MONARCH

Kit No. CBMD-005

Construction Detail

Part 1 of 2: Fuselage construction and D/T Installation

CB Model Designs

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Revision N/C

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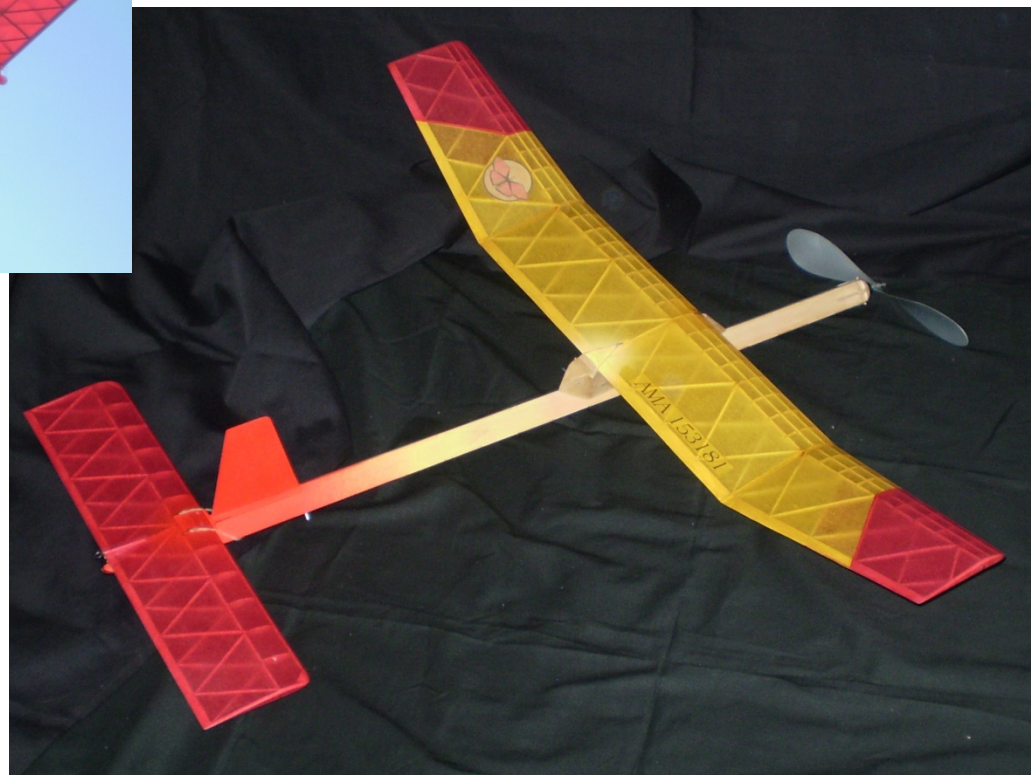
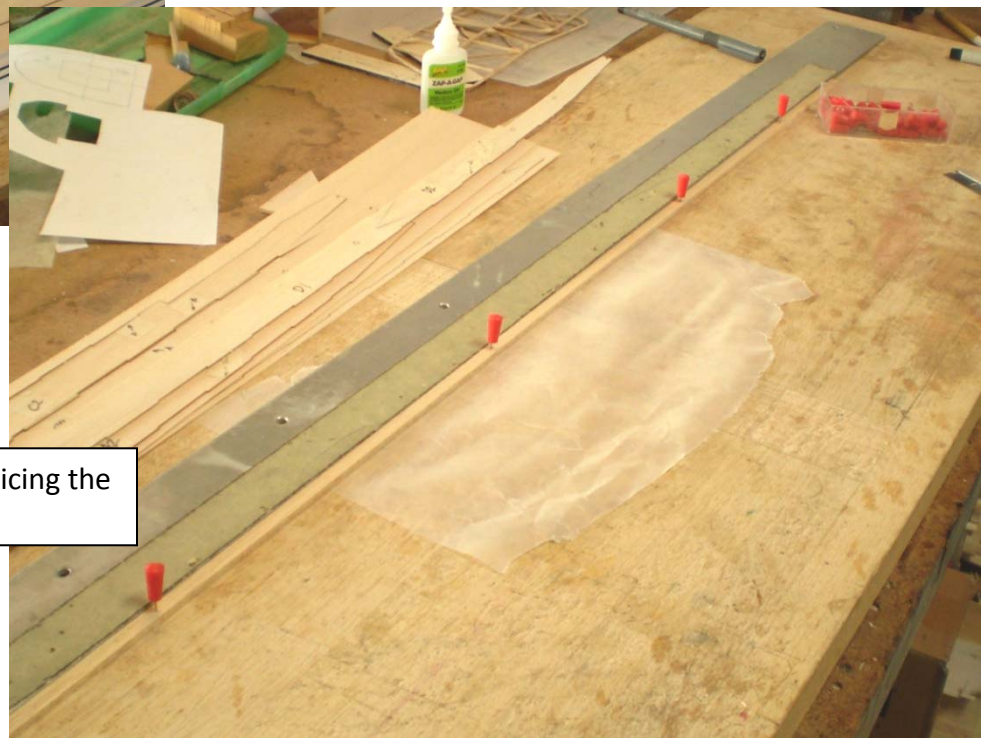


Model data:

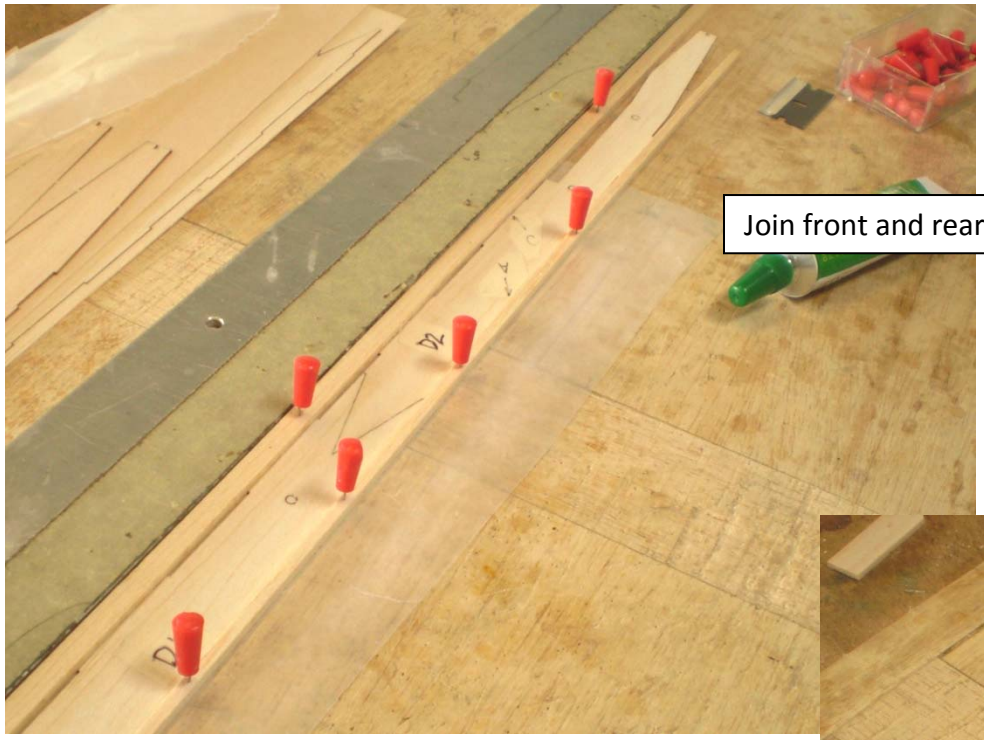
•Weight range 43-45 grams as shown (no motor) with Esaki tissue covering
•Wingspan……..30 Inches
•Wing Area……125.4 Sq. In.
•Nominal Length (with Gizmo prop)……29.9 Inches
•Construction……All balsa

Note: the images in this presentation are based on two of the prototype builds. Some information may vary slightly from the written instructions but the configurations and intent remain the same.

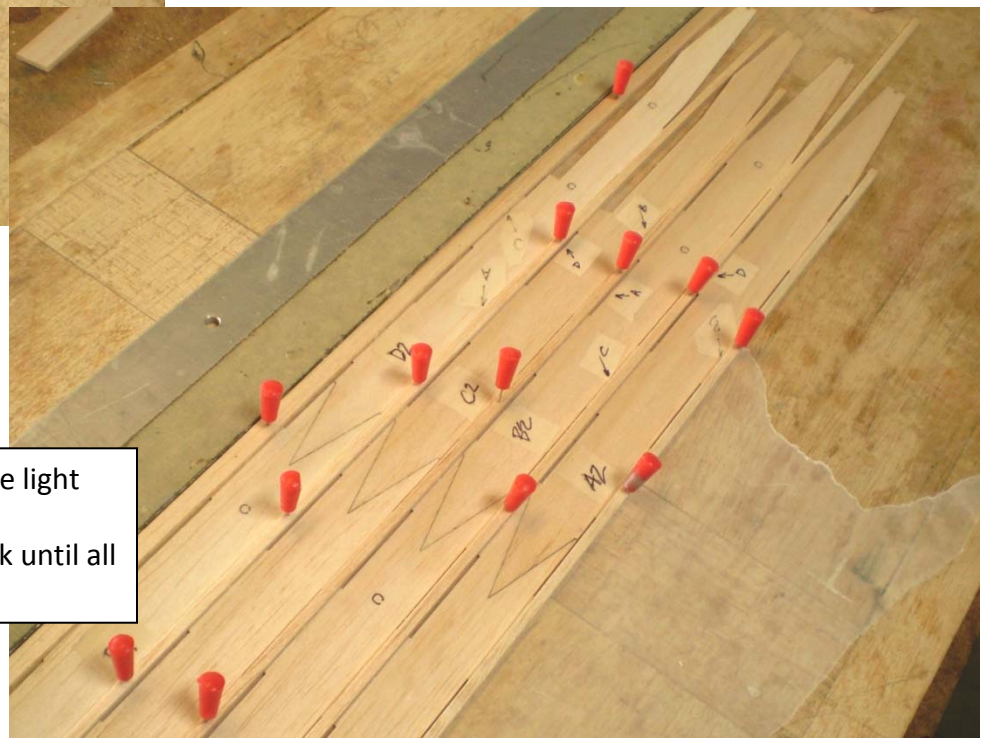
Mark fuselage side skins and mating edges per laser part legend



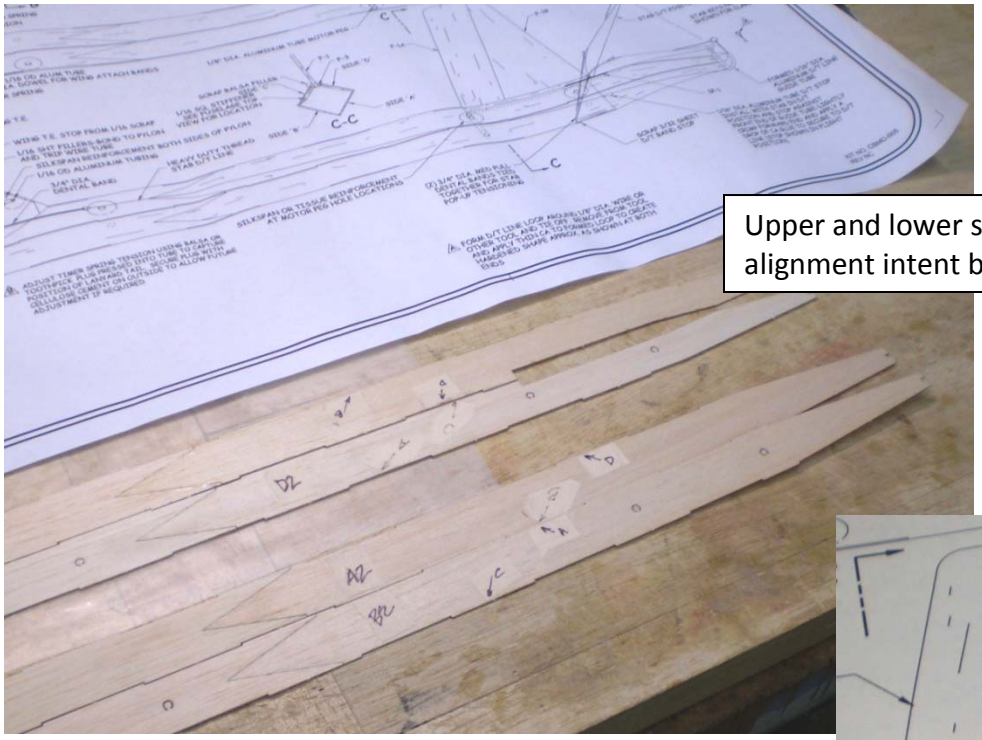
Establish reference straight edge for splicing the fuselage sides



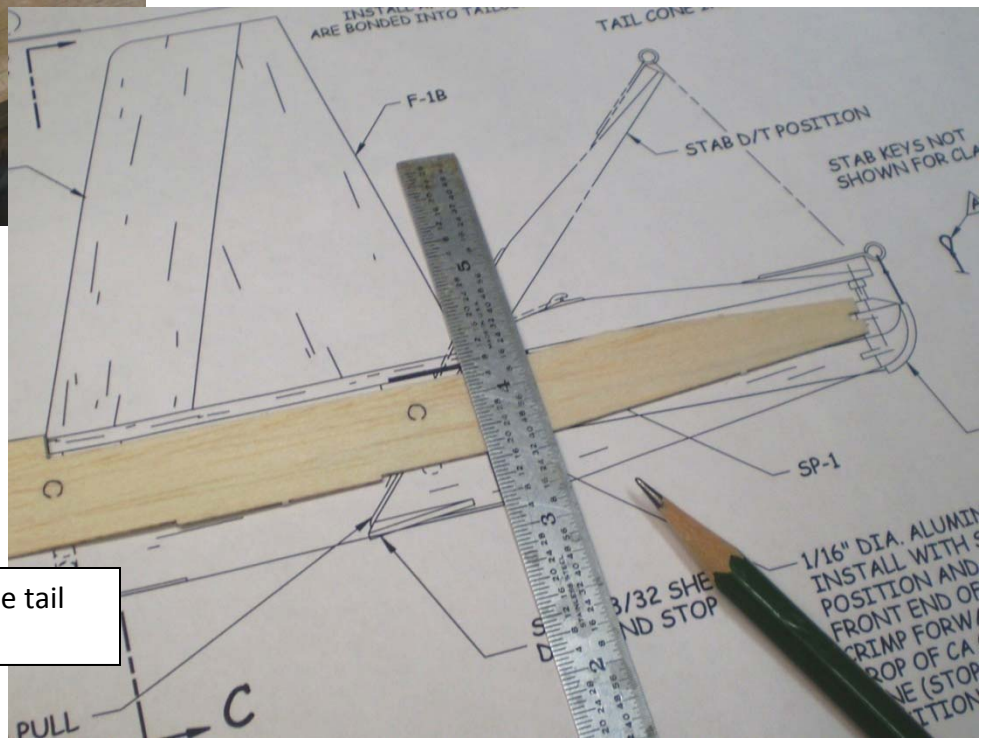
Join front and rear fuselage side at splice



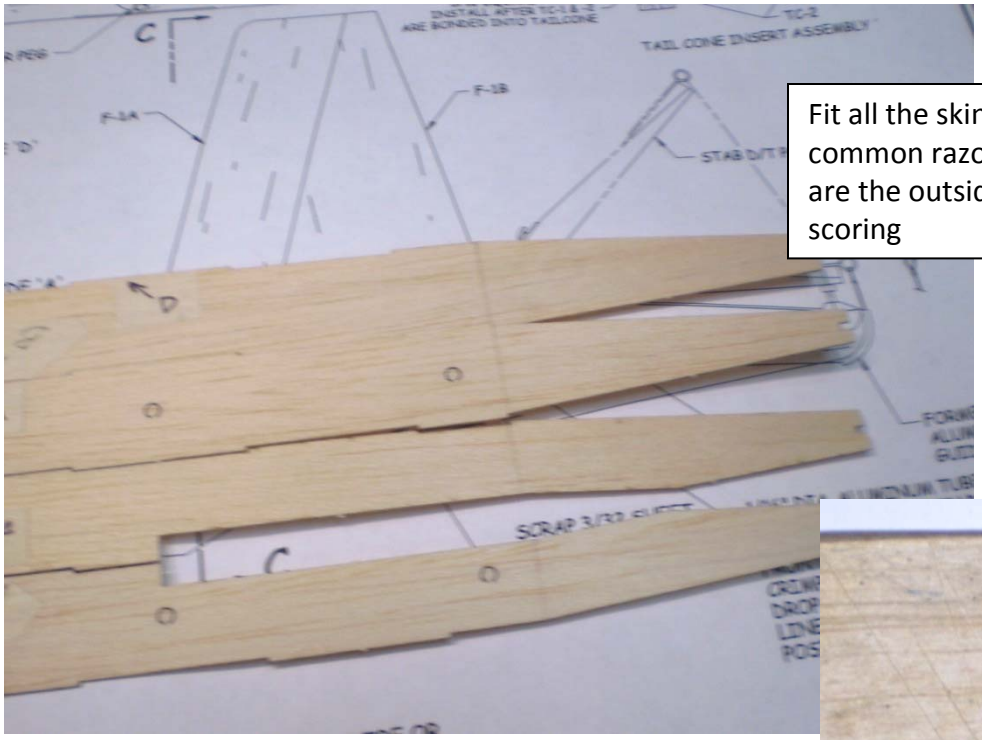
Add strip stock between sides to provide light clamping force against the sides for straightness-continue to splice and stack until all four sides are joined



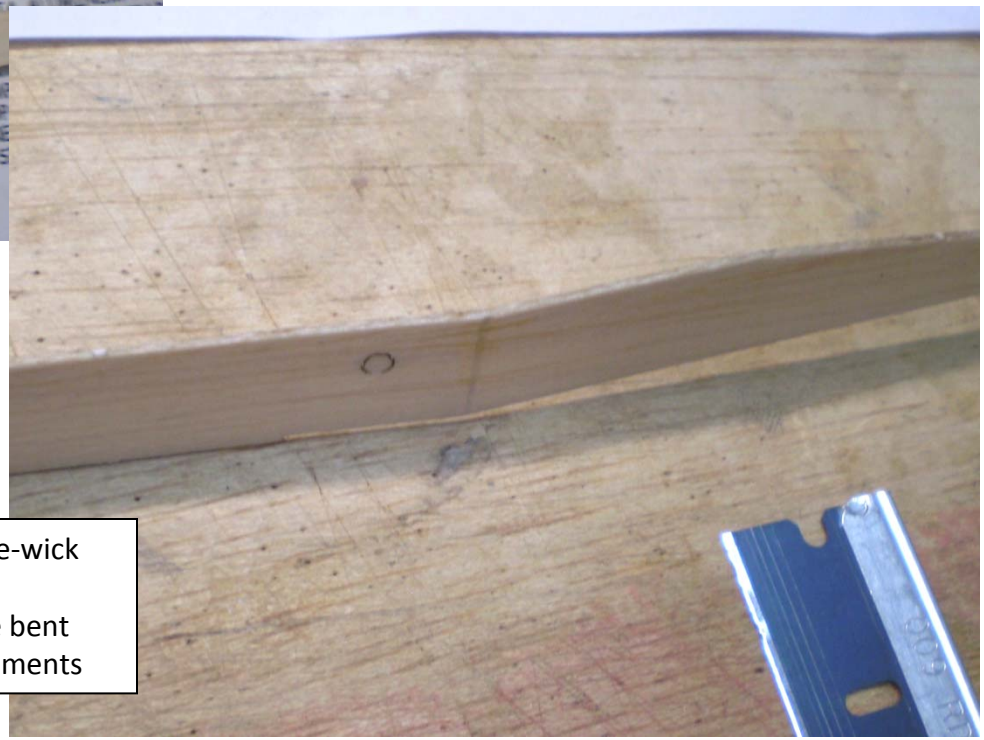
Upper and lower subassembly skins-check alignment intent before assembly



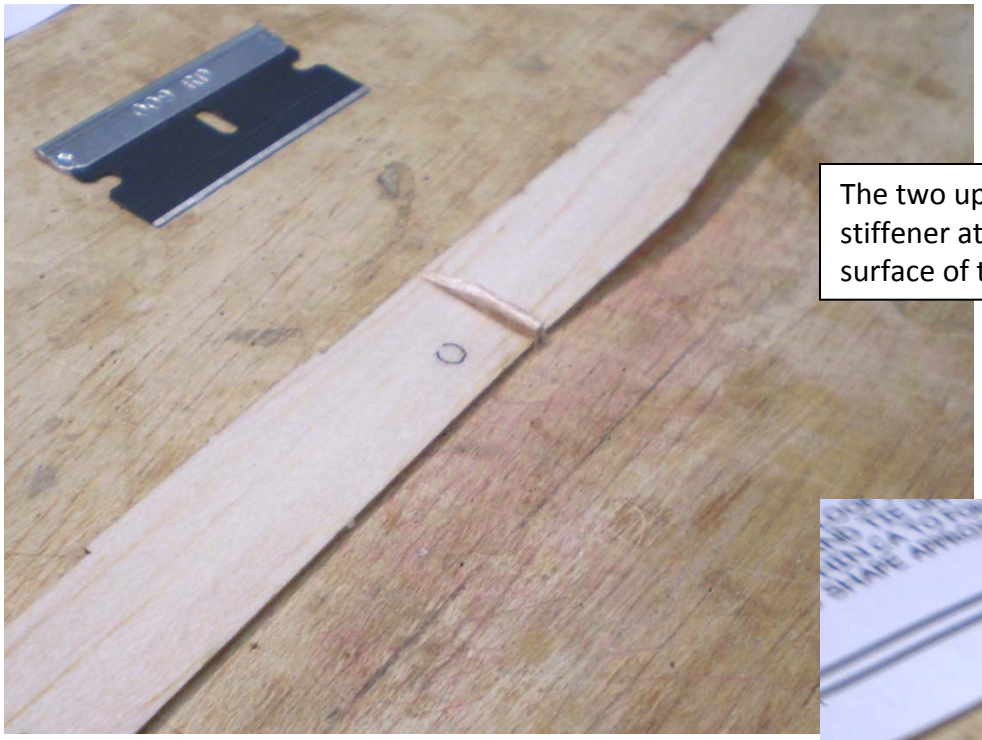
Establish the razor scoring location for the tail cone transition



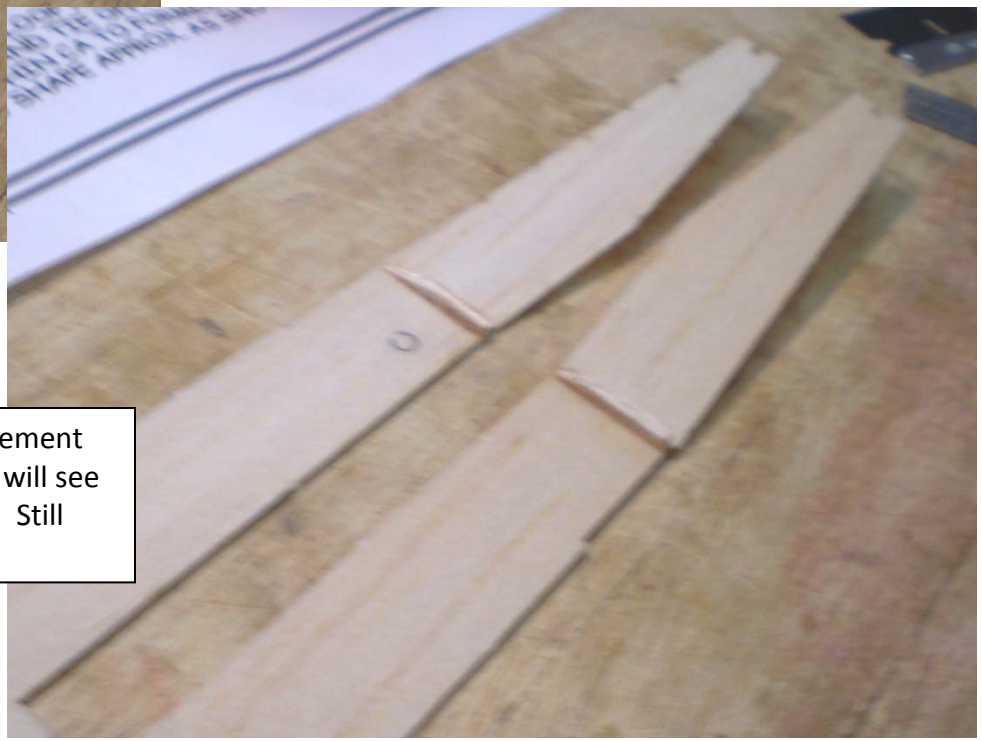
Fit all the skin edges together to establish the common razor score line. MAKE SURE all skins are the outside surface face up prior to razor scoring



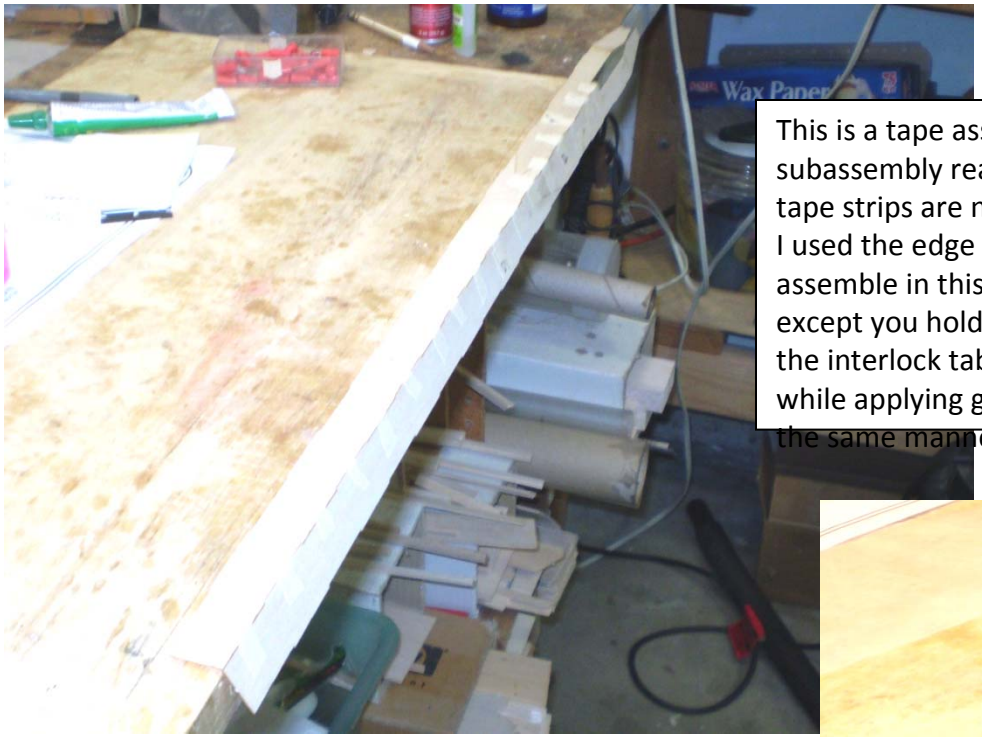
Scored skin is cracked to a shallow angle-wick some thin CA into the scored joint to strengthen. Again, make sure the angle bent allows proper assembly-all tail cone segments bend inward



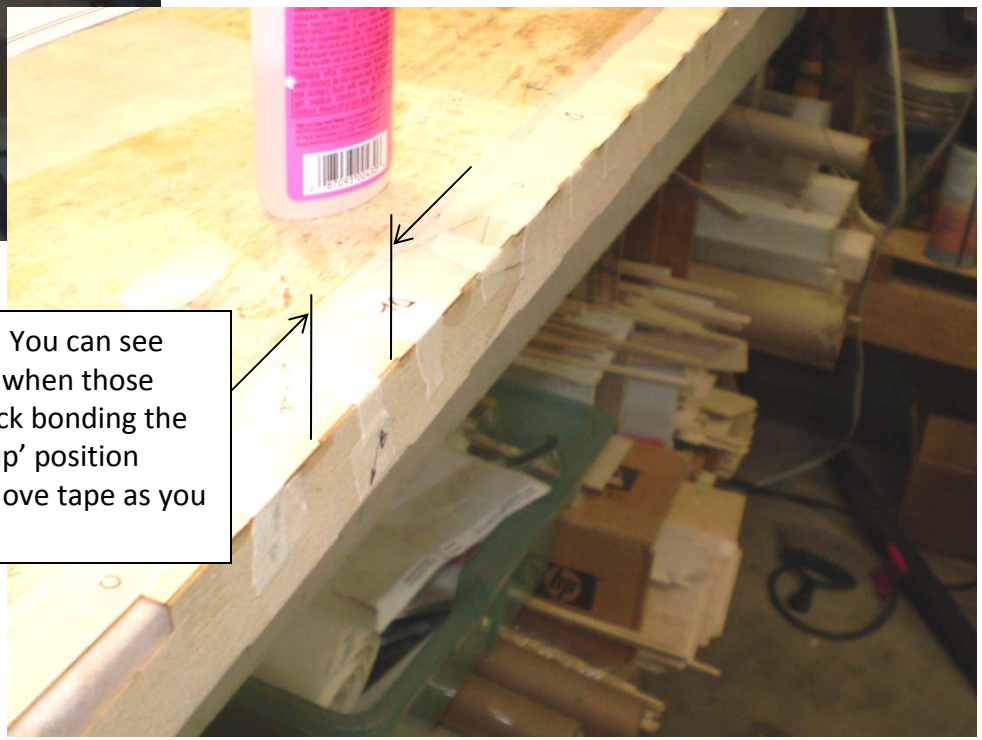
The two upper skins (C & D) get a 1/16 square stiffener at the tail cone transition on the inside surface of the skins



A little blurry but showing both reinforcement stiffeners installed-look closely and you will see the designer installed one upside down. Still worked though…



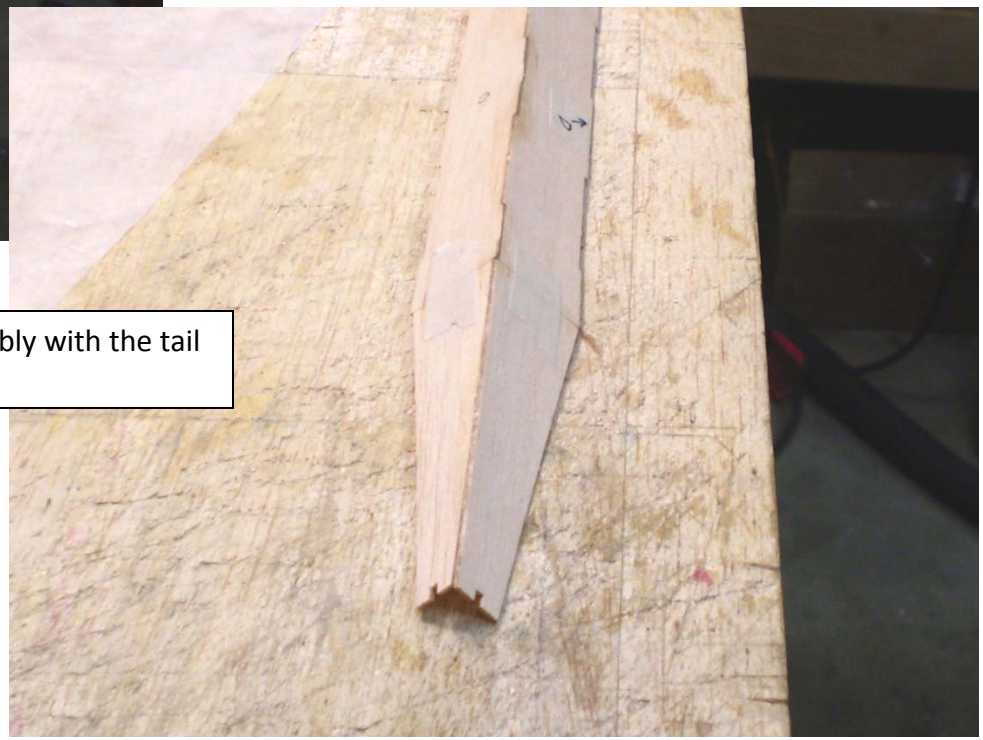
This is a tape assembled upper skin subassembly ready to be tack bonded. Note the tape strips are narrower than the interlock tabs. I used the edge of the building board to assemble in this manner-pretty much as shown except you hold the skins against the edge at the interlock tab area being taped for support while applying glue. Use the assembly tool in the same manner.

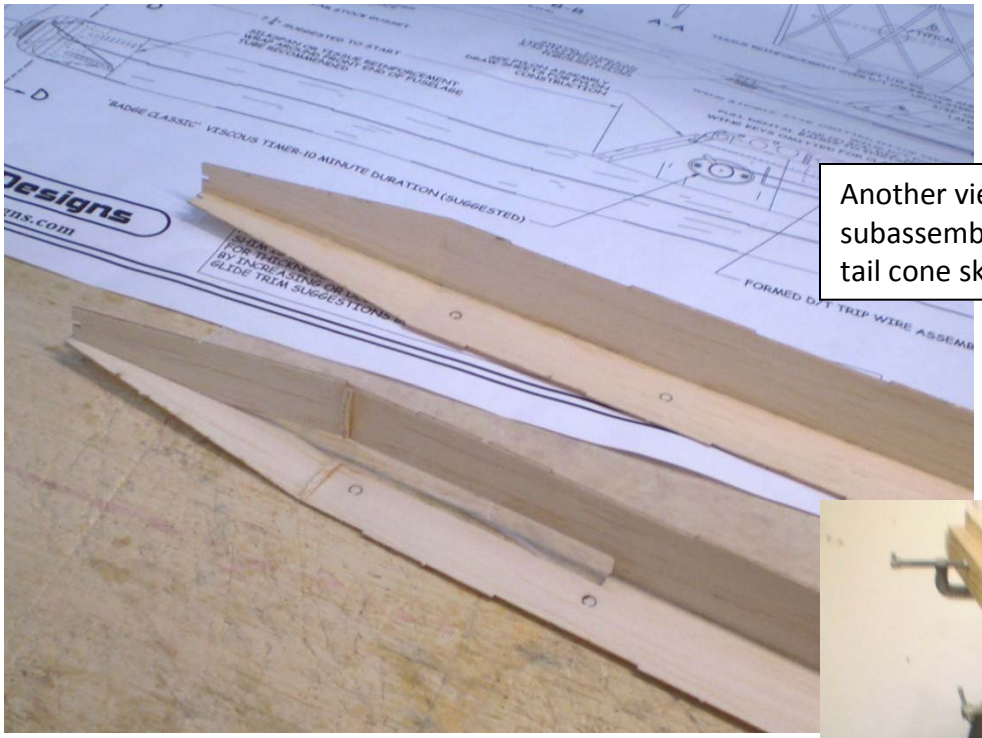


Tack bonding the interlock tabs. You can see the areas glued on the first pass when those areas were 'tab up'. Now I'm tack bonding the remaining tab areas in the 'tab up' position (typical as indicated). Note: remove tape as you tack glue each tab.

Here is the upper skin subassembly bonded and removed from edge of the building board. The wax paper is adhered to the corner joint- remove and install the ¼" triangular gusset at the front end.

Here is the lower skin subassembly with the tail cone skins bonded together.





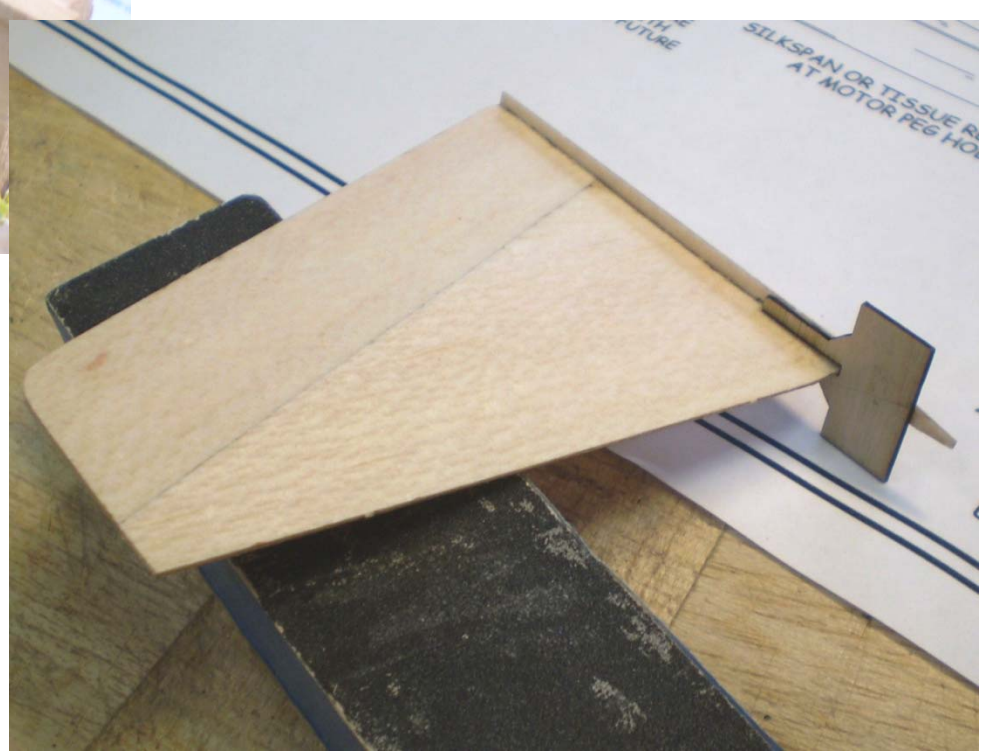
Another view of the upper and lower skin subassemblies. Note the upper subassembly tail cone skins are not bonded together yet.

Here is a simple tool you can set up for joining the two skin subassemblies. If you have no vise to hold it, consider 'C'-clamping to your workbench top.

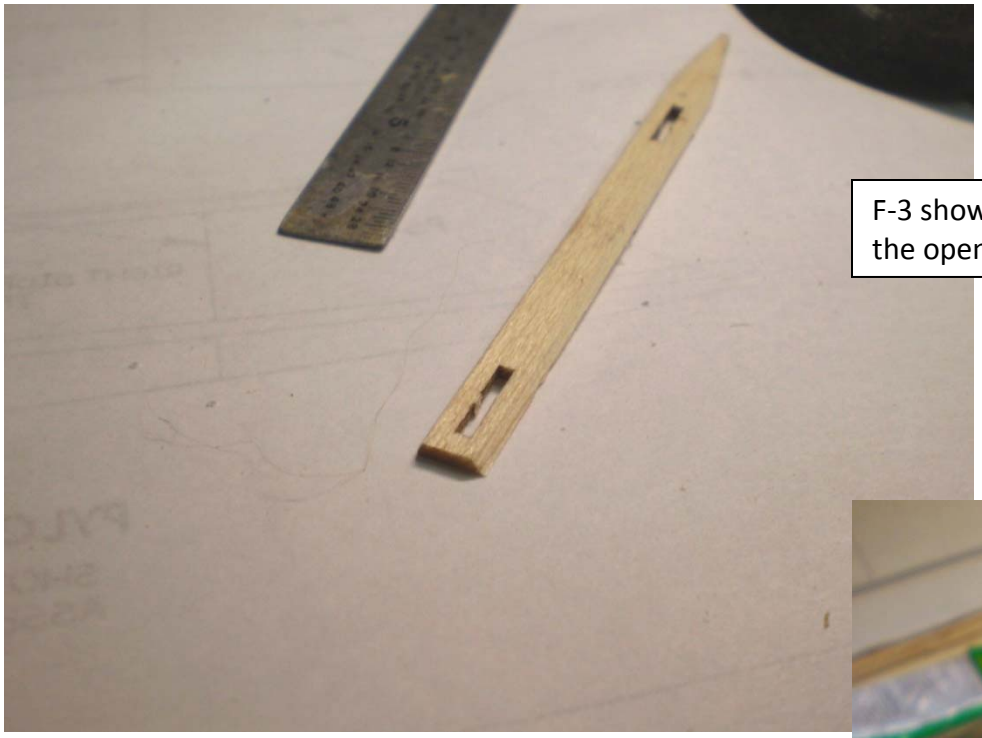
Here is the fuselage tube with the previously bonded joint against the adjacent tool surfaces. I use the NB-1 part to support the front end in terms of fit and making sure this area is as square as this part allows. This photo is of an earlier version of the Monarch that has the ¼" triangular gusset common to the nose block further down inside the tube. Yours should be flush to the front end-the NB-1 has been relieved to allow this. I also recommend the strip clamps down the two edges of the fuselage to retain much more securely and accurately than the masking tape bands you see here-lessons learned!

Another overall view of the fuselage tube installed in the tool. Note the tape bands that are lightly securing the assembly against the jig faces to help control squareness in the resulting assembly. Again, I now recommend the clamping strips to hold the box assembly securely into the tool instead of the tape bands.

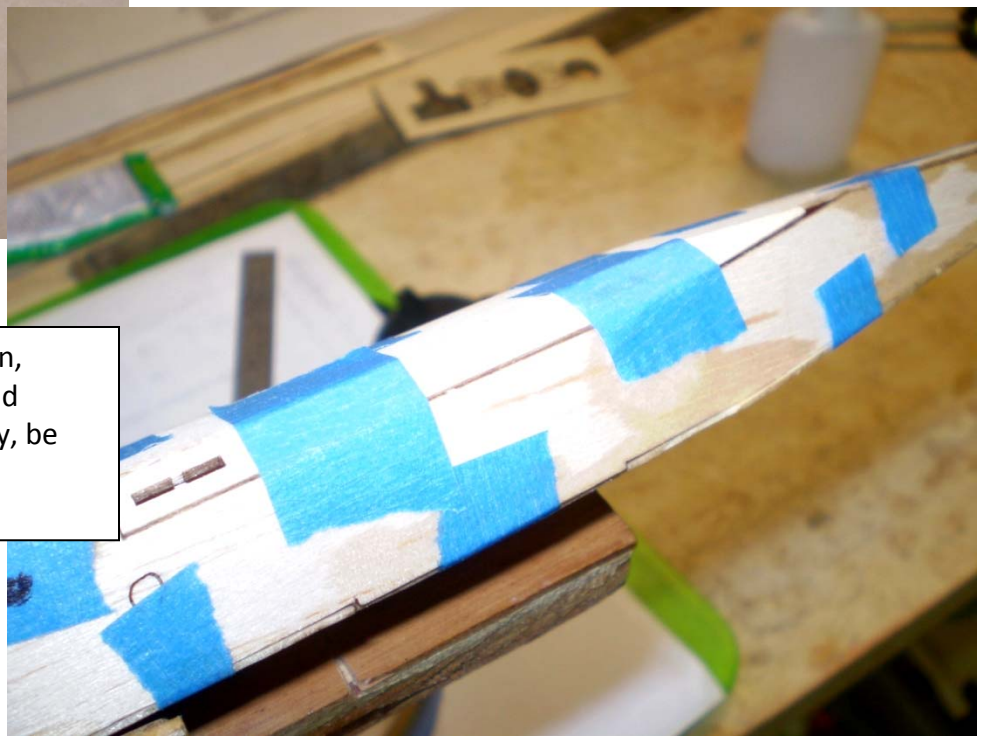
This picture shows the balsa strip added to support the two edges of the fuselage during the taping and bonding process on the upper fuselage seam. This helps support the fuselage material from deflecting over the hard edge of the tool during this step and recommended before adding the tape bands used to hold the assembly in the tool. Note: this was an earlier version of the tool-the drawing in your kit shows the better setup for assembling the tool and fuselage.



Here is the fin and F-3 subassembly option-this is installed as a unit into the top of the fuselage box. I think this method works best as it allows a clean installation of the stabilizer platform on top of F-3.



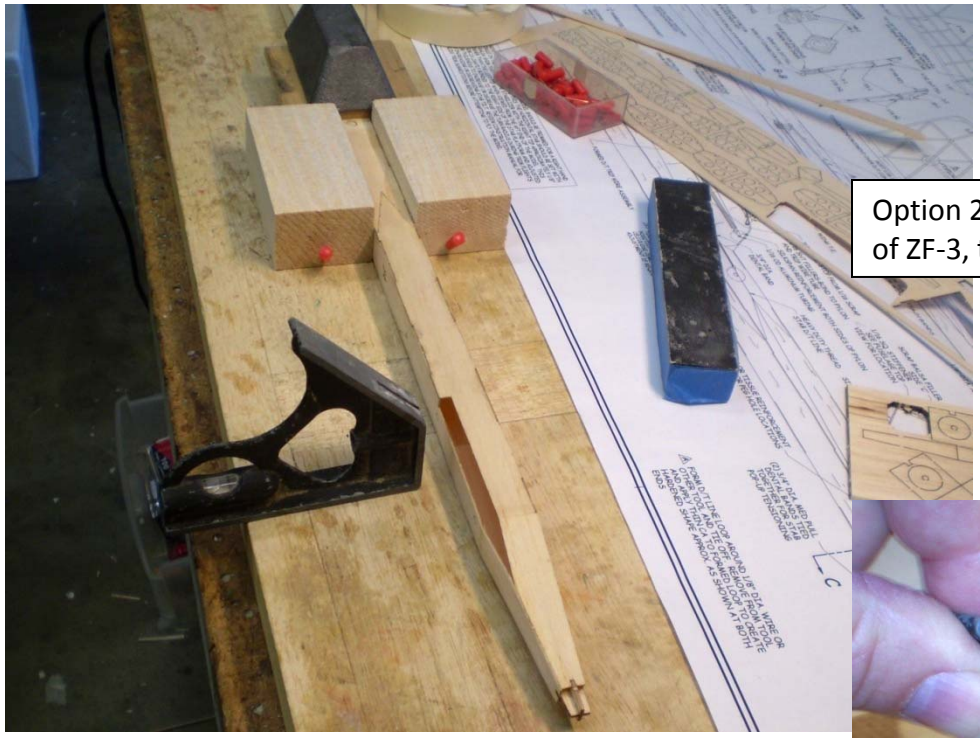
F-3 shown with chamfered edge that mates with the opening in the top of the fuselage box.



F-3 being installed in the fuselage box –fin, platform SP-1 installed after as the second optional method to assemble. Either way, be patient and careful with this step of the assembly.

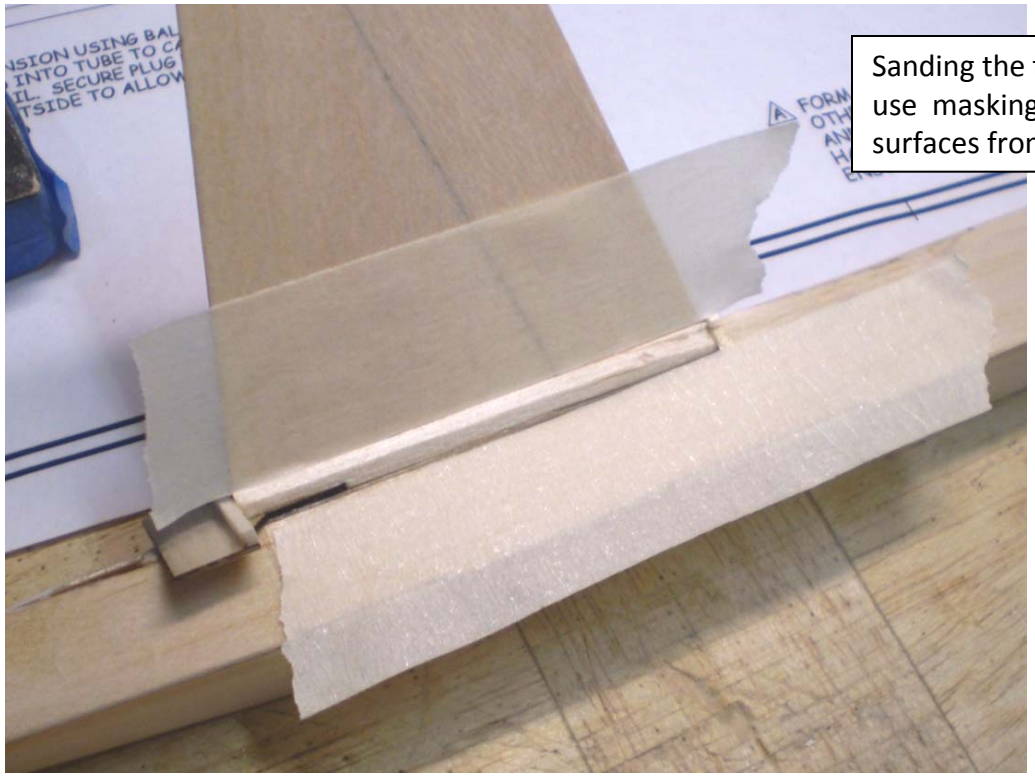
F-3 ready to accept the fin, stab platform and fillers

Setting the fin using a 45 degree side of a tri-square tool. Note how I have weighted the fuselage down to hold flat against the building board and stabilize for movement. You don't need that much lead though…I was lazy and it was handy.

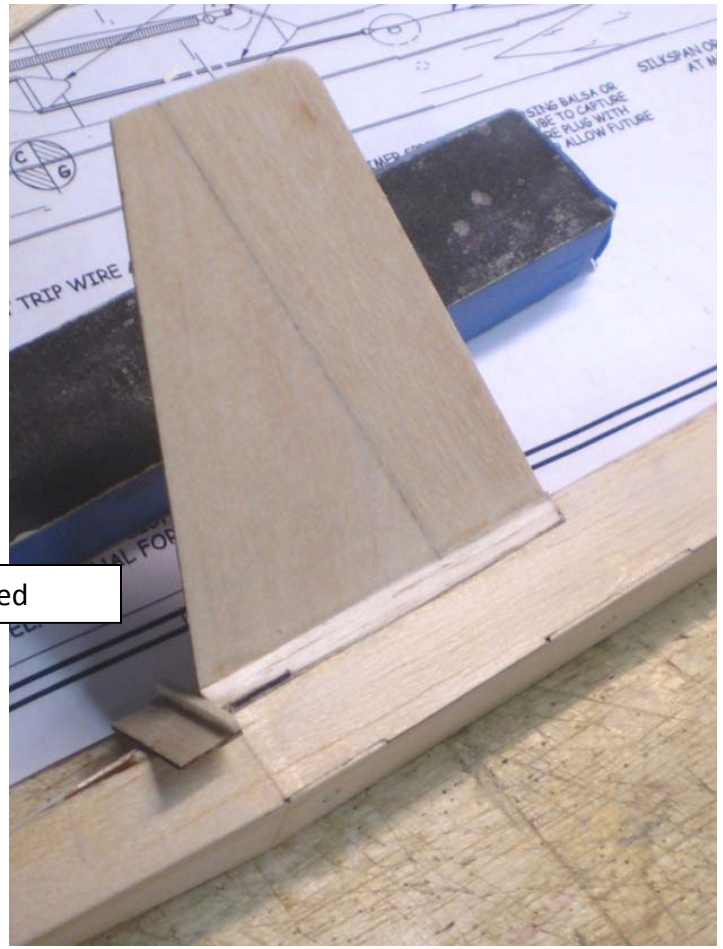


Option 2-install the F-3 subassembly (consists of ZF-3, the fin and stab platform SP-1)

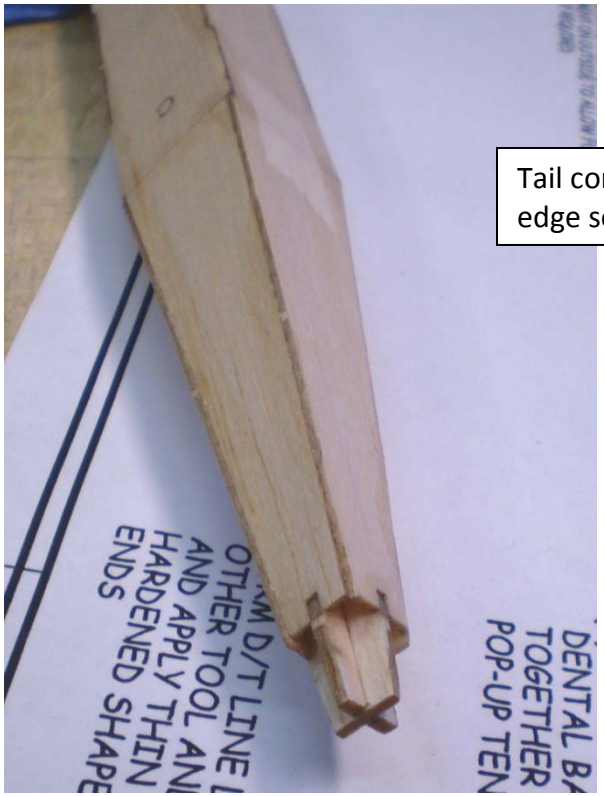
You can see I've already installed the soft fillers at the base of the fin and the leading edge stop on the platform prior to installing the subassembly. Same protractor method used to help control the position of the fin.



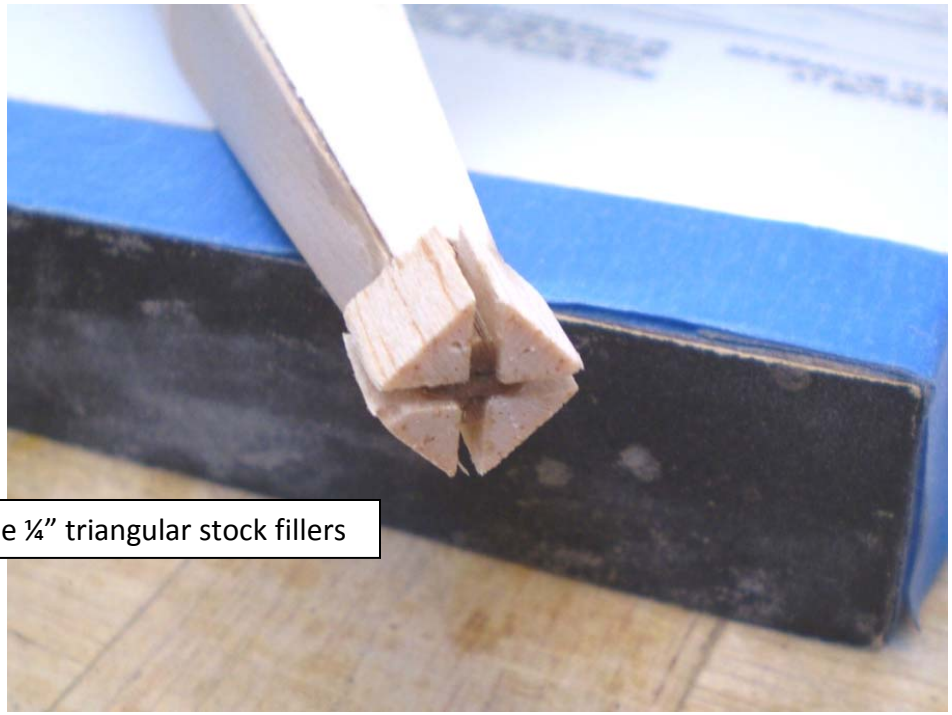
Sanding the fillers to blend with the fuselage- use masking tape to protect the adjacent surfaces from damage while sanding.



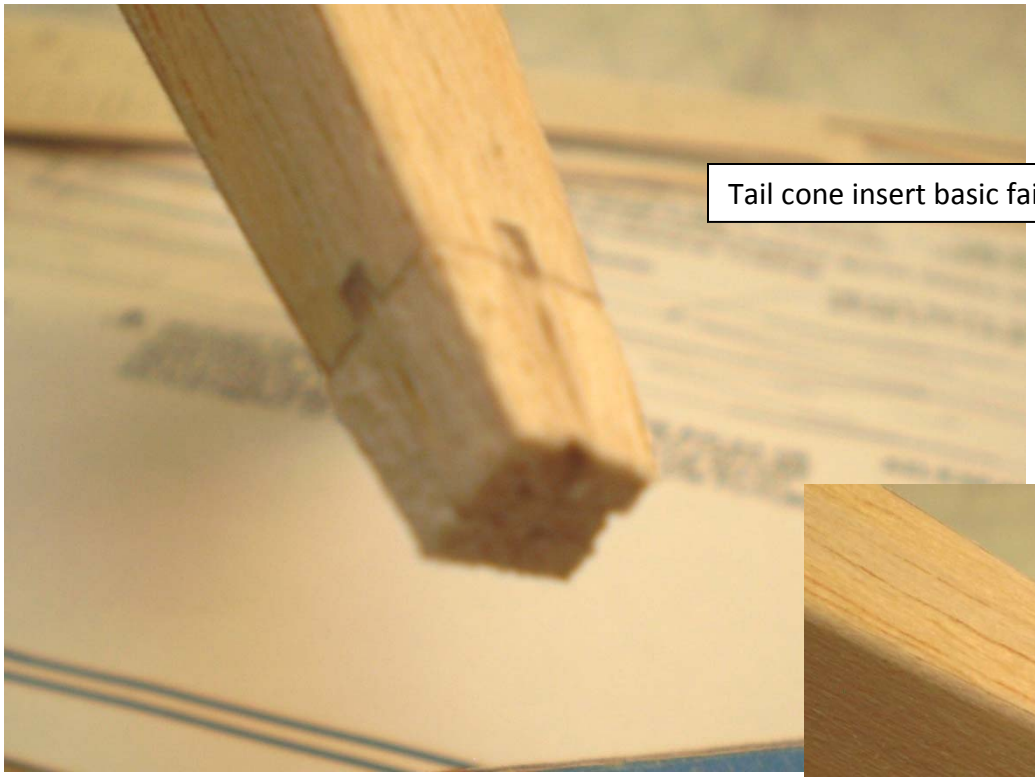
Filler area finished



Tail cone assembly installed and tail cone skin edge seams joined.



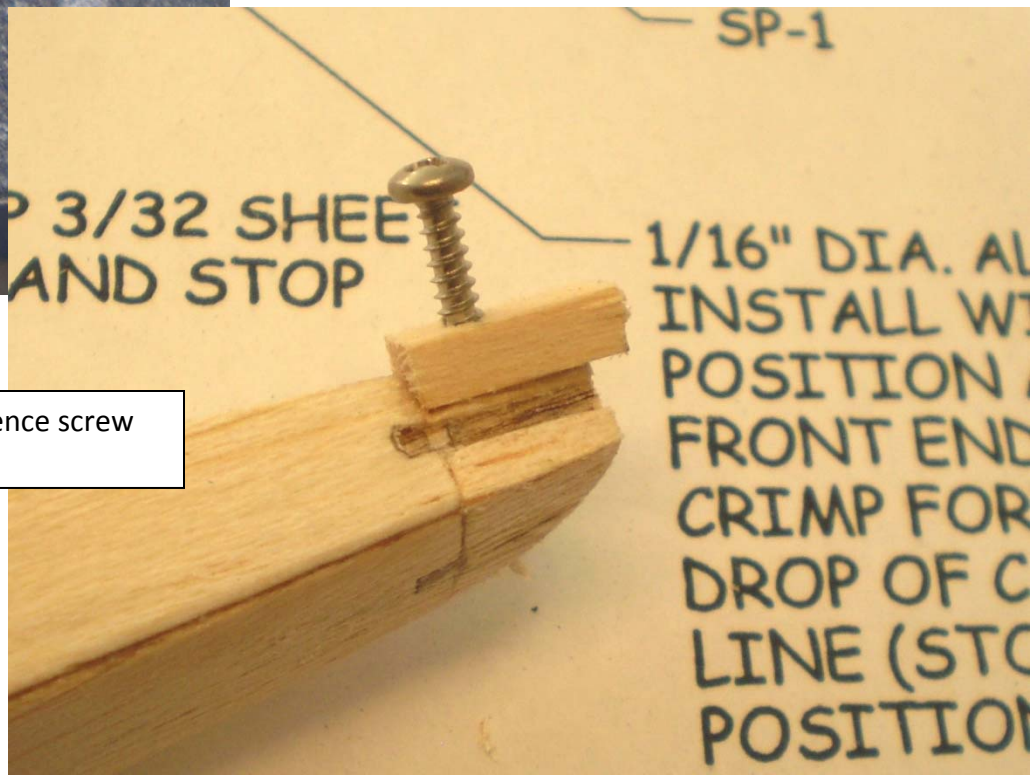
Install the ¼” triangular stock fillers



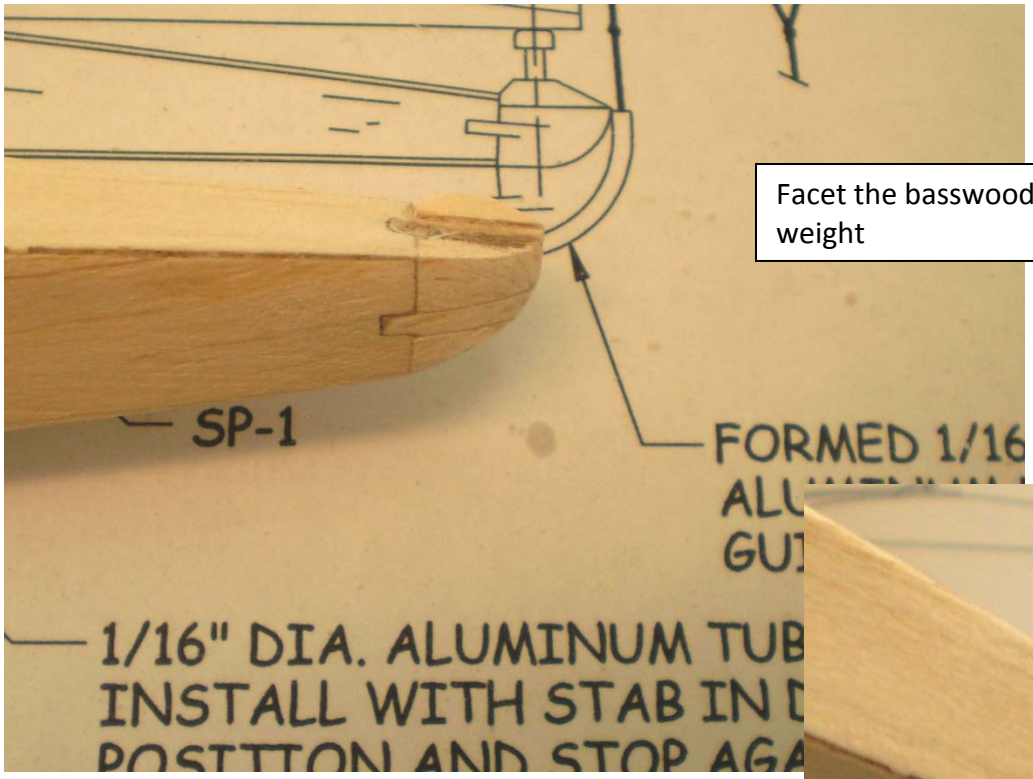
Tail cone insert basic faired shape

Profile to the side view for the curved aluminum guide tube shape

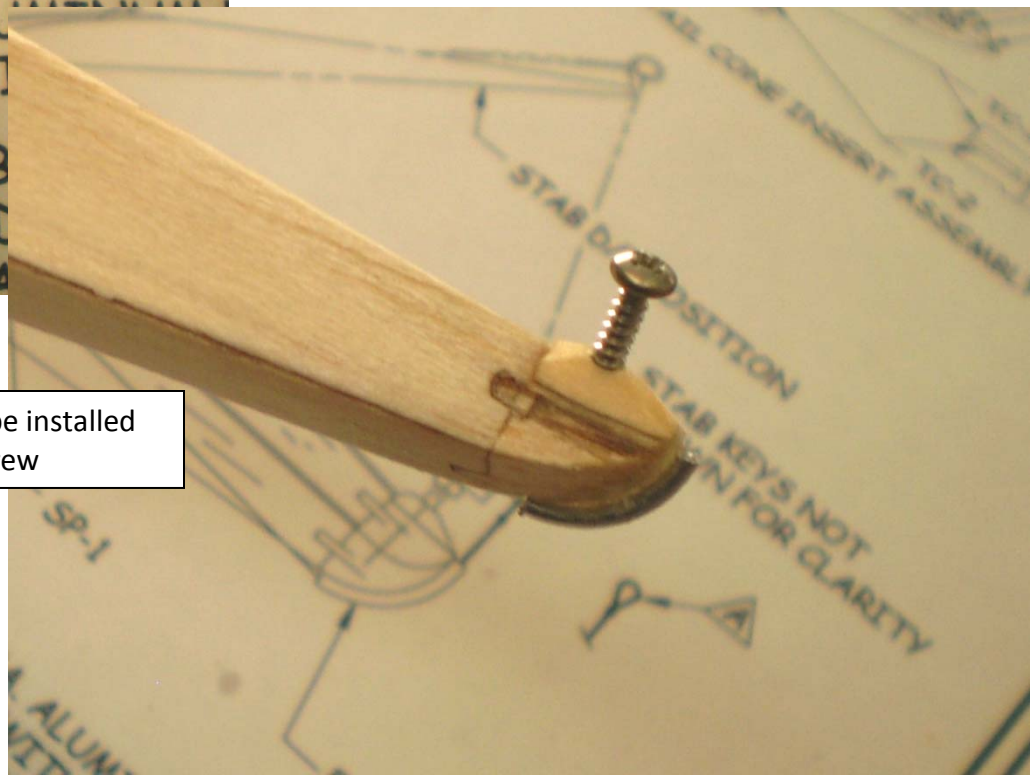
Create relief to install basswood incidence screw insert



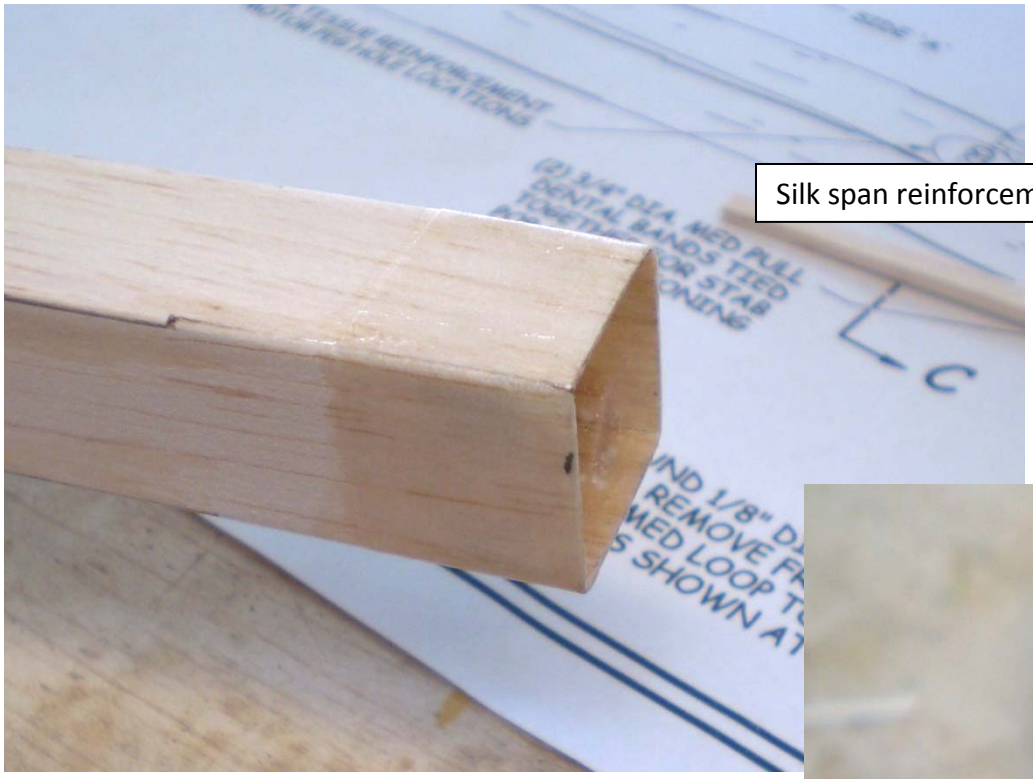
Basswood insert installed and incidence screw installed



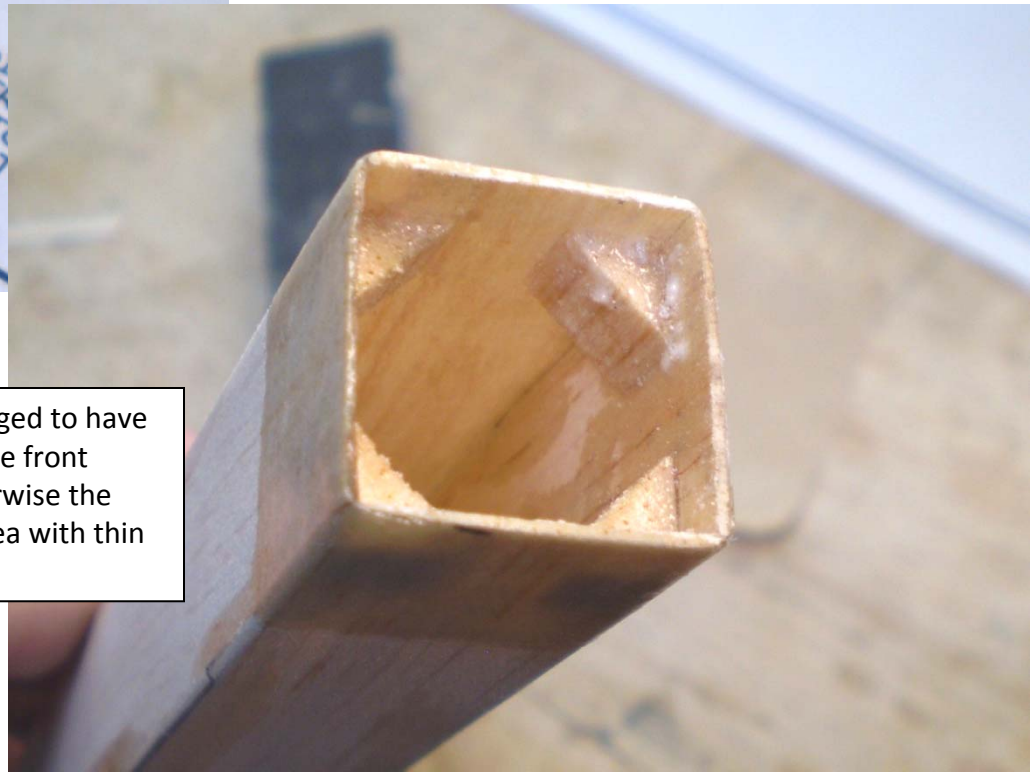
Facet the basswood insert to remove excess weight



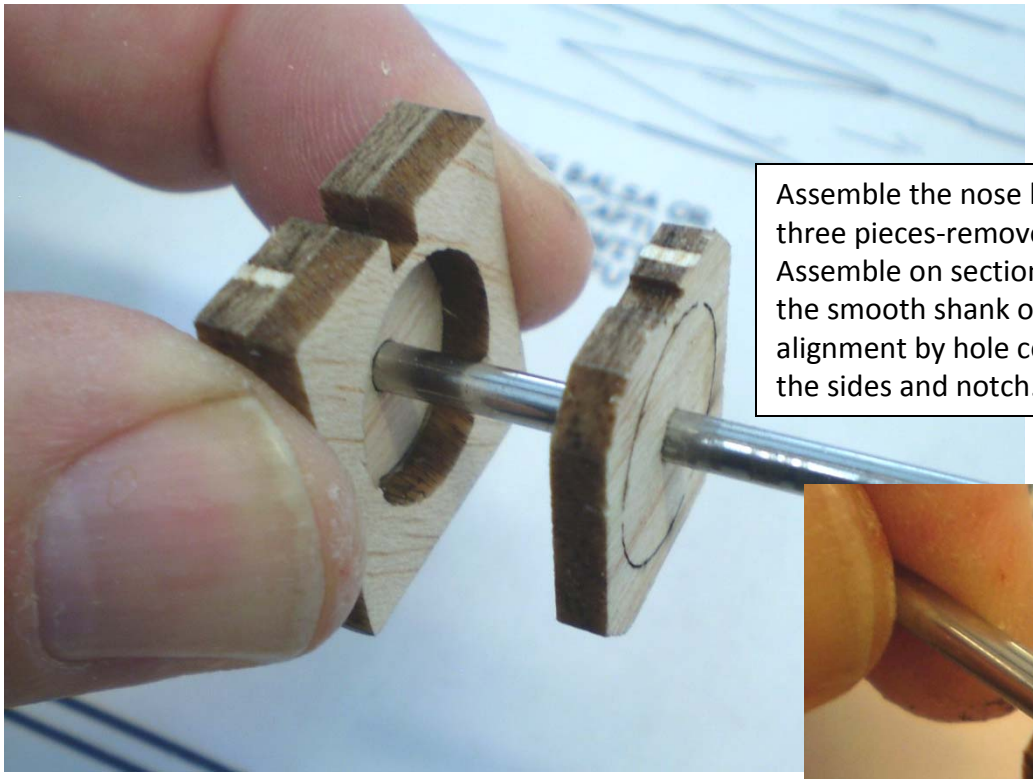
Curved aluminum D/T line guide tube installed along with incidence adjustment screw



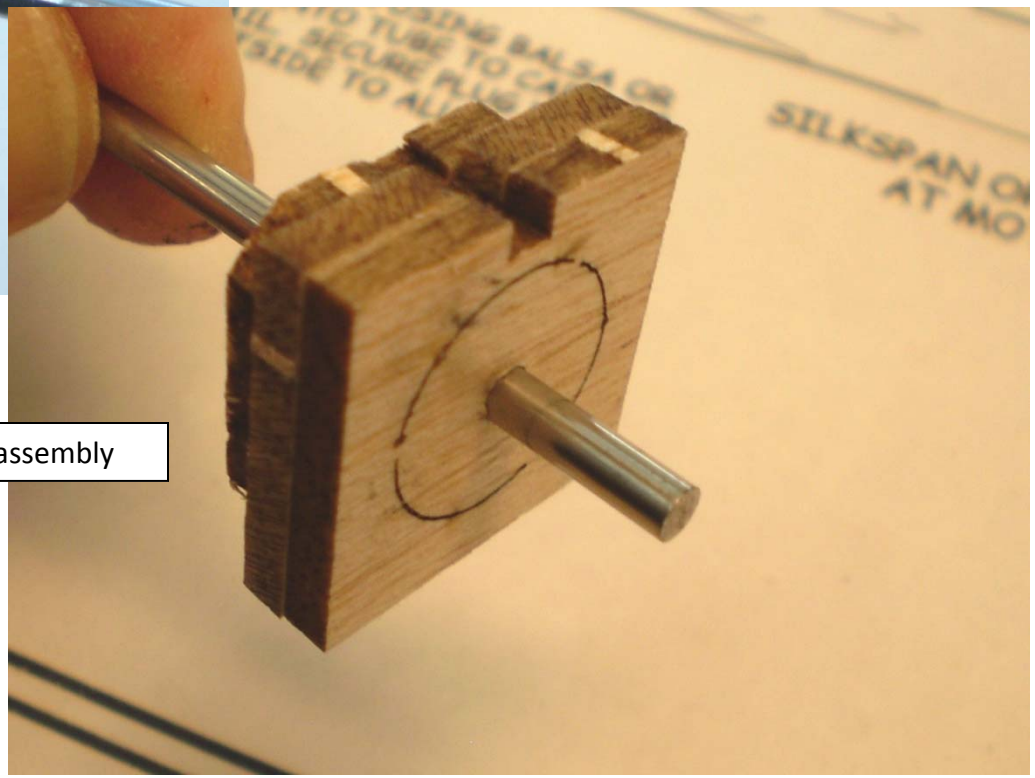
Silk span reinforcement applied to the front end



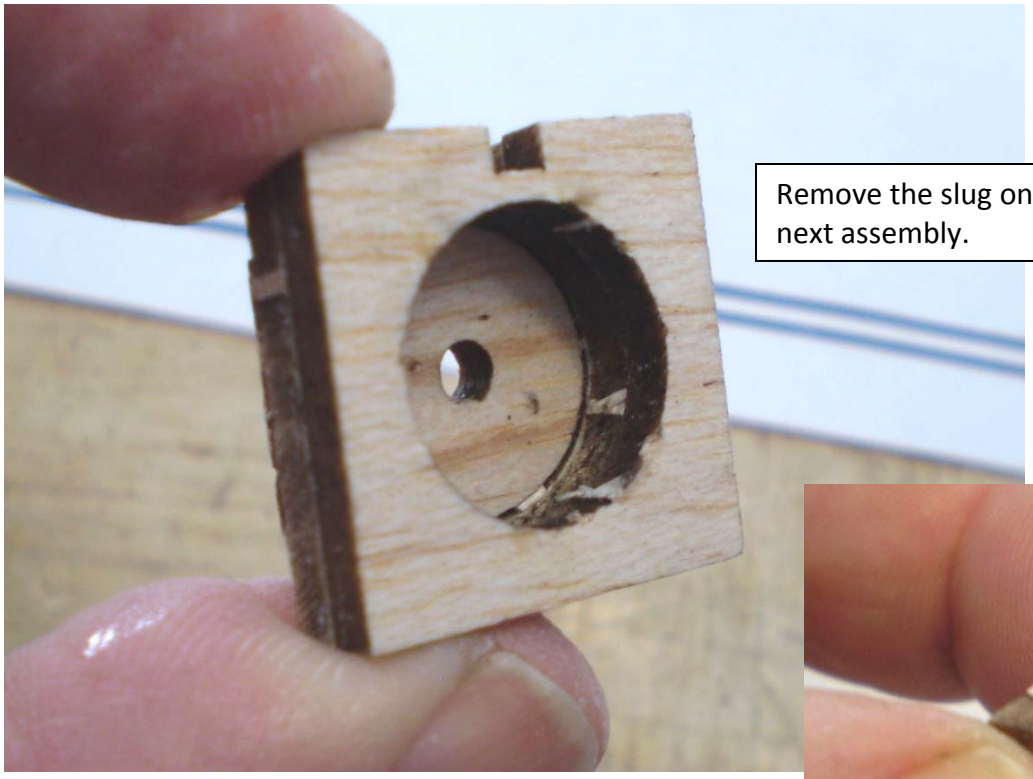
Another view-design has been changed to have the triangular gussets set flush to the front edges of the fuselage box, but otherwise the same configuration. Harden this area with thin CA.



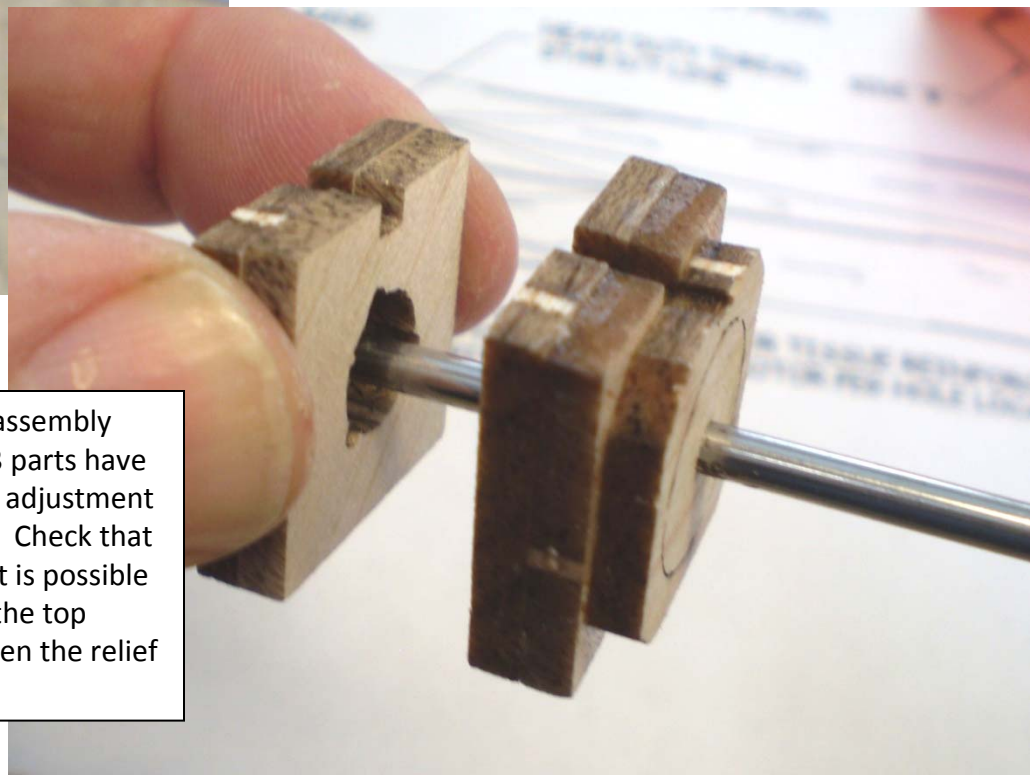
Assemble the nose block starting with the back three pieces-remove the slug in the center item. Assemble on section of 1/8” diameter wire or the smooth shank of a 1/8” drill bit to maintain alignment by hole centers. Center item aligns to the sides and notch.



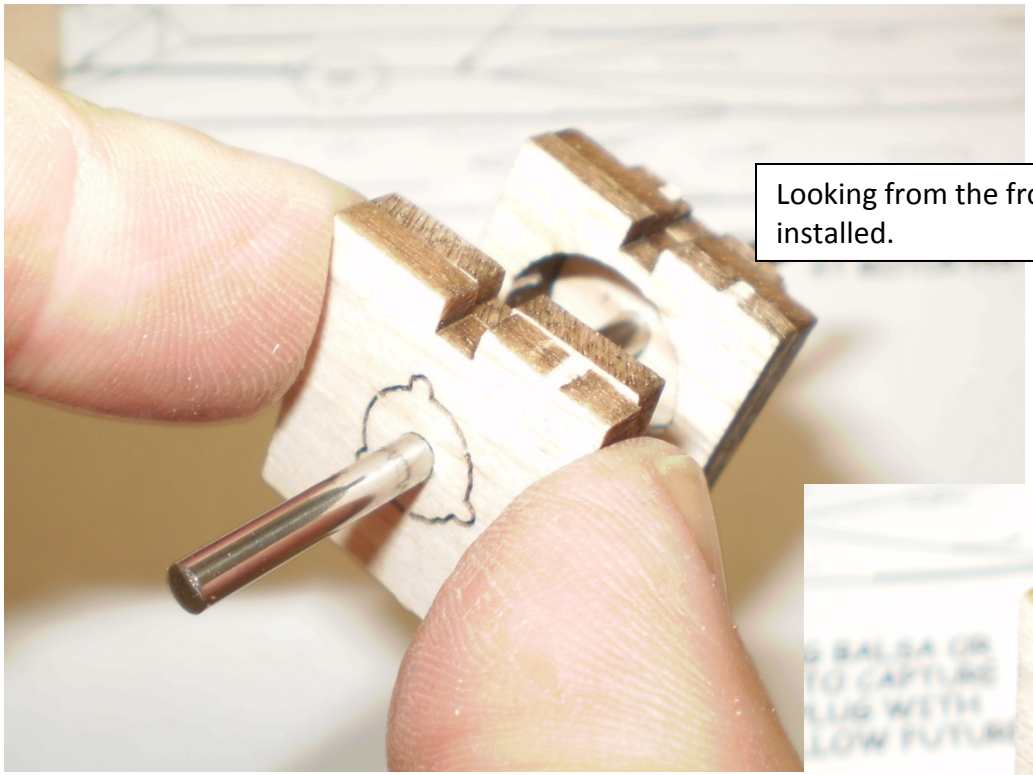
Bonded initial nose block assembly



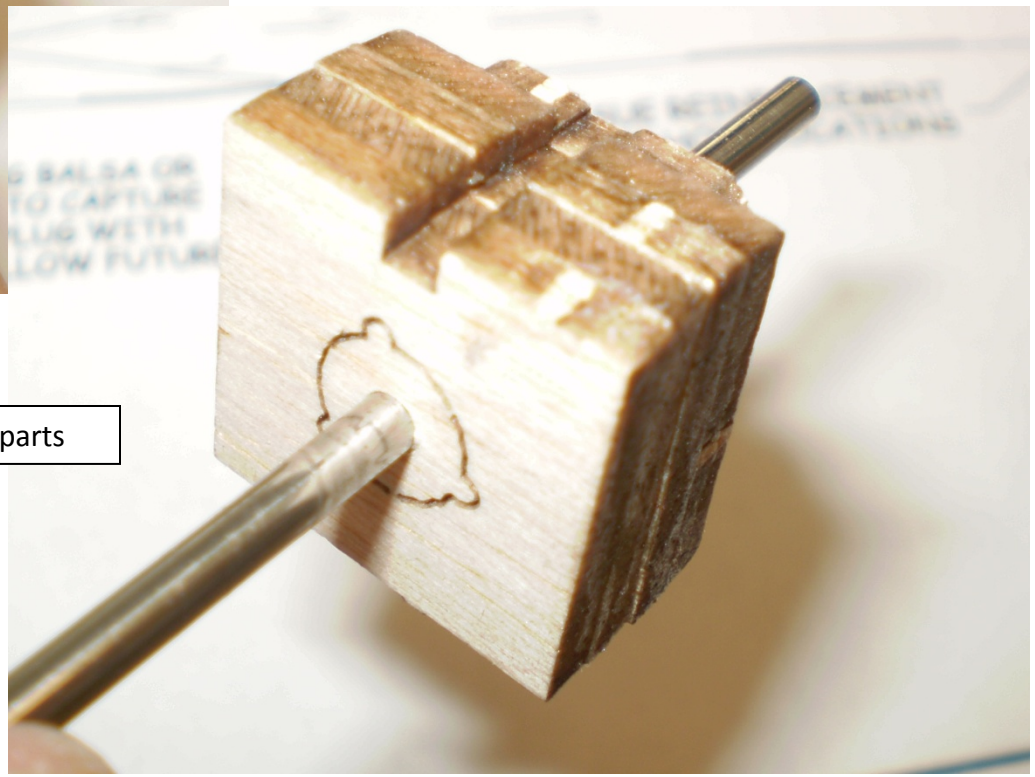
Remove the slug on the NB-2 element for the next assembly.



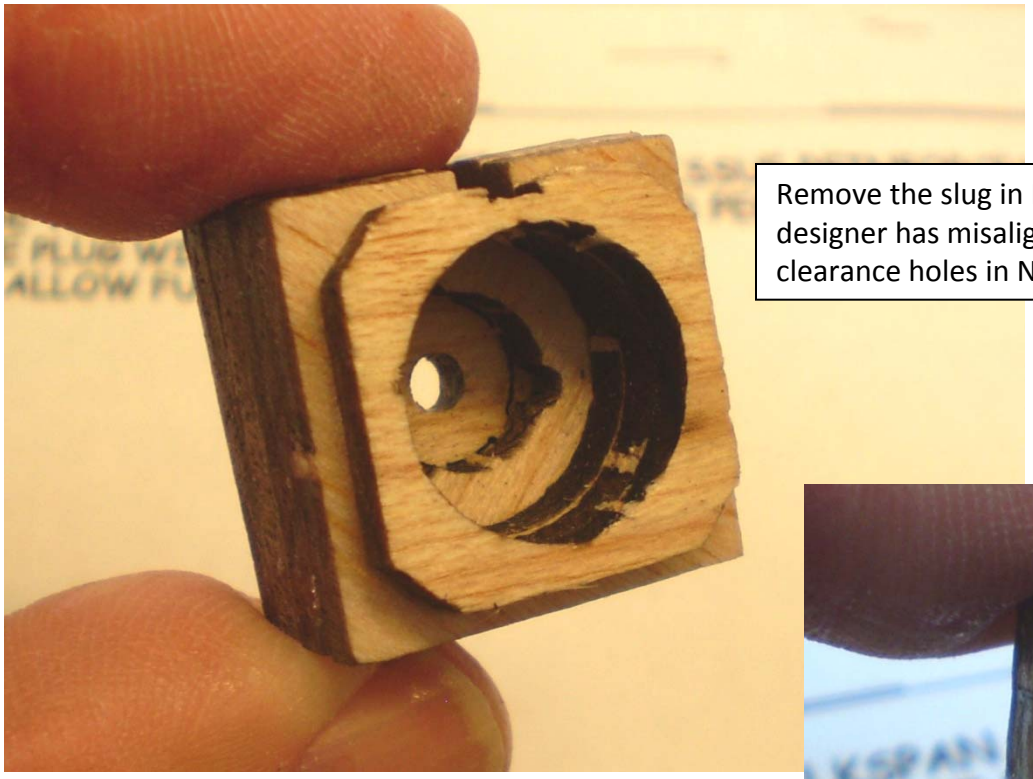
The forward part of the nose block assembly being positioned. Caution: the NB-3 parts have 3 relief cutouts for the Gizmo screw adjustment bosses in the bearing installed here. Check that both NB-3 relief cutouts are in line-it is possible to reverse one part with the slot in the top aligned and have a mismatch between the relief cutouts.



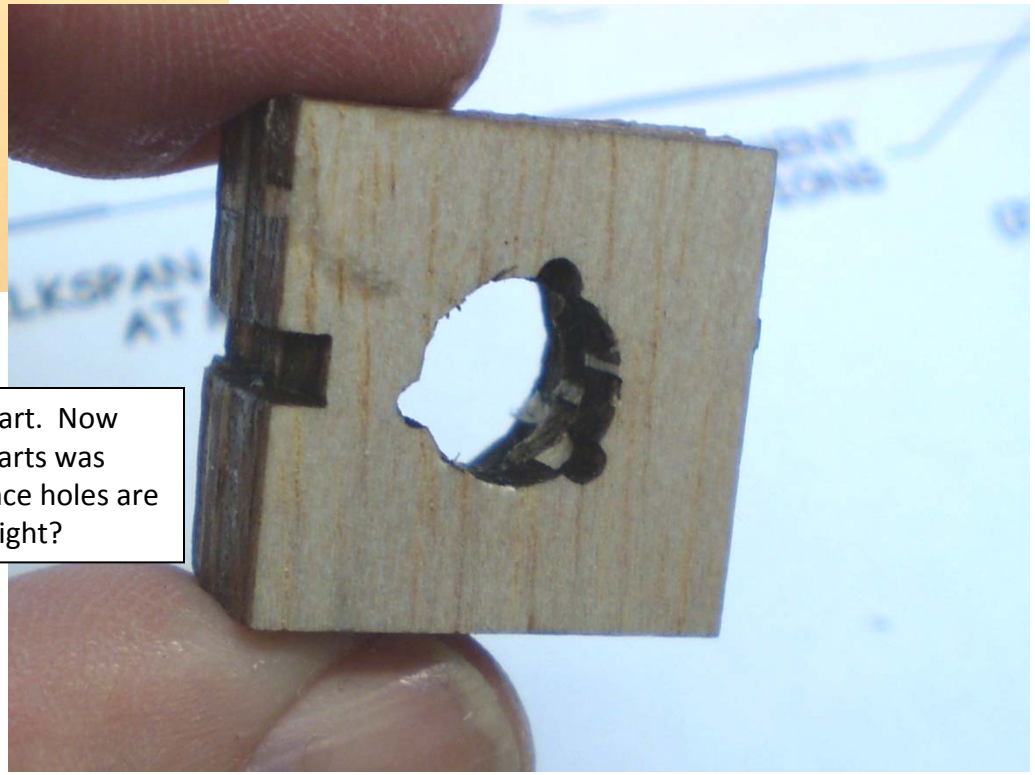
Looking from the front end at NB-3 parts to be installed.



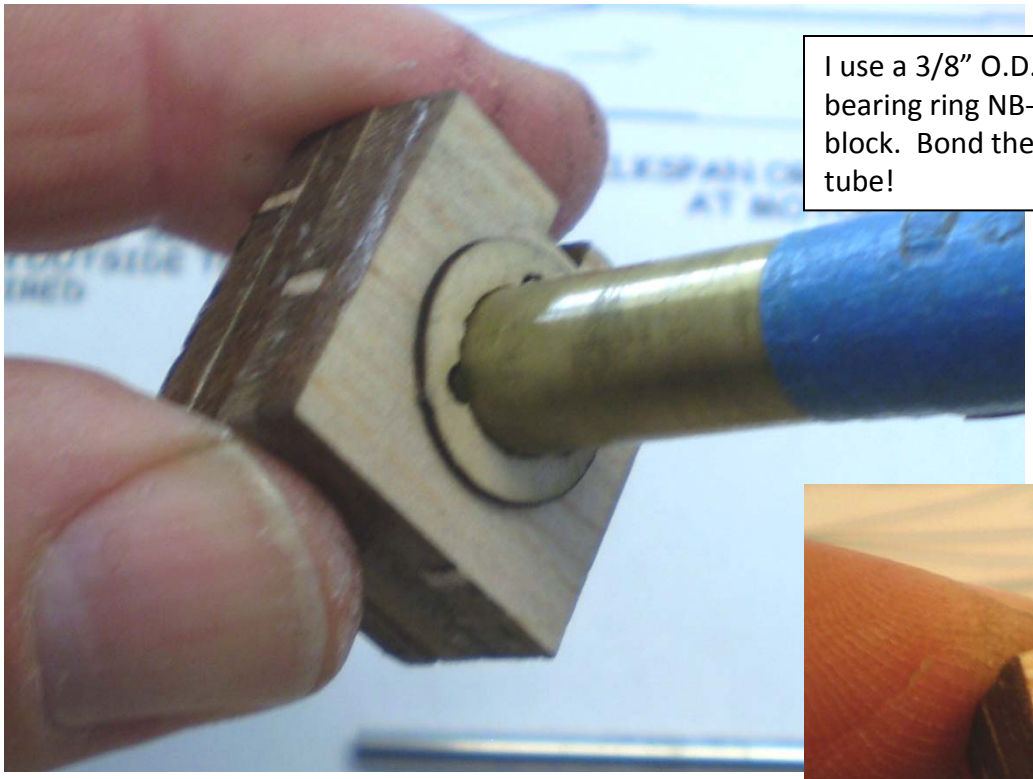
Assembled balsa nose block parts



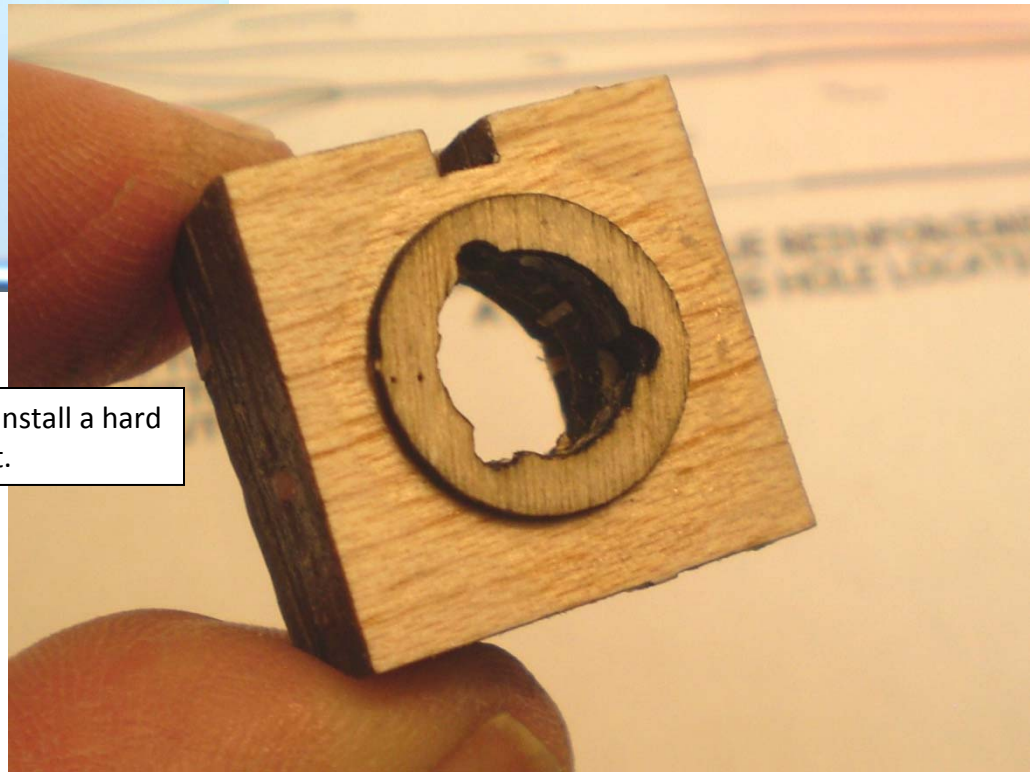
Remove the slug in NB-1. Note the fact the designer has misaligned the 3 Gizmogeezer clearance holes in NB-3 in this example…



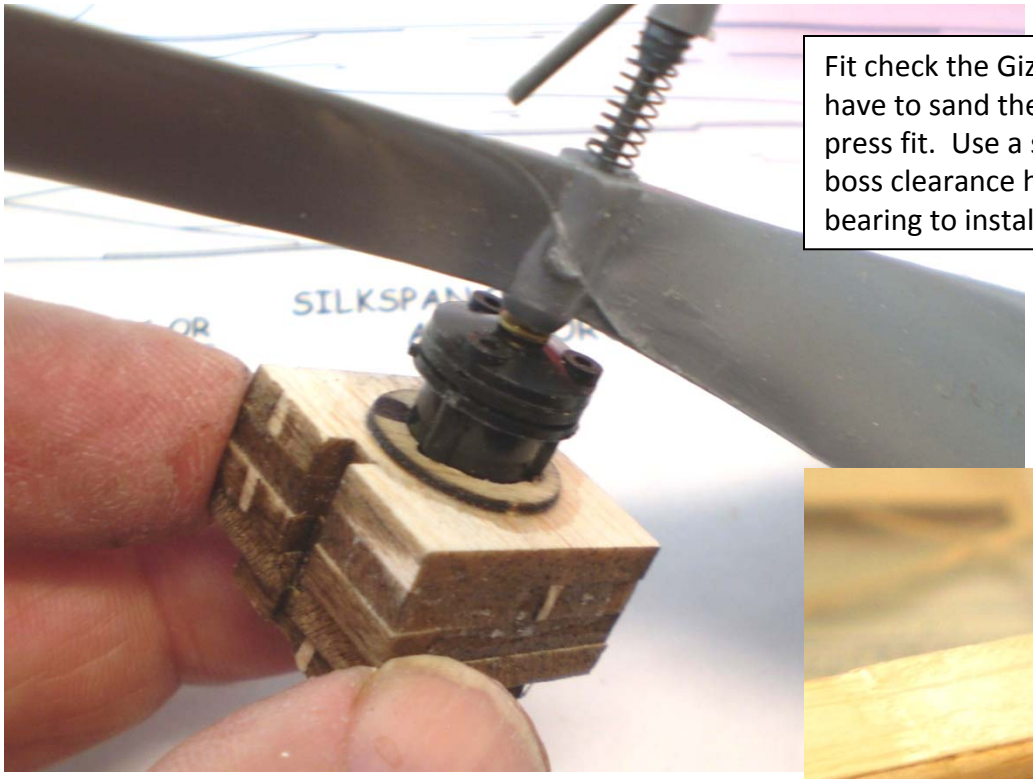
Remove the slug in the front NB-3 part. Now you can really tell one of the NB-3 parts was reversed and the misaligned clearance holes are evident-you won't do that though, right?



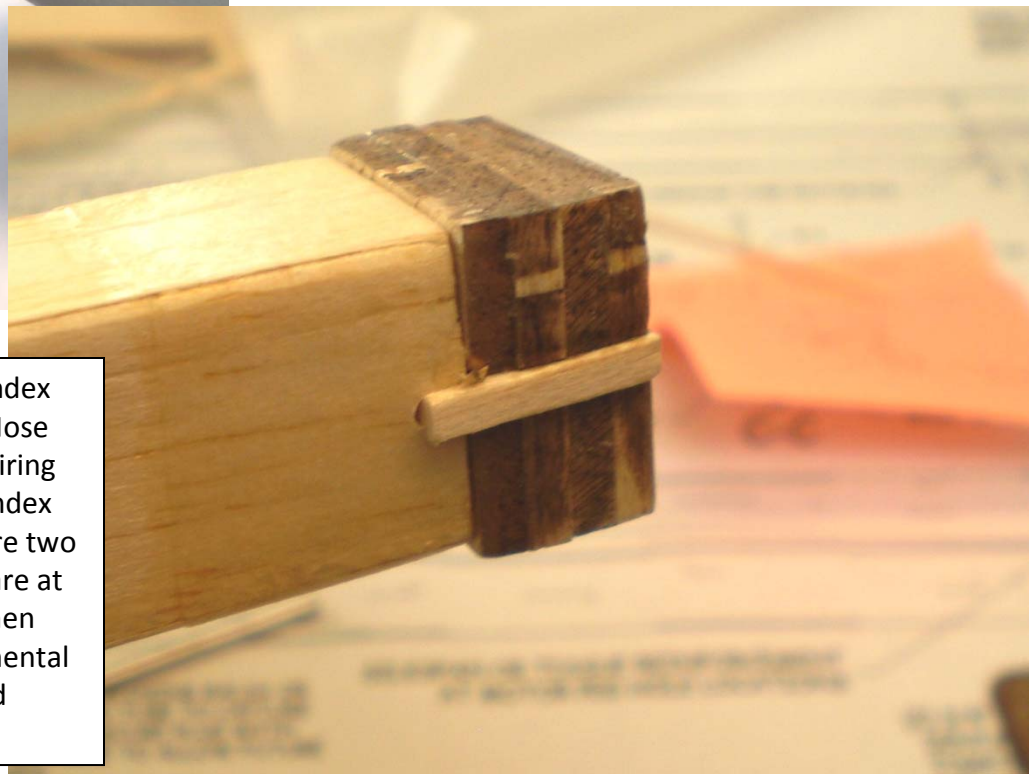
I use a 3/8” O.D. tube to align the plywood nose bearing ring NB-4 to the main hole in the nose block. Bond the ply part in place, but not the tube!



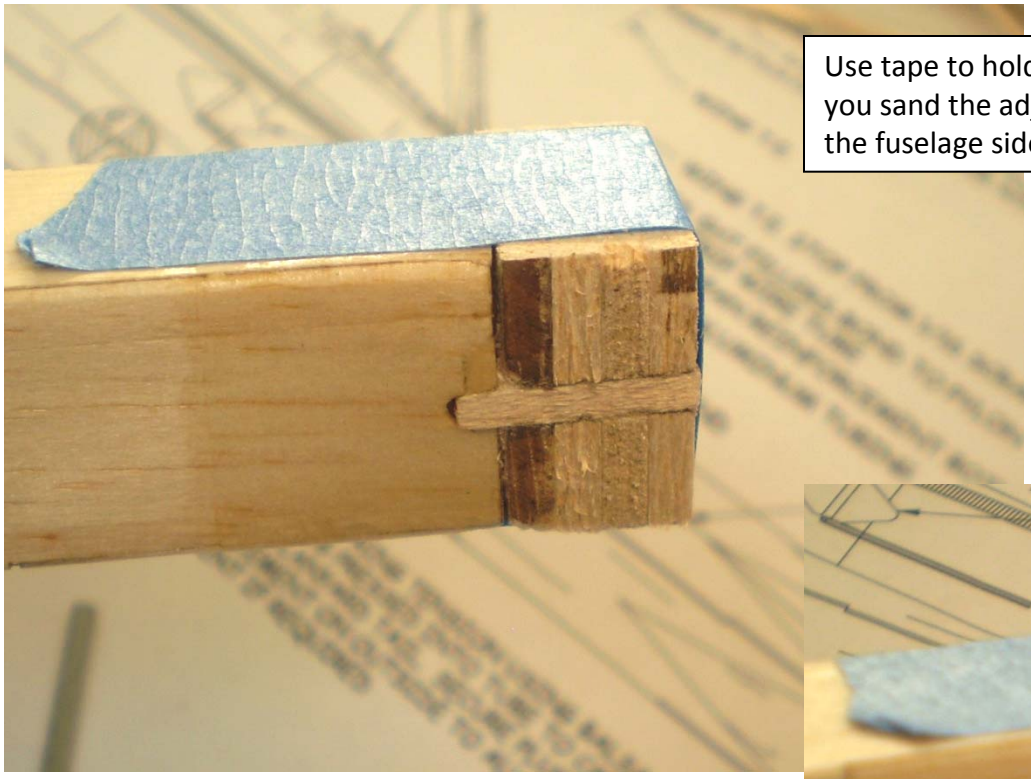
Almost ready to shape-still need to install a hard balsa scrap key in the remaining slot.



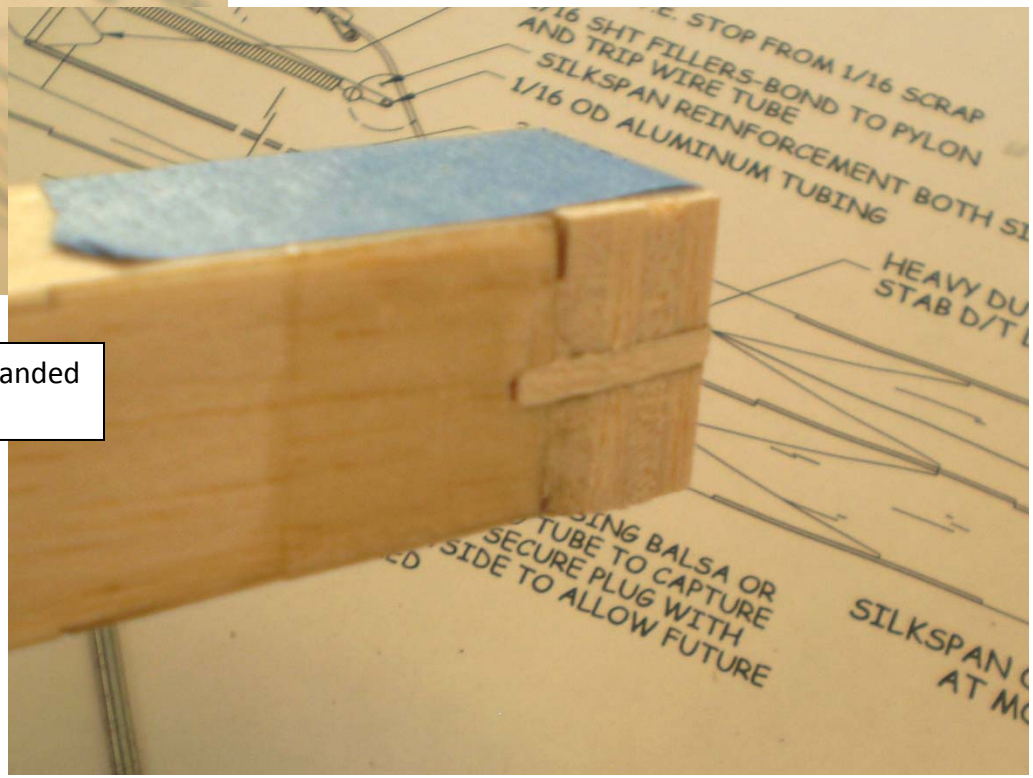
Fit check the Gizmogeezer prop unit. You may have to sand the 3/8” hole slightly to get a light press fit. Use a small round file to clear the 3 boss clearance holes as required to allow the bearing to install.



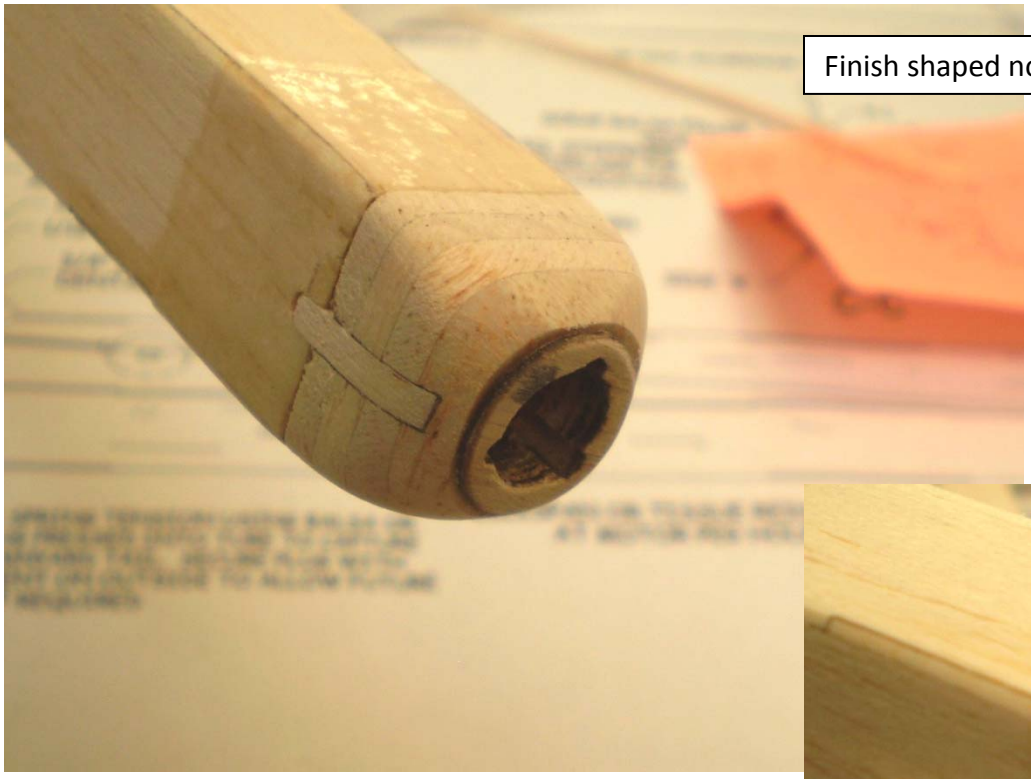
Balsa index key installed and the mating index slot in the fuselage is made to accept it. Nose block is now ready for final shaping and fairing to the fuselage. I suggest you install the index slot where shown on the drawing to ensure two of the thrust adjustment screw locations are at the top of the diamond of the fuselage when rigged. This will help flight trimming for mental orientation when adjusting the screws and bearing for thrust angle.



Use tape to hold the nose block in place while you sand the adjacent nose block sides flush to the fuselage sides.

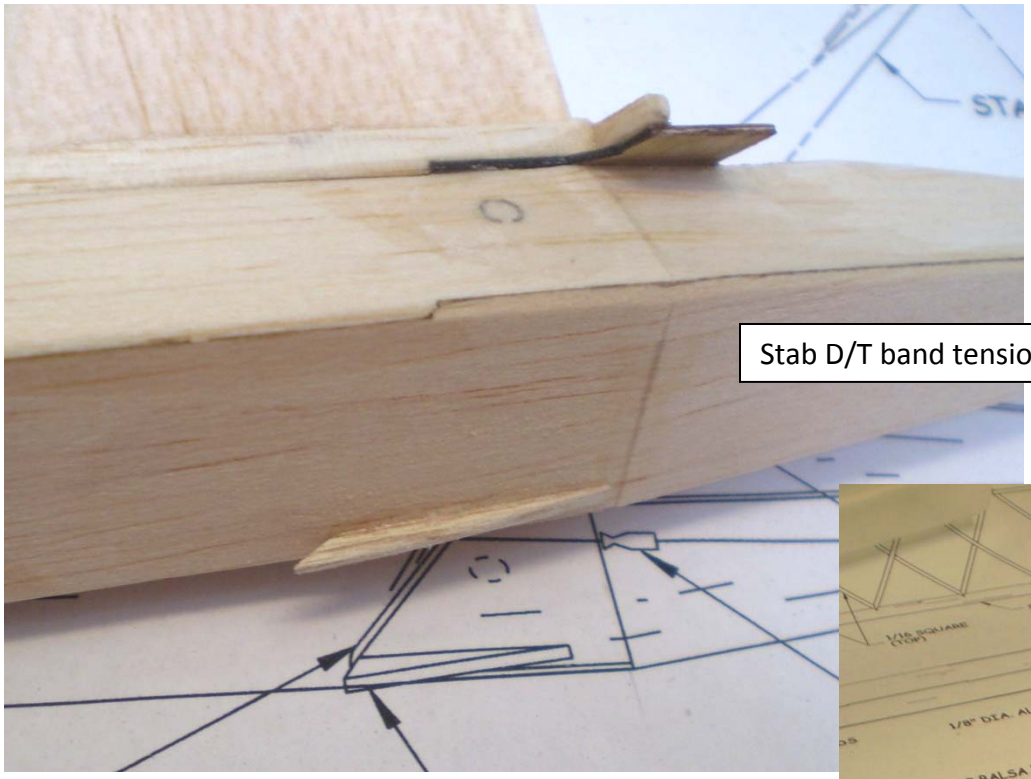


All four sides of the nose block assembly sanded flush to the fuselage sides.

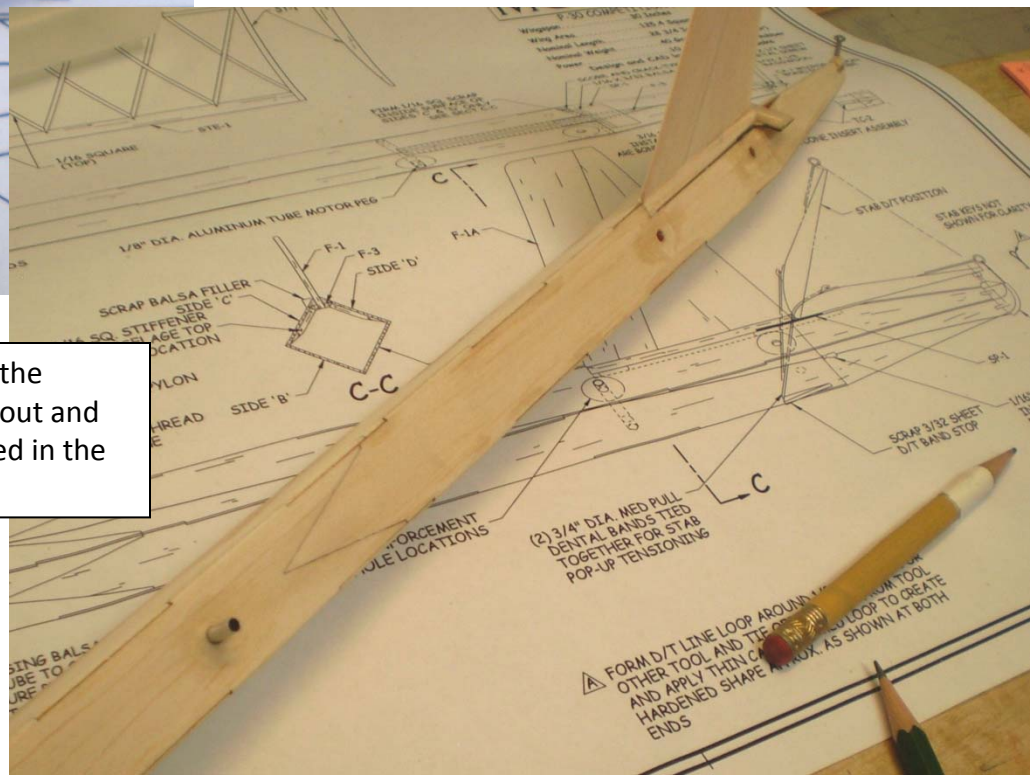


Finish shaped nose block assembly

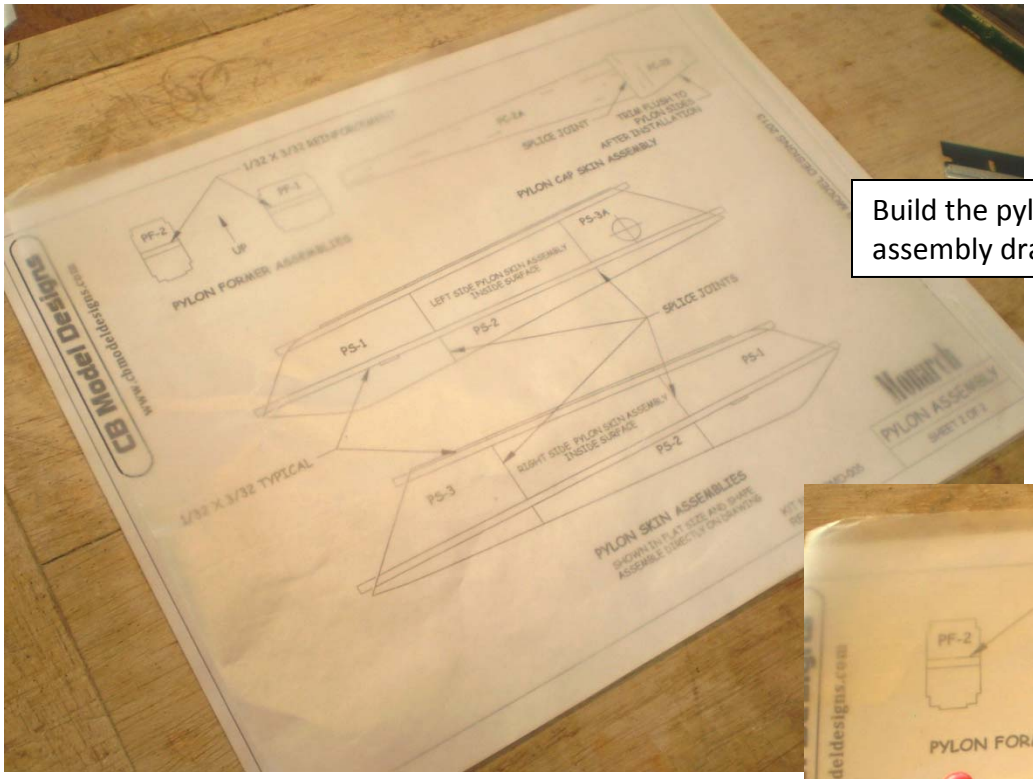
Retaining band features added



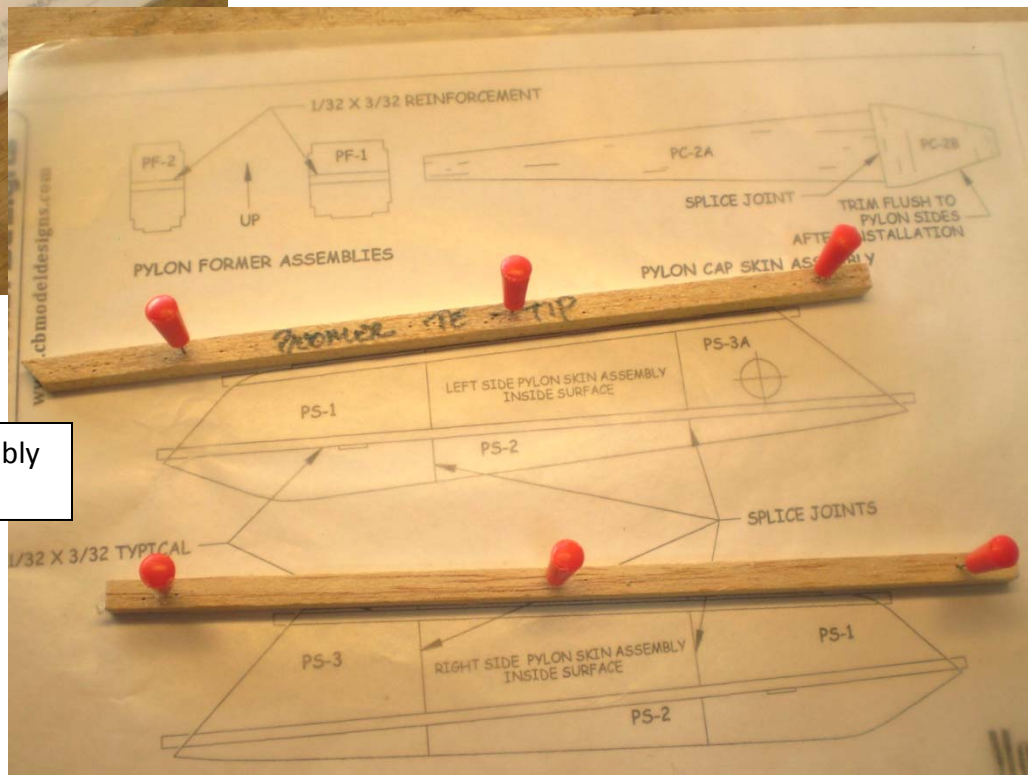
Stab D/T band tensioning barb installed



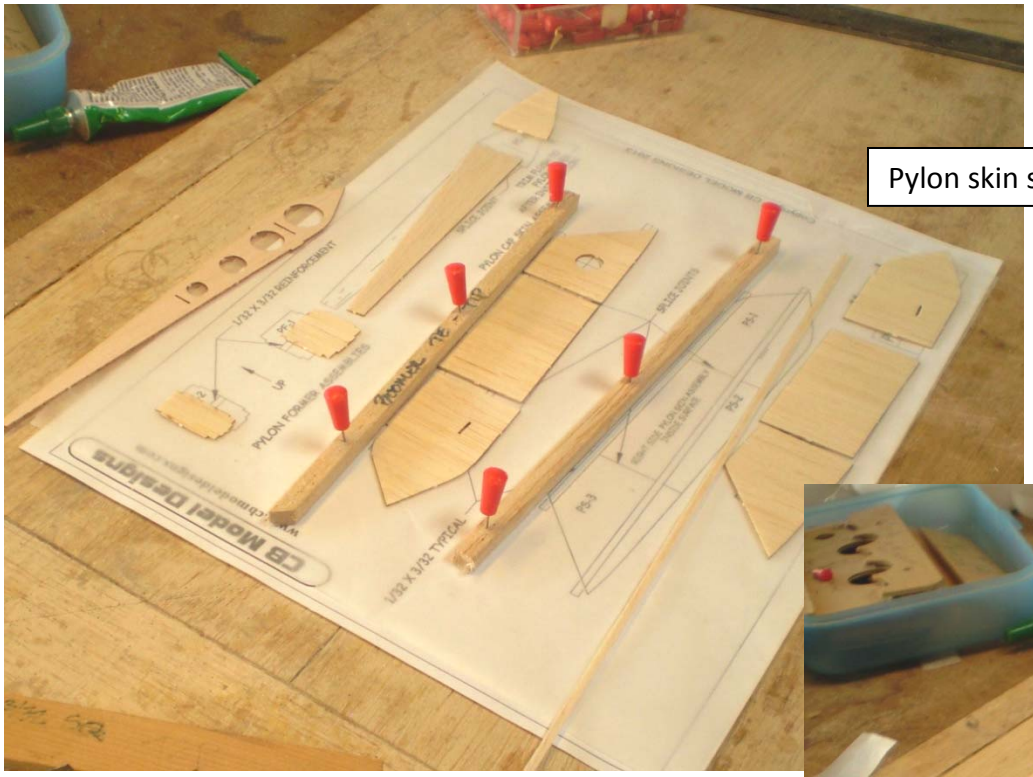
Silk span reinforcement dots added at the motor peg location, the holes cleaned out and ready for the motor peg-shown installed in the number one peg location.



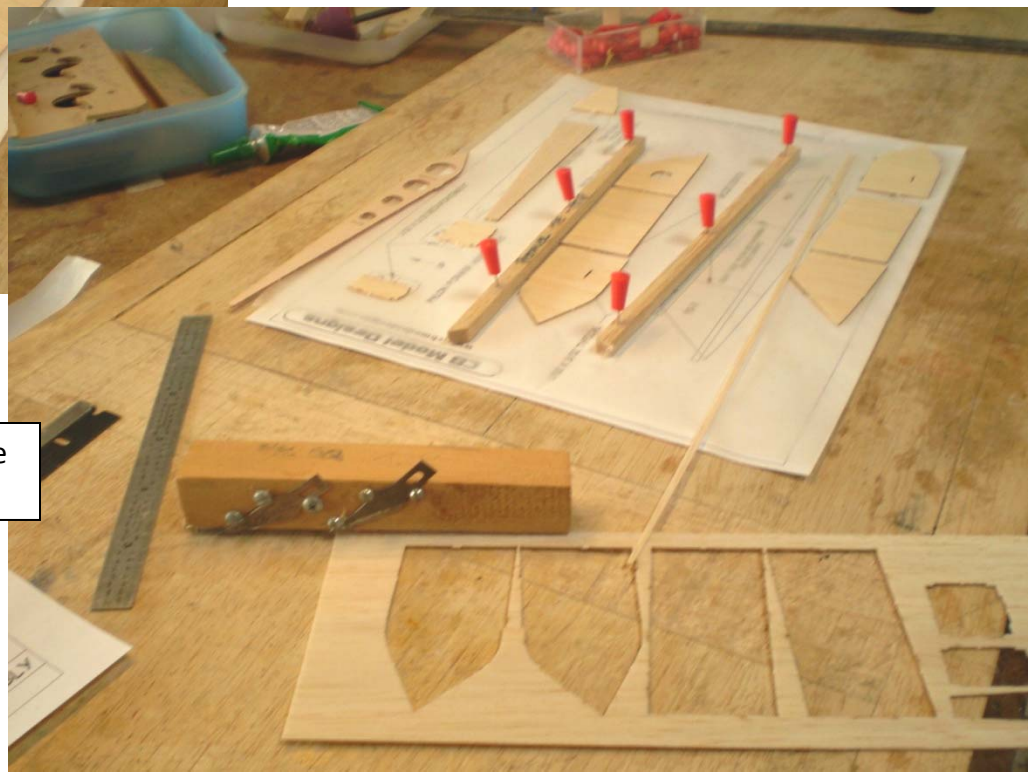
Build the pylon skins using sheet 2 of the pylon assembly drawing



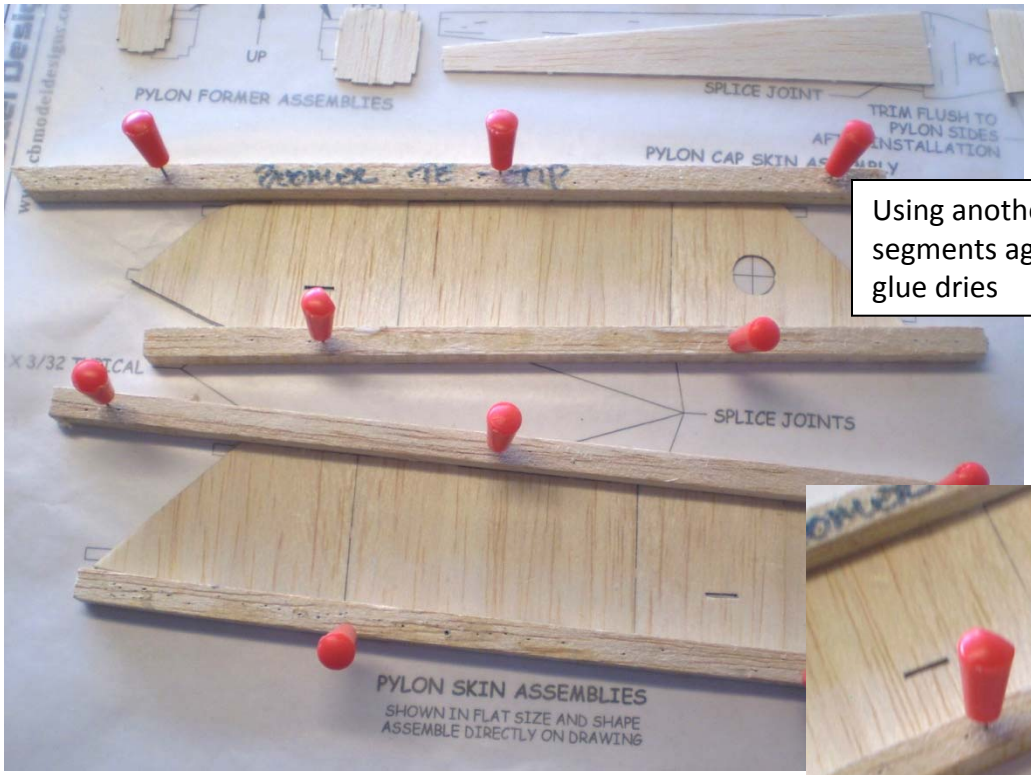
Control the top edge of each side skin assembly using scrap strip stock



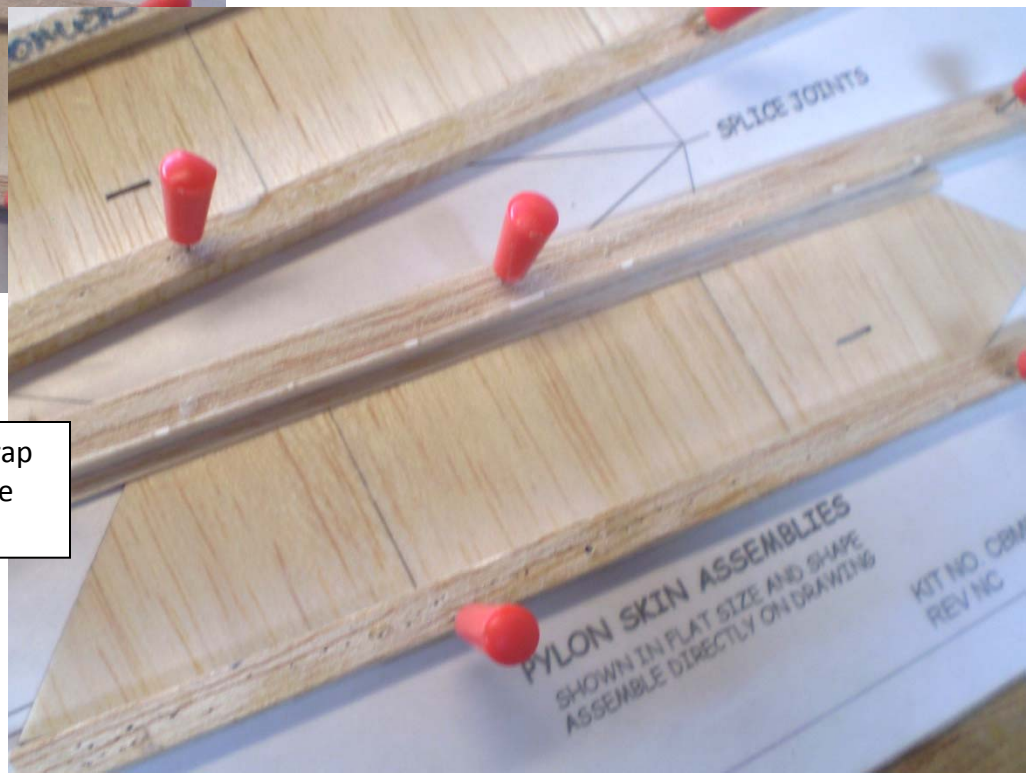
Pylon skin segments



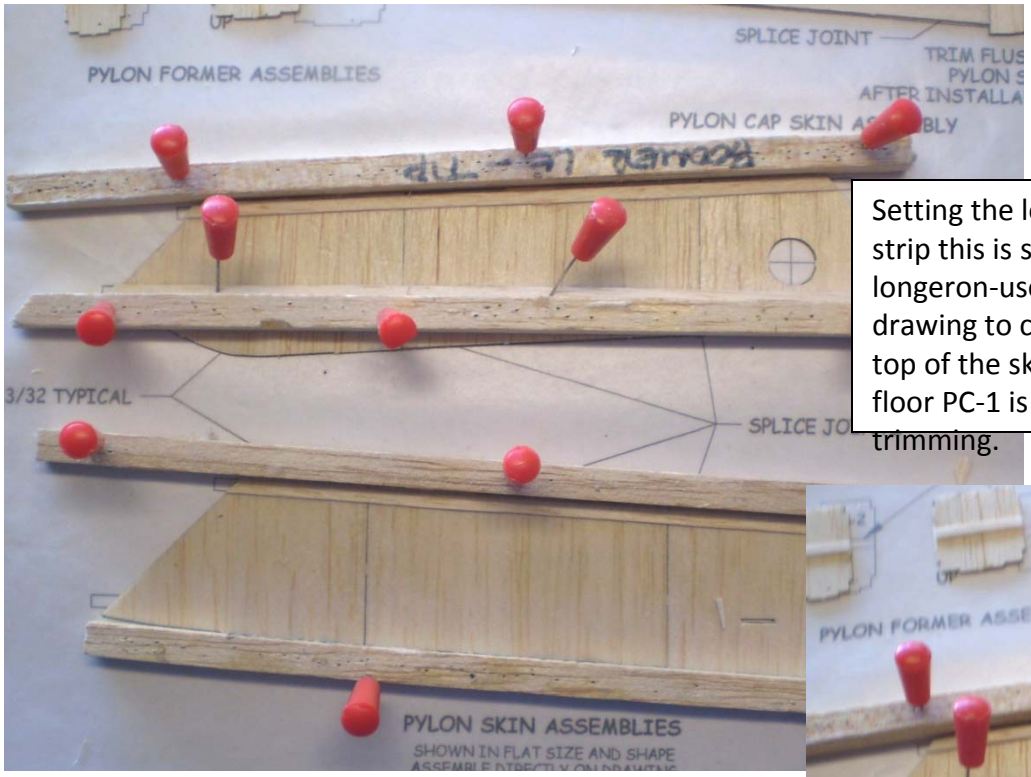
Cut 1/32 X 3/32 strips for longerons from the edges of the 1/32 part sheets



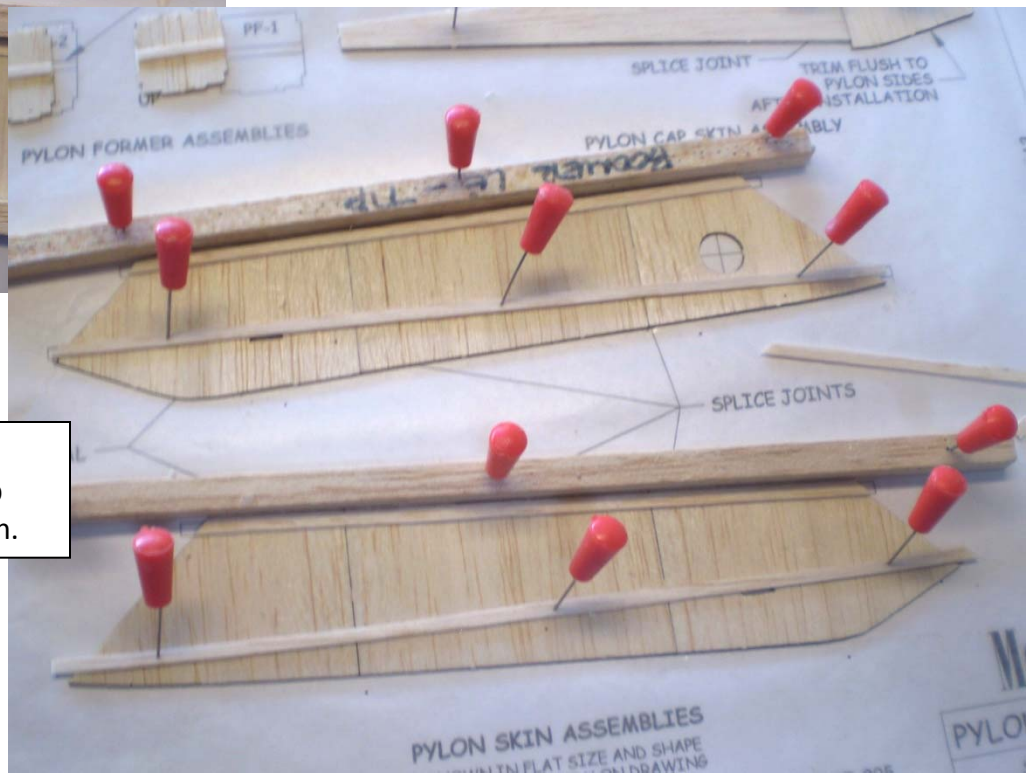
Using another scrap strip piece to push the skin segments against the upper stop as the splice glue dries



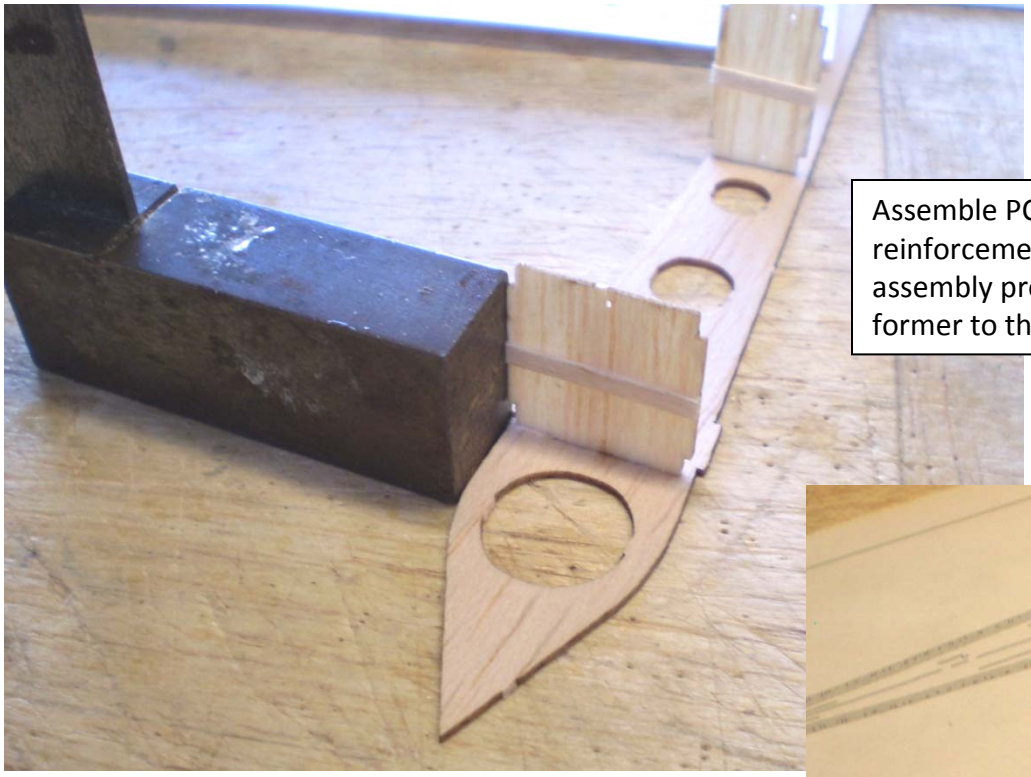
Setting the upper longeron location using scrap 1/32 sheet to provide an offset shim from the upper skin edge stop.



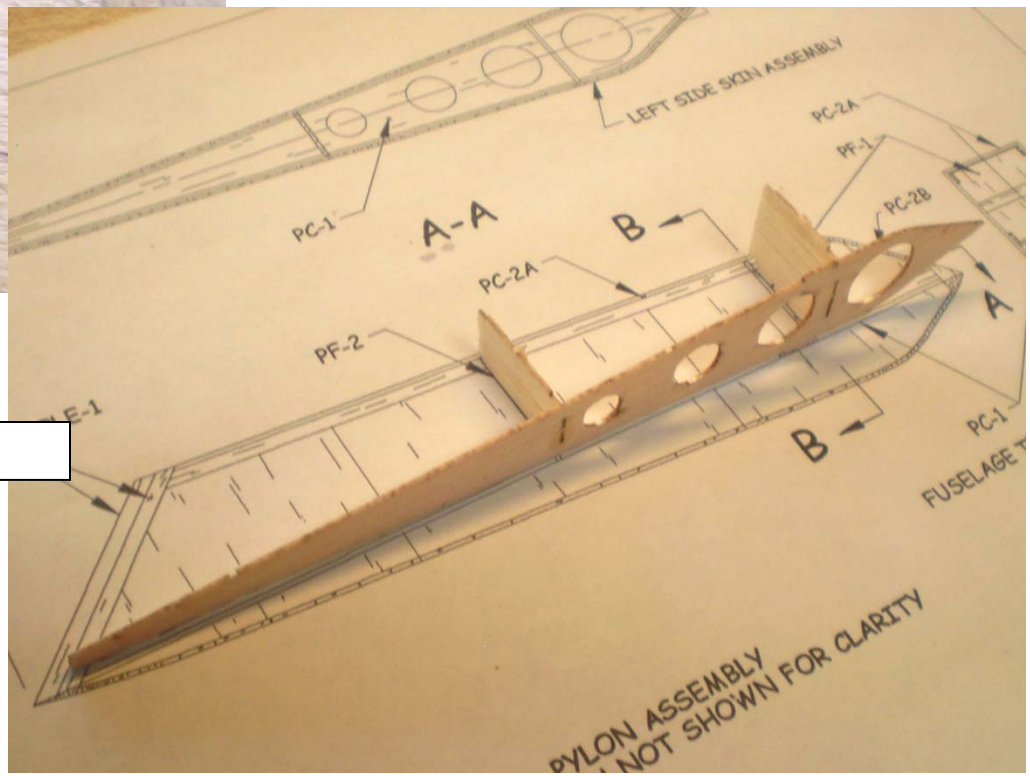
Setting the lower longeron using another scrap strip this is set to the lower edge of the longeron-use the projection lines on the drawing to control this. The angle between the top of the skins and the bottom of the pylon floor PC-1 is important to maintain for flight trimming.



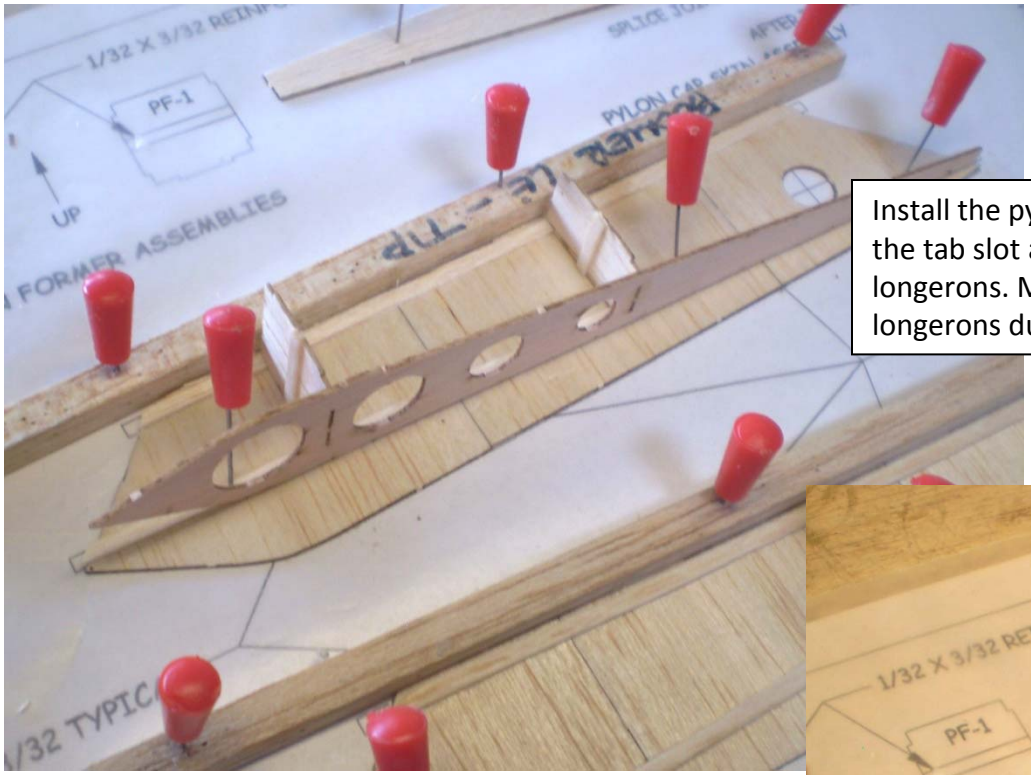
A view of the lower longerons with the edge stops removed. Note the top of the PC-1 tab slot is flush to the lower edge of the longeron.



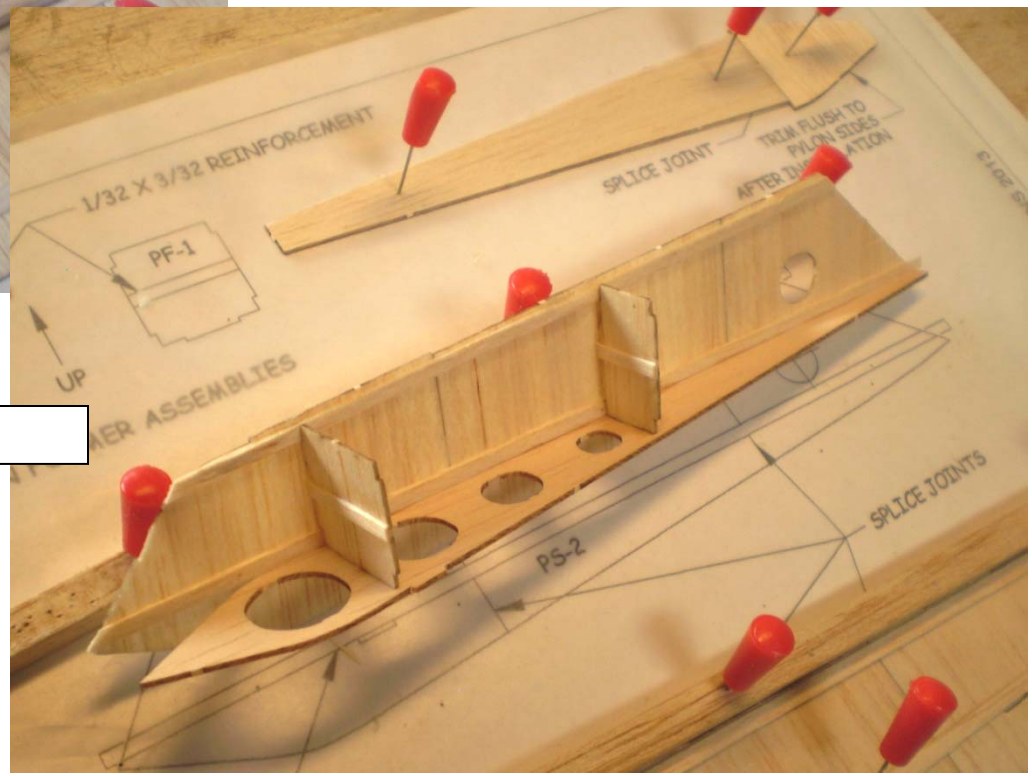
Assemble PC-1 with the two formers PF-1 & PF-2. Note reinforcement to keep these from collapsing under the assembly process. Use stop blocks to equalize the former to the sides of the PC-1 part profile.



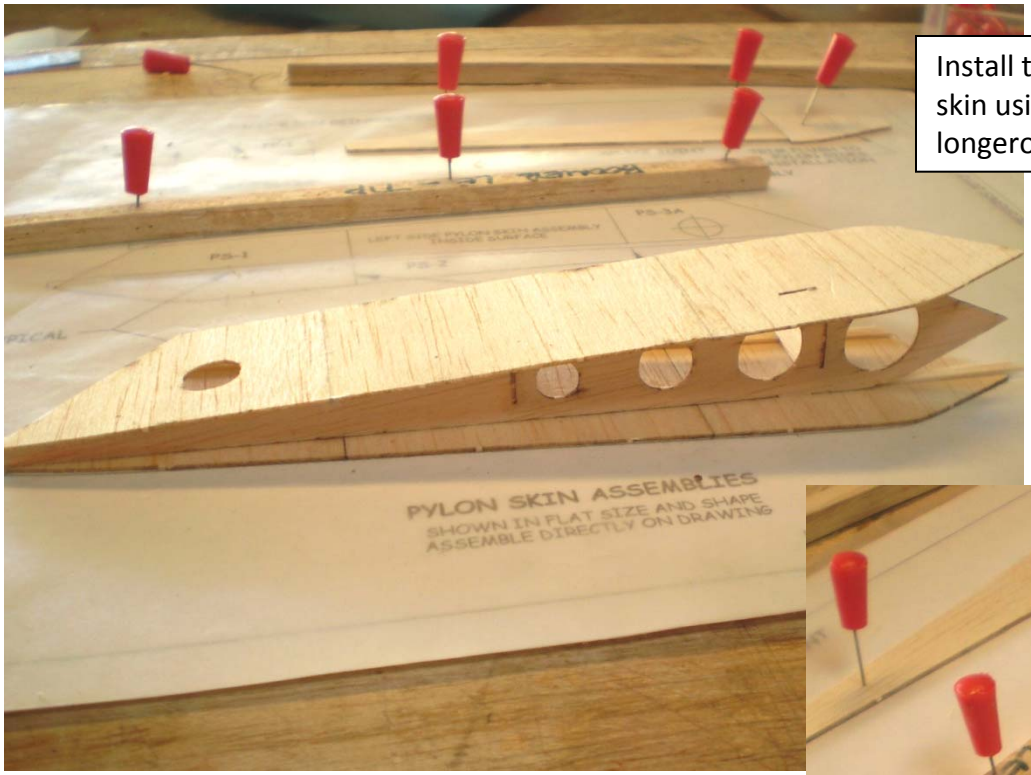
Another view of the pylon floor subassembly



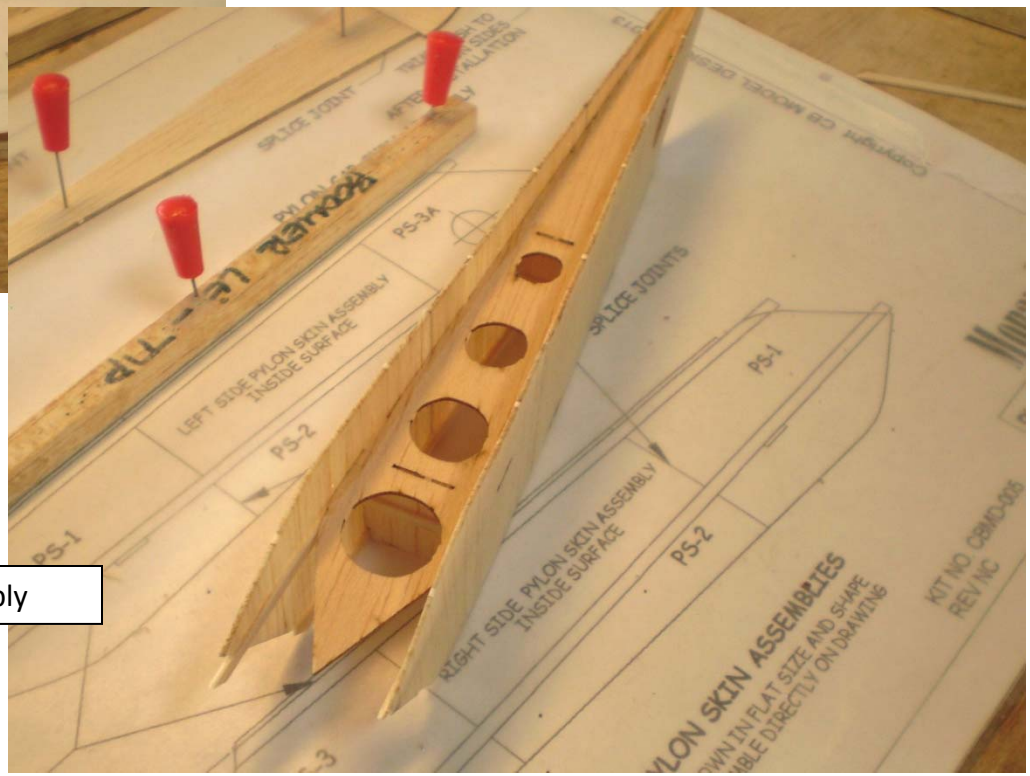
Install the pylon floor assembly by locating in the tab slot and against the bottom edges of the longerons. Make sure the formers clear the longerons during a pre-fit check.



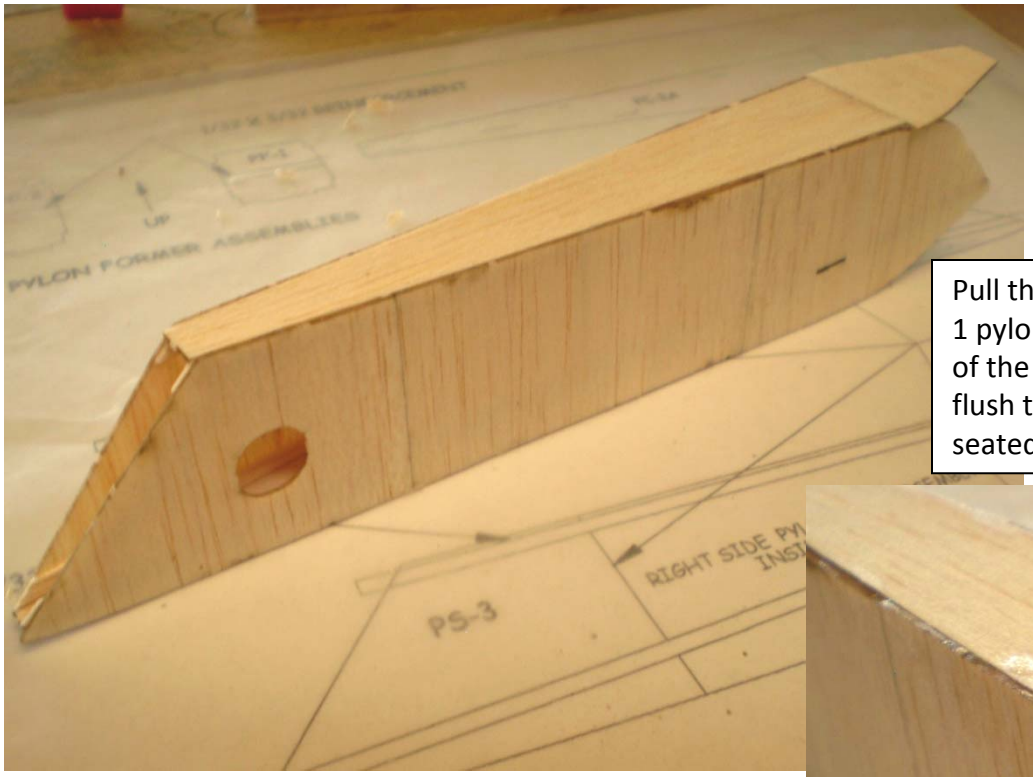
Partial pylon assembly



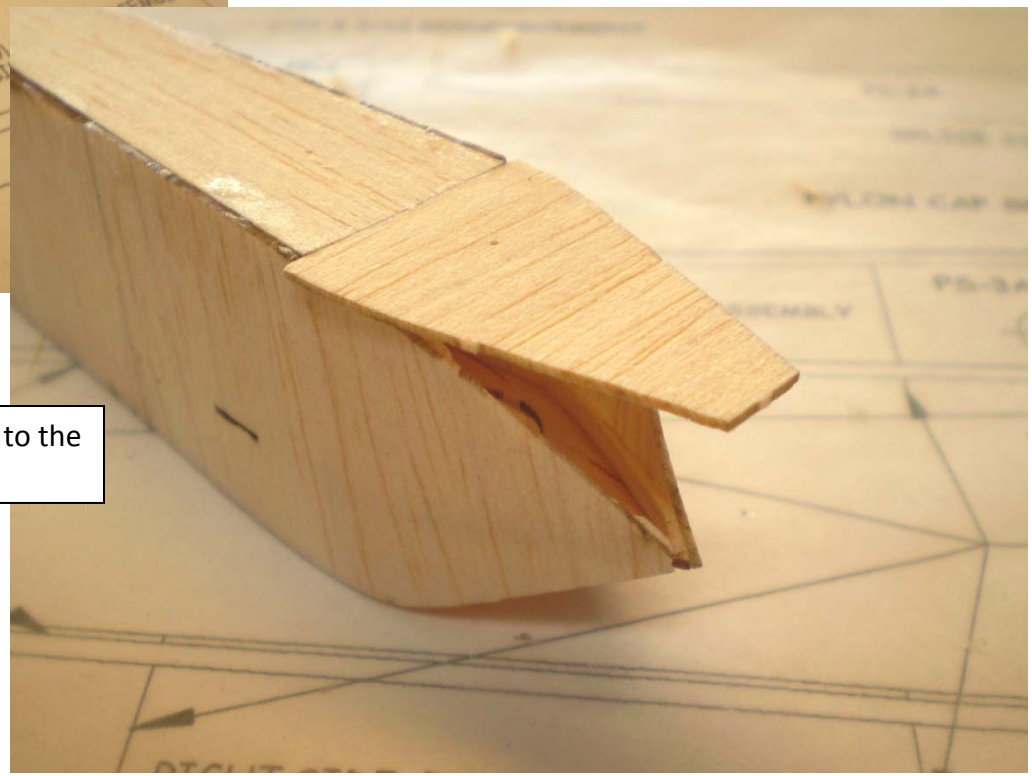
Install the partial assembly with the remaining skin using the tab slot and lower edge of the longeron to locate.



Basic pylon assembly

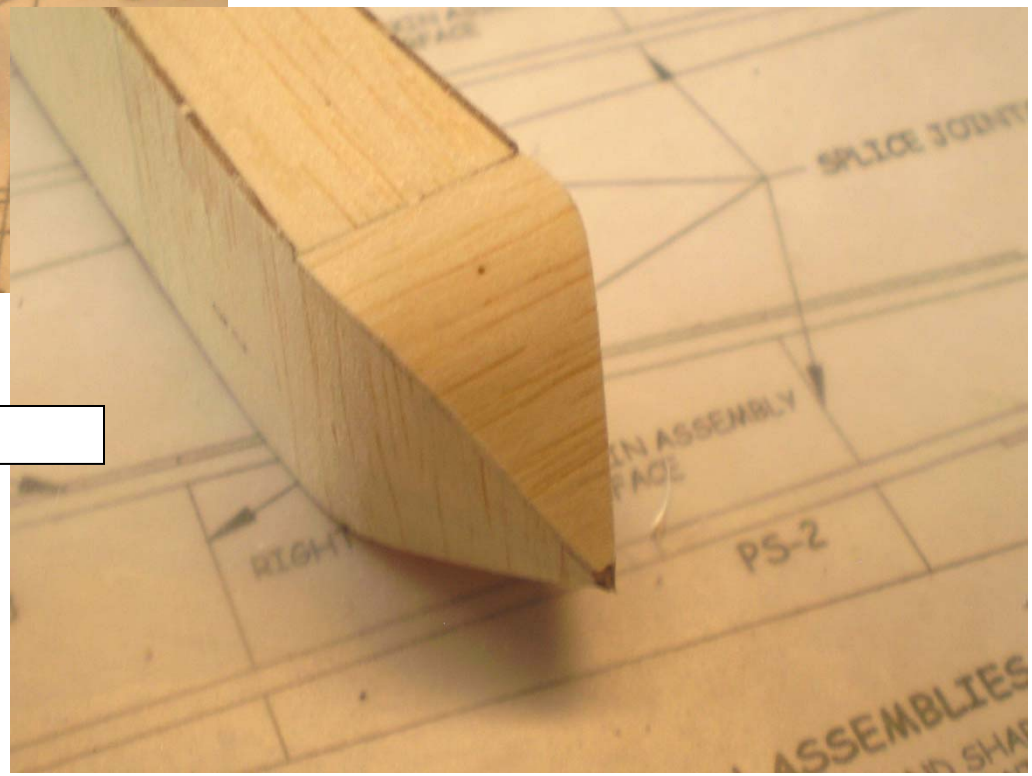


Pull the two pylon skins together against the PC-1 pylon floor to complete the plan form shape of the pylon. Install the PC-2 skin subassembly flush to the top edges of the pylon skin and seated against the top edges of the longerons.

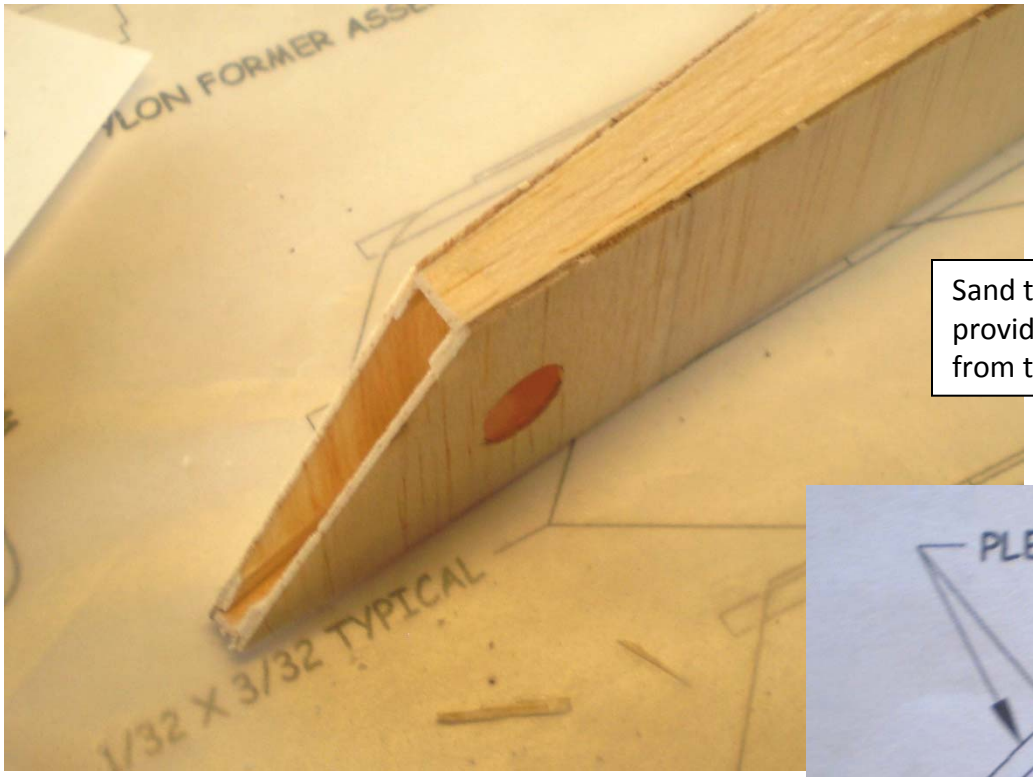


PC-2 subassembly locates forward and aft to the stepped edges in the pylon skins.

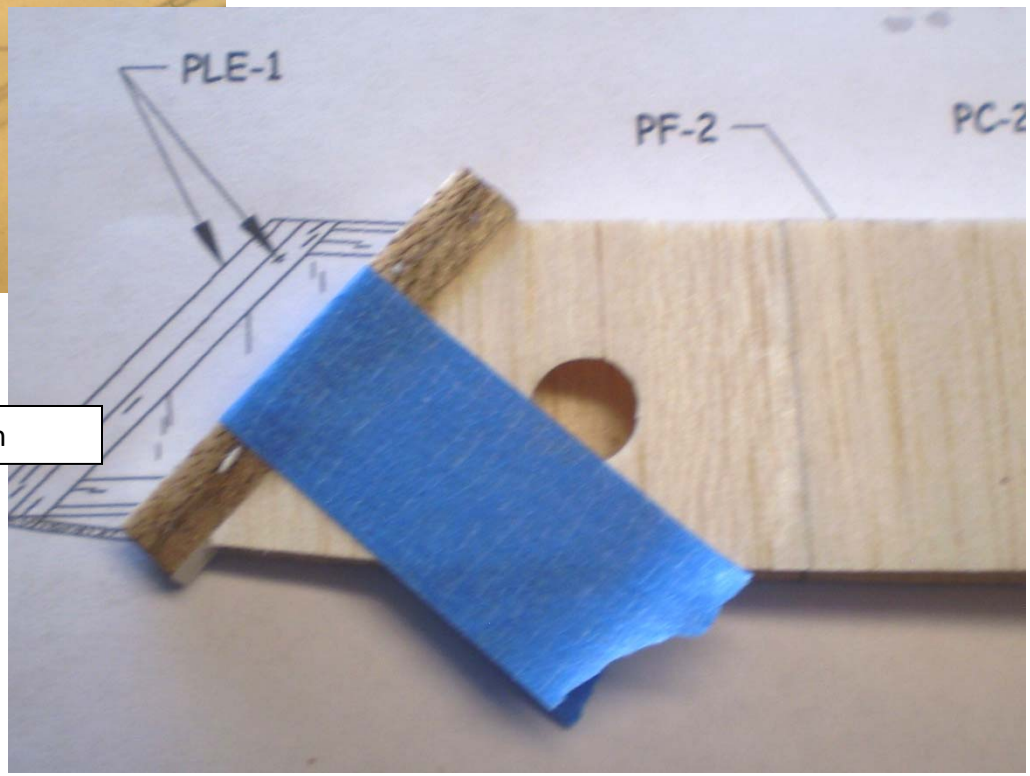
Close out the pylon top by wrapping the PC-2B skin down against the pylon skin edges and bond in place



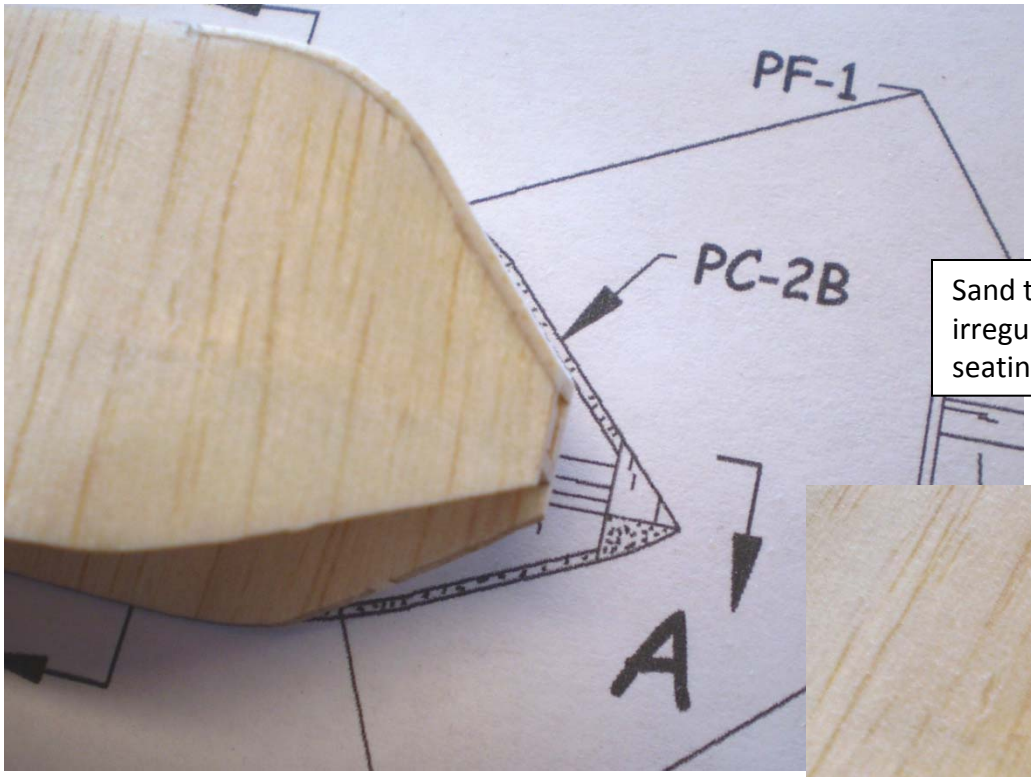
Trim off the excess material on PC-2B skin



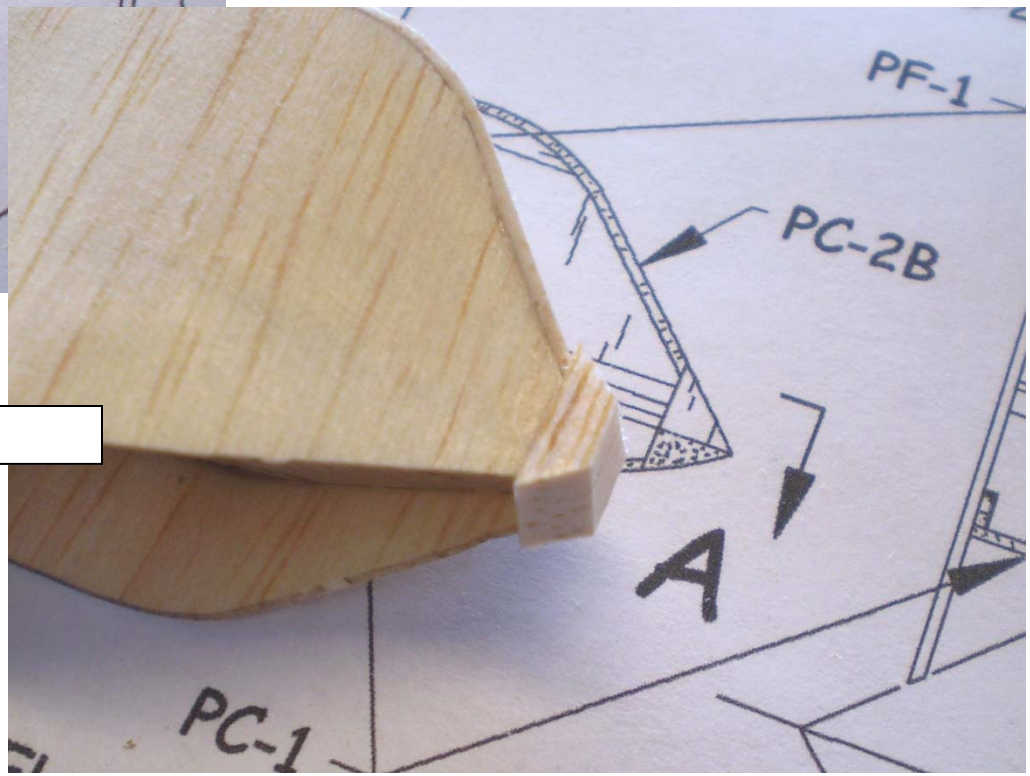
Sand the front end of the pylon assembly to provide seating for the filler assembly made from the two PLE-1 parts.



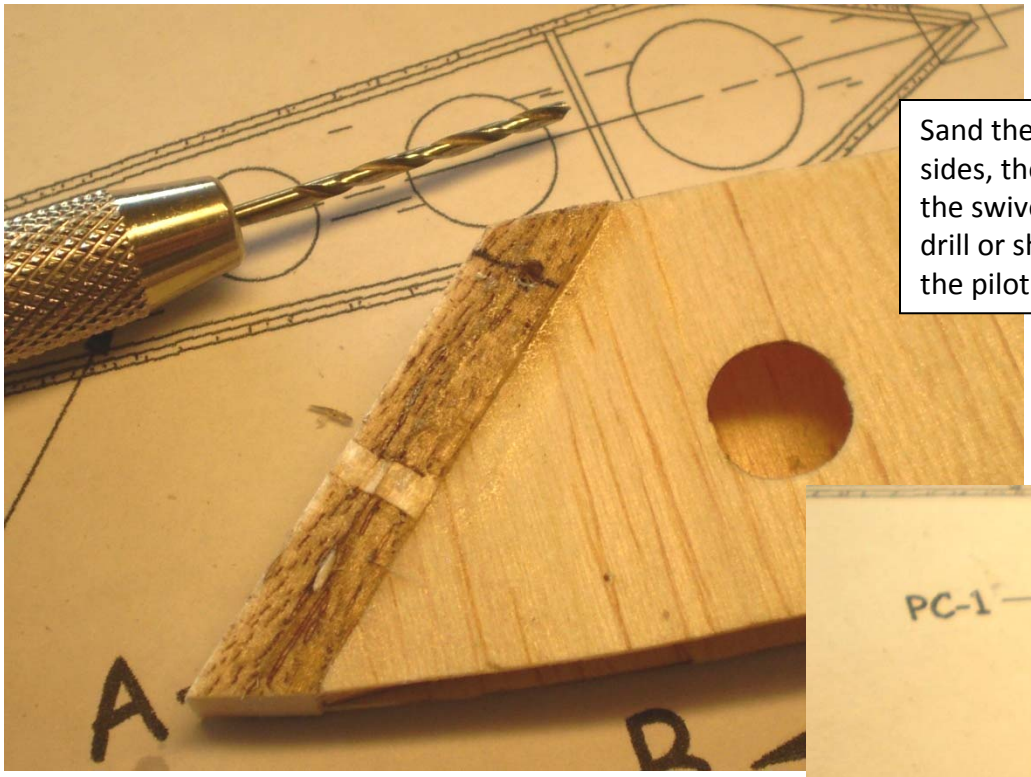
Position and bond the leading edge filler in place



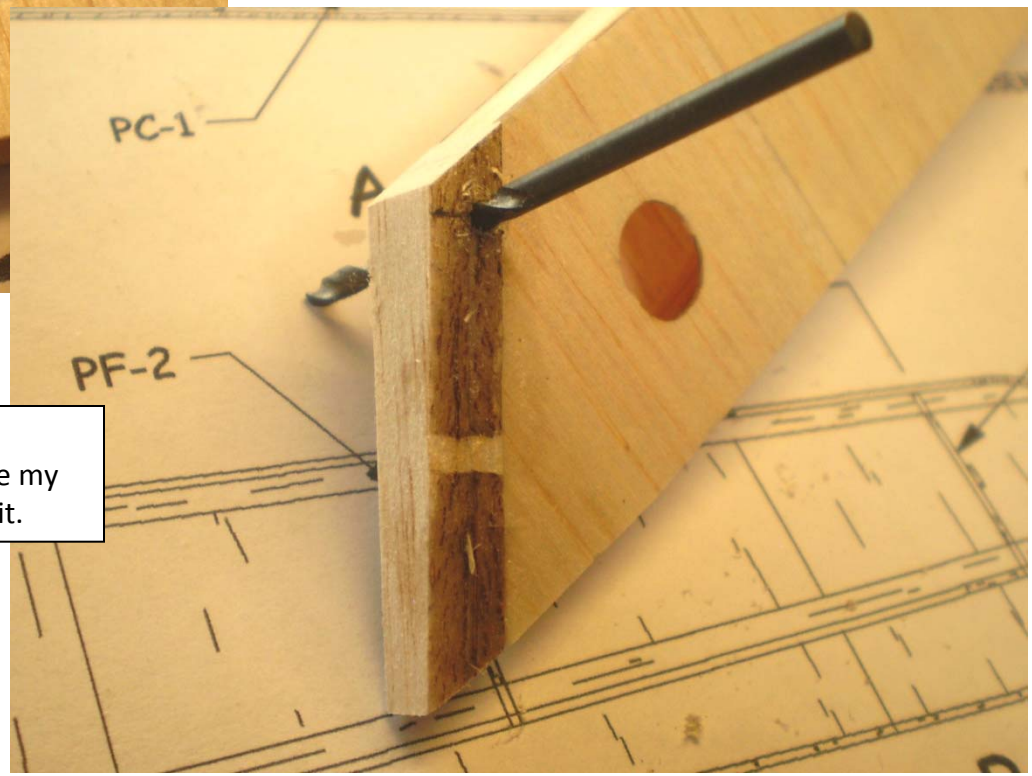
Sand the aft end of the pylon to remove any irregular termination of the skins to allow seating of a scrap balsa filler.



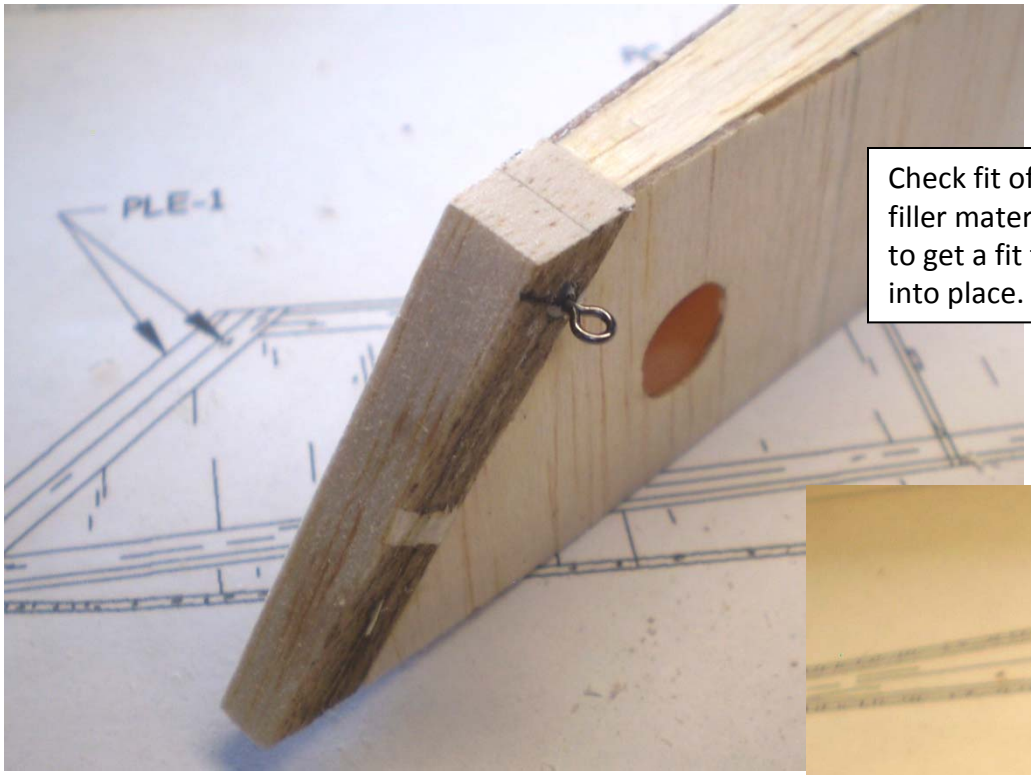
Position and bond the filler in place



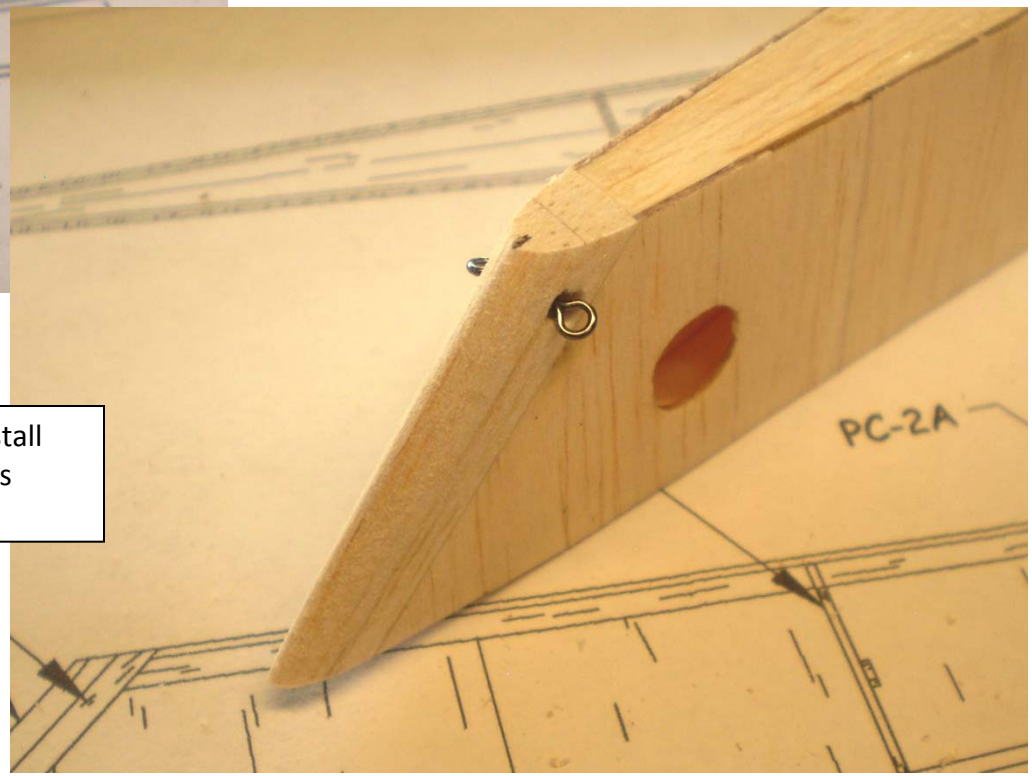
Sand the leading edge filler flush to the pylon sides, then measure and drill the location for the swivel fairlead. I start with a 1/16” diameter drill or sharpened 1/16” diameter wire to auger the pilot hole at this location.



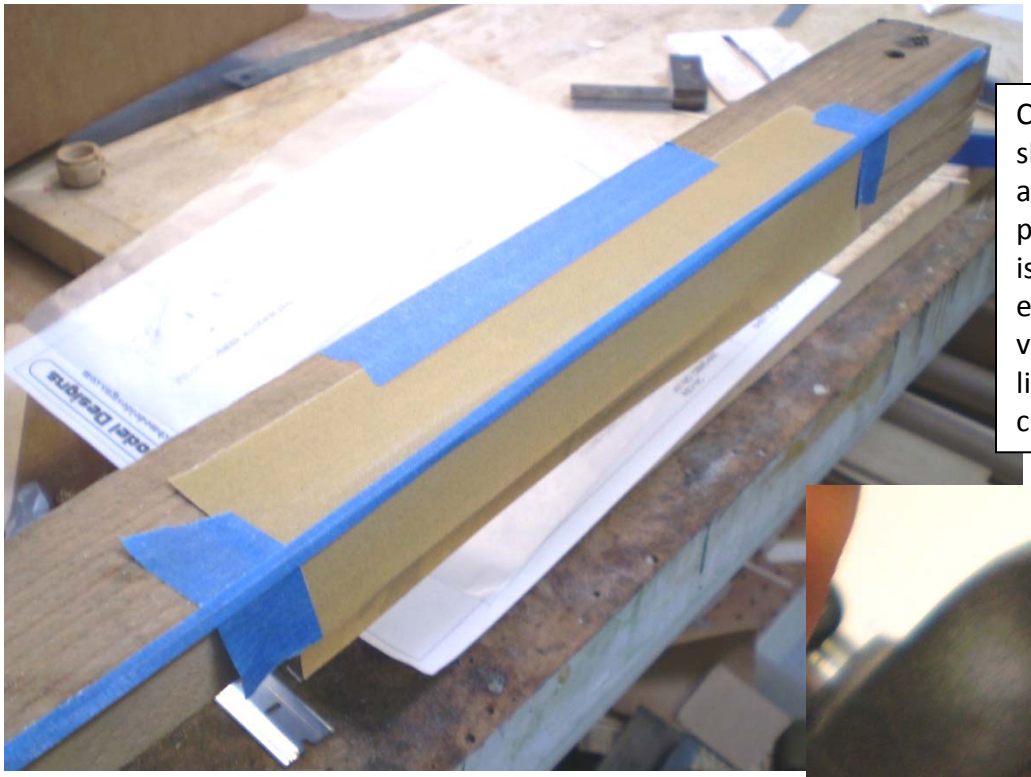
Open up the pilot hole with a 3/32” (.093) diameter drill or sharpened wire. I just use my fingertips to ream the hole with the drill bit.



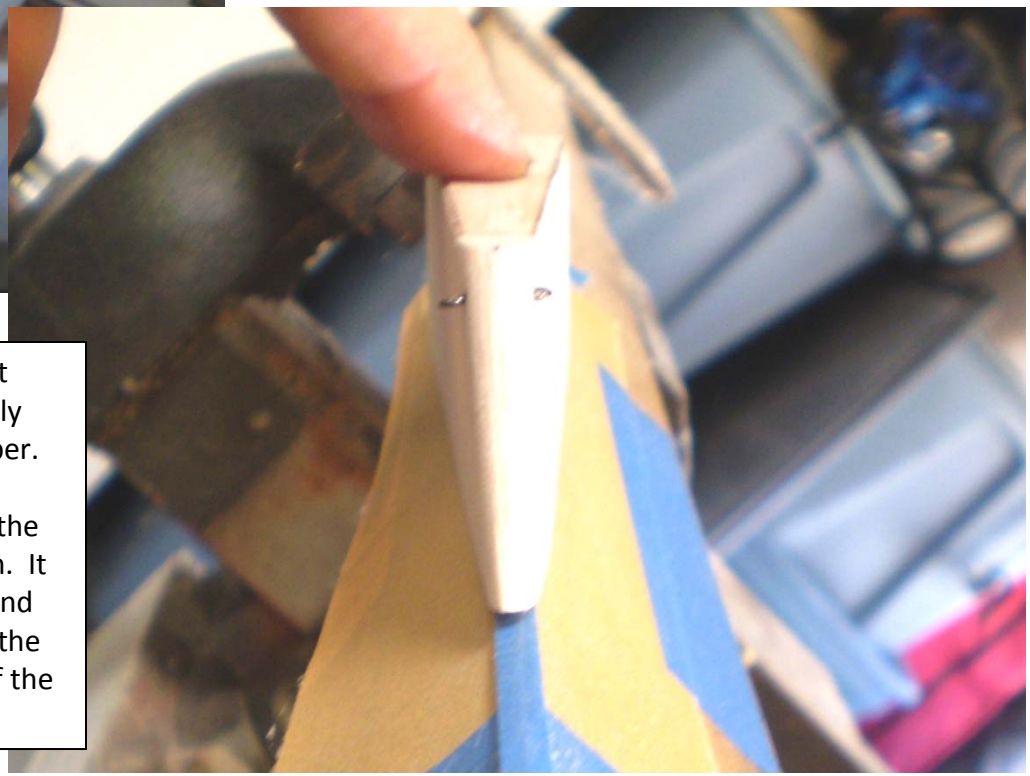
Check fit of swivel fairlead into the hole. Hard filler material may require additional hole sizing to get a fit that allows the swivel to be pushed into place.



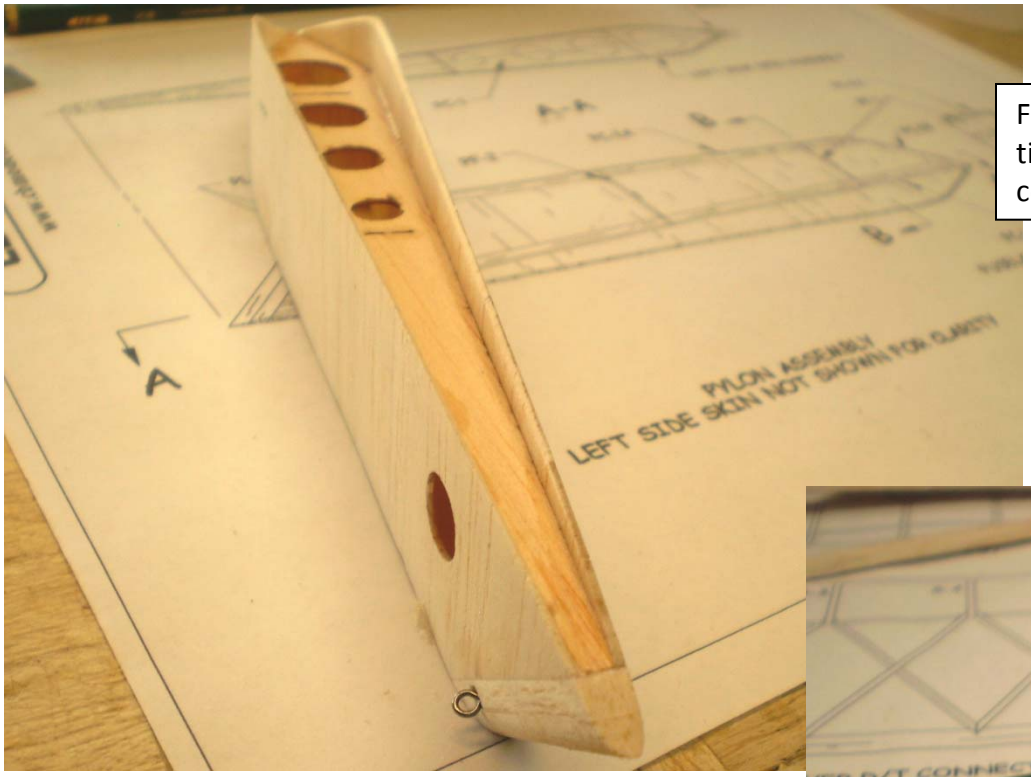
After shaping the leading edge you can install the swivel fairlead or wait until the pylon is sealed with dope and sanded.



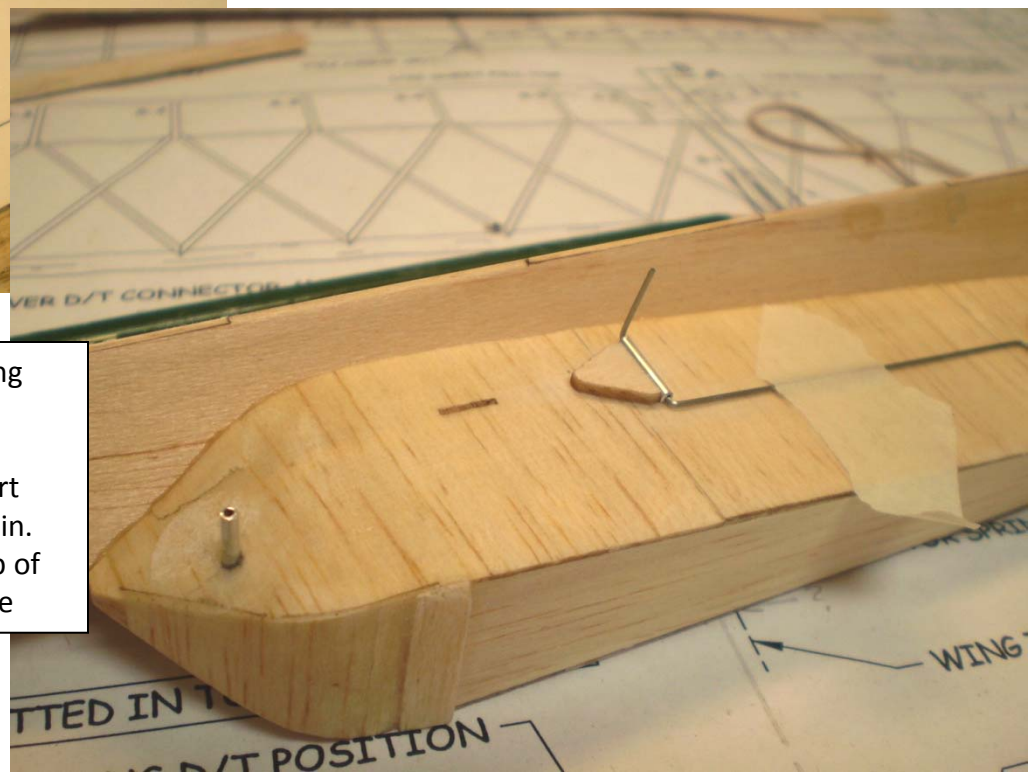
Create a sanding bar to set the pylon lower edge skin chamfers to match the fuselage box. I used a protective strip at the corner on this one to protect the pylon floor from damage but this isn't really desirable. You want to sand the skin edges on the sanding bar corner until there is visible scoring on the pylon floor, indicating the limit of the sanding process and ensuring the correct incidence in the pylon.



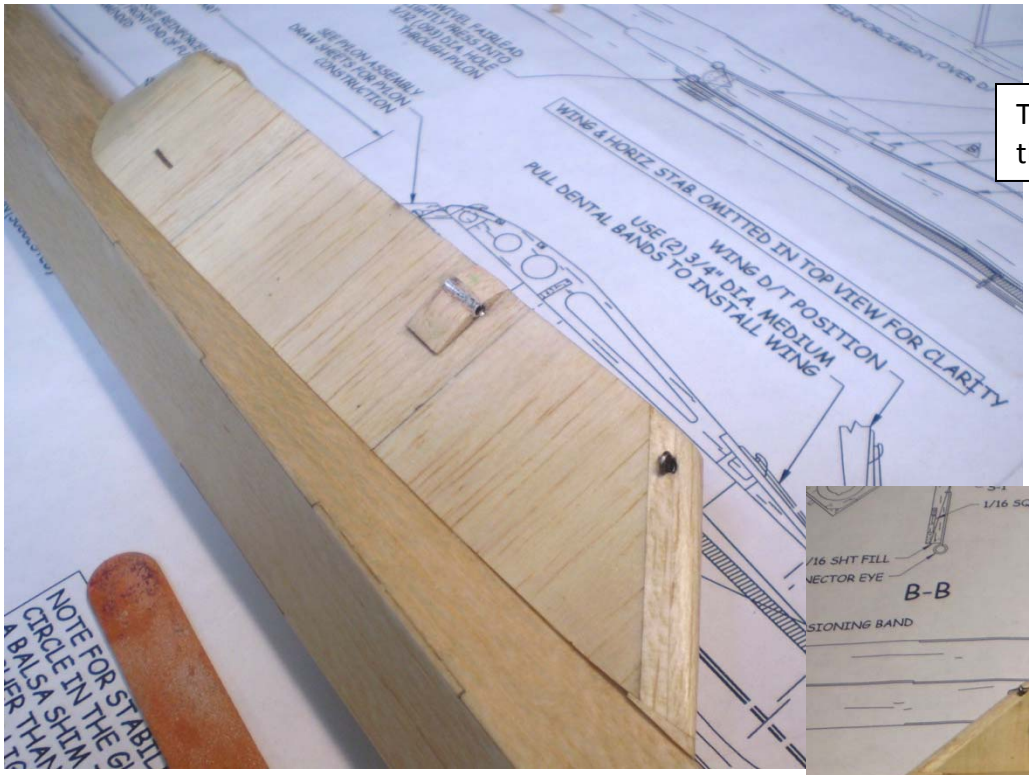
Hold the pylon assembly approximately as it would be installed on the fuselage and lightly draw it forward and aft against the sandpaper. The thin material sands quickly on the skin edges-the main effort goes toward making the fillers at the leading and trailing edge match. It only takes a few minutes for this-use light and slow movement, concentrating on keeping the center of the pylon centered on the edge of the sanding bar.



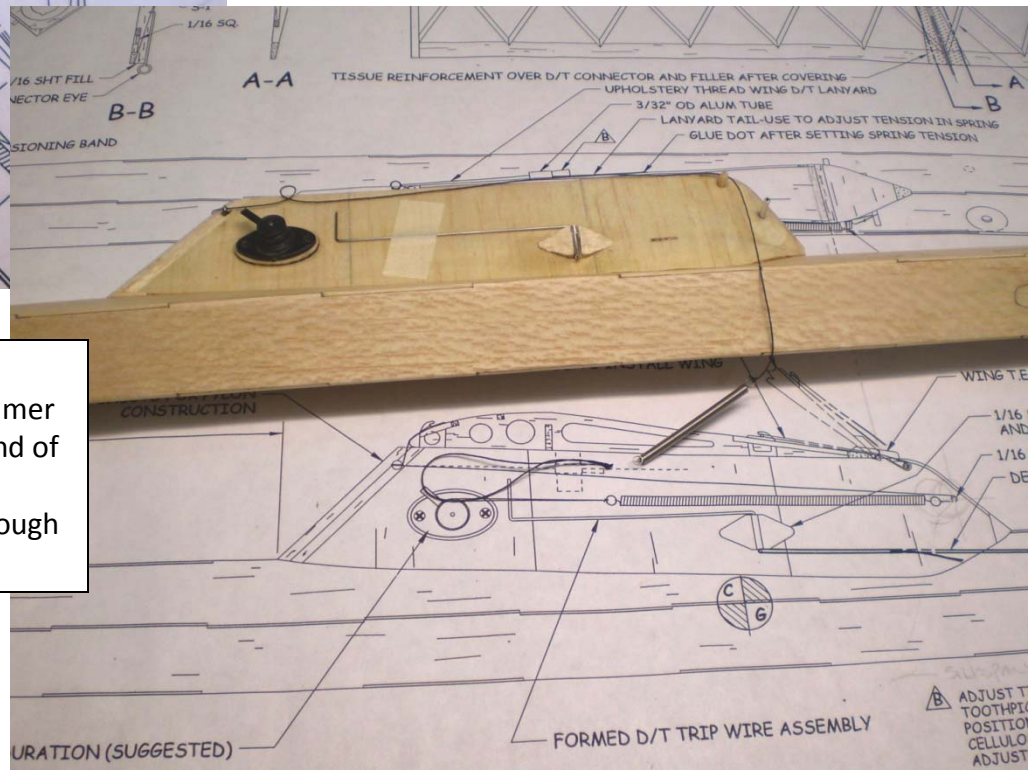
Finish sanded pylon ready for installation of the timer mounting plate and the D/T system components.



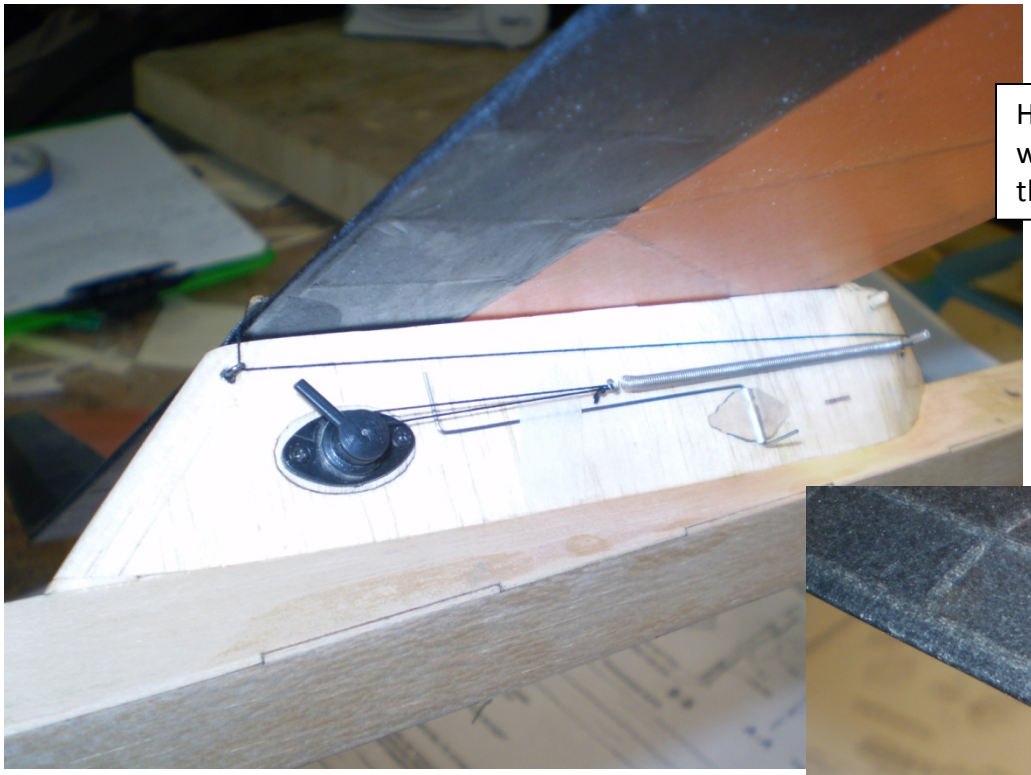
The D/T trip wire assembly and fairings being installed. The D/T line turn around post is already in place. Note the silkspan reinforcement dot at this location to support the very thin material this tube is mounted in. Note also the wing trailing edge stop on top of the pylon. Wing dowel holes still need to be added.



This is the timer lanyard 'bung tube' installed on the opposite side of the pylon, with fairings.

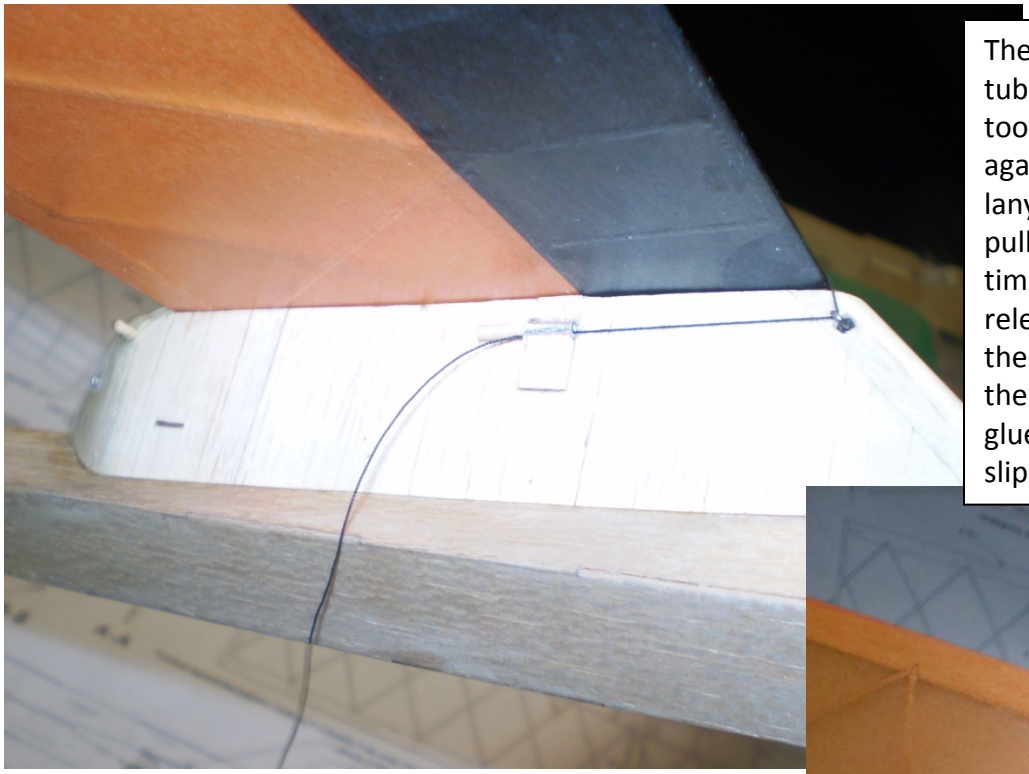


The Button Classic viscous timer is installed against the plywood mounting plate. The timer lanyard and spring are shown. The other end of this is anchored in the bung tube on the opposite side of the pylon after passing through the swivel fairlead.

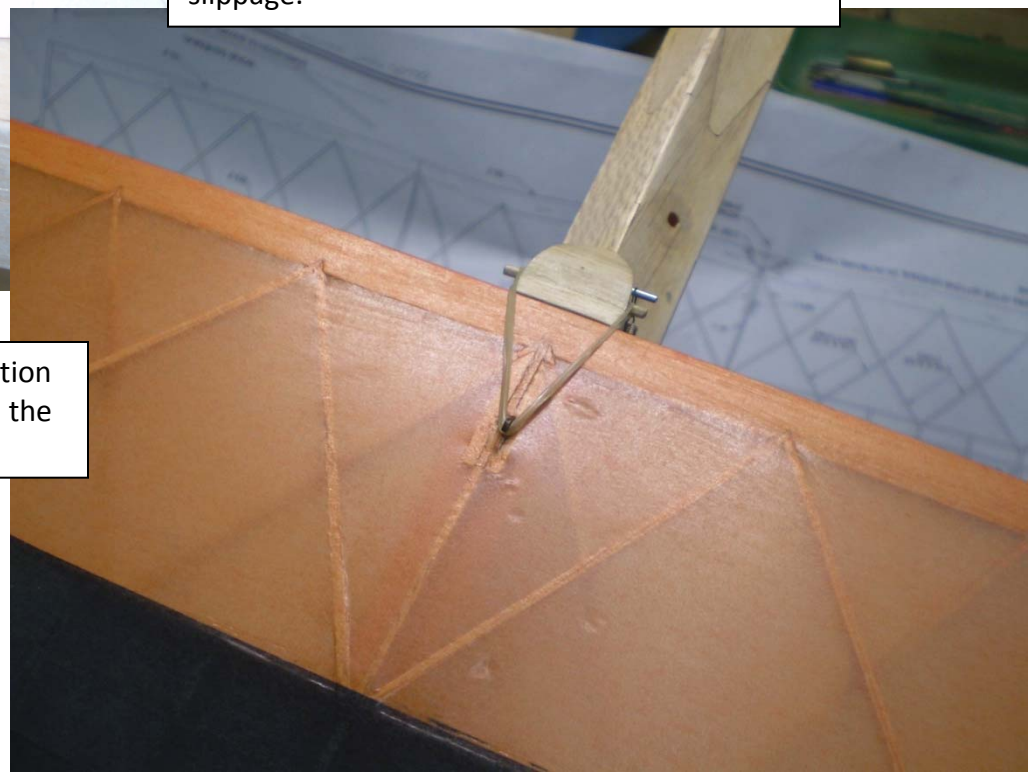


Here is one of the prototypes (T-1) with the wing pop-up D/T installed and tensioned using the timer barrel to anchor the lanyard.

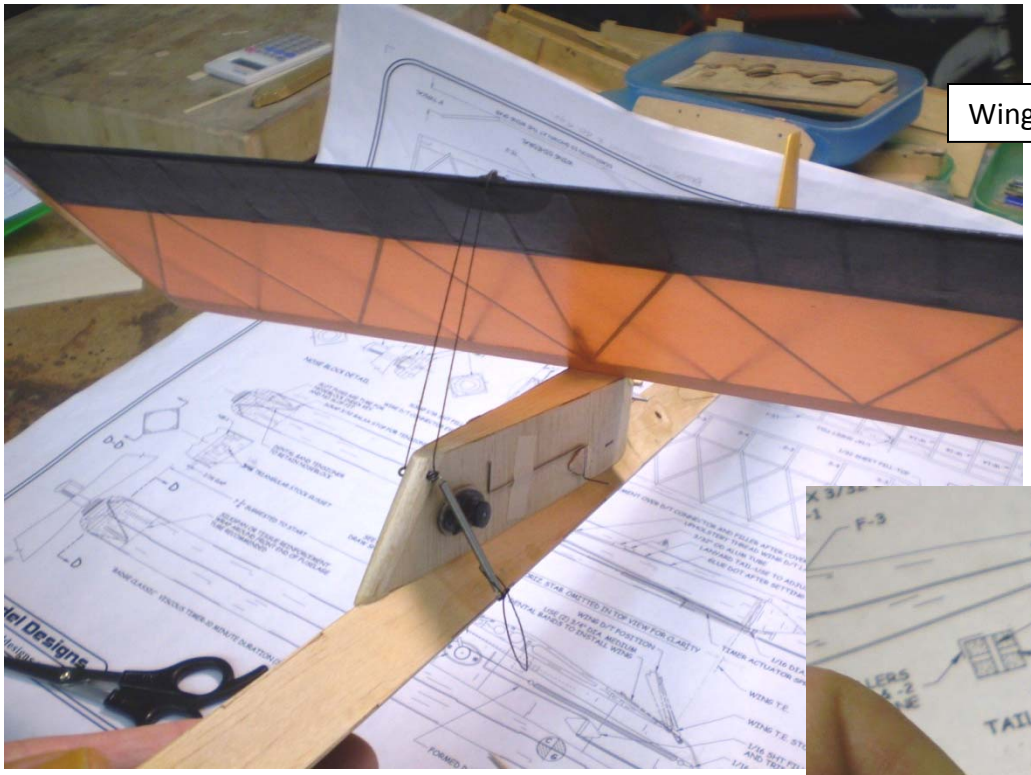
A close-up of the wing D/T lanyard passed through the swivel fairlead and wing D/T hook. This tension is what holds the front end of the wing against the pylon. The stability of the wing seating is improved by adding the wing keys shown on the wing drawing, trapping it to the pylon sides.



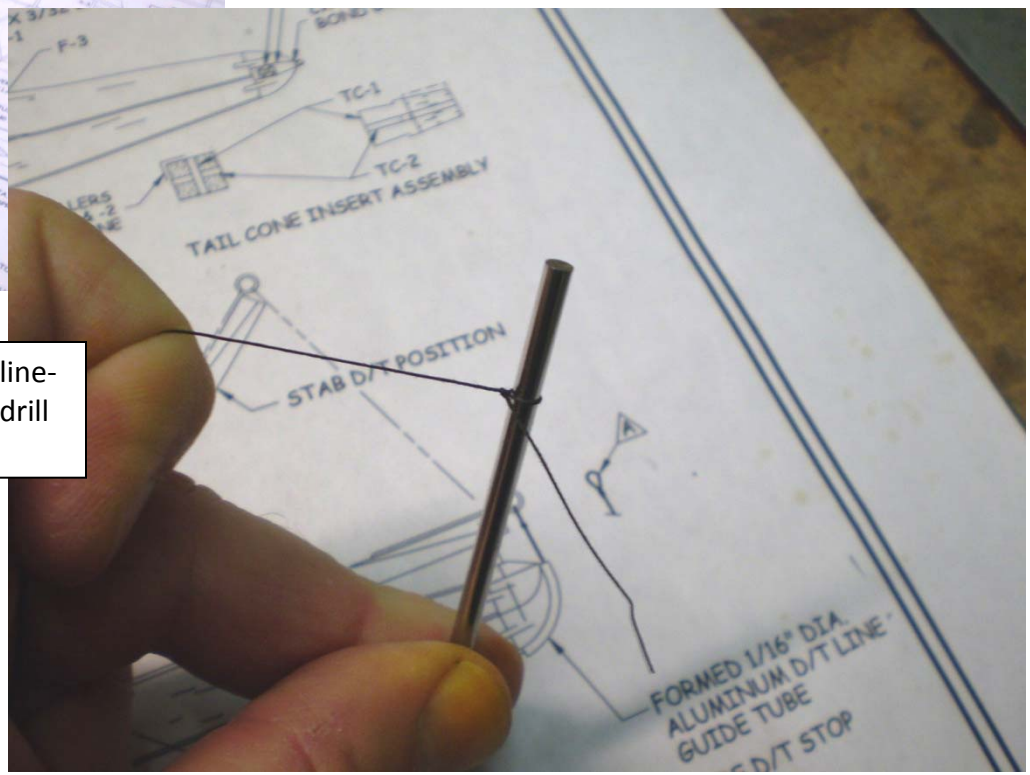
The wing D/T lanyard is anchored into the bung tube by pinching it with the tapered end of a toothpick cut off and inserted into the tube and against the thread. Leave some tail on the lanyard to adjust the timer speed by either pulling aft or letting it slip forward until the timer release speed is just barely enough to release the lanyard. Then trim off all but 1 ½" of the tail and secure with a tiny glue dot against the side of the pylon. Also use some cellulose glue to adhere the toothpick plug and line from slippage.



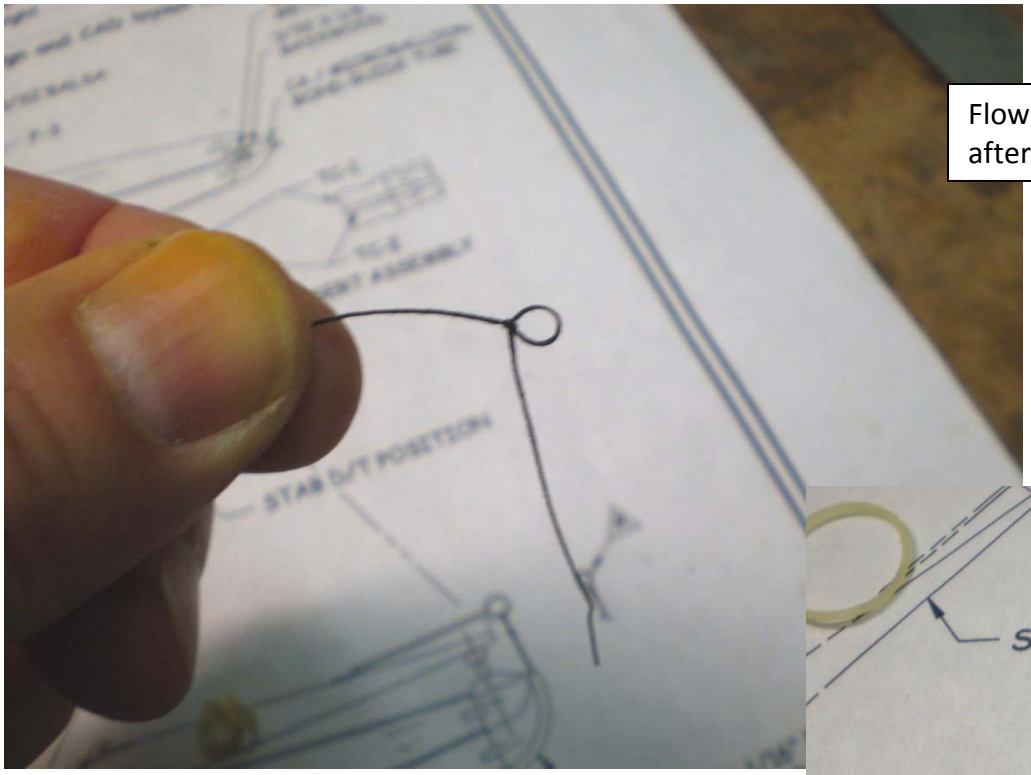
The rear wing hook and wing dowel installation in use. I have not added the little fairing on the wing against the rear stop yet.



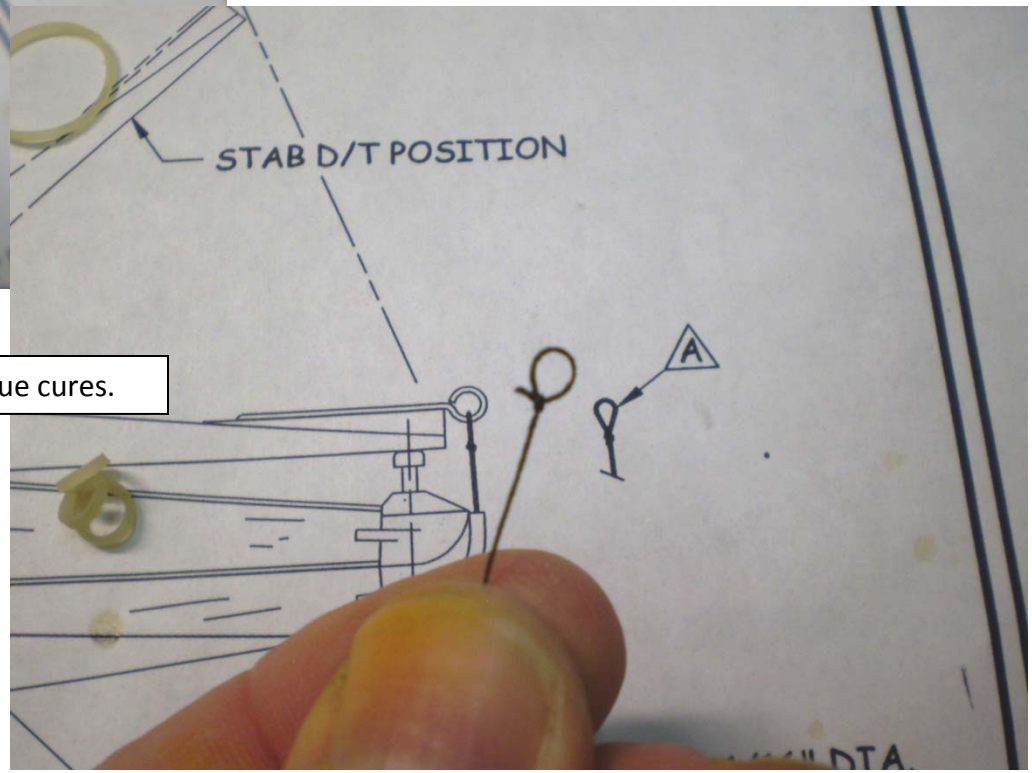
Wing in D/T position



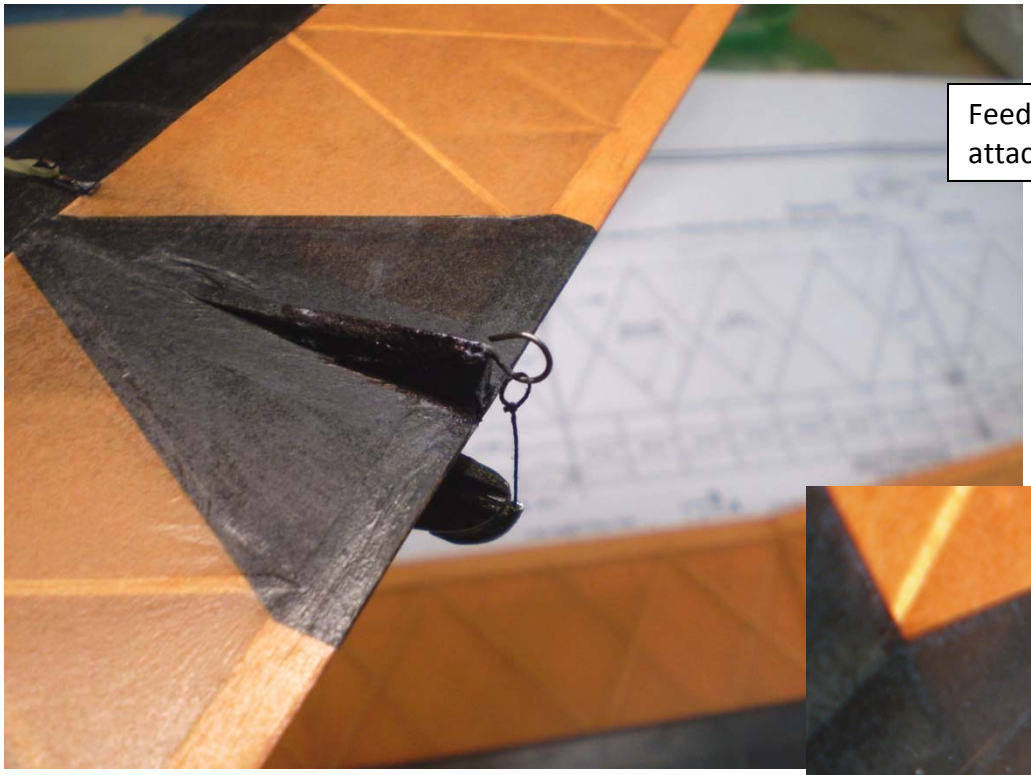
Making the hardened loop for the stab D/T line- tie it around a piece of 1/8" diameter wire, drill bit, etc.



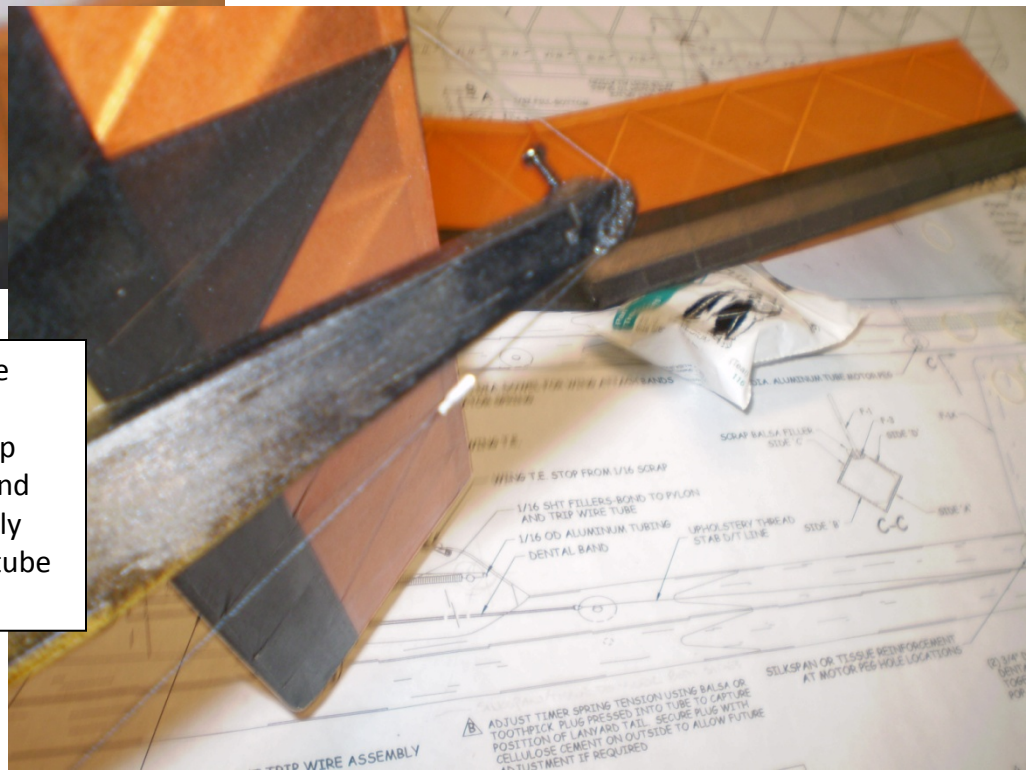
Flow some thin CA onto this loop and the knot after slipping off the forming mandrel.



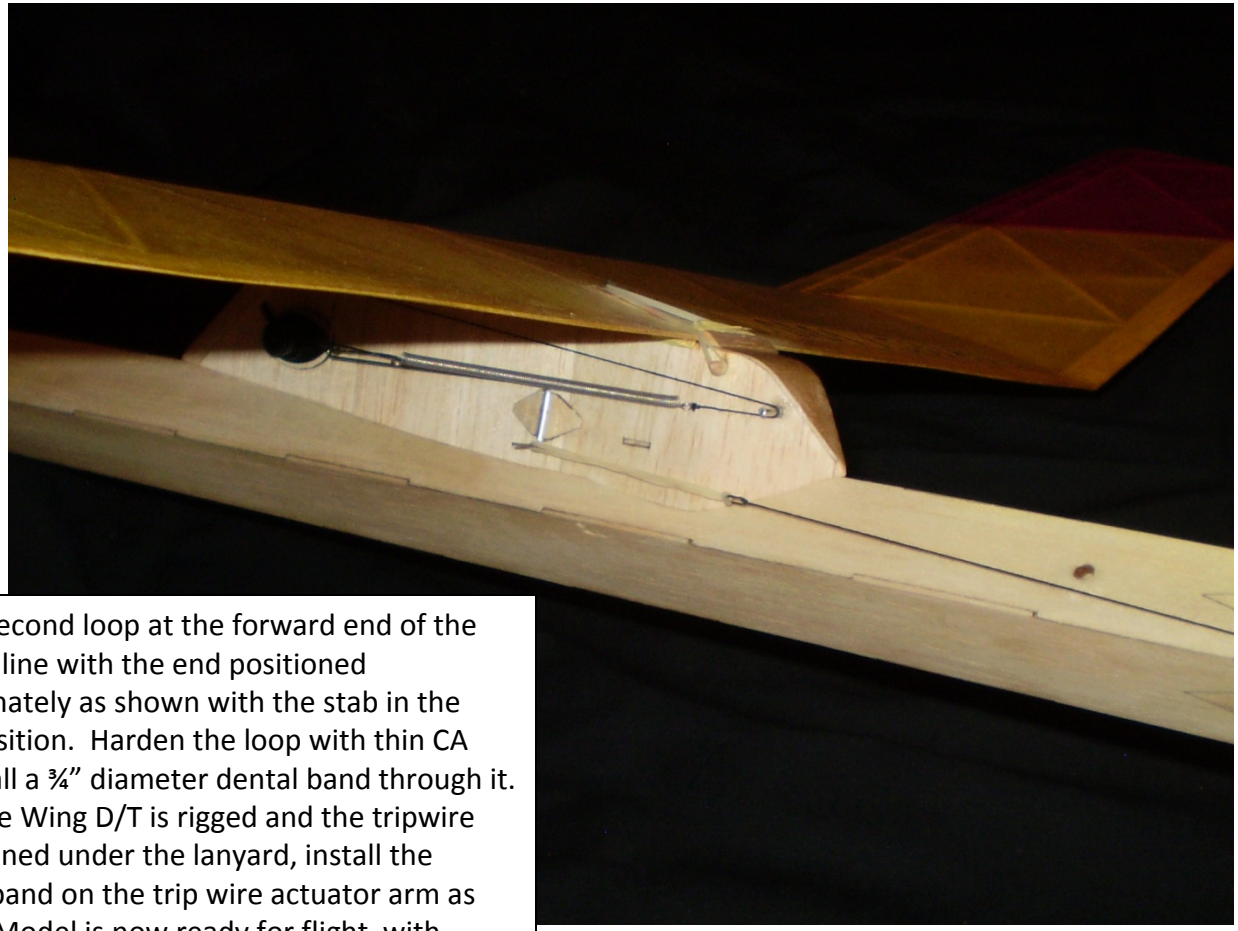
Cut the tail off after the glue cures.



Feed the D/T line through the guide tube and attach to the stab connector tie.



Slip the 1/16” diameter aluminum stop tube over the D/T line. Allow the stab to cant upwards to about 45 degrees. Push the stop tube up against the end of the guide tube and crimp in place with needle nose pliers. Apply some thin CA glue to the front of the stop tube to further secure it to the D/T line.



Form a second loop at the forward end of the stab D/T line with the end positioned approximately as shown with the stab in the flying position. Harden the loop with thin CA and install a ¾" diameter dental band through it. When the Wing D/T is rigged and the tripwire end retained under the lanyard, install the tension band on the trip wire actuator arm as shown. Model is now ready for flight with these settings.