CHAPTER 12
REVISION LIST

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
12-1	B12	R&R	Changed bulkhead 171 to 172.
12-2	B14	R&R	Changed bulkhead 244 to 242.
12-3 thru 12-18	0	None	
12-19 thru 12-20	1	R&R	Corrected Steps B12, B13, B15 Corrected Figures 12:B:6, 12:B:7
12-21	B17	R&R	Added NOTE.
12-22	B17	R&R	Added NOTE.
12-23	0	None	
12-24	B5	R&R	Changed Step C2.
12-25	B17	R&R	Added (text) to Fig. 12:C:2
12-26 thru 12-31	0	None	
12-32 thru 12-33	1	R&R	Changed Figure 12:D:4:a & b headings
12-34	0	None	
12-35	B15	R&R	Added note and drawing.
12-36	B6	R&R	Revised Figure 12:E:2
12-37	0	None	
12-38	B17	R&R	Added text to end of step F1.
12-39	1	R&R	Corrected Steps F2, F3, F6.
12-40	15	R&R	Revised Figure for new hardpoint.
12-41	0	None	
12-42	B17	R&R	Modified text in fig.,added text to F15.
12-43	B15	R&R	Revised Figure for new hardpoint.
12-44	B7	R&R	Corrected Step F17.
12-45 & 12-46	0	None	
12-47 thru 12-59	B12	R&R	Changed bulkhead 171 to 172.
12-50	B17	R&R	Added to NOTE.
12-51	0	None	
12-52	B17	R&R	Bulkhead 242 is now 241, removed text.
12-53	B17	R&R	Bulkhead 242 is now 241, edited I5.
12-54	B17	R&R	Bulkhead 242 is now 241, edited I6-I8.
12-55	B17	R&R	Bulkhead 242 is now 241, modified fig.

CHAPTER 12
REVISION LIST

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
12-56	B17	R&R	Bulkhead 242 is now 241.
12-57	B17	R&R	Bulkhead 242 is now 241.
12-58	B17	R&R	FS 242 is now 241.
12-59	B17	R&R	FS 242 is now 241.
12-60	B17	R&R	Added NOTE after K1.
12-61	B17	R&R	Corrected step K2, NOTE, & Figure.
12-62	B17	R&R	Changed sentence to bold print in K5.
12-63	0	None	
12-64	B4	R&R	Corrected Step K11 & Figure 12:K:5.
12-65	0	None	
12-66 & 12-67	B9	Add	Added pages.

CHAPTER 12
FIREWALL AND BULKHEADS

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 When such revisions are made, you should immediately replace all outdated pages with the revised pages.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.

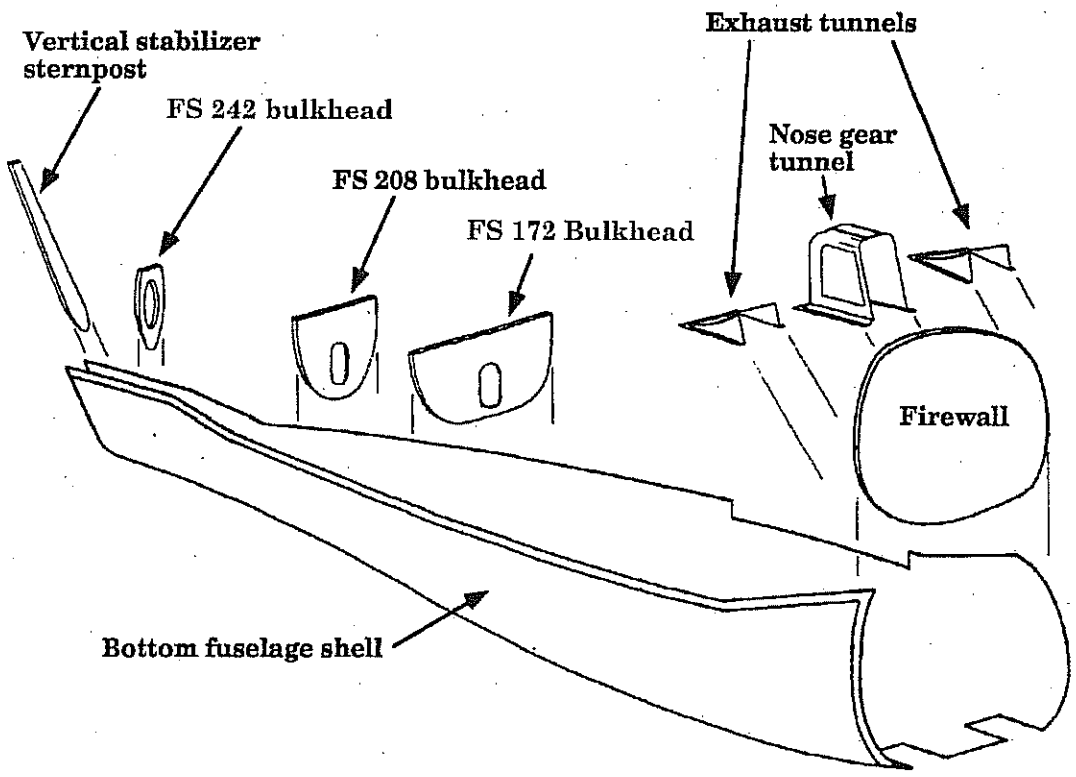
CONTENTS

1. INTRODUCTION

In this chapter, you will install all the major bulkheads in the bottom fuselage shell, including the firewall. The firewall of the Lancair is constructed of a 1/4" thick, 2 ply per side, fiberglass prepreg panel. For fire protection, a premolded firewall "blanket" is provided, but will not be installed until the nose gear tunnel and exhaust tunnels are installed.

Firewall and bulkheads

Figure 12:i:1



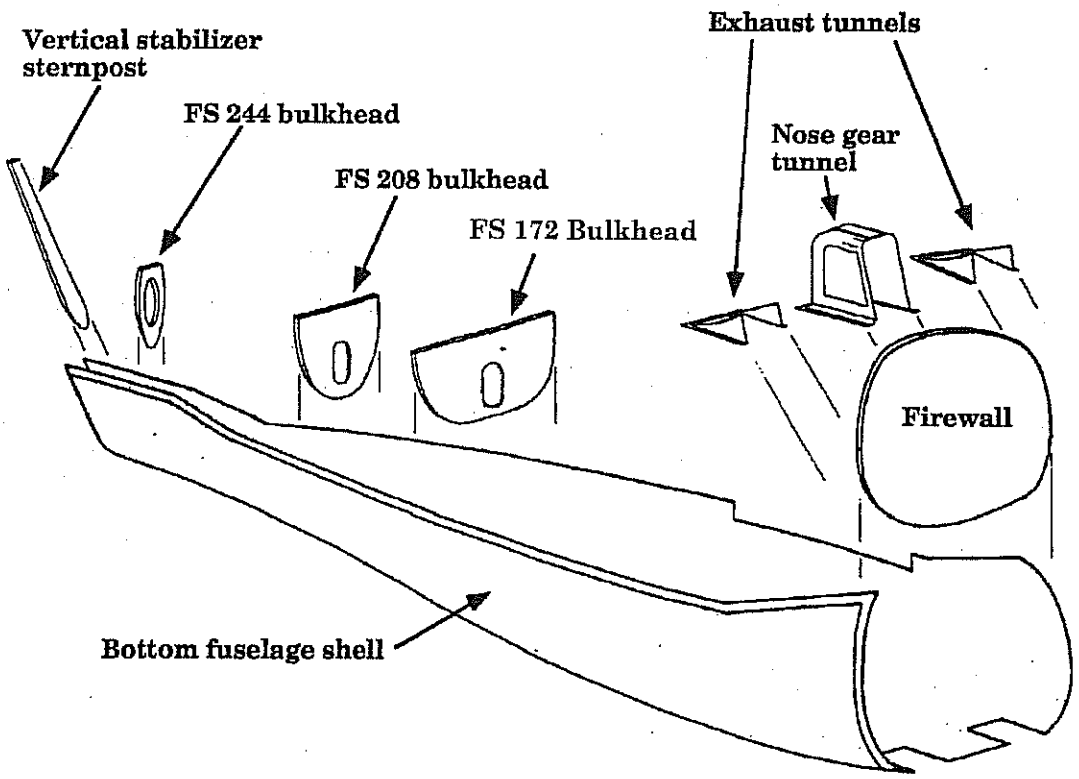
The other bulkheads in the fuselage are also made from the 1/4" thick, 2 ply per side fiberglass prepreg panel provided in the kit.

1. INTRODUCTION

In this chapter, you will install all the major bulkheads in the bottom fuselage shell, including the firewall. The firewall of the Lancair is constructed of a 1/4" thick, 2 ply per side, fiberglass prepreg panel. For fire protection, a premolded firewall "blanket" is provided, but will not be installed until the nose gear tunnel and exhaust tunnels are installed.

Firewall and bulkheads

Figure 12:i:1



The other bulkheads in the fuselage are also made from the 1/4" thick, 2 ply per side fiberglass prepreg panel provided in the kit.

Before any bulkhead is installed, the top fuselage shell and vertical stabilizer halves are fit to the bottom shell and clecoed in place. Besides being a major morale booster to the builder, installing the top fuselage shell pulls in the bottom fuselage sides to insure proper fuselage width while the bulkheads are curing in position.

2. SPECIAL PARTS, TOOLS & SUPPLIES LIST

A. PARTS

Bottom fuselage shell
Top fuselage shell
2 BID, 1/4" thick fiberglass prepreg panel
2 BID, 1/4" thick fiberglass prepreg panel (with firewall pre-outlined)
Nose gear tunnel
Exhaust tunnel (left)
Exhaust tunnel (right)
5 - 3" x 3" x 1/4" thick phenolic pieces
1/4" thick plywood

B. TOOLS

Saber saw
Dremel tool
Plumb bob
Grinder
Smart level
Carpenter's bubble type level
Cleco pliers
Clecoes

C. SUPPLIES

Fiberglass
Epoxy
Micro
Flox
Paint brushes
MC
Acetone
Paper towels

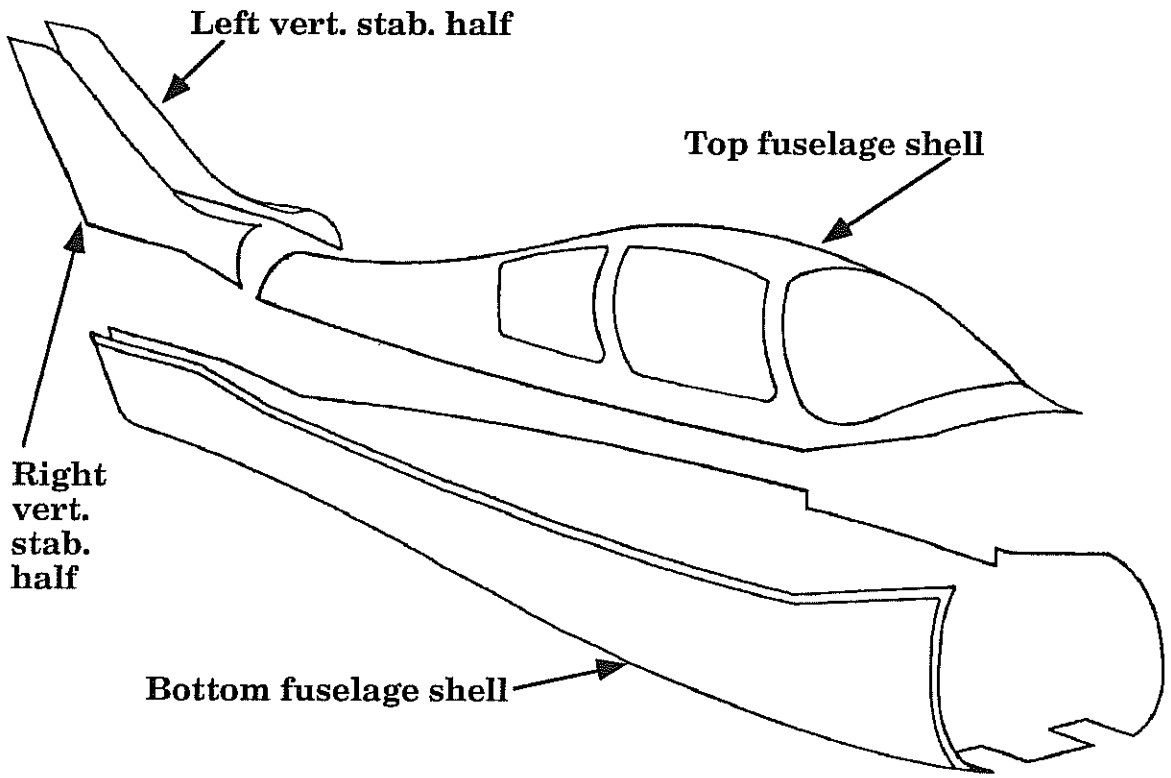
3. CONSTRUCTION PROCEDURE

A. FITTING TOP FUSELAGE AND VERTICAL STABILIZER

You're going to enjoy completing this construction section because your fuselage will take shape quickly. Fitting the top fuselage shell and the vertical stabilizer is necessary to assure proper fuselage width when bonding in the bulkheads and firewall. A side benefit is that you get to see what your fuselage looks like all put together. You can invite your friends over and brag about the interior room of your Lancair IV, and call your wife out to the shop to show her all that baggage space. Maybe she'll forgive you.

First things first, though, finish this section before bragging. Let's begin with the vertical stabilizer.

Fitting top fuselage shell and vertical stabilizer
Figure 12:A:1

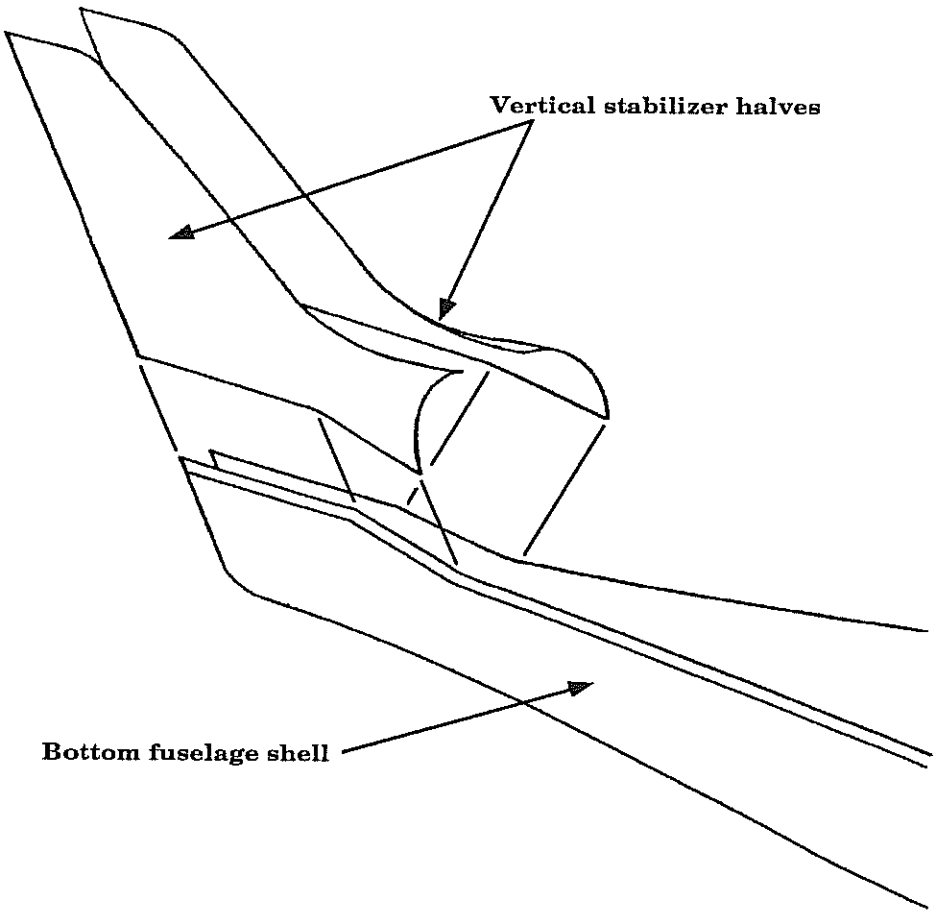


A1. There are scribe marks on the lower edges of the vertical stabilizer halves that are used for positioning the pieces onto the bottom fuselage shell. The scribe marks should align with the top edges of the bottom fuselage shell (within a +-1/8" tolerance). Trim any excess fiberglass from the bottom edges of the vertical stabilizer halves to allow the pieces to fit in the bottom fuselage shell joggle.

WARNING: The scribe marks are not cut marks! Do not trim the bottoms of the vert. stab. halves or the top fuselage shell to the scribe lines, they would be too short for a proper fit.

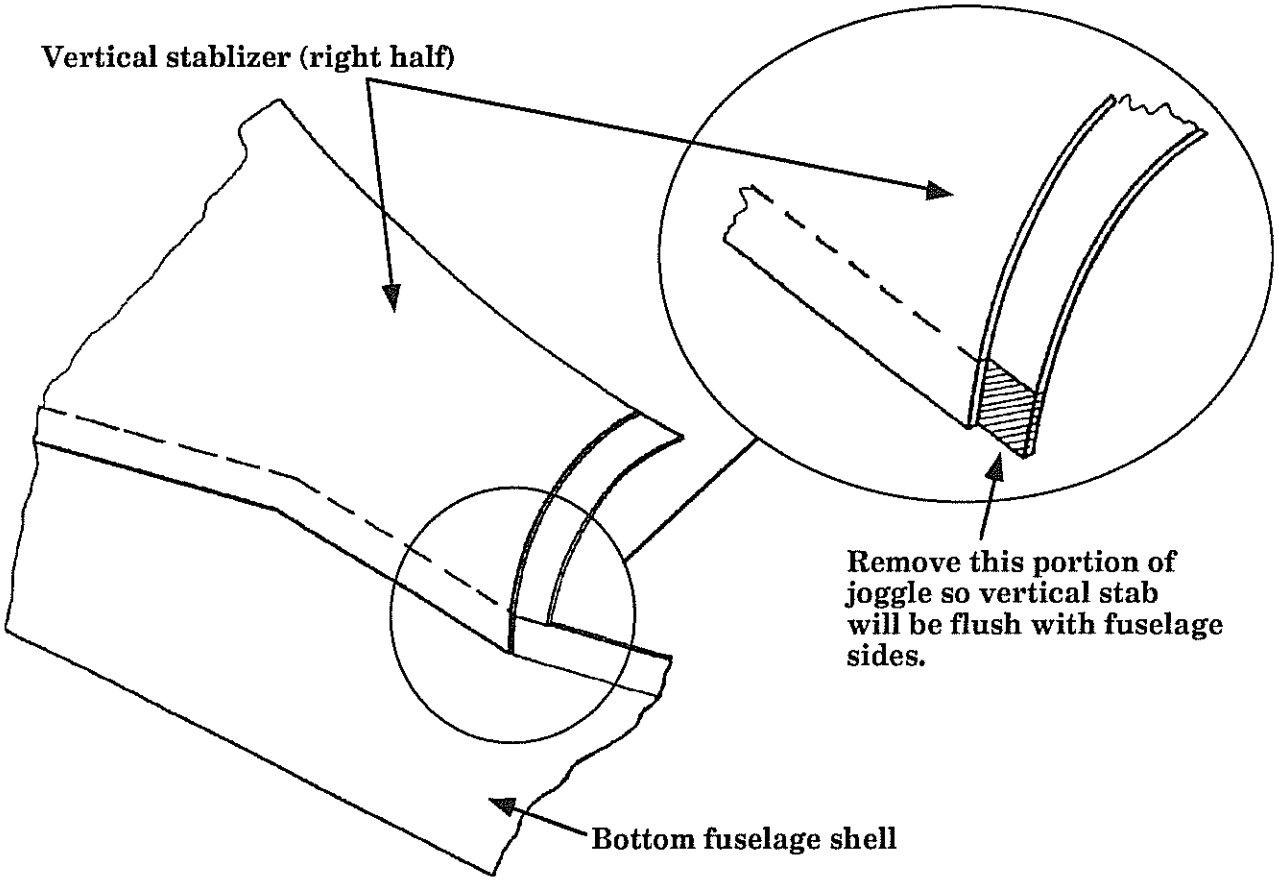
NOTE: It is a good idea to read further about vertical stabilizer construction before fitting the stabilizer skins to the fuselage. Chapter 14 contains a much more thorough description of vertical stabilizer alignment. What you DON'T want to do is cut the vert. stab. too short. (The old "I've cut it three times and it's still too short" syndrome.)

Fitting vertical stabilizer halves to bottom fuselage
Figure 12:A:2



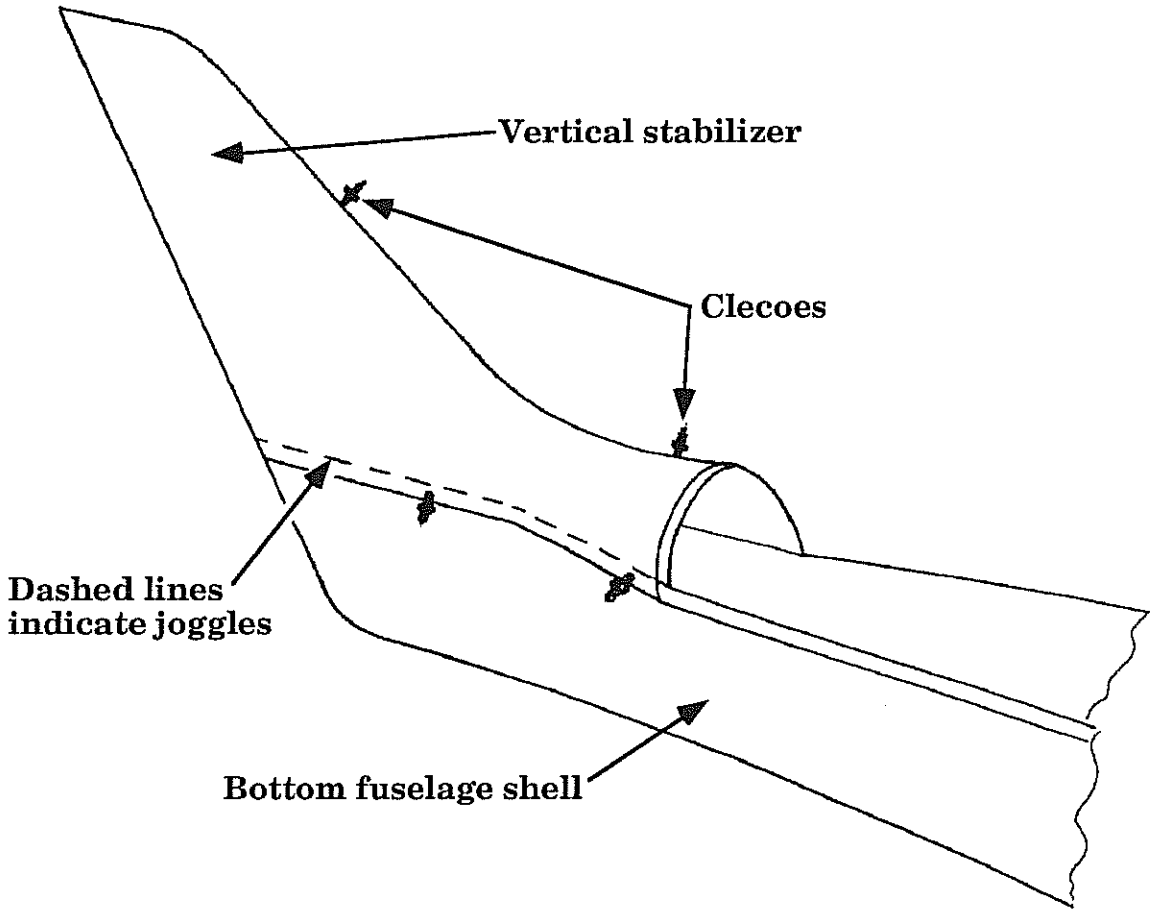
A2. Trim back the vertical stabilizer joggles where they rest against the bottom fuselage shell, as shown in Figure 12:A:3. This will allow a flush fit of the vertical stabilizer to the bottom fuselage.

Trimming vertical stabilizer joggle
Figure 12:A:3



A3. The joggles on the forward edge of the vertical stabilizer halves must be aligned. Keep this in mind when fitting the vertical stabilizer halves to the bottom fuselage shell. When satisfied with the fit of the vertical stabilizer, use clecoes to secure the halves together and to the bottom fuselage shell. Use only a few clecoes (3 or 4 per half) in case you have to later adjust the vertical stab position.

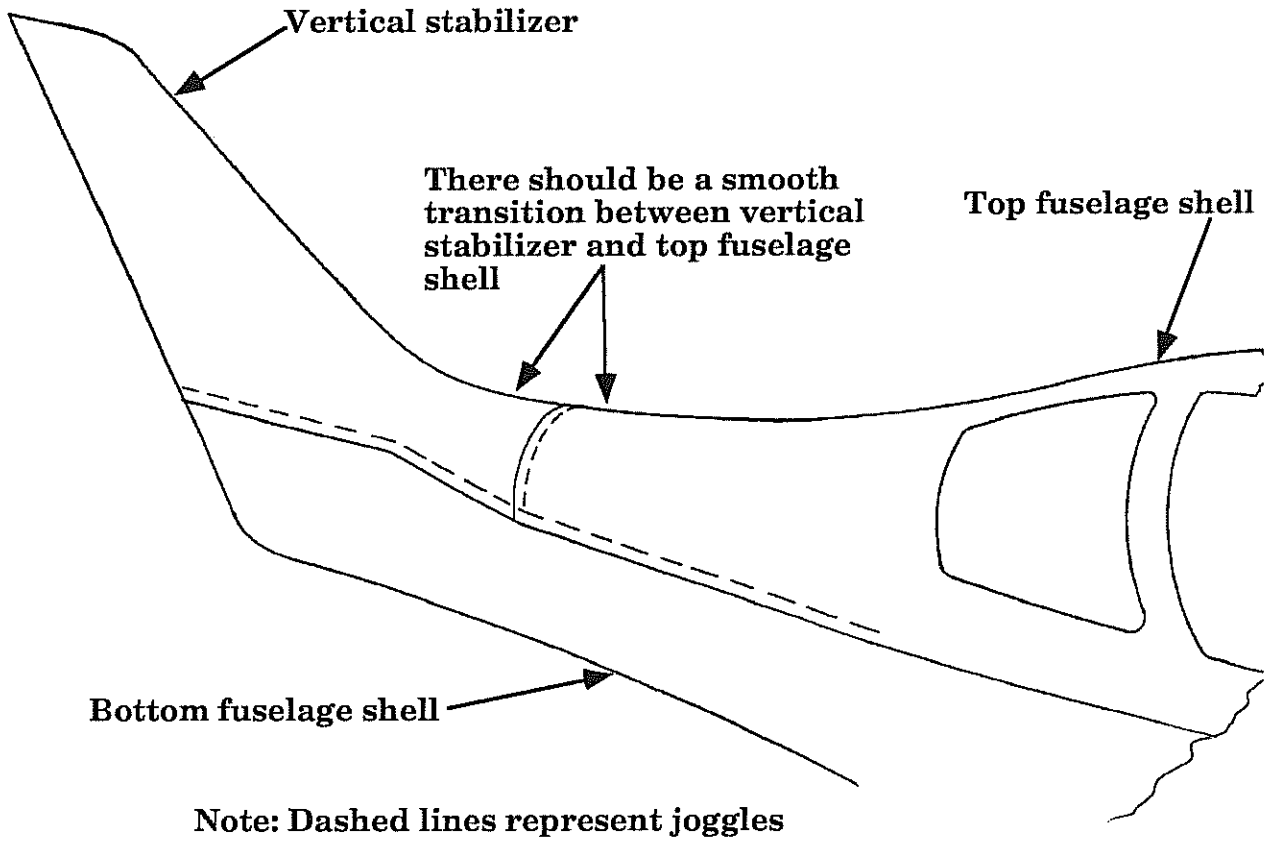
Securing vertical stabilizer to fuselage with clecoes
Figure 12:A:4



A4. The top fuselage shell also has a scribe line denoting the top edge of the WL22 joggle. Set the top shell onto the bottom shell. You'll probably have to pull in the sides of the bottom fuselage shell slightly so the top shell will fit over the WL 22 joggle.

A5. There are several key areas to align properly between the top and bottom fuselage shells. Starting from the aft edge of the top fuselage shell, the shell should rest in the vertical stabilizer joggle.

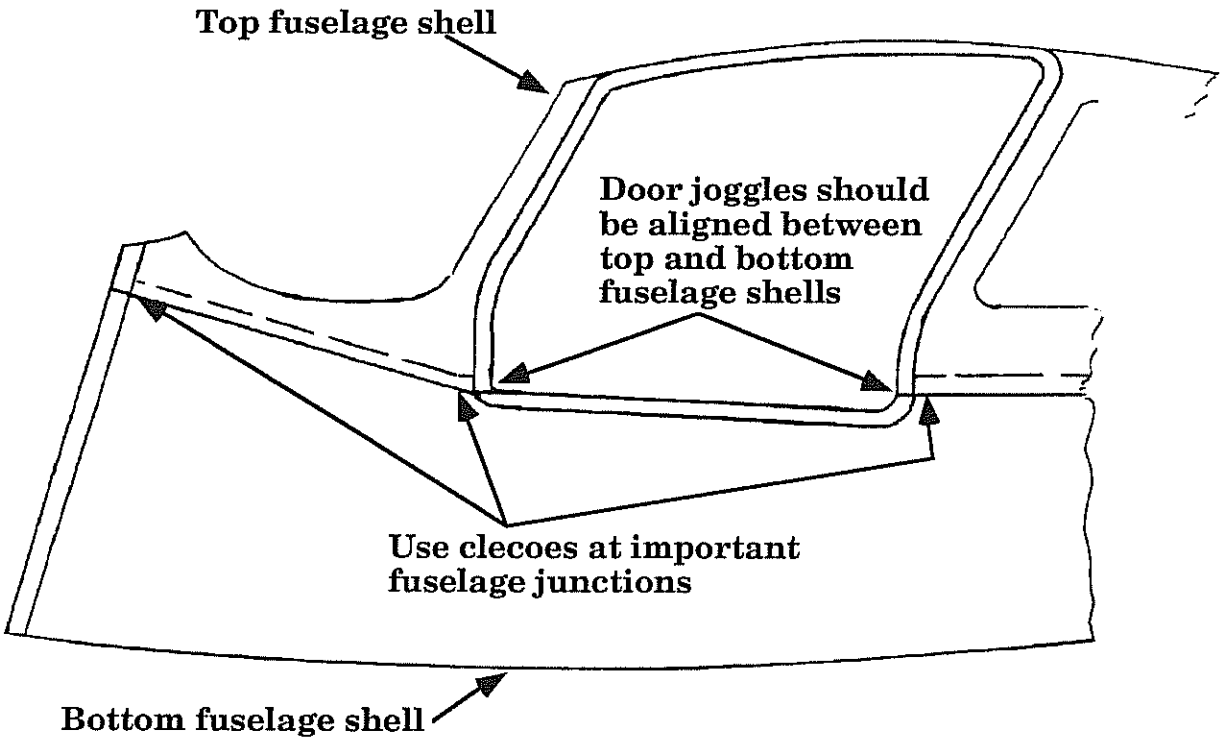
Top fuselage shell / vertical stab. junction
Figure 12:A:5



Note: Dashed lines represent joggles

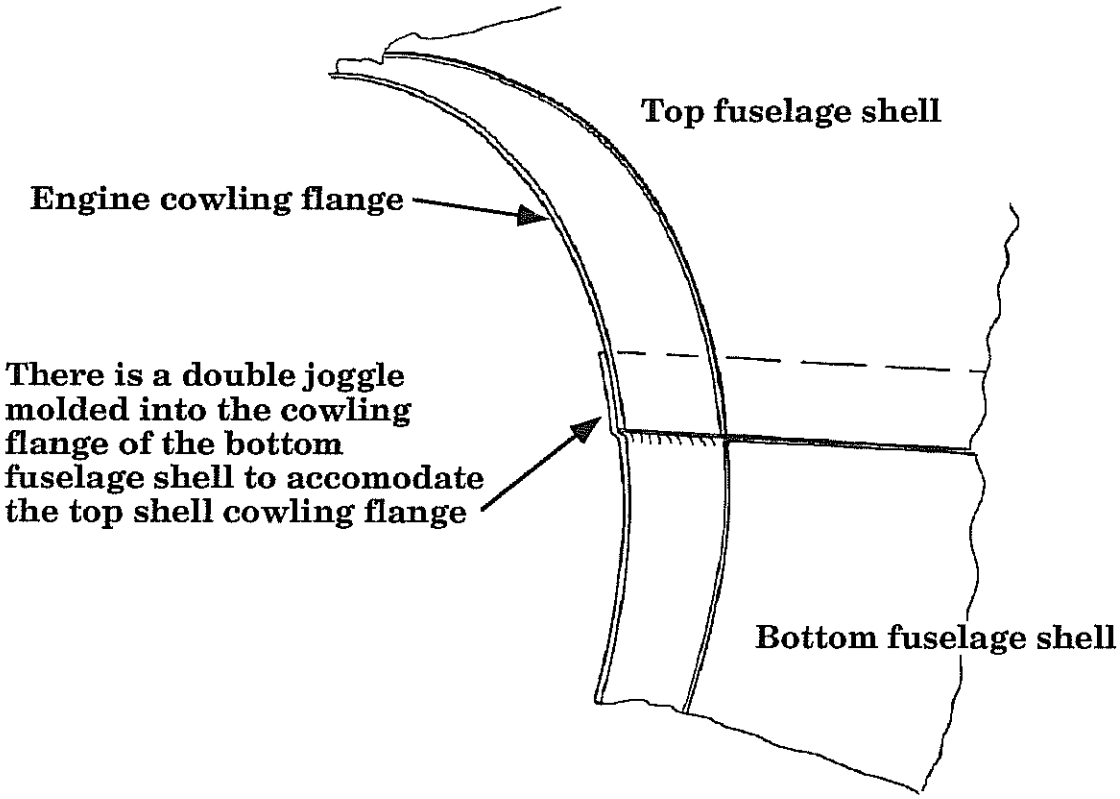
A6. The cockpit door joggles of the top fuselage shell should align with the door joggles of the bottom fuselage shell. There are double joggles molded into the the bottom fuselage shell in the door area so you will not have to notch the top shell for a flush joggle fit (as you did on the vert. stab.).

Fitting top fuselage shell at door joggle
Figure 12:A:6



A7. The cowling joggles of the top and bottom fuselage shells should align fore/aft. Again, we have molded a double joggle in the bottom fuselage shell so a flush fit can be obtained.

Fitting top fuselage shell at cowling joggle
Figure 12:A:7

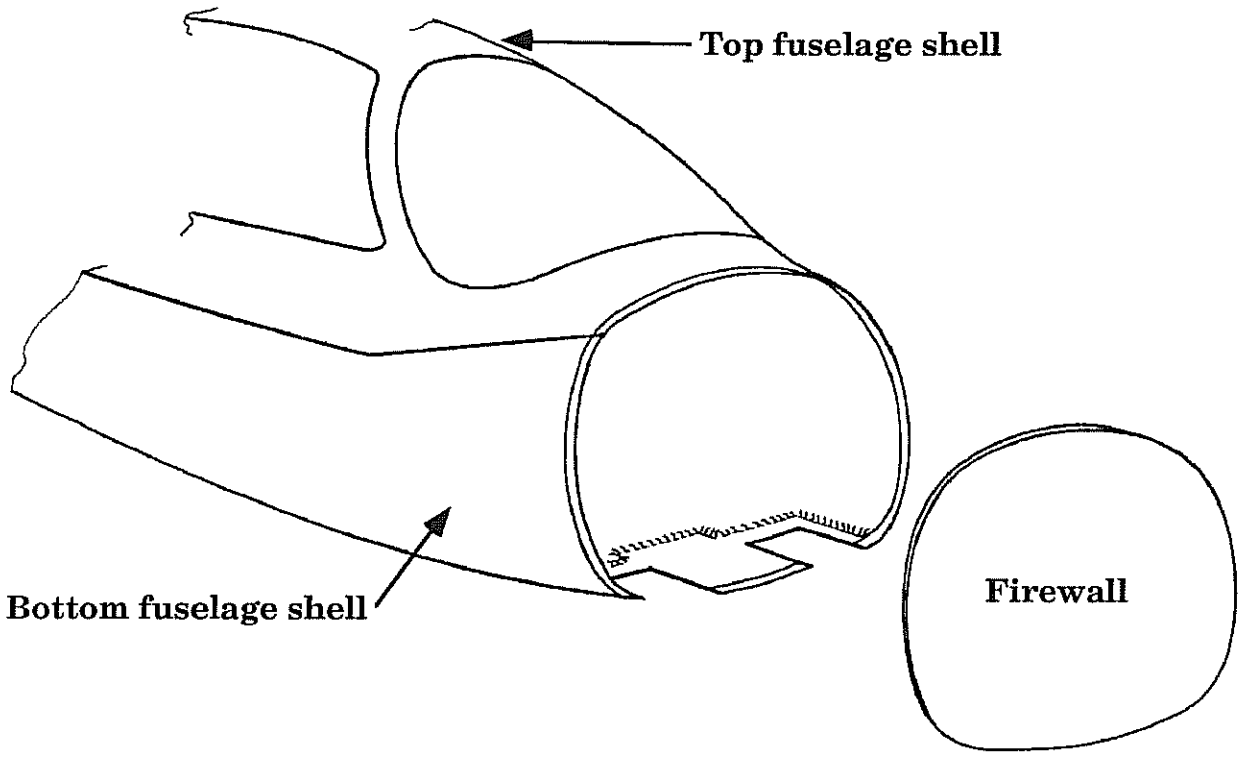


A8. When satisfied with the position of the top fuselage shell, use clecoes to secure it in position. Again, use only a few clecoes as you might have to slightly adjust the top fuselage shell in the future.

B. FIREWALL INSTALLATION

The firewall is made from 2 ply per side, fiberglass prepreg panel (1/4" thick). The firewall is pre-outlined onto the panel at the factory. Also marked on the firewall panel are the engine mount bolt locations.

Firewall installation
Figure 12:B:1



The top fuselage shell should be clecoed in place while you are fitting and installing the firewall. This will hold the fuselage sides to the proper width.

B1. Use a saber saw to cut out the firewall from the pre-outlined, 2 ply per side firewall panel. As usual, cut to the outside of the firewall outline so you can later custom fit it to your fuselage.

B2. With 40 grit, thoroughly scuff up the inside of the bottom fuselage shell where the firewall will mount.

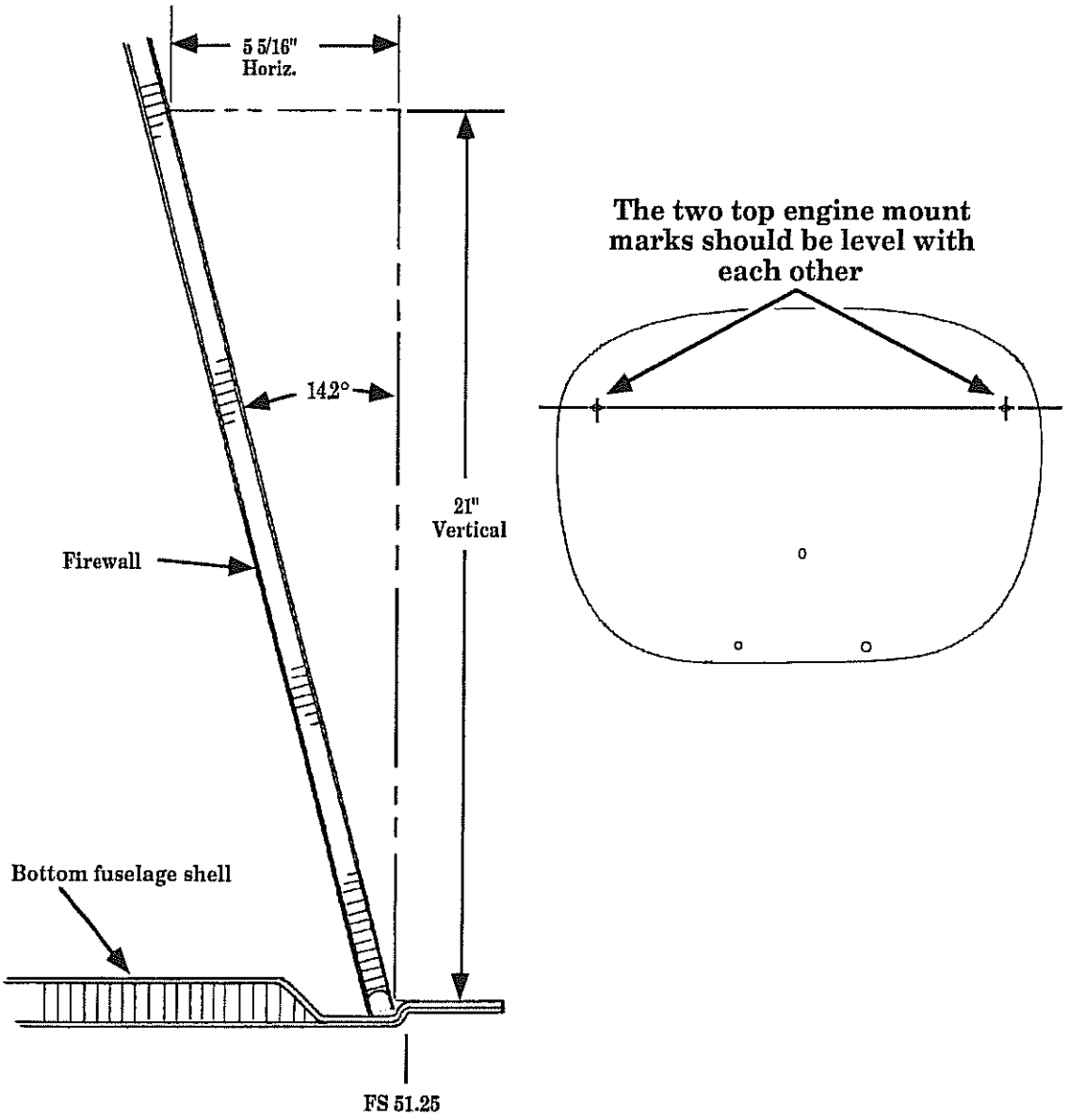
NOTE: Be sure to cleco the top fuselage shell in position while you custom fit your firewall. Otherwise, the fuselage sides may not be at the proper width.

B3. To locate the firewall in the bottom fuselage shell, align the bottom forward edge of the firewall with the cowling joggle (FS 51.25). The firewall should be angled aft 14.2 degrees off vertical. DO NOT use the cowling joggle in the upper part of the bottom fuselage shell to attain the 14.2 degree angle. It is much more accurate to use a protractor type level or Smart Level. Remember to calibrate the Smart Level before using it! In Figure 12:B:2, we have given you a measurement for the firewall angle that may be easier than using a protractor/Smart Level.

B4. Use the two top engine mount reference points to level the firewall. A carpenter's bubble type level works well for this step. The centerline of the firewall should be aligned with the fuselage centerline. See Figure 12:B:2.

Locating the firewall in the bottom fuselage shell

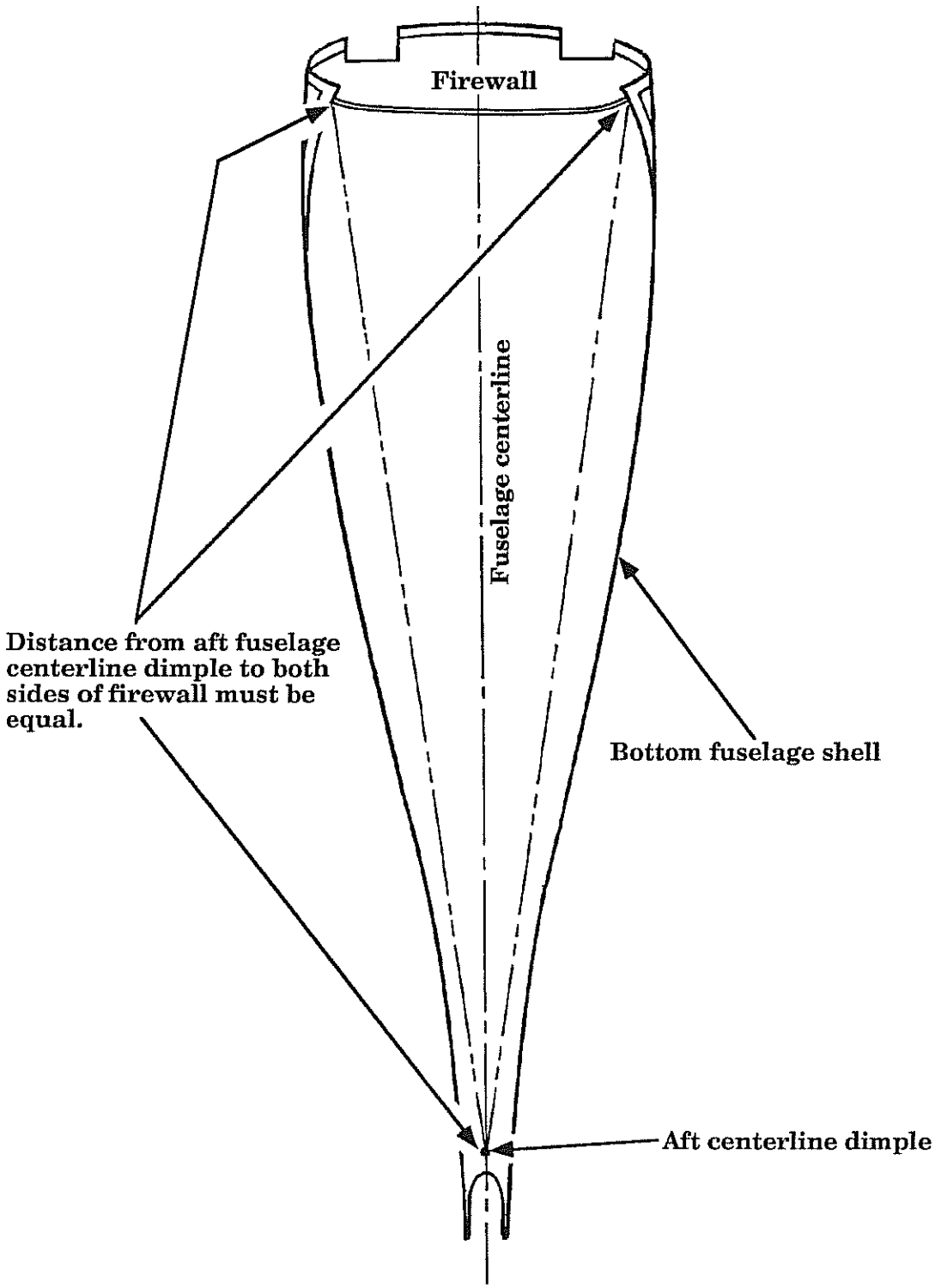
Figure 12:B:2



B5. Use the 1/8" centerline reference hole you drilled at the aft end of the bottom fuselage shell to align the firewall perpendicular to the fuselage centerline. Use a long tape measure to measure the distance from both left and right sides of the firewall to the centerline reference hole. When the measurements are equal, the firewall is correctly located. See Figure 12:B:3.

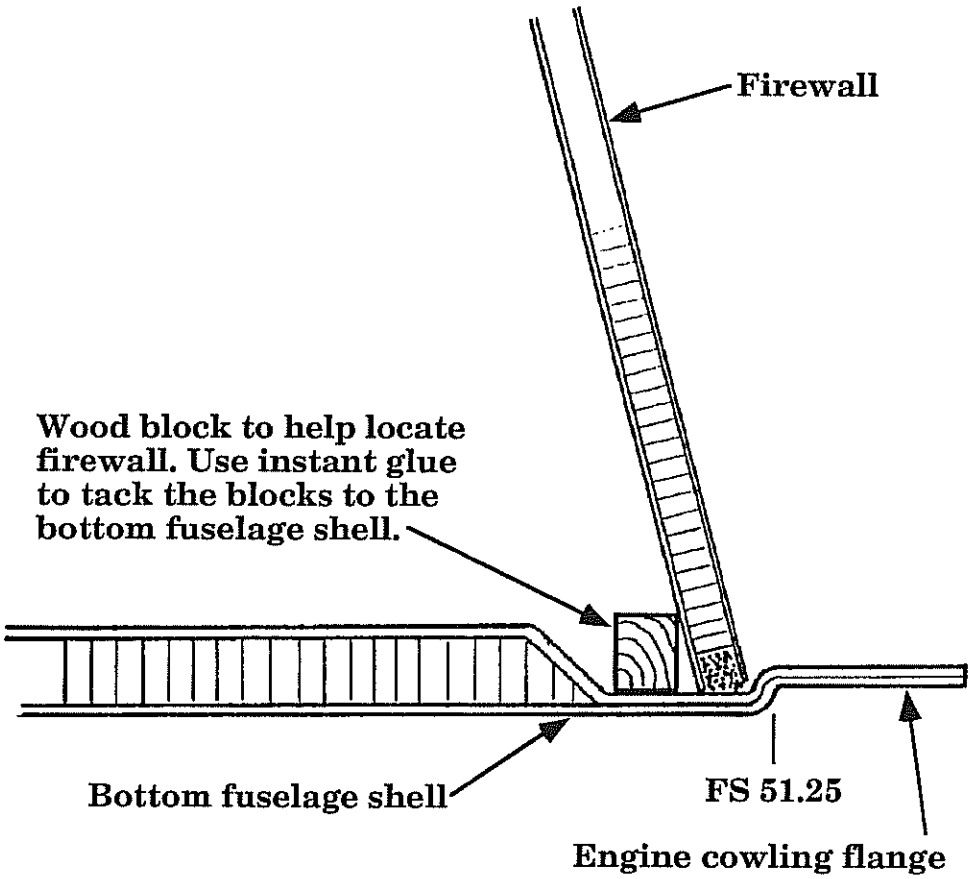
Aligning firewall to fuselage centerline

Figure 12:B:3



B6. When satisfied with the location of the firewall, use a few drops of instant glue to bond a few small wood pieces to the bottom fuselage shell. Butt these wood pieces against the aft face of the firewall so you can relocate the firewall easily and accurately. The wood pieces will aid in keeping the firewall accurately located during the bonding process.

Placing wood locating pieces
Figure 12:B:4



B7. Form a 1/8 - 1/4" deep trough around the perimeter of the firewall, just as you did with wing and tail ribs in previous chapters.

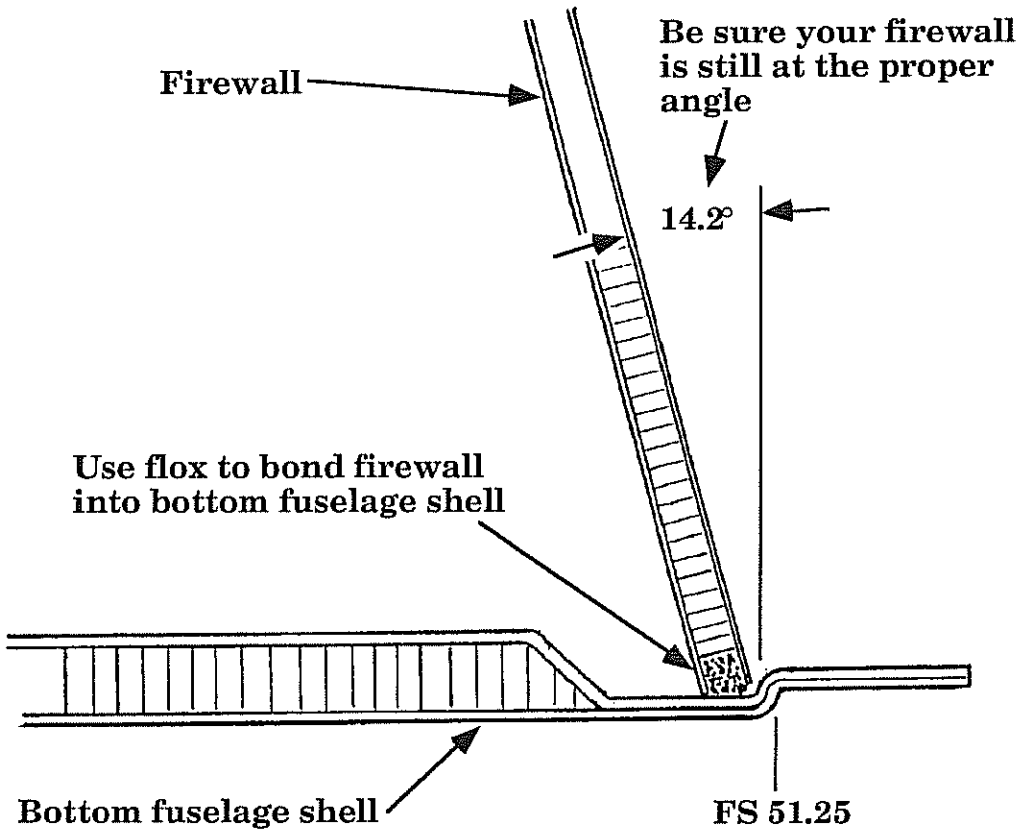
B8. With MC, clean the bottom fuselage shell where the firewall will be bonded.

B9. Paint a VERY light coat of epoxy onto the bonding areas, just enough to wet the exposed fibers.

B10. Fill the trough in the firewall perimeter with a thick mixture of epoxy/flox.

B11. Carefully position the firewall in the bottom fuselage shell. It would be difficult to form the flox into a radius like you would would do with micro, so it is easier just to remove the excess flox from around the firewall.

Bonding firewall into bottom fuselage shell
Figure 12:B:5



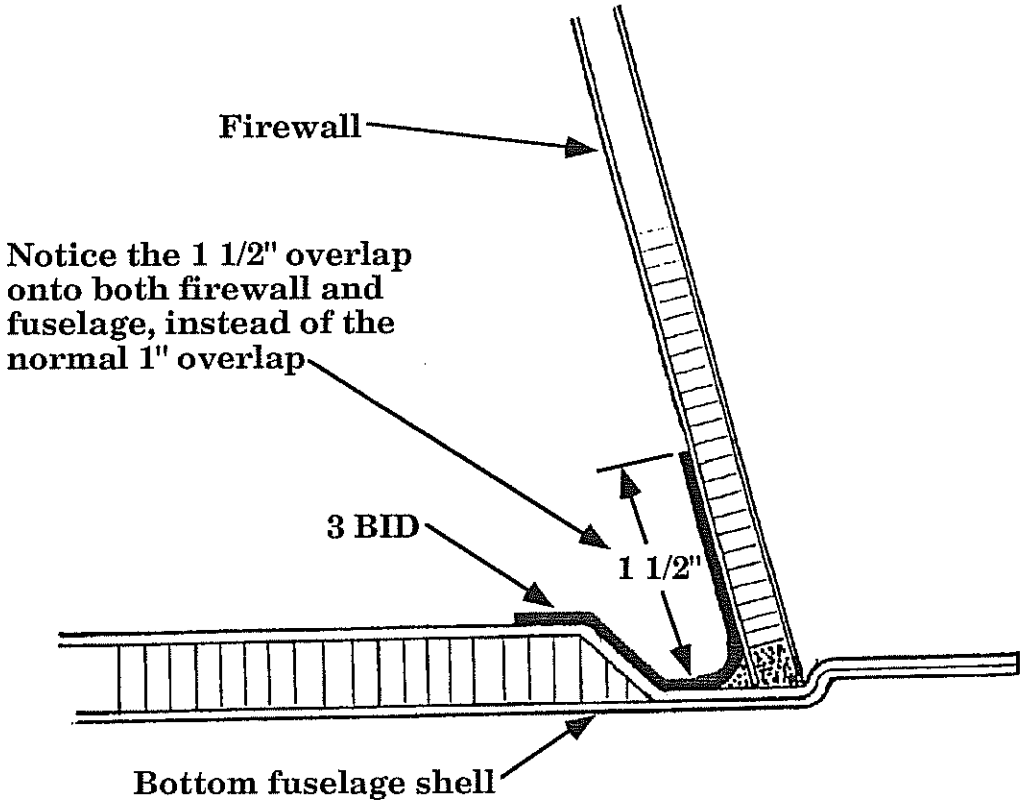
B12. Sand the area where the 3 BID will be applied to the firewall and bottom fuselage shell. See Figure 12:B:6 for details of the 3 BID laminate. Notice that this isn't a standard 2" wide laminate, but a 3" wide one, lapping onto the firewall and fuselage 1 1/2" EACH.

B13. Clean the area where the 3 BID will be applied with MC.

B14. Form a micro radii where the firewall meets the bottom fuselage shell.

B15. Secure the firewall to the bottom fuselage shell with a 3" wide, 3 BID laminate. As always, the BID tapes are cut on a 45° bias to the fiberglass cloth weave.

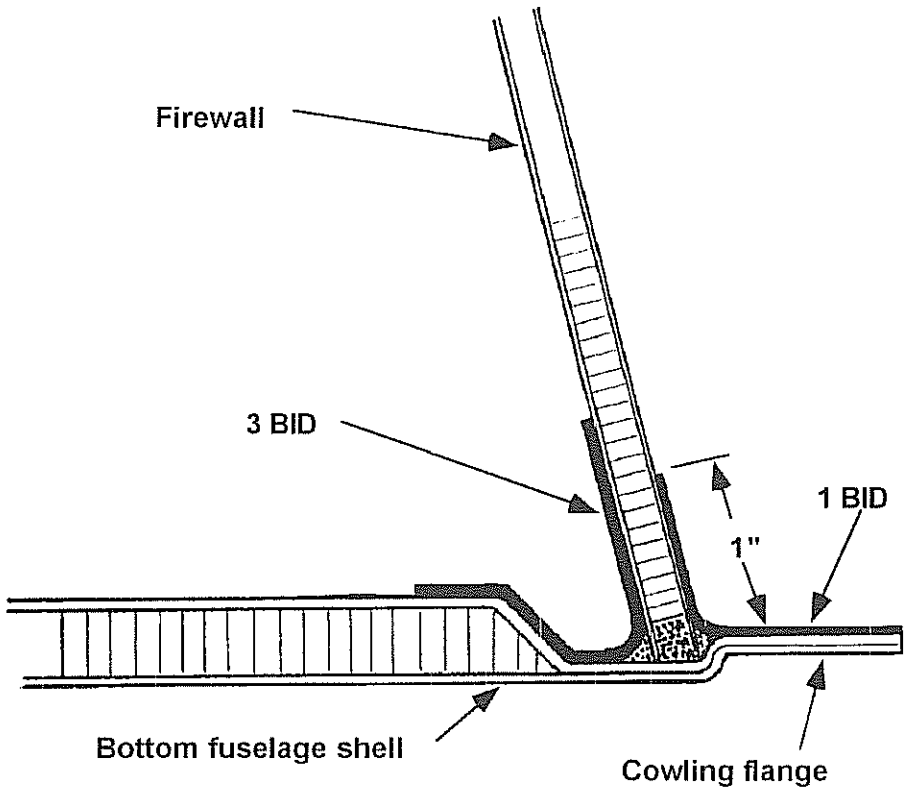
Securing the firewall to the bottom fuselage shell
Figure 12:B:6



B16. Since the 3 BID laminate is the main structural support between firewall and fuselage, we only need to apply a 2" wide, 1 BID laminate to secure the forward face of the firewall to the bottom fuselage shell. Sand the area of the firewall where the 1 BID will be attached. Also sand the inside of the cowling flange.

B17. Clean the area where the 1 BID will be applied with MC.

Applying 1 BID to firewall and cowling flange
Figure 12:B:7



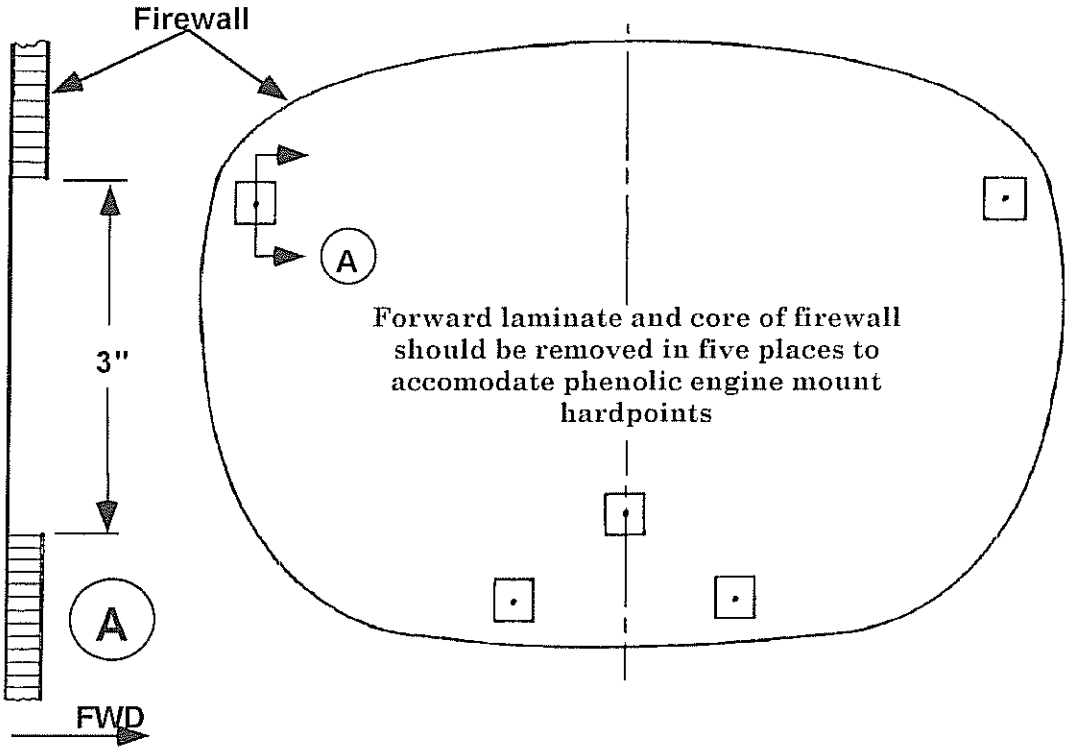
B18. Apply the 1 BID laminate to the forward face of the firewall as shown in Figure 12:B:7. Run this laminate all the way forward and off the cowling flange. This will provide a uniform surface for later mounting of the cowling nutplates.

NOTE: Steps B19 through B23 should only be done on standard non-pressurized kits. All non-pressruized fast build kits have the hard points completed at the factory.

B19. Five, 3" x 3" x 1/4" phenolic pieces are provided for the engine mount hardpoints. The phenolic pieces will be embedded into the firewall behind each engine mount location. Cut out 3" x 3" sections of the forward laminate and core of the firewall, centering the cuts on the engine mount bolt locations. See Figure 12:B:8.

Firewall cutouts for engine mount hardpoints

Figure 12:B:8

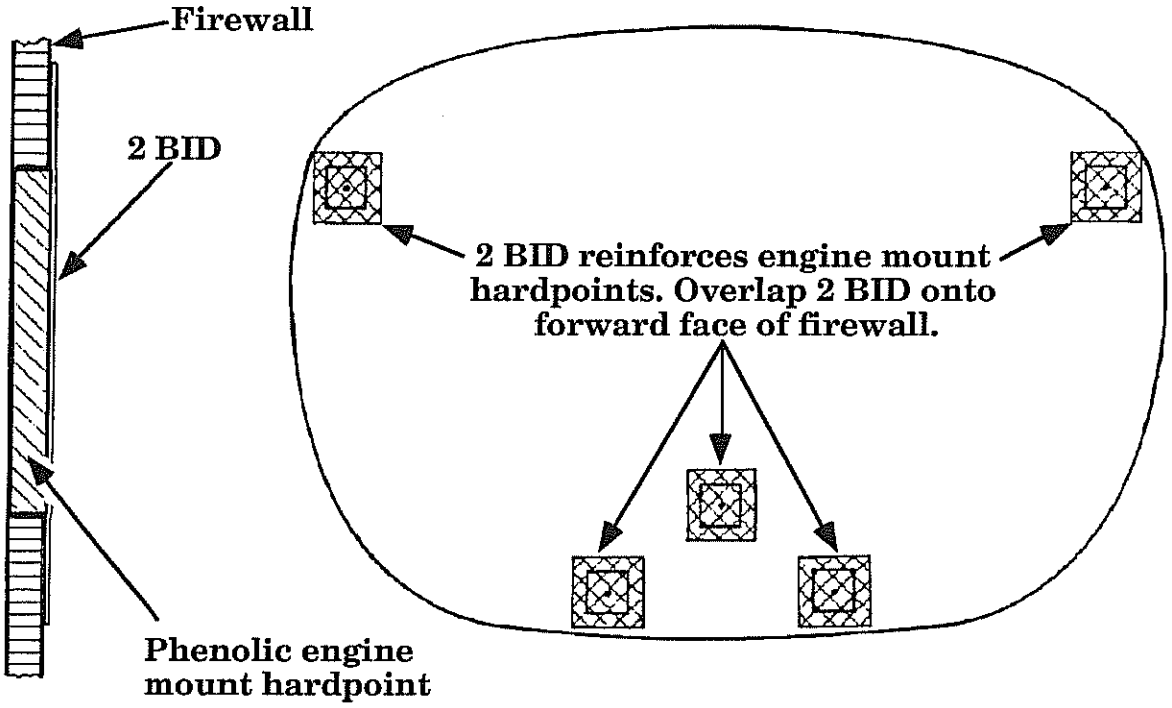


B20. Sand both faces of each phenolic piece with 40 grit. Clean the pieces with MC.

B21. With 40 grit, sand the cutout areas of the firewall where the phenolic pieces will be bonded. Clean these cutout areas with MC.

B22. Bond the 3" x 3" phenolic pieces into the firewall with micro.

Reinforcing phenolic engine mount hardpoints
Figure 12:B:8

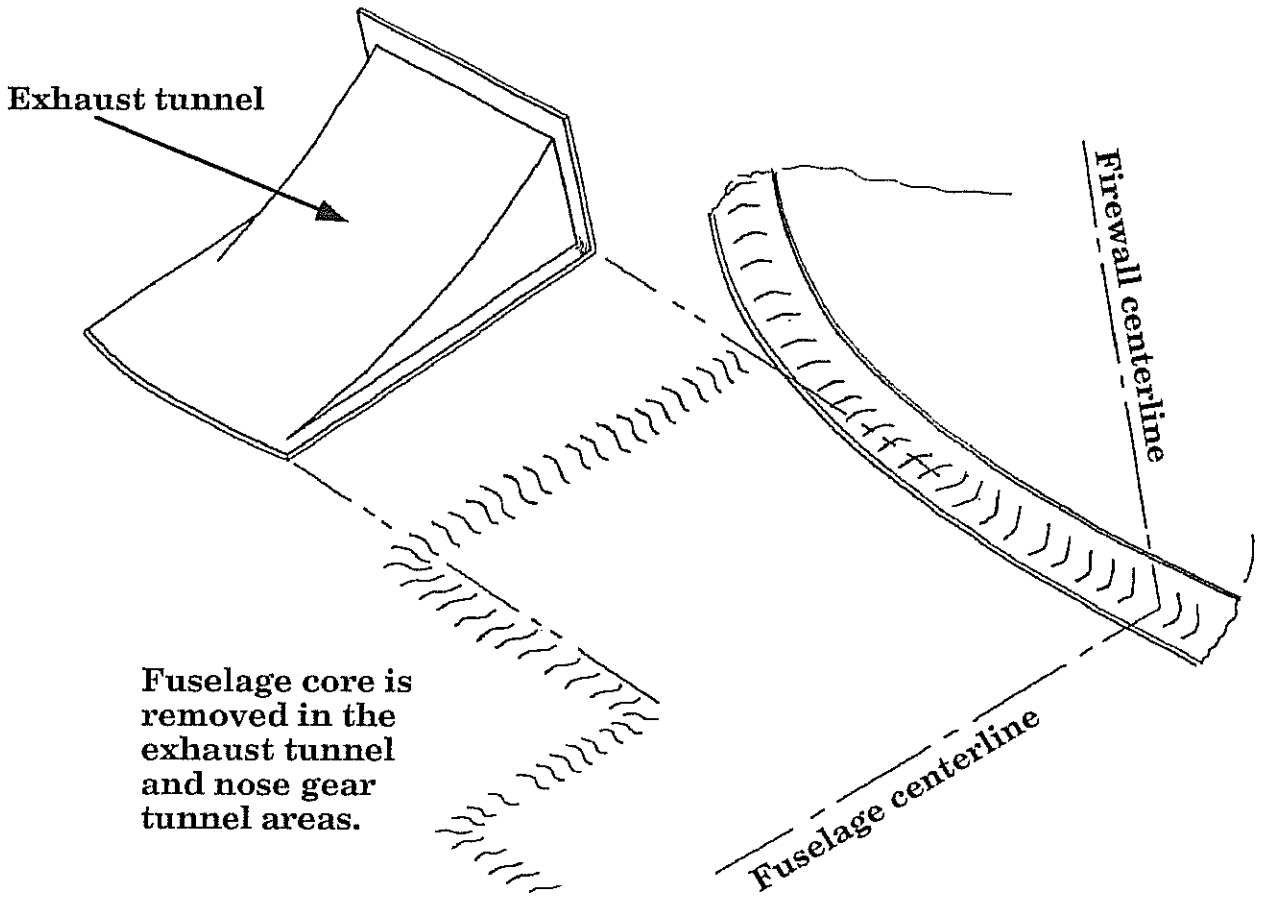


B23. Reinforce the phenolic engine mount hardpoints with 2 BID, overlapping 1" onto the forward face of the firewall. Be sure the areas where you apply the 2 BID are sanded and clean.

C. INSTALLING EXHAUST TUNNELS

Two, premolded exhaust tunnels are provided in your kit. These tunnels are designed for the Continental TSIO- 550, so if you are using another engine type, check that your exhaust is compatible with these parts.

Exhaust tunnels
Figure 12:C:1

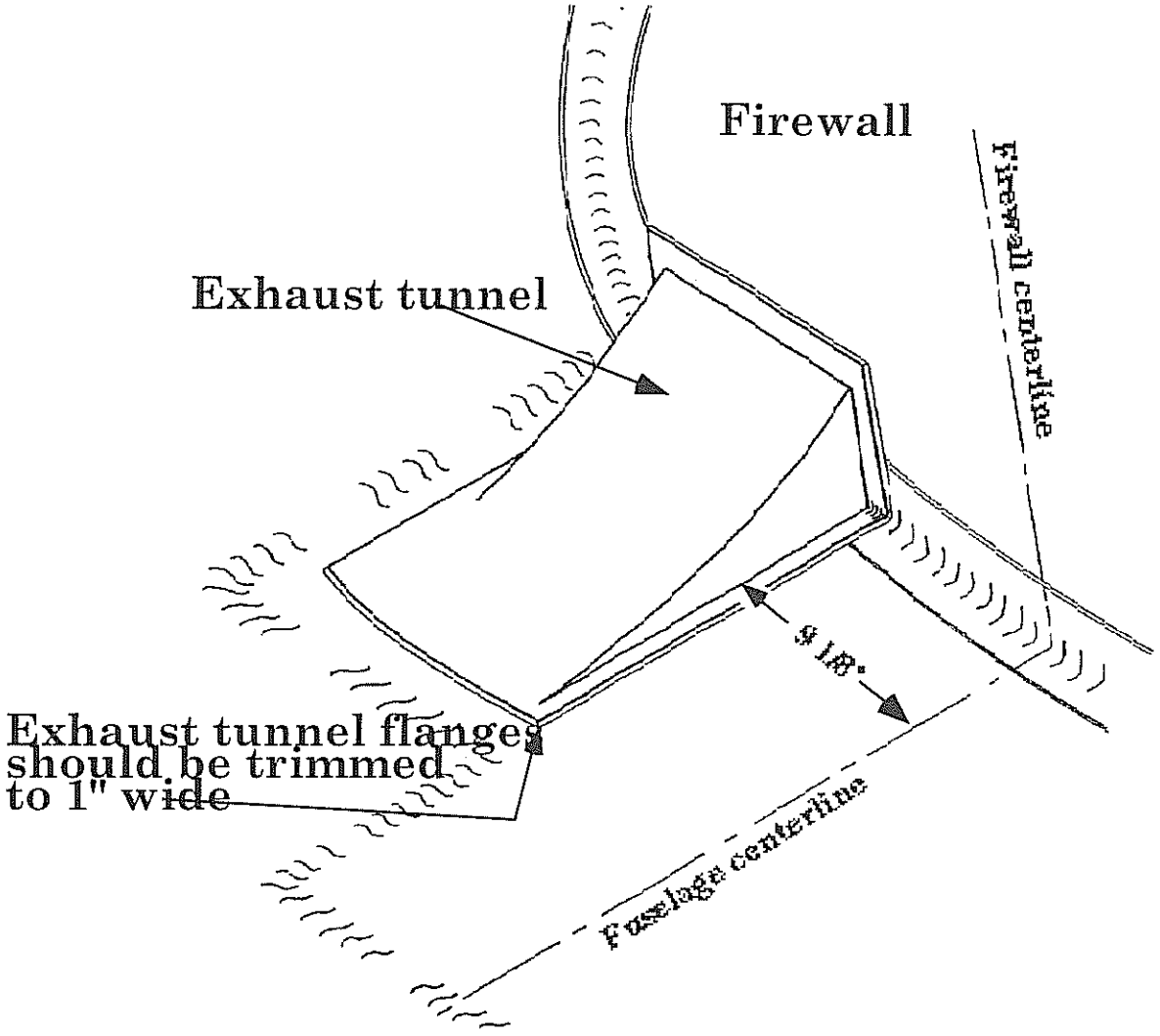


C1. Trim the flanges of the exhaust tunnels to 1" in width.

C2. Locate the tunnels so that the inboard faces are 9 1/8" from the fuselage centerline, as shown in Figure 12:C:2. The tunnels should butt up against the aft face of the firewall.

Locating exhaust tunnels

Figure 12:C:2



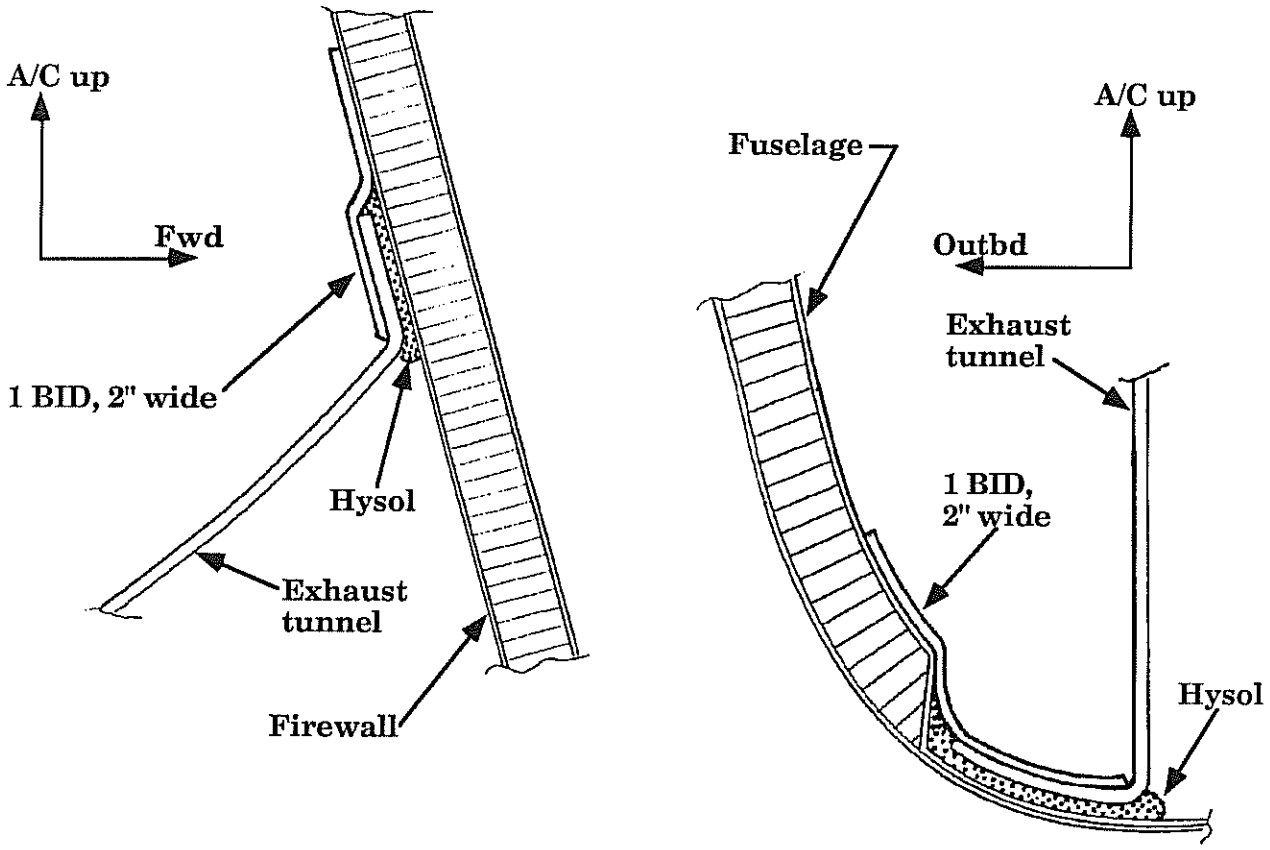
C3. With 40 grit, sand the flanges of the exhaust tunnels and the areas of the fuselage and the firewall where the tunnels will be bonded.

C4. Clean the bonding areas with MC.

C5. Bond the exhaust tunnels to the fuselage and firewall with Hysol. As usual, mix a little flox in with the Hysol to give the adhesive a bit more body.

C5. Bond the exhaust tunnels to the fuselage and firewall with Hysol. As usual, mix a little flox in with the Hysol to give the adhesive a bit more body.

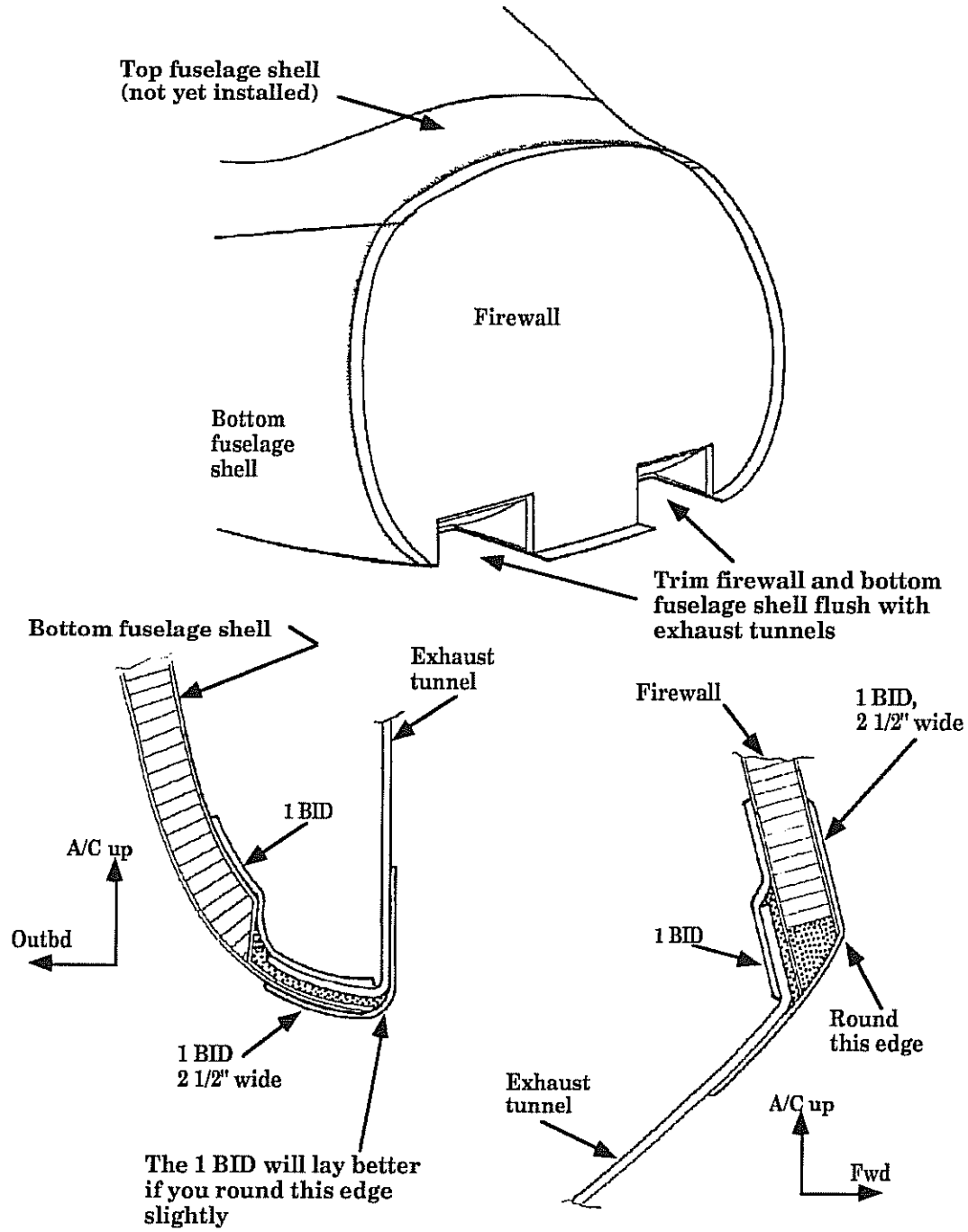
Bonding exhaust tunnels into fuselage
Figure 12:C:3



C6. Reinforce the exhaust tunnel bonds with 1 BID, 2" wide fiberglass strips. Be sure the areas where the BID is applied have been sanded and cleaned.

C7. Grind the fuselage and firewall until they fit flush with the inside of the exhaust tunnels. Sand smooth transitions (for good airflow) where the firewall meets the tops of the exhaust tunnels, as shown in Figure 12:C:4.

Flushing up firewall and fuselage to the tunnels
Figure 12:C:4

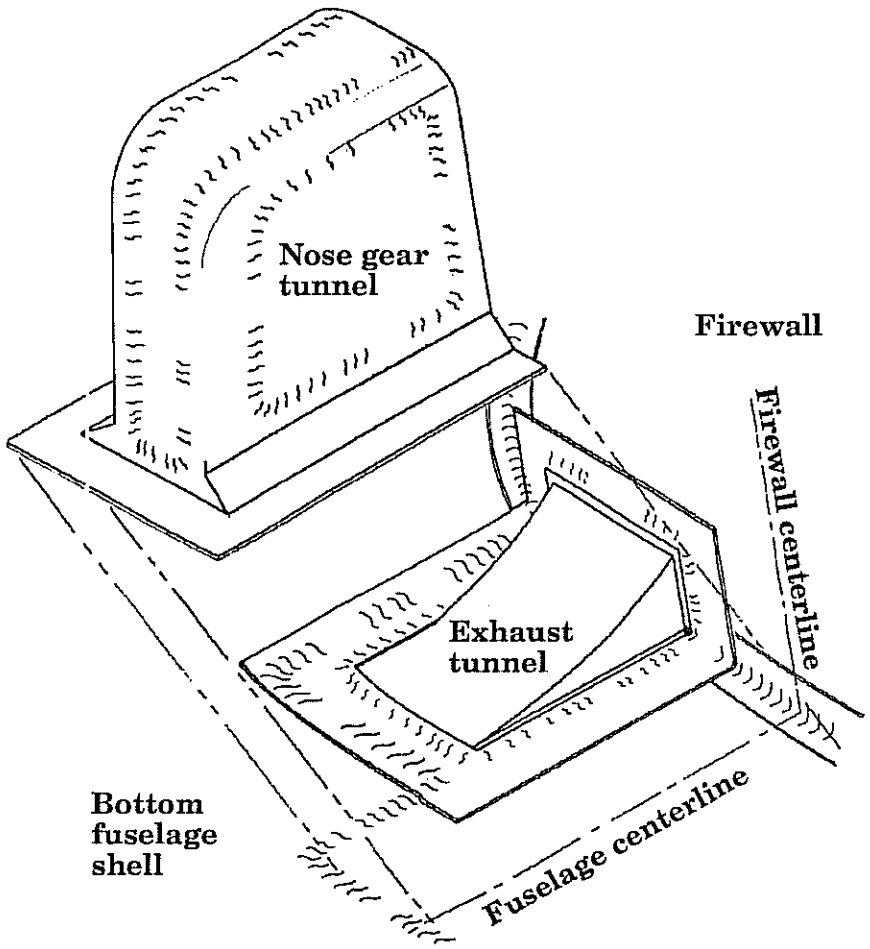


C8. Fill the exposed core areas of the firewall and fuselage (in the tunnel areas) with epoxy/micro and apply 1 BID, 2 1/2" wide laminates to close out these areas. It helps the BID to lay properly if you sand a small radius at the 90 degree junctions.

D. NOSE GEAR TUNNEL INSTALLATION

The premolded nose gear tunnel is installed in a similar manner as the exhaust tunnels except that there is no flange resting against the back of the firewall.

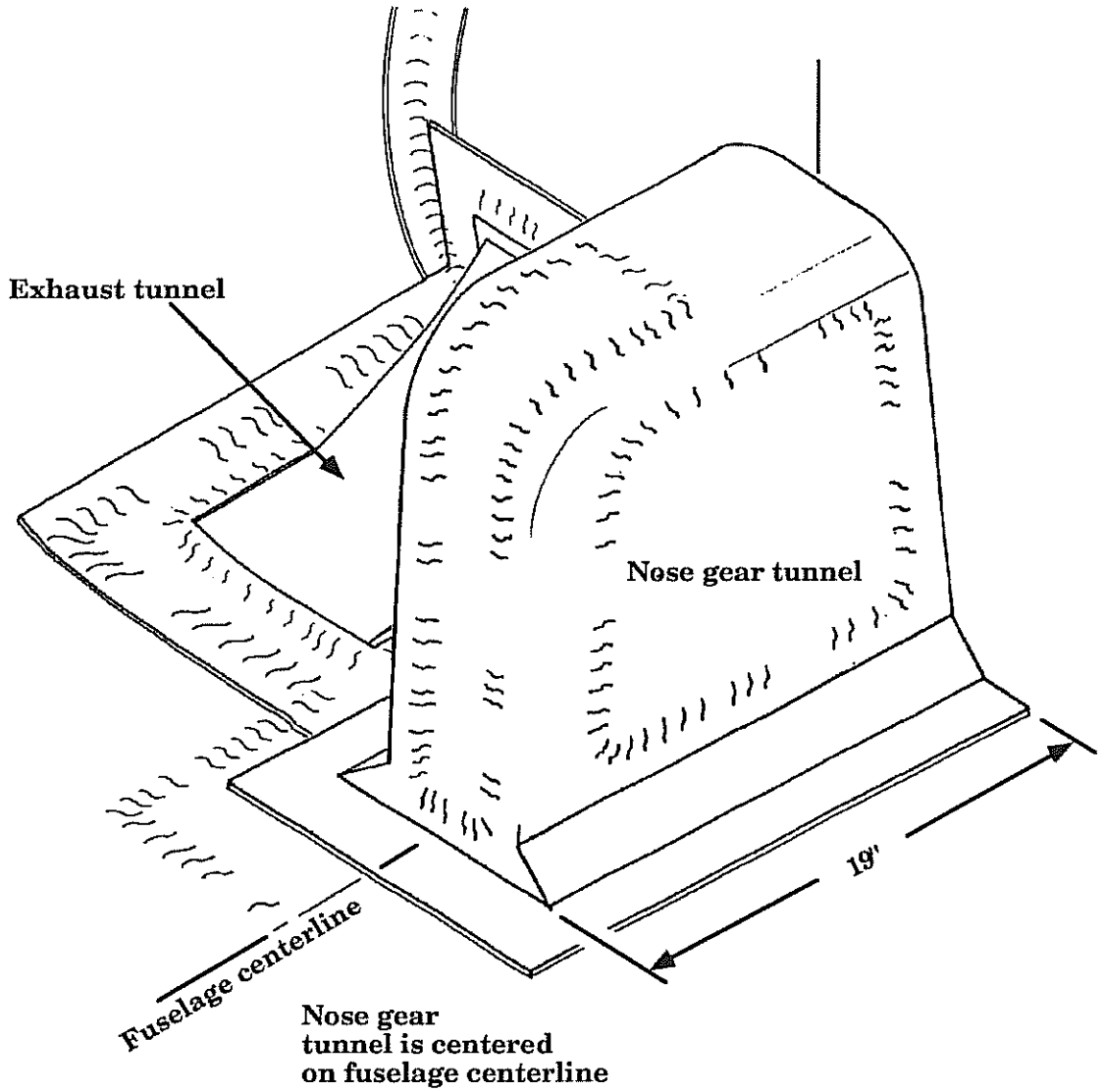
Nose gear tunnel
Figure 12:D:1



D1. Trim the bottom flange of the nose gear tunnel to a 1" width.

D2. Center the nose gear tunnel on the fuselage centerline and butt it against the aft face of the firewall. Trim the forward edges of the tunnel until the distance from the firewall to the back of the tunnel is 19", as shown in Figure 12:D:2.

Locating nose gear tunnel
Figure 12:D:2



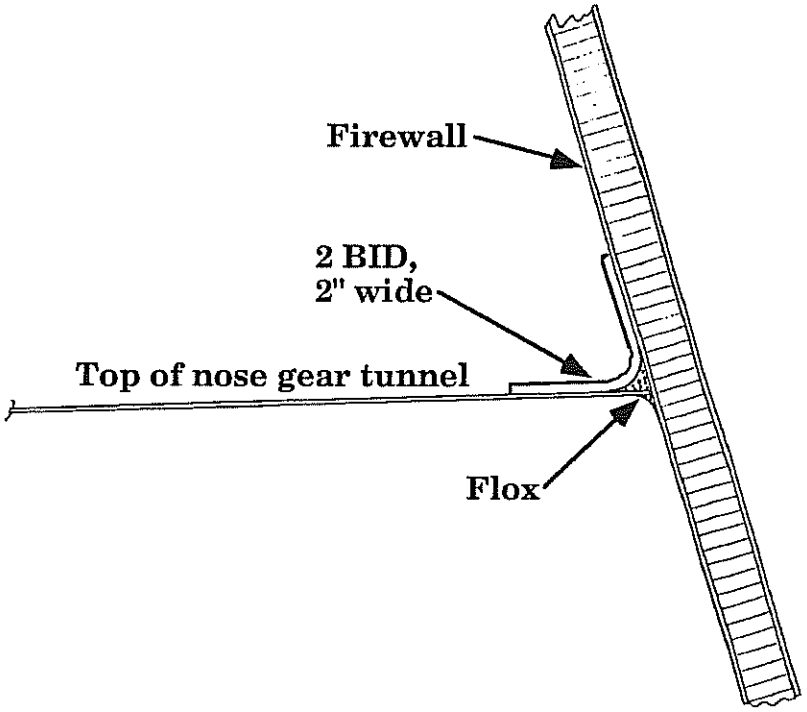
D3. With 40 grit, sand the bottom flange of the nose gear tunnel and the areas of the fuselage and firewall where the tunnel will be bonded.

D4. Clean all bonding areas with MC.

Note: The interior width of the nose gear tunnel should be at least 7 1/2". Since composite parts tend to flex, it is a good idea to insert a 7 1/2" wood spacer in the nose gear tunnel to hold apart the sides during bonding. Place the spacer at the bottom forward corner of the tunnel as this is where the most flex would be seen.

D5. Use Hysol to bond the nose gear tunnel's bottom flange to the fuselage and firewall. You will only have a small butt joint bonding the tunnel to the aft face of the firewall, so use a thick epoxy/flox mixture to bond these two surfaces together. Form a radius with the flox for extra support until the BID is applied.

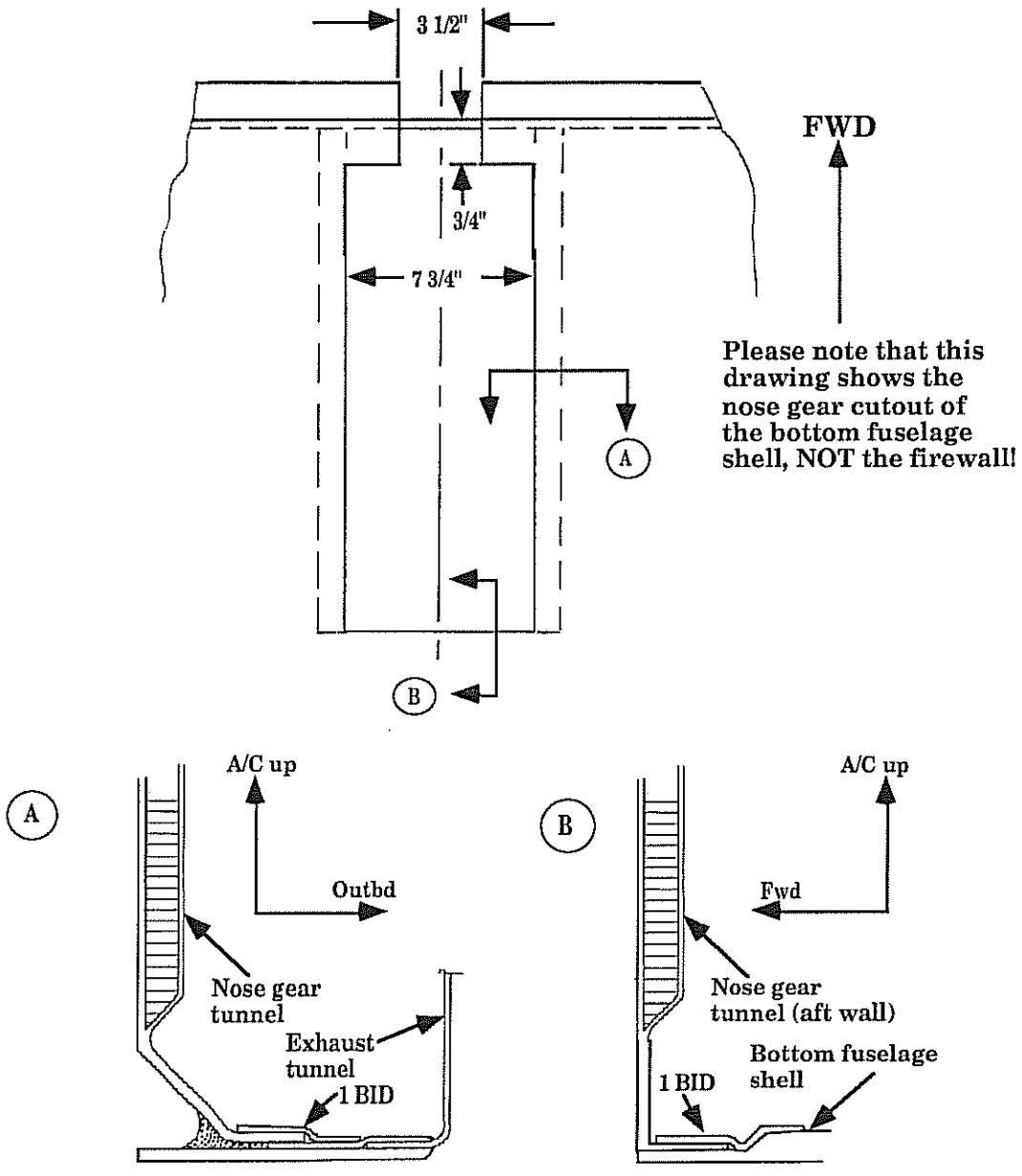
Bonding nose gear tunnel into fuselage
Figure 12:D:3



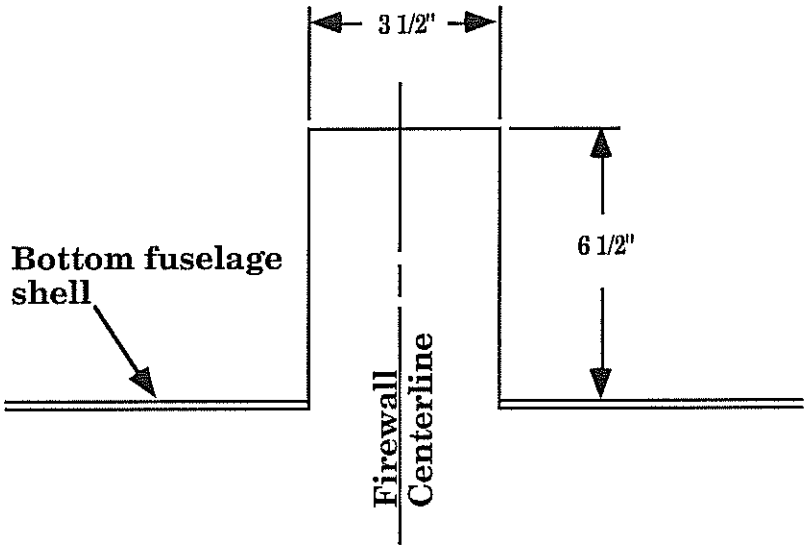
D6. Reinforce the bond between the nose gear tunnel bottom flange and the fuselage shell with 2" wide 1 bid strips. Reinforce the bond between the nose gear tunnel and the firewall with 2" wide, 2BID. Be sure the areas where the BID is applied have been sanded and cleaned.

D7. Trim back the firewall and the bottom fuselage shell in the nose gear tunnel area as shown in Figure 12:D:4. Notice that the firewall is NOT trimmed flush with the inside of the nose gear tunnel. The bottom surfaces of the nose gear tunnel are angled to allow for mounting the nose gear door hinges to the fuselage. Only the nose gear strut will pass through the firewall, the tire is completely enclosed in the tunnel.

Location of nose gear cutout
(on bottom fuselage)
Figure 12:D:4:a



Location of nose gear cutout
(0n firewall)
Figure 12:D:4:b

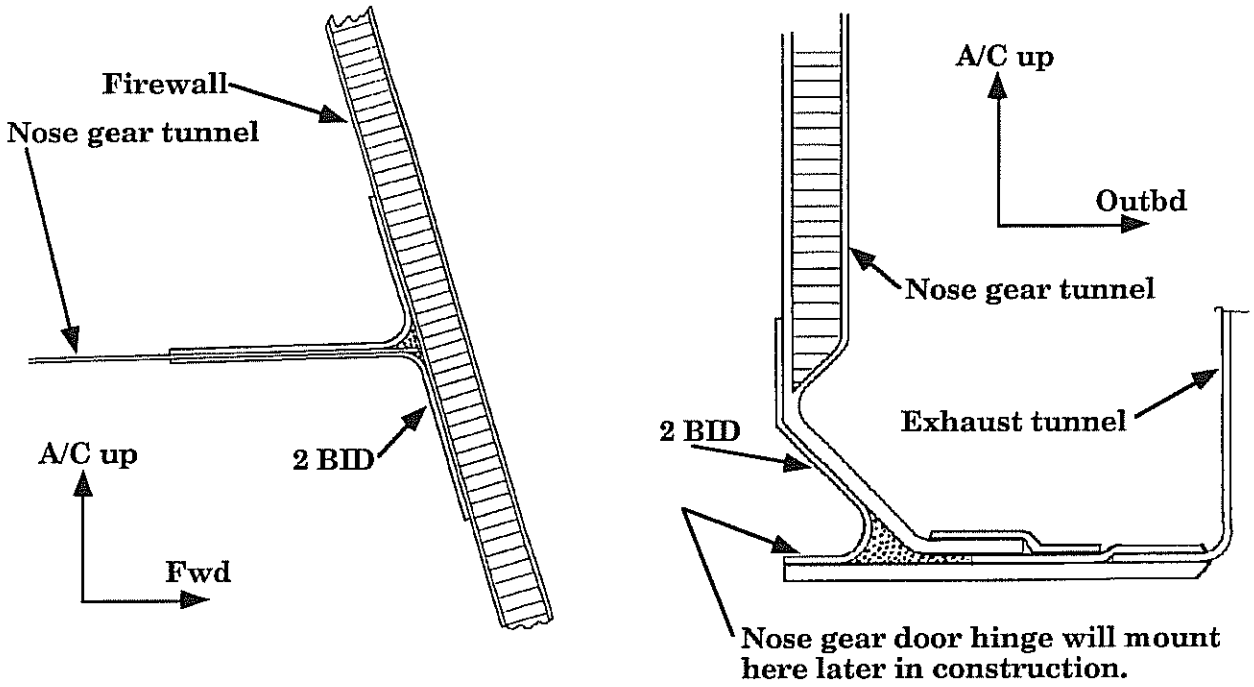


D8. With 40 grit, sand the areas where the inside of the nose gear tunnel joins the bottom fuselage shell and the aft face of the firewall. BID tapes will secure the inside of the nose gear tunnel to the fuselage and firewall. See Figure 12:D:5 for BID tape locations.

D9. With MC, clean the areas where the BID tapes will be applied.

Securing inside of nose gear tunnel

Figure 12:D:5



D10. Apply an epoxy/micro radius inside the nose gear tunnel where it meets the bottom fuselage shell and the aft face of the firewall.

D11. Secure the inside of the nose gear tunnel to the firewall and bottom fuselage shell with 2 BID, 2" wide strips. These BID tapes will also reinforce the areas where the nose gear door hinges will be mounted.

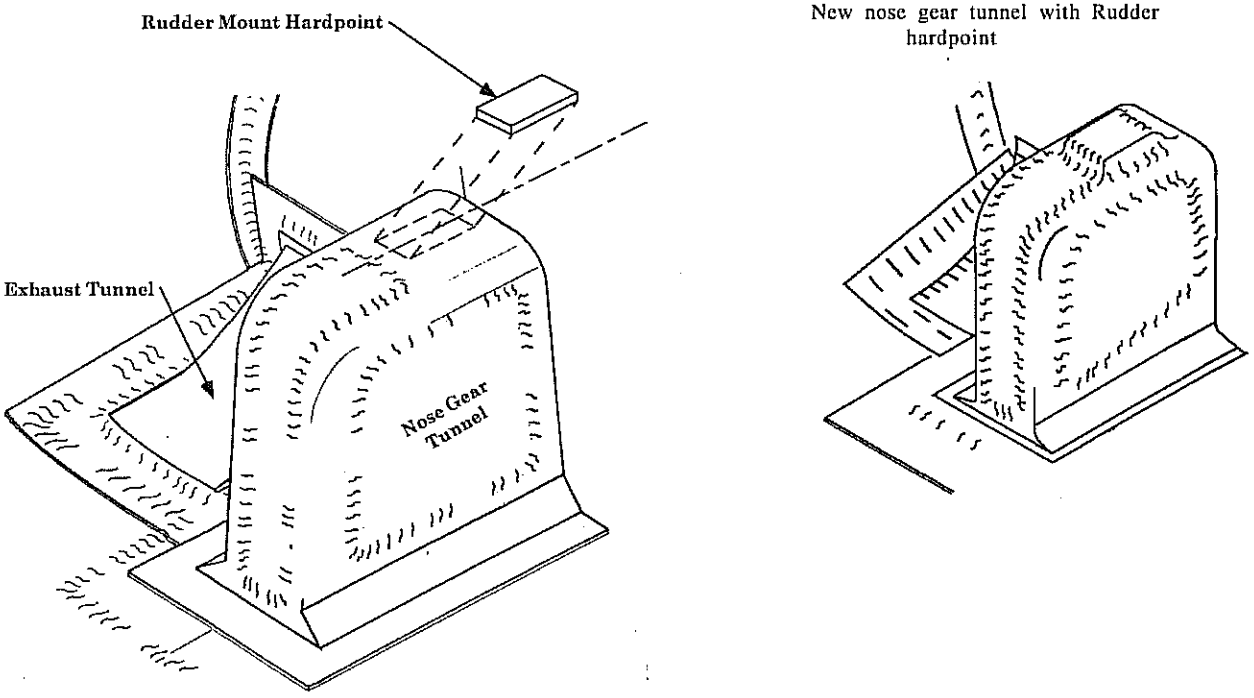
E. RUDDER MOUNT HARDPOINT

NOTE: These hardpoints are already installed on Fast Build Fuselages.

Although this section may seem out of place, the rudder mount hardpoint must be installed on top of the nose gear tunnel so the plywood engine mount reinforcements can be positioned at the right height. In a later chapter, the rudder pedal assembly will be mounted to the nose gear tunnel hardpoint and the plywood engine mount reinforcements.

Rudder mount hardpoint
Figure 12:E:1

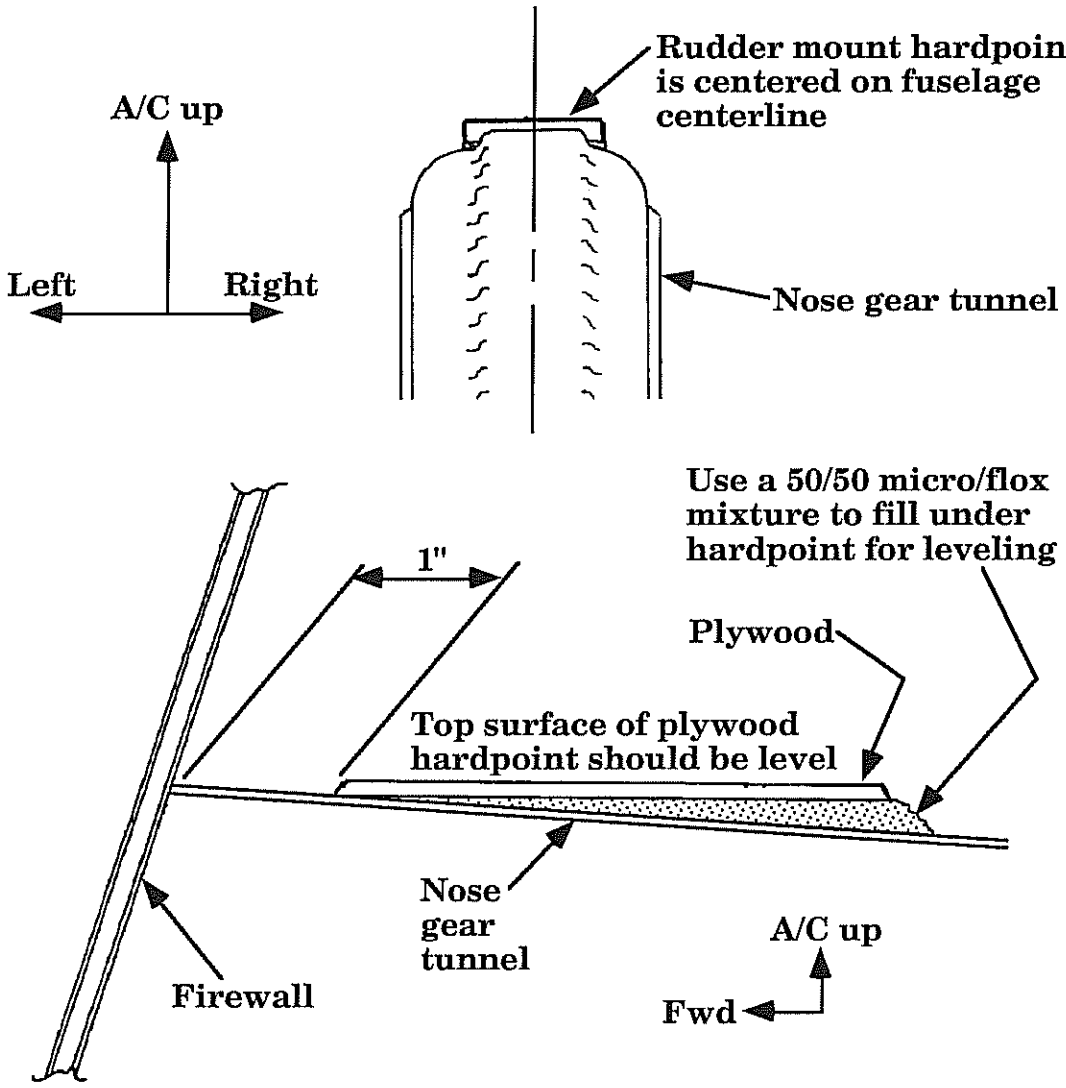
Note: For kits that have the new nose gear tunnel, which were shipped after the 1st of October 1997, omit section E (this section).



E1. From the 1/4" thick plywood provided in the kit, cut a 3" x 6" section.

E2. Center the section of plywood on top of the nose gear tunnel, 1" aft of the firewall.

Positioning 3" x 6" plywood hardpoint
Figure 12:E:2

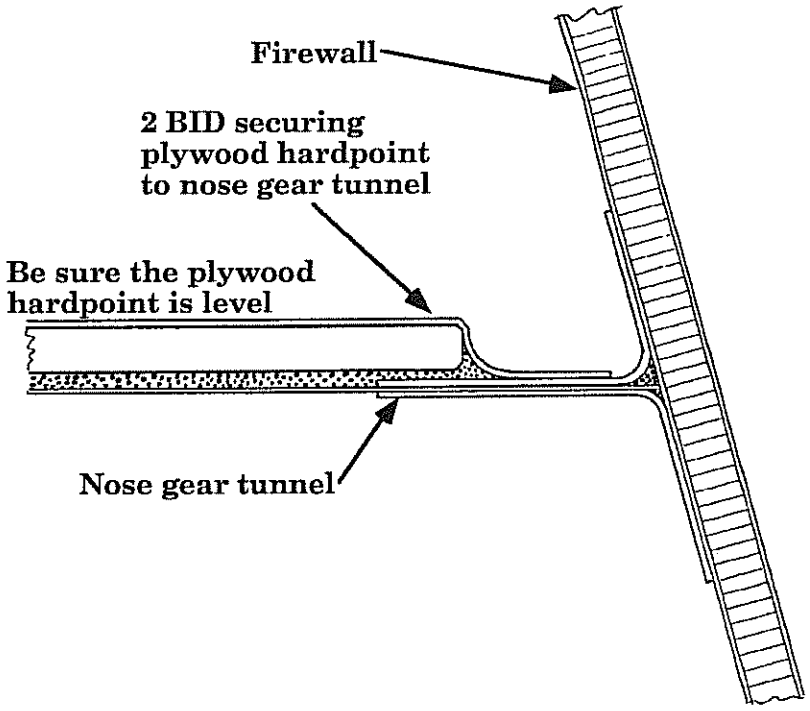


E3. The plywood piece you have positioned on the nose gear tunnel must be level. Use another small piece of plywood to shim the back of the rudder mount hardpoint until it is level.

E4. With 40 grit, sand both sides of the plywood and the top of the nose gear tunnel where the plywood will be mounted. Clean with MC.

E5. Bond the plywood piece(s) to the top of the nose gear tunnel with a 50/50 micro/flox mixture. Double check that the plywood is level.

Bonding plywood hardpoint to tunnel
Figure 12:E:3

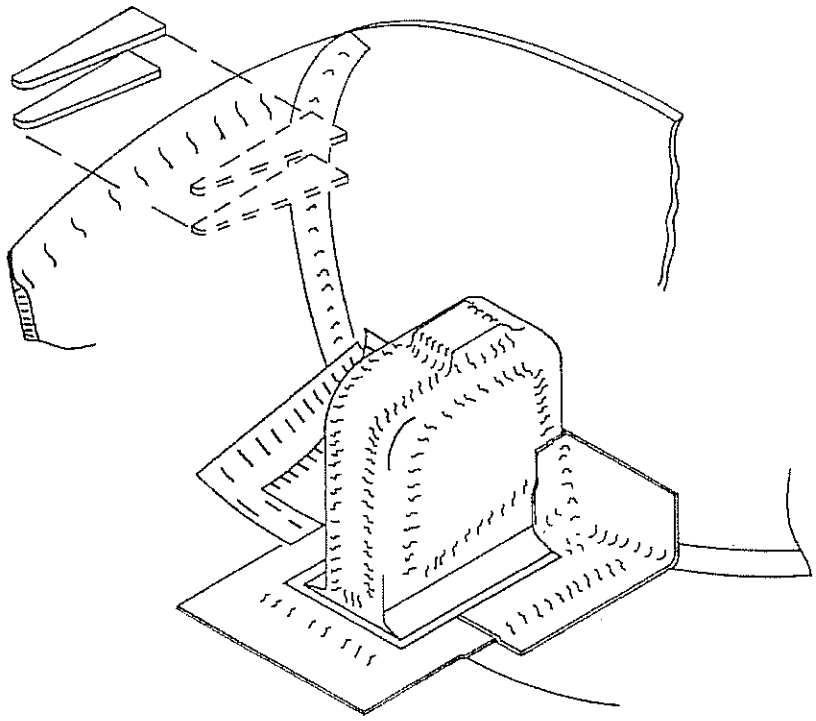


E6. Reinforce the plywood hardpoint with a 2 BID layup, overlapping 1" onto the nose gear tunnel surface.

F. ENGINE MOUNT REINFORCEMENTS

There are five phenolic hardpoints bonded into the firewall for engine mount installation. Additional reinforcement is needed behind each hardpoint to transfer the engine mount stress to a larger area.

Engine mount reinforcements
Figure 12:F:1



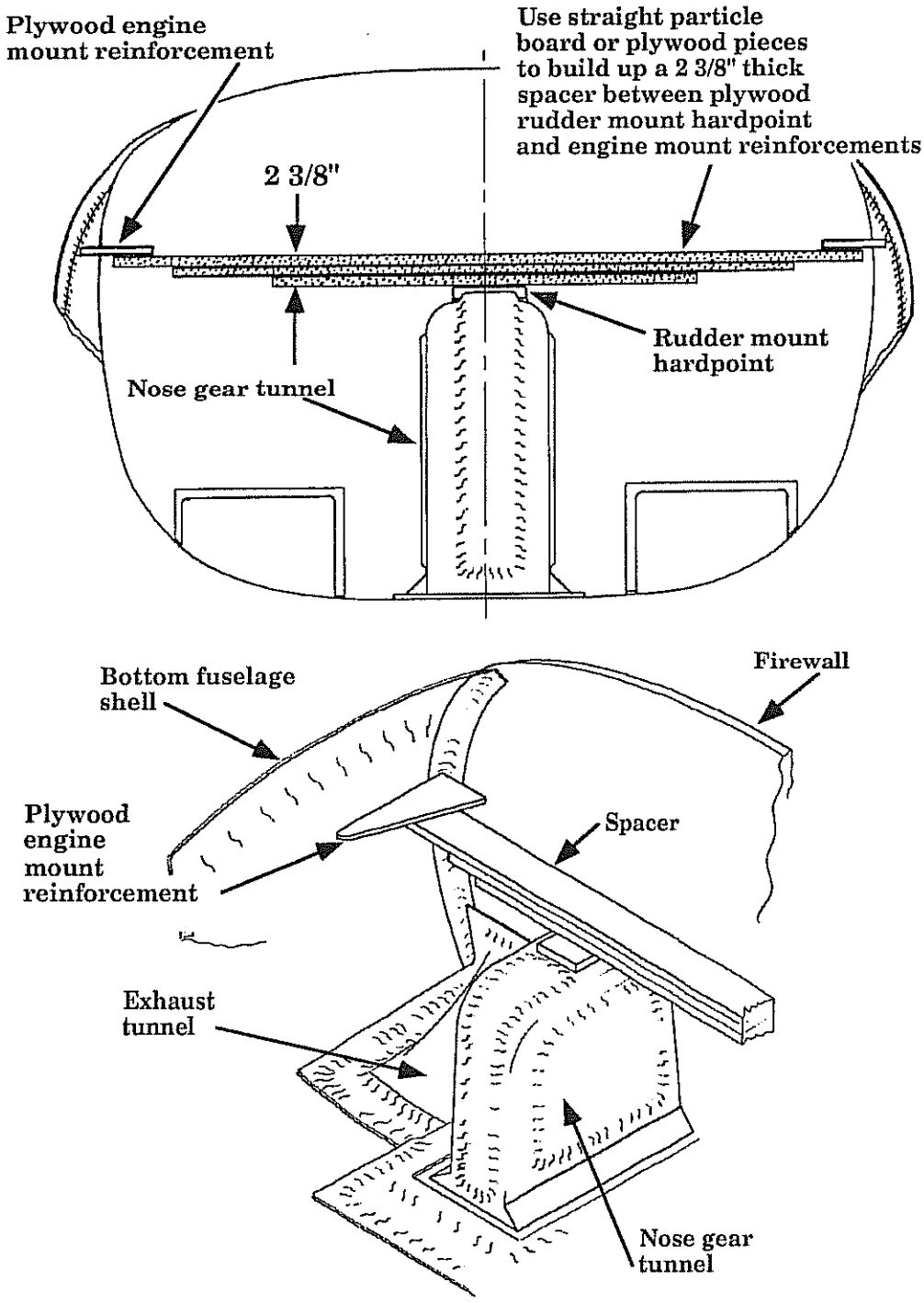
There are five engine mount reinforcements behind the firewall; two upper (left upper shown) two lower (between the nose gear and exhaust tunnels), and one inside the nose gear tunnel.

F1. Use the templates given on Blueprint A-303 to cut four plywood angle reinforcements. These plywood reinforcements are for the top two engine mount bolts. The bottom three engine mount hardpoints don't need plywood angle pieces. No plywood reinforcement pieces are needed on the Fast Build kit.

F2. The two bottom plywood angle pieces are mounted 2 3/8" higher than the rudder mount hardpoint on the nose gear tunnel. To get the bottom plywood pieces parallel with the rudder mount hardpoint, a flat 2 3/8" thick spacer is built from particle board to support the plywood pieces while they are being bonded to the fuselage sides. See Figure 12:F:2.

Positioning bottom plywood angle reinforcements

Figure 12:F:2



F3. Fit the bottom plywood angle reinforcements to the sides of your bottom fuselage shell and the aft face of the firewall. The pieces should be resting on the 2 3/8" thick support.

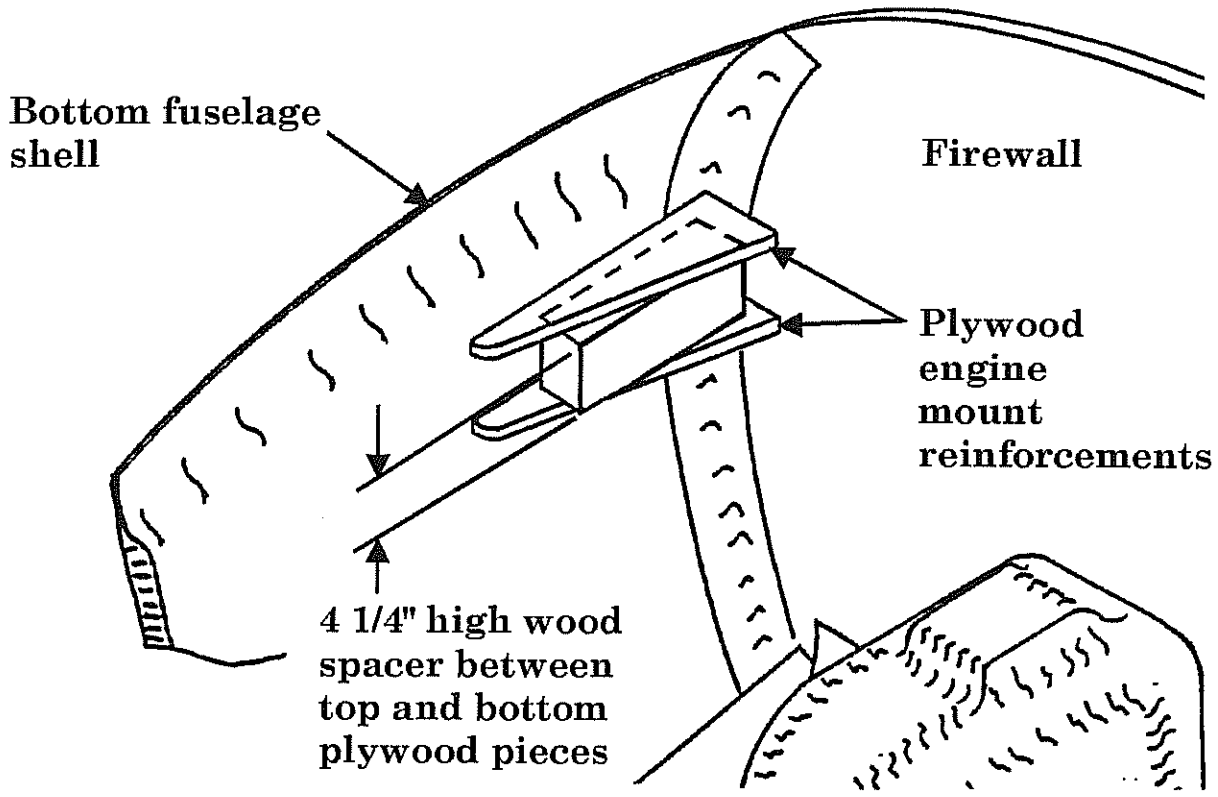
F4. With 40 grit, sand both sides of the plywood angle pieces and the areas of the fuselage and firewall where they will be mounted. Clean these areas with MC.

F5. Bond the bottom plywood angle reinforcements in position with epoxy/flox. Be sure the pieces are parallel with the rudder mount hardpoint.

F6. Remove the 2 3/8" thick spacer after the bottom plywood pieces have cured in position. The top plywood angle reinforcements are positioned 4 1/4" above and parallel with the bottom pieces. Make two 4 1/4" high spacer blocks to support the top plywood pieces while bonding.

F7. Fit the top plywood pieces to the bottom fuselage shell and firewall.

Positioning top plywood angle reinforcements
Figure 12:F:3



F8. Sand and clean the bonding areas of the fuselage shell and firewall where the top plywood pieces will be located.

F9. Bond the top plywood pieces to the bottom fuselage shell and the firewall with epoxy/flox.

F10. After the flox has cured, remove the spacer blocks from between the top and bottom plywood pieces. Sand and clean the areas where the reinforcement BID will be applied to the plywood angle pieces, the fuselage sides, and the firewall. Refer to the next few steps for the location of these reinforcement BID

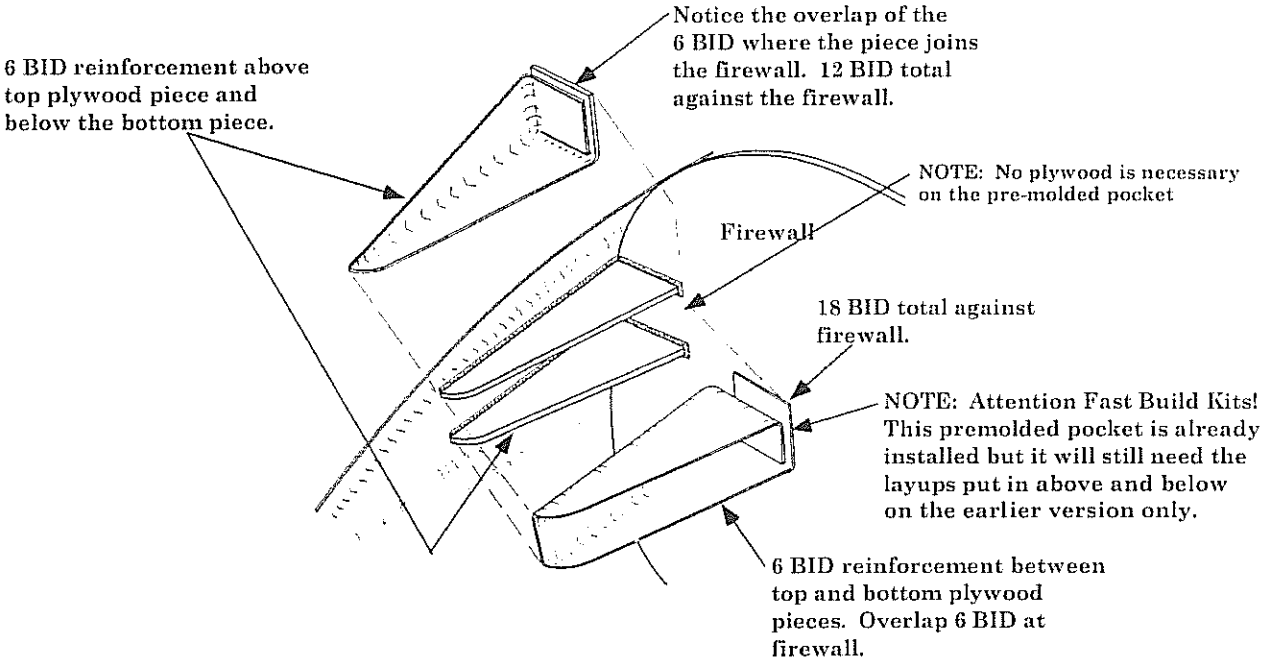
F11. Use the templates given on Blueprint A-304 & 305 to cut the 6 BID reinforcement for the two, top engine mount areas. Notice that the BID is folded over itself to increase it's thickness on the firewall. Cut out the templates and become familiar with how they fit against the plywood angle braces and the firewall. Customize the templates in necessary for the proper BID shape.

F12. Form flox radii where the plywood angle braces meet the fuselage sides and the firewall.

F13. Apply the 6 BID reinforcement to the top engine mount areas as shown in Figure 12:F:4. The plastic sandwich method of wetting out your BID is very helpful in this step. Notice that the middle 6 BID laminates (the ones *between* the plywood pieces) are overlapped on the aft face of the firewall three times to create an 18 BID reinforcement area. The 6 BID laminates applied *above* the top plywood pieces and *below* the bottom pieces are only double overlapped against the firewall to create a 12 BID reinforcement.

Top engine mount reinforcement BID

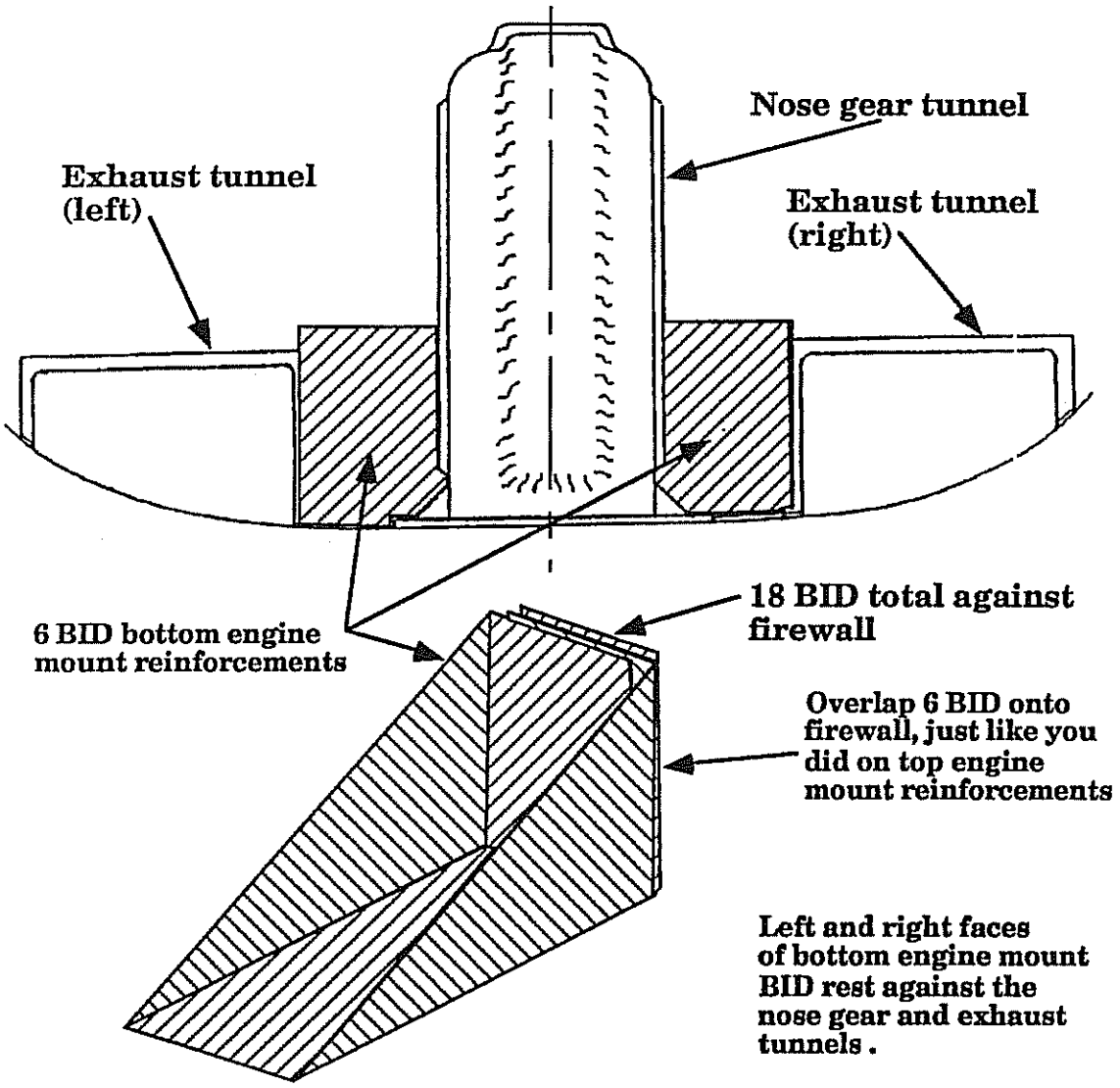
Figure 12:F:4



F14. The two bottom engine mount areas do not require plywood angle braces. The sides of the nose gear tunnel and the exhaust tunnels are sufficient to brace for the engine mount. Use the templates on Blueprint A-306 to cut the necessary 6 BID reinforcement for the two bottom engine mount areas.

F15. Apply the 6 BID reinforcements to the two bottom engine mount areas as shown in Figure 12:F:5. The BID will lap up onto the sides of the nose gear tunnel and the exhaust tunnels. Notice that the 6 BID is overlapped on the aft face of the firewall three times to create an 18 BID reinforcement area. Be sure to sand and clean the areas where the BID is applied.

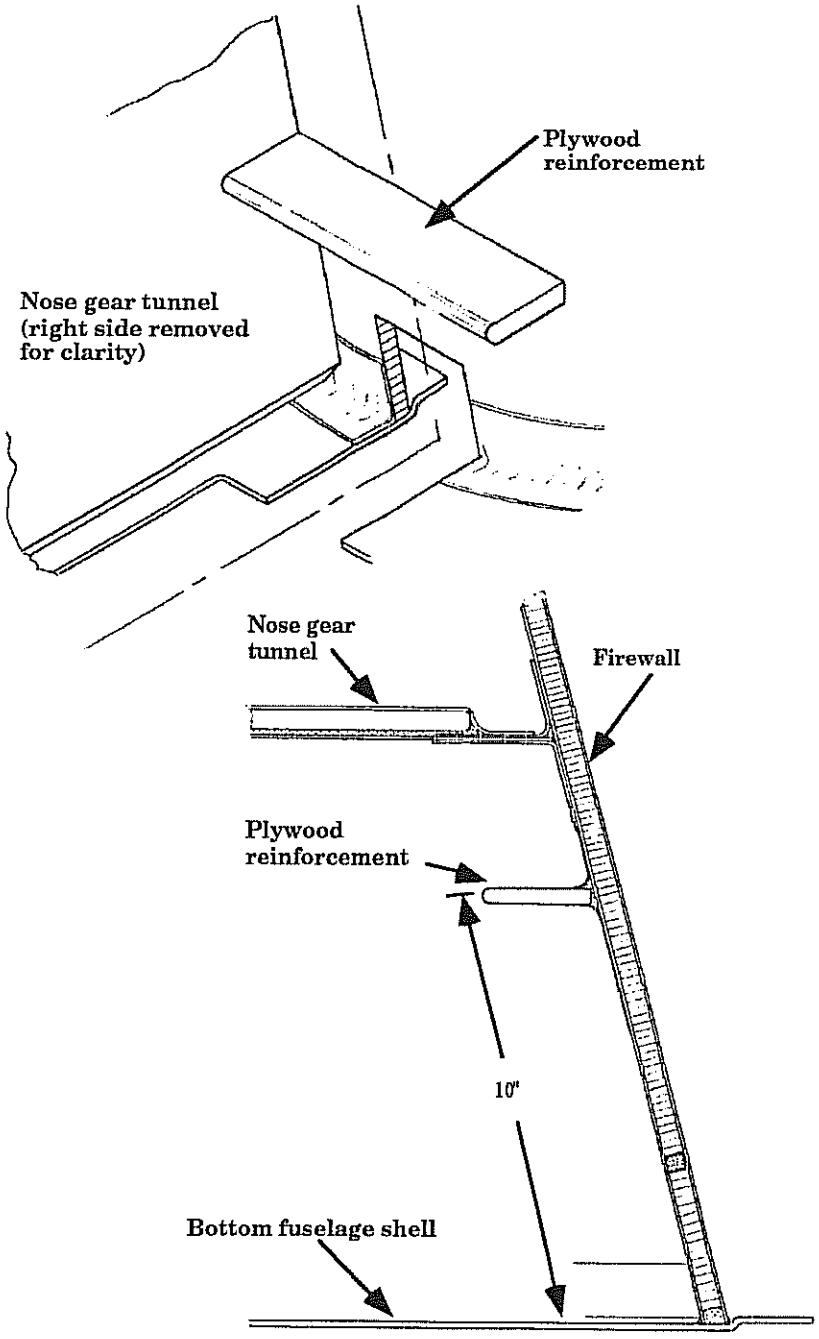
Reinforcement BID on bottom two engine mount areas
Figure 12:F:5



F16. The last engine mount hardpoint is located inside the nose gear tunnel. Cut a plywood reinforcement using the template on Blueprint A-307.

F17. Fit the plywood reinforcement into the nose gear tunnel at the location given in Figure 12:F:6. Round the aft edge of the plywood piece so the 6 BID that secures the piece can wrap around the edge.

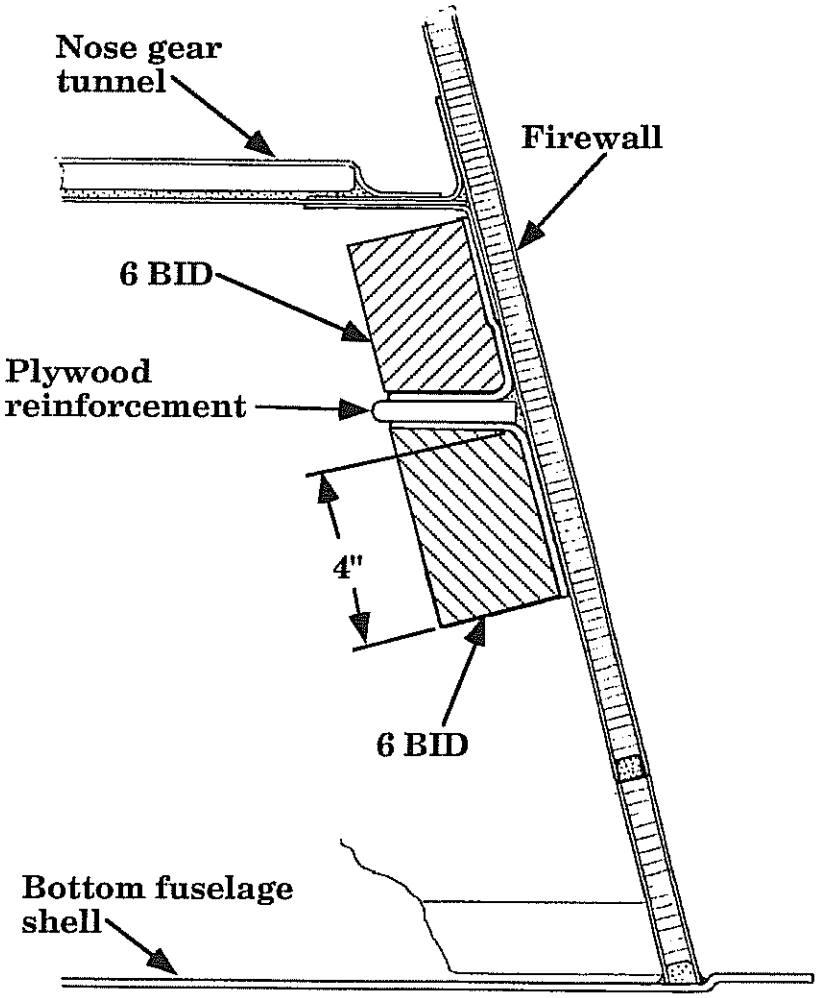
Plywood reinforcement in nose gear tunnel
Figure 12:F:6



F18. With 40 grit, sand the area of the firewall and nose gear tunnel where the plywood reinforcement and it's associated laminates will be applied. Clean these areas with MC.

F19. Use epoxy/flox to bond the plywood reinforcement to the aft face of the firewall and the nose gear tunnel. Form a flox radius where the plywood piece meets the surrounding surfaces.

Securing plywood reinforcement in nose gear tunnel
Figure 12:F:7

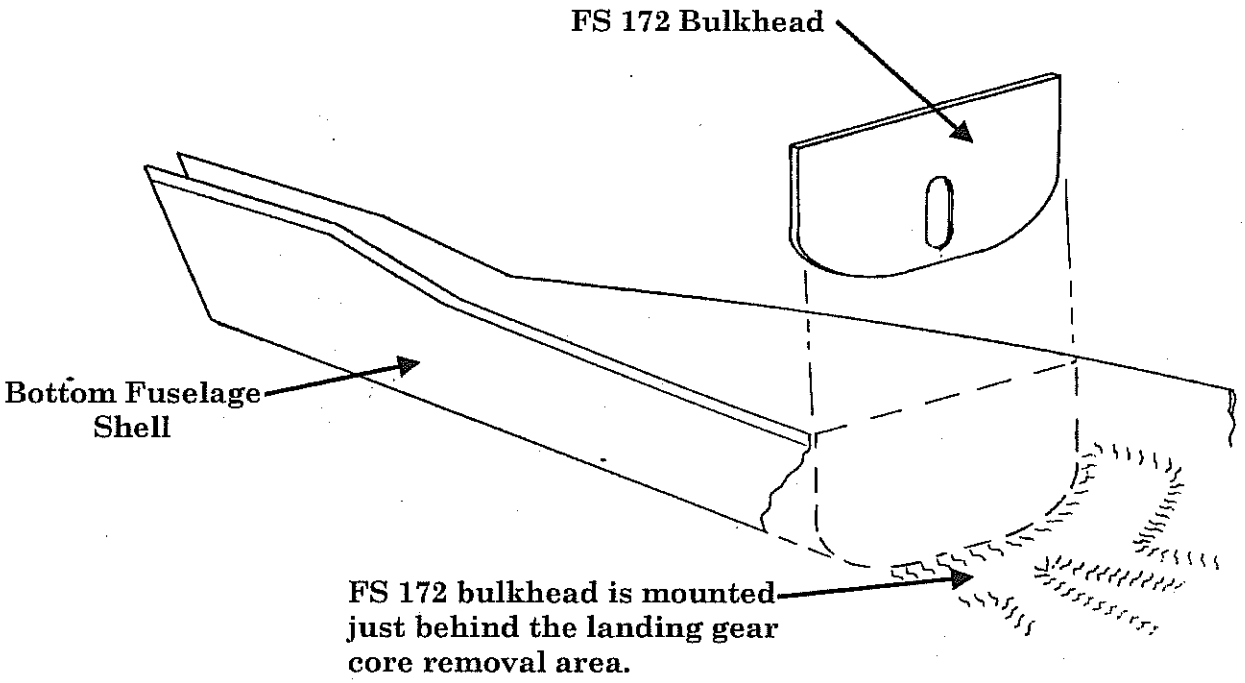


F20. Apply 6 BID to the plywood reinforcement in the nose gear tunnel, overlapping 4" onto the firewall above and below the piece. Also tie the plywood into the sides of the nose gear tunnel with the 6 BID.

G. - FS 172 BULKHEAD INSTALLATION

The FS 172 bulkhead bulkhead is located just aft of the main landing gear tires in the retracted position. Beside being a structural member of the fuselage, the FS 172 bulkhead doubles as the aft wall of the wheel wells.

FS 172 bulkhead
Figure 12:G:1

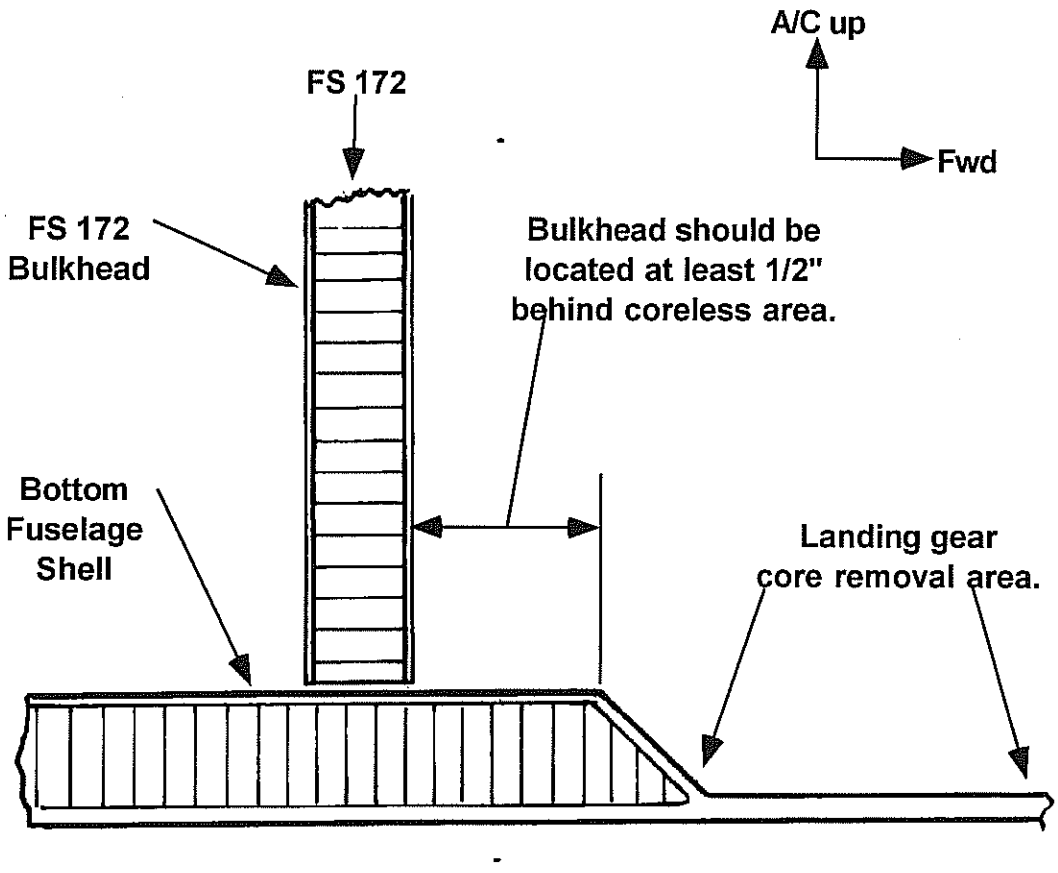


G1. Use the template provided on Blueprint A-310 as a guide to cut the FS 172 bulkhead from 2 ply per side, 1/4" thick fiberglass prepreg material. As usual, don't trust that the template is perfect. Cut the bulkhead larger and custom fit it to your fuselage.

NOTE: Be sure the top fuselage shell is clecoed in position when you are custom fitting the FS 172 bulkhead. Otherwise, the fuselage sides may not be at the proper widths.

G2. Fit the bulkhead into the bottom half of the fuselage at FS 172. The bulkhead is oriented true vertical. The forward face of the bulkhead should be at least 1/2" behind the coreless tire areas of the fuselage shell. See Figure 12:G:2.

Locating FS 172 bulkhead
Figure 12:G:2



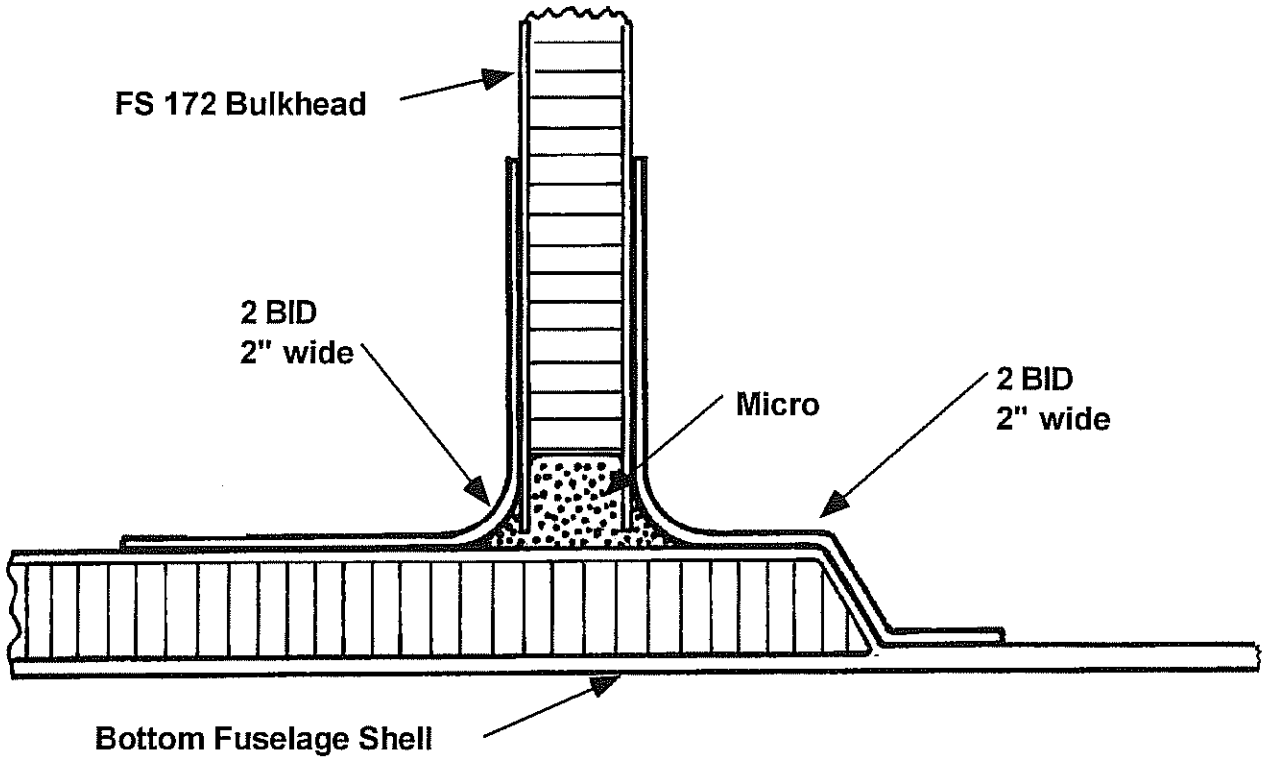
G3. Sand the fuselage where the FS 172 bulkhead will be located.

G4. Form a 1/8-1/4" deep trough in the bulkhead core where it will be bonded to the bottom fuselage shell.

G5. Clean the bonding area with MC.

G6. Mound up a thick micro/epoxy mixture in the bulkhead trough and place the bulkhead in position in the bottom fuselage shell.

Bonding FS 172 bulkhead in position
Figure 12:G:3

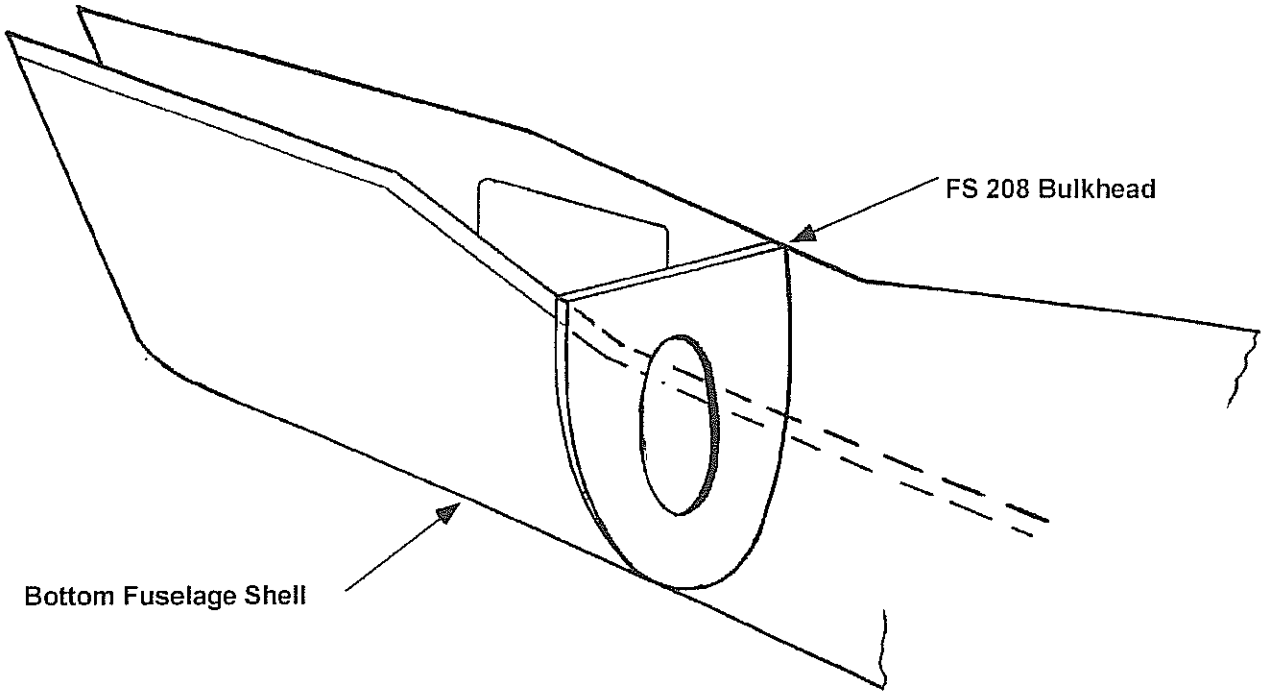


G7. With 40 grit, sand the areas of the bottom fuselage and the FS 172 bulkhead where the BID tapes will be applied. Clean these areas with MC.

G8. Apply a 2 BID, 2" wide laminate to the forward and aft sides of the FS 172 bulkhead where it joins the bottom fuselage shell.

The aft fuselage bulkhead is located at FS 208, ahead of the tail area access panel.

FS 208 bulkhead
Figure 12:H:1



H1. Use the template provided on Blueprint A-311 as a guide to cut out the aft fuselage bulkhead from 2 ply per side, 1/4" thick prepreg.

H2. Installation of the FS 208 bulkhead is the same as for the FS 172 bulkhead. The FS 208 bulkhead is installed vertical, with 2" wide, 2 BID fiberglass tapes.

H3. Fit the FS 208 bulkhead at the proper location in the bottom fuselage shell. The template will get you close to the exact shape, but custom fitting is always necessary.

NOTE: Be sure the top fuselage shell is clecoed in position when you are custom fitting the FS 208 bulkhead. Otherwise, the fuselage sides may not be at the proper width.
It is also recommended to temporarily fit the sternpost (section K) before bonding inthe FS 208 bulkhead to prevent fuselage twisting.

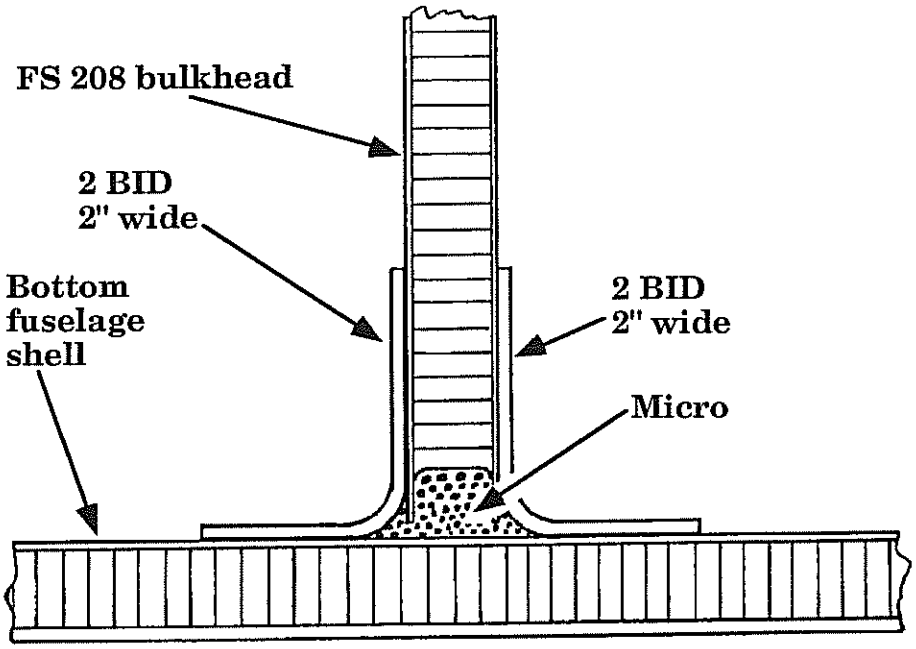
H4. With 40 grit, sand the fuselage where the FS 208 bulkhead will be located.

H5. Form a 1/8 - 1/4" deep trough in the FS 208 bulkhead core where it will be bonded to the bottom fuselage shell.

H6. Clean the bonding area with MC.

H7. Mound up a thick micro/epoxy mixture in the bulkhead trough and place the bulkhead in position in the bottom fuselage shell.

Bonding FS 208 bulkhead in position
Figure 12:H:2



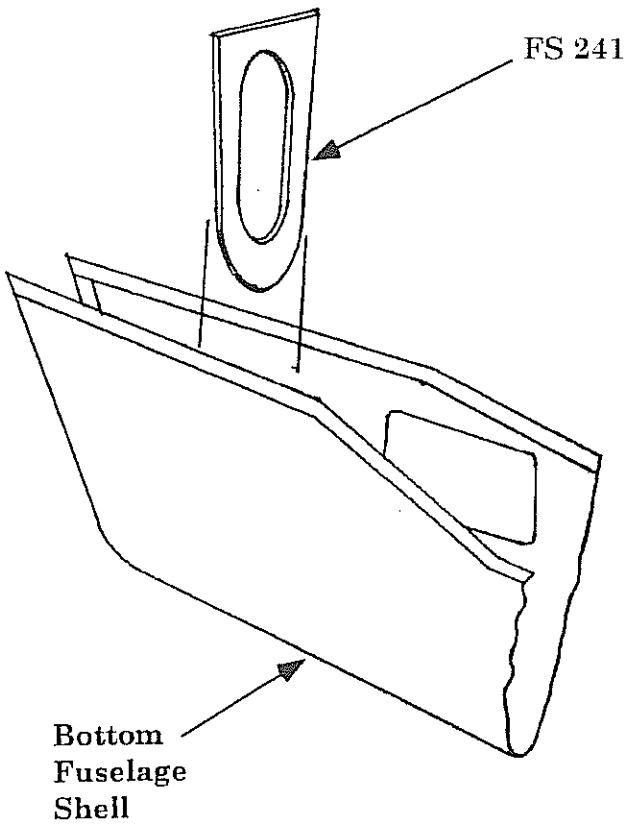
H8. With 40 grit, sand the areas of the bottom fuselage and FS 208 bulkhead where the BID tapes will be applied. Clean these areas with MC.

H9. Apply a 2 BID, 2" wide laminate to the forward and aft sides of the FS 208 where it joins the bottom fuselage shell.

I. FS 241 BULKHEAD INSTALLATION

Like the other fuselage bulkheads, FS 241 is oriented vertical.

FS 241 bulkhead
Figure 12:I:1

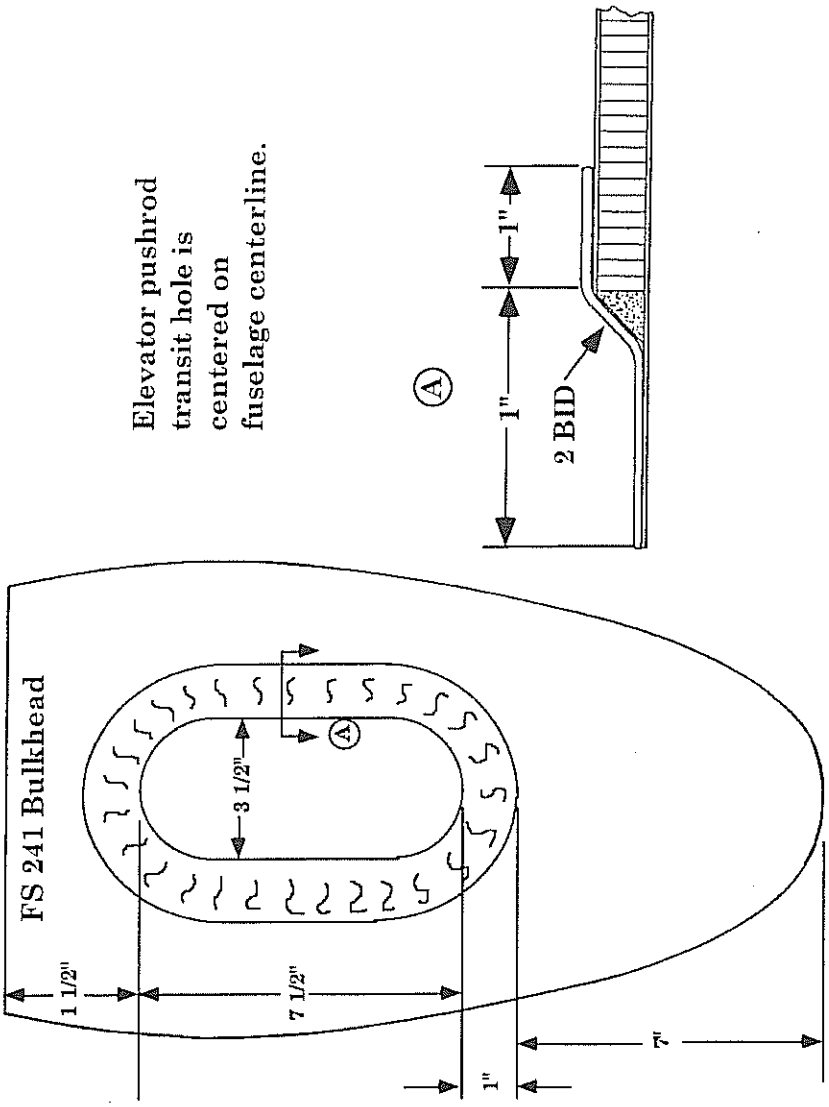


I1. Use the template given on Blueprint A-312 as a guide to cut the FS 241 bulkhead from 2 ply per side fiberglass prepreg.

I2. It is much easier to cut the elevator pushrod transit hole BEFORE you install the FS 241 bulkhead. Use the dimensions in Figure 12:I:2 as a guide to cut this hole. The forward laminate and core of the bulkhead are trimmed 1" farther back to accomodate a 2 BID reinforcement.

I3. Form a micro radius around the perimeter of the elevator pushrod transit hole, where you have cut back the forward laminate and core.

Elevator pushrod transit hole in FS 241 bulkhead
Figure 12:I:2



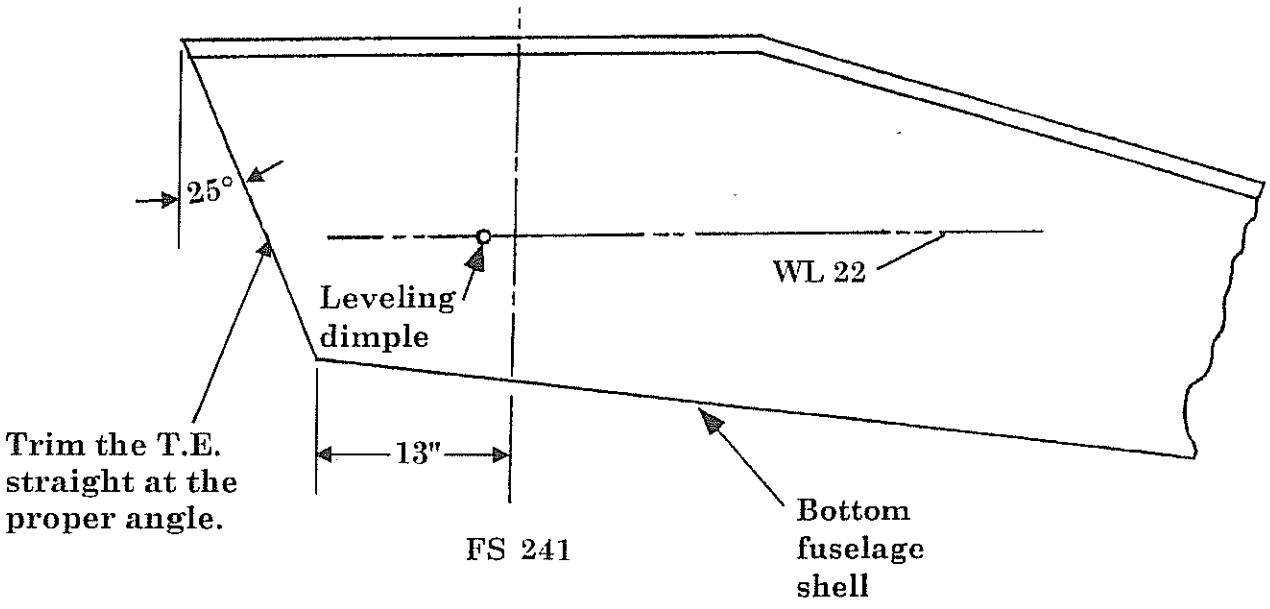
I4. Apply 2 BID around the perimeter of the elevator pushrod transit hole, overlapping 1" onto the forward surface of the FS 241 bulkhead. You may not be able to do this layup with one length of 2 BID. It is okay to glass half the transit hole at a time and overlap the 2 BID layups by 1".

I5. Before you custom fit the FS 241bulkhead to your bottom fuselage shell, you must verify that the width of the fuselage is correct. To do this you can now trim the aft edges of the bottom fuselage shell.

I6. Using the dimensions in Figure 12:I:3, mark where you're going to trim the aft edges of the bottom fuselage shell. Use the intersection of WL 22 and FS 241 as a base for your measurements. Use a plumb bob to transfer FS 241 from your floor reference grid to the fuselage sides. A tolerance of + - 1/8" is fine for this step. Drill a small reference hole through the bottom of the fuselage at FS241. Measure back along the fuselage bottom 13" and mark the trailing edge trim line. A Smart level or a dial type protractor are good tools for finding the proper angle of the fuselage T.E..

Trimming the aft edge of the bottom fuselage shell

Figure 12:I:3



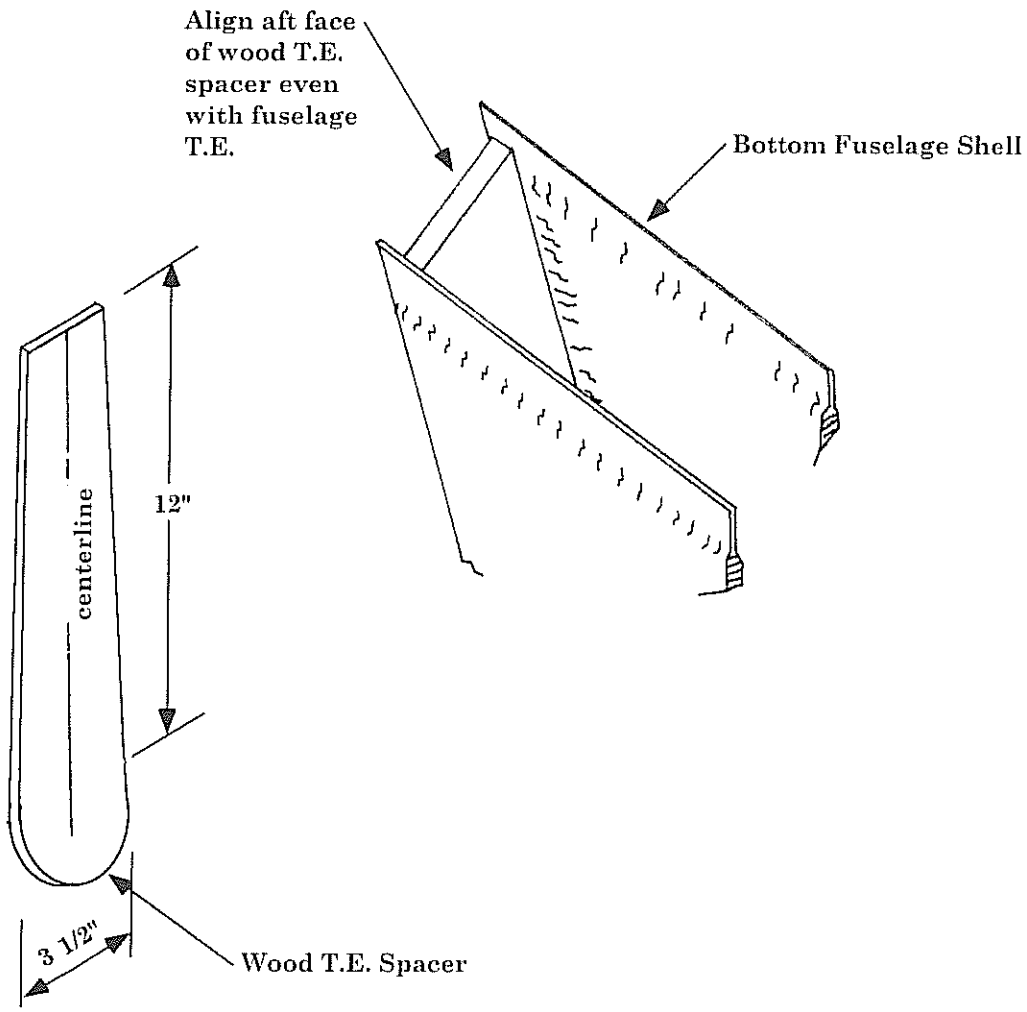
I7. Trim the aft edges of the bottom fuselage shell to the marks you've made. The fast build fuselage has already been trimmed.

I8. To hold the aft edges of the fuselage at the proper width you must brace them with a piece of wood. Cut a piece of flat, 1/4" thick wood to the dimensions shown in Figure 12:I:4. Mark a centerline on the wood piece. You can temprorarily fit the sternpost as a substitute for this procedure.

Note: Before you bond this wood piece in position, it is a good idea to make reference marks on the inside surface of the fuselage where the vertical stabilizer sternpost will be located. Otherwise, the wood piece will interfere with making these marks. Refer to construction section "K" for details on vertical stabilizer sternpost positioning.

Bracing the aft edge of the bottom fuselage shell

Figure 12:I:4



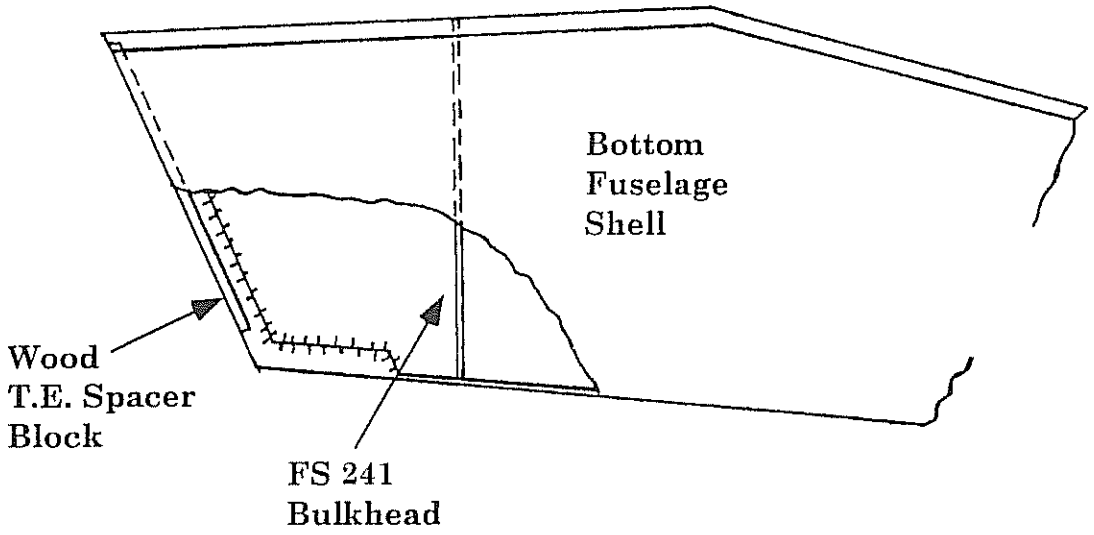
I9. Use instant glue to temporarily bond the piece of wood between the fuselage sides at the aft edge of the bottom fuselage shell. The outside width of the fuselage should be a constant 3 5/8" until the radius at the bottom of the fuselage dictates otherwise. The centerline of the wood brace should be vertical and aligned with the fuselage centerline. Leave this wood brace in position until you have installed both the FS 241 bulkhead and the vertical stabilizer sternpost.

I10. Now you can go ahead with custom fitting the FS 241 bulkhead in your bottom fuselage shell. The bulkhead should be positioned vertical.

Positioning FS 241 bulkhead

Figure 12:I:5

FS 241 bulkhead is mounted vertical



I11. When satisfied that the position and fit of the FS 241 bulkhead is correct, form a 1/8 - 1/4" deep trough in the bulkhead core where it will be bonded to the bottom fuselage shell.

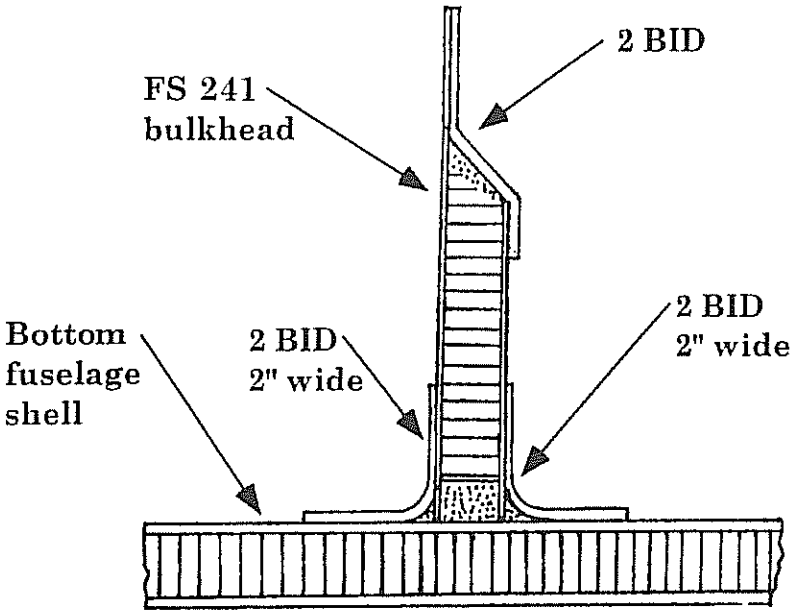
I12. Sand the area of the bottom fuselage shell where the FS 241 bulkhead will be bonded.

I13. Clean all bonding areas with MC.

I14. Use a thick micro/epoxy mixture to secure the FS 241 bulkhead in position.

Securing FS 241 bulkhead in position

Figure12:I:6



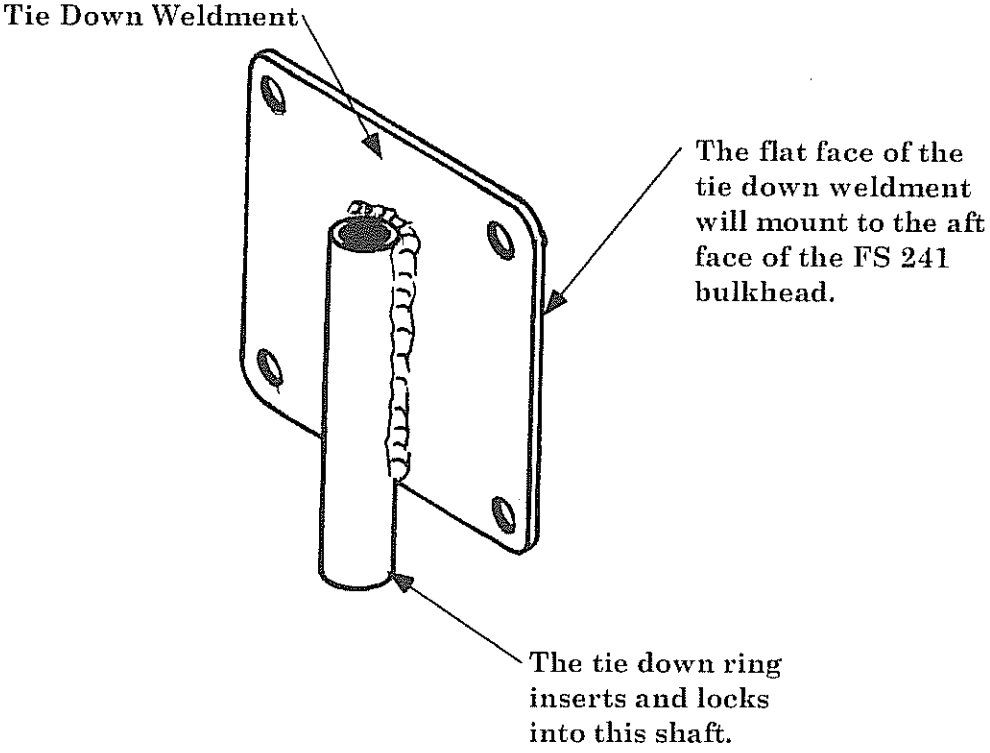
I15. Apply a 2" wide, 2 BID laminate where the FS 241 bulkhead meets the bottom fuselage shell.

I16. The top edge of the FS 241 bulkhead will be trimmed down when you locate and fit the horizontal stab to the fuselage, but for now, leave the bulkhead untrimmed.

J. REAR TIE DOWN INSTALLATION

The rear tie down is installed onto the rear face of the FS 241 bulkhead. It is the same type tie down assembly that you have previously installed in each wing. The only part of the tie down assembly visible from the outside will be a small hole into which the tie down pin is inserted.

Rear Tie Down Assembly
Figure 12:J:1



J1. Use acetone or paint remover to remove the paint from the tie down weldment. Scuff the surface of the weldment with 40 grit and clean with MC.

J2. The tie down weldment will be bonded to the aft face of the FS 241 bulkhead, with the pin aligned on the fuselage centerline. Grind a hole in the bottom of the fuselage for the tie down shaft. The end of the shaft should be flush with the fuselage bottom (a little filing on an angle helps this).

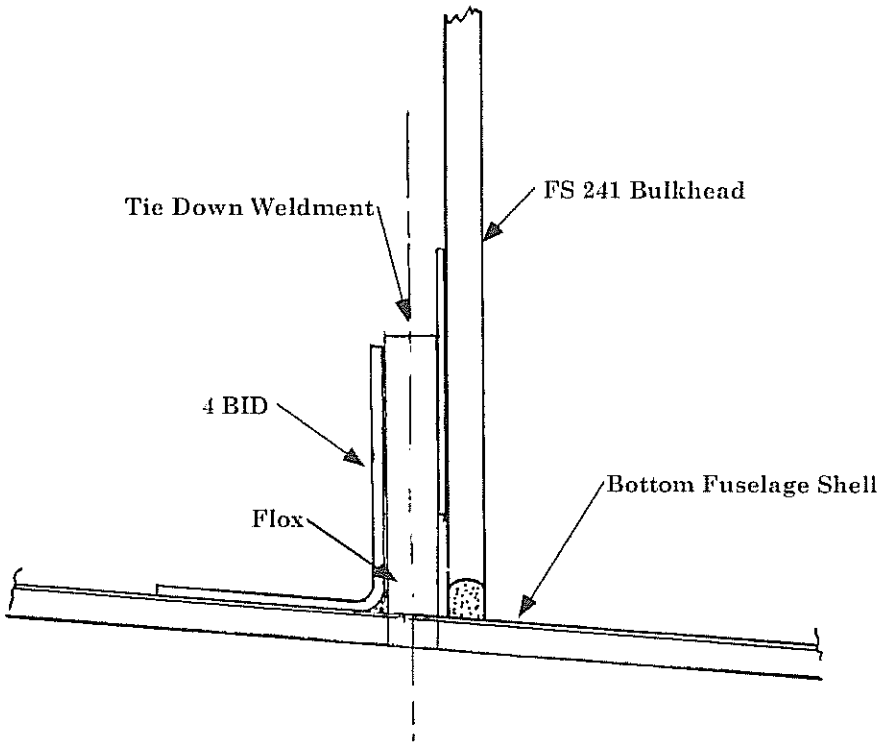
J3. Sand the FS 241 bulkhead where the tie down weldment will be bonded and clean with MC.

J4. Drill four, 3/8" dia. holes in the flange of the tie down weldment. These holes will provide a better mechanical bond to the bulkhead.

J5. Bond the tie down weldment to the FS 241 bulkhead with epoxy flox. Mound the flox around the tie down shaft so BID can be applied over the weldment.

Securing tie down weldment to FS 241 bulkhead

Figure 12:J:2

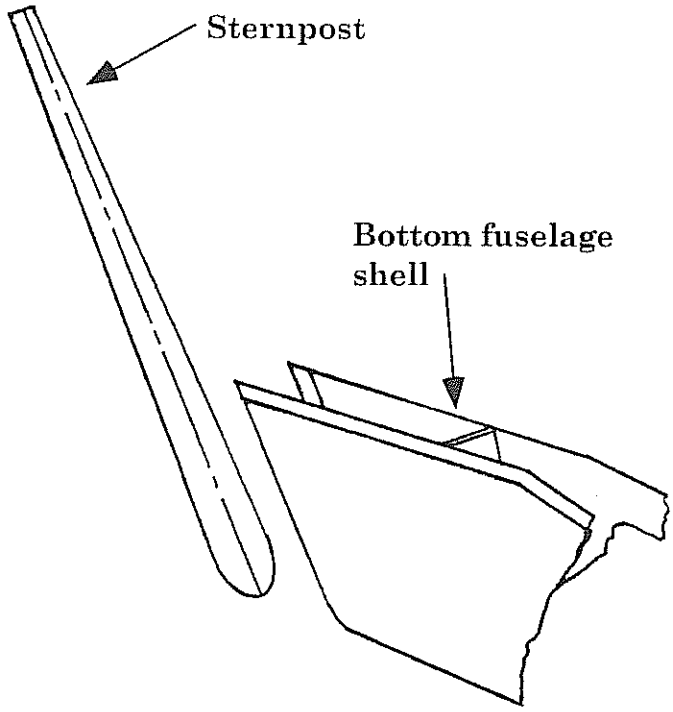


J6. Apply 4 BID to the tie down weldment, overlapping the BID 2" onto the surrounding fuselage and bulkhead surfaces. This will transfer the tie down loads to a larger area. It is best to apply the 4 BID while your flox buildup on the weldment is still wet. Otherwise you should sand (or grind with a Dremel) the hardened flox to provide a smooth glassing surface.

K. VERTICAL STABILIZER STERNPOST

The last bulkhead installed in the bottom fuselage shell is the vertical stabilizer sternpost.

Vertical stabilizer sternpost
Figure 12:K:1

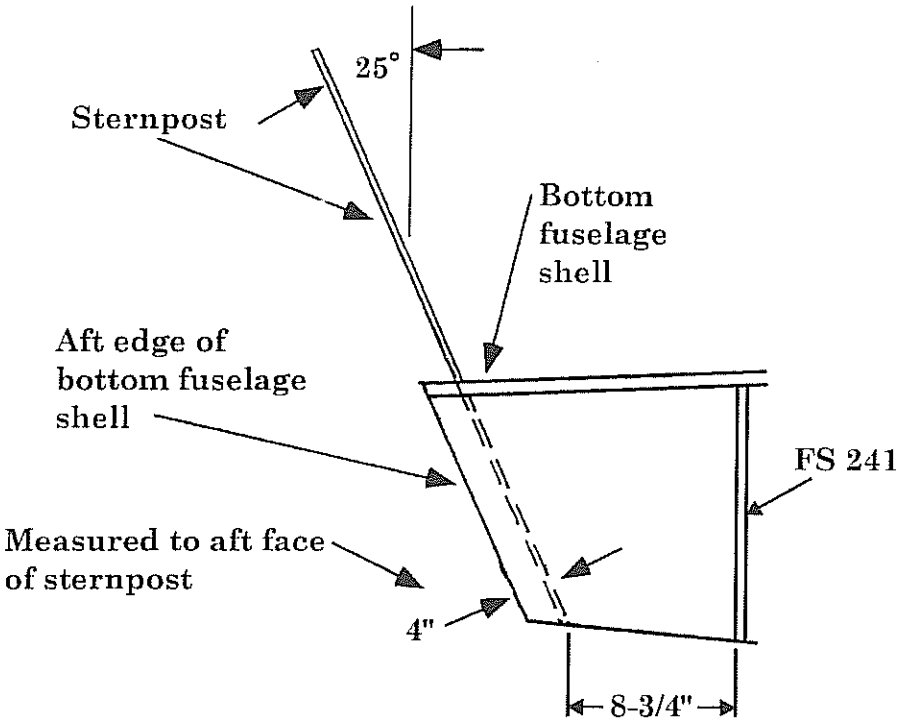


K1. Using the template on Blueprint A-308, cut the sternpost from 2 ply per side, 1/4" thick, fiberglass prepreg material. Be sure to draw a centerline on the sternpost for later alignment.

NOTE: The blueprint may need some adjustments to allow for variations in core placement, etc.

K2. Measure forward along the bottom fuselage shell 4" to find the location of the vertical stabilizer sternpost. Check that you have accurately trimmed the aft edges of the bottom fuselage shell. (Refer back to Figure 12:I:3.) The final trim line will be determined when you fit the rudder, appriximately 3" from the sternpost.

Locating vertical stabilizer sternpost
Figure 12:K:2



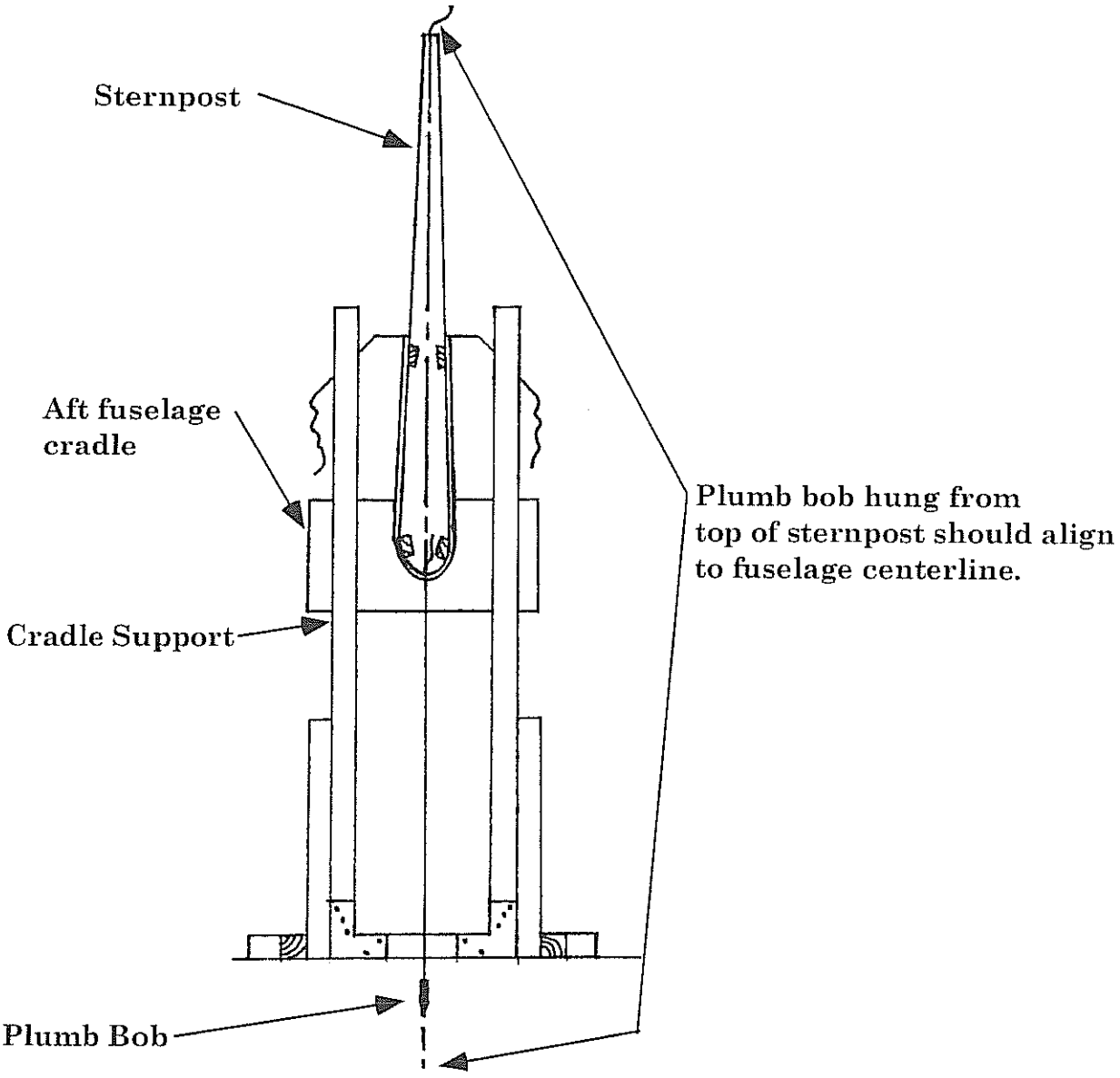
Note: for locating the vertical stabilizer sternpost, please study the pertinent Blueprints (A-308) and construction sections (Chapter 14 - Section A). These will help you picture what the sternpost alignment will affect in the future. With the fast build version, place the sternpost on the aft side of the web and trim the aft edge of the fuselage to match the rudder.

K3. Use instant glue to secure four small support blocks to the inside surface of the bottom fuselage shell. These blocks will locate the aft face of the sternpost and provide support while it is curing in position. See Figure 12:K:3 and 12:K:4.

K4. Custom fit your vertical stabilizer sternpost so it will fit into the bottom fuselage shell and rest against the four support blocks. If you trim the sides of your sternpost for a better fit, be sure to trim both sides equally. This will ensure that the sternpost centerline stays in the center of the fuselage.

K5. As a final check of sternpost alignment, drop a plumb bob from the top of the sternpost at the centerline, down to the fuselage centerline you marked on the floor. The plumb bob should be within 1/2" of the fuselage centerline marked on the floor. **Any remaining sternpost misalignment can be taken out when the vertical stabilizer halves are bonded to the fuselage.**

Proper vertical alignment of sternpost
Figure 12:K:3



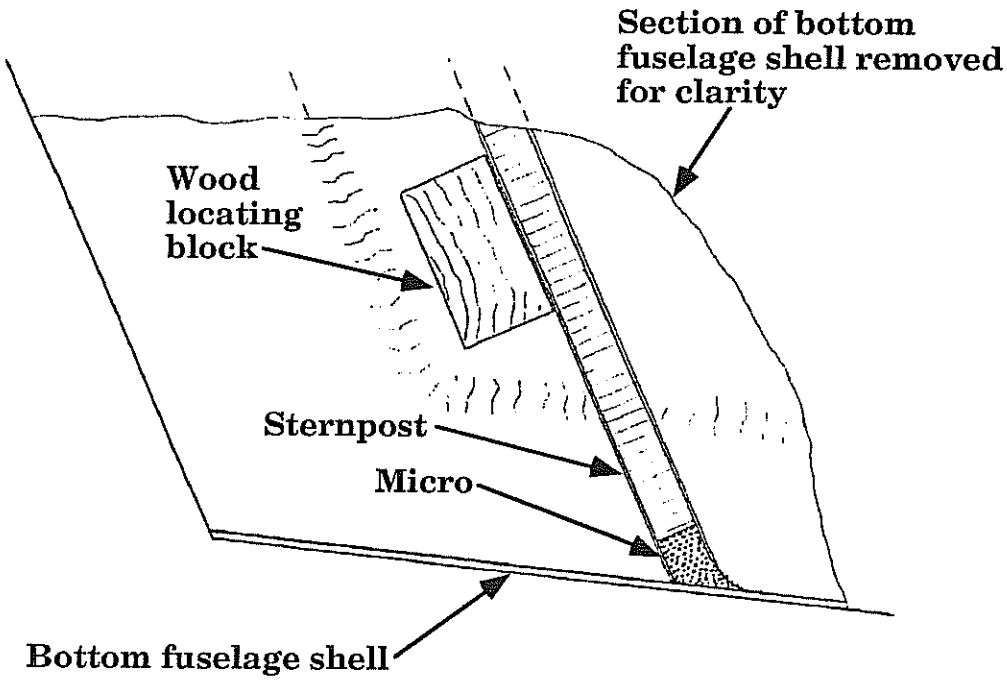
K6. When satisfied with the alignment of the vertical stabilizer sternpost, remove the sternpost and prepare to bond it in position. First, remove 1/8 - 1/4" of core from the edges of the sternpost where it will join the bottom fuselage shell.

K7. With 40 grit, sand the area of the bottom fuselage shell where the sternpost will be located.

K8. Clean all bonding areas with MC.

K9. Mound up a thick epoxy/micro mixture in the trough you formed in the sternpost core. Set the sternpost into position in the fuselage and form a 1/4" radius micro fillet where the sternpost joins the fuselage shell. You will only be able to form the micro radii on the forward side of the sternpost because the wood brace prevents easy access to the aft side. This isn't a problem, you can form the micro radii on the aft side of the sternpost later in construction.

Bonding sternpost in position
Figure 12:K:4

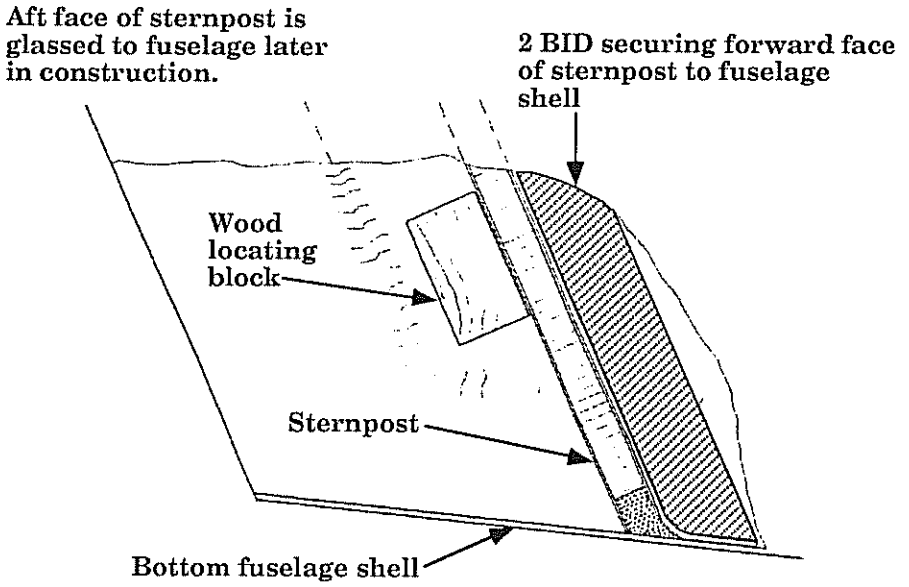


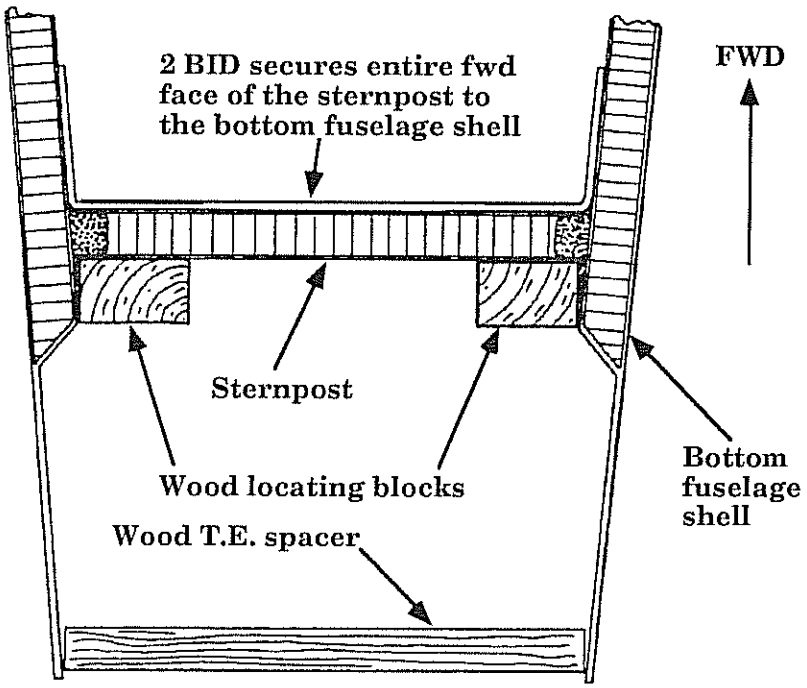
K10. After the micro has cured sand the area of the sternpost and the fuselage shell where BID will be applied to secure the sternpost in position. See Figure 12:K:5. Clean the area with MC.

K11. Secure the sternpost in position with a 2 BID laminate joining the forward face of the sternpost to the inside of the bottom fuselage shell. The 2 BID covers the entire forward face of the sternpost and overlaps at least 1" onto the fuselage sides.

Securing the sternpost with 2 BID

Figure 12:K:5



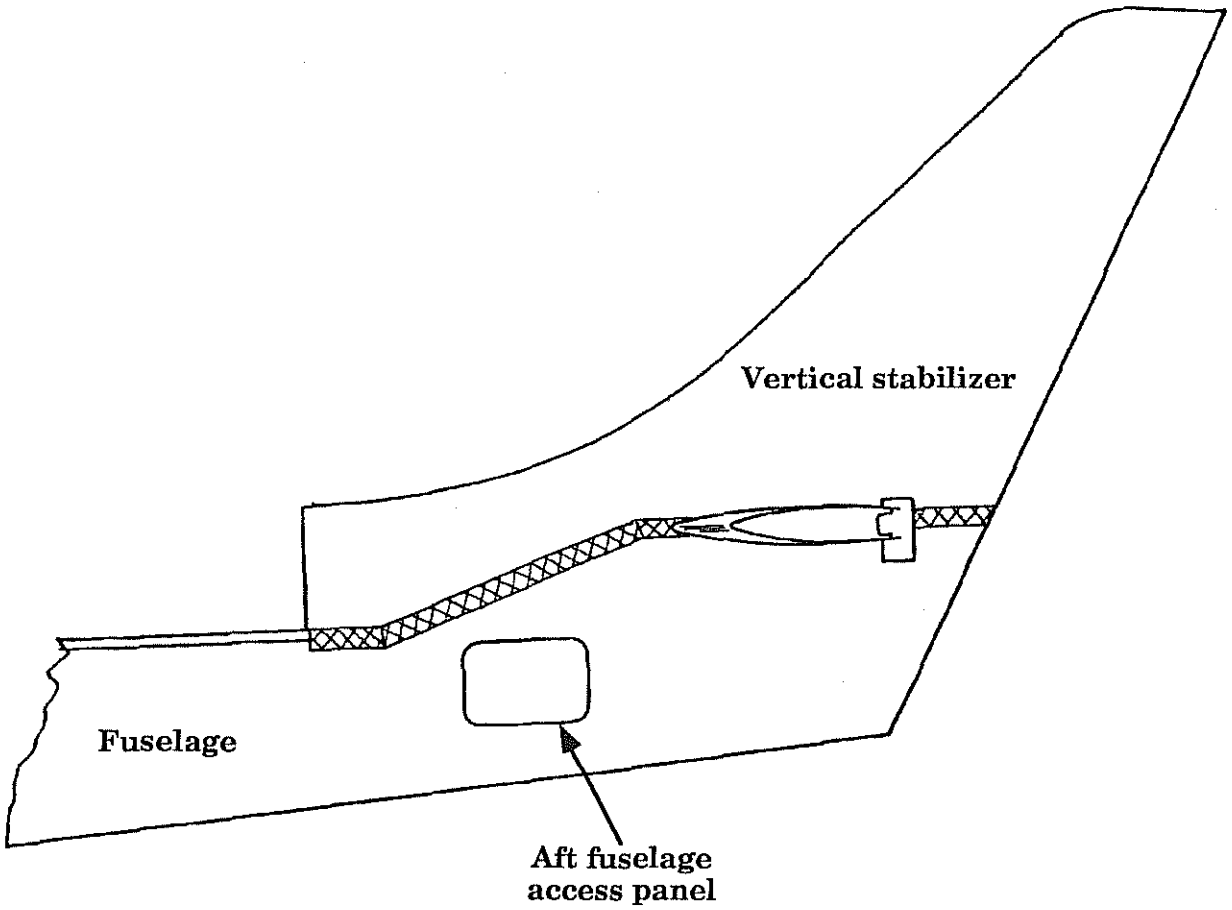


K12. The aft face of the sternpost will be secured to the fuselage sides later in construction. For now, leave the wood brace in position between the fuselage sides.

L. AFT FUSELAGE ACCESS PANEL

The aft fuselage access panel (1005) is premolded from carbon fiber. It provides access to any antennas mounted in the aft section of the fuselage and the fresh air tube.

Aft Fuselage Access Panel
Figure 12:L:1



L1. Trim the edges of the access panel so it will fit in the joggled area of the fuselage. To get a good looking, flush fit of the access panel, do a micro release. Cover the edges of the access panel with release tape, tacke glue the panel in position, and apply a thick epoxy/micro mixture to the fuselage around the perimeter of the panel. When the micro has cured, sand it flush with the access panel.

L2. Secure the access panel to the fuselage with MS24693-S28 screws, K1000-06 nutplates and AN426A3-6 Rivets.

Securing the Access Panel
Figure 12:L:2