

CHAPTER 5

ALIGNING WINGS IN CRADLES



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 When such revisions are made, you should immediately replace all outdated pages with the revised pages. Discard the outdated pages.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 particular assembly step. However, time goes on and changes are made, so careful attention should be paid to the orientation arrows. That old cartoon of the guy agonizing over the plans for his canoe, built one end up, one end down, should not happen in real life. Especially to you.

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1. **INTRODUCTION**

There are two wing spars. The Main Wing Spar mounts in the forward portion of the wing and assumes the supporting load, and the Aft Spar mounts near the trailing edge and is primarily to absorb twisting loads. The main spar is a C-Section spar. There is a box section that the factory glues together to make a box beam, and then the entire main spar is glued into the top wing skin. The main spar bolt holes are pre-drilled by the factory for the proper dihedral, so the wings do not require a full length jig.

Chapter 5 was originally written for the standard kit. With most of the work completed on the IV Fast-build, it has become a short chapter.



2. SPECIAL PARTS, TOOLS & SUPPLIES LIST

A. PARTS

Qty	Description
1	Left wing
1	Right wing
2	Rear spar bolt plate (1/4" thick) P/N SP 101-01
8	MS24694-S103 countersunk screws
8	AN365-428A locknut
8	AN960-416 washers
1	AN6-10A rear spar bolt (for alignment only)
2	Rear spar bolt plate (1/8" thick) P/N SP 101-02

B. TOOLS

Weight bags
Heat gun
Mat knife
Plumb bob
Drill motor with bits;
 1/4" drill bit
 3/8" drill bit

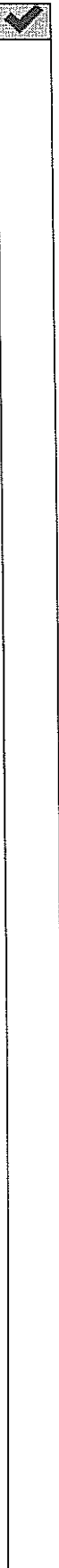
C. SUPPLIES

Instant glue
12 Small wood blocks (1" x 1" x 1'2")
20 Weight bags - we used 25 bags of lead shot (500 lbs.) to do 2 wings at once**
Bondo™
Sandpaper, #40 grit
Microballoons
BID tapes
Epoxy
Flox
MC

Jeffco 9700 fuel tank sealer

Paint brush

**You might try to make a deal with a reloading shop to 'rent' some bags of shot until you're finished with the wings, or perhaps a buy-sell-back arrangement.





3. CONSTRUCTION PROCEDURE

A. POSITIONING THE UPPER WING SKIN AND MAIN SPAR

The wing must be assembled in the wing cradle assembly. Prior to assembly the wings must be positioned in the cradle. This includes a fore/aft alignment and inboard/outboard alignment.

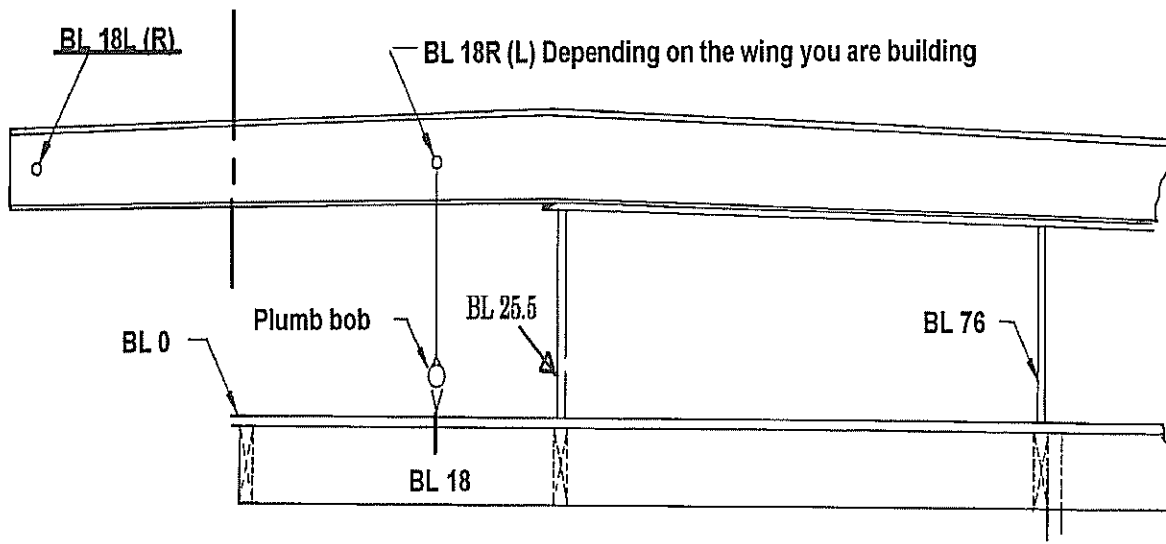
Note: Be sure all peelply is removed from the wing skin before proceeding.

Inboard/Outboard Alignment

- A1 The predrilled main spar mounting bolt bushing holes are both located 18" off centerline, at BL 18 left and BL 18 right. You will line up your wing using the hole closest to the wing tip. See Figure 5:A:1. The inboard edge of the wing skin has been pre-trimmed, and should be within 1/8" of being flush with the inboard edge of your BL 25.5 jig cradle. It should not be outboard of the inboard edge of the cradle.

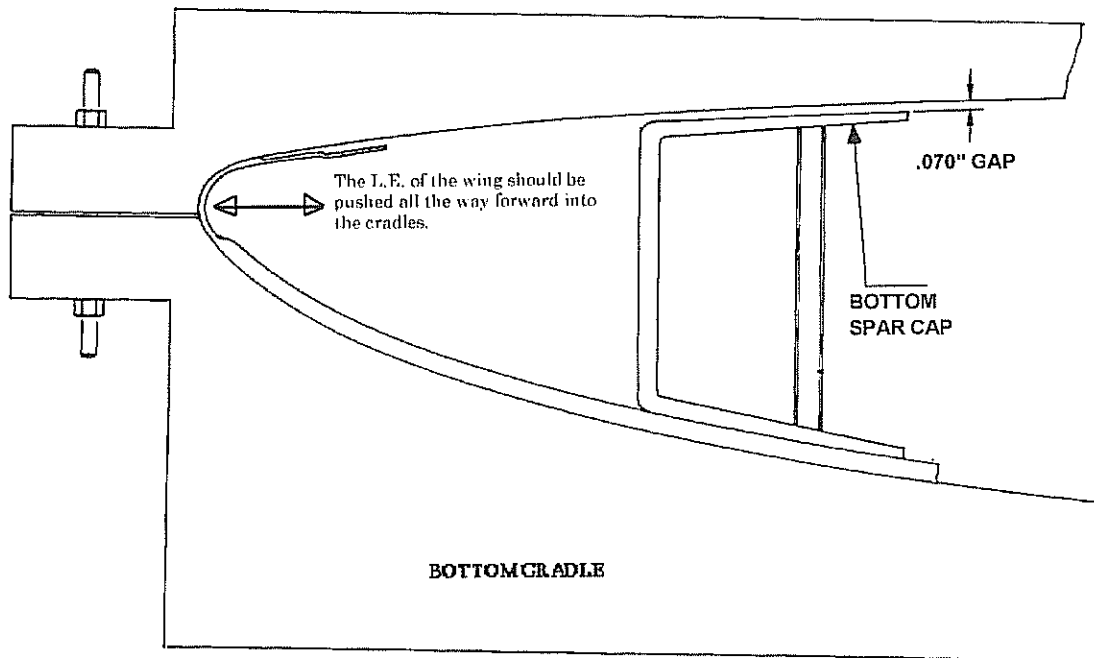
Positioning Skin in Cradle- Inboard/Outboard Alignment

Figure 5:A:1



Positioning Skin in Cradle- Fore/Aft Alignment

Figure 5:A:2



- A2. The leading edge of the wing should be pressed into the cradle and be the basis for the alignment, since it is the most rigid part of the assembly at this point, and will not require any trimming (the trailing edge will require some trimming later).
- A3. Weight the skin down with shot bags until it is in full contact with the cradle. The skins tend to curl slightly, so you will probably have most or all of the weight on the leading and trailing edges of the wing skins to hold them against the cradle. Visually inspect the fit between the upper wing skin and the cradles. The upper skin should conform nicely to the cradles. However, it is not uncommon to have to use some weight to "make" it fit into place.
- A4. Secure the wing to the cradle with small fillets of Bondo™ between the top skin and cradles. In the bonding surfaces we recommend dewaxing with MC and gently scuffing it up to get a better bond.
- A5. Trim the inboard end of the upper wing skin to BL 25.5. BL 25.5 is the inboard face of the BL 25.5 cradle. Make the cut slightly inboard and hand-sand up to the cradle. (When the wing is closed and still in the cradles, the lower skin will be trimmed).

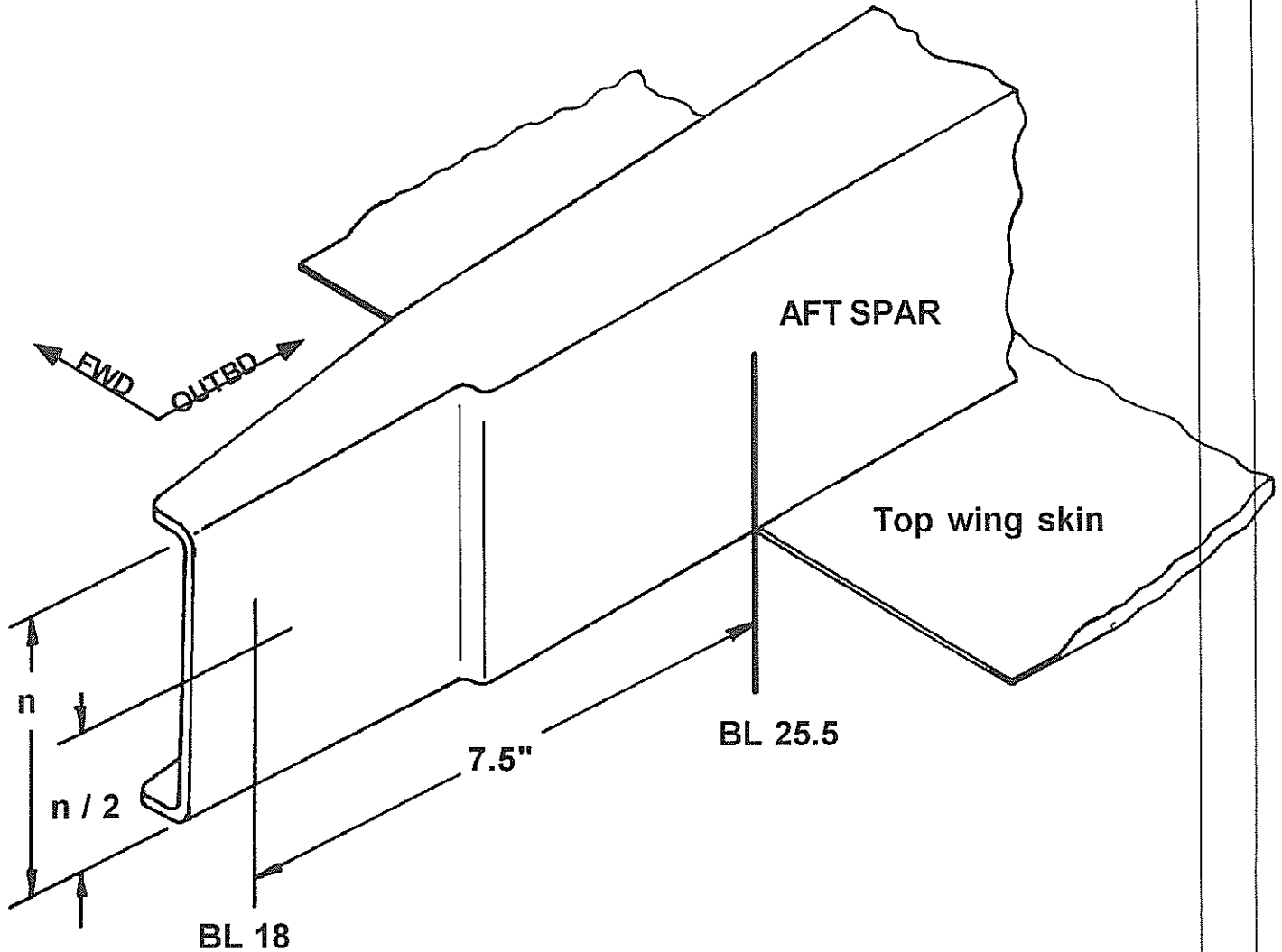
CAUTION: BE CAREFUL NOT TO CUT INTO THE SPAR CAPS WHEN PERFORMING THIS STEP. (The uni-directional spar cap is one of the few things that can not be repaired if damaged!)

B. REAR SPAR BOLT PLATE INSTALLATION

Although it is not necessary for you to install the rear spar bolt plates at this time (you won't need them until mating the wing to the fuselage), we will describe the process now, while the wing is still in the fixture.

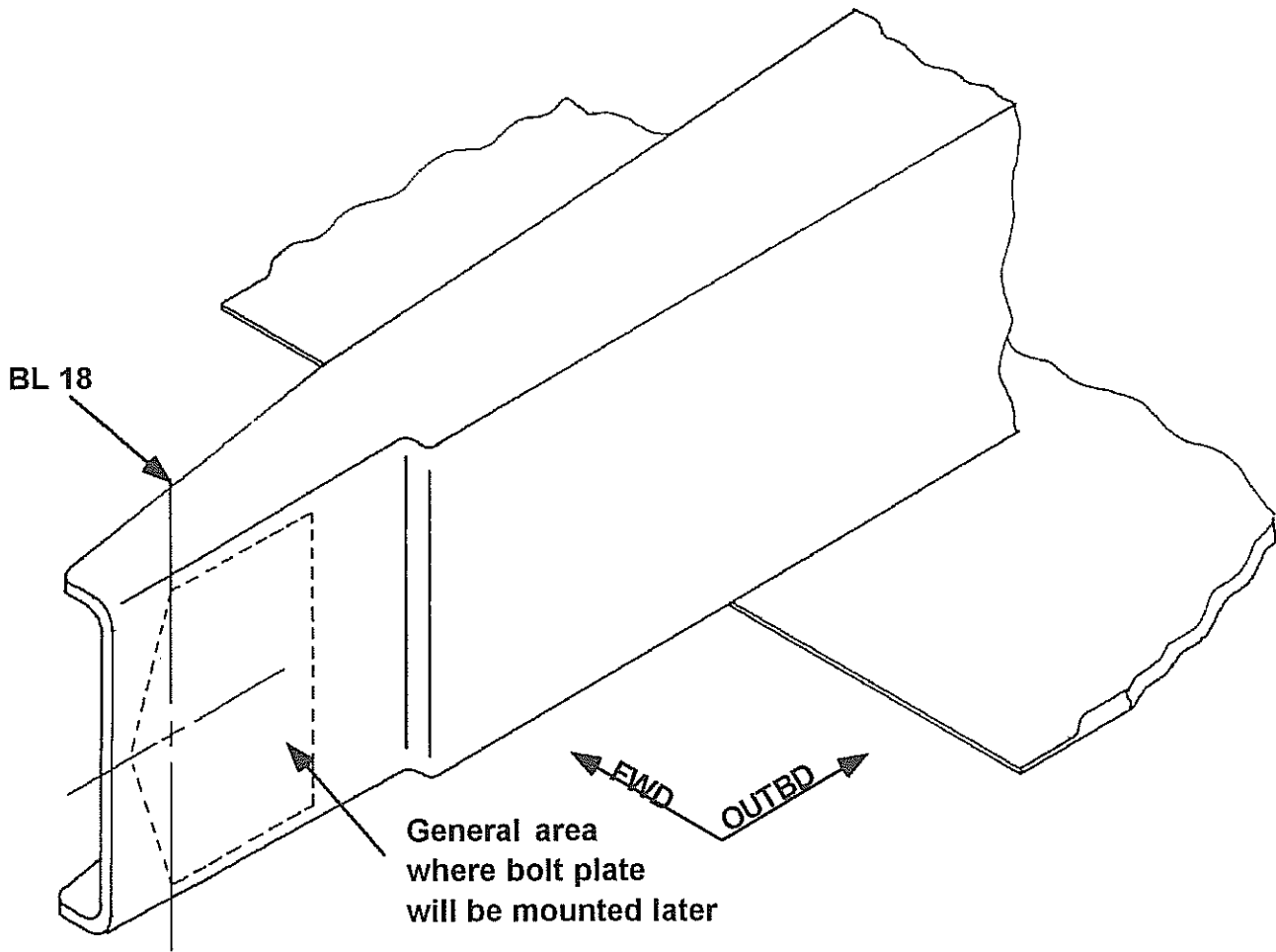
Measuring for Aft Spar Bolt Hole

Figure 5:B:1



Aft Spar Bolt Plate Position

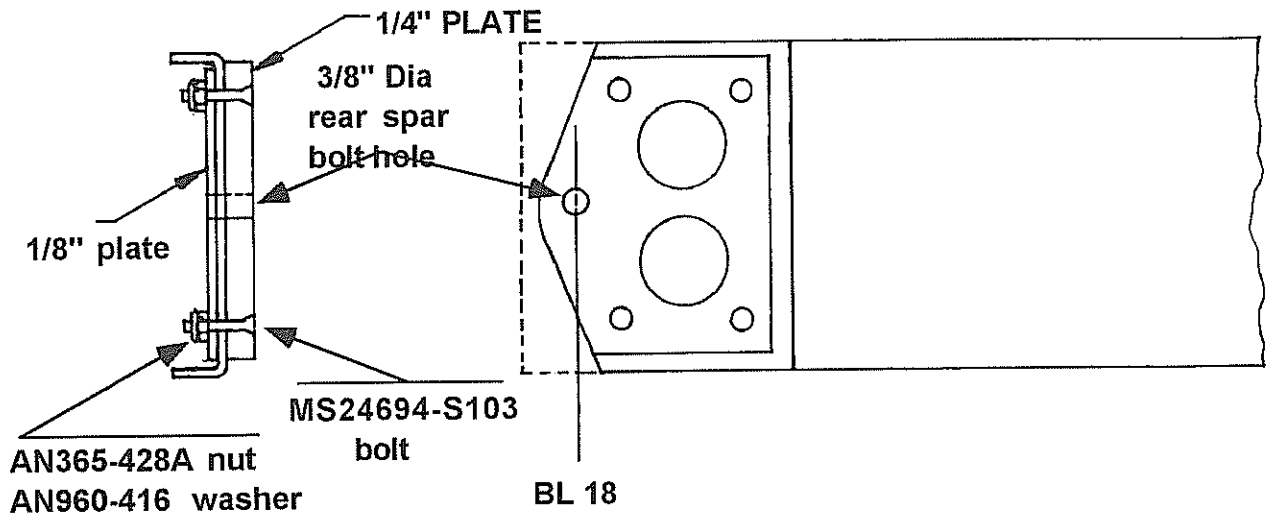
Figure 5:B:2



- B1. Draw a reference line at BL 18 as shown in Figure 5:B:1. The bolt will be centered vertically on this line. Measure the height of the spar at this location and divide by 2.

Aft Spar Bolt Plates

Figure 5:B:3



- B2. Drill a 3/8" hole through the rear spar for the rear spar bolt at the location of step B1.
- B3. Align the aft bolt plate, the 1/4" thick one, on the rear spar bolt hole you just drilled. Slip an AN6-10A bolt through the plate and spar to maintain alignment. The top and bottom edges of the bolt plate should be roughly parallel to the top and bottom spar caps. Use instant glue to tack the aft plate into position.
- B4. Using the aft bolt plate as a guide, drill the 1/4" mounting bolt holes through the rear spar web.
- B5. Use MS24694-S103 countersunk screws to secure the bolt plate to both sides of the spar. If the top or bottom edge of the forward plate, the thin one, tends to ride up on the radius between the spar cap and web, simply file an equal radius on the bolt plate edge. The bolt plates **MUST** rest flat against the spar. See Figure 5:B:3.
- Note: The AN6 bolt provided in the "A" kit is not actually used as the rear spar bolt. Correct size bolt will be provided in the "B" kit.
- B6. You can trim the inboard edge of the rear spar flush with the bolt plates. Remember though, don't trim any material that will be sandwiched between the bolt plates, even where the lightening holes are cut in the plates.