

Chapter 20 Interior Panels

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20.1 Introduction

This is a chapter where the homebuilder can truly make their airplane unique. The interior fiberglass panels, hat rack and arm rests can vary considerably from builder to builder since you create each piece. Feel free to customize the look and position of cosmetic assemblies like the floorboards, side panels and arm rests.

Note: The foot rest for the rear seats is no longer included in this manual. Since the fuel lines have been re-routed through the wing fairings, it is not necessary to have a foot rest.

Steps to Completion

- Cut and fit the hat rack pieces and install into the fuselage.
- Cut and fit the arm rest pieces and install into the fuselage.
- Cut and fit the side panel pieces and install into the fuselage.
- Cut and fit the forward floorboard pieces, create the access panels, and install into the fuselage.
- Fit and install the provided fuel line cover.

A Word about Sanding and Cleaning

The instructions in this chapter refer to preparing a surface or preparing a bonding area. When we recommend preparing a surface or a bonding area, we expect each of the following steps to be completed every time.

1. Sand the area using 40-grit sandpaper.
2. Vacuum all sanded areas.
3. Clean all sanded surfaces with Acetone.

20.2 Parts List

Hat rack

Item	Part Number	QTY	Description
1)	1026B-19-90		1/4" thick 2 PPS prepreg for hat rack pieces
2)	K1000-08	2	Nutplates
3)	AN426A3-5	4	Rivets
4)	AN525-832-R7	2	Screws

Arm rests

Item	Part Number	QTY	Description
1)	1026B-19-90		1/4" thick 2 PPS prepreg for arm rest pieces

Side panels

Item	Part Number	QTY	Description
1)	1050A-38-86	1	1/8" thick Divinycell with 1 ply per side for side panel pieces
2)	K1000-08	8	Nutplates
3)	AN426A3-5	16	Rivets
4)	AN525-832-R7	8	Screws

Floorboards

Item	Part Number	QTY	Description
1)	1026B-19-90		1/4" thick 2 PPS prepreg for floorboard pieces
2)	K1000-08	2	Nutplates
3)	AN426A3-5	4	Rivets
4)	AN525-832-R10	2	Screws

Floorboards

Item	Part Number	QTY	Description
5)	<u>K1000-3</u>		<u>Nutplates for floorboard access panels</u>
6)	<u>MS24693-S28</u>		<u>Screws for access panel nutplates.</u>

Fuel line cover

Item	Part Number	QTY	Description
1)	1042	1	Forward tunnel floor
2)	K1000-08	4	Nutplates
3)	AN426A3-5	8	Rivets
4)	AN525-832-R7	4	Screws



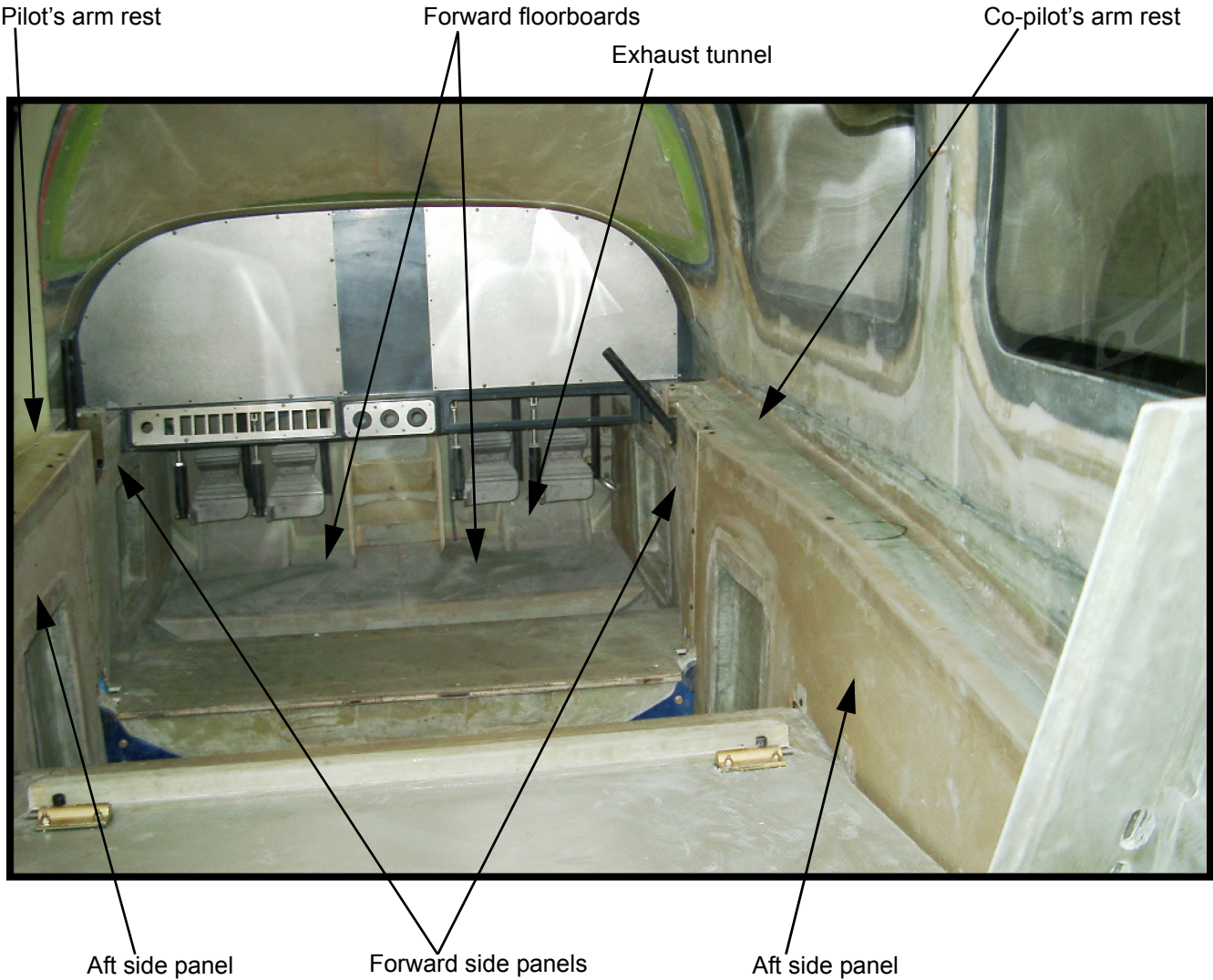
20.3 Construction Procedures

Figure 20.3.0.1 provides an overview of all the interior panels except for the hat rack and the fuel selector cover. All of the pieces in the diagram are made by you, and can be customized to your tastes.

Each piece finishes the following portion of your airplane:

- Hat rack – closes off the tail section from the baggage compartment behind the FS 185 bulkhead.
- Arm rests – extends from the forward aileron torque tube supports to the rear seat back, providing a top cover for the aileron torque tube.
- Side panels – closes of the inside of the fuselage, covering the controls that run along the fuselage wall, including the rudder controls, aileron, brake lines, etc.
- Forward floor panels – covers the fuel lines and the exhaust tunnels (will have an access panel on each side)
- Fuel line cover – covers the fuel lines and the fuel selector.

Figure 20.3.0.1 Overview of interior panels



20.3.A Creating the Hat Rack

To close off the tail section from the baggage compartment, a hat rack is added behind the FS 185 bulkhead. The hat rack is only meant for light objects, partially due to the center of gravity (CG) limitations. There is not a hat rack pattern supplied in your kit so we expect you to make a pattern and fabricate the rack.

Steps...

1. Make a cardboard pattern approximately 10" long and contoured to fit the side of the fuselage.
2. Fit the cardboard pattern.
3. Cut out the 2 PPS prepreg piece using the pattern.
4. Fit the horizontal piece of the hat rack.
Once you have a nice fit, remove 1/8" - 1/4" of core around the perimeter of the piece.
Fill the trough with a thick epoxy/micro mixture.
5. Modify the top of the FS 185 bulkhead by completing the following:
 - Towards the outboard sides remove a 2" x 2" (50 x 50 mm) piece of the aft laminate and core of the bulkhead. Now reinforce these areas with 2-BID extending it 1" (25 mm) onto the original laminate.
 - Along the remainder of the upper edge of the bulkhead, remove 1/8" to 1/4" (3 to 6 mm) of core and fill with a thick epoxy/micro mixture.
6. Install a 2 PPS hat rack mounting flange by butting the flange up against the FS 185 bulkhead and potting it in place with a thick epoxy-micro mixture.
Before you pot it in place, make sure the piece is level. The hat rack will rest on this flange. The flange should be approximately 2" wide and 10" long.

Figure 20.3.A.1 Fuselage cross-section with the hat rack location

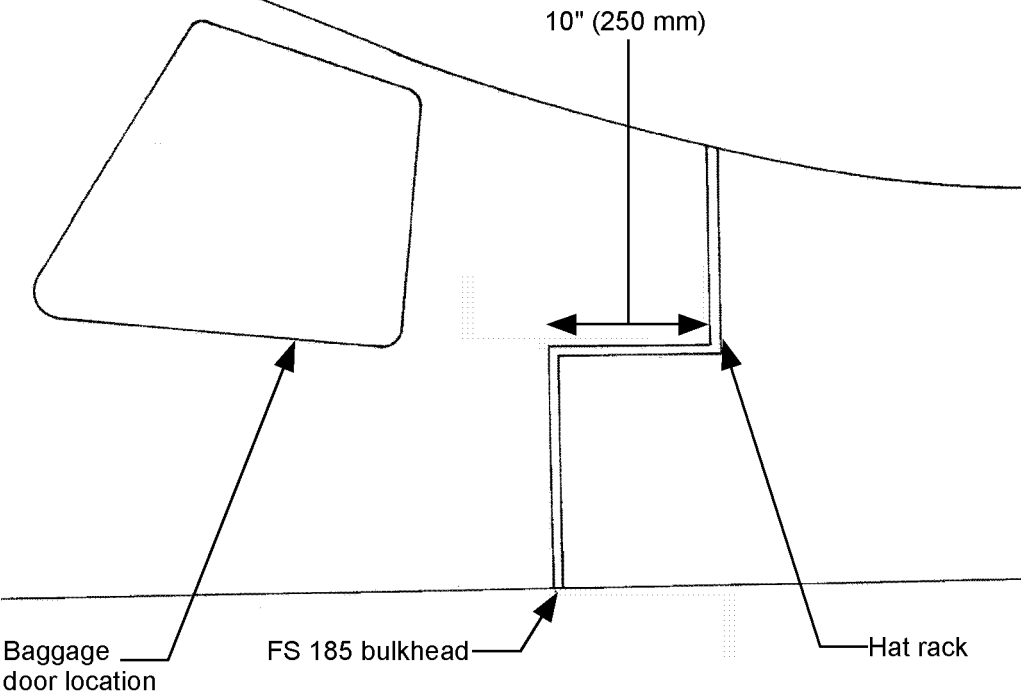
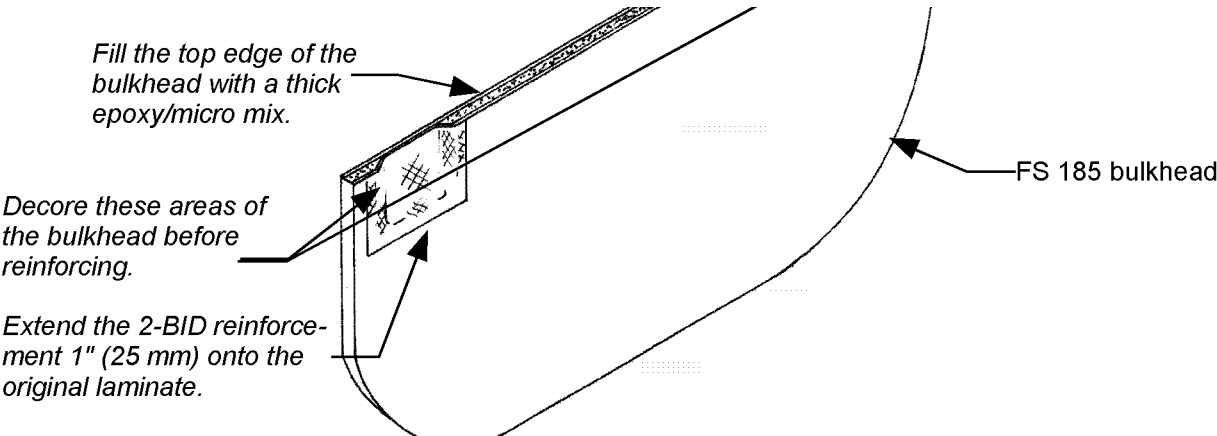
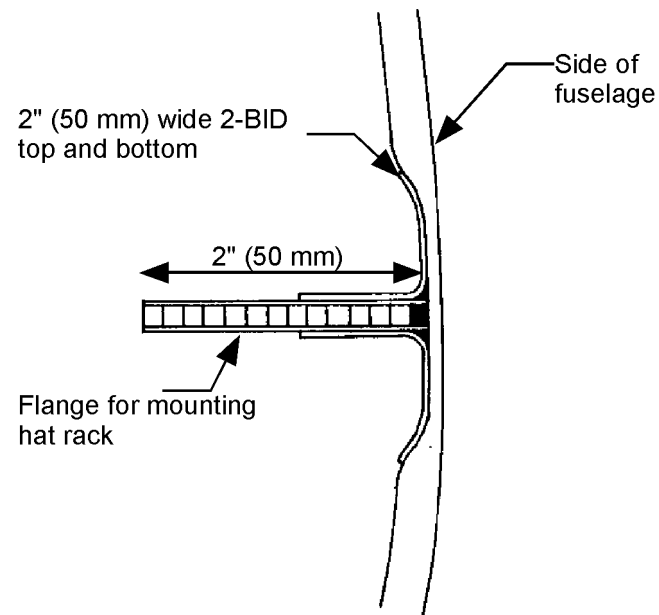


Figure 20.3.A.2 Modifications to the FS 185 bulkhead



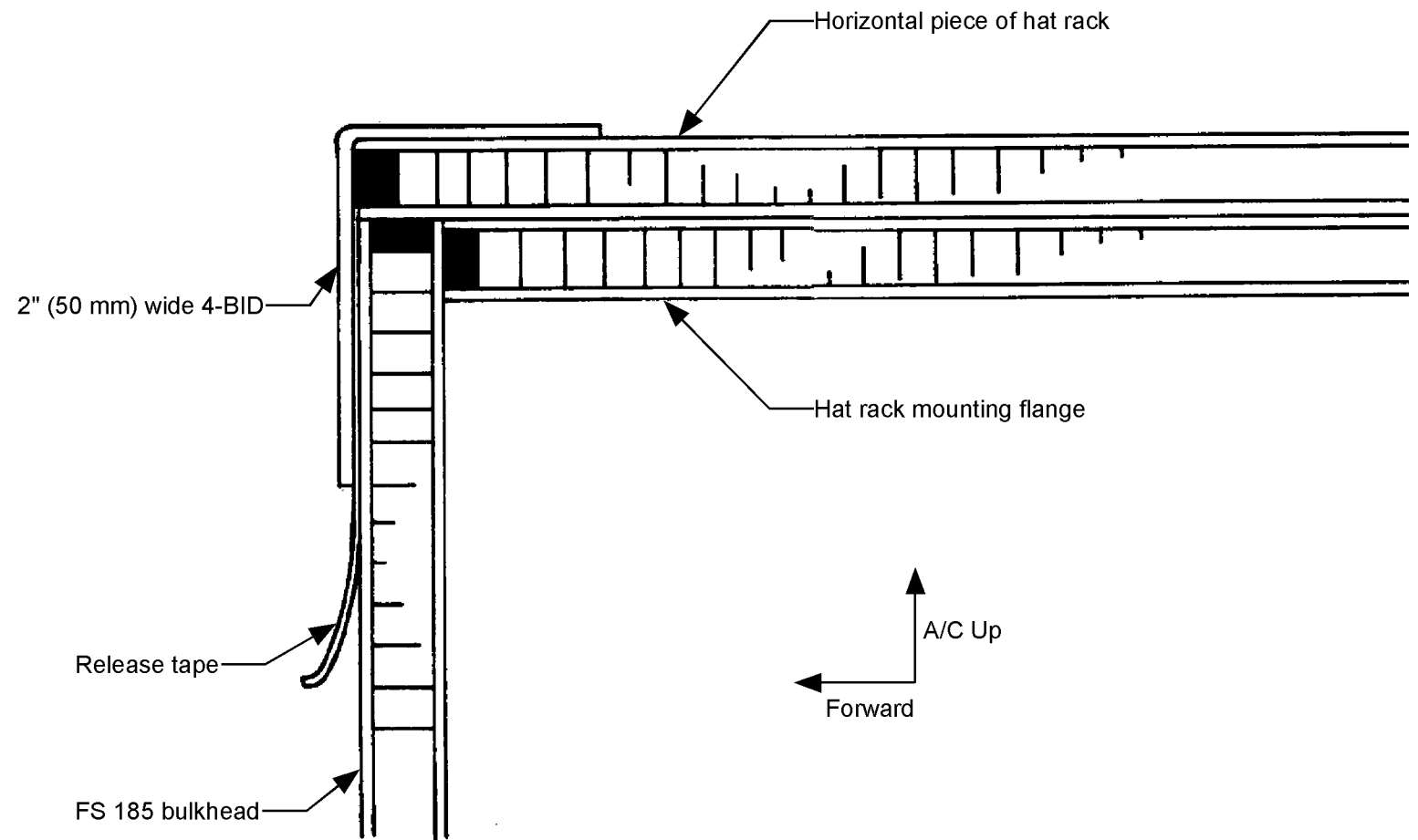
7. Secure the flange with a 2" wide, 2-BID as shown in Figure 20.3.A.3.

Figure 20.3.A.3 Mounting flange for the hat rack



8. Release tape the FS 185 bulkhead before building the next flange
9. Form a 4-BID flange along the forward edge of the hat rack.
10. After it cures, sand the lower edge of the 4-BID flange straight.
11. Drill holes for the rivets by positioning the hat rack's horizontal piece and drill through the 4-BID flange and the reinforced areas at the same time.
12. Install two nutplates (K1000-08) in the FS 185 bulkhead in the two reinforced coreless areas. The nutplates are secured with rivets (AN426A3-5).

Figure 20.3.A.4 Hat rack 4-BID to secure horizontal piece



13. Cut and fit a pattern for the vertical piece of the hat rack.
14. Cut the vertical hat rack piece from 1/4" thick 2 PPS prepreg using the pattern.
15. Cut a notch in the vertical piece for the air duct.
16. Make sure you have a nice fit for the vertical piece and then remove 1/8" - 1/4" of the core around the perimeter of the piece.
17. Fill the perimeter with a thick epoxy/micro mixture.
18. Pot the vertical piece of the hat rack on the aft end of the horizontal piece of the hat rack.
19. Secure the two pieces of the hat rack with a 3-BID on the forward and aft side as shown.
20. Make a vertical piece support by cutting the piece from 2 PPS prepreg.
This small support will support the hat rack.
21. Remove 1/8" to 1/4" (3-6 mm) of core around the perimeter of the piece.
22. Micro the piece in place directly aft of the hat rack and reinforce each side with 2" wide 2-BID. The support may be installed on either side of the air duct. Fill the remainder of the exposed core with an epoxy/micro mixture.

Figure 20.3.A.5 Hat rack aft support

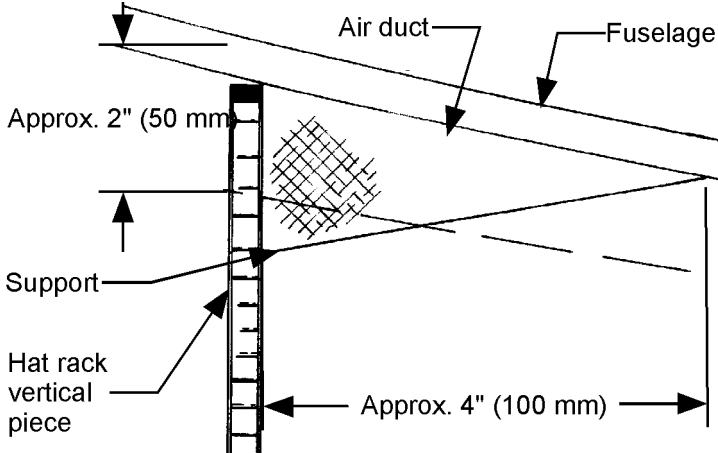
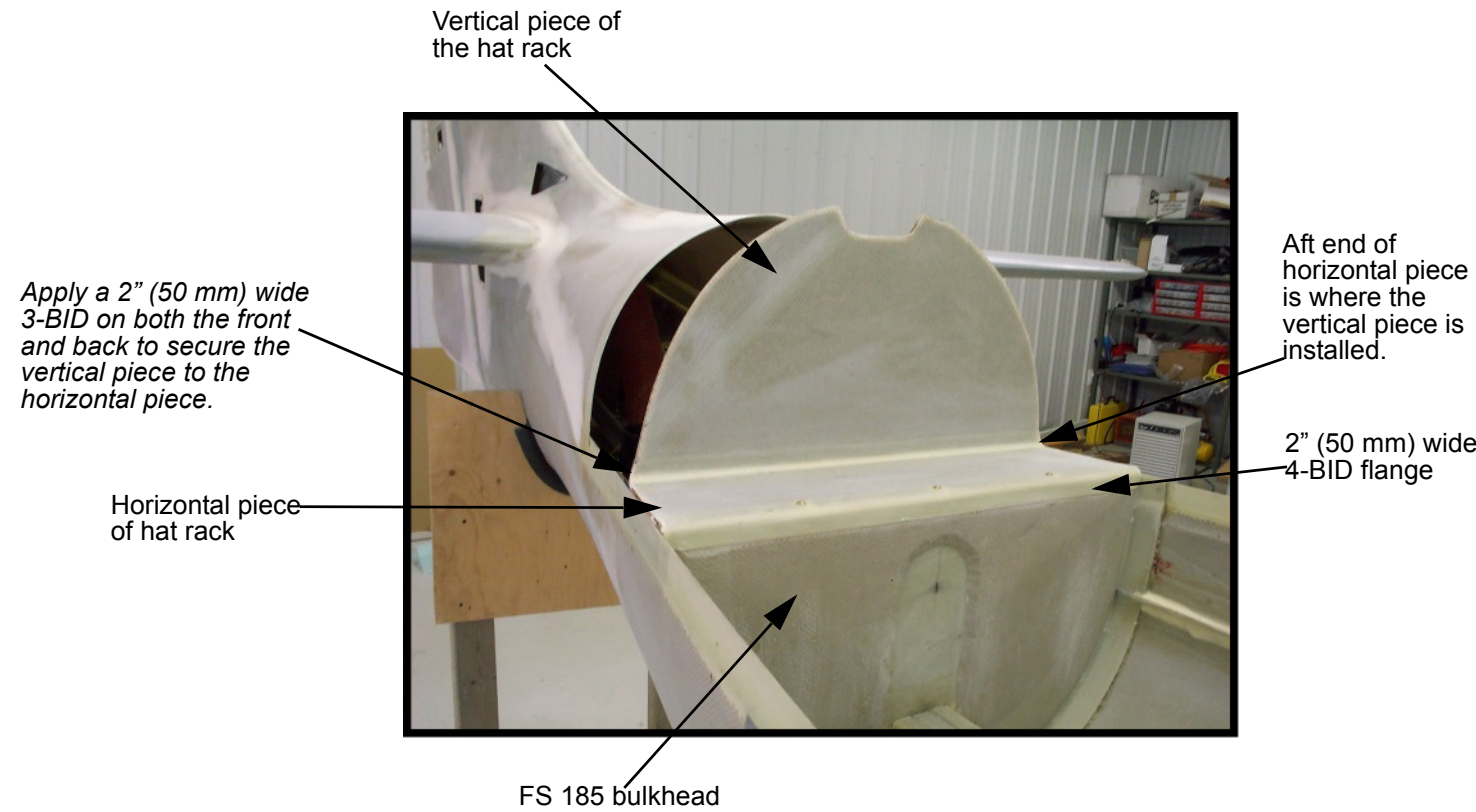


Figure 20.3.A.6 Completed hat rack



20.3.B Making and Installing the Arm Rests

The Lancair ES arm rests extend from the forward aileron torque tube supports to the rear seat back. On the right side of the cockpit the arm rest is one piece. On the left side the arm rest is divided by the door frame which also serves as an arm rest.

Steps...

1. Cut the three pieces for the two arm rests from a 2-BID, 1/4" thick prepreg panel. The arm rests will be approximately 4" (100 mm) wide on the forward edge and 2 1/2" (62 mm) on the aft edge. The arm rests expand in width from the seat back to the aileron torque tube supports.

The pieces are:

- one long arm rest piece for the right side of the cockpit
- two shorter arm rest pieces 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.

2. Trim the shear web supports and aileron torque tube supports as required to form a straight base for the arm rest.
3. Fit the arm rests at the locations shown in Figure 20.3.B.1 and Figure 20.3.B.2.

Fitting tips:

- Notch the arm rests to accommodate the full range of the control stick travel.
- The arm rests extend all the way to the rear seat back.
- The arm rests do not extend forward as far forward as the instrument panel in case the instrument panel needs to be removed.
- Extend the arm rests up to the forward support for the aileron torque tube.

Figure 20.3.B.1 Right arm rest

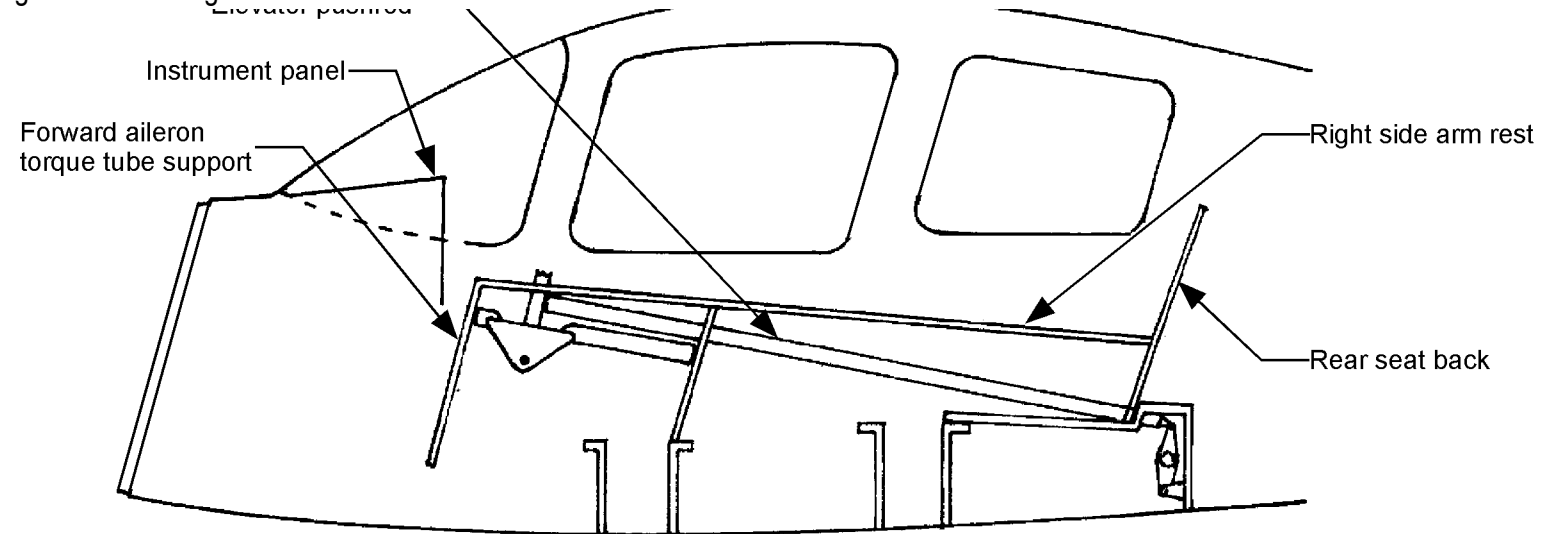
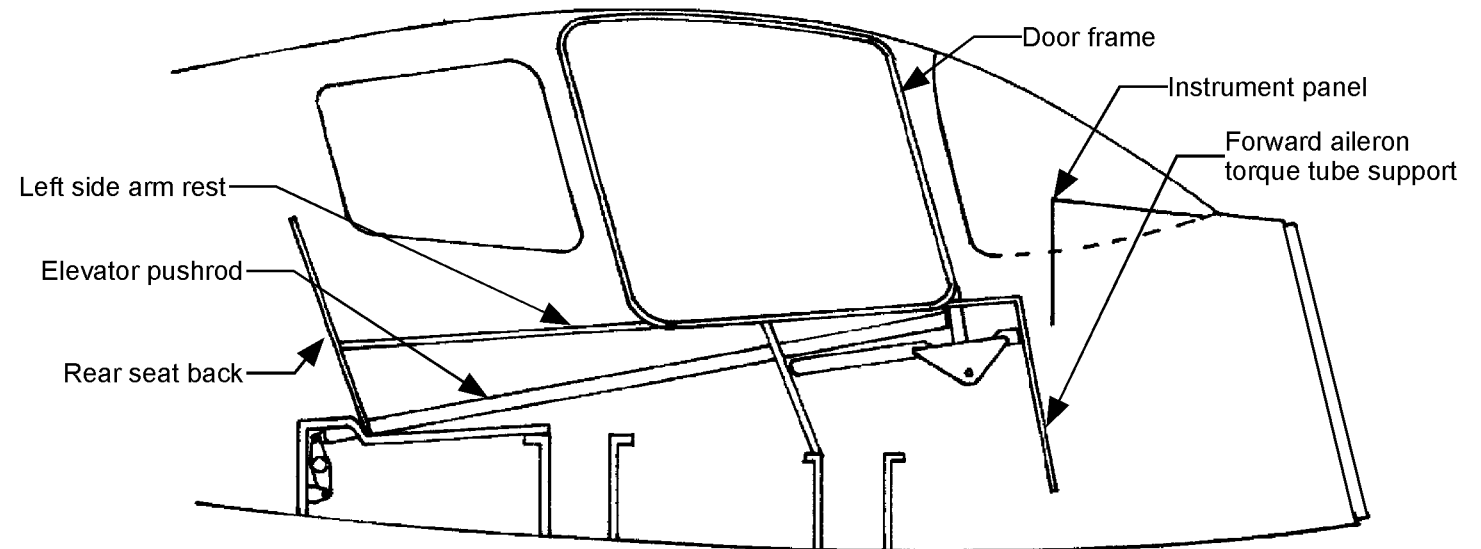


Figure 20.3.B.2 Left arm rest



4. Remove the normal 1/8" - 1/4" (3-6 mm) deep trough of core material from the edges of the arm rests in preparation for bonding.
5. Sand and clean the fuselage sides where the arm rests will be located.
6. Remove 1/8" - 1/4" (3-6 mm) of core material from the top edge of the bulkhead supports, the shear panel supports and the torque tube support.
7. Remove the bottom laminate and core of the arm rests along the inboard 1" (25 mm). Refer to Figure 20.3.B.4.
8. Reinforce the inboard edges of the arm rests with 2-BID, overlapping onto the original bottom surface by 1" (25 mm) as shown in Figure 20.3.B.4. This will provide a coreless edge on the arm rests for later mounting of the side panels.
9. Use a thick epoxy/micro mixture to bond the arm rests to the sides of the fuselage.
The left side arm rest pieces will also be bonded to the door frame.
10. Secure the arm rests to the fuselage sides with 2" (50 mm) wide, 2-BID laminates in the following locations:
 - On the top and bottom,
 - to the bulkhead,
 - to the shear panel supports,
 - and the forward torque tube support.

Figure 20.3.B.3 Fitting the right arm rest – top view

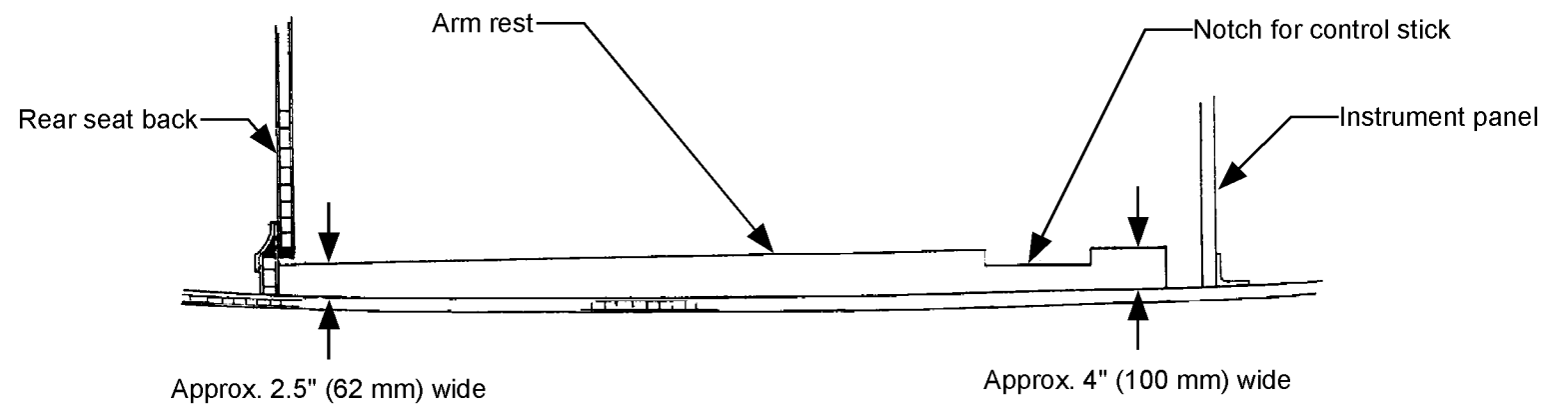
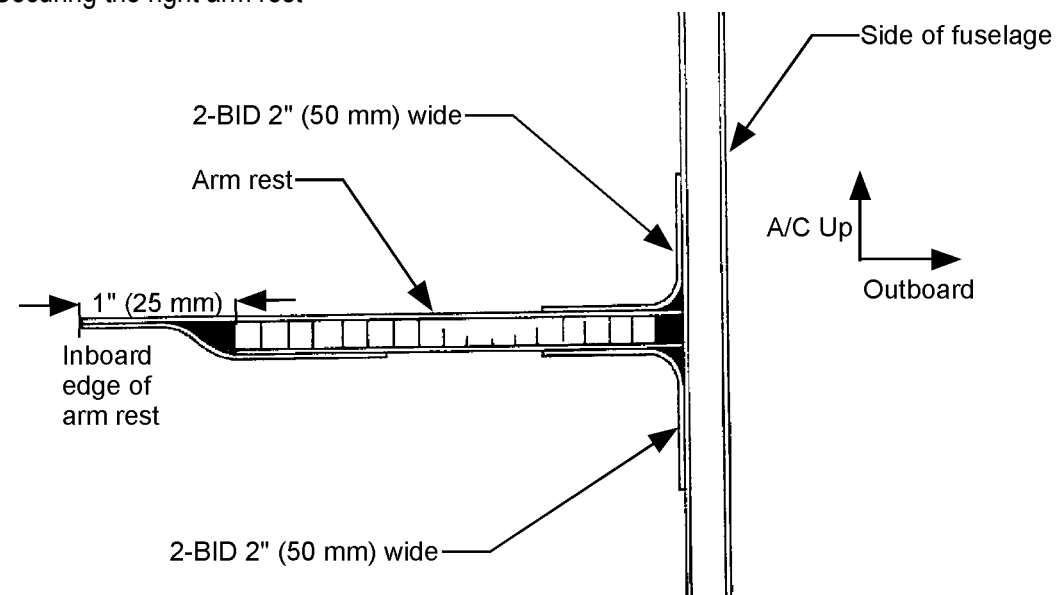


Figure 20.3.B.4 Securing the right arm rest



20.3.C Making and Installing the Side Panels

The side panels are made from 1/8" thick Divinycell with 1-ply per side. This is not a honeycomb core but instead 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.

With so many dimensions and custom shapes, we cannot give you a specific size for each panel. Instead this section and the diagrams provide general information for installing the side panels.

Steps...

1. Using Figure 20.3.C.1 you will see the general shape of the forward side panel with reference points as general guidelines. Cut and fit templates for your side panels using cardboard.
2. Transfer the templates to the Divinycell panel and cut them out.
3. Trim both side panels to fit.

Notice that the forward side panels fit snugly up against the instrument panel but the arm rests do not. This allows the side panels to be removed in case the instrument panel must be removed. Since the arm rests are fixed in place they were set back from the instrument panel. The square hole behind the instrument panel and forward portion of the arm rest will be covered with a removable upholstered cushion.

Figure 20.3.C.1 Forward side panel layout

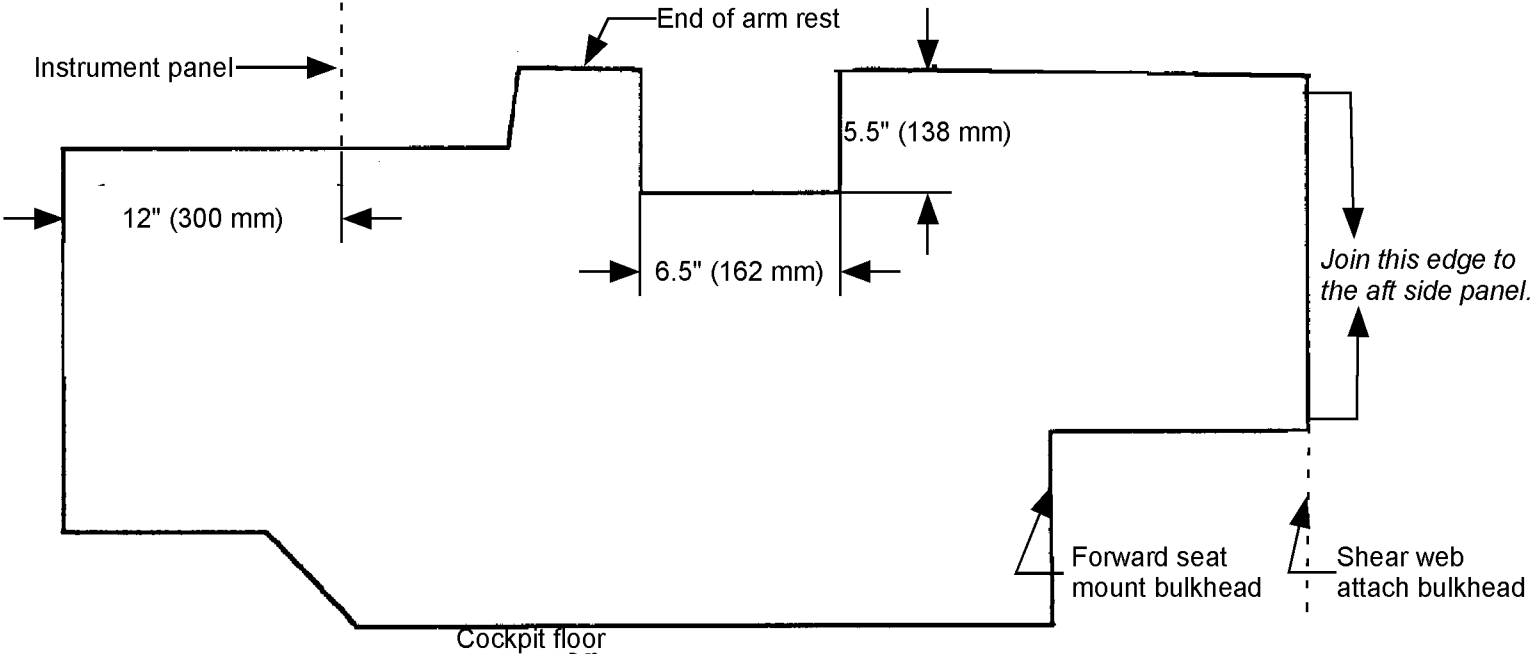
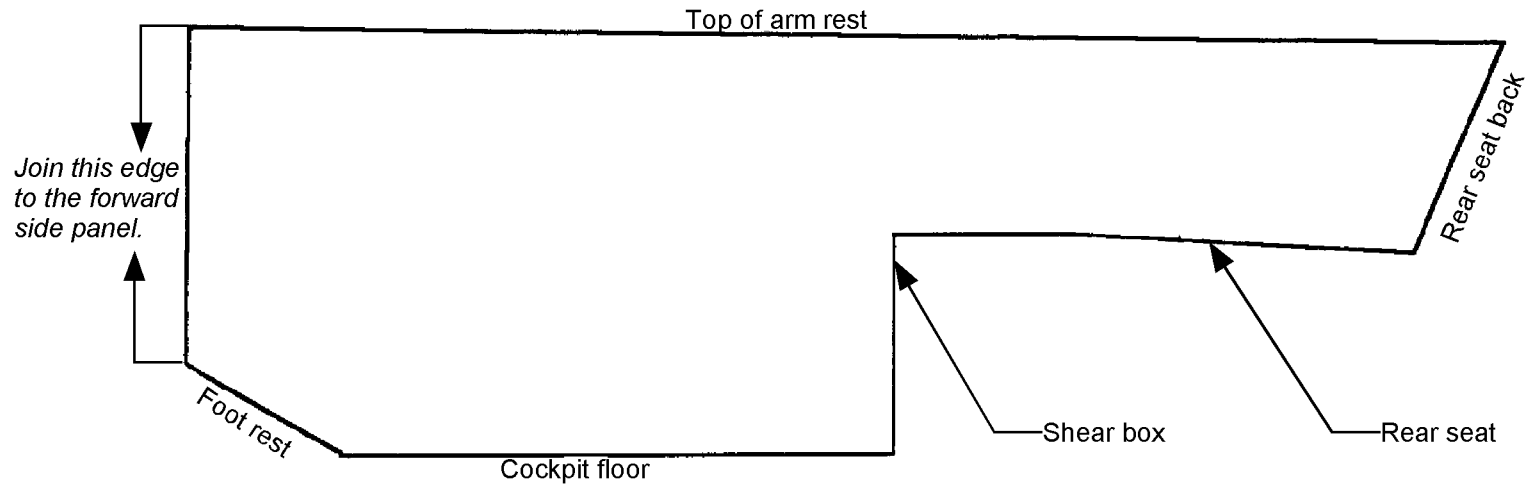


Figure 20.3.C.2 Aft side panel layout

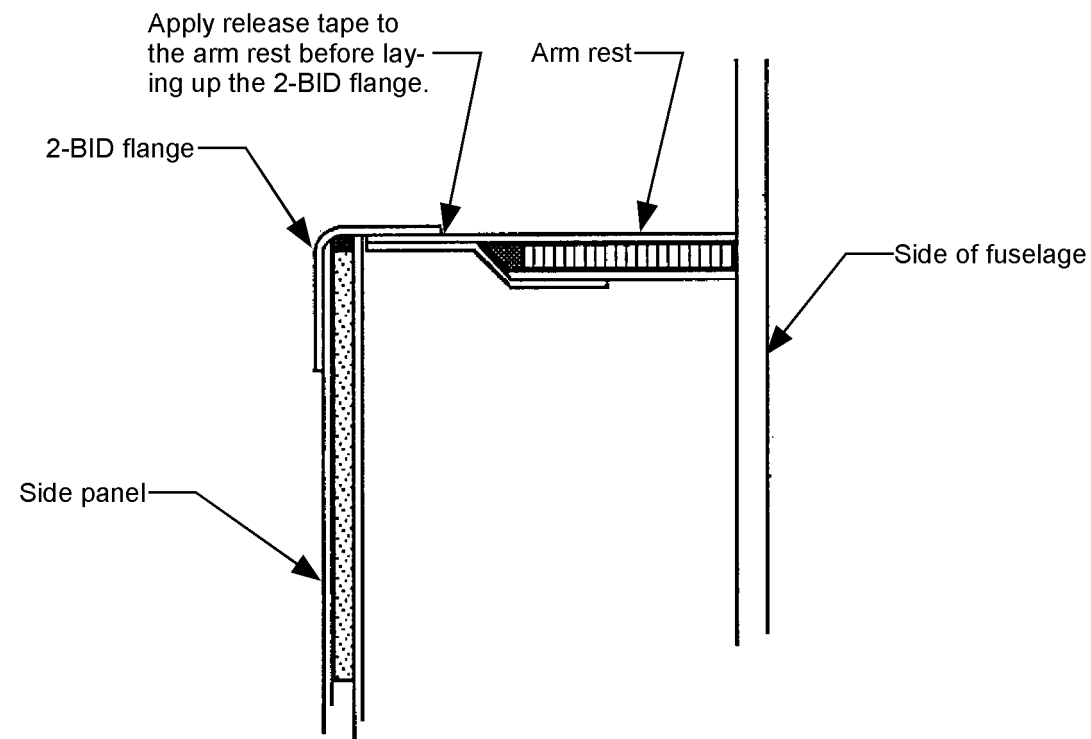


4. Apply release tape to the tops of the arm rests along the inboard two inches.
5. Use instant glue to tack glue the side panels in position.
6. Sand and clean the areas where the BID is applied to the side panels.
7. Apply a 2-BID, 2" (50 mm) wide laminate to the top edge of each side panel, overlapping onto the arm rests 1" (25 mm).

Steps after cure...

1. Remove the arm rests and trim the flange edges straight.
2. Prepare the attach point locations for securing the side panels to the inside of the fuselage.

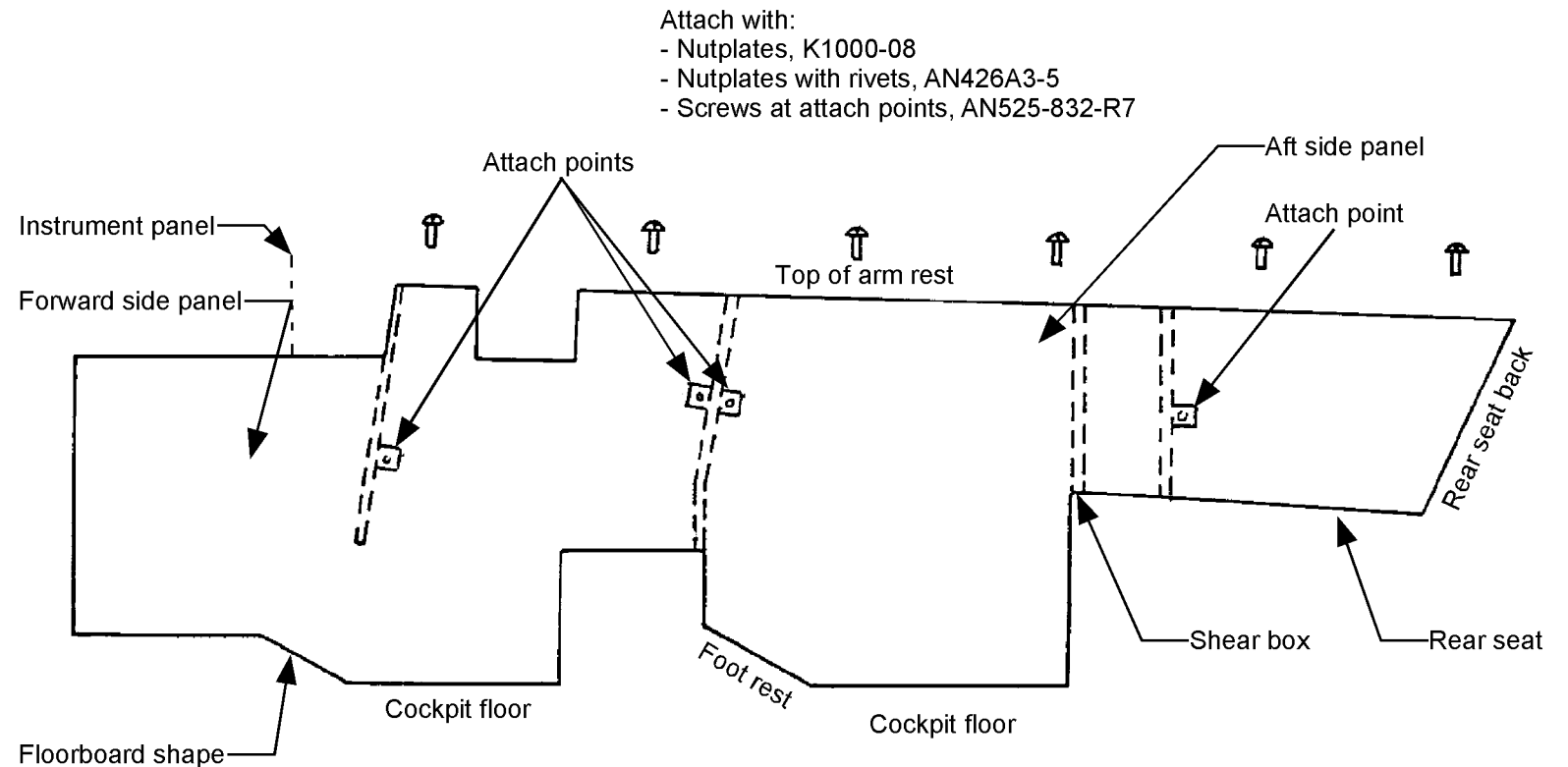
Figure 20.3.C.3 2-BID flange from side panel and over arm rest



There are any number of locations where the side panels can be secured. Here are some suggestions:

- Bond a fiberglass mounting flange (like a capstrip) to the bulkhead support as an attach point for the forward side panel.
 - Bond a flange to the outboard surface of the forward side panel, sticking out 1" (25 mm) behind the aft edge. Use this flange to secure the aft side panel.
 - Bond a fiberglass mounting flange (like a capstrip) to the aft shear web support and the aft seat flange as an attach point for the aft side panel.
3. Secure the nutplates, K1000-08, to the bottom surface of the arm rests using rivets, AN426A3-5.
 4. 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.
 5. Reinforce the areas of the divinycell panels where you will drill for the attachment screws by inserting a small piece of 2-BID.
This will spread the loads out and prevent crushing of the divinycell.
 6. Secure the side panels to the arm rests and the attach points using screws, AN525-832-R7.

Figure 20.3.C.4 Attach points for the forward and aft side panels



20.3.D Forward Floorboards

The pilot and copilot's feet rest on a raised floorboard. The floorboard also covers the exhaust tunnels and fuel lines which would otherwise be exposed and could be stepped on. The floorboard is split in the middle to make two pieces. ~~The pilot's side of the floorboard is secured permanently to the fuselage, but the copilot's floorboard must be removable for access to the fuel lines. Both floorboard pieces have an access panel.~~

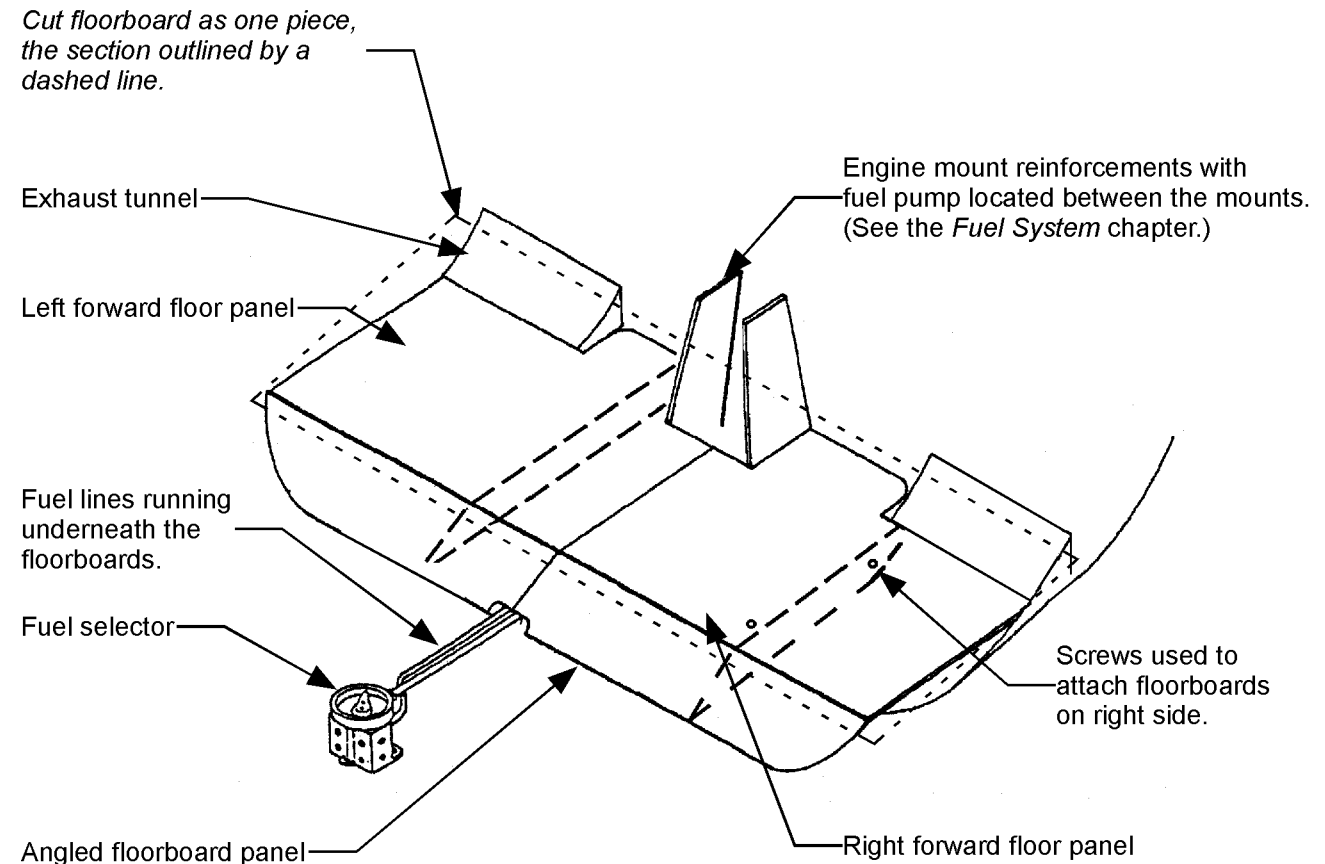
The floorboard is not a structural member and can be fitted higher, lower, or further aft than shown in this section. The dimensions provided in this section can be altered so the floorboard is customized to your airplane.

Steps...

1. Cut and fit the floorboard pieces from 2-ply per side prepreg as shown in Figure 20.3.D.1.
The floorboard pieces are:
 - The larger, flat piece outlined with a dashed line in Figure 20.3.D.1.
 - The narrower, angled piece aft of the larger, flat piece.
2. Secure the angled aft section of the floorboards to the forward sections with 2-BID, 2" (50 mm) wide laminates on the top and bottom.
3. Split the floorboard in the center.
4. Rout out 1/8" - 1/4" (3 to 6 mm) of core material along the inboard edges of the left and right floorboards.
5. Fill the trough with a thick epoxy/micro mixture.

After the floorboards are bonded in place, make a 5" x 5" (125 mm x 125 mm) access panel in each side for access to the fuel lines. Use nutplates (K1000-3) and screws (MS24693-S28) to secure the access panels.

Figure 20.3.D.1 Forward floorboards for pilot and copilot sides



6. Release tape the co-pilot's side of the floorboard (bottom inboard 2" (50 mm)).
7. Form a 3" (75 mm) wide 3-BID flange, splitting it evenly on the left and right floorboards.
8. Install two nutplates, K1000-08, nutplates in the 3-BID flange by drilling through the flange and the co-pilot's side floorboard. Secure the nutplates with rivets AN426A3-5.
9. Form hardpoints around each screw location by replacing the core material with a micro/flox mixture.

Adding Vertical Supports

A vertical support is desirable under both floorboards for added strength. We recommend the following locations for the supports:

- Co-pilot's side support – towards the inboard edge of the exhaust tunnel.
- Pilot's side support – approx. 4" (100 mm) to the left of the fuselage center line.

Steps...

1. Cut out and fit each supports from 2-ply per side prepreg.
2. Bond the floorboard supports to the exhaust tunnel and the fuselage bottom with a thick epoxy/micro mixture.
3. Reinforce this bond with 1-BID, 2" (50 mm) laminates on both sides of the supports.

Note: Mounting screw locations are not critical.

4. Fit a capstrip to the floorboard support, on the copilot's side only.
5. Secure two nutplates to the co-pilot's side. This allows the removal of the copilot's floorboard.

Figure 20.3.D.2 3-BID flange for the forward floorboards

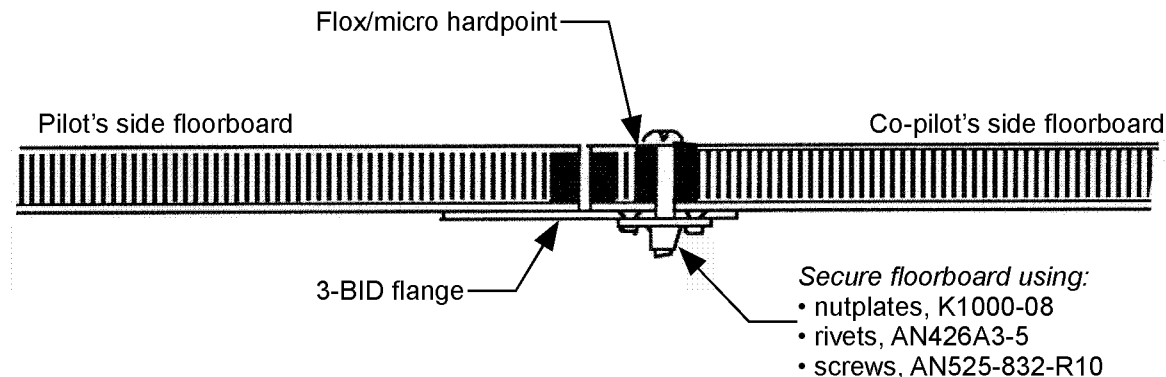
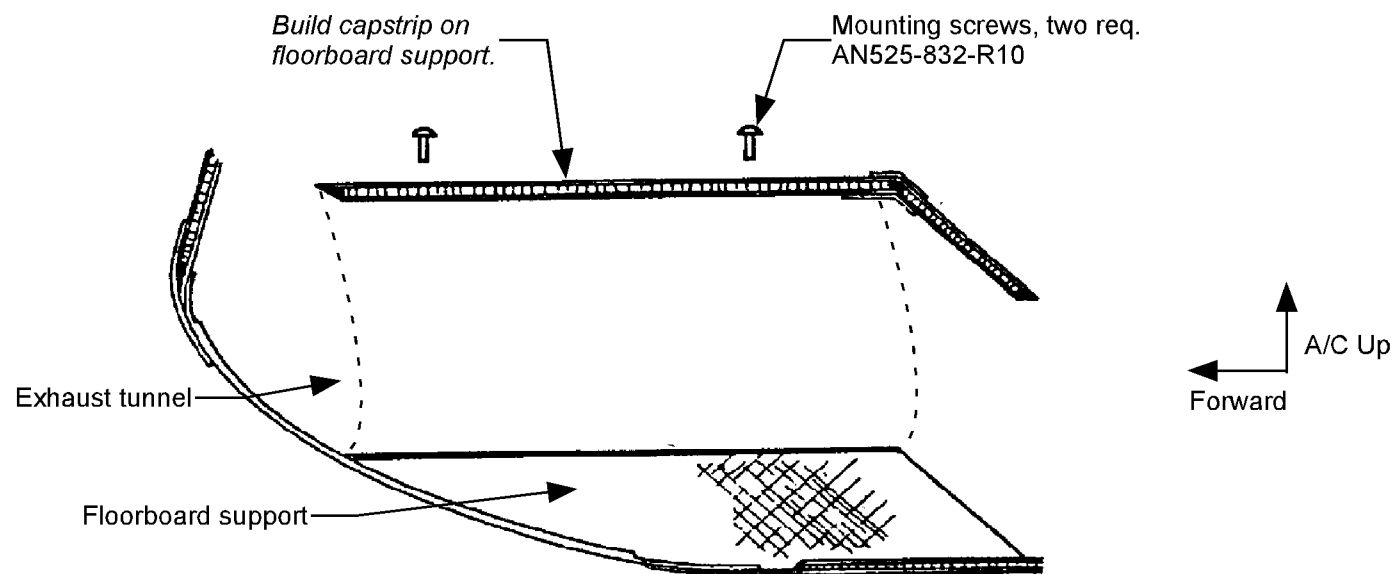


Figure 20.3.D.3 Floorboard support with capstrip

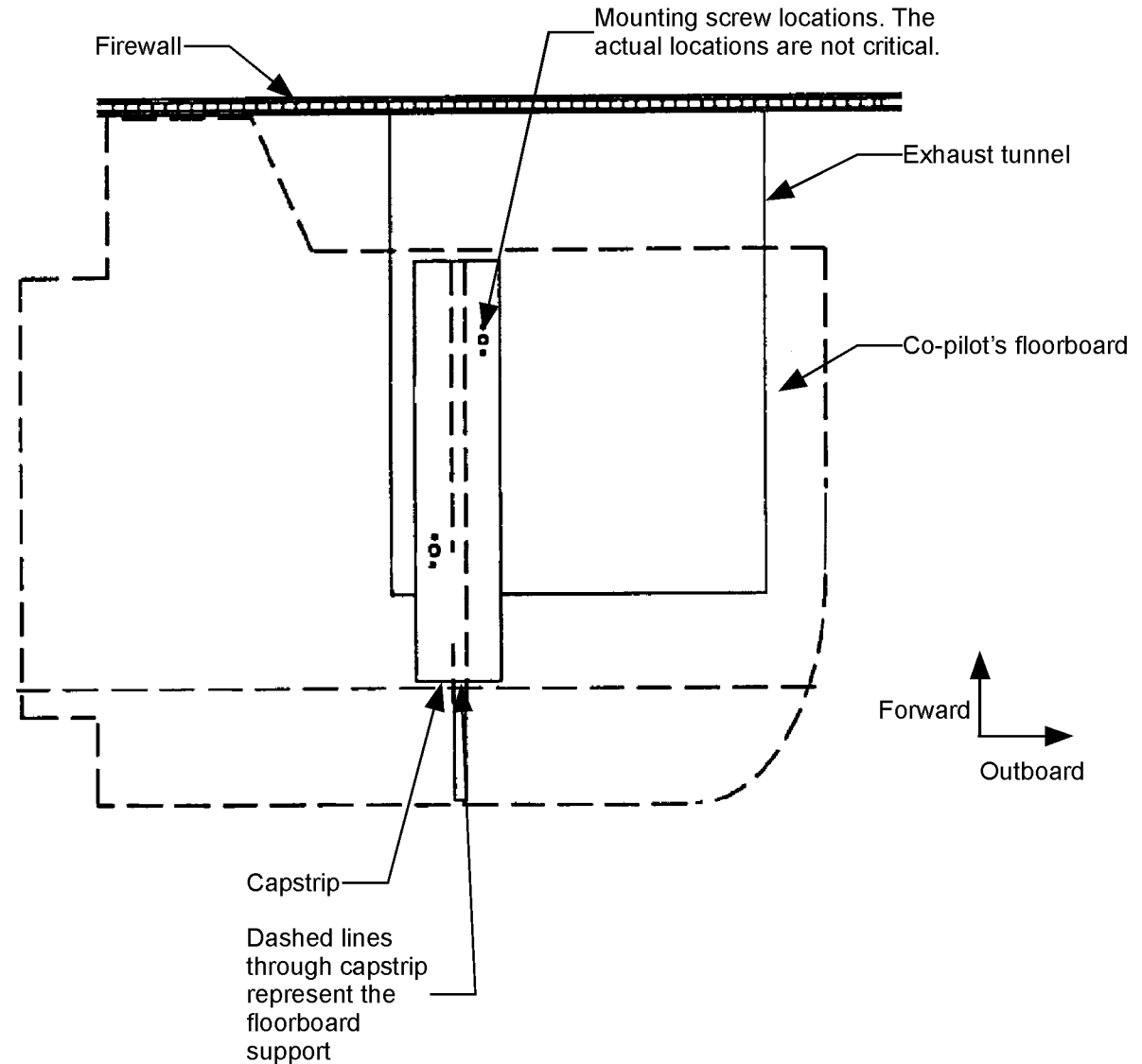


6. Apply release tape to the underside of the copilot's floorboard and lay up a 2" (50 mm) wide, 2-BID capstrip centered on the vertical support.
7. Mound up thick micro in the top edge of the floorboard support and place the floorboard in position.
8. Pop the floorboard loose when the capstrip has cured.
9. Secure the capstrip to the floorboard support with a 1-BID, 2" (50 mm) wide laminates on both sides of the support.
10. Drill two #20 holes through the copilot's floorboard and the capstrip for the screws, AN525-832-R10.
11. Secure two nutplates, K1000-08, to the bottom side of the capstrip at the locations you just drilled. Use rivets, AN426A3-5, to secure the nutplates.
12. Form hardpoints for the mounting screws by removing the core around the holes and replacing it with epoxy/micro.
13. Redrill the screw holes after the micro has cured.
14. Do a micro release between the copilot's floorboard and the surrounding surfaces to achieve the best fit along the curved edges of the floorboards using the following guidelines:
 - Apply release tape to the surfaces where the copilot's floorboard makes contact.
 - Next fill the edges of the floorboard with a thick micro mixture.
 - Position the floorboard and let the micro cure.

Note: This is not required on the pilot's floorboard because it is permanently microed in place.
15. Clean up the excess micro from the copilot's floorboard and secure it in position with the screws, AN525-832-R10.
16. Bond the pilot's side floorboard in position with a thick micro mixture. Reinforce this bond with 2-BID, 2" (50 mm) wide laminate.

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

Figure 20.3.D.4 Installed support and floorboards



20.3.E Installing the Fuel Line Cover

The fuel line cover is installed between the front seats and forward so it covers the fuel lines and the fuel selector valve which run along the center of the floor. The fuel line cover is premolded plastic.

Steps...

1. Trim the white plastic cover (1042) to fit between the forward seat mount and the floorboard.
Be careful when trimming the tunnel around the fuel selector valve to get a nice snug fit.
2. Use a 4-BID flange to secure the fuel line cover to 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.

Note: The fuel line cover will not support the weight of somebody stepping on it. You may want to install a small support internally to strengthen the cover.

3. Secure the nutplates (K1000-08) to the flange with rivets (AN426A3-5).
4. Secure the forward tunnel with four screws (AN525-832-R7) screws, two per side.
The exact locations of these screws is not critical.

Figure 20.3.E.1 Forward tunnel floor cover installed over the fuel lines and fuel selector

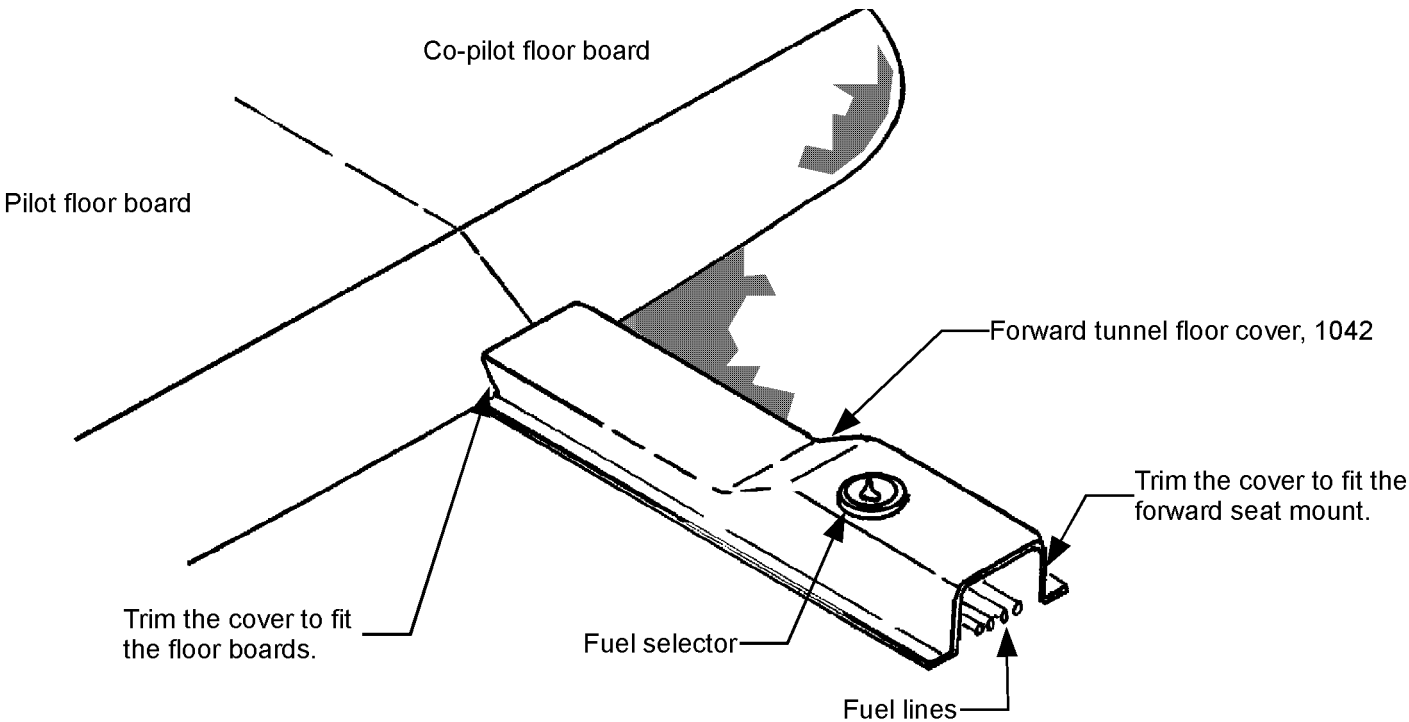


Figure 20.3.E.2 Anchoring the tunnel floor cover

