LSS Section I

PREFACE TO ASSEMBLY

Your Challenger Kit has been supplied to you with most of the major construction completed. Each section of the aircraft has been checked by our quality control process to ensure the section meets our high standards.
It is important, however, for you to also examine each component and part of the kit as a double quality control inspection.

There is an old adage that applies very well to the project you are about to undertake:

" If all else fails… read the instructions !"

This certainly is important in this case. If you have any questions about any phase of assembly of your Challenger, contact your dealer or the factory.. We are glad to assist in every way. We are as concerned about the completed Challengers appearance and structural integrity as you are, so please take time to perform each task carefully and according to instruction.
Pre-reading each step before beginning the step will also help in understanding.

WARNING:

The parts and hardware in the kit making up the Challenger are of special aircraft grade ! DO NOT attempt to substitute any part or hardware your-self. Contact the factory for assistance when replacement is necessary.
Your life may depend on it !

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LSS Section I Inventory

CHECK	QUANTITY	DESCRIPTION
( )	1	Challenger hat
( )	1	Instruction Manual (sect. 1,2,3 & 4)
( )	1	Challenger retail parts price list
( )	1 Qt	PT-QT Poly-Tak Adhesive
( )	1 Qt	MEK-QT M.E.K. (Methyl Ethel Keytone)
( )	1	**ST-300-LSS** Set of heat shrinkable Dacron socks for Elevators, Stabilizers & Rudder, Vertical fin & Dorsal fin have Pre-cut sheets only.
( )	1	**EMP-100-LSS** Rudder frame
( )	1	**EMP-200-LSS** Vertical fin frame
( )	2	EMP-300 Horizontal stabilizer frames.
( )	2	EMP-400 Elevator frames
( )	1	**LSS-VFEK** Vertical Fin Extension kit (1 x Extension tube, 1 x U-bracket, 10 x 1/8" S.S. short rivets)
( )	20	ST-16L stainless steel hinge brackets.
( )	60	AD64ABS 3/16" Aluminum rivets.
( )	25	SSD42SSBS SS Rivets. 1/8" x 1/8"
( )	6	AN3-6 bolts.
( )	6	AN310-3 castle nuts.3/16"
( )	12	AN960-10 washers. 3/16"
( )	6	AN416-2 safety pins
( )	2	EMP-7R & EMP-7L control horns elevator
( )	2	EMP-8R & EMP-8L control horns rudder
( )	6	AN525-10R20 3/16" Phillips head bolts
( )	6	AN365-1032 3/16" Nyloc nuts
( )	4	AN960-10 3/16" washers
( )	4**	Cotter pins
( )	4**	Rony-78.7/8 Rony Brkts (black alum. 'U' Brackets)
( )	2**	AN4-15A 1/4" bolts (for Rony Brackets)
( )	2**	AN364-428 1/4" Nyloc nuts (thin)
( )	4**	AN4-14A bolts (for attaching stabilizers)
( )	4**	PW-4 (black plastic washers. **NOTE:- for rear 7/8" Rony bracket only on horizontal stab)**

Note: ** These parts are shipped in pre-assembled form.

IMPORTANT NOTE

Make notes on how the 7/8" Rony bracket assembly hardware is pre-assembled and the sequence of assembly, so they may be re-installed properly.

ASSEMBLY INSTRUCTIONS—Introduction

'Tail Feathers'

CHALLENGER II LSS - SECTION 1- Tail section (Empennage)

We supply a 'Heat Shrinkable Dacron' material to cover the tail section. It is lightweight at 1.8oz per sq yard and has a tight weave. Using heavier fabric requires extreme care to avoid distorting airframe members when shrinking, and does not have the fine finish as offered by the lighter material.

The assembly of your Challenger II LSS Kit will be 'TAIL FIRST'. This will give you the opportunity of getting the feel of working with shrinkable covering material.

Objective of SECTION I
Upon Completion of SECTION 1 the tail surfaces (Rudder, Elevators, Horizontal Stabilizers and Vertical Fin) will be finished with most of the tail surface hardware installed.

Tools Required: (not supplied)
Hammer
Good camel hair brushes—1/2" - 1" brush
Razor blades
Scissors (also 'pinked edged' scissors if available)
Household clothes iron
3/16" pop rivet gun
Electric drill
3/16" drill bit
Metal file
De-burring tool
Medium grit sandpaper
Suitable filtered breathing mask

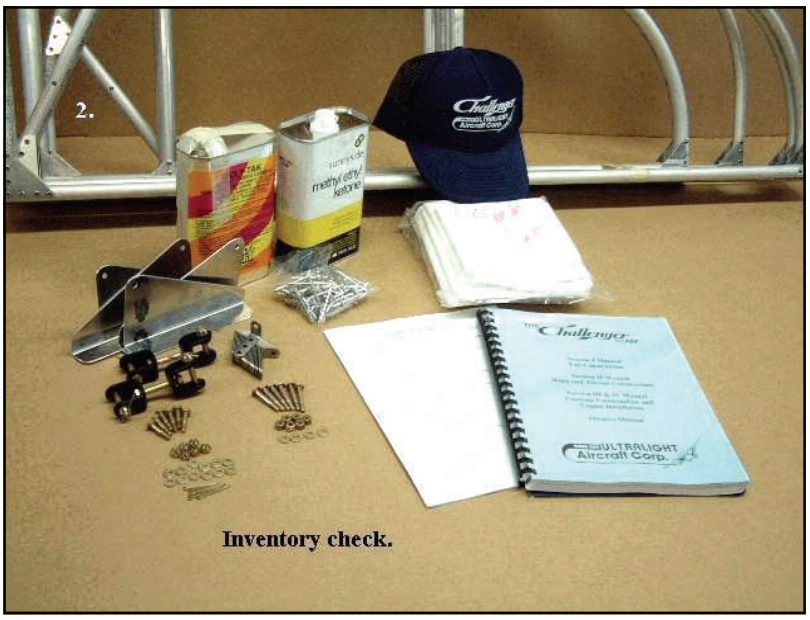
Other Materials: (not supplied in kit).
3/4" Masking tape
Paint mixing cups
Paint filter
Paper towels
Sponge brushes 1 1/2" to 2"
Protective gloves (rubber)

Conduct a full and careful inventory check using the list on page 2.

Typical completion time: 8 Hours

Here' s the way the tail section comes out of the box.
remove all tape and tape residue from tubes.

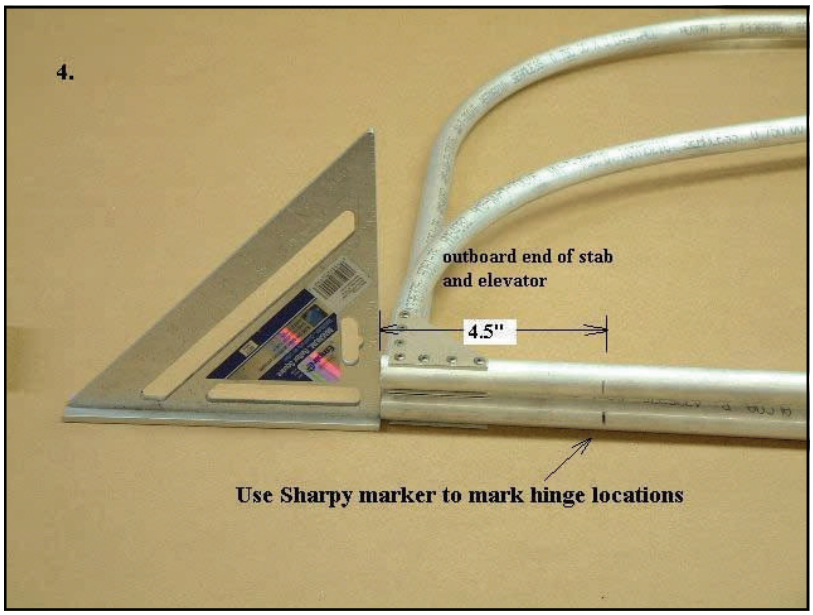
Open the box and spread out the contents



Check the inventory sheet to see that you have everything. (Page 2 for STD planes & Page 22 for LSS Planes)

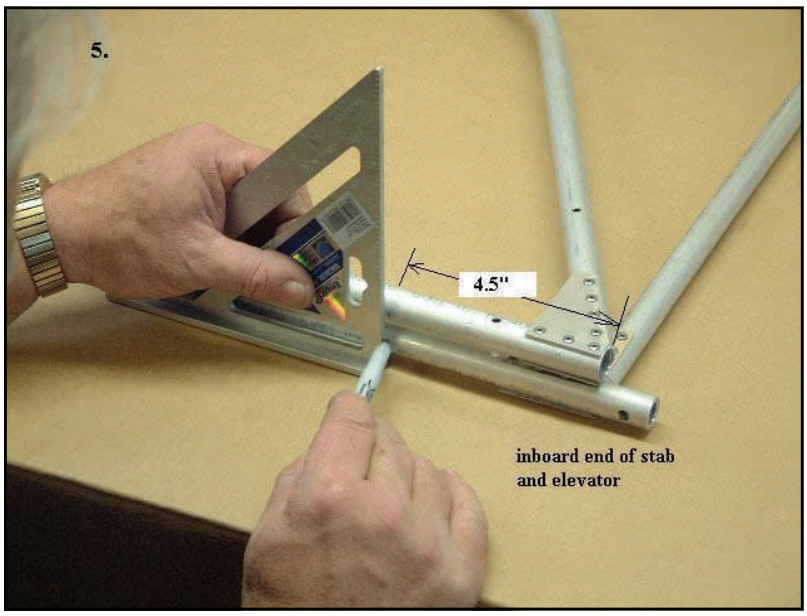
Here's some other stuff you will need to finish the tail section.

Not shown is a paint sprayer. You can rent a paint sprayer or buy a HVLP (high volume low pressure) paint sprayer.



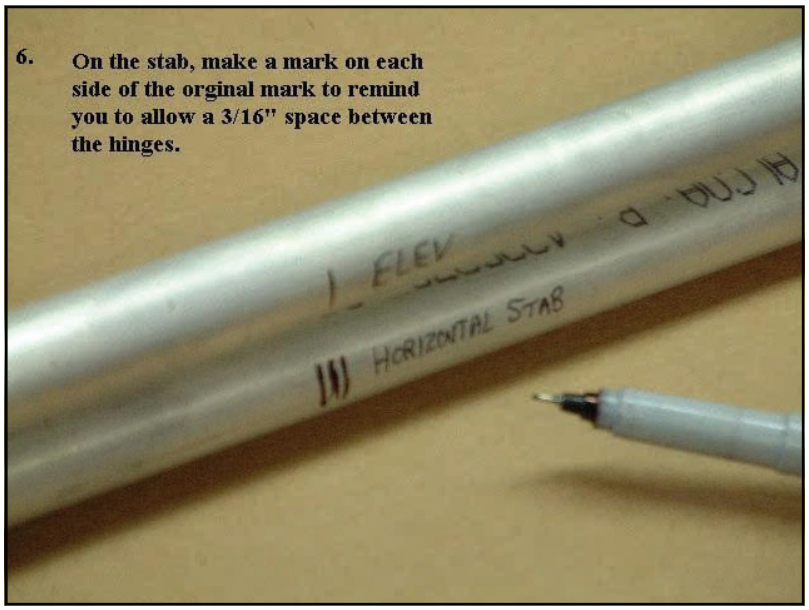
Use a straight edge and line up the Outboard ends of the Stab and Elevator.

Measure 4.5” in and use a Sharpy marker to mark center of outboard hinge location.



NOTE: the elevator is shorter than the stab.

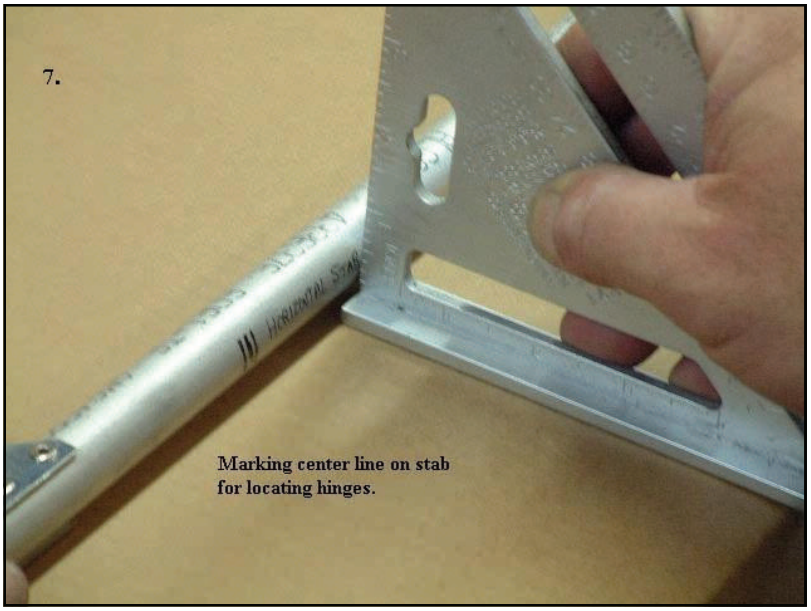
Measure and mark 4.5” from the inboard end of the ELEVATOR.



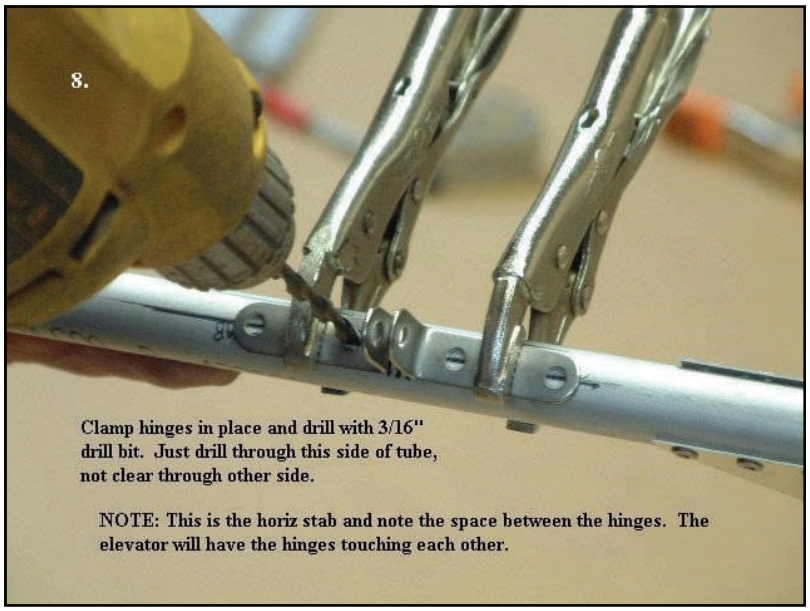
On the Elevator, the two hinge ‘L’ Brackets (ST-16L) butt together.

On the Stab, the two hinge ‘L’ Brackets (ST-16L) are 3/16” apart.

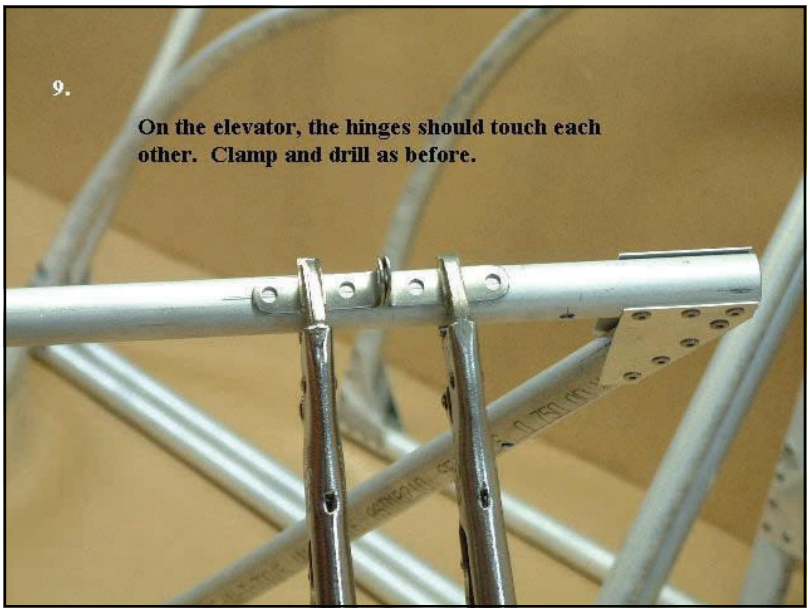
Refer to picture-6 and mark each accordingly.



It's easy to find the centerline of any tubing. Just lay the frame on a flat surface and rub a 'set square' tool down the tubing as shown here.

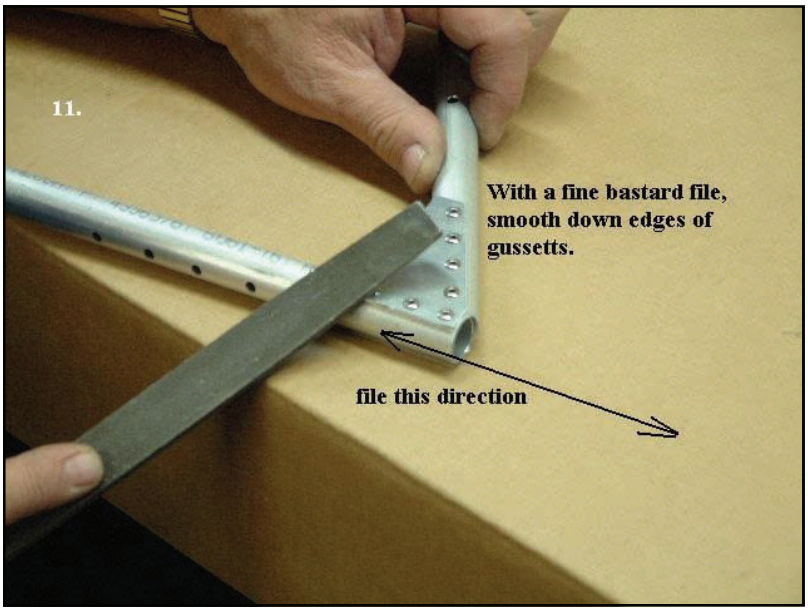


We prefer to use these stub nosed clamps. They provide a better grip than the needle nosed type.
Drill the first hole then make sure the bracket is on centerline and drill out the last hole. Do not drill out center hole at this time.



Repeat the drilling process on all bracket hinges of the tail surfaces.
Note: Make sure you have the correct spacing and orientation for each bracket prior to drilling any holes.

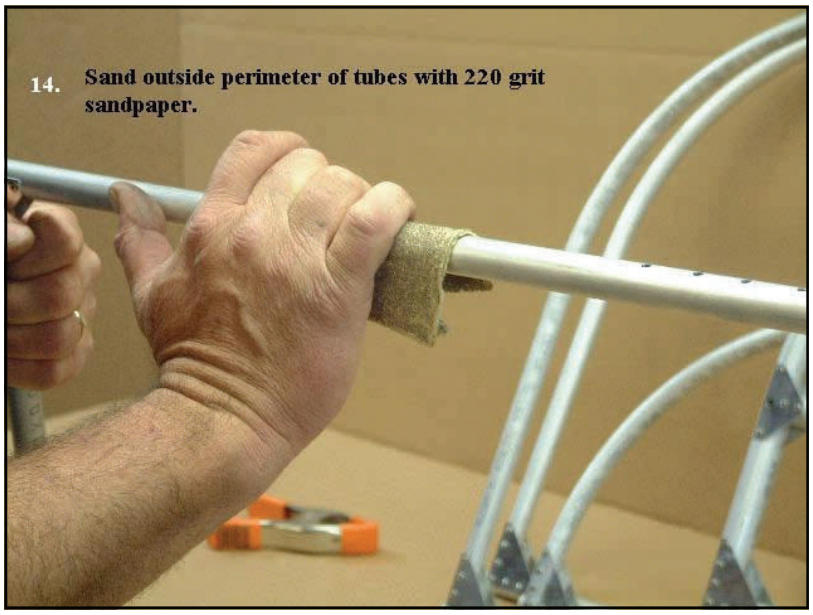
4 holes nicely centered on the tube.



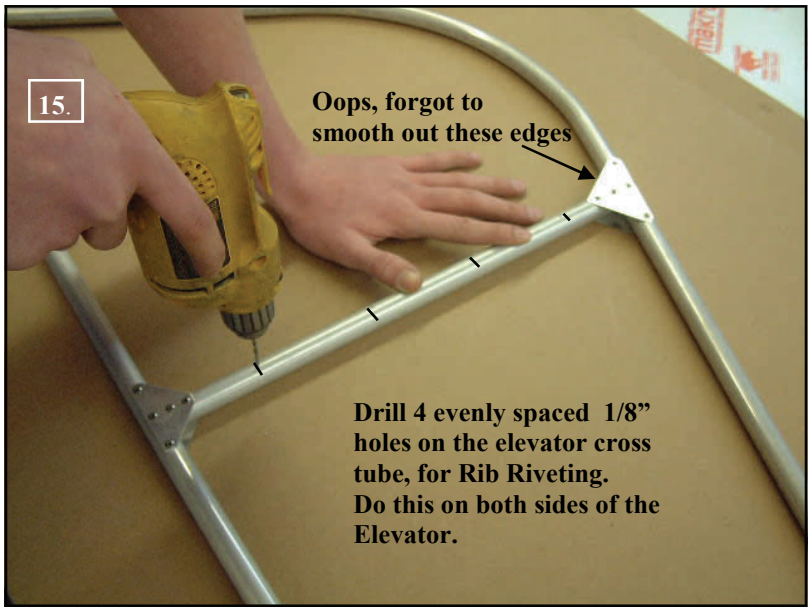
Good preparation for covering is essential. This will minimize premature wear on the fabric.

Get rid of all sharp edges and burrs. The more care you take at this stage, the better your overall result will be.

Don't apply too much tape, especially on the outer perimeter of the frame. You'll need good, clean surfaces for the glue and fabric to stick to.



Carefully sanding the perimeter will remove contaminates such as tape residue etc. and provide a good 'keyed' surface for the glue to bind to.



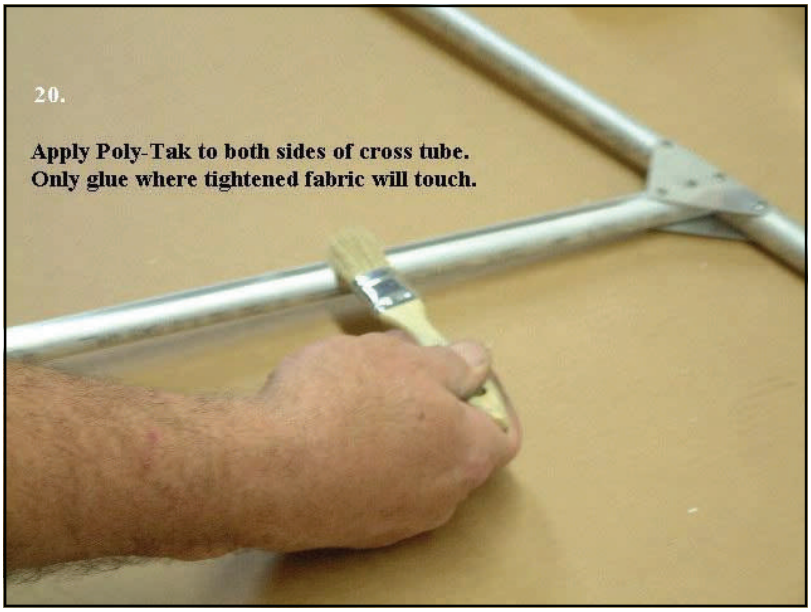
Don't forget about the cross tube on the elevator. Sand and clean, ready for glue.
It looks like Dave forgot to smooth out the edges of that gusset. All sharp edges must be smoothed out.

Use the MEK supplied with your kit and dampen a cloth.

Carefully wipe over all surfaces that you have sanded, smoothed out and de-burred.

Use a clean, dust free table or flat surface.

Don't let too much time go by after cleaning with MEK before you glue.. Oxidation will occur and you will have to re-sand and apply more MEK. Glue around the entire perimeter with one good coat.



Running the brush 'flat' along the cross tube (as shown) will put just the right amount of glue needed for the covering process.

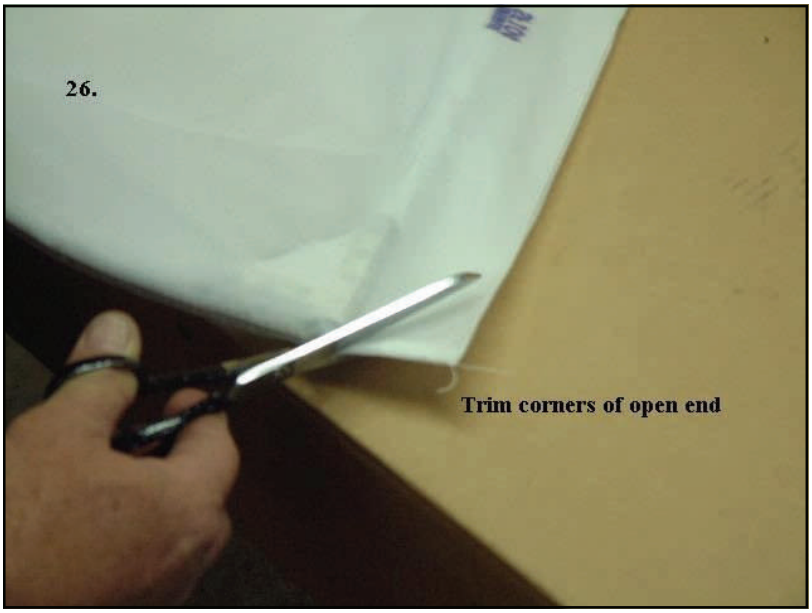
Each sock is individually marked so as to avoid confusion.

MEK, Poly-Tak glue, a brush, a mixing bowl for 50% MEK and 50% glue and a bowl for 100% Poly-Tak glue.

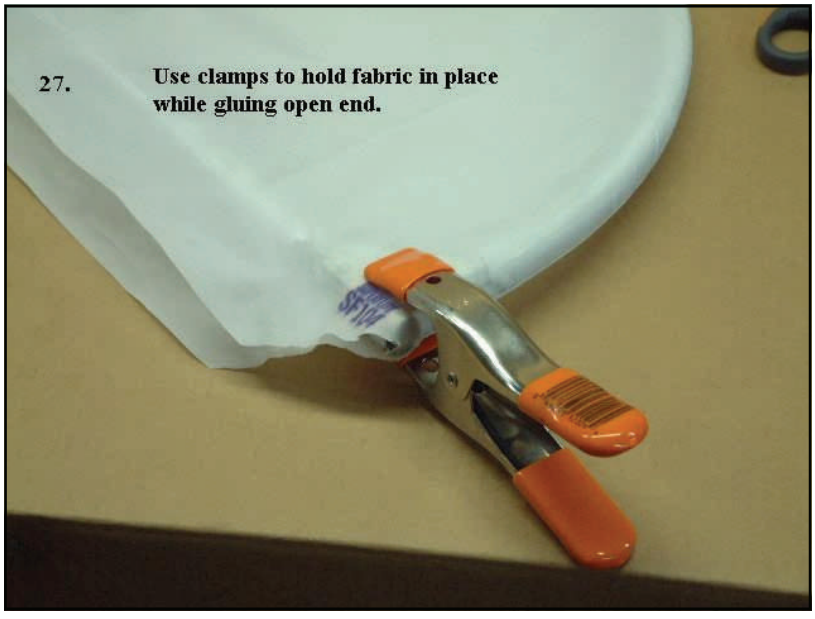
Before laying out the fabric sock, thoroughly brush off dust and shavings from the work surface .

Ensuring correct orientation, insert the frame into the sock.

A scrap piece of cardboard works well to cover the bowls and prevent evaporation.



Make sure the frame is snug inside the sock and the sewn seam is folded to one side of the frame all the way round..

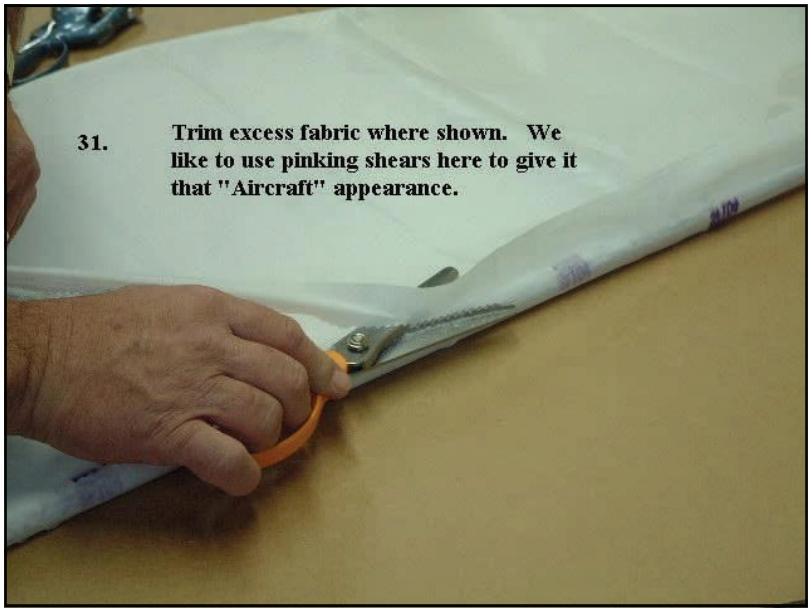


We found that using these style clamps are invaluable and saves a lot of fumbling.

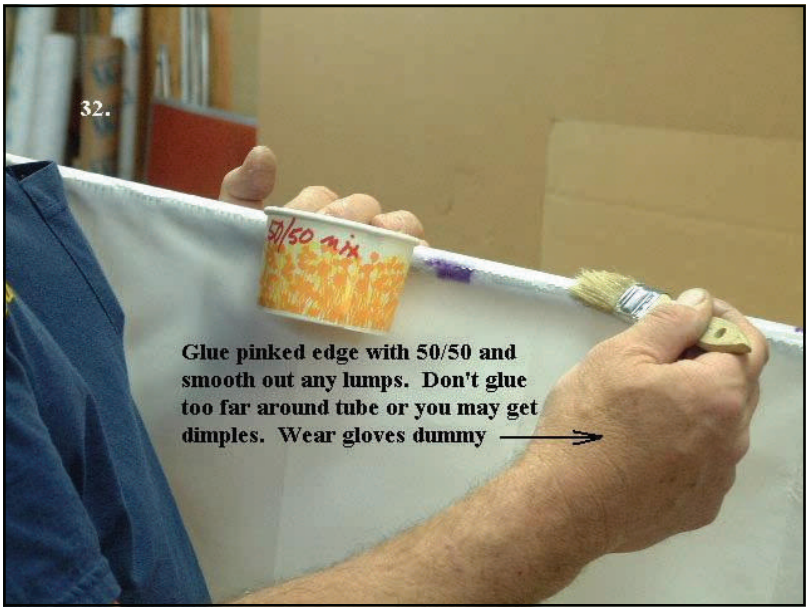
Make sure the mix thoroughly soaks through the fabric to the tube. Try to smooth out the fabric and glue as much as possible.

One good, smooth coat of 100% glue applied.

As before, make sure the 50/50 mix soaks through the fabric and re-activates the 100% glue previously applied.



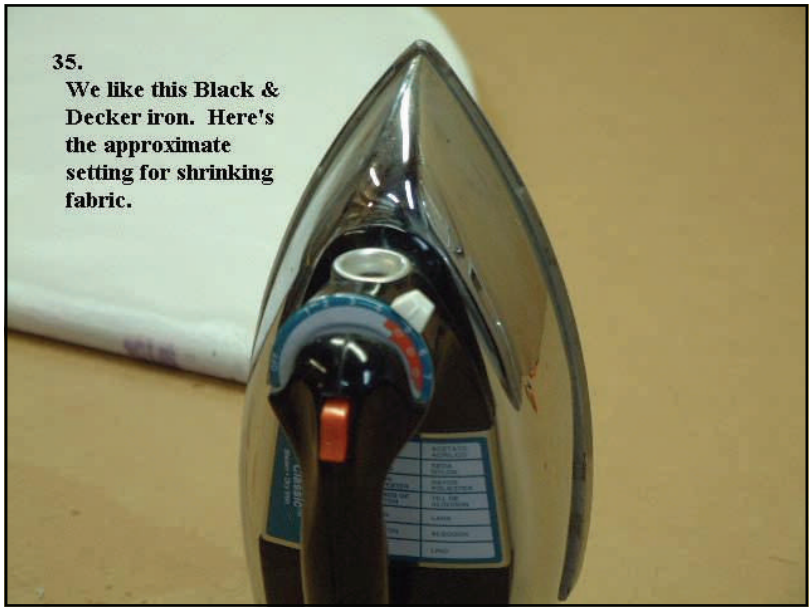
Take care when cutting the fabric. The neater the cut, the better the final appearance will be when it's on the plane.
You can opt to have the cut edge on the underside of the stab and elevator for better appearance.



Use the 50/50 mix sparingly here. Concentrate on the pinked edge only.

Even the professionals end up with a wrinkle or two. These can easily be removed with the iron before heat shrinking..

<u>WARNING</u>:
If you heat shrink the open area first and then attempt to remove wrinkles from the overlapped area, you will more than likely pop open the glued seam.



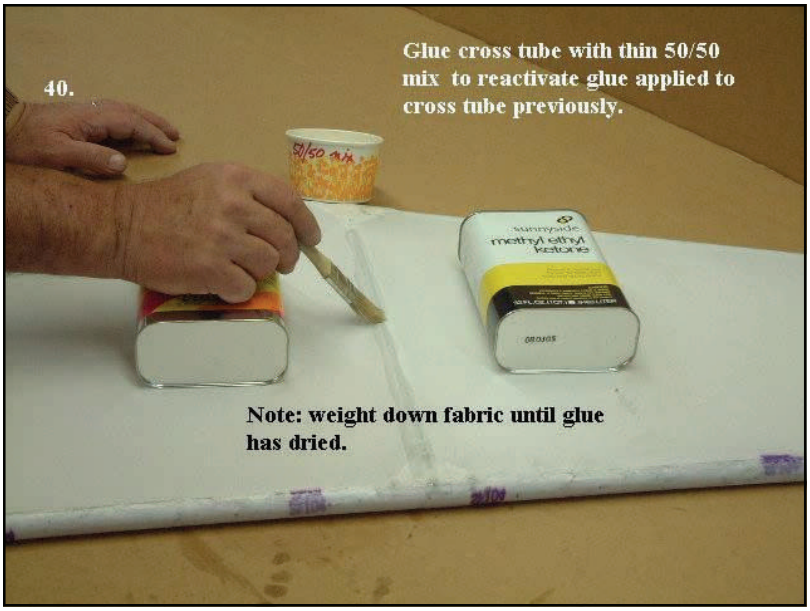
Initial heat setting should be approximately 300 deg.
When you are ready to do a final shrinking, set the iron to 350 deg.

Always keep the iron moving and avoid keeping it on one spot.
Slow, sweeping movements are recommended.

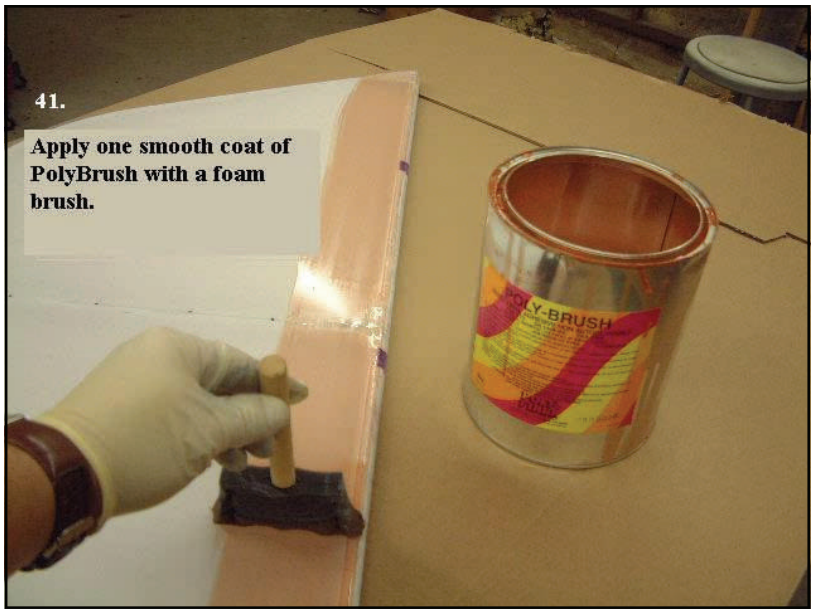
Apply ‘even’ amounts of heat on both sides of the frame.

We are getting close to completing the heat shrink process for this panel. Carefully iron out any last remaining wrinkles and folds - Avoid applying heat to the overlapped edge.

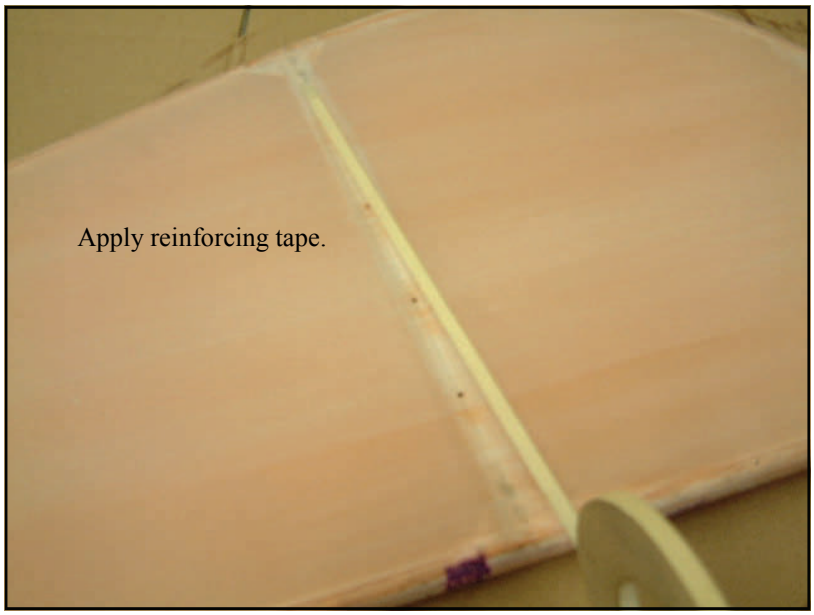
At this point, the sewn seam should be fairly straight and even. Apply some 50/50 mix to the seam.
DO NOT APPLY MEK 50/50 MIX OR GLUE TO PREVIOUSLY GLUED OVERLAPPED SEAM AFTER SHRINKING.



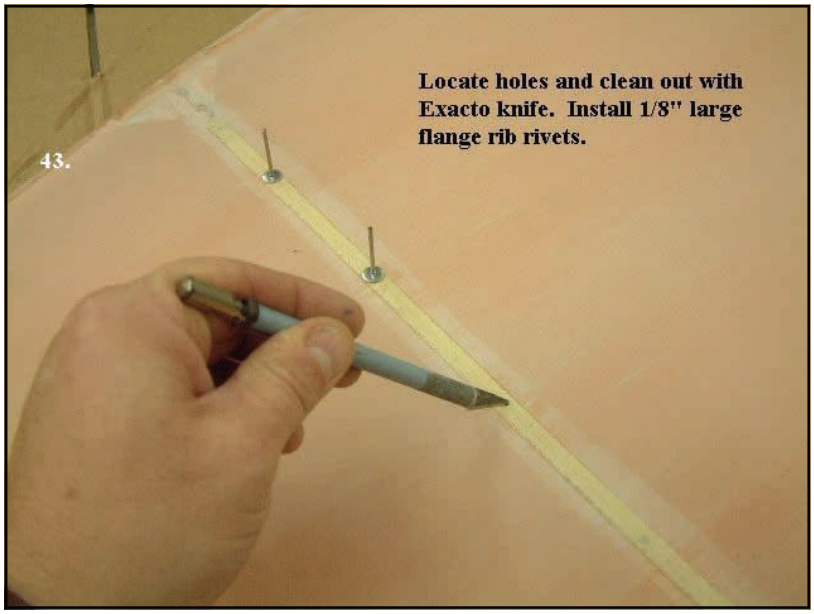
We used the Poly-Tac and MEK containers as weights, but any clean object of similar size will work. Maybe books ?

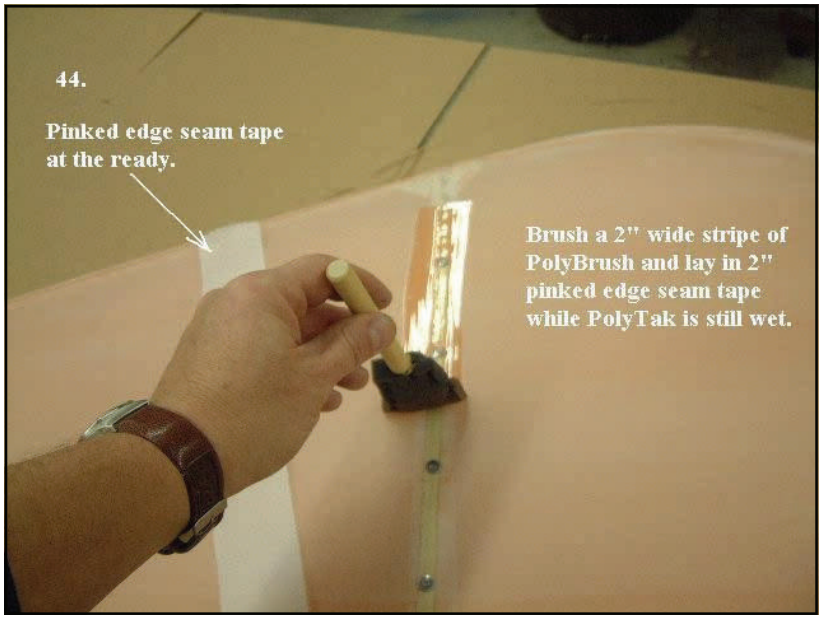


Try to keep the brush strokes smooth and even. One stroke per length works well. Poly-Brush will 'collect and congeal' on the fabric if too much is applied in one spot.



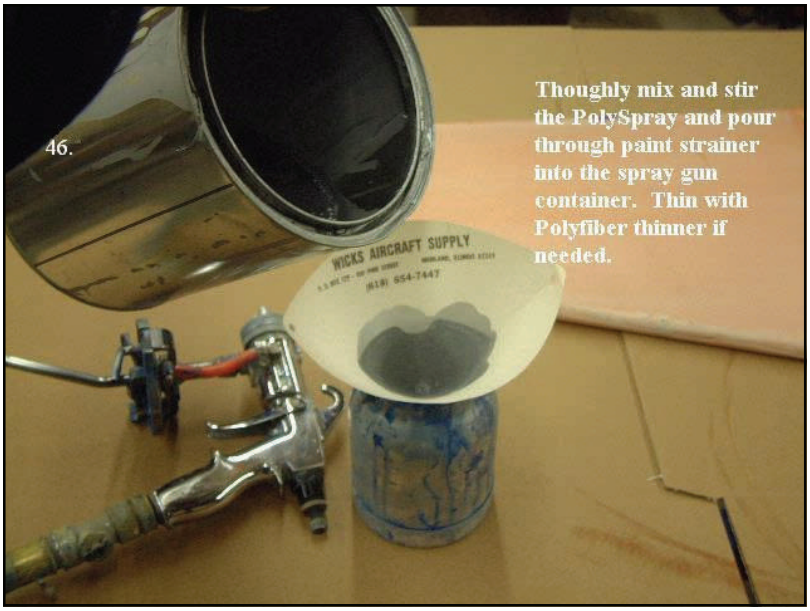
Carefully align the tape along the centerline of the holes. Cut to length and stick the tape down on the tube.





Poly-Brush dries quite quickly. Cut the seam tape to length, ready to be laid on the tube as soon as you have applied the Poly brush.

Apply more Poly-Brush over the tape and make sure it soaks through.



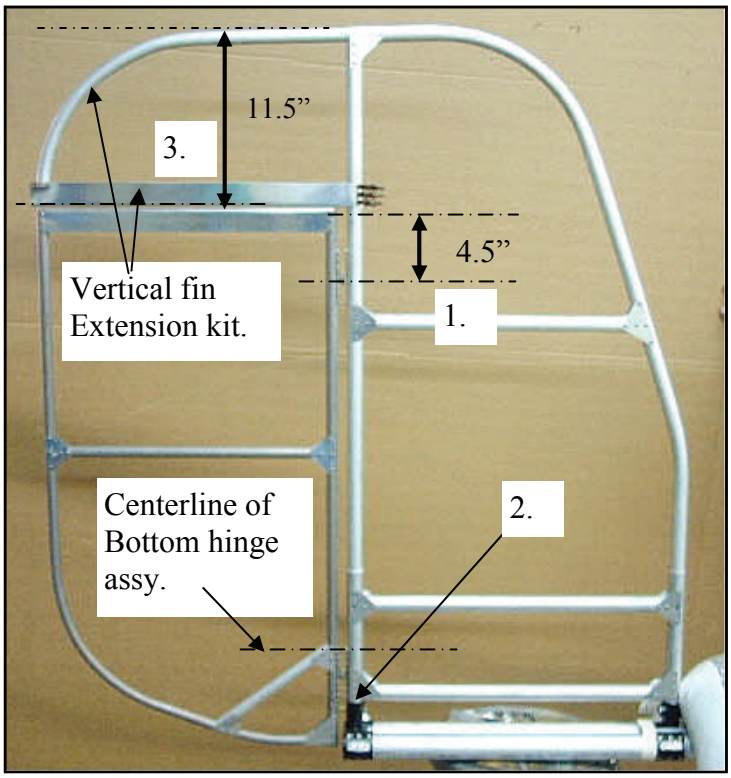
Make sure you have a well ventilated area. The use of a painters mask is recommended during the painting procedure.

The key here is smooth and even strokes with the spray gun.
Spray off the edge of the panel before shutting the spray gun off. Do not apply thick coats. Thinner coats dry quicker and are easy to fill, if required, with another 'THIN' coat.

This picture shows each stage of your Poly-Brush, Poly-Spray and Poly-Tone paint job.

Hinges and horns can be installed now, or set aside until final assembly.

LSS Section I Vertical fin assembly

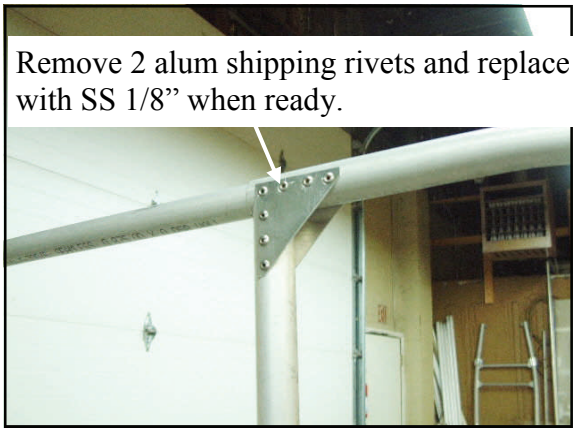


Be sure to install vertical fin all the way down into the steel tail posts. Make sure the tail posts are clean, free of debris and lightly lubricated with lithium grease. The stab extension should not be attached at this point.

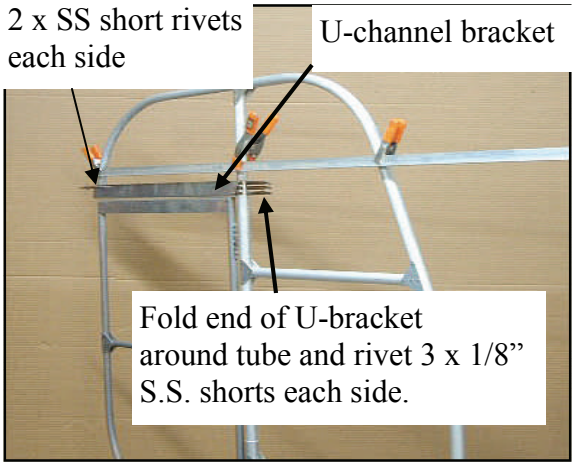
1. Install top hinge assy. on rudder. Centerline of hinge assy is 4.5” from top of rudder frame.

2. Place the lower half of the bottom hinge assy just above the tail post (approx 1/16”) on the vertical fin. Install the lower hinge at this point.

3. Use the top edge of rudder as a guide to install the vertical fin extension.

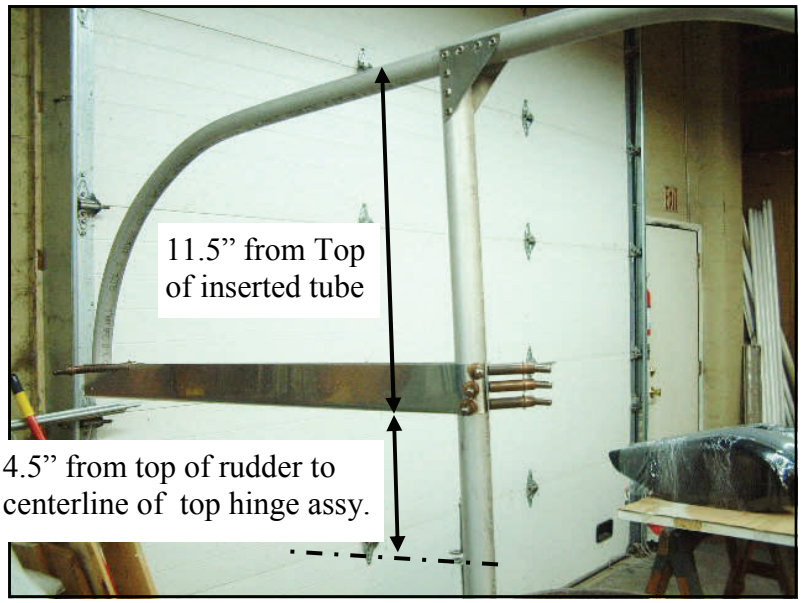


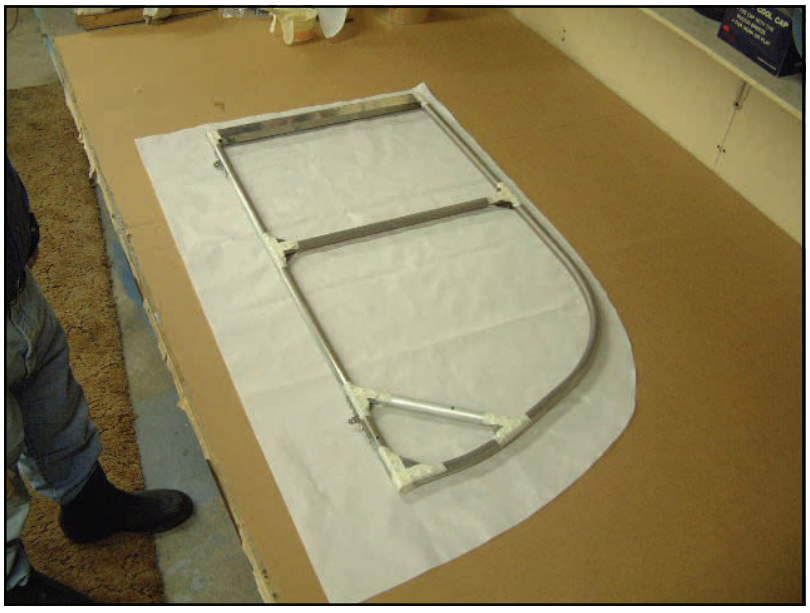
Remove the two shipping alum rivets, de-bur holes and insert extension tube. Adjust the extension tube accordingly to fit in line with the trailing edge of the rudder. Some trimming will be required at the end of the tubing to obtain a good fit.



Clamp a stiff straight edge to the vertical fin and then line up and clamp the fin extension (as shown in picture) on the right hand side (facing forward). This will align the vertical fin assy correctly. Drill 1/8” holes and insert 1/8” SS rivets where the aluminum shipping rivets were removed. Insert the U-channel bracket. Adjust the bracket to be approx 1/4” above the rudder. Drill and rivet into position. Some trimming of the U-channel bracket will be required on the trailing edge.

<u>Attach Rudder assy first</u>. The vertical stab extension assy must be adjusted to align with the installed rudder assy. Slide the top curved component into the top hole on rudder assy. Line up trailing edge with rudder frame. Some trimming of the top curved component and the U channel cross component will be required .





The rudder and vertical fin have separate sheets for each side of the frame. Select one of the rudder sheets and lay it on a clean surface. Lay the rudder frame on top and trim the material to leave a 2” skirt all the way round.

Prepare the frame as described previously in Section I.

This is an easy method of getting the fabric to curve with the bend of the frame. Apply a layer of 100% glue on the underside edge of the frame and attach the fabric (using 50/50 mix).

When glue is dry, apply pressure to the fabric with one hand while forming it around the curved tube with an iron set at 300 Deg.

Work your way around the curved piece until you are satisfied that any excess material has been shrunk and shaped to the curve.

Turn the frame over and repeat the above process. Make sure the fabric has been formed around as much of the tube as possible.

Next, apply 50/50 mix to the fabric on the curved piece while keeping up pressure with your other hand. Allow the glue to dry and then release pressure.

Cut away the excess fabric to about level with the tube.

Iron out any further wrinkles or creases. Apply 100% glue and repeat the whole process again for the second sheet.

Once both sheets are on, heat shrink the fabric as shown Previously.

Follow the same procedure for covering the Vertical Fin and Ailerons.