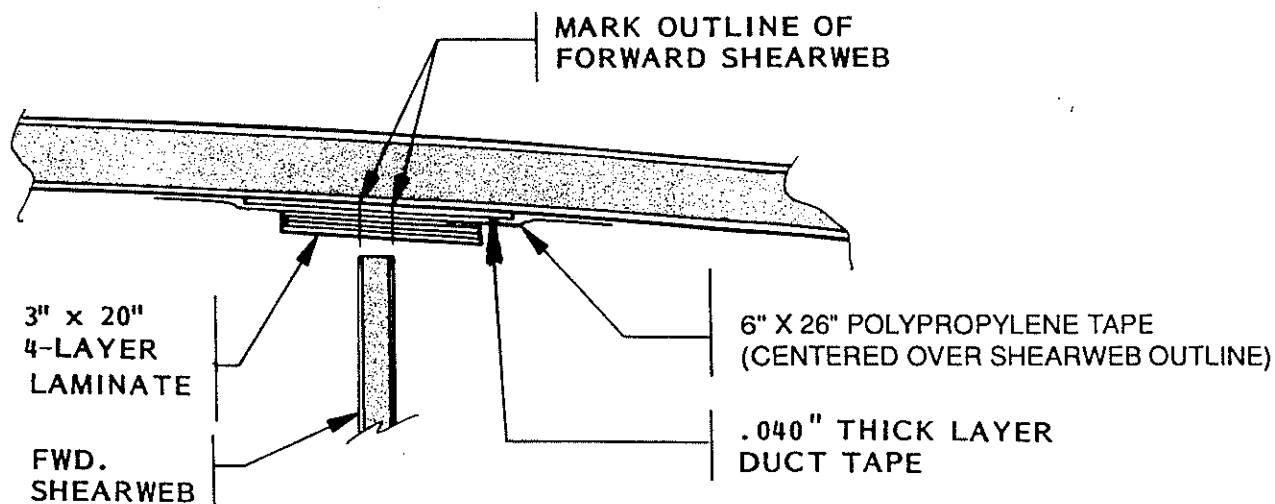
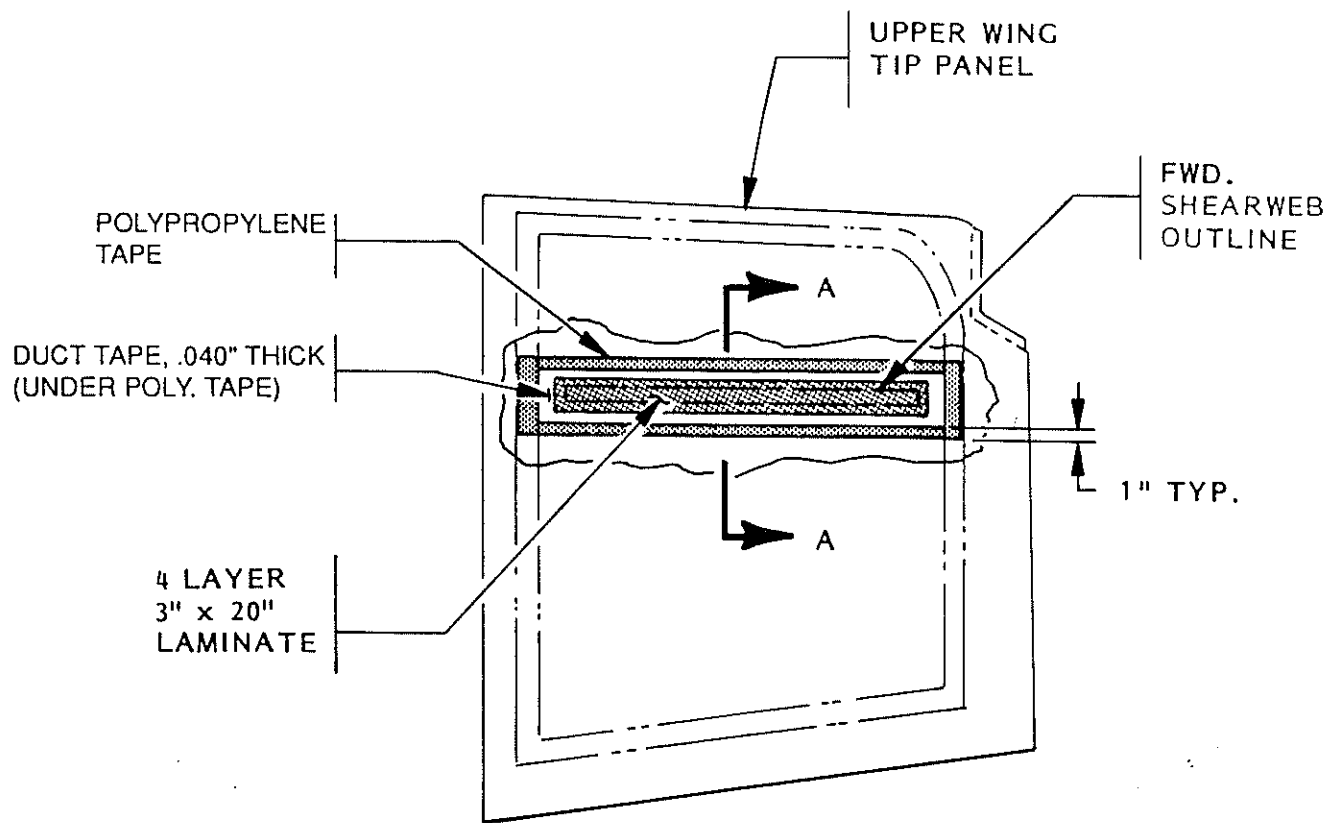
*LH complete
9-27-01
2.0*

RHS complete 10/31/01 2.0 hours



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STEP 6 FORWARD SHEARWEB UPPER ATTACH FLANGE FABRICATION



VIEW A-A

FIGURE (5)



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Remove the upper and lower tip extension panels from the wing tip attach flanges, and mark an outline of the forward tip extension shearweb onto the inner laminates of the upper tip extension panel. Remove the upper tip extension panel and mark a 4" x 24" area onto its inner laminates centered over the shearweb outline. Fill the 4" x 24" area with duct tape, building up a .040" thickness. Cover the entire surface of the duct tape with a layer of polypropylene crating tape extending beyond the duct tape 1" onto the tip extension laminates all around. The polypropylene tape acts as a release agent. Remark the shearweb outline onto the surface of the polypropylene tape.

Cut (4) 3" x 20" pieces of bidirectional cloth on the 45° bias. Laminate the (4) bidirectional cloth pieces over the polypropylene tape, centered over the shearweb outline. Be careful not to allow any resin to run off the polypropylene tape. Let cure.

5 layers duct tape = -06

✓ Completed 9/26/01

1.5 hours for LHS only

1.5 hours for RHS 10-31-01



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STEP 7 BONDING THE UPPER ATTACH FLANGE TO THE FORWARD SHEARWEB

✓ Completed 10/5/01 LHS only 1.5 layers
 11/5/01 RHS 1.5 layers

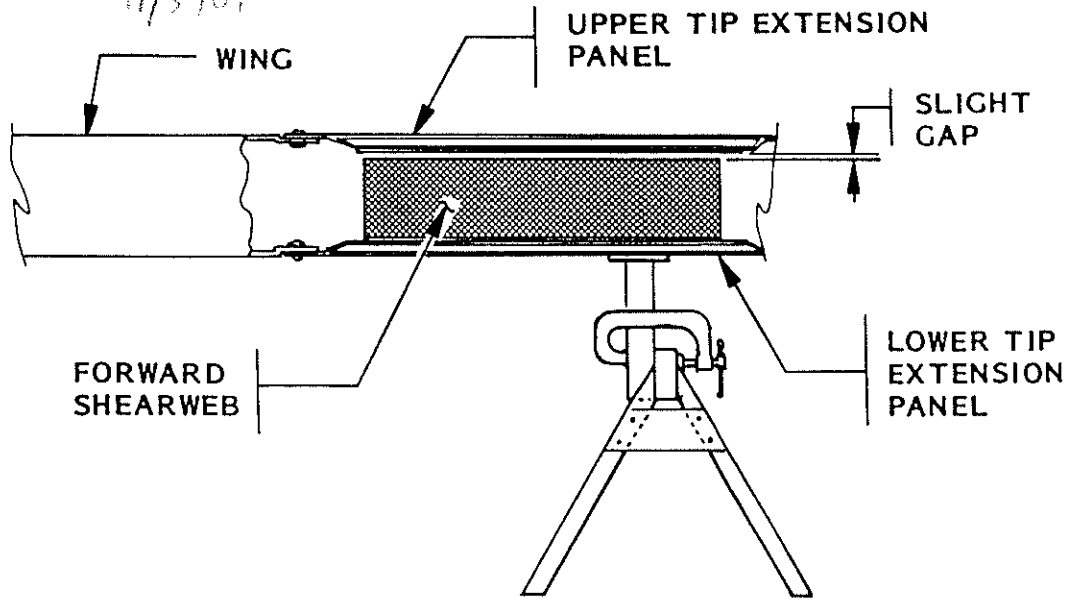



FIGURE (6)

Attach the lower tip extension panel to the wing, using a sawhorse to support the panel, as shown in FIGURE (6). Place a small light (such as a flashlight) on the aft side of the forward shearweb so that it shines toward the shearweb. Attach the upper tip extension panel to the wing and verify that the alignment is correct. Tape the edges of the tip extension panels together. Sight through the navigation light lens opening and verify that there is a slight gap (light is visible) between the upper edge of the forward shearweb and the (4) layer upper flange laminate. The gap ensures that the forward shearweb is not holding the upper tip extension panel too high. Remove the upper panel and sand the upper edge of the forward shearweb as required to achieve the slight gap.

probably a bit .12" on LHS
 .08" on RHS

			
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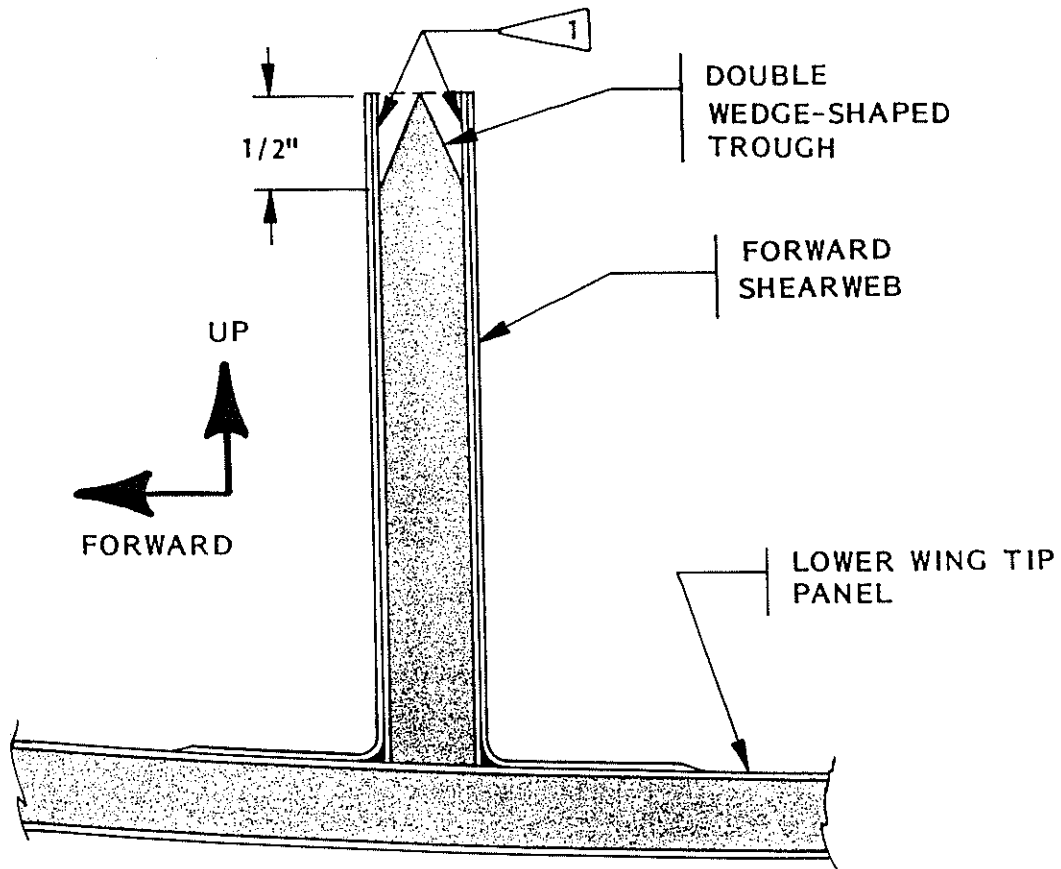


FIGURE (7)

Remove the upper wing panel. Carve a double wedge-shaped trough in the upper edge of the forward shearweb, as shown in FIGURE (7).

NOTE: Be sure to thoroughly scrape all foam off the fiberglass laminates in the areas indicated by Flag #1 in FIGURE (7) to prepare a good surface for bonding. This troughed area will be filled with mill-fiber mixture during bonding.


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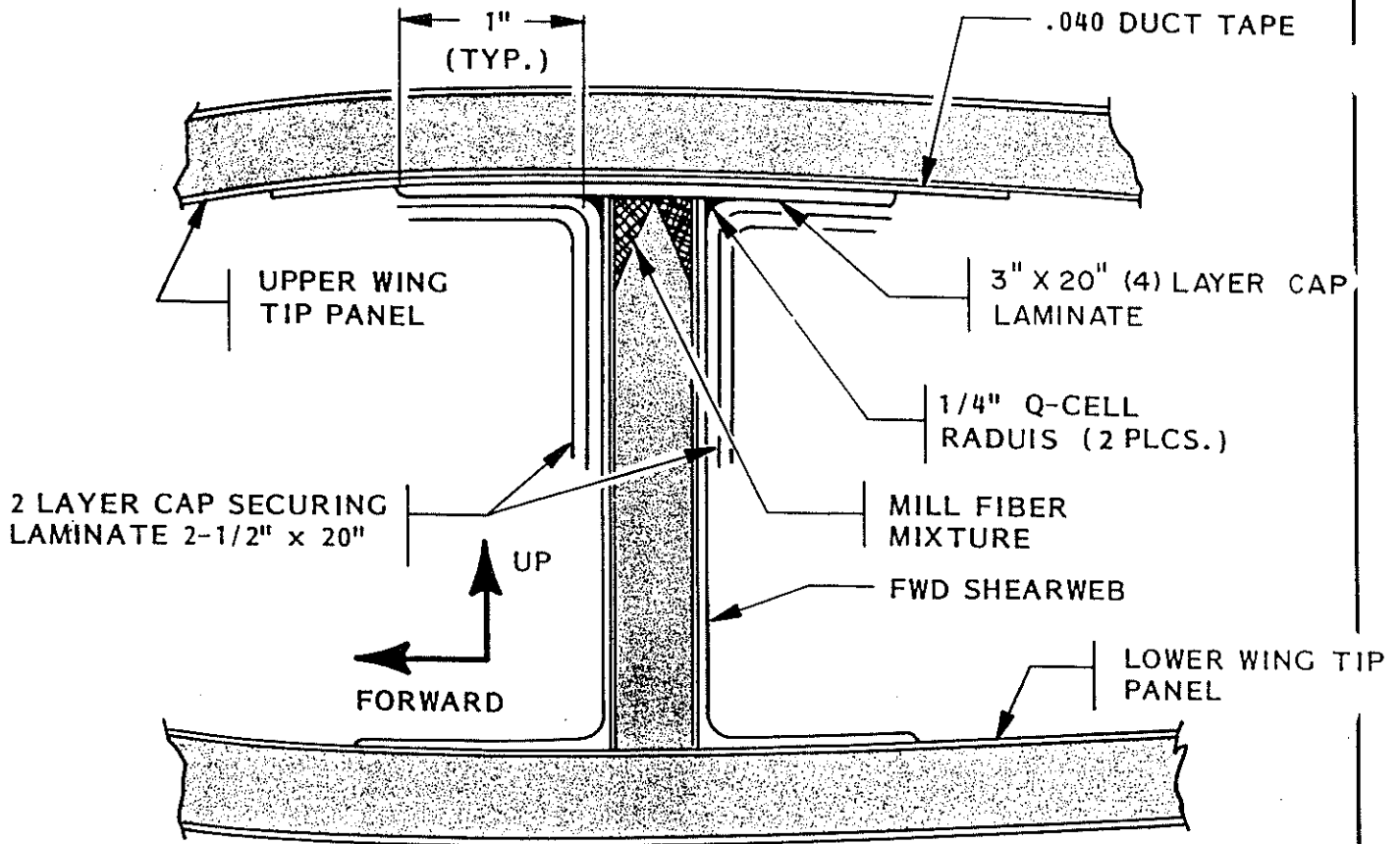


FIGURE (8)

used 70 grams

Mix about 50 grams of resin at 1% to 2% and make a thick but wet mill-fiber mixture. Fill the trough, building up a mound of the mixture about 1/4" above the top of the shearweb. To ensure a good bond, it is very important that the mixture doesn't sag after the wing tip panels are taped together.

about 1.0 hour

NOTE: Before filling the trough with mill-fiber mixture, brush a thin coat of resin over the sides of the trough to enhance bonding. ✓

Carefully place the upper tip extension panel onto the lower panel. Avoid shifting the upper panel and disturbing the mill-fiber mixture filling the trough in the forward shearweb on the lower panel. Temporarily secure the upper panel to the wingtip attach flange with (4) NAS603-10P screws. Tape the edges of the upper and lower panel together with masking tape after verifying that the wing tip panels are correctly aligned with the wing. Let cure.

Use used polypropylene tape to seal sides of shearweb to minimize gap to upper skin and to facilitate mill fiber mix into trough

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STEP 8 UPPER ATTACH FLANGE TIE-IN LAMINATES ✓

Remove the masking tape from the edges of the tip extension panels and carefully separate the upper panel from the lower panel. The upper panel should separate along the polypropylene tape surface, leaving the (4) layer shearweb upper attach flange bonded in place on the forward shearweb.

Cut (4) 2-1/2" x 18" pieces of bidirectional cloth on the 45° bias, and use them to form (2) layer laminates between the underside of the upper attach flange and the forward and aft surfaces of the forward shearweb, as shown in FIGURE (8). Let cure.

Trim the forward and aft edges of the forward shearweb upper attach flange 1" from the surfaces of the forward shearweb, as shown in FIGURE (8).

NOTE: Leave the .040" thick duct tape filler in place in the upper tip extension panel until the final bonding of the upper and lower tip extension panels. The duct tape filler simulates the thickness of the mat material used to bond the upper and lower tip extension panels.

STEP 9 SEALING SHEARWEB FOAM CORE ✓

Seal the exposed inboard and outboard ends of the forward shearweb foam core with a thin resin/Q-cell mixture.

Completed 10/7/01, 1 1/2 hrs. LHS
Steps 8+9

Completed RHS 11-15-01 1.0 hours



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✓ STEP 10 NAVIGATION LIGHT BULKHEAD FABRICATION AND INSTALLATION

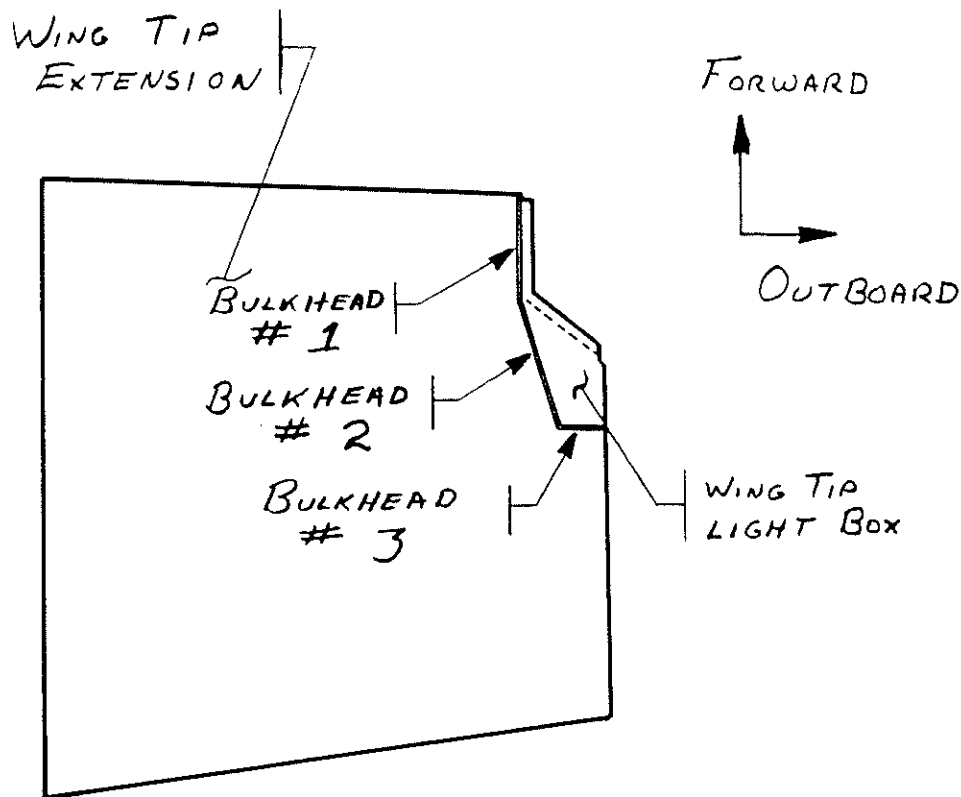


FIGURE (9)

The navigation light assembly and the strobe light flasher unit are located in a walled off section at the outboard end of the wing tip. This wing tip light box must be completely sealed off from fuel and fuel vapors in the wing tip to avoid danger from explosion. The tip extension light box sections are first fabricated and installed on the lower panel and later, when the upper panel is bonded to the lower panel, they will also be bonded to the upper panel, and the entire light box will be sealed.

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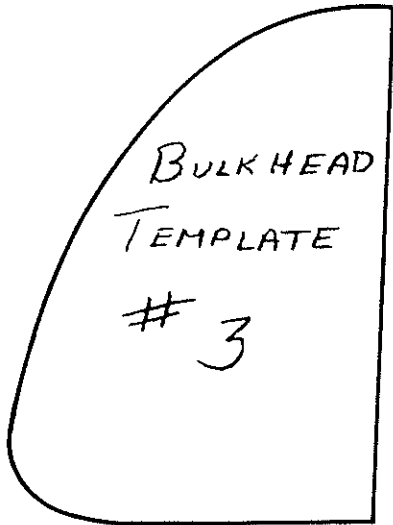
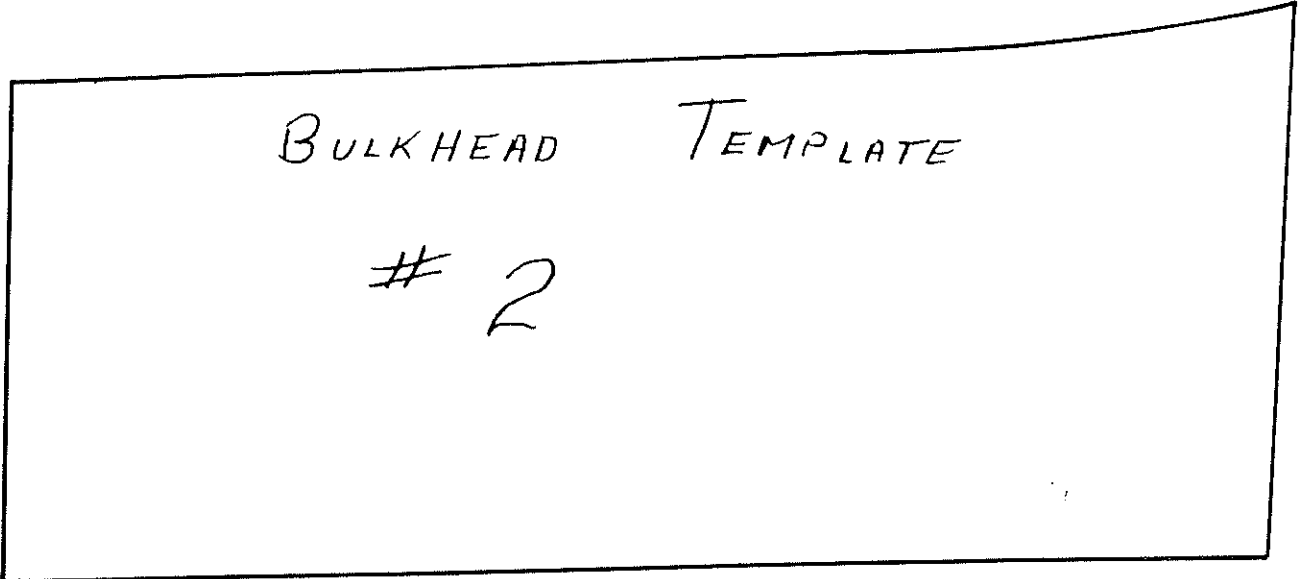
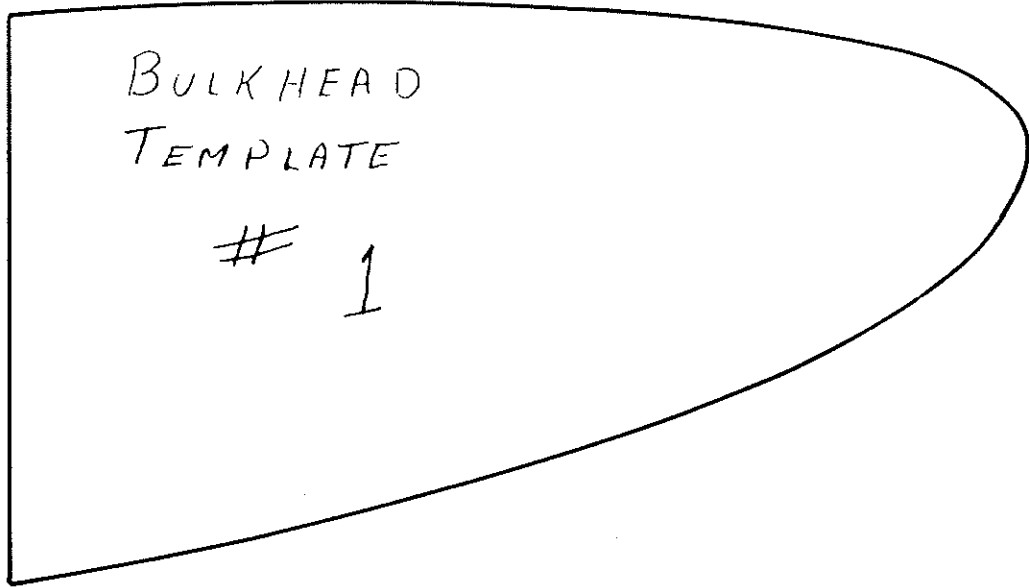


FIGURE (10)

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The navigation light bulkheads are cut from an 8" x 14" (2) layer precured laminate. Use the full size bulkhead templates provided in FIGURE (10) to mark the outline of the bulkhead pieces on the pre-cured laminate. The templates represent the left hand wing tip bulkheads. The right hand bulkheads are marked by flipping the templates over. Lay the templates on the smooth side of the pre-cured laminate when marking the bulkhead outlines.

NOTE: When fitting and assembling the navigation light bulkheads in the tip extensions, fit the parts so that the smooth surfaces of the bulkheads face outboard.

Use 60 grit sandpaper to roughen both sides of each navigation light bulkhead piece to prepare them for bonding.

Fuel Bulkheads made from $\frac{1}{4}$ " foam and 1 set $1\frac{1}{2}$ " 1/8 of lens joggle.
with 2 layer laminates on each side.

LHS

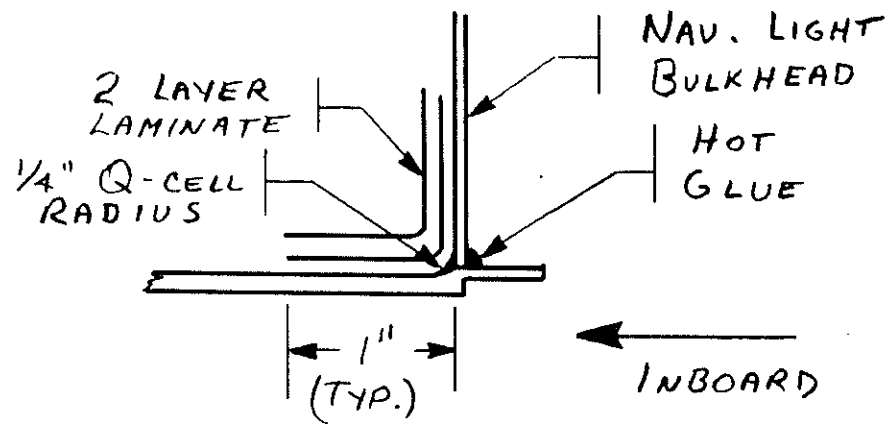
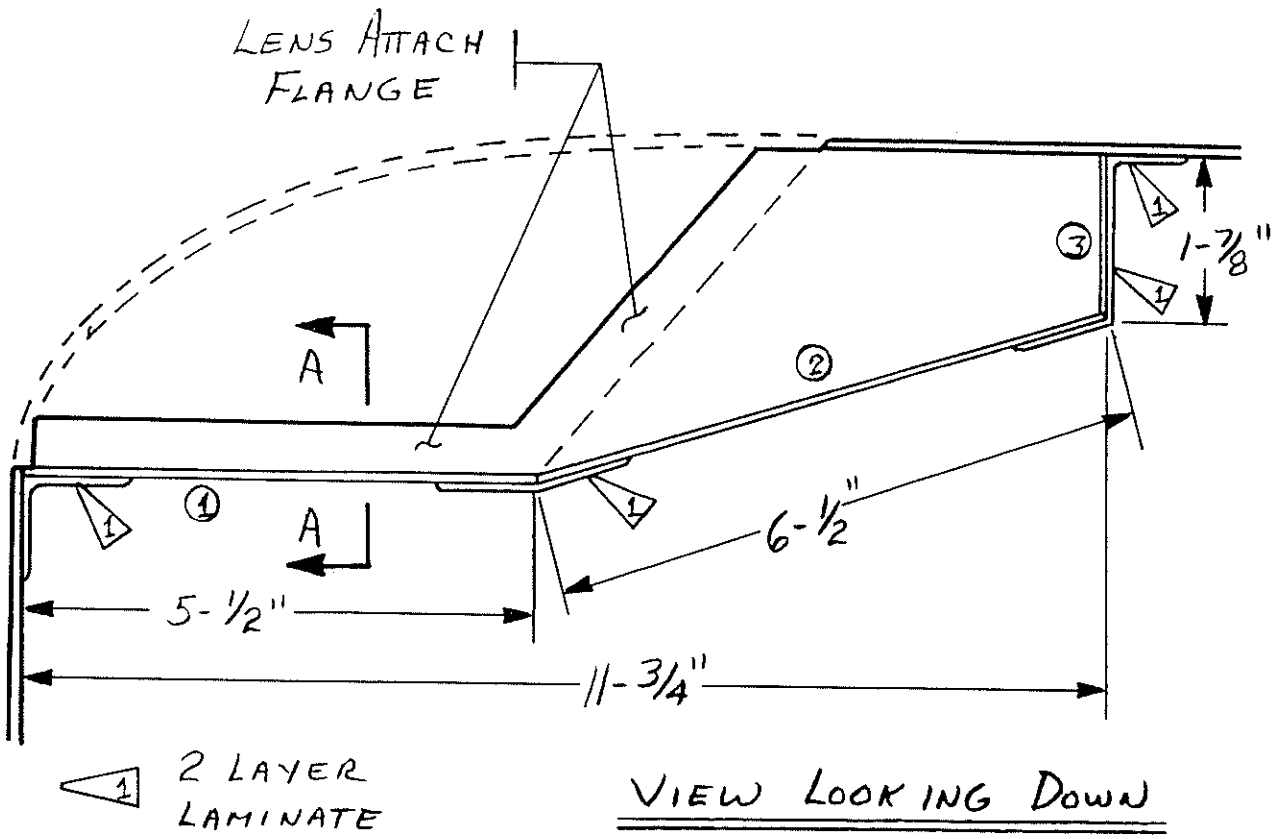
Completed 10/28/01 $3\frac{1}{2}$ hours.

RHS

✓ 1/18/02 $3\frac{1}{2}$ hours



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VIEW A-A

FIGURE (11)

			
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Position the navigation light bulkheads on the lower tip extension panel, using the dimensions given in FIGURE (11). Align bulkhead #1 with the edge of the lens attach flange joggle, as shown in View A-A FIGURE (11). Position bulkheads 2 and 3 using the dimensions shown in FIGURE (11). Hold the bulkheads temporarily in place with dabs of hot glue placed between the outboard sides of the navigation light bulkhead and the lower wing tip panel, as shown in View A-A of FIGURE (11). The dabs of hot glue are more easily removed when placed against the smooth, outboard sides of the laminates.

NOTE: The bulkheads are slightly oversize and may require some trimming to allow the upper and lower wing tip halves to fit together properly. Use sandpaper or shears to trim the bulkheads to the proper height.

NOTE: The height of the bulkheads must not prevent the .040" duct tape shim on the upper panel from seating completely against the upper attach flange on the forward shearweb. Leave a slight gap as was done with the forward shearweb.

Form 1/4" Q-cell radii between the lower inboard edges of the bulkheads and the lower tip extension panel, as shown in View A-A, FIGURE (11). Let cure.

Cut (4) 18" x 2" pieces of bidirectional cloth on the 45° bias, and use these pieces to form a (2) layer laminate between the inboard lower edge of the bulkhead and the lower wing panel, as shown in FIGURE (11), View A-A.

The bulkhead pieces are spliced together by 2" wide (2) layer bidirectional cloth laminates, as shown in FIGURE (11). Cut 2" wide bidirectional cloth pieces on the 45° bias to the length required to form the splice laminates. Apply the splice laminates and let cure.



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