

CHAPTER 11

REVISION LIST

(Pressurized Version)



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

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

Page(s) affected	Current Rev.#	Action	Description
11-1	0	None	
11-1.1 thru 11-1.9	PB17	Add	Index to chapters 11/33 (FB)
11-2	PB13	R&R	Edited Fig. 11:i:1
11-3	P8	R&R	Fig. 11:i:1
11-4 thru 11-6	0	None	
11-7	PB13	R&R	Edited Fig. 11:A:1
11-8	PB13	R&R	Edited Fig. 11:B:1
11-9 thru 11-10	0	None	
11-11	PB13	R&R	Edited Fig. 11:B:2:c
11-12	PB13	R&R	Edited Fig. 11:B:3.
11-13	PB19	R&R	FS 242 is now 241, edited fig. and text
11-14	PB19	R&R	C3 cradle positions, fig. dim & FS station
11-15	PB19	R&R	Changed dims in figure.
11-16	PB19	R&R	Changed FS# to 241.
11-17	0	None	
11-18	PB13	R&R	Edited Fig. 11:C:5
11-19	0	None	



CHAPTER 11

JIGGING FUSELAGE



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 When such revisions are made, you should immediately replace all outdated pages with the revised pages.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

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 - B. Building fuselage jig stands
 - C. Positioning fuselage in cradles
4. PHOTO PAGES

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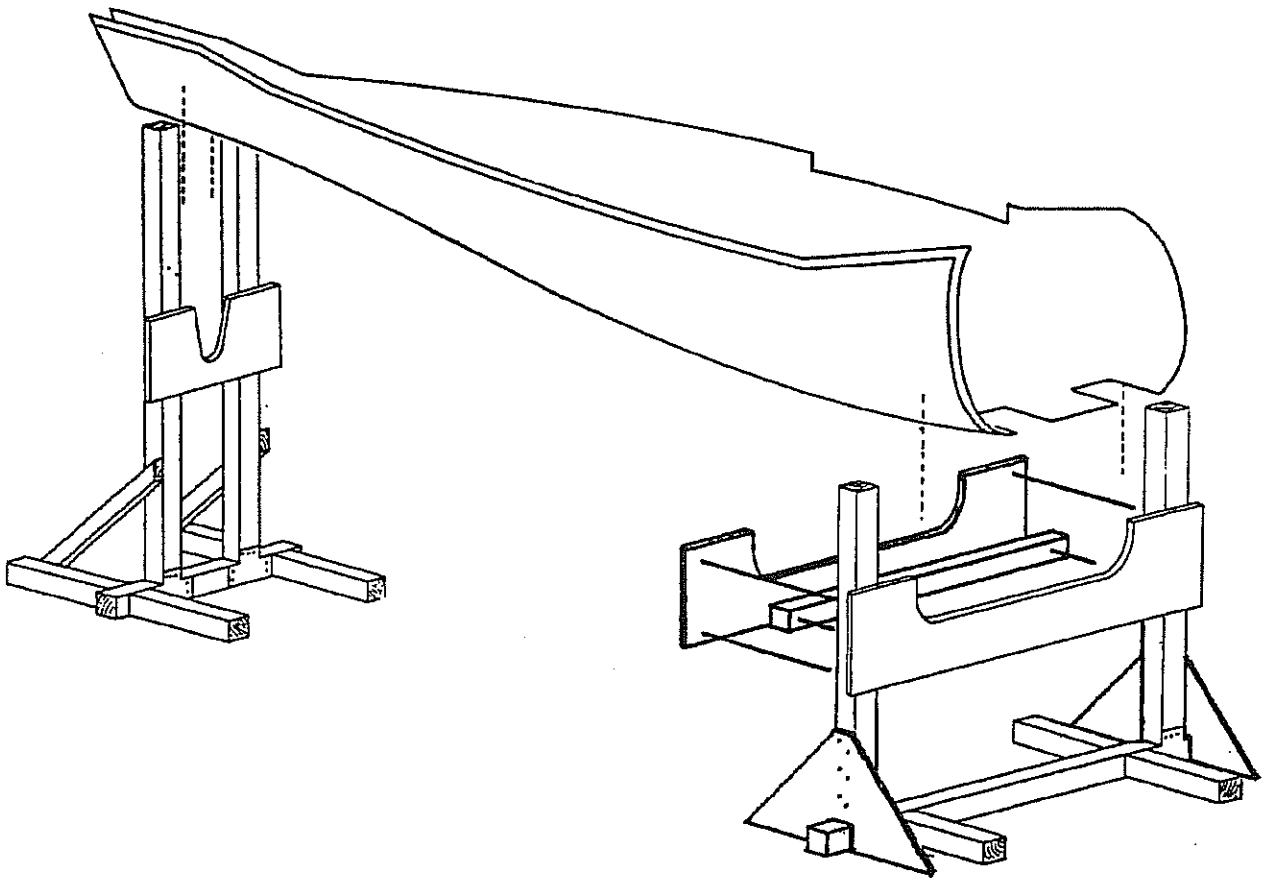
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1. INTRODUCTION

Jigging the fuselage of your Lancair IVP in position is a simple process. Three cradles are required to hold the bottom fuselage shell. The bottom shell will be mounted so you will be able to retract and extend the landing gear. The arc of the main gear legs during retraction is such that the bottom shell will be uncomfortably high for most builders. There is no way to get around the height requirement so if you use this method of supporting the fuselage we suggest you build a raised platform around your bottom fuselage shell to aid in builder comfort. The height of the platform should be decided by the builder.

The fuselage assembly jig

Figure 11:i:1



Another option is to jig your fuselage lower to install the bulkheads, firewall, engine mount, and gear box, then re-jig the bottom fuselage shell higher for installation and testing of the gear legs. Using the sturdy jig stands described in Section B, the raising and re-leveling of the fuselage is easy to accomplish.

From our experience, we highly suggest that you apply at least the first two coats of primer to your bottom fuselage shell **BEFORE** you secure it into the jig cradles. This will greatly decrease the amount of time you spend on your back sanding later in construction. After the fuselage is set into the cradles, it will not (or should not) be removed before the top fuselage shell is bonded to the bottom shell. So you can imagine the difficulty of rolling the heavy fuselage over or spraying primer upside down after the landing gear, electrical, and control systems have been installed.

Some helpful hints about spraying primer are included in Chapter 1 of the Lancair IV "A" manual. Depending on the brand of primer you are using, follow the manufacturer's instructions and suggestions for application. Don't apply primer to the joggled areas or the areas where the wing fillets will be installed.

Pick a construction area which is convenient and where you will not have to move the fuselage for quite a while. You should have enough room to install and remove both wings. Also be sure you have an exit route from your workplace that will accommodate the 11' wide horizontal stabilizer.

You'll be dealing with some new terms while building the fuselage as opposed to the wings and tail. Most of the parts in the fuselage are located using fuselage stations (FS) for fore/aft measuring and waterlines (WL) for height measurements. Be sure you are familiar with these terms as practically every part built into the fuselage is located from a WL or FS location.



2. SPECIAL PARTS, TOOLS & SUPPLIES LIST

A. PARTS

Bottom fuselage shell
Fuselage cradle Blueprints A-301 and A-302



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Jigging Fuselage

B. TOOLS

- Saber saw
- 4' carpenter's (bubble type) level
- Chalk line
- Carpenter's square
- Tape measure
- Hammer
- Table saw (nice for cutting 4 x 4's but not necessary)
- Transit
- Water level



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Jigging Fuselage



C. SUPPLIES

Bondo
Spray contact adhesive



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Jigging Fuselage

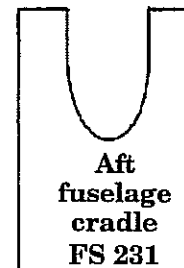
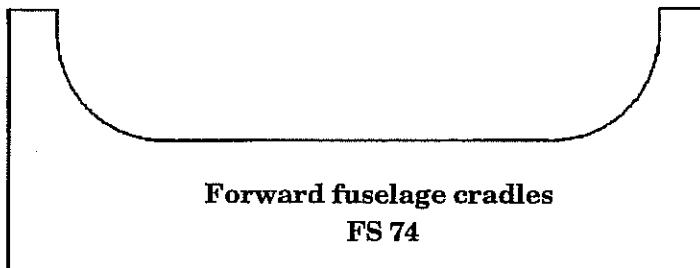
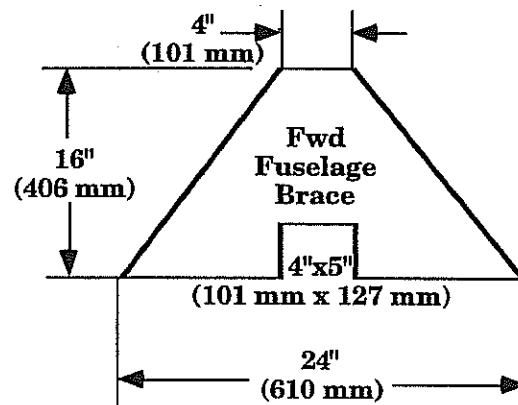
A. CUTTING FUSELAGE CRADLES

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.

- A1. Use spray contact cement to bond the fuselage cradle templates to two adequate sized 5/8" pieces of plywood. Use a good grade of plywood and try to pick a sheet with minimum warp.
- A2. Use a sabre saw to cut the fuselage cradles from the plywood.
- A3. Sand any rough edges of the cradle contours smooth. There will be a lot of weight on these cradles eventually, and you don't want any pressure points that may damage the carbon fiber.

Plywood fuselage cradles

Figure 11:A:1



All pieces are made from 5/8" thick plywood.

Use Blueprints A-301 and A-302 as templates for FS 74 and FS 231.

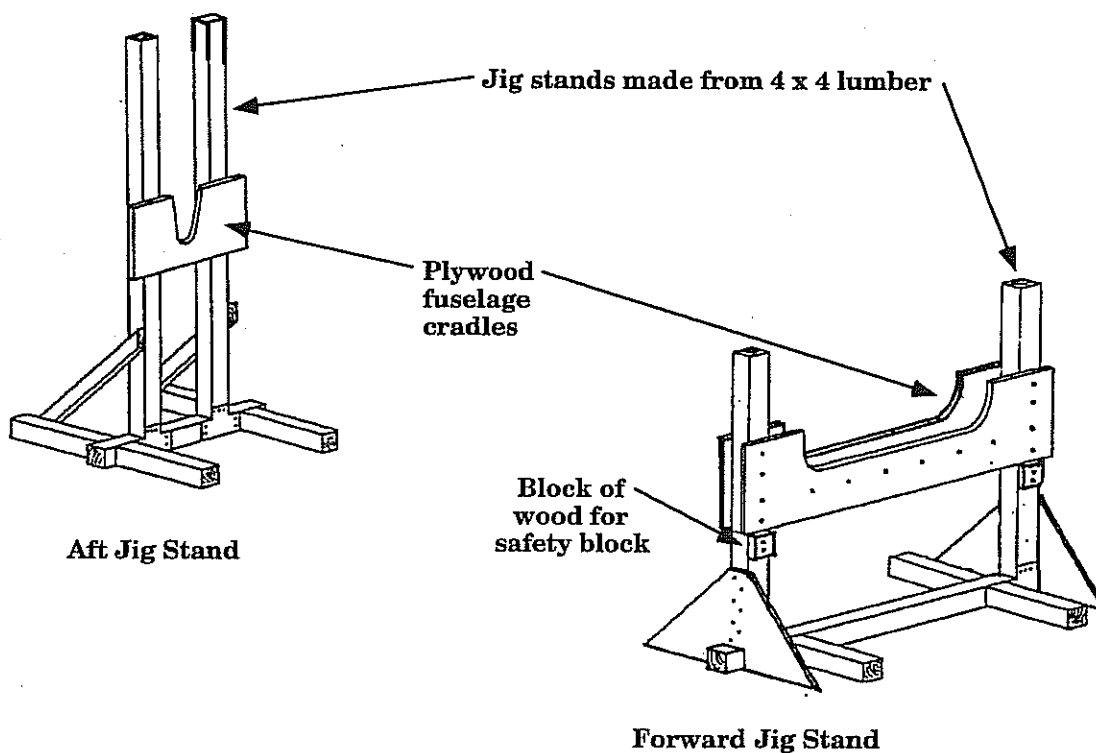


B. BUILDING JIG STANDS

The fuselage cradles are supported by two sturdy stands built from 4x4 lumber. Take your time and build these stands strong, they will be supporting your precious project for a long time. The stands are built purposefully tall so you can raise the fuselage for gear retraction tests or lower it for ease of construction.

Fuselage jig stands

Figure 11:B:1



You'll need to take a trip to the lumber yard and buy the following lengths of 4 x 4 and 2 x 4 stock.

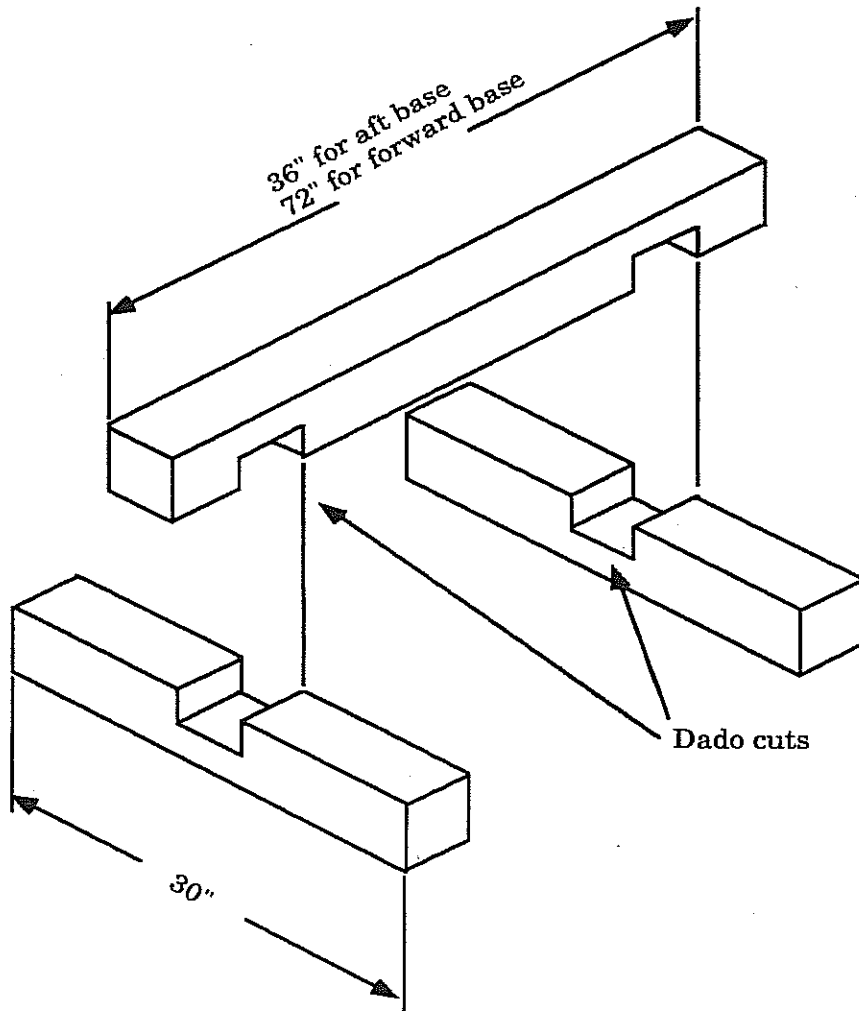
Quantity	Size
1	4" x 4" x 3'
4	4" x 4" x 6'
3	4" x 4" x 5'
4	2" x 4" x 2 1/2'



- B1. Cut the needed lengths of 4 x 4's and construct the base assemblies as shown in Figure 11:B:2:a, b, & c. Dado joints are required where the two short base pieces meet each long base piece. Use a circular saw or table saw and a wood chisel to make these joints.

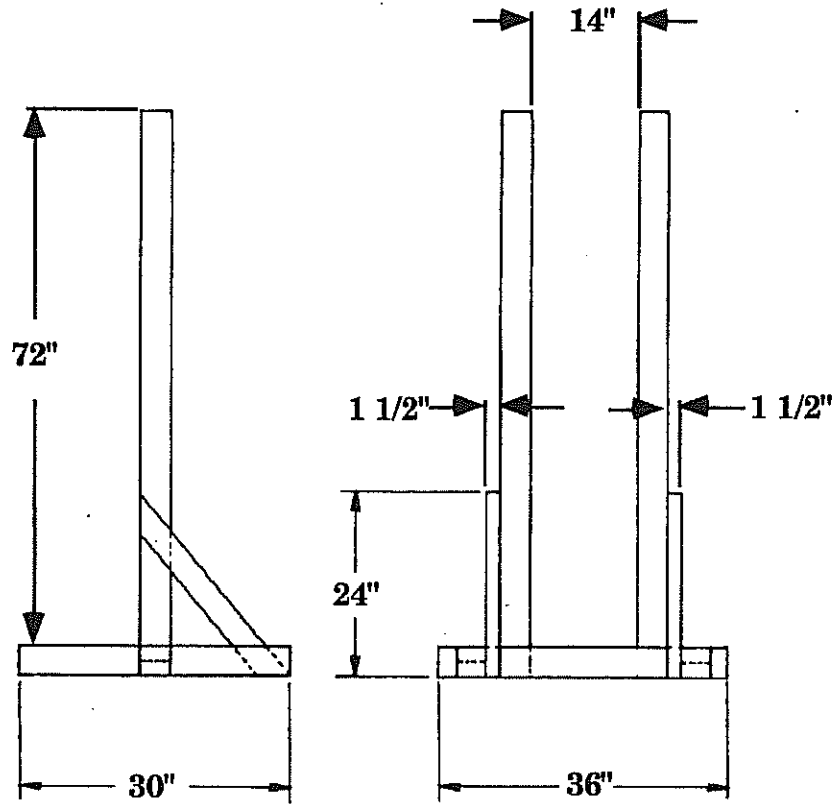
Base assembly construction

Figure 11:B:2:a



Dimensions for aft jig stand

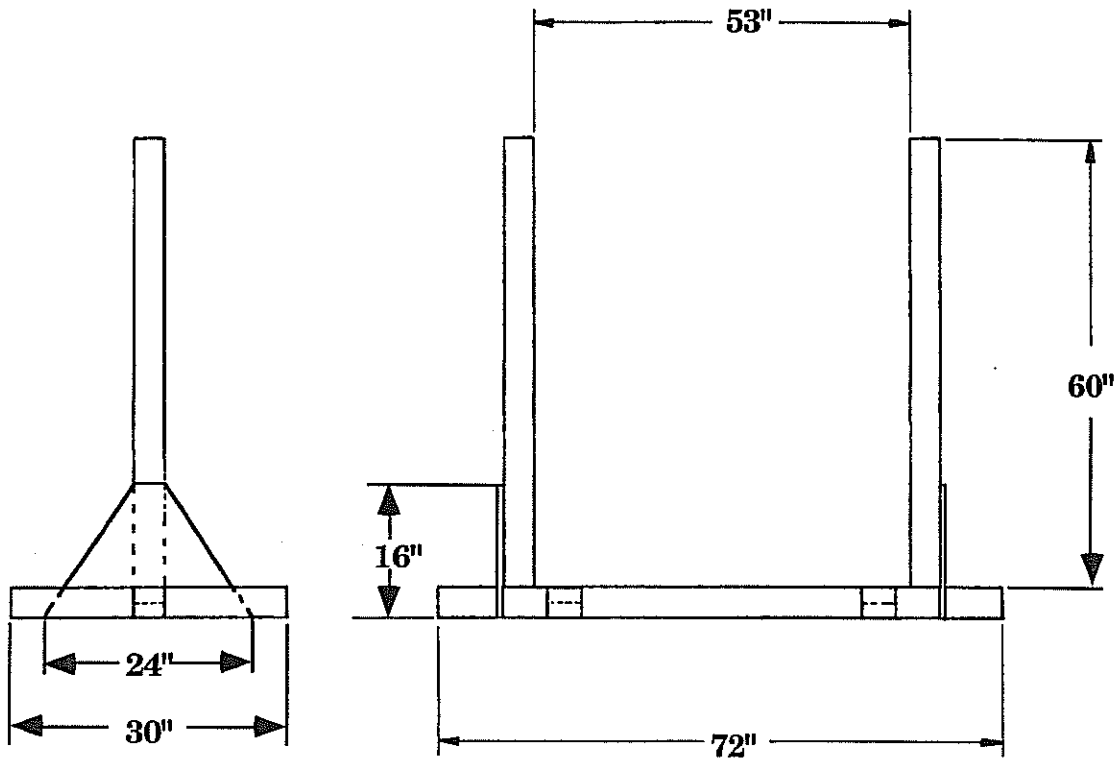
Figure 11:B:2:b



Aft jig stand

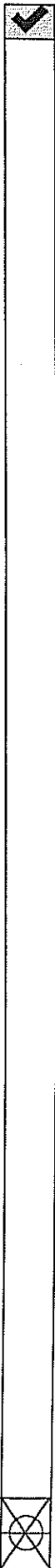


Dimensions for forward jig stand
Figure 11:B:2:c



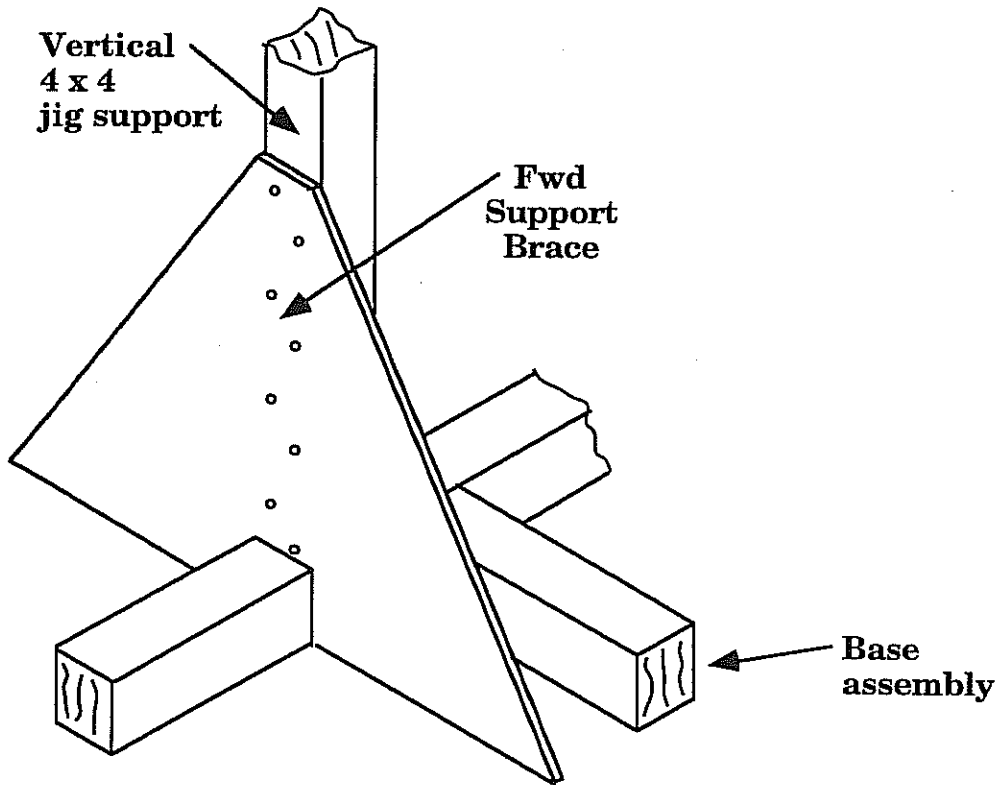
Forward jig stand

- B2. Mount the long, 4 x 4, vertical supports to the base assemblies using the metal brackets you bought at the hardware store. Use a bubble level to get these 4 x 4's close to vertical.



Mounting the vertical 4 x 4 fwd supports

Figure 11:B:3



Metal brackets secure vertical 4 x 4's to the base assemblies. Brackets available at hardware store.

- B3. Reinforce the vertical 4 x 4 supports with 2 x 4 braces for the aft jigging. Use the fwd support brace to reinforce the 4 x 4 supports on the forward jigging.

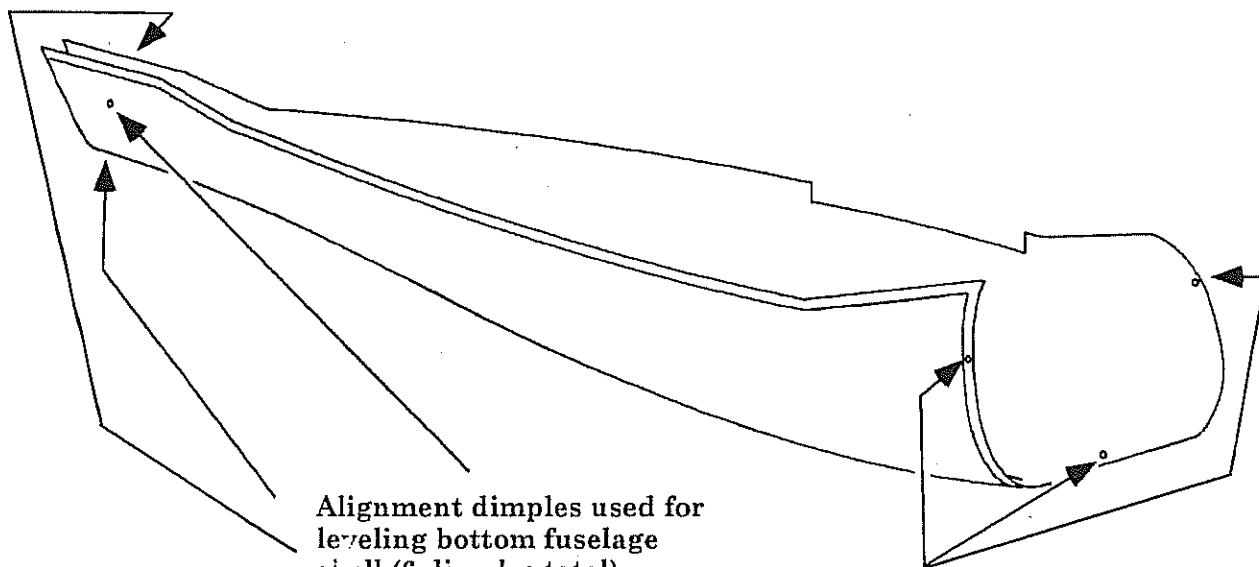
C. POSITIONING THE FUSELAGE IN THE CRADLES

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 the rear). Two more dimples are molded into the bottom of the fuselage at the centerline on the standard kit, but not the fast build.

You must now decide where to put your fuselage during its construction. It is best not to move the fuselage after it is aligned in the cradles, so pick an area where you can work on all sides of the fuselage. Keep in mind the additional space required for the engine mount and the vertical stabilizer assembly.

Alignment Dimple Locations on the Bottom Fuselage Shell

Figure 11:C:1



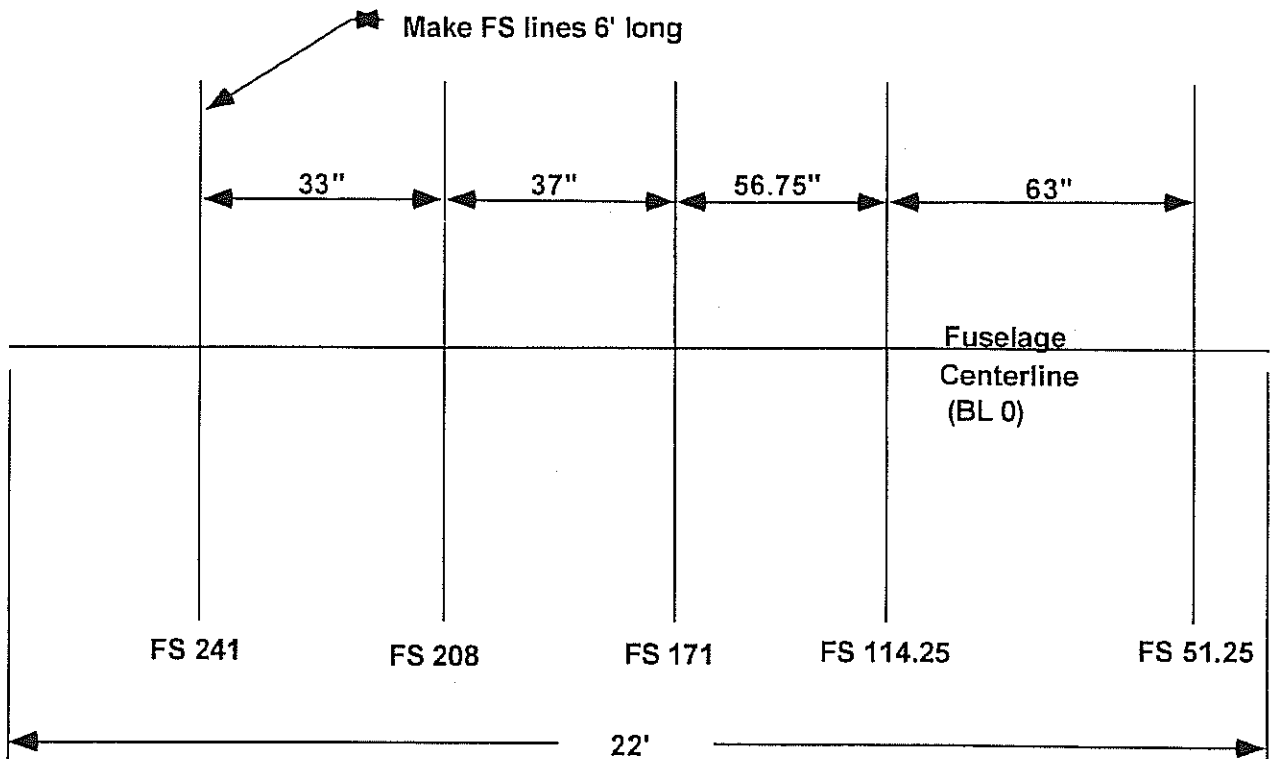
Alignment dimples used for leveling bottom fuselage shell (6 dimples total)

Fast Build Kits: Use the center engine mount bolt for the center dimple on the older kits.
For newer FB kits, use a point halfway between the two drilled holes on the bottom joggle.

- C1. When you have decided where to locate your fuselage during construction, draw a 20' long centerline mark on your shop floor. A carpenter's chalk line is best for this step. Be accurate and make a straight line because proper fuselage alignment is at stake. A clean, level shop floor will help.
- C2. Draw lines perpendicular too the centerline at FS (Fuselage Station) 51.25, FS 114.25, FS 171, FS 208, and FS 241. Confirm that your lines are perpendicular by triangulation (remember your geometry?).

Centerline and FS Line Pattern on Your Shop Floor

Figure 11:C:2

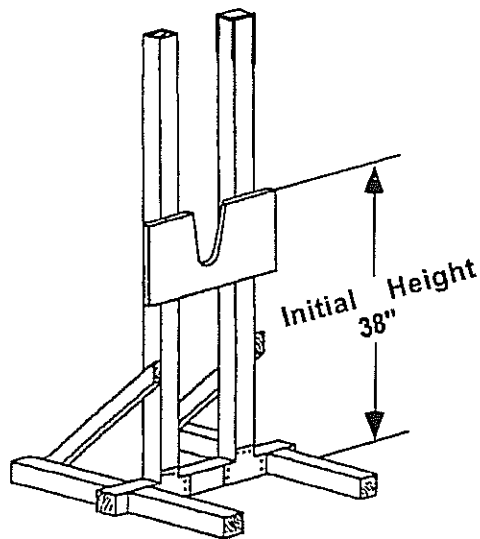


- C3. Clamp the forward and aft fuselage cradles to their respective supports.. For now, position the bottom of the forward cradle about 27" above the floor and the bottom of the aft cradle about 38" above the floor. These heights are rough dimensions at this time, you will adjust the cradles to their final position in the next few steps. See Figure 11:C:3.
- C4. Place the forward fuselage cradle and support over FS 74 and align it with the centerline on your shop floor. Align the aft cradle and support over FS 232.5. The centerline marks on the cradles are okay to use in this step for the initial placement of the cradles but should not be considered as perfectly accurate. You will adjust these cradles again in the next few steps after the fuselage is placed in position.

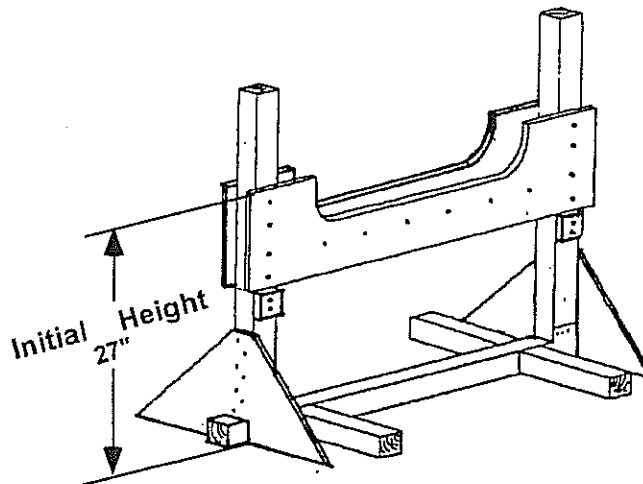


Initial Placement of the Fuselage Cradles

Figure 11:C:3



Aft Jig Stand



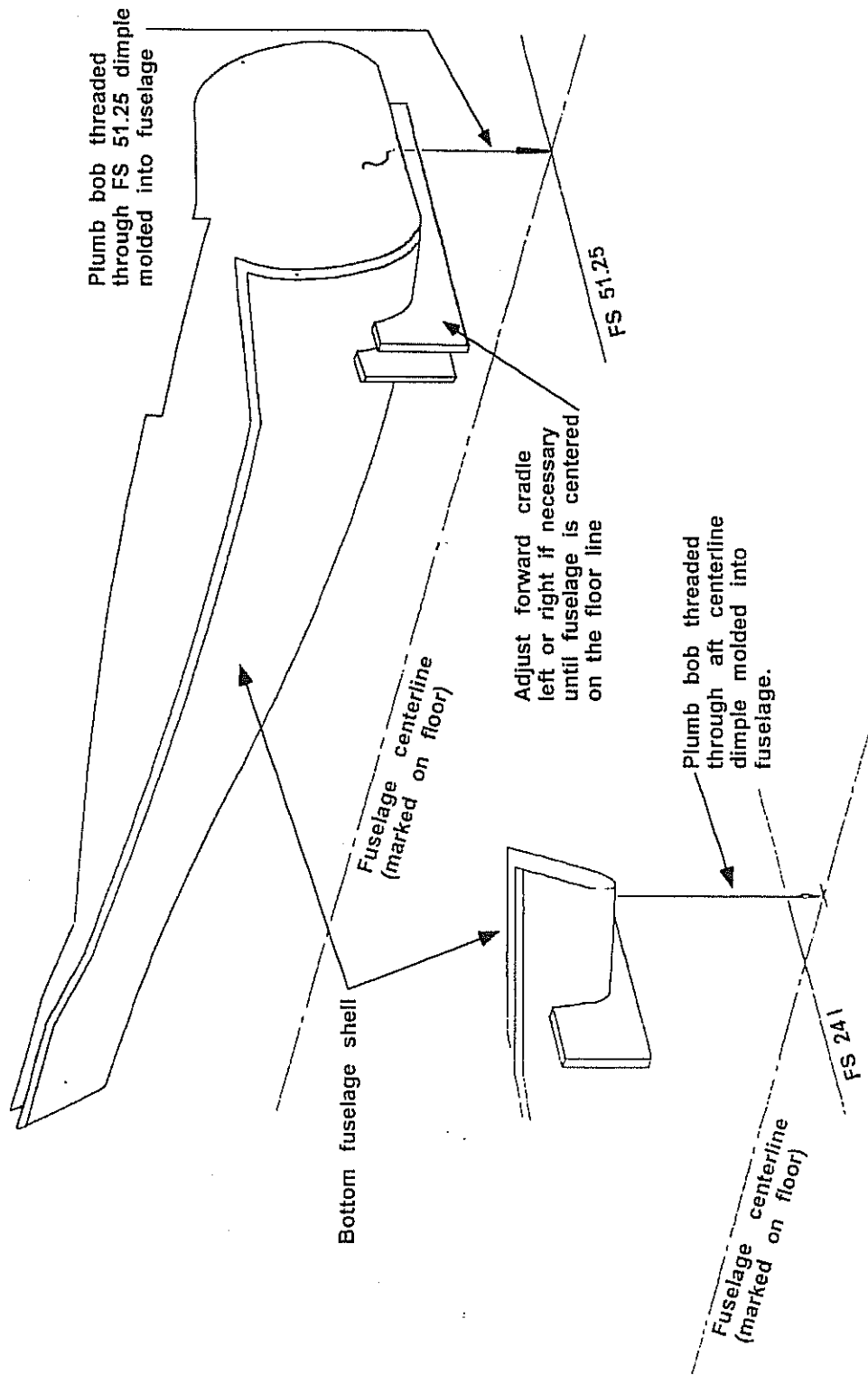
Forward Jig Stand

Exact cradle locations will be determined when the bottom fuselage shell is set in place. These initial heights will be close for the final positioning.

- C5. Now set the bottom fuselage shell in the cradles. Use a plumb bob to align the forward centerline dimple of the fuselage over the FS 51.25 mark on your shop floor. You can drill a 1/8" hole through each centerline dimple through which to feed a plumb bob string. The aft fuselage centerline dimple should also be plumbed to the floor centerline. Adjust the cradles left or right if necessary to properly center the fuselage.
- C6. Do the cradles fit the curve of the fuselage? Probably not perfectly. This is a good time to make custom fitting jig cradles by applying release tape to the bottom surface of the fuselage, where it rests on the cradles, and applying 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. Realign the fuselage to the floor centerline and continue the leveling process.

Aligning the Fuselage Over the Floor Centerline and FS 51.25

Figure 11:C:4



11-16

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Jigging Fuselage (Pressurized Version)





C7. To level the bottom fuselage shell in the pitch and roll axis, use the four dimples molded into the fuselage sides. A good water level or a transit are the best tools for this job. Choose one dimple (i.e. forward left) and level the rest to it. When you adjust the cradles to align the dimples, go back and recheck the original dimple to make sure it has not moved. When the four side dimples are level with each other, and the two centerline dimples are plumb over the floor centerline, your fuselage should be positioned properly.

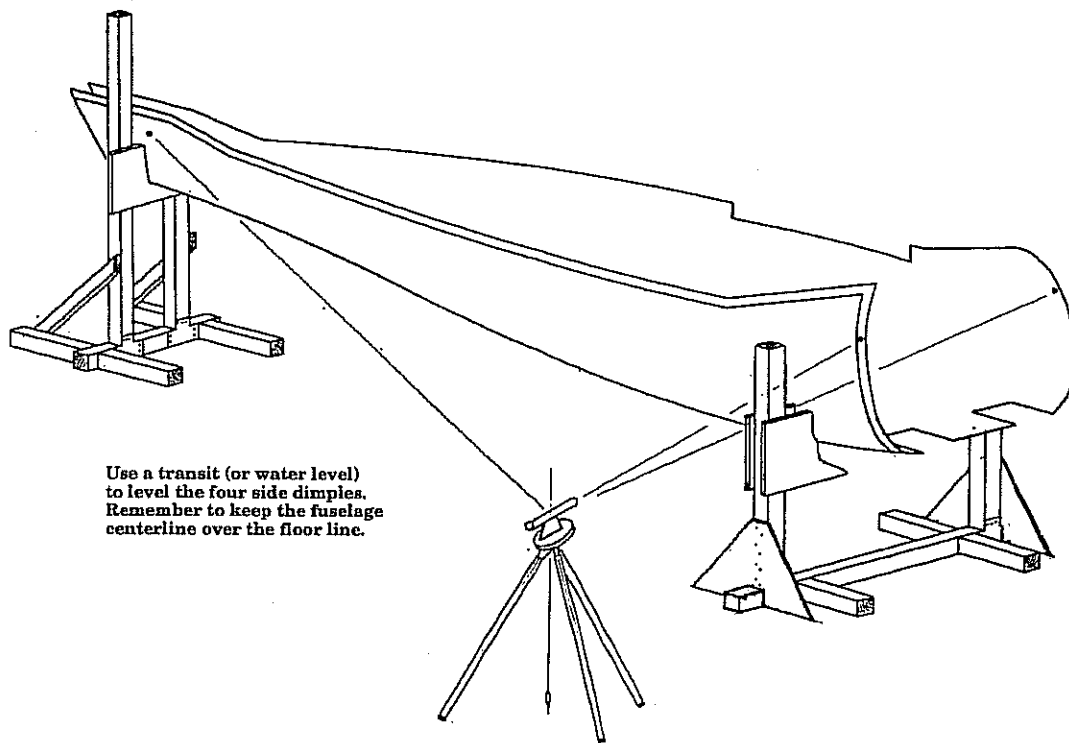
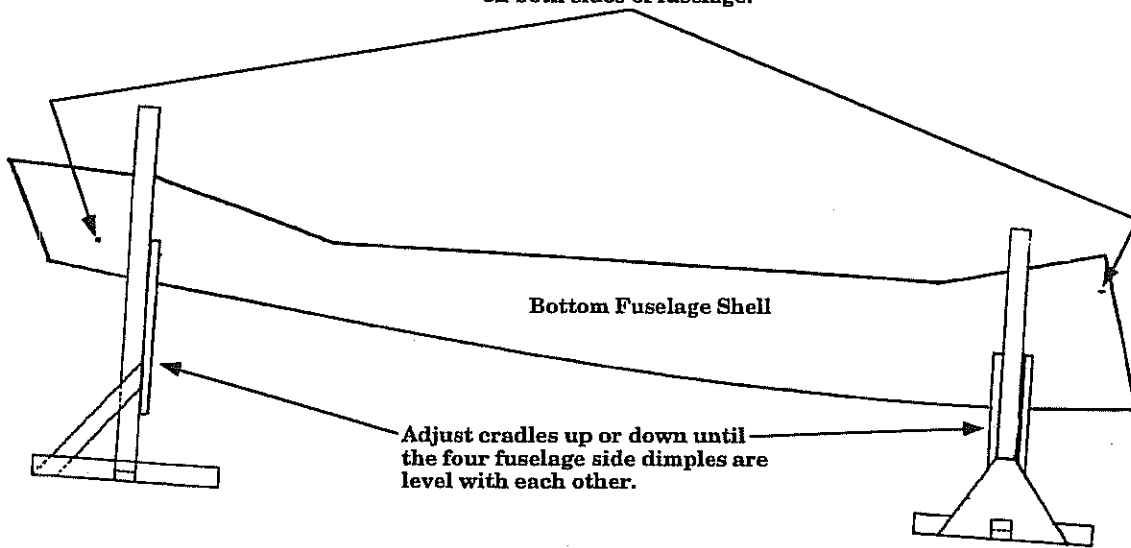
Note: An error of +/- 1/8" is acceptable when leveling the fuselage. The airplane wouldn't even feel this small of a deviation. Don't try to get the fuselage aligned to within a thousandth of an inch, this has needlessly frustrated many builders in the past.



Leveling fuselage with four side dimples

Figure 11:C:5

Fore and aft alignment dimples should be level with each other on both sides of fuselage.



- C8. When satisfied that your fuselage is level and aligned with the centerline, secure the cradles to their supports with a couple wood screws. Apply a few blobs of Bondo to secure the cradle supports to your shop floor so you won't accidentally kick the supports and cause a misalignment. The adhesion from the release tape/Bondo filling you did in Step 6 should hold the fuselage firmly in the cradles. If in doubt, you can add a few Bondo blobs to the fuselage/cradle junction just to make sure.

