

**ZIPP MANUFACTURING**

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# Bullitt Thunderboat

Zippkits R/C Boats

## **BUILDING INSTRUCTIONS**

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## Introduction

Thank you for purchasing this kit. We are sure that it will provide you with many hours of enjoyment.

*Please take the time to read this entire manual before building this boat. You will become familiar with the building order, and less likely to make mistakes.*

This kit is not a toy. Although R/C boating is a fun and rewarding hobby, it can be dangerous if not done with common sense and safety in mind. Just about anyone should be able to build this kit, but it should not be operated by children without close adult supervision.

Here are a few safety tips:

- **Never operate your boat alone. If you get hurt, you may not be able to drive for help.**
- **Never, ever operate your boat in an area where there are full size boats or swimmers. If something happens, a 15 pound object traveling at 50+ mph can do serious damage.**
- **Always use a failsafe. This shuts the engine off in the event of radio signal loss. Test the failsafe each day of running, by shutting off your transmitter.**
- **Always carry a fire extinguisher, as gasoline is extremely flammable.**

**The manufacturer assumes no liability for damages or other loss in the use of this product, as we have no control over the construction or end use of this product.**

## **Purpose**

The Bullitt Thunderboat was designed based on our popular Rivett and Rockett hulls.

Thunderboats are scale type hydros specifically designed for gasoline power.

The Rivett/Rockett were designed as easy to build kits that are also easy to setup, and very predictable to drive. They have excellent stability and turning ability, and handle rough water very well.

The secret to their outstanding performance is the modern design features, such as the sponson angle of attack, non trip and deck crown. All these elements add up to an aerodynamically sound design.

The Bullitt adds several new design elements that make the boat more efficient (faster) and easier to build.

The Bullitt is also legal in all Thunderboat classes in both IMPBA and NAMBA.

You can build this boat without having the engine or radio, but it does make it easier to have them available when you build.

You can use any gasoline engine, as long as it has mounts for 5 inch rails.

Please note that this boat was designed for the Zenoah style marine engines. Other engines may not fit without cutting, and may not fit under the cowling.

# Preparation

Tools and supplies needed to build:

- Small wood plane (mini plane)
- Sanding blocks with 80 and 220 grit paper
- Drill with bits
- Right angle drill or attachment
- Square
- FLAT Workbench
- 3 wood blocks  $\frac{3}{4}$  x 2 x 13 (1x stock or  $\frac{3}{4}$  ply)
- $\frac{3}{4}$ x 12x 48 MDF or ply
- 1 ounce thin CA glue and accelerator
- Good quality 30 minute epoxy
- Epoxy finishing resin
- Lots of clamps! Spring clamps, paper clamps, c clamps, etc.
- Razor saw
- Wide tape
- Wood filler
- Primer
- Paint

## **Additional items needed to complete:**

- Gasoline engine with 5 inch mounts
- .250 Collet for engine (Zipp 3440)
- .250 36 inch cable w/welded stub shaft (Zipp 3445)
- Tuned pipe (Zipp 2011)
- 2 channel surface radio with 1 standard and 1 heavy duty servo (100 in/oz minimum)
- Throttle pushrod (2-56 or 4-40 Size) with Clevises (Zipp 3462 and 3459)
- 2- 4-40x12 Pushrods (Zipp 3463)
- ¼” OD carbon pushrod
- 2 pushrod seals (Zipp 3404 or 3422)
- 16 ounce Fuel Tank or IV Bag(gasoline compatible)
- .250 strut (Zipp 3416)
- .250 drive dog (Zipp 3442 or 3448)
- 6518/3 or 6717/3 prop (Zipp 4003)
- Prop nuts (Zipp 3450)
- Engine Mounts (Zipp 3409 for Zenoah)
- Cable grease
- Large rudder (water pickup type) (Zipp 3413)
- 5 feet large silicone tubing (water line) (Zipp 3461)
- 12 inch length of 11/32 brass tubing (Zipp 3453)
- 36 inch length of 5/16 brass tubing (Zipp 3452)
- Floatation (pool noodles, foam, etc.)

Before we can start building, we need to do some prep work. Good prep work will pay off later with a straight, true running boat.

First, we need a flat work surface. Nothing else will do.

Put your 3/4x13x48 MDF or plywood on the bench. If necessary, screw it down so that it stays flat.

The entire boat will be built on this, so make it right.

We are ready to start the build!

Let's identify the parts in the sheets. Don't remove the parts until you actually need them, as some look similar, but are not the same. This boat is not symmetrical. **The right and left are not the same**, so it is critical that you mark the parts correctly, or they will not fit. Note that all reference to right or left are as if you were sitting in the boat.

## See Printed Version

## See Printed Version

## See Printed Version

## See Printed Version



We like the Great Planes 11 inch bar sanders



Use good quality epoxy and finishing resin

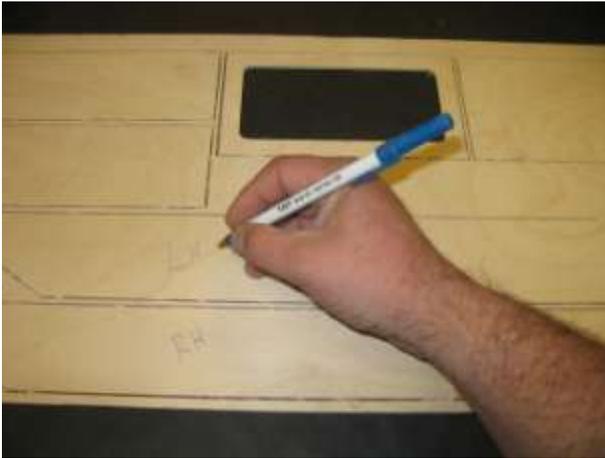


Epoxy brush trimmed for fast epoxy application



Your life will be much easier with one of these

## Let's get started

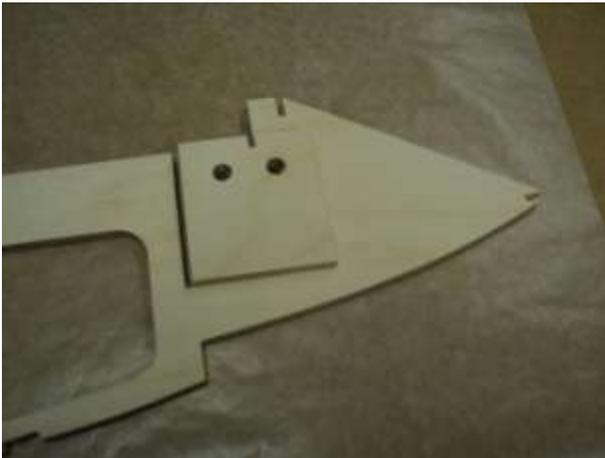


Marking parts before removal.

The first thing you should do is to carefully sand the parts while they are still in the sheets. Do this with your 80 grit sanding block. Sand both sides, as this will make it much easier to sand the parts once they are out of the sheet.

While the parts are still in their sheets, use a pencil to mark each part with the name. Note that the parts only fit correctly one way.

## Turn fin doubler



Bulkhead 3 with turn fin doubler in place.

Sand the edges of bulkhead 3. Sand inside the holes.

Remove the cutout containing the turn fin doubler.

Remove and sand the doubler. Toss the piece it was in.

The doubler only goes on correctly one way.

Hold the doubler over the matching holes on bulkhead 3. Make sure you are on the FRONT RIGHT of the bulkhead. This will be the forward facing side.



Doubler installation. Note bottom chine slot is not covered.

Make sure the doubler will be on the front (inside) of the bulkhead.

When you are sure you have it correct, glue the doubler to the bulkhead with 30 minute epoxy. Clamp while it cures.

The doubler will be on the right front (inside) of the bulkhead when correctly assembled.



Correctly installed doubler. Holes centered and slot uncovered



Blind nuts epoxied to turn fin doubler.

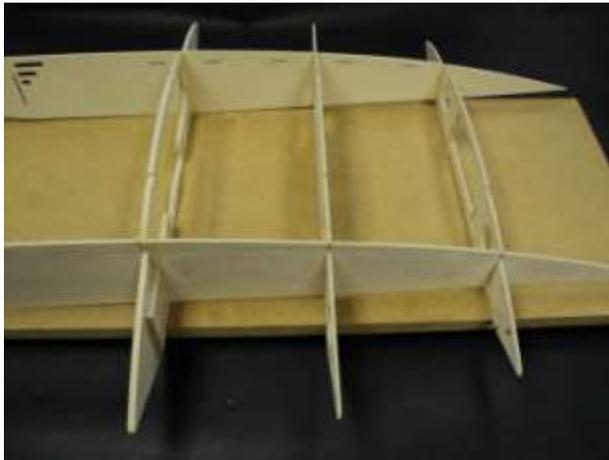
Install the two blind nuts to the turn fin doubler with 30 minute epoxy.

## **Frame assembly**

Cover your building board with waxed paper or clear plastic wrap. We don't want to glue the boat to the building board...



Our building board is two pieces of 3/4x13x48 MDF Covered with wax paper.



Fitting bulkheads to stringers before wicking thin CA into joints.



Be positive that bulkheads are in correctly before gluing!



Note that air vents are on the left side.

Start by assembling bulkheads 1, 2 and 3 to the side stringers. Make sure the bulkheads are in the correct slots, and facing the correct way. The “R” should be on the right.

Push the bulkheads all the way into the stringers, until they are flush at the bottom of the stringer. You may need to tap the bulkheads with a block of wood or a small hammer to get them fully seated.

Be sure that the cooling slots in the side stringers are on the left side when viewed from the rear.

Once you are satisfied with the fit of the bulkheads in the stringers, wick some thin CA into the joints. Don't glue bulkhead 3 until the others are done.

Don't use so much CA that it drips off the part. Thin CA is about as thick as alcohol, so it runs and seeps everywhere.

Hit each joint with accelerator to harden it. Only glue once, we will go over the joints a second time after we fit this assembly to the bottom. If needed, we can break the glue joints pretty easily at this point, but not after double gluing.

Now glue bulkhead 3, being careful to align the bottom part flush with stringer. Also be sure the fin doubler is on the right.

Fit bulkheads 4 and 5, making sure that they fit tightly to the side stringers. The two holes go on the right. Wrap a rubber band around bulkhead 5 to keep it in the stringers.

Set this assembly aside for now.

## Bottom

Place the bottom sheets on the building board. Align the sheets at the rear. Don't worry if the front isn't perfectly aligned. Check the fit of the two sheets and sand the edges if needed.



Bottom sheets taped together.

Tightly tape the bottom sheets together with masking tape. Tape only one side.

Mix up some 30 minute epoxy and glue the sheets together by "hinging" them open and applying epoxy.



Bottom curing.

Close the gap, wipe away any excess epoxy and tape tightly closed.

Allow to cure.

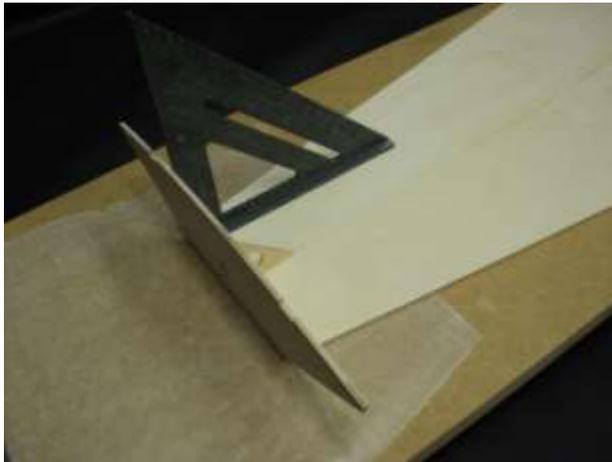
Note that the completed bottom has a right and left. The right side is wider. If you have trouble figuring this out, slip the bottom in place on the framework. You will see that it only fits the framework correctly one way.



Gusset glued to bulkhead 6.

Check the fit of the transom gusset into the bottom. Make sure it fits tightly to the bottom. Also check the fit of the gusset into bulkhead 6.

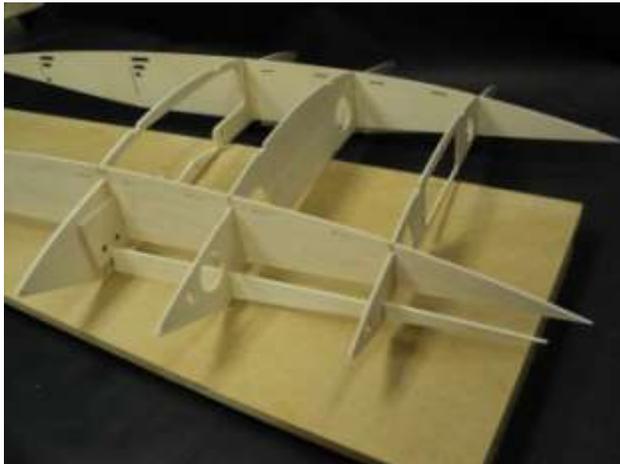
Once you have identified the correct orientation of the bottom, glue bulkhead 6 to the bottom.



Bulkhead 6 being glued in place with gusset installed.

Clamp a piece of wood to the rear of bulkhead 6 to keep it straight if needed, and then glue it and the gusset to the bottom with epoxy. Be sure the back of the bulkhead is flush with the back edge of the bottom.

## Chines

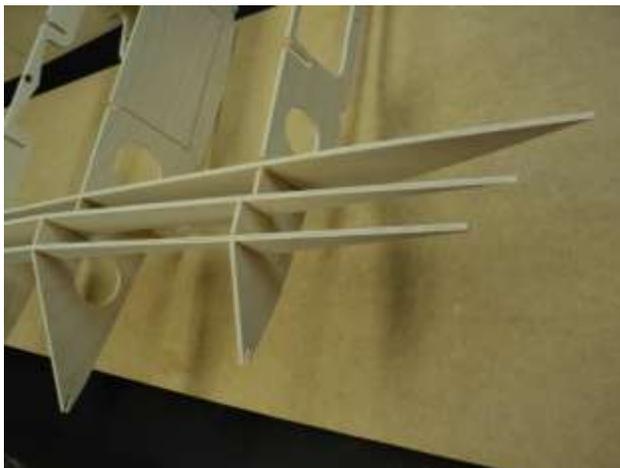


Inner chine in place.

Gather the inner chines and sand the edges smooth.

The chine for the right side has two holes in it.

Slip the inner chines in place from the bottom. Check to see that the bottom is flush with the bulkheads.



Inner and outer chines in place.

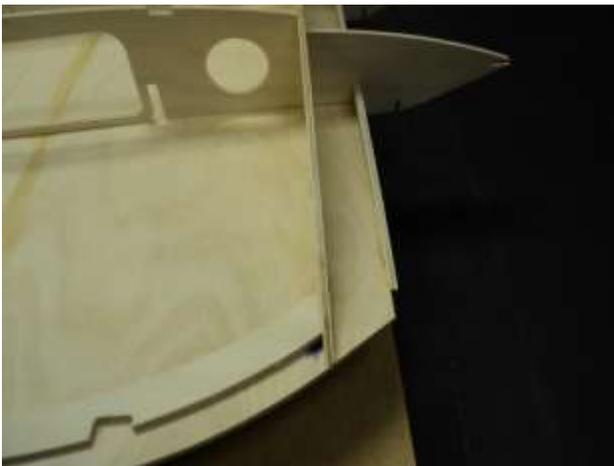
Install the outer chines, be sure they are flush with the bottom of the bulkheads and.

Wick thin CA in the joints and hit with accelerator.

## Putting it together



Bottom glued to sides. Note broken cinder blocks as weights.



Bottom doubler in place 3/8 inch back from nose.



Bulkhead 6 and gussets glued in place.

Slip the framework over the bottom. Place weights on the bottom to keep it flat against the building board.

Align the bottom with the rear of bulkhead 3. Check both sides.

Using epoxy, glue the bottom to bulkheads 3, 4 and 5. This area of the bottom is flat.

Do not glue bulkhead 1 to the bottom yet!

Glue bulkheads 2 and 3 to the bottom.

Wrap your 3/4x2x13 gluing block with waxed paper. Slip it under bulkhead 2 to support the bottom while we glue

Press down on bulkhead 2 and if it is tight to the bottom, wick thin CA into the joint, and spray with accelerator. Do not glue the center area of bulkhead 2, as it will be removed later.

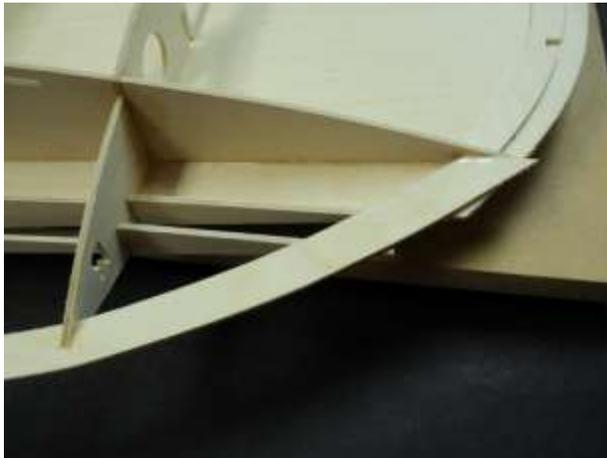
Slide the gluing block forward to bulkhead 1.

Mark 3/8 inch back from the front edge of the bottom on both sides. Glue the forward bottom doubler in place using these marks as a guide. Also use the center notch in this doubler to keep it centered.

Now glue the bottom to the sides only in the area of bulkhead 1! Do not glue bulkhead 1 to the bottom yet!

.Epoxy bulkhead 6 to the side stringers. Be sure bulkhead is 90 degrees to the bottom. Side stringers may overhang bulkhead slightly. We will trim these later. Glue in the two gussets between the side stringers and bulkhead 6.

Allow to cure



Outer non trip chines are glued to both inner and outer chines.

Install the outer non trip chines. Note that the right chine has two holes in it.

The outer non trip chines get glued to the tops of both inner and outer chines.



Bulkhead 3 must be 90 degrees.

Use a square to be sure that the rear of bulkhead 3 is perfectly square. Repeat on the other side and glue with thin CA.

This is a critical step as the turn fin bolts here.

Double glue all bulkheads and chines to the bottom and sides, **except bulkhead 1**.

Do not glue bulkhead 1 to the bottom yet!



Cutting out the middle of bulkhead 2.

Use your slitting saw or razor saw to cut the center out of bulkhead 2.

Leave the top bridge in place for now, as it keeps the sponsons from twisting until we can put the deck on.

Lightly sand the cut area so that it is straight and smooth, as the engine rails will be glued here.

## Engine Rails



Fitting engine rails. Note front holes and notch in RH rail.



Rails in place.



Make sure the rails are installed correctly!

Lightly sand the 2 engine rails.

The engine rails have round holes to indicate the front. **The right rail also has a cutout for the carb.**

Test fit the rails as follows:

Put the right rail in the slot in bulkhead 3.

Push the rail against bulkhead 1 so that it “bows” forward slightly. The rail will snap into place. Do the same for the left rail. If all looks good, carefully remove the rails by bowing bulkhead 1 back so that you can get them out, one at a time.

Mix up about ½ ounce of 30 minute epoxy.

Coat the bottoms of the rails, as well as the slots in the bulkheads with epoxy. Coat the drain holes at the rail slots.

Also coat the two vertical surfaces on bulkhead 2.

Snap the rails in as before. Use any excess resin to create a fillet where the rails meet the bottom.

When the rails are fully epoxied in, place some weights on them, with the gluing block under bulkhead 2.

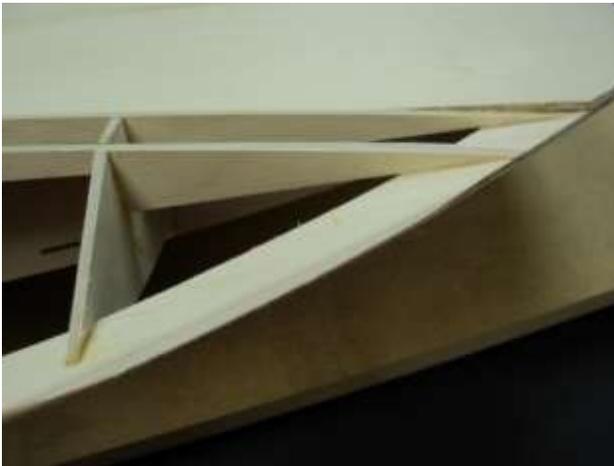
Let cure for at least 2 hours.

When cured, press down on bulkhead 1 and double glue in place.

## Sponson Non Trip



Sanding chines for sponson non trip sides.



Ready for sponson side. Note bevel in outer chine.



Sealing hard to reach areas while gluing. Rockett hull shown.

With the hull upside down, use your wood plane to bevel the side and bottom chines to match the angle of the bulkheads.

Sand the chines and bulkheads so that the non trip sides will fit squarely. Do this in stages starting from the rear.

Sand from bulkhead 3 to bulkhead 2.

Sand from bulkhead 2 to bulkhead 1.

Sand from bulkhead 1 to the tip.

Note that the outside chine offers very little surface for the non trip side. This is normal.

Mix up about ½ ounce of 30 minute epoxy.

Using your special epoxy brush, put a coat of epoxy on the chines and bulkheads where the sides will touch. Also seal the chines at this time, as they will be difficult to seal after the sides are in place.

Brush epoxy on the outer perimeter of the non trip side.

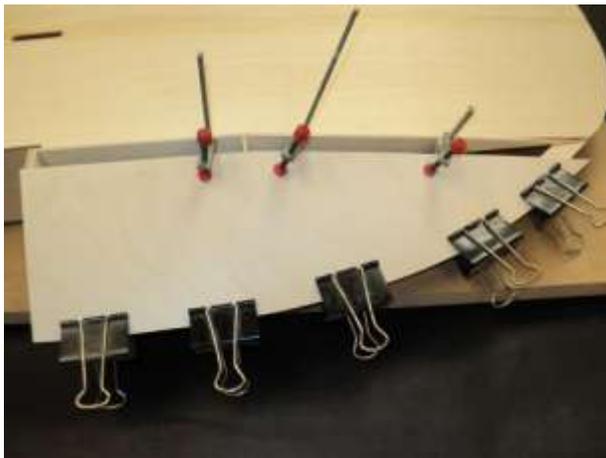


Sponson side with epoxy.

Place the non trip side on the framework and adjust it so that it just covers the (bottom) chine and hangs over 1/16 in the rear. Use your 1/16 overlap gauge.

Use clamps to hold side against the frame.

Check that the non trip side is in contact all the way around.

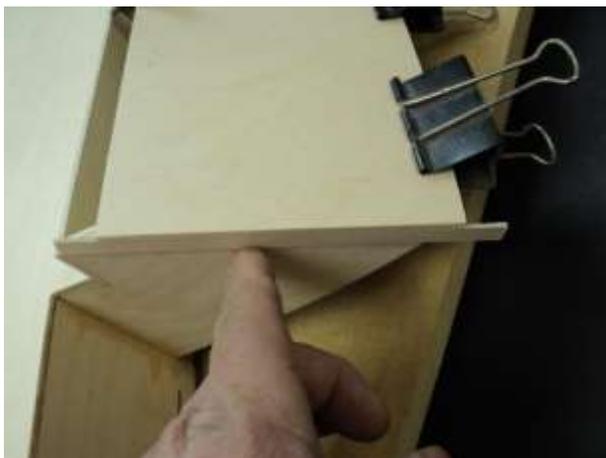


Clamps holding the non trip side in place.

Double check that everything is still in place and you have the correct 1/16 inch overhang in the rear.

Allow to cure at least 2 hours.

Repeat on other side



Using the 1/16 overlap gauge to check the rear overhang..

When the non trip sides have fully cured, remove the clamps.

Before doing the sponson bottoms, read ahead so that you understand what we are trying to accomplish.

Epoxy is hard to remove...



Sponson sanded for bottom sheeting .



Forward bottom sanded. Note bevel and inner chine.

## See Printed Version

Forward and aft sanded for bottom sheet.

## Sponson Bottoms

Plane and sand the sides even with the sponson bottom. Take your time here, as this is a critical ride surface.

Note that the bottom is not curved, but actually two flat, straight running surfaces. We will refer to these as the aft bottom and forward bottom.

Also note that the right and left bottoms are different in width.

Make sure that you sand the sponson bottom evenly and squarely.

Keep the bottom flat when sanding. When you reach the front, match the slope of the inner chine while sanding.

If you have dried epoxy on the inner chine, and it is preventing the forward bottom from resting in place at the front, you can use a single edge razor to scrape the glue away.



Scraping excess glue with a single edge razor blade.

## See Printed Version

Aft bottom sheet beveled.

Pre bevel the aft bottom sheets (both right and left) and carefully sand these as they will be the finished ride pads.

The bevel should be at one end of the sheet. Don't worry too much about having enough bevel as we will finish sand this once it is in place.

Make sure that you have the correct bottom sheet for the side you are working on ( the wider sheet goes with the wider bottom).

The sheeting is wider than the sponson bottom and will overhang both inside and at the rear.

## See Printed Version

Aft bottom sheet overhang matches non trip side.  
Note inside overhang.

Use your epoxy brush to coat all areas that the sponson bottoms will touch. Do one sponson. This will be bulkheads 2 and 3, as well as the inner chine and non trip bottom.

Brush epoxy on the outer perimeter of the bottom. Be sure you do the inside of the piece (you did mark them as left and right inside, didn't you?)

## See Printed Version

Aft sponson bottom sanded to match forward bottom.

Tape the sponson bottom tightly to the sponson. Be sure that the inside edge of the sponson bottom has a 1/16 overhang using your 1/16 tool. Also make sure that the bottom has the same 1/16 overhang at the rear..

Repeat for the other sponson bottom.

Allow to cure for 2 hours.

## See Printed Version

Forward bottom sheet in place over bevel.

Finish sanding the aft sponson bottom bevel so that it matches the forward portion.

Test fit the forward bottom in place. This should go back only far enough to cover the bevel, and leave a square edge.

Mark the forward bottom so that you can locate it the same distance from the bevel when you glue.

## See Printed Version

Better view of bottom sheets.

Check to be sure that the front of the forward bottom is sitting nicely on the inner chine. If not, scrape some more with your razor until it does.

Epoxy the forward bottom in place the same was you did the aft bottom.

Match the inside overhang with the aft bottom sheet.

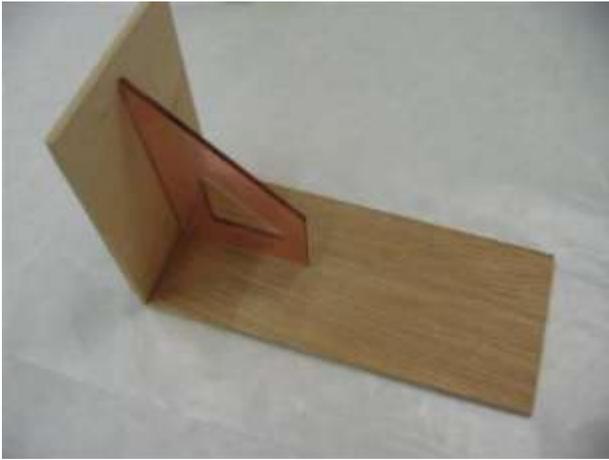
Tape in place and let cure.

When you are done, you should have a nice bottom!

## See Printed Version

State of the art bottom...

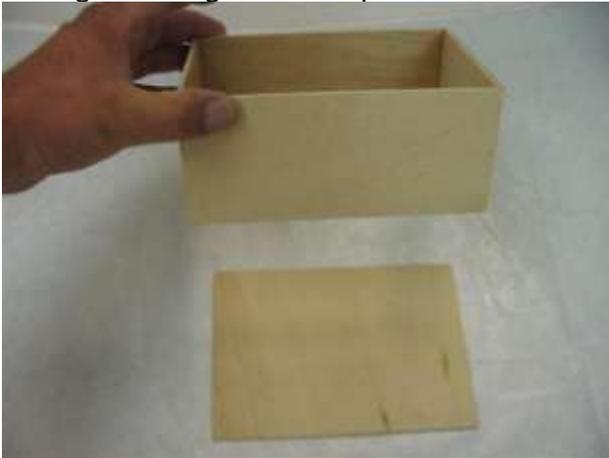
This is a water shearing, anti capillary bottom. Designed to repel water and keep it from climbing. Makes for a much more efficient (faster) hull.



Gluing the short side to the long.



Gluing sides together. Keep on flat surface.



Gluing on bottom.

## Radio Box

Lets build the radio box while the bottom sheet cures.

Remove all of the radio box parts: Two long sides, two short sides, the top and bottom, as well as the 1/8 ply top with lid.

Sand all the parts smooth with 80.

Lay a piece of plastic wrap or waxed paper on your bench.

Using CA, glue the two small sides to the two long sides.

The small sides go between the long ones.

Use a square.

Put glue on the edges, and join the two box halves on the bench.

Lightly sand the bottom of the box.  
Glue on the bottom.

Lightly sand the top.



Gluing on top.



Top on and box sanded.



Gluing 1/8 ply top in place.

Glue the radio box top on.

This is the 1/8 inch Birch top.

Using 80 grit, sand the overhang on the top and bottom so that it's flush with the sides.

Sand the top with 180 or 220 grit paper on a block.

Carefully remove the lid from the 1/8 ply radio box top.

Sand the edges smooth.

Glue the 1/8 ply top to the radio box. It has a slightly larger hole for the lid, so try to center it so that the "lip" is even all around.

Make sure that you don't get any glue in the "lip", as it will interfere with the way the lid seats.

Sand the entire box with 180.

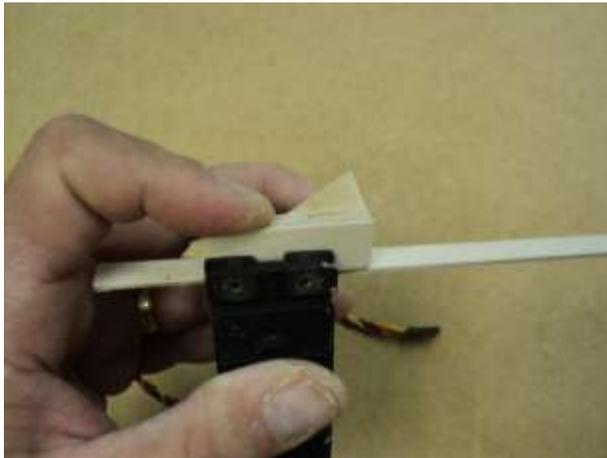
Stand back and admire your awesome radio box!



Completed box, ready for sealing.



Servo mounts assembled.



Marking servo. Note the 1/16 ply spacer.



Sitting flat on bench.

## Radio

Find the 4 pieces of  $\frac{1}{4} \times 1\frac{1}{2}$  ply, and the 4 pieces of tri stock.

These are the servo mounts.

Using CA, glue one piece of tri stock to each piece of ply.

Make sure the two pieces are flush with each other by holding them flat against the bench while the glue dries. Use a piece of waxed paper or cling wrap on the bench, so the part doesn't become a permanent part of your bench...

When dry, sand each mount smooth with 80.

Get your servos.

Hold the servo at the end of the mount, mark the hole locations in the ply.

Be sure to leave a  $\frac{1}{16}$  gap between the servo case and the mount. You can use your  $\frac{1}{16}$  overlap gauge here.

Drill on the marks with a  $\frac{1}{16}$  bit.

Repeat for the other side.

Repeat for the other servo.

Assemble the grommets and bushings on the servos. Note that the brass bushings go in from the bottom of the servo.

Screw the servos to the mounts, making sure the case does not touch the mount.

Lay each mounted servo on the bench. Check to see that it sits flat on the mounts. If not, find out why and correct it.

Cut your  $\frac{1}{16}$  ply overlap gauge in half and place this on the floor of the radio box, where the rudder servo will be.



Radio box with servos installed.

With the radio box still on its side, glue the rudder servo mounts in with CA. Make sure the 1/16 ply is under the servo, to space it up from the radio box bottom. Do not glue any part of the servo to the radio box! Check the servo wire!

Hold firmly until dry.

Your engine will determine where you mount the throttle servo.

Mount it the same way as you did the rudder servo.

Drill 3/8 holes where the pushrods will exit.

Remove everything from the radio box, and coat the inside and outside with finishing resin.

Be careful not to get any buildup in the lip, where the lid seats. It will make it impossible for the lid to seal properly. To get inside the upper part, bend an acid brush about 120 degrees, this works very well.

Seal the lid, as well. You can seal one side, drop it onto some waxed paper and do the other side.

You can seal the inside, top and all four sides of the outside in one session. Allow to cure overnight.

Sand the top of the box with 400 grit of finer, so that the sealing tape has a smooth surface to adhere to.

We like Scotch Plastic tape (clear).

Back to the boat:



Completed radio box.



Deck support beveled in front to meet bottom sheet squarely.



Deck support strips in place.



Weights used to keep hull flat while deck strips are installed.

## Deck Supports

Bevel one end of the deck supports so that they meet the front bottom sheet squarely.

Glue these in place starting at the front.

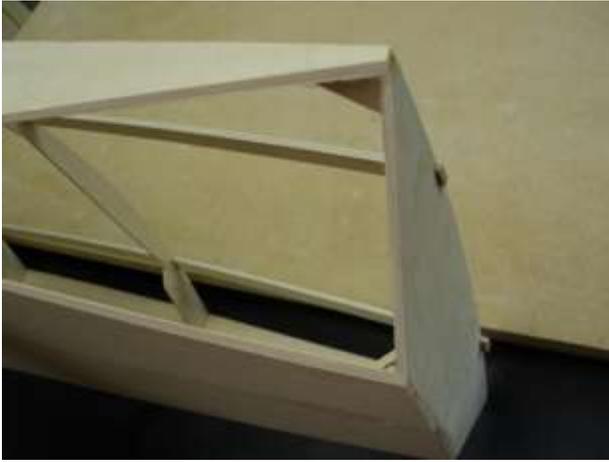
Start about  $\frac{1}{4}$  inch back from the front edge and glue to each bulkhead.

Do this all the way back to bulkhead 6. We recommend that you use CA for this, as holding these in the proper position while the epoxy cures can be difficult.



Front of deck support. Note bevel.

## Rear Non Trip



Rear sanded for non trips.

The rear non trip sides are designed to go outside of the hull, over the sides and bottom.  
The sides must be sanded flat in order for the sides to fit.



Forward end of rear non trip sanded and ready.

Use your plane and 80 grit to make the sides and bottom flat.  
Test fit the non trip in place.



Rear non trip in place.

When satisfied with the fit, glue in place with thin CA and accelerator. Glue again.

Repeat on other side.

When cured, sand the rear non trips and deck supports flush with the back of bulkhead 6.



Inside view of rear non trip.



Transom being glued in place.



Sealing underside of deck supports.

## Transom

When the rear non trips are done, sand the rear of bulkhead 6 flat. Glue the transom to the rear of bulkhead 6 using 30 minute epoxy. Clamp in place until it cures.

Note that the transom should be flush with the top of bulkhead 6. Any overhang should be at the sides and bottom. Allow to cure.

## Sealing Interior

Now we need to seal the inside. It is vital that all exposed wood be sealed.

Mix up about 2 ounces of epoxy finishing resin.

Start from the front.

Using a brush, coat all areas of wood inside the hull. Get inside the holes and "R's".

Get the bottom of the deck supports. Try not to get too much resin in the threads of the blind nuts.

Seal inside the sponsons very well. These will not be accessible, so they



Sealing interior.



One side of decks sealed.



Same.

must be sealed well.

Continue coating the inside with finishing resin.

If you need to mix more, use a new container and brush. If you don't, the old resin will mess with the new resin, and create a problem. Trust me...

After you are 100% sure that all exposed wood inside the hull has been coated, let it sit overnight.

Use any excess resin to seal the bottoms of the deck pieces. All lite ply deck pieces are identical to each other.

Arrange the deck pieces to mirror each other and coat one side only with finishing resin. Do only one coat at this time.

After the finishing resin has had a chance to cure, apply a second coat.

If you want a nice finish, you can scrape the first coat of resin with a razor to get it smooth before applying the second coat.

Be sure that all areas of the hull interior are sealed with two coats of finishing resin.

Use any excess to coat the deck pieces a second time.

**Do not put a second coat on the cowl deck at this time.**

If the deck pieces have curled a little from the sealer, that is good as it will help them conform to the framework later.



Only seal one coat on cowl deck.



5/32 brass water lines annealed.



Engine end of water lines.

Allow everything to cure overnight.

## **Water Supply Lines**

You will need two lengths of 5/32 OD brass tubing for the water supply lines.

The bulkheads are pre drilled for these.

Before you install them, you should use a torch to anneal one end of each tube.

Heat the tube about 2 inches from one end until it changes color. Allow to cool.

This will allow you to bend the tube smoothly without kinks.

Install the brass tubes in the pre drilled holes (annealed end first) until they protrude past bulkhead 3 by about 2 inches.

Cut the transom end so that there is about  $\frac{3}{4}$  inch protruding. Clean the ends to remove all burrs. Mark where each bulkhead is on the brass tube.

Remove the tubes and sand the brass where each bulkhead is.

Reinstall the tubes and glue in place with epoxy.

Allow to cure.



Transom end of water lines.



Engine in place.



Engine in place, ready for mounting.

## Mounting Engine

Your engine should be in its 5 inch mounts, and have some sort of throttle assembly installed. We like the simple bell crank.

Remove the carb and header, if installed.

Be sure to keep the top of bulkhead 2 in place until after we install the deck.

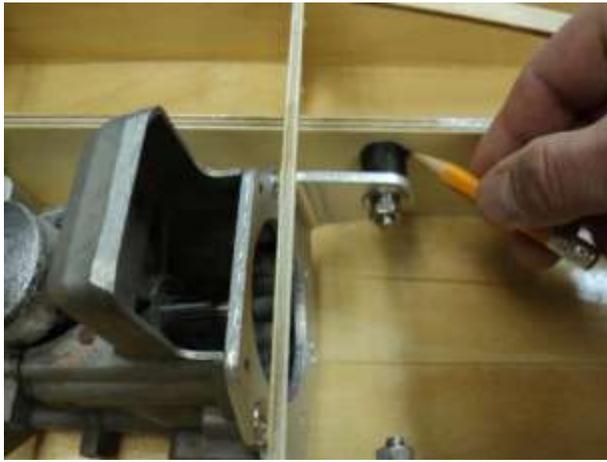
Slip the engine between the rails until the carb is centered or slightly forward in the slot in the right rail.

Place a 1/8 ply scrap under the engine as a spacer. The engine can be no closer than 1/8 inch to the bottom.

Aim the engine towards the hole in bulkhead 3.

Use a 1/4 inch drill bit or long bolt to align the engine to the hull.

Push the rod from the bottom, through the slot and hole in bulkhead 3, and into the collet.



Engine mounts being marked. Note that the top of bulkhead 2 is still in place.

With a pencil, mark around the rubber isolator as far as you can. Do this for both sides.

Remove the engine and mark the center by holding a flat washer in place and marking the center holes.



Center hole marked.



Outline of rubber isolator.

Drill the two holes with your right angle drill.

Put the engine back in, and loosely bolt the rear in place.

Push your 1/4 inch bit back up through into the collet. Mark the front holes.



Washer being used to mark center hole.

Remove the engine and drill the two front mounting holes.



Right angle drill attachment from Harbor Freight.

Bolt the engine in place, with the 1/4 inch rod in the collet.  
Try to slip a piece of 9/32 brass tubing over the rod, up to the collet.

If that fits without interference, slip a piece of 5/16 brass tubing over that, if that slips on, slide the 11/32 brass stuffing tube over that. You should have to sand a little to get the tubes to fit.

When you can slide the 11/32 tube over the others without moving anything, its time to glue the stuffing tube.



Stuffing tube in place.

The stuffing tube is a piece of 11/32 brass tubing about 3-1/2 inches long.

Rough up the outside of the tube with coarse sandpaper.

Slip the tube onto the 5/16 tube, until it is within 1/4 inch of the collet.  
Tape around the bottom of the tube, so that no epoxy can seep out.



11/32 by 3-1/2 stuffing tube in place.  
Note epoxy in front of bulkhead 3.

When happy with the tape job, flip the hull upright, and set it on small boxes or a boat stand, as the stuffing tube is now sticking down.

Mix up about a 1/4 ounce of 30 minute epoxy, and mix a little filler in, such as micro balloons or silica.  
Just thicken to about mustard consistency.

Apply this under, around, behind and on top of the stuffing tube to hull joint.



Bottom of hull taped around stuffing tube.



Stuffing tube epoxied in place.



View of radio box cutout.

Try to be neat, and put some on the engine side of bulkhead 3.

Don't move anything for at least two hours.

Sand the hull bottom where the radio box will go. This will be between bulkheads 3 and 4, on the right side.

We recommend cutting the corner off of the radio box for stuffing tube clearance. This will allow the radio box to be mounted closer to the center, making the job of taping the lid in place much easier.

Measure about 1 inch up, and about 3 inches back and cut the left front corner off the radio box.

Sand this flat and glue the piece of included 1/16 ply over the hole and sand flush.

Seal this with finishing resin.

When cured, put a second coat of resin on the radio box. You don't need to seal the bottom of the radio box.

Use any leftover resin to seal the deck bottoms if they don't have 2 coats on them.

You can also seal the top and bottom of the cowl deck as well.

Using 30 minute epoxy, glue the radio



Cutout sheeted with 1/16 ply in kit.



Radio box glued in place over stuffing tube.



Marking 2-3/4 inches to the left...

box to the bottom.  
Center the radio box, front to rear  
between bulkheads 3 and 4.

Mount the radio box so that the right  
side is just below the left edge of the  
deck support strip.

If you mount it further to the right, taping  
the lid on will be tougher, and further to  
the left will get the radio box too close to  
the exhaust.

Let cure at least two hours.

## Hardware

Draw a center line on the transom, top  
to bottom. Draw a parallel line 2-3/4  
to the **left** of the center line.

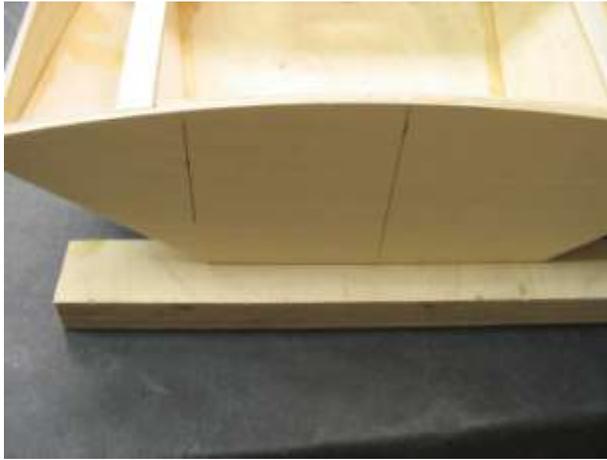
Assemble your strut to the bracket, and  
adjust the strut so that it is all the way up  
in the bracket.

Hold the strut on the transom so that it is  
about 3/4 inch off the bottom, align it to  
the center line and mark one hole.

Drill this hole and bolt the strut to the  
transom with this one screw and nut.

Align the strut to the center line and  
tighten the screw.

Take a step back and eyeball the strut to  
make sure it, and your center line are



Strut and rudder centerlines.



Rudder and strut mounted.



Annealing shaft tube for easier bending. Just heat until color changes.

straight. If all looks good, mark and drill the other 3 holes.

Mount the rudder on the left side of the transom, aligning it to the line you drew earlier. Mount it the same way, eyeballing it before you drill the last 3 holes.

The rudder should extend at least 2 inches below the strut.

Mark and drill the hole for the rudder pushrod in the transom. Because it is so long, we used a ¼ inch carbon tube and “4-40” pushrod material for our rudder pushrod.

We used a solder clevis at the servo end, and a 4-40 ball link at the rudder end.

Remove the rudder.

Adjust the strut so that the bottom of the transom is 1 inch off the bottom. The shaft center of the strut should be 1 inch from the hull bottom. Tighten the strut.

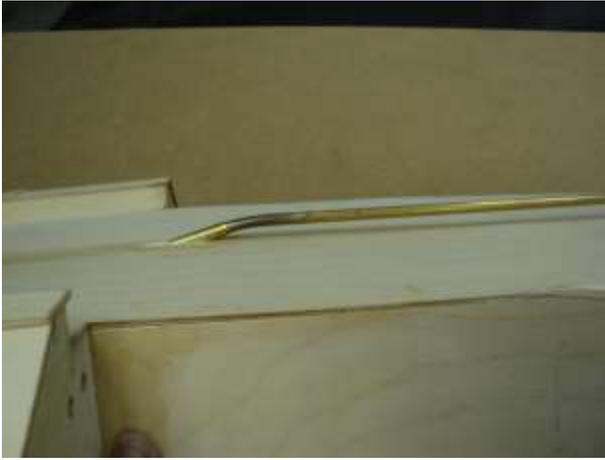
Install the engine, and make the shaft tube from a piece of 5/16 brass tubing.

Slip the 36 Inch long shaft tube into the stuffing tube until it hits the collet.

Mark the outside of the tube where the stuffing tube ends.

Remove the shaft tube and heat the area around the mark with a torch, until it changes color. This will anneal the brass tubing, making it soft, and easy to bend.

Only heat an area about 1 inch on either side of your mark.



Shaft tube with smooth bend.



Measuring depth of shaft tube in strut.



Shaft tube installed.

After it cools, carefully bend the tube at your mark.

Slip the tube back in to the stuffing tube and continue to bend it to meet the strut. You want one smooth bend, then a parallel run to the strut.

Hold the tubing next to the strut and mark where the front of the strut will be.

Remove the strut from the transom.

Slip the strut onto the 5/16 tubing and Mark the front of the strut on the tubing. Remove the strut and measure how far the tubing goes into the strut. The Zipp strut is about 7/8 inch.

Cut the tubing behind your forward mark by this amount, so that with the strut mounted, the tubing will be fully seated in the strut.

Deburr the end of the shaft tube, and slip the strut onto the tube.

Bolt the strut and shaft tube in place again.

## **Flex Shaft**

Slip your drive dog onto the flex shaft, then the prop. Adjust the drive dog so that you have about 1/2 inch of threads showing past the prop.

Tighten the drive dog set screw.

Make a mark on the shaft against the drive dog. Remove the drive dog and file or grind a flat spot for the drive dog set screw. Using your mark for reference, grind the flat spot about 1/8 inch behind this mark.



Flex shaft being measured for cut.

The flat spot should be about 1/16 to 3/32 deep.

Slip the cable into the strut and tube, being absolutely certain that the cable is all the way into the collet.

Measure the distance from the back of the strut to the front of the drive dog. Subtract 3/8 inch from this measurement.

This is the amount to cut off the front of the cable to leave a 3/8 inch drive dog to strut gap.



Proper 3/8 inch gap at strut.

As an example, if the distance from the strut to drive dog is 3-3/8 inch, you would cut 3 inches off the cable.

## Exhaust

We used a quiet pipe in our hydro, and recommend that you use a quiet pipe or effective muffler, as loud boats lose ponds!

Install the engine in the hull with the 90 degree header in place.

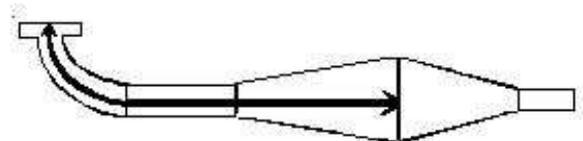
Leave the carb off, for now.

Slip the pipe onto the header and adjust it to the proper length.

The Zipp Super tuned pipe should be 13-1/2 inches from the face of the exhaust port, measured along the header and pipe center, to the maximum pipe diameter.



90 degree header in place.





Pipe mount assembled.

Assemble the pipe mount from the two 1/4 inch plywood parts as shown.

The pipe clamp bolts to this.



Pipe mounted in hull.

You will need an exhaust extension to reach the transom. We used the Zipp 2019 kit. It includes a nice exhaust outlet.



Throttle linkage in place.

## Throttle

We used the straight pushrod, vertical bell crank throttle linkage on the prototype, and prefer it.

Whatever method you use, take the time to get it right, as there is very little room. Once you are happy with the way the rudder and throttle work, remove everything.

## Turn fin



Fin mounted correctly to inside of bracket.

Assemble the turn fin to the bracket so that it is on the inside of the bracket.

If you mount the fin on the outside of the bracket, it would cause the water to lift the right sponson in the turns, as water hits the bracket.



Turn fin mounted to sponson transom.  
Rivett hydro shown.

Use the 1/4-20x3/4 socket head screws to mount the turn fin bracket to the blind nuts in the right sponson.

You may have to run a 1/4-20 tap in the blind nuts if there is epoxy in the threads from sealing the interior.

If all is well with the turn fin, remove it.

## Cowling

The cowling is made from a lite ply deck with the epoxy glass cowling glued to it.

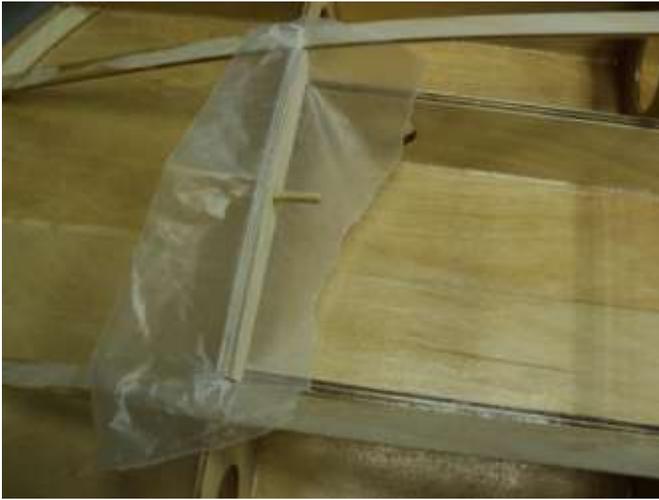
You should have already sealed one side of the cowl deck.

Glue the two halves together. Do not adjust the way the decks come together as they are designed to bow slightly when you glue them together.



Lite ply cowl deck glued together.

Use waxed paper and put the forward cowl deck former in place with its 3/16 dowel. The waxed paper will prevent the deck and former from being glued to the boat. Use small clamps inside to



Forward cowl former. Note waxed paper.

hold the former flush with bulkhead 1.

Do the same with the rear former, only use small clamps to hold it slightly above flush.

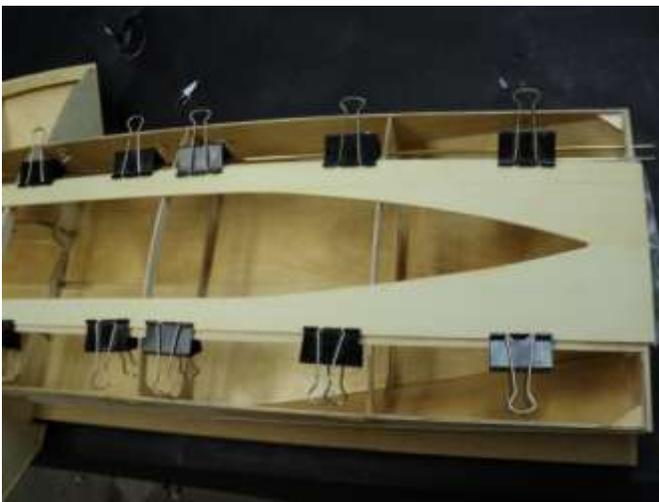


Aft cowl former. Note waxed paper and clamps.

Set the cowl deck in place and center it on the deck support strips.

If all is well, put epoxy on the front and rear deck formers and set the cowl deck in place.

Be sure that the deck is flush with bulkhead 1 and centered on the deck strips. There will be some overhang at the rear.



Cowl deck clamped in place.

Clamp the cowl deck completely along both sides and against the deck formers.

Spray the lite ply cowl deck with water to help in conform to the compound curve of the deck.

Double check that everything is in contact and allow to dry for several hours or overnight.

You can spray the lite ply deck again after a few hours if you want. It will



Note front clamps.



Epoxy glass cowling being test fit.



Cowling assembled.

help the cowl deck to conform to the compound curve of the hull.

While the deck is drying, grab the epoxy glass cowling. Wash the cowling in soap and water to remove the mold release agent.

Test fit the epoxy glass cowling to the boat.

The cowl should sit on the bulkheads and fit inside of the lite ply deck. You will have to sand the deck opening slightly.

Try to fit the cowl so that it just touches the lite ply deck, without putting pressure on it. If there is any pressure on it, the deck will distort.

Once you are happy with the fit, use medium CA or epoxy to attach the epoxy glass cowling to the lite ply deck.

Make sure that the cowl is sitting on top of the bulkheads.

When cured, sand the rear of the cowl deck flush with the transom.

Remove the clamps and remove the cowl assembly.

You must provide cowl flotation, as epoxy glass does not float. It's not a question of *if* you will lose your cowling, it's *when*...

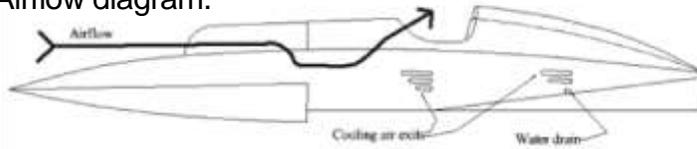
Use white polystyrene foam and 5 minute epoxy to glue it into the cowling.

You must block the air from blowing straight through the cowling, by diverting it down, and over the exhaust before it



Flotation in place. Early cowling shown.

Airflow diagram.



can exit. See page 54 for a diagram of the air flow needed.

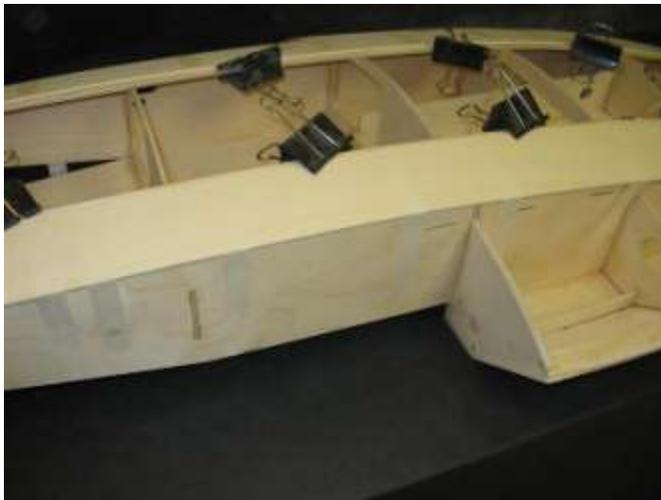
Do this with a piece of foam, sanded to conform to the inside of the cowling, just at bulkhead 3.

We will be cutting air holes in the front of the cowling, and an air exit where the “dashboard” would be.

If we didn’t have an air dam, the air would come in the front of the cowling, and sail straight through to the air exit, carrying very little heat with it. We need it to go into the front, and go around the bottom of the hull, before going up to the “dashboard”.

See page 54 for details.

## Top Deck



Tape and clamps are your friend!

The Bullitt deck is done in 5 pieces; Two deck sides, two sponson decks and one deck center.

It is important that you test fit and fully understand how the deck fits on before you epoxy.

The deck halves are attached one at a time, allowed to cure, and the center deck is attached at the front.

The cowling covers most of the open center section.

Before you glue anything, lets test fit the deck.



Ready for trimming.



Rockett sponson deck test fitted.



Deck in place after epoxy cures.

Put the cowling in place and carefully draw a line on each side of the cowling. These lines should trace the cowl on each side, marked on the deck supports.

Remove the cowling.

Using a couple of small clamps, clamp one deck to the deck support near the front and rear.

Line up the rear of the sponson with the deck, and line up the deck inside edge with the line you drew on the deck support.

When the deck is lined up correctly, add clamps along the deck support. Clamp the nose as well.

Use masking tape, tape the rear portion of the deck down. Tape at the transom too.

Continue taping the front portion.

Make sure that the inside edge of the deck matches your line on the deck support.

If all looks well, make an alignment mark on the deck and deck support. This will make it easier to line up the deck when you are gluing it in place.

Remove the tape and clamps.

For the deck installation, make sure that the hull is sitting on your flat work surface, and the rear is sitting on a  $\frac{3}{4}$  inch gluing block. If the hull is twisted, the deck installation will lock it in that position. Weight the hull down so that it remains straight.

You will need a small glue brush and a credit card or piece of thin plastic or wood for the next steps.

Mix about 1/2 ounce of epoxy finishing resin.



Be sure that rear edge of deck is glued.

Use your brush to coat all areas that this deck will touch. Work quickly.

As soon as everything is ready, start clamping and taping the deck as before. Use your alignment mark to save time.

Tape the crap out of the deck, make sure it is completely attached, and repeat the procedure on the other side.

Make sure the hull stays weighted on the bench until the deck center is done.

Glue the sponson decks on the same way. You may find it easier to bend these decks if you soak them in water first. If you do, let them dry while clamped and taped to the sponson. When dry, they will conform to the sponson shape and be easy to glue.

Don't forget to seal the bottom of the deck before gluing it on.

Once all decks are cured, fit and glue in the deck center with 30 minute epoxy. Seal the underside with epoxy as well. The deck center should be flush with the back of bulkhead 1.

Tape tightly in place. Let sit for at least 2 hours.

You can cut the top of all bulkheads (2, 3, 4 and 5) off at this point. Sand and seal the cut areas.



## Finishing

Sand the entire hull with 80.

Fill any dings, dents, craters, valleys or chips with wood filler.

When dry, sand again with 180. Check to make sure that all imperfections are filled.

If not, fill and sand again.

Spend a little time getting this right, as it will make your boat look so much better when done.

Blow off the hull with compressed air, or use a vacuum to get the dust off.



Mix about 1 ounce of finishing resin.

Use a credit card to spread out the resin on the top and sides.

Squeegee as much as you can. Get a thin even coat of resin on all areas.

Use a small acid brush to get the edges. Scrape as much resin as possible. You just want to wet the wood with resin, any excess will just have to be sanded off later.

This first coat is easy, as the wood will darken as it gets wetted with resin.

The second coat will be a little more challenging, but will use far less resin and be faster to cover.

When you are sure that all areas on the top and sides are covered, let it cure overnight.



When cured, sand lightly with 80. Just make it smooth. It's ok if you sand through the resin on this coat.

When done, blow the dust off and do the bottom.

When the bottom is cured, sand with 80.



Repeat the whole thing for the second coat, only this time, after the second coat has cured, sand with 220 wet. Sand with a bucket of water, a dribbling hose or in your bathtub. Use one of those rubber sanding blocks. Don't worry about the hull, it's waterproof now... Sand the inside of the hull too.

Sand until all areas are smooth, but don't sand through to the wood. If you do, you have to re-coat the area with resin, and re-sand.



Once the hull is dry, wipe it down with alcohol. Use a tack cloth lightly to remove any dust. Spray a light coat of primer, inside and out. Let this flash for a few minutes, and spray a heavy coat on. Let sit overnight.



When the primer is dry, use spot putty to fill any nicks or surface imperfections. When dry, wet sand with 400 on the rubber block. If you are happy with the surface, spray on another medium coat of primer.

When dry, wet sand with 600 or 800.

Use compressed air or a vacuum to remove the dust on the inside and outside of the hull. Wipe down the entire boat with alcohol. Use a tack cloth to lightly wipe all surfaces.

Spray your color coats. When cured, wet sand with 800+ and clear coat the entire hull. Make sure the clear is completely cured before final assembly.

Apply your decals.

Wipe the area with alcohol, allow to dry. Remove the backing from the decal. If you have trouble removing the backing, press or squeegee it firmly, and try again.

Align the decal and press firmly to surface. Roll or squeegee in place. Remove transfer sheet from top of decal.



Final assembly

Before you bolt anything to the hull, give it a good coat of paste wax.

Put the boat on your stand. This is where it will live, when it's not in the water.

Sharpen the turn fin. Using a file (or grinder) and 220 grit paper, sharpen the right side of the turn fin only.

The front and bottom should be sharp, and the back flat.

Put the turn fin in its mount, and bolt it onto the sponson with the 1/4-20 screws, into the blind nuts.

Install the engine.  
Install the servos.

Install the shaft tube.

Install the strut, pushing the end of the shaft tube all the way in. Leave the strut loose in the brackets.

Put the boat on a flat surface. You can hang the turn fin over the side of the table.

Block up the transom 1 inch from the table.



Push the strut to the table so that it is flat on the table while the transom is 1 inch off the surface.  
Tighten the strut in the brackets.

Install the rudder assembly

Install the flex shaft.

Install the fuel bag and fuel lines. Place foam rubber under the tank, and use a few rubber bands to hold the tank in place.

Install the bulkhead fittings and water outlets.

Install exhaust or tuned pipe.

Install water lines.

Push the threaded end of the rudder and throttle pushrods through the big end of the pushrod seals.

Attach both ends of the pushrods, making sure the seals are on the outside of the radio box.

Use Goop or CA to glue the pushrod seals to the outside of the radio box.

Make sure the seals are centered on the pushrod holes. Allow to dry.

You can also use our 3422 pro seals for a secure, no glue installation.

Install your antenna.



## Setup

Grease the flex cable.

Slide the cable through the strut, into the engine collet.

Leave a 3/8 inch gap between the drive dog and strut.

Tighten the collet.

Wrap your receiver, failsafe and battery pack in foam rubber.



Roger Newton with the Rivett Prototype in 2005.



Mount the switch.

Turn the transmitter on first, then the receiver.

Make sure the trims are centered.

Put the rudder servo arm on. It should be parallel with the servo, and 90 degrees to the pushrod. Use the sub trim function, if your radio has it. If not, get it as close as you can.

Attach the rudder to the pushrod. Is the rudder straight? If not, adjust the clevis or ball link until it is.

Be sure to put the screw in the servo arm...

Adjust the throttle so that the carb is wide open when you pull the trigger all the way back, and closed when you push the trigger forward.

When the engine is running, you can use the throttle trim to set the idle speed.

Take the time to get this right. It's no fun running your boat onto the shore because the engine won't shut off...

Make sure all your water lines are firmly attached. Use those teeny little tie wraps at each fitting.

## Center of Gravity

The CG is very important.

The CG is at bulkhead 3.

Check the CG with everything installed and no fuel in the tank.

To check the CG, pick the boat up with one finger on each side of bulkhead 3.

You want the boat to balance level at bulkhead 3 or slightly nose down. This is critical. If the CG is any farther

back, the boat will blow off the water at high speeds, as well as “hop” in the turns.



## Running

If you are using a new engine, you should run it on the stand before going to the pond.

This will do several things; It will allow the engine to loosen up a little, making starting a simple matter, as well as get YOU familiar with its starting and running characteristics.

When new, the engines are very tight, and starting is difficult at best. Under no circumstances should you ever run a marine engine for an extended time without cooling water.

If you are going to run the boat on the stand, take the prop off, but leave the shaft connected to the engine. This will help to “break in” the strut bushings.

## At the pond

Make sure your transmitter and receiver batteries are fresh, or fully charged.

Do a range check with your transmitter antenna down, and note the distance. You should do a range check every day that you run. Should a problem arise, you can fix it before you damage anything. Tape the lid on the radio box with radio box tape, or use Scotch Plastic Tape. Regular tape leaves a residue.

Make sure that your prop is sharp and balanced.  
Make sure all screws and nuts are tight.

Fill the tank; turn on your transmitter, then receiver.

Wiggle the rudder so you know it works, and then start the engine.

Don't rev the engine much, as there is no load on the prop until it's in the water.

To launch, have a helper toss the boat in level.

You can give it a little gas as it gets to the water, but not too much. Most people don't like getting sprayed with water...

Let the engine warm up for 30 seconds or so before giving it full throttle.

Drive past yourself, and make sure you have a stream of cooling water.

If you don't see any, bring it in pronto!

If all looks good, hit it!

Notice how the boat rides in the straights. Does it lean or pull to one side?

Is the deck and transom level?

How about the turns? Does the transom rise or fall in the turns? Does it slide or hook?

It's a good idea to have a helper write down your comments as you run the boat. After the run, you can use the included "Hydro Tuning Tools" sheet to help you sort out any problems.

We appreciate you buying this kit and hope that you enjoy it as much as we do!

If you need any help with any aspect of this kit, please contact us via email or phone.

[support@zipkits.com](mailto:support@zipkits.com)

**Toll Free (866) 922-9477**

## Troubleshooting

|                                      |  |
|--------------------------------------|--|
| Boat bounces in the straights-       | Strut too high<br>CG too far back<br>Speed too slow                                  |
| Boat blows over at high speed-       | CG too far back<br>Strut too high  |
| Boat “plows”-                        | CG too far forward<br>Strut too low<br>Strut too negative                            |
| Boat is very “light” and unstable-   | Strut too high<br>CG too far back  |
| Boat needs left trim to go straight- | Prop walk<br>Prop walk<br>Prop walk<br>Turn fin not aligned correctly<br>Prop walk   |
| Boat slides too much in turns-       | Turn fin bent<br>Turn fin too small<br>Turn fin fell off!                            |
| Boat hooks in turns-                 | CG too far back<br>Turn fin too big (unlikely)<br>Lateral (side to side) balance off |
| Boat “dances” in the straights       | Pretty cool, huh?  |
| Boat “hops”                          | CG too far back or too much lift in prop   |
| Boat is slow and won’t turn-         | <b>Get a Zippkits boat!</b>  |

## Tuning notes

The Bullitt is just like any 3 point hydro, as far as tuning and adjustment. There are a few things that you should know when you are tuning your boat for maximum performance.

The most important thing is to understand blow overs. Blow overs can only occur if the angle of attack gets positive. Angle of attack is the angle that the boat hull strikes the air. Since the bottoms of our hydros are flat, we use that for a reference point.

When setting up the boat on the bench, the 1 inch measurement is a starting point. The goal is to get the hull to ride level, or just a teeny bit tail high at full speed. If you have to push the strut down to 1 inch, or 3 inches to get the boat level, do it!

This will change with different props, so strut adjustments are usually necessary with prop changes. Remember that the goal is always to keep the angle of attack no higher than zero, period.

The turn fin can have a strong influence on angle of attack if it is not aligned properly.

Also note that this hull is designed to turn right. Left corrections can be made at full throttle, but due to prop rotation, left turns are not pretty.

Remember that if you don't allow the nose to come up, the chance of blowing over is greatly reduced.

Be aware of wind conditions and always watch the nose of the boat. If it starts to rise, let off the throttle slightly to settle it.

The Bullitt does not warn you before it blows over, so you must watch the nose, especially when running into the wind.

