

Chapter 6 Closing out the Fuselage and Installing the Door

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6.1 Introduction

Installing the cabin door requires one person inside the fuselage and a second person on the outside. The installation starts with a thorough pre-fit with just the doorframe and next with both the doorframe and door. This process requires the door assembly to be installed and removed several times, depending on the amount of trimming required to obtain a satisfactory fit. Do not trim any more than is necessary.

After the pre-fit is completed, the door assembly is prepared for bonding. All the bolts, spacers and shims are replaced and the epoxy/flox is applied.

Steps to Completion

- Remove the door from the doorframe.
- Pre-fit the doorframe to the fuselage and trim as necessary.
- Fit the door into the doorframe and adjust the fit.
- Insert bolts, spacers and shims as needed.
- Open and close the door to verify that it works smoothly and does not bind.
- Bond the door assembly in place using the same bolts, spacers and shims.

Before You Start

We recommend that you body work the bottom fuselage shell before putting it in its jig. The top and bottom fuselage must be pre-fit and clecoed together.

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.

6.2 Parts List

Blueprints needed for this chapter include:

- A-301 – Fuselage cradle blueprint
- B-302 – Fuselage cradle blueprin
- 3540 – Door latch

Fuselage

Item	Part Number	QTY	Description
1)	2001	1	Fuselage top
2)	2002	1	Fuselage bottom

Door – D-OPTION-ES

Item	Part Number	QTY	Description
1)	D-OPTION-ES	1	Door kit
2)	SF14-1651	1	Seal-inflatable pressurized door
3)	SF14-1704	1	Seal-extrusion 144” pressurized door
4)	SWS-951	1	RTV silicone pressure door

Overhead console/air ducts

Item	Part Number	QTY	Description
1)	1039-1	1	Overhead console
2)	301-08	2	Aluminum inserts
3)	6-32		Screws
4)	K1000-06		Nutplates
5)	Rubber or plastic hose	3” dia. hose	

Door lock (available options)

Item	Part Number	QTY	Description
1)	DL-01		Door lock with removable key
2)	DL-02		Door lock with non-removable key
3)	DLT-01		Tab door lock

Supplies

We also recommend that you have the following supplies on hand before starting this chapter.

- both slow Jeffco and fast Jeffco epoxy
- tongue depressors
- packing and duct tape
- refillable caulking tubes are available from West Marine Supply at www.westmarine.com.



6.3 Construction Procedures

6.3.A Building the Fuselage Cradles

There are three cradles necessary to hold the bottom fuselage shell in position. Templates for these cradles are provided on blueprints A-301 and A-302.

It is your choice what height you use to mount the fuselage. We suggest mounting the fuselage at a comfortable working height and then raise it later for gear installation. The stands are built purposefully tall so you can raise or lower the fuselage for ease of construction. It is a good idea to build a step for getting in and out of the fuselage.

In this chapter you will level the fuselage in the jig. You should always check that the fuselage is still level prior to installing the horizontal stabilizer, wings, landing gear, etc.

Terminology

You'll be dealing with some new terms while building the fuselage.

Fuselage Stations (FS) Most of the parts in the fuselage are located using fuselage stations for fore and aft measuring. This distance is measured with respect to datum line FS 0. FS 0 is 51-1/4" forward of the dimple on the underside of the fuselage.

Water Lines (WL) These are used for height measurements.

Make sure you are familiar with these terms as practically every part built into the fuselage is located from a WL or FS location.

Tip: If the metric dimension is not provided, simply multiply the FS by 25.4 to get dimensions in metric millimeters (mm).

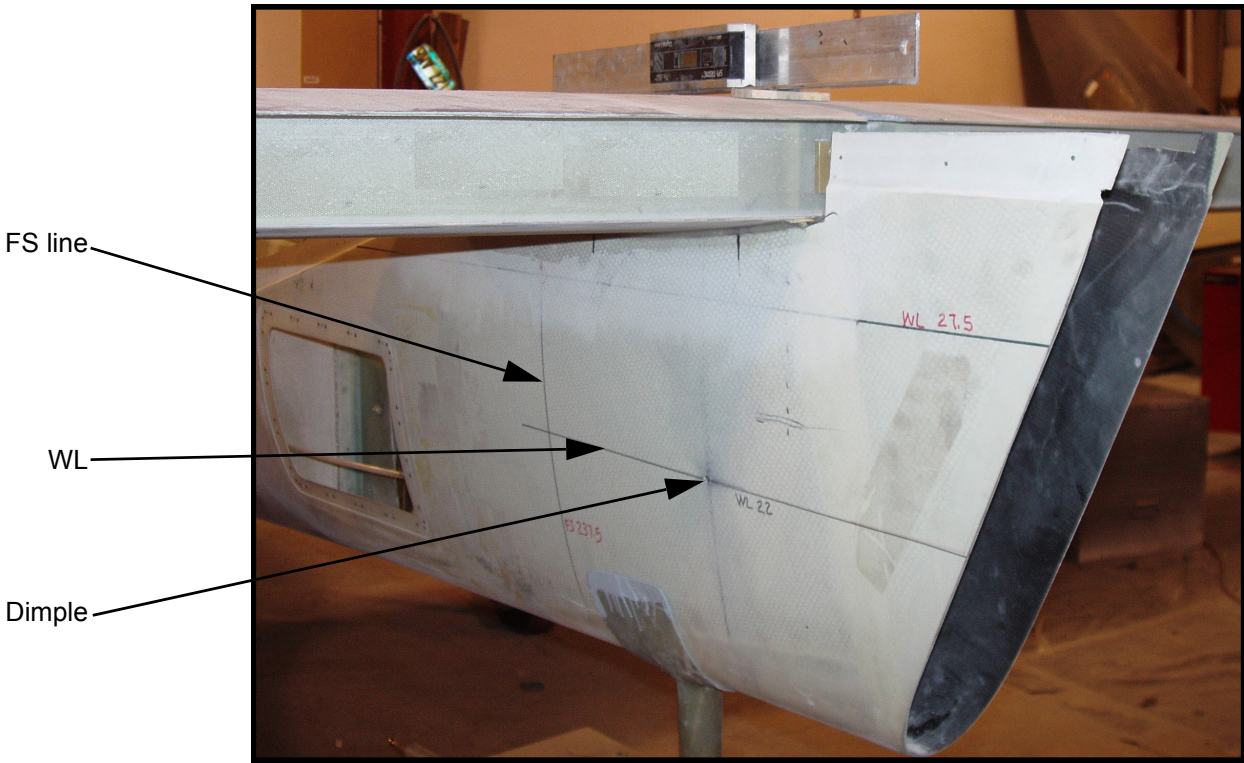
Positioning the Cradles

Now you need to decide where to put your fuselage during construction. We recommend that you do not move your fuselage after it is aligned in the cradles. Pick an area where you can work on all sides of the fuselage, keeping in mind the additional space required for the engine mount and the vertical stabilizer assembly.

The bottom fuselage shell is positioned in the two cradles by using the six alignment dimples molded into the fuselage. Four dimples are molded into the left and right fuselage sides, two just behind the firewall and two at FS 244.

Two more dimples are molded into the bottom of the fuselage at the center line (one forward and one aft).

Figure 6.3.A.1 Example of alignment dimple location and FS and WL lines on the bottom fuselage



6.3.B Aligning the Bottom Fuselage to a Center Line

Steps...

1. Draw a 22' (6.7 meters) long center line mark on your shop floor at the location you have selected for working on the fuselage.
A carpenter's chalk line is best for making a straight line.
2. Draw lines perpendicular to the center line at FS points:
 - 51.25" (1.3 m) – location of dimple on the underside of the fuselage.
 - 114.65" (2.91 m) – location of the forward face of the wing spar.
 - 185" (4.7 m) – location of the baggage bulkhead.
 - 237.5" (6 m) – location of the aft bulkhead.
3. Confirm that your lines are perpendicular.
4. Clamp the forward and aft fuselage cradles to their respective supports. For now, position the bottom of the forward cradle about 27-1/8" (690 mm) above the floor and the bottom of the aft cradle about 38-3/4" (985 mm) above the floor.
These heights are rough dimensions at this time, you will adjust the cradles to their final position in the next few steps.
5. Place the forward fuselage cradle and support over FS 74 and align it with the center line on your shop floor. Align the aft cradle and support over FS 232.5.
The center line marks on the cradles are okay to use in this step for the initial placement of the cradles. You will adjust these cradles again in the next few steps after the fuselage is placed in position.
6. Set the bottom fuselage shell in the cradles.
7. Use a plumb bob to align the forward center line dimple of the fuselage over the FS 51.25 mark on your shop floor. You can drill a 1/8" (3 mm) hole through each center line dimple and hang a plumb bob from a string.

- The aft fuselage center line dimple should also be aligned to the floor center line. Adjust the cradles left or right as necessary to properly center the fuselage.
8. Custom fit the cradles to fit the curve of the fuselage.
Apply release tape to the bottom surface of the fuselage, where it rests on the cradles, and apply Bondo to the top of the cradles. Set the fuselage down into the wet Bondo on the cradles and the Bondo will dry to form perfect support surfaces for the fuselage.
 9. Realign the fuselage to the floor center line and continue with the leveling process.

Figure 6.3.B.1 Center line and FS line pattern for your shop floor

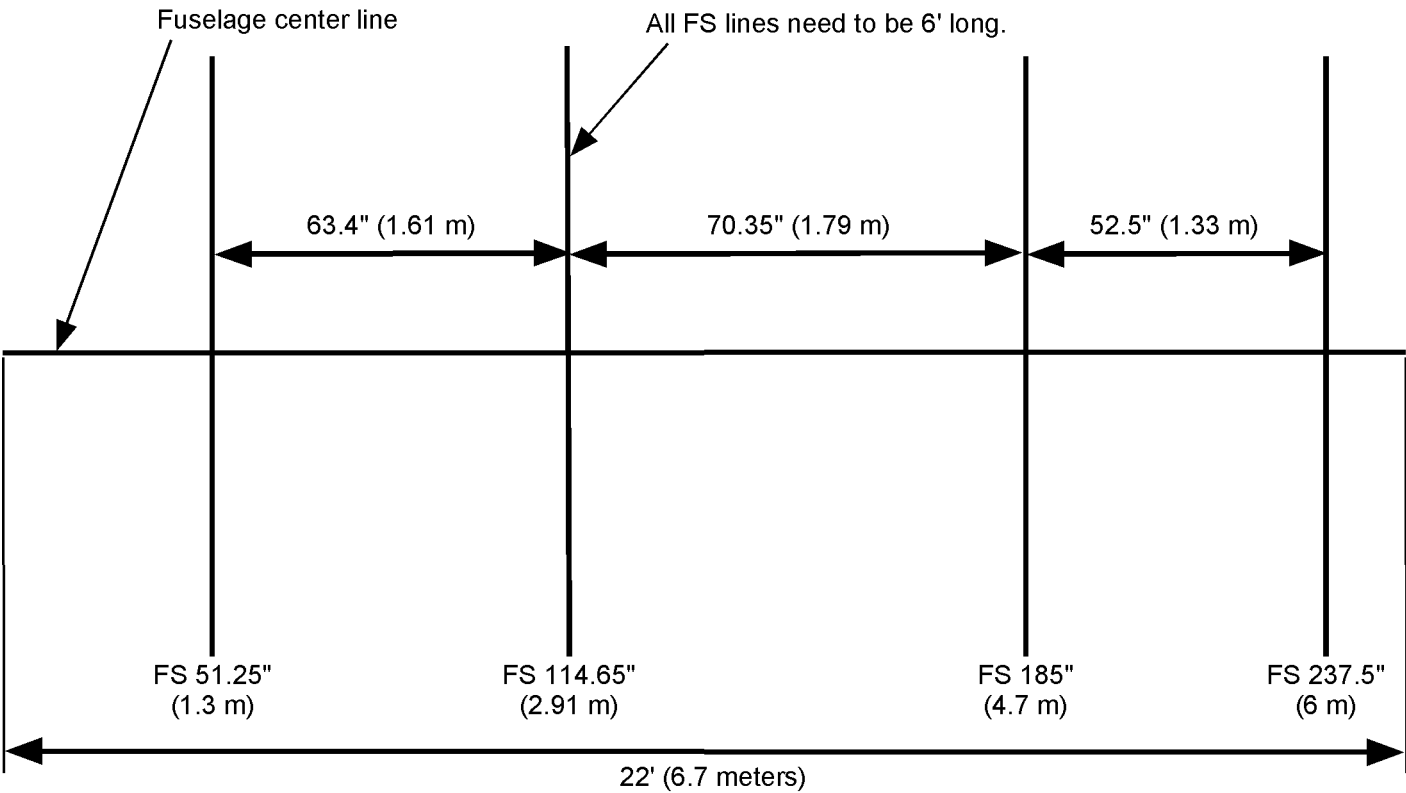
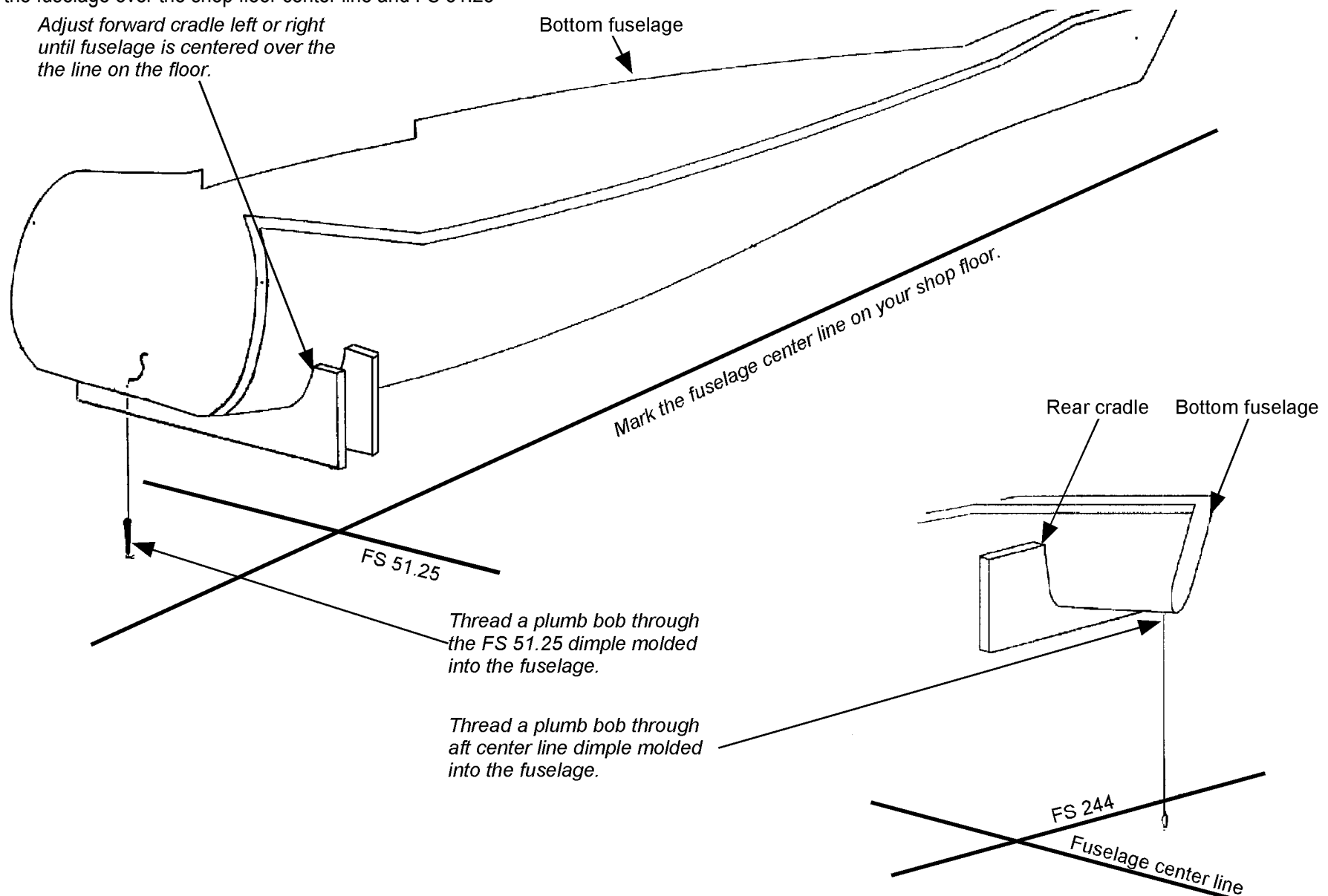


Figure 6.3.B.2 Aligning the fuselage over the shop floor center line and FS 51.25



6.3.C Setting the Bottom Fuselage to Level

Now you will level the bottom fuselage shell on the pitch and roll axis using the dimples molded into the fuselage sides and the hole near the back on the fuselage side. A good water level or a transit are the best tools for this job.

After marking an accurate center line in 6.3.B *Aligning the Bottom Fuselage to a Center Line* on page 6.4, complete the following steps.

Steps...

1. Select one of the forward dimples (i.e. forward left) and level it using a water level
2. Level the hole near the back of the fuselage side to the level dimple by adjusting the cradles.

When you adjust the cradles to align the hole and dimple, go back and recheck the original dimple to make sure it has not moved.

When the holes and side dimples are level with each other, and the two center line dimples are plumb over the floor center line, your fuselage should be in the correct position.

Note: An error of +/- 1/4" (6 mm) is acceptable when leveling the fuselage. The airplane wouldn't even feel this small of a deviation. It is not necessary to get the fuselage alignment to within a thousandth of an inch.

3. Secure the cradles to their supports with a couple of wood screws when you are satisfied that your fuselage is level and aligned with the center line.
4. Apply a few drops of Bondo to secure the cradle supports to your shop floor so you won't accidentally kick the supports and cause a misalignment.

Figure 6.3.C.1 Leveling the fuselage



6.3.D Pre-fitting the Top and Bottom Fuselage Shells



This section contains the pre-fit instructions for closing the top and bottom fuselage shells.

Trimming the Joggle

The top fuselage joggle, where the top and bottom fit together, needs to be marked with a trimline and then trimmed before the two fuselage pieces are assembled.

Steps...

1. Rest the fuselage top on sawhorses and mark the top's joggle with a trimline, working in the following order:
 - Start at the lower front corner of the door and make a mark 1-7/8" below the scribe line. There should be very little to trim at this location.
 - Continue the trimline between the door and the firewall at 1-7/8" below the scribe line.
 - Make a trimline mark 1-7/8" below the scribeline on the fuselage top at the firewall joggle.
 - Connect the trimline marks by continuing around the fuselage top.
2. Trim the fuselage top between the door and firewall. Continue to trim using your trimline that follows the measurements in Figure 6.3.D.1.
3. Set the top fuselage in position on the bottom fuselage. It should fit in the joggle all the way around.

It is a good idea to practice closing the fuselage and pretending that the adhesive has been applied. If you just drop the fuselage top in place, you will have a problem with the adhesive being scraped off. Practice lowering the fuselage top in place by slightly pulling the sides out so the joggles will make direct contact. Make sure you have enough help to accomplish this successfully.

Figure 6.3.D.1 Pre-fitting the top and bottom fuselage shells

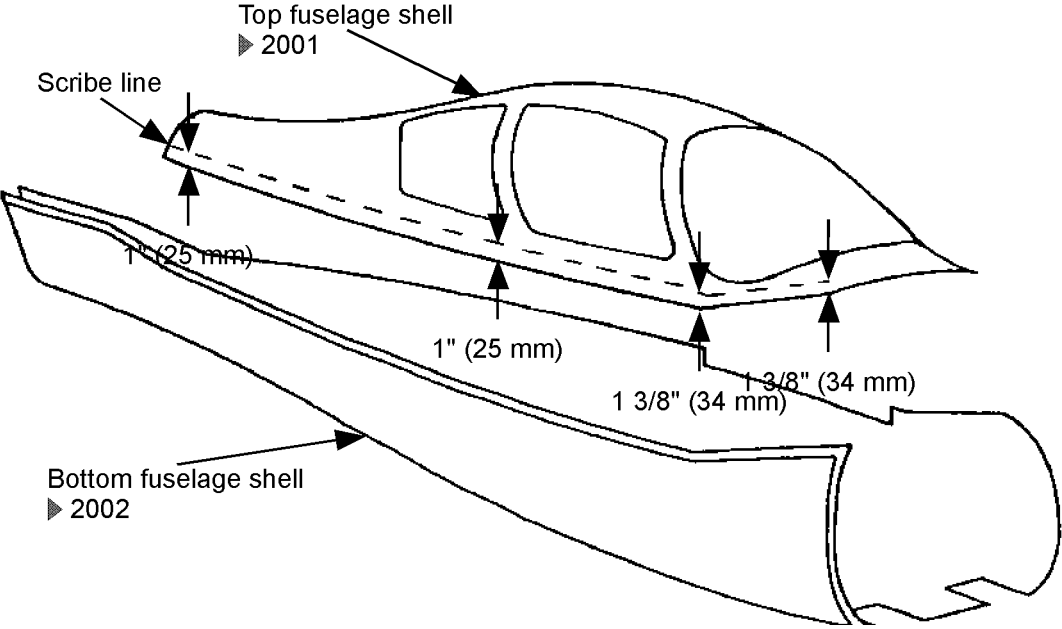
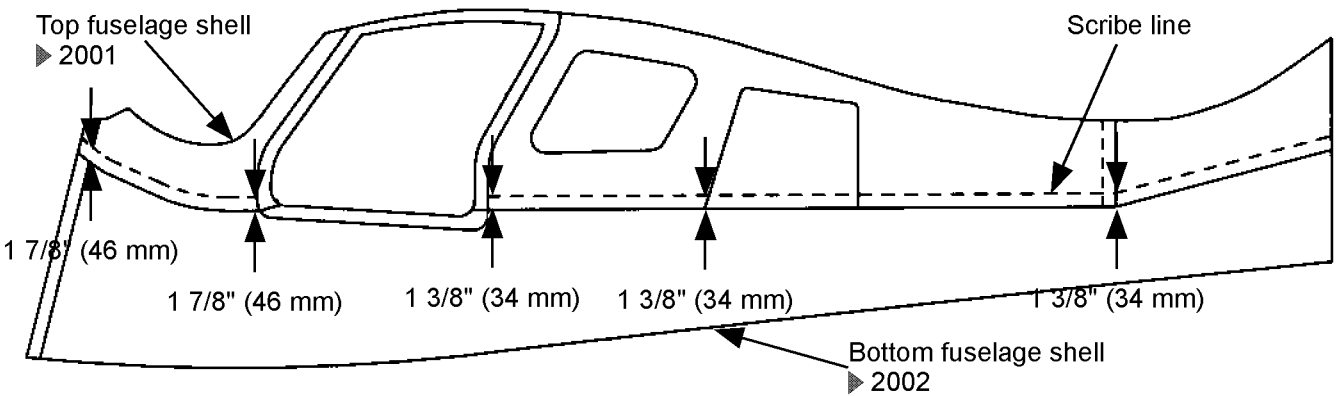
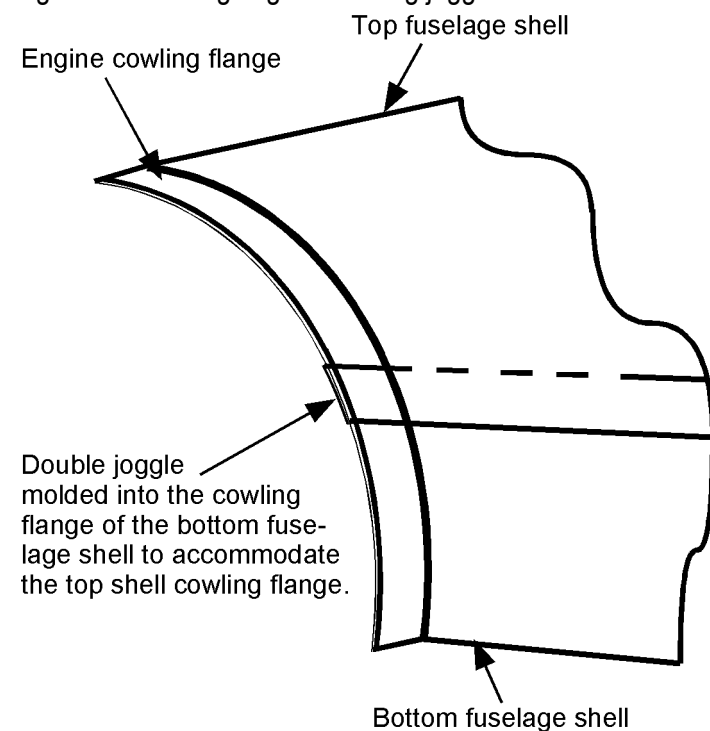


Figure 6.3.D.2 Trim line measurements for the top fuselage joggle



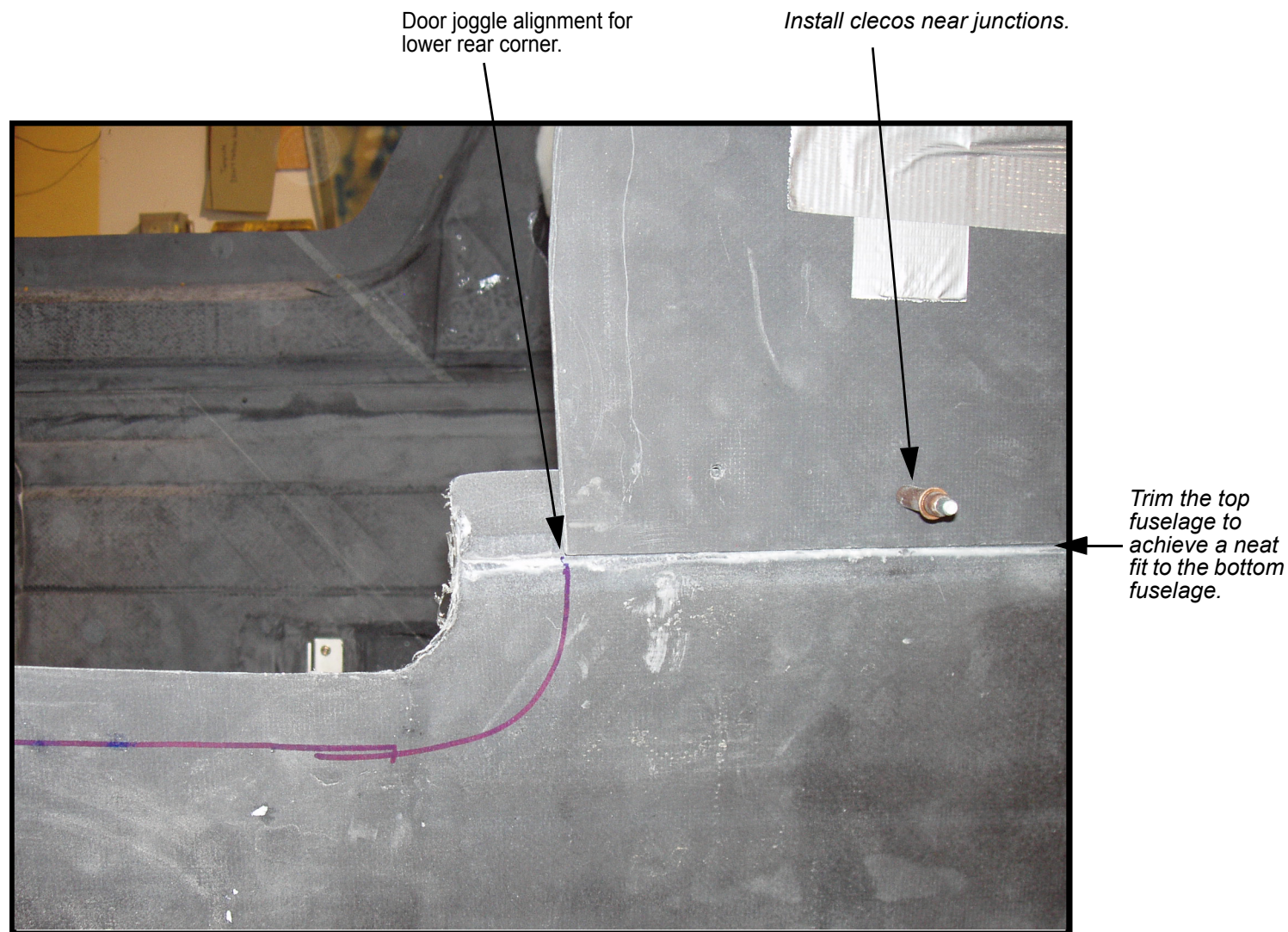
4. Align the forward corner of the door where the top and bottom fuselage meet. Align the firewall joggle on the left side of the door. Drill and secure with clecos.
5. Align the lower rear corner of the door and secure with clecos. See Figure 6.3.D.4.
6. Align the cowling joggles, of the top and bottom fuselage shells, fore and aft. A double joggle is molded in the bottom fuselage shell so it fits flush. See Figure 6.3.D.3.
7. Fit the remainder of the fuselage top into position and secure with clecos.

Figure 6.3.D.3 Aligning the cowling joggle



Now perform the pre-fit of the vertical stabilizer/rudder assembly. See 18.3.B *Fitting the Vertical Stabilizer/Rudder Assembly* on page 18.4

Figure 6.3.D.4 Aligning the door joggle



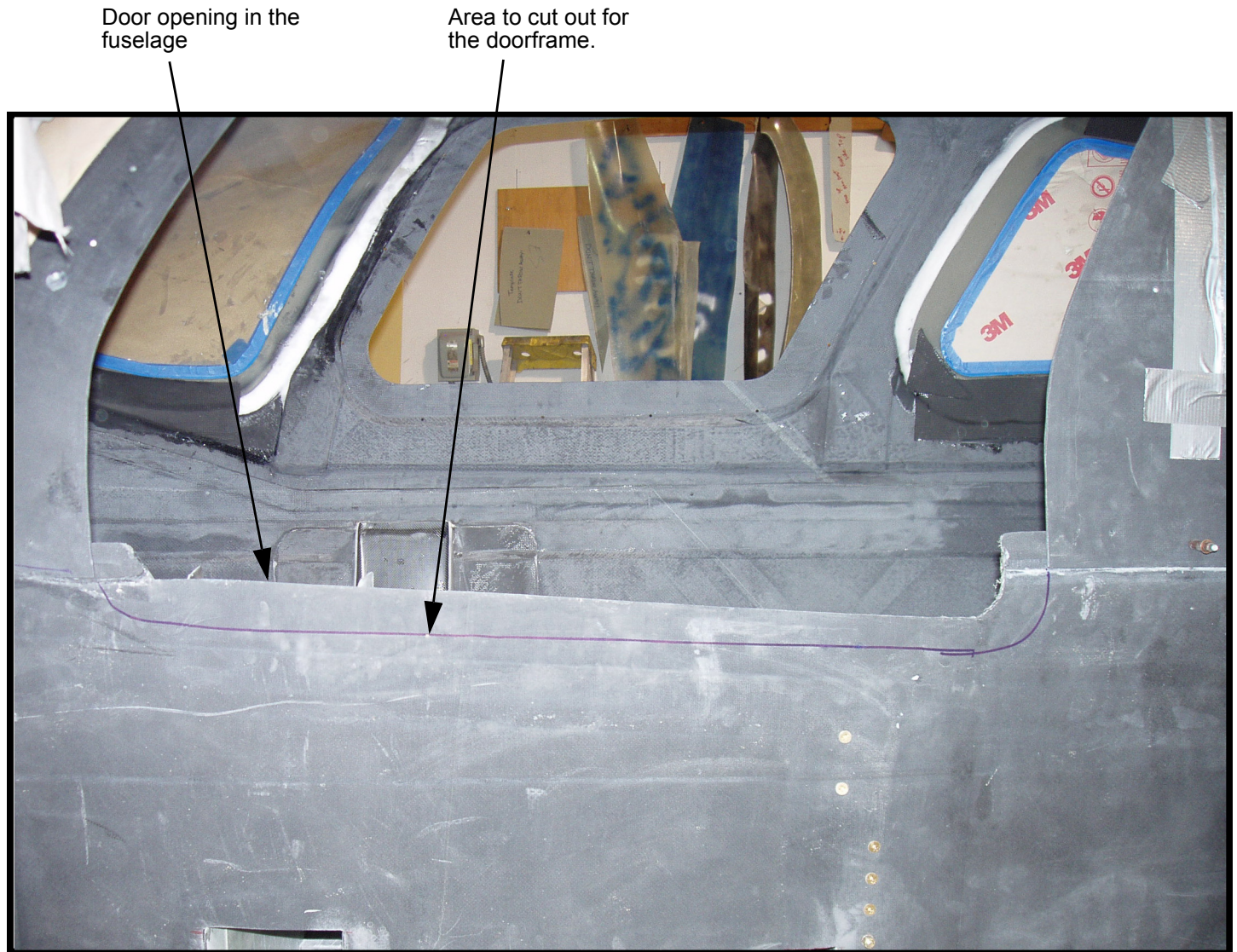
6.3.E Fitting the Doorframe

Before you can fit the cabin door, you need to remove the section of fuselage along the bottom of the door. First you will make a pattern of the doorframe and then you can trim the door opening in the fuselage.

Steps...

1. Remove the door from the doorframe.
 2. Make a paper pattern of the doorframe and secure the pattern over the cabin door opening in the fuselage.
 3. Mark the fuselage along the bottom of the pattern.
 4. Remove the pattern and cut out the marked area.
- You may also need to trim the armrest supports inside the fuselage.

Figure 6.3.E.1 Trim line on the fuselage for the cabin door



5. Fit the doorframe in the opening by aligning the two hinge pockets at the top.
The doorframe hinge pockets need to fit up and into the fuselage hinge pockets.
6. Mark the fuselage hinge pockets for the trim area.
Trimming the fuselage pocket at a 45° angle may be all that is needed to snugly fit the hinge pockets together. Mark only to the height that is needed to fit the hinge pocket. Refer to the blue mark in Figure 6.3.E.2.
7. Check and mark the following areas for possible notching of the doorframe.
 - shear panel supports
 - gear box bracketReview the photographs on the next page for notching the doorframe. Do not make the notches any larger is necessary.

Figure 6.3.E.2 Mating the fuselage hinge pocket to the doorframe hinge pocket

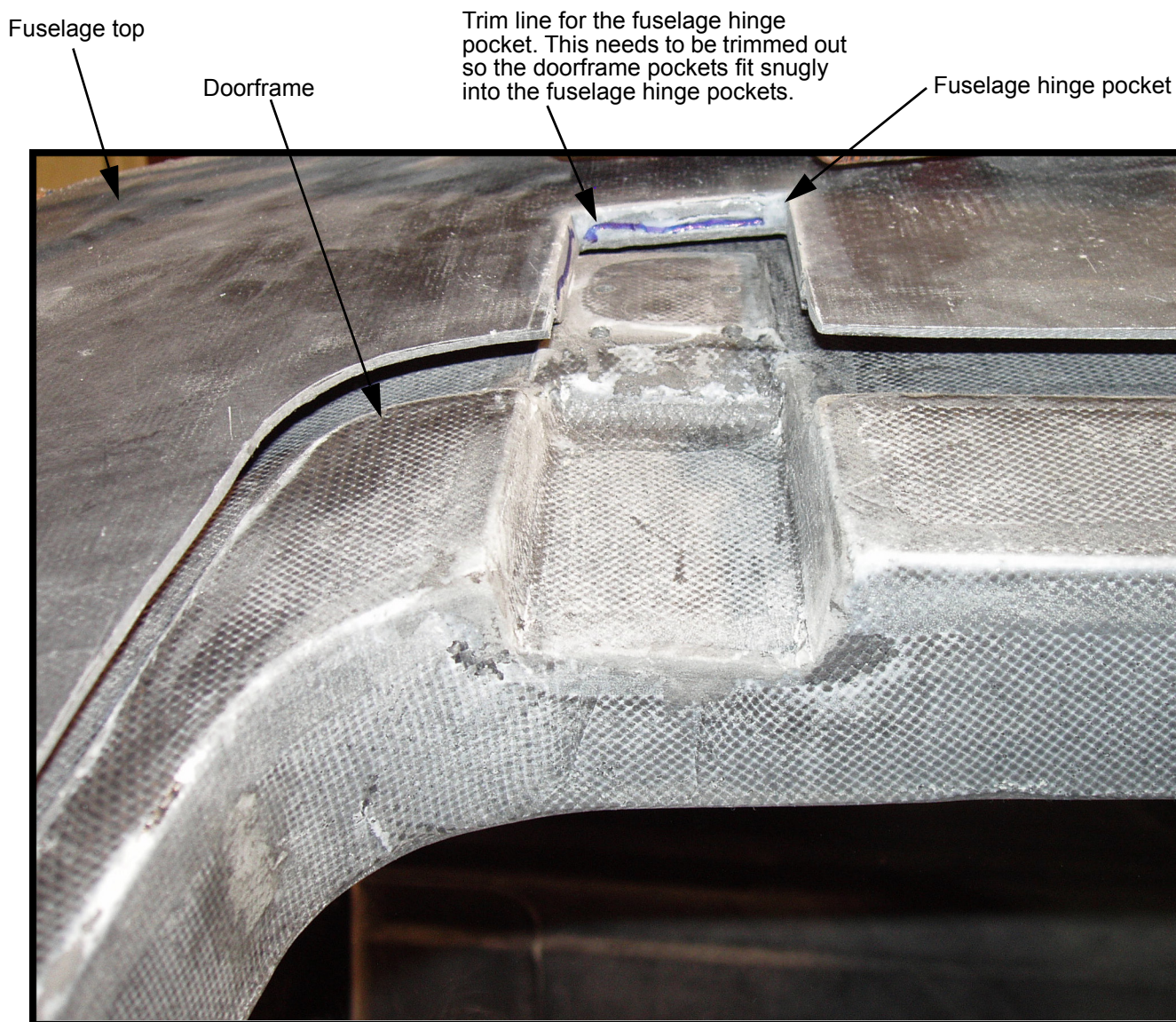


Figure 6.3.E.3 Marking the doorframe for notching around the bracket

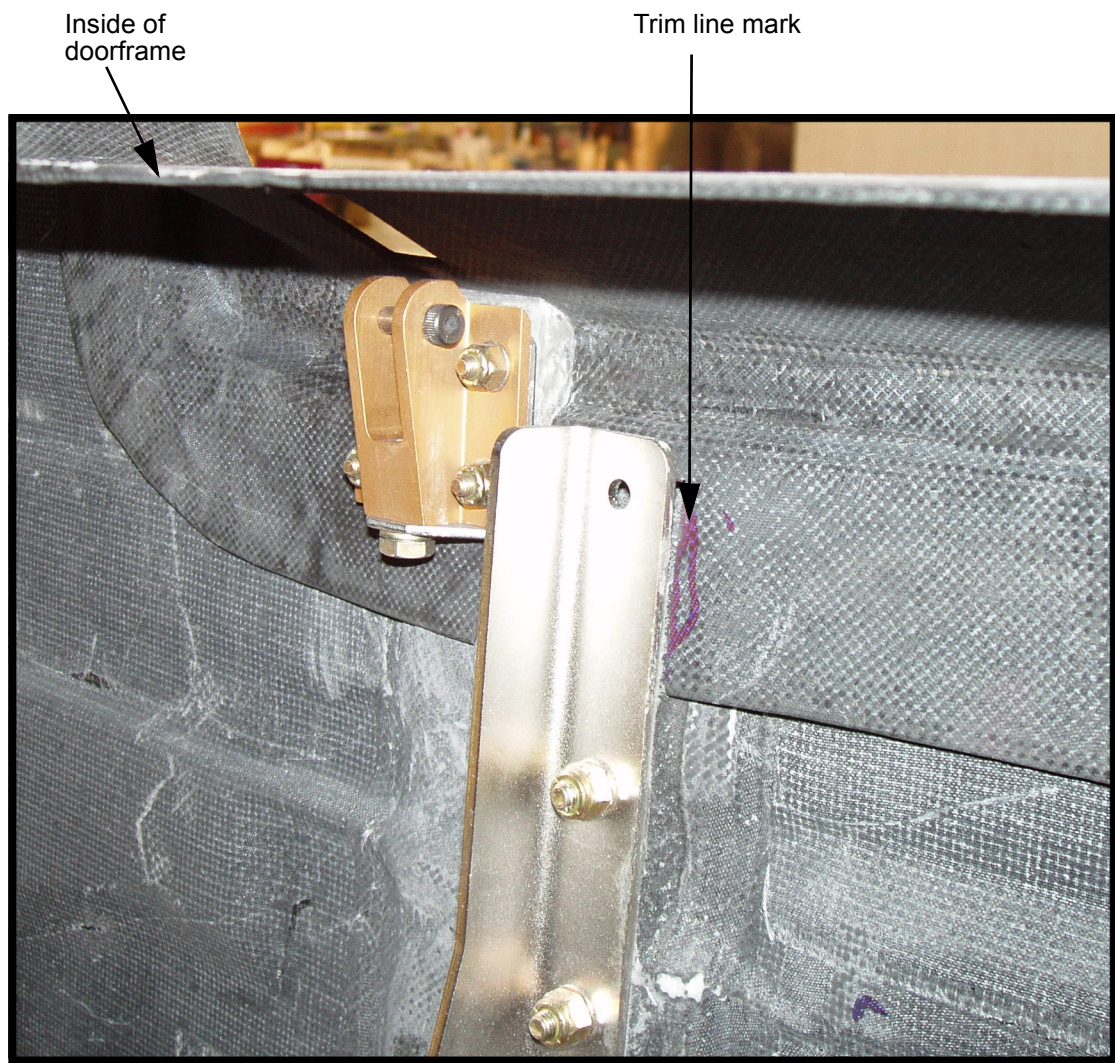
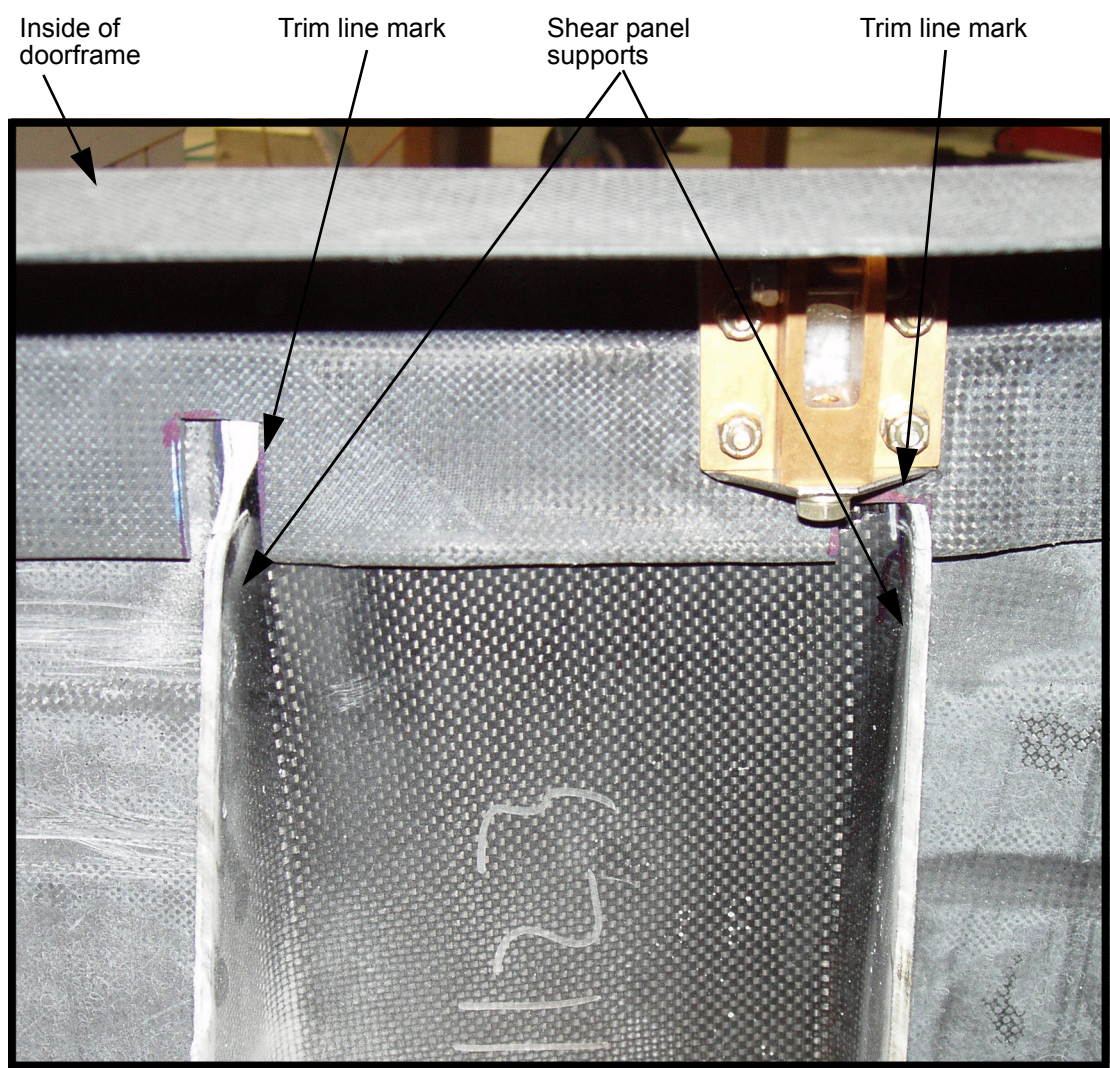
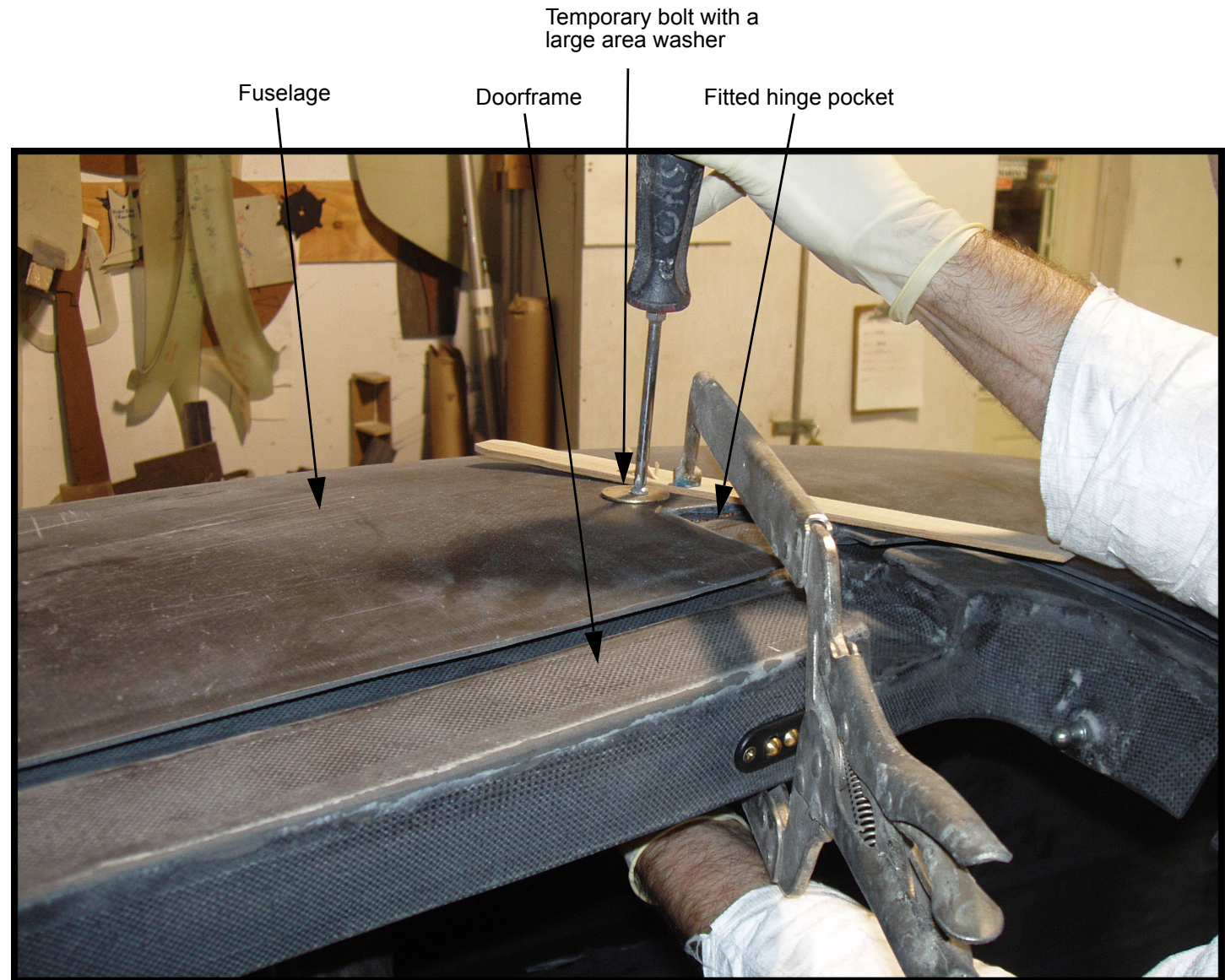


Figure 6.3.E.4 Marking the doorframe for notching around the shear box supports



8. Remove the doorframe and trim the marked areas.
9. Fit the doorframe again.
Continue this process of fitting, marking and trimming until the doorframe fits the fuselage.
10. Clamp the hinge pockets in place and check the fit of the doorframe.
 - doorframe hinge pockets need to fit snugly into the fuselage pockets
 - all corners of the doorframe need to fit the fuselage
 - doorframe joggle needs to fit with an even gap with the fuselage
11. Drill two 3/16" (4.5 mm) holes, one above each hinge pocket.
12. Insert a temporary bolt with a large area washer and tighten using a wing nut from inside the fuselage.
Tip: We recommend the wing nuts because they are easier to loosen when the doorframe is removed.

Figure 6.3.E.5 Doorframe fitted and clamped to the fuselage



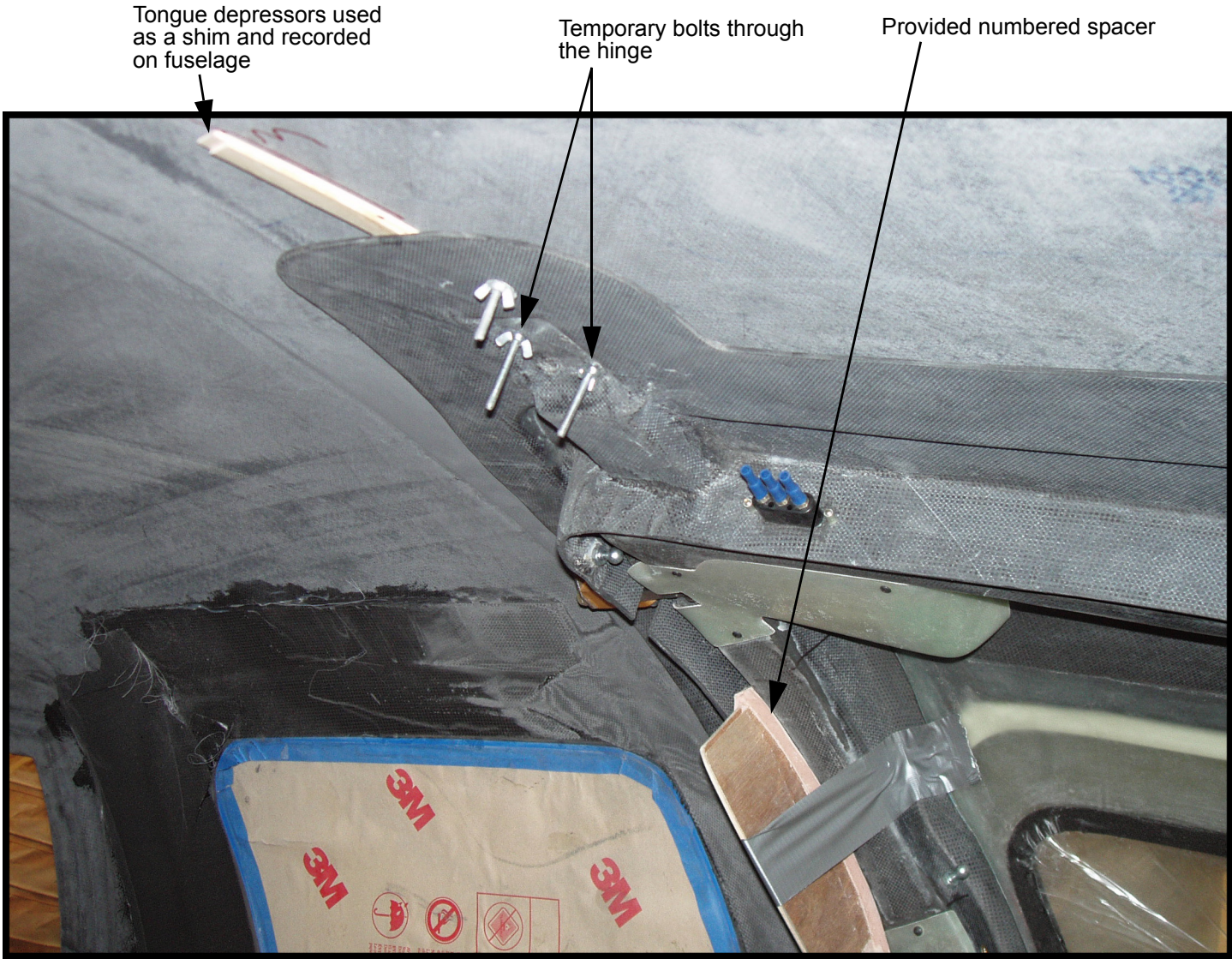
6.3.F Fitting the Door

Now with the help of a second person you can fit the door into its frame.

Steps...

1. Install the door by attaching the two door hinges with two temporary bolts per hinge.
The gap should be as small as possible between the fuselage and the edge of the door.
2. Shut and latch the door.
The gap should be as small as possible between the fuselage and the edge of the door.
3. Insert the four spacers that came with the door from inside the fuselage. Each numbered spacer needs to be inserted at the corresponding number on the inside of the doorframe.
These four spacers are important for setting the proper gap for the door seal.
4. Use tongue depressors to shim other areas of the doorframe.

Figure 6.3.F.1 Interior of fuselage after the door is reattached to the doorframe



5. Continue to adjust the door by securing the doorframe with two or three bolts. Select the locations where the fitting may be difficult but do not twist or force it out of shape.
 - Drill two or three 3/16" (4.5 mm) holes at different locations. Refer to Figure 6.3.F.2 for possible locations.
 - Insert a temporary bolt with a large area washer and tighten using a wing nut from inside the fuselage.
6. Loosen the bolts as necessary to allow the door to fit all the way around.

WARNING: Do not insert more bolts than you need. Too many bolts can tweak the door out of shape and it will not close properly. Four bolts is the most we recommend.

A good fit meets the following criteria:

- Door does not bind when it is opened. Check it for proper operation and do not stress the door.
- Gap around closed door should equal at least the width of one tongue depressor.
- The gap at the top of the door needs to be slightly larger to accommodate opening the door.
- Align the door to fuselage surface should.

To obtain a good fit:

- Loosen the bolts as needed to allow the doorframe to recess level to the surface of the fuselage.
- Tighten the bolts as needed to list the doorframe level with the fuselage's surface.
- Mark areas on the fuselage where the door to fuselage gap is too close and trim as necessary.
- Use as many shims (tongue depressors) as needed on the inside to recess or lift the doorframe level with the fuselage's surface.
- Mark the inside of the fuselage where the shims are inserted and how many tongue depressors are used. See Figure 6.3.F.1.

Figure 6.3.F.2 Door reattached to the doorframe and fitting is in process



6.3.G Bonding the Doorframe to the Fuselage

In this section the bonding surfaces are prepared and the door is reinstalled and bonded to the fuselage. But only the doorframe and the fuselage top are bonded together. The bottom is not bonded until the fuselage top is permanently installed.

Steps...

1. Remove all the shims and bolts from the door fitting. Set them aside since they will be used again when bonding the door to the fuselage.
2. Remove the door first and then remove the doorframe.
3. Prepare all the bonding surfaces on the doorframe and the fuselage.
4. Tape or wax any areas that should not be bonded. These areas need to be protected so the door will open.
 - tape the edge of door
 - tape the corresponding edge on the doorframe
 - wax the hinges and latchesThis area needs to be protected so the door bottom does not bond to the fuselage.
 - cover the bottom fuselage where it meets the doorframe
5. Mix a thick batch of epoxy/flox.
6. Wet all bonding surfaces on the doorframe and the fuselage.
7. Apply the epoxy/flox to the doorframe joggle.
8. Carry the doorframe, with the flox on it, to the fuselage.
9. Refit the frame and insert all the bolts and shims.
10. Clean up any squeeze-out on the inside or add more epoxy/flox in areas.
11. Wrap tongue depressors with clear tape and insert them in the joggle between the bottom and top fuselage. These will act like a dam to prevent the epoxy/flox from running down and bonding the lower doorframe.
12. Install the door into the doorframe.

13. Fill a plastic bag or caulking tube with the epoxy/flox mixture. From inside the fuselage, squeeze the mixture into any areas that need additional epoxy/flox.
14. Monitor the cure until it begins to get firm. From the exterior drag a tongue depressor around the perimeter of the door to create a small clearance between the door and the fuselage.

Steps after cure...

1. Remove the door. It may take some firm pressure to dislodge the door.
 2. Sand any areas where there is excess squeezed.
- This completes the installation of the cabin door.

Figure 6.3.G.1 Doorframe bonded to the fuselage



6.3.H Installing the Optional Door Lock

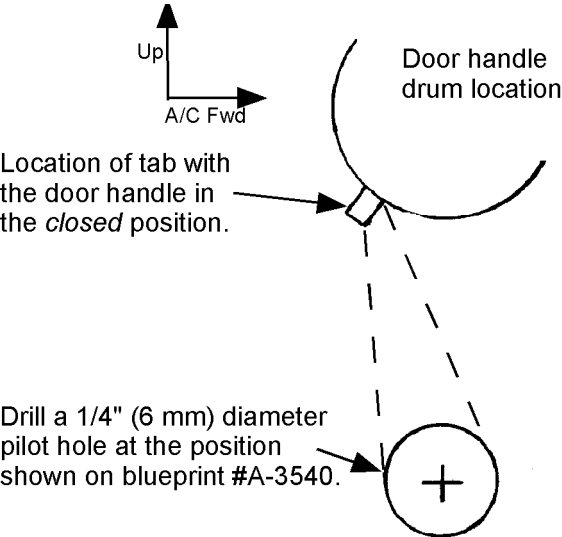
Lancair has an optional door lock kit that locks the door handle in place. To install the door lock we recommend that you remove the door from the aircraft

Steps...

1. Mark the door lock location using the dimensions on blueprint #A-3540.
2. Drill a 1/4" (6 mm) diameter pilot hole at this location.
3. Drill a 7/8" (22 mm) diameter hole from the outside as shown in Figure 6.3.H.2.

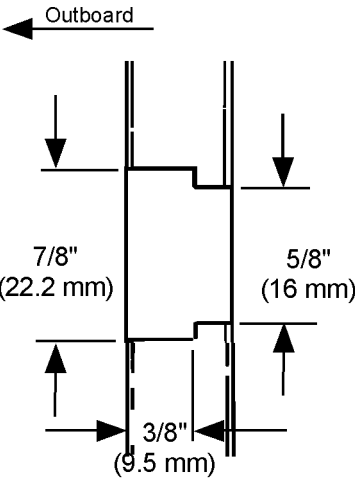
Tip: It is ideal if you can make the hole 3/8" (9.5 mm) deep, but you must not drill all the way through the door! Every door's thickness will vary slightly at this location so check your door. You can simply check the depth of your 1/4" hole that you drilled. You should leave at least 3/16" (5 mm) of material beyond the 7/8" (22 mm) diameter hole. It is acceptable if the face of your lock sticks out slightly on the front of the door.

Figure 6.3.H.1 Door lock location



4. Drill through the remainder of the hole using a 5/8" (16 mm) diameter drill.
5. Enlarge the hole so the rest of the lock will fit.

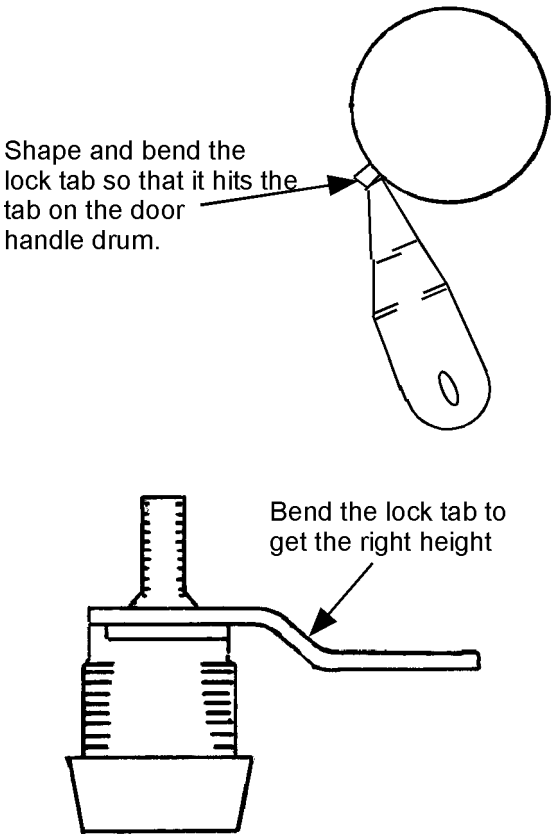
Figure 6.3.H.2 Side view of recess hole drilled for the door lock



6. Place the door handle in the locked position.
It is somewhat difficult to determine exactly on which sides to enlarge the hole. Ideally the lock will drop into its hole with a snug fit on all sides to prevent it from rotating.
We suggest using the following method:
 - Turn the lock over so you are looking at the front of it. With the key, turn the lock all the way clockwise. This is the locked position.
 - Put the lock tab on the assembly.
 - Point the lock tab directly at the tab on the door handle drum. Grind the hole so the door lock will fit snugly in this orientation. If you remove too much material you can fill with epoxy/flox.
7. Shape and bend the door lock tab.

8. Slide the door lock through and tighten down the lock with the ring nut.
9. Bend and shape the lock tab so that it hits the tab on the door handle drum as shown.
10. Operate the door lock.
It is possible you'll need to make a notch in the door stiffener for the lock tab to fit through in the open position.

Figure 6.3.H.3 Door Lock Tab



6.3.1 Installing the Door Hinges

You used the hinge pockets when the doorframe fit was checked. In this section you will permanently install the door hinges in the joggle in the doorframe. As you install the hinges, you need to remember these three rules of alignment.

1. The hinges must be 'in plane' with each other.
2. The hinges must be aligned forward/aft such that their hinge pin axes are concentric with each other.
3. The hinges must be spaced apart the correct distance to fit into the joggles. This should be 20.5" (520 mm).
Verify this measurement.

The thicker portion of the hinge, the part with the pivot pin in it, should be just off the edge of the step on the fuselage joggle.

Note: For cosmetic reasons we typically fill the large lightening hole with micro. We do not recommend that you fill it over with the hinge in place since the hinge is installed and removed several times.

Tip: The hinge pins need to be inspected, and possibly replaced, every year. Allow for this future maintenance during the installation.

Steps...

1. Bolt the hinge to the fuselage using countersunk screws, MS24694-S54 on the outside, with washers, AN960-8, and locknuts, AN365-1032A, on the inside.
Make sure the hinge pins are aligned concentric with each other before you set the attachment screws through the hinge.
2. Prop up the door so the hinge section meets the surface of the fuselage joggle. Use tongue depressors or equivalent. Note that one side of the hinge section will be below the joggle.
It is helpful if you have someone lend a hand during this step.

Figure 6.3.1.1 Bolting door hinges to the fuselage

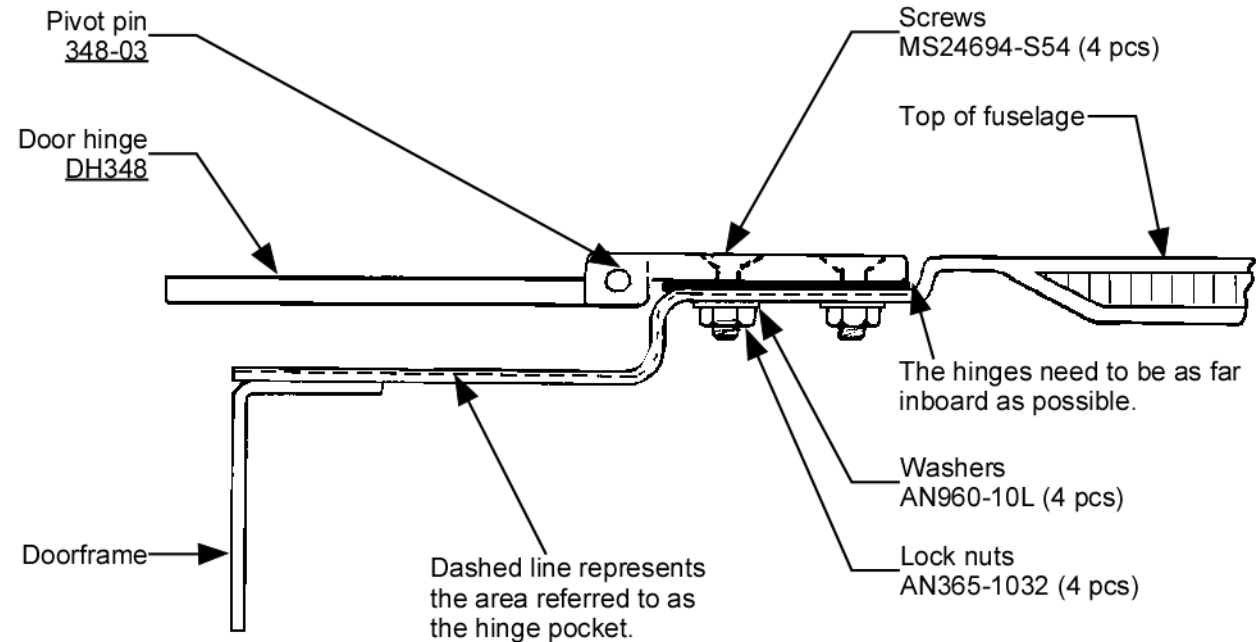
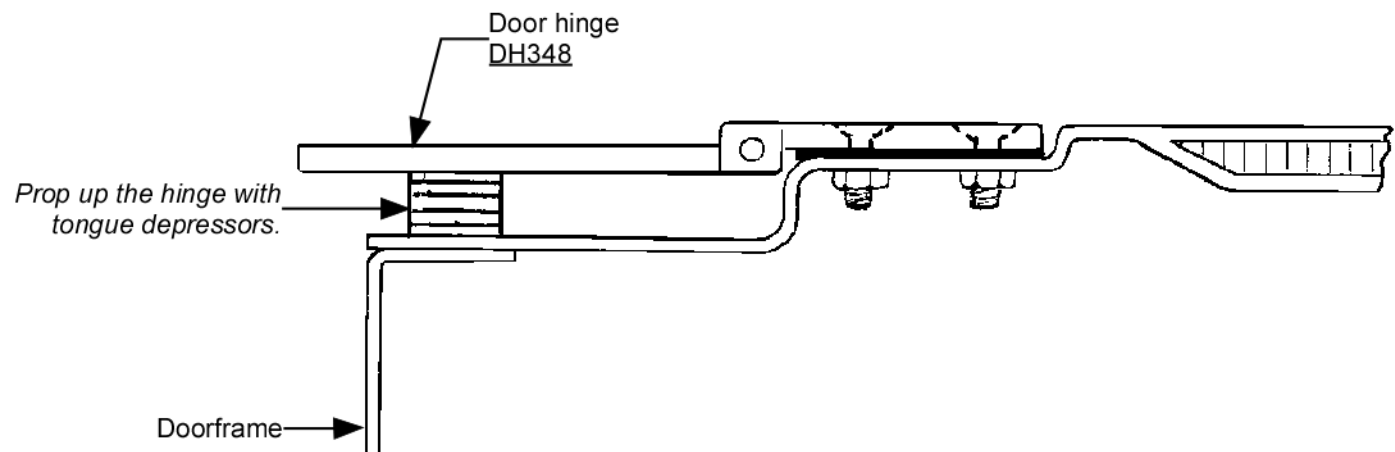


Figure 6.3.1.2 Propping up the door side of the hinge



3. Cover the top of the hinge with plastic tape. This will keep the micro you apply in the next step from sticking to the hinge.
4. Add a micro pad on top of the hinge section to fill the area between hinge and the upcoming door skin.
5. Place the door into position on the fuselage and set the clamping bolts, if necessary, to hold it in place while the micro cures.

Steps after cure...

1. Carefully lift the door while the hinges are temporarily stuck in place. You must be very careful to not break loose the micro from the hinge piece. (This is where some help is required.)
2. Using a #12 bit, drill through one hole on each hinge piece and set the machine screw in the hole (or any bolt) to hold the hinge in place.
3. Drill the remaining screw holes for attaching the door hinge to the door skin.
4. After the holes are drilled, the door surface side will have to be 100° countersunk to accept the machine screws.
5. Use screws MS24694-S56 (long) in the forward and aft holes on the door skin side and use screws MS24694-S55 (short) in the holes toward each other to attach the hinge. Use lock nuts AN365-1032 with all screws.

Tip: Screw lengths could vary depending on the thickness of your micro pad. If you need a different length screw(s), please contact one of our service representatives. Also, do not permanently install the door at this point. You'll need to remove the door for additional installations procedures.

Figure 6.3.1.3 Micro pad between the door skin and hinge

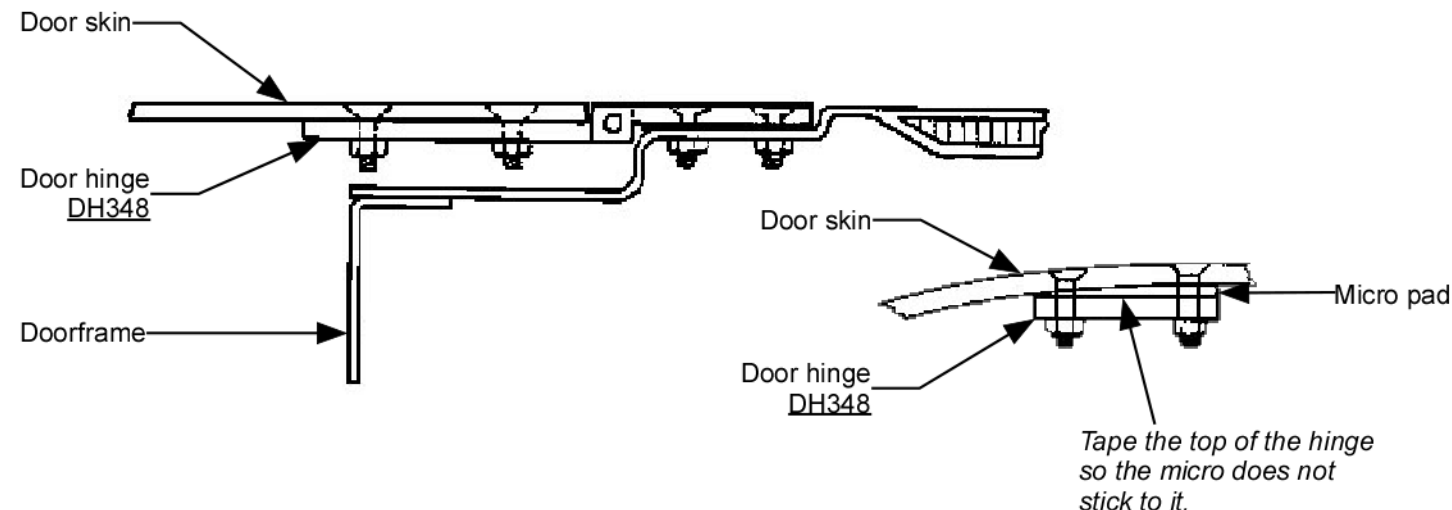
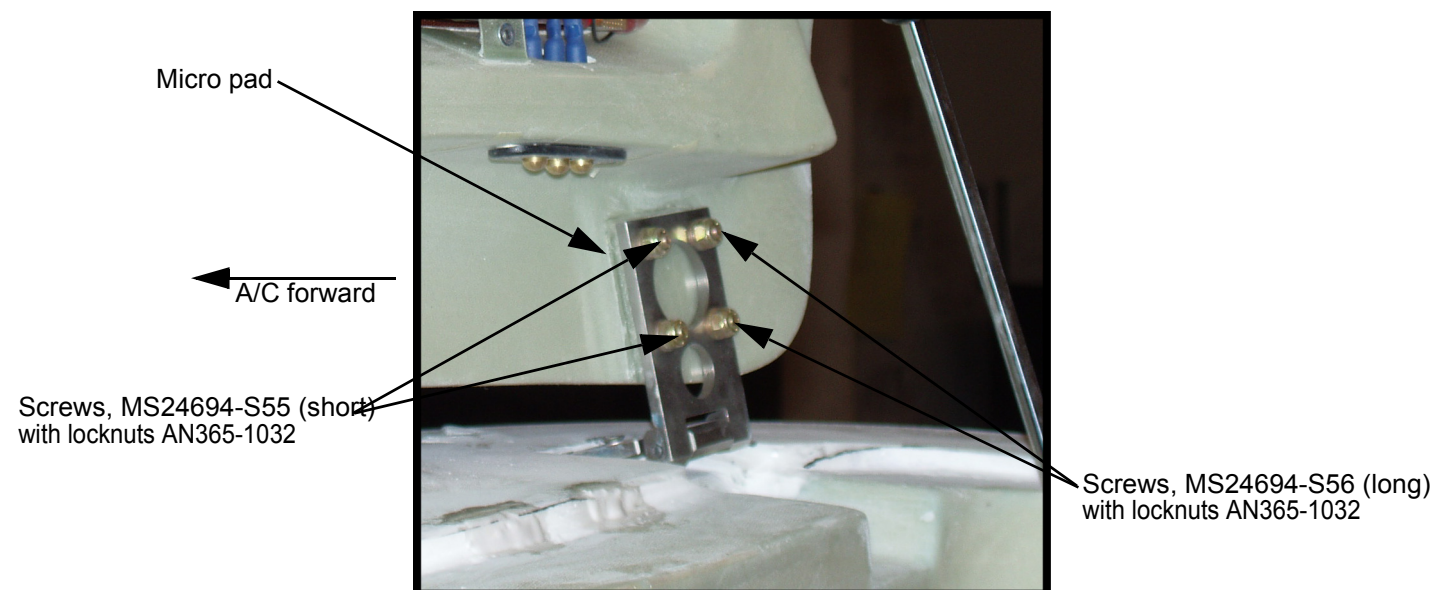


Figure 6.3.1.4 Completed door hinge showing the micro pad between hinge and door skin



6.3.J Installing the Door Seal

The door seal is installed after your plane has been painted. You will need to return to this section when your plane comes back from the paint shop.

The door seal consists of an inflatable seal on the door side. The door seal is inflated with an electronic pump that is installed on the upper inside area of the door. The inflatable door seal will expand up to 3/4" (19 mm). The door seal is attached with silicone.

Steps...

1. Install the inflatable door seal (SF14-1651) by routing it in the door stiffener joggle. Orient the door seal on the door so the stem is located approximately halfway in between the two door hinges.
2. Drill a 1/4" hole through the door stiffener at this location and pull the 4" long outlet stem through. Refer to Figure 6.3.J.2.
3. Silicone the door seal in place on the door stiffener.
The door seal needs to be approximately 1/8" from the door skin all the way around the door.

Steps after cure...

The door seal stem will need to be connected to the air line coming from the pump. The wiring to the instrument panel, and the connections to the pump will be completed in *Chapter 23 General Wiring*, in 23.3.H *Wiring the Automatic Door Seal Pump* on page 23.19.

1. Connect the door seal stem to the pump. See Figure 6.3.J.3 for the location.

Figure 6.3.J.1 Door seal

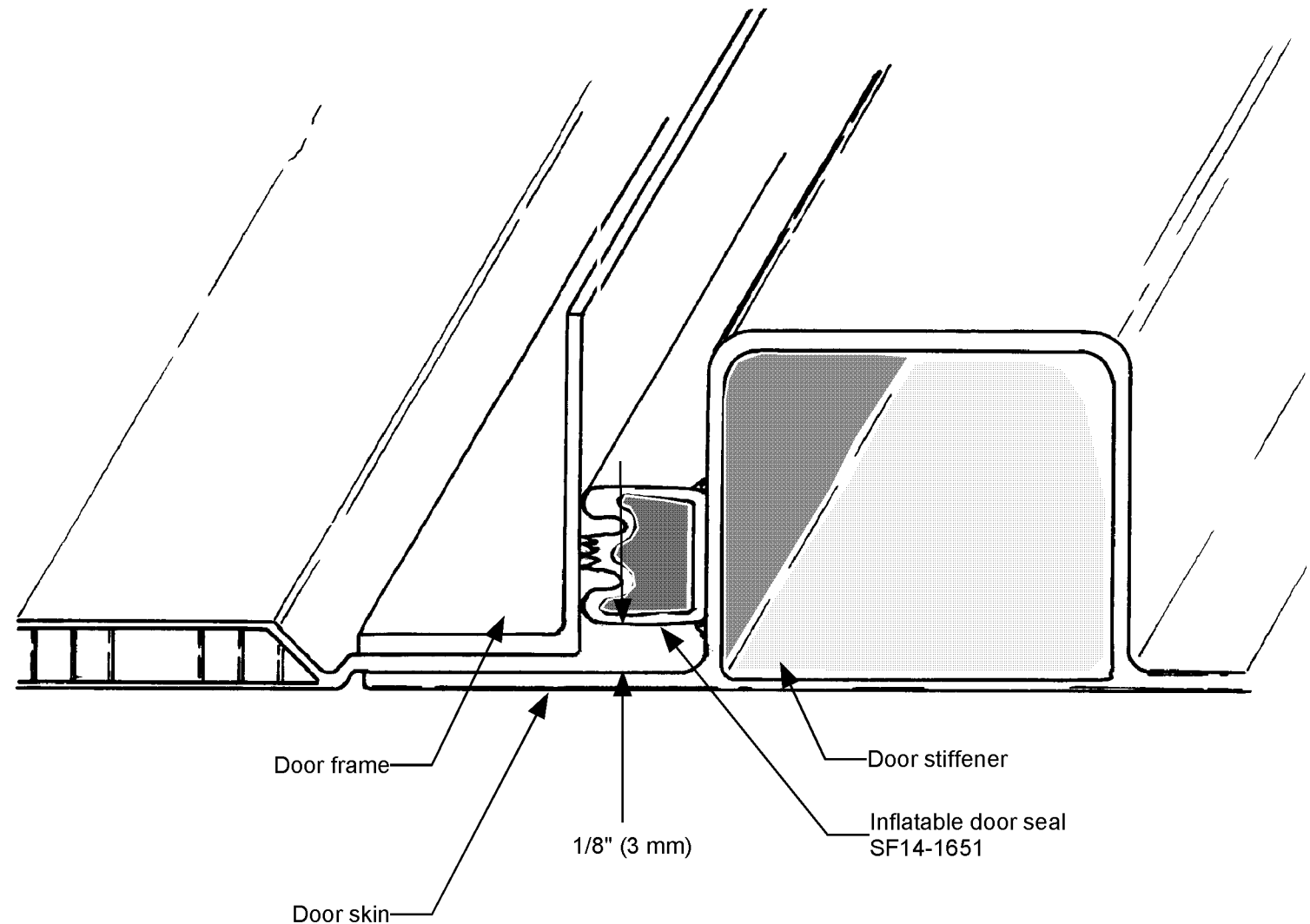


Figure 6.3.J.2 Location of the door seal and the door seal stem

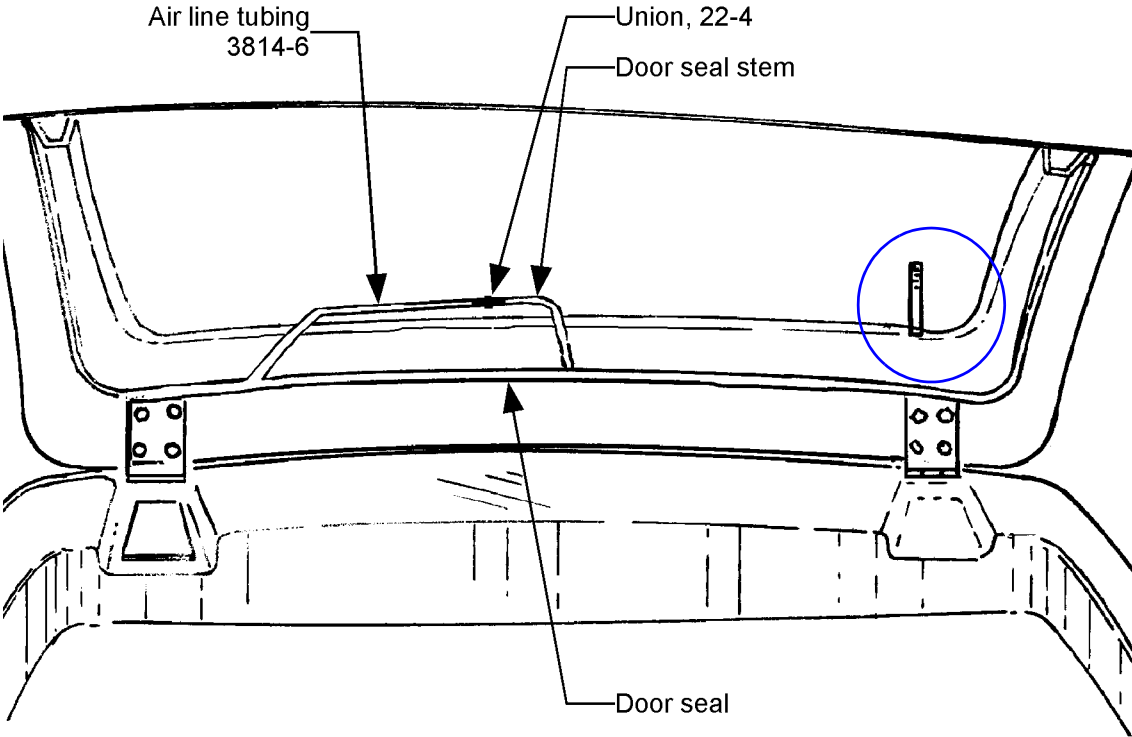
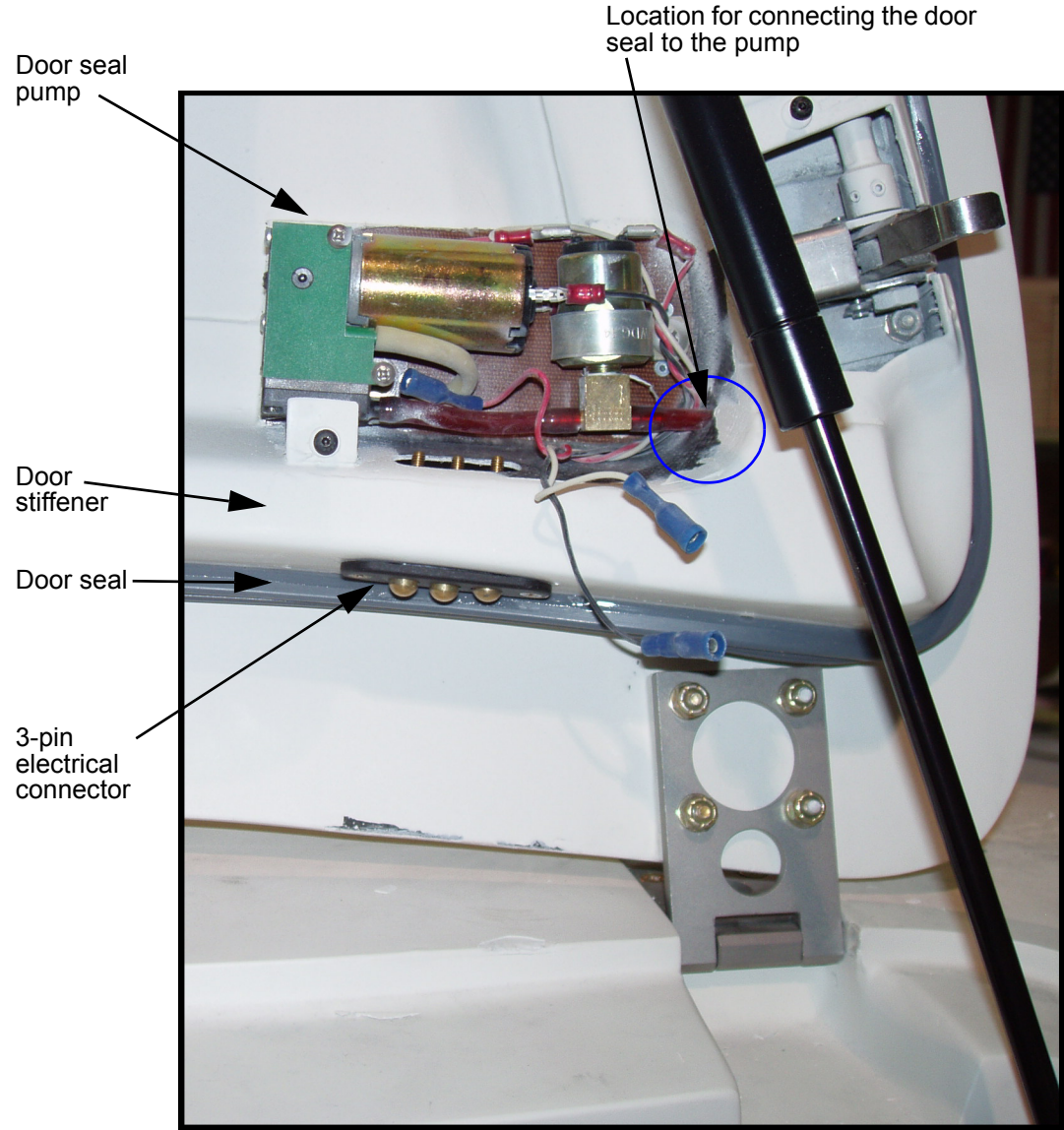


Figure 6.3.J.3 View of the inside of the door with the door seal and door seal pump



6.3.K Installing the Overhead Console and Air Ducts

The overhead console is a simple molded piece forming a passageway for air coming from the plenum formed in the vertical fin. A variety of vent and accessory arrangements can be installed into this overhead piece based on personal preference.

Note: You'll see a shallow joggle in the console at approximately 43" forward of the aft end. Generally, the console will be split into two pieces for shipping purposes. A 2-BID tape is used to seal the two pieces together once installed into the top fuselage. Note that the gel-coat primer must be sanded off prior to attaching the 2-BID tape. In some cases, the duct may arrive in one piece, if so, you can simply ignore this depression or fill it with micro for cosmetic purposes.

Steps...

1. Pre-fit the overhead console (1039-1) into the fuselage top.
This is performed with the fuselage top resting upside down on a table and the overhead console is laid in position.
2. Trim the edges of the premolded piece(s) so that about 3/4"-1" (18-25 mm) remains for bonding onto the inside side of the fuselage top.

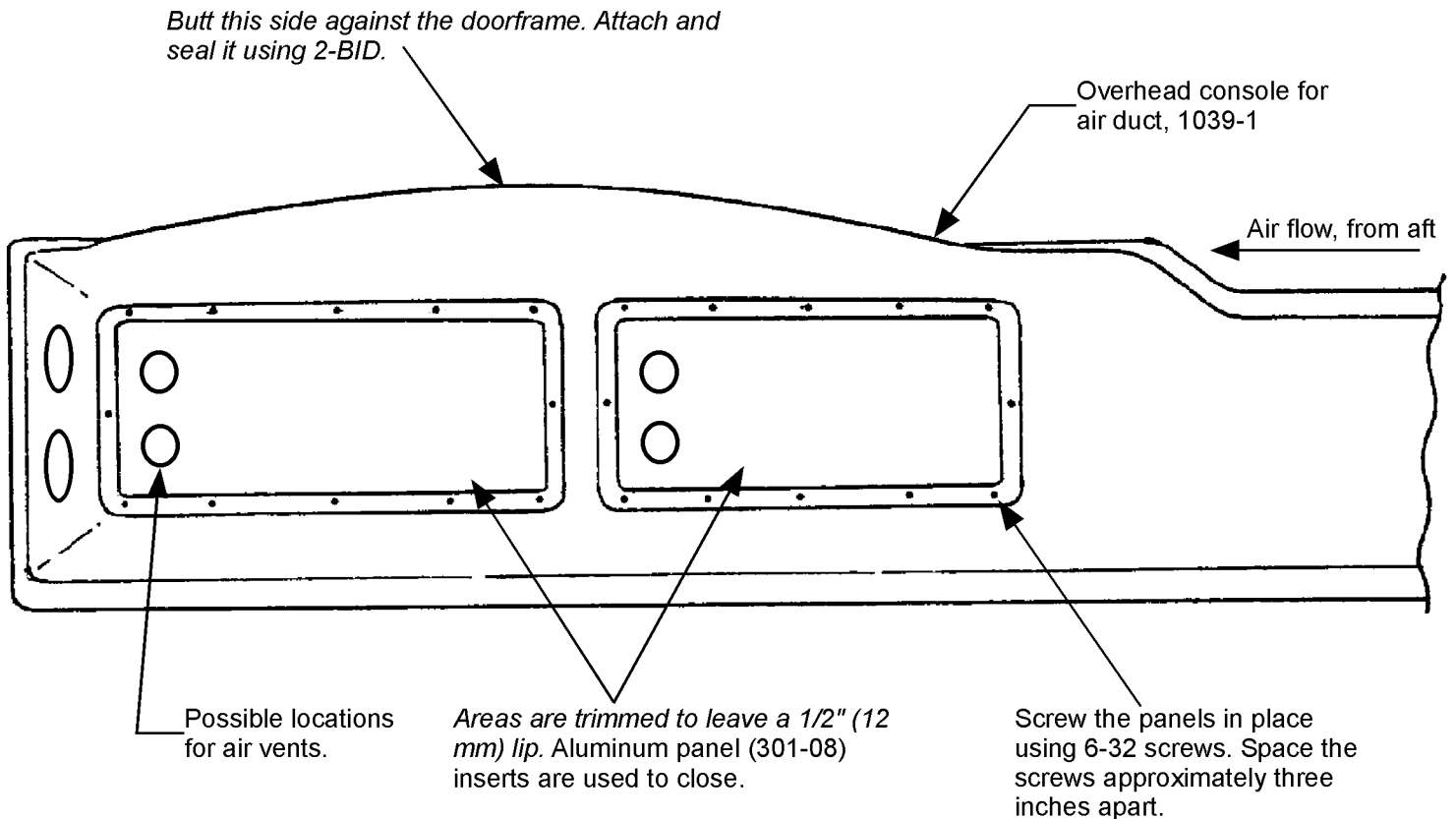
Achieving a good fit...

- There should be about a 1/2" (12 mm) along the front where the console is close to the windshield.
- The overhead console must bump, and seal, up against the fuselage's door frame.
- The overhead console will essentially center on the top fuselage.

If your overhead console is in two pieces, simply butt them together for alignment purposes.

3. Grind or sand as required to attain a good fit onto the top fuselage and a snug fit against the door frame.

Figure 6.3.K.1 Overhead console and air duct layout



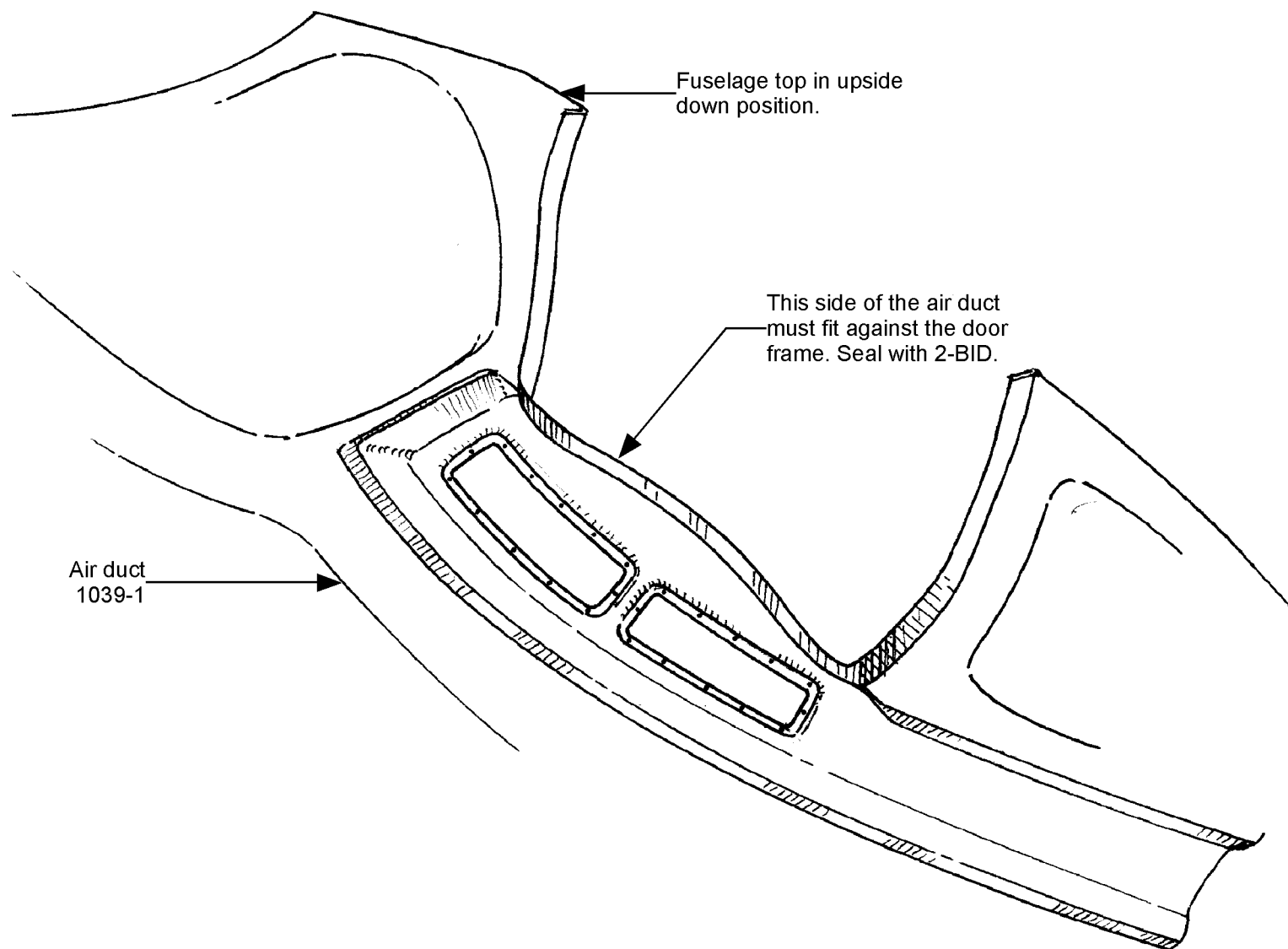
4. Fit the removable aluminum panels into the console.
It is a good idea to fit the aluminum panels and any other desired items into the console prior to bonding. It's not essential, just easier this way.
The two aluminum panels fit into the flat areas measuring approx. 5-7/8" x 13-7/8" (152 x 345 mm). These panels simply screw into place and provide access to the door hinges.
Tip: The panels (approx. .060" aluminum) are rough cut to size. Use a belt type sander to quickly sand a radius around the corners as desired.
5. Screw the panels in place using 6-32 screws. Space the screws approximately three inches apart.
The air pressure is often sufficient to blow air by if spacing is greater than that.
6. Trim away the fiberglass in the panel areas leaving about 1/2" (12 mm) around the perimeter.
7. Install the nut plates, K1000-06, and set the screws.
Tip: Before you bond the console in position, read the recommendations below.
8. Bond the console into position by roughing up the surfaces and using epoxy/flox. You can either weight the flanges down to achieve a compression bond or set clecoes to pull it down against the top fuselage.

Recommendations for the aluminum panels...

The panels can be nicely finished if they are covered with interior trim material for an accent, such as leather or vinyl. You might consider the following possibilities for the panels.

- Various types of air vents – We've used one eyeball vent for each seat position and have found that this approach seems to work to everyone's satisfaction. Lancair carries two types of vents; a panel mount type and a screw mount type. Other types are also available from a variety of sources.
- Overhead light – A cabin light could be a useful addition in this area.
- Overhead control switching location – This area might be suitable for low profile rocker type switches.

Figure 6.3.K.2 Fitting the air duct



Steps after cure...

1. Add a 2-BID to connect the console to the door frame. Make a small micro fillet and apply the 2-BID to seal this area.
2. Seal the aft end of the console by fitting a small piece of urethane foam to form a surface. Cover this surface with 2-BID. You could also make a 3-BID cured piece to fit and attach it with 1-BID.
3. Make and install a hose pickup using a 3" (75 mm) diameter hose to connect the aft plenum in the vertical stabilizer

Tip: This process is explained in Chapter 24, 24.3.A *Completing the Fresh Air Vent*, to make the air duct pickup using a soda can wrapped with four layers of duct tape.

4. Finish connecting the air vent by using a piece of either seat or cat ducting to connect to the piece in the vertical stabilizer Use a hose clamp at each end to secure the hose in place.

Figure 6.3.K.3 Sealing the air duct against the doorframe

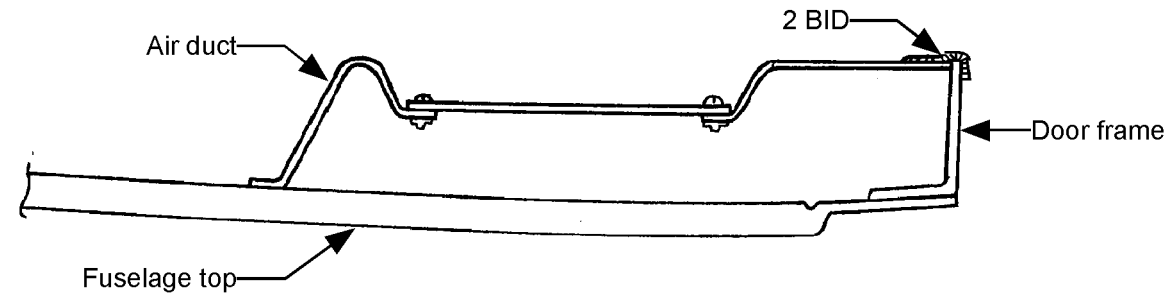


Figure 6.3.K.4 Sealing the aft end of the air duct

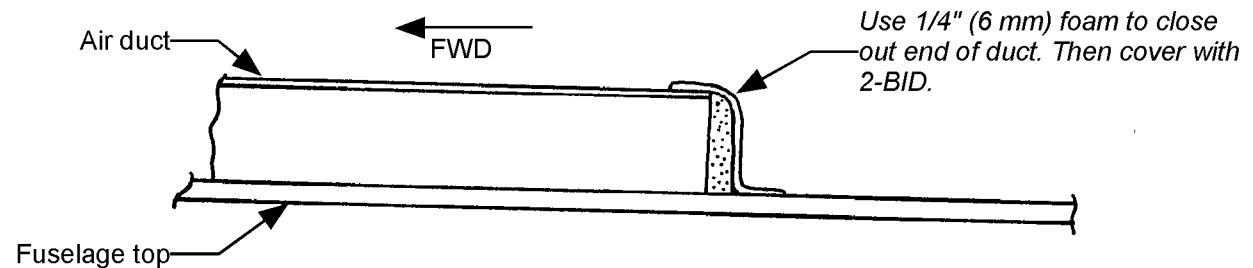
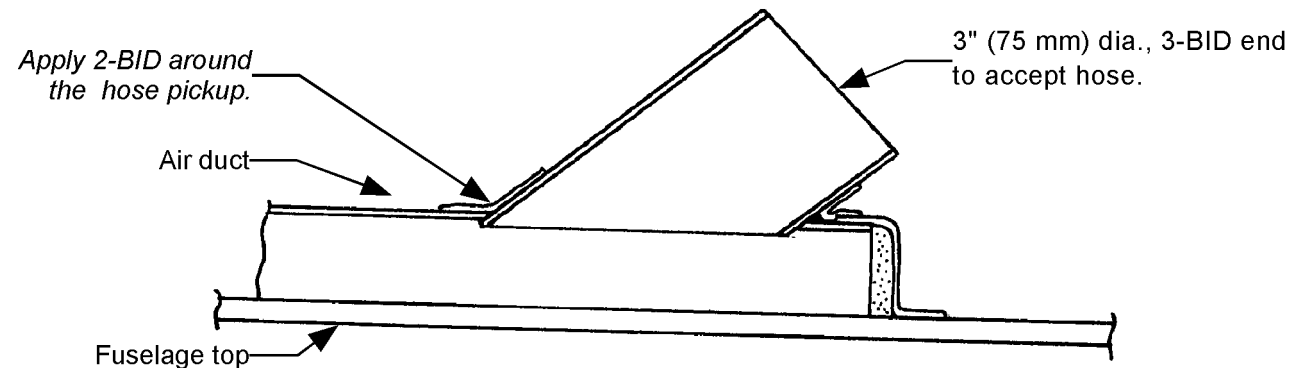


Figure 6.3.K.5 Attaching the air duct pickup hose



6.3.L Closing Out the Fuselage

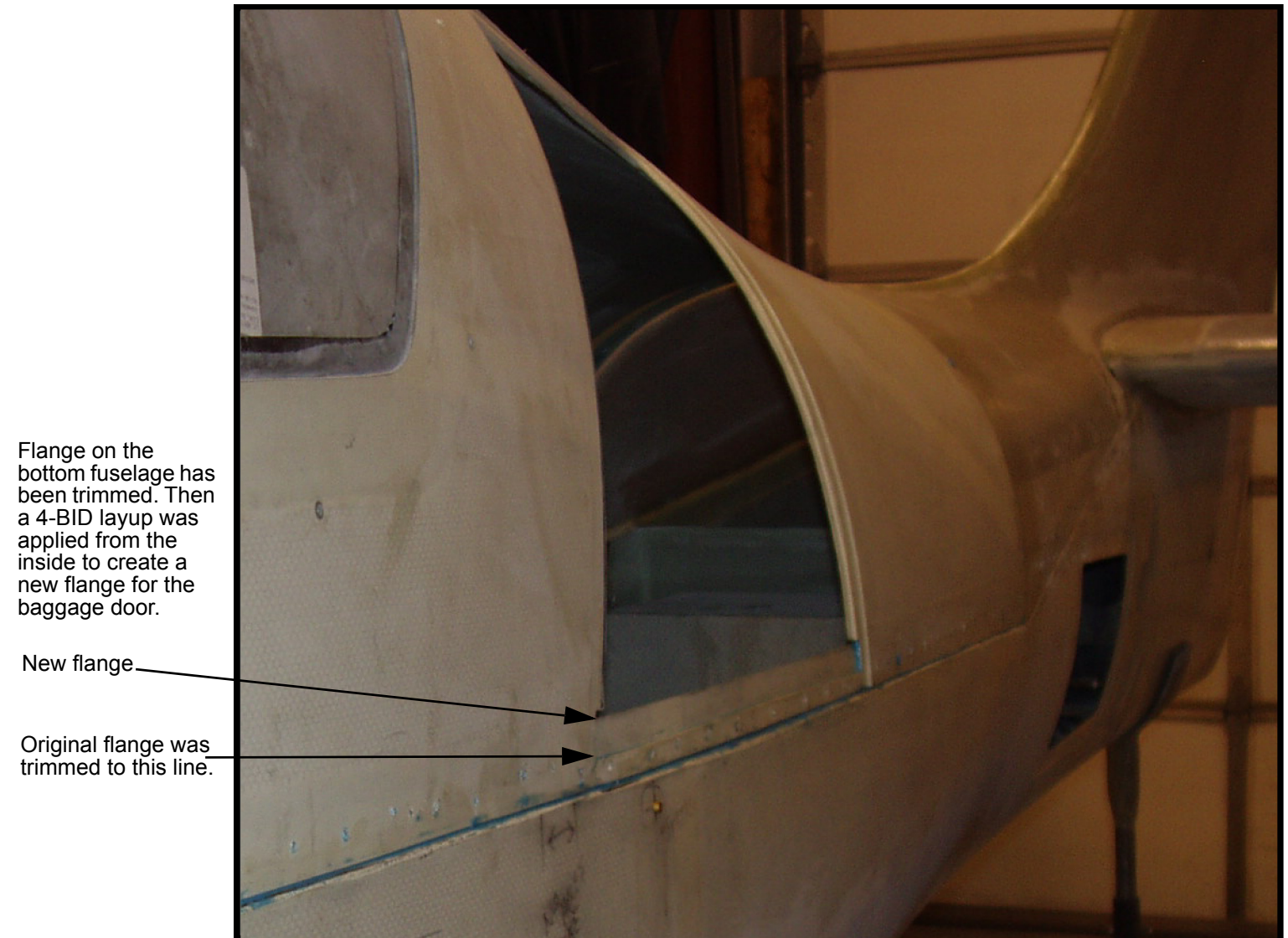
Next you need to complete the installation of the fuselage top. You pre-fit the top in 6.3.D *Pre-fitting the Top and Bottom Fuselage Shells* on page 6.7. You also performed the prefit of the vertical stabilizer. Although the vertical stabilizer is referenced in this section, you will not install and close it until *Chapter 18 Mounting the Vertical Stabilizer and Rudder*.

Steps...

1. Practice lowering the fuselage top in place by slightly pulling the sides out so the joggles will make direct contact.
If you just drop the fuselage top in place, you will have a problem with the adhesive being scraped off.
2. Inspect all bonding areas for gaps. Install more screws or clecoes as required.
Note: If the firewall blanket has already been installed, pull it back and scrape off the silicon for the 2-BID.
3. Check the fit around the baggage door. You may need to trim the bottom fuselage flange at the bottom of the baggage door.
Trim as much as necessary to get a close fit of the baggage door.
In a later step you will apply a 4-BID layup from the inside to create a new flange for the baggage door. This will replace the flange that was trimmed away.
4. Prep all bonding areas. The bonding areas include:
 - The joggles between the fuselage bottom and top.
 - The joggles between the fuselage top and the vertical stabilizer (vertical stabilizer).
 - The bonding areas between the lower part of the door frame and the fuselage bottom.
 - The section on top of the firewall and where it makes contact with the fuselage.

WARNING: Go ahead and prep all the areas described in this step, but do not bond the vertical stabilizer in place at this time.

Figure 6.3.L.1 Trimming the bottom fuselage for the baggage door



5. Apply a thin coat of Hysol™ to all bonding areas, except for the vertical stabilizer joggle.
6. Mix in floc with the remainder of the Hysol and apply it to the bonding areas where you already applied the pure Hysol. Fill the core on top of the firewall and leave a buildup a 1/8" (3 mm) tall "V" shape with the Hysol.
7. Lower the fuselage top onto the fuselage bottom and cleco or screw it in place. Remember to pull the sides of the fuselage out to make direct contact onto the adhesive. Make sure you have a good squeezeout along the joggles.
Tip: You cannot simply drop the fuselage top in place as you normally would as this tends to scrape off the adhesive.
8. Apply BID reinforcements on the inside of the fuselage joints.
 - Apply a 2" (50 mm) wide 1-BID to the following joints:
 - between the fuselage top and bottom,
 - later you will apply a 2" (50 mm) wide 1-BID between the fuselage top and the vertical stabilizer. See 18.3.B *Fitting the Vertical Stabilizer/Rudder Assembly* on page 18.4.
 - Apply a 4" (100 mm) wide 2-BID to:
 - secure the fuselage top to the firewall. Extend this reinforcement 2" (50 mm) onto the fuselage bottom (on both sides),
 - to the forward side of the firewall securing it to the fuselage top as shown in Figure 6.3.L.2.
 - Apply a 4-BID layup to:
 - the lower edge of the baggage door over the area trimmed away.
9. On the outside of the fuselage fill the gap between the fuselage top and bottom with micro.

Figure 6.3.L.2 BID reinforcements securing the fuselage top

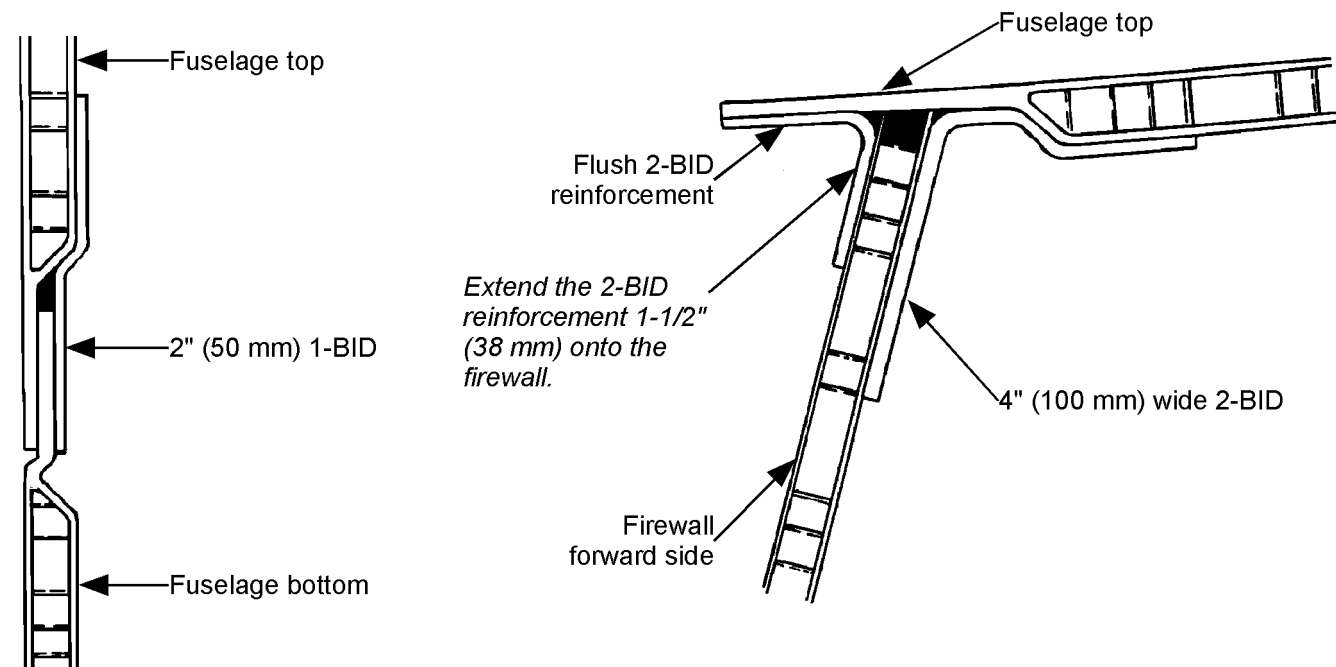
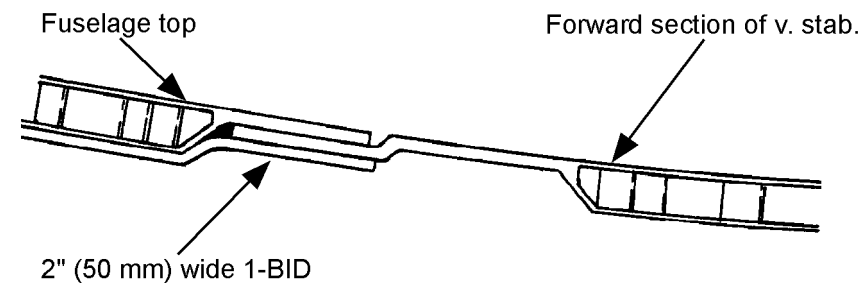


Figure 6.3.L.3 BID reinforcement securing the fuselage top to the vertical stabilizer



6.3.M Installing the Aft Seat Back Flanges

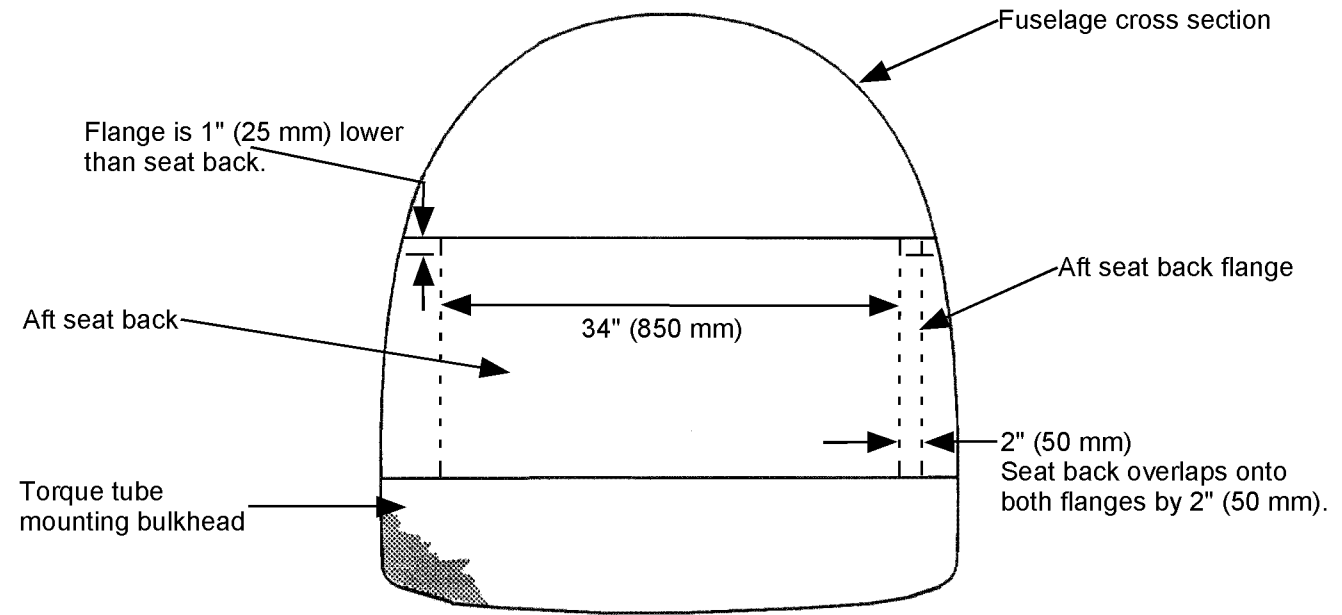
With the fuselage top in place, the aft seat back flanges are created by bonding a piece of prepreg to the sides of the bottom and top fuselage shells. The seat back flanges support all the weight that will rest on the seat back.

Tip: If you prefer to wait to close the fuselage top when the vertical stabilizer/rudder is closed, the flanges can be customized so the fuselage top can be removed.

Steps...

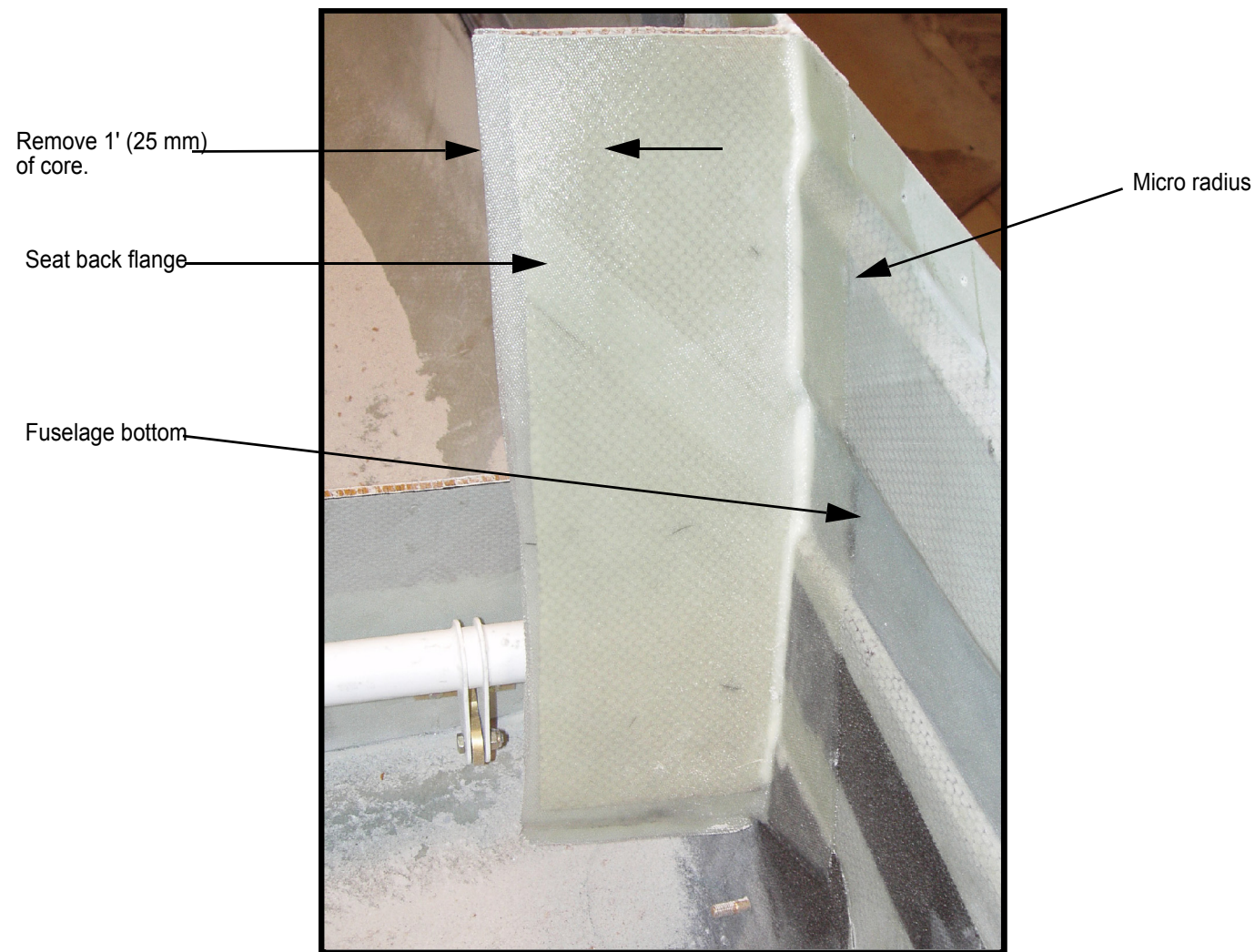
1. Fit a cardboard pattern to the fuselage area for the seat back flanges using the following criteria.
 - The actual seat back will be about 34" (860 mm) wide by 20" (530 mm) high so the flanges need to account for the remaining width of the inside of the fuselage.
 - The angle of the seat back is 27°.
 - The seat back flange only needs to extend 2" onto the seat back. The flange will be wider at the bottom than at the top since the distance between the seat back piece and the fuselage is greater at the bottom of the seat back. Stop the flange 1" short of the top of the seat back
2. Use the cardboard pattern to cut two seat back flanges from 2 PPS 1/4" (6 mm) prepreg.
3. Remove 1/8" to 1/4" (3 to 6 mm) of core along the edges of each flange where they make contact with the fuselage.
4. Prepare the bonding surfaces on the fuselage and the flange pieces.

Figure 6.3.M.1 Looking forward in the fuselage of the aft seat back and flange area



5. Pot the flanges in place with a thick epoxy/micro mixture.
The flanges extend onto the top fuselage shell.
6. Form a micro radius between the flange and the fuselage.
7. Apply three layers of duct tape on the outboard 2" (50 mm) of the seat back. This will simulate a 3-BID reinforcement on the forward face of the flange.
8. Remove a 1" (25 mm) strip of the aft and inboard laminate and core of the flange as shown in Figure 6.3.M.2.
9. Apply a 6-BID reinforcement on the aft side of the flange.
10. After the 6-BID has cured, push the seat back forward and out of the way. Thoroughly sand the forward face of the flange and side of the fuselage. Apply a 3-BID to the forward face of the flange.

Figure 6.3.M.2 Seat bank flange bonded to fuselage



Steps...

1. Reinforce the seat back by adding a 3" (75 mm) wide stiffener.
This will reinforce the seat back and prevent it from bending under load.
2. Bond in place with a thick epoxy/micro mixture and BID as shown in Figure 6.3.M.4.
3. Closeout the aft edge with 1-BID as shown.

Tip: Keep the seat back as wide as possible. The determining factor is clearance between the arm rest and the seat back in the folded position. Remember to allow room for upholstery. It may also be necessary to remove a little off the upper sides of the seat back in order so it clears the fuselage as it is folded forward.

The seat back is finished in 15.3.K *Finishing the Seat Back* on page 15.23

Figure 6.3.M.3 Seat back stiffener with 1-BID closeout on aft edge

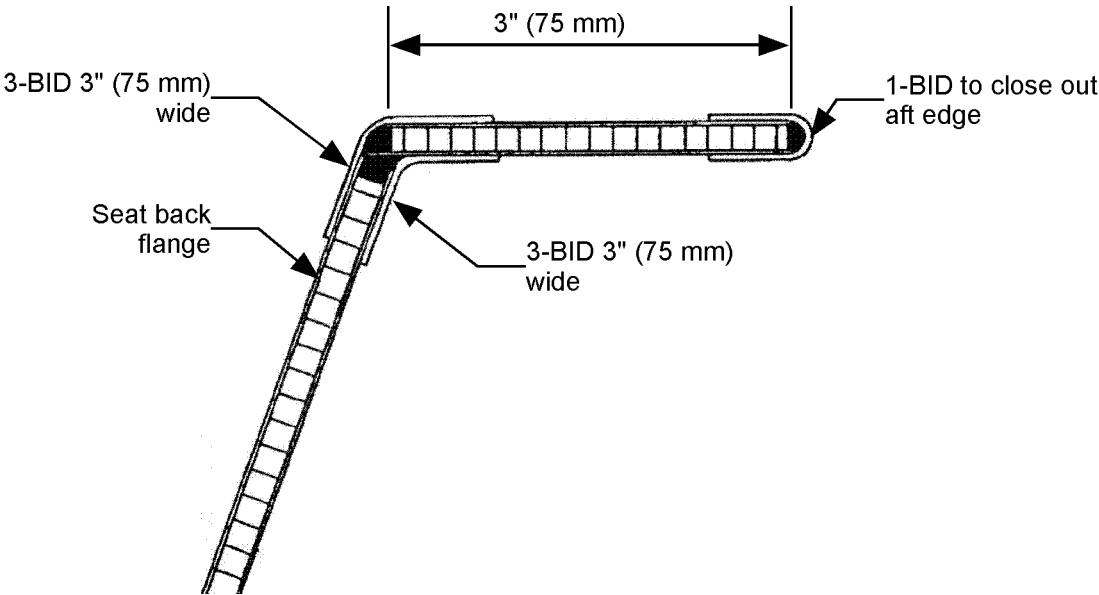
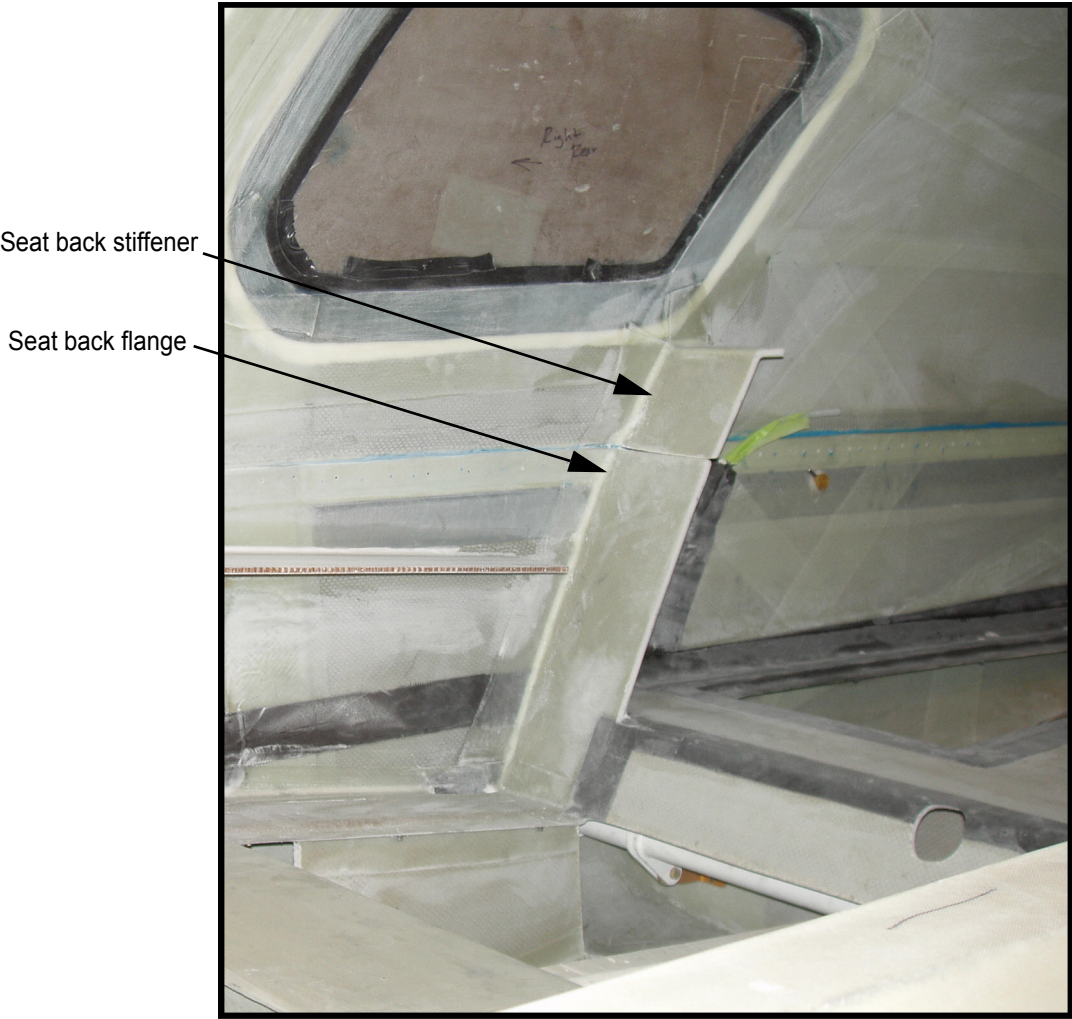


Figure 6.3.M.4 Seat back flange and stiffener



Now you can complete the installation of the last window that you left out in *Chapter 5 Installing the Windows and Windshield*