

Joulebox 190

Kit No. CBMD-006

Construction Detail

CB Model Designs

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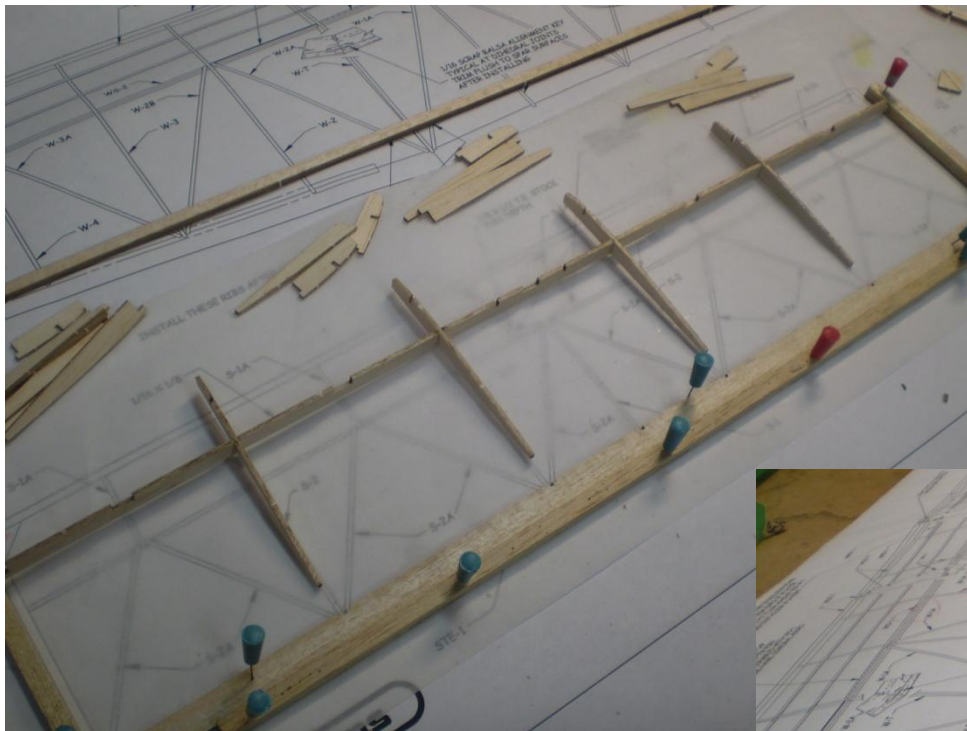
CB Model Designs

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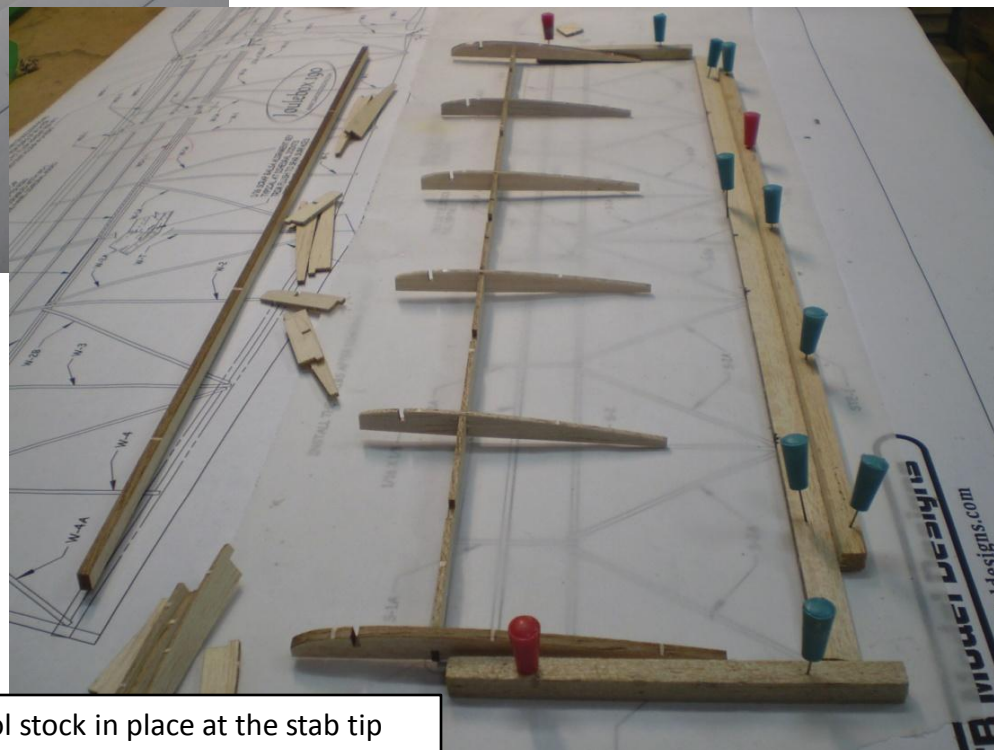


Model data:

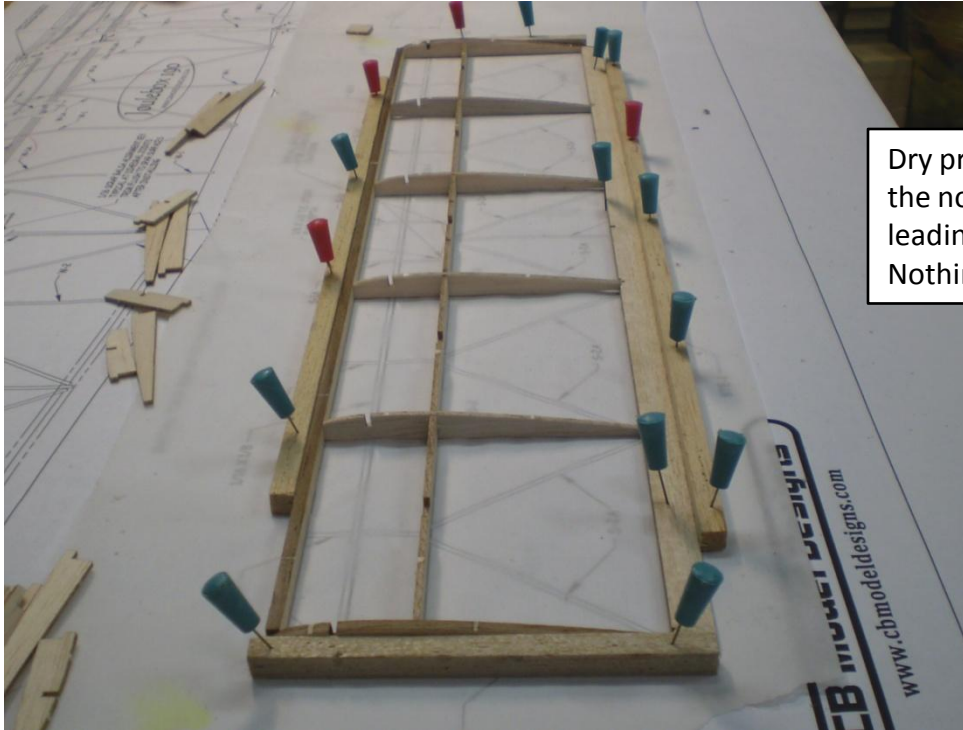
- Weight ready to fly.....150 grams
- Wingspan.....36 Inches
- Wing Area.....190 Sq. In.
- Nominal Length.....31 5/8 Inches



Dry prefit the stabilizer spar and main ribs to start stab construction. Use of boundary control stock is recommended to keep the edges of the assembly straight and true to the plan. Fit the trailing edge STE-1 against the control stock as shown. Note: I highly recommend the use of parchment paper over the plan to prevent sticking if using CA to assemble the components.

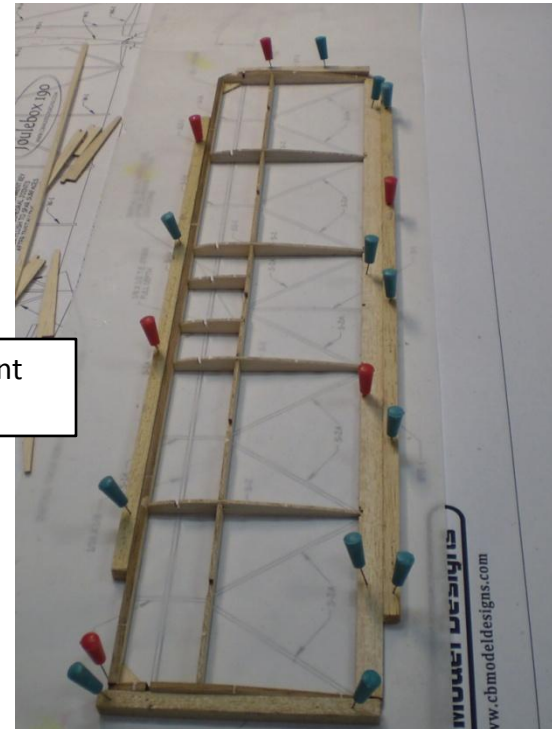


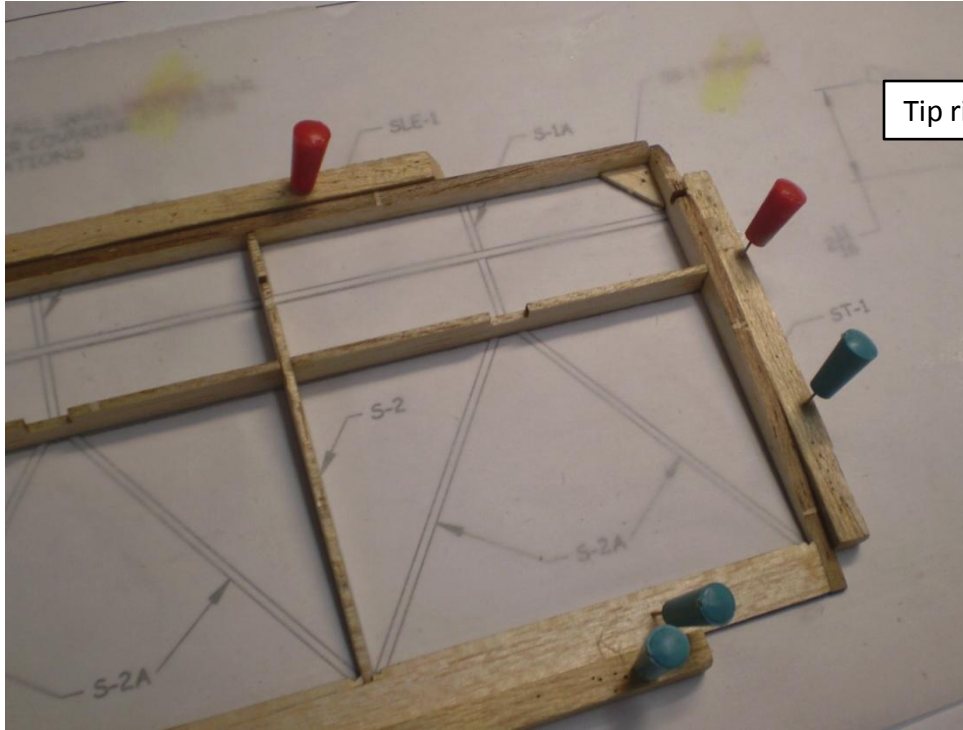
Boundary control stock in place at the stab tip rib locations.



Dry pre-fit the rib and spar subassembly into the notches in STE-1 and placement of the leading edge SLE-1 against the front of the ribs. Nothing is glued yet.

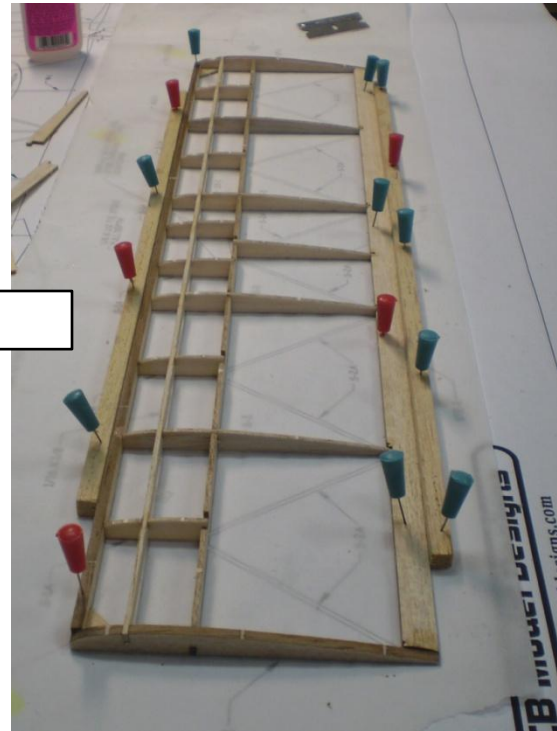
Nose rib installation at the center-at this point begin gluing the basic assembly together.

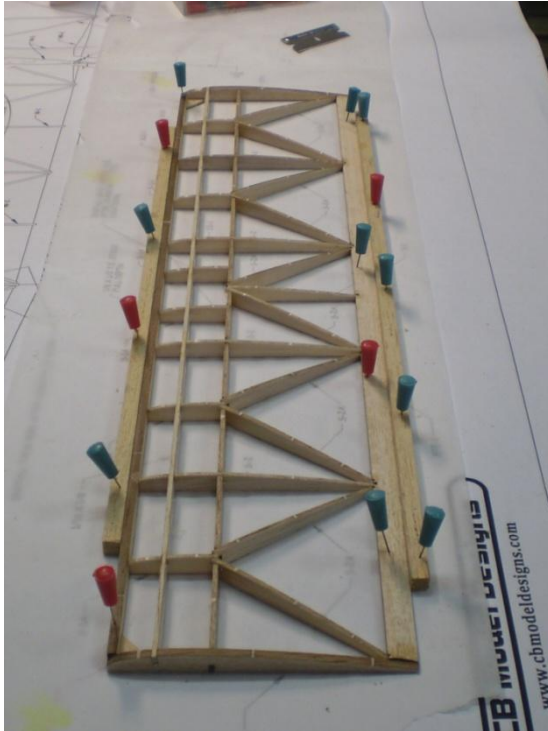




Tip rib ST-1 and corner gusset SG-1 in place

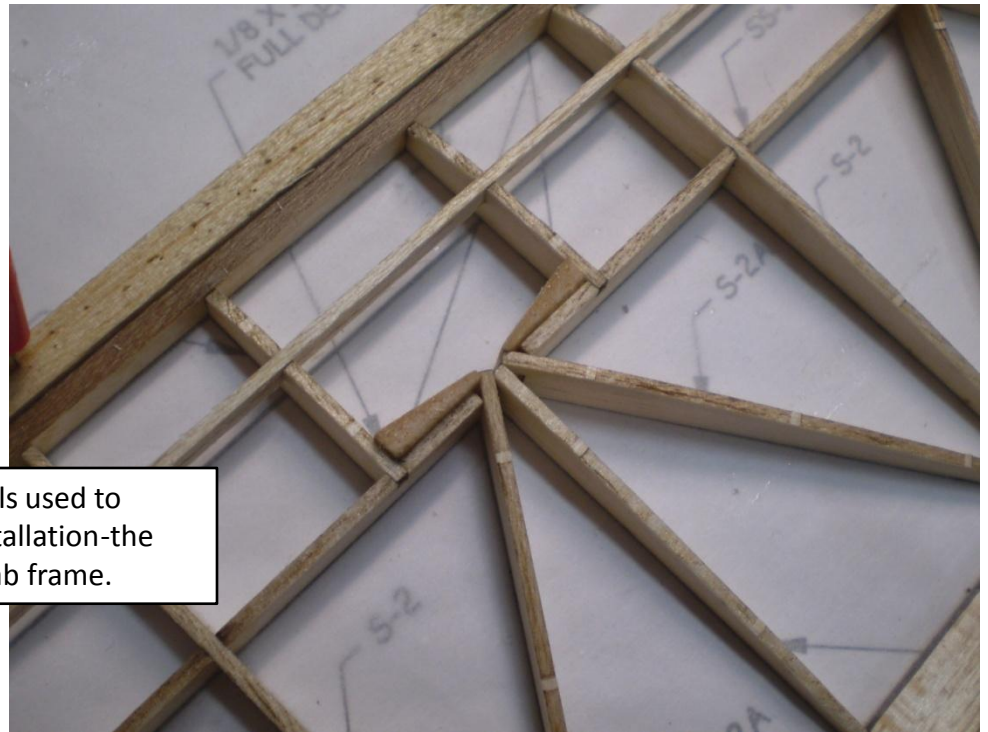
All nose ribs and 1/16 X 1/8 spar installed

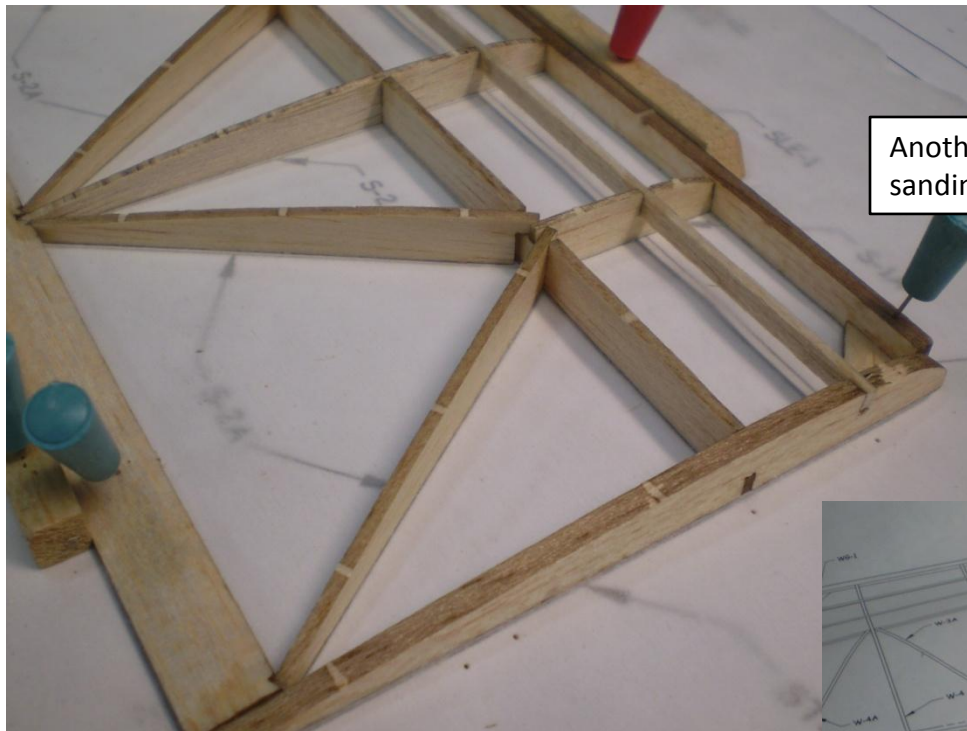




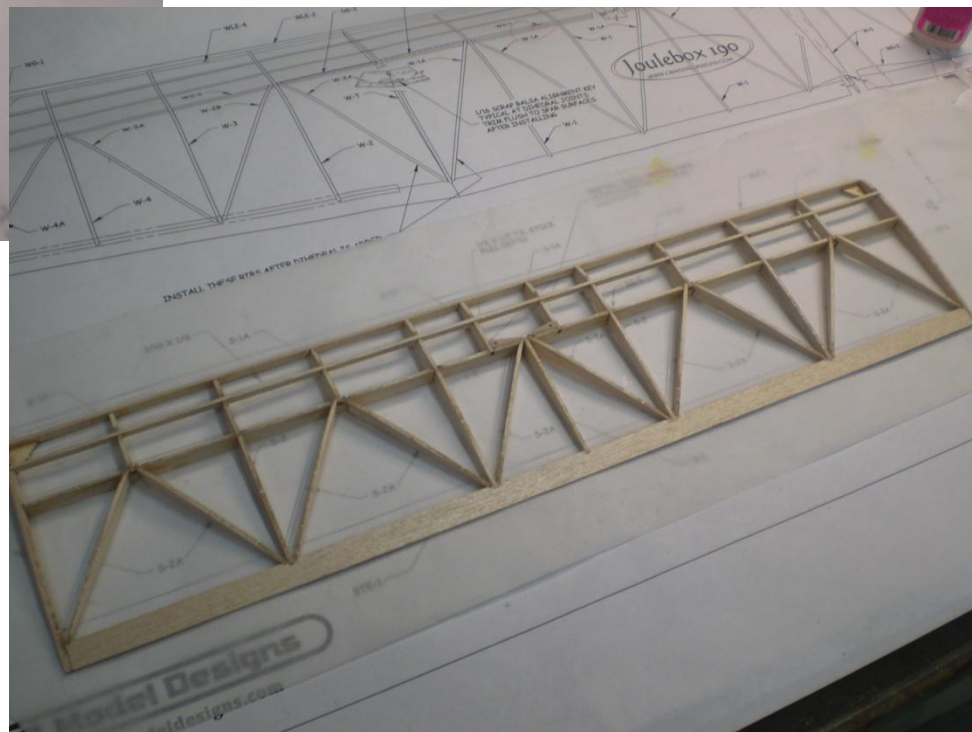
S-2A diagonal ribs installed into respective notches.

Tapered stock fillers installed to support the small nails used to attach the D/T bands later. Shown slightly high at installation-the tops of these are sanded flush before covering the stab frame.

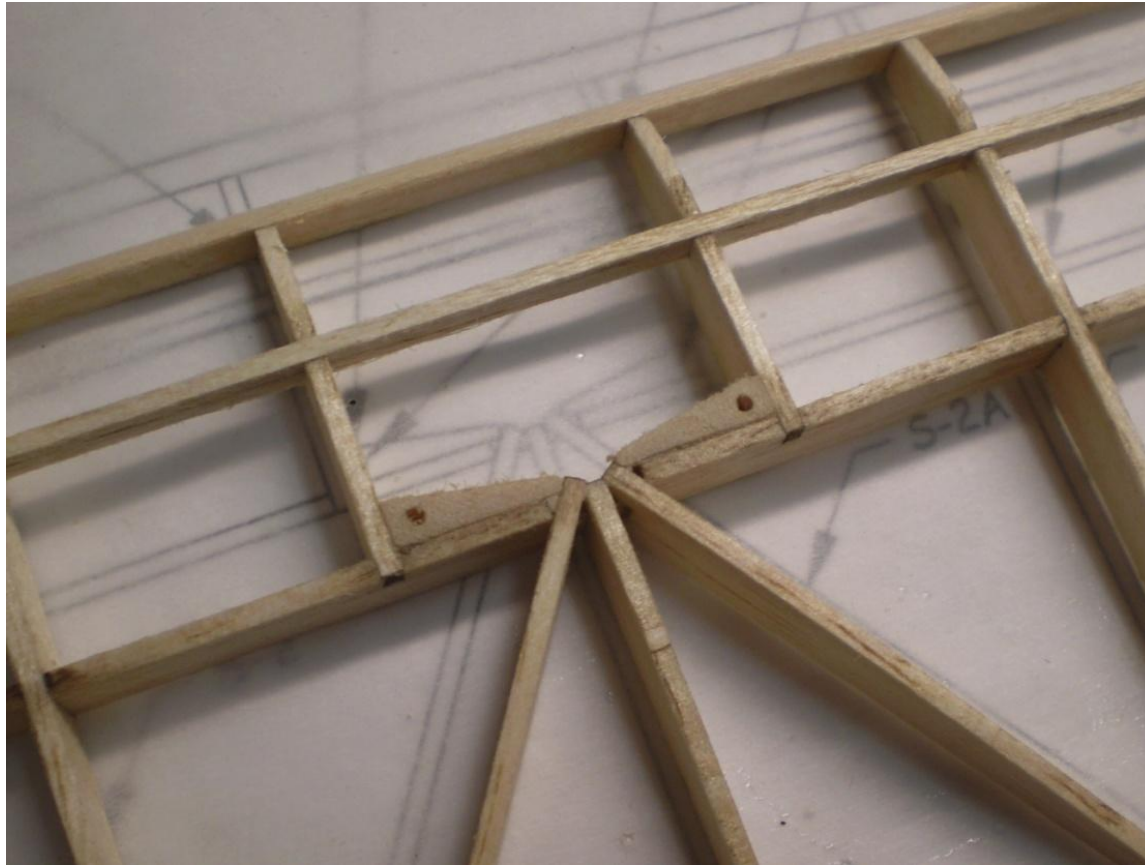




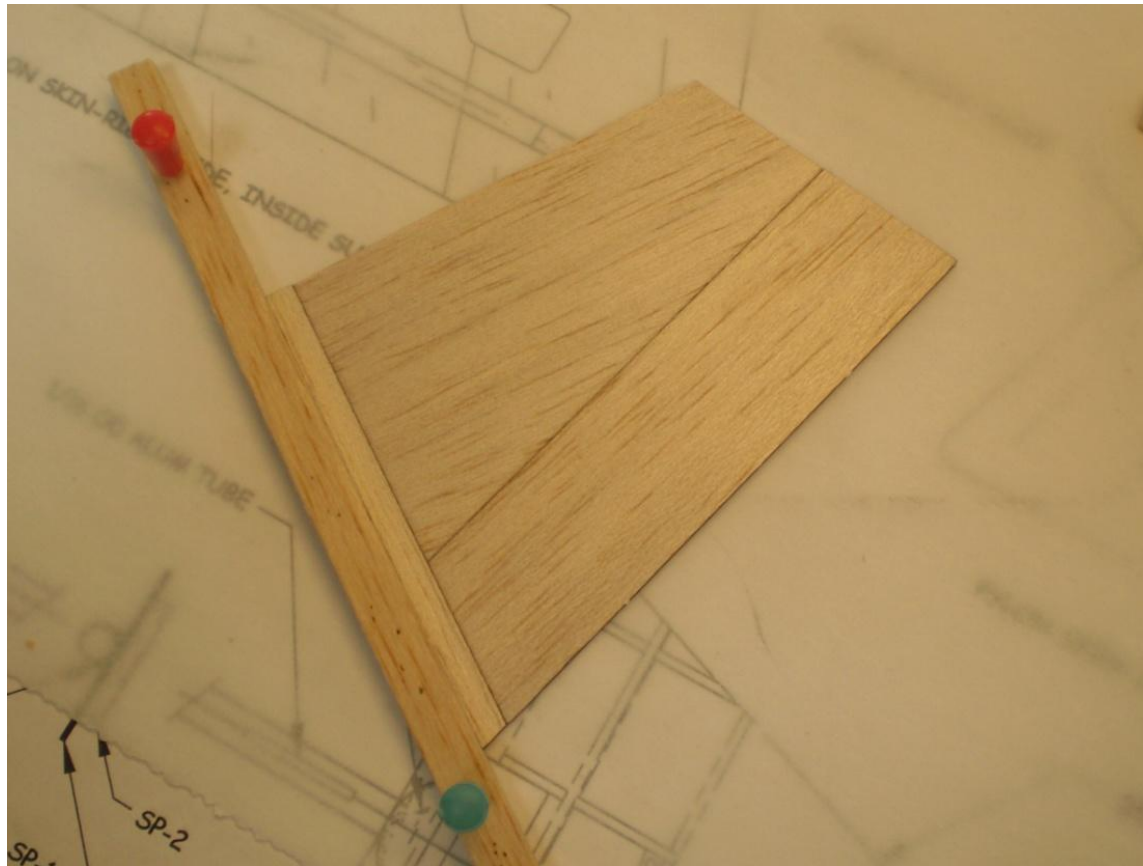
Another view of the stabilizer tip prior to sanding



Finished stabilizer frame sanded to the airfoil contour on leading and trailing edges-contour of ribs very lightly sanded smooth and flush using a sanding block with 220 grit sandpaper.



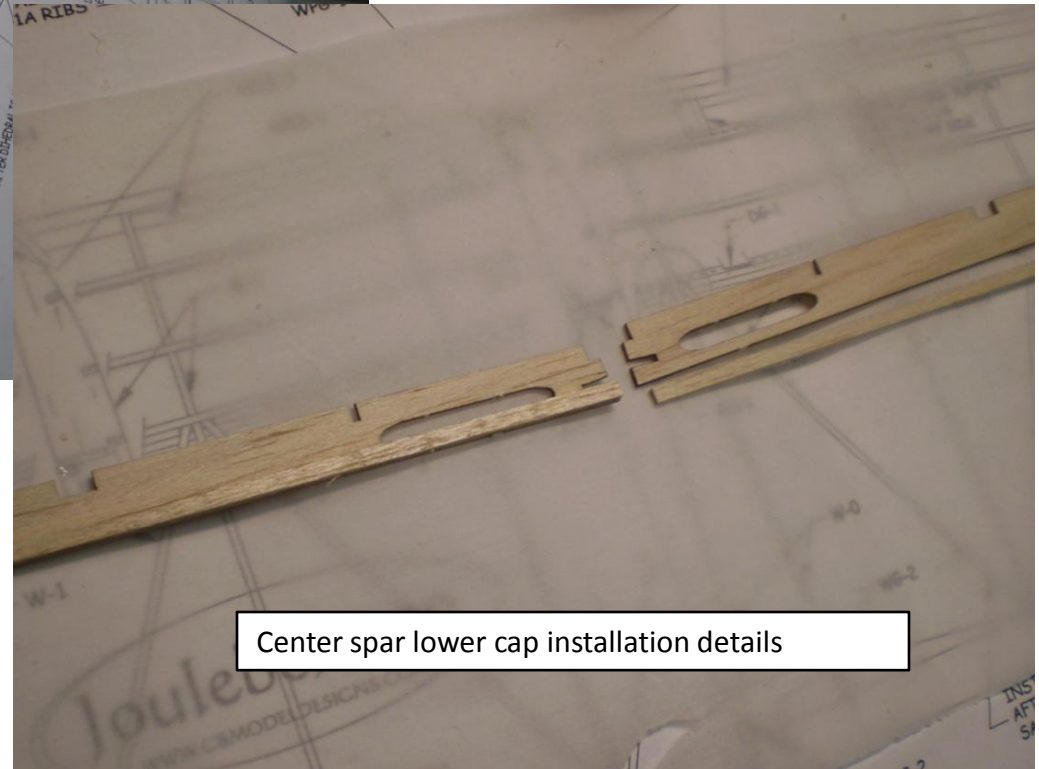
Another view of the stabilizer center section with the fillers sanded flush and pilot holes drilled for the small nails to be added after covering the frame.



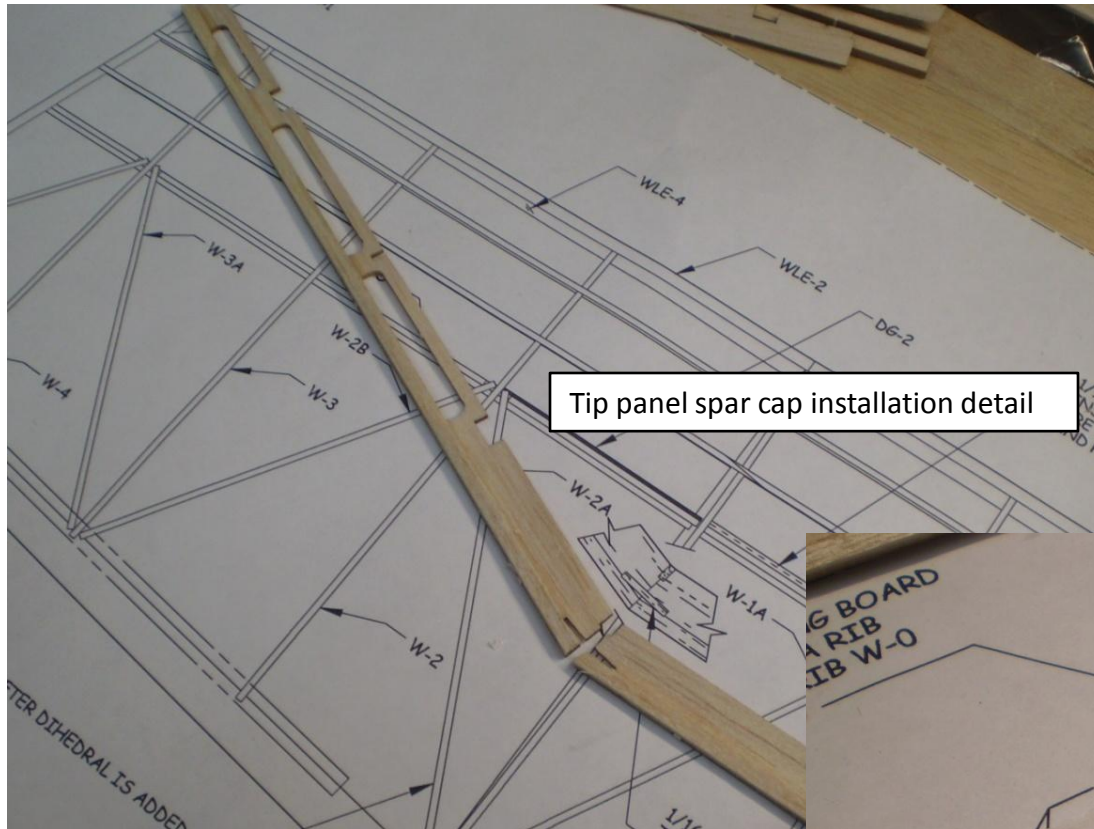
Assembly of the fin just takes a few minutes..



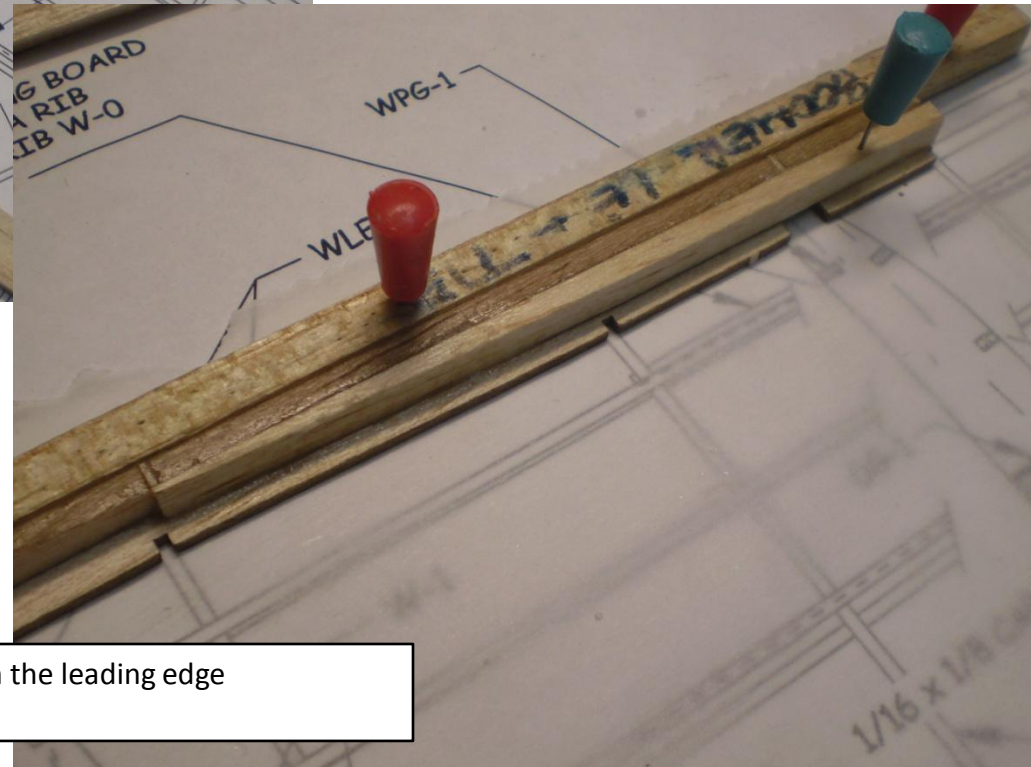
Wing spars and lower spar cap material-make sure you build left and right hand assemblies, with the lower caps on the AFT sides of the spars.



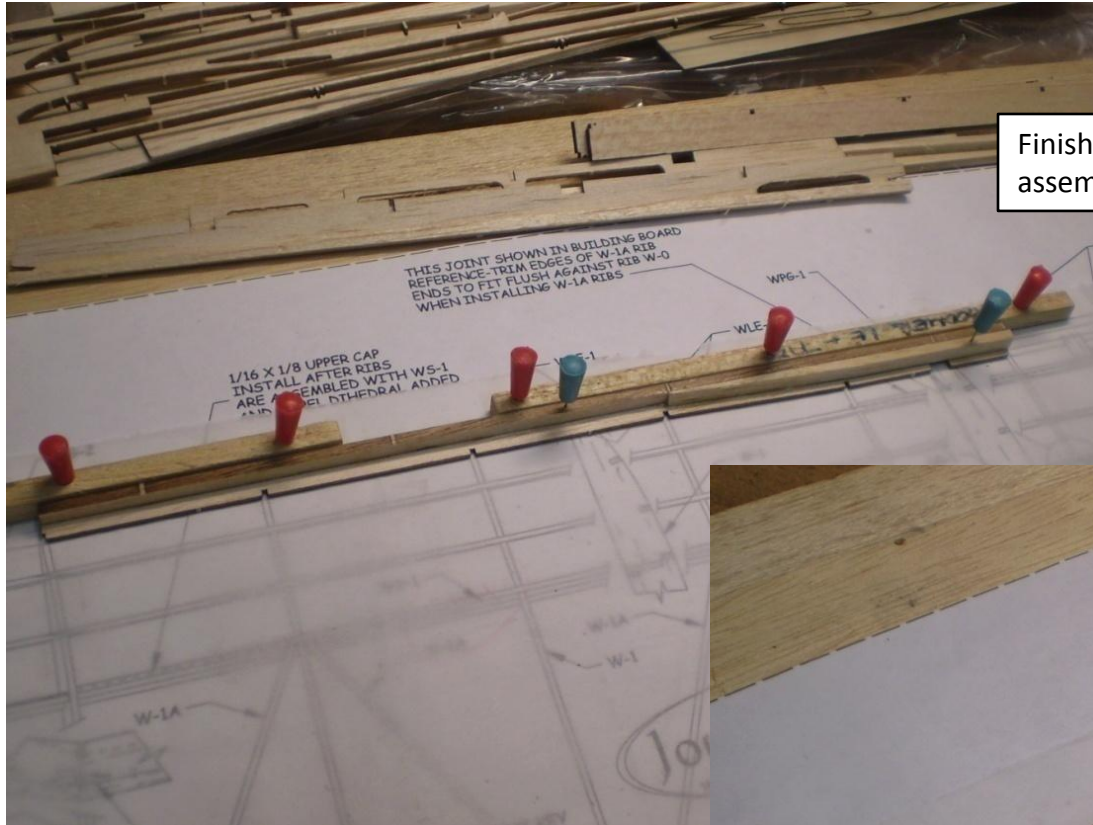
Center spar lower cap installation details



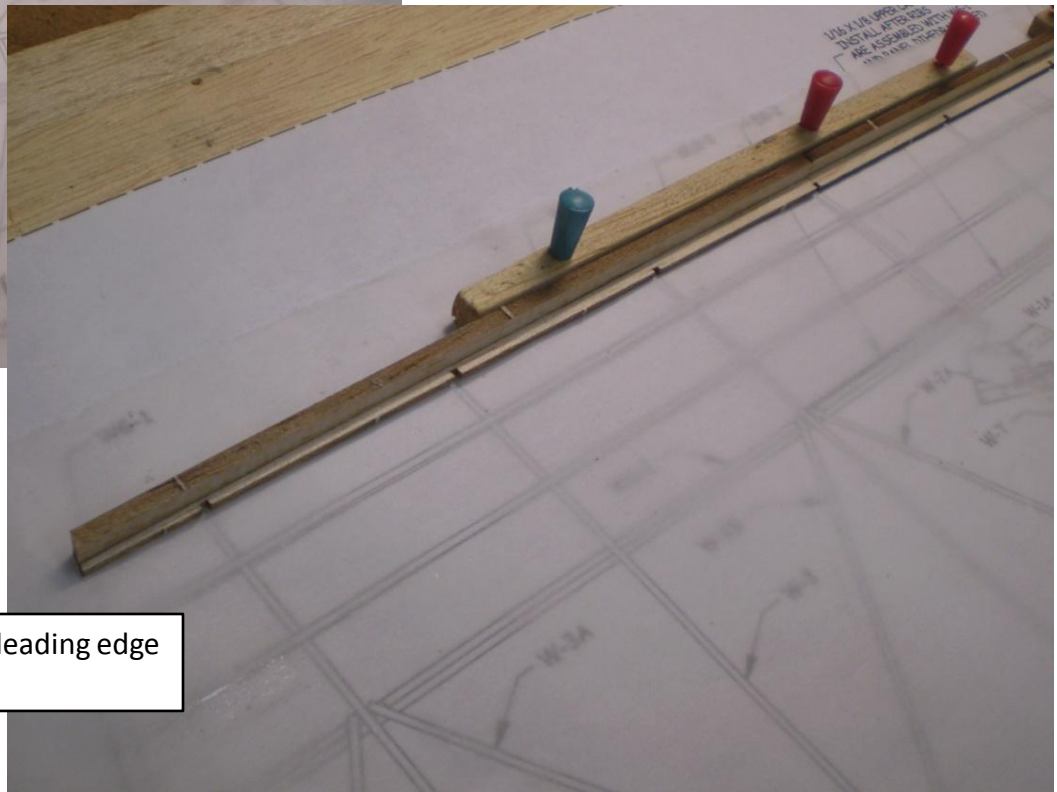
Tip panel spar cap installation detail



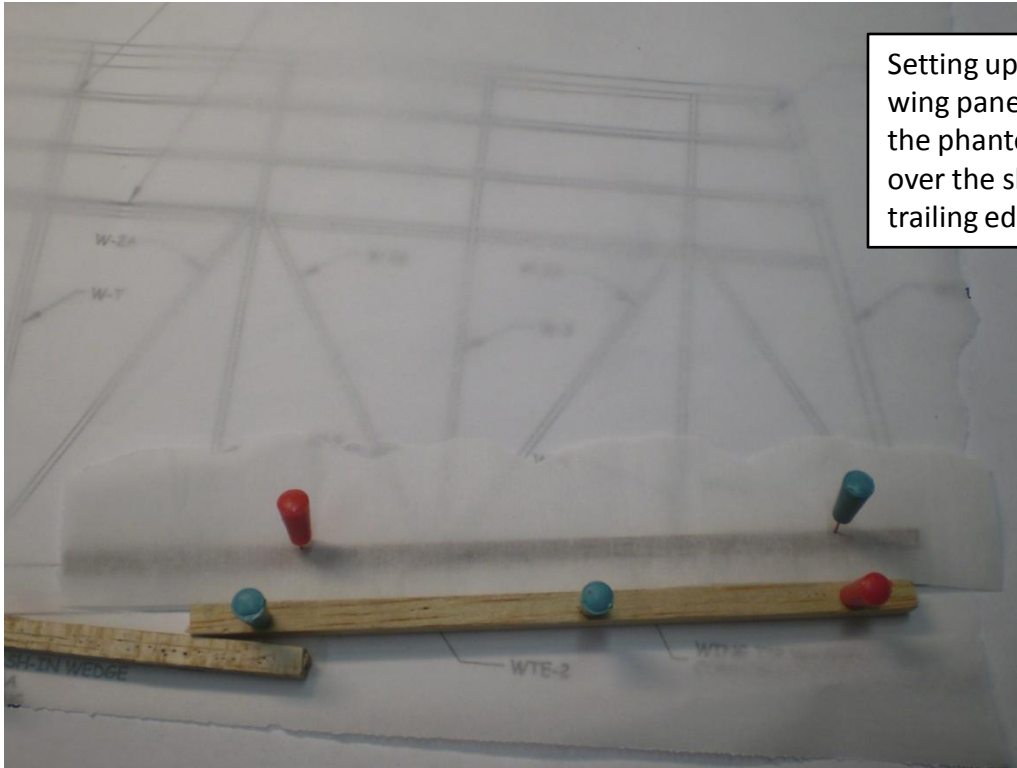
Adding the scrap 1/8 balsa filler on the leading edge subassembly for the center panel



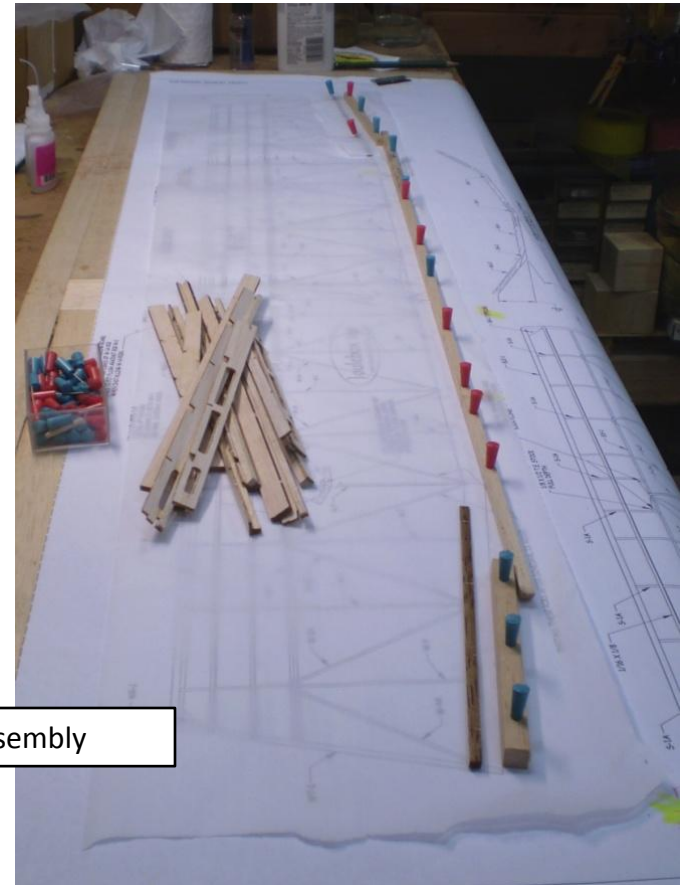
Finished center wing panel leading edge assembly



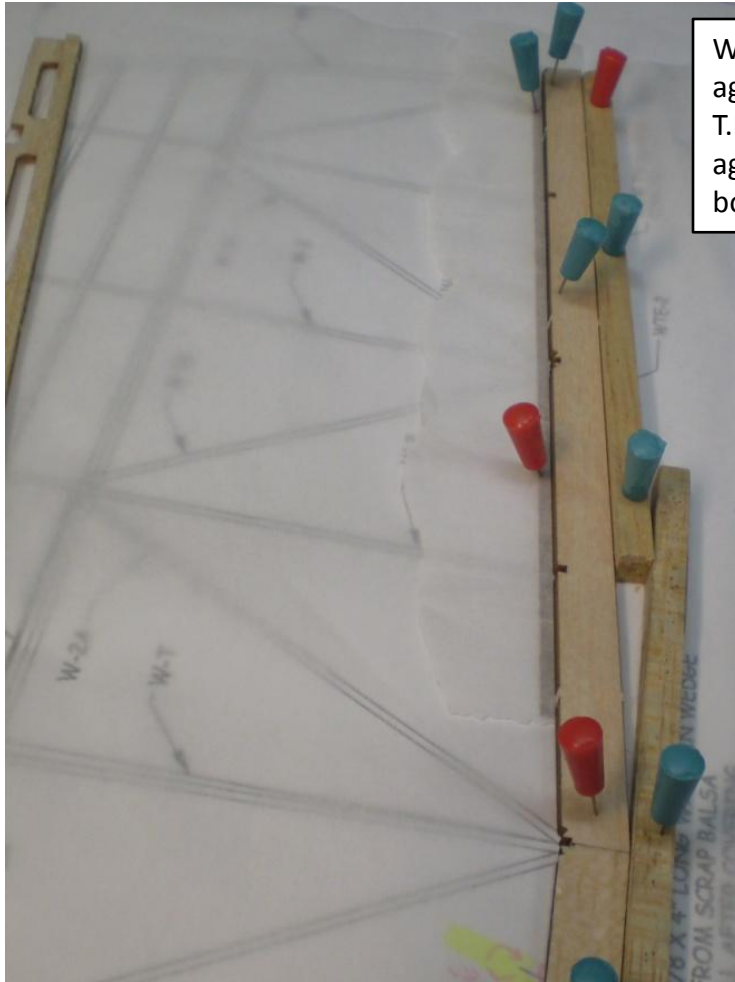
Finished wing tip panel leading edge assembly



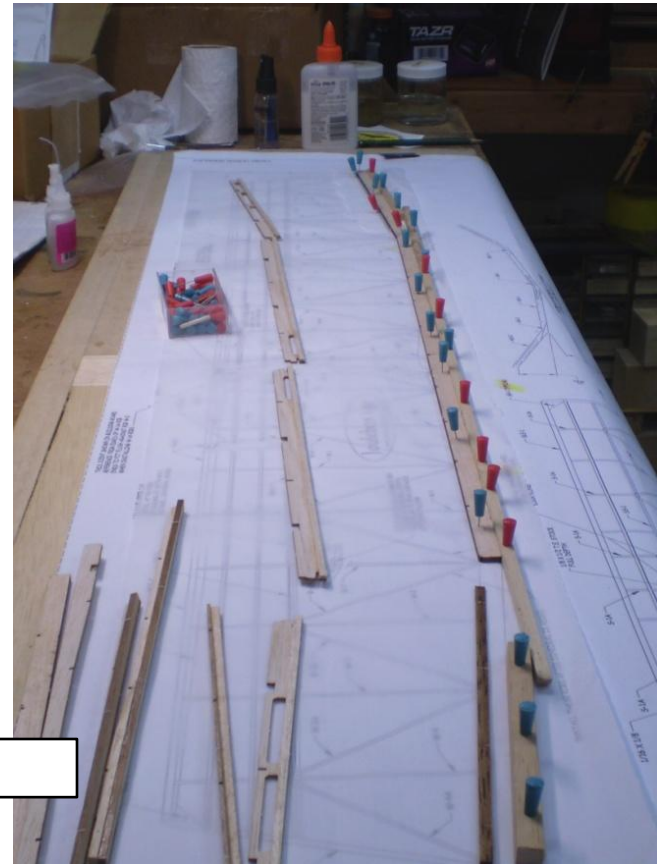
Setting up the boundary control stock along the trailing edge s of the wing panels. This is showing the placement of the washout shim to the phantom line locations on the plan. Use of parchment paper over the shim is recommended to keep the shim from bonding to the trailing edge during assembly.



Overall view of the setup for wing assembly



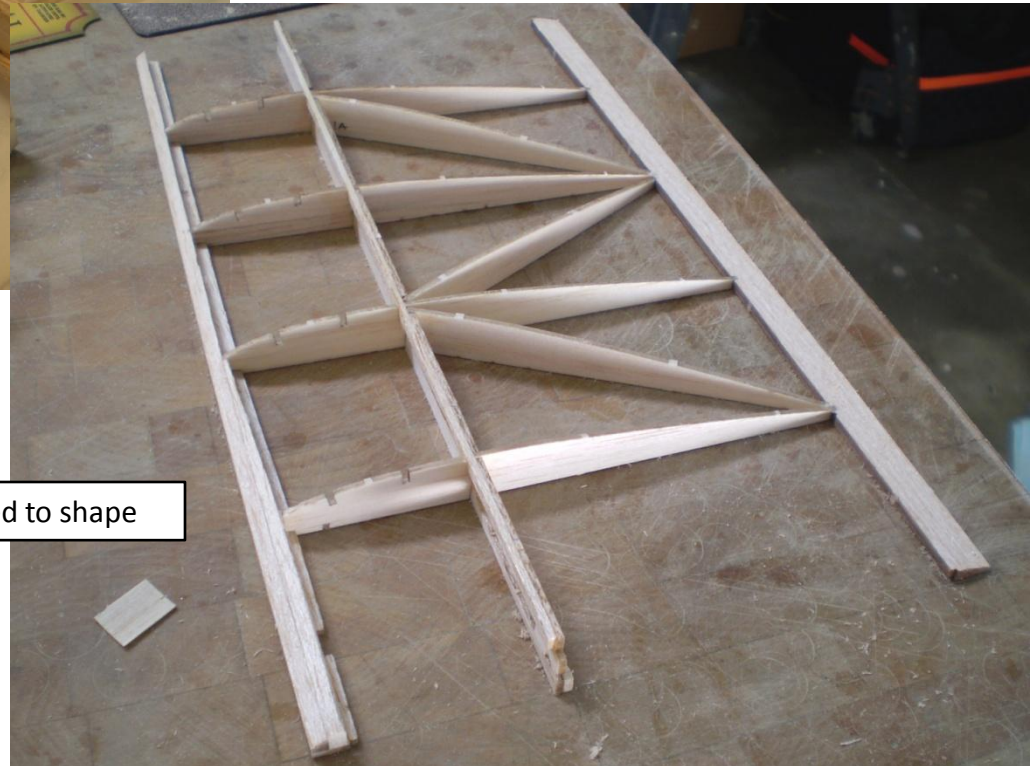
Wing panel trailing edges installed with pins against the boundary control stock. Tip panel T.E. sits flat on top of the washout shim, the root against the building board to maintain the flat bottom airfoil contour.



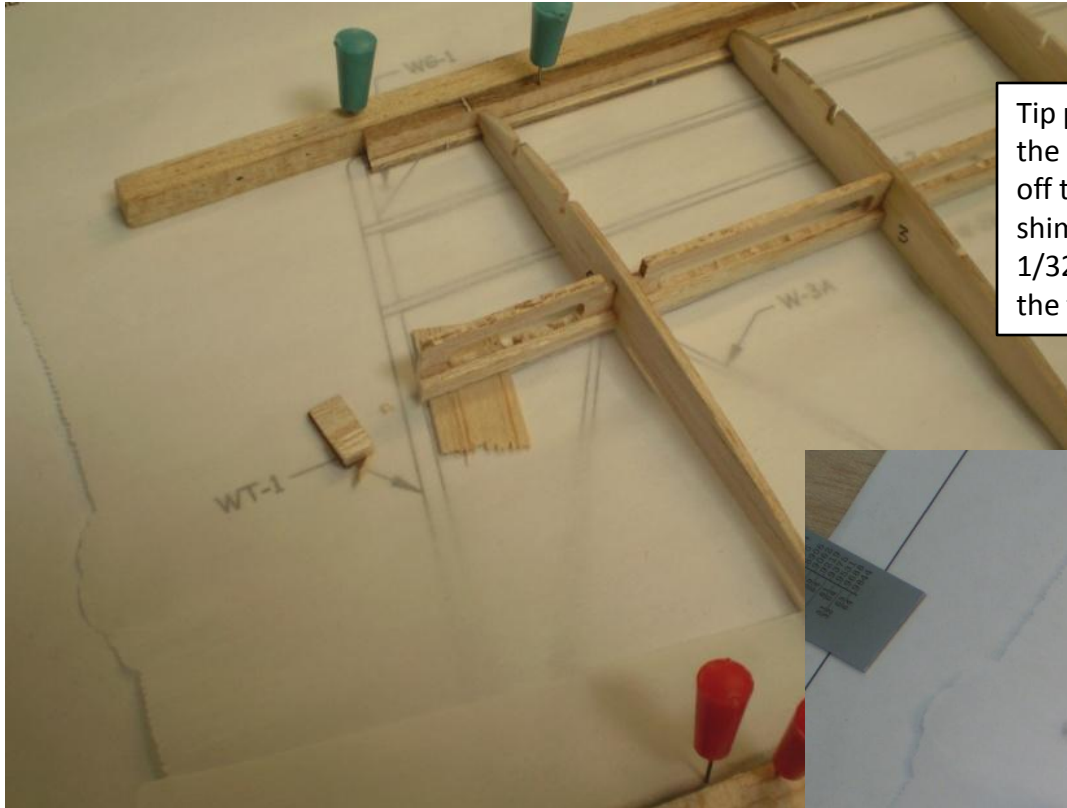
Overall view of the trailing edge locations in progress



Jumping ahead-build each basic panel assembly less the diagonal ribs that will attach to the dihedral break ribs W-0 and W-T. Then remove the panel off the plan for rough shaping of the leading and trailing edges and light bevel of the leading and trailing edge dihedral joint ends.

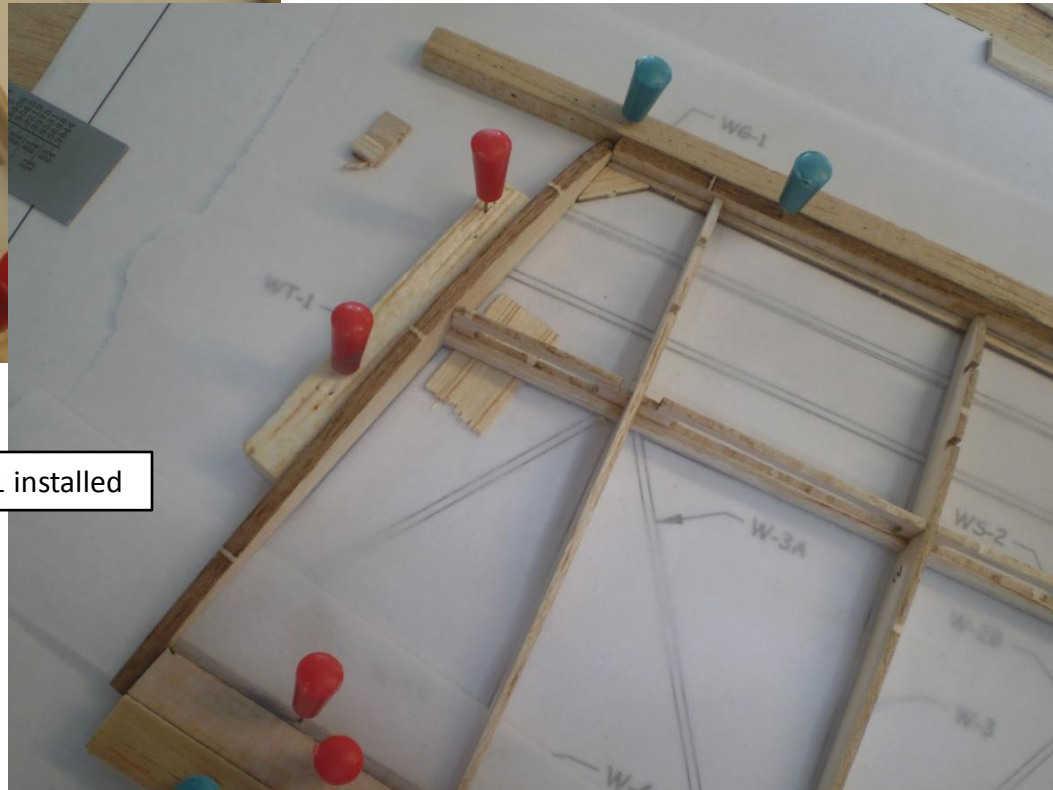


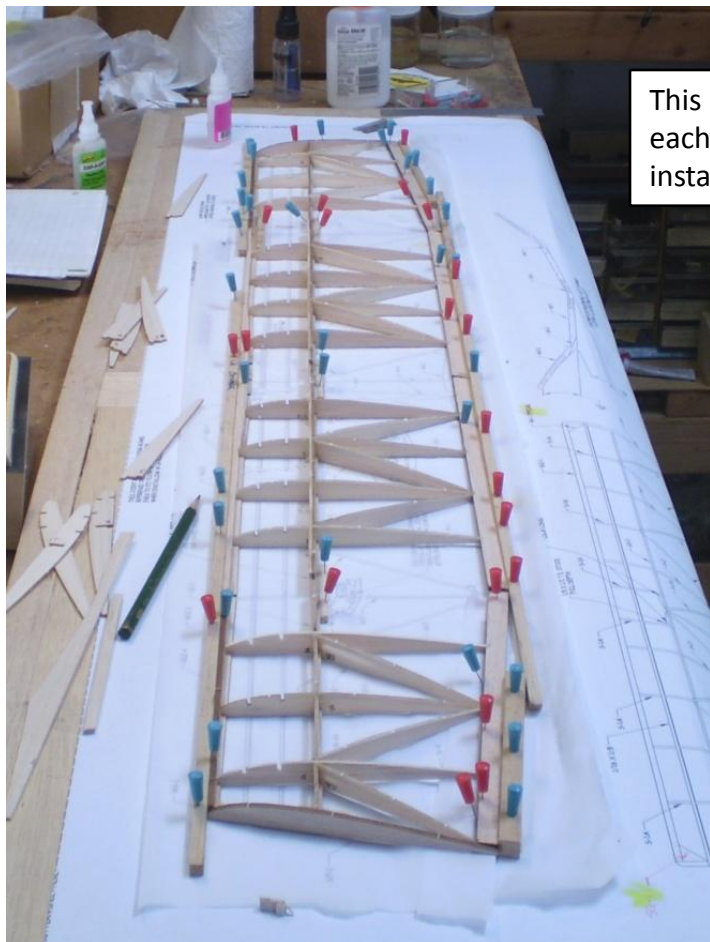
A center section panel being sanded to shape



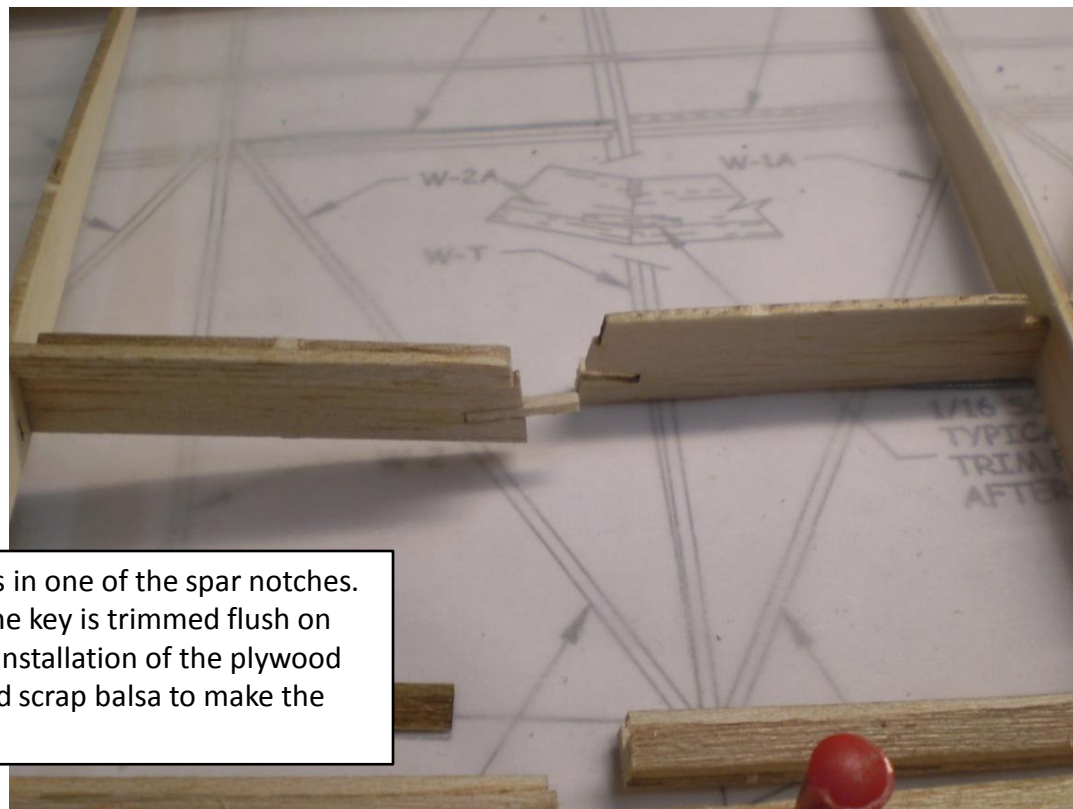
Tip panel build up-the leading edge remains pinned flat to the board and the rest of the structure in the tip is slightly off the board to build in the washout twist created by the shim under the trailing edge. Shim under the spar with 1/32 shim and trim the end to meet the inside surface of the tip rib WT-1.

Tip rib WT-1 and gusset WG-1 installed

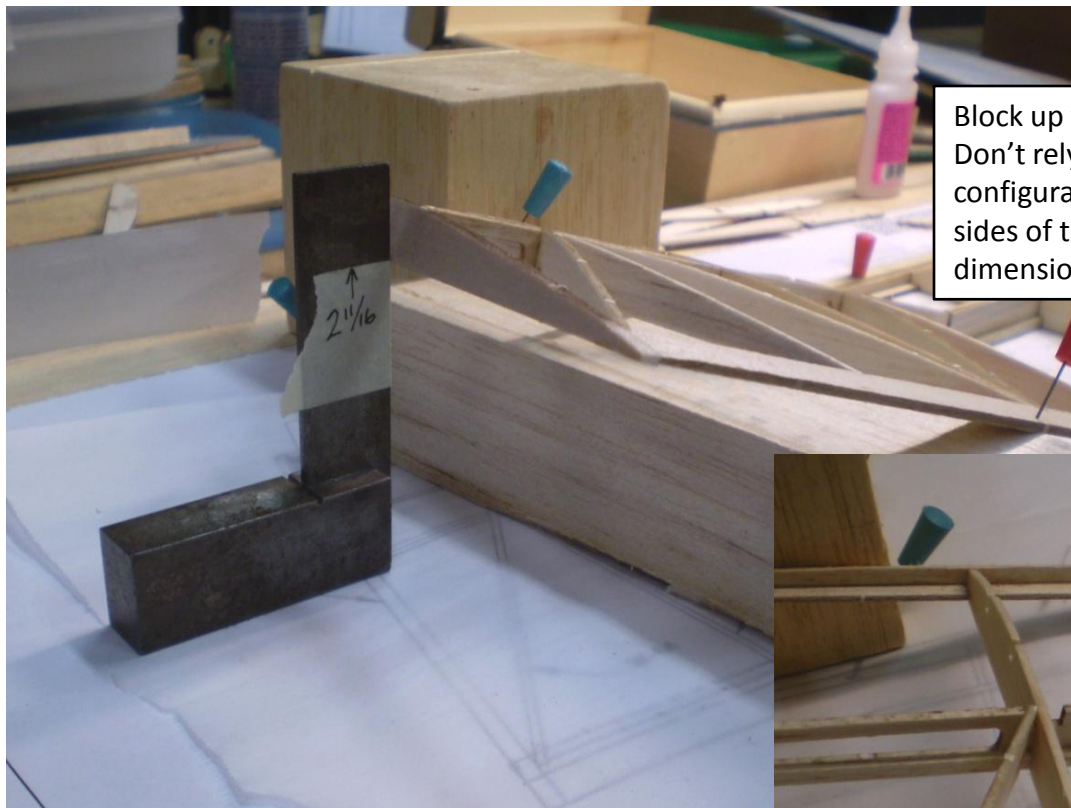




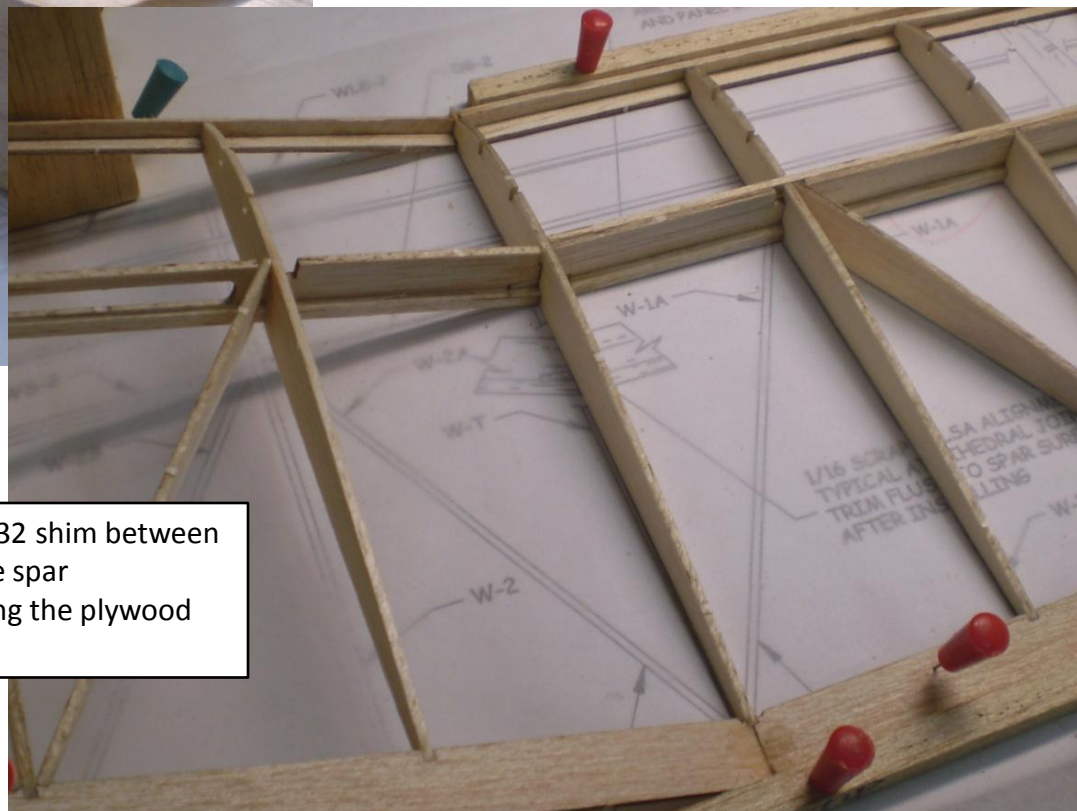
This is the basic wing construction up to the point of adding the dihedral for each panel. Note the diagonal ribs common to the dihedral breaks are not installed yet.



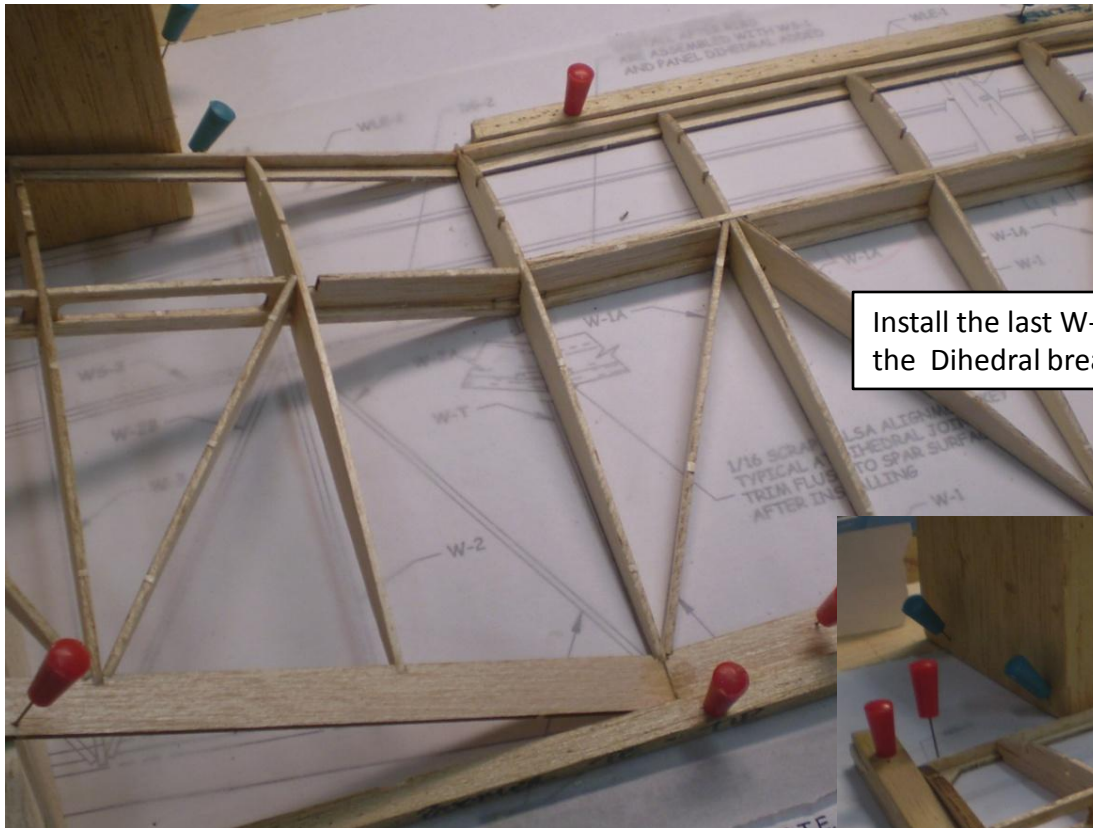
Install 1/16 X 1/2 long scrap balsa keys in one of the spar notches. Width can be left rough, make sure the key is trimmed flush on the forward spar faces to allow flush installation of the plywood dihedral gusset that follows. Use hard scrap balsa to make the key.



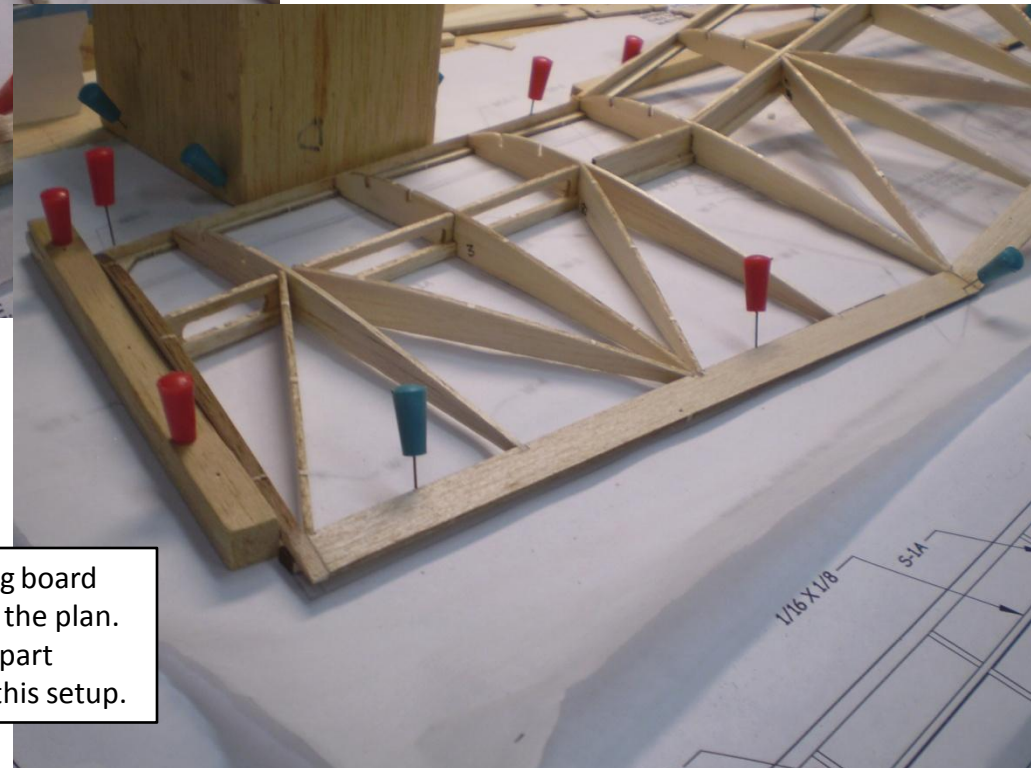
Block up wing panels for setting the dihedral. Don't rely on the key and spar end angle configuration alone for this-make sure both sides of the wing have been set to the dimensions shown on the plan.



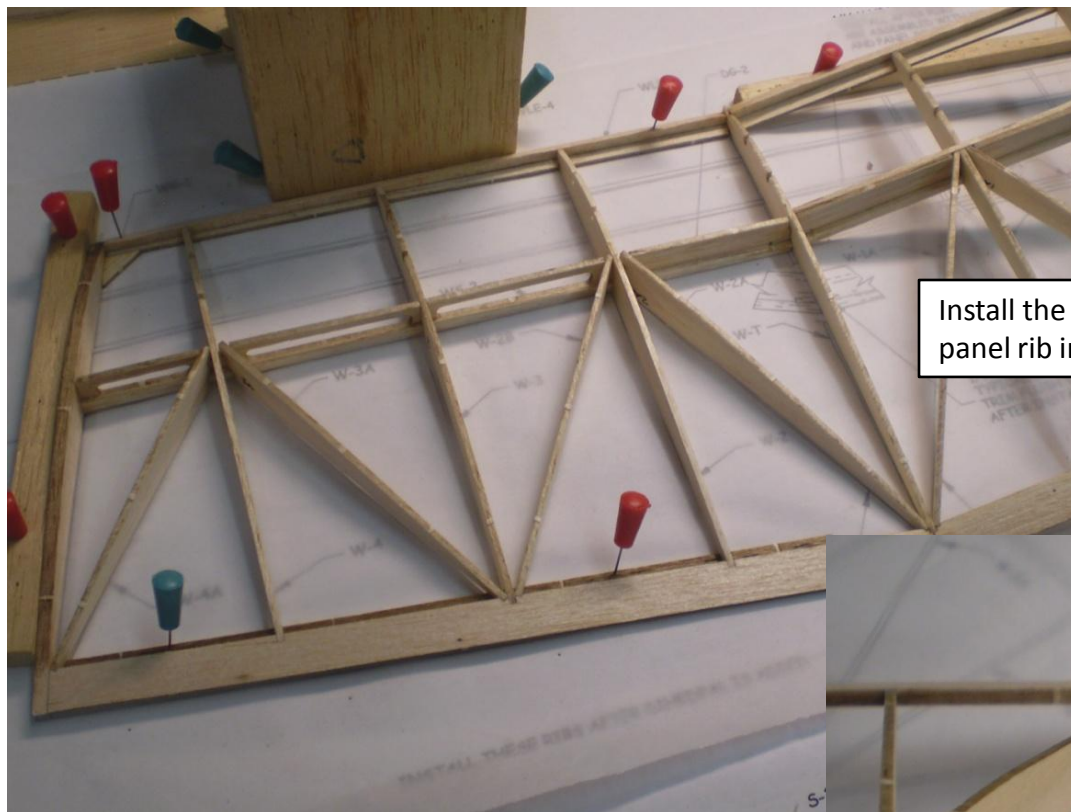
Installing dihedral break rib W-T; carefully dry fit a 1/32 shim between the edge of the rib spar notch and front surface of the spar intersection to maintain the space needed for installing the plywood dihedral gusset that follows.



Install the last W-1A diagonal rib after adding the Dihedral break rib.



Re-establish the tip panel against the building board with the washout shim in place as shown on the plan. To lock in the washout twist each additional part installation needs to be made in context of this setup.



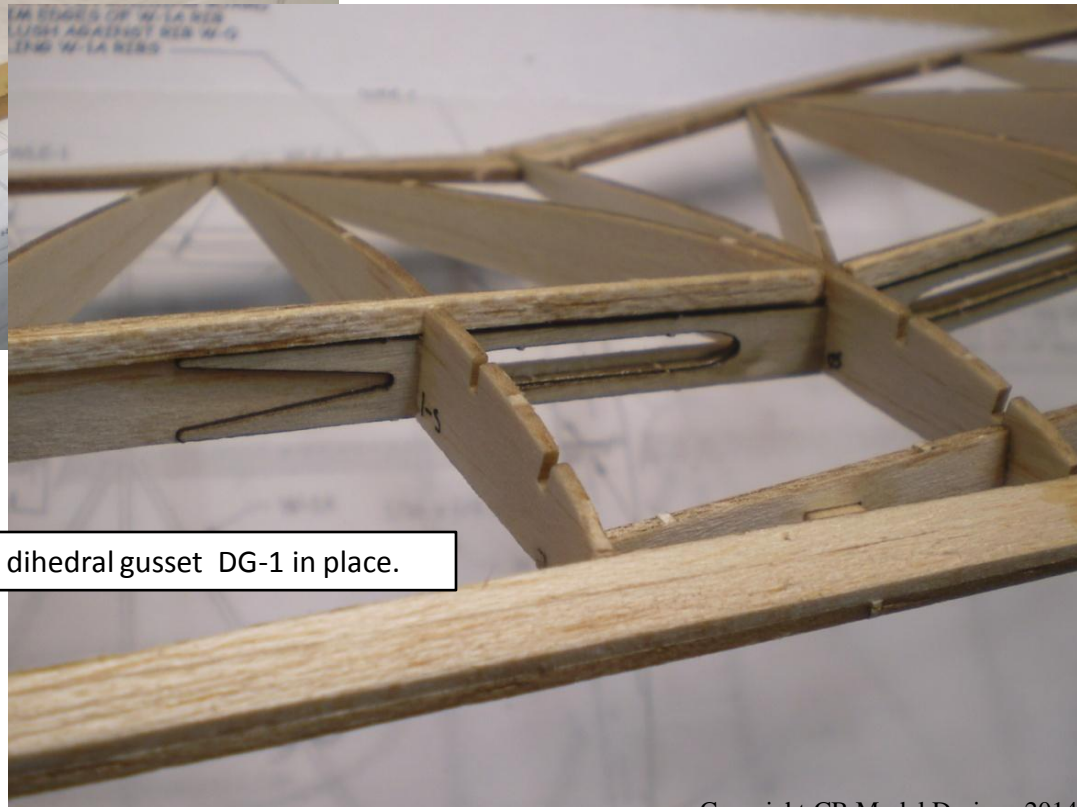
Install the W-2A diagonal rib to complete the tip panel rib installations.



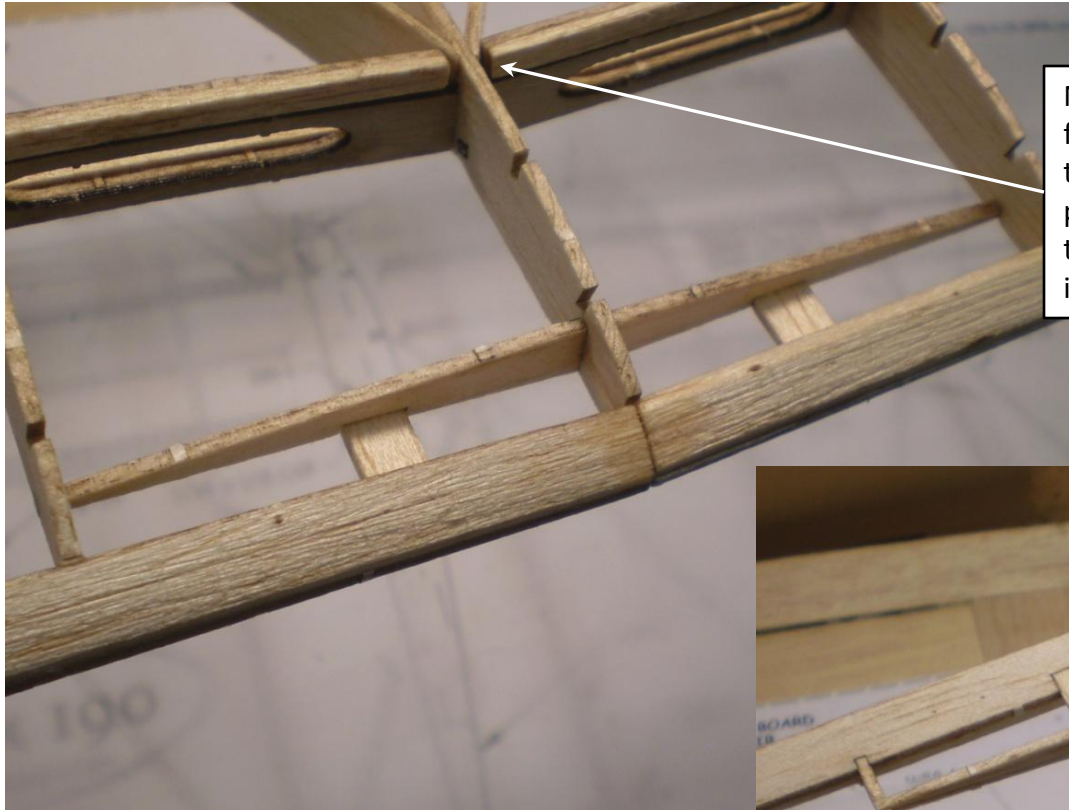
Remove the 1/32 shim between the rib and spar installed earlier and install the 1/32 plywood dihedral gusset DG-2, flush to the bottom of the spars. Note in these pictures I show the upper spar cap already installed. You can do this as you build the basic center section panels, but when notching the ribs W-1-S for this cap you will break completely through the rib. I suggest you do this after when the gap is filled by the dihedral gusset, or simulate this with a dry installed 1/32 shim to maintain the fit of the W-1-S ribs in place.



Completed wing frame less the turbulator spars



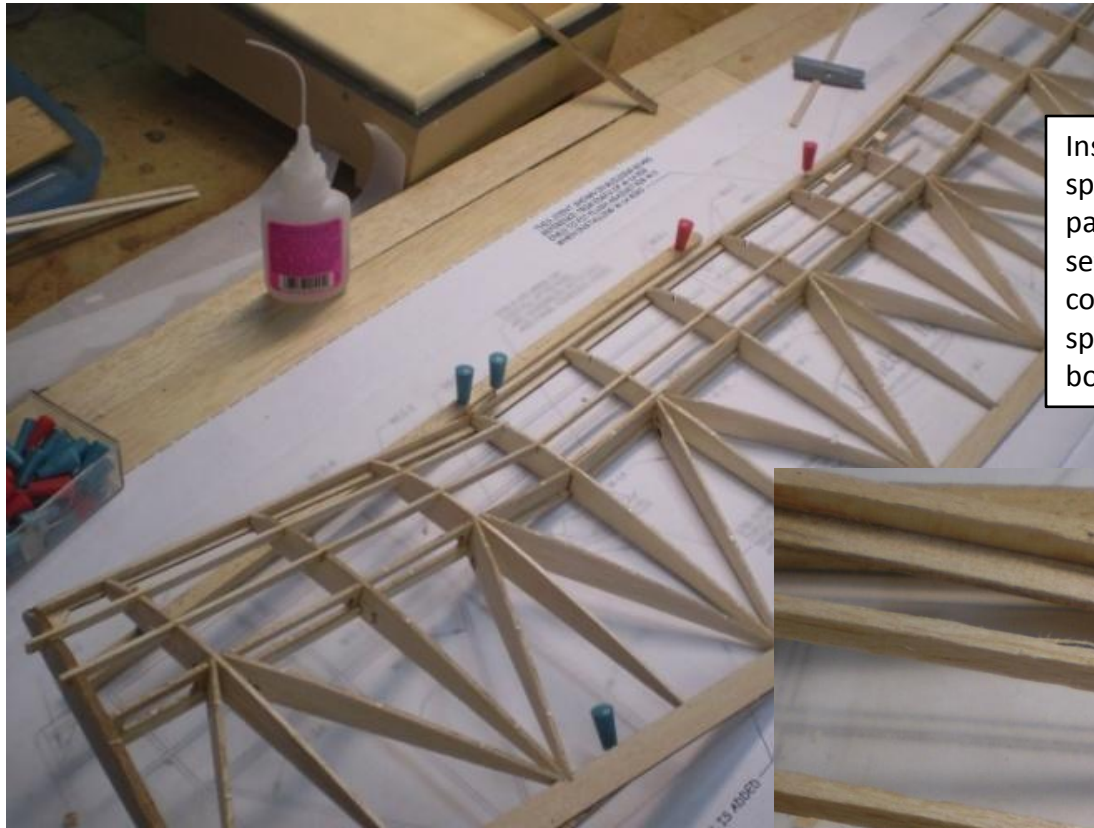
Wing center section with dihedral gusset DG-1 in place.



Not shown on the plan-this gap across the center will flex a little on D/T landing and show a small rupture in the tissue covering. I add a piece of scrap 1/32 plywood to the front of the caps to tie the two sides together and bridge the gap. I make this 1/8 wide X 1 inch long, centered on the installation.

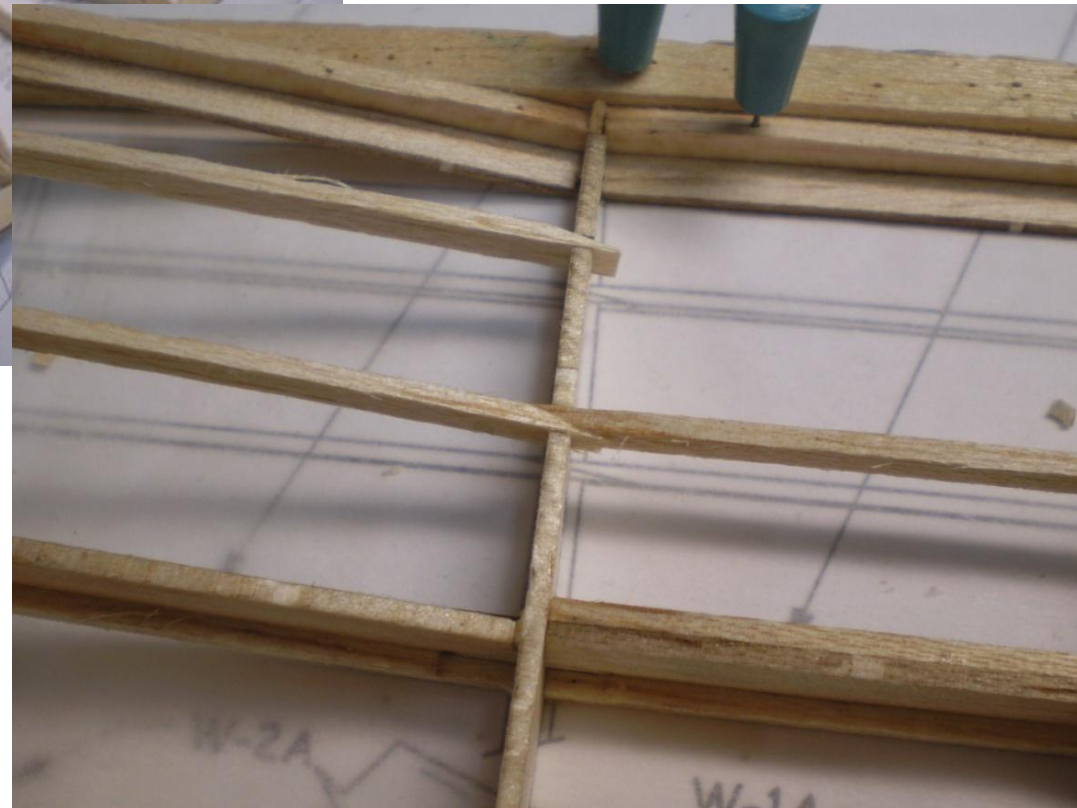


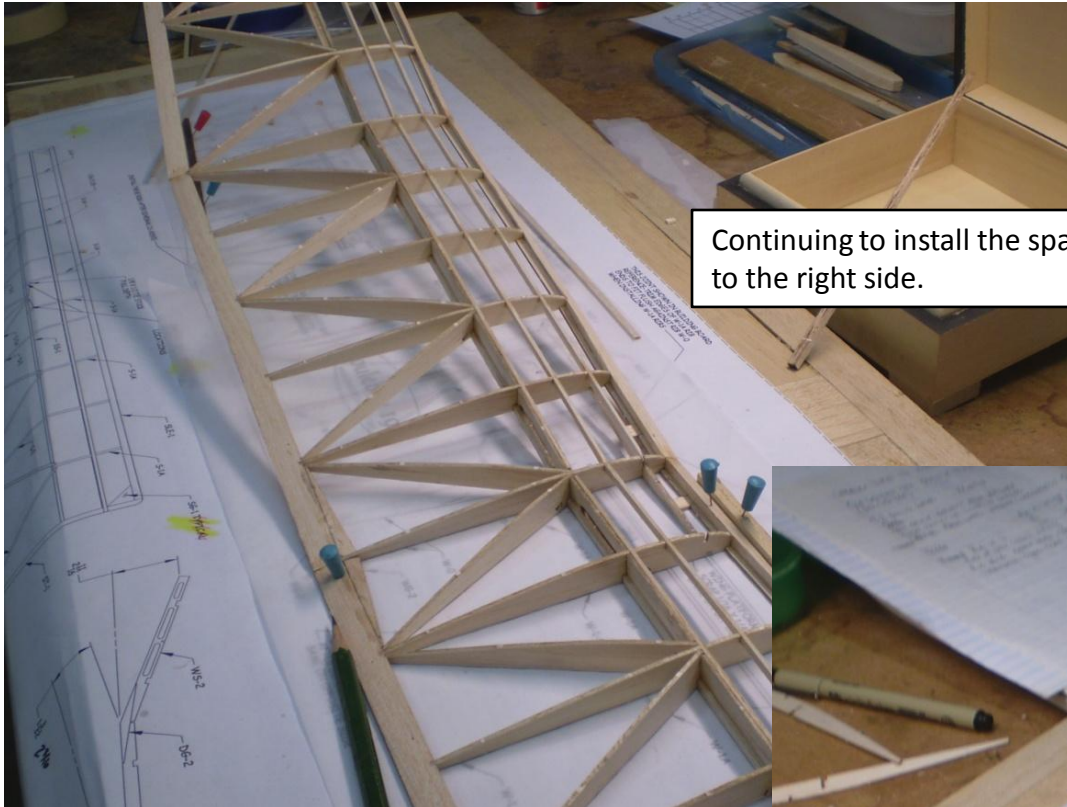
Detail of the wing platform mount support structure



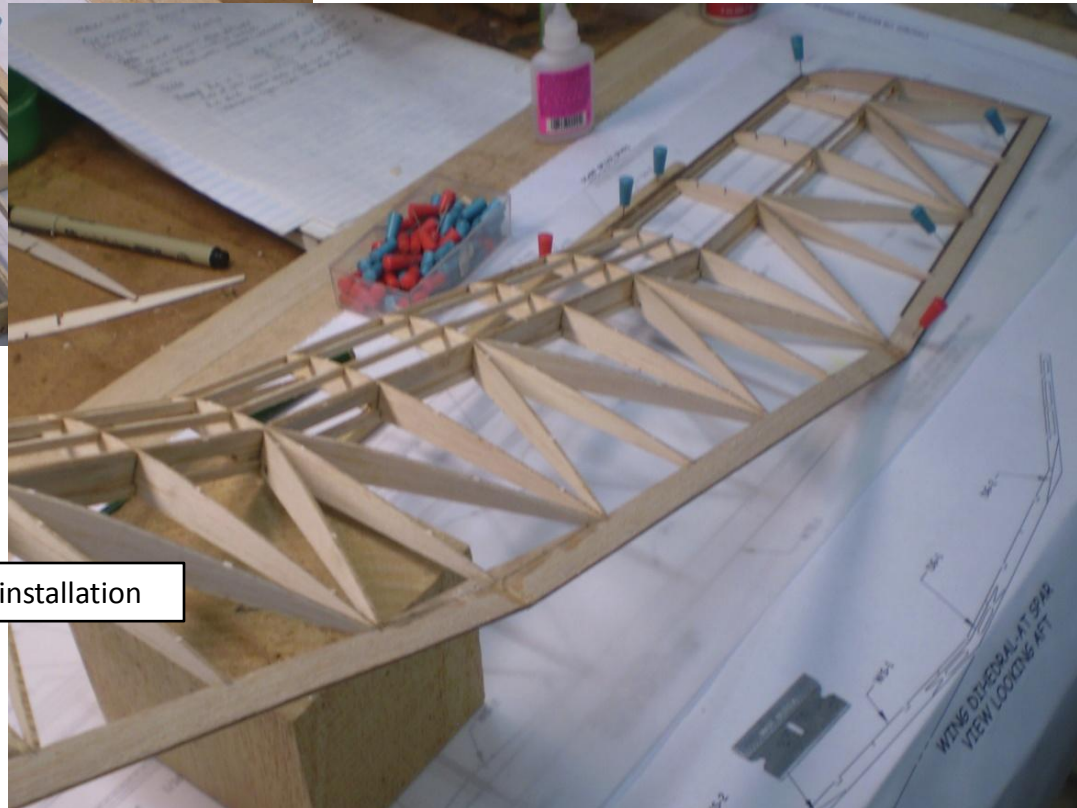
Installation of turbulator spars. The tip panel spars are glued in based on having set the tip panel against the building board as done for setting the ribs, to maintain the washout configuration. Each panel receiving turbulator spars needs to be held flat against the building board for the installation.

Detail of a scarf joint on the turbulator spars. The missing spar is sliced at an angle on the end and adjusted for a tight fit against the existing spar mating surface. The trim the far end of the spar for it's splice location before installing. You can do quite a bit of dry fitting before bonding any of this if need be-just return to holding each panel flat against the building board when gluing in the spars.

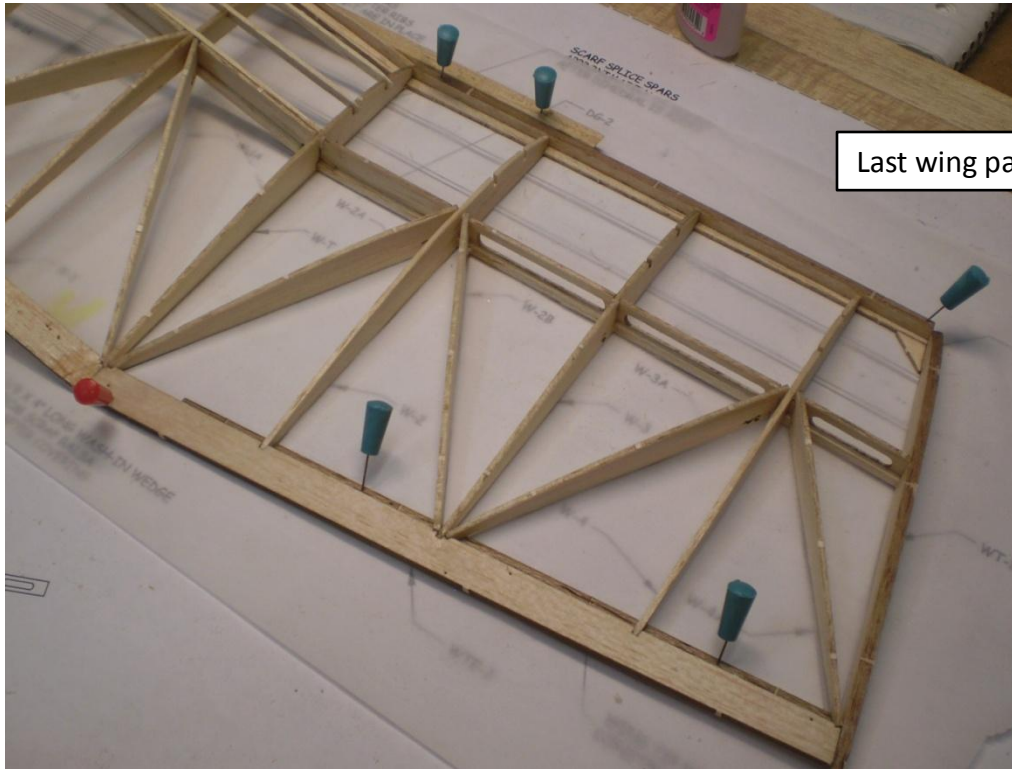




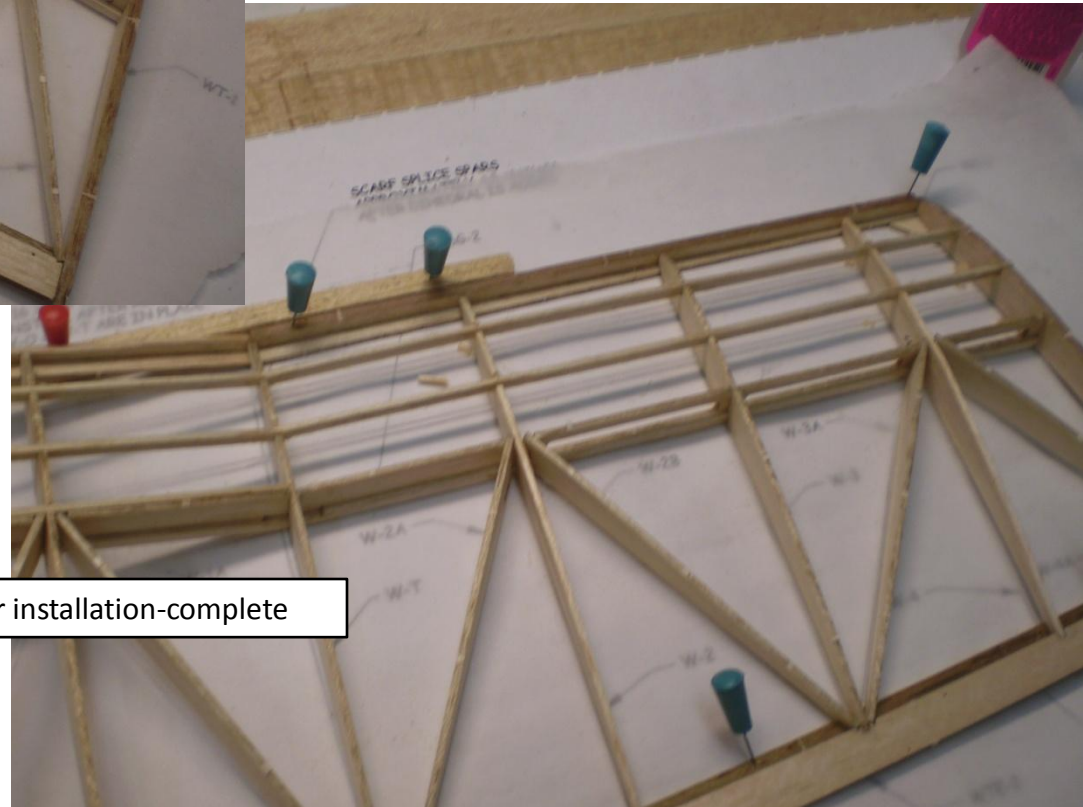
Continuing to install the spars, working from the left side of the wing to the right side.



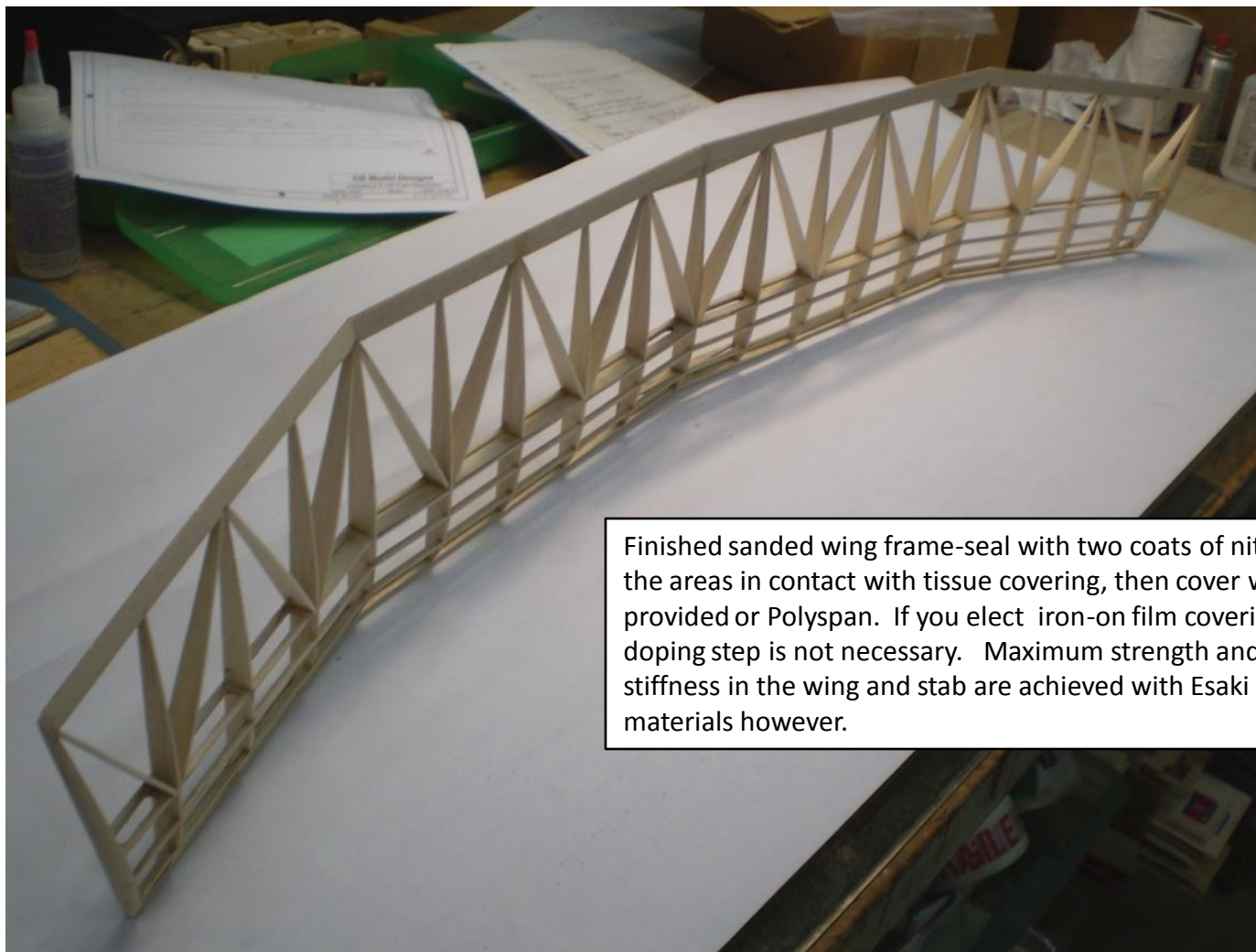
Down to the last panel for turbulator spar installation



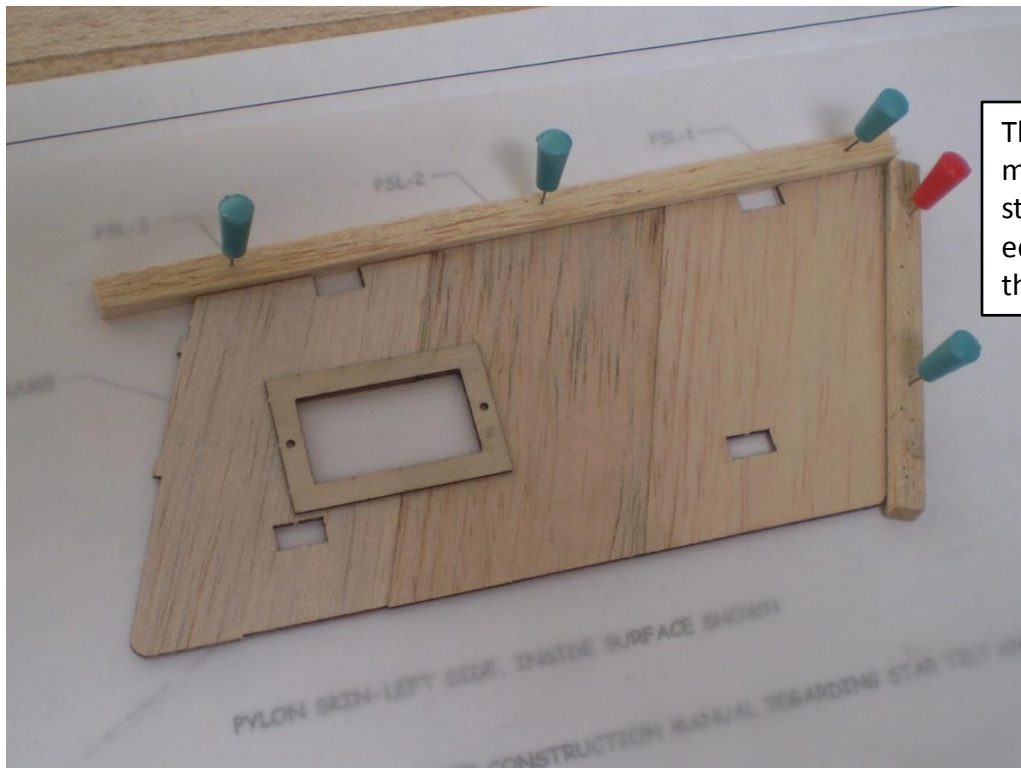
Last wing panel for turbulator spar installation



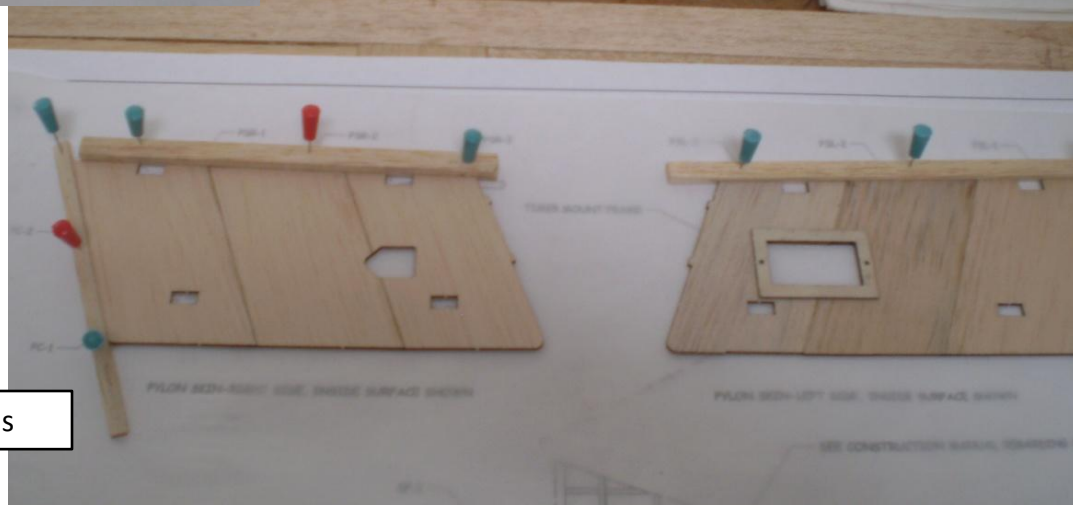
Typical spar installation-complete



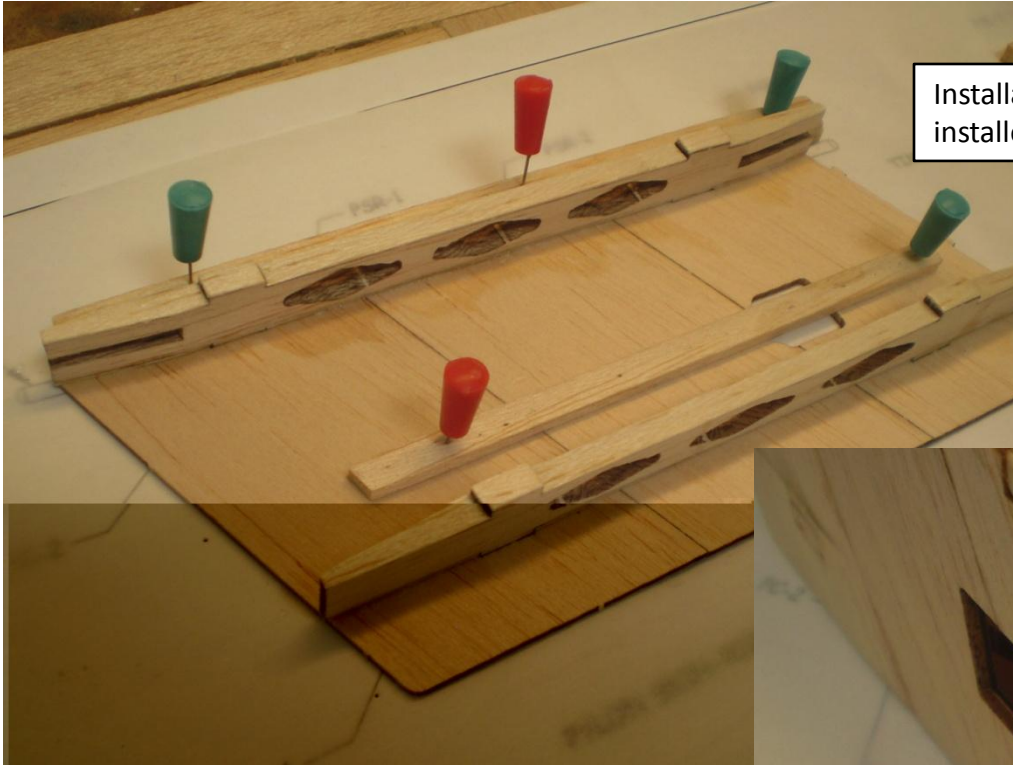
Finished sanded wing frame-seal with two coats of nitrate dope on the areas in contact with tissue covering, then cover with Esaki provided or Polyspan. If you elect iron-on film covering, the doping step is not necessary. Maximum strength and torsional stiffness in the wing and stab are achieved with Esaki or Polyspan materials however.



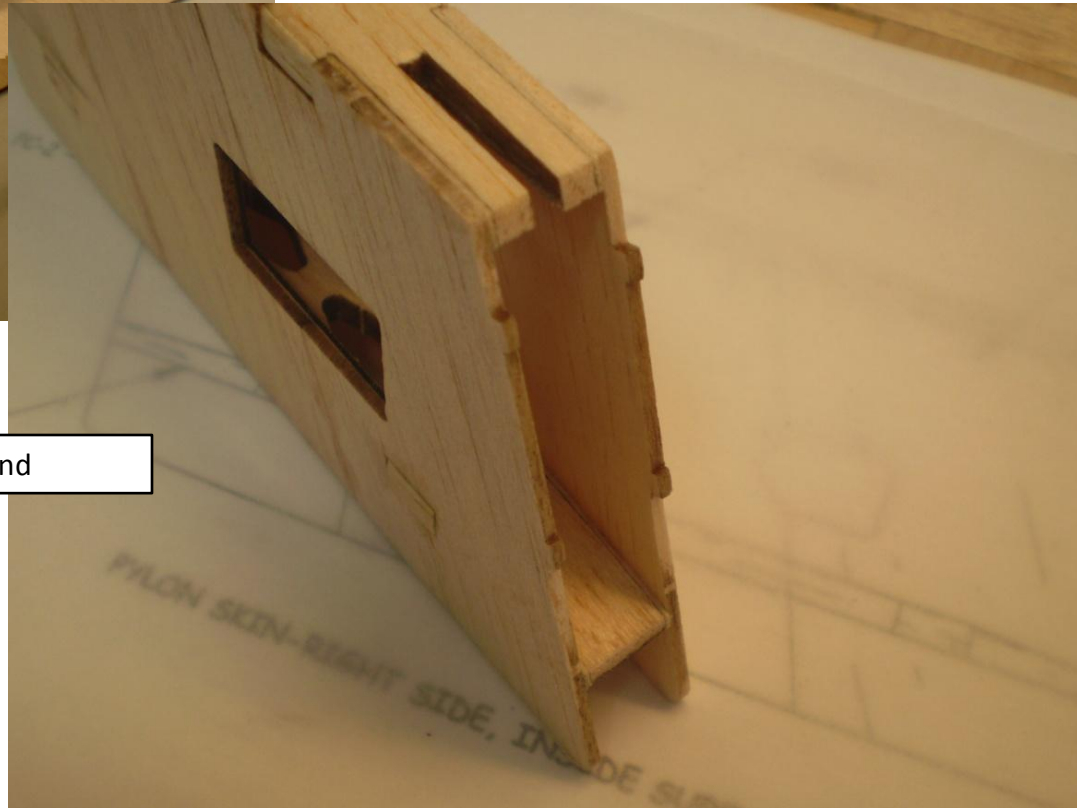
The right side pylon skin assembly with timer mounting frame installed. Boundary control stock in place to provide alignment of segment edges-top is more critical to the assembly than the lower edge.



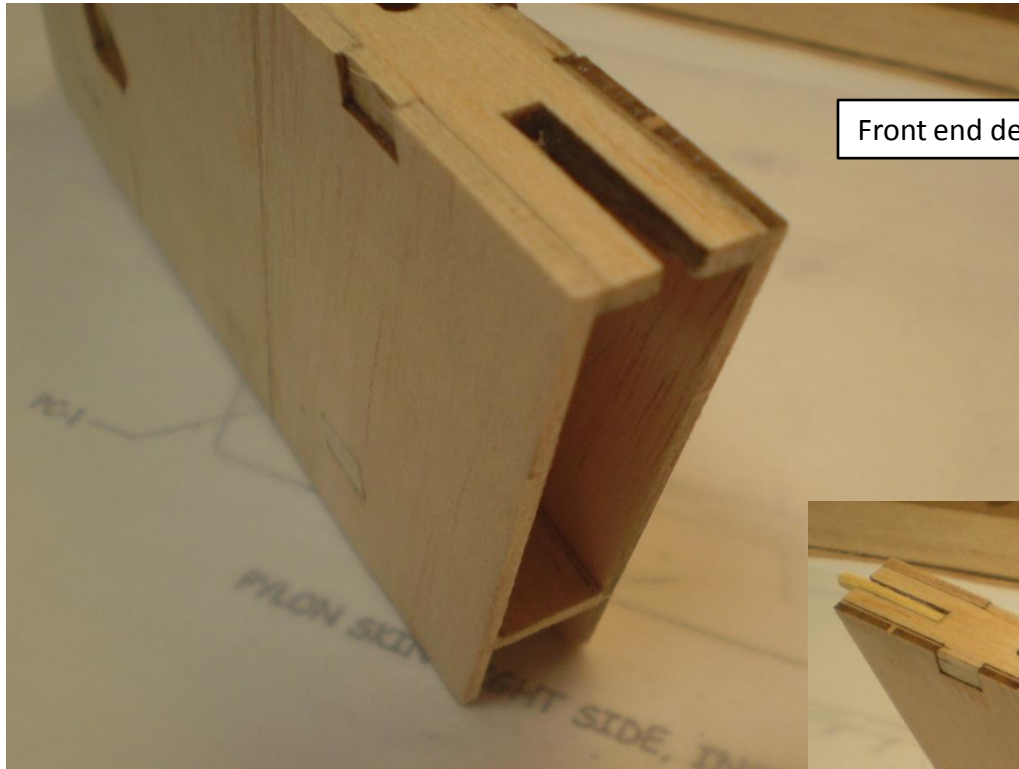
Assembly of pylon skins



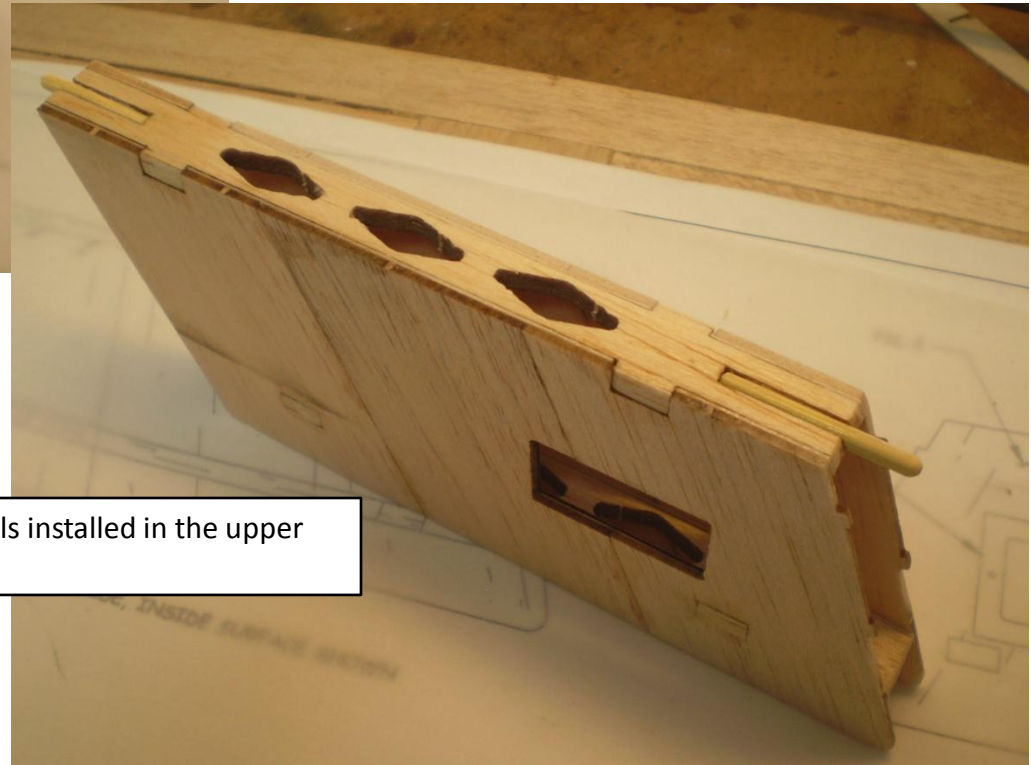
Installation of the pylon caps-make sure these are installed square to the building board surface.



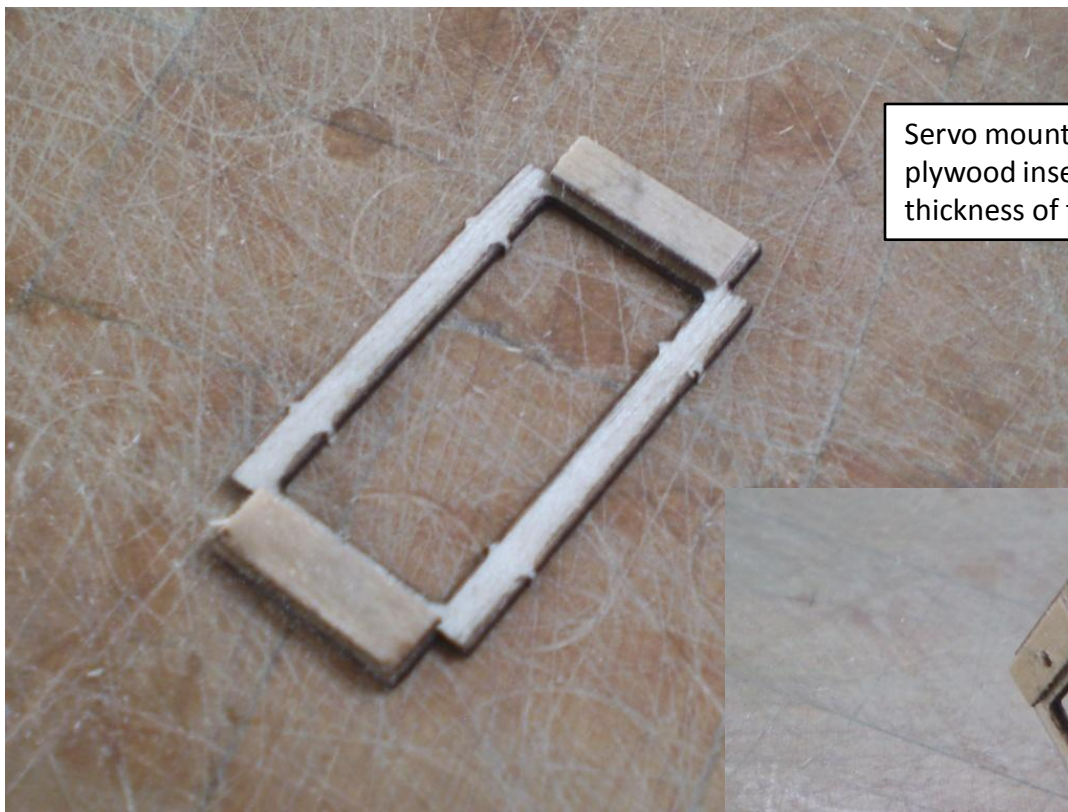
Assembled pylon-rear end



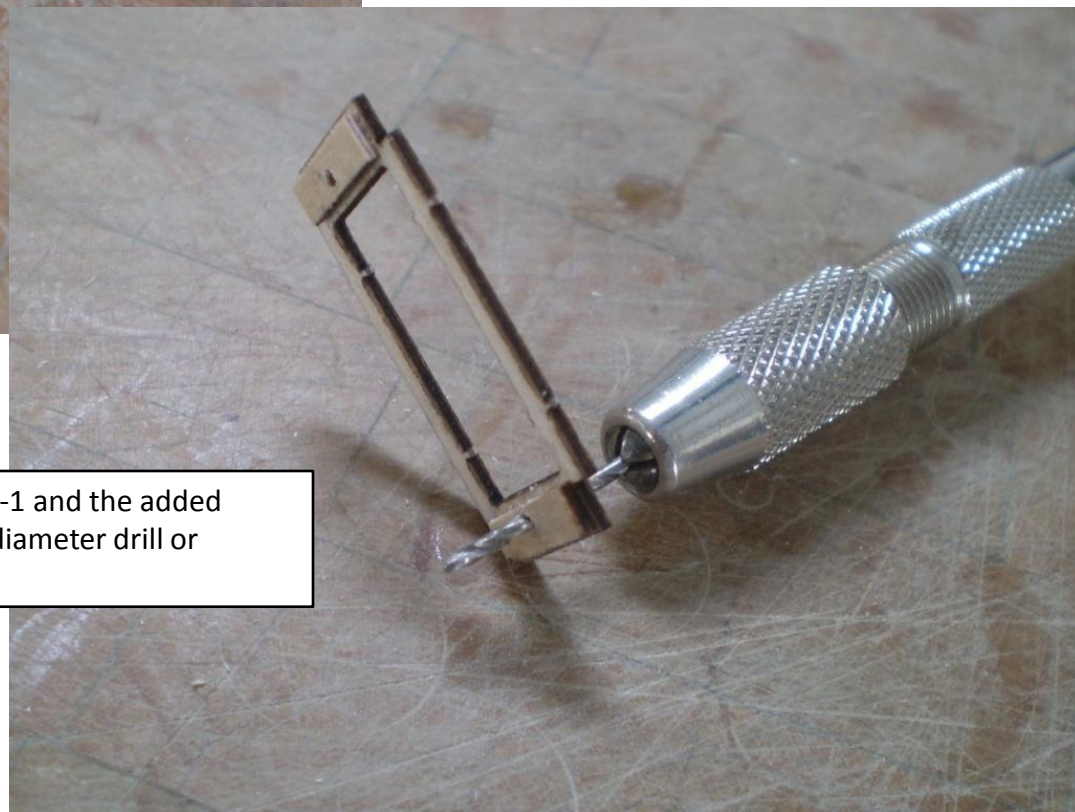
Front end detail-basic pylon assembly



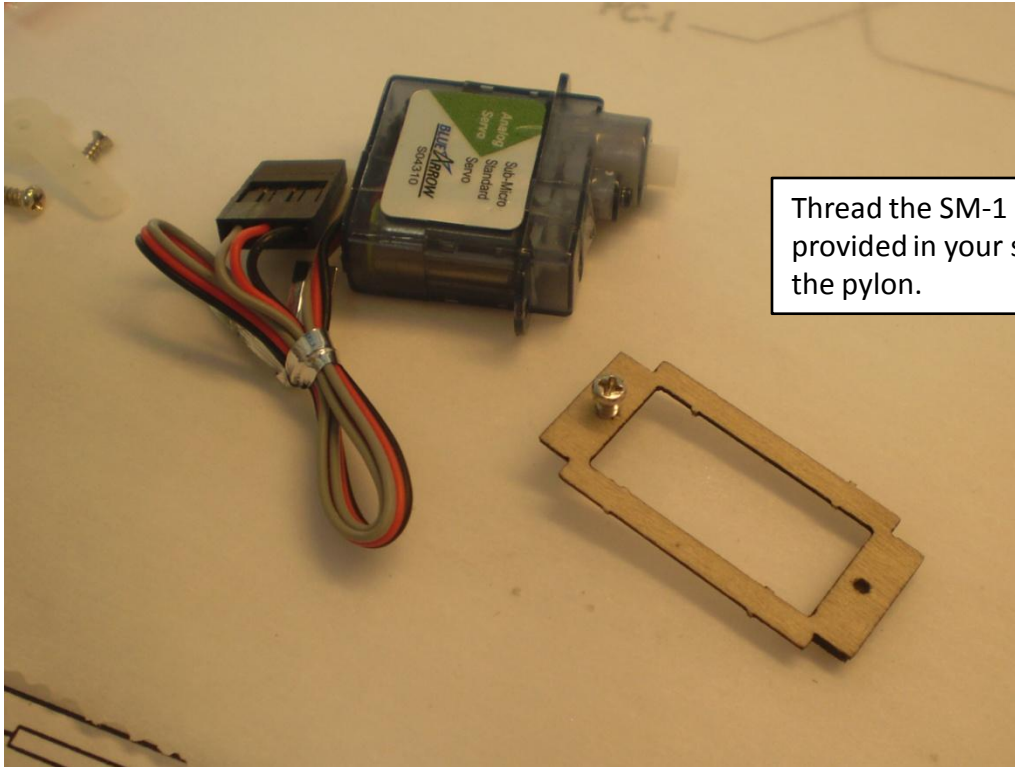
Wing hold down dowels installed in the upper pylon cap



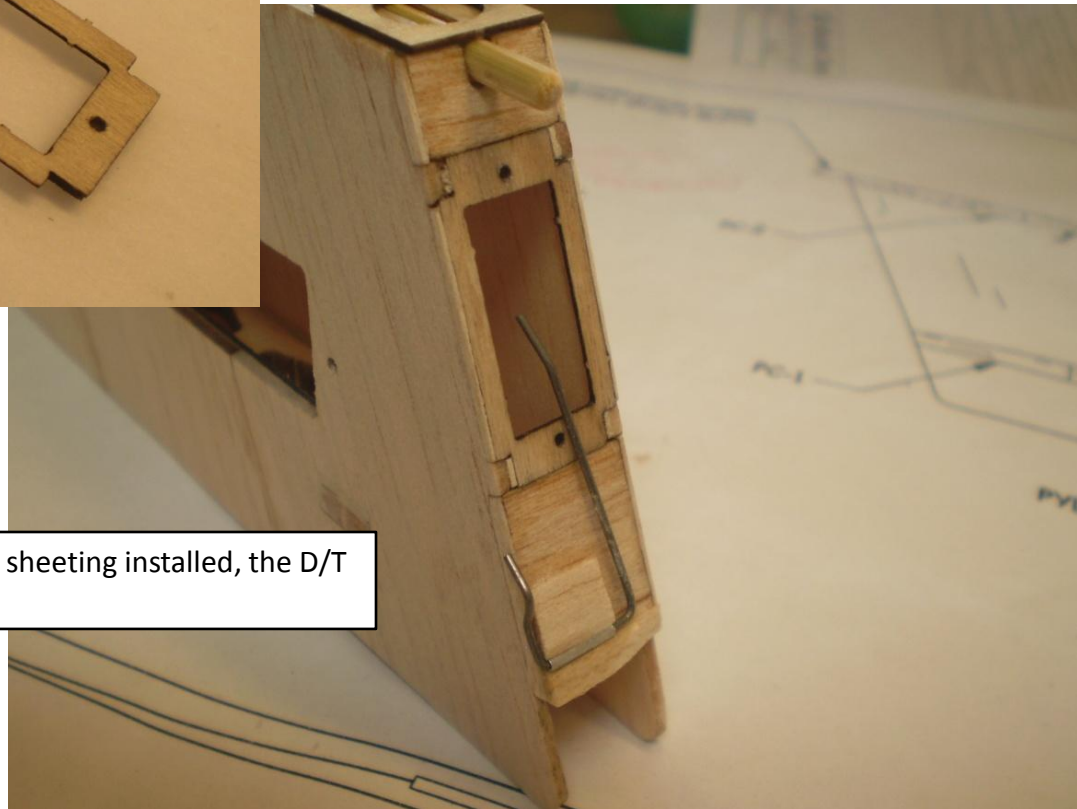
Servo mount SM-1 with scrap 1/32
plywood inserts glued on-improves grip
thickness of the servo mounting screws.



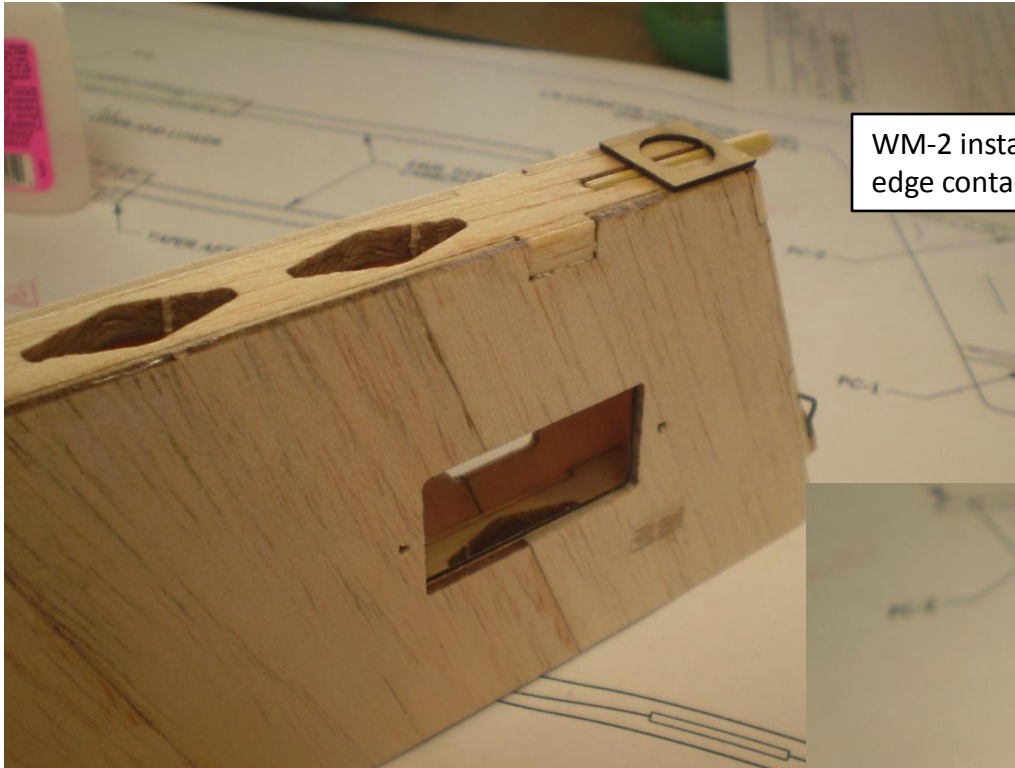
Pilot drill through SM-1 and the added
inserts using a .047 diameter drill or
sharpened wire.



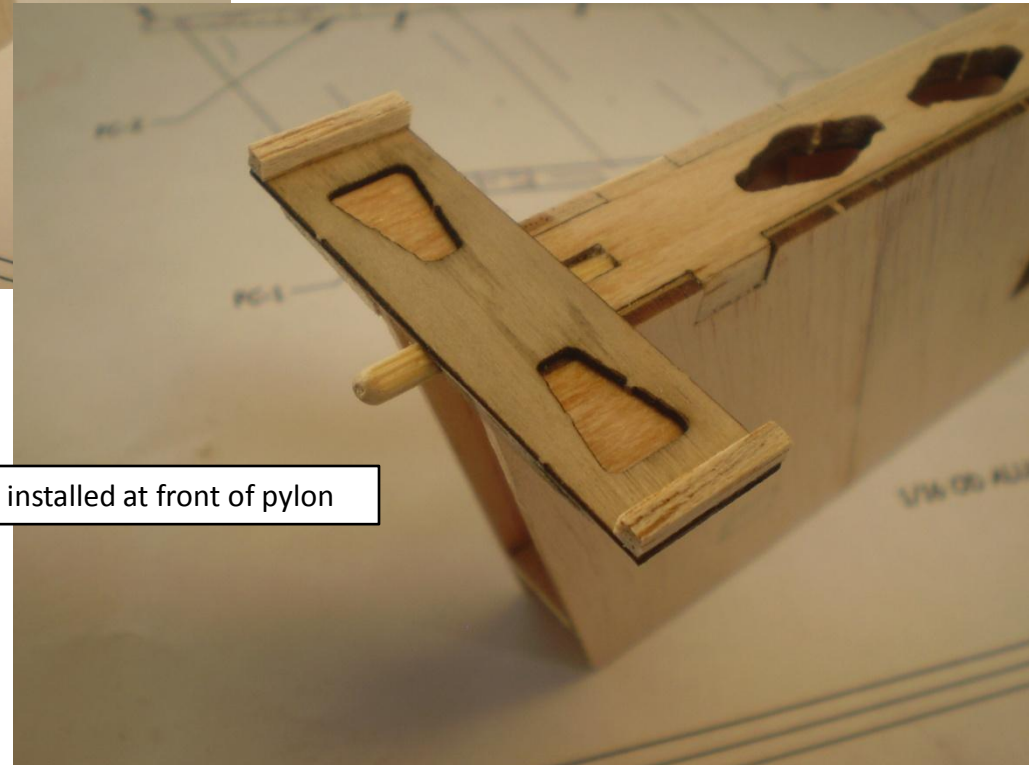
Thread the SM-1 servo mounting holes with the screws provided in your servo pack before gluing the mount into the pylon.



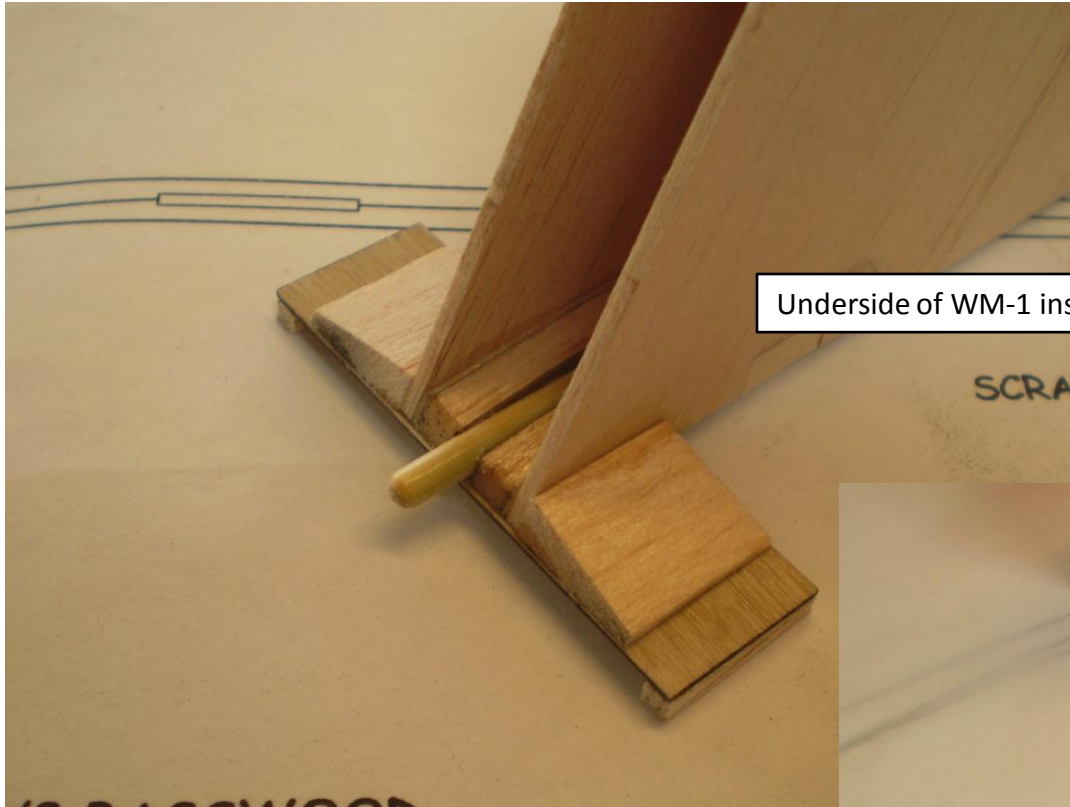
The servo mount and sheeting installed, the D/T tripwire installed.



WM-2 installed on top of pylon for wing trailing edge contact and support.

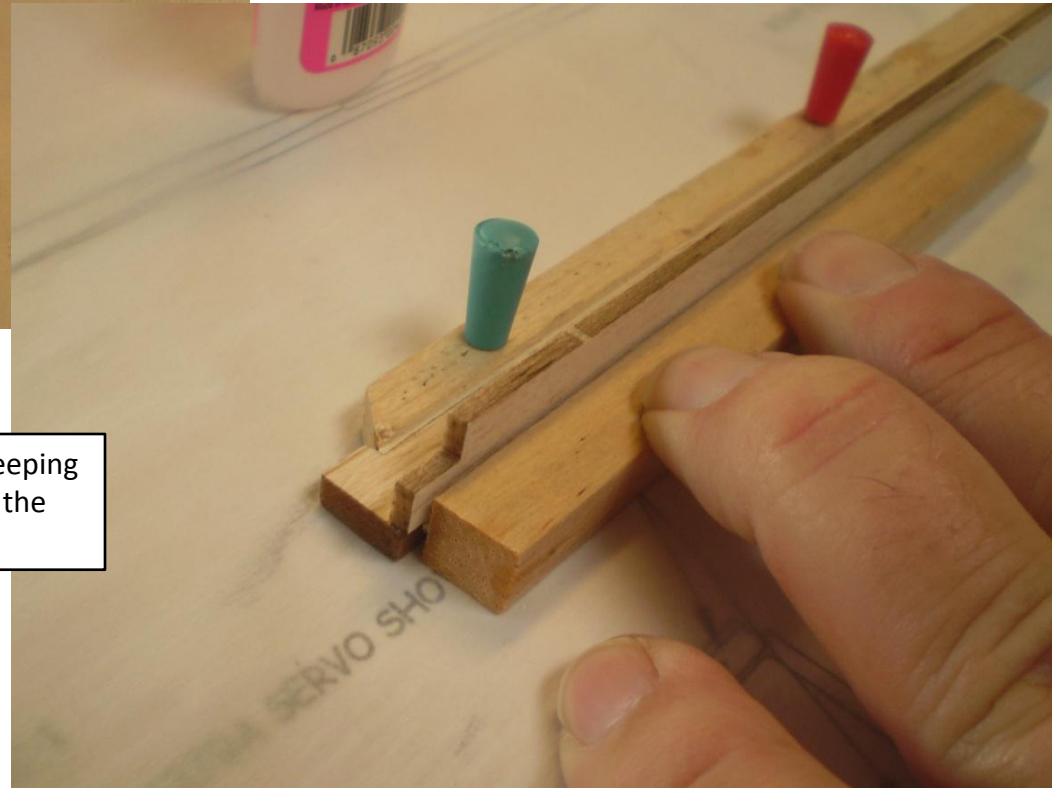


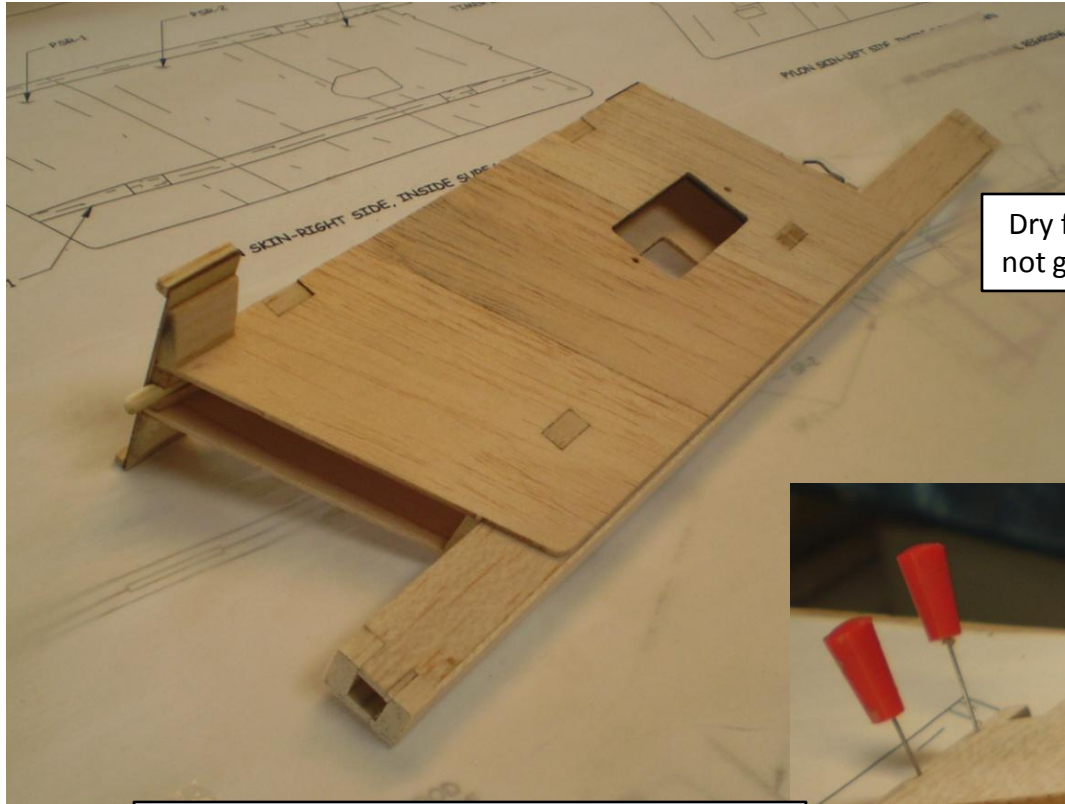
WM-1 installed at front of pylon



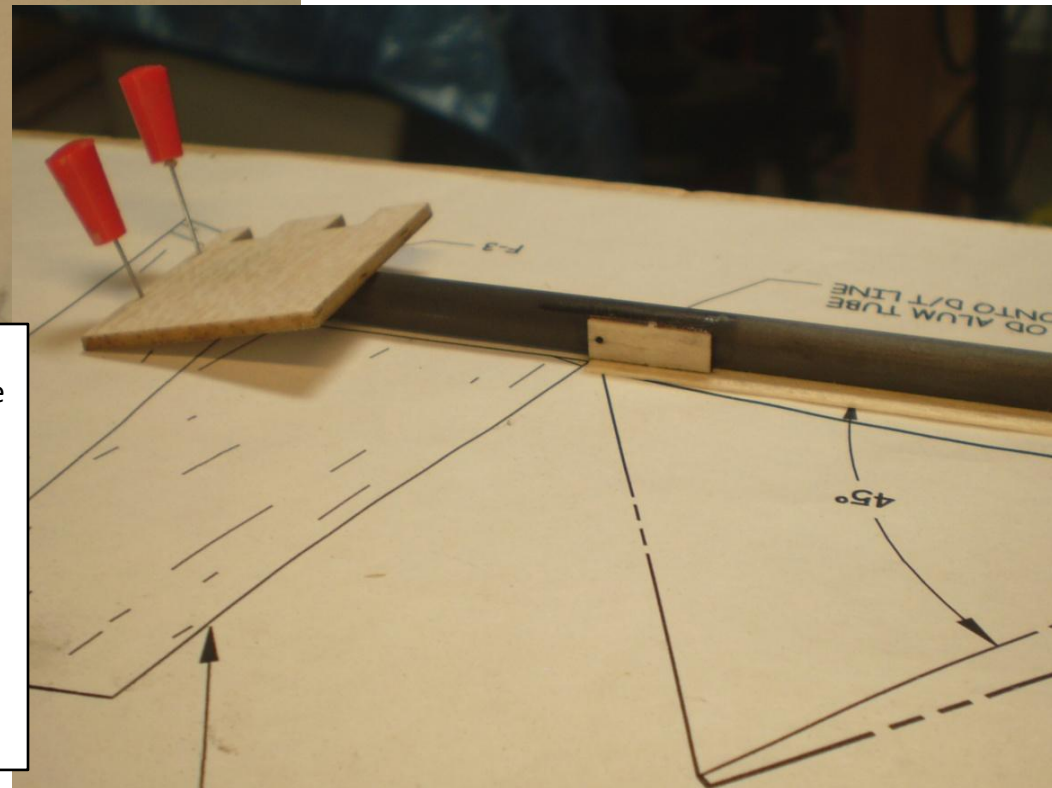
Underside of WM-1 installation

Building up a fuselage pod subassembly-keeping things square while wicking thin CA along the joint.





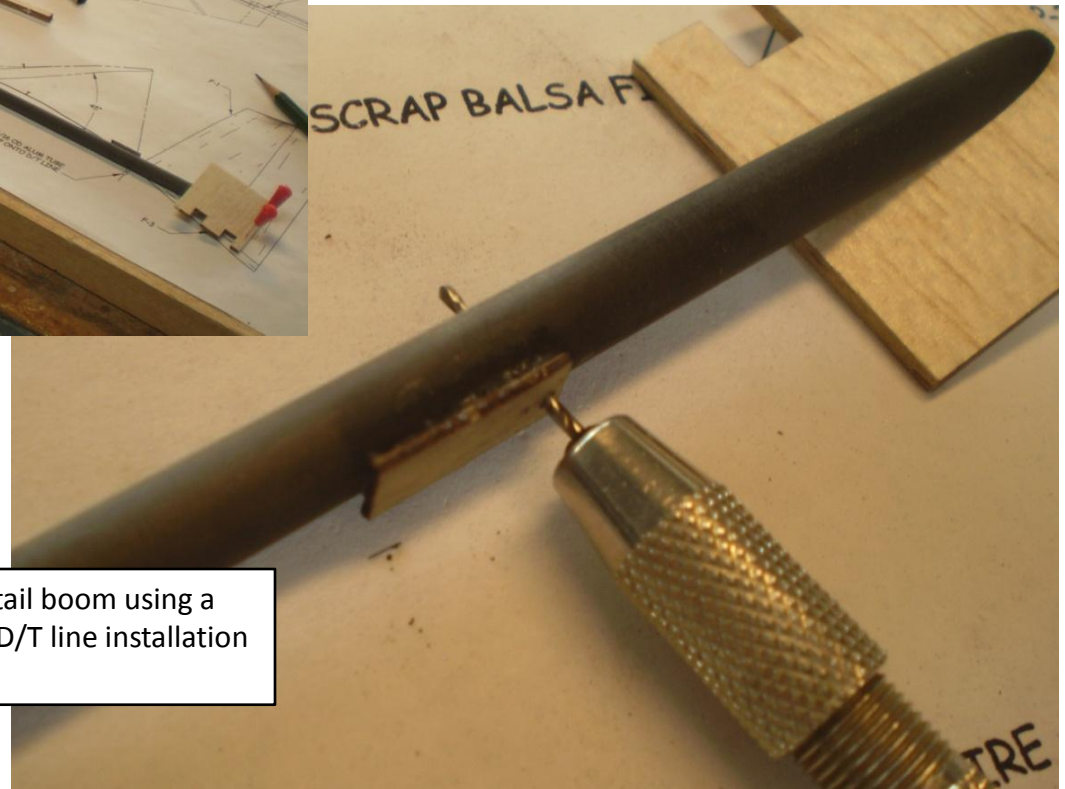
Dry fit of the pylon with the fuselage pod-do not glue the two assemblies together yet.



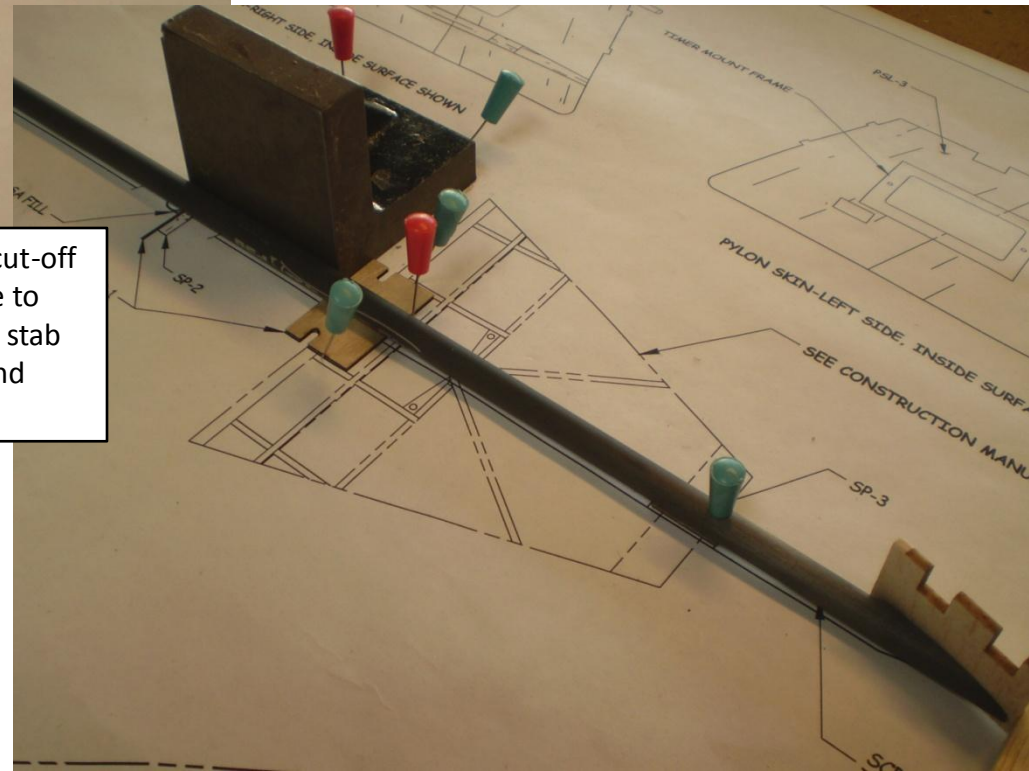
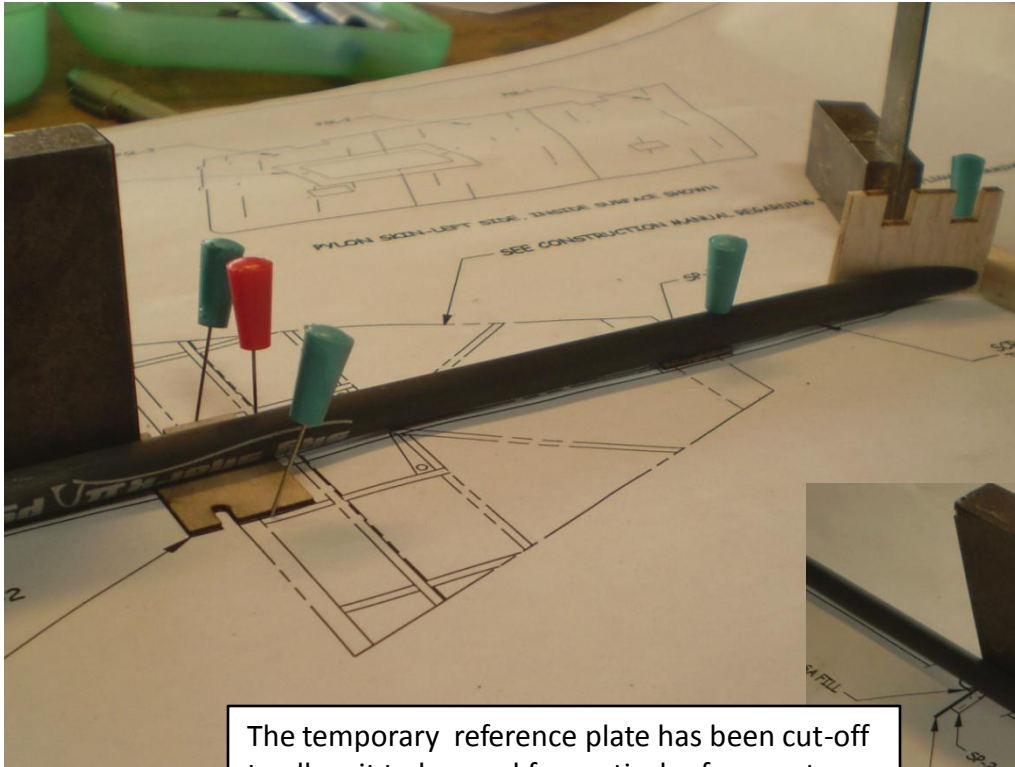
Setting up the tail boom for installation of the stab platform SP-3. The end chamfer in the tube is being used to provide orientation to the stab platforms and fin installation by temporarily bonding a scrap balsa plate to provide reference to the building board surface. The boom has been centered over the drawing based on a temporary stop at the forward end, and matching the plan. The platform is then set square to the building board surface per plan location and bonded to the tube with thin CA.



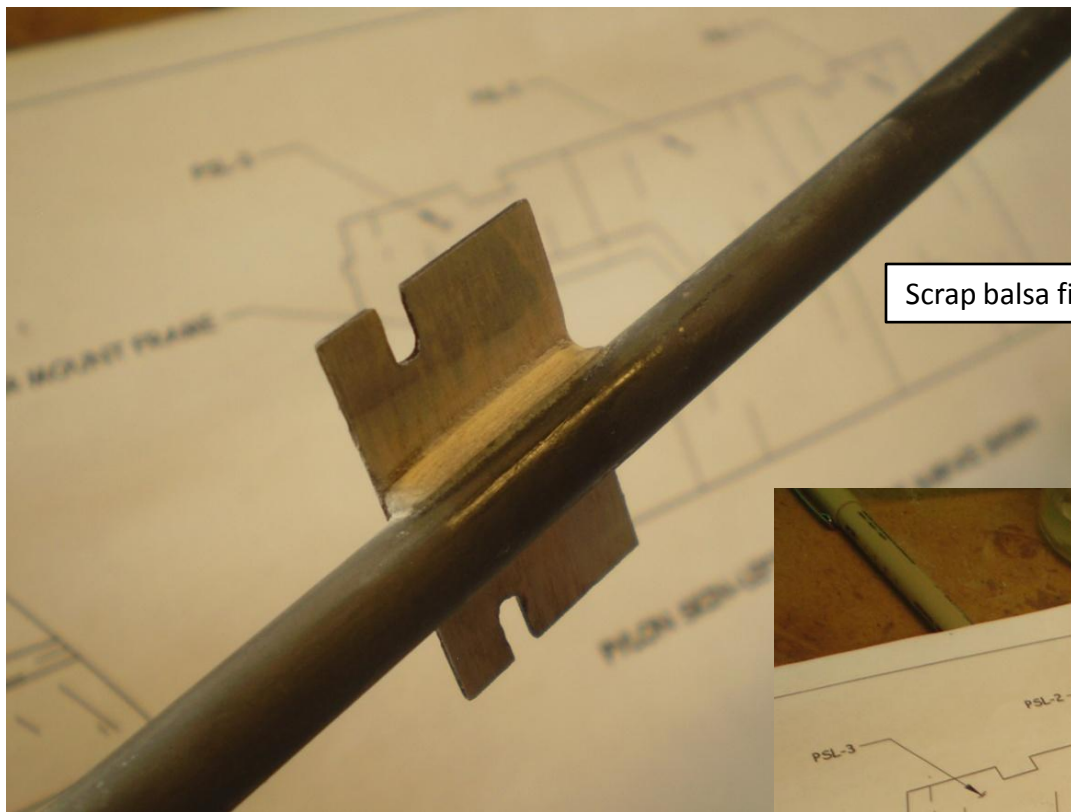
An overall view of the tail boom location setup for installing the stab platform details and fin.



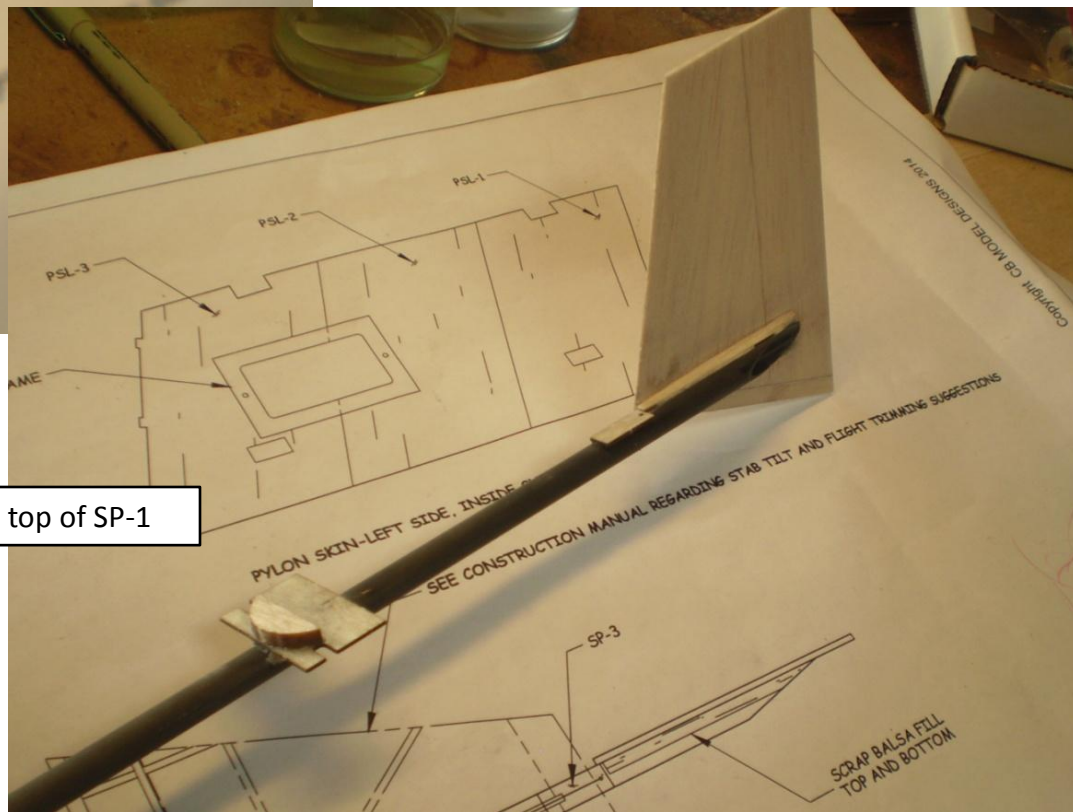
Finish drilling through the tail boom using a .047 diameter drill for the D/T line installation later.



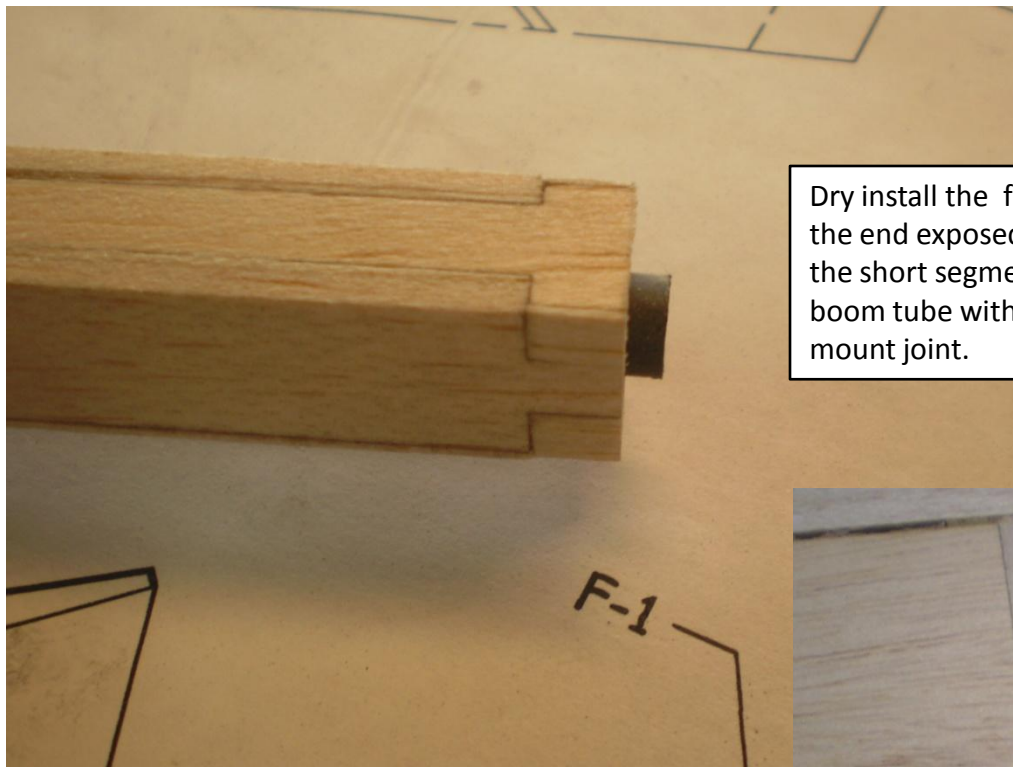
The temporary reference plate has been cut-off to allow it to be used for vertical reference to the building board surface. Thus held, the stab mount platform SP-1 is located per plan and glued to the tube with thin CA.



Scrap balsa filler installed under SP-1

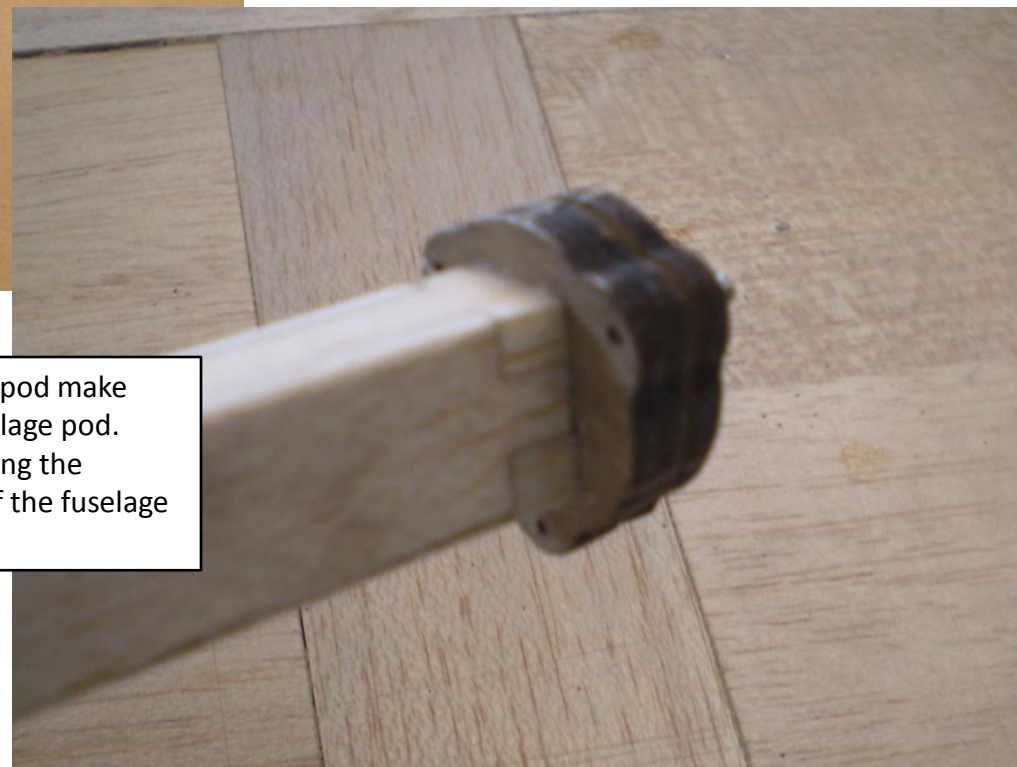


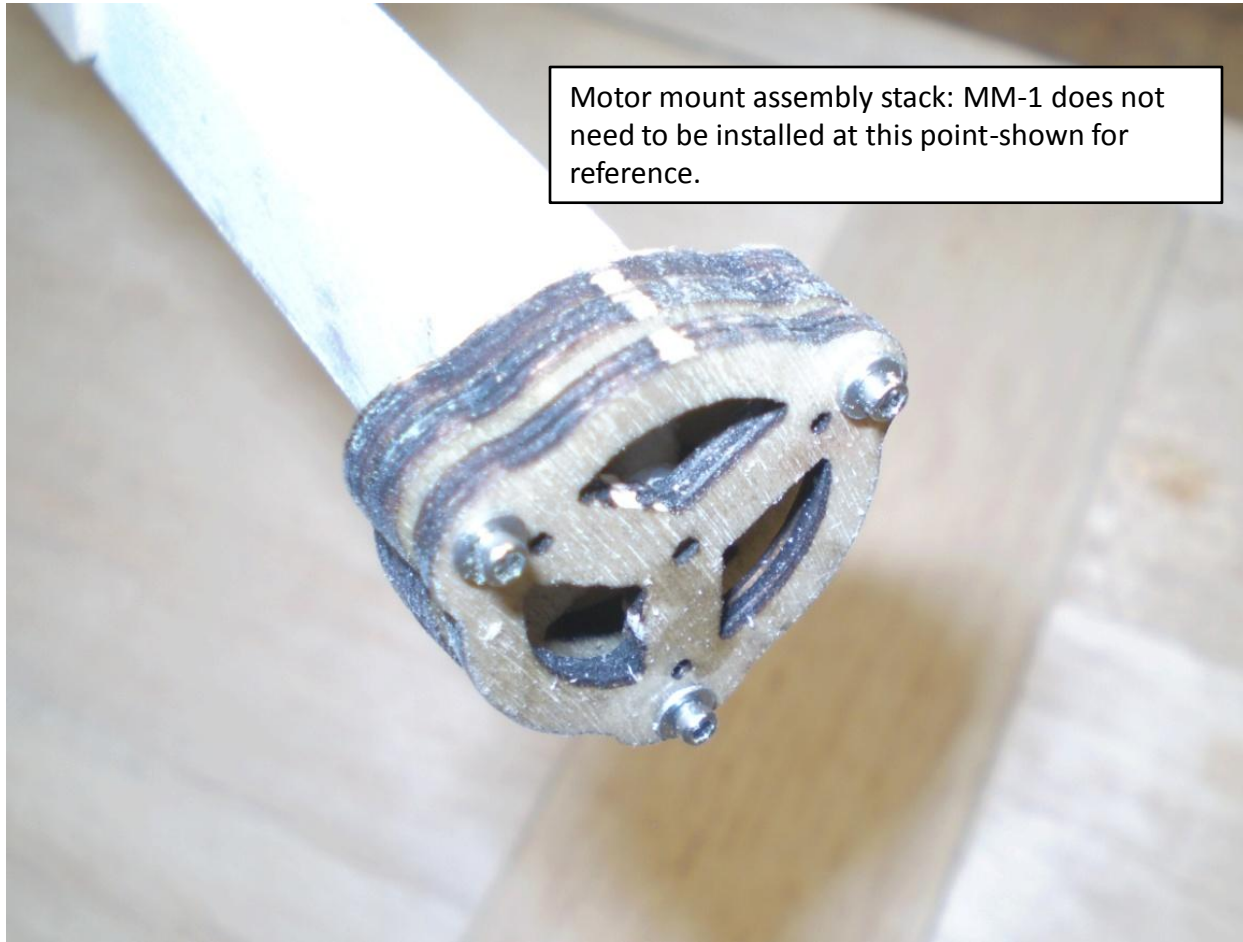
Fin installed along with SP-2 stop filler on top of SP-1



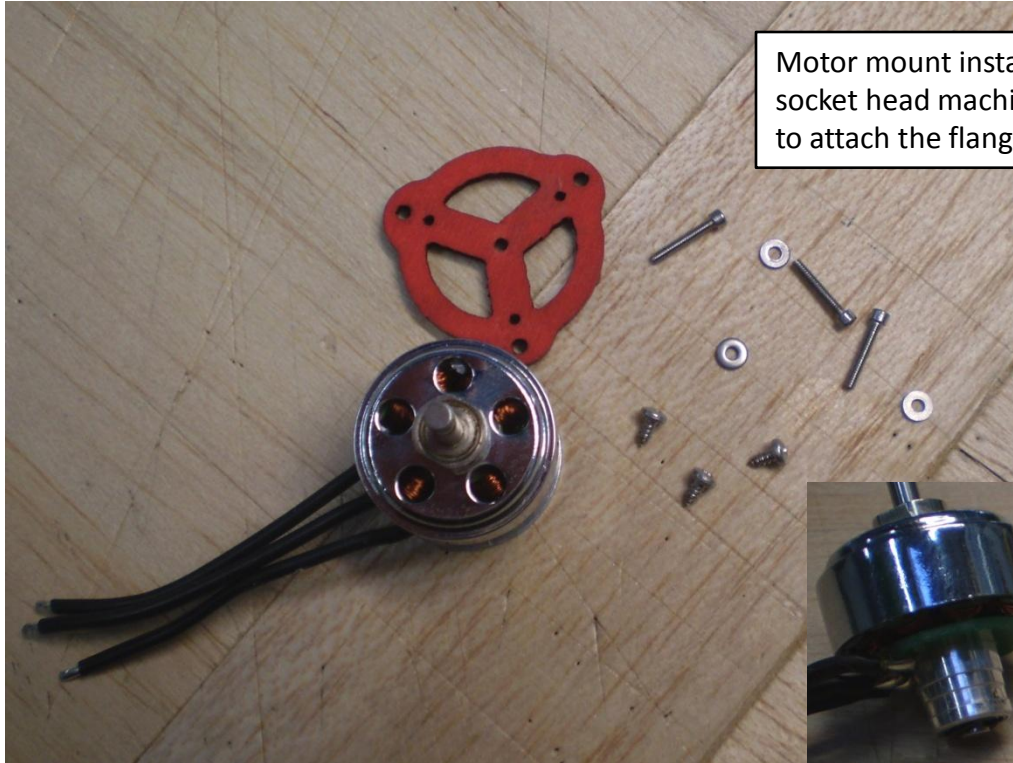
Dry install the fuselage pod onto the tail boom-leave 3/32" of the end exposed to install the motor mount subassembly. Install the short segment of carbon tube into the front end of the tail boom tube with epoxy to provide extra strength at the motor mount joint.

Before gluing the motor mount to the fuselage pod make sure the fin is parallel with the sides of the fuselage pod. Glue the pod to the tube by wicking thin CA along the contact points as accessed from the rear end of the fuselage pod.

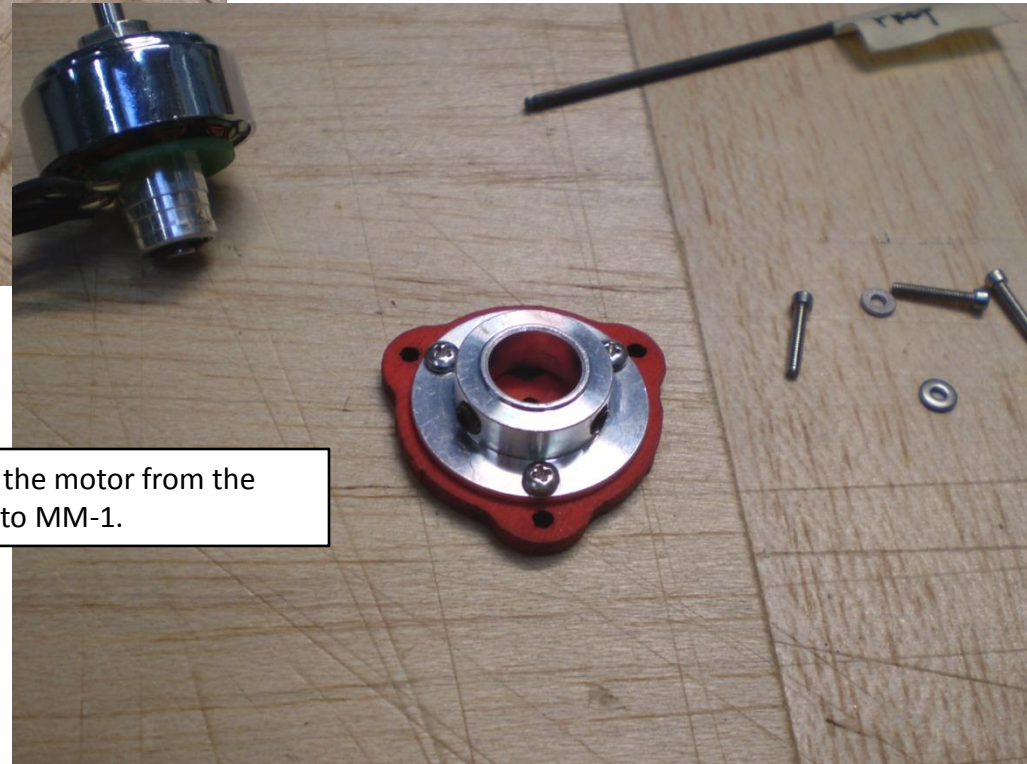




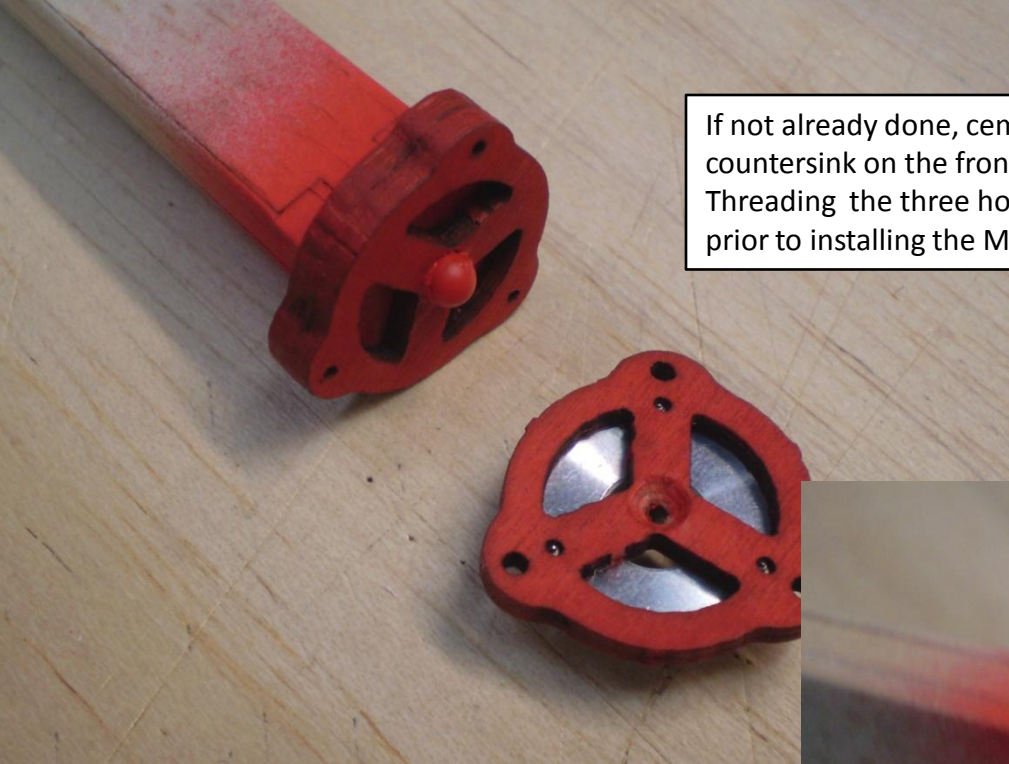
Motor mount assembly stack: MM-1 does not need to be installed at this point-shown for reference.




Motor mount installation hardware shown: MM-1 frame, (3) #0-80 socket head machine screws & washers, (3) # 1 x 1/8 sheet metal screws to attach the flanged motor mount to MM-1.



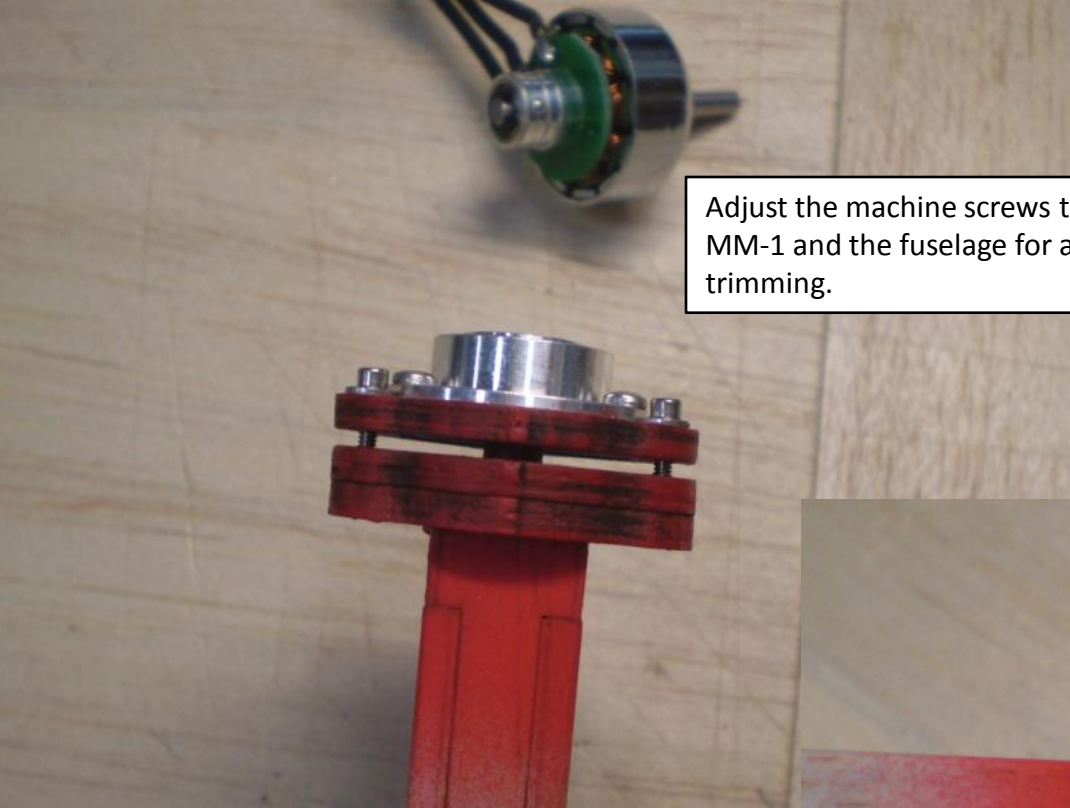
You will need to remove the motor from the flange mount to install it to MM-1.



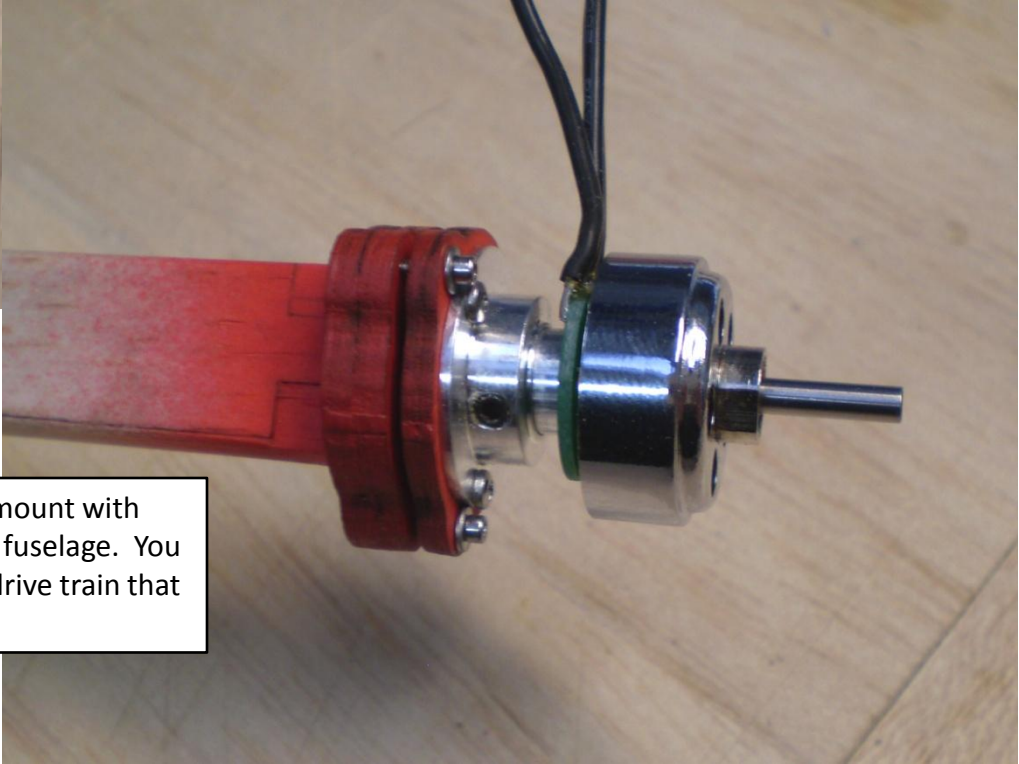
If not already done, cement the plastic centering ball into the countersink on the front of MM-2 prior to installation of MM-1. Threading the three holes in MM-2 & -3 using the machine screws prior to installing the MM-1 is suggested.



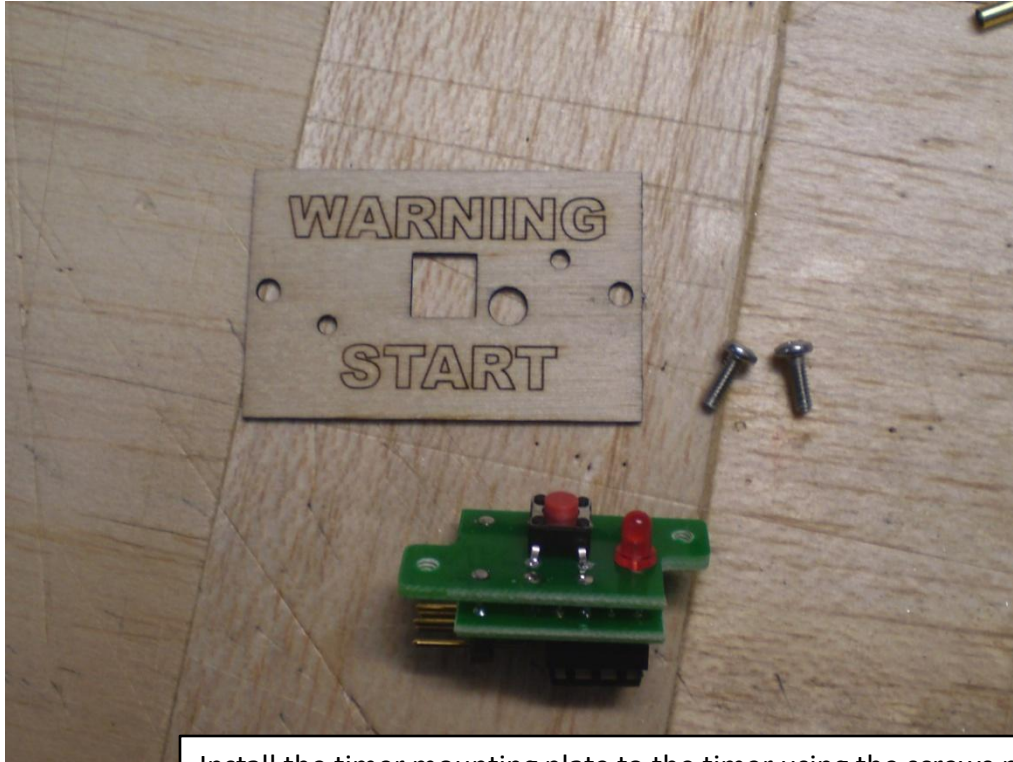
MM -1 with outrunner mount installed. The set screws used to hold the motor should be oriented to the **BOTTOM** of the fuselage.



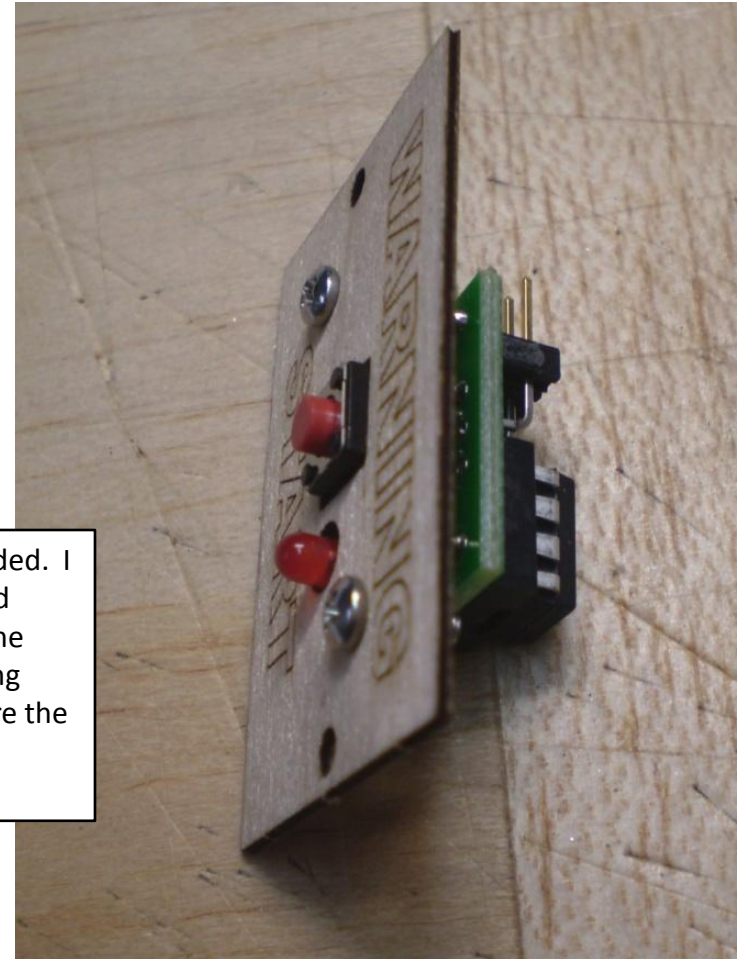
Adjust the machine screws to equalize the gap between the MM-1 and the fuselage for a neutral position to start flight trimming.



Install the outrunner motor back into the mount with the connector wires toward the TOP of the fuselage. You can leave like this for bench testing of the drive train that follows.



Install the timer mounting plate to the timer using the screws provided. I install 1/32 balsa shims between the back of the mounting plate and timer circuit board. The cover plate will warp if tightened against the circuit board which has protrusions on it. The shims allow tightening the plate to a flat and flush installation on the pylon side. Make sure the balsa shims don't bridge any of the circuit board protrusions if you choose to do this.

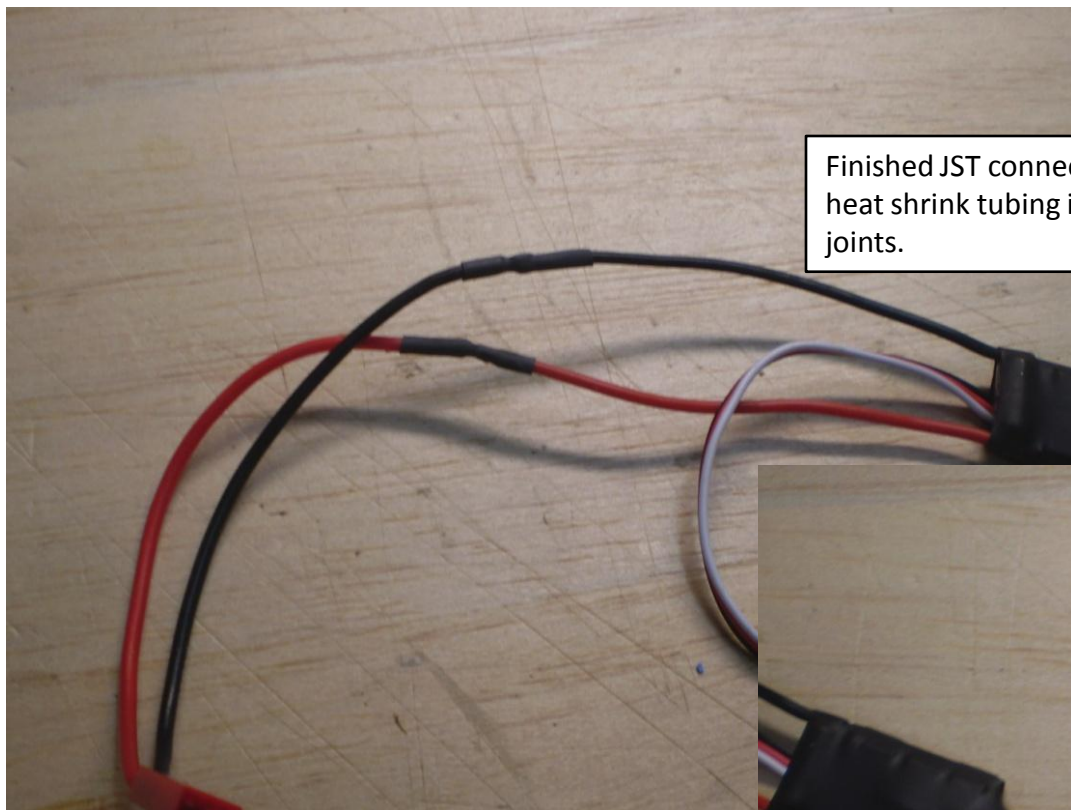




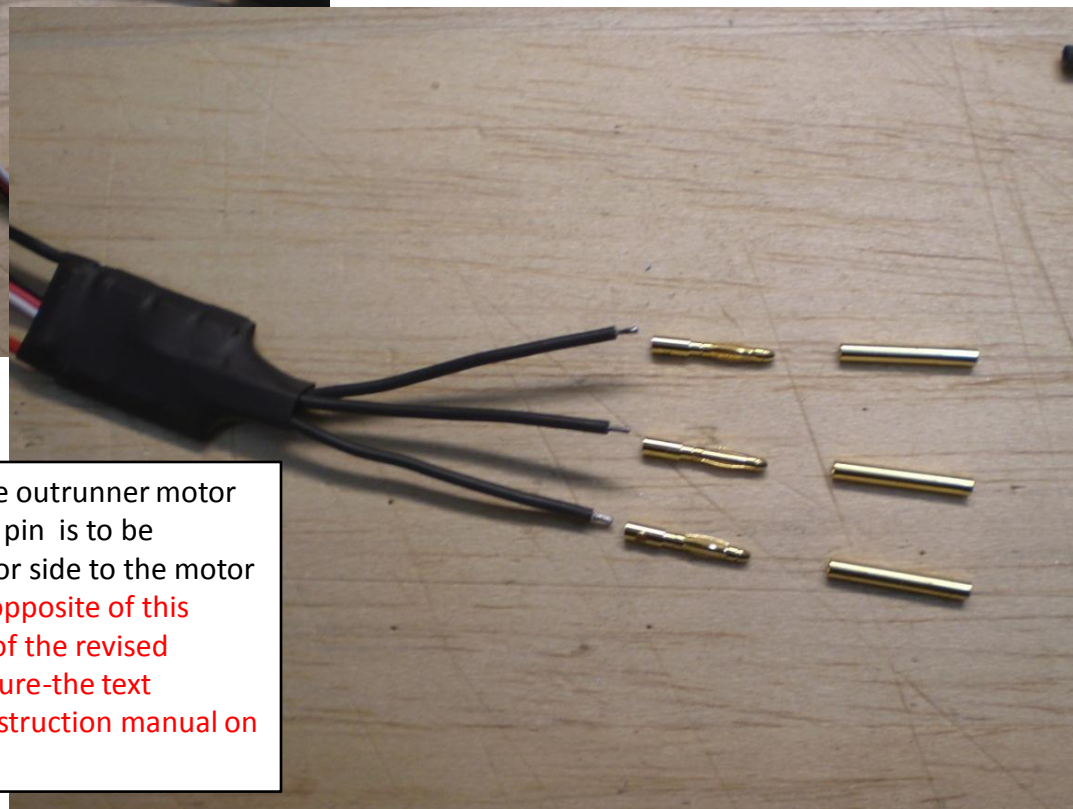
Soldering the battery connection plug leads (JST) to the two connector leads from the Electronic Speed Control (ESC) shown at the right. One solder connection has been made-note the heat shrink tubing out of the way near the plug end of the connector. The center three wire connector plug will eventually be installed on the timer.



Method of soldering the wires together-it's at minimum a three handed operation.



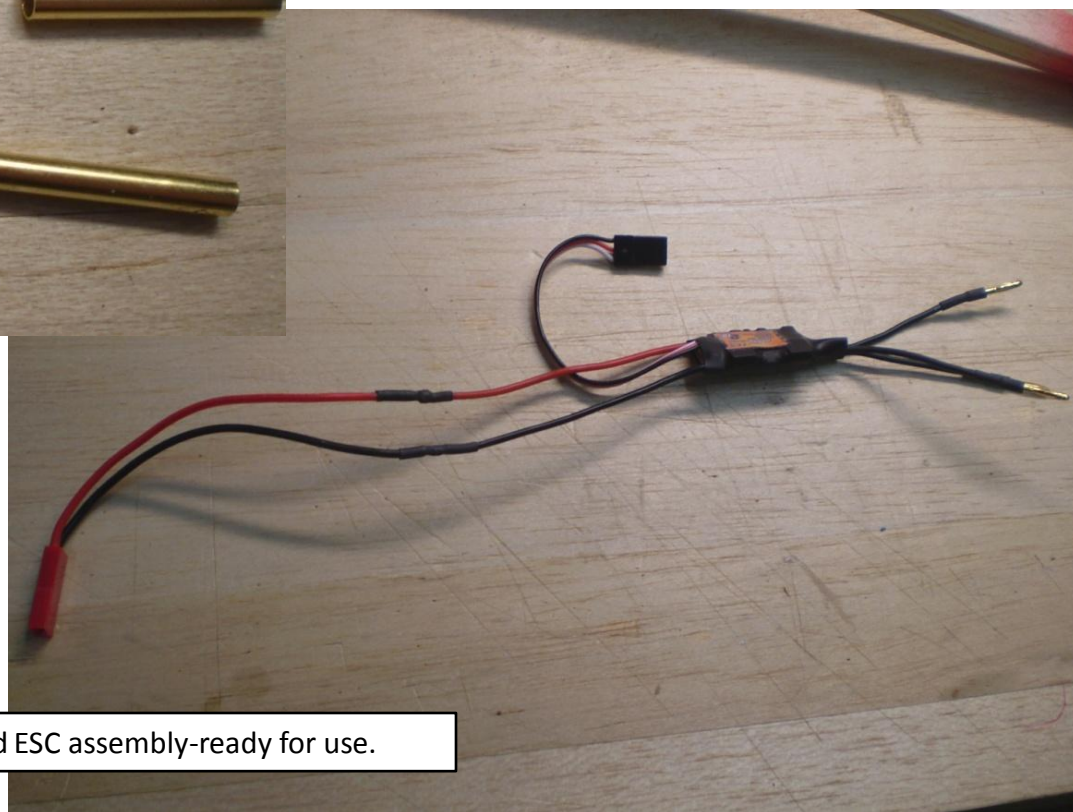
Finished JST connector plug installation to ESC- heat shrink tubing is in place over the soldered joints.



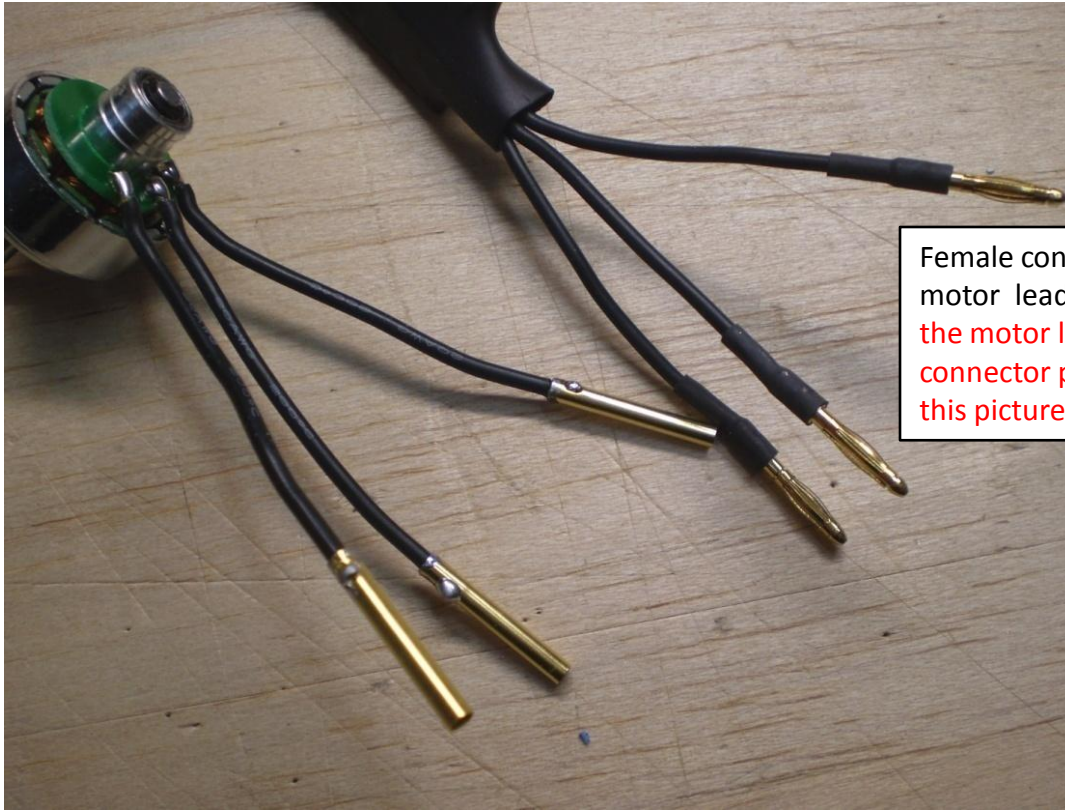
The 2MM connector pin orientations for the outrunner motor connections to the ESC. **Female** side of the pin is to be soldered to the ESC lead, the **male** connector side to the motor lead. **This picture shows the arrangement opposite of this statement and was taken before discovery of the revised standard. Picture will be updated in the future-the text supersedes the image and matches the construction manual on this point**



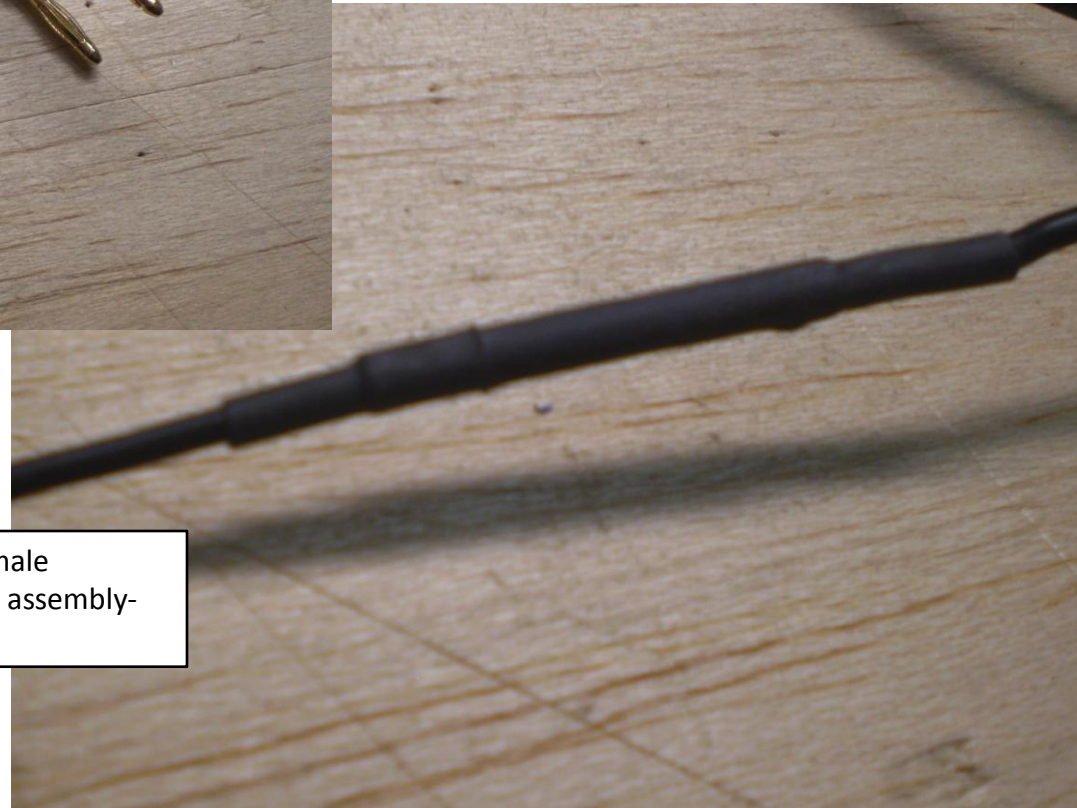
ESC connector pins soldered onto the wire leads-one piece of heat shrink tubing in place so far-install on all three connectors. **Note-per previous slide these should be the female pins on the ESC wires.**



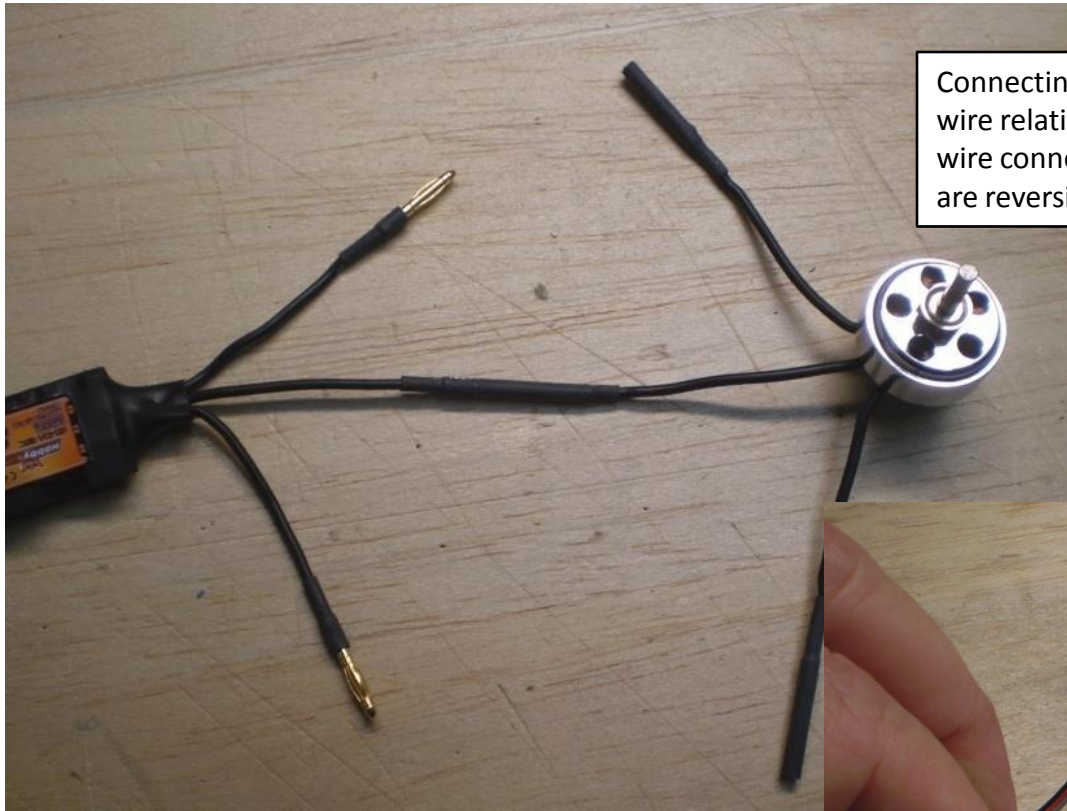
Finished ESC assembly-ready for use.



Female connectors soldered on the outrunner motor lead wires. **Note-per previous two slides the motor lead wires should have male connector pins installed. Connections shown in this picture should be installed in reverse order.**

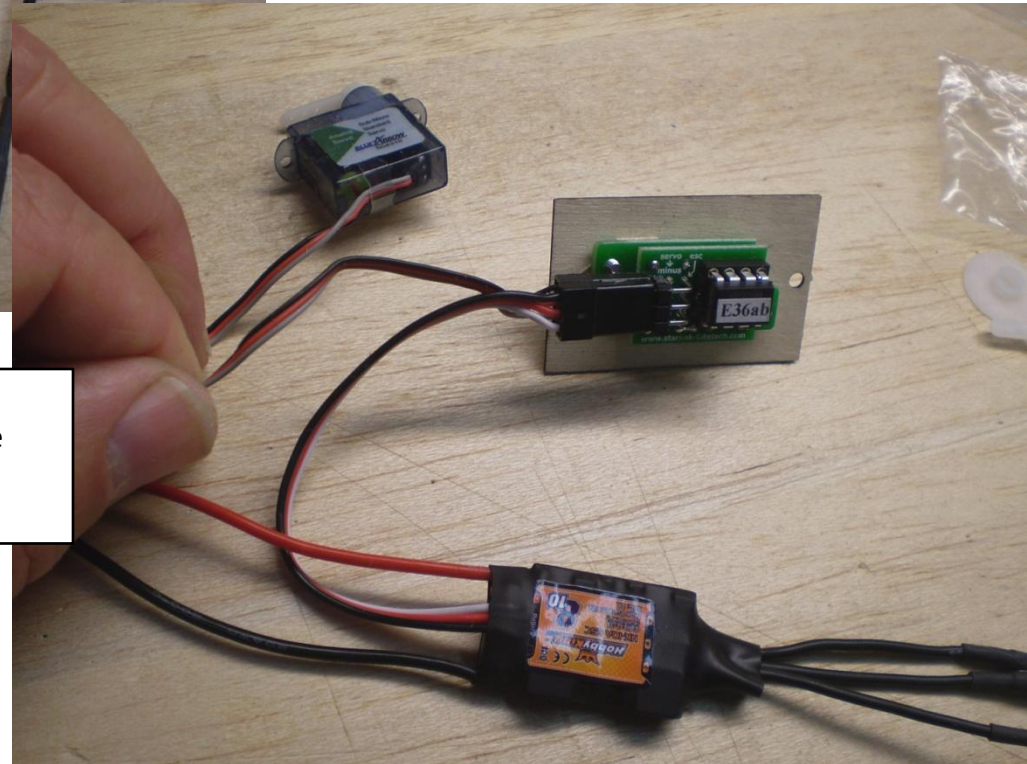


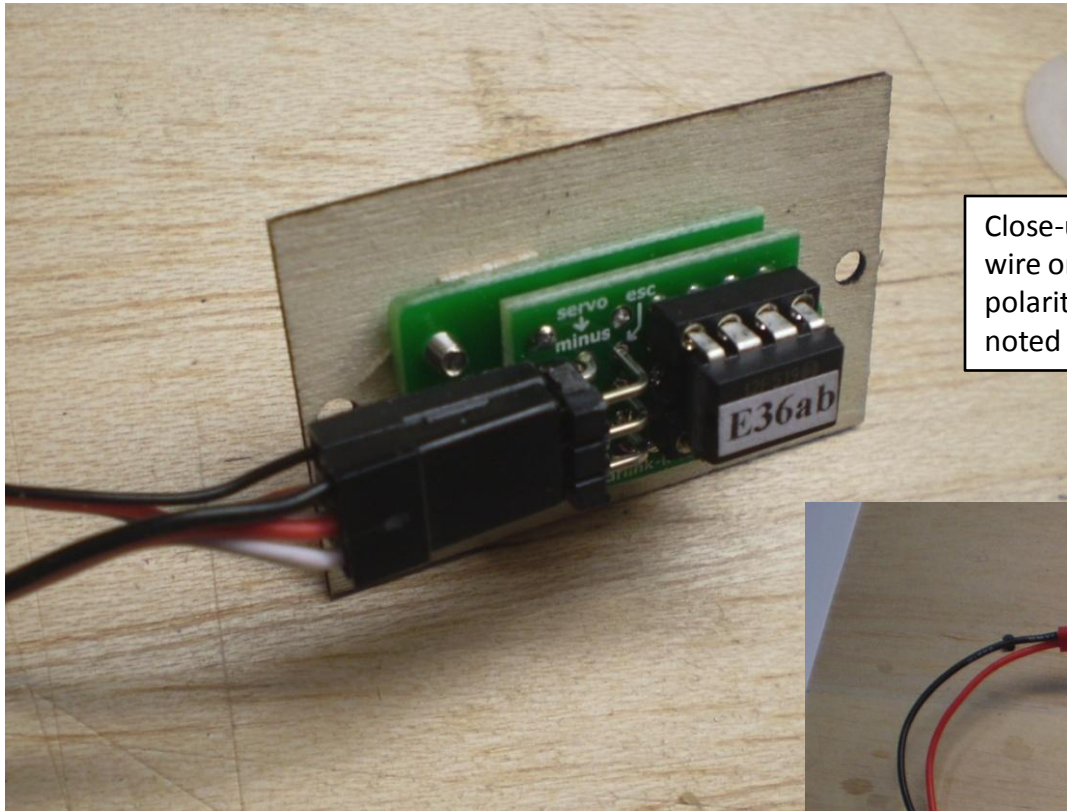
Heat shrink tubing installed on a female connector and typical connection at assembly- no bare metal exposed.



Connecting the motor to the ESC-the center wire to center wire relationship must be maintained. The left and right side wire connections determine polarity and motor rotation and are reversible to adjust this.

Connecting the timer into the system-servo connection is closest to the circuit board, the ESC connector piggybacks above the servo connector block.

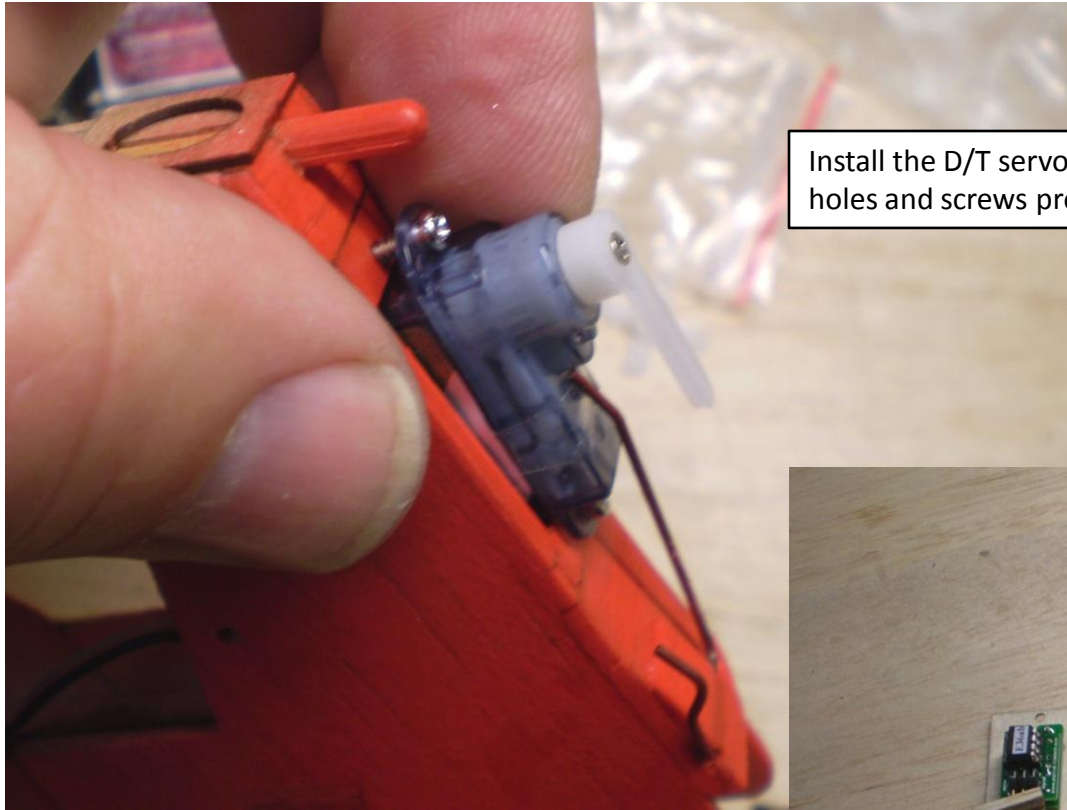




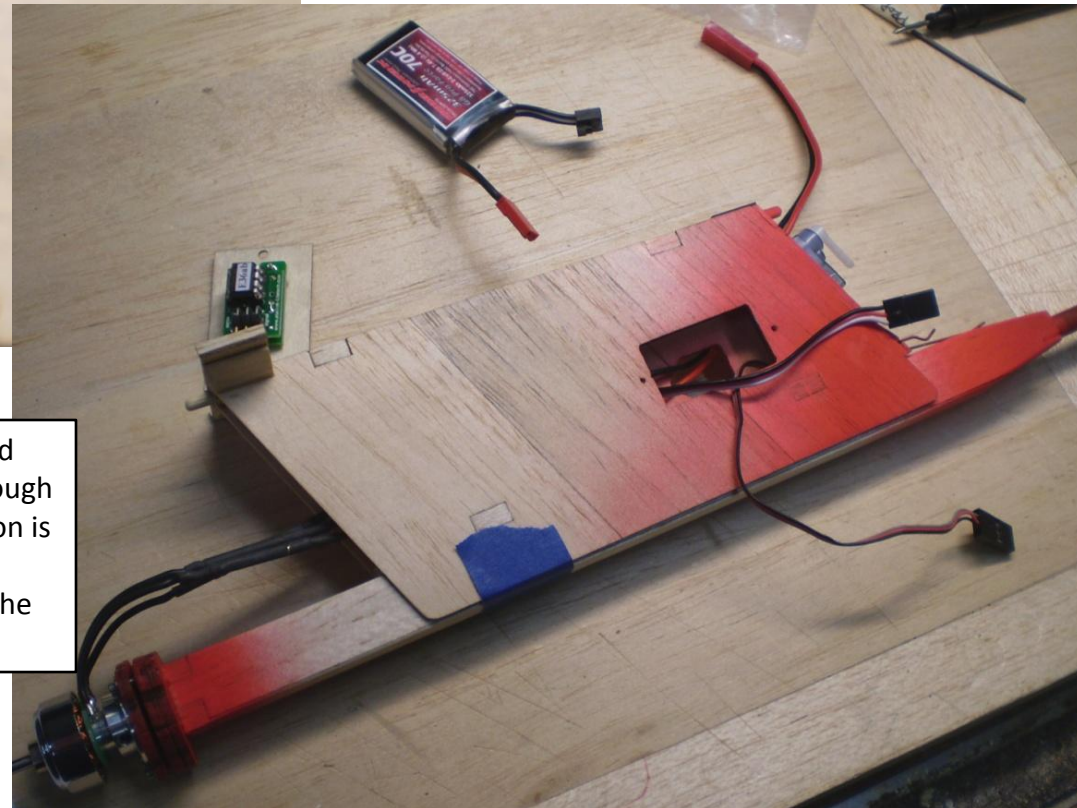
Close-up of the timer connections. The black wire on the servo and ESC are the negative polarity wire and must be aligned to the side noted as "MINUS" on the timer circuit board.



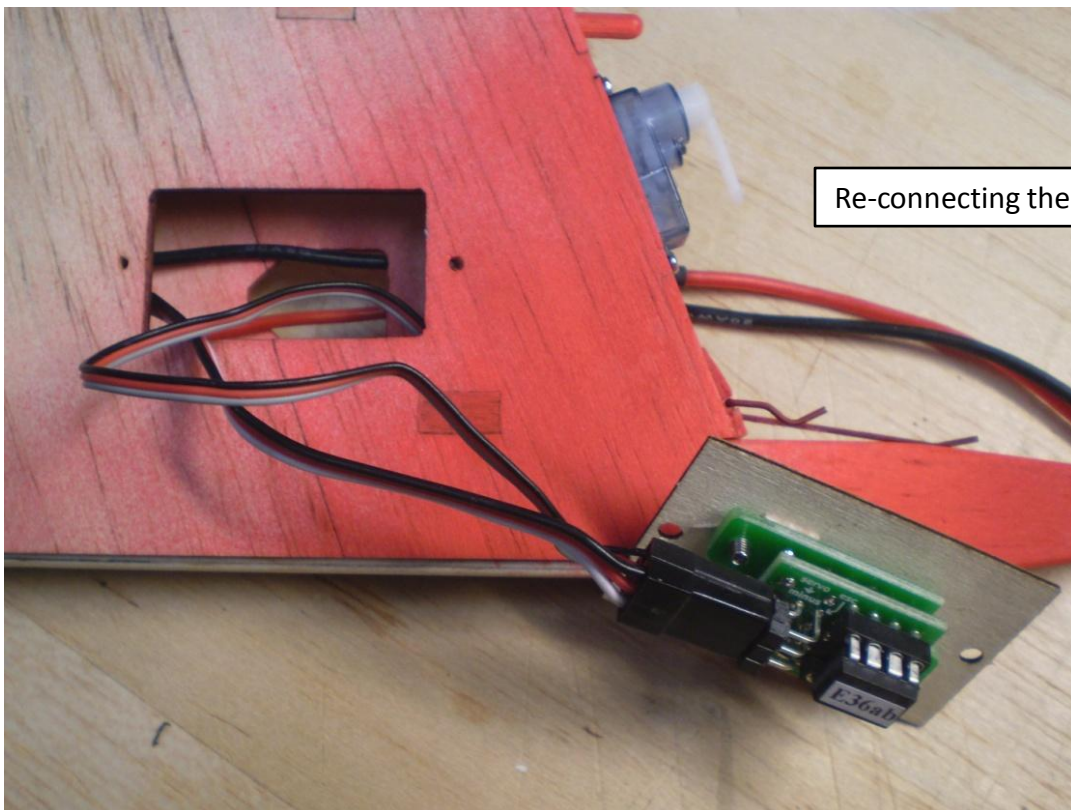
Connect the LiPo battery to the system and it is ready for bench running prior to installation into the model. Confirm all functionality required for the servo operation and motor rotation direction. Follow the timer instructions included in the kit for testing the timer functions.



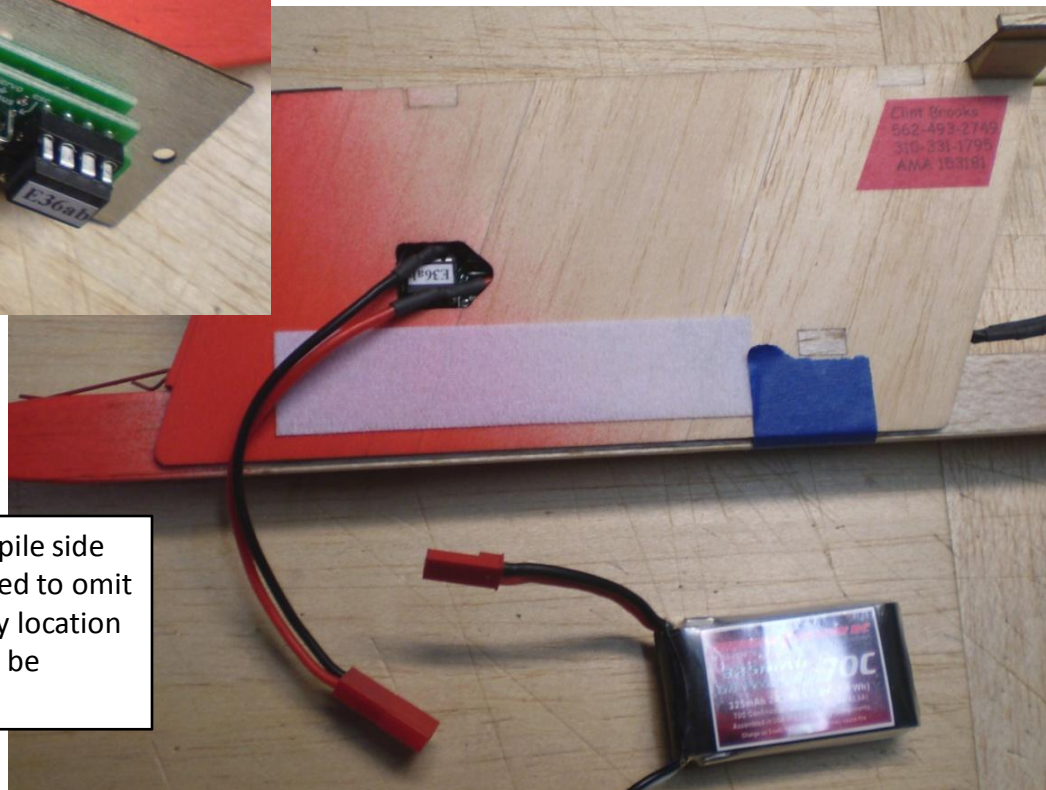
Install the D/T servo using previously threaded holes and screws provided.



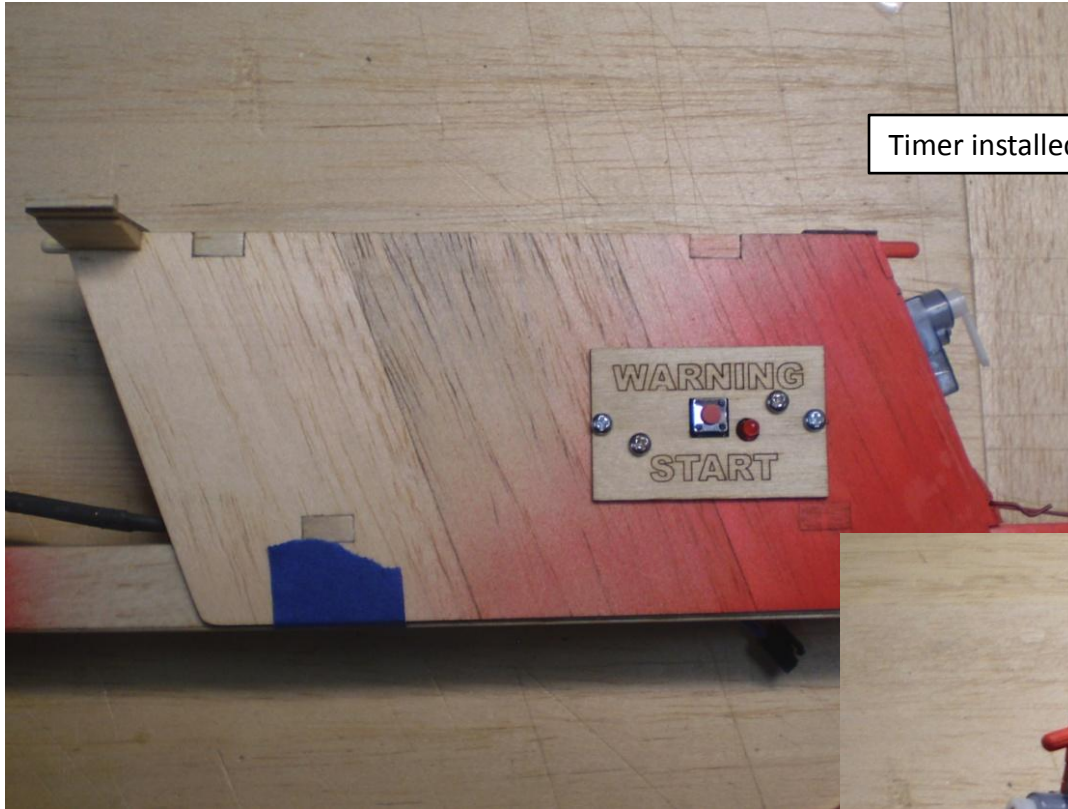
Position the ESC assembly inside the pylon and pull the ESC connector block and JST plug through the respective cutouts in the pylon sides. Pylon is temporarily installed at this point. The two connectors on the near side of the pylon are the ESC and servo.



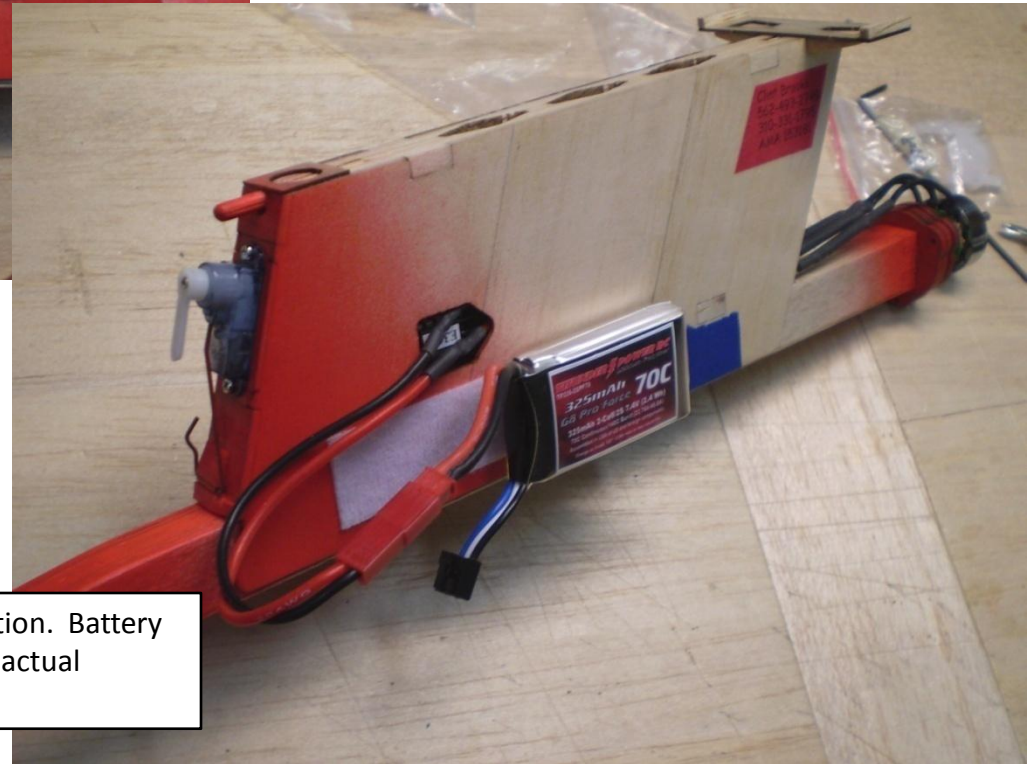
Re-connecting the timer to the ESC and servo.



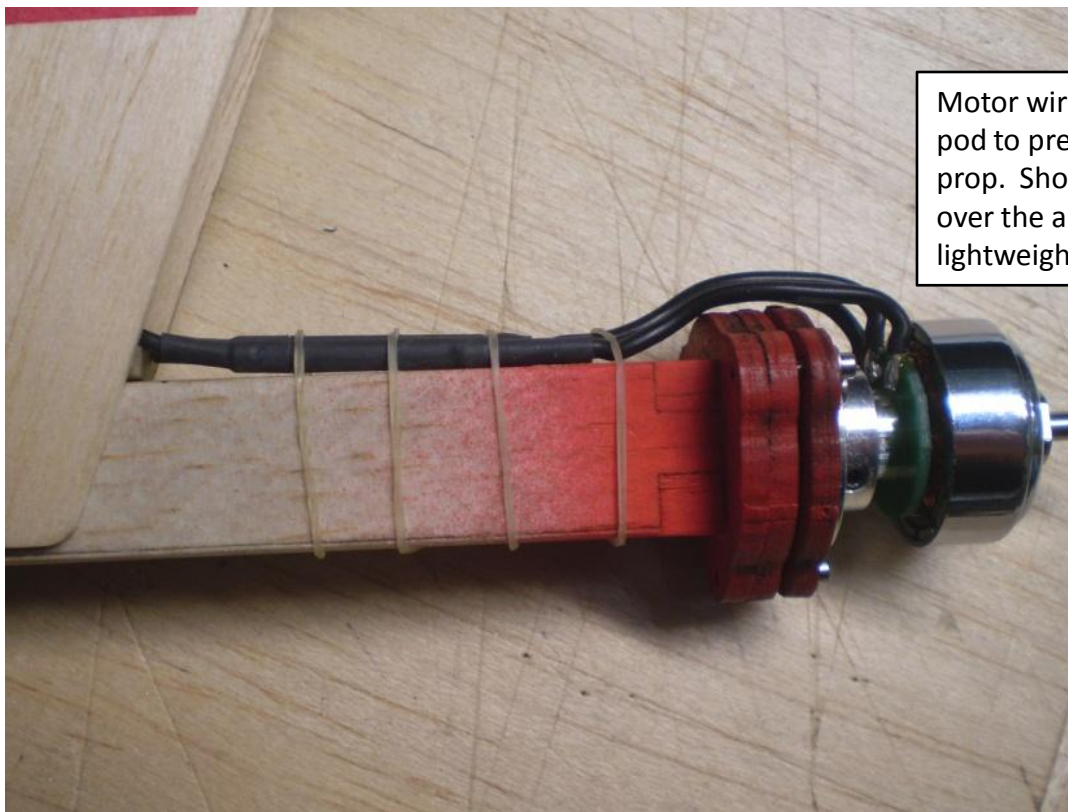
How the battery lead feeds out of the pylon cutout. The pile side Velcro tape is installed in this photo, but it is recommended to omit until powered test flights are undertaken and final battery location is known. That way a minimal amount to Velcro tape can be applied to reduce weight gain.



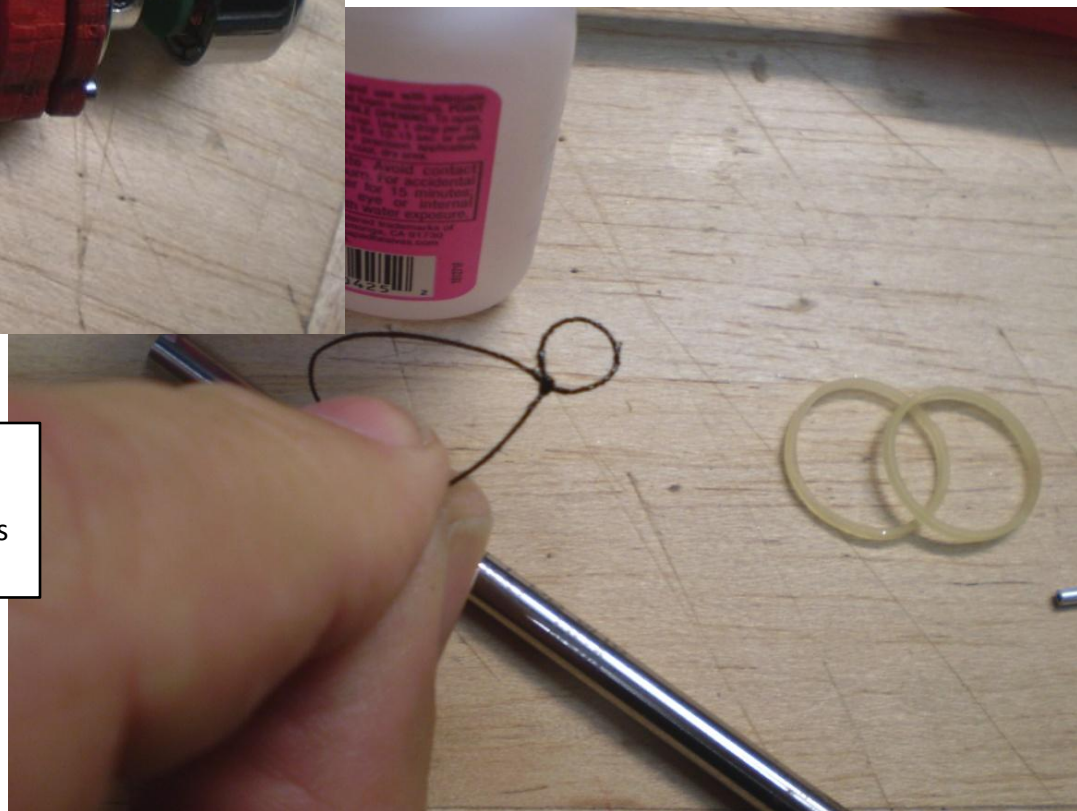
Timer installed using the two screws provided



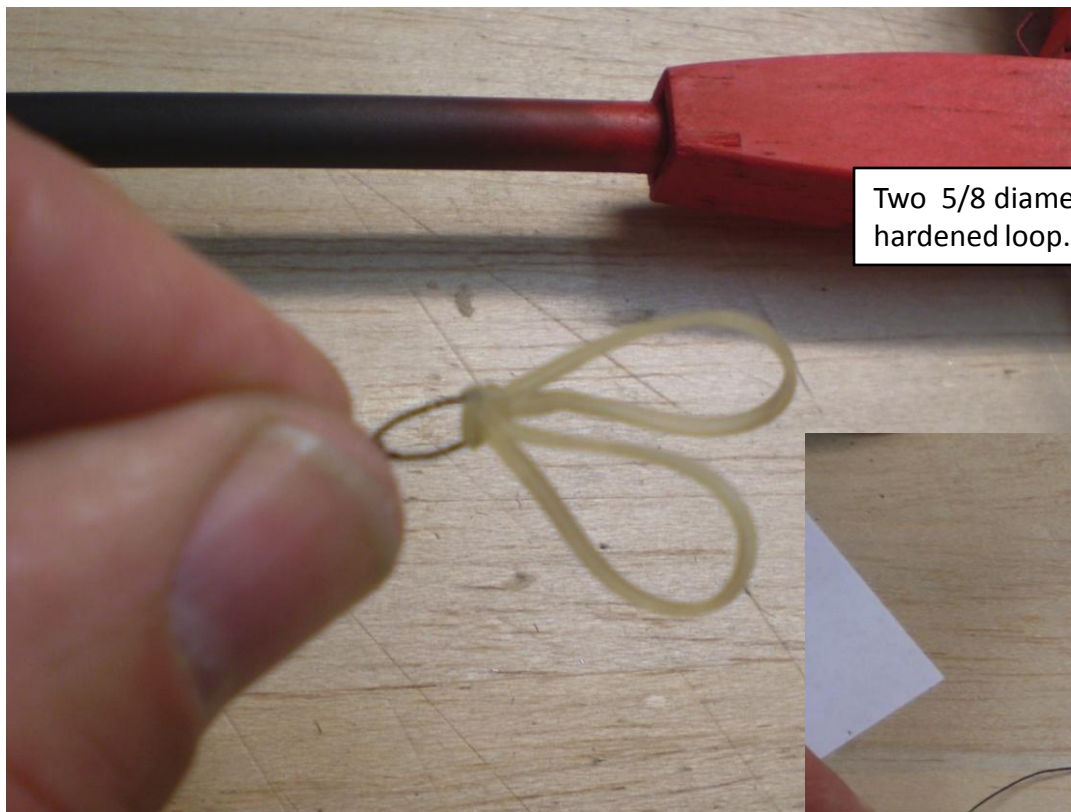
View of the LiPo battery installed via the Velcro connection. Battery should not be left connected to the system when not in actual operation.



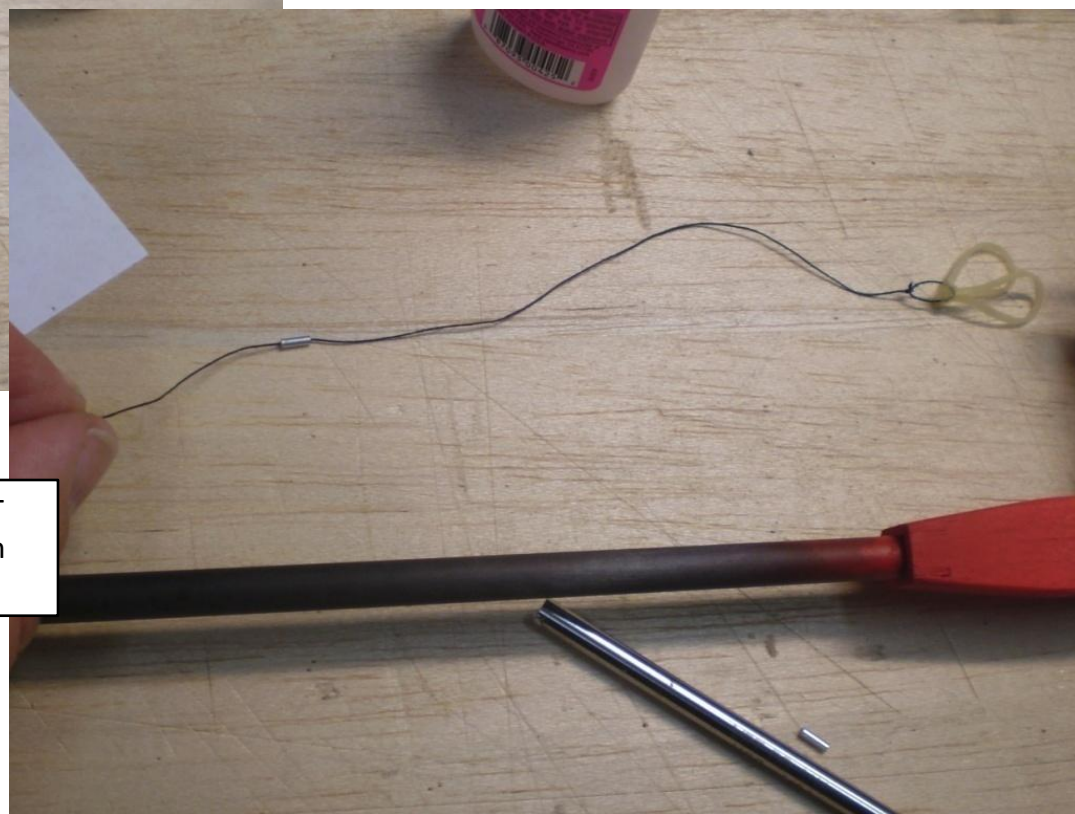
Motor wire leads should be held close to the fuselage pod to prevent inadvertent fouling with the folding prop. Shown are 3/8 diameter light pull dental bands over the area to provide compaction to the fuselage in a lightweight manner.



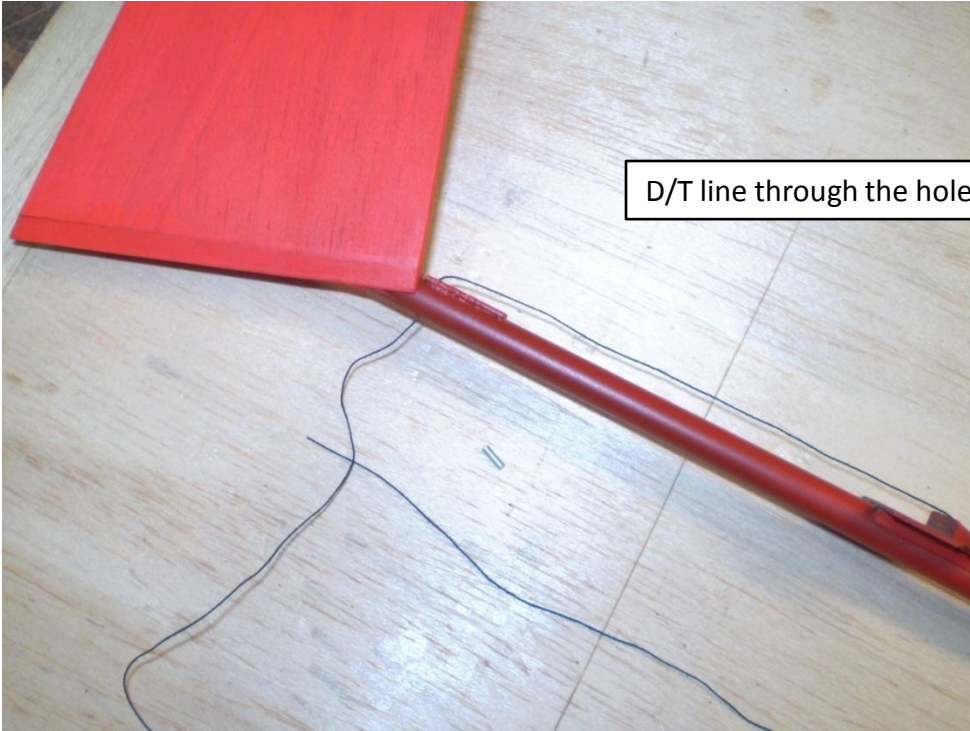
Start the D/T installation by forming a loop in one end of the thread provided, and harden with thin CA to form a loop for the dental bands to be installed.



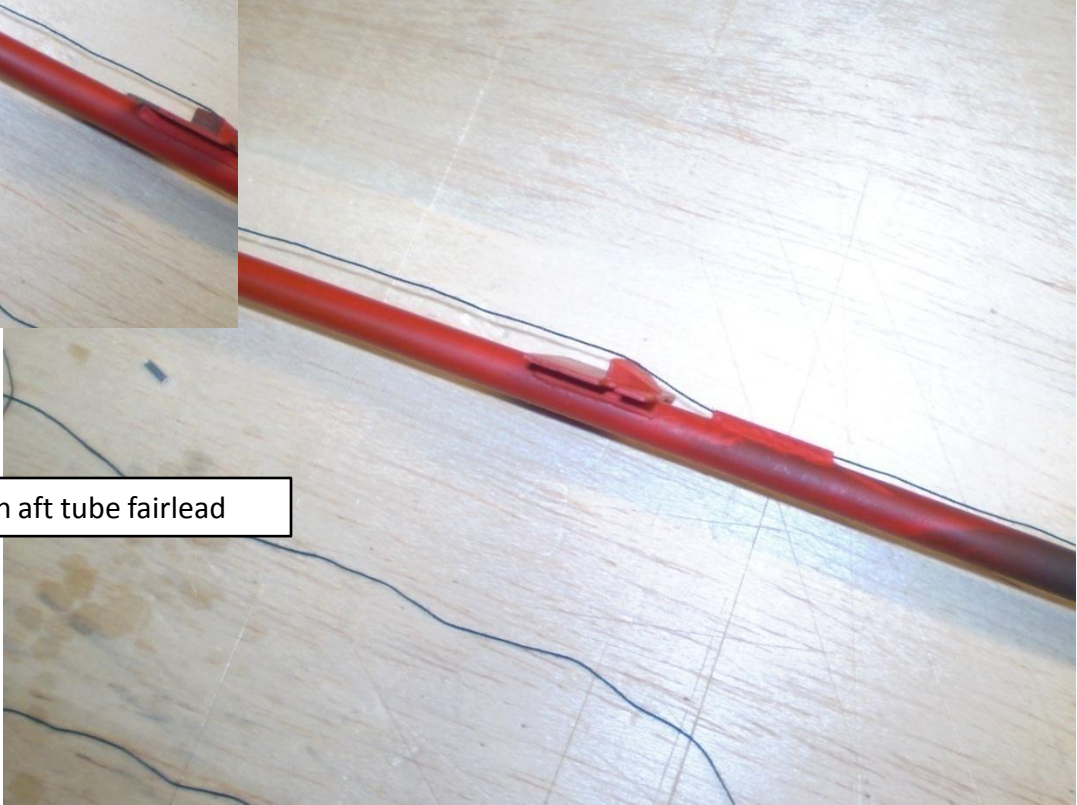
Two 5/8 diameter dental bands installed on the hardened loop.



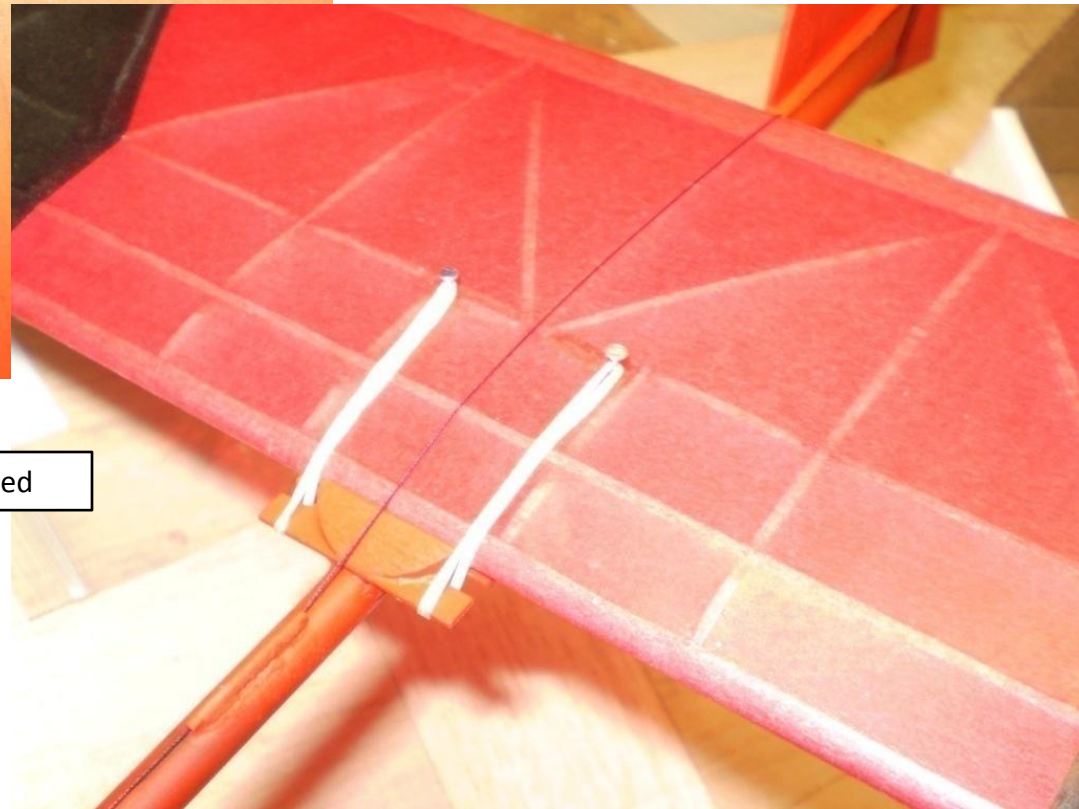
Place the 1/16 OD aluminum tube stop onto the D/T line prior to feeding the line through the fairleads on the tail boom.



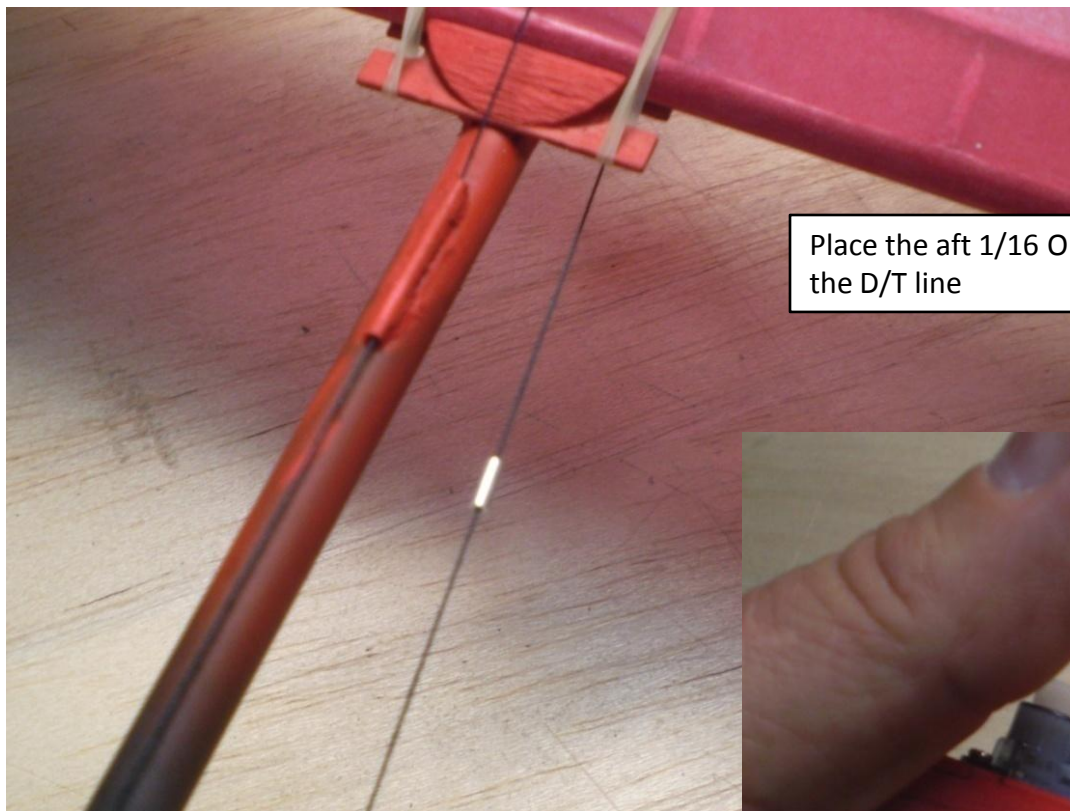
D/T line through the hole in the tail boom at SP-3 location



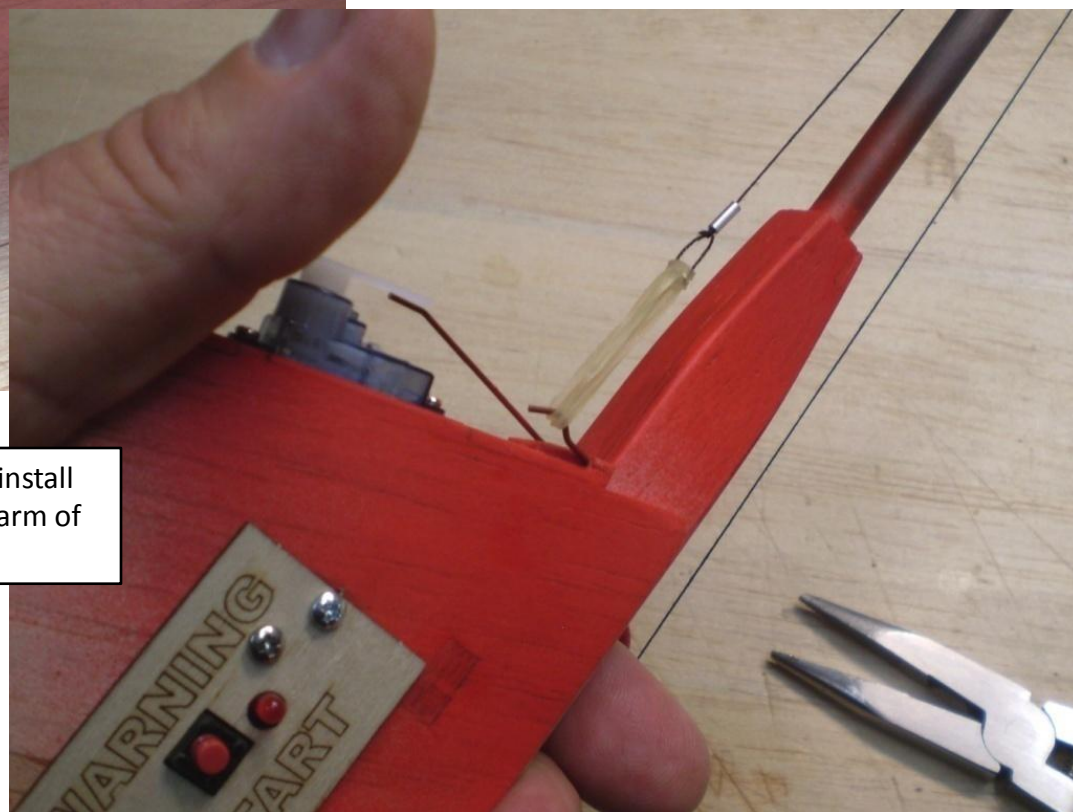
D/T line through aft tube fairlead



D/T line under tension with stabilizer installed



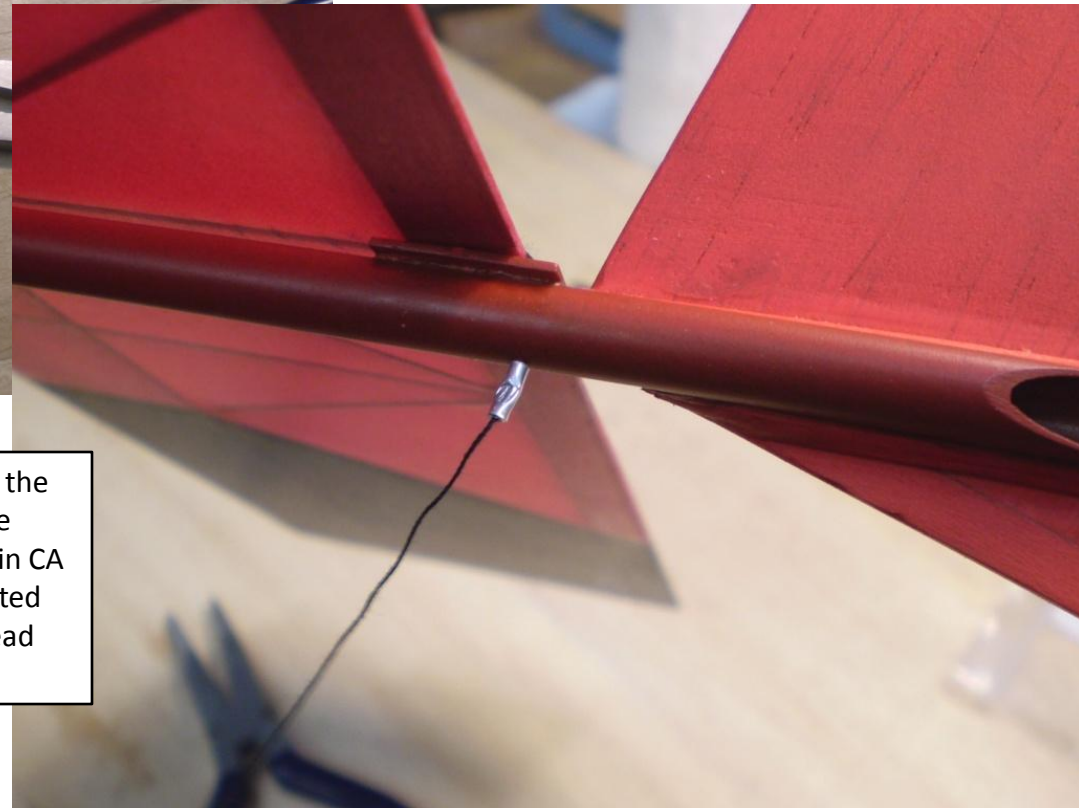
Place the aft 1/16 OD aluminum tube stop onto the D/T line



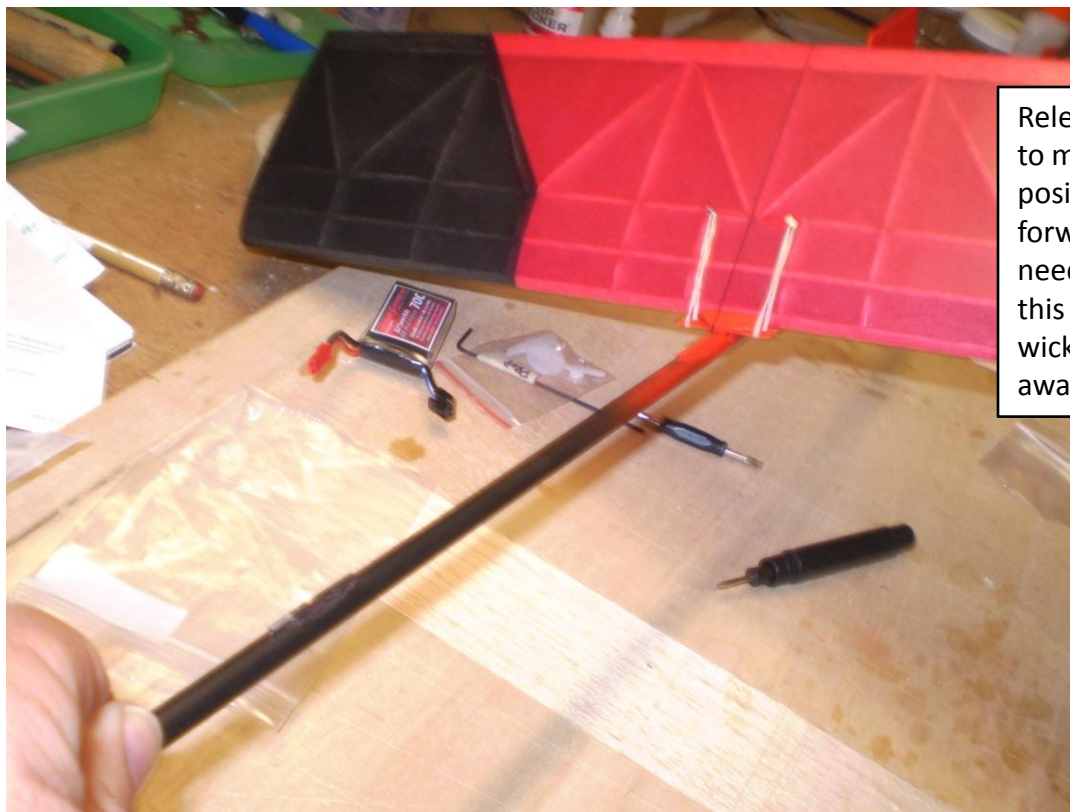
Lock the D/T tripwire under the servo arm and install the D/T line tensioning bands onto the release arm of the tripwire.



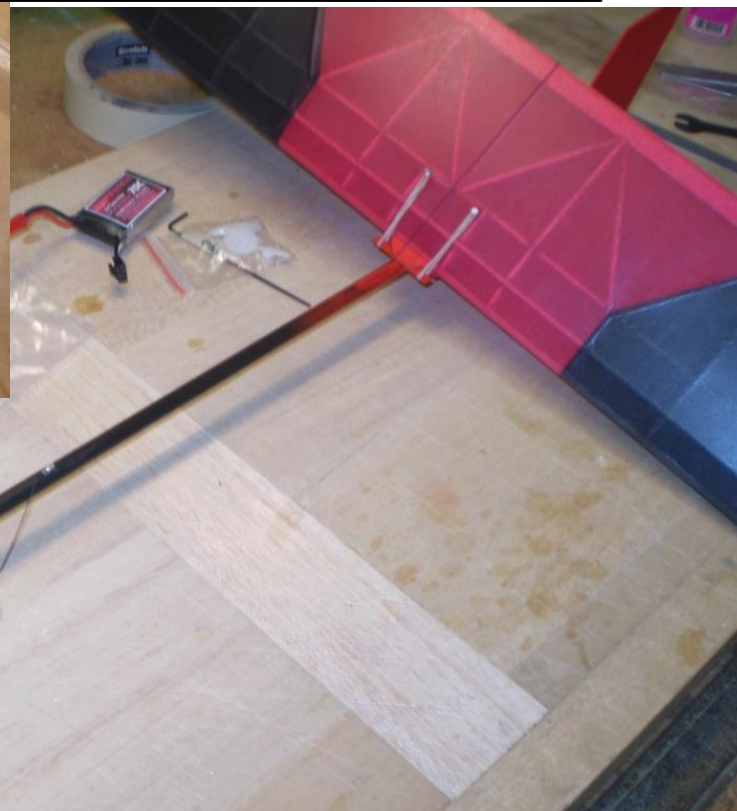
Tension the D/T line to stretch the dental bands



Maintaining the rubber tension in the D/T line, slip the stop tube up against the tail boom and crimp to the thread with needle nose pliers. A small drop of thin CA applied to the lower end of the stop tube is suggested to prevent slippage in use. Trim off the excess thread after.



Release the D/T trip wire and allow the stabilizer to move to a 45 degree angle to set the D/T position stop tube. Slide this up against the forward tube fairlead and crimp to the line with needle nose pliers-add a small drop of thin CA to this to prevent slippage. Make sure no glue wicks into the fairlead of course-pull the stop away to prevent accidental gluing.



Released D/T line with stabilizer in pop-up position.

Install the folding propeller blades into the hub
It will take some light filing to get these
to fit into the yokes-remove just enough
material to allow the blades to fold forward and
aft under light air pressure or gravity.

Texas Timers Folder Hub
3mm Shaft 6mm Yoke

Graupner
MODELLBAU-ZUBEHÖR

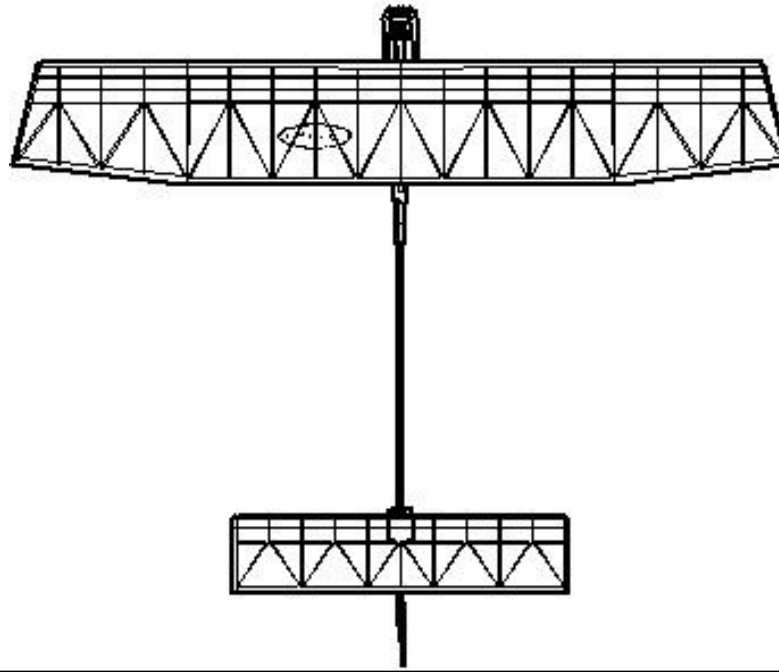
2 St. Best-Nr 1336.19.10
Klapp - Luftschraubenblätter
CAM FOLDING PROP - Luftschraube
Ø/Steigung 19/10 cm, 7.5/4"



4 013389 103840



Now go flying and have a blast!



Joulebox 190 Build Weight Data

•Wing frame (sanded)	21.7 gm
•Stabilizer frame (sanded)	5.5 gm
•Unfinished fuselage assembly	30.5 gm
•Unfinished (bones) all-up weight	57.7gm
•Wing frame (Esaki covered and ready to use)	27.1 gm
•Stabilizer (Esaki covered and ready to use)	7.5 gm
•All-up, ready to fly weight	150 gm

(This is test build T-2)