

MGB Warpath Rigger Building Instructions (Rev. 2012-05-01)

Thank you for choosing the Warpath Rigger Plans. These instructions were initially written for the kit version, but they can also be used for the plan version as long as you take your time accurately making all the required parts.

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:

- two (2) 2"x3"x18" foam or balsa blocks
- two (2) 1"x3"x18" foam or balsa blocks
- two (2) Pieces 15.5" long Aluminum Tubing 0.625" O.D. – 0.504" I.D. (Booms)
- four (4) Pieces 6" long Aluminum Tubing 0.500" O.D. – 0.375" I.D. (Sponson Pins)
- varying lengths of 1/2", 1/4" and 3/8" hardwood dowels
- 10-32 Lag Bolts for Turnfin mounting
- good quality Plywood
- If you want to use CA, use medium (we recommend building with epoxy)
- Good quality epoxy such as West Systems
- 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 31/64 are the most important ones)
- A square
- A good FLAT building surface
- 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 acid brushes (trimmed) for applying epoxy.

Note: feel free to reinforce the build any way you see fit. 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 will sometimes use 1" strips of fibreglass to reinforce joints between bulkheads and tub bottom/top and sides. This is added piece of mind and not that much more work. Other people will use triangular stock, or 1/4" square stock. Some people will use additional dowels to pin the sheeting on the boat. In general, the stronger you make the boat, without modifying critical ride surfaces and angles, the better it will be for you in the long term.

Sponson Assembly:

These are the most critical parts of the boat, and you guessed it, the most difficult part of the build as well! No need to panic though, it's pretty straight forward if you 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:

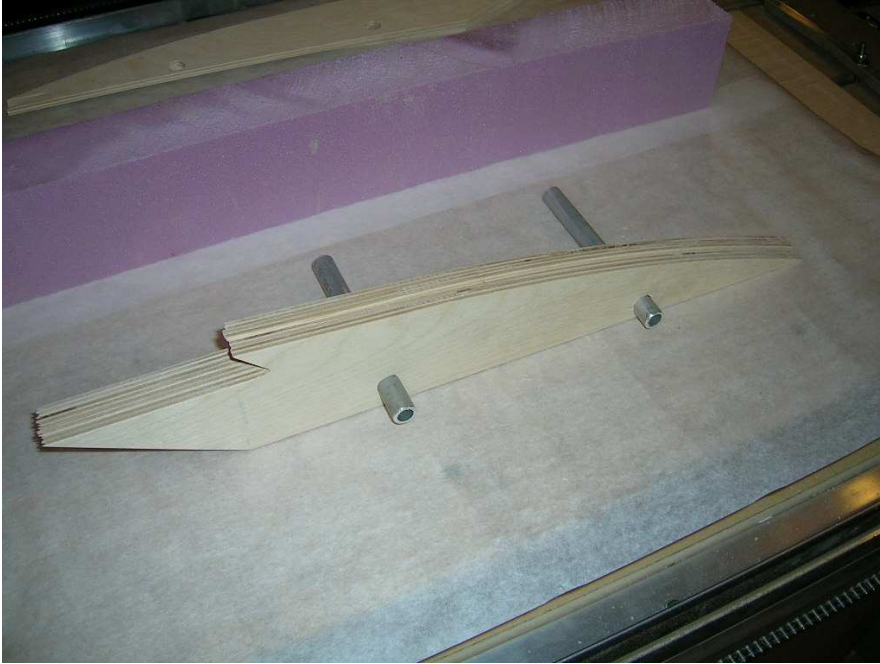
- the four (4) 1/4" thick sponson frames (sides/stringers)
- the four (4) sponson pins (1/2" O.D.)
- two (2) 2"x3"x18" foam blocks
- two (2) 1"x3"x18" foam blocks

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 higher of these two is the inside former (nearest to the tub - Starboard Former 1) of the starboard sponson. The other is the outside former (furthest from the tub - Starboard Former 2) of the starboard sponson.

The other two formers are for the port side sponson. The highest is the inside (closest to the tub - Port Former 1) former. The other is the outside former (furthest from the tub, Port Former 2).

* 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. The foam (or balsa) blocks should be placed cut-side down, so that they stand 2" wide, 3" high.

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.

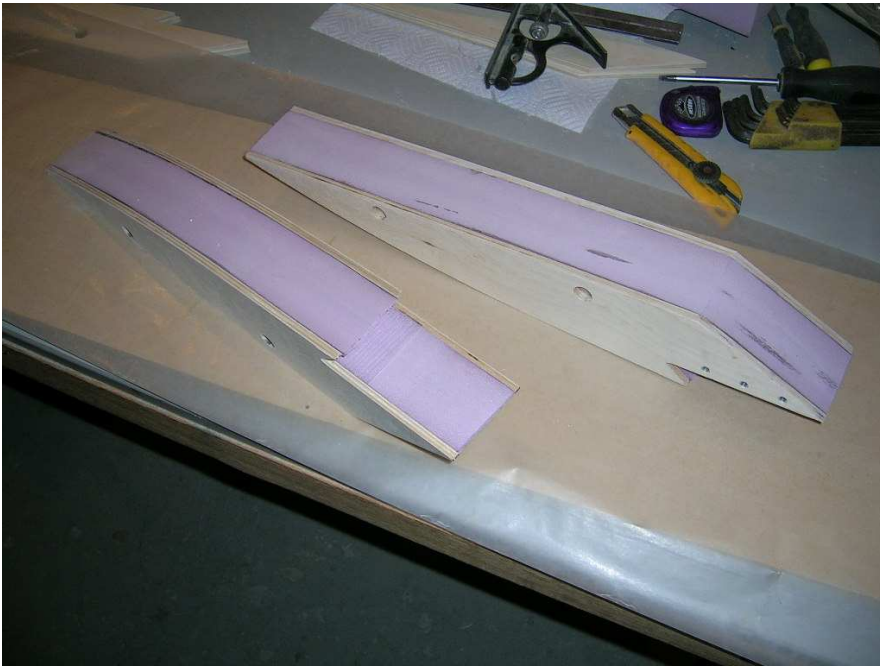
*** In this step you want to make absolutely certain of a few things. First make sure the rear tips of the sponsons are square to one another. Also, you want to make sure everything stays flat against the build surface, including the foam block. This is ABSOLUTELY necessary. It will ensure that the sponson bottoms have the correct dihedral and that the sponson tubes go in straight later on. This is the most important and critical part of the entire build.**

Repeat for both sponsons.



Once the epoxy has cured you can use the flush-cut saw and trim the excess foam following the edges of the wood pieces. Don't go too close with the saw, finish with a sanding block. **DO NOT CUT OR SAND THE WOOD.** 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!

Let's move on then. Now it's time to drill out the blocks for the sponson pins and the wood dowels.

Drill from one side about half way through, then drill from the other side to complete the side-to-side holes.

***All holes in foam cores are pre-drilled in 2015 and newer kits.**

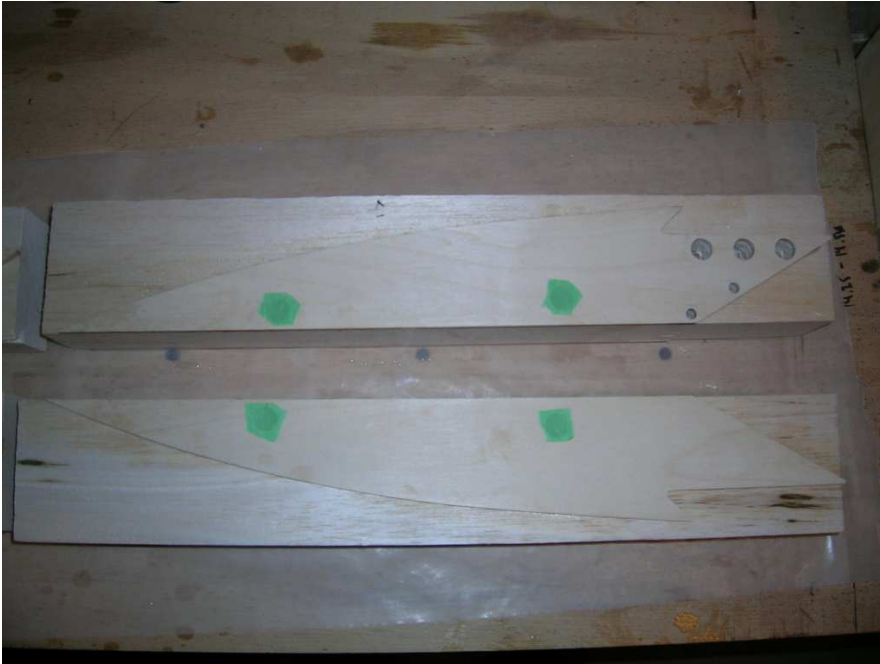


At this point you can install the $\frac{1}{2}$ " and $\frac{1}{4}$ " wood dowels for the turn fin mounting area. Here are some pictures of some that were done at a later point in the build but now or later, the end result is the same. You epoxy in the dowels, then center drill the $\frac{1}{2}$ " ones with a $\frac{9}{64}$ " bit and thread in the supplied hangar bolts. All the dowels pictured here

must be installed so that the go through BOTH ¼" thick sponson formers. This is important for maximum strength of the turn fin mounting area.



Now take two 1"x3"x18" blocks of foam (or balsa) and epoxy them to the outside of both sponsons with the cut edge of the foam lining up with the flat edge of the sponson. I like to use small pieces of masking tape on the outside formers where the second block is glued on so as to prevent epoxy from getting inside the holes. This makes it much easier later on to get the pins and dowels in correctly.



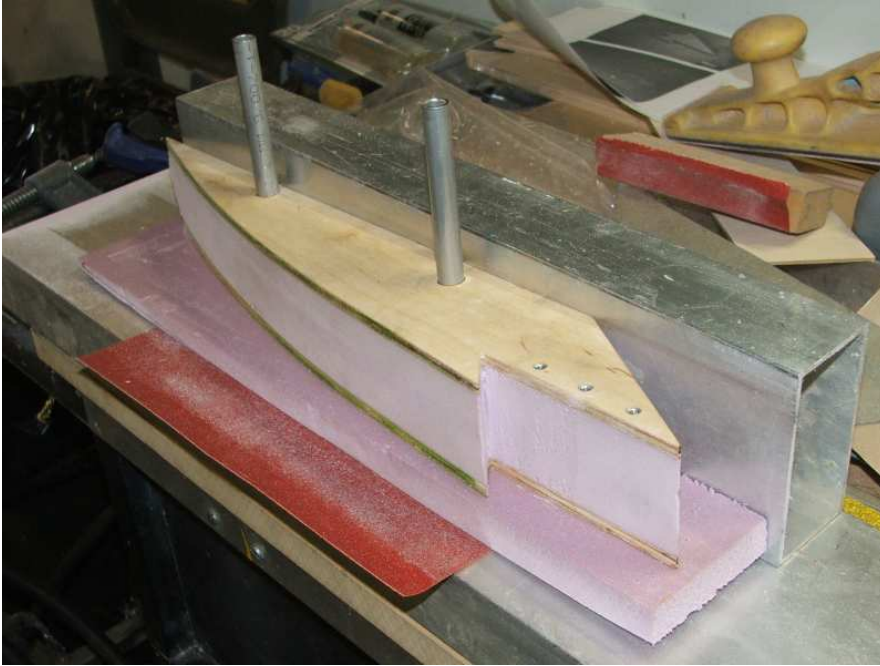


Once the glue is cured, get the sponson top sheeting template out. This piece is shaped like the top of the sponsons and is made of 1/8" ply. What we have to do now is trace the outline of the outer edge of the sponsons using the template as a guide. The template is actually 1/16" narrower than the final 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 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.

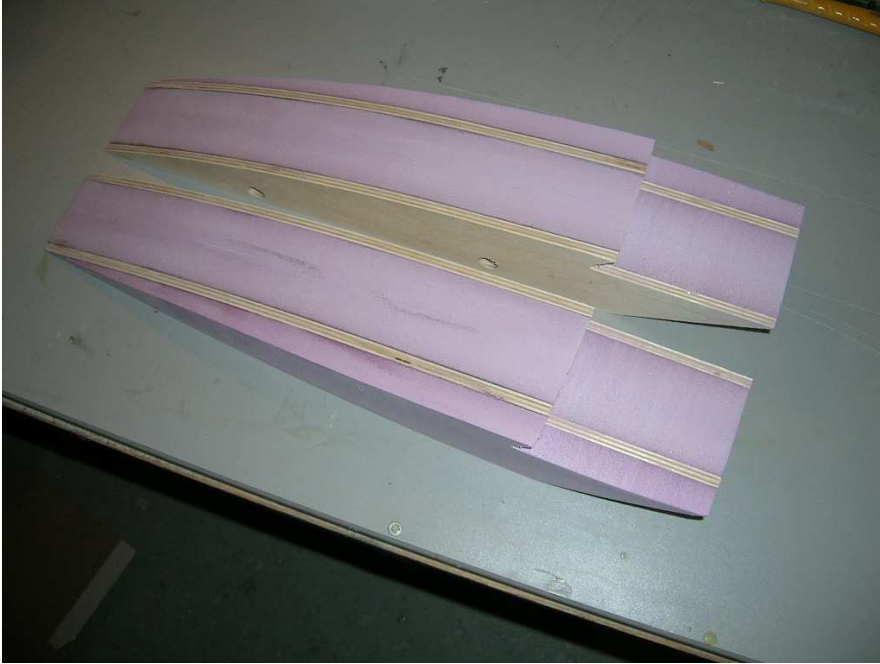
G. Lockhart from Australia sent in these pictures of a simple sanding jig he made to accomplish this step while keeping the side of the sponson perfectly vertical.



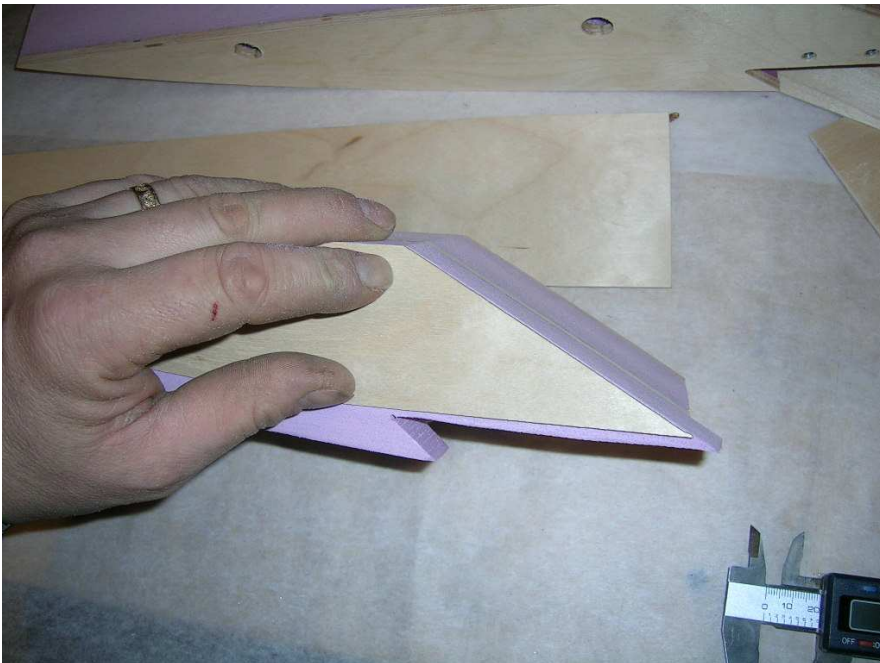
* When doing the final shaping of the sponson sides, put the sponsons back-to-back and sand both together to ensure they both end up identical.

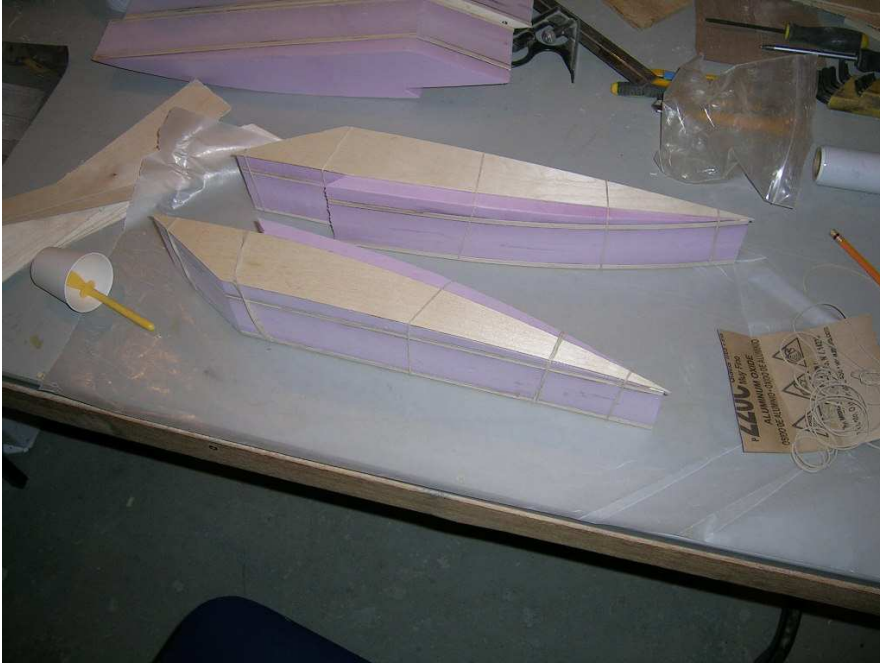
The important parts to have block sanded at this point are, the top of sponson, the bottom of sponson and the back taper of the sponson.





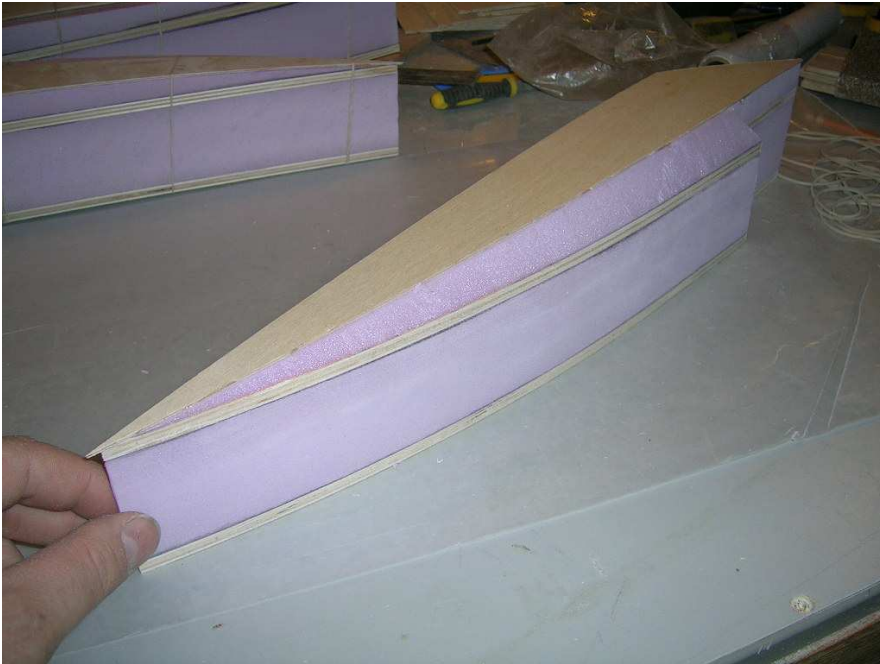
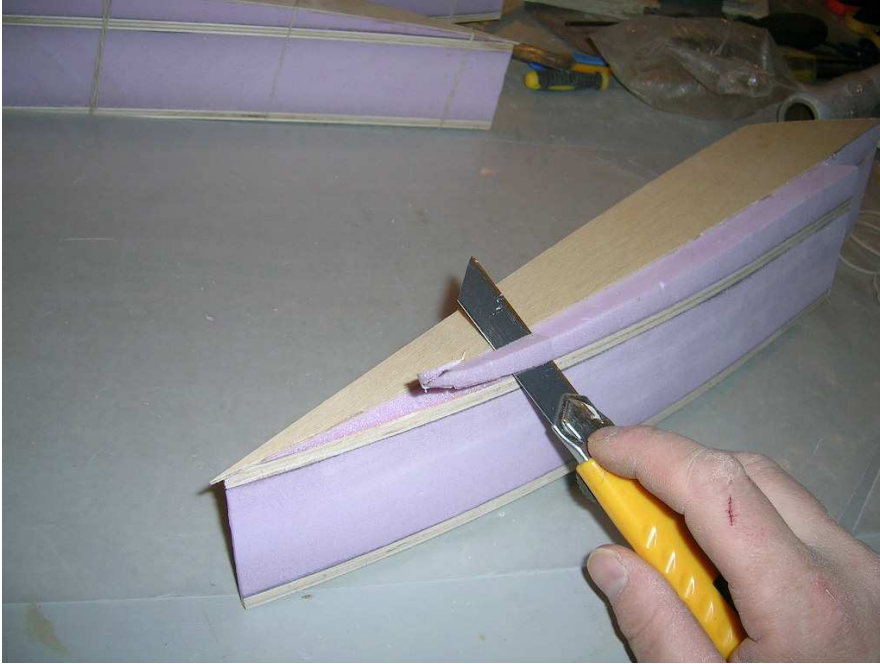
Now epoxy the sponson side sheeting to the foam. Line up the straight edge of the ply to the foam...at the back and the top of the sponson. Use rubber bands to hold the ply in place while the glue cures.





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

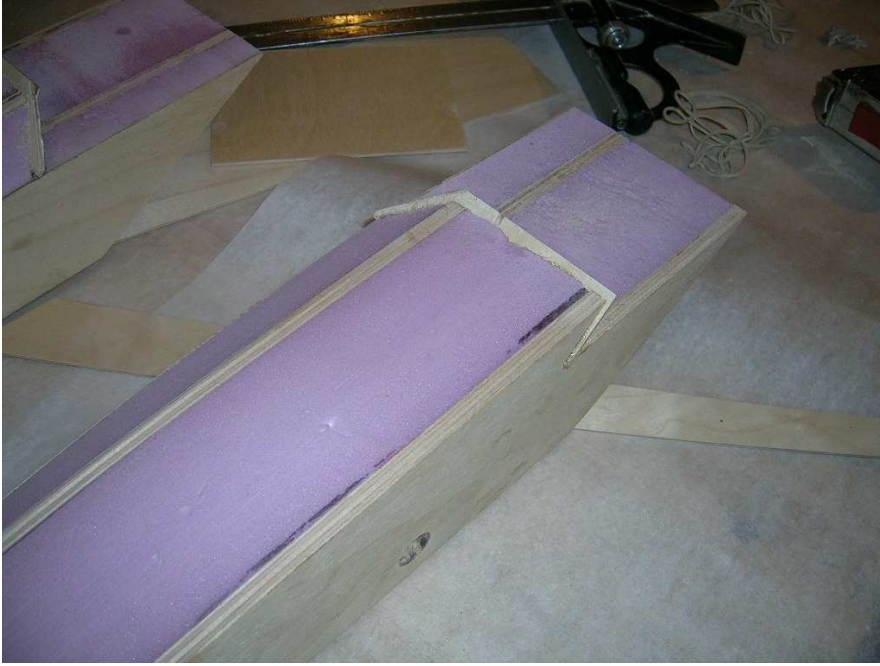






Start gluing on the rest of the sheeting. Begin with the small piece covering the lower rear taper of the sponson. Block sand all edges of the pieces as you go once the glue is cured. Follow the sequence as picture below.

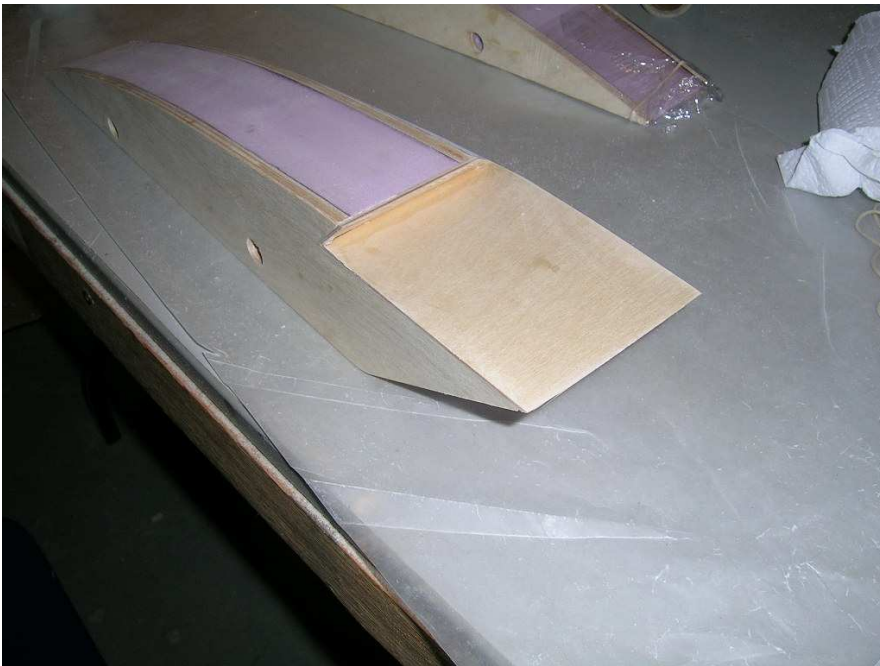
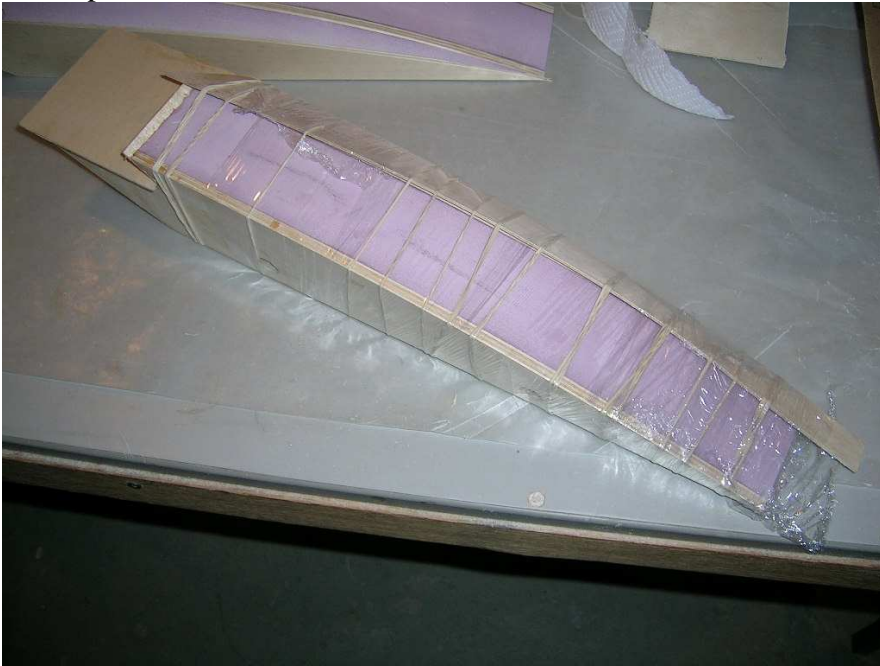
* When gluing the sheeting on the sponsons, use a brush to apply a coat of epoxy to the entire sheet of plywood. Make sure there will also be glue at the intersections of the different pieces to ensure a strong bond and a tough sponson. I like to use at least 30-min cure epoxy for all the sheeting.





*** 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.

Side taper...

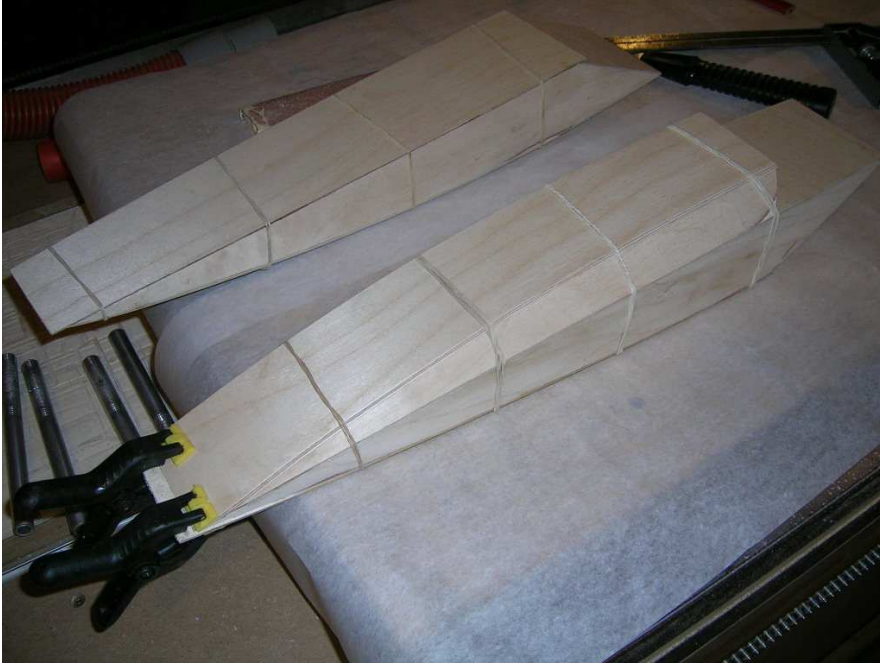


Bottom...



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.







Now you can install the sponson tubes. You will notice in the picture, I like to rough the surface of the tubes that will be glued inside the sponsons. I also like to cross-drill a hole or two in them. You'll see why in a minute.

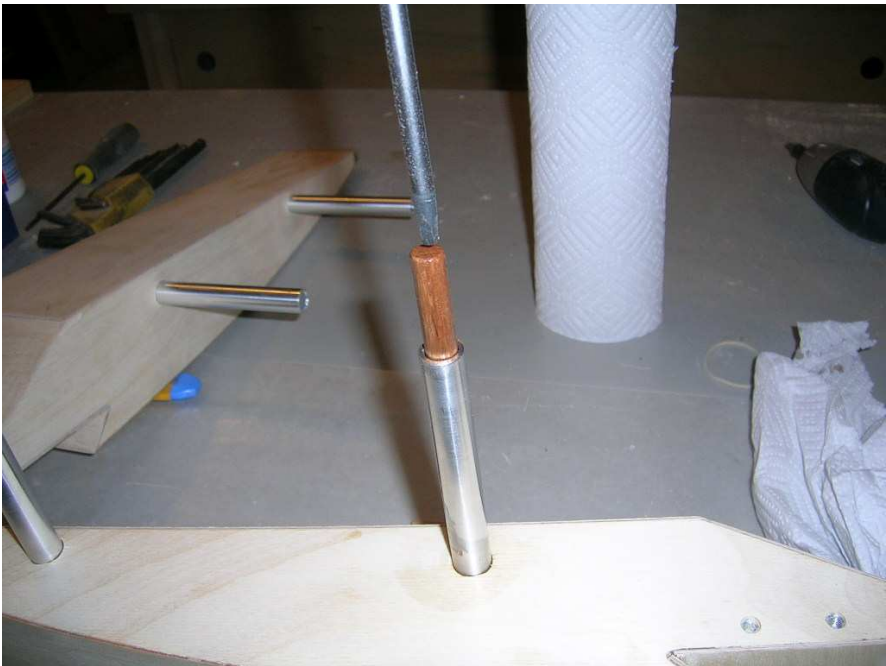
Take the larger wood dowel supplied in the kit and cut it into 4 equal length pieces.

Brush some epoxy onto the portion of the aluminum tubes that go in the sponson (and in the holes) and push them into place. Make sure they go in all the way. They will go through the first 1/4" plywood and also through the other plywood inside the sponson. Once in place pour some epoxy down inside the tube. Coat the dowel piece with epoxy and insert it into the tube. Use a screwdriver or something similar to push them in all the way. Push them in slowly..you will feel the glue seeping out of the holes in the tubes inside the sponsons. (Don't overdo it though.) This will allow glue to go fill voids, if any, between the foam and the tubes. It will also send glue down to the end of the tube where it crosses the inner 1/4" ply. Just a little bit of added strength.

Wipe off excess glue around the tubes and let cure.

***** NOTE: the sponson pins have some grooves machined into them. If the pins are properly installed (going through both 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 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 once the glue has cured 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.







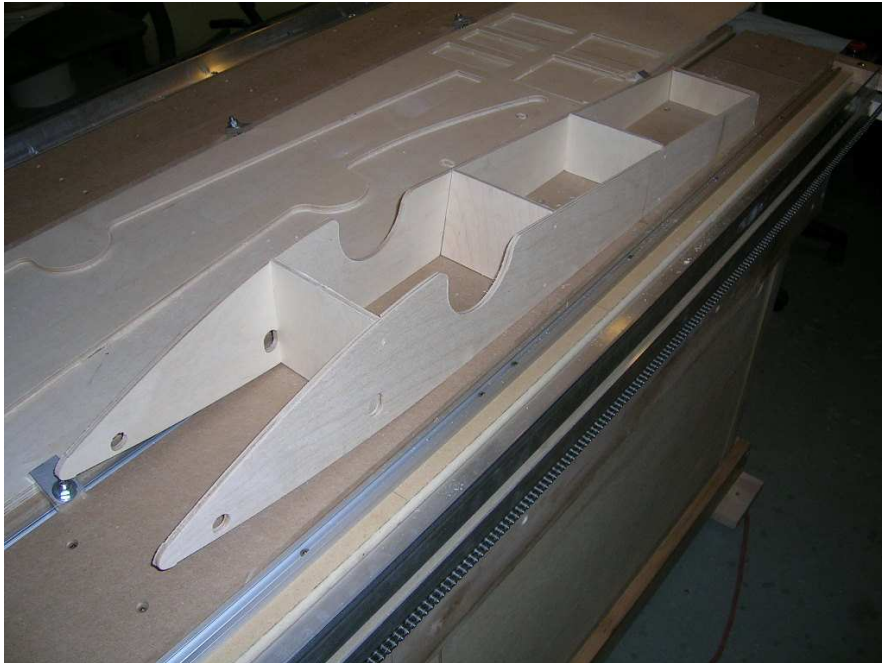
You can now seal the outside of the sponsons. I use West Systems epoxy for this. 105 resin with 207 hardener.

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

Now the tub!

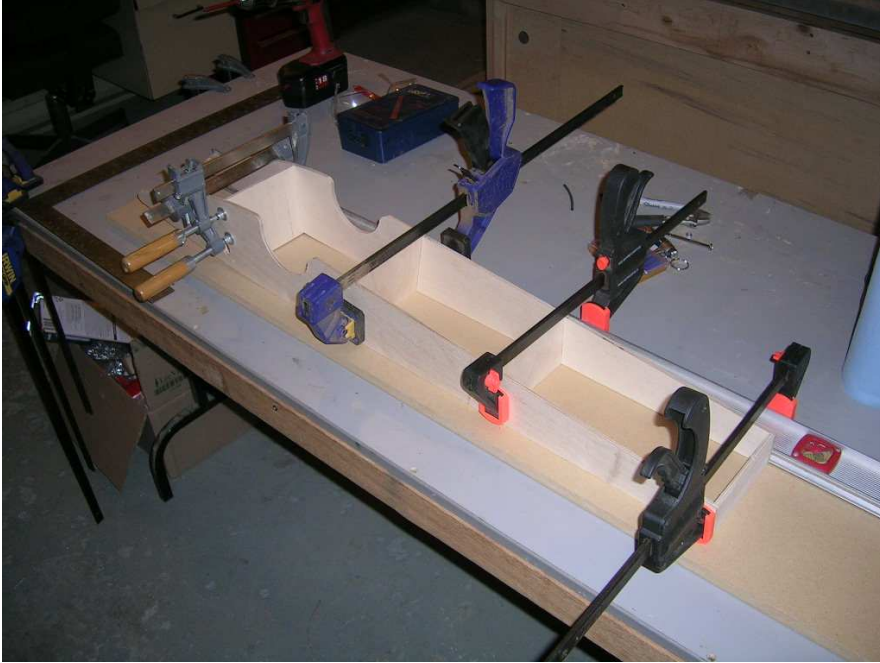
Building the tub is pretty straight forward. The key factor is that you build it straight! You should have a long straight edge (long enough to span the length of the tub) a good square and several clamps (5+ inch span) ready for this step. Again, you should be working on a perfectly FLAT work surface.

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 three main bulkheads 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.



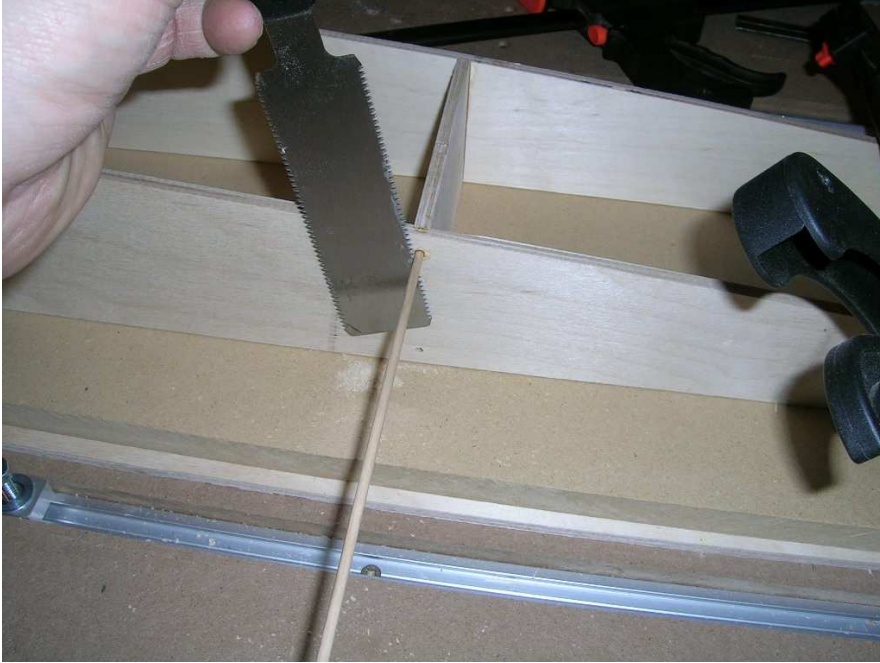
When you're satisfied with the fit, mix up a batch of 30-min epoxy and apply to the edges of the bulkheads and to the slots in the tub. As with the sponson build, you may want to lay a length of wax paper on your work surface so that the tub doesn't get glued to the table. Use a long straight edge (I use a long aluminum level) 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.



After the glue has cured, take your drill with a 1/8" drill bit and using the holes in the sides of the tub as guides, drill into the bulkheads about 1/4" to 1/2" making sure you drill in line with the bulkheads. Take the 1/8" dowel piece supplied with the kit, dip it in glue (I use 30-min epoxy again) and push it into one of the holes until it bottoms. Cut off

excess with the flush-cut saw and repeat for all holes in bulkheads. After the glue has cured, block sand all dowels flush to the sides.





At this point you are ready to start installing the 1/16" sheeting on the tub.

*** Use a piece of 4.5" wood between the sides at the tip of the boat as a spacer just to keep the sides at the correct spacing when gluing on the sheeting...just do not glue the piece into place. You can use the rear boom-tube hardwood block supplied in the kit.



Start with the bottom sheeting. This is the longest continuous piece of 1/16" plywood. Put the tub upside down on your table. Use 30-min epoxy to coat all the edges of the sides and bulkheads/transom. 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 a straight edge along one side of the tub to keep everything straight. Also make sure it is square at the transom.

Place the sheeting on 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!



Now is a very good time to install the radio box doublers. These are two pieces of 1/4". You can install them after putting on the top sheeting, but it is much easier to do it now. I like to have them staggered in the radio box as pictured below. Seal them completely with epoxy and try to get a good bond with the bottom of the boat and to the sides/bulkheads of the tub.



You should also install the hardwood rear boom tube support. This is the 4.5" long block with bevelled edges on the bottom. The bevelled edges it to allow the block to sit flat in place even if there is a little bit of epoxy "filets" from gluing the bulkheads and sheeting into place. Test fit this piece and ensure it sits flat in the bottom of the hull and that it also makes good contact with the bulkhead. Coat it with epoxy on the bottom, rear face and both ends and position it into the boat making sure it stays in good contact with the bottom and bulkhead. You want this entire piece to be sealed with epoxy.



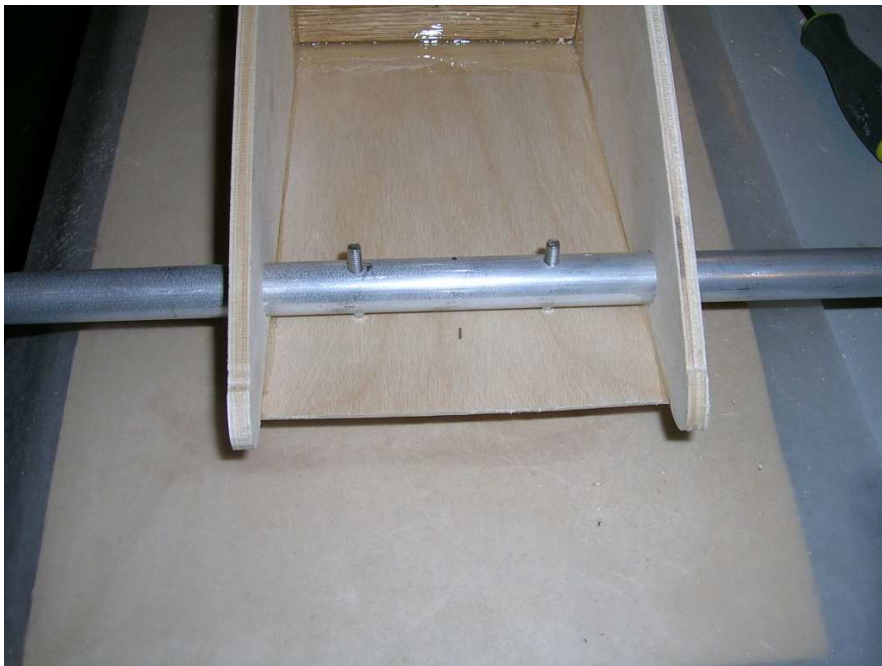
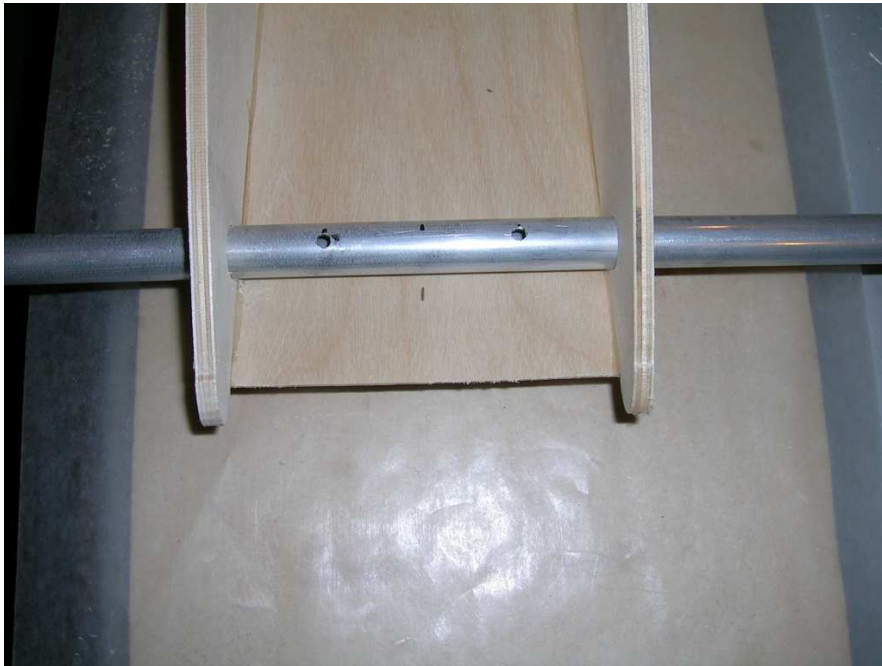
Take the boom tubes and mark the center on both of them. Then make two marks at 1-1/8" on either side of the center mark. Drill a 5/32" hole at each of the marks off center.

Take one of the tubes and position in the hull and in the rear position and center it. Using the holes in the tube as guides, drill holes in the support block.



Drill completely through the block and bottom of the hull. The buttonhead screws will go in from the bottom of the tub through the boom tubes and be capped off with locknuts inside the hull.

Now take the other boom tube and position it in the tub in the forward position. Again center it in the tub. Using the holes in the tub, drill through the bottom of the hull. Temporarily install the mounting bolts. With the bolts in place but not tightened, find one of the 1/8" thick shims supplied in the kit. Apply some glue to the bottom of it and slide it under the boom tube. Screw the nuts onto the bolts and tighten until snug. Let cure.





When everything is cured, remove the boom tubes and hardware and mix up a good batch of epoxy to seal the inside of the tub. I use West Systems epoxy for sealing. Usually I will use 206 or 205 hardener with 105 resin. I will typically also add a small amount of acetone to thin out the epoxy for better penetration in the wood. DO NOT use too much acetone...it can weaken the epoxy and the existing joints. A very little bit goes a long way.

You can now flip the tub over and 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.

Some frames are supplied with the inside not removed. If this is the case with your kit, cut the holding tabs and remove the inside from the frames. Sand off the holding tabs on the frames being VERY careful not to break the pieces.



The frame that is cut cross-grain will be much more flexible than the other two. **This frame is for the front access cover.**

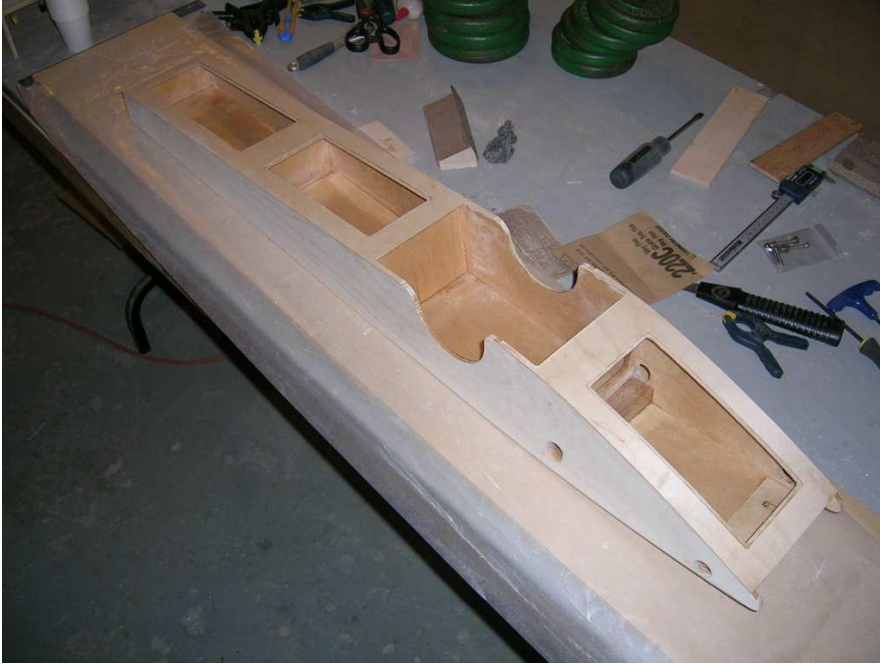
*** You also have to seal the entire underside of the sheeting pieces at this point before installing them to the tub. Again I use West System for this. For this step however, I DO NOT thin with acetone. I coat the underside of the entire sheeting pieces and the edges of the tub and apply the sheeting to the tub. You should sand the sheeting where it will make contact with the tub for proper adhesion of the epoxy.



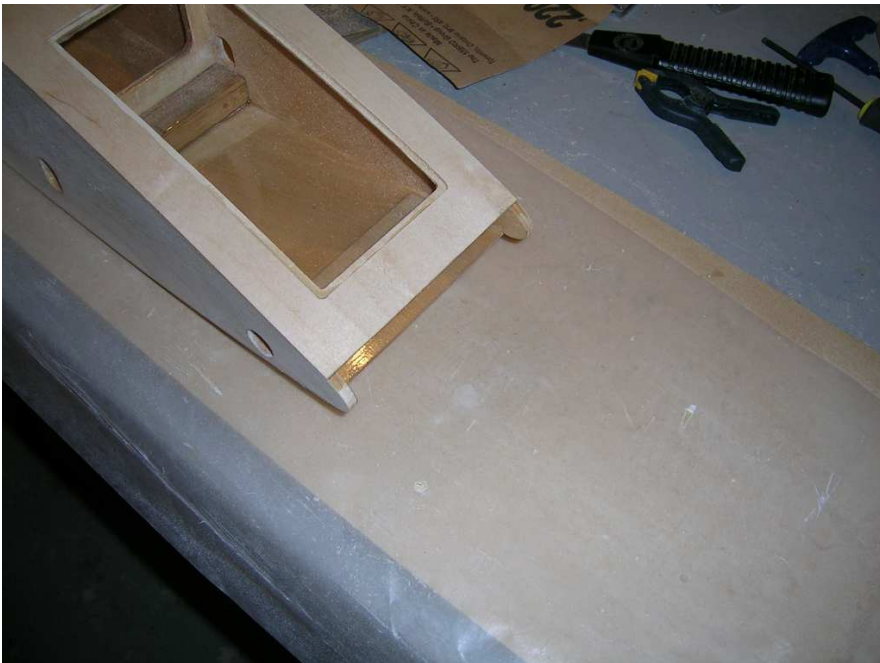
You can also do this in two steps, but if you let the sealing coat dry you will have to lightly sand the sheeting where it will make contact to the tub to ensure a good bond. Clamp, tape and/or weigh down the sheeting for good contact to the tub until glue cures.



After glue has cured you can proceed to sanding the edges of the sheeting to match the sides of the tub.



Now trim the nose of the tub by removing about $\frac{1}{2}$ " from the tip of the tub. Use pieces of $\frac{1}{4}$ " square stock to frame the inside of the nose as pictured below. It will help keep the thin plywood flat and straight and also add a lot of surface for gluing the nosepiece to. Glue on the hardwood nosepiece with slow cure epoxy and let cure.





When the glue has cured, shape the nose piece to match the tub. It should look something like this.



Inside view...



We can now do the rear shoes. These are CNC cut to shape already. All that is required is that you glue the 1/16" ride pads to them and then sand a 1/4" bevel to the outside lower edge of each. They should look something like this.



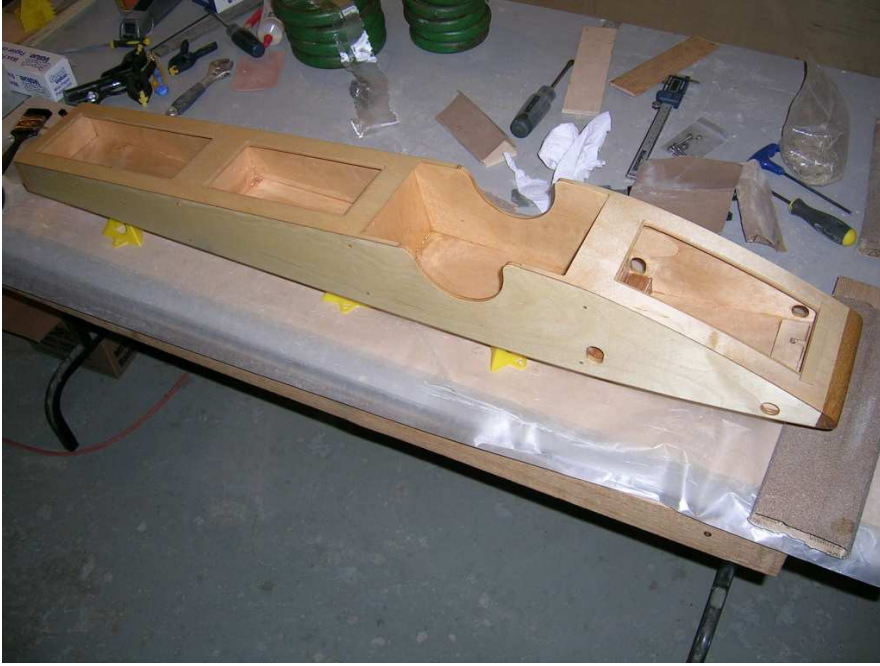
Mount the rear shoes to the tub with 30-min epoxy. They should be mounted so that the beginning of the back taper is flush with the back of the transom. The sides of the shoes

should be flush and parallel to the sides of the tub. The shoes must be mounted with their bevelled edge on the outside.

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.



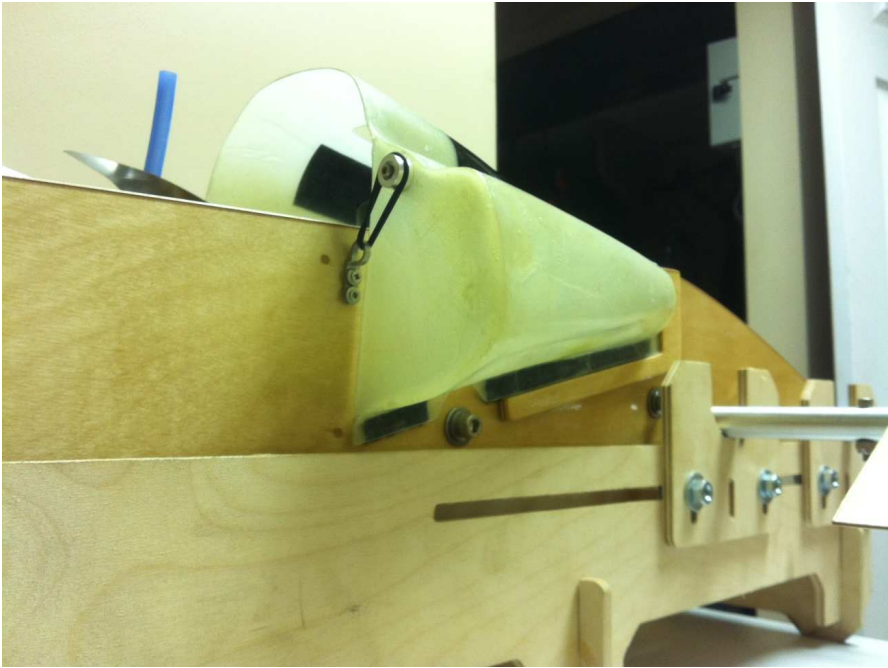
This completes the assembly of the tub. All that remains to be done now is to seal any wood that has not already been sealed. I use West Systems 105 resin with 207 hardener for the outside of the tub.



Cowl

The cowls are made of epoxy glass and are delivered roughly trimmed. They still require that you trim, sand and paint them. Included with the cowl is a trim piece that looks somewhat like a hockey stick. This is to be installed (glued or screwed) to the carburetor side of the tub and serves as a rest for the cowl and also as a water deflector to prevent water from creeping in between the cowl and the tub. Here are a few pictures of an installation to give you some ideas on how to mount your cowl.





Setup

Now it's time to setup your Warpath. You will have to first install the boom tubes in the hull. The rear boom tube should already be ready. Repeat the same for the front boom tube, this time though, drill through the bottom of the hull and install the 1 1/4" bolts with washers from the underside of the tub and through the boom tube. Secure with the nylock nuts over the boom tube. There is a 1/8" plywood shim supplied in the hardware bag...this goes under the front boom tub. Seal it before you install it. This will take up the space between the tub bottom and the tube.

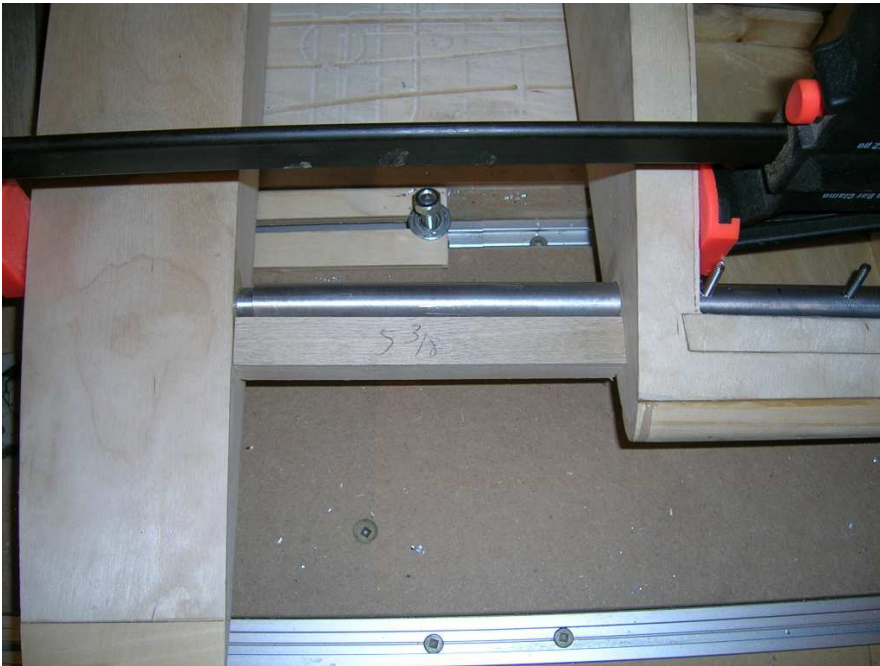




Now it's time to install the sponsons to the boom tubes. Slide the sponsons on and set the boat on the table. You want to set the starboard sponson with $1/8''$ of toe-in and the port sponson $1/16''$ toe-in. To make this job easier I use blocks that I cut to the correct length.

I start with the starboard sponson. With the spacer blocks in place ($5-1/2''$ at the rear boom tube and $5-3/8''$ at the front tube) I use some long clamps to lightly pull the sponsons tight to the blocks. Center punch the hole locations and drill straight through with a $5/32$ drill bit. Install the supplied 8-32 bolts and nuts.

Repeat on the port sponson, using $5-7/8''$ spacing at the rear tube and $5-13/16''$ at the front.





Hardware

We recommend using Speedmaster strut and rudder. For the strut we recommend the **SPDS-010-250MR** 1/4" Strut XTD assembly (strut brackets should be 2" long) For the rudder we recommend the **SPDR-013-1SB or the SPDR-011-60SB, 60/90 Rudder Assembly**. Both of these seem to work equally well on the boat.

Mount the strut on the center of the transom with the brackets about 1/4" from the bottom of the tub.

Mount the rudder on the port side of the transom with the bracket butting up against the strut's bracket and at the same height. The rudder bracket will overhang the edge of the tub about 1/16" or so. That's ok. If you want, you can bevel the edge of the bracket that is overhanging. I don't cut the rudder on my Warpath, but you can experiment if you want. (You can probably cut off up to about an inch safely.)

To mount the engine, we use CC Racing standard mounts but replace the stock rubber isolators (which are 3/4" long) with 1/2" long isolators. You can get them from places like [McMaster Carr](#) (p/n: 9378K24). Mount engine as far forward as possible in the engine compartment.

The stuffing tube will go through the front of the radio box and exit the hull through the bottom of the radio box between the two doublers.

Your gas tank or IV bag goes in the front compartment of the tub, just forward of the engine compartment. I use a 250ml IV bag. It fits nicely in that compartment and still allows sufficient room to squeeze in a Etrex GPS.

The turn fin can be purchased for [Modelgasboats.com](#). It should be sharpened with a taper of about 3/8" as straight as possible. Mount the fin (with the supplied 10-32 bolts and washers) after having done the strut and sponson adjustments below. Start with the fin level with the ride attitude of the boat and tune accordingly once at the lake. Lifting the back end of the turn fin will make the boat tighter. Dropping the back end of the fin will do the opposite, making the boat looser.

* if the turn fin is not properly sharpened it will create a lot of drag and cause the boat to pull right at speed, so make sure you get a nice sharp edge on the fin.

Props: I have had very good success with cupped up ABC 3014 and 3016 so this is a good place to start.

[Propworks](#) and [Propworks West](#) both have developed some VERY good props for the Warpath.

Preliminary adjustments

Set your warpath on a setup table...the table must be perfectly flat, wide enough for both sponsons to sit on the table and long enough for the rear shoes to sit on table also.

Start with a 1/8" shim under the rear tube. We have found this to be a very good starting point on most boats. For heat racing you might need to shim a little bit more to keep the boat tight in the rough water conditions.

Set the strut so that it is 1" from the bottom of the transom (not the shoes) to the bottom of the strut. Adjust it so that it has 0 degrees angle, so in other words, flat against the setup table. Again this has shown to be a very good starting point for the strut. This of course is prop-dependant.

Now take a piece of 1/16" plywood (you should have a few pieces left over from the kit) and slide it under one sponson's ride pad. Hold it flat against the table and slide it back slowly toward the back of the sponson until you see/feel it touch the ride pad. Check this a few times to be certain. Measure the distance between the edge of the ply that is touching the ride pad and the trailing edge of the sponson. You want this to be about 1-1/8". Check both sides. You want both sponsons to be the same. This is a good starting point.

If it is not correct, use the supplied shims (or remove shims) under the rear boom tube to adjust. Tighten the boom tube bolts and check again. You can shim both sides of the boom tube differently if required to get the proper angle on both sponsons.

Note on tracking: assuming your turn fin is properly sharpened and aligned, if you find the boat pulls to ones side with the rudder set straight, you can try adding additional shims under the rear boom tube on the side opposite to the pull.





With this correctly done, you should be ready to head out to the lake to try out your Warpath!

At the lake

Make sure you go over everything to ensure all nuts and bolts are in place and tightened. Test fire your engine. Range-check your radio. Don't be in a hurry. Put all the odds on your side for a successful first run!

It is preferable that you have a pit man with you at the pond, as launching a rigger by yourself can be very tricky, not to mention dangerous.

Try to launch the boat as flat as possible while giving it a good push forward.

If you're lucky the boat will run great first time out, but as with any boat, you can usually get more out of them with more fine-tuning.

If you have any issues with the way your Warpath is handling/running, please post on our forum and we will help you sort it out. There are too many combinations of symptoms and solutions to list here really. I prefer we work issues out on the forum if any and that way the information can be useful to all members.

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