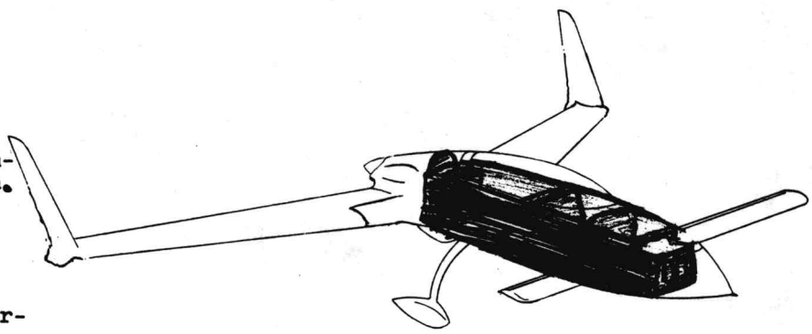
CHAPTER 6

FUSELAGE ASSEMBLY



OVERVIEW: In this chapter you will assemble the fuselage sides, bulkheads & bottom. First, you assemble the fuselage sides with the bulkheads, checking for a good square, straight fuselage.

The fuselage bottom is contoured, glassed, and installed last.

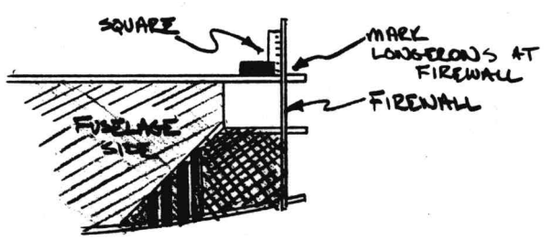
STEP 1

ASSEMBLING THE FUSELAGE SIDES AND BULKHEADS

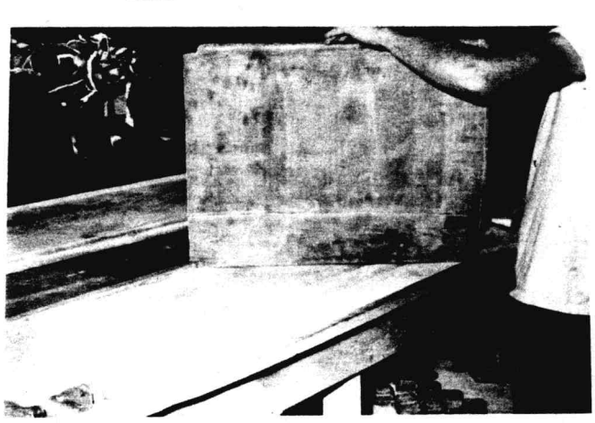
This step should take two to four hours for you and one buddy, don't try to do the last part of it alone.

Sand the bulkheads and fuselage sides for bonding where they mate. Or, remove peel ply.

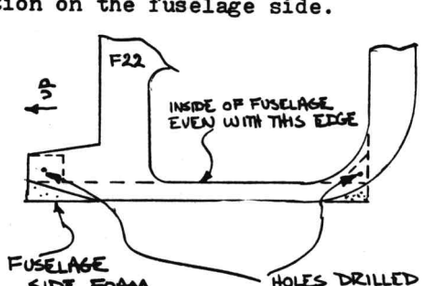
Trial fit the firewall to each fuselage side. Trim until it will sit flush against the lower foam face with all three longerons protruding through. Use a carpenters square to check that it is 90° to the top longerons and mark this position on the top longeron.



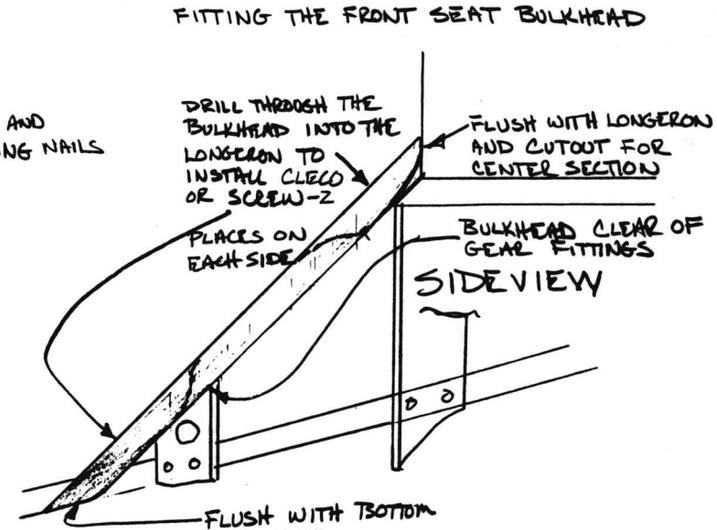
Trial fit the front seat bulkhead to each fuselage side. With it lined up on the marks drawn on the side and its top and bottom flush with the fuselage longerons, drill several small holes from the outside into the bulkhead. You will later install nails in these holes to temporarily hold the bulkhead in the correct position on the fuselage side.



FITTING THE FRONT SEAT BULKHEAD



Now, trial fit the forward bulkhead (F22) to the front of each fuselage side. Carefully line up the two longerons in the correct position and drill holes through the bulkhead and into each longeron. Note that the inside skin of the fuselage lines up with the bulkhead edge.



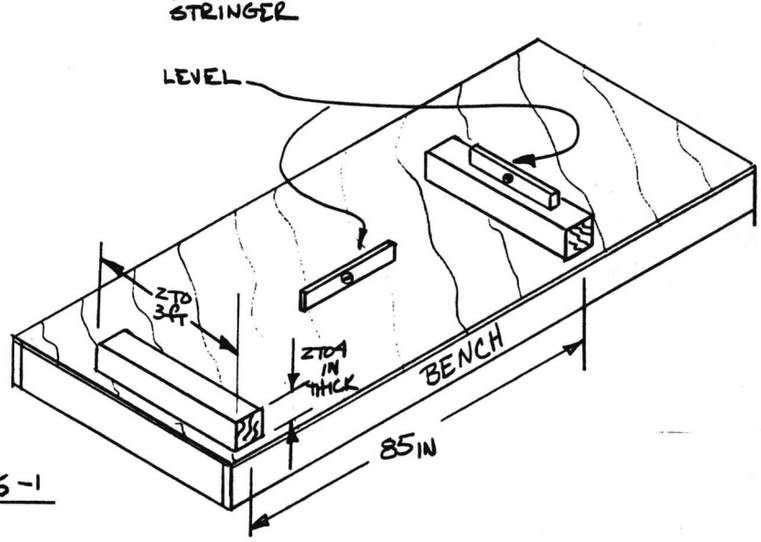
You will later install nails in these holes to temporarily hold the bulkhead in position until the epoxy cures.

Now, trial fit the rear seat bulkhead in place on each fuselage side. It should be flush with the bottom and with the spar cutout and should sit flat against the wood piece without touching the metal landing gear brackets. Clecos or small wood screws are very handy to hold this bulkhead during cure. With the bulkhead correctly located, drill 1/8" holes as shown.

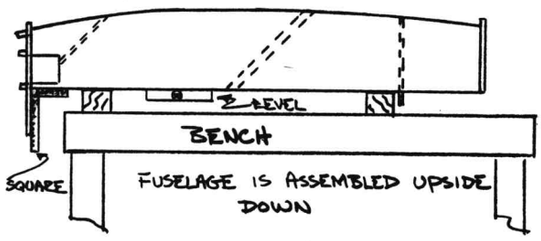
Trial fit the instrument panel to each fuselage to check that the bottom edge is flush and the sides fit correctly. Nails/clecos are not required to position this bulkhead during assembly.

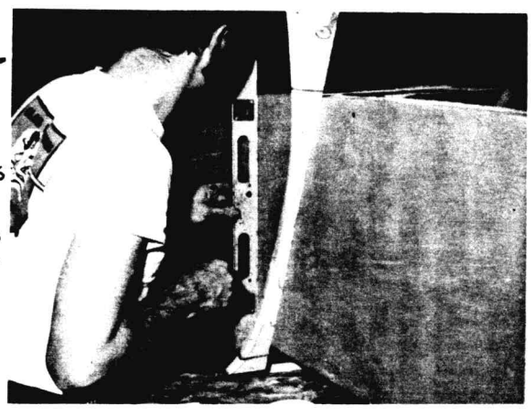
Do not be concerned if you have gaps up to 1/4" in any bulkhead fit. These can easily be filled with flox or micro during assembly. The primary strength of the side/bulkhead joints is in the glass tapes that are later laid into the corners.

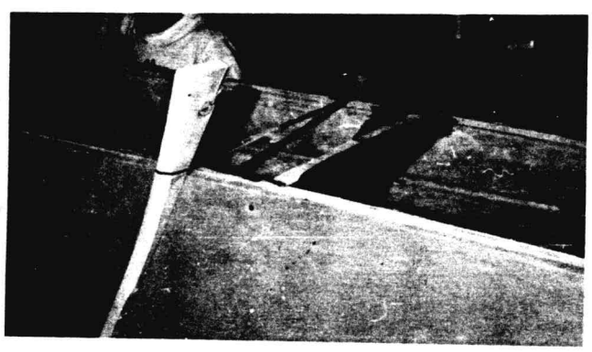
Now, lay two blocks on your table approximately two to three-ft long and two to four-inches high; level them with respect to each other as shown.

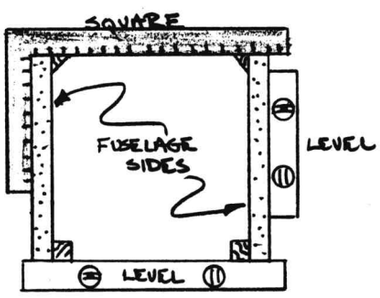


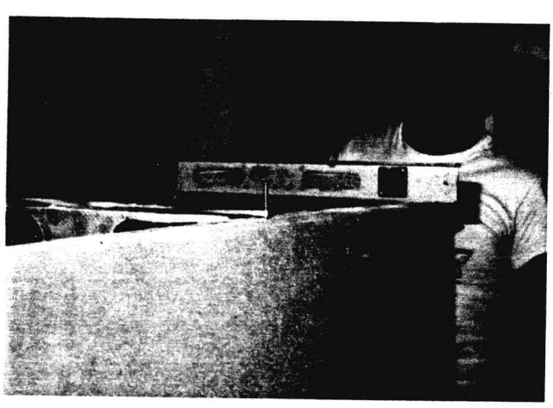
You will now set the fuselage sides upside down on these blocks and trial fit the bulkheads as a complete unit. Install them in the following order: front seat, instrument panel, F22, rear seat and firewall. Refer to the photos. Place some scrap lumber along the outsides of the fuselage and hold together with rubber bands to hold the sides flat against the front seat bulkhead or at any place where they will not stay in place. Now, use the carpenters level and square to check the squareness of the temporary jigged fuselage. Refer to the top view sketch and check the symmetry of the fuselage. It may be difficult to get everything exactly straight, but do your best to at least get the straight top longerons level and parallel, and to not get the firewall crooked. Now, disassemble everything, recheck all bond areas are sanded dull, mix up flox and apply it to all bulkheads, including the firewall.

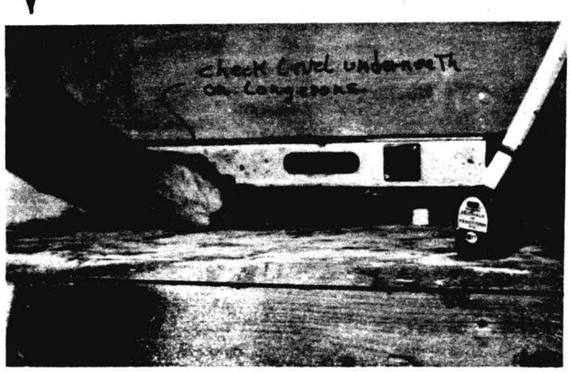


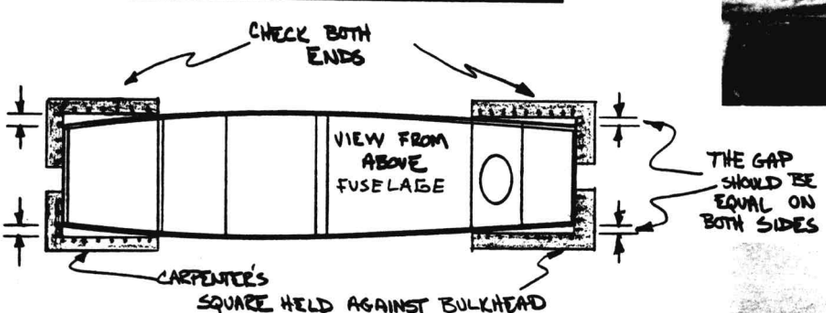




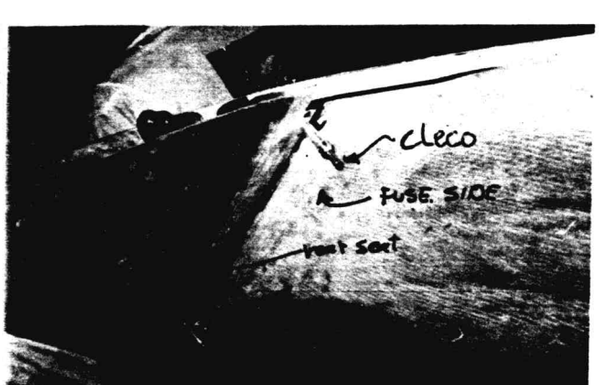








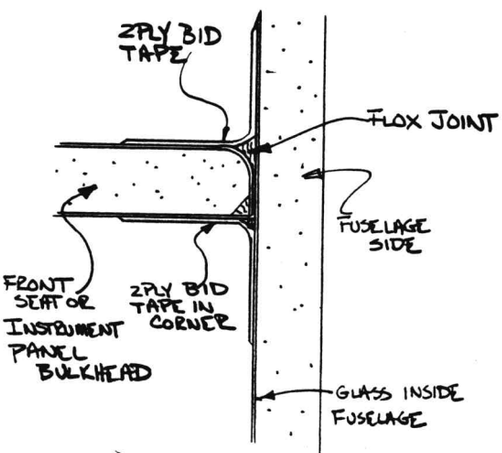
CHECKING SYMMETRY

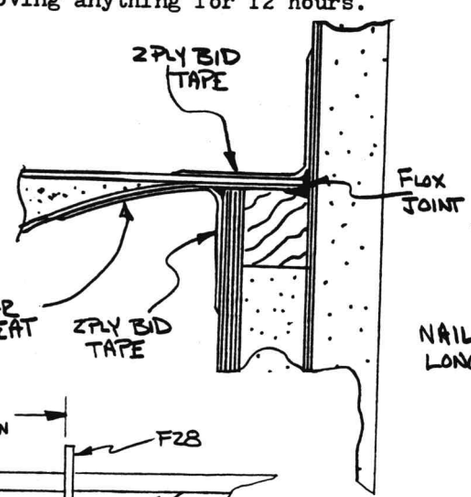


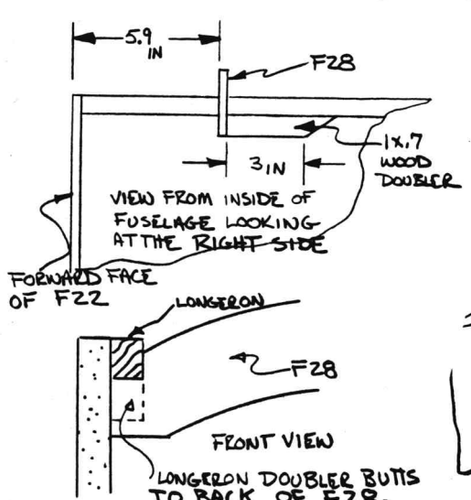
THE REAR SEAT BACK BULKHEAD HELD IN POSITION WITH CLECO'S. SMALL WOOD OR SELF TAPING SHEET METAL SCREWS CAN BE USED ALSO.

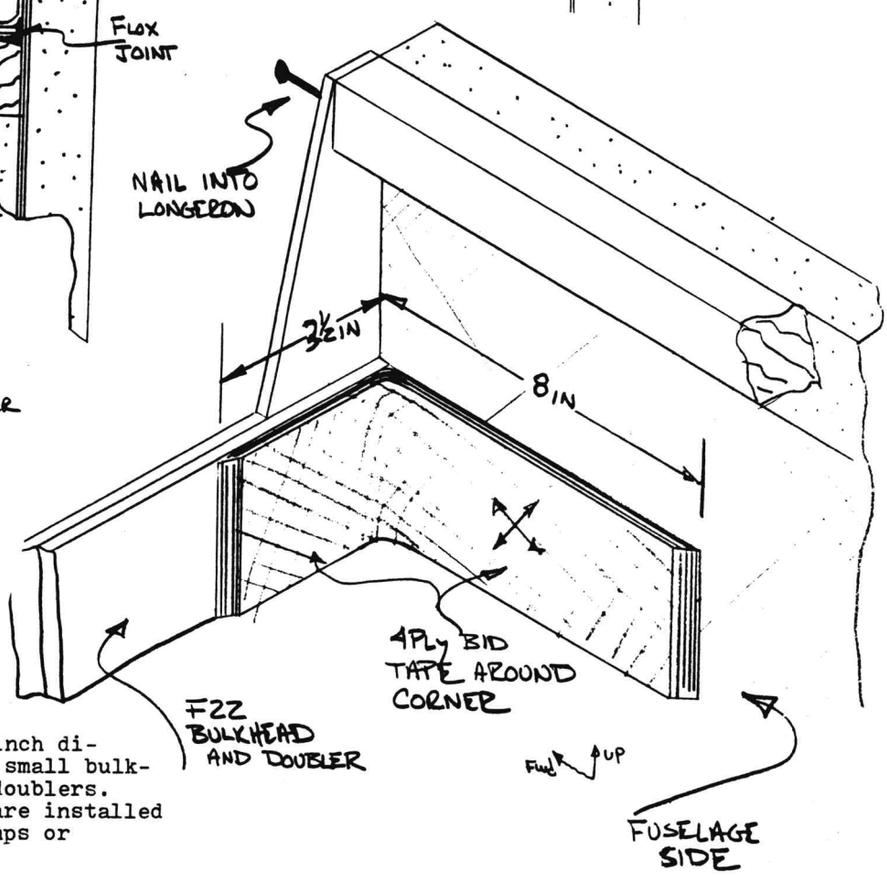
Reassemble the parts and again carefully check the alignment. Glass tapes are applied now (while the flox is still wet) in the corners of the instrument panel and the front seat bulkhead as shown. The clecos in the rear seat are in the way so just wipe away excess flox, and tape <u>after</u> cure. The front F22 bulkhead gets tapes only in the area shown (its other reinforcements are installed in chapter 13). All glass tapes have a 45-degree fiber orientation.

Recheck alignment and leave alone without moving anything for 12 hours.









Carefully measure the 5.9-inch dimension shown and mount the F28 small bulkhead and the two .7x1.0x3 wood doublers. The bulkhead and wood doublers are installed with wet flox and held with clamps or staples until cured.

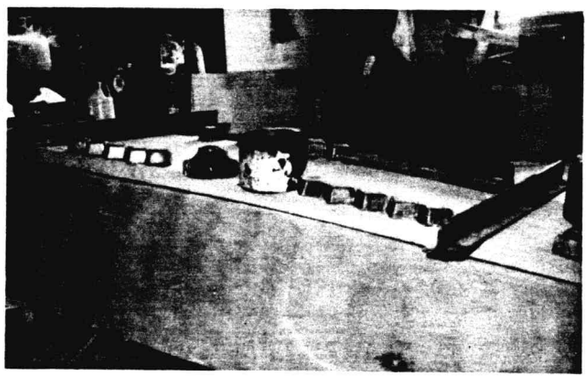
The firewall must be square so the centersection spar will fit well and accurately. The centersection spar is installed in chapter 14 by sliding it in from one side.

NOTE: The long MAIN landing gear ATTCH BOLT can be installed thru the lower hole of the aft seat bulkhead on the right side only. Open a hole on the left to allow installation of this bolt.

STEP 2

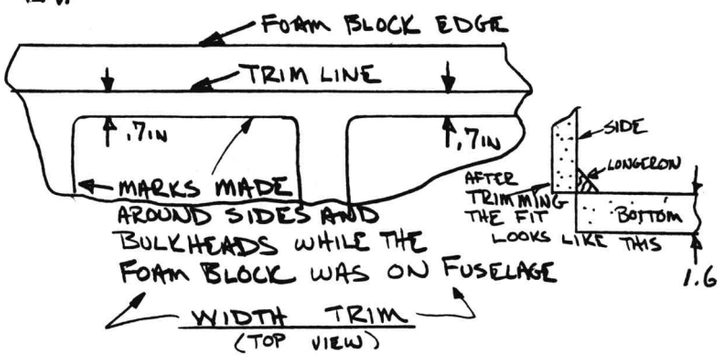
CONTOURING AND INSTALLING THE FUSELAGE BOTTOM

This step should take five to six hours. Place the fuselage upside down on a couple of saw horses. Take a 1.6"x24"x96" dark blue Type R45 PV foam block and weight it onto your fuselage bottom as shown in the photo. The foam edge should be butted against the forward bulkhead (F22) and trimmed as required to contact the bulkhead surface fully. Crawl under the assembly and, using a felt pen, mark the bottom foam block around each bulkhead and along the fuselage sides. These marks will be used as a reference for contouring and trimming your bottom piece.

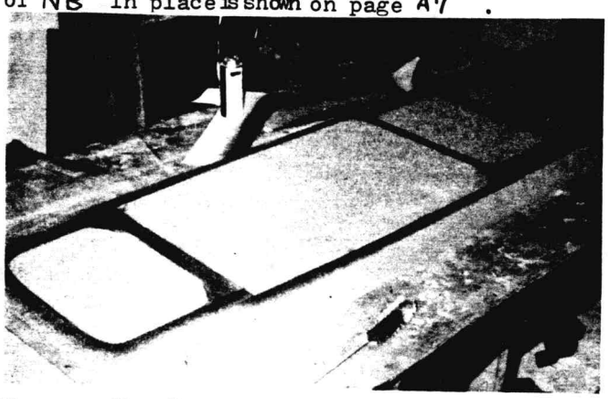


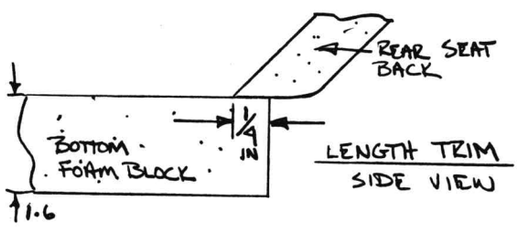
BUTT TWO PIECES SEE Pg 2-3

Remove the block and place right side up on your work bench. Measure out to 0.7 inches outboard of your marks, and trim the block to the correct width as shown. Measure 1/4" aft of the back mark and trim the block to the correct length as shown.



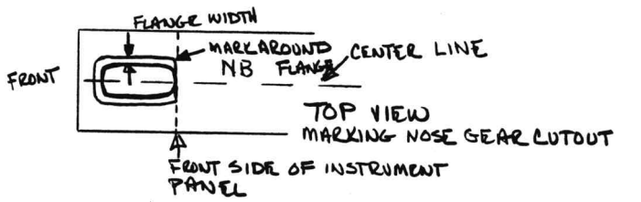
Now, round up your NB nose gear box cover. This is a fiberglass part available from distributors. Set it (centered) in place as shown and trace around it to determine the forward contour marks as shown on page 6-6 . A full-size view of NB in place is shown on page A7 .



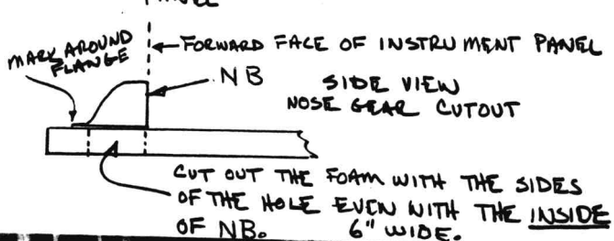


FOAM MARKED FOR TRIMMING AND CONTOURING

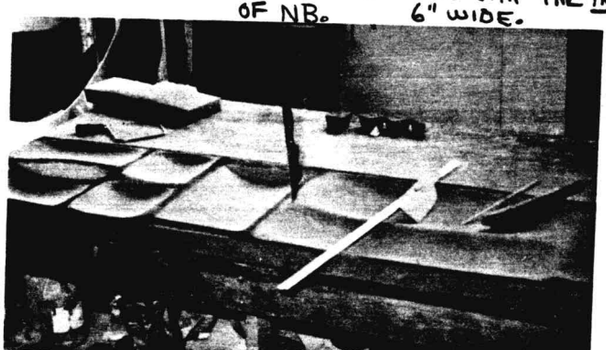
Measure the flange width of NB and use this information to draw a contour on the bottom block which corresponds to the inside of NB . Cut vertically along this line to remove a block of foam. This is the wheel well for the nose gear.

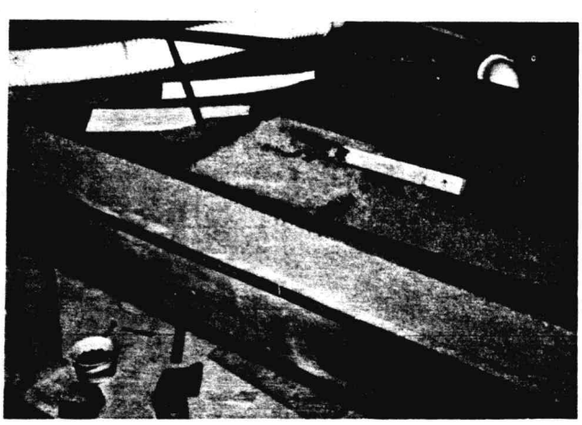


Now, study carefully the dimensions and contours shown on page 6-6 . None of the contours are real critical for exact shape or size, however, if you follow the sections shown, you will have a cockpit bottom shape that transitions smoothly up onto the seat bulkheads and side consoles (arm rests). Note that the left and right contours are not the same in the front cockpit because the right arm rest is wider than the left arm rest.



Now, get out the Drill with Rotary File, Sandpaper knife, ruler, yardstick, dust mask and vacuum cleaner and carve and smooth all the concave contours. Refer to the drawing on page 6-6 and the photos for contour information. Round any sharp corners.

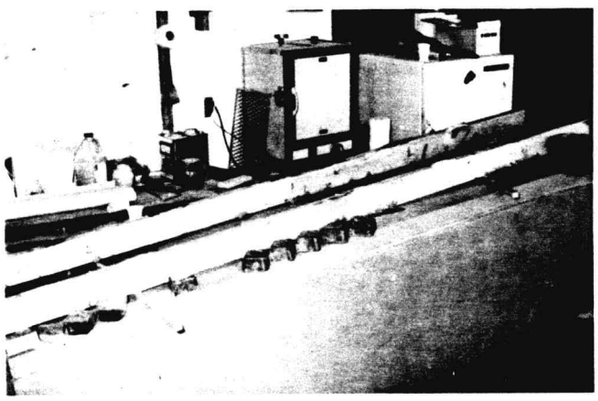


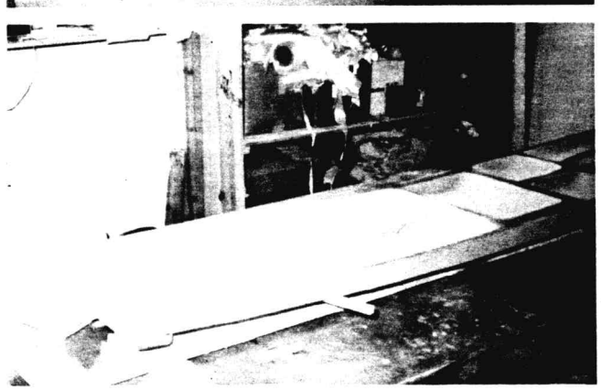


Set the block back on the upside down fuselage (still on saw horses). Weight it in place and get down inside the fuselage and see how the contours look. When you're satisfied that they fit and look good, you're ready to continue.

Locate the foam block on the fuselage, then use weights to hold the flexible foam down on the curved fuselage as shown. Position a pair of long 2x4's on the foam as shown with scrap wood shims to keep them from rocking on the curved foam. Use Bondo dabs to temporarily hold the 2x4's and shims to the foam. Don't make huge blobs, but use plenty of small ones so that when the weights are removed, the boards hold the foam securely in its curved shape. The reason you're using the 2x4's, is to hold the bottom block in its curved shape while you take it to the table for glassing. When the Bondo is hard, remove the weights and bottom foam block from the fuselage. Place the foam block, right side up, on your work table (see photo).

Lay up two plies over the contoured foam face using 2 plies BID @ 45°. The glass runs down the forward face. Run the fibers at 45°, trim the selvage, and overlap the joints one inch. Add a third ply in the back seat area, forward of where the seat cushion goes. This gives extra surface durability where the back seater stands when getting in and out. Two plies are sufficient in the curved areas where the cushions are placed. Scissor trim flush with the foam edges on the sides. Leave 2" excess cloth at the rear. Let this layup "tack" for two to four hours. This will allow the bottom to cure enough, so that the glass doesn't fall off when you turn it upside down onto the fuselage. Mix flox and spread a liberal bead along the mating surfaces of the longerons and bulkheads as shown in the photos.





SPREADING FLOX

Now, turn the glassed bottom over and relocate it on the fuselage. Weight it into position again, being sure to get good contact along the sides and on the bulkheads. Clean off the excess flox inside and outside. Refer to the sketch showing what to do with the 1" of excess cloth on the back of the bottom block. This provides an excellent joint for bottom of the rear seat. Let the assembly cure fully. After a full cure, you can remove the boards, Bondo blobs, and weights. Flip the fuselage right side up, and tape the bulkheads and sides to the bottom just like you did the sides to the bulkheads earlier. Do not sit or stand in your fuselage yet. It does not attain its stiffness and strength until the outside is glassed in the next chapter.

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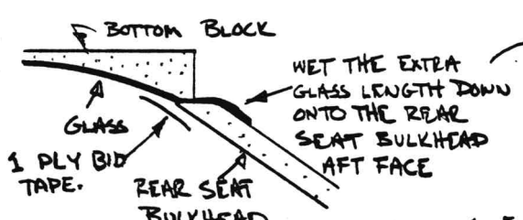
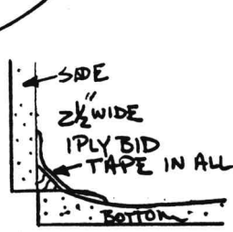
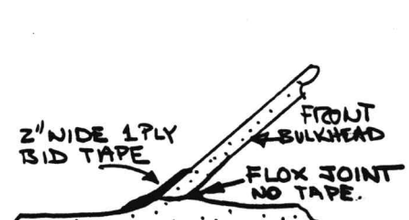
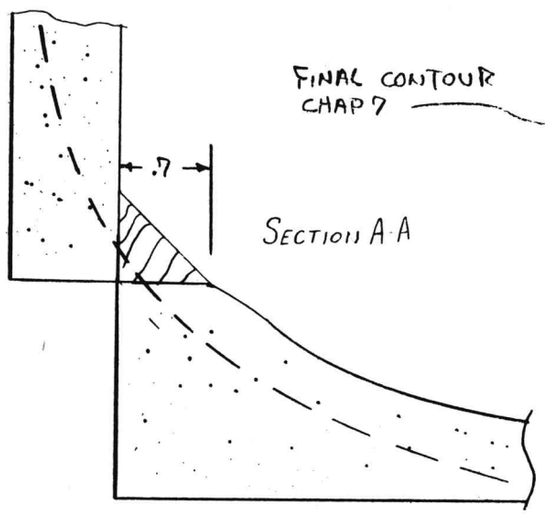


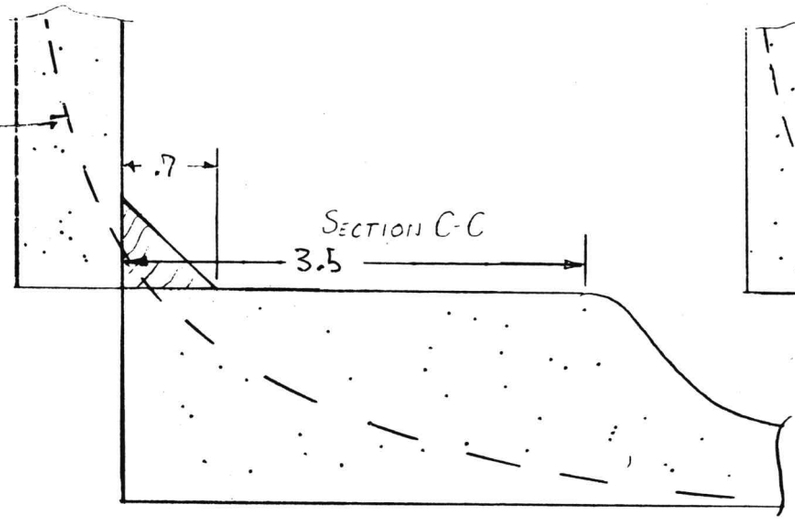




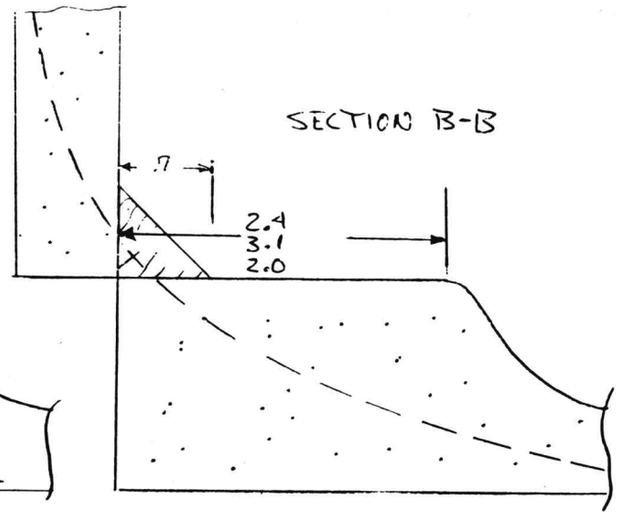


SECTION A-A

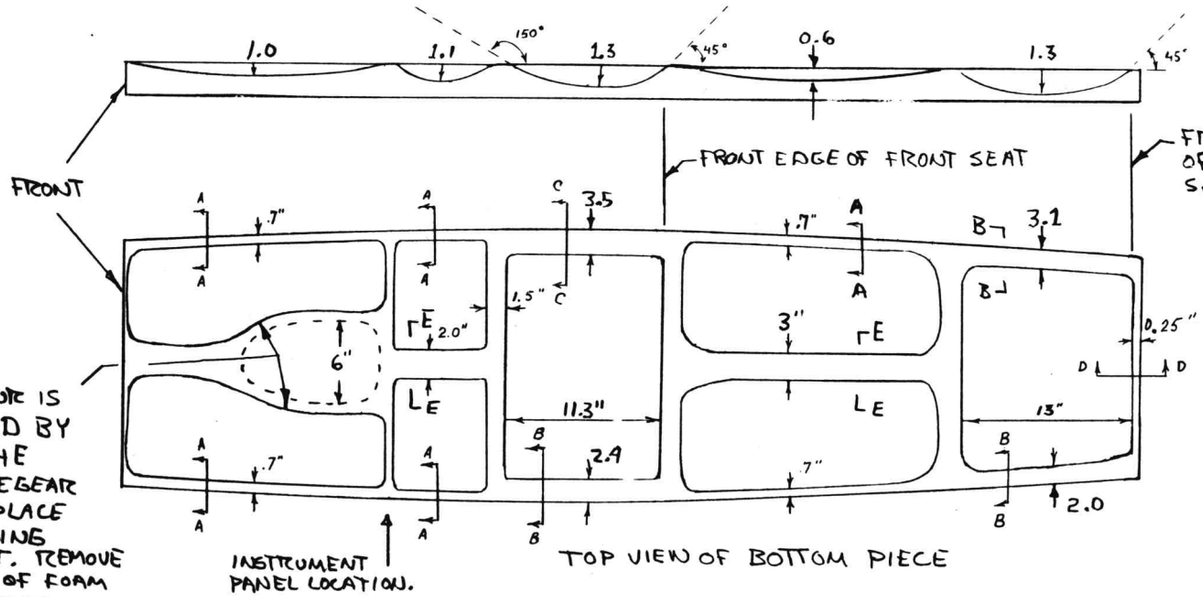
FINAL CONTOUR CHAP 7



SECTION C-C



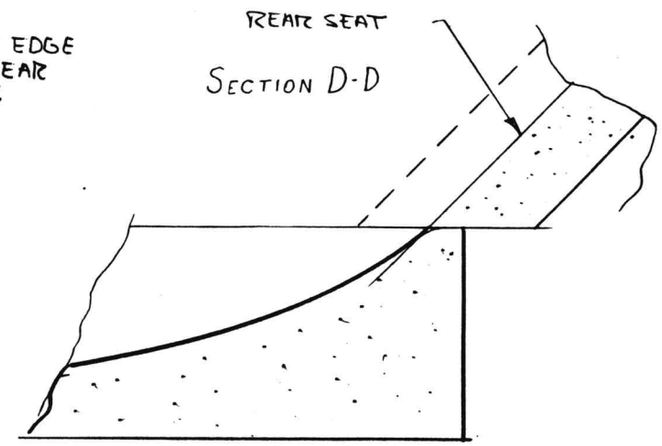
SECTION B-B



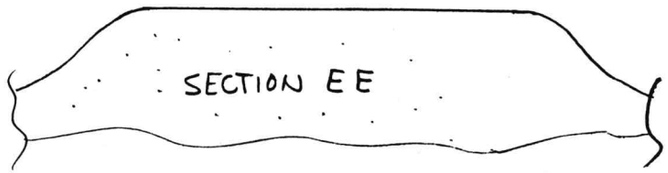
THIS CONTOUR IS DETERMINED BY PLACING THE NB NOSEGEAR COVER IN PLACE AND TRACING AROUND IT. REMOVE THE PIECE OF FOAM SHOWN BY THE DASHED LINE WHICH CORRESPONDS TO THE INSIDE CONTOUR OF NB.

INSTRUMENT PANEL LOCATION.

TOP VIEW OF BOTTOM PIECE



SECTION D-D



SECTION E E