Thanks for buying a Useful Aircraft kit.

These instructions will guide you during the construction of your aircraft.

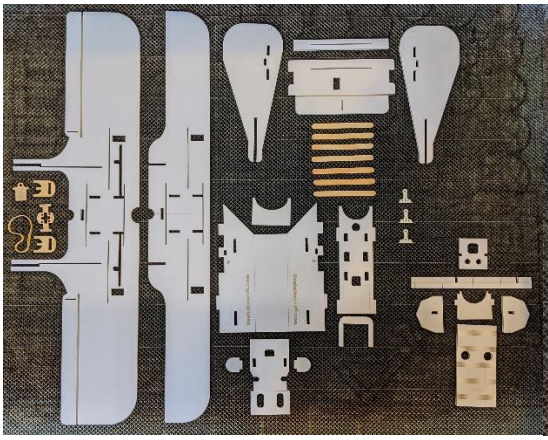
With the right tools and workspace, you should be able to comfortably turn your collection of parts into a completed airframe in around an hour. I'd suggest reading through this document with a cup of coffee at least once before you begin your build, just to get familiar. It's a fun and easy build, and after you've built your first one, your next one will go even quicker and cleaner.

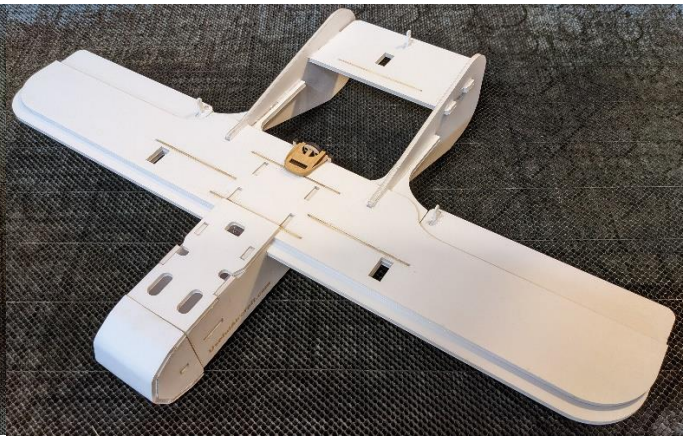
Once built, she's a great plane, with conventional handling and responsive flight controls that's fun to fly fast and yet well-mannered when slow. High wing loading with decent stability. It's a great platform for FPV or line of sight, or you've got room for all manner of avionics, GPS, and automation. Designing, iterating, and building this airplane was quite the productive distraction for me, and I'm proud of the results. I hope you enjoy your experience with her.

If you encounter any problems, have suggestions for improvement, or just want to provide feedback – feel free to reach out to me at usefulaircraft@gmail.com.

Thanks,

Brett





A word of caution…

We are going to be working with tools, razors, hot glue and other potentially dangerous stuff. Ultimately, we're building an aircraft that could also cause injury or harm. I have no say over what you do with your kit, but I ask you to be safe and to be careful.

This is designed to be built and used by competent, responsible adults. Go slow and be aware you can get injured if you are not careful. Have a first aid kit ready before you begin. Razors can cut quicker than you think.

Hot Glue is exactly that – Hot. Hot Glue will stick to you and continue to burn until it cools down. It can easily injure you, so please be careful.

I am not responsible if you do something silly and get injured in the build process, or after you begin flying. As the builder, the pilot, and the ultimately the end user – you are assuming all responsibility and liability for your actions.

Be safe and have fun.

Workspace and tools

To build your aircraft, you'll need:

- Clean and Flat workspace of at least 2' X 3'. The bigger the better.
- Hot Glue Gun and plenty of glue sticks.
- Weights to hold glued components together or flat. I've used books, bricks, cordless drill battery packs, pieces of wood, really anything flat that can provide steady pressure.
- Razor or precision craft knife

Before you begin, plug in your glue gun, and give it plenty of time to warm up. I usually allow at least 10 minutes to get it up to temperature. I go through a lot of glue, so I buy 10-inch glue sticks in bulk. You can build with smaller sticks, but you will be going through even more of them. I usually use just under two 10-inch glue sticks per aircraft. Ensure you have got plenty of hot glue on hand, as healthy amounts of glue help to ensure the strength and integrity of the airframe, and some places are nearly impossible to re-bond after they are sealed in. Do not begin the project unless you have more glue than you need.

Hobby size glue sticks and glue guns that use the smaller, narrower glue sticks are not recommended. We are going to be melting a lot of glue in the construction of these airframes, and the small hobby glue guns tend not to be able to keep the glue hot enough in the melt chamber and slow the build process. When you are bonding the upper and lower surfaces of the wing, the small glue guns frequently cannot melt enough glue fast enough to ensure a speedy application across the entire wing skin prior to surface mating. If any portion of the glue cools prior to mating, you will end up with poor wing skin adhesion issues, and that can be an inelegant fix at best.

I also have a collection of maker blocks (or 123 blocks). They are the metal blocks shown in the lower left of the above picture. These are used as weights to hold surfaces in contact and keep parts aligned and square. Prior to learning about makers blocks, I used cordless drill batteries, bricks, books, pieces of wood, and even rocks. Obviously, the smoother and flatter the surface in contact with the foam board, the better the results. Build tools such as these really speed my build process and allow me to move onto subsequent portions of the build while I wait for hot glue to cool.

Give yourself plenty of flat space to build. A clean worksurface will help to keep your airplane looking clean during the build process. I like an open area of about 3' X 4' to spread out subassemblies and allow me to work quickly and efficiently while I'm waiting for components to bond. It is important that your worksurface is as flat and clean as possible. Give it a good wipe down, ensure it's clean and dry, and let's begin.

Unpacking and Wing Unfolding

Your kit should have been delivered looking something like this.

It's packed securely and folded small, as I'm trying to minimize shipping costs while still providing a sound airframe.

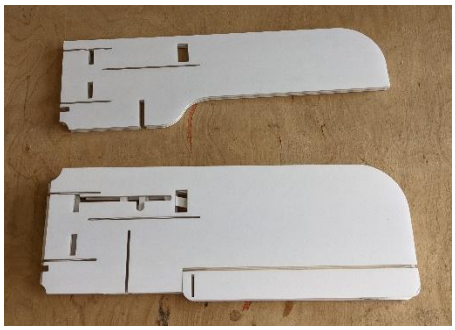
Let's open the package carefully, lay out all the parts included and unfold the parts we need to build the wing.

Inside you'll notice everything neatly stacked.

Remove the parts carefully and lay them out flat.

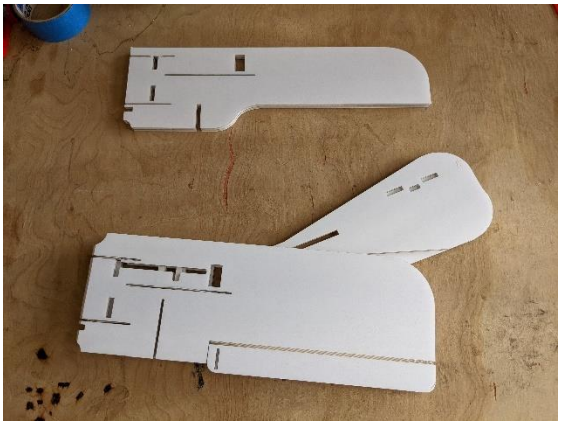
We're looking to get to the Upper Wing Skin and the Lower Wing Skin.

Folded inside the Upper Wing Skin will be the Vertical Stabilizers.



In this photo, the Upper Wing Skin is on top.

The Lower Wing Skin is on the bottom. The Vertical Stabilizers are tucked inside the Lower Wing Skin.



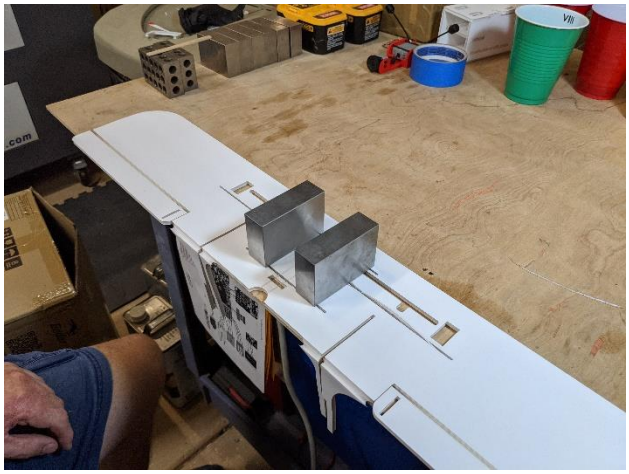
Remove the Vertical Stabilizers and set them aside.

We're going to work with the Lower Wing Skin first.

It's the larger of the two folded wing skins.

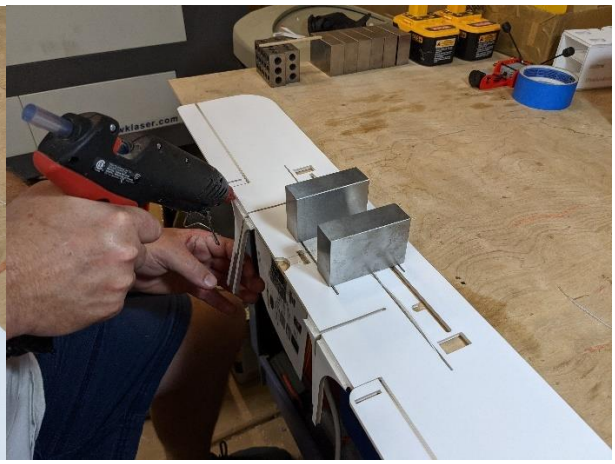
Run a bead of hot glue along the interior folds of the Upper Wing Skin as shown in the photos above.

Be careful of the Vertical Stabilizer Attach Fittings that are hanging off the trailing edge of the Lower Wing skin. We will unfold those once the wing is glued flat. I hot glue the center folds first along the edge of a table, so the attach fittings can hang off the side while the lower wing skin fold line's hot glue is cooling. See the photos below.

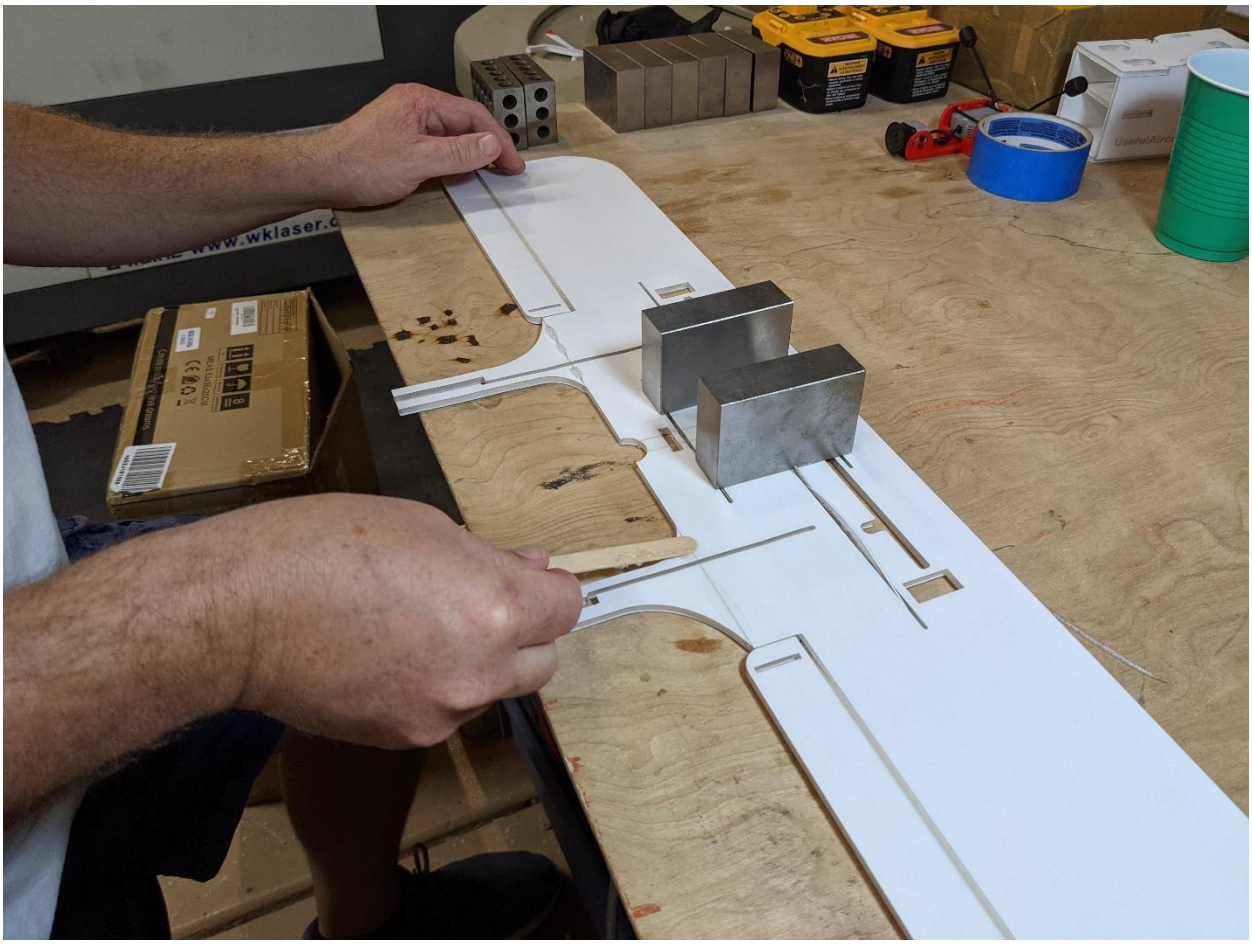


Unfold the wing, and use a popsicle stick to smear the hot glue along the top surface of the seam. Use weights to keep the wing flat while the Hot Glue cools.

The photos below show Hot Glue being applied to the both sets of Vertical Stabilizer Attach Fittings.

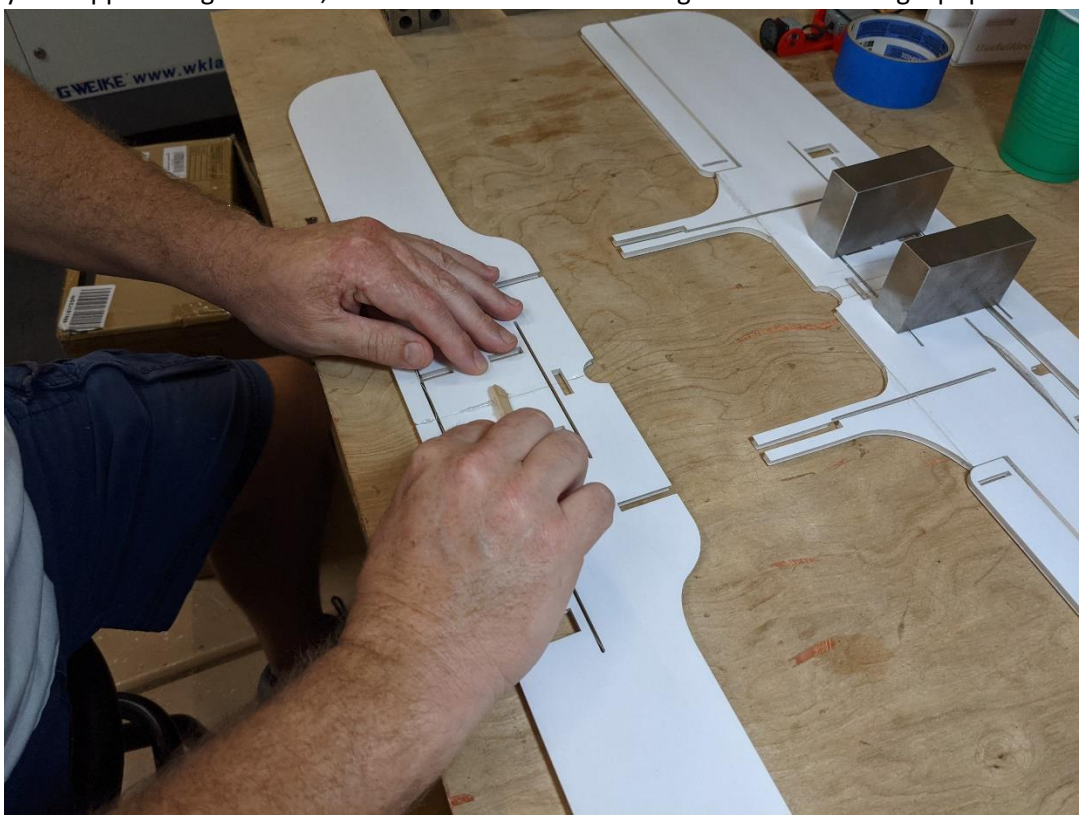


Once the Hot Glue is applied, Slide the wing forward onto the work surface and smear the Hot Glue along the fold seam. Repeat for both left and right sides. Allow the Lower Wing Skin to cool.

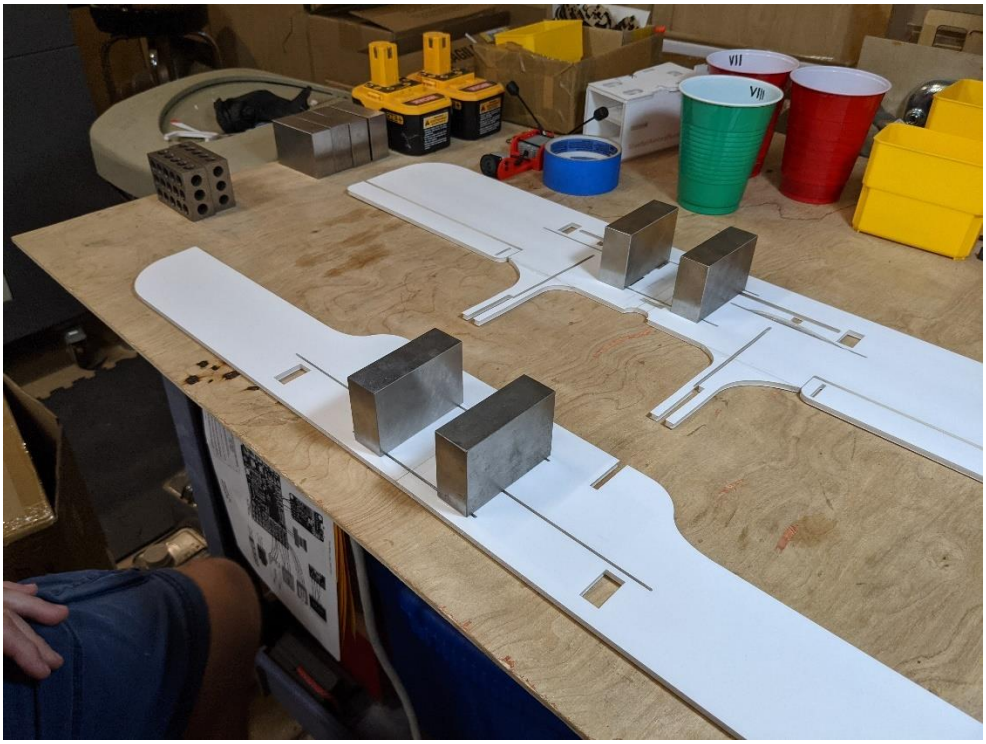


For the Upper Wing Skin, the procedure is the same. Apply hot glue into the fold seam.

Lay the Upper Wing Skin Flat, and smear the Hot Glue along the fold line using a popsicle stick.



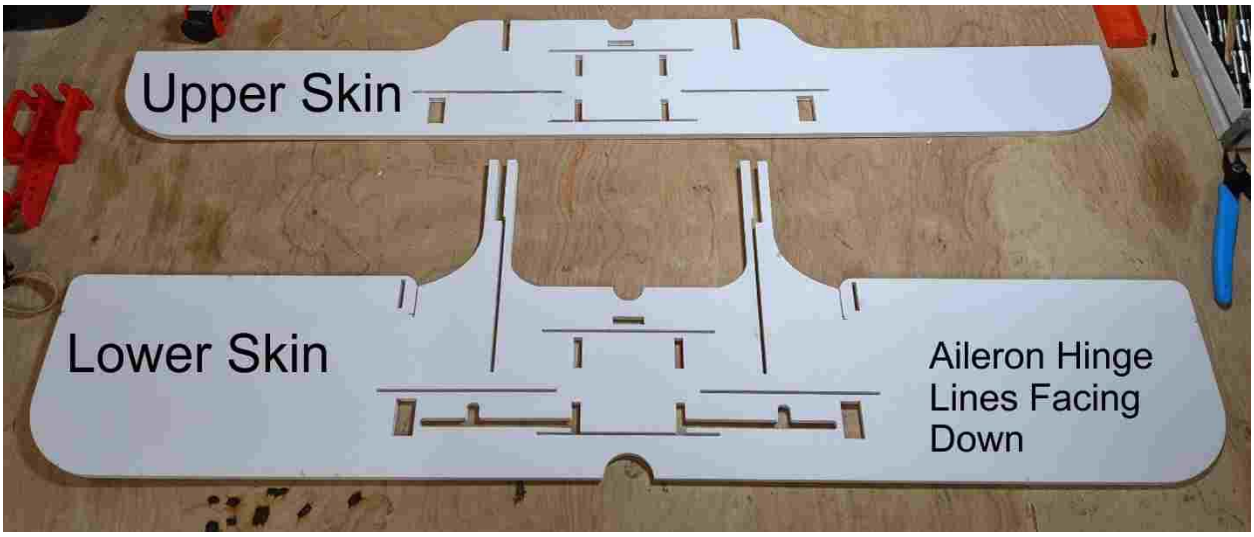
Apply weights to ensure the wing is flush to your build surface, and allow the Hot Glue to cool.



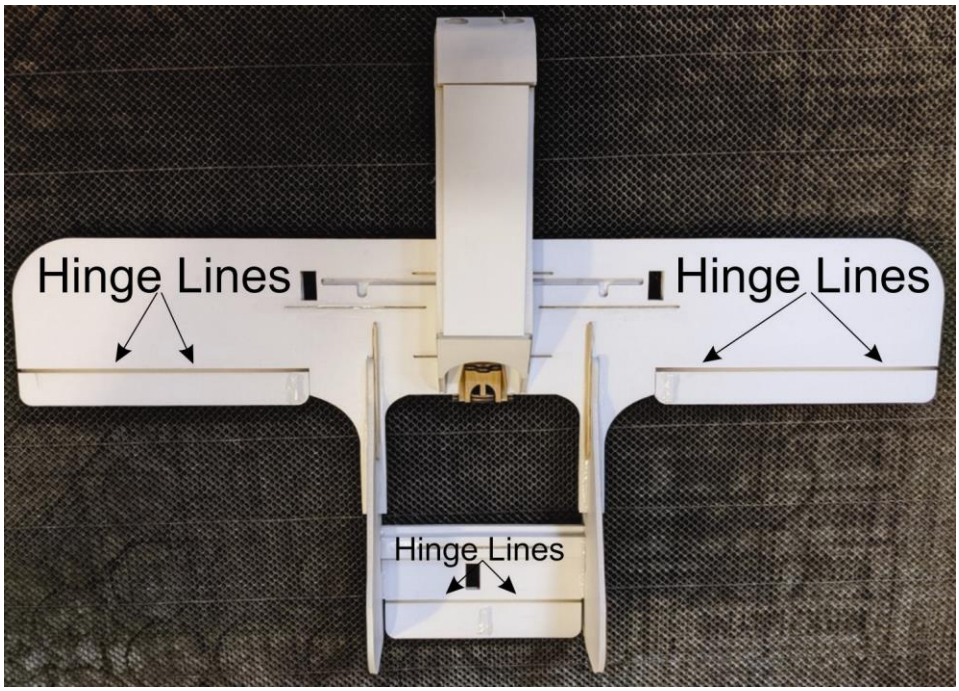
The Upper Wing Skin and Lower Wing Skin are now ready for use in construction.

Wing Assembly

Unfold and place both upper and lower wing skins onto your work surface as shown.

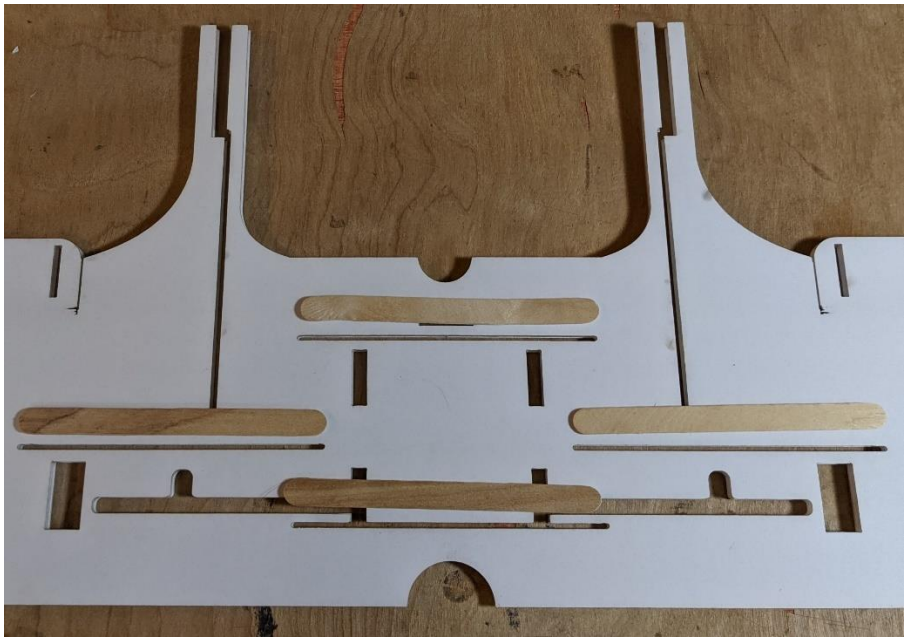


Notice the hinge lines on the lower wing skin are face down, as are the fold line on the upper skin. This is strictly an aesthetic choice for me – so don't fret if you build it upside down (actually I can think of aerodynamic reasons why that might be better – so do what you want) – it'll fly great either way. For reference, the photo below of the aircraft's underside is to show the hinge lines on the ailerons and elevator.

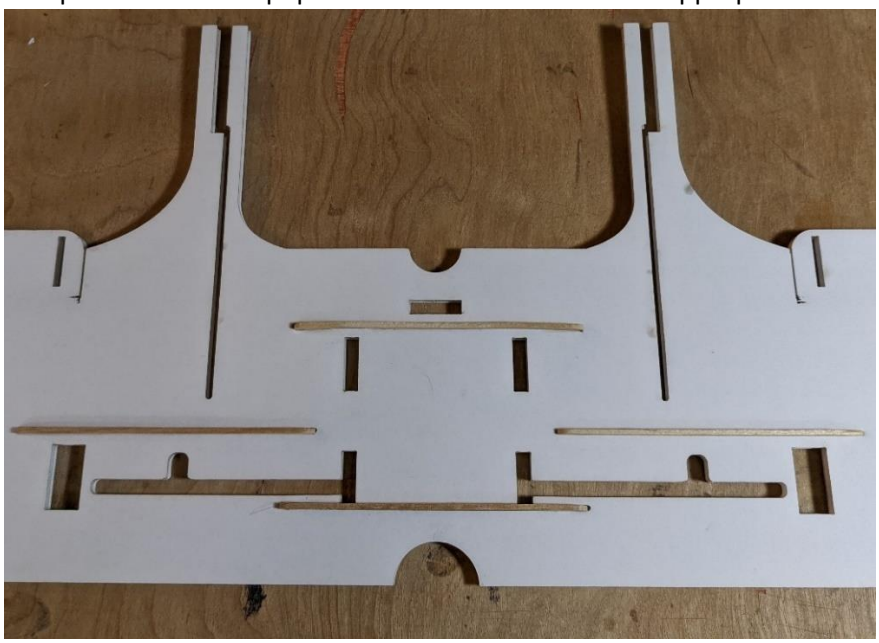


Insert the popsicle sticks into the lower wing skin. These will enhance the rigidity of the wing assembly and aid in alignment of the upper and lower wing skin.

This photo shows the popsicle sticks laying adjacent to where they will be placed.



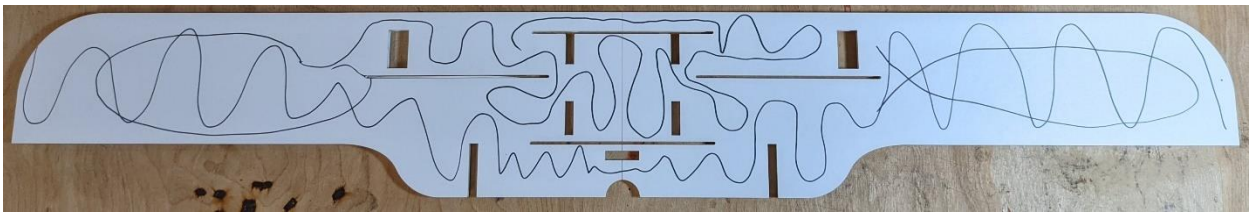
This photo shows the popsicle sticks inserted into their appropriate slots.



Before gluing – test fit the upper wing skin so you understand the alignment. Ensure the tab holes, servo mounting holes and wing tips are aligned. Correct upper surface alignment makes fitting the fuselage and tail easier and helps to ensure a square airframe.

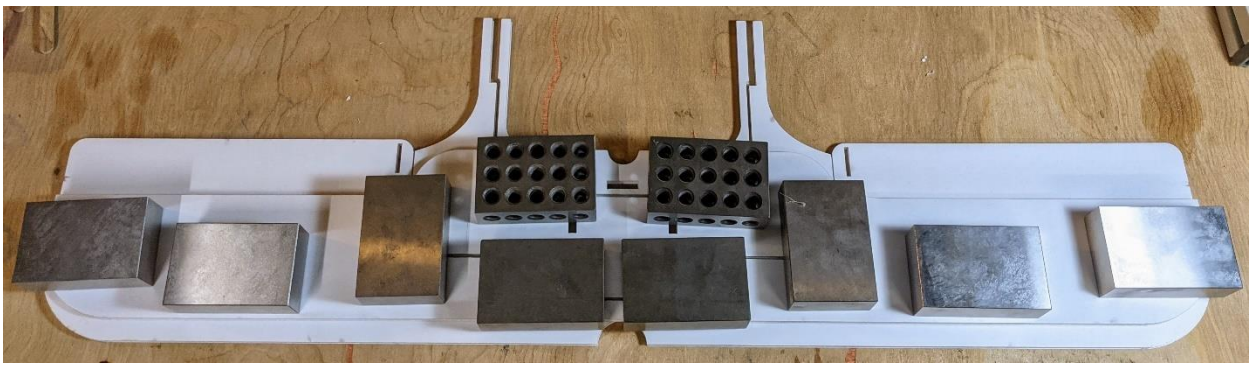
When ready and you understand how the parts will fit, let's begin with the upper wing surface.

This is where getting hot glue evenly distributed to all corners of the wing panels is critical. I used a sharpie in the image below to show you what I'm talking about. I lay out swirling patterns of hot glue across the entire upper wing skin. I want enough hot glue near to all edges to ensure good bonding of the upper and lower wing skins. Remember – cold ambient temperatures in your work area can greatly reduce the working time of the glue.



A good glue gun will give you at least 30 seconds to get the glue on the top wing panel and get it in place. You've got time. It's not really a rushed process – but once it starts – see it through.

Place the upper wing skin on the lower skin being careful to ensure your alignment is correct, and all servo holes, fuselage tab mounting holes, and wing tips are aligned. Place weights on the upper skin to ensure a good bond. Check that the leading edges of the upper skin are in close contact and well bonded to the lower skin.

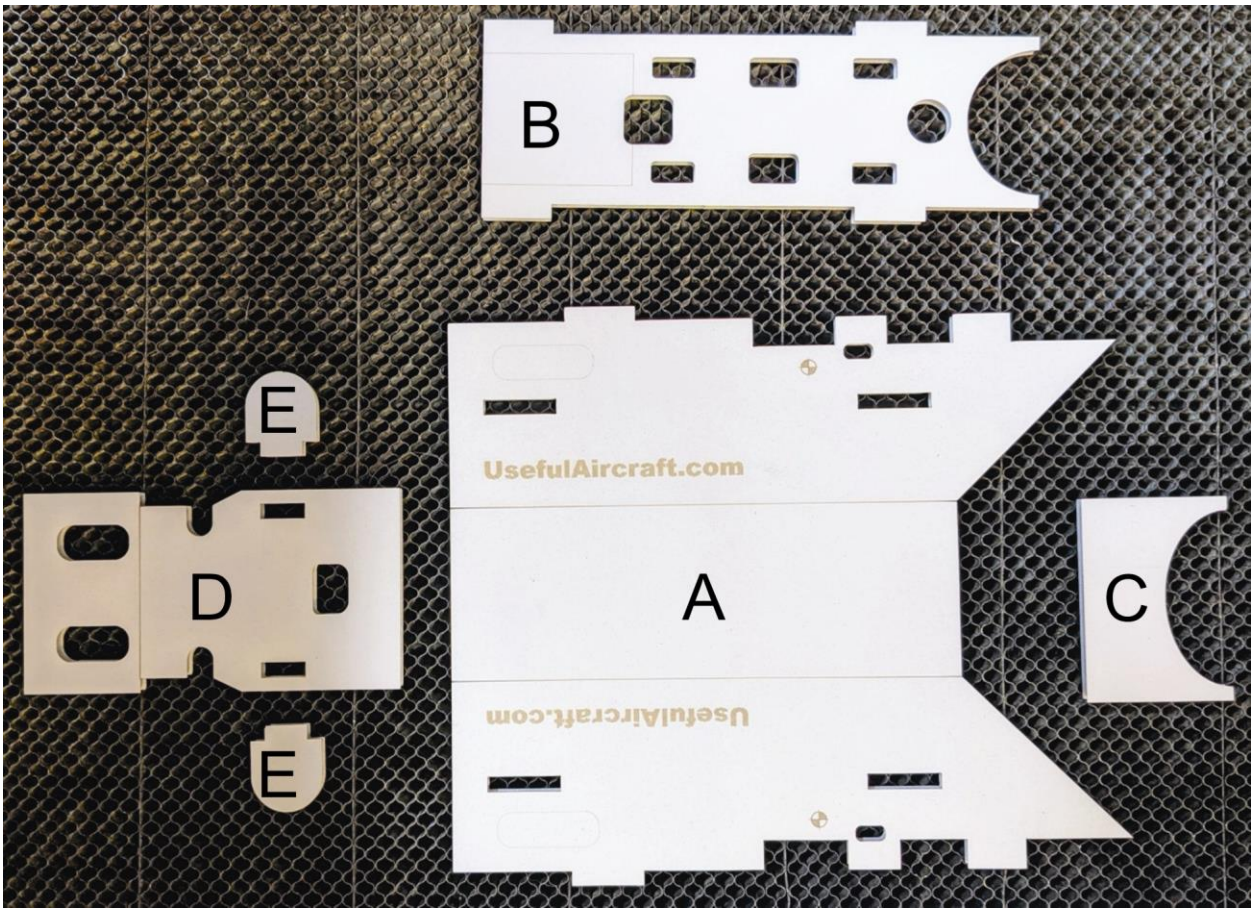


Once cooled, I do apply hot glue to seal the popsicle sticks in the new structure by laying a bead of hot glue the length of each popsicle sick, and then wiping it away. Do this to both sides of your wings to ensure the popsicle stick is well fixed inside the new structure.

Allow this subassembly to cool. We're done with the wings at this time.

Fuselage

Items in to build the fuselage are shown in the photo below.



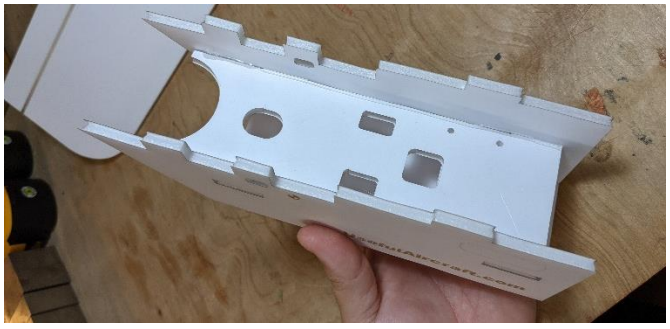
The fuselage subassembly consists of: (Parts labeled in photo above A, B, C, D, E)

- (A) Fuselage Exterior Skin
- (B) Avionics Shelf
- (C) Tailgate
- (D) Avionics hatch
- (E) Two Avionics Hatch hold down tabs

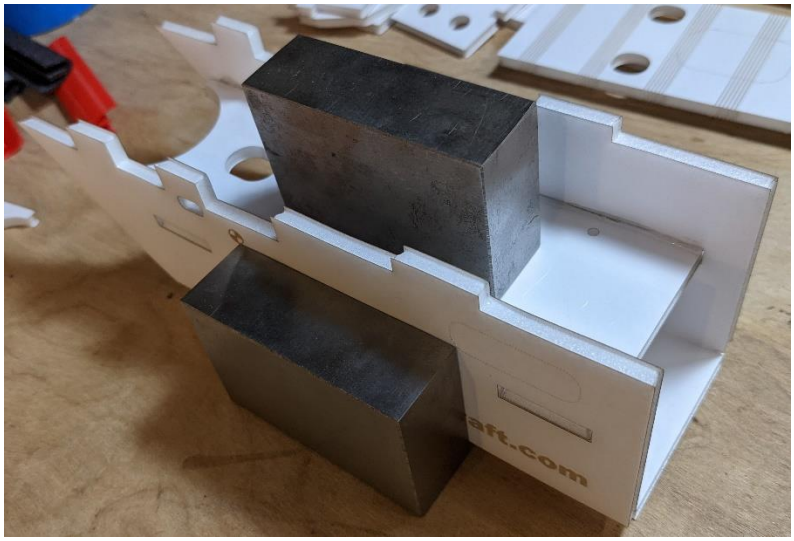
Take the Fuselage Exterior Skin and using a straight edge (I'm using the edge of my worksurface) bend the side panels along their fold lines.

Next, take the avionics tray and apply hot glue to the interior bonding surfaces – not the tabs that will penetrate the fuselage skin.

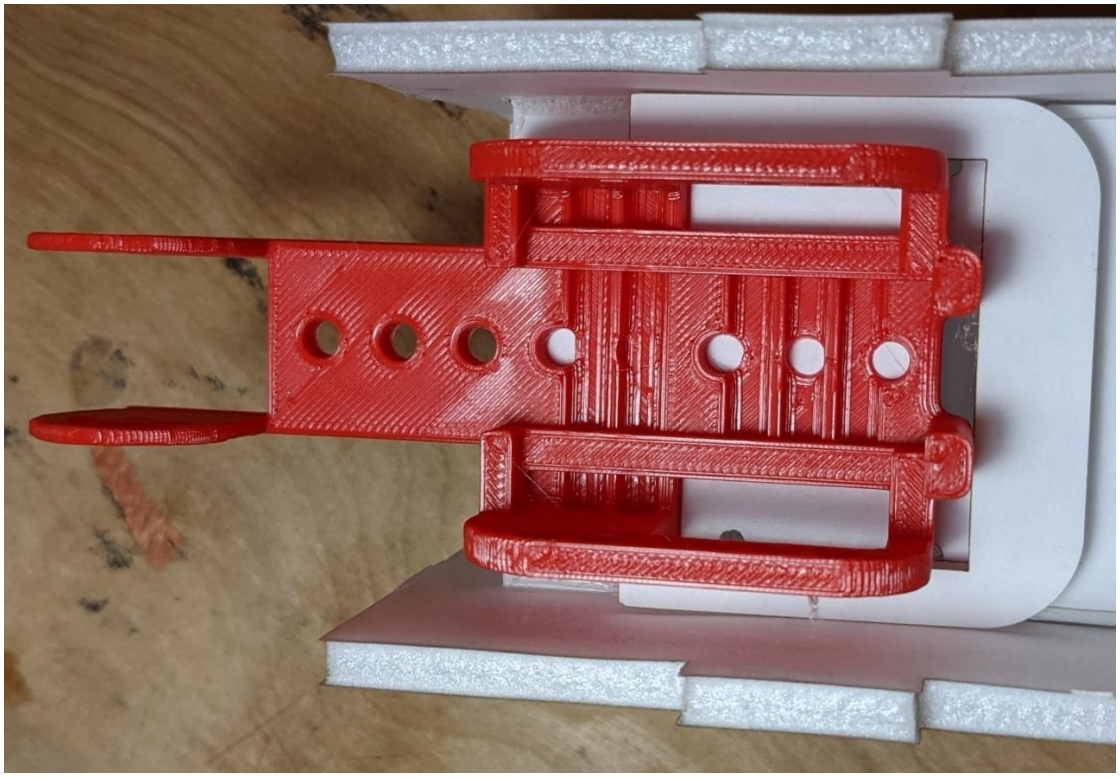
Insert the avionics tray into the fuselage skin ensuring the tabs are completely flush on both sides.



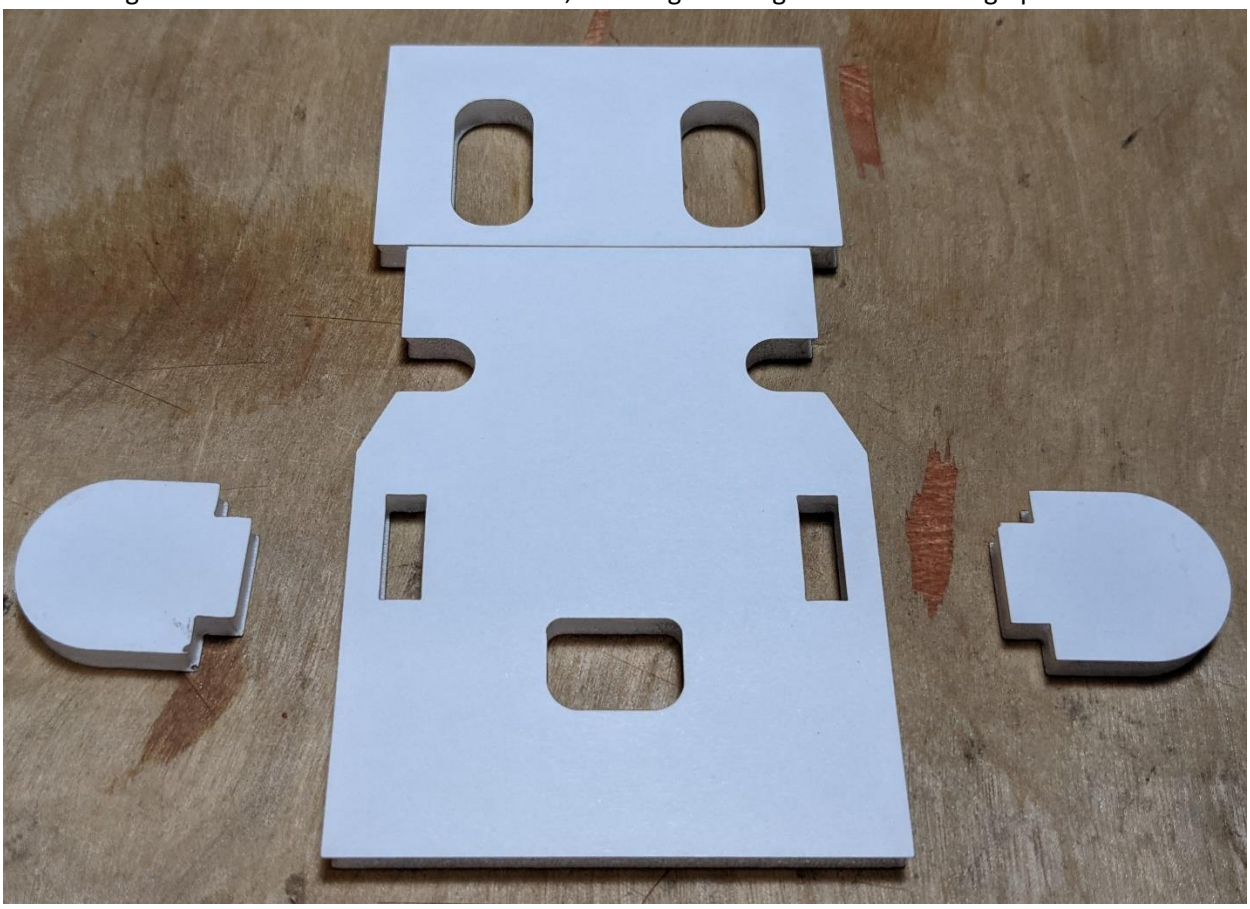
I place makers blocks on either side, and one in my avionics tray to allow the hot glue to cool while ensuring the fuselage is held square.



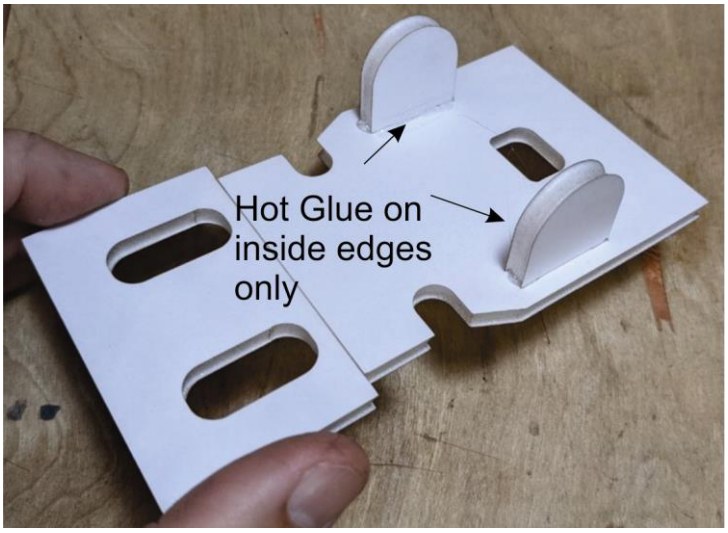
If an FPV Camera is intended to be installed, the outlined rectangle at the leading edge of the avionics tray provides alignment guidelines to ensure the camera mount is installed correctly for the cutout in the nose. A disposable foamboard alignment tool is also included to assist in securing your FPV system as shown below.



The fuselage hatch should be laid out as shown, ensuring the hinge cut line is facing up as shown below.



Glue the tabs into the fuselage hatch, using hot glue underneath the tab bonding areas, and on the interior of the tabs as shown.



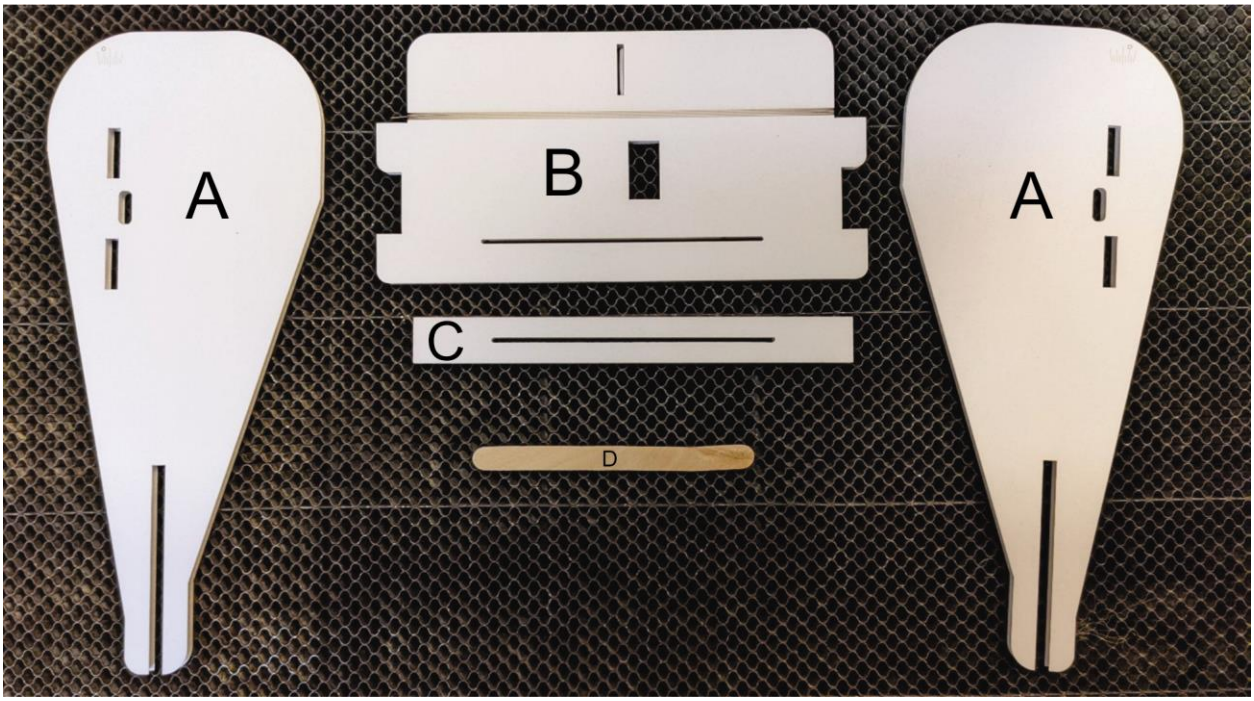
After completion of the build, if a more secure closing of the hatch is required, hot glue can be added to the exterior surfaces of these tabs as shown below. Check this prior to first flight.

I generally do not glue the hatch assembly, or the tailgate on to the fuselage until after all electronics installations are complete and thoroughly tested, as these parts will only restricts subsequent access.

Allow all parts to cool and set aside. At this point we are done with the fuselage.

Empennage (Tail assembly)

Components for assembly of the empennage are shown in the photo below.



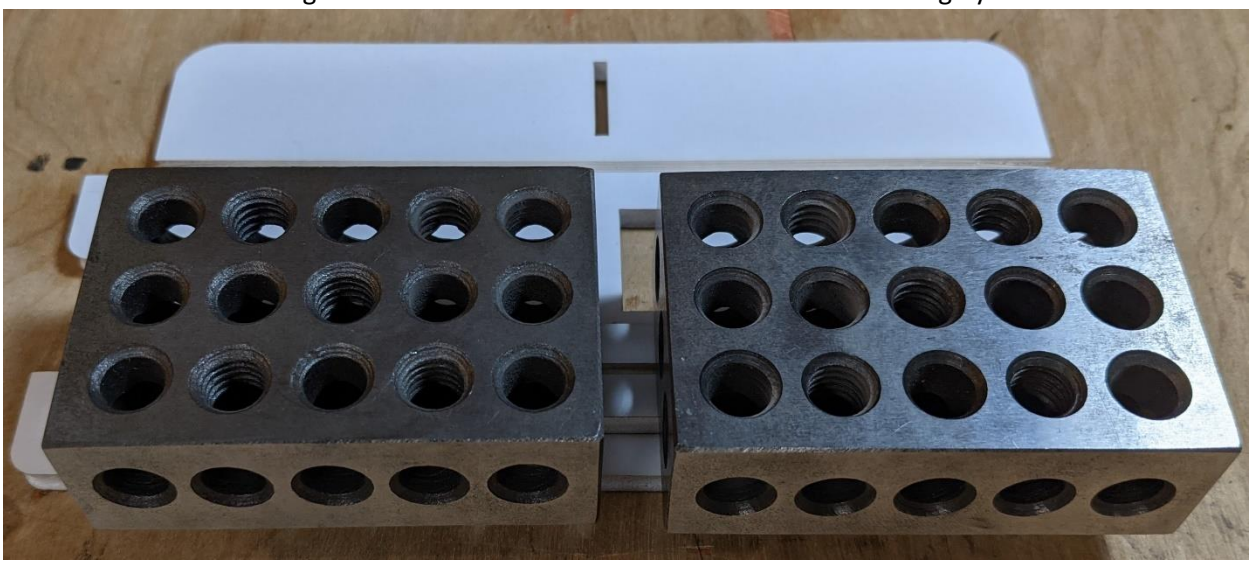
Parts include: (Parts labeled in photo above A, B, C, D)

- (A) Vertical Stabilizers
- (B) Elevator
- (C) Camber Rib
- (D) Popsicle Stick

Assembly is straight forward, but as opposed to the wing, the elevator is built with the hinge facing up. This is critical, as unlike the wing which provides lift to keep the plane in the air, the tail provides downforce to balance the weight of the nose. The Camber Rib helps to provide this, as well as strengthens the elevator.

Insert the popsicle stick into the slot in the elevator, apply glue to the mating surface of the Camber Rib, and secure it to the Elevator. Once cooled, I do apply hot glue to seal the popsicle stick in the new structure by laying a bead of hot glue the length of the popsicle stick and then wiping it away. Do this to both sides of your elevator to ensure the popsicle stick is well fixed inside the elevator.

Place weights on the mated surfaces and allow them to thoroughly bond.



Once the elevator has cooled and is well bonded, apply hot glue to the area between the tabs only (not on the control surface – this will have to move freely). Insert the tabs through the Vertical Stabilizers, ensuring the hinge line and camber rib is now facing down. The elevator should line up with the elevator trim indexes on the inside of the vertical stabilizers on both sides.

Once the hot glue has cooled and set, we need to secure the elevator at the outer face of the vertical stabilizers as shown in the photo below. This second bead of hot glue prevents vibration from simply delaminating the foamboard on the surface of the vertical stabilizers. This is done by a simple bead of hot glue at the exterior junction of the tabs and the vertical stabilizer. Perform this step on both the left and right sides.

Ensure the elevator tabs are glued on the outside of both vertical stabilizers as shown in the photo above. All 4 tabs protruding through the vertical stabilizers should be glued from above and below.

Allow all parts to cool and set aside. This completes the construction of the tail assembly.

Wing and Tail Assembly Mating

This is a process that I find easiest to do with the wing pressing against my body allowing me to control the movement of the tail as I install it. The tail assembly has the camber rib on the underside and the wing has the upper skin facing up (aileron hinge lines are facing down).

Make careful alignment and go slow. There is no rush. The parts gain considerable strength once assembled, but at this point they can be damaged easily. If something is binding and not sliding, stop and check alignment of all interfacing surfaces. There are a lot of close tolerances and parts can be misaligned vertically or horizontally. Take your time with this process.

Ensure the hinge lines are facing down on both the tail and the wing. You should not be able to see the camber rib on the elevator. Don't apply hot glue until you're sure things are correct.

Align the parts and begin sliding them towards one another taking care to see where any binding is occurring and re-aligning the parts as they slide into one another.

Bring the surfaces together until the vertical stabilizers are just about to enter the alignment channels on the upper surface of the wing as shown in the photo below.

At this point I apply glue inside the upper wing surface alignment channels and then slide the vertical stabilizers the rest of the way into position.

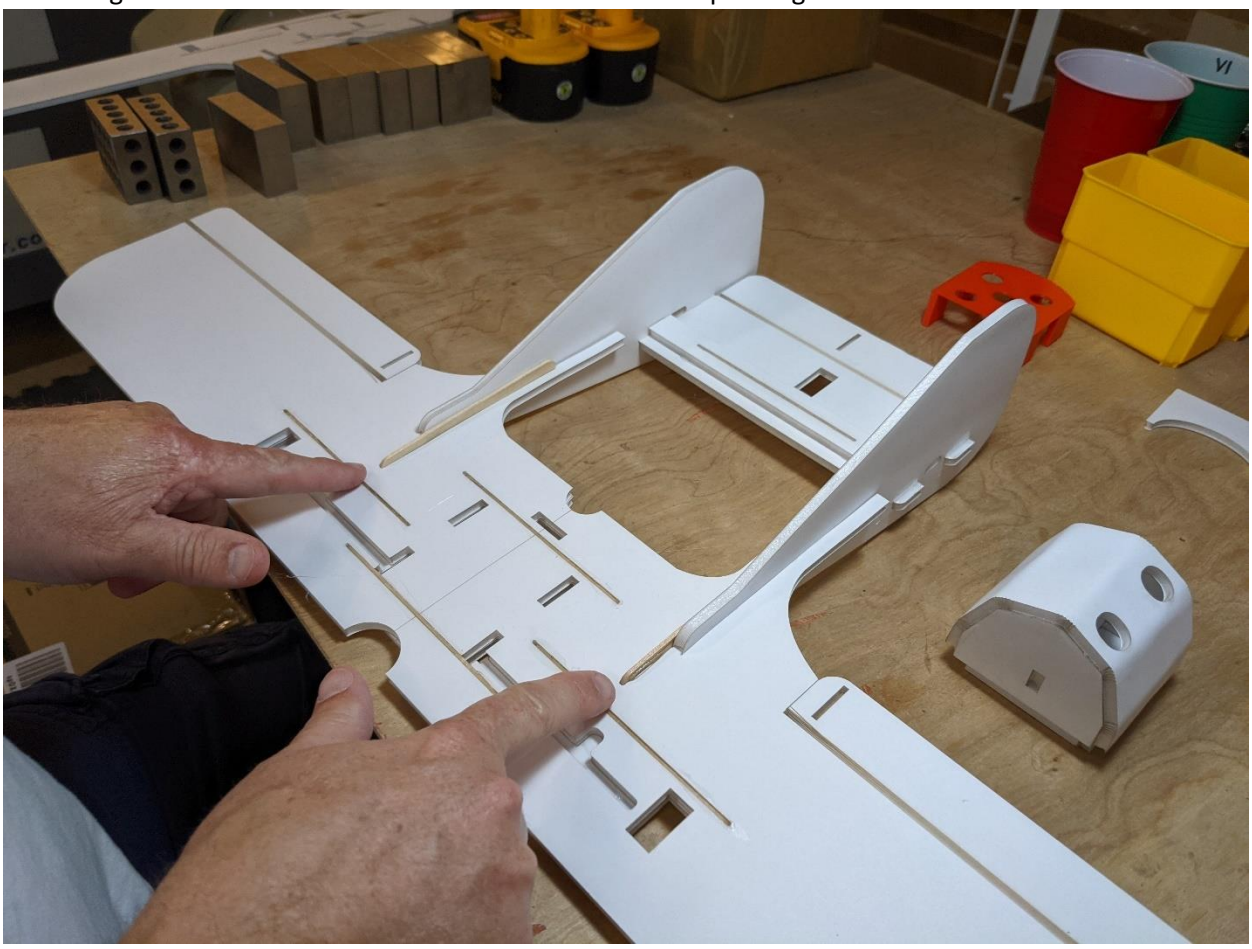
When fully mated, flip the wings and tail over, so we can now work on the underside. We need to install the popsicle sticks that will help to distribute pitching moments. I point out where those go in the photo below.

Apply glue to the flat side of a popsicle stick as shown in the photo below and install into the main wing assembly and to the interior surface of the vertical stabilizer. Ensure the popsicle sticks are well bonded to the vertical stabilizer and secure. The popsicle sticks are installed on the lower side of the wings, and the interior of the vertical stabilizers helping to strengthen the interface.

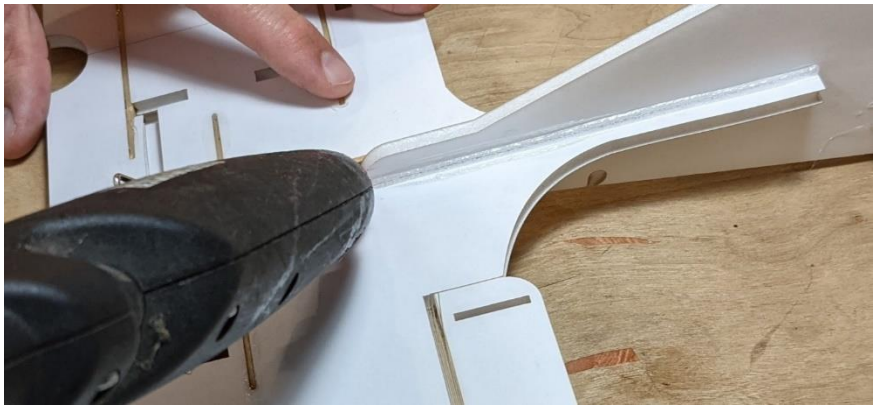
Hold in place until it is secure.

Repeat this process with the other side.

Both wings are now braced to better absorb and distribute pitching loads.



As further reinforcement, I run beads of hot glue down all mating surface joints. This is a good idea to do at all 90 degree joints on your airframe.

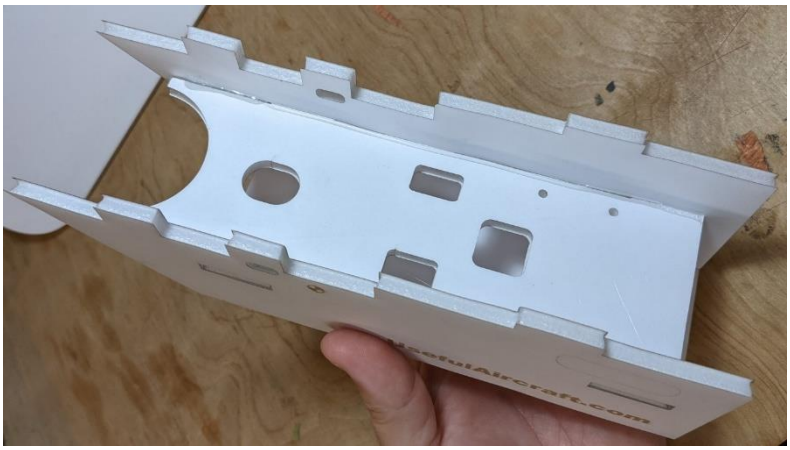


Apply glue beads in this manner to all interior and exterior joints surrounding each vertical stabilizer.

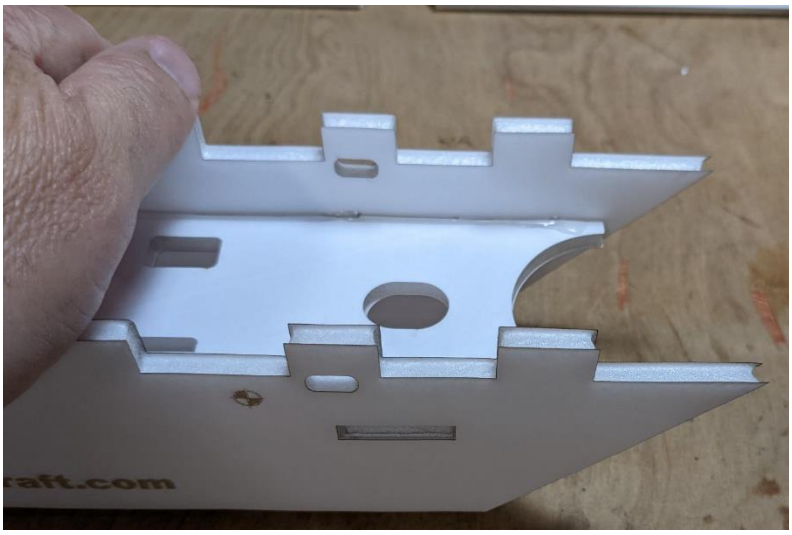
The wing to empennage mating is now complete. Allow the structure to cool and fully set.

Fuselage and Motor Mount Installation

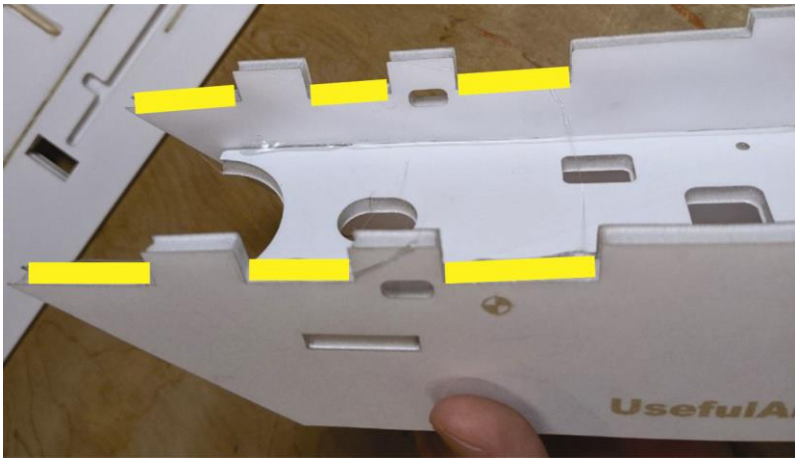
Mating the fuselage is simple.



There are four tabs that slot into the underside of the wing.



The forward set of tabs has a cut out for wiring to pass through.



Apply glue in the low areas only.

In the photo to the left, I have highlighted the areas in yellow where you should apply the hot glue.

Ensure you are mounting the fuselage to the underside of the wing.

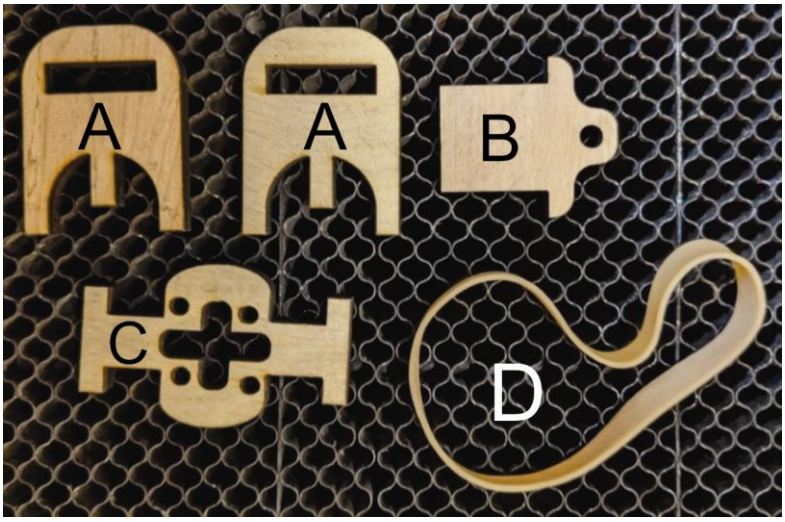
You should see wiring cutouts extending from the servo cutouts.

Slide the tabs into the appropriate holes and press your fuselage into place.

Run a bead of hot glue down the wing to fuselage juncture to further ensure a solid mating.

Be sure not to fill the oval cutouts for the wiring passthroughs with hot glue.

The fuselage is now installed. The Motor mount is next.



The motor mounts are installed from underneath. The required parts are shown below.

The parts consist of:

- (A) Two Motor Mounts
- (B) One Alignment Pin
- (C) One Motor Backplate
- (D) One Rubber Band

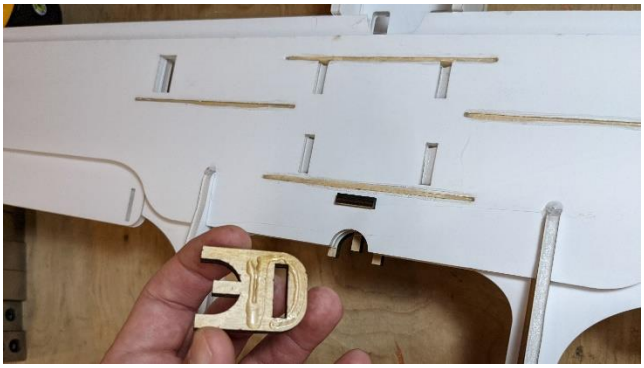
Insert the Alignment Pin into one of the Motor Mounts.

The hole in the Alignment Pin can be used to secure motor wiring later.

Next we'll apply glue to these components, and install them from the underside of the aircraft.

Apply hot glue as shown. Be sure to use enough glue that both the Alignment Pin and the motor mount are bonded.

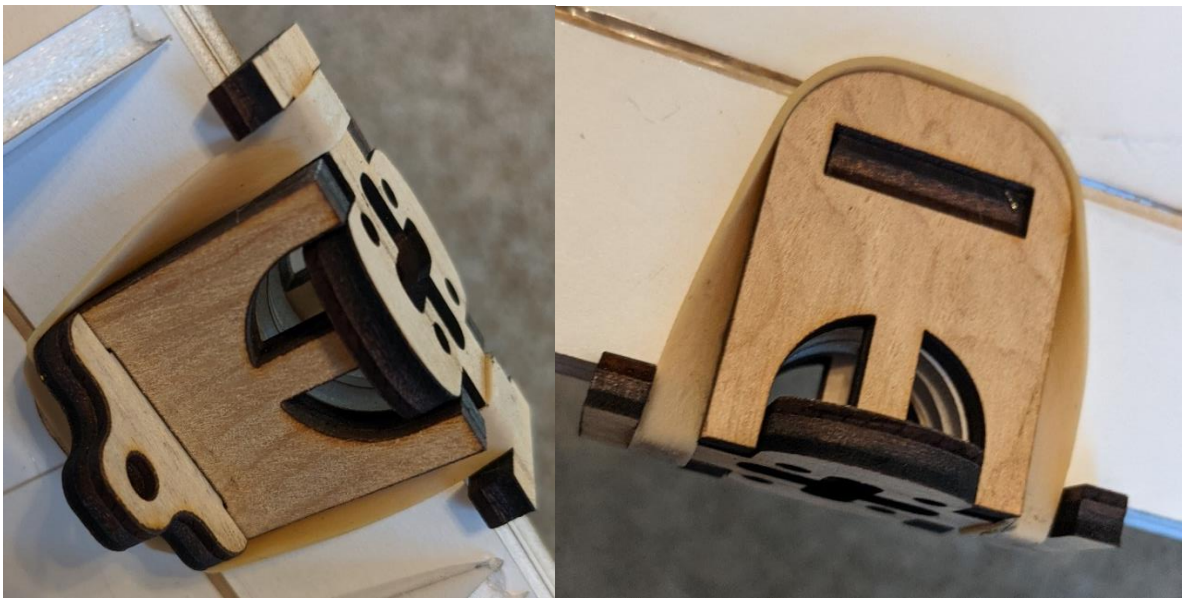
Insert the Alignment Pin and Motor Mount into the Wing assembly as shown. They are glued in on the lower wing skin. The Alignment Pin is protruding through the upper wing skin.



Apply glue to the remaining motor mount and glue it to the top of the upper wing skin.

Hold in place until the glue has set and the motor mounts are secure.

The rubber band loops around the upper and lower motor mounts and holds the motor backplate.

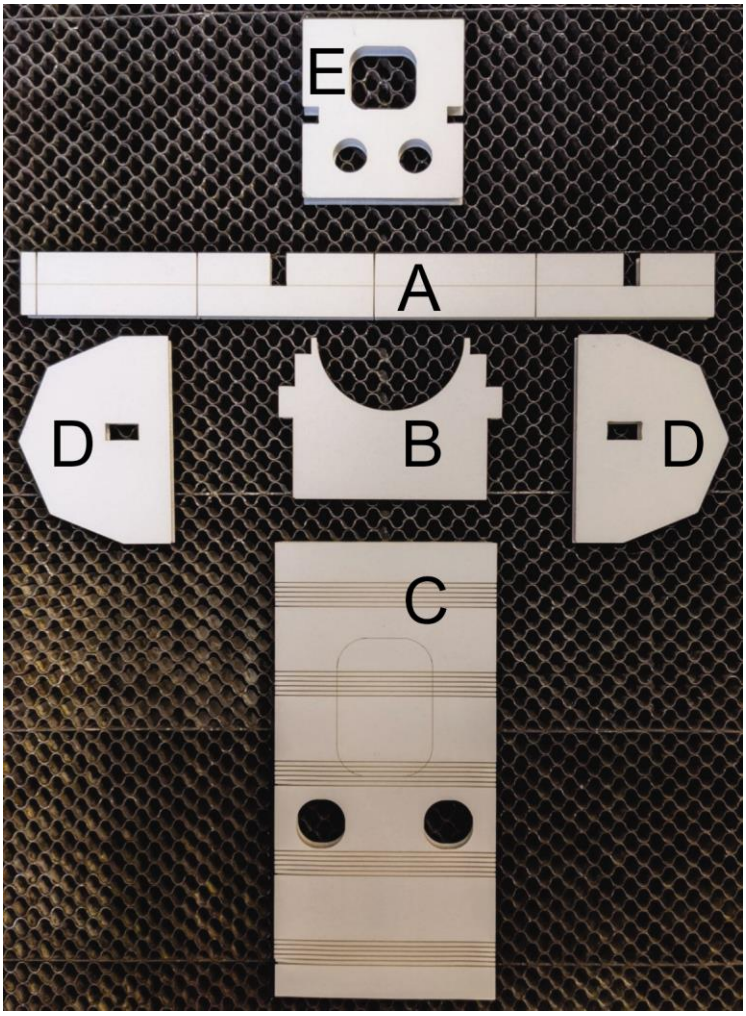


As this aircraft is a pusher design, the motor is pushed into the fuselage during forward flight. The rubber band allows the motor mount to have limited flex in the event of a prop strike and allows for easy motor changes. **There is no glue on the Motor Backplate.**

This completes the Fuselage and Motor Mount Installation.

Nose Construction

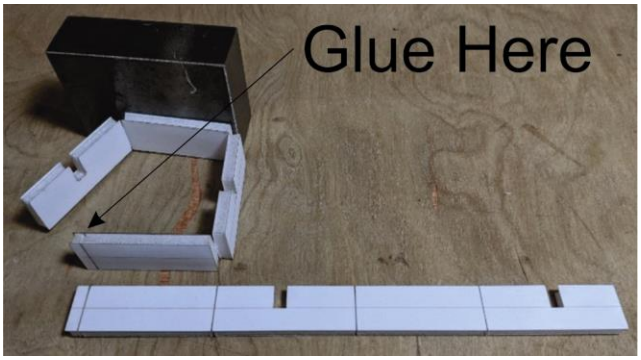
The nose of the aircraft is the single most complex airframe component. That said, it's a series of simple steps, and taken one at a time, it'll go well. The photo below has the components that make up the nose of the aircraft.



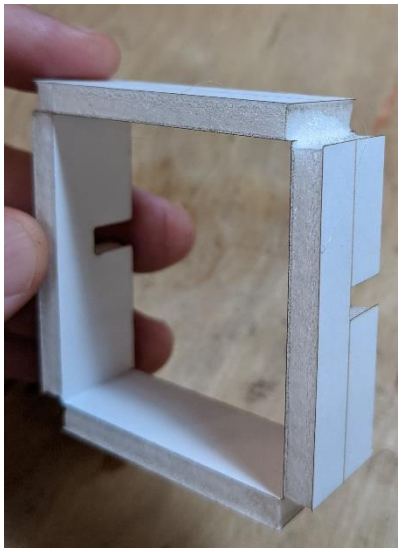
The Nose is made up of the following parts:

- (A) Slip Ring
- (B) Camera Platform
- (C) Exterior Skin
- (D) Two Side Skins
- (E) Nose Frame

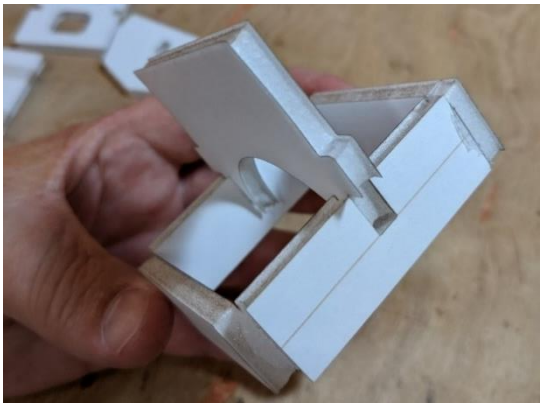
The Slip Ring is the part of the nose that slides into the leading edge of the fuselage and forms a secure attachment.



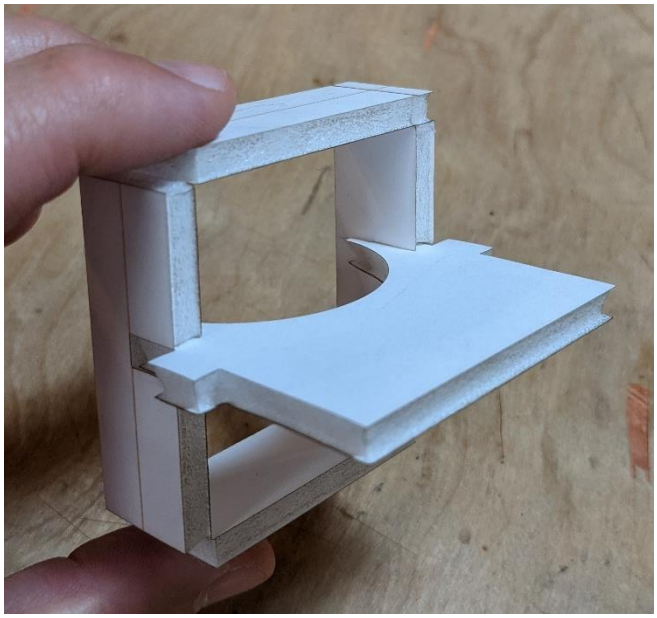
The Slip Ring has cuts that allow it to form into a rectangle. Bend it as shown in the next photo.



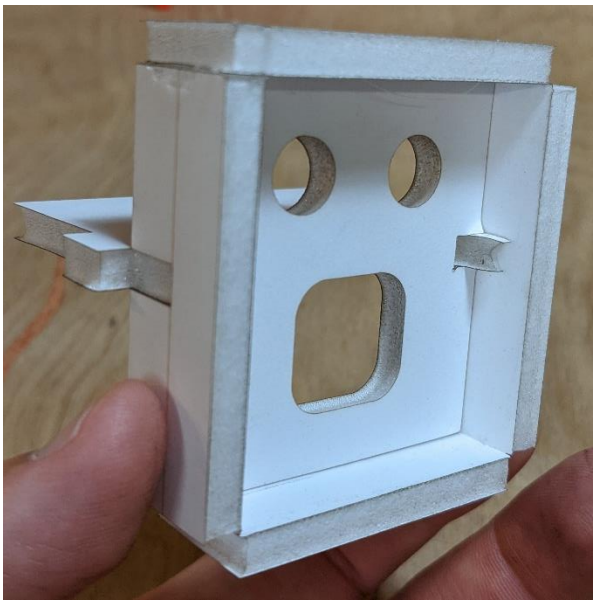
The Slip Ring is glued in this position, and in the photo to the left, I'm holding pressure on the glue joint. Hold this pressure manually, keeping all parts in alignment, and allow it the glue to cool. Don't rush this.



Next insert the camera platform. It is designed to be a snug fit. You may need to pinch the edges of the camera platform's interfacing tabs – and that's ok.

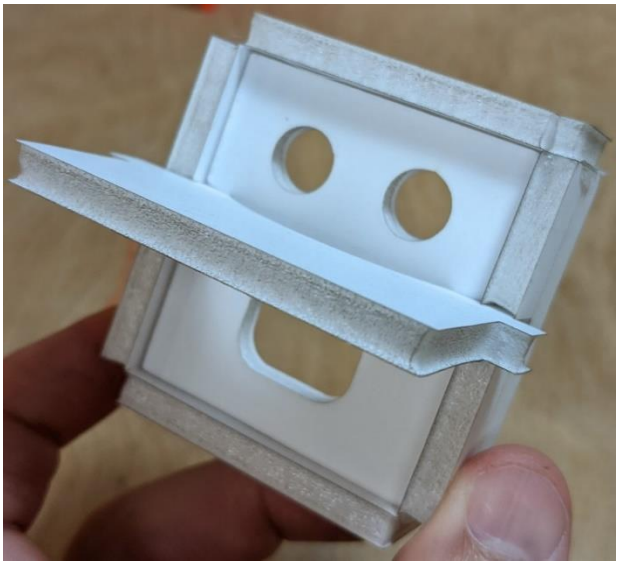


The Camera Platform is only being held in place with friction at this point. No glue yet.



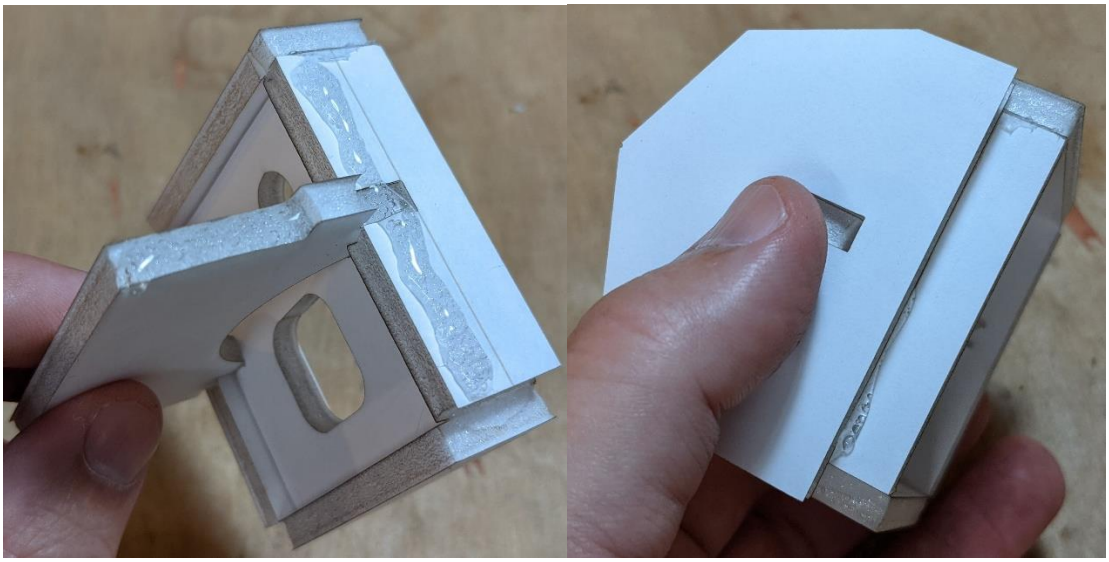
Insert the Nose Frame into the slip ring noting that it will only fit one way. There is an up and a down to this part. Go slow and do not force it. This is what it should look like when it is inserted correctly.

The Nose frame is used to keep the Slip Ring square during the following steps. It will be removed at the end of construction and discarded.

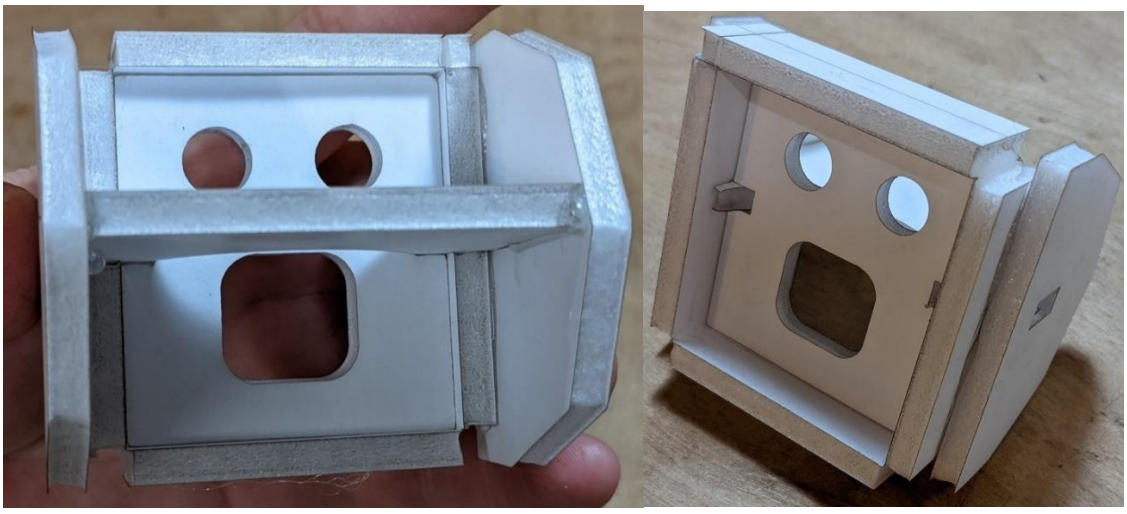


The Nose Frame is not glued in. It is simply used to hold the Slip Ring square and the camera tray flat during the rest of the installation. It also provides a guide to show how to install the Nose Skin (match the air inlets and camera ports).

Next, we attach the Side Skins. Test fit these to ensure you're installing them correctly. There is a top and a bottom. Once you know how you will be attaching them, glue them in place. Apply your hot glue, and ensure the back of the Side Skin covers only the front half of the slip ring (up to the line). Reference the photos below. Hold this in place, and let the hot glue cool fully. Take your time, and you'll build a beautiful nose.

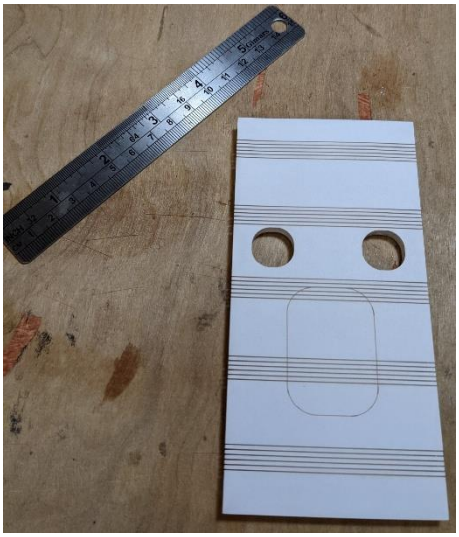


Apply the other side skin in a similar fashion.

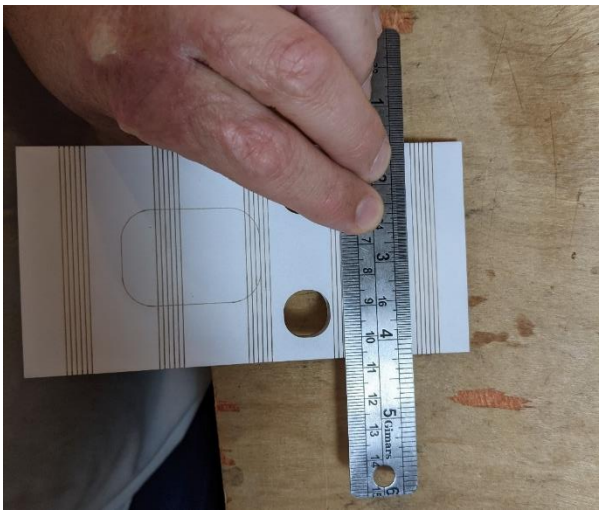


Once the Side Skin installations are complete – set it aside and ensure the hot glue is fully cooled. It's time to pre-form the Nose Skin.

At this point decide if you'll want to install a camera or not. If you want a camera, cut out the oval pattern in the Nose Skin using a razor or other sharp knife. Once the nose is skinned – this will be far more difficult to remove this piece. With or without the cutout, the following steps are the same.

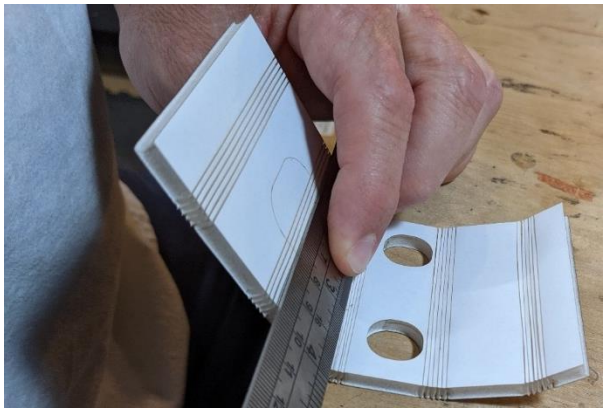


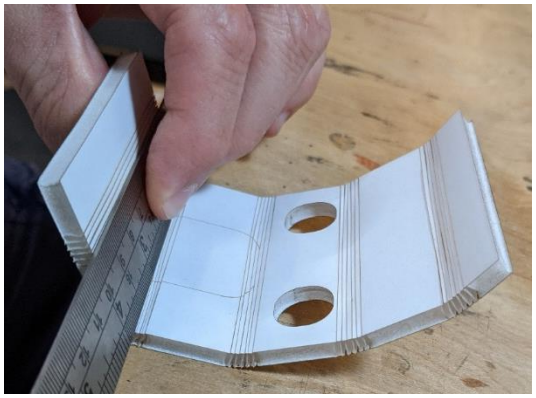
Find a ruler or a straight edge of some kind. We'll use this to make clean bends to the Nose Skin. The Nose Skin is pre-scored like the hinges that form the ailerons and elevators. In these cuts, the laser vaporizes the interior foam, allowing radius bends that leave the exterior skin intact.



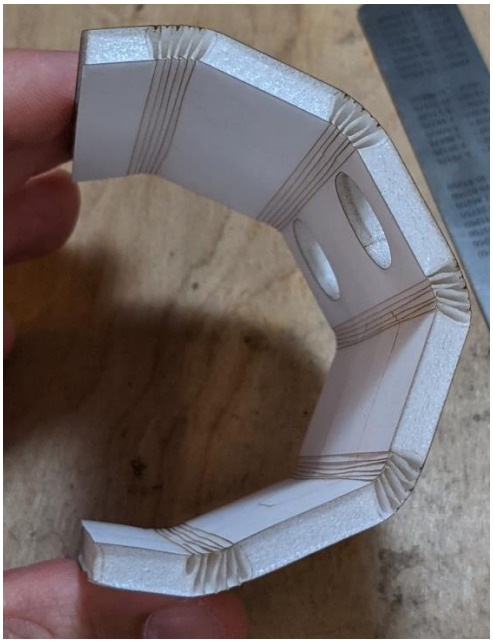
Use the straight edge to keep the foamboard rigid as you form the folds. The straight edge is placed behind the last fold line in any given group. The foamboard is held firmly against the straight edge and then bent a little more than 45 degrees. The foamboard will rebound after, closer to its original shape, and that's fine. We're just setting a pre-bend to make our final installation easier.

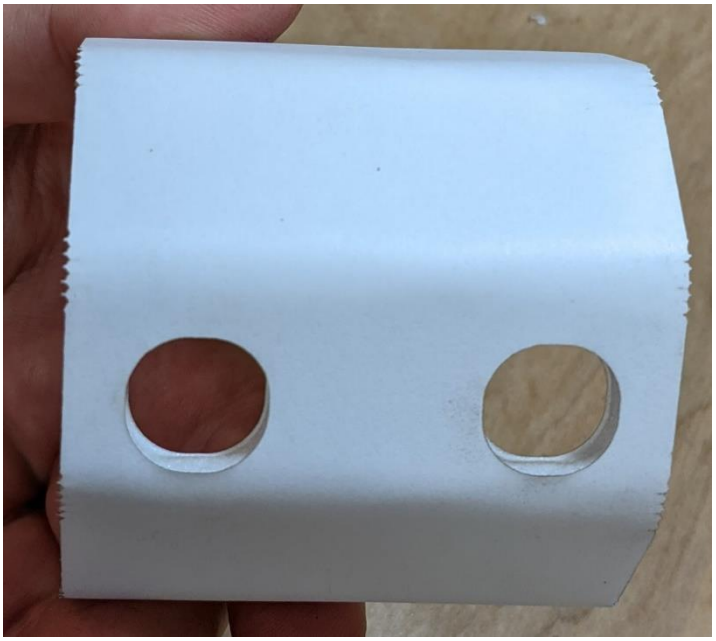
Move through each group of bend lines in a similar manner. Passing the mid point, you can simply turn the nose 180 degrees so the bends are easier for you.



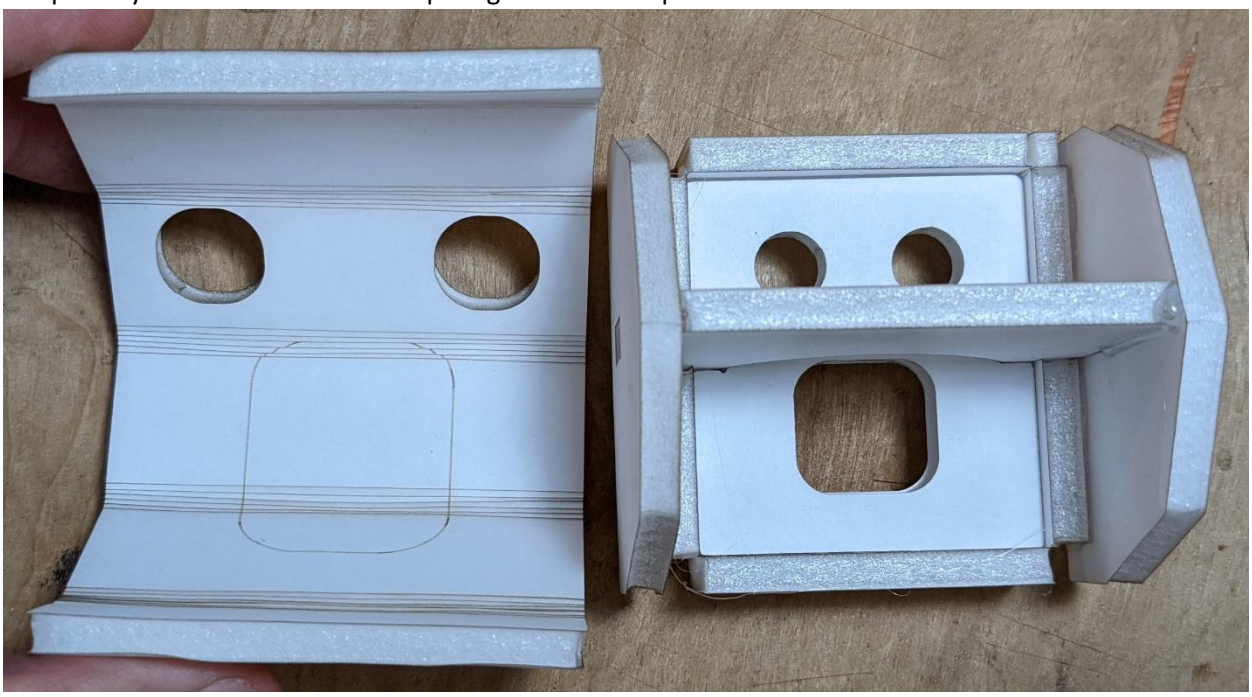


Once formed, your Nose Skin should look like the photos below.

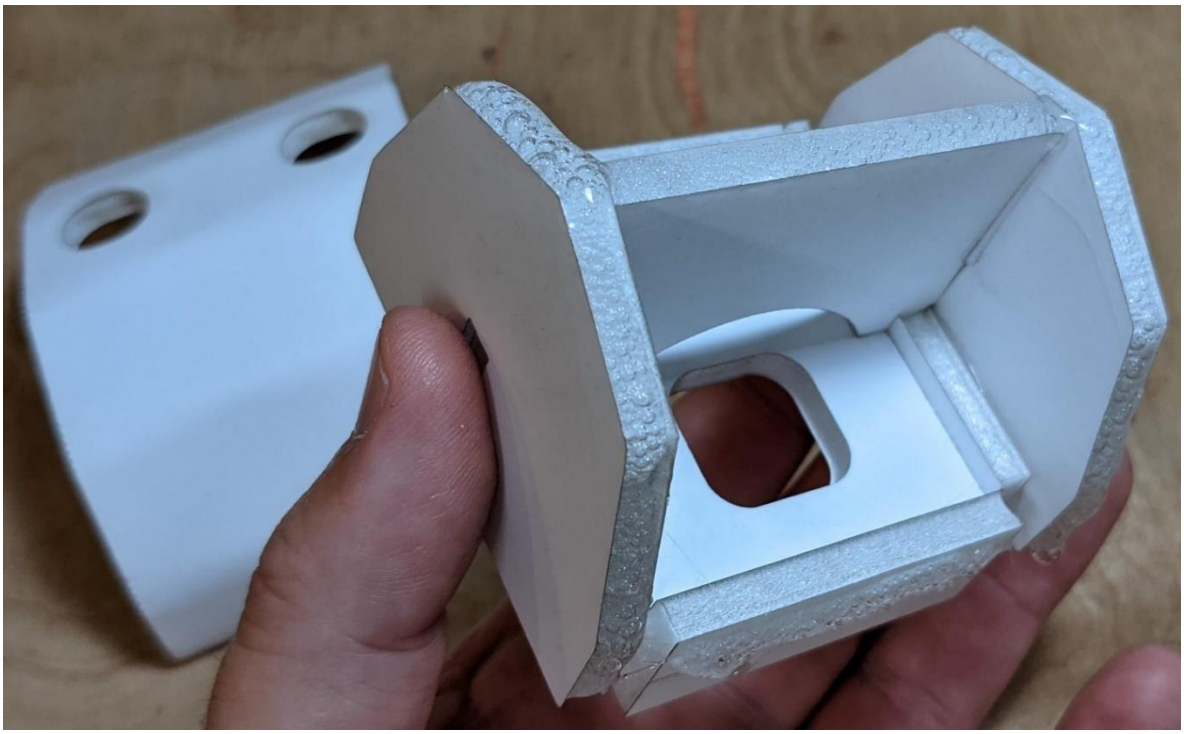




Now, let's think about the installation. Those air intakes need to align with the Nose Frame that we've temporarily installed in the Nose Slip Ring. Look at the photo below.

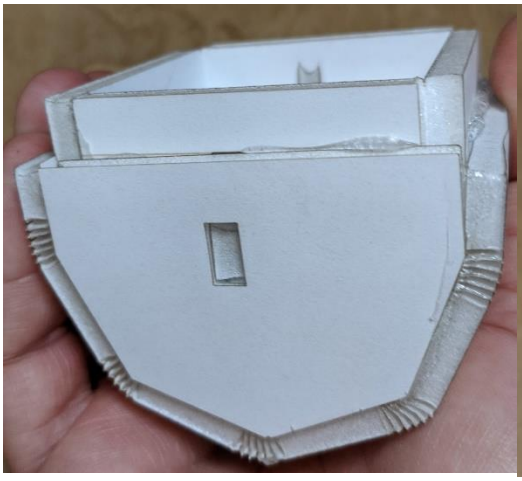


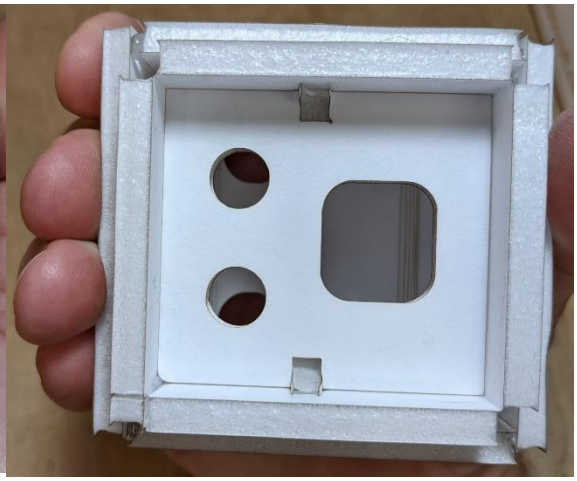
When ready, apply hot glue to on all edges of the Camera Platform, side skins, and the front half of the slip ring. The back half of the slip ring will form a press fit into the fuselage, and that's why there's a line around the perimeter of the slip ring - to mark this boundary. Try not to get hot glue on the back half of the slip ring.



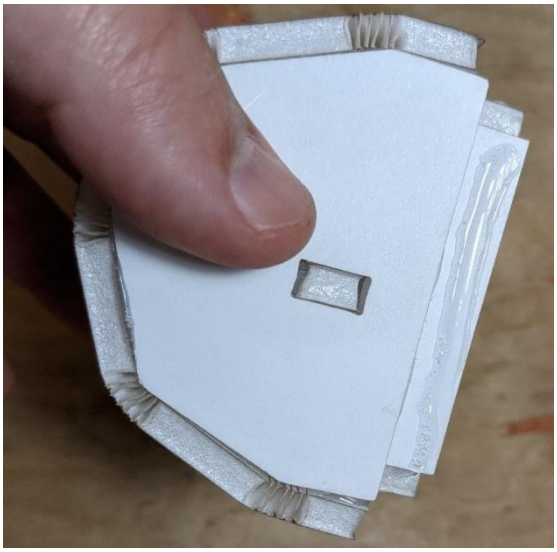
At that point, and referencing the Nose Frame, install the Nose Skin to match the Nose Frame.

Hold this snug, and check all sides until the glue cools.





Allow all parts to fully cool to ensure everything remains in place.

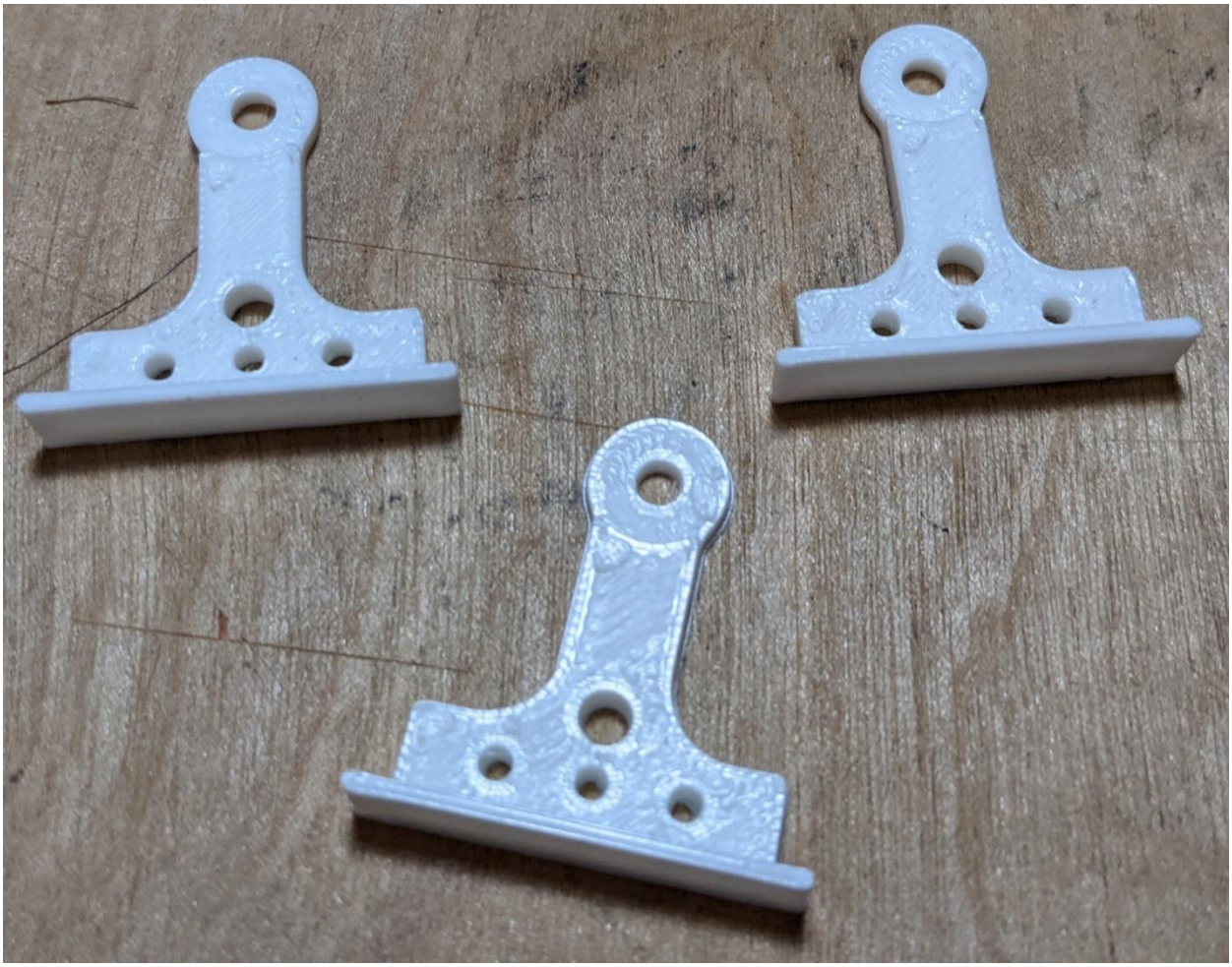


When installing the nose onto the airframe the first time, you may need to pinch the leading edge of the slip ring as it interfaces with the fuselage, as it's a snug fit. If things loosen up, you can apply a thin layer of hot glue to the exterior surface of the slip ring to make that fit snug again.

Remove the Nose Frame, and construction is complete.

Control Horns

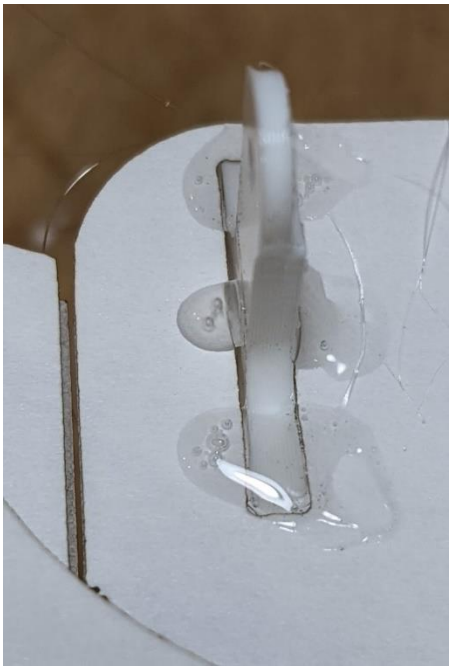
Control Horns are conventionally mounted.



Push the control horn through from the underside of the elevator and ailerons. Apply hot glue and allow it to cool. Control horns are 3d printed and too much heat could deform them, so allow the horns to cool fully before flipping the airplane and applying more glue.

Flip the plane over and secure the control horns on the top side with additional hot glue.

On the top side of the installed control horn, there is a hole just above the wing skin in the center of the horn itself.



Look at the photo to the left. This is the upper surface of the wing.

Glue your control horns in from below and above. This keeps the flight control in compression and prevents delamination issues.

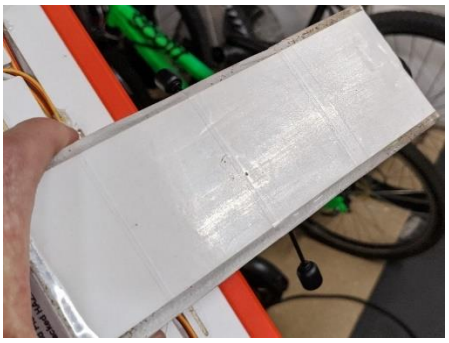
Control horns can be installed with the detent at the tip of the control horns facing either direction. The outfitting of your pushrods will help you determine what is best for your intended application. In my builds, I install them as shown.

This completes the installation of the control horns.

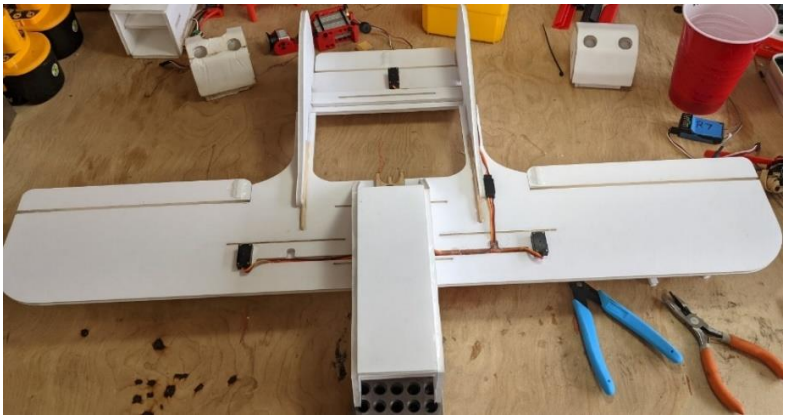
Completion, and some thoughts…

At this point, the airframe should be complete. Here are some thoughts on completion and some design choices.

Run a bead of hot glue along the outer bottom edges of your fuselage. That connection between the lower skin and sidewalls of your airframe is only strengthened by this.

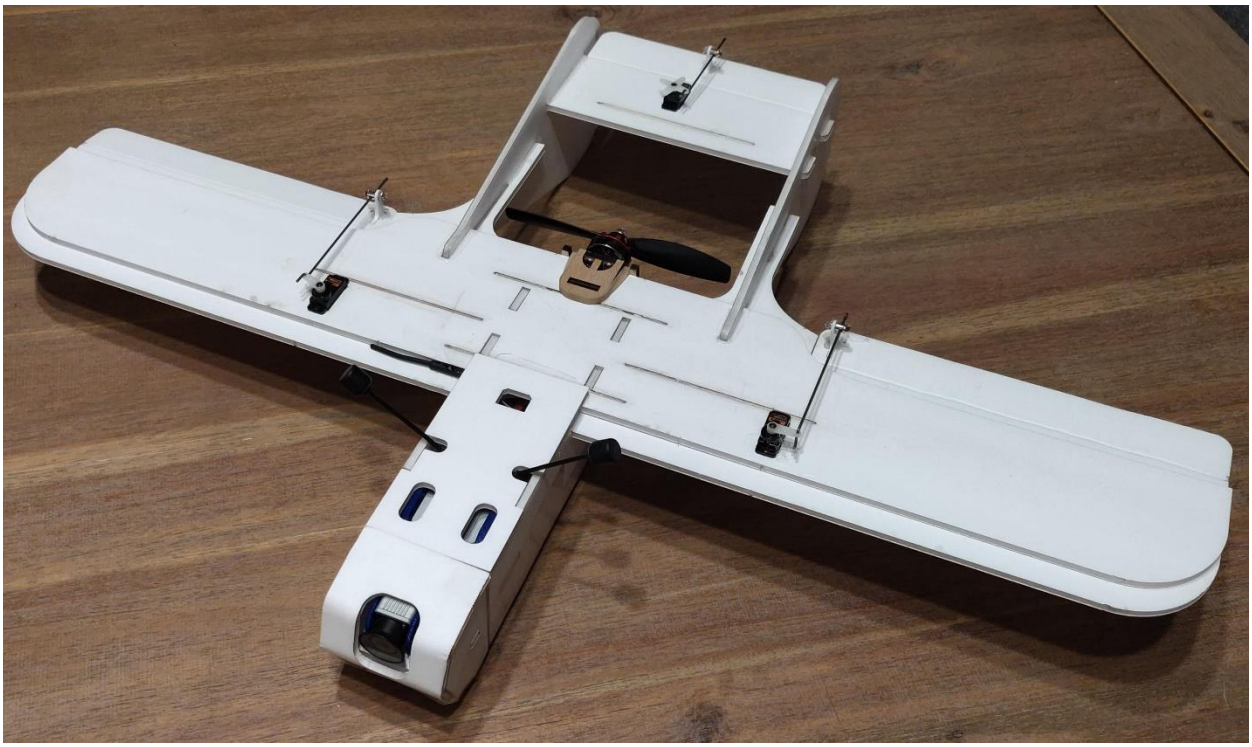


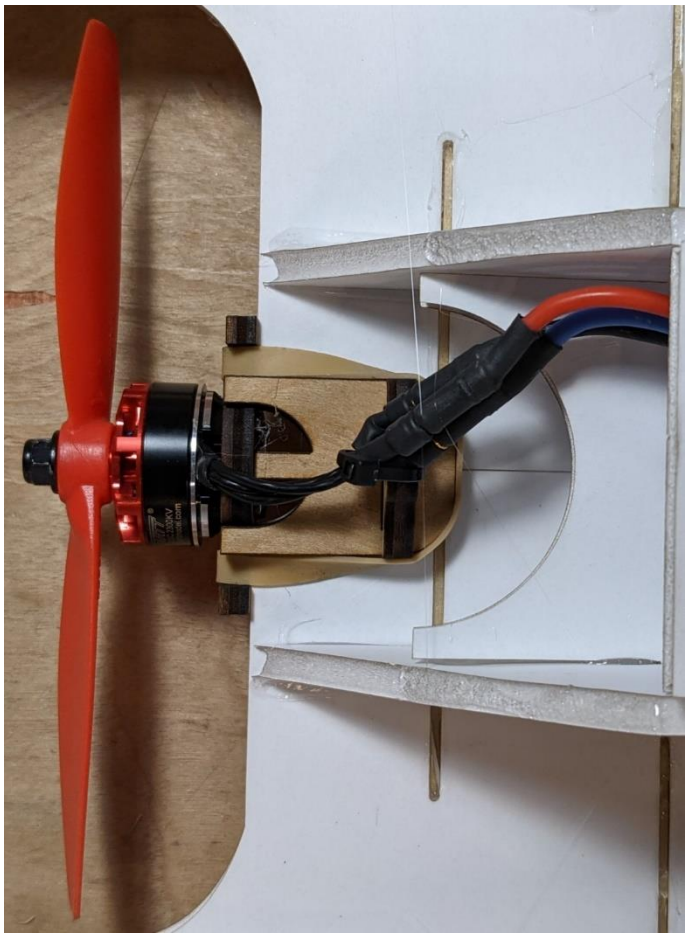
I apply clear packing tape to the underside of my fuselage, overlapping from back to front. It acts as a second skin and helps to prevent damage to the foamboard on landings on damp surfaces, grass, sand, dirt, and even asphalt.



A small dot of hot glue is perfect for keeping servo wires in their conduits. When removing electronics from an airframe being recycled, isopropyl alcohol in high concentration makes hot glue fall right off.

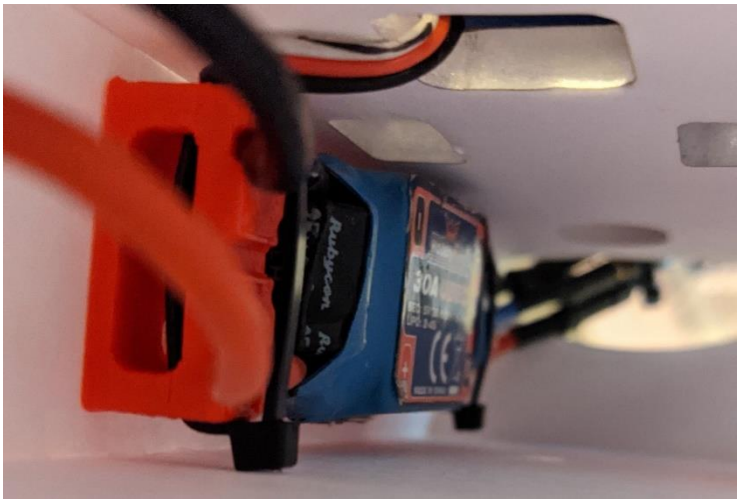
Servos, motors, ESCs and receivers can all be installed conventionally. A single servo extension cable of around 8 inches should be sufficient for the servo installed in the elevator to reach your receiver.





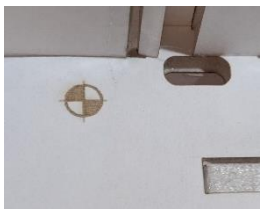
I run my receiver antennas at 90 degrees to each other. One runs aft through the fuselage and is secured by a dab of hot glue along the skin of the fuselage. The other I run out the hatch and along the leading edge (it's the black antenna at the root of the right wing's upper skin leading edge in the photo above). This keeps my antennas in a good configuration for optimal reception.

The alignment pin on the underside of the motor mounts has a hole for a zip tie to keep your motor wires organized and out of the way of cooling airflow.



I float my ESCs using a 3D printed mount that secures to the interior side wall of the aircraft with hot glue. The mount allows for airflow all around the ESC for better cooling in hot environments and demanding conditions. This keeps my ESC's away from the receiver and FPV equipment and seems to work well for reducing interference. It also keeps hot glue off my ESCs. ESCs can melt hot glue. Ask me how I know.

The battery compartment is just shy of 33mm tall. It fits most 4s packs, and is designed to be very snug. They don't slide around, and are a friction fit. That's how I fly FPV. You can put much larger packs that aren't as tall as I've flown with some really long 3s 3000mah packs, and 18650 and 21700 Li-Ion packs – but you've got to secure them from sliding around. You can use a touch of hook and loop tape, a wadded-up paper towel, whatever. Just secure them from sliding fore and aft and check your CG. A loose battery can make for some dramatic CG changes.



The Center of Gravity markings and take off trim recommendations are exactly that: **recommendations**.

Much will depend on your installed equipment and technique. The plane with a 4S 1300mah battery and a 2205 motor coupled with a 6045 prop has incredible performance, and unlimited vertical capability. In that configuration, I generally take off at about 65% throttle, with the **elevator centered on the takeoff trim mark**. More than that, and torque roll will dominate, and the elevator will really pitch the nose up. It's battery life will be reflective of your throttle aggression, as at full throttle, you'll pull nearly 28 amps, and have incredible punch, but you'll go through the battery quickly.

Conversely, flown with a 3s 3000mah (or a similar Li-Ion) and a 5X4X6 propeller, she's a pussycat. Nowhere near the punch out, but I've loitered and explored for over 20 minutes.

3D Printed leading edge cuffs are great for giving you better penetration through brush or the occasional tree branch. While I don't recommend flying through vegetation, I've learned that I enjoy flying with the leading-edge cuffs. Don't feel they are a necessity – as I don't install them on my line-of-sight aircraft, but for my FPV aircraft I like to shoot gaps with, the leading-edge cuffs are great.

For your preflight, ensure your electronics are functioning as expected, your flight control response is good, and your motor mount was not bumped on your last landing. The motor backplate is only held in by rubber bands, and if the prop touches during landing, it can pitch the motor backplate into a very nose up configuration. Just ensure it is flush to the mounts prior to takeoff.

Takeoffs are easy. I run a flight control check, ensure takeoff elevator trim is set, test for throttle response (check video is live if going FPV), and then set about 65% or so throttle. A gentle toss like you're throwing a football, and your plane should track straight and true if you've got your rigging right.

In cruise, she can be surprisingly quick. She'll cruise all day at around 45% throttle, loafing around, but aileron response is diminished as the airspeed is obviously slower. Give her more power, get the airspeed up, and she rolls quick.

In flying FPV, she's a joy to fly as her responses are very predictable. For FPV, I fly with about 40% expo for a nice smooth ride. I use full rates so you have the authority if you want it – but you've got to move the stick.

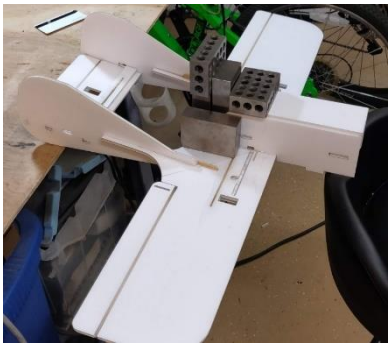
Throttle-pitch coupling is conventional. I use about a mix of 4% nose down pitch coupling with power. So as I add throttle, my mix will lower the nose by 4% of my throttle input. It keeps you accelerating, and mostly keeps the pitch flat. You could go more aggressive, but it's my preference to keep it with a little climb when punching high power.

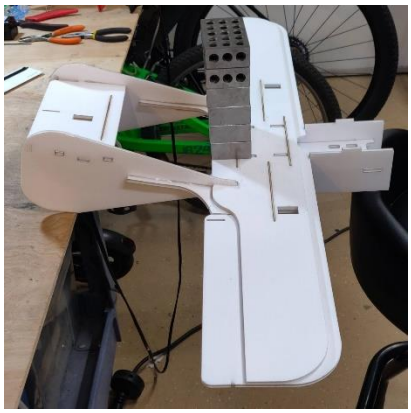
In the event of any low-speed problem, power is your friend. You'll have instantaneous pitch control, as the elevator is awash in induced flow. The vertical stabilizers will work out most any yaw issues, and you'll get ailerons back if you've got the room to recover the airspeed. Most emergency procedures in this plane begin with adding power.

I use 4 channel receivers as my minimum as I enjoy using flaperons. The flaperons are effective, and they do lower your stall speed, but they give the stall a nastier wing down break. Clean (flaperons up), this plane stalls nicely. Dirty (Flaperons down) however, there's a lot of torque on a two bladed prop in this plane, so be aware of it. I don't often land with flaperons, but they're fun to play with. For some reason, I really enjoy them line of sight more than FPV.

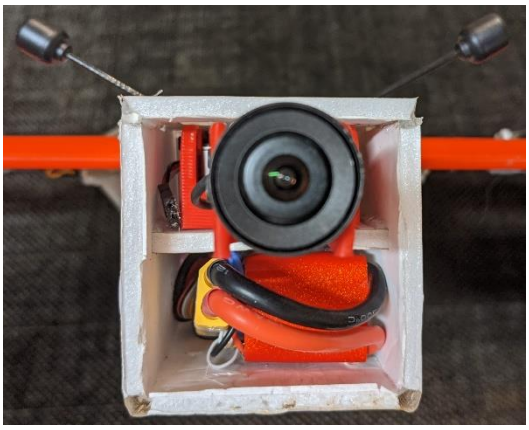
She glides like a dropped cell phone. Keep power on for landing. Actually, I like how precisely you can set her down. It's conventional for a high wing loading airplane.

She will fly on one aileron. Ask me how I know. Put hot glue or Loctite on your control arm linkages.





The tail is held on surprisingly well.



The battery compartment is designed to slip fit a 4s battery. It should hold it snug. The battery must be pushed back far enough to allow the Nose Slip Ring to engage the leading edge of the fuselage. I routinely fly this with various 4S batteries from 1300mah to 2200mah. 3S and Li-Ion (either 18650 or 21700) packs will fit, but will require some additional means to prevent them from sliding around during flight.

That's about it. Follow these instuctions, and use some common sense, and you'll do just fine.

I sincerely hope you enjoy your new aircraft.

Send me some pictures (and video!) of when you get yours built. I love to see the innovation of others.

Thank you.

bt