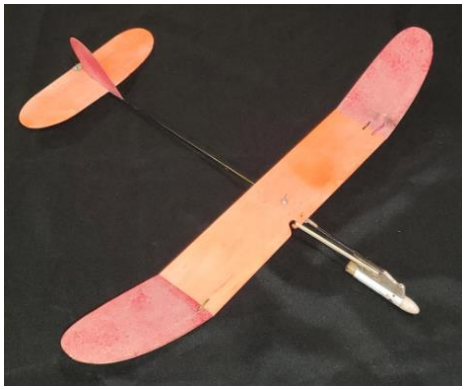
Build Manual

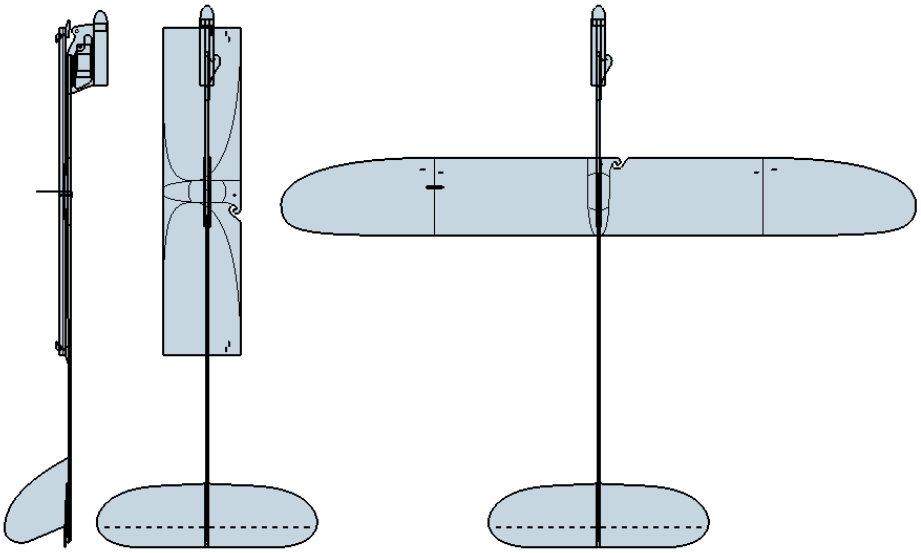


Flipflop FAI Rocket Glider

By *J&H Aerospace*

www.jhaerospace.com

A competition rocket glider
for 13mm engines



Recommended power: Estes A3-2T, A10-3T

Flipflop FAI Rocket Glider

J&H Aerospace

Building Instructions

Congratulations on your purchase of the Flipflop FAI rocket glider! Please use the Flipflop FAI build manual to complete your model: https://jhaerospace.com/product/fliplock-fai/

1. Parts list

Before beginning construction, please verify that your kit contains all of the necessary parts listed below. Please be aware that some of the laser cut parts may have separated from their carrier sheet, so you should ensure that all of those parts are present and undamaged.

1. Parts Sheet #1 (wing, 1/8” balsa)
2. Parts Sheet #2 (tail, 1/16” balsa)
3. Parts Sheet #3 (hooks, 1/32” ply)
4. Parts Sheet #4 (pylon sides, 1/64” plywood)
5. Parts Sheet #5 (wing mount and pylon core, 1/8" balsa)
6. Wing Bearing (1/8" plastic nose bearing)
7. 1/32" sq basswood strip, 24" long
8. Motor tube (T-2.5, 2.25”)
9. Clay ballast
10. Kevlar DT line (24”)
11. #19 rubber bands (4x)
12. Dental bands (8x)
13. 0.6 mil doculam hinge material (6"x12")
14. Launch lug
15. Wing axle (1/32" piano wire)
16. Carbon wing stop (0.040"x2" carbon rod
17. DT line guides (3/32” Al tubing, 2" long)
18. BT-5 balsa Nose cone
19. Spool of thread

Verify from your kit packet that you have all of the parts and parts sheets listed. This is a moderately complex model, and it can be assembled almost entirely with CA glue. There are a few very demanding segments of the build, particularly the hinge bonds and wing axle final installation. Please resist the desire to decorate this airplane with paint and sealants. At the absolute most, you should give the wood an extremely thin layer of minwax spar varnish with slight paint misting in a few places. If you take the time to do a precise construction job, this airplane will reward you with absolutely stunning flight performance. It is capable of well over 1 minute on an A engine without a piston.

Begin by separating the wings from the parts sheet as shown. Sand any tabs off of the wing edges, but do not round anything off at this time. First, we must attach the basswood leading edge strip. Once that step is completely, it is important to sand the wings to an airfoil shape. You do not need a perfectly accurate airfoil to achieve excellent performance from your Fliplock, but you will gain significant increases in performance if you do make the effort to achieve a proper airfoil. If you have a razor plane, it will be very helpful in finishing out your wings quickly. You do need a good quality plane like the David Combi Plane or the Kimball plane from Bruce Kimball (available direct from Bruce at iflyhlg@hotmail.com).

For this build, we are choosing to let the deployment hook be on the right side of the wing as shown. This will be important later.

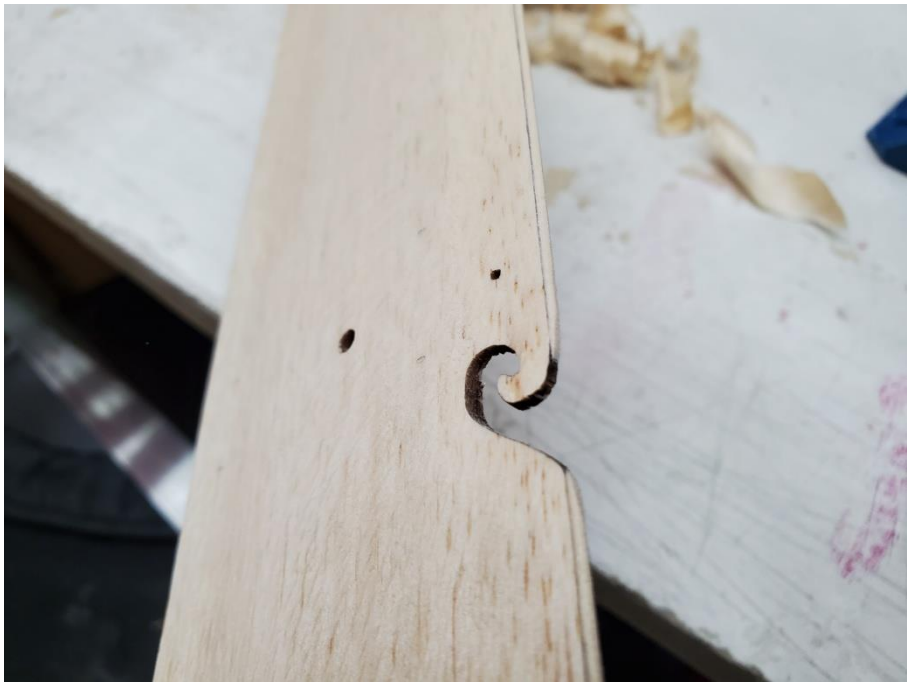
As viewed in the photo, the basswood leading edge liner must be glued flush with the lower surface of the wing, the surface in contact with the table.

Wet the basswood so that it will curve smoothly around the leading edge at the tips. Glue it in place with medium CA.

Use a razor plane to carve the trailing edge of the wing to a wedge shape. Leave the trailing edge about 1/32" thick. The wedge should extend to about 1/2 of the wing chord (covering 2/3 of the chord as shown in the photos is even better).

Carve the leading edge to a rounded shape, all the way down to the basswood liner.

Carve the wingtips to a smooth taper, then sand the wing smooth.



Round the underside of the leading edge.

Glue the 1/64" ply reinforcements to the bottom of the wing as shown.

Saw the wingtips off with a zona saw along the perforations.

Carefully sand the wing center section dihedral breaks flat using a sanding block.

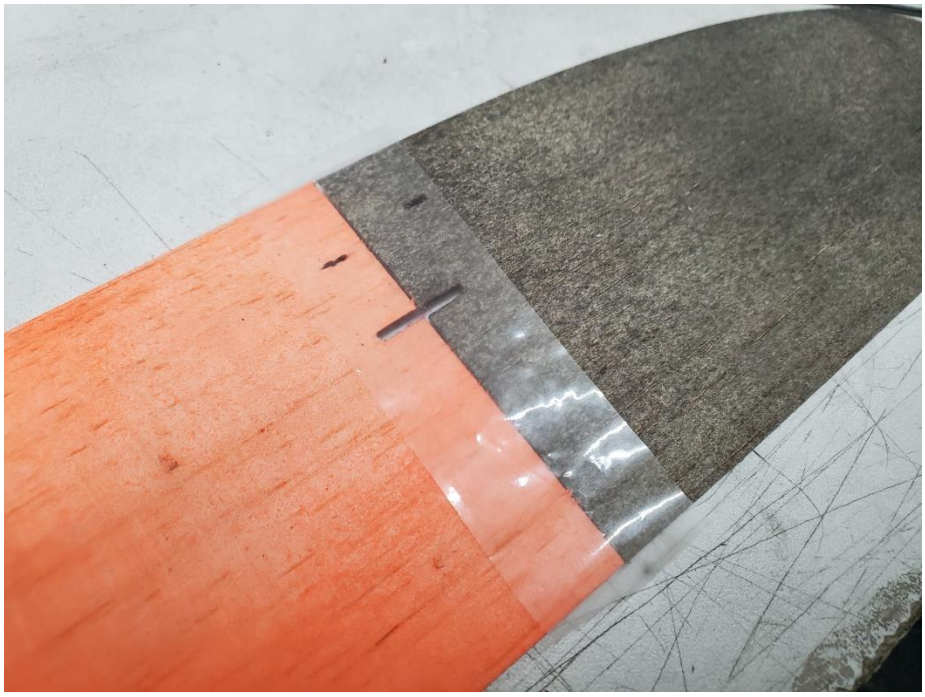
Angle the wingtips up about 2" and sand their roots to a bevel (make sure the top surface is facing up!

Check the fit of the dihedral breaks and sand more as required.

This point is an important break in the construction. Apply any sealer and paint you intend to apply to the wing. We recommend a very thin coat of Minwax oil-based varnish. Do not attempt to substitute with water based urethanes or even nitrate dope, as these provide an insufficient stabilization of the wood fibers. After the varnish has dried, sand the wing with very fine sandpaper and then mist on any color that is desired. The paint should be so lightly applied that the wood grain remains visible.

You will need a covering iron on low-medium heat for the next step. In a pinch, a clothes iron on medium heat will work but may require a few attempts to get a good result.

Flip the wing upside down and cut a piece of laminating film about 1" wide, with a little excess on either side of the wing. Don't trim off the excess. The adhesive side is the dull side and should contact the wing.

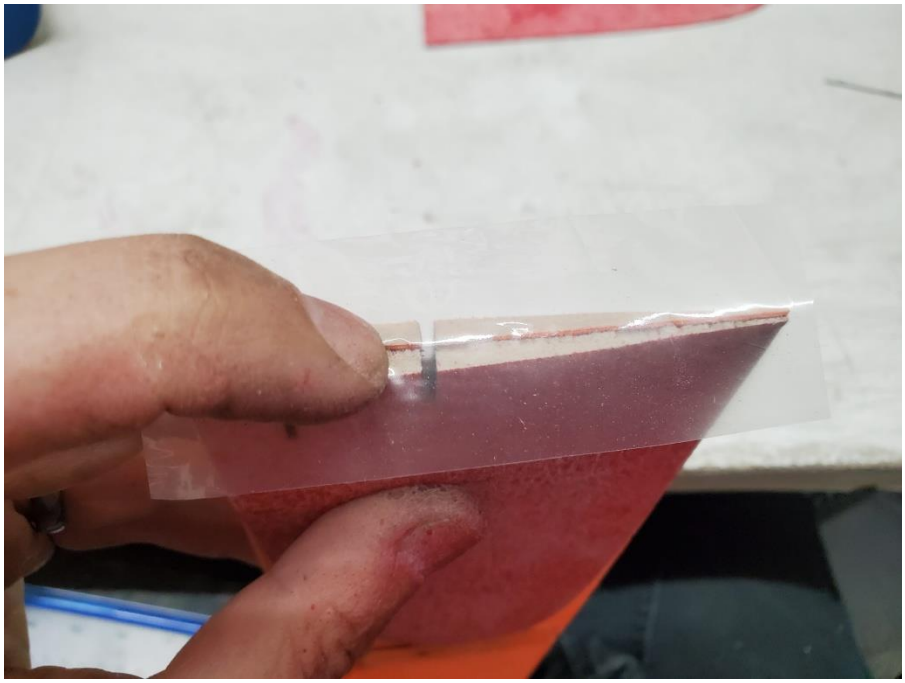


Working from an edge, carefully tack down the film, being careful to press it down rather than heat shrinking it prior to contact.

Once you have the film fully bonded to one side, tack it down to the other side, starting from the hinge line.

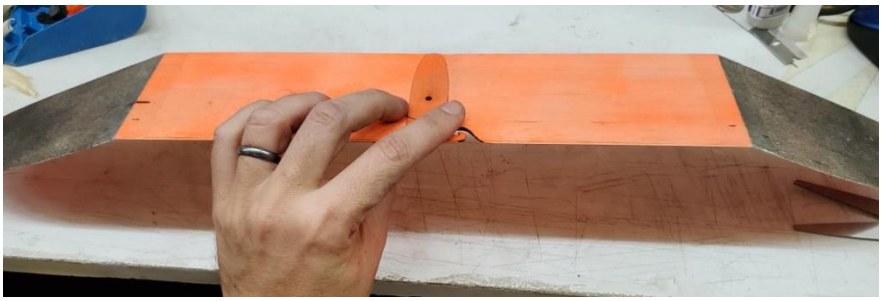
Slit the excess film at the hinge line so that the wingtip can be folded and the excess ironed onto the top surface of the tip and the inner section.

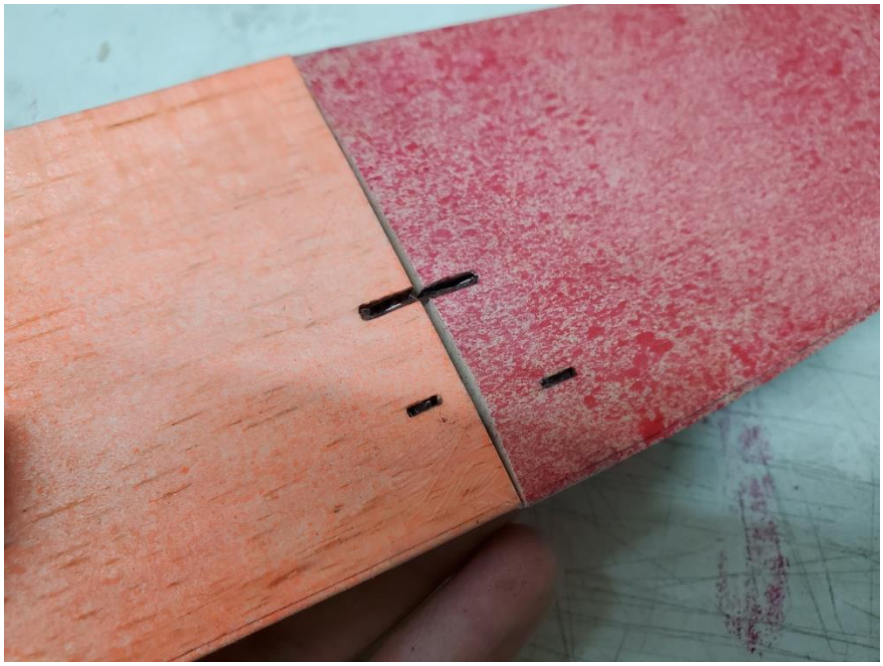
With the wing folded, cut another piece of film of the same size and carefully iron it into the folded hinge line.



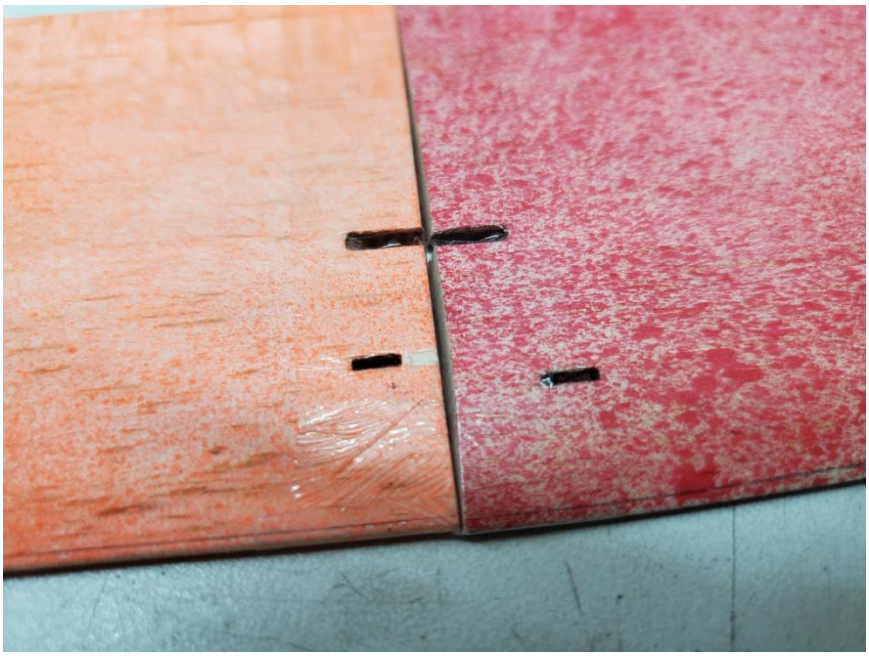
Iron the rest of the film onto the top surface of the wing and wingtip, then split the excess at the leading and trailing edges as before so that it can be ironed over the edges and onto the bottom wing surface.

The result should be a low-resistance hinge which opens to the correct angle.

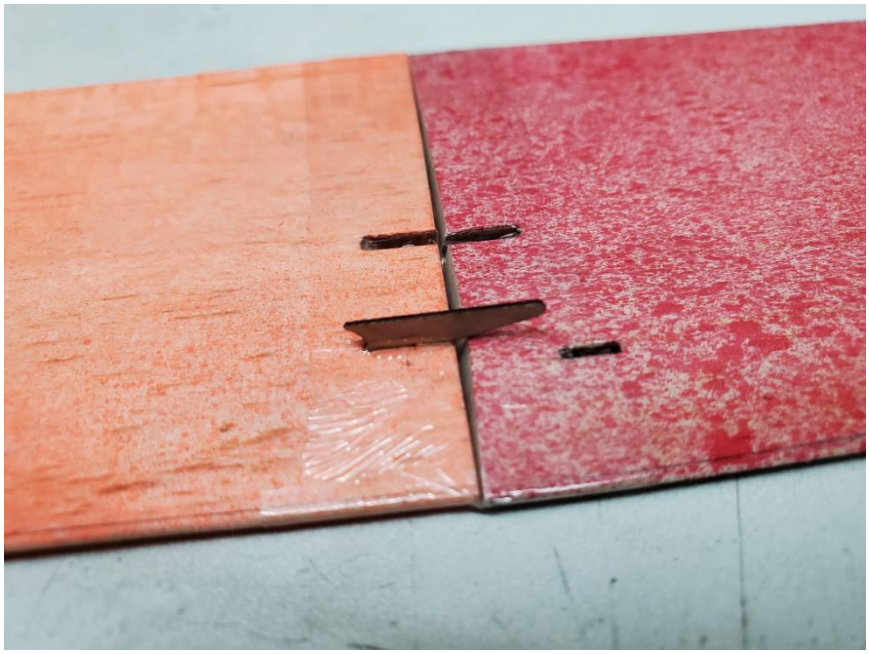




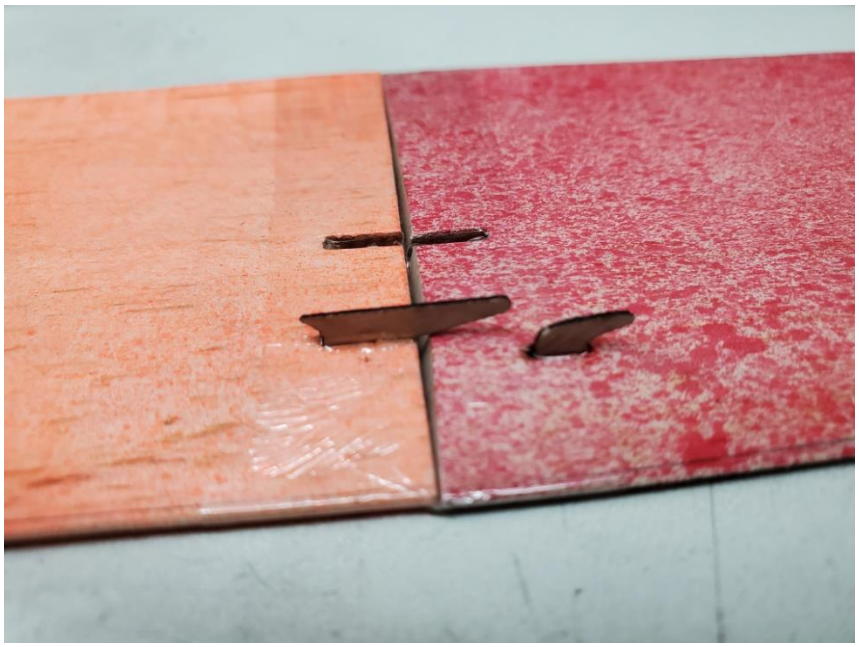
Use a sharp, pointed knife to clear the plastic film from the slots in the top and bottom of the wing.



Glue the plywood wing stop/hook into the slot in the top of the left inner wing panel in the orientation shown below.

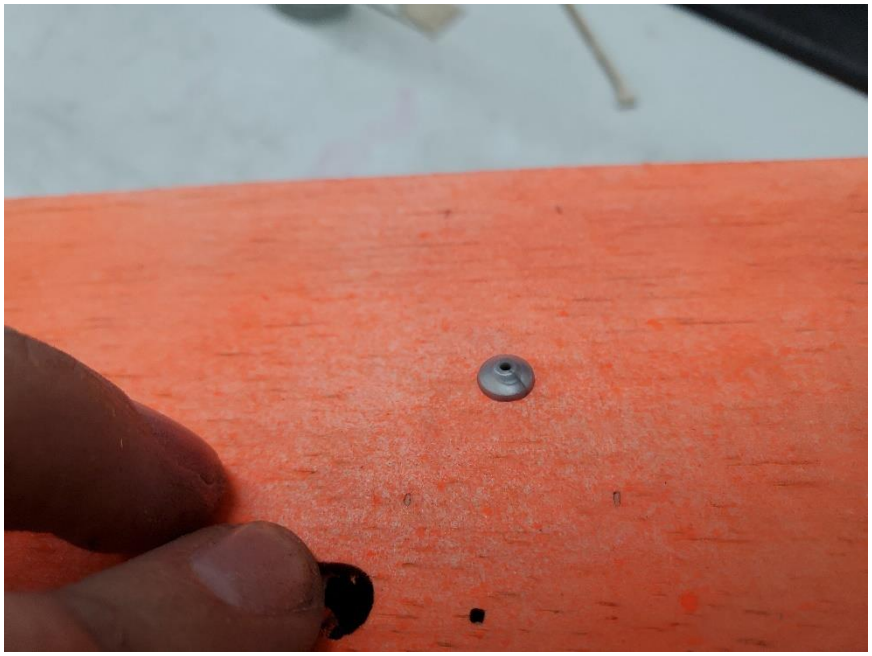


Next, glue in the hook in the outer panel as shown.

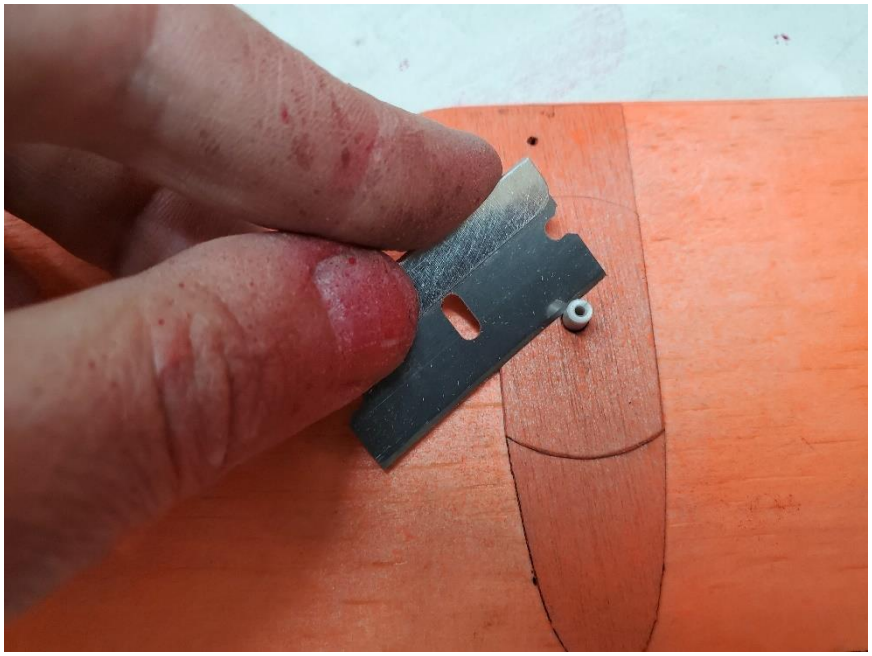


Repeat the hook installation for the right wing dihedral break.

Insert the gay plastic wing bearing into the top of the wing. Do not glue it into place.



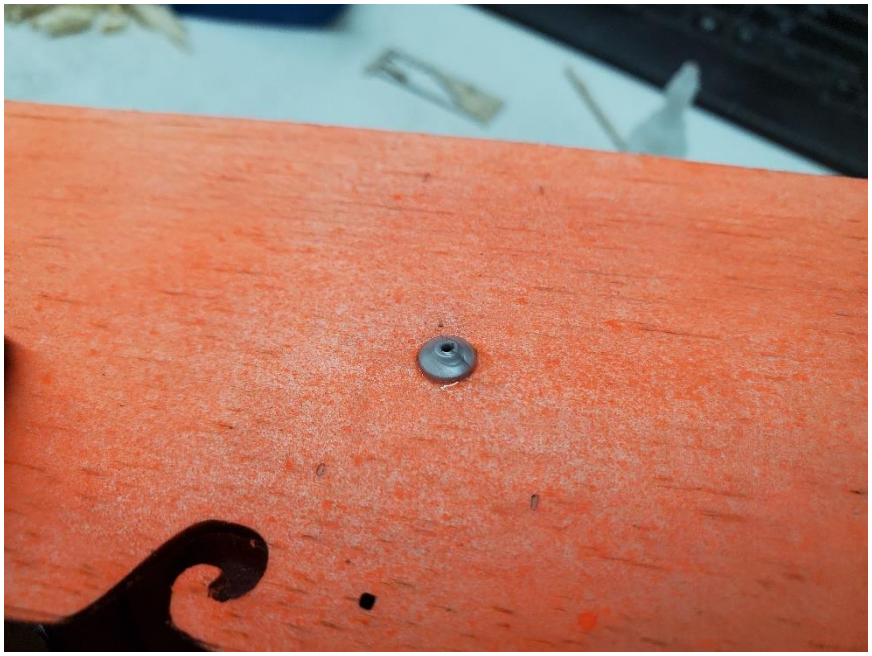
With the bearing fully seated in the wing, score the bearing flush with the bottom of the wing.



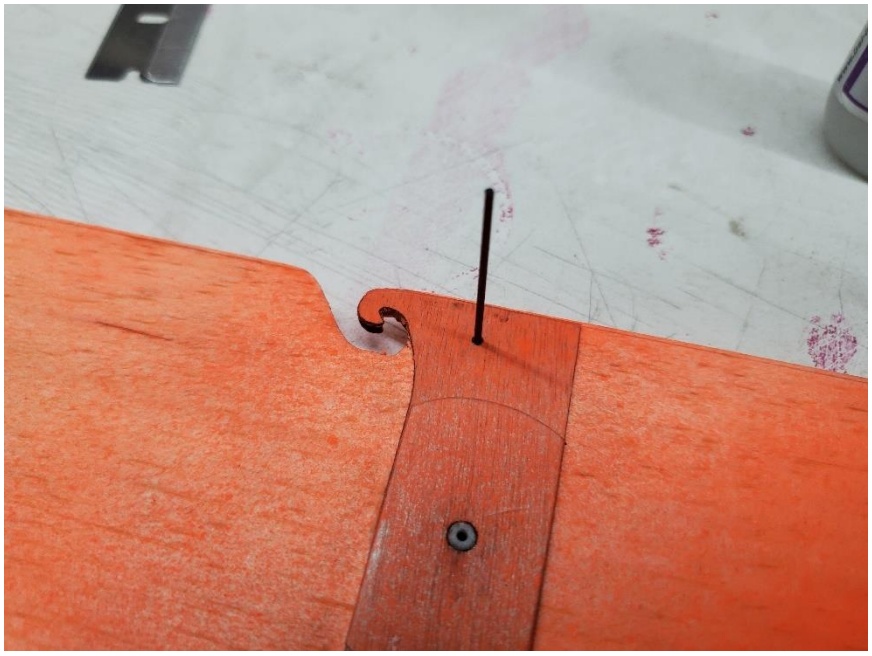
With the bearing removed from the wing, cut off the excess material at the score line you cut previously. BE CAREFUL: don’t lose either piece during cutting.

DO NOT LOSE the piece you cut off! You will need it later.

Glue the trimmed bearing into the wing.



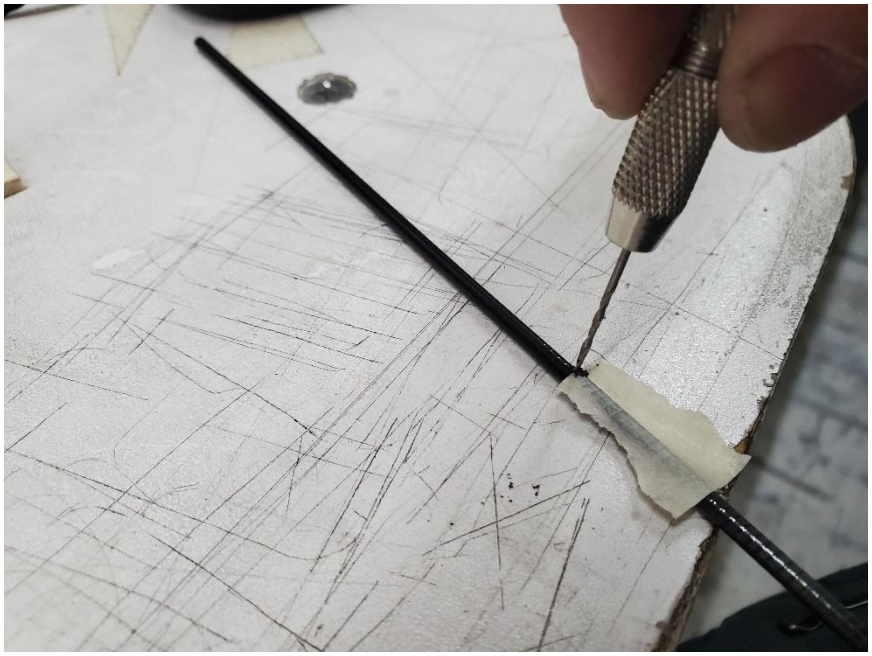
Cut the 0.030” carbon rod using scissors to a length of ½ inch and insert it into the hole in the the bottom of the wing at the leading edge. Glue it firmly in place.



Fillet the glue joint for added strength.

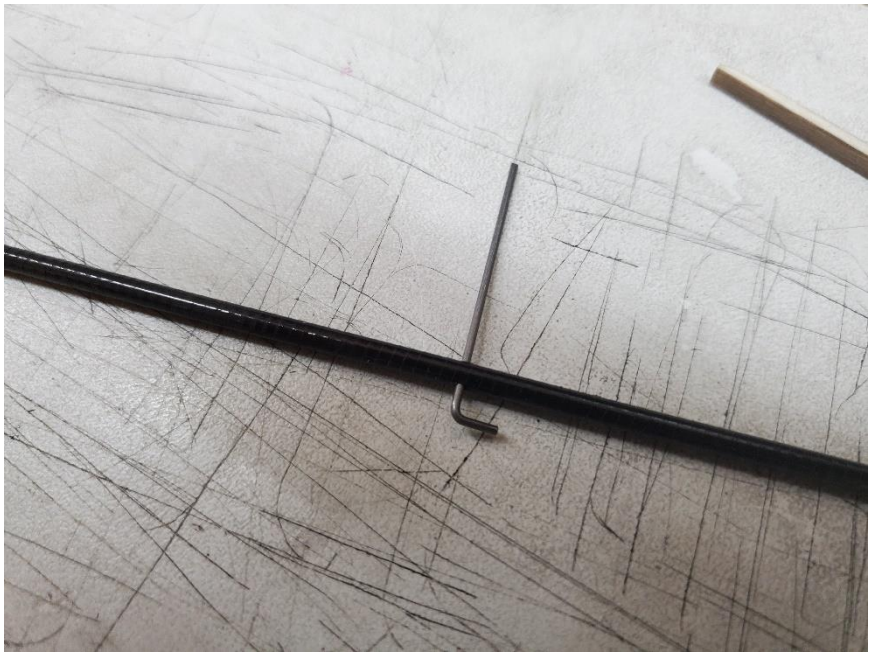
Measure 5.25 inches from the big end of the carbon fuselage and apply a tape strip to mark this location.

Use a drill bit of absolutely no more than 1/16 inch diameter (1/32 inch preferred) do drill a hole completely through the fuselage at the previously marked 5.25 inch location.

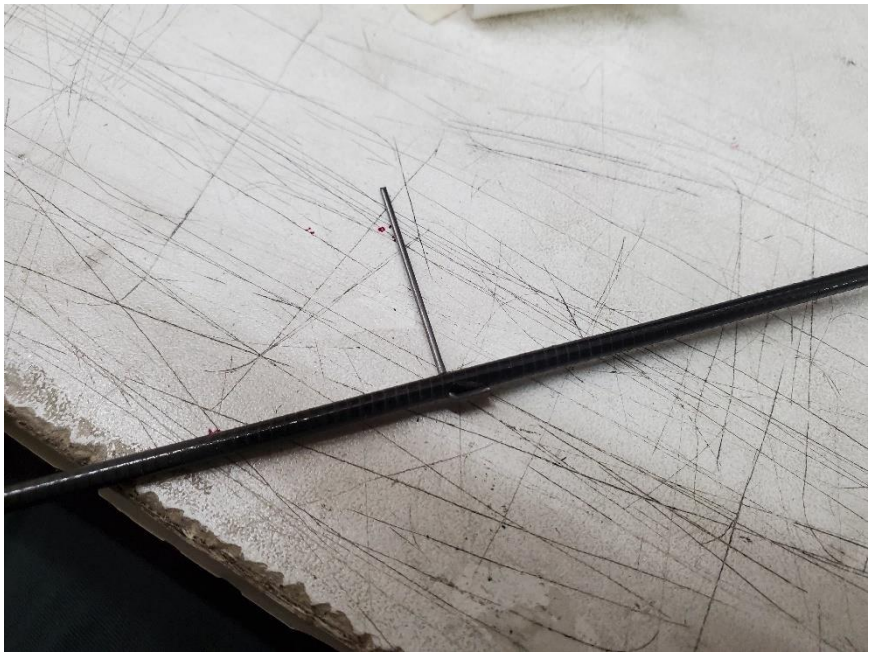


Insert the wing axle through the 1/8” balsa standoff exactly as shown, then remove it.

Slide the wing axle through the hole in the fuselage.



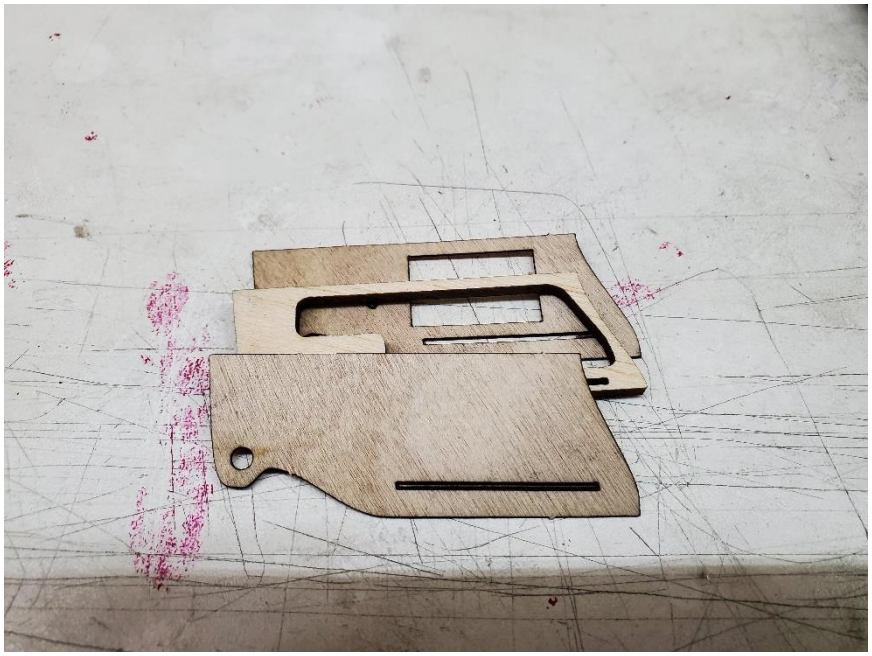
Glue the axle firmly in place with a small fillet around the 90 degree bend area.



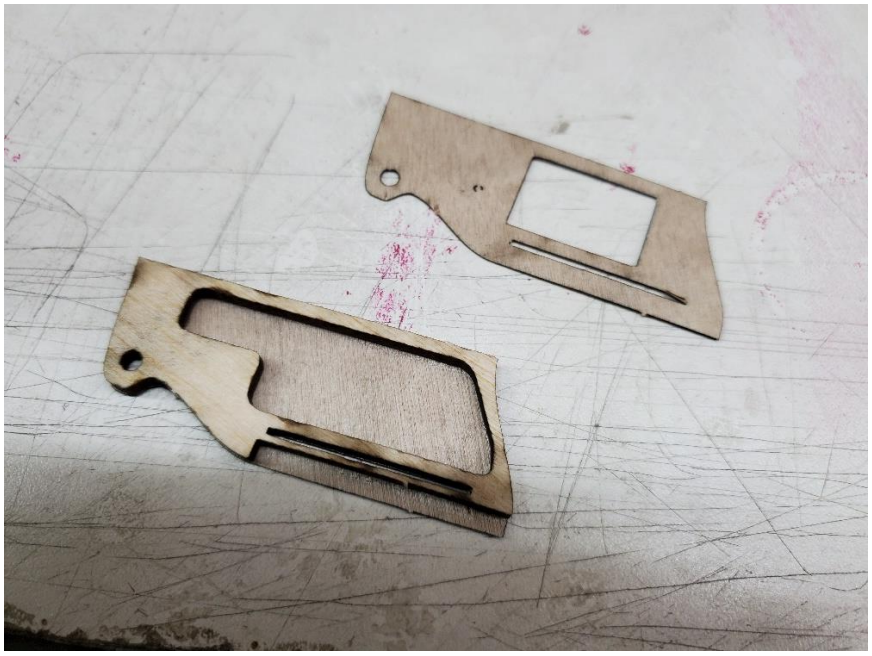
Apply glue to the flat edge of the wing standoff and slide it into place over the wing axle and against the fuselage.

Locate the plywood fuselage reinforcements and glue them in place aligned with the wing standoff. Sand off any sharp edges.

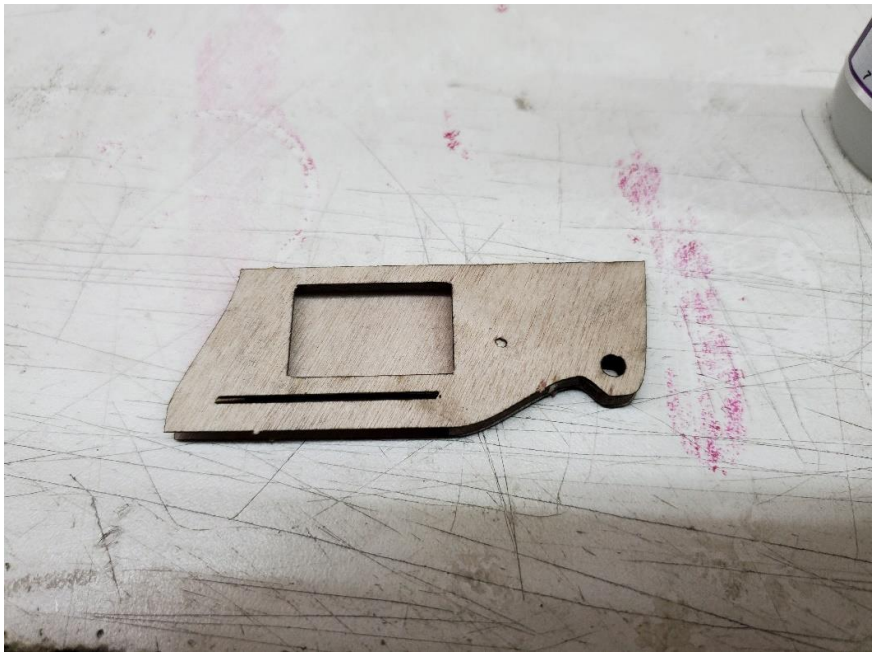
Locate the 3 pod pylon pieces (2 from plywood, one from 1/8 inch balsa).



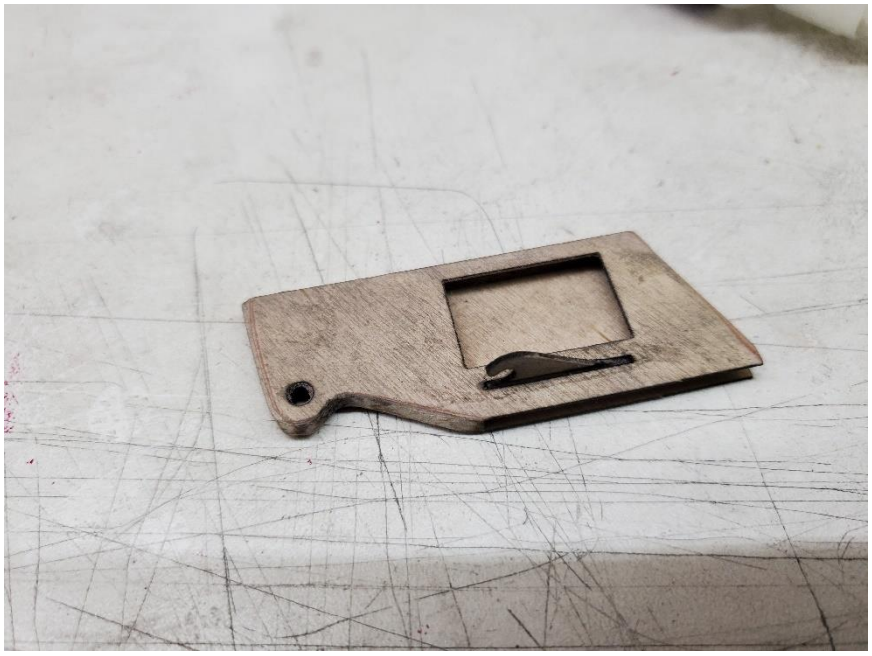
Glue the 1/8” balsa core to the plywood segment without the rectangular cutout as shown, being careful to avoid getting glue into the slot.



Glue the other plywood side in place on the opposite side of the fuselage core.



Slot the plywood hook into place in the pylon slot with the hook facing toward the small hole as shown. Sand off any rough edges.



Laying the fuselage with its axle on its side, glue the fat end of the fuselage into the top slot in the pylon, being careful to align the pylon with the axis of the wing axle. Please note that the photo shows a slightly different pylon used on an earlier prototype. Note the use of a shim under the wing axle to assist with proper alignment.

Measure 1/2 inch back from the end of the 13mm body tube and use drill bits to progressively widen out a hole completely through the tube to ¼ inch diameter.

Roll up sandpaper and sand the openings so that they have minimal fuzz.

Drill another smaller hole of about 1/8 inch next to one of the ¼ inch holes.

Mix up some 5 minute epoxy.

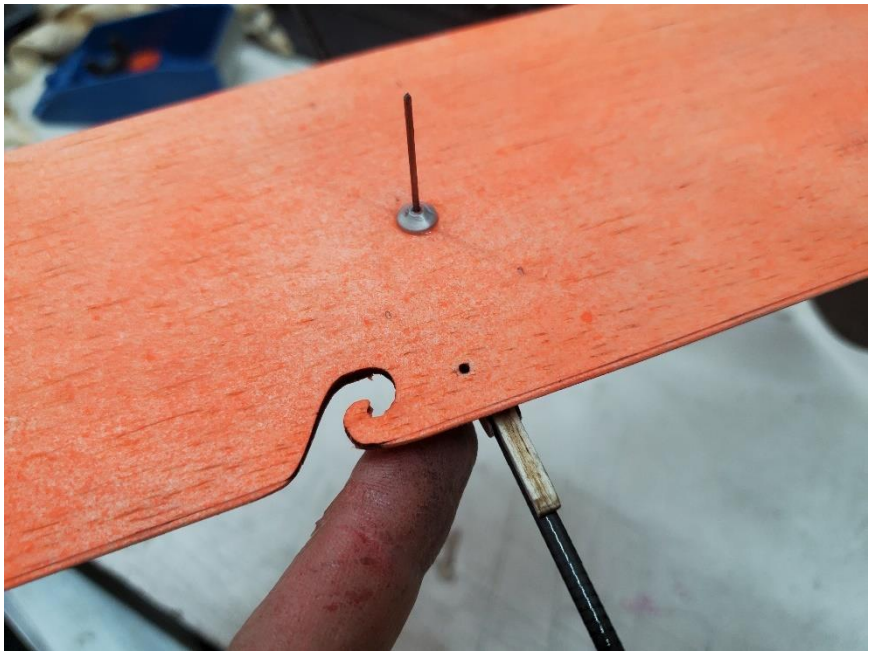
Coat the inside of the tube at the end with the holes, as well as the holes themselves, with the epoxy.

Coat the base of the nose cone with epoxy and insert it into the body tube.

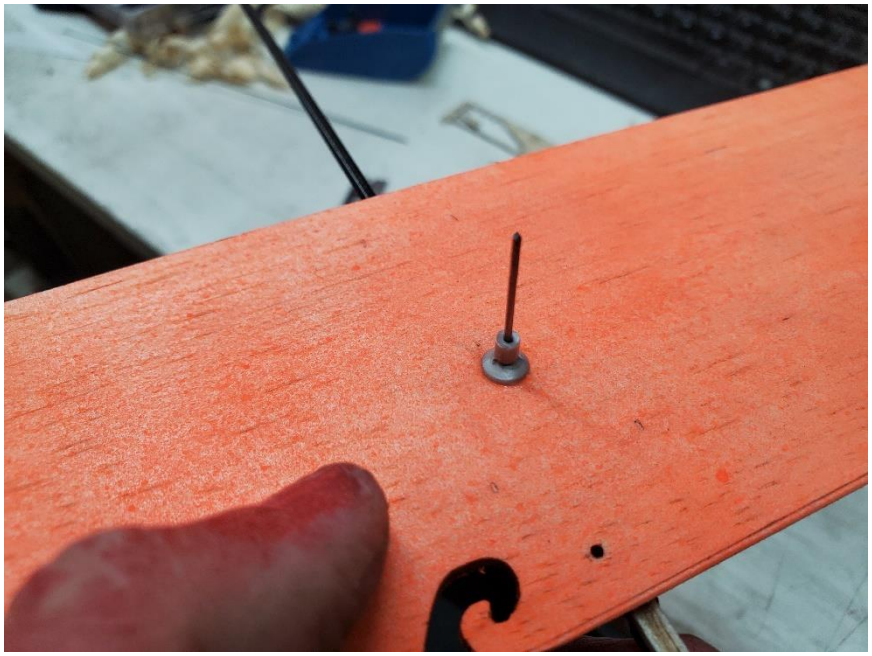
Coat the outside of the body tube around the nose cone and holes with epoxy.

Epoxy the pylon in place on the body tube flush with the back as shown.

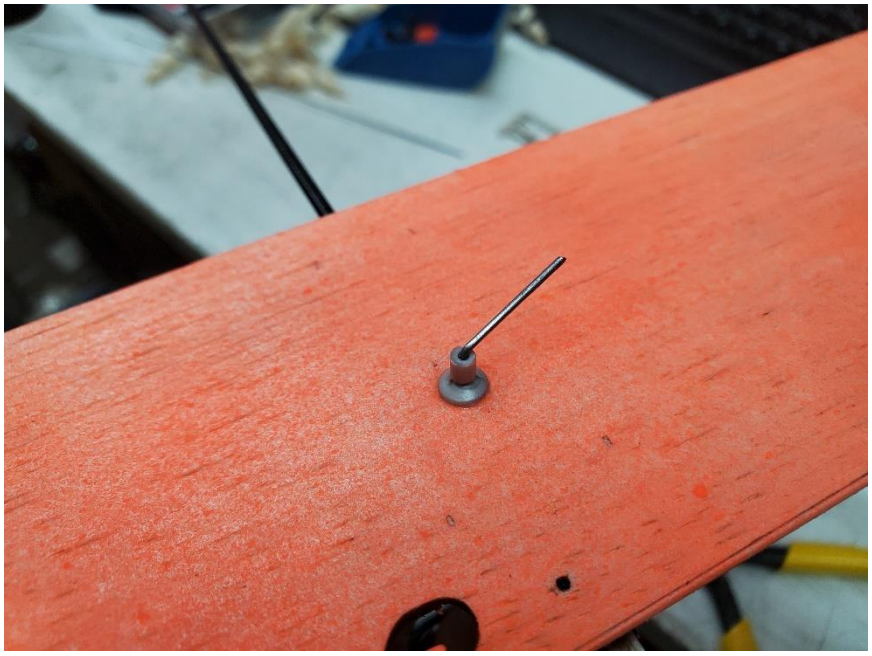
Slide the wing into place on its axle.



Locate the excess from the wing bearing and slide it in place on the axle above the bearing.

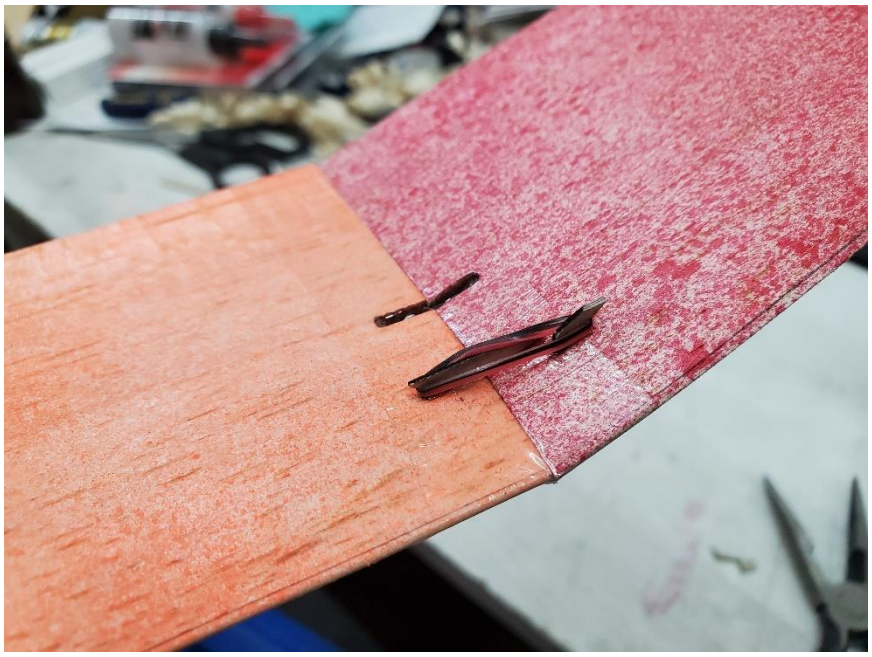


Use needle nose pliers to bend the wing axle over very carefully in a sharp bend tight against the plastic so that the wing is held close against the fuselage standoff.



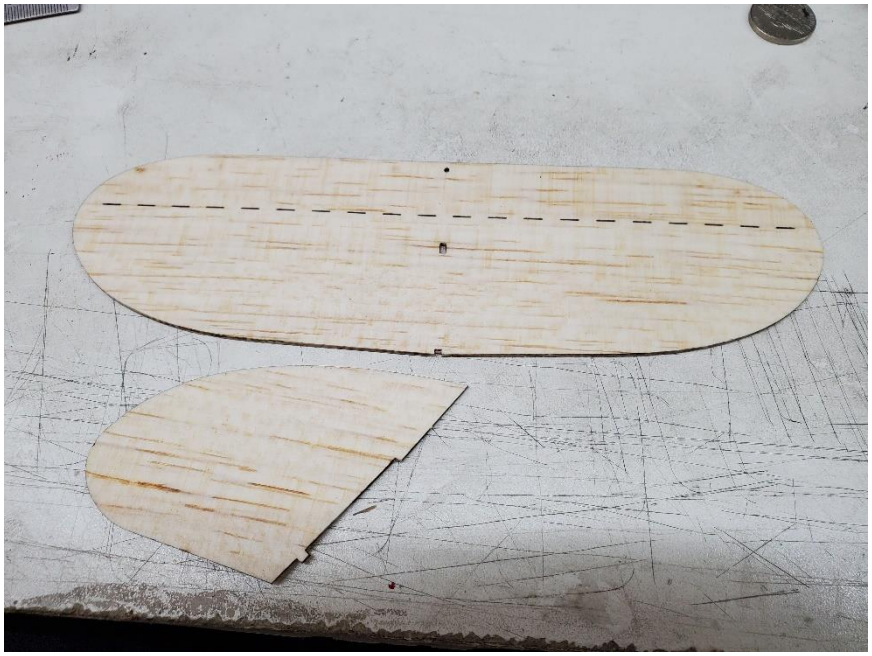
Cut off the excess wire as shown using wire cutters.

Test the wingtips for proper deployment by installing two dental bands on each tip to verify that the wings properly unfold. You may need up to 3 dental bands for proper action. The model cannot be stored with the bands installed as this stretches them out and they will no longer provide sufficient opening force.

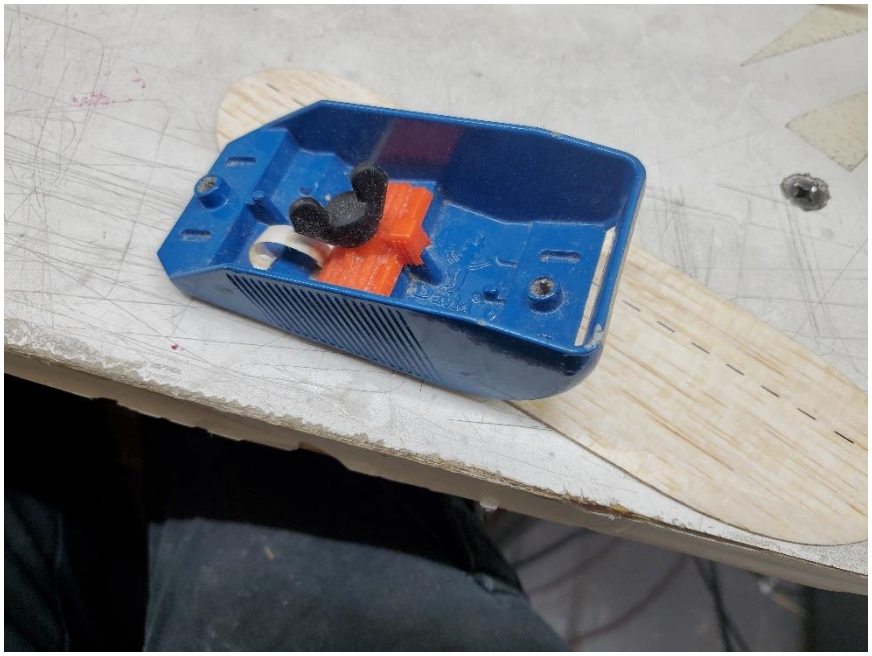


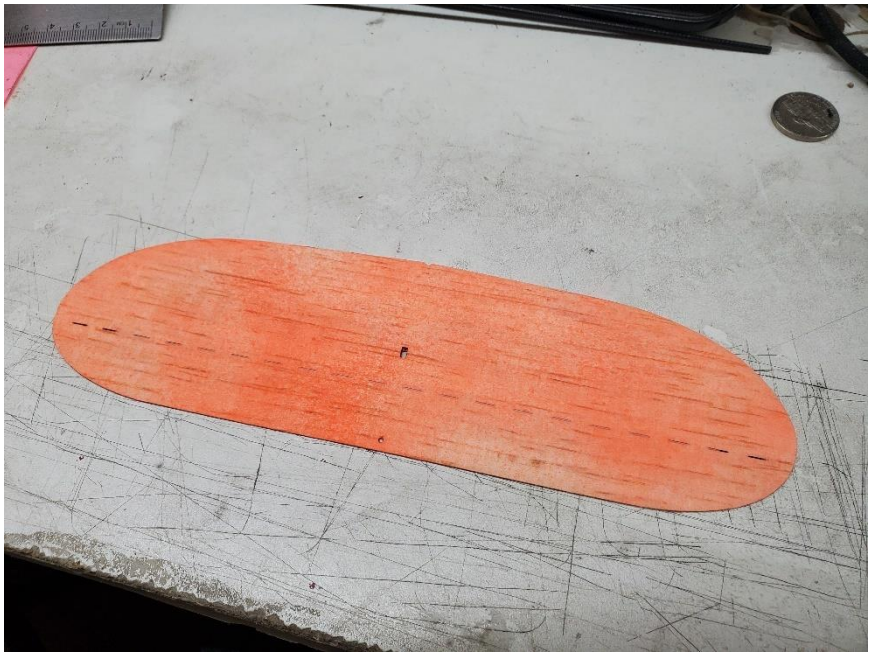
One or two of the #64 rubber bands are required to deploy the wing. Verify that no glue has gotten into the axle area by testing deployment of the wing a few times. Again it is recommended that you store the model with the rubber bands removed.

Remove the fin and stab from their carrier sheets and sand off any rough edges.

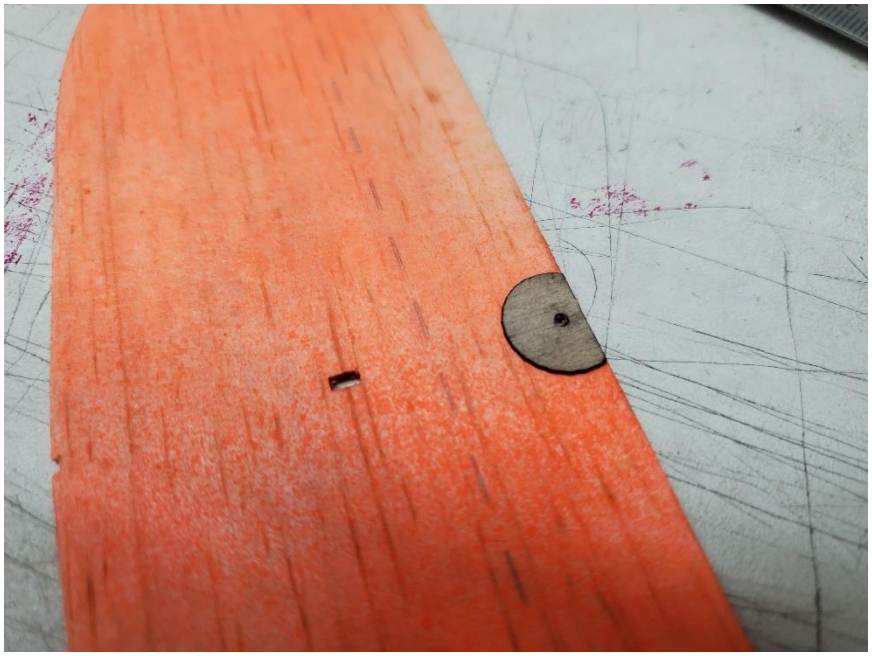


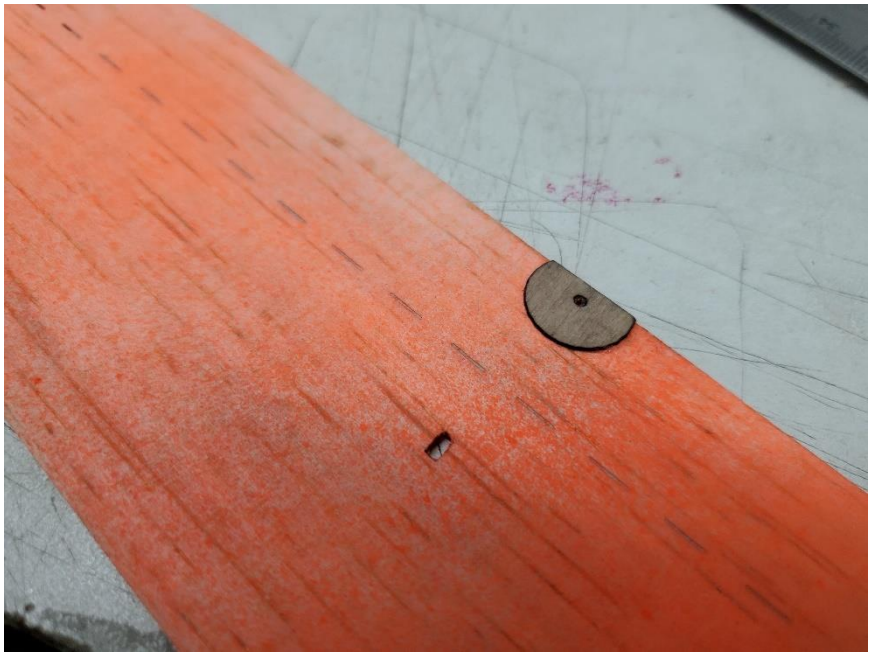
With the exception of the basswood leading edge liner on the wing, the stab should be finished in the same manner as the wing, planing it to shape before sanding lightly and then sealing with oil based varnish. A very light misting of paint is the final step.





Glue the stab trailing edge shield over the trailing edge centerline hole.





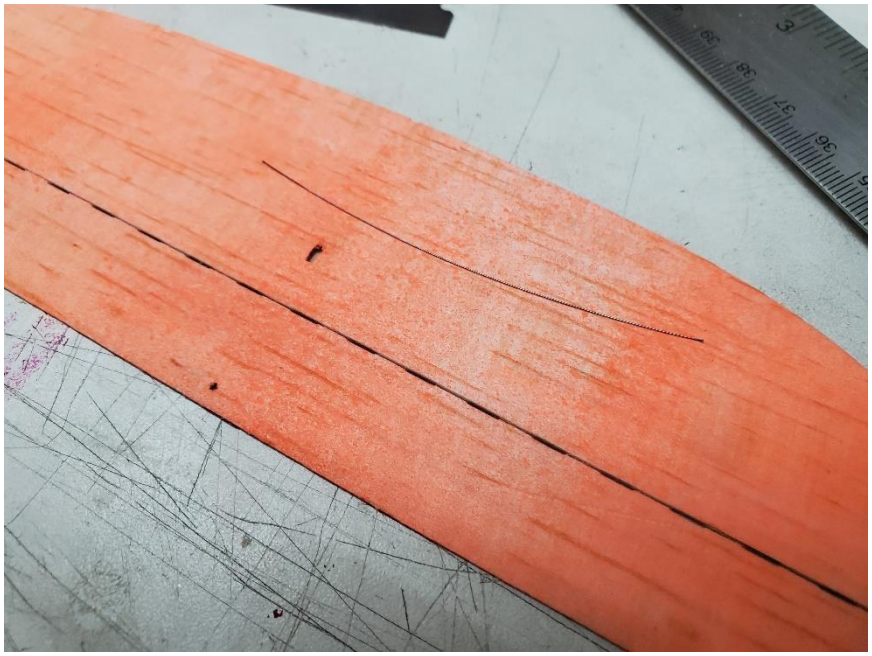
Rigging the horizontal tail dethermalizer flap

The following steps show how to configure the tail for a dethermalizer. If you do not plan to use a dethermalizer, you may skip them, however this system is highly recommended for competition flying.

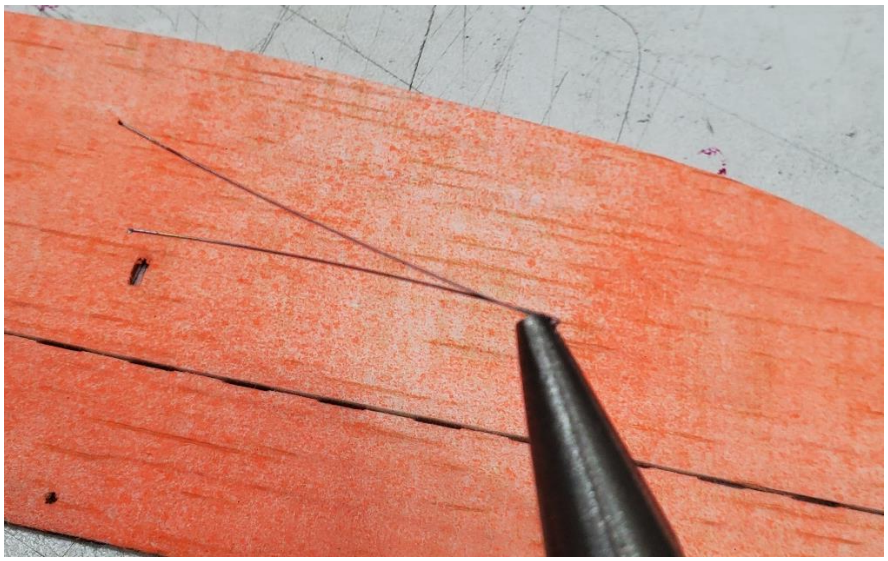
Use a straightedge to cut the back of the stab off along the perforations.

Use blenderm tape along the top surface to secure the stabilizer trailing edge back onto the stab, forming a hinge line.

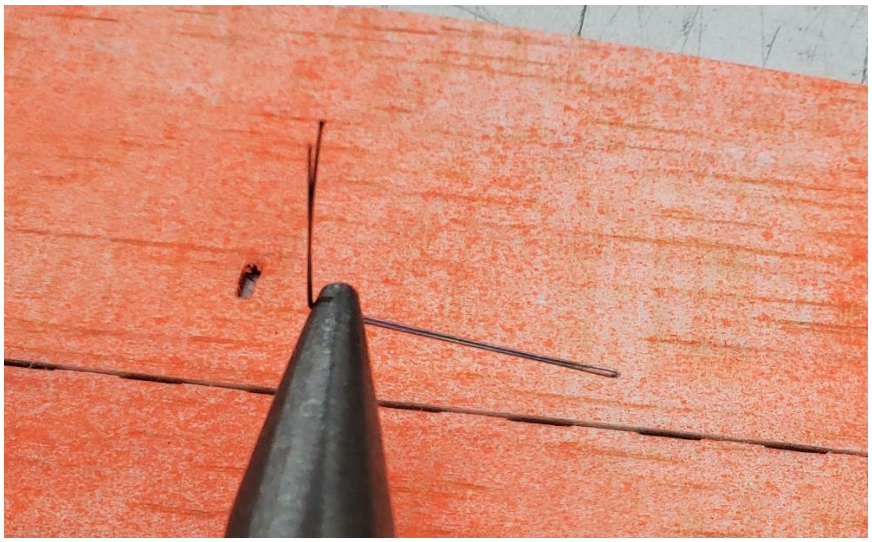
Locate the piece of fine spring wire supplied for the dethermalizer action.



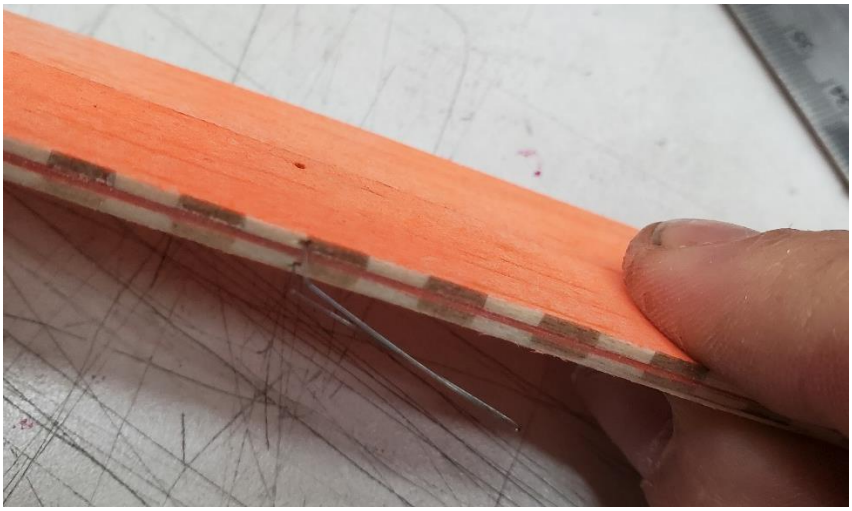
Bend this wire in half as shown.

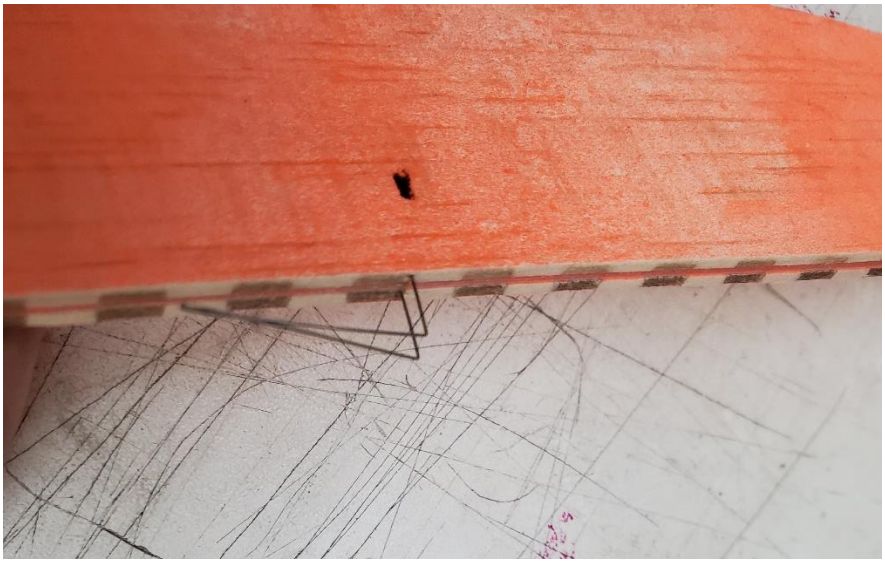


Bend both halves of the wire as shown to a 90 degree offset.



Fold the stab trailing edge over and press the ends of the wire into the opposing panels as shown, roughly at the centerline.

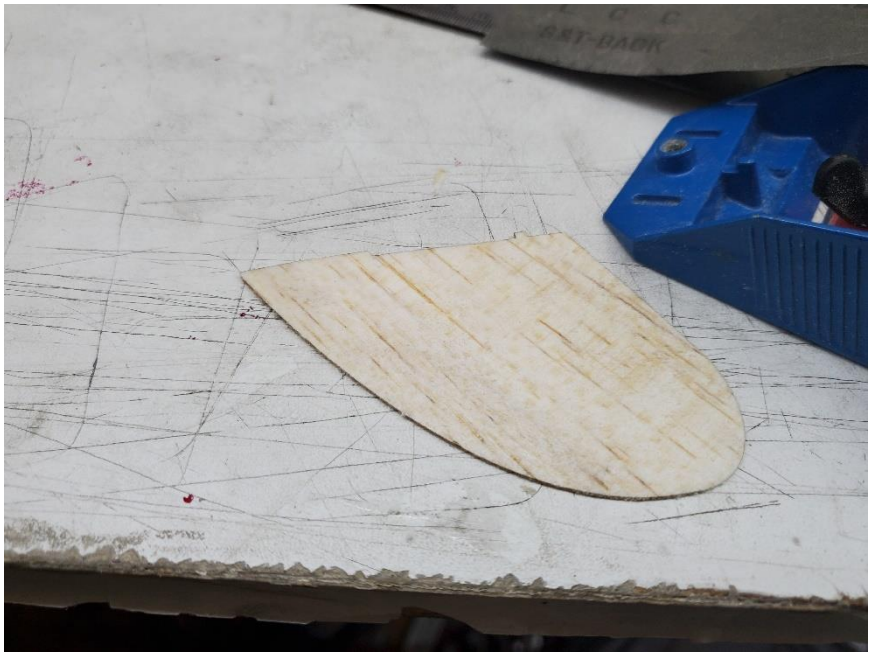




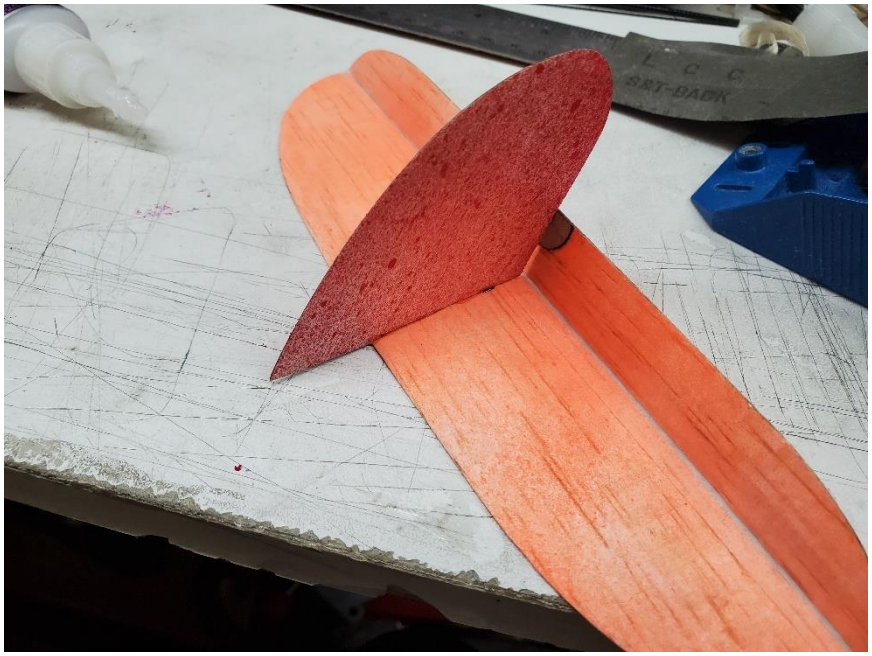
You have now created a spring loaded hinge.

Installing the tail surfaces

Finish the vertical tail (fin) with a symmetrical airfoil and seal/paint it as you did with the other surfaces.

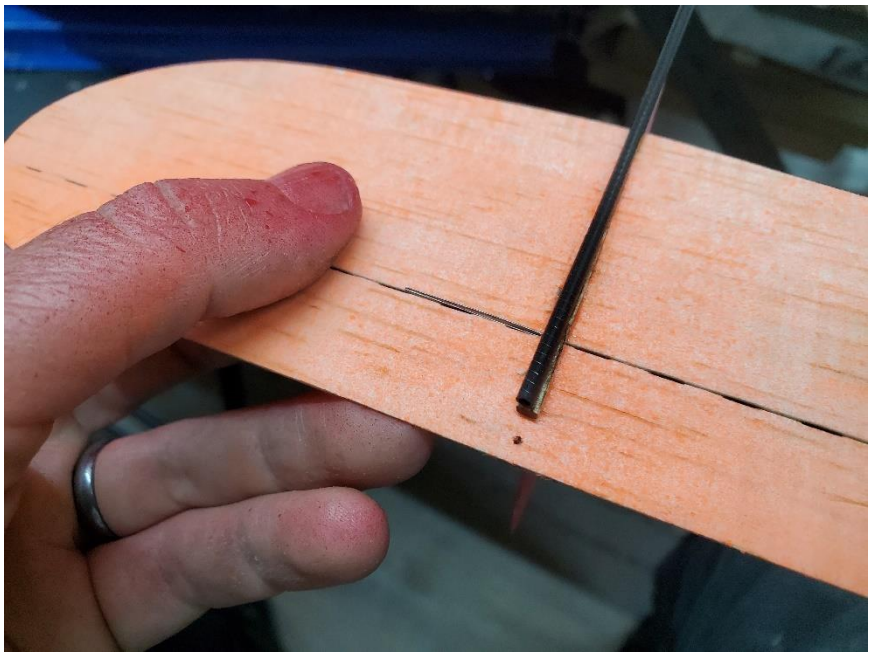


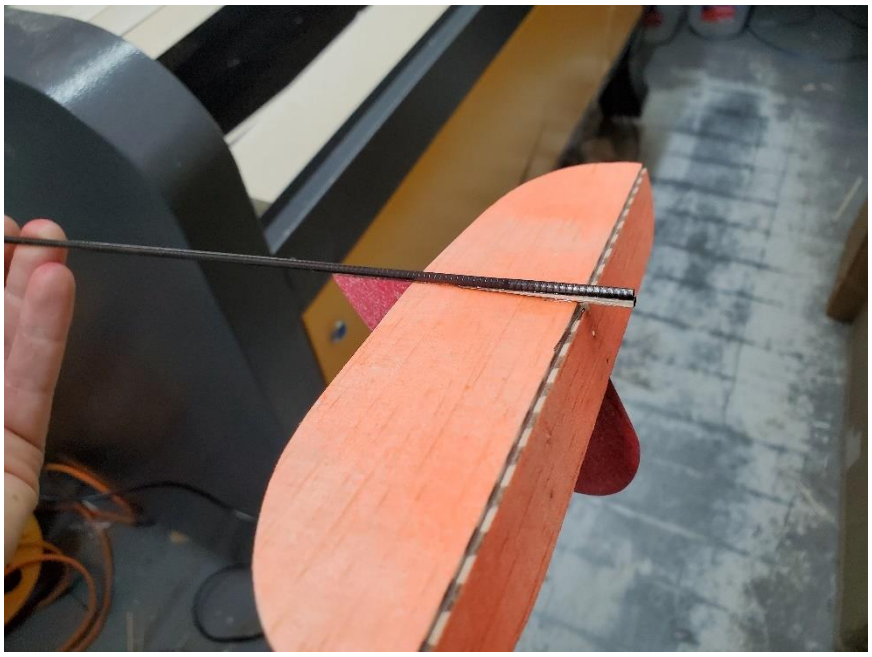
Glue the finished fin in place in the slots in the top of the horizontal tail.



Glue the tail incidence wedge atop the back of the fuselage (same side as the wing standoff, aligned with it.

Glue the stab atop the incidence wedge with the hole in the trailing edge hanging out beyond the end as shown.

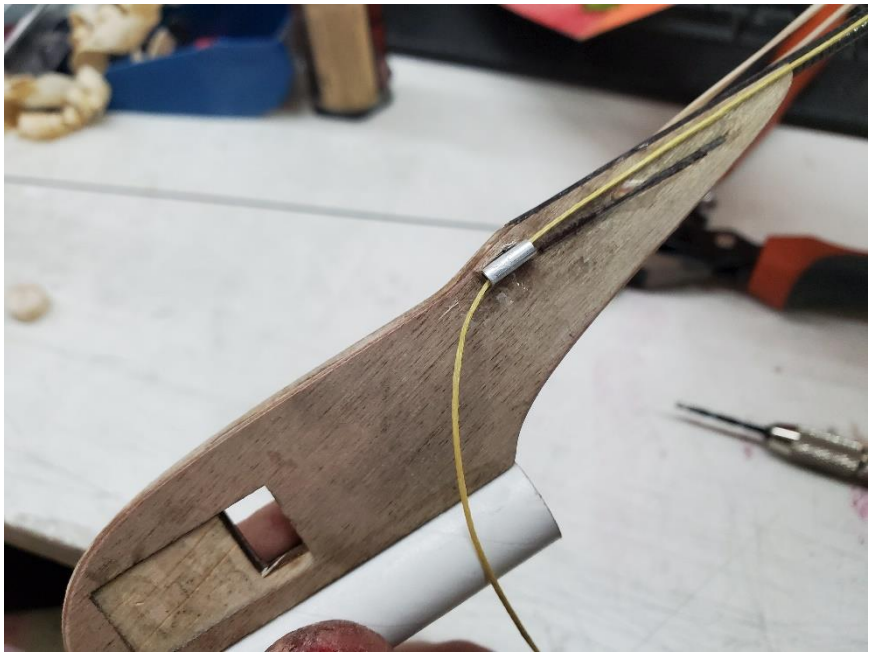




Configuring the dethermalizer hold-down line

Roll a razor blade over the 3/32” aluminum tubing to cut off a section about ¼ inch long.

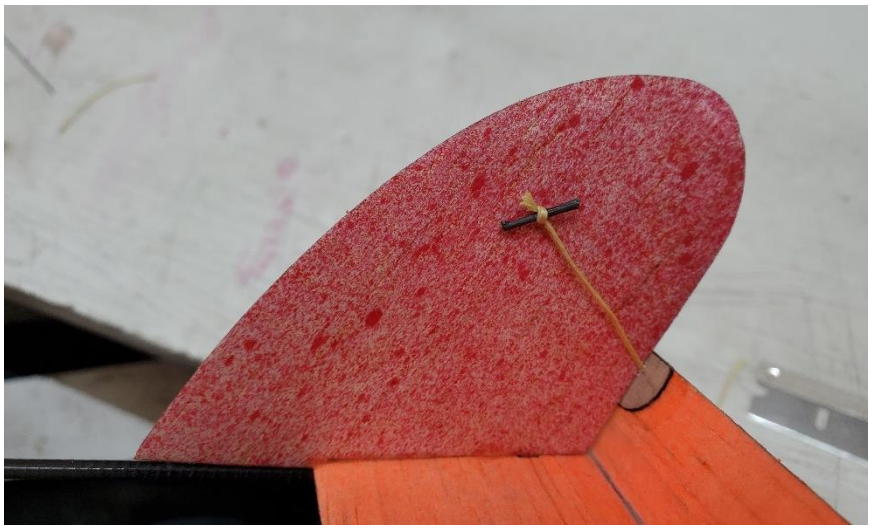
Glue it in place as shown (don’t get glue inside the tube). This piece of tubing should be mounted as far back as possible to provide more range for the DT line to travel from the timer.



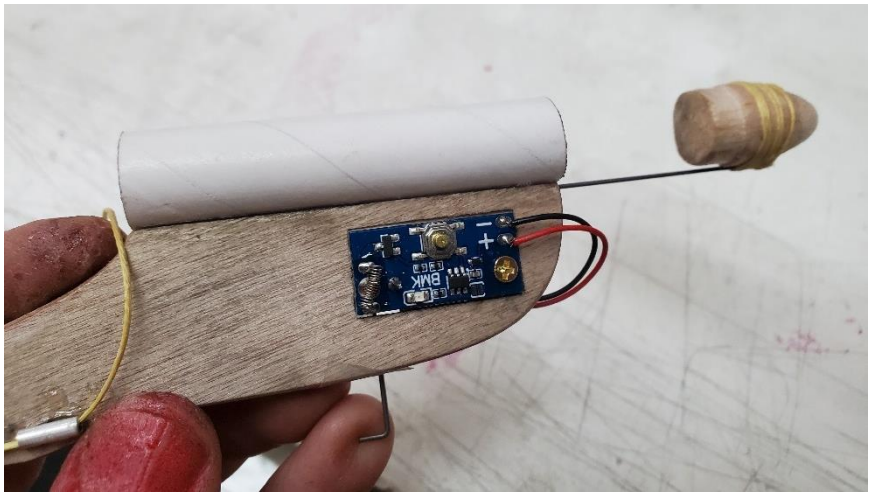
Use pliers to bend a piece of the tubing to a curve and cut it off as before. Bind and glue in place as shown using Kevlar thread. Slide Kevlar thread into the tube.

Thread the Kevlar aft from the front tube into the curved aft tube and through the hole in the horizontal tail.

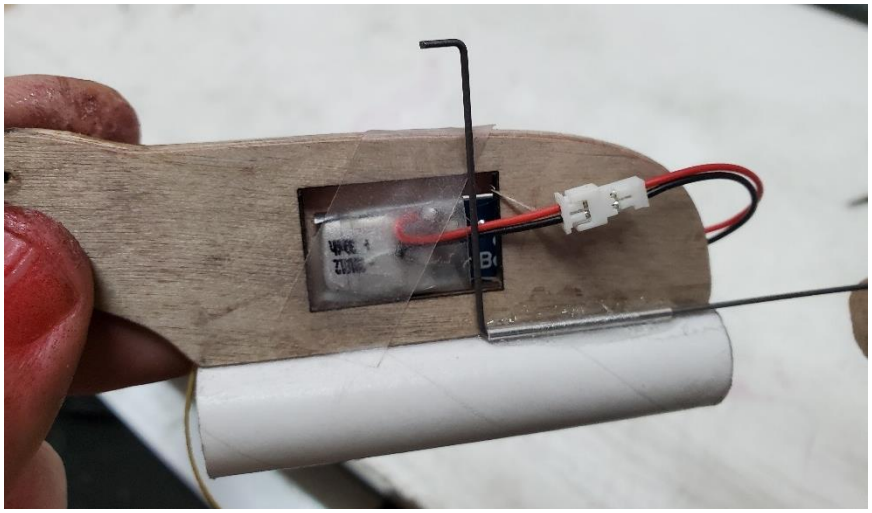
Cut off a piece of 0.030” carbon rod about ¼” long and tie off/glue into the Kevlar as shown.



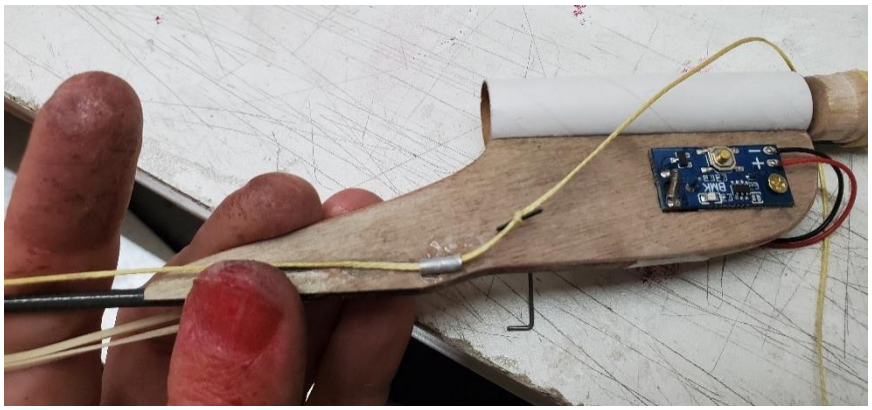
Mount your dethermalizer ahead of the forward piece of aluminum tubing so that you will have sufficient range for the stab trailing edge to fully rise.

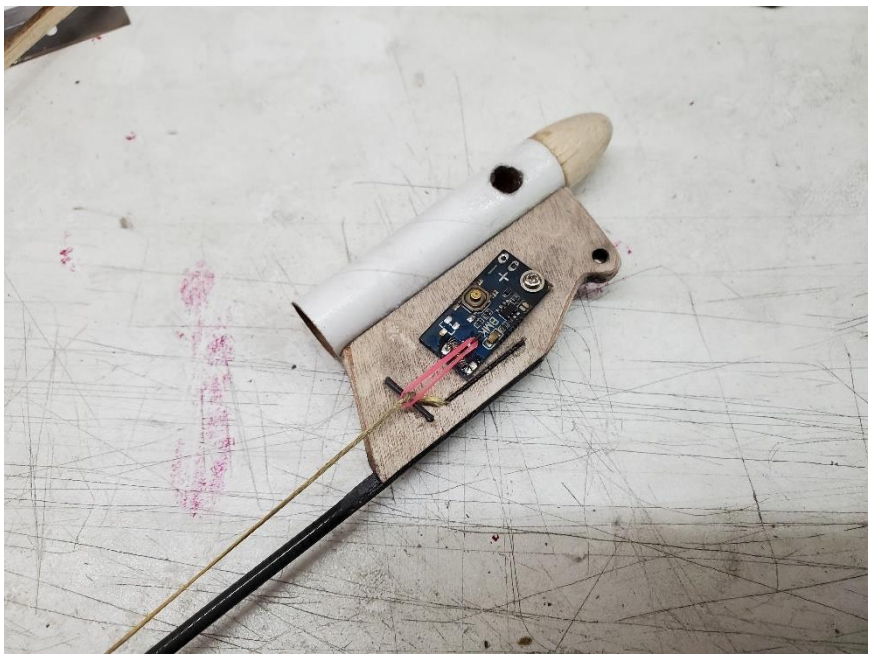


Yout battery will mount to the other side in the pocket. Use tape to keep the battery in place in flight.



Tie off another piece of 0.030” carbon in the line as shown to provide a retainer for the burn band.





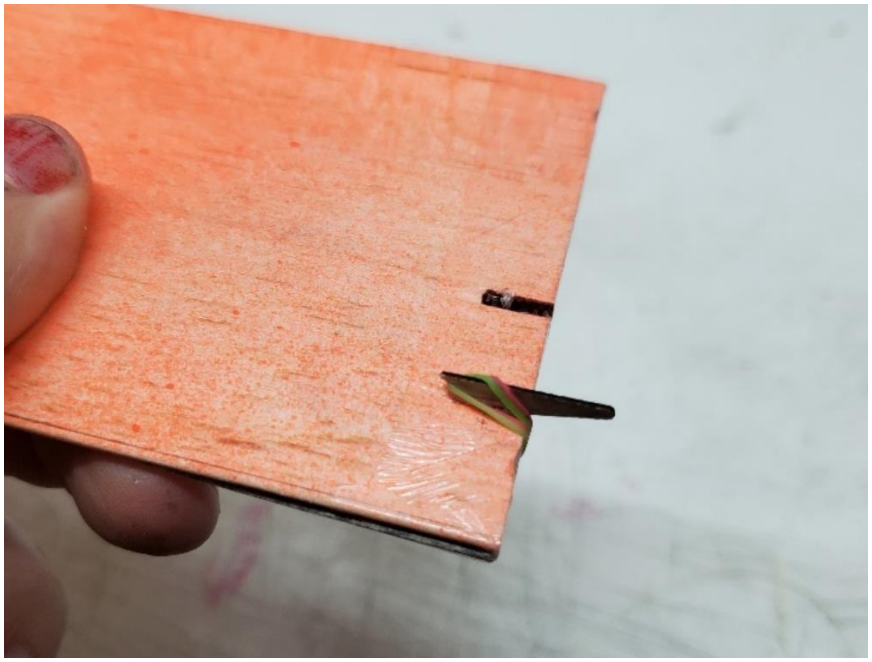
It is highly recommended that you consider installing a launch lug on the pod to provide better guidance as your model comes up to speed, even if using a launch piston, because swing-flop models tend to shift off toward the wing as they separate from the piston if adequate guidance is not provided.
Construction is complete!

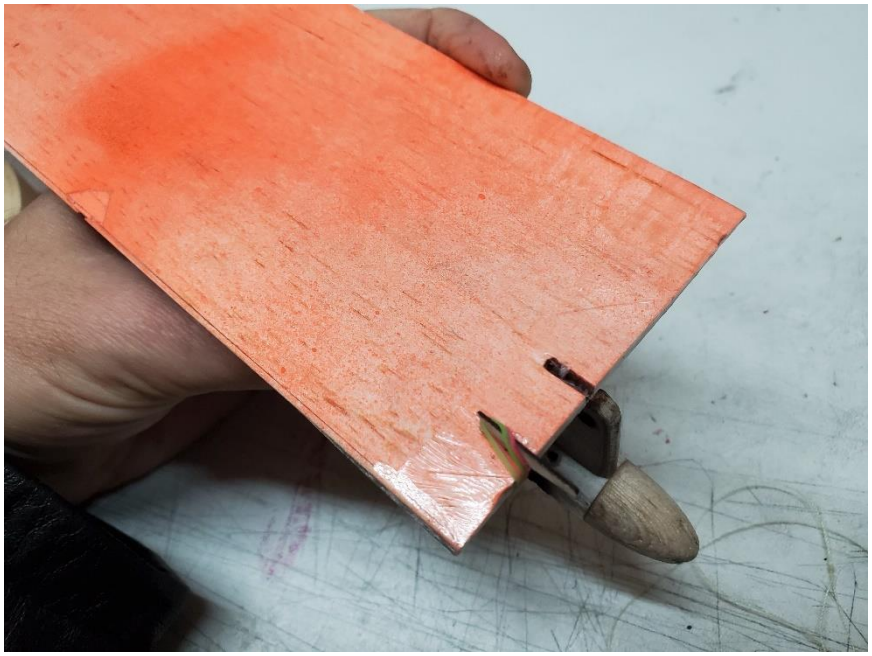
Wing retainer burn string usage.

Use plain sewing thread to hold the wing closed during launch. The line will be fed from right wing dihedral limiter through the left side of the pylon hole, down through the hole in the nose body tube, and out the other side to a piece of tape.

Tie a small loop about ½ inch in one end of a piece of thread.

Fold both wingtips under and rotate the wing into the launch position.



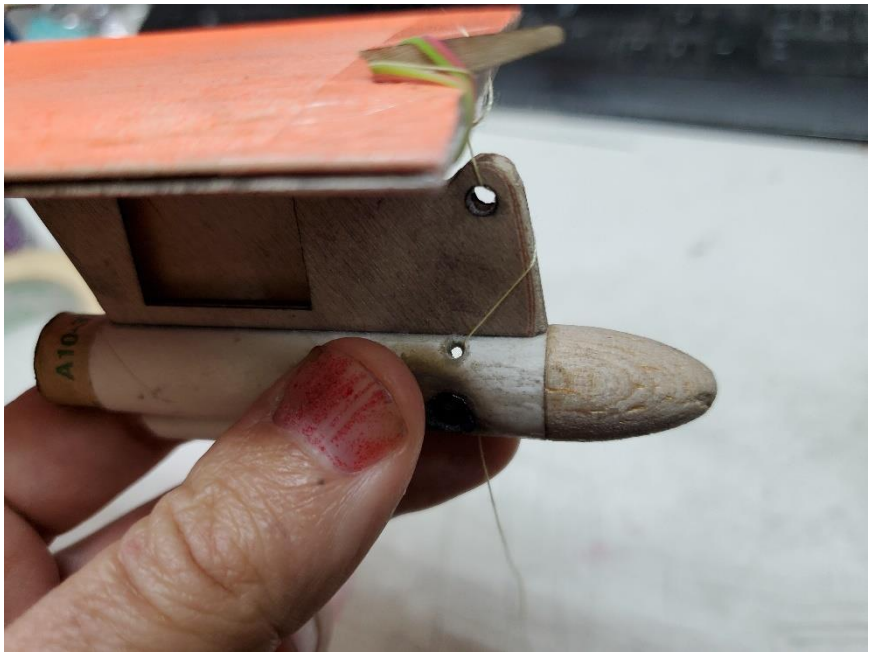


Loop the hold down line

Pull the thread down through the slot in the dihedral break.

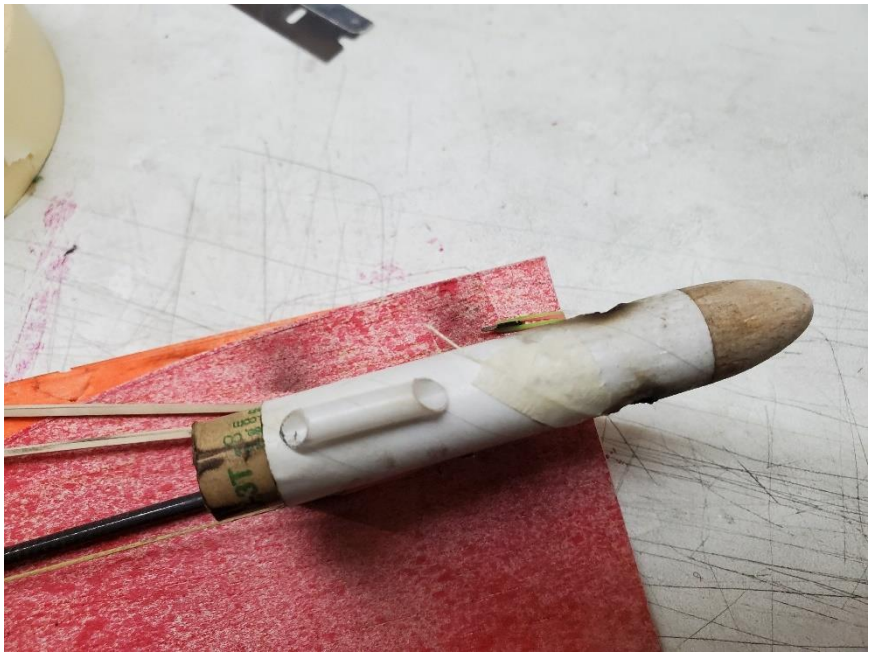
Now pull the thread through the pylon hole.

Now pull the thread through the small hole and out one of the vent holes.



Tape the thread against the side of the body tube where it exits the vent hole.

The rocket motor must be friction fitted or held in place using strong mylar tape.



Balance your Fliplock roughly at the middle of the wing and then adjust from there. Your goal is to achieve a floating glide with a gentle turn.

If you have questions or comments about your Fliplock gliders, please contact us at joshuawfinn@gmail.com