Mark III

Kit No. CBMD-001

Construction Detail

CB Model Designs

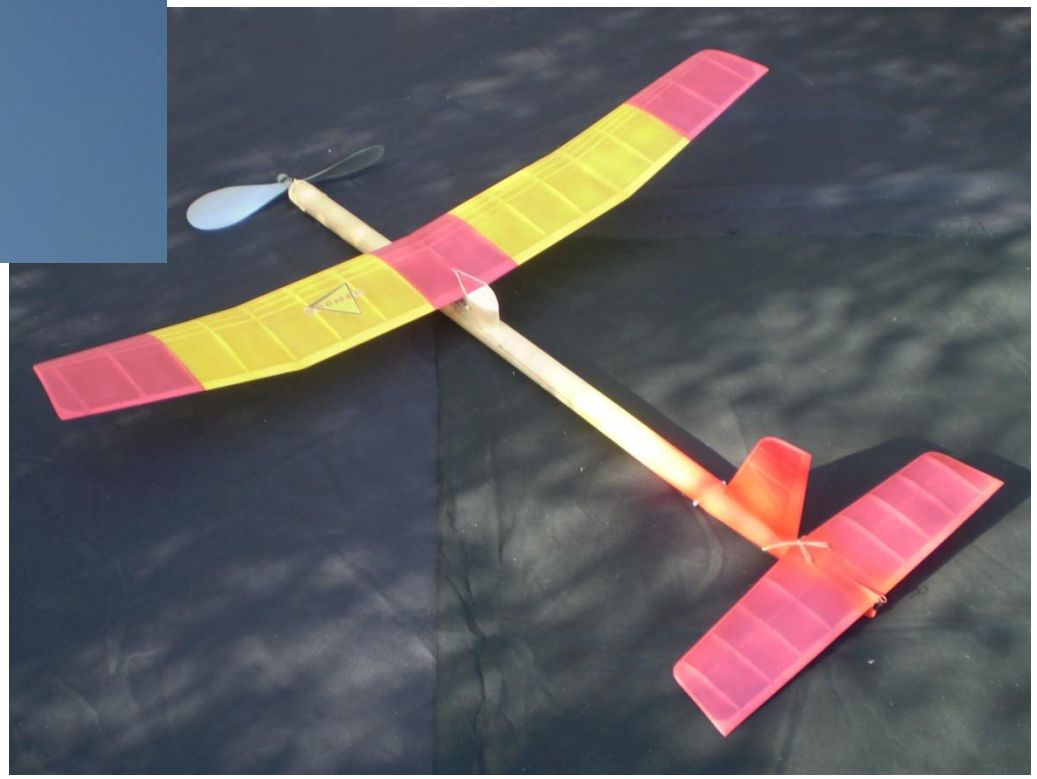
www.cbmodeldesigns.com

Revision N/C

Kit No. CBMD-001 Boomer MkIII P-30

CB Model Designs

www.cbmodeldesigns.com

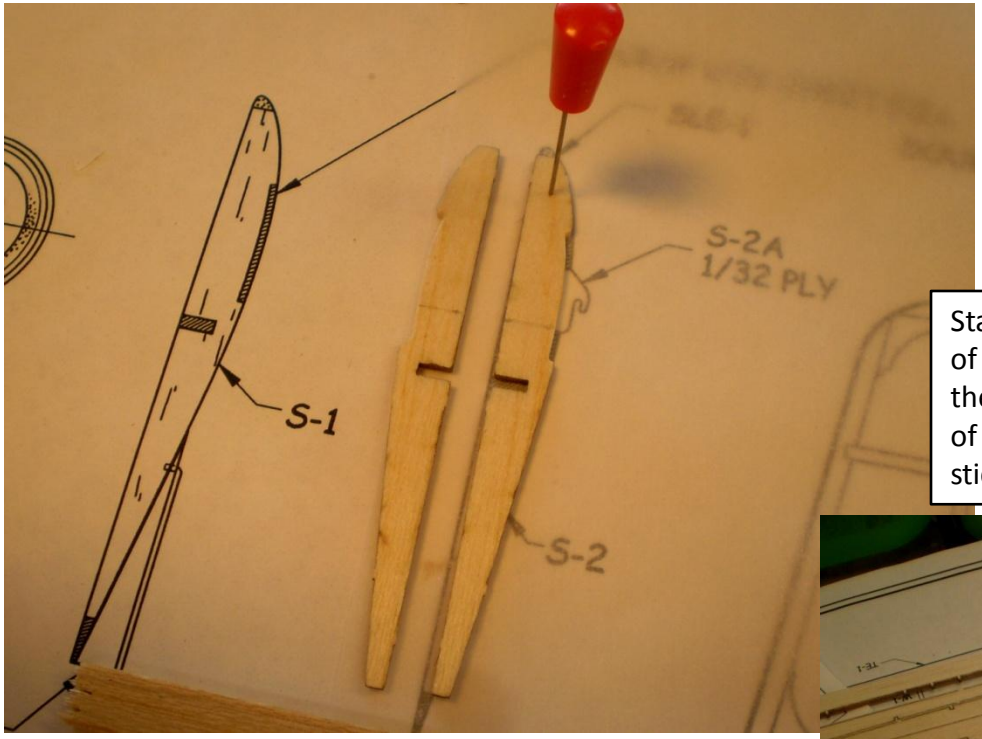


Model data:

- Weight range 38-40 grams as shown (no motor) with Esaki tissue covering
- Wingspan……..30 Inches
- Wing Area…….110 Sq. In.
- Nominal Length (with Gizmo prop)……29.9 Inches
- Construction……All balsa

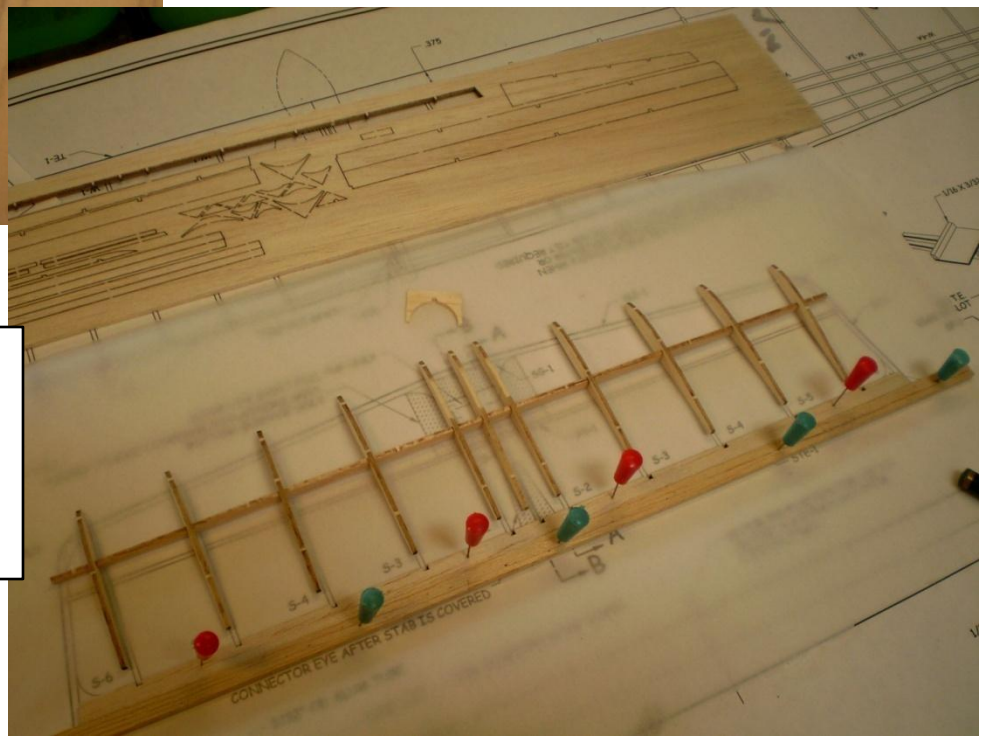
CB Model Designs

www.cbmodeldesigns.com

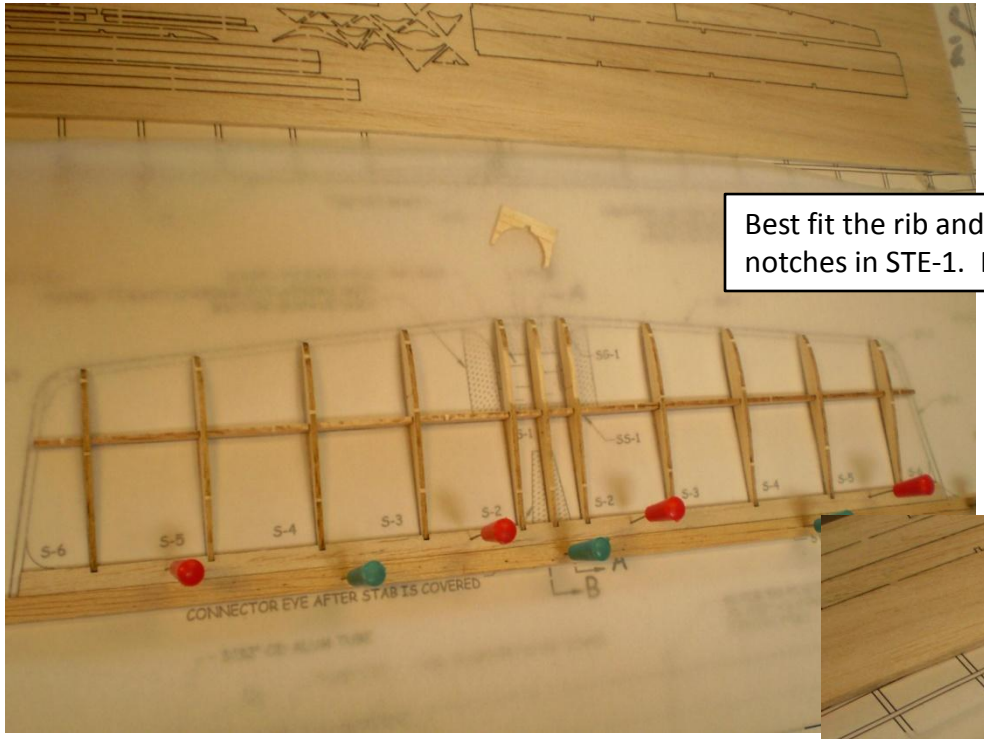


Note: the images in this presentation are based on two of the prototype Mk 3 builds. Some information may vary slightly from the kit instructions but the configurations and intent remain the same.

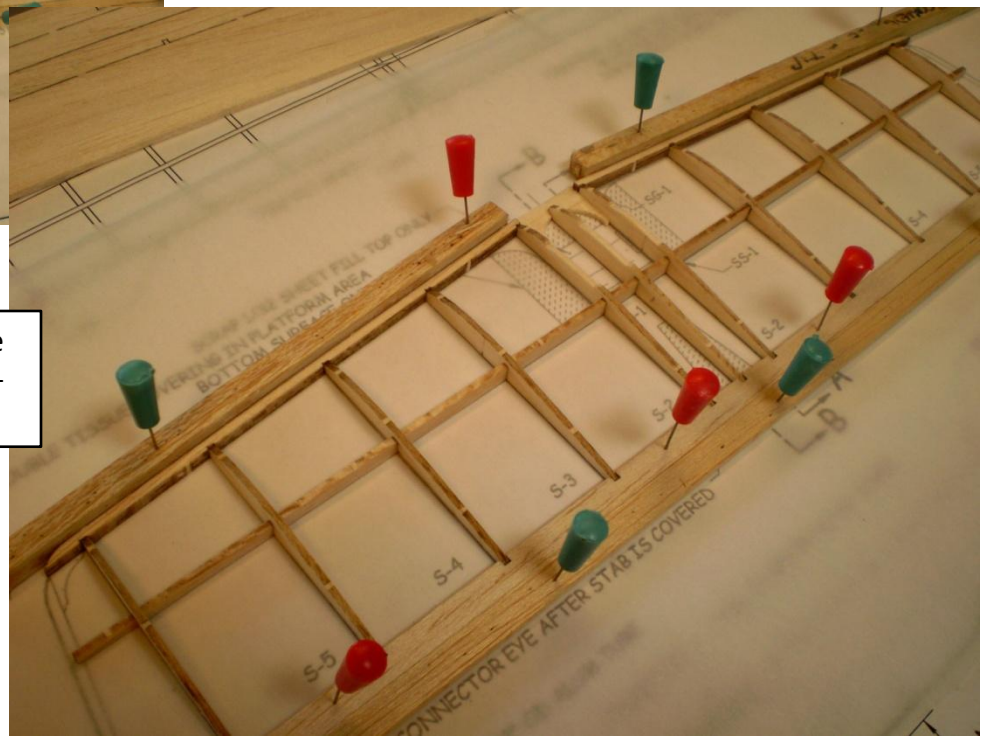
Start stab construction by indicating the location of the D/T band hooks on the inboard faces of the S-2 ribs. Note: I highly recommend the use of parchment paper over the plan to prevent sticking if using CA to assemble the components.



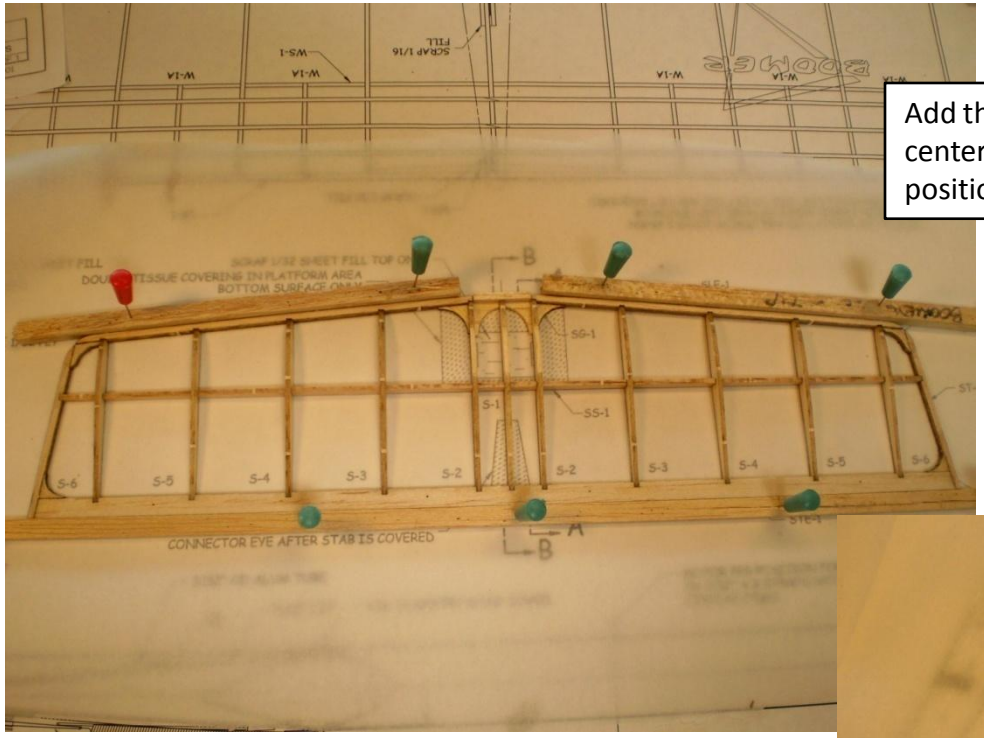
Block the STE-1 part to maintain alignment to the drawing and prevent bowing or other distortions as you construct. This also maintains sizing to the plan view of the part as it gets built up. You can dry fit all the ribs to the SS-1 spar notches.



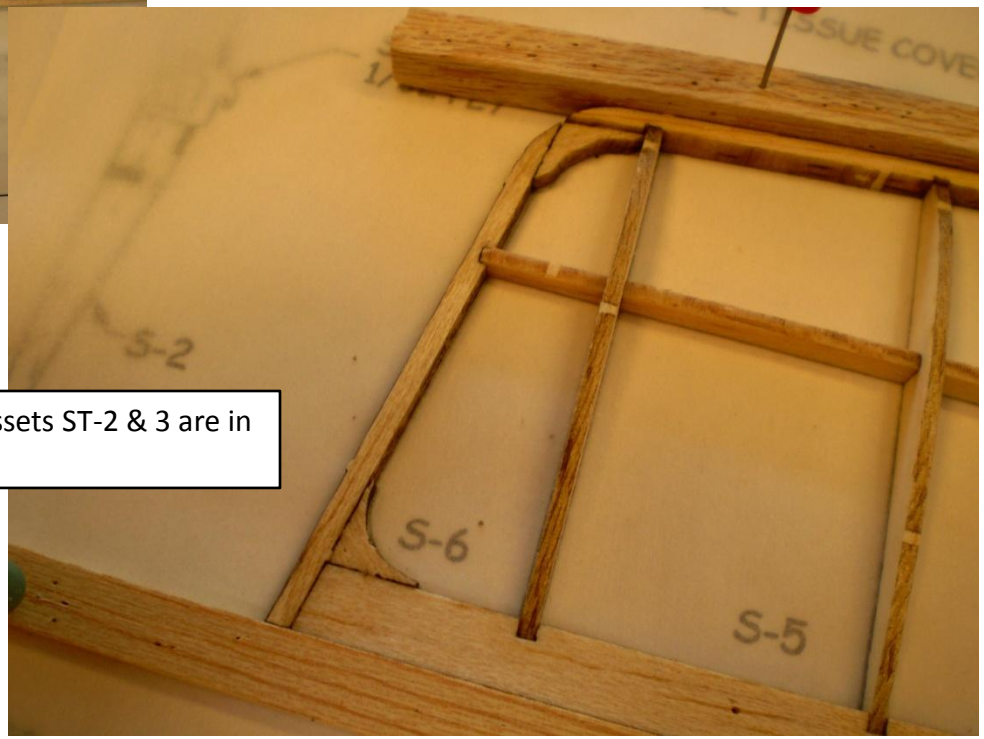
Best fit the rib and spar subassembly into the notches in STE-1. Nothing is glued yet.



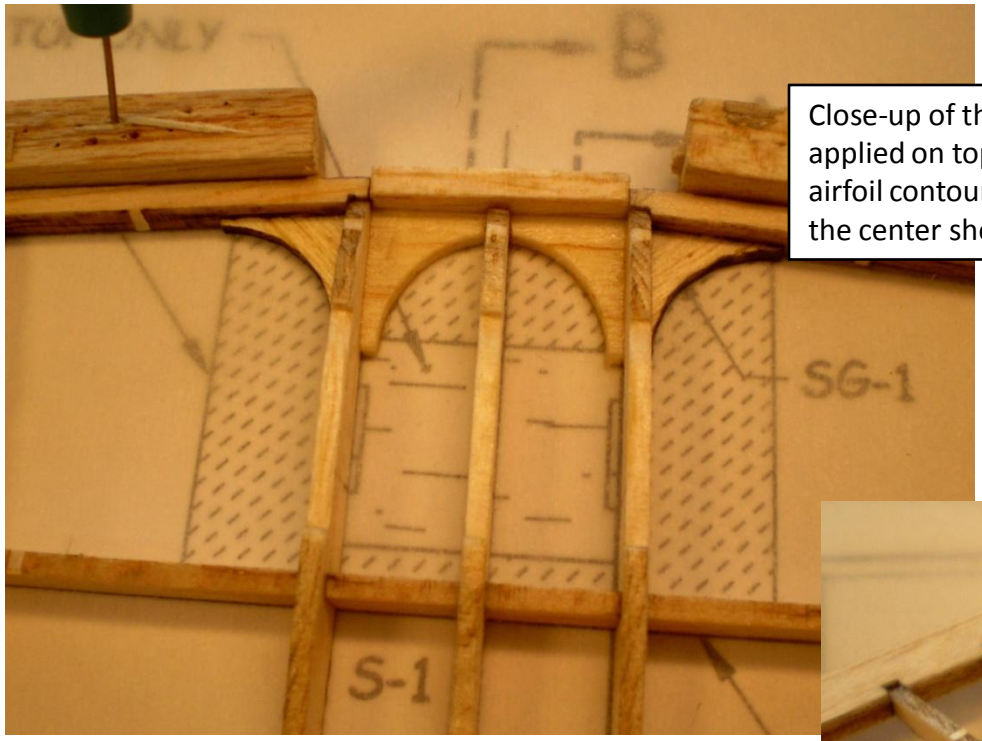
Use blocking to hold the SLE-1 parts against the front ends of the ribs in the respective notches- still nothing glued yet.



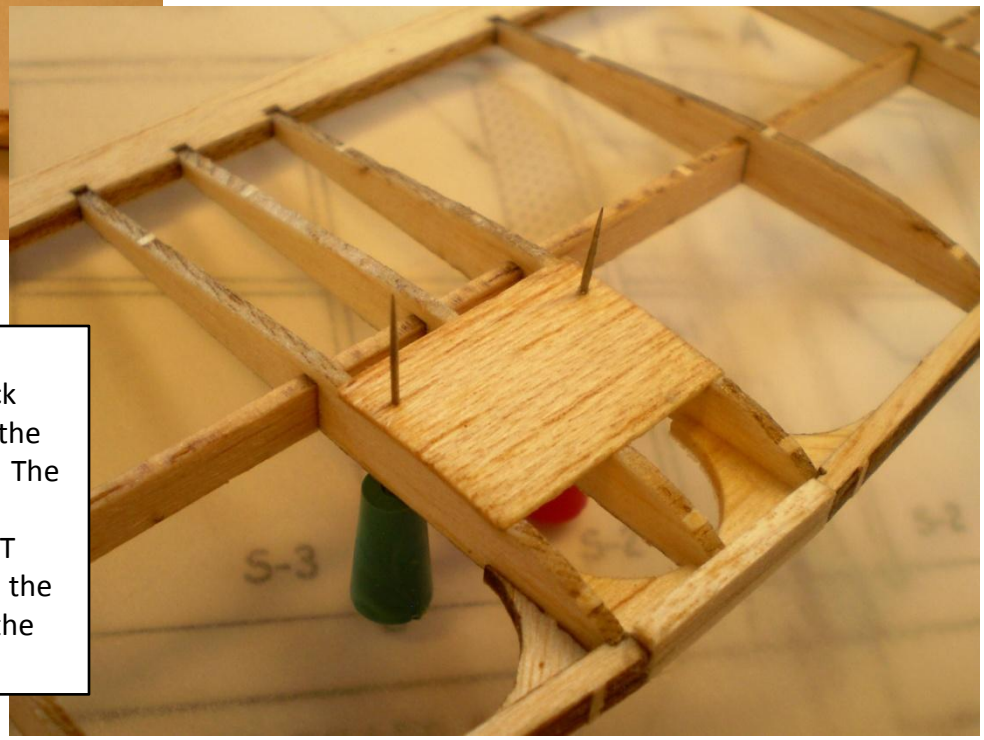
Add the SLE-2 filler and SG-1 gussets at the center of the assembly. Make sure everything is positioned and commence gluing.



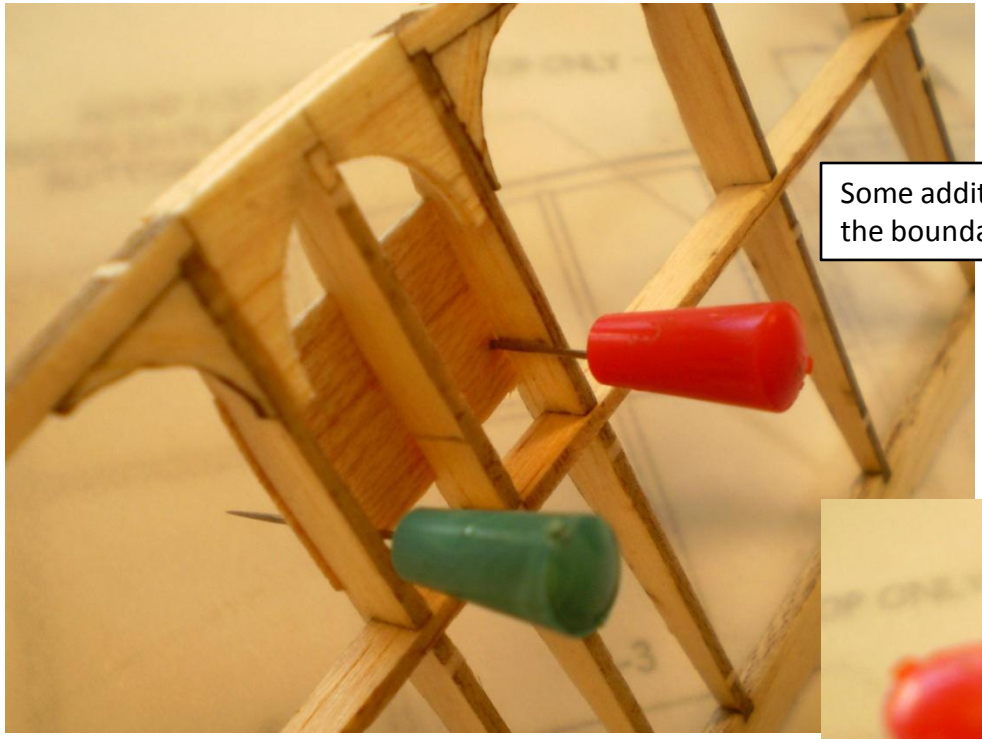
Note tip ST-1 and related gussets ST-2 & 3 are in place.



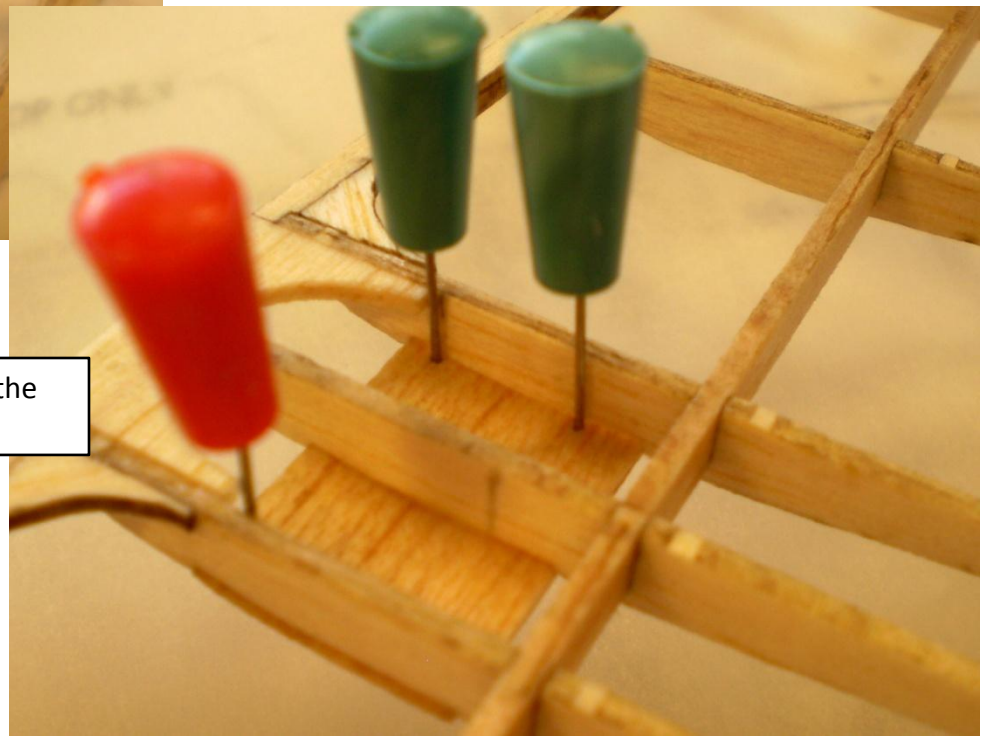
Close-up of the SLE-2 filler with the scrap strip applied on top to allow fairing this section to the airfoil contour. Note the notches in the ribs for the center sheeting.



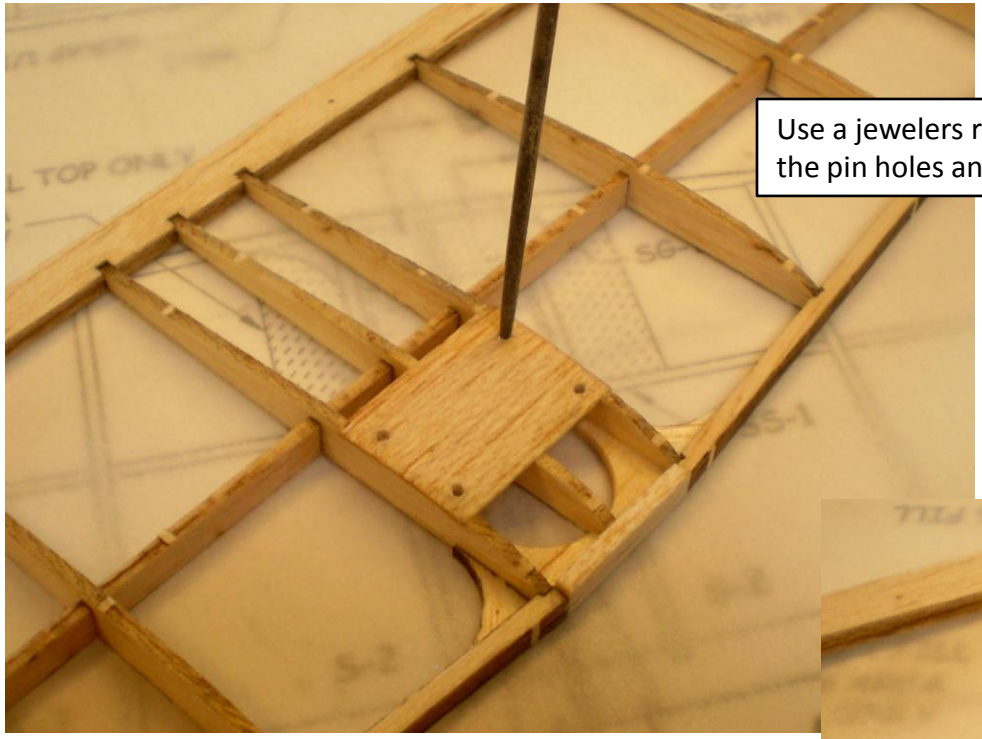
This is my suggested method of installing the D/T band hooks- starting with the filler sheet made from a piece of the 1/32 stock included in the wood part package. This fits flush to the top of the ribs when nested into the notches provided for this on the ribs. The main purpose of this filler is to ease the covering process and reinforce against covering tissue damage when installing the D/T bands to fly the model. I project pinholes from below based on the mark for the back edge of the D/T hook to indicate one end of the slot to be cut in this filler for the hook.



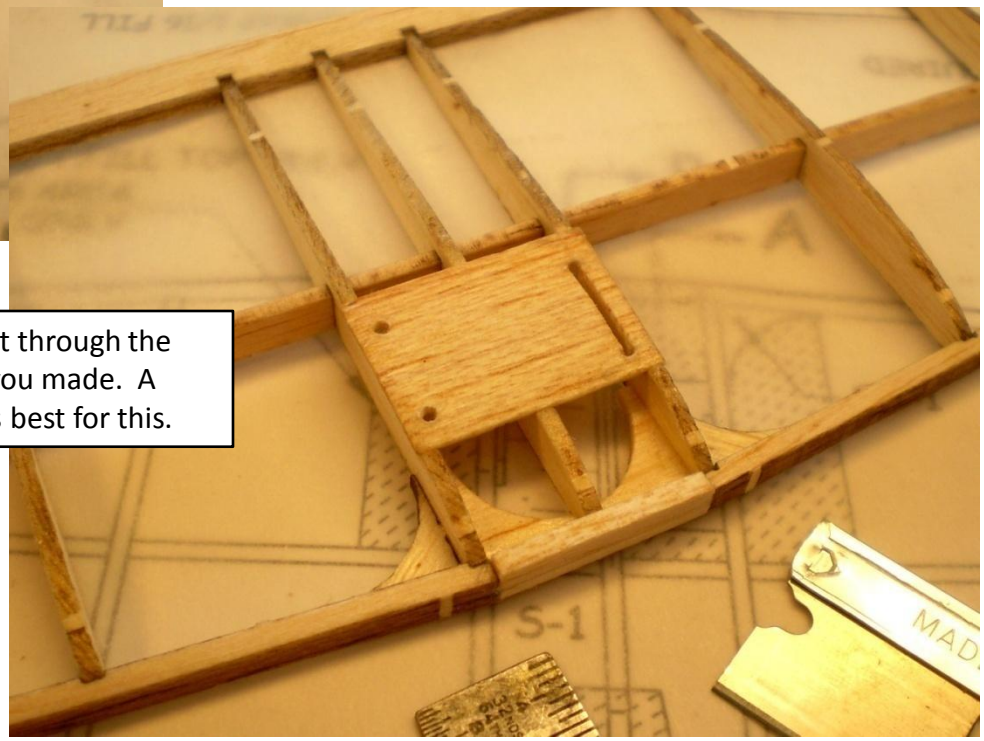
Some additional pins added to show how I mark the boundary of the hook slots.



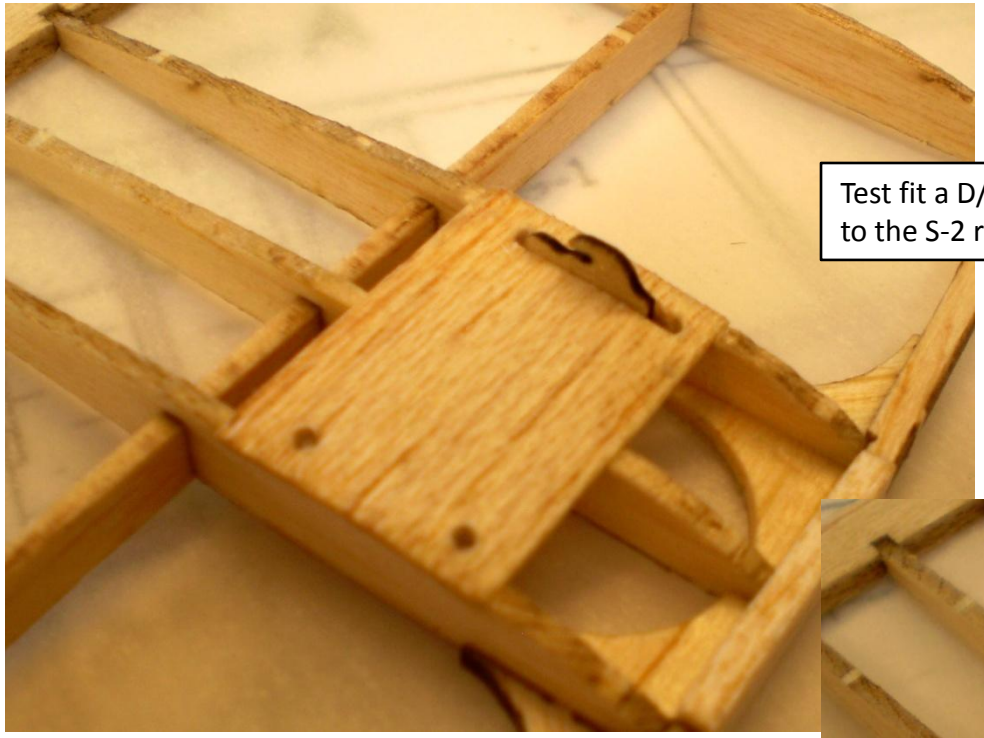
The pins line up on the marks you made at the first step.



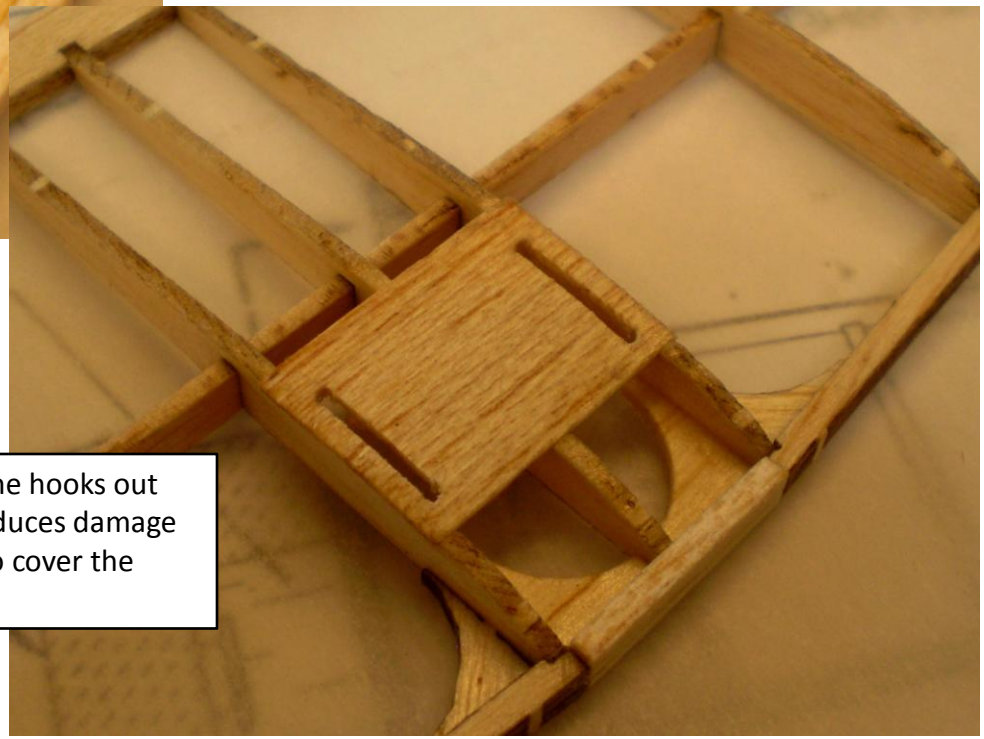
Use a jewelers rat tail file or similar to open up the pin holes and form the slot ends.



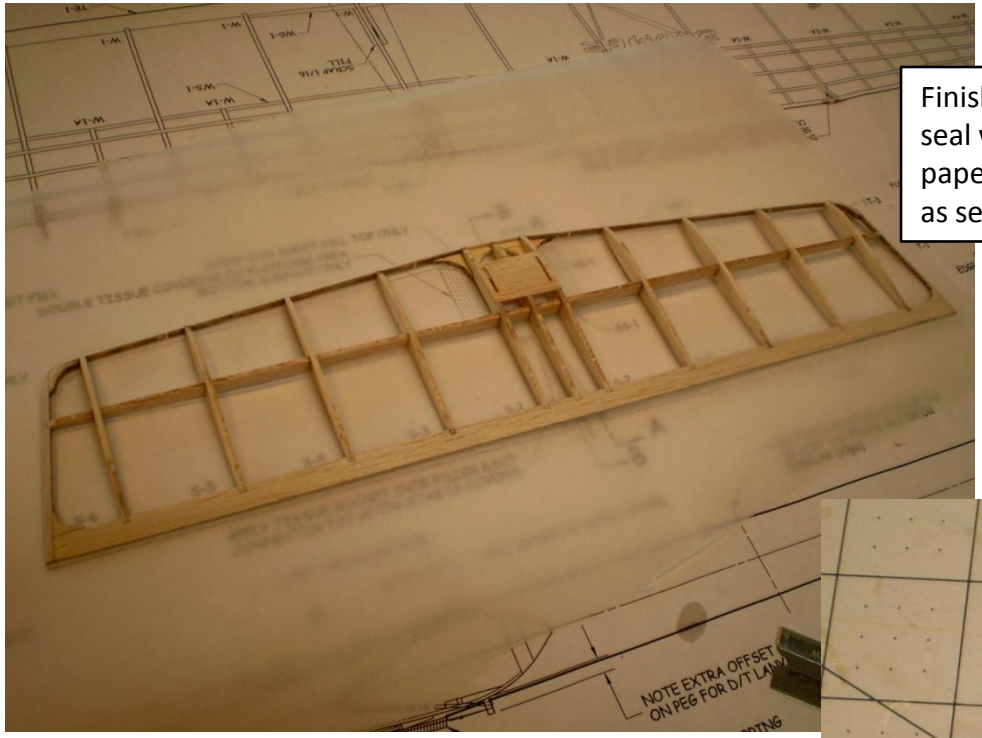
Here a slot has been carefully cut through the sheet, terminating at the holes you made. A new sharp extra fine razor works best for this.



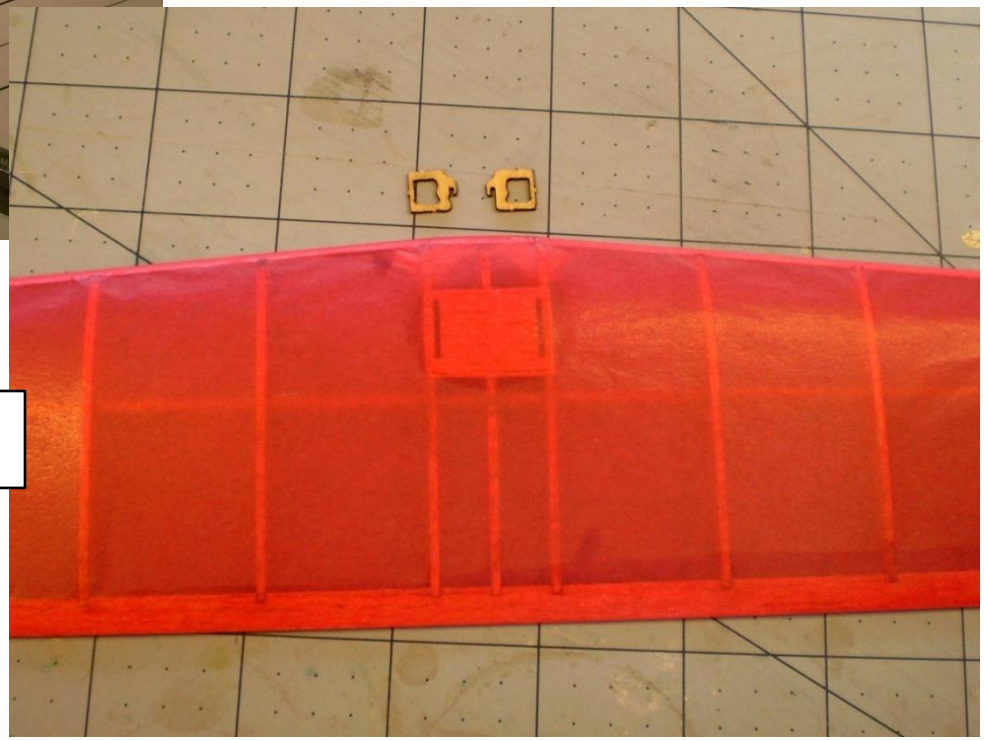
Test fit a D/T hook through your slot-don't glue to the S-2 rib until after covering is suggested.



Finished D/T hook slots. Leaving the hooks out until after sanding and covering reduces damage problems and makes it far easier to cover the stab.



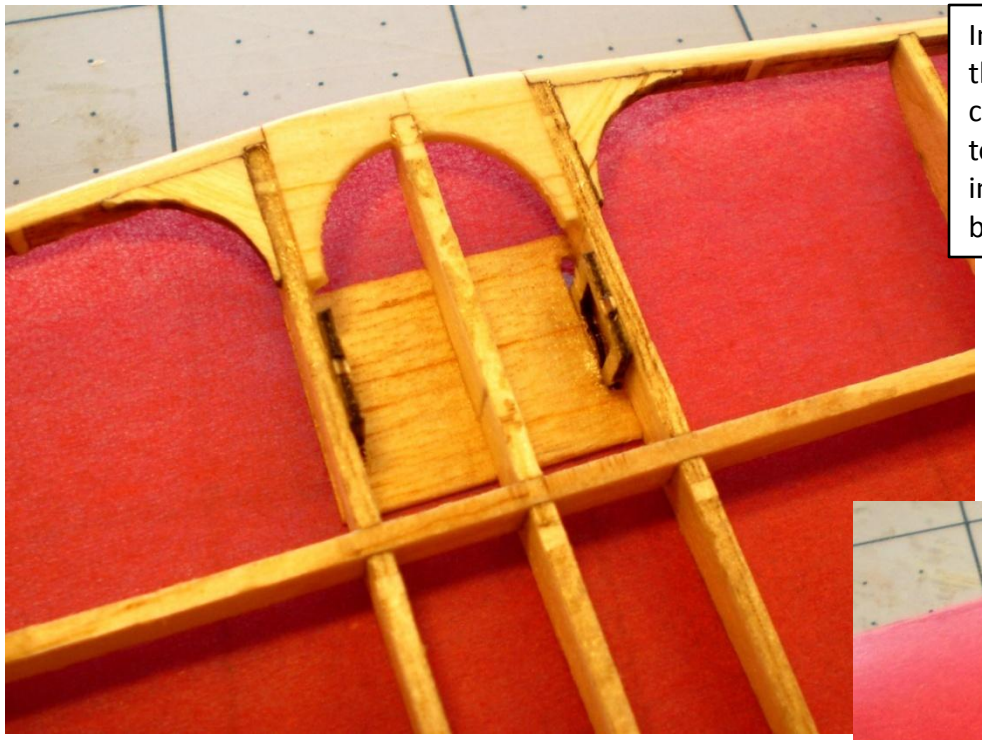
Finish sand and blend the framework and prepare for covering. I seal with two coats of nitrate dope, lightly sanded with 320 grit paper. I also use nitrate dope to adhere the tissue covering as well as sealing after shrinking.



Cover the upper surface of the stab first to allow installation of the D/T hooks from below.

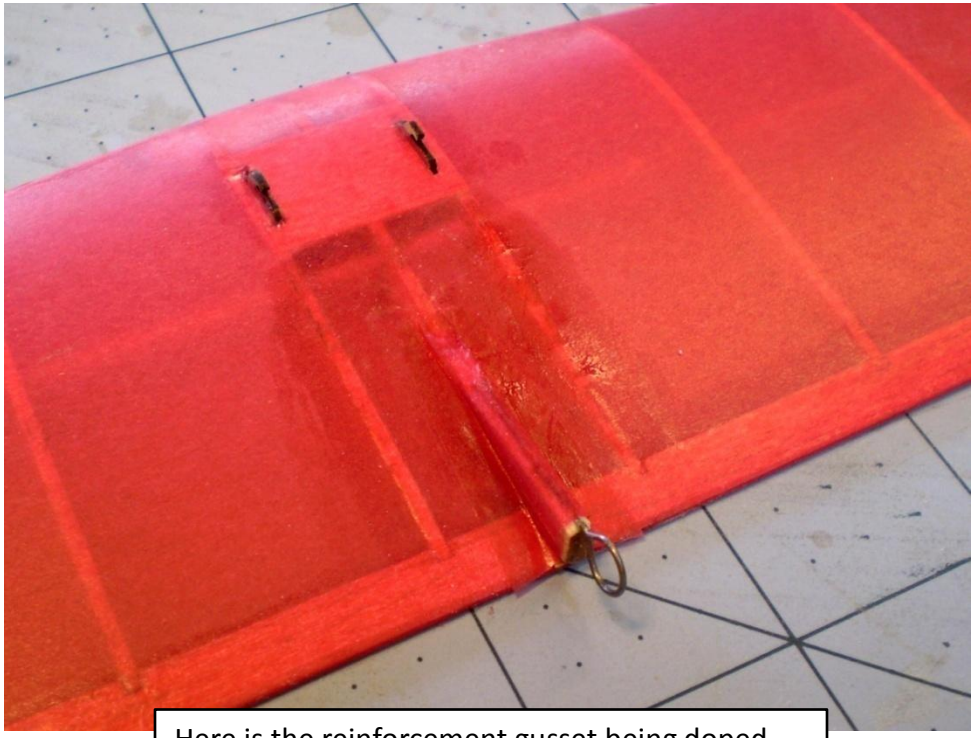
Slit the tissue at the hook slots, then carefully position the hooks through them and against the S-2 ribs. Use your marks from the first step to position either the front or back edge on both sides-use the same feature on either side to avoid a staggered looking installation, right?

I install the hooks to be slightly proud of the top surface of the stab.

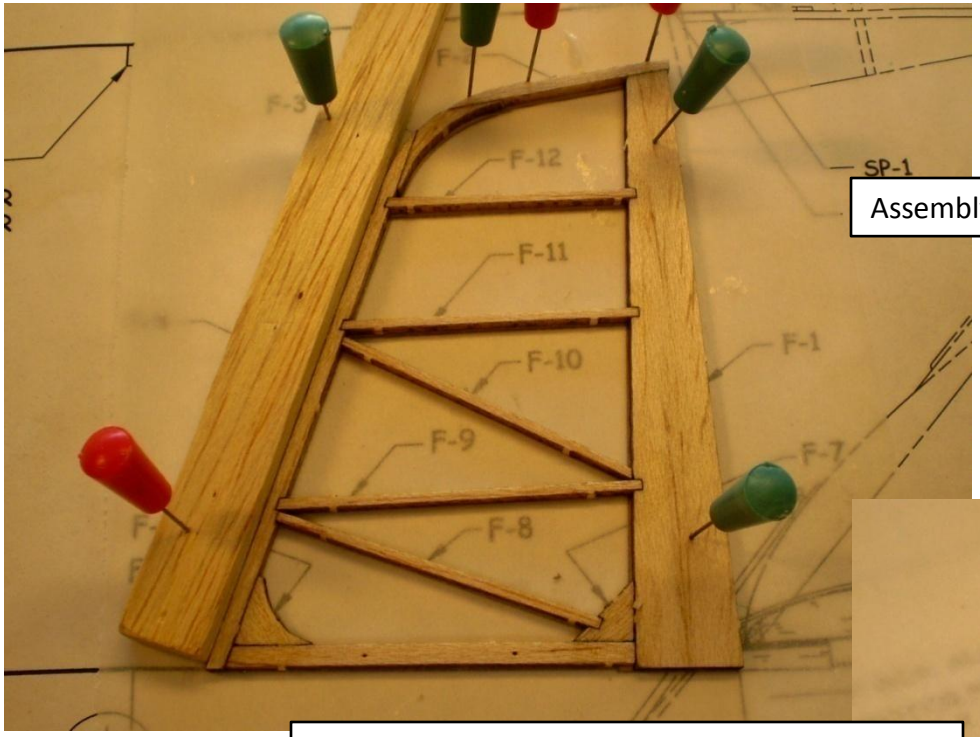


Installed hooks as seen from below. Now cover the bottom surface and shrink the tissue covering. Add the double tissue area common to the stab platform to support the stab keys installed later and generally stiffen this area a bit.

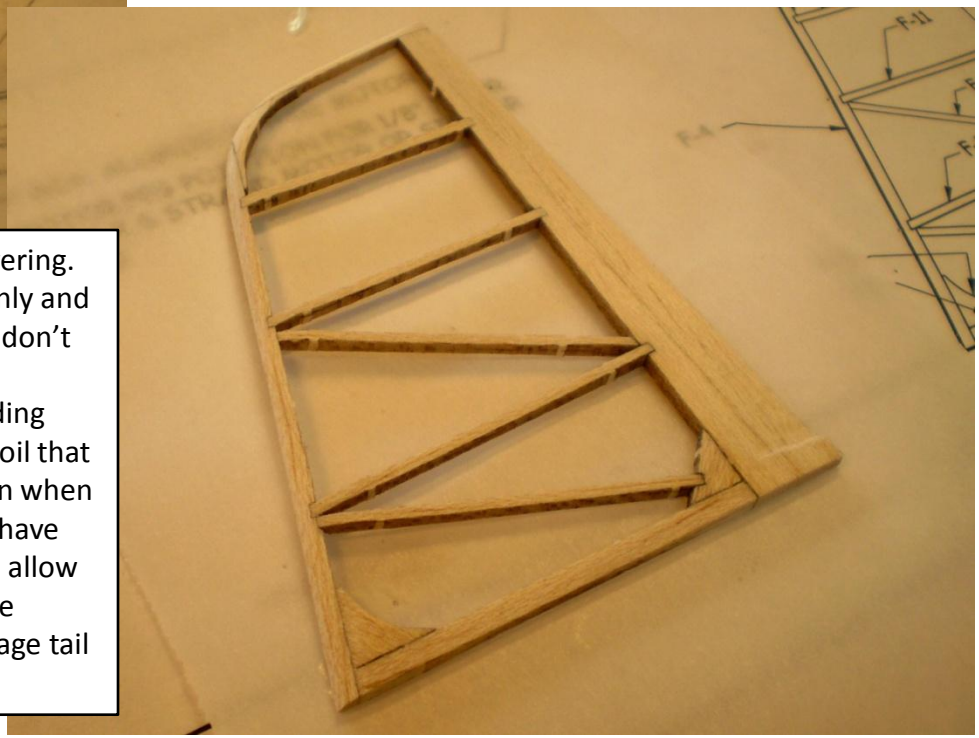
Install the filler to support the D/T connector eye. Install the wire connector-I use medium CA and dust with micro balloons to form a nice glue fillet on top of the filler with the wire. I also install a tissue gusset over this installation to help strengthen from side forces that may occur. This shows the tailoring of the reinforcement gusset over the filler.



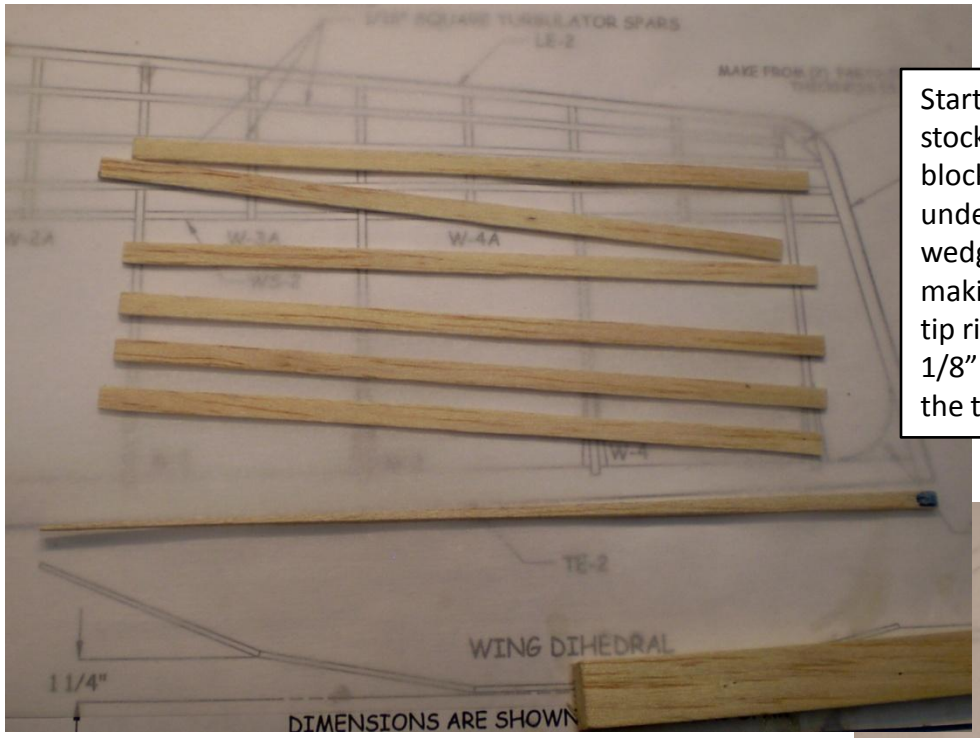
Here is the reinforcement gusset being doped into place. Clean up the tissue flash and seal the entire stabilizer with two coats of 50% thinned nitrate dope.



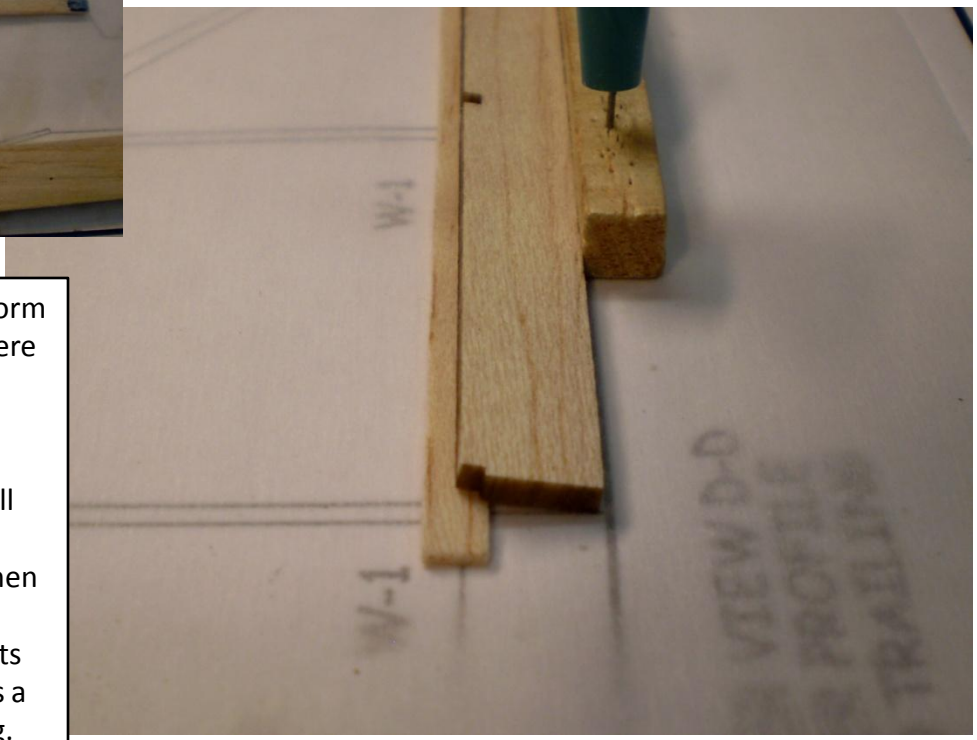
Assembly of the fin just takes a few minutes..



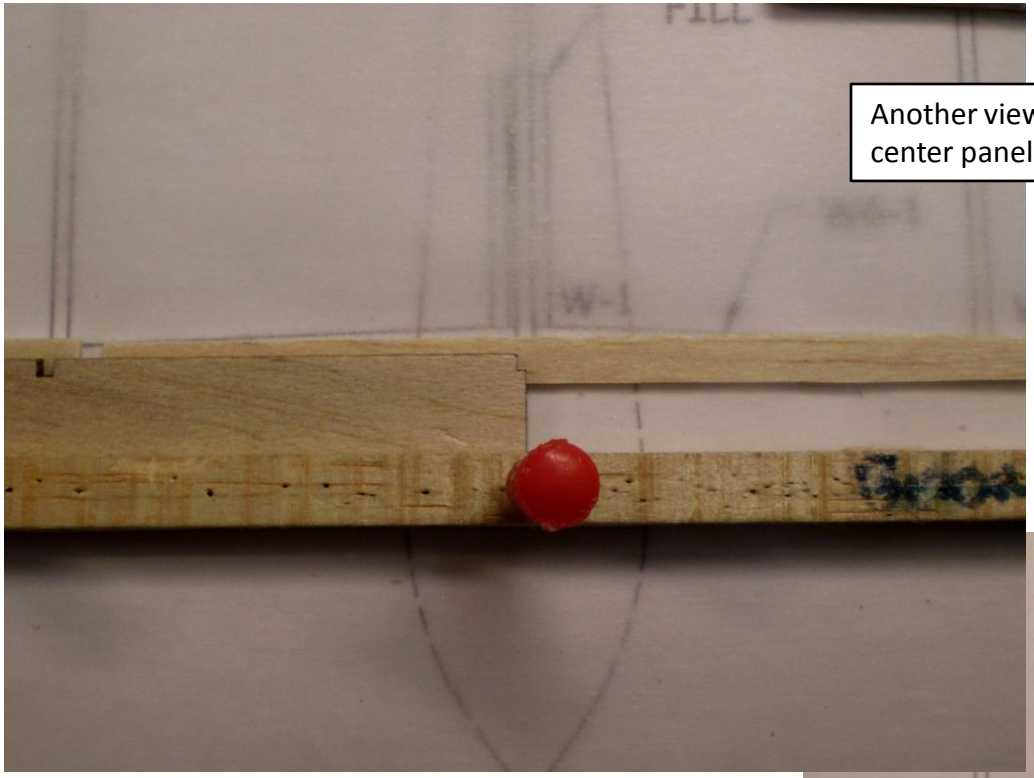
Here is the finish sanded fin ready for covering. I bevel the trailing edge on the left side only and leave the entire right side of the fin flat. I don't sand any airfoil section into the open framework, and just radius blend the leading edge. This results in an asymmetrical airfoil that will influence the right hand turn direction when installed. As seen at the lower aft edge I have left the original trailing edge thickness to allow a good fit with the stab platform slot to be installed after the fin is glued to the fuselage tail cone.



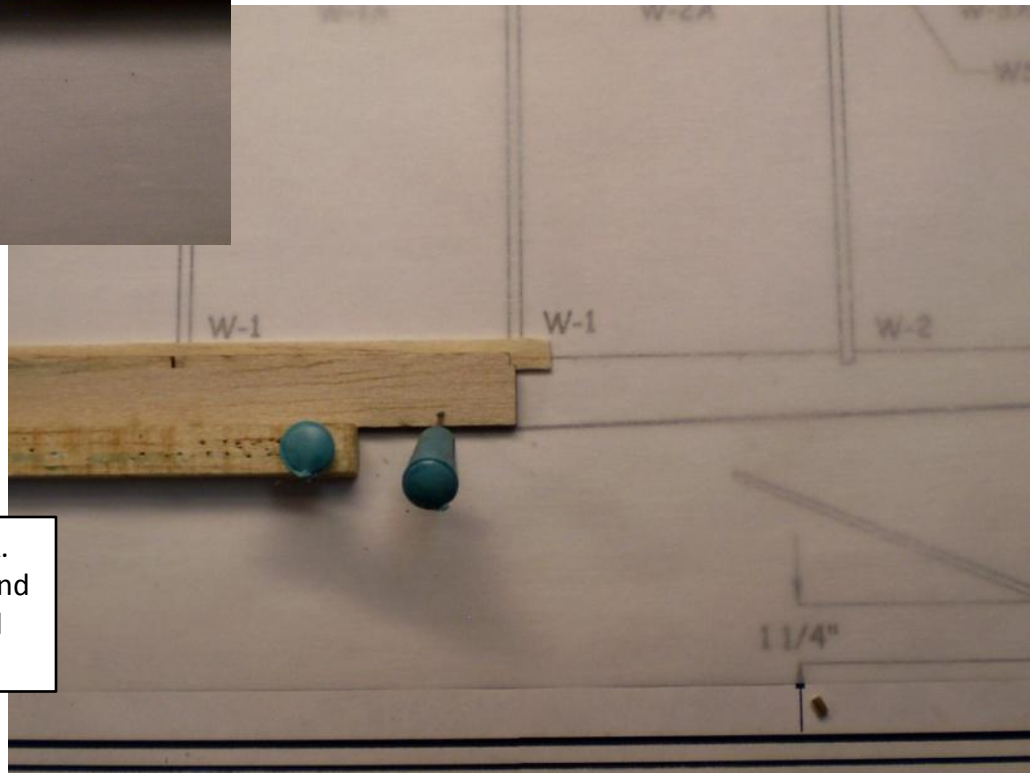
Start wing construction by making some shim stock from 1/32 sheet, about 3/16” wide to block up the trailing edge to rough match the undercamber of the wing ribs. Also, cut two wedges the length of the tip panel trailing edge, making them 1/8” tall at the intersection of the tip rib. I show one here, with the excess beyond 1/8” tall colored. Any excess gets cut-off during the tip rib installation.



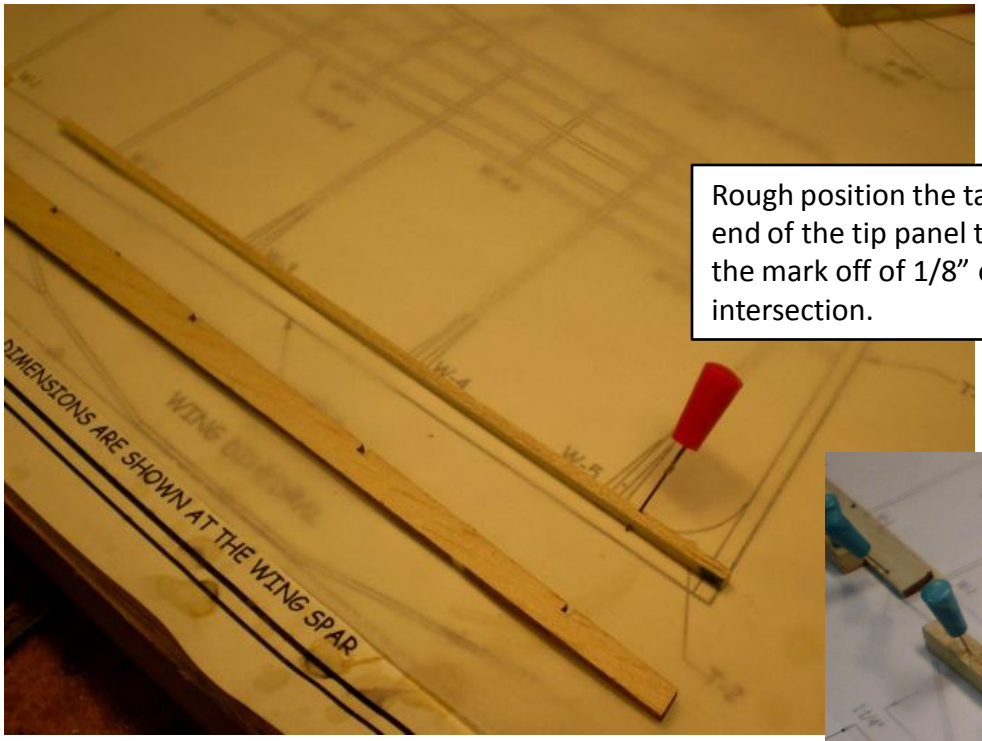
I block all flying surfaces to control the plan form alignment of the structure to the drawing. Here you can see a 1/32 shim installed under the front edge of a training edge part. Pin to the building board to maintain this tapered gap condition while assembling the wing. This will only apply to the inboard panel sections-the tapered shims will serve a similar purpose when used for the tip panel trailing edge. Note the shim will also control how deep the rib end fits down into the assembly notch, and maintains a flush condition across the bottom of the wing.



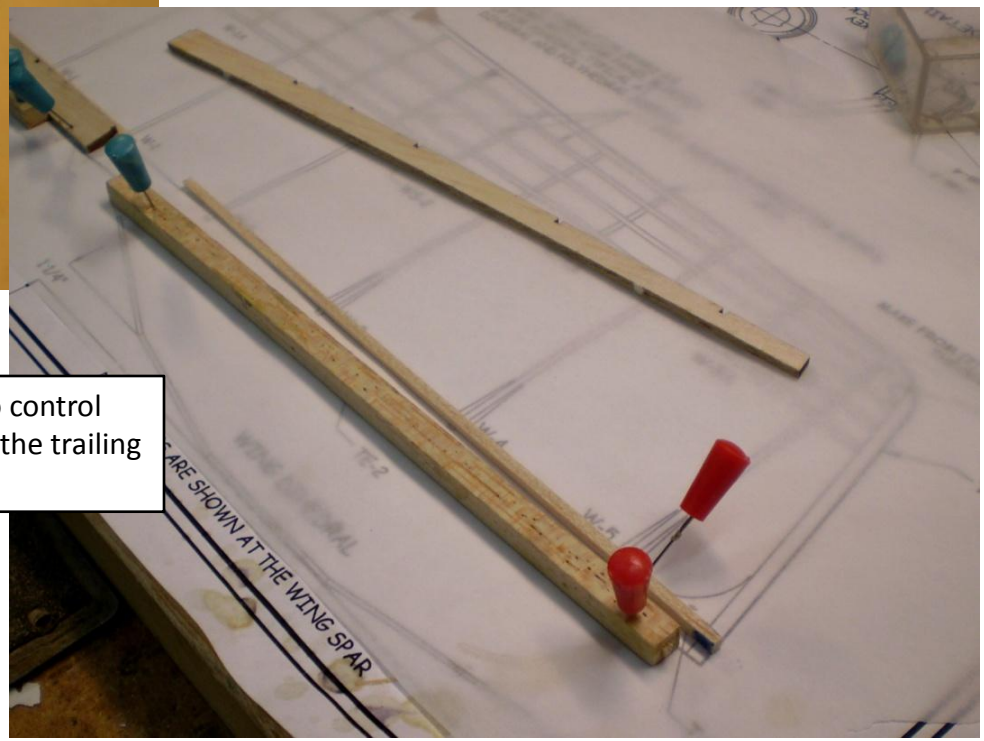
Another view of the trailing edge shim for the center panels-at the wing center location.



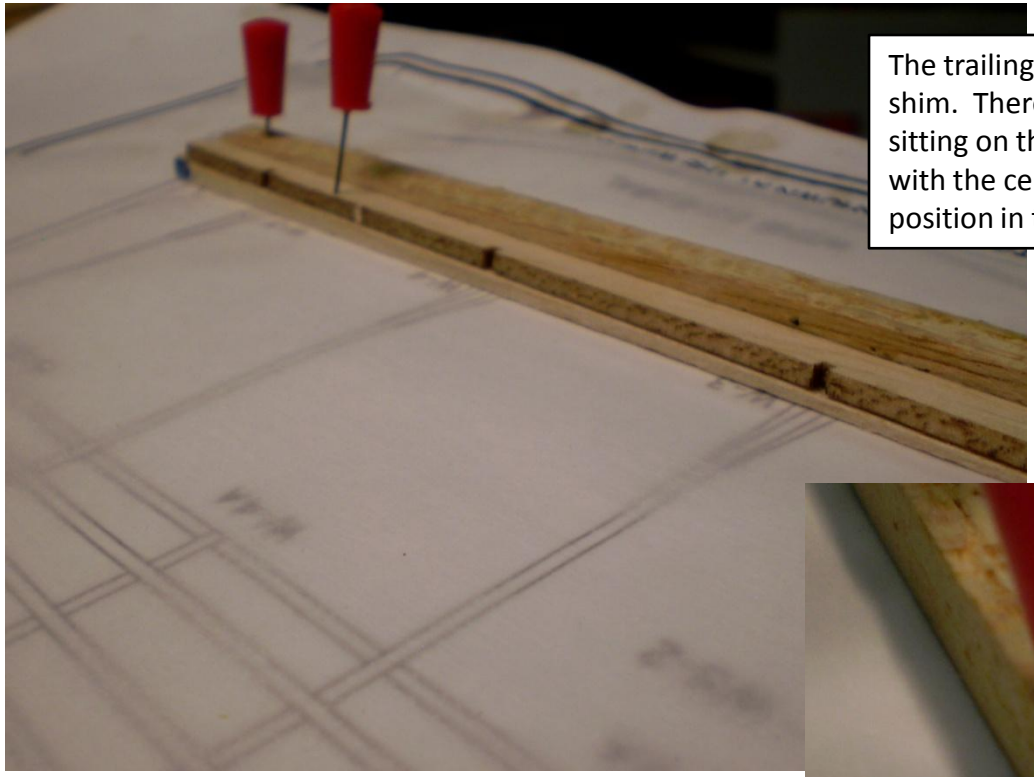
Allow the shim to project slightly beyond the polyhedral break. This will locate the inboard end of the tip panel trailing edge and maintain flushness at this joint. The tip panel trailing edge will be off the board surface from this joint out to the tip.



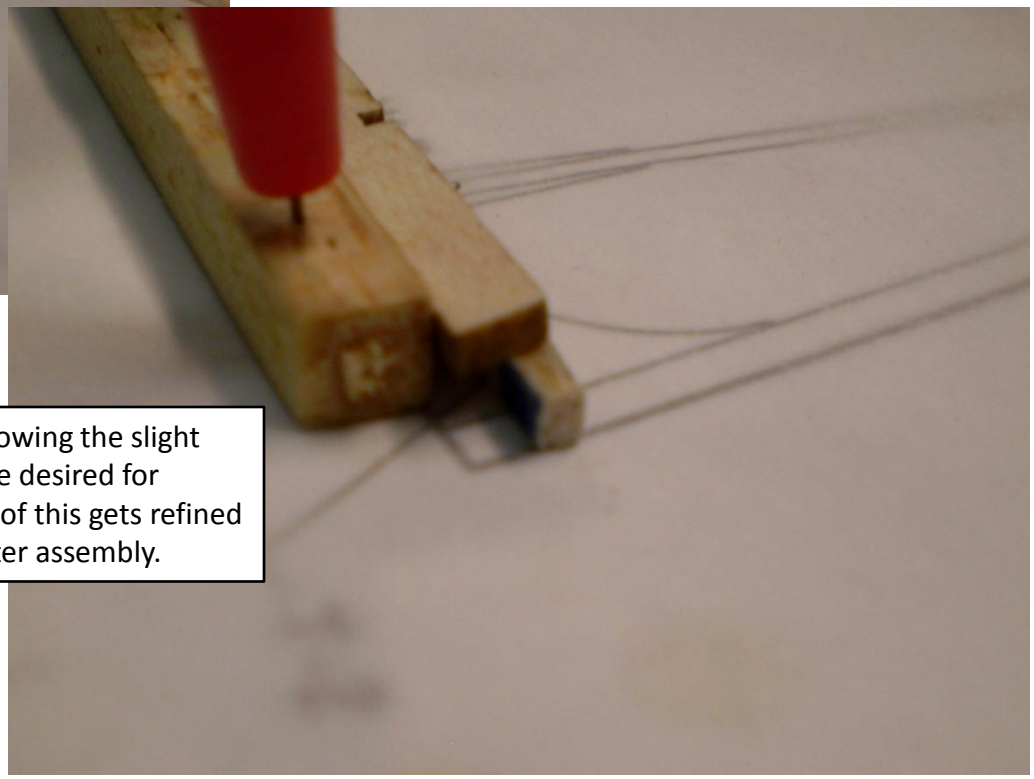
Rough position the tapered shim at the front end of the tip panel trailing edge location. Note the mark off of 1/8” offset at the tip rib intersection.



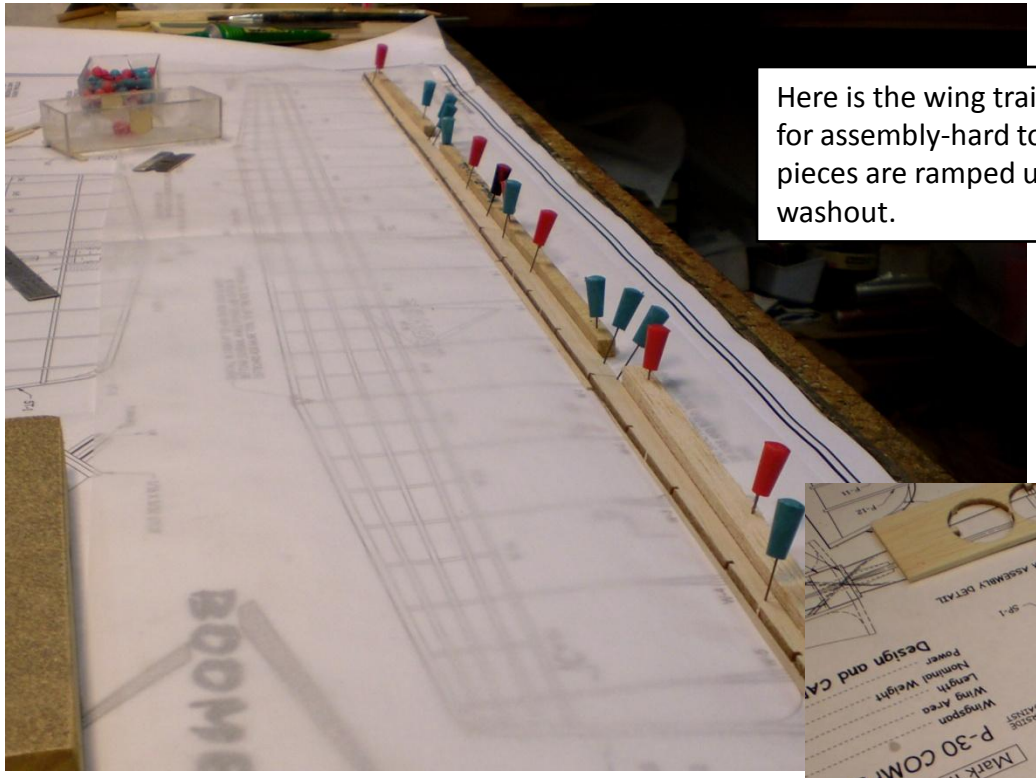
Setting up the blocking to control the plan form location of the trailing edge.



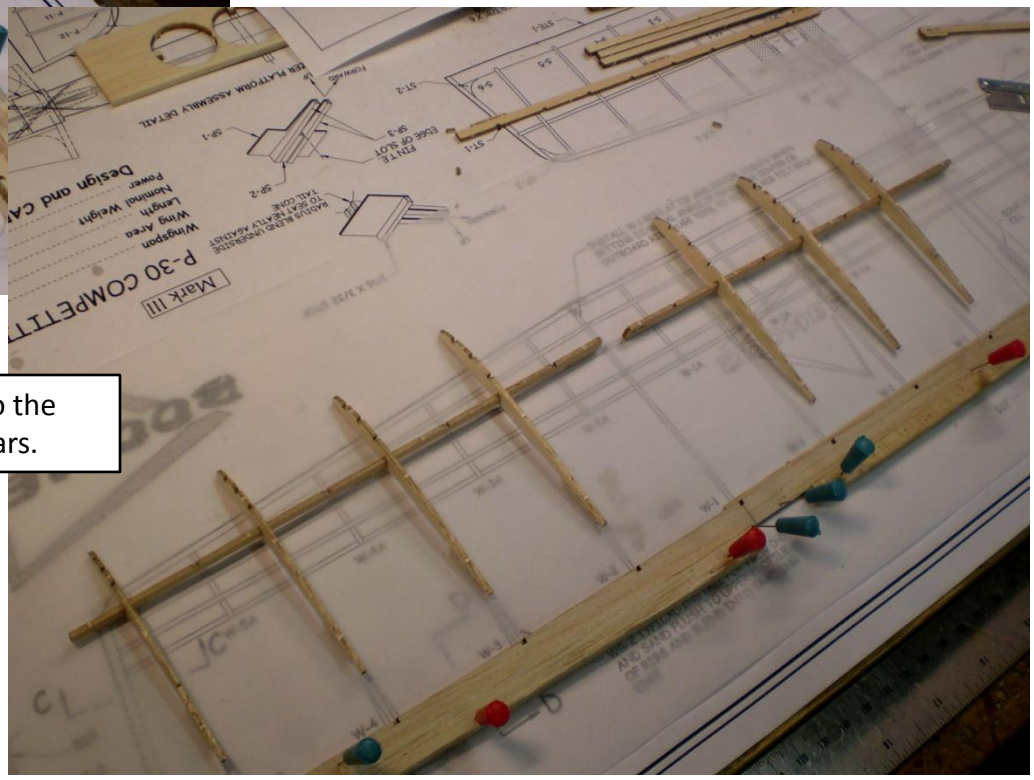
The trailing edge is nested against the blocking on top of the tapered shim. There is a slight ramp down based on how the trailing edge is sitting on the little projected piece of shim at the polyhedral joint with the center panel trailing edge. Secure the tip panel trailing edge position in this attitude using pins.



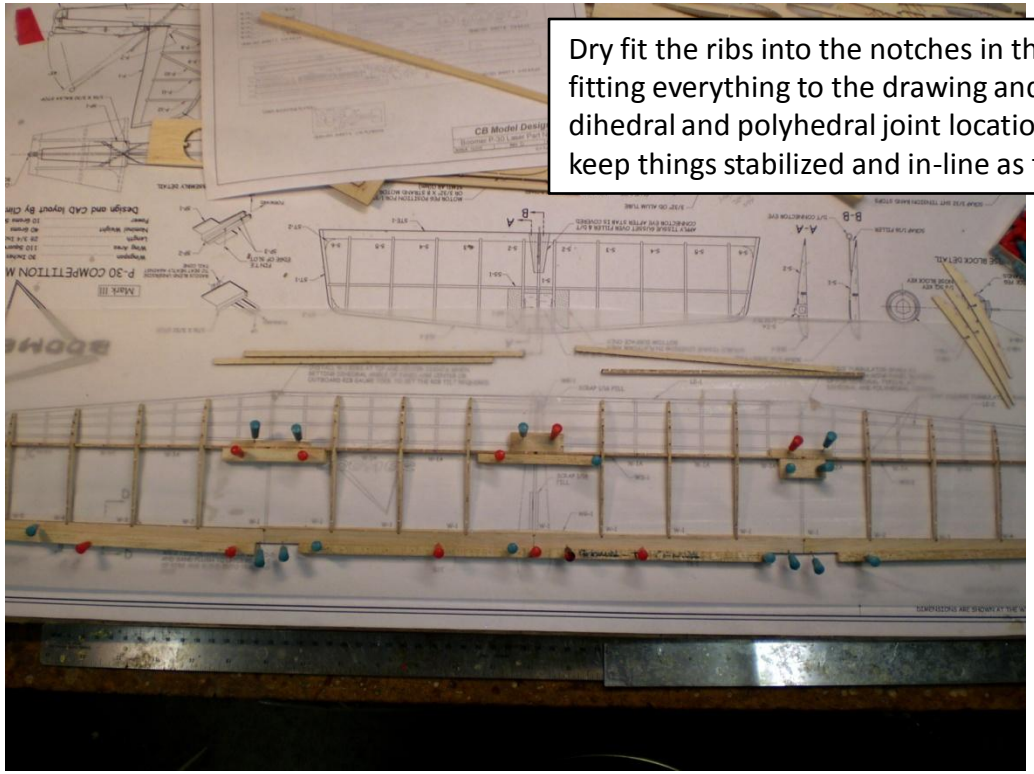
A view of the wing tip area showing the slight ramp down of the trailing edge desired for assembly of the tip panel. All of this gets refined during the sanding process after assembly.



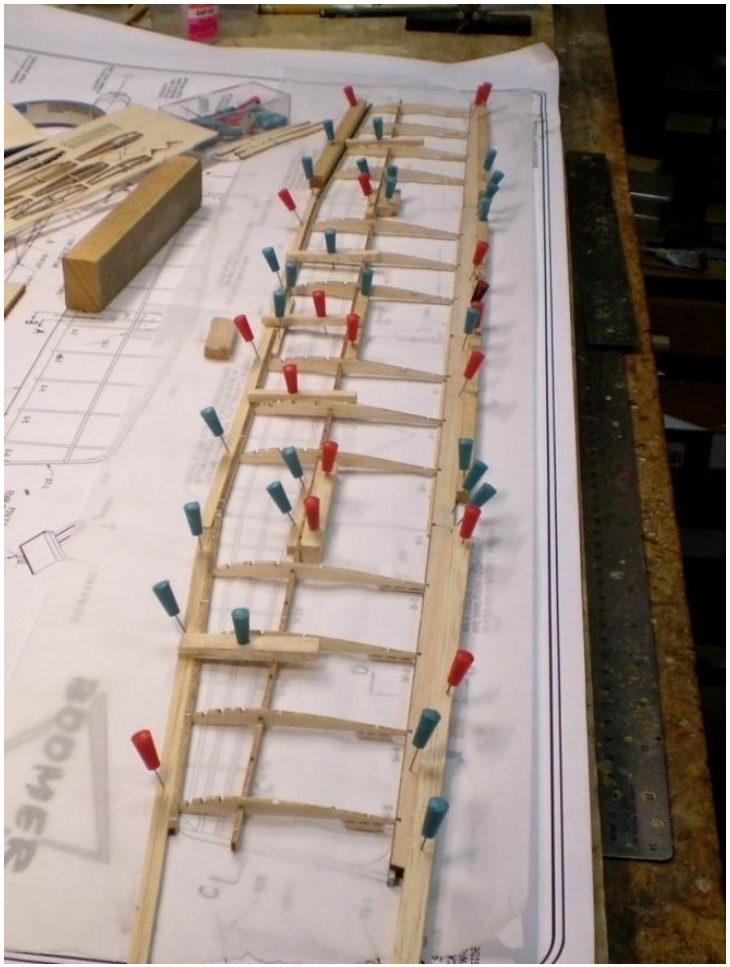
Here is the wing trailing edge segments all set for assembly-hard to see, but the tip panel pieces are ramped up at the tips for built-in washout.



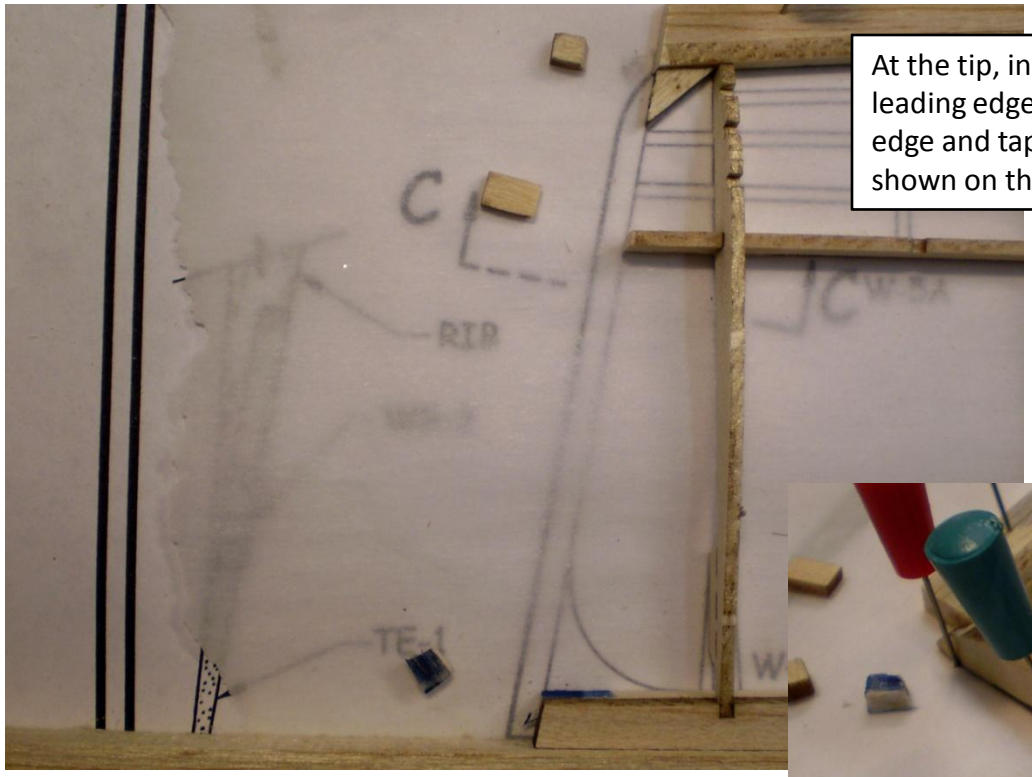
Dry fit the WS-1 inboard spars to the W-1 ribs. Do the same for the tip panel ribs and WS-2 outboard spars.



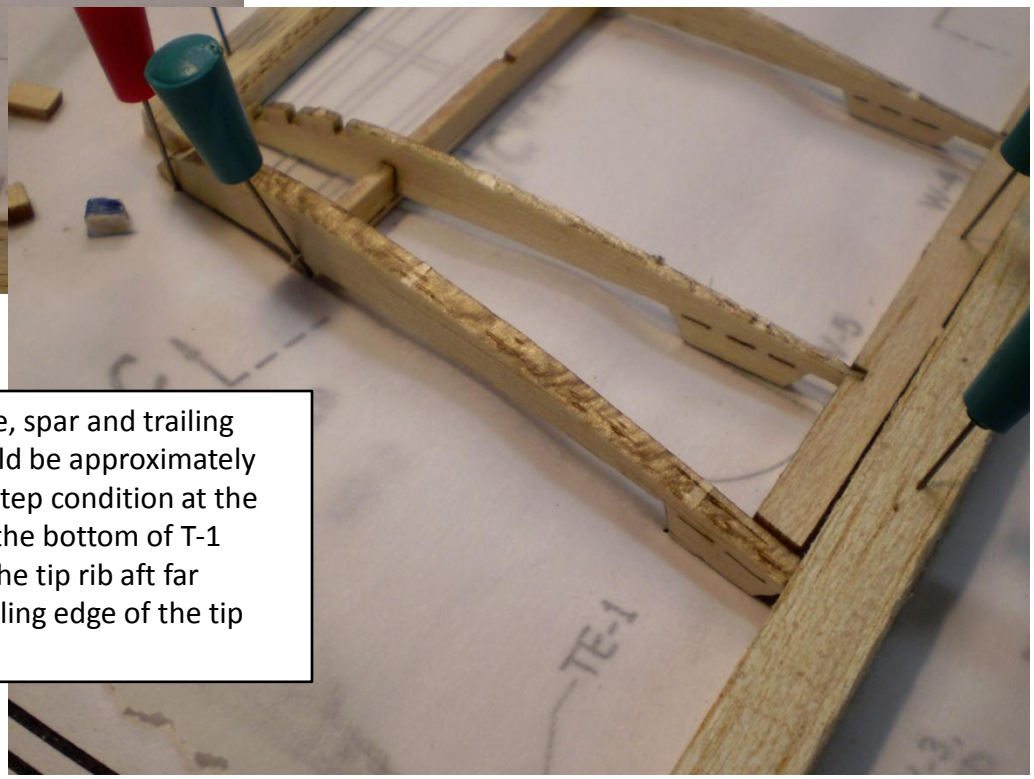
Dry fit the ribs into the notches in the trailing edge segments, best fitting everything to the drawing and maintaining the ends at the dihedral and polyhedral joint locations. I then block the joint areas to keep things stabilized and in-line as the gluing process begins.



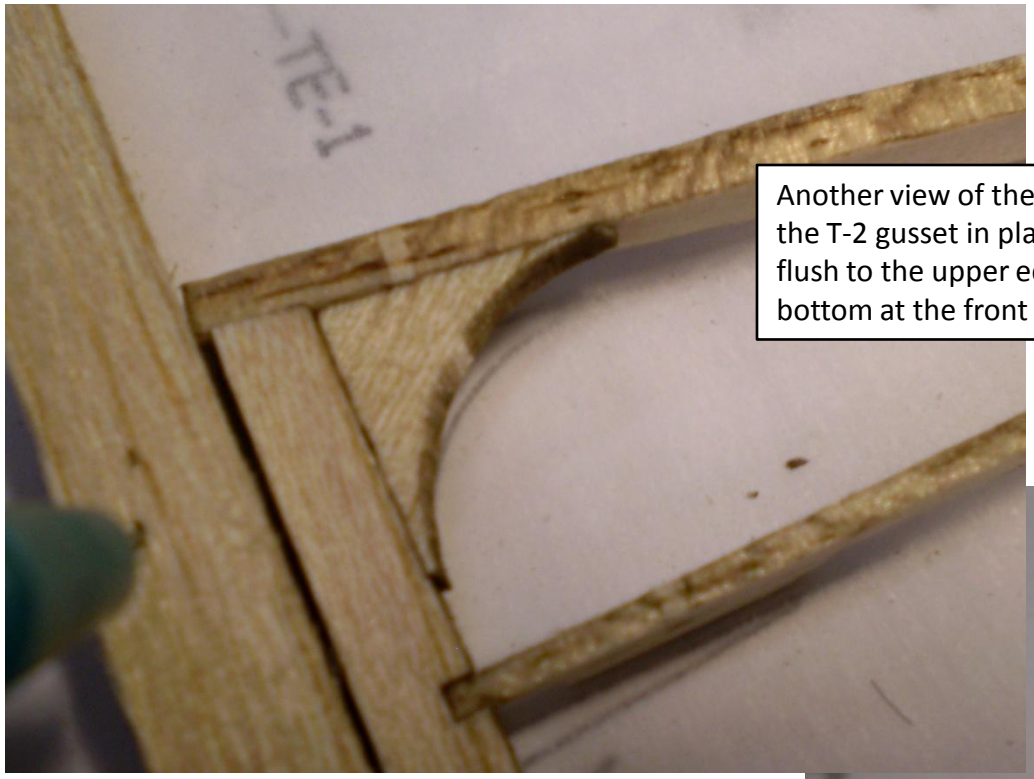
LE-1 & -2 leading edge segments are positioned and held against the front of the ribs using blocking to maintain alignment to the drawing. Note the tip panel ribs have offset tabs against the building board to facilitate the built-in washout for each tip panel. I have installed temporary bridging stock across the spar and leading edges held down firmly with pins to assist in keeping the structure held tightly against the building board for gluing the assembly at this point.



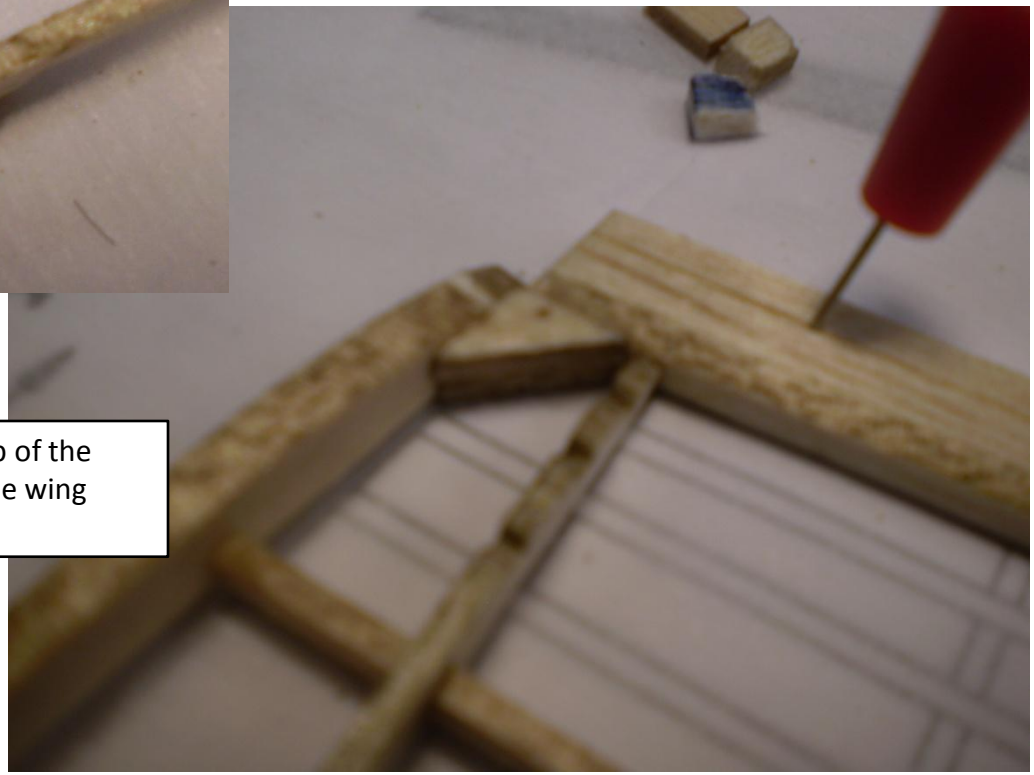
At the tip, install the first of the two T-3 gussets against the leading edge. Carefully trim the end of the spar, leading edge and tapered shim to match the edge plane of the tip rib shown on the drawing.



Position the tip rib T-1 against the ends of the leading edge, spar and trailing edge. Note the bottom of the rib at the trailing edge should be approximately flush with the bottom, not top-that is why there is a little step condition at the trailing edge joint when viewed from the top. The tab on the bottom of T-1 should yield this result when installed correctly. Position the tip rib aft far enough to allow flush cleanup of the end to match the trailing edge of the tip panel.



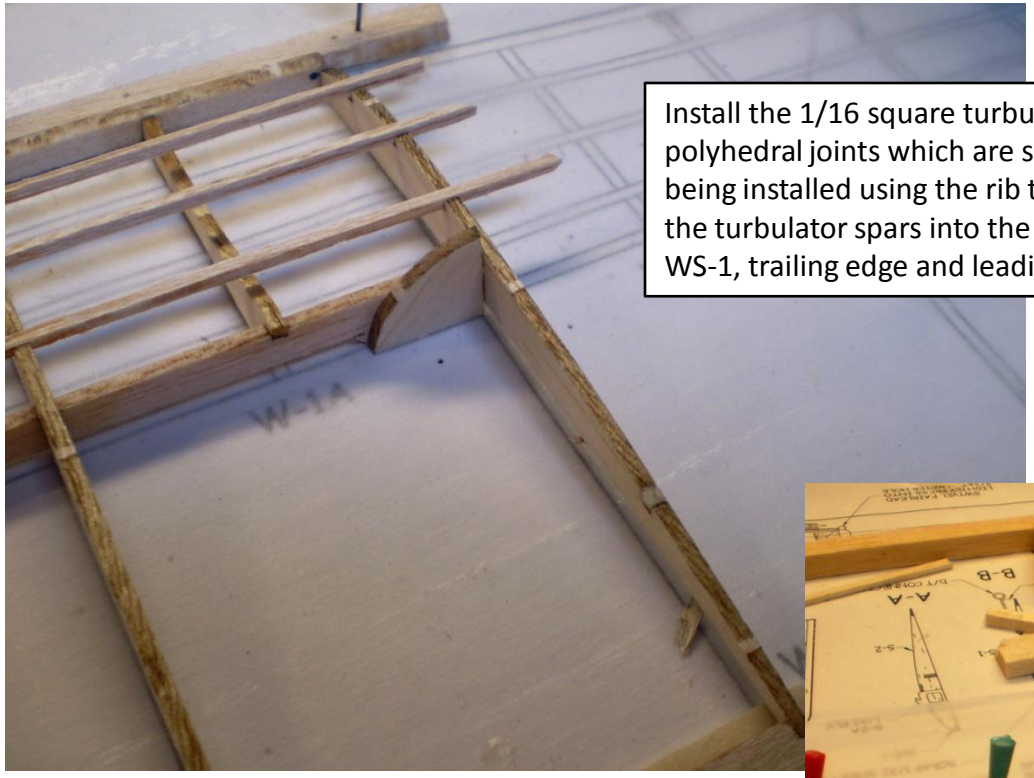
Another view of the tip trailing edge area with the T-2 gusset in place-set this approximately flush to the upper edge of T-1 and flush to the bottom at the front end of the trailing edge.



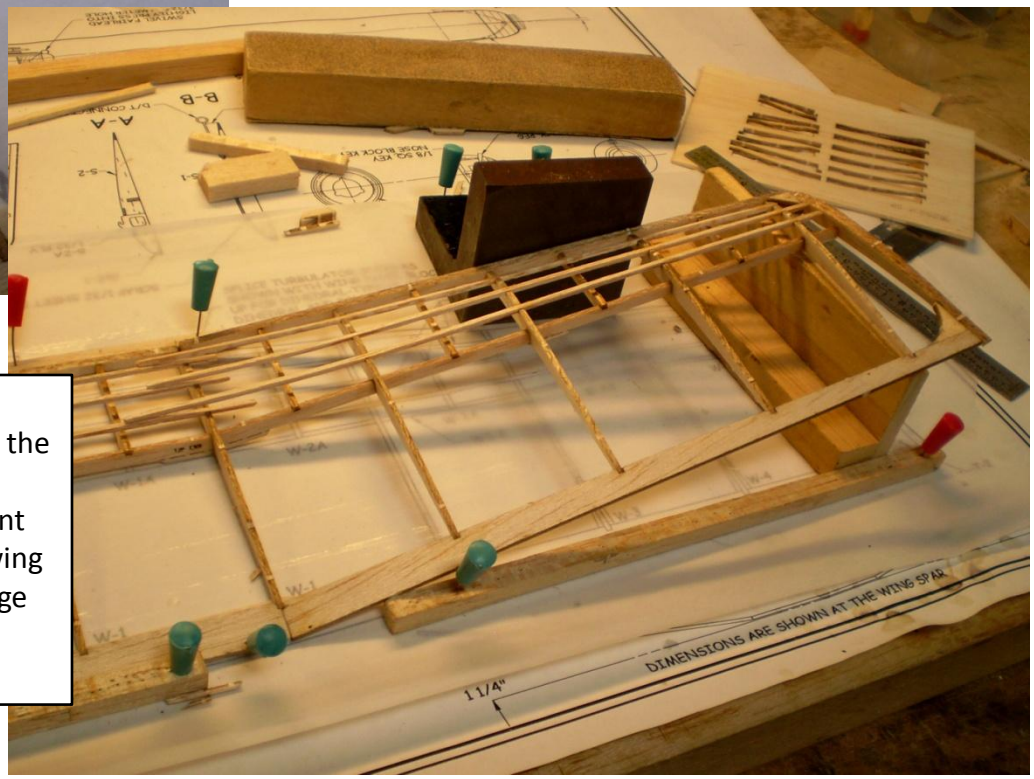
The second T-3 gusset is installed on top of the second one to complete the fillers on the wing tips.

Install the leading edge sub ribs in between the main ribs in their respective spar notches. Not shown here but important-the little triangular fillers WG-2 on the outboard tip rib ends. Without these the ribs ends will buckle and the trailing edge will warp down when the tissue covering shrinks and applies pressure on these thin cross sections. WG-2 gussets offer significant strength to prevent this.

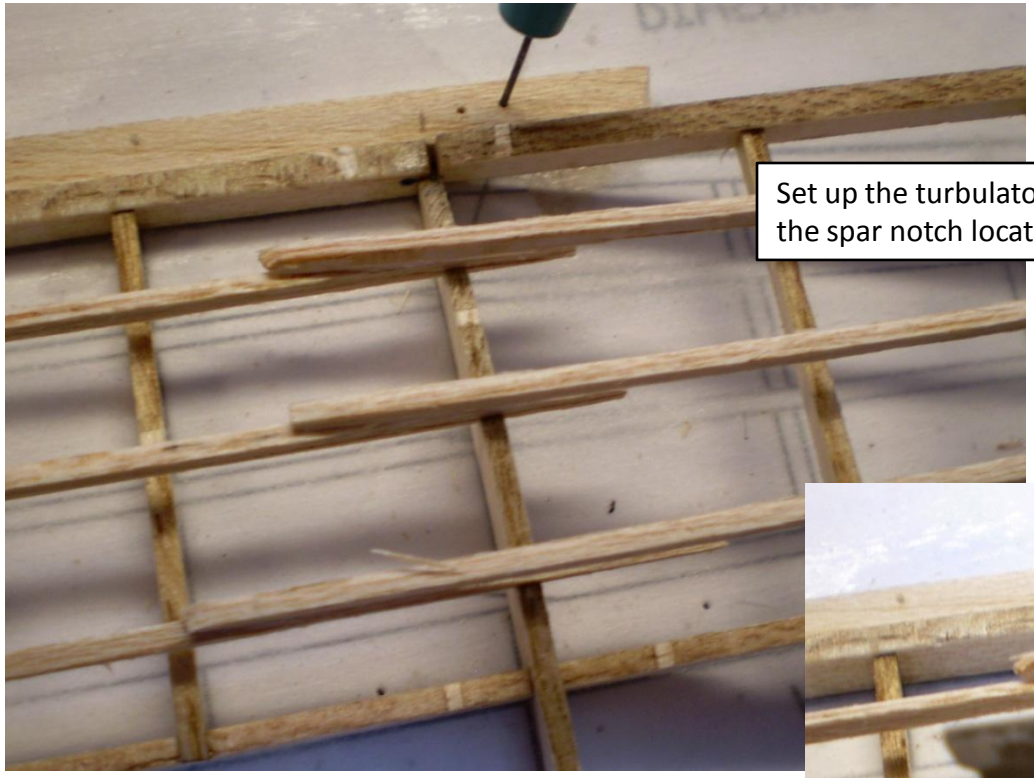
This is how the tapered shim under the tip panel trailing edge looks where it meets the tip rib. You can also see how the lower edge of the tip rib will be flush to the bottom of the trailing edge surface when the standoff tab is removed later.



Install the 1/16 square turbulator spars in all panels prior to preparing the polyhedral joints which are set first. This is showing a tip panel W-1 joint rib being installed using the rib tilt gage provided on the laser sheet. Do not glue the turbulator spars into the notches yet-just bond the rib to the end of spar WS-1, trailing edge and leading edge for now.

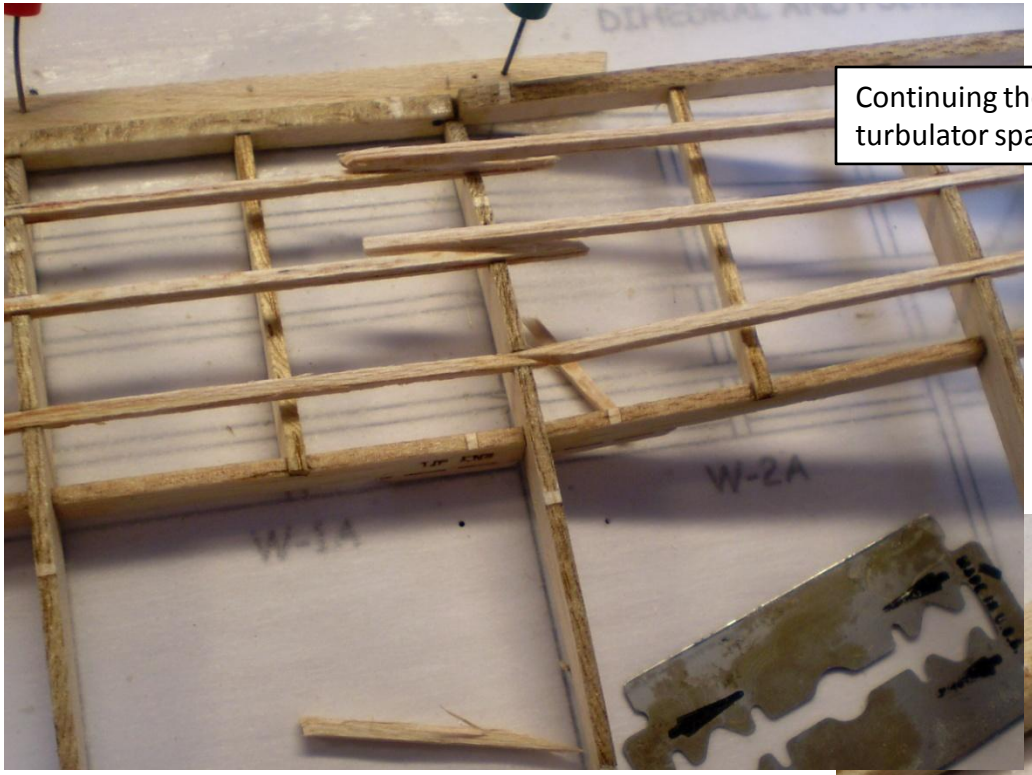


You can remove the tip panel and very lightly touch up the leading and trailing edge joints with a sanding block to include the bevel required for the polyhedral angle. Then dry fit with the center panel using blocking to maintain the projected alignment to the drawing. Block up to the dimension shown on the drawing and glue the trailing edge joint, main spar joint and leading edge joints for now. Note the wild ends of the turbulator spars overlapping at the W-1 joint rib location.

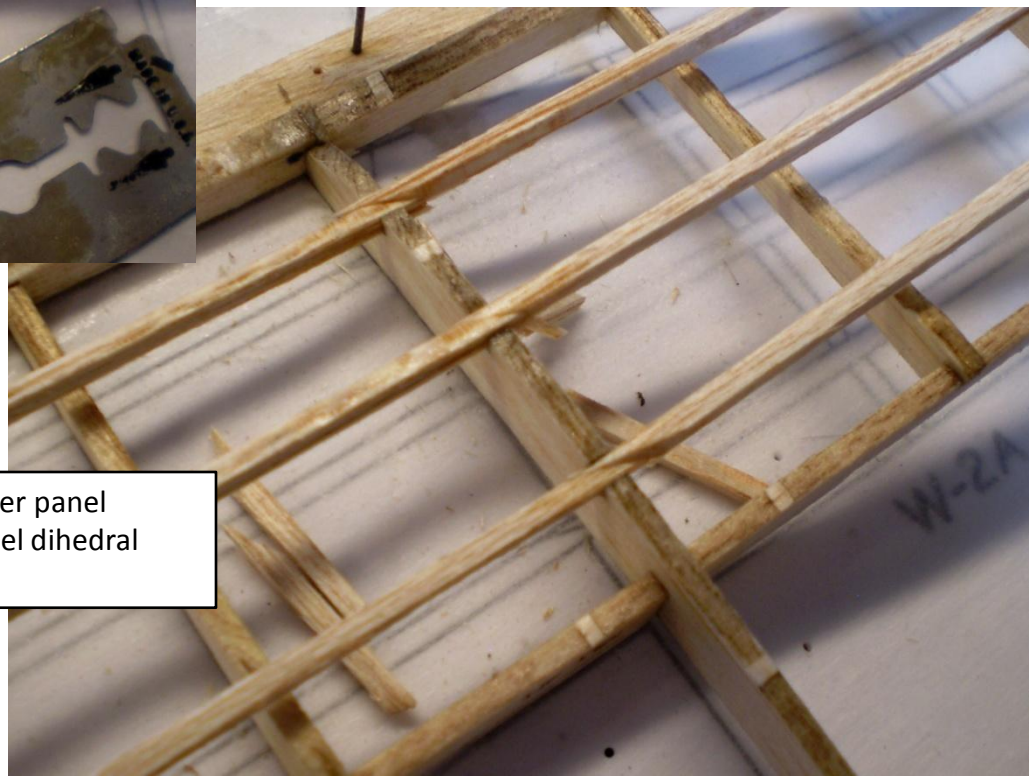


Set up the turbulator spars to overlap neatly at the spar notch locations in the W-1 joint rib.

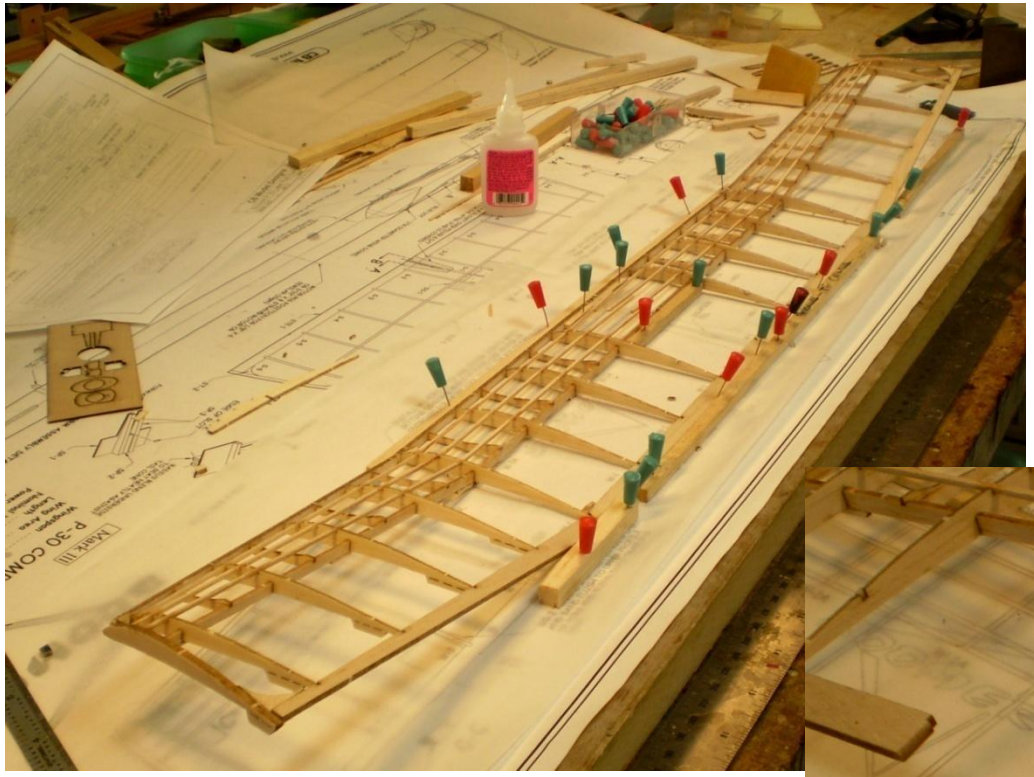
Using a very fine, sharp razor slice through the stack up of each spar overlap to create a matching scarf joint centered on the rib notch. Allow both ends to fit together in the notch and glue. Any gaps in the joint can be filled with thin shims of balsa, glued and cleaned up after. This is a very light and efficient joint that has never failed in all the years I've been flying this design. You should need no other reinforcements at any of the dihedral break joints if the wing is constructed neatly and these joints are well fitted and solidly glued.



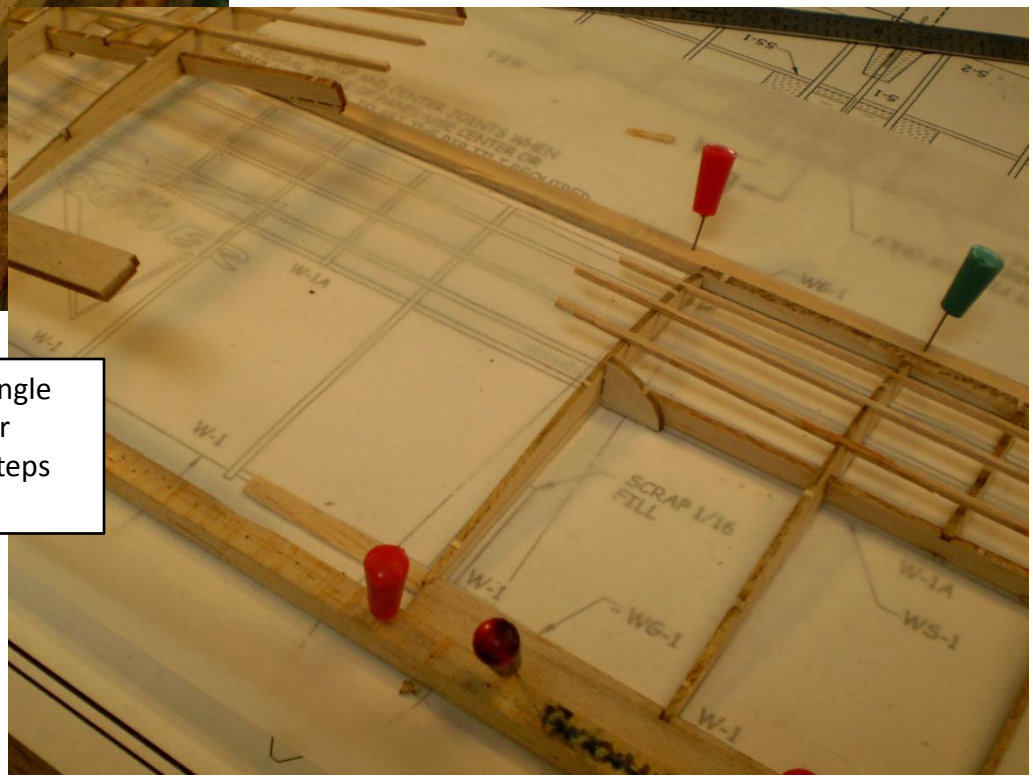
Continuing the process to scarf the overlapping turbulator spar joints.



Finished splicing of the tip panel to center panel turbulator spars-this locks in the tip panel dihedral firmly.



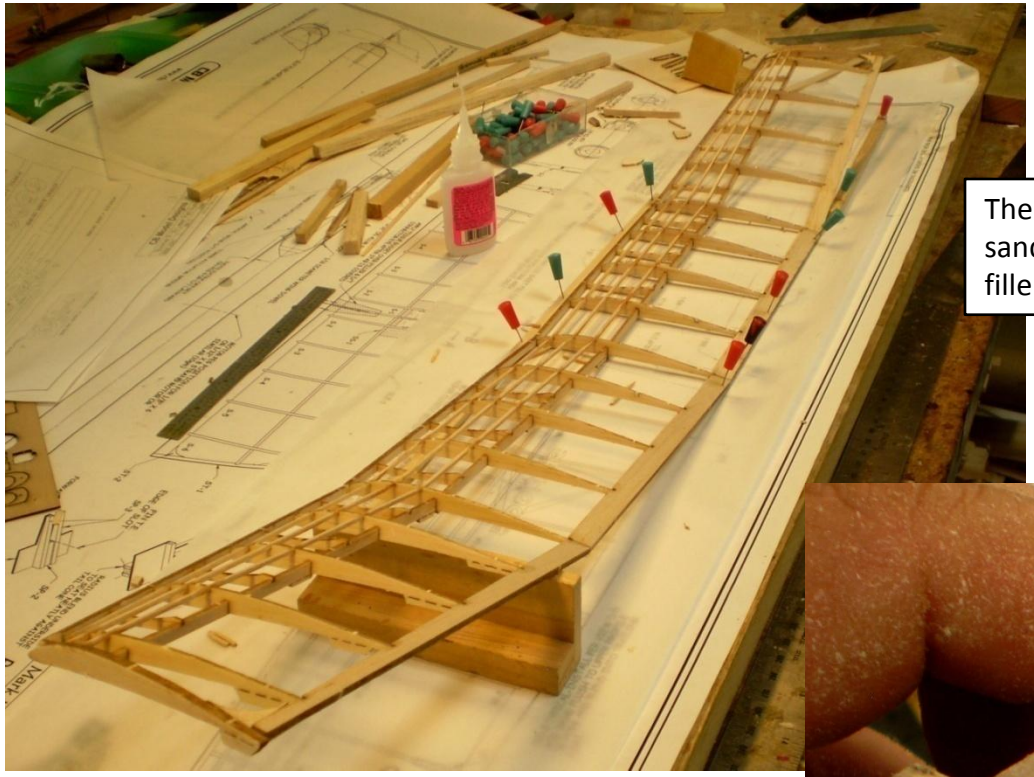
Wing rig with tip panels set-the center panels still require the dihedral set. This is performed in the same manner as the tip panels.



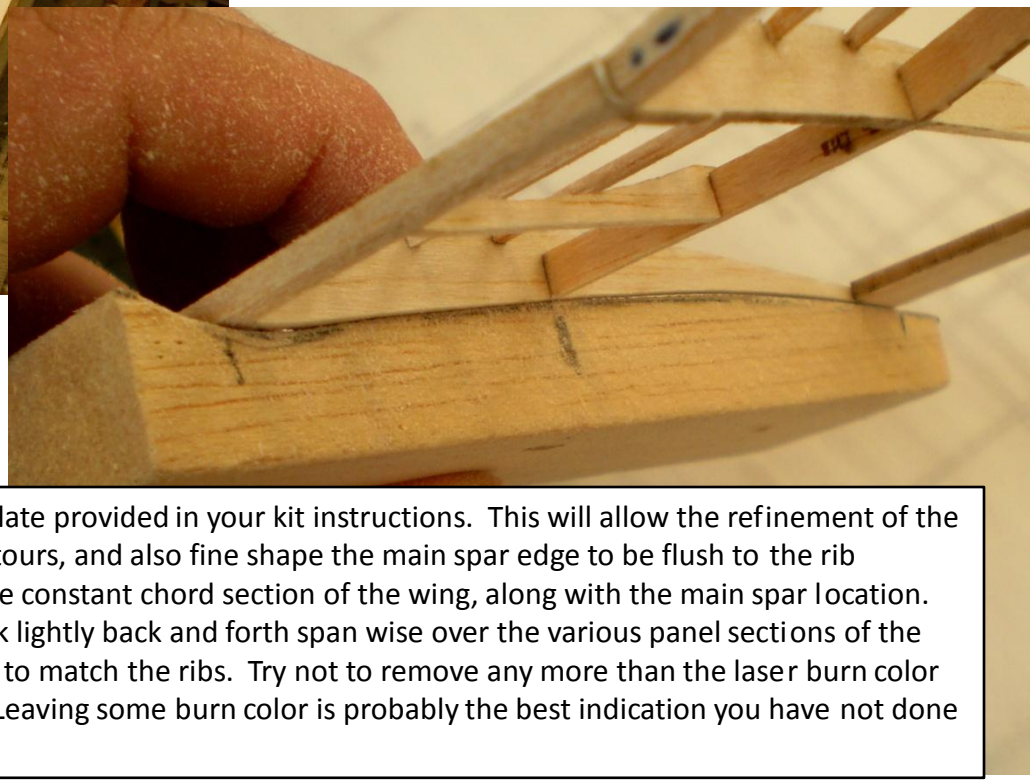
Setting the center w-1 joint rib using the angle gauge included. Do not glue the turbulator spars in the notches yet-follow the same steps as used to set the tip panels.

CB Model Designs

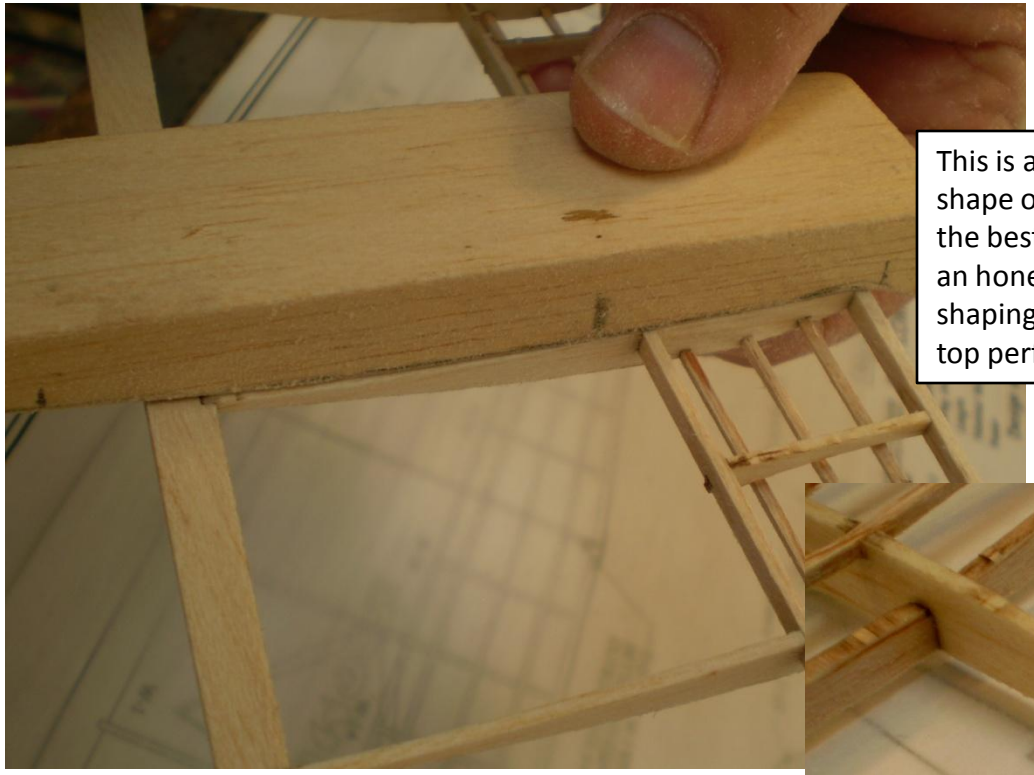
www.cbmodeldesigns.com



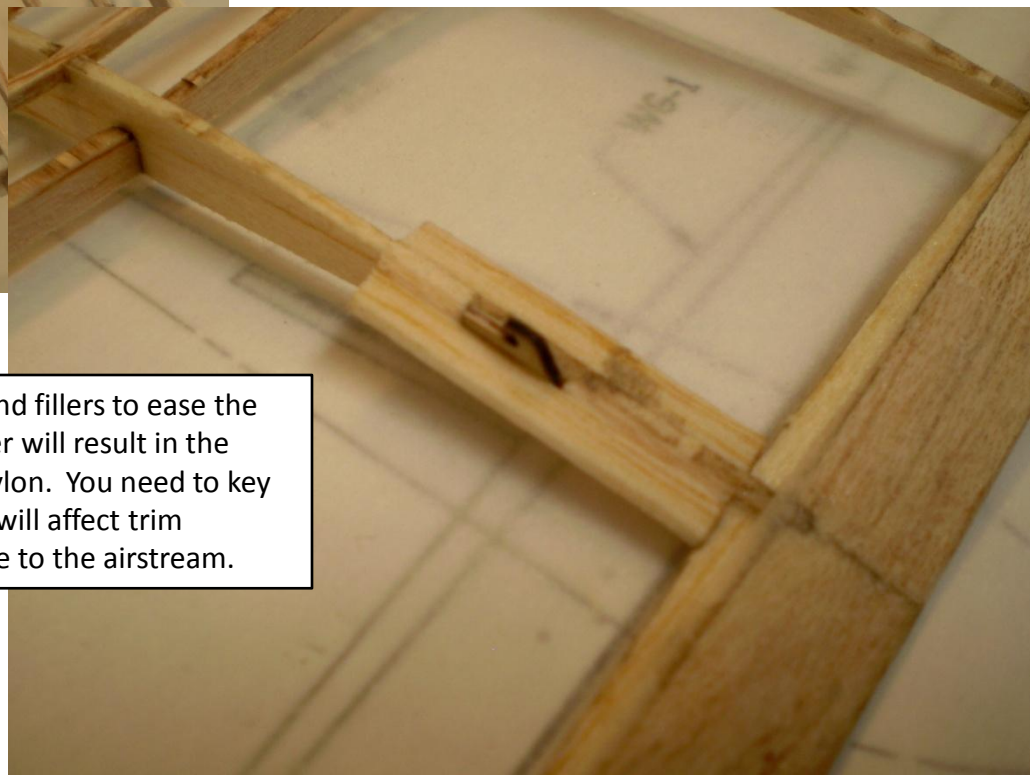
The wing frame is assembled and ready to be sanded to shape. Install the wing D/T hooks and fillers after the basic shaping is complete.



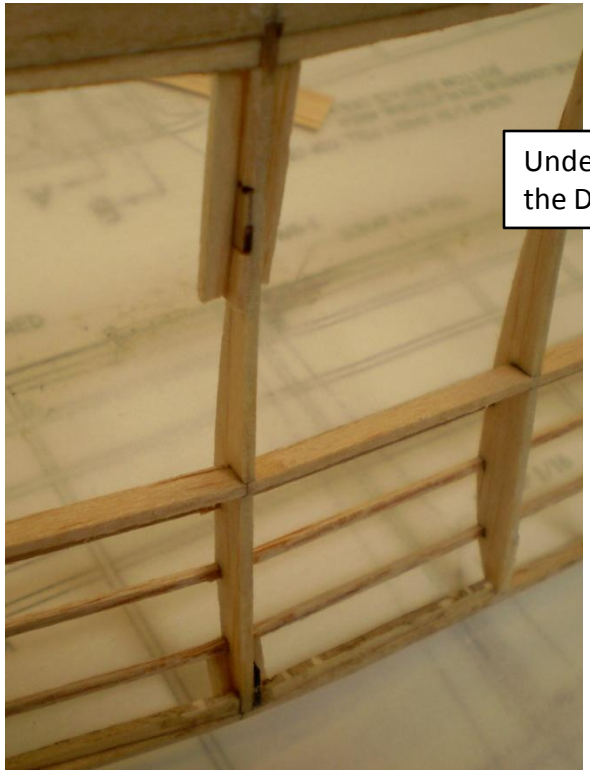
I suggest fabricating a contoured sanding block from the template provided in your kit instructions. This will allow the refinement of the lower surface of the trailing edges to be flush with the rib contours, and also fine shape the main spar edge to be flush to the rib bottoms. Mark where the leading and trailing edges are on the constant chord section of the wing, along with the main spar location. This is a very light sanding operation where you draw the block lightly back and forth span wise over the various panel sections of the wing. It will slowly work down the surface of the trailing edge to match the ribs. Try not to remove any more than the laser burn color on the rib edges-go easy and carefully to avoid over sanding. Leaving some burn color is probably the best indication you have not done any damage to the profile of the ribs.



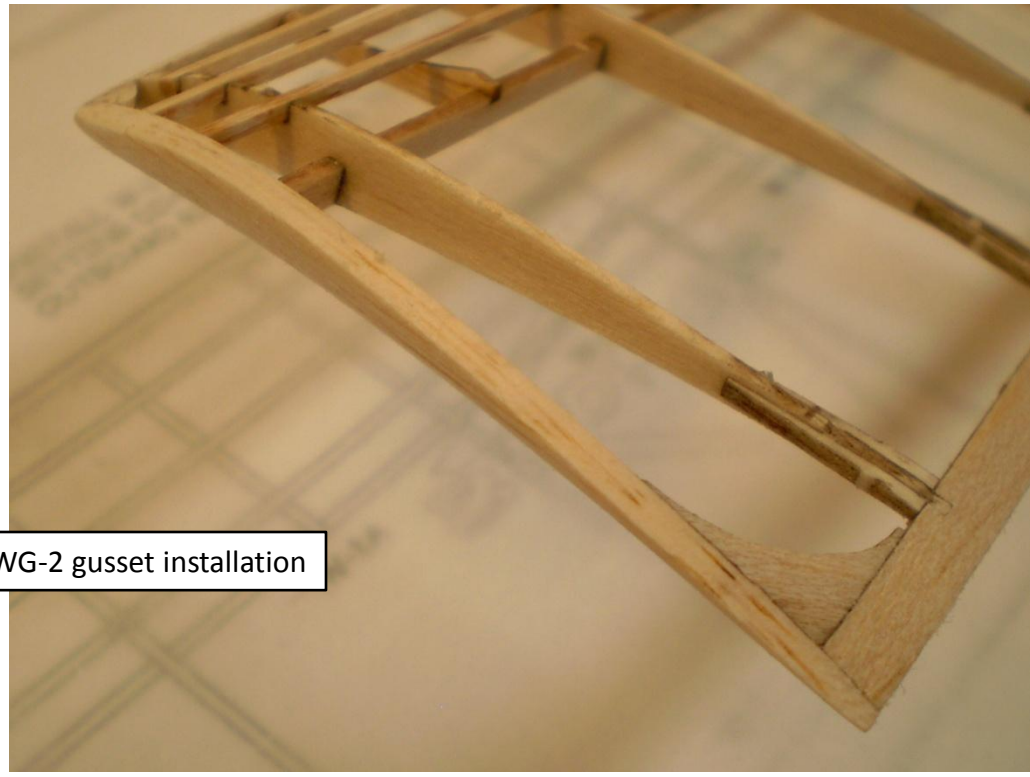
This is attempting to show the sanding block contour still fits the shape of the tip panel ribs by adjusting forward and aft until you see the best fit, and then carefully work this panel in like the rest. It takes an honest hour of careful sanding to do a proper job on the wing shaping. Don't rush this part as it is the heart of the design and offers top performance if done neatly.



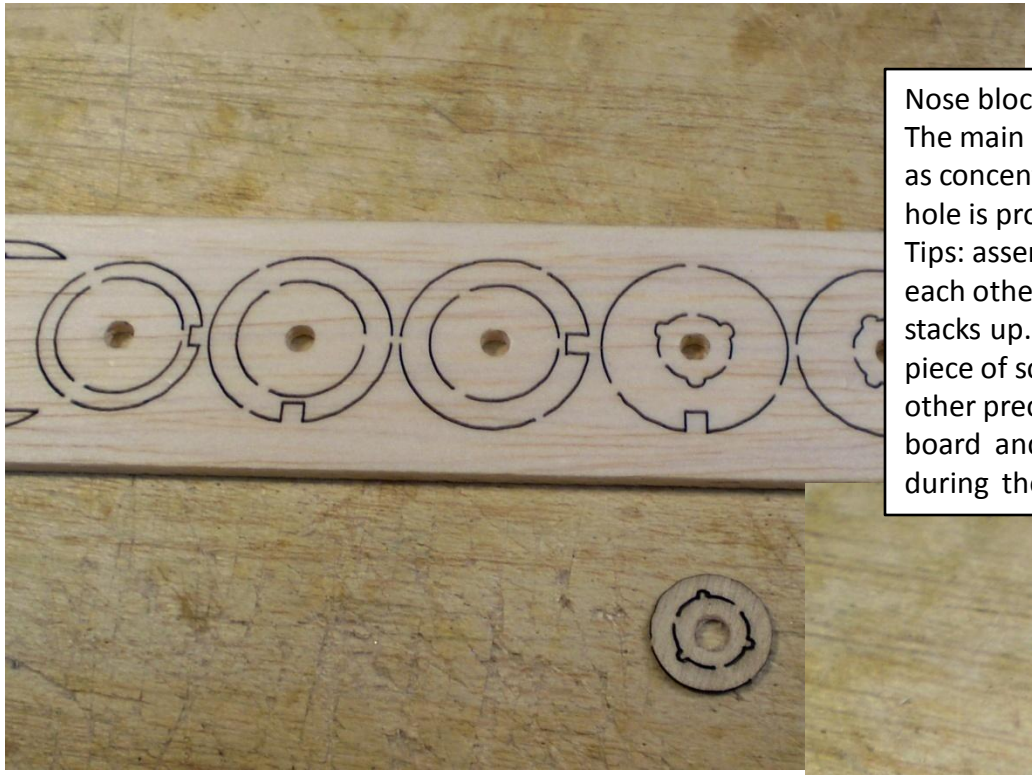
After shaping the wing completely, add the D/T hooks and fillers to ease the covering installation. Having the hooks slightly off center will result in the wing wanting to rotate slightly when mounted on the pylon. You need to key the wing to the pylon after covering to control this as it will affect trim characteristics by allowing the tip panels to skew relative to the airstream.



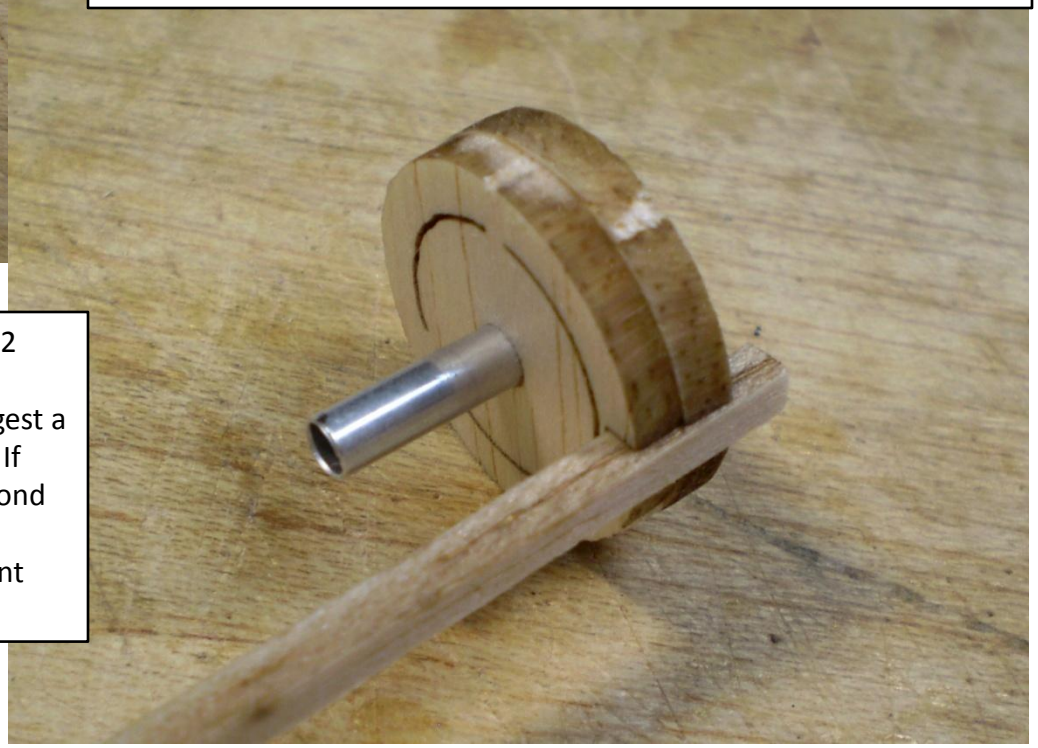
Underside of the wing center section showing the D/T hook installations



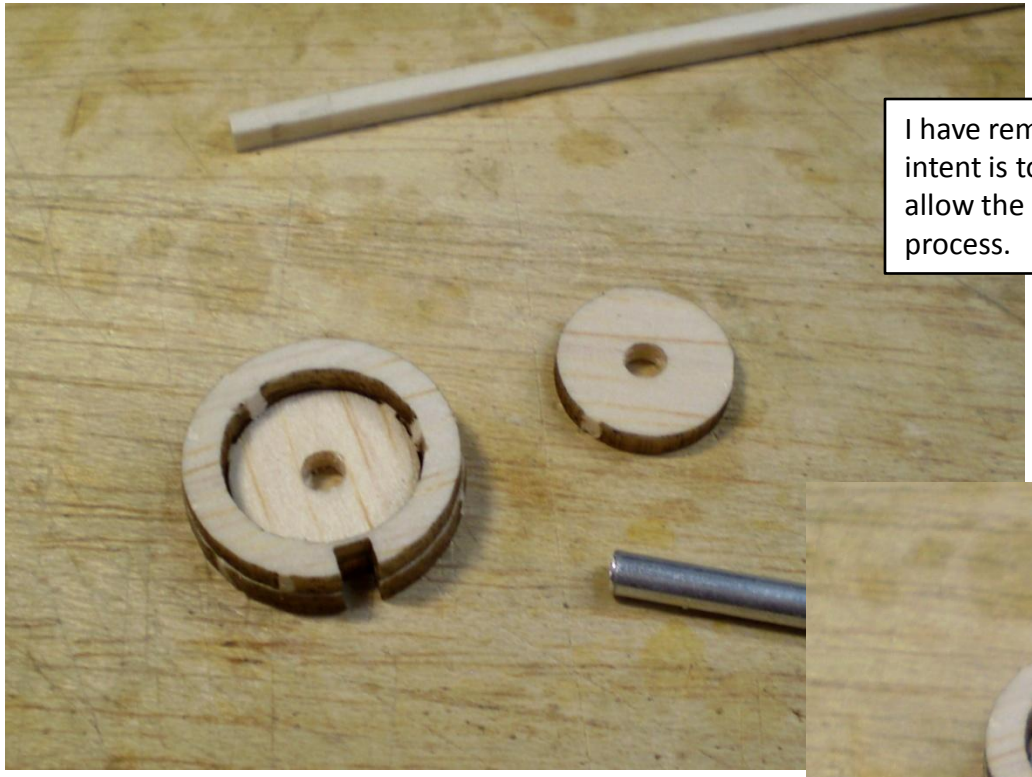
Final shape of the wingtip and WG-2 gusset installation



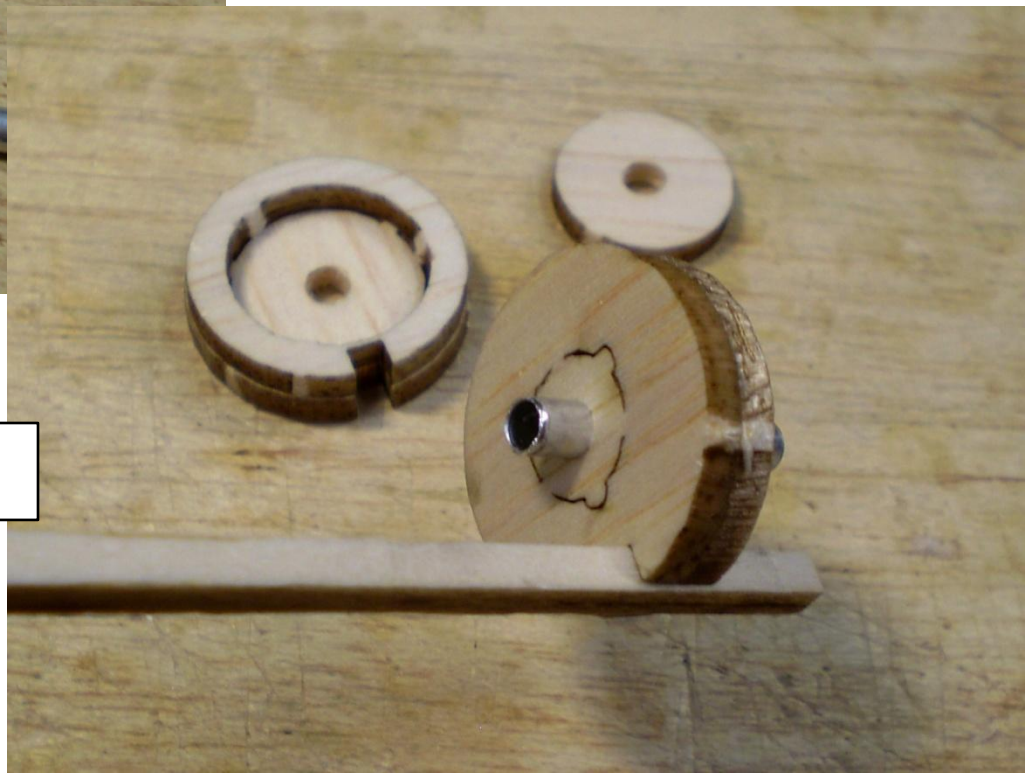
Nose block construction can be performed in several different ways. The main objective in the rough assembly is to keep the various discs as concentric to each other as you can. The 5/32" diameter center hole is provided to give reference to a common center.
Tips: assemble the discs against two surfaces that are 90 degrees to each other and maintain an even cylindrical shape as this assembly stacks up. Another option is to install a 5/32 diameter mandrel into a piece of scrap flat wood that has been drilled using a drill press or other precision method to yield a perpendicular alignment to the board and install the discs over this to maintain stable alignment during the assembly process.



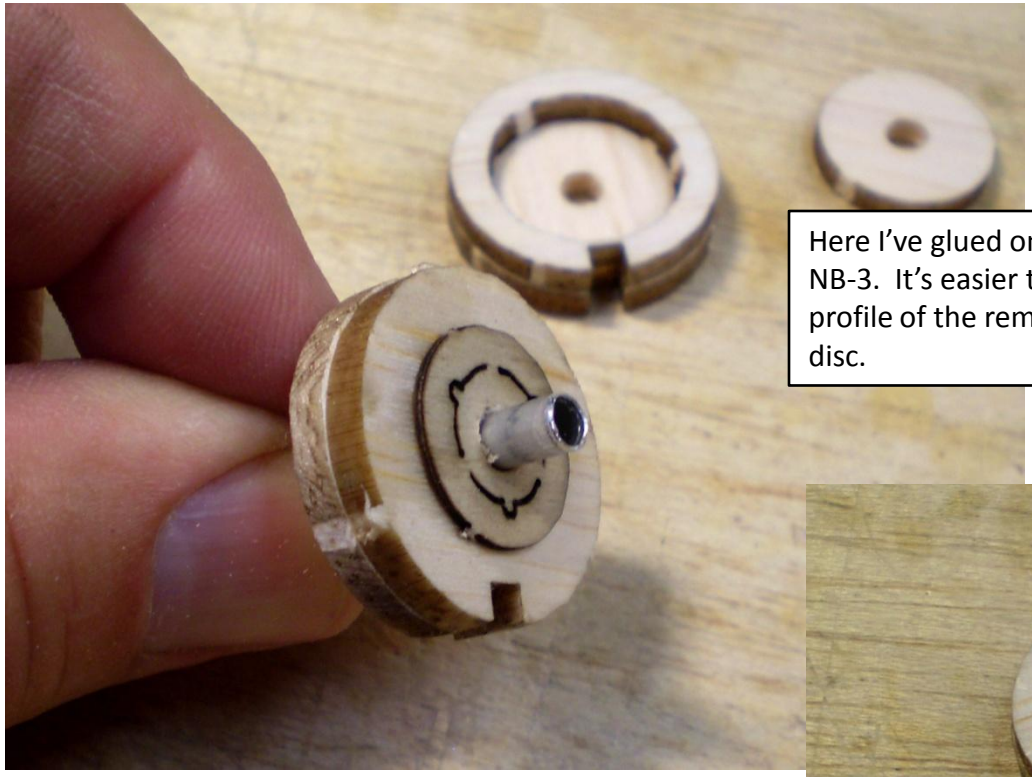
I'm starting with assembly of the two NB-2 discs using a 5/32 diameter tube as an assembly mandrel, and a secondary alignment using the notch provided for the index key. I suggest a very light tack glue in a few spots to hold together for now. If you apply CA heavily it will soak down the balsa grain and bond the mandrel in place. Don't completely glue the nose block assembly (all steps complete) until you remove the alignment mandrel.



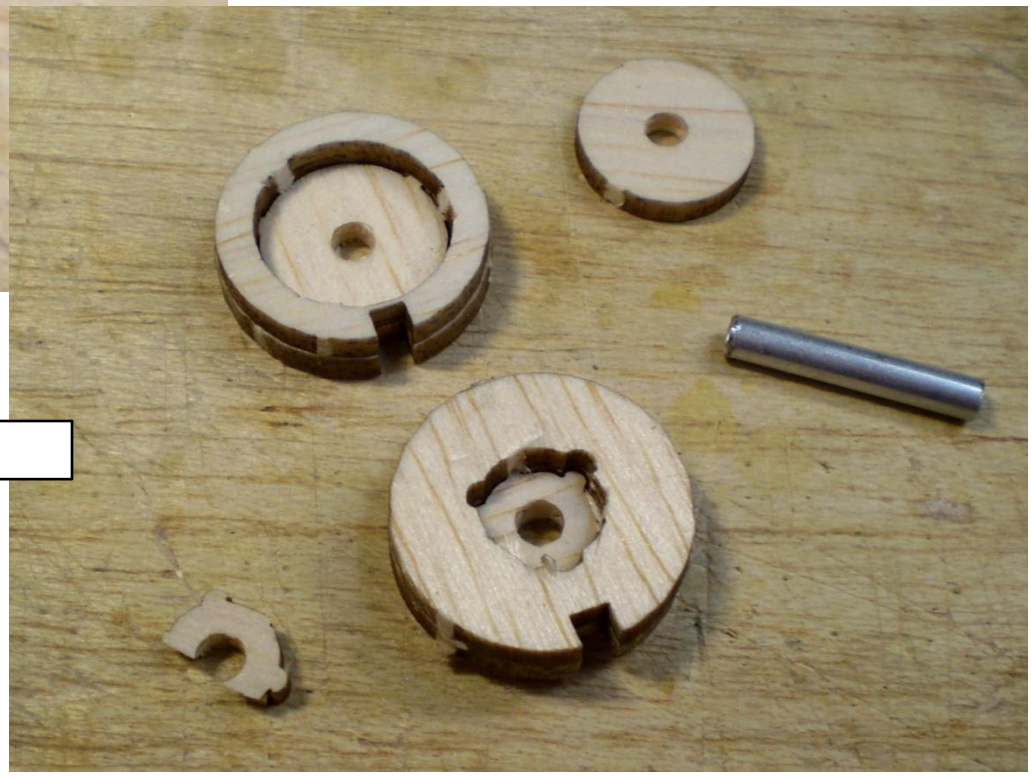
I have removed one of the slugs from the assembly. The intent is to leave some cavities in the built-up assembly to allow the slugs to collapse for extraction at the end of the process.



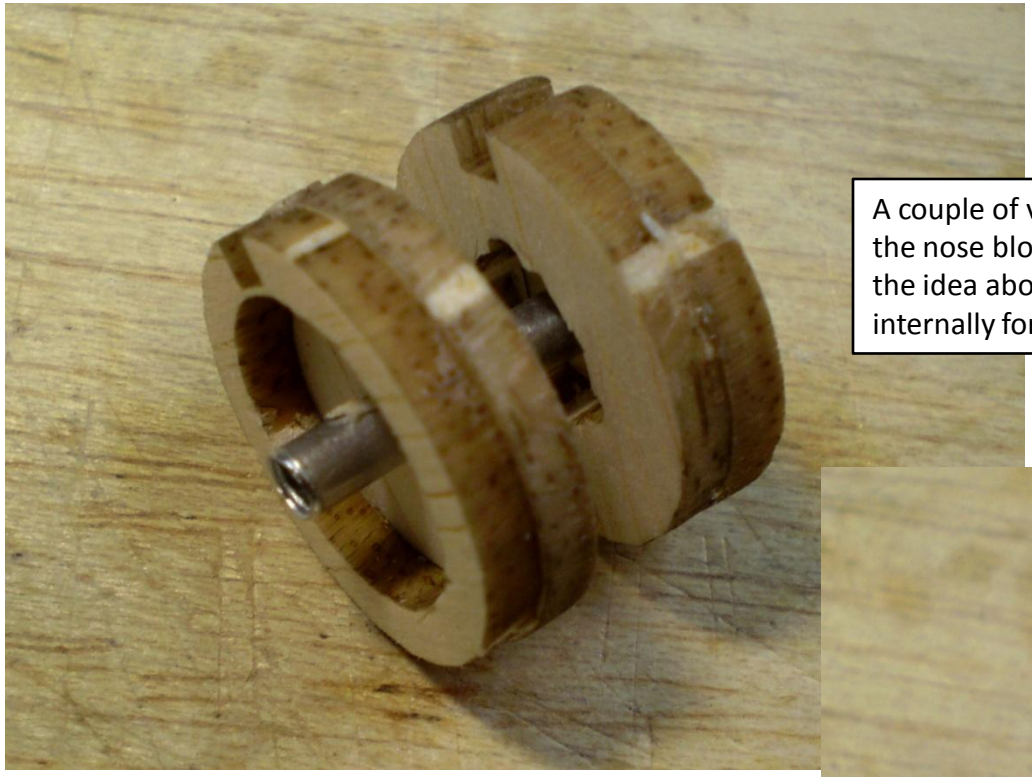
I'm repeating the subassembly process with the two NB-3 discs.



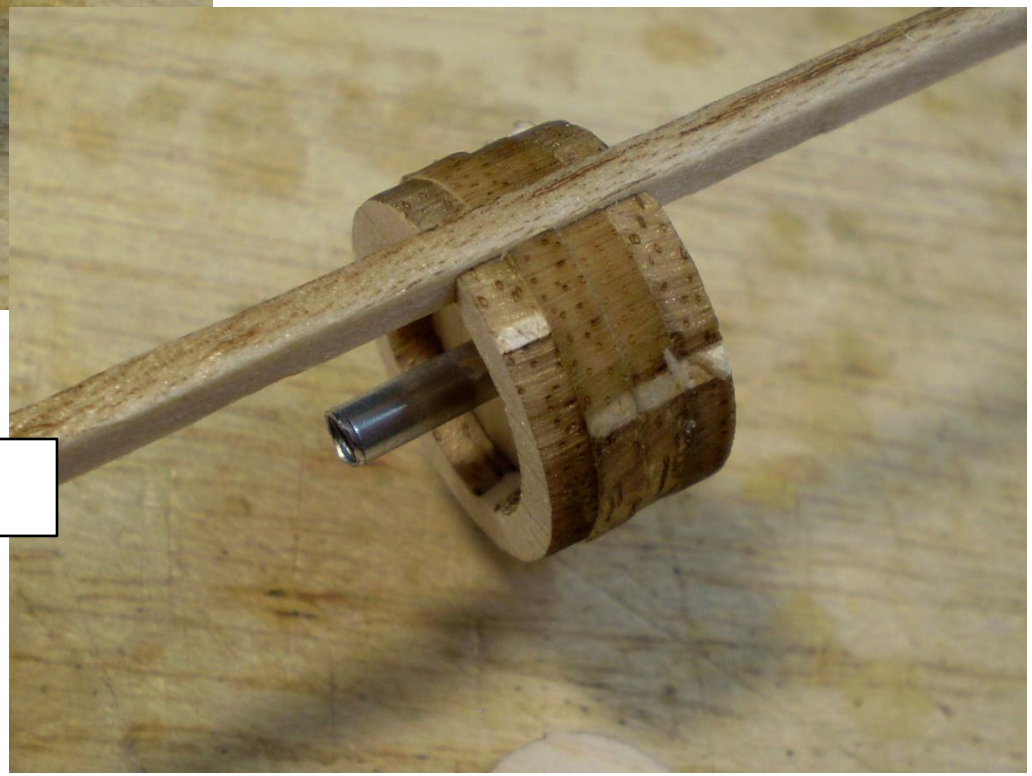
Here I've glued on the NB-4 plywood doubler on the front of NB-3. It's easier to take out the slug in NB-4 first and align the profile of the remaining edge to the same pattern in the NB-3 disc.



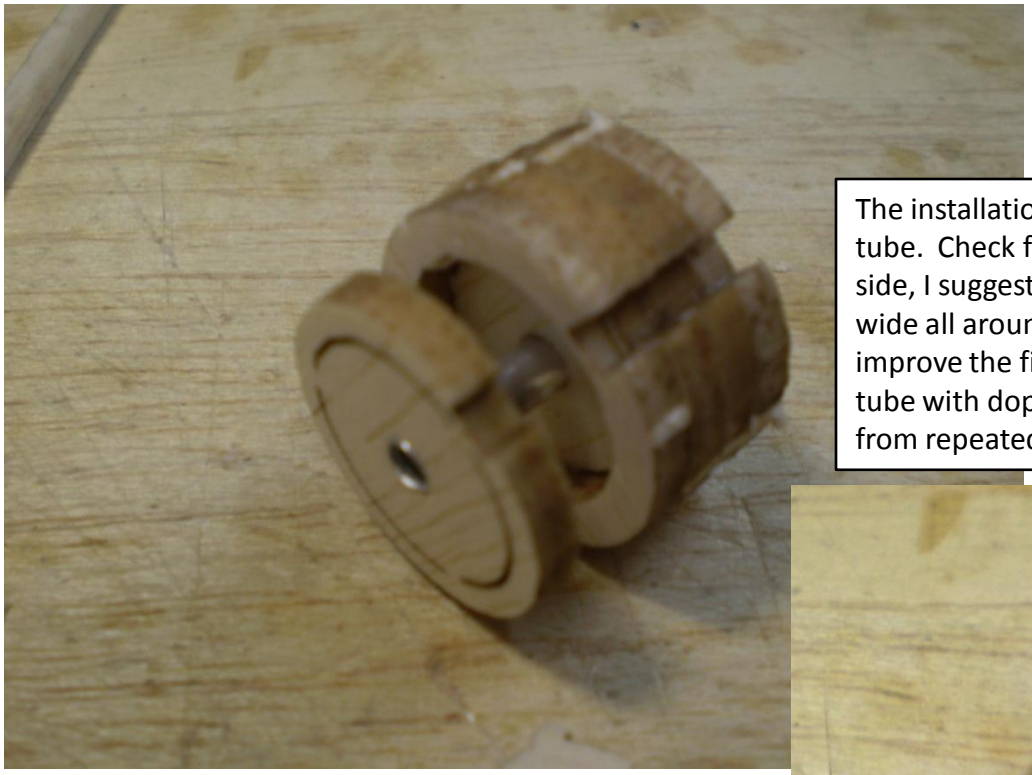
I've removed the aft slug in the NB-3 stack



A couple of views showing the final assembly of the nose block subassemblies. This gives you the idea about the cavities that are left internally for the slug removal step.

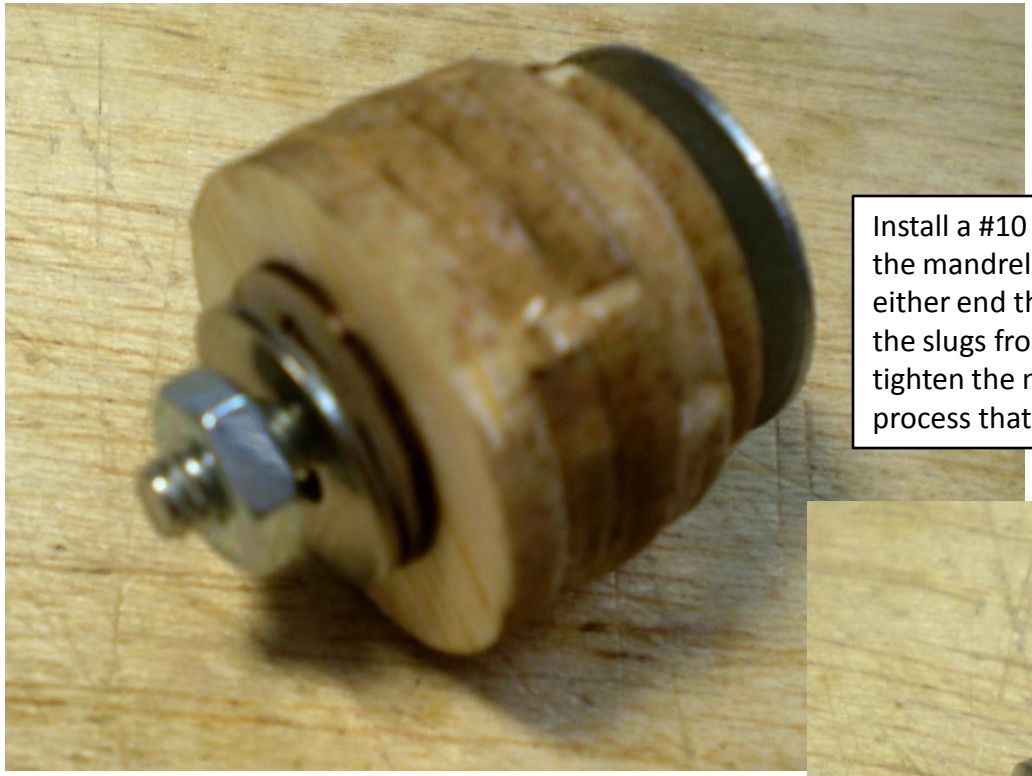


Using 1/8 thick scrap material to maintain the alignment to the index key slot.



The installation of the NB-1 ring that fits into the fuselage tube. Check for a fairly snug fit here. If it is on the loose side, I suggest adding a strips of tissue approximately ½" wide all around the inside surface of the fuselage tube to improve the fit. Adhere the tissue well to the motor tube with dope or thin CA so it won't easily peel back from repeated installations of the nose block in use.

Do your best to get NB-1 aligned evenly with the NB-2 disc for a uniform fit into the front end of the fuselage tube.



Install a #10 machine screw or similar that fits the mandrel holes snugly. Use a washer over either end that will be large enough to prevent the slugs from being pulled through when you tighten the nut. Snug firmly for the turning process that follows for final shaping.

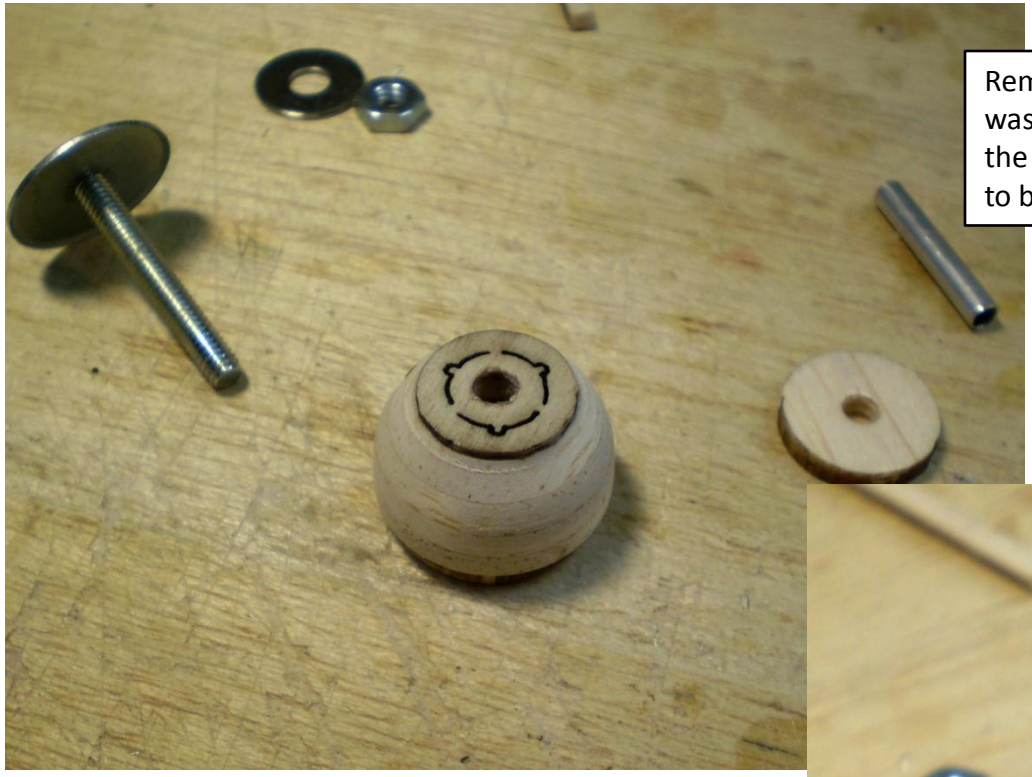
Setting up in a drill press to perform the final shaping of the nose block. This can also be done using a hand drill motor.

Carefully turn the cylinder down to clean up. Pay attention the diameter of the cylinder to the step at the back end common to NB-1 to avoid over sanding and not being flush with the fuselage tube outer diameter. You can remove and check fit-this is a minimum clean step to achieve flushness with the fuselage tube.

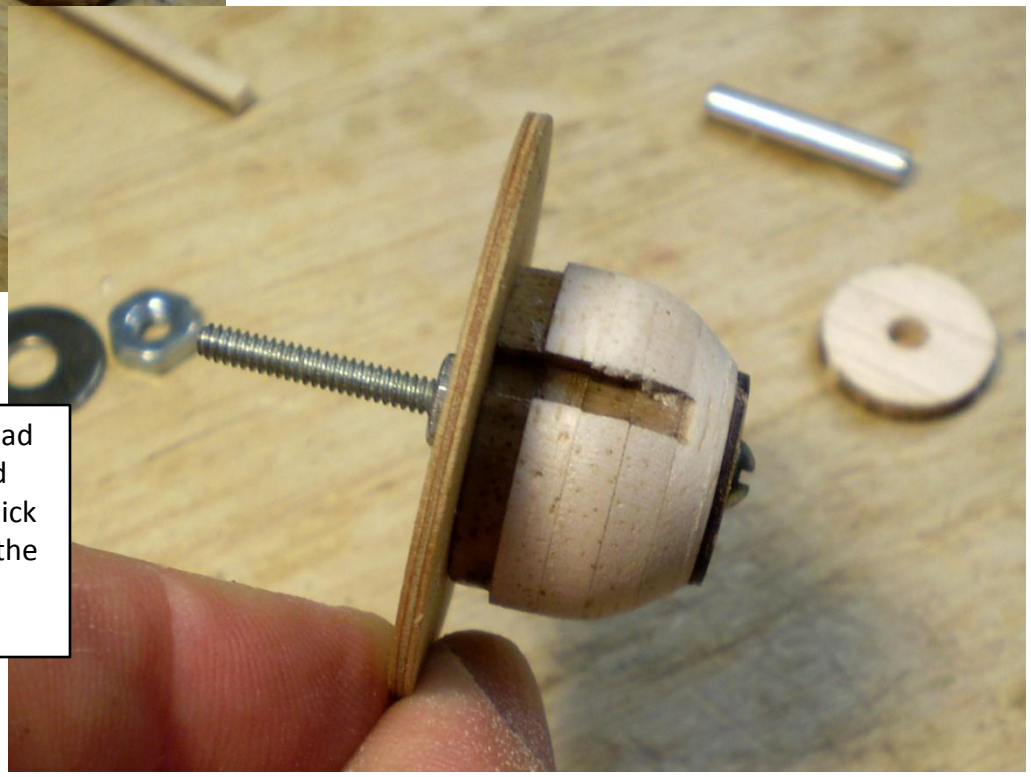
Profile in a radius blend from the aft edge to the diameter of the NB-4 ply doubler. Fine sand and that completes this operation.

CB Model Designs

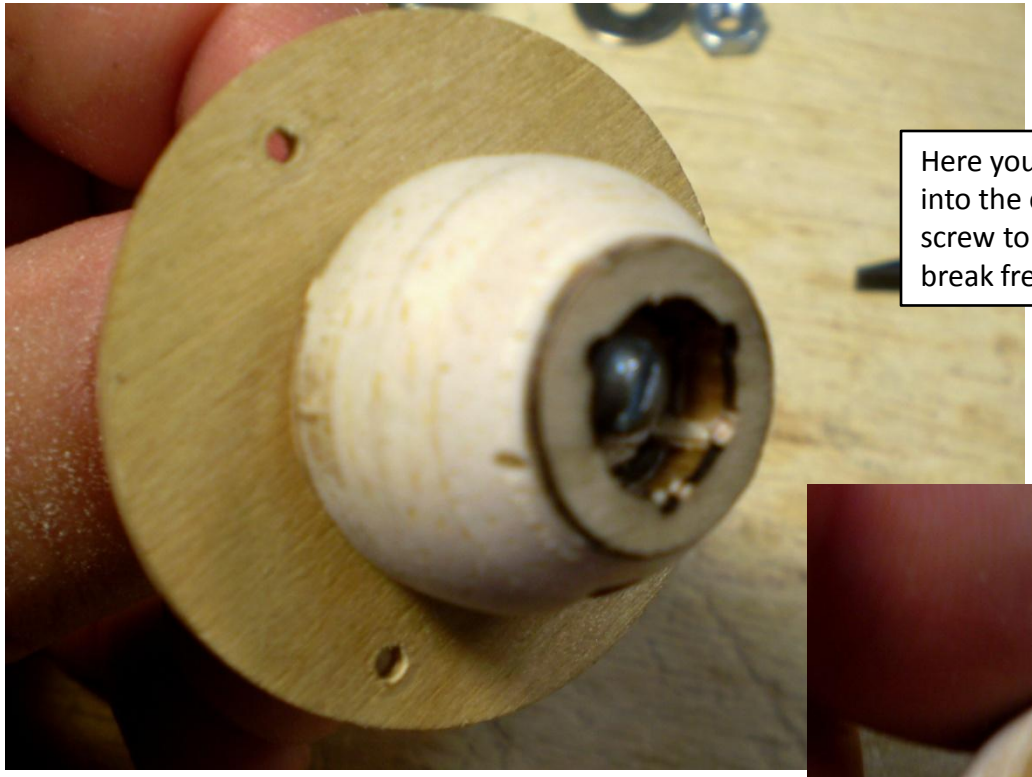
www.cbmodeldesigns.com



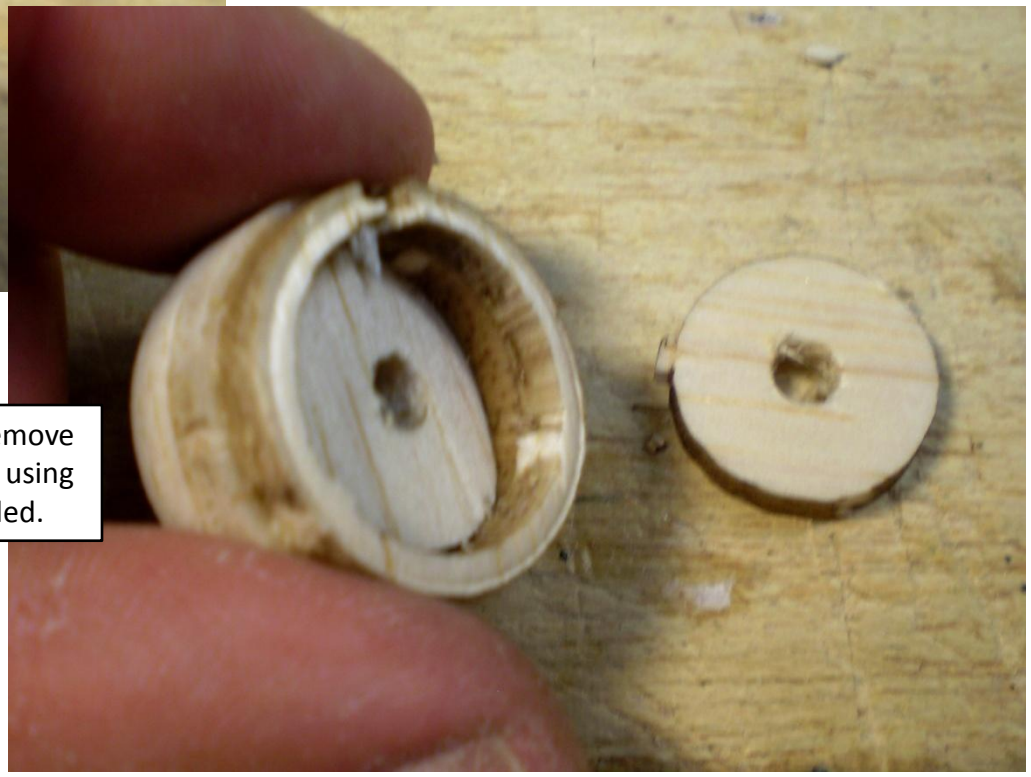
Remove the mandrel and replace with a large washer or plate on the back side of NB-1, and the screw head at the front within the slug area to be removed



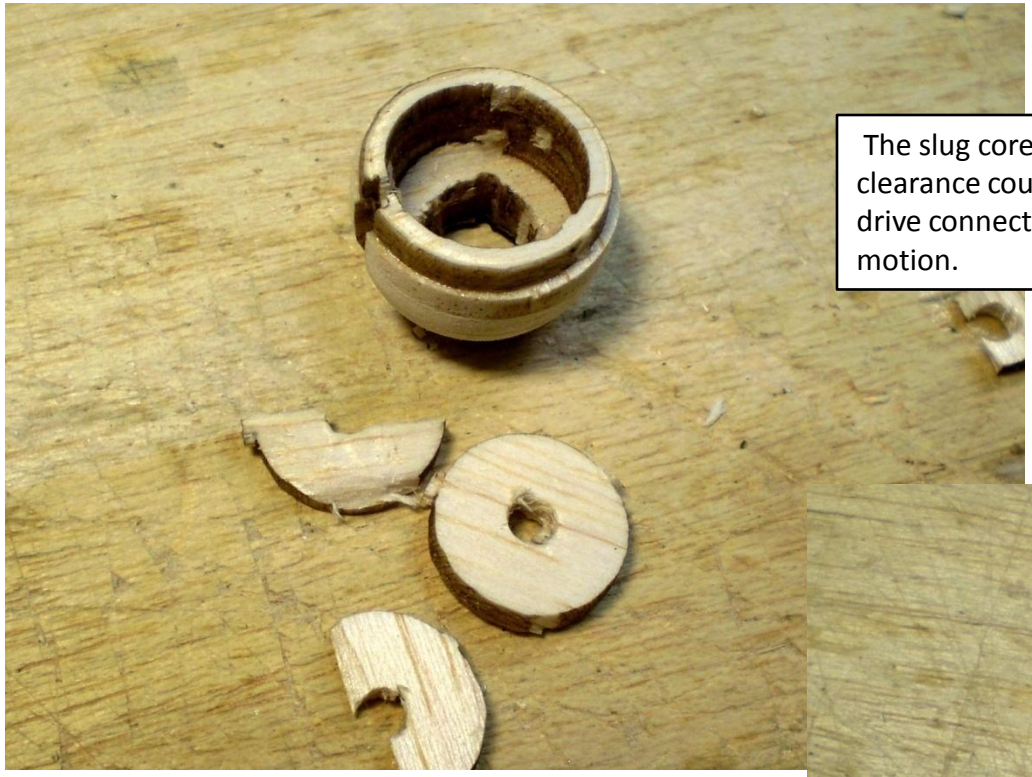
By tightening the screw and nut the screw head will start to compress the slug in NB-3 toward the back. Go slowly and use a #11 blade to nick or loosen as needed to keep from damaging the sides of the bore that is being created by removal of the slugs.



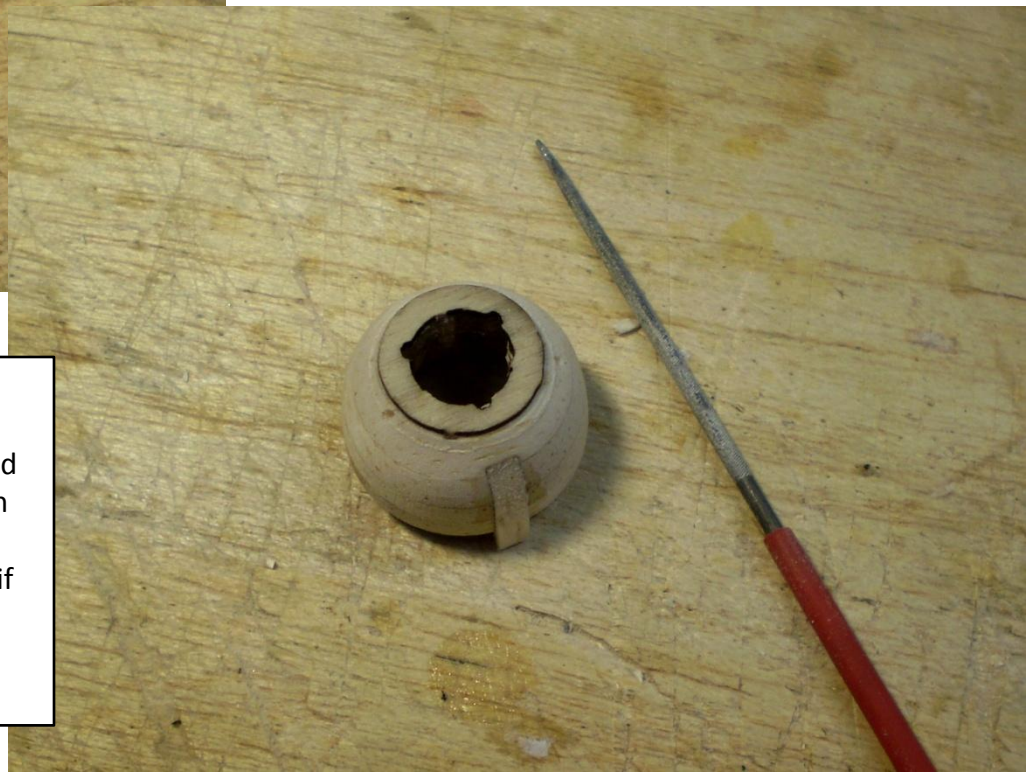
Here you can see how the slug has collapsed into the cavity behind it. Keep tightening the screw to draw down on the slugs until they break free.



Remove the screw and plate to carefully remove any of the slug material from the back end using the #11 blade to split or chip away as needed.



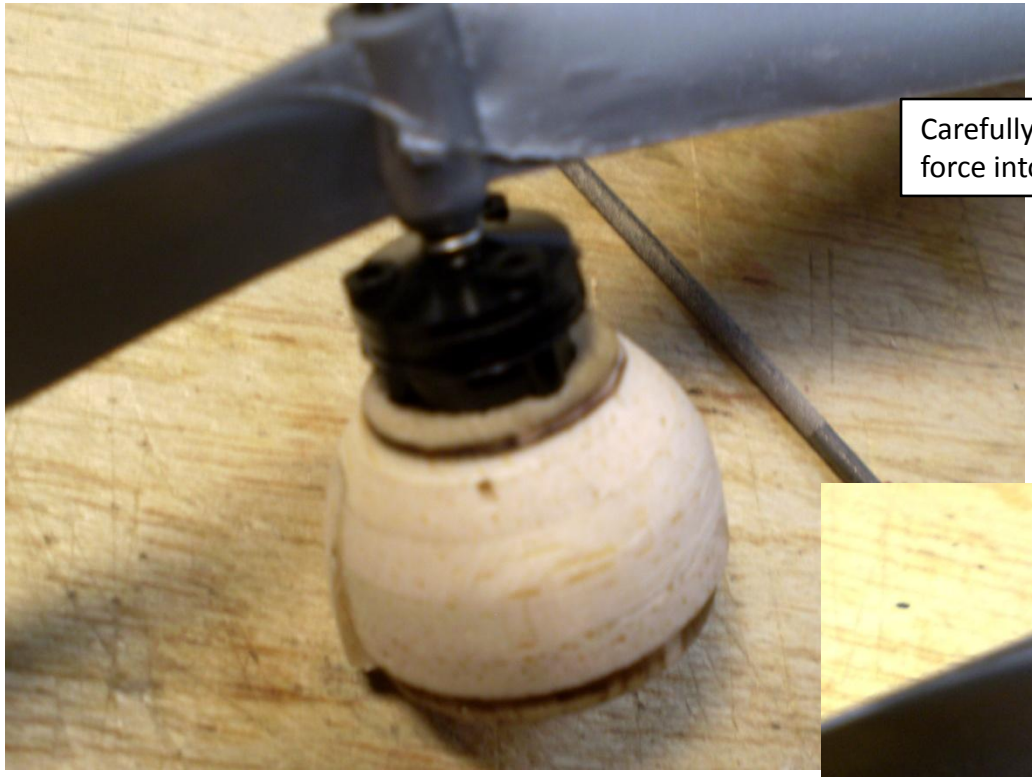
The slug cores removed, leaving the needed clearance counter bore for the Gizmogeezer drive connector and thrust adjustment range of motion.



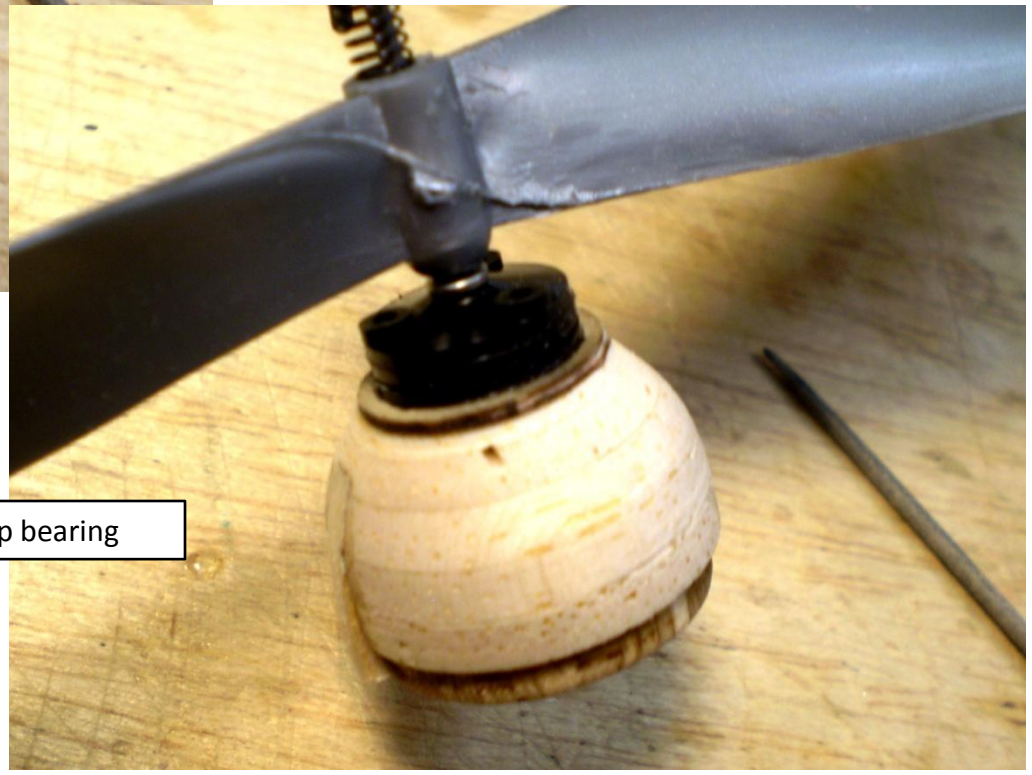
Use a jewelers rat tail file to enlarge the three prop bearing boss clearance notches. Also lightly sand the hole with a sandpaper wrapped dowel to lightly clean up and provide a smooth installation of the prop bearing. Too tight and the bearing will cause the nose block to crack if pressed in. Note the index key has been installed and sanded to match the nose block contour.

CB Model Designs

www.cbmodeldesigns.com



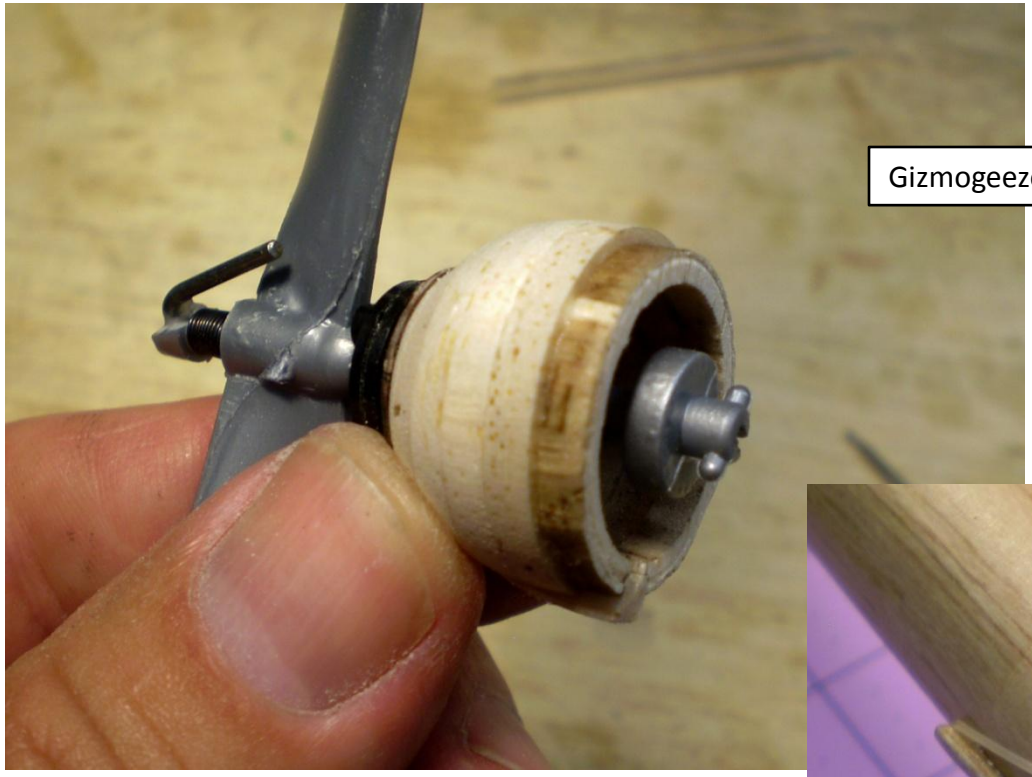
Carefully pre-fit the prop bearing in place-do not force into place.



The fully seated prop bearing

CB Model Designs

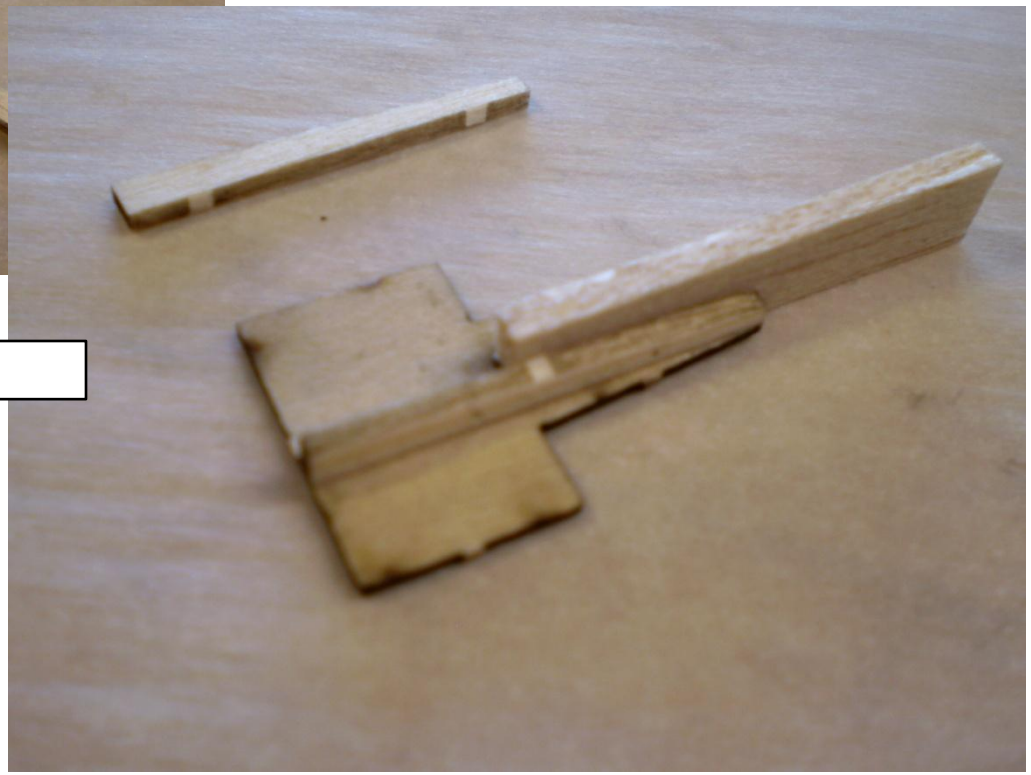
www.cbmodeldesigns.com



Gizmogeezer prop unlocked and in run position.

Fuselage index notch and tension band pegs

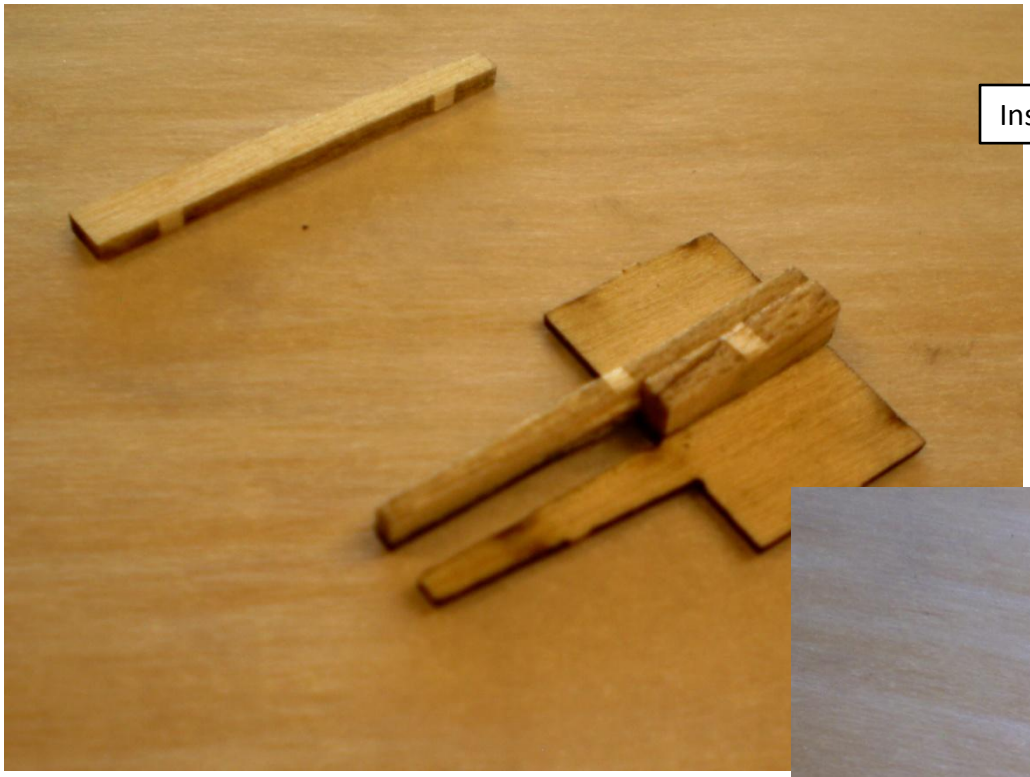
Assembly of the stab platform starts with use of scrap 3/32 material in the fork slot that goes around the fin base to provide a reference surface for gluing on the 1/16 SP-3 fillers on either side.



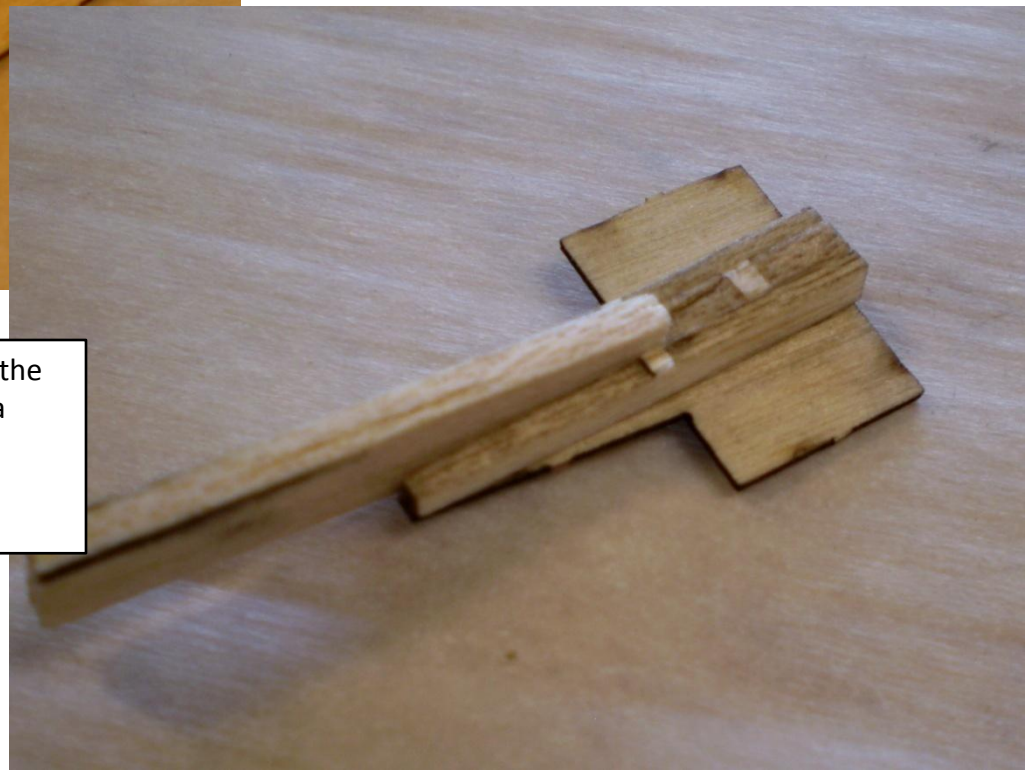
One of the SP-3 fillers installed

CB Model Designs

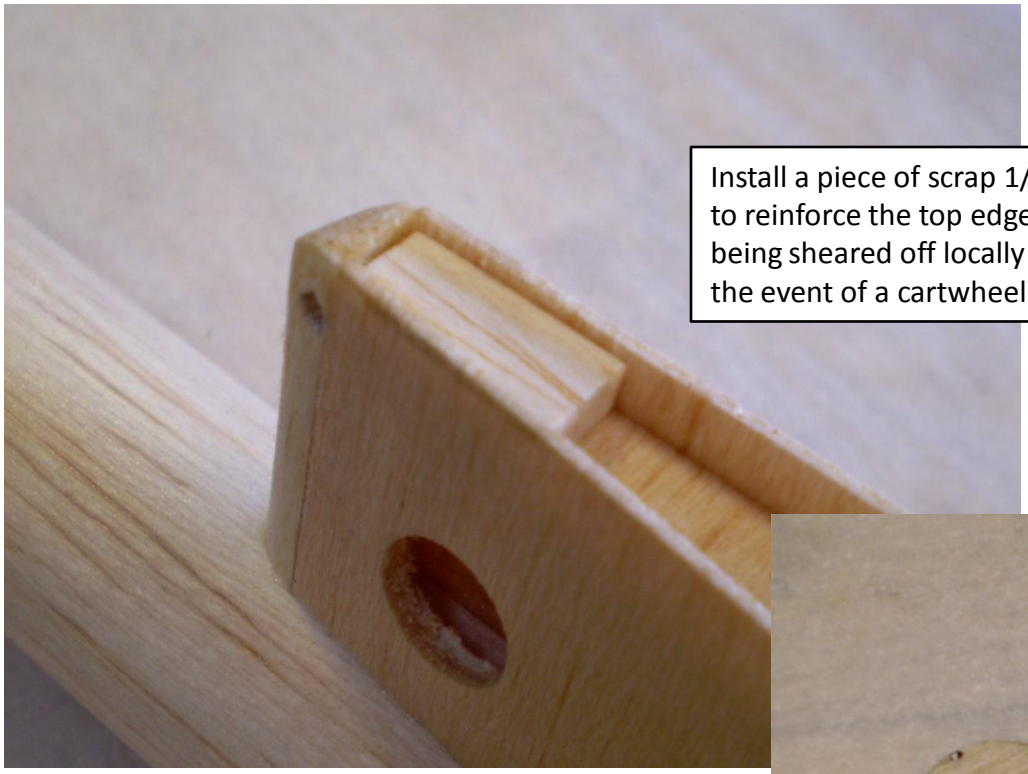
www.cbmodeldesigns.com



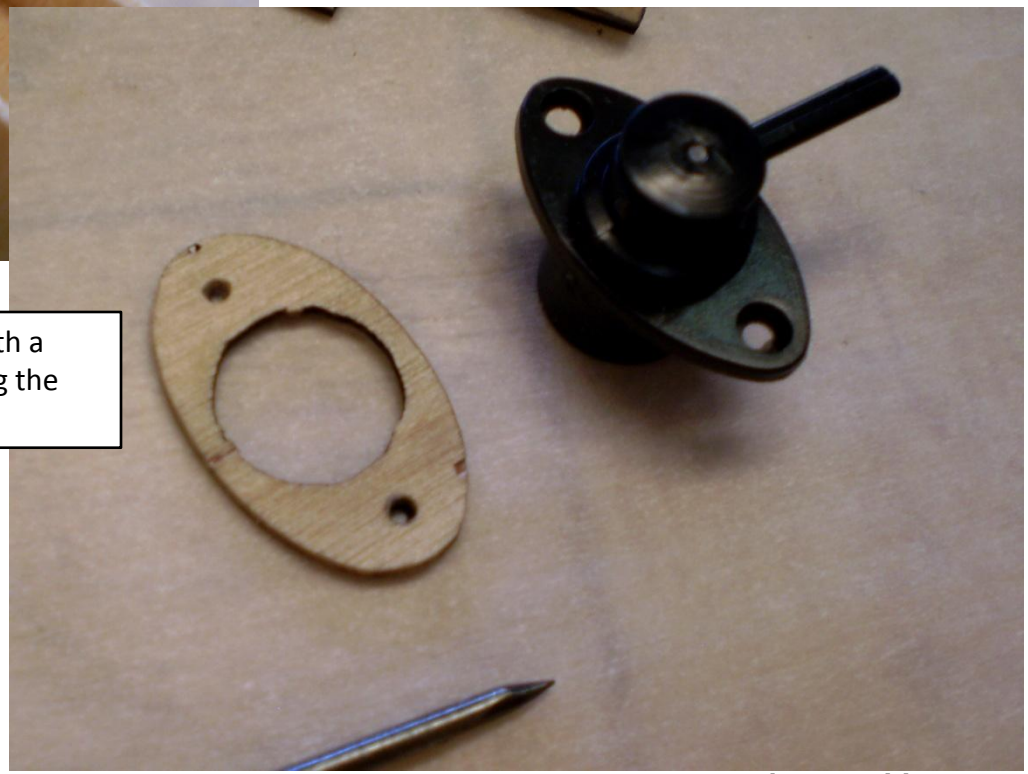
Install the SP-2 filler



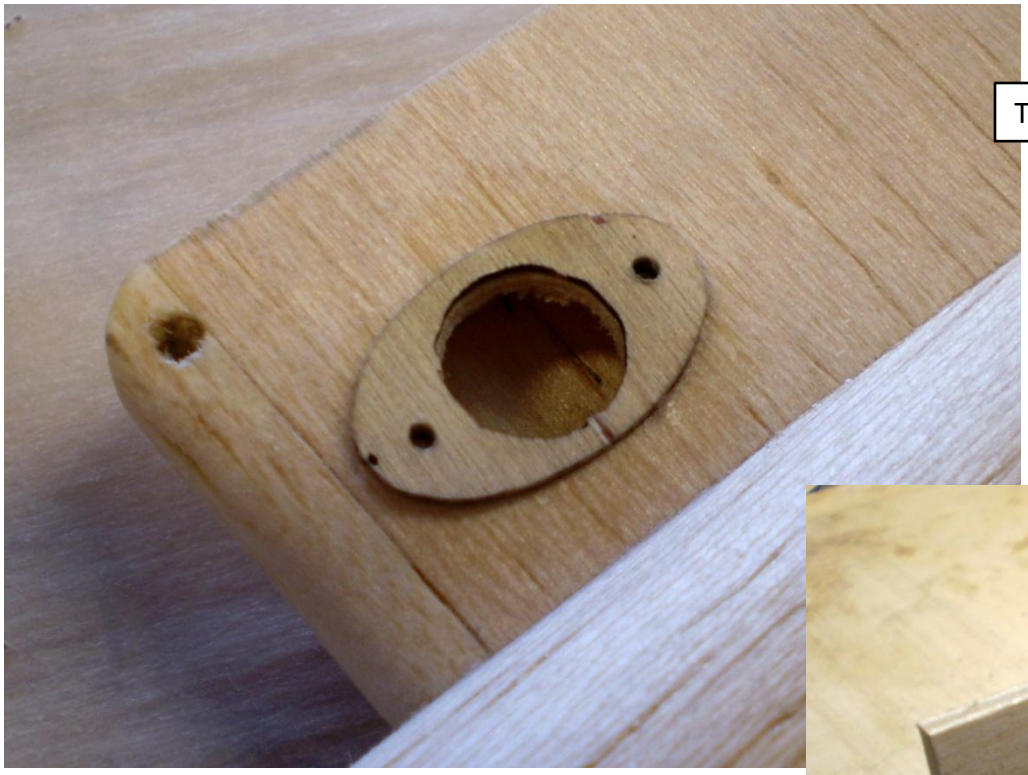
Install the remaining SP-3 filler and remove the scrap material from the slot. You can sand a slight concave radius into the surface of the fillers that contact the tail cone to obtain a better contact foot print for gluing.



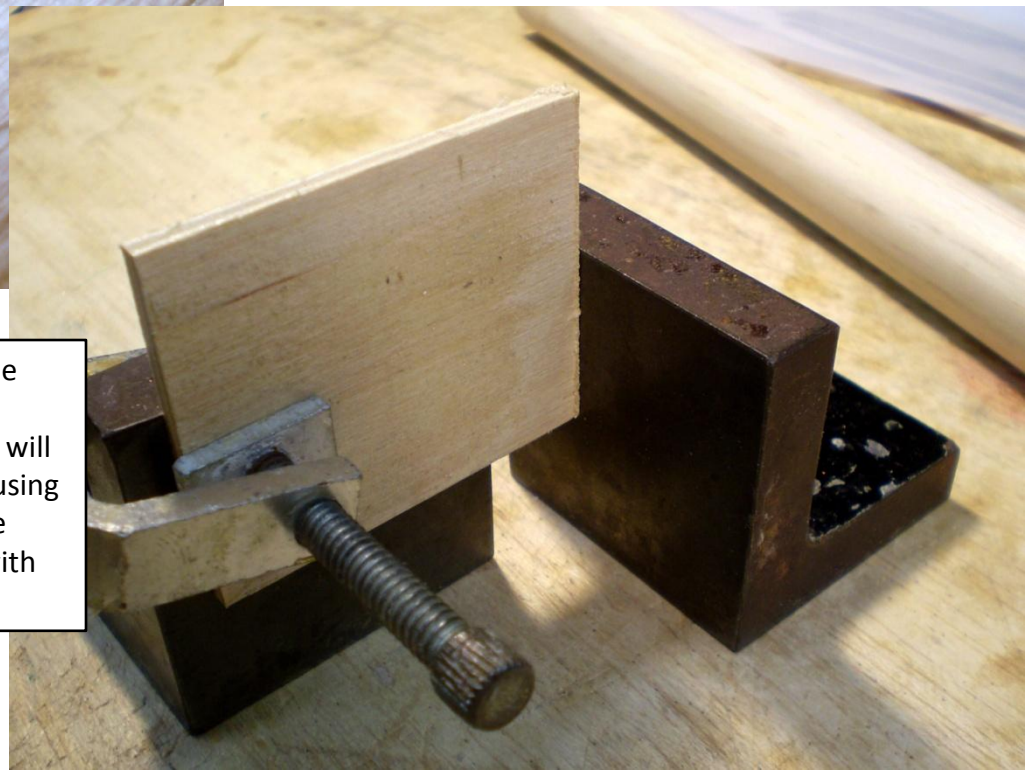
Install a piece of scrap 1/8”material in this area to reinforce the top edge of the pylon skins from being sheared off locally due to the wing keys in the event of a cartwheel landing.



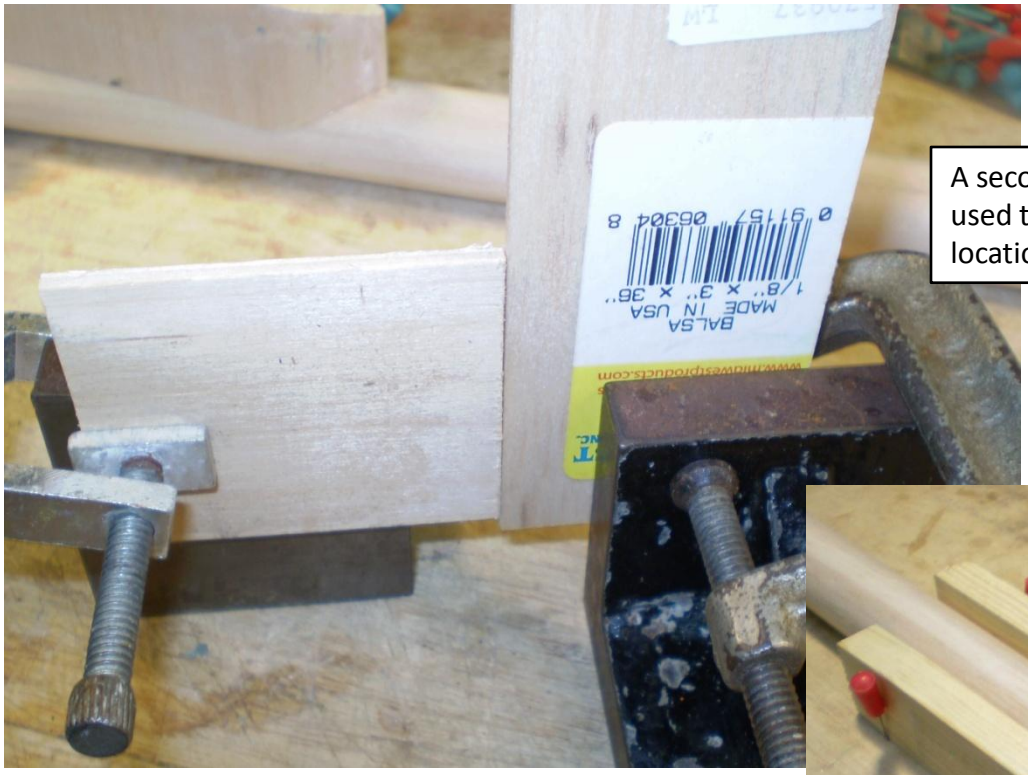
Pre-pilot the timer screw attach holes with a sharpened piece of wire prior to installing the plywood adapter plate to the pylon side.



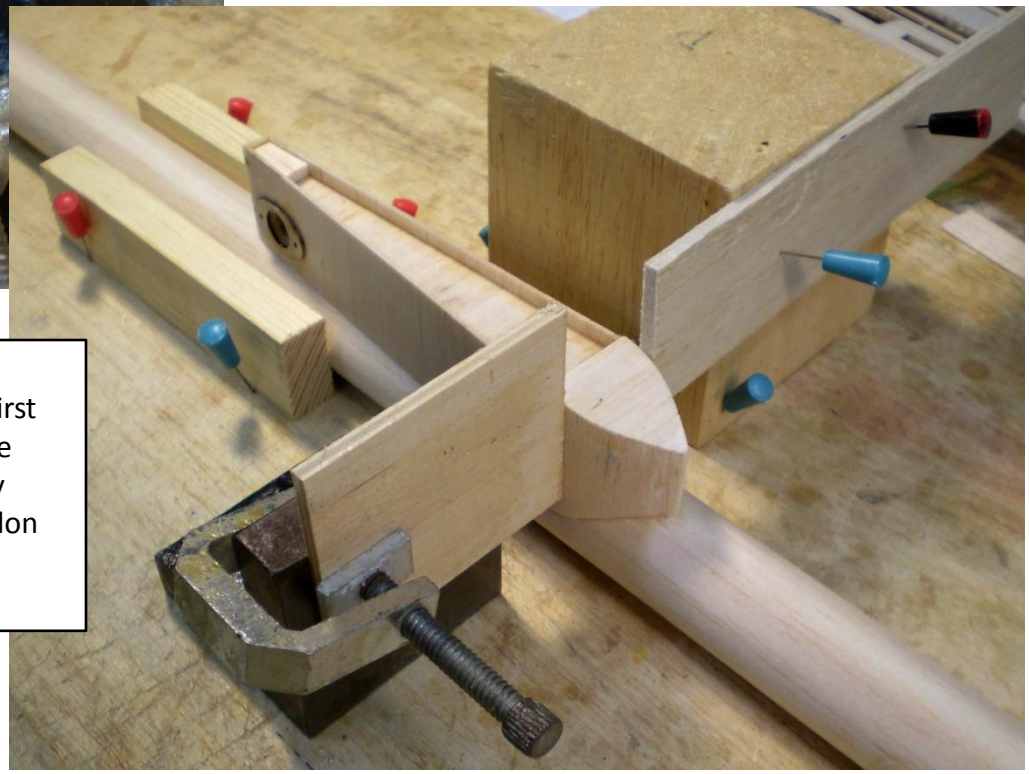
Timer adapter plate installed



A temporary gauge is being made to hold the fuselage square to the building surface by referencing from the side of the pylon. This will be the alignment for installing the fin. I'm using one construction angle to set the side of the temporary gauge surface to allow contact with the pylon side above the motor tube.

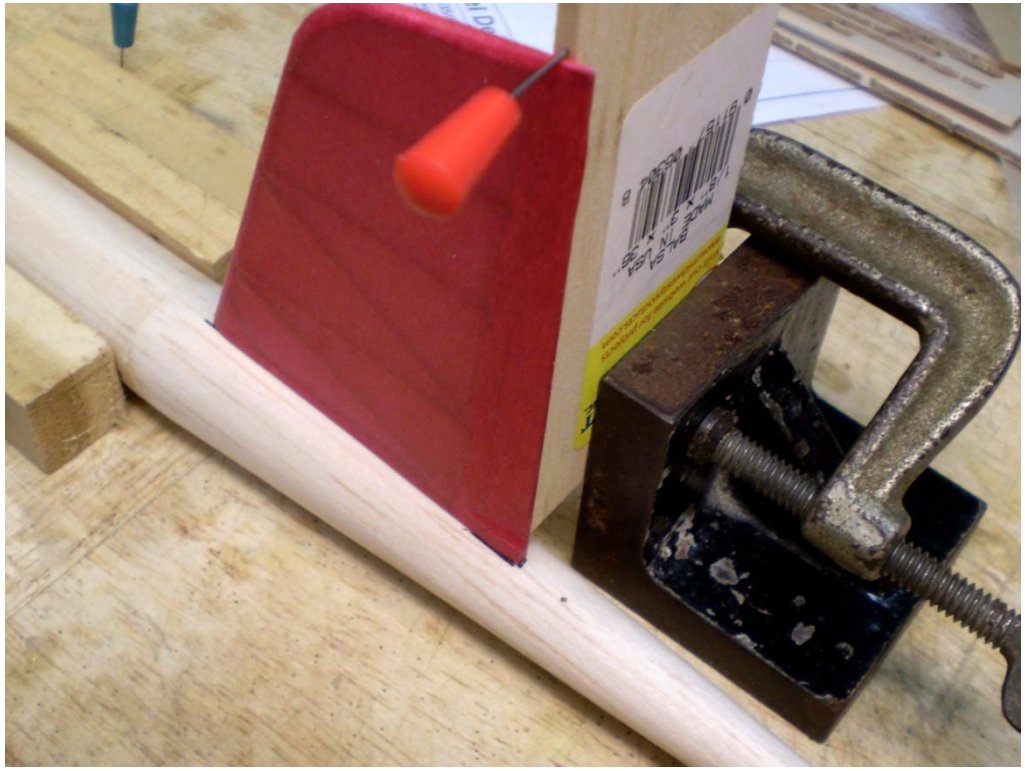


A second gauge is set to the first one that will be used to reference the side of the fin for vertical location.

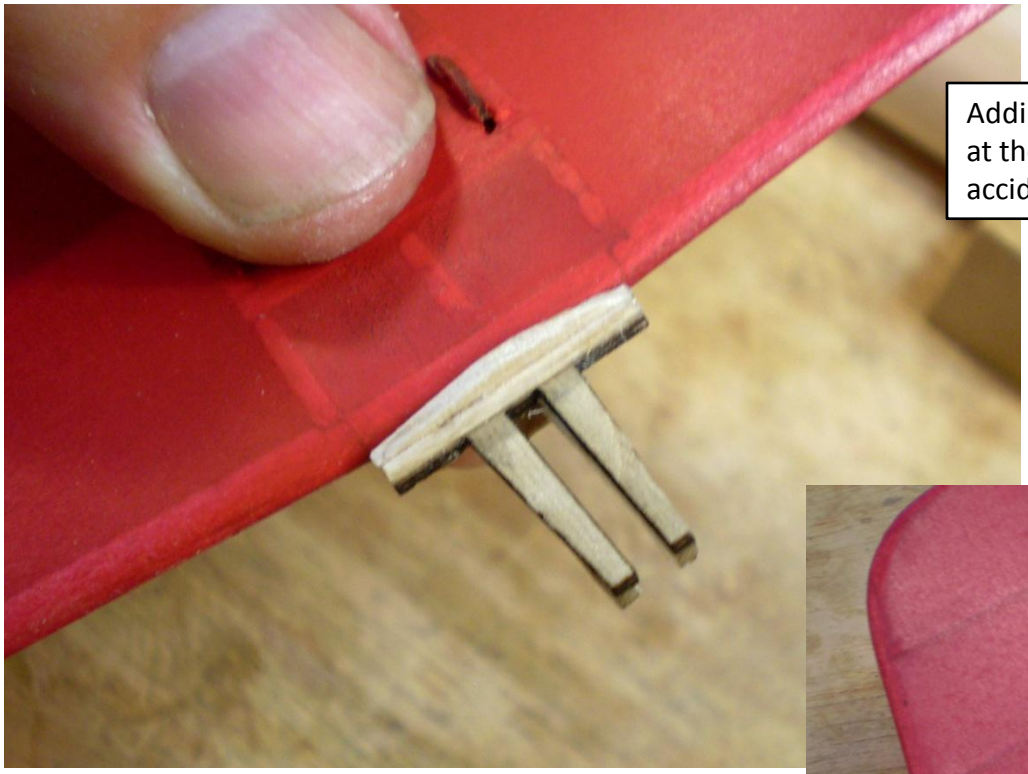


Box the fuselage at either end to trap from lateral sliding on the building surface. The first gauge is then set to reference the side of the pylon. The opposite side is just a temporary piece of stock used to lightly restrain the pylon against the gauge surface and maintain squareness to the building surface.

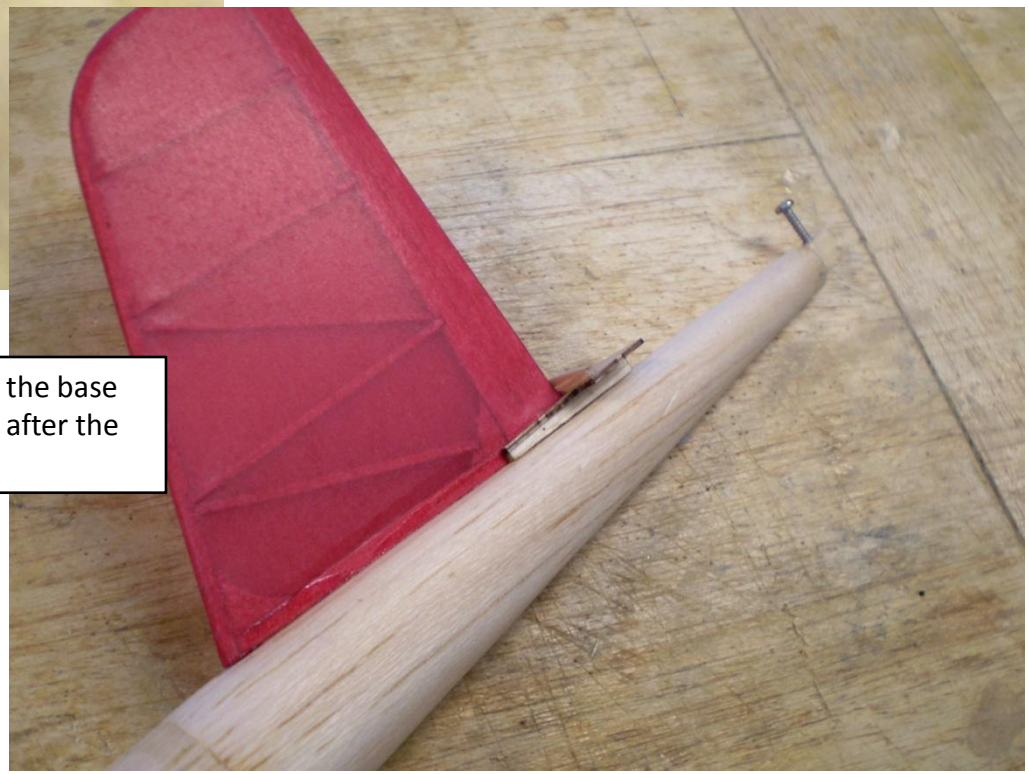
The fin gauge is positioned until the fin fits into the marks on the tail cone for the fin base location.



The fin is aligned along the trailing edge for vertical position, The pin at the top is just to capture and trap the fin against the gauge. Adjust position until it fits between the marks and the trailing edge at the aft mark

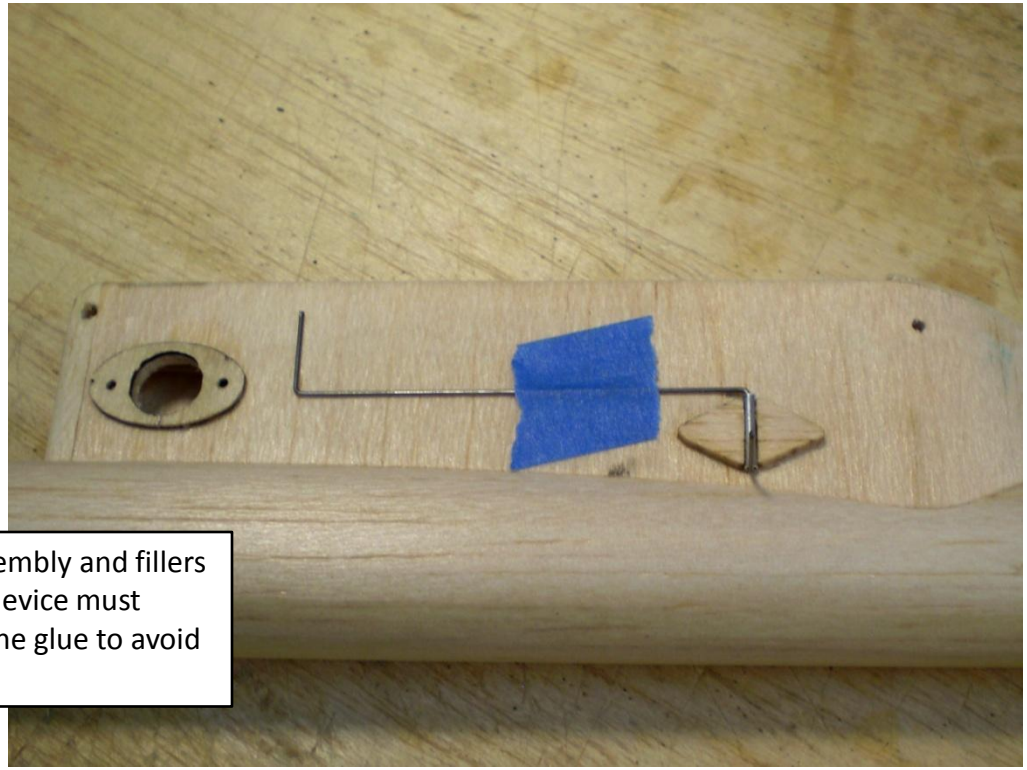


Adding the forward stab stop. I crown this a bit at the center to prevent the leading edge from accidently riding up during flight prep, etc.

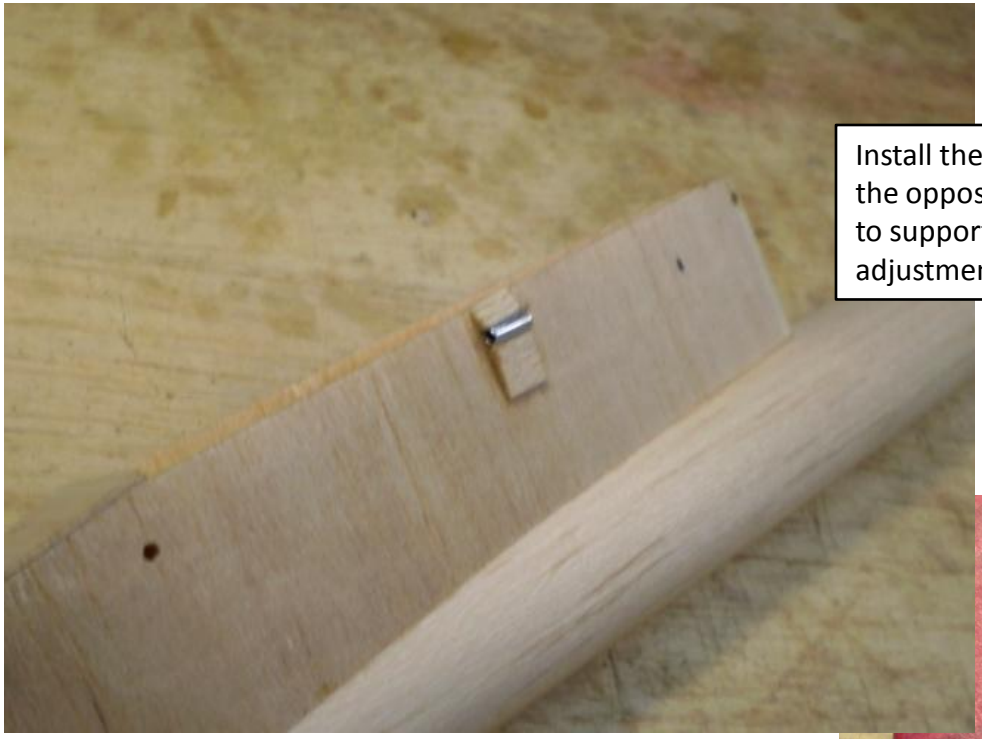


Install the stab platform at the base of the fin and trailing edge after the fin is installed.

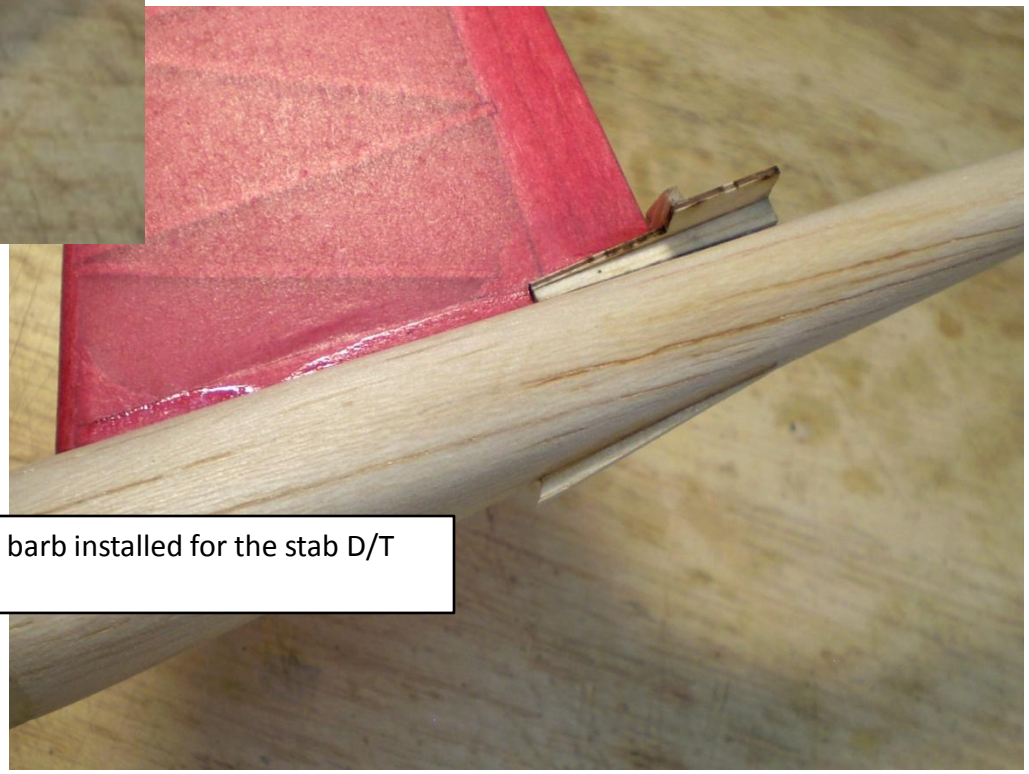
Stab platform installation



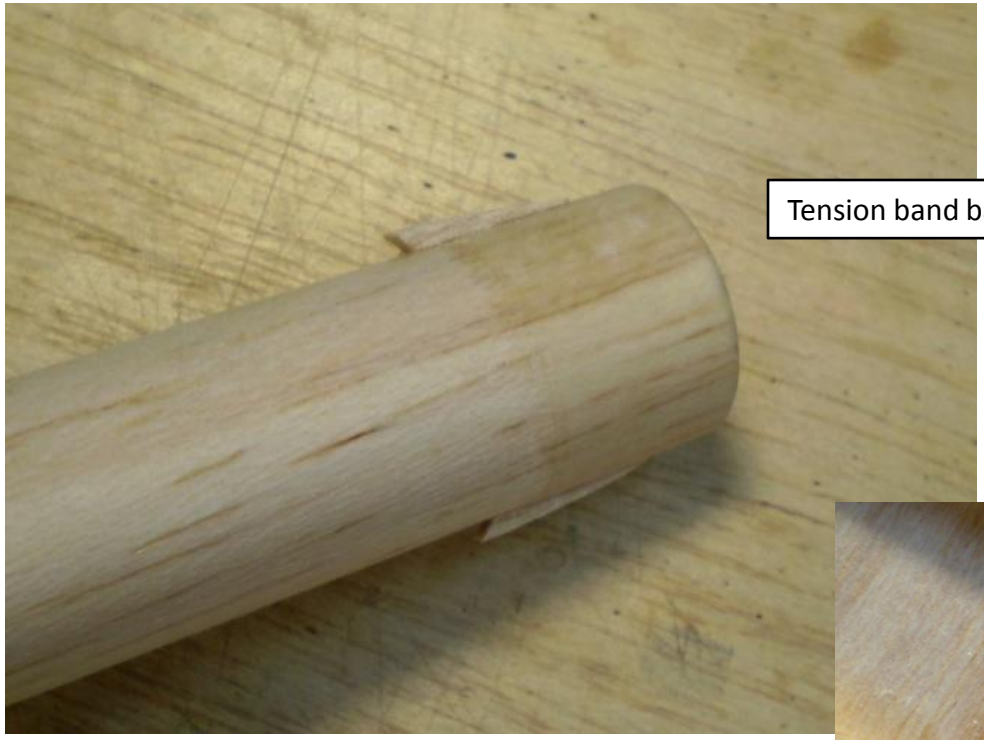
Carefully install the trip wire assembly and fillers as shown on the drawing. This device must freely operate, so be easy with the glue to avoid fouling the hinge tube.



Install the D/T lanyard adjustment bung tube on the opposite side of the pylon. Fillers are added to support the tube from breaking off during adjustments and press in of the retaining plug.

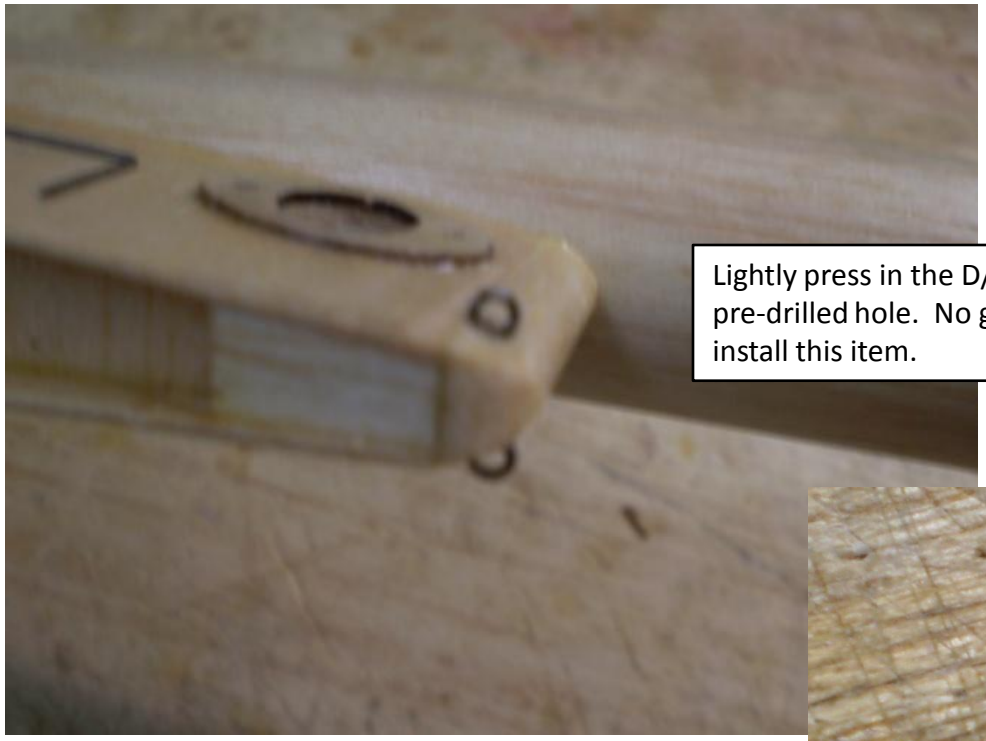


The scrap balsa barb installed for the stab D/T bands.

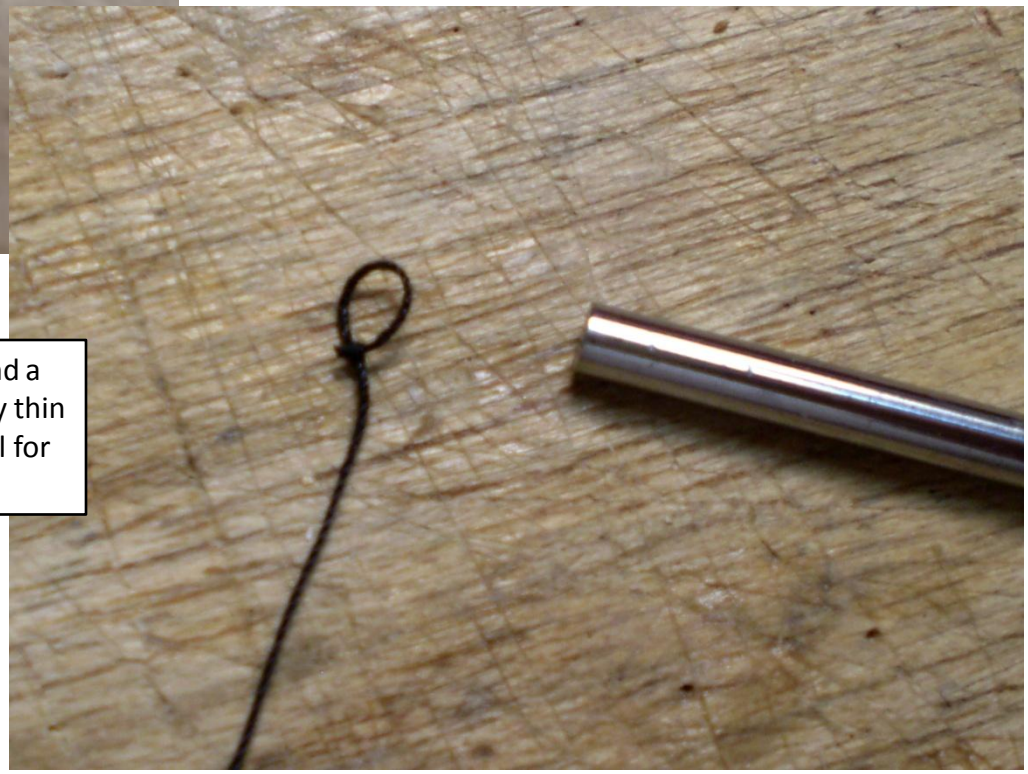


Tension band barbs installed for the nose block.

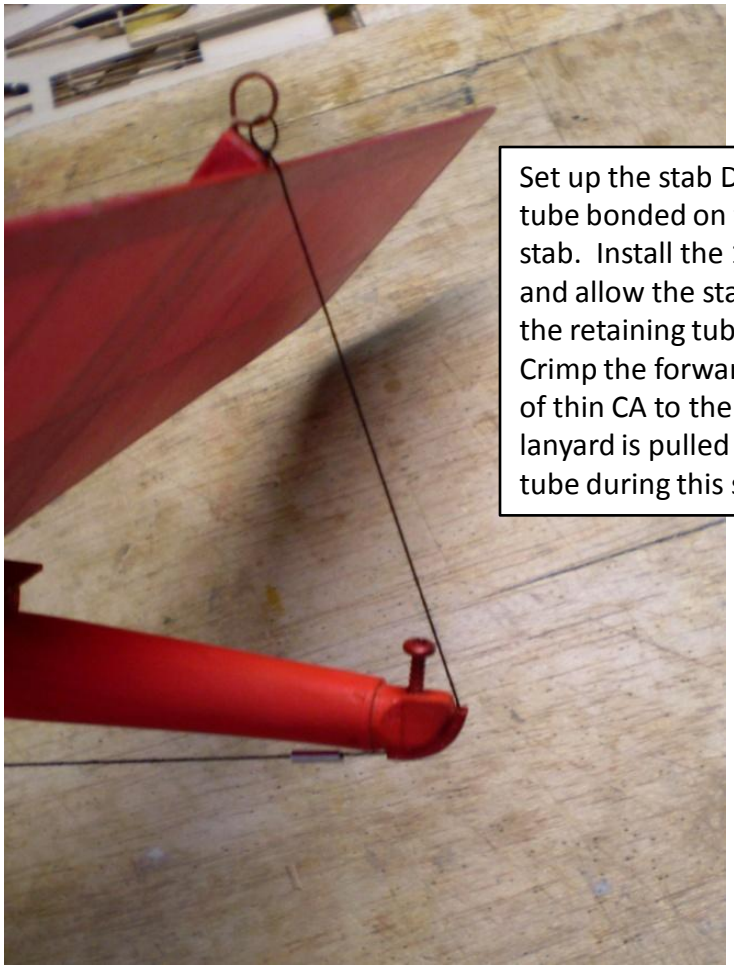
Wing dowel installed and the wing trailing edge stop in place.



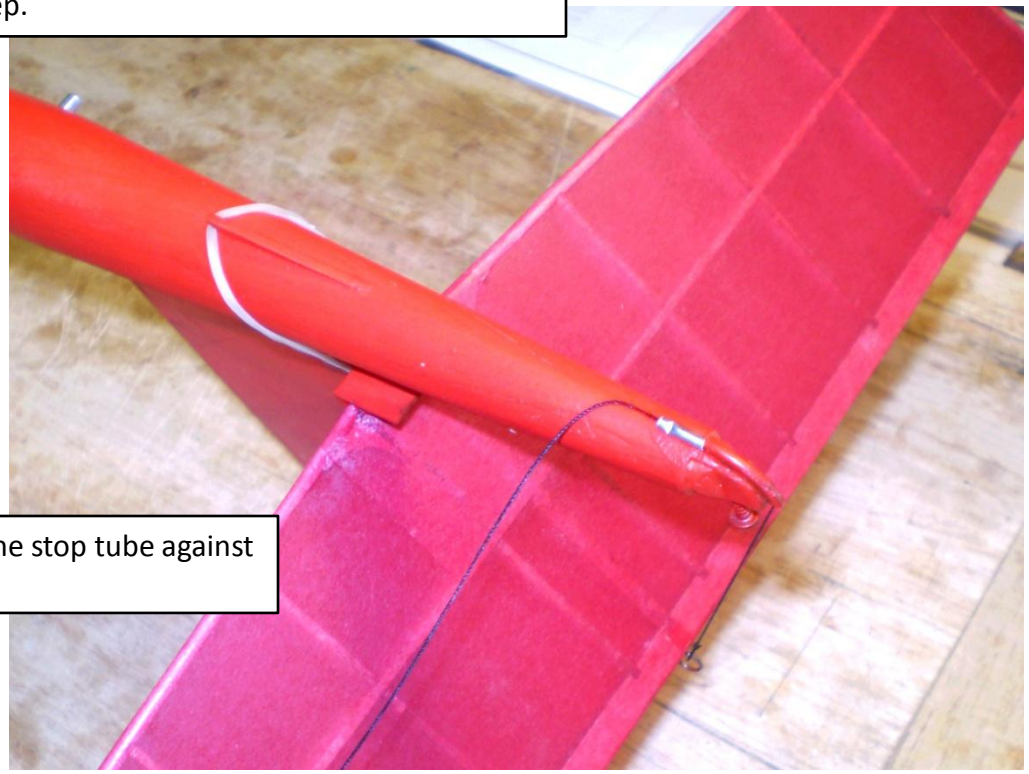
Lightly press in the D/T lanyard fairlead in the pre-drilled hole. No glue should be needed to install this item.



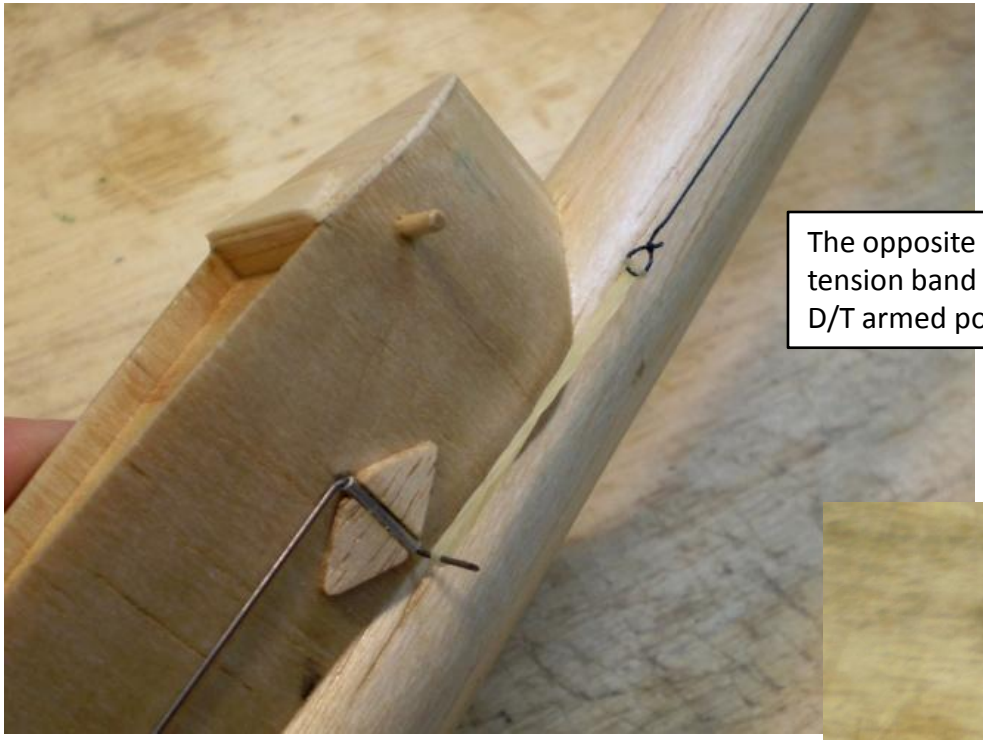
For the stab D/T lanyard, make a loop around a 1/8” diameter rod or tube, slip off and apply thin CA to form a hardened shape. This is typical for the opposite end as well.



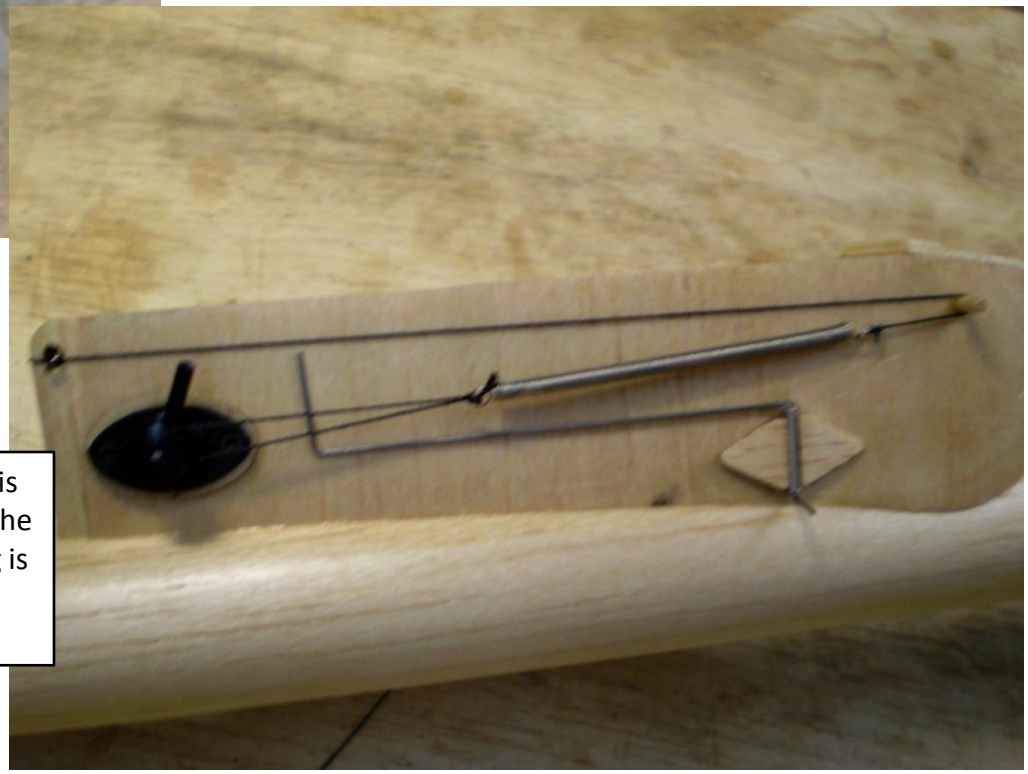
Set up the stab D/T by feeding the lanyard through the guide tube bonded on the tail stem and connect to the eye on the stab. Install the 1/16 diameter retaining tube on the lanyard and allow the stab to lift up approximately 45 degrees with the retaining tube against the guide tube for a stop position. Crimp the forward end of the tube to retain, then apply a dot of thin CA to the forward end of this, making sure the lanyard is pulled forward to prevent any bonding to the guide tube during this step.



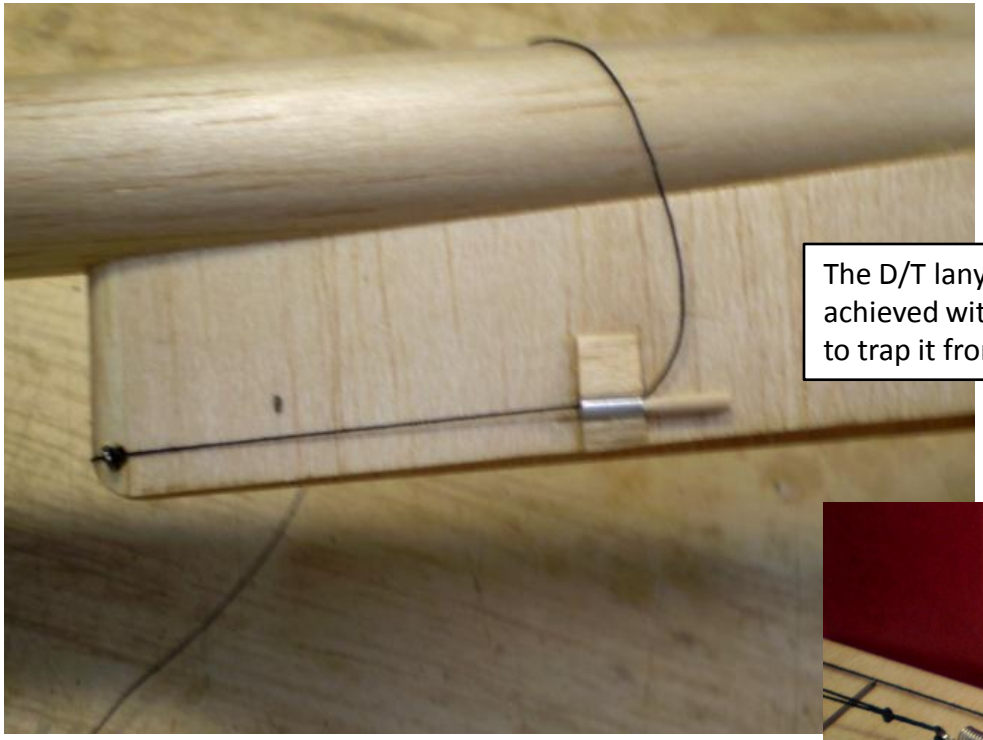
The stab D/T deployed and the stop tube against the guide tube.



The opposite end of the stab D/T line with the tension band installed over the trip wire end-the D/T armed position.

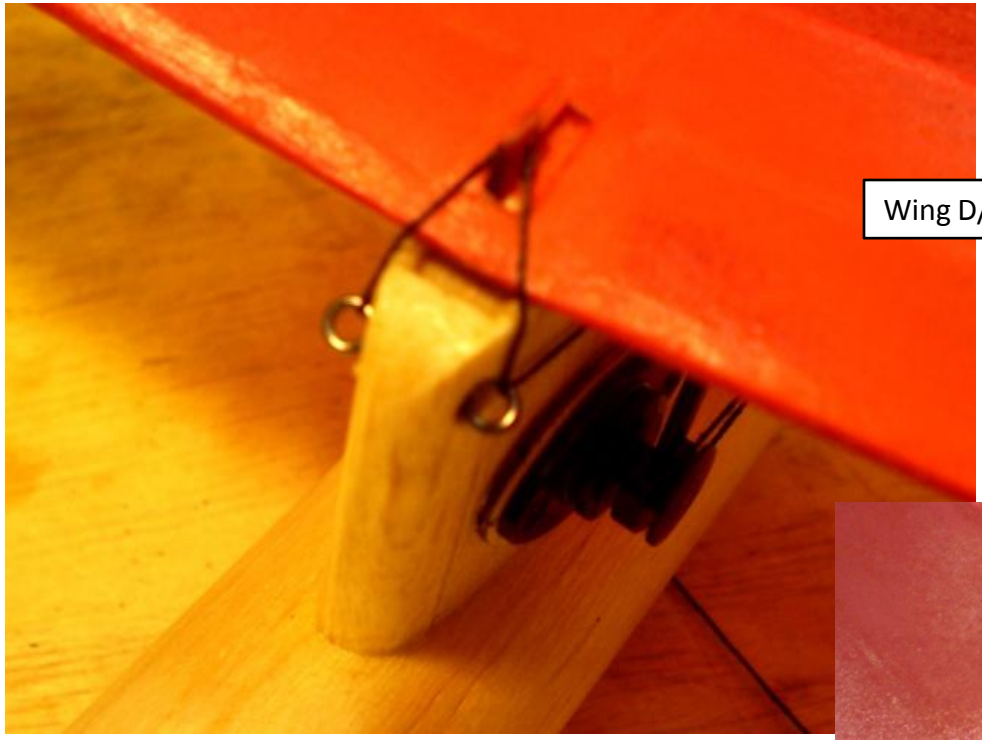


Setting up the wing D/T and timer lanyard. This is an approximate starting configuration with the wing off. Note where the aft end of the spring is relative to the wing dowel end used as a turnaround for the system.



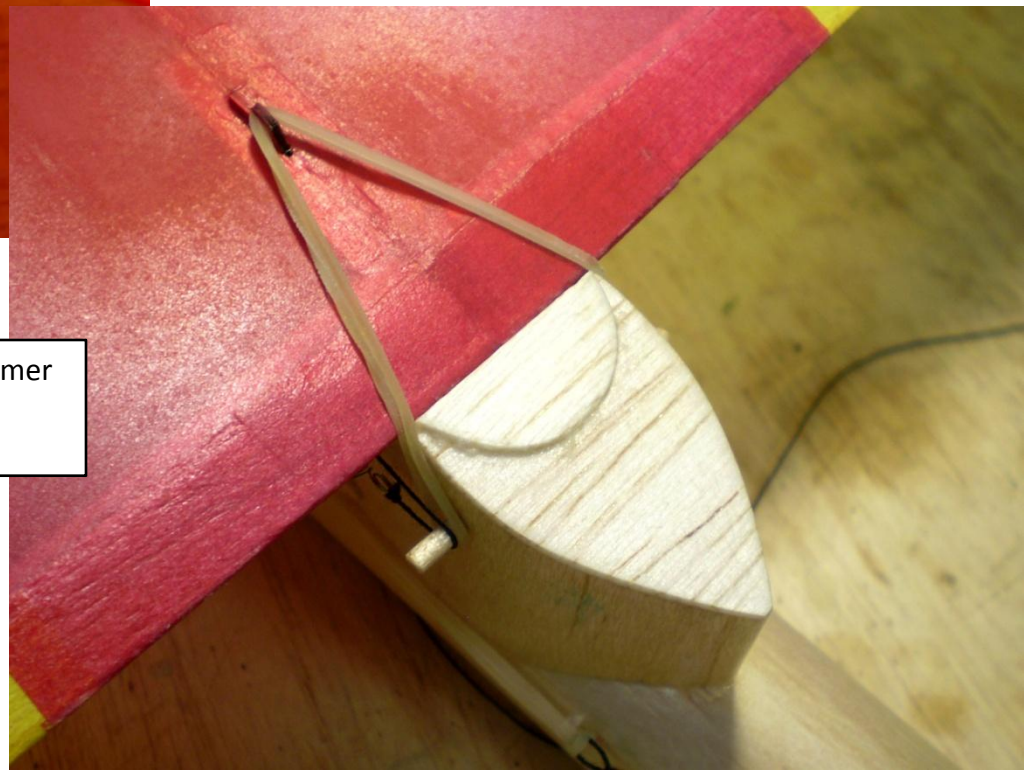
The D/T lanyard adjustment for tension is achieved with the bung tube and toothpick end to trap it from movement,

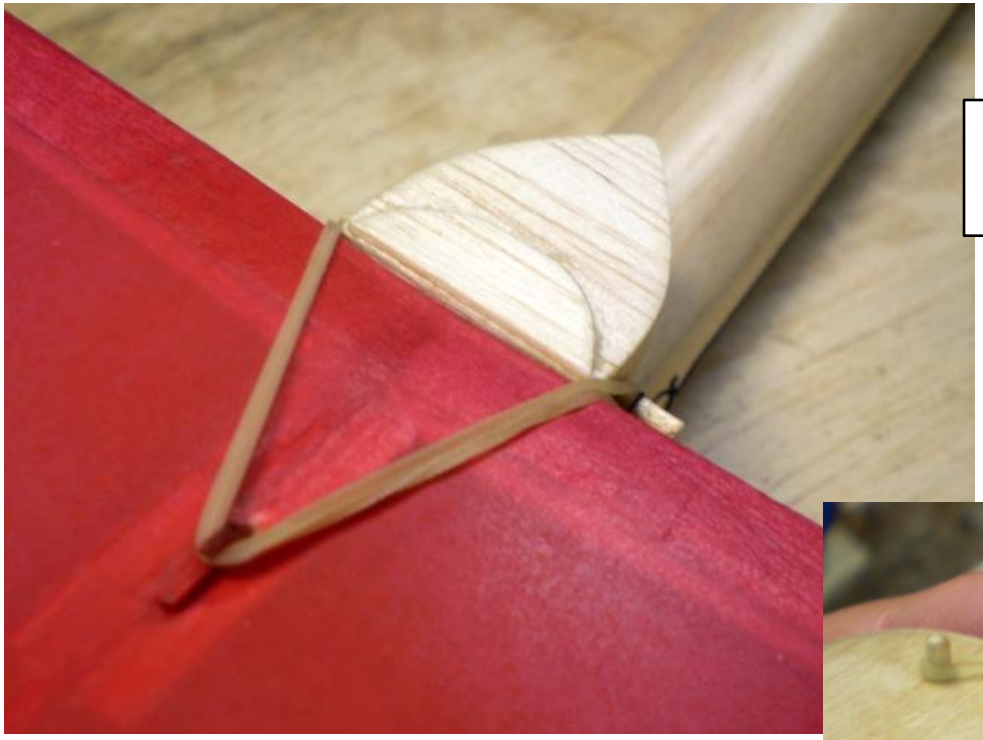
With the wing installed and the D/T lanyard routed through the forward wing hook the tail end of the spring should not be any closer to the wing dowel than this or it will be hard to set the timer without damaging the spring. Any length adjustment will have to come to the forward loop length at this point. You can see I've made a small knot in this one to shorten it a bit. Or you can make a new one until you get the right length. Now go ahead and start setting your timer speed by making slight adjustments to the lanyard tension using the bung tube plug.



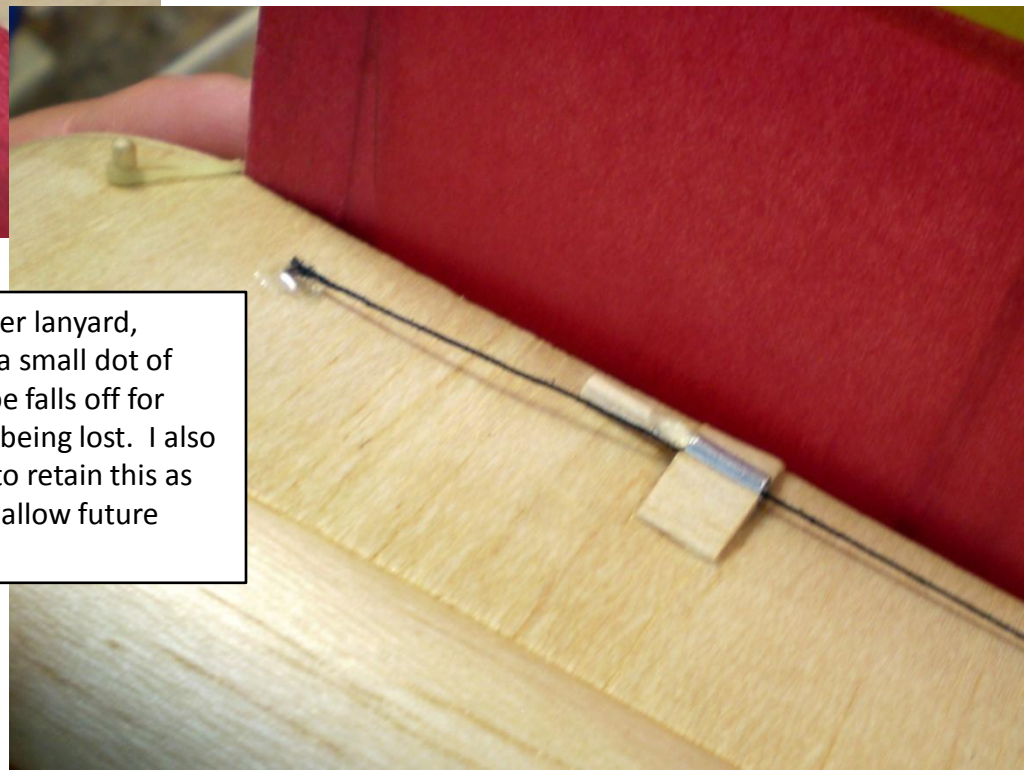
Wing D/T lanyard setup on the front hook.

The rear D/T hook and turnaround for the timer lanyard and distance to spring end under tension.

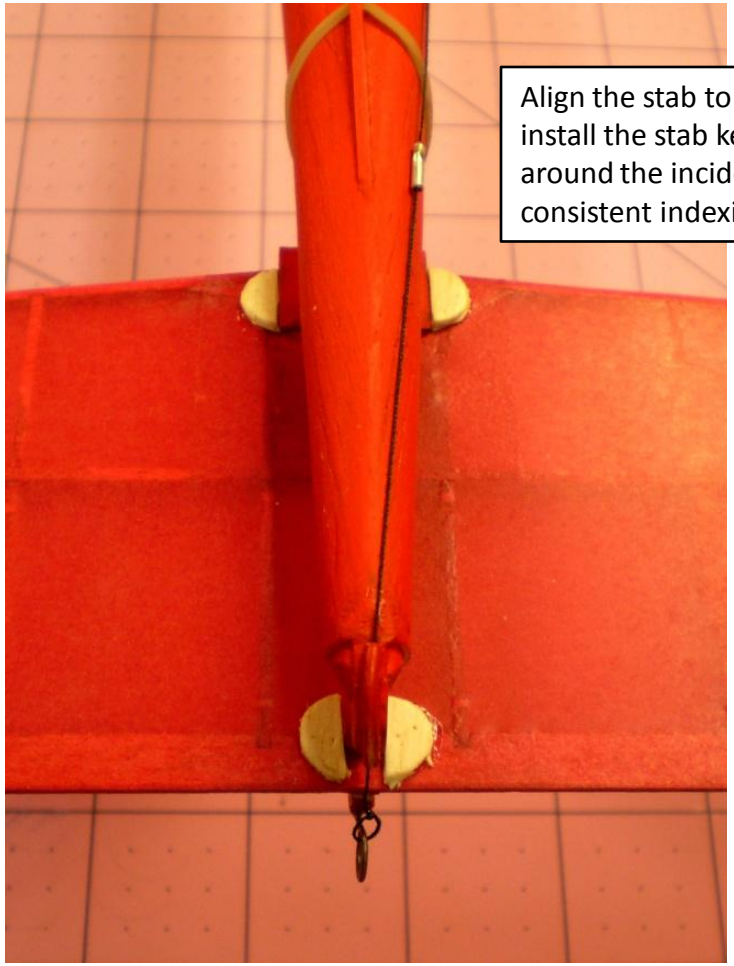




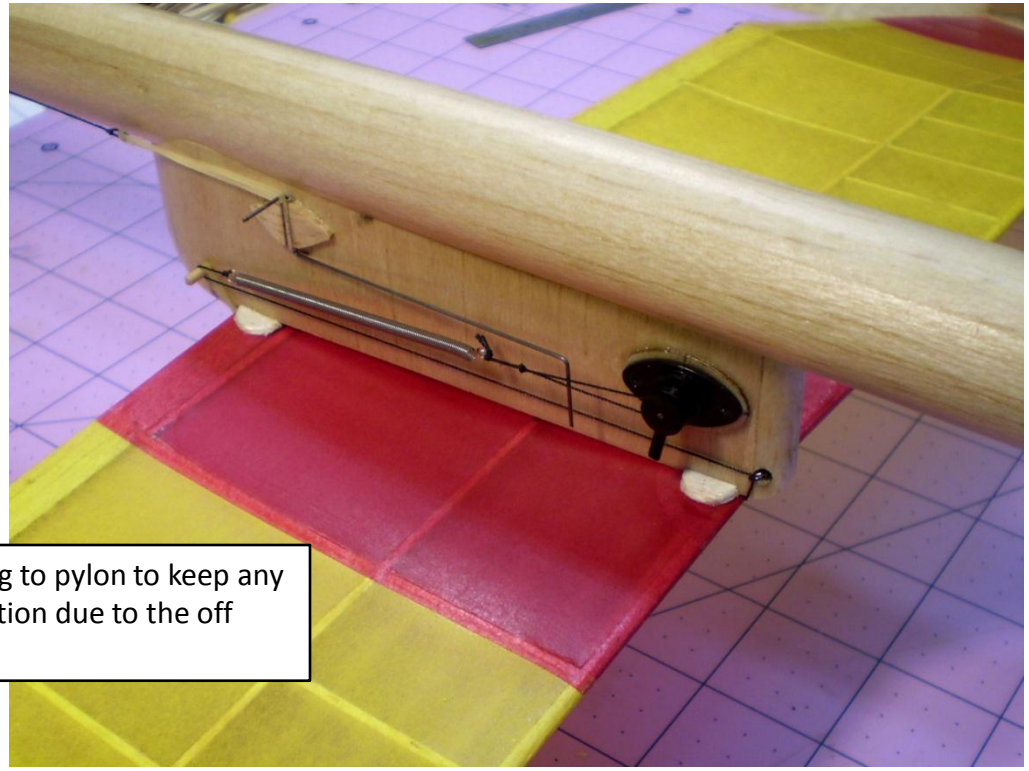
I leave the wing stop proud of the trailing edge height to make sure the wing doesn't jump out of location on landing or pop-up in flight.



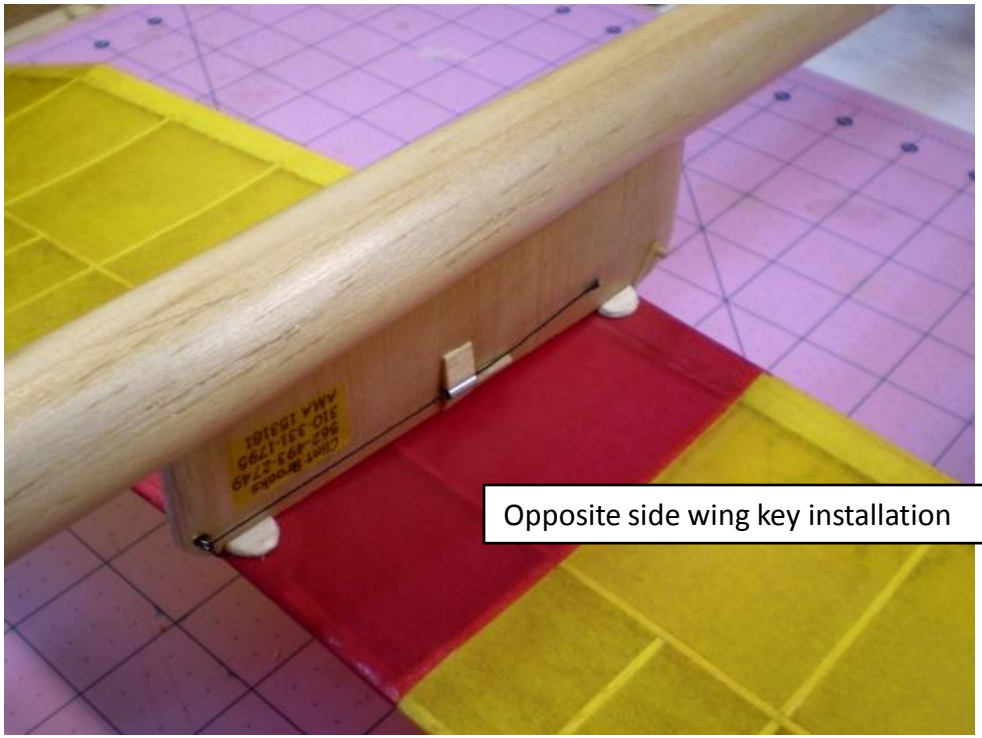
After the timer speed is set, cutoff the tail of the timer lanyard, leaving a bit for future adjustments if needed. I use a small dot of cellulose glue to secure the end in case the bung tube falls off for some reason, preventing the lanyard assembly from being lost. I also apply a dot of glue to the plug and tube connection to retain this as well. A little dab of acetone will soften the glue and allow future tensioning adjustments.



Align the stab to the wing and fuselage and install the stab keys at the platform sides and around the incidence screw head to allow consistent indexing for trim settings.



Install the keys for the wing to pylon to keep any rotation out of the installation due to the off center wing D/T hooks.

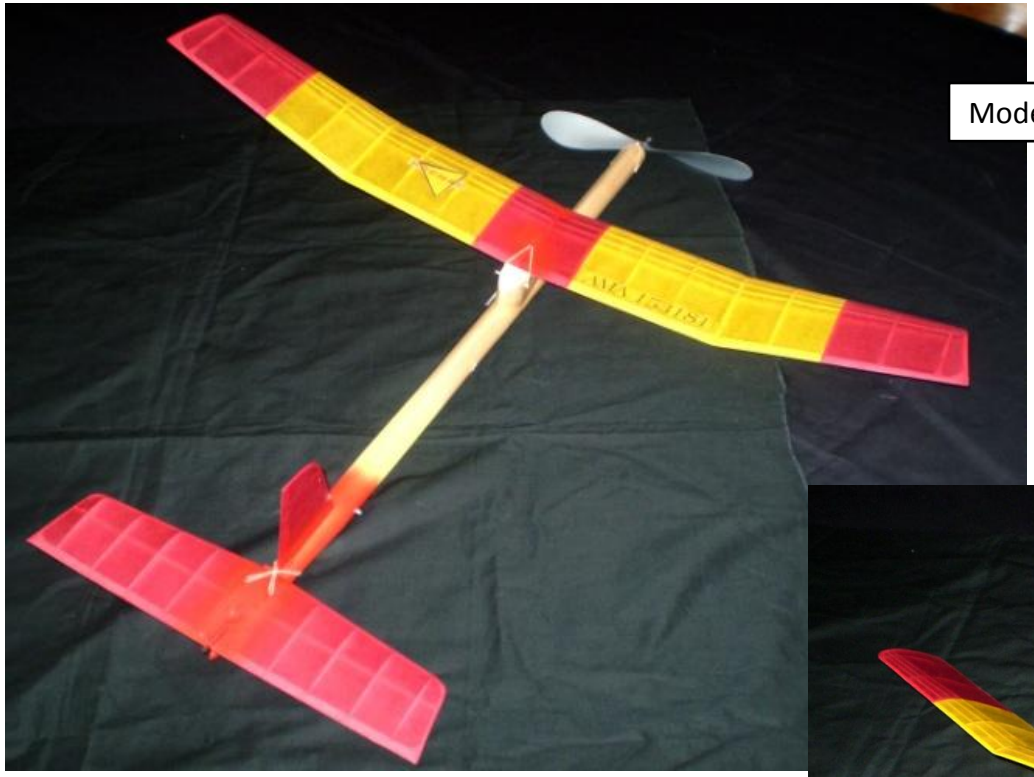


Opposite side wing key installation

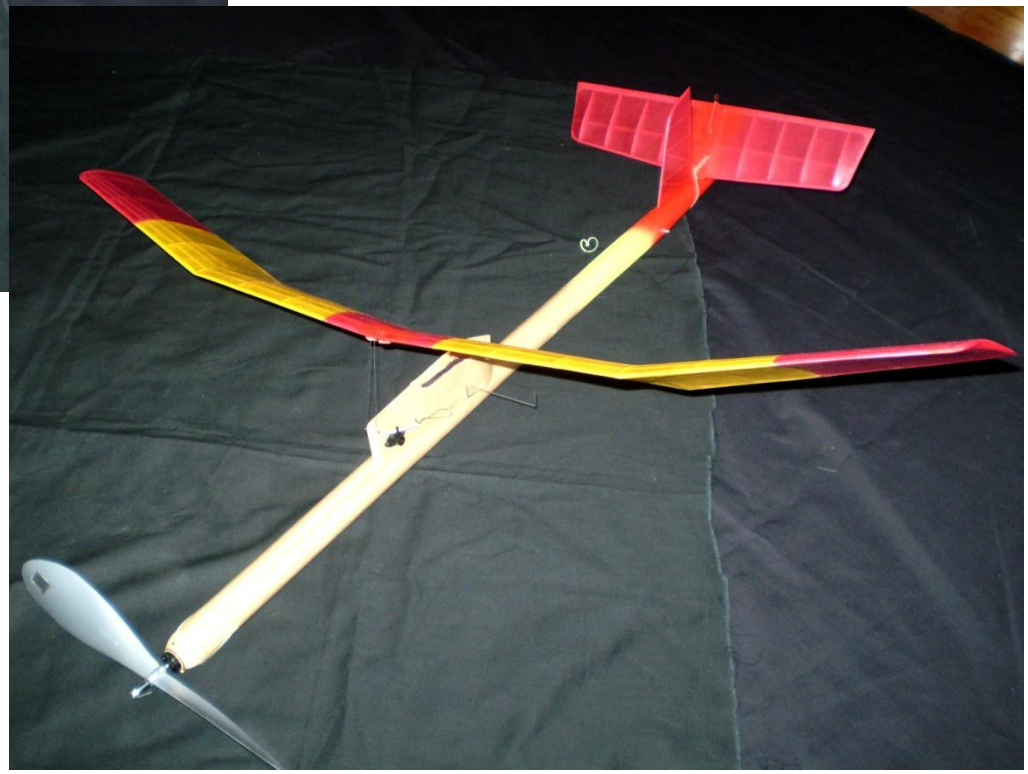
Kit No. CBMD-001 Boomer MkIII P-30

CB Model Designs

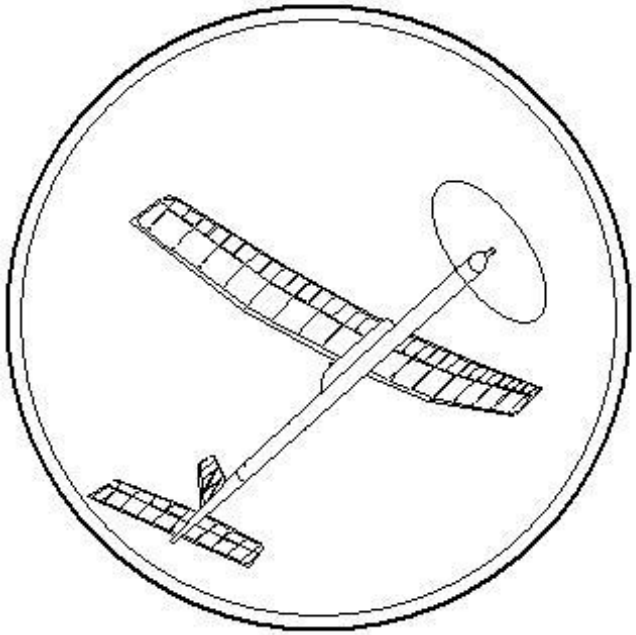
www.cbmodeldesigns.com



Model assembled and ready for flight



D/T system deployed. Wing will stay level to the horizon and the fuselage will point down about 45 degrees. I find this method the most effective and least damaging of the three generally practiced methods of stab only D/T, wing pop-up D/T or wing pop-off D/T. Wing pop-off is positive but also damaging to the prop assembly unless you always have a soft surface to land on. If the lift is strong-something this light goes up no matter how dirty you make it for further flight! Good luck with yours.



Boomer Mark III Build Weight Data

•Wing frame (rough-unsanded)	7.5 gm
•Wing frame (sanded-uncovered)	6.9 gm
•Wing frame (covered and ready to use)	10.9 gm
•Stab (covered and ready to use)	2.9 gm
•Unfinished fuselage as received	9.6 gm
•Fuselage assembled (no wing/stab/nose block/prop)	14.8 gm
•Nose block with prop	10.2 gm
•All-up, ready to fly without motor installed	**38.8** gm

(This is test build T-2)

(Test build T-1 all-up weight was 37.4 gm)

Revision N/C