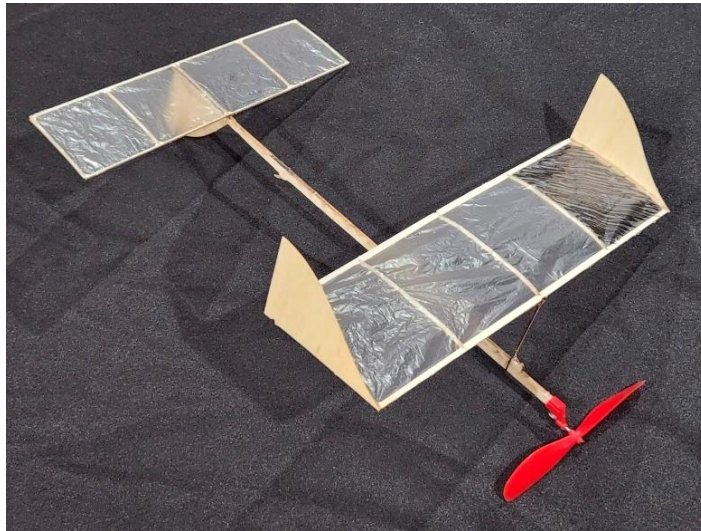


Senior Flyer C 2027

By J&H Aerospace ↗

www.jhaerospace.com



*A High Performance Indoor Free Flight model legal for the 2026-2027
Science Olympiad Flight Event, Division C*

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, turns counter (volareproducts.com).

Senior Flyer C 2027

Building Instructions

Congratulations on your purchase of the Senior Flyer 2027! You are about to build a high performance airplane for indoor flying competition.

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. Parts Sheet #1: Motorsticks (2x Div B and 2x Div C)
2. Parts Sheet #2: Wing spars
3. Parts Sheet #3: Wing posts and rear hook
4. Parts Sheet #4: Wingtips and fins
5. 6 inch Propellers (2x)
6. Covering Film (veggie bag)
7. Wing hold down rubber bands (8x)
8. O-rings (8x)
9. Clay ballast
10. 1/16" Flight Rubber Strip
11. ¼" sq x 18" balsa sticks (2)
12. ¼" sq x 7" balsa sticks (2)

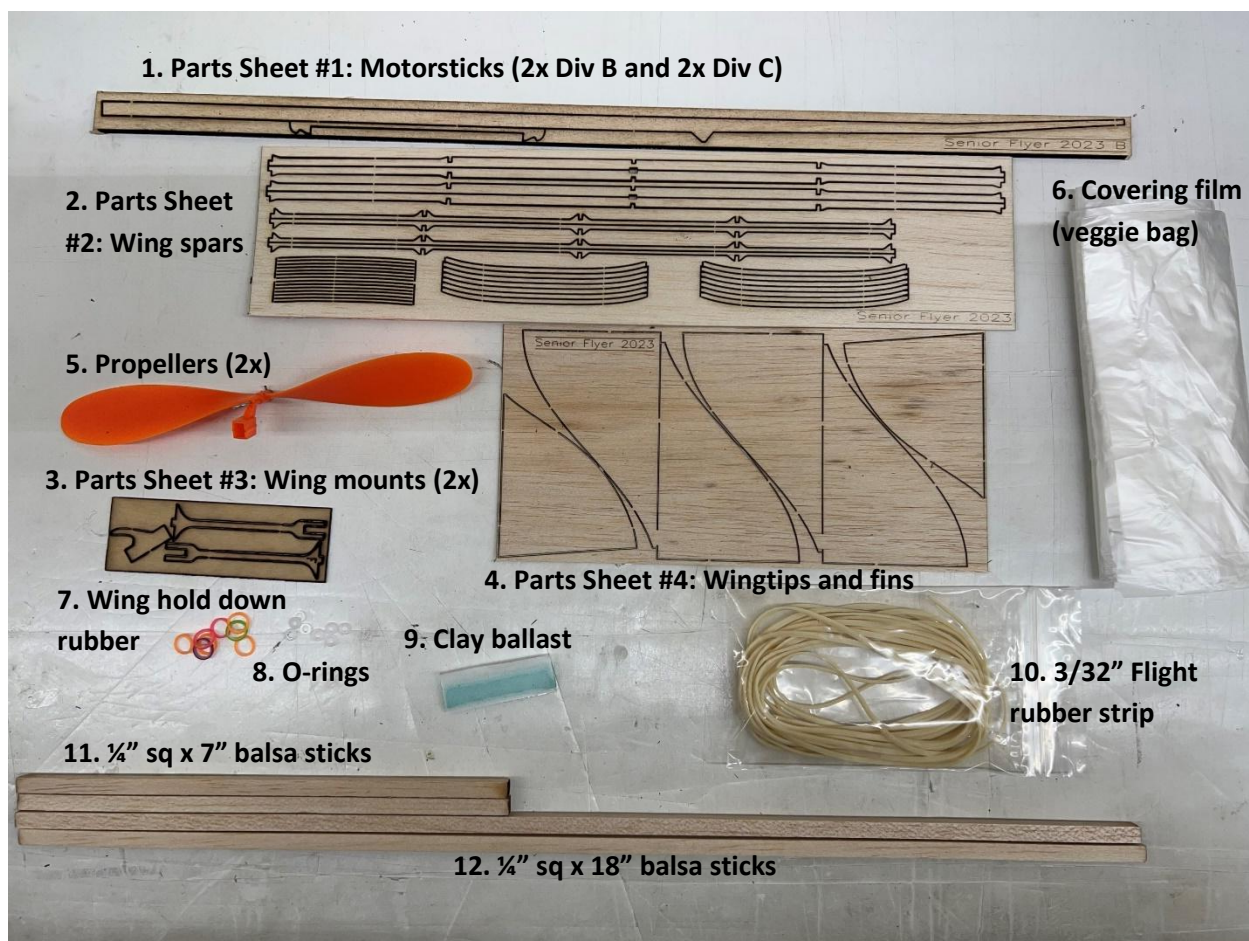
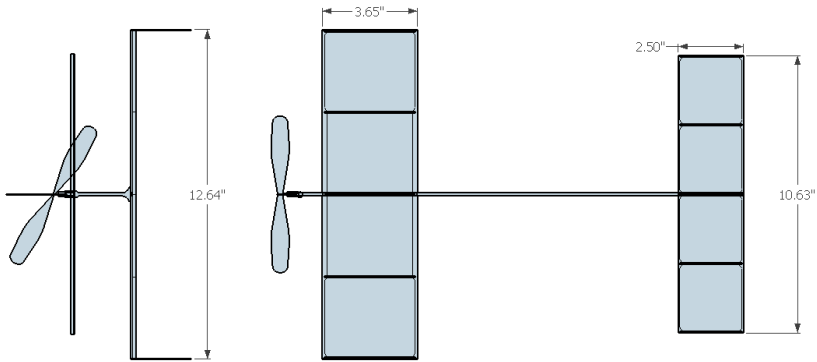
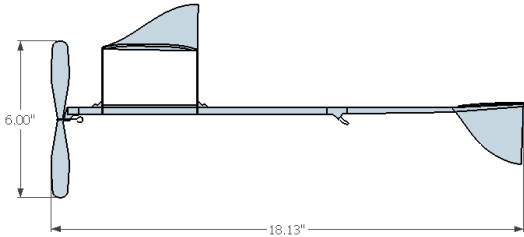


Figure 1: Parts included in the kit

Division C Senior Flyer 2024



Senior Flyer C: 2024
J&H Aerospace



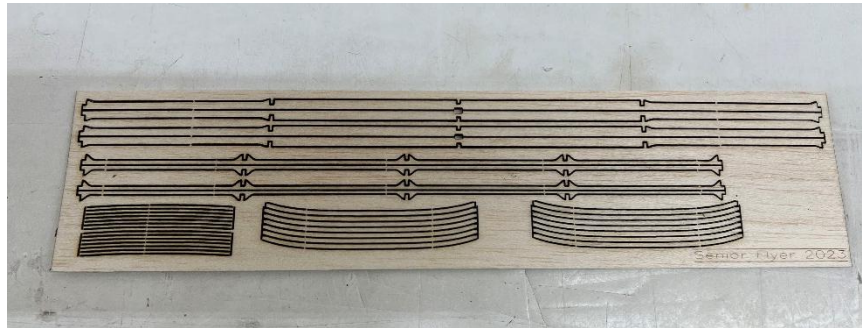
Flight Data Log

[illegible]

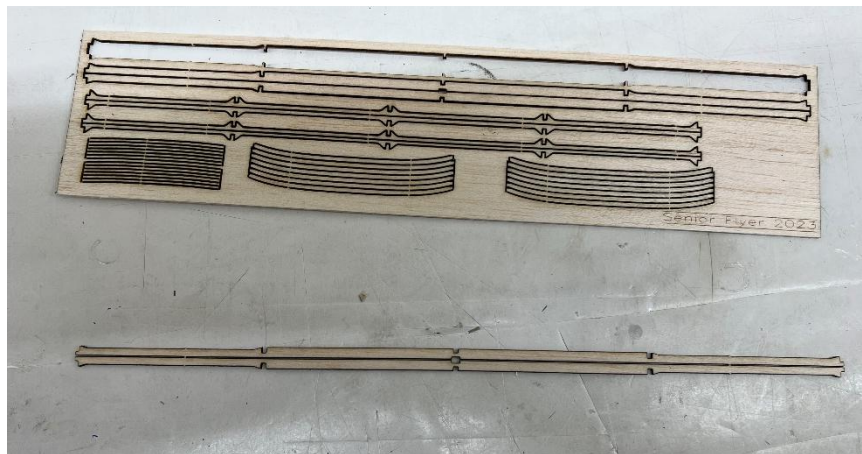
Before beginning construction, be sure to verify that you have all of the recommended tools for building your Senior Flyer. Also be sure to verify that all parts are present in the kit. If anything has been damaged in shipping, please contact us IMMEDIATELY to get those issues resolved. Occasionally 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.

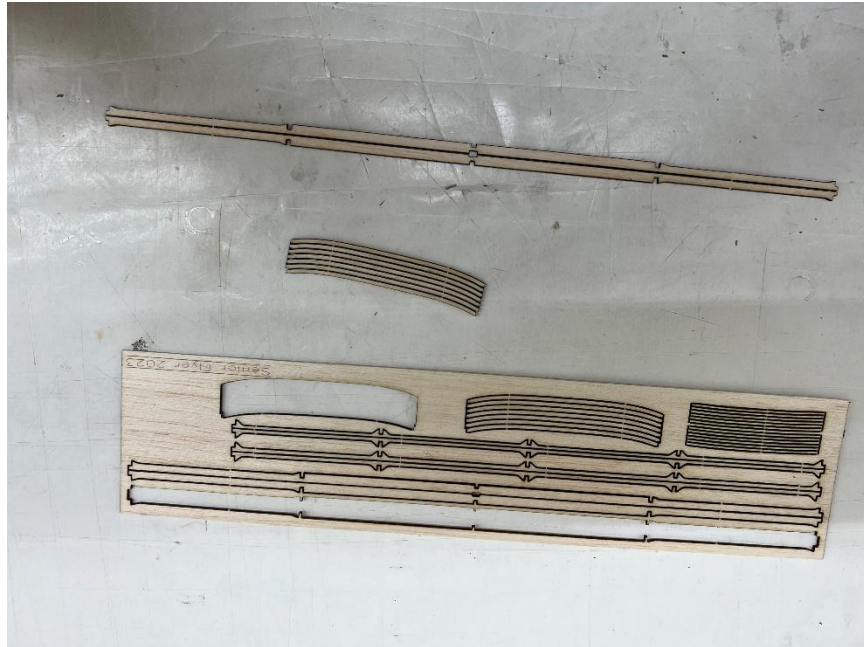
Locate the spar and rib sheet as shown below.



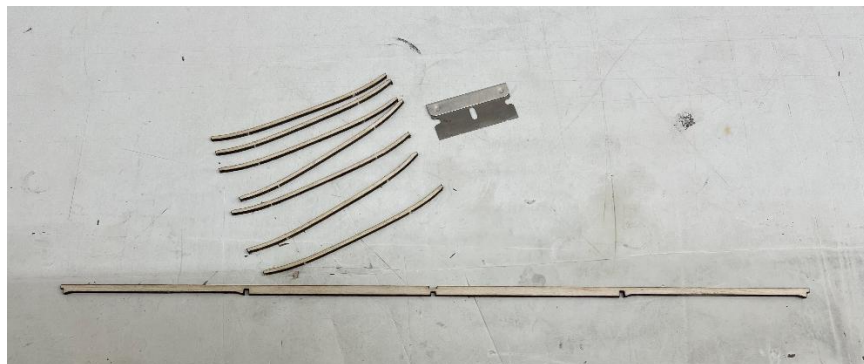
Separate one pair of wing spars out. These are the longest parts on the sheet. You will want to use a razor blade to carefully remove the spar pair.



Separate out a set of wing ribs. These are the highly curved parts. Note that there is one extra rib per set, and a single center rib. This rib is shorter than the others and located at the bottom of each set.



Use a razor blade to carefully separate the ribs in the wing rib set you removed.



The center rib should be installed in the center slot. Note that there is a slot on either side at the center of the wing spar. The rib goes into the narrower slot, which is on the same side as the other slots. Do not force the rib in place, but rather pinch it on the end if it is too tight. Now remove the rib and apply glue, and reinsert it. This is the procedure you will use for gluing all of the parts on your airplane.



Install two more ribs in the other two slots.



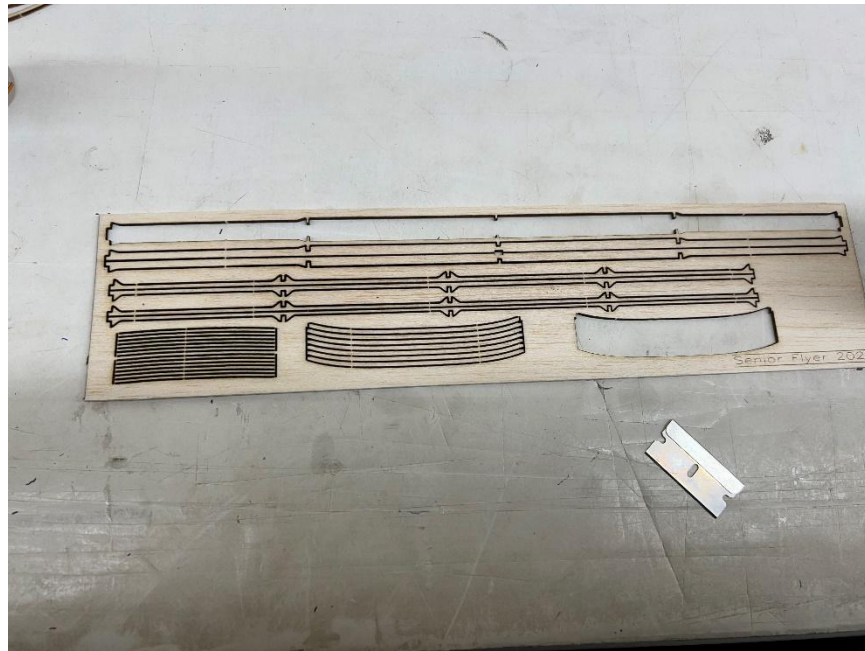
Glue the other ends of the ribs into the other spar in the same way you installed them in the first one.



Glue the end ribs in place (these are the same as all the other ribs).



On the spar sheet, there are some smaller spar pairs. They are for the horizontal tail.



Carefully remove one pair of horizontal tail spars from the sheet, along with one set of horizontal tail ribs (these are the thin ribs)



Use a razor blade to separate the spars and ribs. All of the tail ribs are the same.



Install the tail ribs in the same way that you did the wing ribs. Make sure they are all curved the same direction as you install them. This curvature is very slight, but it does improve the flight performance of your model.





You now have the completed structure for your wing and tail.



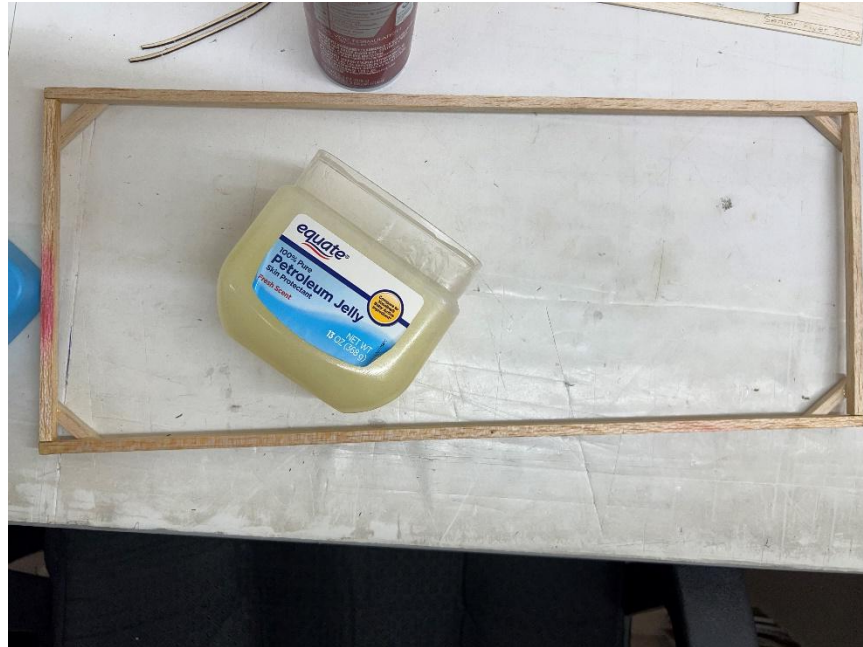
The large $\frac{1}{4}$ " square sticks are used to make your covering frame. Glue them firmly together to form a rectangular frame as shown.



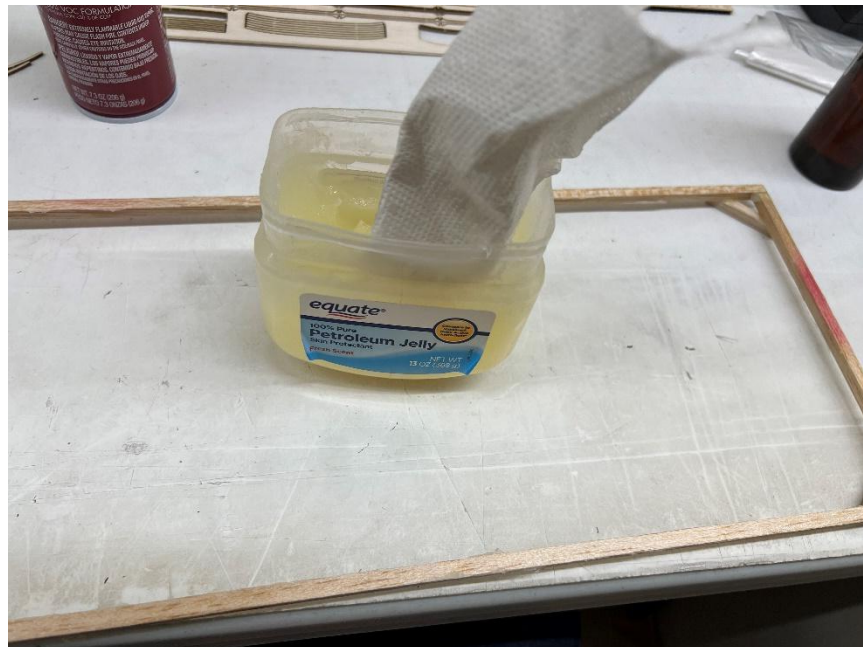
You will need 3M-77 spray adhesive to cover your wing and tail. Get it out and have it handy. Plan ahead—you do not want to use this product indoors because it will make everything around you extremely sticky!



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.



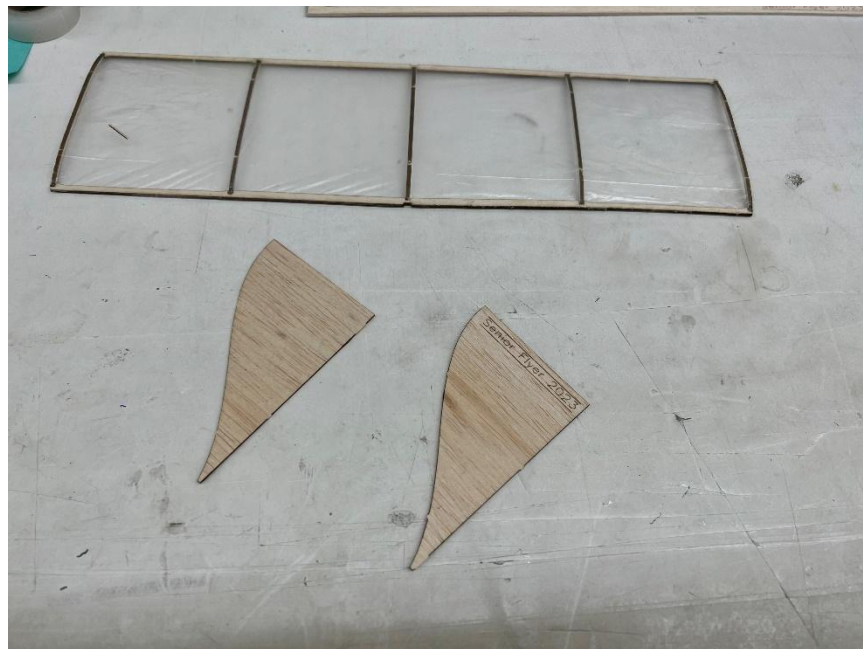
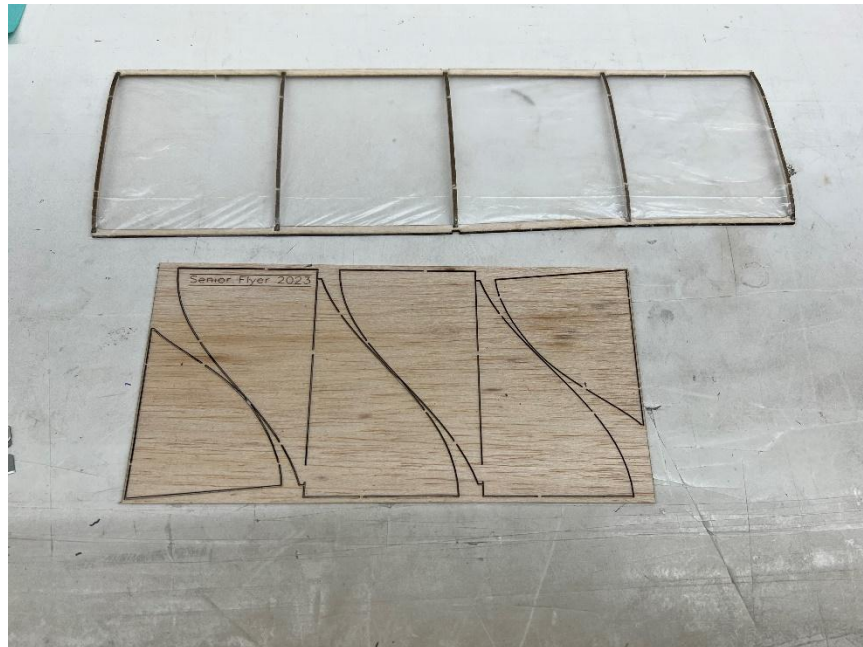
Lay the wing and tail, adhesive side up, onto a smooth, flat surface. Carefully lower the covering frame, covering side down, onto the flying surfaces. Then gently run your finger around the outlines of the wing and tail to press the film into contact with the parts. Be careful to press very, very gently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



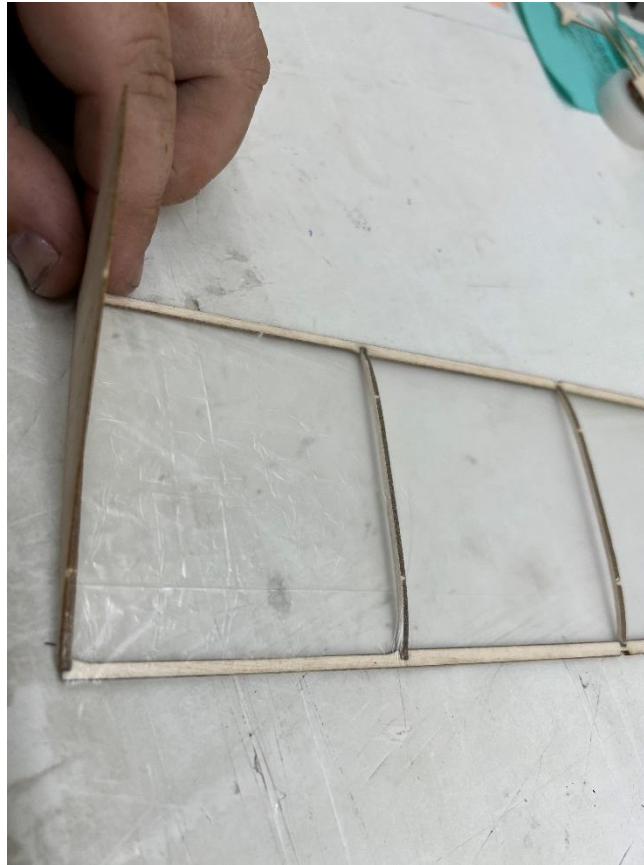
Use an electric cautery or brand new razor blade to cut the film around the outside of the wing and tail. Do not leave any excess. Try to get as smooth of a trimming job as possible. Excess film waving in the air will make your model fly poorly.



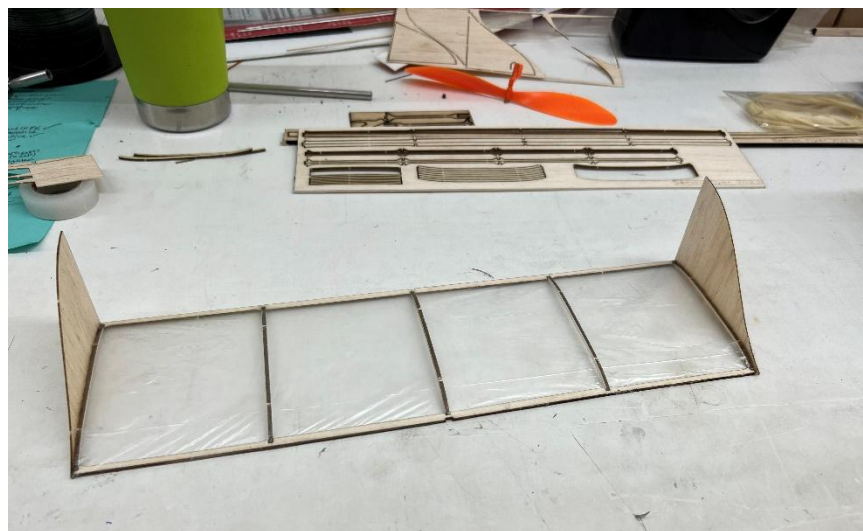
Locate the sheet of wingtips and tail fins. Break out one pair of wingtips (these are the larger parts in the middle)



Glue the wingtips onto the end of the wing. Make sure they are positioned vertically and not sticking out.



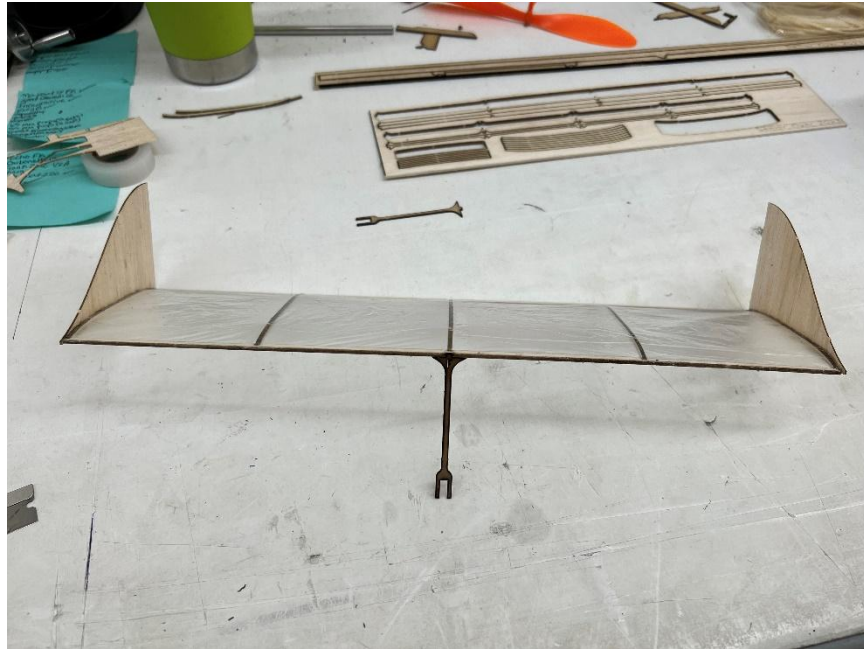
Be sure to orient both wingtips the same way as shown. In this photo, you are facing toward the front of the wing, IE, the back of the tips is swept away from you.



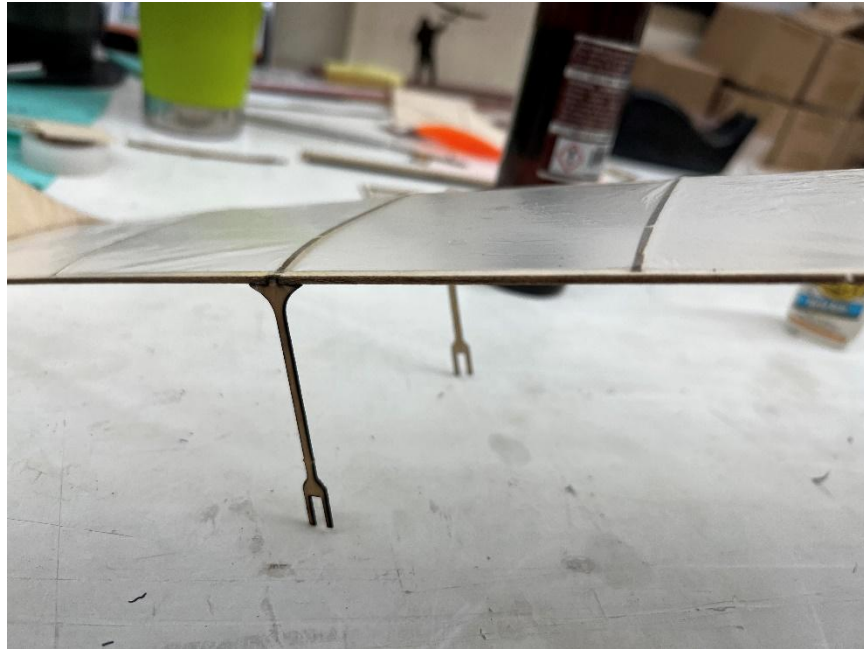
Find the 1/32" plywood sheet with the wing posts and rear hook. Break out the wing posts. One wing post will have an F burned into it. This is the front post. The front of your wing is the side that is away from the tall end of the wingtips.



Glue the front post into place in the slot on the leading edge that matches it.



Glue the rear post into place in the same manner. Make sure the posts are parallel!



Locate the motorstick/wing saddle assembly. CAREFULLY separate this set out from its carrier sheet and then remove the wing saddle from the motorstick. The wing saddle is VERY fragile at this stage.



Separate the rear hook out of the 1/32" plywood parts sheet.

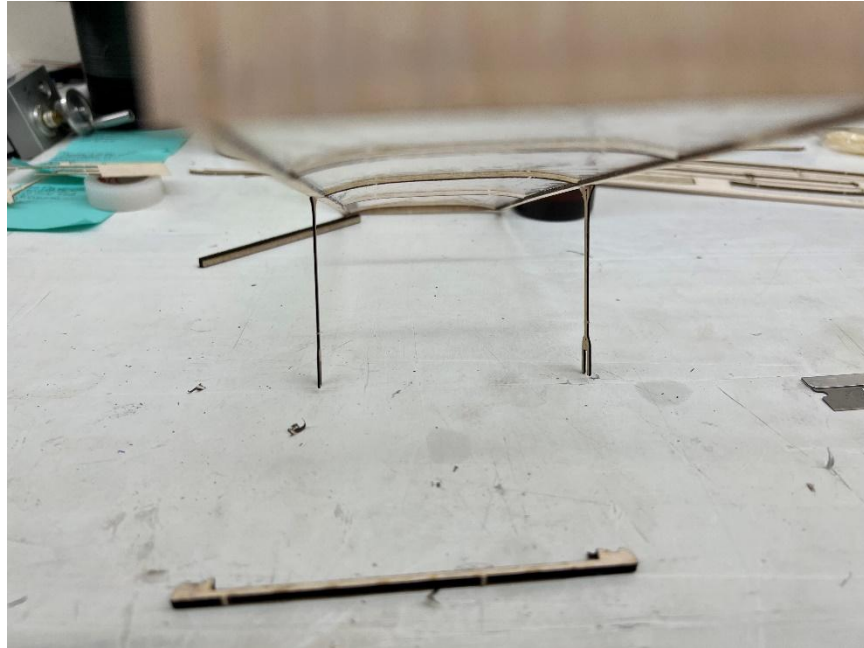


Install the rear hook as shown, pointing back toward the skinny end of the motorstick. The triangle sticking out of the bottom of the motorstick lines up with the hook.



The wing saddle slots into the bottom of the wing posts.

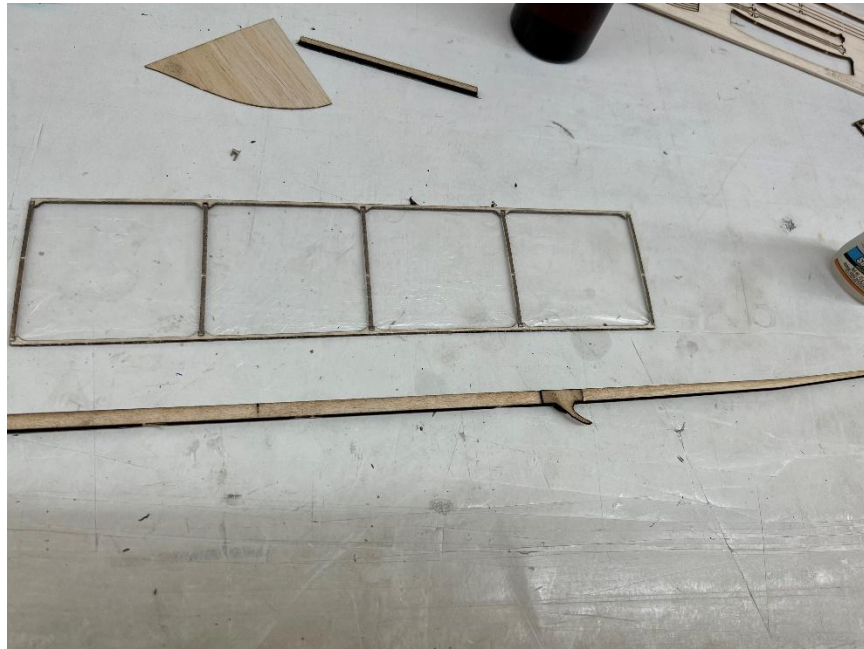




Apply glue and then slide the saddle all the way into the wing post slots, and slide the posts all the way up against the end knobs on the saddle as shown below.



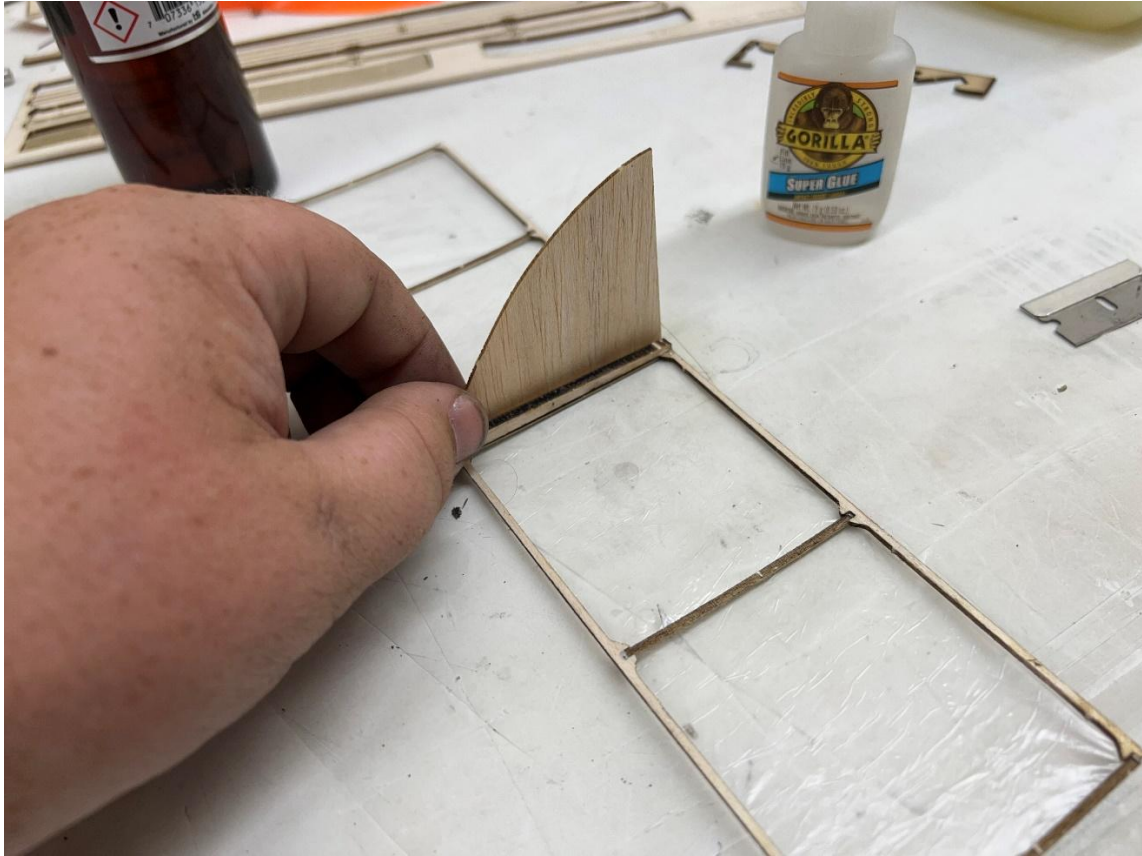
The horizontal tail is attached to the skinny end of the fuselage, on the opposite side from the rear hook. The end of the fuselage bends upward. You want the tail on the upward bend, covering side away from the fuselage.



The easiest way to attach the horizontal tail is to lay it on the table, covering side down, apply glue on the spars at the center ribs, and then lower the fuselage onto the tail. You will have to prop up the front of the tail.



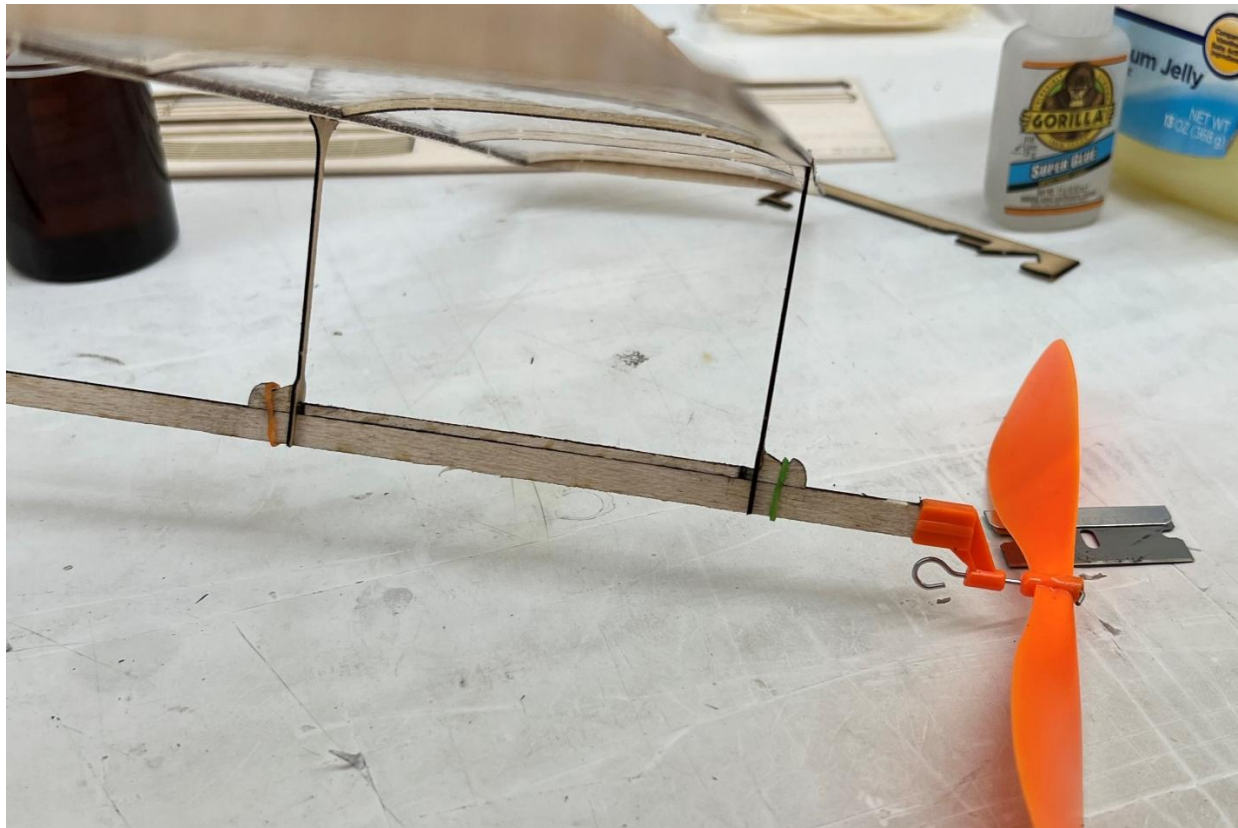
The fins are the smaller parts on the wingtips/fins sheet. Remove one of the fins and glue it as shown to the side of the fuselage under the horizontal tail. **WARNING:** look at the photo and note where the wood grain is oriented. If you orient the grain wrong, you will break the rudder off just by laying the airplane down in its storage box, let alone flying!

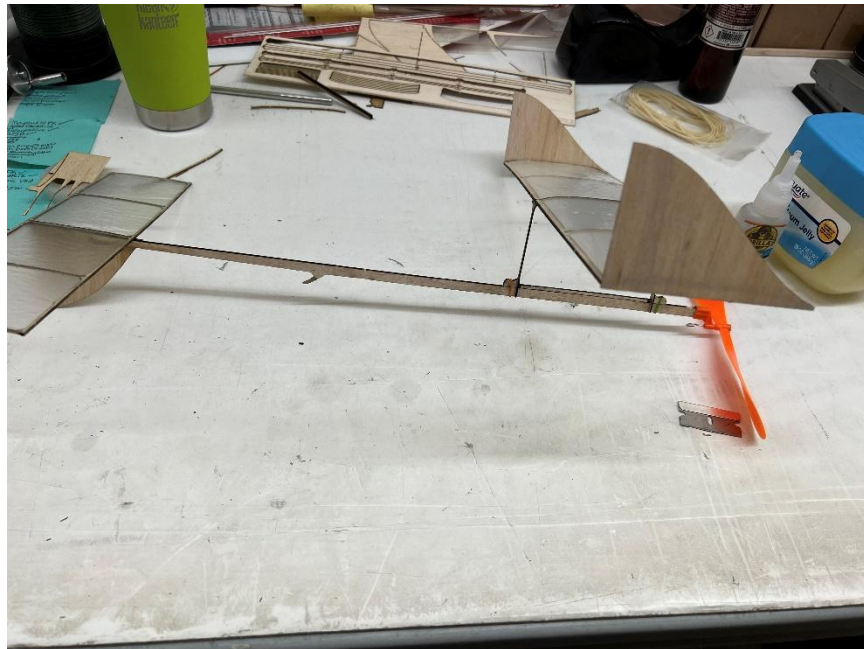


Roll two dental bands onto the motorstick as shown.

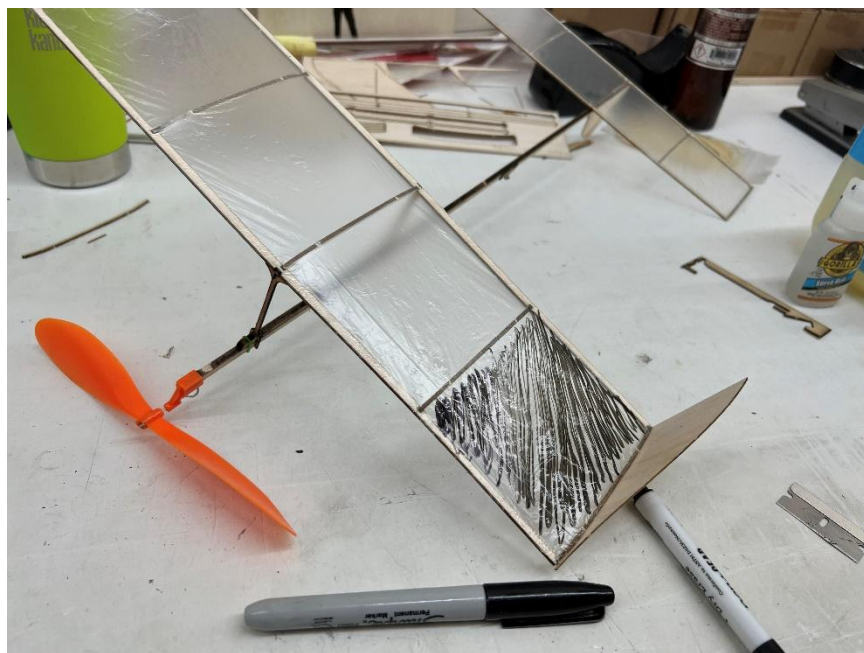


Now place the wing atop the fuselage and pull the dental bands onto the ends of the wing mount.





Color one panel of your wing with a black sharpie marker to make it more visible in the air.



Be sure to write your school and team name on the side of the fuselage to ensure that your airplane is clearly identified.



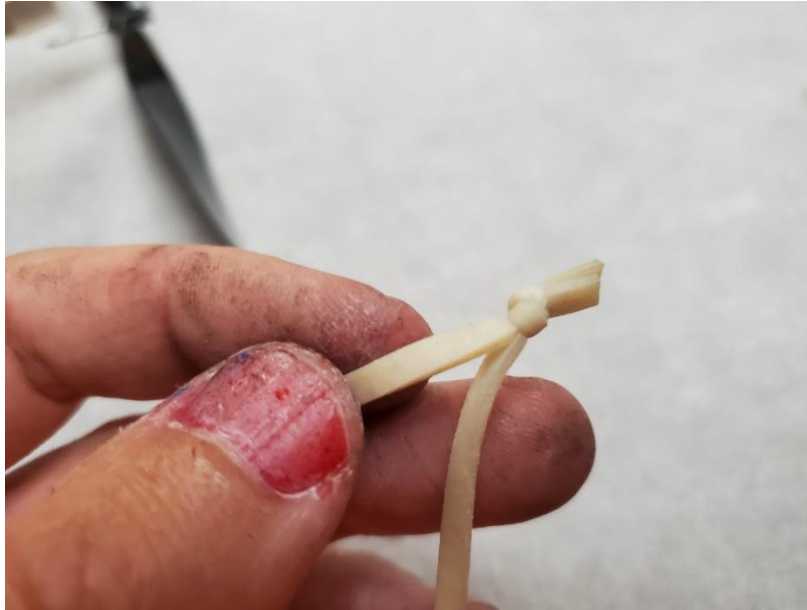
Congratulations! Your Senior Flyer is completed!

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

Cut a piece of 1/16" rubber about 34 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 O-rings 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 $\frac{2}{3}$ of the way back on the wing. If you have the wing slid all the way against the propeller assembly and it's still not balancing as recommended, don't worry, the model should fly fine like this. 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=kOpIA_DUH5I

NOTE: Rules changes for 2027 have made the large propellers used in 2023 impractical. Use clay and wing positioning to balance your Senior Flyer about 1 inch ahead of the wing trailing edge. This location has proven to be the most successful for this airplane.

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

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/>