# REVISION LIST

# CHAPTER 8: OUTBOARD WING SECTION CLOSING

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 |
|---|---|---|---|
| 8-1 through 8-11 | 0/02-15-02 | None | Current revision is correct |
| 8-1 | 3/12-15-04 | R&R | Updated table of contents with page numbers and changed part nbr. |
| 8-11 | 3/12-15-04 | R&R | Changed part nbr. |

# Chapter 8: Outboard Wing Section Closing

Contents



## 1. PARTS LIST

| # | PART NO. (P/N) | QTY | DESCRIPTION | OPTIONAL ITEM *(not included with kit)* |
|---|---|---|---|---|
| **STROBE LIGHT** | | | | |
| 1) | A600 PR | 1 | Whelen Strobe/Nav Light Left | **Yes |
| 2) | A600 PG | 1 | Whelen Strobe/Nav Light Right | **Yes |
| 5) | MS21069-06 | 3 | Nutplates | |
| 6) | MSC-34 | 12 | Rivets | |
| 3) | MS24693-S28 | 4 | Screws, Machine (Structural) | |
| 4) | MS24693-S26 | 2 | Screws, Machine (Structural) | |

**Note:**

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

# 2. CONSTRUCTION PROCEDURES

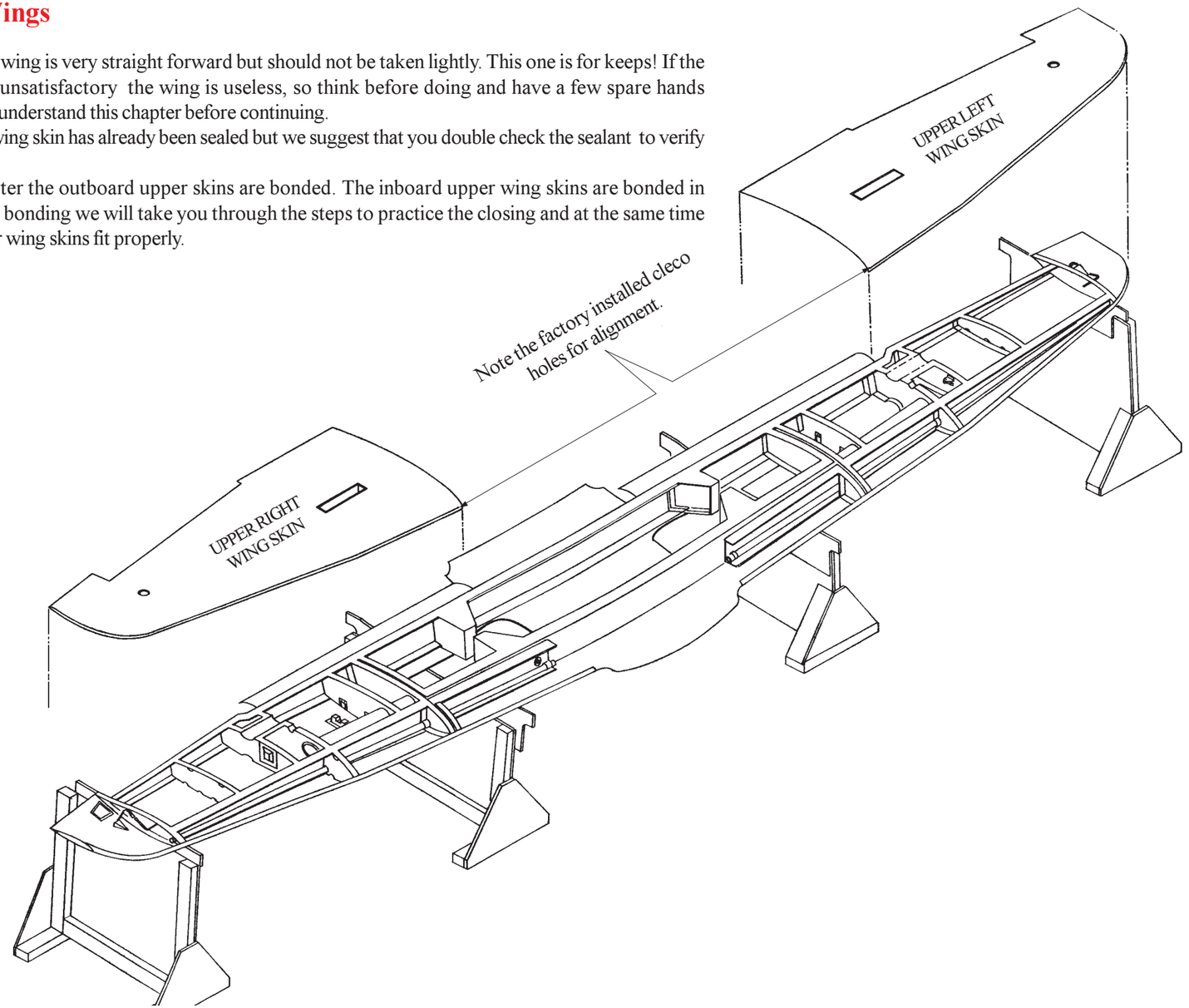
## A. Closing the Wings

Closing the wing is very straight forward but should not be taken lightly. This one is for keeps! If the upper skin bond is unsatisfactory the wing is useless, so think before doing and have a few spare hands available. Read and understand this chapter before continuing.

The upper wing skin has already been sealed but we suggest that you double check the sealant to verify the location.

In this chapter the outboard upper skins are bonded. The inboard upper wing skins are bonded in chapter 11. Prior to bonding we will take you through the steps to practice the closing and at the same time check that the upper wing skins fit properly.

**Closing the Wings**
**Fig. 8:A:1**




Double check everything. Here's a partial list of things to look for:

* If there is a dip or bump in the skin now it will be permanent when you bond the bottom skin into position. Check the structure for straightness. If you think there might be a problem call Lancair to discuss the options.

* Recheck that the fuel sealer is not contaminating any bonding surface. A small overlap (less than 1/8" (3 mm) of fuel sealer to the structure bonding area is okay.

* Be sure the slosh door rib on WS-68.5 is secured with proper bolts. You will not be able to access this door after the wing is closed, so make sure it operates freely.

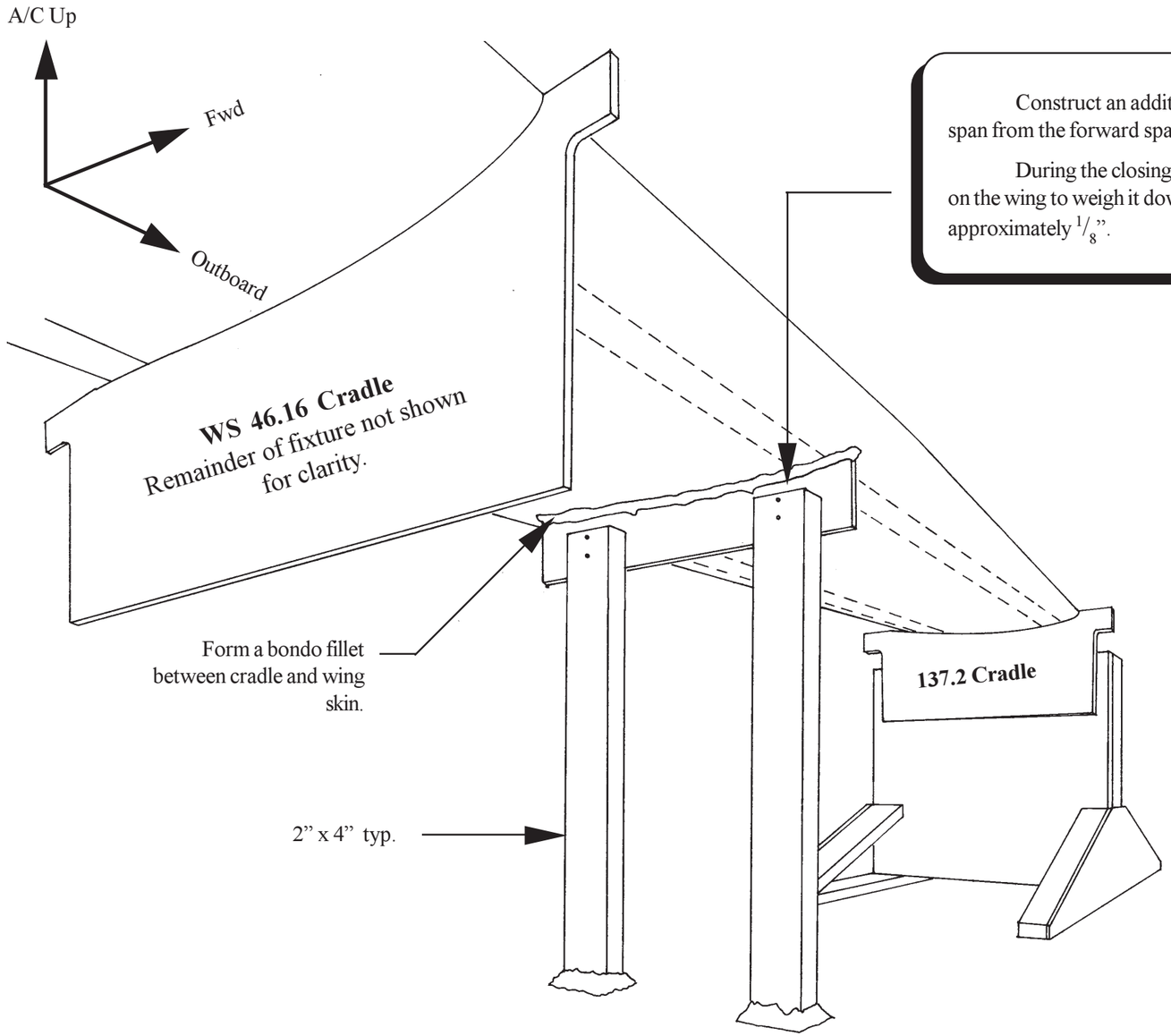
* Clean dust and debris from the fuel tank. Don't do a Mega-Blunder, like leaving tools inside your newly closed wing! (It's happened!)

* Cover all Hardware you can access. Cover the idler arm and bell crank. DO NOT FORGET TO REMOVE THE TAPE AFTER BONDING!

* You should have accurate marks on the upper wing skin for the ribs, spar, and shear web locations. If you sand them off in the process you must remark them so you will know where to apply the adhesive.

* Check that every fuel bay has a drain and vent hole.

**Additional Support for Wing Closing**
**Fig. 8:A:2**

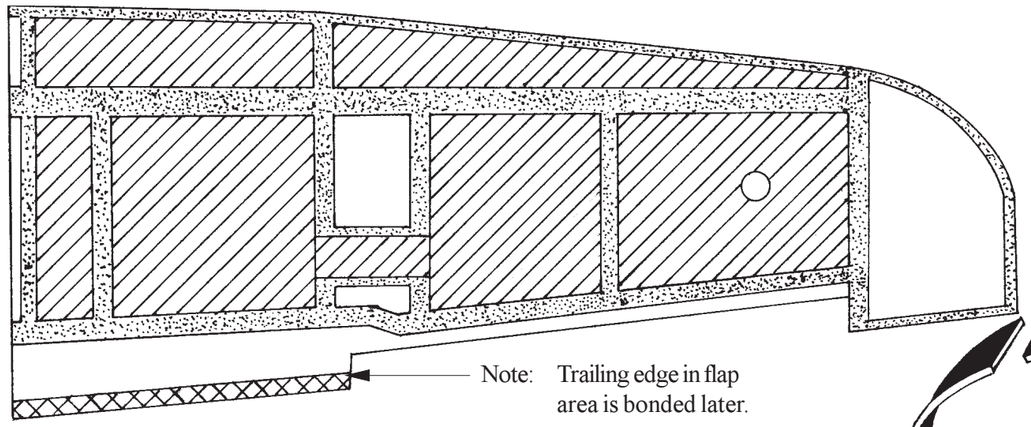



Construct an additional support at WS 90.5. The support should span from the forward spar to the aft spar.

During the closing process you will use approximately 600 lbs on the wing to weigh it down. Without this support the wing would bow approximately $^{1}/_{8}$".

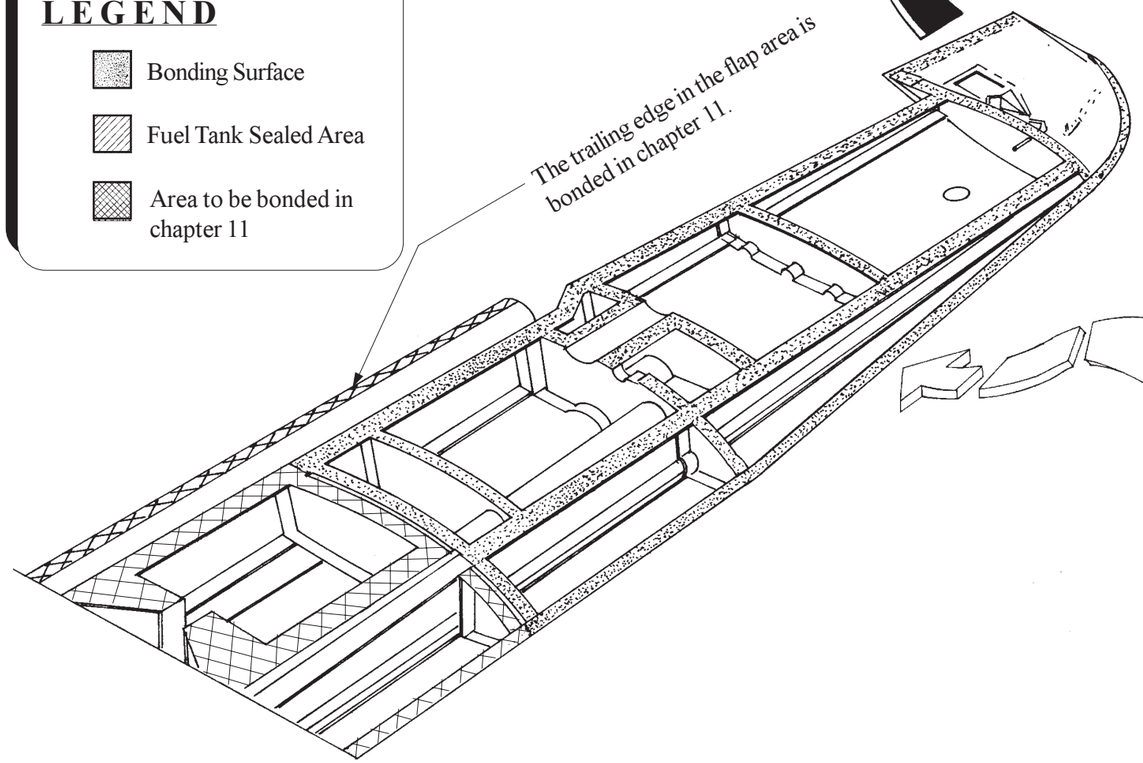
**Bonding Areas**
**Fig. 8:A:3**

## Bonding Areas of Upper Wing Skin

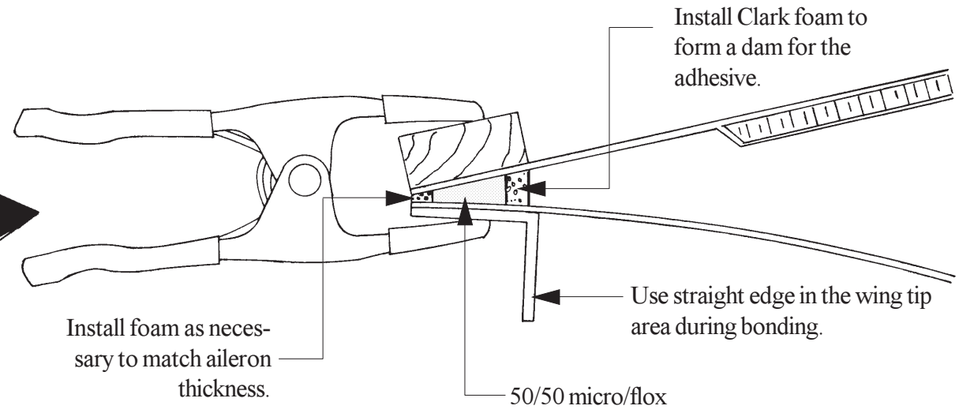



**LEGEND**

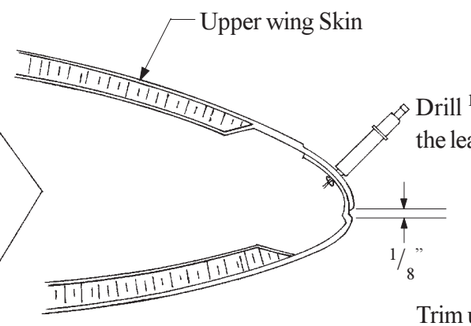
- Bonding Surface
- Fuel Tank Sealed Area
- Area to be bonded in chapter 11




## Trailing Edge Cross Section at Wing Tip




## Typical Leading Edge Cross Section

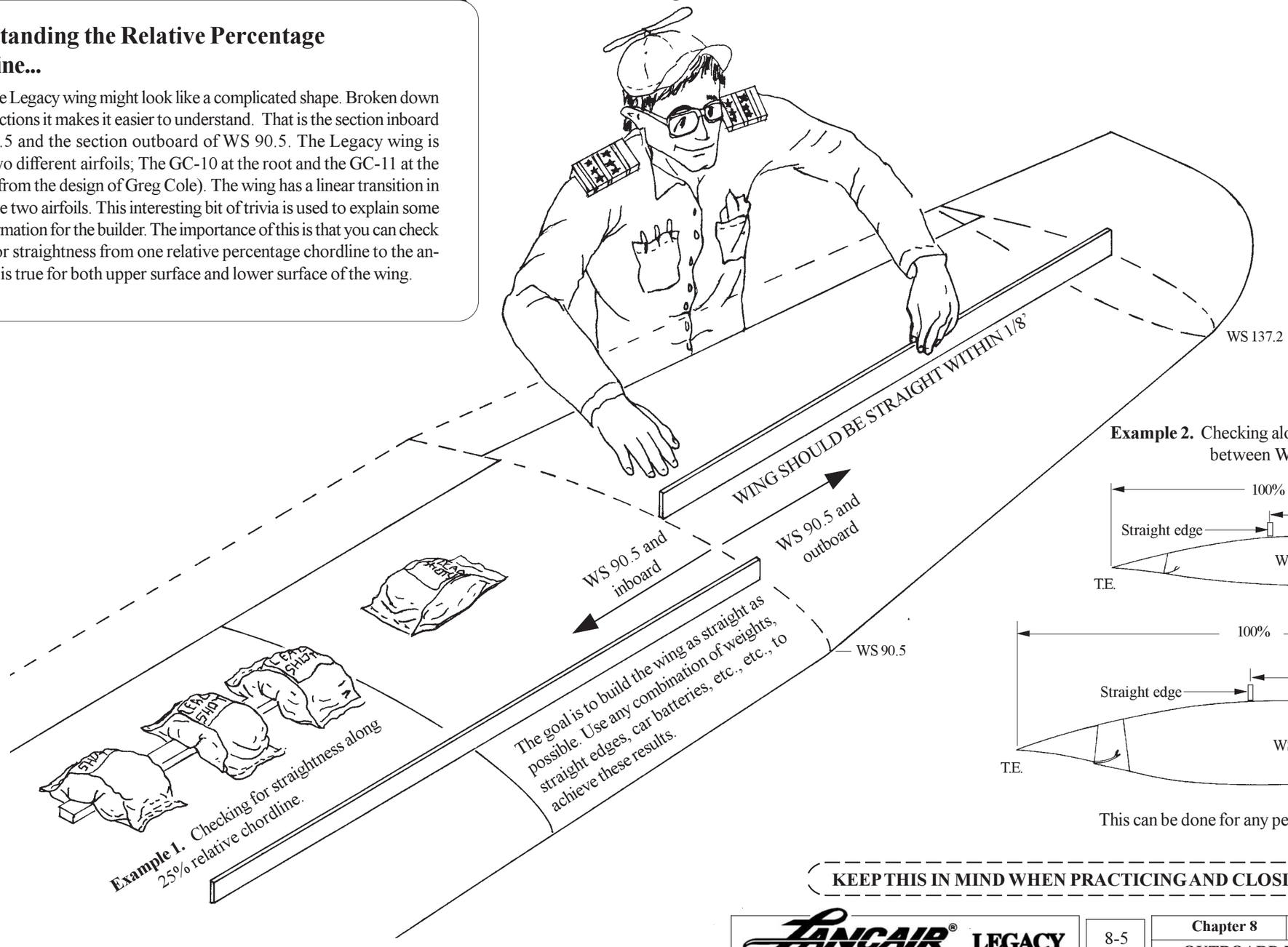



Trim upper skin back as necessary to avoid the skin riding onto joggle. We suggest 1/8" clearance.

## Understanding the Relative Percentage Chordline...

The Legacy wing might look like a complicated shape. Broken down into two sections it makes it easier to understand. That is the section inboard of WS 90.5 and the section outboard of WS 90.5. The Legacy wing is made of two different airfoils; The GC-10 at the root and the GC-11 at the tip ( GC is from the design of Greg Cole). The wing has a linear transition in between the two airfoils. This interesting bit of trivia is used to explain some useful information for the builder. The importance of this is that you can check the wing for straightness from one relative percentage chordline to the another. This is true for both upper surface and lower surface of the wing.

**Checking for Wing Straightness**
**Fig. 8:A:4**




**Example 1.** Checking for straightness along 25% relative chordline.

**Example 2.** Checking along 50% chordline between WS 90.5 and WS 137.2



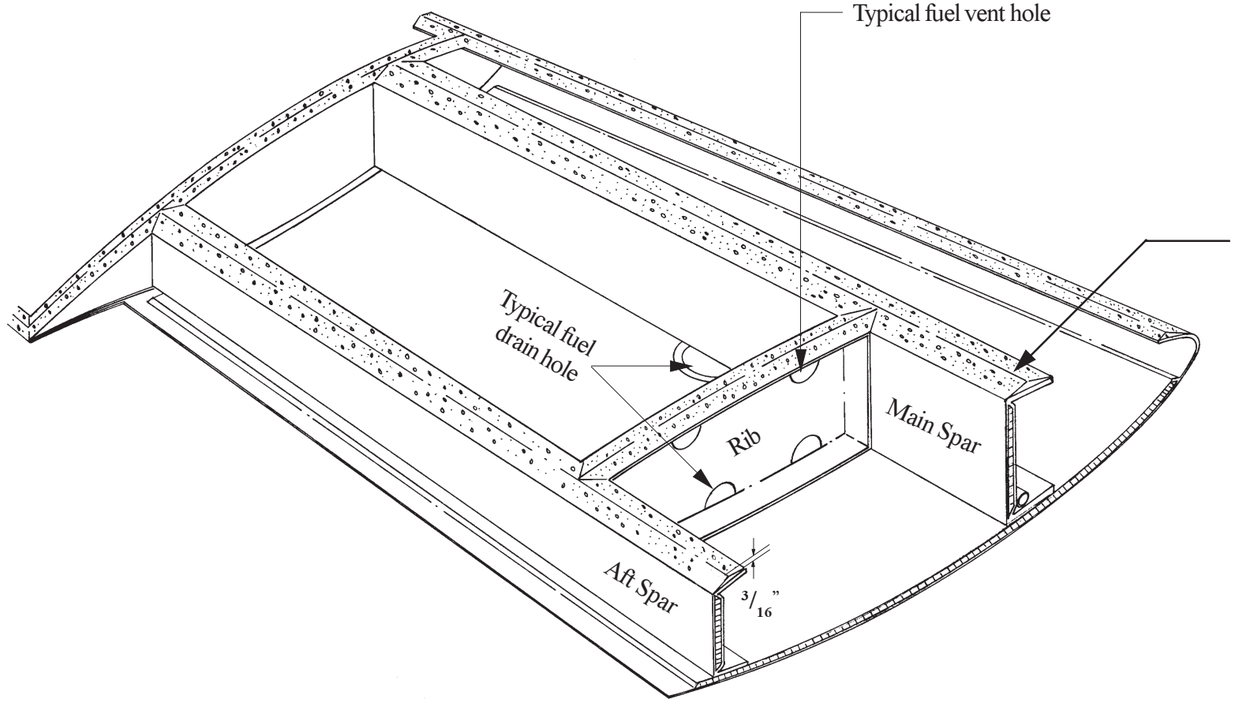

This can be done for any percent chordline.

**KEEP THIS IN MIND WHEN PRACTICING AND CLOSING THE WING!!**

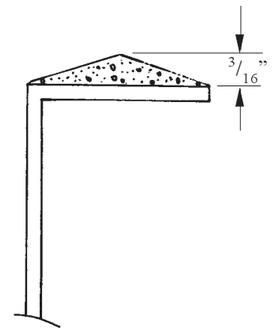
**Applying Adhesive**
**Fig. 8:A:5**

**Be aware of working time!**

This varies between the adhesives, batch size and temperature. If you mix a large batch spread as soon as possible to avoid exotherming.



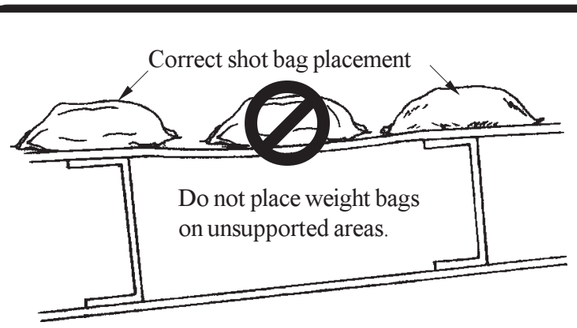

**Typical Internal Part**




Attempt to form a perfect 3/16" tall inverted "V" shape. We suggest you use a plastic squeegee to form the adhesive. Careful application of adhesive will reduce the chance of leakage.

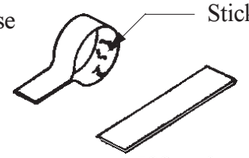
Follow normal bonding procedures. It is extremely important that you understand these procedures for this step! You can use any Lancair approved structural adhesive for bonding the upper skin.

**Typical Arrangement during Closing**
**Fig 8:A:6**




**Suggestion:**
During practice closing use masking tape as shown to check the fit:

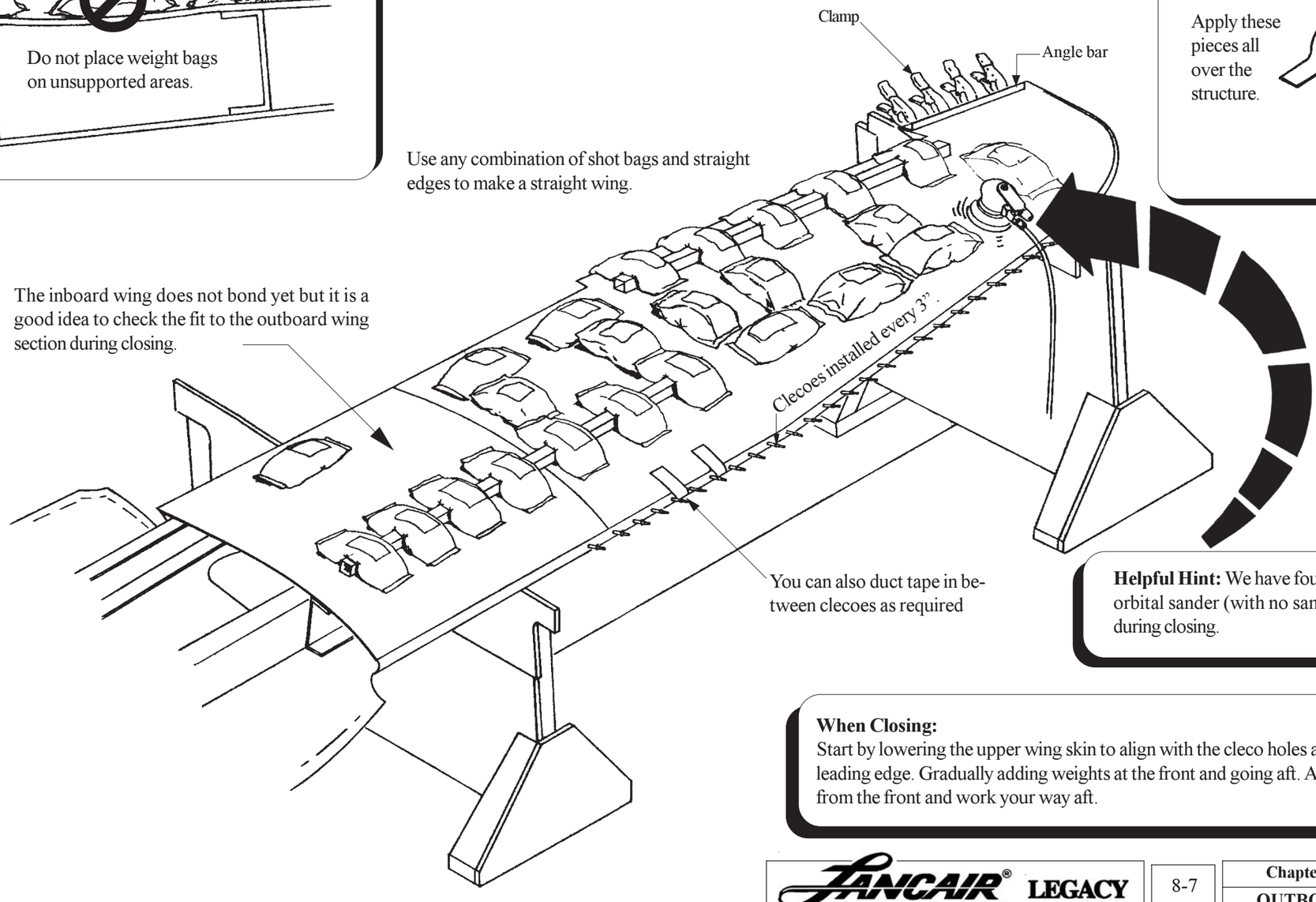
Apply these pieces all over the structure.




If flat after practice you have a good fit.

Use any combination of shot bags and straight edges to make a straight wing.

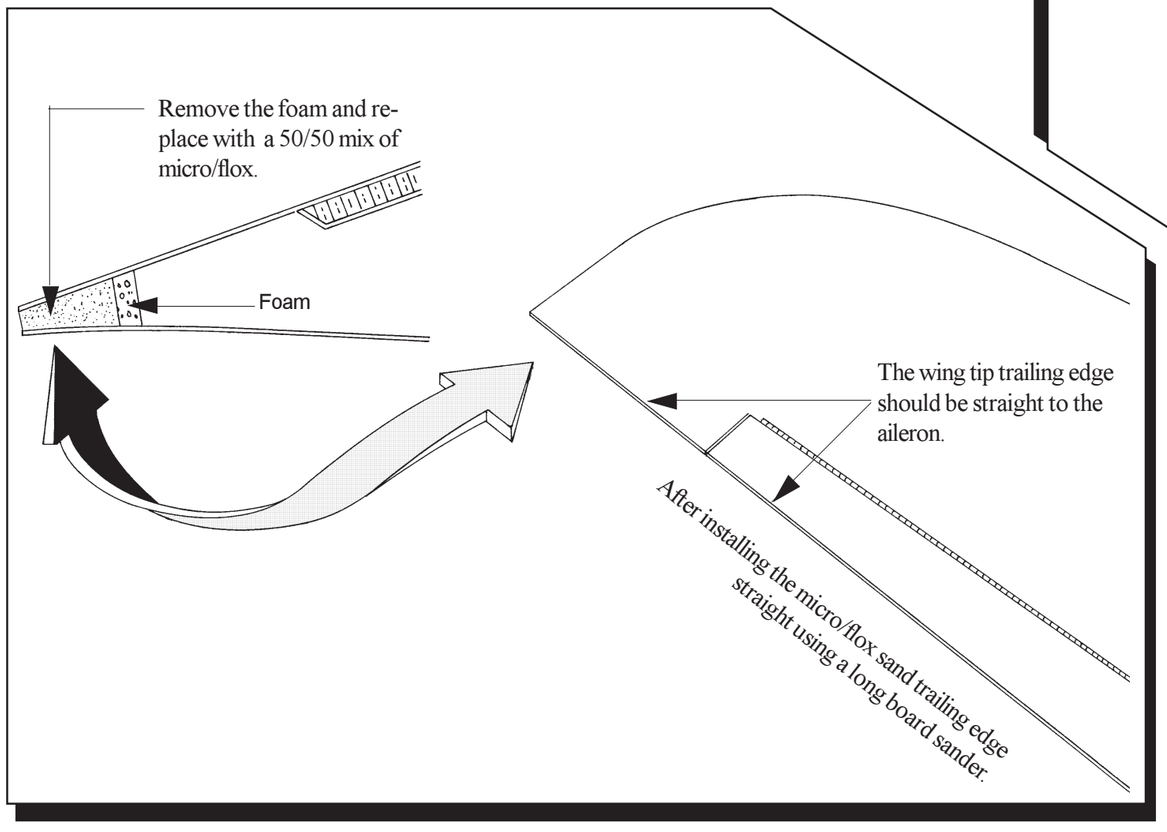
The inboard wing does not bond yet but it is a good idea to check the fit to the outboard wing section during closing.

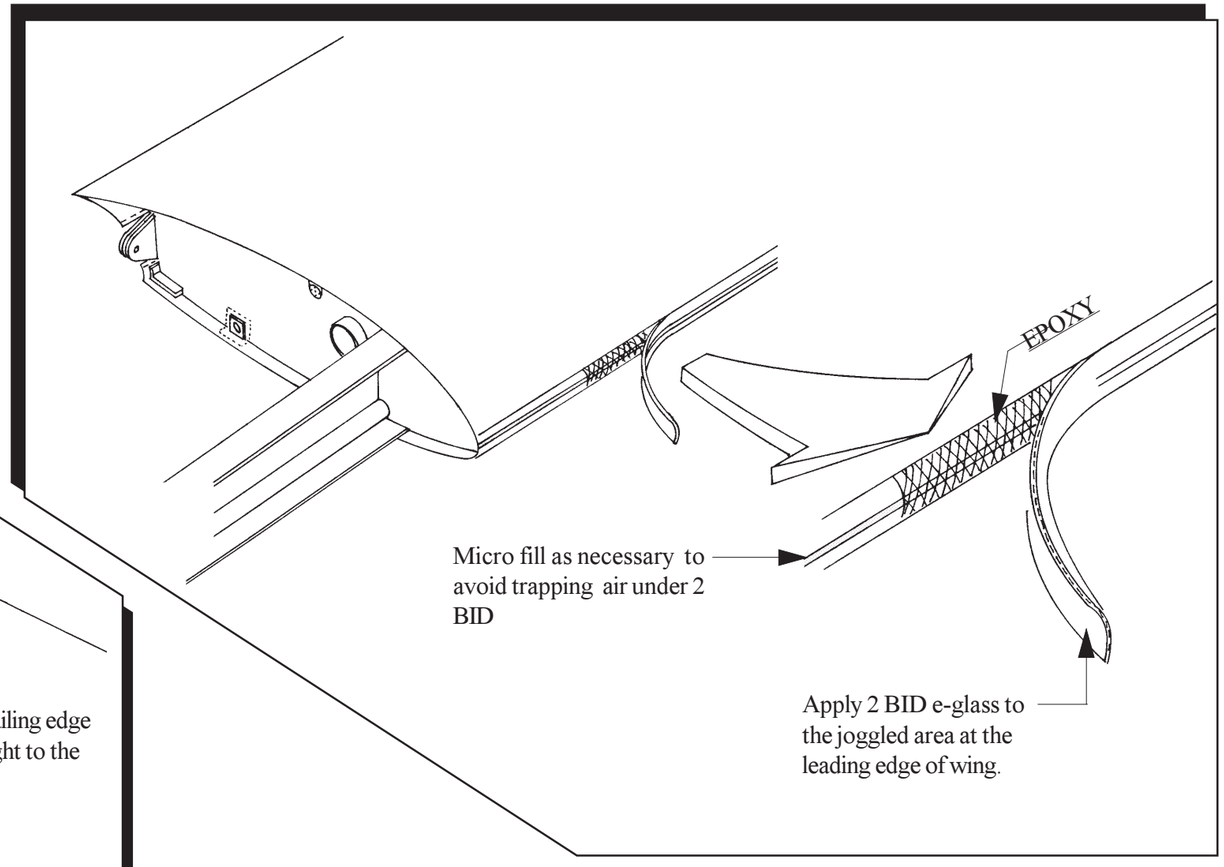



**Helpful Hint:** We have found that using a padded dual action orbital sander (with no sand paper) helps settle the adhesive during closing.

**When Closing:**
Start by lowering the upper wing skin to align with the cleco holes at the leading edge. Gradually adding weights at the front and going aft. Always work from the front and work your way aft.

**L.E. BID and T.E. Fill**
**Fig. 8:A:7**



## B. Pressure Testing the Wings

You should wait a couple of weeks prior to pressure testing the wing to make sure it is fully cured. If you were careful with shaping your capstrips and applied a sufficient amount of adhesive when closing the wings you should have no problems with fuel leaks.

Pressurizing a fuel tank with air should be done very carefully. Only 1 psi is required to test the fuel tank. If you have strong lungs you will be able to apply 1 psi. Any more than 2 psi would hurt the wing structure. To pressurize a wing use a bicycle pump or one of those foot pumps for inflating rafts. Using an air compressor should be avoided as it is easy to over pressurize the wing. You must monitor the pressure with a gauge if you use anything but your lungs.

Another method is to use low pressure (suck the air out of the tank). It can be safer because it is harder to implode a wing than explode a wing.

The tools needed to pressure check a wing are simple: something to pressurize a wing with, like the pumps previously mentioned, and a gauge to read the pressure in the wing. The gauge can be a cheap dial type gauge connected to the brass fuel drain with the appropriate fittings. Another method is to attach a balloon. Leave the balloon for 30 min. If you can't detect a change in the size, you are fine. Be aware that some air will actually leak through the balloon skin.

Tape off all tank openings that are not being used to either pump in air or check pressure. Even the fuel caps must be taped over because they are not airtight. When the tank is pressurized, the gauge will usually fall off a little bit just after stopping the air pressure, but should remain steady after that.

Leaks are detected by a drop in the tank pressure. Most of the time you can locate the leaks by listening carefully. If you suspect a leak in an area brush soap and water around the edges until the bubbles are sighted, just like checking an inner tube.

### Fixing a Leak

Once you locate a leak, it is best to create a vacuum on the tank to suck the epoxy into the crack. Use your shop vacuum to pull the vacuum. **Be careful, a powerful shop vacuum may collapse the wing**. Just bring the vacuum close up to the fuel cap for a slight pressure drop.

You can also use a sloshing compound to fix leaks. Depending on the type of sealer you used, make sure the sloshing compound is compatible, and position the wing so the compound will sink to the edges where you suspect the leak is. The sloshing compound is poured into the wing through one of the openings. The wing is positioned such that the sloshing compound runs towards the suspected area of the leak. This method should be a last resort as it tends to be messy. Attempt to keep the sloshing compound away from the slosh doors. If this becomes necessary, it is a good idea to contact Lancair.

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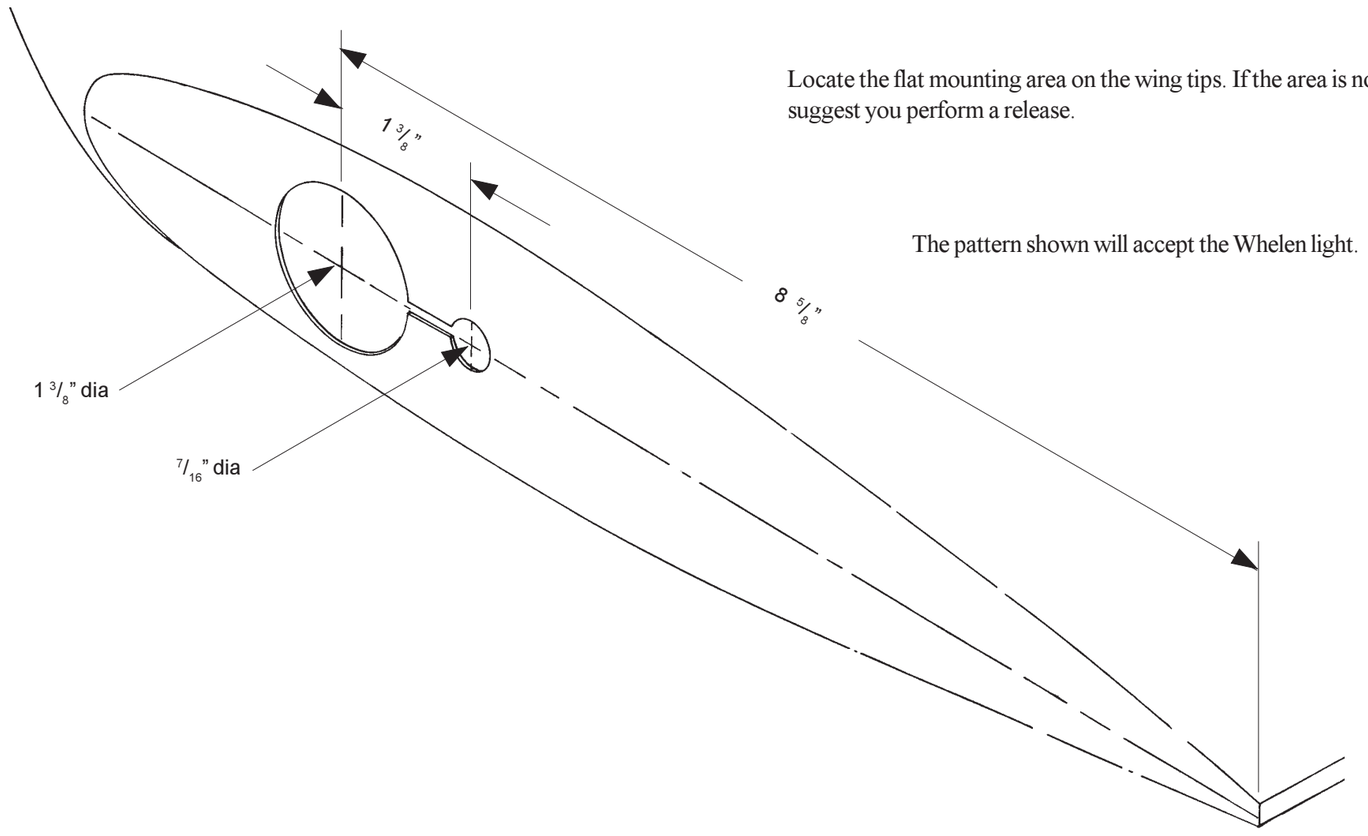
## C. Strobe and Nav Lights

**Strobe/ NAV Lights Installation**
**8:C:1**

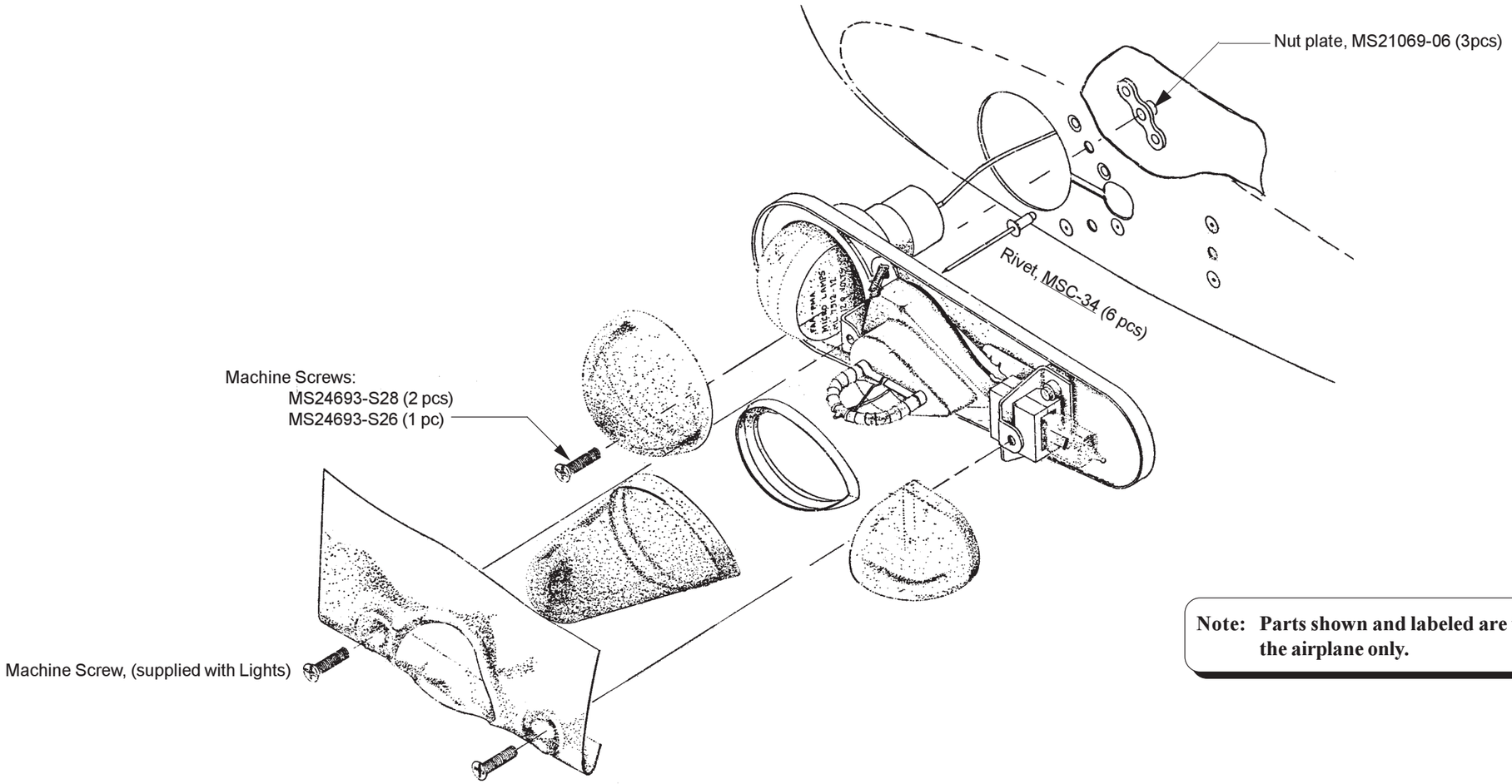
The Legacy wing tips are made to accept the Whelen A600 PR/A600 PG light assemblies. The unit incorporates all required lighting for night flight. It has the red (left side) or green (right side) wing tip position light, a strobe light in the middle and a white tail light at the back. The Kit A600 includes all; a left and a right assembly, power supply and installation wire kit.




Locate the flat mounting area on the wing tips. If the area is not flat we suggest you perform a release.

The pattern shown will accept the Whelen light.

**Strobe/NAV lights Exploded view**
**Fig. 8:C:2**




**Note: Parts shown and labeled are for one side of the airplane only.**