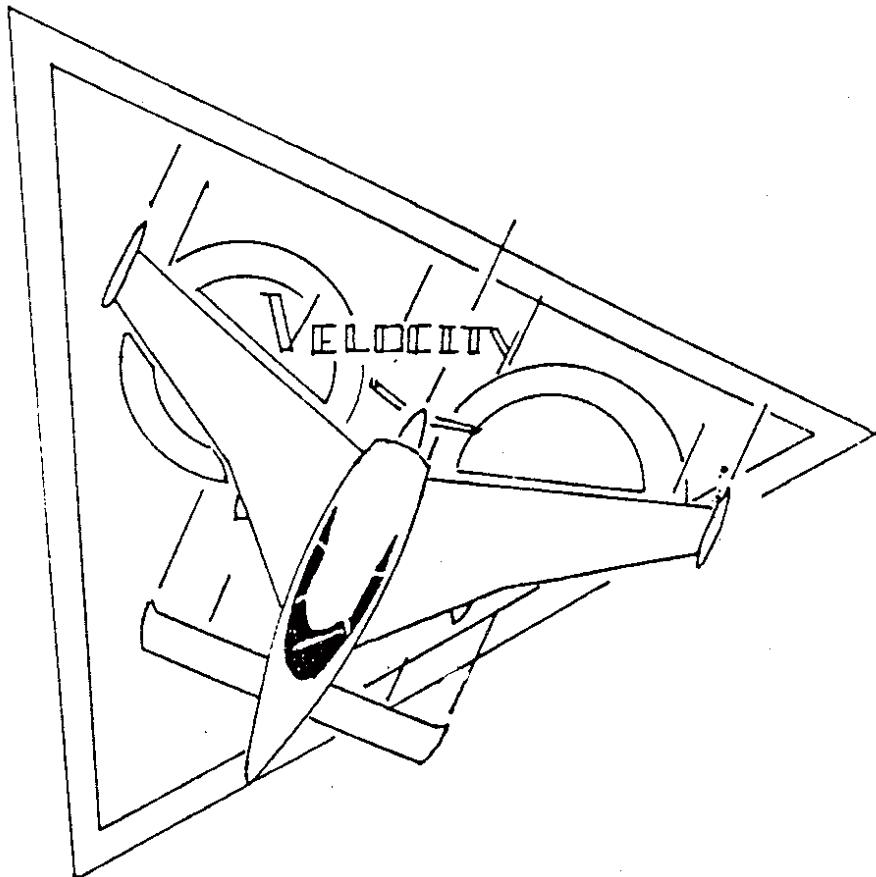


VELOCITY



Section IV

SECTION IV: FUSELAGE AND RELATED PARTS

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MARK REFERENCE LINES

There is an index hole in the fuselage flange 1" forward of the airplane. All measurements on the plane include this 1".

SPEED BRAKE CUT-OUT

The speed brake is pre-marked on the bottom fuselage. Begin the cut-out with a razor knife/blade. Be careful, you do not want too large a cut line. Cut this short line with a hacksaw blade and then all the way through the foam and inner skin with the razor and hacksaw blades. Insert a saber saw and cut out brake hole very carefully as the cut out portion will be used as your speed brake. Support the brake while making the last part of the cut so as not to let it break out. Sand the edge of the hole with a block on the straights and a pipe in the corners.

Use folded sandpaper to sand a relief about 1/8" X 1/8" deep around the upper and lower edges of the brake hole. (See SKETCH A - NEXT PAGE)

Fill relief flush with Microglass. Glass over edge with fine BID cut at 45 degrees overlapping edge about 1/4". This should be done as follows; prime edge with epoxy, fill reliefs with milled fiber mix (microglass), coat again with epoxy, and apply BID cloth removing any air bubbles.

Let cure for 20 hours and trim carefully with razor knife and lightly sand rough edges.

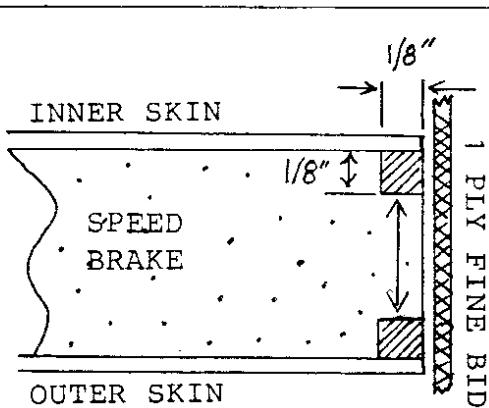
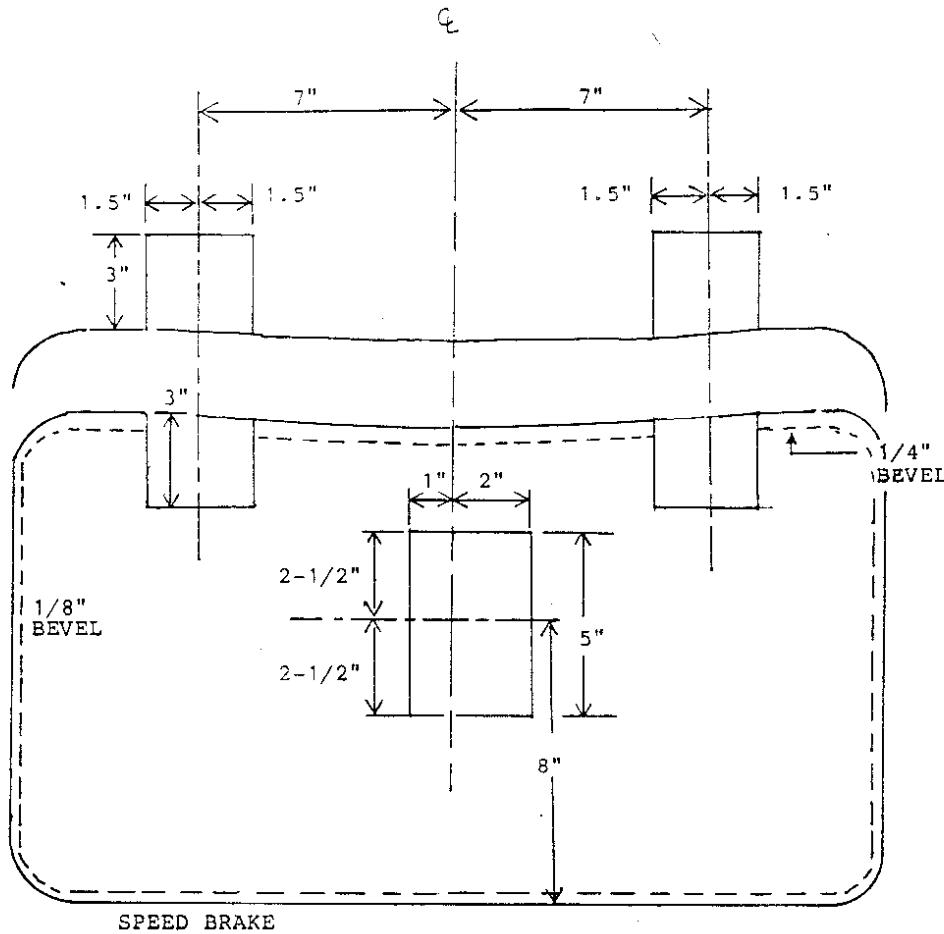
COVER SPEED BRAKE HOLE AND EDGES

Bondo stirring sticks on the outside skin around the speed brake hole so you may set the brake back in the hole from the inside. After turning fuselage upright, add pieces of stick to shim the speed brake up in the hole to produce an operating clearance of about 1/16" (1 stir stick). Sand a 4" margin around the hole for overlapping glass lay-ups. (See SKETCH B)

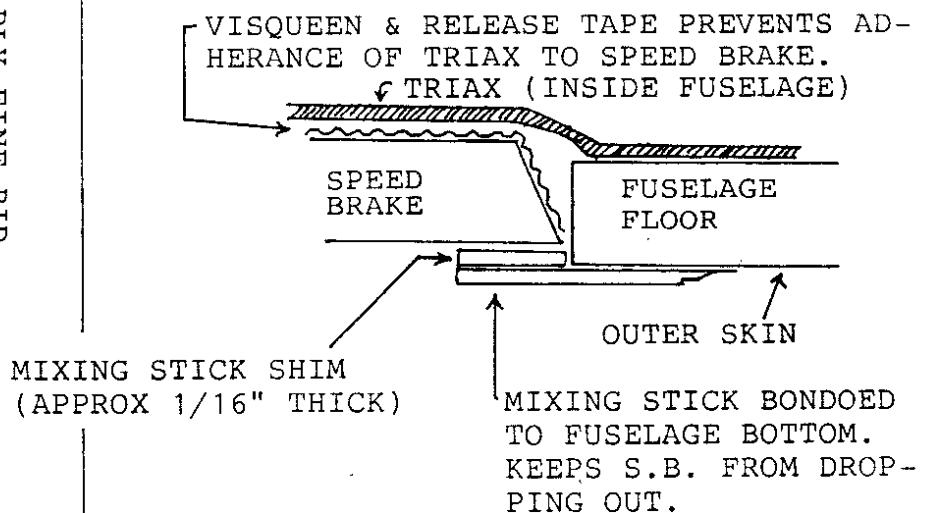
In order to glass over speed brake hole, you must now wrap the speed brake in Saran Wrap. Place wrapped brake in the hole.

Prime area around hole with epoxy and lay in 1 layer of 20" X 30" triax with major axis perpendicular to the centerline, centered over the hole, then lay-up a 16" X 26" Triax, major axis parallel to the centerline, again centered over hole. Try not to let resin run down gap between brake and fuselage. Let cure.

Remove the brake and bevel back the inner skin and foam of the speed brake with coarse sand paper on a block, 1/4" on



FILL $1/8 \times 1/8$ RECESSES
WITH MICROGLASS. COVER
WITH 1 PLY FINE BID.
LET CURE, KNIFE TRIM, &
SAND...



SECTION 4

SPEED BRAKE

the L.E. and 1/8" the other three sides (refer to SKETCH C.) Again, with a folded piece of sandpaper, remove the foam at the inside and outside skins as you did on the speed brake hole. Fill the reliefs with microglass and cover brake edges with fine BID cloth cut on a 45 degree bias. Let cure.

SPEED BRAKE REINFORCEMENTS

On the speed brake L.E., measure and mark points 7" to the right and left of the centerline. Measure and mark 1-1/2" to each side of these points and 3" aft forming 3" X 3" squares. Inside fuselage, reinstall speed brake and duplicate 3" X 3" squares directly in front of the squares in the speed brake as in SKETCH 402. This square will accept the other half of the hinge. Cut out the inner skin and foam in these squares down to the outer skin and sand the exposed glass as well as a 1" margin on the inner skin around the recesses.

SKETCH PAGE 402

Measure and mark a 3" X 5" rectangle on the speed brake inner skin, centering the 5" dimension 8" forward of the T.E. and put the 3" dimension 2" to the right and 1" to the left of the fore and aft centerline. Cut out the marked rectangle down to the outer skin and sand the exposed glass area as well as a 1" margin around the inner skin hole. This recess is for the actuator hard point.

SECTION 4

SPEED BRAKE

HARD POINTS

HARDWARE REQUIRED: SPEED BRAKE INSTALLATION

FOR HINGE NO. VMBA-02:

(16) AN507C-1032R8 SCREWS
(2) VMBA-02 HINGE, SPEED BRAKE MACHINED
#21 DRILL & #10 TAP

Sand the skin in and around the cut-out areas. Fill any voids in the foam around all the hinge recesses (door and fuselage) with microglass. Apply 5 plies of 3" X 3" TRIAX in the hinge areas. Put a 'finger' radius of microglass in the corners and cover the recesses with a layer of fine BID lapping onto the inner skin about an inch.

For the actuator hardpoint, sand the skin in and around the cut out area. As above, fill any voids in the foam around the recess with microglass. Apply 5 layers of 3" X 5" Triax in the actuator hardpoint area. Put a finger radius of microglass in the corners and cover the recess with a layer of FINE BID lapping onto the inner skin approximately an inch.

INSTALL SPEED BRAKE

Make trial fits of the speed brake. Sand out rough edges and interferences.

Cut 3/8" notches 2 " wide in the lower fuselage skin centered on the aft edge of the hinge pockets.

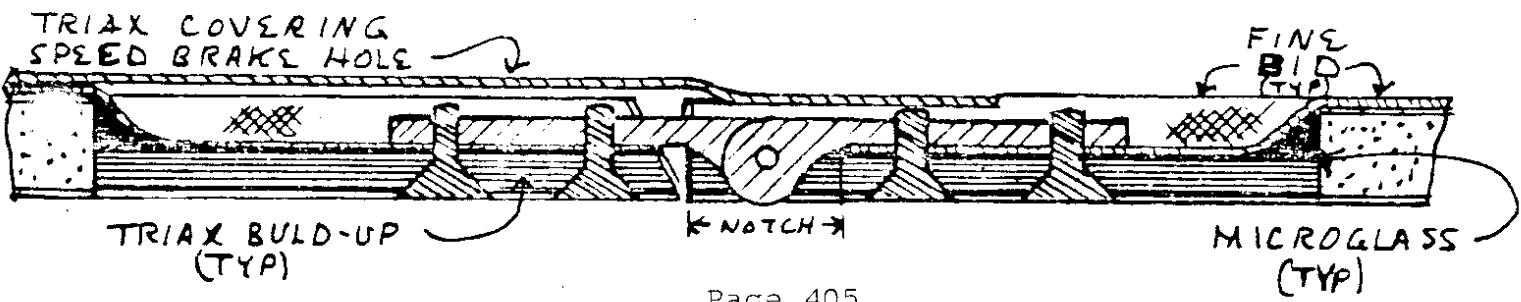
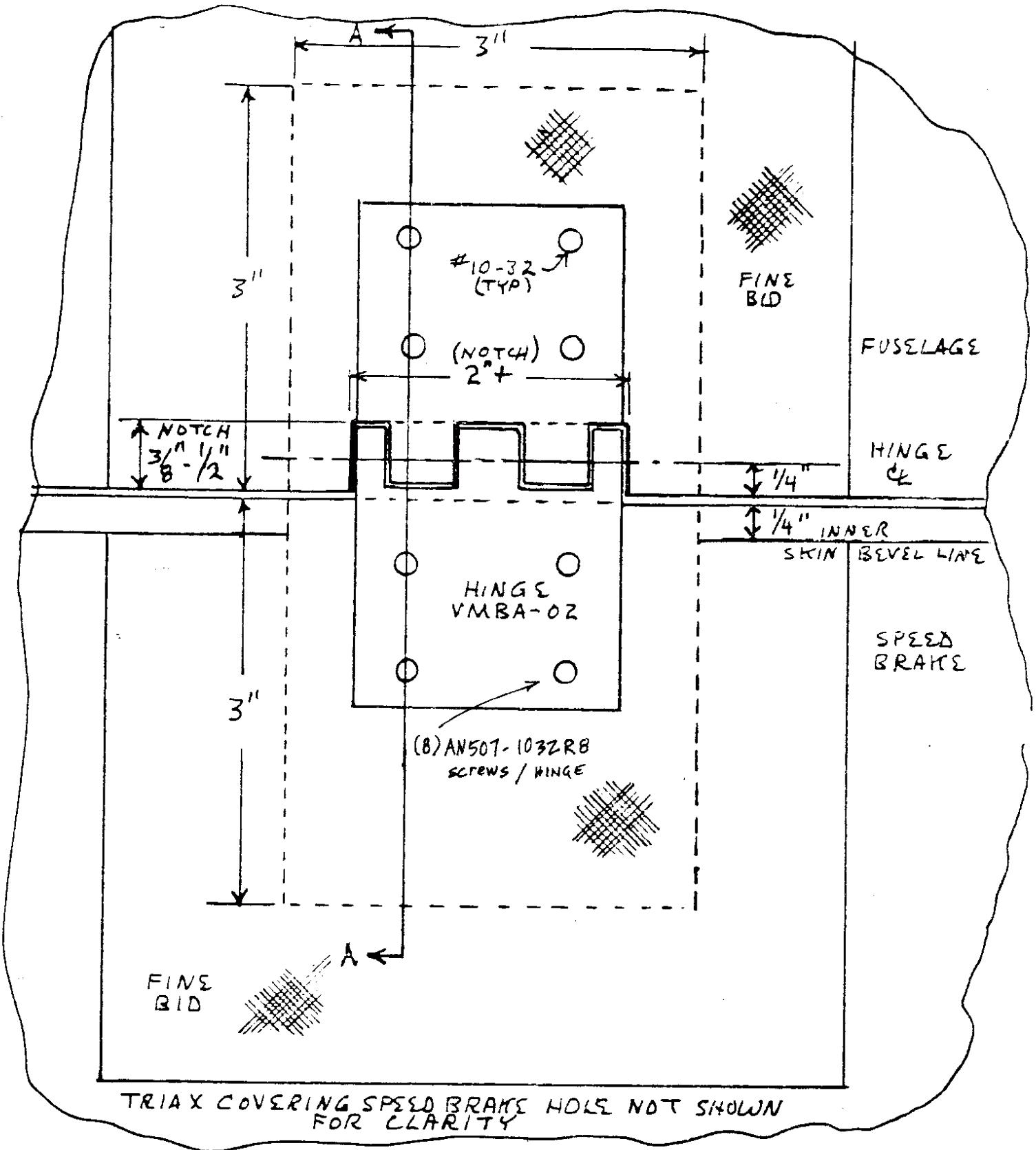
Place the hinges in the hinge pockets, holding the speed brake in position under the fuselage. With the hinge pins extending 1/4" to 3/8" out from the brake, align the hinges so that the hinge pin line is in a straight line.

Drill and cleco one hole through each hinge half. Recheck alignment and operation of speed brake.

Drill pilot holes for the other three screws in each half.

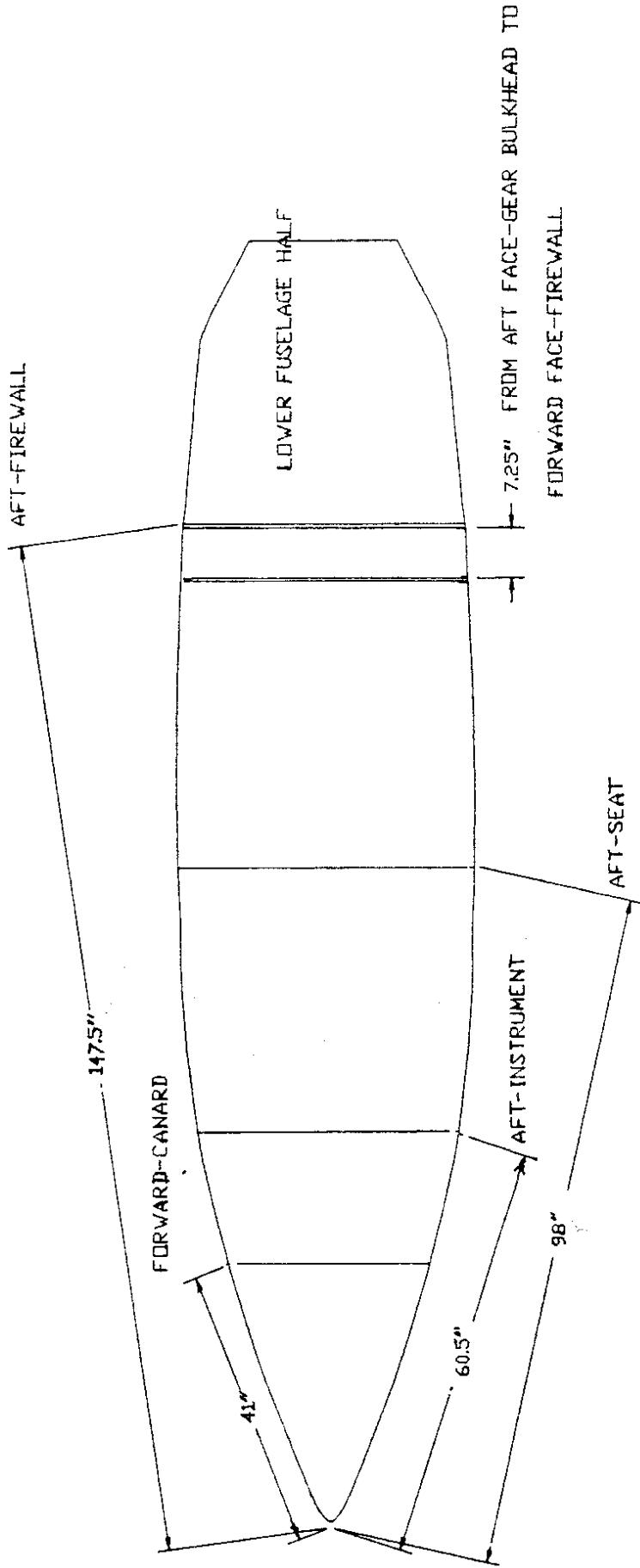
Remove the brake and hinges (put identifying marks on the hinges) and drill out the outer skin holes in the brake and fuselage for #10-32 screws. Countersink the skin holes. Drill and tap the hinges for #10-32 screws.

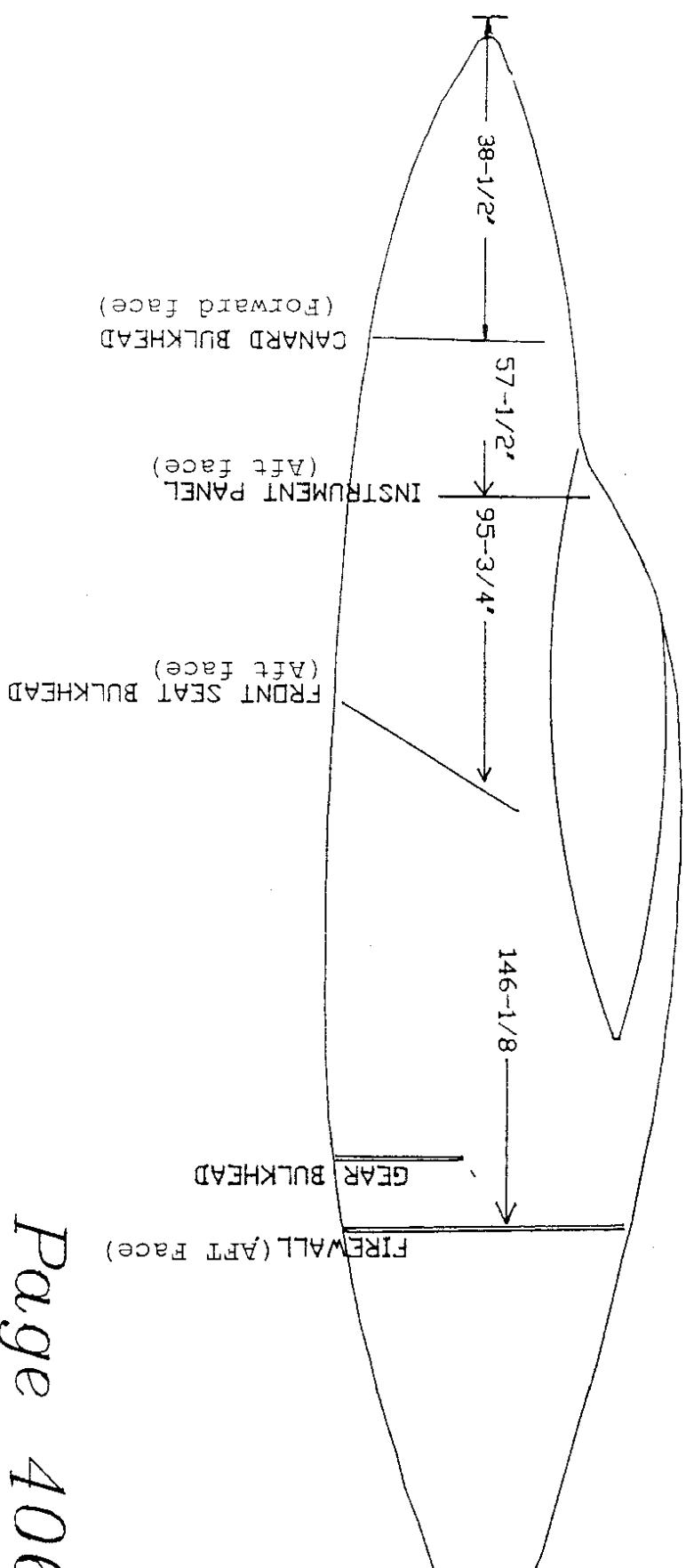
Use #10-32 X 1/2" (AN507C-1032R8) countersunk screws for the speed brake installation.



- * Origin of measurements is the bolt-hole on the nose flange. Measure and mark all bulkheads on lower fuselage flange. MEASUREMENTS SHOWN BELOW ARE FROM NOSE BOLT HOLE TO FLANGE, NOT ALONG THE CENTERLINE OF THE AIRCRAFT. SEE Page 406-B FOR CENTERLINE DIMENSIONS.
- * Pay attention to the "AFT" & "FORWARD" references, as they specify the location of the aft and forward faces of the bulkheads.

PAGE 406-A





Page 406-B

- * All measurements depicted above are from the NOSE BOLT-HOLE to the indicated face of each bulkhead. These measurements are along the centerline of the aircraft.
- * The aft face of the gear bulkhead should be positioned 7-1/4" forward of the front face of the firewall.
- * It is extremely important that the aircraft be level, both transversely & longitudinally for proper installation of the bulkheads.

CUT OUT BULKHEADS

Cut out bulkheads from plywood on the pre-marked lines. Sand in preparation for glass lay-ups. Mark the orientations for the lay-ups on the bulkheads.

The canard bulkhead is made from 1/4" plywood, double thick 3-1/2" high on top aft side. Taper the 3-1/2" piece on one edge. The tapered edge faces down.

The instrument panel is supplied already laid up with 3 layers of 16" X 38" TRIAX. The smooth side is aft, facing the pilot.

The front seat bulkhead is 1/2" Clark pvc foam.

The main gear bulkhead is made from 1/4" plywood.

The firewall bulkhead is made from 1/4" plywood

LOCATE BULKHEAD PLACEMENT

To locate bulkhead placement inside fuselage you must level the fuselage upright.

SKETCH OPPOSITE PAGE

Measure and mark the bulkhead positions on the flange per the sketch.

Notes: The canard bulkhead mark is for the forward side position. The instrument panel, pilot seatback, and firewall marks are for the aft side positions. The gear bulkhead mark is 7-1/4" from the engine bulkhead forward side to the gear bulkhead aft side.

Using the water level you made in Section 01, place the nose at the same level as the aft center of lower cowl.

Centrally, on the side of the fuselage, about 6" down from the flange, place masking tape and mark a level line on it. Use this line for all future longitudinal leveling. It is also a good idea to bondo a couple of string levels on the fuselage floor, one on the longitudinal axis and one on the transverse axis. Make sure they are also level, of course. A good place is just behind the instrument panel, ahead of the front seat, to the left of the console. These can be referred to for future levelling, also.

Place a straightedge across fuselage at the marked locations for bulkheads and, using a plumb bob every few inches across

fuselage, mark points to locate bulkheads transversely (except for the seat bulkhead).

Across the fuselage at the front seat backrest location, clamp a straightedge and lean the foam seat against it. The nominal, or 'plans' location establishes about a 125 degree seatback angle, which is the result of locating the bottom of the bulkhead by plumbing down from marks across the flange that are 85.5" from the nose bolt. Alternate methods are to position the seat with a tri-square, set to 125 degrees with a protractor, or using an inclinometer. Align the foam and trace a line on the fuselage.

NOTE: The front seat bulkhead can be moved up to 3" aft or up to 2" forward. The seatback angle can be varied within the above fore and aft limits, but we leave that choice to the builder as well.

IMPORTANT!: The above note is referenced from a nominal distance of 25" along the floor between the aft of the instrument panel and the bottom of the seatback angled to 125 degrees. At a 26" measurement, a 6' pilot can be accommodated. Be aware that moving further aft affects ease of entry to the back seat. Also, more attention will have to be paid to C.G. calculations when loading the aircraft. In addition, be sure installation of this bulkhead does not create a mismatch of the fuselage top-to-bottom fit. Check it, in any case.

CONDUIT INSTALLATION

Locate conduit position in fuselage by temporarily installing them with the bulkheads. Fasten the conduits in place with clecos. Mark the outline of the conduits then remove them and the bulkheads from the fuselage.

Sand the inner skin about 1-1/2" above and 1-1/2" below your outlines. Bondo the conduits in place so they protrude beyond the canard and firewall bulkheads (to be trimmed later). Prime sanded areas and apply 1 layer of BID 8" wide tape overlapping 1-1/2" onto floor and sides.

GLASS BULKHEADS

Cut out TRIAX cloth using the bulkheads (and canard 'knees') as patterns and according to the pre-marked orientations. Allow sufficient margins so that you do not have frayed edges during lay-ups.

Cover work table with visqueen (thin plastic) so that glassed parts won't adhere during cure. Wear latex gloves. Use a metal trowel on flat surfaces and plastic or rubber squeegees on curved ones. Cut off major excess with shears. Work edges down that lift while trimming. After cure, edge trim and sand

SECTION 4

BULKHEADS

smooth. You may knife trim after 6 to 8 hours when the glass is cured enough not to move but soft enough to cut.

Prime the wood surfaces with safety-poxy. Wet out TRIAX cloth properly with the fiber axis in the proper orientation. Squeegee off all excess. Remember, too much resin adds weight, not strength.

On the canard bulkhead, lay-up one layer of TRIAX both sides with the major fiber axis vertical. Put a second layer of TRIAX on both sides, on the upper 6", with the major axis horizontal. While the aft face is still uncured, install the 1/4" X 3-1/2" plywood doubler, tapered edge down, and cover with 2 layers of TRIAX, overlapping 4" down onto the bulkhead, with the major axis horizontal.

On the canard 'knees', lay-up one layer of TRIAX on both sides with the major axis about 45 degrees from vertical (the short straight edge).

Fill the front seatback foam surfaces with glass bubbles and epoxy (micro-slurry) prior to glassing. Cover the forward and aft faces with 1 layer of TRIAX with the major axis horizontal.

On the main gear bulkhead, lay-up 1 ply of TRIAX on the forward side, with the major axis vertical, and apply 1 ply of TRIAX on the aft side, with the major axis horizontal. In addition, apply the two plies of TRIAX at the lower corners, each side, (8 plies total) as indicated on the template markings, major axis at 45 degrees.

Lay-up 1 ply TRIAX on the forward side of the firewall bulkhead, with the major axis vertical, and apply 1 ply of TRIAX on the aft side, with the major axis horizontal.

NOTE: It is convenient now and saves sanding later to apply the 2 layers of 7" X 23" TRIAX reinforcement to the aft side of the firewall bulkhead as shown on page 409A.

INSTALL BULKHEADS

Sand about 2" either side of the marked bulkhead lines.

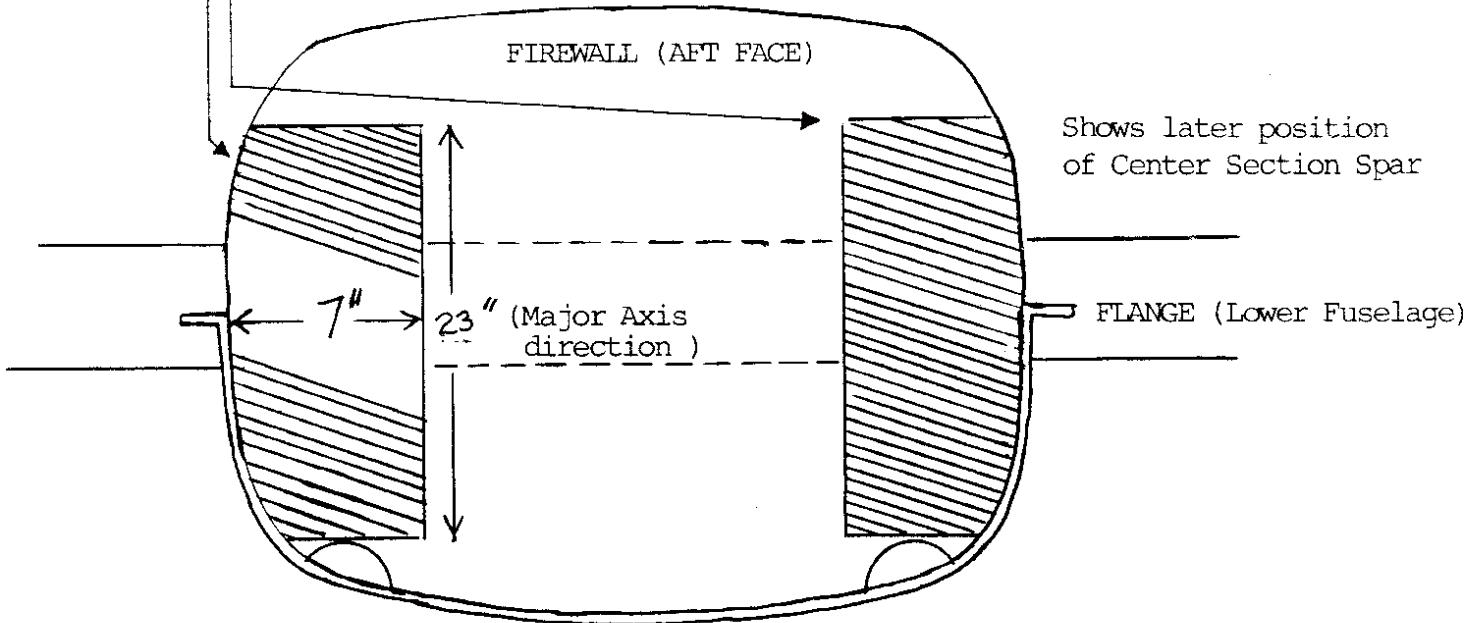
Recheck fuselage level.

Clamp an angle across the fuselage at each bulkhead position, clamp each bulkhead in place, and plumb each bulkhead vertically. Bring together any spread of the fuselage with the flange-to-angle clamps.

Bulkheads should fit easily into place without causing any pressure against inner skins. Sand trim the bulkheads if necessary to prevent 'ripples' from showing on the fuselage.

TRIAx REINFORCEMENTS TO AFT FACE of FIREWALL

- * 2 plies Triax left side aft face
- 2 plies Triax right side, aft face
- Apply with major axis running the 23" length
- * It is recommended that you apply these reinforcements while initial lay-ups to firewall are still wet. (Prior to installation of bulkhead)



- * In correct position, the Triax reinforcements should extend up from the top of the duct cut-outs, as shown above.

Fasten with dobs of bondo.

Fill any voids with microballoon (Q-cells and epoxy) prior to glassing the bulkheads in place. Fill the voids and form a 'finger' radius where the bulkheads meet the fuselage. Wet the sanded areas for glassing sparingly.

All bulkheads are installed with 2 plies BID approximately 3" wide, with the axis at 45 degrees, overlapping equally on bulkhead and fuselage (see ENGINE BULKHEAD below for additional lay-ups).

IMPORTANT: Be sure to maintain 7-1/4" spacing between firewall and main gear bulkheads.

ENGINE BULKHEAD:

Before cure of the BID layers above, add a third layer of BID 3-1/2" wide, lapping 2" on the bottom-aft side of the bulkhead and 1-1/2" on the fuselage. Tape up to within 3" of flange. The area above that will be cut out later for the spar.

ENGINE & GEAR BULKHEADS:

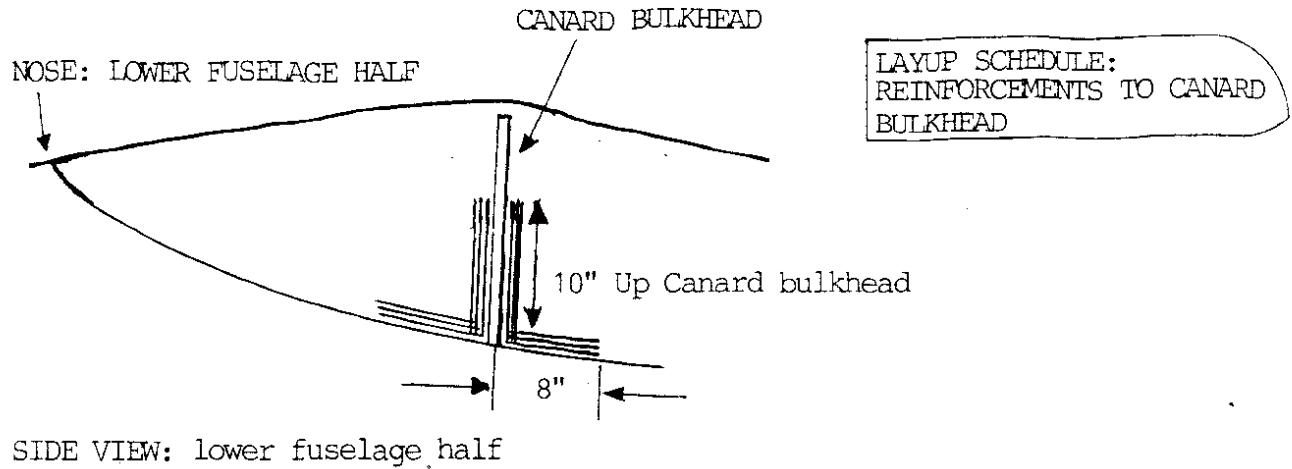
Apply one layer of TRIAX, 7" X 33", major axis fore & aft (the 7" dimension), between the engine and gear bulkheads, centered transversely, running from one duct to the other. This reinforces the floor at this point.

This is the time to drill a 1" hole in both conduits just forward of the engine bulkhead toward the bottom of the fuselage for later routing of wires and brake lines.

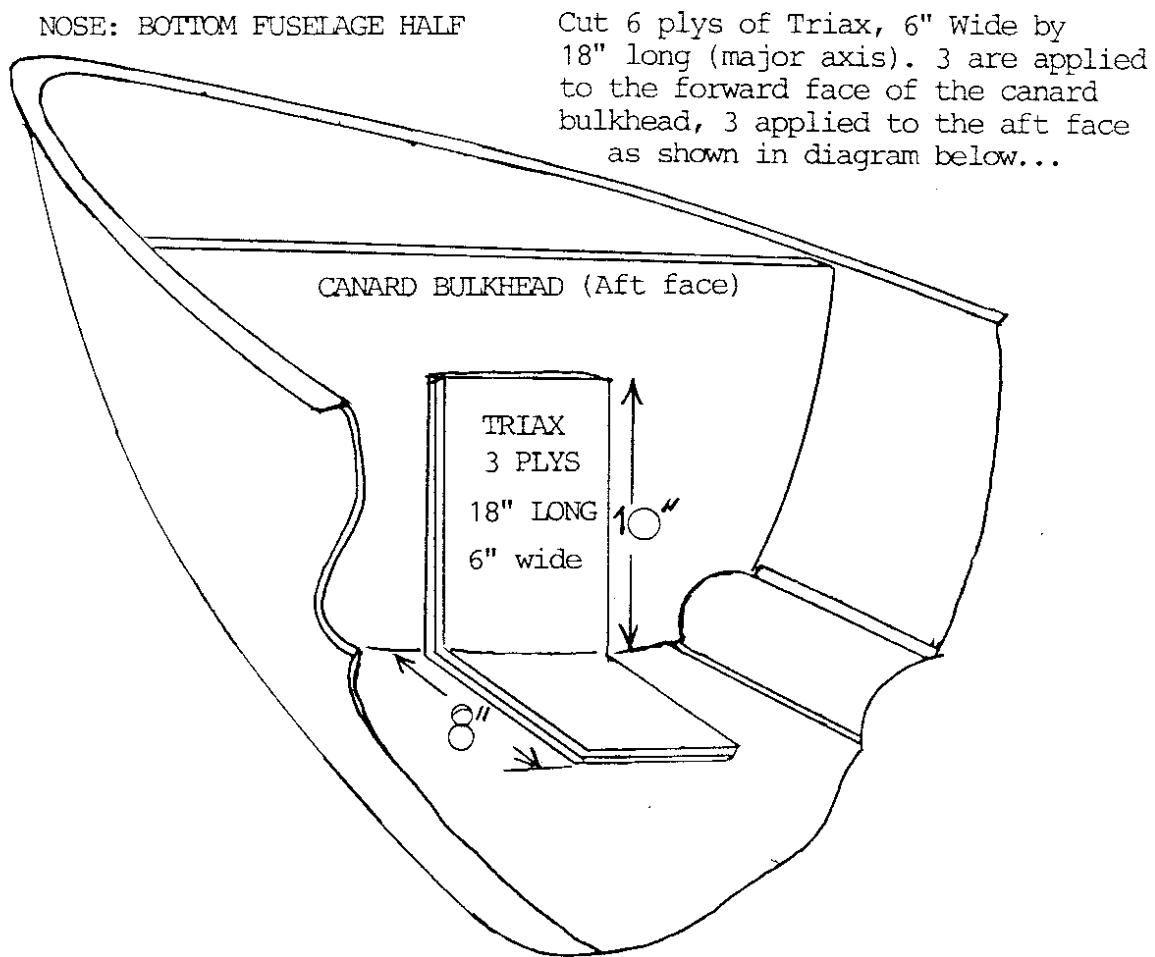
SEAT BULKHEAD FINISHING CAP:

With the seat bulkhead installed, bondo two 1-1/2" strips, one at a time, of 1/2" Clark foam on the top edge of the seatback. Hold in place with nails while curing.

Round the corners by sanding. Fill voids with microballoon and cover with 2 layers of BID cut on a 45 degree bias. (REFER TO VIDEO 3)



SIDE VIEW: lower fuselage half



SECTION 4

BULKHEADS

CANARD BULKHEAD:

Recheck fuselage to be level and install the canard bulkhead plumb (2 plies of BID, etc.).

Sand a 8" X 10" area up each side of the bulkhead in line with the recess.

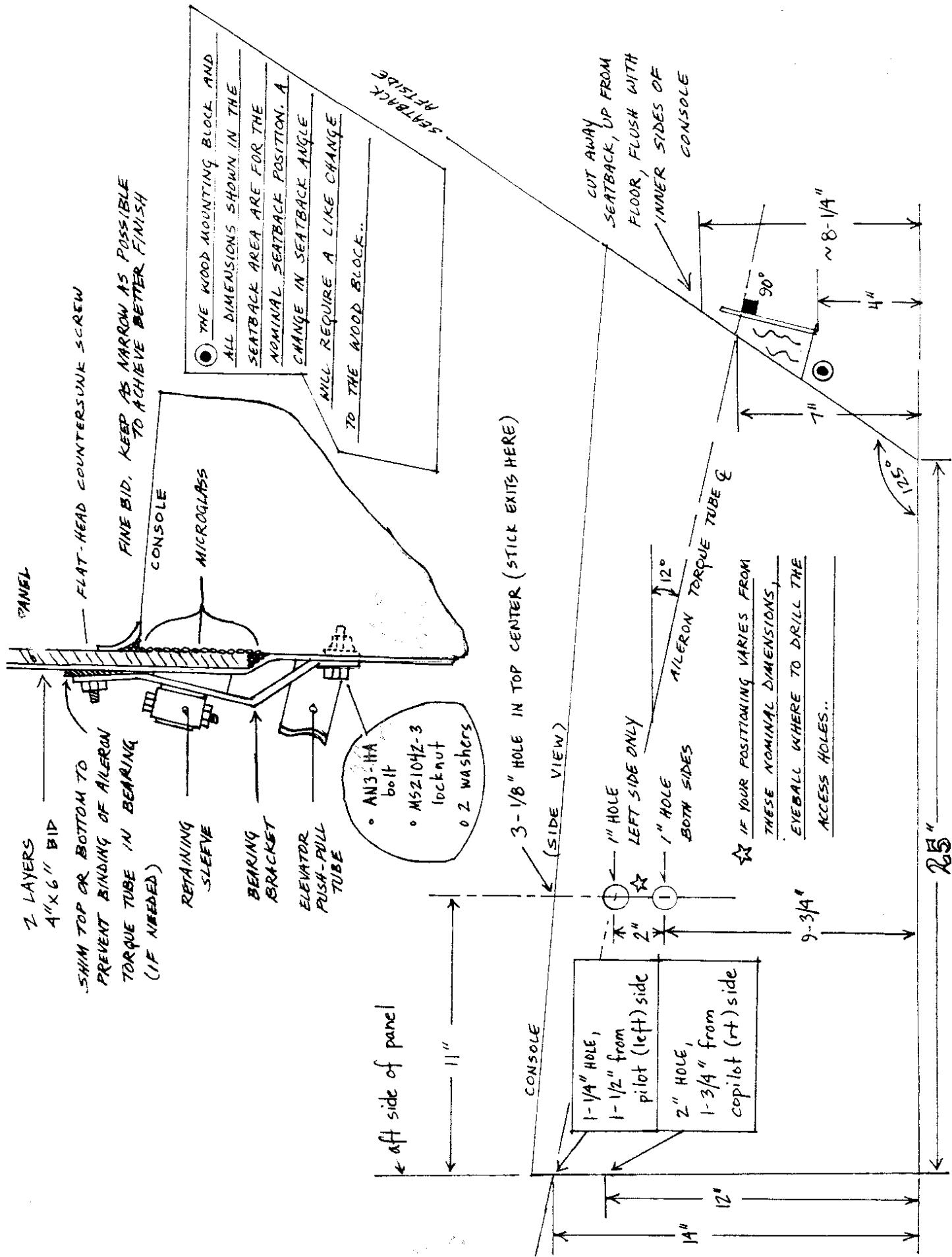
Lightly prime the exposed glass areas. On visqueen, wet out three layers of 6" X 18" TRIAX for each side of the canard bulkhead. Apply the layers, shiny side down to prevent kinking the longitudinal fibers, to the recesses, overlapping up the canard bulkhead 10" (both sides). Refer to page 411 for diagrams.

Take care to work out any kinks in the cloth. Some times it helps to peel back 1 or 2 layers and work the cloth into the corners one at a time without taking the 3 layers completely apart. Be especially careful to work the material into the sharp bend where the bulkhead meets the bottom skin.

While these reinforcements are still wet, install the knees, or supports, on the forward face of the canard bulkhead 3-1/2" on each side of the centerline, plumb, and against bulkhead. Glass in place with two layers of 3" BID tape, cut on a 45 degree bias, on both sides of each knee.

BATTERY BULKHEAD

Sand trim the battery bulkhead to fit in the nose, plumbed vertically. Position for best fit. Install with BID tape as before.



HARDWARE REQUIRED TO INSTALL FRONT AILERON BEARING BRACKET

BRACKET, FRONT AILERON TORQUE BEARING (VFAB-01)
CONTROL TORQUE TUBE, AILERON (VCTT-01)
(END WITH RETAINING SLEEVE TO FRONT OF A/C)
(1) AN3-11A BOLT
(1) AN507C-1032R8 SCREW
(2) AN960-10L WASHERS
(3) AN960-10 WASHERS (USE AS SHIMS IF NECESSARY)
(2) MS21042-3 LOCKNUTS

1-1/4" & 2" HOLE SAWS

LOCATE PANEL & CONSOLE

The instrument panel aft surface is located 60-1/2" from nose bolt to the marks on the flanges. The bottom of the panel is 4" down from the flange. Plumb the instrument panel vertically. It is suggested you leave the leg room cutting of the panel until the seating is 'tested' to optimize the comfort and instrumentation to suit the builder.

The panel overlaps the console about 1-1/2". The front of the console is about 14-3/4" tall. 26" aft, the vertical height is about 12-5/8". The rear of the console is about 1/2" below the 'dip' in the seat back.

Note: The locations of the control system are based upon these nominal measurements. Any adjustments to these nominal dimensions as well as any change to the nominal seat back installation must be taken into account.

SKETCH OPPOSITE PAGE

Put a little thick microglass between the panel and console overlap and bondo console and panel in place. Lay up 2 plies, of BID tape 2-1/2" wide to fasten the console in place. Don't forget to sand, pre-wet, and cut on the 45 degree bias.

Apply 2 layers of 4" x 6" BID over the front panel to console junction.

Glass the sides of the panel to the fuselage, overlapping the aft side of the instrument panel sparingly for better appearance. Let cure.

CONSOLE CONTROL ASSEMBLY LOCATIONS

On the forward face of the console, measure and mark 14" up from the floor and 1-1/2" from the left side for the aileron torque tube bearing hole. Drill a 1-1/4" hole. 12" up and 1-3/4" from the right side, drill a 2" hole for the elevator push tube.

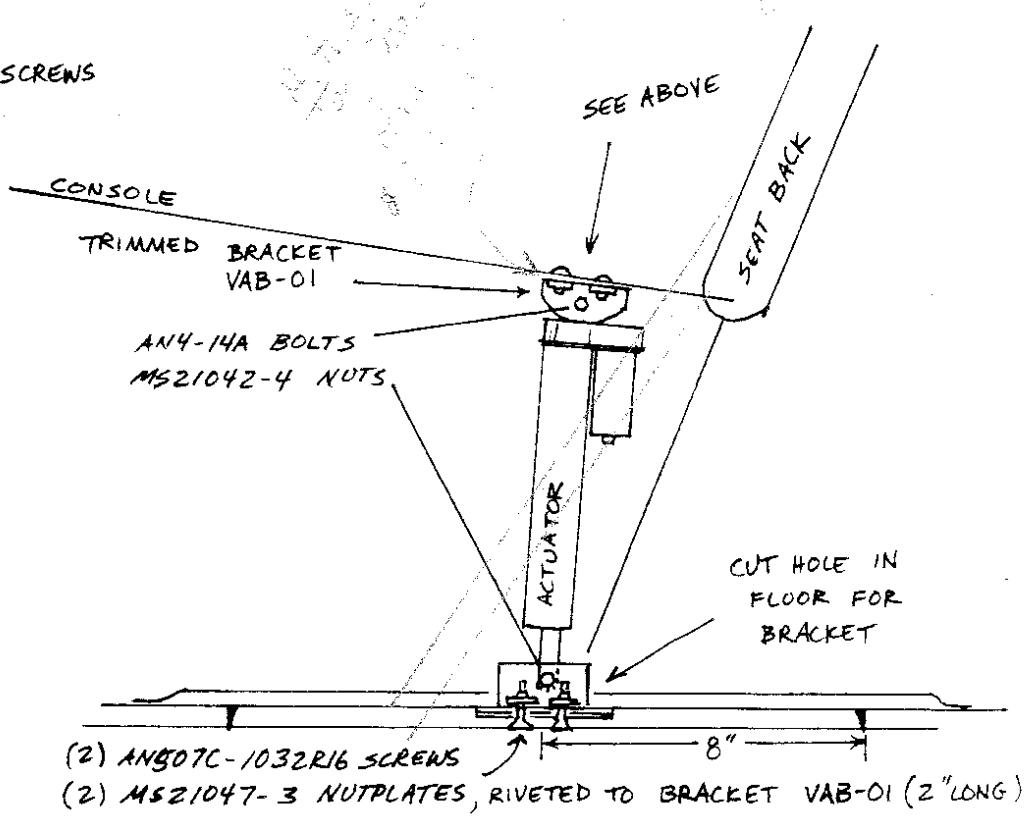
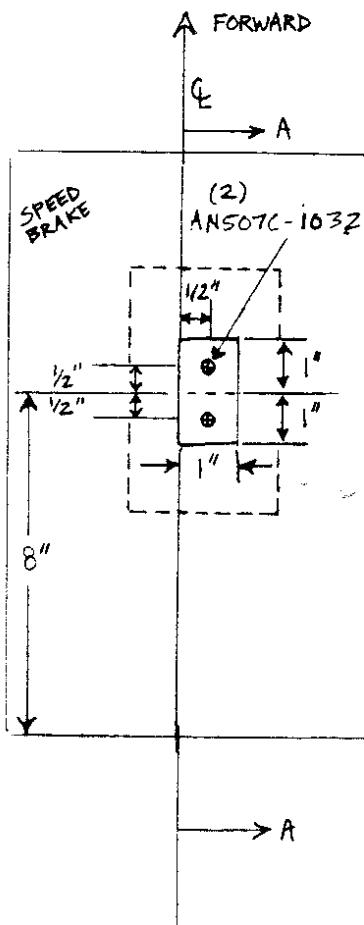
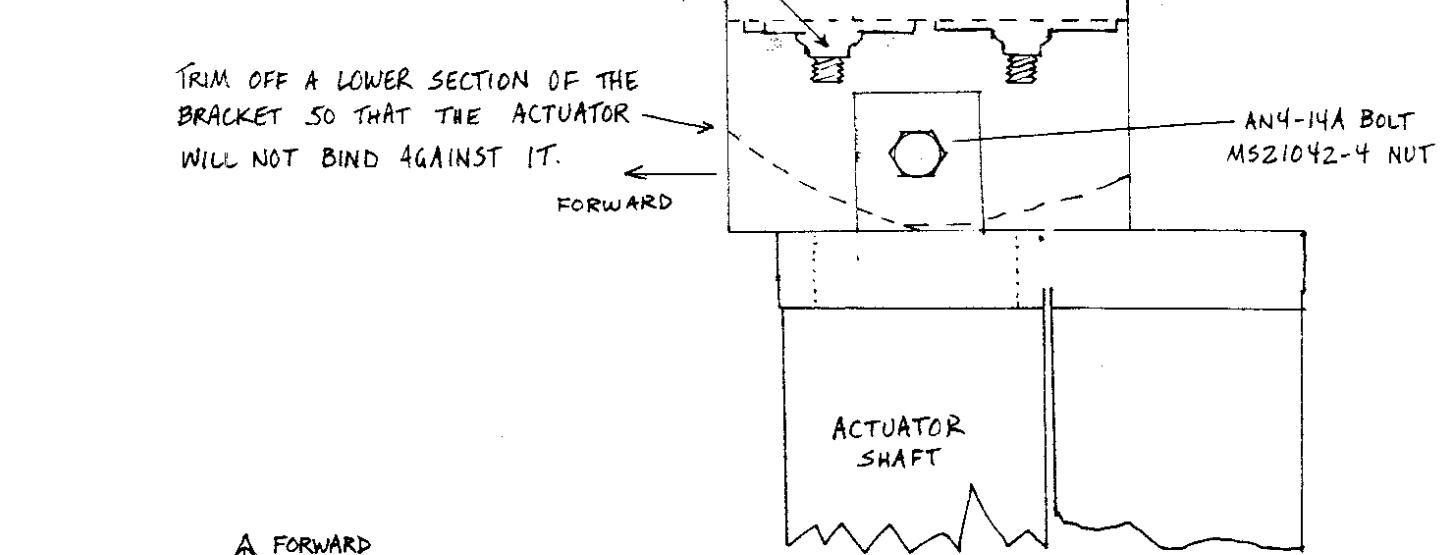
On the top centerline of the console, measure and mark 11" aft of the panel. Drill a 3-1/8" hole.

At this same 11" distance aft of the panel, measure and mark 9-3/4" up from the floor. Drill a 1" hole through both sides of the console. 2" directly above the 1" hole on the left side of the console, drill another 1" hole. These are access holes for assembling the stick mechanism.

Now is the time to install the speed brake actuator. The positioning of the console, seat back, speed brake actuator, and console controls are all inter-related. Repositioning for builder convenience is no problem as long as operating clearances are provided. Be sure to coordinate the installation of all these items.

VAB-01 2" ALUMINUM U-CHANNEL

(2) AN525-10R8
screws
(2) MS21047-3
nutplates
★ ATTACH NUTPLATES TO BRACKET
WITH 3/32 RIVETS (AAC-3-4)



ACTUATOR INSTALLATION:

Center the actuator bracket (VAB-01 2" length) on the speed brake hardpoint. Drill holes in the locations shown in SKETCH OPPOSITE PAGE. Install the bracket with #10 X 1" flat head screws (AN507C-1032R16) and MS21047-3 nutplates. The nutplates should be attached to the bracket with 3/32 rivets (AAC-3-4).

Cut out a hole in the fuselage floor to clear the bracket with the speed brake closed.

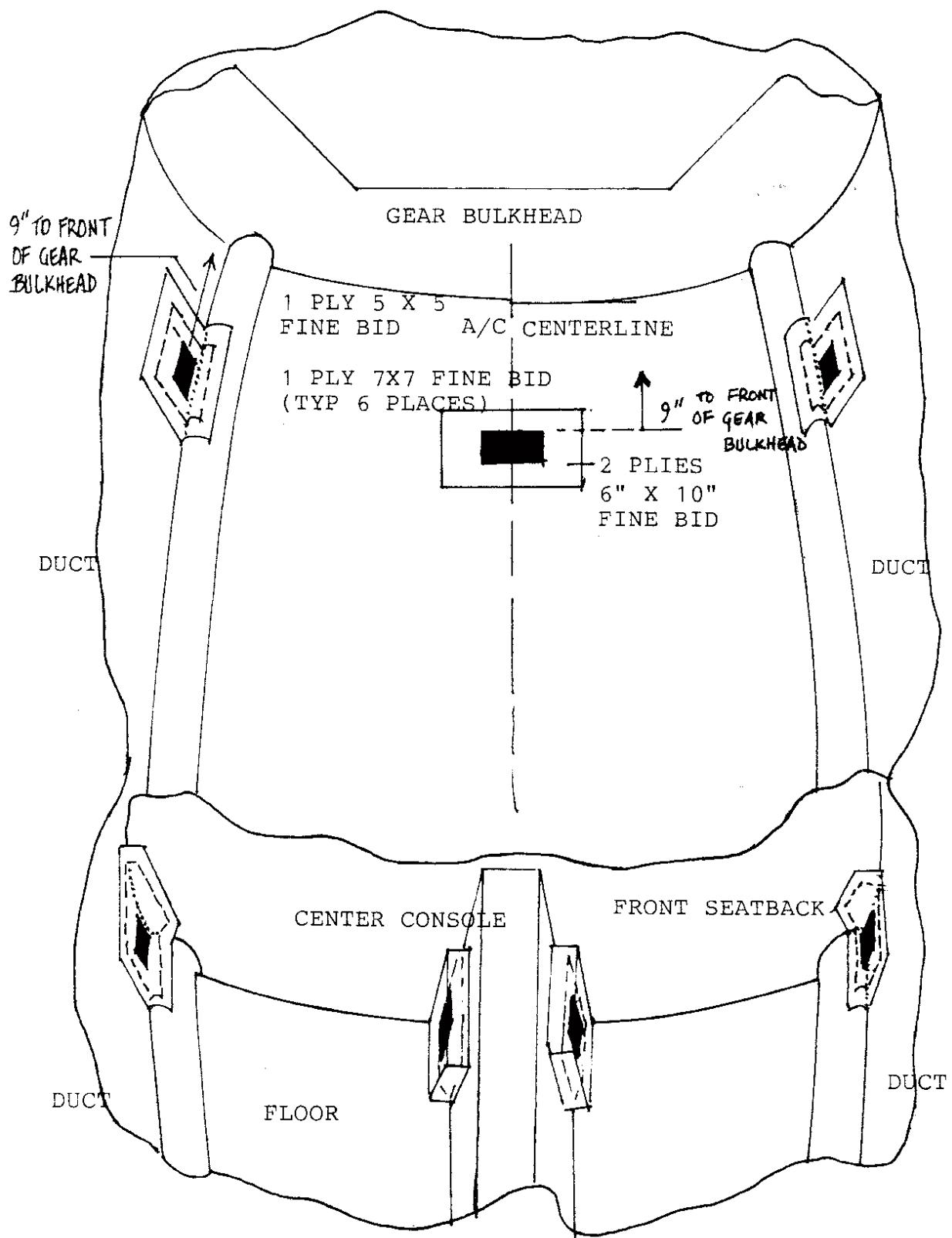
Cut up about 8-1/4" (measured vertically) from the floor through the aft center of the seat bulkhead for a sufficient opening to install the actuator, fully retracted, into the console. Make the hole flush with the inner sides of the console. Apply 2" wide BID to the exposed edges, lapping the inner console surface and aft side of the seat bulkhead about 3/4".

Block up the speed brake in the closed position. Attach the actuator arm to the aluminum channel bracket with an AN4-14A bolt and MS21042-4 nut. Put another bracket on the top of the actuator using the same hardware. You will need to trim the bottom of the bracket as shown in the sketch on page 416 to allow the actuator to move without binding. The sketch is merely approximate, so you may have to experiment just a bit for proper fit. Fit the actuator inside the rear of the console and hold the upper bracket up against the inside upper skin of console. Drill down through the console top and bracket. Bolt the bracket into place with (2)AN525-10R8 screws and (2)MS21047-3 nutplates. Again, the nutplates are installed with 3/32 rivets. Check the speed brake for operation by connecting the actuator leads to a battery. Reverse leads to reverse action. Make sure that the brake closes completely.

ACTUATOR INSTALLATION: HARDWARE REQUIRED

- (1) ACTUATOR, 6" SPEED BRAKE VSBA-01
 - (2) VAB-01 BRACKET, ACTUATOR, SPEED BRAKE & CONSOLE
 - (2) AN507C-1032R16 SCREWS
 - (2) AN525-10R8 SCREWS
 - (2) AN4-14A BOLTS
 - (2) MS21042-4 LOCKNUTS
 - (4) AAC-3-4 3/32 POP RIVETS
 - (4) MS21047-3 NUTPLATES
- * You will probably need 10 AN960-416 WASHERS as shims for the pivot bolts (AN4-14A's)

- * SEAT BELT HARD POINTS SHOWN IN BLACK
- * DRILL & TAP FOR 5/16-18 BOLTS (ONE IN EACH SMALL HARPOINTER & TWO IN EACH LARGE HARPOINTER)



SEAT BELT HARD POINTS

Now is the best time to install the seat belt hard points. There are six small (1" X 2") and one large (2" X 4") 1/4" thick aluminum plates. The small plates are used at the sides of the seats and the large plate is used at the center of the rear seat.

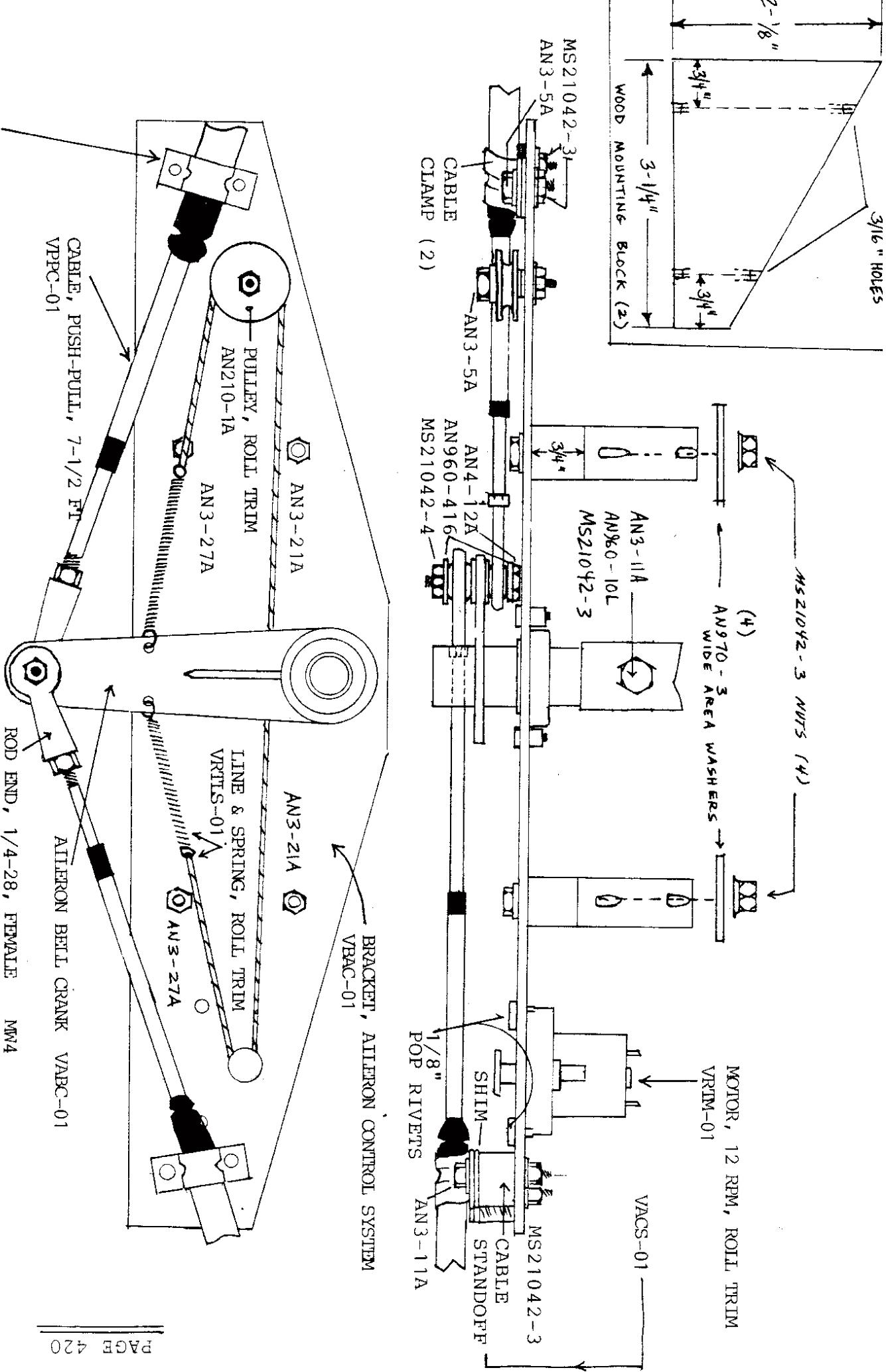
SKETCH OPPOSITE PAGE

Sand each plate and an area about 3" larger all the way around the plate at each installation location. Cut 1 piece of 7" X 7" and 1 piece of 5" X 5" for each small plate, and 2 pieces of 6" X 10" for the large plate from fine BID.

Bed the plates in microglass forming a tapering fillet around the plates to prevent voids under the fine BID layups. Lay up the larger pieces and then the smaller pieces centered over each plate conforming to the surrounding surfaces.

When you install the seat belts you will simply drill and tap into these hardpoints for fastenings.

PART #: VSBHP-01
SEAT BELT HARPOINTS, 6 SMALL, 1 LARGE



CLAMP & SHIM, CONTROL CABLE, AILERON
VOCC-01

SEAT BELT HARD POINTS

Now is the best time to install the seat belt hard points. There are six small (1" X 2") and one large (2" X 4") 1/4" thick aluminum plates. The small plates are used at the sides of the seats and the large plate is used at the center of the rear seat.

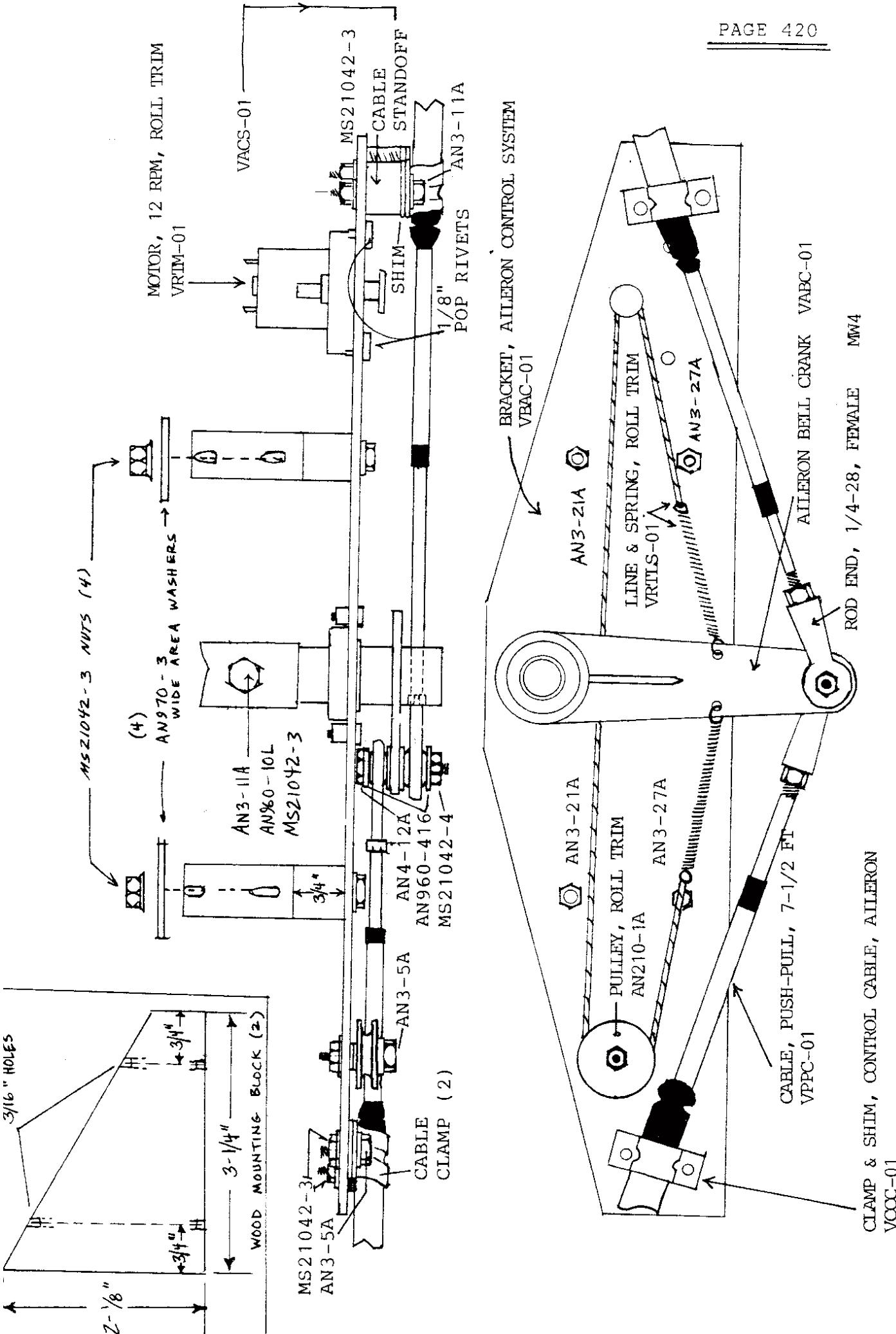
SKETCH OPPOSITE PAGE

Sand each plate and an area about 3" larger all the way around the plate at each installation location. Cut 1 piece of 7" X 7" and 1 piece of 5" X 5" for each small plate, and 2 pieces of 6" X 10" for the large plate from fine BID.

Bed the plates in microglass forming a tapering fillet around the plates to prevent voids under the fine BID layups. Lay up the larger pieces and then the smaller pieces centered over each plate conforming to the surrounding surfaces.

When you install the seat belts you will simply drill and tap into these hardpoints for fastenings.

PART #: VSBHP-01
SEAT BELT HARPOINTS, 6 SMALL, 1 LARGE



HARDWARE REQUIRED TO INSTALL REAR AILERON CONTROL BRACKET

(1) BRACKET, AILERON CONTROL SYSTEM	(VBAC-01)
(1) AILERON BELL CRANK	(VABC-01)
(2) CABLE, PUSH-PULL, 7-1/2 FT	(VPPC-01)
(2) ROD END, 1/4-28, FEMALE	(MW4)
(2) CLAMP & SHIM, CONTROL CABLE, AILERON	(VCCC-01)
(1) SPACER, AILERON CABLE STANDOFF	(VACS-01)
(1) PULLEY, ROLL TRIM	(AN210-1A)
(1) LINE & SPRING, ROLL TRIM	(VRTLS-01)
(1) MOTOR, 12 RPM, ROLL TRIM	(VRTM-01)
(1) CONTROL TORQUE TUBE, AILERON	(VCTT-01)

BOLTS:

(2) AN3-27A	(2) AN960-416	(9) MS21042-3
(2) AN3-21A	(4) AN970-3	(1) MS21042-4
(3) AN3-11A	(1) AN960-10L	
(3) AN3-5A		
(1) AN4-12A		

WASHERS:

LOCKNUTS

(2) BSP-44 POP RIVETS (1/8" PROTRUDING)

INSTALL CONSOLE CONTROLS

Assemble the forward aileron torque tube bearing, bracket and retaining sleeve to the torque tube. (SEE SKETCHES ON 414)

Insert the torque tube assembly through the upper left (1-1/4") hole in the front of the console until the bearing bracket is touching the panel/console.

SKETCHES OPPOSITE PAGE

The torque tube is provided with enough length for at least the aftmost allowable position of the seatback and will require trimming. With the torque tube resting on the hole at the front and blocked up about 5-1/2" where it exits the seatback, mark the torque tube so it just protrudes behind the seatback. Remove the torque tube and cut off the excess tubing. Reinsert.

Assemble the roll trim motor and pulley to the aileron control bracket with two long 1/8" pop rivets.

Make the wood mounting blocks for the aileron control bracket. Be aware that a change from the nominal seatback angle will require a corresponding change in the wood mounting blocks.

With the wood mounting blocks flush with the bottom of the bracket and centered on the mounting holes, drill the 3/16" holes for the mounting bolts. This assembly might have to be installed slightly to left of center to clear the speed brake actuator.

Block the assembly against the seatback 4" from the floor. With one bolt in a mounting hole in each mounting block, drill through the second hole as a guide on through the seatback and attach the assembly. Drill the remaining holes and attach in like manner. Slight modification of the wood blocks may be necessary in order to ensure free movement in the torque bearing.

Slip the aileron bellcrank through the bearing and into the end of the torque tube. Using duct tape, hold the front bearing in place against the panel/console in the previously drilled hole located approximately 1" left of center. Allow about 5/8" clearance between the crank and the bracket and mark the bellcrank tube where it joins the torque tube. Remove the bellcrank and torque tube assembly.

CONTROL
STICK

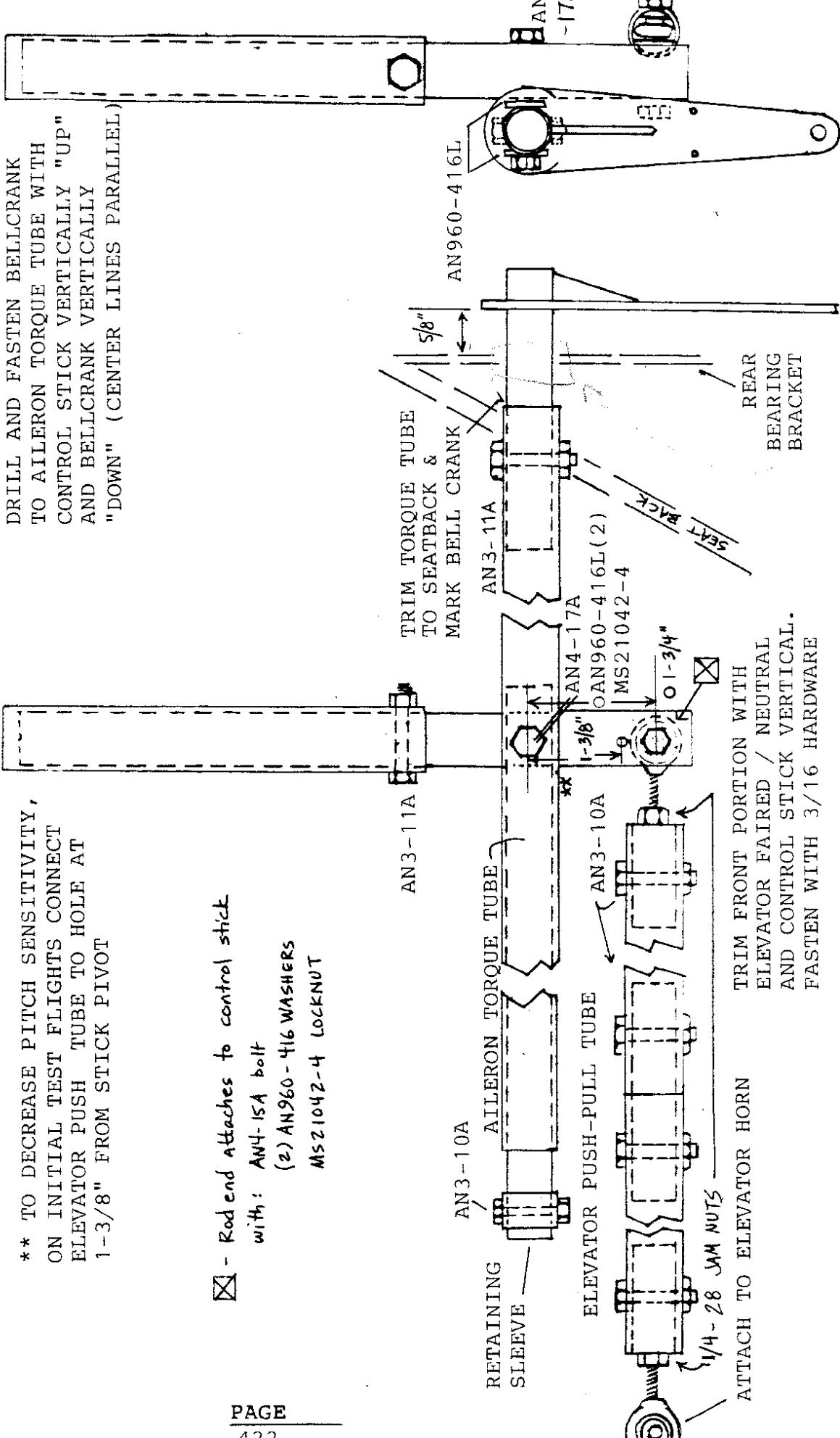
** TO DECREASE PITCH SENSITIVITY,
ON INITIAL TEST FLIGHTS CONNECT
ELEVATOR PUSH TUBE TO HOLE AT
 $1\frac{3}{8}$ " FROM STICK PIVOT

- Rod end attaches to control stick

with : AN4-15A bolt

(2) AN960-416 WASHERS

MS21042-4 LOCKNUT



HARDWARE LIST

CONTROL STICK, AILERON CONTROL TORQUE TUBE, ELEVATOR PUSH-PULL TUBE

- | | |
|----------------------------------|---------|
| (1) CONTROL STICK ASSEMBLY | |
| (1) CONTROL TORQUE TUBE, AILERON | VCSA-01 |
| (1) ELEVATOR PUSH ROD ASSEMBLY | VCTT-01 |
| (2) ROD END, 1/4-28, MALE | VEPR-01 |
| (2) 1/4-28 NUT | MM4 |
| | BI1428 |
| (1) AN4-15A BOLT | |
| (1) AN4-17A BOLT | |
| (4) AN3-10A BOLT | |
| (4) AN960-416L THIN WASHER | |
| (2) MS21042-4 LOCKNUT | |
| (4) MS21042-3 LOCKNUT | |

* SOME BOLTS MAY COME ALREADY INSTALLED TO THE STICK & TUBE ASSEMBLIES...

SKETCH OPPOSITE PAGE

Assemble the control stick to the torque tube. The hole in one side of the stick is tapped for the threaded portion of the stick pivot bolt. The nut locks it in place. Don't drill this hole out by mistake.

Insert the bellcrank into the torque tube up to the marked join line. With the control stick 'up' and the bellcrank 'down', i.e. each pointing in opposite directions and their centerlines parallel to each other, drill a 3/16" hole for an attaching bolt about 3/4" from the end of the torque tube through both pieces holding both in the above alignment.

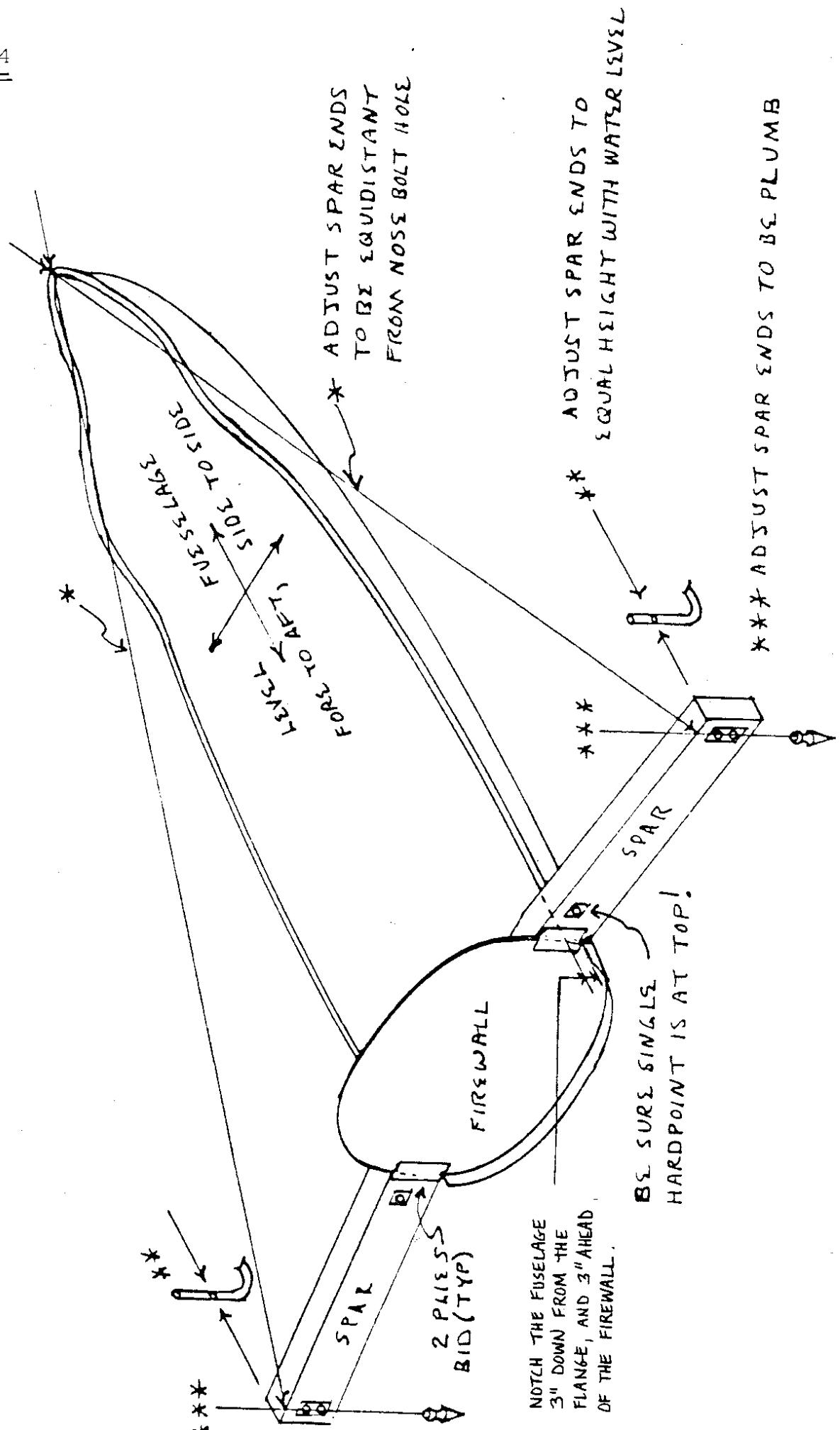
Remove the bellcrank and control stick from the torque tube. Drill two 1/8" holes 2" up from the bottom tip of the bellcrank, 3/16" in from each side, for the trim spring attachments. These holes can be moved up or down to achieve the desired trim action.

Reinsert the torque tube into the control console. Install the bellcrank with the hardware provided. Be sure the orientation of the control stick pivot bushing is horizontal when the bellcrank is vertical.

Install the two roll trim springs into the attachment holes of the bellcrank. Tie the line to the left spring, route the line clockwise around the pulley, wrap around the trim motor shaft (two complete wraps) and tie to the right spring. Be sure there is sufficient tension on the springs with no slack. If the motor shaft slips during operation more tension is required.

Assemble the control stick to the torque tube. Position the front bearing bracket approximately centered over the hole, and check for free rotation of the torque tube. Drill holes for mounting the bearing bracket, shim as required to ensure proper alignment, and fasten with (1) AN507C-1032R16 screw countersunk from the instrument panel side. Use AN960-10 washers as shims. On the bottom, use an AN3-5A bolt and (2)MS21042-3 nuts.

Locate the two 8-1/2' aileron control cables and thread on the 2-1/4" rod ends. Screw them on about halfway to ensure adequate threads for adjustment. Be careful during future adjustment that you have at least 3/8" of the cable threads in the rod and use the locknuts provided on the cables. Install the cables as per drawing on page 420 using the proper bolts, nuts, washers, shims, and spacers. This step can be done later, but make a note as to where to locate this information.



IT IS ADVISABLE AT THIS TIME TO REMOVE YOUR LOWER COWLING. REFER TO PAGES 440-441 FOR THE PROCEDURE INVOLVED.

SPAR POSITIONING

LOWER FUSELAGE HALF

Cut out a 3" wide X 3" high hole for the main spar with the aft side in line with the front face of the engine bulkhead.

****MAKE SURE THE FUSELAGE IS LEVEL AND PLUMB!****

Center the spar in place WITH THE INBOARD SINGLE HARPOINTER UP TOP. Sand areas to be bonded on spar and fuselage.

SPAR INSTALLATION

SKETCH OPPOSITE PAGE

Put the spar in place with center of spar aligned with the fuselage centerline.

SPAR PLUMB:

With a level on the outboard hard points, shim the spar to be plumb. If they differ, split the difference.

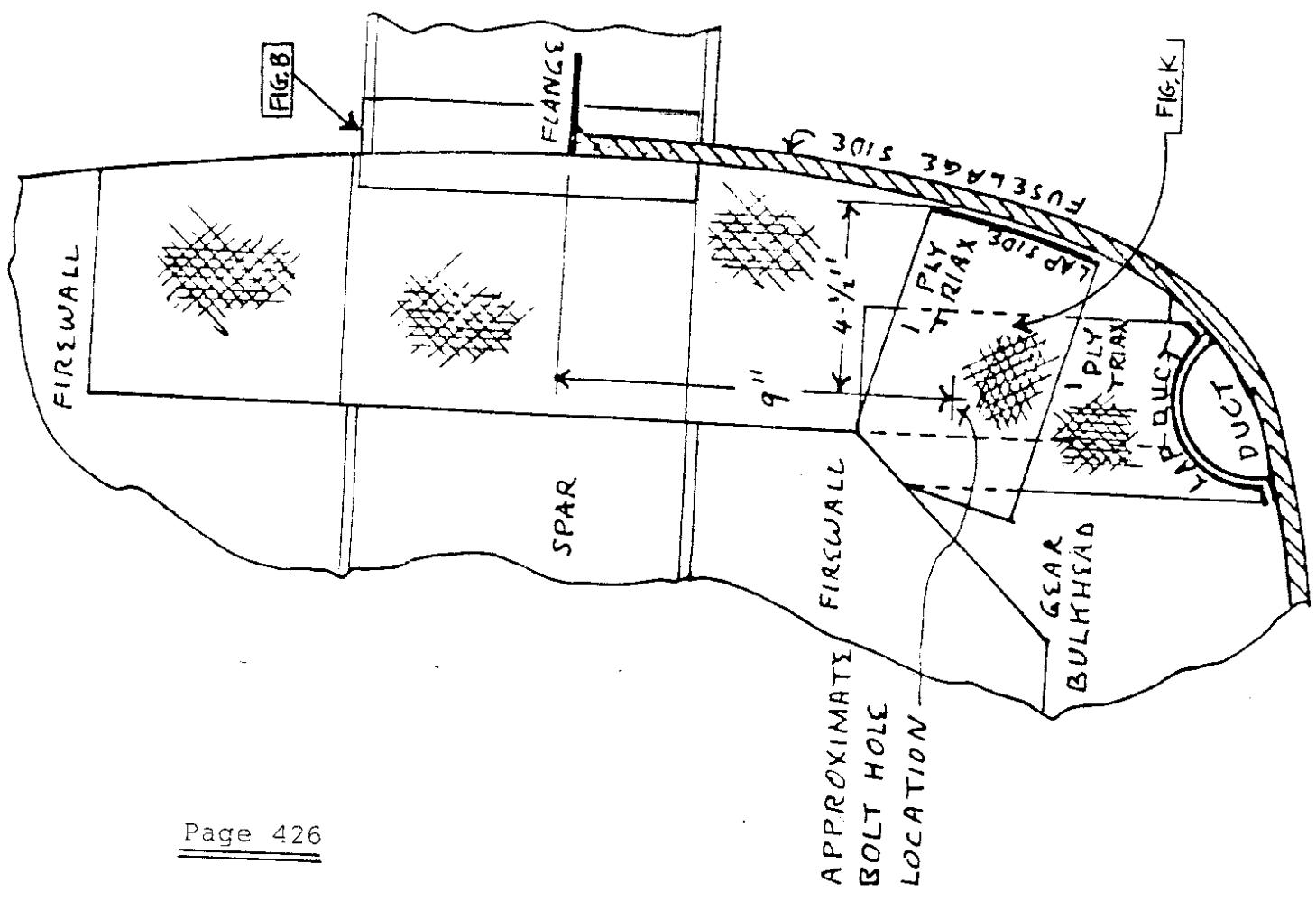
SPAR 'SWEET':

Adjust the spar ends to have the same distance from the nose bolt hole to the plumbed level on the outboard hard points. Be consistent with your measuring reference points at each end. Slip bolts into the outboard hardpoints to use as a guide.

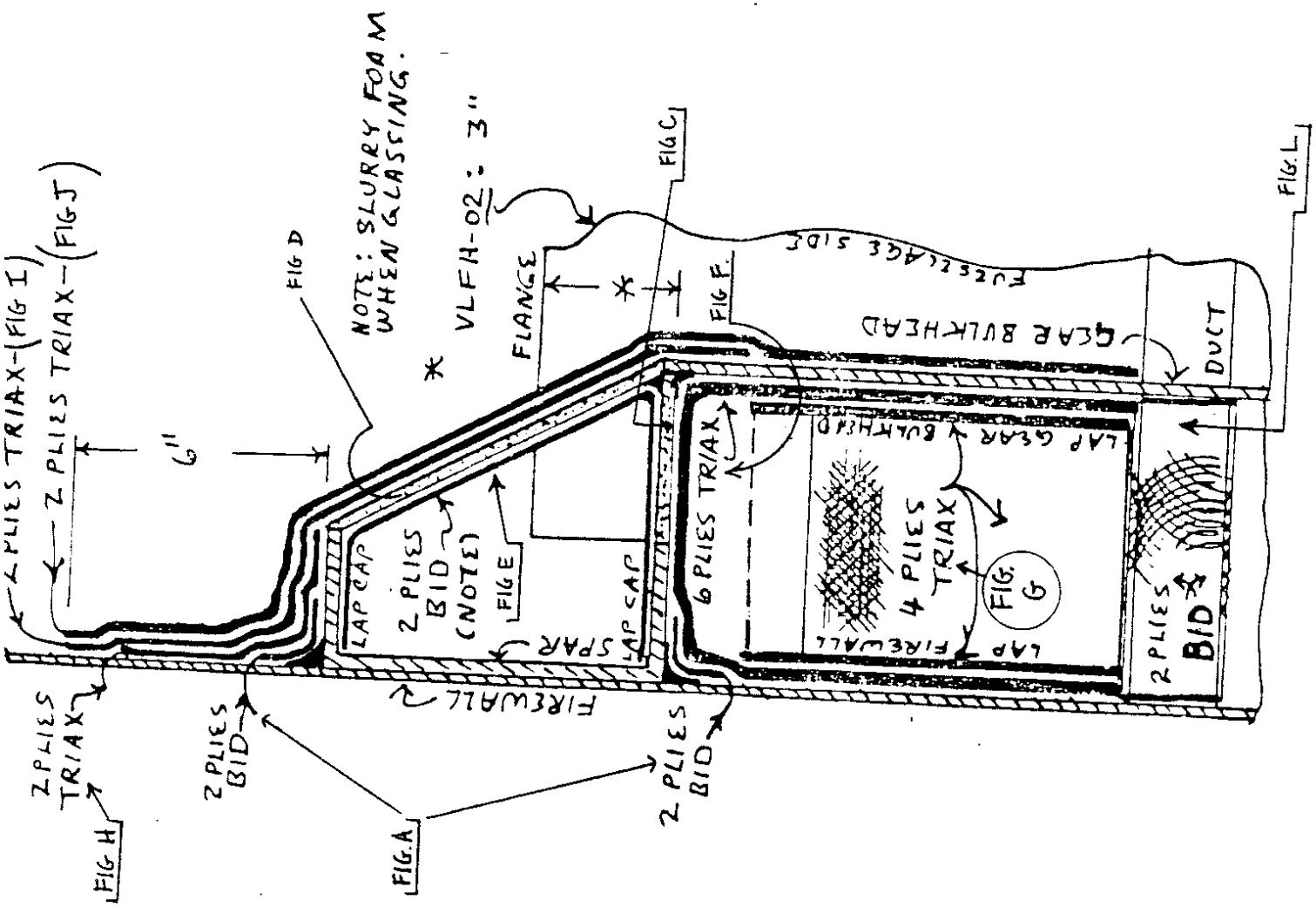
SPAR LEVEL:

Use the water level to set the spar ends at the same height. Measure from the same place on the outboard hard points.

After rechecking all measurements, levels, and plumbs, bond the spar to the firewall, securing it for sanding and glossing. If there are any discrepancies, split the difference to correct.



Page 426



LAY-UPS:

! REMEMBER!

DON'T FORGET TO SAND BEFORE APPLYING YOUR LAY-UPS!

ALL BID IS ALWAYS CUT ON A 45 DEGREE BIAS!

UNLESS NOTED, TRIAX MAJOR AXIS IS ON THE LONG DIMENSION!

PRE-WET MULTIPLE LAYERS OF TRIAX ON PLASTIC

* PRECUTTING THE PLIES CALLED FOR IN THIS CHAPTER WILL MAKE YOUR WORK GO MUCH EASIER.

SKETCH OPPOSITE PAGE

Microglass a radius along the engine-bulkhead-to-spar line. Apply two plies of 3" X 41" piece of BID along the engine-bulkhead-to-spar line, top and bottom (FIG-A). Also, apply two plies of 3" X 8" BID,lapping the aft sides of the firewall and spar (FIG-B).

Trim the tops of the gear bulkhead to be even with the top of the bottom spar cap.

Cut 2 pieces, 1 for each side, of 3/8" Clark foam, 6" wide by about 4" to fit between the bottom forward edge of the spar cap to overlap the top of the gear bulkhead (FIG-C).

Cut 2 pieces, 1 for each side, of 3/8" Clark foam, 6" wide by about 9-3/4" to fit between the top forward edge of the spar cap angling down onto the Clark foam on top of the gear bulkhead. Taper these pieces to fit (FIG-D).

Cut 4 plies, 2 for each side, of 6" X 16" BID and apply to the top of the horizontal and to the back of the angled Clark foam, lapping the top of the bottom and bottom of the top spar caps (got that?). Hold the foam pieces in place with duct tape. Let cure (FIG-E).

Cut 12 plies, 6 for each side, of 10" X 29" TRIAX and apply under the horizontal Clark foam, lapping the bottom spar cap and down the forward face of the firewall and aft face of the gear bulkhead. Trim excess away later (FIG-F).

Cut 8 plies, 4 for each side, of 9" X 22" TRIAX and apply over the gear bolt hole locations in the firewall and gear bulkheads just above the ducts, lapping onto the side of the fuselage above the ducts (FIG-G).

Cut 4 plies, 2 for each side, of 6" X 8" TRIAX and apply to the top of the spar and up the firewall (FIG-H).

Cut 4 plies, 2 for each side, of 6" X 20" TRIAX and apply to the firewall about 6" above the spar, across the top of the spar, down the angled foam and onto the gear bulkhead about 2"

(FIG-I).

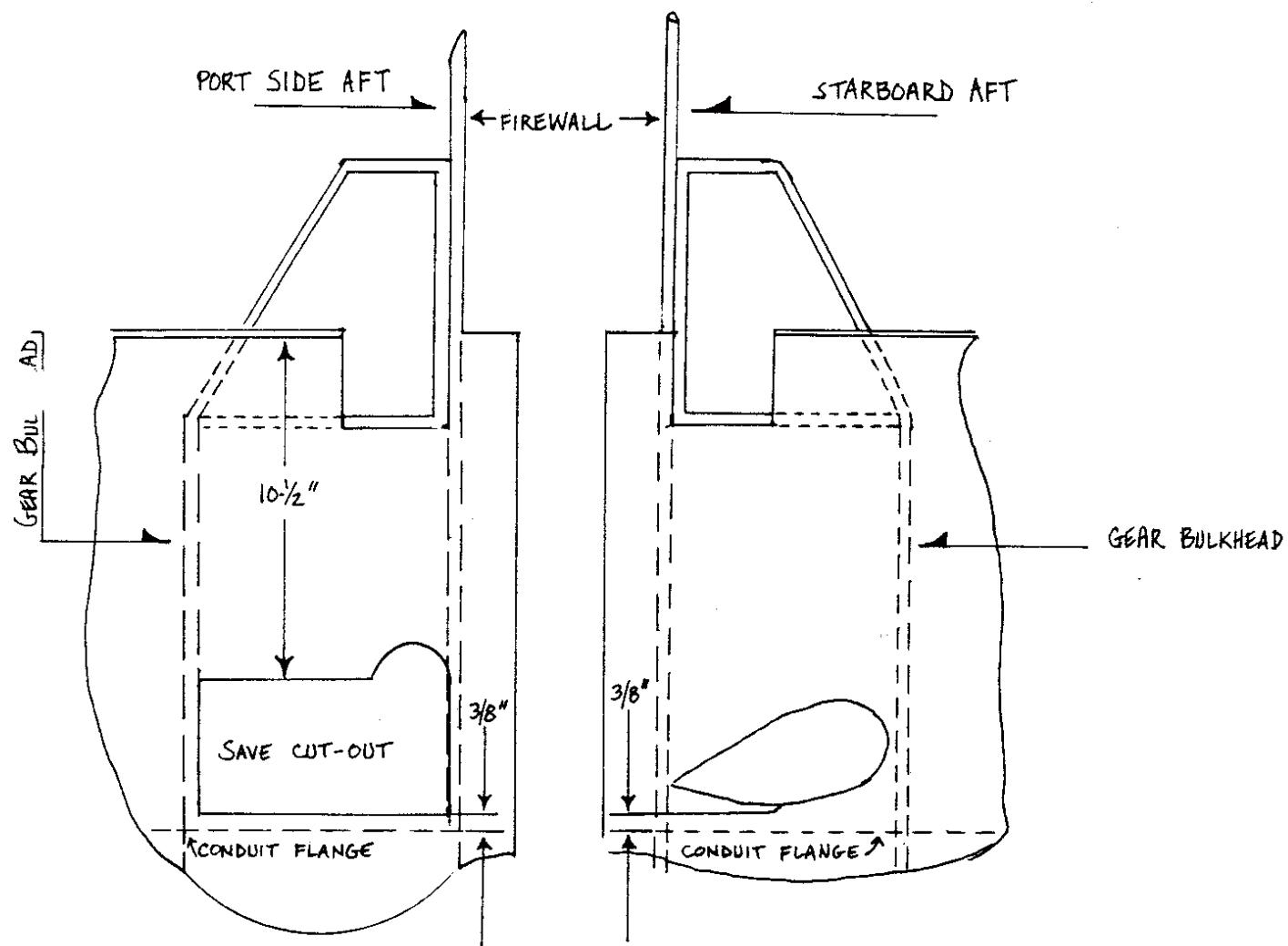
Cut 4 plies, 2 for each side, of 6" X 32" TRIAX and apply over the previous lay-up and on down to the fuselage floor(FIG-J).

Cut 4 plies, 2 for each side. of 4" X 12" TRIAX and apply, crossed, over the gear bolt hole area, onelapping onto the fuselage side and one lapping onto the conduit and floor (FIG-K).

Cut 4 plies, 2 for each side, of 7" X 8" BID and apply, centered, over the duct between the gear bulkhead and the firewall, lapping each bulkhead slightly (FIG-L).

Join fuselage-to-spar line, inside and outside, with two 2" wide strips of BID over a finger radius of microglass.

Check all the lay-ups to be sure they are not pulling away from the corners. Let cure.



SECTION 4

MOUNTING MAIN GEAR

BULKHEAD PREPARATION

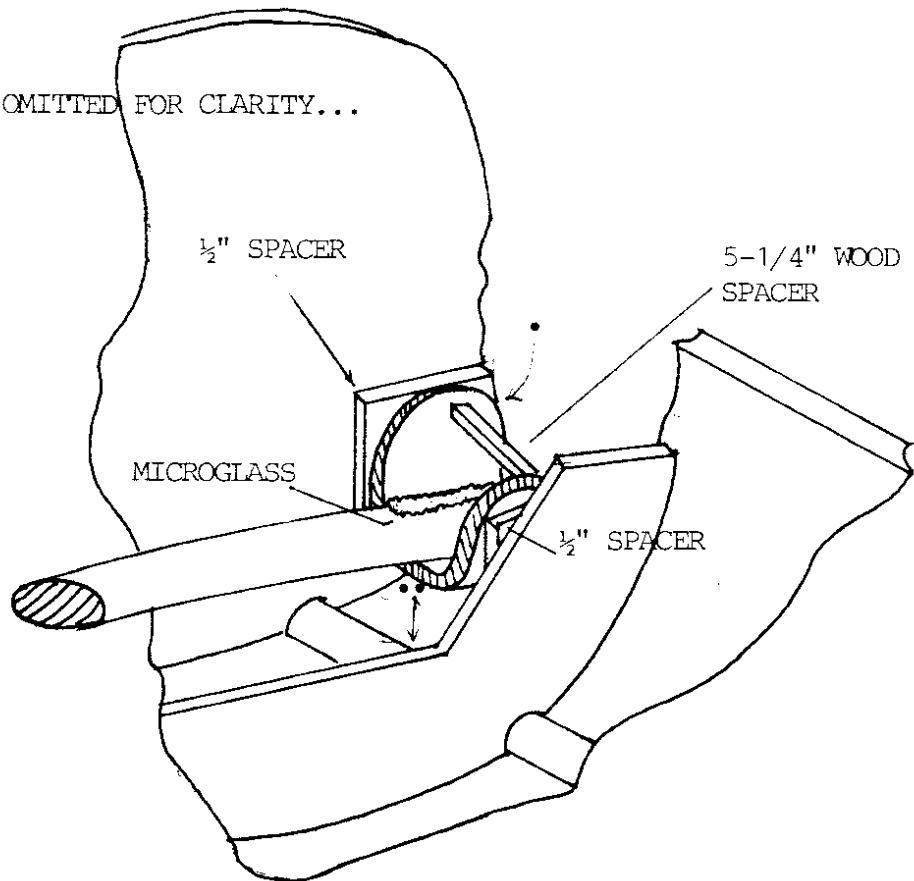
Mark the approximate gear bolt hole location through the gear and the engine bulkheads at points 15-1/4" out from the fuselage centerline down 9-1/2" from the fuselage flange.

GEAR CUT-OUTS

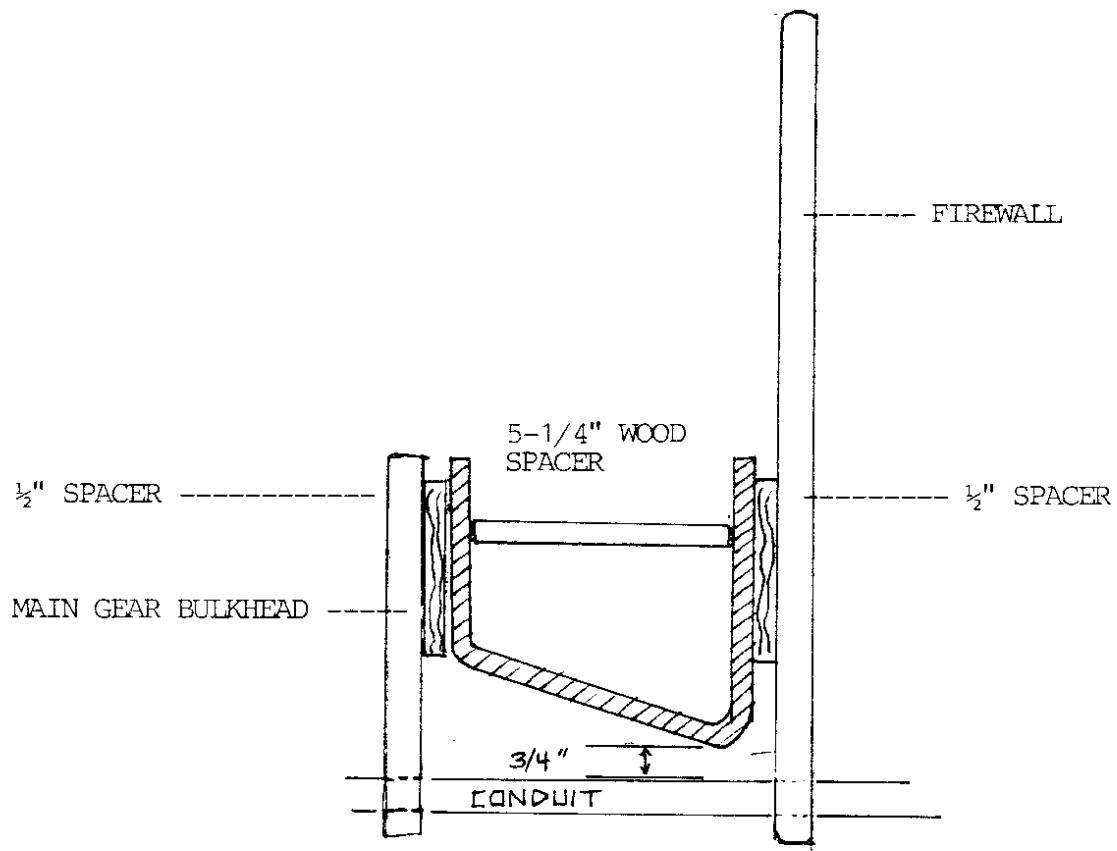
On the port side of the fuselage, shine a light from the inside between the firewall and gear bulkheads. Along the bulkhead lines, measure and mark two points 10-1/2" down from the flange and two points 3/8" above the conduit flange. Connect the four points to form your approximate gear leg cut-out. Cut neatly, as you will be using part of the cut-out to refill the hole. It will probably be necessary to cut an additional half-moon shaped piece from the upper aft corner, as shown in the diagram on the previous page.

On the starboard side of the fuselage, draw a line 3/8" above the conduit flange, running from the aft face of the gear bulkhead to the forward face of the firewall. Draw a teardrop shape about 1/2" larger than a cross-section of the gear leg, using the line you drew above the conduit as the lower limit of the cut-out. Trim both port and starboard holes as necessary.

SPAR & SUPPORTS OMITTED FOR CLARITY...



- 1/4" CLEARANCE BETWEEN SADDLE & FUSELAGE SIDE
- 3/4" CLEARANCE REQUIRED FOR LAY-up



LOCATE GEAR POSITION

First of all, sand the gear in the areas where the saddles will be installed. Insert the gear from the port side (square hole), with the thicker edge forward. Lift the aft end of the fuselage to about 6° to get the gear in. Raise and level the fuselage, on both the longitudinal and transverse axes, keeping the tips of the gear several inches off the floor. Now, shim the gear up above the conduit about 3/4" to allow for clearance after future lay-ups on the gear tabs.

Drop a plumb bob from the nose bolt hole and mark the floor. Do the same from the aft centerline of the firewall. Lay a long straightedge on these marks.

Stretch a piece of tape between the forward edge of each gear tip just above the straightedge. Measure and mark the halfway point on the tape. Align this point with the straightedge 131" back from the nose bolt hole plumb mark. Adjust each gear tip to equalize the distances to the nose plumb mark (approximately 134-1/2"). REFER TO PAGE 432-A FOR DETAILS.

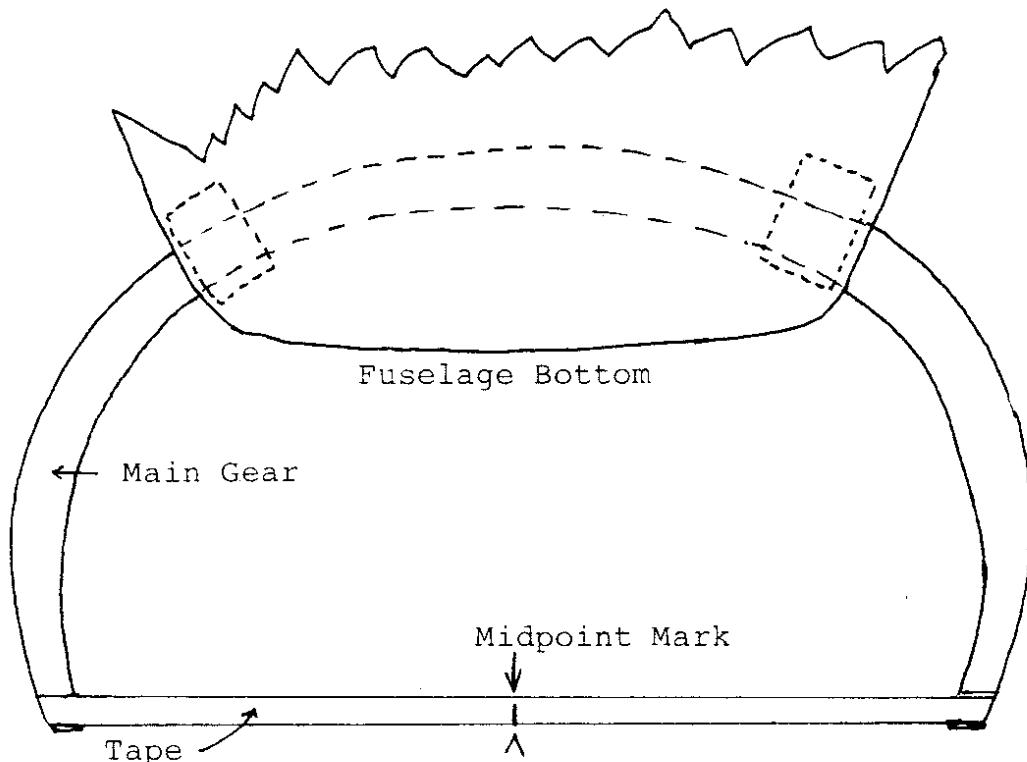
Put the gear saddles into place with the larger tab aft. Use a 5-1/4" wood spacer to spread the saddle ears so they are parallel to the bulkheads. Shim the saddles 1/2" from the firewall and 1/2" from the gear bulkhead.

Arrange the saddles so that their tabs centers are as close as you can get them to your approximated gear bolt hole marks. Allow about 1/4" clearance from the fuselage side.

Recheck all your measurements and levels. Shim and bondo the gear in place against the firewall and other points.

Remove the saddles and sand inside and out. Spread microglass on the inside bottom and reinstall, squeezing the micro around the gear. Use the wood spacers, and shim and clamp the saddles in their proper place. Microglass a radius in the top corners to aid in future lay-ups. Let cure.

Make a few appropriate reference marks on the gear and points adjacent to the gear to aid reinstallation in its proper position. Break the bondo loose and remove the gear assembly from the plane.



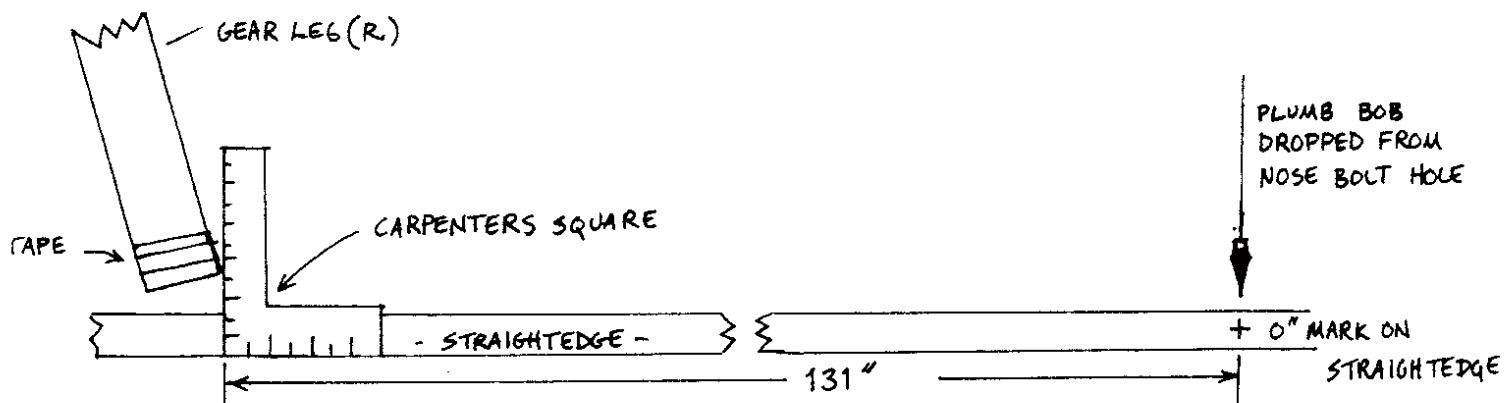
Aircraft Centerline

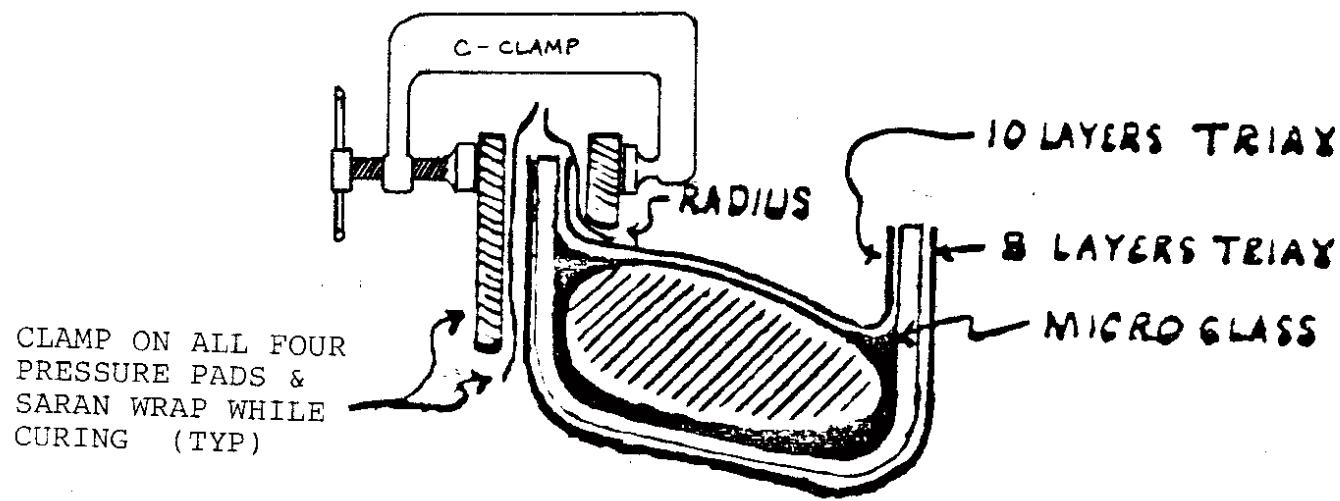
131" (between 0" mark and line through LE of the gear tips.)

Approx 134.5" diagonally from 0" mark to LE of gear tips

TO SET GEAR POSITION:

- 1] LEVEL THE AIRCRAFT FORE-TO-AFT/SIDE TO SIDE
- 2] LAY ONE OF YOUR ALUMINUM STRAIGHTEDGES ON THE FLOOR, BENEATH THE AIRCRAFT, ALONG THE A/C CENTERLINE.
- 3] DROP A PLUMB BOB FROM THE NOSE BOLT HOLE, AND MARK ITS POSITION ON THE STRAIGHTEDGE (0").
- 4] MEASURE 131" AFT, ALONG THE STRAIGHTEDGE, AND MARK A POINT. ALIGN THE MIDPOINT OF THE TAPE (STRETCHED BETWEEN THE GEAR TIPS) WITH THIS MARK. IT IS HANDY TO USE A CARPENTERS SQUARE FOR THIS, SEE BELOW:
- 5] FOR FINAL POSITIONING, EACH GEAR TIP SHOULD BE EQUIDISTANT FROM THE 0" MARK (A DIAGONAL MEASUREMENT).





GEAR PREPARATION:

Lay up 10 layers 4" X 11" of TRIAX inside saddle as shown.

SKETCH OPPOSITE PAGE

Sand and pre-wet areas to be glassed. Wet out 2 layers at a time on visqueen then work into place, shiny side (longitudinal fibers) down. This prevents gathering or kinking, especially down into the corners.

Apply 8 layers of TRIAX, shiny side out, onto the outside of the saddles. Clamp plastic wrapped pressure pads on outside tab faces.

Make up radiused pressure pads, wrapped in plastic, to be clamped in place, holding lay-ups down into the corners, and pads for the outside to create a smooth and parallel surface on the outside. Let cure.

Trim the saddle tabs leaving no less than 3/4" of glass around the bushing (about 1-1/8" from the bushing center). This will make the gear easier to reinstall.

DRILL MOUNTING PILOT HOLES:

Reinstall and check the gear to be sure it is in its proper position as before. You may have to enlarge the gear cut-outs and grind places on the gear to allow the gear to be installed.

The pre-marked approximate bolt hole location should be about right if the saddles are installed per the instructions. The idea is to get the hole centered in the saddle tabs from side to side and just above all the lay-ups on top of the gear.

Using a 12" long 1/4" bit, drill a hole through the gear bulkhead, tabs, and engine bulkhead. Align the drill bit parallel to the fuselage fore and aft centerline and angle down toward the rear so that the drill clears the top of the gear inside the saddle by about 1/4". Remove the gear.

GEAR BUSHING:

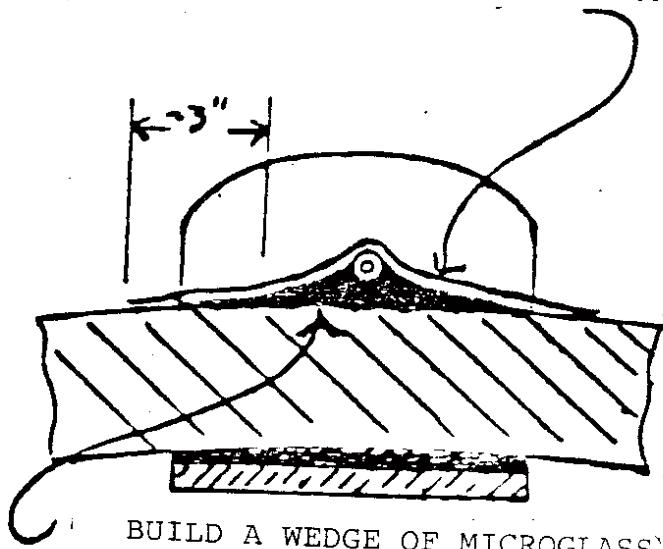
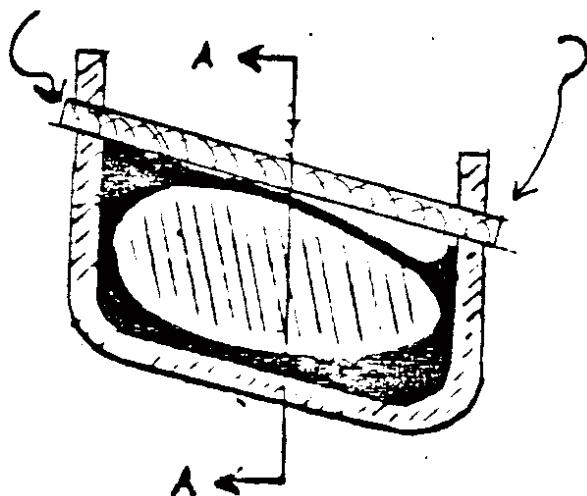
Use a 5/8" hole cutter with a long 1/4" pilot drill to open up the hole in the gear saddle tabs. Drill part of the way through one tab first leaving the 'plug' to use as a guide while drilling the other tab from the other side. Drill the other tab out and then go back and finish drilling out the first tab.

Distress (score) the exterior of the 5/8" O.D. bushing for

SKETCH A

DISTRESS/SCORE BUSHING
FOR BONDING. ALLOW TO
EXTEND APPR. 1/4" both
ends.

APPLY SIX LAYERS
OF BID, BIAS 45°

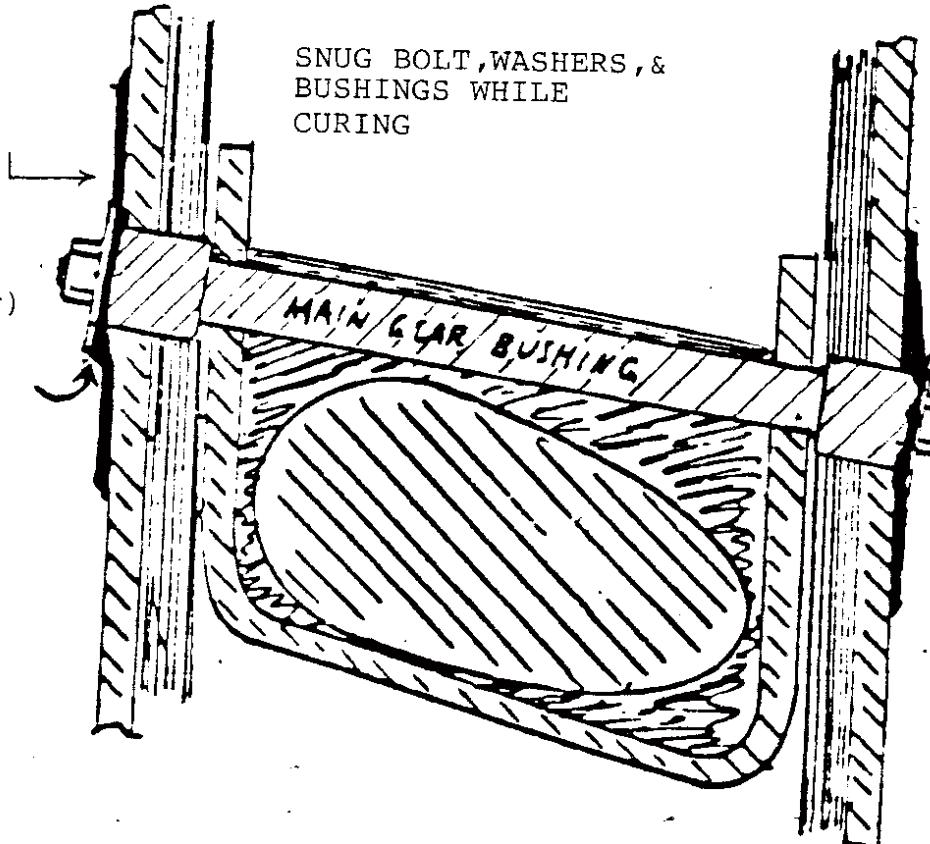


SKETCH B

MICROGLASS AND
2 PLIES 4" X 4"
TRIAx (TYP)

SNUG BOLT, WASHERS, &
BUSHINGS WHILE
CURING

LARGE (fender)
WASHER (TYP)



better bonding. Press in the bushing without undo force. Make it extend out equally from both tabs. Open the hole some with rat tail file if necessary. Fill voids with microglass.

SKETCH A OPPOSITE PAGE

Lay in a thick paste of microglass forming a wedge below the bushing.

Don't be concerned with the bushing not being 'square' with the saddle tabs. The bulkhead bushings will compensate for irregularities. If the bushing holes are low and the bushing interferes with the gear it is permissible to grind away a relief to accommodate the bushing.

Apply 6 layers of BID over the bushing, lapping onto the gear about 3" each way.

GEAR INSTALLATION:

Drill out the 1/4" pilot holes in the firewall and gear bulkheads with a 1" hole saw. Use a round file to open up the 1" holes so that the knurled gear bushings will freely slide in place.

Once the bushings are free, push a 3/8" metal rod or tube through both bushings to make sure they are both in line with each other.

Take the guide out and insert the gear into the fuselage.

SKETCH B OPPOSITE PAGE

Slide the gear attach bolts into place. Level and plumb the fuselage with the gear leg tips just off floor, using horses under the spar ends and nose.

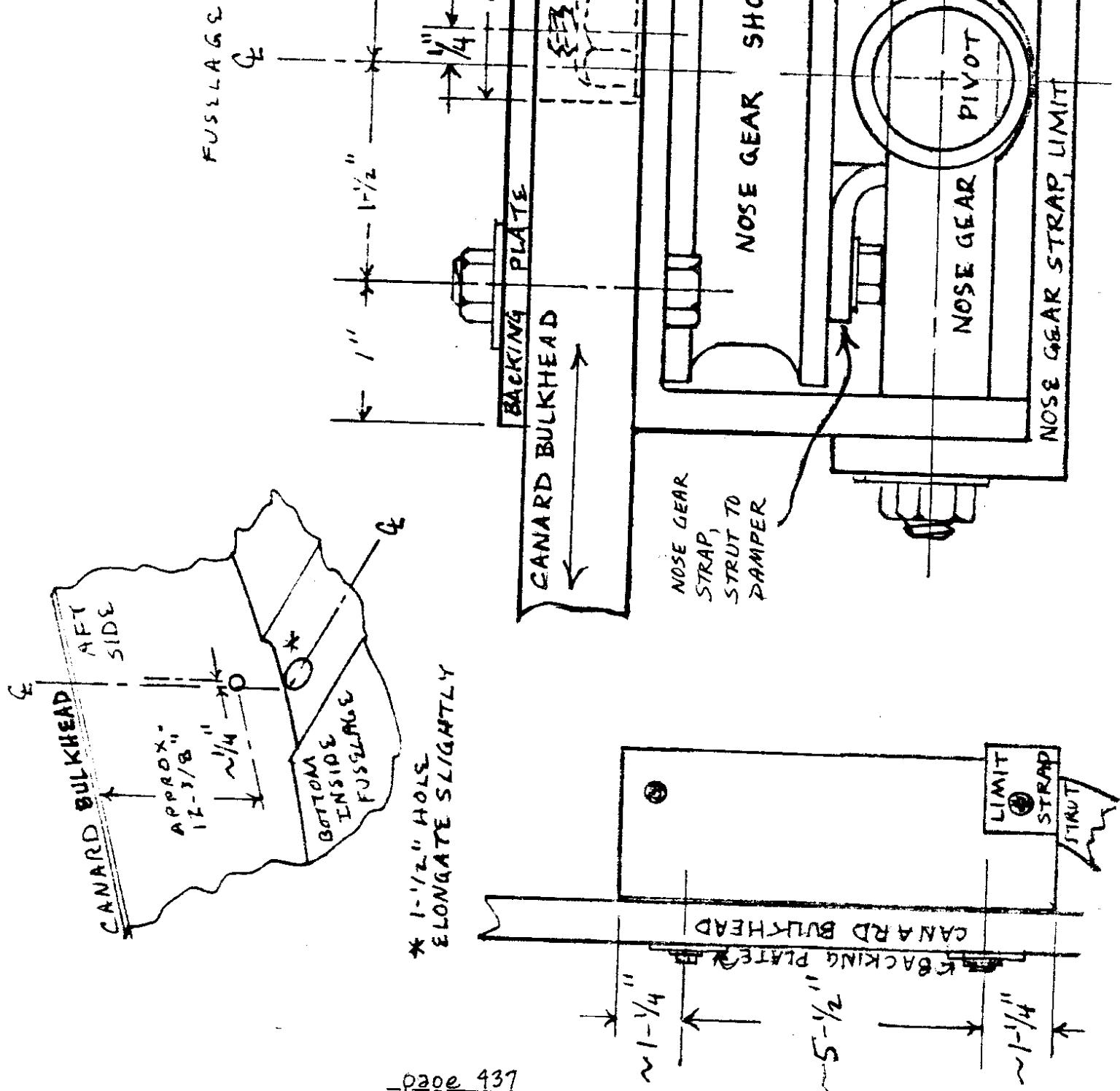
Check the distance from the nose plumb bob to the gear leg tips (at the same elevation on both legs - the height of the shortest leg). The bulkhead bushing holes may need to be enlarged slightly to adjust your gear tips to be equidistant from the nose bolt plumb bob. Adjust as necessary. Also, grind the bushings to fit flush with the bulkhead when they are in position against the main gear bushing.

Shim between the gear and floor. Remove the bolt and bushings, clean bushings with solvent such as xylene, and microglass the bushing outside surfaces.

Slip the bushings into the holes. Apply microglass around the bushings. Apply 2 layers of 4" X 4" TRIAX over the bushing. Use large (fender) washers, insert the bolt, and snug a nut so that the gear bushings meet the bulkhead bushings and the whole assembly is in compression for curing. Try not to get glass on the bolts. A little candle wax on the bolts will allow bolt removal when needed. Let cure.

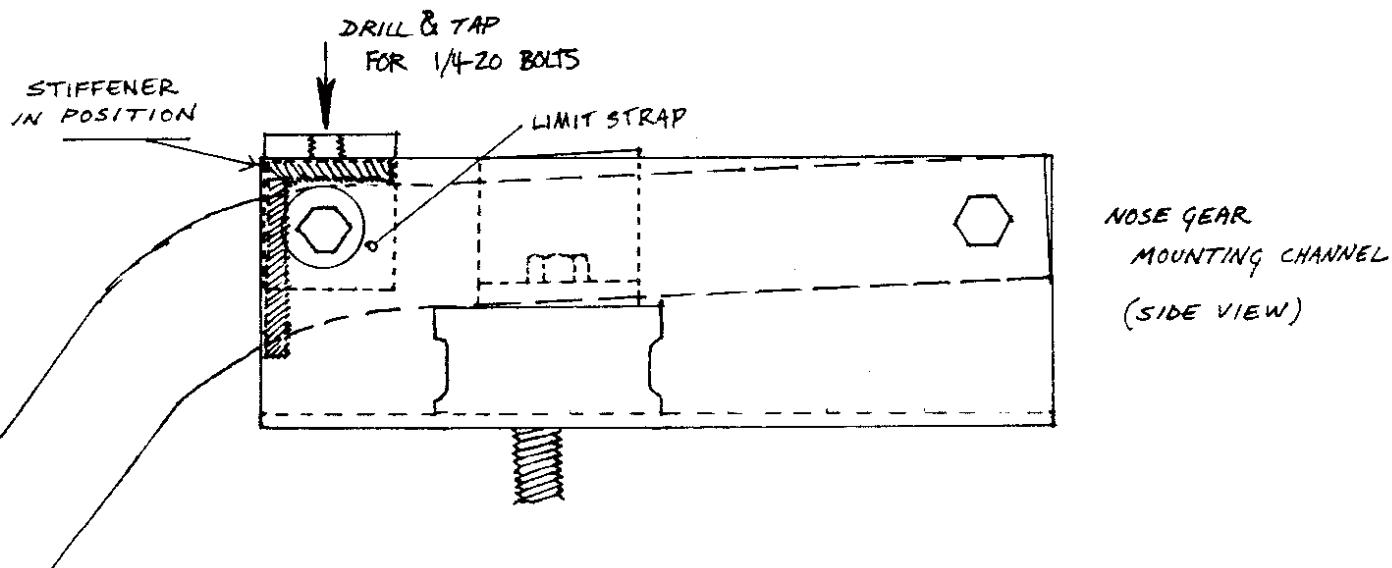
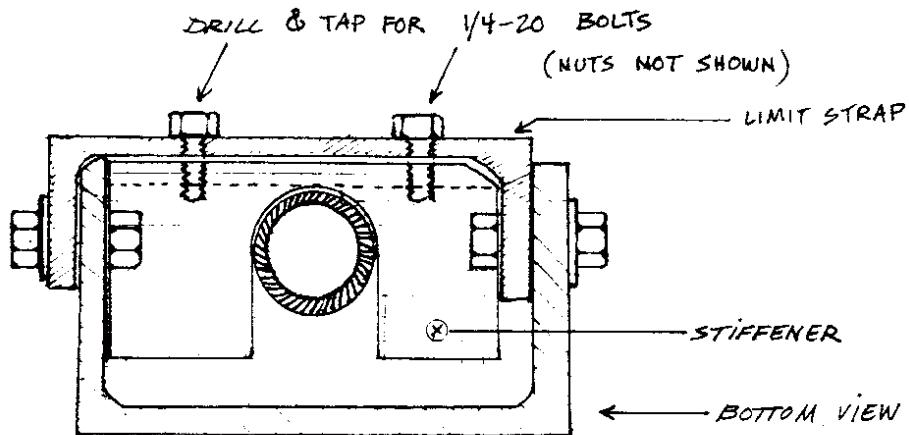
ATTACH PRE-ASSEMBLED
NOSE GEAR SYSTEM TO
CANARD BULKHEAD WITH:

- (4) 3/8 24 X 1-1/2" BOLTS
- (4) AN363-624 LOCKNUTS
- (8) AN960-616 WASHERS



This part is designed to minimize lateral travel of the nose gear leg. The slot cut into the part needs to fit tightly around the leg, so avoid any trimming to the inside of the slot. If some trimming is necessary to ensure fit within the channel, do so on the outside edges of the part. Drill and tap through the limit strap and into the stiffener to accomodate 1/4-20 bolts, then attach with the appropriate nuts.

* INSTALL BEFORE ATTACHING NOSE GEAR TO CANARD BULKHEAD



SECTION 4

MOUNTING NOSE GEAR

LEVEL FUSELAGE AND MARK REFERENCES

Level the fuselage fore to aft, side to side with the main gear tips touching the floor. The floor should be reasonably level.

Measure and mark a vertical centerline on the forward and aft side of the canard bulkhead. Use a plumb bob.

Tape a plumb bob centered on the fuselage nose. Mark a fore to aft centerline on the floor from the nose back to about the canard bulkhead.

INSTALL NOSE GEAR STRUT

Drill a 1-1/2" hole through the fuselage next to the aft center of the canard bulkhead. Elongate the hole slightly to allow the 2" flange on the nose gear pivot to pass through.

Drill a 1" hole through the canard bulkhead to clear the shock dampener nut. The location is typically 12-3/8" from the top of the canard bulkhead, 1/4" to the right of the center. However, the builder should measure and mark this position and align the nose gear assembly in place to check the location in case there is any variation in construction.

Insert the nose gear assembly. Position the gear with the mount against the canard bulkhead and the end of the pivot touching the floor. Align the strut on centerline and in a vertical plane with the plumb bob.

SKETCH PAGE 437

With the nose gear assembly held firmly in its proper position, use a long bit to drill pilot holes in the aluminum channel and into the canard bulkhead (this is quite a bit easier than trying to drill through the bulkhead first, and then into the channel). Next, drill out the holes to accomodate the 3/8-24 mounting bolts, then attach the gear assembly as shown in the sketch.

The oversized hole can be closed up with fine BID. Leave about 3/16" all the way around the strut for operating clearance. Use a flexible (silicone) sealer to fill the remaining gap.

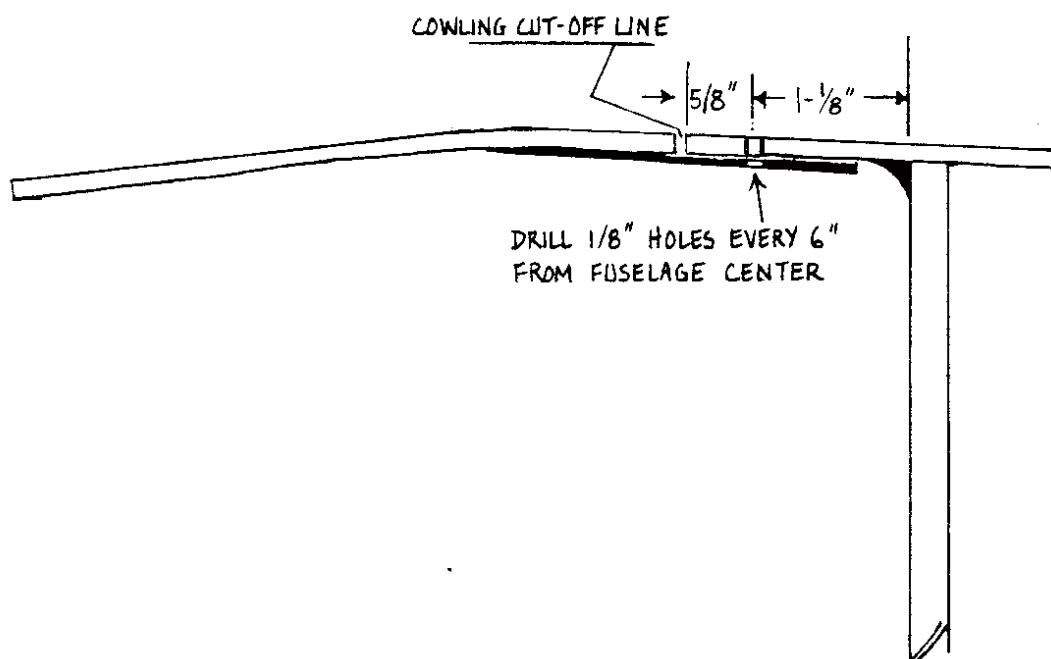
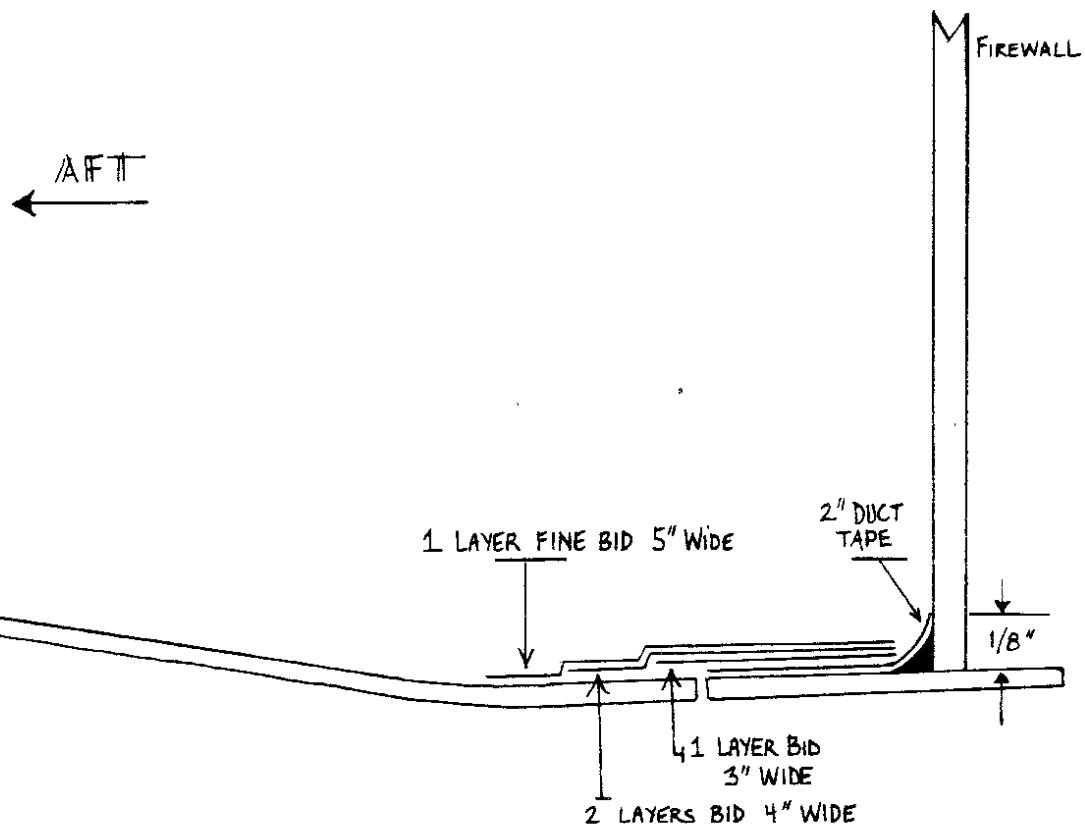
INSTALL FORK & WHEEL

The nose wheel fork slides onto the pivot up to the flange followed by a large flat washer, the bellville washers, and the castle nut.

The first washer is installed with the 'cupped' (concave) side up followed by cupped side down and finally cupped side up with the castle nut holding them in compression.

Adjust the castle nut for a fairly high amount of fork rotation friction to prevent shimmy. It should be tight enough to take some effort to turn the fork by hand but still be steerable when moving the aircraft.

Install the nose wheel into the fork with the nose gear axle centered with the spacers provided. Lock the axle in place with the set screw provided.



LOWER FUSELAGE COWL

SKETCH OPPOSITE PAGE

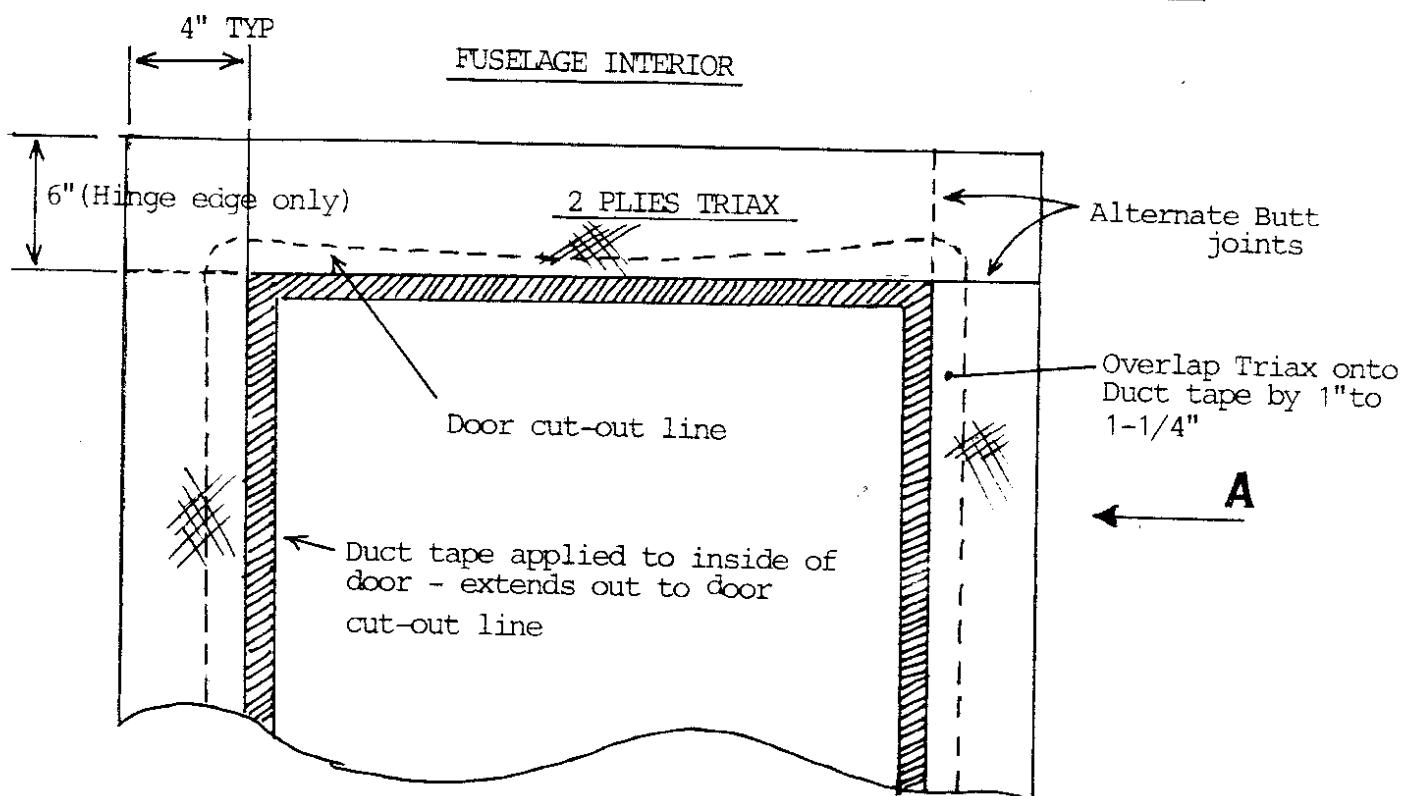
Place 2" wide duct tape across the fuselage where it meets the aft firewall face, from side to side. The tape should go up the firewall 1/8" to 3/16". Apply one layer of 3" and 2 layers of 4" BID tape across the fuselage over the duct tape but just butting into the duct tape radius at the firewall. Put 1 layer of 5" wide fine BID, over the BID. This we'll call the 'lip'. After cure clean up the rough edges

Drill 1/8" holes through the 'lip' and fuselage 1-1/8" aft of the firewall (or 5/8" forward of the cut line), spaced 6" apart, from the centerline to each side of the fuselage. These holes will become future nut plate locations and are used for clecos while doing various fitting operations.

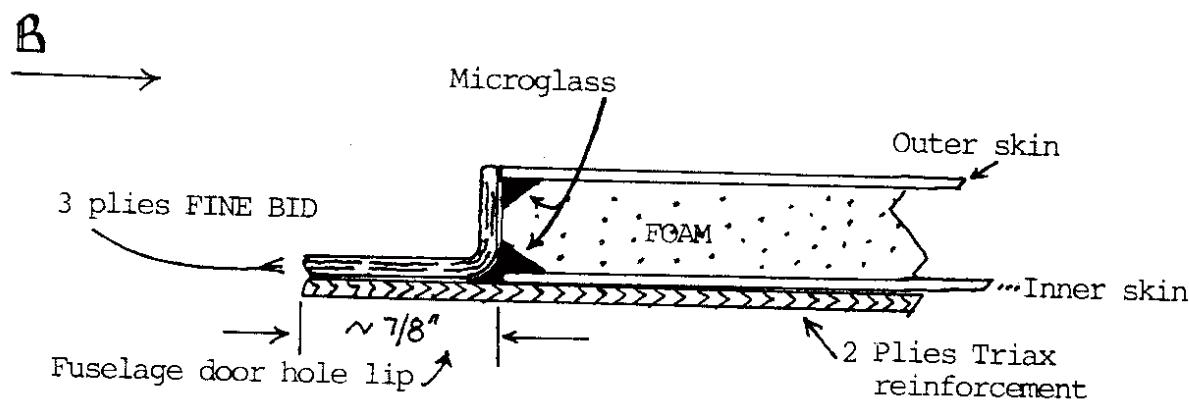
On the outside of the fuselage, measure and mark spots 5/8" aft of each hole establishing a cut line. Place a piece of masking tape along this spot line to form a smooth, fair line for cutting off the cowl. The cowl cut lines are premarked on the fuselage upper and lower halves. If the lines are not exactly in the right place, alter or compromise, as it is not that critical. Shine a light on the inside of the cowl to make sure the duct tape is over the cut line. Do not cut aft of the duct tape!

Carefully saw along this line with a hacksaw blade, by hand, down to, but barely through, the duct tape. Break the cowl away from the fuselage, sand the edges, remove the tape, and clean up.

CONSTRUCTION OF FUSELAGE DOOR HOLE LIP



Fuselage Door Hole Edge Treatment



DOOR CUT-OUT

IMPORTANT: THIS WORK IS TO BE COMPLETED PRIOR TO CUTTING OUT THE DOOR WINDOW. REVIEW THE TAPES & MANUAL BEFORE STARTING WORK.

Handle the door carefully and do the following work through to completion so that the glasswork will reinforce and maintain the shape to fit back into the fuselage hole. Keep checking the fit, and jig as required if distortion occurs. Check to make sure that the width of the top half of the fuselage is the same as that of the bottom half. It would be a good plan to install a brace from flange to flange to ensure that no spreading occurs.

Carefully cut out the door. Start the cut by hand with a hacksaw blade. Insert the saber saw and carefully finish the cut. You want to preserve the door piece for a close fit.

CREATE FUSELAGE DOOR LIP SKETCH A, PAGE 442

Sand all edges smooth. Sand a 3" to 4" margin around the door hole, inside (sand about a 5" margin along the hinge side).

Cut about 24' of 4" TRIAX cloth strips, and about 8' of 6" TRIAX cloth strips, axis long. Trim the lengths to fit around the door opening,lapping the door 1" to 1-1/4". Cut the strips on the first layer so they butt into each other at the corners. Cut the strips on the second layer so that they overlap the first layer butt joints.

Put a 2" margin of duct tape on the edges of the door to prevent adherance.

Bondo tongue depressors around the outside of the opening on top. Invert fuselage top. Bondo the door in the opening, centered in the hole and flush to the top surface. This step is identical to the speed brake installation, except that the door sits flush against the top surface of the fuselage.

Prime sanded areas sparingly and apply lay-ups. Create a lip by overlapping the duct tape on the door 1" to 1-1/4". Let cure.

FUSELAGE DOOR HOLE TREATMENT SKETCH B, Page 442

Once the layup has cured, remove the door. Trim the 'lip' to 7/8". Sand out wedges on the edges of the inner skin, like you did on the speed brake hole and apply microglass, as well as a small 'finger' radius in the inside corners where the foam meets the glass lip.

Cut 6 pieces, 2-1/4" X 65", fine BID, axis 45 degrees. Apply 3 three of the plies of FINE BID around the door hole, from the edge of the lip to the edge of the inner skin. Let cure.

FUSELAGE HINGE REINFORCEMENT

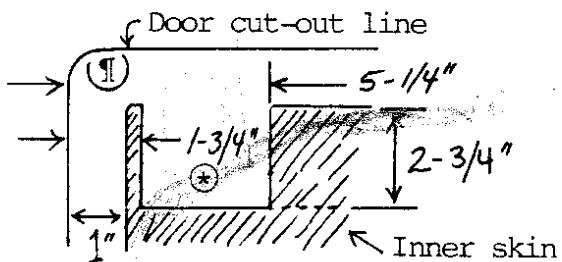
From the front and rear door cut-out lines (not from the lip edges), measure and mark (on the inner skin) 1-3/4" and 5-1/4" along the hinge line side. This will place the hinge centerlines 3-1/2" from the front and rear door cut-out lines.

Leaving the 7/8" lip, remove the inside skin and foam in the hinge area outboard of the door cut-out line about 2-3/4" (which is about 3-3/4" from the edge of the lip). Cut out the small section of 3-ply fine BID that crosses the hinge area (not the lip portion, however).

Cut 5 plies of TRIAX to fit in each recess. Sand the exposed outer skin, prime, pre-wet, and apply the reinforcing TRIAX. Put a finger radius of microglass around the edges and apply 2 plies of 6" X 6" fine BID,lapping the recess and surrounding sanded inner skin, much like that on the speed brake. SEE SKETCH 444-A.

DOOR EDGE TREATMENT & HINGE REINFORCEMENT

Mark a 1" margin around the door on the inside surface. Cut down to the outer skin along in this outline and remove the inner skin and foam. See following sketch:

Door Edge Treatment

* Hinge recess
I - Outer skin. Foam & inner skin have been removed to create door lip and hinge recess.

From the front and rear door edges (including the lip), measure and mark (on the inner skin) 1-3/4" and 5-1/4" along the hinge line side. This will place the hinge centerlines 3-1/2" from the front and rear door edges.

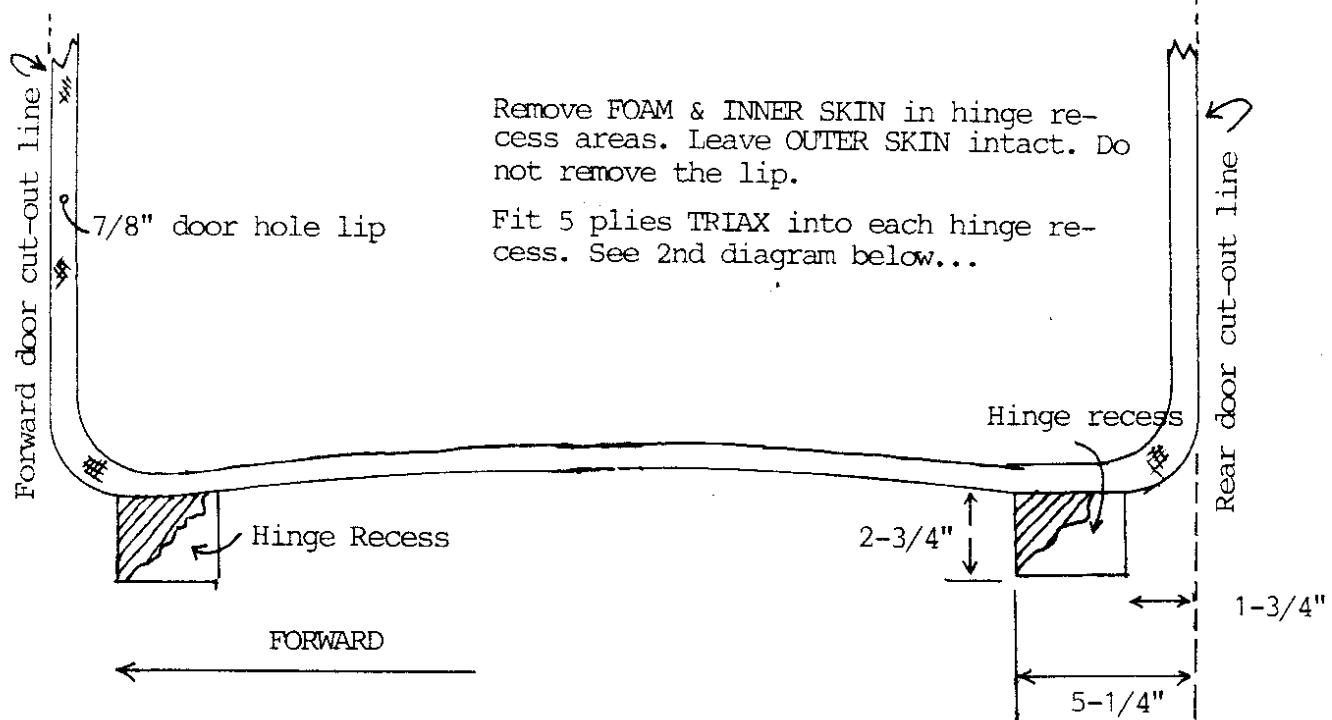
Remove about 2-3/4" of the inside skin and foam, inboard in the hinge area, (which will be about 3-3/4" from the edge of the lip).

Cut 5 plies of TRIAX to fit in each recess, right out to the edge of the door. Sand the exposed outer skin, prime, pre-wet, and apply the reinforcing TRIAX. Put a finger radius of microglass around the edges of the recess and apply 2 plies of 4" X 6" fine BID, lapping the recess and surrounding sanded inner skin.

The kit is supplied with a length of UNIdirectional stranded S-glass roving sufficient to reinforce the door edge and hold the matching shape of the fuselage (before cutting out the pilot side window). There is about 27 feet of S-2 glass supplied, which should go around the door at least 3 times.

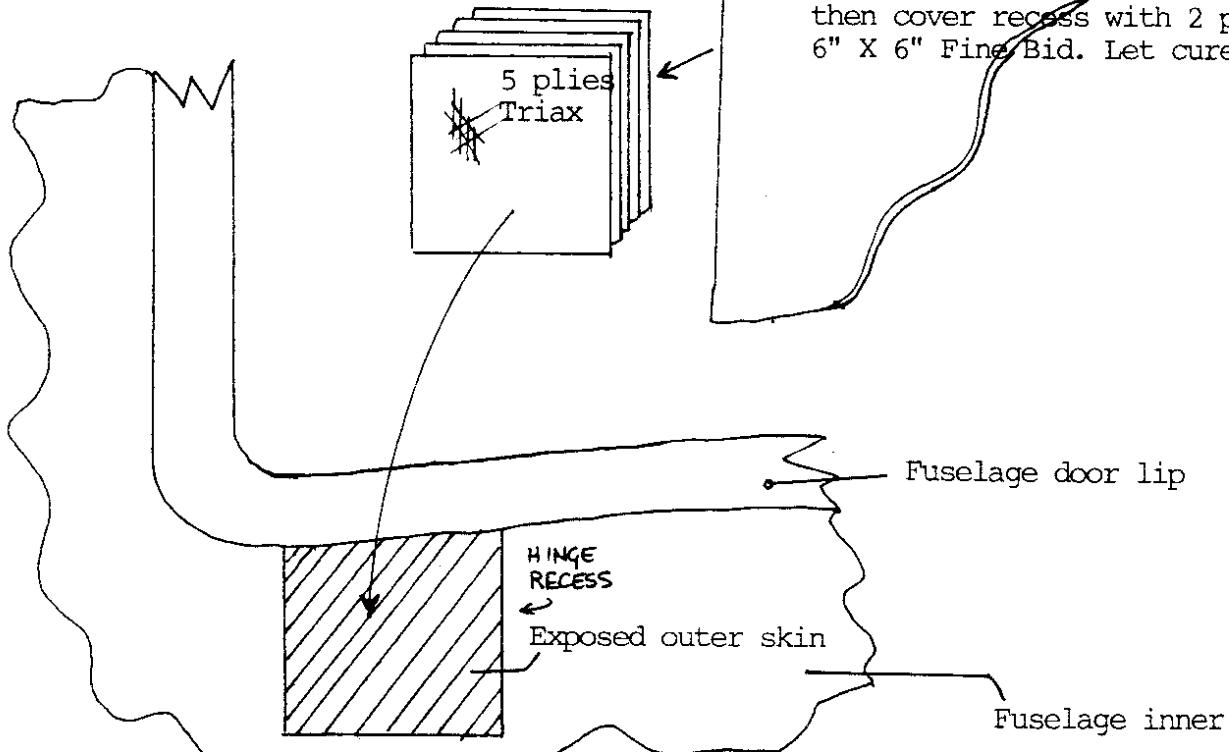
FUSELAGE HINGE REINFORCEMENT

TOP HALF IS INVERTED, VIEW IS LOOKING DOWN ON
INNER SKIN



- (1) Hinge recess cut,
inner skin and foam
removed...
- (2) Fill recess with 5
plies of Triax..

(3) Apply finger radius of microglass
around inside edges of recess,
then cover recess with 2 plies of
6" X 6" Fine Bid. Let cure.

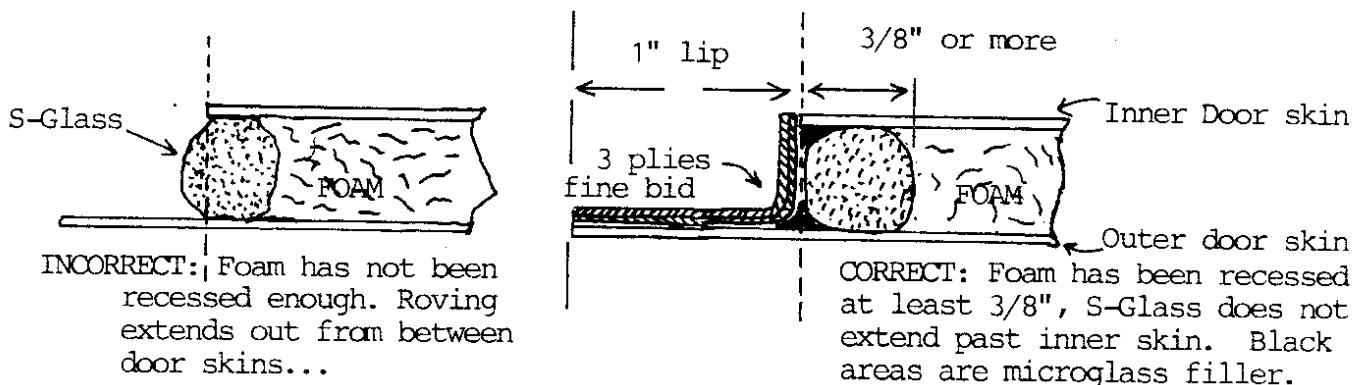


SECTION 4

DOOR & WINDOWS

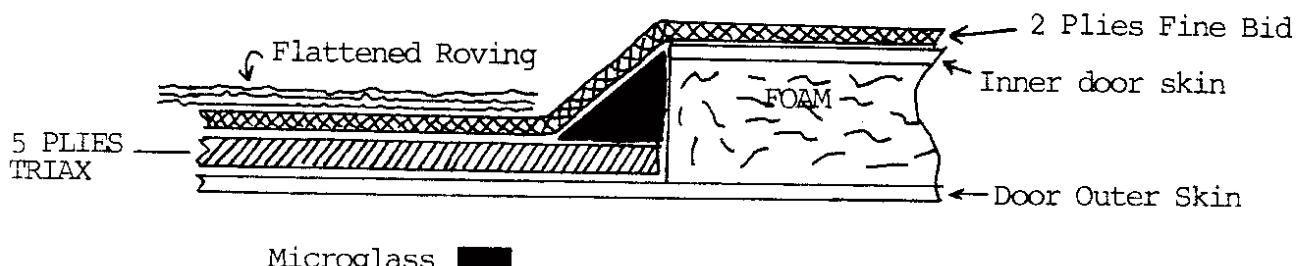
Remove about 3/8" depth of foam from between the door skins all the way around the edge. Make that a bit more than 1/2" for about 3" halfway between the hinge areas. These figures are suggested, but you will probably need to remove a bit more foam than this to squeeze in three wraps of S-glass. Sand the exposed outer skin.

Wet out the roving on plastic with a brush and, wearing gloves, squeegee out the excess resin by hand. Lay-up the roving in the groove around the door edge, all in one piece, overlapping the ends about 3" at the halfway point between the hinge areas. Press the roving flat where it crosses over the hinge areas. Don't let the S-glass extend out from between the door skins, as you want a straight line from top skin to bottom. See diagram below:



Apply a finger radius of microglass in the corner and apply 3 plies of fine BID from the edge of the lip to the edge of the inner skin (diagram above). Do this before the S-Glass Roving is cured. Now set aside and let cure. *NOTE To ensure proper fit, make sure that the door is not in the relieved position while this latter layup cures .

Door Hinge Area Reinforcement



HINGE TO DOOR ALIGNMENT AND INSTALLATION SKETCH 446-A

HARDWARE:

- (16)AN507C-1032R8 SCREWS
- (2)AN507C-1032R16 SCREWS
- (2)DOOR HINGE [VMDH-02]
- (1)BRACKET, DOOR DAMPER, FUSELAGE [VDDF-02]
- (1)BRACKET, DOOR DAMPER, DOOR [VDDD-01]
- (1)PRESSURE DOOR DAMPER [VPDD-01]
- (2)PRESSURE DOOR DAMPER BALL [VPDDB-01]
- (2)PRESSURE DOOR DAMPER CLIP [VPDDC-01]
- (2)5/16 COARSE NUTS [BI516]

Grind away enough of the reinforcing S-glass across the hinge area to allow for the hinge to lie flush with the inner door pocket surface. File the door edge to an inward taper along the hinge side for operating clearance.

Clamp the bottom (flat side) of the hinges about 31" apart, center to center, on a straightedge to keep the hinge pins in line. Cover the free hinge halves with duct tape to prevent adhesion.

Put pads of microglass in the door hinge recesses. Position the free halves of the hinges onto the door, centered in the hinge areas, with the hinge pin centerlines outboard of the lip about 3/16". Clamp in place, squeezing the microglass down to a wedge, keeping the hinge pins in line with the straightedge.

Be sure the hinges operate attached to the straightedge.
Fill any remaining voids in the hinge recesses with microglass. Let cure.

Drill four #21 holes through each hinge half. Countersink from the outside. Tap for #10-32 X 1/2" flat head screws. It works best to complete one fastening at a time. Do not tighten, however. Tightening will distort the hinge positioning.

An alternative is to add an additional step by drilling first with a #40 drill and use 3/32" clecos throughout the fitting and then do the above for final fastening. This allows for 'adjustments'.

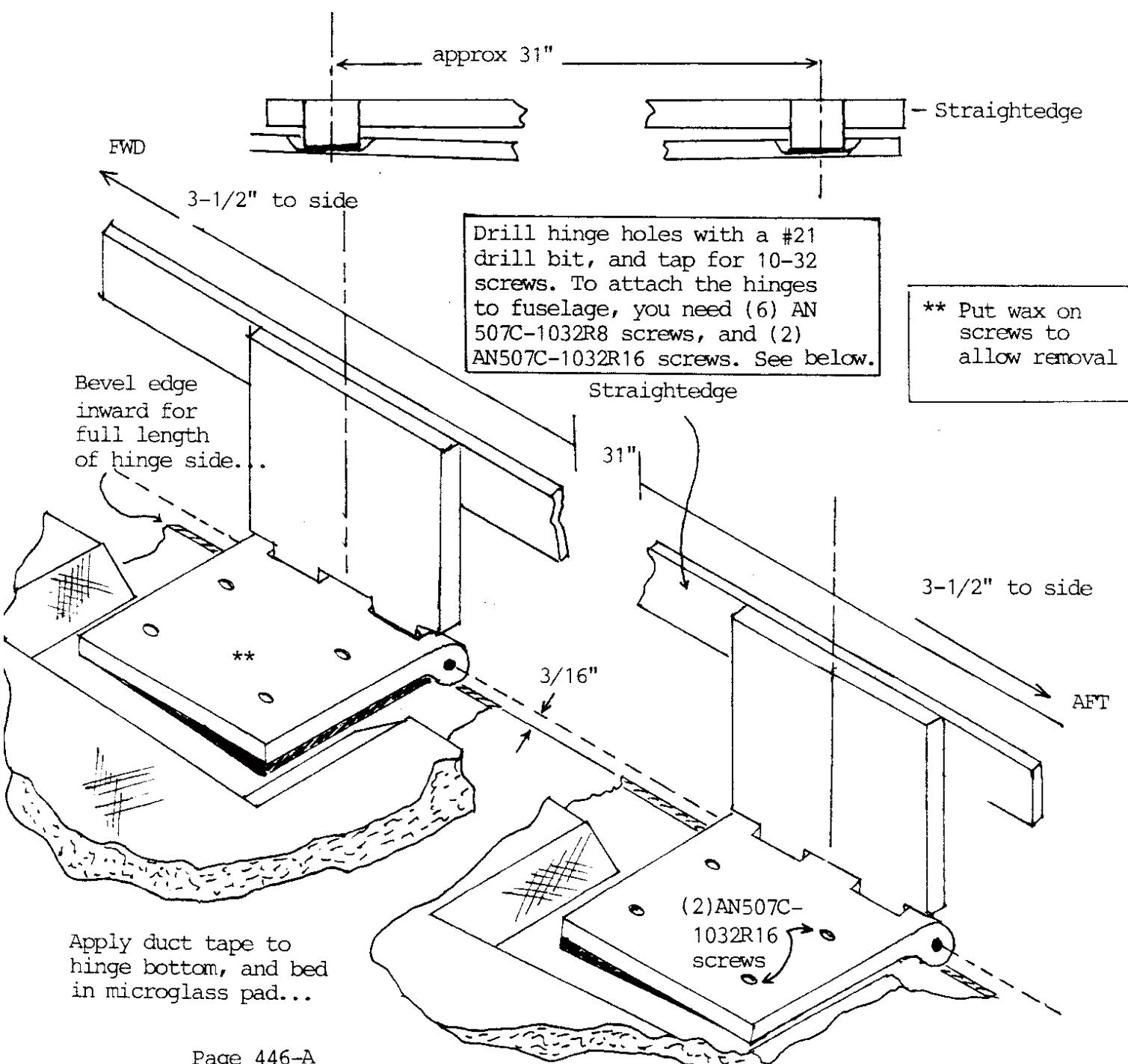
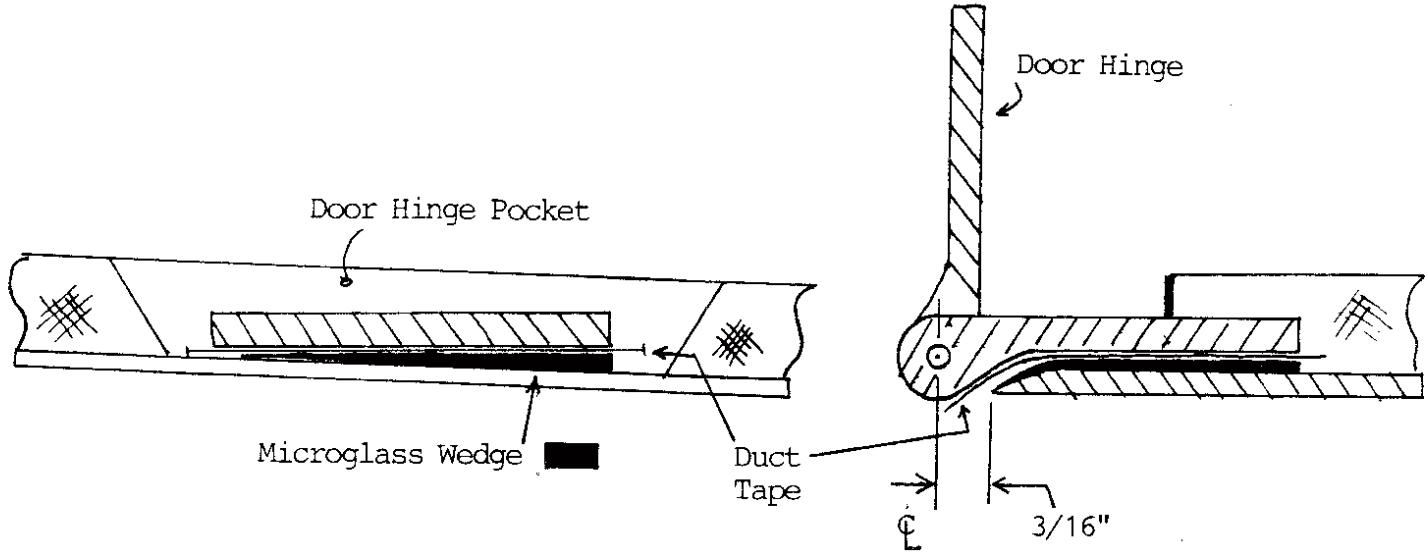
INSTALL DOOR WITH HINGES TO FUSELAGE

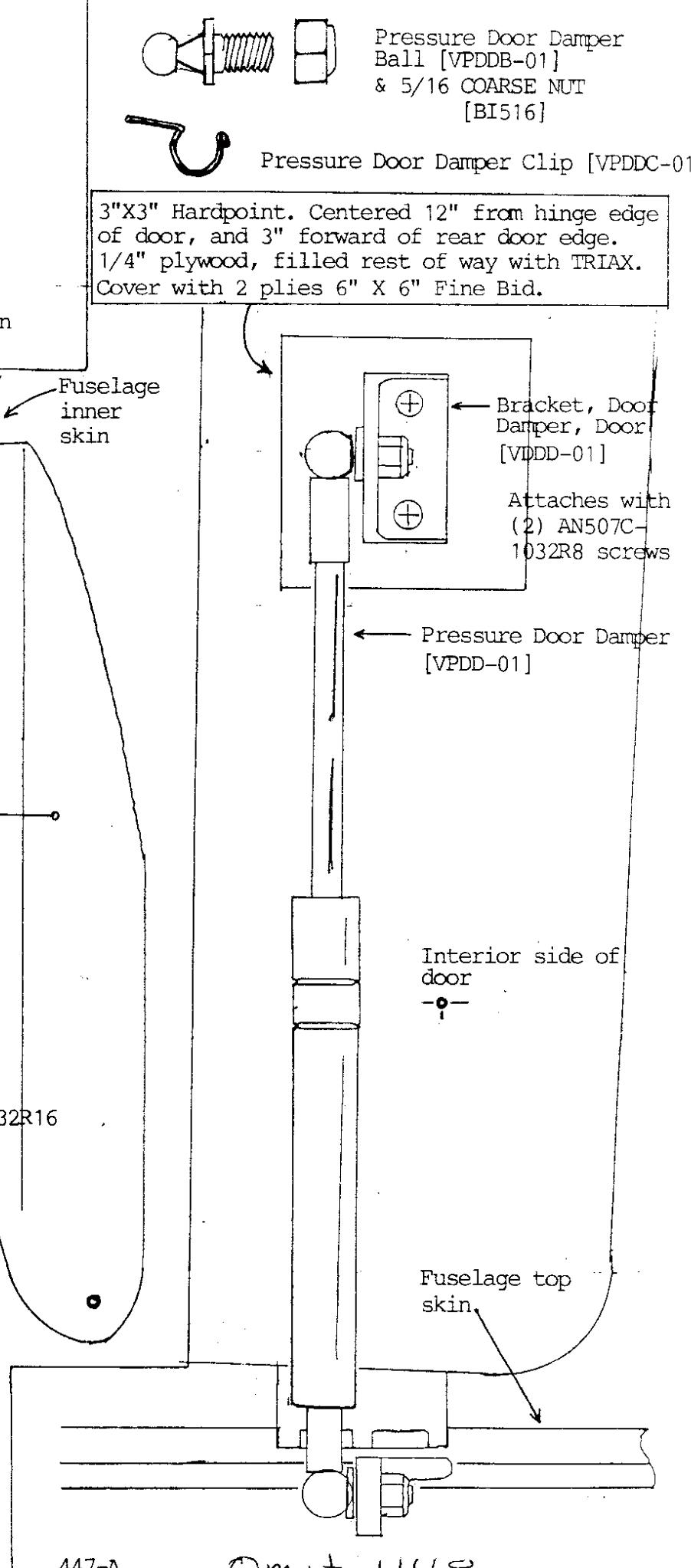
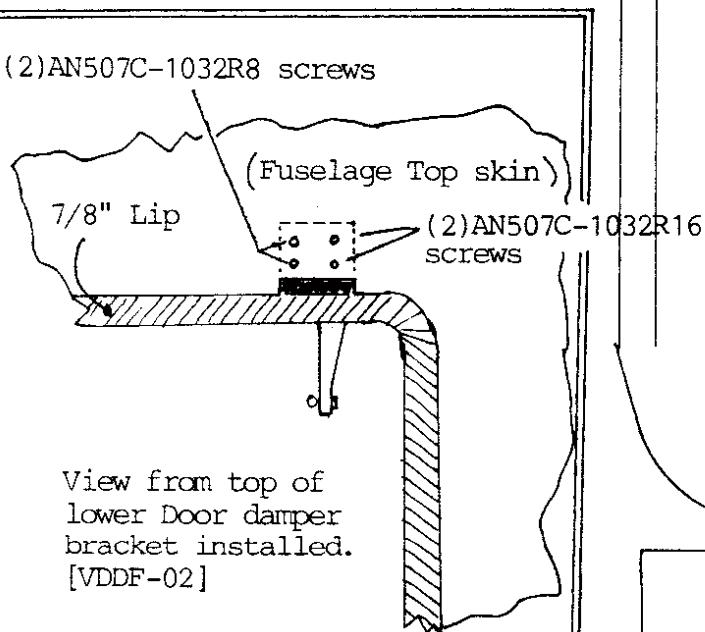
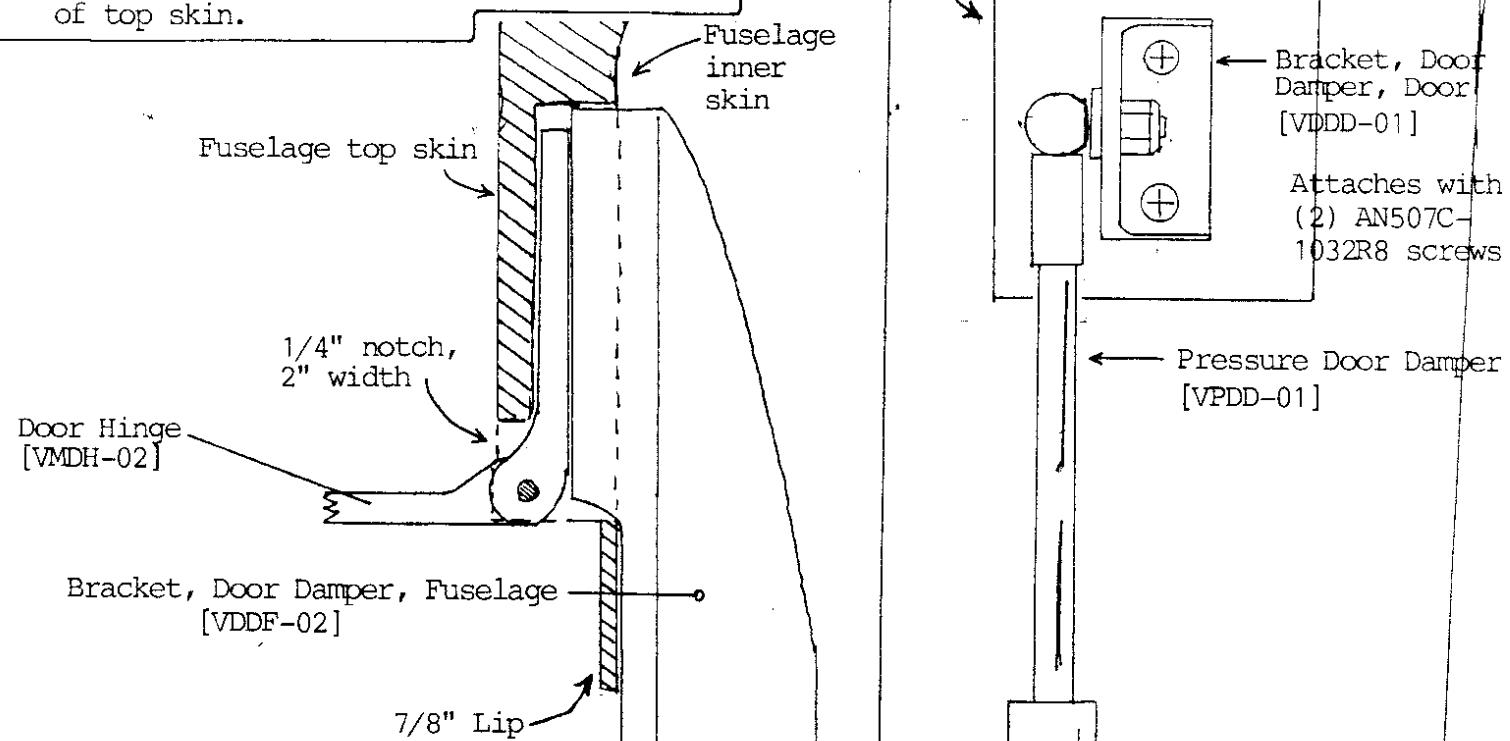
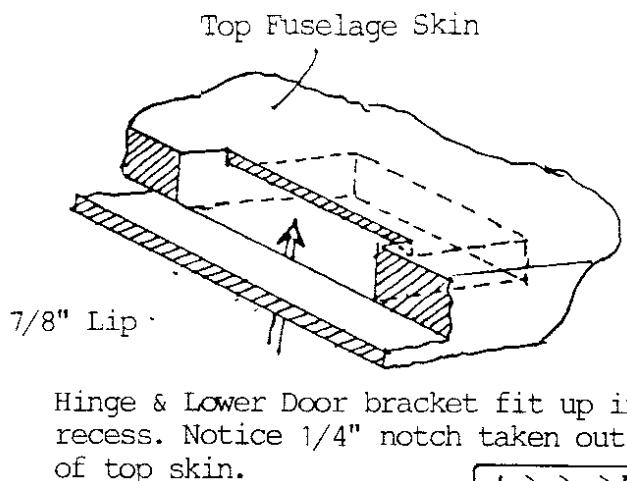
Remove the clamped straightedge from the hinges and wrap the free hinge halves with duct tape to prevent adhesion.

Trim about 1/4" outboard, 2" wide, from the fuselage hinge areas for clearance of the hinge pivoting portion. This notch is shown in the top left corner of page 447-A.

Bondo the door in the opening, hinges attached, centered in the hole. **INVERT UPPER FUSELAGE HALF.**

With the fuselage half upright, countersink the holes from the outside, and fasten with six AN507C-1032R8 and two AN507C-1032R16 (for the damper bracket) screws. The damper bracket (BRACKET, DOOR DAMPER, FUSELAGE - VDDF-02) attaches at the two rear screw positions, as shown on page 447-A. **DO NOT**





WINDOW CUT-OUTS

IMPORTANT: Do not cut out the door window until the door has been cut out and the door edges are reinforced (earlier in this chapter).

Cut out the window holes as marked on the top fuselage half using a saber saw. Start the cut to the inside of the pre-marked lines.

IMPORTANT NOTE: Be sure there is a 2-3/4" to 3" margin from the forward and aft edges of the door to the pilot's side window cut-out line.

Smooth out the nicks with a sanding block on the straights and a pipe wrapped with sandpaper in the corners.

Mark a 5/8" border on the inside of all window holes. Cut through the inner skin with a dremel tool along these lines. Cut out the foam with a razor knife taking care not to press the outer skin too hard causing de-lamination. Clean and sand the foam away from the outer skin for future bonding.

FIT WINDOWSSKETCH PAGE 448

Place windows in a position of best conformance on the outside of the fuselage. Mark the windows with a water soluble pen from the inside. Remove and cut the windows 3/8" to 1/2" outside the markings. Fit the windows from the inside without cutting away too much glass. (DIAGRAM #1)

IN THE PAST, AS SHOWN ON THE VIDEO, WE HAVE USED CLECOS TO INSTALL THE WINDOWS. WE HAVE COME UP WITH AN EASIER AND MORE EFFECTIVE METHOD, ELIMINATING THE NEED TO DRILL HOLES AND FILL THEM LATER.

Cut approximately 25-35 wood wedges from your mixing sticks, as shown in DIAGRAM A/PAGE 448 . These will be used to hold the window in place for fitting and cure. As the wedge is pushed into the Clark Foam, it will push against the inner skin, and subsequently against the window, forcing the window outward, against the outer fuselage skin. Be careful not to jam the wedge in too hard, as it can cause delamination of the inner and outer skins from the Clark Foam.

Once the window will fit into the recess with no interference, cover it with duct tape (both sides). The window hole should already be smoothed up, and have nice straight lines and clean curves. Using 100 grit paper, taper the edges of the window cutouts from the outside so that they transition smoothly into the window (DIAGRAM B). Replace the taped window into the hole, and work it until you can get a near-perfect fit. At worst, there should be only a few small gaps between the window and the outer fuselage skin visible from outside the aircraft. When you are satisfied with the fit, insert some of the wedges

SECTION 4

DOOR & WINDOWS

OVERTIGHTEN. The screws will distort the hinge positions.

Break the bondo loose and check the operation of the door. Any binding is easier to correct at this point. Bondo the door back in place. Remove the hinge screws. Invert fuselage half.

Put microglass in the fuselage recesses to 'bed' the hinges. Press the fuselage hinge halves into the microglass flush with the inner skin. Coat the screws with candle wax and refasten the hinges, again, without over tightening.

If you carefully avoided getting epoxy on the hinges and from between the door and fuselage and you waxed the screws, you should be able to remove the door. The duct tape can then be removed from the hinges.

Later you can build up an 'overhang' on the notch where the hinges protrude to cover any excess gap. A little protrusion of the hinges on top may need grinding away later, also.

INSTALL DOOR DAMPER AND HARD POINT

Locate a 3" X 3" area on the inner skin of the door centered at 12" in from the hinge edge and 3" forward of the rear edge. Remove the inner skin and foam. Sand the exposed outer skin and inner skin around this area. Cut a 3" X 3" piece of 1/4" plywood and microglass it to the outer skin. Fill the remainder of the hole with TRIAX until it is flush with the inner skin. Cover with two plies of 6" X 6" BID and let cure.

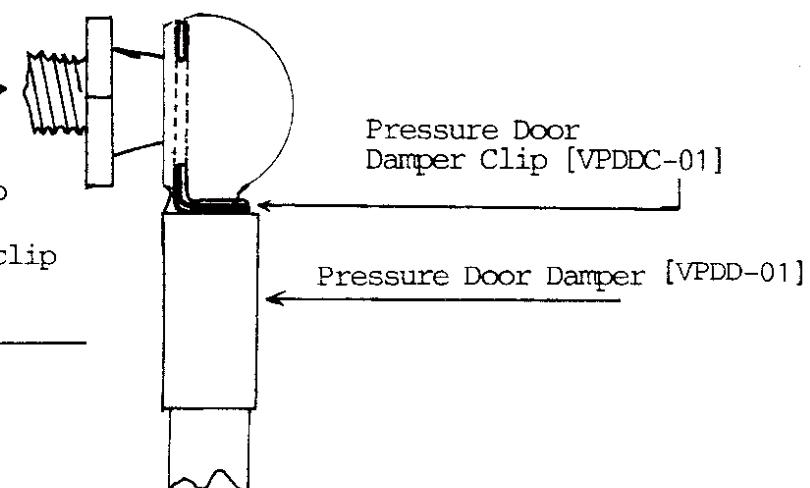
To attach the door damper fuselage bracket (VDDF-02), first drill out the two aft holes in the aft door hinge to 3/16". Mark the holes on the damper bracket, and drill and tap it out to 10-32. Use the (2)AN507C-1032R16 screws, brought down through the roof, through the hinge holes, and into the bracket to secure the assembly. SKETCH 447-A.

Center bracket VDDD-01 on the door hardpoint. Use the bracket as a template, drill and tap the fiberglass pad for (2) AN507C-1032R8 screws, and mount the bracket. Connect the damper.

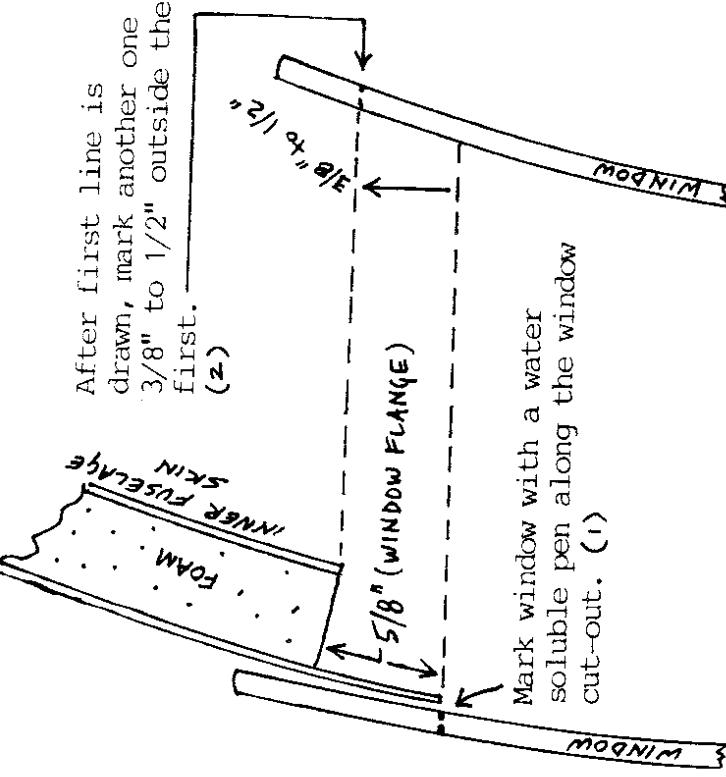
Pressure Door

Damper Ball
[VPDDB-01]

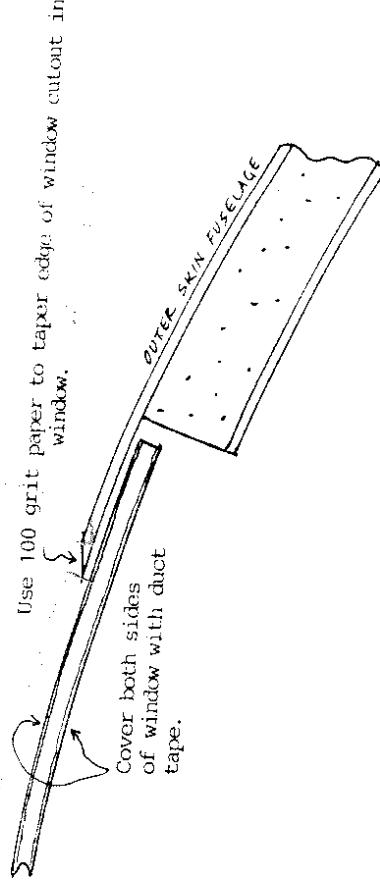
Straight piece of Damper clip passes through the two holes in the ends of the damper. Curved portion of clip wraps around base of ball housing.



hold window in place for best conformance

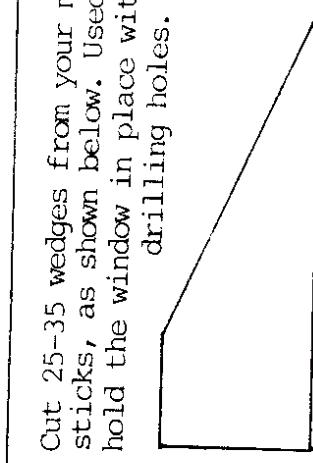


DIAG A



DIAG B

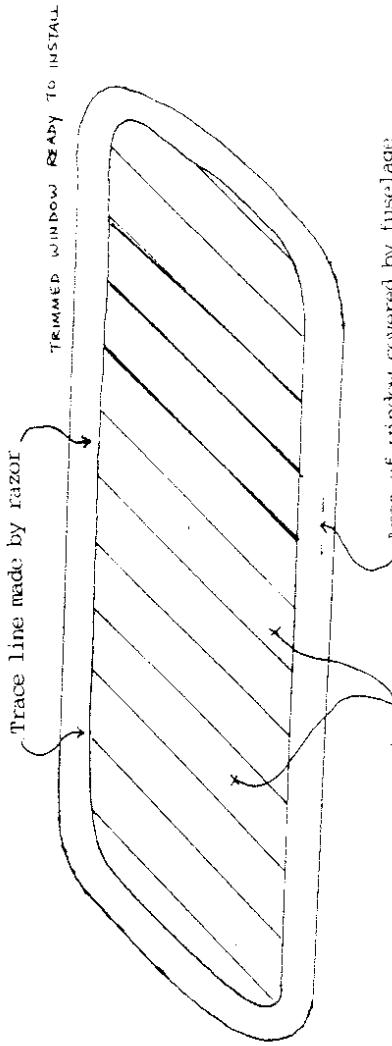
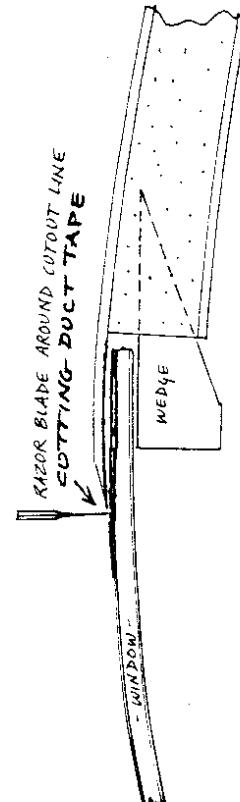
Cut 25-35 wedges from your mixing sticks, as shown below. Used to hold the window in place without drilling holes.



DIAG C

DIAG A

* NOTE: LEAVE DUCT TAPE IN PLACE ON INSIDE OF WINDOW TO PROTECT FROM WEDGES. REMOVE PERIMETER TAPE AFTER CURE...

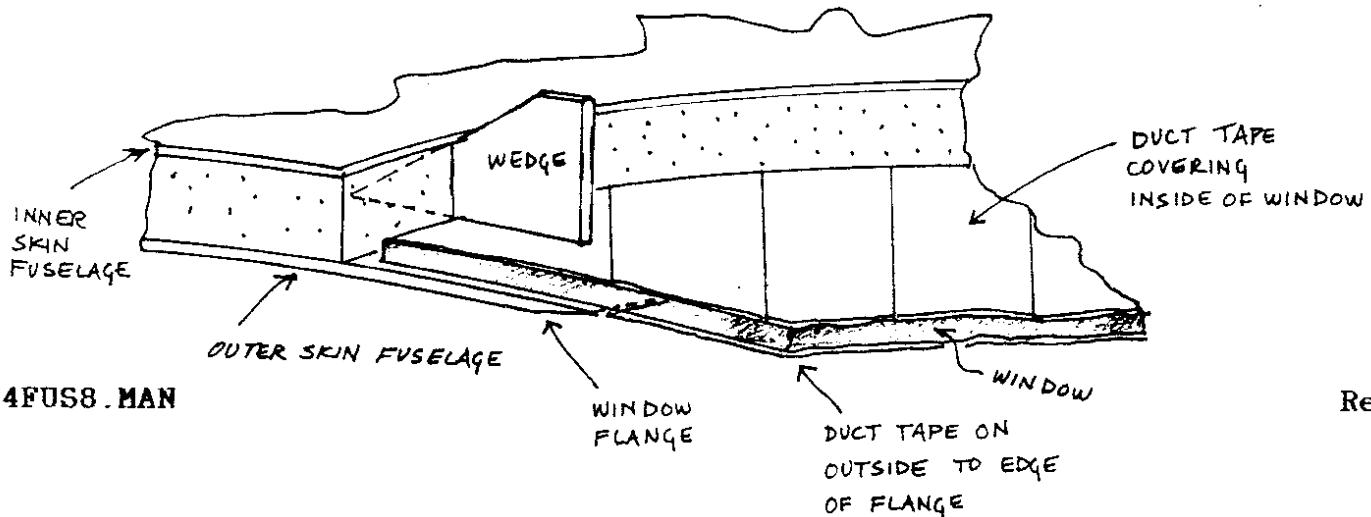
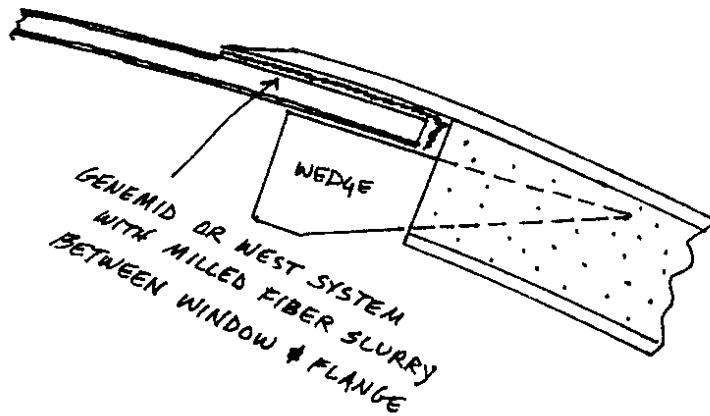


Duct Tape Strips
Area of window covered by fuselage skin. Duct tape has been removed and surface has been scuffed with 100 grit sandpaper.

to hold the window in place. Trace around the window cutout carefully with a razor blade, cutting the duct tape as close to the edge of the fuselage skin as possible (DIAGRAM C/pg 448). Remove the wedges, and the window, and peel away the duct tape skin around the outside edge of the window. Rough up the exposed plexiglass with some 100 grit paper, for superior bonding to the fuselage skin (DIAGRAM D/pg 448). Be sure that all viewing surfaces of the window are still covered with duct tape.

INSTALL WINDOWS

Sand the inner surface of the window flange and clean it off with acetone. Mix a slurry of Genemid (Brand-X) and Milled Fiber (West system will work well here, as well). Apply the slurry to the inner surface of the window flange on the fuselage, then carefully press the window into place (DIAGRAM BELOW). Get it aligned as you did earlier, then use the wedges to hold it in place. Try and space the wedges evenly around the window (approx. every 3"). If gaps are still visible from the outside, use extra wedges at those locations to seal the spaces. Remember, do not press the wedges in hard enough to delaminate any of the fiberglass from the Clark Foam. Let cure, and remove the wedges.



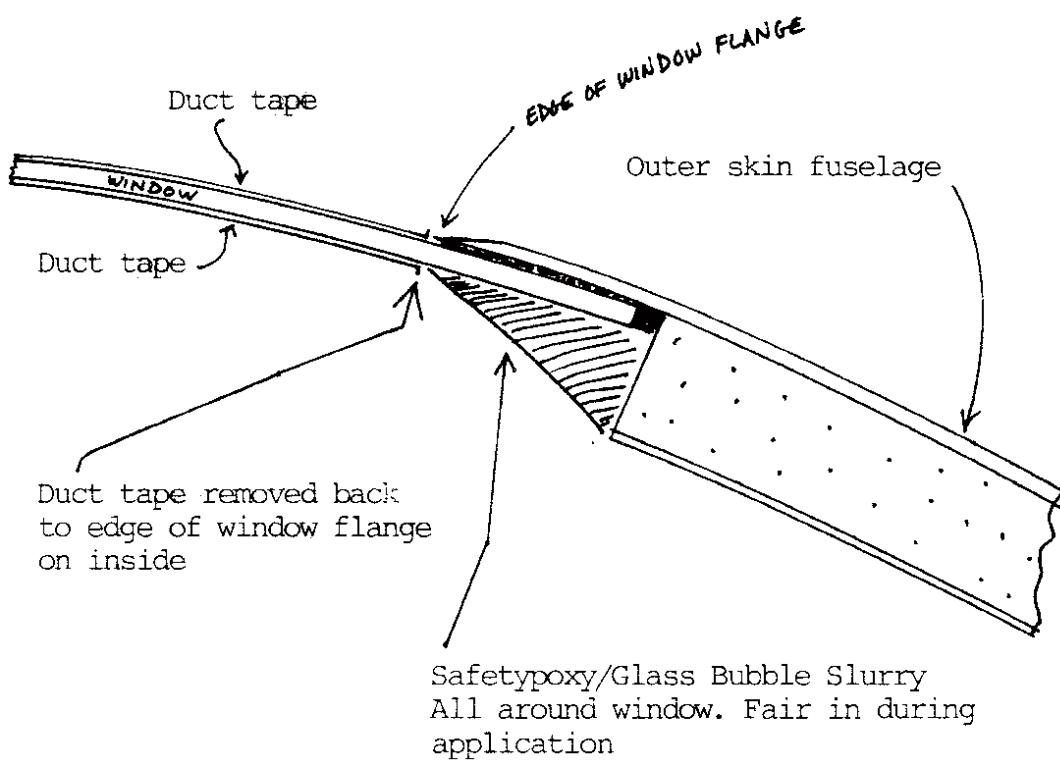
On the inner surface of the window, trim the duct tape back approximately 1/2" from the edge, all the way around the window. If possible, trim the tape all the way back to the edge of the window flange. If you go past the flange edge, cover back up with tape. Score the exposed plexiglass with 100 grit paper, then trowel a thick slurry of Safetypoxy & Glass Bubbles up to the new edge of the tape. Smooth and trim while troweling. Take the time now, it's a mess later. Let cure. DIAGRAM AT PAGE BOTTOM.

At this time, it is advisable to finish out the areas around the windows for painting. It is quite easy to fill and sand these areas while the top is off. (HINT: Do the instrument panel and the seat hand rail at this time as well.)

It is not mandatory, but you can also back up this micro with a ply of fine BID around the windows.

TIP: CUT A CORNER OFF A BAGGIE, AND USE IT LIKE A CAKE DECORATOR TO APPLY MICROSLURRY.

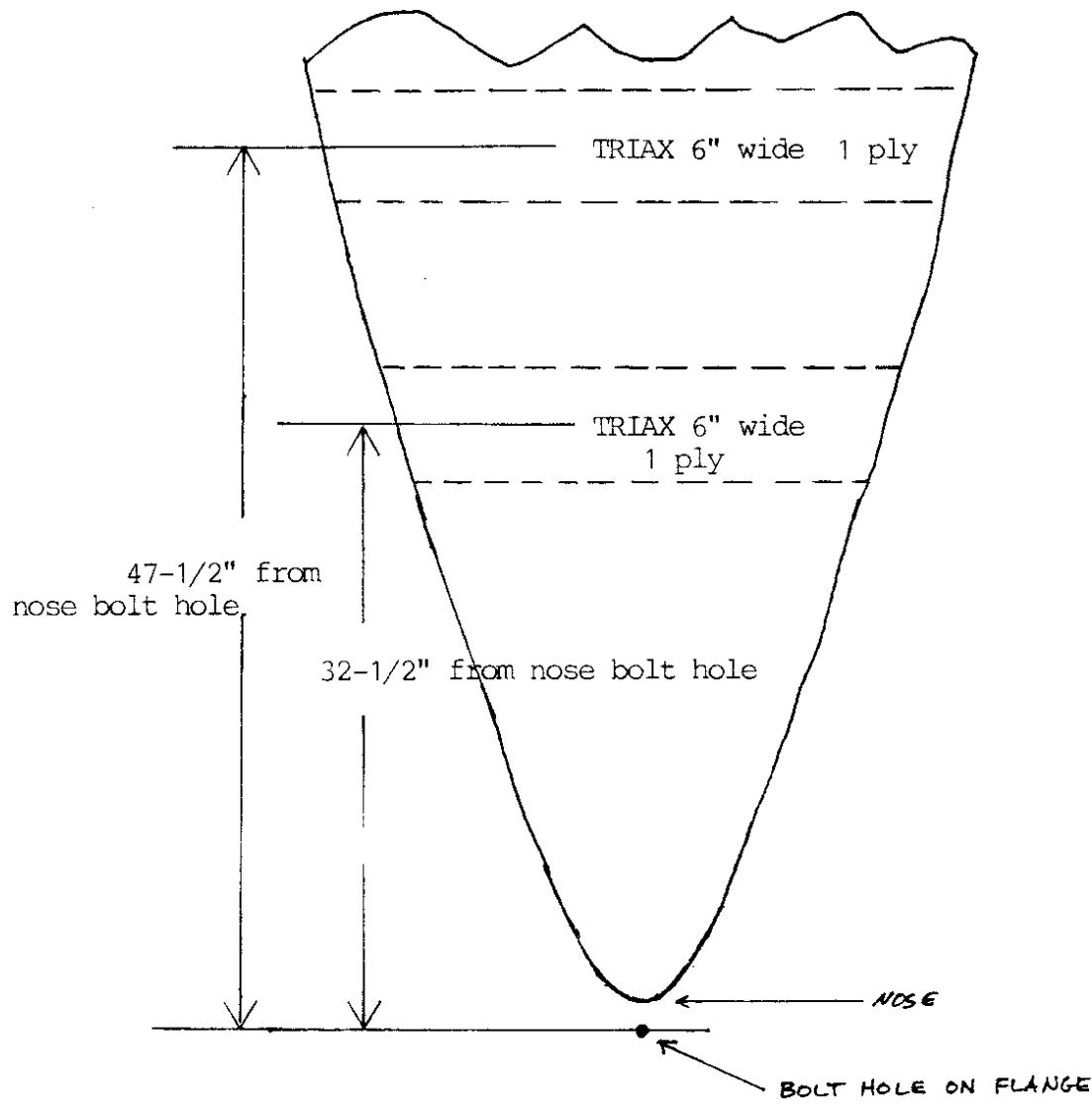
Diagram below shows Safetypoxy/Glass Bubble Slurry applied to inside of window surface.



**FUSELAGE REINFORCEMENTS : UPPER CANARD COVER
DIAGRAM BELOW**

This is the time to add reinforcements to the inside top fuselage half in the canard cut-out area. Measure and mark 32-1/2" and 47-1/2" aft of the nose bolt. Apply single layers of 6" wide TRIAX for the full width, centered on the above measurements. Don't forget to sand the areas before the lay-ups, or to lightly pre-wet the areas prior to the lay-ups.

LAYUPS ON INSIDE OF UPPER FUSELAGE HALF
Act as reinforcements for the canard fairing



NOSE ACCESS COVER

Page 452

SKETCHES OPPOSITE PAGE & BELOW

*NOTE IT IS ALRIGHT TO CHANGE THE SHAPE OR SIZE OF THE ACCESS COVER IF YOU SO DESIRE AS LONG AS THE ALTERATIONS ARE NOT COMPLETELY RADICAL.

Using a thin blade in your sabre saw, carefully cut out the nose access cover. Remove the cover and clean up all edges and radii on the cover and in the hole with a sanding block and files. Check the cover for fit. Leave approximately a $1/16$ " gap all the way around for one ply of BID over the exposed foam edge. Remove a small amount of foam behind the inner and outer skins and fill the void with microballoon. Apply one ply of FINE BID over all exposed foam (just as you did with the speed brake). On the upper corners of the door, remove about 1" of foam and fill with microballoon to eliminate the possibility of crushing the foam when the screws are installed. Let cure and trim.

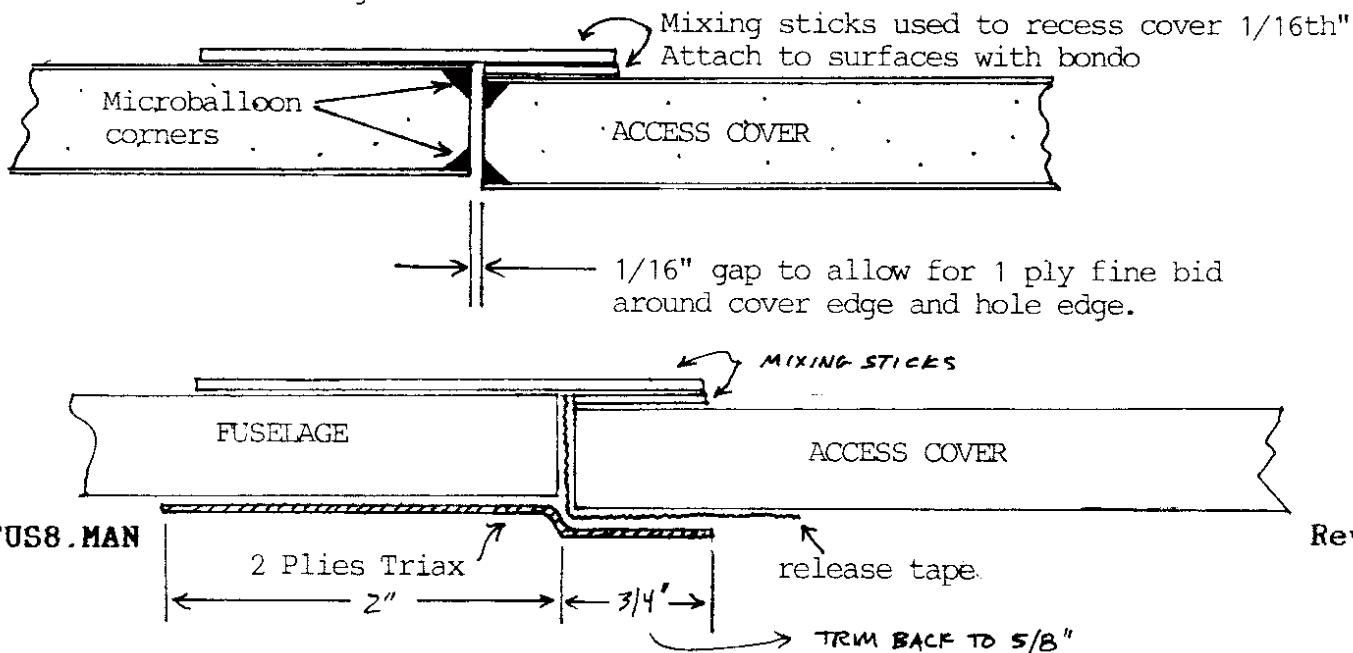
Use the same technique of creating a 'lip' as you did for the door, except that when you place the cover back into the hole, use tongue depressors around the top surface at the edges as a guage to recess the cover about $1/16$ ". The recess allows room for a water seal.

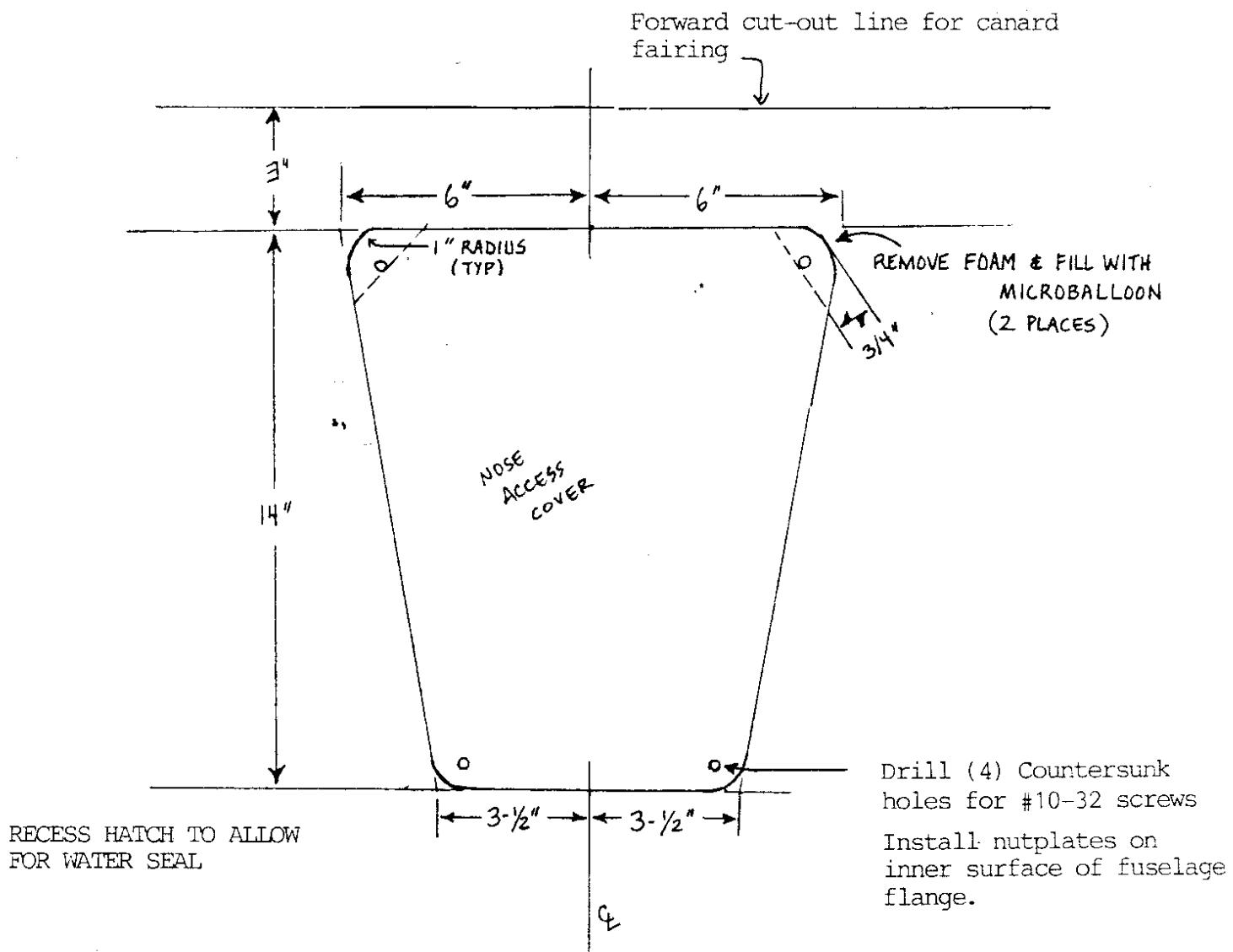
TIP: Be sure duct tape is also around the cover edge to prevent adherance to the fuselage.

To reiterate the technique: Put duct tape around the edge of the cover; sand a 2" margin around the hole inner skin; bondo the cover in the hole from the top, recessing about one mixing stick's thickness; apply two layers of 2-1/2" pre-wet TRIAX tapelapping the duct tape about $3/4$ "; after cure knock out cover and trim lip to about $5/8$ ".

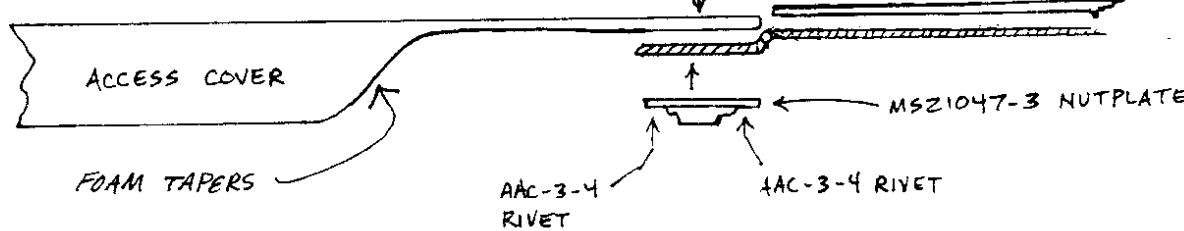
Drill countersunk holes for #10 screws at the four corners of the cover, through the lip, and install 10-32 nutplates with $3/32$ pop rivets.

Outer skin fuselage





AFT ← → FWD



INITIAL FIT OF CANARD TO LOWER FUSELAGE

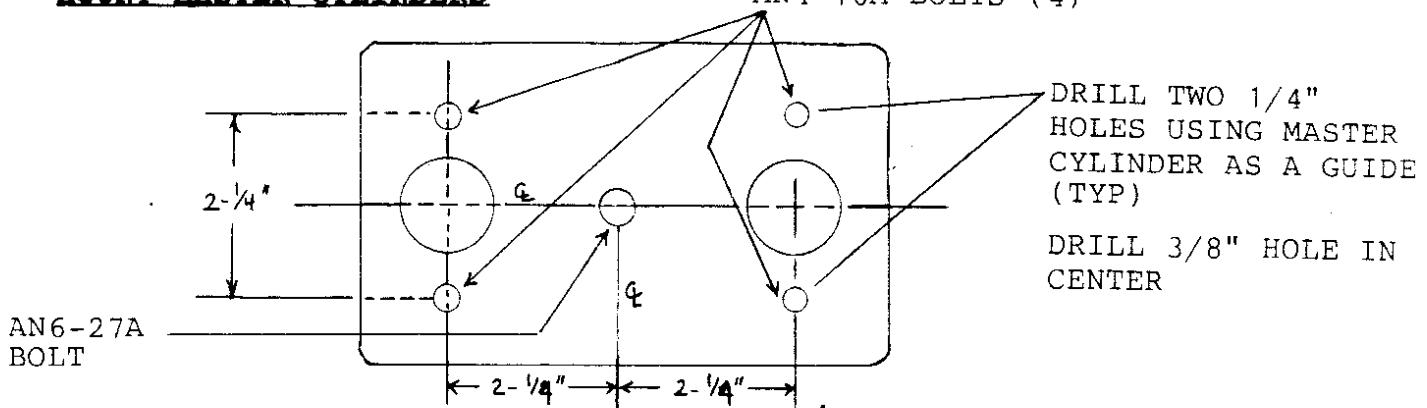
Level and plumb the fuselage. Cut off the flange in the area of the canard. Set the canard (without the elevators) on the fuselage with the lift tabs against the front of the canard bulkhead, centered. Using a level and your incidence block, get the canard level right, left, fore, and aft. Also make sure that it is perpendicular to the fuselage by measuring back to the outboard hardpoints in the main spar from the TE of the canard. Scribe lines on the fuselage sides below and remove material until the canard is down to the bulkhead. If the canard tabs are not flush with the bulkhead, you will have to offset bushings in the bulkhead or use washers between the tabs and bulkhead.

Now install the elevators and remove enough material to ensure free operation of the elevators. Remove foam along the inner and outer skins, fill the resulting voids with microglass, and apply one ply of FINE BID over the exposed foam. At this time it is easy to get to the canard lift tabs. Pre-drill a 1/4" hole in the center of the lift tabs.

SECTION 4

MASTER CYLINDERS & PEDDLES

MOUNT MASTER CYLINDERS

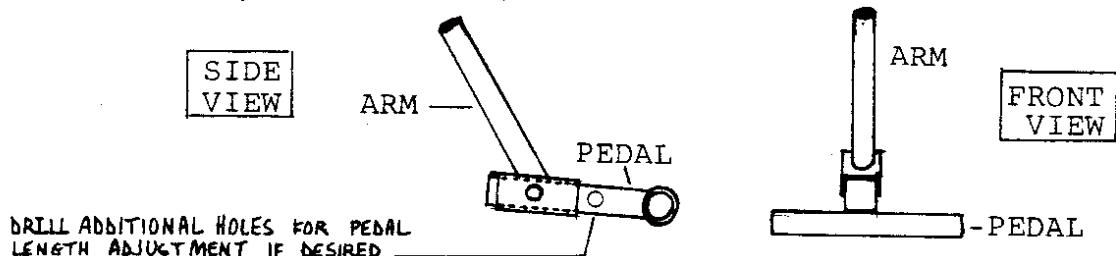


Measure and mark centerlines on the master cylinder box provided. Drill two 1-1/2" holes, 2-1/4" from center on the long centerline. Use the master cylinders as a guide and drill for 1/4" mounting bolts. Mount the master cylinders with (4) AN4-10A bolts, (4) AN960-16L washers, and (4) MS21042-4 nuts.

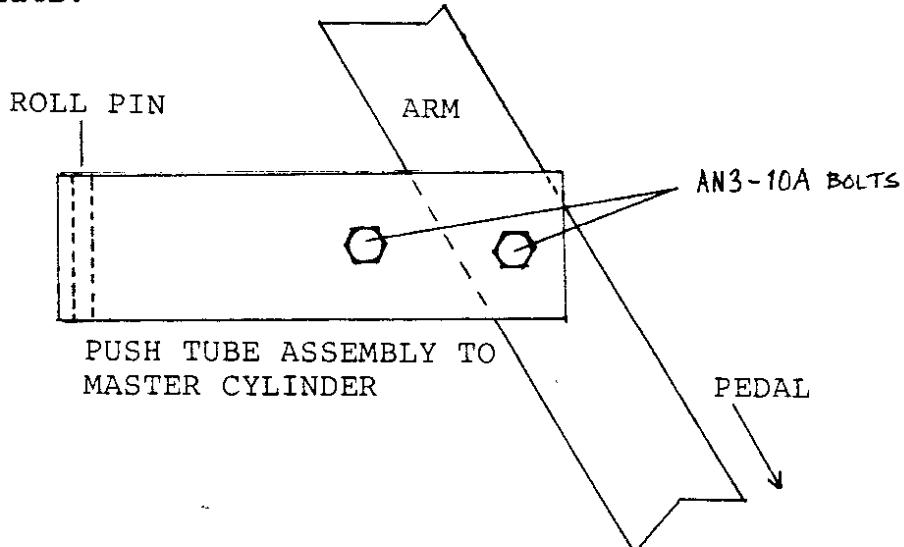
Measure and mark two points 7" down from the top of the canard bulkhead, 6" and 10-1/2" left of center, onto the canard bulkhead. Drill 1-1/2" holes.

ASSEMBLE RUDDER PEDALS

Install pedals into pedal arms with (4) AN3-7A bolts, (4) AN960-10L washers, and (4) MS20142-3 nuts. Multiple holes can be drilled in pedals for adjustment.



Install push tube and push tube stop bolts to the pilot's pedal arms with (4) AN3-10A bolts, (4) AN960-10L washers, and (4) MS20142-3 nuts.



HARDWARE LIST

ASSEMBLY & INSTALLATION OF PEDAL SYSTEM/BRAKE CYLINDERS

(2) MASTER BRAKE CYLINDER	VMBC-01
(1) BRAKE & RUDDER PEDAL ASSEMBLY	VBRPA-02
(4) BRAKE & RUDDER PEDAL	VBRP-01
(1) BRAKE PEDAL MOUNT, LEFT (LARGER HOLE THAN RIGHT SIDE MOUNT)	VBML-01
(1) BRAKE PEDAL MOUNT, RIGHT	VBMR-01
(2) BRAKE PUSH TUBE	VBPT-01
(2) BRAKE PEDAL PUSH BLOCK	VBPB-01
(2) ROLL PIN, 1/8 X 1, BRAKE PUSH TUBE	VPTRP-01
(2) FITTING, 1/8, BRAKELINE	VFBL-01

1/4" DRILL BIT

3/8" DRILL BIT

1/8" DRILL BIT

3/16" DRILL BIT

1-1/2" HOLE SAW

(2) AN970-6 WIDE AREA WASHERS

(4) AN960-416L WASHERS (THIN)

(4) MS21042-4 LOCKNUTS

(14) AN960-10L WASHERS (THIN)

(14) MS21042-3 LOCKNUTS

(1) AN363-624 LOCKNUTS

* IT'S A GOOD IDEA TO DIG OUT YOUR NYFLOW TUBING AND RUDDER CABLE AT THIS TIME. KEEP THEM HANDY...

Install rudder actuator arms to assembly using (1) AN3-11A bolt on pilot's side, (1) AN3-10A bolt on the co-pilot's side, (2) AN960-10L washers, and (2) MS20142-3 nuts. Make sure to put the mounting blocks on each side first.

MOUNT PEDALSSKETCH 455-APrevious Page

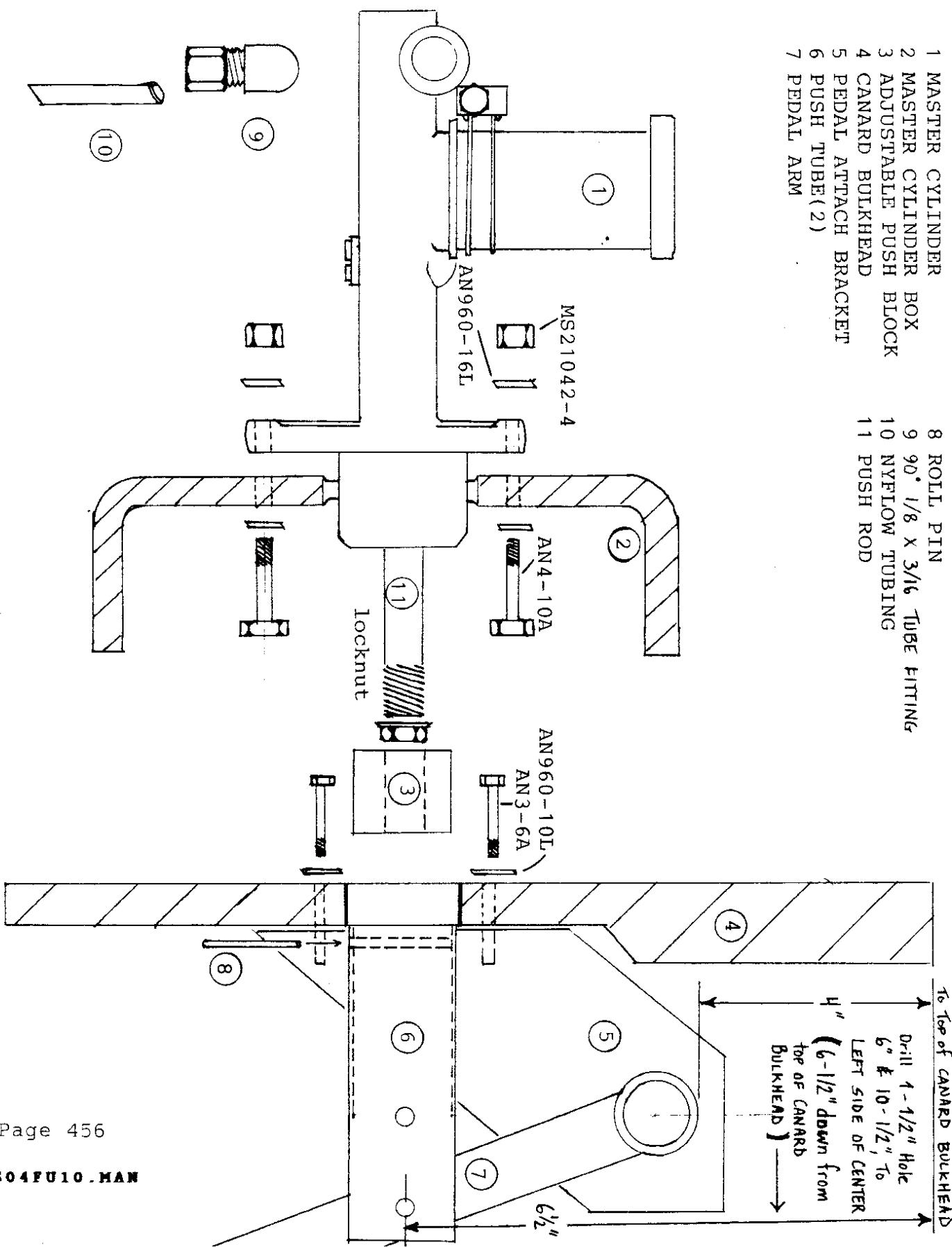
Position the rudder and brake pedal assembly centered against the bulkhead, 4-1/4" to 4-1/2" down from the top of the canard bulkhead to the top of the large pivot tubing. Be sure the left pedals are aligned with the holes in the bulkhead.

Drill 1/8" pilot holes through the bulkhead using the pedal assembly attach brackets as a guide. Enlarge these holes for 3/16" bolt clearance and install the assembly up-side-down. Pilot drill the remaining two holes, remove the assembly, enlarge those holes, and reinstall (right side up).

Install the adjustable push blocks onto the master cylinder rods and position the master cylinder brake box in front of the bulkhead so that the pushrods extend through the bulkhead into the pushtubes on the pilot's rudder pedals. Hold in place and check for binding while operating each pedal. Make any necessary adjustments to ensure free movement. When you are satisfied with the operation of the assembly, drill a 3/8" hole in the center of the brake box on throught the bulkhead and mount in place with an AN6-27A BOLT, 2-3/8" WASHERS, and a lock nut. Check for proper operation, then sand and apply two plies of FINE BID securing the brake box to the bulkhead. Now install 2-1/8" fittings, 90 degree fittings (use teflon tape), and brakelines. Run the brakelines down the pilot's side duct, exiting the duct under the gear in front of the firewall, and leading down the appropriate gear leg. DON'T MAKE THE LINES TOO SHORT!! Length should be approximately 15' right and 12' left. The adjustment of the push block and the installation of the lock nut will be done when the brakes are installed and the fluid is added.

DO NOT USE ANYTHING BUT SILICONE BRAKE FLUID. AIRCRAFT BRAKE FLUID WILL RUIN THE TOYOTA MASTER CYLINDERS, AND AUTOMOTIVE BRAKE FLUID WILL MESS UP THE AIRCRAFT BRAKES. SILICONE BRAKE FLUID IS THE ONLY TYPE YOU CAN USE.

At this time, you can install your axles and wheels if you wish, however, the airplane becomes quite tall at this point, and working inside becomes more difficult.

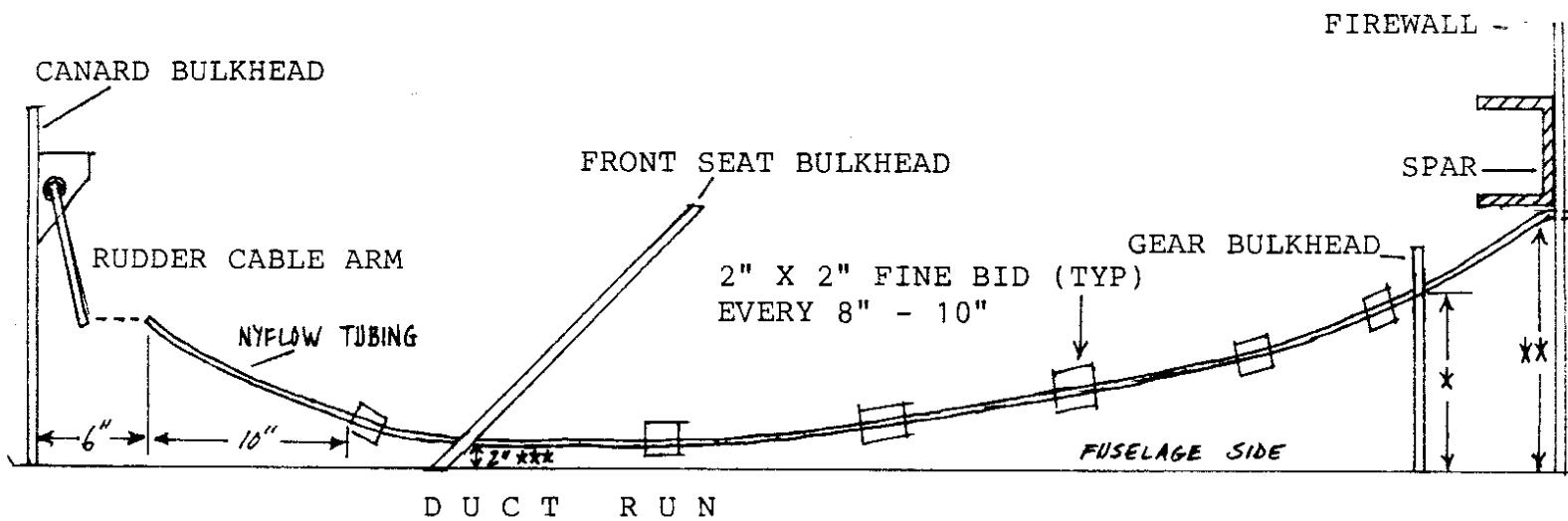


SKETCH BELOW

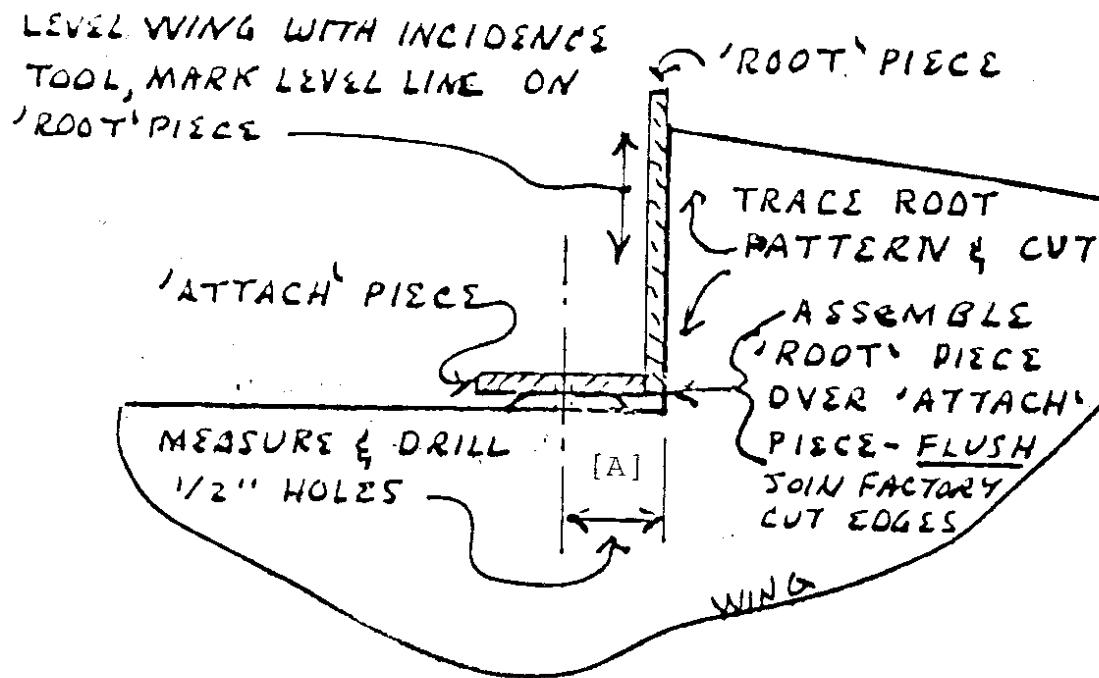
Drill a 3/16" hole through the firewall 5" from each side, just below the center section spar. Also drill a 3/16" hole through the gear bulkhead 2" from each side, 8" above the duct. Drill yet another hole through the front seat bulkhead adjacent to each side, 2" above the duct.

Cut two lengths of the 3/16" nyflow tubing provided, to run from the back of the firewall (protruding slightly) to within 6" of the canard bulkhead. Route the tubing with a smooth curve, with the forward end at the same height as the cable attach point on the rudder pedal arm.

Hold the tubing against the fuselage sides with pieces of duct tape and apply pieces of 2" X 2" fine BID every 8" to 10", starting about 10" from the forward end, to fasten permanently in place.

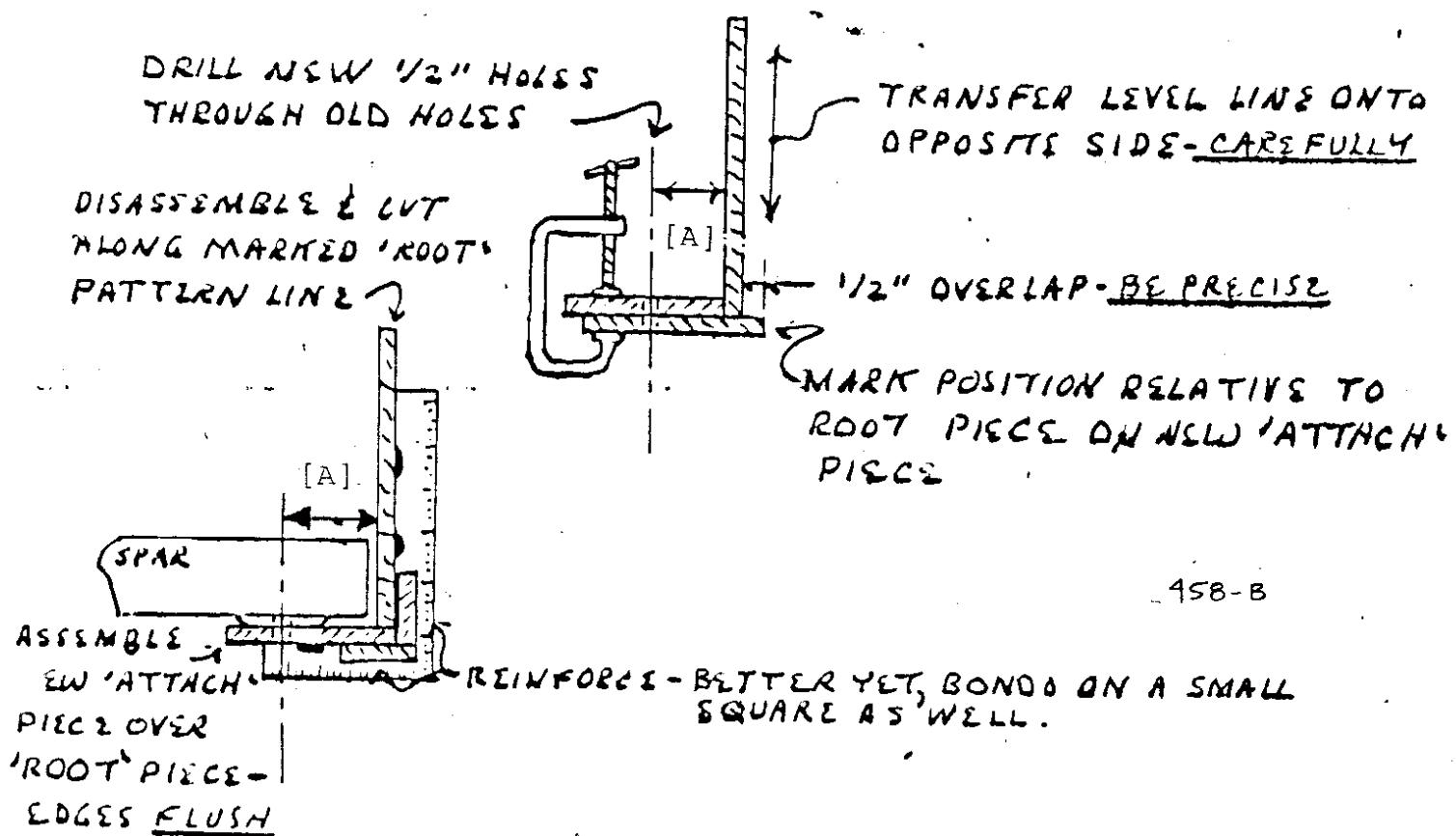


- * 8" ABOVE DUCT, 2" FROM SIDE
- ** JUST BELOW SPAR, 5" FROM SIDE
- *** ADJACENT TO SIDE



NOTE: DIMENSION A, WHICH IS AN OUT-SIDE MEASUREMENT AT FIRST, BECOMES AN INSIDE MEASUREMENT WHEN THE JIG IS BOLTED ON.

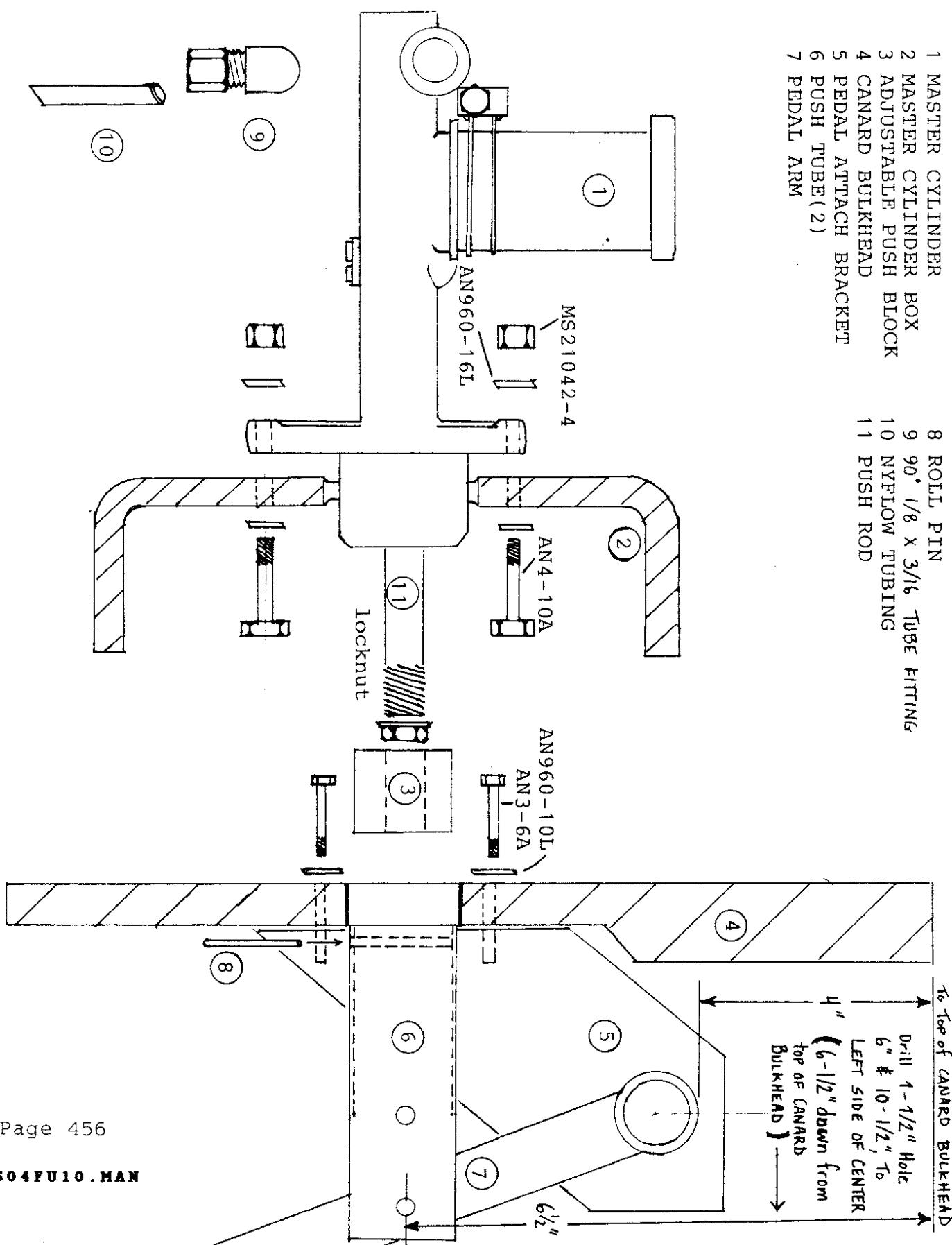
458-A



458-B

- 1 MASTER CYLINDER
- 2 MASTER CYLINDER BOX
- 3 ADJUSTABLE PUSH BLOCK
- 4 CANARD BULKHEAD
- 5 PEDAL ATTACH BRACKET
- 6 PUSH TUBE(2)
- 7 PEDAL ARM

- 8 ROLL PIN
- 9 90° $1/8 \times 3/16$ TUBE FITTING
- 10 NYFLOW TUBING
- 11 PUSH ROD

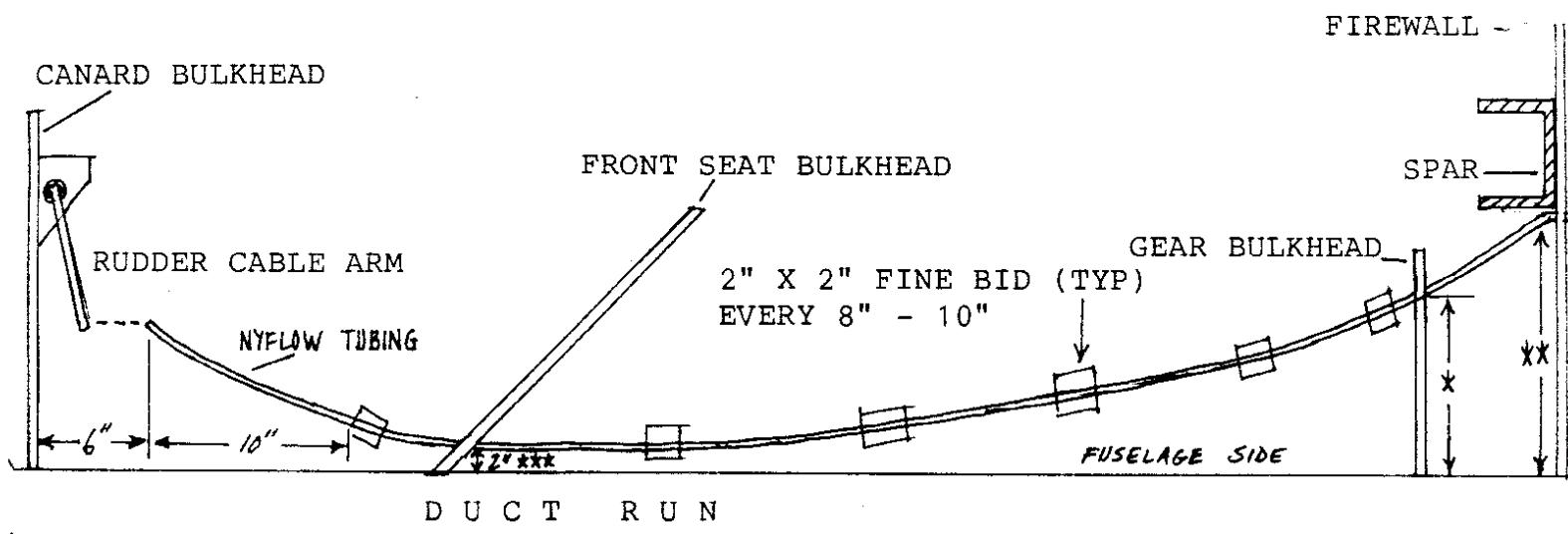


SKETCH BELOW

Drill a 3/16" hole through the firewall 5" from each side, just below the center section spar. Also drill a 3/16" hole through the gear bulkhead 2" from each side, 8" above the duct. Drill yet another hole through the front seat bulkhead adjacent to each side, 2" above the duct.

Cut two lengths of the 3/16" nyflow tubing provided, to run from the back of the firewall (protruding slightly) to within 6" of the canard bulkhead. Route the tubing with a smooth curve, with the forward end at the same height as the cable attach point on the rudder pedal arm.

Hold the tubing against the fuselage sides with pieces of duct tape and apply pieces of 2" X 2" fine BID every 8" to 10", starting about 10" from the forward end, to fasten permanently in place.



- * 8" ABOVE DUCT, 2" FROM SIDE
- ** JUST BELOW SPAR, 5" FROM SIDE
- *** ADJACENT TO SIDE

piece. The transferred level line is a good point of reference.

FUEL STRAKES AND UPPER FUSELAGE HALF

At this time it is advisable to build your wings and canard if you haven't already done so. You will need the wings for proper mating of the fuel strakes, and the canard for the procedure on page 453 (INITIAL FIT OF CANARD TO LOWER FUSELAGE).

LOWER FUEL STRAKE

Level your fuselage fore and aft, and install one wing at a time, both wings if you have room. If you don't have room, build the transfer template described on page 458. Using your wing attach bolts for fit, go to the hardware store and get some 1/2"-20 nuts and save your locknuts for final assembly.

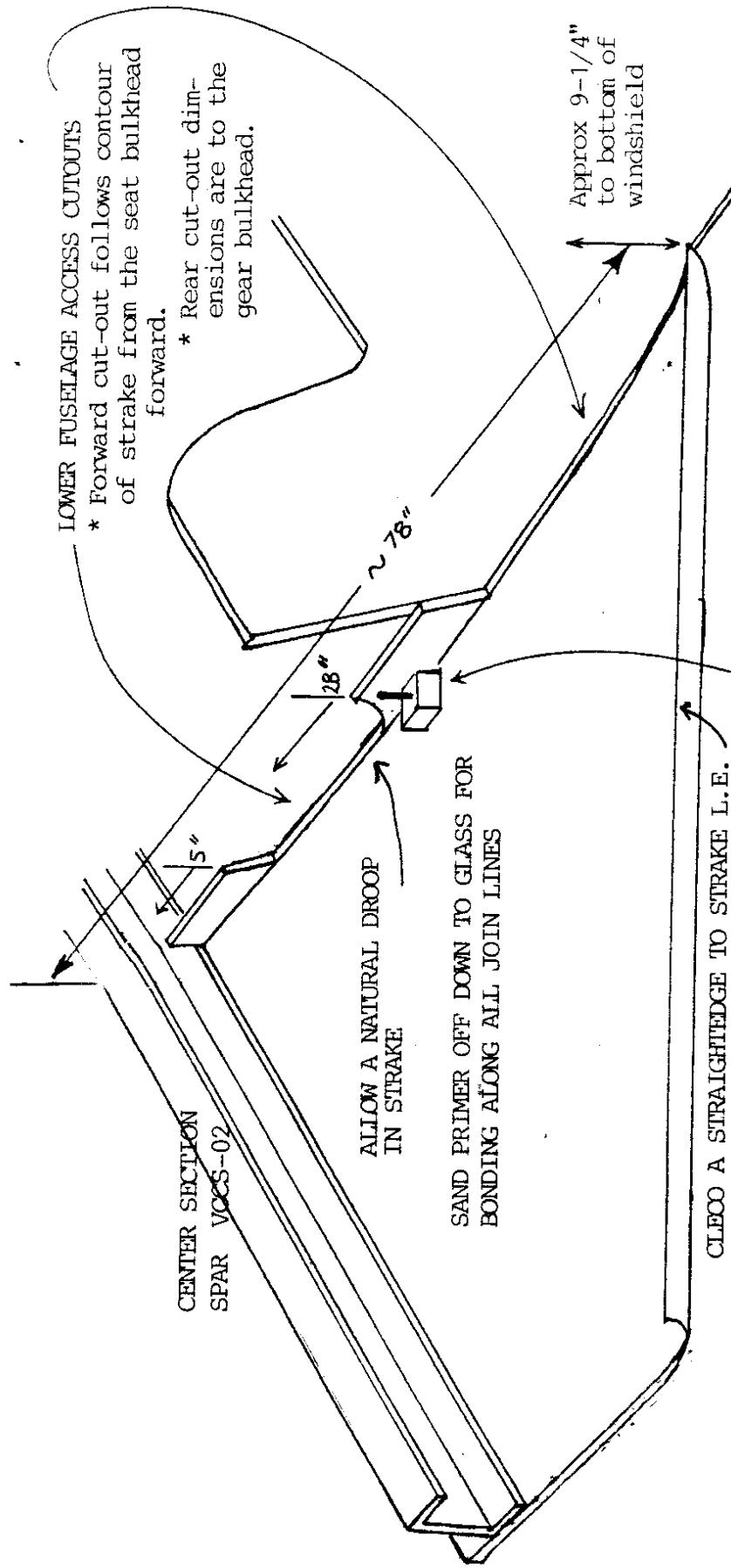
Once the wing(s) is bolted to the CS spar, check the level of the wing using your incidence block. To adjust to level, support the wing outboard, and twist the spar with the wing by shimming the outboard support until zero incidence is achieved. Be sure that nothing moves during the strake installation process (the strakes take all the torsional loading back into the fuselage and they are not rigid until the upper halves of both the strake and the fuselage are complete.)

If you are using transfer templates, twisting of the spar becomes difficult, so shim washers must be used if any variations occur (keep track of how many washers are used and their positions.)

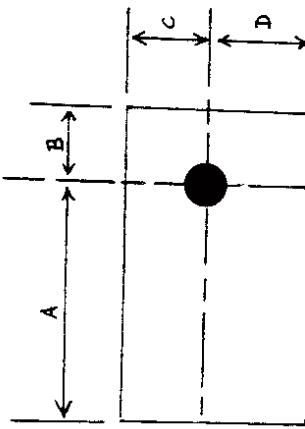
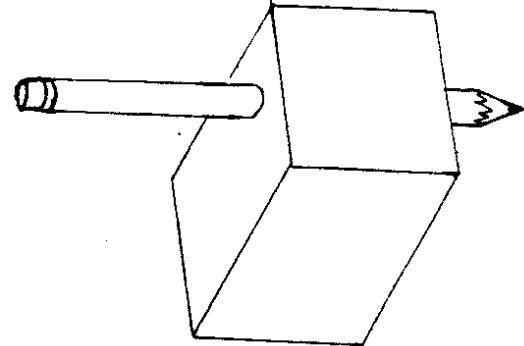
Remove the flanges on both halves of the fuselage in the areas where the strakes are to be installed. Remove the glass area in the upper fuselage half to accept the carry-through spar and set the upper half on the lower half. Check for any structural interference by the instrument panel and the firewall. Trim if necessary.

THE NEXT PARAGRAPH IS OF CRITICAL IMPORTANCE! The elevation of the leading edge of the strake at the fuselage side with respect to the elevation of the bottom of the lower spar cap is of great importance. The strake leading edge must not be more than 2" higher than the lower spar cap at the side of the fuselage. These dimensions are taken with the fuselage level fore-to-aft, and side-to-side, and the wings zeroed with the incidence jig. If the fuselage was leveled correctly, the strake LE should be located 9-1/4" down from the lower corner of the windshield cut-out. Improper leveling will result in a dimension other than 9-1/4". Prior to cutting the sides of the fuselage and installing the strakes, check the above dimensions carefully. Proper installation will result in a -0.5 degree angle of attack on the inboard fuel strake area. This angle of attack is critical in maintaining the proper center of lift. See SKETCH AT TOP OF PAGE 462.

It is advisable to use an installed wing when fitting the strake and twisting the CS spar, rather than the wing transfer template.



Mark reference lines forward of the aft face of the spar) and on the Leading Edge of the strake.



PLAN AHEAD & GET 4 DIFFERENT GAP SPANNING MARKERS IN ONE DEVICE...

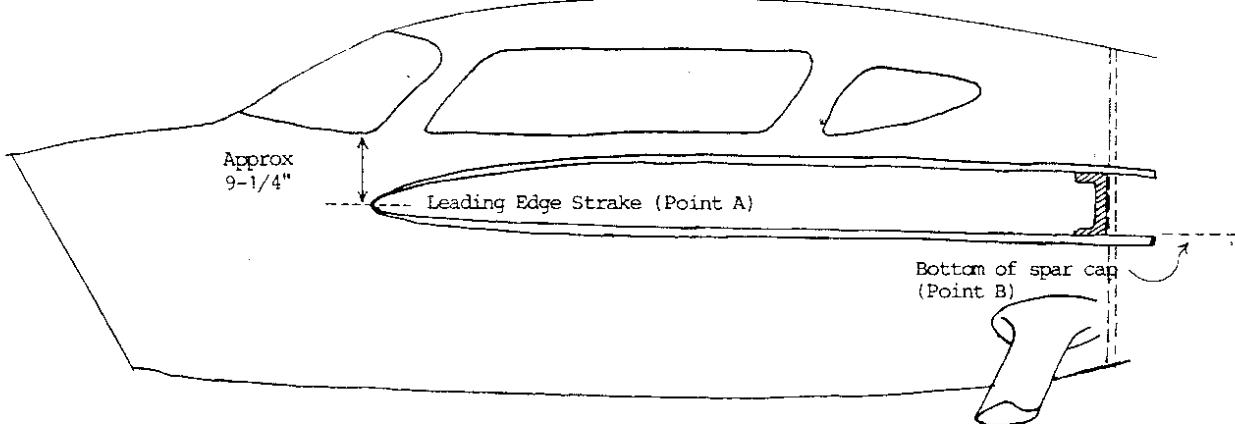
SECTION 4

LOWER STRAKE HALF INSTALLATION

Point A, which represents the Strake LE, should be no more than 2" higher than point B, which is the bottom surface of the lower spar cap. The comparative elevations are taken with a water level when the aircraft is level, FORE TO AFT, AND SIDE TO SIDE.

Use the horizontal line drawn appro 9-1/4" below the lower corner of the windshield as another reference for placement of the leading edge of the strake. This line should intersect the line drawn along the LE of the fuel strake.

*2-10-95 Called Scott, critical dimension is the 2" above
the wing from bottom*



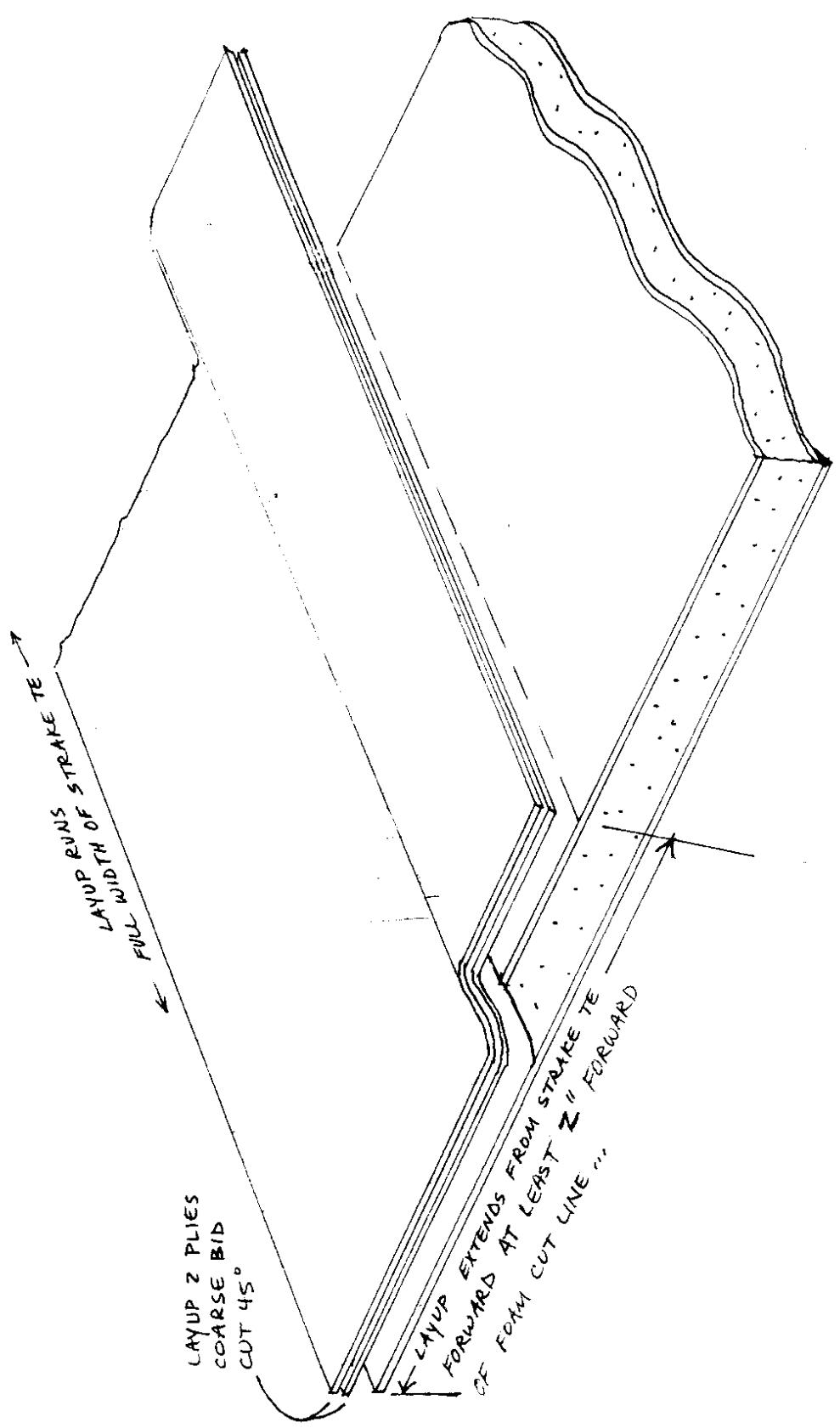
When the top half is in place, measure down approximately 8-1/4" from the lower windshield corners and scribe a horizontal line that runs about 76"-82" in front of the aft spar face. Establish a LE centerline on both strakes inboard. Get both sides the same.

NOTE: DUE TO A CHANGE AT THE FACTORY, THERE IS A DISCREPANCY BETWEEN THE VIDEO AND THE PLANS DURING THE FOLLOWING PHASE OF CONSTRUCTION. IN THE PAST, THE STRAKE ALREADY HAD THE FOAM RECESSED, LEAVING A LIP APPROXIMATELY 4-5" WIDE RUNNING THE LENGTH OF THE TE. THIS IS NO LONGER THE CASE, AS BUILDERS WERE EXPERIENCING DIFFICULTY WHEN THEY TRIED TO MAKE THE RECESSED EDGE FIT PARALLEL TO THE C-SECTION SPAR. NOW, WE DO NOT REMOVE THE FOAM AT THE FACTORY, BUT INSTEAD LET THE BUILDER DO IT, ALLOWING HIM TO CUSTOM FIT THE STRAKE TE TO HIS AIRCRAFT. THIS CHANGE APPLIES TO BOTH UPPER AND LOWER STRAKES.

Utilizing a saw horse, some shims, and a 2 X 4, support the lower strake up under the spar and support the LE inboard centerline mark even with the line on the fuselage side approximately 78" forward of the aft spar face. You want to have approximately 1" of the strake TE lapping over onto the wing. This will serve as a fairing, bridging the spar gap.

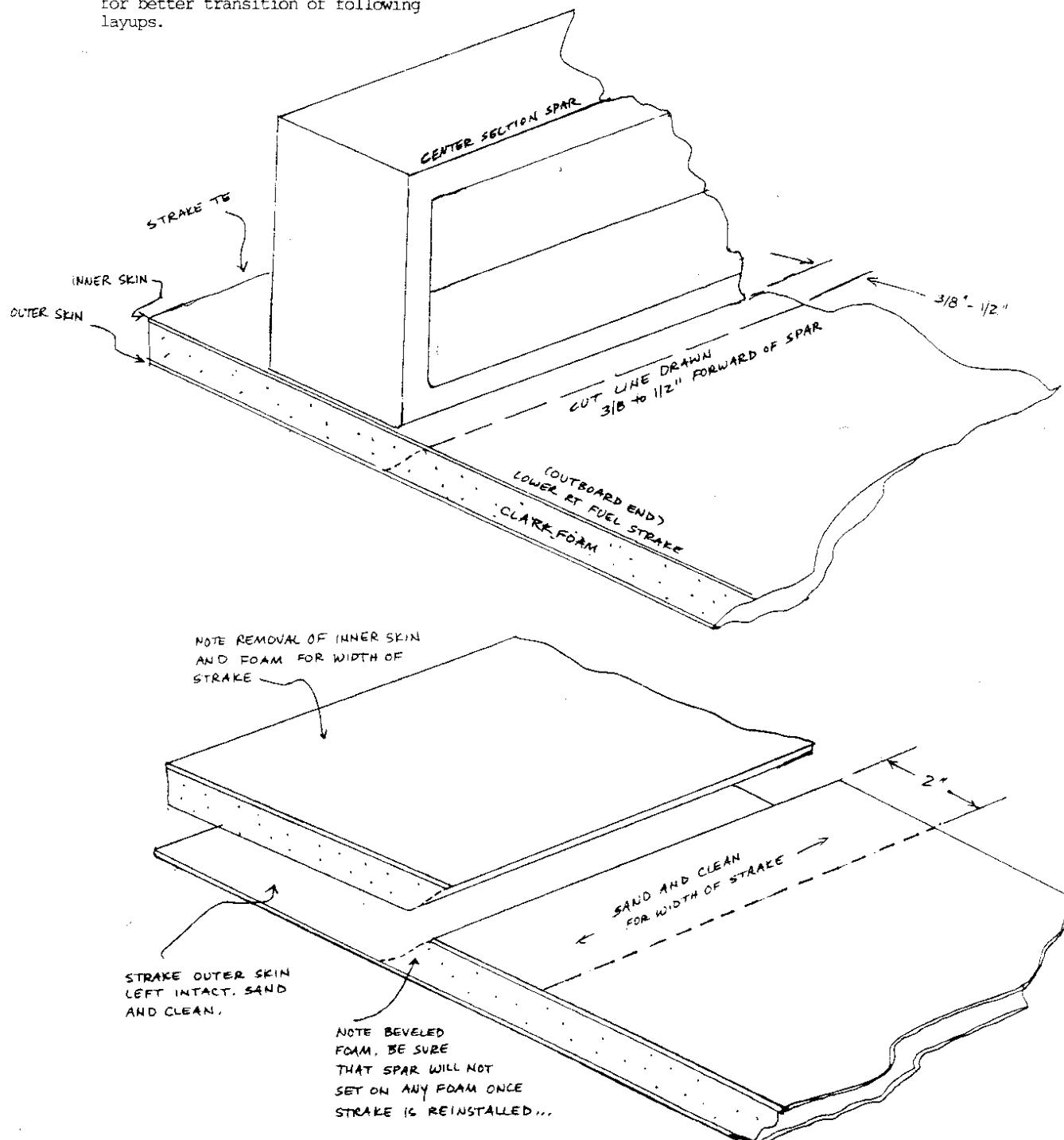
Fashion a pen/pencil to a small block of wood to bridge the gap between fuselage and strake and guide the marker along the fuselage side marking a cut-off line on the strake. Take small 'bites' as you cut and try the fitting. ***SKETCH 461***

Pay careful attention to the outboard edge match with the wings. Trimming is required here. (Before you cut, think of what



162 A

View is of the right end of the Center Section Spar & Lower-Right Fuel Strake (Prior to removal of inner skin and foam from TE). Once strake is in proper position, draw the cut line as described in the text (3/8" to 1/2" forward of the spar FWD face), running parallel to the spar. Pull the strake, and remove the inner skin and foam aft of this line, leaving the Strake Outer skin (primed surface) intact. Bevel the foam edge after material is removed for better transition of following layups.



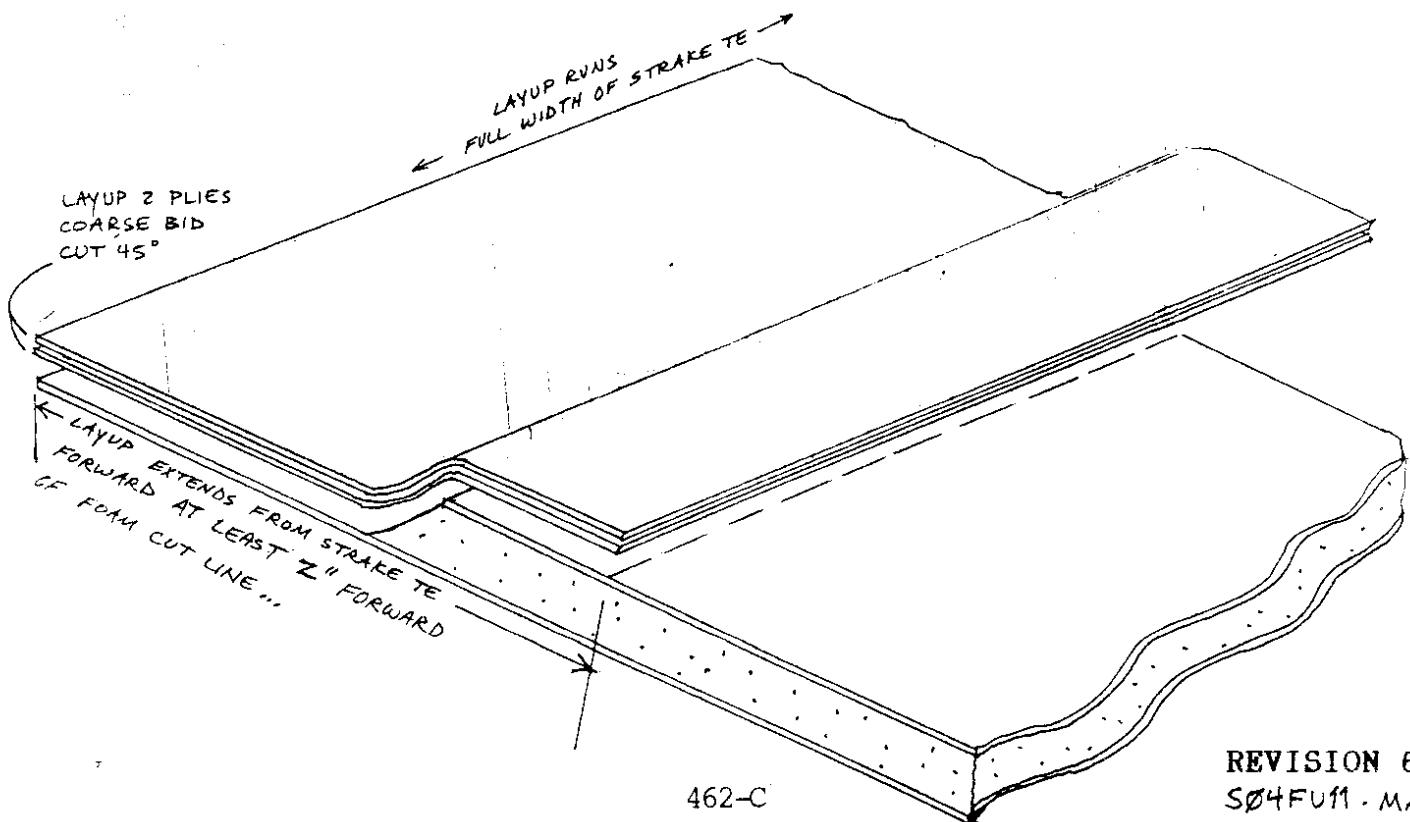
SECTION 4

LOWER STRAKE HALF INSTALLATION

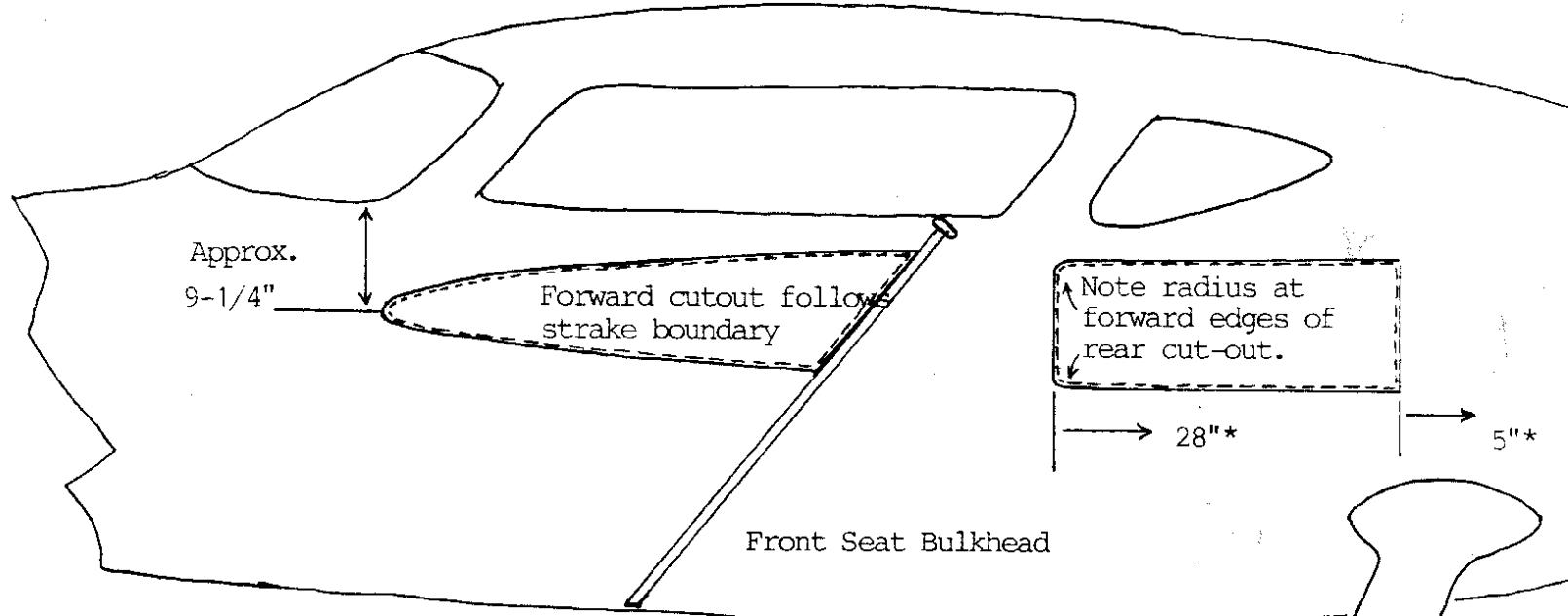
will be affected; cutting in one place will affect another place!) You want to square up the outboard end of the strake with the inboard end of the LE wing root, and get a smooth transition of the strake curve to the wing curve. Keep in mind that the transition match up might change a small bit once the foam is removed from the TE of the Strake.

REFER TO DIAGRAM 462-B

Once you are pleased with the fit of the strake, mark a line where the strake meets the LE of the center section spar. Pull the strake half, and mark another line, parallel to the first, approximately 3/8" to 1/2" forward of the first. Remove the INNER SKIN AND FOAM aft of the second line that you drew, leaving the outer strake skin intact. Clean up the inner surface of the outer skin with some 80/100 grit paper and some acetone. At the same time, clean and sand the inner surface of the INNER SKIN, up to 2" forward from the edge of the recessed foam. Bevel the foam transition so that you don't have a 90 degree bend for the following glass layups to contend with. Place the strake back into position, and check the fit once more. The new edge of the Clark Foam should run parallel to the forward face of the center section spar, about 3/8" to 1/2" forward of it. If everything lines up, pull the strake, and prepare to lay up (2) two plies of COARSE BID (cut on a 45 bias) along the length of the TE. Be sure that (1) the foam is beveled, (2) exposed foam is covered with slurry, (3) the strake surface is pre-wet with epoxy. The cloth should be cut wide enough to extend from 2" forward of the edge of the foam back to the TE of the strake (Approximately 9" X 55"). Apply the glass, and let cure.



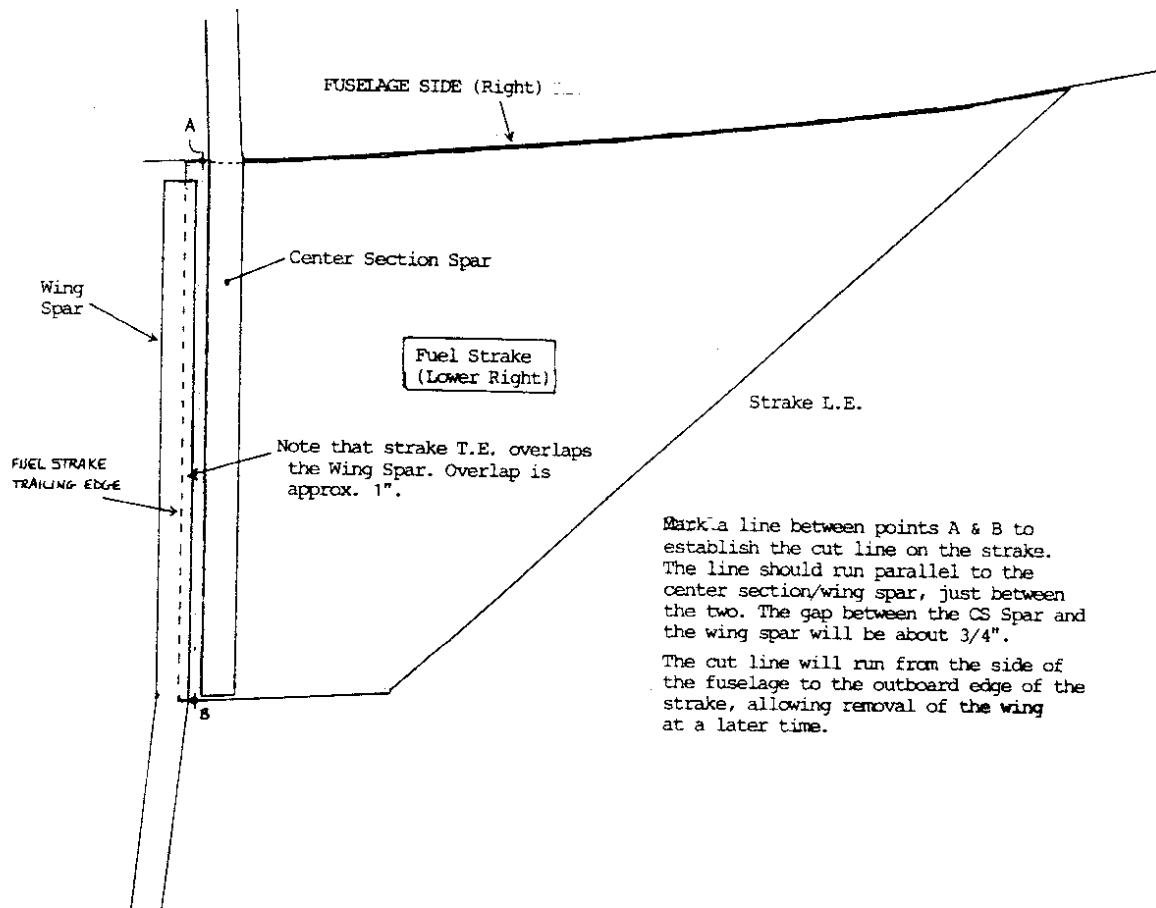
BAGGAGE ACCESS CUT-OUTS



* Back to Gear Bulkhead

DIAGRAM A

DIAGRAM B



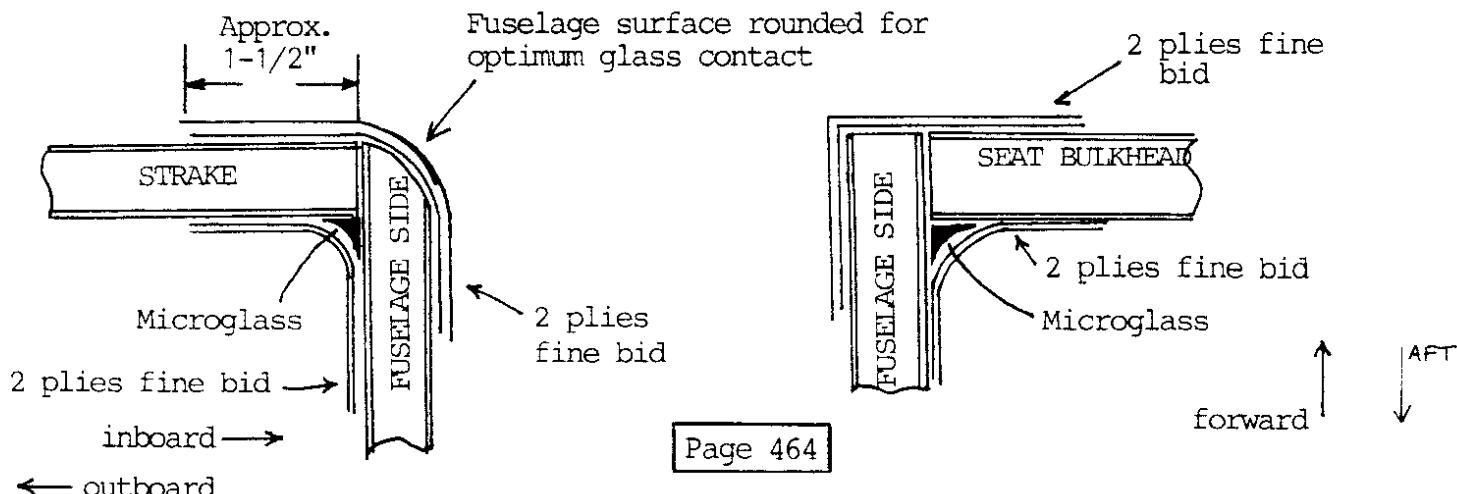
After proper fit is achieved and all the seams and edges line up, it is time to cut out the side of the fuselage for baggage access. Reinstall the lower strake half, supporting it firmly under the spar with a straightedge. At the point where the fuselage and leading edge intersect, support with a sheet metal screw or cleco. A sheet metal screw run from the inside of the fuselage into the foam of the strake (near the LE) steadies the strake up nicely. With the strake hanging, sight down the line of intersection between the fuselage and strake to make sure that it is a nice, constant curve. You don't want binding against the side of the fuselage. Mark the fuselage side where it intersects the inner skin of the strake. Also, support the strake at the wingroot or transfer template with blocks bondoed to the roots or the template. IT IS TO YOUR ADVANTAGE TO GET THE OUTBOARD END OF THE STRAKE TO MATCH THE CURVE OF THE WINGROOT AS CLOSELY AS POSSIBLE. USE CLAMPS, WEIGHTS, ETC. TO ACHIEVE THIS. IT WILL SAVE YOU A LOT OF WORK LATER. Be sure that the two sides are the same.

CUT OUT LOWER BAGGAGE ACCESS OPENINGS

The forward access openings simply follow the upper skins of the lower strakes from the (inner) L.E.s back to the forward side of the front seat bulkhead. Cut away the fuselage sides from these areas.

Measure and mark the vertical edges of the rear access openings about 5" and .28" forward of the gear bulkhead. The lower edges follow the upper skins of the lower strakes. Cut away the fuselage sides from these areas. Leave about a 1-1/2" radius in the forward corners. SEE SKETCHES 460 & 463-A

At this time it is very important to thoroughly sand all the areas where the strake and fuselage intersect as well as where the strake and spars intersect. PROPER MATING OF THESE COMPONENTS IS VERY CRITICAL. The strakes not only carry fuel and baggage, but they transfer torsional loading into the fuselage (so break out the sandpaper!) In the areas where the outer skins meet strake/fuselage it is necessary to remove primer back approximately 2" to accept the tape glass. On the inner skins of the fuselage, it is necessary to round the corners slightly so tape glass will conform around the corners. SKETCH 464 (BELOW).



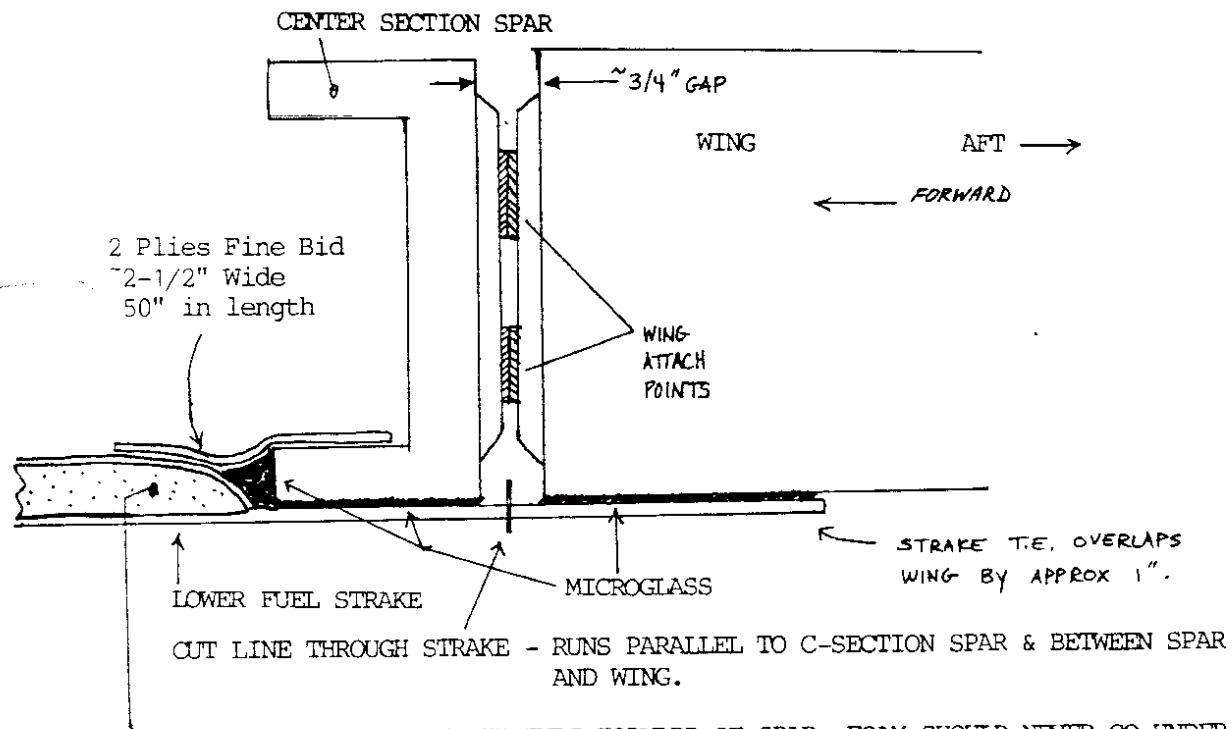
SECTION 4

LOWER STRAKE HALF INSTALLATION

GLASSING

Make a trial run and get your skins and supports ready for the installation. Make sure that everything fits well and both sides are the same. Notice that the lower strake TE extends aft of the center section spar and overlaps the lower surface of the wing by about an inch. This TE is going to be microglassed to both the spar and the wing, and therefore necessitates a cut line to allow wing removal. The cut will be made following complete installation of the fuel strake system, but now is a good time to mark where the cut line will go. The cut line will run parallel to the CS Spar and the wing spar, midway between the two, extending from the fuselage side to the outboard edge of the strake. See Sketch 463-B. (BE CAREFUL NOT TO CUT THE SPAR CAP WHEN THE CUT IS MADE!)

You will need an healthy amount of microglass (Safetypoxy & milled fiber) to mate the strake skin to the center section spar cap and the wing spar cap. Pre-wet all the mating areas with epoxy, apply microglass to the strake in area below the spars and jig into place. When supporting the rear of the strake, use a straight piece of wood that runs parallel to the spar caps. Next, lay-up two plies of fine bid to tie the strake inner skin to the forward face of the center section spar. The lay-up should run the length of the spar-to-strake contact area. See SKETCH 465 (BELOW).



NOTE HOW FOAM IN STRAKE ENDS FORWARD OF SPAR. FOAM SHOULD NEVER GO UNDER THE SPAR, AND THE GAP BETWEEN SPAR AND FOAM EDGE SHOULD REMAIN UNIFORM FOR LENGTH OF THE STRAKE (approx 1/4" to 3/8" gap).

SECTION 4

LOWER STRAKE HALF INSTALLATION

It will be necessary to remove primer in the areas where the outside surface of the strake intersects the outside surface of the fuselage. Take the primer back about 2" on both the strake and the fuselage side, then apply a finger radius of microglass along the length of the intersection. (Sketch 464) As shown in the sketch on page 464, you should round the inside corners of the fuselage where it meets the strake to facilitate better surface contact by the fiberglass that you will be applying in the next step. All areas of intersection of strake to fuselage (inside and out) get two plys of FINE BID tape glass approximately 2-1/2" wide cut at a 45 degree bias. Check everything and let cure.

It might be advantageous for the builder to be able to differentiate between the upper and lower strakes without having to rely upon the labels alone. Looking at the strake from the outboard end, you will notice that the upper strake has a more pronounced curvature than does the lower strake. Just in case your labels fell off, this might be nice to know.

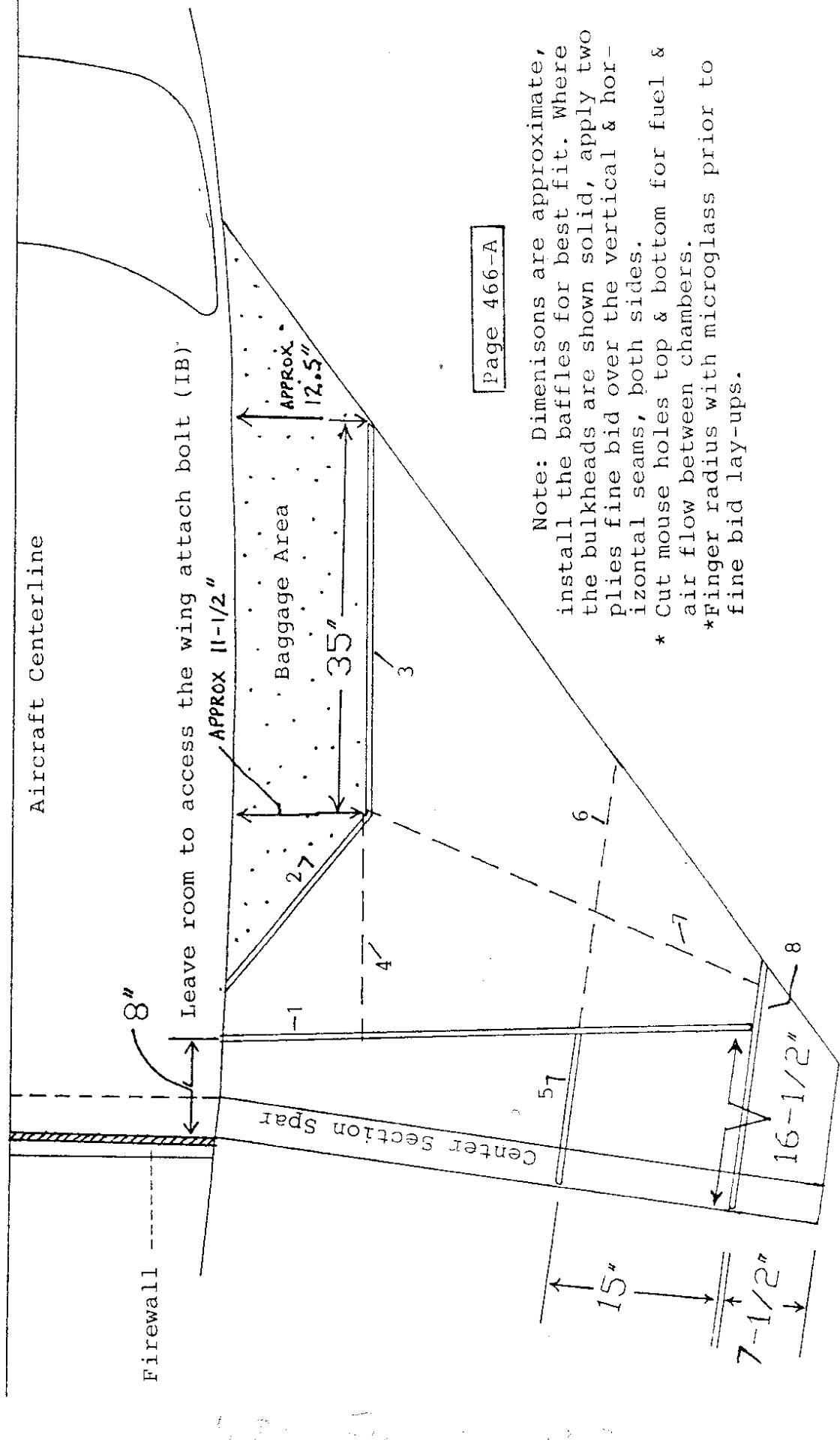
To fit the upper strake, use exactly the same procedure that you used to fit the lower strake skin. Do not force anything and think first before cutting. It will be necessary at this time to fit the upper half of the fuselage. First remove the flange in areas where affected and remove the area forward of the firewall to accept the main spar. It might be helpful to remove small sections of the flange in the nose area to insure proper alignment of outer skins so there won't be any surprises when it comes time to finish the mating line between the upper and lower fuselage halves. The baggage cutout in the rear is an extension of the lower cutout right up to the inner skin of the upper strake. In the forward section, all the fuselage side is removed from the seatback along the upper strake to the leading edge of the strake. The sanding and preparation of the upper strake and fuselage is the same as that of the bottom strake. After fitting the upper strake, overlap the leading edges and cleco together to hold in place while fitting the bulkheads and baffles. Be sure that the leading edges are both the same.

BAFFLES & BULKHEADS (Diagram 466-A for bulkhead/baffle layout)

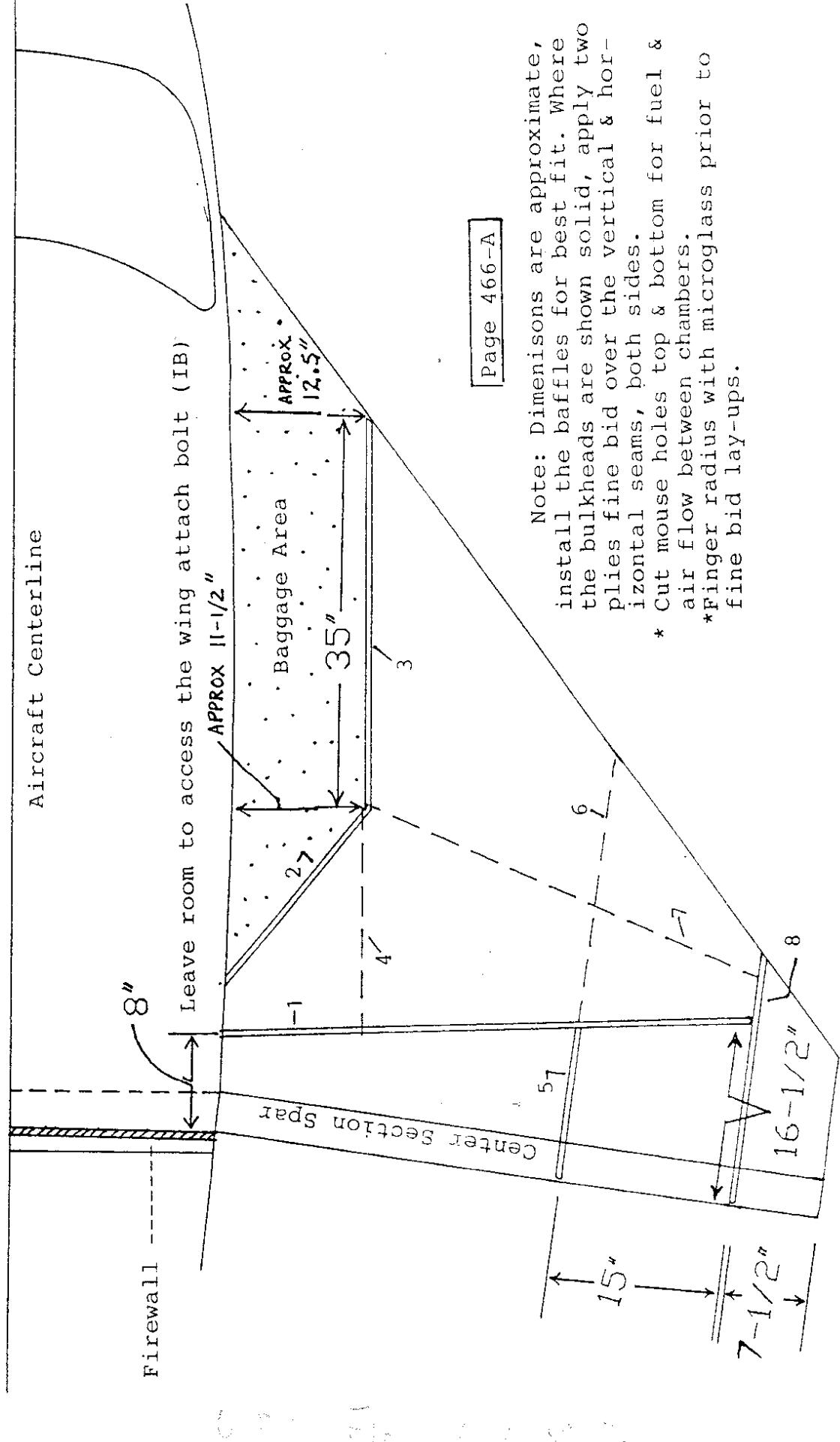
The baffles are located within the fuel cell. They do not need to be sealed and are installed with one ply of tape glass. The function of the BAFFLES is to prevent the fuel from sloshing and to add rigidity to the structure of the craft. The BULKHEADS serve as the boundaries of the fuel cell. These are installed with two plys of tape glass and also require extra coats of epoxy on the fuel side to seal in the fuel. The bulkheads are installed first and properly sealed before the baffles are installed.

Using the templates provided, lay out two sets of baffles and bulkheads on a piece of 2' X 8' X 3/8" CLARK FOAM. Some

- 1: Rear Fuel Bulkhead
- 2: Inboard Forward Fuel Bulkhead
- 3: Inboard Fuel Strake Bulkhead
- 4: Aft Interior Baffle
- 5: Center Strake Rib
- 6: Center Baffle
- 7: Forward Baffle
- 8: Outboard Fuel Bulkhead



- 1: Rear Fuel Bulkhead
- 2: Inboard Forward Fuel Bulkhead
- 3: Inboard Fuel Strake Bulkhead
- 4: Aft Interior Baffle
- 5: Center Strake Rib
- 6: Center Baffle
- 7: Forward Baffle
- 8: Outboard Fuel Bulkhead

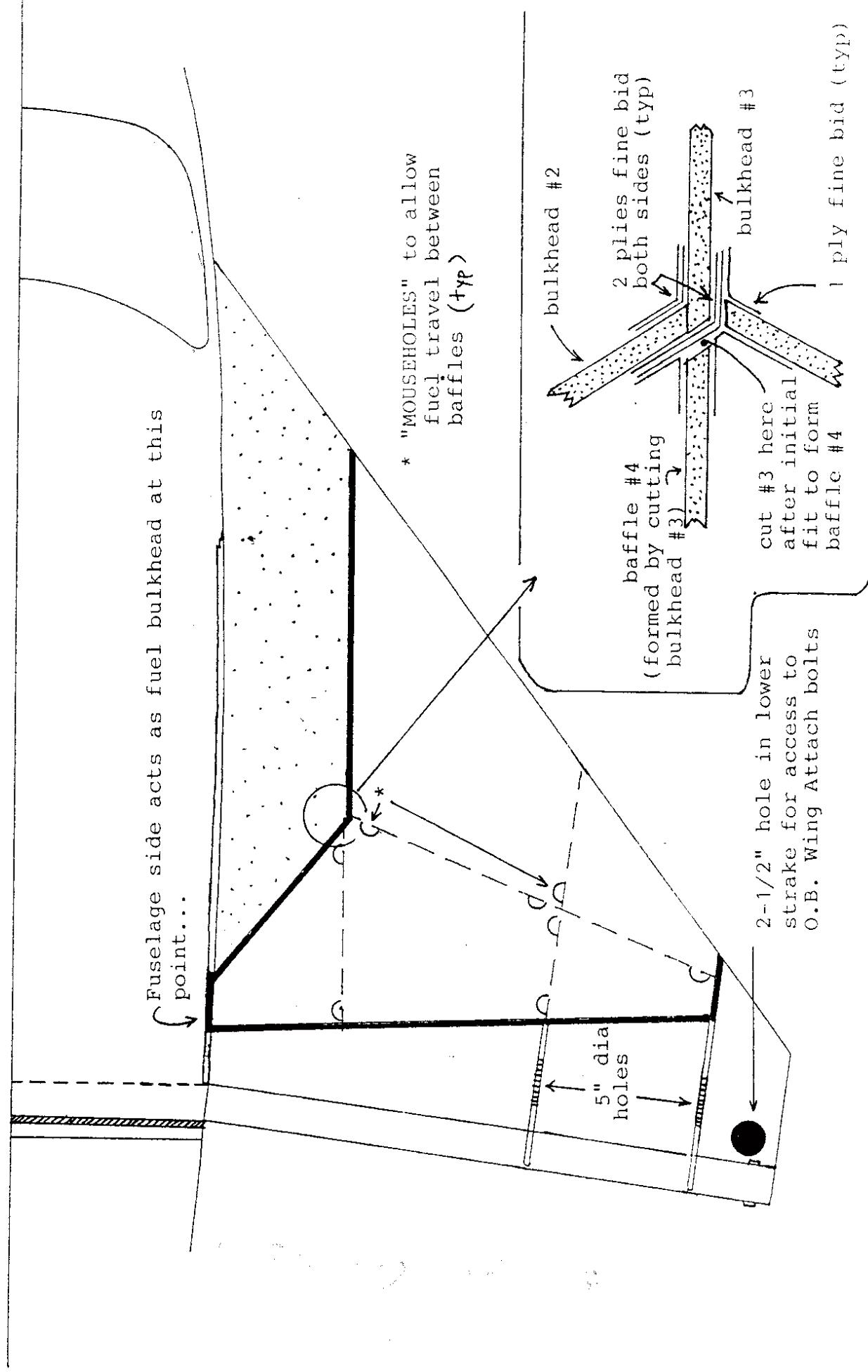


Note: Dimensions are approximate, install the baffles for best fit. Where the bulkheads are shown solid, apply two plies fine bid over the vertical & horizontal seams, both sides.

- * Cut mouse holes top & bottom for fuel & air flow between chambers.
- * Finger radius with microglass prior to fine bid lay-ups.

Note: Install & paint inside of bulkheads &
strakes until glossy (prior to installing
baffles.)

Page 466-B



LOWER STRAKE HALF INSTALLATION

piecing may be necessary. DO NOT CUT OUT YET! Apply microslurry (safetypoxy and microballoon) to the surface, then apply one layer of fine bid to each side. The fiber orientation is not critical and it is OK to overlap the cloth joint during this layup. Do one side at a time. After complete cure, cut out with a sabre saw, BEING SURE TO OVERSIZE THE CUT-OUTS JUST A BIT. You will later sand the bulkheads/baffles to fit.

Fit all baffles and bulkheads to the lower strake first. Mark the exact location of each piece on the lower skin before removal.

Once proper fit is achieved, start with the outside and rear bulkheads. First, carefully set the upper skin on and sight through the baggage area or wing root to locate any gaps or interference. Sand or cut to fit. Baffles and bulkheads can be temporarily held in place with bondo or hot glue.

Once your bulkhead boundaries are marked, and proper fit has been achieved, remove the bulkheads, and paint the fuel affected areas of the inner strake skin liberally with epoxy. It is advisable to paint a bit outside your marks. Reinstall the bulkheads and let cure.

NOTE: ANY MODIFICATIONS TO THE TANK OR BAGGAGE AREAS TO ACCEPT MORE OR LESS FUEL MAY AFFECT THE C.G. WHEN FUEL IS ADDED. WE DO NOT RECOMMEND ANY CHANGE TO THE ESTABLISHED PLACEMENT OF THE BULKHEADS/BAFFLES IN THE FUEL STRAKES. CAREFUL ATTENTION MUST BE PAID WHEN CALCULATING THE C.G. SHIFT WHEN FUEL IS ADDED AND THE AIRCRAFT IS AT ATTITUDES OTHER THAN THAT OF LEVEL FLIGHT, AND THE SPECS CALLED FOR IN THE CONSTRUCTION PLANS ACCOUNT FOR SUCH CONDITIONS QUITE SATISFACTORILY. IF YOU DISREGARD OUR WARNING, PLEASE BE CAREFUL.

Install all bulkheads before you install any baffles (see sketch page 466-A). Paint the inside of the bulkheads and lower skin with epoxy until shiny. Apply second coat just before first one has cured. Check for porosity, and paint again if there is any question. Also paint the fuel affected area of the upper strake at this time.

INSTALL STRAKE BAFFLES

Diagram 466-A

In general, the following applies throughout the installation:

All patterns are oversize and will require trial trim fits. While fitting, check the strake to be sure you are not distorting its shape. Keep the L.E. straightedge in place for that purpose. Follow the sketch for locations in the strake, placement of 'mouse holes' for fuel flow and venting, and lay-ups for glassing in place.

Always use safety-poxy as it is the best for fuel containment. Apply liberally to all surfaces that are between the fuel and the outside, i.e. the inner strake skin and all surfaces that form the tank or fuel containment. Sand these skins and paint them until they are 'shiny' and non-porous.

Use two plies of fine BID at all joints, inside and out, that are part of the periphery. Always apply a good 'finger' radius of microglass at these joints first.

One ply is sufficient to hold the inner baffles and porosity is not a concern as the Clark foam will not be affected by fuel. Be sure, however, that the strake skin is shiny under the baffles prior to their installation.

Be sure you include the upper 'mouse holes' as well as the bottom ones or you will never fill the tank.

Fit one baffle or bulkhead at a time with trial fits of the upper strake half. Start with the outboard bulkhead. Work your way inboard one piece at a time, sighting and marking trim lines through the baggage access cut-outs.

After fitting, remove the top fuselage half for easier access and glass the baffles and bulkheads to the lower strake half. Try to get the contour and size of both tanks the same. Allow to cure.

Following cure, drill a 2-1/2" hole in the lower strake skin in line with the outboard attach bolt holes in front of the spar cap for wing bolt access. Cut a 5" hole in the outboard (8) and center bulkhead (5) aft of the rear fuel bulkhead for upper strake installation access.

SECTION 4

LOWER STRAKE HALF INSTALLATION

INSTALL BULKHEAD FUEL FITTINGS Diagram 469-A (previous page)

Install the fuel guage fittings (FITTING, 3/8 ELBOW, SIGHT GAUGE - SUPPLY # VFSG-01) through the inboard forward fuel bulkhead, about 4" inside both baggage compartments at the top and bottom. Drill a 3/4" hole in these locations. Gouge out about 1/4" of foam from between the bulkhead skins. Microglass in the fittings provided with the bottom fittings pointing up at the top fittings and vice versa (depending upon whether you are standing on your head or not). Put fine bid over the microglass on all fuel lines and fittings on the inside of the tank.

Drill a 1/2" hole through the fuselage (both sides) near the rear lower corner of the fuel tank for the fuel feed line(s). Gouge out about 1/8" of foam exposing both fuselage skins. Safetypoxy microglass a 20" piece of 3/8" aluminum fuel tubing in this hole with smooth bends along the forward edge of the bottom spar cap. Microglass a small piece of stainless steel or brass screen over the hole, inside the tank, cut from a kitchen strainer (sorry Mom).

On the pilot's side of the plane only, drill a 3/8" hole through the fuselage above the strainer at the aft of the tank for the sump tank vent line. Again, gouge out some foam for good bonding and sealing of a 30" piece of 1/4" aluminum tubing with microglass. Bend the tubing and route it along side of the 3/8" fuel tubing. Attach the tubes with dabs of microglass.

SECTION 4

LOWER STRAKE HALF INSTALLATIONINSTALL BULKHEAD FUEL FITTINGS Diagram 469-A (previous page)

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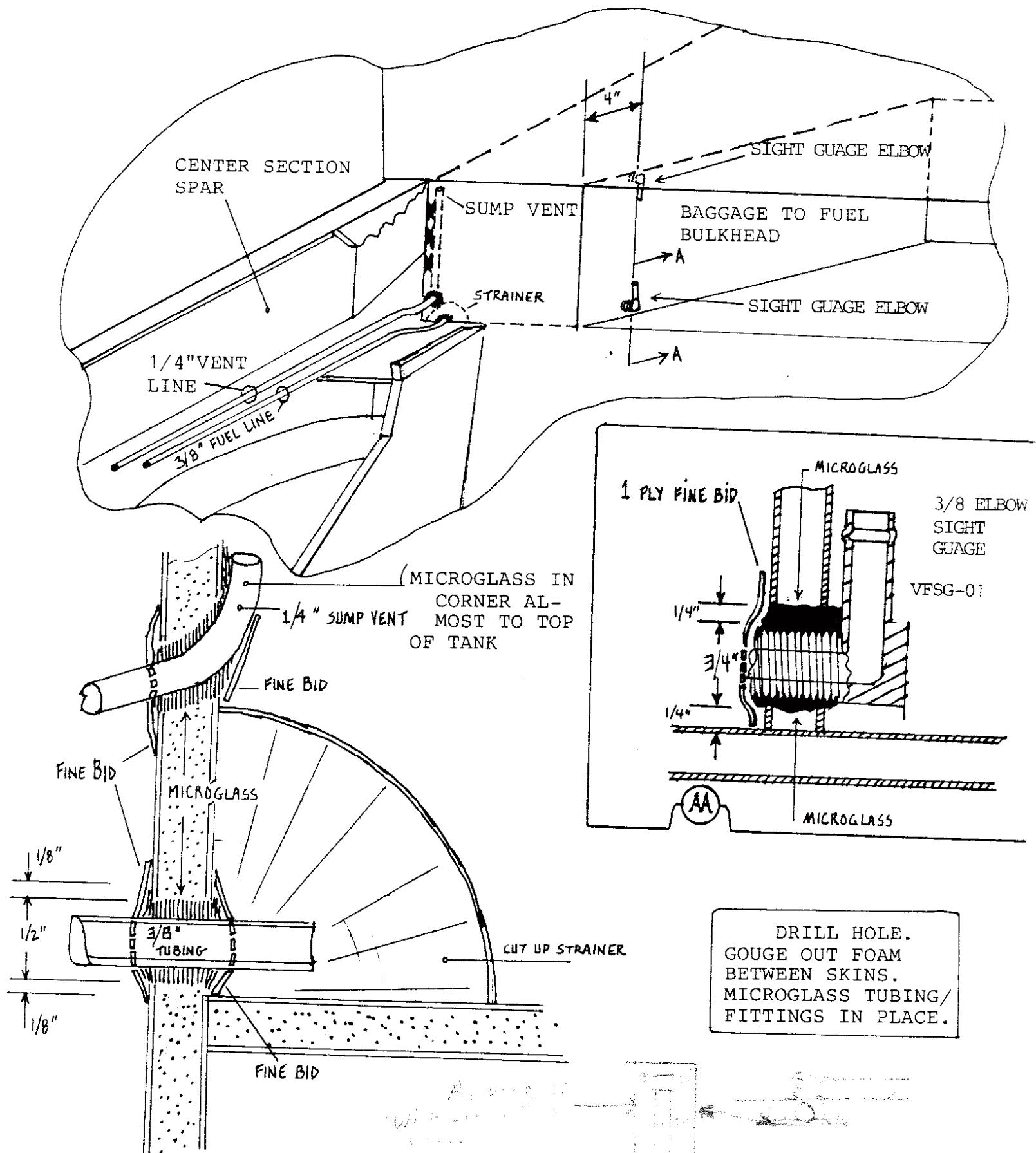
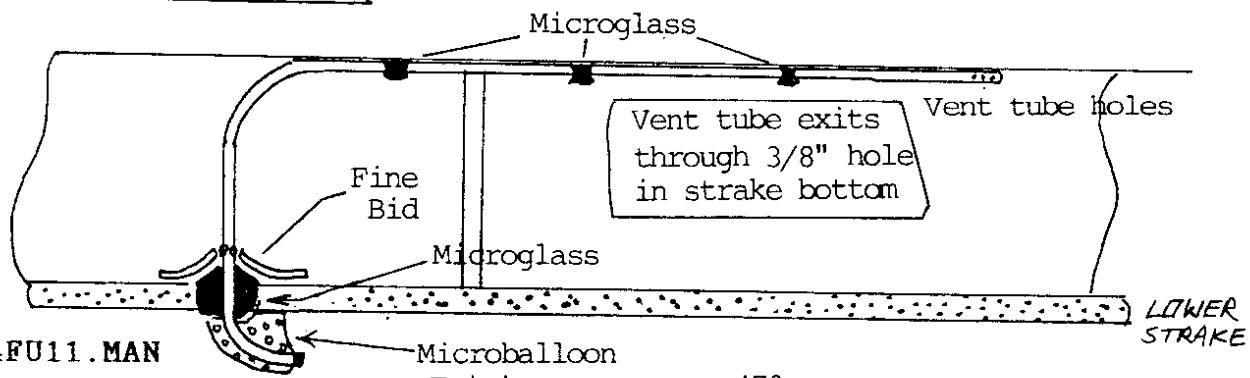
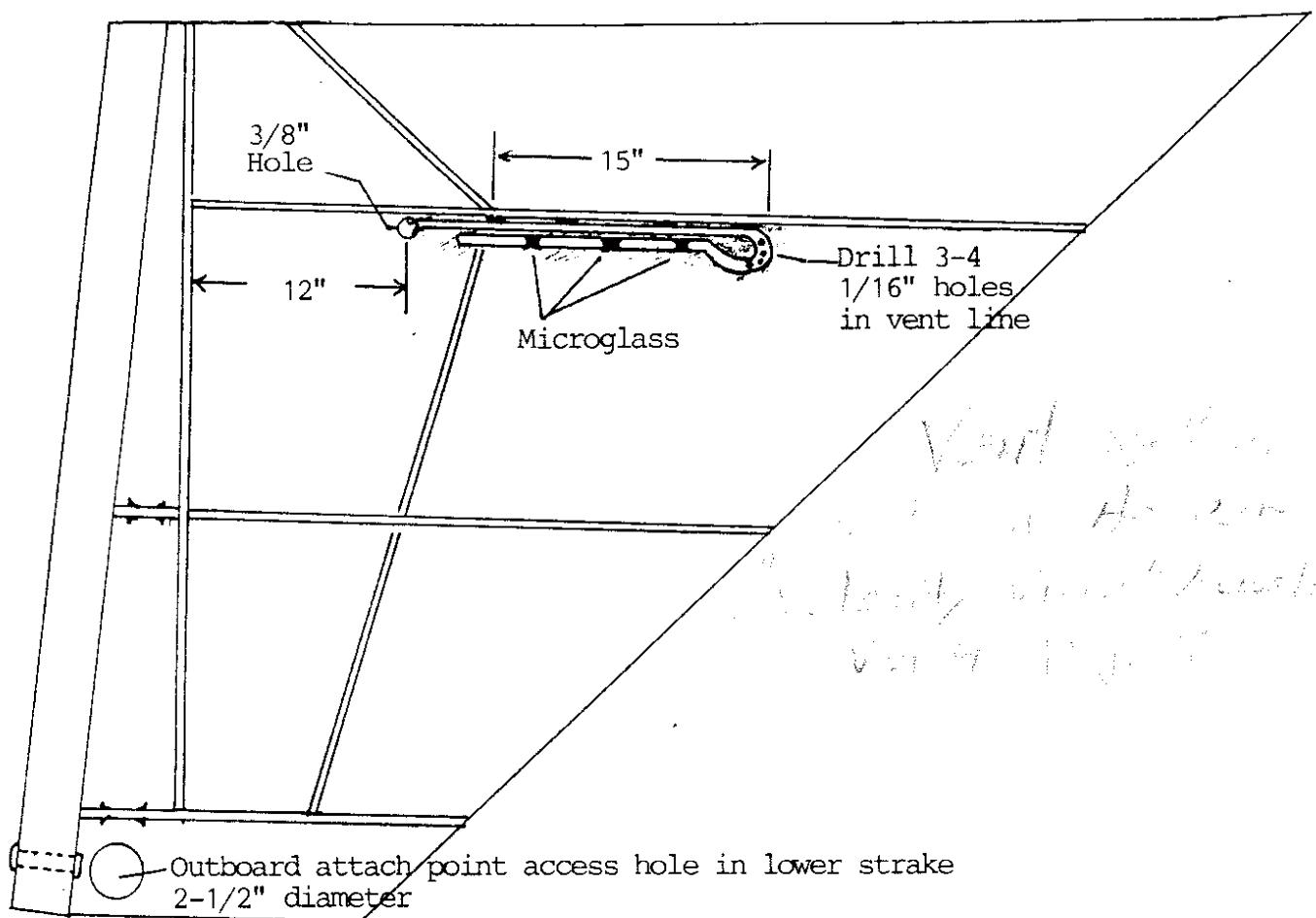


DIAGRAM
469-A

SECTION 4

LOWER STRAKE HALF INSTALLATION

✓ Drill a 3/8" hole in the bottom strake half 12" forward of the rear of the tank next to the aft interior baffle (#4 on sketch 466-A) (both strakes) for the strake tank vent line(s). This vent line extends down, out, and forward a few inches for ram air. Also, it runs up to the top of the tank, 15" forward of the forward inboard baffle, and loops back to the aft of that baffle. Drill three or four 1/16" holes at the forward part of the loop. This provides alternate venting for nose up and nose down attitudes. Attach this line with microglass as above and along the length of it against the fore-to-aft bulkhead. Build up some microballoon around the tube on the outside for reinforcement and fairing.



FUEL CAP INSTALLATION

Install the fuel cap before installing the upper strake.

Measure and mark 18" from the rear of the spar and 18" from the side of the fuselage to locate the center of the fuel cap.

SKETCH 471 (Below)

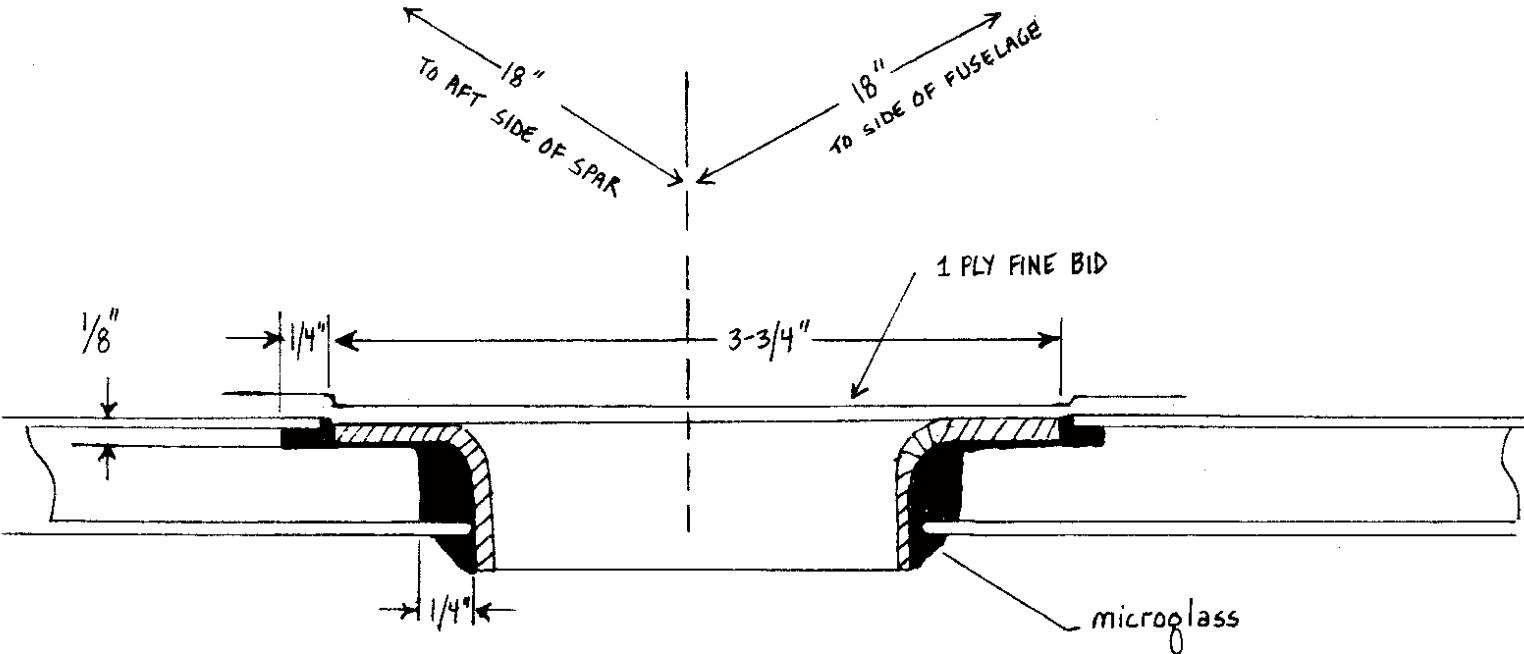
Using a fly cutter with a 1/4" pilot, adjusted to 3-3/4" diameter, cut through the top skin only. Peel off the outer skin.

With a 2-1/4" hole saw, drill through the foam and the inner skin. Gouge away another 1/4" of foam around the inner hole, down to the inner skin. Scrape/sand the skin for good adherence. Also, gouge about 1/4" of foam wedge from under the outer skin for good bonding.

Be sure to sand a little recess in the height of the remaining foam to allow for the cap housing to be bedded on microglass, plus room for a layer of fine BID on top. This will leave a nice finished appearance.

Sand the cap housing for good adherence, pre-wet, and bed into the hole. It is important to be sure there is a complete seal of microglass from the inner skin hole to the outer skin hole to prevent gasoline from seeping into the foam of the strakes. While it won't hurt the foam, it could eventually find its way somewhere to give the impression of a leak. Let cure.

Cut and apply a 5-1/2" O.D. circle of BID, lapping the fuel cap flange and top skin. Let cure.



SECTION 4

UPPER STRAKE HALF INSTALLATION

UPPER STRAKE HALF INSTALLATION

After complete cure of the bulkheads and baffles, reinstall the upper strakes and use a light to shine through the tank area and check the fit between the baffles and bulkheads and upper skin. Sand or file any high points down to ensure uniform fit (especially at the bulkheads). When you are satisfied, sand all the mating surfaces. Also sand outside the leading edge of the lower strake and inside the leading edge of the upper strake where the two overlap. Sand the upper spar cap and all areas where the bulkheads touch the inner skin.

INSTALL UPPER HALF FUSELAGE

The fuselage upper half is mated to the lower half with two plys of fine bid both inside and out. There have been many suggestions as to how to get a uniform mating. Our method is to remove the flange all the way around and use some aluminum tabs clecoed or screwed to the outer skin to hold them in line while the inside skins are being glassed together.

The first step is to remove all flanges and sand back about 2" on the inner and outer skins on both the upper and lower halves of the fuselage. Place the upper half back into position and notice the gap around the nose where there is no foam core. Check for interference on the firewall, etc., and tie the outside skins together with the aluminum tabs and clecos. (See diagram page 472-A). Be careful to get a smooth mating of the outer skins. You don't need to worry about the inner skins.

When a proper fit is achieved, fill all inside gaps with microballon (microglass is optional) and cover inside skin with two plys of fine bid. In the nose where there is no core and the gap is wide, cover the outside with two layers of duct tape back to back and glass across the tape from the inside onto the upper and lower fuselage with 3 layers of fine bid. (Page 472-A, bottom left corner).

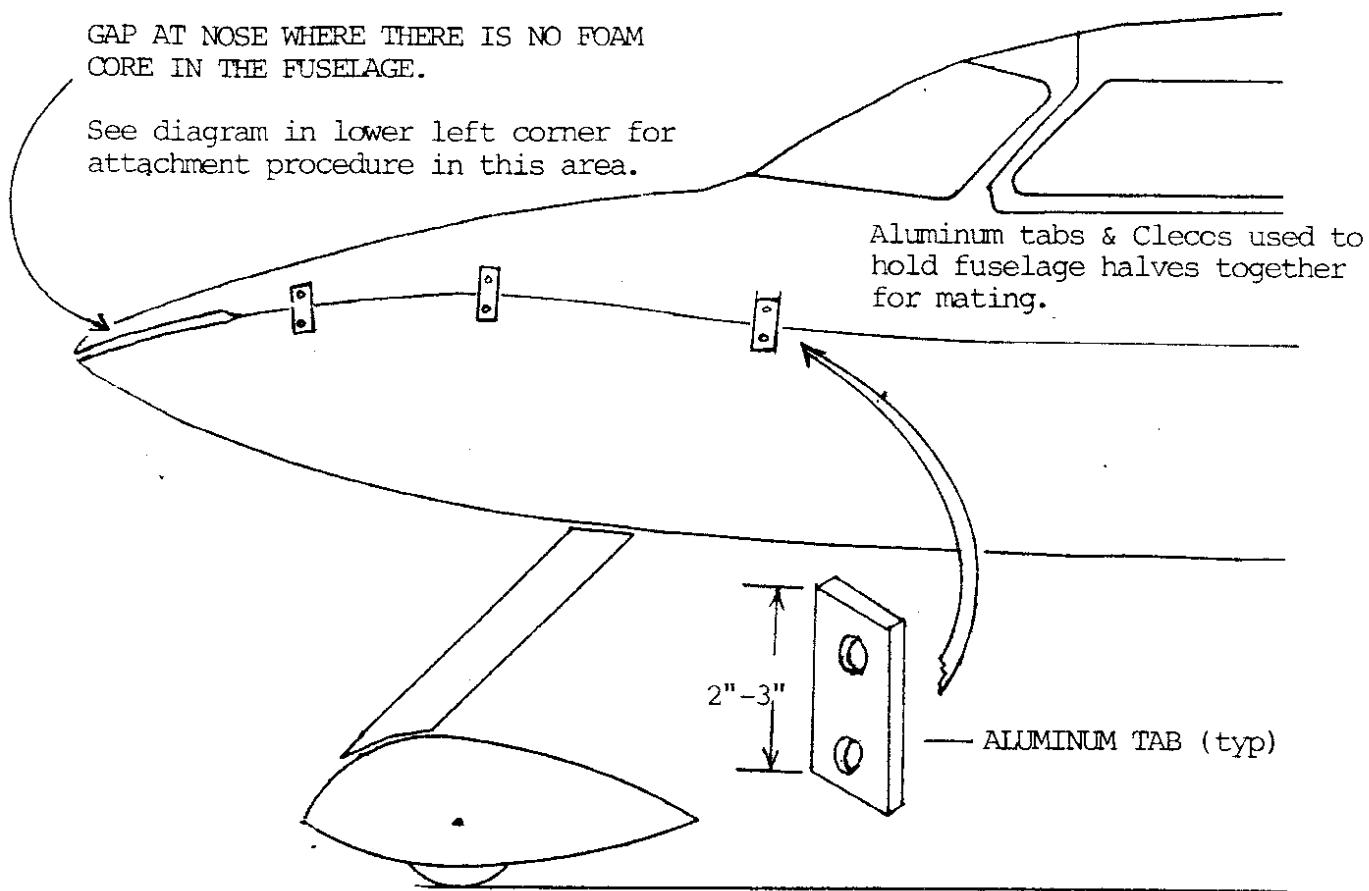
Glass both sides of the firewall, instrument panel, and seatback to the fuselage with two plys of bid. Let the inner layups cure, then remove the tabs on the outside skin. Sand thoroughly and apply two plys of fine bid to all the seams. Pay particular attention to the area which becomes part of the fuel tank. Microglass the two bulkheads to the upper fuselage skin and tape glass with fine bid. Sand this area after it has cured and apply two coats of epoxy.

After cure, sand all visible mating areas with a sanding block and 100 grit paper. Apply microballoon for fairing in all visible areas. Now is a good time to build the flange for the upper cowl, and to initiate the removal process. Follow the procedure outlined on page 441 that describes building the flange for the lower cowl and removing the cowl itself.

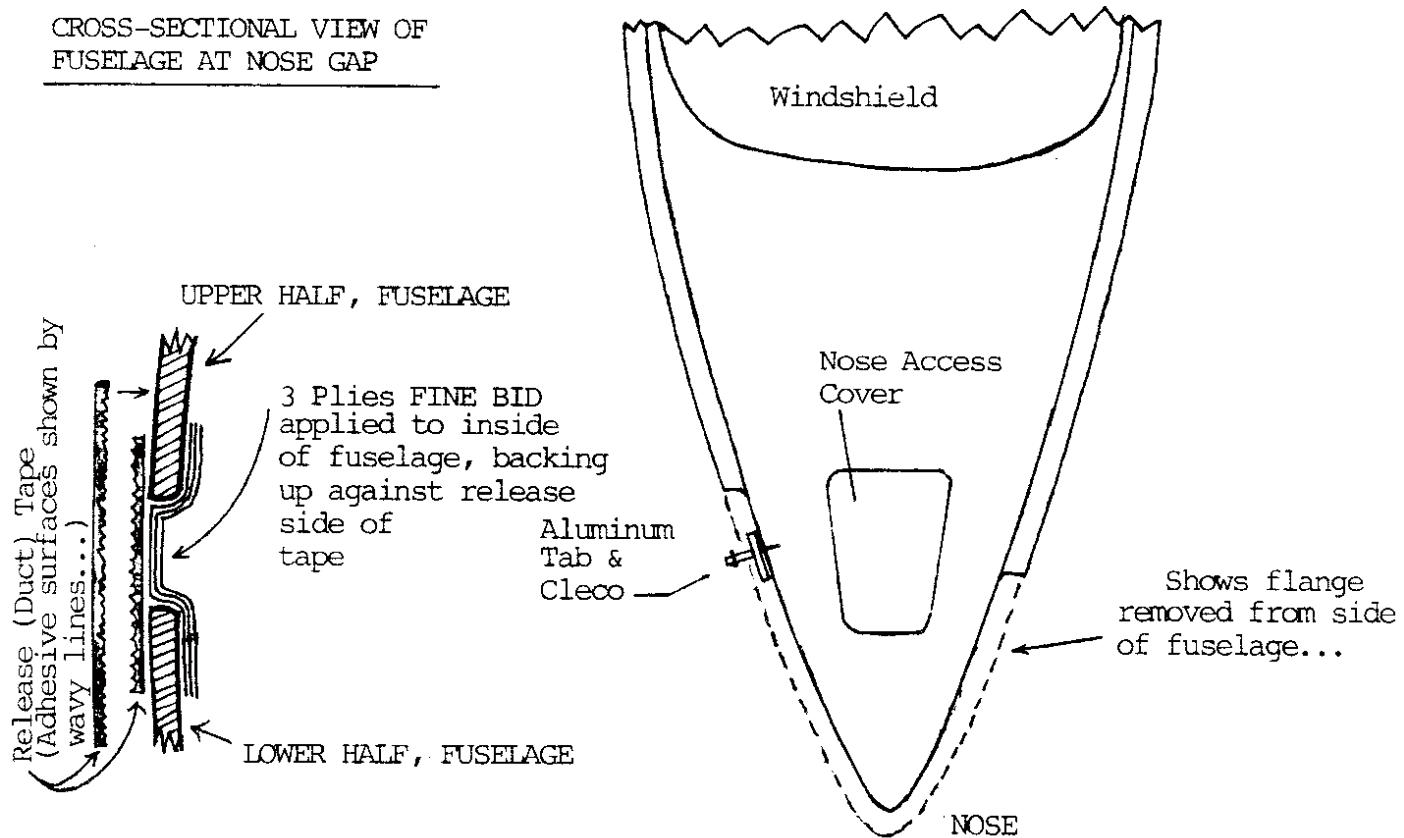
MATING FUSELAGE HALVES

GAP AT NOSE WHERE THERE IS NO FOAM CORE IN THE FUSELAGE.

See diagram in lower left corner for attachment procedure in this area.



CROSS-SECTIONAL VIEW OF
FUSELAGE AT NOSE GAP

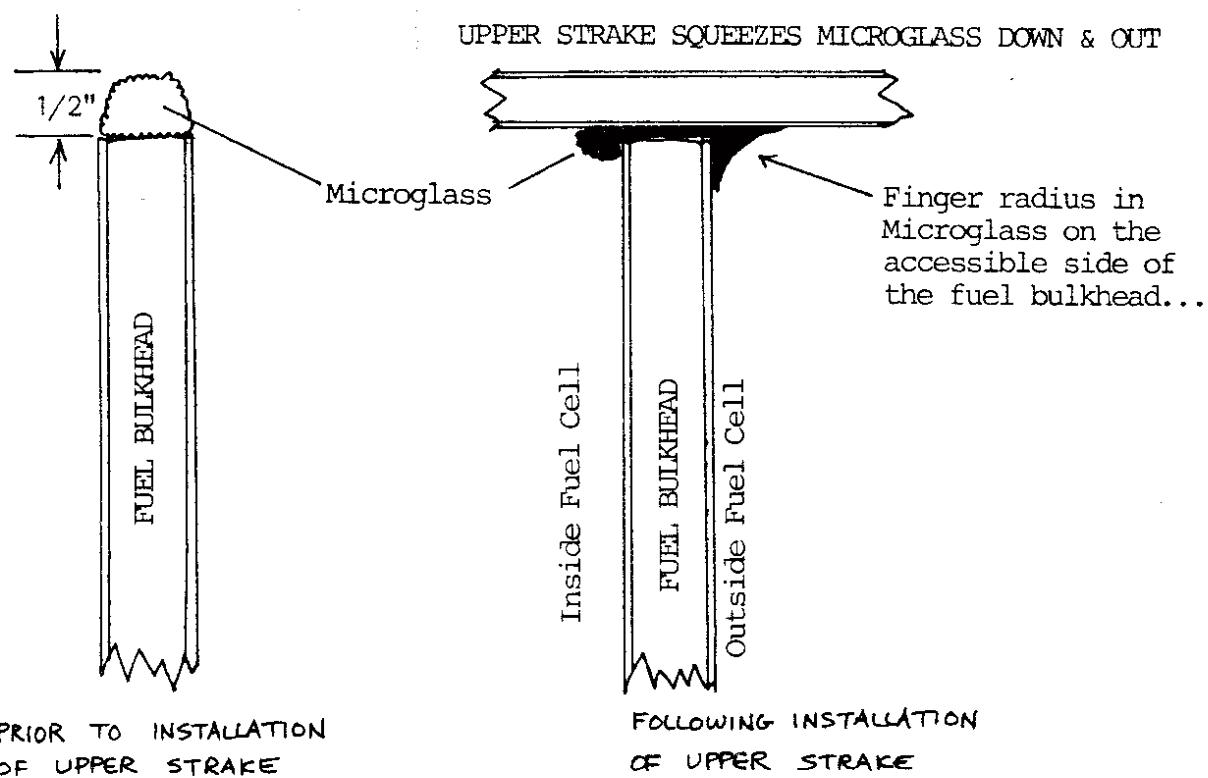


SECTION 4

UPPER STRAKE HALF INSTALLATION

The upper strake inner skin should already have been sealed with epoxy where fuel will come into contact with its surface. If this hasn't been done, do it now. ****CLEAN AND VACUUM THE TANK AREA VERY THOROUGHLY. ANY DEBRIS LEFT IN THE TANK WILL BE HARD TO REMOVE ONCE THE TOP IS ON. ANY REMAINING FOREIGN MATERIAL WILL END UP IN YOUR FUEL SYSTEM.****

Paint epoxy on the inner skin just prior to installation. Paint upper spar cap with epoxy, then heap microglass upon the sparcap, baffles, bulkheads, outside the leading edge of the lower strakes, and on the portion of the wing spar that the strake will overlap, again by approximately 1". Mix the microglass thick enough that it will stand up on the bulkheads approximately 1/2". Get some help and install the upper strake, gently setting it STRAIGHT down. Avoid sliding the strake so as not to knock any of the microglass out of place. Clip the clecos into the leading edge, and check for any voids in the overlap. If you find some, add more clecos. Lay a straight 2 X 4 on top of the strake above the spar and add some weight to hold it in place while curing. Do not add any concentration of weight to the unsupported strake areas as this could deform the upper skin.



SECTION 4

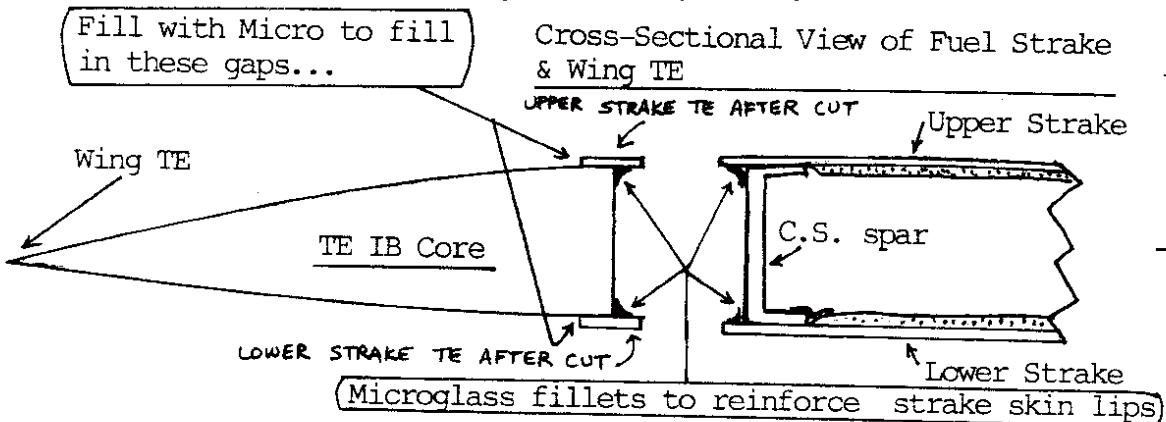
UPPER STRAKE HALF INSTALLATION

At this time only areas inside the fuel strake and the aft bulkheads inboard in front of the spar are accessible. Use your finger (or a mixing stick) to form a radius with the excess microglass and cover these seams with two plys of fine bid. The other areas will be done after wing removal. If you are using a transfer template, all areas are accessible, so the radius and fine bid layup should be done now while the microglass is still soft. If any voids occur, fill them with more microglass.

Just before attaching the strake to the side of the fuselage, force some microglass down between the strake edge and the fuselage side. Pay particular attention to the area just to the rear of the baggage strake where the fuel comes into contact with the side of the fuselage. You don't want any fuel getting past the inner skin and into the foam. Now tape glass the strake to the side of the fuselage. When you are satisfied that everything that you can get to is sealed and glassed, let cure completely.

Some visual inspection of the outboard seams can be made through the bolt access cover in the lower strake skin. After cure, remove the clecoes in the L.E.. Sand the overlap smooth. Fill the cleco holes with microglass and cover the seam with two plys of fine bid.

Using a straight edge, connect the marks on the fuselage with the marks on the wings and carefully cut the wing off. After both upper and lower seams are cut, take the bolts out and remove the wing. The intersection of strake to fuselage can now be sanded and filled with microballoon. A radius of microballoon can be put in here to achieve a more pleasing cosmetic intersection. See Diagram 474 (below).



WHEN REMOVING THE WINGS FROM THE PLANE, CUT THE STRAKE SKINS, WHICH ARE OVERLAPPING THE INBOARD SECTION OF THE WINGS BY ABOUT 1 INCH, HALFWAY BETWEEN THE CENTER SECTION SPAR AND THE WING SPARCAP. USE A HACKSAW, AND FOLLOW THE LINE THAT YOU MARKED BACK ON PAGES 463, 465. CUT AS CAREFULLY AS POSSIBLE, AND NOT SO DEEP AS TO DAMAGE THE HARDCOATS. THE RESULTING SEAM IS VISIBLE IN THE FINISHED PRODUCT, SO TRY TO GET IT AS STRAIGHT AS YOU CAN.

SECTION 4

UPPER STRAKE HALF INSTALLATION

After removal of the wing, the areas in the outboard bulkhead, aft outboard bulkhead, and upper strake are accessible. At this time, check for any voids or gaps in this area, as it is very rough and rugged. You will have to sand the skins a bit, fill with microglass, and cover with two plys of fine bid.

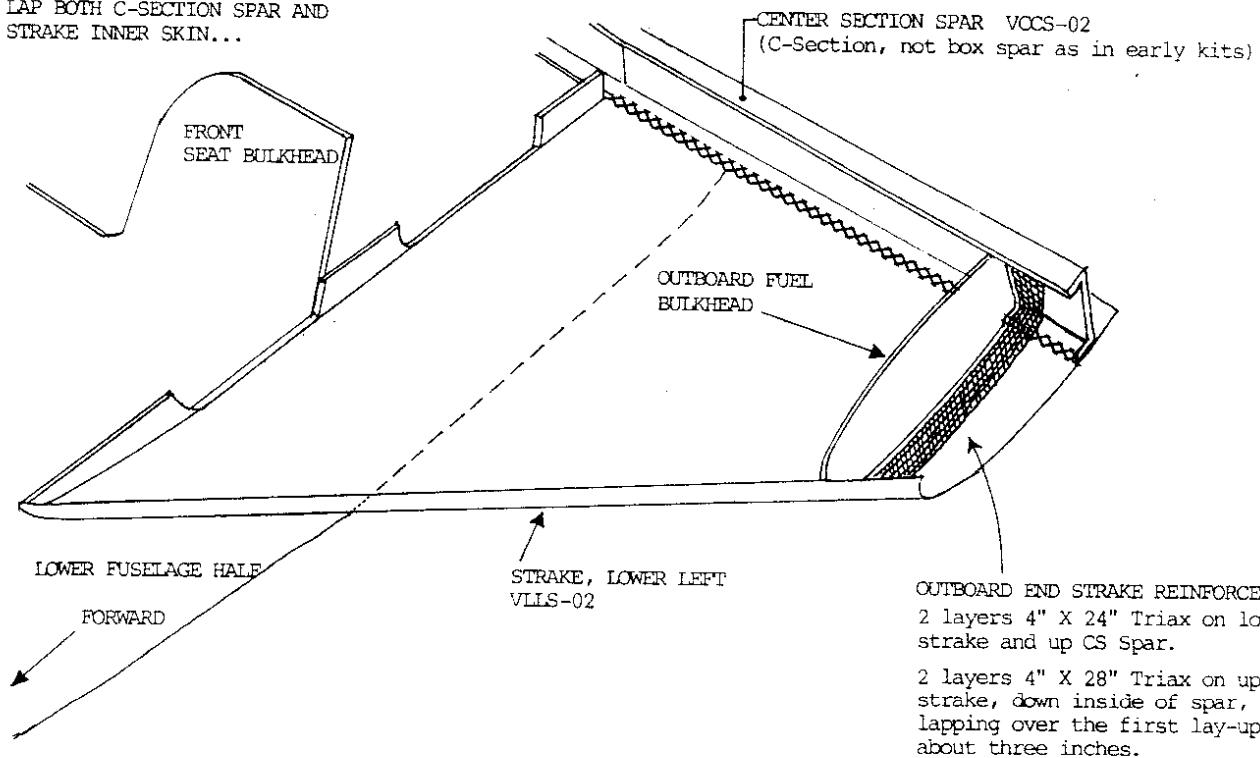
OUTBOARD END STRAKE REINFORCEMENT DIAGRAM 475 (Below)

Cut 4 strips of TRIAX 4" wide by 24" long, and 4 strips 28" long. The major axis should run lengthwise. On the outboard side of the OUTBOARD FUEL BULKHEAD, sand a 4" wide strip, roughing up the surfaces on the upper & lower strakes, as well as on the inside of the spar. Level any voids between the spar caps and the strake inner skins with microglass.

Apply two of the 24" strips along the bottom strake in the sanded area, starting at the strake LE, and extending up the spar shear web. Next, apply two of the 28" strips to the upper strake, lapping down the spar shear web a few inches. For increased reinforcement, overlap the lower layup with the upper layer by an inch or so at the strake leading edge.

NOTE: Remember to put the longitudinal fibers to the outside of the bends to prevent kinking...

TWO PLIES FINE BID

LAP BOTH C-SECTION SPAR AND
STRAKE INNER SKIN...

SUMP TANK AND FUEL LINESINSTALL BAFFLES

Sand the front edges of the sump tank smooth and straight. Sand the tank inside and out thoroughly.

Cut out the sump baffles a little oversize and sand to fit the sump tank. Be sure to cut out the top and bottom 'mouse holes' to facilitate filling and venting.

The two baffles divide the tank into 3 equal sections about 8-1/2" wide each. Sand a full 1" wide margin on the baffle edges and 2" wide at the joining locations inside the tank. Cut 2" wide strips of BID and glass in the baffles with 1 ply. Let cure.

INSTALL MOUNTING TABS

Cut twelve 3" X 6" pieces of TRIAX, axis long. Pre-wet 3 plies at a time on plastic. Lay plastic on a flat surface that is about 6" wider than the sump tank. Sand full 3" high X 4" wide rectangles between 3-1/4" and 6-1/4" from the tank bottom at the rear corners on the back and sides.

Apply two of the 3 ply pads on the back of the sump tank, horizontally, between 3-1/4" and 6-1/4" from the bottom, lapping 4" onto the back of the tank and letting 2" extend out as a tab. Lay the tank down on the plastic covered surface, back side down, and smooth the tabs straight against the plastic.

Apply the other two 3 ply pads onto the sides of the tank, aligned with the above pads, lapping 4" onto the tank sides and 2" onto the above pads, forming a 6 ply 2" X 3" mounting tab.

INSTALL FUEL AND VENT TUBING

Drill a clearance hole for 3/8" fuel tubing in the top center of the tank. Drill another 7" to the left and one more 7" to the right of center, centered fore and aft. Drill a clearance hole for the 1/4" fuel vent tubing 9" to the right of center, centered fore and aft.

Cut two 6" pieces and one 13" piece of 3/8" tubing and one 6" piece of 1/4" tubing. Microglass the two short pieces of 3/8" tubing in the two outer holes with about 2" inside the tank and 4" outside. Microglass the longer piece in the central hole with the inner end about 2" from the tank bottom. Microglass the 1/4" piece in the remaining hole, 2" inside, 4" outside.
NOTE: BE SURE TO SAND THE TUBING WHERE IT WILL BE MICROGLASSED AND APPLY A LIBERAL FILLET INSIDE AND OUTSIDE AROUND THE TUBES. ALL TUBES ARE INSTALLED POINTING TOWARDS THE FEEDING TANK AND ANGLED SLIGHTLY AFT SO THAT THE LINES WILL CLEAR THE GEAR BULKHEAD.

Install the sump drain hardpoint by microglassing a 1-1/2" X 1-1/2" piece of 1/4" aluminum to the lowest point in the bottom of the tank. Cover with 2 plies of fine bid. Later this will be drilled and tapped to 1/8" pipe to install a quick drain which extends through the bottom of the fuselage. This is the lowest

How to Install Fittings in a Fuel Tank

As a continuation of last month's article on fuel tank construction, we will discuss how to install the fittings into the body of the fuel tank. We will use the same tank we constructed of a foam sandwich construction and install a simple fitting such as a drain fitting. The concept is to develop a hardpoint area that we can place the fitting into. Often I use a welding flange that has the appropriate size hole and thread for the fitting that I desire to use and sandwich it into the layup. Using a welding flange requires that I lathe off the outer rim so that it will provide a flat surface for the layup. Since some folks don't have a lathe on hand I will omit this technique.

This will be a picture-book type demonstration and can be used for many types of fittings such as drain valves, fuel lines, fuel strainers, and fuel filler caps. Remember to make the build up area and the laminates epoxy rich. Failure to make epoxy rich laminates in a fuel cell application can result in wicking of the fuel by the fibers. All final plies should be peel plyed to cause the fibers to lay flat and not be exposed to the fuel.

The first fitting you make may seem to be a little awkward, but after the second fitting you will find that this is a simple method that anyone can reproduce. This method has provided me with a good solid fitting points that DO NOT LEAK!

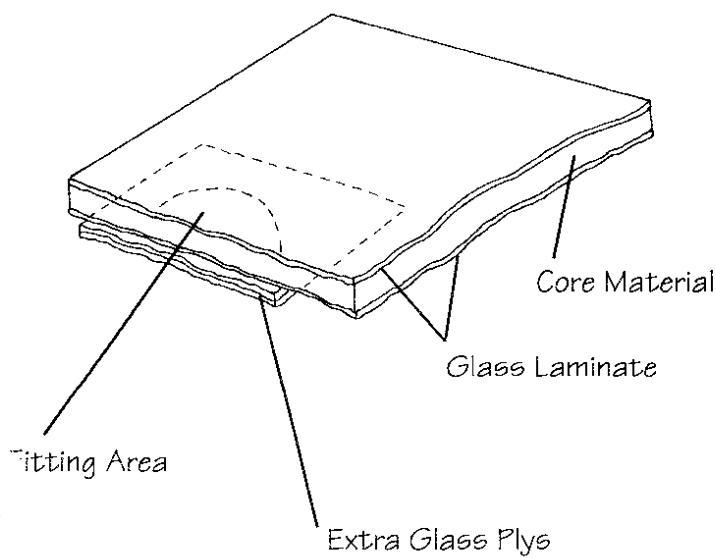
Here are the steps:

STEP 1:

Locate area for installing fitting.

STEP 2:

Add 2 ply extra glass to lower side, 2" greater than area to be removed.

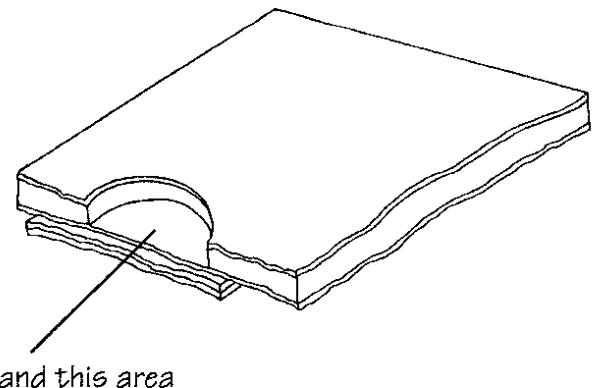


STEP 3:

Remove upper glass and core to lower glass.

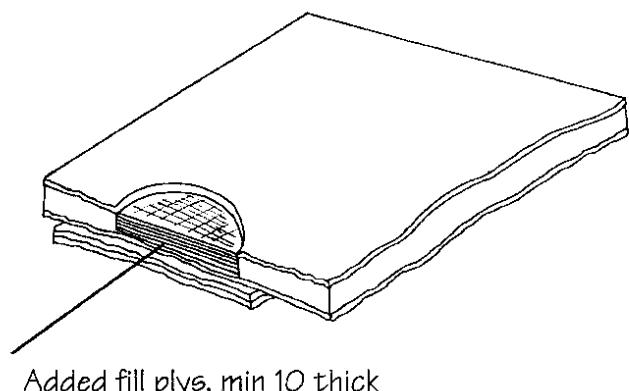
STEP 4:

Sand lower glass to prepare for secondary bonding.



STEP 5:

Fill cut out area till glass thickness is min of 10 ply thick, peel ply and let cure.

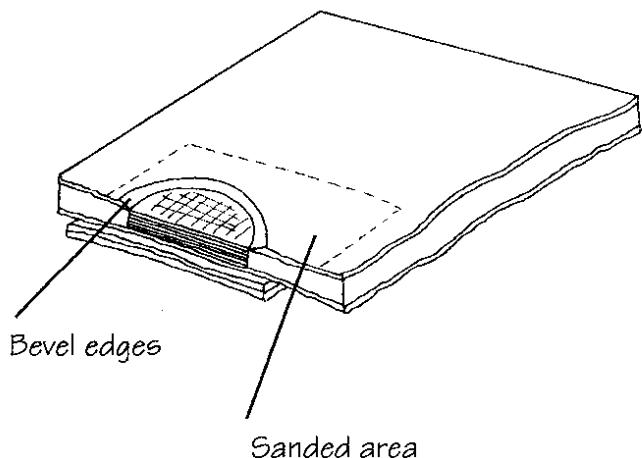


STEP 6:

Bevel edges of hole as shown.

STEP 7:

Sand area shown



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Aeronca 15 AC	246.29	247.39	206.99
Beech D175/F17D/E17D		589.24	491.09
Beech D18/AT1/Twin		212.76	176.05
'Bellanca 14-19/14-13	110.28	111.94	92.38
'Bellanca Viking	292.10	293.70	245.42
Cessna 120/140/170	149.68	150.44	125.78
Christen Husky		389.62	326.18
Citabria 7, 8	383.64	385.06	322.52
Douglas DC-3		272.37	226.69
Ercoupe	116.82	116.39	98.44
Fairchild 24G/RW	440.32	178.67	369.22
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Luscombe	122.69	122.47	103.32
Maule 4	177.61	178.56	149.23
Maule 5	118.56	120.51	99.26
Navy N3N	400.61	403.45	336.42
N. American AT6/SNJ		114.28	95.13
N. American P51		31.77	26.38
Piper J2/3/PA11/18-150	368.52	370.56	309.63
Piper J5/PA12/14	368.52	370.56	309.63
Piper PA15/17	333.31	334.08	280.33
Piper PA16	334.43	335.23	281.26
Piper Colt	335.37	336.21	282.04
Piper PA20/22	335.29	334.97	282.29
Ryan PT22/STA	290.83	291.80	244.52
Schweizer 119	418.09	423.31	350.50
Schweizer 126	219.61	217.44	185.42
Schweizer 222	442.46	447.16	371.15
Schweizer	340.70	343.48	286.02
Stearman PT13/17	563.62	566.31	473.67
Stinson 108-1, 2, 3	285.12	287.28	239.40
Stinson 10A/105/HW75	390.10	391.75	327.89
Stinson L5	445.26	448.90	373.79
Taylorcraft	360.31	362.05	302.79
Waco UPF7	482.99	484.52	406.11
J-3 Interior	57.64	57.79	48.48
Agricultural Aircraft			
'Ag Cat	167.31	170.21	140.05
Airtractor	106.13	107.98	88.83
Callair A9/A9B	300.29	301.03	252.55
Piper PA25/Pawnee	352.84	353.15	296.89
Snow	499.54	505.13	418.95
Snow C/D	111.06	111.35	93.40
Thrush	169.07	172.04	141.51
'Weatherly	92.79	93.00	78.04
Homebuilts			
Acro Sport I		391.58	330.24
Acro Sport II		435.99	367.76
Avid Flyer	288.56	288.87	242.79
Baby Great Lakes	264.84	259.66	224.29
Bowers Fly Baby	303.09	302.77	255.19
Christen Eagle 1 & 2		480.29	404.58
Corbin Baby Ace	228.41	226.56	192.74
Kitfox	313.44	314.65	263.49
Pitts S1S/S1C		310.26	267.40
Pitts S2S/S2A		322.42	277.17
Smith Miniplane	259.88	252.20	220.78
Sonerai II	96.92	94.96	82.10
Starduster I		309.12	265.25
Starduster II		290.83	246.84
Steen Sky Bolt		566.81	473.44

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ISSUE SPECIAL

FLORIAN SHEARS

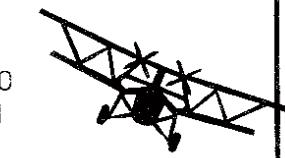
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ACF-50 ANTI-CORROSION FORMULA

De-activates and prevents corrosion on all metals. Safely lubricates and penetrates. Use on interior skin sections, micro switches, avionic components, solenoids/motors, etc. Exceeds MIL-C-81309D, II, III, BMS 3-23C.

13 oz. Spray
Cat. # ACF502.....Reg. \$ 13.95

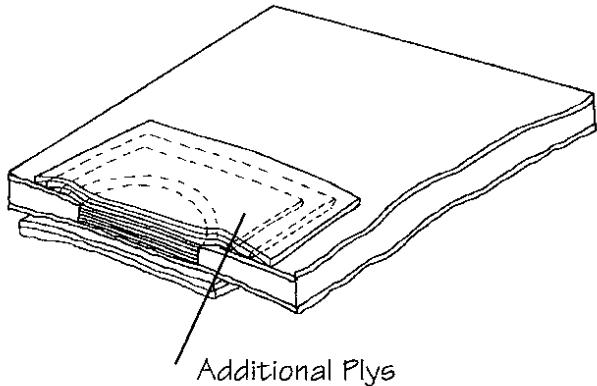
On Sale for a Limited Time Only-

\$9.00

STEP 8:

Lay up 3 additional ply as shown, start with smallest (largest last), peel ply.

* Make all layup epoxy rich.

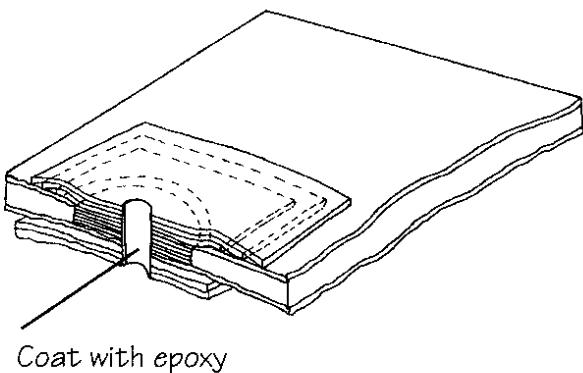


STEP 9:

Bore hole for fitting, slightly oversize.

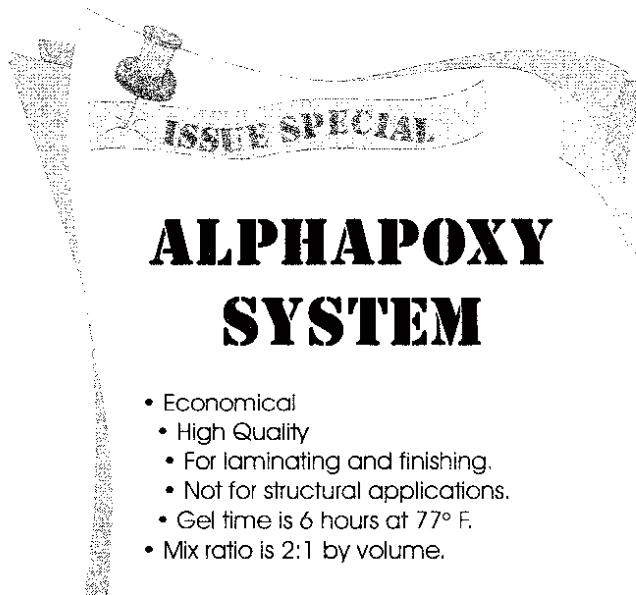
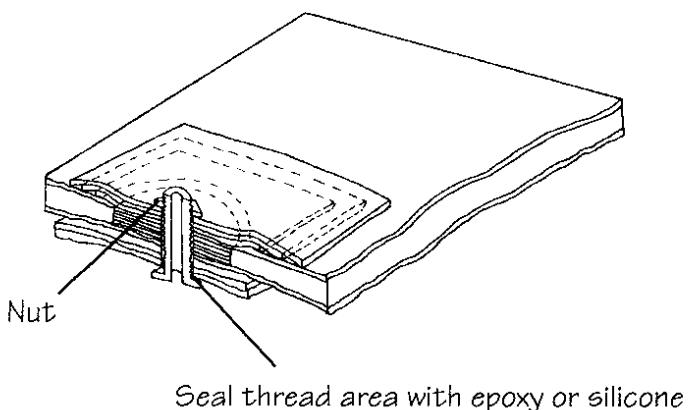
STEP 10:

Coat hole area with epoxy.



STEP 11:

Install fitting.



- Economical
- High Quality
- For laminating and finishing.
- Not for structural applications.
- Gel time is 6 hours at 77° F.
- Mix ratio is 2:1 by volume.

1.5 GALLON KIT

Cat. #ALPHAPOX
reg. \$42.95

SALE \$39.95

COMPOSITE REFERENCE BOOK AND CATALOG

Alexander Aeroplane Company has been monitoring the growth of composites in many areas and has recognized a need for the user to have sufficient information on how to choose and use the materials necessary for their projects. In the Spring of 1995 Alexander's will introduce their new Composite Reference Book and Catalog. This reference book is made for the user. This publication offers answers for the common issues and the rare questions that have been seen over the years from our customers and from our Aeroplane Builders' Workshops. This publication should be available in the Spring of 1995.



This stuff is a very light weight epoxy filler that can be used in place of either Bondo or microballooned epoxy. It has a density at least half that of Bondo, doesn't shrink, is very sandable, and contains a built-in chromate conversion for use on aluminum. It also contains an agent that helps tiny entrapped bubbles rise to the surface and burst so pinholes are greatly reduced. The only thing I've tried it on so far is to fill an aluminum nose gear fork, and it has very nice working properties. I'm definitely going to try it when I start finishing the wings on my Velocity.

David Parrish
— online to Corky Smith
of Dartmouth College

SECTION 4

SUMP TANK AND FUEL LINES

point in the fuel system.

INSTALL THE SUMP TANK COVER

Cut out the cover to fit the front of the tank. Clean the inside of the tank and cover, MEK works well, and sand again to eliminate hand prints, etc.

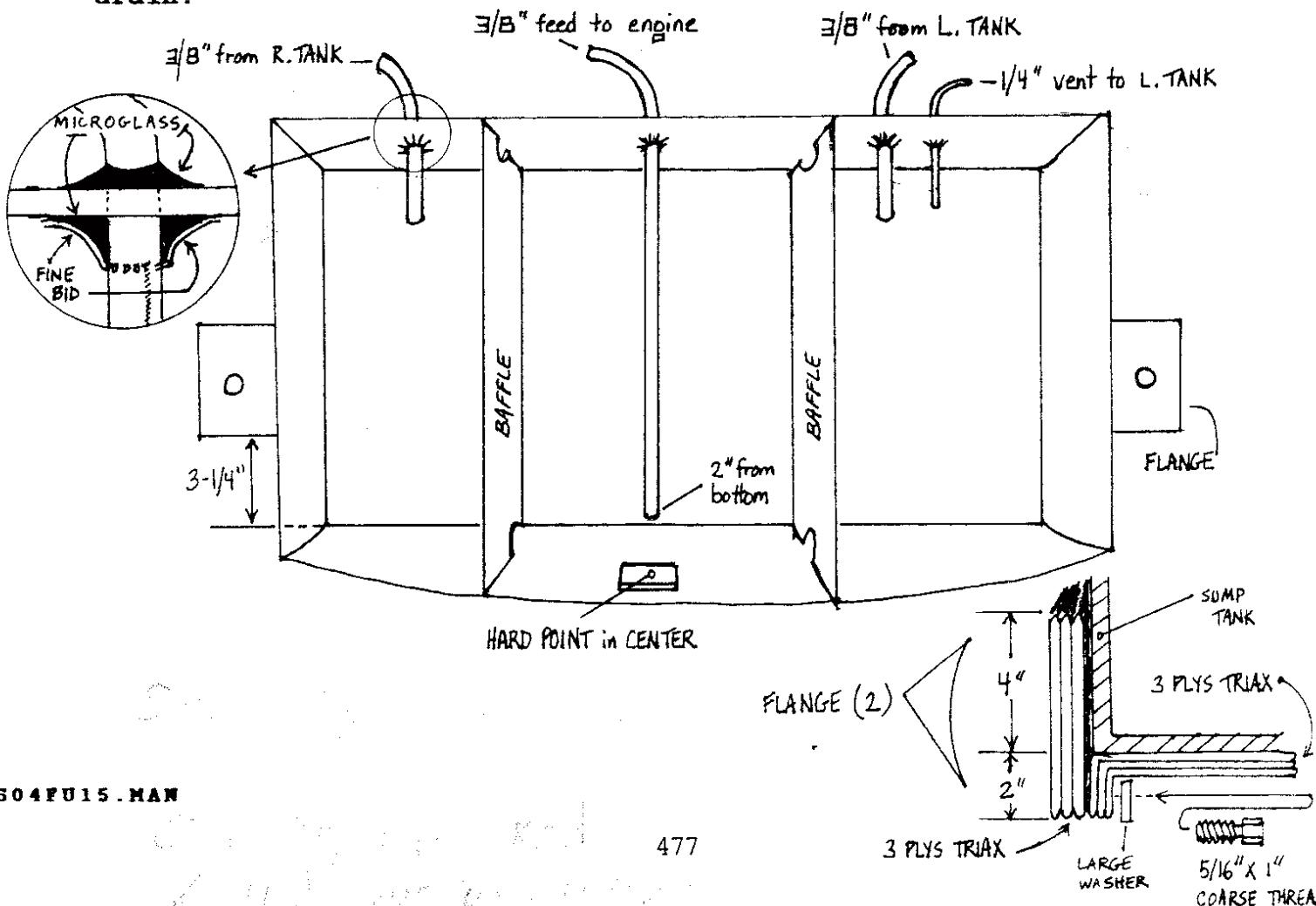
Paint the inside of the sump tank and cover liberally with as many coats as it takes to make the surface shiny with no fabric weave showing. Let cure and inspect it again. Repeat if necessary.

Sand a full 1" margin around the outside front edges of the tank and cover. Apply some microglass to the front edges of the baffles. Put the cover in place and apply 2 plies of fine BID with a liberal amount of epoxy. Let cure.

Clean and sand the outside completely as you did the inside. Paint the outside repeatedly for a shiny, weave free, finish.

SUMP TANK INSTALLATION

The sump tank is positioned in the center of the fuselage floor against the front of the gear bulkhead. In this position, drill and tap for a 5/16" X 1" coarse thread bolt tapped into the gear bulkhead with a large area washer over the tabs. Once the sump is fitted into place, a hole must be drilled through the bottom of the fuselage to facilitate access to the sump drain.



SECTION 4

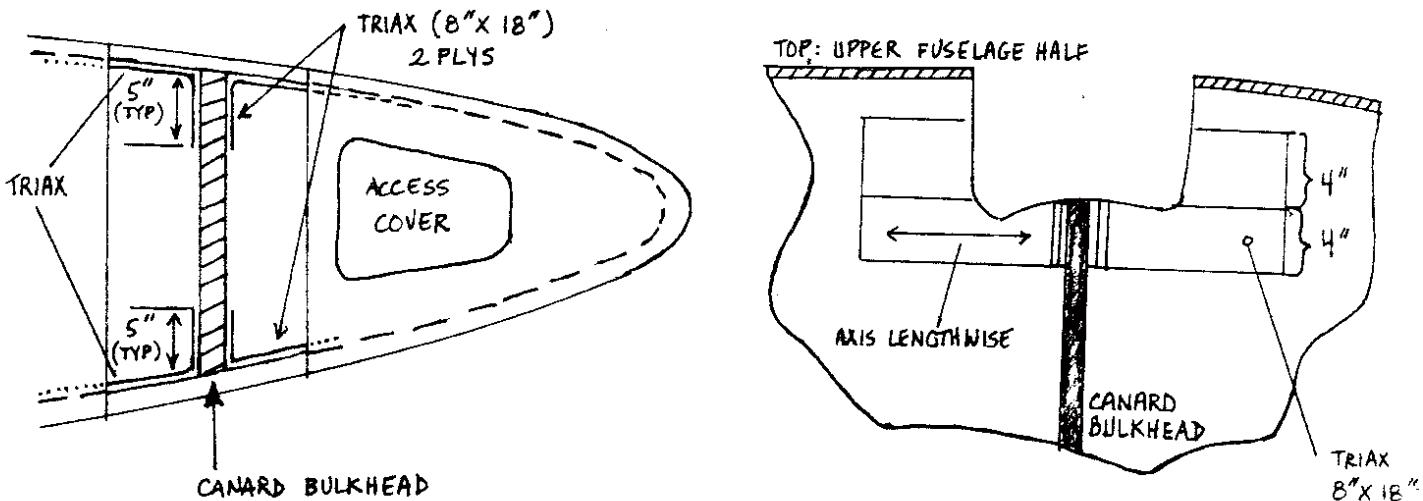
CANARD INSTALLATION

UPPER CANARD CUTOUT

Carefully cut out the upper canard cutout along the pre-marked lines fairing the lines to the lower cutout.

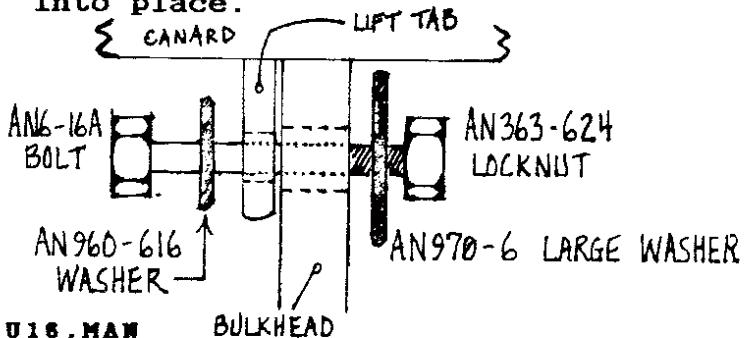
CANARD ATTACH REINFORCEMENT

Pre-cut eight pieces of 8" X 18" TRIAX, axis lengthwise. Trim to fit as shown in the sketch lapping 4" below the canard cut-out, 4" above and below the fore and aft sides of the opening, and 5" onto the canard bulkhead.



After cure of the reinforcements, trim them back to the edges of the canard cut-out. Square up and straighten any cut lines with a sanding block, remove 1/8" foam behind the inner and outer skins. Fill the recesses with microglass, and apply 1 ply of FINE BID on a 45 degree bias. Let cure.

Reinstall the canard and check to make sure that it is level, centered, that the incidence is OK, and that it is on straight. Using the pre-drilled holes in the lift tabs as guides, drill 1/4" pilot holes in the canard bulkhead. Remove the canard and open these holes up to 1" to accept bushings. Enlarge the holes in the lift tabs to 3/8" so they will accept the attach bolts. As a dry run, put the bushings in, put the canard back in place, and fit the bolts. If everything is OK, remove the canard and install the bushings with GENEMID MICROGLASS. When the microglass is cured, file the bushings flush with the bulkhead faces. Reinstall the canard and bolt into place.



Recheck the incidence, etc.. Sometimes shims are needed to get everything perfect (i.e. between lifttabs and bulkhead if the canard is cocked a bit off). Fit the upper cover to the top of the canard. Trim a little on each side of the cover where it rests on the canard until it is flush with the top of the fuselage. The cover now gets glassed permanently to the canard with TWO PLIES OF BID inside and out, both sides. In the case that you have already microed your canard, it will be necessary to remove that micro in areas that will come into contact with the attaching BID. Once cured, remove 1/8" of foam from behind inner and outer skin of the cover edges. Fill with microglass and cover with one ply of FINE BID. Knife trim and sand smooth when cured.

Trial fit the elevators to check for any interfence. Remove any material that interferes with the free movement of the elevators.

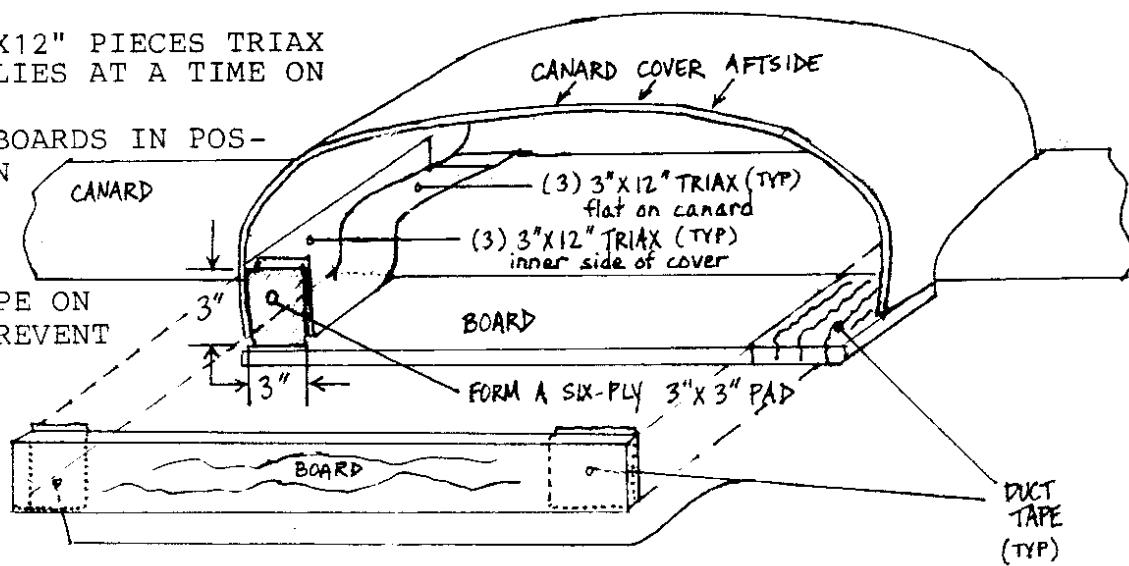
CANARD REAR ATTACH POINTS

Use scrap 1 X 4 for backing to build up 3" X 3" 6 PLY TRIAX pads on the aft side of the canard just above the TE. Put duct tape on the wood where the pads will be laid up. Bondo the board onto the TE of the canard cover just above the trailing edge of the canard. A small piece of wood with duct tape on it will have to be placed between the 1 X 4 and the TE of the canard to span the gap and support the TRIAX until it cures. Sand all areas on top of the canard and inner sides of the cover. Cut twelve 3" X 12" pieces of TRIAX (major axis lengthwise) and wet out three at a time on some visqueen. Transfer to canard, three plies across the top of the canard and up 3" onto the 1 X 4. Place three plies along the inner side of the cover overlapping the other three plies. This forms a 6-ply 3" X 3" pad. Put aside and let cure.

*CUT (12) 3"X12" PIECES TRIAX
*PRE-WET 3 PLIES AT A TIME ON
PLASTIC

*BONDO FORM BOARDS IN POS-
ITIONS SHOWN

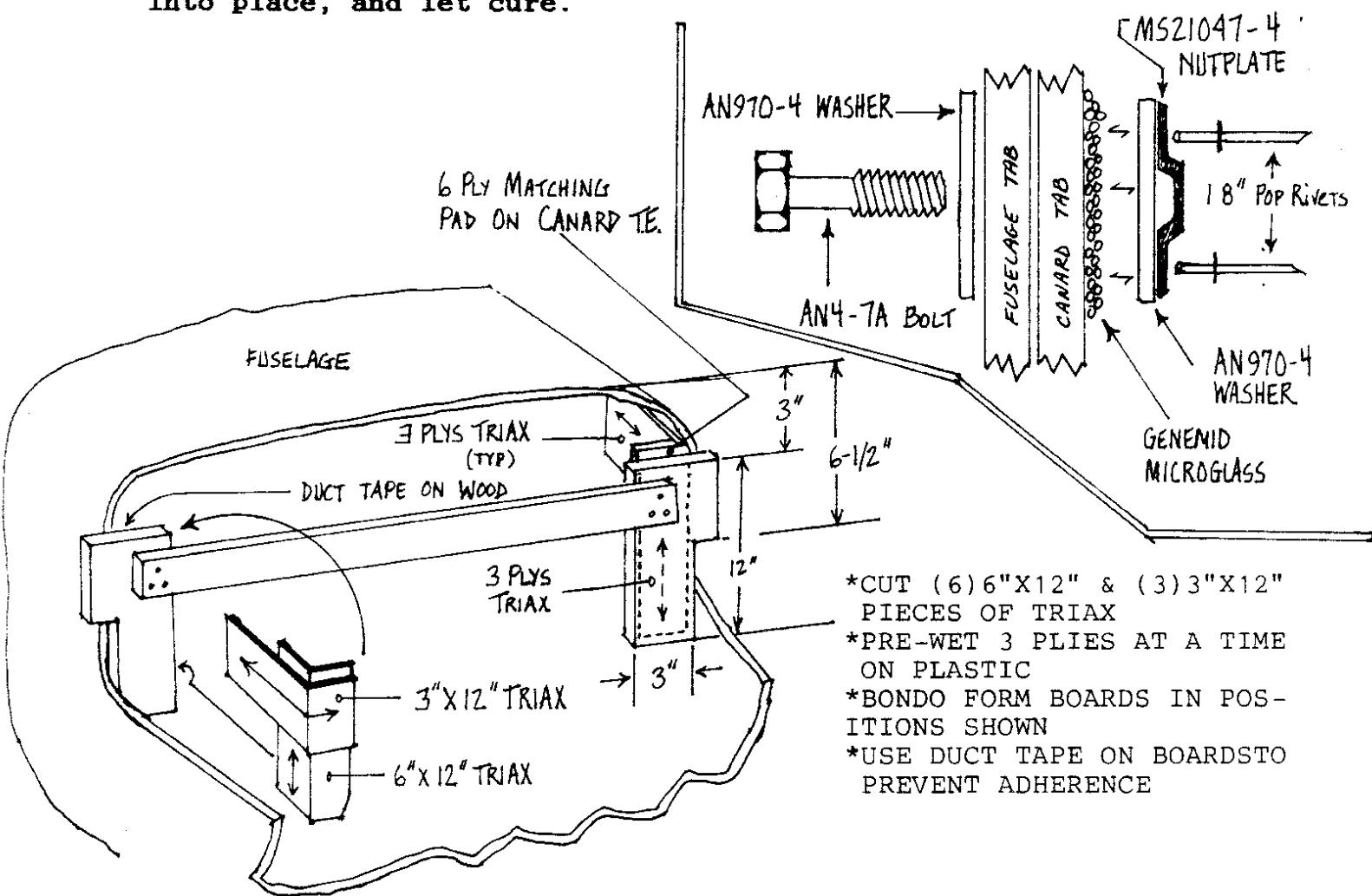
*USE DUCT TAPE ON
BOARDS TO PREVENT
ADHERENCE



CANARD INSTALLATION

On the fuselage, aft of the canard cut-out, prepare an area for mating 3" X 3" pads. Sand the inner skin for about 12" aft and 12" below the pad area. Fabricate a wooden fixture as shown in the following sketch. Put duct tape on affected surfaces and install to fuselage with bondo. Cut six pieces of 6" X 12" , and six pieces of 3" X 12" TRIAX . Prewet three plies at a time on some visqueen and install the 3" X 12" horizontally onto the side of the fuselage, with 3" overlapping the 1 X 4 board. The 6" X 12" pieces are installed vertically with 3" on the board and 3" on the fuselage. This forms a six-ply pad to mate with the one that you just constructed on the canard. (Make sure that the pads are on the same elevation .)

Once cured, remove the wood, square up the edges on both pads, and taper the vertical portion of the pad on the fuselage from 3" wide at the top back to the fuselage skin at the bottom. Reinstall the canard, file away any interference, and bolt in place. Drill a 1/4" hole through both pads. Using 1/8" pop rivets, attach a 1/4" nutplate to a 1/4" wide area washer. Lightly sand the back of the washer and the back of the pad. Spread GENEMID MICROGLASS between the pad and the washer ,bolt into place, and let cure.

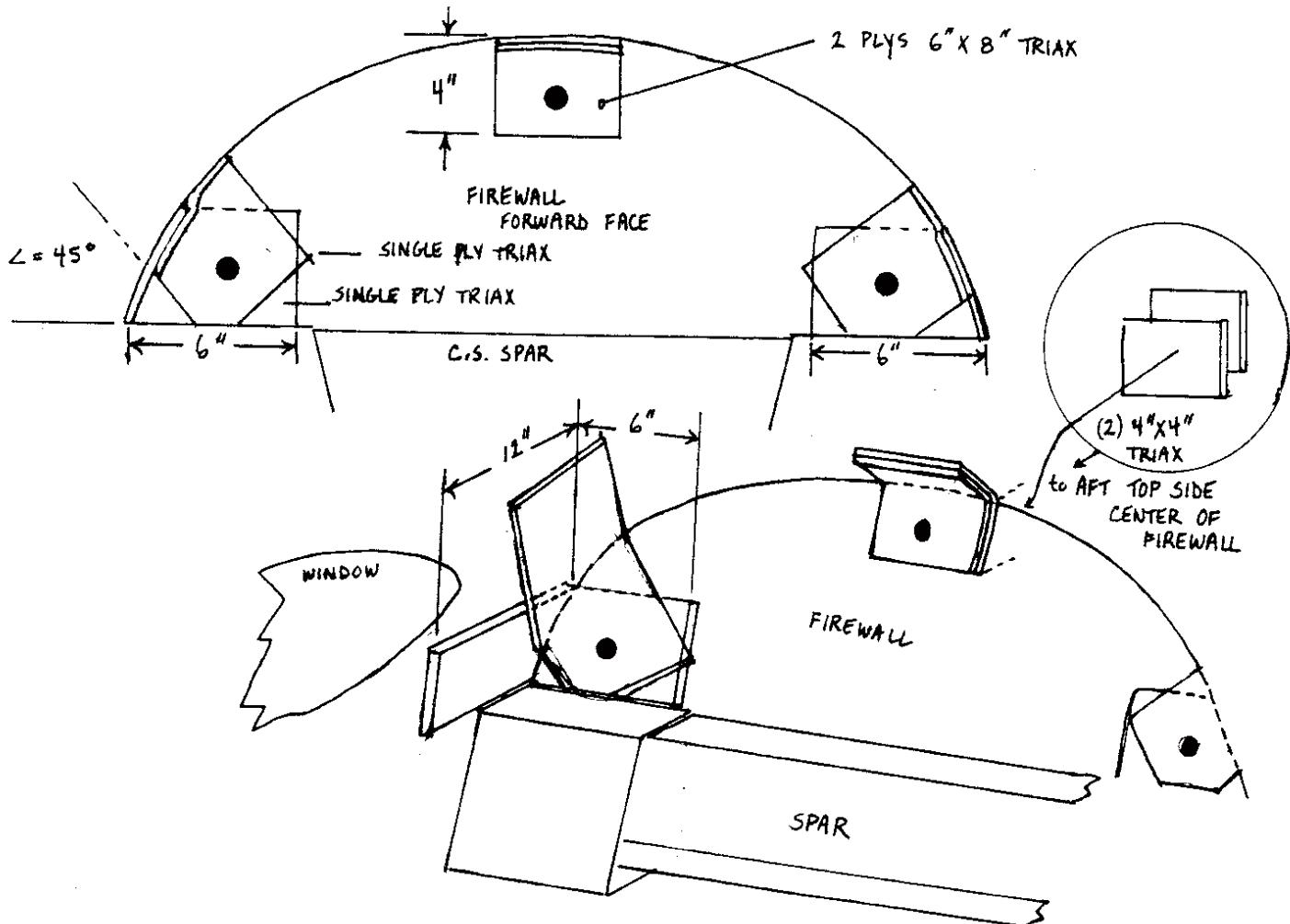


FIREWALL REINFORCEMENTS

Cut four 6" X 18" and two 6" X 8" pieces of TRIAX, axis lengthwise. Pre-wet Lap the larger pieces 6" onto the firewall forward face and 12" onto the fuselage just above the carry through spar. Apply one layer horizontal and another at a 45 degree angle.

Lap the short pair half on the firewall and half on the fuselage at the top center. Also apply two 4" X 4" plies of TRIAX on the aft side top center of the firewall (opposite the layup on the front.)

All these pieces serve to tie the firewall and upper fuselage together and reinforce the upper engine mounting points.

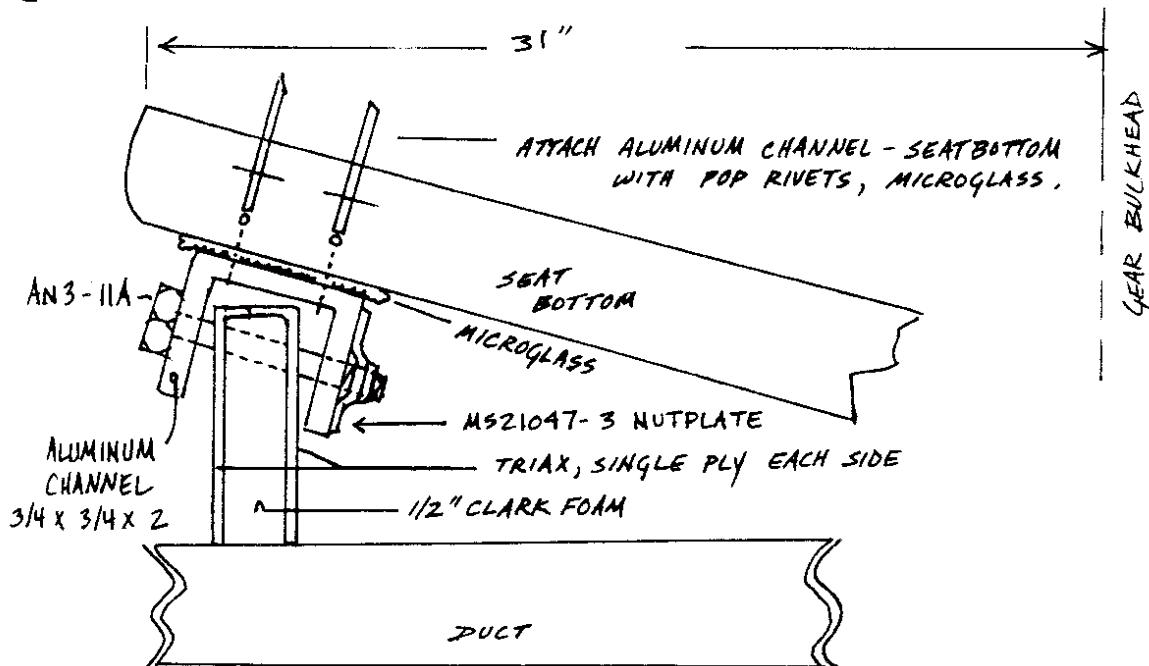


*** NOTE *** IF YOU PLAN TO INSTALL A NAV ANTENNA, DO SO PRIOR TO INSTALLATION OF REAR SEAT. SEE SECTION 7 FOR ANTENNA INSTALLATION. ***

The seats are supported by bulkheads made of 1/2" Clark foam and TRIAX. The rear of the seat pans sit down on the fiberglass ducts. In our own aircraft, our front bulkheads are 6" high and are mounted vertically 13" forward of the intersection of the front seat bulkhead and the floor. The rear seat bulkhead is 6" high and mounted vertically 28" forward of the gear bulkhead. We suggest that you construct the bulkheads a bit oversize and position them to your preference.

For the front, cut two pieces of 1/2" Clark foam 6-1/2" X 16", and glass both sides with a single layer of TRIAX. For the rear bulkhead, cut one piece of 6" X 42" Clark foam and glass both sides, again with a single ply of TRIAX, each side. It will be easier to fit the bulkheads to your fuselage prior to the TRIAX lay-ups. Let cure.

Following cure, we cut 3" X 12" oval access holes in the front seat bulkheads and (2) 4" X 12" access holes in the rear seat bulkhead for storage purposes. These bulkheads are installed with one ply of FINE BID across the bottom and 2 plies on each end, each side. Once the bulkheads are in place, fit your seat bottoms, and mark them where they come into contact with the bulkheads. Install 3/4" X 3/4" X 2" pieces of aluminum channel to the seat bottoms, 2 for each front seat, 3 for the rear. The installation is accomplished with a couple of pop rivets and some microglass. Once these fasteners are cured, put the seats into place, with the channel legs straddling the bulkheads. Drill a 3/16" hole through the channel and bulkhead. Remove the seat bottom and install a MS21047-3 nutplate on the rear leg and install the seat with AN3-11A bolts.



To install the front seatbacks to the front seat bulkhead, glue a 6" X 6" piece of 3/4" plywood onto the seatback in an area which will not interfere with the handrail on the seat bulkhead. Attach the seatback by running (4) 1-1/2" sheet metal screws, complete with finishing washers, through the back of the seat bulkhead and into the plywood. Do the same for the other front seatback.

BRAKE LINES & CUFFS

Suspend the fuselage by blocking it up under the outboard ends of the centersection spar and also under the belly just aft of the nosegear. Get it level forward - aft, right-left with the maingear tips about 7" off the ground. If the gear is uneven, trim the longest one down. Don't set your reference by the floor, use a level running from one gear leg to the other. Using a plumb bob, find the fore-aft C.L. between the nose and the center of the firewall. Mark on the floor and connect the marks with a chalkline or a piece of tape. The brake lines must be installed before the axles and gear leg cuffs.



Route the appropriate brake lines down the rear of each gear leg. Sand the back edge of the gear leg and bond the brake line into place. Sand smooth once the bondo has cured, but take care not to abrade the brake line too much. Apply a 2" wide strip of BID tape, glassing the line to the gear down to within 8" of the gear end. Allow about 15" of free tubing to extend past the point where the tape glass ends. Where the tubing comes through the fuselage side, be sure that there is at least 1/2"-5/8" clearance between line and fuselage side. Radical movement of the gear during extremely hard landings could sever the brakeline if adequate clearance is not provided.

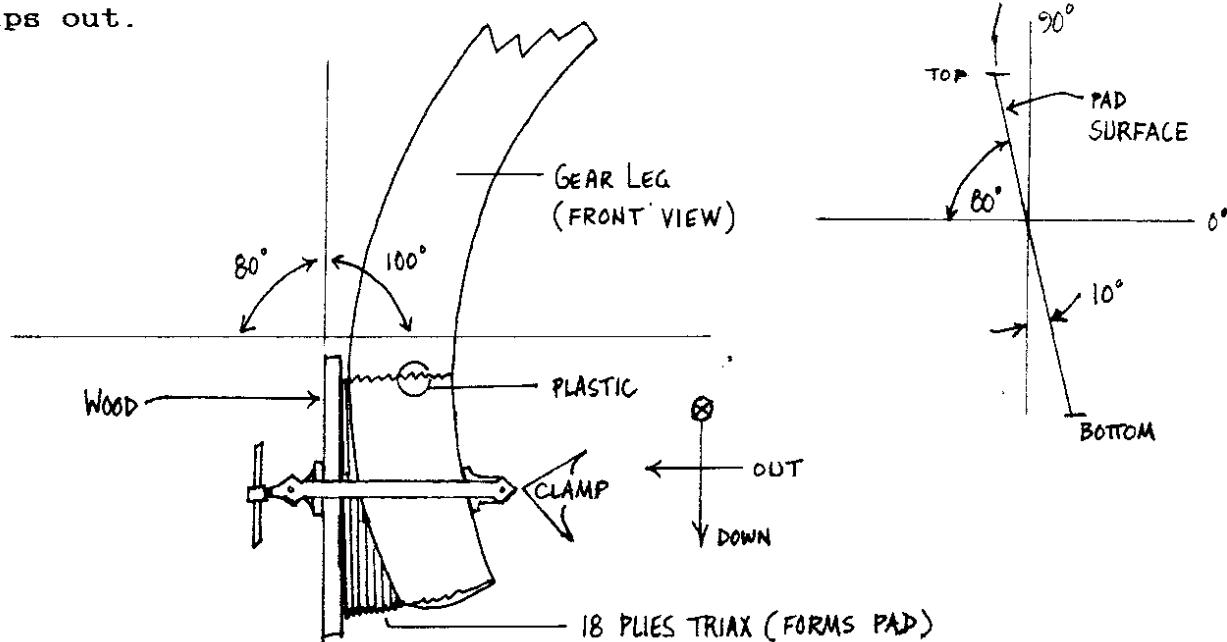
Slide the gear cuffs up the legs to mate with the fuselage sides. Sand the edges of the cuffs smooth, and so that they conform to the fuselage sides. When you are happy with the fit, bond them into place. With the gear unloaded, the cuffs should be approximately 1/16" away from the fuselage sides at the bottom and 3/16" away at the top. Permanently bond them to the gear leg with 2 plies of BID around the bottom of the cuff extending onto the gear leg. Any interference between the cuff and fuselage when gear is loaded can be sanded away later.

INSTALL AXLES

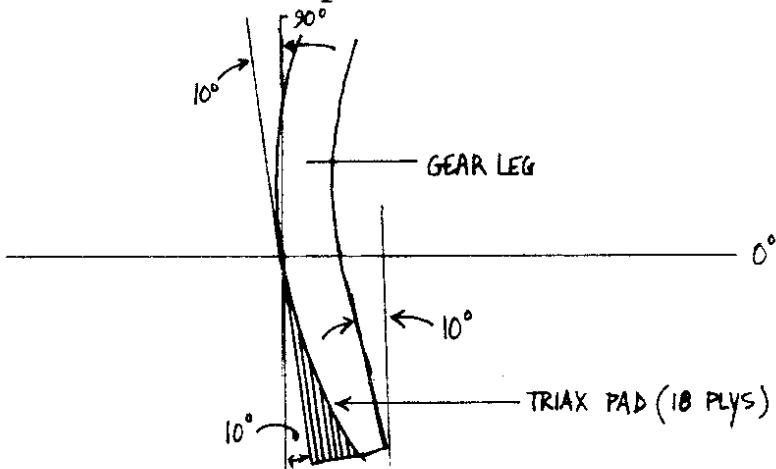
Sand the lower 6" on both gear legs thoroughly. Cut approximately 18 pieces of TRIAX 4" wide. The longest piece should be about 6" long, and the shortest should be 3" long for each side. These will form a pad to mount the axle to. Wet out the plies on a piece of plastic, the shortest piece on the bottom. Stack the progressively longer pieces on top, keeping one end even and the other forming a taper. Pre-wet the gear leg bottom and transfer the plies to the leg, thick end extending down. Wrap the plastic around the gear leg and tape into place. Take a flat piece of wood and clamp it over the outside of the

SECTION 4INSTALLATION OF WHEELS/AXLES

pad. Try to get the pad angled to 10 degrees and parallel to the fuselage C.L.. Put a cover on the floor to catch the epoxy that drips out.

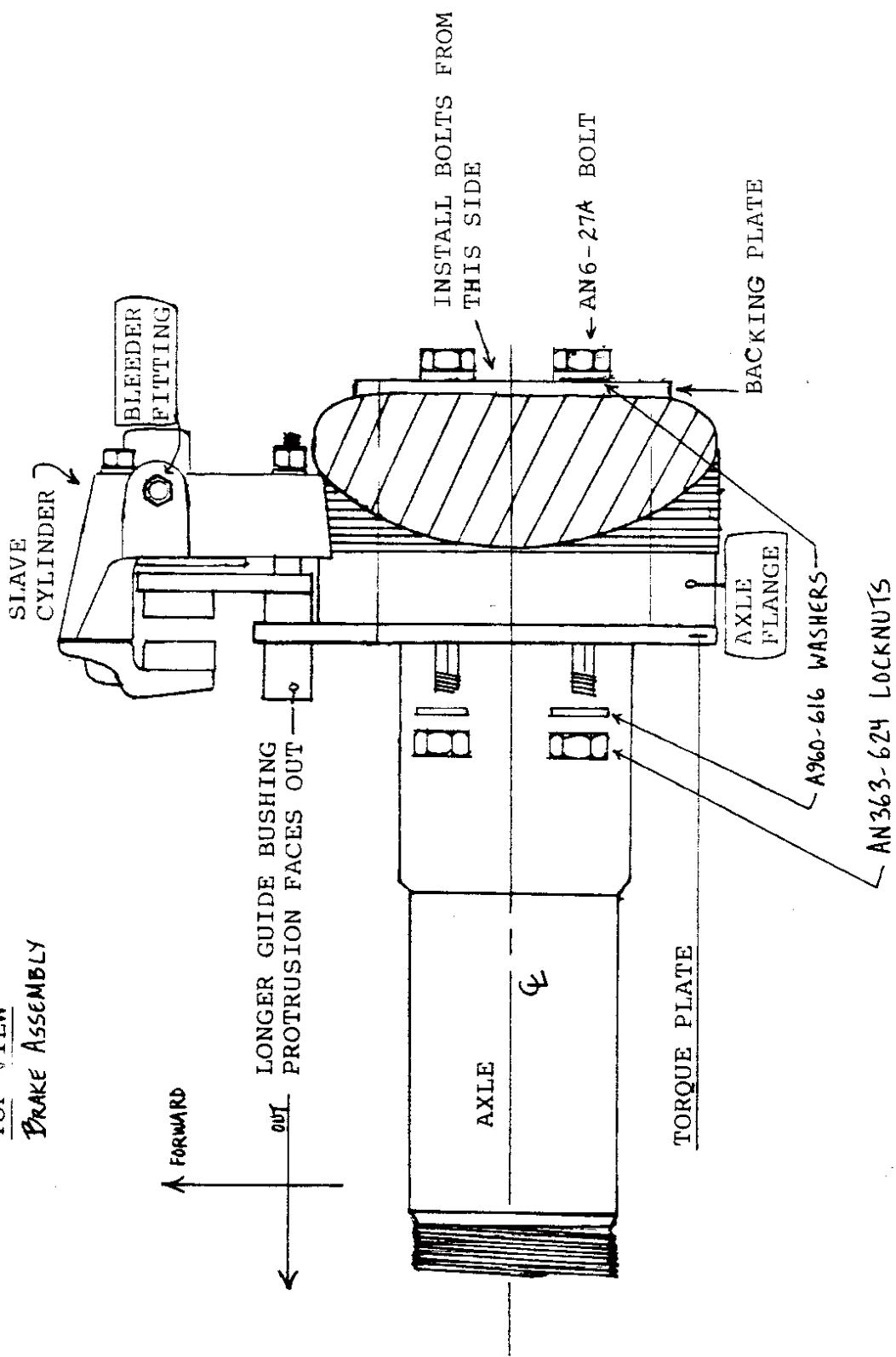


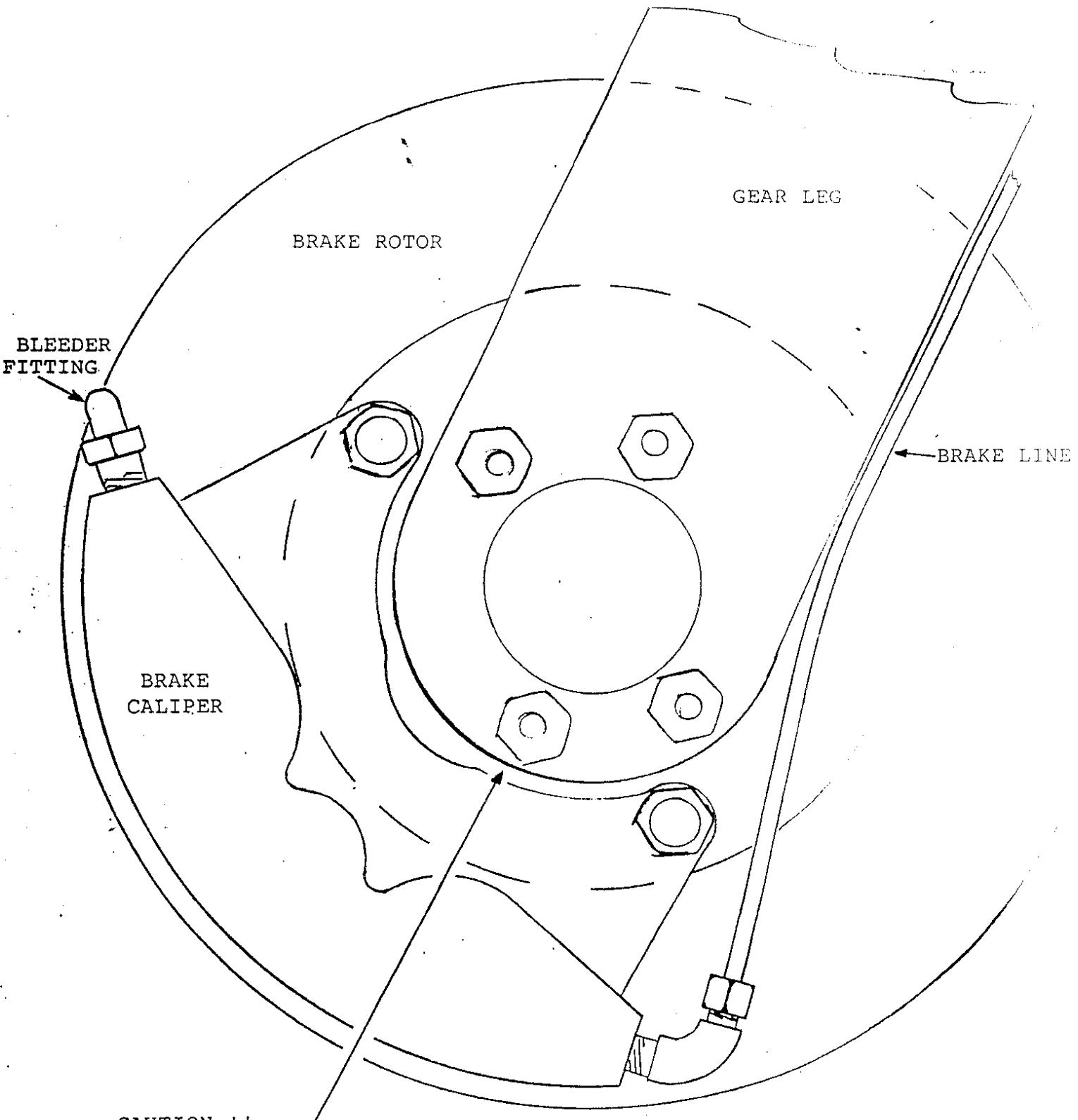
Following cure, sand or grind away all excess glass, concentrating on getting the outside pad flat and approximately 10 degrees topout. Grind the inside of the gear leg to be about parallel to the outside of the pad. To check for toe-in at this point, place one of your straight edges flush against the pad and measure to your C.L.. The measurement at the nose should be about 1" less than the measurement at the main gear. Final sanding can be done with a large file or long sanding block. The result should be a pad as shown in the following sketch.



After the shaping of the pad is complete, locate a center on the pads approximately 2" up from the bottom of the leg and center your axle on this point. The axle bolt holes should parallel the gear leg, two on top and two on the bottom. Clamp the axle in place after smoothing the pad to assure that no rocking occurs, and check to see that the axle is angled 10 degrees down at the threaded end. Using a long 3/8" bit, drill through the gear leg using the axle holes as a pilot. Make a 3"

TOP VIEW
Brake Assembly





CAUTION !!

REMOVE ADEQUATE GLASS FROM GEAR
LEG TO CLEAR BREAK ASSEMBLY,

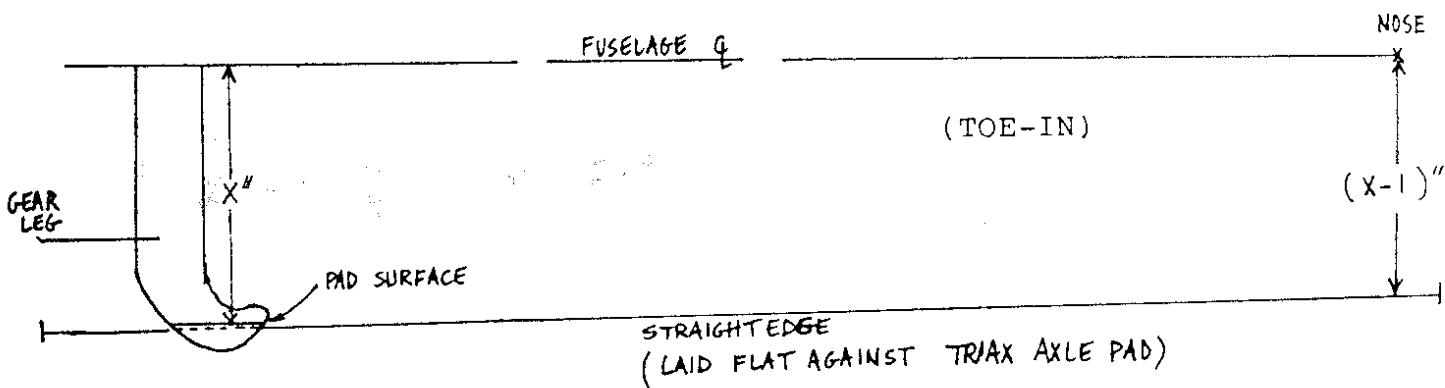
AFT ----->>

BREAK ASSEMBLY MOUNTED ON FORWARD LOWER
CORNER OF GEAR LEG AT APPROX. 45°

X 2" X 3/16" aluminum backing plate with the same hole pattern as the axle to back up the bolt heads on the gear side. Trial fit the axle to the gear leg using AN6-26A BOLTS, (2)AN960-616 WASHERS, and AN363-624 LOCKNUTS. Bolt into place and install the wheel without the tire and torque plate. Check outside of the rim vertically for 10 degree camber and horizontally with a long straight edge for 1" toe-in at the nose. Perform necessary adjustments to get angles correct. Dismantle assembly and locate the torque plate and brake assembly. Reinstall the axle with the torque plate mounted to forward side of gear. You will notice that considerable notching of the gear leg will have to be done to mount the brake assembly. Do this notching with a rat-tail file and give yourself at least 1/8" clearance for free movement of the brake assembly. Once everything fits properly and proper clearances are established, bolt the whole assembly together (SEE SKETCH OPPOSITE PAGE), install wheel and tire, put axle nut and cotter pin on, and set fuselage on the ground. In order to check if you have correct toe-in, the gear legs should tend to come together when pushed forward and spread slightly when pushed backward. If not, check it later once the motor and wings are on. Now install the brake lines to the assembly. Sometimes the fittings have to be reversed so that the bleeder is on top. Use 1/8" pipe, 3/16" tubing, a 90 degree fitting, and teflon tape. Route the brake line around and under the gear leg to the fitting facing aft and inward a little.

YOU DO NOT WANT YOUR LINES CLOSE TO THE BRAKE DISK!

Sometimes a small slot cut in the lower rear corner of the gear leg will help the brake lines stay put. Once the system is all hooked up, add SILICONE BRAKE FLUID and bleed the system from the bleeder on top of the brake assembly.



INSTALL NOSE WHEEL

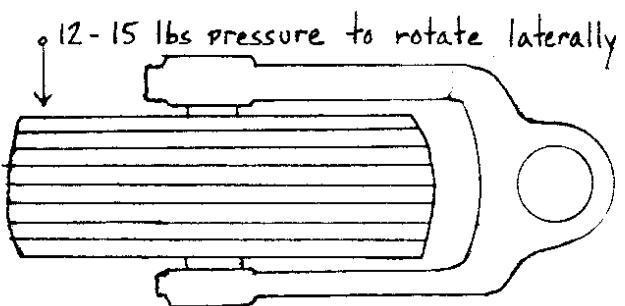
The fork assembly comes with the axle, shims, and set screw in place. Assemble the nose wheel, tire, and tube with the three 5/16 X 3" bolts and locknuts provided. Inflate tire to 45 psi, and maintain it at that pressure. Trial fit the wheel to the axle and fork assembly, centering the wheel with spacers. Some material may need to be filed off inside the bosses of the fork to ensure no side load on the bearings when everything is assembled. Lock axle into place using the set screw provided. Install the fork and wheel onto the nose gear, fork first, then

SECTION 4

INSTALLATION OF WHEELS/AXLES

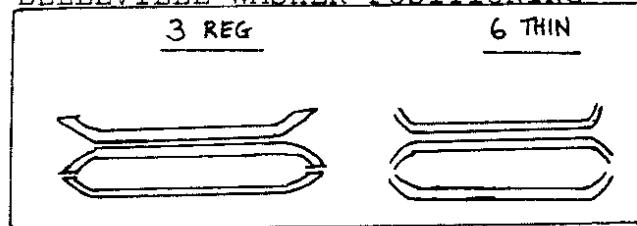
a 1" large washer, then either 6 thin BELLEVILLE WASHERS, or 3 thick belleville washers.

Put on the 1" castle nut and tighten until the pressure required to rotate the rear side of the tire is approximately 12-15 lbs. Drill a 1/8" hole through the strut, and install a 1/8" cotter pin to lock the castle nut into place.



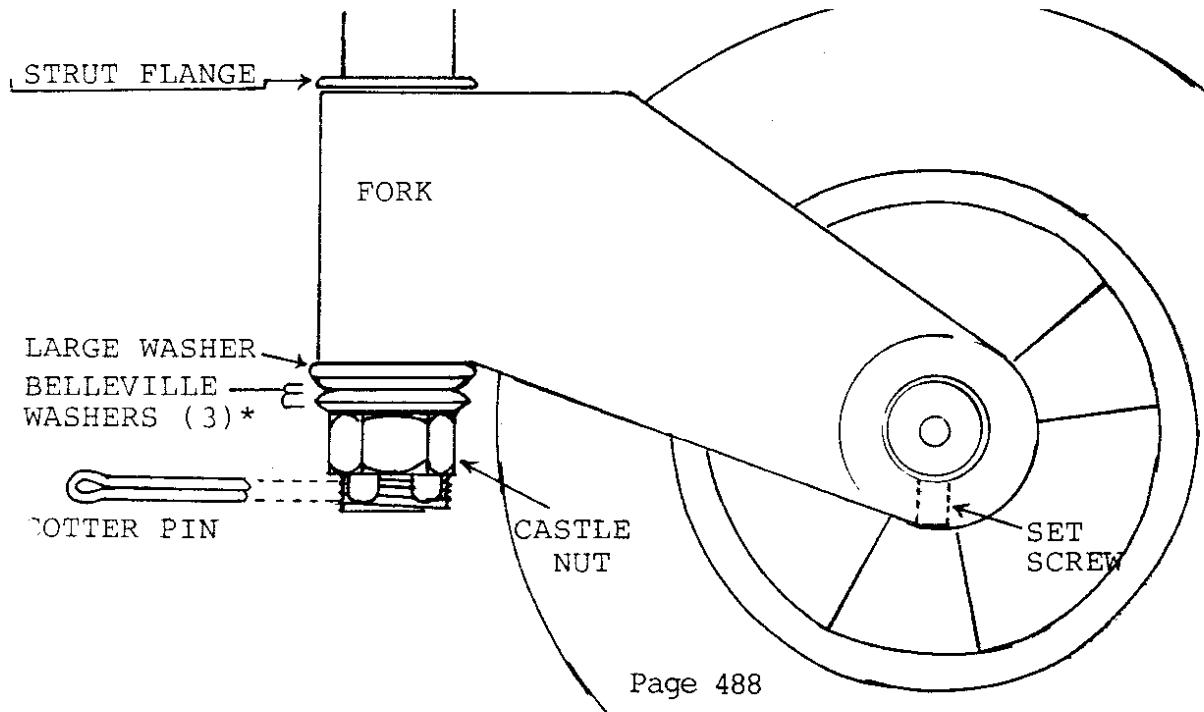
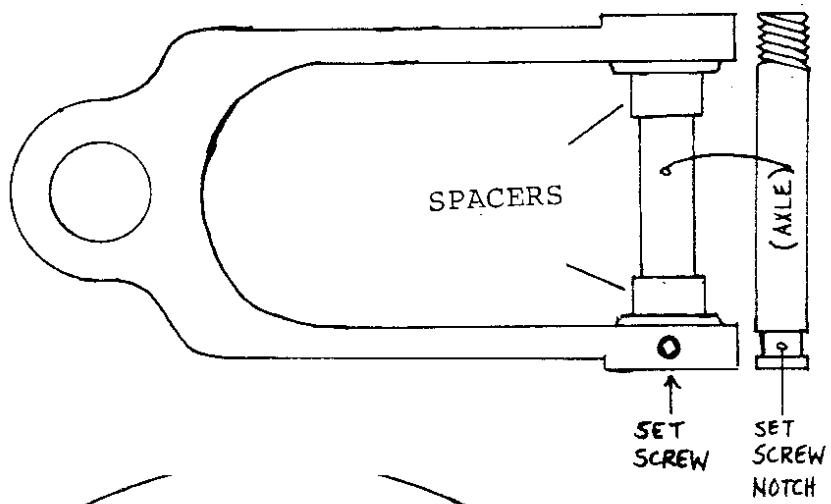
IMPORTANT: It is extremely important throughout the operation of the VELOCITY to maintain proper inflation in the nosewheel tire as well as adequate pressure on the belleville washers. The belleville washers prevent shimming, which can be disasterous in a tricycle-gear aircraft such as the VELOCITY.

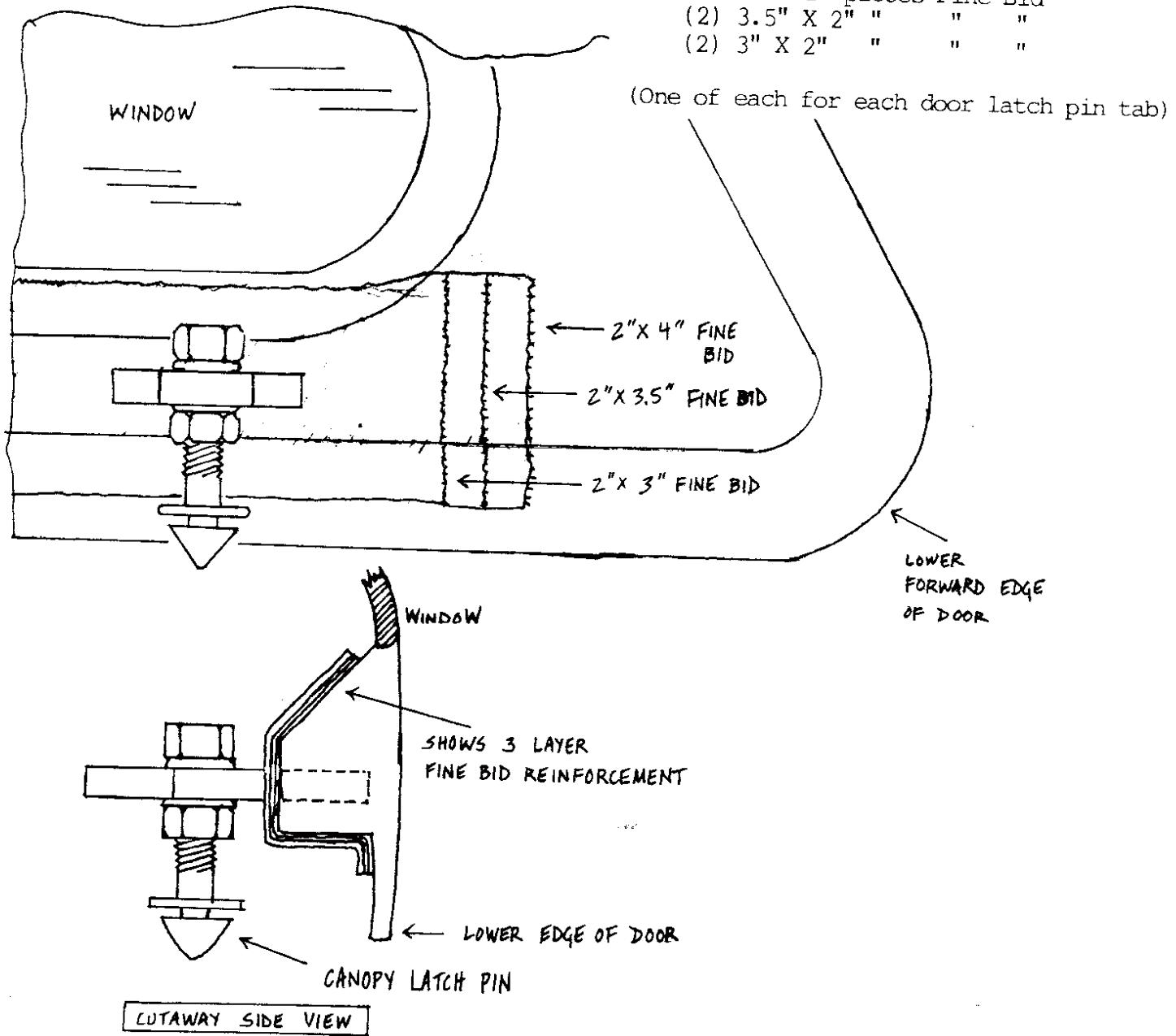
BELLEVILLE WASHER POSITIONING



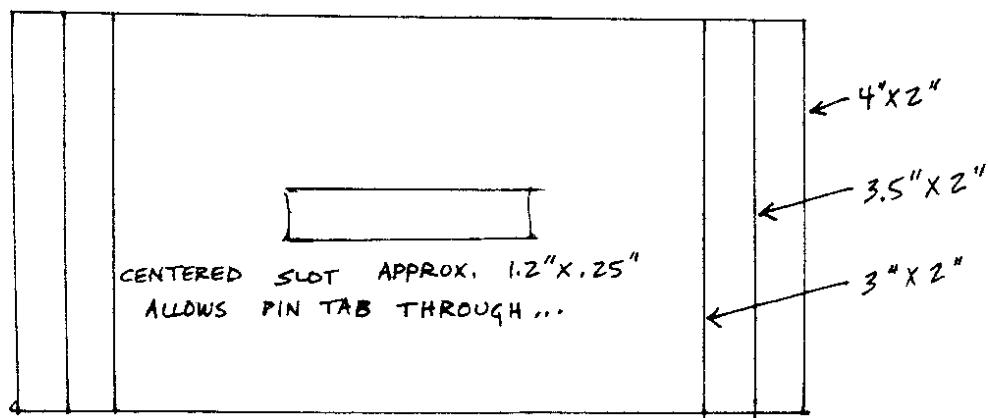
- * FIRST B.WASHER CUP UP
- 2nd CUP DOWN
- 3rd CUP UP

FORK: VIEW FROM BOTTOM

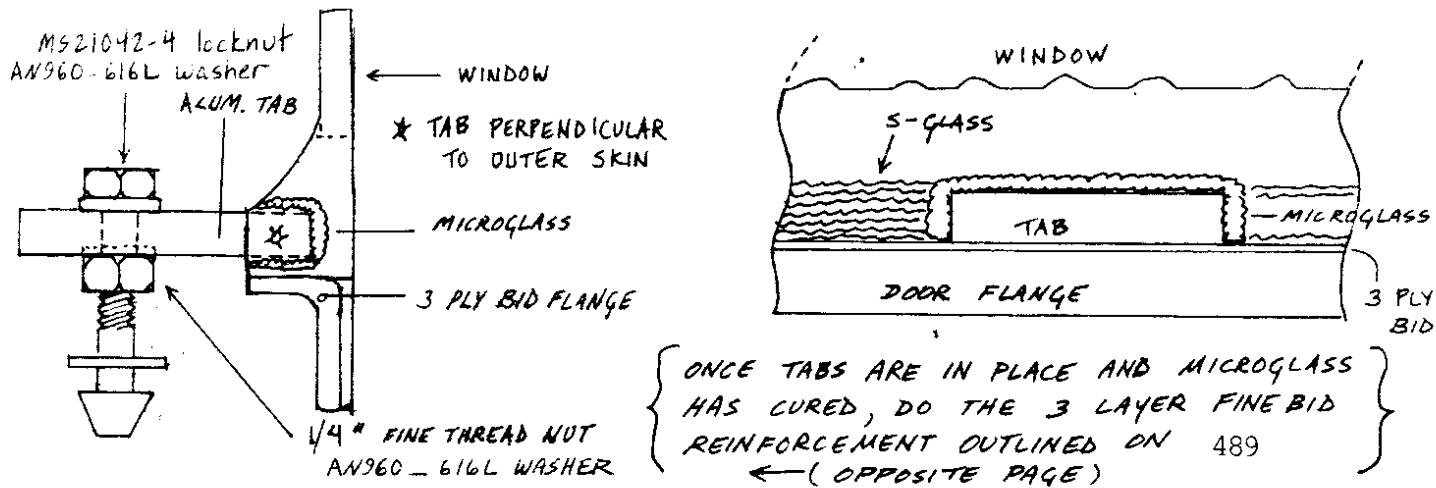




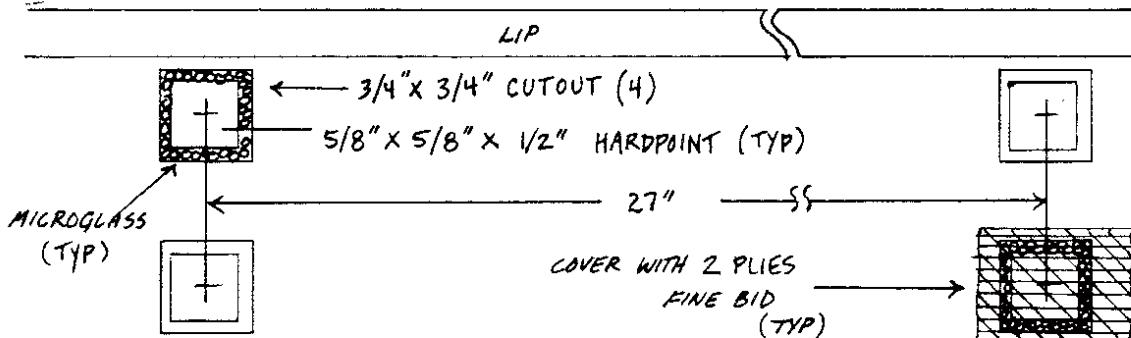
This is a new reinforcement. Cut a notch in the center of each piece of cloth so that it will slip over the tab (see below)



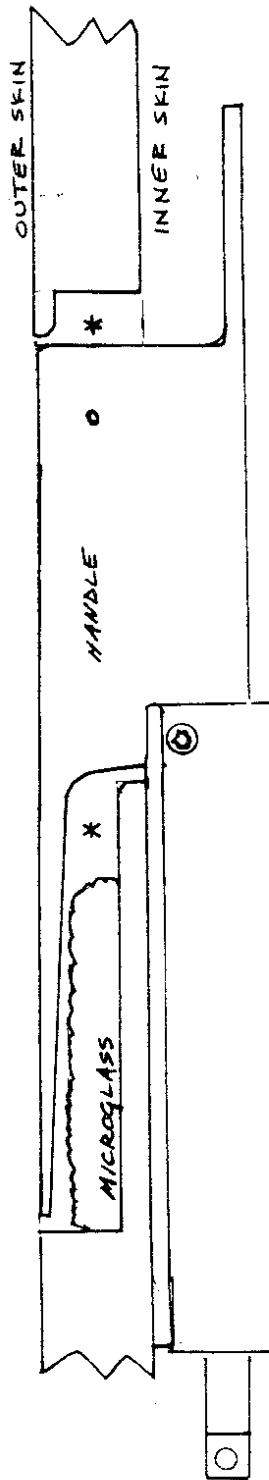
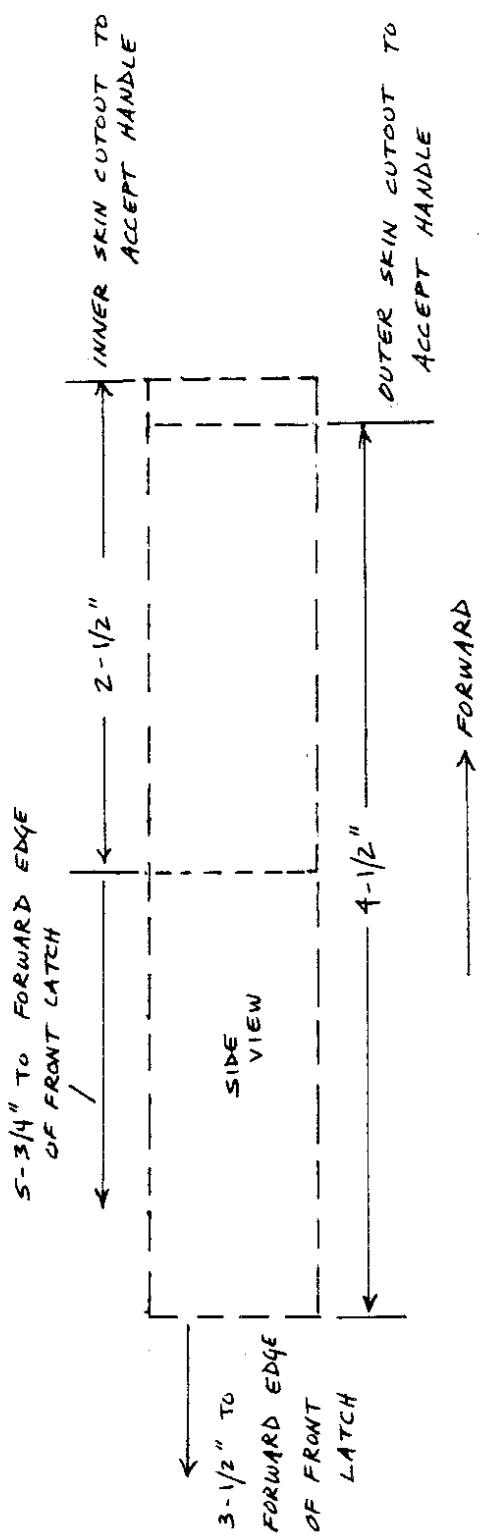
The latch system is installed once the two fuselage halves are mated together and the fuel strakes are in place. Begin by installing the 1-1/4 X 1-1/2 X 1/4 aluminum latch pin tabs in the door, 27" center to center, and 5-1/2" from each end. These are installed right behind the three-ply BID flange, perpendicular to the outside skin. Use genemid microglass for the installation. Locate the areas where they get installed and remove the inner skin, foam, and S-Glass roving down the outer skin. Sand the outer skin, the BID flange, and the aluminum tab, and microglass it into place. Let cure...



Following cure, install the latch pins into the slot with a 1/4" fine thread nut, (2)AN960-616L washers, and a MS21042-4 locknut. Take your latch assemblies inside the fuselage and close the door. Locate your latch positions, fore and aft, directly below the pins. The jaws should be level with the edge of the flange on the fuselage when held in the fully open position. Mark the position of the mounting holes on the inner fuselage skin. Remove a 3/4" square area of inner skin and foam down to the outer skin. Sand the outer skin and install the four 5/8 X 5/8 X 1/2 aluminum hard points with GENEMID MICROGLASS. Cover with 2 plies of FINE BID. Let cure..



After cure, relocate the latch assembly mounting holes. Drill and tap the hard points out to 10-32, and install the latch assemblies with (2)AN3-11A bolts and AN960-10L washers. Sometimes a shim between the fuselage and latch assembly



* LAY UP A LAYER OF BID
OVER THE EXPOSED FOAM

TOP VIEW

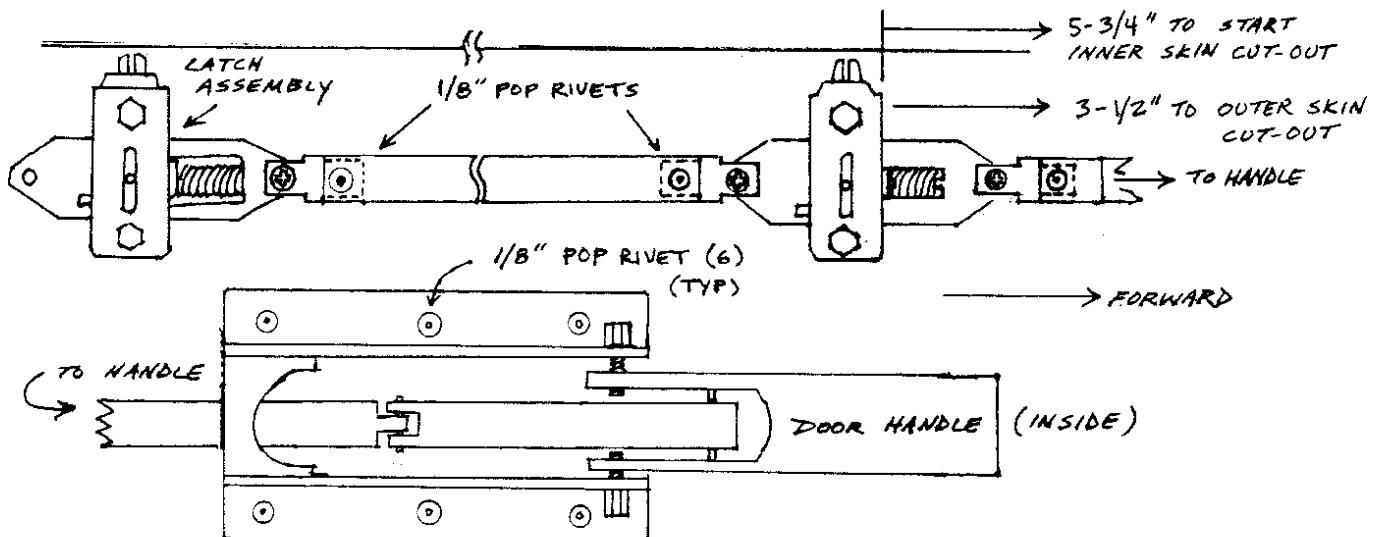
SECTION 4

CANOPY LATCH

is needed to improve operation. ONCE LATCHES ARE IN PLACE, DO NOT CLOSE THE DOOR UNLESS THERE IS SOMEONE INSIDE. HAVING TO BREAK A WINDOW TO GET IN IS NO FUN.

Get inside the plane and check the operation of the latches. Adjust to get proper operation. Now fit the linkage between the latches. The linkage consists of a 7/16 aluminum tube and two rod end adaptors. Cut the tube to length and install the adaptors to the ends of the tube with (2) 1/8" pop rivets at each end. Install the linkage to the latches with AN525-10R10 truss head screws and MS21042-3 locknuts. (Get it right, as there are no adjustments on this rod.)

Now it is time to install the handle assembly. The handle assembly is centered horizontally on the same plane as the linkage rod. The skin cut-out is measured from the forward side of the forward latch. The skin and foam removal is the same inside and out vertically, but staggered fore and aft. The outer skin is removed from 3-1/2" to 8" forward of the forward edge of the front latch assembly. This means that you remove an area of the outer skin to accept the outer handle only. The inner skin is removed on the same elevation, but from 5-3/4" to 8-1/4" forward of the forward edge of the front latch assembly. Trial fit the handle assembly into the hole in the fuselage and install a AN525-10R10 truss head screw and an MS21042-3 locknut (or a cleco) to join the handle assembly and the linkage rod.



Cleco the handle assembly to the inner skin and check the operation, fit, and flushness to the outer skin. When you are satisfied, sand the inner skin of the fuselage and the mating surfaces of the handle, then install to inner skin with genemid microglass and (6)1/8" pop rivets. After cure, check operation to make sure that the handle resists closing approximately 30 degrees from the outer skin. When pushed past this point, the mechanism in the handle will go over center, thus locking the door. This adjustment and fit is very critical to having a safe door latching unit.

