

CHAPTER 17-A CANOPY SYSTEM INSTALLATION

USE THIS SUPPLEMENT IN PLACE OF CHAPTER 17 IF YOU WISH TO
INSTALL YOUR CANOPY WITH THE FORWARD HINGE OPTION.

A. DESCRIPTION

This supplement is to provide the information necessary to mount your Lancair 320 canopy as shown in Figure 2. The normal mounting method is shown in Figure 1. This installation requires alterations to the header tank (chapter 11, "Fuel System"), but any of the three header tank mounting configurations (permanent, hinged or screw mount) can still be used (Note - we do not recommend permanent installation of the header tank, since it severely limits future access to rudder pedals and engine mount bolts, and expansion of your instrumentation cluster!). This supplement will detail the modification of the header tank and installation of the Forward Hinge Canopy. Read these instructions through entirely at least once before proceeding with these modifications. These instructions cover regular construction and fast build kits.

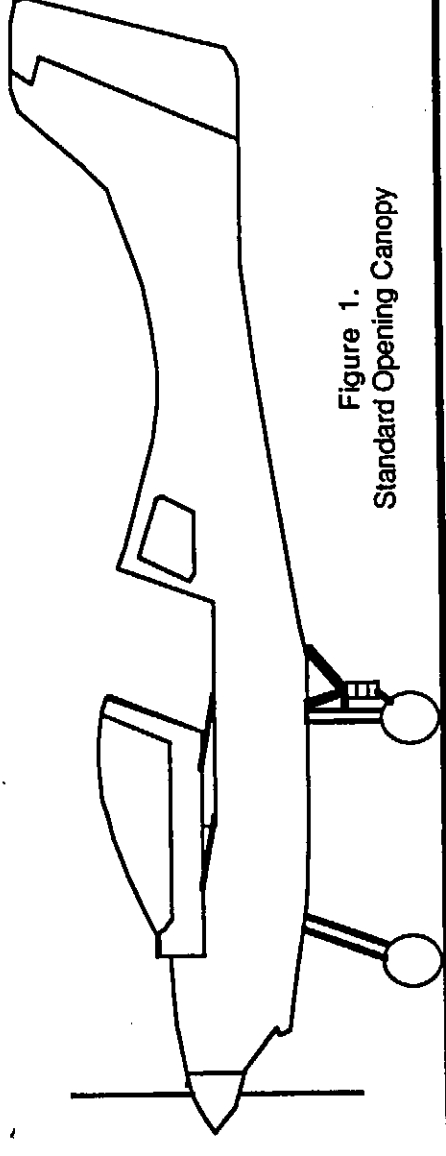


Figure 1.
Standard Opening Canopy

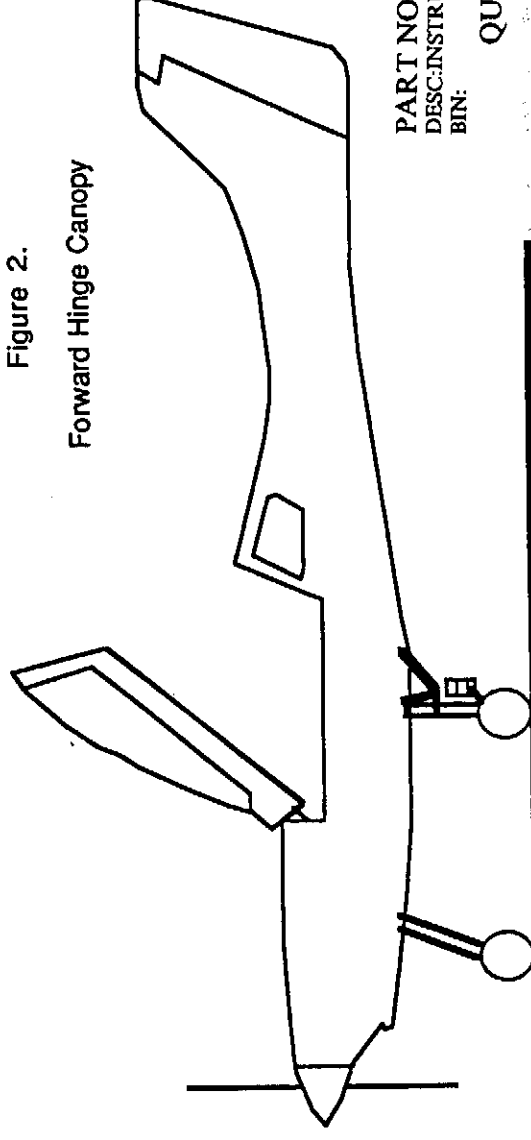


Figure 2.
Forward Hinge Canopy

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DESC: INSTRUCTIONS FORWARD H
BIN:

QUANTITY: 1
300-0019

B. EQUIPMENT REQUIRED

Tools:

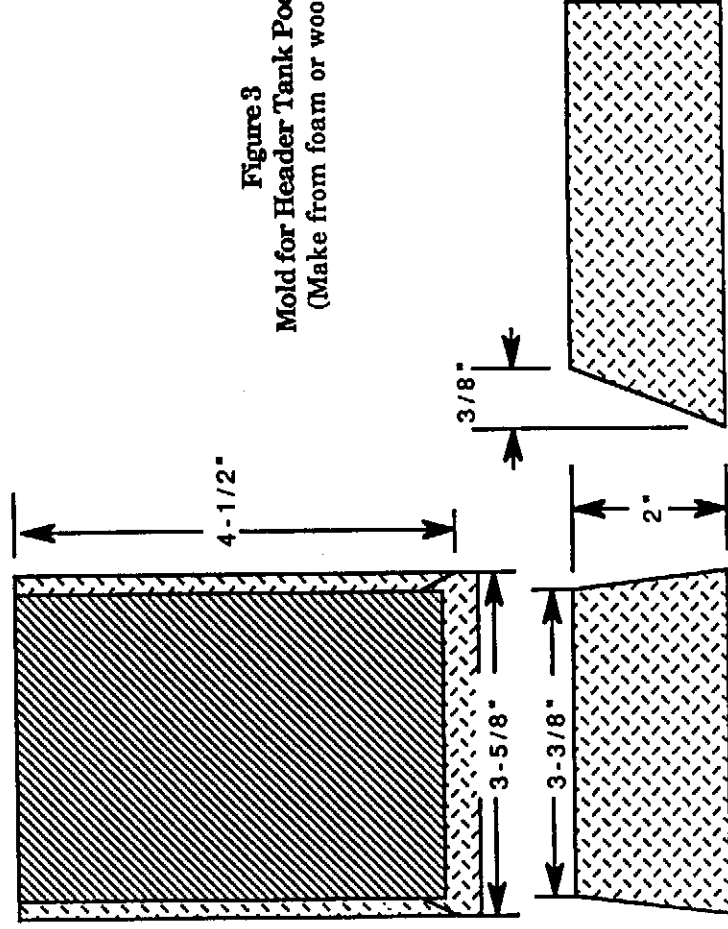
3/8" wrenches (2)
3/16", 9/32" and 1/8" drill bits
Drill motor
Hammer
Hot glue gun or clamps
Tape measure
Router
1/4-20 Tap & drill bit

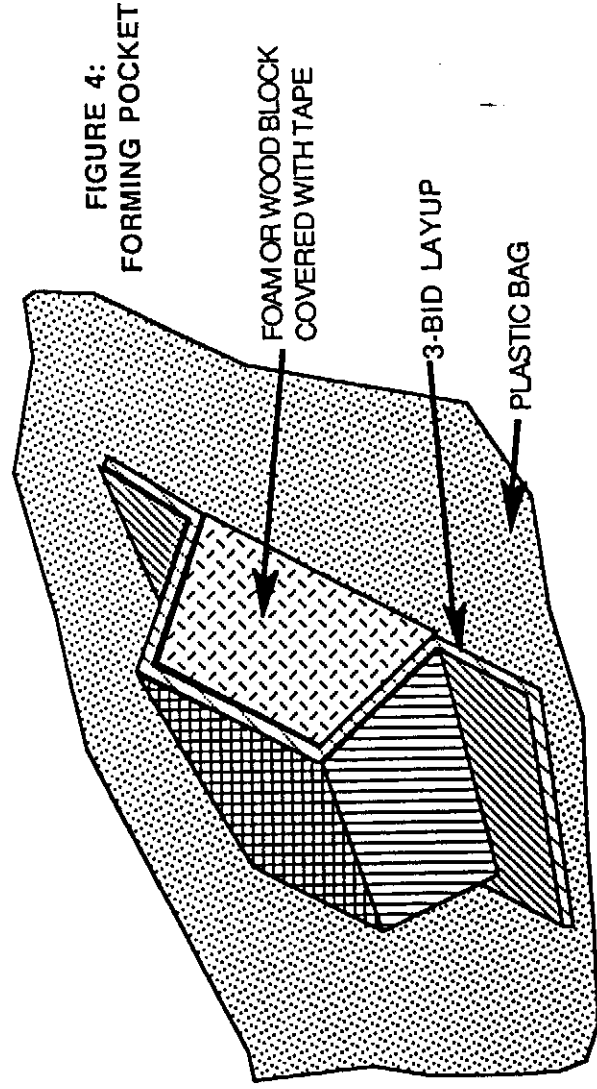
Materials:

L-320 Forward Hinge Canopy Kit
Uni-Directional Carbon Fiber
Epoxy/Flox mix
Material for BID layups
Bondo
Sandpaper, #40 Grit
White foam sheets, 1/4" & 1/2"
Structural adhesive
Plastic tape
Epoxy/micro mix
Nails
2x4" board, 16-17" long
Hot glue (or clamps)
Inflatable "D" seal or equiv.
3/8" plywood or equiv.
Some scrap wood for making a canopy frame holding fixture
Thin plastic, like supermarket grocery bags
Double-sided tape or equiv.

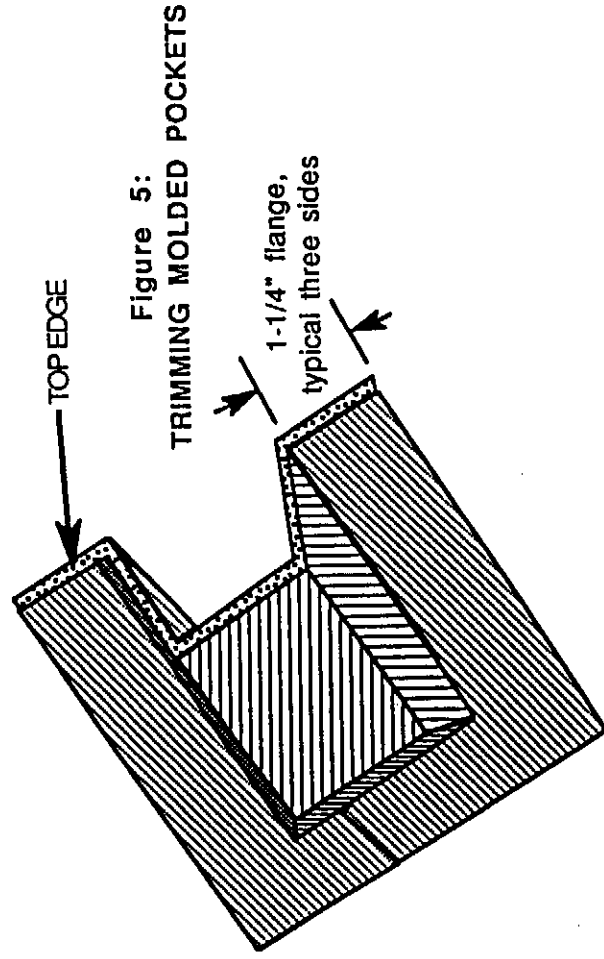
C. PROCEDURE**17-1 MODIFYING HEADER TANK**

1. After performing the steps in Chapter 11 up through page 287, step 78 of the manual then calls for attaching the header tank to the fwd deck. before doing this, we need to install pockets in the header tank to accept the hardware for the canopy hinges.
2. **Put tape or caps over the ends of the fuel tank fittings so that nothing from the following steps can get into them and form an obstruction.**
3. Place the header tank in position on the forward deck, with the forward deck mounted in it's cradle.
4. Mark areas of header tank to be cut out for pockets (refer to blueprint "Q", L-320 FWD HINGE CANOPY, for locations).
5. Mark outline of header tank on fwd deck, and mark where pockets will be.
6. Cut out pocket areas.
7. Make foam blocks (or pcs of 2x4 wood) per fig. 3, contouring to fwd deck shape.
8. Cover blocks with plastic tape.
9. On a flat sheet of plastic bag, make 3-bid lay ups over the blocks and forming the flanges, as shown in figure 4.





10. When dry, remove from plastic sheet, pry out taped blocks and trim molded pockets per figure 5.



11. Position pockets on inside of header tank and mark positions (see fig 6).
12. Using #40 grit paper, 'scuff' the inside of the header tank where pockets will go. Clean surfaces of pockets and header tank with acetone.
13. Using structural adhesive, bond the pockets to the inside of the header tank and clamp in place, wiping off any excess adhesive before it hardens. Let parts set up before proceeding.
14. Lay up a 3-bid attachment strip around pockets as shown in fig 7.

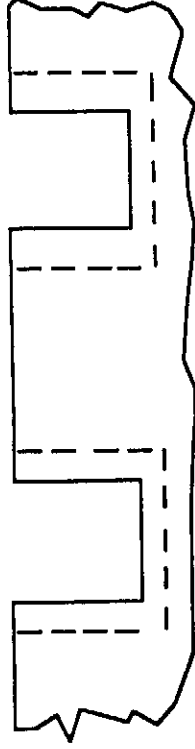


Figure 6:

HEADER TANK POCKET MOUNTING AREAS

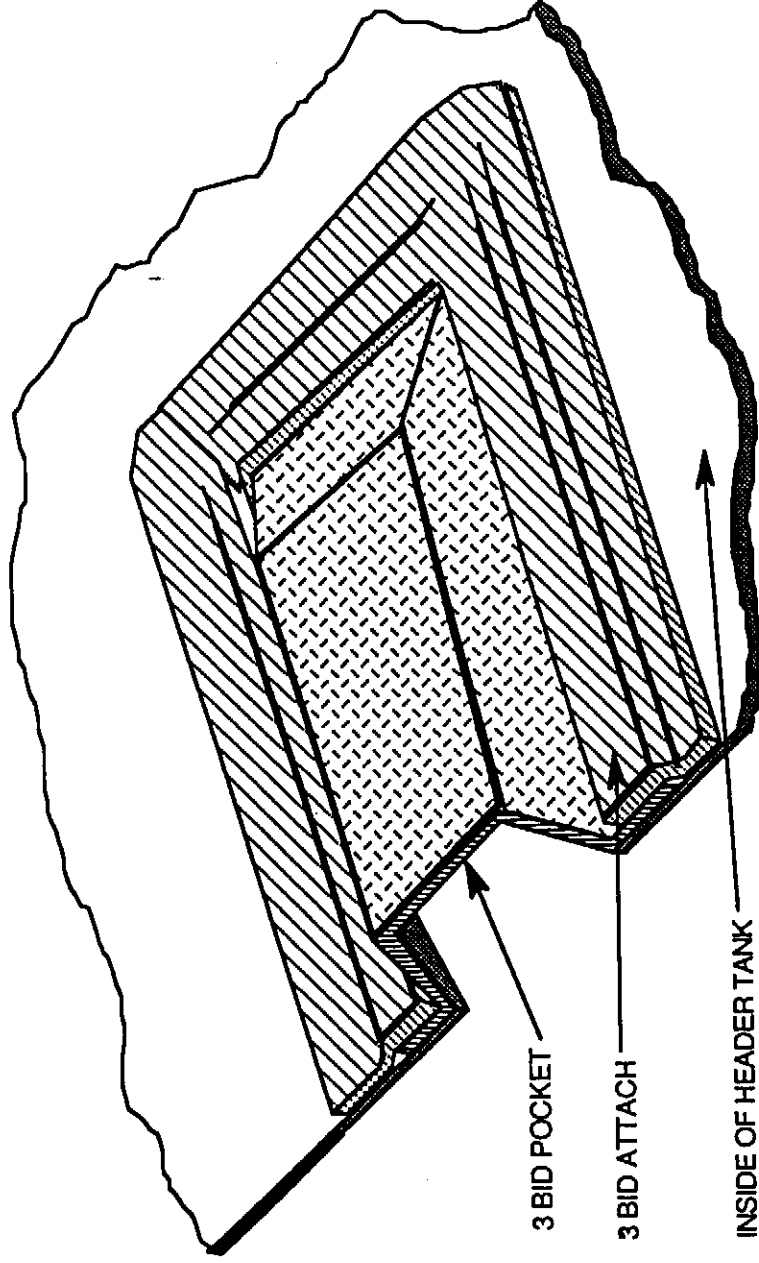


Figure 7
POCKET ATTACHMENT (Typ. 2 places)

15. Remove the tape or caps from the header tank fittings and proceed with the section in the manual for attaching the header tank to fwd deck (chapter 11, page 288). When you attach the header to the fwd deck, you will, at that time, attach the top of the pockets to the fwd deck. **AT THAT TIME, LAY IN THE 8 BID STIFFENER SHOWN ON DWG "Q".**

NOTE: IF YOUR HEADER TANK HAS GEL-COAT ON IT, IT MUST BE REMOVED FROM ANY AREAS THAT ARE TO BE BONDED.

Proceed with the manual until you reach Chapter 17, Canopy Systems, and then return to this supplement, where we will begin with the Canopy Frame Installation.

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As previously discussed, the canopy frame installation must be initially fitted in conjunction with the forward deck and the top cowling. The cowling, being best fitted with the aid of the engine for placement, will most effectively locate the ideal forward deck line. The canopy frame will fit to that established line.

17-2 FUSELAGE PREPARATION

16. Referring to figure 8 and to the blueprint "Q" for "L-320 FWD HINGE CANOPY", install the fuselage bracket for the gas struts:
- Measure aft to FS-17.6, and put a vertical mark on the top and inboard sides of both longerons.

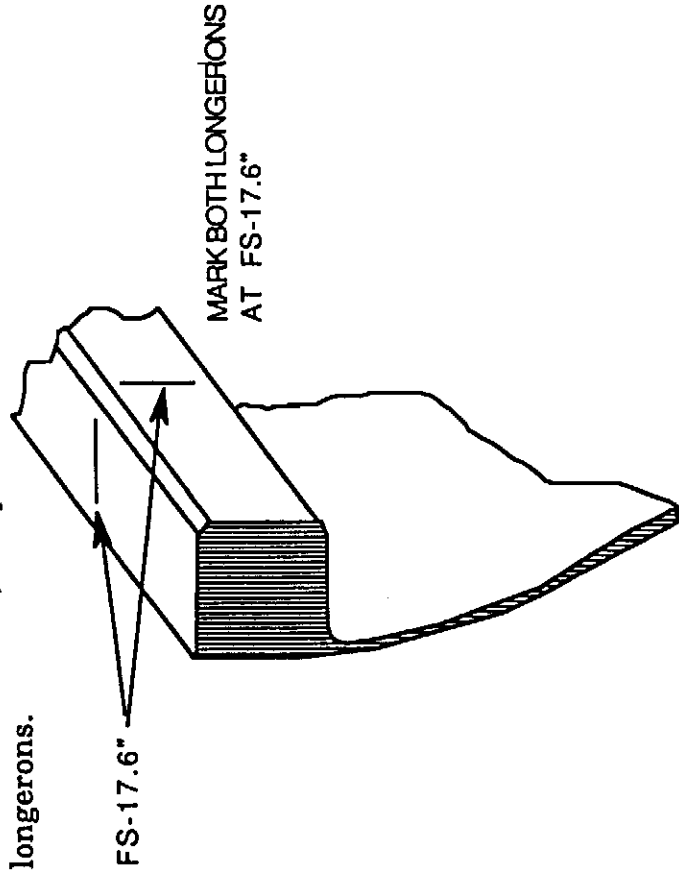


Figure 8

LOCATING STRUT BRACKET ATTACH POINTS ON LONGERONS

- In order for the gas strut to have proper clearance, the bracket will have to be mounted at an angle, slanting inboard at the top. The strut mounting point will require 1" of clearance between the bracket and the inside of the fuselage. Referring to figure 8 and blueprint "Q", install the aluminum attach brackets to the fuselage. Suggestion - roughly carve a couple of pieces of wood about 1/8" larger than the end of the gas strut, and hot-glue them to the approximate attach points on the outboard side of the fuselage attach brackets. When you are measuring, the wood can rest against the fuselage, and you know you will have the necessary clearance.
- Drill the two bottom 1/8" holes in each mounting bracket as shown on "Q".
 - Using the vertical mark on your longeron, measure and mark the center point of the longeron, and drill a 1/8" hole straight through to the outside of the fuselage.

Note: drill 1/8" holes. you can use them and small screws to position and hold the bracket and phenolic blocks for now. Later, after everything is prepared and in proper position, you can drill the holes for the #3 hardware.

19. Using a small screw or dowel to center the bracket, and wood shims for spacing, position the bracket and, making sure you have the necessary clearance for the strut, measure the approximate size of the phenolic blocks you will need for the left and right fuselage sides.
20. Cut the phenolic blocks to go between brackets and fuselage, and shape them to fit (see fig. 9).

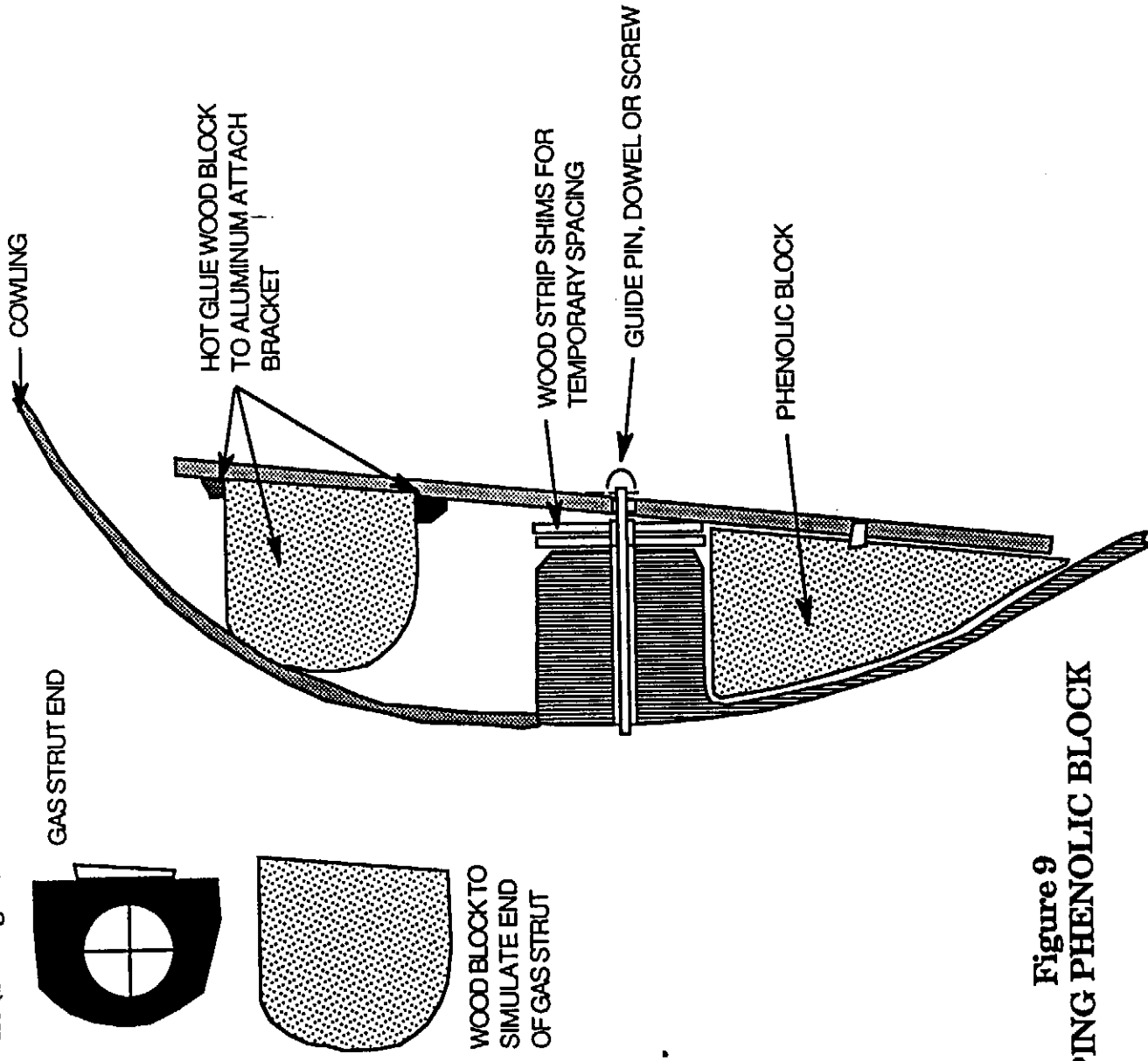


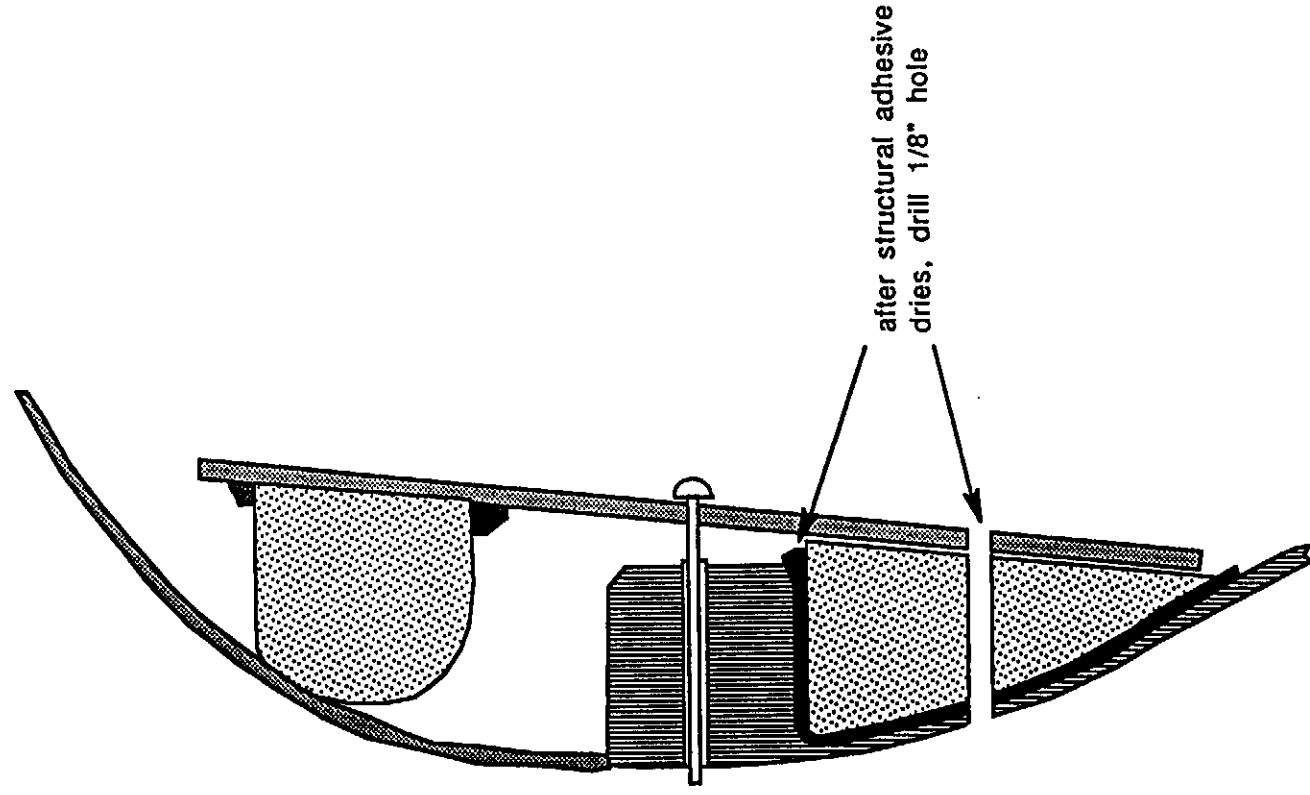
Figure 9
SHAPING PHENOLIC BLOCK

21. Put the phenolic blocks in place and, using structural adhesive, bond the phenolic blocks to their proper positions inside of the fuselage. Being careful not to dent the fuselage, clamp the phenolic blocks in place and wipe off any excess adhesive that oozes out. Let harden.

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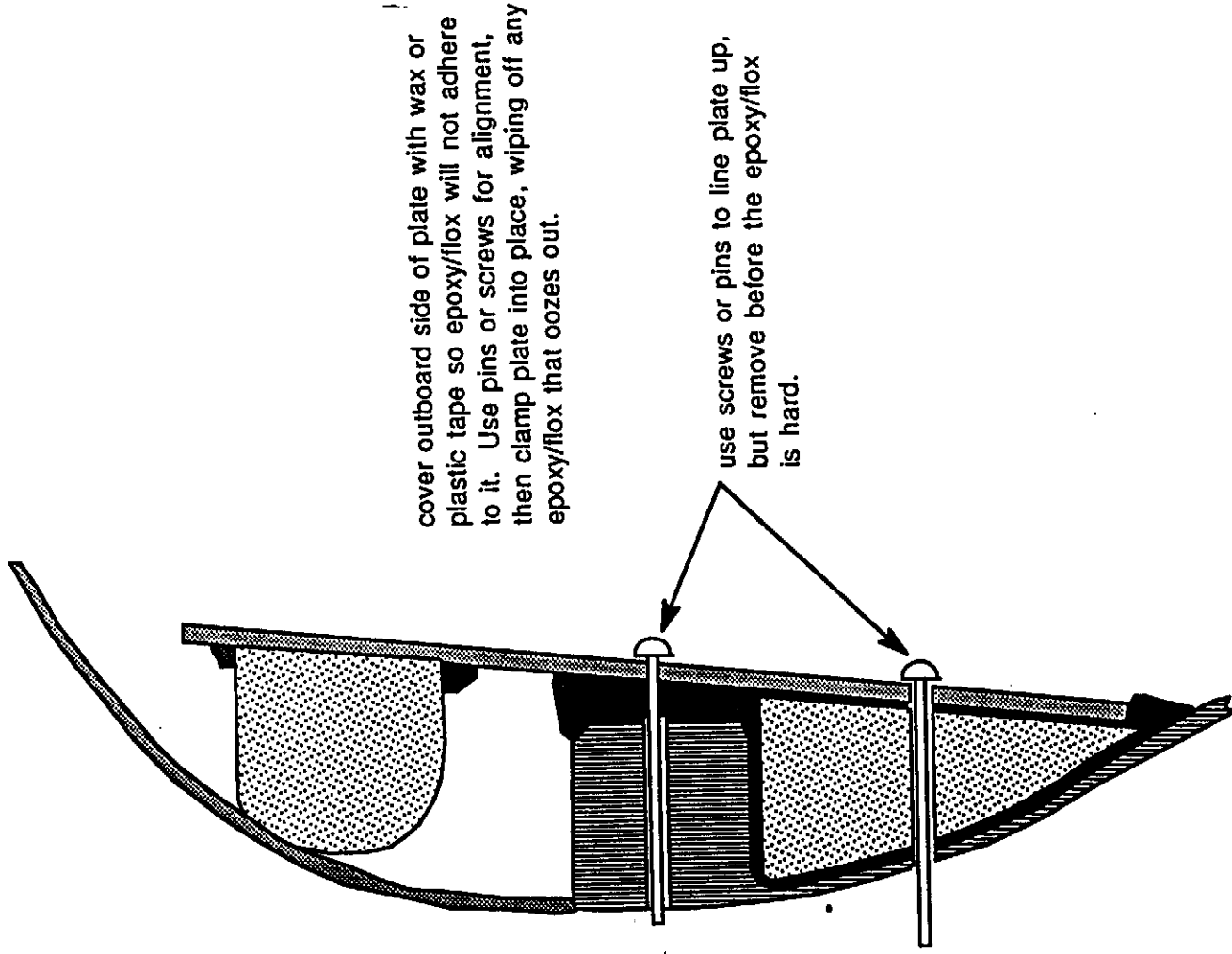
22. With the bracket positioned over them, measure and drill a 1/8" hole through the phenolic block and the fuselage, using the lowest hole in the bracket as a guide hole. (figure 10).

Figure 10
INSTALLING PHENOLIC BLOCK



23. After the adhesive has set, use epoxy/flox to fill any gaps between the bracket and fuselage.

Figure 11
BEDDING THE MOUNTING PLATE



cover outboard side of plate with wax or plastic tape so epoxy/flox will not adhere to it. Use pins or screws for alignment, then clamp plate into place, wiping off any epoxy/flox that oozes out.

use screws or pins to line plate up, but remove before the epoxy/flox is hard.

24. In order to prevent the mounting screws from "pulling in" and damaging the fuselage/longerons when tightened, the area around the head of the mounting screws will need to be reinforced. Using the 1/8" holes you have drilled as a guide, cut away a small area around where the heads of the bolts will be. Using the Hole as the center, cut away an area about 1/2" in diameter and about 1/4" deep.

25. Fill the area with epoxy/flox mix and let harden.

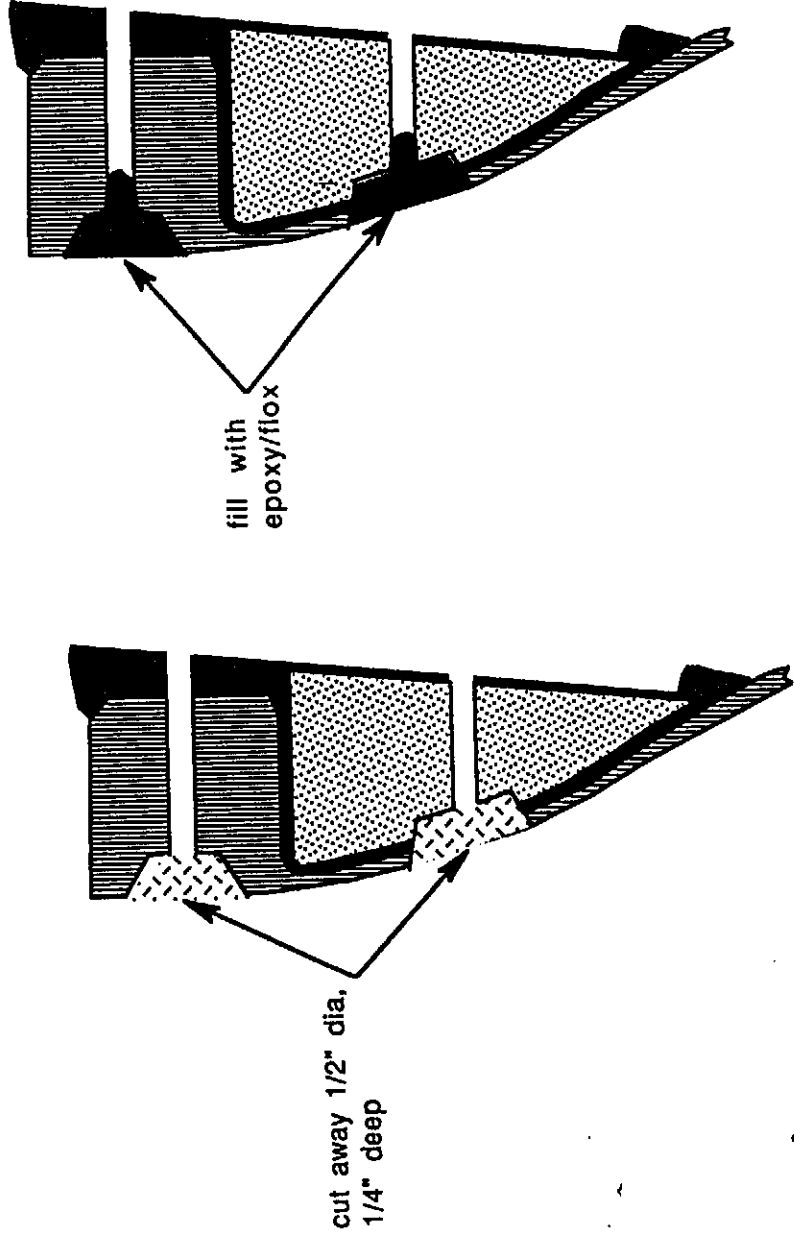
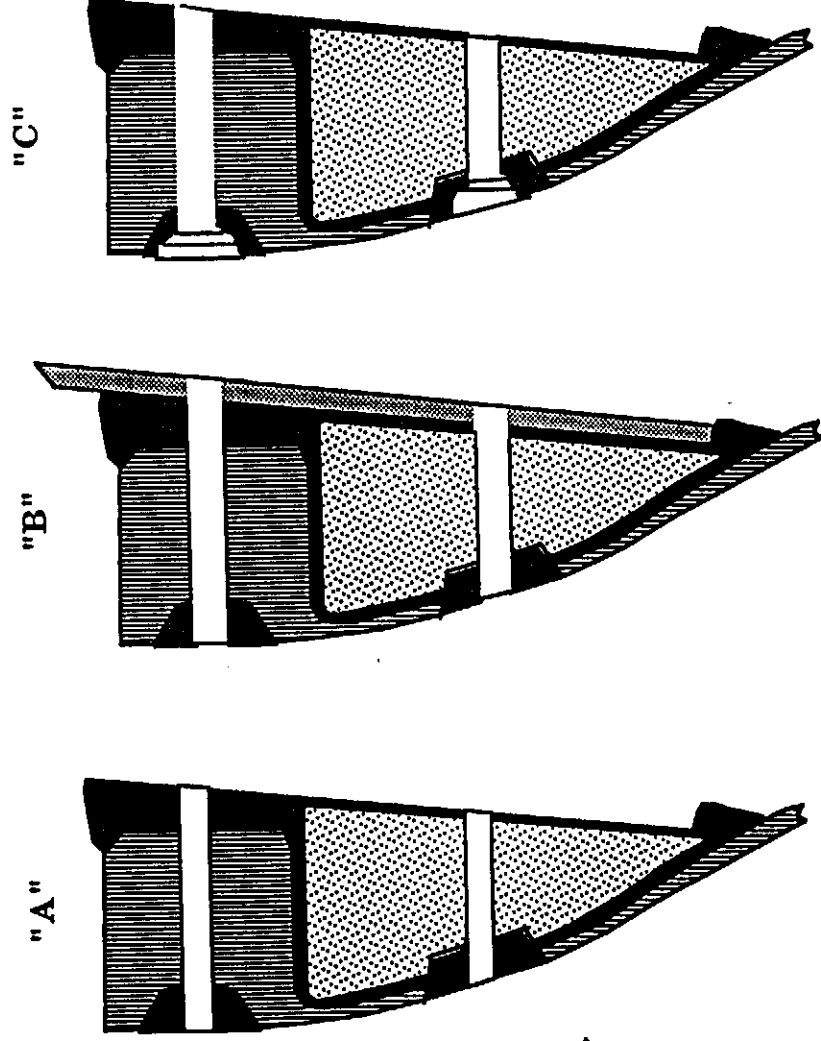


Figure 12
REINFORCING MOUNTING HOLES

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26. Redrill the 1/8" hole from the inside, so you will have an accurate pilot hole (Fig. 13A).
27. From inside the fuselage, drill the 3/16" hole for the mounting screws through the longerons and the fuselage/phenolic blocks and mounting plates (Fig. 13B).
28. Countersink the holes on the outside of the fuselage so that the screw heads will be recessed about 1/16" into the fuselage (Fig. 13C).

Figure 13
MOUNTING PLATE



29. Insert the #3 screws into the fuselage about 1", then place structural adhesive around the rest of the screw and push it into the fuselage. This should keep the threads free of adhesive but make a good bond to hold the screw firmly in the fuselage. Position the brackets in place and install the washers and nuts, snugging the nuts, but do not over-tighten - *do not distort the fuselage*. See Fig. 14.
30. After the adhesive has had time to set up properly, remove the brackets. Remove the wood guides from the brackets, clean the brackets and re-install them onto the fuselage.
31. Referring to "Q" and figure 14, measure the exact location for the 9/32" hole and mark the brackets. Remember, the bracket is at an angle, so don't just measure up the side - measure UP 1 7/8" from the longeron, then on a level line to the bracket, to a point at FS 17.6".

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32. Remove the brackets, drill the 9/32" holes (it is always a good idea to start with a small pilot hole), and attach the ball screws for the gas struts into the holes. Next, attach the gas struts by firmly pressing the body end onto the ball until it snaps into place.

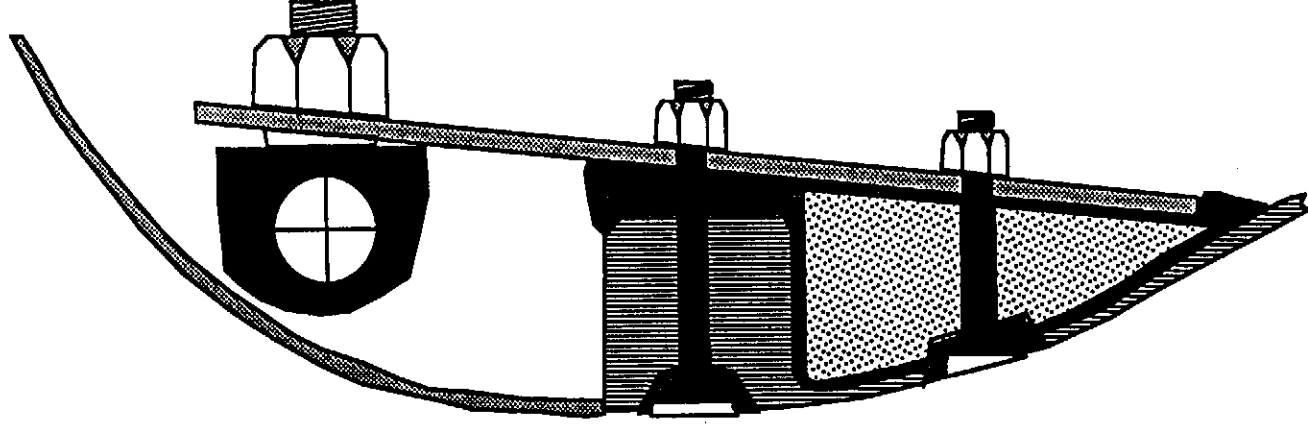


Figure 14
MOUNTING THE GAS STRUT FUSELAGE ATTACHMENT PLATE

33. Re-install the brackets, with the gas struts attached. We will need them over the next few steps to be sure that we leave clearance for them. It might be a good idea to tape a clear plastic bag over them to keep them spiffy.

17-3 CANOPY FRAME

34. With the forward deck location established, first lay the canopy frame over the airframe in relative position. Check for side rail alignment, the frame sides will eventually have approximately 1/8" - 3/16" clearance from the top of the longerons. This is to allow for a "D" strip seal or equivalent.

CANOPY FRAME ASSEMBLY

Fig. 15



35. Locate the frame in a fwd/aft orientation that places it at a point which allows for complete coverage of both the fwd deck joggle and the aft roll over joggle. The frame will be trimmed to mate with these joggles. See Fig. 16. If possible, it is generally best to position the frame as far forward as possible, to provide additional instrument room since the distance from canopy to panel would be at it's maximum potential. Trim and sand to establish an alignment with the L.E. of the fwd deck joggle and alignment with the T.E. of the aft roll over joggle.

NOTE:

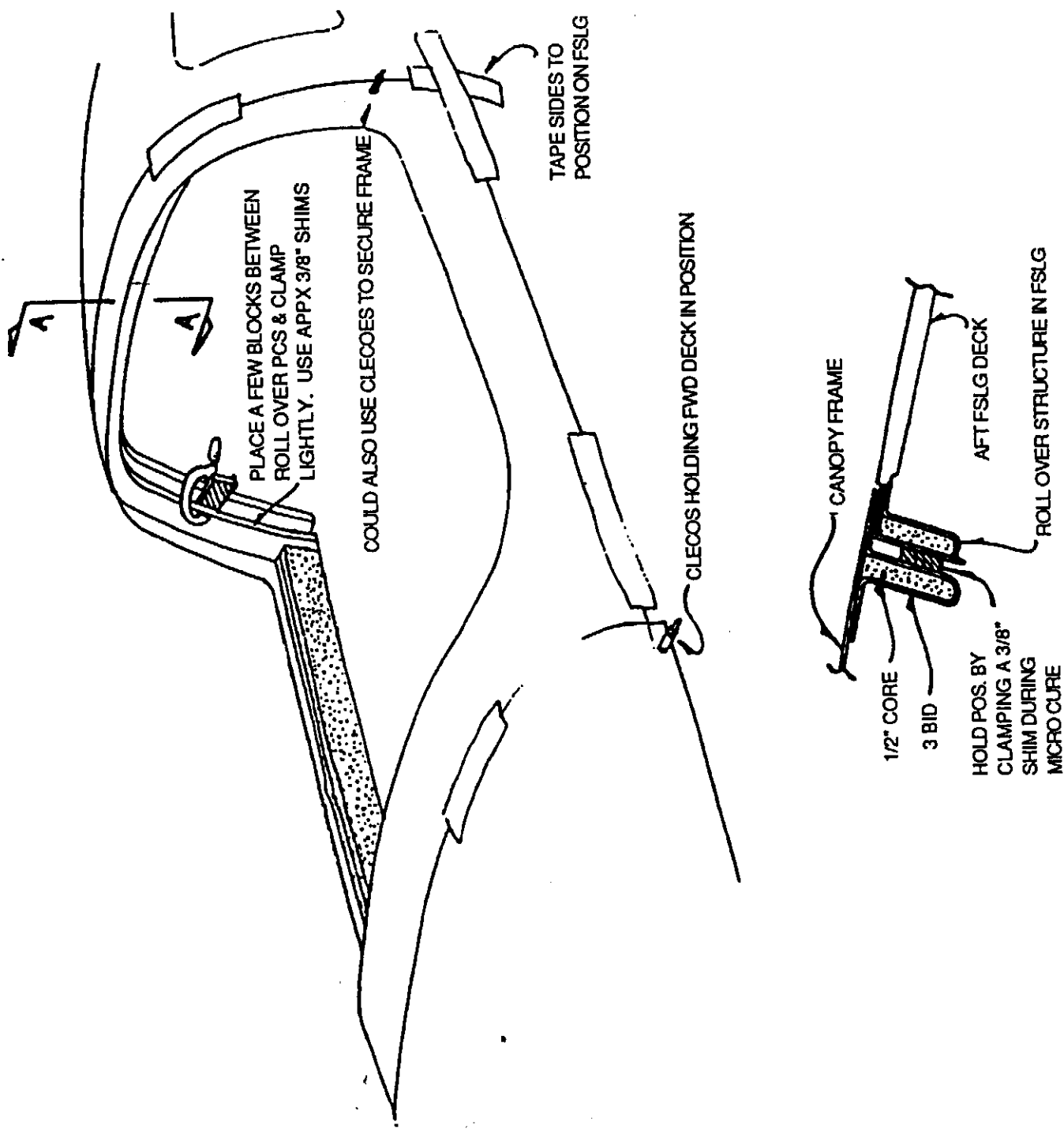
It is recommended that before you trim any of the material on the sides of the frame, first be sure that the frame is flush with the surfaces on the fwd deck and aft deck. The joggle will initially be too deep so use short pieces of mixing sticks to shim the frame up to a flush position. Use dabs of hot glue to hold these shims in temporary position. Note also, review both canopy seal methods prior to trimming frame sides, as the alternate method benefits from this extra material.

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Do not trim the inside of the frame (where the canopy will install) until you have laid the canopy itself over and verified dimensions. You'll want to establish at least 5/8" overlap on all areas except for the front curved area where the overlap can be a little less. The canopy will be bonded to the inside of the frame but you can verify dimensions by fitting it over the top initially.

CANOPY ROLL OVER RAILS

Fig. 16



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36. With the canopy frame fitted into the joggles you are ready to bond in the aft roll over (already done on the fast-build). Clean and sand the frame. Hold it in position on the fuselage with pieces of mixing sticks hot glued across the joint lines. It is particularly important to accurately establish the side profiles to match the fuselage sides. However, before you temporarily bond the frame in position there are a couple of suggestions:
COVER the longerons with plastic tape to prevent any micro from dripping down and permanently attaching the frame to the longerons. You could chip it loose but it would make a mess. If your instrument panel is mounted, it too should be covered with plastic tape to keep epoxy and micro off of it.
GET two pieces of 3/8" plywood or equivalent and make a contour pattern of the fwd deck at the junction of the canopy frame and also a rear pattern of the roll over. These do not have to be accurate at all, just pencil them in by placing the piece of plywood on the longerons and by laying a pencil flat on the decks, trace off the contour line all the way down to the longerons. These pieces of wood should be about 6" wider than the fuselage at their relative positions so that they hang over the longerons by 3" per side. They will be used later to make a quick and simple jig to hold the canopy frame when you remove it from the fuselage.
37. Cut and fit an aft roll over that will install inside the frame (already done in the fast-build kits). It can be made with 1/2" foam core or 3/8" honeycomb with 2 BID per side initially. Space the roll over fwd of the fuselage roll over brace by about 3/8". Simply clamp three or four wood spacers between the two to easily achieve this spacing, see fig. 16.
38. Attach the roll over with 3 BID along the fwd face (you'll attach with 2 BID along the aft face after you have removed the frame from the fuselage).
39. Before you remove the canopy frame from the fuselage it is necessary to build a simple (crude) jig around it so as to maintain its shape until all of the final glassing is completed with the canopy installed. This jig can be made of 3/8" plywood or similar. From the patterns you made earlier, cut a fwd and aft jig board that can be bonded onto the top surfaces of the canopy frame. It is also recommended that two simple side jig boards and angle braces be made. Use bondo to temporarily attach them to the frame (be sure to clean and sand the frame where the bondo will be applied). These jigs do not have to fit close at all, the bondo will fill the gap and produce a good rigid frame work that will hold the canopy frame in exact position. Also, make the fwd and aft top of these jig boards level so that the frame will easily sit upside down on the floor or bench when it is removed from the fuselage. See figures 363 and 364 on page 428 of your manual, Canopy Frame and Bracing. Just mix up a big hot (lots of hardener) gob of bondo, spread it along a pencil line that depicts the location where you'll be setting the jig board, then squish the board down into position. Check that the top line of the board is level (so it will be able to rest upside down) and hold it for about five minutes while the bondo cures enough to hold it's position. When you are finished with the frame, simply knock the boards off with a good smack of a hammer (NOT NOW, later!).
40. Measure from the center of the fuselage strut attach point aft 12 5/16" to a point 1 1/4" above each longeron (Refer to "Q"), and mark this spot on the inside and outside of your canopy frame. This will be the center for a phenolic hard point later. Regular 320 kit builders, proceed to step 41., below.

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FAST-BUILD KIT BUILDERS: YOU WILL NEED TO DO THE FOLLOWING:

The existing forward stiffener in your canopy frame is not stiff enough to handle the hinge pressure of the forward opening canopy. It will have to be removed and replaced with a stronger one. Also, the stiffeners in the canopy side rails are, for the forward opening canopy, much thicker than they need to be. They can be cut back, giving you a little more "elbow room" in the cockpit later. If you want the extra room, now is a good time to go for it. The side rail stiffeners in your canopy frame can be cut back until they are the same width as your longerons. While you are cutting away the forward stiffener, remove any excess width from the side stiffeners as well. You will also need to remove material from the front of the side stiffener for clearance for the gas strut. Holding the strut up to the frame, mark the area you will need to remove for it's clearance. Remember, the strut is fully extended now, but when installed it will be fully collapsed when canopy is down, so only mark out the area you will need for the body in the collapsed position.

- a. after marking the canopy for the strut position and clearance, remove the canopy frame from the fuselage and place it inverted on a bench or on the floor.
- b. cut around the forward stiffener and remove the covering BID.
- c. using the existing stiffener as a pattern, cut another one from 1/4" white foam, and set it aside until you get to step 9, below.
- d. chisel or grind away the exposed foam stiffener, being careful not to go into the glass beneath it.
- e. if you want the extra space, cut away the side rail stiffeners as discussed above.
- f. the remainder of the BID that held the old forward stiffener in place should be sanded away until you have a fairly smooth area to work with. It isn't necessary to remove all of the BID that held the stiffener, but at least smooth it down.
- g. remove the excess material from the canopy side for clearance of the gas strut. Proceed to step 42.

41. Remove the canopy frame from the fuselage and place it inverted on a bench or on the floor.

42. Referring to "Q", cut a 1/4" thick white foam stiffener to wrap around the L.E. area of the canopy frame. This stiffener must stop short of the overlap where the frame rests on the fwd deck joggle. It can roll most of the way down the fwd sides (leaving room for the gas strut!), getting a little wider as it moves down the sides. Also, keep it back from where the canopy will lay against the inside of the frame (Keep about an inch or so of clearance). Sand a large bevel onto the stiffener so that it does not interfere with the instrument panel dust cover. This bevel should be along the fwd side of the stiffener. Also sand the edges to a smooth transition into the frame so the UD will lay up easily.

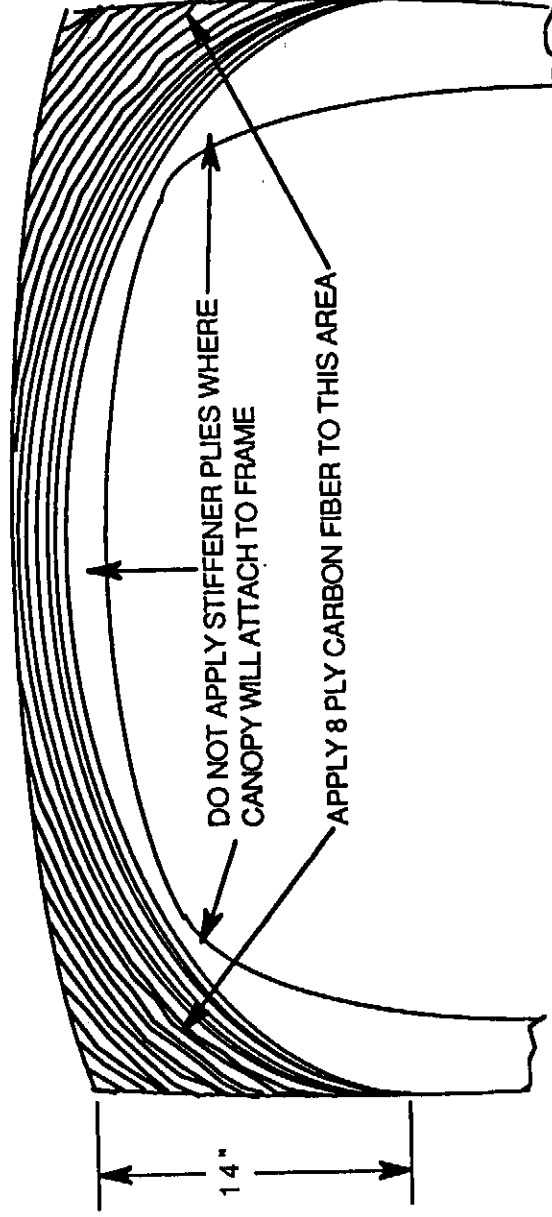
NOTE: The following steps are performed using **UNIDIRECTIONAL GRAPHITE FABRIC**. Drawing "Q" shows how many *total* plies go where. The method, though, is to put on half the plies indicated, put in a foam stiffener, then lay up the rest of the plies. When making these lay ups, it is best to do them without waiting for the previous layer to harden. If A layer sets up before you begin applying the next one, you will have to stop and wait until it is hard enough to rough up, so that the next layer can properly adhere.

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43. Referring to Dwg "Q" and figure 17. Using #40 grit, rough up the area shown (just enough to make a good surface - you don't need to remove any material) and clean area with acetone or MEC.
44. Lay up 4 plies of UG in the direction and area shown as "8 ply carbon".
45. Lay up 1 ply of UG in the area shown as "10 ply total carbon f. full width".
46. Lay up 2 plies of UG in the area shown as "(32")-14 ply total carbon f."
47. Lay up 3 plies of UG in the area shown as "(20") 18 ply total carbon f."
48. Use micro to attach the stiffener you made in step 42 to the inside of the canopy frame. Use weights to hold it until it cures.
49. Apply a thin layer of micro over the foam stiffener to seal the foam pores.
50. Lay up 3 plies of UG in the area shown as "(20") 18 ply - -".
51. Lay up 2 plies of UG in the area shown as "(32") - 14 ply - -".
52. Lay up 1 ply of UG in the area shown as "10 ply total - -".
53. Lay up 4 plies of UG across the area shown in fig. 17.
54. Let cure.

CANOPY STIFFENING

Fig. 17



55. Referring back to the mark you made in step 40, above, for the canopy strut hard points, prepare two pieces of phenolic about 1 1/8" square and 1/4" thick. bevel the sides so the attaching lay-ups can smoothly cover them.

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56. Drill and tap a 1/4-20 hole in the center of the phenolic pieces.
57. Remove the captive washers from the two remaining strut attach ball studs, and grind the threaded end off until, when threaded into the phenolic blocks, no portion of the threads sticks out the back.
58. Mix up enough structural adhesive for the next two steps.
59. lightly coat the ball stud threads with structural adhesive, and put enough adhesive into the threaded hole in the phenolic blocks to make a good bond. Screw the ball studs tightly into the blocks.
60. coat the back of the blocks with sufficient adhesive and position them onto the canopy frame, clamping them in place (tight, but not too tight!) until they cure.

17-4 SIDE RAIL STIFFENERS

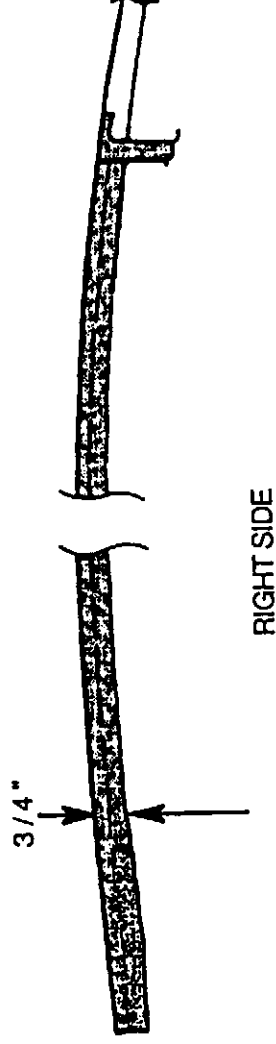
Note: You will want the bottom of the frame side rail to be at least 1/8" wider than the seal strip you will use. If you are using the inflatable "D" strip we use on our plane, you will need to make the side rail about 11/16" wide. This procedure covers our choice, using the "D" inflatable seal. Now is a good time to consider what type of seal and sealing system you are going to use, because it will have to be provided for here. Study the following steps (61-87), and review the alternative method shown on pages 27-29, until you are sure about the seal system you will use.

61. place the canopy back onto the fuselage, still in the support frame.
On the Fast-Build kit, you can reduce the width of the side rails to that of the longerons. On the standard kits, the side rails need to be built up to that width. For the regular kit builders, go to step 62., below. For the Fast-Builders, go to step 67.
62. Referring to figure 18, cut a 1/4" piece of foam for each side panel, and fit them to the frame sides. Run the 1/4" pieces against the frame and extend them all the way from the aft roll over to within 1/2" of the fwd deck joggle edge. Using a little creative sculpting (figure 20), you can neatly 'fair in' the gas strut. REMEMBER to leave them some clearance, and still have the bottom rail wide enough to perform well with the seal.
63. Using 1/2" white foam, make matching pieces to go inboard of the 1/4" foam.
64. Using epoxy/micro, bond the 1/4" pieces into position, and use it generously to get all the air voids out.
65. Over the 1/4", bond in place the 1/2" foam.
66. Place clamps along the sides to hold the foam in position during cure of the micro. BE VERY CAREFUL TO NOT CLAMP TOO TIGHTLY when securing of the foam side rails. You should only snug it up and always place scraps of thin wood against the outside so that you do not dent the frame sides.

CANOPY SIDE RAIL FOAM LAYOUT

OVERHEAD VIEW

Fig. 18



RIGHT SIDE

67. With the foam cured in place, sand a smooth finish (Fast-Builders, you may have to fill in spots with the micro first). Sand them down with a small 6" block sander and some #50 grit paper. Sand down to be flush with the inside of the longerons along the area of the side rails. Remember the clearance for the gas struts.
68. Cover the foam side rails with micro (just enough to fill in the pores in the foam only) and lay up 3 BID over the top. Contact at least 1" onto the frame prepreg and roll over in the back. Trim the 3 BID so that it just extends a little past the bottom and hangs there for now. If you have more than about a half inch hanging over it will possibly put some waves in the finished part so trim it that close for initial layup.
69. Remove the canopy frame from the fuselage and place it inverted on the floor or workbench. Sand a smooth line onto the bottom of the rails to create a finished line for the side rails.

17-5 CANOPY LATCH STRIKE INSTALLATION

The normal in flight latch mechanism is a very straight forward installation using Cam-Loc® safety latches. These latches will pull over center for a positive lock with an additional safety catch to prevent accidental opening. These are each load rated at more than 4 times the required strength. An alternate method is described at the back of this supplement, on page 29.

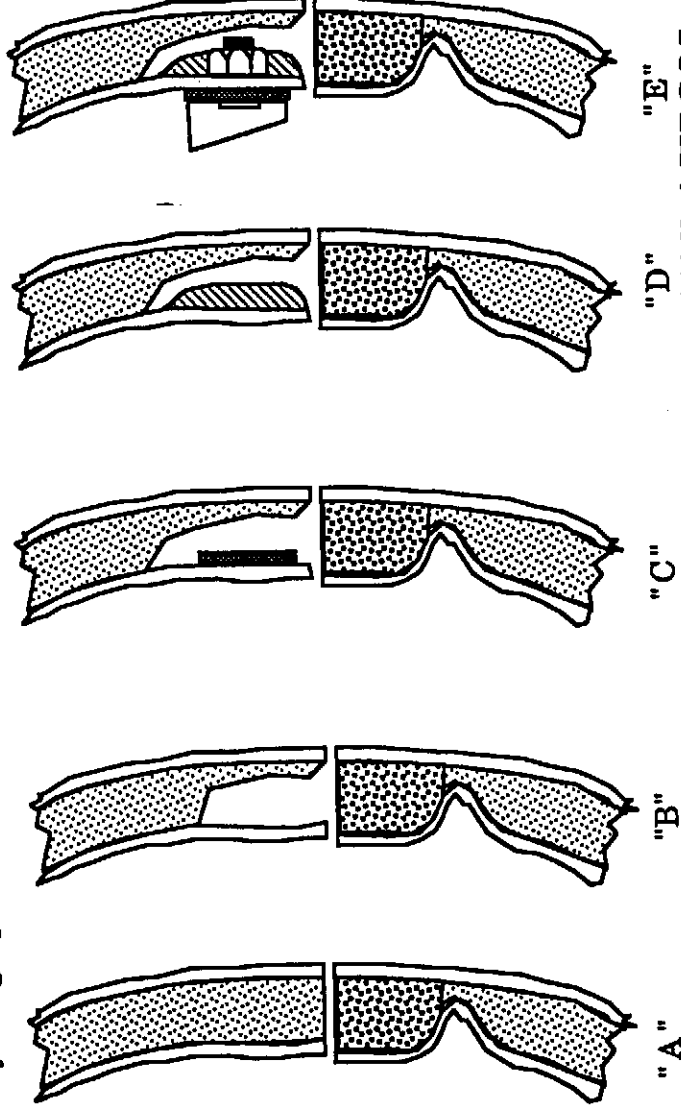
70. Decide where you want to put your latches - with this canopy opening configuration, we find that one on each side, just forward of the seat back, is just fine. Draw a vertical line that crosses the longerons and the canopy to provide a reference on both the canopy frame and fuselage representing the center of the latch positions of your choice.
71. Cut 2 pieces of .090" aluminum that are 2" long and 1-1/4" high. These will be potted into the inner sides of the frame where the latches will anchor.
72. Using a drill with a router bit, remove the foam from the inside bottom of the side rails at the point you have chosen for your latches. You will need enough room to lay BID around the hard points, and the area will have to be completely free of foam for a good bond.

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NOTE:

the hard points that will attach the latches will require the full elimination of foam against the aluminum inserts on the inboard side of the channel. For structural integrity, all foam must be removed from these areas, so the inner BID will attach directly to the aluminum inserts. Mount the aluminum hard points up about 1/8" from the bottom of the frame rail to give you clearance for the steps later where you install the bottom rail seal. See figure 19A.

73. Once the channel is carved out for your hard points (fig. 19B), go in by hand with a piece of 36-50 grit sand paper and give it a final sanding to smooth everything up.



CANOPY LATCH STRIKER INSTALLATION FIGURE 19

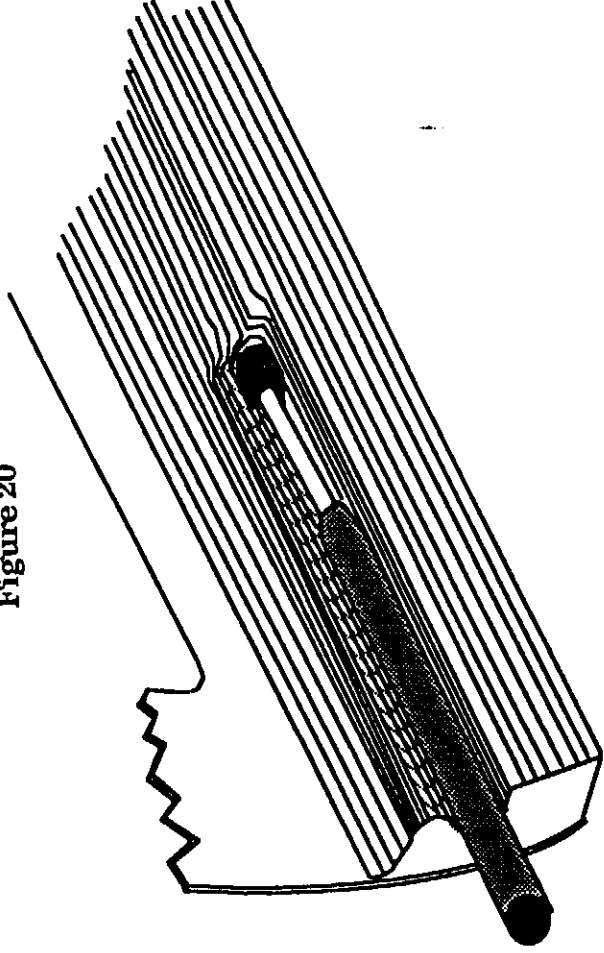
74. Using epoxy/micro (or preferably, structural adhesive), bond the hard points to the canopy frame (figure 19C), about 1/8" up from the bottom edge. Rough the aluminum up and clean it with acetone or MEC immediately before bonding in place.
75. Lay 2 BID over the hard point (figure 19D) and let cure before proceeding to next step.
76. Position and mount the 'strike' for the latches by drilling two #19 holes through the strike as a guide and through the inbd side rails of the canopy frame. The strikes should be positioned even with the bottom of the side rail see figure 19E).

17-6 CANOPY SEALING SURFACES PREPARATION

There are almost as many 'preferred' methods of sealing the canopy as there are kits out there. One of the ones we've tried with excellent results is outlined here, and another is described starting on page 27. They are both based on using the inflatable "D" seals we offer, and either one should require no more than 18 feet for a finished installation.

LANCAIR 320 Canopy Supplement
FAIRING IN THE GAS STRUT

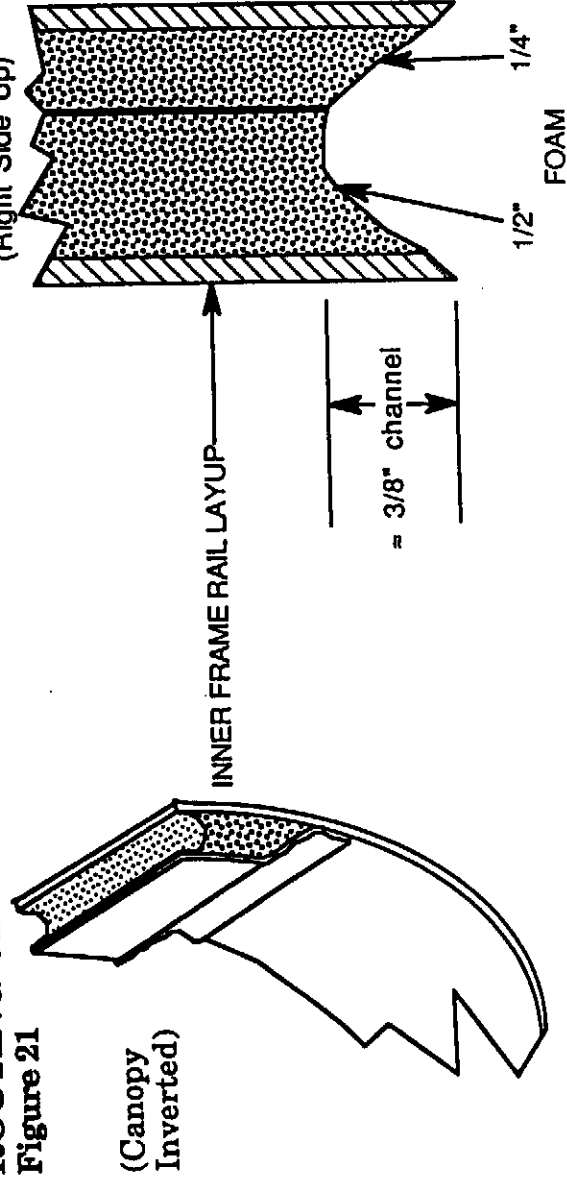
Right Side
Figure 20



77. Where the longeron meets the roll over at the aft of the canopy, build up a smoothly rounded transition in the area where the seal will go from the horizontal longeron and go up the face of the roll over, using micro/flox. Sand it smooth. It should not have a radius that is too tight, or it will distort the seal. About 1-3/4" to 2" radius is good.
78. smooth the aft portion of the canopy frame to match this transition area.
79. With the canopy frame back on the bench or floor, inverted, use the router or sand paper to remove a rounded channel from the side rail foam about 3/8" deep along the whole bottom of the rail, rounded, as shown in fig. 21.

ROUTING CHANNEL FOR "D" SEAL

Figure 21



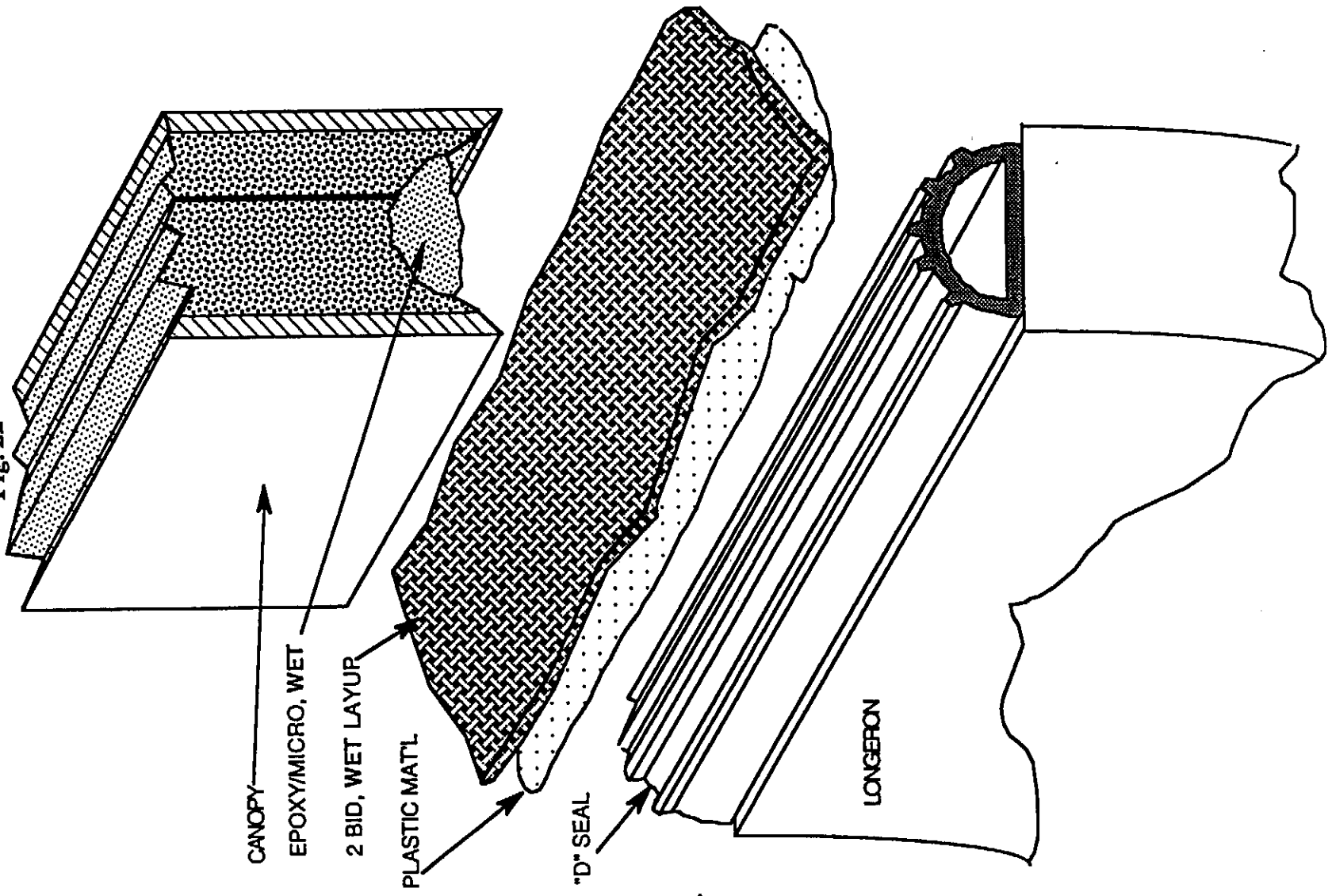
80. Clean the top of the longerons and the fuselage roll over surface where the seal strip is to be mounted.
81. Using some thin double-sided adhesive tape (available at most art/craft stores), tape the "D" seal into place on the longerons and fuselage roll over.
82. Using thin plastic (like the supermarket grocery bags), cover the seal completely from end to end, taping the plastic lightly into place so that the plastic can still move enough to closely conform to the shape of the seal in step 85, below.

These next few steps can best be performed with a couple of extra hands. Make sure everything is covered that might be hit by dripping epoxy.

83. Referring to figure 22, lay up a 3 BID strip long enough to go over the "D" seal for the length of the longerons. Don't force out the excess resin, leave it a little 'juicy'. Lay this over the plastic, leaving it just lay flat. It is best to do both longerons at one time.
84. With the canopy upside down, use a mix of epoxy and micro to fill any voids in the channels you sanded out. Now pour into the channel an epoxy/micro mix about 1/4" deep, then spread it inside the channel so that it is evenly coating the channel.
85. While the 3 BID layup and the micro mix are both wet, turn the canopy right side up and carefully place it in position on the fuselage. Weight the canopy frame down so that it forces out all of the excess micro, and you should now have a channel that precisely conforms to your seal, even without inflation. When you are done installing your latches, they should put just enough additional pressure on the seals to make them work perfectly.
86. After the curing process is complete, take off the canopy, invert it on the bench or the floor, and trim off the excess BID, sanding the bottom of the rail smooth.
87. You can use this same process later (after the installation of the canopy hinges, to make it easier), to do the seal at the roll over.

LANCAIR 320 Canopy Supplement
SIDE RAIL SEALING CHANNEL

END VIEW
Fig. 22



LANCAIR 320 Canopy Supplement
17-7 CANOPY HINGE INSTALLATION

At this time, you should have the header tank installed, with the 8 BID stiffeners installed in the pockets.

88. With the canopy frame off of the fuselage and the header tank, mounted, refer to Dwg "Q". The header portion of the hinge is centered exactly 8" from the centerline of the aircraft. Using #50 grit sand paper, scuff the inside of the pockets in the area where the hinges are to be mounted, and make a vertical line through the pocket at the 8" point.

Note: A way we found to make this next part of the installation a little easier and more 'goof-proof':

89. Center the LS 3 bearing in the small end of the two curved .250" brackets.
90. Using freezer or plastic tape and an exacto knife, build up the surface around the bearing bushing until it is thick enough that, when it is bolted between the two pieces of tank bracket, it holds the two brackets together tightly, with the bearing shoulders just touching the two hinge halves. They should be tight enough so that they remain at any angle you set them.
91. Using #50 grit paper, rough up the area of the brackets that will later be bonded.
92. Cut a piece of 2x4 wood so that it is 15 3/4" long, with the ends flat and square to each other.
93. • Lay the wood on a flat surface.
94. With the bracket ends flat on the surface, hot glue or clamp them onto the ends of the 2x4.
95. Make sure the header tank brackets are vertical, 90° to the flat surface (Remember, the assembly is now upside down).

NOTE: IT IS IMPORTANT to mount the hinges as high as possible in the header tank pocket so that you will have the maximum canopy travel, and the canopy to fwd deck transition will be as smooth as possible. The lower the hinge mounting point, the more you will have to bevel the meeting edges of the canopy and fwd deck later.

96. To make this easiest, find something that you can put inside the cockpit that you can use to prop up and hold the hinge/2x4 assembly in position while the adhesive is curing. **CLEAN THE BRACKETS WITH ACETONE OR MEC.** Using structural adhesive, coat the mounting surface of the hinges and, turning the assembly right side up, bond it to the header tank. Remember, get the hinges as high as possible in the pocket, but **KEEP THE HINGES LEVEL TO THE AIRCRAFT.**

97. Clamp in place, wipe away any excess adhesive and wait until the adhesive has had sufficient time to cure.

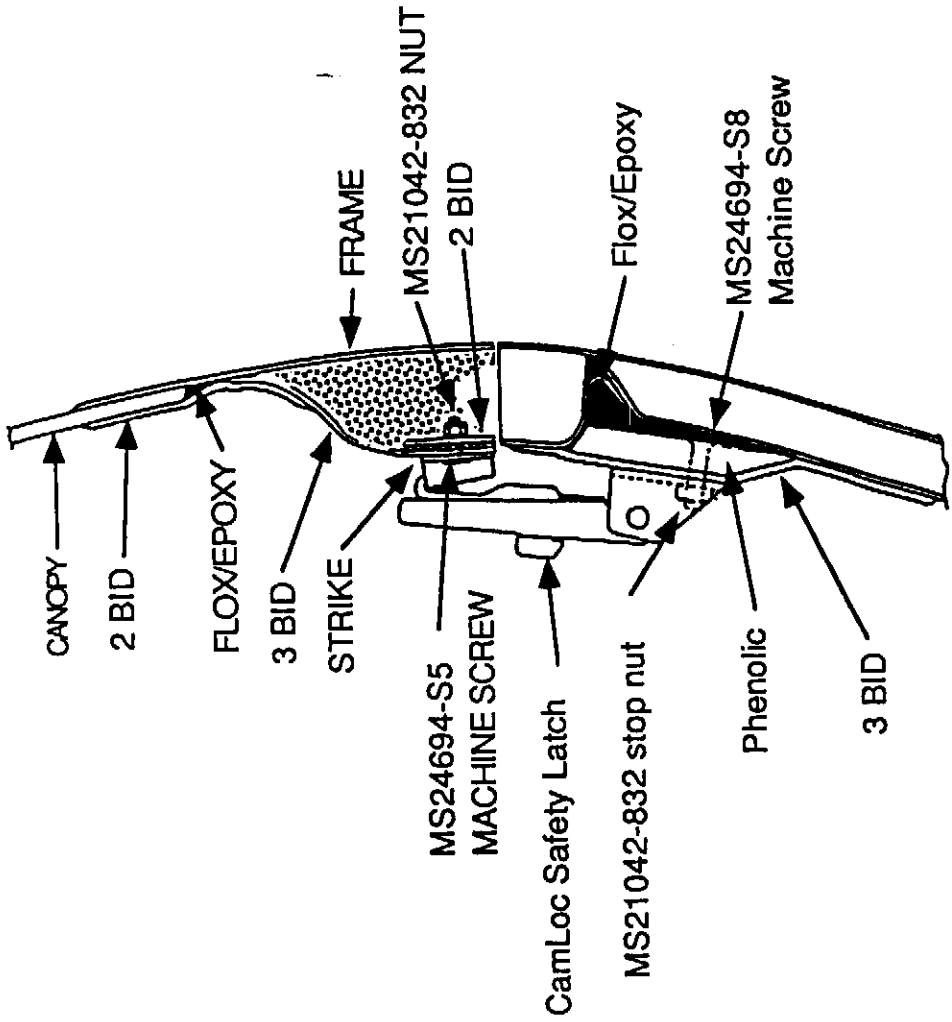
LANCAIR 320 Canopy Supplement

98. Per Dwg. "Q", fill the bracket holes with floc, and the gap at the top of the bracket with micro. Do not remove the tape from the bearing area yet.
99. Finish the header tank portion of this procedure by laying the 6 BID attach over the brackets, being careful to not get any epoxy into the workings of the hinges.
100. After cure time, carefully remove the 2X4 and clean off any residue that may be left on the hinge bracket from the hot glue, and apply plastic release tape to the area where it will attach to the canopy.
101. Carefully rough up the surface on the canopy frame where the hinge will attach (see dwg. "Q").
102. Place the canopy frame in position on the fuselage.
103. Raise the bracket arms up until they touch the canopy.
104. Following the pattern shown on drawing "Q", lay up first the 4 BID areas, then the four additional BID, then the final 6 BID, each layer going up the sides of the bracket arm about 2".
105. After everything has had time to cure, and without disturbing the position of the arms or the canopy, drill the two holes in each bracket, through the fiberglass, as indicated.
106. You can now unbolt the brackets from the header tank and remove the canopy. Remove the arms from the canopy, one at a time, and mark them so you will know which is left & right.
107. With the canopy upside down, fill the void area inside the brackets, between the bracket arms and the canopy, with solid micro/floc to stiffen the radius area of the 14 BID fiberglass fittings. Re-insert the arms (with their plastic release tape still on them) into their respective holes until they are in proper position, and wipe off any excess epoxy that is squeezed out.
108. After the epoxy/floc has set, remove the bracket arms.
109. Remove the tape from their ends and clean the brackets.
110. You can now proceed with finishing mounting the lock and latches, as outlined in your assembly manual starting with figure 23, below, and the instructions on page 436.

LANCAIR 320 Canopy Supplement
LATCH INSTALLATION
CANOPY FRAME SIDE RAIL CHANNEL

CROSS SECTION VIEW

Fig. 23

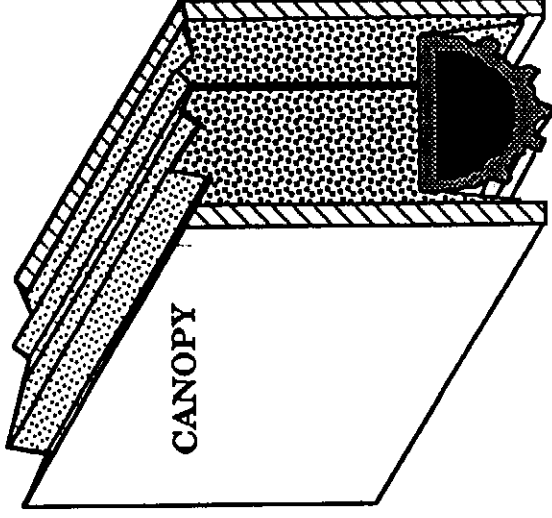


LANCAIR 320 Canopy Supplement AN ALTERNATIVE METHOD FOR SEALING THE CANOPY

The main drawback to the method described above is that, once the seal is in place, everyone getting into the plane will rub against it, step on it, or use it while pulling themselves aboard. This will cause the seal to wear out and/or come loose. An alternative is to mount the seal into the canopy, leaving the top of the longeron flat to act as the sealing surface.

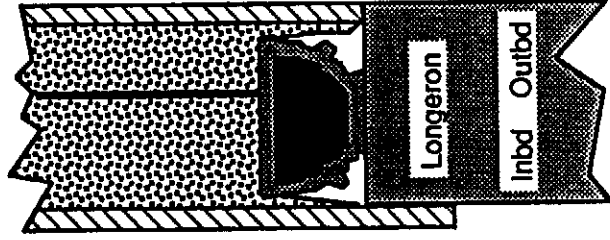
Some drawings and thoughts to help you, if you decide to take this approach, are included herein.

In stead of mounting the seal on the longeron, route a channel in the canopy wide enough for the channel, and just deep enough so that when in place, the seal will be compressed about 1/8".



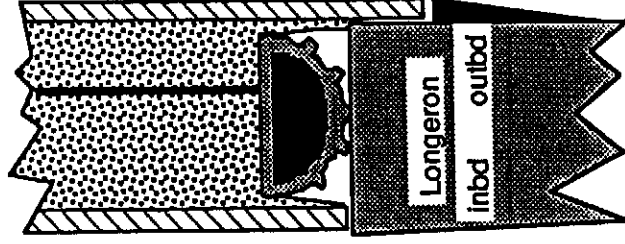
EASIEST METHOD FOR TOP SEAL

SOME OTHER SUGGESTIONS:

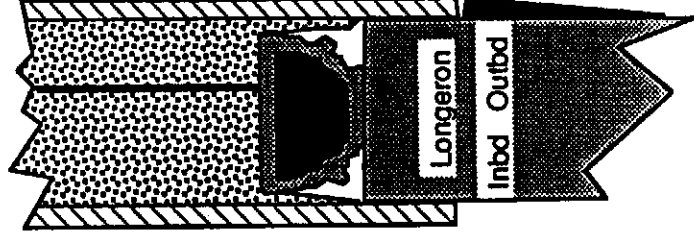


This method calls for extending the inner canopy panel down for 1/4" to 1/2" inside the longeron. It provides a quieter seal than the one above. Consider it before you install the side rail stiffeners in step 61.

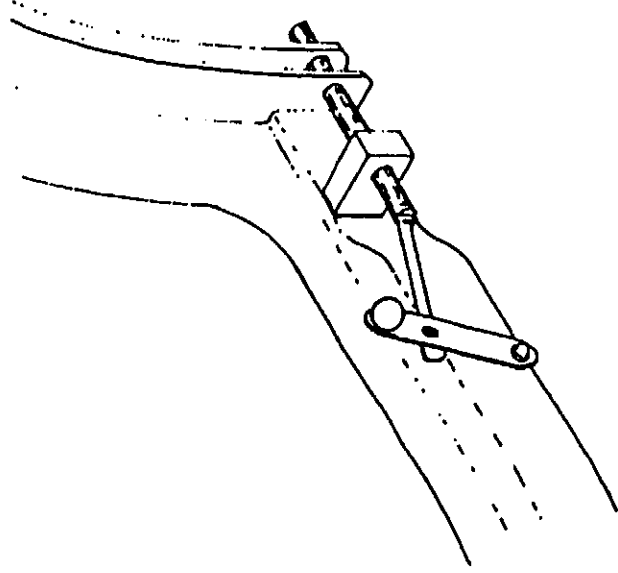
Another possibility is to extend the outboard side of the canopy down past the longeron by some distance then, using epoxy/micro, fair in the edges. This will create a quieter seal than either of the above methods.



This method incorporates the best of all of the methods, but requires a little more work. It will give you the quietest and best protected seal, and it will give you the stiffest structure.



AN ALTERNATIVE LATCHING METHOD



- If you consider using this method, you may want to install bushings in the roll overs, and then you can use a tapered pin to draw the hatch down as the pin goes into the fuselage roll over, giving you the 'crush' you need on the "D" seal to make it work. Be sure you set it up so that it is "over-center" locked, and cannot be accidentally released in flight.

WINDSHIELD INSTALLATION AND HANDLING INSTRUCTIONS

Depending on your aircraft make and model, the windows which you purchase may require trimming and/or drilling. The following directions will give you tips on the proper procedures for accomplishing this. Check our list of installation supplies for acrylic drill bits, cleaners, finish restorers, tapes and sealants. **WE HIGHLY RECOMMEND THE PURCHASE OF OUR ACRYLIC DRILL BITS WHEN HOLES ARE TO BE DRILLED IN THE ACRYLIC.**

WINDSHIELD TRIM VARIATION: We can guarantee fit on most of our windshields, but many aircraft manufacturers allowed variations to exist in the original trim of the windshields. We therefore manufacture and trim the replacement windshields for these aircraft slightly oversize to allow trimming for each individual aircraft. These windshields may require trimming or grinding to fit upon installation. **NOTE: As a service to our customers we will accurately trim any windshield or window which we manufacture to the exact size of your original window at no additional charge. Please notify us in advance of your shipping the original window or template to us. All transportation charges will be the responsibility of the customer.**

HANDLING: It is very important to keep the windshield well supported at all times. Do not allow a strain to be put on the windshield during the cutting or grinding operations. Warm temperatures are not required during these operations however, acrylic will take much more abuse at 80 degrees than at 30 degrees. **DO NOT STORE ANY WINDOW OUTDOORS WHILE THE PROTECTIVE COVERING IS STILL ON THE WINDOW, THE COVERING WILL BECOME VERY DIFFICULT, IF NOT IMPOSSIBLE, TO REMOVE WITHOUT DAMAGING THE WINDOW.**

PREPARATION FOR INSTALLATION: After inspection of the window, trim the protective covering to expose enough of the edge of the window to allow for fitting including the portions going into channels and under fairings. The remaining protective covering should be left on the window to protect it until fitting has been completed. Residue left behind by the "Spraylat" protective coating may be removed by soaking the area with isopropyl alcohol and rubbing with an alcohol soaked soft flannel cloth. Residue left behind by the adhesive backed paper covering can also be removed by the above method. If, however, the paper covering has been stored on the window for an extended period of time, you will have to soak the paper with kerosene and keep it wet for several hours. You will then be able to remove the paper backing, but the adhesive will remain. This may be removed by using a mixture of equal parts of kerosene and isopropyl alcohol. Soak a soft flannel cloth with this mixture and rub the window with the cloth. The window should be cleaned after this procedure with a dish washing liquid and plenty of water. **REMOVE THE REMAINING PROTECTIVE COATING AND INSPECT THE WINDSHIELD BEFORE FINAL INSTALLATION.**

MARKING FOR TRIM - PAPER PATTERN: The windshield may be marked with a china marking grease pencil, a felt tip marker, or masking tape. A fast and accurate method for trimming can be accomplished through the use of a paper pattern made by laying a piece of craft paper over the outside of the old original windshield and trimming the paper exactly to size. The paper will lay flat on windshields of simple curvature and can be taped in position. The windshield outline can then be traced onto the paper with a marker. This pattern can then be cut out, properly aligned over the new windshield and the new windshield marked to size. On windshields of compound curvature the paper should be pulled tight across the outside center of the original windshield and taped at this point. At a 90 degree angle to this the paper should again be pulled tight and taped. The loose areas between the tape should be cut with a razor knife and overlapped with enough cuts to allow the paper to follow the curvature of the windshield. Once this is accomplished, masking tape should be used over all the cuts to hold them in place. An outline of the original may now be made and cut to size. This pattern may then be removed from the original windshield, aligned properly on the new windshield, taped in position and traced. When tracing these patterns on the new windshield allowances should be made for areas which were short on the original installation. If mailing patterns to us be sure to mark the pattern as to left side, right side, and outside.

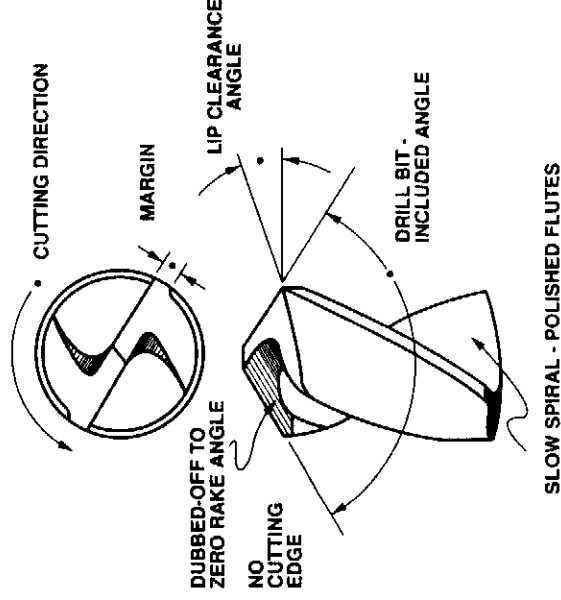
MARKING FOR TRIM - CUT AND FIT: If the original windshield is not in condition to make a pattern then you must cut the new windshield to fit. Remove the wing and cowl fairings and place the new windshield in position allowing the top and sides to hang over. Mark and trim the bottom first. Make sure that the windshield is aligned at the wing roots or that trimming will bring about alignment at the wing roots. After trimming and fitting the bottom, the sides and top will not be difficult to fit. Care should be taken to fit the windshield in place using small cuts rather than one large cut. Remember, you can always trim a little more, but once cut you can never add to it.

MARKING FOR TRIM - OVERLAY: Place the new windshield over the outside of the old windshield and trace a trim line. This will give an oversize rough trim. This method is not recommended for any Cessna windshield or any other windshield where a tight fit between the windshields cannot be achieved.

WINDSHIELD TRIMMING: Trimming is best done with a band saw using a 1/4" or 3/8" wide raker blade with 14 or more teeth per inch. Mask the band saw table to protect the windshield from scratches. Support the windshield during the cutting operation and do not allow the weight of the windshield to rest on the edge being cut away. After cutting, the edges should be sanded with a belt sander to remove all saw marks. Satisfactory results may also be had by using a 7" or 9" disc sander with a coarse 40 to 80 grit sanding disc. This will remove material quite rapidly with only slight pressure. A belt sander may be used with similar results. For best results the edges should be smoothed and rounded with fine sand paper. This can be sanded by hand, with a rotary drum sander, or a file may be used in place of sanding. Smoothing the edges will lessen the tendency towards edge cracking or breakage. It will also extend the service life of the windshield.

NOT RECOMMENDED: Trimming with a jig saw, saber saw, or a hand saw is not advisable. If hand sawing is absolutely necessary, a coping saw with a bone cutting blade with 30 teeth per inch may be used. Extreme care must be used to avoid the blade hanging up and starting a crack. We recommend that the blade be inserted in the saw backward so that the blade cuts when it is drawn towards you. Do not allow the edges of the acrylic to pinch and bind the blade

DRILLING WINDSHIELDS: Do not use a standard metal or wood cutting bit to drill acrylic. This type of bit must be resharpened for acrylic. Take this bit and square off the cutting edge as per the drawing. The drill bit sharpened in this way will scrape a clean hole through the acrylic with no tendency to dig in or grab. Sharpen your drill bit as shown or purchase one of our special acrylic drill bits. The small price you pay for the correct drill bit will pay you dividends a hundred fold by drilling smooth clean holes. Practice drilling on your old windshield or a piece of scrap acrylic before drilling your new windshield. Use a high speed with very light pressure when drilling. Holes should be drilled oversize to allow for expansion and contraction of the acrylic. Example: Drill a 3/16" hole for a 1/8" screw. Do not over tighten screws. Screws should be snug only. Over tightening will cause cracks around the holes. **STANDARD WOOD OR METAL BITS WILL CAUSE BINDING AS IT BREAKS THROUGH THE OPPOSITE SIDE OF THE ACRYLIC. THIS WILL CAUSE SMALL CHIPS, FRACTURES, CRACKS, OR CAUSE THE WINDOW TO BREAK. DO NOT TAKE THE CHANCE!**



WARRANTY: Our windshields and windows are warranted against defective materials and workmanship. The warranty is limited only to the replacement of the defective parts. There is no allowance for labor costs incurred during installation and removal of a defective part. Prior to installation the protective coating should be peeled and the part inspected. After inspection the window may be recovered with the protective coating which was removed or recovered with a cling type plastic food wrap. We will not assume any liability for damages due to improper installation or any damage incurred during shipping. Our warranty does not cover cracking, crazing, scratches or breakage. Any item shipped to us without proper authorization will be refused. Call for a return authorization number.

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