CHAPTER 29
REVISION LIST
(Pressurized Version)

The following list of revisions will allow you to update the Lancair IV construction manual chapter listed above.

Under the "Action" column, "R&R" directs you to remove and replace the pages affected by the revision. "Add" directs you to insert the pages shown and "R" to remove the pages.

Page(s) affected	Current Rev.#	Action	Description
29-1	PC17	R&R	Removed Section M.
29-2	0	None	
29-3	PC18	R&R	Added two parts.
29-4	0	None	
29-5	PC14	R&R	Edited Fig. 29:A:1.
29-6	PC10	R&R	Edited dimensions in Fig. 29:A:2.
29-7 thru 29-14	0	None	
29-15	PC14	R&R	Edited Fig. 29:B:1.
29-16 thru 44	0	None	
29-45	PC14	R&R	Edited Fig. 29:I:1.
29-46 thru 29-49	0	None	
29-50	PC18	R&R	Added text to Fig. 29:J:1.
29-51 & 29-52	PC10	R&R	Changed Fig. 29:2 & Fig. 29:J:3.
29-53	PC14	R&R	Edited Fig. 29:J:4.
29-54	PC14	R&R	Edited Fig. 29:J:5.
29-55 thru 29-57	PC13	R&R	Revised pressurization system.
29-58	PC14	R&R	Cleaned up Fig. 29:K:5.
29-59 thru 29-63	0	None	
29-64 thru 29-65	PC17	R&R	Deleted Section M.
29-66 thru 29-69	0	None	
29-70	PC18	R&R	Added text to 1st paragraph.
29-71	0	None	
29-72	PC13	R&R	Changed Fig. 29:P:1.
29-73	PC13	R&R	Edited Fig. 29:P:2 and paragraph P4.
29-74 thru 29-81	0	None	
29-82	PC12	R&R	Edited page.

CHAPTER 29
INTERIOR PANELS
(PRESSURIZED VERSION)

REVISIONS

From time to time, revisions to this assembly manual may be deemed necessary. When such revisions are made, you should immediately replace all outdated pages with the revised pages. Discard the out dated pages. Note that on the lower right corner of each page is a "revision date". Initial printings will have the number "0" printed and the printing date. All subsequent revisions will have the revision number followed by the date of that revision. When such revisions are made, a "table of revisions" page will also be issued. This page (or pages) should be inserted in front of the opening page (this page) of each affected chapter. A new "table of revisions" page will accompany any revision made to a chapter.

ARROWS

Most drawings will have arrows to show which direction the parts are facing, unless the drawing itself makes that very obvious. **"A/C UP"** refers to the direction that would be up if the part were installed in a plane sitting in the upright position. In most cases the part shown will be oriented in the same position as the part itself will be placed during that assembly step. However, time goes on and changes are made, so careful attention should be paid to the orientation arrows.

CONTENTS

1. INTRODUCTION

This chapter will not only deal with the cosmetic interior panels, such as foot rests, side panels, and arm rests, it will also get into many of the pressurization essentials, such as the pressure bulkhead, outflow valve, pressure compensator, and control pushrod seals. These are important steps to safely pressurize the Lancair IV.

While you can customize and modify the foot rest positions, side panel shapes, and other non structural panels, we ask that you please do not modify the pressurization structure. These pieces are a result of much testing here at Lancair. Modifying the pressure bulkhead location, for instance, may cause increased stresses in other parts of the pressurized cabin, resulting in failure.

2. PARTS

	Top seat back (#1036-1P)	Seat Bottom	(P/N 1051P)
	Bottom seat back (#1036-2P)	Firewall Rib	(P/N 1052P)
	Clark foam, 1/2" thick, 24" x 96"		
	1/8" thick, Divinycel, 1 ply per side		
8	K1000-3 nutplate		
294	AN426A3-5 rivet		
16	AN3-4A bolts		
95	AN3-5A bolts		
280	AN960-10 washers		
26	AN525-832-R10 screws		
70	K1000-08 nutplates		
1	Gear leg cover (1038-1)		
6	MSC-32 pop rivets		
1	Fwd tunnel, white plastic (1042)		
1	Aft tunnel, fiberglass or white plastic (1045)		
24	AN525-832-R7 screws		
2	707-01 seat belt w/shoulder harness		
2	707-01 seat belt , no shoulder harness		
5	AN6-6A bolts		
1	AN364-624A locknuts		
4	AN5-5A bolts		
2	AN364-524A locknuts		
4	AN365-624A locknuts		
8	AN960-616 washers		
2	AN365-524A locknuts		
2	AN960-516 washers		
2	AN5-6A bolts		
2	AN970-5 washers		
1	Outflow valve, Dukes (Model#5022-00-1)		
1	Outflow valve bucket, fiberglass (1043)		
6	AN525-10R10 screws		
12"	1/4" D. x .035" wall, 5052-0 alum. tube		
2	AN819-4D fitting		
2	AN818-4D fitting		
1	AN924-4D nut		
1	AN832-4D bulkhead fitting		
12"	2 1/2" D. x .049" wall, 6061-T6 alum. tube		
4	PR409 rubber boot seal		
12	Tie wraps		
24"	RC1023 rubber grommet material		
4	417-02 flanged sleeve		
10	91251A-196 Allen head screws		
2	Rear spar covers (1046)		

114	RS313 reinforcement plates
10	MS24694-S56 screws
60	MS24694-S54 screws
10	MS24694-S53 screws
55	MS24694-S52 screws
120	AN365-1032A locknuts

Parts for pressure compensator:

4	AN316-4 check nut
2	AN4-4A bolt
16	AN960-416 washers
1	AL206-01 connecting rod
1	F34-14 rod end bearing
4	AN365-428A locknuts
2	AN310-4 castle nut
2	MS24665-140 cotter pin
2	AN4-10 bolt
1	419-04 housing
2	419-01 piston
2	419-08 guide rod
4	TS4 linear bearing
2	419-03 bushing
2	PR409 rubber boot
2	417-02 retaining sleeve
16	91255A146 screws
16	AN960-6 washers
16	MS21042-06 nut
6"	.75" x .75" x 1/8", 6061-T6 alum. angle for TMS60-154 bridge
2	Tie wraps
2	98409A151 circlips
1	EL-056-02-02 tab
1	AN4-11A bolt
1	PH250x2x2 phenolic
10 ft.	5268K13 plastic hose
1	AN838-4D bulkhead fitting
1	AN924-4D nut
1	AN842-4D fitting
2	5321K16 hose clamps

3. CONSTRUCTION PROCEDURE

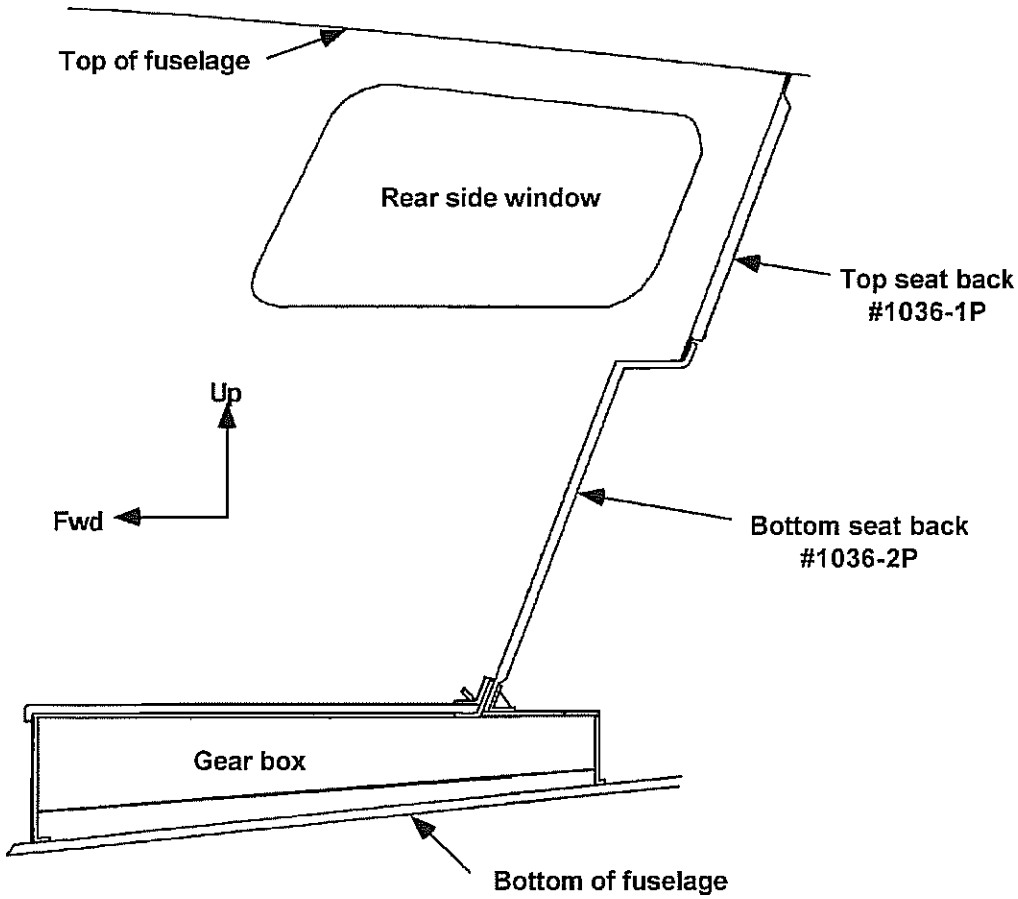
A. REAR SEAT BACK (PRESSURE BULKHEAD)

The rear seat back of the Lancair IV also doubles as the pressure bulkhead. This bulkhead consists of a top and bottom section, both of which are removeable.

Do not alter the design of the pressure bulkhead in any way. This is an integral part of the pressurization structure and a result of much testing here at Lancair.

To complete the rear seat back, the top shell of the fuselage must be attached to the bottom, but it does make forming the mounting flange easier if the top and bottom fuselage shells are separated. Whether you have joined the top and bottom shells or not, we will note in this section at what point you must join those two pieces.

Lancair IV rear seat back/pressure bulkhead
Figure 29:A:1



A1. Trim the bottom edge of the bottom seat back to the premolded scribe line. This scribe line should be about 3" from the bottom edge of the core.

NOTE: When trimming the top and bottom sections of the seat back, do not trim any closer than 2" from the start of the core material. This will provide plenty of room for the large flange which the seat back mounts to.

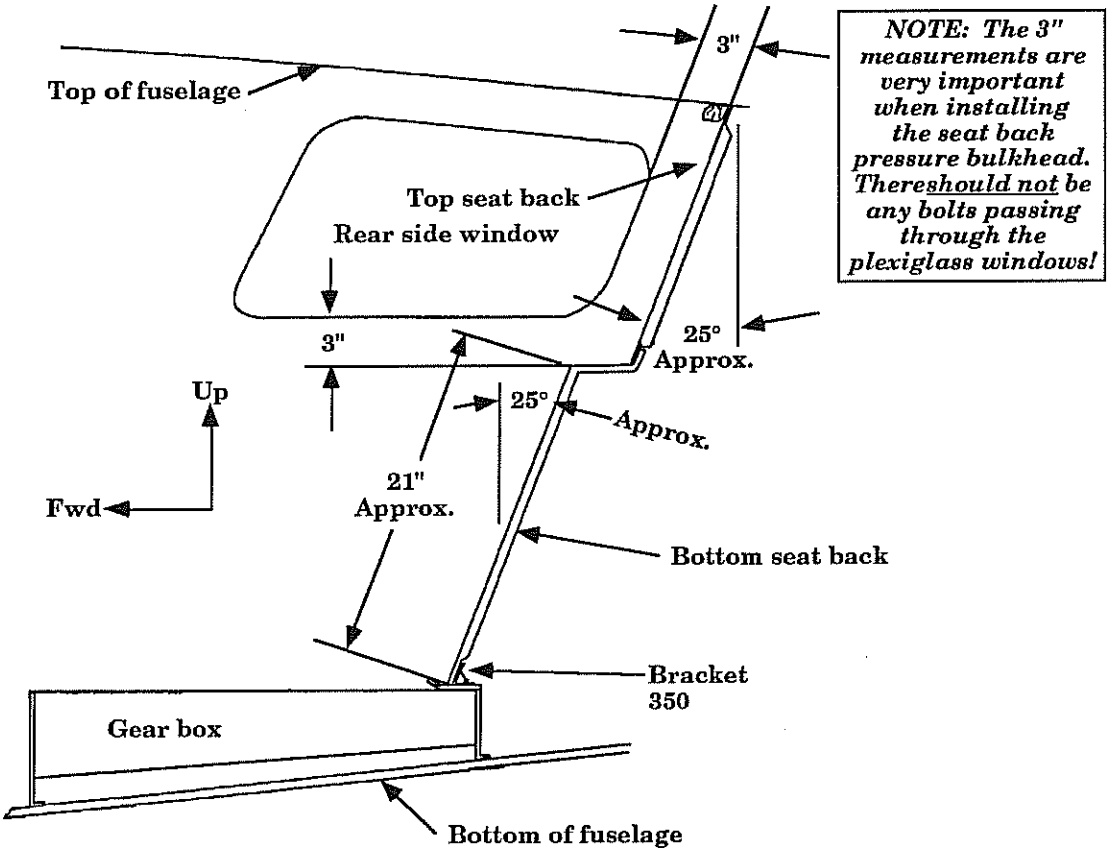
A2. Position the bottom seat back in the fuselage, resting against the aft face of the angled gear box flange. The bottom seat back will rest on the center seat belt attachment plate. Angle the seat back 25° aft of vertical. The top edge should be level, left and right. Try to trim the seat back to within 1/4" of the fuselage sides.

A3. Temporarily secure the bottom seat back to the fuselage with instant glue and a few wood blocks. Do this from the FWD side of the seat back because you will be forming a mounting flange against the aft side.

A4. Position and fit the top section of the seat back. It has the same 25° aft angle as the bottom section. Top seat back rests against the fwd face of the bottom seat back so the top section can be removed separately. See Figure 29:A:2. Place wood blocks against the fwd face of the top seat back section, and glue those blocks to the fuselage. Do not glue the blocks to the top seat back as it will be removed.

Positioning bottom and top seat back

Figure 29:A:2



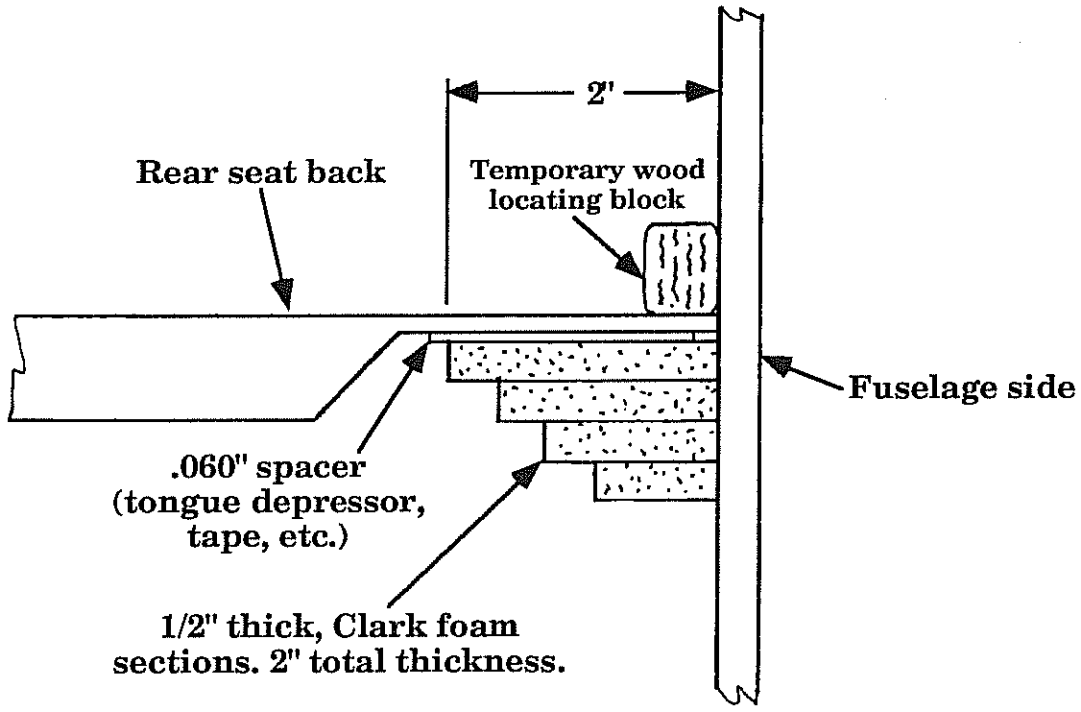
A5. Remove the top seat back section.

A6. The mounting flange for the seat back/pressure bulkhead consists of 6 BID wrapped over a foam core. Starting with the bottom section of the seat back, cut and fit lengths of 1/2" thick Clark foam as shown if Figure 29:A:3. Notice that these foam pieces are NOT resting flat against the top and bottom seat backs, but are spaced about .060" behind seat backs. This gap is to accomodate the 6 BID that will be laid onto the foam. Use tongue depressors, duct tape, or what have you, as spacers between the seat backs and the foam. There are four layers of Clark foam in the flange to give a 2" thick final depth. The flange should be at least 2" wide (where the seat backs rest against it).

NOTE: This is one area where it is obviously a little easier to complete if the top and bottom fuselage shells are not attached. You can fit, sand , and glass the foam cores without the top and bottom shells together, then go ahead and do the final fuselage closeout. The flanges can be spliced together with the proper number of BID when the fuselage is closed.

A7. Bond the foam pieces to the fuselage and each other with a thin epoxy/micro mixture.

Forming seat back flanges
Figure 29:A:3



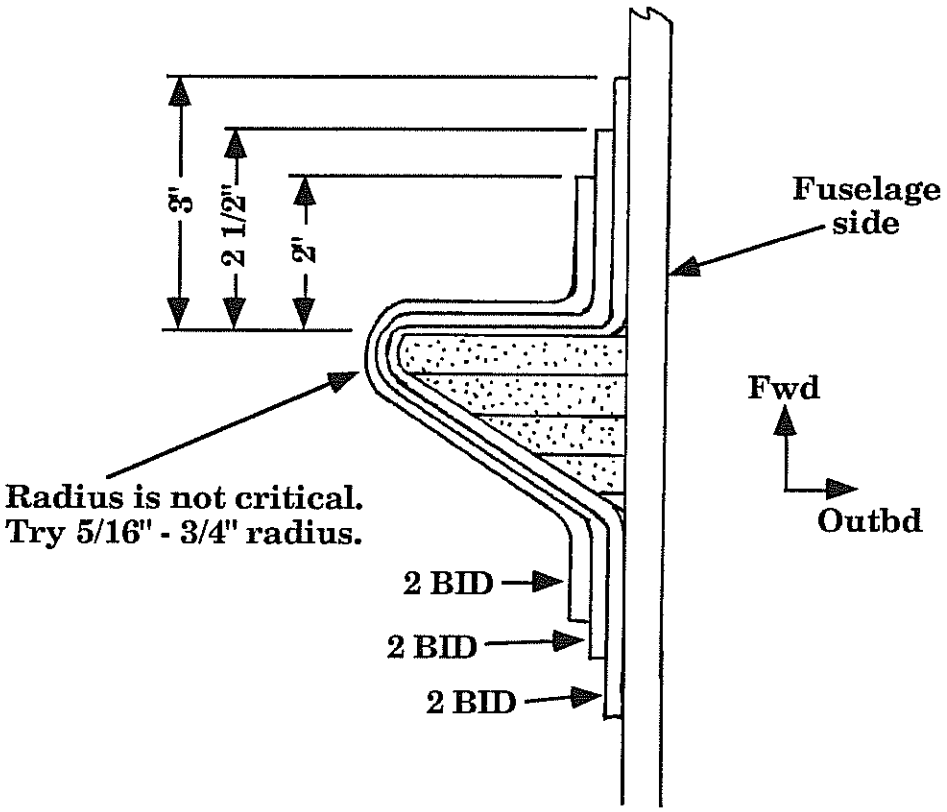
A8. Sand and shape the foam pieces to form the core of the flange. Try to keep a 1 1/2" flat area on the fwd surface of the foam core for the seat backs to mount against.

A9. Sand and clean the laminating areas of the fuselage shells 3" fwd and aft of the foam core.

A10. Apply a generous micro radius in the corners where the foam core meets the fuselage shells. Again, try to keep the 1 1/2" flat mounting surface for the seat back.

A11. Apply 2 BID to the foam core of the mounting flange, extending 3" onto the fuselage shells both fwd and aft of the foam. While this laminate is still wet, apply another 2 BID, overlapping only 2 1/2" onto the fuselage shells. And last but not least, apply another 2 BID, overlapping 2" onto the shells, giving 6 BID total on the flange. See Figure 29:A:4.

Applying 6 BID to foam core of flange
Figure 29:A:4



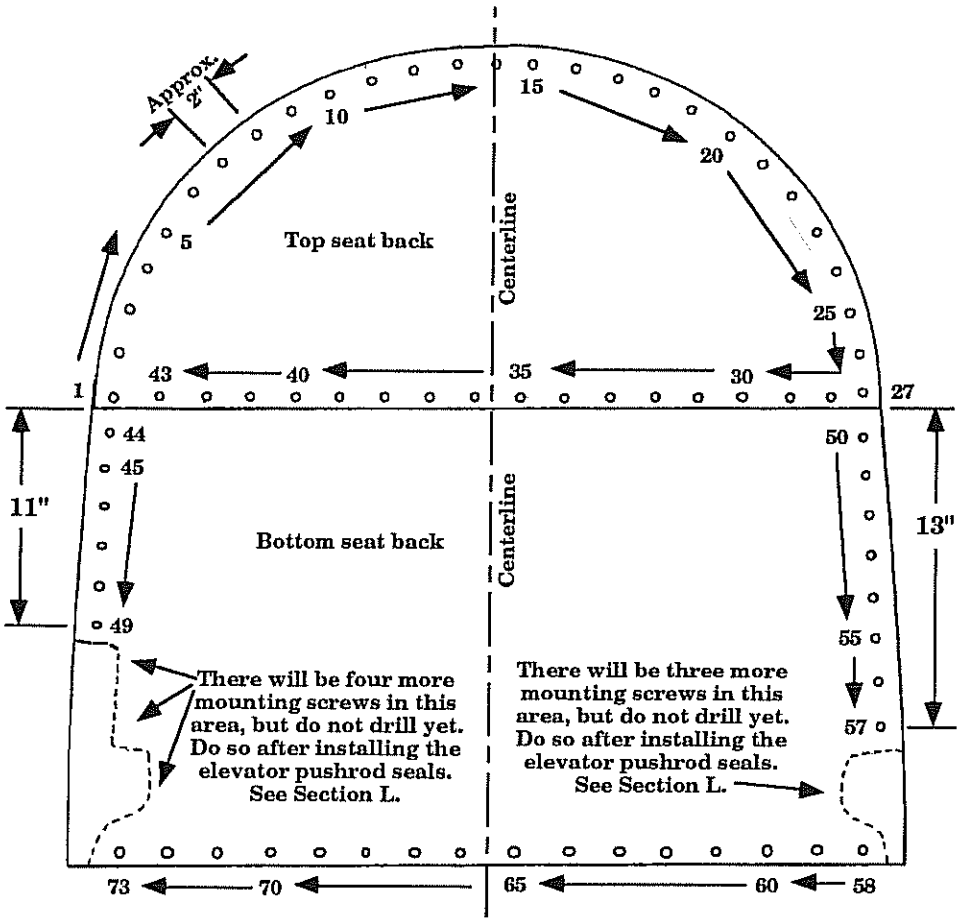
NOTE: If you have not already done so, now is the time to join the top and bottom fuselage shells, before continuing with this section. You will be drilling for the seat back mounting screws and you would not want any misalignment caused by bonding the shells together.

A12. Slide the bottom seat back into position. It should rest against the aft face of the gear box flange and the fwd face of the 6 BID, foam core flange (no need for the .060" spacer anymore). Drill 3/16" Dia. holes through the bottom seat back and mounting flange. Use a long drill so you can extend the holes all the way through the foam core flange and out the aft face. (These are hole numbers 44 - 57 in Figure 29:A:5).

A13. Place the top seat back in position and drill 3/16" dia. holes through it and the foam core flange as you did on the bottom seat back (hole numbers 1 - 27 in Figure 29:A:5). Also drill 3/16" dia. holes along the edge where the top and bottom seat backs join (hole numbers 28 - 43 in Figure 29:A:5).

Mounting screw locations for seat back

Figure 29:A:5



A14. To secure the seat back sections to the foam core flange, nutplates must be secured to the fwd 6 BID laminate. Of course, this will require removal of the foam core locally around each mounting bolt hole. Use a 1.25 - 1.5" diameter hole saw and drill from behind the flange, removing the aft 6 BID and the foam core ONLY. Do not drill through the fwd 6 BID laminate. Do this at each hole location. See Figure 29:A:6.

A15. On a flat table with release tape on it, lay up a 4 BID laminate, enough to cut up into fifty, 1 1/4" x 3/4" pieces.

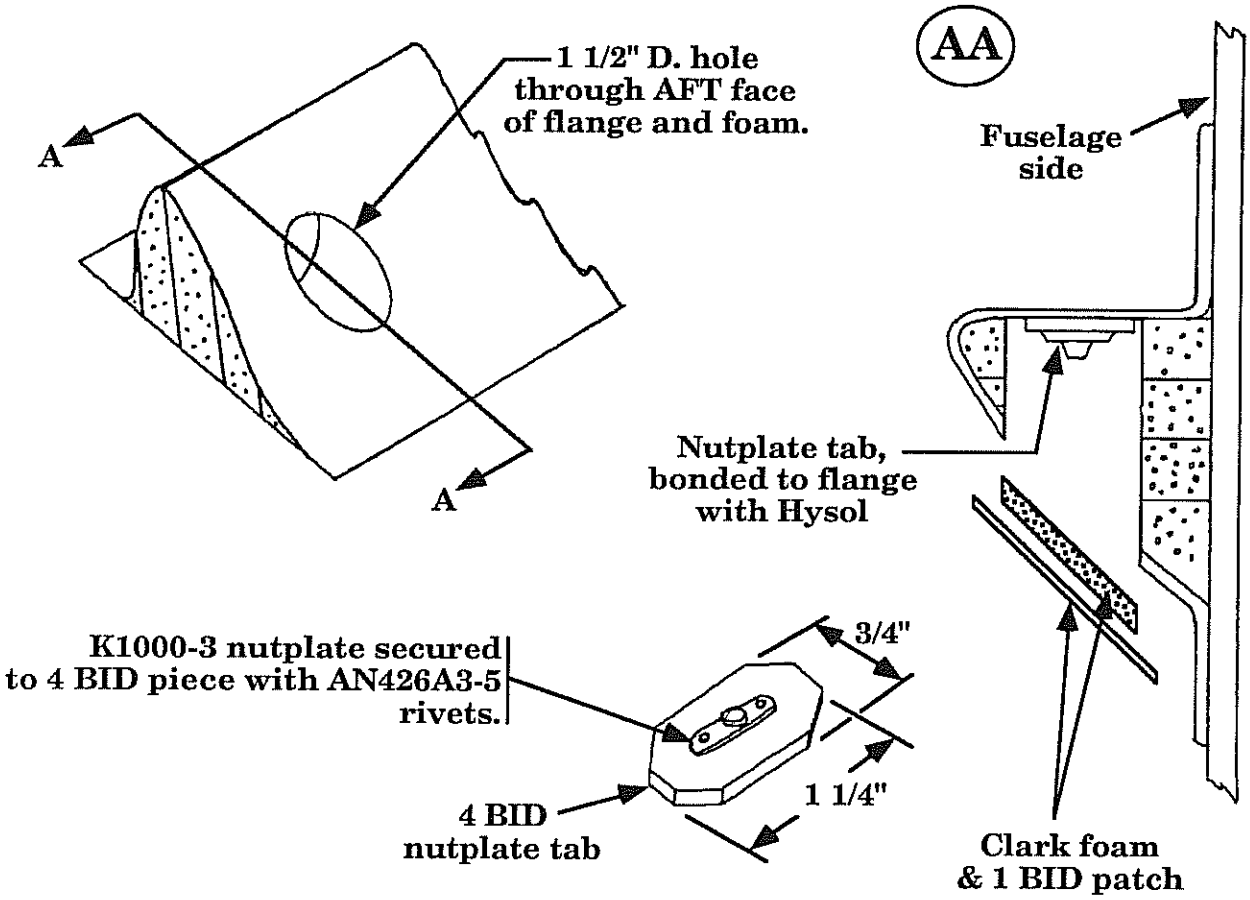
A16. When the 4 BID has cured and you have cut it into the fifty pieces, drill a 3/16" dia. hole through the center of each piece. Install a K1000-3 nutplate to each of these 4 BID pieces, centered on the hole. Use AN426A3-5 rivets to secure the nutplate. Trim the corners of the 4 BID pieces so that they can be fit into the circular holes in the flange.

A17. Use Hysol to bond the 4 BID nutplate tabs into the seat back flange, aligning the 3/16" D. holes in the flange to the nutplates. Hold the 4 BID nutplate tabs in position with an AN3 bolt. The pressure bulkhead/seat back is installed using AN3-5A bolts with AN960-10 washers under the bolt heads. A number of AN3-4A and AN3-6A bolts are also provided because builder variances could dictate a slightly shorter or longer bolt length.

A18. Cover the circular holes in the aft face of the seat back flange by potting a piece of Clark foam into each hole, then applying a 1 BID patch. This is obviously not a structural necessity, just a cosmetic patch. You could even do without the Clark foam plug if you feel inclined.

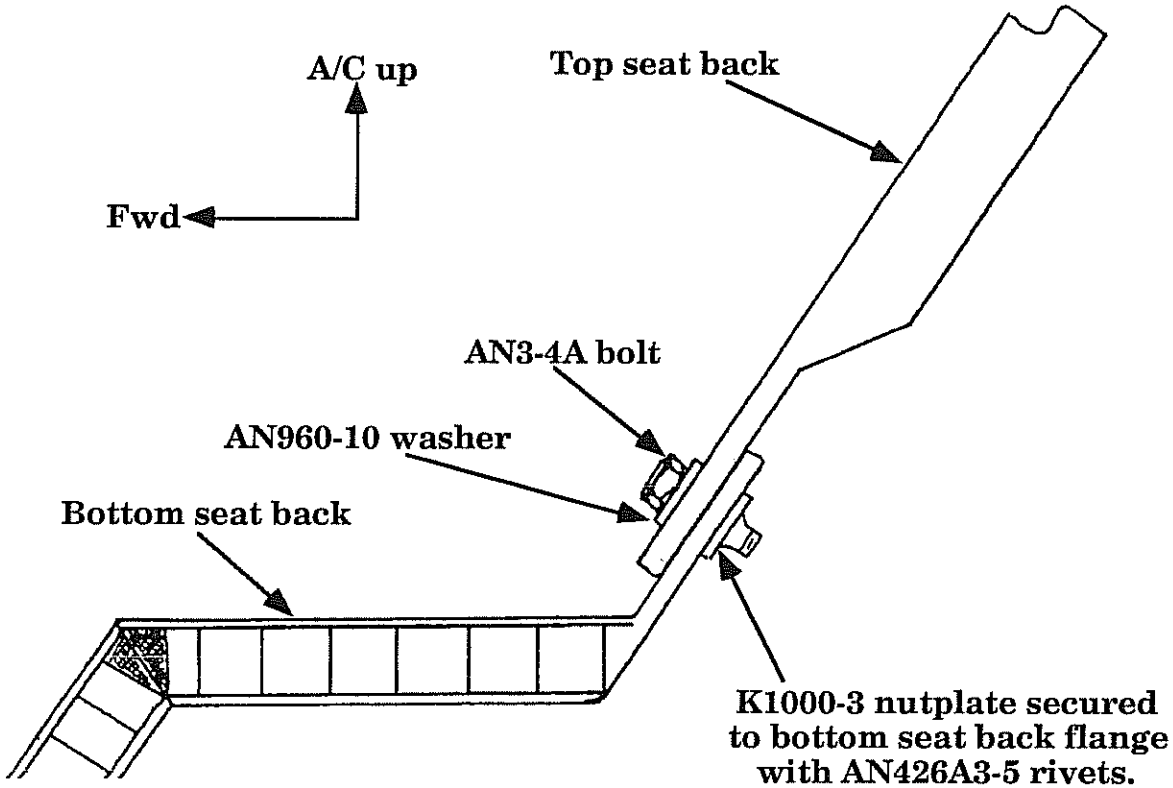
Nutplate holes in mounting flange

Figure 29:A:6



A18. Secure the bottom and top seat backs together along their adjoining edge with AN3-4A bolts and K1000-3 nutplates, as shown in Figure 29:A:7.

Bottom and top seat back junction
Figure 29:A:7



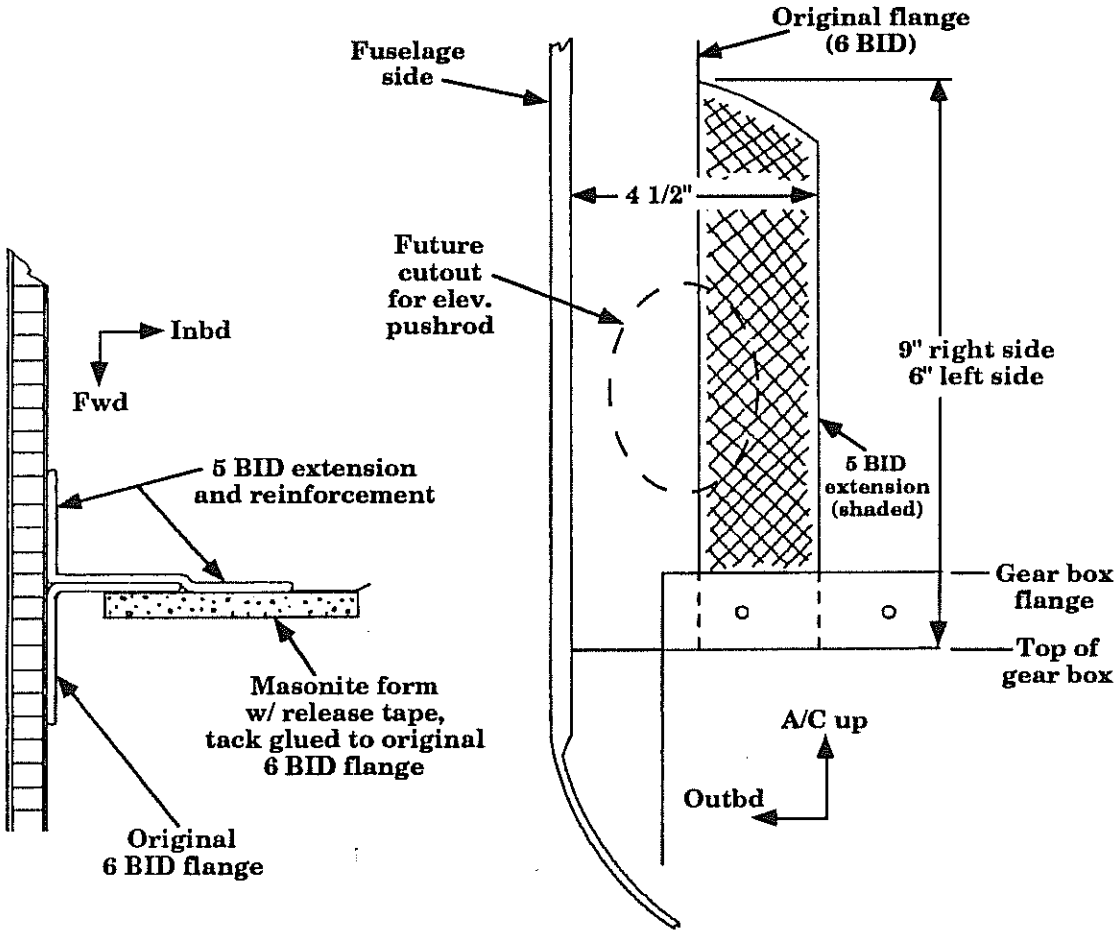
A19. Remove the aft laminate and foam core of the RIGHT side seat back flange 9" above the top of the gear box. Leave the flat surface of the fwd laminate intact. This coreless area will be the mounting area for the elevator pushrod seal tube and the two brake line bulkhead fittings. Remove the core similarly on the LEFT side seat back flange, but only to 6" above the gear box.

A20. Cut a 10" x 5" (7" x 5" for left side) piece of masonite and apply release tape to one surface. With the release surface facing aft, tack glue the masonite to the fwd face of the seat back flange, just above the gear box. This will act as a mold for the 5 BID extension in the next step.

A21. Enlarge the right seat back flange to 4 1/2" wide, 9" up from the gear box (6" on the left side), with a 5 BID laminate. The 5 BID covers the entire aft face of the flange (no core) and extends 2" onto the fuselage side. The 5 BID also extends onto the release surface of the masonite enough to get the required flange width.

Extending the flanges with 5 BID

Figure 29:A:8



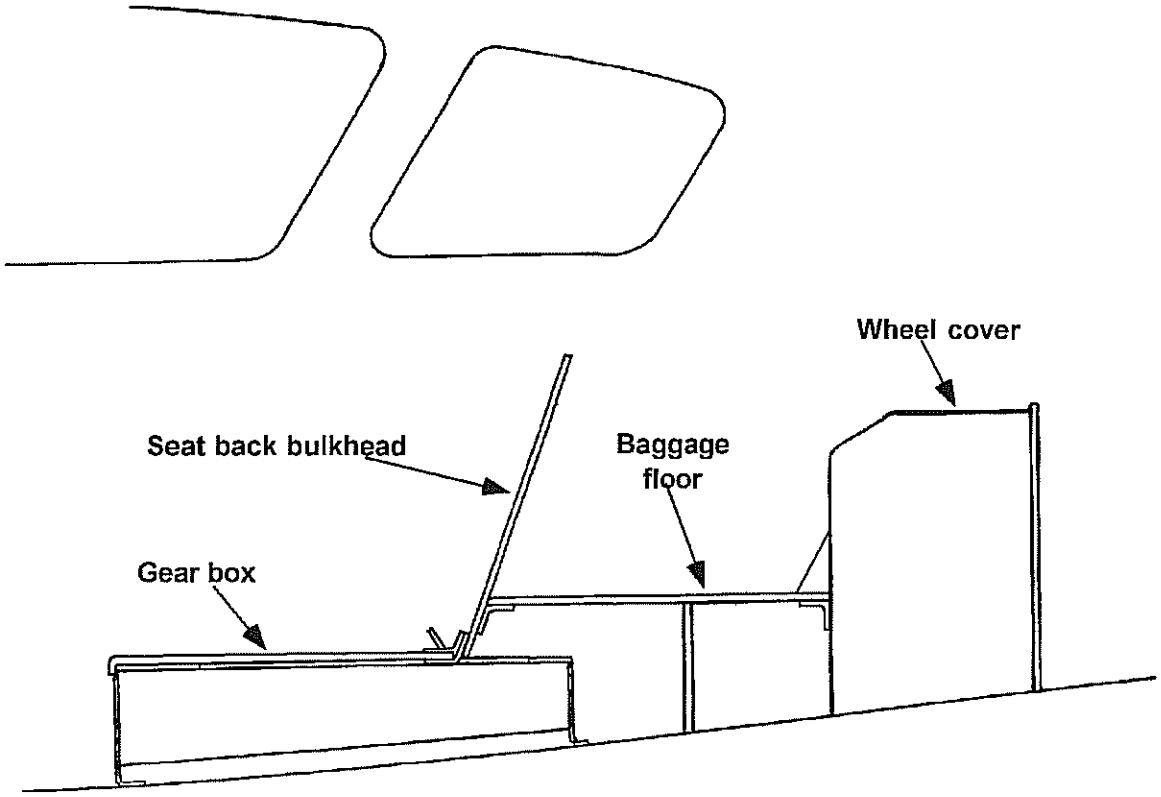
A22. A few more mounting bolts are needed to complete the pressure bulkhead installation. The location of these bolts will be given in the "Elevator pushrod seals" section of this chapter.

A23. You may now (at long last) complete the brake system by installing the two AN832-4D bulkhead fittings through the seat back flange. Refer back to Chapter 23, pages 23-25 and 23-26 for installation of these fittings. Just a reminder, though, the fittings should be centered 7" and 8 1/2" above the gear box and 1" inbd of the fuselage shell. The bottom seat back will require trimming around both the brake fittings and the elevator pushrod seals, but this can wait until the seal tubes are installed.

B. BAGGAGE FLOOR

The floor of the baggage compartment both covers the landing gear and supports the baggage. The two piece floor is removeable for landing gear maintenance.

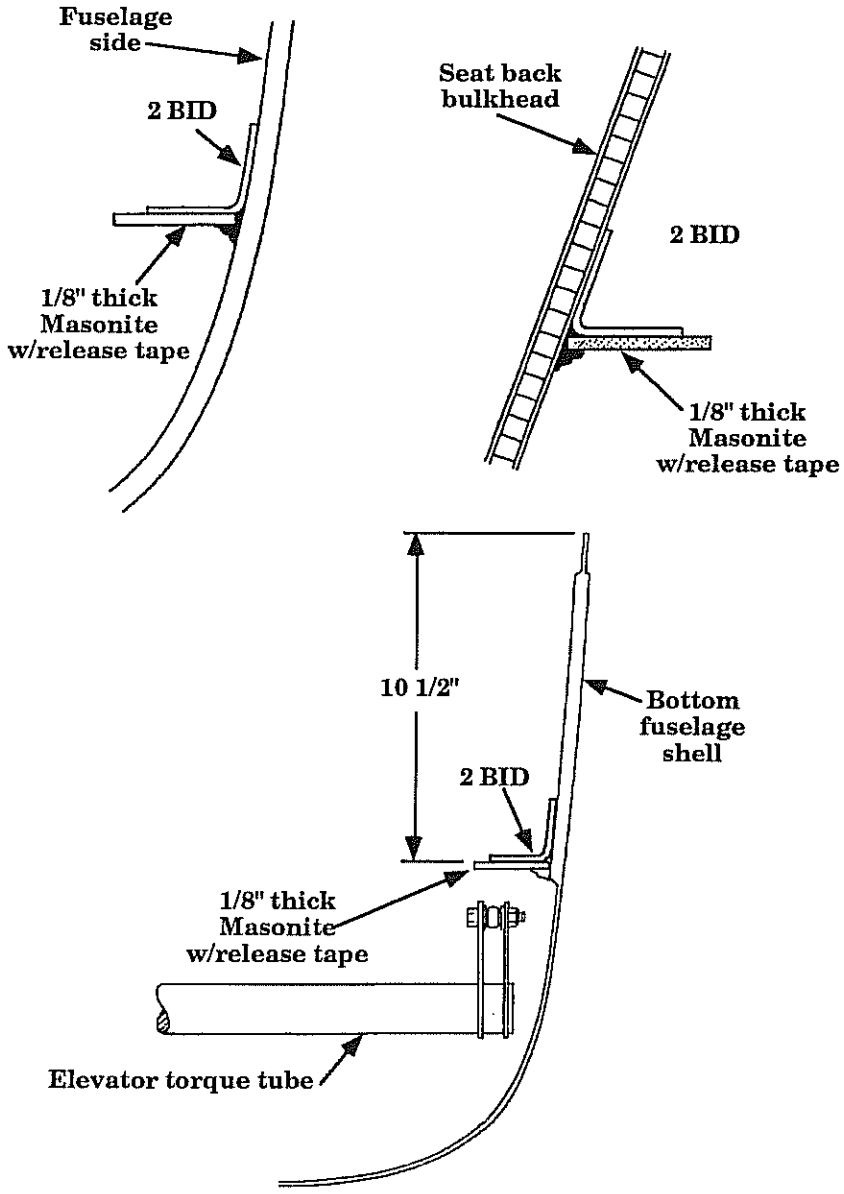
Baggage floor
Figure 29:B:1



B1. A flange is needed around the perimeter of the baggage floor to support its weight. The flange is most easily formed by tack gluing straight pieces of masonite to the fuselage, seat back, and wheel wells under the flange areas. Apply release tape to these masonite pieces.

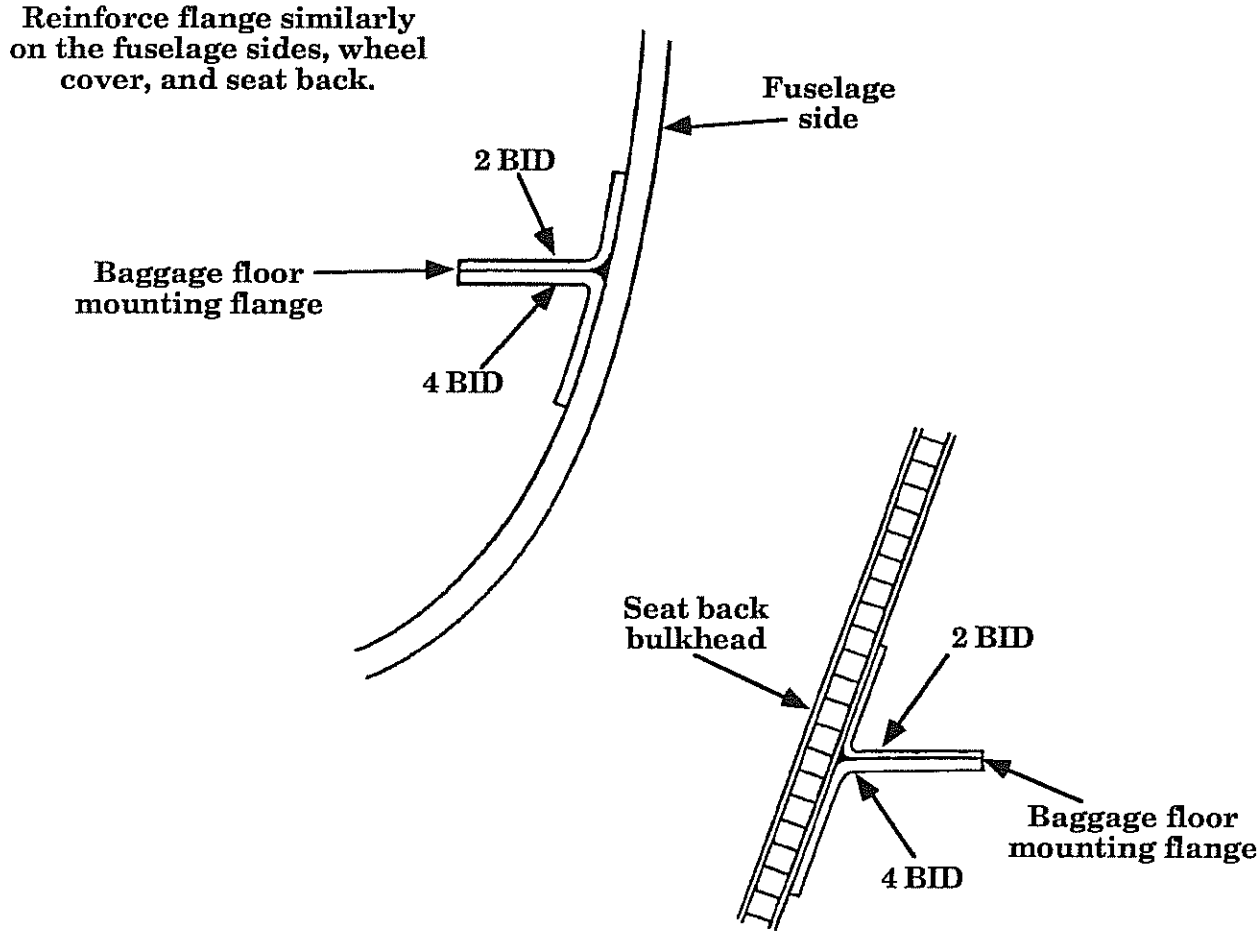
B2. Apply 3" wide, 2 BID, overlapping 1 1/2" onto both the masonite and the fuselage sides, wheel wells, and seat back. When the 2 BID has cured, remove the masonite.

Laying 2 BID onto masonite
Figure 29:B:2



B3. Apply 4 BID, 3" wide to the bottom of the 2 BID flange formed in Step B2. Overlap the 4 BID 1 1/2" onto the fuselage sides, seat back, and the wheel well. Be sure to sand and clean all areas where BID is applied.

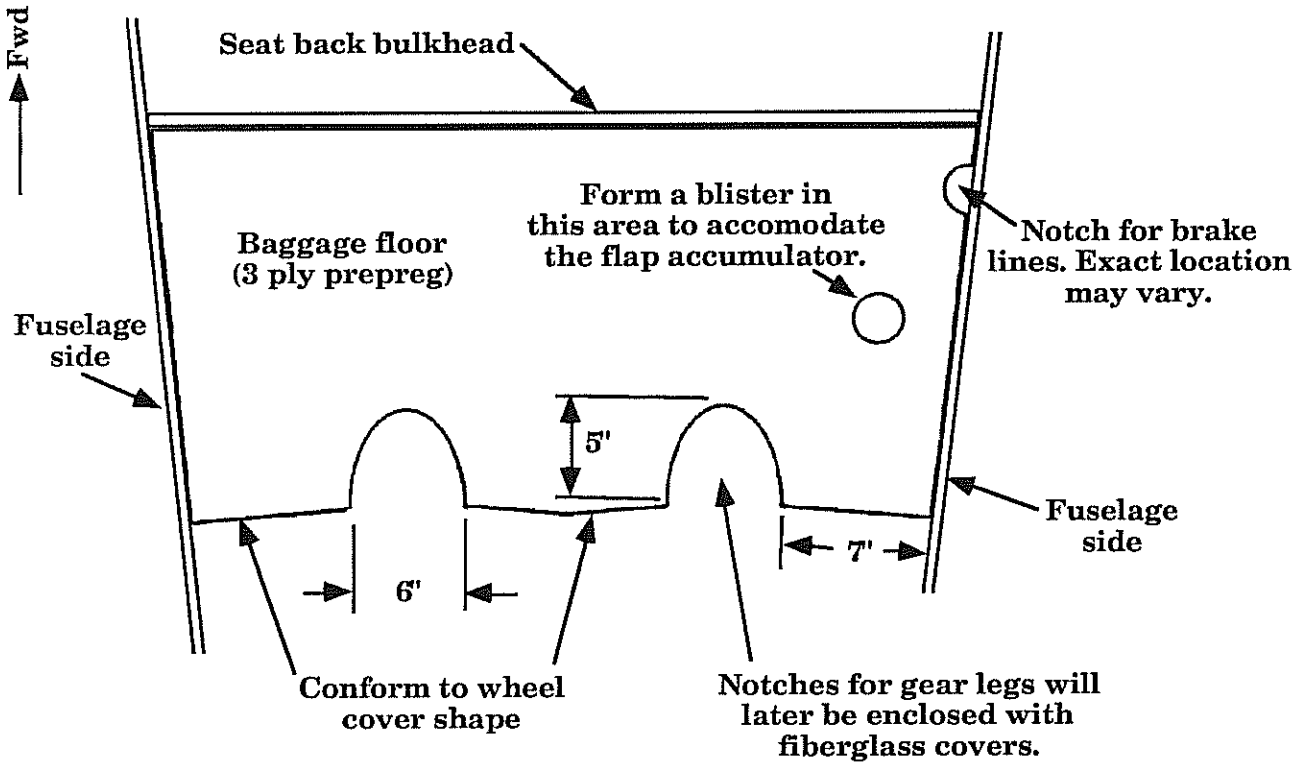
Applying 4 BID to baggage floor flange
Figure 29:B:3



B4. Trim the baggage floor flange to 1 1/4" wide.

B5. From 3 ply per side, 1/4" thick prepreg, cut out a baggage floor panel. A good cardboard template, prefit to fit nicely on the flange is a valuable tool for this step. Figure 29:B:4 references some of the key areas of the baggage floor, but the overall size will be a custom fit to your plane. You will have to form a blister from 3 or 4 BID to cover the very top of the flap accumulator.

Baggage floor
Figure 29:B:4

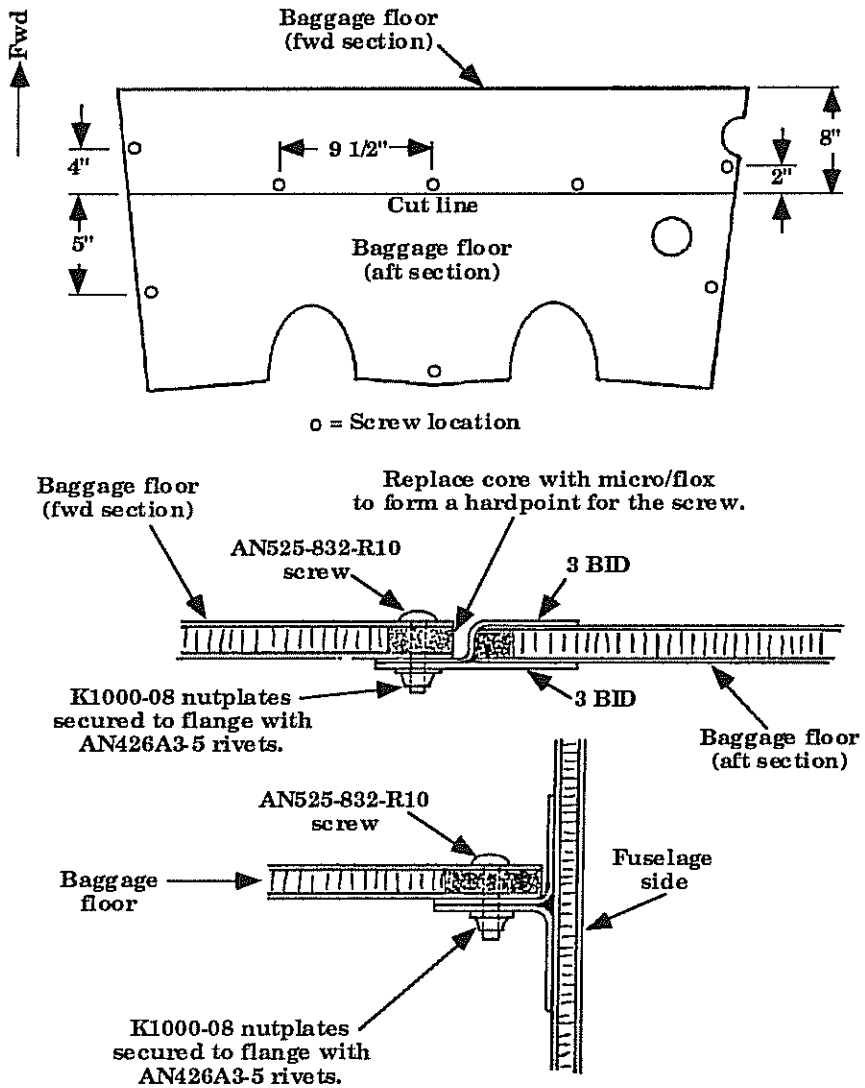


B6. To make the baggage floor easier to install and remove, cut it into two pieces 8" behind the front edge.

B7. Form a flange from 6 BID, as shown in Figure 29:B:5, which will support the fwd portion of the baggage floor.

B8. Secure the two baggage floor sections together with three AN525-832-R10 screws and K1000-08 nutplates, which are riveted to the 6 BID flange. Secure the entire baggage floor to the perimeter flange with the same screws and nutplates. Use only a couple nutplates per side. Remove the core around the screw holes and fill the troughs with a micro/flox mixture to form hardpoints. Otherwise the screws will crush the core material when tightened

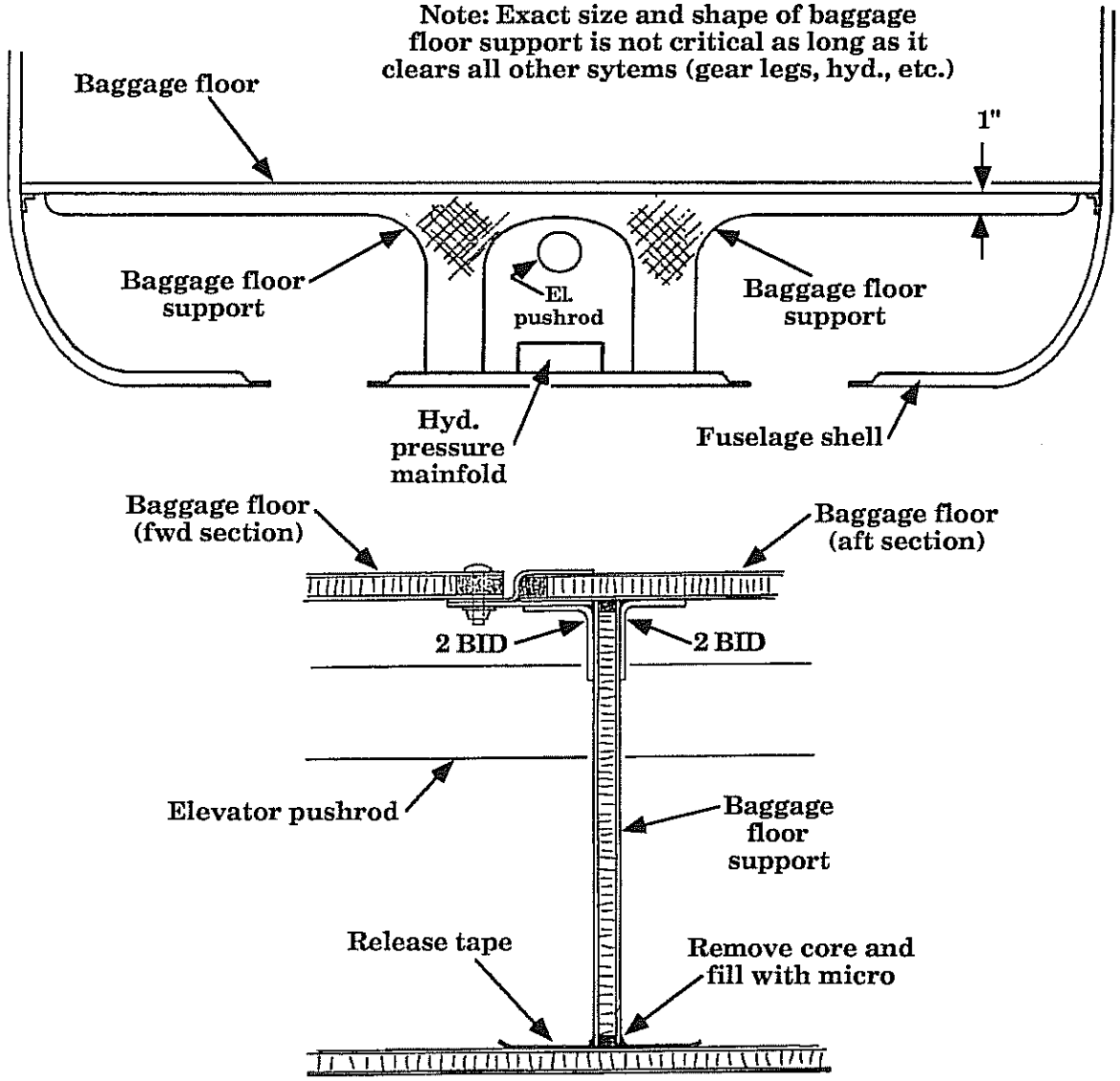
Securing baggage floor
Figure 29:B:5



B9. A support is needed under the baggage floor to prevent it from flexing under load and touching the elevator pushrod. Cut the support from 3 ply prepreg as shown in Figure 29:B:6. Secure the support with 2 BID, 2" wide to the bottom of the baggage floor, 1" behind where the floor is split.

B10. Trim the baggage floor support so it rests flat against the fuselage bottom when the baggage floor is mounted. Do a micro release against the floor so the bottom of the support is hard.

Baggage floor support
Figure 29:B:6

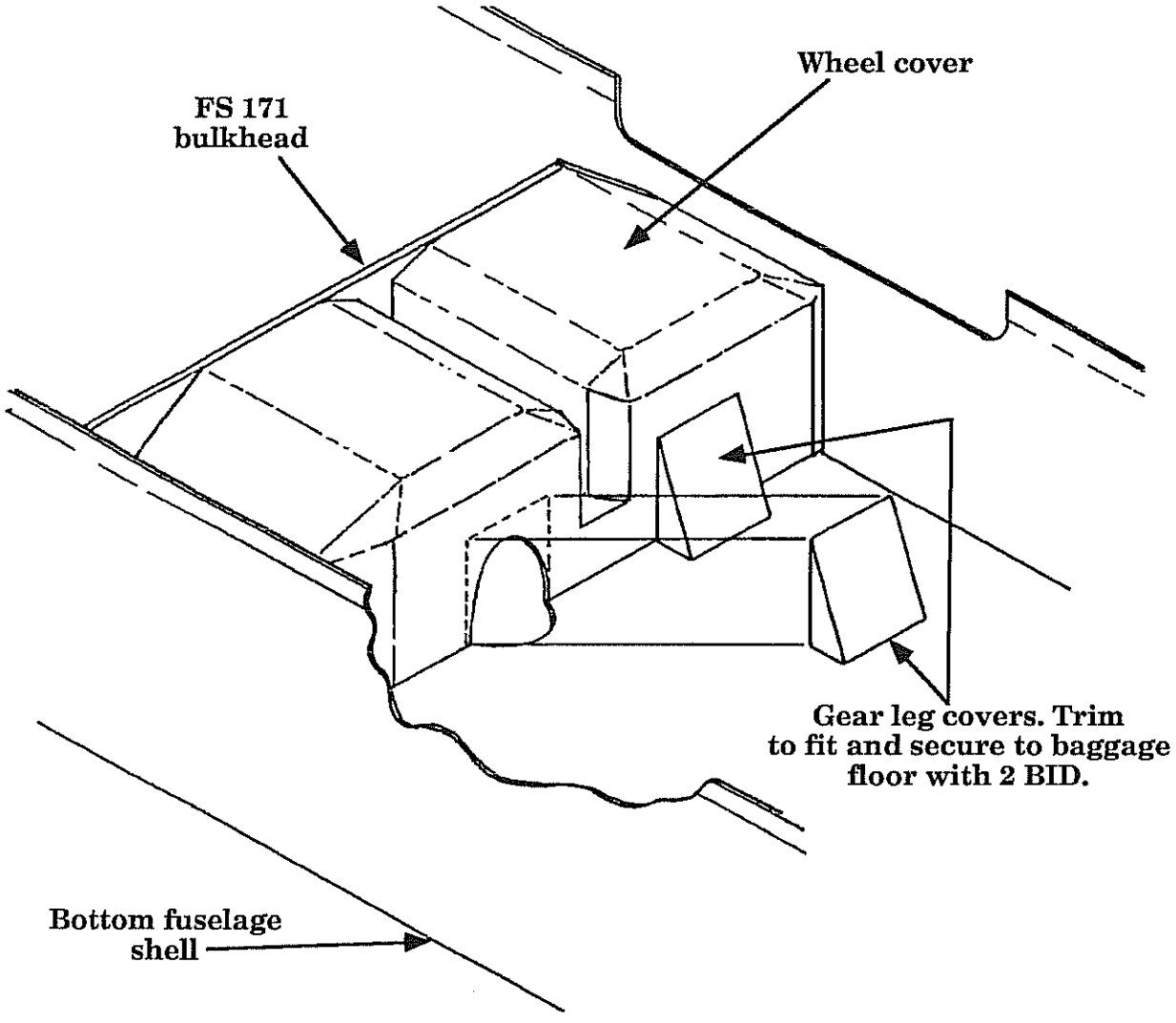


B11. To cover the gear legs where they stick out of the baggage floor, a premolded fiberglass "U" channel (#1038-1) is provided. Inside this "U" channel, you will see scribe marks to cut out two gear legs covers. Cut out the covers, as always, leaving excess material around the scribe marks for later costom fitting.

B12. Trim the gear leg covers to fit your baggage floor and wheel cover.

B13. Secure the gear leg covers to the baggage floor with 2 BID, 2" wide strips. Apply similar BID strips to the gear leg covers, overlapping onto the wheel covers, but be sure to have a layer of release tape between the the two covers. This will give a tight tolerance seal between the gear leg and wheel covers.

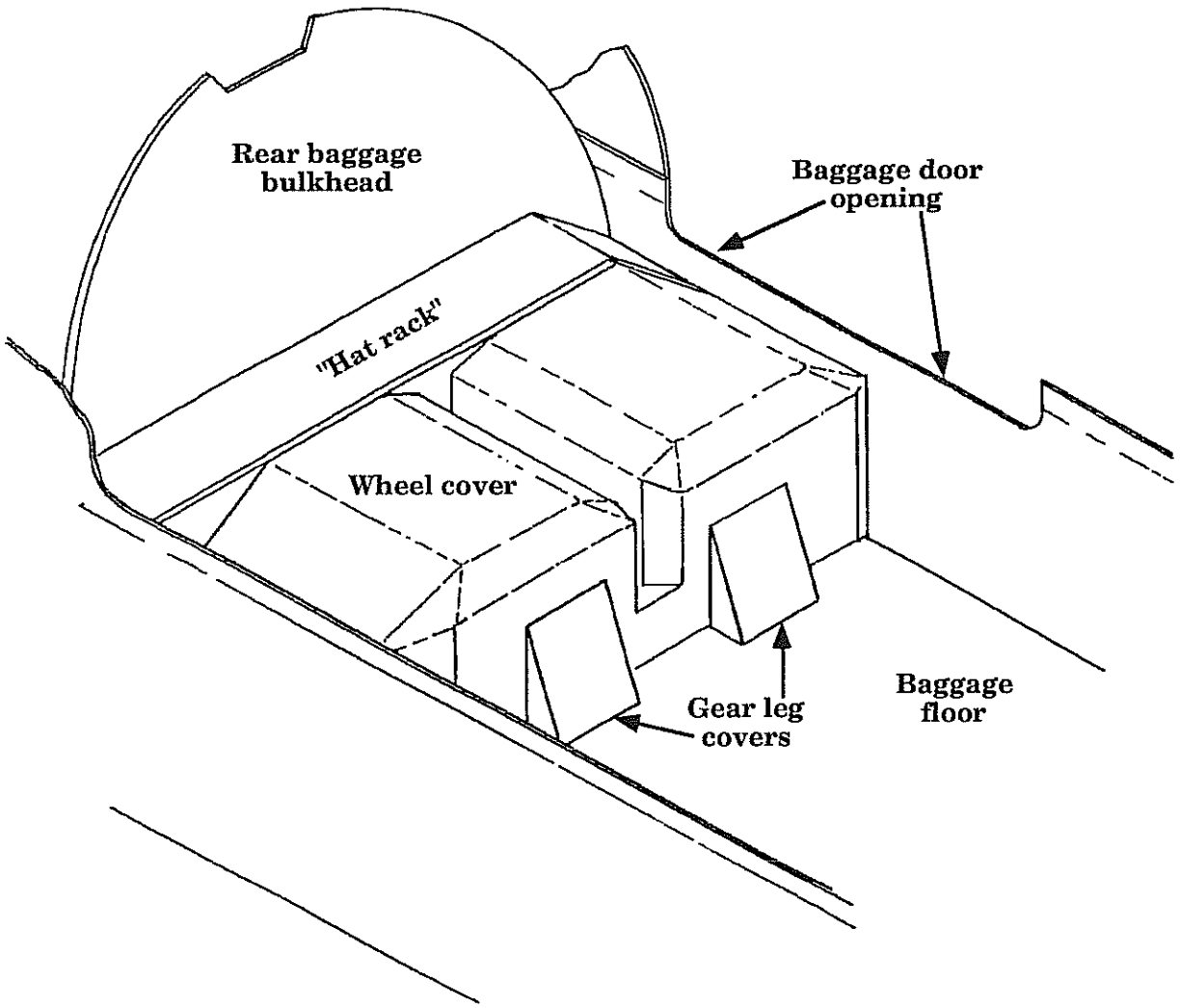
Gear leg covers
Figure 29:B:7



C. REAR BAGGAGE BULKHEAD

To close off the tail section from the baggage compartment, a bulkhead is added behind the FS 171 bulkhead. Do not change the location of this baggage bulkhead. By moving it aft, you would add more baggage capacity, but you could also be loading the airplane out the aft C.G. limit. Because of the baggage door location, a 9" long horizontal section, the "hat rack", is required to move the baggage bulkhead farther aft.

Rear baggage bulkhead
Figure 29:C:1



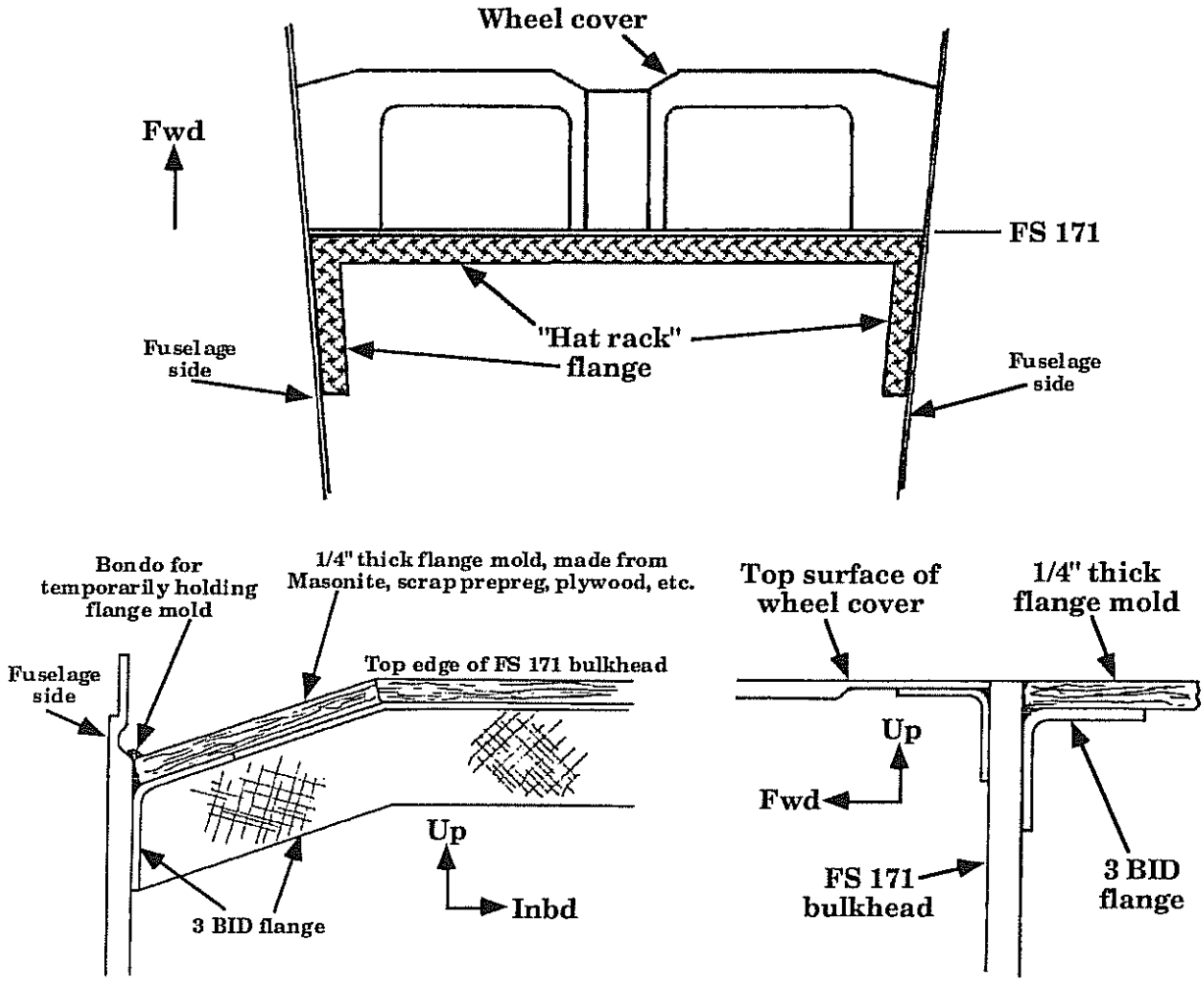
C1. Trim the FS 171 bulkhead as shown in Figure 29:C:1. Notice that the bulkhead is flush with the top of the wheel cover except on the far right side, where it does not follow the angle of the cover.

C2. Temporarily glue a form to the aft face of the FS 171 bulkhead to be used as a mold to lay up a 3 BID flange. Make this form from scrap 1/4" prepreg or plywood, with release tape on the bottom surface. Glue similar size form blocks to the sides of the fuselage from the FS 171 bulkhead aft 10". These flanges will be used to mount the "hat rack" section.

C3. Apply 3 BID to the underside of the flange forms, overlapping onto the FS 171 bulkhead and fuselage sides 1". Be sure to sand and clean the areas where BID is applied.

Forming the "hat rack" mounting flanges

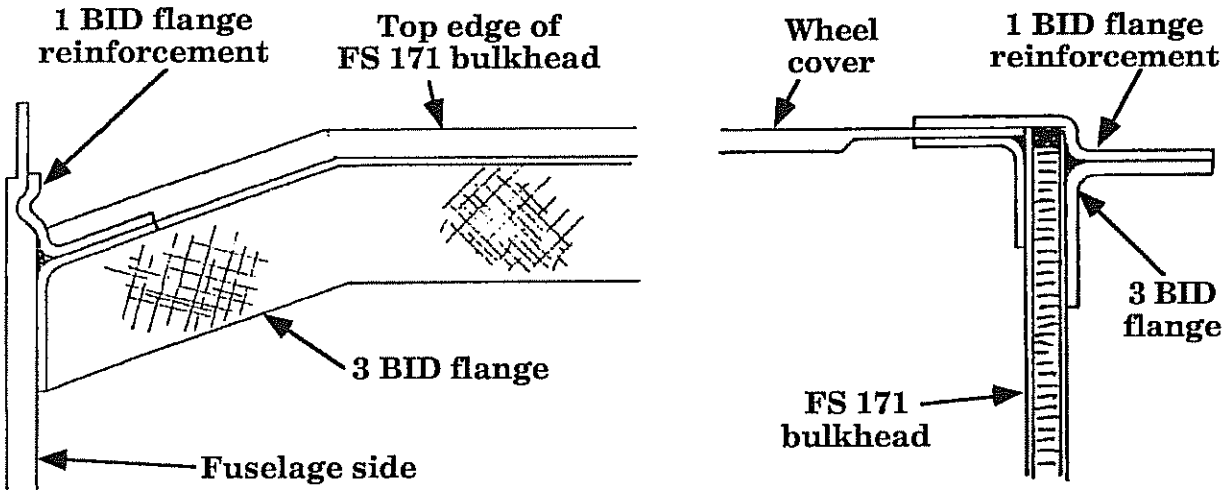
Figure 29:C:2



C4. When the 3 BID flange has cured, remove the forms and sand the flanges in preparation for BID.

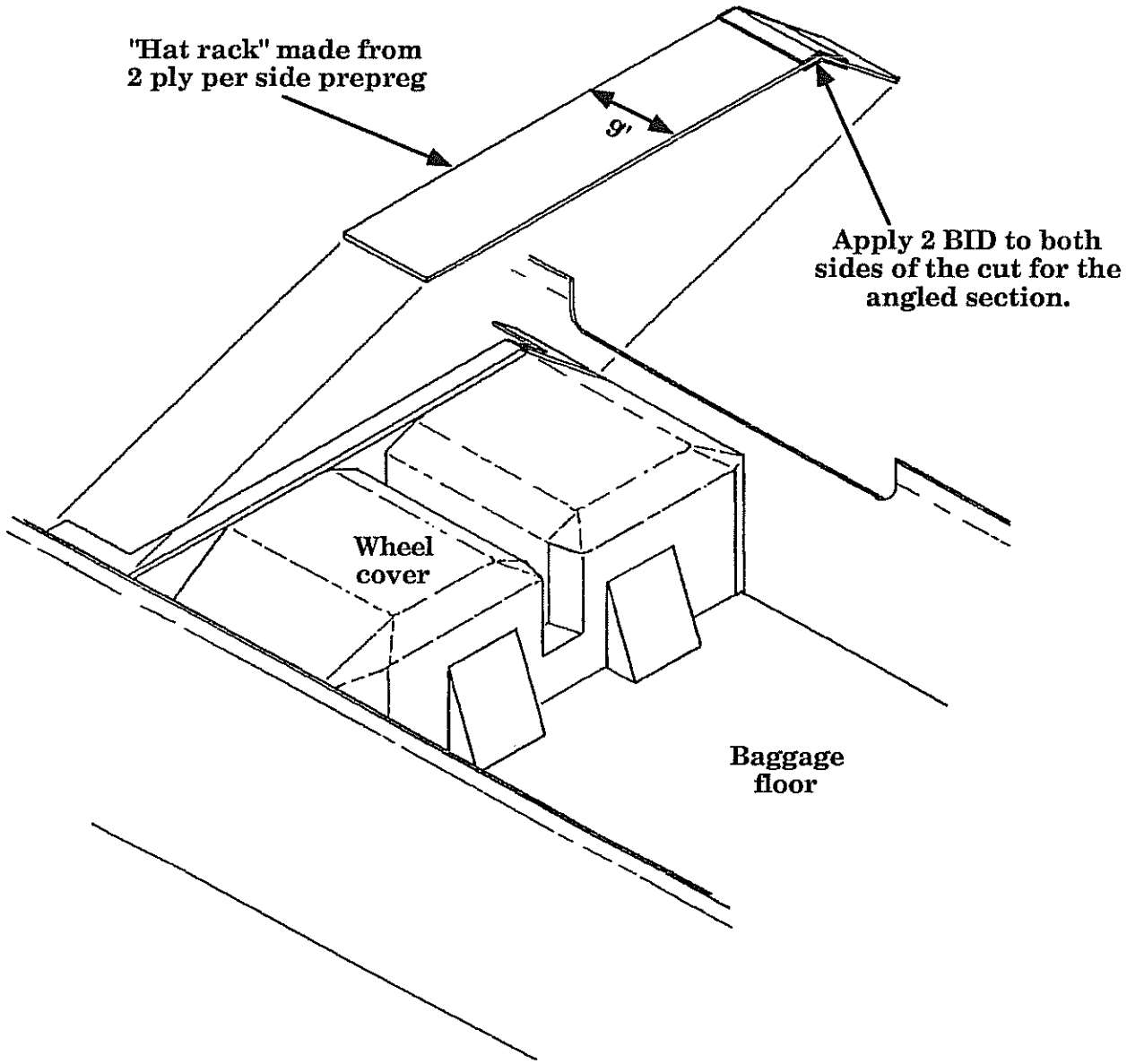
C5. Apply 1 BID to the top surface of the flanges, overlapping onto the fuselage and FS 171 bulkhead as shown in Figure 29:C:3.

Reinforcing "hat rack" flanges
Figure 29:C:3



C6. Cut out the "hat rack" from 2 ply per side, 1/4" thick prepreg, as shown in Figure 29:C:4. You will have to slice the "hat rack" and bend it to follow the top edge of the FS 171 bulkhead (only on the left side). Reinforce this cut area with 2 BID, 2" wide sections on the top and bottom of the "hat rack".

Fitting "hat rack"
Figure 29:C:4

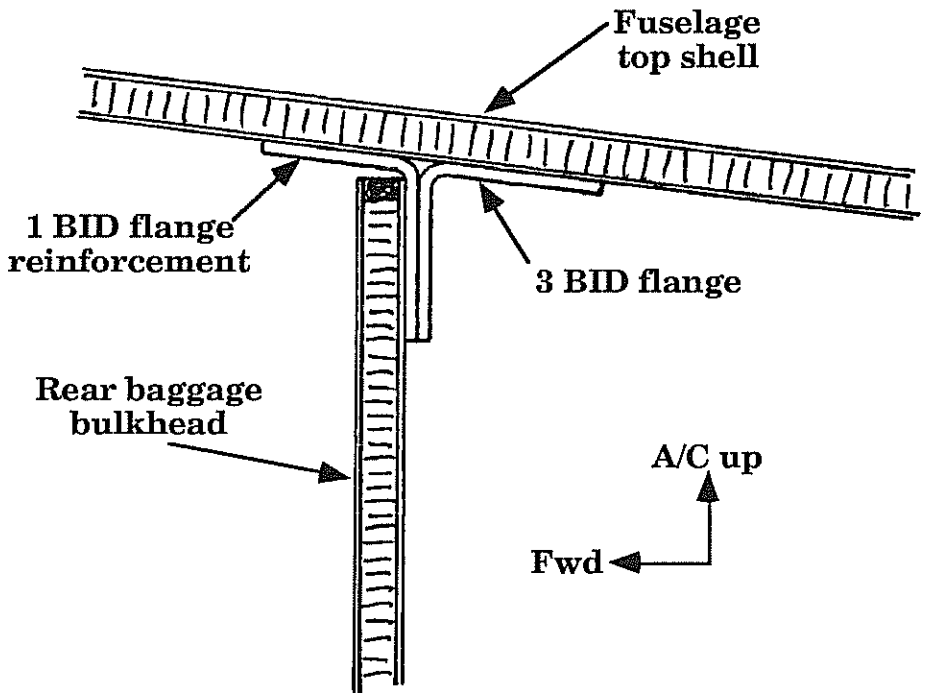


C7. Cut out and fit the vertical portion of the rear baggage bulkhead from 2 ply per side, 1/4" thick prepreg. A cardboard template is helpful here to find the correct shape of the bulkhead.

C8. A 3 BID flange needs to be formed behind the rear baggage bulkhead, just like you did under the hat rack. If you have already joined the top and bottom fuselage shells, forming this flange is rather awkward but it must be done. You can use the bulkhead as a form with release tape on the back if the top and bottom shells are still separated. If they are already joined, use a method similar to the "hat rack" in Steps C2 - C5.

C9. Reinforce the bulkhead flange with 1 BID from the forward side as shown in Figure 29:C:5.

Rear baggage bulkhead flange
Figure 29:C:5



C10. The last flange to be formed is secured to the rear baggage bulkhead and supports the "hat rack". Trim the bottom edge of the rear baggage bulkhead even with the "hat rack".

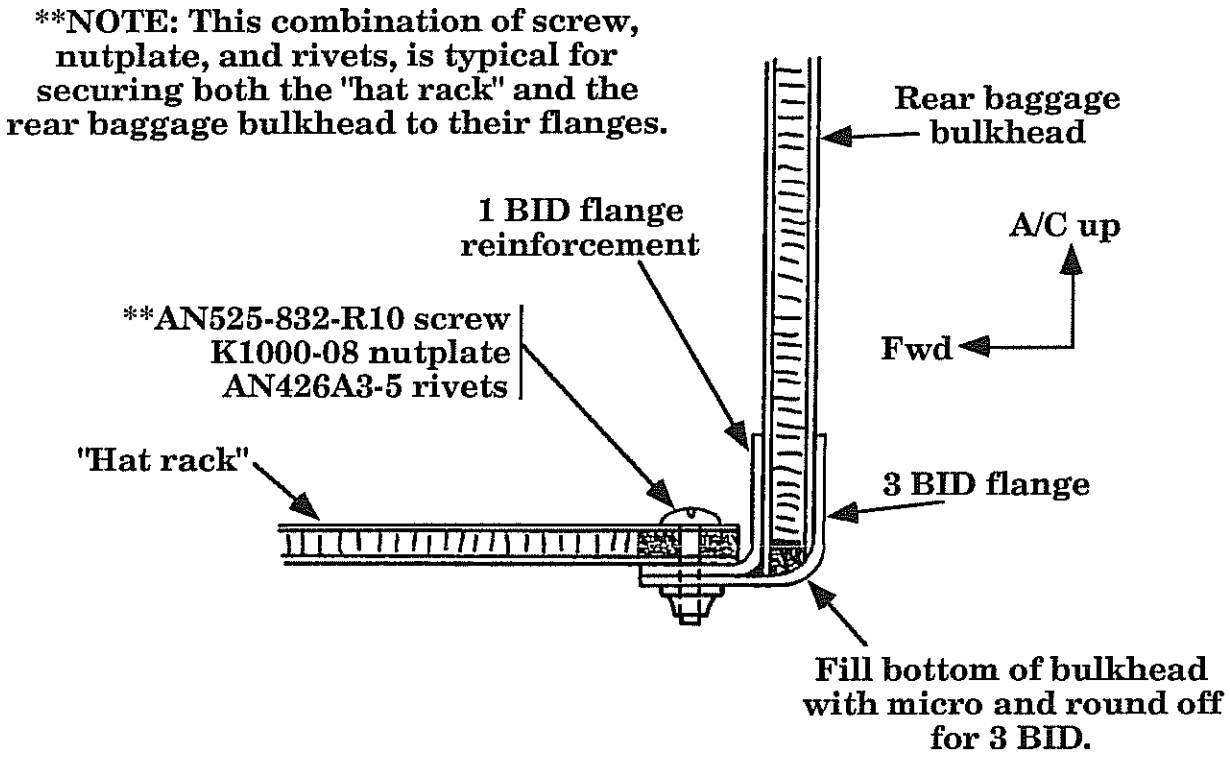
C11. With both the vertical bulkhead and the hat rack in position, temporarily bond the two pieces together with wood gussets and Bondo. Remove both pieces from the fuselage together.

C12. Apply a layer of release tape to the bottom of the "hat rack", along the aft edge.

C13. Apply a 3 BID flange to the aft face of the baggage bulkhead, overlapping 1" onto the bottom of the "hat rack".

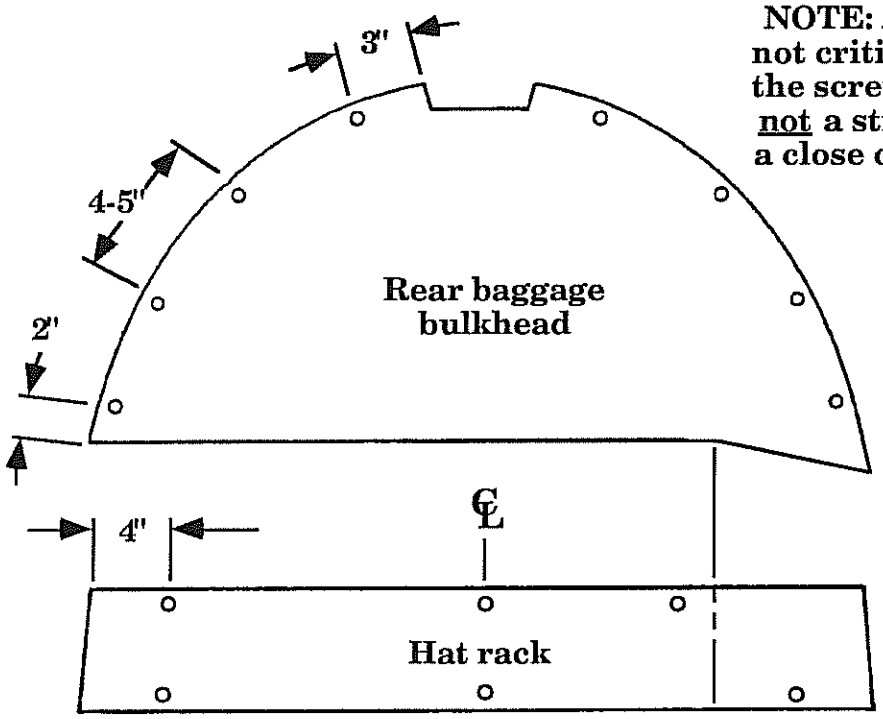
C14. When the 3 BID has cured, remove the "hat rack" from the baggage bulkhead. Reinforce the 3 BID flange with 1 BID, applied to the fwd side of the bulkhead.

Securing baggage bulkhead to "hat rack"
Figure 29:C:6



C15. Secure the baggage bulkhead and the "hat rack" to their mounting flanges with AN525-832-R10 screws and K1000-08 nutplates, locating the screws as shown in Figure 29:C:7. Just like you did on the baggage floor, form hardpoints around each screw location by replacing the core material with a micro/flox mixture. Secure the K1000-08 nutplates to the flanges with AN426A3-5 rivets.

Securing bulkhead and "hat rack" in position
Figure 29:C:7



NOTE: All screw locations are not critical, so feel free to place the screws how you like. This is <u>not</u> a structural bulkhead, just a close out of the baggage area.

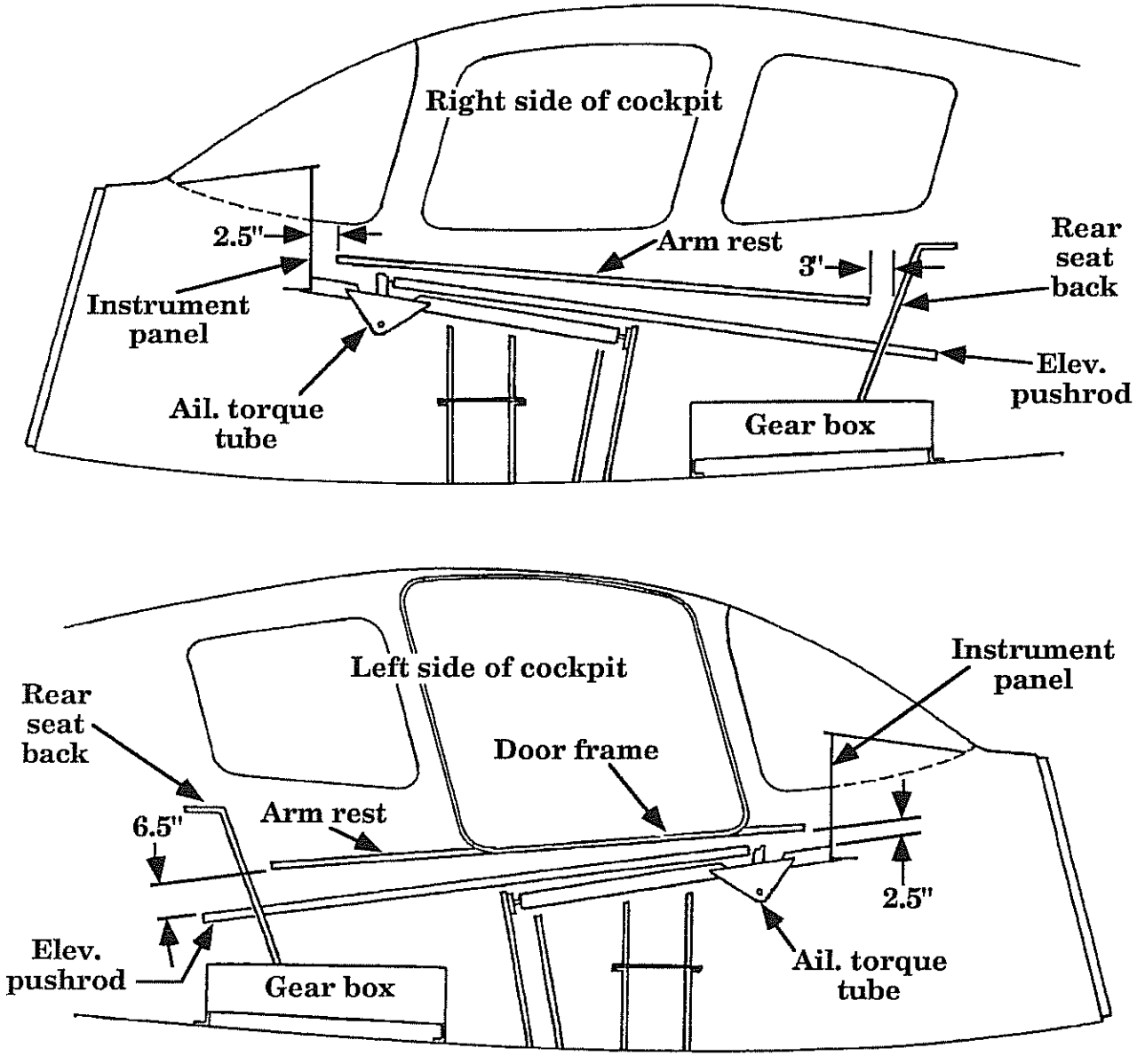
o = Screw location

All screws are AN525-832-R10. Use AN426A3-5 rivets to secure K1000-08 nutplates to the flanges at each screw location.

D. ARM RESTS

The Lancair IV arm rests extend from the instrument panel aft to the rear seat back. On the right side of the cockpit, the arm rest is one long piece. On the left side, the arm rest is divided by the door frame, which also serves as an arm rest.

Arm rests
Figure 29:D:1

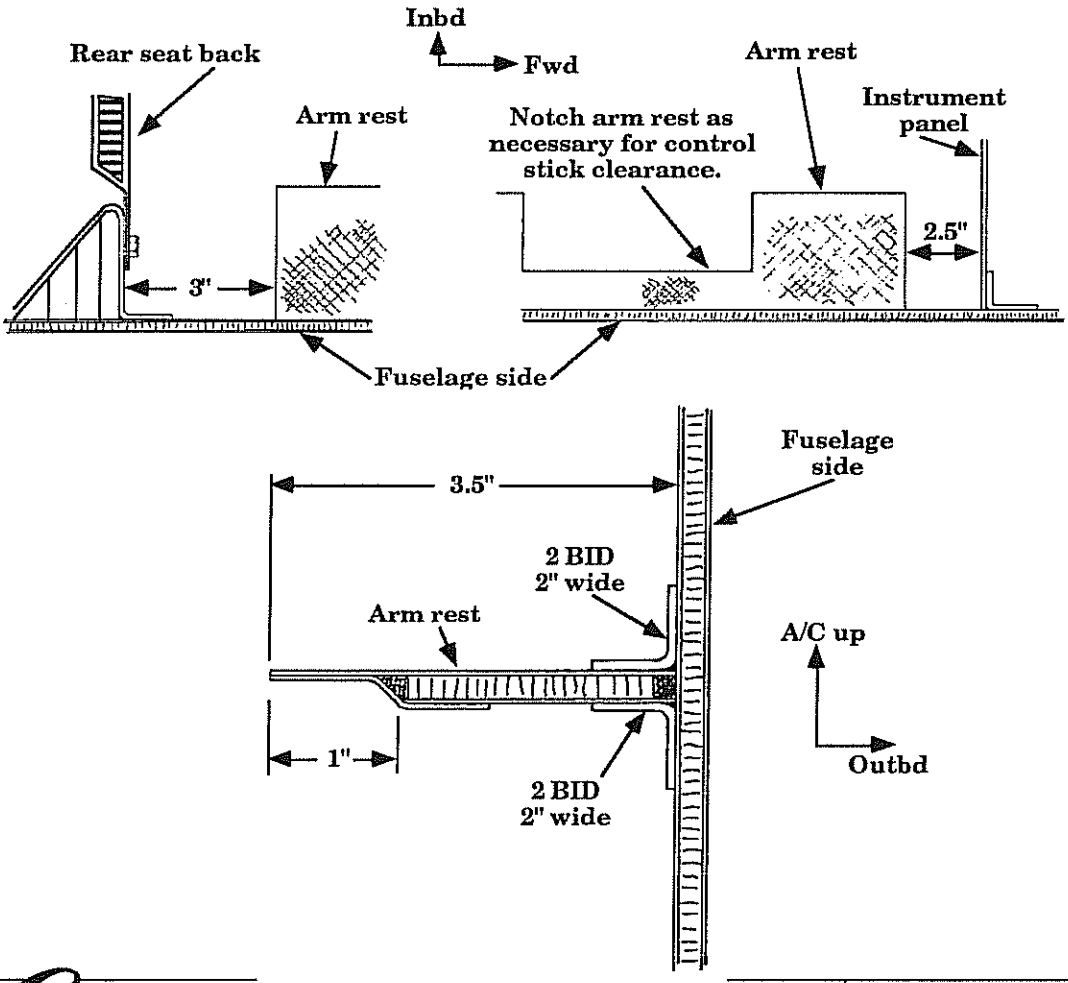


D1. Cut the arm rests from a 2 BID prepreg panel. There will be three individual arm rest; one long arm rest on the right side of the cockpit and two shorter arm rests on the left side, separated by the door frame. The length of the arm rests can vary, so measure the individual pieces on your airplane.

D2. Fit the arm rests at the locations shown in Figure 29:D:1. The arm rests will have to be notched to accomodate the full range of control stick travel. Notice that the arm rests do not extend all the way to the rear seat back. This would interfere with installation and removal of the seat back. The arm rests also do not extend forward to the instrument panel in case the instrument panel needs to be removed.

D3. Remove the normal 1/8 - 1/4" deep trough of core material from the edges of the arm rests in preparation for bonding. Sand and clean the fuselage sides where the arm rests will be located.

Securing arm rests
Figure 29:D:2



D4. Use a thick epoxy/micro mixture to bond the arm rests to the sides of the fuselage. The left side arm rests will also be bonded to the door frame.

D5. Secure the arm rests to the fuselage sides with 2" wide, 2 BID laminates on top and bottom.

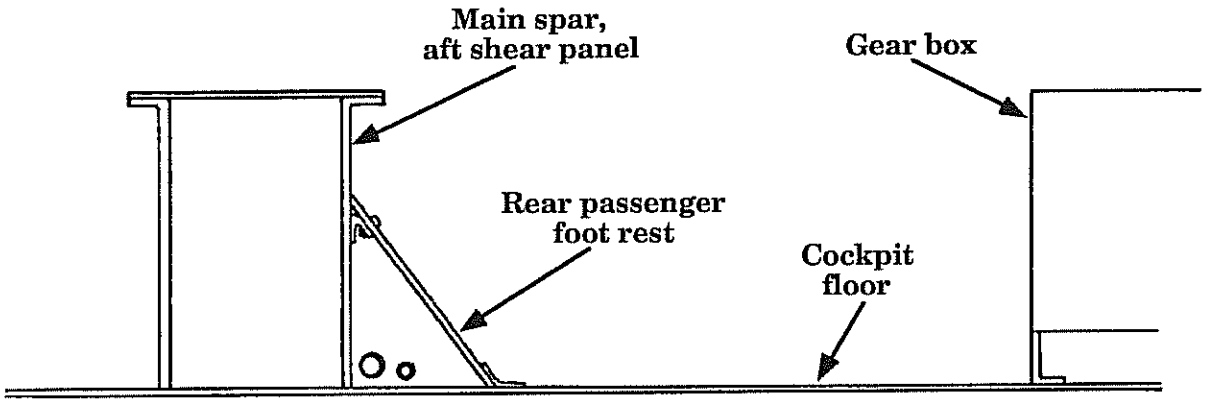
D6. Remove the bottom laminate and core of the arm rests along the inbd 1 1/2".

D7. Reinforce the inbd edges of the arm rests with 2 BID, overlapping onto the original bottom surface 1", as shown in Figure 29:D:2. This will provide a coreless edge on the arm rests for later mounting of the side panels.

E. REAR PASSENGER FOOT REST

For both comfort and to cover the fuel lines, an angled cover is installed behind the spar box. This is not a structural member, but it should be sturdy enough to support the passengers tapping toes.

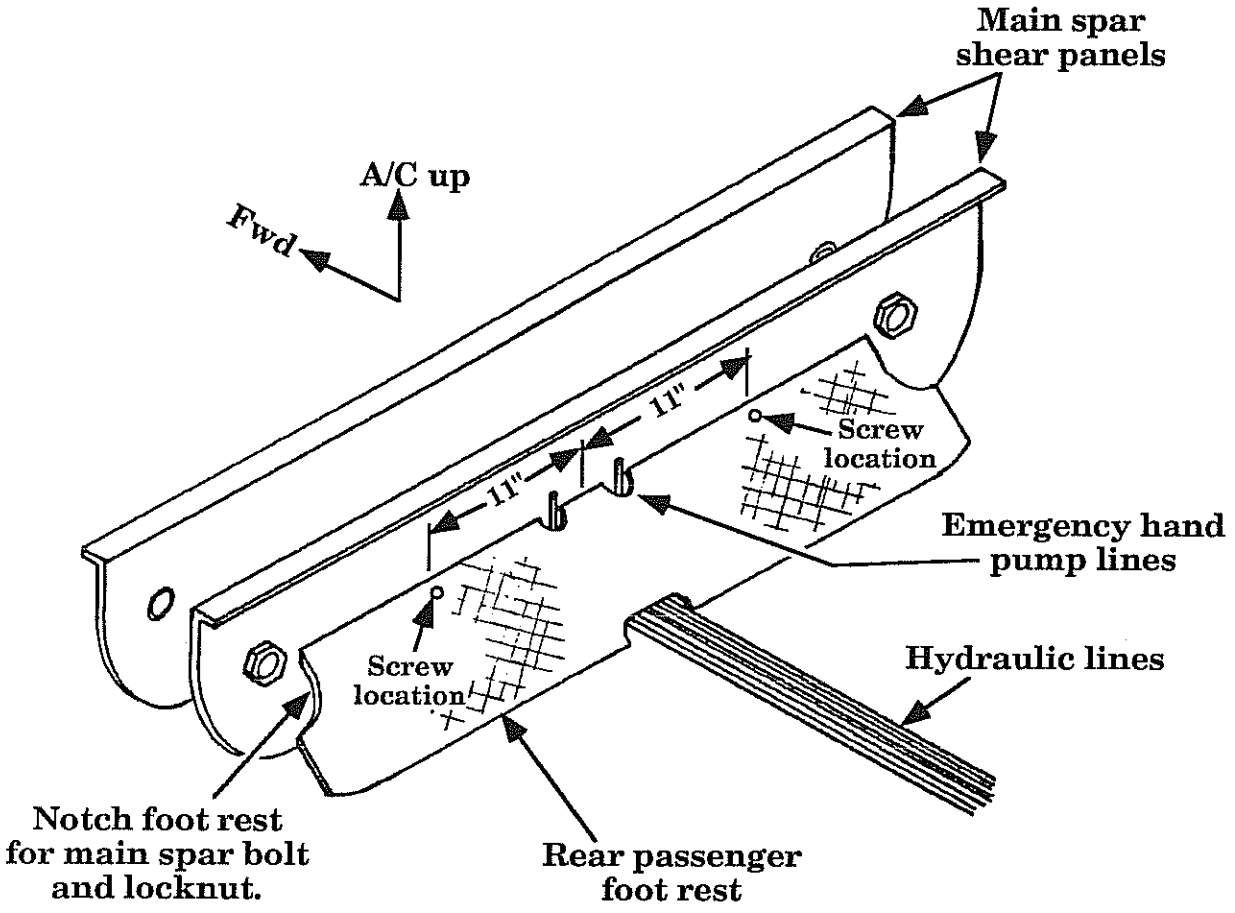
Rear passenger foot rest
Figure 29:E:1



E1. Cut out a 36" x 6 1/2" foot rest from 2 ply per side prepreg as shown in Figure 29:E:2.

E2. Trim the foot rest to fit against the aft main spar carrythru and the cockpit floor as shown in Figure 29:E:2. You'll have to notch the foot rest for the main spar locknuts and the hydraulic lines.

Fitting foot rest
Figure 29:E:2



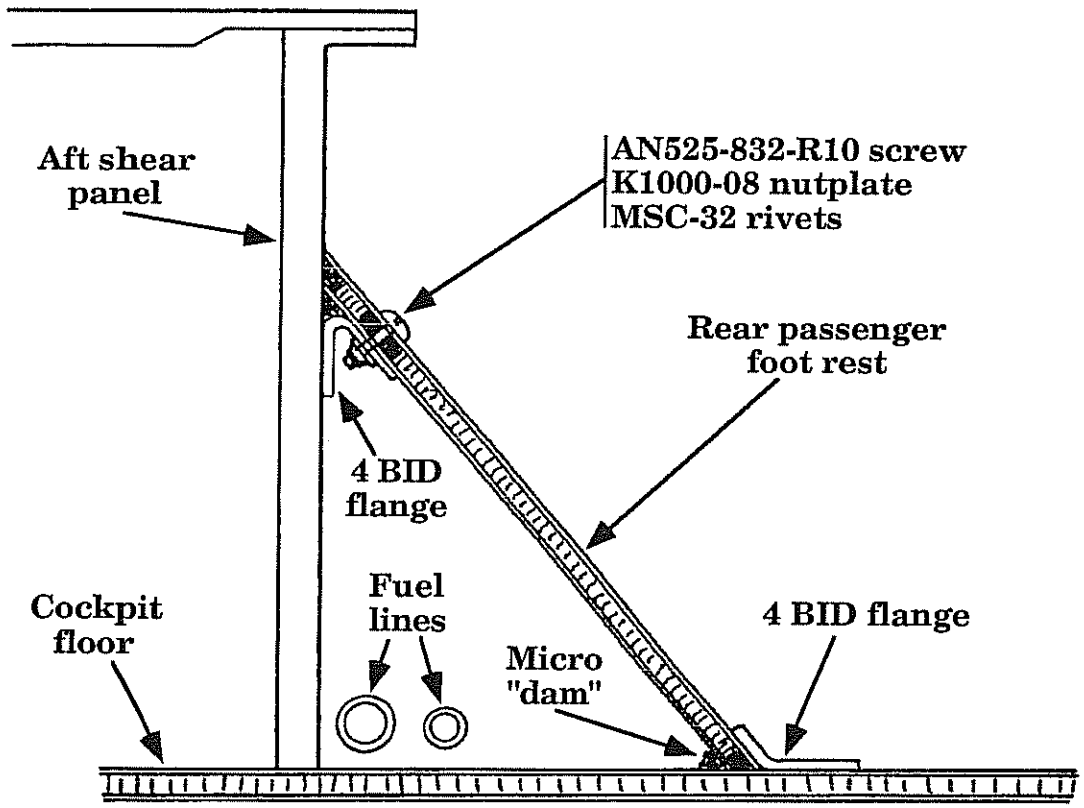
E3. To get a very tight fit between the foot rest and the surfaces which it rests against, do a micro release. Apply release tape to the aft spar shear panel and the cockpit floor where the foot rest is located. Trough out 1/8 - 1/4" of core from the edges of the foot rest and fill the trough with a thick epoxy/micro mixture. Position the foot rest against the shear panel and the floor and let cure. Remove the foot rest and sand away the excess micro. Now you should have a tight fitting foot rest.

E4. To mount the foot rest, two flanges need to be formed. Apply release tape to the bottom surface of the foot rest along the forward edge. Also apply release tape to the top surface of the foot rest along the aft edge.

E5. Wet out a 3" wide, 4 BID laminate and apply it to the release tape along the fwd, bottom surface of the foot rest. Leave half the width of the laminate hanging off the fwd edge. Reposition the foot rest in the fuselage and secure the 4 BID laminate to the shear panel. The 4 BID will adhere to the shear panel but not the foot rest, so sand and clean the shear panel where the BID is located. When cured this laminate will form a mounting flange for the foot rest.

E6. The aft edge of the foot rest is secured to cockpit floor by sliding under a simple 4 BID flange. Form the flange by applying a 2" wide, 4 BID laminate to the top of the foot rest, along the aft edge, overlapping onto the cockpit floor 1". Remember that you have release tape on the foot rest, but the 4 BID will stick to the cockpit floor. Sand and clean the floor accordingly where the BID will secure.

Securing foot rest
Figure 29:E:3



E7. Secure the foot rest to the shear panel flange with two AN525-832-R10 screws and K1000-08 nutplates. The nutplates are secure to the flange with MSC-32 countersunk pop rivets.

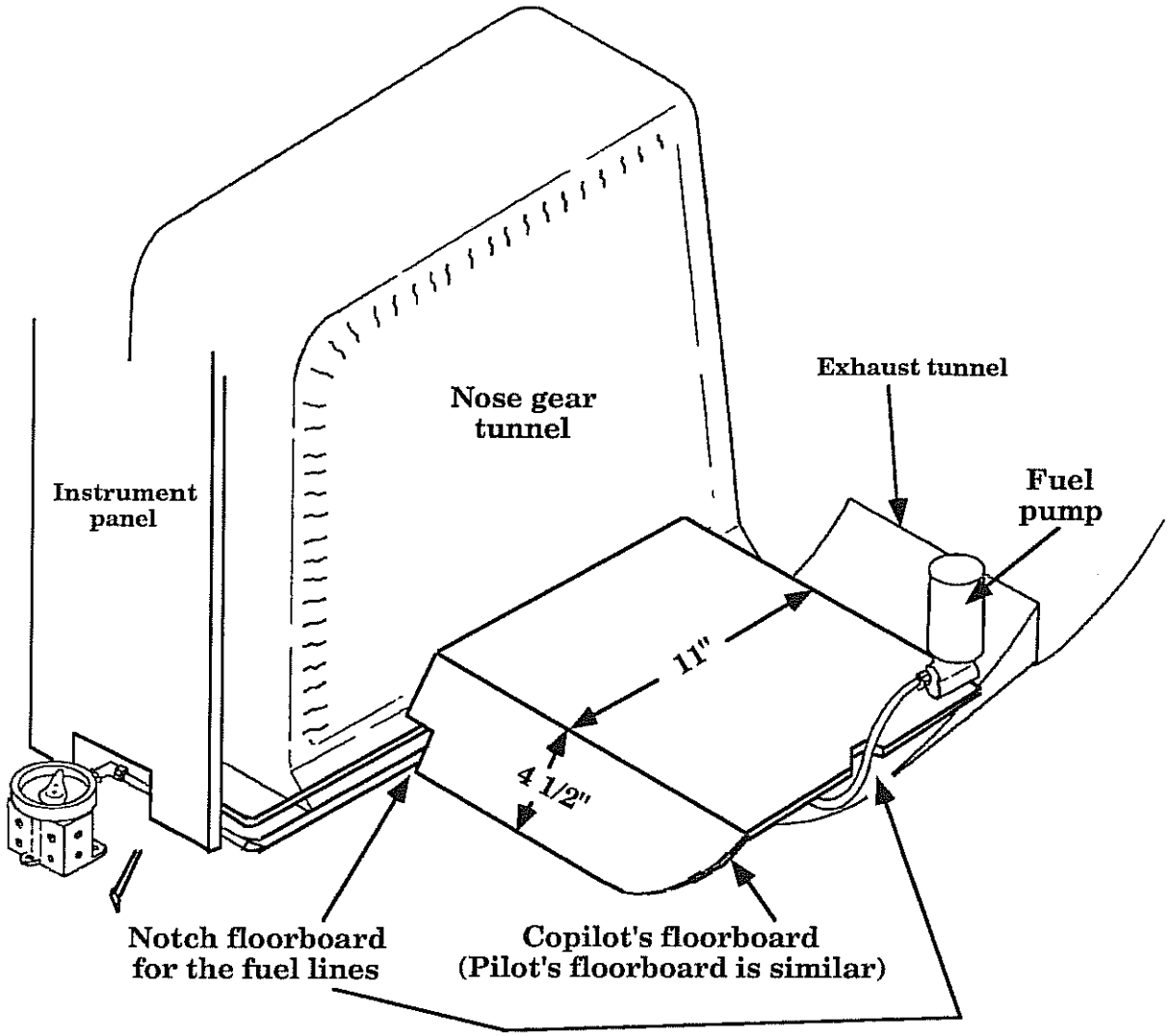
E8. To prevent the foot rest from being pushed forward, form a small, 1/4" high, dam out of a thick epoxy/micro mixture. Be sure you have release tape on the foot rest when forming the dam. Now the foot rest should have three separate supports; the two flanges and the micro dam. This should keep it stable and strong enough for the most fidgety passenger.

To install the foot rest, slide it down and aft in between the bottom flange and the micro dam, then rest it flat on the upper flange and secure with the two screws.

F. FWD FLOORBOARDS

The pilot and copilot's feet rest on raised floorboards. These floorboards also cover the exhaust tunnels and fuel lines which would otherwise be stepped on. The pilot's floorboard is secured permanently to the fuselage, but the copilot's floorboard must be removable for access to the fuel lines.

Floorboard
(Pilot and copilot side similar except as noted)
Figure 29:F:1



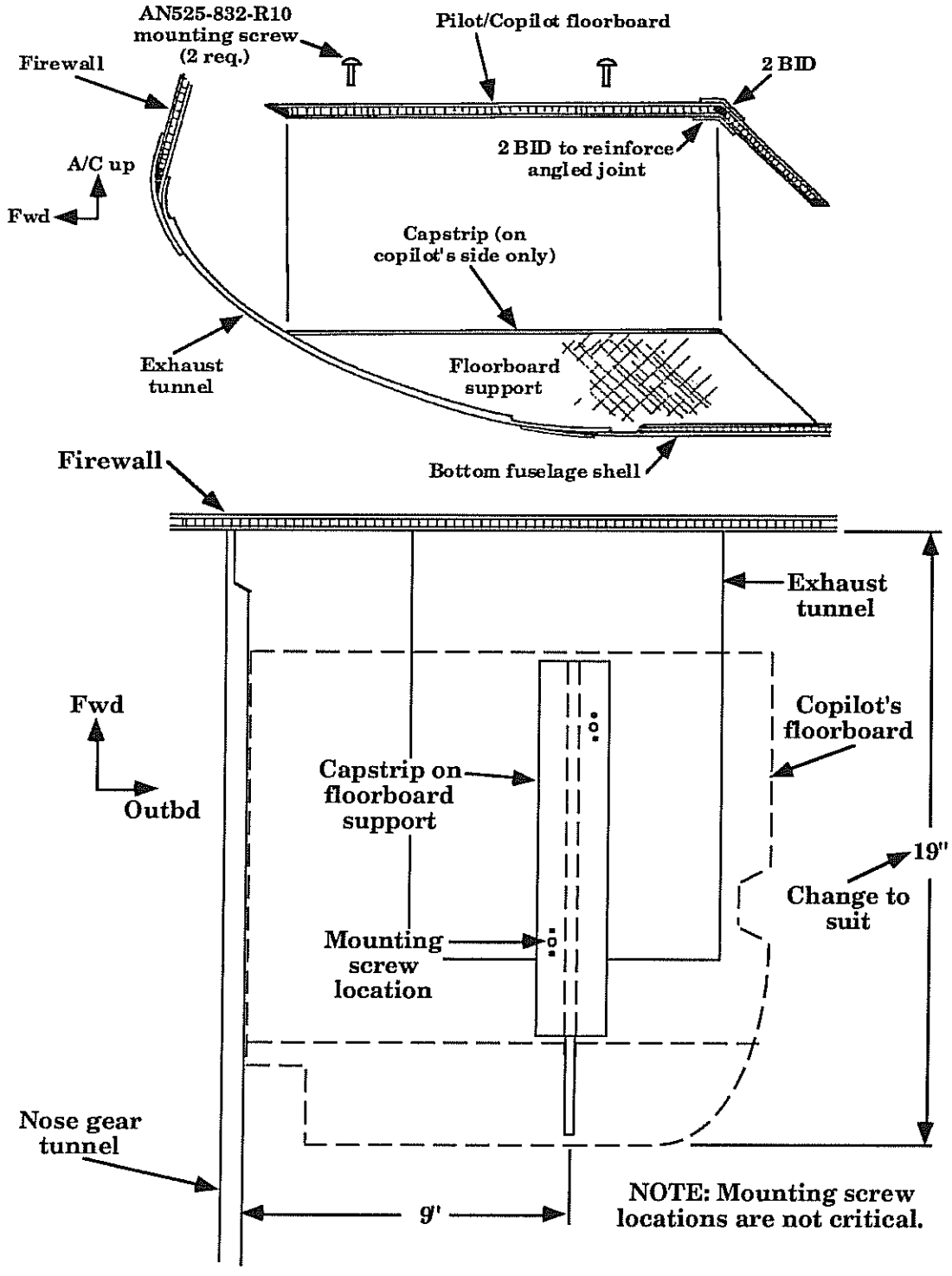
F1. The pilot and copilot floorboards are not stuctural members and can be fitted higher, lower, or more aft than shown in this section. Hence, the dimensions given can be altered accordingly. With this freedom in mind, cut and fit two floorboards from 2 ply per side prepreg as shown in Figure 29:F:1 & 2. Secure the angled aft section of the floorboards to the fwd sections with 2 BID, 2" wide laminates on top and bottom.

F2. A vertical support is desirable under both floorboards for added strength. Cut out and fit these supports from 2 ply per side prepreg.

F3. Bond the floorboard supports to the exhaust tunnel and the fuselage bottom with a thick epoxy micro mixture. Reinforce this bond with 1 BID, 2" laminates on both sides of the supports.

Floorboard supports

Figure 29:F:2



F4. On the copilot's side only, a capstrip needs to be fitted to the floorboard support. Onto this capstrip, you will secure a nutplate which will mount the removable copilot's floorboard. Apply release tape to the underside of the copilot's floorboard and lay up a typical 2" wide, 2 BID capstrip centered on the vertical support. Mound up thick micro in the top edge of the floorboard support and place the floorboard in position.

F5. When the capstrip has cured, pop the floorboard loose. Secure the capstrip to the floorboard support with 1 BID, 2" wide laminates on both sides of the support.

F6. Drill two #20 holes through the copilot's floorboard and the capstrip for AN525-832-R10 screws.

F7. Secure two K1000-08 nutplates to the bottom side of the capstrip at the locations you just drilled. Use AN426A3-5 rivets.

F8. Form hardpoints for the AN525-832-R10 mounting screws by removing the core around the holes and replacing it with epoxy/micro. After the micro has cured, redrill the holes.

F9. Since it is hard to achieve a perfect fit along the curvy edges of the floorboards, it is desirable to do a micro release between the copilot's floorboard and the surrounding surfaces. This is not required on the pilot's floorboard because it gets microed in permanently. Apply release tape to the surfaces where the copilot's floorboard contacts, then fill the edges of the floorboard with a thick micro mixture. Reposition the floorboard and let the micro cure.

F10. Clean up the excess micro from the copilot's floorboard and secure it in position with the AN525-832-R10 screws.

NOTE: Before bonding in the pilot's floorboard, you should fit and install any sound proofing material that you are planning.

F11. The pilot's side floorboard does not require mounting screws or a capstrip. When satisfied with the fit of this floorboard, bond it in position with a thick micro mixture. Reinforce this bond with 2 BID, 2" wide laminates.

G. FUEL/HYDRAULIC LINE TUNNELS

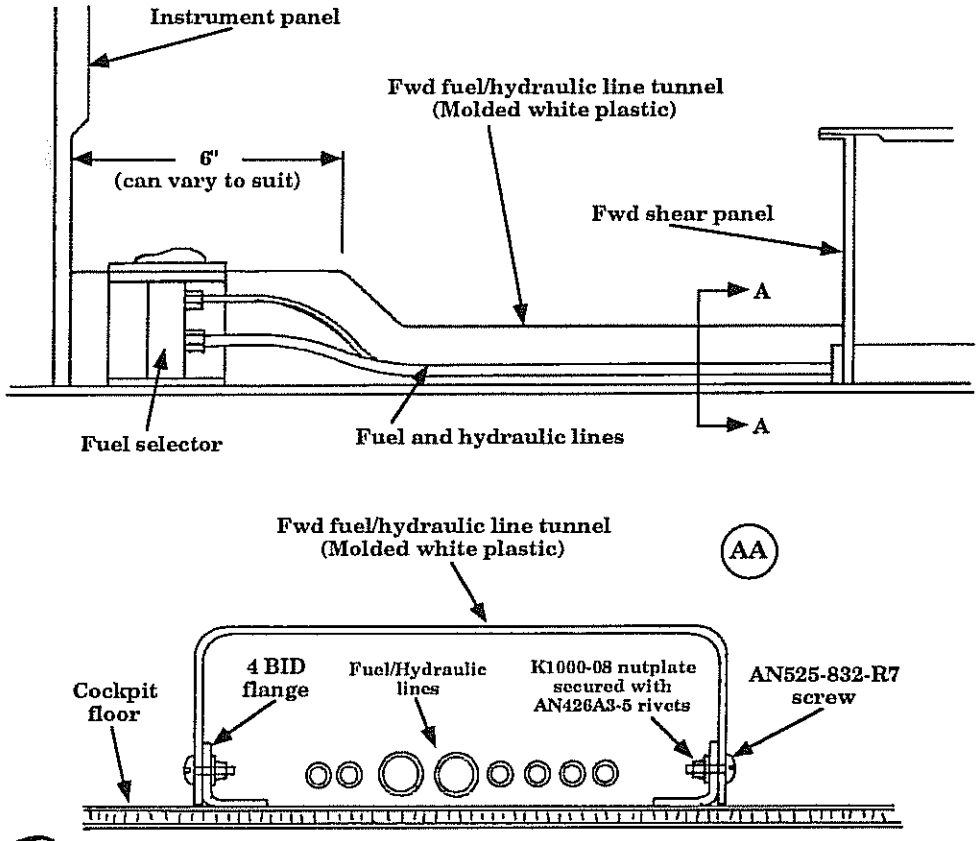
To cover the fuel and hydraulic lines which run along the center of the floor, tunnels are fit. The forward tunnel is premolded plastic and also covers the fuel selector valve. The aft tunnel is either premolded fiberglass or plastic, depending on your serial number, and covers the seven hydraulic fittings in the fwd face of the gearbox.

G1. Trim the white plastic fwd tunnel (Part #1042) to fit between the fwd shear panel and the instrument panel. Be carefull when trimming the tunnel around the fuel selector valve.

G2. The fwd tunnel is secured to a 4 BID flange on the cockpit floor. Form this flange against an aluminum angle with release tape. The distance between the two flanges is the same as the inside width of the tunnel.

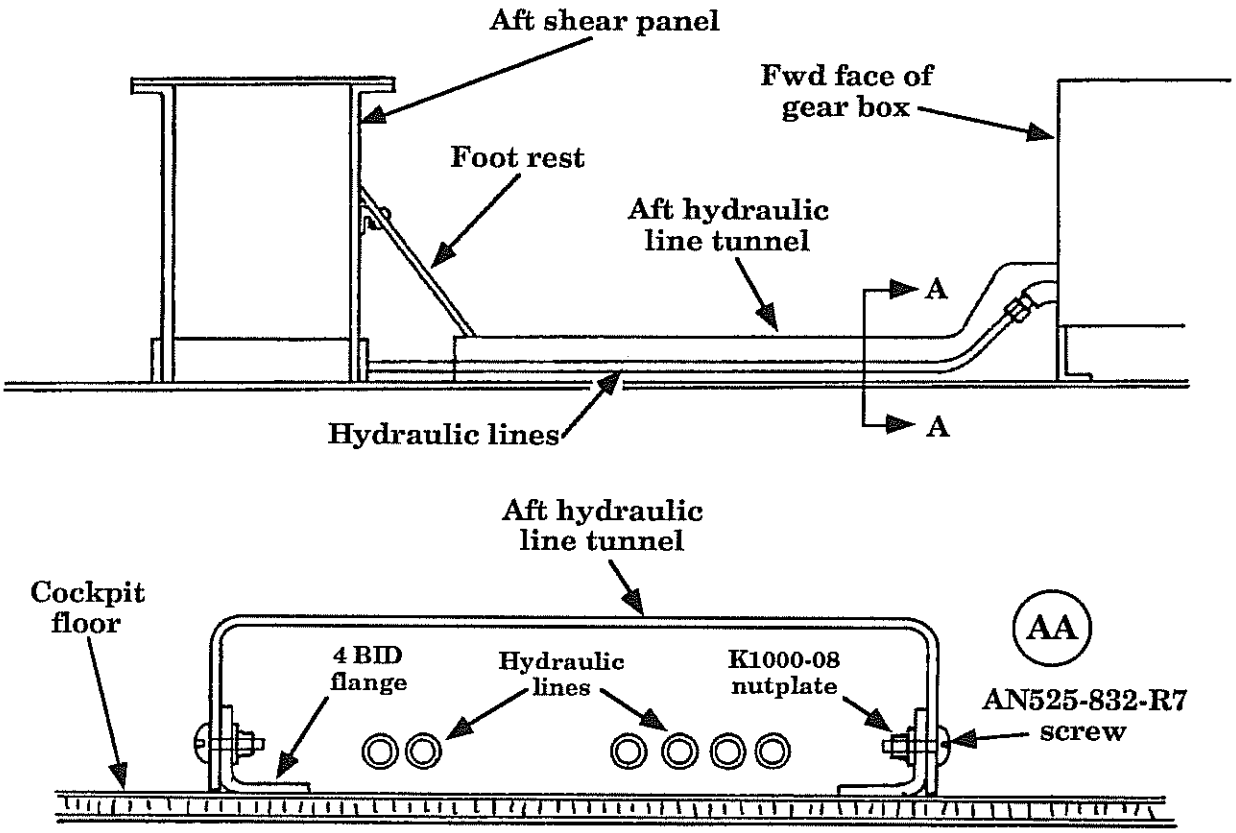
G3. Secure the fwd tunnel with AN525-832-R7 screws. Secure the K1000-08 nutplates to the flange with AN426A3-5 rivets.

Fwd fuel/hydraulic line tunnel
Figure 29:G:1



G4. The aft tunnel (Part #1045) is premolded from fiberglass or white plastic if you have a later kit. Installation of this tunnel is similar to fwd tunnel, with two 4 BID flanges secured to the cockpit floor. This aft tunnel will cover all the hydraulic fittings on the fwd face of the gear box. Again, use four, AN525-832-R7 screws to secure the tunnel, two per side.

Aft hydraulic line tunnel
Figure 29:G:2

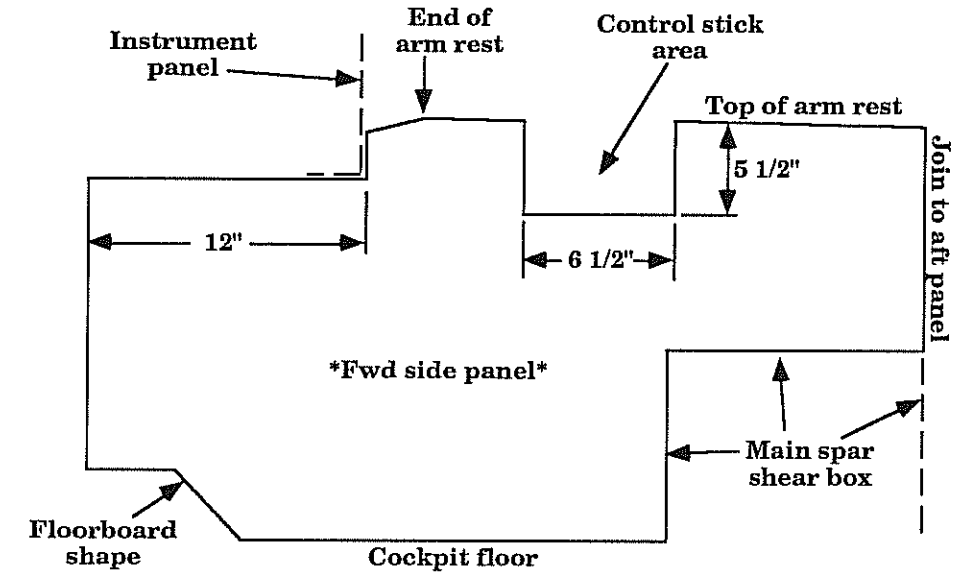


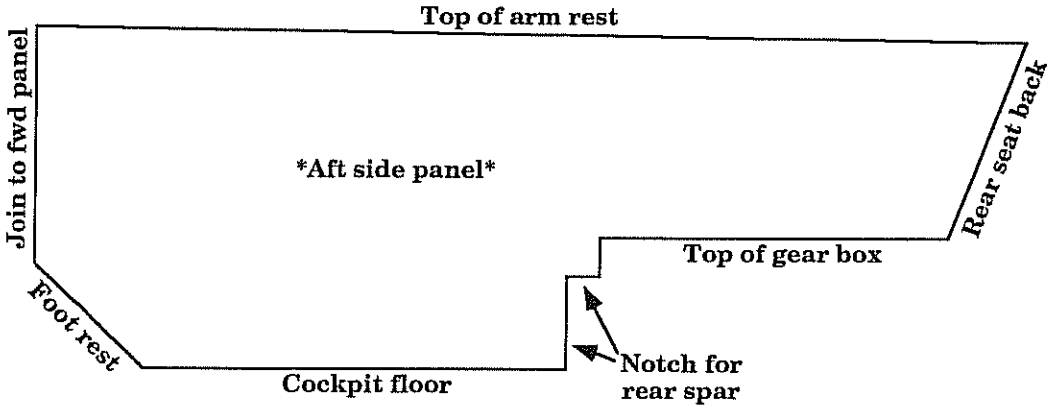
H. SIDE PANELS

Side panels are made from 1/8" thick Divinycel with 1 ply per side. This is not a honeycomb core, but a high temperature foam core. The side panels are secured to the arm rests and are not structural, just cosmetic. Feel free to change the shape, size, and mounting of the side panels to suit your preferences.

H1. With so many dimesions and custom shapes, we will not give you a specific size for each panel. Instead, in Figure 29:H:1, you will see the general shape of each panel with reference lines where each panel begins and ends. Using these references as general guidelines, cut templates for your side panels from cardboard, then transfer those templates to the Divinycel panel and cut them out.

Side panel locations
Figure 29:H:1

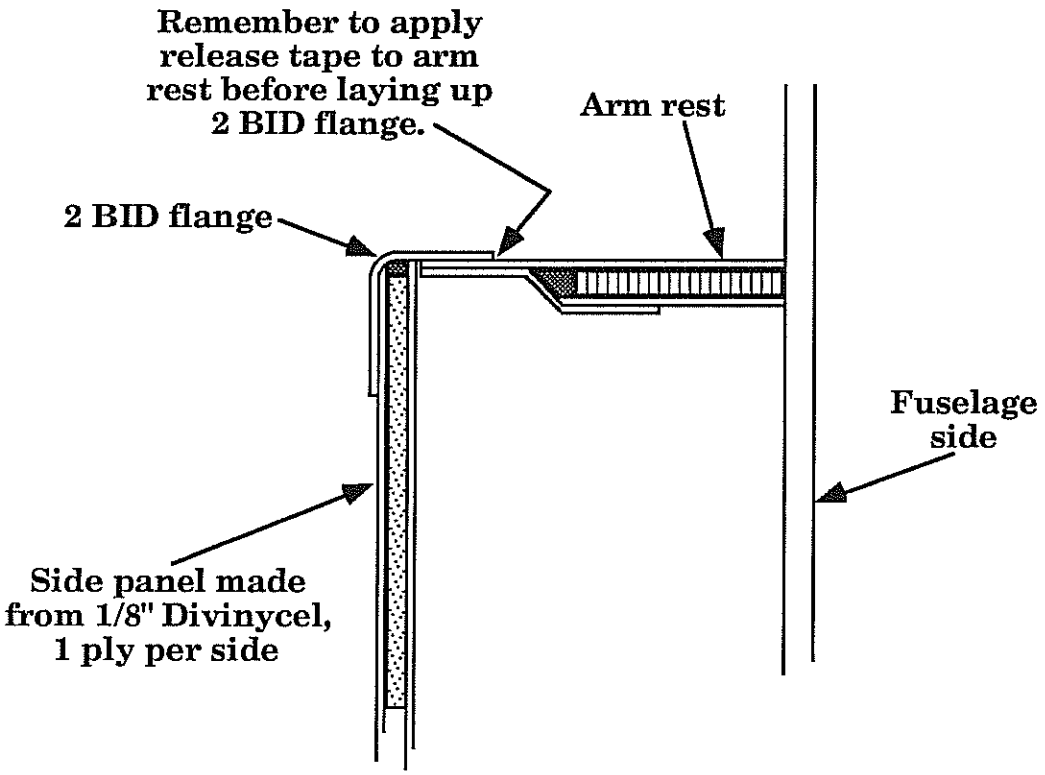




H2. Trim the side panels to fit. Notice that the fwd side panels butt up against the instrument panel, but the arm rests do not. This is because the side panels can be removed in case the instrument panel must be removed, but the arm rests are fixed. The square hole behind the instrument panel and fwd of the arm rest will be covered with a removable upholstered cushion.

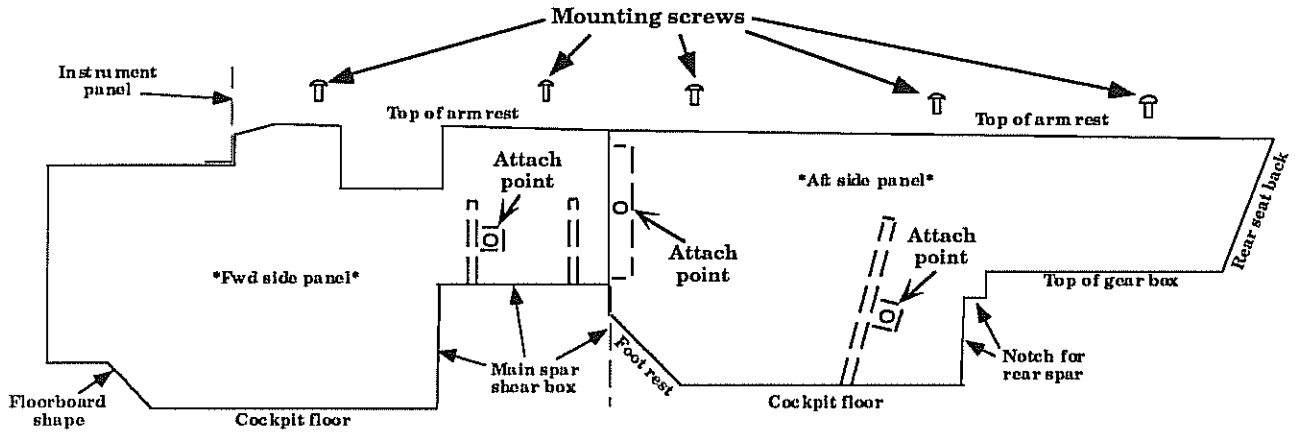
H3. Apply release tape to the tops of the arm rests along the inbd two inches. Use instant glue to tack glue the side panels in position. Apply a 2 BID, 2" wide laminate to the top edge of each side panel, overlapping onto the arm rests 1". Be sure to sand and clean the areas where the BID is applied to the side panels.

Arm rest flanges
Figure 29:H:2



H4. When the flanges have cured, remove the arm rests and trim the flange edges straight. There are numerous other places where the side panels can be secured. Here are some suggestions:
- Bond a fiberglass mounting flange to the fwd or aft shear panel as an attach for the fwd side panel.
- Bond a flange to the outbd surface of the fwd side, sticking out 1" behind the aft edge. Use this flange to secure the aft side panel.
- Bond a fiberglass flange to the inbd aileron bellcrank support as a mounting surface for the aft side panel.

Side panel attach points
Figure 29:H:3



H5. Secure the side panels to the arm rests and one or two other attach points with AN525-832-R7 screws. Secure K1000-08 nutplates to the bottom surface of the arm rests with AN426A3-5 rivets. On the left side of the cockpit, you can secure the arm rest directly to the door frame (where the door frame doubles as an arm rest).

I. SEAT BELT INSTALLATION

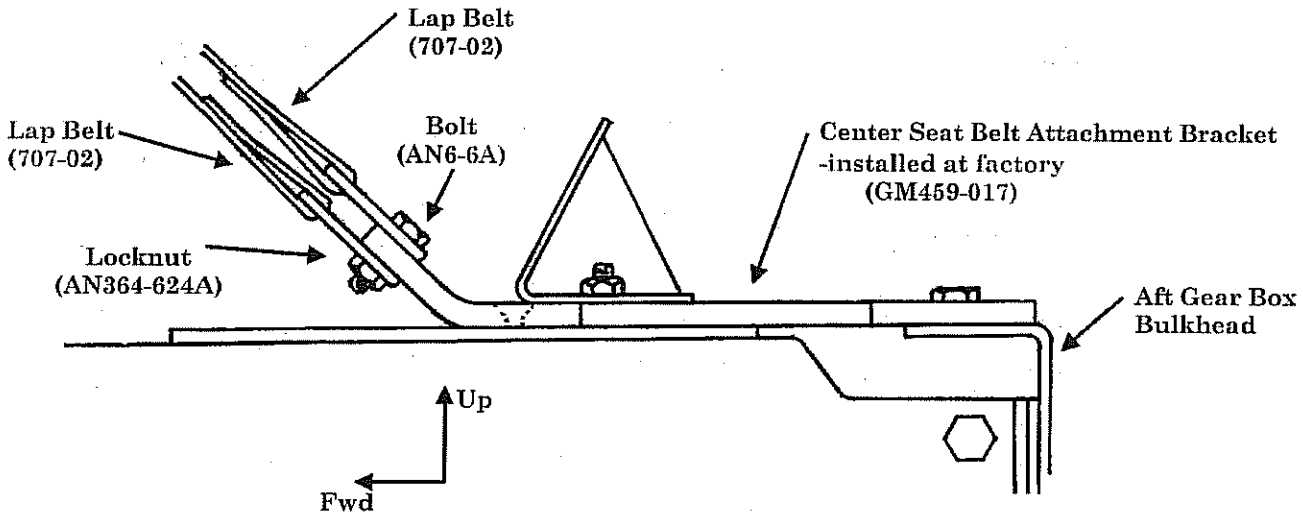
Included in your kit are seat belts for all four occupants. The pilot and copilot both have a shoulder belts, but the rear seat passengers just have the lap belts.

I1. You have already (Chapter 19) installed the attach lugs for the rear passenger seat belts. The center attach lug, GM459-017, is factory installed and the side seat belt lugs, GM459-027's, are bolted to the oubd side of the gear box. Attach the center seat belts of both rear passengers to the GM459-017 lug with an AN6-6A bolt and AN364-624A locknut.

NOTE: Using an elastic locknut on parts that can swivel is not exactly standard, but in the case of all the seat belts, we feel it is cleaner to have the elastic locknut than a castle nut and cotter pin. The exposed cotter pins could snag on clothing, fingers, or other body parts. Tighten all the seat belt locknuts until the seat belts are snug, but can still swivel to accomodate different passengers.

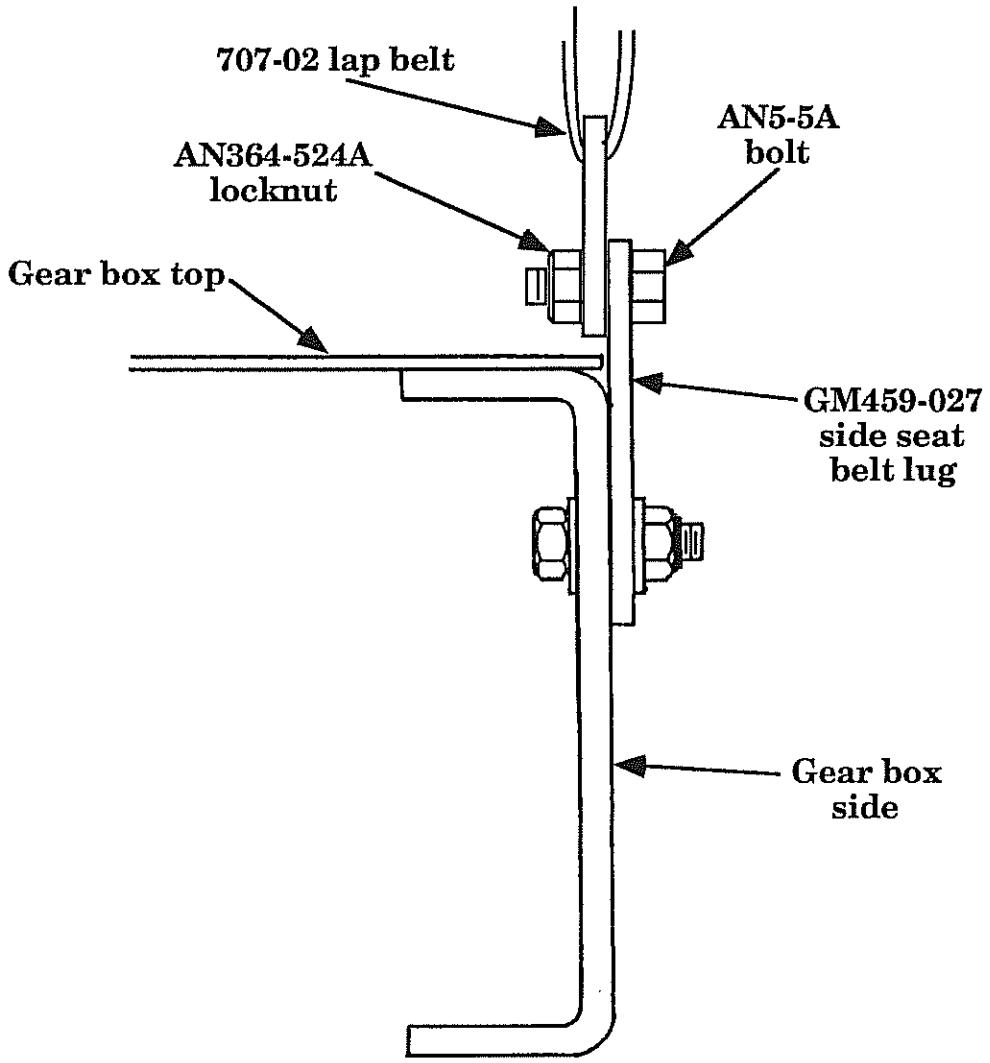
Securing center seat belts for rear passengers

Figure 29:I:1



I2. The oubd seat belts for the rear passengers are secured with AN5-5A bolts as shown in Figure 29:I:2. Notice that the seat belt is drilled for a 3/8" D. bolt and the seat belt lug for a 5/16" bolt. Use the 5/16" D (AN5) bolt as shown or you can drill out the GM459-027 lugs for 3/8" (AN6) bolts. Either method is okay.

Securing outbd, rear passenger seat belts
Figure 29:I:2



I3. The inbd seat belts for the pilot and copilot are secured to the aft main spar shear panel. Drill two, 3/8" D. holes through the shear panel at the locations shown in Figure 29:I:3.

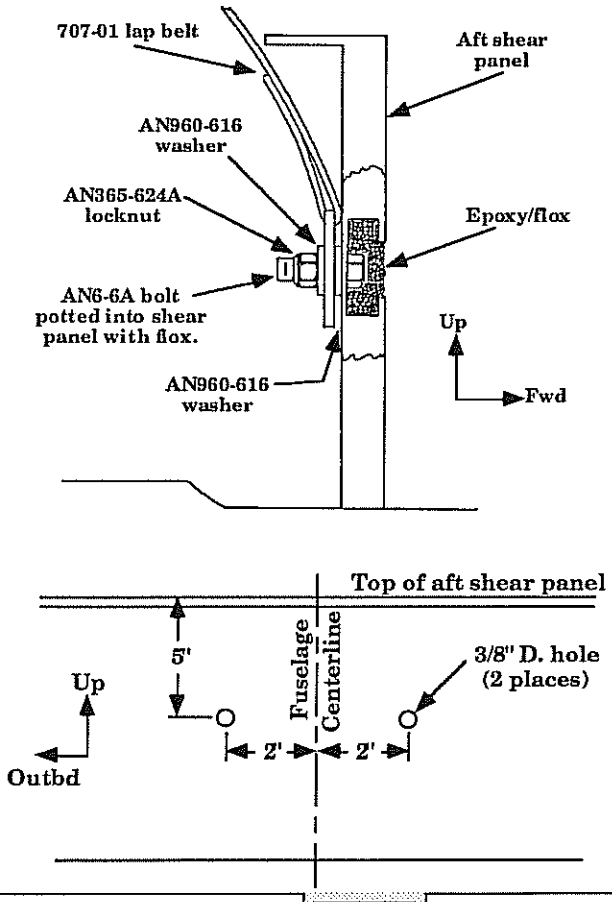
I4. Use a Dremel tool with an angle attachment to enlarge the 3/8" D. holes in the FWD laminate and core of the aft shear panel. DO NOT enlarge the hole diameter in the aft laminate of the shear panel. There are a larger number of BID preinstalled in the aft face of the shear panel for seat belt reinforcement. The fwd laminate is only a few BID and should grind away easily. Grind a large enough hole for the head of a 3/8" D, bolt (AN6). See Figure 29:I:3

I5. Use a thick epoxy/flox mixture to pot an AN6-6A bolt into each 3/8" D. hole you drilled in the aft shear panel. Do not apply any BID to the fwd face of this shear panel because it would interfere with the main spars.

I6. When the flox has cured, secure the inbd seat belts to the AN6-6A bolts (studs) with AN365-624A locknuts.

Securing inbd, pilot/copilot lap belts

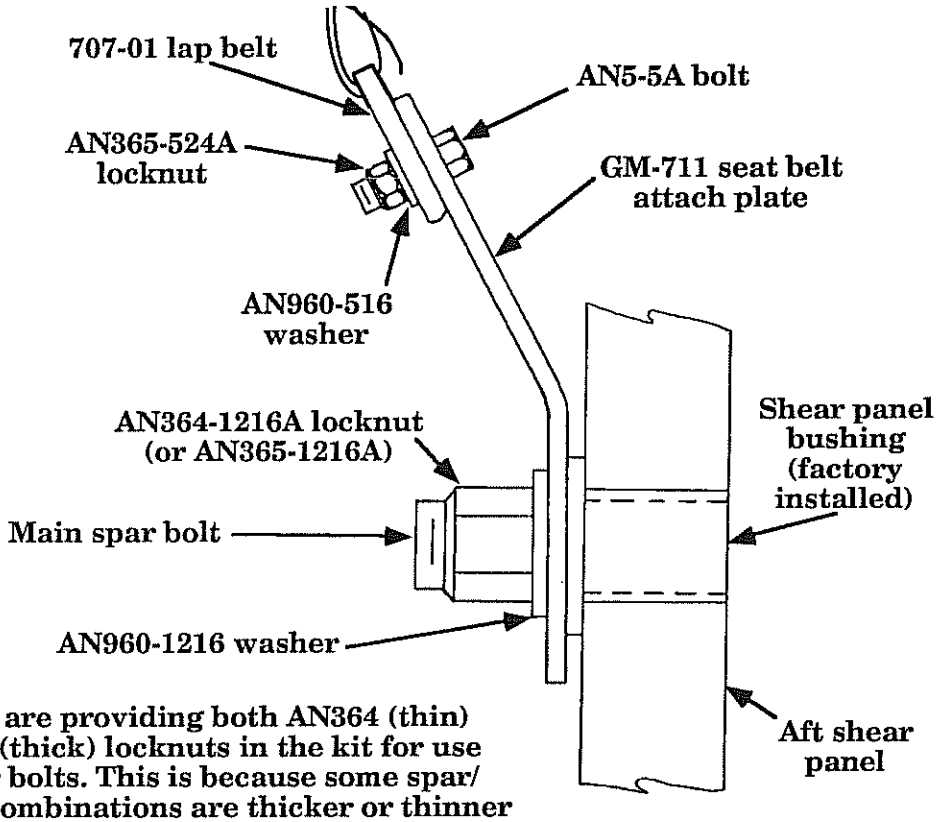
Figure 29:I:3



I7. The outbd, pilot/copilot seat belts use the main wing spar bolts as anchor points, which means, of course, that you must have the wings installed to secure the belts. Secure a GM-711 seat belt anchor between each main spar locknut (AN364-1216A) and the factory installed bushing in the aft shear panel.

I8. Secure an outbd seat belt to each GM-711 seat belt anchor using AN5-5A bolts. Notice again that the seat belt is drilled for a 3/8" D. bolt and the seat belt attach plate for a 5/16" bolt. Use the 5/16" D (AN5) bolt as shown or you can drill out the GM711 attach plates for 3/8" (AN6) bolts.

Securing outbd, pilot/copilot lap belts
Figure 29:I:4



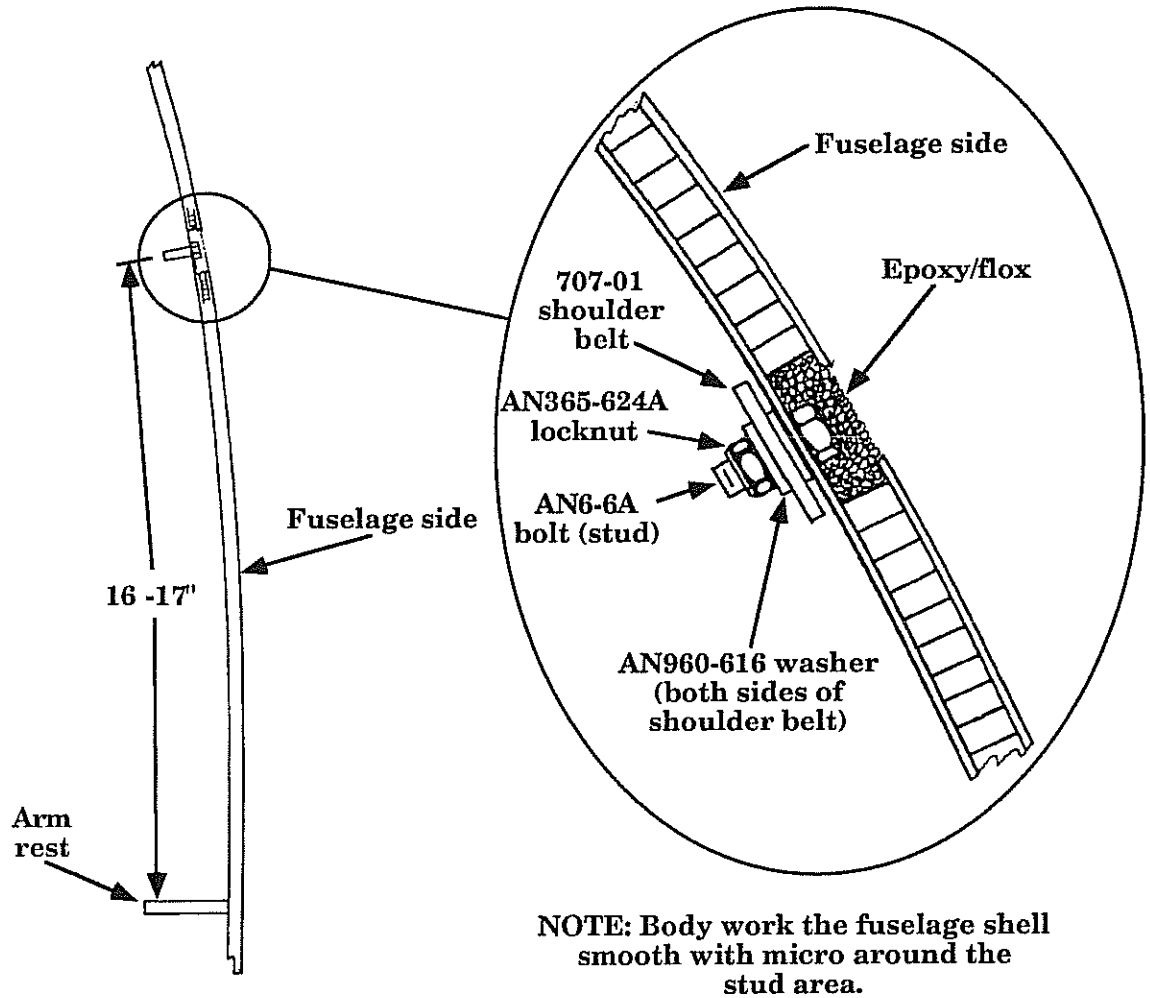
NOTE: We are providing both AN364 (thin) and AN365 (thick) locknuts in the kit for use on the spar bolts. This is because some spar/ shear panel combinations are thicker or thinner than others. If you have enough room to install the thick locknut, go ahead. But if there are less than three threads showing behind a thick locknut when tightened, use a thin (AN364) locknut. You may even have to add additional washers in some instances to avoid bottoming the locknuts on the shoulder of the bolt.

I9. The pilot/copilot shoulder belts are secured to the fuselage shell by potting studs into the fuselage, much like you did in the aft shear panel. Locate and drill 3/8" D. hole through the fuselage shell at the locations shown in Figure 29:I:5. The studs are 3" fwd of the rear side windows and 16-17" above the arm rests. Enlarge the hole in the outer laminate and core to accept the head of an AN6 bolt. DO NOT enlarge the hole in the inner laminate. Notice that the inner laminate is thicker than the outer laminate due to a premolded roll over structure. This additional structure comes in handy for the shoulder belt attach points.

I10. Use a thick epoxy/flox mixture to pot AN6-6A bolts into the fuselage as anchor studs for the shoulder belts.

I11. When the flox has cured, secure a shoulder belt to each AN6-6A bolt (now a stud) with an AN365-624A locknut.

Securing pilot/copilot shoulder belts
Figure 29:I:5

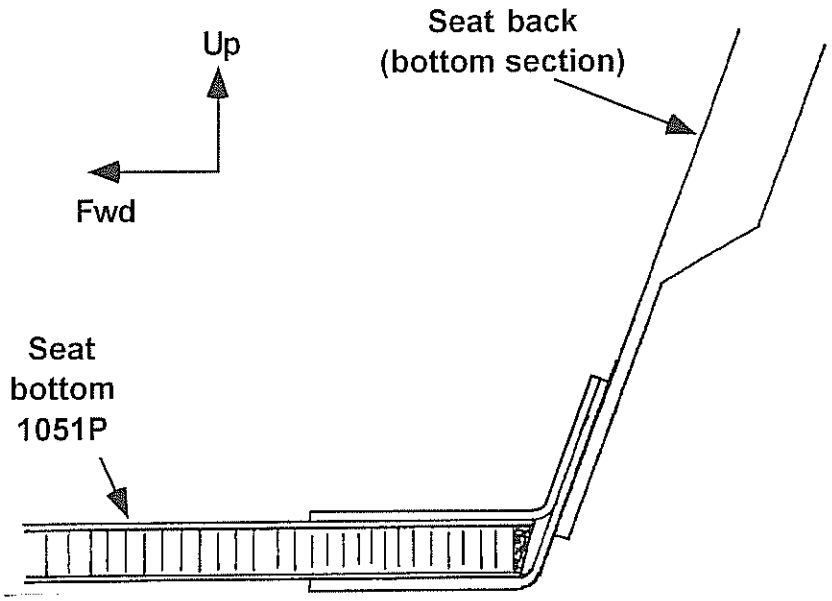


NOTE: Body work the fuselage shell smooth with micro around the stud area.

J. REAR SEAT BOTTOM

The rear seat bottom is mounted flat on top of the gear box. The seat bottom is a very rigid, 4 ply per side, 3/8" thick prepreg panel. Another duty of the seat bottom is to reinforce the thin aluminum gear box top from the forces of pressurization.

Rear seat bottom
Figure 29:J:1



J1. To seal the gap between the sides of the gear box and the fuselage shell, fiberglass closeouts are custom formed in these areas. Cut a Clark foam or cardboard dam to fit between the gear box sides and the fuselage sides. Tack glue these dams in position and cover the areas where the 4 BID will be applied with release tape. See Figure 29:J:2.

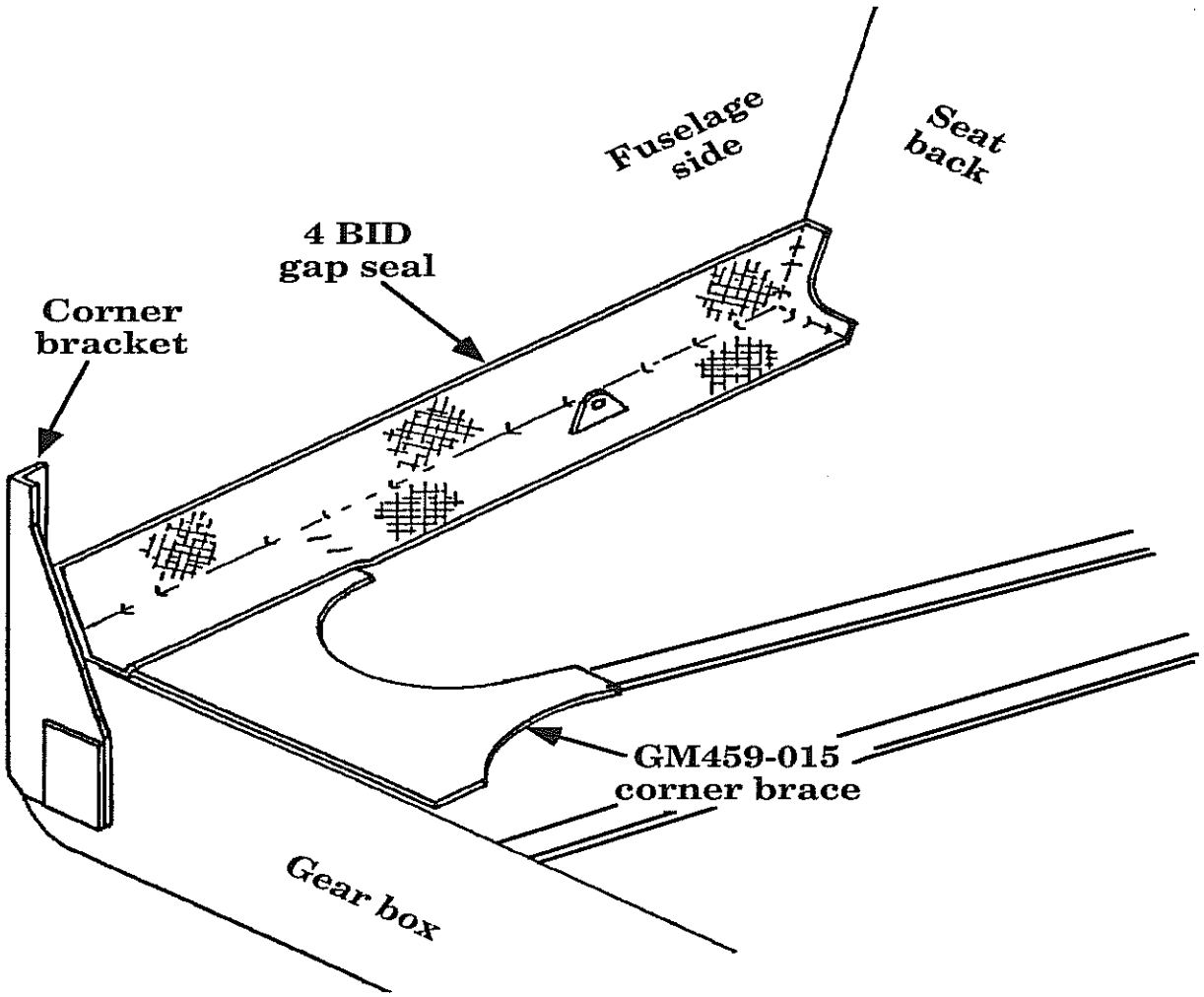
J1. To seal the gap between the sides of the gear box and the fuselage shell, fiberglass closeouts are custom formed in these areas. Cut a Clark foam or cardboard dam to fit between the gear box sides and the fuselage sides. Tack glue these dams in position and cover the areas where the 4 BID will be applied with release tape. See Figure 29:J:2.

J2. Apply a 4 BID laminate to the dams, overlapping onto the gear box top and the fuselage sides 2-3". Also overlap the 4 BID onto the rear seat back where it meets the gear box top and the fuselage sides.

J3. When the 4 BID gap seals have cured, remove the dams and trim the edges of the seals. Install the seals using RTV silicon sealant.

NOTE: You might want to wait on installing the gear box side seals with RTV until the airplane is ready for final assembly and flight.

4 BID gear box side seals
Figure 29:J:2



J4. Cut out the rear seat bottom from 4 ply per side, 3/8" thick prepreg material.

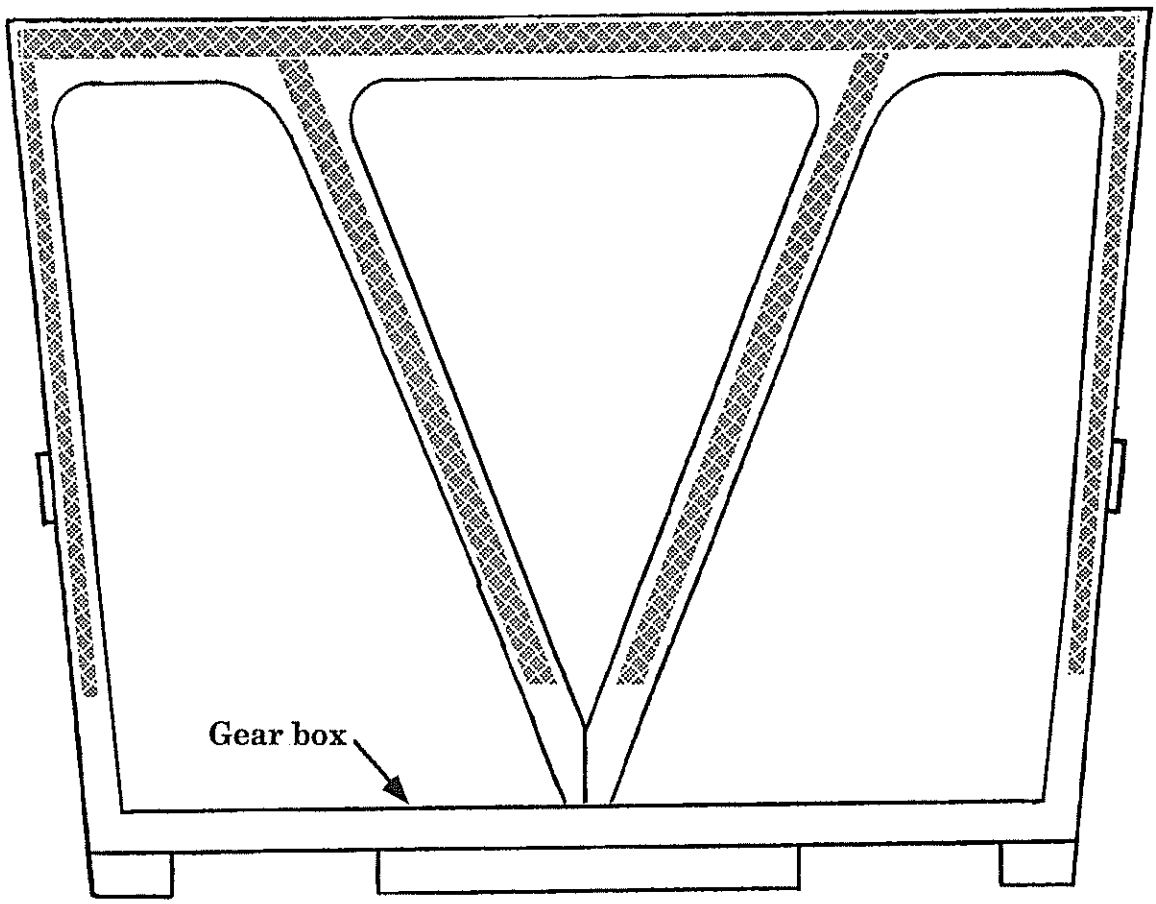
J5. Since you do not want the rear seat bottom sitting on top of the bolt heads, additional support is gained by doing a micro release between the seat bottom and the gear box top. Apply release tape to the top of the gear box in the areas shown in Figure 29:J:3. Mound up a thick epoxy/micro mixture in these areas, then place the rear seat bottom in position, weighting it down uniformly. The micro will adhere to the rear seat bottom and form a custom support in the release areas.

J6. After the micro has cured, remove the rear seat bottom. Check that the micro has contacted the gear box and the rear seat bottom in all release areas. Do additional releases if necessary.

Release areas between gear box and seat bottom

Figure 29:J:3

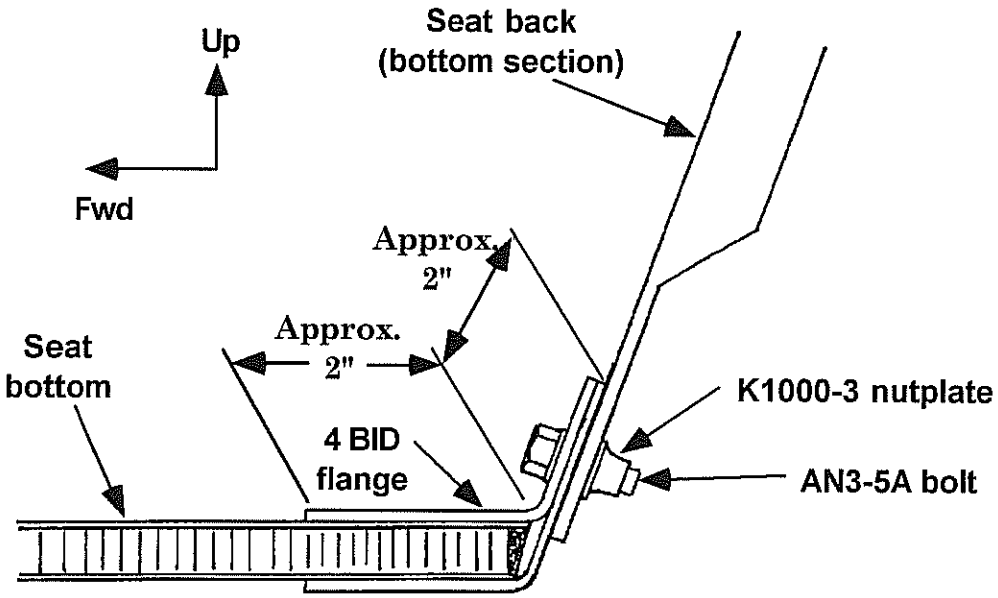
Shaded areas represent the areas where a micro release should be done on the rear seat bottom. Apply release tape to the gear box top in these areas, apply a thick epoxy/micro buildup, then push the seat bottom down into position.



J7. A 4 BID flange is needed to seal between the rear seat bottom and the rear seat back. Place the rear seat bottom in position and apply release tape to the rear seat back along the bottom 4". Sand and clean the aft edge of the seat bottom where the 4 BID flange will be applied. Remove the bolts that secure the seat back to the gear box flange.

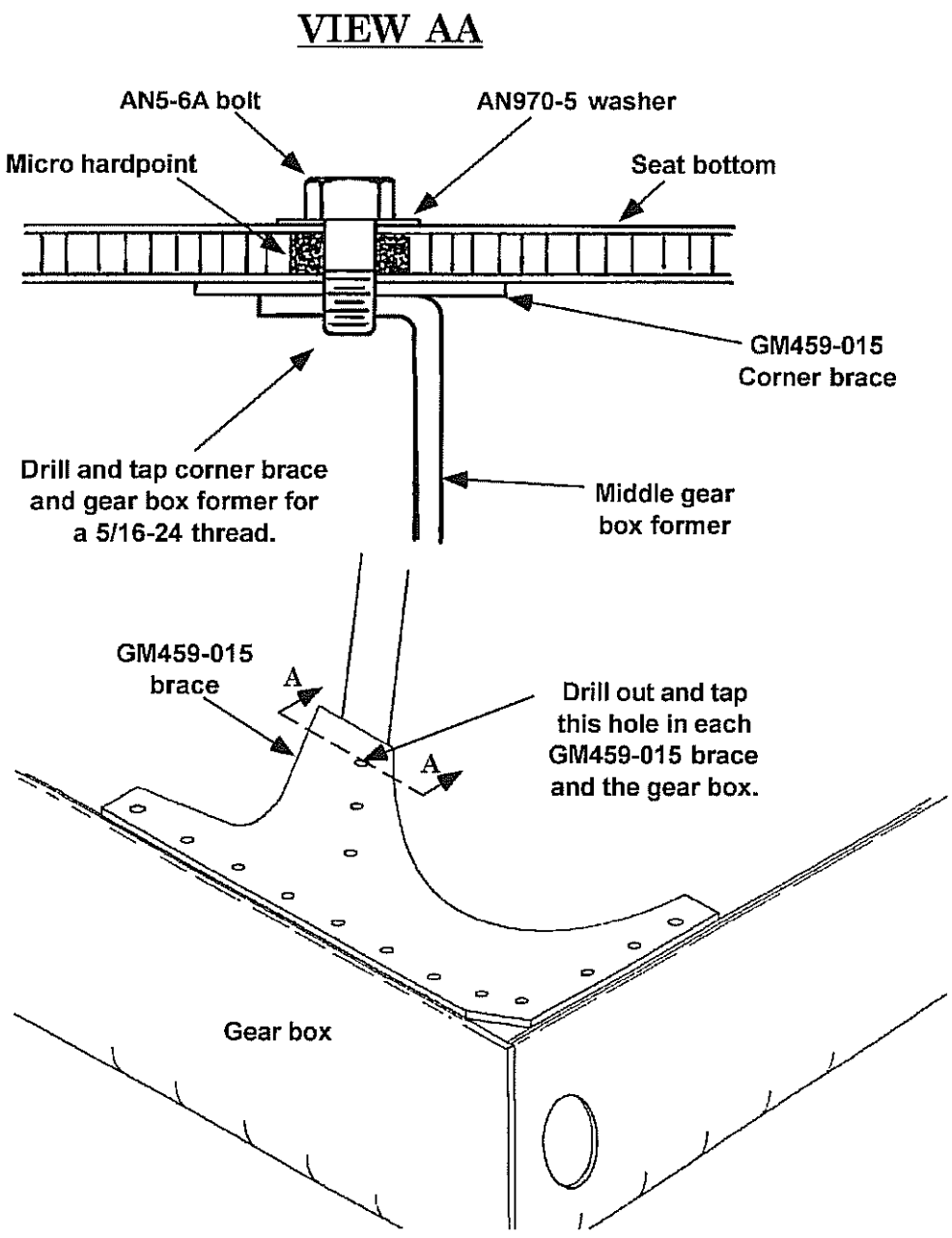
J8. Apply a 4 BID flange to the rear seat bottom, overlapping onto the rear seat back apporx. 2" as shown in Figure 29:J:4. When the flange has cured, redrill the 3/16" D. holes for the bolts that secure the seat back to the gear box flange.

Seat bottom flange
Figure 29:J:4



J9. To secure the seat bottom to the gear box, remove the two 1/4" bolts shown in Figure 29:J:5. Drill out the holes in the gear box and corner brace to .2720" D. (drill size "I"), then tap the holes to a 5/16 - 24 thread. Drilltwo 5/16" D. holes in the seat bottom corresponding to your newly threaded gear box holes. Secure the seat bottom with AN5-6A bolts with AN970-5 washers. Use a little Loctite on the threads of the bolts.

Securing seat bottom to gear box
Figure 29:J:5



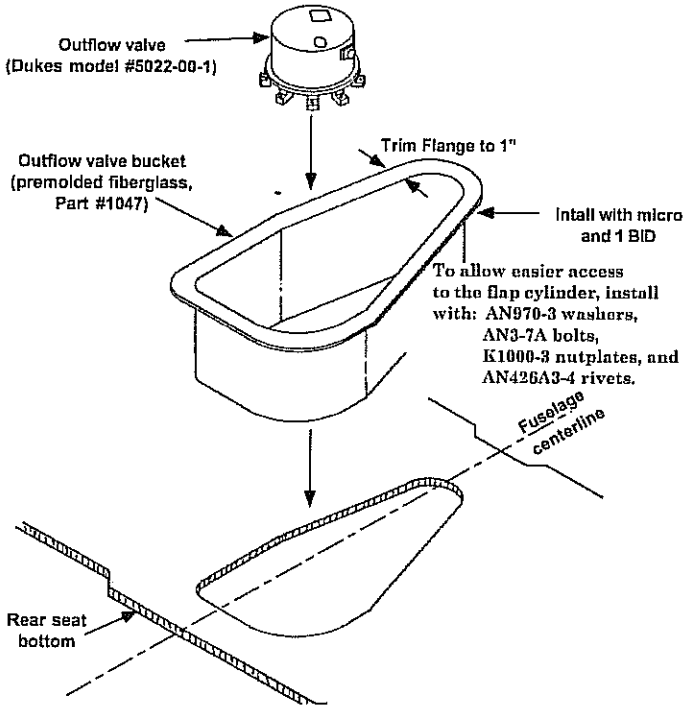
K. OUTFLOW VALVE INSTALLATION

The outflow valve is basically a regulator for the pressurized air in the cockpit. When open, it allows air to escape the cabin while still maintaining the 5 psi differential. This process keeps fresh, pressurized air flowing into the cabin. The outflow valve is mounted inside a fiberglass bucket (Part #1047) recessed into the center bay of the gear box.

This section will describe only the installation of the outflow valve itself (See drawing #339), not the wiring associated with it. Wiring will be described in a later chapter.

Outflow Valve and Bucket

Figure 29:K:1



Note: The gasket that installs between the outflow valve and the bucket is not shown.

K1. There is a circular scribe mark on the bottom of the 1047 fiberglass bucket. This is the outline of the air outlet hole. Grind out the hole to the scribe lines.

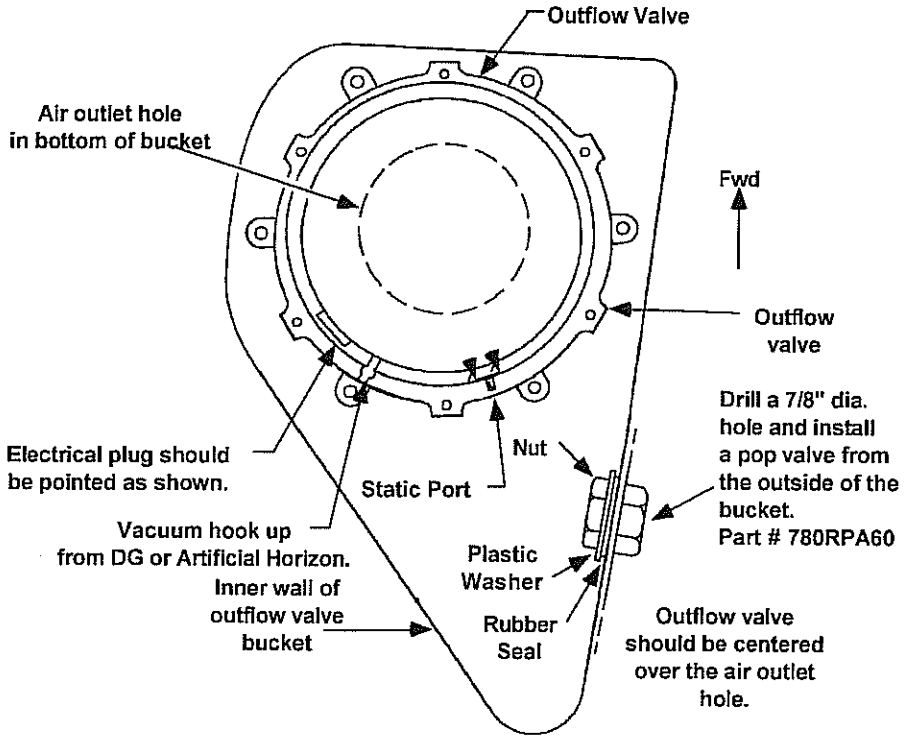
K2. Place the outflow valve into the fiberglass bucket as shown in Figure 29:K:2 with the 341 gasket sandwhiched between. The electrical connection should be pointing as shown. Use the mounting holes in the outflow valve as guides to drill 3/16" diameter holes through the fiberglass bucket. Center the outflow valve over the air outlet hole in the bucket.

K3. Secure the valve to the bucket with 4AM87 hex screws and K1000-3 nutplates. The nutplates are secured to the bottom surface of the bucket with AN426A3-4 rivets.

K4. Lower the fiberglass bucket into the center access panel. You can trim the flange of the fiberglass bucket to 1" in width. Secure the bucket to the seat bottom with micro and reinforce the bond with 1 BID. The alternate method is to install the bucket with bolts, washers, and nutplates. This will allow easier access to the gear compartment.

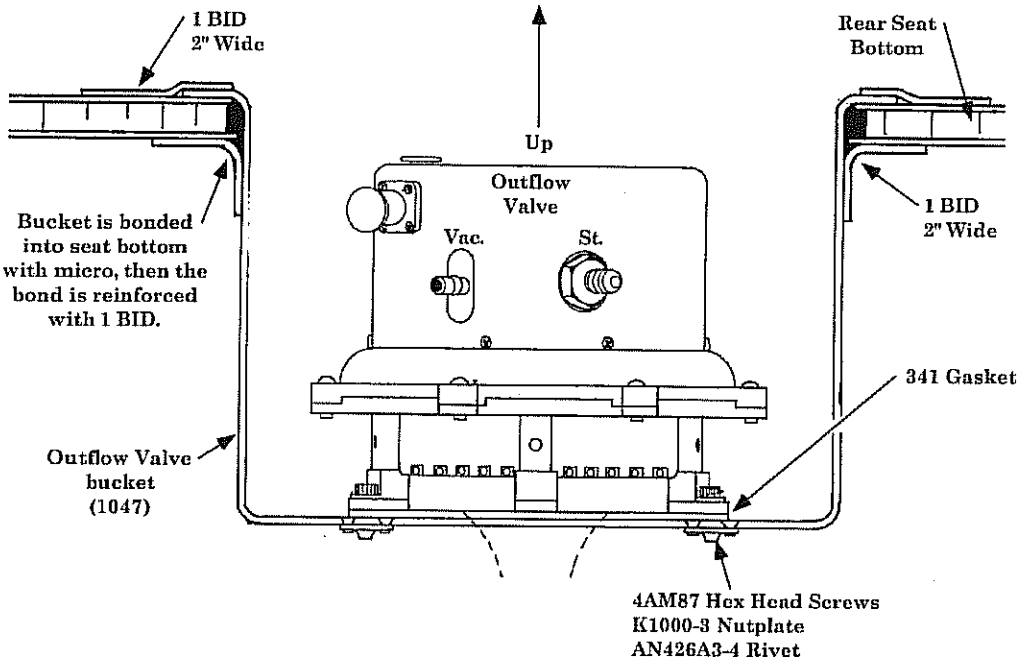
Positioning Outflow Valve in Bucket

Figure 29:K:2



Installing outflow valve bucket

Figure 29:K:3



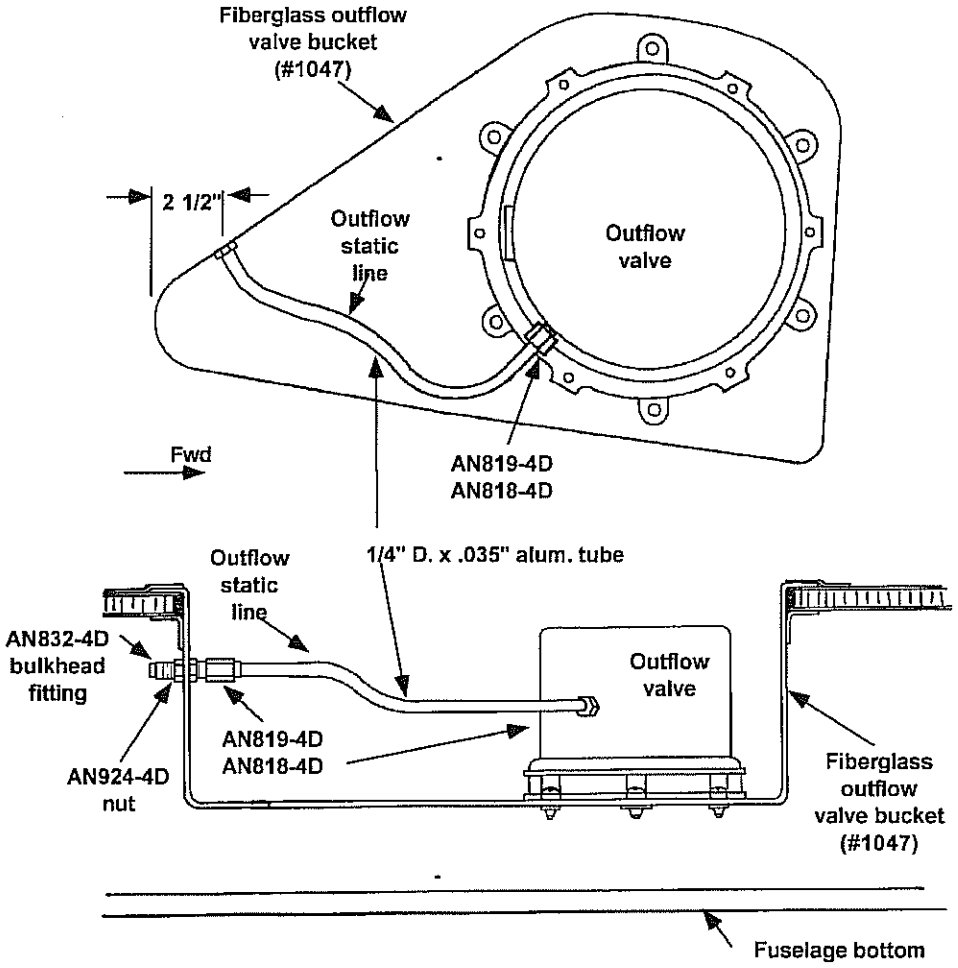
K3. Secure the valve to the bucket with 4AM87 hex screws and K1000-3 nutplates. The nutplates are secured to the bottom surface of the bucket with AN426A3-4 rivets.

K4. Lower the fiberglass bucket into the center access panel. You can trim the flange of the fiberglass bucket to 1" in width. Secure the bucket to the seat bottom with micro and reinforce the bond with 1 BID.

K5. The outflow valve must be vented to a static (outside) air source to work properly. There is already a fitting installed in the side of the outflow valve for the static tube. Install an AN832-4D fitting through theside of the fiberglass bucket at the location shown in Figure 29:K:4. Connect the fitting in the outflow valve to the AN832-4D fitting with 1/4" D., .035" wall aluminum tubing.

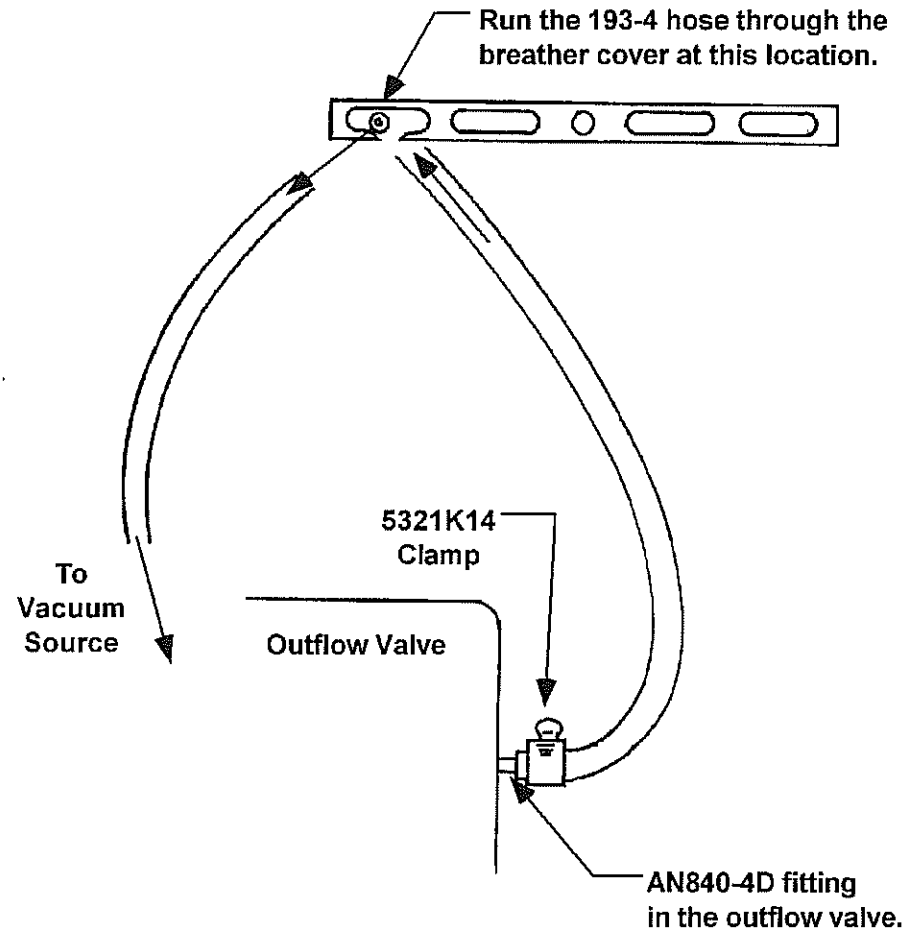
Outflow valve static line

Figure 29:K:4



K6. Install the vacuum hose to the outflow valve. Run the 193-4 stratoflex hose from the outflow valve to one of the extra ports in the altitude or the heading indicator. An AN840-4D fitting is provided for this purpose. Secure the hose with 5321K14 clamps at each end.

Installing the Vacuum Source to the Outflow Valve
Figure 29:K:5



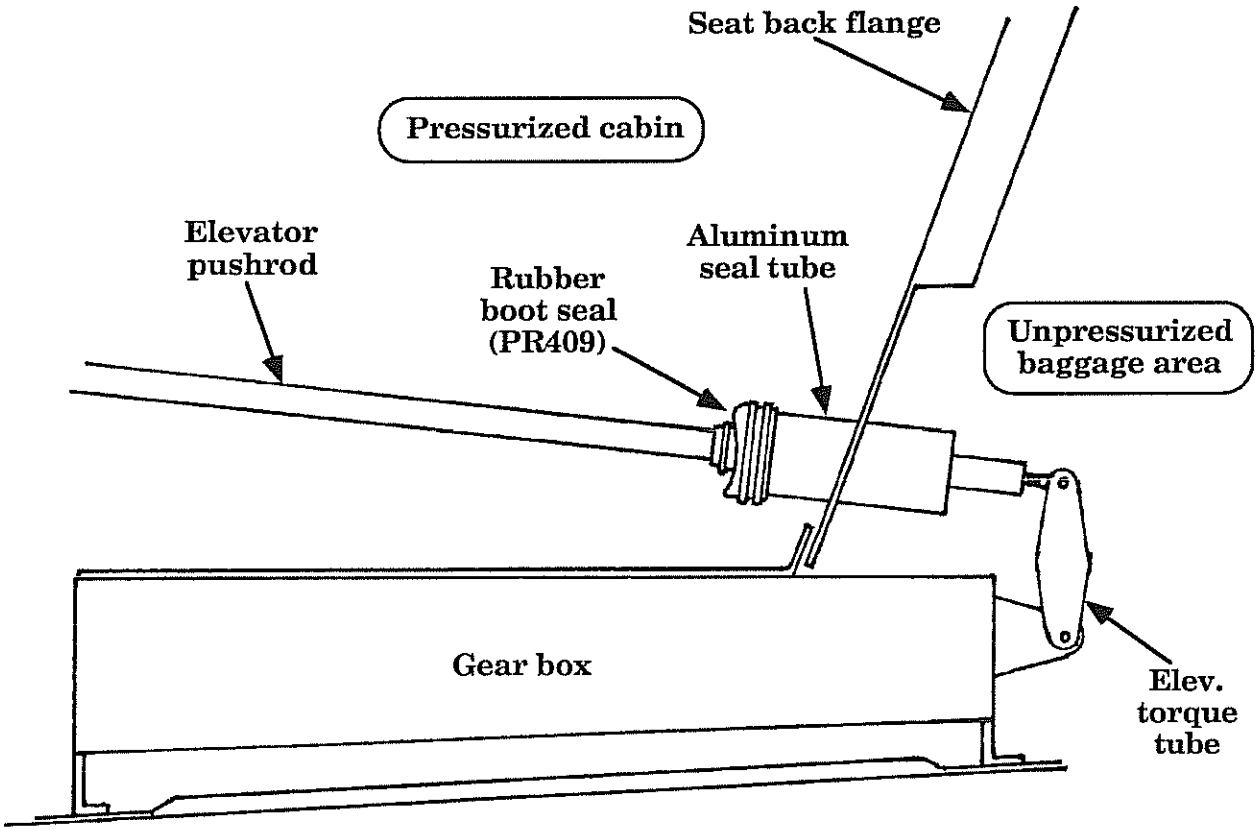
K7. Install the cabin controller in the instrument panel. The cabin pressurization rate selector needs to be removed for the installation of the unit. The dump valve switch should be installed where it can not be inadvertently activated.

Turn to the wiring chapter to complete the outflow valve installation.

L. ELEVATOR PUSHROD SEALS

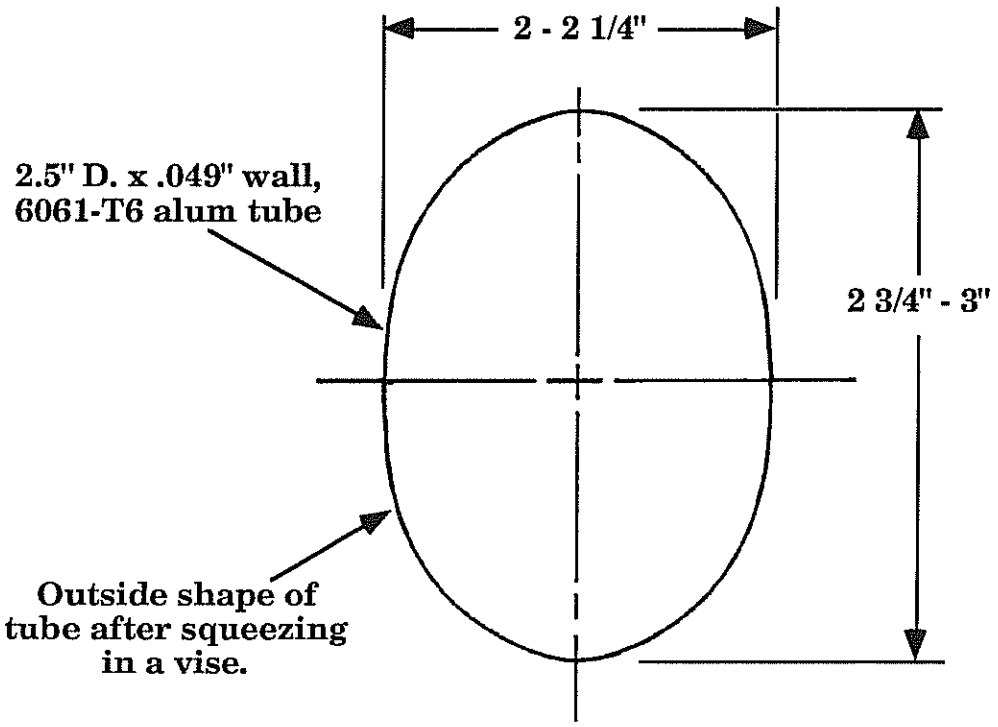
As the elevator pushrods pass through the pressure bulkhead (seat back) flange, they must be sealed for pressurization. Aluminum tubes are installed in the flanges, just above the gear box, with rubber boots that seal the elevator pushrods. The boots produce very little friction in the elevator control system.

Elevator pushrod seal assembly
Figure 29:L:1



L1. There is a 12" long section of 2 1/2" diameter, 6061-T6 aluminum tube provided in the kit. Cut the tube into two, 6" long segments. Flatten each of these tubes into an oval shape of 2" - 2 1/4" width and 2 3/4" - 3" height. Use a vise to squeeze the tube (carefully!). Scuff the outer surface of the aluminum tubes with 40 grit sandpaper.

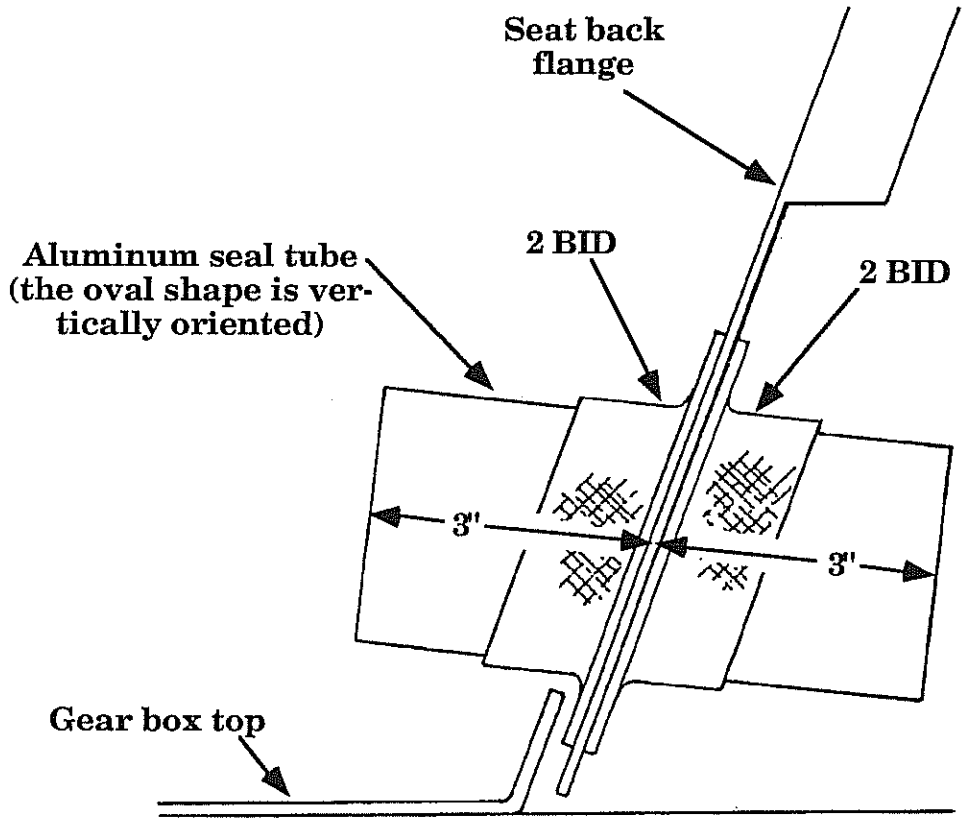
Aluminum seal tube shape
Figure 29:L:2



L2. Grind an oval shaped hole in the seat back bulkhead large enough for the elevator seal tube. The tube should be positioned so the elevator pushrod does not touch the inside walls (minimum 1/8" clearance). Check to ensure clearance in all control extremes because the pushrod does have a slight left-right and up-down movement.

L3. Bond the aluminum seal tubes into the seat back flanges with an epoxy/micro mixture. Reinforce this bond with 2 BID, overlapping onto both the tubes and the flanges 1".

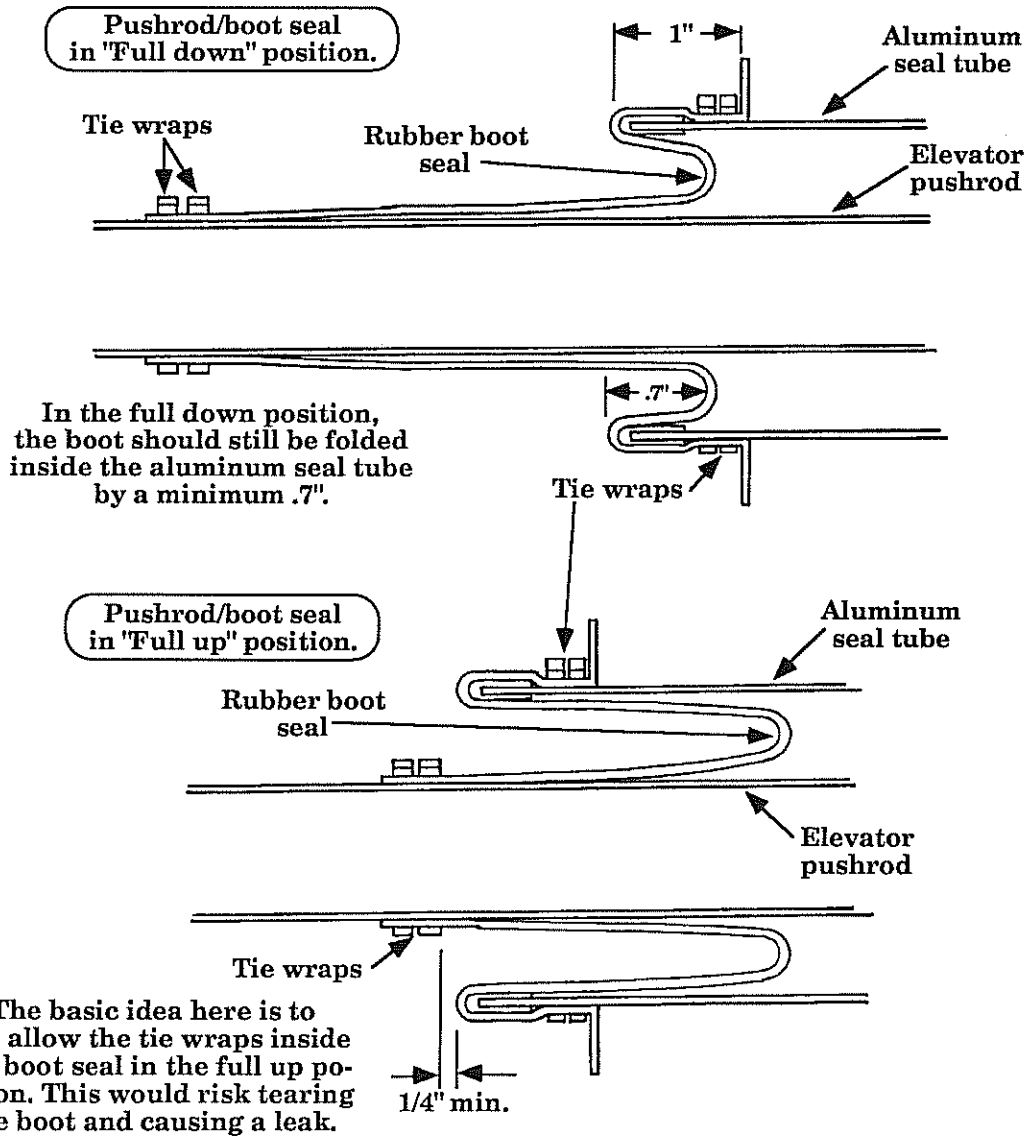
Installing aluminum seal tubes
Figure 29:L:3



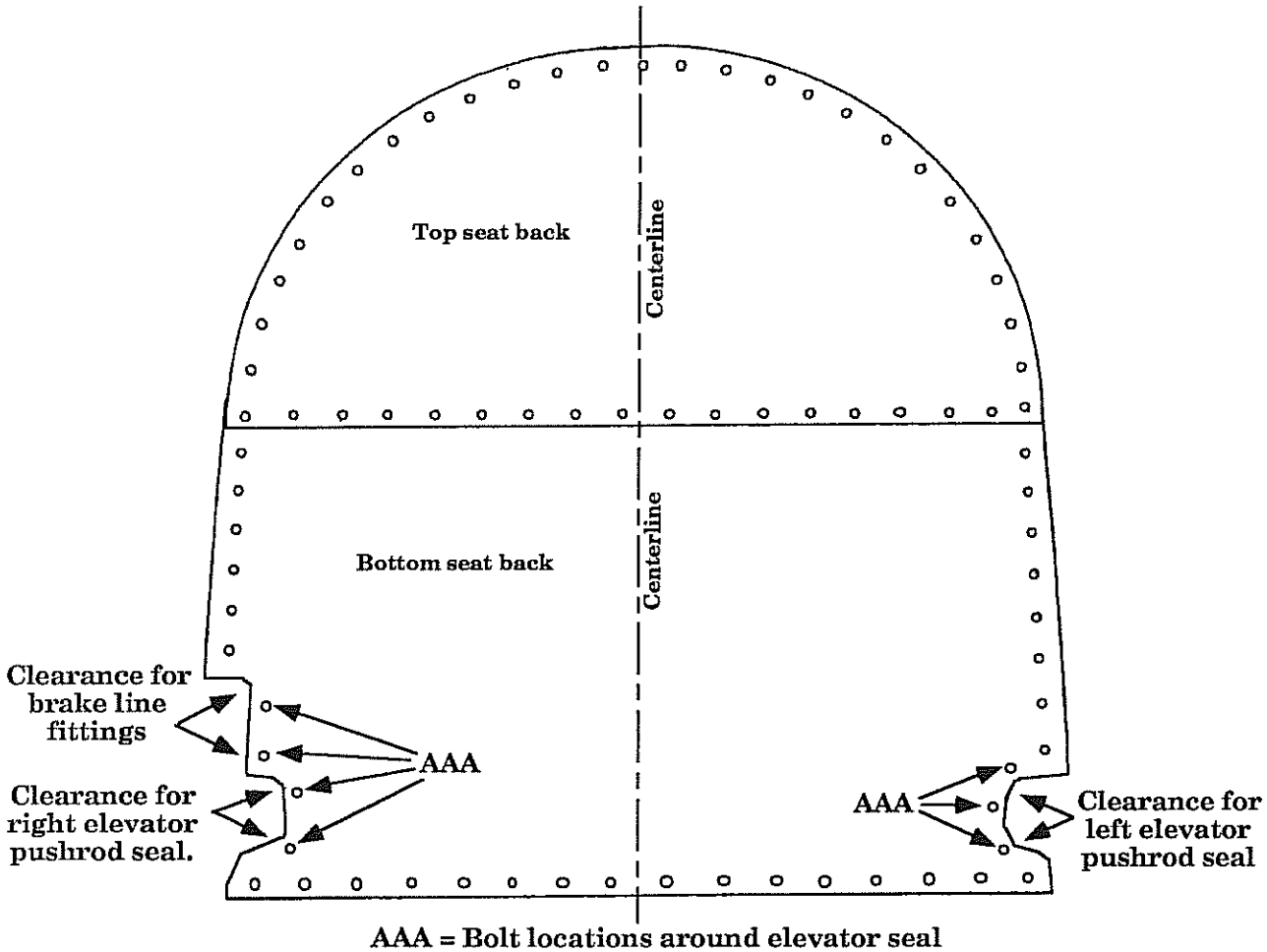
L4. To prevent chaffing of the rubber boots, a rubber grommet is bonded to the fwd edges of the aluminum pushrod seal tubes. This rubber grommet material (Part #RC1023) is provided in a 2' length and must be sized and cut to the proper length for each tube. Slide the rubber grommet onto the fwd edge of the tubes, then bond the rubber to the aluminum with instant glue.

L5. Fold the rubber boots (Part #PR409) in on themselves as shown in Figure 29:L:4. Secure the boots to the elevator pushrods and the aluminum seal tubes with tie wraps. Both elevator pushrods should be able to move to all control extremes without interference from the boots or the tie wraps.

Installing rubber elevator boots
Figure 29:L:4



L6. You may now drill and install the seven remaining pressure bulkhead mounting bolts, labeled AAA in Figure 29:L:5.



AAA = Bolt locations around elevator seal tubes and the brake line bulkhead fittings. Use AN3-5A bolts and K1000-3 nutplates as you did for the other seat back mounting points.

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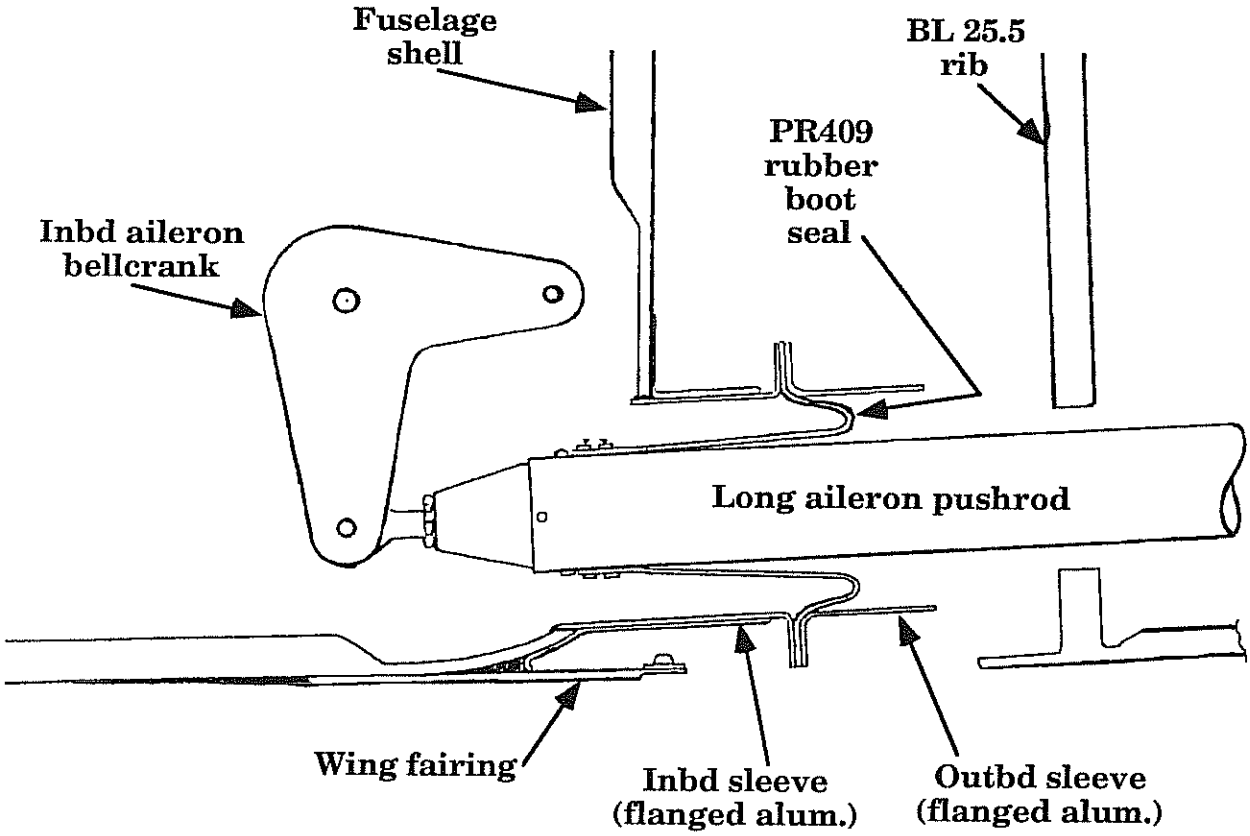
N. AILERON PUSHROD SEALS

The aileron pushrods are sealed for pressurization as they enter the fuselage. The seals are rubber boots of the same type used to seal the elevator pushrods.

The aileron control system does not need a pressure compensator like the elevator system does. When the cabin is pressurized, each rubber boot wants to push its aileron pushrod outbd, thereby balancing the system automatically with no trim change.

It is possible to fit and install the aileron pushrod seals with the wings off by simulating the pushrod with a short length of 1 1/4" D. tube. The tube should angle up about 3.5° from the inbd aileron bellcrank. This should simulate the actual position close enough to fit the seal.

Aileron pushrod seal
Figure 29:N:1



N1. Trim two, flanged sleeves (Part #417-02) to 1 1/2" in length. These will be the outbd sections of both aileron seals.

N2. Place an outbd (1 1/2" long) sleeve section onto an inbd sleeve and drill the five #20 holes through both flanges as shown on Blueprint A-420. Make two of these assemblies.

N3. You should already have oval shaped holes in your fuselage side for the long aileron pushrod to enter. Grind out these holes so you can slip in a flanged sleeve (remember, the long sleeve are the inbd ones which will be secured to the fuselage). The pushrod must clear the inside surface of the flanged sleeve by at least 1/4" throughout its' travel range. See Blueprint A-420 to get an idea of how far outbd of the fuselage the flanged sleeve should extend. (about 1.4" at midpoint). When satisfied with the sleeve's position, use 40 grit to scuff up the exterior of each sleeve where it will be glassed to the fuselage.

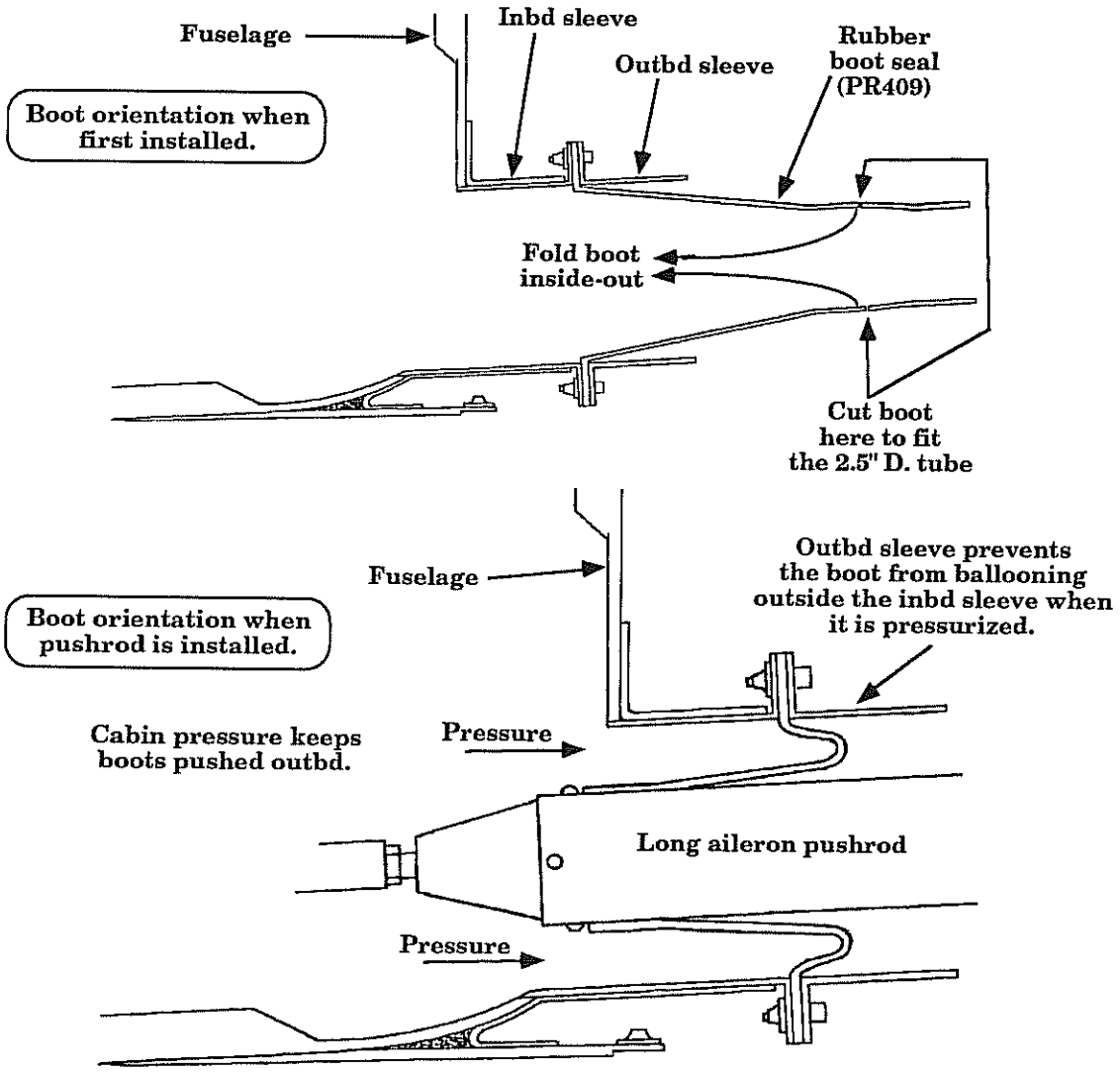
N4. Before bonding the sleeves to the fuselage, trim the inbd sleeves flush with the inner surface of the fuselage shell. Be sure the five holes in each sleeve are oriented as shown in Blueprint A-420 for easiest screw access.

N5. Secure the inbd sleeves to the fuselage with a thick epoxy/flox mixture. Reinforce the bond with 4 BID, overlapping onto the sleeve as much as possible for maximum bond strength.

N6. Secure a rubber boot seal between the inbd and outbd sleeves as shown in Figure 29:N:2. Coat the flange of the rubber boot with silicon, then snug up the five Allen head screws. Do not tighten the screws fully until the silicon has cured. You are now ready to install the wings and long aileron pushrod.

N7. Cut the small diameter end off of each rubber boot as shown in Figure 29:N:2. There is a stepped section of the boot that is the proper diameter for the long aileron pushrod.

Installing rubber boot seal
Figure 29:N:2



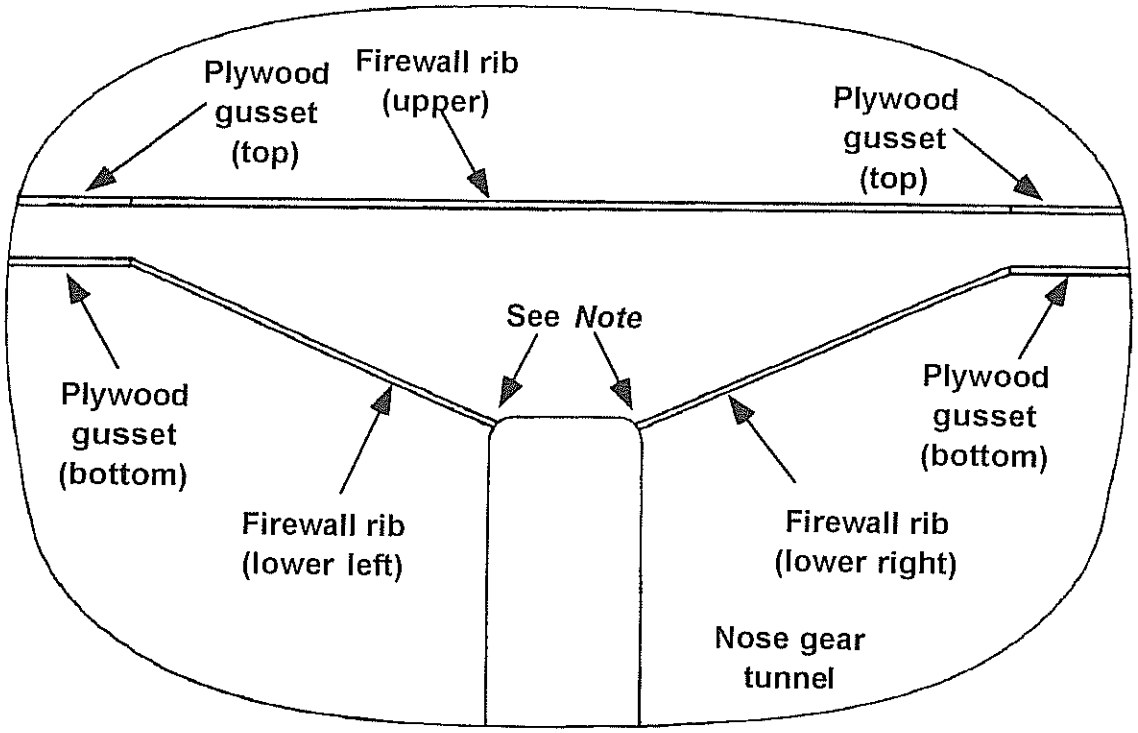
N8. When mounting the wings to the fuselage, be very carefull to insert the long aileron pushrods through the rubber boots cleanly, without nicking or tearing the boots. The boots are secured to the aileron pushrods with a couple tie wraps each. Do not secure the boots over the rivets on the inbd end of the pushrod. This may cause tearing later on. The boots should be secured just outbd of these rivets.

N9. Check to make sure that the aileron pushrod seals do not interfere with control movement. When the cabin is pressurized, the boots will expand into the outbd sleeve sections.

O. FIREWALL REINFORCEMENT RIBS

The firewall must be reinforced with three ribs to prevent bulging during pressurization. The horizontal rib is also handy for mounting instrument accessories, radio stack braces, etc..

Firewall reinforcement ribs
Figure 29:O:1



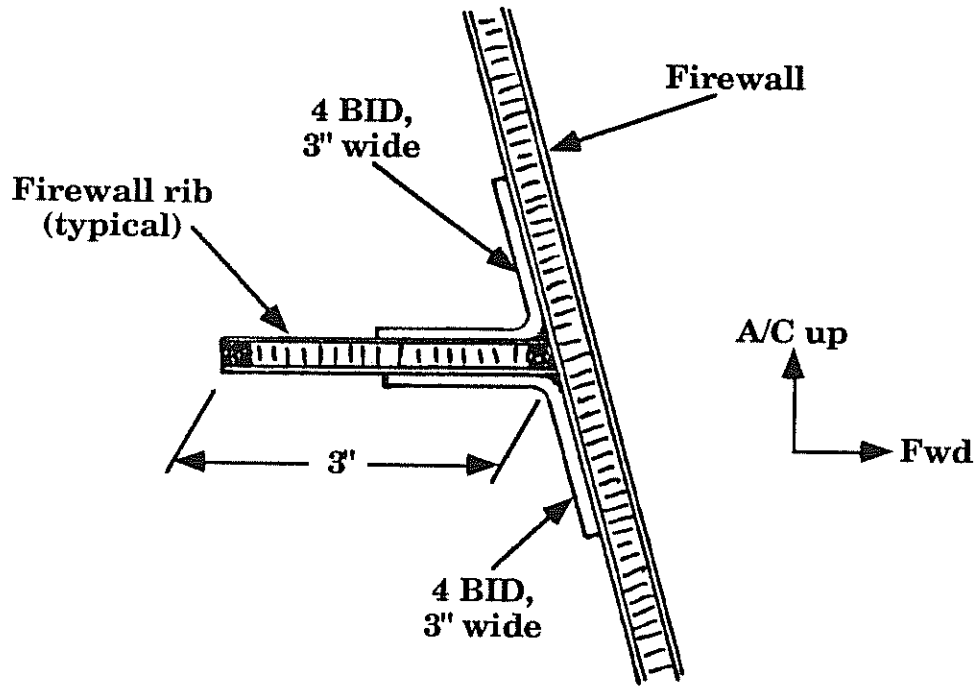
Note: The lower left and right firewall ribs contact the nose gear tunnel at about the centers of the round corners. This is an "eyeball" placement and is not critical.

O1. Cut out and fit the three reinforcement ribs shown in Figure 29:O:1. They are made from 4 ply per side, 3/8" thick prepreg.

O2. Remove 1/8 - 1/4" of core from the edges of the firewall reinforcement ribs where they will be bonded to the firewall, nose gear tunnel, and engine mount brackets.

O3. Bond the firewall reinforcement ribs in place with a thick epoxy/micro mixture. Reinforce the bond with 4 BID, 3" wide strips, overlapping 1 1/2" onto the reinforcement ribs and the adjoining surfaces. Be sure to sand and clean all areas where the 4 BID is applied.

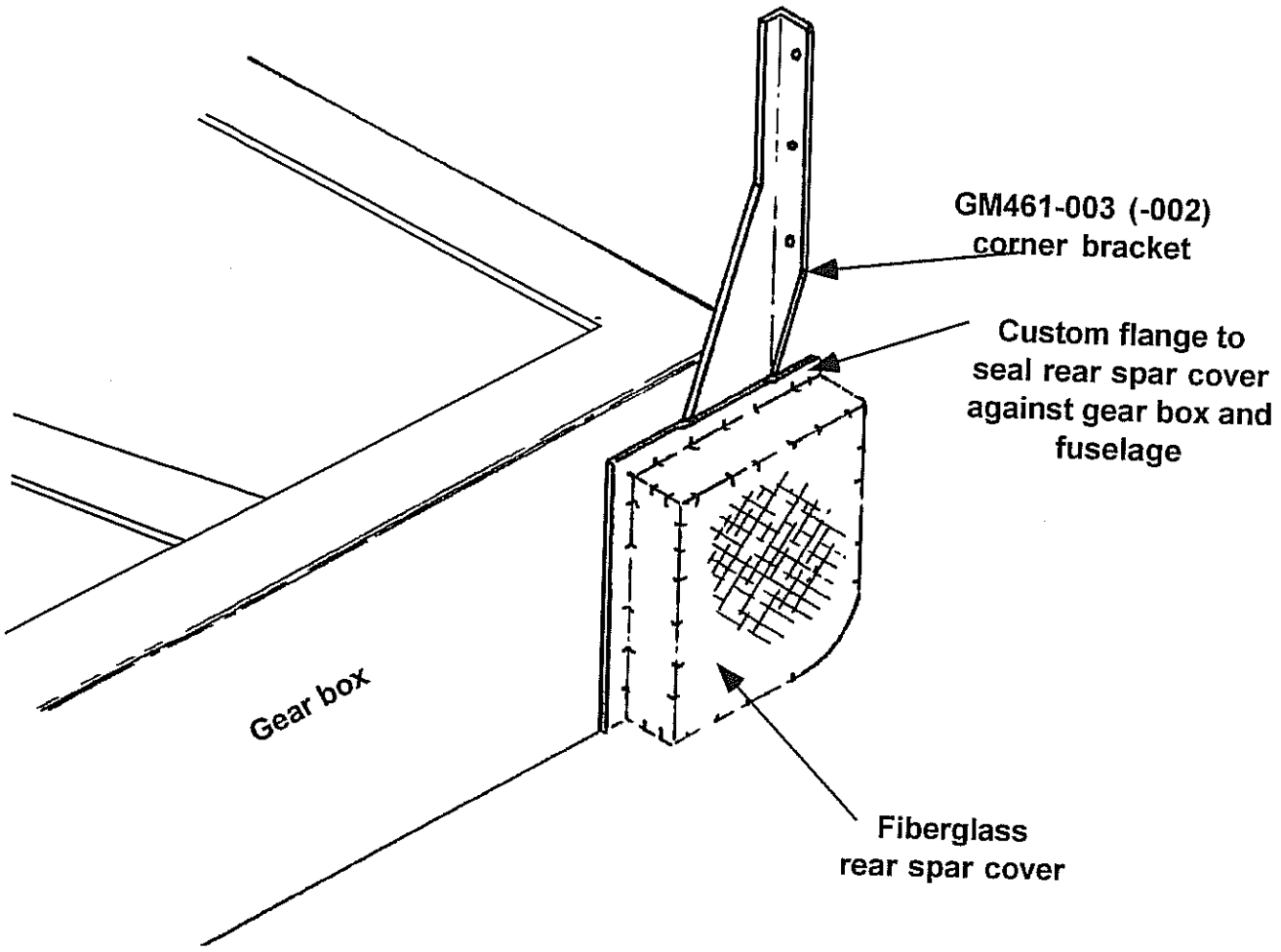
Securing reinforcement ribs
Figure 29:O:2



P. REAR SPAR COVERS

Fiberglass covers (Part no. 1046) are secured over the rear spar areas inside the fuselage for pressurization sealing. The covers seal against the fuselage shell and the gear box.

Rear spar covers
Figure 29:P:1



P1. The fiberglass rear spar covers are molded to be used as either left or right, depending on how they are trimmed. Trim the covers to fit over the rear spars while conforming closely to the fuselage sides, bottom, and gear box. Don't try to get a hairline fit with the covers initially, because you will be apply a 4 BID flange that will custom fit each cover. There is no set height and width of each cover, just so it clears the rear spar ends.

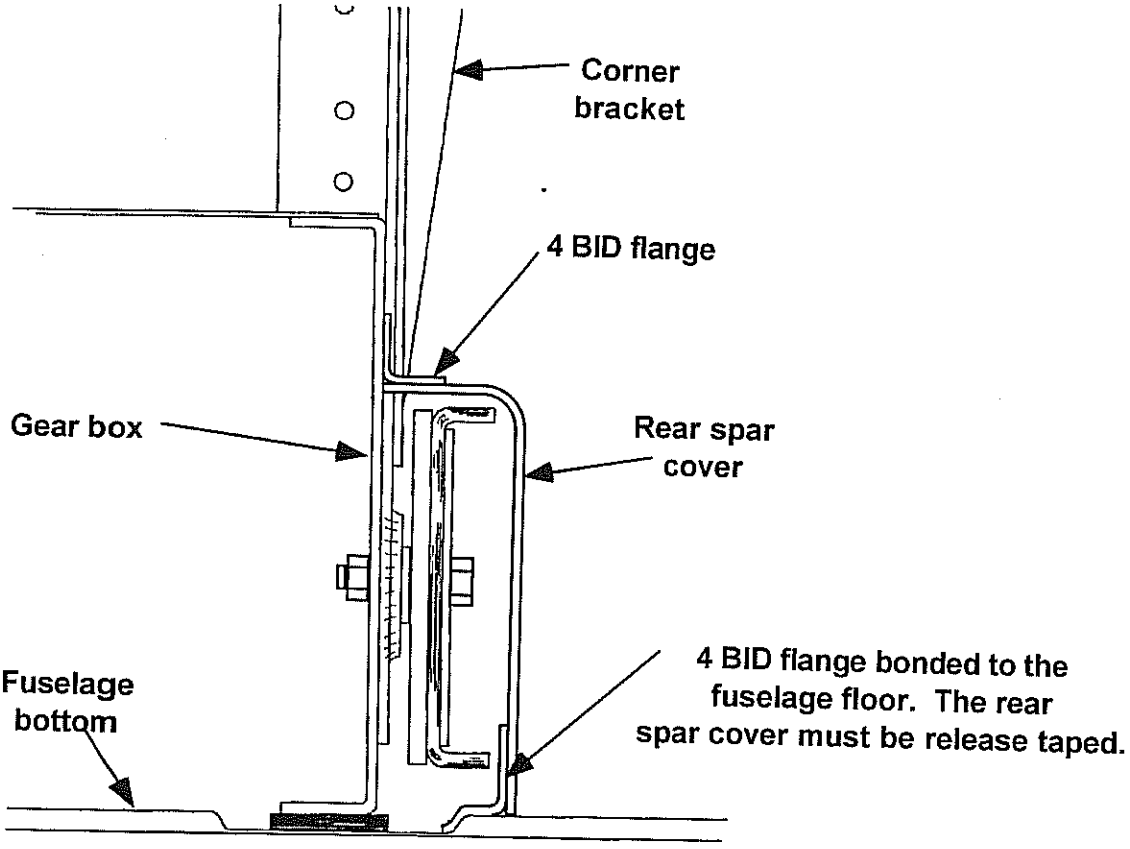
P2. Apply release tape to the inner surface of the fuselage and the gear box where the 4 BID flange will be applied. Sand and clean the edges of the rear spar covers wher the 4 BID will be located.

P3. Use a few drops of instant glue to temporarily tack the rear spar covers in place on the release tape.

P4. Apply a 2" wide, 4 BID laminate to form a custom flange around the rear spar covers. The 4 BID should overlap 1" onto the fuselage and gear box. Note that part of the 4 BID is installed on the rear spar cover and part of the 4 BID is installed on the fuselage.

Custom fit, 4 BID flange on rear spar cover

Figure 29:P:2



P5. When the 4 BID has cured, trim the edges and remove the release tape. You now have two, custom fit rear spar covers. When you are ready (probably not quite yet), bond the rear spar covers in place with a silicon RTV caulking.

NOTE: Keep in mind that you will need to drill a hole in the rear spar covers for the spped brake cable if you are installing that option. It is best to avoid securing the rear spar covers until you are sure the aircraft is ready to fly.

Q. REINFORCEMENT PLATES

Aluminum reinforcement plates (RS313's) are required to protect the bond between some of the BID layups and the fuselage. The cabin wants to blow up (oops, bad word, let's say "expand") into a circular shape when pressurized to a 5 psi differential. The stiff carbon fiber structure is ideal for these expansion stresses, but there are a few very rigid structures inside the cabin, such as the main spar box and pressure bulkhead, that do not want to expand along with the fuselage shell. The fiberglass BID tapes holding these rigid structures in place must endure considerable stresses. The RS313 plates are placed over the high stress laminates and secured through the fuselage skin with bolts or flush head screws, effectively preventing the BID from delaminating.

Q1. Installation of a typical RS313 reinforcement plate begins with locating the plate on the inside of the fuselage. Bond the plate to the fuselage surface with a thick epoxy/flox mixture. The flox will also provide an even, supportive surface when the plate is secured.

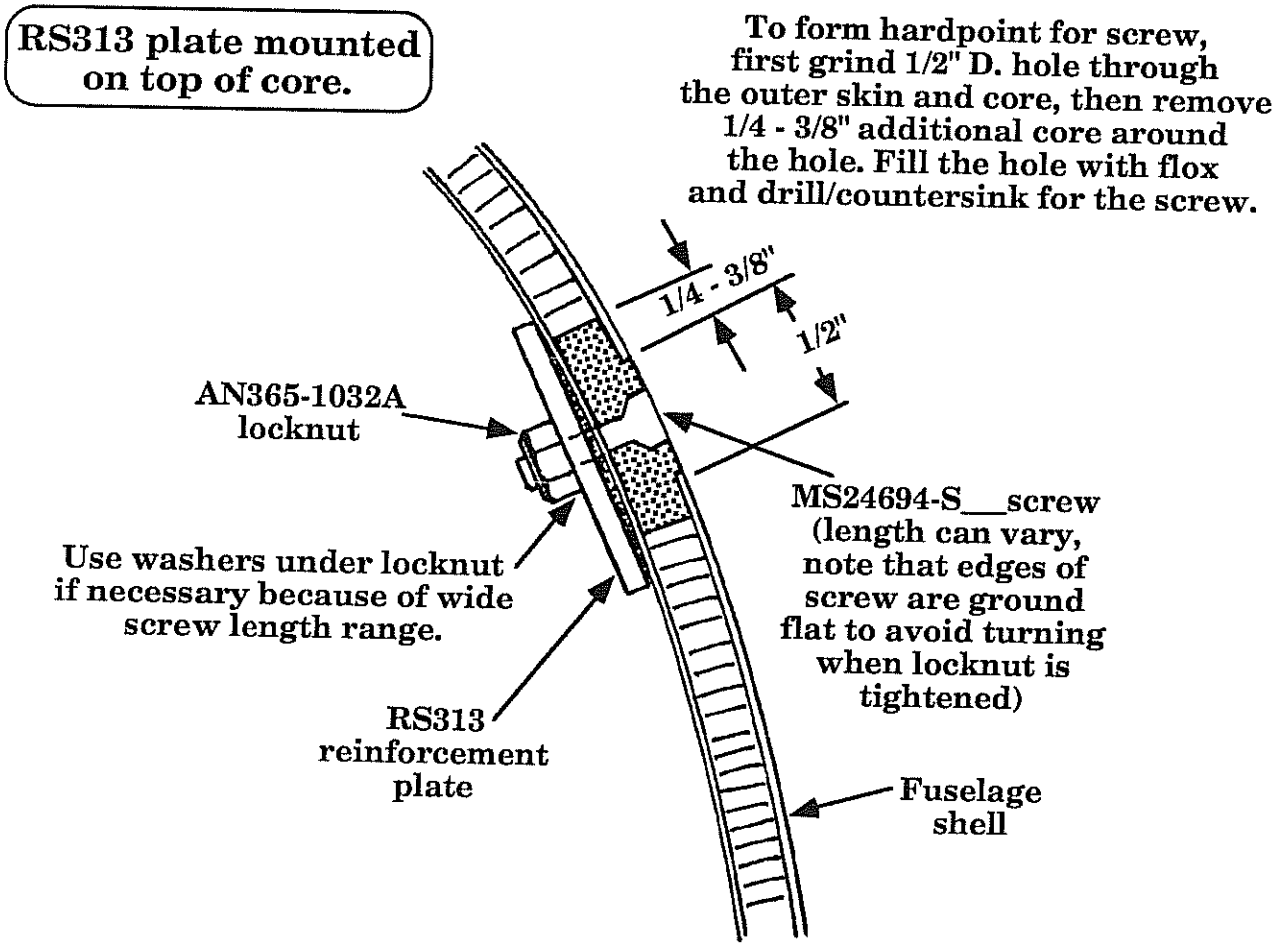
Q2. Use the hole in each RS313 plate as a guide to drill a 3/16" D. hole through the fuselage shell (or nose gear tunnel).

NOTE: You'll notice in this section that we do not usually specify the lengths of the MS24694 screws. This is because the lengths can easily vary due to builder tolerances. We have provided a quantity of MS24694-S54 screws for use on the reinforcement plates that rest on core areas, MS24694-S52 screws for use on the plates that do not rest on core, and an assortment of different length screws (MS24694-S56 and -S53) in case they are needed. You can also vary the number of washers under the nuts or the depth of countersinking to compensate for an oddball screw size.

Q3. If an RS313 plate is resting on top of core (as in Figure 29:Q:1), a hardpoint must be formed before the bolt or screw is tightened. Enlarge the hole in the outer laminate of the fuselage shell to 1/2" diameter. Remove another 1/4 - 3/8" of core material around the perimeter of the hole. Fill the entire cavity with a thick epoxy/flox mixture and let cure. Redrill the 3/16" D. hole through the flox, then countersink for the MS24694-S__ screw. (See previous NOTE). Countersink so the screw head is below flush, because you will be filling over the screw for a smooth finish. Use a grinder to flatten the sides of the screw to prevent turning when potted into the hole.

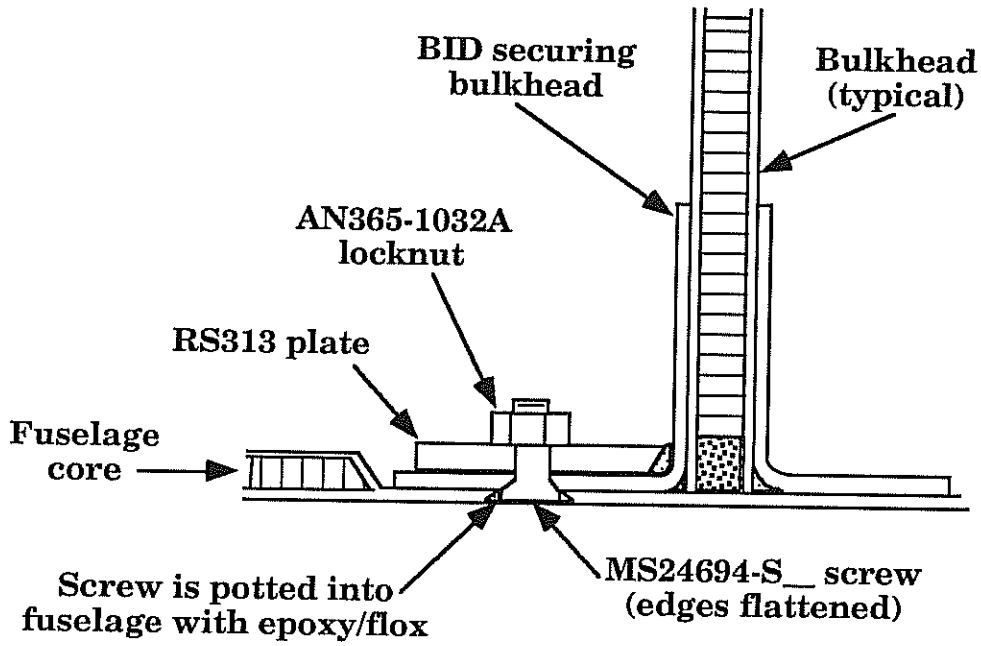
Q4. Bond the screws into the fuselage shell with epoxy/flox. Tighten the AN365-1032A locknuts against the RS313 plates. Fill over the screw heads with the flox so you can later sand the outer surface smooth.

RS313 plate installation
(Through core material, typ.)
Figure 29:Q:1



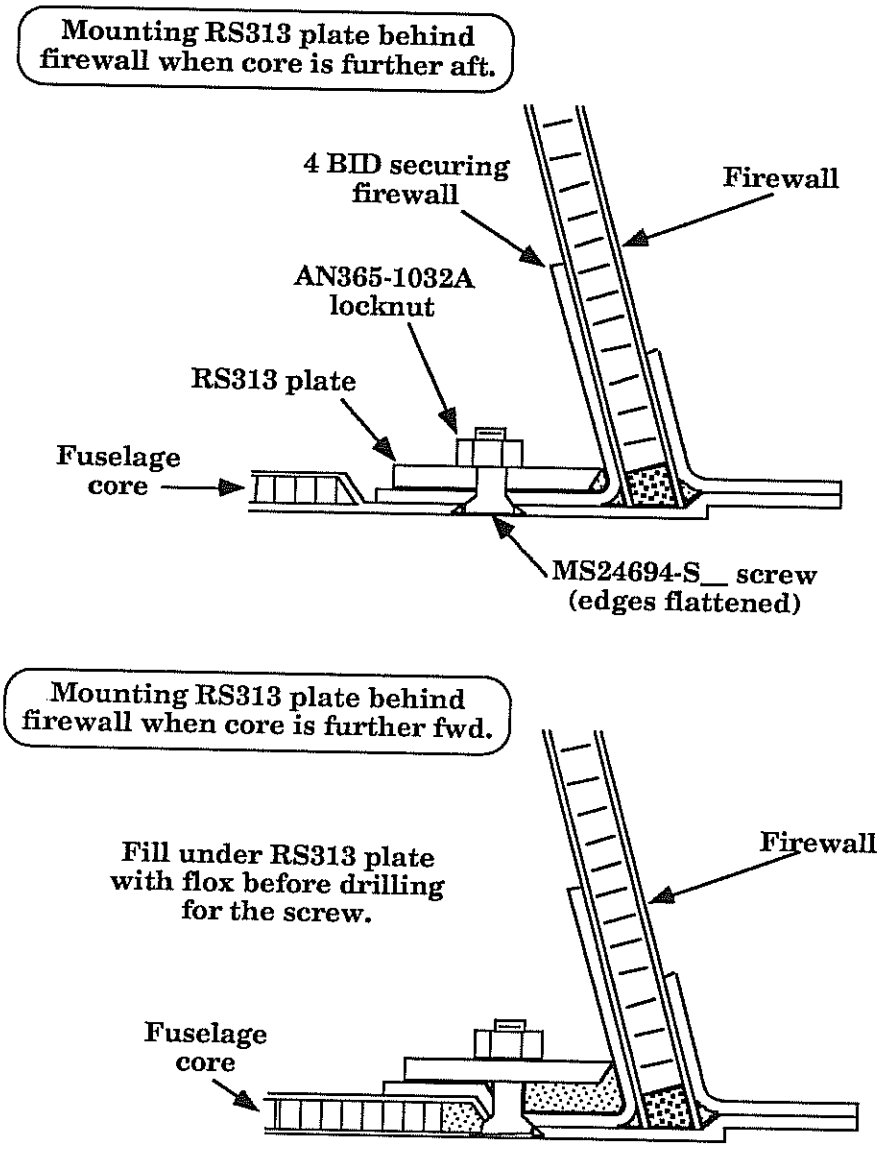
Q5. When a RS313 plate is installed in an area with no core material, no hard point is required. There should be enough BID in the mounting area to countersink for the MS24694-S__ screw. You should still install the plate on a bed of thick epoxy/flox to get a uniform surface to tighten against.

RS313 plate installation
(Coreless area, typ.)
Figure 29:Q:2



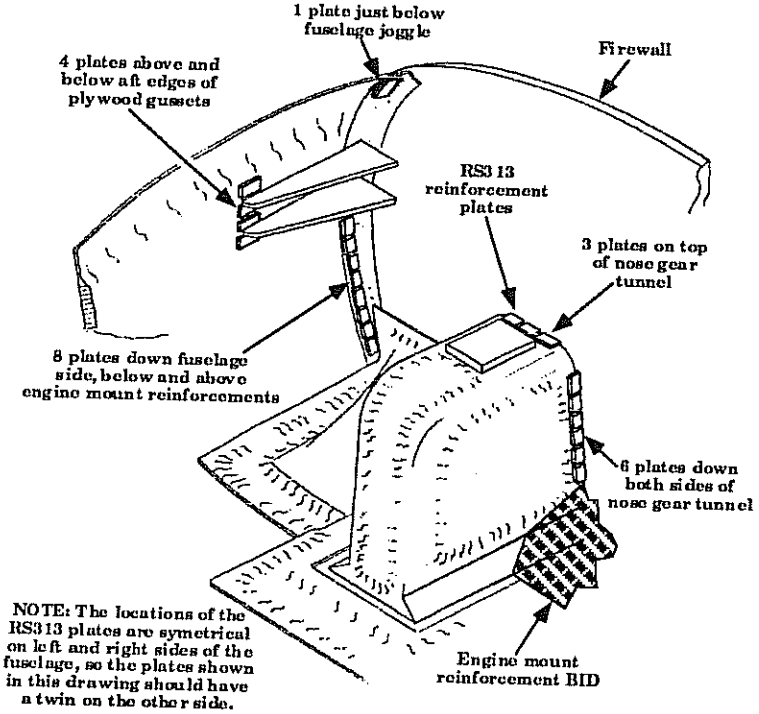
Q6. Figure 29:Q:3 shows the typical plate installation around the firewall. Depending on the core location in your fuselage, the RS313 plates may either be on or off the core when butted up against the aft face of the firewall.

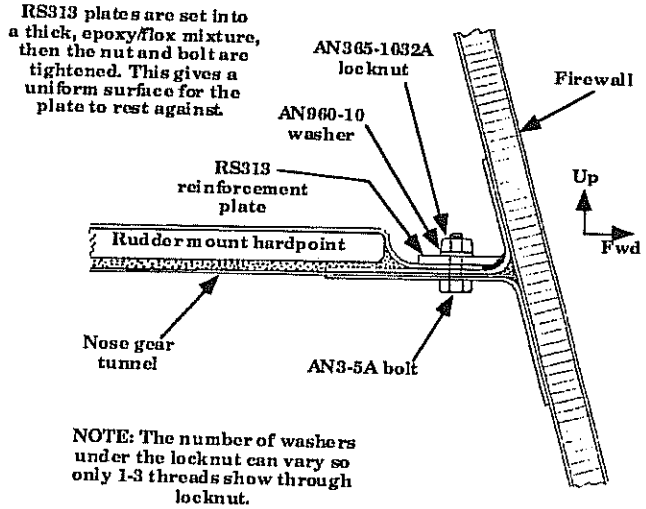
RS313 plate installation
(Firewall area, typ.)
Figure 29:Q:3



Q7. Figure 29:Q:4 shows the locations of the RS313 reinforcement plates on the firewall, engine mount gussets, and nose gear tunnel. When you have to install rows of RS313 plates, space the plates 0 - 1/4" apart from each other. The RS313 plates may or may not be on top of core, so use the examples shown in Figures 29:Q:1,2,&3 for installation reference.
For the RS313 plates on the nose gear tunnel, AN3-5A bolts are used instead of screws. The bolts do not have to be potted into the structure with flox, just tightened normally.

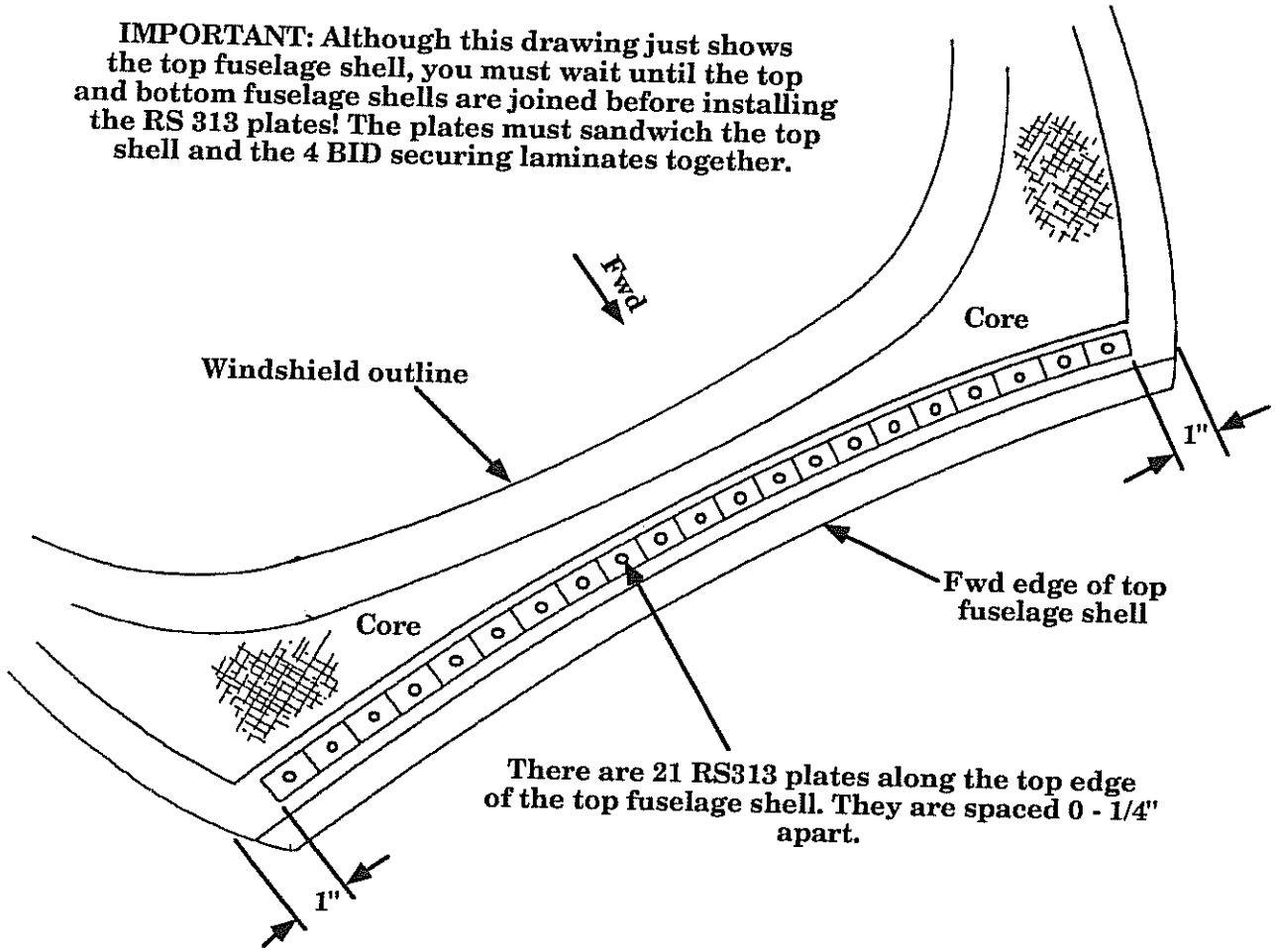
RS313 plate locations in nose area
Figure 29:Q:4





Q8. Reinforcement plates are also required where the top fuselage shell and firewall meet. There are 21, RS313 plates to install in this area as shown in Figure 29:Q:5. The plates must be installed AFTER the top shell has been secured with 4 BID. Bond the RS313 plates in position with epoxy/flox. Drill through the top fuselage shell and secure the plates with MS24694-S__ screws and AN365-1032A locknuts as you did in the other areas of the firewall.

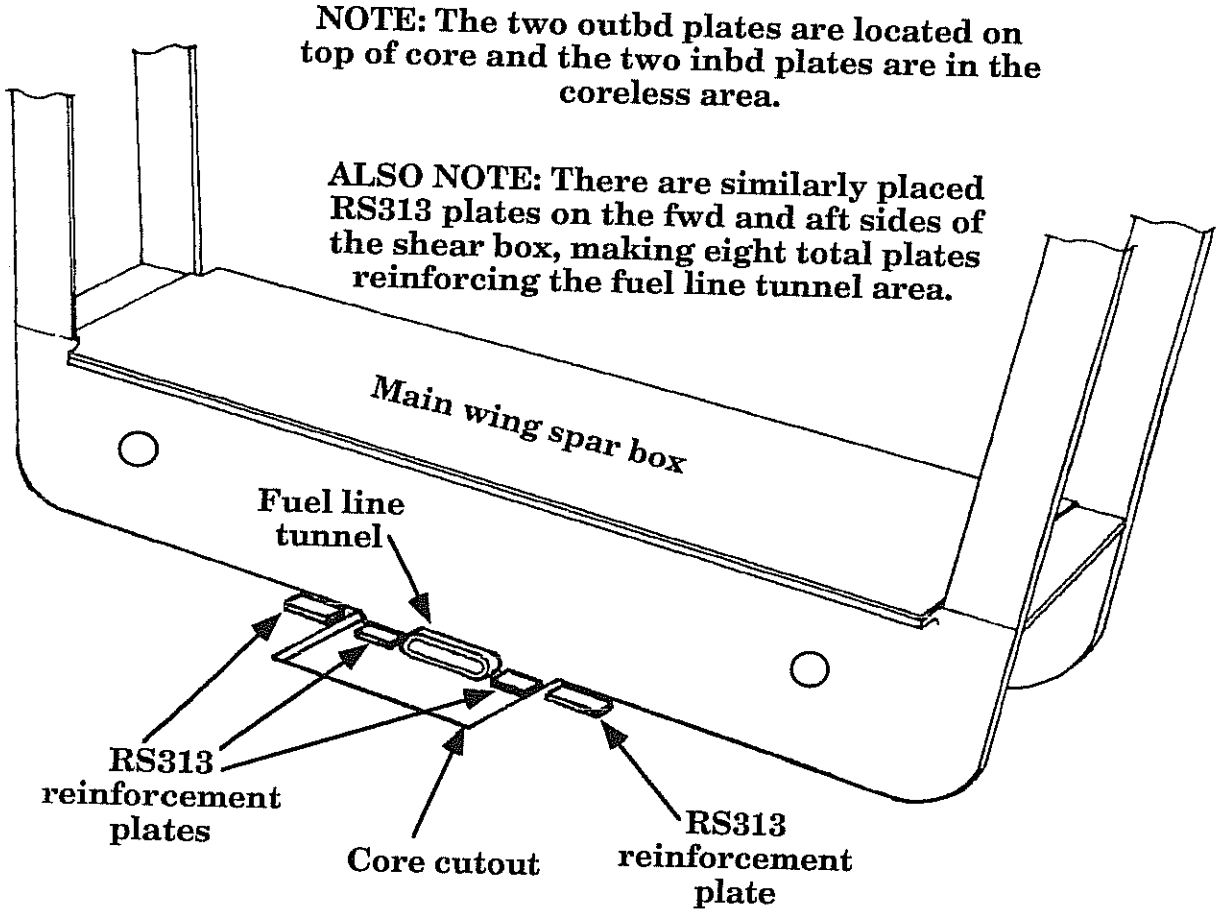
RS313 plates along top fuselage shell/firewall
Figure 29:Q:5



Q9. RS313 reinforcement plates are also required on both sides of the fuel line tunnel, fwd and aft of the spar box. Locate the plates as shown in Figure 29:Q:6. The outbd plates will be on top of core and the inbd plates will be in the coreless area, right next to the tunnel. Bond the RS313 plates in position with epoxy/flox.

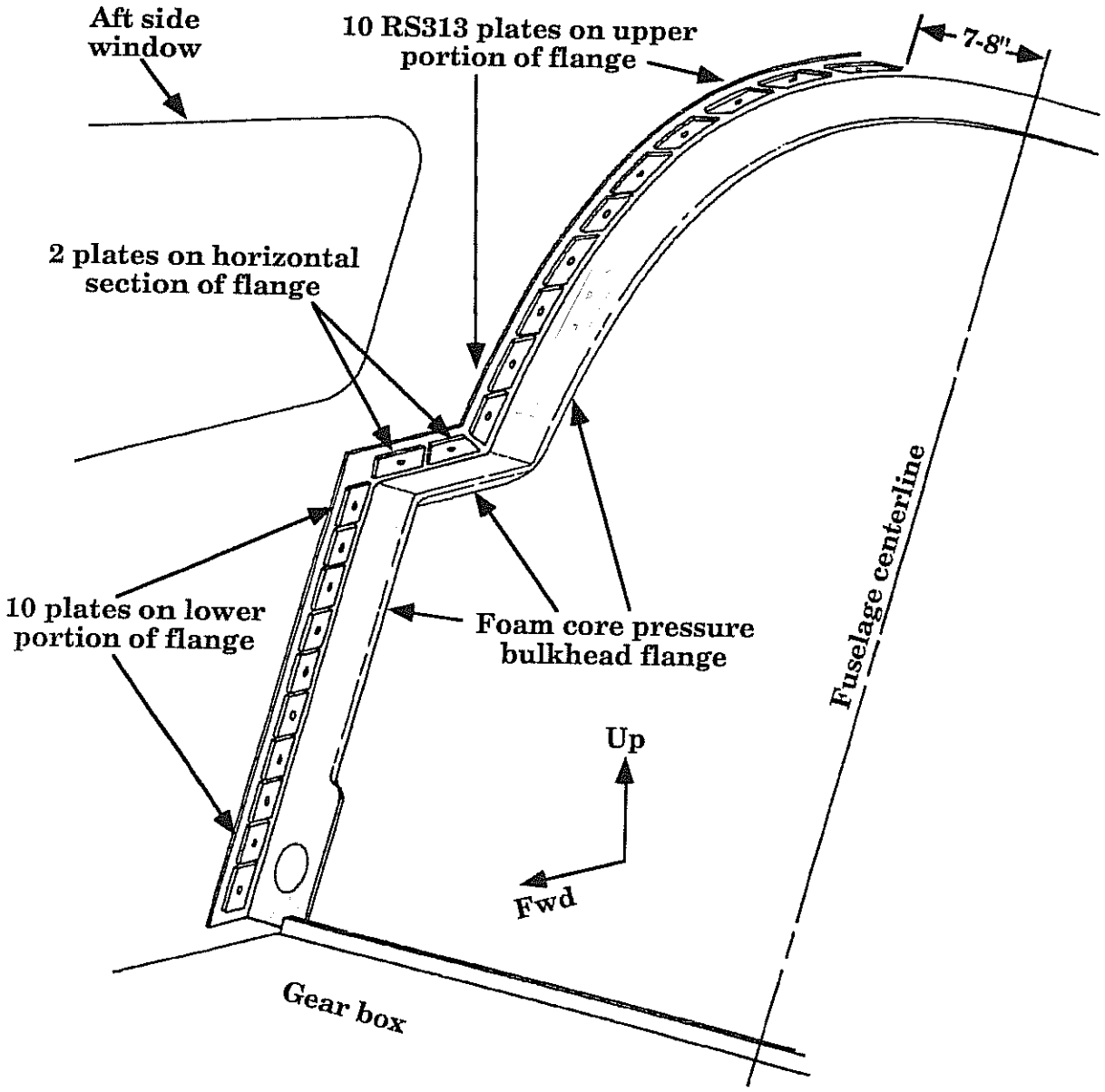
Q10. Drill through the fuselage bottom and secure the RS313 plates as you did for the firewall and nose gear plates. Again, you will have to form hardpoints for the plates that are on top of the core.

RS313 plates around the fuel line tunnel
Figure 29:Q:6



Q11. The foam core, pressure bulkhead flange is nearly surrounded with RS313 reinforcement plates. Figure 29:Q:7 shows the locations of the RS313 plates around the flange. Bond, drill and secure the plates to the fuselage shell as described for the other plates. There should only be a few plates, around the joggle area, that are not on core. The rest of the plates will require hardpoints formed in the core for the screws.
Note that the uppermost RS313 plates do not extend to the fuselage centerline. This is to avoid interference with the overhead console.

RS313 plates around pressure bulkhead flange
Figure 29:Q:7



Q 12. BEFORE FINAL ASSEMBLY - Install the 93625K13 (approx. 18ft req.) rubber strip tape to the aft bulkhead top and bottom. And, approx. 20 ft. of GS100 sealant tape to the seat bottom. Make sure the ends just meet or overlap for these tapes will press very thin.

Placement of Tape along Bulkhead and Seat Bottom

Figure 29:Q:8