



# Panther Builders Manual



**Team Panther**

**Sport Performance Aviation LLC**

**10/21/2013**

**Revision 1.5.2**





# Panther Builders Manual

## Table of Contents

Introduction .....	4
About This Document.....	4
References .....	4
Getting Support .....	5
Overview of Build Layout.....	5
Getting Ready to Build.....	5
Building Considerations.....	5
LSA Version.....	5
Sport Version .....	5
Folding Wings.....	6
Tri-Cycle Gear .....	6
Rivet Options .....	6
Understanding the Plans .....	8
Plans Layout.....	8
Part Numbers.....	9
Processes.....	10
Parts Preparation.....	10
Verifying Straightness .....	11

Countersinking Holes.....	12
Dimpling Techniques .....	12
Building the Tail .....	12
Parts Inventory List.....	12
Tools Needed.....	15
Elevators.....	16
Right Elevator .....	16
Left Elevator .....	21
Rudder .....	26
Overview .....	26
Detailed Instructions.....	26
Horizontal Tail .....	34
Overview .....	34
Detailed Instructions.....	35
Vertical Tail .....	43
Vertical Stab .....	43
Finishing the Tail .....	49
Building the Wings .....	50
Building the Spar .....	50
Hardware List.....	50

# Introduction

Welcome to the Panther Builders Manual. The Panther is versatile, mid-sized, single seat low wing Sport or LSA aerobatic airplane with quick fold wings. This manual is to be used in conjunction with the plans for builders to assemble their Panther Sport or LS.

## **About This Document**

This document is being revised on a regular basis. Therefore this document will only be available online. The revision date and number is listed on the first page of this document. If you have printed this document, please make sure you check the online copy for a new revision.

## **References**

There is so much information available these days that it can seem a little overwhelming. However, if you can start with a few trusted sources the rest will come easy. This is the information age after all, so take advantage of it and dive in!

**Panther Builders Cave** – this site is designed as the place for builders to get documentation and see revisions and announcements. This site is restricted and only builders will have access to it. The site URL is <https://FlywithSPA.sharepoint.com/sites/Builders>. If you are a Panther plans owner and you do not have access to this site please contact us right away.

**Panther Blog** – this is a must for anyone who wants to keep up with what is going on with SPA. Sign up for automatic email delivery at [www.FlyPanther.net](http://www.FlyPanther.net) on the right.

**Panther Forum** – this is an online forum that builders and potential builders can share their suggestions, comments, how to's and how not to's. Sign up and post questions here. Please note, this is not highly monitored by SPA, so take the information as is and if you have a question that you need an official designer's response please contact SPA. Click here for the forum - <http://flywithspa.com/panther/panthercavebuilderforum.html>

**SPA LLC Website** – accessory links, official pricing structures, and important information can be found at [www.FlywithSpa.com](http://www.FlywithSpa.com). Please use this site regularly so you are familiar with the layout and navigation.

**SPA FAQs** – SPA has an ever-expanding knowledge base and online FAQ library that can be seen here: <http://flywithspa.com/panther/pantherfaqs.html>

**EAA Homebuilders** - The EAA Homebuilders website is an excellent resource for online videos, form searches and links to some great data. <http://www.eaa.org/homebuilders/>

**FAA Guidelines Link** – Here is a link to the FAA AC43.13-1B guidelines that may be helpful to builders.

[http://rgl.faa.gov/Regulatory and Guidance Library/rgAdvisoryCircular.nsf/list/AC43.13-1B/](http://rgl.faa.gov/Regulatory%20and%20Guidance%20Library/rgAdvisoryCircular.nsf/list/AC43.13-1B/)

Antenna and Avionics Mounting and other mods -

[http://rgl.faa.gov/Regulatory and Guidance Library/rgAdvisoryCircular.nsf/list/AC%2043.13-2B/](http://rgl.faa.gov/Regulatory%20and%20Guidance%20Library/rgAdvisoryCircular.nsf/list/AC%2043.13-2B/)

## **Getting Support**

### **SPA LLC**

You can submit a Support Request directly to SPA LLC if you need to. Please [click HERE](#) ([www.FlywithSPA.com/contactus.html](http://www.FlywithSPA.com/contactus.html)) for our support site. Our response time is generally within a few hours or so. If you need immediate assistance you can also place a phone call directly to 904.563.4337.

### **Other Builders**

Other builders of the Panther are an excellent resource. Builders are encouraged to introduce themselves on the [Panther Builders Forum](#) (<https://FlywithSPA.sharepoint.com/sites/Builders>) . This site is restricted and for builders only. Here builders who are keeping online logs will share their links as well as their building experiences and advice. It is a great place to ask questions and get answers, keep in touch with fellow builders and build a Panther Builders community.

## **Overview of Build Layout**

Critical path to completion - Coming soon

# **Getting Ready to Build**

## **Building Considerations**

### **LSA Version**

### **Sport Version**

## **Rudder**

### **Overview**

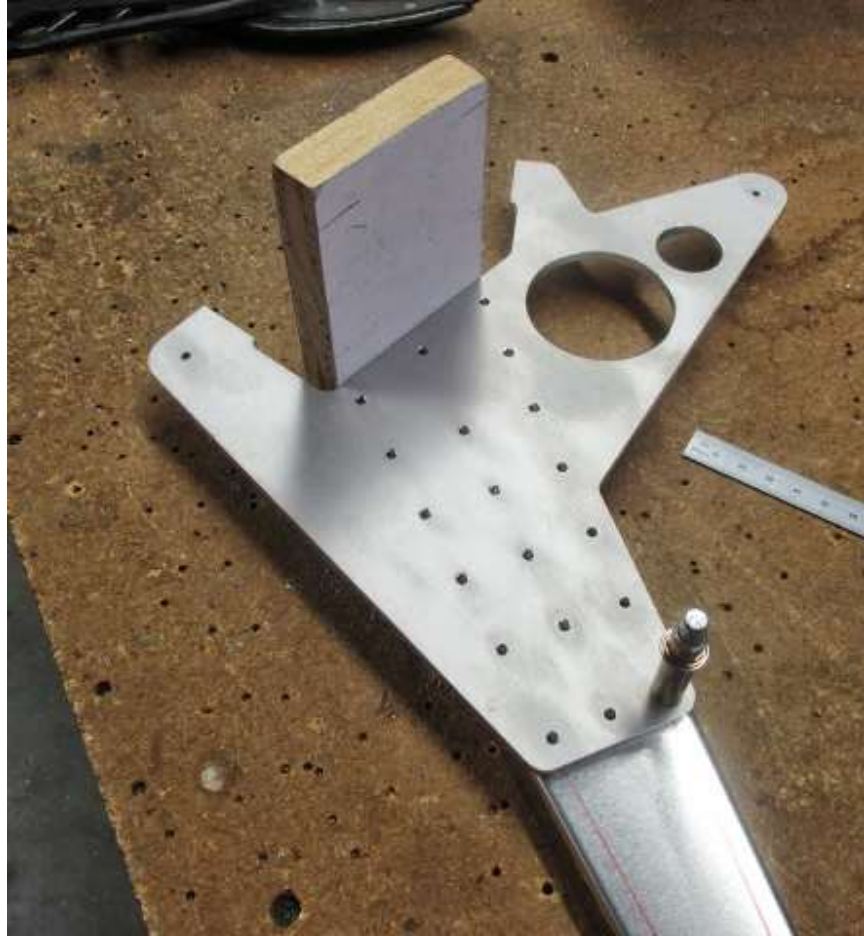
The rudder consists of the skin, 3 ribs, 4 stiffeners, a hinge half, and the rudder control horn.

Simple overview

1. Prepare Parts using guidelines [HERE](#)
2. Fit rudder control horn to rudder rib 1
3. Fit stiffeners to skin
4. Fit ribs
5. Fixture
6. Fit hinge
7. Up drill
8. Disassemble, debur and dimple as needed
9. Re-assemble and rivet

### **Detailed Instructions**

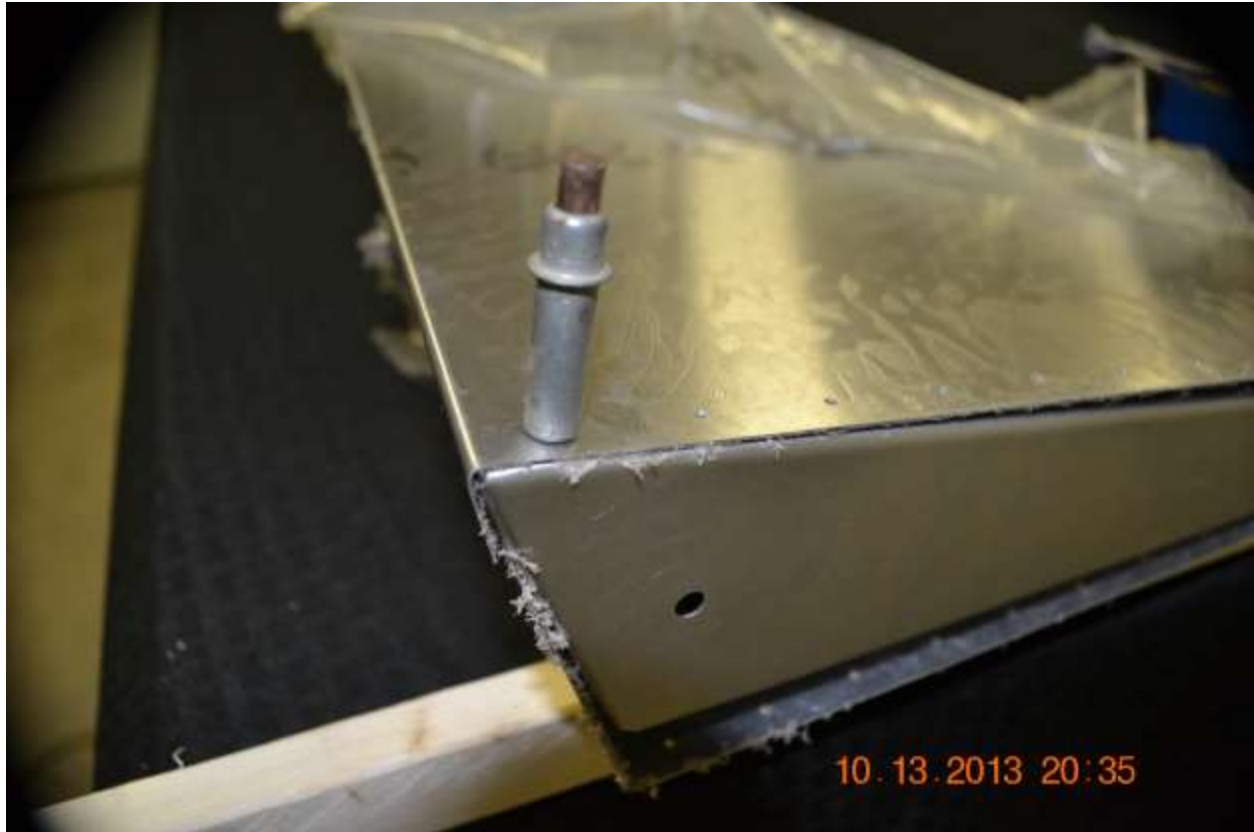
1. Using plans P-T-VT-rudder details fit the rudder control horn to lower rib (P-T-VT-R-rib 1). **De-bur but do not rivet at this time!**
2. Un-cleco the rudder horn from rib 1.



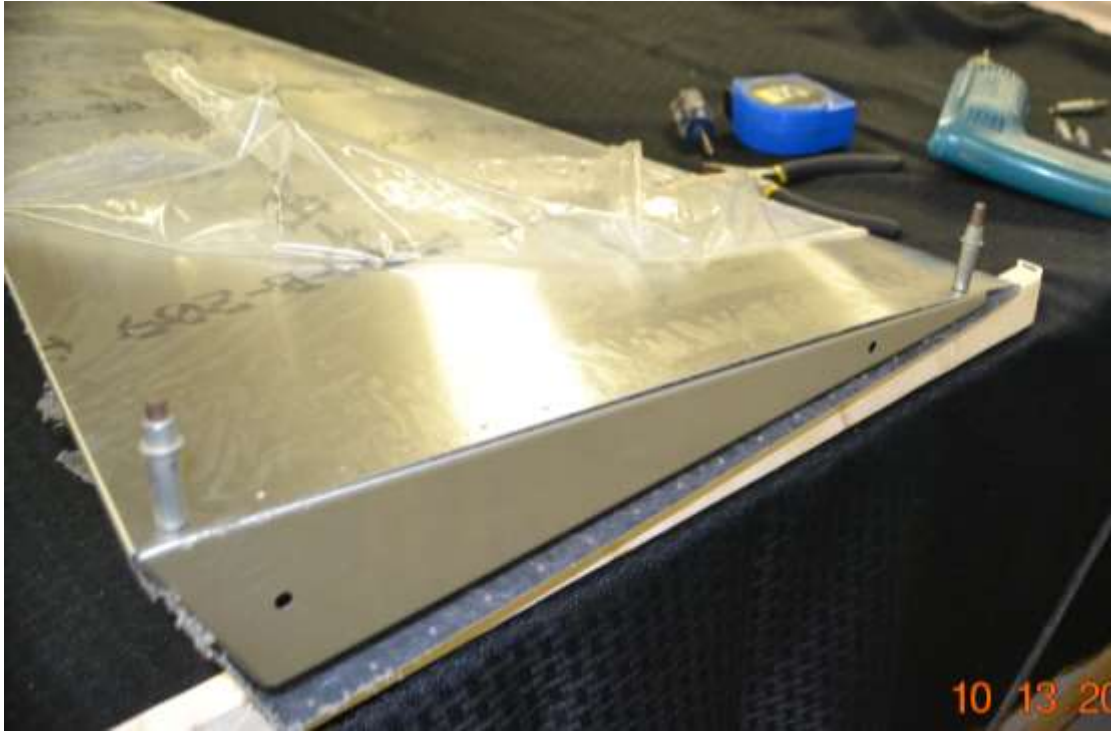
\*NOTE again use care when drilling hinge and the aft of the skin to ribs to prevent damage to outer adjacent skin surface!

3. Trim P-T-VT-R-skin stiffeners from the “strip” and cleco to skins. Trim as needed.
4. Fit ribs per plans and cleco in place. Fitting the ribs correctly requires applying pressure to the ribs so they are forced to fit tight against the front skin.
  - a. Fit the bottom (largest) rib first, tight against the skin front and drill at the center line. (shown in photo below)





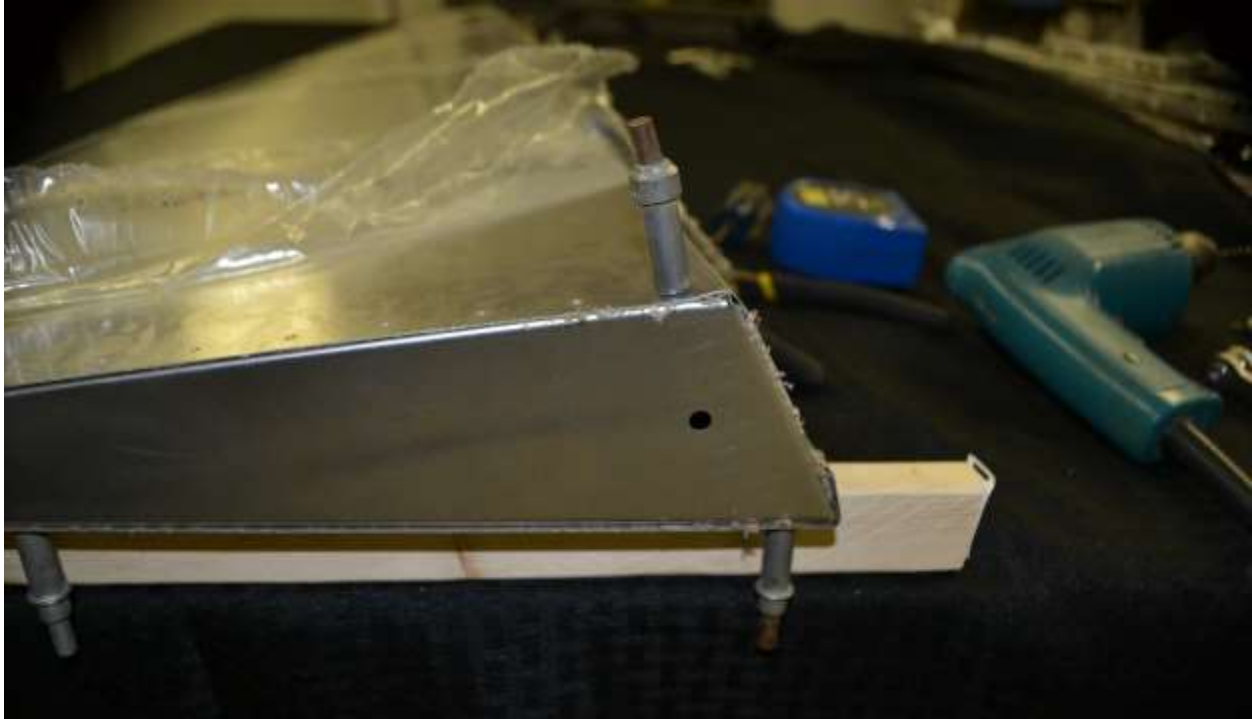
b. Drill furthest aft hole on the center line (shown in photo below)



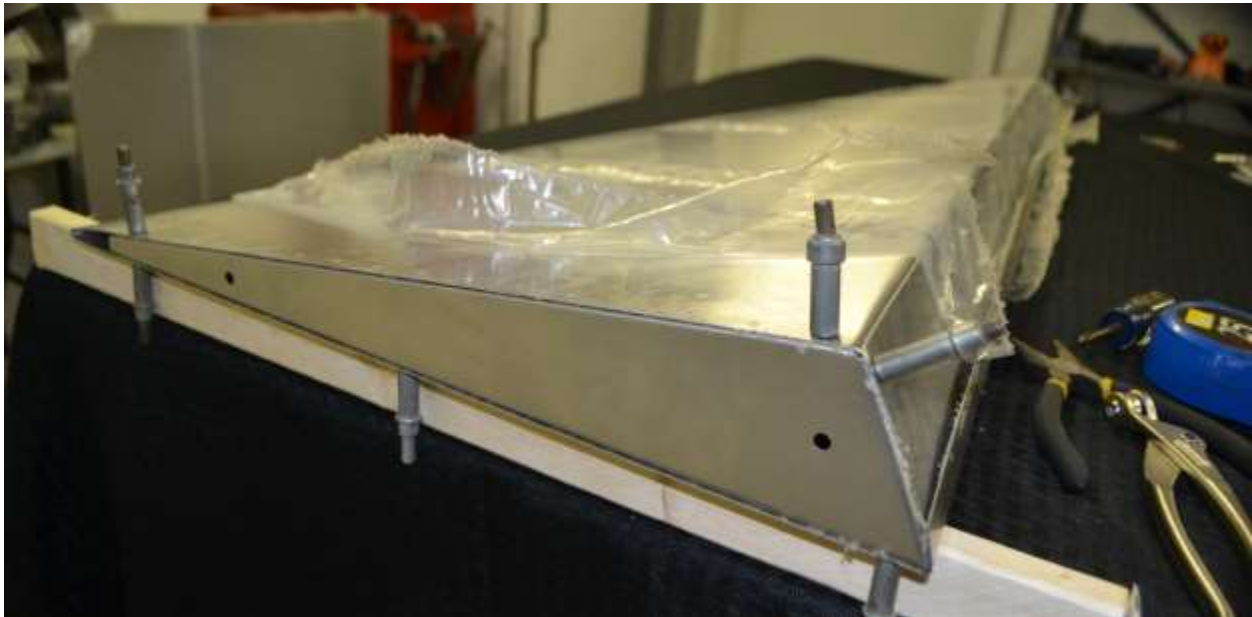
- c. Flip the rudder over and drill forward hole verifying the trailing edge bend centerline is on the centerline of the tooling holes (see photo below)



- d. Move to the forward hole and drill pressing down firmly when drilling (see photo below)



- e. Then using firm pressure so the corner of the skin is tight to the rib side and front drill the first hole in the front (see photo below)



5. **IMPORTANT STEP:** Uncleco the top (small rib) and attach the fixture block to rib 3 with  $\frac{1}{4}$  inch bolts. See plans for fixture block information. Cleco back in place and set on the 2" x 4" blocks. (see photo below)

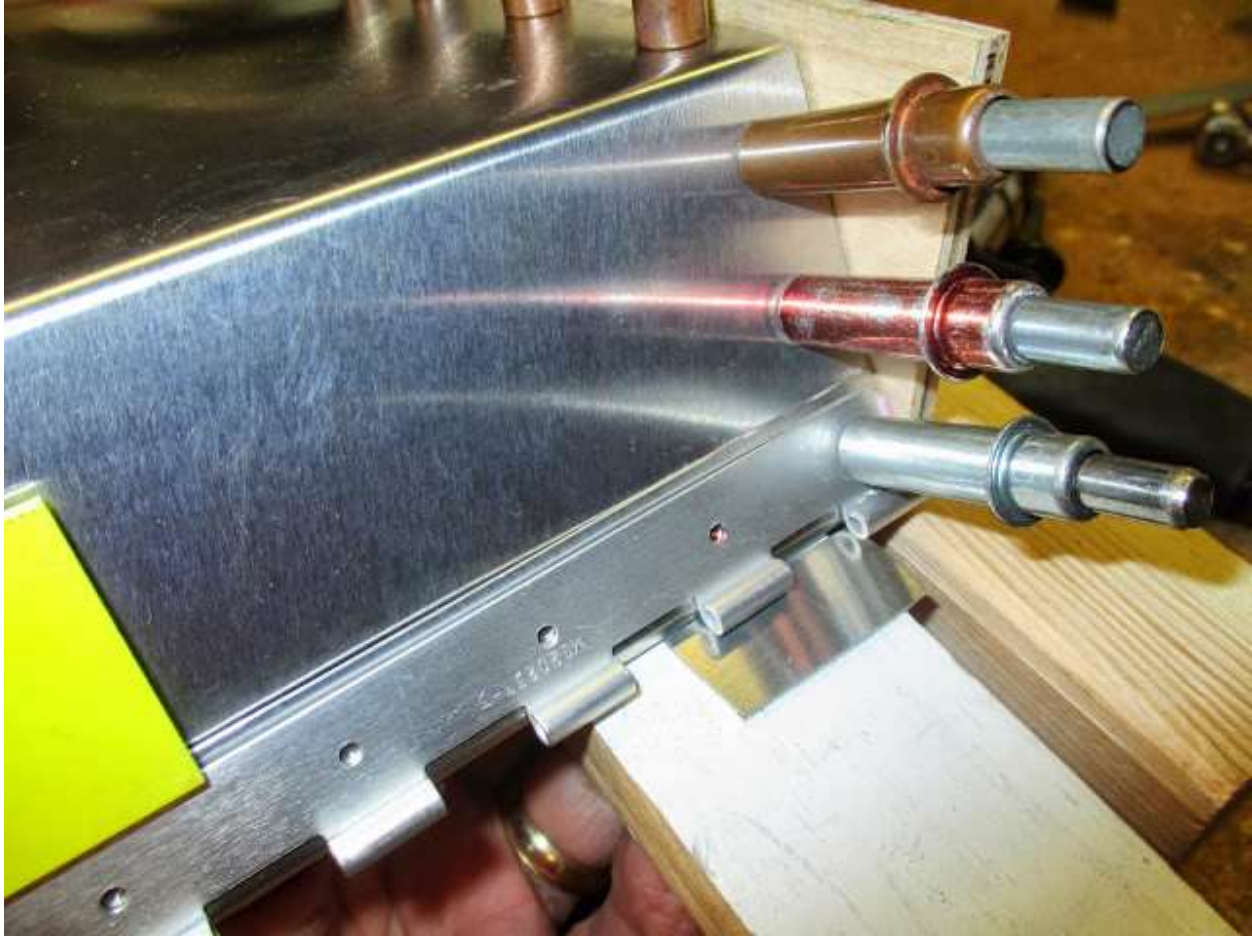


6. Remove the clecos from the ribs on right side of rudder and place front of skin on front side of the shorter hinge flange. This makes it much easier to drill the front rivet row in the skin as the longer “flexible” side is supported by the short “stiff” side.
7. Lay out and drill rudder hinge per drawing.
8. Working on a flat surface, rest the bottom end of the rudder on a 2” x 4” block and the fixture block at #3 on a 2” x 4” block. This will prevent a twist in the rudder and allow room for clecos holding ribs in place to clear the table top.





9. Align hinge on rudder per plans. Drill/ cleco #40 hinge using care so it and leading edge of rudder is straight.



10. Remove the clecos from the hinge and right side of rudder and return the skin front to under the shorter flange and re-cleco rudder and hinge. With rudder on flat surface up drill all holes to #30 cleco-ing as you go.

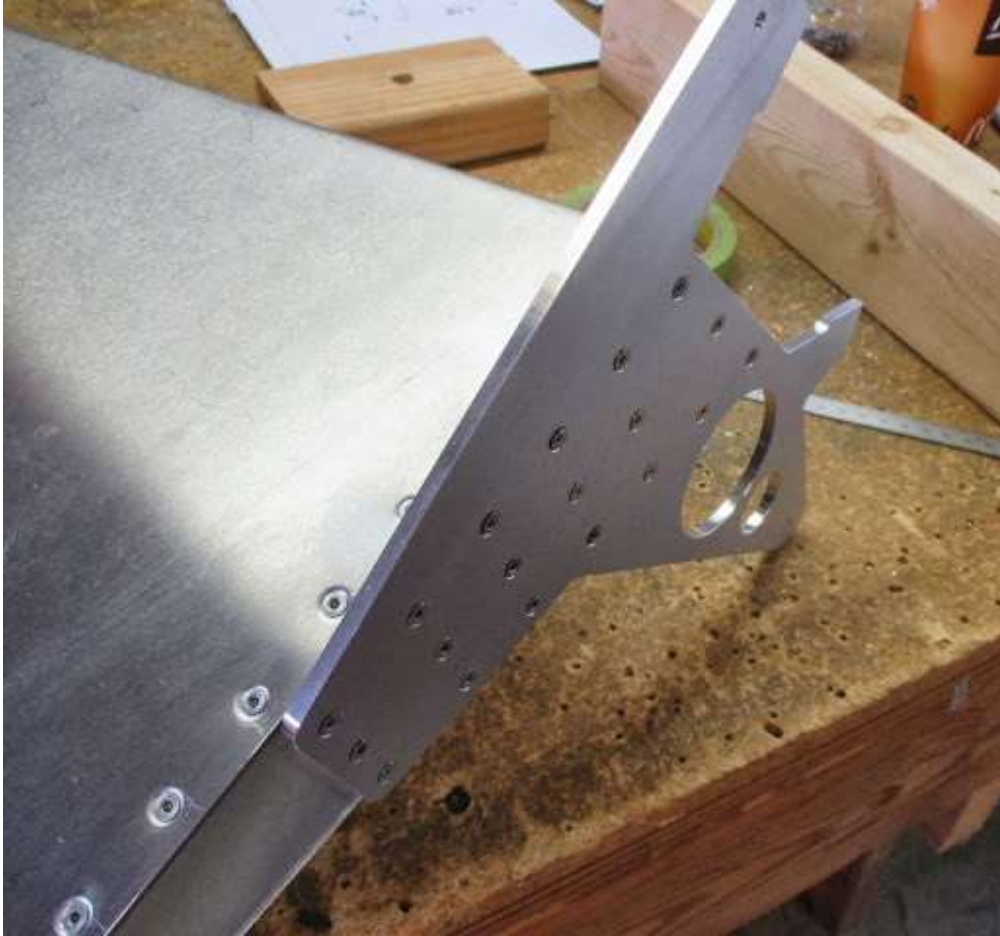
\*NOTE again use care when drilling hinge and the aft of the skin to ribs to prevent damage to outer adjacent skin surface!

11. Disassemble, debur and dimple as needed.

12. Re-assemble and rivet with rudder on flat surface **except rib 3.**

13. With all other rivets installed un-cleco rib 3 and remove the fixture block, then re-install rib and rivet.

14. Install and rivet the rudder horn (fitted in step one, but not riveted until now)



## **Horizontal Tail**

### **Overview**

The horizontal tail consists of 6 nose ribs, 6 main ribs, 2 forward spar channels attached with a stiffener and two aft spar channels attached with a stiffener. Then each side of the horizontal stab is covered with a skin, one for the left and then one for the right. The elevator hinge half is attached to the upper rear spar flange. The Horizontal Tail structure is symmetrical until skins and hinges are fitted

Simple assembly overview

1. Prepare all parts for assembly – see [Parts Preparation](#)