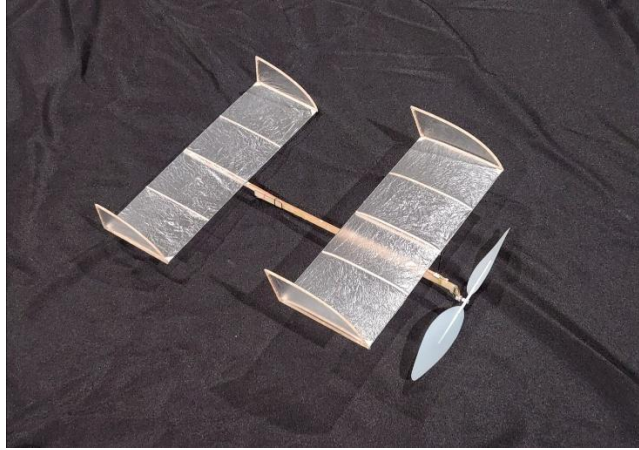


Stinger C 2027 R1



*The Ultimate Indoor Free Flight model legal for the 2026-2027
Science Olympiad Division C Flight Event*

Includes materials for two complete airplanes

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

Stinger C 2027

J&H Aerospace 

Building Instructions

Congratulations on your purchase of the Stinger! 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. Plans (rolled paper patterns)
2. Parts Sheet #1: motorsticks (1/8" balsa)
3. Parts Sheet #2: wing ribs (1/16" balsa)
4. Parts Sheet #3: rear hook (1/32" plywood)
5. 0.030x18" carbon rods (8x)
6. Dental bands (6x)
7. 3/32" Flight Rubber Strip
8. Clay ballast
9. O-rings (8x)
10. 24cm Ikara propellers with shafts and bearings (2x)
11. Gray plastic prop hangers (2x)
12. ¼" sq x 18" balsa sticks (2, not shown)
13. ¼" sq x 10" balsa sticks (2, not shown)
14. Veggie bag covering film (not shown)
15. Thread binding (not shown)

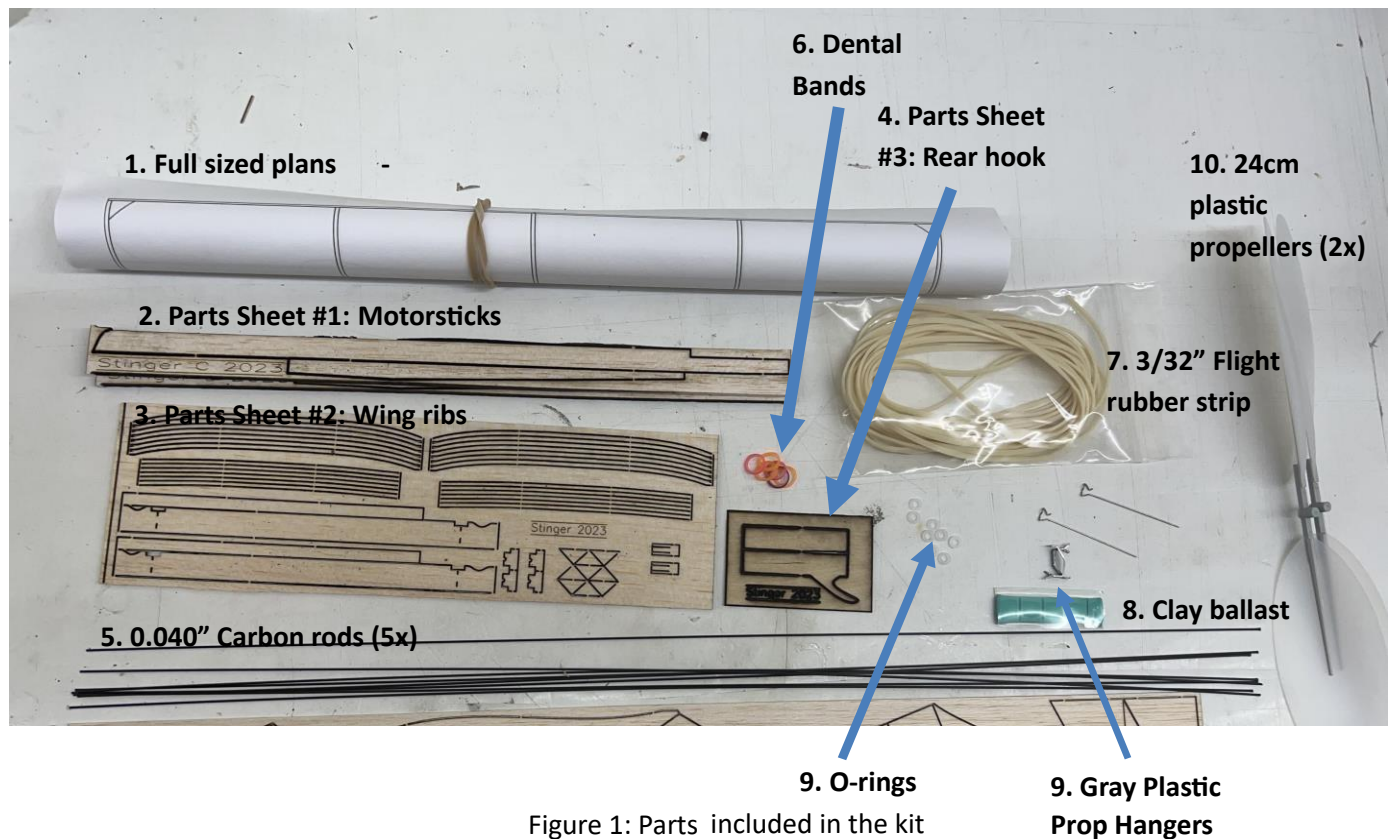
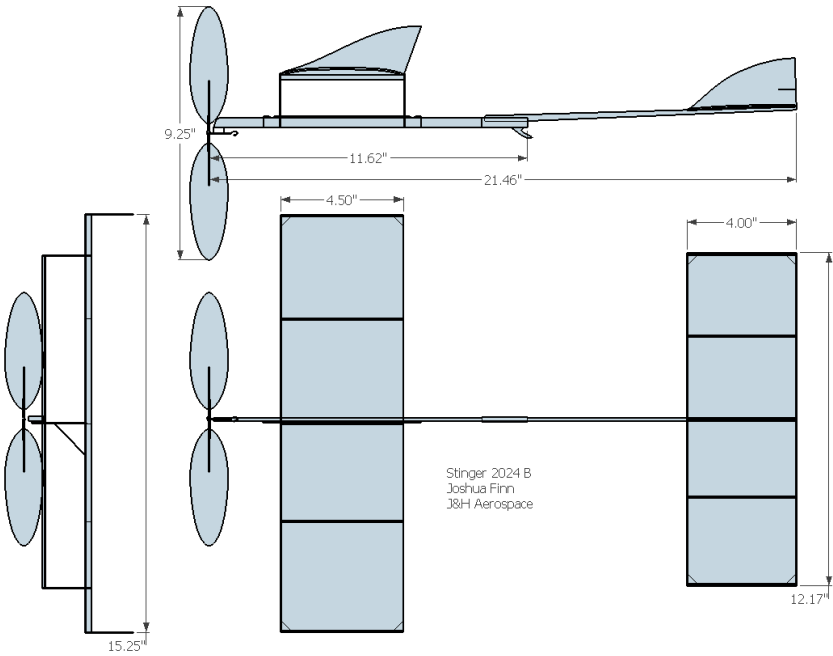
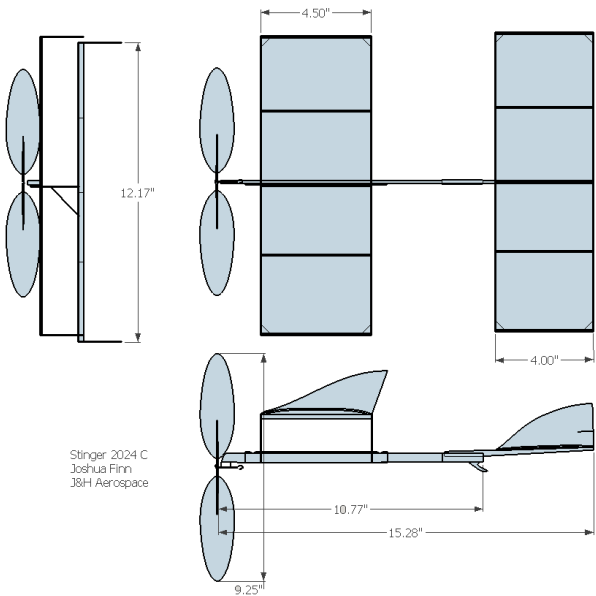


Figure 1: Parts included in the kit

Division B Stinger 2024



Division C Stinger 2024



Flight Data Log

[illegible]

Before beginning construction, be sure to verify that you have all of the recommended tools for building your Stinger. Also be sure to verify that all parts are present in the kit. If anything has been damaged in shipping, please contact us IMMEDIATELY to get those issues resolved. Occasionally a component will be missing or different from what's shown in the instructions. Please contact us for that as well. Sometimes minor changes are made during the production life of a model, so most confusion is simply related to these changes.

DO NOT separate all the parts out of your parts sheets. Only separate parts out as you actually need them so that they don't get damaged or lost.

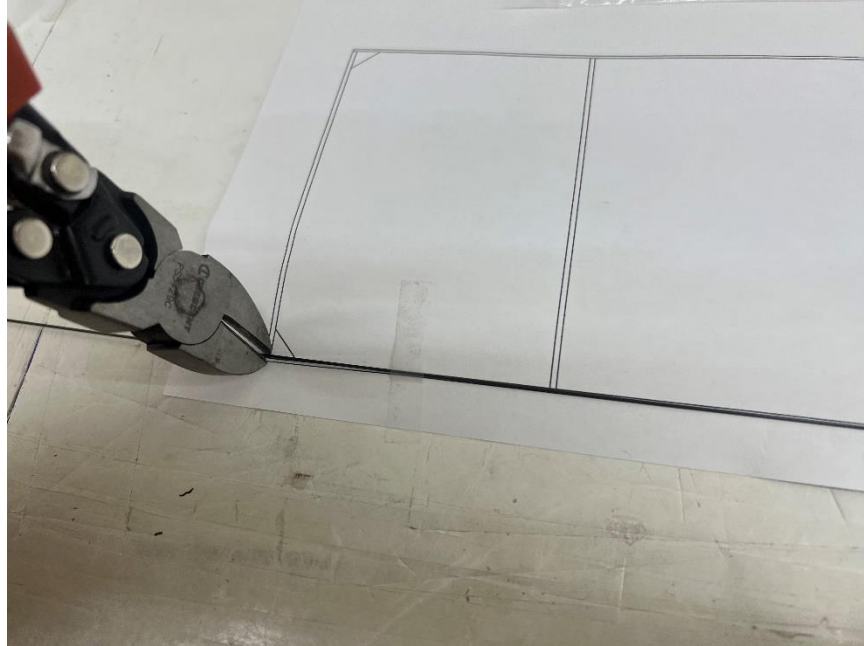
Each end of the rolled plans has a template for either the wing or the tail. Find the template for the wing and cut this template off the plans, leaving a few inches of excess so that you can easily tape parts down to the plans.

Lay down packing tape over the leading and trailing edges on the plans to make a non-stick surface. If you are working on a table, you can actually overlap the tape over the edges of the plan to secure it to the table, which will make construction much easier.

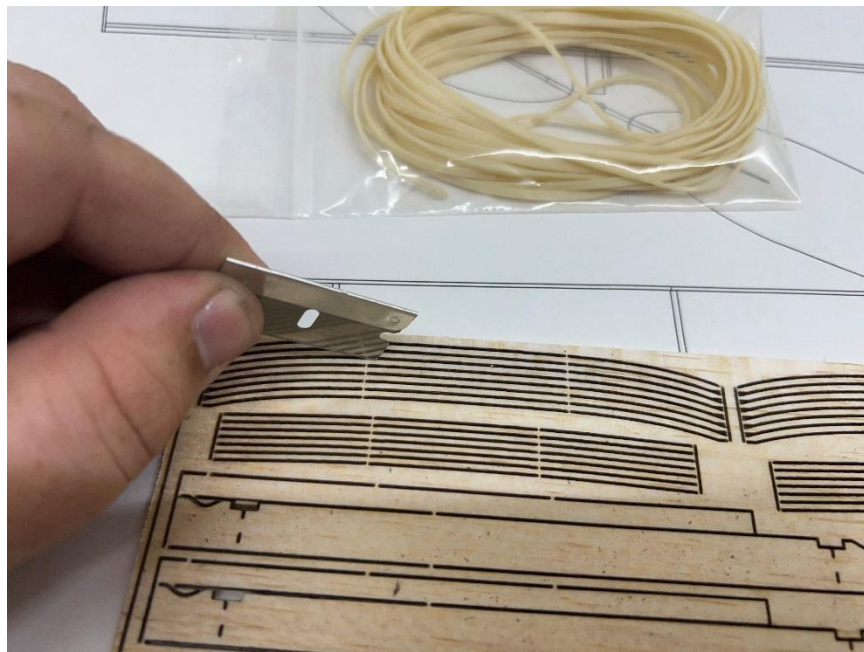
Use small strips of tape to tape down one of the carbon rods over a spar (leading or trailing edge) on the plans. Don't cover up any of the rib stations with tape. Make sure the rod is flush with one tip of the wing.



Use scissors or wire cutters to trim the other end of the carbon rod. DO NOT throw away the excess carbon—you will need it later!

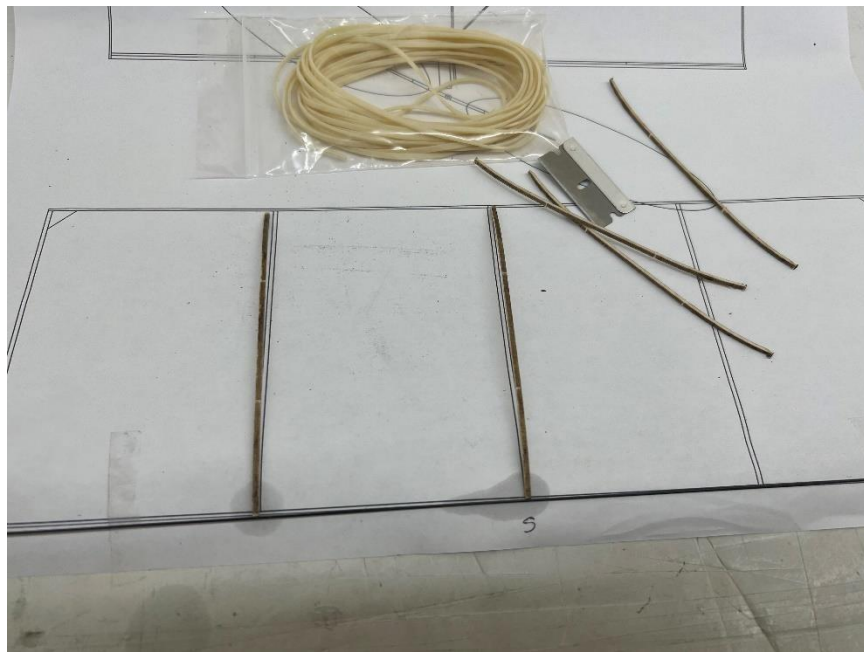


Use a razor blade to carefully separate a set of wing ribs (the larger and more curved ribs) from the 1/16" parts sheet. Be careful because the ribs are quite fragile. Each set includes one spare rib.





Glue the ribs to the spar. Take your time to try to get them aligned as closely as possible over the rib marks on the template.



Cut a second carbon rod to size over the template and glue the ribs to it, being careful to correctly align everything as shown on the template.



You can no remove the tape strips and carefully remove the wing from the plans.



Cut 4 of the triangular gussets from the rib sheet.



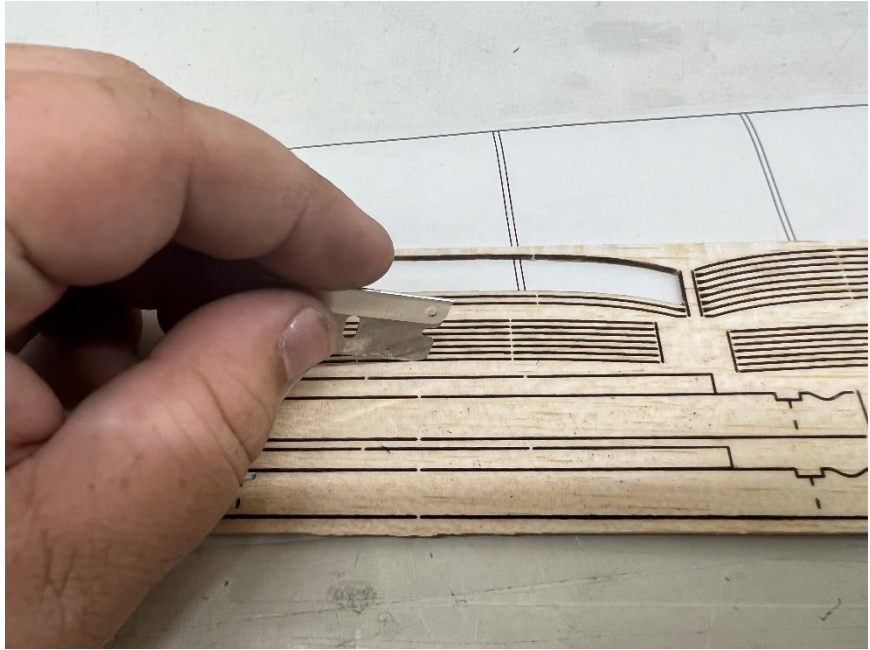
Install the gussets in the corners of the wing as shown. You can poke the gussets with the corner of a razor blade to move them into position.

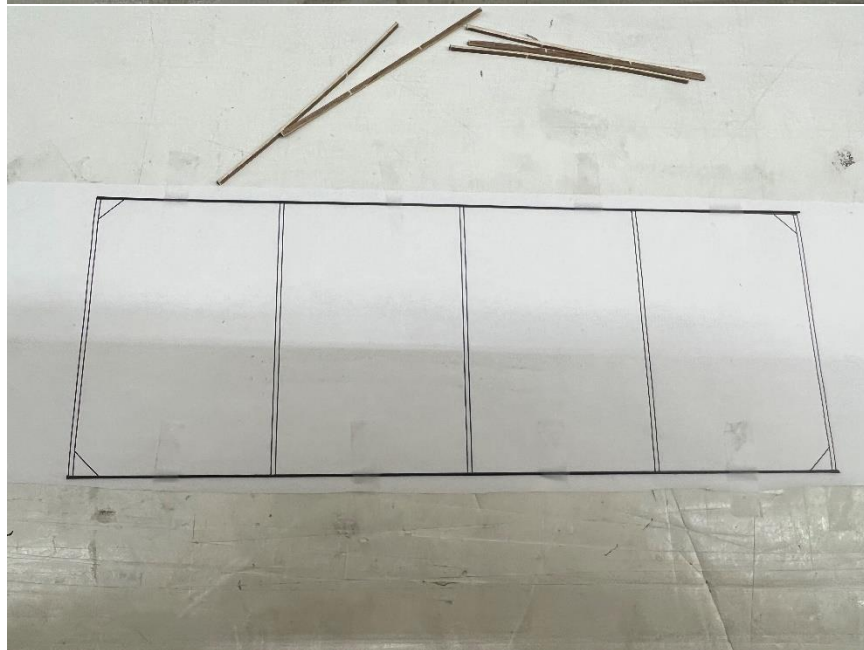
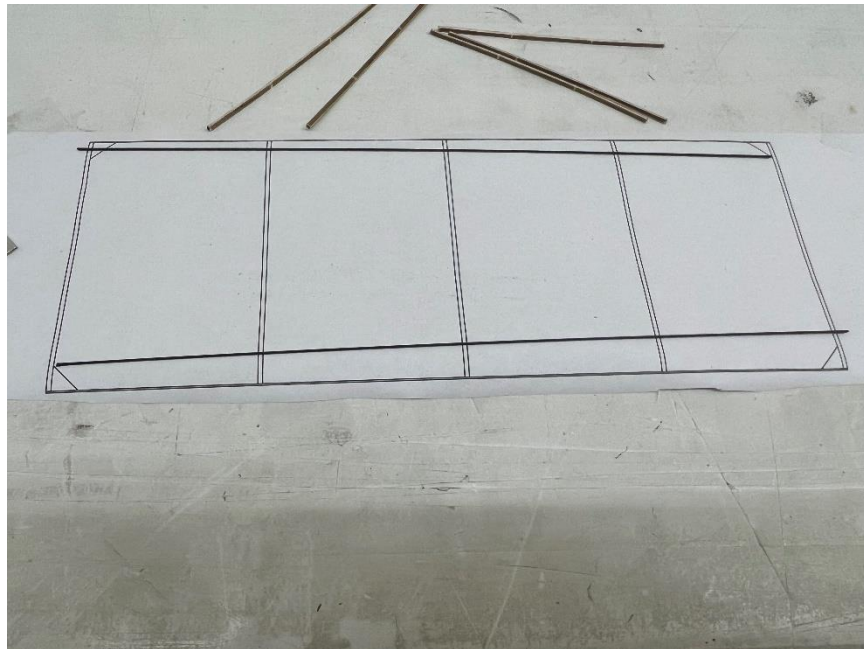


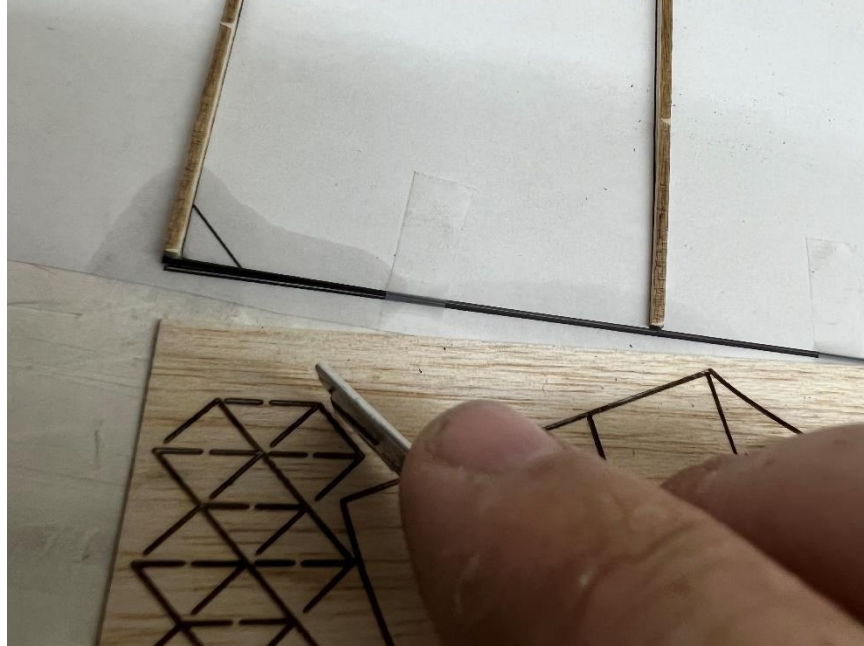


Repeat the previously mentioned steps for the horizontal tail. Please note that the tail ribs are thinner and will need thinner gussets to match them. These gussets are found on the 1/32" balsa wingtips sheet.

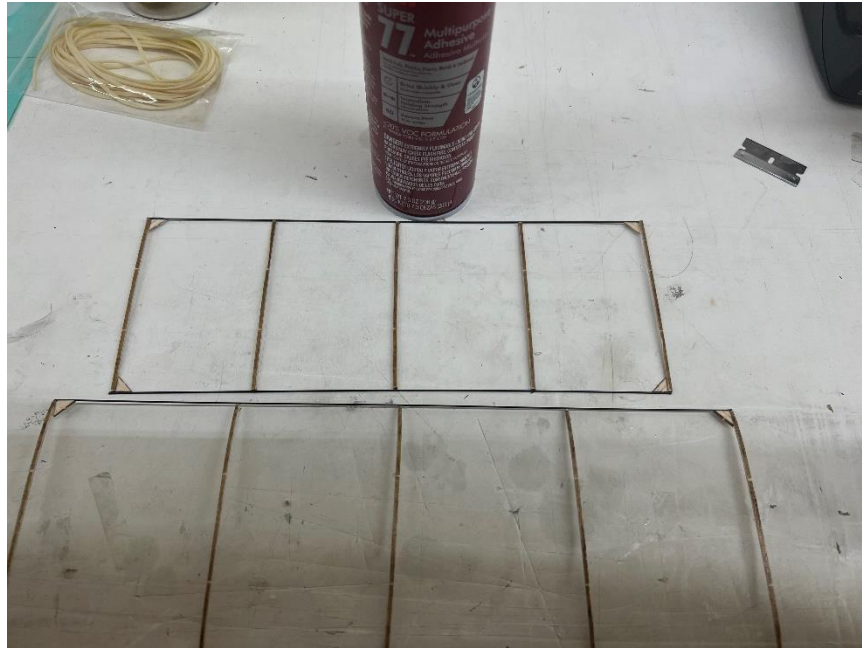




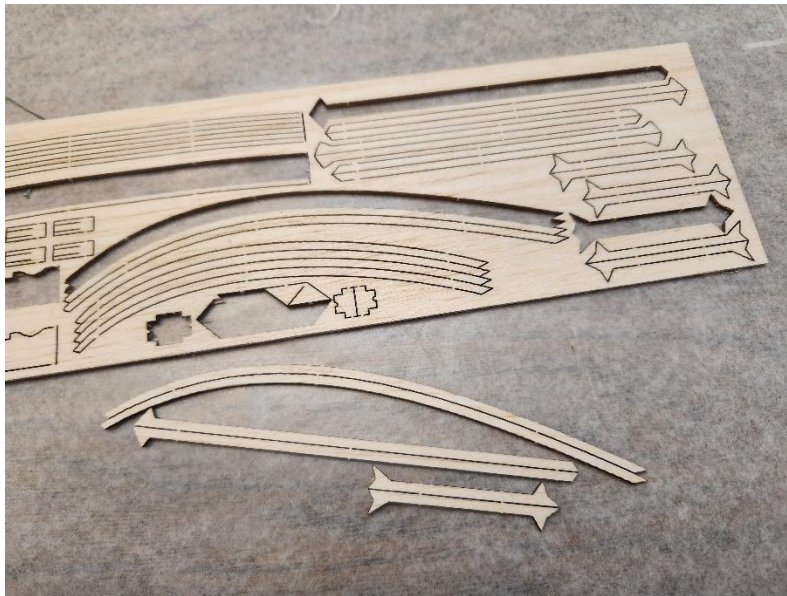




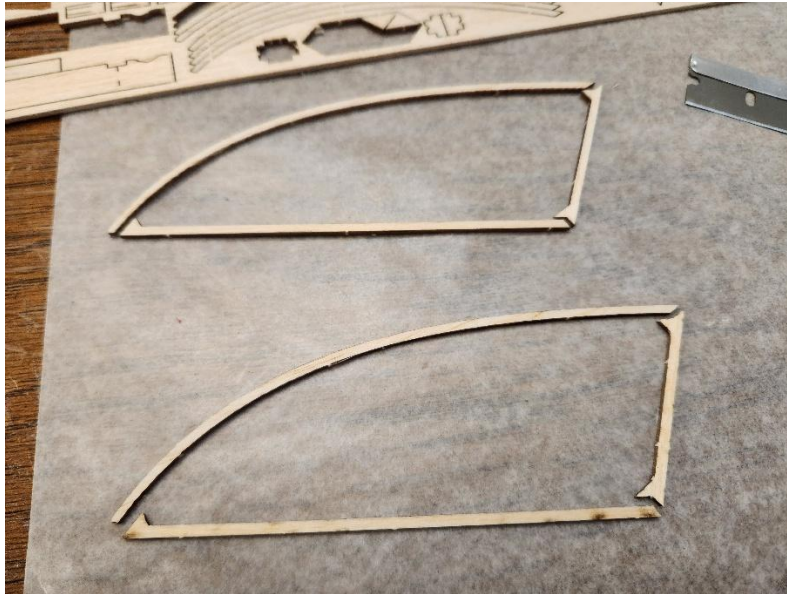
You now have complete structures for the wing and stab.



Remove the wingtip components from the parts sheet.



The wingtip parts are designed to mate closely together without any measuring, so you can build them over the plans or free hand. Arrange the parts so that they mate together as shown.



Glue the wingtips together.



Repeat the same steps for the tail fins.



The large $\frac{1}{4}$ " square sticks are used to make your covering frame. Glue them firmly together to form a rectangular frame as shown.



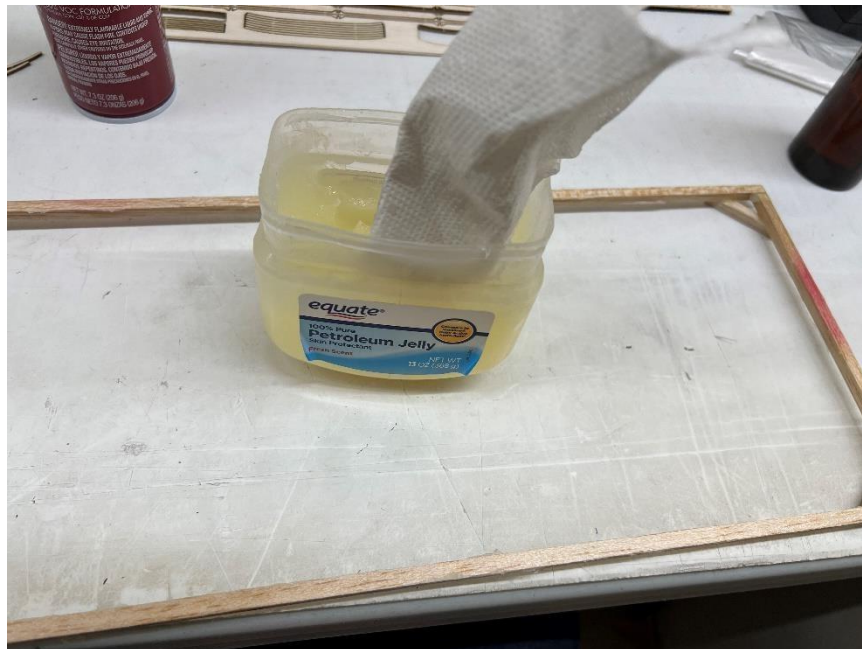
You will need 3M-77 spray adhesive to cover your wing and tail. Get it out and have it handy. Plan ahead—you do not want to use this product indoors because it will make everything around you extremely sticky!



You need petroleum jelly/vaseline to make the covering frame stick to the veggie bag plastic. This method allows you to reposition the covering so that it can be applied neatly to the flying surfaces.



We recommend using a paper towel to smear the Vaseline onto the frame so you can limit the travel of this material. DO NOT get Vaseline/petroleum jelly near any of the rubber bands or strip in your airplane because it will destroy those materials. Also it is best to do this over an alternate workspace that you won't be using for the rest of the build.



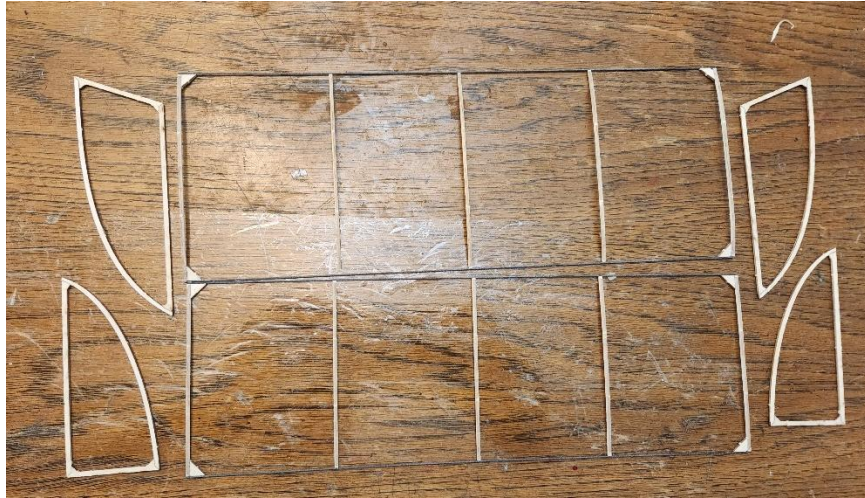
Cut out a piece of veggie bag a bit larger than your covering frame. Make sure it is going to be large enough to have about 2 inches of excess on all sides before cutting it out and wasting covering material. You have plenty of extra covering material, so if you don't get it right the first time, try again. Take the piece of covering and wad it up tightly into a ball. Flatten the covering out BY HAND on a clean, flat surface. Now wad it up again. This time, flatten it out fully and completely, again by hand only, and get it as smooth as your hands can get it. Do not try attempt to iron it flat or use any other method than simply smoothing it out with your hands. Take your time to get it right. Once the film is smoothed out (it will now have a crinkled appearance and texture), lower your covering frame, Vaseline side down, onto the covering, and press it down all around to get it to attach to the covering. Now lift the frame-covering assembly off, flip it over, and tension out any wrinkles or excess slack to get the covering as smooth as possible (again, the crinkled texture is good, don't try to get rid of it, and never attempt to heat shrink the film).



Take your wing and tail outside, or into a spray booth, and spray the curved rib side of each with 3M Super 77. This will make them extremely sticky—be careful! It is very easy to damage the parts once they have been sprayed because they will stick to your hands and get damaged if you don't carefully disengage your hands from them. Arrange the wing and tail so they will fit within the bounds of the covering frame.

Important: The wingtip and tail fins must be sprayed on opposite sides so that they can face covering side out—away from the wing and tail, so that the covering is not sandwiched between.

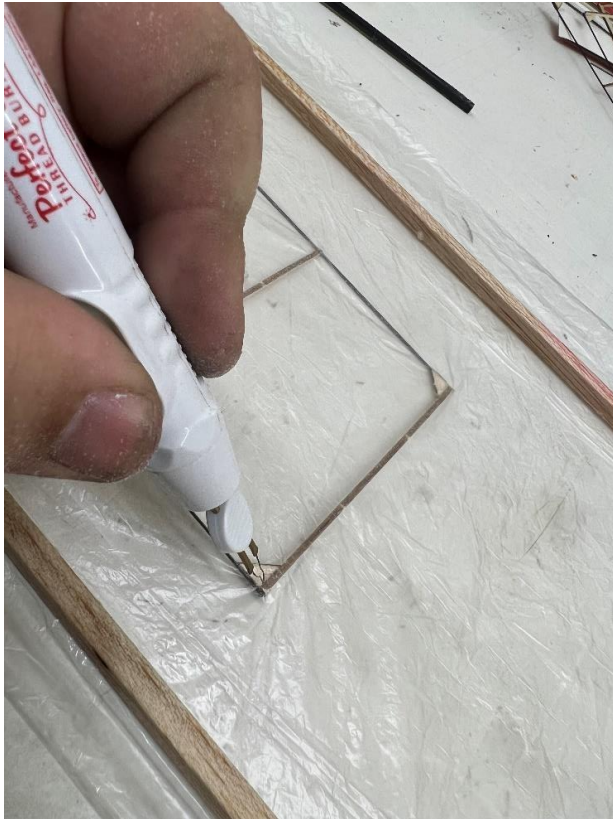
Also, you may find it easier to cover the tips separately as they take up a lot of space. You have plenty of covering material supplied so that you can do this without running out.



Lay the wing and tail, adhesive side up, onto a smooth, flat surface. Carefully lower the covering frame, covering side down, onto the flying surfaces. Then gently run your finger around the outlines of the wing and tail to press the film into contact with the parts. Be careful to press very, very gently so that you do not damage the wing ribs!

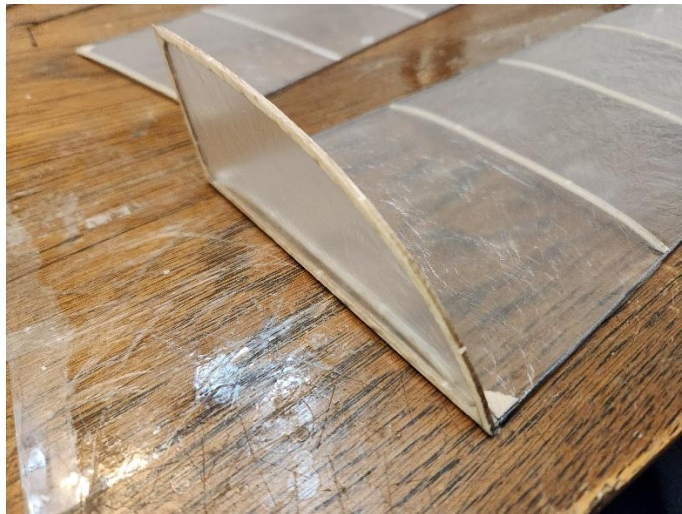


Use an electric cautery (available from indoorffsupply.com) or brand new razor blade to cut the film around the outside of the wing and tail. Do not leave any excess. Try to get as smooth of a trimming job as possible. Excess film waving in the air will make your model fly poorly.

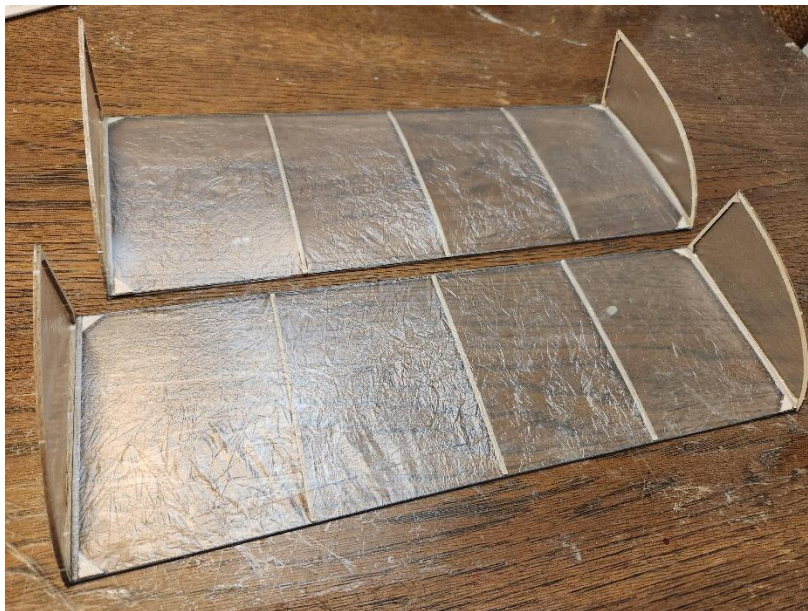




Glue the wingtips, covering side out, onto the ends of the wing.



Your model uses twin fins rather than a single tail fin. Glue a fin on each end of the horizontal tail, covering side out.



The ribs sheet contains parts for two wing saddles. Remove one set of wing saddle parts.

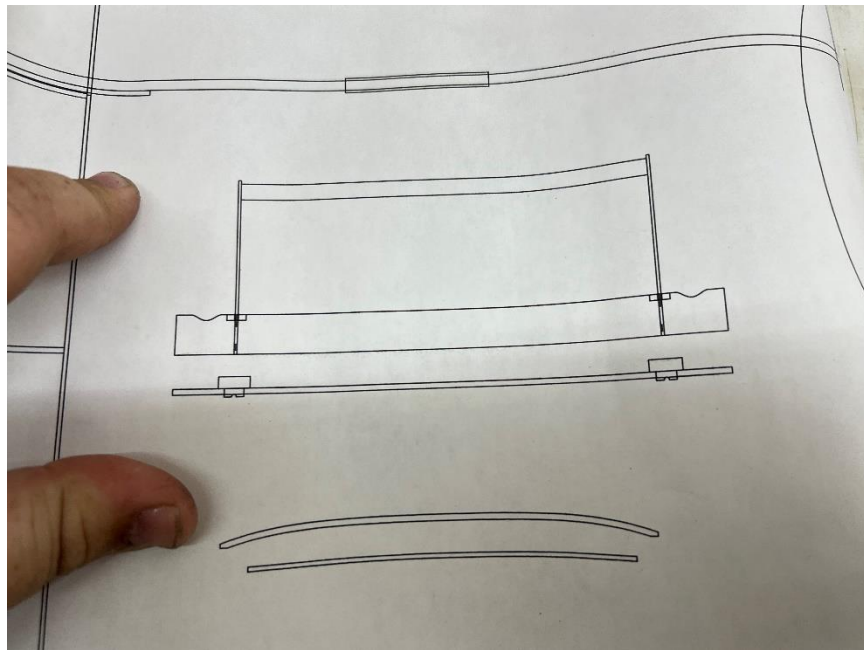




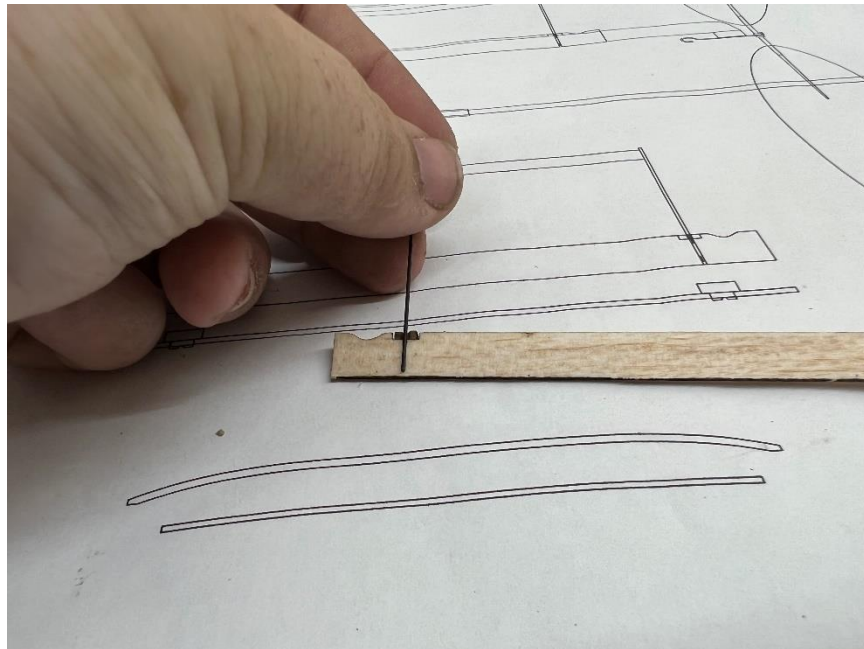
The wing saddle has slots in it which match the two small tabs. Glue them in place.



Use the plans drawing of the wing saddle to cut two wing posts to length from some of the scrap carbon rod you generated from building the wing and tail.



Glue the rods in place on the saddle as shown. The tabs have small slots in them to accommodate the wing posts.

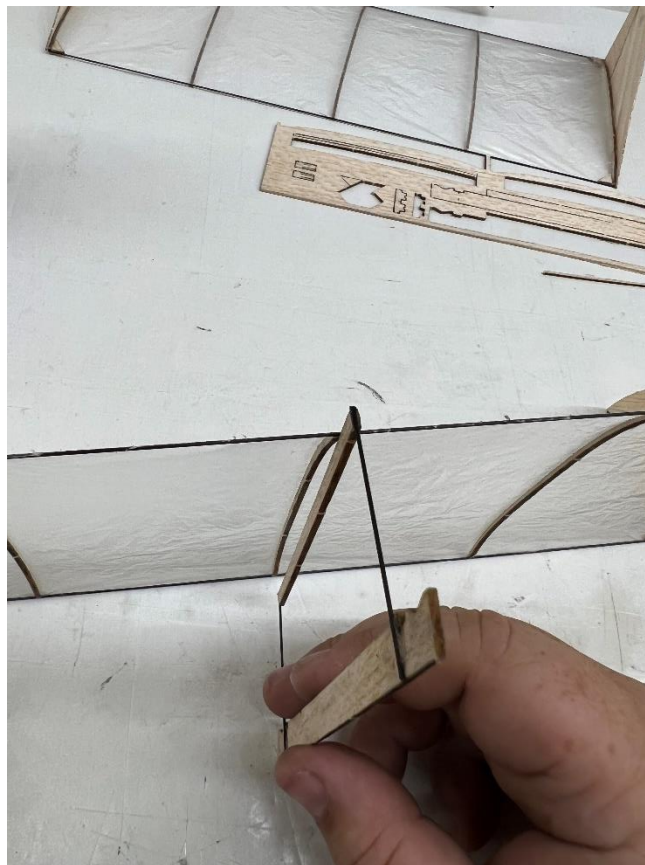


Glue the wing cross piece in place as shown on the plans.





Glue the wing in place on top of the wing cross piece. Be careful to get the wing perpendicular to the wing saddle assembly.





Glue pieces of scrap carbon rod in place as per the plans front view to brace the wing. Use wire cutters to snip off the excess carbon.





Locate the fuselage parts.



Separate the motorstick and tailboom from their carrier sheet and locate plywood the rear hook/tailboom channel pieces.



Glue the channel plates on the end of the motorstick with the notch as shown such that the rear hook is on the opposite side from the notch.



After ensuring that the glue is fully hardened, test fit the tailboom, using dental bands to hold it in place. The bottom of the tailboom is the side with the slight bend in it near the fat end. This bend is extremely important because it angles the boom away from the motorstick at approximately a 2 degree angle. You will be able to shim the tailboom as needed to adjust this angle for proper flight.



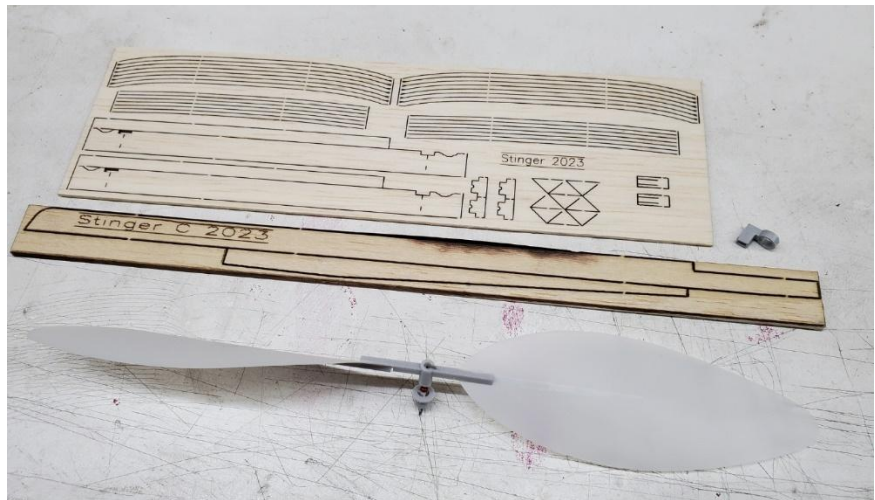
Remove the tailboom from the motorstick.



Glue the horizontal tail onto the skinny end of the tailboom as shown. It is best to block the boom in place so it is level, but slightly skewed to the side as shown to induce a left turn.



Now it is time to install the propeller hardware.



Locate the small nose slot pieces on the rib sheet. Separate two of these out to support the nose ring for your propeller.



Glue one nose slot block in place as shown, being careful to avoid getting glue into the slots.



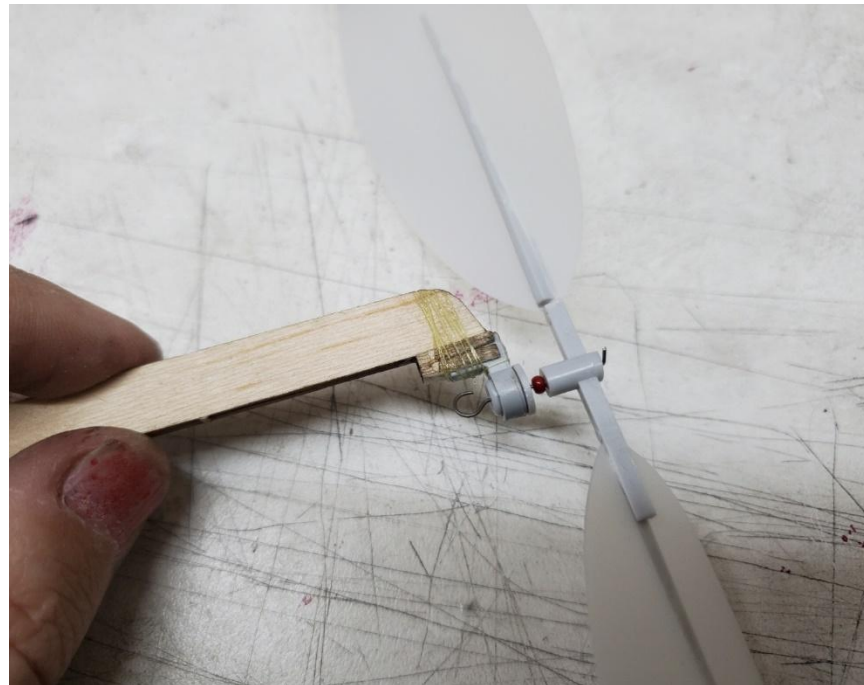
Glue a second block atop the first, again being careful to keep glue out of the slots. You may need a razor blade to clear the slots.



Glue the nose ring firmly in place in the slots.

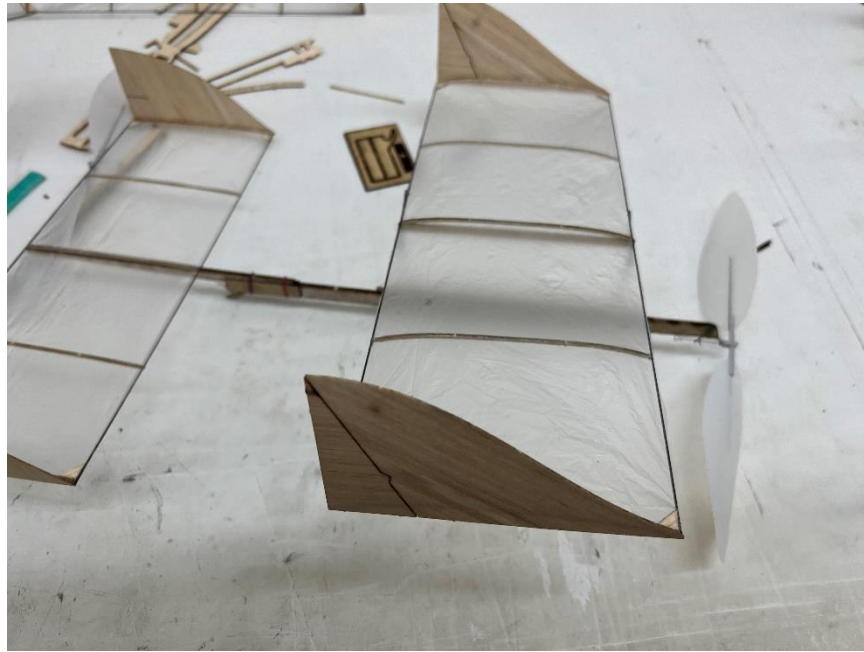


Use the binding thread to firmly bind the nose bearing in place. Harden the thread with glue after wrapping.



Fit the propeller/bearing assembly in place as shown. DO NOT glue the bearing in place in the nose ring! Doing so prevents you from being able to change out propeller assemblies.

Install two more dental bands on the motorstick so that you can install the wing on the motorstick. Now install the tail on the motorstick and verify the weight of your airplane. Add clay as needed to reach the 8g minimum weight. If your model is already over 8g, don't worry, it can still be very competitive.



Congratulations! Your Stinger is completed! Don't forget to write your school name on the fuselage where it is clearly visible.

Now you will need to make some rubber motors for it.

Cut a piece of rubber about 24 inches long. Slide two of the white plastic o-rings onto the rubber. Coil the rubber up onto a weighing scale and snip off small amounts of rubber until the rubber with the Orings weighs about 1.45g. Now you will need to tie a knot to join the ends of the rubber.

Bring the ends of the strip together and tie a granny knot as shown.



Tie a second granny knot and sinch it up to the first one for added security. Add a tiny dab of glue to the knot on the outside (free ends) of the rubber loop. Trim off any excess.

Now lubricate the rubber as shown by rubbing silicone oil into it. As mentioned before, do not use petroleum products to lubricate your rubber motor because they dissolve the rubber, making it unusable.





You can now load the rubber onto the rear hook and the prop shaft as shown. Typically the rubber will be very slack, hanging loose under the model. It's ok for the rubber to hang loose, as this will actually reduce tension on the prop bearing and allow the rubber to be wound more tightly.

Slide your wing forward until the model balances about 3/4 of the way back on the wing. If you have to slide the wing back more than 3 inches from the front of the propeller to balance, add clay to the nose until the plane balances correctly rather than sliding the wing back any further.

Verify that your propeller is balanced by holding the model horizontally with the rubber motor removed and seeing if the propeller consistently stops with one blade down. Glue tiny dabs of clay to the opposite tip of the propeller until the prop balances level, or in any position in which you place it.

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 trimming guides and in the Senior Flyer trimming video from 2023:

<https://www.youtube.com/watch?v=8BKVXRzcSLE>

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.

<https://jhaerospace.com/product-category/curriculum/>