

WINGS & AILERONS

Heat shrinkable material method Preface

CHALLENGER II - SECTION IIa

NOTE: Challenger I and Challenger II 'Clipped wing' can only be covered with heat shrinkable material. The standard wing Challenger I and II can also be covered using this method as an option.

OBJECTIVE of SECTION IIa

Upon completion of Section II of the assembly instructions, both wings and ailerons will be covered and hardware installed.

Tools required: (not supplied)

1/2" or 1" soft brush.
Electric drill, 3/16" & 1/8" drill bits.
Razor blades.
Scissors.
Household clothes iron.
Soldering gun with knife tip.
File
De-burring tool.

Materials required: (supplied)

Poly-tak adhesive.
MEK Solvent.

Other materials: (not supplied)

Masking tape.
Clear packing tape.
#220 grit sandpaper wet or dry.

NOTE: BEFORE COVERING AILERONS AND WINGS,
SEE PAGE 5 - 8 & 16. SECTION II - sailcloth method.

If you have any questions prior to, or during assembly, please feel to contact the factory.

WINGS & AILERONS **Heat shrinkable material method.**

Section IIa - Introduction.

Please conduct a complete and thorough inventory check prior to commencing your build. Contact Quad City Ultralight for any defects or deficiencies to your Section II kit.

Please refer to the inventory sheet supplied with the Section II hardware kit.

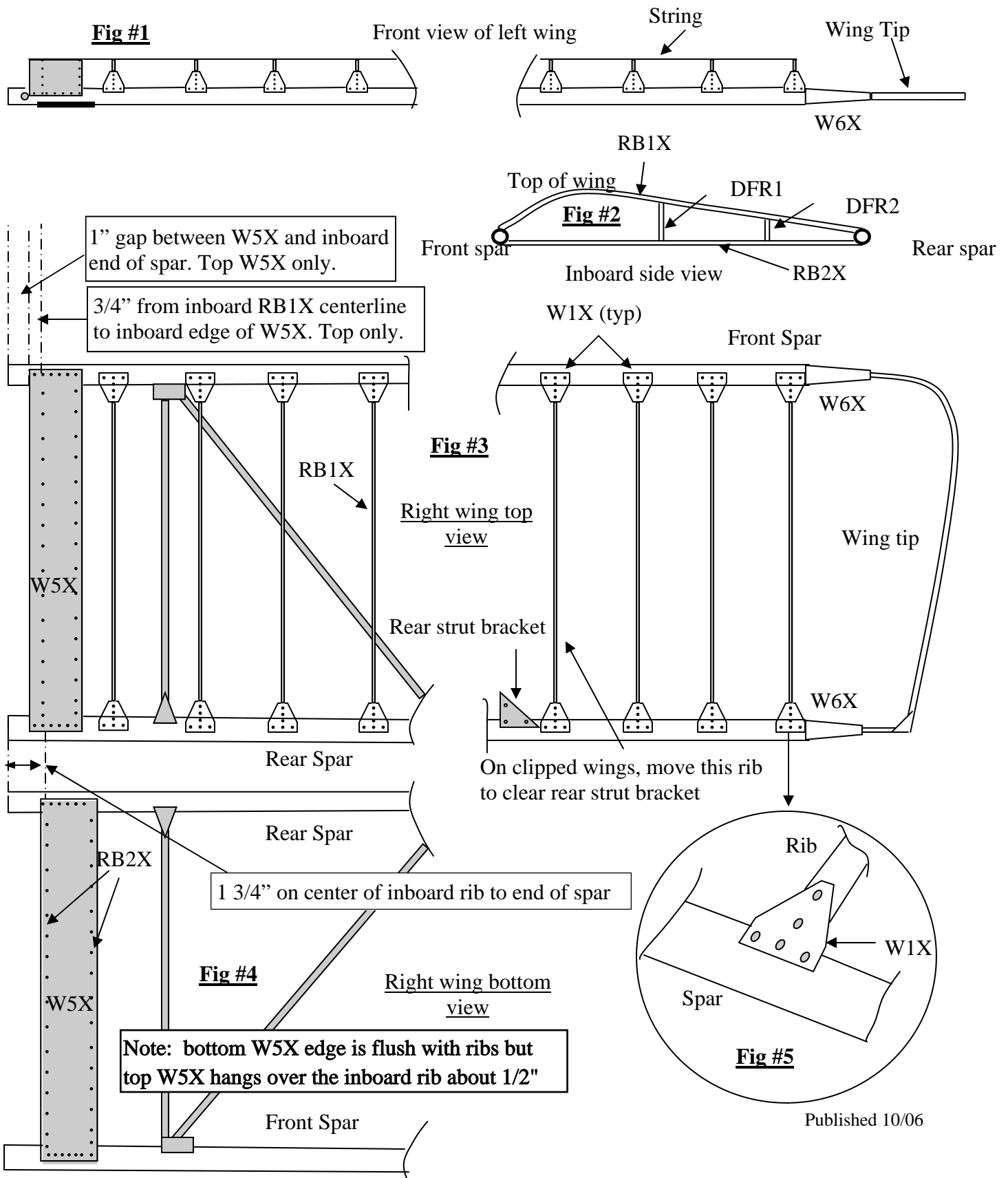
Important:

Inspect all parts of this kit for integrity. If any burs are present in the aluminum parts, remove these as described in Section I.

Note:

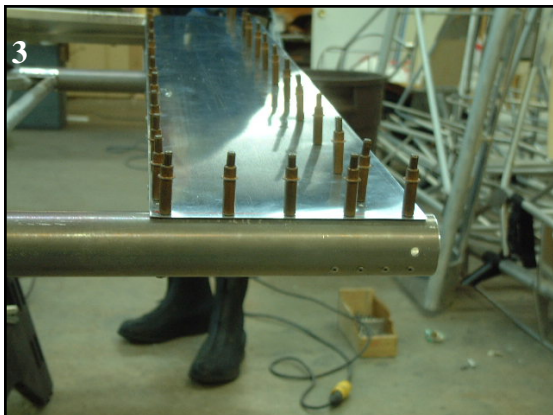
Because of the shrinking capacity of the 'heat shrinkable material', a very smooth and tight finish can be obtained, but care must be taken not to over-tighten the fabric and deform the airframe parts. The parts in this kit are designed to give a more rigid frame to attach the fabric to. The shrink rate of the 'heat shrinkable material' we supply is 8 to 10%. The finishing (pinked) tape shrinks by 3%.

Wing panel schematic

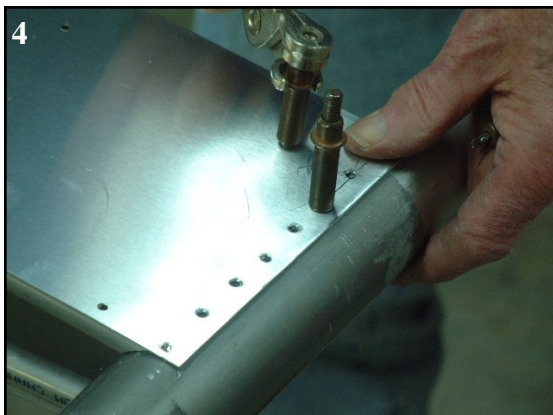




Install the DFR1 and DFR2 brace ribs between the Top and bottom wing ribs supporting the W5X flat sheets. Slide them into position and use Alum. 1/8" short rivets. Trim as necessary. Try to avoid distorting the line of both top and bottom ribs during the installation.



We like to use Cleco's to secure the W5X before committing to rivets. Trim excess material from W5X as required.



Rivet spacing on the spars is 3/4" using S.S. 1/8" long rivets. Rivet spacing on the ribs is 2 to 3" for the entire length of the W5X using S.S. 1/8" short rivets

How to assemble the wings.

Step # 1. How to attach RB2X ribs (bottom) and W5X flat sheet

Starting on the bottom of the wing frame, attach the W5X flat sheet and RB2X ribs to the inboard end of the wing frame. Use 1/8" x 1/4" Stainless steel rivets at the spar ends of W5X and 1/8" x 1/8" Aluminum * rivets through W5X into RB2X ribs. This flat sheet and ribs assembly provides a rigid attachment for the bottom fabric. Be sure to allow 1-1/2" of the spars to extend beyond the W5X sheet to allow clearance for the fuselage to wing junction. Rivet spacing approximately 3" spacing on ribs, 3/4" on spar.
(* Stainless Steel rivets can be used in place of aluminum if you wish.)

Step #2. How to attach RB1X ribs (top curved) and W5X flat sheet

Turn the wing over & install two RB1X curved ribs. The inboard rib must be set at 1-1/2" (on center) from inboard end of the spar . The W5X top flat sheet must be placed to allow an inboard overhang of 1/2" on the inboard RB1X rib (only 1" of spar to extend beyond the W5X). Use 1/8" x 1/4" Stainless Steel rivets at spar locations and 1/8" x 1/8" Aluminum OR Stainless Steel rivets along the RB1X ribs.
Now add braces DFR-1 & DFR-2 as shown on photo #2 previous page.
Aluminum rivets work fine here.

Step #3. How to attach the remainder of RB1X ribs

Install the outermost RB1X rib using gussets W1X and 1/8" x 1/8" Stainless Steel rivets. Install the remaining ribs at one foot intervals making sure they are all at the same height. 1/8" x 1/4" Stainless Steel rivets must be used on spars.

NOTE:

Use a string tied between inboard and outboard ribs to line up remaining ribs for equal height.

Step #4..How to attach W6X gusset

Install W6X (spar to tip fairing gusset). This gusset helps to eliminate the bump in the fabric when covering over the spar to tip junction.
Form the W6X gusset around the leading edge spar, trailing edge spar and wing tip bow. Attach with 1/8" Stainless short rivets.

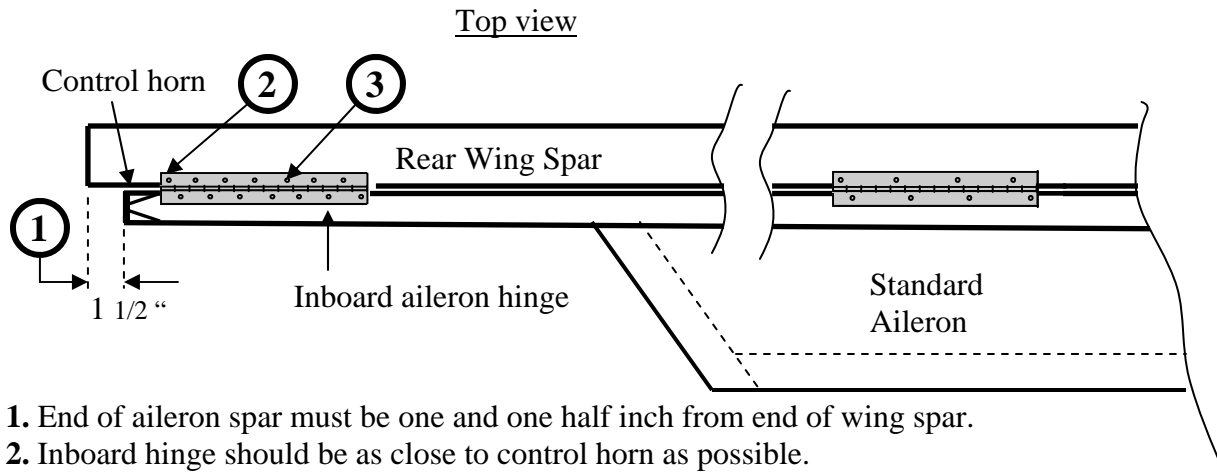
Step #5. Clean up before covering the wings

File smooth any sharp edges on gussets and rivets. Lightly sand entire perimeter of wing and all ribs where fabric will touch. Clean with MEK or Acetone. Tape over any sharp edges and rivets etc. Use your newly acquired knowledge of the fabric covering procedure to attach the wing fabric.

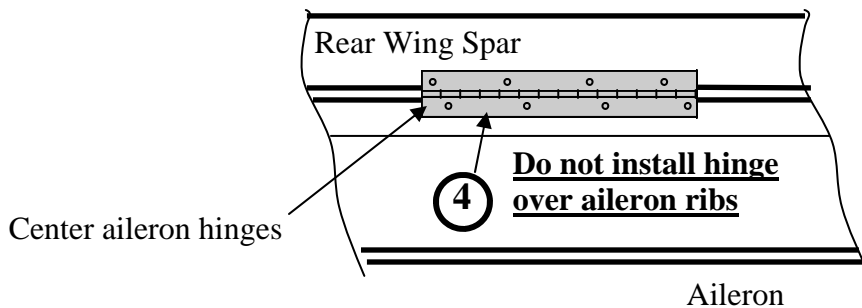
Important:

Pre-install the ailerons BEFORE you cover both the wings and ailerons with fabric.
Mark each aileron hinge with its appropriate position for future reference when re-assembling.
Use cleco's to attach hinges and ailerons to rear spar.. Do not rivet at this time.
If you cannot use cleco's, use two alum rivets per hinge side and drill out after final positioning.

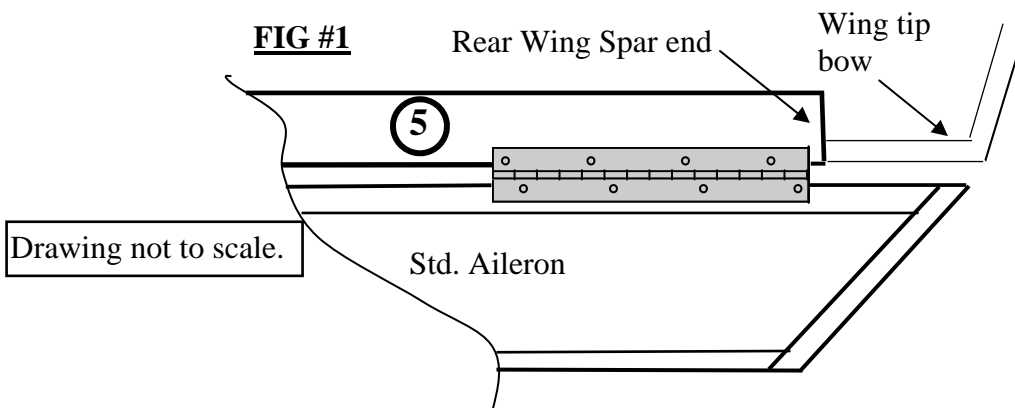
How to install Aileron hinges - Hinge location

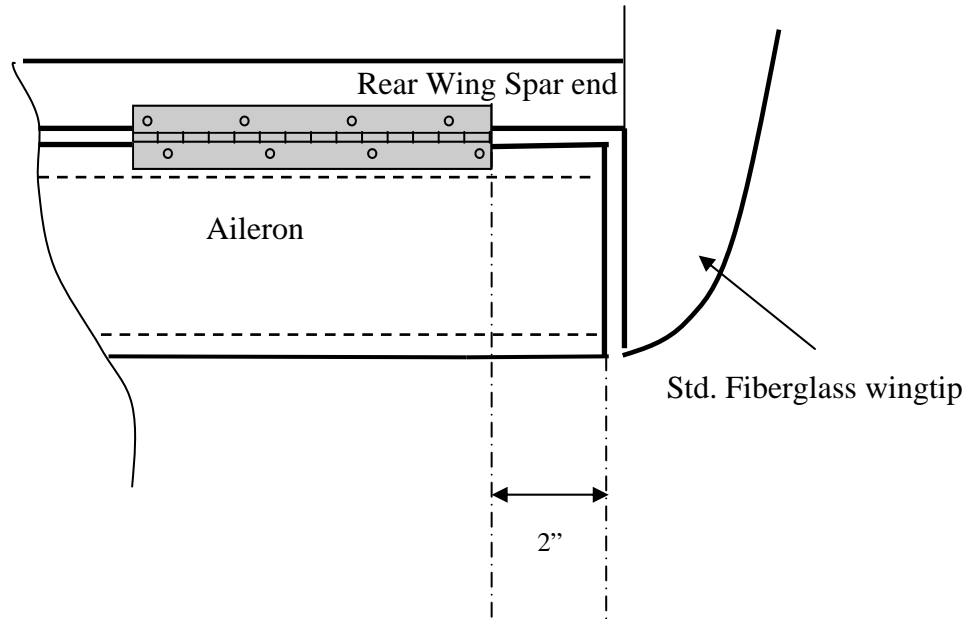


1. End of aileron spar must be one and one half inch from end of wing spar.
2. Inboard hinge should be as close to control horn as possible.
3. Stagger rivets to allow more aileron travel.



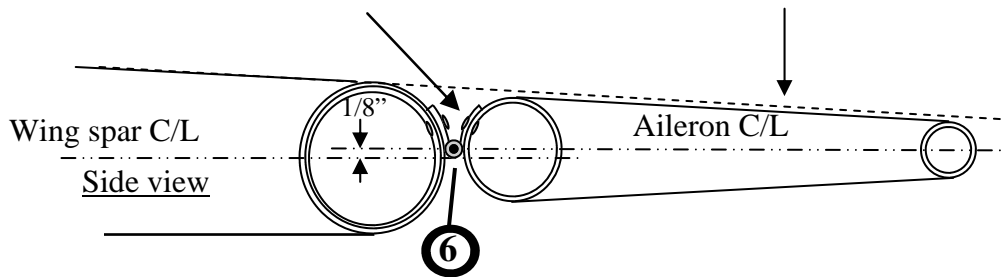
4. Four rivets per side on all hinges except inboard hinge; which gets seven per side. The two center hinges must be spaced evenly between inboard and outboard hinges without interfering with ribs or wing strut brackets.
5. The outboard hinge should be as far out on the rear wing spar as possible without interfering with rib placement for wings with the standard wing tip bow. See Fig # 1 below.
6. The outboard hinge for wings with fiberglass wing tips should be 2" from end of rear wing Spar. See fig # 2. page 7.





Hinge with stainless rivets
SSD42SSBS on aileron side of hinge
SSD44SSBS on Spar side of hinge

Top surface almost flush with top surface of wing fabric



6. Center of hinge should on the center line of aileron. Bottom of hinge barrel should be on centerline of rear spar.

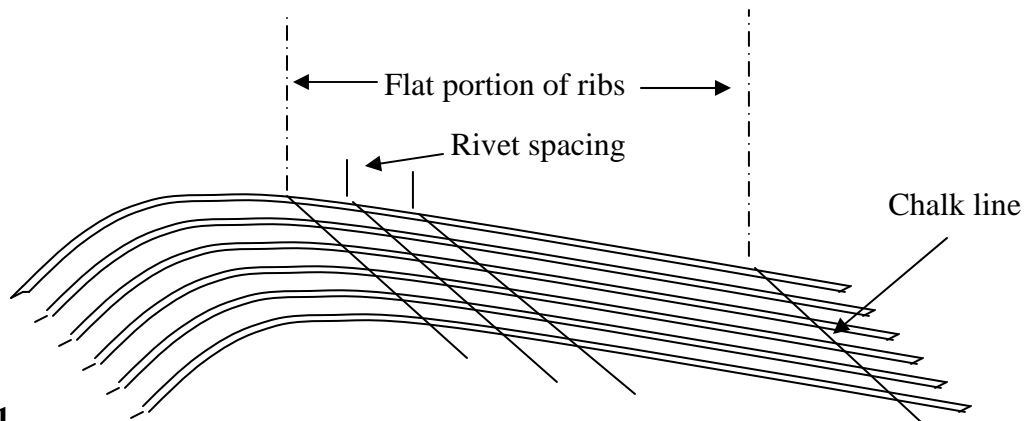


How to assemble the wings.

How to cover wings with heat shrinkable material

Rib rivets

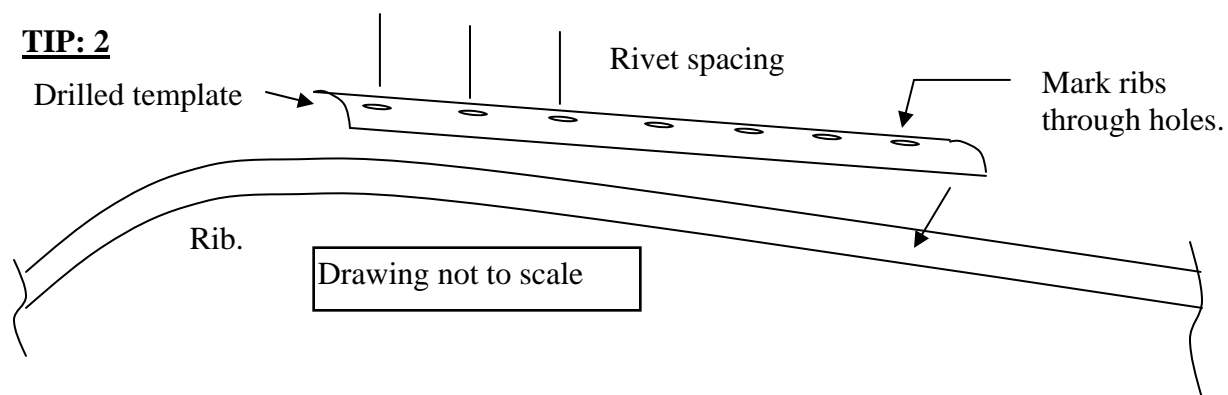
Drill all the wing ribs for 1/8" x 1/8" LARGE FLANGE aluminum rib rivets before installing. Rib rivet spacing of 4" to 5" is good. Place rivets only on flat portion of the ribs (about 2/3 of the way from rear spar to the front)



TIP: 1

Lay out the ribs on a flat surface, mark up the first rib with desired rivet spacing. Snap a chalk line across the rest of the ribs. Presto' ... just saved a bunch of time.

TIP: 2



Make a template as shown above. Place on ribs and mark the locations for the rivets. Be sure to start at the same point on each rib.

Cover the bottom of the wing first. Before applying glue, sand the entire perimeter of the wing, and W5X sheets, wipe with MEK and apply glue as soon as possible.

Apply a generous coat of 100% adhesive to the perimeter of the wing panel.

Next, attach the bottom fabric around the perimeter with 50/50 mix as described in Section I.

It is important to keep wrinkles to a minimum during this phase. This will reduce the amount of finishing work you do later. Allow to dry and shrink material with the iron set to 300 degrees.

How to assemble the wings.

How to cover wings with heat shrinkable material Cont:

Now, let's cover the top. Sand and MEK each rib top. Apply 100% adhesive to the ribs and to the perimeter again until fabric weave is filled (shiny) and let cement dry.

Now glue fabric to perimeter, let dry, then tauten with the iron as above.

After shrinking top fabric, weight the fabric on each side of the rib (two good sized books do the job) and brush 50/50mix through to bond the fabric securely to the rib. Let dry.

Apply reinforcing tape centered over the rib and along the straight section of rib only.

Locate the rivet holes with a hot nail (to melt the tape and fabric). Use your rivet template to locate holes if you chose to use that method of marking your ribs. Install the Large flange rivets then cover ribs and rib rivets with finishing tape, using 50/50 glue/MEK mix.

An option is to paint the finishing tapes on with your first coat of primer which is much easier and uses no glue.

Painting.

Once the wings are covered and complete, they need to be sealed, have UV protection and painted as described in Section I

Inspection.

We did not use inspection covers as most areas are accessible without them. Drain holes at the back edges of bottom surfaces are a good idea, particularly if aircraft is operated on floats or tied down outside.

Wing Gap covering options

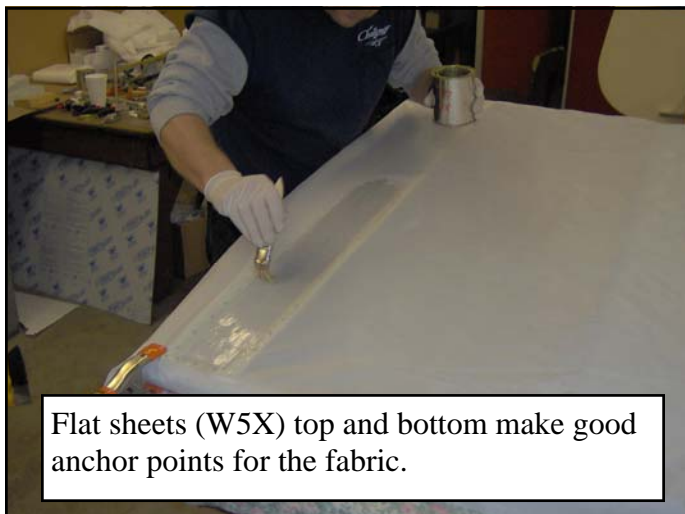
The gap between the left and right wing panels can be covered with fabric, sheet aluminum, .040 lexan or a specially designed fiberglass 'Center section gap cover' option.

If you will be re-moving the wings often, we suggest installing a removable panel.

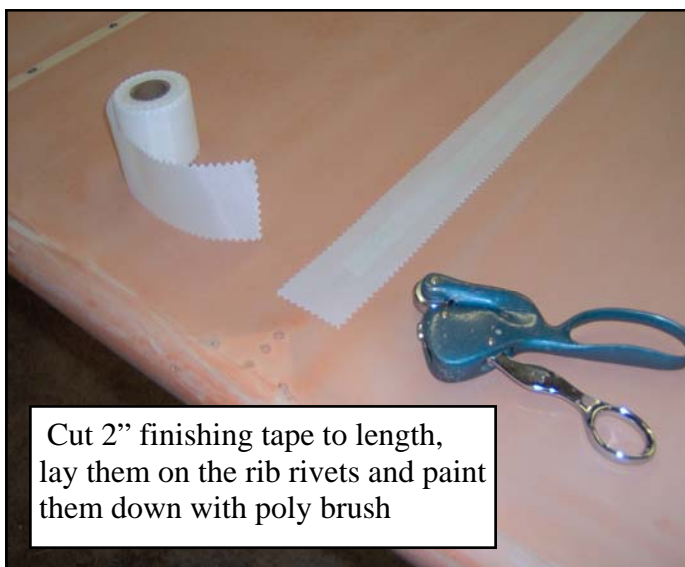
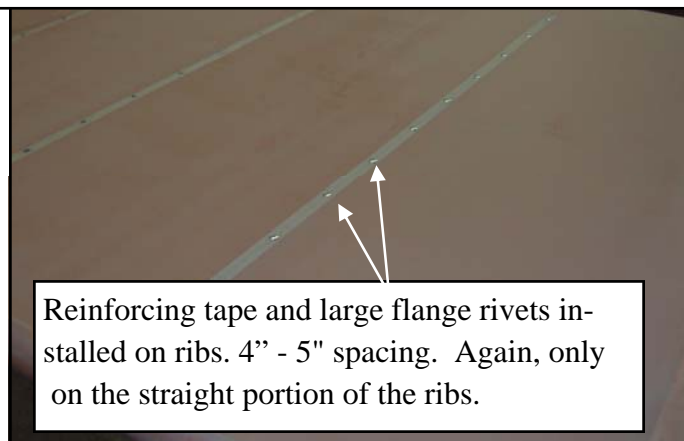
The Lexan option makes it easy to inspect the flaperon mechanism when conducting your pre-flight routine. Covers can also be held in place with aluminum rivets or rivnuts and screws.

IMPORTANT NOTE:

The aileron to wing gap must be sealed before flight. We used 3" wide seam tape (finishing tape) and attached it during the primer process (poly brush) of the heat shrinkable material. Be sure to tuck the tape into the gap so the bend line of the tape and hinge line are the same, and will not interfere with proper aileron deflection. Pictures on page 11.



Shrink fabric before gluing fabric to ribs. Glue fabric to ribs with 50/50 mix. Apply 1 coat of primer.

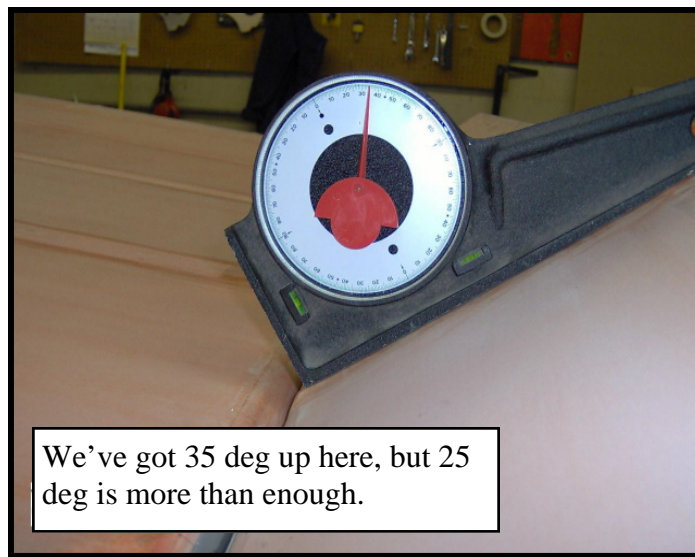


When you have covered the wings and ailerons and have applied fabric sealant (Poly-Brush), locate the previously drilled hinge locations and install the aileron hinges.

Important : Make sure you have the correct hinge for each attachment point. It will be highly unlikely that a different hinge will fit the holes you have previously drilled



Inboard hinge needs lots of stainless rivets. Longs on the spar and shorts on the aileron. Looks good. Lets get going



We've got 35 deg up here, but 25 deg is more than enough.



Outboard hinge installation

Typical outboard hinge installation. This application is for fiberglass wing tips
Note: Holes are drilled at every OTHER hinge barrel. 4 each side for outboard hinges. Inboard hinges are drilled at every hinge barrel point (7 each side).



Painting the gap seal with Poly Brush

This is the way to create a gap seal. Lay 2" finishing tape in the space between aileron and wing. Aileron must be in the down position.
Lay some drill bits in the groove to keep the tape in place and simply apply Poly-Brush.

Move the drill bit as you go and don't paint the drill bit into the gap. Sorry to have to say this but some people will ask "do I leave the drill bit in there?"