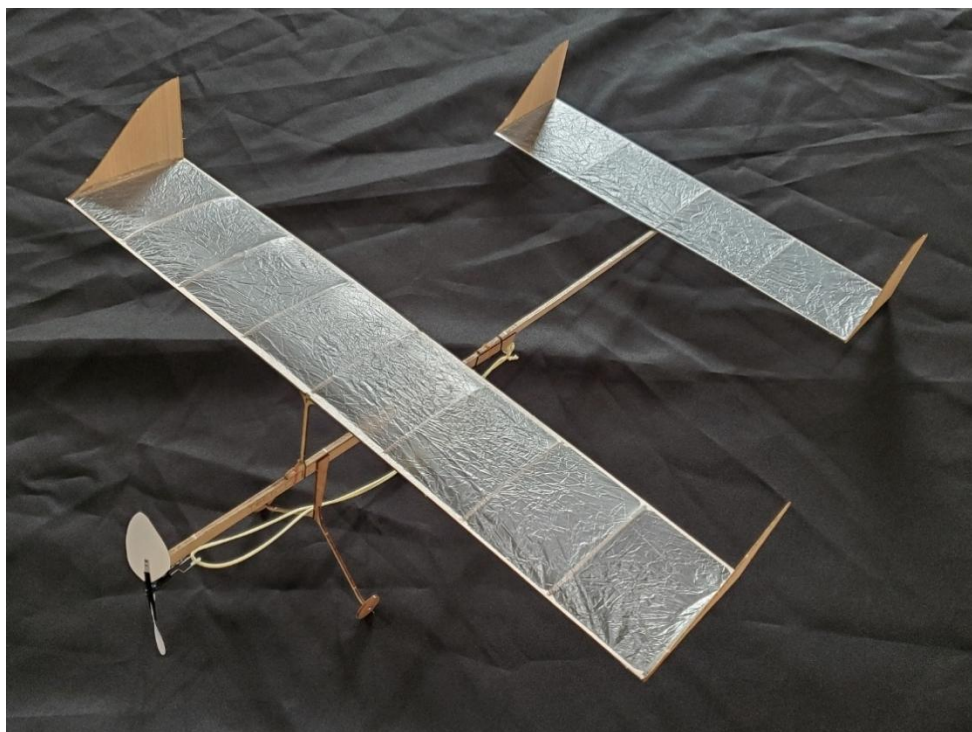


Tech Flyer 2024 Build Manual

Authored by Sarvesh Thirumalai, August, 2026

By J&H Aerospace ↗
www.jhaerospace.com



*A High Performance Indoor Free Flight model legal for the 2026-2027
Technology Student Association Flight Endurance Event*

Includes materials for two biplane airplanes or three monoplanes

*Tools/materials required: rubber lubricant (son of a gun works great), winder,
needle nose pliers/wire cutters, CA glue (or Duco/Ambroid/Sigment), 3M-77 spray
adhesive, vaseline, razor blades, sandpaper, ruler, scissors. Optional: Torque meter.*

Tech Flyer 2024

J&H Aerospace ↗

Building Instructions

Congratulations on your purchase of the Tech Flyer! You are about to build a high performance airplane for indoor flying competition.

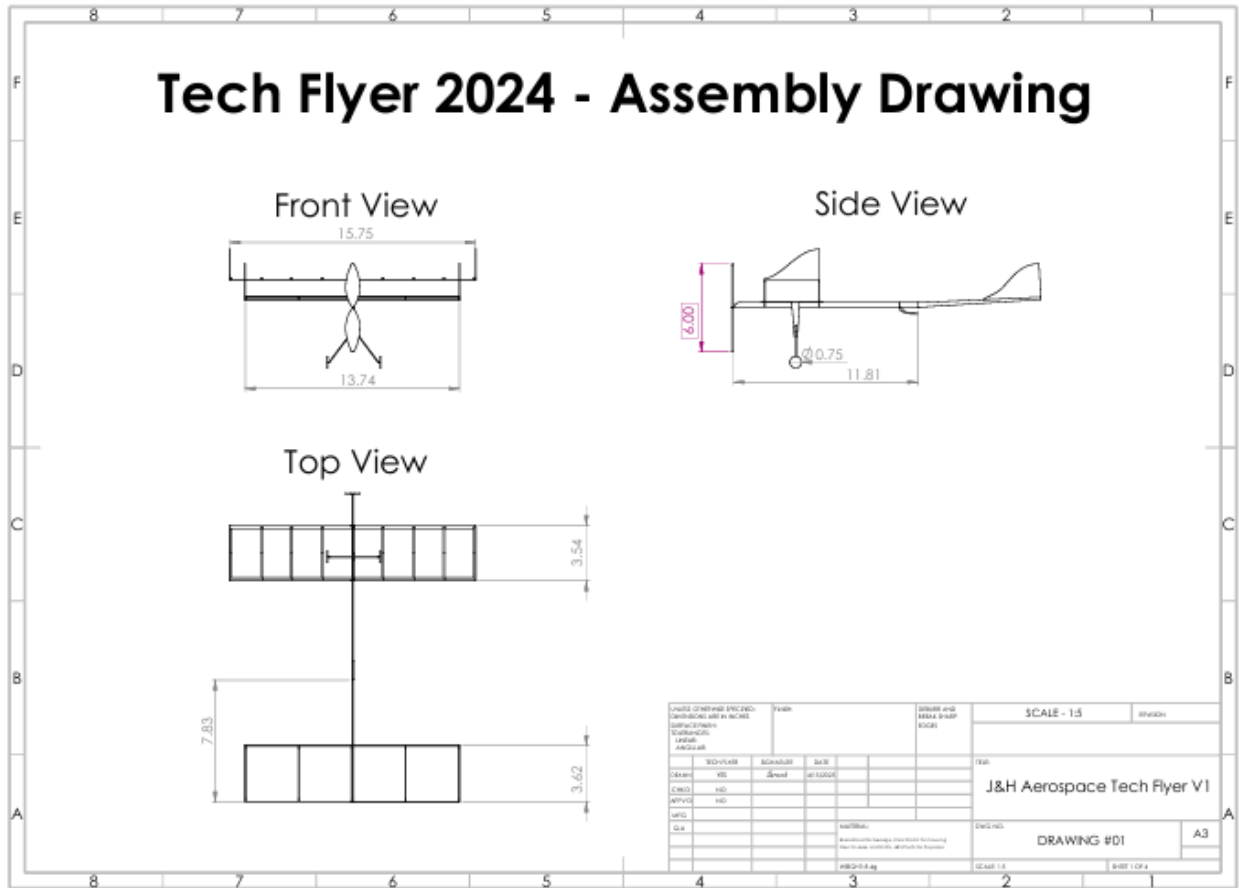
Important: The included plans include many details to explain the construction of this airplane. Please analyze them carefully before beginning construction.

1. Parts list

Before beginning construction, please verify that your kit contains all of the necessary parts listed below and shown in Figure 1. 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. Balsa parts sheet #1: spars, ribs, and landing gear assembly
2. Balsa parts sheet #2: fuselage assembly (2x)
3. Balsa parts sheet #3: wing tips
4. 2x long balsa sticks
5. 2x short balsa sticks
6. Plywood parts sheet: rear hook assembly, tail boom mount, and uprights (2x)
7. Veggie bag covering material
8. Indoor FF supply propellers (2x)
9. 1/16" Rubber
10. Piano wire
11. Modeling clay ballast
12. Aluminum tubing
13. Thread binding
14. Dental elastics
15. O-rings
16. Foam board
17. Instruction manual



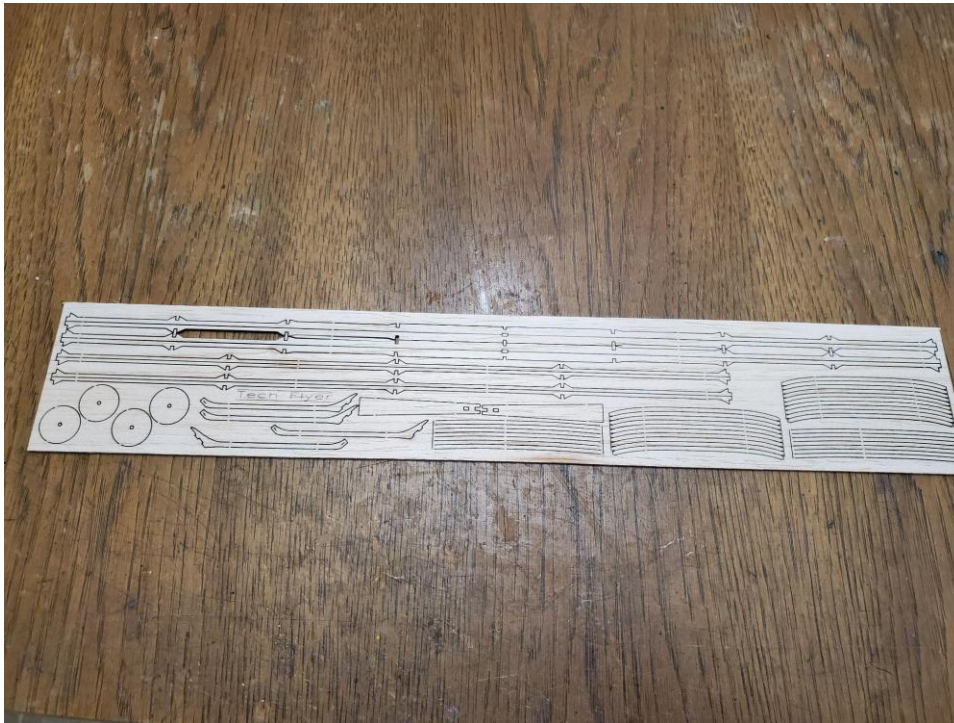


Pre-Construction

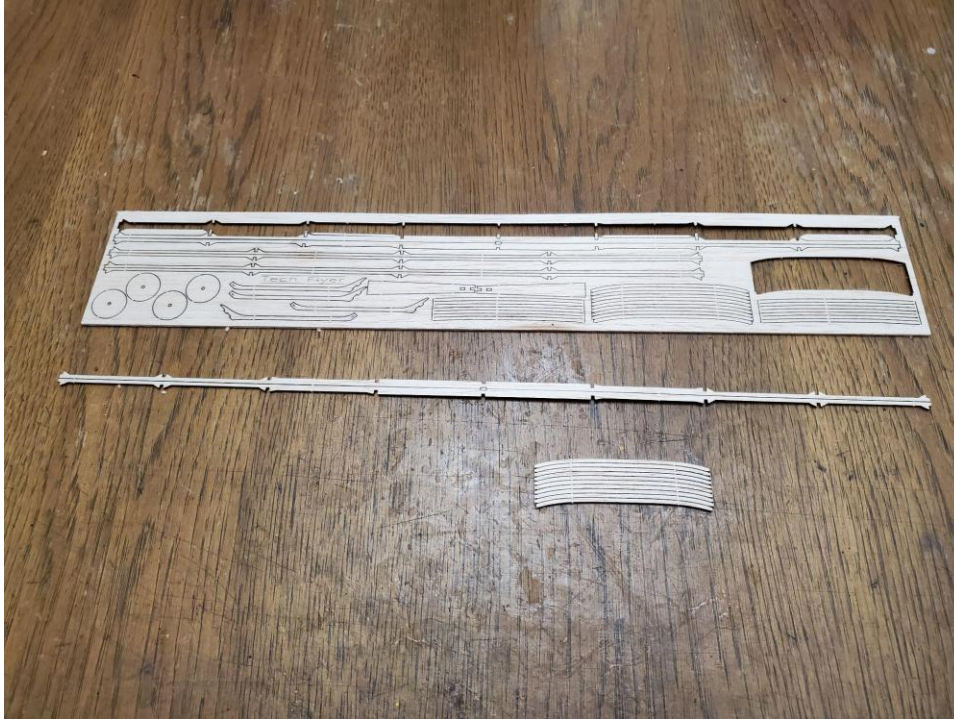
Before beginning construction, make sure to have a clean, flat work space (please do not work on a carpeted floor). Ideally, use a desk with a large piece of parchment paper taped over it. Be sure to verify whether all parts mentioned in page 2 have arrived in the kit. If any pieces are damaged or missing, contact us immediately through our website. Do not separate all parts from the parts sheet just yet—this leads to messes and lost pieces. Follow along in our guide to know exactly which pieces to start out with. Above all, please be careful with any sharp tools and chemicals. Your safety should be a priority!

Step 1: Wing and Horizontal Stabilizer Assembly

Put balsa parts sheet #1 on the work surface. There are two sets of wing spars, horizontal stabilizer spars, wing ribs, and horizontal stabilizer ribs.



For now, we will only worry about the wing spars and wing ribs. Only separate out one set of wing spars and wing ribs, not both sets. Once separated, set aside the parts sheet—we won't be needing it for a bit.



Now separate the two spars and all the wing ribs using the razor blade.

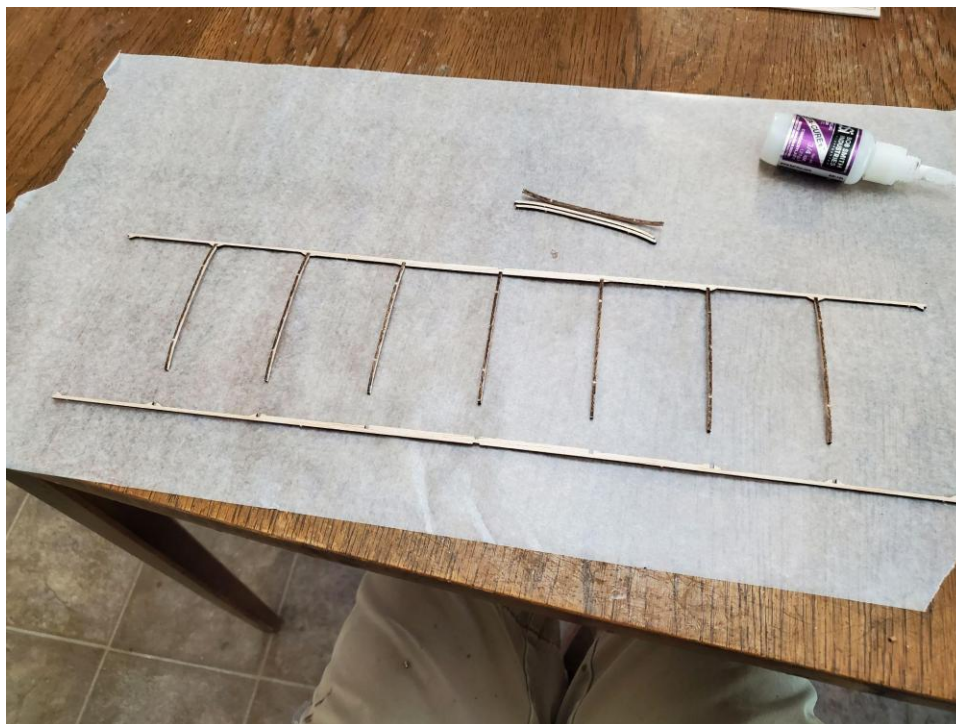


Set the two spars flat on the work surface with their notches facing each other. Don't make the mistake of making the notches face towards the ceiling—this presents too much frontal area when the plane flies, causing a steep drop in performance. If you look carefully, there is one rib in this set which is slightly shorter than the others. This rib is our centerpiece. Apply a *tiny* amount of superglue (too much will

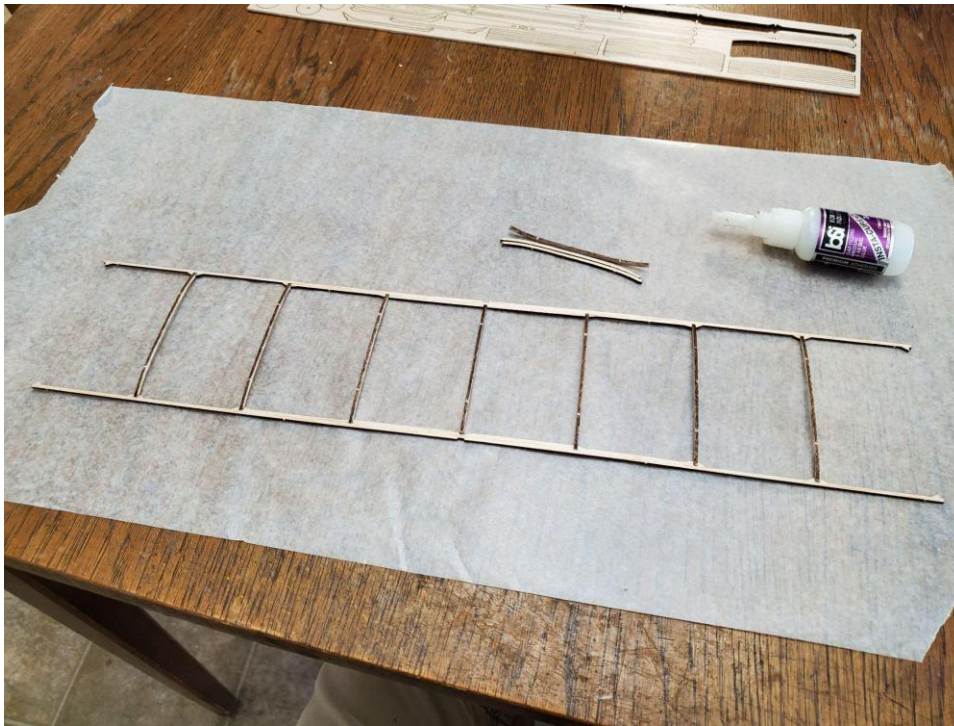
reduce performance drastically) to one end of the center rib, and push it into the central notch on one of the wing spars, with the curved side facing up.



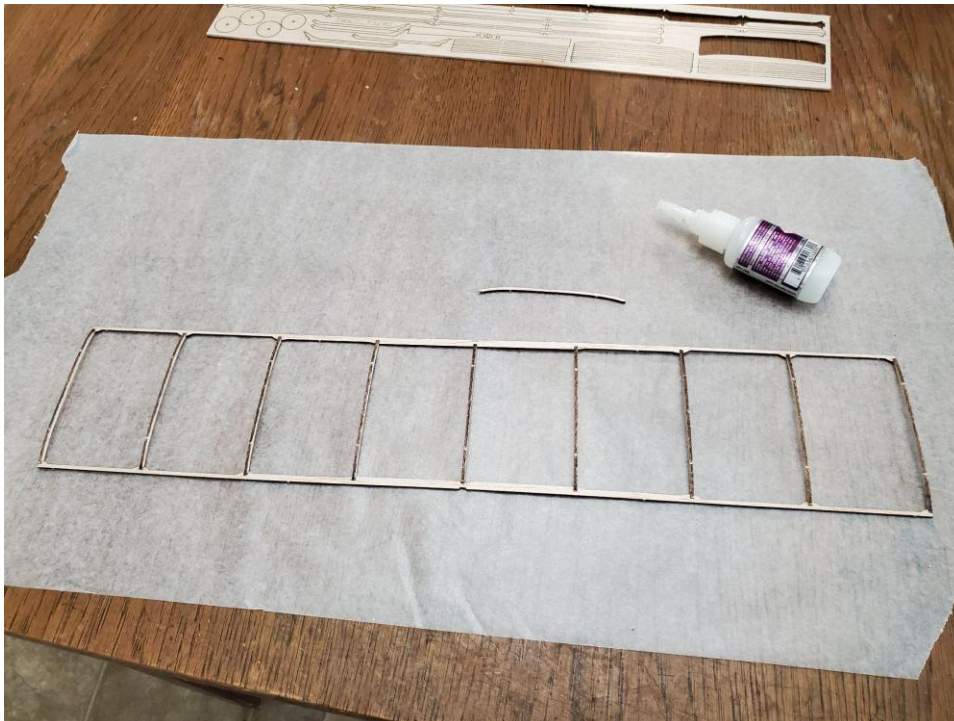
Do the same with the rest of the ribs and notches, curved side of the ribs facing up, except for the notches at the ends of the spars—we'll do those last. If the ribs take too much effort to fit into the notches, gently squish the end of the ribs a little to narrow them down so they fit easier.



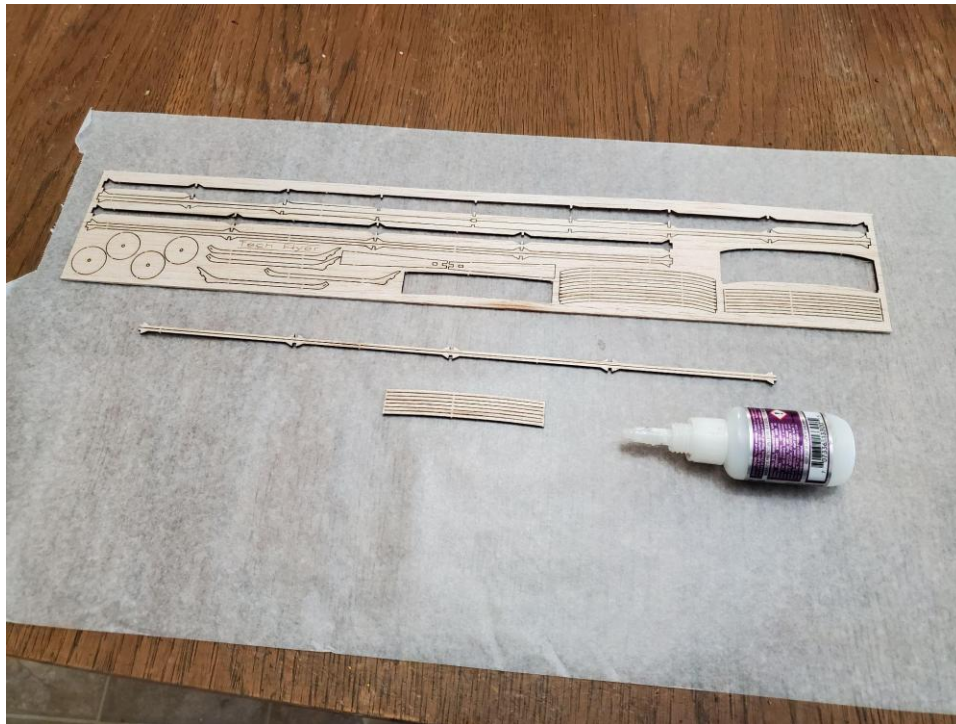
Now, apply a tiny bit of glue to the remaining ends of the ribs and connect them to the remaining spar.



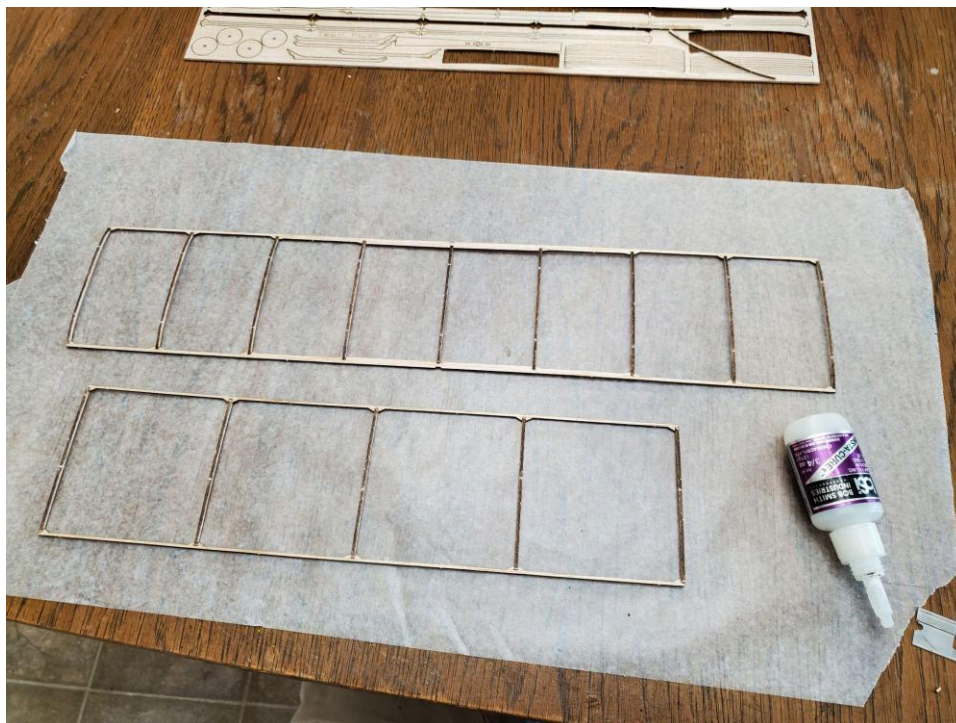
Now take two of the remaining ribs (one is a spare) and glue them to the notches at the ends of the spars.



Now your wing is done! Set it aside in a safe place, and be sure to handle it with care—it is fragile! We'll work on the horizontal stabilizer next. Set balsa parts sheet #1 on the work surface and separate out one set of horizontal stabilizer spars and one set of horizontal stabilizer ribs.



The following process is extremely similar to the assembly process for the wing we just made. Separate the spars and ribs, and glue them together with the curved side of the ribs facing up, just as we did with the wing assembly.



Now that the wing and horizontal stabilizer have been built, we need to cover them with our covering material. To do this, we'll first make a covering frame by gluing the ends of the long balsa sticks to the short balsa sticks to make a giant balsa rectangle. Cover one side of the covering frame with petroleum

jelly using a paper towel. Be extremely careful not to get petroleum jelly on any parts of the airplane, including the covering material. This can mess up the glue joints and cause lots of mayhem.

Now for the covering material. Take the veggie bag covering and lay it flat across the work surface.



Trim off the bottom of the bag so it becomes a massive hoop which you can stick your arm cleanly through. Then make one smooth cut through the hoop so it becomes a massive plastic sheet. Estimate roughly the width and length of covering you'll need to fully cover the covering frame with a little excess. Be sure not to lay the covering material over the frame just yet.



Once you've determined how much covering material you'll need, cut it off from the rest of the covering material, and set it flat on the work surface.



This next step might seem counterintuitive: we're going to tightly wad the covering material into a ball, then stretch it back out. This will make the covering material a little "springy", allowing it to fit better on the wing and horizontal stabilizer. This will result in a better looking and better flying airplane. Once you've wadded the covering material up, stretch it back out, doing your best to get it completely flat.



Next, lay the covering frame onto the covering material, petroleum jelly side down.



The covering material will be a little loose on the covering frame. To get a good covering job, stretch the covering material out lengthwise on the covering frame. Be extremely careful not to stretch it out too far widthwise, since this can lead to uneven wing warping when put onto the wing and horizontal stabilizer.



This next step should be done outdoors. Take your 3M-77 spray adhesive, and hold the wing by the corner, holding it a good distance out from the spray adhesive. Check which way the wind is blowing outside—this is the direction you'll want your spray adhesive to go. Spray the spray adhesive towards the wing, making sure to only get some of the mist on the wing—too much spray adhesive is counterproductive, too little will allow the covering material to fall off of the wing. Make sure to shift your grip and coat the areas where you were holding the wing before. Repeat this process with the horizontal stabilizer.

Set the wing and horizontal stabilizer flat on the table, sticky side up. Make sure to leave a little bit of room between both so as to not stick the two together.



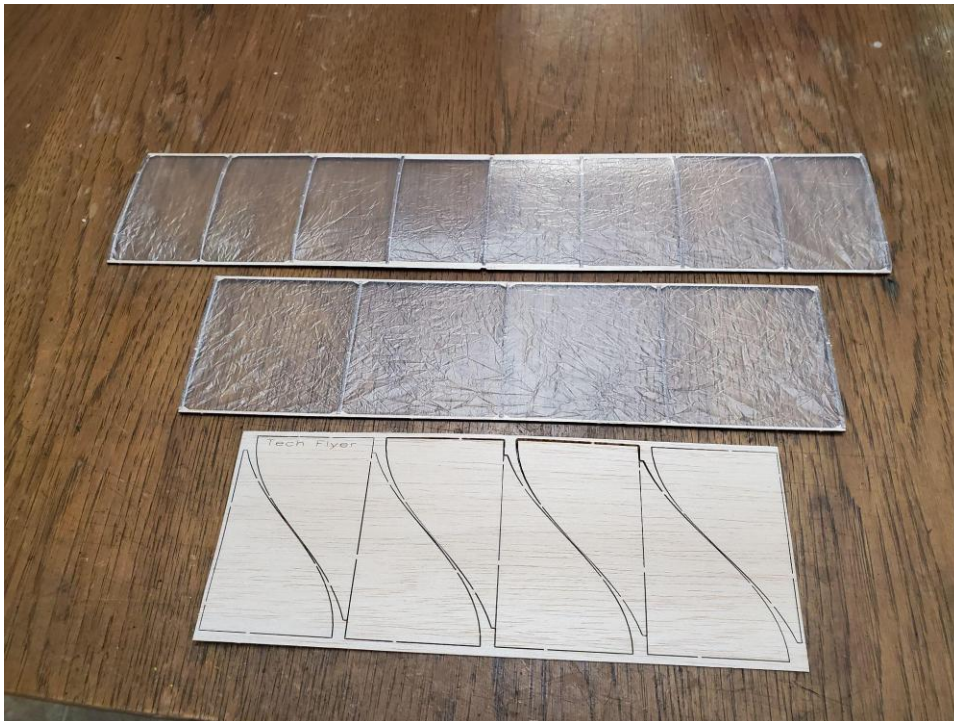
Take the covering frame, covering material side down, and press it onto the wing and horizontal stabilizer. Make sure everything is aligned properly before doing this step, and don't try to reposition anything once you've pressed it on.



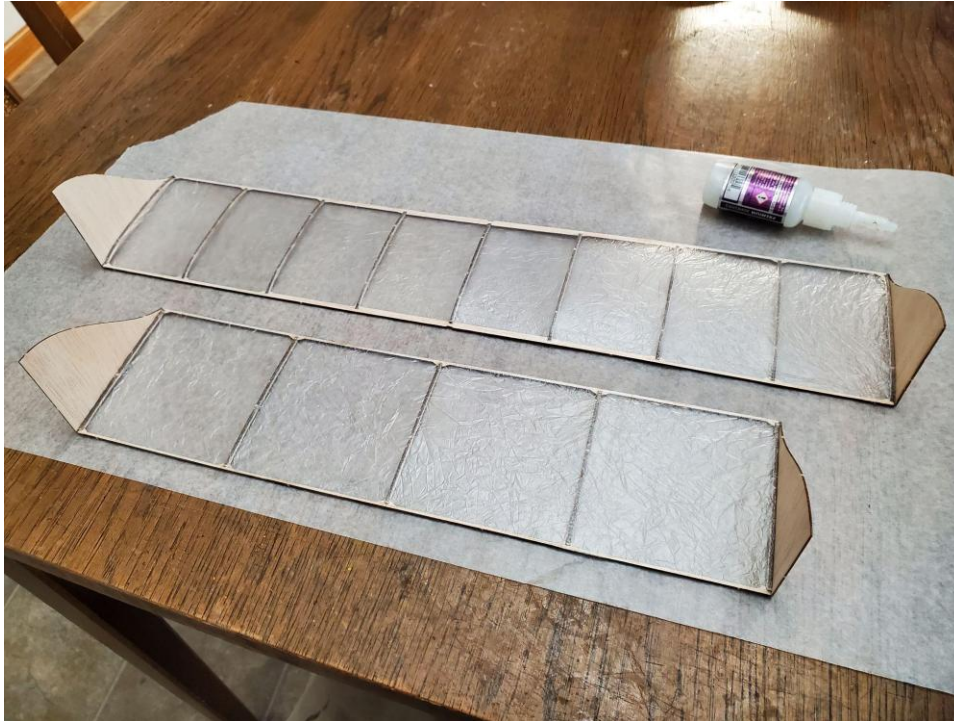
Take a fresh razor blade and slice the covering material around the wing and horizontal stabilizer, starting from the space between the two.



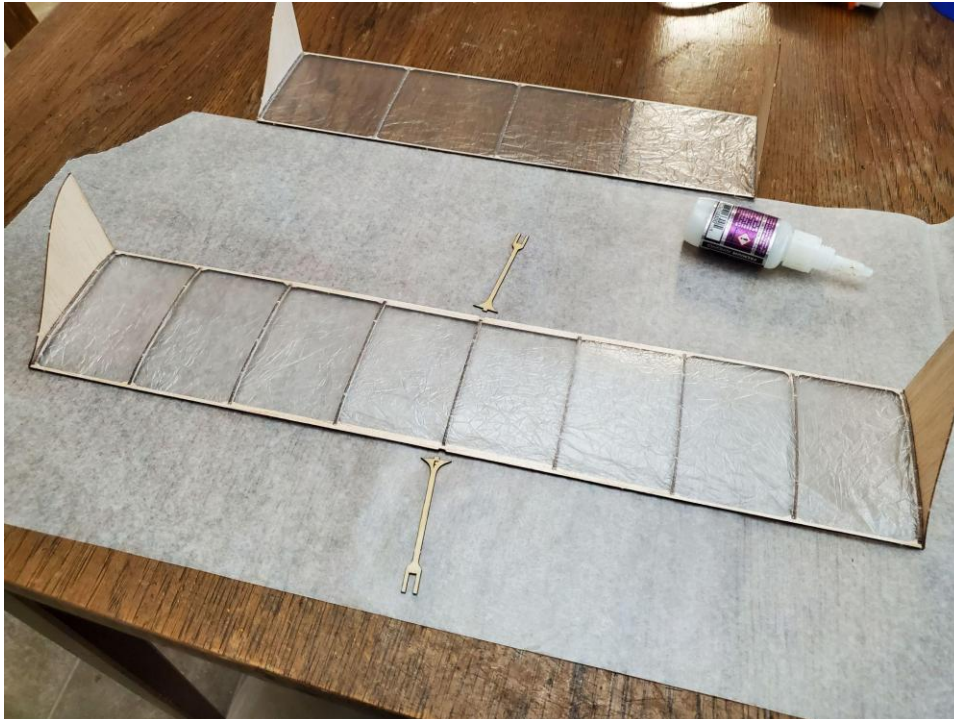
Once you've cut out the wing and horizontal stabilizer, set aside the covering frame. Set your covered wing and horizontal stabilizer on the work surface, along with balsa parts sheet #3.



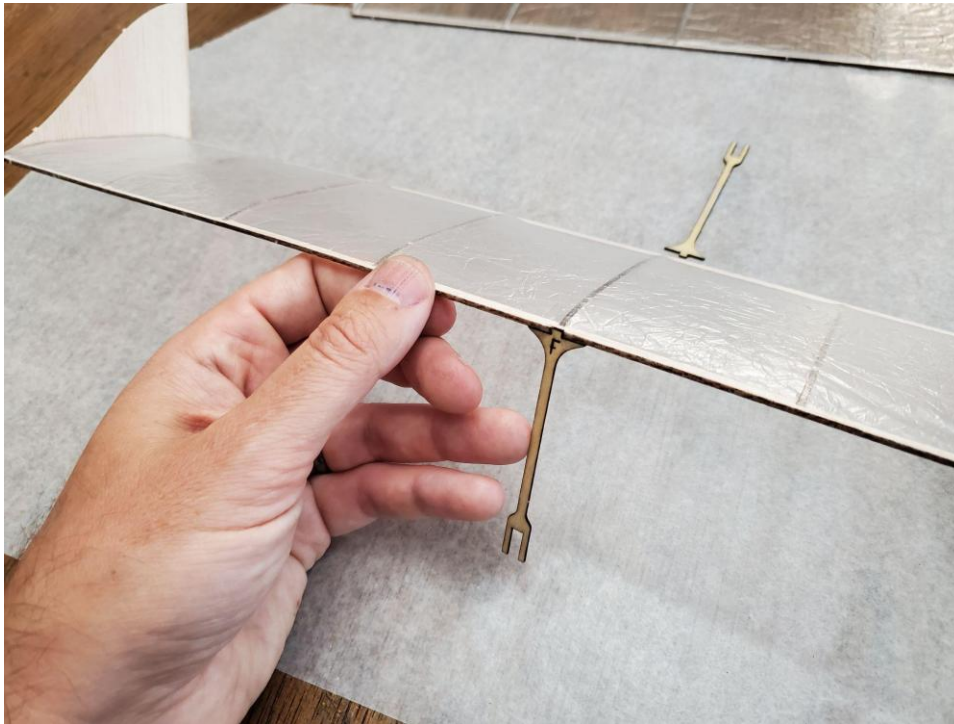
Being careful as to not break the thin balsa, detach 4 wing tips from the parts sheet. Apply a tiny amount of CA glue to an outside rib, and press a wing tip gently to it. Quickly lay the assembly flat on the work surface, and use an object to prop up the wing tip before the glue dries to ensure the tips form a right angle. Repeat this process for the other outside rib of the wing and the two outside ribs of the horizontal stabilizer.



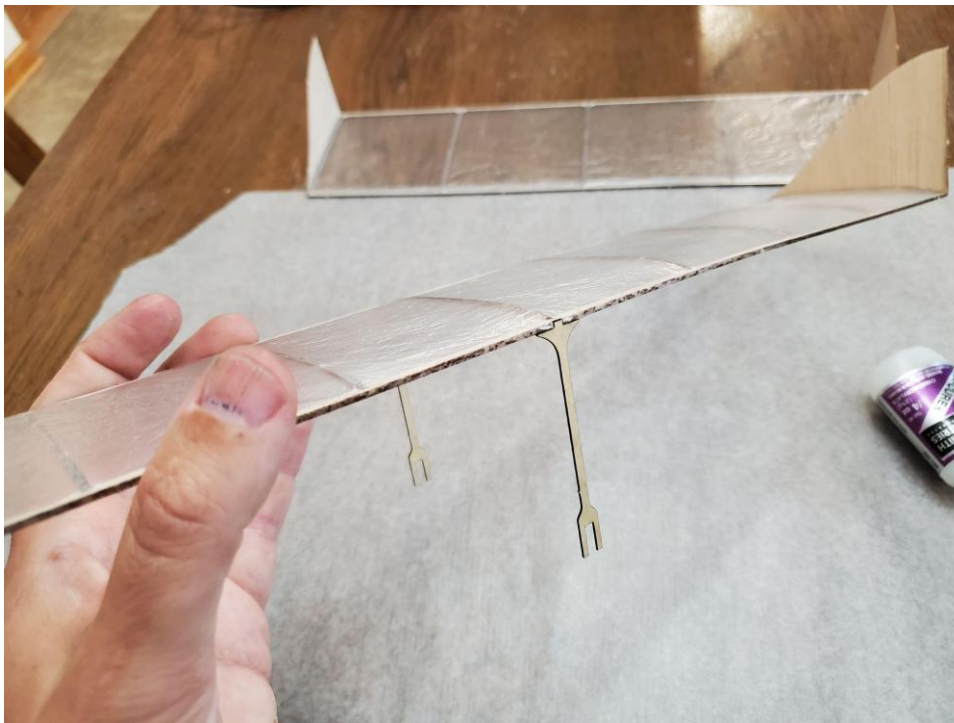
Now take one of the plywood parts sheets and separate the uprights.



Take the upright labeled “F” and glue it to the notch on the front of the wing (the side with the tapered side of the wing tips).



The other upright should be glued to the corresponding notch on the back of the wing.



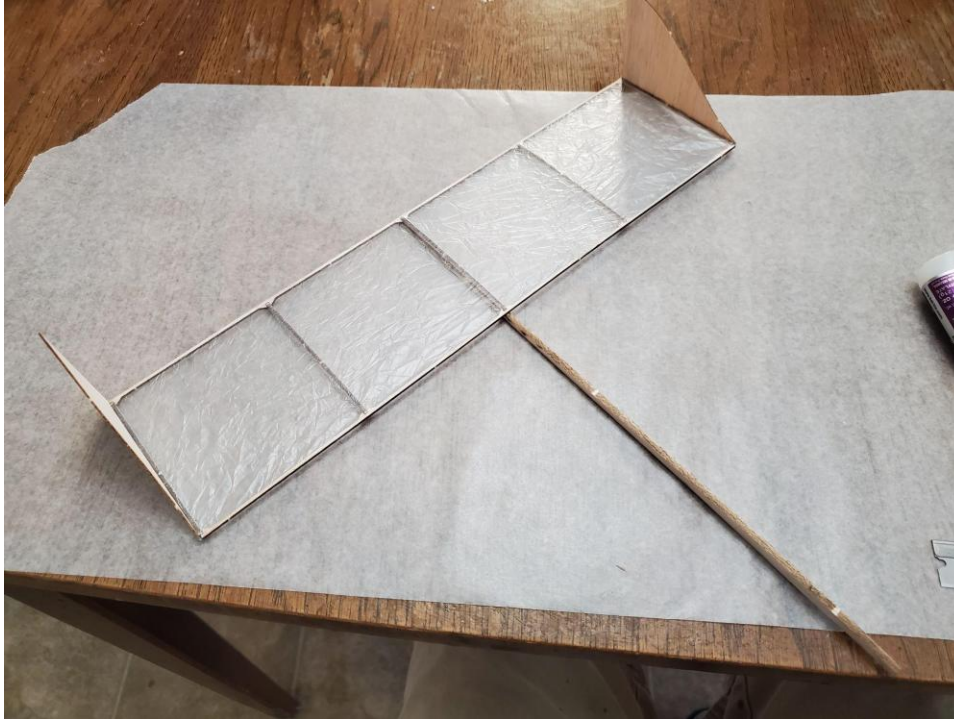
Now take balsa parts sheet #2 and separate a single wing mount from it.



Put CA glue on the faces of the wing mount and glue both to the uprights.



Now the wing assembly is complete, and we can set it aside in a safe place. Take balsa parts sheet #2 and detach a tail boom from it. Lay the tail boom on the work surface, with the thicker dimension facing up and down. Put a tiny amount of CA glue on both ends of the central horizontal stabilizer rib. Line the back of the horizontal stabilizer up with the thinner end of the tail boom, and press gently. Line up the front of the horizontal stabilizer with the tail boom, and press gently.



Congrats! Your wing and horizontal stabilizer assembly is complete!

Step 2: Fuselage Assembly

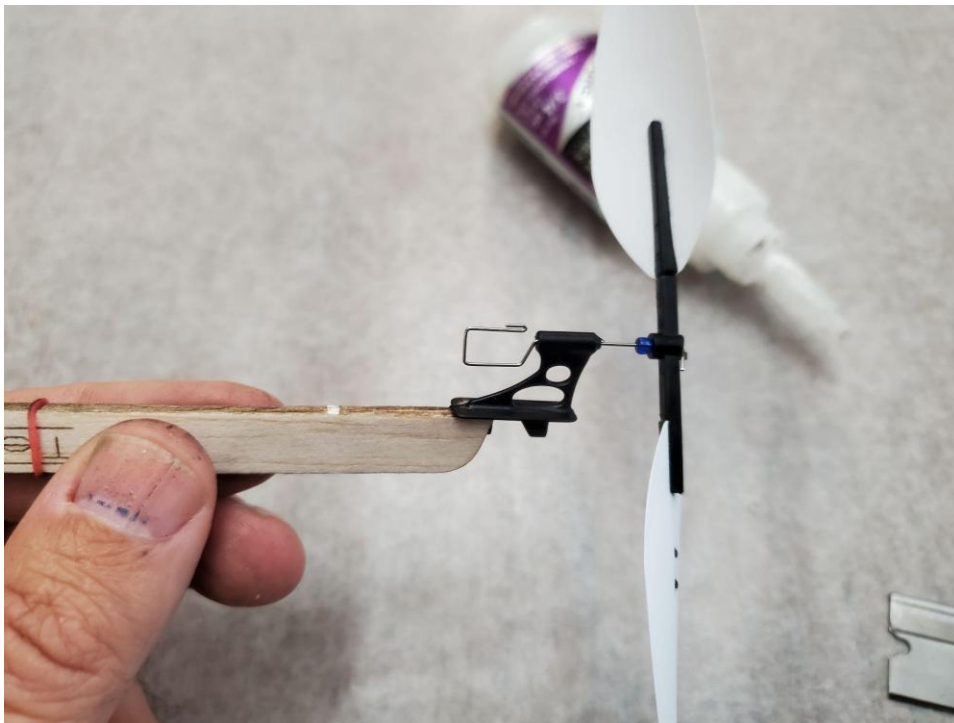
Detach a fuselage from balsa parts sheet #2. Take four dental elastics and slide them onto the fuselage. Separate the tail boom mount and rear hook assembly from the plywood parts sheet. Glue the two parts on the back of the fuselage, making sure to align the back of the parts with the back of the fuselage.



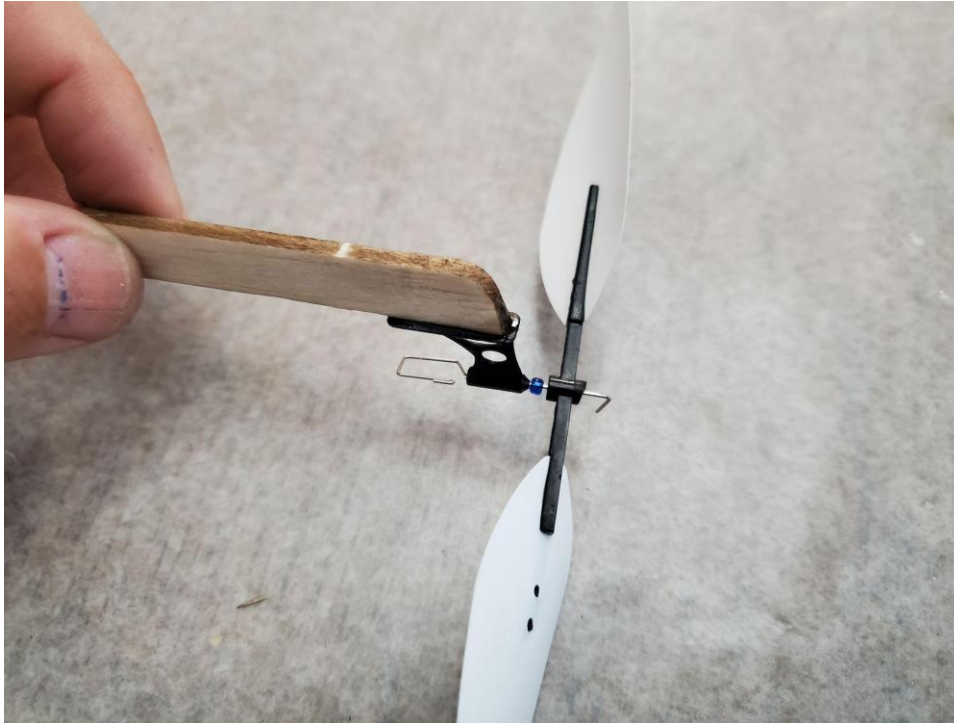
Now take a razor blade and make a vertical cut halfway deep into the bottom of the nose of the fuselage.



Take one of your propellers and slide the mount into the cut, making sure it fits well.



Once you've made sure it fits, well, apply glue to the propeller mount, and quickly slide it into the cut. Make sure to work quickly, as the glue dries extremely fast and the propeller will not be removable once you slide it in.

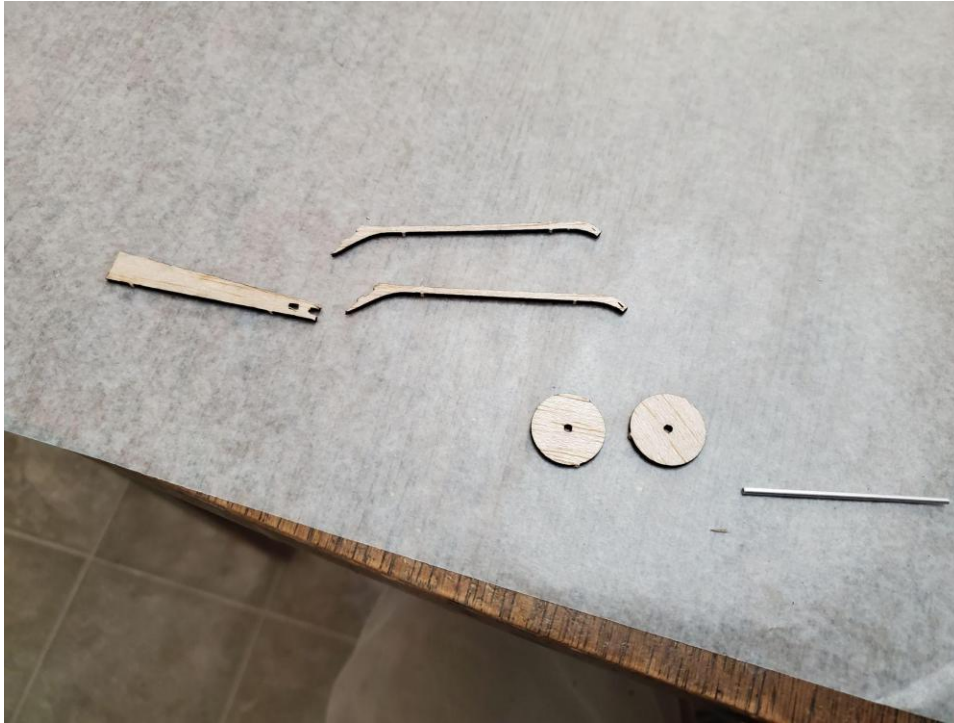


Step 3: Landing Gear Assembly

Separate out 2 landing gear legs and 1 center strut from balsa parts sheet #1.



Cut out 2 wheels from balsa parts sheet #1 as well.



Now take the aluminum tubing. We're going to cut two pieces of tubing from this. This step will dull your razor blade.



Roll the razor blade back and forth on the tubing. Make sure not to squish the tubing. You should cleanly slice through the tubing. Do this twice to get two pieces around $\frac{1}{8}$ " long, and set aside the rest of the tubing.



Push one piece of tubing through the hole in one of the wheels. Apply a tiny amount of glue (preferably using a tiny piece of scrap wood) to the outside of the tubing. Be very careful not to get it inside the tubing. Then, center the tubing in the wheel.



Do the same to the other piece of tubing and wheel, so you have two completed wheels.



Now take the piano wire, and grip one end of it tightly with a pair of needlenose pliers. Bend the end at a 90 degree angle.



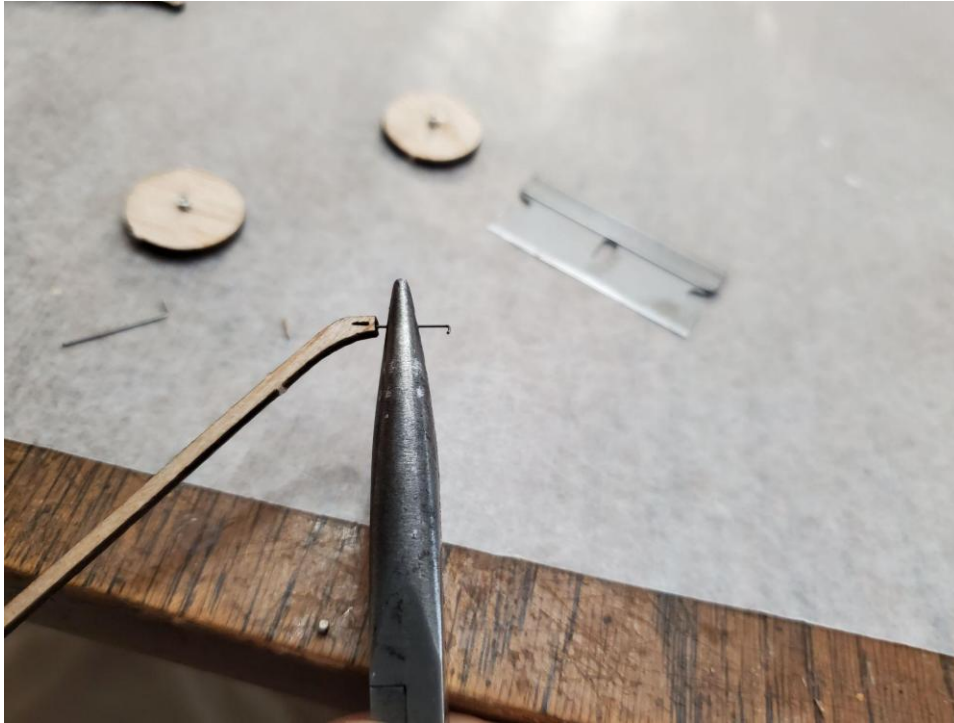
Snip the wire around $\frac{3}{4}$ " from the end with a pair of wire cutters. The two wire pieces will go flying, so make sure to hold both of them tightly while snipping.



Do this one more time with the remaining wire. You should have two axles.



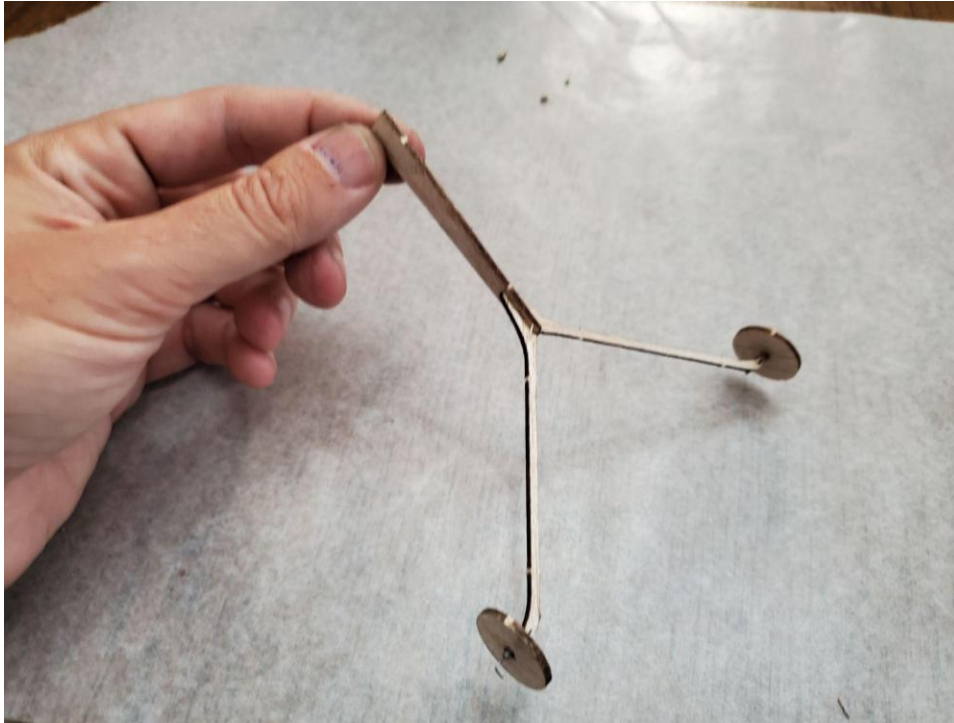
Take one of the axles and push it through one of the legs, parallel to the tiny slot.



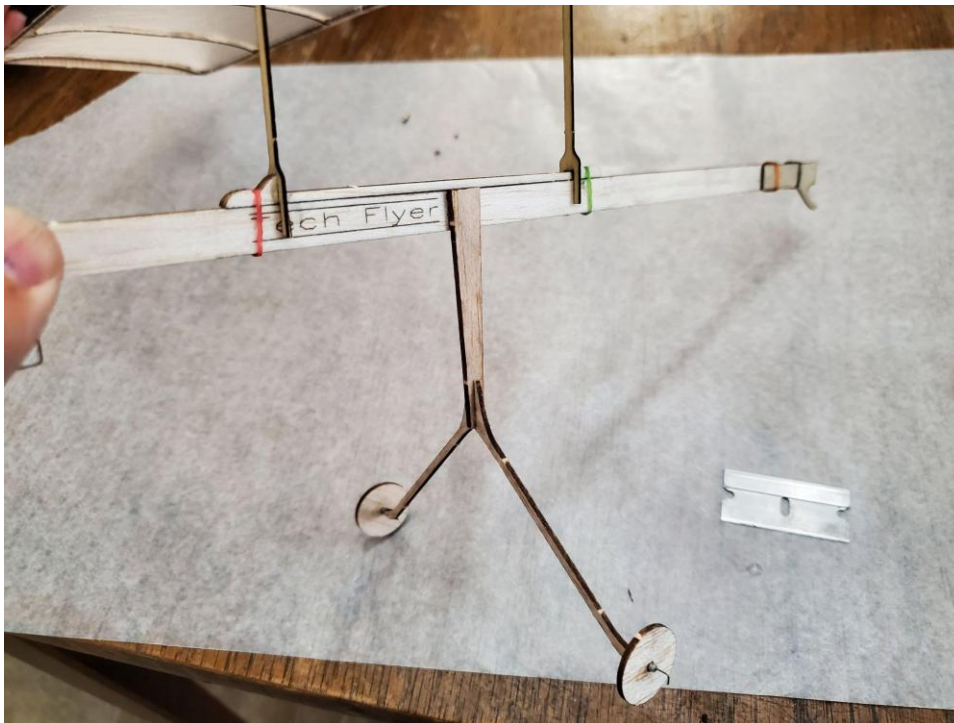
Pull the axle back out, and apply a tiny bit of glue to the hole that was created. Push the axle through the aluminum tubing in the wheel first, then push it through the glue-filled hole. Make sure not to get any glue in the aluminum tubing. Both wheels should spin freely after this step.



Next, glue both legs to the center strut.



Glue the center strut to the fuselage, using the markings on the fuselage.



Slide the wing into the rubber bands at the front of the fuselage, and the horizontal stabilizer into the tail boom mount, using the rubber bands to hold them in place. Congratulations! Your Tech Flyer is done! Weigh this airplane on a scale, and if it is underweight, put some clay ballast on the nose.



Step 4: Making Rubber Motors

Take two o-rings and cut off around 1.7 grams of rubber (this will be approximately 41 inches long). Put these on a weighing scale.



Keep snipping off some rubber until you reach just below 1.50 grams.



Lightly lubricate the ends of the rubber.



Use a pair of hemostats to tie a granny knot with the rubber.



Tie the knot as tightly as possible, then add a tiny bit of glue to the knot.



Take a glob of lubricant in your hand along with the rubber motor.



Thoroughly lubricate the rubber motor by mixing it with the lubricant glob.



Store this rubber motor in a ziploc bag in the refrigerator. When you want to use the rubber motor, hook one o-ring onto the propeller hook and the other o-ring onto the rear hook.

Slide the wing forward or aft until it balances at the wing trailing edge with the rubber motor loaded in place.



Congratulations! You have completed the Tech Flyer build.

Do not expect perfect flights from your model at first. All model airplanes require subtle adjustments to get them flying correctly. If your model crashes, never simply try to fly it again without taking time to figure out what made it crash and what can be done to correct it. Crashes can be caused by a poor launch (throwing too hard or too softly) or by the model being out of trim. Trimming advice can be found in our TSA airplane trimming video from 2023: <https://www.youtube.com/watch?v=LPJ6fjzV8TE>

Please contact us using the contact form at jhaerospace.com or at joshuawfinn@gmail.com if you have any questions regarding your Stinger.

Want to become a pro at indoor flying? Try our Indoor Flight University curriculum. It contains extensive information on building, designing, and flying your airplanes to get the most out of them. Along the way you will learn a strong foundation of aerodynamic principles which will reveal the secrets of flight.

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