

MGB Warpath PRO Rigger Building Instructions (Rev. 2015-10-24)

Thank you for choosing the Warpath Pro Rigger. We have worked hard to make this kit as easy as possible to assemble while maintaining a high level of quality. Please read through these instructions before you begin the build to familiarize yourself with all the parts and steps involved. If you take your time and build your Warpath following the included instructions, we are confident that your project will be a success. The finished product will be a high performance outrigger hull that can last many years and win races!

Tools and supplies you should have to build this kit:

- Sand paper, different grit...lots of it! (I like to use 60, 80, 100 and 220)
- A long straight edge 48" in length or so... a level works great
- A good square
- A small wood plane does come in hand for rough shaping of some parts
- Drill and drill bits (1/8, 5/32 and 3/16 are the most important ones)
- A square
- A good FLAT building surface
- If you want to use CA, use medium (we recommend building with epoxy)
- Good quality epoxy such as West Systems
- Clamps...several of them. At least 4-5 with a 6" span, plus some spring clamps
- Rubber bands and packaging cling wrap are also good to have on hand
- A flush-cut saw is also very handy
- Wax paper
- Exacto / carpet knives
- Lots of brushes for applying epoxy.
- Also very handy are these [glue spreaders from Lee Valley](#)...

Pay special attention to notes especially during the sponson assemblies as some parts are very much alike, but there are important differences that will be pointed out.

Note: Built as described in these instructions, the Warpath should be strong and reliable, but some people want more, and we encourage that you add reinforcements if you feel they are required. For example, when I build them, I use carbon fibre cloth to reinforce the tub. This is added piece of mind and not that much more work. Other people will use triangular stock, or 1/4" square stock.

Sponson Assembly:

These are the most critical parts of the boat. Follow the steps carefully and work with attention to detail and accuracy.

- **Starboard = right side of boat as viewed from the rear.**
- **Port = left side of boat as viewed from the rear.**

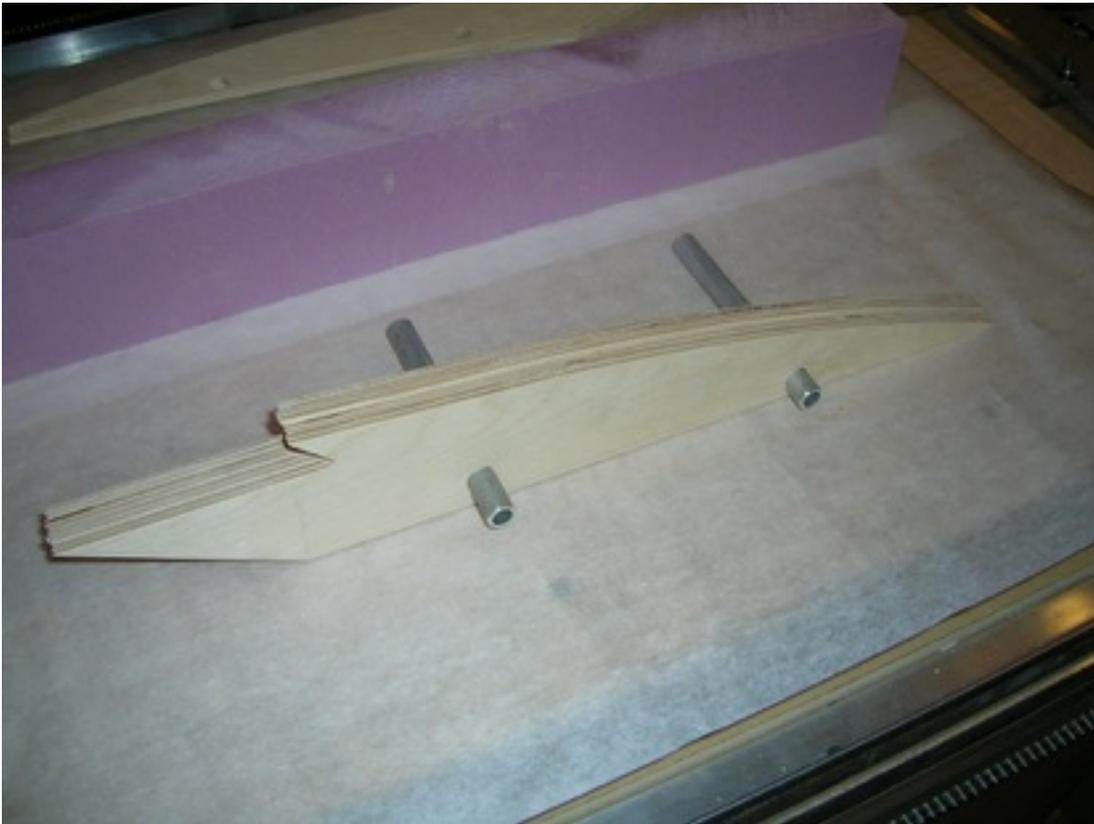
What you need to start the sponson build is:

- the four (4) ¼" thick sponson frames (sides/stringers)
- the four (4) sponson tubes (½" O.D.)
- the 2 CNC cut 2" thick foam sponson cores

For this first step, the sponsons will be upside down on the build table. It is very important here that you use the correct former pieces in the right place, as they look alike but they aren't all the same. Of the four sponson formers, two stand out above the rest. They are the ones with three holes in them for the turn fin mounting. The taller of these two is the inside former (nearest to the tub) of the starboard sponson. The other is the outside former (furthest from the tub) of the starboard sponson.

The other two formers are for the port side sponson. The tallest is the inside (closest to the tub) former. The other is the outside former (furthest from the tub).

- When I refer to closest or furthest from the tub, imagine the sponson installed on the finished boat. It's pretty easy to see which are taller if you run the sponson tubes through them all as shown in the picture below.



Pair the pieces, one inner with one outer. Mark them as such if it's not already done. Put them top-down on the table with a block of foam between them.

So for the starboard sponson (the one the turn fin mounts to) it should be like this: with the pieces on the table in front of you, top-down and the back of the sponson to your right, you should have: starting with piece nearest you, **outer piece – foam – inner piece** (inner meaning the piece that will be nearer to the tub of the boat).

For the port sponson, it should be like this: with the pieces on the table in front of you, flat edge down and the back of the sponson to your right, you should have: starting with piece nearest you, **inner piece – foam – outer piece**.

Now the fun part! Mix up a batch of epoxy and coat the surface of each piece that will be against the foam block. Then position the pieces to “sandwich” the foam block and lightly clamp in place until the epoxy sets. Put some wax paper on your work table as it will prevent the sponsons from sticking to it as the glue cures.

*** In this step you want to make absolutely certain of a few things. First make sure the rear tips of the sponsons are square to one another. Also, you want to make sure everything stays flat against the build surface, including the foam block. This is **ABSOLUTELY** necessary. It will ensure that the sponson bottoms have the correct dihedral and that the sponson tubes go in straight later on. You can also temporarily install the sponson pins through all to help align everything, just don't forget to remove and clean them before the epoxy sets. This is the most important and critical part of the entire build...take your time and get it done correctly.**

Repeat for both sponsons.





Once the epoxy has cured you should notice that on the bottoms of the sponsons the foam extends lower than the outer sponson formers. That is because the foam cores are cut at 90 degrees on the CNC. The bottom of the sponson however are not to be 90 degrees, thus the reason for the outer sponson former being shorter than the inner former. You should now block sand the foam on the bottom of the sponsons using the wood formers as guides. **DO NOT SAND INTO THE WOOD...**sand everything flush to the wood only. If you alter the shape of the plywood pieces, you alter the final shape of the sponsons. These pieces are precisely cut on a CNC to ensure proper angles of the sponsons' bottom.

If you did these steps correctly, as I'm sure you have, you should measure about 1.5 degrees dihedral on the bottom of the sponsons. Measured from the inner piece to the outer piece.

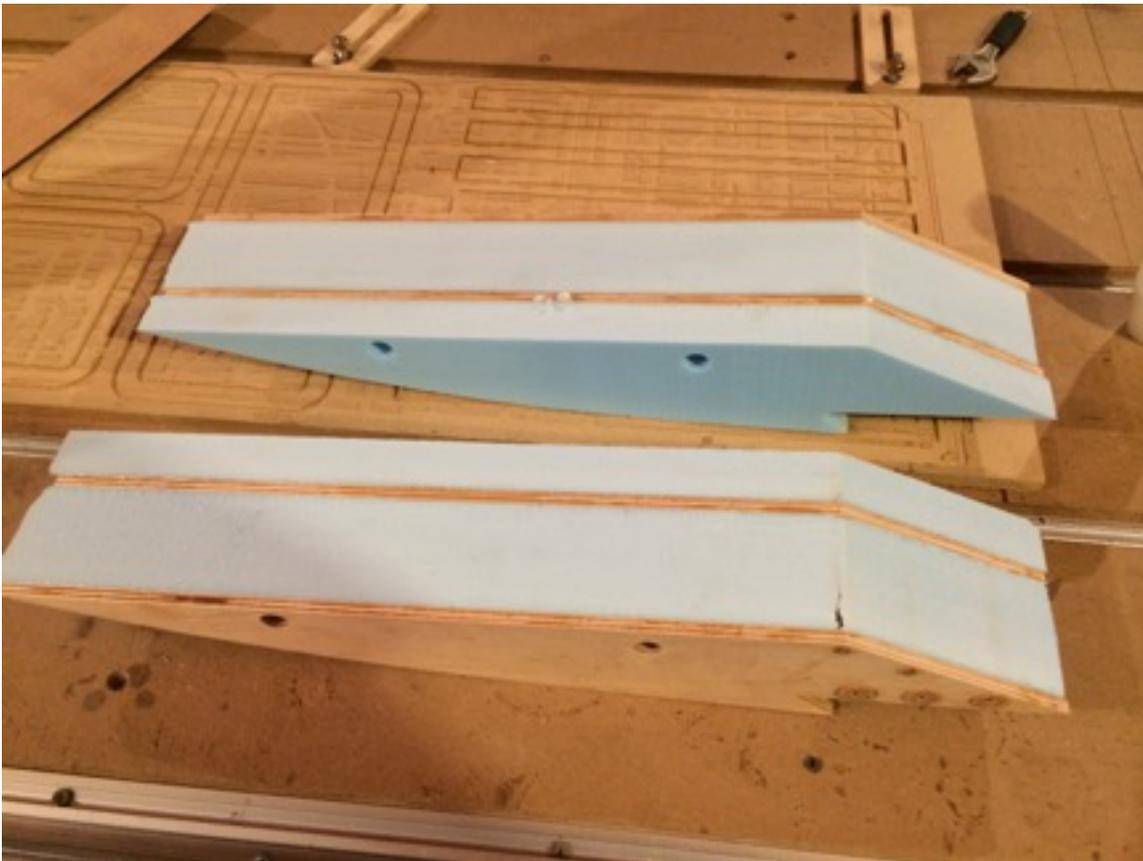


Now, it's time to step back and congratulate yourself...you've completed the most important part and are on your way to a very successful build!

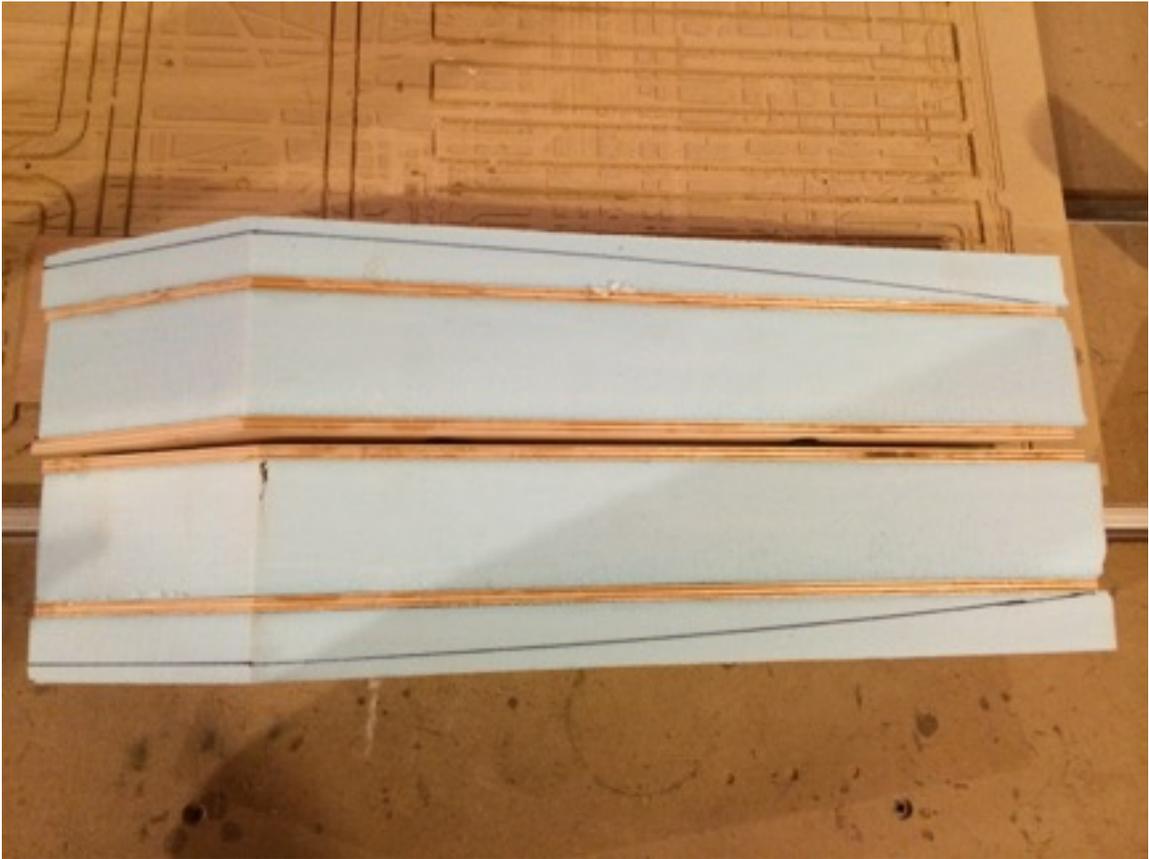
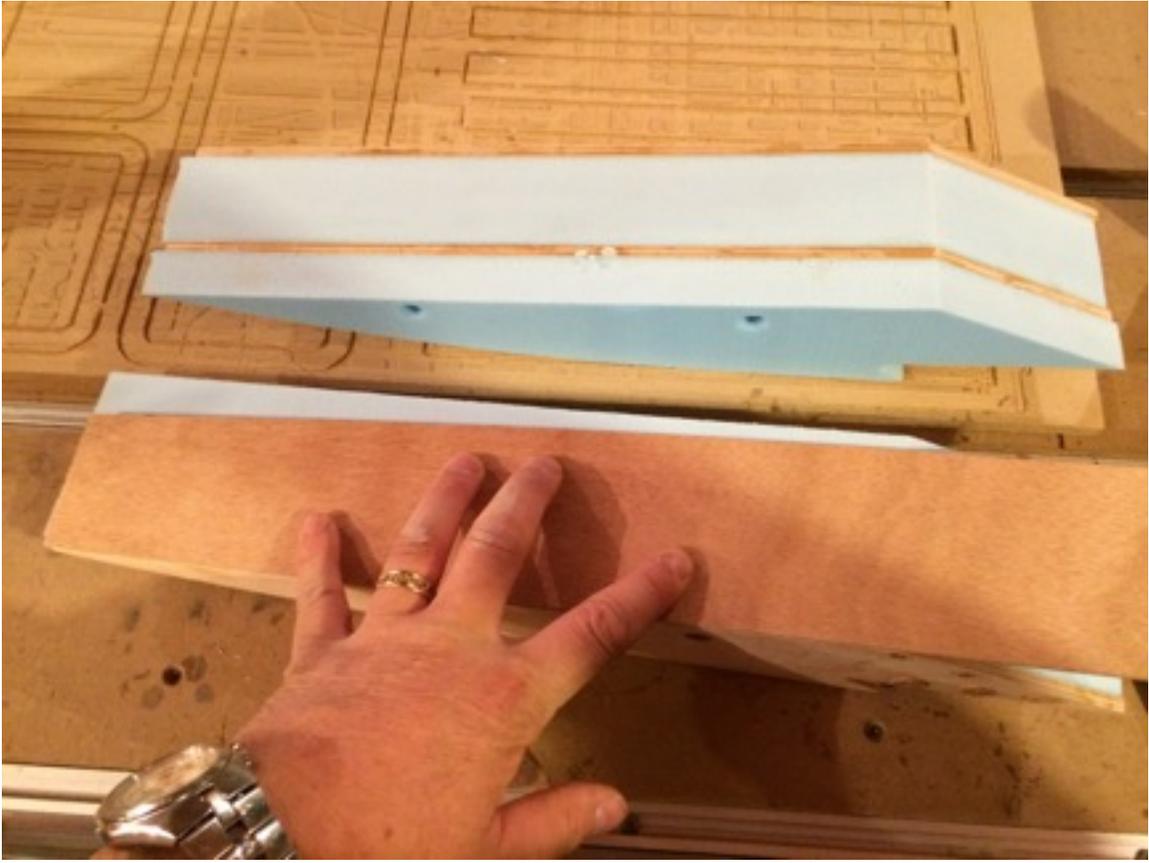


At this point you can install the $\frac{1}{2}$ " and $\frac{1}{4}$ " wood dowels for the turn fin mounting area. You epoxy in the dowels, then centre drill the $\frac{1}{2}$ " ones with a $\frac{9}{64}$ " bit for the supplied hangar bolts that will be installed for the turn fin mounting. All the dowels must be installed so that they go through BOTH $\frac{1}{4}$ " thick sponson formers. This is important for maximum strength of the turn fin mounting area.

Now take two 1" thick Sponson foam core pieces and epoxy them to the outside of both sponsons.



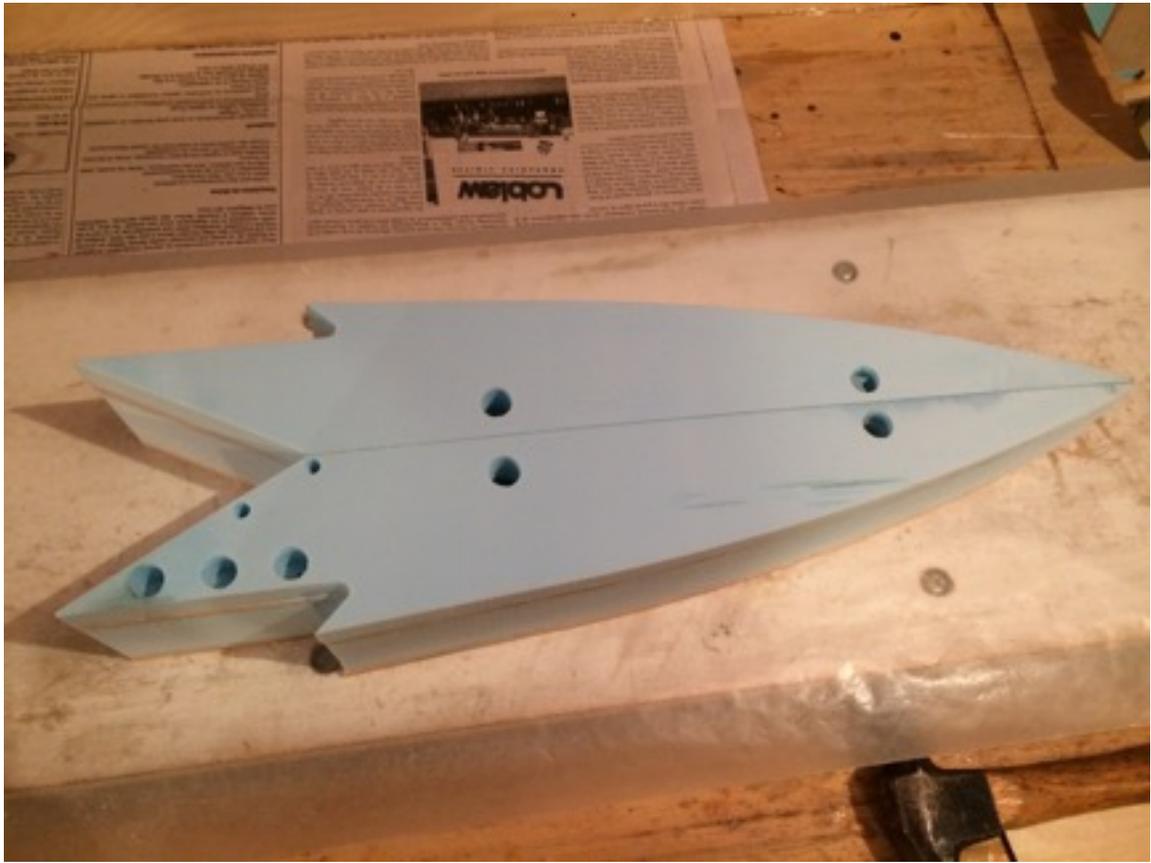
Once the glue is cured, get the sponson top sheeting template out. This piece is shaped like the top of the sponsons and is made of $\frac{1}{8}$ " ply. What we have to do now is trace the outline of the outer edge of the sponsons using the template as a guide. The template is actually $\frac{1}{16}$ " narrower than the final sponson will be...this allows for the top sheeting to cover the side sheeting. Position the template on the top of the sponson, lining up the inside edge (the straight one) with the inside $\frac{1}{4}$ " ply of the sponson. Also line up the front of the template with the tip of the sponson. Once in position, take a pencil and lightly scribe the outline (curved side) onto the foam. Flip the template over and repeat on the other sponson.



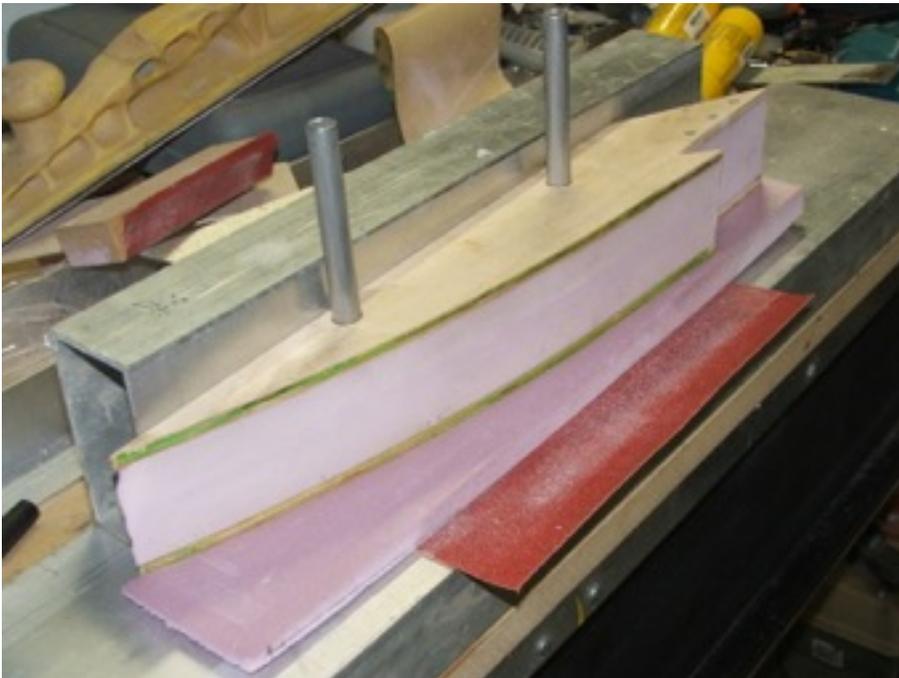
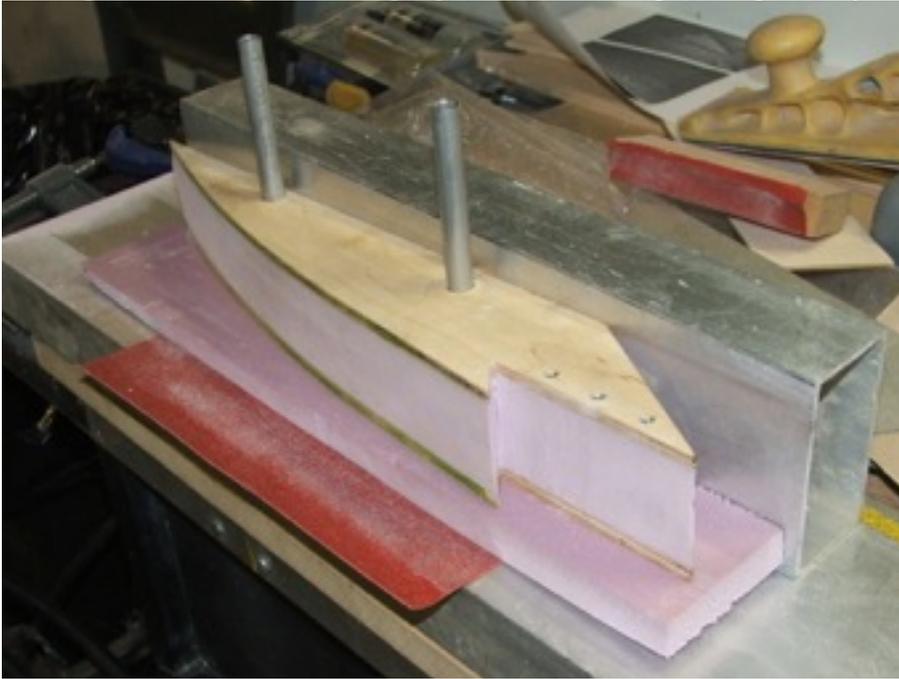
Cut along the outline on a bandsaw if you have one. If you don't have a band saw, you can rough cut with the flush-cut saw or even a jigsaw or scroll saw. Keep the cut as close as possible to vertical and do the final shaping by block sanding. This cut really isn't that critical, so just do the best you can. Test fit the 1/16" top and side sheeting on the sponsons to ensure the top sheet will cover the side sheet. Fine tune with sanding block until you get the fit you want.

I do the sanding/matching of the sponsons on a 6x24" belt sander. Here are a few pictures.





G. Lockhart from Australia sent in these pictures of a simple sanding jig he made to accomplish this step while keeping the side of the sponson perfectly vertical.

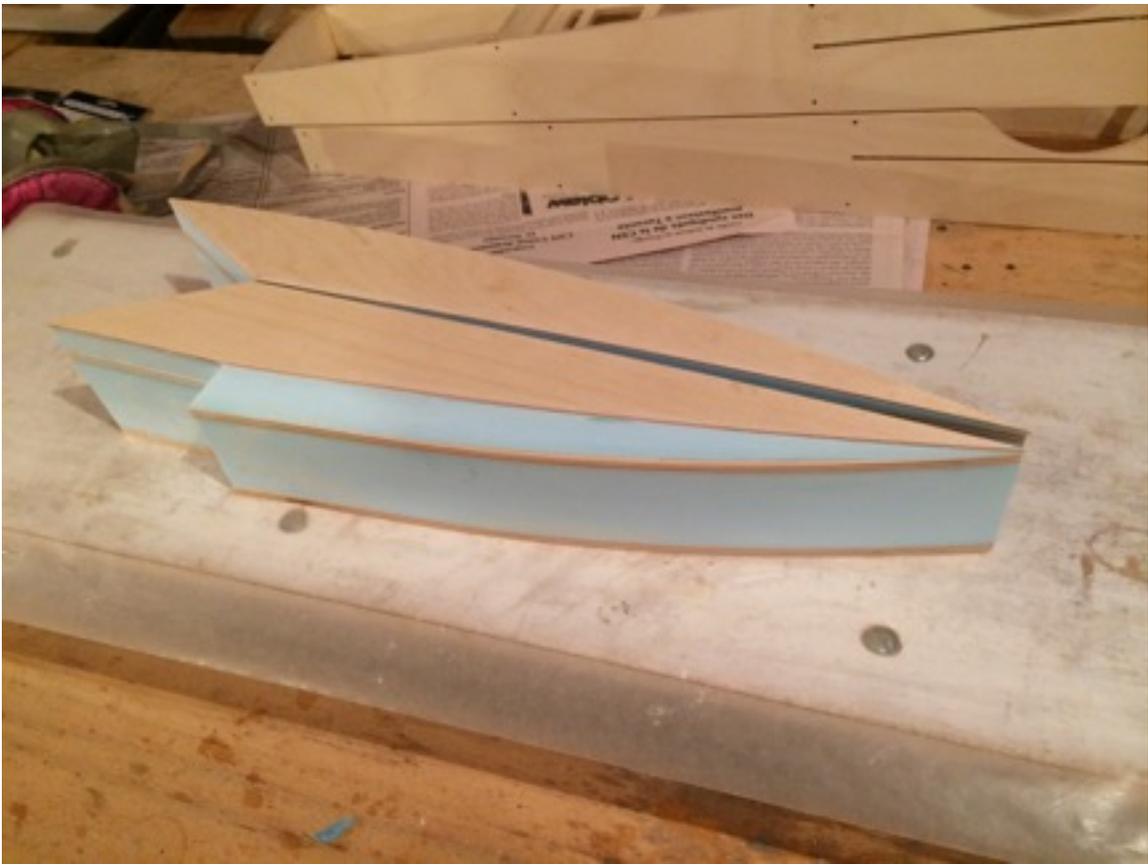


When doing the final shaping of the sponson sides, put the sponsons back-to-back and sand both together to ensure they both end up identical.

Now epoxy the sponson side sheeting to the foam. Line up the straight edge of the ply to the foam...at the back and the top of the sponson. Use rubber bands or shrink wrap (or whichever method you prefer) to hold the ply in place while the glue cures.



Now you can finish trimming the foam using the edges of the plywood pieces as guides. Block sand lightly.



Start gluing on the rest of the sheeting. Block sand all edges of the pieces as you go once the glue is cured. Follow the sequence as picture below.

* When gluing the sheeting on the sponsons, use a brush to apply a coat of epoxy to the entire sheet of plywood and to the foam. Make sure there will also be glue at the intersections of the different pieces to ensure a strong bond and a tough sponson. Use slow cure epoxy.

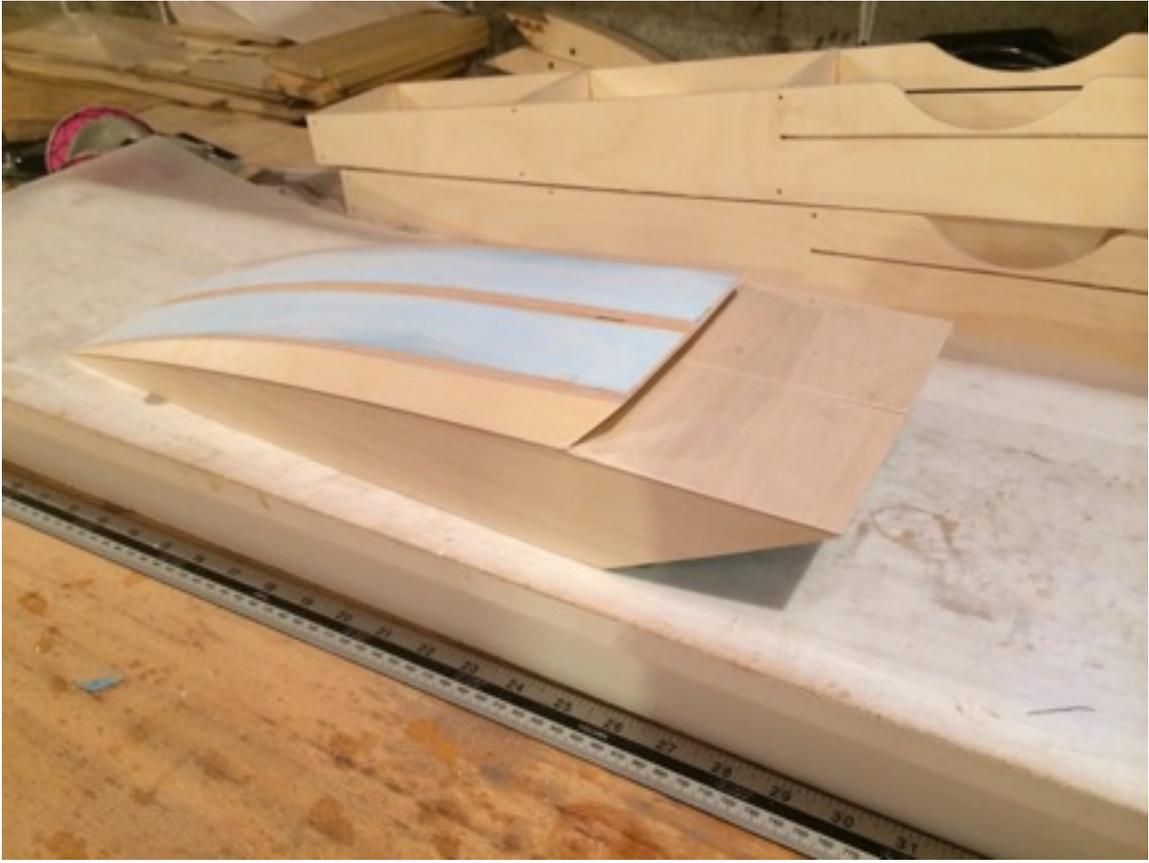




*** something I discovered while building several of these boats is that the cling wrap or shrink wrap commonly used for packaging works great for holding on the thin ply to the foam while the glue cures. It keeps a nice even tension on the pieces and allows for very tight joints.

Chine...





Bottom...

Make sure to keep riding surface FLAT when clamping... a thicker plywood is used here between the clamps and sponson to help ensure this.





Top...



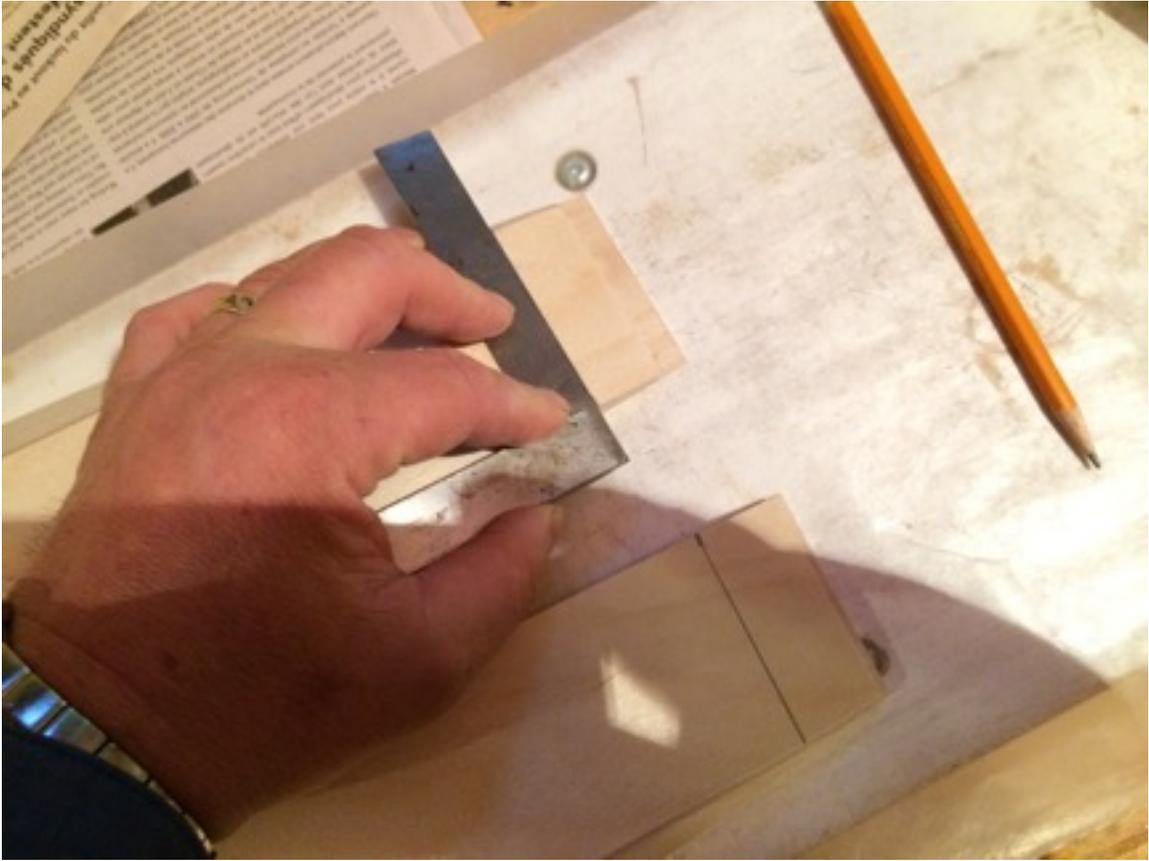


At this point the sponsons are almost completed. Cut off the excess at the tips of the sponsons and sand them flush. Do them together so they are the same.

Now we must install the sponson tips. Make a mark at about $\frac{3}{4}$ " back from the tips of the sponsons. Put both sponsons together side by side to make these lines even. Then cut off the sponson tips at these marks. A table saw works great for this step, but it can easily be done by hand also. Block sand to make sure the ends are nice and straight.











Take the short blocks of wood supplied in the kit and epoxy them to the tips of the sponsons and let cure completely. After the glue has cured, use your wood plane and a sanding block to shape the sponson tips to match the rest of the sponson. The sponson tips are made of hardwood, so it will take some time to match them perfectly. If doing this on a belt sander it is pretty quick. If you are doing it by hand however, I suggest using a small hand plane to do the rough removal, then finish by block sanding.



Install the ride pads on the sponsons. These line up flush with the inner edge and the back trailing edge of the sponsons. You can blend them in at the tips with a sanding block or you can trim them square the choice is yours.

At the back, let them overhang a little bit and sand them back taper and flush with the back of the sponson on the same angle.







Now you can install the sponson tubes.

Take the larger wood dowel supplied in the kit and cut it into 4 equal length pieces.

Epoxy the sponson pins into the sponsons. Make sure they go in all the way. They will go through the first $\frac{1}{4}$ " plywood and also through the other plywood inside the sponson (2.5" deep in all). Epoxy the hardwood dowels into the sponson pins.

Wipe off excess glue and let cure.

***** NOTE:** the sponson pins have some grooves machined into them. If the pins are properly installed (going though both $\frac{1}{4}$ " plywood sponson formers) none of these grooves should be apparent with the pins in place. If some of the grooves are showing, the pins are not in far enough, so recheck and correct the situation.



The final step is to thread in the lag bolts for the turn fin. Double up the nuts on these to help thread them in. Let about 3/8" to 1/2" of the bolt extend outside of dowels when done.



You can now seal the outside of the sponsons. I use West Systems epoxy for this. 105 resin with 207 hardener.

This concludes the assembly of the sponsons and the most difficult part of the build!

Now the tub!

Building the tub is pretty straight forward. The key factor is that you build it straight! You should have a long straight edge (long enough to span the length of the tub) a good square and several clamps (5+ inch span) ready for this step. Again, you should be working on a perfectly FLAT work surface.

Dry-assemble the parts on your work surface to begin with and see where everything goes. We start by working with the tub right-side-up. There are four main bulkheads, a servo tray and two pieces that make up the transom. The tub sides are slotted for the bulkheads to fit into place. Test the fit, adjust slightly with sand paper if required. Don't make the slots deeper than they are though, as this will reduce the spacing between the sides and you will end up with less than 4.5 inches. This will make it difficult to get then engine mounts in when the time comes.



When you're satisfied with the fit, mix up a batch of epoxy and apply to the edges of the bulkheads and to the slots in the tub. As with the sponson build, you may want to lay a length of wax paper on your work surface so that the tub doesn't get glued to the table. Use a long straight edge and clamp it along side of the tub as you glue everything together. Also check that the transom is square with the sides. Continue checking this as you position all clamps. You can also clamp the square to the side/transom if you wish. Make sure everything stays flat against the build table also as the glue cures.

You can also glue and clamp the transom doubler in place during this step, or do it after, choice is up to you. I usually do it all at once.



Epoxy in the rear boom tube support (hardwood piece 4.5" x 1" x 0.75") and the nose piece doubler (piece of 4.5" long spruce or hardwood).



Once the epoxy has cured its time to block sand all the frame work. Sand all bulkheads flush to the tub sides.

At this point you are ready to start installing the 1/16" sheeting on the tub. **Don't forget to seal the underside of the servo tray with epoxy before completing the next step.**

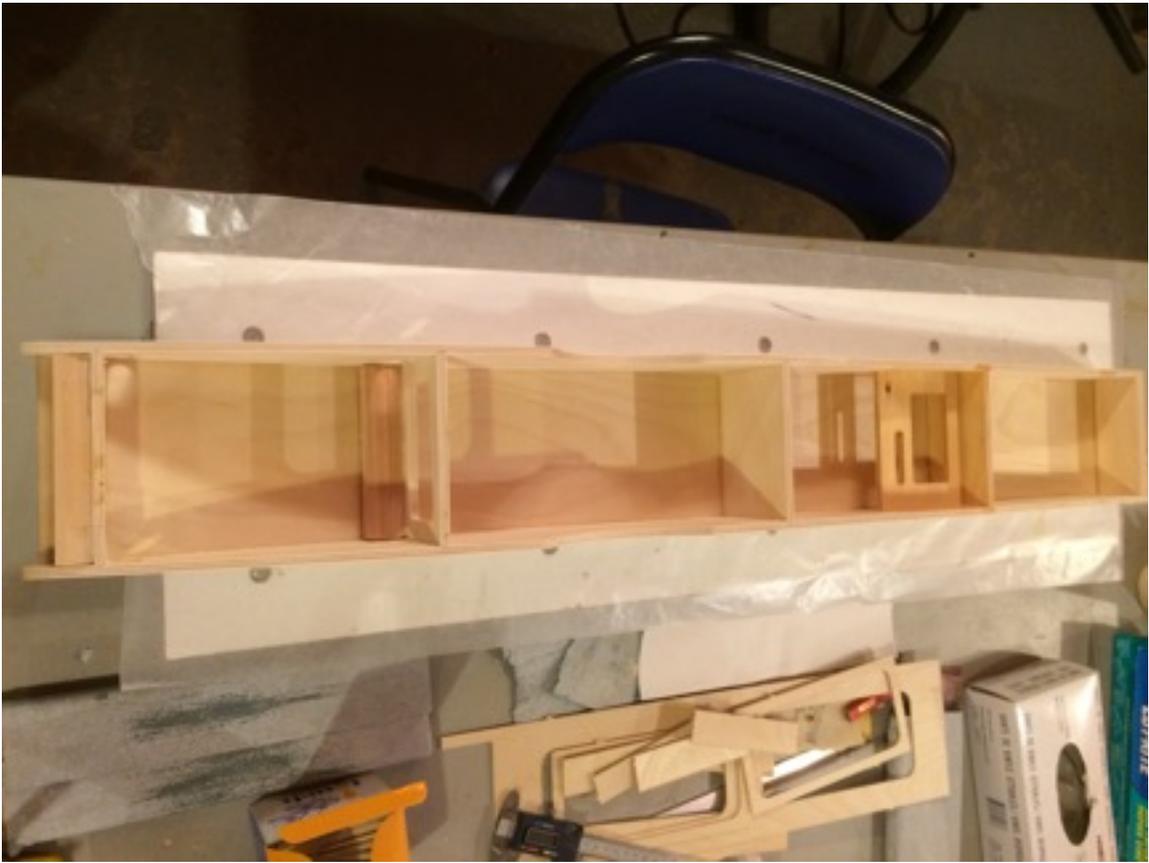
Start with the bottom sheeting. This is the longest continuous piece of 1/16" plywood. Since the 1/16" plywood is so glossy finish, I recommend roughing it up a little bit with coarse sandpaper where it will make contact with the tub to ensure a good bond.

Clamp straight edges to the sides of the tub to keep everything straight. Also make sure it is square at the transom.

Epoxy the sheeting to the bottom of the tub. The piece will overhang the entire tub so you have some "wiggle" room here to get a nice fit all around. When satisfied, clamp, tape and/or weigh it down to ensure good contact between it and all sections of the tub until the glue cures. Let sit until completely cured. Again, very important to do this on a FLAT surface if you do not want a twisted tub!







Install the cowl tabs. These should fit nicely in the slots in the tub...fine tune with sand paper if required. Install them so that they are flush with the inside of the tub and square to the tub sides. Also epoxy in the small braces (2 per tab).



Laminate together the front boom tube support. This is two pieces of 1/16" thick plywood 4.5" x 1.25"...the two pieces are identical. Epoxy this in the tube up against the front bulkhead between the front boom holes.

- * if you are doing glass or carbon reinforcement of the tub, wait until next step to install this piece.
- * If you are not reinforcing with cloth, seal the entire inside of the hull at this time.



If you are going to do glass or carbon fibre reinforcing of the tub, do it now while sealing the entire inside of the hull. I like to line the inside of the tub with 5.9oz carbon cloth.

(Install the front boom support over the reinforcement if applicable).





Trim all the reinforcement once the epoxy has cured enough to do so. Sand flush in order to prep for the top deck sheeting.





Now prepare to install the top sheeting. Before installing the top sheeting, get the access cover “frames” from the parts and glue them onto the underside of the top sheeting. If positioned correctly, these will create a “lip” about 1/8” wide to hold the access covers.

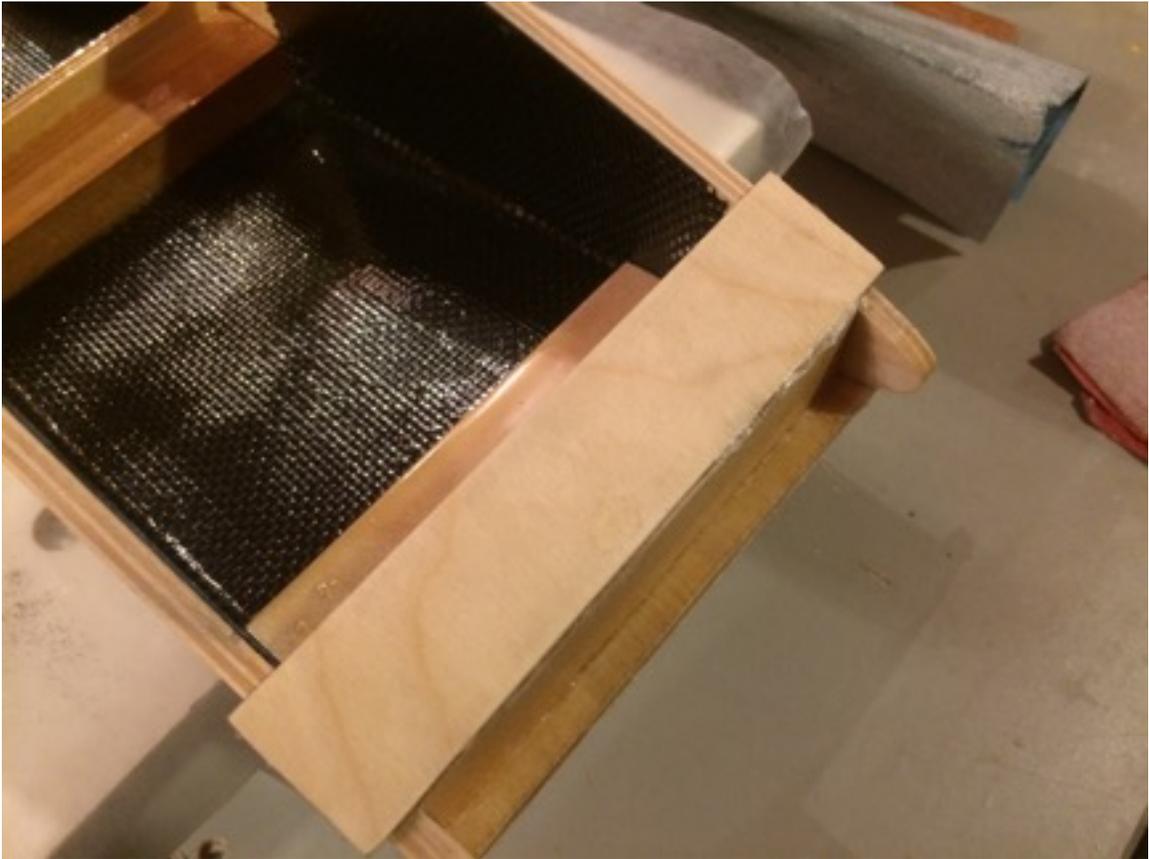
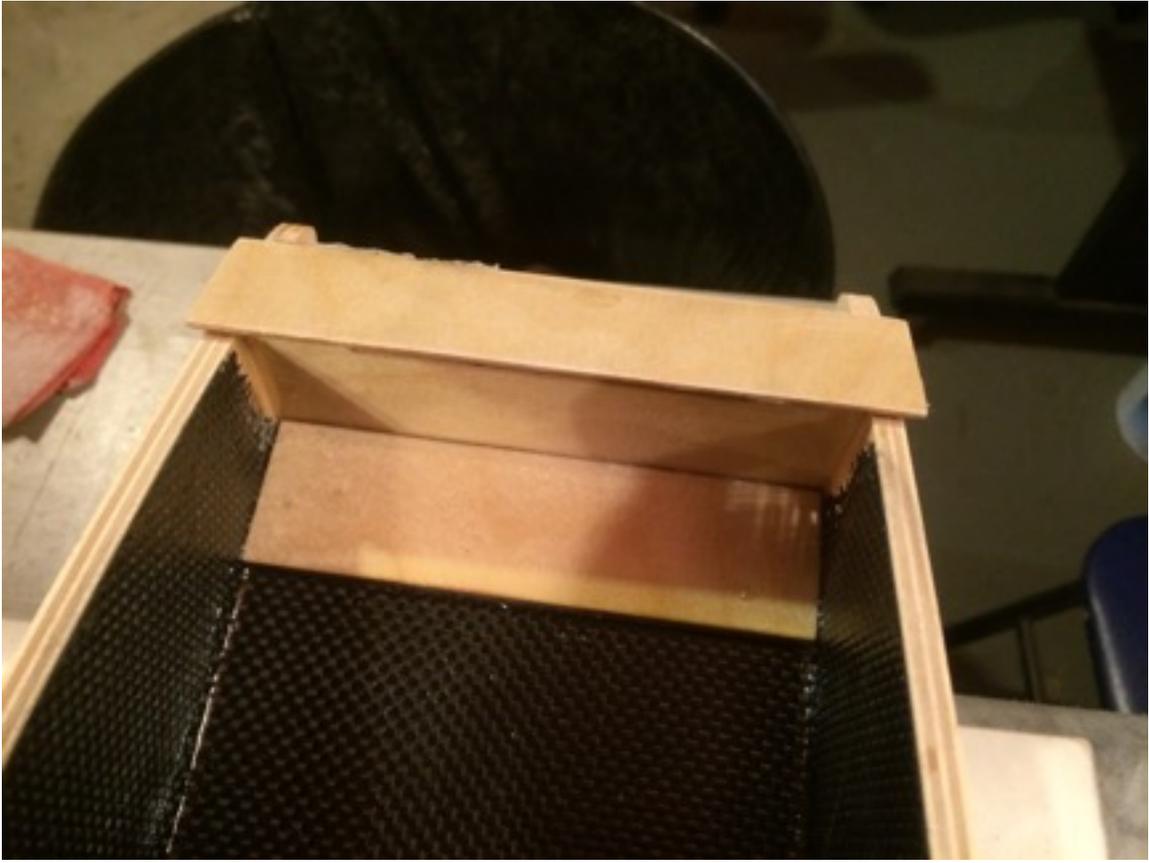


Seal the entire underside of the sheeting pieces at this point before installing them to the tub. Coat the underside of the entire sheeting pieces and the edges of the tub and apply the sheeting to the tub.



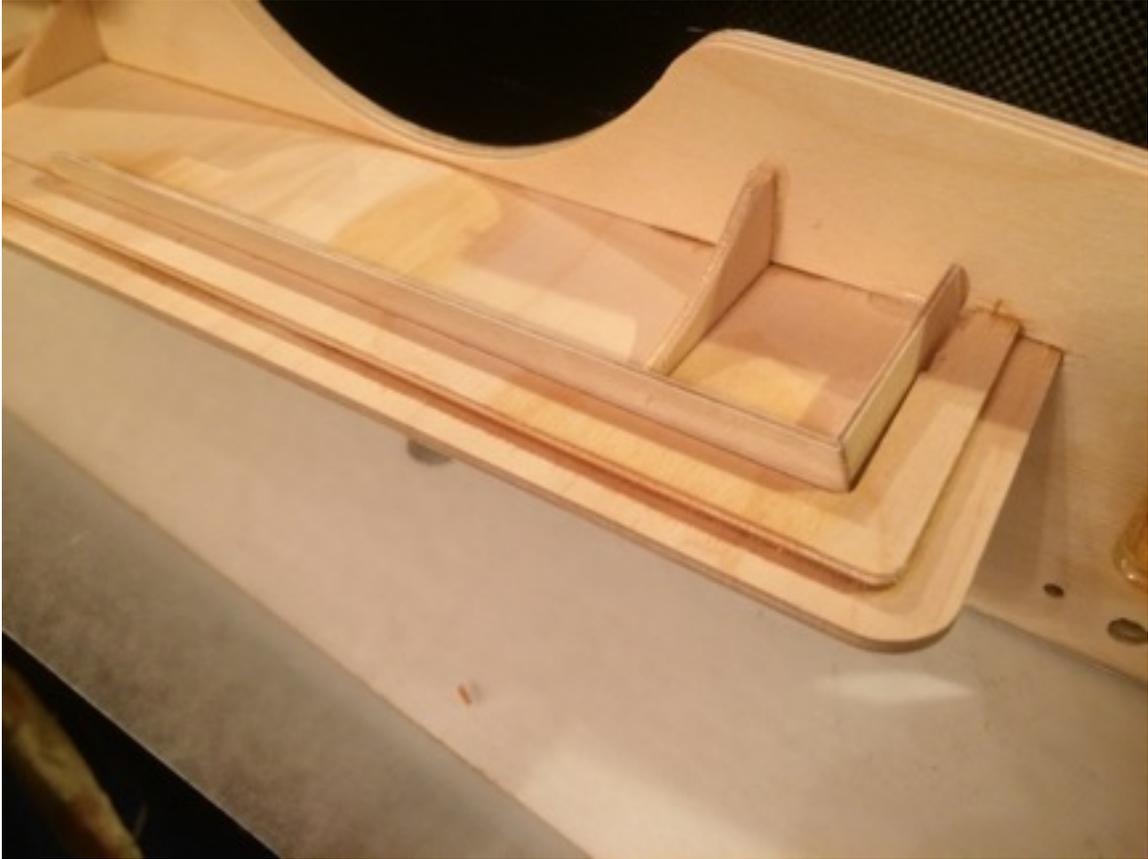
Laminate together the two pieces that make up the cowl nose piece. They are 1/16" plywood pieces. One is 5.25" x 1.125" and the other is 5.25" x 1". The narrower (1" wide) piece goes on the bottom. Position the pieces so they are flush on 3 sides...this should create a piece with a 1/8" lip extending on one edge.

Once laminated, glue this piece to the tub over the front bulkhead. The bottom edge should be flush with the front bulkhead inner edge.



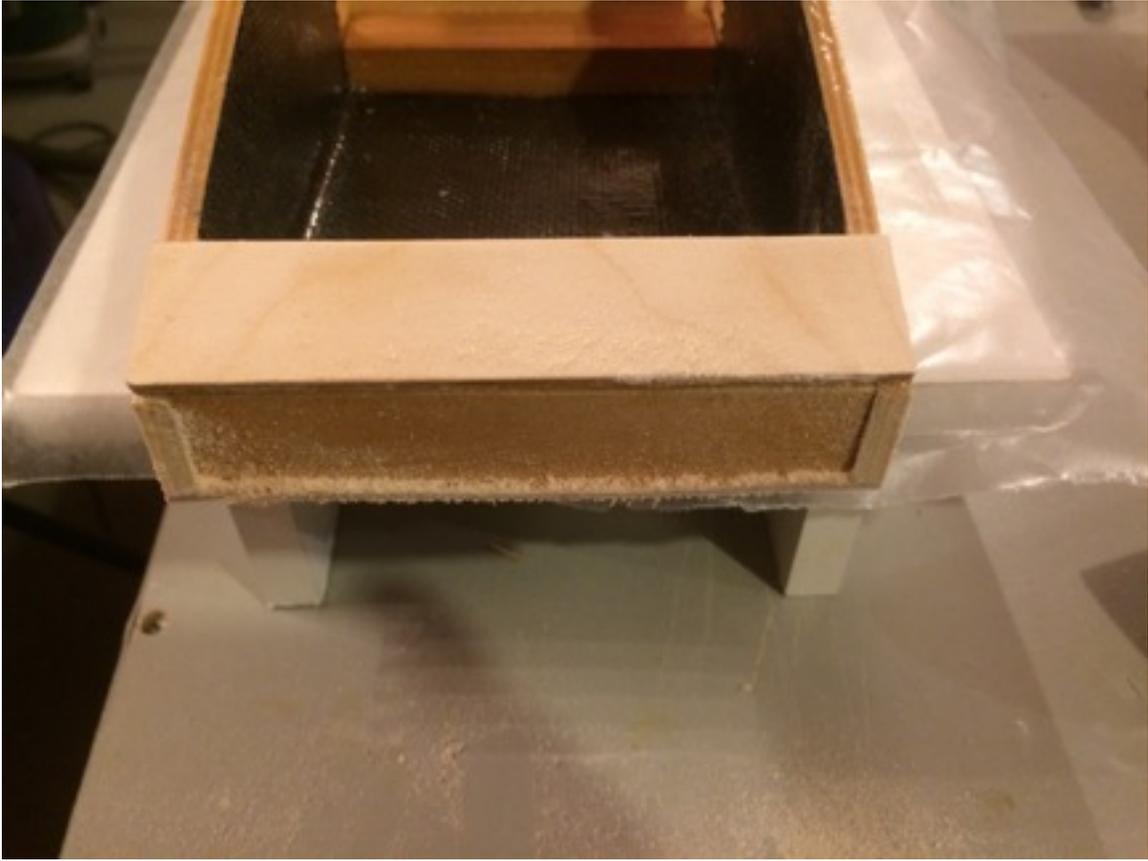


Here are a couple pictures of the cowl tabs done with the doublers installed and a small water shield I make with scraps of plywood.



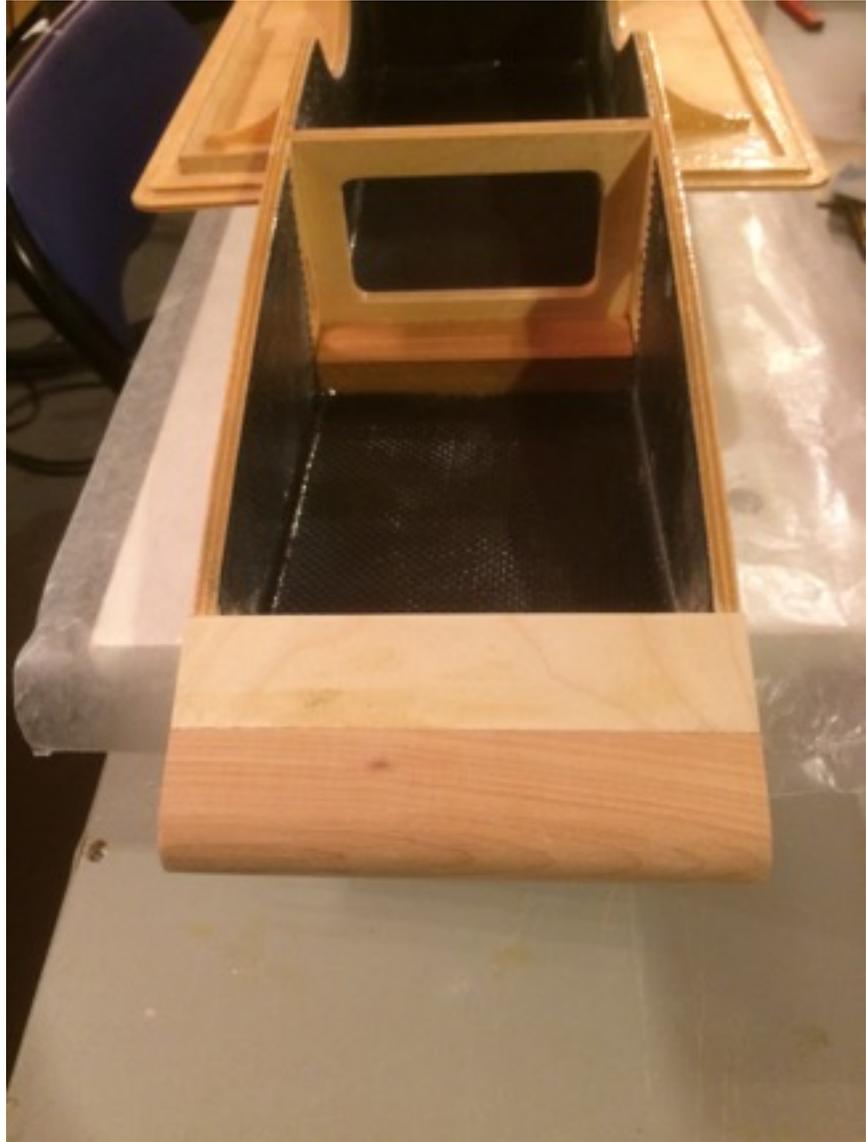


Cut off the excess at the nose and sand flat to prepare it for the hardwood nose piece.



Epoxy the nose piece (5-1/4" x 1-1/4" x 1" hardwood) the tub. Once the glue cured, sand and shape the nose piece to match the hull.





Using the pre-drilled holes in the tub sides as guides, drill for dowel pins into the bulkheads (1/8" diameter dowel) and into the rear boom support block (1/4" dowel).



Trim the cowl to fit the nose of the boat at the front.





Rear shoes...

There are four spruce pieces to make up the rear shoes. Begin by gluing these together as pictured... a short and a long with ride surface and rear edge flush.



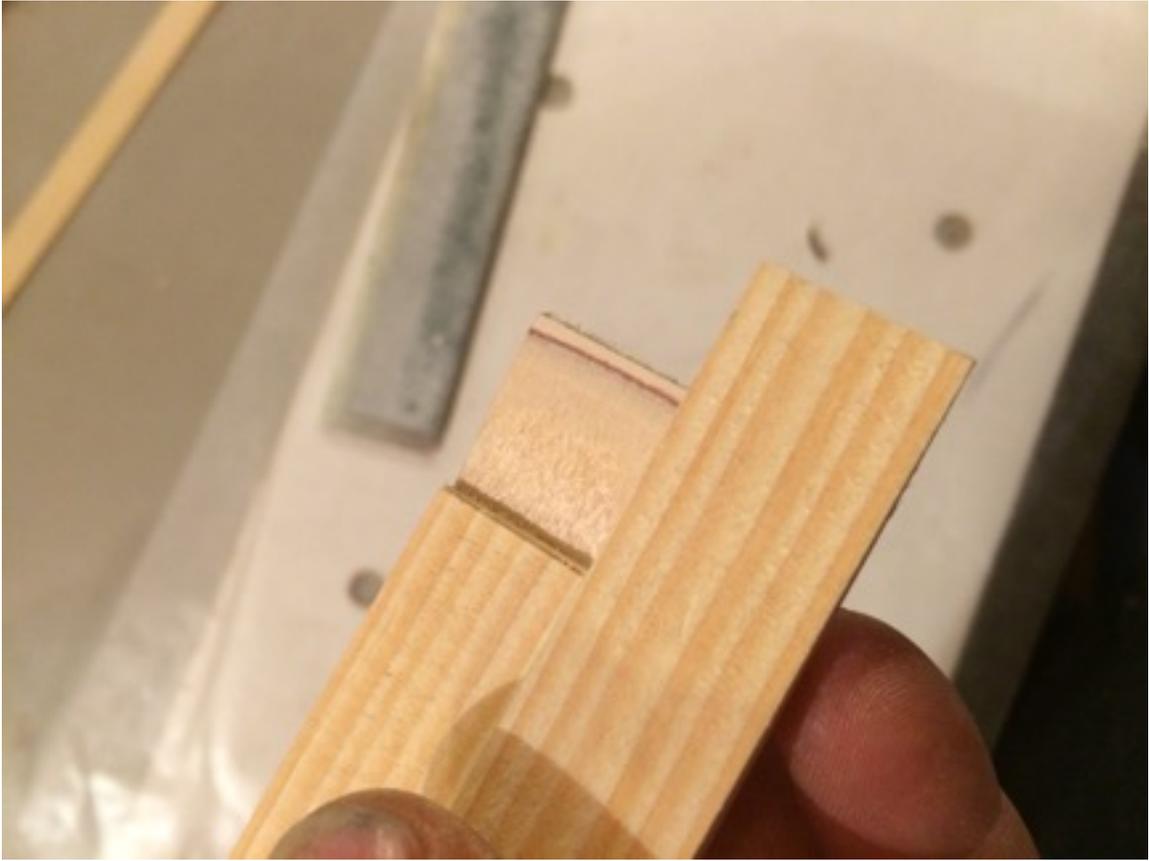
The next step is installing the bottom sheeting.



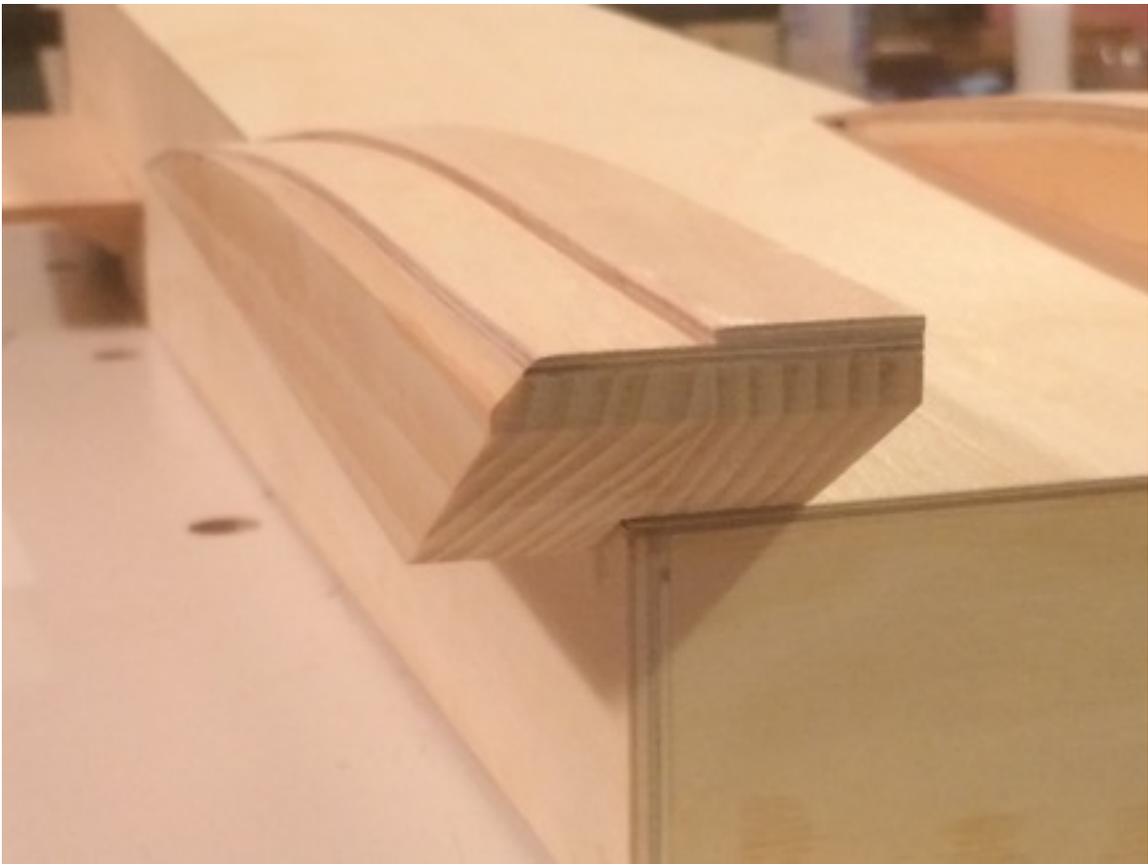
Trim and sand everything flush. Now install the ride pads, see the pictures for ideas on how to do this for a nice fit on the boat.







Sand a bevel (non-trip) on the outer bottom edge of both rear shoes...I make the bevel about 1/4" wide 45 degrees.



Mount the rear shoes to the boat. Make sure they are even in relation to each other and square to the tub.

NOTE: make sure the shoes do not extend past the back of the transom more than 1-1/16" in order to have proper clearance for the rudder. If required sand the back of the shoes square to obtain the required clearance.



Next you have to prepare your boom tubes and drill the tub for them.

Find the center of the boom tubes and make a **mark 1/2" to the right of the center**. This will be the centerline of the booms as they will be offset 1/2" to the PORT side of the hull. From this centerline, mark to points 1-1/8" on either side. These are your mounting holes. Drill with a 5/32" bit.

*** Note: if you have purchased the Composite Boom Tubes, they come with 1/2" hardwood dowels approximately 6" long. These must be epoxied in the center of the boom tubes to prevent crushing in the mounting bolts area.



Now mark the hull from drilling. Find the center of the hull from one boom hole to the other. Mark the center location. Make a mark at 1-1/8" on either side of the center along the line you made. These are your mounting holes. Drill with a 5/32" bit. Stay as perpendicular as possible.



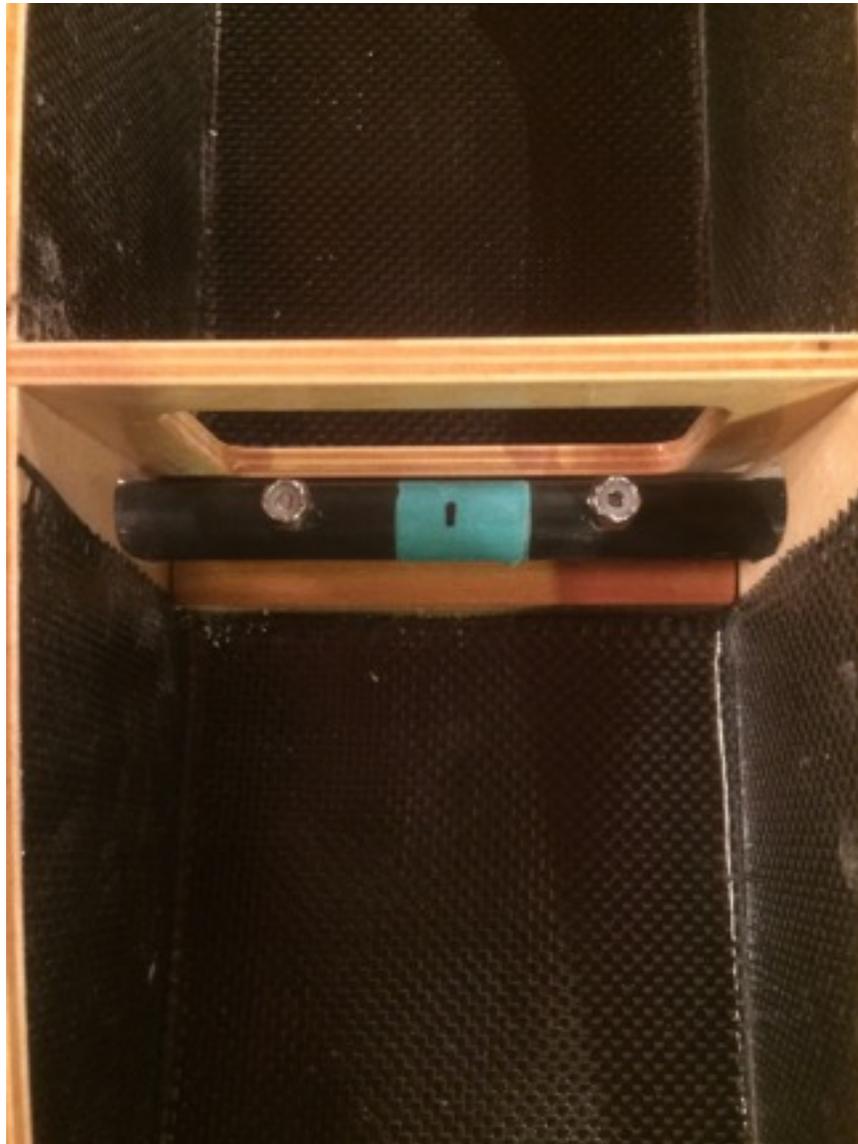


Countersink the holes slightly for the Tinnerman washers included with the mounting bolts.



Position the booms in the hull remember the offset is to the PORT side (left side looking at boat from the rear). Using the 5/32" drill bit, drill through the tub AND boom holes. This will line them up. After drilling one, insert the 8-32 mounting bolt then drill the second hole and insert the second mounting bolt. Repeat the same procedure for the second boom tube. If the bolts are too tight you might prefer using a 11/64" drill bit for this last step.

*Once this is done, I recommend permanently marking the booms to identify which orientation they belong in the boat so that when you remove them you know where and how to reinstall them. This is particularly useful to maintain settings as accurately as possible when you have to disassemble.





This completes the assembly of the tub.

Now to put it all together...

Mount the sponsons to the booms and set the proper spacing as follows:

Tub to starboard sponson, measured just behind the rear boom: 5-1/2"

Tub to starboard sponson, measured just forward of the front boom: 5-3/8"

Tub to port sponson, measured just behind the rear boom: 6-5/8"

Tub to port sponson, measured just forward of the front boom: 6-9/16"

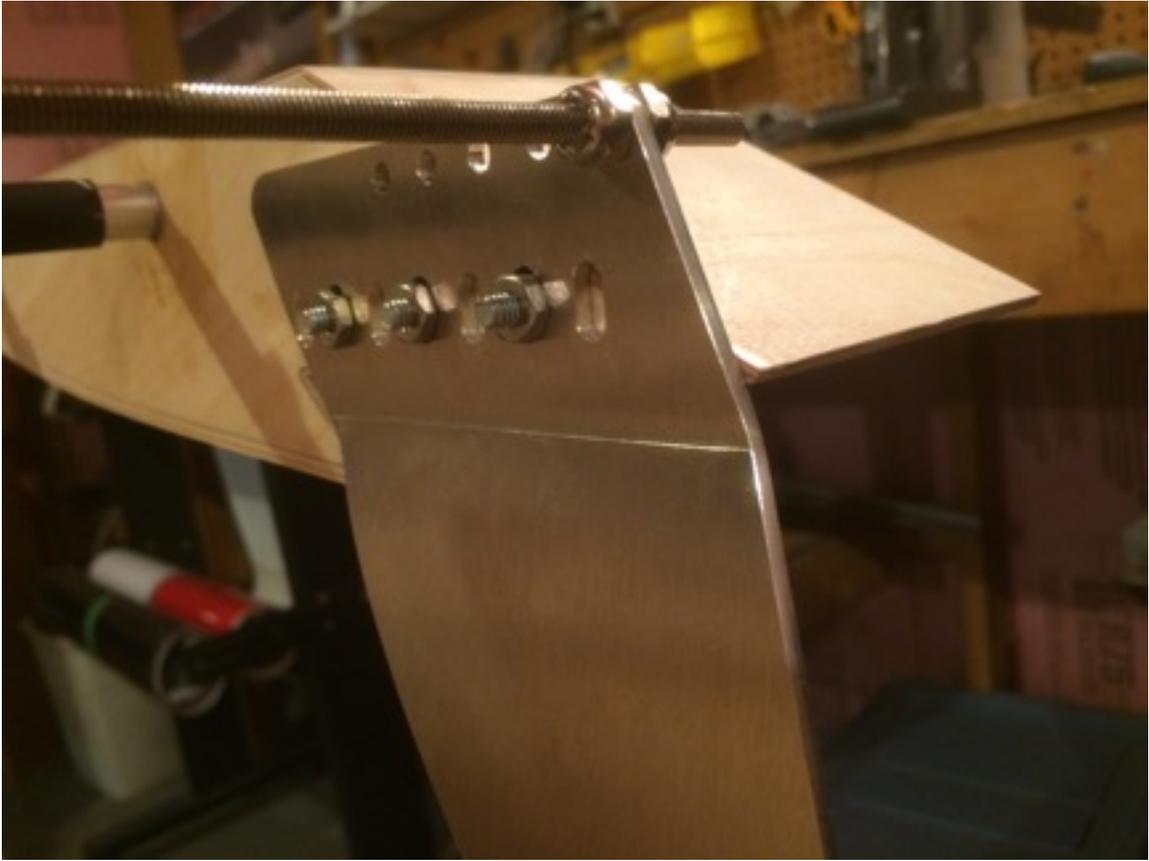
Drill the booms and sponson pins with the spacing accurately set as indicated above. A good method to ensure this is done accurately is to cut 4 pieces of 1x1" (or similar) to the measurements and use them as spacers between the sponsons and tub. You can then lightly clamp the sponsons in position and drill for the mounting bolts without fear of things moving.

Here is a pic of me doing it on an older Warpath...



Turn Fin installation...

Mount the fin to the sponson...start with the fin centred in the mounting holes. Run the threaded rod through the hole in the fin and see where the rod lines up on the tub. Mark the location on the tub, then drill 1/4" holes in the tub.

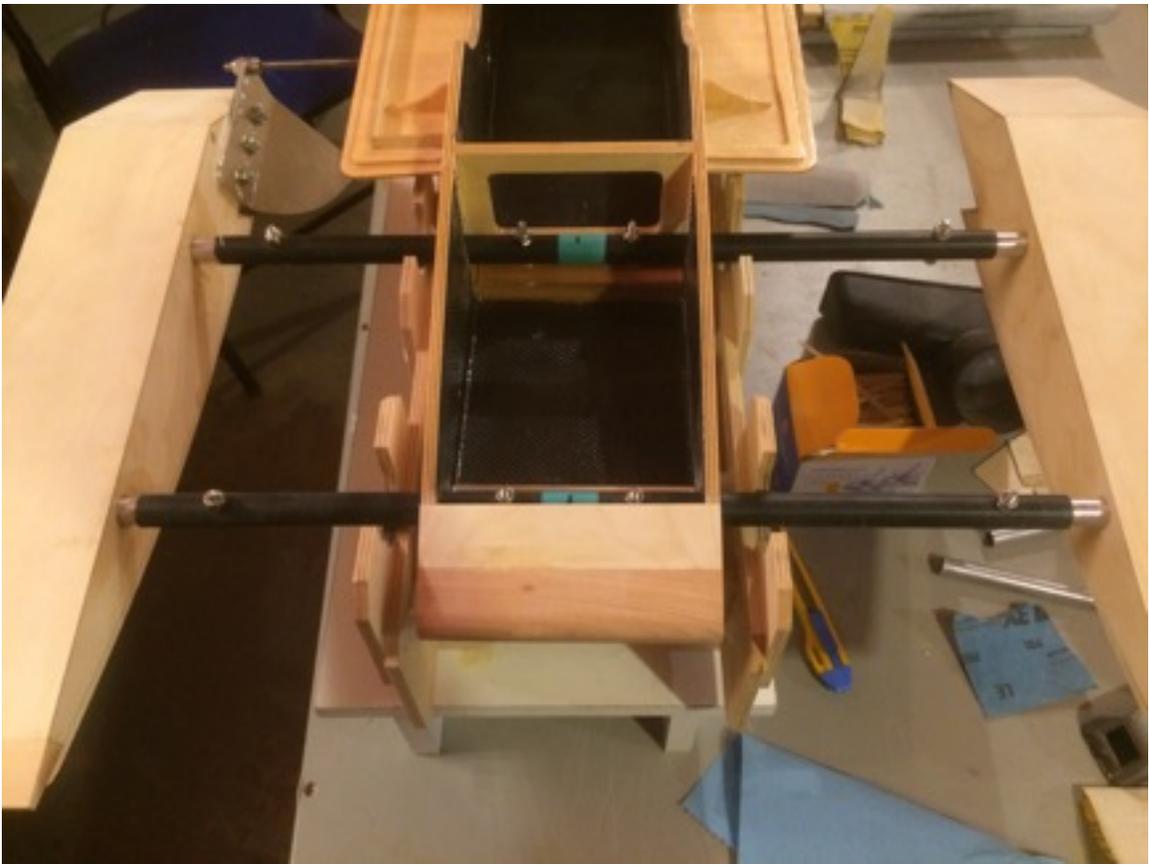
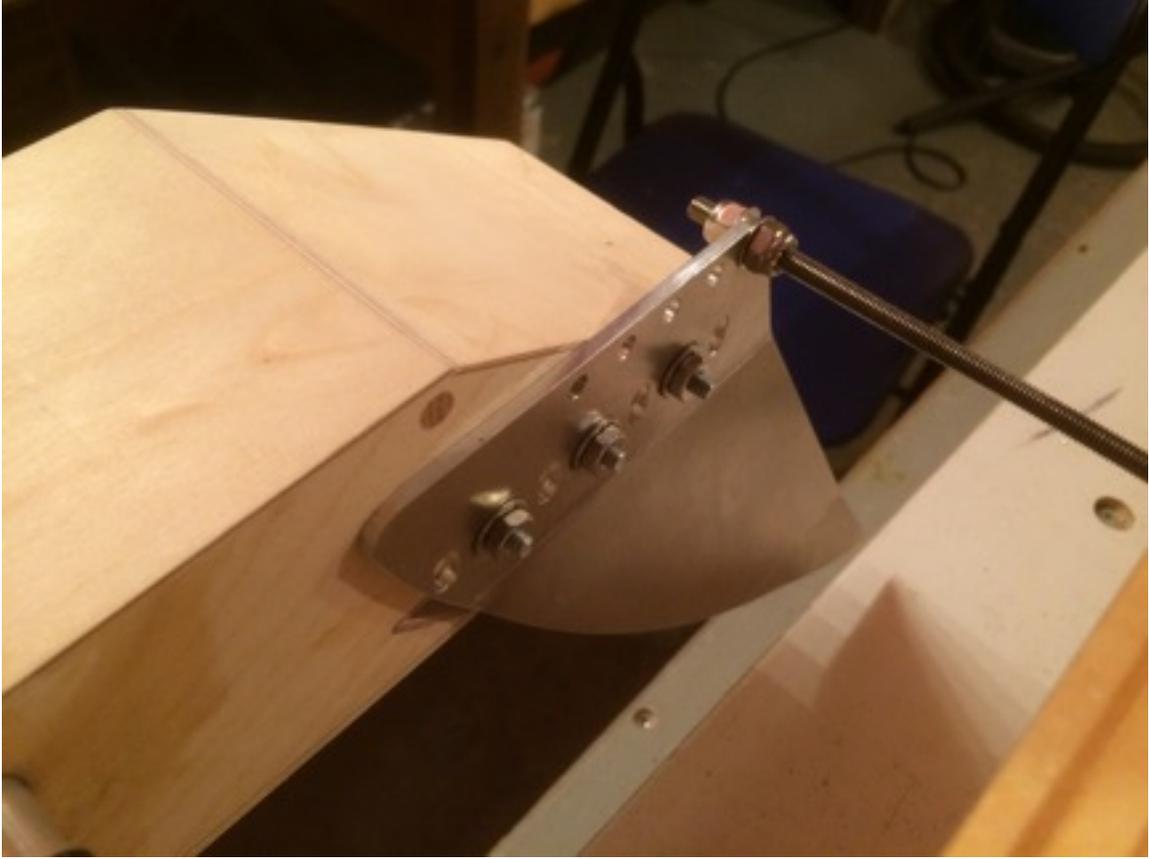




Install the T-nut from the inside and complete the turn fin brace installation.









Congratulations, you have successfully completed the build! Don't forget to completely seal all exposed wood on your Warpath before rigging it and heading out to the pond!

Thank you for choosing the Warpath. Happy Boating!!!