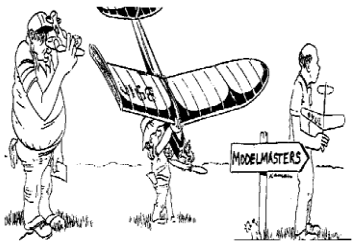


Wing Tips

AUGUST 2023

The Newsletter of the Mid-Hudson Modelmasters

Editor: Domenick Fusca, PO Box 266, Pleasant Valley, NY 12569-0266

Email: hvmodelmasters@gmail.com Website: http://www.Modelmasters.us

2023 Club Officers

President: Paul Ollivett [redacted]
Secretary: Larry Kunz
Sgt. at Arms: Flavio Ambrosini [redacted]

Vice President: Scott Fellin [redacted]
Treasurer: Tom Eng

Club Calendar

Coming Up:

- **CLUB MEETING:** Saturday, August 12, at the flying field. Watch your email sent via Google Groups for any updates. Items to be discussed include, finalizing details for the picnic on September 23rd and club finances and expenses.
- **September 2023 Wing Tips articles & photo submissions due, Thurs., Sept. 7:** Earn Modelmaster dollars for club related items submitted. Send your submissions to hvmodelmasters@gmail.com Due date is first Thursday of each month.

Other Events:

- **MONTHLY MEETINGS:** Watch your email for meeting announcements..
- **OUTDOOR FLYING SESSIONS AT REDL PARK (aka West Road Field) –** Every Saturday Morning, weather permitting. Generally there is someone there every Saturday. Most members are flying between 9am and 12pm. Exceptions are weather related (rain, snow, excessive wind). If driveway to field is covered in snow, meet behind West Road School. If temperatures are extremely cold (roughly below 20 degrees) people tend to leave earlier than 12pm

Model Masters Meeting Minutes July 8, 2023

+ Field meeting Called by President Paul Olivett @ 10:10 AM
> Next meeting is Saturday August 12, at the field.

+ Treasurer's report: by Tom Eng
> $1769.34 is the current treasury balance.

> 2023 **Membership** now at 37
Edouard and Olga Servan-Schreiber have joined. (Roman's parents)
Brian & Michael Schatz have joined.

+ Old Business :
> Brad mowed last Wednesday.
> Scott, Paul & Dom had an impromptu work party
to clear lots of brush and weeds from around the field entrance.
Thanks guys ! Coming and going is a lot safer now !
> We hope to plan a work party soon to spiff up the field and drive,
and hopefully run Lloyd's brush hog through the high field !
> Town of Pleasant Valley has accepted our memo of understanding
for our use of the field.
> There has been no perceptible progress on any of the town's plans for the field.

+ New business :
> Pleasant Valley weekend will be Sept 8,9 & 10.
Larry will create a poster, and some info cards to leave there,
but we do not plan to man a booth.
>Flavio will put directions to our field on our web site (Flavio !?)
>**Fall Picnic**: Tentatively Sept 23.
Probably the usual flying contests, some free flight, and Chicken dinner !?
Bob has agreed to coordinate once more !
>FAA: Transponders required in September.
We are holding off on registering our field till we see how things go.

+ Show & Tell :
> Brad showed his new laminated Cub tail. And landing gear.

Nine Foot Coropast Cub Build Instructions Chapters 1,2 & 3 by Brad Quick

CHAPTER One

This is the first in a series of articles meant to document the steps involved in building a nine foot coroplast cub. I finally received 25 sheets of 2mm coroplast from my local sign maker. It takes two 4' x 8' sheets to build a nine foot

coro-cub. I successfully machined the first two sheets using a CNC router and am in the process of assembling the prototype of the next generation cub. These articles will show the work involved and help our members decide whether they want to try to build one themselves. We did a group build of the last generation a few years ago and I believe that most of the seven cubs we built are still flying (although one still hasn't flown yet). I'm thinking that we will do less of the project as a group this time, but these articles will be hopefully be complete enough to walk anyone through the build.

When we get to the point of distributing kits, I will most likely sell the parts to make the airframe for under $100 (my cost, whatever that is). If I remember correctly, the remaining parts to make the plane fly ran around $200, but that was quite a few years ago (I'll have to dig out my old spreadsheet). The plane flies very nicely on a 6S 5000 mah battery, but if you want it to hover on its prop, we can teach you to make an 8S2P 5000 mah 18650 pack. It will take me around 2 hours to machine each set of parts I won't charge for my time, but I do ask that if you buy a kit that you complete it within six months and fly it at least once at our flying field.

This article is going to be dedicated to the glue that we use to bond the coroplast. The best glue that I have found is standard, yellow Gorilla Glue, sold at places like Home Depot. Gorilla Glue makes many different glues, but we want the original yellow polyurethane glue. They also make a white polyurethane glue, but this is a little too soft. They also, make a clear polyurethane glue that doesn't foam and dries to a rubbery consistency, but we want the yellow Gorilla Glue that cures to a very stiff foam.

I should point out that Gorilla glue is messy to work with. If you get it on your fingers, wipe as much of it off as quickly as possible using a dry paper towel. It won't hurt you if you leave it on, but you will have crusty fingertips for about three days. If you get it on your clothes, it will never come out. Use newspapers and gloves if you prefer (I don't). If you get it on your work surface or drip some on the floor, wipe immediately with a dry paper towel and get as much off as possible.

Yellow Gorilla Glue foams as it cures. This is very helpful for filling gaps and it naturally creates fillets between pieces being glued together. One of the tricks to successfully using Gorilla Glue is to learn how to control the foaming. In this build, I will make extensive use of masking tape. I will use it for clamping parts together while glue cures and I will use it to cover glued joints while the glue cures to limit the ability of the glue to foam. The foaming action will push pieces apart if they are light and they aren't clamped, but the foaming will stop when it meets with even slight resistance. Masking tape offers enough resistance to keep the glue at bay.

Yellow Gorilla Glue is cured by water. When gluing wood, it will cure using the moisture in the wood. It will also cure slowly if left out in the air because of the moisture in the air. When gluing plastic however, we need to add water if we want it to cure at any reasonable rate. For most jobs, the procedure is as simple as squeezing out a small puddle onto a mixing surface (I use old Model Aviation Magazines and tear off pages as they get fouled), then dripping a few drops of water into the puddle using your fingers, then stirring with a bamboo skewer from the dollar store. Within a minute or two, the glue will start foaming. After about half an hour, it should be soft, but not stick to your fingers. After an hour, it's probably safe to unclamp and handle. This is a good time to scrape any excess glue off with your hobby knife because it's still soft enough to work with. Gorilla Glue will continue curing for days. After a week, it becomes rock hard and almost impossible to work with. Check the leftover mixed glue in the puddle for curing progress. When the puddle is cured, the working glue is cured.

It's best to apply the glue before it starts foaming because once it has foamed to full size, touching it will often collapse the bubbles. For most uses, the amount of water added isn't very critical. If you add too little, it won't foam as much and will take longer to cure. If you add too much, the puddle will become soupy, but most of the excess water will stay on the magazine and the rest of the excess wa-

ter will evaporate after the glue is applied.

The first steps in the cub build, however, will involve laminating relatively large piece of coroplast face to face. In this case, it's more important to mix in the correct amount of water because if there is too little water, it won't be possible for the moisture in the air to get inside the lamination to finish the cure and if there's too much water, it won't be able to evaporate.

So to begin, I did a short scientific test to determine the proper amount of water. I made six puddles of Gorilla Glue, each weighing .1 ounce. I then added drops of water to each puddle using an eye dropper. The first puddle got one drop, the second two, etc. I then watched the puddles foam. My conclusion was that three or four drops per .1 ounce was the proper amount. The one and two drop samples took longer to foam. The five and six drop puddles foamed similarly to the three and four drop puddles, but I could see the excess water soaking into the paper it was mixed on.

The steps to laminating two pieces of coroplast are as follows:

Before mixing glue, use some scrap coroplast to make a one inch wide squeegee. Notice the direction of the flutes in the picture to the left.

Add Water to Gorilla Glue

Squeeze out a puddle of Gorilla Glue onto the magazine. It's better to make the puddle larger than needed because if you mix too little you will find yourself having to mix another batch while the first batch is already starting to cure. In the picture below, I didn't weigh the puddle, but when laminating, it would be a good idea to weight the puddle and add three drops of water for each .1 ounce of glue. When weighing, I rip a page off of the magazine and fold it and half. I then put that half on my scale and weigh the glue as I squeeze out the puddle. If you don't have an eye dropper, you will probably get away with adding water by eye. Just do some sample mixes first to learn about how much water is required.

Stir with skewer

Use a bamboo skewer to stir the water into the glue for about ten seconds:

Scoop the glue out of the puddle using the squeegee:

Use the squeegee to apply and spread the glue one piece of coroplast. Work quickly to spread the glue evenly. The goal is to leave a thin, even layer of glue. This is done by dragging the squeegee at a shallow angle to the workpiece. If you press too hard, you will scrape off too much glue, but at the same time, you don't want to leave too much glue on the workpiece.

Finally, place the workpiece on a flat surface (a flat table or the floor) and place the mating piece on top of it. Put another flat surface on top (a flat board or a book) and put something heavy on top to hold the parts together. If you don't put enough weight on top, the expanding glue will separate the workpieces and they may slide relative to each other or the assembly will cure with unwanted space between the workpieces. It is strongly recommended that you use waxed paper or newspaper between the clamping surfaces and workpieces, otherwise when excess glue foams out from between the two pieces it will stick to your floor or books.

Before you laminate any real plane parts, use scrap parts to practice on. When you have applied the correct amount of glue, you will see a small amount of glue foaming out from between the workpieces.

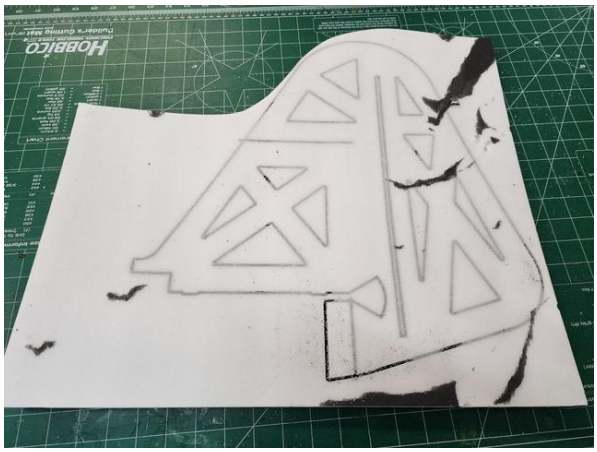
Many people who build coroplast airplanes like to remove any oils from the surface of the material by quickly running the flame of a propane torch over the surface. I have never found this to be necessary when using Gorilla Glue.

In the next chapter, we will use the above techniques to laminate some dollar tree foam between two sheets of coroplast to create the tail of our cub.

CHAPTER Two

In this chapter, we will build the tail section of the Coro-Cub. Both the vertical and horizontal stabilizers will be formed from a sheet of dollar tree foam laminated between two pieces of coroplast.

The first step is to remove the paper from both sides of the styrofoam. This paper will be either white or black. Sometimes, the paper will peel off of the foam easily in one big sheet, but it will more often partially come off or be very difficult to come off. If it mostly peels off in large pieces, go ahead and peel and then run the remaining parts under warm running tap water while you roll the paper off with your fingers. If it won't peel well at all, then spray the entire surface of the paper with a mist of water, let it sit for a while, then try to peel it. If none of the above work, you can soak it with warm water, then peel and roll off the paper. Save this as a last resort, because it will take you a long time and you will end up with a real mess of soggy paper pieces.



Mine mostly peeled off. I removed the rest with warm water (right photo):

Next, finish cutting out the foam and plastic pieces. The somewhat rectangular tab on the bottom front of the rudder should be removed from the foam piece only and discarded. See the photos below. If you forget to remove it, you will just need to cut if off when we glue the lower end of the rudder to the side of the fuselage.

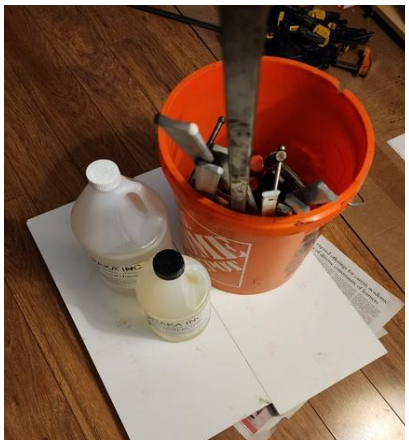
Notice that we cut out the lightening holes from the foam but NOT from the plastic:

The lightening holes in the plastic have been milled out by a CNC router, but there is a fair amount of "fuzz" remaining. If you want to do a quick and dirty build, you can probably just pick out the large

pieces and leave the rest without noticeably affecting the flying characteristics of the plane. I chose to remove the fuzz by scraping sideways with my hobby knife, in the direction of the flutes (up and down in the picture below). This takes a couple of hours. Don't scrape the flutes all of the way off or you will run the risk of cutting through to the outer surface. I ended up with one small cut through the surface that I may have to hide with a decal. If you choose to scrape, make sure you have a vacuum cleaner close at hand because as you can see from the photo, small pieces of plastic will get everywhere.

Before applying glue, put some waxed paper (I used newspaper on this one) on the floor (or table) and have your clamping surface and weights ready to go.

Mix and apply glue to the left side of the vertical stabilizer using a homemade squeegee. Mixing .4 ounces of glue with 12 drops of water will be more than enough. Stir for about 10 seconds, then apply the glue as quickly as possible. You will see the glue start to foam where it is the thickest. You can use your squeegee to spread the thick areas around. You want to get it clamped before the foaming is done.



Lay the foam on the mixed glue and take care to align the edges as best as possible. Push down on the foam to make sure it comes into contact with the plastic and won't slide when you put weight on it. Put on another layer of waxed paper then add clamping pressure. I used some shelving boards as the top clamping surface and a bucket of clamps and bottles of epoxy to apply weight. If you don't have boards, then stacks of magazines or hard cover books will work.

After about a hour (check the leftover puddle of glue), unclamp and clean up the excess glue with your hobby knife.

Before gluing on the 2nd surface, prepare the slots for the carbon fiber tube. To clean out the slots for the carbon fiber tubes, use the end of the tube as a tool and push it endwise through the slot to make sure the slot is deep enough:

Before gluing the right hand side on , cut out the slot between the vertical stabilizer and the rudder in the left hand coroplast skin to match the slot in the Styrofoam as shown below if you haven't already done so. This will be easier than trying to find this slot after everything has been glued together.

Also, hold the tail wheel wire in the position shown below and trace around it with your knife. Cut a shallow slot in the foam, just deep enough to bury the wire. If you look closely at the photo, you will see an extra slot in mine. After I cut that slot, I realized that the tail wheel wire has to go as close to the carbon fiber tube as possible or else it will interfere with the hinge joint which isn't cut yet.

Mix a second batch of glue and first coat the carbon fiber tube and tail wheel wire. To coat the tube, hold it vertically with the bottom end on the table right next to the puddle of mixed glue. Use the squeegee to rub glue up and down the tube while you rotate the tube from the top end. The picture (left) shows glue applied to the tube and tail wheel wire. Apply glue to the right hand plastic side and lay it on top. Carefully align the layers and clamp as done above.

Once cured, clean up the outer edges so that the skins and foam match at the edges. I used a hobby knife to cut off large miss-matches and then used a belt sander to even up the outer edges. A sanding block should work just as well but will take longer. It's much easier to clean the edges up now than to wait until after the assemblies are glued each other and attached to the fuselage.

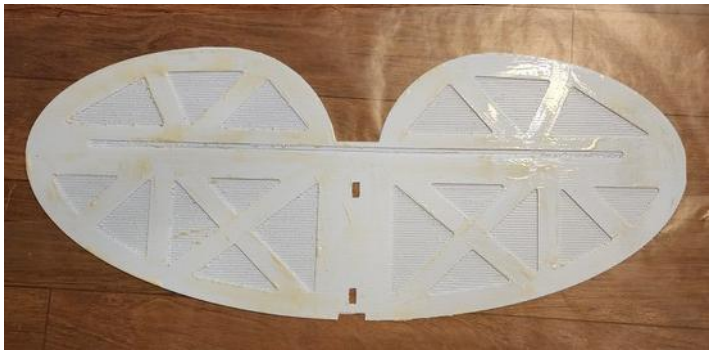
Hold the assembly up to the light to see where the 1/4" wide hinge cutout is located under the surface on the right hand side. Mark this at each end with a pencil and use a hobby knife to cut the 1/4" wide slot JUST THROUGH THE SURFACE of the right hand side. The 1/4" wide strip should now peel up like a zipper. Use your knife to cut a V out of the foam underneath. The deepest part of the V should be near the bottom plastic surface, but make sure to not cut into the plastic. You can always make the V deeper later. In hindsight, it may have been best to cut out most of the 1/4" slot before gluing, leaving just enough to hold the proper shape of the plastic, but it's not terribly difficult to find the location of the slot by using the light method.

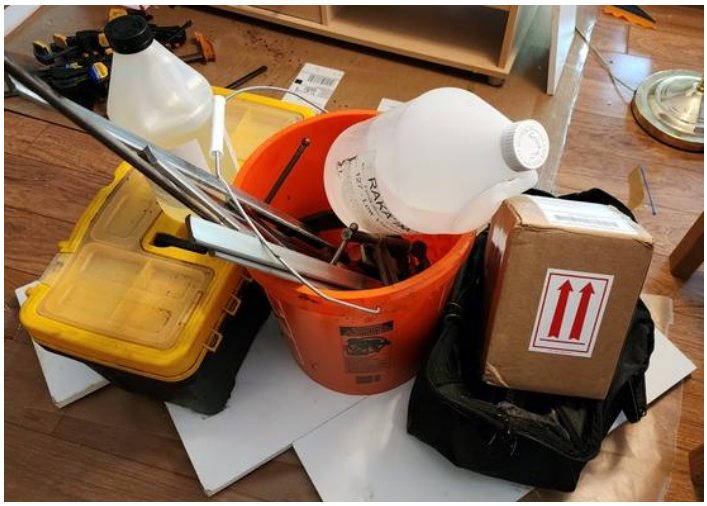
On the left hand side of the assembly, find the cell of the surface that is closest to the center of the V that was cut in the right hand side and cut out the surface of that cell from the bottom of the rudder up to the existing slot that separates the vertical stabilizer and the rudder. This can be done carefully with a hobby knife, but I have found that the best tool for this is a "seam ripper" that is used in sewing. The seam ripper has a little plastic ball on one side that can't be seen in the photo below because it's inside the coroplast. This plastic ball keeps the cutter from poking through the other side. I had to sand the plastic ball slightly on mine to get it to fit into the 2mm coroplast. As seen in the photo below, I make two passes, one with the ripper tilted to the left, and another with it tilted to the right to completely remove the surface of the coroplast cell.

When we get to the wing, we will do a lot of slitting of one layer of the coroplast, so it would be wise to invest in a seam ripper or two from Joanne's or eBay.

Do the same with the horizontal stabilizer, starting with the top surface (which has the two rectangular holes near the center). I mixed .5 ounces of Gorilla Glue with 15 drops of water for each side and used about 80% of it.

A bigger surface area requires more weight:



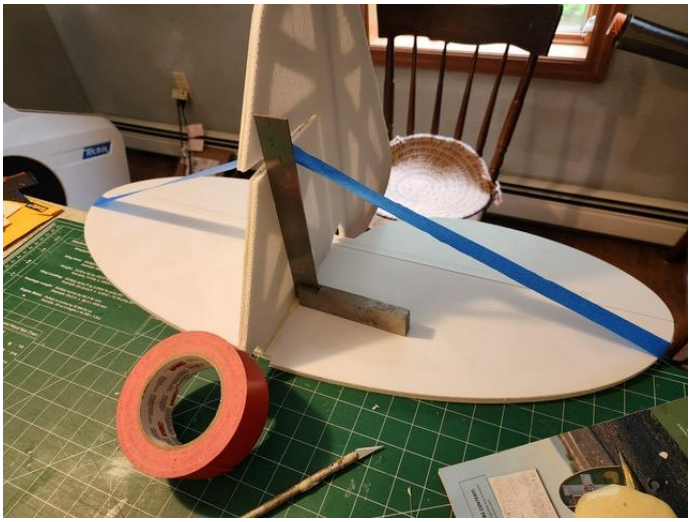


The 1/4" wide slot goes in the bottom (no rectangular holes):

The slit goes in the top:

Vertical stabilizer bottom

Vertical stabilizer top



Next, clean up the tabs on the bottom of the vertical stabilizer and the rectangular holes on the horizontal stabilizer so that the two fit together nicely. Mix and apply a generous amount of glue to the bottom of the vertical stabilizer and glue the two together. By now, you should have an idea of how much water is necessary for a puddle of glue, so you may not need to measure it.

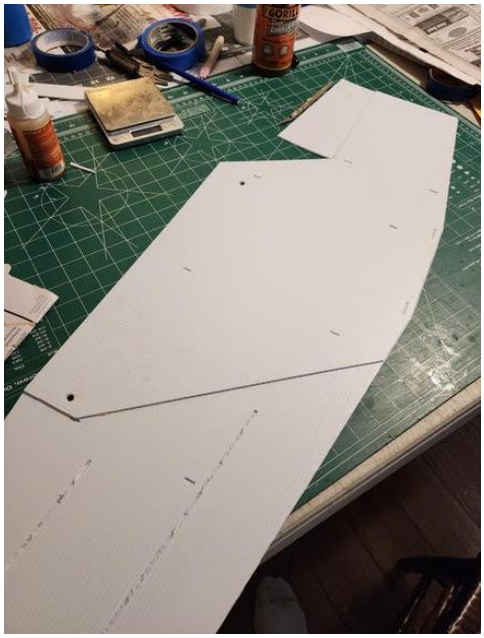
Make sure the assembly is square. Use some masking tape to hold the parts in place. This is a job that you could really use three hands for, so having someone hold the parts in place while you set up the square and masking tape would be helpful. I managed to do it by myself, but came very close to getting glue all over the top surface of the horizontal stabilizer where I didn't want it. Notice how the rudder is hanging off the table. The red roll of duct tape is holding the front end down.

CHAPTER Three

Building the Fuselage

Important note: When cutting out the panels for the top and bottom of the fuselage, don't cut on the inside of the routed grooves as we have done with the previous parts. Instead, cut to the outside of the 1/8" groove to leave a thin "lip" on the outer edges. The top and bottom panels will fit inside the fuselage side walls, but the lip will sit on the top (or underneath the bottom) edge of the sides and cover the ugly edge.

Cutout the fuselage sides and doublers. Cut out the two dowel holes on each piece.

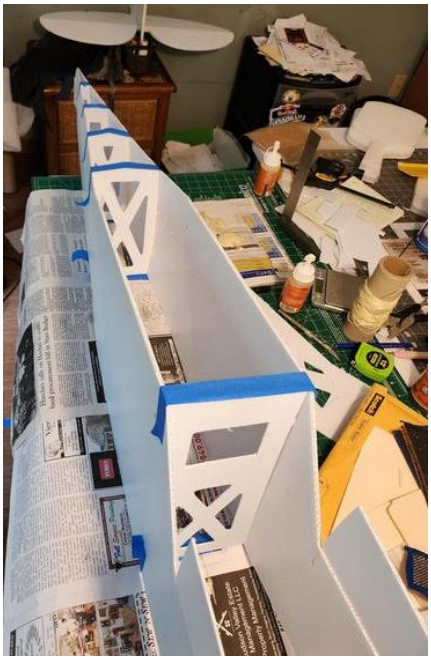


Use your laminating skills to glue the fuselage doublers to the fuselage sides. When properly positioned, the machined side of the doublers and the machined side of the fuselage sides should all be toward the center of the fuselage. The two part assembly should be aligned on the top edge, the windshield edge, and the front edge. Along the bottom, there should be a 3/32" gap between the two edges were the bottom panel will later nest into.

Place the side piece on the floor and apply glue to the smooth side of the doubler. I used .6 ounces of glue with 18 drops of water per side and used about 75% of it. I used a wider squeegee (1-1/2" wide) to make spreading go more quickly. There is a lot of area to cover, but it goes quickly because the shape is uncomplicated. Press down and double check the alignment carefully before adding clamping weight. On a previous plane that I built, the doublers slid on the fuselage sides as the glue was curing and it required a fair amount of re-work to make them work.

Once cured, clean up the foam where it squeezed out, especially in the 3/32" gap along the bottom where the bottom panel will need to fit later on.

The photo (right) is out of sequential order because I didn't do this next step until later, but it makes most sense to do it now. When we get to the point shown below, the front top of the fuselage is too stiff to roll over the curved top of the fuselage without buckling. To fix this problem, we need to slit the inside surface of every cell of the coroplast while leaving the outside surface intact. Use the seam-ripper to do this and the piece that needs to be wrapped around the fuselage will become quite floppy. Experiment with slitting a scrap piece before working on the real thing.



Next, lay the two sides on top of each other (with the doublers facing each other) and align them as best as possible. Wrap some masking tape around the lower tail end to firmly hold the last 1/2" or so of the rear together. Make sure the tail ends are aligned as well as possible. I don't have a photo for this because I glued mine together instead of taping it and had to cut it apart later. We will glue this after the fuselage is complete.

Put the largest bulkhead in place and pull the fuselage sides in using pieces of masking tap across the top and and bottom as shown below. Don't glue this bulkhead in place yet. We are taping this in place to hold the flimsy fuselage in generally the proper shape. Again, this isn't the way I did it, but it would probably be a

good idea to tape all of the bulk heads in place before gluing any of them.

Starting from the rear, loosen the masking tape for one bulkhead at a time, leaving it attached to one fuselage side for quick reattachment after gluing. Mix a small puddle of glue and water and apply glue to both edges of the bulkhead. Put the bulkhead in place while spreading the fuselage sides with the other hand so as to not smear glue all over the inside of the fuselage. Pull firmly as you reapply the tape to conform the fuselage sides to the shape of the bulkhead.

After each bulkhead is glued, make sure the fuselage still looks straight and readjust the tape if necessary. Let the glue cure for 1/2 hour or so before going on to the next bulkhead.

Don't glue in the plywood motor mount bulkhead (as I did) yet because it is difficult to do while maintaining the straightness of the fuselage.

Once the bulkheads are in place, remove the tape from the rear of the fuselage to allow the two sides to float relative to each other. From this point on, we want the top and bottom panels to hold the fuselage straight.

Glue the bottom-front panel in place. Notice how the panel fits inside the fuselage while the lip covers the edge of the fuselage side. Start at the nose and align front edges of the fuselage sides with the front edge of the bottom panel. Mix glue and apply it to the lip on the panel. Also apply glue to the bottom of the bulkheads. While applying the panels, glue only about a foot of length at a time. It takes time to apply the glue to the lip of the panel and if you try to glue too large of a piece, the glue will start to set up and you won't have time to do a good job making sure the joint between the panel and the fuselage sides is perfect.

Use tape as often as necessary to hold the joint closed. Once secured, tape the entire edge to control the foaming of excess glue. Notice that in the photo below, my wooden firewall is installed, but yours shouldn't be at this point.

Before installing the lower-rear panel, check it for fit. Slide it forward and aft to find the best position that will match up the edges, especially near the firewalls, since the fuselage can't flex at these points. Mark the best position and trim any overlap between the lower-front and lower-rear panels. I had to cut about 3/8" off of the front edge of the lower-rear panel. Again, glue about a foot at a time and tape in place.

After about an hour, remove the tape and scrape sideways with your hobby knife to remove any excess glue from the outsides of the fuselage. At this point, there should be a small amount of lip overhanging the fuselage sides. Use a sanding block to remove this excess plastic and make the joint look nice.

Repeat this procedure for the upper-rear deck. Remember to slide the deck forward and aft and then mark the position with the best overall fit.

Next, you can glue the wooden firewall in place. See the photo below and the one above showing the slitting of the top deck. Apply a generous amount of mixed glue to three edges of the firewall and position it about 3/16" from the

front edges of the fuselage. Use pins through the plastic and into the wood to keep the firewall from sliding. Camp with tape. Let the glue foam on both sides of the firewall to hold it firmly in place.

DON'T glue the top deck into place yet. You can tape these flaps down for now, just to keep them out of the way.

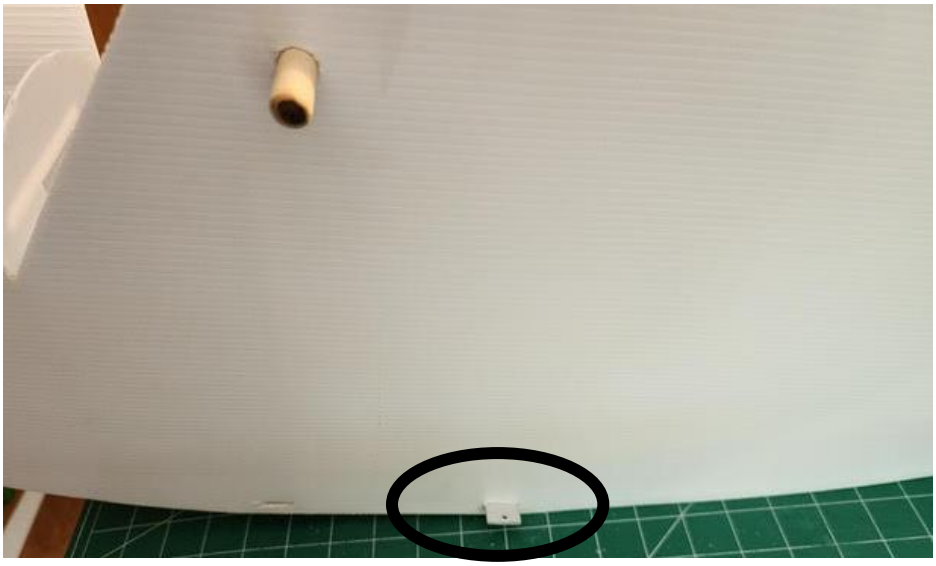
Fit the tail into the fuselage. Tape the rudder straight. Eye the rudder from the front of the fuselage to make sure the rudder is aligned with the center of the fuselage and that the horizontal stabilizer is parallel with the top of the fuselage. Trim the slots in the fuselage if necessary. Make the slots longer if necessary to make the lower rudder hinge close to the lower rear of the fuselage while leaving room for the hinge to swing. Keep in mind where the lower hinge of the rudder falls with respect to the bottom of the fuselage. It's designed so that the flap on the bottom of the rudder should be flush with one side of the fuselage, but mine needed a spacer because my fuselage isn't straight. It may possibly need to go between the fuselage sides.

Once you are satisfied with the fit, remove the tail and put glue on all of the edges of the fuselage that will contact the tail, then slide the tail into place. Pins may be necessary to keep the top of the fuselage in contact with the vertical fin. Remove excess glue as if foams using a bamboo skewer.

Once the glue has cured, scrape the excess glue.

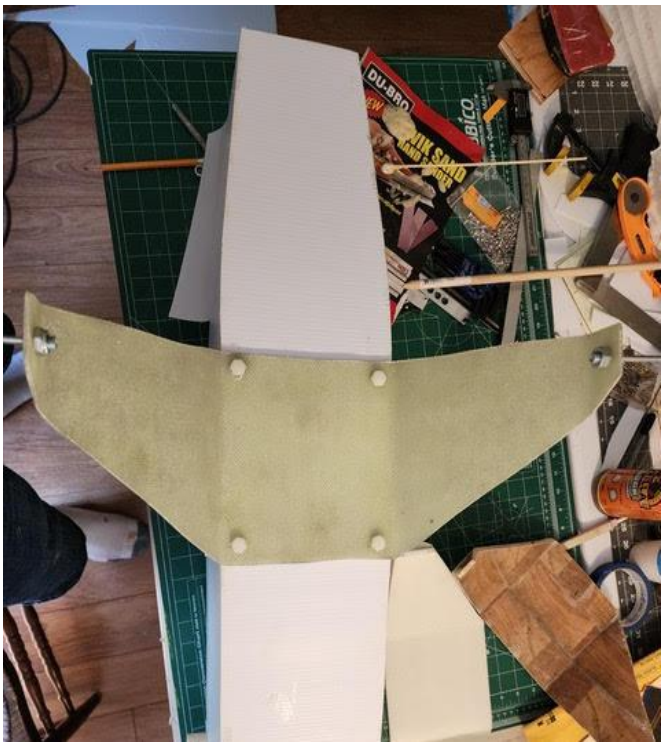
Install the two dowels in the top of the fuselage. Ream the holes to size using one of the dowels and twisting as you push hard. Ream each hole from the outside of the fuselage so that any flange created is on the inside of the fuselage. Once the dowels are centered, lock them in place with some glue on the inside of the fuselage only.

Install the two aluminum landing gear bars through the slots in the fuselage. The longer bar goes in the rearmost slot. Again, lock these in place with some glue on the inside of the fuselage. Put the glue in the corners using a long bamboo skewer so that after the glue foams, it doesn't cover the threaded holes.



Poke a hole in the center of each of the threaded holes using a bamboo skewer from the top, through the bottom of the fuselage. Flip the fuselage over and trace the outline of one of the aluminum spacers, then cut the circles out of the bottom of the fuselage.

Place the spears in the holes, then bolt the landing gear in place using the nylon bolts.



Put the screws for mounting the motor through the wooden firewall with a flat washer on each side of the firewall and secure each with a hex nut.

Congratulations, the fuselage is complete!

Field Entrance clean up