



**KITFOX® SUPPLEMENTAL FABRIC
COVERING INSTRUCTIONS**
(DOCUMENT P/N: 10196.000)

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Section A. Introduction

Covering your airplane with fabric can seem like a daunting task if you have never done it before. Although most builders find the process to be fairly easy and enjoyable, there are usually some questions and concerns before they begin.

In this chapter of the manual, we will attempt to address the most commonly asked questions. We will also give some specific details relating to the covering of the Kitfox.

For many years we have used and recommended the time-tested Poly-Fiber covering system. As this system has been well documented by Poly-Fiber, begin by reading completely through the book *How to Cover an Aircraft* by Jon Goldenbaum. You will likely read through it several times before you are finished, but this will give you a good idea of what the process will involve.

The main purpose of the fabric is to provide an aerodynamic covering for the flying surfaces of the airplane. If the fabric is not applied properly, your aircraft may be unsafe in flight. Take your time when covering and do the job right. One of the advantages of the Poly-Fiber method is that most errors can be easily corrected.

We recommend that you begin by covering the wings. The excess fabric that you will trim off the wings is enough to cover the horizontal stabilizer, elevator and rudder. Covering other parts of the airplane first can result in a shortage of fabric.

You may also wish to break up the covering process and do it while assembling other parts of the airplane. Covering the airplane is a fairly time-consuming process, and some builders prefer to do it in stages so that it does not seem repetitious or monotonous.

Although some components will have specific steps added to the covering process, the following outline covers all of the steps you will need to accomplish to cover the structure.

1. Properly prepare the surface(s) to be covered
2. Cover the surface
 - A. Bond the edges of the fabric to the structure
 - B. Iron the edges where bonded
 - C. Heat shrink the fabric
 - D. Brush on the first coat of Poly-Brush
 - E. Rib stitch (wings only)
3. Add doilies and reinforcement pieces for inspection holes and chafe protection
4. Apply finishing tapes and heat smooth the edges.

The finishing of the fabric involves three steps:

1. Apply a spray coat of Poly-Brush
2. Apply spray coats of Poly-Spray (silver-colored UV protection)
3. Apply paint



Figure A-1
Covered Parts



Section B. Covering the Wing

1. Begin covering the lower surface of the wings as described in the Poly-Fiber manual. We suggest that you allow extra material along the leading edge that will allow you to wrap the fabric onto the top of the front spar, as shown in Figure B-1. Scallop the edge of the fabric so that it stops at the leading edge of each rib.
2. Sand the surface of the fuel tanks with 220-grit sandpaper, being careful around the spars. Clean the dust off and apply a coat of three parts Poly-Brush mixed with one part reducer.
3. Pre-coat each rib capstrip with Poly-Tak.
4. After attaching the lower fabric to both the leading and trailing edges, cut slits in the fabric that are just large enough to allow the ears of the lift strut brackets to pass through. See Figure B-2.
5. Apply two coats of the Poly-Brush/reducer mixture to the fabric reinforcing plates that you made during the wing assembly process. Once dry, place the plates as shown in the wing assembly manual on the **inner** surface of the lower wing fabric using Poly-Tak.

Completion Date



Figure B-1
Leading Edge Overlap with
Scallops to Clear Ribs



Figure B-2
Fabric Cut to Allow Lift Strut Bracket
Ears to Protrude



Figure B-3
Fabric Reinforcing Plate



6. After you have attached the fabric and have applied heat to all of the bonded areas, do the initial heat shrinking of the fabric on the lower surface of the wing by heating it to 250°.
7. Make a cutout in the fabric on the upper surface of the wing to clear the fuel tank fill neck with a razor blade.
8. Do not bond the fabric on the upper surface of the wing to the top of the fuel tank. Bond it to the capstrips of the ribs on both sides of the tank and the partial rib (rib #2).
9. Do not completely cover the root rib (#1) with fabric. Heat form the fabric around the edge of the rib capstrips and bond it to the inner surfaces of the wood. Trim the fabric where it contacts the rib web. If you are installing wing tips, do the same with the fabric on rib #10.
10. Do not do the final heat tightening of the fabric on the wings at temperatures above 325°. Doing so can cause the aluminum trailing edge of the wing to deform.

NOTE

You can achieve the final 350° fabric tension if you bond sections of aluminum tubing in the gap of the aluminum trailing edge pieces. This aluminum should be $\frac{3}{8}$ " diameter and have a wall thickness of .028" to .035". See Figure B-5.

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Figure B-4
Fabric to be Heat Formed and
Bonded Around Capstrip of Rib #1

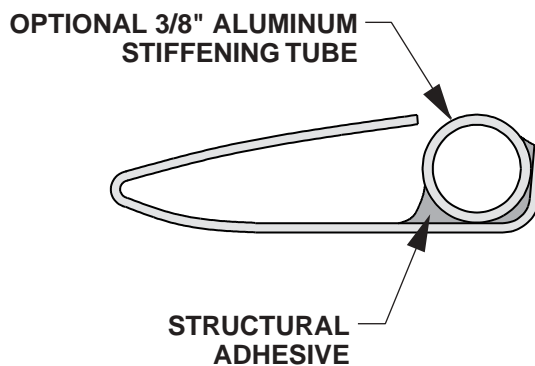


Figure B-5
Cross-Sectional View of Wing Trailing Edge
with Optional Stiffener Tube Installed



11. If your wings will have wing tips, melt small holes in the fabric and rivet the aluminum mounting strips to the capstrip of rib #10 using the hardware called out in the wing chapter of your assembly manual. See Figure B-6.
12. Although Kitfoxes have not required rib stitching on the wing ribs in the past due to the fabric being bonded to the 1" wide capstrips, Poly-Fiber and SkyStar recommend that you secure the fabric to the rib capstrips by rib stitching. Refer to the Ploy-Fiber manual for the proper method of doing this.
13. After you have done the final heat tightening and stitched the fabric to the ribs, place the finishing tapes on the wings as described by Poly-Fiber. Add the tapes to the ribs and false ribs before adding the leading edge tape. Always remember, place the further-forward tapes on last to help keep the slipstream from working its way underneath further back tapes. Use 2" tapes over the ribs, 2" and 4" tape over the leading edge, and 4" tape on the trailing edge. For the false ribs, cut 2" tape in half to make 1" wide tapes. Refer to Figure B-7.

NOTE

You may wish to order an optional roll of 6" wide tape and cover the leading edge of the wing with a single tape. You can also purchase a roll of 1" wide tape for covering the false ribs. Contact SkyStar's customer service department for ordering information.

14. On the upper surface you will need to add a reinforcement "doily" around the fill neck of the fuel tank. Add reinforcements on the lower surface of the wings at the fuel tank sump, lift strut brackets, jury strut brackets, pitot tube, and fuel tank drain.
15. You should add inspection cover rings on the lower surface of the wings. You may wish to install one or two, or you can place one in every other wing bay between the ribs. One should be placed near the pitot tube. Keep the rings aft of the lower false ribs, if installed.
16. Add a drain hole in the lower fabric at the aft, outboard edge of each wing rib. You can cover them with drain grommets as desired for a more professional look.
17. Heat smooth all of the finishing tapes and doilies.

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Figure B-6
Wingtip Mounting Strips Riveted to Rib #10 Capstrip

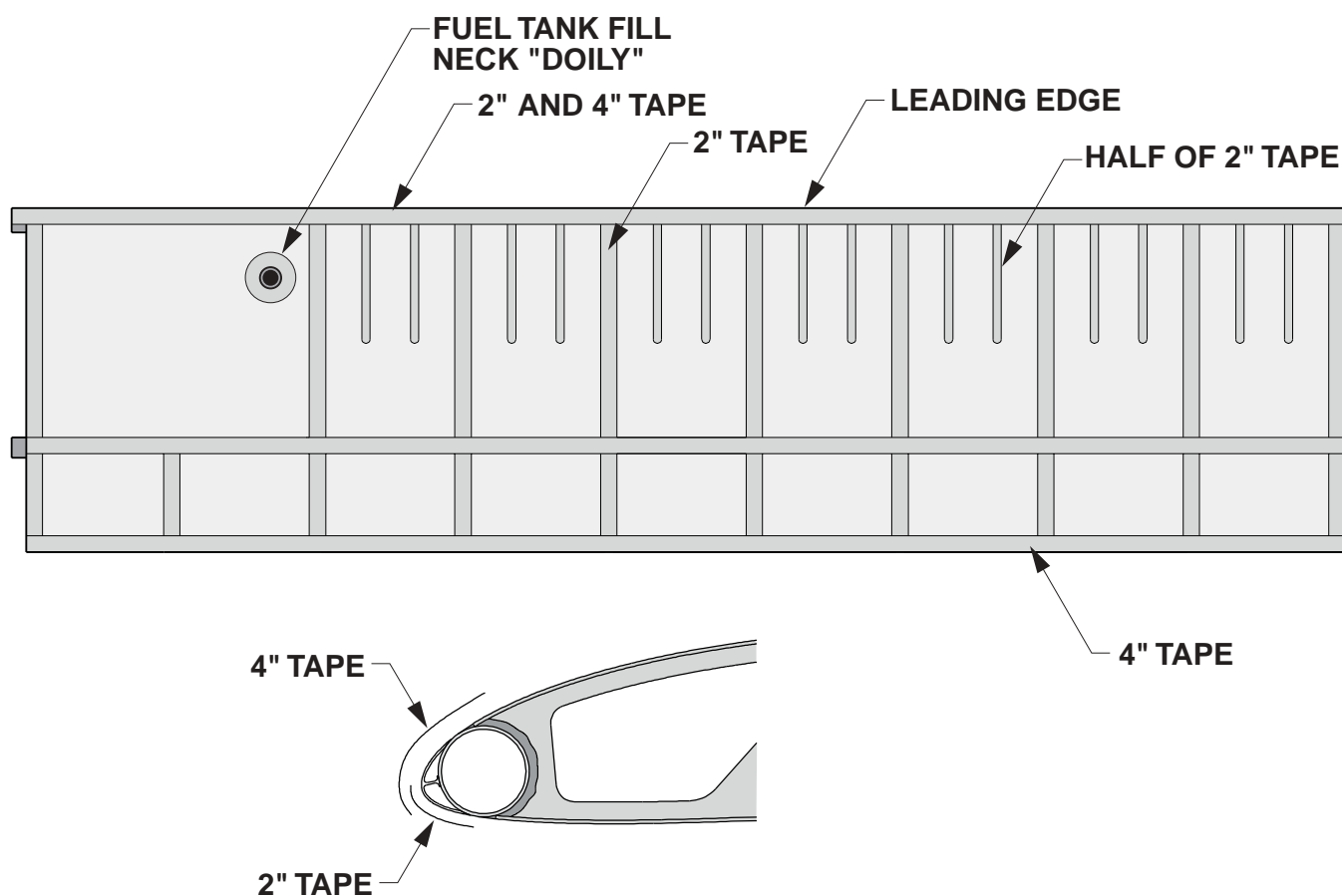


Figure B-7
Wing Finishing Tape Details
(Top View)



Section C. Covering the Fuselage Belly

The fuselage will be covered using the "blanket" technique described in the Poly-Fiber manual, and no sewing is required. The belly of the fuselage will be covered first, followed by the sides, and then the top.

1. With the fuselage inverted, roll the fabric along the entire length as indicated in Figure C-1. Trim around the edges of the fuselage, allowing about 3" excess, and clamp the fabric in place. Save the fabric removed in a clean location for later use. The fabric on the Classic IV aircraft will stop at the diagonal tubes which lie beneath the rudder pedal mounts. The fabric on the Series 7 will stop at the first transverse tube behind the front of the airframe, as shown.
2. Attach the fabric to the "tangential point" of the perimeter of the structure (Figure C-4) with Poly-Tak, gently pulling the slack out as you proceed to remove the wrinkles. Work the Poly-Tak into the weave thoroughly. If Poly-Tak flows along the inner edge of the tube and bonds the fabric below the tangential point, don't be concerned. This can be fixed quite easily. First, when the fabric is heat tightened later the tension of the fabric may cause the bond to separate up to the tangential point. If not, applying a small amount of MEK to the fabric over the area below the tangential point will cause the bond to release.

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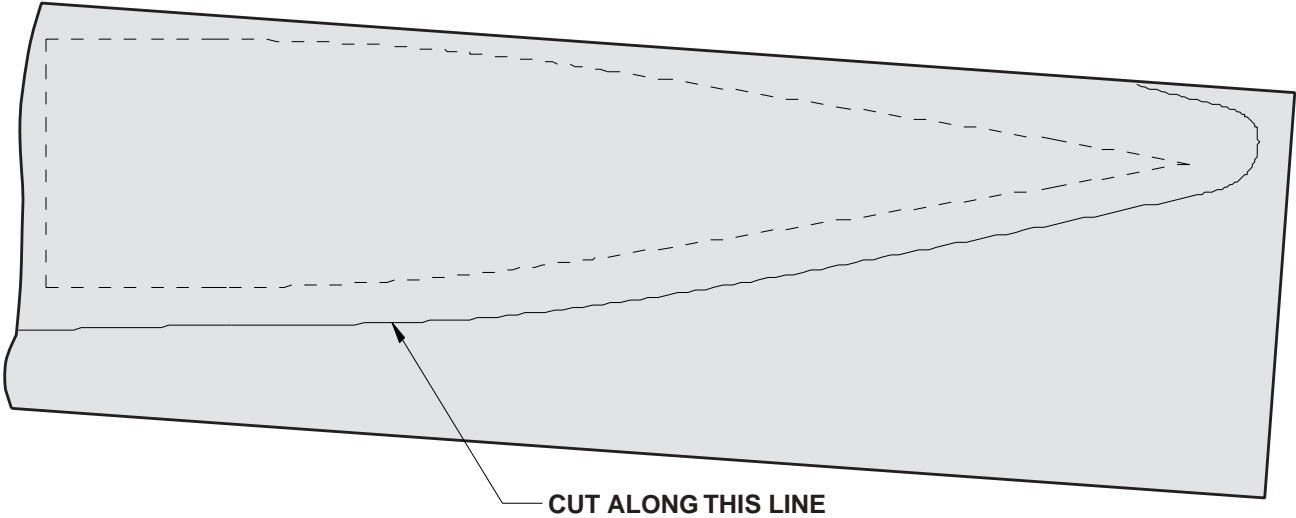


Figure C-1
Fuselage Belly Fabric Cut Pattern



Figure C-2
Series 7 Belly Fabric Forward Termination

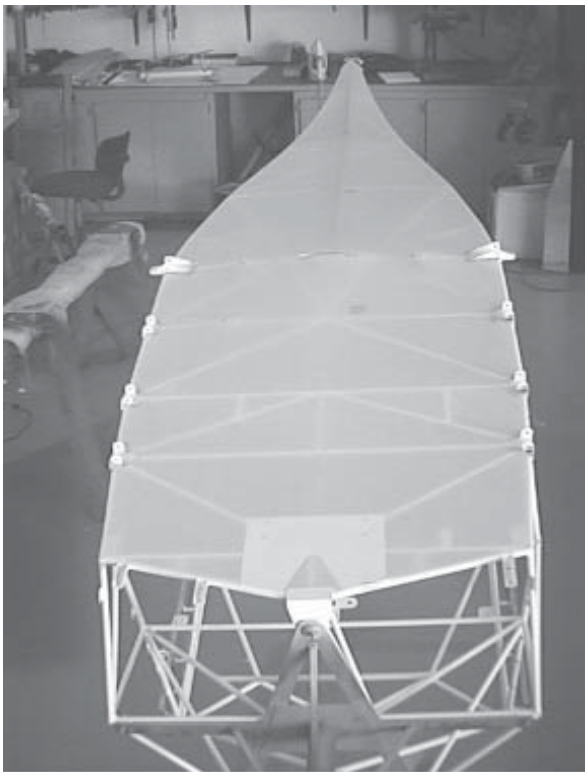


Figure C-3
Classic IV Belly Fabric Forward Termination



3. Make cutouts in the fabric to allow it to be formed around tubing intersections and brackets as shown. You may also need to make relief cuts in the fabric to allow it to wrap around the structure without causing wrinkles to form. Heat form the fabric around the perimeter of the fuselage.
4. Trim off the excess fabric, making sure the fabric will wrap $\frac{3}{4}$ of the way around each tube. Bond the remaining portion of the fabric to the tubes using Poly-Tak.
5. Heat tighten the fabric. On the Classic IV only take the fabric up to 300°. Use 350° on Series 7 aircraft.
6. Use the tip of a hot soldering iron to melt slots in the fabric where any mounting tabs are located on the belly of the aircraft.

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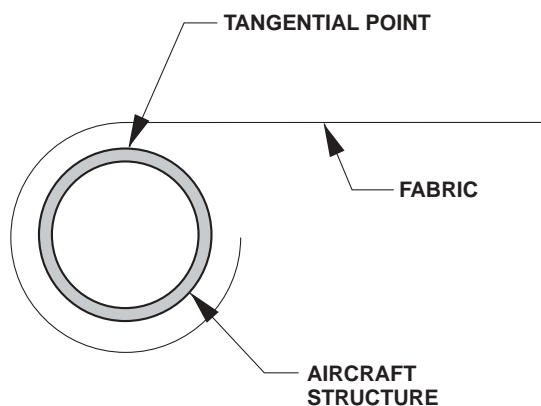


Figure C-4
Fabric Interface with Structure



Figure C-5
Fabric Cut to Clear Structure

Figure C-6
Fabric Cuts to Wrap Around
Tubing Clusters

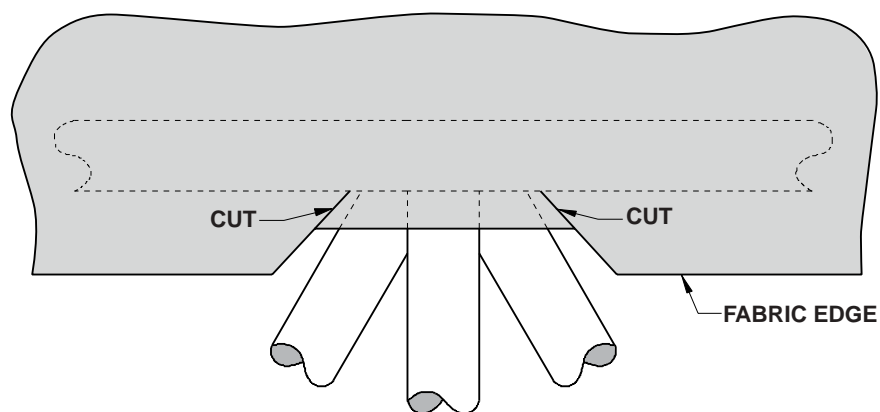


Figure C-7
Completed Fabric-to-Structure Bond



Section D. Covering the Fuselage Sides

NOTE

If you are going to install the static pressure kit (P/N: 69175.000), cover the left side of the fuselage first. Install the port and route the static line forward to the cabin area before covering the right side of the fuselage.

1. If you have a Series 7, prep the aluminum door angles and aluminum quarter window angles with Poly-Brush as described in the Poly-Fiber manual.
2. Roll fabric along the side of the fuselage, similar to what was done on the belly. Clamp the fabric and trim to shape. You should trim the fabric so that it does **not** extend onto the vertical stabilizer, as it will be covered separately later.
3. Tack the fabric to the airframe along the tangential point of the structure. Trim the fabric to overlap the belly fabric by 1", and trim the top to wrap $\frac{3}{4}$ of the way around the structural tubing. If you have aluminum door angles, trim the fabric so that it will wrap completely over the square structural tubing.
4. Make cuts in the fabric to allow it to pass over the tabs, brackets, and bushings of the fuselage, as shown.
5. Bond the remainder of the overlapping fabric to the structure and belly fabric and heat tighten as before.

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Figure D-1
Fabric Rolled Out and
Trimmed on Side of Fuselage



Figure D-2
Fabric Trimmed around
Door Opening



Figure D-3
Cutouts for Rudder Stop and
Tailwheel Spring Plate

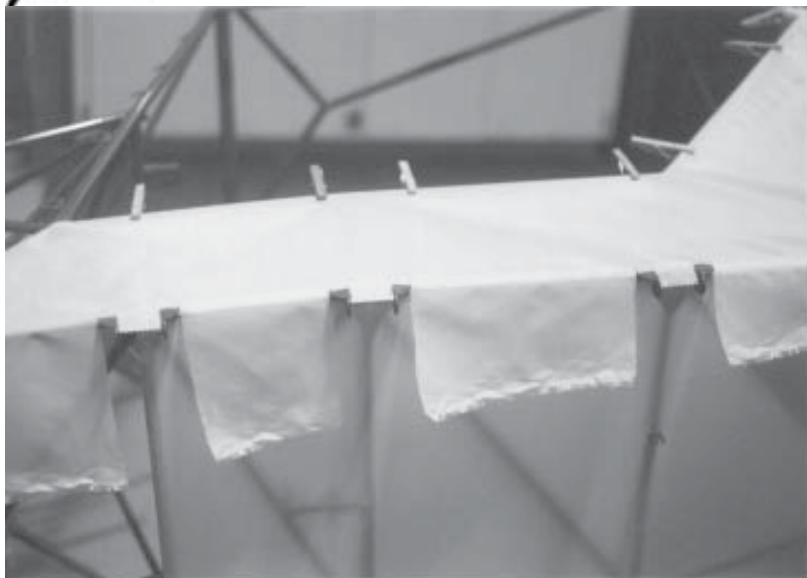


Figure D-4
Fabric Trimmed to Fit
Around Mounting Brackets



Figure D-5
Trimming Fabric for Proper
Overlap Along Longerons



Figure D-6
Front End Details



Figure D-7
Bonding Side Fabric
Overlap to Belly

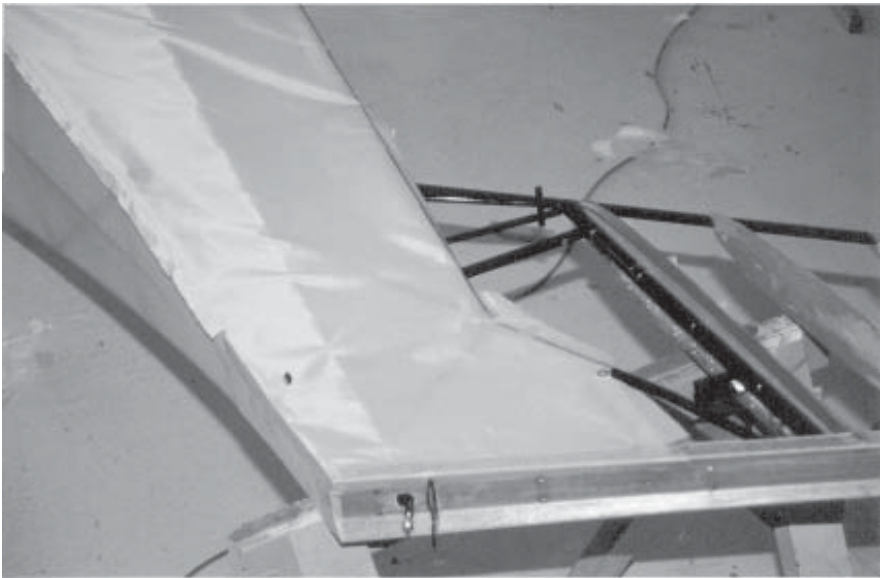


Figure D-8
Rear End Details

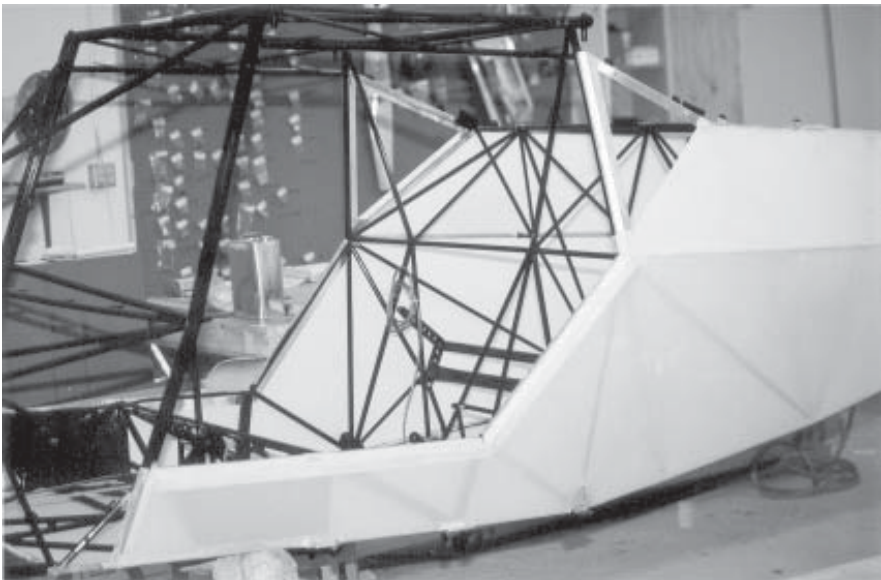


Figure D-9
Completed Sides



Section E. Covering the Fuselage Top

1. Cover the area on the top of the fuselage with a piece of fabric that will extend from the aft end of the turtledeck to the tube that is located near the handle on the empennage. On Classic IV aircraft the front end of the fabric will end on the tube that has the camloc receptacle mounting tabs welded to it (Figure E-1). On Series 7 aircraft terminate the fabric on the **lower** surface of the rear turtledeck mounting angle (Figures E-2 and E-3). Be sure to prep the aluminum angle with Poly-Brush.
2. Mark the sides of the fabric where it will be trimmed to overlap the sides of the fuselage with a straight edge and carefully cut along the lines. This edge will be visible underneath the finishing tape, and any variations in the edge will be noticeably visible.

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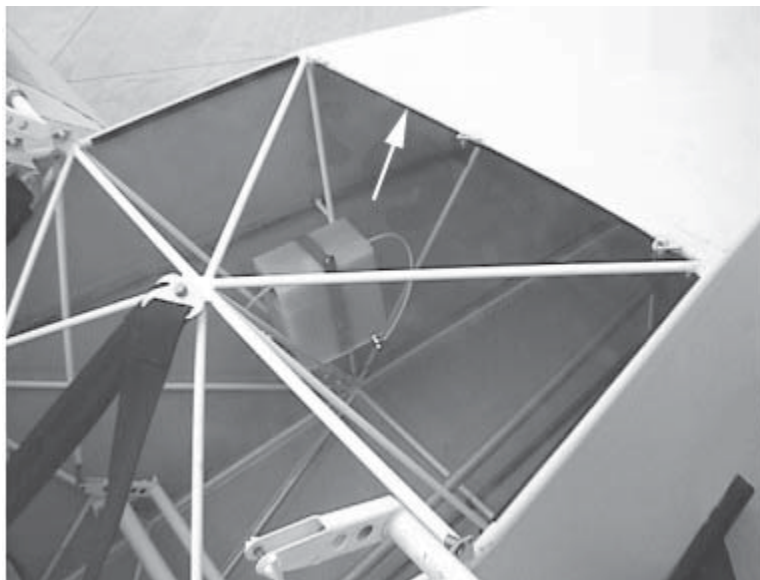


Figure E-1
Classic IV Forward Fabric Termination



Figure E-2
Series 7 Forward Fabric Termination

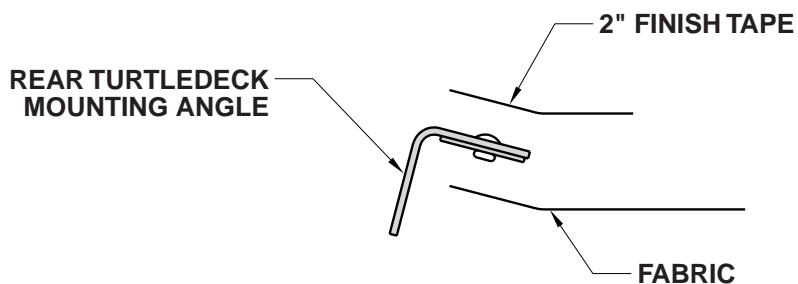


Figure E-3
Side View of Series 7
Forward Fabric Termination



3. To cover the area at the base of the vertical stabilizer, begin by cutting a piece of fabric that will cover both sides of the stabilizer. Bond the fabric securely to the leading edge of the stabilizer tube, as shown in Figure E-4.

NOTE

Figures E-4 through E-7 depict the covering procedures for the Series 7 aircraft. The Classic IV uses a similar procedure, however the fabric will extend further aft, as shown in Figure E-8.

NOTE

Some builders prefer to cover this area using two separate pieces of fabric - one for each side of the stabilizer. This is acceptable, as there will be a finishing tape placed over the leading edge of the stabilizer later.

4. Melt a hole in the fabric where it will pass over the wing lock-back brace bushing with the hot tip of a soldering iron.
5. Pull downward and rearward to remove the slack from the fabric. While holding the tension, bond the fabric to the structure using Poly-Tak. Continue to pull on the fabric while the Poly-Tak dries.
6. Heat tighten the fabric.

Completion Date



Figure E-4

Bond Fabric to Leading Edge of Vertical Stabilizer



Figure E-5

Melt Hole to Clear Bushing



Figure E-6

Pull Tension on Fabric and Bond Around Perimeter



Figure E-7

Heat Tighten Fabric

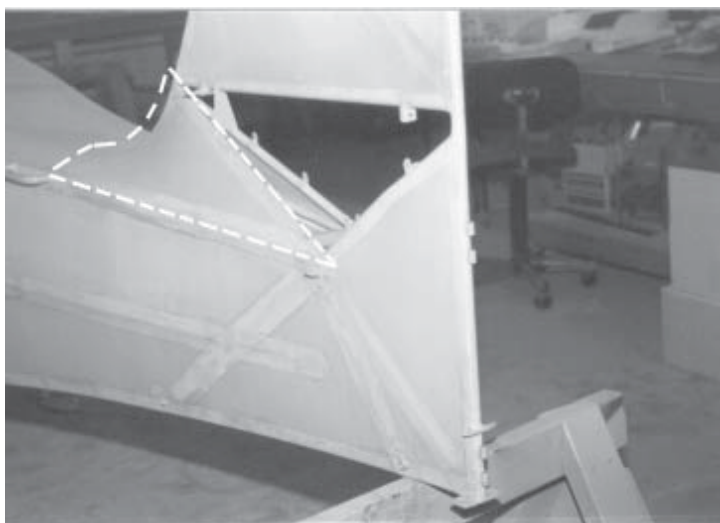


Figure E-8

Classic IV Coverage Detail

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Section F. Covering the Vertical Stabilizer

- 1. You can cover the vertical stabilizer using a piece of fabric on each side or a single piece wrapped around the leading edge. Using a single piece, however, can be somewhat more difficult to form the fabric around the curve and top of the stabilizer. Make relief cuts in the fabric along the radius to allow it to form smoothly around the structure as shown.

NOTE

If you have a molded fiberglass fairing on the trailing edge of the stabilizer, coat it with Poly-Brush as described in the Poly-Fiber manual before bonding the fabric to it.

- 2. Heat tighten the fabric in the usual manner on both sides of the stabilizer, bringing both sides up to the same temperature before increasing to the next higher temperature level.

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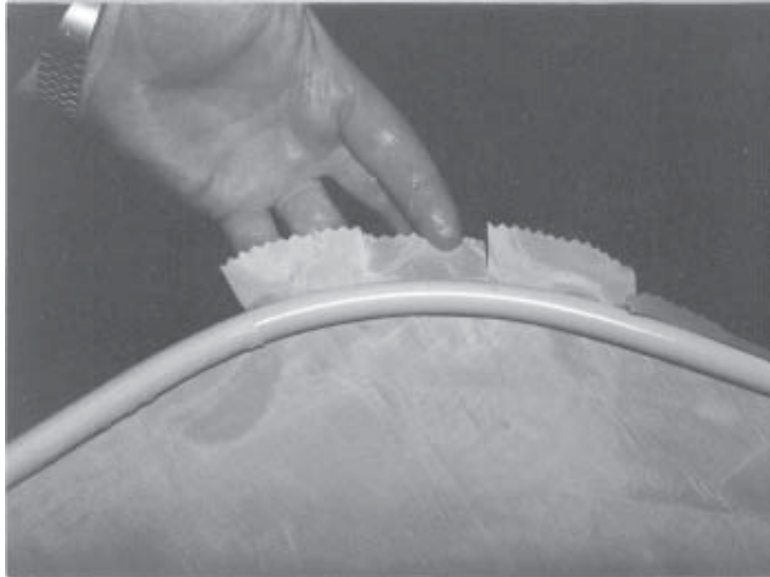


Figure F-1
Forming the Fabric around the Top of the Vertical Stabilizer



Section G. Covering the Rudder, Elevator, and Horizontal Stabilizer

Cover the rudder, elevator, and horizontal stabilizer using the techniques described in the Poly-Fiber manual.

The following illustrations show the typical process.

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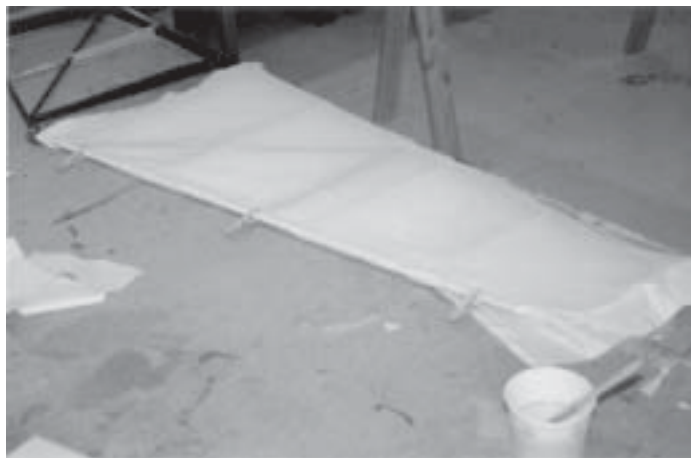


Figure G-1
Fabric on Bottom of
Horizontal Stabilizer



Figure G-2
Heat Forming Fabric
Around Edge of Stabilizer



Figure G-3
Making Relief Cuts in
Top Fabric around Curve



Figure G-4
Bonding Upper Fabric
to Lower Fabric



Section H. Covering the Butt Ribs

The butt ribs are one of the more challenging parts to cover on the Kitfox. Having many different lines and irregular shapes in a rather small area is the primary reason for this. To successfully cover the butt ribs, take your time to prevent making mistakes that will cause you to start a given segment of the process over again.

- 1. Fabricate aluminum cuffs for the front and rear ends of the butt ribs using scrap pieces of .020" aluminum. The purpose of the cuffs is to close out the area between the butt ribs and the structure of the airframe, as shown in Figures H-1 and H-2. You may find it easier to make templates out of a heavy bond paper or non-corrugated cardboard initially and trim them until the desired shape is achieved. The shape of the templates can then simply be transferred to the aluminum. Keep in mind as you are fitting the cuffs that they must not interfere with the wing spars.
- 2. Once you are satisfied with the shape of the cuffs, prep the mating surfaces of the cuffs, butt ribs, and airframe structure and bond them in place with structural adhesive mixed with flox. Clamp the cuffs in place while the adhesive cures.

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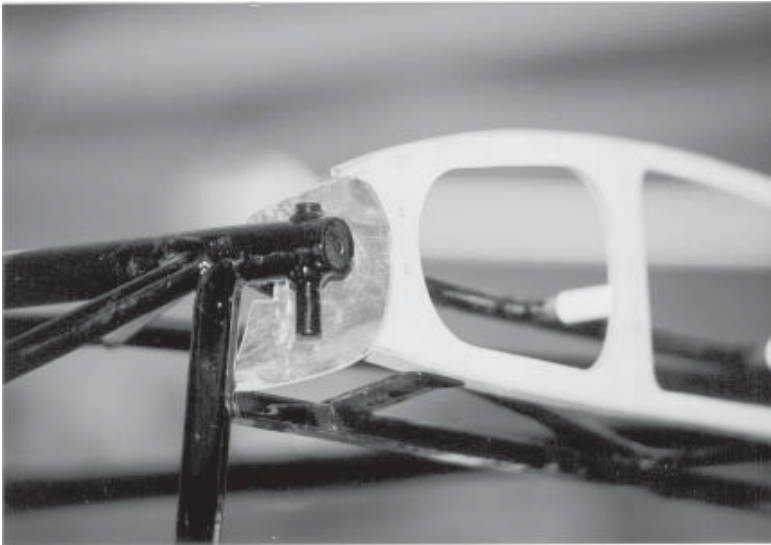


Figure H-1
Front Butt Rib Cuff

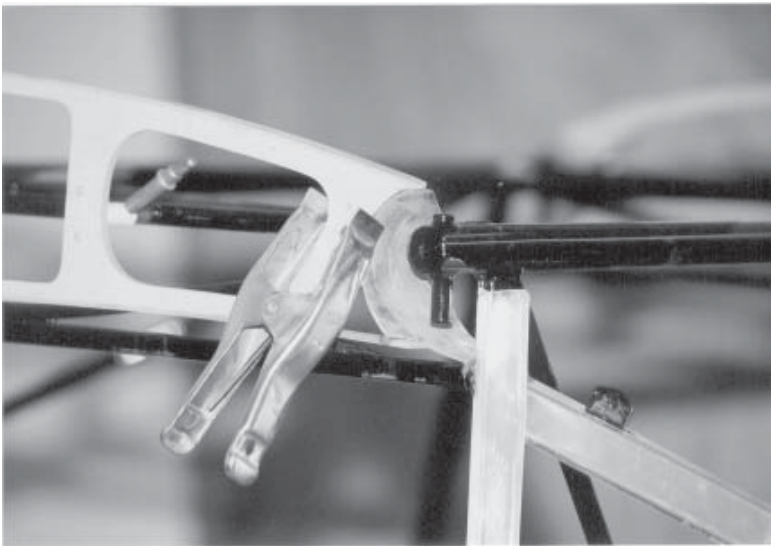


Figure H-2
Rear Butt Rib Cuff



3. Cut two pieces of fabric that are 32" x 15". Make a cutout in the center of each piece that is approximately 7" wide by 4-1/2" high. Sew a thin piece of clear plastic in the openings. This will serve as a window for the fuel tank site gauge.

NOTE

SkyStar offers fabric with the windows pre-sewn in them. This option is P/N: 10256.000.

4. Place the fabric so that the window is over the airframe structural tubing of the headrack and aligned with the opening in the center of the butt rib. See Figure H-3. Bond the fabric to the top capstrip of the butt rib. Wrap the bottom edge of the fabric over the tubing that forms the top of the door opening. Bond the fabric to the structural tubing and up to the bottom of the butt rib. Bond the fabric to the lower capstrip of the butt rib. Trim the fabric to wrap around the remaining airframe tubing and onto the butt rib cuffs.
5. Heat tighten the fabric. As the window material will not shrink, the remaining area of fabric is relatively small and may not get as tight as the other parts of the airplane that you have covered. Heat the fabric to 350° to get it as tight as possible.

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Figure H-3
Window Fabric Draped over Airframe Structure

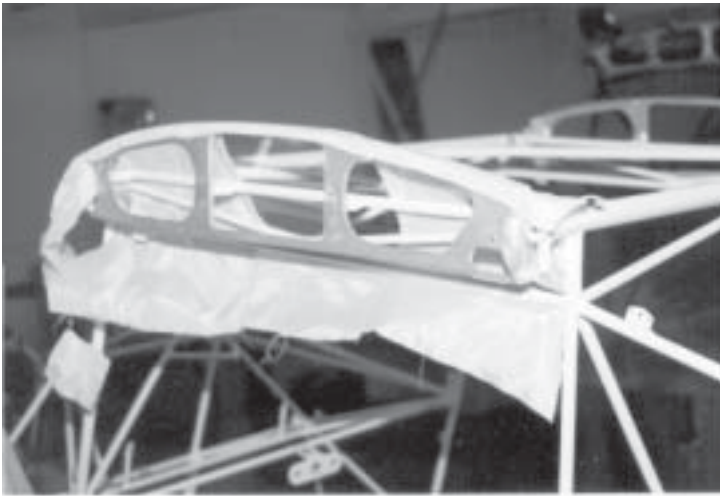


Figure H-4
Window Fabric Bonded to Butt Rib Top Capstrip

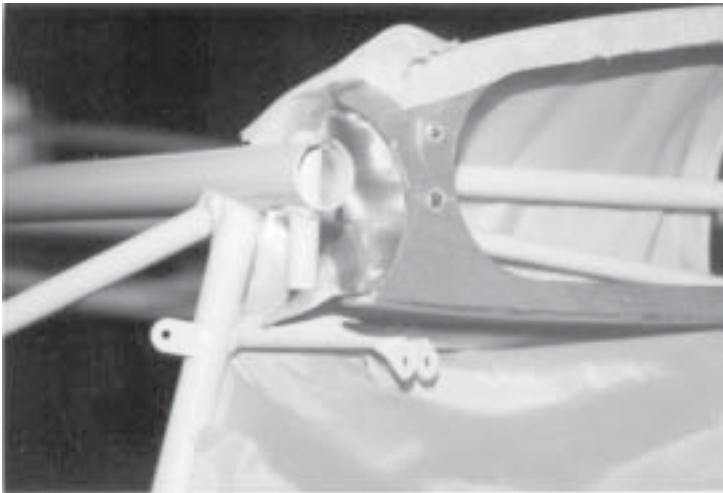


Figure H-5
Window Fabric Interface with Airframe Structure



6. Some builders cover the exterior surface of the butt ribs, as shown in Figure H-6. If you choose to cover them, leave the fabric intact until after the fuselage has been painted and then remove the section of fabric over the center opening of the butt rib using the hot tip of a soldering iron.

NOTE

If you do cover the exterior of the butt ribs, installing the windshield and door hinges on Series 7 aircraft can be somewhat difficult due to the nuts that must be placed on the interior surfaces of the butt rib capstrips. If you have covered this surface, you may find it helpful to make a special tool for installing the nuts. One way of doing this is to bond or weld appropriately-sized sockets onto a length of metal to act as an extension, as shown in Figure H-7.

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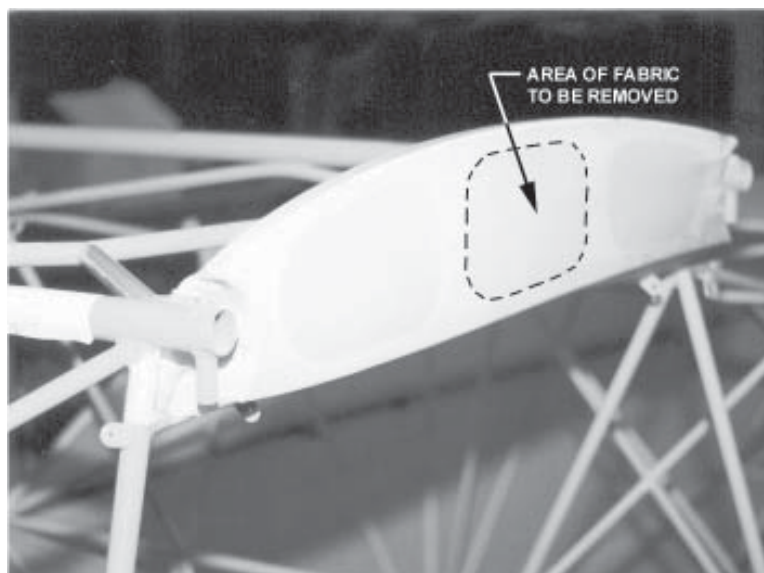


Figure H-6
Exterior Surface of Butt Rib Covered (Optional)

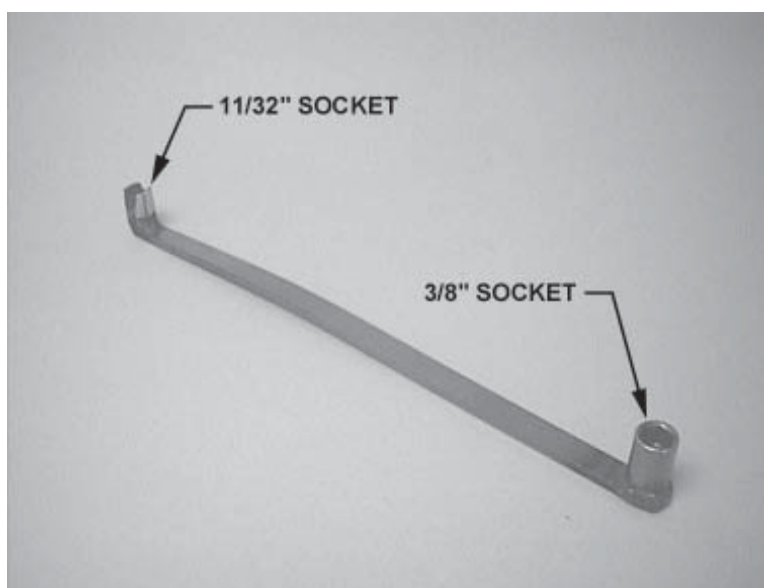


Figure H-7
Door Hinge and Windshield Hardware Tool



Section I. Finishing Tapes, Gussets, and Doilies

You should place the finishing tapes, gussets, and doilies on the fabric using the procedures described in the Poly-Fiber manual. You need to have one of these forms of reinforcement over **every** place where the fabric lies over a structural member of the aircraft or where there is an opening in the fabric.

As a general rule, you will use 2" finishing tape over all of the tubes of the fuselage, horizontal stabilizer, elevator, and rudder. Use 4" tape on the leading and trailing edges of the vertical and horizontal stabilizer, rudder, and elevator. You may wish to use 4" bias tape on the leading edge of the vertical stabilizer and trailing edge of the rudder as it tends to form more easily around the radiused shapes.

To have nice, straight lines to place the finishing tapes, you may want to use a 2" wide clear, plastic straight edge with a centerline drawn on it, as shown in Figure I-1. By placing the centerline of the straight edge over the structural member to be covered, you can simply draw a straight line on either side of the member. This will ensure that the finishing tape will be centered along the length of the structure.

Refer to the following photos to get further specific information regarding the placement of the reinforcement pieces and inspection rings on the aircraft. You should place an inspection ring on the lower, left side of the empennage near where the horizontal stabilizer strut attaches to the fuselage. Place another on the belly of the empennage. If you installed a static port in the side of the empennage, install this ring below the port location. The wing inspection ring locations are described in Section B.



Figure I-1
Clear Straight Edge for Marking
Finishing Tape Locations



Figure I-2
Fuselage Belly Finishing Tapes

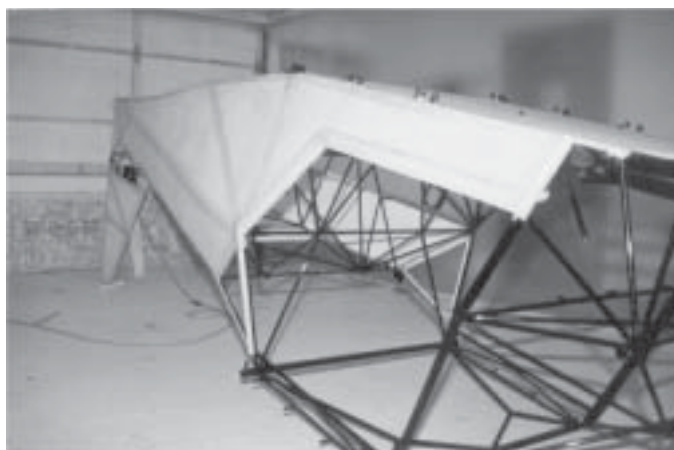


Figure I-3
Fuselage Side Finishing Tapes

Figure I-4
Finishing Tape on
Lower Longeron





Figure I-5
Finishing Tapes around Door Frame



Figure I-6
Horizontal Stabilizer Strut Doily



Figure I-7
Fuselage Top Finishing Tapes



Figure I-8
Vertical Stabilizer Finishing Tapes

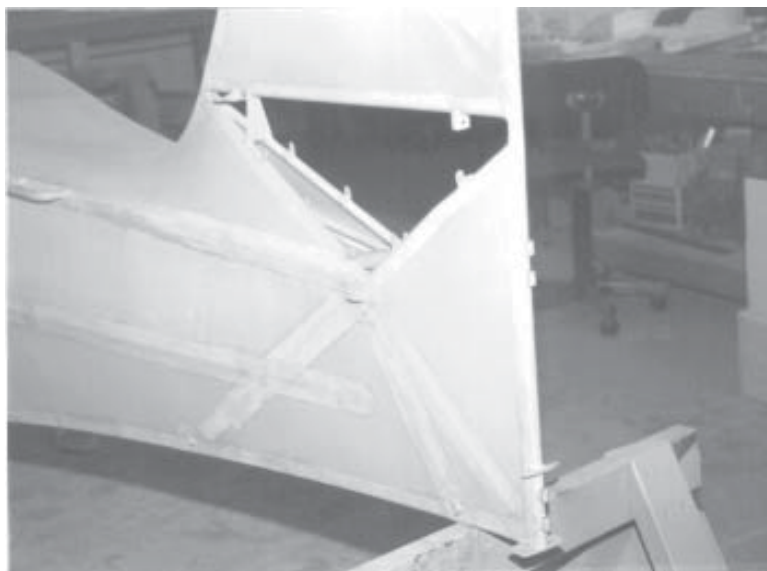


Figure I-9
Empennage Finishing Tapes - Classic IV

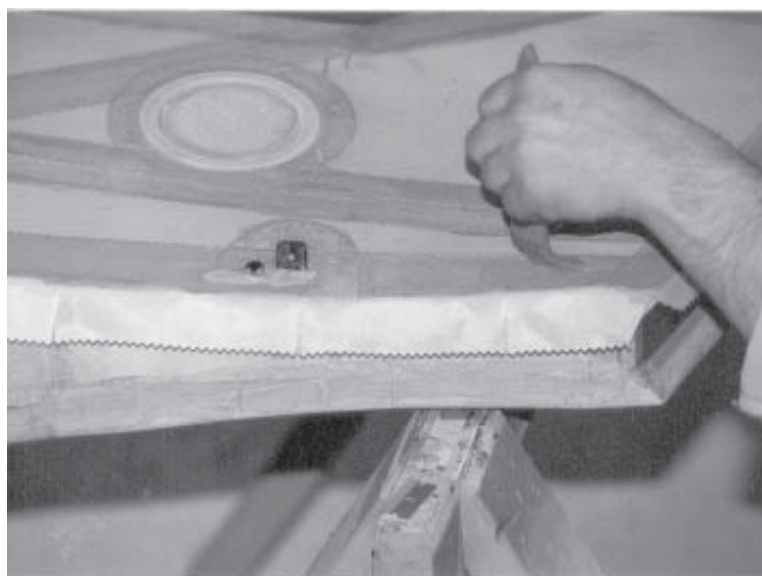


Figure I-10
Empennage Finishing Tapes - Series 7

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Figure I-11

Horizontal Stabilizer and Elevator Finishing Tapes

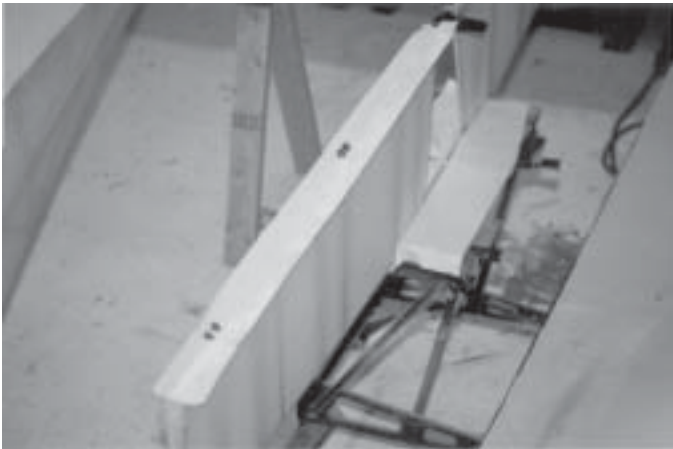


Figure I-12

Elevator Leading Edge Finishing Tape



Figure I-13

Completed Horizontal Stabilizer



Figure I-14

Completed Rudder