# REVISION LIST

# CHAPTER 7: AIRCRAFT ALIGNMENT JIG

The following list of revisions will allow you to update the Legacy 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 shows and "R" to remove the pages.

| PAGE(S) AFFECTED | REVISION # & DATE | ACTION | DESCRIPTION |
|---|---|---|---|
| 7-1 through 7-12 | 0/02-15-02 | None | Current revision is correct |
| 7-1 | 3/12-15-04 | R&R | Updated table of contents with page numbers. |

# Chapter 7: Aircraft Alignment Jig

Contents



## 1. INTRODUCTION

The Aircraft alignment jig aligns the wings to the fuselage to the horizontal to the vertical. The jig is used in the subsequent chapters during the installation of these parts.

## 2. PARTS LIST

| # | PART NO. (P/N) | QTY | DESCRIPTION | OPTIONAL ITEM *(not included with kit)* |
|---|---|---|---|---|
| **WING JIG** | | | | |
| 1) | BP-4423 | 2 | Blueprint, WS 46.16 Cradle | |
| 2) | BP-4424 | 2 | Blueprint, WS 137.2 Cradle | |
| **AFT FUSELAGE** | | | | |
| 1) | BP-4415 | 1 | Blueprint, Aft Fuselage Cradle | |
| 2) | BP-4421 | 2 | Blueprint, BL 21 H. Stab. Cradle | |
| 3) | N/A | 2 | Aft Fuselage Cradle Mounting Plates | |
| 4) | AN3-5A | 6 | Bolts, Undrilled | |
| 5) | AN365-1032A | 6 | Nut, Nylock | |
| 6) | AN960-10 | 6 | Washers, Flat | |
| **VERTICAL TAIL SUPPORTS** | | | | |
| 1) | BP-4416-01 | 1 | Blueprint, Top Vertical Cradle | |
| 2) | BP-4416-02 | 1 | Blueprint, Lower Vertical Cradle | |

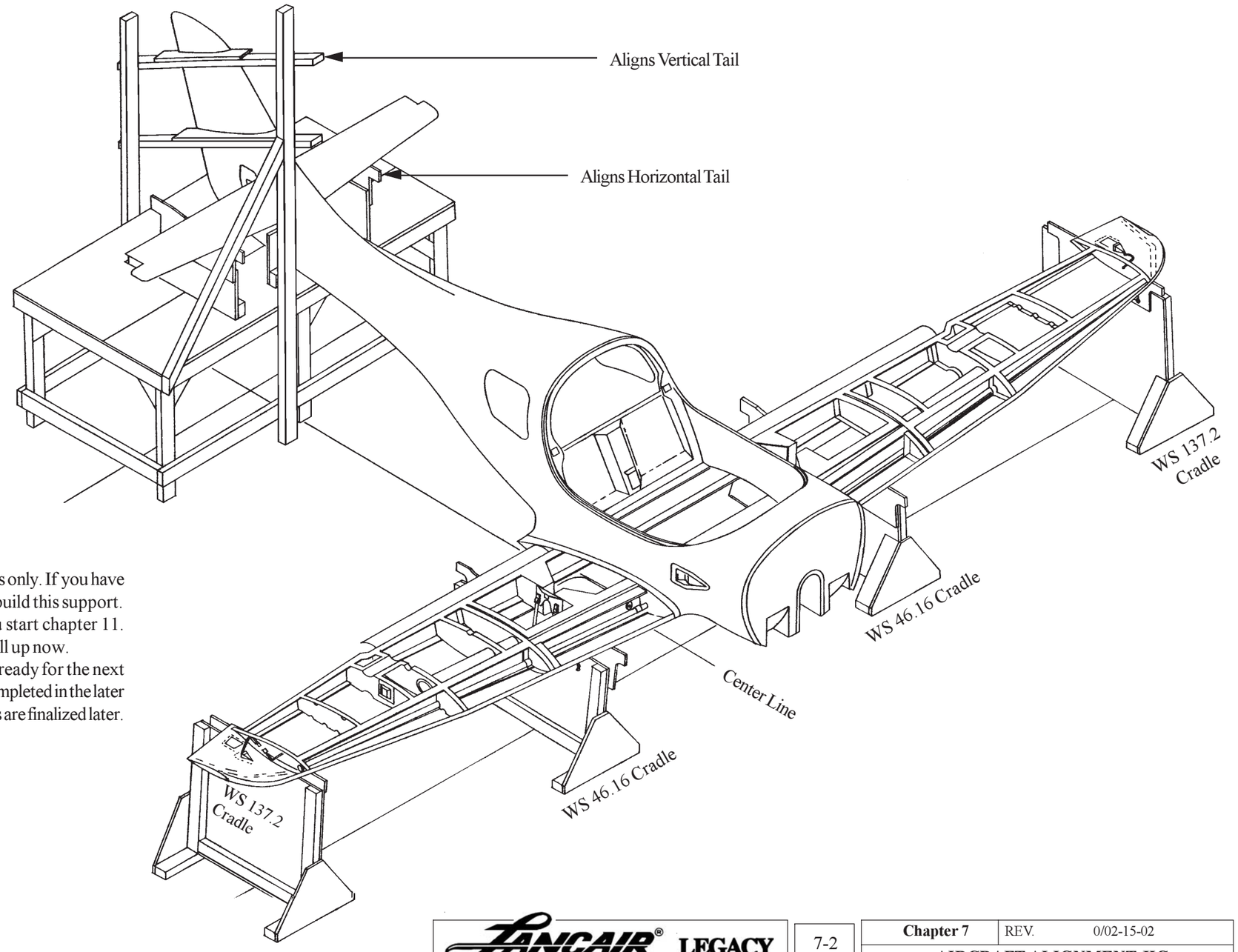
## Supplies List

| QTY | DESCRIPTION |
|---|---|
| A/R | Wood |
| A/R | Wood Screws |

**Note:**

**Optional Parts available through :**
**(*) Lancair Avionics**
**(**) Kit Components, Inc.**

**Aircraft Alignment Jig Introduction**
**Fig. 7:A:1**




**A few important notes before getting started:**

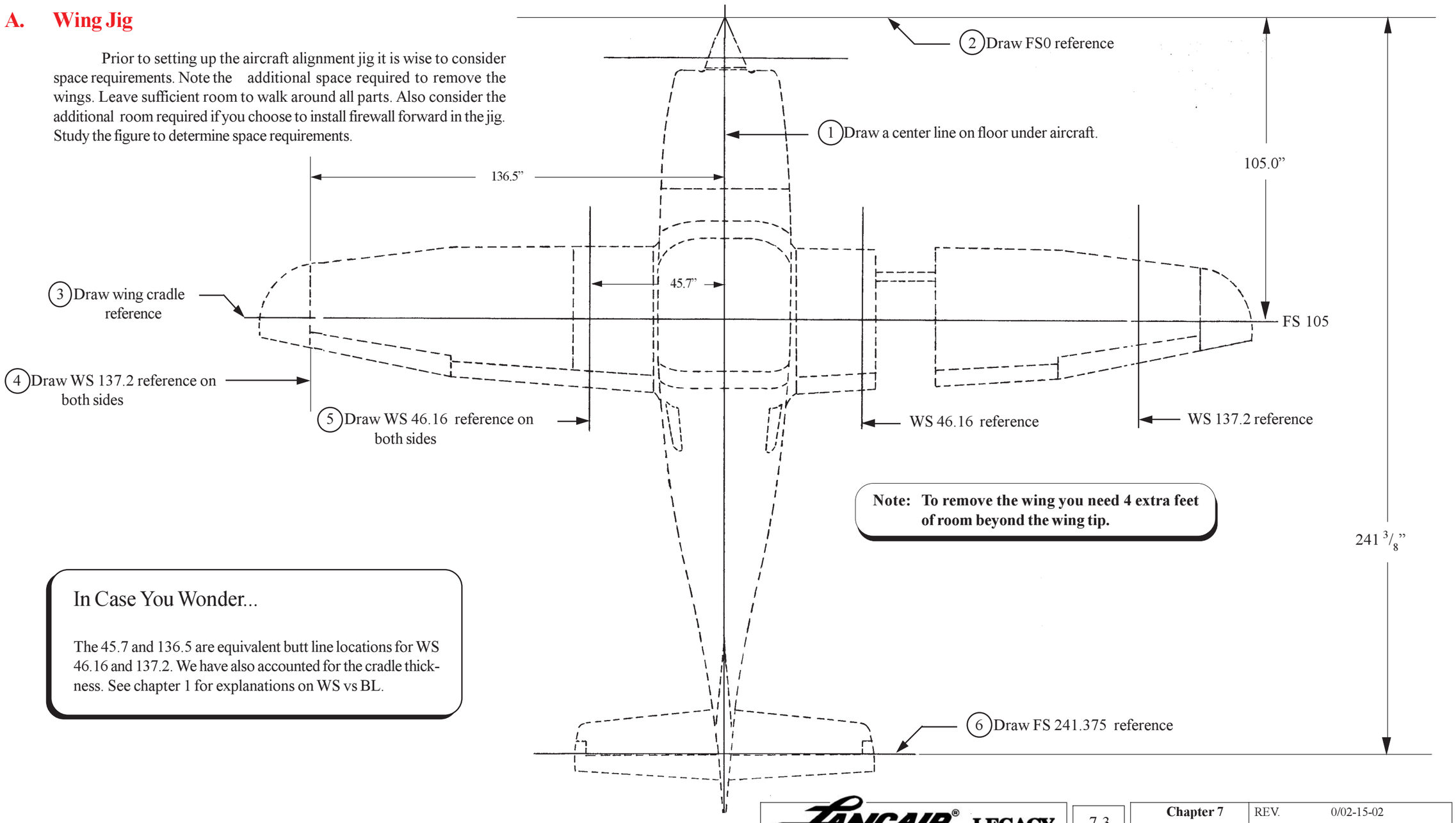
1. The 137.2 cradle supports are used for closing the wings only. If you have been to the builders assist program you don't need to build this support.
2. You don't need to build the aft alignment jig until you start chapter 11. However if you have the room, we suggest you set it all up now.
3. The purpose of this chapter is to get the alignment jig ready for the next chapters. Some of the final alignments to the jig will be completed in the later chapters. The text will specifically state which alignments are finalized later.

# 3. CONSTRUCTION PROCEDURES

## A. Wing Jig

Prior to setting up the aircraft alignment jig it is wise to consider space requirements. Note the additional space required to remove the wings. Leave sufficient room to walk around all parts. Also consider the additional room required if you choose to install firewall forward in the jig. Study the figure to determine space requirements.

**Shop Lay out**
**Fig. 7:A:2**



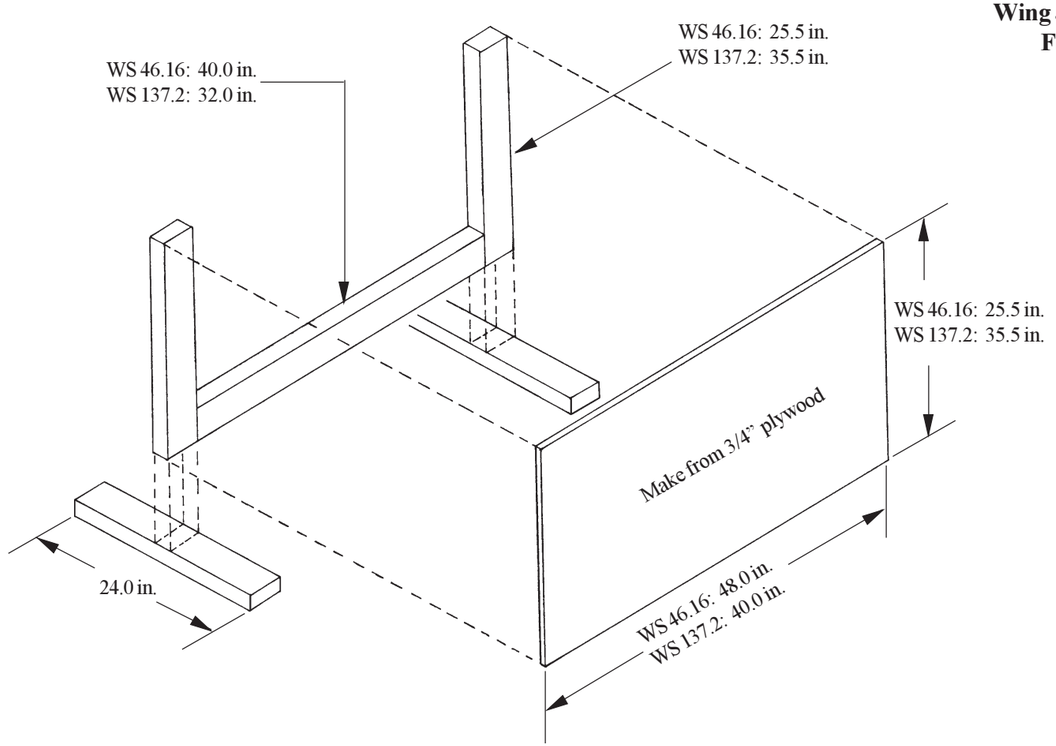

**Note: To remove the wing you need 4 extra feet of room beyond the wing tip.**

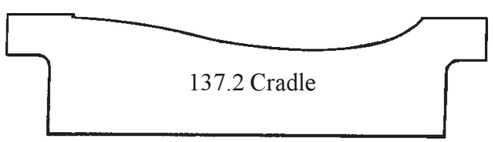
### In Case You Wonder...

The 45.7 and 136.5 are equivalent butt line locations for WS 46.16 and 137.2. We have also accounted for the cradle thickness. See chapter 1 for explanations on WS vs BL.

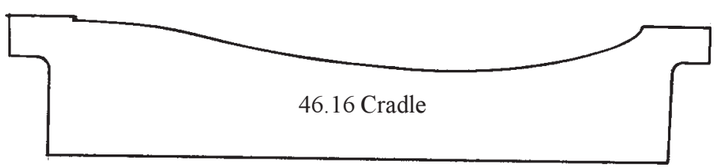
There are a total of four (4) supports for the wing, 2 at the WS 46.16 and 2 at WS 137.2. Note that there are 2 sets of dimensions given: One for the WS 46.16 support and one for the WS 137.2 support.

**Wing Jig Supports**
**Fig 7:A:3**

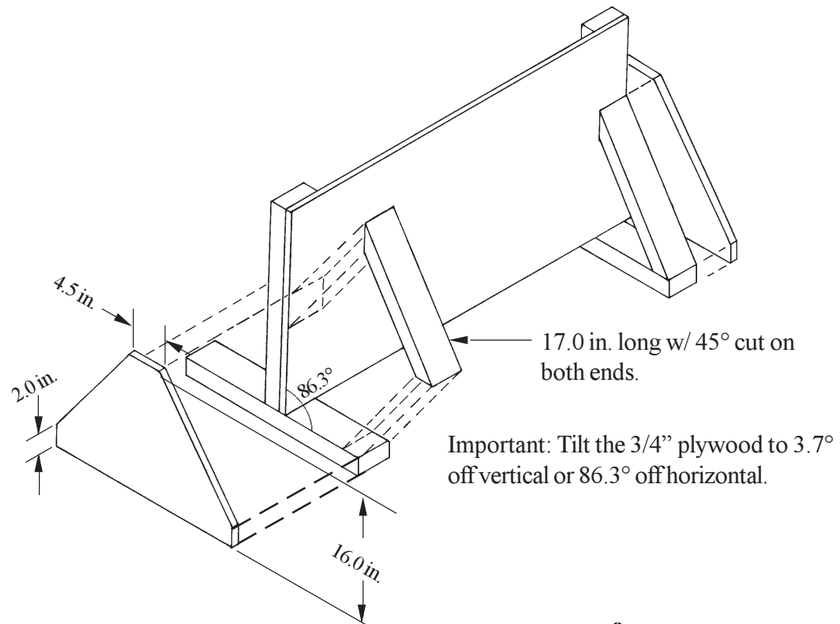



Cut 2 pieces from 3/4" plywood or particle board

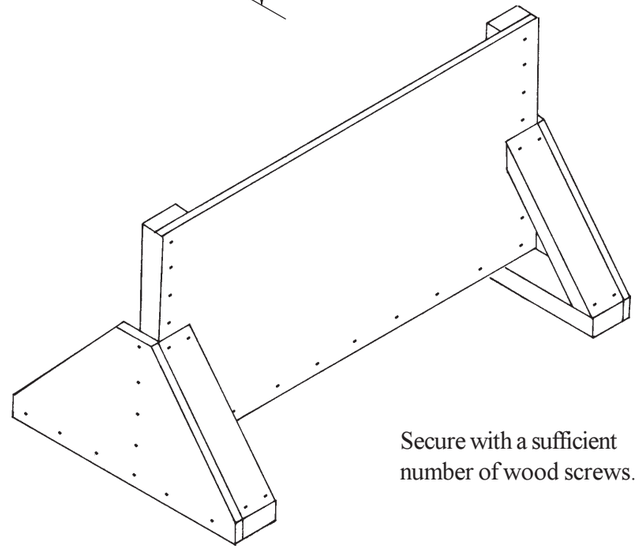



Cut 2 pieces from 3/4" plywood or particle board




17.0 in. long w/ 45° cut on both ends.

Important: Tilt the 3/4" plywood to 3.7° off vertical or 86.3° off horizontal.



Secure with a sufficient number of wood screws.

**Align Left 46.16 Cradle**
**Fig. 7:A:4**

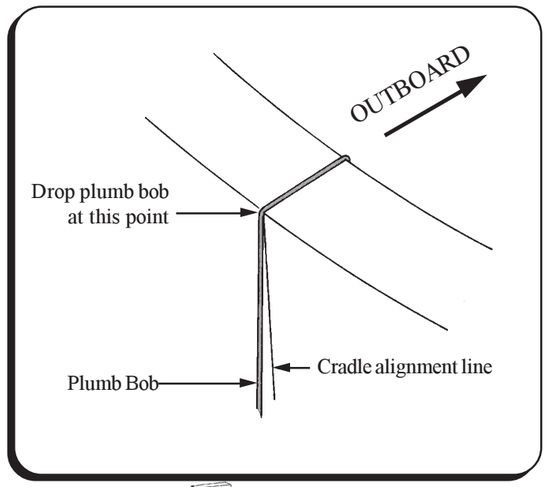
It is easiest to start by setting one of the 46.16 cradles. All the other cradles will be aligned to this one. So let's start with the left 46.16 cradle.

## 46.16 Alignment:

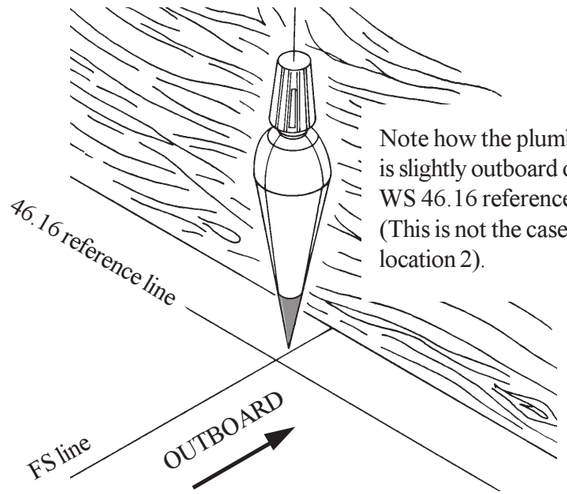
1. Start by setting the cradle to +1.2° ± .1°. This is the wing incidence. (This means leading edge up.)

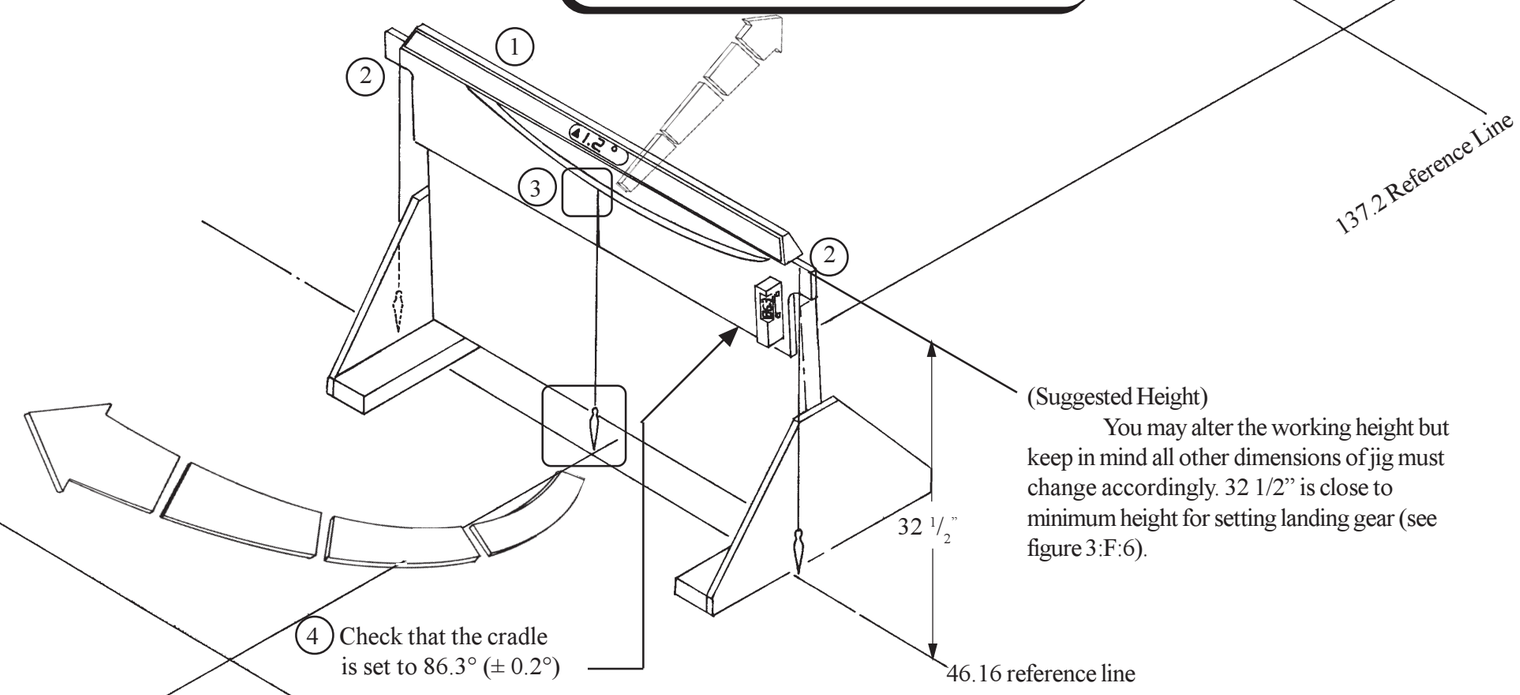
2. Align the cradle to the 46.16 reference line. Plumb bob off the inboard face of the cradle as shown.

3. Align the cradle to the cradle reference line.



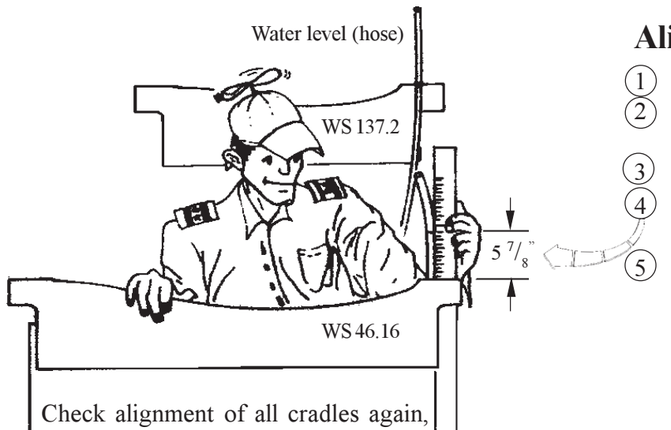

**ALIGNING CRADLE TO FS 105**



The remainder of the wing cradles are set in similar manner using the 41.16 left cradle as reference.

**Aligning 46.16 Cradles**
**Fig. 7:A:5**




## Alignment Criteria

1. Set all cradles to 1.2° (± 0.1°).
2. Align the cradles to their respective WS reference lines.
3. Align all cradles to the cradle reference line.
4. Set the 137.2 cradles 5 $^{7}/_{8}$" above the 46.16 cradle.
5. Align to the right 46.16 cradle to the left as shown.

Check alignment of all cradles again, Bondo feet in place. Secure cradles using a sufficient amount of screws. At this point you can check how the wing fits the jig. A small amount of weight may be necessary for the wing to conform to the jig.

It is acceptable to make minor adjustments:

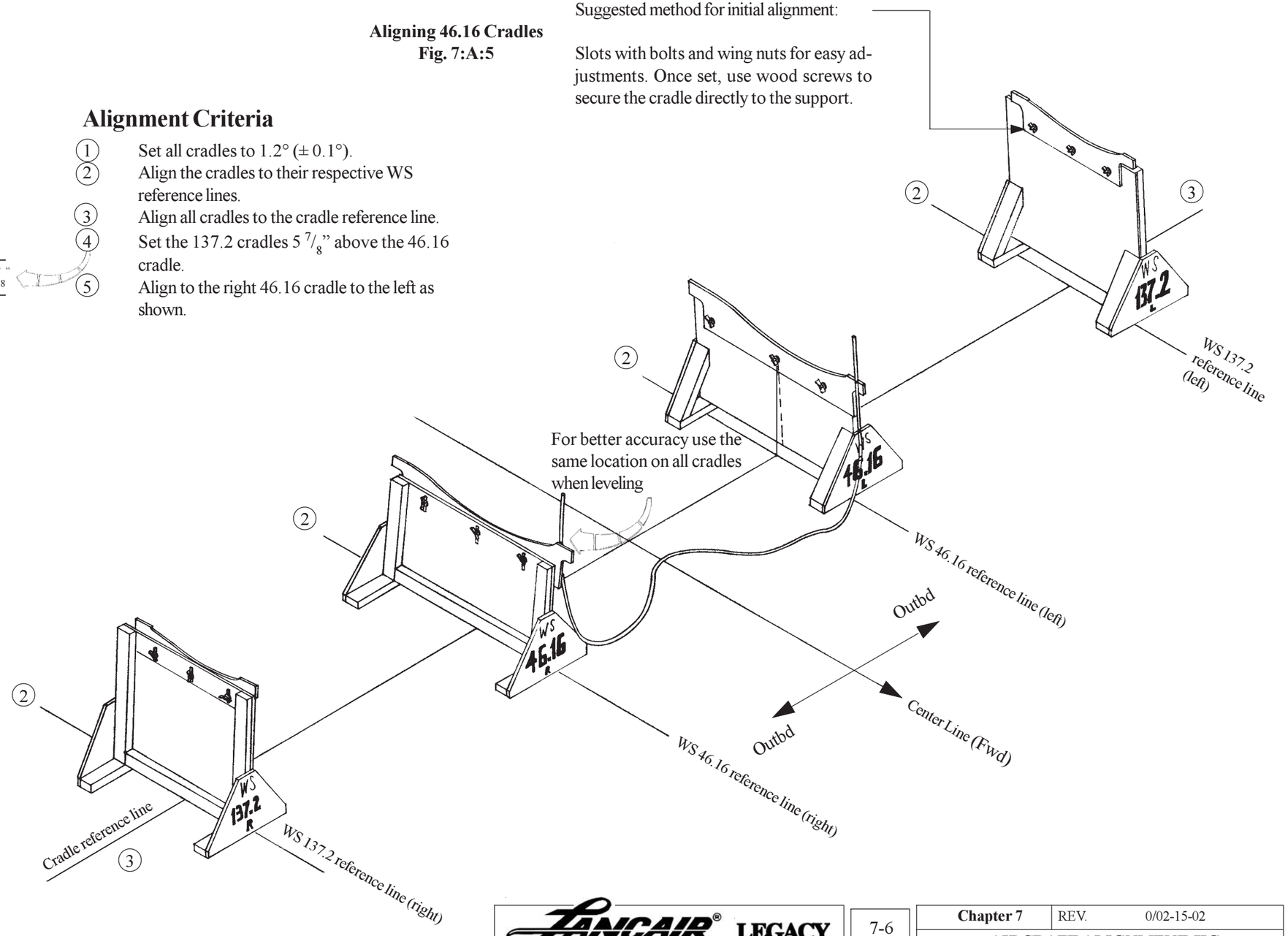
1. <u>You can</u> make minor adjustments to 137.2 in the fore/aft direction if necessary.

2. <u>You can</u> make minor adjustments to 137.2 in the up/down direction if necessary.

3. <u>You can not</u> alter the incidence of 1.2°!

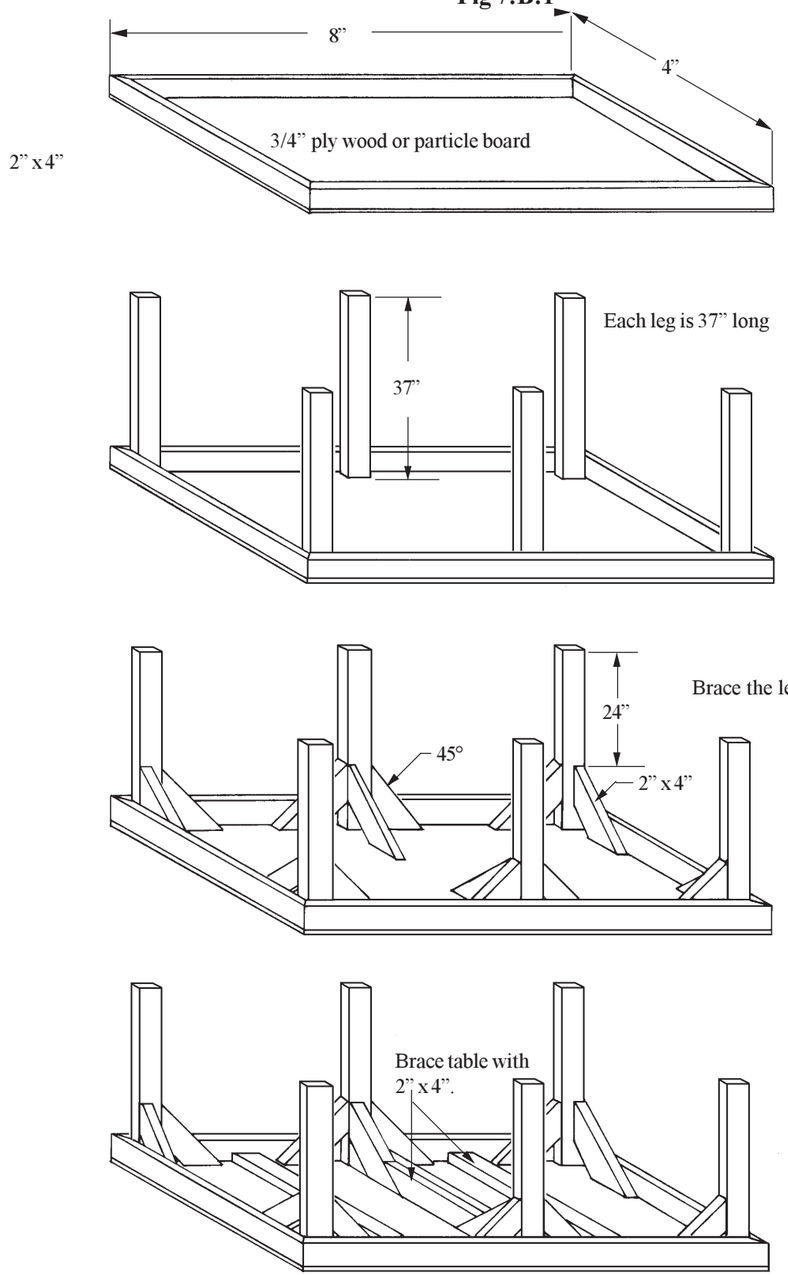
Suggested method for initial alignment:

Slots with bolts and wing nuts for easy adjustments. Once set, use wood screws to secure the cradle directly to the support.

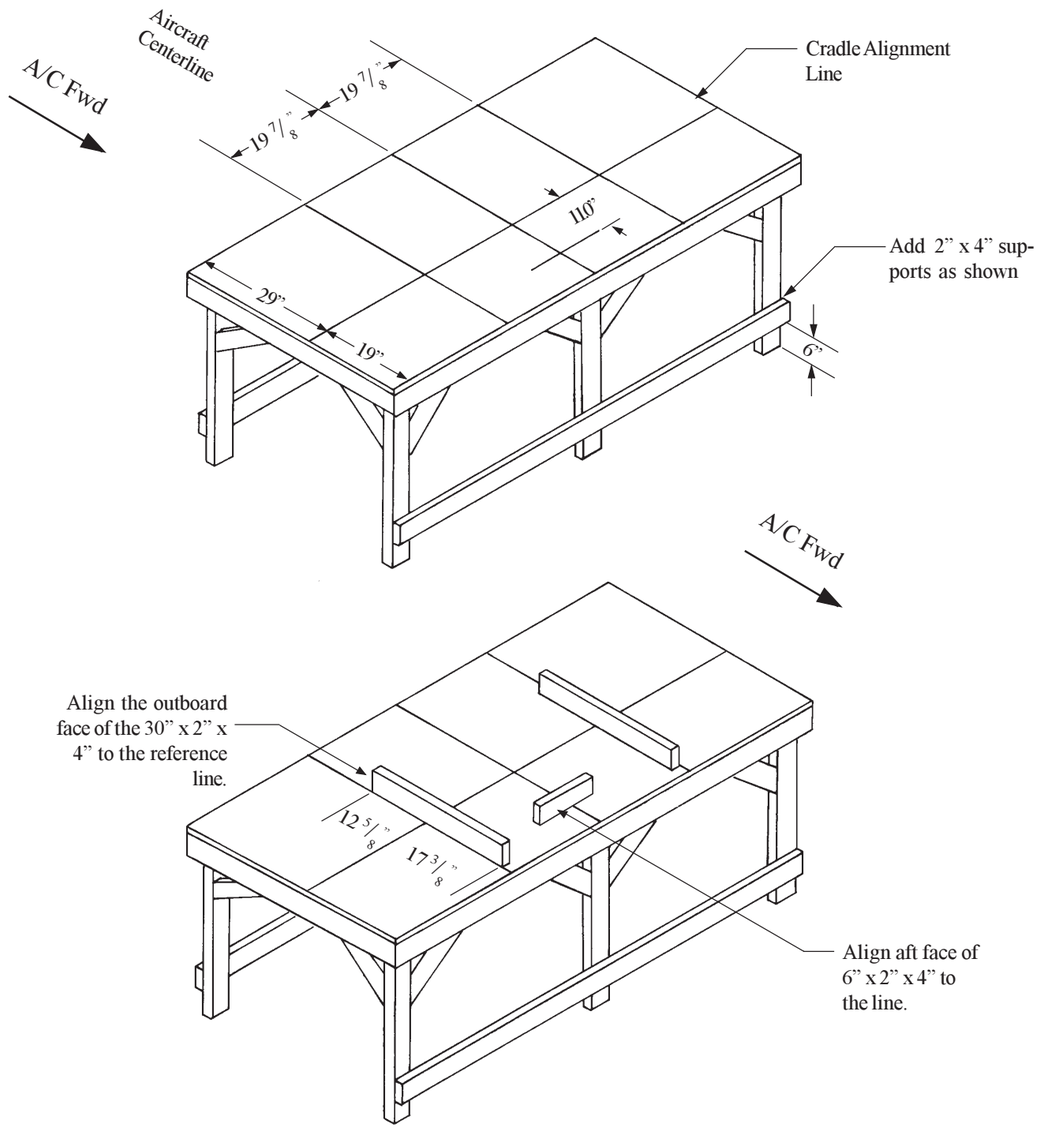


## B. Aft Fuselage Jig

**Aft Fuselage Jig Table**
**Fig 7:B:1**

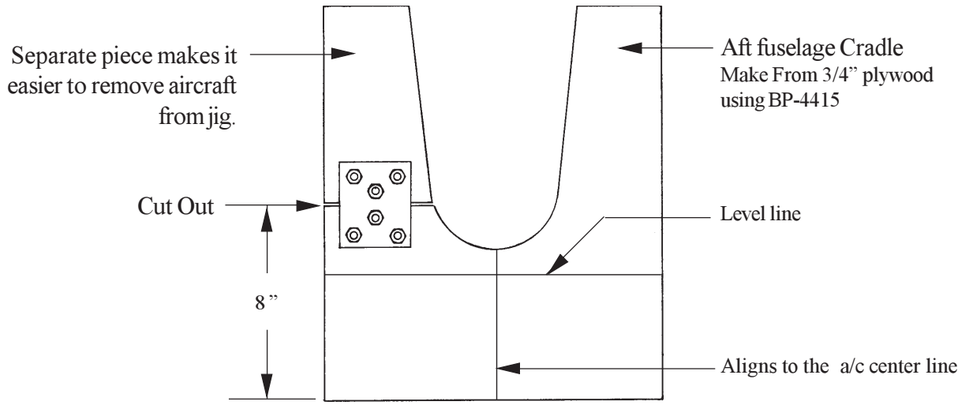


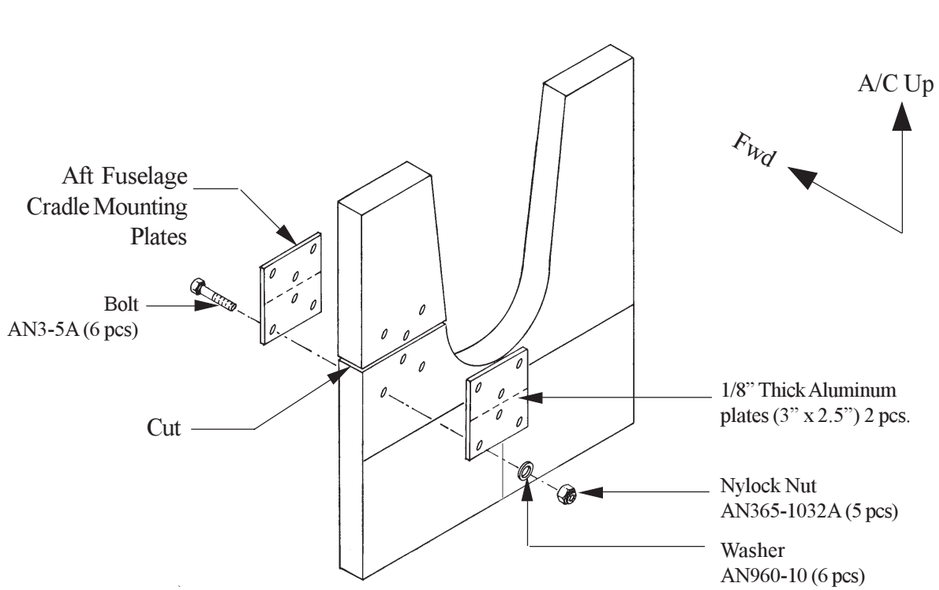

**Aft Fuselage Jig Table Alignment Marks**
**Fig. 7:B:2**

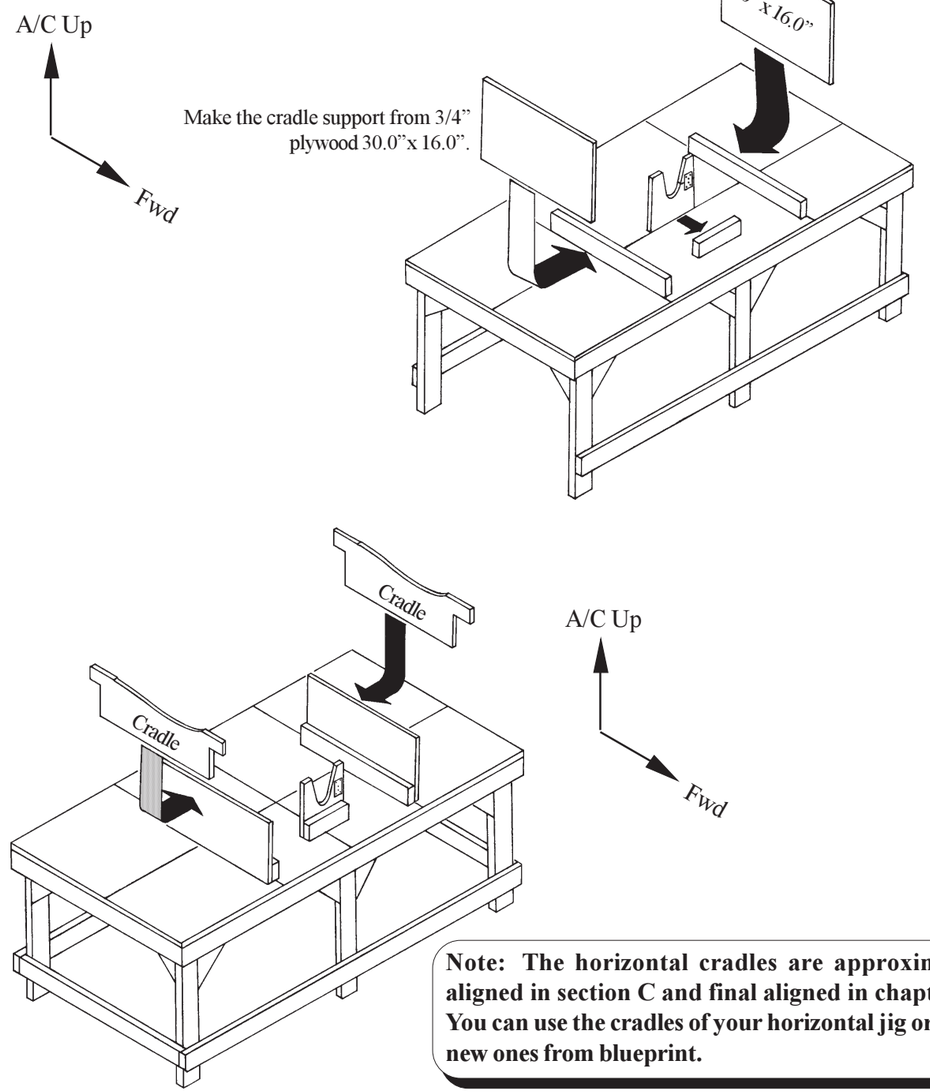


**Aft Fuselage Jig**
**Fig. 7:B:3**

**VIEW FROM AFT**

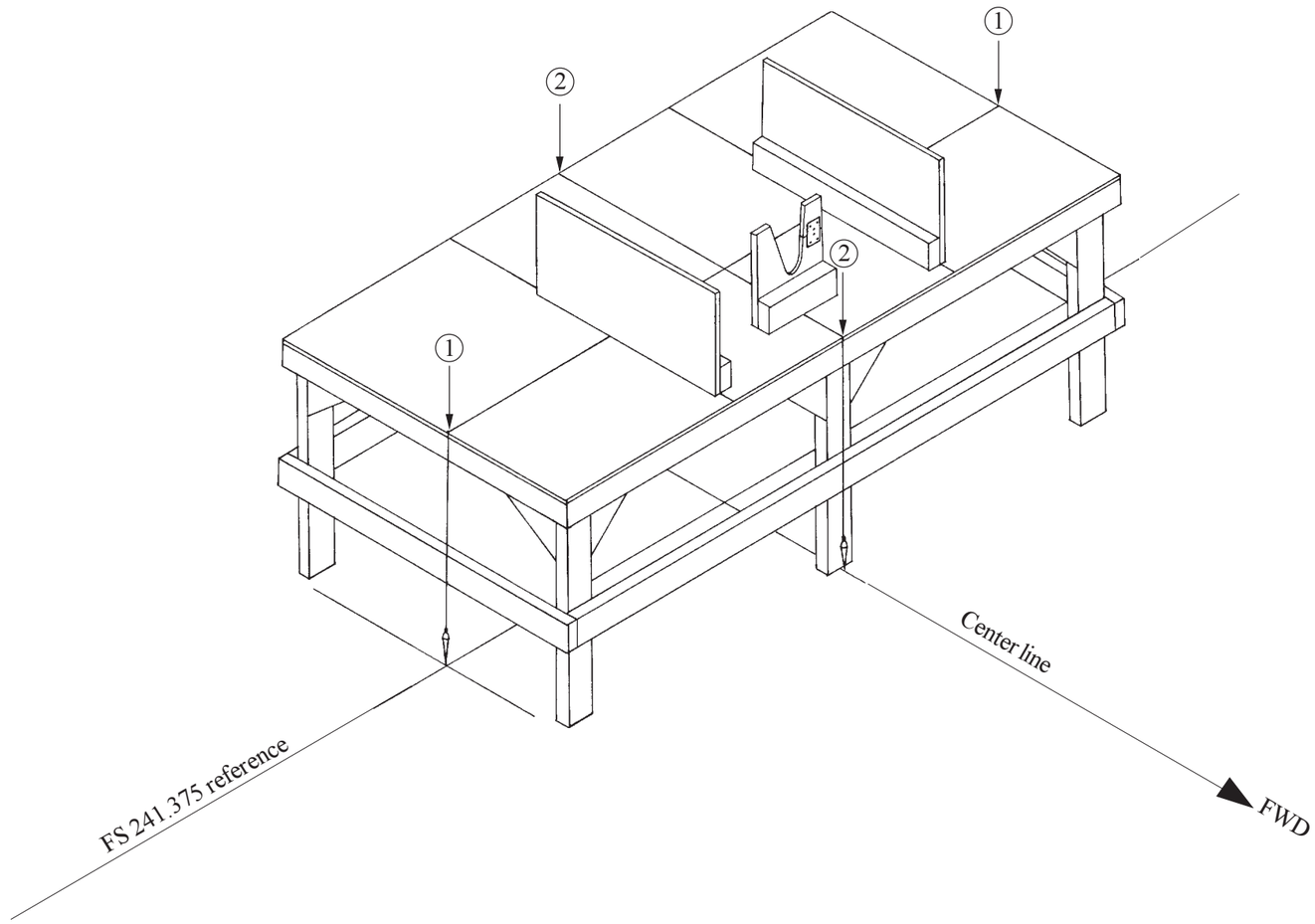



**Note: The horizontal cradles are approximately aligned in section C and final aligned in chapter 12. You can use the cradles of your horizontal jig or make new ones from blueprint.**

**Aligning Aft Fuselage Jig**
**Fig. 7:B:4**

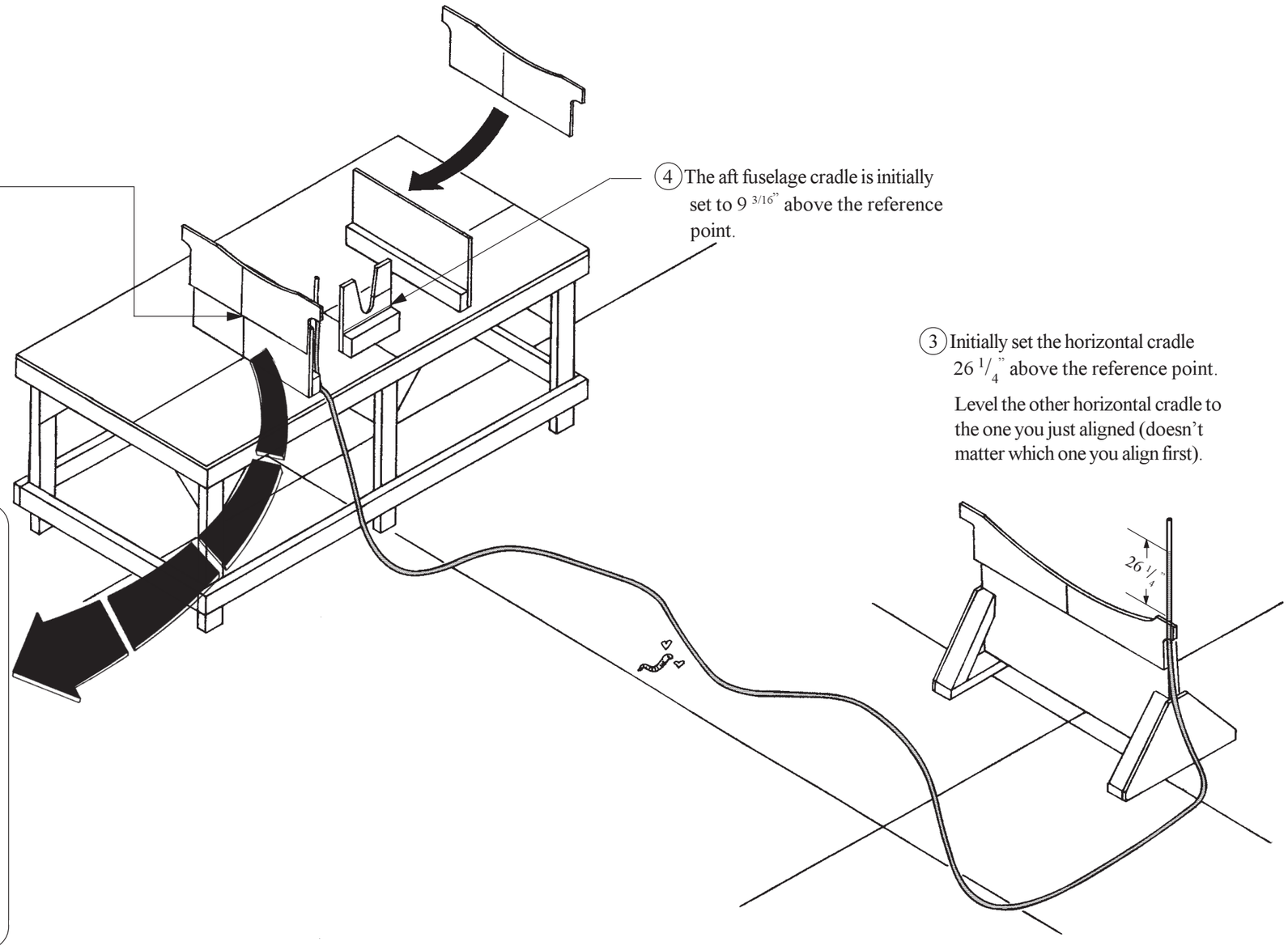



**To Align the Aft Fuselage Jig Table:**

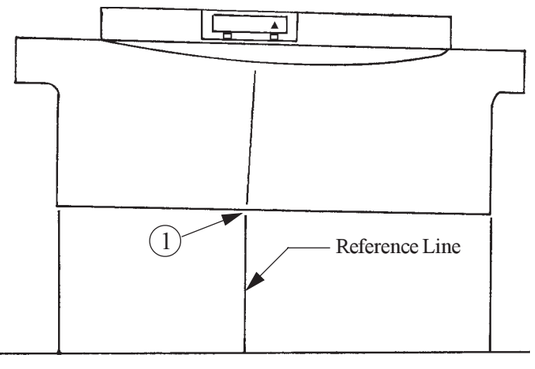
1. Plumb bob table to FS 241.375 reference.
2. Plumb bob table to aircraft center line.
3. The table should be approximate level (within 3/16" end to the end and front to aft).
4. Bondo legs in place.

**Horizontal Cradle Alignment**
**Fig. 7:B:5**

Initially align the aft cradles as shown. The final alignment is done with the entire aircraft on the jig. (For the purpose of completing chapter 8 you don't need the aft fuselage jig).



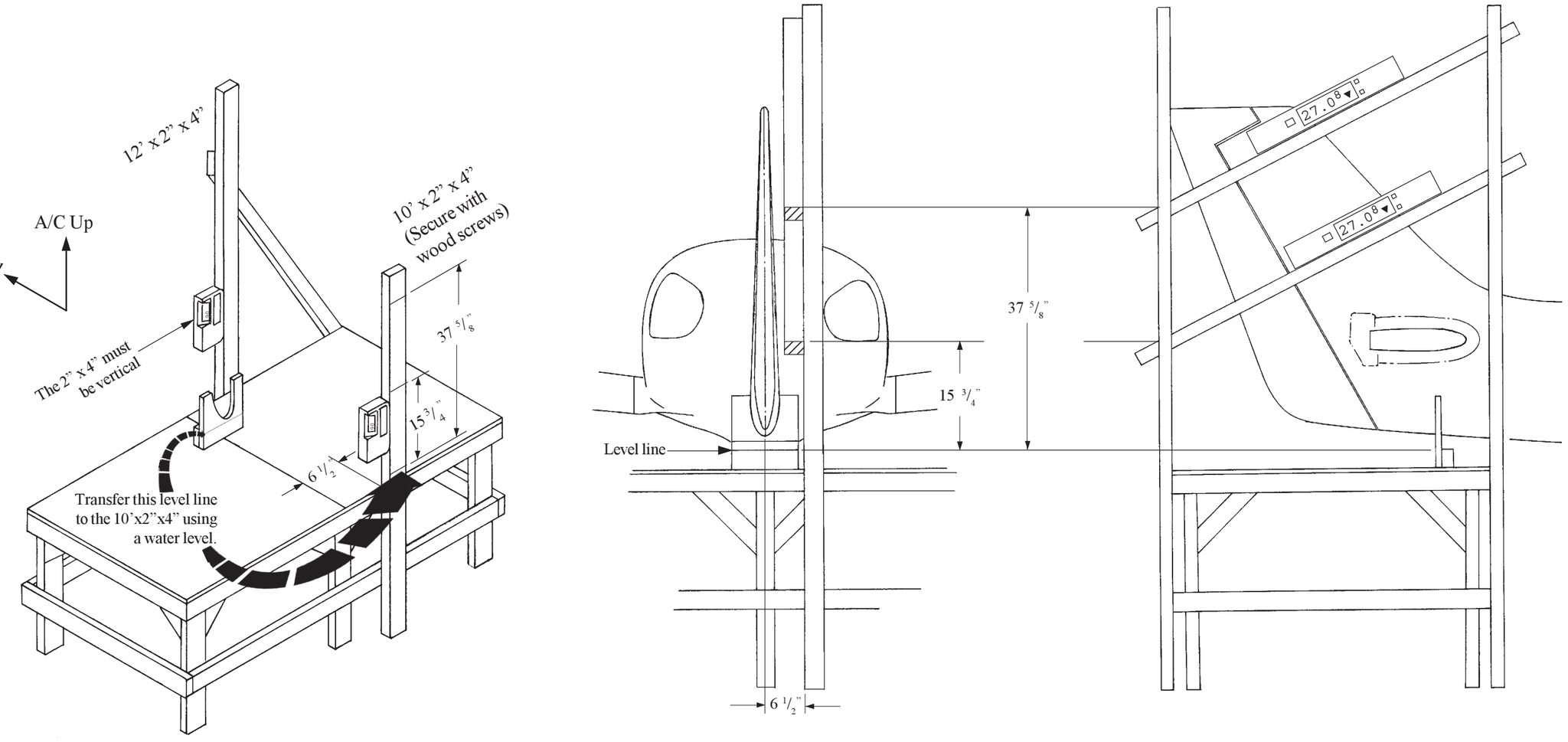

2 The cradle must be set to -0.5°.
This is the incidence of the tail.
(This means nose down)



## C. Vertical Tail Supports

The vertical tail support is used for closing the vertical. It is final aligned and used in chapter 13.

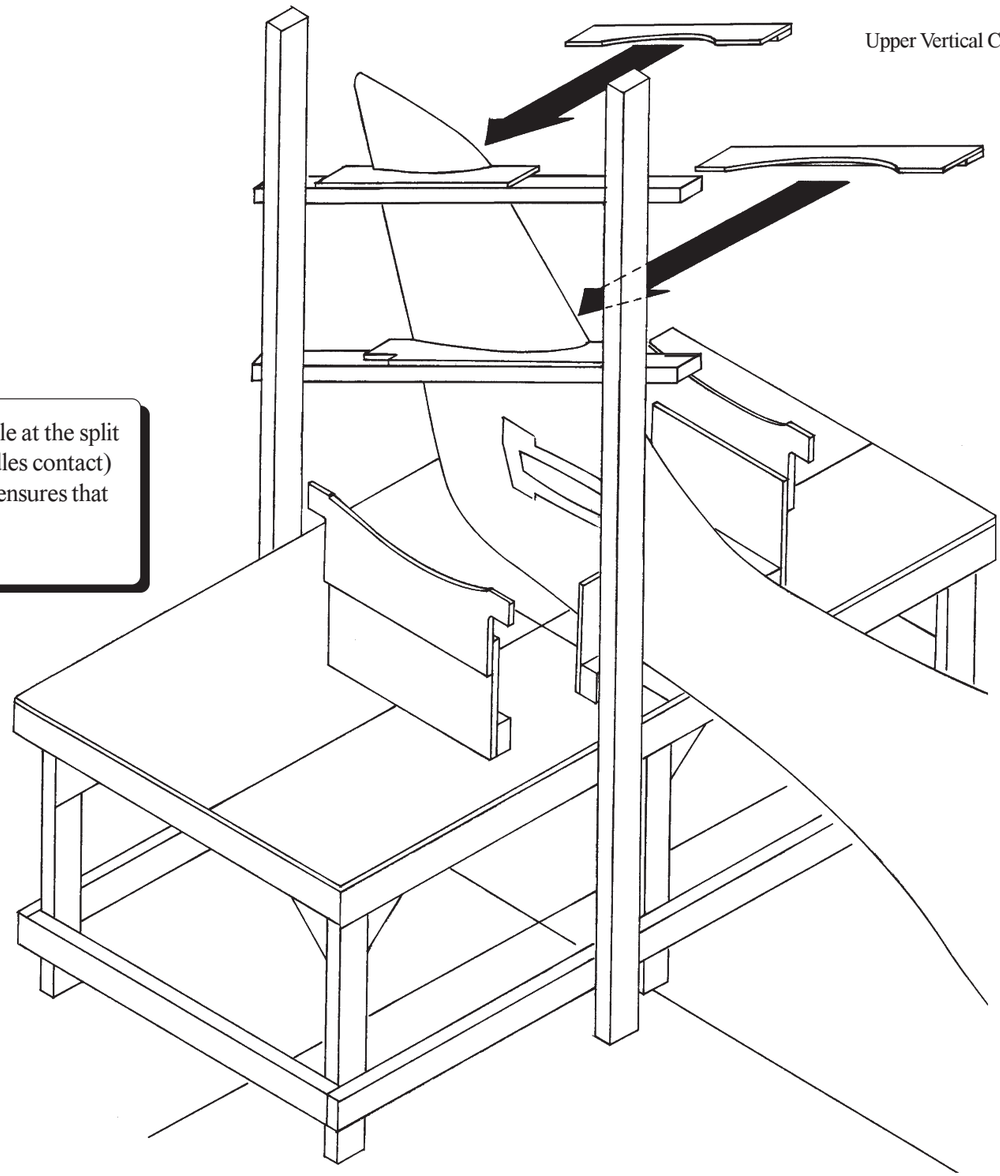
**Vertical Tail Support**
**Fig. 7:C:1**



**Tail Supports**
**Fig. 7:C:2**

Align the cradles as necessary to fit the vertical. It is acceptable to move the cradles up/down and aft/fore as necessary to get a good fit.

Plumb bob the front and aft of the cradle at the split line (where the left and right of the cradles contact) onto the centerline of the aircraft. This ensures that there will be no twist in the vertical tail.




Make cradles out of 1/2" plywood or particle board using blueprint BP-4416-01and BP-4416-02.